Oracle® AI Database

Data Guard Broker Concepts

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Preface

This document provides information about Oracle Data Guard broker, a management and monitoring interface that helps you configure, monitor, and control an Oracle Data Guard broker configuration.

Audience

Oracle Data Guard Broker is intended for database administrators (DBAs) and system administrators who want to use the Oracle Data Guard broker to automate many of the tasks involved in configuring and monitoring an Oracle Data Guard configuration.

The information presented in this book assumes that you are already familiar with Oracle Data Guard, Oracle Enterprise Manager Cloud Control (Cloud Control), Oracle Real Application Clusters (Oracle RAC), and the network services provided by Oracle Net Services.

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.

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Related Documents

Refer to the following documentation for more information about Oracle Data Guard:

- *Oracle Data Guard Concepts and Administration*.
- Oracle release notes specific to your operating system.
- Oracle installation guide specific to your operating system.
- For more information about managing Oracle Data Guard through the Cloud Control graphical user interface (GUI), see the Cloud Control online Help.

Conventions

The following text conventions are used in this document:

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Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
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.

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1

Oracle Data Guard Broker Concepts

Learn about Oracle Data Guard broker, its architecture and components, and how it automates the creation, control, and monitoring of an Oracle Data Guard configuration.

- Overview of Oracle Data Guard and the Broker
- Benefits of Oracle Data Guard Broker
- Oracle Data Guard Broker Components
- Oracle Data Guard Broker User Interfaces
- Oracle Data Guard Monitor

See *Oracle Data Guard Concepts and Administration* for the definition of an Oracle Data Guard configuration and for complete information about Oracle Data Guard concepts and terminology.

> **Note**
>
> A multitenant container database is the only supported architecture in Oracle Database 21c and later releases. While the documentation is being revised, legacy terminology may persist. In most cases, "database" and "non-CDB" refer to a CDB or PDB, depending on context. In some contexts, such as upgrades, "non-CDB" refers to a non-CDB from a previous release.

Changes in Oracle AI Database Release 26ai for Oracle Data Guard Broker

These are the changes in *Oracle Data Guard Broker* for Oracle AI Database Release 26ai.

New Features

- Support up to 4 observers.
- Set preferred observers based on current primary database (affinitizes a set of observers to the current primary).
- Automatic Temp File Creation on Standby database.
- New `VALIDATE DATABASE STRICT` command
- New fixed views for getting broker info:
  - `V$FAST_START_FAILOVER_CONFIG`
  - `V$DG_BROKER_PROPERTY`
  - `V$DG_BROKER_ROLE_CHANGE`
  - `V$FS_LAG_HISTOGRAM`
- New DGMGRL CLI Commands:

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  - DGMGRL CLI command `VALIDATE DGConnectIdentifier`
  - DGMGRL CLI command `EDIT ALL MEMBERS [SET|RESET] PROPERTY`
  - DGMGRL CLI command `EDIT ALL MEMBERS [SET|RESET] PARAMETER`
  - DGMGRL CLI command `SHOW ALL MEMBERS` (Property)
  - DGMGRL CLI command `SHOW ALL MEMBERS PARAMETER`
- PL/SQL APIs in DBMS_DG to create and manage a DG Broker Configuration.
- New Broker properties:
  - `FastStartFailoverLagType`
  - `FastStartFailoverLagGraceTime`

Changes in Oracle Database Release 21c for Oracle Data Guard Broker

These are the changes in *Oracle Data Guard Broker* for Oracle Database Release 21c.

New Features

- Oracle Data Guard Broker supports Data Guard for Pluggable Databases.
- Starting with Oracle Database 21c Release Update July 2022 (21.7), Oracle Data Guard can protect the database at the pluggable database level (DGPDB). Each pluggable database can individually switch over or fail over without the need for a role change for the whole container database. The standby PDBs are in another primary database, referred to as a target database
- Misconfigurations in a fast-start failover configuration can be identified by validating the configuration using the `VALIDATE FAST_START FAILOVER` command. See VALIDATE FAST_START FAILOVER.
- A default directory, managed by Data Guard broker, is used to store the observer runtime data file, observer files, and callout configuration files. See Location of Client-side Broker Files.
- Callout configuration scripts can be used to automatically execute specified tasks before and after a fast-start failover operation. See Fast-start Failover Callout Configuration Files.
- When no synchronous standby destinations are available, a standby that uses asynchronous redo transport can be used as a fast-start failover target provided the `FastStartFailoverLagLimit` configuration property is set. When a synchronous standby becomes available, the broker automatically switches back to the synchronous standby.
- Fast-start failover can be enabled in maximum availability mode for configurations with a `FAR SYNC` instance, even if the primary database has no synchronous standby databases.
- The syntax for the `START OBSERVER`, `START OBSERVER IN BACKGROUND`, and `STARTUP` commands contain changes that allow more flexibility in specifying command options. See START OBSERVER, START OBSERVER IN BACKGROUND, and STARTUP.
- The `PreferredObserverHosts` database configurable property has changed to allow the user to specify which observer should observe the configuration when a database is in the primary role. The user can also assign priorities to the observer.
- The maximum number of observers in a Data Guard Broker configuration is increased to four.

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- The `CREATE FAR_SYNC` command instantiates a far sync instance and adds it to the broker configuration. See CREATE FAR_SYNC.
- The `PREPARE DATABASE FOR DATA GUARD` command configures a database and sets it up to be used as a primary database in a Data Guard broker configuration. See PREPARE DATABASE FOR DATA GUARD.

Desupported Features

- The following parameters that were deprecated in Oracle Database Release 19c are desupported: `ArchiveLagTarget`, `DataGuardSyncLatency`, `LogArchiveMaxProcesses`, `LogArchiveMinSucceedDest`, `LogArchiveTrace`, `StandbyFileManagement`, `DbFileNameConvert`, `LogArchiveFormat`, `LogFileNameConvert`, `LsbyMaxEventsRecorded`, `LsbyMaxServers`, `LsbyMaxSga`, `LsbyPreserveCommitOrder`, `LsbyRecordAppliedDdl`, `LsbyRecordSkipDdl`, `LsbyRecordSkipErrors`, and `LsbyParameters`.
- Logical standby databases

  New data types added after Oracle Database 12c Release 1 (12.1) are not supported with Oracle Data Guard logical standby. For example, Oracle Data Guard logical standby does not support long identifiers, complex Abstract Data Types (ADTs), and spatial data types. Note that this limitation does not exist with an Oracle Data Guard physical standby database, `DBMS_ROLLING`, or Oracle GoldenGate. To obtain the benefits of a standby database with more recent data types, Oracle recommends that you consider using either a physical standby database, a snapshot standby database, or that you use the logical replication features of Oracle GoldenGate.

Overview of Oracle Data Guard and the Broker

Oracle Data Guard ensures high availability, data protection, and disaster recovery for enterprise data. Oracle Data Guard provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases to enable production Oracle databases to survive disasters and data corruptions. Oracle Data Guard maintains these standby databases as transactionally consistent copies of the primary database. If the primary database becomes unavailable because of a planned or an unplanned outage, Oracle Data Guard enables you to switch any standby database to the production role, thus minimizing the downtime associated with the outage. Oracle Data Guard can be used with traditional backup, recovery, and cluster techniques, as well as with the Flashback Database feature to provide a high level of data protection and data availability.

Oracle Data Guard Configurations and Broker Configurations

An *Oracle Data Guard configuration* consists of one primary database and a combination of standby databases, far sync instances, and Zero Data Loss Recovery Appliances that receive redo directly from the primary database. The members of an Oracle Data Guard configuration are connected by Oracle Net and may be dispersed geographically. There are no restrictions on where the members are located as long as they can communicate with each other.
The Oracle Data Guard broker logically groups these members into a *broker configuration* that allows the broker to manage and monitor them together as an integrated unit. You can manage a broker configuration using either Oracle Enterprise Manager Cloud Control (Cloud Control) or the Oracle Data Guard command-line interface.

Oracle Data Guard Broker

The Oracle Data Guard broker is a distributed management framework that automates and centralizes the creation, maintenance, and monitoring of Oracle Data Guard configurations.

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The following list describes some of the operations the broker automates and simplifies:

- Creating Oracle Data Guard configurations that include one primary database and zero or more standbys (physical, logical, or snapshot), far sync instances, and Zero Data Loss Recovery Appliances along with any associated redo transport services and log apply services.
- Creating Oracle Data Guard for Pluggable Databases configurations that provides Data Guard level protection at the pluggable database level.
- Adding standbys (physical, logical, or snapshot), far sync instances, and Zero Data Loss Recovery Appliances to an existing Data Guard configuration.
- Managing the protection mode for the configuration.
- Invoking switchover or failover with a single command to initiate and control complex role changes across all databases in the configuration.
- Configuring failover to occur automatically upon loss of the primary database, increasing availability without manual intervention.
- Monitoring the status of the entire configuration, capturing diagnostic information, reporting statistics such as the Redo Apply rate and the redo generation rate, and detecting problems quickly with centralized monitoring, testing, and performance tools.
- Assessing whether a database is ready to become a primary. (See "VALIDATE DATABASE").
- Assessing whether the network is properly configured between databases. (See VALIDATE NETWORK CONFIGURATION.)
- Assessing whether the specified connect identifier value for the `DGConnectIdentifier` property of a database is properly configured and that it conforms to best practice recommendations for Data Guard usage. (See "VALIDATE DGConnectIdentifier") (See VALIDATE DGConnectIdentifier.)

You can perform all management operations locally or remotely through the broker's easy-to-use interfaces: the Oracle Data Guard management pages in Cloud Control, and the Oracle Data Guard command-line interface called DGMGRL.

These interfaces simplify the configuration and management of an Oracle Data Guard configuration. The following table provides a comparison of configuration management using the broker's interfaces and using SQL*Plus.

Table 1-1 Configuration Management With and Without the Broker

Tasks	With the Broker	Without the Broker
General	Provides primary database, standby database, and far sync instance management as one unified configuration.	You must manage the primary database, standby databases, and far sync instances separately.
Standby Database Creation	Provides Cloud Control wizards that automate and simplify the steps required to create a configuration with an Oracle database on each site, including creating the standby control file, online redo log files, datafiles, and server parameter files.	You must manually (using RMAN or other tools, such as DBCA): • Create the standby. • Copy the database files to the standby database system. • Create a control file on the standby database system. • Create server parameter or initialization parameter files on the standby database system.

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Table 1-1 (Cont.) Configuration Management With and Without the Broker

Tasks	With the Broker	Without the Broker
Configuration and Management	Enables you to configure and manage multiple databases from a single location and automatically unifies all of the databases in the broker configuration.	You must manually connect to multiple locations in order to: • Set up redo transport services and log apply services on each database in the configuration. • Manage the primary database and standby databases individually.
Control	• Automatically sets up redo transport services and log apply services. Simplifies management of these services, especially in an Oracle RAC environment or for configurations that include large numbers of standby databases. • Simplifies switchovers, failovers, reinstatements, and conversions to and from a snapshot standby database, allowing you to invoke them through a single command. • Automates failover by allowing the broker to determine if failover is necessary and to initiate failover to a specified target standby database, with no need for DBA intervention and with either no loss of data or with a configurable amount of data loss. • Integrates role changes with Oracle Clusterware. • Manageable and monitorable through Cloud Control • Integrates with Oracle Global Data Services, providing support for role-specific global services.	You must manually: • Use multiple SQL statements to manage the database. • Coordinate sequences of multiple commands across multiple database sites to execute switchover and failover operations. • Coordinate sequences of multiple commands to manage services and instances during role transitions.
Monitoring	• Provides continuous monitoring of the configuration health, database health, and other runtime parameters. • Provides a unified updated status and detailed reports. • Provides integration with Cloud Control events.	You must manually: • Monitor the status and runtime parameters using fixed views on each database—there is no unified view of status for all of the databases in the configuration. • Provide a custom method for monitoring Cloud Control events.

Oracle Data Guard Broker in a Multitenant Environment

Oracle Data Guard broker supports multitenant container databases (CDBs) within a broker configuration.

Keep the following in mind:

- All broker actions execute at the root level and not at the individual pluggable database (PDB) level.
- To administer a multitenant environment you must have the `CDB_DBA` role.
- The broker also opens all PDBs on single instance databases, when the operation involved opening the instance; for example, on the new primary after a role change.

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See Also

- *Oracle Database Concepts* for more information about CDBs

Oracle Data Guard Broker and Oracle Clusterware

Oracle Data Guard broker interacts with Oracle Clusterware in the course of Data Guard broker operations when the member is configured within Clusterware. This allows for optimal availability at all members, and for appropriate role based services to be started without user intervention. During initial configuration, the Clusterware attributes of standby database members of the Oracle Data Guard broker configuration must be modified to reflect their database roles. This is a requirement only during initial configuration. The role gets updated automatically during subsequent role changes. This integration also allows for Application Continuity, with the ability to allow for sessions to drain, service notifications to be issued, and appropriate services to be started at the right member. It also caters for smooth handling of database health check conditions in the event Fast Start Failover is engaged, improving production database availability. Finally, it also allows for continued DR protection in the event of Rac One Node member relocation.

Oracle Data Guard Broker and Oracle Global Data Services

To manage broker configurations that support Oracle Global Data Services (GDS), you use both the broker command-line interface, DGMGRL, and the GDS command line interface,GDSCTL. Broker configurations are added to GDS pools (logical groupings of GDS databases which span across GDS regions).

Managing Broker Configurations in a GDS Pool

To add a broker configuration to a GDS pool, use the GDS command-line interface, GDSCTL. A broker configuration can only be added to an empty pool. A broker configuration cannot span multiple pools.

To delete a broker configuration that is in a pool, you must first remove it from the pool by using the GDSCTL `REMOVE BROKERCONFIG ...` command. Otherwise an error is returned.

Only entire broker configurations are added and removed using GDSCTL; to add and remove individual databases to/from a broker configuration, use the broker command-line interface, DGMGRL.

Managing Individual Configuration Databases When They Are Part of a GDS Pool

If a GDS pool already contains a broker configuration, then only databases that belong to that configuration can be added to the pool. The only way to add or remove individual databases to or from a broker configuration in a pool is to use the broker command-line interface, DGMGRL.

When a database is added to a broker configuration, that database is automatically also added to the GDS pool to which the configuration belongs.

When a database is removed from a broker configuration, it is automatically removed from the GDS pool to which the configuration belongs.

The broker interacts with GDS and notifies it of any role or configuration changes to ensure that the appropriate database services are active and that the appropriate FAN events are published after a role change.

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See Also

- *Oracle Database Global Data Services Concepts and Administration Guide* for more information about GDS.

Benefits of Oracle Data Guard Broker

The broker's interfaces improve usability and centralize management and monitoring of an Oracle Data Guard configuration.

Available as a feature of the Enterprise Edition and Personal Edition of the Oracle database, the broker is also integrated with the Oracle database and Cloud Control. These broker attributes result in the following benefits:

Disaster protection:

By automating many of the manual tasks required to configure and monitor an Oracle Data Guard configuration, the broker enhances the high availability, data protection, and disaster protection capabilities that are inherent in Oracle Data Guard. Access is possible through a client to any system in the Oracle Data Guard configuration, eliminating any single point of failure. If the primary database fails, the broker automates the process for any one of the standby databases to replace the primary database and take over production processing. The database availability that Oracle Data Guard provides makes it easier to protect your data.

Higher availability and scalability with Oracle Real Application Clusters (Oracle RAC) Databases:

While Oracle Data Guard broker enhances disaster protection by maintaining transactionally consistent copies of the primary database, Oracle Data Guard, configured with Oracle high availability solutions such as Oracle Real Application Clusters (Oracle RAC) databases, further enhances the availability and scalability of any given copy of that database. The *intrasite* high availability of an Oracle RAC database complements the *intersite* protection that is provided by Oracle Data Guard broker.

For example, if one instance of an Oracle RAC primary database unexpectedly fails, Oracle Clusterware attempts to recover the failed instance and keep the primary database available. From an Oracle Data Guard perspective, the primary database remains available as long as at least one instance of the clustered database continues to transport redo data to the standby databases. If Oracle Clusterware is unable to recover a failed instance, the Oracle RAC database continues to run automatically with one less active instance. If the last instance of the primary database fails, and fast-start failover is enabled, the broker can continue to provide high availability by automatically failing over to a pre-determined standby database.

The broker is integrated with Oracle Clusterware so that database role changes occur smoothly and seamlessly. This is especially apparent in the case of a planned role switchover (for example, when a physical standby database is directed to take over the primary role while the former primary database assumes the role of standby). The broker and Oracle Clusterware work together to temporarily suspend service availability on the primary database, accomplish the actual role change for both databases during which Oracle Clusterware works with the broker to properly restart the instances as necessary on the old primary database, and then start services defined on the new primary database. The broker manages the underlying Oracle Data Guard configuration and its database roles while Oracle Clusterware manages service availability that depends upon those roles. Applications that rely on Oracle Clusterware

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for managing service availability will see only a temporary suspension of service as the role change occurs in the Oracle Data Guard configuration.

Note that while Oracle Clusterware helps to maintain the availability of the individual instances of an Oracle RAC database, the broker coordinates actions that maintain one or more physical or logical copies of the database across multiple geographically dispersed locations to provide disaster protection. Together, the broker and Oracle Clusterware provide a strong foundation for Oracle's high-availability architecture.

> **See Also**
>
> *Oracle Real Application Clusters Administration and Deployment Guide* for information about Oracle Clusterware

Automated creation of an Oracle Data Guard configuration:

The broker helps you to logically define and create an Oracle Data Guard configuration. The broker automatically communicates between the members of an Oracle Data Guard configuration using Oracle Net Services. The members can be local or remote, connected by a LAN or geographically dispersed over a WAN.

Cloud Control provides a wizard that automates the complex tasks involved in creating a broker configuration, including:

- Adding an existing standby database, or a new standby database created from existing backups taken through Cloud Control
- Configuring the standby control file, server parameter file, and datafiles
- Initializing communication with the standbys
- Creating standby redo log files
- Enabling Flashback Database if you plan to use fast-start failover

Although DGMGRL cannot automatically create a new standby, you can use DGMGRL commands to configure and monitor an existing standby, including those created using Cloud Control.

Easy configuration of additional standbys:

After you create an Oracle Data Guard configuration, you can add new or existing standbys to each Oracle Data Guard configuration. Cloud Control provides an Add Standby Database wizard to guide you through the process of adding more databases.

Simplified, centralized, and extended management:

You can issue commands to manage many aspects of the broker configuration. These include:

- Simplify the management of all components of the configuration, including the primary database, standbys, far sync instances, Zero Data Loss Recovery Appliances, redo transport services, and log apply services.
- Coordinate database state transitions and update member properties dynamically, with the broker recording the changes in a broker configuration file that includes information about all the members in the configuration. The broker propagates the changes to all databases in the configuration and their server parameter files.
- Simplify the control of the configuration protection modes (to maximize protection, to maximize availability, or to maximize performance).

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- Invoke the Cloud Control verify operation to ensure that redo transport services and log apply services are configured and functioning properly.

Simplified switchover and failover operations:

The broker simplifies switchovers and failovers by allowing you to invoke them using a single key click in Cloud Control or a single command at the DGMGRL command-line interface (referred to in this documentation as *manual* failover). For *lights-out administration*, you can enable fast-start failover to allow the broker to determine if a failover is necessary and to initiate the failover to a pre-specified target standby automatically, with no need for DBA intervention. Fast-start failover can be configured to occur with no data loss or with a configurable amount of data loss.

Fast-start failover allows you to increase availability with less need for manual intervention, thereby reducing management costs. Manual failover gives you control over exactly when a failover occurs and to which target standby. Regardless of the method you choose, the broker coordinates the role transition on all databases in the configuration. Once failover is complete, the broker publishes a Fast Application Notification (FAN) event to notify applications that the new primary is available.

Note that you can use the `DBMS_DG` PL/SQL package to enable an application to initiate a fast-start failover when it encounters specific conditions. See Application Initiated Fast-Start Failover for more information.

Only one command is required to initiate complex role changes for switchover or failover operations across all databases in the configuration. The broker automates switchover and failover to a specified standby database in the broker configuration. Cloud Control enables you to select a new primary database from a set of viable standby databases (enabled and running, with normal status). The DGMGRL `SWITCHOVER` and `FAILOVER` commands only require you to specify the target standby database before automatically initiating and completing the many steps in switchover or failover operations across the multiple databases in the configuration.

Built-in monitoring and alert and control mechanisms:

The broker provides built-in validation that monitors the *health* of all of the databases in the configuration. While connected to any database in the configuration, you can capture diagnostic information and detect obvious and subtle problems quickly with centralized monitoring, testing, and performance tools. Both Cloud Control and DGMGRL retrieve a complete configuration view of the progress of redo transport services on the primary database and the progress of Redo Apply or SQL Apply on the standby database.

The ability to monitor local and remote databases and respond to events is significantly enhanced by the broker's health check mechanism and tight integration with the Cloud Control event management system.

Transparent to application:

Use of the broker is possible for any database because the broker works transparently with applications; no application code changes are required to accommodate a configuration that you manage with the broker.

Oracle Data Guard Broker Components

These are the components that make up Oracle Data Guard broker.

- Oracle Enterprise Manager Cloud Control

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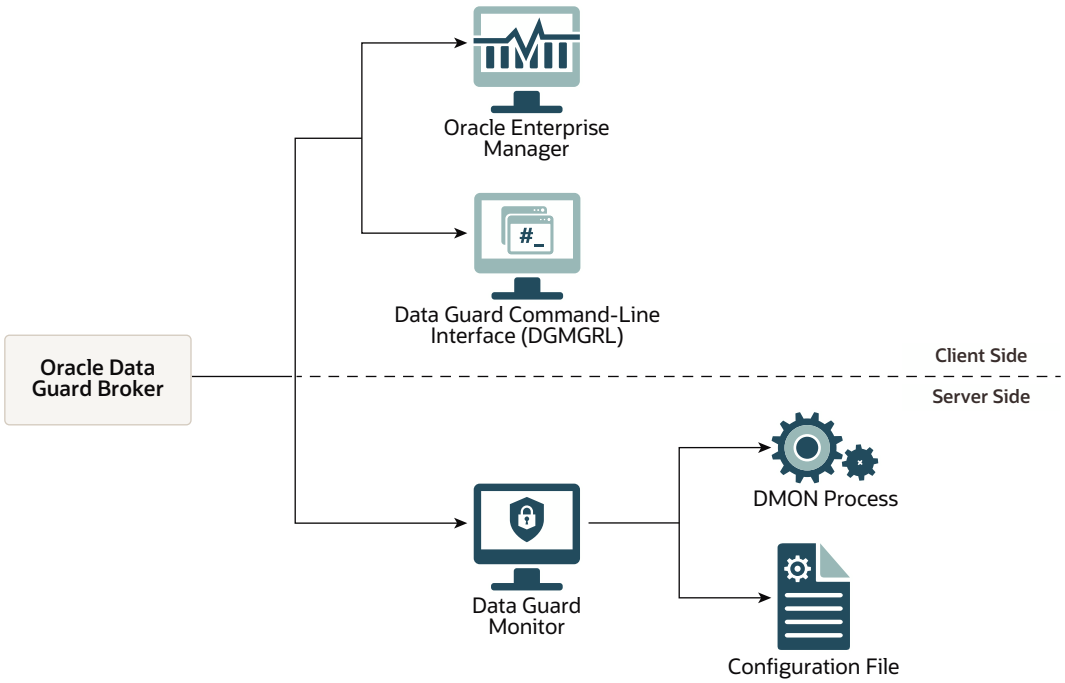
- Oracle Data Guard Command-Line Interface (DGMGRL)
- Oracle Data Guard Monitor

Cloud Control and the Oracle Data Guard command-line interface (DGMGRL) are the broker client interfaces that help you define and manage a configuration consisting of a collection of primary and standby databases, far sync instances, and Zero Data Loss Recovery Appliances. DGMGRL also includes commands to create **observer** processes for fast-start failover.

The Oracle Data Guard monitor is the broker server-side component that is integrated with the Oracle database. The Oracle Data Guard monitor is composed of several processes, including the DMON process, and broker configuration files that allow you to control the databases of that configuration, modify their behavior at runtime, monitor the overall health of the configuration, and provide notification of other operational characteristics.

Figure 1-1 shows these components of the broker.

Figure 1-1 Oracle Data Guard Broker



Oracle Data Guard Broker User Interfaces

You can use either of the broker's user interfaces to create a broker configuration and to control and monitor the configuration.

The following sections describe the broker's user interfaces:

- Oracle Enterprise Manager Cloud Control
- Oracle Data Guard Command-Line Interface (DGMGRL)

Oracle Enterprise Manager Cloud Control

Oracle Enterprise Manager Cloud Control (Cloud Control) works with the Oracle Data Guard monitor to automate and simplify the management of an Oracle Data Guard configuration.

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With Cloud Control, the complex operations of creating and managing standby databases are simplified through Oracle Data Guard management pages and wizards, including:

- An Add Standby Database wizard that helps you to create a broker configuration, if one does not already exist, having a primary database and a local or remote standby database. The wizard can create a physical, snapshot, or logical standby database or import an existing physical, snapshot, or logical (Oracle RAC or non-Oracle RAC) standby database. If the wizard creates a physical, snapshot, or logical standby database, the wizard also automates the creation of the standby control file, server parameter file, online and standby redo log files, and the standby datafiles.
- A switchover operation that helps you switch roles between the primary database and a standby database.
- A failover operation that changes one of the standby databases to the role of a primary database.
- Performance tools and graphs that help you monitor and tune redo transport services and log apply services.
- Property pages that allow you to set database properties on any database and, if applicable, the settings are immediately propagated to all other databases and server parameter files in the configuration.
- Event reporting through e-mail.

In addition, it makes all Oracle Net Services configuration changes necessary to support redo transport services and log apply services.

See Also

My Oracle Support note 787461.1 at https://support.oracle.com for information about which versions of Cloud Control are required to manage the full set of Oracle Data Guard features in various Oracle Database releases

Oracle Data Guard Command-Line Interface (DGMGRL)

The Oracle Data Guard command-line interface (DGMGRL) enables you to control and monitor an Oracle Data Guard configuration from the DGMGRL prompt or within scripts.

You can perform most of the activities required to manage and monitor the databases in the configuration using DGMGRL commands.

DGMGRL also includes commands to create observer processes that continuously monitor the primary and target standby databases and evaluate whether failover is necessary, and then initiate a fast-start failover when conditions warrant.

See Also

Oracle Data Guard Command-Line Interface Reference for complete reference information for the Oracle Data Guard command-line interface.

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Oracle Data Guard DBMS_DG API

The Oracle DBMS_DG PL/SQL APIs enable you to control and monitor an Oracle Data Guard configuration from within scripts or batch programs.

You can perform many of the activities required to manage and monitor the databases in the configuration using DBMS_DG PL/SQL APIs.

The DBMS_DG PL/SQL APIs can be used to create and manage broker configurations. In addition, there is also functionality to allow applications to notify the primary database or the fast-start failover target database in an Oracle Data Guard broker environment to initiate a fast-start failover when the application encounters a condition that warrants a failover.

Please see the DBMS_DG API Reference section for complete reference information for the Oracle Data Guard DBMS_DG APIs.

Oracle Data Guard Broker Views

Fixed views provide the means to view and monitor Oracle Data Guard broker configurations, members, and performance.

You can perform many of the activities required to manage and monitor the databases in the configuration using Oracle fixed views.

The following views can be used to monitor Oracle Data Guard processes and Broker Properties:

- `V$DG_BROKER_CONFIG`
  Use this view to monitor Oracle Data Guard Broker properties. It provides a view of the entire Oracle Data Guard broker configuration from any database in the configuration. For more information see Monitoring Oracle Data Guard Broker Properties
- `V$DG_BROKER_PROPERTY`
  This is a new view introduced in Oracle AI Database 26ai to further aid in monitoring Data Guard Broker properties. For more information see Monitoring Oracle Data Guard Broker Properties
- `V$DG_BROKER_ROLE_CHANGE`
  This view displays information about the past role changes across a Data Guard broker configuration. The role change history is maintained in the configuration metadata. It keeps up to 10 records of the latest role changes. For more information see *Oracle Database Reference*

Viewing Fast-Start Failover Configuration Statistics and Status:

- `V$FAST_START_FAILOVER_CONFIG`
  Query this view on the primary database to display statistics about the fast-start failover configuration. For more information please see: *Oracle Database Reference*
- `V$FS_FAILOVER_STATS`
  This view has been deprecated in Oracle AI Database 26ai. Please see the V$DG_BROKER_ROLE_CHANGE view: *Oracle Database Reference*

Viewing Information About All Observers:

- `V$FS_FAILOVER_OBSERVERS`
  This view shows detailed information about all observers. For more information see: *Oracle Database Reference*
- `V$FS_OBSERVER_HISTOGRAM`

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This view displays statistics that are based on the frequency of successful pings between the observer and primary database for different time intervals. See *Oracle Database Reference* for a description of the `V$FS_OBSERVER_HISTOGRAM` view.

Oracle Data Guard Monitor

The configuration, control, and monitoring functions of the broker are implemented by server-side software and configuration files that are maintained for each database that the broker manages.

The software is called the Oracle Data Guard monitor. The following topics describe how the Oracle Data Guard monitor interacts with the Oracle database and with remote Oracle Data Guard monitors to manage the broker configuration.

Oracle Data Guard Monitor (DMON) Process

The Oracle Data Guard monitor process (DMON) is an Oracle background process that runs on every database instance that is managed by the broker.

When you start the Oracle Data Guard broker, a DMON process is created.

> **See Also**
>
> Starting the Data Guard Broker for information on starting the broker

Whether you use Cloud Control or DGMGRL to manage a database, the DMON process is the server-side component that interacts with the local database and the DMON processes of the other databases to perform the requested function. The DMON process is also responsible for monitoring the health of the broker configuration and for ensuring that every database has a consistent description of the configuration.

Figure 1-2 shows the broker's DMON process as one of several background processes that constitute an instance of the Oracle database. Each database instance shown in the figure has its own DMON process.

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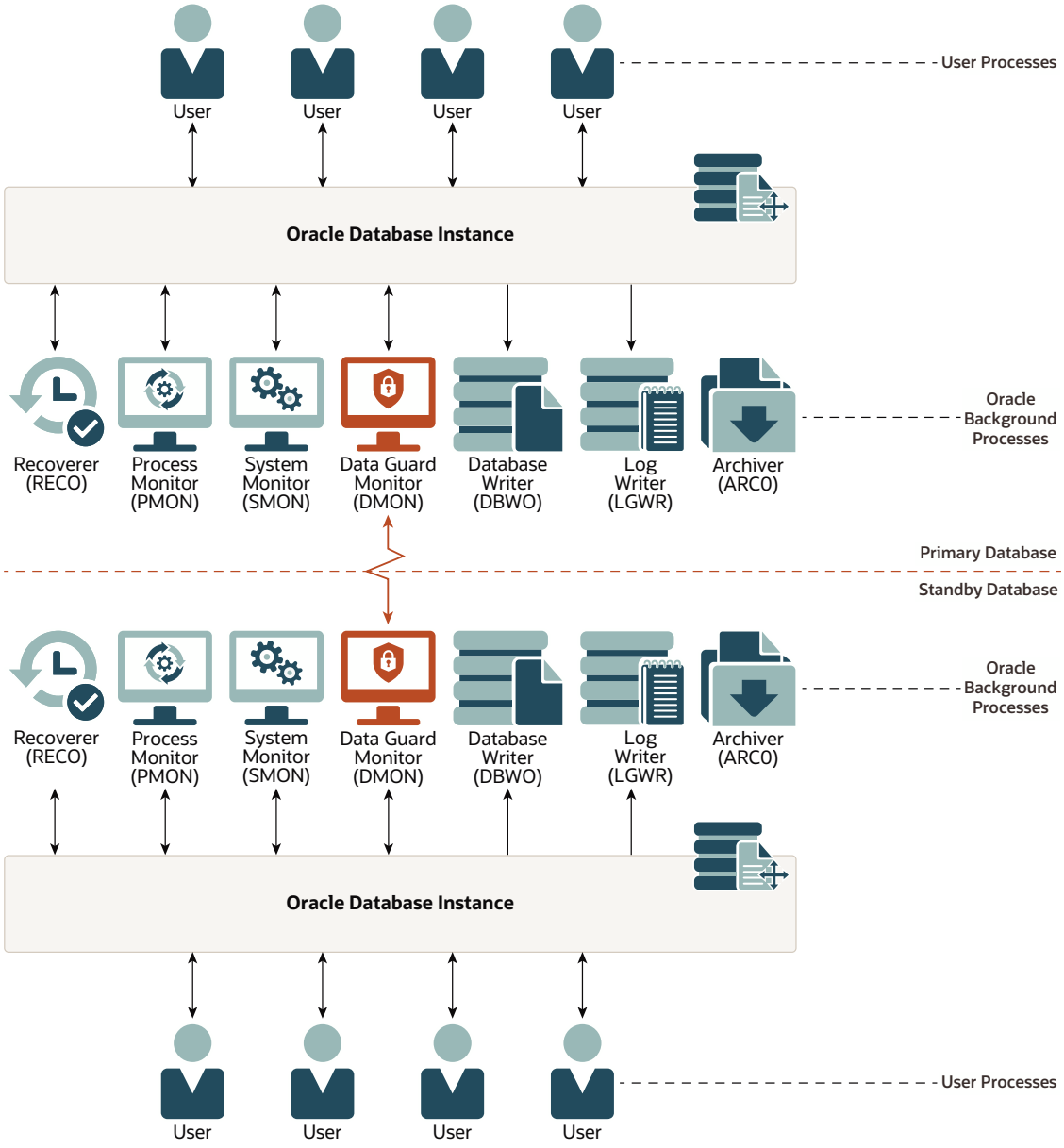
Figure 1-2 Databases With Broker (DMON) Processes



The zigzag arrow in the center of Figure 1-2 represents the two-way Oracle Net Services communication channel that exists between the DMON processes of two databases in the same broker configuration.

This two-way communication channel is used to pass requests between databases and to monitor the health of all of the databases in the broker configuration.

Monitoring Data Guard Broker Processes

Use the `V$DATAGUARD_PROCESS` view to monitor the status of broker processes, as well as other Data Guard processes. This view contains a row showing information for the broker DMON process. The following are the columns and values shown for the DMON process (other columns in the view are generally not relevant to the broker):

- `NAME` — DMON

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- `ROLE` — broker monitor
- `PID` — operating system process identifier of the process
- `PROC_TIME` — timestamp of when the process was started or registered for inclusion in the view

> **See Also**
>
> - *Oracle Database Reference* for more information about the `V$DATAGUARD_PROCESS` view

Configuration Management

The broker's DMON process persistently maintains information about all members of the broker configuration in a binary configuration file.

A copy of the configuration file is maintained by the DMON process for each of the databases that belong to the broker configuration. For an Oracle RAC database, all instances of the database share the same configuration file.

This configuration file contains information that describes the states and properties of the databases in the configuration. For example, the file records the databases that are part of the configuration, the roles and properties of each of the databases, and the state of each database in the configuration.

The configuration data is managed transparently by the DMON process to ensure that the configuration information is kept consistent across all of the databases. The broker uses the data in the configuration file to configure and start the databases, control each database's behavior, and provide information to DGMGRL and Cloud Control.

> **See Also**
>
> Managing Database Properties for more information

Whenever you add databases to a broker configuration, or make a change to an existing database's properties, each DMON process records the new information in its copy of the configuration file.

Database Property Management

Broker uses various properties associated with each database to control the database's behavior. The properties are recorded in the configuration file.

To ensure that the broker can update the values of parameters in both the database itself and in the configuration file, you must use a server parameter file to control static and dynamic initialization parameters. The use of a server parameter file gives the broker a mechanism that allows it to reconcile property values selected by the database administrator (DBA) when using the broker with any related initialization parameter values recorded in the server parameter file.

When you set values for database properties in the broker configuration, the broker records the change in the configuration file and propagates the change to all of the databases in the Oracle Data Guard configuration.

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Note

The broker supports both the default and nondefault server parameter file filenames. If you use a nondefault server parameter filename, the initialization parameter file must include the complete filename and location of the server parameter file. Oracle RAC databases must be configured to use a single server parameter file accessible by all instances.

See Also

Configurable (Changeable) Properties for more information

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2

Oracle Data Guard Installation

For all members that you want to add to a broker configuration, you must complete installation and configuration tasks.

- Oracle Data Guard Installation
- Prerequisites

> **See Also**
>
> Oracle Data Guard Broker Upgrading and Downgrading for help with upgrading to a new release in an Oracle Data Guard broker configuration

Oracle Data Guard Installation

Oracle Data Guard is included with the Enterprise Edition and Free Edition of the Oracle database software.

You can manage an Oracle Data Guard configuration by using either SQL*Plus, the Oracle Data Guard broker's command-line interface (DGMGRL), or a compatible version of Oracle Enterprise Manager Cloud Control (Cloud Control).

Install the Oracle Enterprise Edition or Personal Edition database software on each location you expect to include in broker configurations. You must install a compatible version of Cloud Control if you want to use the graphical user interface for Oracle Data Guard.

In addition, to use fast-start failover you must install DGMGRL and run the observer software. Oracle recommends running observers on computer systems that are separate from the primary and standby systems. To install DGMGRL on an observer computer, use one of the methods described in the following list:

- Install the complete Oracle Client Administrator by choosing the `Administrator` option from Oracle Universal Installer.

  This installation includes DGMGRL but it does not include the Cloud Control agent. This allows you to manage observer processes using DGMGRL commands, but not Cloud Control. (The Cloud Control agent can be installed separately.)

  For more information please see: *Oracle® Enterprise Manager Cloud Control Basic Installation Guide*.

- Install the full Oracle Database Enterprise Edition or Personal Edition software kit

  This installation includes DGMGRL and the Cloud Control agent, allowing you to manage observer processes using Cloud Control or DGMGRL commands.

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> **Note**
>
> An observer can be run from any platform that supports it, and that platform can be different from the platform of the primary or target standby database.

> **Note**
>
> Zero Data Loss Recovery Appliance does not require broker software to be installed.

Prerequisites

These are the conditions that must be met before you can use the broker.

- The primary and standby databases and far sync instances must be using the same version of Oracle Database and each can be installed in either a single-instance or multi-instance environment. The database must be licensed for Oracle Enterprise Edition or Personal Edition.
- You must use a server parameter file (SPFILE) to ensure the broker can persistently reconcile values between broker properties and any related initialization parameter values. See Configurable (Changeable) Properties for more information.

  If any of the databases in the configuration is an Oracle RAC database, you must configure the server parameter file (SPFILE) appropriately for use in an Oracle RAC environment.

  > **See Also**
  >
  > *Oracle Real Application Clusters Administration and Deployment Guide* for information about initialization files in an Oracle RAC

- The value of the `DG_BROKER_START` initialization parameter must be set to `TRUE` for all databases in the configuration. See Starting the Data Guard Broker for more information. (Cloud Control sets this parameter automatically.)
- If any of the databases in the configuration is an Oracle RAC database, you must set up the `DG_BROKER_CONFIG_FILE`*n* initialization parameters for that database such that they point to the same shared files for all instances of that database. The shared files could be files on a NFS file system, if available, or stored using Oracle Automatic Storage Management (Oracle ASM).

  > **See Also**
  >
  > Configuration file information in Configuration Management. Also, see Setting Up the Broker Configuration Files for details about setting up the broker configuration file.

- Network configuration files must be set up on the primary database and on the standby database if you configure an existing standby database into the broker configuration. Cloud Control can assist you in creating the configuration files when creating a standby database.

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> **See Also**
>
> *Oracle Database Net Services Administrator's Guide* for more information about network configuration files

- In a broker configuration, use the `DGConnectIdentifer` property to specify a connect identifier for each database. The connect identifier for a database must:
  - Allow all other databases in the configuration to reach it.
  - Allow all instances of an Oracle RAC database to be reached.
  - Specify a service that all instances dynamically register with the listeners so that connect-time failover on an Oracle RAC database is possible.

    > **Caution**
    >
    > All instances of a database must be accessible via the service in MOUNT, READ WRITE, and READ ONLY modes. The service should NOT be one that is defined and managed by Oracle Clusterware or created via Server Control Utility (SRVCTL). For most users it will be sufficient to use the db_unique_name service.

  - Have failover attributes set to allow the primary database's Redo Transport Services to continue shipping redo data to an Oracle RAC standby database, even if the receiving instance of that standby database has failed.

> **See Also**
>
> *Oracle Database Net Services Administrator's Guide* for more information about connect identifiers

- To enable DGMGRL to restart instances during the course of broker operations, a static service must be registered with the local listener of each instance. For configurations where Oracle Clusterware or Oracle Restart are not being used, a static service must be registered with the local listener associated with each instance. The static service allows DGMGRL to restart instances during the course of broker operations and to allows the observer to restart instances during automatic reinstatement of the old primary database after a fast-start failover has occurred. A static service is not required for DG PDB configurations.

  By default, the broker assumes a static service name of `<db_unique_name>_DGMGRL.<db_domain>` and expects the listener has been started with the following content in the `listener.ora` file:

```
LISTENER = (DESCRIPTION =
     (ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=host_name)
     (PORT=port_num))))
SID_LIST_LISTENER=(SID_LIST=(SID_DESC=(SID_NAME=sid_name)
     (GLOBAL_DBNAME=<db_unique_name>_DGMGRL.<db_domain>)
     (ORACLE_HOME=oracle_home)
     (ENVS="TNS_ADMIN=oracle_home/network/admin")))
```


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Alternatively, you can use a different static service name. If you do, be sure to modify the `StaticConnectIdentifier` instance-specific property to reflect the static service that has been registered.

To ensure that the connect identifier has been set up correctly, use the `VALIDATE STATIC CONNECT IDENTIFIER` command.

See Also

- See *Oracle Database Net Services Administrator's Guide* for more information about configuring static services
- See also VALIDATE DGConnectIdentifier
- See the My Oracle Support Note 1387859.1 at `http://support.oracle.com` for additional information about using static services and the `StaticConnectIdentifier` configurable property
- VALIDATE STATIC CONNECT IDENTIFIER

- The primary database must be opened in `ARCHIVELOG` mode.
- You must set the `COMPATIBLE` initialization parameter to 12.2.0 or higher for both the primary and standby databases. However, if you want to take advantage of Oracle Database Release 21c new features, then set the `COMPATIBLE` parameter to 21.1 on all databases within the Oracle Data Guard configuration. For example, if all databases in the configuration are Oracle Database Release 19c, then set COMPATIBLE to 19.1 to take advantage of 19c features.

  For the broker to work, the `COMPATIBLE` initialization parameter must be set to the same value on both the primary and standby databases. If the values differ, redo transport services may be unable to transmit redo data from the primary database to the standby databases.
- Select and configure a redo transport authentication method, as described in *Oracle Data Guard Concepts and Administration*.

See Also

- Starting the Data Guard Broker for more information about preparing and starting Oracle Data Guard broker

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3

Managing Broker Configurations

Use Oracle Data Guard broker to manage and monitor the configuration. Oracle Enterprise Manager uses the broker to report health and other operational characteristics.

- Configuration Support
- Configuration Properties
- Setting Up the Broker Configuration Files
- Starting the Data Guard Broker
- Management Cycle of a Broker Configuration
- Enable and Disable Operations
- Configuration Status

Overview of Broker Configurations

Data Guard broker provides support for two mutually-exclusive configurations.

- Data Guard for Container Databases (DG CDB)

  Protects the whole primary database. A role change converts the whole database from a primary database to a standby database. The standby database includes all the pluggable databases (PDBs) within the primary database. Deploy one or more physical or logical standby databases to protect the redo stream of the primary database.

- Data Guard for Pluggable Databases (DG PDB)

  Protects one or more PDBs in a primary database. The destination for redo data is another primary database, referred to as a target database. When there is a failure in a protected PDB, the broker can switchover or failover to the corresponding PDB in the target database. There is no need for a role change of the whole database.

Configuration Support

Oracle Data Guard broker enables you to create a broker configuration consisting of up to 253 members, including one primary database and a combination of standby databases, far sync instances, and Zero Data Loss Recovery Appliances.

The broker controls the members of the configuration, monitors the health of the configuration, and reports health and other operational characteristics through the Oracle Enterprise Management notification mechanisms if you are using Oracle Enterprise Manager Cloud Control, or through `SHOW` commands if you are using DGMGRL.

A supported Oracle Data Guard configuration contains the following components:

- A primary database (Oracle RAC or non-Oracle RAC)
- A combination of standby databases, far sync instances, and recovery appliances that receive redo from the primary database.

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- Oracle Net Services network configuration that defines a connection between the databases
- Standby (archived redo log files) destination parameters and configuration properties
- Redo transport services that transmit the redo data from the primary database to the standbys and far sync instances
- Log apply services that apply redo data to the standby databases from the archived redo log files or standby redo log files

The Oracle Data Guard log apply services update standby databases with redo data that is transmitted automatically from the primary database by redo transport services. The archived redo log files and standby redo log files contain all of the database changes except for *unrecoverable* or *unlogged* changes.

- On physical standby databases, Redo Apply applies the redo data to keep the standby consistent with the primary database.
- On logical standby databases, SQL Apply applies the redo data to keep the standby consistent with the primary database.
- On snapshot standby databases, the redo data is received but not applied until the snapshot standby database is converted back to a physical standby database.
- On far sync instances, the redo data is received and then forwarded to a physical standby database. A far sync instance does not have data files and does not apply any of the redo data it has received.

The broker's Oracle Data Guard monitor (DMON) process configures and maintains the broker configuration as a group of objects that you can manage and monitor as a single unit. Thus, when you enter a command that affects multiple databases, the DMON process:

- Carries out your request on the primary database
- Coordinates with the DMON process for each of the other databases, as required for your request
- Updates the configuration file on the local system
- Communicates with the DMON process for each of the other databases to update their copies of the configuration file

Through the DMON process, you can configure, monitor, and control the databases and the configuration together as a unit. If you disable the configuration, broker management of all of the databases in the configuration is also disabled. If you later enable the configuration, broker management is enabled for each database in the configuration.

Figure 3-1 shows a broker configuration with a primary database and physical standby database.

On the primary database, the figure shows the redo transport services in addition to the following main components: the primary database, DMON, the online redo log files, and the archived redo log files. The figure also shows standby redo log files in outline form on the primary side; the standby redo logs are outlined to indicate they are currently inactive but have been configured in preparation for a switchover or failover to the standby role. The physical standby database includes the following components: a standby database, log apply services, DMON, archived redo log files, and standby redo log files. The online redo log files on the physical standby database are outlined to indicate they are currently inactive but have been configured in preparation for a switchover or failover to the primary role.

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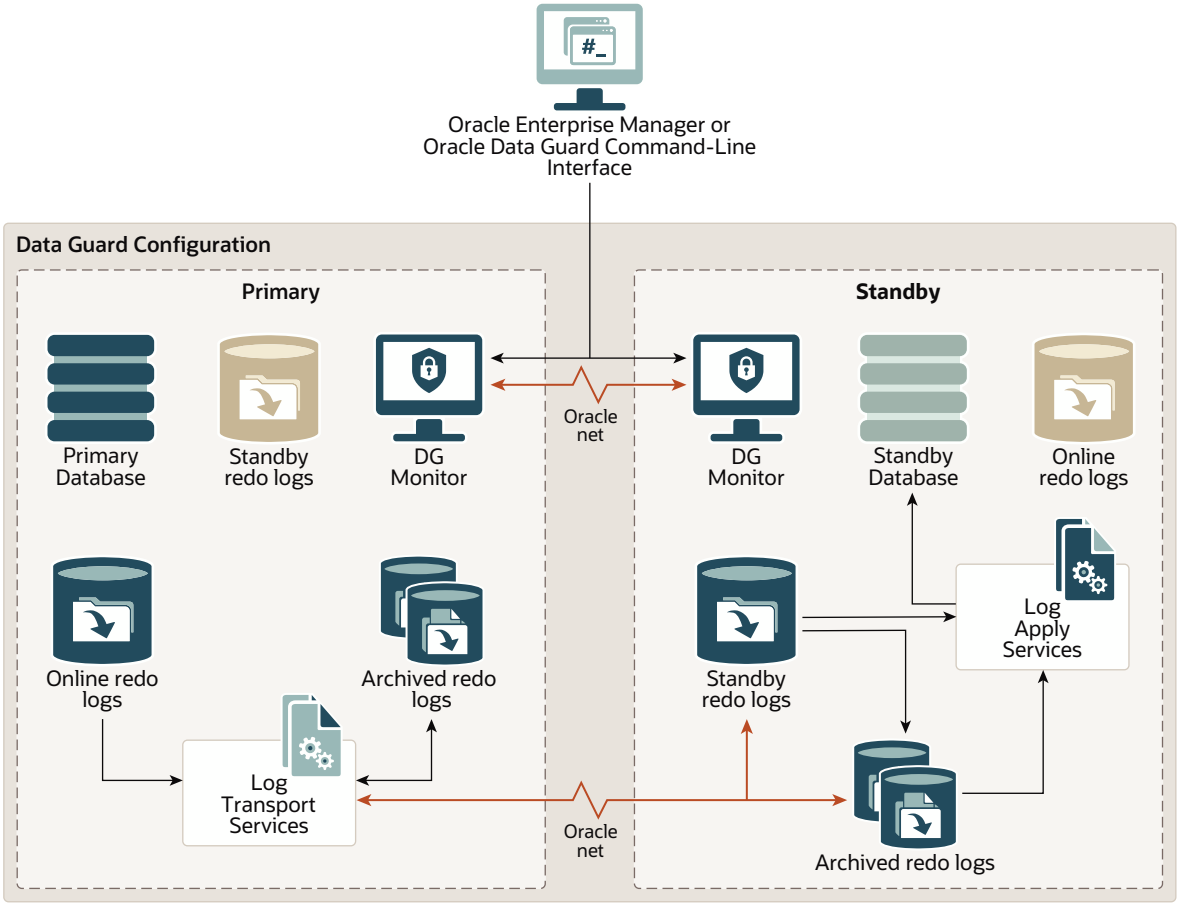
> **See Also**
>
> *Oracle Data Guard Concepts and Administration* for more information about standby databases

Figure 3-1 Oracle Data Guard Broker Configuration



Configuration-Wide Service Names

The broker publishes a service, using the same name, on each configuration member. The default name of this configuration-wide service is *primarydbname*_CFG, where a suffix of _CFG is appended to the value of the DB_UNIQUE_NAME initialization parameter of the primary database at the time the configuration is created. To change the name of the configuration-wide service, use the ConfigurationWideServiceName property. See ConfigurationWideServiceName.

Configuration Support for DG PDB

Two primary databases are required to provide support for Data Guard for individual pluggable databases. Each primary database constitutes its own broker configuration, thus requiring two broker configurations to provide data protection. Communication between the two configurations is established using Oracle Net.

The broker provides support for DG PDB through a set of DGMGRL commands.

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DG PDB Terminology

Learn about the terminology used with DG PDB configurations.

- Source PDB

  A pluggable database (PDB) within a container database that must be protected. Data Guard maintains a copy of the source PDB in the target container database.

- Source database

  A primary container database that contains one or more source PDBs, and is the source of redo data.

- Target PDB

  A PDB that is a copy of the source PDB. Redo data from the source PDB is applied to the target PDB. If there is a failure in the source PDB, the broker can switchover or failover to the target PDB.

- Target database

  A primary container database that contains one or more target PDBs. It instantiates and maintains the source PDBs that must be protected.

- Source configuration

  A Data Guard broker configuration that contains the source database.

- Target configuration

  The Data Guard broker configuration that contains the target database.

Components of DG PDB Configuration

A DG PDB configuration must contain 2 primary databases, each within their own configuration.

One or more source PDBs from one container database can be set up for Data Guard protection at the other container database. A container database may contain one or more source, target, or both source and target PDBs. Redo is shipped from the container database that contains source PDBs, to the container database that contains the target PDBs. Since a container database could contain both source and target PDBs, it could simultaneously be shipping redo, as well as receiving redo from the other container database.

Figure 3-2 illustrates the components of a DG PDB configuration.

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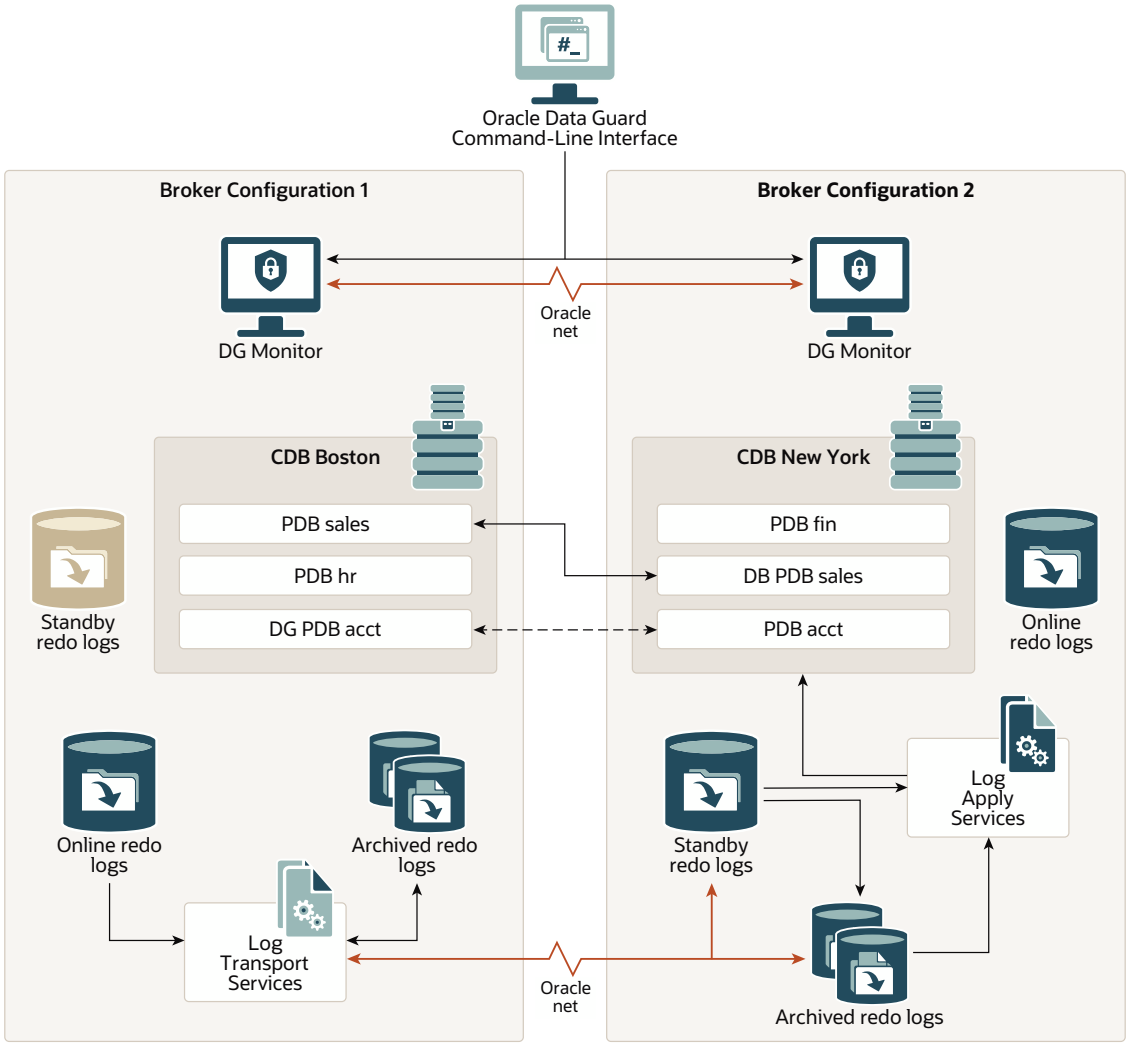
Figure 3-2 Oracle DG PDB Configuration



`Broker Configuration 1` is the source configuration PDB sales and a target configuration for DG PDB acct. `Broker Configuration 2` is a source configuration for PDB acct and a target configuration for DG PDB sales. Both configurations show the redo transport services in addition to the following main components: the source DMON, the online redo log files, standby redo log files, and the archived redo log files. The source PDB `pdb_sales` is instantiated as `dgpdb_sales` in the target database `cdb_newyork`.

The primary database in a DG PDB configuration can be either a source or target of redo data. Depending upon where the source and target PDBs reside, a primary CDB can be both a source and a target CDB. There can be a maximum of two CDBs. For example, in the above figure, `cdb_newyork` contains a PDB named `pdb_acct` which is connected using a dotted line to `dgpdb_acct` in the database `cdb_boston`. This indicates that the source PDB `pdb_acct` has a DG PDB instantiated as `dgpdb_acct`. However, a primary database can be the target for only one redo stream, that is, only one source database.

The Oracle Data Guard monitor (DMON) process configures and maintains the broker configuration as a group of objects that you can manage and monitor as a single unit. The functionality is the same as that described in a DG PDB broker configuration.

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About the DGPDB_INT User Account

The DGPDB_INT user account is used by the database server when making connections to other sites involved in the DG PDB configuration. Typically this occurs during creation and switchover of a standby PDB.

When the first DG PDB is added, DGMGRL asks for the password of the DGPDB_INT account. If the account is still locked at the remote site, DGMGRL unlocks it, assigns to it the password supplied, and grants the required privileges to it. The password is securely recorded using the DBMS_CREDENTIAL package at the local site. Along with the connect identifier for the remote site, the credential and the DGPDB_INT account are used to make connections to the remote site when required.

Before you can create a target PDB for a source PDB, the SYSDG administrative privilege must be granted to the DGPDB_INT user in the source PDB. DGMGRL makes this grant as part of creating a target PDB for a given source PDB.

DGMGRL revokes the SYSDG administrative privileges and locks the DGPDB_INT account when appropriate.

DG PDB Configuration Restrictions

Several restrictions apply when using the DG PDB configuration.

A DG PDB configuration does not support the following:

- Snapshot standby databases, far sync instances, and bystander standbys
- Maximum availability and maximum protection modes
- Rolling upgrades using the DBMS_ROLLING package
- A source CDB cannot have more than one target CDB and a target CDB cannot have more than one source CDB.
- Oracle GoldenGate as part of a configuration that provides support for DG PDB configurations
- Downstream data capture for Oracle GoldenGate
- Data Guard broker external destinations
- Data Guard broker functionality for Zero Data Loss Recovery Appliance (ZDLRA)
- Backups to ZDLRA
- Application containers
- Only individual PDBs are supported for Oracle Data Guard.

Workflow for Using DG PDB Configuration

Use the workflow to understand the tasks required to set up and manage a DG PDB configuration.

To provide data protection for one or more PDBs using the DG PDB configuration:

1. Identify the source PDBs that must be protected. These source PDBs are contained in the source database.
2. Identify the target database that is the destination for redo data from the source database.

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3. Establish a relationship between the source configuration and the target configuration. See Scenario 4: Establish a Connection Between the Configurations and Enable Them.
4. Specifying Locations for Archived Redo Log Files
   Set up standby redo log and archived redo log locations in the target configuration. See .
5. Instantiate the source PDBs at the target database. See #unique_76.
6. Start redo transport from the source database to the target database and start recovery at the target database. See #unique_77.
7. When required, perform a switchover operation. See Performing PDB Switchover.

   Or, when required, initiate a failover to the target PDB. See Performing PDB Failover.
8. Monitor the progress of redo transport at the source database and recovery at the target database. See #unique_80.

Configuration Properties

Configuration properties control the behavior of a broker configuration.

You can view and dynamically update the values of these properties using either DGMGRL or Cloud Control. However, some properties can only be updated through DGMGRL.

A configuration property has configuration-wide scope; meaning that the value you set for the property applies uniformly to each database in the configuration.

> **Note**
>
> Starting with Oracle Database Release 19c, properties related to database initialization parameters, except `log_archive_dest_`*n* and `log_archive_dest_state_`*n*, are no longer stored in the broker configuration file.

> **See Also**
>
> Oracle Data Guard Broker Properties for complete descriptions of all broker configuration properties

Setting Up the Broker Configuration Files

When the broker is started for the first time, configuration files are automatically created and named using a default path name and filename that is operating-system specific.

Two copies of the configuration file are maintained for each database so as to always have a record of the last known *valid* state of the configuration. You can override the default path name and filename by setting the following initialization parameters for that database:

```
DG_BROKER_CONFIG_FILE1
DG_BROKER_CONFIG_FILE2
```

Note the following restrictions when setting the `DG_BROKER_CONFIG_FILE1` and `DG_BROKER_CONFIG_FILE2` initialization parameters:

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- These parameters can only be set or changed when the Oracle Data Guard broker is not running (DG_BROKER_START=FALSE).
- For Oracle RAC databases, these parameters must specify a common Oracle ASM, Oracle OCFS, or NFS location shared by all of the Oracle RAC instances
- When an upgrade is performed using the PL/SQL package, DBMS_ROLLING, the DG_BROKER_CONFIG_FILE*n* parameters must specify a location outside of the Oracle home. (The default location is the dbs directory in the Oracle home.)

The Oracle Data Guard broker works with databases that use either Oracle managed or user managed datafiles. These datafiles can reside on a file system or an Oracle ASM disk group. The following section contains these topics:

- Renaming the Broker Configuration Files
- Managing Broker Configuration Files in an Oracle RAC Environment

Renaming the Broker Configuration Files

You can change the names of the broker configuration files by issuing the ALTER SYSTEM SQL statement.

However, you cannot alter these parameters when the broker's DMON process is running. To change the names of configuration files for a given database, perform the following steps:

1. Disable the broker configuration using the DGMGRL DISABLE command. See Enable and Disable Operations.
2. Stop the Oracle Data Guard broker DMON process using the following SQL statement:

   ```
   SQL> ALTER SYSTEM SET DG_BROKER_START=FALSE;
   ```

3. Change the configuration filenames for the database:

   ```
   SQL> ALTER SYSTEM SET DG_BROKER_CONFIG_FILE1=filespec1;
   SQL> ALTER SYSTEM SET DG_BROKER_CONFIG_FILE2=filespec2;
   ```

   > **Note**
   >
   > If the broker is managing an Oracle RAC database, the value of DG_BROKER_CONFIG_FILE1 and the value of DG_BROKER_CONFIG_FILE2 for each of the instances must point to the same set of physical files.

4. The method of moving the files depends upon where they currently reside and where you want to move them to:
   - If the files reside on an operating system file system, use operating system commands to move the files to their new location.
   - If the old or new location is an Oracle ASM disk group, use the DBMS_FILE_TRANSFER.COPY_FILE function to transfer the files to their new location.
5. Restart the Oracle Data Guard broker DMON process, as follows:

   ```
   SQL> ALTER SYSTEM SET DG_BROKER_START=TRUE;
   ```

6. Enable the broker configuration using the DGMGRL ENABLE command or the Enable operation in the Oracle Data Guard management pages of Cloud Control.

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Managing Broker Configuration Files in an Oracle RAC Environment

In an Oracle RAC environment, all instances of a database must reference the same set of configuration files.

This means that if the broker is managing an Oracle RAC database, then the value of `DG_BROKER_CONFIG_FILE1` and the value of `DG_BROKER_CONFIG_FILE2` for each of the instances must point to the same set of physical files. The configuration files can be deployed using one of the following methods:

- Using Cluster File System (CFS) for Configuration Files
- Using Oracle ASM Disk Groups for Configuration Files

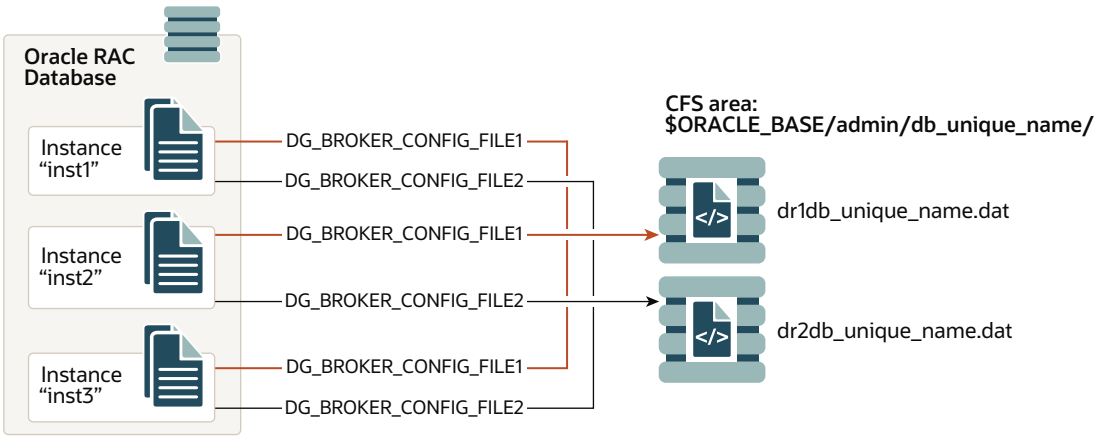
Using Cluster File System (CFS) for Configuration Files

The broker configuration files can reside on a cluster file system (CFS).

If they do, the `DG_BROKER_CONFIG_FILE`*n* parameters on all of the instances must be set to these files including the path to the CFS area. Figure 3-3 shows the set up for the broker configuration files on CFS. In this scenario, the parameters and value for all instances would be:

```
DG_BROKER_CONFIG_FILE1=$ORACLE_BASE/admin/db_unique_name/dr1db_unique_name.dat
DG_BROKER_CONFIG_FILE2=$ORACLE_BASE/admin/db_unique_name/dr2db_unique_name.dat
```

Figure 3-3 Broker Configuration Setup in a CFS Area



Using Oracle ASM Disk Groups for Configuration Files

The broker's configuration files can also reside on an Oracle ASM disk group.

Use one of the following techniques to set the location of broker configuration files:

- Specify the name of the configuration file along with the complete path

  Set the `DG_BROKER_CONFIG_FILE1` and `DG_BROKER_CONFIG_FILE2` initialization parameters to a string value that includes the name of an existing Oracle ASM disk group, an existing directory in that disk group, and the name of the configuration file itself.

- Specify only a disk group name

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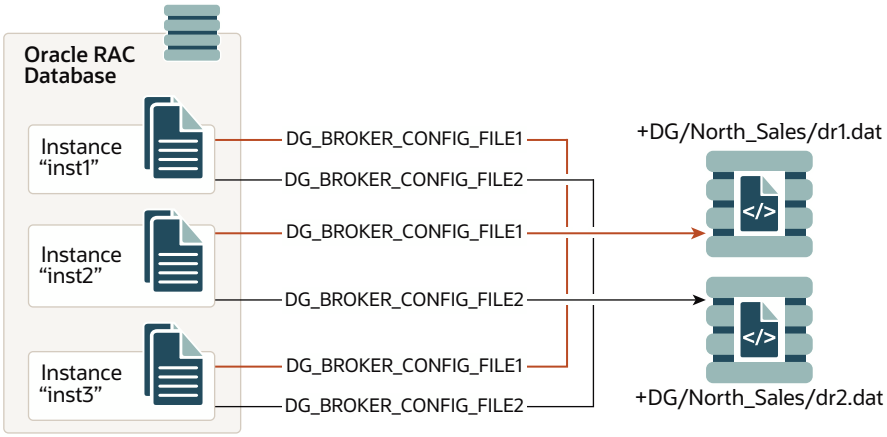
Set the DG_BROKER_CONFIG_FILE1 and DG_BROKER_CONFIG_FILE2 initialization parameters to the name of an ASM disk group. The broker automatically translates the disk group name to a predefined path and file name. The configuration files are as follows:

```
DG_BROKER_CONFIG_FILE1 = '+DG/db_unique_name/DATAGUARDCONFIG/dr1db_unique_name.dat'
DG_BROKER_CONFIG_FILE2 = '+DG/db_unique_name/DATAGUARDCONFIG/dr2db_unique_name.dat'
```

Figure 3-4 shows the setup for the broker configuration files on Oracle ASM devices. In this scenario, the parameters and values would be specified, as follows:

```
ALTER SYSTEM SET DG_BROKER_CONFIG_FILE1 = '+DG/North_Sales/dr1.dat' SCOPE=BOTH;
ALTER SYSTEM SET DG_BROKER_CONFIG_FILE2 = '+DG/North_Sales/dr2.dat' SCOPE=BOTH;
```

Figure 3-4 Broker Configuration Setup with Oracle ASM



Starting the Data Guard Broker

After setting up the configuration files, the DG_BROKER_START initialization parameter must be set to TRUE for each database to start the DMON processes.

By default, the DG_BROKER_START initialization parameter is set to FALSE. However, you can set the value in the following ways:

- If you are using Cloud Control, it automatically sets the DG_BROKER_START initialization parameter to TRUE for new standby databases that it creates.
- If you are using DGMGRL, you must explicitly set the DG_BROKER_START initialization parameter to TRUE; otherwise, the broker will not start. You can set the DG_BROKER_START initialization parameter with the following SQL statement:

```
SQL> ALTER SYSTEM SET DG_BROKER_START=TRUE;

System altered.

SQL> SHOW PARAMETER DG_BROKER_START

NAME                 TYPE      VALUE
------------------------------------
dg_broker_start      boolean   TRUE
```

Whether you use Cloud Control or DGMGRL, set the value of the DG_BROKER_START initialization parameter to TRUE on each database and far sync instance. Doing so ensures that Oracle Data Guard broker will start automatically the next time you start any instance of the database.

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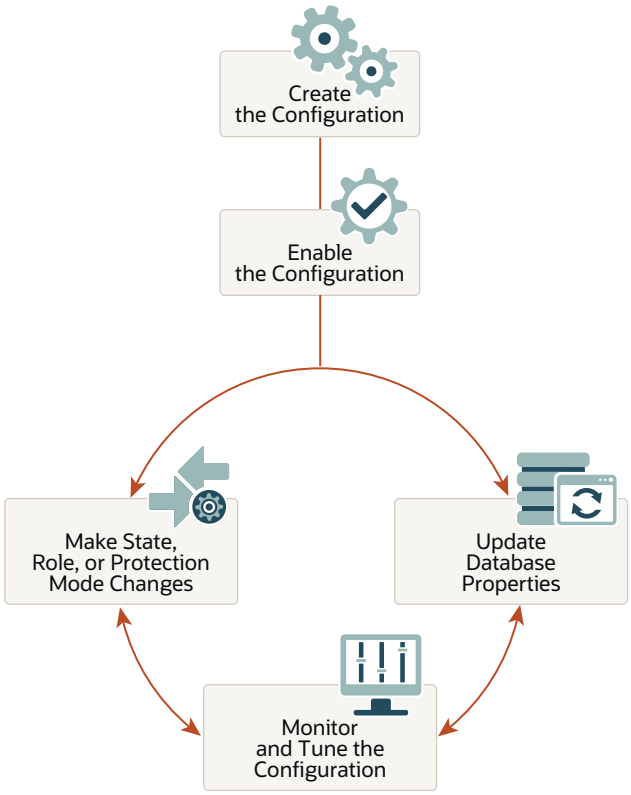
> **Note**
>
> If the initialization parameter `DG_BROKER_START=TRUE`, then archivelog mode is automatically enabled when the primary database is enabled and the database is not open on any instance.

Management Cycle of a Broker Configuration

This figure shows the life cycle of a broker configuration and the accompanying text explains each phase of the cycle.

Figure 3-5 Life Cycle of a Broker Configuration and Its Databases



> **Note**
>
> For DG PDB configurations, you cannot make state changes or protection mode changes.

Create the Broker Configuration

When using Cloud Control, the Add Standby Database wizard can either add an existing single-instance or Oracle RAC standby database into the configuration or create a new single-instance or Oracle RAC standby database and add it to the configuration. The standby database can be a physical, logical, or snapshot database.

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When using DGMGRL, the primary database and a standby database must already exist. You construct the standby database from backups of the primary database control files and datafiles, and then prepare it for recovery.

Enable the Broker Configuration

An Oracle Data Guard configuration must be enabled to be managed or monitored by the broker. Conversely, you disable a configuration if you no longer want to manage it with the broker. When you disable a configuration, broker management of all of its databases is also disabled.

> **Note**
>
> You can enable or disable the configuration using DGMGRL. You cannot disable the configuration using Cloud Control. You can enable the configuration using Cloud Control in the event that it was previously disabled using DGMGRL.

A broker configuration, when first created using Cloud Control, is automatically enabled as soon as the Add Standby Database wizard completes.

A broker configuration, when first created using DGMGRL, is in a disabled condition. This means its constituent databases are not yet under active control of the broker. When you finish configuring the databases into a broker configuration with DGMGRL, you must enable the configuration to allow the broker to manage the configuration.

You can enable:

- The entire configuration, including all of its databases
- An individual standby database

You can easily disable a database if a problem occurs such that it cannot function properly in a broker configuration. Note that you cannot disable the primary database. You must disable the entire configuration to disable the primary database.

You may also want to disable a configuration temporarily, and then change some properties in the broker configuration without affecting the actual database properties. The changed properties will take effect when the configuration is enabled again for management by the broker.

Make Role Changes Within the Broker Configuration, As Needed

At any time, you can issue a single command to change the roles of the databases in the configuration. If some event renders the primary database unusable, you can fail over one of the standby databases to become the new primary database.

If Flashback Database was enabled on the former primary database, then after failover has completed, you can reinstate the former primary database as a standby database for the new primary database. This prevents you from have to re-create the old primary database from a copy of the new primary database.

In addition, planned downtime for maintenance can be reduced because you can quickly switch over production processing from the current primary database to a standby database, and then switch back again after the planned maintenance.

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> **See Also**
>
> Switchover and Failover Operations for more information about role changes

Convert to Snapshot Standby Database

At any time, you can issue a single command to convert a physical standby database to a snapshot standby database. The snapshot standby database is a fully updatable database that receives redo data generated from the primary database, but does not apply it.

Once you are done using the snapshot standby database, you can again issue a single command to convert it to a physical standby database. After the conversion to a physical standby has completed, Redo Apply services will start (assuming the state is `APPLY-ON`) and apply all of the accumulated redo data. Any changes made to the snapshot standby are not retained.

Make State Changes to the Databases, As Needed

When you enable a configuration for the first time, the broker, by default, starts redo transport services on the primary and starts log apply services on the standby (except for a snapshot standby).

At any time, you can issue a single command through Cloud Control or DGMGRL to change the state of the database. For example, you could bring the primary database into the `TRANSPORT-OFF` state to temporarily stop sending redo data to the standby databases. Then, to resume sending redo data to the standbys, you could bring the primary database into the `TRANSPORT-ON` state.

> **See Also**
>
> Managing the Members of a Broker Configuration for more information about database state changes

Update Database Properties, As Needed

The broker enables you to set database properties, some of which correspond to database initialization parameters. You can change these properties to dynamically control such things as redo transport, standby file management, log apply, and to support the overall configuration protection mode. The broker records the changes in the broker configuration file for each database in the Oracle Data Guard configuration and propagates the changes to the related initialization parameters in the server parameter files, if needed.

> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for complete information about database properties

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Set Data Protection Modes, As Needed

The broker enables you to set the data protection mode for the configuration. You can configure the protection mode to maximize data protection, maximize availability, or maximize performance.

> **See Also**
>
> Managing Data Protection Modes for information about managing data protection modes

Monitor the Configuration

You can check the health of the configuration, display and update the properties of the databases, and set Cloud Control events.

Cloud Control also provides a dynamic performance page that automatically and dynamically refreshes chart data and status at specified intervals. The performance chart shows a graphical summary of how far behind and how much redo data is being generated and applied.

Enable and Disable Operations

When you enable or disable a database in the broker configuration, you are effectively enabling or disabling the ability of the broker to manage and monitor the specified database.

The enable and disable operations are defined only for databases that are in a broker configuration; you cannot perform these broker operations on databases that are not part of the broker configuration.

However, disabling a broker configuration does not affect current services and operations in the actual Oracle Data Guard configuration. For example, when you disable a broker configuration, redo transport services and log apply services in the Oracle Data Guard configuration continue to function unchanged, but you can no longer manage them through the broker interfaces.

In addition, disabling a database *does not* remove or delete it from the broker configuration file. You can still change the properties of a disabled database and later reenable your ability to manage with the broker using the DGMGRL `ENABLE CONFIGURATION` or `ENABLE DATABASE` commands, or the Enable option in the Oracle Data Guard management pages of Cloud Control.

> **Note**
>
> If you disable broker management of a standby database in the broker configuration, that standby database cannot be used by the broker as a failover target in the event of loss of the primary database.

Disabling broker management of the configuration may be useful to do even though you are removing the broker's ability to monitor and control the databases. For example, it may be advantageous to disable a configuration temporarily in order to change one or more properties in the broker configuration all at the same time. When you change properties in a disabled configuration, it does not affect the actual database properties underneath because the

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changes are not applied to the running database until you reenable the configuration. For example, you might want to change the overall configuration protection mode and the redo transport services properties on a disabled configuration so that all changes are applied to the configuration at the same time upon the next enable operation.

> **See Also**
>
> How the Protection Modes Influence Broker Operations

Configuration Status

A configuration status reveals the overall health of the configuration.

Status of the configuration is acquired from the status of all of its databases.

The following list describes the possible status modes for a configuration:

- Success

  The configuration, including all of the databases configured in it, is operating as specified by the user without any warnings or errors.

- Warning

  One or more of the databases in the configuration are not operating as specified by the user. To obtain more information, use the DGMGRL `SHOW DATABASE <db-unique-name>` command or the Cloud Control display to locate each database and examine its status to reveal the source of the problem.

- Error

  One or more of the databases in the configuration failed or may no longer be operating as specified by the user. To obtain more information, use the DGMGRL `SHOW DATABASE <db-unique-name>` command or the Cloud Control display to locate each database and examine its status to reveal the source of the problem.

- Unknown/Disabled

  Broker management of the configuration is disabled and the broker is not monitoring the status of the databases in the configuration.

- ROLLING DATABASE MAINTENANCE IN PROGRESS

  An operation performed using the PL/SQL `DBMS_ROLLING` package is in progress.

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4

Managing the Members of a Broker Configuration

Learn how to manage broker configuration members, and monitor the state of each member of the configuration.

- Managing Broker Configuration Members
- Managing States of Broker Configuration Members
- Managing Database Properties
- Managing Redo Transport Services
- Managing Redo Transport Services for Recovery Appliance
- Managing Log Apply Services
- Managing Data Protection Modes
- Managing Far Sync Instances
- Managing Fast-Start Failover
- Managing Database Conversions
- Database Status

Managing Broker Configuration Members

The broker uses information in its configuration file to manage and monitor the state of each member of the configuration.

The broker distinguishes between different types of members in a broker configuration. Each type of member has a set of states and properties that are appropriate for that type of member.

Managing States of Broker Configuration Members

The members of a configuration can be in various states which, in an enabled configuration, determine the behavior of Oracle Data Guard.

The following table describes the various states.

Note that the following are not listed in the table:

- Snapshot standby databases (because they do not have states; they only receive redo data)
- Far sync instances (because they do not have states; they only receive redo and forward it to a standby database)
- Zero Data Loss Recovery Appliances (because they do not have states)

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Table 4-1 Database States and Descriptions

Database Role	State Name	Description
Primary	TRANSPORT-ON	Redo transport services are set up to transmit redo data to the standby databases or far sync instances when the primary database is open for read/write access. If this is an Oracle RAC database, all instances open in read/write mode will have redo transport services running. This is the default state for a primary database when it is enabled for the first time.
Primary	TRANSPORT-OFF	Redo transport services are stopped on the primary database. If this is an Oracle RAC database, redo transport services are not running on any instances.
Physical standby	APPLY-ON	Redo Apply is started on a physical standby database. If the standby database is an Oracle RAC database, the broker starts Redo Apply on exactly one standby instance, called the apply instance. If this instance fails, the broker automatically chooses another instance that is either mounted or open read-only. This new instance then becomes the apply instance. As of Oracle Database 12*c* Release 2 (12.2.0.1), Redo Apply can be set up to run on each active running physical standby instance. If a database has already been set up to run Redo Apply on multiple instances, then you can use the Data Guard broker property ApplyInstances to restrict the number of instances that are involved in Redo Apply on an Oracle RAC physical standby database. APPLY-ON is the default state for a physical standby database when it is enabled for the first time. If a license for the Oracle Active Data Guard option has been purchased, a physical standby database can be open while Redo Apply is active. This capability is known as real-time query. See *Oracle Data Guard Concepts and Administration* for more details.
Physical standby	APPLY-OFF	Redo Apply is stopped. If this is an Oracle RAC database, there is no instance running Apply Services until you change the database state to APPLY-ON.
Logical standby	APPLY-ON	SQL Apply is started on the logical standby database when it is opened and the logical standby database guard is on. If this is an Oracle RAC database, SQL Apply is running on one instance, the apply instance. If this instance fails, the broker automatically chooses another open instance. This new instance becomes the apply instance. This is the default state for a logical standby database when it is enabled for the first time.

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Table 4-1 (Cont.) Database States and Descriptions

Database Role	State Name	Description
Logical standby	APPLY-OFF	SQL Apply is stopped. The logical standby database guard is on. If this is an Oracle RAC database, there is no instance running SQL Apply until you change the state to APPLY-ON.

Database State Transitions

You can use the DGMGRL EDIT DATABASE command to explicitly change the state of a database.

For example, the EDIT DATABASE command in the following example changes the state of the North_Sales database to TRANSPORT-OFF.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET STATE='TRANSPORT-OFF';
Succeeded.
```

The following sections describe in more detail the possible state transitions for primary and standby databases.

Primary Database State Transitions

When transitioning the primary database to the TRANSPORT-ON state, the broker sets up redo transport services using the redo transport-related properties of the configuration members and the RedoRoutes property at the primary database. Redo transport services setup is done by setting the LOG_ARCHIVE_DEST_*n* and LOG_ARCHIVE_DEST_STATE_*n* initialization parameters on the primary database, and the LOG_ARCHIVE_CONFIG initialization parameter on all databases (primary or standby) and far sync instances. If necessary, the broker also sets up the data protection mode of the database to match the protection mode recorded in the broker configuration file. Finally, if the database is open, the broker switches a log for each thread to initiate redo transport services.

When transitioning the primary database to the TRANSPORT-OFF state, the broker turns off redo transport services to all broker-managed standbys by resetting the LOG_ARCHIVE_DEST_STATE_*n* initialization parameter. Transmission of redo data to all broker-managed standbys is stopped. Log files continue to be archived at the primary database.

If the primary database is an Oracle RAC database, the broker configures redo transport services on all primary instances with the same settings.

Physical Standby Database State Transitions

When transitioning a physical standby database to the APPLY-ON state, the broker starts Redo Apply with options specified by the Redo Apply-related properties. If the standby is an Oracle RAC database, then the broker starts Redo Apply on one standby instance, called the apply instance.

Redo Apply can be set up to run on multiple active running physical standby instances. (This feature requires the standby database to have a license for the Oracle Active Data Guard option.) If a database has already been set up to run Redo Apply on multiple instances, then you can use the Data Guard broker property ApplyInstances to restrict the number of instances that are involved in Redo Apply on an Oracle RAC physical standby database.

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If a license for the Oracle Active Data Guard option has been purchased, a physical standby database can be open while Redo Apply is active. This capability is known as real-time query. See *Oracle Data Guard Concepts and Administration* for more details.

The apply instance must be open before starting Redo Apply if any other instance is open.

When transitioning to the `APPLY-OFF` state, the broker stops Redo Apply.

> **Note**
>
> If you perform online database relocation with Oracle RAC One Node on a physical standby, then the new instance is started in the same mode as the currently running instance. Therefore, if the database is mounted on the original instance, then the database will be mounted on the new instance. Likewise, if the database is open on the original instance, then the database will be open on the new instance. This may result in the new instance starting in a mode that does not match the start option recorded with Oracle Clusterware for the database.

Logical Standby Database State Transitions

When transitioning a logical standby database to the `APPLY-ON` state, the broker will wait until the database is open, and then enable the database guard to prevent modifications to tables in the logical standby database, and start SQL Apply with options specified by the log apply-related properties. If the logical standby database is an Oracle RAC database, the broker starts SQL Apply on one standby instance, the apply instance.

When transitioning to the `APPLY-OFF` state, the broker stops SQL Apply.

> **See Also**
>
> - Managing Log Apply Services for information about managing SQL Apply
> - Managing Redo Transport Services for more details on managing redo transport services and a list of redo transport-related properties
> - *Oracle Data Guard Concepts and Administration* for information about the database guard
> - Oracle Data Guard Command-Line Interface Reference for complete information about the `EDIT DATABASE` command.

Managing Database Properties

There are two types of database properties: monitorable and configurable.

Both monitorable and configurable properties can be further divided into properties having database-wide scope or instance-specific scope.

- Monitorable property values can be viewed only when the associated database is enabled.

  Monitorable properties allow you to view run-time information related to databases, but you cannot change the values of these properties.
- Configurable property values can be viewed and dynamically updated.

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Configurable properties affect the operation or configuration of the broker. You can change the value of these properties using DGMGRL or Cloud Control. You can edit properties whether the configuration and its members are enabled or disabled. However, if a configuration member is disabled, then the new property value does not take effect until you enable the configuration or member, as appropriate.

> **See Also**
>
> Oracle Data Guard Broker Properties for a detailed list of all database properties

To see these properties, you can use the DGMGRL `SHOW` command or Edit Properties page in Cloud Control. Example 4-1 uses the `SHOW DATABASE VERBOSE` command to display information about the `North_Sales` database.

> **See Also**
>
> Oracle Data Guard Command-Line Interface Reference for complete information about the DGMGRL command-line interface

Example 4-1 Using the SHOW DATABASE VERBOSE Command to Display Properties

```
DGMGRL> SHOW DATABASE VERBOSE 'North_Sales';

Database - North_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Redo Rate:          202 Byte/s  in 15 seconds (computed 11 seconds ago)
  Instance(s):
    NorthSales

  Properties:
    AlternateLocation              = ''
    ApplyInstanceTimeout           = '0'
    ApplyInstances                 = '0'
    ApplyLagThreshold              = '30'
    ApplyParallel                  = 'AUTO'
    ArchiveLocation                = ''
    Binding                        = 'OPTIONAL'
    DGConnectIdentifier            = 'north_sales'
    DelayMins                      = '0'
    FastStartFailoverTarget        = ''
    HostName                       = 'sales1'
    InconsistentLogXptProps        = '(monitor)'
    LogShipping                    = 'ON'
    LogXptMode                     = 'ASYNC'
    LogXptStatus                   = '(monitor)'
    MaxFailure                     = '0'
    NetTimeout                     = '30'
    ObserverConnectIdentifier      = ''
    PreferredApplyInstance         = ''
    PreferredObserverHosts         = ''
```


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```
    RecvQEntries                    = '(monitor)'
    RedoCompression                 = 'DISABLE'
    RedoRoutes                      = ''
    ReopenSecs                      = '300'
    SendQEntries                    = '(monitor)'
    SidName                         = '(monitor)'
    StandbyAlternateLocation        = ''
    StandbyArchiveLocation          = ''
    StaticConnectIdentifier         = '(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
(HOST=sales1.example.com)(PORT=1521))
(CONNECT_DATA=(SERVICE_NAME=North_Sales_DGMGRL.example.com)
(INSTANCE_NAME=NorthSales)(SERVER=DEDICATED)))'
    TopWaitEvents                   = '(monitor)'
    TransportDisconnectedThreshold  = '30'
    TransportLagThreshold           = '30'

  Log file locations:
    Alert log               : /sales/oracle/diag/rdbms/north_sales/NorthSales/
trace/alert_NorthSales.log
    Data Guard Broker log   : /sales/oracle/diag/rdbms/north_sales/NorthSales/
trace/drcNorthSales.log

Database Status:
SUCCESS
```

Monitorable (Read-Only) Properties

Monitorable properties allow you to view information related to a configuration member, but you cannot change the property values.

Monitorable properties can be very helpful when you are trying to diagnose problems in the broker configuration. For example, you can view the `InconsistentLogXptProps` monitorable property to determine where there is a discrepancy in redo transport services properties between the broker configuration file and the actual value currently used by the database.

You can list all monitorable properties using the DGMGRL `SHOW DATABASE VERBOSE` command. Use the `SHOW DATABASE` command to obtain more details about a particular property. For example, the following shows the `InconsistentLogXptProps` property:

```
DGMGRL> SHOW DATABASE 'North_Sales' 'InconsistentLogXptProps';

INCONSISTENT LOG TRANSPORT PROPERTIES

   INSTANCE_NAME         STANDBY_NAME        PROPERTY_NAME         MEMORY_VALUE
BROKER_VALUE
      NorthSales          South_Sales            DelayMins
10                    0
```

Cloud Control displays the information obtained from these properties on the Edit Properties page.

Configurable (Changeable) Properties

Configurable properties affect the operation or configuration of a database or far sync instance.

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When you use DGMGRL or Cloud Control to create a primary database and import existing standby databases and far sync instances into a new broker configuration, the property values are initially imported from the database or far sync instance settings.

You can update many property values when a configuration member is either disabled or enabled. When a new member is added into the configuration, the broker connects to that member and imports initial values for the member's properties from the current member settings. For example:

```
DGMGRL> SHOW DATABASE 'North_Sales' LogXptMode;
  LogXptMode = ASYNC

DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY LogXptMode='SYNC';
  Property "LogXptMode" updated

DGMGRL> SHOW DATABASE 'North_Sales' LogXptMode;
  LogXptMode = SYNC
```

When the configuration is enabled, for properties related to redo transport, the broker keeps the member property values in the broker configuration file consistent with the values being used by the member. The broker no longer maintains values for properties related to initialization parameters in the configuration file. Note that there is no issue with maintaining consistency. Although the broker no longer maintains values for these properties, it is still possible to use the broker CLI to update and examine the value of these properties. Due to user action, it is possible for the parameter value in the system global area (SGA) to differ from the parameter value in the server parameter file. This is not flagged as an inconsistency and only means that the server parameter file value will take effect the next time the database is restarted. The specified database must be accessible to be able to make these property changes.

> **Note**
>
> Even though you can change a property value when the configuration is disabled, the change does not take effect on the configuration member unless the configuration is enabled. Also note that some property values can only be changed in the disabled state.

Resetting Broker Configurable Properties to Default Values

Most broker configurable properties have a default value, but you can specify a different value to override it.

The broker recognizes when a default value has been restored for a property and no longer considers it a user-supplied value. This is expedient in upgrade scenarios because if a default value for a property changes between releases, then the new default value is automatically put into effect after an upgrade is complete. Values that are considered user-supplied are not automatically upgraded.

You do not need to know the actual default value in order to reset it. You can reset a default value at the configuration, configuration member, or instance level.

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See Also

- "EDIT CONFIGURATION RESET (Property)"
- "EDIT DATABASE RESET (Property)"
- "EDIT FAR_SYNC RESET (Property)"
- EDIT RECOVERY_APPLIANCE RESET (Property)

Managing Redo Transport Services

To manage redo transport services, you specify configurable properties on each configuration member.

The properties you specify are as follows::

- `DGConnectIdentifier`
- `StandbyAlternateLocation`
- `Binding`
- `Encryption` (This property can be set only on a Recovery Appliance)
- `LogShipping`
- `LogXptMode`
- `MaxFailure`
- `NetTimeout`
- `RedoCompression`
- `RedoRoutes`
- `ReopenSecs`
- `StandbyArchiveLocation`

You can use these properties to specify how the broker configures redo transport services for the standby database. The actual redo transport setup, such as setting the `LOG_ARCHIVE_DEST_`*n* initialization parameter, is carried out by the broker on the primary database (except for the `StandbyArchiveLocation` property). If changing the property requires that you change the `LOG_ARCHIVE_DEST_`*n* initialization parameter attributes, the broker forces a log switch on each thread so that the new setting is adopted immediately by the primary database.

You should also preset these properties on the primary database in preparation for it to be switched over to a standby database.

Note

Transport application failover (TAF) cannot be enabled on a connection for redo transport.

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Setting Up For Redo Transport

Redo data is transported to a standby database using Oracle Net.

An Oracle Net service name is specified with the SERVICE attribute of the LOG_ARCHIVE_DEST_n initialization parameter and is used to transmit redo data to the standby database. The Oracle Net service name is translated into a connect descriptor that contains the information necessary for connecting to the standby database.

The SERVICE attribute can be set or changed by using the DGConnectIdentifier database property. The DGConnectIdentifier property is set when a database is first added to the configuration. Its initial value is the connect identifier that is specified in the optional CONNECT IDENTIFIER IS clause of the ADD DATABASE command.

The DGConnectIdentifier property value is also used to set up the FAL_SERVER initialization parameter. If the DGConnectIdentifier property for any database is changed, the SERVICE attribute of the corresponding LOG_ARCHIVE_DEST_n initialization parameter will also be changed. In addition, the FAL_SERVER initialization parameter will also be updated on every enabled standby database in the configuration.

Managing Redo Transport Services for Data Protection Modes

As a part of the overall configuration protection mode, you must ensure that redo transport services are also properly set up for the data protection mode that you choose.

Managing Data Protection Modes describes how the broker handles data protection modes.

You use the LogXptMode or RedoRoutes database properties to set the SYNC, ASYNC, or FASTSYNC mode for redo transport services.

The following redo transport modes are supported:

SYNC

Configures redo transport services for this standby database using the SYNC and AFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. This mode, along with standby redo log files, is required for configurations operating in either maximum protection mode or maximum availability mode. This redo transport service enables the highest grade of data protection to the primary database, but also can incur a higher performance impact.

ASYNC

Configures redo transport services for this standby database using the ASYNC and NOAFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. This mode, along with standby redo log files, enables a moderate grade of protection to the primary database, and lower performance impact.

FASTSYNC

Configures redo transport services for this standby database using the SYNC and NOAFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. This mode is only available in maximum availability protection mode.

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Advanced Redo Transport Settings

You can use the RedoRoutes property to override the default behavior in which a primary database sends its redo to every possible redo transport destination in the configuration.

An example of redo transport topology other than the default would be one in which a physical standby or a far sync instance forwards redo received from the primary database to one or more destinations, or one in which the redo transport mode used for a given destination is dependent on which database is in the primary role.

> **See Also**
>
> - RedoRoutes for information about redo routing rules when you use the RedoRoutes property

Example 4-2 Using the RedoRoutes Property for Real-Time Cascading

Consider a configuration that has a primary database (North_Sales) and two physical standby databases (Local_Sales and Remote_Sales). The Local_Sales database is located in the same data center as the primary for high availability purposes. The Remote_Sales database is located in a remote data center for disaster recovery purposes. Instead of the primary having to ship its redo to both databases, it is possible to use the RedoRoutes property to configure real-time cascading, in which the local physical standby database forwards redo from North_Sales to the remote physical standby database, Remote_Sales. To accomplish this, the RedoRoutes property must be set as follows:

- On the North_Sales database, the RedoRoutes property must specify that if North_Sales is in the primary role, then it should ship redo to the Local_Sales database using synchronous transport mode. This rule prevents the primary from shipping redo data directly to the Remote_Sales database.
- On the Local_Sales database, the RedoRoutes property must specify that if North_Sales is in the primary role, then Local_Sales should forward redo it receives from North_Sales on to Remote_Sales.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'RedoRoutes' = '(LOCAL : Local_Sales
SYNC)';
DGMGRL> EDIT DATABASE 'Local_Sales' SET PROPERTY 'RedoRoutes' = '(North_Sales :
Remote_Sales ASYNC)';
```

To see the runtime RedoRoutes configuration, use the SHOW CONFIGURATION command. For example:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - Sales_Configuration

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    Local_Sales  - Physical standby database
      Remote_Sales  - Physical standby database (receiving current redo)

Fast-Start Failover: DISABLED
```


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```
Configuration Status:
SUCCESS
```

Note that the ASYNC redo transport attribute was explicitly specified in the redo route rule for the Remote_Sales destination to enable real-time cascading of redo to that destination. (Real-time cascading requires a license for the Oracle Active Data Guard option.)

To disable real-time cascading of redo, do not specify the ASYNC redo transport attribute. For example:

```
DGMGRL> EDIT DATABASE 'Local_Sales' SET PROPERTY 'RedoRoutes' = '(North_Sales :
Remote_Sales)';
```

Example 4-3 Using the RedoRoutes Property for Remote Alternate Destinations

The RedoRoutes property can also be used to set up a remote alternate destination so that a terminal member can still receive redo data even if the member from which it was receiving the redo data fails. Using the previous example, it would be possible to have the primary database, North_Sales, send redo data directly to Remote_Sales if the Local_Sales standby database failed. It is also possible, using the PRIORITY attribute, to set it up so that once the Local_Sales failure has been resolved it can resume shipping redo to Remote_Sales.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'RedoRoutes' = '(LOCAL :
( Local_Sales ASYNC PRIORITY=1, Remote_Sales ASYNC PRIORITY=2 ))';
Property "RedoRoutes" updated

DGMGRL> EDIT DATABASE 'Local_Sales' SET PROPERTY 'RedoRoutes' =
'(North_Sales : Remote_Sales ASYNC)';
Property "RedoRoutes" updated

DGMGRL> SHOW CONFIGURATION;

Configuration - Sales_Configuration

  Protection Mode: MaxPerformance
  Members:
  North_Sales    - Primary database
    Local_Sales  - Physical standby database
      Remote_Sales - Physical standby database
Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

To see the full RedoRoutes configuration, use the SHOW CONFIGURATION VERBOSE command. For example:

```
DGMGRL> SHOW CONFIGURATION VERBOSE;

Configuration - Sales_Configuration

  Protection Mode: MaxPerformance
  Members:
    North_Sales - Primary database
      Local_Sales - Physical standby database
        Remote_Sales - Physical standby database
      Remote_Sales - Physical standby database (alternate of Local_Sales)
```


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```
  Properties:
    FastStartFailoverThreshold      = '180'
    OperationTimeout                = '30'
    TraceLevel                      = 'USER'
    FastStartFailoverLagLimit       = '300'
    CommunicationTimeout            = '180'
    ObserverReconnect               = '0'
    FastStartFailoverAutoReinstate  = 'TRUE'
    FastStartFailoverPmyShutdown    = 'TRUE'
    BystandersFollowRoleChange      = 'ALL'
    ObserverOverride                = 'FALSE'
    ExternalDestination1            = ''
    ExternalDestination2            = ''
    PrimaryLostWriteAction          = 'CONTINUE'
    ConfigurationWideServiceName    = 'c0_CFG'

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

Turning Redo Transport Services On and Off

You turn redo transport services on and off by setting the state of the primary database.

Setting the primary database state to `TRANSPORT-ON` starts redo transport services at the primary database, and setting the primary database state to `TRANSPORT-OFF` stops redo transport services at the primary database.

> **Note**
>
> Oracle does not recommend turning off redo transport services to all standby databases. This increases the risk of data loss if the primary database fails.

Turn redo transport services on and off to an individual standby database using the `LogShipping` database property on the standby database. The `LogShipping` property accepts values `ON` and `OFF`. If you set the `LogShipping` property to `OFF` for a standby database, redo transport services to this standby database are turned off, while redo transport services to other databases are not affected. You can set `LogShipping` to `ON` to turn back on redo transport services to the standby database.

The relationship between setting the primary database state and setting the `LogShipping` property is as follows:

- If the primary database state is set to `TRANSPORT-OFF`, redo transport services to all the standby databases are stopped regardless of the `LogShipping` property values of the individual standby databases.
- If the primary database state is set to `TRANSPORT-ON`, redo transport services to each standby database are determined by the `LogShipping` property of that database.

Example 4-4 and Example 4-5 show how to turn off redo transport services in two different scenarios.

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Example 4-4 Turn Off Redo Transport Services to All Standby Databases

```
DGMGRL> EDIT DATABASE 'North_Sales' SET STATE='TRANSPORT-OFF';
Succeeded.
DGMGRL> SHOW DATABASE 'North_Sales';

Database - North_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-OFF
  Redo Rate:          (unknown)

  Instance(s):
    NorthSales

Database Status:
SUCCESS
```

Example 4-5 Turn Off Redo Transport Services to a Specific Standby Database

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'LogShipping'='OFF';
Property "LogShipping" updated

DGMGRL> SHOW DATABASE 'South_Sales' 'LogShipping';
  LogShipping = 'OFF'
```

Specifying Locations for Archived Redo Log Files

You can use broker configurable properties to set up locations to store both archived standby redo log files and archived online redo log files.

For online redo log files, use the `ArchiveLocation` and `AlternateLocation` properties on a primary, logical, or snapshot standby database.

For standby redo log files, use the `StandbyArchiveLocation` and `StandbyAlternateLocation` properties on a standby database. If the `StandbyArchiveLocation` is not set, `ArchiveLocation` or `AlternateLocation` specify the archiving location for both of online and standby redo log files. If `StandbyArchiveLocation` is set, `ArchiveLocation` and `AlternateLocation` specify the archiving location for online redo log files.

The `StandbyArchiveLocation` property specifies a location to store archived redo log files. The broker uses the location to store only archived redo log files received from the primary database. For archived redo log files generated locally when the database is either the primary database, a logical standby database, or a snapshot standby database, you need to specify the `ArchiveLocation` property. The broker allows the value of the `StandbyArchiveLocation` and `ArchiveLocation` properties to be the same as the location you set up for locally generated logs, in which case the broker sets up the `VALID_FOR` attribute of the destination appropriately so that it can be used for both the archived redo log files received from the primary database and archived redo log files generated locally. When a location is used for both online and standby redo log files, you must configure the `ArchiveLocation` property to the shared location and leave the `StandbyArchiveLocation` property empty.

You can also set up an alternate location to store archived redo log files by using the `StandbyAlternateLocation` and `AlternateLocation` properties. The alternate locations specified by these properties are where the archived redo log files are stored if the original archive location (specified by `StandbyArchiveLocation` or `Archivelocation`) fails. The broker sets up the alternate location properly using the `ALTERNATE` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter.

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> **Note**
>
> You can use the database recovery area to store archived redo log files on the standby. In such a case, the value of the `StandbyArchiveLocation` or `ArchiveLocation` properties can be set to `USE_DB_RECOVERY_FILE_DEST`.
>
> If you are not using a database recovery area, then on a logical standby database Oracle recommends that the `ArchiveLocation` property be different from the value of the `StandbyArchiveLocation` property.

Example 4-6 Using the Same Archiving Location for Standby Redo Log Files and Online Redo Log Files

The following example uses the same archiving location for online redo log files and standby redo log files.

```
ArchiveLocation='/archfs/arch'
```

Example 4-7 Specifying an Alternate Location for Archived Standby and Online Redo Log Files

The following example uses the same archiving location for online redo log files and standby redo log files. Configuring the `AlternateLocation` property ensures that a shared, alternate, location is available to store standby redo log files if the location specified by the `ArchiveLocation` property is unavailable.

```
ArchiveLocation='/archfs/arch'
AlternateLocation='/archfs/alt'
```

Example 4-8 Specifying Separate Archiving Locations for Online and Standby Redo Log Files

This example configures separate archiving locations for standby redo log files and online redo log files. Also, alternate archiving locations are configured for the online and standby redo log files by using the `AlternateLocation` and `StandbyAlternateLocation` properties respectively

```
ArchiveLocation='/archfs/arch/online'
AlternateLocation='/archfs/alt/online'
StandbyArchiveLocation='/archfs/arch/standby'
StandbyAlternateLocation='/archfs/alt/standby'
```

Other Redo Transport Settings

You can use database properties to tune the performance of redo transport services and to set up redo transport services failure policies.

The properties used are: `Binding`, `MaxFailure`, `NetTimeout`, `RedoCompression`, and `ReopenSecs` . These properties correspond to attributes on the `LOG_ARCHIVE_DEST_`*n* initialization parameter.

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> **See Also**
>
> Oracle Data Guard Broker Properties for complete information about these database properties

Redo Transport Services in an Oracle RAC Database Environment

If the primary database is an Oracle RAC database, the broker ensures that redo transport services are set up identically on each of the primary database instances.

Each instance has the same remote destinations, and for each remote destination, all instances are set up the same in terms of redo transport service, performance related settings, local archival of the online redo logs, and so on. If an instance has different settings, the broker raises a health check warning on that particular instance

Settings relative to redo transport services are saved in the broker configuration file as properties. When you update a redo transport-related property on a standby database, the corresponding change is also made automatically by the broker to the `LOG_ARCHIVE_DEST_`*n* initialization parameter on all of the primary database instances. If a new instance comes up on the primary database, the broker sets up redo transport services for the new instance using the redo transport-related properties of all the configuration members currently being managed by the broker. After the new instance is opened for activity, all archived redo log files generated on this instance begin to transmit to members of the configuration.

> **See also**
>
> *Oracle Data Guard Concepts and Administration* for additional information about the `LOG_ARCHIVE_DEST_`*n* initialization parameter

Transport Lag

Transport lag is a measure of the degree to which the transport of redo to a standby database or far sync instance lags behind the generation of redo on the primary database.

If there are one or more redo gaps on a standby database or far sync instance, then the transport lag is calculated as if no redo has been received after the beginning of the earliest redo gap.

Both Cloud Control and the DGMGRL client display the redo transport lag for each managed standby or far sync instance. Cloud Control displays the transport lag on the Oracle Data Guard home page. The DGMGRL client displays the transport lag in the `SHOW DATABASE` output. There is no transport lag displayed for a primary database. Here is an example of the transport lag for a physical standby database:

```
DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      0 seconds (computed 1 second ago)
  Apply Lag:          0 seconds (computed 1 second ago)
  Average Apply Rate: 13.00 KByte/s
```


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```
  Real Time Query:     OFF
  Instance(s):
    SouthSales

Database Status:
SUCCESS
```

Starting with Oracle Database Release 19c, the `SHOW CONFIGURATION LAG` command displays a summary of the broker configuration and the transport lag of all standby databases.

```
DGMGRL> SHOW CONFIGURATION LAG;

Configuration - config

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database
    Warning: ORA-16801: Redo transport-related property is inconsistent with member
setting.

    South_Sales - Physical standby database
                  Transport Lag:       0 seconds (computed 1 second ago)
                  Apply Lag:           0 seconds (computed 1 second ago)

Fast-Start Failover:  Disabled

Configuration Status:
WARNING   (status updated 11 seconds ago)
```

The transport lag can help you identify any problems that may exist with the redo transport services.

You can set the `TransportLagThreshold` database configurable property to generate a health check warning when the transport of redo data to a standby database or far sync instance lags behind the generation of redo data on the primary database.

The following command sets the `TransportLagThreshold` property to 15 seconds:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'TransportLagThreshold'=15;
Property TransportLagThreshold updated
```

Additionally, you can set the `TransportDisconnectedThreshold` database configurable property to generate a health check warning if a standby or far sync instance finds that it has not had any redo transport-related communication with the primary database. The property has a default value of 30 seconds.

The following command sets the `TransportDisconnectedThreshold` property to 15 seconds:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'TransportDisconnectedThreshold'=15;
Property TransportDisconnectedThreshold updated
```

Managing Redo Transport Services for Recovery Appliance

Redo transport services for a Zero Data Loss Recovery Appliance (Recovery Appliance) are managed in the same way as for a standby database.

You can use the broker to manage redo transport services to a Recovery Appliance from any member in the configuration. For example, to add a Recovery Appliance to a broker configuration and then enable it, you would take the following steps:

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1. Add the Recovery Appliance to the broker configuration.

```
DGMGRL> ADD RECOVERY_APPLIANCE EnterpriseRecoveryAppliance AS CONNECT IDENTIFIER IS
EnterpriseRecoveryAppliance.example.com;
Oracle Recovery Appliance "EnterpriseRecoveryAppliance" added

DGMGRL> SHOW RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
 Oracle Recovery Appliance - EnterpriseRecoveryAppliance
   Transport Lag: 0 seconds
  Redo Source: North_Sales

Oracle Recovery Appliance Status:
DISABLED
```

2. Enable the Recovery Appliance.

```
DGMGRL> ENABLE RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';

DGMGRL> SHOW RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
 Oracle Recovery Appliance - EnterpriseRecoveryAppliance
   Transport Lag: 0 seconds
  Redo Source: North_Sales

Oracle Recovery Appliance Status:
SUCCESS
```

3. Set a transport lag threshold.

   Set the `TransportLagThreshold` database configurable property to generate a health check warning when the transport of redo data to the Recovery Appliance lags behind the generation of redo data on the source database. This step is optional, but if you do not specify a transport lag threshold, then the default value of 30 seconds is used and a warning is generated if a transport lag exceeds 30 seconds.

   The following command sets the `TransportLagThreshold` property to 15 seconds:

```
DGMGRL> EDIT RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance'
SET PROPERTY 'TransportLagThreshold'=15;
Property TransportLagThreshold updated
```

Example 4-9 Setting Up Redo Transport From a Physical Standby To a Recovery Appliance

Consider a configuration that has a primary database (`North_Sales`) a physical standby database (`South_Sales`), and a Recovery Appliance (`EnterpriseRecoveryAppliance`). Instead of the primary having to ship its redo to both the standby and the Recovery Appliance, you can set up the `RedoRoutes` property so that the primary sends redo only to the physical standby, and the physical standby then forwards that redo to the Recovery Appliance. To accomplish this, the `RedoRoutes` property must be set as follows:

- On the `North_Sales` database, the `RedoRoutes` property must specify that if `North_Sales` is in the primary role, then it should ship redo to the `South_Sales` database using synchronous transport mode. This rule prevents the primary from shipping redo data directly to the Recovery Appliance, `EnterpriseRecoveryAppliance`.
- On the `South_Sales` database, the `RedoRoutes` property must specify that if `North_Sales` is in the primary role, then `South_Sales` should forward redo it receives from `North_Sales` on to `EnterpriseRecoveryAppliance`.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'RedoRoutes' = '(LOCAL : South_Sales
SYNC)';
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'RedoRoutes' = '(North_Sales :
EnterpriseRecoveryAppliance ASYNC)';
```


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Note that the ASYNC redo transport attribute was explicitly specified in the redo route rule for the EnterpriseRecoveryAppliance destination to enable real-time cascading of redo to that destination.

Once a Recovery Appliance has been added to a broker configuration, it can receive redo from either the primary database or a standby database. Example 4-9 shows how to set up a Recovery Appliance to receive redo from a physical standby database.

See Also

- Managing Redo Transport Services for information about managing redo transport services

Managing Log Apply Services

You can manage Redo Apply and SQL Apply on physical and logical standby databases by using database properties related to log apply.

The database properties related to log apply are as follows:

- Properties common to Redo Apply and SQL Apply
  - ApplyInstanceTimeout
  - DelayMins
  - PreferredApplyInstance
- Properties specific to Redo Apply
  - ApplyParallel
  - ApplyInstances

There are some properties related to SQL Apply that, if changed, may require a restart of SQL Apply if the current database state is APPLY-ON. See the information in Oracle Data Guard Broker Properties about properties related to SQL Apply, to determine which ones require SQL Apply to be restarted.

If the current database state is APPLY-OFF, the property changes will take effect the next time the database state is changed to APPLY-ON.

Managing Delayed Apply

You can set up Apply Services so that the application of redo to the standby database is delayed.

This allows the standby database to lag behind the primary database, and if a user error (for example, dropping a table) occurs during this window of time, the standby database will still contain the correct data that can be transmitted back to the primary database to repair the data.

By default, no delay is configured and the redo data is applied on a standby database as soon as possible. If the standby database has standby redo logs configured, the broker will enable real-time apply. When Redo Apply and SQL Apply apply redo in real time, the redo data is recovered directly from the standby redo log files as they are being filled. This means that the standby database does not have to wait for the log files to be archived before applying redo

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data from the archived redo log files. This minimizes the transactional lag between the primary and the standby.

Use the `DelayMins` database property to specify the number of minutes that log apply services must wait before applying redo data to the standby database. Note that only log apply services on the standby database are delayed. Redo transport services on the primary database are not delayed, thus the primary database data is still well protected by the standby database.

> ⚠ **Caution**
>
> Because the broker automatically enables real-time apply on standby databases, Oracle recommends that you configure all databases to use Flashback Database.

Managing Parallel Apply with Redo Apply

For Redo Apply, you can configure whether multiple parallel processes are used to apply redo data received from the primary database by using the `ApplyParallel` database property.

Parallelism is enabled by default, which means Redo Apply automatically chooses the optimal number of parallel processes based on the number of CPUs in the system. (This is equivalent to setting the `ApplyParallel` property to `AUTO`.) You can disable parallelism by setting the `ApplyParallel` property to `NO`.

> ⓘ **Note**
>
> Parallel Redo Apply is different from multi-instance Redo Apply. Parallel Redo Apply means that there are multiple Redo Apply slaves per instance; this value is set using the broker `ApplyParallel` property. Multi-instance Redo Apply means that there are multiple instances running Redo Apply; this value is set with the broker `ApplyInstances` property. The two properties can be used together to control the Redo Apply appliers on each instance on which apply is running in multi-instance apply. The number of parallel appliers specified by the `ApplyParallel` property will be the same on each instance in a multi-instance apply configuration.

> ⓘ **See Also**
>
> ApplyParallel
>
> ApplyInstances

Managing Multi-Instance Redo Apply

For Redo Apply in an Oracle RAC database, you can configure the number of instances that can be engaged in recovery by means of the `ApplyInstances` property value.

By default, only one instance is involved in recovery activity. However, the `ApplyInstances` property can be set to indicate a specific number of instances or the value `ALL`, to indicate all instances. When recovery is started, it checks to see if enough instances as configured are available to start recovery on. If not, then broker delays starting recovery for one minute to allow other instances to start up and then starts recovery.

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During periodic health checks, broker checks to see if more instances have started that could potentially be engaged in recovery. If so, then broker stops and restarts recovery to engage the additional instances.

Changing the value of the `ApplyInstances` property value results in recovery being restarted with the new values.

All instances must be in the same state (open or mounted) to be able to engage that instance in recovery.

Apply Services in an Oracle RAC Database Environment

When a standby database is an Oracle RAC database, SQL Apply and Redo Apply make use of an apply instance.

SQL Apply can run on only one instance of an Oracle RAC database at any time. This instance is called the apply instance.

Redo Apply can run on all instances of an Oracle RAC database at the same time, but only one of the instances is the apply coordinator and that is the instance that the broker considers to be the apply instance. This feature requires that the `ApplyInstances` database configurable property (valid only on physical standby databases) be set to a non-zero value. See ApplyInstances.

If the apply instance fails, then the broker automatically restarts SQL Apply, or the Redo Apply coordinator, as appropriate, on a different instance. This is called apply instance failover (see Apply Instance Failover).

Selecting the Apply Instance

If you have no preference which instance is to be the apply instance in an Oracle RAC standby database, the broker randomly picks an apply instance. If you want to select a particular instance as the apply instance, there are two methods to do so.

> **Note**
>
> The information in this section is not applicable to snapshot standby databases or far sync instances.

- The first method is to set the value of the `PreferredApplyInstance` database property to the name of the instance (see the `InstanceName` property) you want to be the apply instance. The broker starts log apply services on that instance if no apply instance is yet selected in the Oracle RAC standby database. This could be the case before you enable the standby database for the first time, or if the apply instance just failed and the broker is about to do an apply instance failover, or if the Oracle RAC database is currently the primary and you want to specify its apply instance in preparation for a switchover. Once the apply instance is selected and, as long as the apply instance is still running, the broker disregards the value of the `PreferredApplyInstance` property even if you change it.
- The second method is to change the apply instance when the apply instance is already selected and is running. To change the apply instance, issue the DGMGRL `SET STATE` command to set the standby database state to `APPLY-ON`, with a specific apply instance argument. The `SET STATE` command will update the `PreferredApplyInstance` property to the new apply instance value, and then move log apply services to the new instance. For example, use DGMGRL `SHOW` command to show the available instances for the standby

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database, then issue the `EDIT DATABASE` command to move log apply services to the new instance:

```
DGMGRL> SHOW DATABASE 'South_Sales'

Database - South_Sales

  Role:            PHYSICAL STANDBY
  Intended State:  APPLY-ON
  Transport Lag:   0 seconds (computed 1 second ago)
  Apply Lag:       0 seconds (computed 1 second ago)
  Apply Rate:      1017.00 KByte/s
  Real Time Query: OFF
  Instance(s):
    south_sales1   (apply instance)
    south_sales2

Database Status:
SUCCESS

DGMGRL> EDIT DATABASE 'South_Sales' SET STATE='APPLY-ON' WITH APPLY
INSTANCE='south_sales2';
Succeeded.

DGMGRL> SHOW DATABASE 'South_Sales' 'PreferredApplyInstance';
  PreferredApplyInstance = 'south_sales2'

DGMGRL> SHOW DATABASE 'South_Sales'

Database - South_Sales

  Role:            PHYSICAL STANDBY
  Intended State:  APPLY-ON
  Transport Lag:   0 seconds (computed 1 second ago)
  Apply Lag:       0 seconds (computed 1 second ago)
  Apply Rate:      1017.00 KByte/s
  Real Time Query: OFF
  Instance(s):
    south_sales1
    south_sales2   (apply instance)

Database Status:
SUCCESS
```

Ensure that the new apply instance is running when the command is issued. Otherwise, the apply instance remains the same.

Once the apply instance is selected, the broker keeps apply instance information in the broker configuration file so that even if the standby database is shut down and restarted, the broker still selects the same instance to start log apply services. The apply instance remains unchanged until changed by the user or it fails for any reason and the broker decides to do an apply instance failover.

Apply Instance Failover

To tolerate a failure of the apply instance, the broker leverages the availability of the Oracle RAC standby database by automatically failing over log apply services to a different standby instance.

The apply instance failover capability provided by the broker enhances data protection.

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To set up apply instance failover, set the `ApplyInstanceTimeout` database property to specify the time period that the broker will wait after detecting an apply instance failure and before initiating an apply instance failover. To select an appropriate timeout value, you need to consider:

- If there is another mechanism in the cluster (such as Oracle Clusterware) that will try to recover the failed apply instance.
- How long your business can tolerate not applying redo data on the standby database.
- The overhead associated with moving the log apply services to a different instance.

The broker default value of the `ApplyInstanceTimeout` property is 0 seconds, indicating that apply instance failover should occur immediately upon detection of the failure of the current apply instance.

After the broker initiates an apply instance failover, the broker selects a new apply instance according to the following rule: if the `PreferredApplyInstance` property indicates an instance that is currently running, select it as the new apply instance; otherwise pick a random instance that is currently running to be the new apply instance.

In addition, if the physical standby database was operating in real-time query mode when the apply instance failed, then after Oracle recovery cleanup is completed, the broker opens any instances that had been automatically closed. If the failed apply instance was the only instance open, then the instance chosen as the new apply instance is opened before starting apply services so that real-time query is once again in effect.

See Also

- *Oracle Data Guard Concepts and Administration* for more information about real-time query mode
- The My Oracle Support note 1357597.1 at https://support.oracle.com for additional information about apply instance failures in an Oracle Active Data Guard Oracle RAC standby

Apply Lag

Apply lag is a measure of the degree to which the data in a standby database lags behind the data in the primary database, due to delays in propagating and applying the redo.

Both Cloud Control and the DGMGRL client display the apply lag for each managed standby database. Cloud Control displays the apply lag on the Oracle Data Guard home page. The DGMGRL client displays the apply lag in the `SHOW DATABASE` output. There is no apply lag displayed for a primary database or far sync instance. For example:

```
DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      0 seconds (computed 1 second ago)
  Apply Lag:          0 seconds (computed 1 second ago)
  Average Apply Rate: 13.00 KByte/s
  Real Time Query:    OFF
  Instance(s):
    SouthSales
```


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```
Database Status:
SUCCESS
```

Starting with Oracle Database Release 19c, the `SHOW CONFIGURATION LAG` command displays a summary of the broker configuration and the apply lag of all standby databases.

The apply lag can help you identify any problems that may exist with both the redo transport services and the log apply services.

You can set the `ApplyLagThreshold` database configurable property to generate a health check warning when a standby database or far sync instance lags behind the data in the primary database.

The following command sets the `ApplyLagThreshold` property to 15 seconds:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'ApplyLagThreshold'=15;
Property ApplyLagThreshold updated
```

Managing Data Protection Modes

You can use the broker to set up a configuration having any of the different data protection modes.

The available modes of data protection are: maximum protection, maximum availability, and maximum performance.

This section contains the following topics to help you configure the proper protection for your configuration:

- Setting the Protection Mode for Your Configuration
- How the Protection Modes Influence Broker Operations

Setting the Protection Mode for Your Configuration

These are the steps for setting the protection mode for your configuration.

- Setting the Protection Mode Task 1: Determine Which Data Protection Mode You Want to Use
- Setting the Protection Mode Task 2: Set up standby redo log files
- Setting the Protection Mode Task 3: Set the redo transport mode
- Setting the Protection Mode Task 4: Using DGMGRL or Cloud Control

Setting the Protection Mode Task 1: Determine Which Data Protection Mode to Use

Each data protection mode provides a different balance of data protection, data availability, and database performance.

To select the data protection mode that meets the needs of your business, carefully consider your data protection requirements and the performance expectations of your users.

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> **Note**
>
> Maximum protection mode cannot be used in the following situations:
>
> - If the only standby database in a configuration is a snapshot standby
> - If a far sync instance is the only configuration member receiving redo in synchronous mode from the primary database

Maximum Availability

This protection mode provides the highest level of data protection that is possible without compromising the availability of a primary database. Transactions do not commit until all redo data needed to recover those transactions has been written to the online redo log and to the standby redo log on at least one synchronized standby database or far sync instance. If the primary database cannot write its redo stream to at least one synchronized standby database, it operates as if it were in maximum performance mode to preserve primary database availability until it is again able to write its redo stream to a synchronized standby database or far sync instance.

This mode ensures that no data loss will occur if the primary database fails, but only if a second fault does not prevent a complete set of redo data from being sent from the primary database to at least one standby database.

Maximum Performance

This protection mode provides the highest level of data protection that is possible without affecting the performance of a primary database. This is accomplished by allowing transactions to commit as soon as all redo data generated by those transactions has been written to the online log. Redo data is also written to one or more standby databases, but this is done asynchronously with respect to transaction commitment, so primary database performance is unaffected by delays in writing redo data to the standby database(s).

This protection mode offers slightly less data protection than maximum availability mode and has minimal impact on primary database performance.

This is the default protection mode.

You can enable fast-start failover if the protection mode is maximum performance.

Maximum Protection

This protection mode ensures that no data loss will occur if the primary database fails. To provide this level of protection, the redo data needed to recover a transaction must be written to both the online redo log and to the standby redo log on at least one synchronized standby database before the transaction commits. To ensure that data loss cannot occur, the primary database will shut down, rather than continue processing transactions, if it cannot write its redo stream to at least one synchronized standby database.

Transactions on the primary are considered protected as soon as Oracle Data Guard has written the redo data to persistent storage in a standby redo log file. Once that is done, acknowledgment is quickly made back to the primary database so that it can proceed to the next transaction. This minimizes the impact of synchronous transport on primary database throughput and response time. To fully benefit from complete Oracle Data Guard validation at the standby database, be sure to operate in real-time apply mode so that redo changes are applied to the standby database as fast as they are received. Oracle Data Guard signals any corruptions that are detected so that immediate corrective action can be taken.

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Because this data protection mode prioritizes data protection over primary database availability, Oracle recommends that a minimum of two standby databases be used to protect a primary database that runs in maximum protection mode to prevent a single standby database failure from causing the primary database to shut down. If only one standby database is supporting maximum protection mode, Oracle Data Guard broker will disallow the shutdown of the apply instance. This prevents the primary database from shutting down.

You can enable fast-start failover if the protection mode is maximum protection.

See Also

- *Oracle Data Guard Concepts and Administration* for complete information about data protection modes

Setting the Protection Mode Task 2: Set up standby redo log files

You must add standby redo log files on all standby databases, regardless of the protection mode you are using.

Also, Oracle requires that you add standby redo log files on the primary database in preparation for a future switchover or failover. Standby redo log files are required on the primary database if you want to enable fast-start failover.

Cloud Control automatically prompts you to select one or more standby databases in the configuration and sets up standby redo log (SRL) files on them and on the primary database in preparation for a future role change.

See Also

If you are using the DGMGRL command-line interface, follow the instructions in *Oracle Data Guard Concepts and Administration* to configure standby redo log files.

Setting the Protection Mode Task 3: Set the redo transport mode

If the data protection mode requires that you change the redo transport mode used by any of the standby databases, then either change the `LogXptMode` database property on each standby database, or set the `RedoRoutes` property on the primary database or on the far sync instance that is directly connected to the standby database.

See Managing Redo Transport Services for more information about setting the redo transport service. Table 4-2 shows the protection modes and the corresponding redo transport service.

Cloud Control automatically specifies the correct redo transport service on the primary database in preparation for a future switchover.

Table 4-2 Oracle Data Guard Protection Modes and Requirements

Protection Mode	Redo Transport	Standby Redo Log Files Needed?	Usable with Fast-Start Failover?
`MAXPROTECTION`	`SYNC`	Yes	Yes

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Table 4-2 (Cont.) Oracle Data Guard Protection Modes and Requirements

Protection Mode	Redo Transport	Standby Redo Log Files Needed?	Usable with Fast-Start Failover?
MAXAVAILABILITY	SYNC, FASTSYNC	Yes	Yes[1]
MAXPERFORMANCE	ASYNC	Yes	Yes

[1] Because FASTSYNC transport mode uses the NOAFFIRM attribute of the LOG_ARCHIVE_DEST_n parameter, data loss is possible. This means that a fast-start failover cannot be initiated when FASTSYNC is used and the standby is missing redo data.

Setting the Protection Mode Task 4: Using DGMGRL or Cloud Control

These steps describe how to set the protection mode using DGMGRL commands or Cloud Control.

With DGMGRL:

1. Use the EDIT DATABASE (property) command and specify the standby database whose redo transport service should be changed to correspond to the protection mode you plan to set. For example, if you plan to set the overall Oracle Data Guard configuration to operate in maximum availability mode, you must use the EDIT DATABASE command to set the SYNC mode for redo transport services. For example:

   ```
   DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY LogXptMode='SYNC';
   ```

   Do this also for the primary database or another standby database in the configuration to ensure that it can support the chosen protection mode after a switchover.

   You could also use the RedoRoutes property, as follows:

   ```
   EDIT DATABASE 'North_Sales' SET PROPERTY RedoRoutes = '(LOCAL : South_Sales SYNC)';
   ```

2. Use the EDIT CONFIGURATION SET PROTECTION MODE AS *protection-mode* command to set the overall configuration protection mode. For example:

   ```
   DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;
   ```

See Scenario 4: Setting the Configuration Protection Mode for a DGMGRL scenario showing how to set the protection mode.

With Cloud Control:

1. On the Oracle Data Guard overview page, click the link to the right of the Protection Mode label.
2. Select Maximum Protection, Maximum Availability, or Maximum Performance and click Continue.
3. If prompted, log in to the database with SYSDG or SYSDBA privileges and click Login.
4. Select one or more standby databases to support the protection mode that you selected. If standby redo log files are needed, verify the names of the log files. Click OK.
5. On the Confirmation page, click Yes.

The broker does not allow the protection mode to be directly upgraded from maximum performance mode to maximum protection mode. You must first change from maximum performance to maximum availability, and then to maximum protection.

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How the Protection Modes Influence Broker Operations

These topics describe how an Oracle Data Guard configuration's protection mode and redo transport services can affect operations such as switchovers, failovers, and disabling or enabling the configuration.

This section This section contains the following sections:

- Upgrading or Downgrading the Current Protection Mode
- Switchover Operations
- Failover Operations
- Disable and Enable Operations
- Requirements For Removing a Database from the Configuration
- Requirements On Other Operations

Upgrading or Downgrading the Current Protection Mode

No restart is necessary when you upgrade the current Oracle Data Guard protection mode to maximum availability or when you downgrade the current Oracle Data Guard protection mode.

Follow these recommendations when upgrading or downgrading the Oracle Data Guard protection mode:

- When upgrading the protection mode, upgrade the redo transport service before you upgrade the overall protection mode. At the time when you change the protection mode or reset the redo transport service of a standby database, the broker verifies that there is at least one standby database in the configuration that can support the desired grade of protection. If not, then the broker does not change the protection mode and returns an error.
- When downgrading the protection mode, downgrade the protection mode first and then change the redo transport service (if necessary). The broker will disallow a change of the redo transport service if doing so invalidates the current overall protection mode.

If you upgrade the protection mode from the maximum performance mode, the broker ensures that there is at least one standby database that receives redo via the `SYNC` transport, either directly or through a far sync instance. Additionally, for upgrades to maximum protection mode, the broker ensures there are no gaps in the redo data on the standby database. If there are no standby databases in the configuration that meet these requirements, the request to upgrade the protection mode is rejected with an error.

Starting with Oracle Database Release 21c, you can upgrade the protection mode to maximum availability even if the primary does not have any `SYNC` standbys.

The protection mode cannot be changed if fast-start failover is enabled. An exception to this is that a downgrade to maximum availability mode is allowed when fast-start failover has been enabled in maximum protection mode.

Switchover Operations

A switchover does not change the overall Oracle Data Guard protection mode. The protection mode remains the same as it was before the switchover.

This requires that there be a standby database that is properly configured to support the current protection mode once the switchover completes. This can be either another standby

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database in the configuration or the current primary database that will become a standby database after the switchover completes.

Before you perform a switchover, if necessary you can add standby redo log files and set the redo transport properties on the current primary database, or on another standby database in the configuration, to the transport mode that is required to support the Oracle Data Guard protection mode. Then, when the switchover begins:

- The broker verifies the presence of standby redo log files and the redo transport service setting on each standby database and on the current primary database.
- The broker verifies there are no gaps in the redo data present on the target standby database.

If the verification is successful, the switchover continues; otherwise, the switchover fails, and the database roles and the broker configuration files remain unchanged.

⚠ Warning

- If the target of the switchover is a physical standby database, then the broker restarts the original primary database.

ⓘ See Also

Switchover for more information about switchovers

Failover Operations

After you perform a manual failover, the Oracle Data Guard protection mode is downgraded to maximum performance mode if the protection mode was at maximum protection. You can upgrade the protection mode later, if necessary. If the protection mode was at maximum availability or maximum performance, it remains unchanged. The redo transport services of the standby databases remain unchanged.

If fast-start failover occurs, the broker preserves the protection mode that was in effect just prior to the fast-start failover. If the protection mode was maximum protection, then the configuration protection mode is preserved, but the new primary database is set to maximum availability to allow the instance to open. When a standby becomes available that supports maximum protection mode (either because the old primary database was reinstated or due to the presence of another standby in the configuration), the database protection mode is elevated to match the configuration protection mode of maximum protection.

ⓘ See Also

Manual Failover and Fast-Start Failover for more information about manual failover and fast-start failover, respectively

Disable and Enable Operations

When you disable broker management of a standby database, the broker checks to see if the overall protection mode can still be satisfied by any of the remaining standby databases. If not,

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the broker rejects the disable operation. Otherwise, the broker allows the disable operation to proceed as long as fast-start failover is not enabled. If it is enabled, the broker allows the disable operation to proceed only if the standby database is not the target standby database for fast-start failovers.

> **Warning**
>
> If you disable broker management of a standby database in the broker configuration, that standby database cannot be used by the broker as a failover target in the event of loss of the primary database.

As long as fast-start failover is not enabled, you can disable the entire configuration regardless of the protection mode. You cannot disable the configuration if fast-start failover is enabled. See Restrictions When Fast-Start Failover is Enabled for more information.

When enabling broker management of the entire configuration, the broker first checks to see if the protection mode will be satisfied by the redo transport settings of the standby databases that will be enabled. If not, the enable operation fails and the configuration remains disabled. Otherwise, the enable operation successfully enables the configuration, and the broker enables the database using the settings saved in the broker configuration file.

Requirements For Removing a Database from the Configuration

When removing a standby database from the broker configuration, the broker checks to see if the protection mode will still be satisfied. The operation fails if:

- Removing the database compromises the protection mode
- Fast-start failover is enabled and you try to remove the standby database that is the target of the fast-start failover
- The configuration member to be removed has its `RedoRoutes` configurable property set to a non-null value

You can remove the configuration at any time, unless fast-start failover is enabled.

Requirements On Other Operations

Some operations that take place in a broker configuration, especially operations related to redo transport services, can affect the overall protection mode. These operations include:

- Stopping redo transport services on the primary database
- Stopping redo transport services to individual standby databases
- Downgrading the redo transport mode from `SYNC` to `ASYNC` to the only standby database that supports a configuration operating in maximum availability mode or maximum protection mode

Before any of these operations can proceed, the broker checks to see if the protection mode will be supported by the redo transport service settings on the standby databases after the operation completes. If not, the broker fails the operation and returns an error.

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Managing Far Sync Instances

An Oracle Data Guard far sync instance is a redo transport destination that accepts redo from a primary database and forwards that redo to one or more redo destinations in the configuration.

It is similar to a physical standby database in that it has a control file, receives redo into Standby Redo Log files (SRLs), and archives those SRLs to local Archived Redo Logs (ARLs). But unlike a standby database, a far sync instance does not have data files, cannot be opened, and cannot apply received redo. These limitations yield the benefit of using fewer disk and processing resources. More importantly, a far sync instance provides the ability to failover to a terminal database with no data loss if it receives redo data using synchronous transport mode and the configuration protection mode is set to maximum availability.

Starting with Oracle Database Release 21c, you can use the `CREATE FAR_SYNC` command to create a new far sync instance and add it to the broker configuration. See CREATE FAR_SYNC.

The following example shows how to add a far sync instance to a broker configuration.

```
DGMGRL> ADD FAR_SYNC FS1 AS CONNECT IDENTIFIER IS FS1.example.com;
Far Sync FS1 added
DGMGRL> ENABLE FAR_SYNC FS1;
Enabled.
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales  - Primary database
    FS1        - Far Sync
    South_Sales - Physical standby database

Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS
```

After a far sync instance has been added to the configuration, set up redo transport to support maximum availability and then upgrade the protection mode:

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'RedoRoutes' = '(LOCAL : FS1 SYNC)';
DGMGRL> EDIT FAR_SYNC 'FS1' SET PROPERTY 'RedoRoutes' = '(North_Sales : South_Sales
ASYNC)';
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MaxAvailability;
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    FS1          - Far Sync
      South_Sales - Physical standby database

Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS
```


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To ensure that maximum availability protection mode can be maintained when South_Sales is the primary database, after a switchover or a failover, add a second far sync instance to the configuration so that South_Sales can send redo in synchronous mode which in turn will send redo to the new terminal database, North_Sales, after the role transition.

The following example shows how to add a second far sync instance to the broker configuration:

```
DGMGRL> ADD FAR_SYNC FS2 AS CONNECT IDENTIFIER IS FS2.example.com;
Far Sync FS2 added
DGMGRL> EDIT FAR_SYNC 'FS2' SET PROPERTY 'RedoRoutes' = '(South_Sales : North_Sales
ASYNC)';
DGMGRL> ENABLE FAR_SYNC FS2;
Enabled.
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'RedoRoutes' = '(LOCAL : FS2 SYNC)';
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    FS1          - Far Sync
      South_Sales - Physical standby database
      FS2         - Far Sync (inactive)

Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS
```

If a far sync instance is monitored for availability by Oracle Clusterware (for example, in an Oracle Restart, Oracle Real Application Clusters (Oracle RAC), or Oracle RAC One Node installation), then use the SRVCTL utility to specify a default open mode of mount. You can use a command such as the following:

```
srvctl modify database -d <db_unique_name> -startoption MOUNT
```

> **See Also**
>
> - *Oracle Data Guard Concepts and Administration* for more information about creating a far sync instance and redo transport

Managing Fast-Start Failover

You can enable **fast-start failover** to allow the broker to determine if a failover is necessary and to initiate a failover to a standby database from a list of one or more pre-specified target standby databases.

The failover can be set up for either no data loss or a configurable amount of data loss. In addition, you can specify under which conditions or errors you want a failover to be initiated. Oracle also provides the DBMS_DG PL/SQL package to allow an application to request a fast-start failover.

You use broker configuration properties to control the behavior of fast-start failover. You can also use Cloud Control or the DGMGRL ENABLE FAST_START FAILOVER CONDITION and DISABLE FAST_START FAILOVER CONDITION commands to specify conditions for which a fast-start failover should occur.

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Configure Properties to Tune Fast-Start Failover

You can set various properties to tune how fast-start failover behaves.

The configurable properties for fast-start failover include:

- `FastStartFailoverThreshold`

  Set the `FastStartFailoverThreshold` configuration property to specify the number of seconds you want the observer and target standby database to wait (after detecting the primary database is unavailable) before initiating a failover. See Enabling Fast-Start Failover for more information and an example.

- `FastStartFailoverPmyShutdown`

  The `FastStartFailoverPmyShutdown` configuration property controls whether the primary database will shut down if redo generation has been stalled (`FS_FAILOVER_STATUS` column of `V$DATABASE` contains a value of `STALLED`) and the primary database has lost connectivity with the observer and target standby database for longer than the number of seconds specified by the `FastStartFailoverThreshold` configuration property. The default value for FastStartFailoverPmyShutdown is `TRUE`.

  > **Note**
  >
  > The primary database is always shut down if a user configurable fast-start failover condition is detected or if an application initiated a fast-start failover by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.

- `FastStartFailoverLagLimit`

  The fast-start failover feature can be configured on databases operating in maximum performance mode. Destinations that receive redo in `ASYNC` mode will be acceptable fast-start failover target standby databases, and these destinations can lag the primary in terms of redo received and applied. A configurable time-based limit can be specified through the `FastStartFailoverLagLimit` configuration property. If the standby database's applied redo point is within this many seconds of the primary's redo generation point, a fast-start failover will be allowed. If its applied point lags beyond this limit, a fast-start failover is not allowed.

  The `FastStartFailoverLagLimit` configuration property can also be used if fast-start failover is enabled when the configuration is operating in maximum availability mode. It cannot be used when the configuration is operating in maximum protection mode. When `FastStartFailoverLagLimit` is set to a non-zero value and the configuration is operating in maximum availability mode, a zero data loss failover or a data loss failover is possible. If a data loss failover is performed, the amount of data loss will not exceed the number of seconds specified by the `FastStartFailoverLagLimit` configuration property. Note that the redo transport mode of the target standby must be set to the value of `SYNC` or `FASTSYNC` or `ASYNC` when a non-zero value is specified for the `FastStartFailoverLagLimit` property and the protection mode is maximum availability mode or maximum performance mode. If you want to change protection mode or redo transport mode to `SYNC` or `FASTSYNC`, you must first disable fast-start failover. Likewise, changing the protection mode from maximum availability mode to maximum performance mode will require first disabling fast-start failover. Reinstatement of an old primary will be possible after a fast-start failover to a target standby. If the observer rediscovers the old primary, it will automatically reinstate the old primary and any redo generated within the specified lag will be lost.

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> **Note**
>
> It is recommended to set the `FastStartFailoverLagLimit` lower than or equal to `FastStartFailoverThreshold`. When setting FastStartFailoverLagLimit greater than `FastStartFailoverThreshold`, the primary will keep committing after the Fast-Start Failover is initiated, exposing the configuration to the risk of having two primary databases for a short period of time.

> **See Also**
>
> Oracle Data Guard Broker Properties for more information

- `FastStartFailoverLagType`

  The `FastStartFailoverLagType` value (`APPLY` or `TRANSPORT`) in the fast-start failover configuration specifies the type of lag (apply lag or transport lag) that is used to specify the data loss threshold.

- `FastStartFailoverLagGraceTime`

  The `FastStartFailoverLagGraceTime` value for the fast-start failover configuration specifies the maximum amount of time (in seconds) that can pass before the lag limit (`FastStartFailoverLagLimit`) is reached when the primary database requests permission to move to the lagging state.

- `FastStartFailoverAutoReinstate`

  The `FastStartFailoverAutoReinstate` configuration property controls whether the former primary database is automatically reinstated if a fast-start failover occurred because the primary database crashed or was stalled for longer than `FastStartFailoverThreshold` seconds. The default value for `FastStartFailoverAutoReinstate` is `TRUE`.

  If you want to perform diagnostic or repair work after failover has completed, you can avoid an automatic reinstatement by setting the `FastStartFailoverAutoReinstate` configuration property to `FALSE`.

  > **Note**
  >
  > The former primary database is never automatically reinstated if a fast-start failover occurred because a user configurable fast-start failover condition was detected or because an application initiated a fast-start failover by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.

- `FastStartFailoverTarget`

  The `FastStartFailoverTarget` configuration property specifies the `DB_UNIQUE_NAME` values of the databases that are eligible to be targets of a fast-start failover when this database is the primary database.

- `ObserverPingInterval`

  The `ObserverPingInterval` configuration property specifies how frequently the observer must ping the primary database. This property is measured in milliseconds. The minimum value is 100 milliseconds. To achieve lower detection times for primary database failures, you must set the `ObserverPingInterval` and `ObserverPingRetry` properties before enabling fast-start failover.

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In low network latency environments where extremely short primary failure detection times are necessary, a combination of the ObserverPingInterval and ObserverPingRetry can be used to reduce detection time to as low as one second. ObserverPingInterval is used to specify on frequently the observer should ping. The lowest value that can be specified is 100ms.

- `ObserverPingRetry`

  The `ObserverPingRetry` configuration property pecifies the number of times that the observer retries a failed ping before it initiates a failover to the target standby database. A failed ping is a ping to the primary database that failed or took longer than the time specified by the `ObserverPingInterval` property. You must set both the `ObserverPingRetry` and `ObserverPingInterval` properties to achieve lower detection times for primary database failures. The minimum value is 10.

- `ObserverReconnect`

  The `ObserverReconnect` configuration property specifies how often the observer establishes a new connection to the primary database. When this property is set to the default value of 0, it prevents the observer from periodically establishing a new connection with the primary database. While this eliminates the processing overhead associated with periodically establishing a new observer connection to the primary database, it also prevents the observer from detecting that it is not possible to create new connections to the primary database. Note that logging in and out of the database is a resource-intensive operation. Given that, Oracle recommends that this property be set so the value specified is small enough to allow timely detection of faults at the primary database, but large enough to limit the impact of logging in to and out of the primary database.

- `ObserverOverride`

  The `ObserverOverride` configuration property, when set to `TRUE`, allows an automatic failover to occur when the observer has lost connectivity to the primary, even if the standby has a healthy connection to the primary.

Configure Conditions for Fast-start Failover

By default, a fast-start failover is done when neither the observer nor the standby can reach the primary after the configured time threshold (`FastStartFailoverThreshold`) has passed.

There are also other conditions under which you might want a fast-start failover to occur.

The configurable conditions fall into two classes: those detected through the database health-check mechanism and those detected through errors raised by the Oracle server (such as ORA errors). When a specified condition occurs, the observer will initiate a fast-start failover without waiting for `FastStartFailoverThreshold` to expire, assuming the standby is in a valid state to accept a failover.

Each condition may be enabled or disabled individually. The Oracle Data Guard configuration persists all user specified configurable fast-start failover conditions in the broker configuration file.

The observer will detect when the primary database has signaled any of the enabled health-check conditions and will immediately initiate a fast-start failover, assuming the standby is in a valid fast-start failover state (observed and either synchronized or within lag limits) to accept a failover.

For specified Oracle ORA-Error conditions, the primary database will notify the observer if the error is signaled and the observer will immediately initiate a fast-start failover, assuming the standby is in a valid fast-start failover state (observed and either synchronized or within lag

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limits) to accept a failover. Please note that the only Oracle ORA-Error for which fast-start failover can be triggered is ORA-240.

> **Note**
>
> The primary database will shut down and the observer will not attempt to automatically reinstate the former primary database.

> **See Also**
>
> - Cloud Control online help
> - ENABLE FAST_START FAILOVER CONDITION
> - DISABLE FAST_START FAILOVER CONDITION

Application Initiated Fast-Start Failover

You can use the `DBMS_DG` PL/SQL package to allow an application to direct a fast-start failover when it encounters specific conditions.

See "Directing a Fast-Start Failover From an Application".

Managing Database Conversions

You can use the DGMGRL `CONVERT DATABASE` command to convert a physical standby database to a snapshot standby database.

A snapshot standby database is a fully updatable standby database.

Like a physical or logical standby database, a snapshot standby database receives and archives redo data from a primary database. However, unlike a physical or logical standby database, a snapshot standby database does not apply the redo data that it receives. The redo data received by a snapshot standby database is not applied until the snapshot standby is converted back into a physical standby database, after first discarding any local updates made to the snapshot standby database.

To convert a physical standby database to a snapshot standby database you must have Flashback Database enabled. The following example shows how to convert a physical standby database to a snapshot standby database:

```
DGMGRL> CONVERT DATABASE 'South_Sales' TO SNAPSHOT STANDBY;
```

When you are ready to convert the snapshot back into a physical standby, use the DGMGRL `CONVERT DATABASE` command as follows:

```
DGMGRL> CONVERT DATABASE 'South_Sales' TO PHYSICAL STANDBY;
```

Database Status

In general, the broker checks the health of a database by verifying that the actual database state and settings match those described in the broker configuration file.

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This is done by checking if any component of the Oracle Data Guard configuration is functioning incorrectly (for example, if redo transport services have an error), and by checking if other required database settings are correctly set (for example, if the server parameter files are available and if the `ARCHIVELOG` mode is turned on). The following is a detailed list of what is being checked by the broker on a primary database and a standby database.

On a primary database, the health check determines whether the following conditions are met:

- Database is in the state specified by the user, as recorded in the broker configuration file
- Database is in the correct data protection mode
- Database is using a server parameter file
- Database is in the `ARCHIVELOG` mode
- Database guard is turned off
- Supplemental logging is turned on when there is a logical standby database in the configuration
- Redo transport services do not have any errors
- Database settings match those specified by the broker configurable properties
- Redo transport settings match those specified by the redo transport-related properties of the standby databases
- Current data protection level is consistent with configured data protection mode
- Primary database is able to resolve all gaps for all standby databases

On a standby database, the health check determines whether the following conditions are met:

- Database is in the state specified by the user, as recorded in the broker configuration file
- Database is using a server parameter file
- Database settings match those specified by the broker configurable properties
- Database guard is turned on when the database is a logical standby database
- Primary and target standby databases are synchronized or within lag limits if fast-start failover is enabled

Querying Database Status

Certain monitorable properties can be used to query the database status.

The following properties are directly accessed through the DGMGRL command-line interface:

- `LogXptStatus`
- `InconsistentLogXptProps`

> **Note**
>
> Cloud Control rearranges the values of these properties for presentation in the GUI.

You can use the `SHOW DATABASE <db_unique_name>` command to get a brief description of the database (name, role, and so on), database status, and information about any health check problems. For example, the output of the following `SHOW DATABASE` command shows two

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problems: some redo transport services errors and an inconsistent redo transport-related property

```
DGMGRL> SHOW DATABASE 'North_Sales';

Database - North_Sales
  Role: PRIMARY
  Intended State: TRANSPORT-OFF
  Instance(s):
    north_sales1
      Error: ORA-16737: the redo transport service for standby
        database "South_Sales" has an error

    north_sales2
      Error: ORA-16737: the redo transport service for standby
        database "South_Sales" has an error
      Warning: ORA-16715: redo transport-related property
        ReopenSecs of standby "South_Sales" is inconsistent
Database Status:
ERROR
```

To further check the details about the database status, you can use the following monitorable properties:

- `LogXptStatus` — lists all log transport errors detected on all instances of the primary database.
- `InconsistentLogXptProps` — lists all redo transport-related properties of standby databases that have inconsistent values between the broker configuration file and the redo transport settings.

Issue the following `SHOW DATABASE` commands to obtain further details about the problems.

```
DGMGRL> SHOW DATABASE 'North_Sales' 'LogXptStatus';
LOG TRANSPORT STATUS
PRIMARY_INSTANCE_NAME  STANDBY_DATABASE_NAME  STATUS
         north_sales1            South_Sales  ORA-12541: TNS:no listener
         north_sales2            South_Sales  ORA-12541: TNS:no listener

DGMGRL> SHOW DATABASE 'North_Sales' 'InconsistentLogXptProps';
INCONSISTENT LOG TRANSPORT PROPERTIES
 INSTANCE_NAME  STANDBY_NAME  PROPERTY_NAME  MEMORY_VALUE  BROKER_VALUE
  north_sales2   South_Sales     ReopenSecs           600           300
```

> **See Also**
>
> Oracle Data Guard Broker Properties for detailed information about database properties

Validating a Database Before a Role Change

You can use the `VALIDATE DATABASE` command to perform a comprehensive set of database checks prior to performing a role change.

The command checks the following items:

- Whether there is missing redo data on a standby database
- Whether flashback is enabled

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- The number of temporary tablespace files configured
- Whether an online data file move is in progress
- Whether online redo logs are cleared for a physical standby database
- Whether standby redo logs are cleared for a primary database
- The online log file configuration
- The standby log file configuration
- Apply-related property settings
- Transport-related property settings
- Whether there are any errors in the Automatic Diagnostic Repository (for example, control file corruptions, system data file problems, user data file problems)

In addition, the role change readiness evaluation for the primary and standby databases does the following:

- If Fast Start Failover (FSFO) is enabled for the broker configuration, the following conditions must be satisfied for the primary database to be ready for switchover:
  - For SYNC FSFO, the FSFO state must be `SYNC`.
  - For ASYNC FSFO, the FSFO state must be `NOT LAGGING`, or the lag must be less than or equal to `FastStartFailoverLagLimit`.
  - FSFO is not `SUSPENDED`
  - The PDB `SAVE STATE` is not configured.
- If Fast Start Failover (FSFO) is enabled for the broker configuration, the following conditions must be satisfied for the standby database to be ready for switchover:
  - For SYNC FSFO, the FSFO state must be `SYNC`.
  - For ASYNC FSFO, the FSFO state must be `NOT LAGGING`, or the lag must be less than or equal to `FastStartFailoverLagLimit`.
  - FSFO is not `SUSPENDED`
- If Fast Start Failover (FSFO) is enabled for the broker configuration, the following conditions must be satisfied for the standby database to be ready for failover:
  - For SYNC FSFO, the FSFO state must be `SYNC`.
  - For ASYNC FSFO, the FSFO state must be `NOT LAGGING`, or the lag must be less than or equal to `FastStartFailoverLagLimit`.
  - FSFO is not `SUSPENDED`
  - FSFO state is `OBSERVED`.

See Also

- "VALIDATE DATABASE" for a description of the command and for examples that show command output for various scenarios

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Validating the Server Parameter Files Before a Role Change

Use the `VALIDATE DATABASE SPFILE` command to compare the contents of the server parameter file (SPFILE) between the primary and standby database.

Comparing the primary to the standby lets you determine whether there are any missing parameters in either database's SPFILE, or whether the entries contain different values.

See Also

- VALIDATE DATABASE SPFILE for a description of the command and for examples that show command output

Validating the Network Configuration Before a Role Change

Use the `VALIDATE NETWORK CONFIGURATION` command to perform network connectivity checks between members of a configuration.

Performing a network connectivity check identifies potential network configuration problems before a role change is attempted.

See Also

- Validating the Network Configuration Before a Role Change

Validating the Static Connect Identifier Before a Role Change

A single-instance database on which Oracle Restart is not configured must have a static service registered with the listener so that the DGMGRL CLI can automatically start the instance when necessary (for example, for the new standby after a switchover).

The broker sets up a default value for the `StaticConnectIdentifier` property that uses that static service (assuming the default value of *db_unique_name*`_DGMGRL` is used for the static service name). This connect identifier is used for instance restart.

Use the `VALIDATE STATIC CONNECT IDENTIFIER` command to confirm that the connect identifier specified by the `StaticConnectIdentifier` property can be used to restart an instance. The command does not restart the database, but rather checks that the service specified in the connect identifier is registered with the listener.

See Also

- VALIDATE STATIC CONNECT IDENTIFIER for a description of the command and for examples that show command output

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Validating the DGConnectIdentifier Property

The DGMGRL command `VALIDATE DGConnectIdentfier` enables users to check to see whether a connection string is valid for the `DGConnectidentifier` property or not.

The `VALIDATE DGConnectIdentifier` command checks if it is able to be translated to something useful and makes a connection using it on all configuration members. This can also be used prior to adding a member to the configuration. If no configuration exists, the command checks a connection string at the database DGMGRL is connected to. If a configuration exists, all members use the specified connection string to see that the connection works.

This command performs the following for each instance of all members.

- Prints a network translation of the connection string at the instance.
- Prints environment variables related to network configuration at the instance.
- Makes a new connection using the translated network address at the instance.
- If a connection test succeeds, the instance name and `db_unique_name` of the connected database will be printed.
- Checks that the service name specified in the connect identifier is the db_unique_name service for the database that the command connected to.

See Also

- VALIDATE DGConnectIdentifier for a description of the command and for examples that show command output

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5

Managing Members of a DG PDB Broker Configuration

Learn how to manage DG PDB broker configurations and monitor the state of DG PDBs.

> **Note**
>
> The only supported protection mode for DB PDB configurations is maximum performance mode.

This chapter contains the following topics:

- Managing Broker Configuration Members
- Managing States of Broker Configuration Members
- State Transitions for DG PDBs
- Managing Database Properties in DG PDB Configurations
- Monitoring Redo Transport for DG PDBs
- Viewing Transport Lag and Apply Lag
- Monitoring a DG PDB Configuration
- Querying Database Status in DG PDB Configurations

Managing Broker Configuration Members

The broker uses information in its configuration files to manage and monitor the state of members in the DG PDB configuration.

The `COMPATIBLE` initialization parameter in the source database and the target database must be set to 21.1 or higher.

Tasks performed for CDB configurations such as setting configuration properties, creating configuration files, starting Data Guard broker, and enabling or disabling broker configurations are also applicable to DG PDB configurations.

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> **Note**
>
> Although you can configure a DG PDB for a PDB that is part of a CDB that already has a standby database, a role change between such a PDB and its DG PDB results in an inconsistent PDB configuration between the primary and standby databases. Similarly, a role change between the primary and standby database will result in the DG PDB being orphaned because it no longer has a source PDB. When you use Data Guard broker to manage the Data Guard primary and standby databases, creating a DG PDB in such a scenario is not allowed.
>
> When Data Guard broker is not used to manage the Data Guard environment, it is recommended to avoid setting up a PDB for Data Guard protection when the container to which the PDB belongs already has a Data Guard standby database.

Managing States of Broker Configuration Members

The standby PDBs in a DG PDB configuration can be in the `APPLY-ON` or `APPLY-OFF` state.

Standby PDBs in a DG PDB configuration can be in the `APPLY-ON` or `APPLY-OFF` state as describe in the following table.

Table 5-1 Database States and Descriptions in DG PDB Configurations

Database role	State Name	Description
Target PDB	`APPLY-ON`	Redo Apply is started on the target PDB within the target configuration. If this is an Oracle Real Application Clusters (Oracle RAC) instance, redo apply is started only on the instance where the command is run. The PDB cannot be opened if recovery is running. If the PDB is open when the command to start recovery is run, the PDB is closed.
Target PDB	`APPLY-OFF`	Redo Apply is stopped on the target PDB.

State Transitions for DG PDBs

Use the DGMGRL `EDIT DATABASE` command to explicitly change the state of a standby PDB. You can only change the state of the entire database, including all its PDBs.

The `EDIT PLUGGABLE DATABASE` command is used to change the state of a standby PDB. For example, the following command changes the state of the target standby `nyc_sales` to `APPLY-OFF`:

```
DGMGRL > EDIT PLUGGABLE DATABASE 'target-prim' SET STATE = 'APPLY-OFF';
Succeeded.
```


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Managing Database Properties in DG PDB Configurations

Database properties of members in a DG PDB configuration are of two types: monitorable properties or configurable properties.

Use monitorable properties to view run-time information related to configuration members. Monitorable properties can be viewed only when the member is enabled. Use the `SHOW DATABASE VERBOSE` command to list all monitorable properties. Use the `SHOW DATABASE` command to view details about a particular property. Use the `SHOW PLUGGABLE DATABASE` command to view information about the source PDB or target PDB.

Configurable properties impact the operation or configuration of a database. Use configurable properties to view and dynamically update information related to configuration members. You can edit properties regardless of the member's state. If the member is disabled when a property is edited, the property value takes effect after the member or configuration is enabled, as appropriate.

Use the `EDIT DATABASE` command to update the properties of the source database or target database. Use the `EDIT PLUGGABLE DATABASE` command to update the state of a source PDB or target PDB.

The `SHOW DATABASE` command has been enhanced to display information about Data Guard at the PDB level. In a DG PDB configuration, the `SHOW DATABASE` output shows whether the database has any source or target PDBs, and the number of PDBs in each role.

Example 5-1 Displaying the Properties of a Source Database (`SHOW DATABASE` output)

```
DGMGRL> SHOW DATABASE boston;

Database - boston
  Role: PRIMARY
  Intended State: TRANSPORT-ON
  Redo Rate:           (unknown)
  PDB Data Guard Role: SOURCE
  Data Guard Source PDB(s): 1
  Instance(s):
    boston


Database Status:
SUCCESS
```

Example 5-2 Displaying the Properties of Individual PDBs (`SHOW PLUGGABLE DATABASE` output)

This example uses the `SHOW PLUGGABLE DATABASE` command to display information about the target PDB `nyc_sales`.

```
DGMGRL> show pluggable database nyc_sales at newyork;

Pluggable database - NYC_SALES at newyork

  Data Guard Role:     Physical Standby
  Con_ID:              3
  Source:              con_id 3 at boston
```


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```
  Transport Lag:       0 seconds (computed 0 second ago)
  Apply Lag:           14 seconds (computed 0 second ago)
  Intended State:      APPLY-OFF
  Apply State:         Not Running

Pluggable Database Status:
SUCCESS
```

Monitoring Redo Transport for DG PDBs

The broker automatically starts redo transport services between a source database and target database once there has been at least one PDB designated for replication.

Viewing Transport Lag and Apply Lag

Transport lag is a measure of the degree to which redo transport has not shipped redo data from the source database to the target database. Apply lag is a measure of the degree to which redo apply has not applied the redo that has been received at the target database.

The redo transport service transmits redo data from the source database to the target database. The log apply services at the individual target PDB updates the target PDB with this redo data, thereby keeping the target PDBs consistent with the source PDBs. Each target PDB has its own log apply service. The archived redo log files and standby redo log files contain all of the database changes except for unrecoverable or unlogged changes.

Transport Lag

The transport lag is displayed in the output of the `SHOW PLUGGABLE DATABASE` command. This lag represents, in seconds, the amount of redo data that has not been received by the target CDB for the specified DG PDB.

Average Apply Rate

If the Apply State is Running, the average apply rate is displayed in the output of the `SHOW PLUGGABLE DATABASE` command. The average apply rate pertains to a specific DG PDB.

Monitoring a DG PDB Configuration

Monitor the status of the configuration and its members to view statistics, diagnostic information, detect problems, and quickly take necessary actions.

After a DG PDB configuration is enabled, the broker schedules an automatic health check on the individual members. It monitors and reports problems with redo transport and recovery progress. Diagnostic information is written to the broker log files (drc*.log) and can be viewed using DGMGRL commands.

Querying Database Status in DG PDB Configurations

Use DGMGRL to query information about the DG PDB configuration and its members.

You can view the status of the DG PDB configuration and detailed information about the source database and target database.

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Example 5-3 Displaying Information for a DG PDB Configuration

The commands below can be used to display information about a DG PDB Configuration:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - Boston

  Protection Mode: MaxPerformance
  Members:
  boston  - Primary database
    newyork - Primary database in NewYork configuration

Data Guard for PDB:   Enabled in SOURCE role

Configuration Status:
SUCCESS   (status updated 7 seconds ago)

DGMGRL> SHOW ALL PLUGGABLE DATABASE AT boston;

PDB Name         PDB ID   Data Guard Role    Data Guard Partner

BOS_SALES           3     Primary            NYC_SALES (con_id 3) at newyork
BOS_ACCT            4     None               None
BOS_FINANCE         5     None               None

DGMGRL> SHOW ALL PLUGGABLE DATABASE AT newyork;

PDB Name         PDB ID   Data Guard Role    Data Guard Partner

NYC_SALES           3     Physical Standby   BOS_SALES (con_id 3) at boston
```


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6

Switchover and Failover Operations

Learn how to use Oracle Data Guard broker to manage databases during switchover and failover.

- Overview of Switchover and Failover in a Broker Environment
- Choosing a Target Standby Database
- Switchover
- Manual Failover
- Fast-Start Failover
- Database Client Considerations

Overview of Switchover and Failover in a Broker Environment

Oracle Data Guard helps you change the role of databases between primary and standby using either a switchover or failover operation.

- A **switchover** is a role reversal between the primary database and one of its standby databases. A switchover guarantees no data loss and is typically done for planned maintenance of the primary system. During a switchover, the primary database transitions to a standby role, and the standby database transitions to the primary role.
- A failover is a role transition in which one of the standby databases is transitioned to the primary role after the primary database (all instances in the case of an Oracle RAC database) fails or has become unreachable. A failover may or may not result in data loss depending on the protection mode in effect at the time of the failover.

The broker simplifies switchovers and failovers by allowing you to invoke them using a single key click in Oracle Enterprise Manager Cloud Control (Cloud Control) or a single command in the DGMGRL command-line interface (referred to in this documentation as *manual* failover). As part of managing the switchover, the broker automatically does the following:

- Sets up redo transport from the new primary to the other members of the configuration
- Starts Redo Apply services on the new standby
- Ensures the other standbys in the broker configuration are viable to the new primary
- Integrates with Oracle Clusterware and Oracle Global Data Services (GDS) to ensure that the proper services are started after a role change

When fast-start failover is enabled, the broker determines if a failover is necessary and initiates the failover to the current target standby database automatically, with no need for manual intervention. The reduced need for manual intervention can increase availability without increasing management costs. Manual failover gives you control over exactly when a failover occurs and to which target standby database. Regardless of the method you choose, the broker coordinates the role transition on all databases in the configuration.

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Choosing a Target Standby Database

When you select a standby database to be the next primary database after a switchover or a failover, there are several factors to consider.

You need to consider all of the options at the time you are building your Oracle Data Guard configuration, including factors such as the characteristics of physical standbys versus logical standbys versus snapshot standbys, the network latency to your standby database sites, the computing capabilities at a future primary database site, and so on.

> **Note**
>
> A snapshot standby cannot be the target of a switchover or fast-start failover operation. You can, however, perform a manual failover to a snapshot standby.
>
> A far sync instance or Zero Data Loss Recovery Appliance is not a database and therefore cannot be the target of a role transition.

For switchovers, understanding all of the factors can simplify the choice of which standby database to consider as your new primary database. In disaster situations where a failover is necessary, you may be more limited as to which standby database is the best one to pick up the failed primary database's activities. Choosing a Target Standby Database for Switchover and Choosing a Target Standby Database for Failover provide guidelines to help you choose a target standby database.

> **Note**
>
> For fast-start failover, you must pre-select at least one target standby database. You can also pre-select multiple targets if you want to; the selection does not have to be reciprocal.

Determining a Database's Readiness to Change Roles

To help you select an appropriate switchover or failover target, use the following DGMGRL commands which perform checks on the database to determine its readiness to complete a role change.

- VALIDATE DATABASE
- VALIDATE NETWORK CONFIGURATION
- VALIDATE DATABASE SPFILE
- VALIDATE STATIC CONNECT IDENTIFIER
- VALIDATE DGConnectIdentifier

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See Also

- "Scenario 9: Performing a Switchover Operation" for an example of using the `VALIDATE DATABASE` command to show a database's readiness to complete a role switchover
- "Scenario 10: Performing a Manual Failover Operation" for an example of using the `VALIDATE DATABASE` command to show a database's readiness to complete a role failover

Choosing a Target Standby Database for Switchover

When performing a switchover in a configuration whose standby databases are all of the same type (all physical or all logical standby databases), choose the standby database that has the least amount of unapplied redo (smallest apply lag).

By choosing the standby database with the least amount of unapplied redo, you can minimize the overall time it takes to complete the switchover operation. For example:

- Using DGMGRL, you can do this by examining the output of the `SHOW CONFIGURATION LAG`.
- Using Cloud Control, you can view the value of the `ApplyLag` column for each standby database in the `Standby Databases` section of the Oracle Data Guard Overview page.

If the configuration contains both physical and logical standby databases, consider choosing a physical standby database (that has the least amount of unapplied redo) to be the target standby database. A switchover to a physical standby database is preferable because all databases in the configuration will be available as standby databases to the new primary database after the switchover operation completes. Whereas a switchover to a logical standby database will invalidate and disable all of the physical and snapshot standby databases in the configuration. You will then need to re-create the physical standby databases from a copy of the new primary database before you can reenable them. Alternatively, if you intend to switch back to the original primary relatively soon, then you may re-enable the disabled standby databases after the switch back.

You cannot perform a switchover to a snapshot standby database unless you first convert it back to a physical standby database.

Note

If the Oracle Data Guard configuration is operating in maximum protection mode, the broker does not allow a switchover to occur to a logical standby database. The configuration must be operating in either maximum availability mode or maximum performance mode in order to be able to switch over to a logical standby database.

Choosing a Target Standby Database for Failover

When performing a failover in a configuration whose standbys are all of the same type, choose the standby database that has the smallest transport lag. Choosing the standby database with the smallest transport lag can minimize the amount of data loss and in some cases, incur no data loss at all.

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If the configuration contains physical, snapshot, and logical standby databases, consider choosing a physical standby database as the target standby database. A failover to a physical standby database is preferable because it is likely that all standby databases in the configuration will still be available as standby databases to the new primary database after the failover operation completes.

You may failover to a snapshot standby database. However failing over to a snapshot standby database will require more time because the broker must first convert it back to a physical standby database. After the conversion, the broker will start Redo Apply to apply accumulated redo data, before failing the database over to the primary role. Because the broker performs the failover after converting the snapshot standby database to a physical standby database, it is likely that all standby databases in the configuration will still be available as standby databases to the new primary database after the failover operation completes.

A failover to a logical standby database requires that all physical and snapshot standby databases be re-created from a copy of the new primary database after the failover completes. In addition, a logical standby database may contain only a subset of the data present in the primary database. (For example, if the `DBMS_LOGSTDBY.SKIP` procedure was used to specify which database operations done on the primary database will not be applied to the logical standby database.)

However, there may be exceptions to the recommendation to choose a physical standby database as the target standby database. For example, if all your physical standbys are also unavailable, then failing over to a logical standby is your only choice.

Switchover

A switchover is a role reversal between the primary database and one of its standby databases.

A switchover guarantees no data loss and is typically done for planned maintenance of the primary system. During a switchover, the primary database transitions to a standby role, and the standby database transitions to the primary role.

Whenever possible, you should switch over to a physical standby database:

- If the switchover transitions a physical standby database to the primary role, then:
  - The original primary database will be switched to a physical standby role.
  - Other members of the configuration will receive redo from the designated redo source based on the new primary.
  - The original primary database will be restarted as a part of the switchover operation. Note that the new primary database does not need to be restarted.

    Standby databases not involved in the switchover (known as bystander standby databases) continue operating in the state they were in before the switchover occurred and will automatically begin applying redo data received from the new primary database.
- If the switchover transitions a logical standby database to the primary role, then:
  - The original primary database will be switched to a logical standby role.
  - Neither the primary database nor the logical standby database needs to be restarted after the switchover completes.

    Other logical standby bystander databases in the broker configuration will remain viable after the switchover. All physical and snapshot standby databases will be

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disabled and must be re-created from a copy of the new primary database after a switchover to a logical standby database.

Switchover to a logical standby database is disallowed when the configuration is operating in maximum protection mode.

> **Warning**
>
> After a switchover to a logical standby database any snapshot or physical standby databases in the broker configuration are no longer viable as standby databases and will; be disabled by the broker. If the switchover to a logical standby is only for a short time, the disabled snapshot and physical standby databases can be successfully reenabled after switching back to the original primary. Reenabling Disabled Databases After a Role Change describes how to restore their viability as standby databases.
>
> If the switchover to a logical standby is only for a short time, the disabled snapshot and physical standby databases can be successfully reenabled after switching back to the original primary.

Before Performing a Switchover Operation

These are some points to consider before you begin a switchover.

- When you start a switchover, the broker verifies that at least one standby database, including the primary database that is about to be transitioned to the standby role, is configured to support the overall protection mode (maximum protection, maximum availability, or maximum performance) after the switchover is completed.
- Prepare the primary database in advance for its possible future role as a standby database in the context of the overall protection mode (see Managing Data Protection Modes). Such preparation includes:
  - Ensuring that standby redo log files are configured on the primary database.
  - Presetting database properties related to redo transport services, such as `LogXptMode`, `NetTimeout`, `StandbyArchiveLocation`, `StandbyAlternateLocation`, and `RedoRoutes`. For more details about managing redo transport services using database properties, see Managing Redo Transport Services.
  - Reset database properties related to Redo Apply services, such as `DelayMins`. Any apply delay must be removed before beginning a switchover. The broker will not allow a switchover to a standby that has an apply delay configured (`DelayMins` property is set to a non-zero value). For more details about managing Redo Apply services using properties, see Managing Log Apply Services.
  - For each temporary table, verifying that temporary files associated with that table on the primary database also exist on the standby database.

  Note that the broker does not use the properties to set up redo transport services and Redo Apply services until you actually switch over the primary database to the standby role. Thus, the validity of the values of these properties is not verified until after the switchover. Once you set these properties, their values persist through role changes during switchover and failover.
- If fast-start failover is enabled, then a switchover can be performed only to the pre-specified target standby database and only if the standby database is synchronized with the primary database or is within the configured lag limit, for the max availability and max

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performance modes respectively. For information about enabling fast-start failover, see Enabling Fast-Start Failover.

- You can use the `SHOW CONFIGURATION WHEN PRIMARY IS` command to show the redo transport configuration (based on each member's setting of the `RedoRoutes` property) that would be in effect if the specified database were the primary database. You can use this information to identify ahead of time any redo transport configurations that would be incorrect after a role change, including any standbys that will not receive redo because the `RedoRoutes` property was not configured correctly.

After a switchover completes, the broker preserves the overall Oracle Data Guard protection mode as part of the switchover process by keeping the protection mode at the same protection level (maximum protection, maximum availability, or maximum performance) it was at before the switchover. Apply services on all other bystander standby databases automatically begin applying redo data received from the new primary database.

If there are physical or snapshot standby databases in the configuration and the switchover occurs to a logical standby database, you need to re-create those databases from a copy of the new primary database and then reenable those databases, as described in Reenabling Disabled Databases After a Role Change.

> **Note**
>
> In an Oracle Data Guard configuration, the SRVCTL `-startoption` and `-role` are updated after switchover to reflect the current open mode and database role on the new primary and standby databases. See "Database Service Configuration Requirements" for additional information about how the broker interacts with Oracle Restart.

Starting a Switchover

When a switchover is started, the primary and standby databases that are involved should have as small a redo lag as possible.

The act of switching roles should be a well-planned activity. *Oracle Data Guard Concepts and Administration* provides information about setting up the databases in preparation of a switchover.

To start a switchover using Cloud Control, select the standby database that you want to change to the primary role and click **Switchover**. When using DGMGRL, you need to issue the `SWITCHOVER` command, specifying the name of the standby database that you want to change into the primary role.

The broker controls the rest of the switchover.

How the Broker Performs a Switchover

These are the actions the broker performs after you start a switchover.

1. Verifies that the primary and the target standby databases are in the following states:
   a. The primary database is enabled and is in the `TRANSPORT-ON` state.
   b. The target standby database is enabled and is in the `APPLY-ON` state.

   The broker allows the switchover to proceed as long as there are no errors for the primary database and the standby database that you selected to participate in the switchover

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operation. Errors occurring for any other configuration members will not impede the switchover.

2. If block change tracking is enabled on the primary database, and the target standby database is mounted, broker remembers this setting so that block change tracking can be enabled on the new primary database.
3. If the `WAIT` option is included in the `SWITCHOVER` command, and the databases are managed by Oracle Clusterware:
   - The broker notifies Oracle Clusterware to stop active services.
   - The broker continuously monitors for all sessions that are connected through these services to exit or for the specified wait time expires.
     - If a non-zero value is specified for the `WAIT` option, broker waits for the amount of time specified in the `WAIT` option.
     - If no value is specified for the `WAIT` option, broker waits for the amount of time specified by maximum configured `drain_timeout` amongst the active services. The `drain_timeout` is specified in the SRVCTL `add service` command.

     Note that a switchover operation may be started before the specified wait time, if all the sessions that are connected though the active services exit.
4. Switches roles between the primary and standby databases.

   The broker first converts the original primary database to run in the standby role. If any errors occur during either conversion, the broker stops the switchover. See Troubleshooting Problems During a Switchover Operation for more information.
5. Updates the broker configuration file to record the change in roles.

   This allows the appropriate Data Guard services, such as redo transport or redo apply, to be started when the database is restarted later for any reason.
6. If the old primary database had block change tracking enabled and the target standby was mounted, the broker enables block change tracking on the new primary database.
7. Restarts the new standby (former primary) database if the switchover occurs to a physical standby database, and Redo Apply begins applying redo data from the new primary database.

   If the switchover occurs to a physical standby database, and the former primary database is managed by Oracle Clusterware, broker directs Oracle Clusterware to restart the new physical standby database. Else, broker restarts the new physical standby database.

   After the restart, Redo Apply begins applying redo data from the new primary database.
8. The new primary database is opened in read/write mode and redo transport services are started.

   If the former physical standby database was running with real-time query enabled, the new physical standby database will run with real-time query enabled.

   If the database is managed by Oracle Clusterware, broker does not open any of the PDBs. Instead, Oracle Clusterware opens PDBs on particular instances based on the service configuration. If the database is not managed by Oracle Clusterware, broker opens all the PDBs on the new primary database and on the target standby database (if real-time query is enabled).

The broker verifies the state and status of the databases to ensure that the switchover transitioned the databases to their new role correctly. Bystander standby databases that are not disabled by the broker after the switchover will continue operating in the state they were in before the switchover.

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In the rare event that a switchover operation fails and you are left with no primary database, retry the switchover command. You can switch back to the original primary and then either retry the switchover to the original target standby, or choose another standby in the configuration to switch over to. See Troubleshooting Oracle Data Guard for more information.

Manual Failover

In a manual failover, you convert a standby database to a primary database because the original primary database failed and there is no possibility of recovering the primary database in a timely manner.

There may or may not be data loss depending upon whether your primary and target standby databases were synchronized at the time of the primary database failure. The word *manual* is used to contrast this type of failover with a fast-start failover (described in Fast-Start Failover).

> **Note**
>
> You can perform a manual failover even if fast-start failover is enabled. See Performing Manual Role Changes When Fast-Start Failover Is Enabled for more information.

The following sections describe how to perform manual failovers:

- Complete and Immediate Manual Failovers
- Performing a Manual Failover Operation
- Reenabling Disabled Databases After a Role Change

Complete and Immediate Manual Failovers

You can use Cloud Control or DGMGRL, to perform either a *complete* (recommended) or an *immediate* failover.

- A *complete* failover is the recommended and default failover option. It automatically recovers the maximum amount of redo data for the protection mode the configuration is operating in. A complete failover also attempts to avoid disabling any standby databases that were not the target of the failover, so that they may continue serving as standby databases to the new primary database.

  Whether or not standby databases that were not the target of failover (bystander standby databases) are disabled depends upon how much redo data they have applied relative to the failover target and the standby type of the failover target:

  – If the failover target is a physical or snapshot standby database, the original primary database must be reinstated or re-created in order to be a standby database for the new primary database. In addition, some standby databases may be disabled by the broker during the failover if the broker detects that they have applied redo beyond where the new primary database had applied. Any standby database that was disabled by the broker must be reinstated or re-created, as described in Reenabling Disabled Databases After a Role Change, before it can be a standby database for the new primary database.

    Note that if failover was performed on a snapshot standby database, the old primary must be either reinstated or re-created as a physical standby database.

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  - If the failover target is a logical standby database, the original primary database and all physical and snapshot standby databases in the configuration will be disabled. The primary database can be reinstated if it had flashback database enabled. The physical and snapshot standby databases will have to be re-created from a copy of the new primary database. See Reenabling Disabled Databases After a Role Change for more information.

  If the primary database can be mounted, it may be possible to flush any unsent redo data from the primary database to the target standby database using the `ALTER SYSTEM FLUSH REDO` SQL statement. If this operation is successful, a zero data loss failover may be possible even if the primary database is not in a zero data loss protection mode. See *Oracle Data Guard Concepts and Administration* for more information on using the `ALTER SYSTEM FLUSH REDO` statement.

  During a complete failover, the broker performs the failover steps described in How the Broker Performs a Complete Failover Operation.

- An *immediate* failover is the fastest type of failover. However, no additional data is applied on the standby database once you invoke the failover. Another consequence of immediate failover is that all other databases in the configuration are disabled and must be reinstated or re-created before they can serve as standby databases for the new primary database. Reenabling Disabled Databases After a Role Change describes how to do this. During an immediate failover, the broker performs the failover steps described in How the Broker Performs an Immediate Failover Operation.

> **Note**
>
> Always try to perform a complete failover first unless redo apply has stopped at the failover target due to an `ORA-752` or `ORA-600 [3020]` error. If one of these errors has occurred, follow the guidelines in "Resolving ORA-752 or ORA-600 [3020] During Standby Recovery" in My Oracle Support Note 1265884.1 before proceeding. This support note is available at `https://support.oracle.com`.
>
> An immediate failover should only be performed when a complete failover is unsuccessful or in the error cases just noted. A complete failover can occur without any data loss, depending on the destination attributes of redo transport services, but an immediate failover usually results in some data loss.

Performing a Manual Failover Operation

Before beginning a failover, first determine that there is no possibility of recovering the primary database in a timely manner, and ensure that the primary database is shut down.

If the database is managed by Oracle Clusterware, broker does not open any pluggable databases (PDBs) on any of the instances. Instead, when broker notifies the Oracle Clusterware agent that the failover completed, the Oracle Clusterware agent opens PDBs on particular instances based on the service configuration.

The steps in this section describe the tasks involved to perform a manual failover. Depending on the failover and the types of standby databases involved, some of the databases may need to be reinstated or re-created.

- Performing a Manual Failover Task 1: Determine Which of the Available Standby Databases is the Best Target for the Failover
- Performing a Manual Failover Task 2: Start the Failover

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- Performing a Manual Failover Task 3: Reset the Protection Mode
- Performing a Manual Failover Task 4: Re-establish a Disaster-Recovery Configuration

Performing a Manual Failover Task 1: Determine Which of the Available Standby Databases is the Best Target for the Failover

These are the guidelines for choosing a target standby database.

See Choosing a Target Standby Database.

Performing a Manual Failover Task 2: Start the Failover

Use Cloud Control or DGMGRL to perform either a *complete* (recommended) or an *immediate* failover.

Manual Failover Using Cloud Control:

On the Oracle Data Guard Overview page in Cloud Control, select the standby database that you want to change to the primary role and click **Failover**. Then, on the Failover Confirmation page, click **Yes** to invoke the default Complete failover option.

Manual Failover Using DGMGRL:

Connect to the target standby database and issue the `FAILOVER` command to perform a failover, specifying the name of the standby database that you want to become the primary database:

```
DGMGRL> FAILOVER TO database-name;
```

Specify the optional `IMMEDIATE` clause to perform an immediate failover if any of the following conditions are true:

- An `ORA-752` error has occurred at the standby database
- An `ORA-600 [3020]` error has occurred at the standby database and Oracle support has determined that it was caused by a lost write at the primary database
- A complete failover is not possible

```
DGMGRL> FAILOVER TO database-name IMMEDIATE;
```

> **See Also**
>
> - FAILOVER

If you are performing a complete failover, then all accumulated redo data is applied before the database role is changed to primary. If you are performing an immediate failover, then the database role is changed to primary without applying any accumulated redo data.

If the target is a snapshot standby database, the broker first converts the database to a physical standby database.

No instances are shutdown when doing a failover, if the target standby database is either a physical or logical standby. If the target standby database is a snapshot standby database, all of its instances must be restarted to the mount mode before performing failover. Both Cloud Control and the DGMGRL CLI will do this automatically as part of failover.

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Performing a Manual Failover Task 3: Reset the Protection Mode

This list describes how the overall Oracle Data Guard protection mode is handled after a manual failover (complete or immediate).

- If the protection mode was at maximum protection, it is reset to maximum performance. You can upgrade the protection mode later, if necessary, as described in Setting the Protection Mode for Your Configuration.
- If the protection mode was at maximum availability or maximum performance, it remains unchanged.

> **Note**
>
> If you perform a manual failover when fast-start failover is enabled:
>
> - The failover can only be performed to the current target standby database.
> - The broker preserves the protection mode that was in effect prior to the failover, unless the protection mode was max protection. In this case the broker sets the protection mode to maximum availability and will later upgrade the protection mode maximum protection mode when a synchronized physical standby database is available.

Performing a Manual Failover Task 4: Re-establish a Disaster-Recovery Configuration

To maintain a viable disaster-recovery solution in the event of another disaster, you may need to perform additional steps.

See Reenabling Disabled Databases After a Role Change

- Reinstate the original primary database to act as a standby database in the new configuration.

  > **Caution**
  >
  > Do not attempt to reinstate the old primary database if an `ORA-752` or `ORA-600 [3020]` error has occurred at the failover target. Instead, the old primary database must be re-created as a standby from a backup of the new primary using the procedure described in How to Re-create and Reenable a Disabled Database.

- Reinstate or re-create standby databases in the configuration that were disabled by the broker.

  After a complete failover finishes, any bystander standby database that is not viable as a standby for the new primary database will be disabled by the broker. This can happen for either of the following reasons:

  – A bystander standby database has applied more redo data than the new primary database itself had applied when it was a standby database. The standby database must be re-created or reinstated before it can serve as a standby for the new primary database.

  – The failover was to a logical standby database. The broker disables all of the physical and snapshot standby databases in the configuration. They must be re-created from a

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copy of the new primary database before they can serve as a standby to the new primary database.

How the Broker Performs a Complete Failover Operation

These are the actions the broker performs after you start a complete failover.

1. Waits for the target standby database to finish applying any unapplied redo data before stopping Redo Apply (if the target is a physical standby database) or SQL Apply (if the target is a logical standby database).

   If the target is a snapshot standby database, the broker first converts the database back to a physical standby and then starts Redo Apply to apply all the accumulated redo before completing the failover and opening the database as a primary database.

2. Transitions the target standby database into the primary database role, as follows:

   a. Changes the role of the database from standby to primary.

   b. Opens the new primary database in read/write mode.

   c. Determines whether or not any standby databases that did not participate in the failover operation have applied redo data beyond the new primary database, and thus need to be disabled.

      If a bystander standby database is not disabled by the broker during this failover, it will remain in the state it was in before the failover. For example, if a physical standby database was in the `APPLY-OFF` state, it will remain in the `APPLY-OFF` state.

      By default, the broker always determines whether bystander standby databases will be viable standby databases for the new primary when performing a complete failover. If you want the broker to skip this viability check of bystander standby databases during a complete failover, thus decreasing the overall failover time, set the `BystandersFollowRoleChange` configuration property to `NONE`.

      When this property is set to `NONE`, the broker will disable all bystander standby databases without checking whether they have applied more redo data than the new primary database. You will have to reinstate or re-create (see Reenabling Disabled Databases After a Role Change) the standby databases after failover has completed. The `SHOW CONFIGURATION` command will show you which databases can be reinstated and which databases must be re-created. Use the `SHOW CONFIGURATION BystandersFollowRoleChange` command to see the value of this property. The default value is `ALL`.

      This property also affects whether the broker skips viability checks of bystander standby databases when a fast-start failover occurs.

   d. Starts redo transport services to begin transmitting redo data to all bystander standby databases that were not disabled.

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> **Note**
>
> Bystander standby databases may be disabled by the broker during the failover, and they must be reinstated or re-created before they can serve as standby databases to the new primary database. Oracle recommends configuring Flashback Database on every database so that if failover occurs to a physical standby database, you can more easily reinstate any disabled standby databases. If failover occurs to a logical standby database, all physical and snapshot standby databases will be disabled by the broker. In this case, Flashback Database cannot be used to reinstate databases. They must be re-created from a copy of the new primary database. Logical standby databases that are disabled during failover can be reinstated.

3. Directs Oracle Clusterware to restart all instances that may have been shut down prior to the failover if the failover target database is an Oracle RAC physical or snapshot standby database.

The broker allows the failover to proceed as long as there are no errors for the standby database that you selected to participate in the failover. Errors occurring for any other configuration members will not impede the switchover. If you initiated a complete failover and it fails, you might need to use immediate failover.

Complete Failovers in Configurations Using Far Sync Instances

It is possible to manually perform a completer failover to a standby database that receives redo data from a far sync instance. To failover, connect to the standby database and use the DGMGRL `FAILOVER TO` *`db-unique-name`* command. Any unsent redo data residing on the far sync instance is transmitted to the target physical standby prior to converting the physical standby into a primary database.

Complete Failovers in Configurations Using Cascaded Standbys

In a complete failover, it is also possible to failover to a standby database (terminal standby) that gets redo from another standby database (cascader). In such a case, no attempt is made to transmit any unsent redo from the cascader to the terminal standby.

How the Broker Performs an Immediate Failover Operation

To start an immediate failover, use the DGMGRL `FAILOVER TO` *`database-name`* `IMMEDIATE` command.

Once an immediate failover is started, the broker:

1. Stops Redo Apply or SQL Apply on the standby database immediately, without waiting until all available redo data has been applied. This may result in data loss.
2. Transitions the target standby database into the primary role, opens the new primary database in read/write mode, and starts redo transport services.

   After an immediate failover completes, all the standby databases in the configuration, regardless of their type, are disabled. They may be reinstated if Flashback Database is enabled on those databases. Otherwise, they must be re-created from a copy of the new primary database.

The broker allows a complete failover to proceed as long as there are no errors present on the standby database that you selected to participate in the failover.

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The broker allows an immediate failover to proceed even if there are errors present on the standby database that you selected to participate in the failover.

Immediate Failovers in Configurations Using Far Sync Instances

It is possible to manually perform an immediate failover to a standby database that receives redo data from a far sync instance. In this case, no attempt is made to transmit any unsent redo from the far sync instance to the target physical standby prior to converting the physical standby into a primary database.

Immediate Failovers in Configurations Using Cascaded Standbys

In an immediate failover, it is also possible to failover to a standby database (terminal standby) that gets redo from another standby database (cascader). In such a case, no attempt is made to transmit any unsent redo from the cascader to the terminal standby.

Reenabling Disabled Databases After a Role Change

To restore your original disaster-recovery solution after switchover to a logical standby database or after failover to any standby database, you may need to perform additional steps.

Databases that have been disabled after a role transition are not *removed* from the broker configuration, but they are no longer managed by the broker.

To reenable broker management of these databases, you must reinstate or re-create the databases using one of the following procedures:

- If a database can be reinstated, the database will show the following status:

  ```
  ORA-16661: The standby database must be reinstated
  ```

  Reinstate the database using the DGMGRL `REINSTATE DATABASE` command or the reinstate option in Cloud Control, as described in How to Reinstate a Database. The broker automatically reenables the database as part of reinstating it.
- If a database must be re-created from a copy of the new primary database, it will have the following status:

  ```
  ORA-16795: The standby database needs to be re-created
  ```

  Re-create the standby database from a copy of the primary database and then reenable it, as described in How to Re-create and Reenable a Disabled Database.

> **Note**
>
> Any database that was disabled while multiple role changes were performed cannot be reinstated. You must re-create the database manually from a copy of the current primary database and then reenable the database in the broker configuration.

Whether you reinstate or re-create a database depends on whether you performed a switchover or failover, on the type of standby database that was the target of the operation, and on whether or not there are sufficient flashback logs. Note that role changes to logical standby databases always result in physical standby database bystanders being disabled. They cannot be reinstated. They must be re-created from a copy of the new primary database.

The following sections describe how to reinstate or reenable a database.

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How to Reinstate a Database

You can use the broker's reinstate capability to make a failed primary database a viable standby database for the new primary.

This can be done regardless of whether the failover was done to a physical, logical, or snapshot standby database.

You can also reinstate bystander standby databases that were disabled during a failover operation.

If the database is managed by Oracle Clusterware, broker does not open any pluggable databases (PDBs) on any of the instances. Instead, when broker notifies the Oracle Clusterware agent that the failover completed, the Oracle Clusterware agent opens PDBs on particular instances based on the service configuration.

For the `REINSTATE` command to succeed, Flashback Database must have been enabled on the database prior to the failover and there must be sufficient flashback logs on that database. In addition, the database to be reinstated and the new primary database must have network connectivity.

To reinstate a database:

1. Restart the database to the mounted state
2. Connect to the new primary database
3. Use Cloud Control or DGMGRL to reinstate the database

The broker reinstates a failed primary database as a standby database of the same type (physical or logical standby database) as the old standby database. The only exception to this is failovers to snapshot standby databases. In such cases, the failed primary database is reinstated as a physical standby database.

The broker reinstates bystander standby databases that were disabled during a failover as standby databases to the new primary database.

Reinstatement Using Cloud Control

On the Oracle Data Guard Overview page, click **Database must be reinstated**. This brings up the General Properties page that provides a **Reinstate** button. After you click the **Reinstate** button, Cloud Control begins reinstating the database.

When the process is complete, the database will be enabled as a standby database to the new primary database, and Cloud Control displays the Oracle Data Guard Overview page.

Reinstatement Using DGMGRL

Issue the following command while connected to any database in the broker configuration, except the database that is to be reinstated:

```
DGMGRL> REINSTATE DATABASE db_unique_name;
```

The newly reinstated standby database will begin serving as a standby database to the new primary database. If reinstatement of a database fails, its status changes to `ORA-16795: The standby database needs to be re-created`. You must then re-create it from a copy of the new primary database and reenable it as described in How to Re-create and Reenable a Disabled Database.

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How to Re-create and Reenable a Disabled Database

If you re-create the old primary database, it must be created as the standby type of the old standby database.

For example, if the old standby was a physical or snapshot standby, then the old primary must be re-created as a physical standby.

After the database has been re-created, enable broker management of the re-created standby database by using the DGMGRL `ENABLE DATABASE` command.

If you performed a failover or switchover that requires you to re-create the failed primary database or standby databases that were disabled during the role transition, then follow the procedures in the *Oracle Data Guard Concepts and Administration* chapter, "Creating a Physical Standby Database" and also the *Oracle Data Guard Concepts and Administration* chapter, "Creating a Logical Standby Database."

Fast-Start Failover

Fast-start failover allows the broker to automatically fail over to a previously chosen standby database in the event of loss of the primary database.

The following sections describe these topics:

- About Fast-start Failover
- Prerequisites for Enabling Fast-Start Failover
- Enabling Fast-Start Failover
- Viewing Fast-Start Failover Configuration Statistics and Status
- Disabling Fast-Start Failover
- Performance Considerations for Fast-Start Failover
- Managing the Observer
- Reinstating the Former Primary Database in the Broker Configuration
- Shutting Down Databases In a Fast-Start Failover Environment

About Fast-start Failover

Fast-start failover quickly and reliably fails over the target standby database to the primary database role, without requiring you to perform any manual steps to invoke the failover.

If the primary database has multiple standby databases, then you can specify multiple fast-start failover targets, using the `FastStartFailoverTarget` property. The targets are referred to as candidate targets. The broker selects a target based on the order in which they are specified on the `FaststartFailoverTarget` property. If the designated fast-start failover target develops a problem and cannot be the target of a failover, then the broker automatically changes the fast-start failover target to one of the other candidate targets.

Fast-start failover can be used only in a broker configuration and can be configured only through DGMGRL or Cloud Control. The `VALIDATE FAST_START FAILOVER` command can be used to validate a fast-start failover configuration and identify misconfigurations that prevent the initiation of fast-start failover.

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> **See Also**
>
> VALIDATE FAST_START FAILOVER

Fast-start Failover Protection Modes

You can use the maximum protection, maximum availability, or maximum performance protection mode with fast-start failover.

- Maximum protection mode

  Provides an automatic failover environment guaranteed to lose no data.

- Maximum availability mode

  Provides an automatic failover environment that is guaranteed to either lose no data (when the `FastStartFailoverLagLimit` configuration property is set to zero) or lose no more than the amount of data (in seconds) specified by the `FastStartFailoverLagLimit` configuration property.

- Maximum performance mode

  Provides an automatic failover environment that is guaranteed to lose no more than the amount of data (in seconds) specified by the `FastStartFailoverLagLimit` configuration property.

Once fast-start failover is enabled, the broker will ensure that fast-start failover is only possible when the configured data loss guarantee can be upheld. If the configured data loss guarantee cannot be upheld, redo generation on the primary database will be stalled. In maximum availability and maximum performance modes, to avoid a prolonged stall, either the observer or target standby database may allow the primary database to continue redo generation after first recording that a fast-start failover cannot happen.

In maximum protection mode, an automatic failover is always possible because the broker does not allow the primary database to commit transactions until it has regained connectivity with target standby. Therefore, the target standby never falls behind the primary (as it might in maximum availability and maximum performance modes).

In maximum availability mode, the behavior depends on the value of the `FastStartFailoverLagLimit` property. If the value is zero, the standby must have received all the redo data the primary has generated in order for automatic failover to occur. If the value is non-zero, failover is possible any time the standby database's apply lag is less than or equal to the value specified by the `FastStartFailoverLagLimit` property.

In maximum performance mode, the ability to automatically failover is restored once the target standby database's redo applied point is no longer lagging behind the primary database's redo generation point by more than the value specified by the `FastStartFailoverLagLimit` property.

The following table summarizes which standby types are supported in which protection modes when fast-start failover is enabled. The table also indicates which protection modes allow for a far sync instance to be used to send redo data to the target standby. (Snapshot standbys are not included in the table because they are not supported as fast-start failover targets.)

Protection Mode	Physical Standbys Supported?	Logical Standbys Supported?	Far Sync Instances Supported to Send Redo?
Maximum Protection	Yes	No	No

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Protection Mode	Physical Standbys Supported?	Logical Standbys Supported?	Far Sync Instances Supported to Send Redo?
Maximum Availability	Yes	Yes	Yes
Maximum Performance	Yes	Yes	Yes

As shown in the table, fast-start failover can be enabled in maximum availability mode when the fast-start failover target is a logical or physical standby database that receives redo data from a far sync instance. This lets you take advantage of the broker's automatic failover feature in configurations set up for zero data loss protection at any distance.

Related Topics

- Scenario 7: Enabling Fast-Start Failover When a Far Sync Instance Is In Use
  Fast-start failover can be enabled in maximum availability mode when the fast-start failover target is a logical or physical standby database that receives redo data from a far sync instance.

Observers in a Fast-start Failover Configuration

An observer is a separate OCI client-side component that run on a different computer from the primary and standby databases and monitors the availability of the primary database.

Observer sites monitor the fast-start failover environment. Once an observer is started, no further user interaction is required. If both the observer and designated standby database lose connectivity with the primary database for longer than the number of seconds specified by the `FastStartFailoverThreshold` configuration property, the observer will initiate a fast-start failover to the standby database. In addition, the primary database will shut down if it perceives a loss of connectivity for a period longer than `FastStartFailoverThreshold` seconds, if the `FastStartFailoverPmyShutdown` configuration property is set to `TRUE`. After the failover completes, the former primary database is automatically reinstated as a standby database when a connection to it is reestablished, if the `FastStartFailoverAutoReinstate` configuration property is set to `TRUE`.

> **Note**
>
> When a fast-start failover occurs because either a user configurable fast-start failover condition is detected or an application initiates a fast-start failover by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function, the former primary database is always shut down and never automatically reinstated. This is true regardless of the settings for the `FastStartFailoverPmyShutdown` and `FastStartFailoverAutoReinstate` configuration properties. See Enabling Fast-Start Failover for more information.

Relationship Between Primary, Target Standby, and Observer During Fast-start Failover

Figure 6-1 shows the relationships between the primary database, target standby database, and observer during fast-start failover:

- **Before Fast-Start Failover:** Oracle Data Guard is operating in a steady state, with the primary database transmitting redo data to the target standby database and the observer monitoring the state of the entire configuration.

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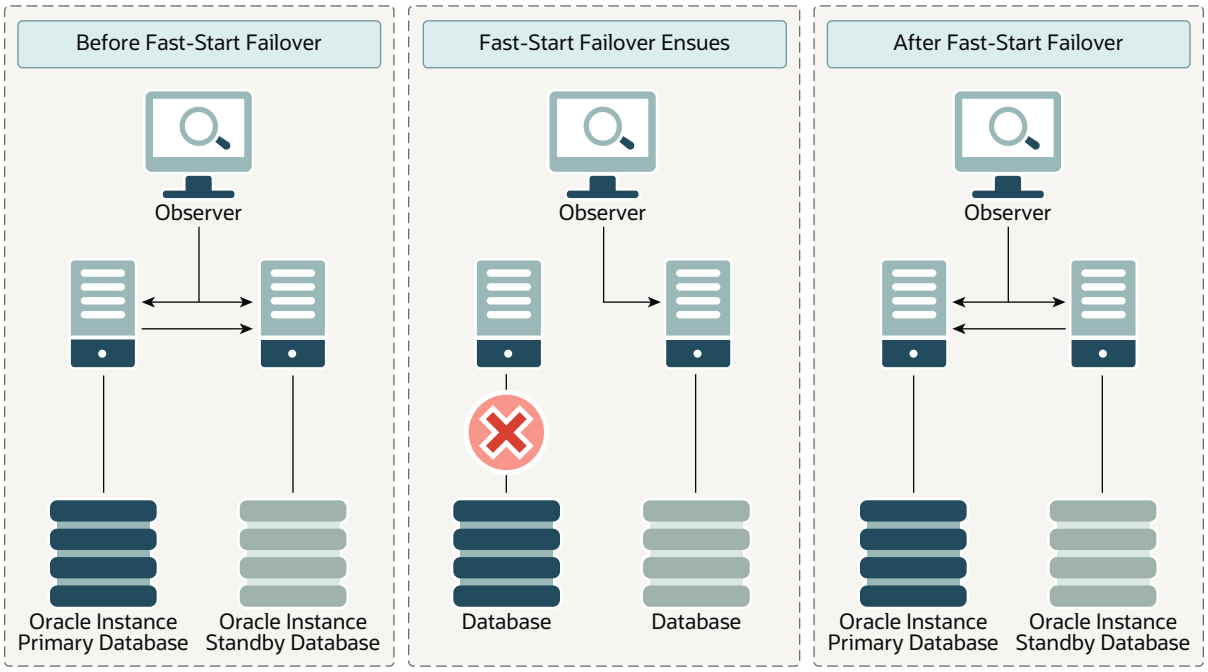
- **FastStart Failover Ensues:** Disaster strikes the primary database and its network connections to both the observer and the target standby database are lost. Upon detecting the break in communication, the observer attempts to reestablish a connection with the primary database for the amount of time defined by the `FastStartFailoverThreshold` property before initiating a fast-start failover. If the observer is unable to regain a connection to the primary database within the specified time, and the target standby database is ready for fast-start failover, then fast-start failover ensues.
- **After Fast-Start Failover:** The fast-start failover has completed and the target standby database is running in the primary database role. After the former primary database has been repaired, the observer reestablishes its connection to that database and reinstates it as a new standby database. The new primary database starts transmitting redo data to the new standby database.

Figure 6-1 Relationship of Primary and Standby Databases and the Observer



> **See Also**
>
> Managing the Observer for information about configuring and managing observers

Location of Client-side Broker Files

Client-side broker files include the observer configuration file (`observer.ora`), observer log file, observer runtime data file (`fsfo.dat`), fast-start failover callout configuration file, and fast-start failover callout script files.

Starting with Oracle Database Release 21c, use the `DG_ADMIN` environment variable to specify the default location for client-side broker files. These files are stored in subdirectories of the `DG_ADMIN` directory. You must create the directory specified by the `DG_ADMIN` environment variable and ensure that it has the required permissions.

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If the DG_ADMIN environment variable is not set, or the directory by this environment variable does not exist, or the $DG_ADMIN directory does not have the required permissions, broker does the following:

- Stores the observer runtime data file and observer configuration file in the current working directory
- Uses standard output for displaying the observer logs

> **Note**
>
> Because callout configuration and script files must be stored in a subdirectory of the $DG_ADMIN directory, fast-start failover callout functionality will not work if the DG_ADMIN environment variable is not set correctly.

When you run DGMGRL commands, if a path and file name are explicitly specified for client-side broker files, the specified values are used. If only a file name is specified, the file is stored in an appropriate directory under the broker's $DG_ADMIN directory. If only a path is specified, the files are stored in the specified path using the default file names. If the DG_ADMIN environment variable is not set, the files are stored in the current working directory.

Table 6-1 Content of Default Directory for Client-side Files

Directory Name	Description
admin	Contains the observer configuration file that is used by DGMGRL to manage multiple observers on multiple configurations. This file also declares broker configurations and defines configuration groups used by multiple configuration commands. The default name for the observer configuration file is observer.ora When DGMGRL starts, if the DG_ADMIN environment variable is set and the specified directory has the required permissions, the admin folder is created under the $DG_ADMIN directory. When you run commands that need access to the observer configuration file, such as START OBSERVING, STOP OBSERVING, and SET MASTEROBSERVERHOSTS, DGMGRL reports an error if the directory does not have the required permissions.

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Table 6-1 (Cont.) Content of Default Directory for Client-side Files

Directory Name	Description
config_*ConfigurationSimpleName*	Stores files related to the observer and callout configuration. This directory has the same permissions as its parent directory. For each broker configuration on which one or more observers are registered, a directory named *ConfigurationSimpleName* is created. *ConfigurationSimpleName* represents an alias of the broker configuration name. Subdirectories within this directory are used to store the files related to the configuration. This directory is created when you run the CONNECT command. When running the START OBSERVER command, if this directory does not have the required permissions, DGMGRL reports an error.
config_*ConfigurationSimpleName*/log	Contains the observer log file for the broker configuration named *ConfigurationSimpleName*. The default name of the observer log file is observer_*hostname*.log.
config_*ConfigurationSimpleName*/dat	Contains the observer runtime data file for the broker configuration named *ConfigurationSimpleName*. The default name of the observer runtime data file is fsfo_*hostname*.dat. This file contains important information about the observer. In the event of a crash, data in this file can be used to restart the observer to the status before the crash.
config_*ConfigurationSimpleName*/callout	Contains the callout configuration file, pre-callout script, post-callout script, and pre-callout success file for the broker configuration named *ConfigurationSimpleName*. The default name of the callout configuration file is fsfocallout.ora.

> **Note**
>
> If the database uses a version lower than Oracle Database Release 21c, the ConfigurationSimpleName is derived from the DB_UNIQUE_NAME of the database. See ConfigurationSimpleName.

Permissions Required by the DG_ADMIN Directory

Ensure that the required permissions are granted to the DG_ADMIN directory.

On Linux/Unix, the directory specified by the DG_ADMIN environment variable must have read, write, and execute permissions for the directory owner only. The subdirectories that DGMGRL creates under this directory will also have the same permissions.

On Windows, the directory specified by the DG_ADMIN environment variable must have exclusive permissions wherein it can be accessed only by the current operating system user who is running DGMGRL The subdirectories created under this directory by DGMGRL will also have the same permissions.

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Fast-start Failover Callout Configuration Files

Use the callout configuration file and script files to automate tasks that must be performed before and after a fast-start failover operation.

The name of the callout configuration file is `fsfocallout.ora`. You cannot use a different name for this file. This file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/callout` directory. If the `DG_ADMIN` environment variable is not defined, or the directory specified by this variable does not exist, or the directory does not have the required permissions, fast-start failover callouts will fail.

The name of the callout configuration scripts is specified in `fsfocallout.ora`. These scripts must be in the same directory as the callout configuration file. You can create two callout configuration scripts, a pre-callout configuration script and post-callout configuration script. Before a fast-start failover operation, the observer checks if a fast-start failover configuration file exists. If it exists, and it contains a pre-callout script location, this script is run before the fast-start failover is initiated. The pre-callout script must create a `.suc` and `.err` file in the `callout` directory. The existence of a `.suc` file, irrespective of its content, indicates that the script executed successfully. After fast-start failover succeeds, if a post-callout script is specified in the fast-start failover configuration file, this script is run.

The `VALIDATE FAST_START FAILOVER` command parses the callout configuration scripts and checks for errors or misconfigurations.

> **Note**
>
> Enabling Fast-Start Failover Task 7: Configure Actions Before and After Fast-start Failover (Optional)

Prerequisites for Enabling Fast-Start Failover

There are prerequisites that must be met before the broker allows you to enable fast-start failover.

The prerequisites are as follows:

- Configure the protection mode. See Setting the Protection Mode for Your Configuration.
- The selected standby database that will be the fast-start failover target must receive redo directly from the primary database.
- Ensure that the standby database you choose to be the target of fast-start failover has its `LogXptMode` property set as follows, depending on the protection mode:
  - Maximum protection — `SYNC`
  - Maximum availability — `SYNC` or `FASTSYNC` or `ASYNC`
  - Maximum performance — `ASYNC`

  The current primary database must have its `LogXptMode` property set accordingly and must have standby redo logs configured. If using either maximum availability or maximum performance mode, use the `RedoRoutes` property to configure the redo transport mode for the target standby and the database currently in the primary role.

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- To use a far sync instance with fast-start failover, the far sync instance transport mode must be set to either SYNC or FASTSYNC and the target standby database transport mode must be set to ASYNC. A far-sync instance cannot be used in maximum protection mode.
- Install the DGMGRL command-line interface on the observer computer as described in Oracle Data Guard Installation.
- Configure the TNSNAMES.ORA file on the observer system so that the observer is able to connect to the primary database and to the pre-selected target standby database.
- If you are not using Oracle Clusterware or Oracle Restart, then you must create static service names so that the observer can automatically restart a database as part of reinstatement. Use the VALIDATE STATIC CONNECT IDENTIFIER command to ensure the static services have been configured correctly. See Prerequisites for more information.

Enabling Fast-Start Failover

You can enable fast-start failover from any site while connected to any database in the broker configuration.

Enabling fast-start failover does not trigger a failover. Instead, it allows an observer that is monitoring the configuration to initiate a fast-start failover should database conditions warrant a failover. (If there are other conditions, unique to an application, that would warrant a fast-start failover then the application can be set up to call the DBMS_DG.INITIATE_FS_FAILOVER function and start a fast-start failover immediately should any of those conditions occur. See Directing a Fast-Start Failover From an Application)

Enabling fast-start failover and starting an observer process involves the following tasks. These tasks assume that you are connected as SYS or SYSDG and that a primary and standby database are already set up in a broker configuration.

- Enabling Fast-Start Failover Task 1: Determine Which of the Available Standby Databases is the Best Target for the Failover
- Enabling Fast-Start Failover Task 2: Specify Target Standbys with the FastStartFailoverTarget Configuration Property
- Enabling Fast-Start Failover Task 3: Determine the Protection Mode You Want
- Enabling Fast-Start Failover Task 4: Set the FastStartFailoverThreshold Configuration Property
- Enabling Fast-Start Failover Task 5: Set Other Properties Related to Fast-Start Failover (Optional)
- Enabling Fast-Start Failover Task 6: Enable Additional Fast-Start Failover Conditions (Optional)
- Enabling Fast-Start Failover Task 7: Using DGMGRL or Cloud Control
- Enabling Fast-Start Failover Task 8: Start the Observer
- Enabling Fast-Start Failover Task 9: Verify the Fast-Start Failover Environment

Enabling Fast-Start Failover Task 1: Determine Which Available Standby Databases Should Be Targets for the Failover

You must determine which available standby databases should be targets for failover.

Follow the guidelines described in Choosing a Target Standby Database.

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Enabling Fast-Start Failover Task 2: Specify Target Standby Databases with the FastStartFailoverTarget Configuration Property

Use the `FastStartFailoverTarget` configuration property on the current primary database to specify one or more fast-start failover targets.

The broker selects a target standby based on the order they are specified in the property.

- If there is only one standby database in the configuration, you can skip this step and continue with Task 3.
- If there is more than one standby database in the configuration, you must explicitly set the `FastStartFailoverTarget` property on the primary database to name one or more candidate target standby databases. When enabling fast-start failover, the broker verifies that the property indicates an existing standby. (Note that the target standby cannot be a far-sync instance. However the target can receive redo from a far sync instance.)

> **Note**
>
> To change the `FastStartFailoverTarget` property to point to a different standby database, disable fast-start failover, set the `FastStartFailoverTarget` property, and reenable fast-start failover.

See FastStartFailoverTarget for more information about this property.

Enabling Fast-Start Failover Task 3: Determine the Protection Mode You Want

If you cannot tolerate any loss of data, then ensure that the configuration protection mode is set to maximum availability or maximum protection. For zero data loss in maximum availability mode, the `FastStartFailoverLagLimit` property must be set to zero.

In maximum availability mode, set the `LogXptMode` database property for both the primary and target standby databases to `SYNC` or `FASTSYNC`. In maximum protection mode, set the `LogXptMode` database property to `SYNC` (note that in maximum protection mode, a far sync instance cannot be used to ship redo to a standby). The following is an example of setting the `LogXptMode` property:

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY LogXptMode=SYNC;
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY LogXptMode=SYNC;
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MaxAvailability;
```

Alternatively, use the `RedoRoutes` property to set the redo transport mode for the target standby and database that is currently in the primary role. Then set the configuration protection mode to maximum availability.

If you are more concerned about the performance of the primary database than a minimal loss of data, consider enabling fast-start failover when the configuration protection mode is set to maximum performance. In this mode you will need to consider how much data loss is acceptable in terms of seconds and set the `FastStartFailoverLagLimit` configuration property accordingly. This property specifies the amount of data, in seconds, that the target standby database can lag behind the primary database in terms of redo applied. If the standby database's redo applied point is within that many seconds of the primary database's redo generation point, a fast-start failover will be allowed. The `FastStartFailoverLagLimit` configuration property is only used by the broker when enabling fast-start failover for

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configurations operating in maximum performance mode. The default value is 30 seconds and the lowest possible value is 5 seconds.

In addition to setting the configuration protection mode to maximum performance, you will also need to ensure that the `LogXptMode` database property for both the primary and target standby database is set to `ASYNC`. For example:

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY LogXptMode=ASYNC;
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY LogXptMode=ASYNC;
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MaxPerformance;
DGMGRL> EDIT CONFIGURATION SET PROPERTY FastStartFailoverLagLimit=45;
```

Enabling Fast-Start Failover Task 4: Set the FastStartFailoverThreshold Configuration Property

Fast-start failover occurs if both the observer and the target standby database lose connection to the primary database for the period of time specified by the `FastStartFailoverThreshold` configuration property.

Set the `FastStartFailoverThreshold` property to specify the number of seconds you want the observer and target standby database to wait (after detecting the primary database is unavailable) before initiating a failover. For example:

```
DGMGRL> EDIT CONFIGURATION SET PROPERTY FastStartFailoverThreshold = 45;
```

The default value for the `FastStartFailoverThreshold` property is 30 seconds and the lowest possible value is 6 seconds. If you have an Oracle RAC primary database, consider specifying a higher value to minimize the possibility of a false failover in the event of an instance failure.

The time interval starts when the observer first loses its connection to the primary database. If the observer is unable to regain a connection to the primary database within the specified time, then the observer begins a fast-start failover provided the standby database is ready to fail over. Although the default value of 30 seconds is typically adequate for detecting outages and failures on most configurations, you can adjust failover sensitivity with this property to decrease the probability of false failovers in a temporarily unstable environment.

If the `FastStartFailoverPmyShutdown` configuration property is set to `TRUE`, the primary database will shut down after `FastStartFailoverThreshold` seconds has elapsed if redo generation has been stalled and the primary database is unable to reestablish connectivity with either the observer or target standby database.

In environments with very low latency networks it's possible to configure even lower values for detecting primary failures by using a combination of the `ObserverPingInterval` and `ObserverPingRetry` properties. The `ObserverPingInterval` property specifies, in milliseconds, how frequently the observer should ping the primary database. The `ObserverPingRetry` property specifies the number of times the observer should retry a failed ping before attempting a failover to the target standby database. When both of these properties are set to non-zero values, it's possible to configure primary failure detection times lower than the lowest limit provided by the `FastStartFailoverThreshold` property.

Note that the `FastStartFailoverThreshold` property can be changed even when fast-start failover is enabled.

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> **See Also**
>
> FastStartFailoverThreshold for reference information about the `FastStartFailoverThreshold` property

Enabling Fast-Start Failover Task 5: Set Other Properties Related to Fast-Start Failover (Optional)

This table describes the optional database properties that you can set.

Property Name	Description	Default Value
`FastStartFailoverPmyShutdown`	This configuration property causes the primary database to shut down if fast-start failover is enabled and `V$FAST_START_FAILOVER_CONFIG.STATUS` indicates the primary has been `STALLED` for longer than `FastStartFailoverThreshold` seconds. A value of `TRUE` helps to ensure that an isolated primary database cannot satisfy user queries. This property cannot be used to prevent the primary database from shutting down if a fast-start failover occurred because a user configuration condition was detected or was requested by an application by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.	`TRUE`
`FastStartFailoverLagLimit`	This configuration property establishes an acceptable limit, in seconds, that the standby is allowed to fall behind the primary in terms of redo applied, beyond which a fast-start failover will not be allowed. The lowest possible value is 5 seconds.	30 seconds
`FastStartFailoverAutoReinstate`	This configuration property causes the former primary database to be automatically reinstated if a fast-start failover was initiated because the primary database was either isolated or had crashed. To prevent automatic reinstatement of the former primary database in these cases, set this configuration property to `FALSE`. The broker never automatically reinstates the former primary database if a fast-start failover was initiated because a user configuration condition was detected or was requested by an application calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.	`TRUE`

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Property Name	Description	Default Value
ObserverConnectIdentifier	This database property is used to specify how the observer should connect to and monitor the primary and standby database. Set this property for the primary and target standby database if you want the observer to use a different connect identifier than that used to ship redo data (that is, the connect identifier specified by the DGConnectIdentifier property).	Observer uses the value of the DGConnectIdentifier property to connect to and monitor the primary and target standby databases.
ObserverOverride	The ObserverOverride configuration property, when set to TRUE, allows an automatic failover to occur when the observer has lost connectivity to the primary, even if the standby has a healthy connection to the primary.	FALSE
ObserverPingInterval	The ObserverPingInterval configuration property specifies how frequently the observer must ping the primary database. This property is measured in milliseconds. The minimum value is 100 milliseconds. To achieve lower detection times for primary database failures, you must set the ObserverPingInterval and ObserverPingRetry properties before enabling fast-start failover.	Valid values are >= 100. Default value is 100 miliseconds.
ObserverPingRetry	The OberverPingRetry property specifies the number of times that the observer retries a failed ping before it initiates a failover to the target standby database. A failed ping is a ping to the primary database that failed or took longer than the time specified by the ObserverPingInterval property. You must set both the ObserverPingRetry and ObserverPingInterval properties to achieve lower detection times for primary database failures. The minimum value is 10. Therefore, the detection time can be reduced to nearly 1 second.	Valid values are >= 10. Default value is 10 miliseconds.

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Property Name	Description	Default Value
ObserverReconnect	The ObserverReconnect configuration property specifies how often the observer establishes a new connection to the primary database. When this property is set to the default value of 0, it prevents the observer from periodically establishing a new connection with the primary database. While this eliminates the processing overhead associated with periodically establishing a new observer connection to the primary database, it also prevents the observer from detecting that it is not possible to create new connections to the primary database. Oracle recommends that this property be set to a value that is small enough to allow timely detection of faults at the primary database, but large enough to limit the overhead associated with periodic observer connections to an acceptable level.	0 (zero)

Enabling Fast-Start Failover Task 6: Enable Additional Fast-Start Failover Conditions (Optional)

By default, a fast-start failover is done when both the observer and the standby cannot reach the primary after the configured time threshold (FastStartFailoverThreshold) has passed.

You can optionally indicate the database health conditions that should cause fast-start failover to occur. These conditions are described in the following table:

Health Condition	Description	Enabled by Default
Datafile Write Errors	If fast-start failover is enabled and the Datafile Write Errors condition is specified, then a fast-start failover is initiated if write errors are encountered in any data files, including temp files, system data files, and undo files.	Yes
Corrupted Dictionary	Dictionary corruption of a critical database. Currently, this state can be detected only when the database is open	Yes
Corrupted Controlfile	Controlfile is permanently damaged because of a disk failure.	Yes
Inaccessible Logfile	LGWR is unable to write to any member of the log group because on an I/O error	No
Stuck Archiver	Archiver is unable to archive a redo log because the device is full or unavailable.	No

In Oracle RAC configurations, the Inaccessible Logfile and Stuck Archiver health conditions may only be applicable to a single instance. Careful consideration should be given before enabling fast-start failover for either of these conditions because doing so will supersede availability options provided by Oracle Clusterware.

You can specify particular conditions for which a fast-start failover should occur using either Cloud Control or the DGMGRL ENABLE FAST_START FAILOVER CONDITION and DISABLE FAST_START FAILOVER CONDITION commands.

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Enabling Fast-Start Failover Task 7: Configure Actions Before and After Fast-start Failover (Optional)

Tasks that must be performed before and after a fast-start failover operation can be automated using callout scripts.

To perform specified actions before or after a fast-start failover operation:

1. Create a pre-callout script, or a post-callout script, or both.

   See Fast-start Failover Callout Configuration Files for information about the directory used to store callout scripts and the permissions required.

2. Create or update the fast-start failover callout configuration file and include the names of the scripts created in the previous step.

Example 6-1 Fast-start Failover Configuration File

The following example displays the contents of the fast-start failover configuration file `/home1/dataguard/config_NorthSales/callout/fsfocallout.ora`. The callout configuration scripts `fsfo_precallout` and `fsfo_postcallout` are stored in the same location as `fsfocallout.ora` and they have the required permissions.

```
# This is a fast-start failover configuration file.

# The pre-callout script that is run before fast-start failover is enabled.
FastStartFailoverPreCallout=fsfo_precallout

# The timeout value (in seconds) for pre-callout script
FastStartFailoverPreCalloutTimeout=1200

# The name of the suc file created by the pre-callout script.
FastStartFailoverPreCalloutSucFileName=fsfo_precallout.suc

# The name of the error file that the pre-callout script creates
FastStartFailoverPreCalloutErrorFileName=precallout.err

# Action taken by observer if the suc file does not exist after
FastStartFailoverPreCalloutTimeout seconds
# or if an error file is detected before FastStartFailoverPreCalloutTimeout
seconds passed
FastStartFailoverActionOnPreCalloutFailure=STOP

# The post-callout script that is run after fast-start failover succeeds
FastStartFailoverPostCallout=fsfo_postcallout
```

Enabling Fast-Start Failover Task 8: Using DGMGRL or Cloud Control

Use the Cloud Control Fast-Start Failover wizard or the DGMGRL `ENABLE FAST_START FAILOVER` command to enable fast-start failover.

To enable fast-start failover, both the primary and target standby databases must be running and have connectivity, and satisfy all of the prerequisite conditions listed in Prerequisites for Enabling Fast-Start Failover.

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> **Note**
>
> The Cloud Control Fast-Start Failover wizard does not currently support specification of multiple targets. If you want to specify multiple targets, then you must use the DGMGRL utility.

Enable Fast-Start Failover Using Cloud Control

To enable fast-start failover in Cloud Control, use the Fast-Start Failover wizard. On the Oracle Data Guard Overview page next to the Fast-Start Failover status field, click **Disabled** to invoke the Fast-Start Failover page. Then, on the Fast-Start Failover Change Mode page, click **Enabled**. Cloud Control will start the observer. Then, on the Fast-Start Failover Configure page, select the standby database that should be the target of a failover. See Choosing a Target Standby Database for helpful advice. This page will not allow you to alter the protection mode. Rather, fast-start failover will be enabled in accordance with the current protection mode. If the currently configured mode is maximum protection, Cloud Control will downgrade the mode to maximum availability.

Enable Fast-Start Failover Using DGMGRL

To enable fast-start failover with DGMGRL, issue the `ENABLE FAST_START FAILOVER` command while connected to any database in the broker configuration, including on the observer computer. For example:

```
DGMGRL> ENABLE FAST_START FAILOVER;
Enabled.
```

> **See Also**
>
> - ENABLE FAST_START FAILOVER
> - Scenario 6: Enabling Fast-Start Failover and Starting the Observer

> **Note**
>
> Administration at the target standby site should be as comprehensive as that at the primary site because the standby database may assume the primary role without prior notice. Staff support, hardware and software, security (both software and site), network connections, and bandwidth should be equivalent at both sites.

Enabling Fast-Start Failover Task 9: Start the Observer

The primary database must be running in order to start the observer.

You can start the observer before or after you enable fast-start failover. If fast-start failover is already enabled, the observer immediately begins monitoring the status and connections to the primary and target standby databases. If fast-start failover is not already enabled, the observer waits until fast-start failover gets enabled and then begins monitoring.

Starting the Observer Using Cloud Control

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If the Cloud Control agent is installed on the observer computer, it automatically starts the observer when you enable fast-start failover through Cloud Control. If the agent is not present, you must start the observer manually using the following instructions for the DGMGRL command-line interface.

Starting the Observer Using DGMGRL

To start the observer with DGMGRL, issue the following command on the observer computer:

```
DGMGRL> START OBSERVER;
```

The observer is a continuously executing process that is created when the `START OBSERVER` command is issued. Thus, the command-line prompt on the observer computer does not return until you issue the `STOP OBSERVER` command from another DGMGRL session. To issue commands and interact with the broker configuration, you must connect through another DGMGRL client session.

There can be up to four observers for a single Data Guard configuration. One is the master observer and the others are backup observers.

Starting the Observer as a Background Process Using DGMGRL

To start an observer as a background process, use the DGMGRL command `START OBSERVER IN BACKGROUND`. If this command is submitted successfully, the command-line prompt on the observer computer is returned to you so that you can continue to issue commands and interact with the broker configuration. This is the preferred method for starting an observer.

- See Installing and Starting the Observer.
- See Managing the Observer
- See the START OBSERVER command for more information about starting the observer as a foreground process.
- See START OBSERVER IN BACKGROUND for more information about starting the observer as a background process.

Specifying Preferred Observers Based on Current Primary

To specify which observer can be a master observer when a database is in the primary role, use the `PreferredObserverHosts` property. This property allows you to specify a priority ordered list of the observers that can become the master observer when that database is in the primary role.

For example:

```
EDIT DATABASE North_Sales SET PROPERTY PreferredObserverHosts="'ob1-host:1,
ob2-host:2';
EDIT DATABASE South_Sales SET PROPERTY PreferredObserverHosts="'ob3-host:1,
ob4-host:2';
```

In this case, only observers on `ob1-host` and `ob2-host` can be a master observer when `North_Sales` is in the primary role. The observer `on ob1-host` will be given priority over the observer on `ob2-host` to become the master observer. If both of those observers are unavailable, the observers on `ob3-host` and `ob4-host` will not become the master observer.

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Enabling Fast-Start Failover Task 10: Verify the Fast-Start Failover Environment

To verify the readiness of the fast-start failover configuration, issue the DGMGRL `SHOW CONFIGURATION VERBOSE` command or the `SHOW FAST_START FAILOVER` command on the primary database.

For example:

```
DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode:    MaxAvailability
  Lag Limit:          0 seconds

  Threshold:          30 seconds
  Ping Interval:      3000 milliseconds
  Ping Retry:         0
  Active Target:      South_Sales
  Potential Targets:  "South_Sales"
    South_Sales valid
  Observer:           observer1
  Shutdown Primary:   TRUE
  Auto-reinstate:     TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
    (none)
```

The following sections provide more information about the fast-start failover environment:

- When Fast-Start Failover Is Enabled and the Observer Is Running
- Restrictions When Fast-Start Failover is Enabled
- Shutting Down the Primary Database When Fast-Start Failover Is Enabled
- Performing Manual Role Changes When Fast-Start Failover Is Enabled

When Fast-Start Failover Is Enabled and the Observer Is Running

After fast-start failover is enabled and up to four observers are started, one observer is nominated as the master observer that continuously monitors the environment to ensure the primary database is available.

This section lists the steps the master observer takes to determine if a fast-start failover is needed and then to perform one, if necessary.

1. Monitor the environment to ensure the primary database is available.

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The master observer waits the number of seconds specified by the `FastStartFailoverThreshold` configuration property before attempting a fast-start failover when the primary database has crashed or has lost connectivity with the observer, as in the following situations:

- The primary database loses its connections with both the observer and target standby database
- Instance failures

  If a single-instance primary database (either Oracle RAC or non-Oracle RAC), or if all instances of an Oracle RAC primary database fail, the observer attempts a fast-start failover.
- Shutdown abort

  If a single-instance primary database (either Oracle RAC or non-Oracle RAC), or if all instances of an Oracle RAC primary database are shut down with the `ABORT` option, the observer attempts a fast-start failover. Fast-start failover will not be attempted for the other types of database shutdown (`NORMAL`, `IMMEDIATE`, `TRANSACTIONAL`).

The master observer never waits for the threshold to expire to perform a fast-start failover in the following situations:

- User-configurable condition

  If the master observer determines that any of the user-configurable conditions has been detected, then it attempts a fast-start failover.
- Application calls to `DBMS_DG.INITIATE_FS_FAILOVER`

  If an application has called this function and it has received a status of `SUCCESS`, then the master observer attempts a fast-start failover.

2. Reconnect within the time specified by the `FastStartFailoverThreshold` property.

   If the master observer detects an availability problem with the primary database, then it typically attempts to reconnect to the primary database within the time specified by the `FastStartFailoverThreshold` configuration property. The `FastStartFailoverThreshold` time interval starts when the observer first detects there might be a failure with the primary database.

   The time interval specified by the `FastStartFailoverThreshold` property is ignored if the master observer detects that a user-configurable condition has occurred or if a fast-start failover has been requested by the `DBMS_DG.INITIATE_FS_FAILOVER` function.

   If the primary database is an Oracle Real Application Clusters (Oracle RAC) database, the master observer will attempt to connect to one of the remaining primary instances. Fast-start failover will not occur unless all instances comprising the Oracle RAC primary database are perceived to have failed. The master observer uses the value specified by either the `DGConnectIdentifier` or `ObserverConnectIdentifier` database properties to connect to the primary and fast-start failover target standby databases. The value specified for either of these properties should allow the master observer to connect to any instance of an Oracle RAC database.

3. Verify the target standby database is ready for failover.

   If fast-start failover is initiated, the master observer verifies the target standby database is ready to fail over to the primary database role.

   Fast-start failover *cannot* occur if:

   - Fast-start failover is no longer enabled
   - The master observer cannot connect to the target standby database

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> **See Also**
>
> What Happens if the Observer Fails? if the observer is not running

- The master observer and the target standby database are inconsistent with regard to the current state of the broker configuration
- The master observer is not running
- If the protection mode is maximum availability or maximum protection and the target standby database was not synchronized with the primary database at the time the primary database failed
- If the protection mode is maximum performance and the apply point of the target standby database lags the redo generation point of the primary database by more than the amount specified by the `FastStartFailoverLagLimit` configuration property at the time the primary database failed
- The target standby database has contact with the primary database. However, failover is attempted if the `ObserverOverride` configuration property is set to `TRUE`.
- The `FS_FAILOVER_STATUS` column in the `V$DATABASE` view for the target standby database displays a reason why fast-start failover cannot occur
- A manual failover is already in progress. See Manual Failover for complete information about manual failovers.
- The primary database was shut down without using the `ABORT` option

4. Initiate a fast-start failover.

   If the target standby database is ready for failover, then the master observer immediately directs the target standby database to fail over to the primary database role. If failover is not possible for some reason, then the master observer will continue checking whether the standby database is ready to fail over. But it will also continue trying to reconnect to the primary database indefinitely. If it reconnects to the primary database before the standby agrees to fail over, then the master observer will stop attempting to initiate a fast-start failover.

5. Reinstate the former primary database as a new standby database.

   After the fast-start failover completes successfully, the master observer will attempt to reinstate the former primary database as a new standby database when a connection to the former primary database is reestablished, and the `FastStartFailoverAutoReinstate` configuration property is set to `TRUE`. If the `FastStartFailoverPmyShutdown` configuration property is set to `TRUE`, then the former primary database will have been automatically shut down and must be manually restarted before the master observer can attempt to reinstate it.

   Note that these properties only affect whether primary shutdown and automatic reinstatement are performed if a fast-start failover occurs because the primary crashed or was isolated from the observer and target standby database.

> **See Also**
>
> Reinstating the Former Primary Database in the Broker Configuration for more information about reinstatement

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Restrictions When Fast-Start Failover is Enabled

This list describes restrictions when fast-start failover is enabled.

- Change:
  - The configuration protection mode
  - The redo transport mode used to send redo to the target standby database or the database currently in the primary role
  - The FastStartFailoverTarget configuration property on the primary unless the new property value contains the current fast-start failover target.
  - The `RedoRoutes` property on the primary if the new value would result in the primary not being able to ship redo to the current fast-start failover target standby. (It is permissible to change the `RedoRoutes` property on all standby databases including target standby databases.)
  - The `RedoRoutes` property on a far sync instance if it is being used to receive redo from the primary database and ship redo to the target standby database
- Disable or delete:
  - The broker configuration
  - The standby database that is the target of fast-start failover
  - A far sync instance if it is being used to receive redo from the primary database and ship redo to the target standby database
- Perform a manual failover:
  - Unless the conditions listed in Performing Manual Role Changes When Fast-Start Failover Is Enabled have been met
  - To a standby database that is not configured as the fast-start failover target

    To determine if the configuration is ready for fast-start failover to occur, issue the DGMGRL `SHOW DATABASE <target-standby-database>` command, or query the `V$DATABASE` view on either the primary or target standby databases. The column value for `V$DATABASE.FS_FAILOVER_STATUS` will be `SYNCHRONIZED` in a configuration operating in maximum availability mode, and it will be `TARGET UNDER LAG LIMIT` in a configuration operating in maximum performance mode when ready to fast-start failover. The `FS_FAILOVER_OBSERVER_PRESENT` column displays `YES` for the target standby database.
- Perform a switchover to a standby database that is not configured as the fast-start failover target
- Perform a switchover to the target standby database in a configuration operating in maximum availability mode, unless the standby database is synchronized with the primary database
- Perform a switchover to the target standby database in a configuration operating in maximum performance mode, unless the standby database is within the lag limit of the primary database
- Attempt to open the primary database, or the following error may be returned:

  ```
  ORA-16649: possible failover to another database prevents this database from being opened
  ```


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This error may return if the fast-start failover validity check fails or does not complete in under two minutes.

- Use the SQL `ALTER DATABASE MOVE DATAFILE` command to rename or relocate an online data file on a physical standby that is a fast-start failover target if the standby is mounted, but not open.

> **Note**
>
> Data Guard Broker cannot failover to second fast-start failover target if both the primary and first fast-start failover targets are down.

Configuring Fast-Start Failover in Observe-only Mode

The observe-only mode for fast-start failover enables you to test how fast-start failover will work in your environment. There is no impact on your current configuration or on applications.

In this mode, no actual changes are made to your Broker configuration. When the conditions for fast-start failover are met, the Broker adds messages to the observer log and broker log indicating that fast-start failover would have been initiated. The logs also contain other details about the actions that will be performed in case of a failover.

Note the following points about the observe-only mode:

- The primary database can enter `UNSYNC` or `LAGGING` state without an acknowledgement from the observer or target standby.
- The primary database can be opened even if there is no acknowledgement from the observer or target standby.
- Manual failover to the fast-start failover target can be performed without receiving an acknowledgement from the observer.
- Manual failover can be performed even if the pre-condition checks are not met. This includes the following: broker configuration is in `UNSYNC` or `LAGGING` state or unobserved state, failover target is invalid, reinstatement is in progress, or a master observer switch is in progress.
- You can switch over or manual failover to a bystander database.

To configure fast-start failover in observe-only mode:

```
DGMGRL> ENABLE FAST_START FAILOVER OBSERVE ONLY;
```

Shutting Down the Primary Database When Fast-Start Failover Is Enabled

Fast-start failover will not be triggered if the primary or standby database is shut down normally.

A normal shutdown uses `SHUTDOWN NORMAL`, `SHUTDOWN IMMEDIATE`, or `SHUTDOWN TRANSACTIONAL`. A normal shutdown prevents a fast-start failover until the primary database and standby database are connected and communicating again.

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Performing Manual Role Changes When Fast-Start Failover Is Enabled

If fast-start failover is enabled you can still perform a switchover or a manual failover as long as certain conditions are met.

The conditions are as follows:

- The role change is directed to the same standby database that was specified for the `FastStartFailoverTarget` database property on the primary database.
- The target standby database is synchronized with the primary database if it is a configuration operating in maximum availability or maximum protection mode, or the target standby database is within the lag limit if it is a configuration operating in maximum performance mode.
- For manual failover, the observer is started and communicating with the target standby database. You must ensure that the primary database is shut down prior to performing a manual failover.

> **Note**
>
> You can disable fast-start failover if necessary, by using the `FORCE` option. See Disabling Fast-Start Failover.

> **See Also**
>
> Switchover and Manual Failover for more information about switchovers and manual failovers, respectively

Directing a Fast-Start Failover From an Application

You can customize fast-start failover setup for a specific application by using the `DBMS_DG` PL/SQL package.

When a serious condition uniquely known to an application is detected, the application can call the `DBMS_DG.INITIATE_FS_FAILOVER` function to initiate an immediate fast-start failover. This function can be called from a connection to either the primary or any standby in the configuration. The database on which the procedure is called notifies the observer. The observer immediately initiates a fast-start failover, as long as the failover target database is in a valid fast-start failover state ("observed" and either "synchronized" or "within lag") to accept a failover. Once the observer has initiated a fast-start failover, the primary database shuts down automatically. The observer does not attempt to reinstate the former primary database.

If the configuration is not failable, the `DBMS_DG.INITIATE_FS_FAILOVER` function returns an `ORA` error number (it does not signal an exception) informing the caller that a fast-start failover could not be performed.

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> **Note**
>
> An application should use caution when calling the `DBMS_DG.INITIATE_FS_FAILOVER` function because the observer will initiate failover, if at all possible.

> **See Also**
>
> *Oracle Database PL/SQL Packages and Types Reference* for more information about the `DBMS_DG` package

Viewing Fast-Start Failover Configuration Statistics and Status

To verify the observer is started and the configuration is ready for fast-start failover, you can issue the `DGMGRL SHOW FAST_START FAILOVER`, `SHOW CONFIGURATION VERBOSE`, or `SHOW OBSERVER` commands.

Alternatively, you can query the `V$FAST_START_FAILOVER_CONFIG` view on the target standby database.

You can also query the `V$FS_FAILOVER_STATS` view to display statistics about fast-start failover occurring on the system.

The rest of this section provides examples of using DGMGRL `SHOW` commands to display fast-start failover information and includes sections describing the following views:

- V$DATABASE View
- V$FAST_START_FAILOVER_CONFIG View
- V$FS_FAILOVER_STATS View

Example 1: SHOW FAST_START FAILOVER

The DGMGRL `SHOW FAST-START FAILOVER` command displays all the fast-start failover related information. For example:

```
DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode:    MaxAvailability
  Lag Limit:          0 seconds

  Threshold:          30 seconds
  Ping Interval:      3000 milliseconds
  Ping Retry:         0
  Active Target:      South_Sales
  Potential Targets:  "South_Sales"
    South_Sales valid
  Observer:           observer1
  Shutdown Primary:   TRUE
  Auto-reinstate:     TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
```


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```
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
    (none)
```

Example 2: SHOW CONFIGURATION VERBOSE

The following example shows the fast-start failover information for the DRSolution configuration:

```
DGMGRL> SHOW CONFIGURATION VERBOSE

Configuration - config

  Protection Mode: MaxAvailability
  Members:
  North_Sales - Primary database
    South_Sales - (*) Physical standby database

  (*) Fast-Start Failover target

  Properties:
    BystandersFollowRoleChange      = 'ALL'
    CommunicationTimeout            = '180'
    ConfigurationSimpleName         = 'config'
    ConfigurationWideServiceName    = 'North_Sa_CFG'
    DrainTimeout                    = '0'
    ExternalDestination1            = ''
    ExternalDestination2            = ''
    FastStartFailoverAutoReinstate  = 'TRUE'
    FastStartFailoverLagLimit       = '0'
    FastStartFailoverPmyShutdown    = 'TRUE'
    FastStartFailoverThreshold      = '30'
    ObserverOverride                = 'FALSE'
    ObserverPingInterval            = '0'
    ObserverPingRetry               = '0'
    ObserverReconnect               = '0'
    OperationTimeout                = '30'
    PrimaryLostWriteAction          = 'CONTINUE'
    TraceLevel                      = 'USER'

Fast-Start Failover: Enabled in Zero Data Loss Mode
  Lag Limit:          0 seconds
  Threshold:          30 seconds
  Ping Interval:      3000 milliseconds
  Ping Retry:         0
  Active Target:      South_Sales
  Potential Targets:  "South_Sales"
    South_Sales valid
  Observer:           observer1
  Shutdown Primary:   TRUE
  Auto-reinstate:     TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configuration Status:
SUCCESS
```


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Example 3: SHOW OBSERVER

The following `SHOW OBSERVER` command displays information about multiple observers in the `DRSolution` broker configuration.

```
DGMGRL> SHOW OBSERVER

Configuration - config

  Fast-Start Failover:     ENABLED

  Primary:            North_Sales
  Active Target:      South_Sales

Observer "observer1" - Master

  Host Name:                    observer1
  Last Ping to Primary:         0 seconds ago
  Last Ping to Target:          2 seconds ago
  Log File:                     /sales/observer_observer1.log
  State File:                   /sales/fsfo.dat

Observer "observer2" - Backup

  Host Name:                    observer2
  Last Ping to Primary:         1 second ago
  Last Ping to Target:          1 second ago
  Log File:                     /sales/observer_observer2.log
  State File:                   /sales/fsfo.dat
```

V$FAST_START_FAILOVER_CONFIG View

You can query the `V$FAST_START_FAILOVER_CONFIG` view to verify that the observer is started and the configuration is ready for fast-start failover.

When querying the `V$FAST_START_FAILOVER_CONFIG` view, pay special attention to the following:

- The `FAILOVER` column, which can contain the values described in Table 6-2. Note that if the `FAILOVER` column has a value of `DISABLED`, then any values returned for the remaining columns related to fast-start failover (`V$DATABASE.FS_FAILOVER_*`) become irrelevant.
- The `OBSERVER_PRESENT` column, which indicates whether the observer is running and actively pinging the database.

Table 6-2 STATUS Column of the V$FAST_START_FAILOVER_CONFIG View

Column Value	Description	Fast-Start Failover ...
`BYSTANDER`	Fast-start failover is enabled, but this standby database is not the target of the fast-start failover. The database cannot provide fast-start failover status information.	Is enabled
`DISABLED`	Fast-start failover is disabled.	Is not possible

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Table 6-2 (Cont.) STATUS Column of the V$FAST_START_FAILOVER_CONFIG View

Column Value	Description	Fast-Start Failover ...
LOADING DICTIONARY	Displays only on a logical standby database that has not yet completed loading a copy of the primary database's data dictionary.	Is not possible
PRIMARY UNOBSERVED	Displays only on the target standby database when it is SYNCHRONIZED with or is TARGET UNDER LAG LIMIT of the primary database, has connectivity to the observer, but the primary database does not have a connection to the observer.	Is not possible
REINSTATE FAILED	Reinstatement of the failed primary database as a new standby database failed. See Sources of Diagnostic Information for details about the broker's drc* log files.	Has completed
REINSTATE REQUIRED	The failed primary database requires reinstatement as a new standby database to the new primary. The observer automatically starts the reinstatement process. REINSTATE REQUIRED is present only after fast-start failover has occurred and shows on both the new primary database and the database undergoing reinstatement. This is cleared on both when the reinstatement has been completed.	Has completed
STALLED	Displays on the primary database after loss of connectivity to the target standby database and the change to the UNSYNCHRONIZED state (maximum availability mode) or to the TARGET OVER LAG LIMIT state (maximum performance mode) cannot be confirmed by either the target standby database or the observer. Note that the value of the FastStartFailoverPmyShutdown configuration property must be FALSE for the primary to stall indefinitely under these conditions. With a value of TRUE for this property, the primary will shut down after being stalled for the number of seconds specified by the FastStartFailoverThreshold property. It shuts down or stalls because it is likely a failover has occurred. **Note**: this state also occurs on the primary during startup when fast-start failover is possible and neither the target standby database nor the observer are present to confirm it is okay to continue opening the database.	Is possible
TARGET OVER LAG LIMIT	Displays if the standby database's redo applied point lags the primary database's redo generation point by more than the number of seconds specified by the FastStartFailoverLagLimit configuration property and the configuration is operating in maximum performance mode.	Is not possible

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Table 6-2 (Cont.) STATUS Column of the V$FAST_START_FAILOVER_CONFIG View

Column Value	Description	Fast-Start Failover ...
TARGET UNDER LAG LIMIT	Displays if the standby database's redo applied point does not lag the primary database's redo generation point by more than the number of seconds specified by the FastStartFailoverLagLimit configuration property and the configuration is operating in maximum performance mode.	Is possible
SUSPENDED	Displays only on the target standby database when either the primary or target standby database was shut down in a controlled fashion (using the NORMAL, IMMEDIATE, or TRANSACTIONAL, options, but not the ABORT option). Fast-start failover is inhibited in this case. SUSPENDED is cleared when connectivity with the primary database is restored.	Is not possible
SYNCHRONIZED	Displays when the primary and target standby databases are synchronized and the configuration is operating in maximum availability mode.	Is possible if the target standby database displays SYNCHRONIZED and the FS_FAILOVER_OBSERVER_PRESENT column displays YES
UNSYNCHRONIZED	Displays when the target standby database does not have all of the primary database redo data and the configuration is operating in maximum availability mode.	Is not possible
FS_FAILOVER_MODE	Displays the current fast-start failover mode.	The mode can have one of the following values: • DISABLED: Fast-start failover is disabled. • OBSERVE-ONLY: Fast-start failover is enabled in observe-only mode. • ZERO DATA LOSS: Fast-start failover is enabled with zero data loss. In this mode, the FastStartFailoverLagLimit configuration property is set to zero. • POTENTIAL DATA LOSS: Fast-start failover is enabled with some data loss. In this mode, the FastStartFailoverLagLimit configuration property is set to a non-zero value. Fast-start failover can incur data-loss within the time specified by FastStartFailoverlagLimit.

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V$FAST_START_FAILOVER_CONFIG View

You can query the V$FAST_START_FAILOVER_CONFIG view on the primary database to display statistics about the fast-start failover configuration on the system.

Some of the statistics that can be monitored are as follows:

- MODE that shows the current fast-start failover mode.
- STATUS that shows the fast-start failover status
- CURRENT_TARGET shows the DB_UNIQUE_NAME of the standby that is the current fail-safe failover observer target standby for the Data Guard configuration

The following is an example of querying the V$FAST_START_FAILOVER_CONFIG view:

```
SQL> SELECT FSFO_MODE, STATUS, CURRENT_TARGET FROM V$FAST_START_FAILOVER_CONFIG;

FSFO_MODE           STATUS                CURRENT_TARGET
------------------- --------------------- ------------------------------
ZERO DATA LOSS      SYNCHRONIZED          South_Sales
```

V$FS_FAILOVER_STATS View

You can query the V$FS_FAILOVER_STATS view on the primary database to display statistics about fast-start failovers that have occurred on the system.

It can be useful to perform such queries because fast-start failovers are fully automated and can occur at any time. Some of the statistics that can be monitored are as follows:

- LAST_FAILOVER_TIME that shows the timestamp of last fast-start failover
- LAST_FAILOVER_REASON that shows the reason for the last fast-start failover

The following is an example of querying the V$FS_FAILOVER_STATS view:

```
SQL> SELECT LAST_FAILOVER_TIME, LAST_FAILOVER_REASON FROM V$FS_FAILOVER_STATS;
 LAST_FAILOVER_TIME
--------------------
LAST_FAILOVER_REASON
--------------------------------------------------------------------------------
12/14/2022 17:12:13
Primary Disconnected
```

Disabling Fast-Start Failover

Disabling fast-start failover prevents the observer from initiating a failover to the target standby database.

If fast-start failover is disabled, then manual failover may still be possible. See Manual Failover for information about manual failover.

> **Note**
>
> Disabling fast-start failover does not stop the observer. To stop the observer, see Stopping the Observer.

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To disable fast-start failover, use the Fast-Start Failover wizard in Cloud Control or the DGMGRL `DISABLE FAST_START FAILOVER [FORCE]` command. The `FORCE` option disables fast-start failover on the database to which you are connected even when errors occur. Whether or not you need the `FORCE` option depends mostly on if the primary and target standby database have network connectivity:

- If the primary and target standby database have network connectivity, and the database to which you are connected has network connectivity with the primary database, the `FORCE` option has no effect. Simply use `DISABLE FAST_START FAILOVER`. This method will disable fast-start failover on all databases in the broker configuration.

  If errors occur during the disable operation, the broker returns an error message and stops the disable operation.

- If the primary and target standby databases do not have network connectivity or if the database to which you are connected does not have network connectivity with the primary database, consider using `DISABLE FAST_START FAILOVER` *with* the `FORCE` option.

  The broker may not be able to disable fast-start failover on all databases in the broker configuration when you issue the `DISABLE FAST_START FAILOVER FORCE` command. As a result, there is no guarantee that the observer will not perform a fast-start failover to the target standby database if the observer determines that conditions warrant a failover. The following list indicates the extent to which fast-start failover is disabled in the broker configuration when the `DISABLE FAST_START FAILOVER FORCE` command is issued on the primary database, target standby database, and a standby database that is not the fast-start failover target.

  If you issue this command on:

  – The target standby database when it does not have connectivity with the primary database, fast-start failover is disabled only on the target standby database. In this case, the observer cannot perform a fast-start failover even if conditions warrant a failover. Disabling fast-start failover with the `FORCE` option when connected to the target standby database guarantees that fast-start failover will not occur.

    When the primary database and the target standby database regain network connectivity, the broker will disable fast-start failover for the entire broker configuration.

  – The primary database, it attempts to disable fast-start failover on as many databases in the configuration with which it has a network connection. If the primary database does not have connectivity with the target standby database, fast-start failover remains enabled on the target standby database and the observer may still attempt a fast-start failover if conditions warrant a failover.

    > ⚠ **Caution**
    >
    > This action may result in two databases in the configuration simultaneously assuming the primary database role should fast-start failover occur. For this reason, you should first issue this command on the target standby database.

  – Another standby database that does not have connectivity with the primary database, fast-start failover is disabled for this database. Because fast-start failover was not disabled on the target standby database, the observer may still attempt a fast-start failover to the target standby database should conditions warrant a failover.

    When the primary database and the (non-target) standby database regain network connectivity, the broker will propagate its current fast-start failover setting (`ENABLED` or `DISABLED`) to the non-target standby.

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> **⚠ Caution**
>
> When you are experiencing network disconnections and you issue the `DISABLE FAST_START FAILOVER FORCE` command on the primary database or a standby database that does not have connectivity with the primary database, fast-start failover may not be disabled for all databases in the broker configuration. As a result the observer may still initiate fast-start failover to the target standby database, if conditions warrant a failover. This may result in two databases in the configuration simultaneously assuming the primary database role.

Conditions Requiring the FORCE Option

Disabling fast-start failover without the `FORCE` option can succeed only if the database on which the command is issued has a network connection with the primary database and if the primary database and target standby database have a network connection. This is the recommended method for disabling fast-start failover.

However, there may be situations in which you must disable fast-start failover when the primary database and the target standby database do not have a network connection, or the database on which you issued the disable fast-start failover command does not have a network connection to the primary database. In cases where there is a lost network connection, be aware that the observer may attempt a fast-start failover to the target standby database if conditions warrant a failover. The `FORCE` option may be the preferred method for disabling fast-start failover when:

- A network outage isolates the primary database from the observer and the target standby database before conditions exist that warrant a failover.

  In this case, the primary database stalls and prevents any further transactions from committing because a fast-start failover may have occurred while it was isolated. If you expect the network to be disconnected for a long time and you need to make the primary database available, first confirm that a fast-start failover has not occurred to the target standby database. Then, disable fast-start failover with the `FORCE` option on the primary database. If possible, confirm that fast-start failover has not occurred to the target standby database prior to disabling fast-start failover with the `FORCE` option on the primary database.

  > **⚠ Caution**
  >
  > This action may result in two databases in the configuration simultaneously assuming the primary database role. This can be avoided by first disabling fast-start failover with the `FORCE` option on the target standby.

- You want to conduct a manual failover to any standby database in the configuration (for example, because a failure occurred on the primary database at a time when the primary and target standby database were not ready to failover).

  In this case fast-start failover cannot occur because the databases are not ready to failover. You cannot perform a manual failover to the target standby database for the same reason. To proceed, you must first disable fast-start failover using the `FORCE` option, and then perform a manual failover.

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> **⚠ Caution**
>
> This action will result in loss of data and the possibility of two databases in the configuration simultaneously assuming the primary database role. This can be avoided by first disabling fast-start failover with the `FORCE` option on the target standby.

- A fast-start failover to the target standby database fails.

  If the failover fails for any reason, it could leave the target standby database inoperable, regardless of whether the target standby database is ready to failover. If there is another standby database that is available for failover, you can perform a manual failover to that standby database after you first disable fast-start failover using the `FORCE` option on that standby database.

- You want to prevent fast-start failover from occurring because the primary database will resume service soon.

  In this case, disable fast-start failover using the `FORCE` option on the target standby database. Once the primary database regains connectivity with the target standby database, fast-start failover will be disabled for all the databases in the configuration.

Disabling Fast-Start Failover Using Cloud Control

Click **Disable** in the Fast-Start Failover wizard. Then, click **Continue** to proceed to the next page. See the Cloud Control online help for more information.

Disabling Fast-Start Failover Using DGMGRL

Issue the `DISABLE FAST_START FAILOVER` command or the `DISABLE FAST_START FAILOVER FORCE` command. See the "DISABLE FAST_START FAILOVER" command in Oracle Data Guard Command-Line Interface Reference for more information.

Performance Considerations for Fast-Start Failover

This list contains some recommendations to obtain better performance when using fast-start failover.

- The failover time is dependent upon whether the target standby database (physical or logical standby database) has applied all of the redo data it has received from the primary database.
- Enabling fast-start failover in a configuration operating in maximum performance mode provides better overall performance on the primary database because redo data is sent asynchronously to the target standby database. Note that this does not guarantee no data will be lost.
- Fast-start failover is faster when you take steps to optimize recovery so that the application of redo data to the standby database is kept up to date with the primary database's rate of redo application. To optimize the log apply rate:
  - Do not configure the `DelayMins` database property to delay applying archived redo log files to the standby database (see Managing Log Apply Services for more information).
  - See *Oracle Data Guard Concepts and Administration* for information about tuning the log apply rate for a physical standby database.
  - See the *Oracle Maximum Availability Architecture* technical briefs at:

    `http://www.oracle.com/goto/maa`

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- When setting the `FastStartFailoverLagLimit` configuration property, consider these tradeoffs between performance and potential data-loss:
  - A low lag limit will minimize data loss but may impact the performance of the primary database.
  - A high lag limit may lead to more data loss but may lessen the performance impact of the primary database.

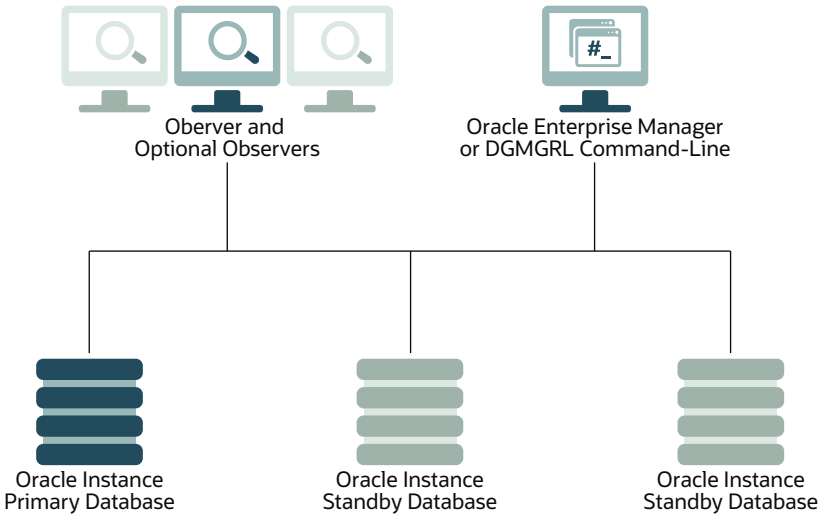
Managing the Observer

An observer process is integrated in the DGMGRL client-side component of the broker and typically runs on a different computer from the primary or standby databases and from the computer where you manage the broker configuration.

There can be up to four observers for a single Data Guard configuration. Observers continuously monitor the fast-start failover environment to ensure the primary database is available (described in When Fast-Start Failover Is Enabled and the Observer Is Running). The observer's main purpose is to enhance high availability and *lights out* computing by reducing the human intervention required by the manual failover process that can add minutes or hours to downtime.

You can manage observers through either the Oracle Data Guard Overview pages in Cloud Control or using DGMGRL commands. Figure 6-2 shows the observer monitoring a fast-start failover configuration.

Figure 6-2 The Observer in the Fast-Start Failover Environment



The following sections provide information about managing observers:

- Installing and Starting the Observer
- Viewing Information About the Observer
- What Happens if the Observer Fails?
- Stopping the Observer
- Moving the Observer to Another Computer
- How the Observer Maintains Fast-Start Failover Configuration Information

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- Patching an Environment When the Observer Is Running and Fast-start Failover Is Enabled

Installing and Starting the Observer

Observers should be installed and run on a computer system that is separate from the primary and standby systems.

Installing and starting an observer is an integral part of using fast-start failover and is described in detail in the following sections:

- Oracle Data Guard Installation explains that you can either install only the Oracle Client Administrator or you can install the complete Oracle Database Enterprise Edition or Personal Edition on the observer system.
- Enabling Fast-Start Failover describes how to start observers as a part of the step-by-step process to enable fast-start failover. Examples of starting observers using DGMGRL are included in Scenario 6: Enabling Fast-Start Failover and Starting the Observer.

To start an observer, you must be able to log in to DGMGRL with an account that has the `SYSDG` or `SYSDBA` privilege. An observer is an OCI (Oracle Call Interface) client that connects to the primary and target standby databases using the same `SYS` credentials you used when you connected to the Oracle Data Guard configuration with DGMGRL.

> **See Also**
>
> - The My Oracle Support note 1625597.1 at `http://support.oracle.com` for information about compatibility requirements between the observer and DGMGRL

Starting Multiple Observers on a Data Guard Broker Configuration

> **Note**
>
> For Oracle Database Release 12.2 and higher, Oracle Enterprise Manager Cloud Control (Cloud Control) supports configuring multiple observers using the Enterprise Manager Command Line Interface (EM CLI). Use the EMCLI verb `dg_configure_observers`. The subcommands for this verb include `start`, `stop`, `setMaster`, `show`, and `delete_alternate_observer`.

You can register up to four observers to monitor a single Data Guard broker configuration. Each observer is identified by a name that you supply when you issue the `START OBSERVER` command. The following conditions apply when multiple observers are registered for one configuration:

- When fast-start failover is enabled, one of the observers is the master observer. The remaining observers are called backup observers. When fast-start failover is disabled, no observer is called the master observer; all observers have the same functionality.
- No two observers on the same Data Guard Broker configuration can have the same name.
- If no name is specified for the observer then a default observer name, the host name of machine where the `START OBSERVER` command is issued, is used.
- An observer name is case-insensitive.

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- The string "NONAME" cannot be used as an observer name.
- Each observer has its own log file. The log file name is specified with the `LOGFILE IS` option of the `START OBSERVER` command. If the specified log file is not accessible, or the `LOGFILE IS` option is not used, then the observer output is sent to standard output.
- Except for testing purposes, it is not recommended that you start more than one observer on the same host for a Data Guard broker configuration.
- The command `SHOW FAST_START FAILOVER` shows a list of registered observers and indicates which one is the master.
- The command `SHOW OBSERVER` provides detailed information about registered observers.

The Master Observer and Backup Observers

The observer does not need to coordinate fast-start failover when fast-start failover is disabled, so the primary and target standby do not nominate a master observer until fast-start failover is enabled. When fast-start failover is enabled, the primary and standby randomly choose one of the registered observers to be the master. If there are no registered observers when fast-start failover is enabled, then the first observer started is designated as the master observer, and all others started later are backup observers. Only the master observer can coordinate fast-start failover with Data Guard broker. All other registered observers are considered to be backup observers.

Manually Changing the Master Observer

If necessary, you can use the `SET MASTEROBSERVER TO` *Observer-Name* command to change which observer is the master. For example:

```
DGMGRL> SET MASTEROBSERVER TO boston-obsever;
Succeeded.
```

If the `PreferredObserverHosts` property is set for the current primary, only the observers specified in the property can be use in the `SET MASTEROBSERHOST TO` command. When this command is issued, the actual switch does not happen until the next time the primary contacts the target standby, usually within a couple of seconds if fast-start failover is enabled. You can issue a `SHOW OBSERVER` command to confirm that the switch took place. For more information, see SET MASTEROBSERVER TO.

Starting Observers as Background Processes

To run an observer as a background process, use the DGMGRL command `START OBSERVER IN BACKGROUND`. You must provide a connect identifier, through which one or more databases in a specific broker configuration can be reached. The following is an example of starting an observer as a background process:

```
DGMGRL> START OBSERVER IN BACKGROUND
FILE IS  /net/sales/dat/oracle/broker/fsfo.dat
LOGFILE IS /net/sales/dat/oracle/broker/observer.log
CONNECT IDENTIFIER IS sales_p

Submitted command "START OBSERVER" using connect identifier "sales_p"

DGMGRL>
```


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The START OBSERVER IN BACKGROUND command uses Oracle wallet to obtain credentials to log into the database server and register observers. Even if you have successfully connected to a database server in the broker configuration using the CONNECT command, this command ignores the existing connection and uses the credentials stored in Oracle wallet. For more information, see START OBSERVER IN BACKGROUND.

Starting Multiple Observers On a Single Host

If you want to use one Oracle home to start multiple observers, with each observer monitoring a different fast-start failover configuration, use the FILE qualifier to specify a unique observer configuration file location for each configuration to be monitored. If you want to capture any logging generated by the observer, use the LOGFILE IS option on the START OBSERVER command, and ensure that the file name is unique. For example:

```
% dgmgrl
DGMGRL> CONNECT /@primary1;
DGMGRL> START OBSERVER FILE IS '/u01/oracle/dbs/config1.dat'
LOGFILE IS '/u01/oracle/log/config1.log'

% dgmgrl
DGMGRL> CONNECT /@primary2;
DGMGRL> START OBSERVER FILE IS '/u01/oracle/dbs/config2.dat'
LOGFILE IS '/u01/oracle/log/config2.log'
```

Viewing Information About the Master Observer

You can find information about the master observer by querying the V$FAST_START_FAILOVER_CONFIG view.

- OBSERVER_HOST shows the name of the computer on which the master observer is running
- OBSERVER_PRESENT shows whether or not the master observer is connected to the local database

The Column Value in the following table is consistent across instances in an Oracle Real Applications Clusters (Oracle RAC) environment. That is, if the observer is connected to any instance in the Oracle RAC, all instances will show a value of YES.

Table 6-3 FS_FAILOVER_OBSERVER_PRESENT Column of the V$DATABASE View

Column Value	Description
YES	The master observer is currently connected to the local database
NO	The master observer is not connected to the local database

For example, to determine if fast-start failover can occur, the STATUS column displays either SYNCHRONIZED or TARGET UNDER LAG LIMIT and the OBSERVER_PRESENT column displays YES for the target standby database. For example:

Database	STATUS	Protection Mode	OBSERVER_PRESENT
Primary	SYNCHRONIZED	Maximum Availability	YES
Standby	SYNCHRONIZED	Maximum Availability	YES

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Database	STATUS	Protection Mode	OBSERVER_PRESENT
Primary	TARGET UNDER LAG LIMIT	Maximum Performance	YES
Standby	TARGET UNDER LAG LIMIT	Maximum Performance	YES

In the following example, assume the network between the primary database and the observer has failed. In this case, the FS_FAILOVER_STATUS and FS_FAILOVER_OBSERVER_PRESENT columns will appear as shown in the following table and fast-start failover will not occur:

Database	FS_FAILOVER_STATUS	FS_FAILOVER_OBSERVER_PRESENT
Primary	SYNCHRONIZED	NO
Standby	PRIMARY UNOBSERVED	YES

See Also

- *Oracle Database Reference* for more information about the V$DATABASE view.

Viewing Information About All Observers

You can find detailed information about all observers, including master observers and backup observers, in the V$FS_FAILOVER_OBSERVERS view.

For each observer, the V$FS_FAILOVER_OBSERVERS view provides the observer name, host, whether it is the master observer, when it became the master observer, whether it is currently connected to the primary and target standby databases, the location of the observer log file, and the location of the observer runtime data file (fsfo.dat).

See Also

- *Oracle Database Reference* for more information about the V$FS_FAILOVER_OBSERVERS view.

What Happens if the Master Observer Fails?

The behavior of the broker if the master observer fails depends on whether the broker configuration has one observer or multiple observers.

If there is only one observer, then it is considered to be the master observer. If there are multiple observers, then only one of them is the master observer.

Broker Configuration Has Only One Registered Observer

When the configuration has only one registered observer, if the primary and target standby databases stay connected but the connection to the observer is lost, then the broker reports that the configuration is not observed. The configuration and database status report that the observer is not running and return one of the following status messages:

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```
ORA-16658: unobserved fast-start failover configuration
ORA-16820: fast-start failover observer is no longer observing this database
```

While the configuration is in the unobserved state, fast-start failover cannot happen. Therefore, the primary database can continue processing transactions, even if the target standby database fails. The configuration status returns the SUCCESS status after the observer reestablishes its connection to the primary database, which then notifies the target standby database.

> **See Also**
>
> Viewing Fast-Start Failover Configuration Statistics and Status

Broker Configuration Has Multiple Registered Observers

When the configuration has more than one registered observer, if the primary and target standby databases stay connected but the connection to the master observer is lost, then the broker tries to nominate a backup observer as the new master observer. This nomination is noted in the observer log file and in the broker log file (drc*.log). Additionally, the new master observer is identified in the output shown for the SHOW FAST_START FAILOVER and SHOW OBSERVER commands.

> **Note**
>
> During the period when a new master observer is being identified, a fast-start failover cannot occur until the new master observer is selected and observing the configuration.

If the primary or target standby databases lose connections to all backup observers, then the broker does not try to nominate a backup observer as the new master observer, and the broker reports that the configuration is not observed. The configuration and database status report the same error messages as are returned when there is only one registered observer.

Managing Observer's Connection to the Primary

The ObserverOverride and ObserverReconnect properties allow you additional control over the connection to the primary.

When the observer loses its connection to the primary database for a period of time greater than that specified by the FastStartFailoverThreshold property, it attempts a failover to the standby database. However, if the standby has had contact from the primary within the period of time specified by the FastStartFailoverThreshold property, the standby prevents the failover attempt.

To override this behavior and allow a fast-start failover to occur if the observer is unable to contact the primary for more than FastStartFailoverThreshold seconds, set the ObserverOverride property to TRUE. For example:

```
DGMGRL> EDIT CONFIGURATION SET PROPERTY ObserverOverride=TRUE;
```

Ordinarily the observer connects once to the primary and does not attempt to reconnect unless the connection has failed. However, if you want the observer to reconnect to the primary database periodically as a means of testing the health of the network connection to the

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primary, then use the `ObserverReconnect` configuration property. This specifies how often the observer establishes a new connection to the primary database. In the following example, `ObserverReconnect` is set to 30 seconds. This results in the observer establishing a new connection to the primary database every 30 seconds.

```
DGMGRL> EDIT CONFIGURATION SET PROPERTY ObserverReconnect=30;
```

Configuring the Time Taken to Initiate Fast-Start Failover

Use broker configuration properties to set the time taken to detect a failure on the primary database.

Before enabling fast-start failover, use one of the following techniques to set the time taken to detect a failure on the primary database:

- Set the `FastStartFailoverThreshold` configuration property

  The broker initiates a failover after the number of seconds specified by this property. The minimum detection time is 6 seconds, which is the default value of the `FastStartFailoverThreshold` property.

- Set the `ObserverPingInterval` and `ObserverPingRetry` configuration properties

  Set both these properties to achieve a primary failure detection time of 1 second. The minimum value of `ObserverPingInterval` is 100 milliseconds and that of `ObserverRetryCount` is 10.

> **Note**
>
> Setting the `ObserverPingInterval` and `ObserverPingRetry` properties must be used only in low latency environments.

Stopping the Observer

You can manually stop a specific observer or all observers.

Before stopping an observer, note the following:

- The observer does not stop immediately when you issue the `STOP OBSERVER` command. After the broker receives the `STOP OBSERVER` request, the request is passed to the observer the next time the observer contacts the broker, and the observer then stops itself.
- Stopping the observer does not disable fast-start failover. However, fast-start failover cannot occur when the target standby database is in an unobserved state.
- To stop the observer when fast-start failover is disabled, the primary database must be running.
- To stop the observer when fast-start failover is enabled, the primary database and target standby database must be connected and communicating with each other. If they are isolated from each other, then you must first disable fast-start failover by using the `FORCE` option, and then stop the observer. (See Disabling Fast-Start Failover for important considerations when using the `FORCE` option.)

Stopping All Observers

You can specify `STOP OBSERVER ALL` to stop all observers registered in a broker configuration.

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Stopping a Specific Observer When There are Multiple Observers

To stop a specific observer when there are multiple registered observers running, issue the following command:

```
DGMGRL> STOP OBSERVER observer_name;
```

You can log into DGMGRL from any machine to stop an observer. For instance, you could log into the system running `observer1` to stop `observer2`.

In an environment where there are multiple observers configured, stopping the master observer is not allowed unless it is the last running observer. To stop an observer currently designated as the master observer, first issue the `SET MASTEROBSERVER` command to designate a different observer as master observer. Then the `STOP OBSERVER` command can be issued successfully on the former master observer.

Stopping the Observer When There is Only One Observer

Use one of the following methods to stop the observer:

- Using Cloud Control

  Choose the **Stop Observer** option on the first page of the fast-start failover wizard and click **Continue** at the bottom of the page. See the Cloud Control online help for more information.

- Using DGMGRL

  Issue the following command:

  ```
  DGMGRL> STOP OBSERVER;
  ```

  If there is more than one registered observer, then this command returns an error; a name is required if there is more than one observer.

> **Note**
>
> See the STOP OBSERVER command for more information.

Moving the Observer to Another Computer

An observer can be moved from one computer to another through a process of stopping it on one system and and re-starting it on another.

To move the observer to another computer:

1. Stop the observer from any computer system in the broker configuration, as described in Stopping the Observer.
2. Start the observer on the new computer system, as described in Step 8 of Enabling Fast-Start Failover.

There is no need to disable fast-start failover when you move the observer.

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How the Observer Maintains Fast-Start Failover Configuration Information

The observer persistently maintains information about the fast-start failover configuration in a binary file created in the working directory where you started the observer.

By default, the observer creates this file in the current working directory when it is started and names the file `fsfo.dat`. This file contains connect identifiers to both the primary and the target standby databases.

Ensure this file cannot be read by unauthorized users.

Once the observer is started, you cannot change the file's name and location. However, you can change the name or the location of the file if you start the observer using the DGMGRL `START OBSERVER` command and include the `FILE IS` qualifier. See the START OBSERVER command for more information.

> **Note**
>
> If the observer is stopped abnormally (for example, by typing `CTRL/C`), restart it and reference the existing `fsfo.dat` file with the `FILE IS` qualifier.

Managing Observers for Multiple Configurations

DGMGRL can be used to manage multiple observers in a group of broker configurations.

You can start, stop, and show observers for a group of configurations. You can also switch the master observer hosts for a group of configurations to one specific host.

The group of broker configurations to be managed is declared in the observer configuration file. The default group is all the configurations defined in the observer configuration file. If you do not want to use the default, you can define a specific group. The observer configuration file is a text file and the syntax to define observers and groups is similar to that used in the `listener.ora` or `tnsnames.ora` files. It has two parts in the following order:

1. Configuration declaration — this section is mandatory. It must appear as the first part of an observer configuration file.
2. Group definition — this section is optional. If provided, then each group needs to have at least one broker configuration declared in the second part.

Syntax for Mandatory Configuration Declaration

The syntax for the configuration declaration is:

```
BROKER_CONFIGS = (
(configuration1-definition)
(configuration2-definition)
...
(configuration-n-definition)
)
```


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The definition for each broker configuration is:

```
CONFIG= (NAME        =configuration-name)
        (CONNECT_ID  =connect-identifier)
        (CONFIG_HOME =config-home-location)
)
```

Note the following:

- The `configuration-name` can be different from the name defined in the metadata of the Data Guard Broker configuration. (This is useful because the name defined in the metadata may contain whitespace and international characters, which the observer configuration file does not allow.)
- The `connect-identifier` is a TNS alias defined in `tnsnames.ora` through which all instances of all databases in this Data Guard broker configuration can be reached.
- `Config-home-location` specifies a location for the observer log file and `FSFO.dat` file.
- Duplicate configuration names in configuration definitions are not allowed.

Syntax for Optional Group Definition

The syntax for the optional definition of a broker configuration group is:

```
CONFIG_GROUPS = (
(group1-definition)
(group2-definition)
...
(group-n-definition)
)
```

The definition of each group is:

```
GROUP =(NAME=group-name)
             (CONFIG_LIST=
                   (NAME=configuration1-name)
                   (NAME=configuration2-name)
                   ...
                   (NAME=configuration-n-name)
              )
```

Note the following:

- The group definition section is optional. If groups are not defined, you can still operate on all configurations defined in the file as a whole.
- The word `ALL` cannot be used as a group name because it is a reserved keyword.
- Duplicate group names are not allowed.
- Each group that you define must have at least one broker configuration.
- Any broker configuration name that is referred to must exist in the configuration declaration section.
- A broker configuration can belong to multiple groups.

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Specifying the Observer Configuration File

When you execute commands that affect multiple observers, if you have not specified a name and location for the observer configuration file, then broker searches `$DG_ADMIN/admin` or the current working directory (if the environment variable `DG_ADMIN` is not defined) for a file named `observer.ora`. The command fails if the file does not exist.

However, you do have the option of specifying a name and location for the observer configuration file. To do this, use the `SET ObserverConfigFile` and `SHOW ObserverConfigFile` commands. These commands can be issued from the DGMGRL command line, but it is not necessary to log on prior to using them.

- `SET ObserverConfigFile` — used to specify a customized observer configuration file. `ObserverConfigFile` is a DGMGRL session runtime property. You must specify it every time you start a new DGMGRL client.
- `SHOW ObserverConfigFile` — used to check the runtime property `ObserverConfigFile`. If you have not used the `SET ObserverConfigFile` command after starting the current DGMGRL client, then the result will always be: `ObserverConfigFile=observer.ora`.

Commands For Managing Observers on Multiple Configurations

The commands that can be executed for a group of configurations (as declared in an observer configuration file) are as follows.

- `START OBSERVING` [*cfg_group_name*] — starts a new observer for each broker configuration in the specified group. If the group name is not provided, then a new observer is started for each broker configuration defined in observer.ora.
- `STOP OBSERVING` [*cfg_group_name*] — stops LOCAL observers running on this host (where this DGMGRL is running) for all broker configurations in a specified group
- `SHOW OBSERVERS [FOR` *fg_group_name* `]` — shows information about observers for all configurations in the specified group. The information shown by this command is the same as that shown by a `SHOW OBSERVER` command on each individual configuration. If a group name is not specified, then `SHOW OBSERVERS` alone is also a valid command. It behaves similarly to `START OBSERVING` and `STOP OBSERVING` to operate on all the configurations defined in the observer configuration file.
- `SET MASTEROBSERVER TO` — allows you to manually change the observer configuration file.

> **See Also**
>
> - Oracle Data Guard Command-Line Interface Reference for more information about these broker commands.

Credentials Required for Access to Broker Configurations

You must use the Oracle wallet to store the credentials for all broker configurations to be managed. Data Guard broker does not manage or store credentials. It uses the connect identifier specified in the observer configuration file to locate the credentials for a broker configuration from the Oracle wallet. If the credentials cannot be obtained, then the attempted command fails (but only for the broker configuration whose credentials have not been obtained).

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Example 6-2 Sample Observer Configuration File

The following is a sample observer configuration file:

```
# is the comment sign in this file
BROKER_CONFIGS = (
 #Broker configuration 'SALES'; the connect ID is 'SALES_P'
 (CONFIG = (NAME=SALES)
           (CONNECT_ID=SALES_P)
           (CONFIG_HOME= ORACLE_HOME/LOG/))
 #Broker configuration 'HR'; the connect ID is 'HR_P'
 (CONFIG = (NAME=HR)
           (CONNECT_ID=HR_P)
           (CONFIG_HOME= ORACLE_HOME/LOG/))
 #Broker configuration 'CUSTOMER'; The connect ID is 'CUSTOMER_P'
 (CONFIG = (NAME =CUSTOMER)
                 (CONNECT_ID=CUSTOMER_P)
                 (CONFIG_HOME= ORACLE_HOME/LOG1/))
            )
# The portion 'CONFIG_GROUP' lists definitions of
# all broker configuration groups
CONFIG_GROUPS= (
 # Configuration 'GRP_A' includes 'SALES' and 'HR'
 (GROUP = (NAME=GRP_A)
                (CONFIG_LIST=
                   (NAME=SALES)
                   (NAME=HR)))
 # Configuration 'GRP_B' includes 'SALES' and 'CUSTOMER'
 (GROUP = (NAME=GRP_B)
          (CONFIG_LIST=
            (NAME=SALES)
            (NAME=CUSTOMER)))
)
```

Since the broker configuration `SALES` consists of three databases, `Boston`, `Chicago`, and `Dallas`, with a `CONNECT_ID` of `SALES_P`, the `SALES_P` connect identifier must be defined such that it can reach any instance of any database within the configuration. The `ConfigurationWideServiceName` configuration property can be used to simplify setting up this connect identifier. Data Guard broker publishes this service on each instance as it comes up and broker management of the instance is initialized:

```
SALES_P = (DESCRIPTION =
                (ADDRESS_LIST =
                    (ADDRESS=(PROTOCOL=TCP)(HOST=boston-cluster)(PORT = 1521))
                    (ADDRESS=(PROTOCOL=TCP)(HOST=chicago-cluster)(PORT =
1521))
                    (ADDRESS=(PROTOCOL=TCP)(HOST=dallas-cluster)(PORT =
1521)))
                (CONNECT_DATA=(SERVER=DEDICATED)
(SERVICE_NAME=cfgSvc.us.example.com)))
```


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Patching an Environment When the Observer Is Running and Fast-start Failover Is Enabled

To patch an environment where the Observer is running and fast-start failover is enabled, follow these steps prior to applying the patch.

1. Stop the observer using the DGMGRL `STOP OBSERVER` command. If multiple observers have been started for the configuration, then be sure to specify the name of the observer whose environment is to be patched (`STOP OBSERVER` *observer-name*). The primary and target standby must have connectivity for the `STOP OBSERVER` command to complete successfully.
2. Disable fast-start failover using the DGMGRL `DISABLE FAST_START FAILOVER` command. Note the primary and target standby must have connectivity for this command to complete successfully.

> **Note**
>
> It is not necessary to disable fast-start failover if there are only backup observers, but no master observer, running in the environment to be patched.

After the patch has been successfully applied to all databases, take the following steps to enable fast-start failover and start the observer.

1. Enable fast-start failover using the DGMGRL `ENABLE FAST_START FAILOVER` command. The primary and target standby must have connectivity for this command to complete successfully.
2. Start the observer using the DGMGRL `START OBSERVER` command. If the configuration has multiple observers, then be sure to specify the name of the observer whose environment has just been patched (`START OBSERVER` *observer-name*).

Reinstating the Former Primary Database in the Broker Configuration

Reinstatement restores high availability to the broker configuration so that, in the event of a failure of the new primary database, another fast-start failover can occur.

If a fast-start failover was initiated because the primary database had crashed or lost connectivity with the master observer and target standby database, then the master observer automatically attempts to *reinstate* the former primary database as a standby database, if the `FastStartFailoverAutoReinstate` configuration property is set to `TRUE`. The reinstated database acts as the fast-start failover target for the new primary database, making a subsequent fast-start failover possible. The new standby database is a viable target of a failover when it begins receiving redo data received from the new primary database.

To allow the master observer to automatically reinstate the former primary database, the database must be started and mounted. It will not be allowed to open in any event if fast-start failover is enabled. The broker reinstates the database as a standby database of the same type as the former standby database of the new primary database.

If the former primary database cannot be reinstated automatically, you can manually reinstate it using either the DGMGRL `REINSTATE` command or Cloud Control. Step-by-step instructions for manual reinstatement are described in Reenabling Disabled Databases After a Role Change.

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Requirements

Reinstatement is supported only after failover in a broker configuration. It also requires Flashback Database to be enabled on both the primary and target standby databases.

Prerequisites for Enabling Fast-Start Failover provides complete information about all of the fast-start failover and reinstatement requirements.

Restrictions on Reinstatement

This list describes conditions in which the broker cannot automatically reinstate the former primary database.

- A fast-start failover occurred because a user-configurable condition was detected or was requested by an application by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.
- `FastStartFailoverAutoReinstate` is set to `FALSE`
- Another failover or switchover occurred *after* the fast-start failover completed but *before* the former primary database restarted
- Fast-start failover was disabled
- The master observer cannot connect to the former primary database
- The former primary database cannot connect to the new primary database
- The former primary database and the new primary database are not configured in the same fast-start failover environment
- The former primary database was disabled because of a manual failover when fast-start failover was disabled

> **Note**
>
> Standby databases that are disabled during switchover, manual failover, or fast-start failover will not be automatically reinstated.

If automatic reinstatement fails, the broker will log errors and the former primary database will remain in the mounted state. At this point, you can either:

- Disable fast-start failover (described in Disabling Fast-Start Failover) and attempt to open the former primary database
- Manually reinstate the former primary database, as described in Reenabling Disabled Databases After a Role Change

How the Broker Handles a Failed Reinstatement

If a failure occurs once a reinstatement operation (automatic or manual) is underway, the broker logs the appropriate information in the broker configuration files and broker log files.

The former primary database is disabled. Most in-progress failures cannot be restarted (for example, archived redo log file corruption on the primary database). You must manually re-create the database as a standby database and then reenable it.

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> **See Also**
>
> How to Re-create and Reenable a Disabled Database

Shutting Down Databases In a Fast-Start Failover Environment

If necessary, you can shut down the primary or target standby database in a fast-start failover environment.

Perform the following steps:

1. Stop the observer and wait for the `REGISTERED` column of all rows in the `V$FS_FAILOVER_OBSERVERS` fixed view to contain the value `NO` for both the primary and target standby databases. This ensures that a fast-start failover will not occur while you are shutting down the primary database.
2. Shut down the primary database and the target standby database using either DGMGRL `SHUTDOWN` command or the SQL*Plus `SHUTDOWN` statement.

When restarting the databases, you may restart them in any order. When both databases have been restarted, you may restart the observer.

Bystander standby databases can be shut down at any time in any order without impacting fast-start failover.

Database Client Considerations

Event notification and database connection failover support is available to database clients connected to local database services when a broker-managed failover occurs.

For information about event notification and database connection failover support for global services, see the *Oracle Database Global Data Services Concepts and Administration Guide*.

After a failover, the broker publishes Fast Application Notification (FAN) events. These FAN events can be used in the following ways:

- Applications can use FAN without programmatic changes if they use one of these Oracle integrated database clients: Oracle Database JDBC, Oracle Database Oracle Call Interface (OCI), Oracle Data Provider for .NET (ODP.NET), or Universal Connection Pool for Java. These clients can be configured for Fast Connection Failover (FCF) to automatically connect to a new primary database after a failover.
- JAVA applications can use FAN programmatically by using the JDBC FAN application programming interface to subscribe to FAN events and to execute event handling actions upon the receipt of an event.
- FAN server-side callouts can be configured on the database tier.

FAN events are published using Oracle Notification Services (ONS) for all Oracle integrated database clients in Oracle Database 12c and later. In previous releases, OCI and ODP.NET clients receive FAN notifications via Oracle Advanced Queuing (AQ).

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> **Note**
>
> A single-instance database must be registered with Oracle Restart in order to publish FAN events via ONS.

> **See Also**
>
> - *Oracle Real Application Clusters Administration and Deployment Guide* for more information about configuring FAN, FCF, and ONS on an Oracle Real Application Clusters (Oracle RAC) database

Oracle Data Guard Specific FAN and FCF Configuration Requirements

There are configuration requirements that must be met in order to publish and properly handle FAN events generated as the result of a broker-managed failover.

These requirements are supplemental to those described in the documents previously referenced and in the following client-specific guides:

- *Oracle Database JDBC Developer's Guide*
- *Oracle Call Interface Programmer's Guide*
- *Oracle Data Provider for .NET Developer's Guide for Microsoft Windows*

Oracle Net Configuration Requirements

For Fast Connection Failover (FCF) to occur, a client must be able to locate the new primary database after a failover.

This section describes how to configure an Oracle Net connect descriptor that meets this requirement.

The connect descriptor can be configured in one of two ways:

1. Configure the connect descriptor for connect-time failover. Add the primary database and each standby database to the address list. Set the `CONNECT_TIMEOUT` parameter to a small value to minimize the delay experienced if a network address is not available. Increase the value of this parameter if resource contention causes connection timeouts to occur during normal operation.

   For example:

   ```
   sales =
         (DESCRIPTION=
           (FAILOVER=ON)
           (CONNECT_TIMEOUT=5)
           (ADDRESS_LIST=
             (ADDRESS=(HOST=boston-scan)(PORT=1521))
             (ADDRESS=(HOST=dallas-scan)(PORT=1521)))
           (CONNECT_DATA=(SERVICE_NAME=sales)))
   ```

2. Configure the connect descriptor with a single network name that is registered with a global naming service such as DNS or LDAP. Create a trigger based on the `DB_ROLE_CHANGE` system event that changes the network address associated with the network name to the network address of the new primary database after a failover.

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> **See Also**
>
> - *Oracle Database PL/SQL Language Reference* for more information about the `DB_ROLE_CHANGE` system event

The connect descriptor must contain the `SERVICE_NAME` parameter in either case.

Database Service Configuration Requirements

Database services can be configured to be active in specific database roles on Oracle RAC databases and on single-instance databases managed by Oracle Restart.

The broker interacts with Oracle Clusterware or Oracle Restart to ensure that the appropriate database services are active and that the appropriate FAN events are published after a role change.

FAN events are always published through ONS. However, the event notifying a failover is only published for database services that have been configured to be active while the database is in the primary role on the new primary database.

Services that must be active in any given database role (primary, physical standby, logical standby, or snapshot standby) must be configured with the Server Control utility (SRVCTL) explicitly on each database where the service must be active.

In the following example commands, a service named `PAYROLL` is configured to be active in the `PRIMARY` role on the primary database `NORTH`. The service is then configured to be active in the `PRIMARY` role on the standby database `SOUTH`, so that it will be active on that database after a role transition. In these sample commands, the ellipse (...) signifies any other `add service` options you wish to supply.

> **Note**
>
> The examples shown in this section do not necessarily show the specific attributes you might need to use in your own environment. The required attributes vary depending on your configuration (including whether your environment is Oracle RAC-based or single-instance). Refer to the appropriate Oracle RAC or Oracle Restart documentation for further information.

On primary database `NORTH`, execute the following:

```
srvctl add service –db NORTH –service PAYROLL –role PRIMARY ...
```

Configure services with the `-drain_timeout` attribute to set the amount of time to wait for the sessions drain prior to a switchover. If different services are configured with different values for `-drain_timeout`, broker will wait for the maximum configured value of the active services at the time switchover is initiated.

On standby database `SOUTH`, execute the following:

```
srvctl add service –db SOUTH –service PAYROLL –role PRIMARY ...
```

Services that are to be active while the database is in the physical standby role must also be created and started on the current primary database regardless of whether the service will be started on that database or not. This is to ensure that the service definition gets propagated to

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the physical standby database via the redo stream and thus allows for the service to be started on the physical standby database. The service can be started on the physical standby only after the redo generated by starting the service has been applied. It is important that all SRVCTL `add service` options be identical on all the databases so that the services behave the same way before and after a role change.

If all the databases do not have the same values, SRVCTL attempts to override the values, which will fail on the physical standby database because it is open read-only. In the following example, a service named `sales` is configured to be active in the `PHYSICAL_STANDBY` role on the primary database `NORTH`. It is then started and stopped on the primary database. It is then configured to be active in the `PHYSICAL_STANDBY` role on the physical standby database `SOUTH`.

Execute the following on primary database `NORTH`:

```
srvctl add service -db NORTH -service SALES -role PHYSICAL_STANDBY ...

srvctl start service –db NORTH –service SALES

srvctl stop service –db NORTH –service SALES
```

Execute the following on the physical standby database `SOUTH`:

```
srvctl add service -db SOUTH -service SALES -role PHYSICAL_STANDBY ...
```

If the broker now performs a switchover or failover, it automatically starts the `SALES` service on the correct database, based on the database's role.

The previous examples dealt with setting up only one service on a database. The following example shows you how to set up more than one service on a database and how using the broker ensures that the correct service starts on the correct database.

Suppose you have a primary database, `BOSTON`, and a standby database, `CHICAGO`. Issue the following SRVCTL commands so that both databases in the Data Guard configuration know about the two potential services for each database:

On `BOSTON`

```
srvctl add service -db BOSTON -service SALESRW  -role PRIMARY -policy AUTOMATIC
srvctl add service -db BOSTON  -service SALESRO  -role PHYSICAL_STANDBY -policy AUTOMATIC
```

On `CHICAGO`:

```
srvctl add service -db CHICAGO  -service SALESRW  -role PRIMARY -policy AUTOMATIC
srvctl add service -db CHICAGO  -service SALESRO  -role PHYSICAL_STANDBY -policy
AUTOMATIC
```

To start things up initially, you must manually start the services on the correct node. You must also start and stop the `SALESRO` service on the primary so that it can be started on the standby. Issue the following SRVCTL commands:

On `BOSTON`:

```
srvctl start service -db BOSTON -service SALESRW
srvctl start service -db BOSTON -service SALESRO
srvctl stop service -db BOSTON -service SALESRO
```

On `CHICAGO`:

```
srvctl start service -db CHICAGO -service SALESRO
```

Now the correct services are running on the correct databases.

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If the broker performs a switchover or failover, then it starts the service SALESRW or SALESRO based on the current role of the database. So SALESRW will start on CHICAGO (which is now the primary) and SALESRO will start on BOSTON (which is now the physical standby). The same thing happens if a shutdown and startup of either database occurs - the service that is started is the one that matches the role of the database being started.

Be aware that issuing the following manual commands on either database starts both the SALESRO and SALESRW services regardless of the roles specified in the SRVCTL command used to create the services. To start only the services specified for the current database role, add the -role qualifier to the srvctl start service command.

On BOSTON:

```
srvctl start service -db CHICAGO
```

On CHICAGO:

```
srvctl start service -db BOSTON
```

The SRVCTL command does not automatically take the database role into account, so any time you start a service manually, you must specify the name(s) of the service you want started or include the -role qualifier as part of the start service command as in the following example:

```
srvctl start service -db BOSTON -role
```

Note

If the service has been configured to start automatically (-policy AUTOMATIC), then the service will automatically start only after a database role change.

Note

In an Oracle Data Guard configuration, the SRVCTL -startoption for a standby database is always set to OPEN after a switchover.

See Also

- For Oracle RAC databases, see *Oracle Real Application Clusters Administration and Deployment Guide* for more information about configuring database services with the SRVCTL utility

ONS Configuration Requirements

If client-side ONS configuration is used, the client-side ONS configuration file must specify the hostname and port of the ONS daemon(s) of the primary database and each standby database.

If the client uses remote ONS subscription, the client must specify the hostname and port of the ONS daemon(s) of the primary database and each standby database.

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Application Continuity

Application Continuity is an Oracle Database feature that enables rapid and nondisruptive replays of requests against the database after a recoverable error that made the database session unavailable.

Application Continuity is supported for Oracle Data Guard switchovers to physical standby databases. It is also supported for fast-start failover to physical standbys in maximum availability data protection mode. Note that primary and standby databases must be licensed for Oracle RAC or Oracle Active Data Guard in order to use Application Continuity.

See Also

- *Oracle Real Application Clusters Administration and Deployment Guide* for information about Application Continuity

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7

Switchover and Failover in DG PDB Environments

Learn how to use Oracle Data Guard broker to manage switchover and failover operations in a DG PDB environment.

This chapter contains the following topics:

- Overview of Switchover and Failover in a DG PDB Environment
- Performing PDB Switchover
- Performing PDB Failover

Overview of Switchover and Failover in a DG PDB Environment

Oracle Data Guard broker enables you to reverse the roles of the source PDB and its designated target PDB using either a switchover or failover operation.

- PDB switchover

  A planned role reversal between a source PDB and its designated target PDB. The broker ensures that the target PDB has applied all the redo generated by the source PDB before switching roles.

  As part of managing a switchover, the broker automatically sets up redo transport from the new source PDB to its designated target PDB and starts redo apply services on the new target PDB.

- PDB failover

  A role transition in which a designated target PDB is transitioned to the source PDB role after the source PDB has failed or has become unreachable. It is recommended that you perform a failover only when the source PDB is unavailable.

Performing PDB Switchover

A PDB switchover is a role reversal between the source PDB and its designated target PDB. Use DGMGRL commands to perform a PDB switchover.

How Broker Performs Switchover in a DG PDB Environment

The broker performs the following actions when you start a switchover:

1. Verifies that the specified target database is reachable, the target PDB exists, and the target PDB is a designated DG PDB.
2. Validates that the source PDB and target PDB are in the correct states. The source PDB must be open in read/write mode and the target PDB must be in recovery mode.
3. Confirms that the target PDB is recovering the current redo stream of the source PDB.
4. Closes the source PDB on all instances.

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5. Converts the source PDB to the standby role. After the switchover completes, the source PDB will become the target PDB.
6. Converts the target PDB to the primary role, after the target PDB has recovered through the all the redo generated by the source PDB and recovery is canceled.
7. Opens the target PDB as the new source PDB.
8. Starts recovery after redo from the target PDB is registered at the original source PDB.

Starting a Switchover to a PDB

When a switchover is started, the source PDB and target PDB must have as small a redo lag as possible.

To start a PDB switchover:

- Run the `SWITCHOVER PLUGGABLE DATABASE` command. Specify the name of the PDB that must now perform the primary role.

The broker controls the rest of the PDB switchover.

Example 7-1 Performing a PDB Switchover

In this example, a switchover is performed between the `bos_sales` and `nyc_sales` PDBs. After the switchover operation completes, the target PDB `nyc_sales` in the target database `newyork` transitions to the primary role and becomes the new source PDB.

```
DGMGRL> SWITCHOVER TO PLUGGABLE DATABASE nyc_sales AT newyork;
Verifying conditions for Switchover...

  Source pluggable database is 'BOS_SALES' at database 'boston'

Performing switchover NOW, please wait...

  Closing pluggable database 'BOS_SALES'...
  Switching 'BOS_SALES' to standby role...
  Waiting for 'NYC_SALES' to recover all redo data...
  Stopping recovery at 'NYC_SALES'...
  Converting 'NYC_SALES' to primary role...
  Opening new primary 'NYC_SALES'...
  Waiting for redo data from new primary 'NYC_SALES'...
  Starting recovery at new standby 'BOS_SALES'...

Switchover succeeded, new primary is "NYC_SALES"
```

Performing PDB Failover

A PDB failover is a role reversal between a source PDB and its designated target PDB. This operation is typically performed when the source PDB has failed and there is no possibility of recovering it in a timely manner.

You can perform one of the following types of PDB failover:

- Complete PDB failover

  This is the default. It results in no data loss and is the recommended option. Use this option when there are problems with the source PDB, but the source CDB is still available.

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- Immediate PDB failover

  This is the fastest type of PDB failover. However, no additional data is applied on the target PDB once you invoke the PDB failover. After an immediate failover operation, you must reinstate the former source PDB before it can serve as a target PDB for the new source PDB. Use this option when the source CDB is not available. There is a high possibility of data loss under these circumstances.

  After an immediate failover operation, the former source PDB must be dropped. The new source PDB after the immediate PDB failover is unprotected. A new DGPDB should be added to resume data protection.

Before You Begin DG PDB Failover

Some factors must be considered before you perform a PDB failover.

- Determine that there is no possibility of recovering the source PDB.

How Broker Performs Failover in a DG PDB Environment

The broker performs a set of steps when you initiate a PDB failover.

1. Verifies that the target database is reachable. If the target database is not reachable, you will not be able to perform a failover.
2. Validates that the source PDB and target PDB are in the correct states. The source PDB can be open or closed. The target PDB must be in recovery mode.

   Note that this validation is not performed for immediate PDB failover.
3. Confirms that the target PDB is recovering the current redo stream of the source PDB.
4. Closes the source PDB on all instances.
5. Waits for the target database to finish applying any unapplied redo data and then stops Redo Apply. Any unapplied redo will not be applied when performing an immediate failover.
6. Transitions the target PDB to the source PDB as follows:
   - Changes the role of the target PDB to the source PDB.
   - Opens the new source PDB in read/write mode.

After the failover completes, the broker does not run recovery at the new target PDB (original source PDB). Recovery is not started even if you restart the new target database or run an `ENABLE DATABASE` command. After you address the issue that caused the failure, start recovery by running the `EDIT PLUGGABLE DATABASE` command with the `SET STATE=APPLY-ON` option.

Starting a PDB Failover

Use DGMGRL to perform a complete (recommended) or immediate PDB failover.

The source PDB need not be open when performing a failover.

To perform a PDB failover:

1. Connect to the target database.
2. Run the `FAILOVER PLUGGABLE DATABASE` command, specifying the name of the target PDB and the name of the target database containing the target PDB.

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In this example, a failover is performed to the bos_sales PDB. After the failover operation completes, the target PDB bos_sales in the target database boston transitions to the primary role.

```
DGMGRL> FAILOVER TO PLUGGABLE DATABASE bos_sales AT boston;
Verifying conditions for Failover...

  Source pluggable database is 'NYC_SALES' at database 'newyork'

Performing failover NOW, please wait...

  Closing pluggable database 'NYC_SALES'...
  Converting 'NYC_SALES' to standby role...
  Waiting for 'BOS_SALES' to recover all redo data...
  Stopping recovery at 'BOS_SALES'...
  Converting 'BOS_SALES' to primary role...
  Opening new primary 'BOS_SALES'...
  Waiting for redo data from new primary 'BOS_SALES'...

Failover succeeded, new primary is "BOS_SALES".
```

All accumulated redo is applied before the target PDB is changed to a source PDB role.

To perform an immediate failover, include the `IMMEDIATE` keyword in the command. In this case, the source PDB role is changed without applying any accumulated redo data.

After the PDB failover operation completes, use the `EDIT PLUGGABLE DATABASE` command with `SET STATE=APPLY-ON` to start redo apply on the former source PDB if it was a complete failover and any issues that warranted the failover have been addressed.

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8

Scenarios Using the DGMGRL Command-Line Interface

Use these scenarios to help you understand what you need to do to start creating, managing, and using an Oracle Data Guard broker configuration.

Read the information about prerequisites for getting started using the Oracle Data Guard command-line interface (DGMGRL), so that you can prepare your instances. Then read the scenarios to understand how you can use DGMGRL to create, manage, and monitor a broker configuration.

- Prerequisites for Getting Started
- Scenario 1: Creating a Configuration
- Scenario 2: Setting Database Properties
- Scenario 3: Enabling the Configuration and Databases
- Scenario 4: Setting the Configuration Protection Mode
- Scenario 5: Setting up Maximum Availability Mode with a Far Sync Instance
- Scenario 6: Enabling Fast-Start Failover and Starting the Observer
- Scenario 7: Enabling Fast-Start Failover When a Far Sync Instance Is In Use
- Scenario 8: Performing Routine Management Tasks
- Scenario 9: Performing a Switchover Operation
- Scenario 10: Performing a Manual Failover Operation
- Scenario 11: Reinstating a Failed Primary Database
- Scenario 12: Converting a Physical Standby to a Snapshot Standby
- Scenario 13: Monitoring a Data Guard Configuration
- Scenario 14: Adding a Recovery Appliance to a Broker Configuration
- Scenario 15: Exporting and Importing a Broker Configuration File
- Scenario 16: Using the Observe-only Mode for Fast-Start Failover

Prerequisites for Getting Started

One of the prerequisites for using DGMGRL is that a primary database and any standby databases must already exist.

The `DG_BROKER_START` initialization parameter must be set to `TRUE` for all databases in the configuration. Each database must also be configured to use a server parameter file (SPFILE).

Convert the initialization parameter files (PFILE) on both primary and standby databases into server parameter files (SPFILE), if necessary. Use the following SQL*Plus command:

```
CREATE SPFILE='spfilename' FROM PFILE='pfilename';
```


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If an instance was not started with a server parameter file, then shut down the instance and restart it using the server parameter file.

After starting the Oracle instance, set the `DG_BROKER_START=TRUE` initialization parameter using the SQL `ALTER SYSTEM` statement. The parameter value will be saved in the server parameter file. The next time you start the Oracle instance, the broker is started automatically, and you do not need to issue the SQL `ALTER SYSTEM` statement again.

The following assumptions are made in these scenarios:

- TCP/IP is used to connect to primary and standby databases.
- The standby database has been created from backups of the primary database control files and datafiles as described in the *Oracle Data Guard Concepts and Administration*.
- The scenarios assume the following broker configuration:
  - The configuration name is `DRSolution`.
  - The database unique name (`DB_UNIQUE_NAME`) of the primary database is `North_Sales`.
  - The database unique name (`DB_UNIQUE_NAME`) of the remote standby database is `South_Sales`.
  - The protection mode is maximum performance mode.
  - There are standby redo log files configured for both the primary and standby database. The transport mode for both databases is `ASYNC`.
  - The standby database is a physical standby database.

Scenario 1: Creating a Configuration

These examples create a broker configuration named `DRSolution` that includes a primary and standby database named `North_Sales` and `South_Sales`.

To create a configuration and add one physical standby database, perform the following tasks:

- Creating a Configuration Task 1: Invoke DGMGRL
- Creating a Configuration Task 2: Connect to the Primary Database
- Creating a Configuration Task 3: Clear Existing Remote Redo Transport Destinations
- Creating a Configuration Task 4: Create the Broker Configuration
- Creating a Configuration Task 5: Show the Configuration Information
- Creating a Configuration Task 6: Add a Standby Database to the Configuration

Creating a Configuration Task 1: Invoke DGMGRL

To start DGMGRL, enter `dgmgrl` at the command-line prompt on a system where Oracle Data Guard is installed.

```
$ dgmgrl
```

The DGMGRL prompt is displayed:

```
DGMGRL>
```


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Creating a Configuration Task 2: Connect to the Primary Database

Before executing any command (other than HELP, EXIT, or QUIT) first connect to the primary database using the DGMGRL CONNECT command. The account used to connect to the primary database must have SYSDG or SYSDBA privileges. A connection to a local database using OS authentication is possible but not recommended because broker operations that also require connections to configuration members on remote hosts will fail.

> **Note**
>
> If no AS clause is specified on the CONNECT command, the connection is made as SYSDBA.

The following example uses the tns alias north_sales to connect to primary database North_Sales using the SYS user. DGMGRL prompts for a password if, as in the example, it is not included as part of the command line:

```
DGMGRL> CONNECT sys@north_sales
Password: password
Connected to "North_Sales"
Connected as SYSDBA.
```

> **Note**
>
> SYSDG as a user has been removed for Oracle AI Database 26ai. However, the SYSDG role remains the same as in earlier releases. If no AS clause is specified for the CONNECT command, the connection is first attempted AS SYSDG and then AS SYSDBA before returning an error if still unsuccessful.

Creating a Configuration Task 3: Clear Existing Remote Redo Transport Destinations on Standbys and Far Sync Instances To Be Added.

You must clear any remote redo transport destinations on standby databases and far sync instances before those standbys and far syncs can be added to a configuration.

If the remote redo transport destinations are not cleared, then the following error message is returned when you attempt to create the configuration:

```
ORA-16698: LOG_ARCHIVE_DEST_n parameter set for object to be added

Failed.
```

To clear LOG_ARCHIVE_DEST_*n* settings, use the ALTER SYSTEM SET LOG_ARCHIVE_DEST_*n*=" " SQL*Plus command.

Remote redo transport destinations on the primary (whether they have the REGISTER or NOREGISTER attribute) can be left as is.

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Creating a Configuration Task 4: Create the Broker Configuration

A broker configuration is initially created with just a primary database.

In this case, the primary is called `North_Sales`. In a later command, you will add the standby database, `South_Sales`.

> **Note**
>
> The names for the primary and standby databases must match their database unique names. Fetch these from their `DB_UNIQUE_NAME` initialization parameter as follows:
>
> ```
> SQL> SHOW PARAMETER DB_UNIQUE_NAME;
> ```

Use the `CREATE CONFIGURATION` command to create the `DRSolution` configuration containing primary database `North_Sales`. The name `North_Sales` is the value of the primary database's `DB_UNIQUE_NAME` initialization parameter and `north_sales` is a tns alias that resolves to a connect identifier for the primary database on all systems hosting members of the configuration.:

```
DGMGRL> CREATE CONFIGURATION 'DRSolution' AS
> PRIMARY DATABASE IS 'North_Sales'
> CONNECT IDENTIFIER IS north_sales;
Connected to "North_Sales"
Configuration "DRSolution" created with primary database "North_Sales"
```

The name `North_Sales` is the value of this database's `DB_UNIQUE_NAME` initialization parameter.

Creating a Configuration Task 5: Show the Configuration Information

Use the `SHOW CONFIGURATION` command to display a summary of the current state of the configuration:

```
DGMGRL> SHOW CONFIGURATION;
```

DGMGRL returns the following information:

```
Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database

Fast-Start Failover:  Disabled

Configuration Status:
DISABLED
```


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Creating a Configuration Task 6: Add a Standby Database to the Configuration

To add a standby database to the DRSolution configuration, use the ADD DATABASE command.

Use the ADD DATABASE command to add standby database South_Sales associated with primary database North_Sales to the configuration. The name South_Sales is the value of the standby database's DB_UNIQUE_NAME initialization parameter and south_sales is a tns alias that resolves to a connect identifier for the standby database on all systems hosting members of the configuration.:

```
DGMGRL> ADD DATABASE 'South_Sales' AS
> CONNECT IDENTIFIER IS south_sales;
Database "South_Sales" added
```

Use the SHOW CONFIGURATION to show the updated configuration state:

```
DGMGRL> SHOW CONFIGURATION;
```

DGMGRL returns the following information:

```
Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database
    South_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
DISABLED
```

Scenario 2: Setting Database Properties

After you create the configuration with DGMGRL, you can set database properties at any time.

For example, the following statement sets the StandbyArchiveLocation database property for the South_Sales standby database:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'StandbyArchiveLocation'='/archfs/arch/';
Property "StandbyArchiveLocation" updated.
```

Use the SHOW DATABASE VERBOSE command to view all properties and their values for a database. The following example shows the properties for the South_Sales database.

```
DGMGRL> SHOW DATABASE VERBOSE 'South_Sales'

Database - South_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      0 seconds (computed 0 seconds ago)
  Apply Lag:          0 seconds (computed 0 seconds ago)
  Average Apply Rate: 2.00 KByte/s
  Active Apply Rate:  0 Byte/s
  Maximum Apply Rate: 0 Byte/s
```


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```
  Real Time Query:    ON
  Instance(s):
    South_sales1

  Properties:
    DGConnectIdentifier             = 'South_Sales.example.com'
    ObserverConnectIdentifier       = ''
    FastStartFailoverTarget         = ''
    PreferredObserverHosts          = ''
    LogShipping                     = 'ON'
    RedoRoutes                      = ''
    LogXptMode                      = 'ASYNC'
    DelayMins                       = '0'
    Binding                         = 'optional'
    MaxFailure                      = '0'
    ReopenSecs                      = '300'
    NetTimeout                      = '30'
    RedoCompression                 = 'DISABLE'
    PreferredApplyInstance          = ''
    ApplyInstanceTimeout            = '0'
    ApplyLagThreshold               = '0'
    TransportLagThreshold           = '0'
    TransportDisconnectedThreshold  = '0'
    ApplyParallel                   = 'AUTO'
    ApplyInstances                  = '0'
    ArchiveLocation                 = ''
    AlternateLocation               = ''
    StandbyArchiveLocation          = ''
    StandbyAlternateLocation        = ''
    InconsistentProperties          = '(monitor)'
    InconsistentLogXptProps         = '(monitor)'
    LogXptStatus                    = '(monitor)'
    SendQEntries                    = '(monitor)'
    RecvQEntries                    = '(monitor)'
    HostName                        = 'South_Sales.example.com'
    StaticConnectIdentifier         =
'(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)
(HOST=South_Sales.example.com)(PORT=2879)))
(CONNECT_DATA=(SERVICE_NAME=South_Sales_DGMGRL.example.com)
(INSTANCE_NAME=south_sales1)(SERVER=DEDICATED)))'
    TopWaitEvents                   = '(monitor)'
    SidName                         = '(monitor)'

  Log file locations:
    Alert log               : /db/oracle/log/diag/rdbms/South_Sales/
south_sales1/trace/alert_south_sales1.log
    Data Guard Broker log   : /db/oracle/log/diag/rdbms/South_Sales/
south_sales1/trace/drcsouth_sales1.log

Database Status:
SUCCESS
```

If broker management of the database is enabled, setting a database property value causes the underlying parameter value to be changed in the corresponding database, and the value for the changed parameter is reflected in the server parameter file. Thus, if the database is shut down and restarted outside of Oracle Enterprise Manager Cloud Control (Cloud Control)

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and DGMGRL (such as from the SQL*Plus interface), the database uses the new parameter values from the updated server parameter file when it starts. However, you should not make changes to the redo transport services initialization parameters through SQL statements. Doing so will cause an inconsistency between the database and the broker.

> **Note**
>
> The database properties are typically displayed in mixed-case (for example, `LogXptMode`) typeface to help you visually differentiate database properties (from the corresponding initialization parameter, SQL statement, or PL/SQL procedure), which are typically documented in `UPPERCASE` typeface. However, the commands to manage properties are not case sensitive; you can issue commands in uppercase, lowercase, or mixed-case.

You can change a property if the database is enabled or disabled. However, if the database is disabled when you change a property, the change does not take effect until the database is enabled.

Scenario 3: Enabling the Configuration and Databases

So far, the `DRSolution` configuration is disabled, which means it is not under the control of the Data Guard broker.

When you finish configuring the databases into a broker configuration and setting any necessary database properties, you must enable the configuration to allow the Data Guard broker to manage it.

You can enable:

- The entire configuration, including all of its databases
- A standby database

Enable the entire configuration

You can enable the entire configuration, including all of the databases, with the following command:

```
DGMGRL> ENABLE CONFIGURATION;
Enabled.
```

Show the configuration

Use the `SHOW` command to verify that the configuration and its databases were successfully enabled:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database
    South_Sales - Physical standby database

Fast-Start Failover:  Disabled
```


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```
Configuration Status:
SUCCESS   (status updated 52 seconds ago)
```

Enable the database

This step is unnecessary except if the standby database was previously disabled with the `DISABLE DATABASE` command. Normally, enabling the configuration also enables the standby database.

```
DGMGRL> ENABLE DATABASE 'South_Sales';
Enabled.
```

Show the database

```
DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      0 seconds (computed 1 second ago)
  Apply Lag:          0 seconds (computed 1 second ago)
  Average Apply Rate: 9.00 KByte/s
  Real Time Query:    OFF
  Instance(s):
    SouthSales

Database Status:
SUCCESS
```

Scenario 4: Setting the Configuration Protection Mode

You can change the protection mode of the configuration at any time.

> **Note**
>
> You cannot change the protection mode from maximum performance mode to maximum protection mode. You must first change the protection mode to maximum availability and then to maximum protection mode.
>
> A restart of the primary database is not necessary when changing the protection mode.

This scenario sets the protection mode of the configuration to the `MAXAVAILABILITY` mode. Note that this protection mode requires that there be at least one standby configured to use standby redo log files and it must receive redo via `SYNC` or `FASTSYNC` mode if it receives redo directly from the primary database. If the standby receives redo via a far sync instance, then the far sync instance must receive redo via `SYNC` or `FASTYSYNC` mode and the standby must receive redo from the far sync instance via `ASYNC` mode.

1. Configure standby redo log files, if necessary.

   Because you will be setting the protection mode to the `MAXAVAILABILITY` mode, it is important to ensure that sufficient standby redo log files are configured on the standby database. For more information on setting up redo transport, see *Oracle Data Guard Concepts and Administration*.

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2. Configure redo transport mode appropriately.

   Configure the standby to receive redo via SYNC or FASTSYNC mode, if the standby receives redo directly from the primary database. If the standby receives primary redo via a far sync instance, then configure the far sync instance to receive redo via SYNC or FASTSYNC mode and configure the standby to receive redo via ASYNC mode. For example:

   ```
   DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'LogXptMode'='SYNC';
   Property "LogXptMode" updated
   ```

   The broker will not allow this command to succeed unless the standby database is configured with standby redo log files in the configuration.

3. Change the overall protection mode for the configuration.

   Use the EDIT CONFIGURATION command to upgrade the broker configuration to the MAXAVAILABILITY protection mode:

   ```
   DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;
   Succeeded.
   ```

   If the configuration is disabled when you enter this command, the actual protection mode change is not applied until you enable the configuration with the ENABLE CONFIGURATION command. The broker will not allow you to enable the configuration if it does not find a standby database in the configuration that can support the requirements of the protection mode.

4. Verify the protection mode has changed.

   Use the SHOW CONFIGURATION command to display the current protection mode for the configuration:

   ```
   DGMGRL> SHOW CONFIGURATION;

   Configuration - DRSolution

     Protection Mode: MaxAvailability
     Members:
       North_Sales  - Primary database
         South_Sales  - Physical standby database

   Fast-Start Failover: DISABLED

   Configuration Status:
   SUCCESS
   ```

> **See Also**
>
> Managing Data Protection Modes

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Scenario 5: Setting up Maximum Availability Mode with a Far Sync Instance

A far sync instance can be used with maximum availability protection mode if the primary and standby database are geographically far enough apart to make the use of synchronous transport mode impractical.

The example in this topic shows how to add a far sync instance to the configuration and then set up the `RedoRoutes` property for all members of the configuration. Setting of `RedoRoutes` property for the far sync instance enables it to send redo data based on either the `North_Sales` or `South_Sales` database being the primary.

1. Issue the following commands to add the far sync instance named `FS1` to the broker configuration:

```
DGMGRL> ADD FAR_SYNC 'FS1' AS CONNECT IDENTIFIER IS FS1;
far sync instance "FS1" added
DGMGRL> ENABLE FAR_SYNC 'FS1';
Enabled.
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database
    South_Sales - Physical standby database
    FS1         - Far sync instance

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 22 seconds ago)
```

   In this output, `South_Sales` and `FS1` are indented under `North_Sales`. This indicates that the primary is sending redo data to both `South_Sales` and `FS1`.

2. Issue the following commands so that the current primary `North_Sales` only sends redo data to the far sync instance `FS1` and the far sync instance sends redo data to `South_Sales` when `North_Sales` is a primary. In addition, configure redo transport for the current standby database `South_Sales` so that when it is in the primary role it sends redo data to the far sync instance `FS1`. The example assumes that the `LogXptMode` property for all configuration members is set to the default `ASYNC` value.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY RedoRoutes='(LOCAL : FS1 SYNC)';
Property "redoroutes" updated for member "North_Sales".
DGMGRL> EDIT FAR_SYNC 'FS1' SET PROPERTY RedoRoutes='(North_Sales : South_Sales)’;
Property "redoroutes" updated for member "FS1".
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY RedoRoutes='(LOCAL : FS1 SYNC)';
Property "redoroutes" updated for member "South_Sales".
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales - Primary database
    FS1         - Far sync instance
```


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```
      South_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 58 seconds ago)
```

The indentation scheme in the output above indicates that `North_Sales` sends redo data to `FS1` and `FS1` sends redo data to `South_Sales`.

3. Issue the following commands to upgrade the protection mode to maximum availability:

```
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MaxAvailability;
Succeeded.
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales - Primary database
    FS1         - Far sync instance
      South_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 32 seconds ago)
```

4. Configure Redo Transport to Support Future Role Transitions

   To verify redo transport is correctly configured if `South_Sales` ever becomes the primary database, issue the following command:

```
DGMGRL> SHOW CONFIGURATION WHEN PRIMARY IS 'South_Sales';
 Configuration when South_Sales is primary - DRSolution

  Members:
  South_Sales - Primary database
    FS1         - Far sync instance

  Members Not Receiving Redo:
  North_Sales - Physical standby database
    Warning: ORA-16685: database does not receive redo data
```

   To correct this error, set the `RedoRoutes` property for `South_Sales` and `FS1` as follows:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY RedoRoutes='(LOCAL : FS1 SYNC)';
DGMGRL> EDIT FAR_SYNC 'FS1' SET PROPERTY RedoRoutes=('North_Sales :
South_Sales)(South_Sales : North_Sales)';

Property "redoroutes" updated for member "FS1".
```

   After the change to the `RedoRoutes` property for far sync instance `FS1` is complete, reissue the `SHOW CONFIGURATION WHEN PRIMARY IS` command to confirm that the error has been resolved:

```
DGMGRL> SHOW CONFIGURATION WHEN PRIMARY IS 'South_Sales';

Configuration when South_Sales is primary - DRSolution

  Members:
  South_Sales - Primary database
```


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```
FS1         - Far sync instance
  North_Sales - Physical standby database
```

Scenario 6: Enabling Fast-Start Failover and Starting the Observer

You can enable fast-start failover from any site, including the observer site, while connected to any database in the broker configuration.

Enabling fast-start failover does not trigger a failover. Instead, it allows the observer that is monitoring the configuration to initiate a fast-start failover if conditions warrant a failover. This section describes the steps to enable fast-start failover and start the observer where the configuration protection mode is set to maximum availability mode.

1. Ensure standby redo logs are configured on the primary and target standby databases. You must stop log apply services prior to configuring standby redo logs.

   > **See Also**
   >
   > *Oracle Data Guard Concepts and Administration* for instructions on configuring standby redo log files

2. Configure the primary and standby databases to receive redo via `SYNC` or `FASTSYNC` or `ASYNC` mode, if they receive redo directly rather than via a far sync instance. If either database receives redo via a far sync instance, then configure the far sync instance to receive redo via `SYNC` or `FASTSYNC` mode and configure the database to receive redo via `ASYNC` mode. For example:

   ```
   DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'logXptMode'='SYNC';
   Property "logXptMode" updated for member "North_Sales".

   DGMGRL> 'South_Sales' SET PROPERTY 'logXptMode'='SYNC';
   Property "logXptMode" updated for member "South_Sales".
   ```

   The broker does not allow these commands to succeed unless the databases are configured with standby redo log files.

3. If you have two or more standby databases, set up the `FastStartFailoverTarget` configuration property on the primary database to indicate the desired target standby database. The broker reciprocally sets this property for the target standby database to indicate the primary database as its future target standby database when fast-start failover is actually enabled. There is no need for you set this property on the target standby as this is done for you automatically. For example:

   ```
   DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY
   FastStartFailoverTarget='South_Sales';
   Property "faststartfailovertarget" updated for member "North_Sales".
   ```

4. If it is necessary to upgrade the protection mode, use the following DGMGRL `EDIT CONFIGURATION` command. For example:

   ```
   DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;
   ```

5. If it is not already enabled on the primary and standby databases, enable Flashback Database by issuing the following statements on each database. Stop Redo Apply before enabling Flashback Database and restart it after Flashback Database has been enabled:

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```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;
[include the existing commands]
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

Ensure that the DB_FLASHBACK_RETENTION_TARGET initialization parameter is set to a sufficiently large value so that reinstatement is still possible after a prolonged outage.

6. Start up to four observers by logging into the observer computers and using DGMGRL. Connect to the configuration as a user with SYSDG or SYSDBA privilege and issue the START OBSERVER command. This command will run in the foreground and not return to DGMGRL> prompt unless the IN BACKGROUND clause is included. Wallet-based authentication with credentials that match the connect identifier used to start the observer must be configured when starting an observer as a background process using the IN BACKGROUND clause.

```
DGMGRL> CONNECT sys@north_sales
Password: password
Connected to "North_Sales"
Connected as SYSDBA.
DGMGRL> START OBSERVER observer1 IN BACKGROUND CONNECT IDENTIFIER IS
north_sales;
Submitted command “START OBSERVER” using connect identifier “north_sales”
```

Oracle recommends using this command format for security reasons; no credentials are visible. This practice prevents other users on the system from using a utility (for example, the UNIX ps utility) to display connection credentials. It also prevents clear-text passwords from being visible on the user's terminal.

When starting the observer from a script, Oracle recommends that you use a method that supports 'connect /', so that database connection credentials do not have to be embedded within the script. If you choose to use a client-side Oracle Wallet as a secure external password store, be sure to add credentials for both the primary and fast-start failover target standby databases. The database connect string that you specify when adding the credentials for each database must match the ObserverConnectIdentifer or DGConnectIdentifier database property.

> **Note**
>
> Enterprise User Security (EUS) is deprecated with Oracle AI Database 26ai. Oracle recommends using Centrally Managed Users (CMU) instead.

When multiple observers are started, one observer is the master observer after fast-start failover is enabled, and the remaining observers are backup observers. Only the master observer can coordinate fast-start failover with Data Guard broker. If the primary and target standby databases stay connected but the connection to the master observer is lost, then the broker tries to nominate a backup observer as the new master observer.

7. Enable fast-start failover. You can enable fast-start failover while connected to any database system in the broker configuration. For example:

```
DGMGRL> ENABLE FAST_START FAILOVER;
Enabled in Zero Data Loss Mode.
```

8. Verify the fast-start failover configuration. Use the SHOW FAST_START FAILOVER command to display the fast-start failover settings:

```
DGMGRL> SHOW FAST_START FAILOVER
```


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```
Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode:    MaxAvailability
  Lag Limit:          0 seconds

  Threshold:          30 seconds
  Ping Interval:      3000 milliseconds
  Ping Retry:         0
  Active Target:      South_Sales
  Potential Targets:  "South_Sales"
    South_Sales valid
  Observer:           (none)
  Shutdown Primary:   TRUE
  Auto-reinstate:     TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
    (none)
```

The following commands show that the `FastStartFailoverTarget` property is set up reciprocally once fast-start failover is enabled. The first command, issued for the current primary database `North_Sales`, shows the value of the `FastStartFailoverTarget` property to be the current target standby, `South_Sales`. The second command, issued for the target standby `South_Sales`, shows the current primary, `North_Sales`, as the target standby's future target standby should it ever take over as a primary.

```
DGMGRL> SHOW DATABASE 'North_Sales' FastStartFailoverTarget;
 FastStartFailoverTarget='South_Sales';

DGMGRL> SHOW DATABASE 'South_Sales' FastStartFailoverTarget;
 FastStartFailoverTarget='North_Sales';
```

Scenario 7: Enabling Fast-Start Failover When a Far Sync Instance Is In Use

Fast-start failover can be enabled in maximum availability mode when the fast-start failover target is a logical or physical standby database that receives redo data from a far sync instance.

To enable fast-start failover when a far sync instance is used to ship redo data to the standby database, the `FastStartFailoverTarget` property must first be set on both the primary and target standby database, as follows:

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY FastStartFailoverTarget='South_Sales';
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY FastStartFailoverTarget='North_Sales';
```

Then, fast-start failover can be enabled, as follows:

```
DGMGRL> ENABLE FAST_START FAILOVER;
```


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Note that the far sync instance database is not specified as the fast-start failover target for either `North_Sales` or `South_Sales`.

Scenario 8: Performing Routine Management Tasks

There may be situations in which you want to change the state or properties of the databases in a broker configuration to perform routine maintenance on one or more databases.

You might also need to temporarily disable broker management of databases in a configuration.

Changing Properties and States

As you monitor the configuration, you might need to dynamically modify the states of the databases or their properties.

The following topics show how to change the state or properties of the databases in the configuration.

Alter a Database Property

You can modify the values of database properties at any time—whether the database is enabled or disabled.

The following example shows how to use the `EDIT DATABASE` command to change the `LogXptMode` database property to the value ASYNC for the `North_Sales` database.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'LogXptMode'=ASYNC;
```

DGMGRL returns the following message to indicate that the `LogXptMode` property was updated successfully in the Data Guard configuration file:

```
Property "LogXptMode" updated
```

If the configuration is currently disabled, the database does not use the new property value until you enable the broker configuration with the `ENABLE CONFIGURATION` command.

Reset a Property to Its Default Value

You can reset a configuration or configurable property to its default value at any time whether the database or configuration is enabled or disabled.

The following example shows how to use the `EDIT DATABASE` command to reset the `LogXptMode` database configurable property to its default value for the `North_Sales` database.

```
EDIT DATABASE 'North_Sales' RESET PROPERTY LogXptMode;
```

The following example shows how to use the `EDIT CONFIGURATION` command to reset the `TraceLevel` configuration property to its default value.

```
EDIT CONFIGURATION RESET PROPERTY TraceLevel;
```


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Alter the State of a Standby Database

You can temporarily stop Redo Apply on a physical standby.

To change the state of the standby database to APPLY-OFF, enter the EDIT DATABASE command as shown in the following example.

```
DGMGRL> EDIT DATABASE 'South_Sales' SET STATE='APPLY-OFF';
Succeeded.
```

Redo data is still being received when you put the physical standby database in the APPLY-OFF state.

Alter the State of a Primary Database

You can stop the transmittal of redo data to the standby database.

To change the state of the primary database to accommodate this, use the following command:

```
DGMGRL> EDIT DATABASE North_Sales SET STATE=TRANSPORT-OFF;

Succeeded.
```

To change the state of the primary database back to TRANSPORT-ON, do the following:

```
DGMGRL> EDIT DATABASE North_Sales SET STATE=TRANSPORT-ON;

Succeeded.
```

Disabling the Configuration and Databases

When you disable the broker configuration or any of its databases, you are disabling the broker's management of them and are effectively removing your ability to use DGMGRL to manage and monitor them.

However, disabling the broker's management of a broker configuration does not affect the actual operation of the underlying Oracle Data Guard configuration or the databases. For example, the redo transport services and log apply services in the Oracle Data Guard configuration continue to function unchanged, but you can no longer manage them.

Disable a Configuration

You must use the DISABLE CONFIGURATION command to disable management of the entire broker configuration including the primary database.

For example:

```
DGMGRL> DISABLE CONFIGURATION;
```

The only way to disable broker management of the primary database is to use the DISABLE CONFIGURATION command; the DISABLE DATABASE command only disables management of a standby database. Likewise, the DISABLE FAR_SYNC command only disables management of a far sync instance.

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> **Note**
>
> If you disable management of a configuration while connected to the standby database or far sync instance, you must connect to the primary database (that is, a database whose control file role is primary) to reenable the configuration.

Disabling the broker's management of a configuration member does not remove the member from the broker configuration file. You can reenable your ability to use DGMGRL (or Cloud Control) to manage the member by entering the appropriate `ENABLE CONFIGURATION` or `ENABLE DATABASE` command.

Disable a Standby Database

You use the `DISABLE DATABASE` command when you temporarily do not want the broker to manage and monitor a standby database.

You can explicitly disable broker management of a standby database to prevent it from being enabled when the rest of the configuration is enabled. The following example shows how to disable the `South_Sales` standby database.

```
DGMGRL> DISABLE DATABASE 'South_Sales';
Disabled.
```

> **Note**
>
> You cannot disable a standby database from the configuration if fast-start failover is enabled and the database to be disabled is the target standby database.

> **Note**
>
> If you disable management of a standby database while connected to that standby database, you must connect to the primary database or another enabled standby database to reenable broker-management of the standby database.

> **Warning**
>
> If you disable broker management of a standby database in the broker configuration, that standby database cannot be used by the broker as a failover target in the event of loss of the primary database.

When operating under either maximum protection mode or maximum availability mode, the broker prevents you from disabling the last standby database that supports the protection mode.

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Disabling a Far Sync Instance

Use the `DISABLE FAR_SYNC` command when you temporarily do not want the broker to manage and monitor a far sync instance.

You can explicitly disable broker management of a far sync instance to prevent it from being enabled when the rest of the configuration is enabled. The following example shows how to disable the far sync instance.

```
DGMGRL> DISABLE FAR_SYNC 'FS';
Disabled.
```

> **Note**
>
> The following restrictions apply when disabling a far sync instance:
>
> - You cannot disable a far sync instance if it is specified in the `RedoRoutes` property of any other configuration member.
> - If you disable management of a far sync instance while connected to that far sync instance, you must connect to the primary database or another enabled standby database to reenable broker management of the far sync instance.

> **Caution**
>
> If you disable broker management of a far sync instance in the broker configuration, that far sync instance cannot be specified in a `RedoRoutes` property for any other configuration member.

Removing the Configuration, a Standby Database, or a Far Sync Instance

When you use the `REMOVE CONFIGURATION`, `REMOVE DATABASE`, or `REMOVE FAR_SYNC` command, you effectively delete the configuration, standby database, or far sync instance from the broker configuration file, removing the ability of Oracle Data Guard broker to manage them.

A remove operation with the `PRESERVE DESTINATIONS` clause *does not* remove or delete the actual Oracle Data Guard configuration underneath, nor does it affect the operation of the actual Oracle Data Guard configuration and its databases.

> **Note**
>
> After you use the `REMOVE CONFIGURATION`, `REMOVE DATABASE`, or `REMOVE FAR_SYNC` command, you must reissue the command(s) that you originally issued if you decide to re-create the deleted object. You must go through the steps in Scenario 1: Creating a Configuration as necessary, to create a broker configuration that can be managed with DGMGRL (or Cloud Control).

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> **Note**
>
> The following restrictions apply:
>
> - You cannot remove a standby database from the configuration if fast-start failover is enabled and the database to be removed is the target standby database.
> - You cannot remove a standby database or a far sync instance if it is specified in the `RedoRoutes` property for any other member in the configuration.

Removing a Standby Database from the Configuration

When you use the `REMOVE DATABASE` command, broker management and monitoring of the database ceases and the database is deleted from the broker configuration file.

Show the configuration before deletion of the `South_Sales` standby database:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      FS - Far Sync
        South_Sales  - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 32 seconds ago)
```

Reset the `RedoRoutes` property for far sync instance `FS` so that it no longer specifies database `South_Sales` and then issue the `DGMGRL REMOVE DATABASE` command to remove the `South_Sales` database information from the Data Guard configuration file:

```
DGMGRL> EDIT FAR_SYNC ‘FS' RESET PROPERTY RedoRoutes;
Property "redoroutes" updated for member "FS".
DGMGRL> REMOVE DATABASE ‘South_Sales’;
Removed database "South_Sales" from the configuration
```

Show the configuration after deletion of the `South_Sales` standby database:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      FS - Far Sync

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 19 seconds ago)
```

When operating under either maximum protection mode or maximum availability mode, the broker prevents you from deleting the last standby database that supports the protection mode.

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Removing a Far Sync Instance from the Configuration

Use the REMOVE FAR_SYNC command to remove far sync instance information from the Oracle Data Guard configuration file.

For example, use the following commands to remove the FS far sync instance information:

```
DGMGRL> EDIT DATABASE 'North_Sales' RESET PROPERTY RedoRoutes;
Property "redoroutes" updated for member "North_Sales".
DGMGRL> REMOVE FAR_SYNC 'FS';
Removed far sync instance "FS" from the configuration
```

Show the configuration after deletion of the FS far sync instance:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

Protection Mode: MaxPerformance
Members:
North_Sales - Primary database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 44 seconds ago)
```

Removing a Broker Configuration

Use the DGMGRL REMOVE CONFIGURATION command to remove the entire configuration from management and monitoring by the broker.

For example:

```
DGMGRL> REMOVE CONFIGURATION;
Removed configuration
```

> **Note**
>
> You cannot remove the configuration if fast-start failover is enabled.

DGMGRL returns the following message to indicate the command successfully removed all of the configuration information from the Data Guard configuration file:

```
DGMGRL> SHOW CONFIGURATION;
Error: ORA-16532: Data Guard broker configuration does not exist

Configuration details cannot be determined by DGMGRL
```

Scenario 9: Performing a Switchover Operation

You can switch the role of the primary database and a standby database using the SWITCHOVER command.

Before you issue the SWITCHOVER command, you must ensure:

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- The state of the primary and standby databases are TRANSPORT-ON and APPLY-ON, respectively.
- All participating databases are in good health, without any errors or warnings present.
- The standby database properties were set on the primary database, so that the primary database can function correctly when transitioning to a standby database (shown in the following examples in boldface type).
- Standby redo log files are configured on the primary database.
- If the configuration is in maximum availability mode, then the current primary is configured to receive redo via SYNC or FASTSYNC or ASYNC mode if it will receive redo directly from the new primary. If it will receive redo via a far sync instance, then the far sync instance is configured to receive redo via SYNC or FASTSYNC mode and the current primary is configured to receive redo via ASYNC mode. If the configuration is in maximum protection mode, then the current primary is configured to receive redo via SYNC mode.
- If fast-start failover is enabled, you can perform a switchover only to the standby database that was specified as the target standby database.

The following are the tasks necessary to perform a switchover using the SWITCHOVER command:

- Using the SWITCHOVER Command Task 1: Check the Primary Database
- Using the SWITCHOVER Command Task 2: Check the Standby Database That is the Target of the Switchover
- Using the SWITCHOVER Command Task 3: Confirm That the Database Is Ready for a Role Change
- Using the SWITCHOVER Command Task 4: Issue the Switchover Command
- Using the SWITCHOVER Command Task 5: Show the Configuration

Using the SWITCHOVER Command Task 1: Check the Primary Database

Use the SHOW DATABASE VERBOSE command to check the state, health, and properties of the primary database.

For example:

```
DGMGRL> SHOW DATABASE VERBOSE 'North_Sales';

Database - North_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Redo Rate:          104 Byte/s  in 15 seconds (computed 9 seconds ago)
  Instance(s):
    NorthSales

  Properties:
    AlternateLocation              = ''
    ApplyInstanceTimeout           = '0'
    ApplyInstances                 = '0'
    ApplyLagThreshold              = '30'
    ApplyParallel                  = 'AUTO'
    ArchiveLocation                = ''
    Binding                        = 'OPTIONAL'
```


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```
    DGConnectIdentifier             = 'north_sales'
    DelayMins                       = '0'
    FastStartFailoverTarget         = 'South_Sales'
    HostName                        = 'sales1'
    InconsistentLogXptProps         = '(monitor)'
    LogShipping                     = 'ON'
    LogXptMode                      = 'SYNC'
    LogXptStatus                    = '(monitor)'
    MaxFailure                      = '0'
    NetTimeout                      = '30'
    ObserverConnectIdentifier       = ''
    PreferredApplyInstance          = ''
    PreferredObserverHosts          = ''
    RecvQEntries                    = '(monitor)'
    RedoCompression                 = 'DISABLE'
    RedoRoutes                      = ''
    ReopenSecs                      = '300'
    SendQEntries                    = '(monitor)'
    SidName                         = '(monitor)'
    StandbyAlternateLocation        = ''
    StandbyArchiveLocation          = ''
    StaticConnectIdentifier         = '(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
(HOST=sales1.example.com)(PORT=1521))
(CONNECT_DATA=(SERVICE_NAME=North_Sales_DGMGRL.example.com)
(INSTANCE_NAME=NorthSales)(SERVER=DEDICATED)))'
    TopWaitEvents                   = '(monitor)'
    TransportDisconnectedThreshold  = '30'
    TransportLagThreshold           = '30'

  Log file locations:
    Alert log               : /sales/oracle/diag/rdbms/north_sales/NorthSales/
trace/alert_NorthSales.log
    Data Guard Broker log   : /sales/oracle/diag/rdbms/north_sales/NorthSales/
trace/drcNorthSales.log

Database Status:
SUCCESS
```

In particular, you should examine the boldface properties and the current status of the primary database.

Using the SWITCHOVER Command Task 2: Check the Standby Database That is the Target of the Switchover

Use the `SHOW DATABASE` command to check the status of the standby database that is the target of the switchover.

For example:

```
DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role: PHYSICAL STANDBY
  Intended State: APPLY-ON
```


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```
    Transport Lag: 0 seconds (computed 0 seconds ago)
    Apply Lag: 0 seconds (computed 0 seconds ago)
    Apply Rate: 1.44 MByte/s
    Real Time Query: OFF
    Instance(s):
      south_sales1

  Database Status:
  SUCCESS
```

Using the SWITCHOVER Command Task 3: Confirm That the Database Is Ready for a Role Change

Prior to performing a role change, you can use the `VALIDATE DATABASE` command to perform an exhaustive set of checks on the database to confirm that it is ready for a role change.

The examples shown in this step use the `VALIDATE DATABASE` command for all three databases in the `DRSolution` configuration: a primary, logical standby, and physical standby database. The configuration looks as follows:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales - Primary database
    South_Sales - Physical standby database
    West_Sales  - Logical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 46 seconds ago)
```

Example: Validate the Primary Database

```
DGMGRL> VALIDATE DATABASE North_Sales;

  Database Role:    Primary database

  Ready for Switchover:  Yes

  Managed by Clusterware:
    North_Sales:  NO
    The static connect identifier allows for a connection to database
"North_Sales".
```

Example: Validate the Logical Standby Database

Validate the logical standby database, as follows:

```
DGMGRL> VALIDATE DATABASE West_Sales;

  Database Role:     Logical standby database
```


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```
  Primary Database:  North_Sales

  Ready for Switchover:  Yes
  Ready for Failover:    Yes (Primary Running)
    Warning: Physical and snapshot standby databases will
    be disabled if a role change is performed to this database

  Flashback Database Status:
    Database     Status           Retention Target
    North_Sales  On               1440
    West_Sales   Off              1440

  Managed by Clusterware:
    North_Sales:  NO
    West_Sales :  NO
    The static connect identifier allows for a connection to database
"North_Sales".

  Parameter Settings:
    Parameter                     North_Sales Value        West_Sales Value
    DB_BLOCK_CHECKING             FALSE                    FALSE
    DB_BLOCK_CHECKSUM             TYPICAL                  TYPICAL
    DB_LOST_WRITE_PROTECT         AUTO                     AUTO
```

Example: Validate the Physical Standby Database

Validate the physical standby database, as follows:

```
sentences.
DGMGRL> VALIDATE DATABASE South_Sales;

  Database Role:     Physical standby database
  Primary Database:  North_Sales

  Ready for Switchover:  Yes
  Ready for Failover:    Yes (Primary Running)

  Managed by Clusterware:
    North_Sales:  NO
    South_Sales:  NO
    The static connect identifier allows for a connection to database
"North_Sales".

  Transport-Related Property Settings:
    Property                      North_Sales Value        South_Sales Value
    LogXptMode                    ASYNC                    SYNC

  Parameter Settings:
    Parameter                     North_Sales Value        South_Sales Value
    DB_BLOCK_CHECKING             FALSE                    FALSE
    DB_BLOCK_CHECKSUM             TYPICAL                  TYPICAL
    DB_LOST_WRITE_PROTECT         AUTO                     AUTO
```

Note that database `South_Sales` is the only database that has its `LogXptMode` property set to `SYNC`. This will not prevent a switchover, but after the switchover the configuration will not be

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able to function in Maximum Availability mode and will display an error if the problem was not corrected prior to the role change (see Task 5).

Using the SWITCHOVER Command Task 4: Issue the Switchover Command

Issue the SWITCHOVER command to swap the roles of the primary and standby databases.

The following example shows how the broker automatically shuts down and restarts the old primary database as a part of the switchover. (See the usage notes in DGMGRL Command Usage Notes for information about how to set up the broker environment so that DGMGRL can automatically restart the primary and standby databases for you.)

```
DGMGRL> SWITCHOVER TO 'South_Sales';
2023-01-11T20:52:23.010+00:00
Performing switchover NOW, please wait...

2023-01-11T20:52:23.233+00:00
Operation requires a connection to database "South_Sales"
Connecting ...
Connected to "South_Sales"
Connected as SYSDBA.

2023-01-11T20:52:24.189+00:00
Continuing with the switchover...

2023-01-11T20:52:36.113+00:00
New primary database "South_Sales" is opening...

2023-01-11T20:52:36.113+00:00
Operation requires start up of instance "NorthSales" on database "North_Sales"
Starting instance "NorthSales"...
Connected to an idle instance.
ORACLE instance started.
Connected to "North_Sales"
Database mounted.
Database opened.

2023-01-11T20:53:41.190+00:00
Switchover succeeded, new primary is "South_Sales"

2023-01-11T20:53:41.196+00:00
Switchover processing complete, broker ready.
```

After the switchover completes, use the SHOW CONFIGURATION and SHOW DATABASE commands to verify that the switchover operation was successful.

Using the SWITCHOVER Command Task 5: Show the Configuration

Use the SHOW CONFIGURATION command to verify that the switchover was successful.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    Warning: ORA-16627: No member available to support the protection mode.
```


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```
    North_Sales - Physical standby database
    West_Sales  - Logical standby database

Fast-Start Failover:  Disabled

Configuration Status:
WARNING   (status updated 46 seconds ago)
```

As noted in Task 3, because redo received by database `North_Sales` was configured to use `ASYNC` transport mode, the configuration is not able to function in Maximum Availability mode after the role change and a warning is reported. To fix this issue, either set the `LogXptMode` property value for database `North_Sales` to receive redo using `SYNC` transport mode or configure the `RedoRoutes` property value for database `South_Sales` to send redo using `SYNC` transport mode. Note that when a database receives redo from a database or a far sync instance that has the `RedoRoutes` property configured with a redo transport mode, that mode overrides the transport mode specified by `LogXptMode`.

Scenario 10: Performing a Manual Failover Operation

You invoke a failover operation in response to an emergency situation, usually when the primary database cannot be accessed or is unavailable.

See Choosing a Target Standby Database before you fail over to decide which standby database should be the target of the failover. The following scenario describes a failover to the remote database called `South_Sales`.

> **Note**
>
> If multiple fast-start failover targets are configured, then a manual failover is only possible to the current fast-start failover target.
>
> If you want to perform a manual failover to a standby database that is not the fast-start failover target standby database, you must first disable fast-start failover using the `FORCE` option on the standby database you want to fail over. See Disabling Fast-Start Failover for more information about the `FORCE` option.

1. (Optional) Check the readiness of the target standby.

   To validate the target standby database to ensure that it's ready to become the new primary database, use the `VALIDATE DATABASE` command, as shown in the following example:

   ```
   DGMGRL>  VALIDATE DATABASE 'South_Sales';

     Database Role:     Physical standby database
     Primary Database:  North_Sales
       Warning: primary database was not reachable

     Ready for Switchover:  No
     Ready for Failover:    Yes (Primary Not Running)

     Flashback Database Status:
       Database     Status           Retention Target
       North_Sales  Unknown          Unknown
   ```


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```
    South_Sales  On              1440

  Managed by Clusterware:
    North_Sales:  Unknown
    South_Sales:  NO
    The static connect identifier allows for a connection to database
"North_Sales".

  Temporary Tablespace File Information:
    North_Sales TEMP Files:  Unknown
    South_Sales TEMP Files:  3

  Data file Online Move in Progress:
    North_Sales:  Unknown
    South_Sales:  No

  Transport-Related Information:
    Transport On:  No
    Gap Status:    Unknown
    Transport Lag:  0 seconds (computed 59 seconds ago)
    Transport Status:  Success

  Log Files Cleared:
    North_Sales Standby Redo Log Files:  Unknown
    South_Sales Online Redo Log Files:   Unknown
    South_Sales Standby Redo Log Files:  Unknown
```

2. To perform the failover operation, you must connect to the standby database to which you want to fail over as a user that has the `SYSDG` or `SYSDBA` privilege. For example:

```
DGMGRL> CONNECT sys@South_Salesm;
Password: password
Connected to "South_Sales"
Connected as SYSDBA.
```

3. Now you can issue the failover command to make the target standby database the new primary database for the configuration.

```
DGMGRL> FAILOVER TO 'South_Sales';
2022-12-20T00:11:12.329+00:00
Performing failover NOW, please wait...

2022-12-20T00:11:18.332+00:00
Failover succeeded, new primary is "South_Sales".

2022-12-20T00:11:18.333+00:00
Failover processing complete, broker ready.
```

   Note that after the failover completes, the original primary database cannot be used as a standby database of the new primary database unless it is reinstated or re-created (as described in Reenabling Disabled Databases After a Role Change).

4. Issue the SHOW CONFIGURATION command to verify the failover.

```
DGMGRL> SHOW CONFIGURATION;
```


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```
Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    Warning: ORA-16627: No member available to support the protection mode.

    North_Sales - Physical standby database (disabled)
      ORA-16661: The standby database must be reinstated.

Fast-Start Failover:  Disabled

Configuration Status:
WARNING   (status updated 11 seconds ago)
```

Note that in this example the configuration was operating in maximum availability mode. The protection mode was preserved after the failover, but the configuration now has a warning status indicating that no configuration member is available to support this mode. The former primary database is disabled and must be reinstated or replaced with a new standby database before the configuration can operate in maximum protection mode again.

5. Show the new primary database.

```
DDGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Redo Rate:          86.30 KByte/s  in 16 seconds (computed 13 seconds
ago)
  Instance(s):
    SouthSales

  Database Warning(s):
    ORA-16627: No member available to support the protection mode.

Database Status:
WARNING
6.
DGMGRL> SHOW DATABASE 'North_Sales';

Database - North_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      (unknown)
  Apply Lag:          (unknown)
  Average Apply Rate: (unknown)
  Real Time Query:    OFF
  Instance(s):
    NorthSales

Database Status:
```


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```
DISABLED - ORA-16661: The standby database must be reinstated.
```

6. Issue the `SHOW DATABASE` command to see that the former (failed) primary database was disabled by the broker as a consequence of the failover. It must be reinstated (as described in Reenabling Disabled Databases After a Role Change).

```
DGMGRL> SHOW DATABASE 'North_Sales';
Database - North_Sales

  Role: PHYSICAL STANDBY
  Intended State: APPLY-ON
  Transport Lag: (unknown)
  Apply Lag: (unknown)
  Apply Rate: (unknown)
  Real Time Query: OFF
  Instance(s):
    north_sales1

Database Status:
ORA-16661: the standby database must be be reinstated
```

Scenario 11: Reinstating a Failed Primary Database

If your former primary database was configured with Flashback Database, you can easily reinstate the failed primary database as a standby database of the new primary database.

The failed primary database will be reinstated as a standby type that matches the old standby database. For example, if you failed over to a physical standby database, the old primary will be reinstated as a physical standby database.

To reinstate the failed primary database, start it to the mounted state. Then run DGMGRL, connect to the new primary database and reinstate the old primary database.

1. Restart the old primary database:

```
% dgmgrl / as sysdba
DGMGRL for Linux: Release 23.0.0.0.0 – Production on Tue Dec 20 00:50:10 2022
Version 23.1.0.0.0

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Welcome to DGMGRL, type "help" for information.
Connected to an idle instance.
Connected as SYSDBA.
DGMGRL> STARTUP
Connected to "North_Sales"
ORACLE instance started.
Database mounted.
ORA-16649: Data Guard prevented this database from opening.
https://docs.oracle.com/error-help/db/ora-16649/

DGMGRL> SHOW CONFIGURATION

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
```


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```
  North_Sales - Primary database
    South_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
DISABLED
DGM-17290: Role change detected. This database may no longer be the primary database.
```

> **Note**

Because a role transition occurred while the old primary was offline, Data Guard prevents the database from reopening and leaves it in a mounted state to ensure there is only one database open in the primary role.

2. Reinstating the old primary database as a standby database requires a connection to the new primary database:

```
DGMGRL> CONNECT sys@south_sales
Password: password
Connected to "South_Sales"
Connected as SYSDBA.
DGMGRL> REINSTATE DATABASE 'North_Sales';
2022-12-20T01:06:56.636+00:00
Reinstating database "North_Sales", please wait...

2022-12-20T01:07:25.747+00:00
Reinstatement of database "North_Sales" succeeded

2022-12-20T01:07:25.747+00:00
Reinstate processing complete, broker ready.
```

After the primary has been reinstated, issue the `SHOW CONFIGURATION` and `SHOW DATABASE` commands to confirm that the old primary has been successfully reinstated.

3. Show the configuration and its members:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    North_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 22 seconds ago)

DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Redo Rate:          146 Byte/s  in 15 seconds (computed 9 seconds ago)
  Instance(s):
    SouthSales
```


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```
Database Status:
SUCCESS

DGMGRL> SHOW DATABASE 'North_Sales';

Database - North_Sales

  Role:               PHYSICAL STANDBY
  Intended State:     APPLY-ON
  Transport Lag:      0 seconds (computed 1 second ago)
  Apply Lag:          0 seconds (computed 1 second ago)
  Average Apply Rate: 435.00 KByte/s
  Real Time Query:    OFF
  Instance(s):
    NorthSales

Database Status:
SUCCESS
```

Scenario 12: Converting a Physical Standby to a Snapshot Standby

If you have a physical standby database that you would like to convert to a snapshot standby database, use the DGMGRL `CONVERT DATABASE` command.

Redo data will continue to be received by the database while it is operating as a snapshot standby database, but it will not be applied until the snapshot standby is converted back into a physical standby database.

A physical standby database must be configured with a fast recovery area to convert it to a snapshot standby database. This is because a guaranteed restore point is created during the conversion process, and guaranteed restore points require a fast recovery area.

```
DGMGRL> CONVERT DATABASE 'North_Sales' TO SNAPSHOT STANDBY;
2022-12-20T01:24:38.396+00:00
Converting database "North_Sales" to a Snapshot Standby database, please wait...

2022-12-20T01:25:12.244+00:00
Database "North_Sales" converted successfully

2022-12-20T01:25:12.244+00:00
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    North_Sales - Snapshot standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 33 seconds ago)
```

When you are ready to revert the database back to a physical standby database, use the DGMGRL `CONVERT DATABASE` command again as follows. Any updates made to the database while it was operating as a snapshot standby database will be discarded. All accumulated redo

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data will be applied by Redo Apply services after the database is converted back to a physical standby database.

```
DGMGRL>  CONVERT DATABASE 'North_Sales' TO PHYSICAL STANDBY;
2022-12-20T01:28:35.434+00:00
Converting database "North_Sales" to a Physical Standby database, please wait...

2022-12-20T01:28:35.495+00:00
Operation requires shut down of instance "NorthSales" on database "North_Sales"
Shutting down instance "NorthSales"...
Connected to "North_Sales"
Database closed.
Database dismounted.
ORACLE instance shut down.

2022-12-20T01:28:52.049+00:00
Operation requires start up of instance "NorthSales" on database "North_Sales"
Starting instance "NorthSales"...
Connected to an idle instance.
ORACLE instance started.
Connected to "North_Sales"
Database mounted.

2022-12-20T01:29:06.816+00:00
Continuing to convert database "North_Sales" ...

2022-12-20T01:29:27.289+00:00
Database "North_Sales" converted successfully

2022-12-20T01:29:27.289+00:00
```

Immediately after the snapshot standby database is converted back to a physical standby database, the configuration is in a WARNING state.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    Warning: ORA-16629: Database reports a different protection level from the
protection mode.

    North_Sales - Physical standby database
      Warning: ORA-16854: apply lag could not be determined

Fast-Start Failover:  Disabled

Configuration Status:
WARNING   (status updated 41 seconds ago)
```

However, once Redo Apply begins applying redo again, the configuration is restored to a SUCCESS state:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
```


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```
    North_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 59 seconds ago)
```

Scenario 13: Monitoring a Data Guard Configuration

These steps demonstrate the tasks necessary to use the SHOW command and monitorable properties to identify and resolve a failure situation.

- Monitoring a Configuration Task 1: Check the Configuration Status
- Monitoring a Configuration Task 2: Check the Database Status
- Monitoring a Configuration Task 3: Check the LogXptStatus Monitorable Property
- Monitoring a Configuration Task 4: Check the InconsistentLogXptProps Monitorable Property

Monitoring a Configuration Task 1: Check the Configuration Status

The status of the broker configuration is an aggregated status of all databases and instances in the broker configuration.

The status of the broker configuration is an aggregated status of all configuration members in the broker configuration.

Check the configuration status first to determine whether or not any further action needs to be taken. A SUCCESS status indicates everything in the broker configuration is working correctly. A WARNING or ERROR status indicates something in the configuration is not working correctly or needs attention.

For the example, the standby database has multiple warnings:

```
DGMGRL> SHOW CONGIGURATION

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    Warning: ORA-16627: No member available to support the protection mode.

    North_Sales - Physical standby database (disabled)
      ORA-16906: The member was shutdown.

Fast-Start Failover:  Disabled

Configuration Status:
WARNING   (status updated 31 seconds ago)
To resolve these warnings, restart standby database North_Sales and recheck the
configuration status again.

DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
```


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```
  South_Sales - Primary database
    North_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 19 seconds ago)
```

Monitoring a Configuration Task 2: Check the Database Status

Sometimes the output from `SHOW CONFIGURATION` is not sufficient by itself to resolve the issue. To identify the warnings on the primary database, show its status using the `SHOW DATABASE` command.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    Error: ORA-16810: Multiple errors or warnings detected for the member.

    North_Sales - Physical standby database
      Warning: ORA-16857: member disconnected from redo source for longer than specified
threshold

Fast-Start Failover:  Disabled

Configuration Status:
ERROR   (status updated 25 seconds ago)
```

In this example, `SHOW CONFIGURATION` identified multiple issues for primary database `South_Sales`. When there are multiple errors or warnings, use the `SHOW DATABASE` command to identify them:

```
DGMGRL> SHOW DATABASE 'South_Sales';

Database - South_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Redo Rate:          (unknown)

  Instance(s):
    SouthSales
      Error: ORA-16738: Redo transport service for member "North_Sales" is not running.

  Database Warning(s):
    ORA-16629: Database reports a different protection level from the protection mode.

Database Status:
ERROR
```


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Monitoring a Configuration Task 3: Check the LogXptStatus Monitorable Property

The `SHOW DATABASE` output in step 2 shows a Warning for error ORA-16737.

The `LogXptStatus` broker monitorable property can help to identify the specific source of the `ORA-16738` redo transport error:

```
DGMGRL> SHOW DATABASE 'South_Sales' LogXptStatus;
LOG TRANSPORT STATUS
PRIMARY_INSTANCE_NAME STANDBY_DATABASE_NAME     STATUS                ERROR
          SouthSales          North_Sales   DEFERRED
```

Redo transport to the standby database `North_Sales` is currently deferred. Examining the alert log for database `South_Sales` shows that redo transport to `log_archive_dest_2` has been deferred:

```
2022-12-20T02:42:38.960566+00:00
ALTER SYSTEM SET log_archive_dest_state_2='DEFER' SCOPE=BOTH;
2022-12-20T02:42:41.650221+00:00
LGWR (PID:3620211): LAD:2 no longer supports SYNCHRONIZATION [krsl.c:7650]
```

Alternatively, the `DGMGRL SHOW DATABASE … PARAMETER` command can be used to check the state of the redo transport destinations configured for database `South_Sales` to identify which log archive destination is deferred:

```
DGMGRL> CONNECT sys@south_sales
Password: password
Connected to "South_Sales"
Connected as SYSDBA.
DGMGRL> SHOW DATABASE 'South_Sales' PARAMETER log_archive_dest_state_2;
  log_archive_dest_state_2 = 'DEFER'
```

To resolve the problem, enable the deferred destination:

```
DGMGRL> SQL 'alter system set log_archive_dest_state_2=ENABLE scope=both';
Succeeded.
DGMGRL> SHOW CONFIGURATION

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  South_Sales - Primary database
    North_Sales - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 26 seconds ago)
```


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Monitoring a Configuration Task 4: Check the InconsistentLogXptProps Monitorable Property

To identify the inconsistent values for the redo transport database property, `ReopenSecs`, you can use the `InconsistentLogXptProps` monitorable property.

This is useful, for example, for the warning shown in the `SHOW DATABASE` display in Step 2 is ORA-16715.

```
DGMGRL> SHOW DATABASE 'North_Sales' 'InconsistentLogXptProps';
INCONSISTENT LOG TRANSPORT PROPERTIES
 INSTANCE_NAME   STANDBY_NAME   PROPERTY_NAME   MEMORY_VALUE   BROKER_VALUE
   south_sales1    South_Sales      ReopenSecs            600            300
```

The current database memory value (600) is different from the Oracle Data Guard broker's property value (300). If you think the broker's property value is correct, you can fix the inconsistency by re-editing the property of the standby database with the same value, as shown in the following example:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'ReopenSecs'=300;
Property "ReopenSecs" updated
```

You can also reenable the standby database or reset the state of the primary database to `TRANSPORT-ON` to fix this inconsistency.

Scenario 14: Adding a Recovery Appliance to a Broker Configuration

These steps show how to add a Zero Data Loss Recovery Appliance (Recovery Appliance) to a broker configuration.

> **See Also**
>
> Example 4-9 for an example of how to set up a Recovery Appliance as the redo destination of a physical standby

1. Add the Recovery Appliance to the broker configuration.

   ```
   DGMGRL> ADD RECOVERY_APPLIANCE EnterpriseRecoveryAppliance AS CONNECT IDENTIFIER IS
   EnterpriseRecoveryAppliance.example.com;
   Oracle Recovery Appliance "EnterpriseRecoveryAppliance" added

   DGMGRL> SHOW RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
    Oracle Recovery Appliance - EnterpriseRecoveryAppliance
      Transport Lag: 0 seconds
     Redo Source: North_Sales

   Oracle Recovery Appliance Status:
   DISABLED
   ```

2. Enable the Recovery Appliance

   ```
   DGMGRL> ENABLE RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
   ```


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```
DGMGRL> SHOW RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
 Oracle Recovery Appliance - EnterpriseRecoveryAppliance
   Transport Lag: 0 seconds
  Redo Source: North_Sales

Oracle Recovery Appliance Status:
SUCCESS
```

Scenario 15: Exporting and Importing a Broker Configuration File

The broker configuration can be exported into a text file in the trace directory. The configuration can be recreated by importing the exported configuration metadata.

For this scenario, save the broker configuration in the trace directory by exporting the configuration metadata into a text file and then restore the configuration by importing the previously exported text file.

1. Exporting a Broker Configuration
2. Importing a Broker Configuration

Exporting a Broker Configuration

Use the `EXPORT CONFIGURATION` command to export the metadata contained in the broker configuration file to a text file.

The directory in which the broker configuration file is stored must be accessible to the Oracle server process.

1. Connect to the primary database.

   ```
   DGMGRL> CONNECT sys@south_sales
   Password: password
   Connected to "South_Sales"
   Connected as SYSDBA.
   ```

2. Export the broker configuration.

   The following command exports the broker configuration and stores it in a file named `myconfig.txt` in the trace directory.

   ```
   DGMGRL> EXPORT CONFIGURATION TO 'myconfig.txt';
   Succeeded.
   ```

   > **Note**

   If a file with the name myconfig.txt already exists in the trace directory, the following error is generated:

   ```
   DGMGRL> EXPORT CONFIGURATION TO 'myconfig.txt';
   ORA-16527: Unable to create output file for broker configuration metadata.
   ```

   To create a new configuration file with the same name as an existing file, first either delete or rename the existing file.

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Importing a Broker Configuration

Use the `IMPORT CONFIGURATION` command to import the broker configuration metadata that is stored in a text file into your current broker configuration.

1. Connect to the primary database.

   ```
   DGMGRL> CONNECT sys@south_sales
   Password: password
   Connected to "South_Sales"
   Connected as SYSDBA.
   ```

2. Import the broker configuration metadata that is stored in the file named `myconfig.txt` in the `trace` directory into your current broker configuration.

   ```
   DGMGRL> IMPORT CONFIGURATION FROM 'myconfig.txt';
   Succeeded.
   ```

   Run `ENABLE CONFIGURATION` to enable the imported configuration. Then run `ENABLE FAST_START FAILOVER` to re-enable Fast-Start Failover.

Scenario 16: Using the Observe-only Mode for Fast-Start Failover

The observe-only mode enables you to test the impact of using fast-start failover in your configuration, without making any actual changes to the configuration. You can use the DGMGRL commands or data dictionary views to verify the observe-only mode setting.

Topics:

- Configuring Observe-only Mode for Fast-Start Failover
- Sample Content of the Log Files in Observe-only Mode
- Disabling Observe-only Mode for Fast-start Failover

Configuring Observe-only Mode for Fast-Start Failover

Use the `ENABLE FAST_START FAILOVER` command to configure observe-only mode for fast-start failover.

1. Use the following command to configure the observe-only mode for fast-start failover.

   ```
   DGMGRL> ENABLE FAST_START FAILOVER OBSERVE ONLY;
   ```

   All existing observers and ones that will be started in the future will run in observe-only mode.

2. Verify that the observe-only mode has be set by using one of the following methods:

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a. Display the current fast-start failover configuration using the following command:

```
DGMGRL> SHOW FAST_START FAILOVER;
Fast-Start Failover: Enabled in Observe-Only Mode

  Protection Mode: MaxAvailability
  Lag Limit: 30 seconds

  Threshold: 30 seconds
  Ping Interval: 3000 milliseconds
  Ping Retry: 0
  Active Target: South_Sales
  Potential Targets: "South_Sales"
    South_Sales valid
  Observer: observer.example.com
  Shutdown Primary: TRUE
  Auto-reinstate: TRUE
  Observer Reconnect: (none)
  Observer Override: FALSE
```

b. Display the current fast-start failover mode using the following command:

```
SQL> SELECT fs_failover_mode from V$DATABASE;

FS_FAILOVER_MODE
-------------------
OBSERVE-ONLY
```

Sample Content of the Log Files in Observe-only Mode

This section shows the entries made to the log files when you configure fast-start failover in observe-only mode.

Example 1: When Fast-start Failover Should be Initiated

Observer Log

```
A fast-start failover would have been initiated...
Unable to failover since this observer is in observe-only mode
```

Broker Log

```
Fast-Start Failover cannot proceed because: "observe-only mode"
```

Example 2: Primary Database Opens During Startup Without an Acknowledgement from Observer or Target Standby

The broker log file (drc*.log) and alert log contain the following:

```
This database is allowed to open in observe-only mode. An acknowledgement
from observer or target standby would have been required in normal FSFO mode.
```


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Example 3: Switchover or Manual Failover to a Bystander Database

The broker log file (drc*.log) and alert logs contain the following information:

```
FAILOVER to database 'database name' is allowed even though observe-only mode
is enabled. It would have been rejected since database 'database name' is a
bystander database.
```

Disabling Observe-only Mode for Fast-start Failover

Use the `DISABLE FAST_START FAILOVER` command to exit the observe-only mode of fast-start failover. You must first disable fast-start failover and then enable fast-start failover without the `OBSERVE ONLY` clause.

Use the following commands to disable observe-only mode for fast-start failover:

```
DGMGRL> DISABLE FAST_START FAILOVER;
DGMGRL> ENABLE FAST_START FAILOVER;
```

Fast-start failover is now enabled, without observe-only mode.

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9

Scenarios for Using DGMGRL with a DG PDB Configuration (26ai)

Use these scenarios to understand how to create, manage, and monitor an Oracle Data Guard broker configuration that provides PDB-level data protection and disaster recovery for one or more pluggable databases.

Before attempting to replicate any of the examples in the scenarios, first review and understand the prerequisites for using the Oracle Data Guard command-line interface (DGMGRL) and the general concepts and terminology associated with Oracle Data Guard DG PDB configurations. (Explained in chapter 3) Managing Broker Configurations

- Prerequisites for Using DG PDB
- Scenario 1: Prepare the Databases
- Scenario 2: Prepare the Environment
- Scenario 3: Create the Source and Target Configurations
- Scenario 4: Establish a Connection Between the Configurations and Enable Them
- Scenario 5: Prepare the Databases for DG PDB
- Scenario 6: Configure Data Guard Protection for the Source PDB
- Scenario 7: Switchover from Source PDB to Target PDB
- Scenario 8: Failover to Target PDB
- Scenario 9: Monitoring a DG PDB Configuration
- Scenario 10: Removing a DG PDB Configuration

Prerequisites for Using DG PDB

Ensure that all prerequisites for using a DG PDB environment are met:

- The source database and target database must exist and be configured to use server parameter files (SPFILEs).
- If the source database or target database uses an initialization parameter file (PFILE), convert this file into a server parameter file (SPFILE). If an instance was not started using a server parameter file, shutdown the instance and restart it using a server parameter file.
- The `DG_BROKER_START` initialization parameter must be set to `TRUE` for the source database and target database. Additional initialization parameter requirements are noted in Scenario 1: Prepare the Databases
- The source and target databases must be configured to run in `ARCHIVELOG` mode.

The following assumptions are made in the DG PDB scenarios:

- TCP/IP is used to connect the source database with the target database.
- The DG PDB configuration consists of the following:

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- The name of the source configuration is `Boston`. The database unique name (`DB_UNIQUE_NAME`) of the single instance source container database is `boston`. The source database contains PDBs `bos_sales`, `bos_acct`, and `bos_finance`. The PDB used as the source PDB in the scenarios is `bos_sales`. The other PDBs are unprotected.
- The name of the target configuration is `NewYork`. The database unique name (`DB_UNIQUE_NAME`) of the target container database is `newyork`. The target database is initially configured as an empty container database. The target PDB that will be created in Scenario 6: Configure Data Guard Protection for the Source PDB is named `nyc_sales`.
- The protection mode is maximum performance. (Default)
- The transport mode is `ASYNC`. (Default)
- The operating system configured for the host systems is Oracle Linux 8.
- The source host is `boshost` and the target host is `nychost`.
- The Oracle Database software installation owner is `myowner` and similar directory structures are used for both the source and target software installations.

Scenario 1: Prepare the Databases

Most of the usual Data Guard preparation steps apply when setting up a DG PDB environment. Notable differences are that standby redo logfiles (SRLs) are added later at the PDB level after the Data Guard DG PDB configuration has been created (instead of beforehand at the CDB level) and that CDB-level file name conversion initialization parameters are not used for DG PDB configurations.

For the source and target databases, use SQL*Plus to connect `AS SYSDBA` and perform the following actions (if they have not been already) to support future PDB-level role transitions:

Enable force logging.

```
SQL> ALTER DATABASE FORCE LOGGING;
Database altered.
```

Enable flashback database.

```
SQL> ALTER DATABASE FLASHBACK ON;
Database altered.
```

If necessary, update the initialization parameters in the server parameter files for each database.

The CDB-level file name conversion initialization parameters `db_file_name_convert` and `log_file_name_convert` are not used for DG PDB configurations, but the `dg_broker_start`, `log_archive_dest_1`, and `standby_file_management` parameters should be set to the values as shown in the table below. In addition, if multi-instance databases are used, the `dg_broker_config_file1` and `dg_broker_config_file2` initialization parameters should be updated to specify locations accessible by all instances. Because the source and target container databases do not share the same `db_name` value, including the `db_unique_name` parameter in the spfile is optional for DG PDB configurations.

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Configure the following initialization parameters on the source database (using `scope=both`):

`dg_broker_start`	`TRUE`
`log_archive_dest_1`	`LOCATION=USE_DB_RECOVERY_FILE_DEST VALID_FOR=(ALL_LOGFILES,ALL_ROLES) DB_UNIQUE_NAME=boston`
`standby_file_management`	`AUTO`

Configure the following initialization parameters on the target database:

`dg_broker_start`	`TRUE`
`log_archive_dest_1`	`LOCATION=USE_DB_RECOVERY_FILE_DEST VALID_FOR=(ALL_LOGFILES,ALL_ROLES) DB_UNIQUE_NAME=newyork`
`standby_file_management`	`AUTO`

DGMGRL must connect to the source and target container databases using an account with SYSDBA privileges to create and manage a DG PDB configuration. For the scenarios, the existing SYS user for each database will be used for this purpose. Optionally, a separate user can be created on each database and granted SYSDBA privileges. Note that because the source and target databases are not copies of each other, the passwords for the management accounts do not need to match on the source and target databases and the password file from the source database does not need to be copied to the target database as is required for CDB-level Data Guard protection.

> **Note**
>
> If multi-instance databases are used, the `dg_broker_config_file1` and `dg_broker_config_file2` initialization parameters must be updated to specify locations accessible by all instances.

Scenario 2: Prepare the Environment

Configure the network configuration files and wallet files required on each host to facilitate connections to the source and target databases.

Configure the `tnsnames.ora` files on each host.

Ensure the tnsnames.ora files on the source and target hosts contain aliases that resolve to connect identifiers for the source and target databases. For the examples, the following aliases are used:

```
BOSTON =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = boshost.example.com)(PORT = 1521))
      (CONNECT_DATA = (SERVER = DEDICATED)
      (SERVICE_NAME = boston.example.com)
    )
)

NEWYORK =
```


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```
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = nychost.example.com)(PORT = 1521))
      (CONNECT_DATA = (SERVER = DEDICATED)
      (SERVICE_NAME = newyork.example.com)
    )
)
```

On systems where connections to the various PDBs are required, also update the tnsnames.ora files to include additional aliases that resolve to connect identifiers that enable connections directly to the PDBs.

Create wallets that contain the credentials required to create and manage the DG PDB configuration.

Identify (and create if necessary) the SYSDBA-privileged user that will be used for DGMGRL connections. For the scenario examples, wallet credentials for the SYS user for the source database and target database will be configured. Unlike CDB-level Data Guard protection, which requires all databases in a configuration to share the same passwords, the passwords for the SYS user for each database configured with PDB-level Data Guard protection are assumed to be different.

On each host, create a directory to contain the wallet and secure the wallet by setting appropriate file permissions on the directory.

```
$ mkdir -p $ORACLE_HOME/dbs/wallets
$ chmod -R 700 $ORACLE_HOME/dbs/wallets
```

Create wallets in the source host and target host wallet locations.

The command below creates a `dgpdb` directory in the wallet location that contains files for a new wallet and should be executed on each host. The password prompts are for the wallet password required to make any future changes to the contents of the wallet and typically would be different for each wallet.

```
$ mkstore -wrl $ORACLE_HOME/dbs/wallets/dgpdb -create
Oracle Secret Store Tool Release 23.0.0.0.0 - Production
Version 23.0.0.0.0
Copyright (c) 2004, 2022, Oracle and/or its affiliates. All rights reserved.

Enter password:
Enter password again:
```

Add credentials to each wallet for the SYS user for the source database and target database that use the previously created boston and newyork aliases by issuing the following commands on each host. The first two password prompts for each command are for the password associated with the username (SYS) for the credential being created and the last password prompt is for the wallet password required to update the wallet contents:

```
$ mkstore -wrl $ORACLE_HOME/dbs/wallets/dgpdb -createCredential boston 'sys'
Oracle Secret Store Tool Release 23.0.0.0.0 - Production
Version 23.0.0.0.0
Copyright (c) 2004, 2022, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
```


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```
Re-enter your secret/Password: Enter wallet password:

$ mkstore -wrl $ORACLE_HOME/dbs/wallets/dgpdb -createCredential newyork 'sys'
Oracle Secret Store Tool Release 23.0.0.0.0 - Production Version 23.0.0.0.0
Copyright (c) 2004, 2022, Oracle and/or its affiliates. All rights reserved.

Your secret/Password is missing in the command line
Enter your secret/Password:
Re-enter your secret/Password: Enter wallet password:
```

Update the `sqlnet.ora` file on the source database and target database hosts to add a `WALLET_LOCATION` clause that identifies the wallet directory location and a line to override any existing OS authentication or password configuration to ensure that only wallet-based authentication will be used when authentication using the wallet credentials is attempted. The sqlnet.ora file used for the examples is as follows, where *<ORACLE_HOME>* is the path for the database `ORACLE_HOME` directory:

```
NAMES.DIRECTORY_PATH= (TNSNAMES, ONAMES, HOSTNAME)
WALLET_LOCATION =
    (SOURCE =
      (METHOD = FILE)
      (METHOD_DATA =
        (DIRECTORY = <ORACLE_HOME>/dbs/wallets/dgpdb)
    )
)
SQLNET.WALLET_OVERRIDE = TRUE
```

Shutdown and restart each database to configure redo transport to use the wallet. Because there are no static services configured, use OS authentication on each host to do this. Then validate that client connections to the source and target container databases are now possible using the wallets by issuing the following commands on each host:

```
$ sqlplus /@boston as sysdba
$ sqlplus /@newyork as sysdba
```

Scenario 3: Create the Source and Target Configurations

Using DGMGRL, connect to the source container database boston using the wallet created in Scenario 2: Prepare the Environment and create the source configuration Boston. It must contain the source container database boston with PDBs `bos_sales`, `bos_acct`, and `bos_finance`. The source PDB that will be protected using a DG PDB configuration is `bos_sales`.

```
$ dgmgrl /@boston
DGMGRL for Linux: Release 23.0.0.0.0 - Development on Mon Jan 30 20:51:01
2023
Version 23.1.0.0.0
Copyright (c) 1982, 2023, Oracle and/or its affiliates. All rights reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "boston"
Connected as SYSDBA.

DGMGRL> CREATE CONFIGURATION 'Boston' CONNECT IDENTIFIER IS boston;
```


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```
Connected to "boston"
Configuration "Boston" created with primary database "boston"

DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
  Protection Mode: MaxPerformance
  Members:
  boston - Primary database
Fast-Start Failover: Disabled
Configuration Status:
DISABLED
```

Using DGMGRL, connect to the target container database newyork using the wallet created in Scenario 2: Prepare the Environment and create the target configuration NewYork. It must contain the target container database `newyork`, which will provide data protection to the PDB `bos_sales` in the source configuration Boston. The source PDB `bos_sales` will be protected by the target PDB `nyc_sales` created in Scenario 6: Configure Data Guard Protection for the Source PDB.

```
$ dgmgrl /@newyork
DGMGRL for Linux: Release 23.0.0.0.0 - Development on Mon Jan 30 20:52:38
2023
Version 23.1.0.0.0
Copyright (c) 1982, 2023, Oracle and/or its affiliates. All rights reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "newyork"
Connected as SYSDBA.
DGMGRL> CREATE CONFIGURATION 'NewYork' CONNECT IDENTIFIER IS newyork;
Connected to "newyork" Configuration "NewYork" created with primary database
"newyork"
DGMGRL> SHOW CONFIGURATION;
Configuration - NewYork
  Protection Mode: MaxPerformance
  Members:
  newyork - Primary database
Fast-Start Failover: Disabled
Configuration Status:
DISABLED
```

See Scenario 1: Creating a Configuration Scenario 1 of chapter 8 "Scenarios Using the DGMGRL Command-Line Interface": Creating a Configuration Tasks 1-5 for more information about creating a Data Guard configuration.

> **Note**

Do not perform the Task 6 steps of Chapter 8 Scenario 1 to create a CDB-level standby database and do not create CDB-level standby redo log files for either container database.

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Scenario 4: Establish a Connection Between the Configurations and Enable Them

Using DGMGRL, connect to the source container database boston in configuration Boston using the wallet created in Scenario 2: Prepare the Environment and establish a connection with configuration NewYork.

```
$ dgmgrl /@boston
DGMGRL for Linux: Release 23.0.0.0.0 - Development on Mon Jan 30 21:00:24
2023
Version 23.1.0.0.0
Copyright (c) 1982, 2023, Oracle and/or its affiliates. All rights reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "boston"
Connected as SYSDBA.

DGMGRL> ADD CONFIGURATION 'NewYork' CONNECT IDENTIFIER IS newyork;
Configuration NewYork added.
DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
  Protection Mode: MaxPerformance
  Members:
  boston - Primary database
  newyork - Primary database in NewYork configuration
Fast-Start Failover: Disabled
Configuration Status:
DISABLED
```

Initially, both configurations are in a `DISABLED` state and must be enabled before configuring PDB-level Data Guard protection. Use the following command to enable both configurations:

```
DGMGRL> ENABLE CONFIGURATION ALL;
Enabled.
```

Note that the Configuration Status has now changed to SUCCESS:

```
DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
  Protection Mode: MaxPerformance
  Members:
  boston - Primary database
  newyork - Primary database in NewYork configuration
Fast-Start Failover: Disabled

Configuration Status:
SUCCESS (status updated 14 seconds ago)
```

Continue to use this DGMGRL session in the next scenario.

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Scenario 5: Prepare the Databases for DG PDB

Connect to each container database and open the PDBs if they are not already open:

```
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
Pluggable database altered.
```

The following SQL query can be used to check the open mode of the PDBs in a container database:

```
SQL> SELECT name, open_mode FROM v$pdbs;
NAME                 OPEN_MODE
-------------------- ----------
PDB$SEED             READ ONLY
BOS_SALES            READ WRITE
BOS_ACCT             READ WRITE
BOS_FINANCE          READ WRITE
```

The Data Guard broker `EDIT CONFIGURATION PREPARE DGPDB` command assumes that the source container database and target container database configurations have been configured and are enabled. During execution, the command prompts the user to enter a password for the `DGPDB_INT` account for each of the container databases and then configures the internal structures required to provide Data Guard protection or change roles for a PDB.

```
DGMGRL> EDIT CONFIGURATION PREPARE DGPDB;
Enter password for DGPDB_INT account at boston:
Enter password for DGPDB_INT account at newyork:
Prepared Data Guard for Pluggable Database at newyork.
Prepared Data Guard for Pluggable Database at boston.
```

Continue to use this DGMGRL session in the next scenario.

Scenario 6: Configure Data Guard Protection for the Source PDB

Configure Data Guard PDB-level protection for the source PDB `bos_sales` by configuring target PDB `nyc_sales` in the `newyork` container database. This is implemented in four tasks:

1. Execute the `ADD PLUGGABLE DATABASE` command to create the target PDB in the target container database.
2. Instantiate the target PDB by copying all the datafiles associated with the source PDB to the target PDB location.
3. Create PDB-level standby redo logfiles (SRLs) to receive foreign source redo.
4. Initiate redo transport from the source PDB to the target PDB.

Task 1: execute the `ADD PLUGGABLE DATABASE` command.

```
DGMGRL> ADD PLUGGABLE DATABASE 'nyc_sales' AT newyork SOURCE is 'bos_sales'
AT boston PDBFileNameConvert is
"'/BOSTON/bos_sales/','/NEWYORK/nyc_sales/'";
Pluggable Database "NYC_SALES" added
```


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Task 2: instantiate the target PDB.

On the target system, create a directory to contain the target PDB files. The name and location for this directory and for the copied files must follow the rules specified in the the `PDBFileNameConvert` clause of the `ADD PLUGGABLE DATABASE` command. Replace <*myowner*> and <*nychost*> with values appropriate for your environment.

```
$ cd $ORACLE_BASE/oradata/NEWYORK
$ mkdir nyc_sales
```

Copy the source PDB files into this directory. The example uses the Linux operating system secure copy command scp to perform this task.

On the source host, connect to the source CDB boston as SYSDBA and issue the following SQL commands:

```
SQL> ALTER SESSION SET CONTAINER=bos_sales;
Session altered.
SQL> ALTER DATABASE BEGIN BACKUP;
Database altered.
SQL> host scp -r $ORACLE_BASE/oradata/BOSTON/bos_sales/*
<myowner>@<nychost>:$ORACLE_BASE/oradata/NEWYORK/nyc_sales
sysaux01.dbf  100%   930MB   22.4MB/s   00:41
system01.dbf  100%   310MB   27.7MB/s   00:11
temp01.dbf    100%   20MB    92.0MB/s   00:00
undotbs01.dbf 100%   100MB   54.9MB/s   00:01
users01.dbf   100%   5128KB  55.0MB/s   00:00
SQL> ALTER DATABASE END BACKUP;
Database altered.
```

> **Note**
>
> RMAN can be used to copy source PDB files to the destination target. For detailed instructions, please see My Oracle Support Note 3081184.1 at https://support.oracle.com

Task 3: create PDB-level standby redo logfiles.

This step is only performed the first time a target PDB is configured within a container database.

For traditional Data Guard deployments, standby redo logfiles (SRLs) typically are added to the primary database at the CDB level before creating any standby databases so RMAN will automatically propagate these files to all standby databases subsequently created from the primary database.

For DGPDB deployments, by contrast, SRLs are added at the PDB level after the initial DGPDB configuration and one or more target PDBs have been created. PDB-level SRLs can be added only to PDBs in the target role. If a CDB has multiple PDBs in the target role, all of these target PDBs share the same set of PDB-level SRLs to receive redo from their corresponding source PDBs. In addition, if a CDB has no PDBs in the target role, a role change from source role to target role for one PDB must be performed before any PDB-level SRLs can be created for that CDB. For the example configuration, PDB-level SRLs will be added to the current source PDB `bos_sales` in Scenario 7: Switchover from Source PDB to Target PDB.

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Connect to the target CDB `newyork` as SYSDBA and issue the following SQL commands to add PDB-level SRLs. Note that the size specified for the PDB level SRLs must be the same size as the source container database online redo log files (ORLs) and that typically the number of PDB-level SRLs is one more than the number of source ORLs to help ensure there is always a free target PDB-level SRL available to receive redo from the source CDB.

```
SQL> ALTER SESSION SET CONTAINER=nyc_sales;
Session altered.
SQL> ALTER DATABASE ADD STANDBY LOGFILE thread 1
  2 group 4 ('$ORACLE_BASE/fast_recovery_area/NEWYORK/onlinelog/
standby_redo04.log') size 200M,
  3 group 5 ('$ORACLE_BASE/fast_recovery_area/NEWYORK/onlinelog/
standby_redo05.log') size 200M,
  4 group 6 ('$ORACLE_BASE/fast_recovery_area/NEWYORK/onlinelog/
standby_redo06.log') size 200M,
  5 group 7 ('$ORACLE_BASE/fast_recovery_area/NEWYORK/onlinelog/
standby_redo07.log') size 200M;
Database altered.
```

Use the `VALIDATE PLUGGABLE DATABASE` command to confirm successful creation of the PDB level standby redo logfiles:

```
DGMGRL> VALIDATE PLUGGABLE DATABASE nyc_sales AT newyork;
  Ready for Switchover:    NO
  Data Guard Role:         Physical Standby
  Apply State:             Not Running
  Standby Redo Log Files:  4
  Source:                  BOS_SALES (con_id 3) at boston
```

Task 4: initiate redo transport from the source PDB to the target PDB.

Note that redo apply is not running. Use DGMGRL to start redo apply on the target PDB.

```
DGMGRL> EDIT PLUGGABLE DATABASE nyc_sales AT newyork SET STATE='APPLY-ON';
Succeeded.
DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
  Protection Mode: MaxPerformance
  Members:
  boston - Primary database
  newyork - Primary database in NewYork configuration
Data Guard for PDB: Enabled in SOURCE role
Configuration Status:
SUCCESS (status updated 3 seconds ago)

DGMGRL> SHOW PLUGGABLE DATABASE bos_sales AT boston;
Pluggable database - BOS_SALES at boston
  Data Guard Role:   Primary
  Con_ID:            3
  Active Target:     con_id 3 at newyork
Pluggable Database Status:
SUCCESS

DGMGRL> SHOW PLUGGABLE DATABASE nyc_sales AT newyork;
Pluggable database - NYC_SALES at newyork
```


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```
  Data Guard Role:    Physical Standby
  Con_ID:              3
  Source:              con_id 3 at boston
  Transport Lag:       13 minutes 11 seconds (computed 59 seconds ago)
  Apply Lag:           (unknown)
  Intended State:      APPLY-ON
  Apply State:         Running
  Apply Instance:      newyork
  Average Apply Rate:  (unknown)
  Real Time Query:     OFF
Pluggable Database Status:
SUCCESS
```

Note that although redo apply is running on the target PDB, there is a transport lag. Connect to the source CDB `boston` as SYSDBA and archive the current log a few times to initiate redo transport to the newly configured standby redo logfiles:

```
SQL> ALTER SYSTEM ARCHIVE LOG CURRENT;
System altered.

SQL> ALTER SYSTEM ARCHIVE LOG CURRENT;
System altered.
```

When the state of the target PDB is checked again, the target PDB is protecting the source PDB with no transport or apply lag.

```
DGMGRL> SHOW PLUGGABLE DATABASE nyc_sales AT newyork;
Pluggable database - NYC_SALES at newyork
  Data Guard Role:        Physical Standby
  Con_ID:                 3
  Source:                 con_id 3 at boston
  Transport Lag:          0 seconds (computed 0 second ago)
  Apply Lag:              0 seconds (computed 0 second ago)
  Intended State:         APPLY-ON
  Apply State:            Running
  Apply Instance:         newyork
  Average Apply Rate:     178 KByte/s
  Real Time Query:        OFF
Pluggable Database Status:
SUCCESS
```

Continue to use this DGMGRL session in the next scenario.

Scenario 7: Switchover from Source PDB to Target PDB

A switchover exchanges the source and target roles between the specified PDBs. This is generally a planned role transition, and, because both PDBs are online and accessible, there is no data loss. Switchovers are useful for load balancing and to facilitate planned maintenance operations. For the example DG PDB configuration, a switchover is used to faciliate adding PDB-level standby redo logs for the `bos_sales` PDB at the `boston` container database.

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To add PDB-level SRLs to the current source PDB bos_sales, this PDB must first be placed in a target role. To do this, perform a switchover to the target PDB nyc_sales and then add PDB-level SRLs to the new standby PDB bos_sales.

```
DGMGRL> SWITCHOVER TO PLUGGABLE DATABASE nyc_sales AT NEWYORK;
Performing switchover
        NOW, please wait...
Switchover succeeded, new primary is "nyc_sales"
```

To create standby redo logs for PDB bos_sales, first stop redo apply:

```
DGMGRL> EDIT PLUGGABLE DATABASE bos_sales AT boston SET STATE='APPLY-OFF';
Succeeded.
```

Then connect to the new target CDB boston as SYSDBA and issue the following SQL commands to add PDB-level SRLs:

```
SQL> ALTER SESSION SET CONTAINER=bos_sales;
Session altered.

SQL> ALTER DATABASE ADD STANDBY LOGFILE thread 1
  2 group 4 ('$ORACLE_BASE/fast_recovery_area/BOSTON/onlinelog/
standby_redo04.log') size 200M,
  3 group 5 ('$ORACLE_BASE/fast_recovery_area/BOSTON/onlinelog/
standby_redo05.log') size 200M,
  4 group 6 ('$ORACLE_BASE/fast_recovery_area/BOSTON/onlinelog/
standby_redo06.log') size 200M,
  5 group 7 ('$ORACLE_BASE/fast_recovery_area/BOSTON/onlinelog/
standby_redo07.log') size 200M;
Database altered.
```

Use the VALIDATE PLUGGABLE DATABASE command to confirm successful creation of the PDB level standby redo logfiles:

```
DGMGRL> VALIDATE PLUGGABLE DATABASE bos_sales AT boston;
   Ready for Switchover:      NO
   Data Guard Role:           Physical Standby
   Apply State:               Not Running
   Standby Redo Log Files:    4
   Source:                    NYC_SALES (con_id 3) at newyork
```

Finally, use DGMGRL to restart redo apply and check that the DG PDB configuration is now in a SUCCESS state and no longer lags the source PDB:

```
DGMGRL> EDIT PLUGGABLE DATABASE bos_sales AT boston SET STATE='APPLY-ON';
Succeeded.

DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
  Protection Mode: MaxPerformance
  Members:
  boston - Primary database
    newyork - Primary database in NewYork configuration
```


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```
Data Guard for PDB: Enabled in TARGET role
Configuration Status: SUCCESS (status updated 58 seconds ago)

DGMGRL> SHOW PLUGGABLE DATABASE bos_sales AT boston;
Pluggable database - BOS_SALES at boston
  Data Guard Role: Physical Standby
  Con_ID: 3
  Source: con_id 3 at newyork
  Transport Lag: (unknown)
  Apply Lag: (unknown)
  Intended State: APPLY-ON
  Apply State: Running
  Apply Instance: boston
  Average Apply Rate: (unknown)
  Real Time Query: OFF
Pluggable Database Status:
SUCCESS
```

Note that target PDB `bos_sales` has `(unknown)` transport lag and apply lag states. Connect to the source database `newyork` as SYSDBA and archive the current logfile a few times to initiate redo transport to the newly created standby redo logfiles:

```
SQL> ALTER SYSTEM ARCHIVE LOG CURRENT;
System altered.

SQL> ALTER SYSTEM ARCHIVE LOG CURRENT;
System altered.
```

With redo now being shipped to and applied from the standby redo logfiles, the target PDB will become synchronized with the source PDB:

```
 DGMGRL> SHOW PLUGGABLE DATABASE bos_sales AT boston;
Pluggable database - BOS_SALES at boston
   Data Guard Role:        Physical Standby
   Con_ID:                 3
   Source:                 con_id 3 at newyork
   Transport Lag:          0 seconds (computed 2 seconds ago)
   Apply Lag:              0 seconds (computed 2 seconds ago)
   Intended State:         APPLY-ON
   Apply State:            Running
   Apply Instance:         boston
   Average Apply Rate:     27 KByte/s
   Real Time Query:        OFF
Pluggable Database Status:
SUCCESS
```

Scenario 8: Failover to Target PDB

For situations where a planned role transition is not possible, a failover can be performed instead of a switchover. A failover is typically performed in an emergency situation where the source PDB has failed or is not accessible. During a failover, the specified target PDB is changed to the source role. If the the original source PDB is unavailable or inaccessible but the container database and other PDBs are all functioning correctly, the failover operation is very

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similar to the switchover operation in the sense that the original source PDB within the container is converted and marked as a physical standby. Recovery, however, is not started and the PDB must be reinstated as a target PDB before any redo from the new source PDB can be applied.

The following commands perform a failover from `nyc_sales` to `bos_sales` and then reinstate `nyc_sales` as a target PDB for `bos_sales`:

```
DGMGRL> FAILOVER TO PLUGGABLE DATABASE bos_sales AT boston;
Performing failover NOW, please wait...
Failover succeeded, new primary is "bos_sales".
```

After the failover completes, recovery is not started on the failed (original source) PDB. This is true even if the container database is restarted or if the `ENABLE DATABASE` command is issued at the container database level. The original source PDB is converted from the primary role to the physical standby role and recovery can only be restarted after it has been reinstated as a target standby for the new source PDB. To verify that the failover was successful and confirm the expected states for each PDB, issue the following commands:

```
DGMGRL> SHOW PLUGGABLE DATABASE bos_sales AT boston;
Pluggable database - bos_sales at boston
   Data Guard Role:   Primary
   Con_ID:            3
   Active Target:     con_id 3 at newyork needs to be reinstated
Pluggable Database Status:
DGM-17450: not protected

DGMGRL> SHOW PLUGGABLE DATABASE nyc_sales AT newyork;
Pluggable database - NYC_SALES at newyork
   Data Guard Role:    Physical Standby
   Con_ID:             3
   Source:             (unknown)
Pluggable Database Status:
ORA-16661: The standby database must be reinstated.
```

After any issues with the former source (primary) PDB have been resolved, start recovery on that PDB to reinstate it in the target role to provide protection for the new source PDB:

```
DGMGRL> EDIT PLUGGABLE DATABASE nyc_sales AT newyork SET STATE=APPLY-ON;
Succeeded.
```

> **Note**

If any issues with former source PDB cannot be resolved, remove the PDB and follow the steps in Scenarios 1-7 to create a new target PDB to protect the new source PDB.

For more information on removing a PDB refer to: Removing a PDB

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Scenario 9: Monitoring a DG PDB Configuration

The `SHOW CONFIGURATION`, `SHOW DATABASE`, and `SHOW PLUGGABLE DATABASE` commands can be used to monitor the status of the members in a DG PDB configuration. The first two of these commands have optional `VERBOSE` qualifiers that provide more detailed information when these commands are executed and the latter has an `ALL` qualifier that can be used to provide summary information for all of the PDBs in the specified container database. The following commands can be used to check the status of the example DG PDB configuration members after the nyc_sales PDB has been reinstated at the end of Scenario 8: Failover to Target PDB. To check the overall state at the configuration level, use the `SHOW CONFIGURATION` command as in these examples:

```
DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
   Protection Mode: MaxPerformance
   Members:
   boston - Primary database
    newyork - Primary database in NewYork configuration
Data Guard for PDB: Enabled in SOURCE role
Configuration Status:
SUCCESS (status updated 6 seconds ago)

DGMGRL> SHOW CONFIGURATION VERBOSE NewYork;
Configuration - NewYork
   Protection Mode: MaxPerformance
   Members:
   newyork - Primary database
     boston - Primary database in Boston configuration
Properties:
   FastStartFailoverThreshold       = '30'
   OperationTimeout                 = '30'
   TraceLevel                       = 'USER'
   FastStartFailoverLagLimit        = '30'
   CommunicationTimeout             = '180'
   ObserverReconnect                = '0'
   ObserverPingInterval             = '0'
   ObserverPingRetry                = '0'
   FastStartFailoverAutoReinstate   = 'TRUE'
   FastStartFailoverPmyShutdown     = 'TRUE'
   BystandersFollowRoleChange       = 'ALL'
   ObserverOverride                 = 'FALSE'
   ExternalDestination1             = ''
   ExternalDestination2             = ''
   PrimaryLostWriteAction           = 'CONTINUE'
   ConfigurationWideServiceName     = 'newyork_CFG'
   ConfigurationSimpleName          = 'NewYork'
   DrainTimeout                     = '0'
Data Guard for PDB: Enabled in TARGET role
Fast-Start Failover: Disabled
Configuration Status:
SUCCESS
```


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To check status and configuration of the source and target container databases, use the SHOW DATABASE command as in these examples:

```
DGMGRL> SHOW DATABASE boston;
Database - boston
   Role:                PRIMARY
   Intended State:      TRANSPORT-ON
   Redo Rate:           110 Byte/s in 15 seconds (computed 11 seconds ago)
   PDB Data Guard Role: SOURCE
   Data Guard Source PDB(s): 1
   Instance(s):
     boston

Database Status:
SUCCESS

DGMGRL> SHOW DATABASE VERBOSE newyork;
Database - newyork
   Role:                PRIMARY
   Intended State:      TRANSPORT-ON
   PDB Data Guard Role: TARGET
   Data Guard Target PDB(s): 1
   Instance(s):
     newyork
Properties:
   DGConnectIdentifier             = 'newyork'
   ObserverConnectIdentifier       = ''
   FastStartFailoverTarget         = ''
   PreferredObserverHosts          = ''
   LogShipping                     = 'ON'
   RedoRoutes                      = ''
   LogXptMode                      = 'ASYNC'
   DelayMins                       = '0'
   Binding                         = 'OPTIONAL'
   MaxFailure                      = '0'
   ReopenSecs                      = '300'
   NetTimeout                      = '30'
   RedoCompression                 = 'DISABLE'
   PreferredApplyInstance          = ''
   ApplyInstanceTimeout            = '0'
   ApplyLagThreshold               = '30'
   TransportLagThreshold           = '30'
   TransportDisconnectedThreshold  = '30'
   ArchiveLocation                 = ''
   AlternateLocation               = ''
   StandbyArchiveLocation          = ''
   StandbyAlternateLocation        = ''
   InconsistentLogXptProps         = '(monitor)'
   LogXptStatus                    = '(monitor)'
   SendQEntries                    = '(monitor)'
   RecvQEntries                    = '(monitor)'
   HostName                        = 'nshga2710'
   StaticConnectIdentifier         = '(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)
(HOST=nshga2710.us.example.com)(PORT=1521))
    (CONNECT_DATA=(SERVICE_NAME=newyork_DGMGRL.us.example.com)
(INSTANCE_NAME=newyork)(SERVER=DEDICATED)))'
```


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```
   TopWaitEvents                   = '(monitor)'
   SidName                         = '(monitor)'
Log file locations:
   Alert log               : /scratch/oracle/diag/rdbms/newyork/newyork/
trace/alert_newyork.log
   Data Guard Broker log   : /scratch/oracle/diag/rdbms/newyork/newyork/
trace/drcnewyork.log
Database Status:
SUCCESS
```

To check the state of all or some of the PDBs, use the `SHOW PLUGGABLE DATABASE` or `SHOW ALL PLUGGABLE DATABASE` commands:

```
DGMGRL> SHOW PLUGGABLE DATABASE nyc_sales AT newyork;
Pluggable database - NYC_SALES at newyork
Data Guard Role: Physical Standby
Con_ID: 3
Source: con_id 3 at boston
Transport Lag: 0 seconds (computed 1 second ago)
Apply Lag: 3 seconds (computed 1 second ago)
Intended State: APPLY-ON
Apply State: Running
Apply Instance: newyork
Average Apply Rate: 13 KByte/s
Real Time Query: OFF
Pluggable Database Status:
SUCCESS

DGMGRL> SHOW ALL PLUGGABLE DATABASE AT boston;
PDB Name        PDB ID    Data Guard Role     Data Guard Partner
BOS_SALES          3      Primary             NYC_SALES (con_id 3) at newyork
BOS_ACCT           4      None                None
BOS_FINANCE        5      None                None

DGMGRL> SHOW ALL SOURCE PLUGGABLE DATABASE AT boston;
PDB Name PDB ID Data Guard Role Data Guard Partner
BOS_SALES 3 Primary NYC_SALES (con_id 3) at newyork
```

The `VALIDATE PLUGGABLE DATABASE` command (used in Scenario 6: Configure Data Guard Protection for the Source PDB and Scenario 7: Switchover from Source PDB to Target PDB) provides additional information about the state of the PDBs in a CDB, for example:

```
DGMGRL> VALIDATE PLUGGABLE DATABASE nyc_sales AT newyork;
   Ready for Switchover: YES
   Data Guard Role: Physical Standby
   Apply State: Running
   Standby Redo Log Files: 4
   Source: BOS_SALES (con_id 3) at boston

DGMGRL> VALIDATE PLUGGABLE DATABASE bos_acct AT boston;
DGM-17560: Pluggable database 'BOS_ACCT' at container database 'boston' is
not protected.
```


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Scenario 10: Removing a DG PDB Configuration

When PDB-level Data Guard protection is no longer required, the following commands can be used to remove the DG PDB configuration. The steps in this scenario restore the boston and newyork databases to their states at the end of Scenario 2: Prepare the Environment. The `REMOVE PLUGGABLE DATABASE` command is used to remove a PDB in the target role that was created using the `ADD PLUGGABLE DATABASE` command. This command stops the recovery process and removes the pluggable database from the configuration. The associated source PDB is then no longer protected. For this example, the optional `REMOVE DATAFILES` clause is included to also delete the PDB datafiles when the PDB `nyc_sales` is removed from the target CDB `newyork`.

```
DGMGRL> REMOVE PLUGGABLE DATABASE nyc_sales AT newyork REMOVE DATAFILES;
Pluggable Database 'nyc_sales' removed.

DGMGRL> SHOW ALL PLUGGABLE DATABASE AT newyork;
No pluggable databases at database 'newyork'
```

After this command executes, the indentation in the `SHOW CONFIGURATION` output changes to show both databases with the same level of indentation because there now is no redo transport active between the two primary databases.

```
DGMGRL> SHOW CONFIGURATION
   Configuration - Boston
   Protection Mode: MaxPerformance
   Members:
   boston - Primary database
     newyork - Primary database in NewYork configuration
Fast-Start Failover: Disabled
Configuration Status:
SUCCESS (status updated 47 seconds ago)
```

Note that although the datafiles for the nyc_sales PDB have been deleted, the standby redo logfiles for nyc_sales are still present in the fast recovery area and need to be manually deleted. After the standy redo logfiles have been deleted, the state of the DG PDB environment is now the same as it was at the end of Scenario 4: Establish a Connection Between the Configurations and Enable Them. To remove the connection between the Boston and NewYork configurations, issue the following command:

```
$ dgmgrl /@boston

DGMGRL> REMOVE CONFIGURATION NewYork;
Succeeded.

DGMGRL> SHOW CONFIGURATION;
Configuration - Boston
Protection Mode: MaxPerformance
Members:
boston - Primary database
Fast-Start Failover: Disabled
Configuration Status:
SUCCESS (status updated 25 seconds ago)
```


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To remove the individual Boston and NewYork configurations and restore the state to that at the end of Scenario 2: Prepare the Environment, connect to each configuration and issue the `REMOVE CONFIGURATION` command:

```
$ dgmgrl /@boston
DGMGRL for Linux: Release 23.0.0.0.0 - Development on Thu Mar 9 18:53:48 2023
Version 23.1.0.0.0
Copyright (c) 1982, 2023, Oracle and/or its affiliates. All rights reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "boston"
Connected as SYSDBA.

DGMGRL> REMOVE CONFIGURATION;
Removed configuration

DGMGRL> exit
$ dgmgrl /@newyork
DGMGRL for Linux: Release 23.0.0.0.0 - Development on Thu Mar 9 18:54:25 2023
Version 23.1.0.0.0
Copyright (c) 1982, 2023, Oracle and/or its affiliates. All rights reserved.
Welcome to DGMGRL, type "help" for information.
Connected to "newyork" Connected as SYSDBA.

DGMGRL> REMOVE CONFIGURATION;
Removed configuration

DGMGRL> exit
```

Optionally, reverse the wallet creation and other initial set up steps from Scenario 1: Prepare the Databases and Scenario 2: Prepare the Environment to restore the environment to its original state

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10

Oracle Data Guard Command-Line Interface Reference

Use the command reference to understand how you can use the Data Guard broker command-line interface (DGMGRL) to manage your broker configuration.

DGMGRL enables you to manage a Data Guard broker configuration and its various members directly from the command line, or from batch programs or scripts. You can use the Data Guard broker command-line interface as an alternative to Oracle Enterprise Manager Cloud Control (Cloud Control) for managing a Data Guard configuration.

- Starting the Data Guard Command-Line Interface
- Exiting the Data Guard Command-Line Interface

> **Note**
>
> A multitenant container database is the only supported architecture in Oracle Database 21c and later releases. While the documentation is being revised, legacy terminology may persist. In most cases, "database" and "non-CDB" refer to a CDB or PDB, depending on context. In some contexts, such as upgrades, "non-CDB" refers to a non-CDB from a previous release.

Starting the Data Guard Command-Line Interface

To start the Data Guard command-line interface (DGMGRL), enter `dgmgrl` at the command-line prompt on a system where Oracle is installed.

```
% dgmgrl
```

The DGMGRL command prompt is displayed:

```
DGMGRL>
```

To run DGMGRL, you must have `SYSDG` or `SYSDBA` administrative privilege.

DGMGRL Optional Parameters

You can supply optional parameters on the command line to indicate how you want the Data Guard command-line interface to display output.

Output includes items such as command prompts, banners, and messages.

Additionally, a single command mode is available. In this mode, DGMGRL executes one command and exits upon the completion of the command. The exit code is the result of the command. If the exit code is 0, the command completed successfully. Otherwise, there was an error.

The command line of DGMGRL appears as follows:

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```
% dgmgrl [<options>] [<logon> [<command>] ]
```

Specify any of the following keywords when you invoke the DGMGRL command-line interface:

- `<options>` can be one of the following choices:
  - `-echo`

    Displays command input and output to the default display device. If you do not use this parameter, only the output from the command is displayed.
  - `-logfile` *<file-spec>* "*<dgmgrl-command>*"

    Specifies a file into which you can capture the actions of the DGMGRL command-line interface.

    > **Note**
    >
    > The DGMGRL `-logfile` option is deprecated as of Oracle Database 12*c* Release 2 (12.2.0.1). It is supported for backward compatibility only. Instead, the log file should now be specified using the `LOGFILE IS` clause on the `START OBSERVER` command.

    > **See Also**
    >
    > * The "START OBSERVER" command
    > * Capturing Observer Actions in the Observer Log File
  - `-silent`

    Suppresses the display of the DGMGRL (`DGMGRL>`) command prompt on your default display device. This option is useful if you are directing the command output to a file or to another display tool.
  - `-json`

    This option allows DGMGRL to convert command output to JSON format. JSON-formatted output enables easy integration with automation tools and scripting environments. The following example shows the `-json` option used on the command line:

    ```
    $ dgmgrl -json <connect_auth> "show configuration tracelevel";
    {
      "Version" : "26.1.0.24.00",
      "ShowProperty" :
      {
        "Configuration" : "abc",
        "Name" : "TraceLevel",
        "Value" : "USER",
        "Type" : "Configurable"
      }
    }
    ```


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The following example shows the `-json` option used interactively:

```
$ dgmgrl <connect_auth>
          DGMGRL> set json on;
          DGMGRL> show configuration tracelevel;
          {
             "Version": "26.1.0.24.00",
             "ShowProperty":
              {
                "Configuration": "abc",
                "Name": "TraceLevel",
                "Value": "USER",
                "Type": "Configurable"
              }
          }
DGMGRL> set json off;
```

- `<logon>` is:
  - `username [@connect-identifier]`

    To connect to the database, enter a `username` and optionally, a `connect-identifier`. You will then be prompted for a password. The connect-identifier is a fully specified connect descriptor, a name to be resolved by an Oracle naming method (for example, TNS) including Easy Connect.

    If a fully specified connect descriptor is used, it needs to include quotation marks; otherwise the connections will fail with an `invalid option` error. The following is an example of connecting using quotation marks:

    ```
    dgmgrl sys@'(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)
    (HOST=sales-server)(PORT=1521)))
    (CONNECT_DATA=(SERVICE_NAME=sales.us.example.com)))'


    Enter password: password
    ```

    Whether the connect identifier is specified using a fully specified connect descriptor or using the Easy Connect naming method, any of the following syntax is valid (you will be prompted for a password):

    * `dgmgrl username@'connect_identifier'`
    * `dgmgrl username@"connect_identifier"`
    * `dgmgrl username@"'connect_identifier'"`

    > **Warning**
    >
    > Including a password on the command line when invoking DGMGRL is a security risk. This risk can be avoided either by omitting the password when invoking DGMGRL and entering it when prompted, or by using an external authentication method.

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  - You can connect as '/' when using operating-system authentication (remote database restarts will not work), Secure Sockets Layer (SSL) protocol, or database credentials stored in a wallet.

- <command> is a single command.

  For example:

  ```
  dgmgrl sys "show database 'North_Sales'"
  ```

  Password: *password*

The following subsections specify the command format that you enter at the DGMGRL> command prompt.

DGMGRL Command Format and Parameters

The DGMGRL commands allow you to create and maintain one broker configuration at a time.

Table 10-1 Summary of DGMGRL Commands

Command	Effect
@ (at sign) Command	Executes a DGMGRL script.
/ (slash) Command	Repeats the last command entered at the DGMGRL command prompt.
ADD CONFIGURATION	Adds a relationship between two Data Guard broker configurations by adding a broker configuration to the current configuration.
ADD DATABASE	Adds a new standby database to the existing broker configuration.
ADD PLUGGABLE DATABASE	This command instantiates a target PDB in the target database.
CONNECT	Connects to the specified database using the specified username.
CONVERT DATABASE	Converts the specified database to either a snapshot standby database or a physical standby database.
CREATE CONFIGURATION	Creates a broker configuration and adds a primary database to that configuration.
CREATE FAR SYNC	Creates a new far sync instance and adds it to the broker configuration.
DISABLE CONFIGURATION	Disables broker management of a configuration so that the configuration and all of its databases are no longer managed by the broker.
DISABLE DATABASE	Disables broker management of the named standby database.
DISABLE FAR_SYNC	Disables broker management of a far sync instance.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
DISABLE FAST_START FAILOVER	Disables fast-start failover.
DISABLE FAST_START FAILOVER CONDITION	Allows a user to remove conditions for which a fast-start failover should be performed.
DISABLE RECOVERY_APPLIANCE	Disables broker management of the named Zero Data Loss Recovery Appliance (Recovery Appliance).
EDIT ALL MEMBERS RESET (Parameter)	Resets the value of the specified parameter for all members in the broker configuration.
EDIT ALL MEMBERS RESET (Property)	Resets the value of the specified property for all members in the broker configuration.
EDIT ALL MEMBERS SET (Parameter)	Changes the value of the specified parameter for all members in the broker configuration.
EDIT ALL MEMBERS SET (Property)	Changes the value of the specified configurable property for all members in the broker configuration.
EDIT CONFIGURATION (Property)	Changes the value of a property for the broker configuration.
EDIT CONFIGURATION (Protection Mode)	Changes the current protection mode setting for the broker configuration.
EDIT CONFIGURATION (RENAME)	Changes the configuration name.
EDIT CONFIGURATION RESET (Property)	Resets the specified configuration property to its default value.
EDIT DATABASE (Property)	Changes the value of a property for the named database.
EDIT DATABASE (Parameter)	Changes the value of a database initialization parameter for the named database.
EDIT DATABASE (Rename)	Changes the name used by the broker to refer to the specified database.
EDIT DATABASE (State)	Changes the state of the specified database.
EDIT DATABASE RESET (Property)	Resets the specified property for the named database to its default value.
EDIT DATABASE RESET (Parameter)	Resets the specified database initialization parameter for the named database.
EDIT FAR_SYNC	Changes the name, state, or properties of a far sync instance.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
EDIT FAR_SYNC RESET (Property)	Resets the specified property for the named far sync instance to its default value.
EDIT FAR_SYNC RESET (Parameter)	Resets the specified database initialization parameter for the named far sync instance
EDIT RECOVERY_APPLIANCE (Property)	Changes the value of the property for the named Zero Data Loss Recovery Appliance (Recovery Appliance).
EDIT RECOVERY_APPLIANCE (Rename)	Changes the name used by the broker to refer to the specified Zero Data Loss Recovery Appliance (Recovery Appliance), as recorded in that Recovery Appliance's profile in the broker configuration.
EDIT RECOVERY_APPLIANCE RESET (Property)	Resets the specified property for the named Zero Data Loss Recovery Appliance (Recovery Appliance) to its default value.
ENABLE CONFIGURATION	Enables broker management of the broker configuration and all of its databases.
ENABLE DATABASE	Enables broker management of the specified database.
ENABLE FAR_SYNC	Enables broker management of the specified far sync instance.
ENABLE FAST_START FAILOVER	Enables the broker to automatically failover from the primary database to a target standby database.
ENABLE FAST_START FAILOVER CONDITION	Allows a user to add conditions for which a fast-start failover should be performed.
ENABLE RECOVERY_APPLIANCE	Enables broker management of the specified Zero Data Loss Recovery Appliance (Recovery Appliance).
EXIT	Exits the Data Guard command-line interface.
EXPORT CONFIGURATION	Saves the metadata contained in the broker configuration file to a text file.
FAILOVER	Performs a database or pluggable database failover operation in which the standby database, to which DGMGRL is currently connected, fails over to the role of primary database.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
HELP	Displays online help for the Data Guard command-line interface.
HOST or ! (exclamation point)	Executes operating system command(s) directly through the DGMGRL console without leaving DGMGRL.
IMPORT CONFIGURATION	Import the broker configuration metadata that was previously exported using the `EXPORT CONFIGURATION` command.
MIGRATE PLUGGABLE DATABASE	Migrates a PDB from one CDB to another on the same host.
PREPARE DATABASE FOR DATA GUARD	Prepares a primary database for a Data Guard environment.
QUIT	Quits the Data Guard command-line interface.
REINSTATE DATABASE	Reinstates the database after a failover.
REMOVE CONFIGURATION	Removes the broker configuration and ends broker management of its members.
REMOVE DATABASE	Removes the specified standby database from the broker configuration.
REMOVE PLUGGABLE DATABASE	Removes the specified pluggable database from the broker configuration.
REMOVE FAR_SYNC	Removes a far sync instance from an Oracle Data Guard broker configuration.
REMOVE INSTANCE	Removes an instance from the broker configuration.
REMOVE RECOVERY_APPLIANCE	Removes the specified Zero Data Loss Recovery Appliance (Recovery Appliance) from the broker configuration and terminates broker management of the Recovery Appliance.
SET ECHO	Controls whether or not to echo commands that are issued either at the command-line prompt or from a DGMGRL script.
SET FAST_START FAILOVER TARGET	Sets the fast-start failover target to the named standby database.
SET MASTEROBSERVER TO	Lets you manually designate which observer is recognized as the master observer.
SET MASTEROBSERVERHOSTS	Sets the master observer of a broker configuration to the observer on the target host.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
SET ObserverConfigFile	Sets the full path and file name of an observer configuration file.
SET TIME	Turns timestamp printing on and off.
SET TRACE_LEVEL	Specifies the amount of tracing done by DGMGRL.
SHOW ALL	Shows the values of DGMGRL CLI properties.
SHOW ALL MEMBERS (Parameter)	Displays the value of the specified initialization parameter for all members in the configuration.
SHOW ALL MEMBERS (Property)	Displays the value of the specified property for all members in the configuration.
SHOW CONFIGURATION	Displays information about the broker configuration.
SHOW CONFIGURATION WHEN PRIMARY IS	Shows the redo transport configuration that would be in effect if the specified database were the primary database.
SHOW DATABASE	Displays information about the specified database.
SHOW FAR_SYNC	Shows information about a far sync instance.
SHOW FAST_START FAILOVER	Displays all fast-start failover related information.
SHOW INSTANCE	Displays information about the specified instance.
SHOW OBSERVER	Shows information about all registered observers in a Data Guard broker configuration.
SHOW PLUGGABLE DATABASE	Displays information about the specified pluggable database.
SHOW ObserverConfigFile	Shows the value of the `ObserverConfigFile` property.
SHOW OBSERVERS	Shows information about all observers for all broker configurations in a specific configuration group.
SHOW RECOVERY_APPLIANCE	Displays information or property values of the specified Zero Data Loss Recovery Appliance (Recovery Appliance).
SHUTDOWN	Shuts down a currently running Oracle database.
SPOOL	Records the input and output of DGMGRL to a file.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
SQL	Allows you to enter SQL statements from the Data Guard command-line interface (DGMGRL).
START OBSERVER	Starts the observer.
START OBSERVER IN BACKGROUND	Starts a fast-start failover observer as a background process on the host where the DGMGRL session is running.
START OBSERVING	Starts a new observer for each broker configuration in the specified group.
STARTUP	Starts an Oracle instance with the same options as SQL*Plus, including mounting and opening a database.
STOP OBSERVER	Stops the observer.
STOP OBSERVING	Stops all local observers running on the host where this DGMGRL session is running, for all broker configurations in a specific group.
SWITCHOVER	Performs a switchover operation in which the current primary database becomes a standby database, and the specified standby database becomes the primary database.
VALIDATE DATABASE	Performs a comprehensive set of database checks prior to a role change.
VALIDATE DATABASE DATAFILE	Performs validation of data files across the primary database and standby databases.
VALIDATE DATABASE SPFILE	Performs a comparison of server parameter file (SPFILE) entries between the primary database and a specified standby database.
VALIDATE DGConnectIdentifier	Enables users to check to see whether a connection string is valid for the DGConnectidentifier property.
VALIDATE FAR_SYNC	Performs a comprehensive set of checks for a far sync instance.
VALIDATE FAST_START FAILOVER	Validates the the fast-start failover configuration settings.
VALIDATE NETWORK CONFIGURATION	Performs network connectivity checks between members of the configuration.

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Table 10-1 (Cont.) Summary of DGMGRL Commands

Command	Effect
VALIDATE PLUGGABLE DATABASE	Performs a comprehensive set of pluggable database checks prior to a role change.
VALIDATE STATIC CONNECT IDENTIFIER	Validates database static connect identifier(s).

DGMGRL Command Usage Notes

The items in this list describe usage notes specific to DGMGRL.

- The `DG_BROKER_START` dynamic initialization parameter is set to `TRUE`.
- To enable broker operations that require restarting databases that are not configured within Clusterware, Oracle Net Services must be configured with a static service on the host that contains the database. By default, broker assumes a static service with the name `<db_unique_name>_DGMGRL.<db_domain>`. If the static service name is different, the `StaticConnectIdentifier` broker property for the database must be updated to the connect identifier that references the configured static service. Specifically, the `listener.ora` file must contain static configuration information about the instance. The `GLOBAL_DBNAME` attribute must be set to `<db_unique_name>_DGMGRL.<db_domain>`. This is not required if the database is managed by Oracle Clusterware or Oracle Restart for single instance databases. See Prerequisites for additional information.
- DGMGRL will automatically shut down and restart a database instance, if the following are true:
  - The instance-name is the SID (this applies to Cloud Control as well as DGMGRL).
  - he broker must be able to connect to the database using the same credentials given in the last `CONNECT` command, even if the last `CONNECT` command was used to connect to another database.
- The connect identifier used while creating the configuration or adding a database, must be resolvable from any of the hosts in the configuration.
- You must have `SYSDG` or `SYSDBA` privileges to use the Oracle Data Guard command-line interface. If you do not include `AS SYSDG` or `AS SYSDBA` on the `CONNECT` command, DGMGRL first attempts an `AS SYSDG` connection; if that fails, it then attempts an `AS SYSDBA` connection. Note that although most commands can be executed with either `SYSDG` or `SYSDBA` privileges, some commands that create or significantly modify configuration members can be executed only with `SYSDBA` privileges.
- If you specify more than one option on the command, you can specify the options in any order.
- A semicolon is required at the end of each DGMGRL command.
- Characters specified in a DGMGRL command string value are interpreted as lowercase characters, unless enclosed in double (") or single (') quotation marks. For example, database and DatAbaSe are equivalent, but "database" and "DatAbaSe" are not.
- You can use the backslash (\) to escape a single quotation mark ('), a double quotation mark ("), and the backslash character (\) itself if these characters appear in a character string.

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Command Examples

Example 10-1 Connecting to a Database Instance on a Local System

This example demonstrates how to connect to a database instance on the local system.

```
% dgmgrl
.
.
.
Welcome to DGMGRL, type "help" for information.

DGMGRL> CONNECT sysdg;
Password: password
Connected to "North_Sales"
Connected as SYSDG.
```

Example 10-2 Connecting to a Database Instance on a Remote System

This example demonstrates how to connect to a database instance on a remote system.

```
DGMGRL> CONNECT sysdg@remote-stby;
Password: password
Connected to "remote-stdby"
Connected as SYSDG.
```

Example 10-3 Connecting Using the AS Option

This example demonstrates how to connect to a database instance using the `CONNECT AS` option:

```
DGMGRL> CONNECT sys@remote-stby AS SYSDBA;
Password: password
Connected to "remote-stdby"
Connect as SYSDBA.
```

Exiting the Data Guard Command-Line Interface

When you are done working with the DGMGRL interface and want to return to the operating system, enter the `EXIT` or `QUIT` command.

For example:

```
DGMGRL> EXIT;
```

@ (at sign) Command

The @ command allows you to execute DGMGRL commands stored in script files.

You can put a sequence of commands into a script file and then use the @ command to execute the file. The commands contained in the script are executed sequentially.

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Format

From within DGMGRL, the syntax is as follows:

DGMGRL> @<*script_file_name*>

Command Parameters

Flag	Description
-echo	Prints all the commands in the script along with their execution results.

Usage Notes

The script that you execute with this command must meet the following qualifications:

- DGMGRL must be able to access the script; otherwise the command fails because DGMGRL cannot open the file.
- Every DGMGRL command included in the script must end with a semi-colon.
- Recursive @ command execution is allowed, but the limit of recursive levels is 20. If the recursive level reaches 20, then the execution is terminated and none of the unexecuted commands are run. Therefore, self-recursive execution of the @ command (for example, putting an @abc.script command in abc.script itself) should be used with caution.
- If there is a `START OBSERVER` command in the script, then any commands that come after it are ignored because the `START OBSERVER` command turns the DGMGRL session into an observer.

  The `START OBSERVER IN BACKGROUND` command is treated as a normal command; that is, any commands that come after it are executed.
- Comment lines are permitted in the script, but they must be terminated with a semi-colon. For example the following comments would be allowed in a script:

  ```
  REM Hello World;
  -- Hello Again!;
  ```

  The double dash must be followed by a space character before the comment text.

/ (slash) Command

Use the DGMGRL / (slash) command to repeat the last command entered at the command prompt.

Format

```
DGMGRL> /
```

Usage Notes

- The following commands are not repeatable using the / (slash) command:
  - Return
  - An unrecognized command

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- The CONNECT command (because it may contain credentials)
- The / (slash) command itself

Command Example

In the following example, the / (slash) command is used to easily repeat the SHOW CONFIGURATION command.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - Sales_Configuration

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    Local_Sales  - Physical standby database
      Remote_Sales  - Physical standby database (receiving current redo)

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS

DGMGRL> /

Configuration - Sales_Configuration

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    Local_Sales  - Physical standby database
      Remote_Sales  - Physical standby database (receiving current redo)

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS

DGMGRL>
```

ADD CONFIGURATION

The ADD CONFIGURATION command establishes a relationship between two Data Guard broker configurations by adding a broker configuration to the current configuration.

Prerequisites

- There must be no traditional Data Guard configured by way of standby databases.
- The initialization parameter DG_BROKER_START must be set to TRUE.
- The DG_BROKER_CONFIG_FILE parameter must be configured correctly.
- A server parameter file (spfile) must be created in the source CDB and target CDB.

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Format

```
ADD CONFIGURATION <configuration_name> CONNECT IDENTIFIER IS
<connect_identifier>;
```

Parameters

Parameter	Description
configuration_name	Name of the broker configuration that must be added. This configuration must contain one primary database and no standby databases.
connect_identifier	Oracle net connect identifier used to connect to the primary database in the configuration_name. The connect identifier must correspond to a primary database.

Usage Notes

- Redo transport is automatically set up between the primary databases in the two broker configurations after the target PDBs are added. However, no primary database is designated as the source or target at this point.
- The configuration name must be different from any other configuration that already exists in the broker metadata.

Examples

Example 10-4 Establishing a Connection Between Two Broker Configurations

This example adds a configuration named MyConfig2 to the current configuration, MyConfig1. The Oracle net connect identifier to connect to the primary database in MyConfig2 is newyork_ci.

```
DGMGRL> ADD CONFIGURATION 'MyConfig2' CONNECT IDENTIFIER IS newyork_ci;
    Added configuration “MyConfig2” with primary database “newyork”.
```

ADD DATABASE

The DGMGRL ADD DATABASE command adds a standby database to an existing broker configuration.

Format

ADD DATABASE <db_unique_name> AS CONNECT IDENTIFIER IS
<*connect_identifier*>;

Command Parameters

db-unique-name
The name that will be used by the broker to refer to this standby database. It must match (case-insensitive) the value of the corresponding database DB_UNIQUE_NAME initialization parameter.

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<connect_identifier>
A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` database property.

Usage Notes

- To issue this command, you must connect to the primary database or to an enabled standby database that is already in the configuration.
- The broker uses the specified `<connect_identifier>` to communicate with the specified database from other databases. Therefore, you must ensure that the `<connect_identifier>` can be used to address the specified database from all databases in your configuration. For example, if TNS is used as the naming method, you must ensure that the tnsnames.ora file on every database and instance that is part of the configuration contains an entry for the `<connect_identifier>`. The connect identifier must resolve to the same connect descriptor. If the database that is being added is an Oracle RAC database, the `<connect_identifier>` provided here must reach all instances of the Oracle RAC, preferably with `FAILOVER` attributes set.

  > **See Also**
  >
  > *Oracle Database Net Services Administrator's Guide*

- If the connection cannot be made, the broker does not add the new database to the configuration.

Command Example

The following example shows how to add a database named `South_Sales`.

```
DGMGRL> ADD DATABASE South_Sales AS CONNECT IDENTIFIER IS South_Sales.example.com;
Database "South_Sales" added
```

ADD FAR_SYNC

The `ADD FAR_SYNC` command adds an existing far sync instance to an Oracle Data Guard broker configuration.

The far sync instance is disabled after creation. You must explicitly enable it before the broker can ship redo to and from it.

Format

ADD FAR SYNC <*db_unique_name*> AS CONNECT IDENTIFIER IS <*connect_identifier*>;

Command Parameters

db-unique-name
The name that will be used by the broker to refer to this far sync instance. It must match (case-insensitive) the value of the corresponding far sync instance `DB_UNIQUE_NAME` initialization parameter.

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connect-identifier
A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` property.

Usage Notes

- The far sync instance must already exist before you can add it to a broker configuration.

Command Example

The following example adds a far sync instance named `chicago` to the configuration.

```
DGMGRL> ADD FAR_SYNC chicago AS CONNECT IDENTIFIER IS chicago.example.com;
```

ADD PLUGGABLE DATABASE

This command instantiates a target PDB in the target database. The target PDB is used to provide data protection for a source PDB in a source database.

Format

```
ADD PLUGGABLE DATABASE <pdb_name> AT <target_db_unique_name>
SOURCE IS <source_pdb_name> AT <source_db_unique_name>
PDBFileNameConvert IS '<filename_convert_string>'
[<create_pluggable_database_options>]';
```

Command Parameters

pdb_name
Name of the target PDB that must be instantiated in the target database. A PDB with the specified name must not exist in the target database.

target_db_unique_name
Name of the target database that contains the target PDB.

source_pdb_name
Name of the source PDB that must be instantiated at the target database. The source PDB must exist in the source database specified by the `source_database_name` parameter.

source_db_unique_name
Name of the source database that contains the source PDB.

filename_convert_string
String conversion of data file names from source database to target database.

create_pluggable_database_options
Options to be used when creating the Data Guard Pluggable Database. These are the options available for the SQL*Plus `CREATE PLUGGABLE DATABASE` command.

Usage Notes

- This command instantiates the specified PDB after verifying that it exists in the source database and does not exist in the target database.
- If a PDB with the specified name exists in the target database and is operating as a native PDB (not set up for Data Guard protection), an error is displayed.

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Examples

Example 10-5 Instantiating a Source PDB in a DG PDB Environment

This example adds a target PDB named `dgpdb_sales` to the target database named `newyork`. The target PDB is used to provide data protection for the source PDB `sales` in the source database `boston`. The `PDBFileNameConvert` keyword specifies how to convert database files in the source database to the target database.

```
ADD PLUGGABLE DATABASE 'dgpdb_sales' AT 'newyork'
SOURCE IS 'sales' AT 'boston'
PDBFileNameConvert IS "'dbs/boston-sales, dbs/newyork-sales-dg'";
```

ADD RECOVERY_APPLIANCE

The `ADD RECOVERY_APPLIANCE` command adds a Zero Data Loss Recovery Appliance (Recovery Appliance) to an existing broker configuration.

The `AS CONNECT IDENTIFIER` clause is optional. If you do not specify this clause, then the broker searches the `LOG_ARCHIVE_DEST_n` initialization parameters on the primary database and all enabled standby databases for an entry that corresponds to the Recovery Appliance being added.

Format

ADD RECOVERY APPLIANCE <*db_unique_name*> AS CONNECT IDENTIFIER IS <*connect_identifier*>;

Command Parameters

db_unique_name
The name that will be used by the broker to refer to this Recovery Appliance. It must match (case-insensitive) the value of the corresponding Recovery Appliance `DB_UNIQUE_NAME` initialization parameter.

connect_identifier
A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the value of the `DGConnectIdentifier` database property.

Usage Notes

- To issue this command, you must connect to the primary database or to an enabled standby database that is already in the configuration.
- The broker uses the specified connect identifier to communicate with the specified Recovery Appliance from any database in the configuration. Therefore, you must ensure that the connect identifier can be used to address the specified Recovery Appliance from any database in the configuration. For example, if TNS is used as the naming method, you must ensure that the `tnsnames.ora` file on every database and instance that is part of the configuration contains an entry for the connect identifier. The connect identifier must resolve to the same connect descriptor.
- If the connection cannot be made, then the broker does not add the new Recovery Appliance to the configuration.
- It is possible to have more than one Recovery Appliance in the configuration.

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- Follow the guidelines in this publication to configure Redo Transport services for a Recovery Appliance: Zero Data Loss Recovery Appliance

Command Example

The following example shows how to add a Recovery Appliance named `EnterpriseRecoveryAppliance`.

```
DGMGRL> ADD RECOVERY_APPLIANCE EnterpriseRecoveryAppliance AS CONNECT IDENTIFIER IS
EnterpriseRecoveryAppliance.example.com;Oracle Backup Appliance
"EnterpriseRecoveryAppliance" added
```

CONNECT

The DGMGRL `CONNECT` command connects you to a database or far sync instance that is a member of a Data Guard broker configuration.

Syntax

```
CONNECT <username>/<password>[@<connect_identifier>] [AS { SYSDBA | SYSDG }]
  CONNECT <username>[/@<connect_identifier>] [AS { SYSDBA | SYSDG }]
  CONNECT /@<connect_identifier> [AS { SYSDBA | SYSDG }]
  CONNECT / [AS { SYSDBA | SYSDG }]
  CONNECT
```

Command Parameters

username
Represents the username with which you want to connect to the configuration member. You will be prompted for a password after you enter a username and optionally, a connect-identifier.

connect-identifier
This parameter is optional. It is an Oracle Net Services connect identifier for the configuration member to which you want to connect. The exact syntax depends upon the Oracle Net Services communications protocol your Oracle installation uses.

Usage Notes

- The username and password must be valid for the configuration member to which you are trying to connect.

  The username you specify must have the `SYSDG` or `SYSDBA` privilege.

- The `AS` clause is optional. If it is specified, then DGMGRL attempts to connect as either SYSDG or SYSDBA, whichever one was specified. If the `AS` clause is *not* specified, then DGMGRL first attempts an `AS SYSDG` connection; if that fails, it then attempts an `AS SYSDBA` connection.
- Each time the `CONNECT` command is run, the broker checks if the default directories containing the client-side broker files exist.
  - If the `DG_ADMIN` environment variable is defined, and the directory specified in this variable exists with the required permissions, the `log`, `dat`, and `callout` subdirectories are created under the `$DG_ADMIN/config_ConfigurationSimpleName` directory.
  - If the `DG_ADMIN` environment variable is not defined, or the directory specified by `DG_ADMIN` does not have the required permissions, then broker does not create any subdirectories.

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- If the CONNECT command returns an error, check to see that you specified a valid connect-identifier.
- When the CONNECT command is successful, the name of the configuration member to which the connection has been made is shown.

Command Examples

Example 1: Connecting to a Local Configuration Member

This example connects to the default configuration member on the local system.

```
DGMGRL> CONNECT sysdg;
Password: password
Connected to "North_Sales"
Connected as SYSDG.
```

Example 2: Connecting to a Remote Configuration Member

This example connects to configuration member on the remote system.

```
DGMGRL> CONNECT sysdg@South_Sales;
Password: password
Connected to "South_Sales"
Connected as SYSDG.
```

Example 3: Connecting Without Showing Connection Credentials

This example connects to a configuration member using CONNECT '/' so that connection credentials are not visible on the command line:

```
DGMGRL> CONNECT /@North_Sales.example.com;
Connected to "North_Sales"
```

You must set up Oracle Wallet or SSL to use CONNECT '/'. By setting up Oracle Wallet or SSL, you can write a script to securely start and run the observer as a background job without specifying database credentials in the script.

CONVERT DATABASE

The CONVERT DATABASE command converts a physical standby database to a snapshot standby database, or reverts the snapshot standby database back to a physical standby database.

A snapshot standby database is a fully updatable standby database. Like a physical or logical standby database, a snapshot standby database receives and archives redo data from a primary database. Unlike a physical or logical standby database, a snapshot standby database does not apply the redo data that it receives. The redo data received by a snapshot standby database is not applied until the snapshot standby is converted back into a physical standby database, after first discarding any local updates made to the snapshot standby database.

A snapshot standby database is best used in scenarios that require a temporary, updatable snapshot of a physical standby database. Note that because redo data received by a snapshot standby database is not applied until it is converted back into a physical standby, the time needed to perform a role transition is directly proportional to the amount of redo data that needs to be applied.

See *Oracle Data Guard Concepts and Administration* for additional information about snapshot standby databases.

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Format

CONVERT DATABASE <*db_unique_name*> TO {PHYSICAL |SNAPSHOT} STANDBY;

Command Parameters

db-unique-name
The value of the `DB_UNIQUE_NAME` initialization parameter of the database you wish to convert to either a physical or snapshot standby.

Usage Notes

- A physical standby database cannot be converted to a snapshot standby database if it is the target of a fast-start failover. The `ORA-16668: operation cannot be performed on the fast-start failover target standby database` error will be returned.
- A physical standby database cannot be converted to a snapshot standby database if its `RedoRoutes` configurable property is set to non-NULL value.
- Use the DGMGRL ADD DATABASE command to import an existing snapshot standby database into an Oracle Data Guard broker configuration.
- A snapshot standby database cannot be the target of a switchover or a fast-start failover.
- A snapshot standby database can be the target of a manual failover if fast-start failover is disabled.
- You can use the `SHOW CONFIGURATION` or `SHOW DATABASE` command to verify the conversion result. For example:

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      South_Sales  - Snapshot standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

- After a snapshot standby database is converted back to a physical standby database, it will be in the default state for a physical standby database, `APPLY-ON`.

Command Examples

Example 1: Converting a Physical Standby to a Snapshot Standby

Issue the following to convert a physical standby database to a snapshot standby database:

```
DGMGRL> CONVERT DATABASE 'South_Sales' to SNAPSHOT STANDBY;
Converting database "South_Sales" to a Snapshot Standby database, please wait...
Database "South_Sales" converted successfully
```

Example 2: Converting a Snapshot Standby Back to a Physical Standby

Issue the following to convert the snapshot standby database back to a physical standby database:

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```
DGMGRL> CONVERT DATABASE 'South_Sales' to PHYSICAL STANDBY;
Converting database "South_Sales" to a Physical Standby database, please wait...
Operation requires shutdown of instance "south_sales1" on database "South_Sales"
Shutting down instance "south_sales1"...
Database closed.
Database dismounted.
ORACLE instance shut down.
Operation requires startup of instance "south_sales1" on database "South_Sales"
Starting instance "south_sales1"...
ORACLE instance started.
Database mounted.
Continuing to convert database "South_Sales" ...
Database "South_Sales" converted successfully
```

CREATE CONFIGURATION

The `CREATE CONFIGURATION` command creates a new broker configuration that includes the specified primary database.

Format

CREATE CONFIGURATION <*`configuration_name`*> AS PRIMARY DATABASE IS <*db-unique_name*> CONNECT IDENTIFIER IS <*`connect_identifier`*>
`[INCLUDE CURRENT DESTINATIONS]`;

Command Parameters

configuration-name
A user-friendly name for the configuration you are creating. Valid names contain any alphanumeric characters. If spaces are included in the name, the name must be enclosed in double or single quotation marks. The name must consist of 30 or fewer bytes.

db-unique-name
The name that will be used by the broker to refer to the primary database. It must match (case-insensitive) the value of the primary database `DB_UNIQUE_NAME` initialization parameter.

connect-identifier
A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` database property.

Usage Notes

- A broker configuration is a named collection of one or more members that you want to manage as a group. You must specify a value for each of the command parameters. There are no default values.
- You must connect to the primary database to issue this command.
- The broker uses the specified `connect_identifier` to communicate with the specified database from other databases. Therefore, you must ensure that the `connect_identifier` can be used to address the specified database from all databases in your configuration. For example, if TNS is used as the naming method, you must ensure that the tnsnames.ora file on every database and instance that is part of the configuration contains an entry for the `connect-identifier`. The connect identifier must resolve to the same connect descriptor. If the database that is being added is an Oracle RAC database, the `connect_identifier` provided here must reach all instances of the Oracle RAC, preferably with `FAILOVER` attributes set.

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> **See Also**
>
> *Oracle Database Net Services Administrator's Guide*

- To add standby databases after you create the broker configuration, use the ADD DATABASE command.

  Similarly, use ADD FAR SYNC and ADD RECOVERY APPLIANCE to add far sync instances and recovery appliances respectively.
- You must clear any remote redo transport destinations on the primary database that do not have the `NOREGISTER` attribute, before a configuration can be created.
- The Data Guard broker will verify that the connect identifier specified results in a connection to the database specified by the `db_unique_name` command parameter.

Command Example

The following example creates a new broker configuration named `DRSolution` with a primary database named `North_Sales`.

```
DGMGRL> CREATE CONFIGURATION 'DRSolution' AS
> PRIMARY DATABASE IS 'North_Sales'
> CONNECT IDENTIFIER IS North_Sales.example.com;
Configuration "DRSolution" created with primary database "North_Sales"
```

CREATE FAR_SYNC

The `CREATE FAR_SYNC` command creates a new far sync instance and adds it to the broker configuration. To use this command, Oracle wallet-based authentication must be configured and you must connect with SYSDBA privilege. In addition, an auxiliary instance must be started on the host where a new far sync instance is created.

Format

When the auxiliary instance is started using a parameter file (PFILE):

```
CREATE FAR_SYNC <db_unique_name> AS CONNECT IDENTIFIER IS <connect_identifier>
[ SPFILE [ PARAMETER_VALUE_CONVERT '<string_pair_values>' ] [ SET
<parameter_name> value ] ... [ SET <parameter_name value> ] [ RESET
<parameter_name> ] ... [ RESET <parameter_name> ] ];
```

When the auxiliary instance is started using a server parameter file (SPFILE):

```
CREATE FAR_SYNC <db_unique_name> AS CONNECT IDENTIFIER IS <connect_identifier>;
```

Usage Notes

- The version of the connected database must be the same as the DGMGRL version.
- If the `SPFILE` clause is included, the initialization parameters in the specified spfile are used when creating the far sync instance.

  This command uses the RMAN `DUPLICATE` command to create a far sync instance. If the auxiliary instance used during RMAN duplication was started using an spfile, you cannot include the `SPFILE` clause in the `CREATE FAR_SYNC` command.

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- The PARAMETER_VALUE_CONVERT clause must immediately follow the SPFILE clause. Note that the command fails if you use the PARAMETER_VALUE_CONVERT clause after the SET or RESET clause.
- You must set up Oracle Wallet. The alias used in the wallet to connect to the far sync instance must resolve to a static service connection on both the primary database host and the far sync instance host. The alias used in the wallet to connect to the primary database does not need to resolve to a static service connection. For both hosts, the connect identifiers for each database must resolve to the same instance on both the primary database host and the far sync instance host.
- You must start an auxiliary instance on the host where a new far sync instance is created. If the auxiliary instance is started with a server parameter file, you cannot specify the SPFILE, PARAMETER_VALUE_CONVERT, SET, and RESET clauses.
- The version of the connected database must be the same as the DGMGRL version.
- To create a far sync instance, this command invokes the RMAN DUPLICATE command with the specified PARAMETER_VALUE_CONVERT, SET, and RESET clauses.
- The PARAMETER_VALUE_CONVERT clause must immediately follow the SPFILE clause. If you specify the PARAMETER_VALUE_CONVERT clause after the SET or RESET clause, the command will fail.
- If the auxiliary instance is started with a parameter file, this command does the following:
  - Sets the following initialization parameters for the far sync instance:
    - DB_NAME to the DB_NAME of the primary database
    - DB_UNIQUE_NAME to the specified db_unique_name
    - SGA_TARGET to 300MB
    - CPU_COUNT to 1
  - Resets the following initialization parameters: CONTROL_FILES, CLUSTER_DATABASE, DB_RECOVERY_FILE_DEST, DB_RECOVERY_FILE_DEST_SIZE, DB_FILE_NAME_CONVERT, and LOG_ARCHIVE_CONFIG. Parameters that contribute the total size of SGA memory such as, but not limited to, DB_CACHE_SIZE, LOG_BUFFER, SHARED_POOL_SIZE, LARGE_POOL_SIZE, JAVA_POOL_SIZE, STREAMS_POOL_SIZE are reset.
  - Clears the existing LOG_ARCHIVE_DEST_*n* initialization parameters.
- If an initialization parameter of the far sync instance is not set appropriately, the command can fail because DGMGRL fails to start up the far sync instance. In this case, identify the cause of the problem by viewing the alert log files or broker log files on the far sync instance and modify the required initialization parameter either in the spfile or by appending the PARAMETER_VALUE_CONVERT, SET, or RESET clause.

Command Parameters

db_unique_name
The value for the DB_UNIQUE_NAME initialization parameter of the far sync instance.

connect_identifier
A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the DGConnectIdentifier database property.

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string_value_pairs
A list of string pairs. The value is set to the value of PARAMETER_VALUE_CONVERT clause when the RMAN DUPLICATE command is invoked.
The PARAMETER_VALUE_CONVERT clause replaces the first string with the second string in all matching initialization parameter values. Multiple pairs of strings may be specified by this parameter.
For example, ‘ “string1”, “string2”, “string3”, “string4”, ... ’
Where:

- • string1 is the pattern of initialization parameters of the primary database.
- • string2 is the pattern of initialization parameters of the far sync instance.
- • string3 is the pattern of initialization parameters of the primary database.
- • string4 is the pattern of initialization parameters of the far sync instance.

This is an optional argument. If not specified, a copy of the server parameter file on the primary database will be used on far sync instance without any modification.

parameter_name
Name of the initialization parameter that must be set or reset.

value
Value that must be set for the specified initialization parameter.

Command Example

The following example creates a far sync instance named "FS1" and adds it to the broker configuration. The initialization parameters LOG_FILE_NAME_CONVERT, DB_RECOVERY_FILE_DEST, and DB_RECOVERY_FILE_DEST_SIZE will be set to the values specified. The initialization parameter UNDO_TABLESPACE will be reset.

```
DGMGRL> CREATE FAR_SYNC 'FS1' AS CONNECT IDENTIFIER IS 'FS1_STATIC_CONN'
          SPFILE
          PARAMETER_VALUE_CONVERT
'North_Sales','FS1','NORTH_SALES','FS1','NorthSales','FS1','NORTHSALES','FS1'
          SET LOG_FILE_NAME_CONVERT 'North_Sales','FS1','NORTH_SALES','FS1'
          SET DB_RECOVERY_FILE_DEST '/scratch/oracle/fast_recovery_area'
          SET DB_RECOVERY_FILE_DEST_SIZE '100G'
          RESET UNDO_TABLESPACE;
Creating far sync instance "FS1".
Connected to "North_Sales"
Connected to "Aux"
far sync instance "FS1" created
far sync instance "FS1" added
```

DISABLE CONFIGURATION

The DISABLE CONFIGURATION command disables broker management of a configuration so that the configuration and all of its databases are no longer managed by the broker.

Format

```
DISABLE CONFIGURATION [<configuration_name> | ALL];
```


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Command Parameters

configuration_name

The name of the configuration you wish to disable. Alternatively, specify the keyword `ALL` to disable all configurations.

Usage Notes

- A disabled configuration and all of its constituent databases are no longer managed by the broker.
- The only way to disable broker management of the primary database is to use the `DISABLE CONFIGURATION` command.
- This command does not remove the broker configuration from the configuration file. See the REMOVE CONFIGURATION command for more information about removing the configuration.
- You can edit database properties and modify the configuration's protection mode while the configuration is disabled. However, any changes made to properties or to the protection mode will not take effect until the configuration is enabled.
- This command cannot be executed if fast-start failover is enabled.

Command Example

The following example disables management of the broker configuration and all of its databases.

```
DGMGRL> DISABLE CONFIGURATION;
Disabled.
```

DISABLE DATABASE

The `DISABLE DATABASE` command disables broker management of the named standby database.

This means that broker directed state changes will be disallowed for this database, and the broker will not monitor the database for health status or for monitorable properties.

Format

DISABLE DATABASE <*db_unique_name*>;

Command Parameters

db_unique_name
Name of the standby database to be disabled.

Usage Notes

- You cannot specify the name of a primary database.
- Use the `DISABLE CONFIGURATION` command to disable the primary and all standby databases.
- If the sole standby database is disabled, you have no failover option. This standby database is not viable for failover until it is reenabled.

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- This command cannot be used to disable the fast-start failover target database when fast-start failover is enabled.

Command Example

The following example shows how to disable a database named `South_Sales`.

```
DGMGRL> DISABLE DATABASE 'South_Sales';
Disabled.
```

DISABLE FAR_SYNC

The `DISABLE FAR_SYNC` command disables broker management of a far sync instance.

Format

DISABLE FAR_SYNC <*db_unique_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the far sync instance to be disabled

Usage Notes

- A far sync instance that has its `RedoRoutes` property set cannot be disabled.

Command Example

The following example disables broker management of a far sync instance named `chicago`.

```
DGMGRL> DISABLE FAR_SYNC 'chicago';
```

DISABLE FAST_START FAILOVER

The `DISABLE FAST_START FAILOVER` command prevents the observer from initiating a failover to the target standby database.

See Disabling Fast-Start Failover for additional information.

Format

DISABLE FAST_START FAILOVER [FORCE];

Command Parameters

None.

Usage Notes

- If the primary and target standby database have a network connection, use `DISABLE FAST_START FAILOVER` *without* the `FORCE` option to disable fast-start failover on all databases in the broker configuration. If errors occur during the disable operation, the broker returns an error message and stops the disable operation. You may need to reissue the `DISABLE FAST_START FAILOVER` command with the `FORCE` option to override the error conditions and disable fast-start failover on the database to which you are connected. See Disabling Fast-Start Failover for more information.

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- Use `DISABLE FAST_START FAILOVER` *with* the `FORCE` option when the network between the primary and target standby databases is disconnected or when the database upon which the command is received does not have a connection with the primary database. The `FORCE` option disables fast-start failover on the database to which you are connected, even when errors occur.
- Disabling fast-start failover with the `FORCE` option on a primary database that is disconnected from the observer and the target standby database does not prevent the observer from initiating a fast-start failover to the target standby database.
- You can disable fast-start failover while connected to any database in the broker configuration so long as connectivity exists between that database and the primary.
- If disabled by force at the target standby database and the connection subsequently resumes with the primary database, fast-start failover is disabled on all databases in the configuration.
- Disabling fast-start failover with the `FORCE` option while connected to the primary will disable fast-start failover on the target standby database if there is network connectivity between both databases.

Command Examples

Example 1: Disabling a Fast-Start Failover

The following example shows how to disable fast-start failover.

```
DGMGRL> DISABLE FAST_START FAILOVER;
Disabled.
```

Example 2: Using FORCE When Disabling Fast-Start Failover

The following example uses the `FORCE` option which disables fast-start failover on the database to which you are connected.

```
DGMGRL> DISABLE FAST_START FAILOVER FORCE;
Disabled.
```

DISABLE FAST_START FAILOVER CONDITION

The `DISABLE FAST_START FAILOVER CONDITION` command allows you to remove conditions for which a fast-start failover should be performed.

Format

DISABLE FAST_START FAILOVER CONDITION <*`condition`*>;

Command Parameters

condition
Possible values are any conditions for which a fast-start failover has been enabled.

Usage Notes

If the condition has not been set or if it is an unrecognized condition, then an error is raised.

Command Example

This example specifies that the detection of a corrupted control file does not automatically initiate an immediate fast-start failover.

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```
DGMGRL> DISABLE FAST_START FAILOVER CONDITION "Corrupted Controlfile";
```

DISABLE RECOVERY_APPLIANCE

The DISABLE RECOVERY_APPLIANCE command disables broker management of the named Zero Data Loss Recovery Appliance (Recovery Appliance).

Disabling broker management of a Recovery Appliance means that the broker will not monitor the health of the transport to the Recovery Appliance. However, redo transport to the Recovery Appliance will not be shut off.

Format

DISABLE RECOVERY_APPLIANCE <*db_unique_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the Recovery Appliance to be disabled.

Command Example

The following example shows how to disable a Recovery Appliance named `EnterpriseRecoveryAppliance`.

```
DGMGRL> DISABLE RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
Disabled.
```

EDIT ALL MEMBERS RESET (Parameter)

The `EDIT ALL MEMBERS RESET` resets the specified configurable parameter for all members in the configuration.

Format

```
EDIT ALL MEMBERS RESET PARAMETER <parameter_name> ["optional ALTER SYSTEM RESET
clauses"];
```

Command Parameters

parameter_name
The name of an existing initialization parameter whose value that must be reset.

Command Example

The following example shows how to reset the `log_archive_trace` initialization parameter for all members in the configuration.

```
DGMGRL> EDIT ALL MEMBERS RESET PARAMETER log_archive_trace;
Parameter "log_archive_trace" reset for member "North_Sales".
Parameter "log_archive_trace" reset for member "South_Sales".
```


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EDIT ALL MEMBERS RESET (Property)

The `EDIT ALL MEMBERS RESET` resets the specified configurable property for all members in the configuration.

Format

```
EDIT ALL MEMBERS RESET PROPERTY <property_name>;
```

Command Parameters

property_name
The name of an existing member-specific configurable property.

Command Example

The following example shows how to reset `NetTimeout` for all members in the configuration.

```
DGMGRL> EDIT ALL MEMBERS RESET PROPERTY NetTimeout;
Property "NetTimeout" updated for member "North_Sales".
Property "NetTimeout" updated for member "South_Sales".
```

EDIT ALL MEMBERS SET (Parameter)

The `EDIT ALL MEMBERS SET` command changes the value of the specified parameter for all members in the broker configuration. Optional `ALTER SYSTEM SET` command options can be included. These options must be specified in quotation marks.

Format

```
EDIT ALL MEMBERS SET PARAMETER <parameter_name>=<value> ["optional ALTER SYSTEM
SET clauses"];
```

Command Parameters

parameter_name
The name of an existing initialization parameter whose value that must be set.

value
The new value for the parameter.

Command Example

The following example shows how to set `NetTimeout` for all members in the configuration.

```
EDIT ALL MEMBERS SET PARAMETER log_archive_trace=255;
Parameter "log_archive_trace" updated for member "North_Sales".
Parameter "log_archive_trace" updated for member "South_Sales".
```


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EDIT ALL MEMBERS SET (Property)

The `EDIT ALL MEMBERS SET` sets the specified configurable property for all members in the configuration.

Format

```
EDIT ALL MEMBERS SET PROPERTY <property_name>=value;
```

Command Parameters

property_name
The name of an existing member-specific configurable property. If this is an Oracle RAC database, this property change affects all instances of all members.

value
The new value for the property.

Command Example

The following example shows how to set `NetTimeout` for all members in the configuration.

```
EDIT ALL MEMBERS SET PROPERTY 'NetTimeout'=45;
Property "NetTimeout" updated for member "North_Sales".
Property "NetTimeout" updated for member "South_Sales".
```

EDIT CONFIGURATION (Property)

The `EDIT CONFIGURATION SET PROPERTY` command changes the value of a property for the broker configuration.

Format

EDIT CONFIGURATION [<*configuration_name*>]SET PROPERTY <*property_name*>=<*value*>;

Command Parameters

configuration_name
The name of the configuration whose property is to be set.

property_name
The name of a configuration property.

value
The new value for the property.

> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for information about configuration properties

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Usage Notes

- Issue this command while connected to the primary database or to any standby database in the broker configuration having connectivity to the primary database.
- Use the `SHOW CONFIGURATION` command to display the current property information for the configuration.

Command Example

The following example shows how to set the `FastStartFailoverThreshold` configuration property to 90 seconds.

```
DGMGRL> EDIT CONFIGURATION SET PROPERTY FastStartFailoverThreshold=90;
```

EDIT CONFIGURATION (Protection Mode)

The `EDIT CONFIGURATION SET PROTECTION MODE AS` command edits the current protection mode setting for the broker configuration.

Format

EDIT CONFIGURATION SET PROTECTION MODE [AS] { MaxProtection | MaxAvailability | MaxPerformance };

Command Parameters

protection-mode
The data protection mode in which you want the configuration to run when the configuration is enabled. The possible protection modes are:

`{MAXPROTECTION}`
`{MAXAVAILABILITY}`
`{MAXPERFORMANCE}`

Usage Notes

- Before you use the `EDIT CONFIGURATION` command to set the protection mode, ensure that at least one standby is configured to receive redo via `SYNC` or `FASTSYNC` mode if it receives redo directly from the primary. If the standby receives redo via a far sync instance, the far sync instance must be configured to receive redo via `SYNC` or `FASTSYNC` mode and the standby must be configured to receive redo via `ASYNC` mode.
- The following table shows the configuration protection modes and the minimum corresponding settings for redo transport services:

Protection Mode	Redo Transport	Standby Redo Log Files Needed?	Usable with Fast-Start Failover?
`{MAXPROTECTION}`	`SYNC`	Yes	Yes
`{MAXAVAILABILITY}`	`SYNC` or `FASTSYNC`	Yes	Yes
`{MAXPERFORMANCE}`	`ASYNC`	Yes	Yes

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The default protection mode for the configuration is MAXPERFORMANCE.

> **See Also**
>
> Managing the Members of a Broker Configuration for more information about the protection modes and redo transport services

- This command cannot be executed if fast-start failover is enabled.
- Upgrading from {MAXPERFORMANCE} to {MAXPROTECTION} is not allowed. You must first go to {MAXAVAILABILITY} and then to {MAXPROTECTION}.
- Use the SHOW CONFIGURATION command to display the current protection mode for the configuration.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      South_Sales     - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

If broker management of the configuration is disabled when you enter the EDIT CONFIGURATION command, the protection mode of the configuration does not take effect until the next time you enable the configuration with the ENABLE CONFIGURATION command.

Command Example

The following example shows how to upgrade the broker configuration to the {MAXAVAILABILITY} protection mode.

Verify that standby redo log files are configured on the standby database and that the redo transport service is set to SYNC, for example:

```
DGMGRL> EDIT DATABASE 'South_Sales' SET PROPERTY 'LogXptMode'='SYNC';
Property "LogXptMode" updated

DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;
Succeeded.
```

EDIT CONFIGURATION (RENAME)

The EDIT CONFIGURATION RENAME TO command changes a configuration's name.

Format

EDIT CONFIGURATION RENAME TO <*new_configuration_name*>;

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Command Parameters

new_configuration_name
The new name for the configuration.

Command Example

The following example shows how to rename a configuration named `DR_Sales` to `HA_Sales`.

```
DGMGRL> SHOW CONFIGURATION

Configuration - DR_Sales

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      South_Sales  - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
DISABLED

DGMGRL> EDIT CONFIGURATION RENAME TO "HA_Sales";
Succeeded.
DGMGRL> ENABLE CONFIGURATION
Enabled.
DGMGRL> SHOW CONFIGURATION

Configuration - HA_Sales

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      South_Sales  - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

EDIT CONFIGURATION PREPARE DGPDB

The `EDIT CONFIGURATION PREPARE DGPDB` command prepares the environment for DG PDB.

Format

EDIT CONFIGURATION PREPARE DGPDB;

Usage Notes

- It is assumed that both container databases are in the environment, and the configuration is enabled. The command prompts the user for the password to unlock, or update the `DGPDB_INT` account at each of the container databases. It then sets up the internal structures necessary to be able to add data guard protection for a PDB, or change roles.

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Command Example

```
DGMGRL> EDIT CONFIGURATION PREPARE DGPDB;

Enter password for DGPDB_INT account at boston:

Enter password for DGPDB_INT account at newyork:

Prepared Data Guard for Pluggable Database at newyork.

Prepared Data Guard for Pluggable Database at boston.
```

EDIT CONFIGURATION RESET (Property)

The `EDIT CONFIGURATION RESET PROPERTY` command resets the specified configuration property to its default value.

Format

EDIT CONFIGURATION RESET PROPERTY <*property_name*>;

Command Parameters

property_name
The name of an existing configuration property.

Usage Notes

- Issue this command while connected to the primary database or to any standby database in the broker configuration having connectivity to the primary database.
- Use the `SHOW CONFIGURATION` command to display the current property information for the configuration.

Command Example

The following example shows how to reset the `BystandersFollowChange` property.

```
DGMGRL> EDIT CONFIGURATION RESET PROPERTY BystandersFollowChange;
Succeeded.
```

EDIT DATABASE (Property)

The `EDIT DATABASE` command changes the value of the specified configurable property for a database member.

Format

EDIT DATABASE <*db_unique_name*> SET PROPERTY <*property_name*>=*value*;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose configurable property value is to be changed.

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property_name
The name of an existing database-specific property. If this is an Oracle RAC database, this property change affects all instances of the database.

> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for information about properties.

value
The new value for the property.

> **Note**
>
> This command can be used to change the value of an instance-specific property if and only if just one instance is known by the broker for the named database. An attempt to use this command to change an instance-specific property when the broker knows of multiple instances of the database will be rejected. It is recommended to only use `EDIT INSTANCE (property)` to change the value of an instance-specific property.

Command Examples

Example 1: Editing a Configurable Property at the Database Level

The following example edits a configurable property at the database level.

```
DGMGRL> EDIT DATABASE 'North_Sales' SET PROPERTY 'LogXptMode'='SYNC';
Property "LogXptMode" updated
```

Example 2: Editing a List of Fast-Start Failover Targets

The following examples show how to specify a list of fast-start failover targets.

```
DGMGRL> EDIT DATBASE db1 SET PROPERTY FastStartFailoverTarget='db2, db3';


DGMGRL> EDIT DATABASE db2 SET PROPERTY FastStartFailoverTarget='db1,db3';


DGMGRL> EDIT DATABASE db3 SET PROPERTY FastStartFailoverTarget='db1';
```

EDIT DATABASE (Parameter)

The `EDIT DATABASE` (Parameter) command sets the specified initialization parameter for the named database.

Format

EDIT DATABASE <*db_unique_name*> SET PARAMETER <*parameter_name*> = *value* [*initialization_parameter_options*]

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Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose parameter value is to be changed.

parameter_name
The name of the existing database initialization parameter that must be modified.

value
The new value for the parameter.

initialization_parameter_options
Additional initialization parameter options must be enclosed within single quotes. Use one or both of the following options:

- `SCOPE`: Set one of the following values for scope: SPFILE, MEMORY, or BOTH. The default value is BOTH. If the specified parameter is a static parameter, then set `SCOPE=SPFILE`.
- `SID`: Specify the name of a database instance for which the parameter must be set. If the specified parameter must be set for all instances, set `SID='*'`.

> **Note**
>
> Because the 'SID=...' clause must be contained within single quotes itself, the single quotes around '*' for the all instances case must be escaped by using '\' characters as in this example to avoid a syntax error:
>
> ```
> DGMGRL> edit database dglcp3 set parameter log_archive_trace=65535
>          'SID=\'*\''; Parameter "log_archive_trace" updated for
> member "dglcp3".
> ```

Usage Notes

The database must be available when this command is run.

Command Example

The following example edits the initialization parameter `log_archive_trace` for the database named `North_sales` and sets its value to 1. The `SCOPE` setting specifies that the parameter must be changed in both the memory and in the database initialization parameter file.

```
DGMGRL> EDIT DATABASE 'North_sales' SET PARAMETER log_archive_trace = 1
'SCOPE = BOTH';
```


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EDIT DATABASE (Rename)

The `EDIT DATABASE` (Rename) command changes the name used by the broker to refer to the specified database.

Format

EDIT DATABASE <*db_unique_name*> RENAME TO <*new_db_unique_name*>;

Command Parameters

db_unique_name
The current value of the DB_UNIQUE_NAME initialization parameter.

new_db_unique_name
The new value of the DB_UNIQUE_NAME initialization parameter.

Usage Notes

- Use this command to track changes to the `DB_UNIQUE_NAME` initialization parameter for this database.

> ⚠ **Caution**
>
> **The *`db_unique_name`* must always match the value for that database's `DB_UNIQUE_NAME` initialization parameter**.

- This command can only be done when broker management of the database that you are renaming is disabled.

Command Example

The following example shows how to edit and rename a database.

```
DGMGRL> DISABLE DATABASE 'South_Sales_typo';
Disabled.

DGMGRL> EDIT DATABASE 'South_Sales_typo' RENAME TO 'South_Sales';
Succeeded.

DGMGRL> ENABLE DATABASE 'South_Sales';
Enabled.
```

EDIT DATABASE (State)

The `EDIT DATABASE` (State) command changes the state of the specified database.

Format

EDIT DATABASE <*`db_unique_name`*> SET STATE=*`state`* [WITH APPLY INSTANCE=<*`instance_name`*>];

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Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose state is to be changed.

state
The state in which you want the database to be running. The possible states are:

`TRANSPORT-ON` (primary database only)
`TRANSPORT-OFF` (primary database only)
`APPLY-ON` (physical or logical standby database only)
`APPLY-OFF` (physical or logical standby database only)

instance_name
The name of the instance you want to become the apply instance if this is an Oracle RAC standby database.

Usage Notes

- If the target state is `APPLY-ON` and this database is currently a physical or logical standby database, the optional `WITH APPLY INSTANCE` clause specifies which instance will become the apply instance.
- If the target state is not `APPLY-ON` or if the database is currently in the primary role, the `WITH APPLY INSTANCE` clause is ignored even if it is specified.
- You cannot change the state of a snapshot standby database.
- All instances of an Oracle RAC database are affected by this database state change.

Command Example

The following examples show how to change the state of a database.

```
DGMGRL> EDIT DATABASE 'South_Sales' SET STATE='APPLY-ON';
Succeeded.
```

EDIT DATABASE RESET (Property)

The `EDIT DATABASE RESET` (Property) command reset the specified property for the named database back to its default value.

Format

EDIT DATABASE <*db_unique_name*> RESET PROPERTY <*property_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose configurable property value is to be reset to the default value.

property_name
The name of an existing database-specific configurable property.

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Command Example

The following example shows how to reset the `NetTimeout` property for the database named `South_Sales`.

```
DGMGRL> EDIT DATABASE 'South_Sales' RESET PROPERTY NetTimeout;
Succeeded.
```

EDIT DATABASE RESET (Parameter)

The `EDIT DATABASE RESET` (Parameter) command resets the specified database initialization parameter for the named database to its default value.

Format

EDIT DATABASE <*db_unique_name*> RESET PARAMETER <*parameter_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose parameter value is to be reset.

parameter_name
The name of an existing database initialization parameter whose value that must be reset.

Command Example

The following example shows how to reset the `log_archive_trace` parameter for the database named `South_Sales`.

```
DGMGRL> EDIT DATABASE 'South_Sales' RESET PARAMETER log_archive_trace;
Succeeded.
```

EDIT FAR_SYNC

The `EDIT FAR_SYNC` command changes the name, properties, or initialization parameters of a far sync instance.

Format

EDIT FAR_SYNC <*db_unique_name*> RENAME TO <*new_db_unique_name*>;

EDIT FAR_SYNC <*db_unique_name*> SET PROPERTY <*property_name*> = *value*;

EDIT FAR_SYNC <*db_unique_name*> SET PARAMETER <*parameter_name*>=value
[initialization_parameter_options];

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Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the far sync instance for which you want to edit information. It must match (case_insensitive) the value of the corresponding database `DB_UNIQUE_NAME` initialization parameter.

new_db_unique_name
The new value of the `DB_UNIQUE_NAME` initialization parameter.

property_name
The name of an existing far sync instance-specific configurable property.

parameter_name
The name of the existing database initialization parameter that must be modified.

value
The new value for the property or parameter.

initialization_parameter_options
Additional options include the following:

- `SCOPE`: Set one of the following values for scope: SPFILE, MEMORY, or BOTH. The default value is BOTH. If the specified parameter is a static parameter, then set `SCOPE=SPFILE`.
- `SID`: Specify the name of a database instance for which the parameter must be set. If the specified parameter must be set for all instances, set `SID='*'`.

Command Examples

The command that follows should replace "`chicago_typo`" with "`chicago`" and rename it to "`dallas`".

```
DGMGRL> DISABLE FAR_SYNC 'chicago_typo';
EDIT FAR_SYNC 'chicago_typo' RENAME TO 'chicago';
ENABLE FAR_SYNC 'chicago;
```

The following example sets the initialization parameter of a far sync instance named `chicago`.

```
DGMGRL> EDIT FAR_SYNC 'chicago' SET PARAMETER log_archive_trace=1;
```

EDIT FAR_SYNC RESET (Property)

The `EDIT FAR_SYNC RESET` (Property) command resets the specified property for the named far sync instance to its default value.

Format

EDIT FAR_SYNC <*db_unique_name*> RESET PROPERTY <*property_name*>;

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Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the far sync instance whose configurable property value is to be reset to its default value.

property_name
The name of the property to be reset to its default value.

Command Example

The following example shows how to reset the `ReopenSecs` property back to its default value for the far sync instance named `dallas`.

```
DGMGRL> EDIT FAR_SYNC 'dallas' RESET PROPERTY ReopenSecs;
```

EDIT FAR_SYNC RESET (Parameter)

The `EDIT FAR_SYNC RESET PARAMETER` (Parameter) command resets the specified database initialization parameter for the named far sync instance to its default value.

Format

EDIT FAR_SYNC <*db_unique_name*> RESET PARAMETER <*parameter_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database whose parameter is to be reset.

parameter_name
The name of the database initialization parameter to be reset to its default value.

Command Example

The following example shows how to reset the `log_filename_convert` initialization parameter to its default value for the far sync instance named `dallas`.

```
DGMGRL> EDIT FAR_SYNC 'dallas' RESET PARAMETER log_filename_convert;
```

EDIT PLUGGABLE DATABASE (State)

The `EDIT PLUGGABLE DATABASE` command changes the state of the specified pluggable database (PDB).

Format

```
EDIT PLUGGABLE DATABASE <pluggable_database_name> AT <db_unique_name> SET
STATE = state_name;
```

Command Parameters

pluggable_database_name
Name of the PDB for which you want to change the state.

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db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the container database that contains the PDB specified by pluggable_database_name.pdb_name.

state_name
State to which the PDB must be transitioned. Permitted states are the following:

- APPLY-ON: Starts redo apply from the specified PDB.
- APPLY-OFF: Stops redo apply from the specified PDB.

Usage Notes

- The specified PDB must exist in the database specified by db_unique_name and must have been configured using the ADD PLUGGABLE DATABASE command.

Examples

Example 10-6 Stopping Redo Apply at a Target PDB

This example stops redo apply for a target PDB named dgpdb_sales that is contained in the target database newyork.

```
DGMGRL> EDIT PLUGGABLE DATABASE dgpdb_sales AT newyork SET STATE=APPLY-OFF;
    Succeeded.
```

EDIT RECOVERY_APPLIANCE (Property)

The EDIT RECOVERY_APPLIANCE (Property) command changes the value of the property for the named Zero Data Loss Recovery Appliance (Recovery Appliance).

Format

EDIT <*db_unique_name*> SET PROPERTY *property_name* = *value*;

Command Parameters

db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the Recovery Appliance whose configurable property value is to be changed.

property_name
The name of an existing Recovery Appliance-specific property. Valid properties are as follows:

- DGConnectIdentifier
- LogXptMode
- DelayMins
- Binding
- MaxFailure
- ReopenSecs
- NetTimeout
- RedoCompression

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- LogShipping
- InconsistentProperties
- InconsistentLogXptProps
- AlternateLocation

value
The new value for the property.

Command Example

The following example shows an example of editing a configurable property.

```
DGMGRL> EDIT RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance' SET PROPERTY
'ReopenSecs'=300;
Property "ReopenSecs" updated
```

EDIT RECOVERY_APPLIANCE (Rename)

The EDIT RECOVERY_APPLIANCE (Rename) command changes the name used by the broker to refer to the specified Recovery Appliance, as recorded in that Recovery Appliance's profile in the broker configuration.

Format

EDIT RECOVERY_APPLIANCE <*db_unique_name*> RENAME TO <*new_db_unique_name*> ;

Command Parameters

db_unique_name
The current value of the DB_UNIQUE_NAME initialization parameter for the Recovery Appliance.

new_db_unique_name
The new value of the DB_UNIQUE_NAME initialization parameter.

Usage Notes

- Use this command to track changes to the DB_UNIQUE_NAME initialization parameter for this Recovery Appliance.

> ⚠ **Caution**
>
> The name of the Recovery Appliance must always match the value of the DB_UNIQUE_NAME initialization parameter for that Recovery Appliance.

Command Example

The following example shows how to edit and rename a Recovery Appliance.

```
DGMGRL> EDIT RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance_typo'
RENAME TO 'EnterpriseRecoveryAppliance';
Succeeded.
```


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EDIT RECOVERY_APPLIANCE RESET (Property)

The `EDIT RECOVERY_APPLIANCE RESET` (Property) command resets the specified property for the named Recovery Appliance to its default value.

Format

EDIT RECOVERY_APPLIANCE <*db_unique_name*> RESET PROPERTY <*property_name*> ;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the Recovery Appliance whose configurable property value is to be reset.

property_name
The name of an existing database-specific configurable property.

Command Example

The following example shows how to reset the `ReopenSecs` property back to its default value for the Recovery Appliance named `South_Sales`.

```
DGMGRL> EDIT DATABASE 'South_Sales' RESET PROPERTY ReopenSecs;
Succeeded.
```

ENABLE CONFIGURATION

The `ENABLE CONFIGURATION` command enables the broker to manage the broker configuration, including all of its databases.

Format

ENABLE CONFIGURATION [<*configuration_name*> | ALL];

Command Parameters

None.

Usage Notes

- Use the `ENABLE CONFIGURATION` command to enable broker management of the primary database and all members of the configuration, if these members are not explicitly disabled by the user.
- To issue this command, you must connect to a database whose control file role is primary.
- By default, broker management of the configuration's databases is enabled in the `TRANSPORT-ON` state with redo transport services turned on at the primary database and `APPLY-ON` with log apply services started at the standby databases. Far sync instances will be enabled such that they receive redo data and send redo data. You can change the state of a database using the EDIT DATABASE (State) command, but not when the database or the entire configuration is disabled. You cannot change the state of a far sync instance.

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- Use this command to update the roles stored in the broker configuration if a failover or switchover was performed using SQL*Plus instead of DGMGRL or Cloud Control.
- Use the SHOW CONFIGURATION command to display information about the configuration.
- Include the `ALL` keyword to enable all configurations. Use this to start redo transport between the source database to the target database after you create a DB PDB configuration.

Command Example

The following example enables management of a broker configuration.

```
DGMGRL> ENABLE CONFIGURATION;
Enabled.
```

The following command enables management of all configured broker configurations that contain one or more PDBs. It begins redo transport from the source database to the target database.

```
DGMGRL> ENABLE CONFIGURATION ALL;
Enabled “MyConfig1” with primary database “boston”.
Enabled “MyConfig2” with primary database “newyork”.
```

ENABLE DATABASE

The `ENABLE DATABASE` command enables broker management of the specified standby database.

> ⚠ **Caution**
>
> Do not issue the `ENABLE DATABASE` command on a standby database that needs to be reinstated. See Reenabling Disabled Databases After a Role Change for more details.

Format

ENABLE DATABASE <*db_unique_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database for which you want to enable broker management.

Usage Notes

- You must connect to the primary database or to an already enabled standby database to issue this command.
- A standby database may have been disabled by the broker as a consequence of a prior failover or switchover operation. See Reenabling Disabled Databases After a Role Change to understand how the database can be reinstated or re-created.

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- By default, broker management of the physical or logical standby database is enabled in the APPLY-ON state with log apply services enabled. You can change the state of the standby database using the EDIT DATABASE (State) command, but only when the database is enabled.
- Use the SHOW DATABASE command to display information about the database.
- For an Oracle RAC database, only one instance is required to be started and mounted for this command to succeed.

Command Example

The following example shows how to enable a database named South_Sales.

```
DGMGRL> ENABLE DATABASE 'South_Sales';
Enabled.
```

ENABLE FAR_SYNC

The ENABLE FAR_SYNC command enables broker management of the specified far sync instance.

Format

ENABLE FAR_SYNC <*db_unique_name*> ;

Command Parameters

db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the far sync instance for which you want to enable broker management.

Command Example

The following example enables broker management of a far sync instance named dallas.

```
DGMGRL> ENABLE FAR_SYNC 'dallas';
```

ENABLE FAST_START FAILOVER

The ENABLE FAST_START FAILOVER command enables the broker to fail over to a specifically-chosen standby database in the event of loss of the primary database, without requiring any manual steps.

See Enabling Fast-Start Failover for complete information.

Format

ENABLE FAST_START FAILOVER [OBSERVE ONLY];

Command Parameters

OBSERVE ONLY: All observers started before or after this command is issued will run in observe-only mode.

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Usage Notes

- The prerequisites described in Prerequisites for Enabling Fast-Start Failover must be met before you issue this command to enable fast-start failover.
- Issuing the `ENABLE FAST_START FAILOVER` command does not trigger a failover, it only allows the observer that is monitoring the configuration to initiate a fast-start failover if conditions warrant a failover.
- You can enable fast-start failover while connected to any database in the broker configuration.
- If you do not start the observer after you have enabled fast-start failover, the `ORA-16819` warning is displayed for the primary and target standby databases. For example:

```
DGMGRL> SHOW DATABASE 'South_Sales';
Database - South_Sales

  Role:            PRIMARY
  Intended State:  TRANSPORT-ON
  Instance(s):
    south_sales1

  Database Warning(s):
    ORA-16819: fast-start failover observer not started

Database Status:
WARNING
```

- To enable fast-start failover for a broker configuration with multiple standby databases, the `FastStartFailoverTarget` configuration property on the primary database must specify one or more viable target standby databases. Both the primary database and the target standby databases must have:
  - Standby redo logs configured
  - Redo transport must be properly configured at both databases for the configured protection mode

  Oracle also recommends Flashback Database be enabled on both the primary and standby databases to allow for reinstatement of the old primary database after a failover. If it is not enabled, then you will receive a warning when you enable fast-start failover:

```
DGMGRL> ENABLE FAST_START FAILOVER;
Warning: ORA-16827: Flashback Database is disabled
```

  Task 2 in Enabling Fast-Start Failover, and FastStartFailoverTarget provide more information about the `FastStartFailoverTarget` configuration property.
- Once you have enabled fast-start failover, you must comply with the restrictions described in Restrictions When Fast-Start Failover is Enabled.

Command Examples

Example 1: Enabling a Fast-Start Failover

The following example enables fast-start failover.

```
DGMGRL> ENABLE FAST_START FAILOVER;
Enabled in Zero Data Loss Mode.
```


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Example 2: Successful Enabling of Fast-Start Failover

The following example shows that fast-start failover was successfully enabled when the configuration is operating in maximum performance mode.

```
DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode: MaxAvailability
  Lag Limit: 0 seconds

  Threshold:                    180 seconds
  Ping Interval: 3000 milliseconds
  Ping Retry: 0
  Active Target:                South_Sales
  Potential Targets:        "South_Sales"
    South_Sales valid
  Observer:                             (none)
  Shutdown Primary:           TRUE
  Auto-reinstate:               TRUE
  Observer Reconnect:        (none)
  Observer Override:        FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile           YES
    Corrupted Dictionary           YES
    Inaccessible Logfile           NO
    Stuck Archiver                       NO
    Datafile Write Errors           YES

  Oracle Error Conditions:
    (none)
```

Related Topics

- Scenario 16: Using the Observe-only Mode for Fast-Start Failover
  The observe-only mode enables you to test the impact of using fast-start failover in your configuration, without making any actual changes to the configuration. You can use the DGMGRL commands or data dictionary views to verify the observe-only mode setting.

ENABLE FAST_START FAILOVER CONDITION

The `ENABLE FAST_START FAILOVER CONDITION` command specifies additional conditions for which a fast-start failover should be performed.

Format

ENABLE FAST_START FAILOVER CONDITION <*`condition`*>;

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Command Parameters

condition
Possible values are those described in the `SHOW FAST_START FAILOVER` command as health conditions. The Oracle error `ORA-00240` can also be named as a condition by specifying `240` as the value.

Usage Notes

- Table 10-2 lists some examples of health conditions maintained by the database health-check facility.
- An error is raised if the specified value is not recognized or if the condition has already been set.
- **Table 10-2 Examples of Health Conditions**

Health Condition	Description
Datafile Write Errors	If fast-start failover is enabled and the Datafile Write Errors condition is specified, then a fast-start failover is initiated if write errors are encountered in any data files, including temp files, system data files, and undo files.
"Corrupted Controlfile"	Corrupted controlfile. This condition is enabled by default.
"Corrupted Dictionary"	Dictionary corruption of a critical database object. This condition is enabled by default.
"Inaccessible Logfile"	LGWR is unable to write to any member of a log group due to an I/O error.
"Stuck Archiver"	Archiver is unable to archive a redo log because device is full or unavailable.

- You can display these configurable conditions with the `SHOW FAST_START FAILOVER` command.
- Please note that ORA-240 is the only Oracle error that can be named as a condition for initiating a fast-start failover.

Command Examples

Example 1

The following example specifies that a fast-start failover should be done if a corrupted controlfile is detected.

```
ENABLE FAST_START FAILOVER CONDITION "Corrupted Controlfile";
```

Example 2

The following example specifies that a fast-start failover should be done if an ORA-00240 error is raised.

```
ENABLE FAST_START FAILOVER CONDITION 240;
```

Example 3

The following examples displays output that shows the condition Datafile Write Errors.

```
DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: DISABLED
```


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```
  Threshold:          180 seconds
  Ping Interval: 3000 milliseconds
  Ping Retry: 0
  Active Target:      (none)
  Potential Targets:  "South_Sales"
    South_Sales    valid
  Observer:           (none)
  Lag Limit:          300 seconds
  Shutdown Primary:   TRUE
  Auto-reinstate:     TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
    ORA-240: control file enqueue held for more than %s seconds
```

ENABLE RECOVERY_APPLIANCE

The `ENABLE RECOVERY_APPLIANCE` command enables broker management of the specified Zero Data Loss Recovery Appliance (Recovery Appliance).

Format

ENABLE RECOVERY_APPLIANCE <*db_unique_name*> ;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the Recovery Appliance for which you want to enable broker management.

Usage Notes

- You must connect to the primary database or to an already enabled standby database to issue this command.
- Use the `SHOW RECOVERY_APPLIANCE` command to display information about the Recovery Appliance.

Command Example

The following example shows how to enable a Recovery Appliance named `EnterpriseRecoveryAppliance`.

```
DGMGRL> ENABLE RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
Enabled.
```


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EXIT

The `EXIT` command exits (quits) the broker's command-line interface.

Format

EXIT;

Command Parameters

None.

Usage Notes

- This command has the same effect as the QUIT command.
- A database connection is not required to execute this command. However, if you are connected, this command breaks the connection.

Command Example

The following example demonstrates how to exit (quit) the command-line interface.

```
DGMGRL> EXIT;
```

EXPORT CONFIGURATION

The `EXPORT CONFIGURATION` command enables you to save the metadata contained in the broker configuration file to a text file. Use this command to maintain an up-to-date copy of the broker configuration metadata.

Format

```
EXPORT CONFIGURATION [TO file_name];
```

Command Parameters

file_name
The name of the file in the trace directory in which the Data Guard broker configuration is saved.
If you omit the `TO` *`file_name`* clause, the broker stores the exported configuration using a default file name. The convention used to name the file is *`SID`*`_dmon_`*`processID-of-DMON`*`_brkmeta_`*`serial-number`*`.trc`.
For example, if the SID is `orcl` and the process ID of the PMON process is 1234, and the `TO` *file-name* clause is omitted, the file created when the broker configuration is first exported is named `orcl_dmon_1234_brkmeta_1.trc`. When the broker configuration is next exported, it is stored in a file named `orcl_dmon_1234_brkmeta_2.trc`.

Usage Notes

- The broker stores the exported configuration in the `trace` directory. You cannot specify the directory in which the configuration must be stored.

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- When you need to downgrade to an earlier version of the database software, you can export the broker configuration to a file before you downgrade the database software. Subsequently, instead of manually recreating the configuration from scratch, you can import this exported file to recreate the broker configuration after the downgrade is complete.

Command Example

The following example exports the metadata in the broker configuration file to a file named `dg_config.txt` in the `trace` directory.

```
EXPORT CONFIGURATION TO 'dg_config.txt';
```

FAILOVER

The `FAILOVER` command invokes a failover that transitions the named (target) standby database into the role of a primary database.

This type of failover is referred to as a *manual failover*. See Manual Failover for more information.

> **Note**
>
> Because a failover results in a transition of a standby database to the primary role, it should be performed when the primary database has failed or is unreachable and cannot be recovered in a timely manner. Failover may or may not result in data loss depending on the protection mode in effect at the time of the failover and whether the target standby database was synchronized with the primary database.
>
> Use the `SWITCHOVER` command if the primary database has not failed and you want the current primary database and a standby database to switch roles with no data loss.

Format

FAILOVER TO <*db_unique_name*> [IMMEDIATE];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of of a physical, logical, or snapshot standby database that you want to fail over to the primary database role.

Usage Notes

- Always try to perform a complete failover first unless Redo Apply has stopped at the failover target due to an `ORA-752` or `ORA-600 [3020]` error. If one of these errors has occurred, then before proceeding follow the guidelines in "Resolving ORA-752 or ORA-600 [3020] During Standby Recovery" in My Oracle Support Note 1265884.1 at `https://support.oracle.com`. An immediate failover should only be performed when a complete failover is unsuccessful or in the error case just noted.
- The specified standby database must be enabled before the primary database fails. However, an enabled standby database that was shut down can be a candidate for the

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failover operation. In this case, restart the standby database using DGMGRL `STARTUP` command, then issue the `FAILOVER` command.

- The failover operates on the specified standby database and changes its role to a primary database. Bystander standby databases (those not involved in the failover) remain in the standby role.
- Before you issue the `FAILOVER` command, verify that you are connected to the standby database that will become the new primary database. If necessary, issue a CONNECT command to connect to the standby database to which you want to failover.
- If the `FAILOVER` command is issued without any options, the standby database chosen as the failover target applies all unapplied redo it has received before changing to the primary role. This is referred to as a complete failover.
- If the broker configuration is operating in maximum protection mode, a manual failover operation will force the protection mode to be maximum performance. The redo transport service settings are unaffected. You need to restore the desired protection mode for the resulting configuration after the failover operation.

> **Note**
>
> With fast-start failover, the broker preserves the protection mode that was in effect prior to the failover.

- If the `FAILOVER` command is issued with the `IMMEDIATE` option, no attempt is made to apply any unapplied redo that has been received. This option more likely results in lost application data even when standby redo log files are configured on the standby database. Additionally, any remaining standby databases in the configuration cannot function as such until they are reinstated or re-created. See Reenabling Disabled Databases After a Role Change for more information.
- You can perform a manual failover or set up the broker to perform a fast-start failover. See the ENABLE FAST_START FAILOVER command for information about allowing the broker to automatically invoke failover, when conditions warrant a failover.
- If fast-start failover is enabled, you can perform a *complete* manual failover only to the fast-start failover target standby database and only if the fast-start failover target standby database is synchronized with, or within the lag limit of, the primary database, and only when the observer is started. You cannot perform an *immediate* manual failover when fast-start failover is enabled.
- If Flashback Database was enabled on the former (failed) primary database prior to the failover, the former primary database can be reinstated using the broker's `REINSTATE` command (see the REINSTATE DATABASE command).

  If failover was performed to a physical standby database, any other physical standby databases that were disabled by the failover can be reinstated if Flashback Database was enabled on the standby database and there are sufficient flashback logs available. See Reenabling Disabled Databases After a Role Change for step-by-step instructions.
- The original primary database can only participate in the configuration as a standby database after it is reinstated or re-created.

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> **⚠ Caution**
>
> Shut down the original primary database if it still has any active instances running prior to failing over.

> **ⓘ See Also**
>
> Reenabling Disabled Databases After a Role Change about reenabling the original primary database so that it could serve as a standby database to the primary database

Command Example

The following example performs a failover in which the standby database, `South_Sales`, transitions to the primary role:

```
DGMGRL> FAILOVER TO 'South_Sales';
Performing failover NOW, please wait...
Failover succeeded, new primary is "South_Sales"

DGMGRL> SHOW CONFIGURATION;
Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    South_Sales - Primary database
    North_Sales - Physical standby database (disabled)
      ORA-16661: The standby database must be be reinstated.

Fast-Start Failover: DISABLED

Configuration Status:
WARNING
```

FAILOVER TO PLUGGABLE DATABASE

The `FAILOVER TO PLUGGABLE DATABASE` command invokes a failover that transitions the named target PDB into the role of a source PDB.

Syntax

```
FAILOVER TO PLUGGABLE DATABASE <pdb_name> AT <target_db_unique_name>
[IMMEDIATE];
```

Command Parameters

pdb_name
Name of the target PDB to that you want to fail over to the source PDB role. This must be the same PDB that was used when setting up the source PDB with the `ADD PLUGGABLE DATABASE` command.

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target_db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the target container database containing the standby pluggable database to be failed over to.

Usage Notes

- When there are problems with the source PDB, but the source database is available, perform a manual failover to a target PDB. The target PDB applies all the unapplied redo that it has received and then changes over to a source PDB role. This is referred to as a complete PDB failover.
- When the source database is not accessible, perform immediate failover by using the FAILOVER PLUGGABLE DATABASE command with the IMMEDIATE option. No attempt is made to apply any unapplied redo that has been received. This option more likely results in lost application data.
- The original source PDB must be manually re-enabled so that it can serve as a target PDB for the new source PDB.

Example 10-7 Performing Failover of a PDB

The following example performs a PDB failover in which the target PDB sales, contained in the target database newyork, transitions to the source PDB.

```
DGMGRL> FAILOVER TO PLUGGABLE DATABASE sales AT newyork;
 Verifying conditions for Failover...
   Source pluggable database is 'SALESB' at database 'boston'
 Performing FAILOVER now, please wait...
  Converting 'SALESB' to standby role...
  Waiting for 'SALES' to recover all redo data...
  Stopping recovery at 'SALES'...
  Converting 'SALES' to primary role...
  Opening new primary 'SALES'...
Failover succeeded, new primary is “sales”.
```

HELP

The DISPLAY command displays online help for the Data Guard command-line interface.

Format

HELP [*command_name*];

Command Parameters

command_name
The command for which help information is desired. If a command is not specified, then all commands are listed.

```
@ Execute DGMGRL script file
!     Host operating system command
/     Repeat the last command
--     Comment to be ignored by DGMGRL
add     Adds a member to the broker configuration
connect     Connects to an Oracle database instance
```


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```
convert     Converts a database from one type to another
create     Creates a broker configuration or far sync instance
disable     Disables a configuration, a member, or fast-start failover
edit     Edits a configuration or a member
enable         Enables a configuration, a member, or fast-start failover
exit           Exits the program
export         Export Data Guard Broker configuration to a file.
failover       Changes a standby database to be the primary database
help           Displays description and syntax for a command
host           Host operating system command
import         Import Data Guard Broker configuration from a file.
migrate        Migrate a pluggable database from one configuration to another.
prepare        Prepare a primary database for a Data Guard environment.
quit           Exits the program
reinstate      Changes a database marked for reinstatement into a viable
standby
rem            Comment to be ignored by DGMGRL
remove         Removes a configuration or a member
set            Set a DGMGRLI CLI property to a specified value
show           Displays information about a configuration or a member
shutdown       Shuts down a currently running Oracle database instance
spool          store input and output of DGMGRL CLI in a file
sql            Executes a SQL statement
start          Starts the fast-start failover observer
startup        Starts an Oracle database instance
stop           Stops the fast-start failover observer
switchover     Switches roles between a primary and standby database
validate       Performs an exhaustive set of validations for a member
```

Enter `help` *`command_name`* to see syntax for individual commands.

Usage Notes

- A database connection is not required to execute this command.

Command Example

The following example gets help on the `EDIT` commands.

```
DGMGRL> HELP FAILOVER
Changes a standby database to be the primary database

Syntax:

  FAILOVER TO <standby db-unique-name> [IMMEDIATE];

  FAILOVER TO PLUGGABLE DATABASE <standby pluggable database name>
    AT <target CDB> [IMMEDIATE];
```

HOST or ! (exclamation point)

The DGMGRL `HOST` and ! commands allow you to execute operating system command(s) directly through the DGMGRL console without leaving DGMGRL.

The `HOST` command and the ! command have the same functionality. They allow you to submit operating system commands while you are logged in to DGMGRL. The DGMGRL prompt

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becomes a shell prompt which accepts operating system commands. You can also directly submit individual operating system commands to DGMGRL through the Host or ! command.

Format

HOST [*command*]

Or alternatively,

! [*command*]

Command Parameters

command
Represents an operating system command

Usage Notes

- If you simply enter `HOST` without specifying a command, then the DGMGRL console becomes an operating system shell prompt until you issue the `EXIT` command to return to the DGMGRL console.
- The HOST and ! commands take all the content entered on the command line after them as input for the operating system shell prompt. See Command Example 2 below.

Command Examples

Example 1

The following example shows the `HOST` and ! commands being used to execute an individual operating system command in the DGMGRL console.

```
DGMGRL> HOST DATE
Executing operating system command(s):" date"
Fri Oct 23 14:08:42 EDT 2015
DGMGRL>

DGMGRL> ! DATE
Executing operating system command(s):" date"
Fri Oct 23 14:09:20 EDT 2015
DGMGRL>
```

Example 2

In the following example, both of the `DATE` commands are executed in the operating system shell before control is returned to DGMGRL.

```
DGMGRL> ! DATE;DATE;
Executing operating system command(s):" date;date;"
Fri Oct 23 14:11:40 EDT 2015
Fri Oct 23 14:11:40 EDT 2015
DGMGRL>
```


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IMPORT CONFIGURATION

The `IMPORT CONFIGURATION` command enables you to import the broker configuration metadata that was previously exported to a file in the trace directory using the `EXPORT CONFIGURATION` command.

Format

IMPORT CONFIGURATION FROM <*file_name*>;

Command Parameters

file_name
The name of file that contains the exported broker configuration metadata.

Usage Notes

- The imported metadata is stored in the in-memory metadata and to either of the broker metadata files specified by `DG_BROKER_CONFIG_FILE1` or `DG_BROKER_CONFIG_FILE2`.
- The specified file name must exist in the `trace` directory.

Command Example

The following command imports configuration metadata stored in the file named `dg_config.txt` in the `trace` directory into the memory and to the broker metadata file.

```
DGMGRL> IMPORT CONFIGURATION FROM 'dg_config.txt';
```

MIGRATE PLUGGABLE DATABASE

The `MIGRATE PLUGGABLE DATABASE` command lets you migrate a pluggable database (PDB) from one multitenant container database (CDB) to another on the same host. You can migrate a PDB from a primary CDB to another primary CDB or failover a PDB from a standby CDB to a primary CDB.

With the introduction of Oracle AI Database 26ai, the `MIGRATE PLUGGABLE DATABASE` command can reuse the standby data files when moving a pluggable database from a primary CDB in a Data Guard Broker's configuration to another primary CDB in a different broker's configuration. To reuse standby data files, you must ensure that:

- All databases in the source/destination configurations must use OMF and ASM.
- The source standby CDB must share the same ASM disk group as the destination standby CDB.

Format

```
MIGRATE PLUGGABLE DATABASE [VERIFY][IMMEDIATE] <pdb_name>
TO CONTAINER <dest_cdb_name>
USING XML_description_file
[CONNECT AS { /@<dest_cdb_connect_identifer> | <dest_cdb_user>/
<dest_cdb_pass>@<dest_cdb_connect_identifer>} ]
[ SECRET secret KEYSTORE IDENTIFIED BY ( EXTERNAL STORE | <wallet_password>) ]
```


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```
[STANDBY FILES { /@<asm_instance_connect_identifer> | sysasm_user/
sysasm_pass@<asm_instance_connect_identifer>} ]
[SOURCE STANDBY <source_standby_cdb_name>
[DESTINATION STANDBY <dest_standby_cdb_name>
[TIMEOUT timeout]
[KEYFILE <key_file>]
[ SOURCE KEYSTORE IDENTIFIED BY ( EXTERNAL STORE | <source_wallet_password>) ];
```

Prerequisites

The `MIGRATE PLUGGABLE DATABASE` command has the following prerequisites:

- The destination CDB must be created and started in such a way that it can access the PDB data files at the same file path as the source CDB.
- The source and destination CDBs must each be in a different Data Guard broker configuration.
- The source CDB can either be a primary database or a physical standby database.
- If the source PDB uses Transparent Data Encryption (TDE), the encryption keys associated with the source PDB must also be migrated. Connect to the database root and use the `ADMINISTER KEY MANAGEMENT` command to export the master encryption keys. The clauses used with this command depend on the PDB mode (isolated mode or united mode) and the type of keystore (software-based keystore or password keystore).

  The file containing the exported keys must be accessible to the destination CDB either using Secure File Copy (SCP) or Oracle Automatic Storage Management Cluster File System (Oracle ACFS).
- If the source CDB is a physical standby database:
  - source CDB and destination CDB must be running the same Oracle version and patches.
  - source CDB and destination CDB must have the same setting for the `COMPATIBLE` initialization parameter.
  - PDB to be migrated must be closed on its primary CDB.
  - execute the failover

    if a PDB failover will result in lost data, then you must specifically choose to execute the failover by using the `IMMEDIATE` option.
- If the source CDB is a primary database, then
  - the destination CDB cannot be running a lower version of Oracle.
  - the setting of the `COMPATIBLE` initialization parameter cannot be set to a lower value on the destination CDB than on the source CDB.
- The services for the PDB must be stopped and removed from the Oracle Clusterware repository of the source database to be migrated. This should be done for all databases in the Data Guard broker configuration of the source database.
- The destination CDB must be open.
- The user executing this command must have `SYSDBA` privileges for both the source and destination CDBs.
- If reusing source standby database files is needed, then:
  - The clause `STANDBY FILES` must be used to specify the connect identifier to the ASM instance having the source standby database files

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- The parameter DB_CREATE_FILE_DEST in the source and destination CDB standby databases must be set to the same ASM disk group name.
- The parameter DB_FILE_NAME_CONVERT in the destination CDB standby database must be null.
- The parameter STANDBY_FILE_MANAGEMENT must be AUTO on the source standby database.

Command Parameters

pdb_name
The name of the PDB to be migrated.

dest_cdb_name
The database unique name of the CDB to receive the PDB to be migrated.

XML_description_file
An XML file that contains the description of the PDB to be migrated. This file is automatically created by the SQL statements executed by the MIGRATE PLUGGABLE DATABASE command.

dest_cdb_user
The user name of the user that has SYSDBA access to the destination CDB.

dest_cdb_pass
The password associated with the user name specified for *dest_cdb_user*.

dest_cdb_connect_identifier
An Oracle Net connect identifier used to reach the destination CDB.

secret
The password that was used to encrypt the export file containing the exported encryption keys of the source PDB. This password would have been specified as part of the ADMINISTER KEY MANAGEMENT command, when exporting the PDB encryption keys.

wallet_password
The password of the keystore containing the encryption keys. This is required if the source PDB was encrypted using a password keystore.

asm_instance_connect_identifer
The connect identifier to the ASM instance having the source standby database file.

sysasm_user
A user having SYSASM privilege for ASM instance.

sysasm_pass
The password for sysasm_user.

source_standby_cdb_name
DB_UNIUE_NAME of the migration source CDB's standby database.

dest_standby_cdb_name
DB_UNIUE_NAME of the migration destination CDB's standby database.

timeout
The timeout value in seconds when waiting for the destination standby database picks up the data files during migration.

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key_file
The key file location for exporting TDE master keys.

source_wallet_password
The keystore password of the source CDB/PDB of a PDB to migrate.

Usage Notes

- By default, when this command is used for PDB failover, the failover attempt is rejected if there is a possibility of data loss. You can override this default behavior by using the `IMMEDIATE` option.
- The `IMMEDIATE` option is ignored if the source database is a primary database.
- The `VERIFY` option performs a pre-check to determine if the PDB can be migrated successfully.
- If a connect identifier is specified, then database credentials are used to authenticate the user on the destination CDB.
- Operating system credentials cannot be used to authenticate the user on the destination CDB. A connect identifier must be specified; a slash (/) is not supported.
- For cases in which a slash (/) is used to specify a connect identifier (for example, `/@boston`), the credentials are fetched from the wallet.
- The following options are available if you want to specify a connect string:
  - *`/@dest_cdb_connect_identifier`* (credentials are fetched from the wallet)
  - *`dest_cdb_user/dest_cdb_pass@dest_cdb_connect_identifier`* (uses database credentials)
- To prevent the password from being visible on the command line, specify only a user name with a connect identifier. You will then be prompted for a password. The following options are supported when you supply only a user name and connect identifier:
  - *`dest_cdb_user@dest_cdb_connect_identifier`* (uses database credentials)
  - *`dest_cdb_user/@dest_cdb_connect_identifier`* (uses database credentials)
- If you omit the connect string entirely from the command line, then you will be prompted for a user name and password. The following options are supported:
  - *`/@dest_cdb_connect_identifier`* (no prompt for password, credentials are fetched from the wallet)
  - *`dest_cdb_user@dest_cdb_connect_identifier`* (uses database credentials)
  - *`dest_cdb_user/@dest_cdb_connect_identifier`* (uses database credentials)
- If you omit `sysasm_pass`, then you will be prompted for password for sysasm_user.
- The database specified in `SOURCE STANDBY` clause must be a physical standby database. This clause is optional if the migration source primary database has only one physical standby
- The database specified in `DESTINATION STANDBY` clause must be a physical standby database. This clause is optional if the migration destination primary database has only one physical standby.
- If the clause `TIMEOUT` is not specified, the default 1800 seconds will be used.
- For a failover from a standby database when TDE is enabled, the clause `KEYFILE` is needed to specify the key file location for exporting TDE master keys, and followed by the

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clause `SOURCE KEYSTORE IDENTIFIED BY` to specify the keystore password of the source CDB.

Command Examples

Example 1: Migrating a PDB From a Primary CDB

```
DGMGRL> MIGRATE PLUGGABLE DATABASE REGION1 TO CONTAINER NORTH_SALES_NEW USING
REGION1.xml
CONNECT AS sys@NORTH_SALES_NEW;
Connected to "NORTH_SALES_NEW"
Connected.

Beginning migration of pluggable database REGION1.
Source multitenant container database is NORTH_SALES.
Destination multitenant container database is NORTH_SALES_NEW.

Closing pluggable database REGION1 on all instances of multitenant container
database NORTH_SALES.
Unplugging pluggable database REGION1 from multitenant container database
NORTH_SALES.
Pluggable database description will be written to REGION1.xml.
Dropping pluggable database REGION1 from multitenant container database
NORTH_SALES.
Creating pluggable database REGION1 on multitenant container database
NORTH_SALES_NEW.
Opening pluggable database REGION1 on all instances of multitenant container
database NORTH_SALES_NEW.
Succeeded.
```

Example 2: Failing over a PDB from a Physical Standby

```
DGMGRL> MIGRATE PLUGGABLE DATABASE REGION1 TO CONTAINER SOUTH_SALES_NEW
USING REGION1.xml CONNECT AS sys@SOUTH_SALES_NEW;
Connected to "SOUTH_SALES_NEW"
Connected.

Beginning migration of pluggable database REGION1.
Source multitenant container database is SOUTH_SALES.
Destination multitenant container database is SOUTH_SALES_NEW.

Continuing with migration of pluggable database REGION1 to multitenant
container database SOUTH_SALES_NEW.
Stopping Redo Apply services on source multitenant container database
SOUTH_SALES.
Succeeded.
Opening database SOUTH_SALES.
Opening pluggable database REGION1 on source multitenant container database
SOUTH_SALES to prepare for migration.
Pluggable database description will be written to REGION1.xml.
Closing pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES.
Disabling media recovery for pluggable database REGION1.
Closing database SOUTH_SALES.
Restarting redo apply services on source multitenant container database
SOUTH_SALES.
```


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```
Succeeded.
Creating pluggable database REGION1 on multitenant container database
SOUTH_SALES_NEW.
Opening pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES_NEW.
Unplugging pluggable database REGION1 from multitenant container database
NORTH_SALES.
Dropping pluggable database REGION1 from multitenant container database
NORTH_SALES.
Succeeded.
```

Example 3: Reusing the Source Standby Database Files When Plugging a PDB into the Primary Database of a Data Guard Configuration

```
MIGRATE PLUGGABLE DATABASE REGION1 TO CONTAINER SOUTH_SALES_NEW USING
REGION1.xml STANDBY FILES sysasm@asm_tns SOURCE STANDBY SOUTH_SALES_STANDBY
DESTINATION STANDBY SOUTH_SALES_NEW_STANDBY ;
Connected.

Beginning migration of pluggable database REGION1.
Source multitenant container database is SOUTH_SALES.
Destination multitenant container database is SOUTH_SALES_NEW.

Connecting to "inst11".
Connected as SYSASM.
Stopping Redo Apply services on multitenant container database
SOUTH_SALES_NEW_STANDBY.
The guaranteed restore point "…" was created for multitenant container
database "SOUTH_SALES_NEW_STANDBY".
Restarting redo apply services on multitenant container database
SOUTH_SALES_NEW_STANDBY.
Closing pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES.
Unplugging pluggable database REGION1 from multitenant container database
SOUTH_SALES.
Pluggable database description will be written to ...
Dropping pluggable database REGION1 from multitenant container database
SOUTH_SALES.
Waiting for the pluggable database REGION1 to be dropped from standby
multitenant container database SOUTH_SALES_STANDBY.
Creating pluggable database REGION1 on multitenant container database
SOUTH_SALES_NEW.
Checking whether standby multitenant container database
SOUTH_SALES_NEW_STANDBY has added all data files for pluggable database
REGION1.
Opening pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES_NEW.
The guaranteed restore point "…" was dropped for multitenant container
database "SOUTH_SALES_NEW_STANDBY".
Migration of pluggable database REGION1 completed.
Succeeded.
```


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Example 4: Reusing the Source Standby Database Files with TDE Enabled When Plugging a PDB into the Primary Database of a Data Guard Configuration

```
DGMGRL> MIGRATE PLUGGABLE DATABASE REGION1 TO CONTAINER SOUTH_SALES_NEW
USING REGION1.xml CONNECT AS sys@SOUTH_SALES_NEW;
Connected to "SOUTH_SALES_NEW"
Connected.

Beginning migration of pluggable database REGION1.
Source multitenant container database is SOUTH_SALES.
Destination multitenant container database is SOUTH_SALES_NEW.

Continuing with migration of pluggable database REGION1 to multitenant
container database SOUTH_SALES_NEW.
Stopping Redo Apply services on source multitenant container database
SOUTH_SALES.
Succeeded.
Opening database SOUTH_SALES.
Opening pluggable database REGION1 on source multitenant container database
SOUTH_SALES to prepare for migration.
Pluggable database description will be written to REGION1.xml.
Closing pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES.
Disabling media recovery for pluggable database REGION1.
Closing database SOUTH_SALES.
Restarting redo apply services on source multitenant container database
SOUTH_SALES.
Succeeded.
Creating pluggable database REGION1 on multitenant container database
SOUTH_SALES_NEW.
Opening pluggable database REGION1 on all instances of multitenant container
database SOUTH_SALES_NEW.
Unplugging pluggable database REGION1 from multitenant container database
NORTH_SALES.
Dropping pluggable database REGION1 from multitenant container database
NORTH_SALES.
Succeeded.
```

Example 5: Performing a Pre-Migration Verification of a Source PDB

```
DGMGRL> MIGRATE PLUGGABLE DATABASE REGION10 TO CONTAINER SOUTH_SALES_NEW
USING .* CONNECT AS sys/knl_test7@tkdg4_tns SECRET "s123" KEYSTORE IDENTIFIED
BY "Welcome4c" STANDBY FILES sys/knl_test7@inst11 ;
Connected.
Master keys of the pluggable database REGION10 to need to be migrated.
Keystore of pluggable database REGION10 is open.

Beginning migration of pluggable database REGION10.
Source multitenant container database is SOUTH_SALES.
Destination multitenant container database is SOUTH_SALES_NEW.

Connecting to "inst11".
Connected as SYSASM.
Stopping Redo Apply services on multitenant container database
SOUTH_SALES_NEW_STANDBY.
```


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```
The guaranteed restore point "..." was created for multitenant container
database "SOUTH_SALES_NEW_STANDBY".
Restarting redo apply services on multitenant container database
SOUTH_SALES_NEW_STANDBY.
Closing pluggable database REGION10 on all instances of multitenant container
database SOUTH_SALES.
Unplugging pluggable database REGION10 from multitenant container database
SOUTH_SALES.
Pluggable database description will be written to ...
Dropping pluggable database REGION10 from multitenant container database
SOUTH_SALES.
Waiting for the pluggable database REGION10 to be dropped from standby
multitenant container database SOUTH_SALES_STANDBY.
Creating pluggable database REGION10 on multitenant container database
SOUTH_SALES_NEW.
Checking whether standby multitenant container database
SOUTH_SALES_NEW_STANDBY has added all data files for pluggable database
REGION10.
Stopping Redo Apply services on multitenant container database
SOUTH_SALES_NEW_STANDBY.
Opening pluggable database REGION10 on all instances of multitenant container
database SOUTH_SALES_NEW.
The guaranteed restore point "..." was dropped for multitenant container
database "SOUTH_SALES_NEW_STANDBY".
Please complete the following steps to finish the operation:
1. Copy keystore located in ... for migration destination primary database
to ... for migration destination standby database.
2. Start DGMGRL, connect to multitenant container database SOUTH_SALES_NEW,
and issue command "EDIT DATABASE SOUTH_SALES_NEW_STANDBY SET STATE=APPLY-ON".
3. If the clusterware is configured on multitenant container databases
SOUTH_SALES_NEW or SOUTH_SALES_NEW_STANDBY, add all non-default services for
the migrated pluggable database in cluster ready services.
Migration of pluggable database REGION10 completed.
Succeeded.
```

PREPARE DATABASE FOR DATA GUARD

The `PREPARE DATABASE FOR DATA GUARD` command configures a database for use as a primary database in a Data Guard broker configuration. Database initialization parameters are set to recommended values.

Format

PREPARE DATABASE FOR DATA GUARD [WITH DB_UNIQUE_NAME IS <*db_unique_name*>] [DB_RECOVERY_FILE_DEST IS <*directory_location*>] [DB_RECOVERY_FILE_DEST_SIZE is <*size*>] [BROKER_CONFIG_FILE_1 IS <*broker_config_file_1_location*>] [BROKER_CONFIG_FILE_2 IS <*broker_config_file_2_location*>] [RESTART];

Command Parameters

db_unique_name
The value for the `DB_UNIQUE_NAME` initialization parameter. If the initialization parameter has been set to a different value, the existing value is replaced with the value specified by

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db_unique_name. If this parameter is not specified, the DB_UNIQUE_NAME parameter is set to the value of the DBNAME parameter.

directory_location
The directory name for the DB_RECOVERY_FILE_DEST initialization parameter, which represents the fast recovery area location. The specified directory must be accessible by all instances of a RAC database.
This parameter can be omitted if a local archive destination is set. However, if the DB_RECOVERY_FILE_DEST initialization parameter has not been set and no local archive destination has been set, specifying this parameter is mandatory.
If directory_location is specified, a log_archive_dest_n initialization parameter is set to the value USE_DB_RECOVERY_FILE_DEST. This is done whether or not there is a local archive destination already set.

size
A size value for the DB_RECOVERY_FILE_DEST initialization parameter. This parameter is mandatory if the DB_RECOVERY_FILE_DEST is specified.

broker_config_file_1_location
A file location that is used to set the DG_BROKER_CONFIG_FILE1 initialization parameter. The file location specified must be accessible by all instances of a RAC database.
This is an optional command parameter.

broker_config_file_2_location
A file location that is used to set the DG_BROKER_CONFIG_FILE2initialization parameter. The file location specified must be accessible by all instances of a RAC database.
This is an optional command parameter.

restart
The RESTART keyword allows for automatic restart of the database if any static initialization parameters require a change, or if the database requires to be in MOUNTED mode to enable archive log mode. If omitted, and any static changes are required, the command will fail.

Prerequisites

You must connect to the primary database as a user with the SYSDBA privilege.

Usage Notes

- Database versions starting from Oracle Database 12*c* Release 2 are supported.
- For a single-instance database, if a server parameter file does not exist, it is created using the current in-memory parameter settings and stored in the default location.
- This command sets the following initialization parameters, as per the values recommended for the Maximum Availability Architecture (MAA):
  - DB_FILES=1024
  - LOG_BUFFER=256M
  - DB_BLOCK_CHECKSUM=TYPICAL
    If this value is already set to FULL, the value is left unchanged.
  - DB_LOST_WRITE_PROTECT=TYPICAL
    If this value is already set to FULL, the value is left unchanged.
  - DB_FLASHBACK_RETENTION_TARGET=120
    If this parameter is already set to a non-default value, it is left unchanged.
  - PARALLEL_THREADS_PER_CPU=1

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  - DG_BROKER_START=TRUE

- This command enables archivelog mode, enables force logging, enables Flashback Database, and sets the RMAN archive log deletion policy to SHIPPED TO ALL STANDBY.
- If standby redo logs do not exist in the primary database, they are added. If the logs exist and are misconfigured, they are deleted and recreated.

Command Example

The following example prepares a database with the name boston for use as a primary database. The recovery destination is $ORACLE_BASE_HOME/dbs.

```
DGMGRL> PREPARE DATABASE FOR DATA GUARD
    WITH DB_UNIQUE_NAME IS boston
    DB_RECOVERY_FILE_DEST IS "$ORACLE_BASE_HOME/dbs/"
    DB_RECOVERY_FILE_DEST_SIZE is "400G"
    DG_BROKER_CONFIG_FILE1 IS "$ORACLE_HOME/dbs/file1.dat"
    DG_BROKER_CONFIG_FILE2 IS "$ORACLE_HOME/dbs/file2.dat";

Preparing database "boston" for Data Guard.
Creating server parameter file (SPFILE) from initialization parameter memory
values.
Database must be restarted after creating the server parameter (SPFILE).
Shutting down database "boston".
Database closed.
Database dismounted.
ORACLE instance shut down.
Starting database "boston" to mounted mode.
ORACLE instance started.
Database mounted.
Server parameter file (SPFILE) is "ORACLE_BASE_HOME/dbs/spboston.ora".
Initialization parameter DB_UNIQUE_NAME set to 'boston'.
Initialization parameter DB_FILES set to 1024.
Initialization parameter LOG_BUFFER set to 268435456.
Primary database must be restarted after setting static initialization
parameters.
Primary database must be restarted to enable archivelog mode.
Shutting down database "boston".
Database dismounted.
ORACLE instance shut down.
Starting database "boston" to mounted mode.
ORACLE instance started.
Database mounted.
Initialization parameter DB_FLASHBACK_RETENTION_TARGET set to 120.
Initialization parameter DB_BLOCK_CHECKSUM set to 'TYPICAL'.
Initialization parameter DB_LOST_WRITE_PROTECT set to 'TYPICAL'.
Initialization parameter PARALLEL_THREADS_PER_CPU set to 1.
Removing RMAN archivelog deletion policy 1.
Removing RMAN archivelog deletion policy 2.
RMAN configuration archivelog deletion policy set to SHIPPED TO ALL STANDBY.
Initialization parameter DB_RECOVERY_FILE_DEST_SIZE set to '400G'.
Initialization parameter DB_RECOVERY_FILE_DEST set to 'ORACLE_BASE_HOME/dbs/'.
Initialization parameter DG_BROKER_START set to FALSE.
Initialization parameter DG_BROKER_CONFIG_FILE1 set to 'ORACLE_HOME/dbs/
file1.dat'.
Initialization parameter DG_BROKER_CONFIG_FILE2 set to 'ORACLE_HOME/dbs/
```


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```
file2.dat'.
LOG_ARCHIVE_DEST_n initialization parameter already set for local archival.
Initialization parameter LOG_ARCHIVE_DEST_2 set to
'location=use_db_recovery_file_dest valid_for=(all_logfiles, all_roles)'.
Initialization parameter LOG_ARCHIVE_DEST_STATE_2 set to 'Enable'.
Initialization parameter STANDBY_FILE_MANAGEMENT set to 'MANUAL'.
Standby log group 4 will be dropped because it was not configured correctly.
Standby log group 3 will be dropped because it was not configured correctly.
Adding standby log group size 26214400 and assigning it to thread 1.
Initialization parameter STANDBY_FILE_MANAGEMENT set to 'AUTO'.
Initialization parameter DG_BROKER_START set to TRUE.
Database set to FORCE LOGGING.
Database set to ARCHIVELOG.
Database set to FLASHBACK ON.
Database opened.
```

QUIT

The `QUIT` command quits (exits) the Data Guard command-line interface.

Format

QUIT;

Command Parameters

None.

Usage Notes

- This command has the same effect as the EXIT command.
- A database connection is not required to execute this command. However, if you are connected, this command breaks the connection.

Command Example

The following example shows how to quit (exit) the command-line interface.

```
DGMGRL> QUIT;
```

REINSTATE DATABASE

The `REINSTATE DATABASE` command reinstates a database as a new standby database in the broker configuration for the current primary database.

Format

REINSTATE DATABASE <*db_unique_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database that is to be reinstated.

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Usage Notes

- If the conditions for reinstatement described in Reinstating the Former Primary Database in the Broker Configuration are not satisfied, the reinstatement will fail with an appropriate error status and the specified database will remain disabled.
- If the *db_unique_name* specified is that of the old primary and fast-start failover is enabled, the old primary database will be reinstated as a standby to the new primary, and the fast-start failover environment will be updated to reflect the availability of the new standby database. It will accept redo data from the new primary database and be the target of a fast-start failover should the new primary database fail. Reinstatement occurs automatically if the observer is running unless the `FastStartFailoverAutoReinstate` configuration property is set to `FALSE`.
- This command does not require that fast-start failover be enabled. It can be used to reinstate an old primary database after a complete manual failover has been performed. It can also be used to reinstate a bystander standby database that had been disabled after either a complete or immediate failover.
- Issue this command while connected to any database in the broker configuration, except the database that is to be reinstated.

Command Example

The following example reinstates the `North_Sales` database as a standby database in the broker configuration.

```
DGMGRL> REINSTATE DATABASE 'North_Sales';
Reinstating database "North_Sales", please wait...
Reinstatement of database "North_Sales" succeeded
```

REMOVE CONFIGURATION

The `REMOVE CONFIGURATION` command removes the Oracle Data Guard broker configuration and ends broker management of all members in the configuration.

Format

REMOVE CONFIGURATION [PRESERVE DESTINATIONS];

Command Parameters

None.

Usage Notes

- When a configuration is removed, broker management of all configuration members is disabled.
- By default, the command removes the corresponding broker settings of the `LOG_ARCHIVE_DEST_`*n* initialization parameter on the primary database and the `LOG_ARCHIVE_CONFIG` initialization parameters on all members of the configuration. To preserve these settings, use the `PRESERVE DESTINATIONS` option.
- This command does not remove or affect the actual primary or standby database instances, databases, far sync instances, data files, control files, initialization parameter files, server parameter files, or log files of the underlying Oracle Data Guard configuration.
- A configuration cannot be removed when when fast-start failover is enabled.

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Command Examples

The following examples show a successful and an unsuccessful `REMOVE CONFIGURATION` command.

Example 1

The following command shows how to remove configuration information from the configuration file.

```
DGMGRL> REMOVE CONFIGURATION;
Removed configuration
DGMGRL> SHOW CONFIGURATION;
Error: ORA-16532: Data Guard broker configuration does not exist

Configuration details cannot be determined by DGMGRL
```

Example 2

The following command is unsuccessful because fast-start failover is enabled.

```
DGMGRL> REMOVE CONFIGURATION;
Error: ORA-16654: fast-start failover is enabled

Failed.

DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
    North_Sales  - Primary database
      South_Sales  - (*) Physical standby database

Fast-Start Failover: Enabled in Zero Data Loss Mode

Configuration status:
SUCCESS
```

REMOVE DATABASE

The `REMOVE DATABASE` command removes the specified standby database from the broker configuration and terminates broker management of that standby database.

Format

REMOVE DATABASE <*db_unique_name*> [PRESERVE DESTINATIONS];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database that you want to remove from the broker configuration.

Usage Notes

- An error is returned if you specify the name of the primary database in the broker configuration.

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- By default, this command removes all references to the specified database from all redo transport initialization parameters at each member of the configuration. To preserve these settings, use the `PRESERVE DESTINATIONS` option.
- This command cannot be executed if fast-start failover is enabled and *database_name* specifies the name of the target standby database.

Command Example

The following example shows how to remove a database from the Oracle Data Guard broker configuration.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
      South_Sales  - Physical standby database

Fast-Start Failover: DISABLED

Configuration status:
SUCCESS

DGMGRL> REMOVE DATABASE 'South_Sales';
Removed database "South_Sales" from the configuration.


Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database

Fast-Start Failover: DISABLED

Configuration status:
SUCCESS
```

REMOVE FAR_SYNC

The `REMOVE FAR SYNC` command removes a far sync instance from an Oracle Data Guard broker configuration.

Format

REMOVE FAR_SYNC <*db_unique_name*> [PRESERVE DESTINATIONS];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the far sync instance that you want to remove from the broker configuration.

Usage Notes

- A far sync instance that has its `RedoRoutes` property set cannot be removed.

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- By default, this command removes all references to the specified far sync instance from all redo transport initialization parameters at each member of the configuration. To preserve these settings, use the `PRESERVE DESTINATIONS` option.

Command Example

The following example removes a far sync instance named `dallas` from the broker configuration.

```
DGMGRL> REMOVE FAR_SYNC 'dallas';
```

REMOVE INSTANCE

The `REMOVE INSTANCE` command removes the specified instance from the broker configuration.

Format

REMOVE INSTANCE *`instance_name`* [ON { DATABASE | FAR_SYNC } <*`db_unique_name`*>];

Command Parameters

instance_name
The name of the instance (SID) that you want to remove from the broker configuration.

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the member with which the instance-name is associated.

Usage Notes

- The broker automatically adds started instances to the broker configuration. However, the broker does not automatically remove instances from the database. The `REMOVE INSTANCE` command can be used to manually remove any instance that no longer exists from the configuration.
- If the `instance_name` is not unique within the configuration, then you must specify both the `DB_UNIQUE_NAME` initialization parameter value of the member, and the `instance_name` to fully identify the instance.
- This command is rejected for an instance that is currently active in the broker configuration.
- This command is rejected if this is the only instance currently associated with a database or far sync.

Command Example

The following example shows how to remove an instance of the database.

```
DGMGRL> REMOVE INSTANCE 'south_sales3' ON DATABASE 'South_Sales';
Removed instance "south_sales3" from the database "South_Sales"
```

REMOVE PLUGGABLE DATABASE

This command stops recovery at a target PDB and then drops the target PDB. Dropping the target PDB ends data protection for the source PDB in a DG PDB environment.

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Format

```
REMOVE PLUGGABLE DATABASE pdb-name AT database-name;
```

Parameters

Parameter	Description
`pdb-name`	Name of the target PDB that must be removed from target database.
`database-name`	Name of the target database that contains the specified target PDB.

Usage Notes

- The specified target PDB must have been configured using the `ADD PLUGGABLE DATABASE` command.

Examples

Example 10-8

This example removes the target PDB named `dgpdb_sales` from the target database `cdb_newyork`. This stops the recovery process at the target PDB and removes it from the target database.

```
DGMGRL> REMOVE PLUGGABLE DATABASE dgpdb_sales AT cdb_newyork;
Removed.
```

REMOVE RECOVERY_APPLIANCE

The `REMOVE RECOVERY_APPLIANCE` command removes the specified Zero Data Loss Recovery Appliance (Recovery Appliance) from the broker configuration and terminates broker management of the Recovery Appliance.

> ⚠ **Caution**
>
> When you use the `REMOVE RECOVERY_APPLIANCE` command, the Recovery Appliance profile information is deleted from the broker configuration file and cannot be recovered.

Format

REMOVE RECOVERY_APPLIANCE <*db_unique_name*> [PRESERVE DESTINATIONS];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the Recovery Appliance you want to remove from the broker configuration.

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Usage Notes

- By default, this command removes the corresponding broker settings of the LOG_ARCHIVE_DEST_n initialization parameter on the member that was shipping redo data to the Recovery Appliance and the LOG_ARCHIVE_CONFIG initialization parameter on all databases in the configuration. To preserve these settings, use the PRESERVE DESTINATIONS option.

Command Example

The following example shows how to remove a Recovery Appliance from a Data Guard broker configuration.

```
DGMGRL> SHOW CONFIGURATION;
 Configuration - DRSolution
   Protection Mode: MaxPerformance
  Members:
    North_Sales   - Primary database
    South_Sales   - Physical standby database
    EnterpriseRecoveryAppliance - Oracle Backup Appliance

Fast-Start Failover: DISABLED
 Configuration status:
SUCCESS (status updated 30 seconds ago)

DGMGRL> REMOVE RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
Removed Oracle Backup Appliance "EnterpriseRecoveryAppliance" from the configuration.

DGMGRL> SHOW CONFIGURATION;
 Configuration - DRSolution
   Protection Mode: MaxPerformance
  Members:
    North_Sales  - Primary database
    South_Sales  - Physical standby database

Fast-Start Failover: DISABLED
 Configuration status:
SUCCESS (status updated 60 seconds ago)
```

SET ECHO

The SET ECHO command controls whether or not to echo commands that are issued either at the command-line prompt or from a DGMGRL script.

Format

SET ECHO [ON | OFF];

Usage Notes

- None

Command Example

```
DGMGRL> SET ECHO ON;
DGMGRL> SHOW CONFIGURATION;
SHOW CONFIGURATION;
```


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```
Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales  - Primary database
    South_Sales - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS
```

SET FAST_START FAILOVER TARGET

The `SET FAST_START FAILOVER TARGET` command enables you to set the fast-start failover target to the named standby database without disabling fast-start failover or modifying the fast start failover list.

Format

SET FAST_START FAILOVER TARGET TO <*db_unique_name*> [NOWAIT];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the the standby database that must be the new fast-start failover target.

Usage Notes:

- The `NOWAIT` clause specifies that the command will not wait for the change of fast-start failover target to complete.

Command Example

Example 1: Setting the Fast-start Failover to a Specific Standby

The following example shows how to set the fast-start failover target to the standby database named `Boston`.

```
DGMGRL> SET FAST_START FAILOVER TARGET TO Boston;
Changing fast-start failover target to 'Boston'…
Succeeded.

DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

    Protection Mode: MaxAvailability
    Lag Limit: 0 seconds

  Threshold:          180 seconds
  Ping Interval: 3000 milliseconds
  Ping Retry: 0
```


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```
  Active Target:      Boston
  Potential Targets:  "Nashua, Boston"
    Nashua   valid
    Boston    valid
  Observer:            observer-node
  Lag Limit:           30 seconds (not in use)
  Shutdown Primary:    TRUE
  Auto-reinstate:      TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
(none)
```

Example 2: Using the NOWAIT Mode with Setting a Fast Start Failover Target

The following command sets the fast-start failover target to the standby database named Boston. The `NOWAIT` clause specifies that the command will not wait for the change of fast-start failover target to complete.

```
DGMGRL> SET FAST_START FAILOVER TARGET TO Boston NOWAIT;
Fast-start failover target switch to “Boston” requested.

DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode:    MaxAvailability
  Lag Limit:          0 seconds

  Threshold:          180 seconds
  Active Target:      Nashua
  Potential Targets:  "Nashua, Boston"
    Nashua   valid
    Boston    valid
  Observer:            observer-node
  Shutdown Primary:    TRUE
  Auto-reinstate:      TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES
```


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```
  Oracle Error Conditions:
    (none)


DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode:    MaxAvailability
  Lag Limit:          0 seconds

  Threshold:          180 seconds
  Active Target:      Boston
  Potential Targets:  "Nashua, Boston"
    Nashua   valid
    Boston    valid
  Observer:            observer-node
  Shutdown Primary:    TRUE
  Auto-reinstate:      TRUE
  Observer Reconnect: (none)
  Observer Override:  FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile          YES
    Corrupted Dictionary           YES
    Inaccessible Logfile            NO
    Stuck Archiver                  NO
    Datafile Write Errors          YES

  Oracle Error Conditions:
    (none)
```

SET MASTEROBSERVER TO

The `SET MASTEROBSERVER TO` command lets you manually change which observer is recognized as the master observer.

Use the `SET MASTEROBSERVER TO` command to manually designate which observer is to be used as the master.

Format

SET MASTEROBSERVER TO <*observer_name*>

Command Parameters

observer_name
The name of the observer that you want to be the master observer.

Usage Notes

- If the specified observer name does not exist, an error message is returned and the master observer is not changed

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- When this command is issued, the actual switch does not happen until the next time the primary contacts the target standby, usually within three seconds if fast-start failover is enabled. You should use the `SHOW OBSERVER` command to verify that the switch took place.
- For the manual setting to succeed, the following conditions must be met during the next fast-start failover ping:
  - The target standby is enabled and does not require reinstatement.
  - There is no role change, reinstating, or fast-start failover target switch in progress
- If the property `PreferredObserverHosts` is set to use priorities and you try to promote an observer with a lower priority, the change will be immediately reverted. In this case, instead of using `SET MASTEROBSERVER TO`, modify the `PreferredObserverHosts` property to give higher priority to the observer you want to promote.

Command Example

The following is an example of designating a new observer to be the master.

```
DGMGRL> SET MASTEROBSERVER TO boston-obsever;
Succeeded.
```

SET MASTEROBSERVERHOSTS

The `SET MASTEROBSERVERHOSTS` command sets the master observer of a broker configuration to the observer on the target host.

For each broker configuration in a specified group, if it has a backup observer running on the target host, then set the master observer of this broker configuration to the observer on the target host.

Format

SET MASTEROBSERVERHOSTS {FOR <*`configuration_group_name`*>} TO *`host_name`*;

Command Parameters

configuration_group_name
The name of a broker configuration group, on which you want to move the master observer to the target host.

host_name
The target host to which you want to move the master observer for the broker configurations in the specified group.

Usage Notes

- If no*`configuration_group_name`* command parameter is specified, then this command attempts to switch the master observer to the specified host for all broker configurations defined in the observer configuration file.
- The *configuration_group_name* cannot be the keyword `ALL`.
- The actual switch does not happen until the next time the primary contacts the target standby in each broker configuration, usually within three seconds if fast-start failover is enabled. You should use the `SHOW OBSERVERS` command to verify that the switch took place.

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- Information about the DGMGRL commands run and execution details are written to the log file, `superobserver.log`. This file is located in the `$DG_ADMIN/admin/` directory. If the `DG_ADMIN` environment variable is not defined, this file is located in the current working directory.

Command Example

```
DGMGRL> SET MASTEROBSERVERHOSTS FOR GRP_A TO dgnet0;
```

SET ObserverConfigFile

The `SET ObserverConfigFile` command sets the full path and file name of an observer configuration file.

An observer configuration file stores information about managed configurations. The commands `START OBSERVING`, `STOP OBSERVING`, and `SHOW OBSERVERS` read the information about broker configuration groups from the file specified on this command.

Format

SET ObserverConfigFile = <*observer_configuration_file*>

Command Parameters

observer_configuration_file
The full path of an observer configuration file.

Usage Notes

- `ObserverConfigFile` is a DGMGRL runtime property. It neither resides in broker configuration metadata nor is persisted to disk. If the observer configuration file name is not observer.ora or it does not exist in the current working directory, then you must specify the name every time you start a new DGMGRL client.
- The default value of the property `ObserverConfigFile` is `observer.ora`.
- You can specify an absolute path for the observer configuration file. If you specify only a file name, the default path is the `DG_ADMIN/admin` directory. If `DG_ADMIN` is not defined, the default path is the current working directory.
- When you issue this command, the name of the configuration file is changed even if the file you specify does not exist or the content of the file is invalid.

Command Example

```
DGMGRL> SET ObserverConfigFile = /usr/oracle/observer.ora
```

SET TIME

The DGMGRL `SET TIME` command turns timestamp printing on and off.

The timestamp printing feature records the timestamp as you input each command at the DGMGRL prompt. This information can be helpful with analysis of DGMGRL console input and output.

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Format

SET TIME [ON | OFF];

Usage Notes

- None

Command Example

```
DGMGRL> SET TIME ON;
03/09/2023 09:28:21 DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:
  North_Sales  - Primary database
    South_Sales - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS

03/09/2023 09:28:24 DGMGRL> SET TIME OFF;
DGMGRL>
```

SET TRACE_LEVEL

The `SET TRACE_LEVEL` command sets the amount of tracing done by DGMGRL. This is a client-side setting and does not impact the tracing set for the broker within the Oracle Database.

Format

SET TRACE_LEVEL [SUPPORT | USER | NONE];

Usage Notes

- Set trace level to USER to limit the amount of tracing information stored. This is the default setting and includes information about fast-start failover, status changes of the primary and target standby database, and error or warning messages.
- Set trace level to SUPPORT to increase the amount of tracing information to include lower-level information needed by Oracle Support Services.

Example 10-9 Setting the DGMGRL and Observer Tracing Levels

The following example starts DGMGRL with the `TRACE_LEVEL` set to the default setting of USER. The `SET TRACE_LEVEL` command is used to modify the trace level for DGMGRL to SUPPORT.

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When you subsequently start the observer, use the TRACE_LEVEL clause to set the observer's trace level to USER. If you omit the TRACE_LEVEL clause in the START OBSERVER command, the observer is started using the same trace level setting as DGMGRL, SUPPORT.

```
$ dgmgrl
DGMGRL> SET TRACE_LEVEL SUPPORT;
DGMGRL> START OBSERVER TRACE_LEVEL is USER;
```

Example 10-10 Setting the DGMGRL and Database Tracing Levels to Different Values

The following example sets the DGMGRL trace level to SUPPORT. The EDIT CONFIGURATION command is used to set the trace level of the Oracle Database to USER. Therefore, DGMGRL and the database use different tracing levels.

```
$ dgmgrl
DGMGRL> SET TRACE_LEVEL support;
DGMGRL> EDIT CONFIGURATION SET PROPERTY TraceLevel = USER;
```

SHOW ALL

The SHOW ALL command shows the values of DGMGRL CLI properties.

Format

SHOW ALL;

Usage Notes

- None

Command Example

```
DGMGRL> SHOW ALL;
echo OFF
observerconfigfile = observer.ora
time OFF
trace_level USER
```

SHOW ALL MEMBERS (Parameter)

The EDIT ALL MEMBERS SET command displays the value of the specified initialization parameter for all members in the configuration.

Format

```
SHOW ALL MEMBERS PARAMETER <parameter_name>;
```

Command Parameters

parameter_name
The name of an existing initialization parameter.

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Command Example

The following example shows how to set `NetTimeout` for all members in the configuration.

```
SHOW ALL MEMBERS PARAMETER log_archive_trace;
  North_Sales : log_archive_trace = '255'
  South_Sales: log_archive_trace = '255
```

SHOW ALL MEMBERS (Property)

The `SHOW ALL MEMBERS` (Property) command displays the value of the specified property for all members in the configuration.

Format

```
SHOW ALL MEMBERS <property_name>;
```

Command Parameters

property_name
The name of an existing member-specific configurable property.

Command Example

```
SHOW ALL MEMBERS 'Nettimeout';
  North_Sales : Nettimeout = '45'
  South_Sales: Nettimeout = '45'
```

SHOW CONFIGURATION

The `SHOW CONFIGURATION` command displays a summary and status of the broker configuration.

The summary lists all members included in the broker configuration and other information pertaining to the broker configuration itself, including the fast-start failover status and the transport lag and apply lag of all standby databases.

Format

SHOW CONFIGURATION [LAG] [VERBOSE];
SHOW CONFIGURATION <*property_name*>;

Command Parameters

property_name
The name of the property for which you want to display summary information.
See Oracle Data Guard Broker Properties for complete information about properties.

verbose
This command parameter is used to force an immediate health evaluation of the configuration before the health information is shown. It also displays all configuration properties and their values.

Usage Notes

- The `lag` command option displays the following information about the broker configuration:
  - transport lag and apply lag for every standby database

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  - transport lag for every far sync instance
  - neither transport nor apply lag is displayed for a Recovery Appliance
- Use the `SHOW CONFIGURATION VERBOSE` command (or the `SHOW FAST_START FAILOVER` command) to show the properties related to fast-start failover.
- You can optionally specify either `VERBOSE` or `property_name`, but not both.
- The `SHOW CONFIGURATION` command displays the status of the configuration and its members as of the last time the health was evaluated. (The health of the configuration and its members is evaluated once a minute.)

  Specifying the `VERBOSE` keyword forces an immediate health evaluation of the configuration and its members before the health information is displayed.
- During a rolling upgrade done using the PL/SQL package `DBMS_ROLLING`, the `SHOW CONFIGURATION` command shows `Transient logical standby database` as the role of the upgrade target, and `ROLLING DATABASE MAINTENANCE IN PROGRESS` as the configuration status. See Example 3.
- The display highlights the current fast-start failover target with an asterisk (*) when fast-start failover is enabled

Command Examples

Example 1: Showing a Summary of the DRSolution Configuration

The following example provides a summary of the `DRSolution` configuration for which fast-start failover is disabled. The output shows a far sync instance named `FS` in the broker configuration. The `North_Sales` database is shipping to `FS`, and `FS` is shipping to `South_Sales`.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales  - Primary database
    FS- Far sync instance
      South_Sales- Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS   (status updated 20 seconds ago)
```

Example 2: Showing Detailed Description of the DRSolution Configuration

The following example provides detailed information about the DRSolution configuration, including configuration properties, and fast-start failover-related information:

```
    DGMGRL> SHOW CONFIGURATION VERBOSE;

    Configuration - DRSolution

      Protection Mode: MaxAvailability
      Members:

      North_Sales  - Primary database
        FS- Far sync instance
          South_Sales- (*) Physical standby database

      (*) Fast-Start Failover target
```


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```
    Properties:
      FastStartFailoverThreshold      = '30'
      OperationTimeout                = '30'
      TraceLevel                      = 'USER'
      FastStartFailoverLagLimit       = '30'
      CommunicationTimeout            = '180'
      ObserverReconnect               = '0'
      FastStartFailoverAutoReinstate  = 'TRUE'
      FastStartFailoverPmyShutdown    = 'TRUE'
      BystandersFollowRoleChange      = 'ALL'
      ObserverOverride                = 'FALSE'
      ExternalDestination1            = ''
      ExternalDestination2            = ''
      PrimaryLostWriteAction          = 'CONTINUE'
      ConfigurationWideServiceName = 'North_Sales_CFG'

  Fast-Start Failover: Enabled in Zero Data Loss Mode

    Lag Limit:          0 seconds
    Threshold:          30 seconds
    Active Target:      South_Sales
    Potential Targets:  “South_Sales”
        South_Sales     valid
    Observer:           observer.example.com
    Shutdown Primary:   TRUE
    Auto-reinstate:     TRUE
    Observer Reconnect: (none)
    Observer Override:  FALSE

  Configuration Status:
  WARNING
```

Example 3: Sample Output During a Rolling Upgrade Performed with the DBMS_ROLLING Package

```
Configuration - DRSolution

  Protection Mode: MaxPerformance
  Members:

  North_Sales  - Primary database
    South_Sales - Transient logical standby database

Fast-Start Failover: DISABLED

Configuration Status:
    ROLLING DATABASE MAINTENANCE IN PROGRESS
```

Example 4: Showing Detailed Transport and Apply Lag Information

```
DGMGRL>  SHOW CONFIGURATION LAG VERBOSE ;

Configuration - The SUPER cluster

  Protection Mode: MaxPerformance
  Members:
    dgb6  - Primary database
    dgb6c - Physical standby database
```


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```
            Transport Lag:      0 seconds (computed 1 second ago)
            Apply Lag:          0 seconds (computed 1 second ago)
    dgb6e - Far sync instance
            Transport Lag:      0 seconds (computed 1 second ago)
    dgb6b - Snapshot standby database
            Transport Lag:      48 seconds (computed 2 seconds ago)
            Apply Lag:          53 seconds (computed 1 second ago)
    dgb6d - Logical standby database
            Transport Lag:      0 seconds (computed 1 second ago)
            Apply Lag:          0 seconds (computed 1 second ago)

  Properties:
    FastStartFailoverThreshold      = '180'
    OperationTimeout                = '30'
    TraceLevel                      = 'USER'
    FastStartFailoverLagLimit       = '300'
    CommunicationTimeout            = '180'
    ObserverReconnect               = '0'
    FastStartFailoverAutoReinstate  = 'TRUE'
    FastStartFailoverPmyShutdown    = 'TRUE'
    BystandersFollowRoleChange      = 'ALL'
    ObserverOverride                = 'FALSE'
    ExternalDestination1            = ''
    ExternalDestination2            = ''
    PrimaryLostWriteAction          = 'CONTINUE'
    ConfigurationWideServiceName    = 'b6_CFG'

Fast-Start Failover: DISABLED
```

SHOW CONFIGURATION WHEN PRIMARY IS

The `SHOW CONFIGURATION WHEN PRIMARY IS` command displays the redo transport configuration that would be in effect if the specified database were the primary database.

The display lists all members, but unlike `SHOW CONFIGURATION`, it does not provide status or any other configuration information.

Format

SHOW CONFIGURATION WHEN PRIMARY IS <*db_unique_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database for which you want to see what the redo transport configuration would be if it were the primary database.

Usage Notes

- Use the `SHOW CONFIGURATION WHEN PRIMARY IS` command to show the redo transport configuration that would be in effect if the specified database were the primary database. You can use this information to identify ahead of time any redo transport configurations that would be incorrect after a role change.

The `SHOW CONFIGURATION` command lists all members in the output of `SHOW CONFIGURATION`, it composes two sections: Section 1 starts with the line "Members:". It lists primary and all

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members receiving redo from primary directly or indirectly. Section 2 is optional . It starts with the line "Members Not Receiving Redo:" that lists members that don’t receive redo if any.

Command Example

The following example provides a summary of the `DRSolution` configuration before and after a role change to the `South_Sales` database.

```
DGMGRL> SHOW CONFIGURATION;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
  North_Sales - Primary database
    North_FS    - Far Sync
      South_Sales - Physical standby database

  Members Not Receiving Redo:
  South_FS - Far Sync

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS

DGMGRL> SHOW CONFIGURATION WHEN PRIMARY IS 'South_Sales';

Configuration when South_Sales is primary - DRSolution

  Members:
  South_Sales  - Primary database
    South_FS     - Far Sync
      North_Sales  - Physical standby database

  Members Not Receiving Redo:
  North_FS - Far Sync
```

These displays are based upon the `RedoRoutes` property being set as follows for each member:

```
DGMGRL> SHOW DATABASE 'North_Sales' RedoRoutes;
  RedoRoutes = '(LOCAL : North_FS)'

DGMGRL> SHOW FAR_SYNC 'North_FS' RedoRoutes;
  RedoRoutes = '(North_Sales : South_Sales)'

DGMGRL> SHOW DATABASE 'South_Sales' RedoRoutes;
  RedoRoutes = '(LOCAL : South_FS)'

DGMGRL> SHOW FAR_SYNC 'South_FS' RedoRoutes;
  RedoRoutes = '(South_Sales : North_Sales)'
```

SHOW CONNECTION

Shows the current database connection.

The `SHOW CONNECTION` command shows details about the current database connection.

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Format

```
SHOW CONNECTION;
```

Command Examples

Example 1:

```
DGMGRL> show connection;

Oracle SID is sales1.

Connected as SYSDBA to instance sales1 of North_Sales.
```

Example 2: Connection to an instance that is not running:

```
    DGMGRL> show connection;

Connected as SYSDBA to an idle instance.
```

SHOW DATABASE

The `SHOW DATABASE` command displays information, property values, or initialization parameter values of the specified database and its instances.

Format

SHOW DATABASE [VERBOSE] <*db_unique_name*> [<*property_name*>];

SHOW DATABASE <*db_unique_name*> PARAMETER <*parameter_name*>;

SHOW DATABASE <*db_unique_name*>VERSION

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database for which you want to display information. The `VERBOSE` keyword, if used, must come before the `db_unique_name` or an error is returned.

property_name
The name of the property for which you want to display a value. If a property name is specified, the output shows only the specified property (not all properties of the database), regardless of whether or not the `VERBOSE` keyword is specified.

> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for information about properties.

parameter_name
The name of the database initialization parameter for which you want to display a value. If a parameter name is specified, the output shows only the specified parameter (not all parameters), regardless of whether or not the `VERBOSE` keyword is specified.

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Usage Notes

- You must connect to the database whose property is being set by using any technique other than operating system authentication if using the PARAMETER command parameter.
- The SHOW DATABASE command shows a brief summary of the database. The SHOW DATABASE VERBOSE command shows properties of the database in addition to the brief summary. They both show the status of the database.
- The SHOW DATABASE VERBOSE command shows the locations of the Oracle alert log file and of the broker log file. The broker log file is created in the same directory as the alert log and is named drc<$ORACLE_SID>.log.
- The SHOW DATABASE VERBOSE command shows database-specific properties and instance-specific properties. For a non-Oracle RAC database, the values of the instance-specific properties are those of the only instance of the database. For an Oracle RAC database, the values of the instance-specific properties will not be shown, although the property names are still listed. To see the instance-specific values of these properties, use the SHOW INSTANCE command.
- The properties that the SHOW DATABASE VERBOSE command shows depend on the database role and the configuration composition:
  - For the primary database, properties specific to physical or snapshot standby databases are shown only if there is at least one physical or snapshot standby database in the configuration. The properties specific to logical standby databases are shown only if there is at least one logical standby database in the configuration.
  - For physical and snapshot standby databases, properties specific to logical standby databases are not shown.
  - For logical standby databases, properties specific to physical and snapshot standby databases are not shown.
- The VERBOSE option cannot be specified with the PARAMETER command option.
- This command is rejected if you use the SHOW DATABASE *database_name property_name* command to show an instance-specific property in an Oracle RAC database.
- The SHOW DATABASE VERSION command shows the database version information. The Instance number, Host Name, Instance Name, and Version values are read from the GV$INSTANCE view of the given database and displayed.
- During a rolling upgrade done using the PL/SQL package DBMS_ROLLING, the SHOW DATABASE command shows a WARNING with an appropriate ORA error for the upgrade target and the trailing or leading standbys, depending on the current rolling upgrade progress. See Example 3.

Command Examples

Example 1: Showing Database Information in Abbreviated Format

This example shows database information in an abbreviated format.

```
DGMGRL> SHOW DATABASE South_Sales;

Database - South_Sales

  Role:            PHYSICAL STANDBY
  Intended State:  APPLY-ON
```


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```
  Transport Lag:   (unknown)
  Apply Lag:       0 seconds (computed 0 seconds ago)
  Apply Rate:      1.73 MByte/s
  Real Time Query: OFF
  Instance(s):
    south_sales1

Database Status:
SUCCESS
```

Example 2: Showing Database Information in Extended Format

This example shows database information in an extended format.

```
DGMGRL> SHOW DATABASE VERBOSE 'North_Sales';

Database - North_Sales

  Role:               PRIMARY
  Intended State:     TRANSPORT-ON
  Instance(s):
    North_Sales1

  Properties:
    DGConnectIdentifier             = 'North_Sales.example.com'
    ObserverConnectIdentifier       = ''
    FastStartFailoverTarget         = ''
    PreferredObserverHosts          = ''
    LogShipping                     = 'ON'
    RedoRoutes                      = ''
    LogXptMode                      = 'ASYNC'
    DelayMins                       = '0'
    Binding                         = 'optional'
    MaxFailure                      = '0'
    ReopenSecs                      = '300'
    NetTimeout                      = '30'
    RedoCompression                 = 'DISABLE'
    PreferredApplyInstance          = ''
    ApplyInstanceTimeout            = '0'
    ApplyLagThreshold               = '0'
    TransportLagThreshold           = '0'
    TransportDisconnectedThreshold  = '0'
    ApplyParallel                   = 'AUTO'
    ApplyInstances                  = '0'
    ArchiveLocation                 = ''
    AlternateLocation               = ''
    StandbyArchiveLocation          = 'USE_DB_RECOVERY_FILE_DEST'
    StandbyAlternateLocation        = ''
    InconsistentProperties          = '(monitor)'
    InconsistentLogXptProps         = '(monitor)'
    LogXptStatus                    = '(monitor)'
    SendQEntries                    = '(monitor)'
    RecvQEntries                    = '(monitor)'
    HostName                        = 'North_Sales.example.com'
    StaticConnectIdentifier         = '(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)
(HOST=North_Sales.example.com)(PORT=2840))
```


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```
(CONNECT_DATA=(SERVICE_NAME=North_Sales_DGMGRL.example.com)
(INSTANCE_NAME=north_sales1)(SERVER=DEDICATED)))'
    TopWaitEvents                   = '(monitor)'
    SidName                         = '(monitor)'

  Log file locations:
    Alert log               : /dev/oracle/log/diag/rdbms/North_Sales/
north_sales1/trace/alert_north_sales1.log
    Data Guard Broker log   : /dev/oracle/log/diag/rdbms/North_Sales/
north_sales1/trace/drcnorth_sales1.log

Database Status:
SUCCESS
```

Example 3: Sample Output for the Target Database During a Rolling Upgrade Performed With the DBMS_ROLLING Package

```
DGMGRL> SHOW DATABASE South_Sales;

Database - South_Sales

  Role: Physical standby database
  Intended State: APPLY-ON
  Transport Lag: 0 seconds (computed 1 second ago)
  Apply Lag: 0 seconds (computed 1 second ago)
  Average Apply Rate: 6.00 KByte/s
  Real Time Query: OFF
  Instance(s):
    South

  Database Warning(s):
    ORA-16866: database converted to transient logical standby database for
rolling database maintenance

Database Status:
WARNING
```

Example 4: Sample Output For the Leading Standby During a Rolling Upgrade Performed With the DBMS_ROLLING Package

```
DGMGRL> SHOW DATABASE South_Sales;

Database - South_Sales

  Role: Physical standby database
  Intended State: APPLY-ON
  Transport Lag: 0 seconds (computed 0 seconds ago)
  Apply Lag: 0 seconds (computed 0 seconds ago)
  Average Apply Rate: 510.00 KByte/s
  Real Time Query: OFF
  Instance(s):
    South

  Database Warning(s):
    ORA-16881: standby database is not protecting the current primary
```


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```
database during rolling database maintenance

Database Status:
WARNING
```

Example 5: Sample output For Showing the Value of the `log_archive_trace` Initialization Parameter

```
DGMGRL> SHOW DATABASE South_Sales
PARAMETER log_archive_trace;
log_archive_trace = '127'
```

SHOW FAR_SYNC

The `SHOW FAR_SYNC` command shows information about a far sync instance.

Format

SHOW FAR_SYNC [VERBOSE] <*db_unique_name*> [<*property_name*>];

SHOW FAR_SYNC <*db_unique_name*> PARAMETER <*parameter_name*>;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the far sync instance for which you want to display information. The `VERBOSE` keyword, if used, must come before the db_unique_name or an error is returned.

property_name
The name of the property for which you want to display a value. If a property name is specified, the output shows only the specified property (not all properties of the far sync), regardless of whether or not the `VERBOSE` keyword is specified.

> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for information about properties.

parameter_name
The name of the database initialization parameter for which you want to display a value. If an initialization parameter name is specified, the output shows only the specified initialization parameter (not all initialization parameters of the far sync), regardless of whether or not the `VERBOSE` keyword is specified.

Usage Notes:

- The `VERBOSE` option cannot be specified with the `PARAMETER` command option.

Command Examples

Example 1: Sample SHOW FAR_SYNC Output Without VERBOSE

The following example shows sample output from this command:

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```
DGMGRL> SHOW FAR_SYNC FS;

Far Sync - FS

Transport Lag: 0 seconds (computed 1 second ago)
Instance(s):
  fs1

Far Sync Status:
SUCCESS
```

Example 2: Sample SHOW FAR SYNC Output With VERBOSE

The following example shows sample output from this command when the VERBOSE option is used:

```
DGMGRL> SHOW FAR_SYNC VERBOSE FS;

Far Sync - FS

Transport Lag: 0 seconds (computed 0 seconds ago)
Instance(s):
  b02

Properties:
  DGConnectIdentifier            = 'fs.example.com'
  LogXptMode                     = 'sync'
  RedoRoutes                     = '(North_Sales : South_Sales)
(South_Sales : North_Sales)'
  Binding                        = 'optional'
  MaxFailure                     = '0'
  ReopenSecs                     = '300'
  NetTimeout                     = '30'
  RedoCompression                = 'DISABLE'
  LogShipping                    = 'ON'
  TransportLagThreshold          = '0'
  TransportDisconnectedThreshold = '0'
  InconsistentProperties         = '(monitor)'
  InconsistentLogXptProps        = '(monitor)'
  LogXptStatus                   = '(monitor)'
  HostName                       = 'fs.example.com'
  StandbyArchiveLocation         = 'USE_DB_RECOVERY_FILE_DEST'
  StandbyAlternateLocation       = ''
  TopWaitEvents                  = '(monitor)'
  SidName =                      = '(monitor)'

Far Sync Status:
SUCCESS
```

SHOW FAST_START FAILOVER

The SHOW FAST_START FAILOVER command displays all fast-start failover related information.

If there is more than one registered observer running, then the output of this command shows all registered observers and indicates, with an asterisk, which one is the master observer. To see information in addition to host names of observers, use the SHOW OBSERVER command.

Format

SHOW FAST_START FAILOVER;

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Command Parameters

None.

Usage Notes

- The `SHOW FAST_START FAILOVER` command shows a summary of the fast-start failover configuration.
- The display shows the current fast-start failover target as well as candidate fast-start failover targets. If the `FastStartFailoverTarget` property of the primary database is set to `ANY`, then the candidate targets would include the standby databases that are properly configured for the prevailing protection mode.

Command Examples

Example 1: This example shows the output when there is only one registered observer running and there are multiple candidate targets.

```
DGMGRL> show fast_start failover;

Fast-Start Failover: Enabled in Zero Data Loss Mode

  Protection Mode: MaxAvailability
  Lag Limit: 0 seconds

  Threshold: 30 seconds
  Ping Interval: 3000 milliseconds
  Ping Retry: 0
  Active Target: db02
  Potential Targets: "db02"
    db02 valid
  Observers: nshga2713
                     nshga2714
  Shutdown Primary: TRUE
  Auto-reinstate: TRUE
  Observer Reconnect: (none)
  Observer Override: FALSE

Configurable Failover Conditions
  Health Conditions:
    Corrupted Controlfile YES
    Corrupted Dictionary YES
    Inaccessible Logfile NO
    Stuck Archiver NO
    Datafile Write Errors YES

  Oracle Error Conditions:
    (none)
```


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Example 2: This example shows the output when there are multiple registered observers running. The asterisk symbol (*) indicates which observer is the master.

```
DGMGRL> SHOW FAST_START FAILOVER;

Fast-Start Failover: Enabled in Zero Data Loss Mode

    Protection Mode: MaxAvailability
    Lag Limit: 0 seconds

    Threshold: 180 seconds
       Ping Interval: 3000 milliseconds
       Ping Retry: 0
    Active Target: South_Sales
    Potential Targets: "East_Sales, West_Sales"
        East_Sales valid
        West_Sales valid
    Observer: observer.example.com
    Shutdown Primary: TRUE
    Auto-reinstate: TRUE
    Observer Reconnect: (none)
    Observer Override: FALSE

Configurable Failover Conditions
   Health Conditions:
    Corrupted Controlfile YES
    Corrupted Dictionary YES
    Inaccessible Logfile NO
    Stuck Archiver NO
    Datafile Write Errors YES

Oracle Error Conditions:
    (none)
```

SHOW INSTANCE

The `SHOW INSTANCE` command displays information or property values for the specified instance.

Format

SHOW INSTANCE [VERBOSE] <*instance_name*> [<*property_name*>] [ON {DATABASE | FAR_SYNC <*db_unique_name*>}];

Command Parameters

instance_name
The name of the instance for which you want to display information. The `VERBOSE` keyword, if used, must come before the instance name.

property_name
The name of the property for which you want to display a value. If a property name is specified, the output shows only the specified property (not all properties), regardless of whether or not the `VERBOSE` keyword is specified.

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> **See Also**
>
> Managing the Members of a Broker Configuration and Oracle Data Guard Broker Properties for information about properties.

database_name | far_sync_name
The name of the database or far sync associated with the instance for which you want to show information.

Usage Notes

- The `SHOW INSTANCE` command shows a brief summary of the instance. The `SHOW INSTANCE VERBOSE` command shows properties of the instance in addition to the brief summary. They both show the status of the instance.
- The `SHOW INSTANCE VERBOSE` command shows the locations of the Oracle alert log file and of the broker log file. The broker log file is created in the same directory as the alert log and is named `drc<$ORACLE_SID>.log`.
- The `SHOW INSTANCE VERBOSE` command only shows instance-specific properties.
- The properties that the `SHOW INSTANCE VERBOSE` command shows depend on the database role and the configuration composition:
  - For instances of the primary database, properties specific to physical or snapshot standby instances are shown only if there is at least one physical or snapshot standby database in the configuration. The properties specific to logical standby instances are shown only if there is at least one logical standby database in the configuration.
  - For instances of physical or snapshot standby databases, properties specific to logical standby instances are not shown.
  - For instances of logical standby databases, properties specific to physical and snapshot standby instances are not shown.
- The *`instance_name`* can be unique across the configuration. If *`instance_name`* is not unique, you must specify both the *`database_name`* and the `instance_name` to fully identify the instance.

Command Examples

Example 1: Showing Instance Information in Abbreviated Format

The following example shows information about a specific instance of a database.

```
DGMGRL> SHOW INSTANCE 'north_sales1';

Instance 'north_sales1' of database 'North_Sales'

Instance Status:
SUCCESS
```

Example 2: Showing Instance Information in Extended Format

The following example shows instance information in an extended format.

```
DGMGRL> SHOW INSTANCE VERBOSE 'north_sales1';

Instance 'north_sales1' of database 'North_Sales'

  PFILE:
```


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```
  Properties:
    HostName                      = 'north.example.com'
    StaticConnectIdentifier       = '(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)
(HOST=north.example.com)(PORT=2094))
(CONNECT_DATA=(SERVICE_NAME=North_Sales_DGMGRL.example.com)
(INSTANCE_NAME=north_sales1)(SERVER=DEDICATED)))'
    TopWaitEvents                 = '(monitor)'
    SidName                       = '(monitor)'

  Log file locations:
    Alert log              : /db/oracle/log/diag/rdbms/North_Sales/north_sales1/trace/
alert_north_sales1.log
    Data Guard Broker log  : /db/oracle/log/diag/rdbms/North_Sales/north_sales1/trace/
drcnorth_sales1.log

Instance Status:
SUCCESS
```

SHOW OBSERVER

The `SHOW OBSERVER` command shows information about all registered observers in a Data Guard broker configuration.

The `SHOW OBSERVER` command displays the observer name, the host name where the observer is running, whether the observer is the master observer, and the last time the observer pinged the primary and standby. It shows this information for all the observers (up to 3) in this single configuration.

FORMAT

SHOW OBSERVER;

Command Parameters

None

Usage Notes

- This command requires a DGMGRL session, which submits this command, to be connected to a single configuration.
- This command can report correct last ping information only when FSFO is enabled.

Command Example

The following example `SHOW OBSERVER` command displays information about all registered observers in the `DRSolution` broker configuration.

```
DGMGRL> SHOW OBSERVER;

Configuration - DRSolution

Primary:               North_Sales
Active Target Standby: South_Sales

Observer "ob2" - Master

   Host Name:              observer2.example.com
   Last Ping to Primary:   1 second ago
   Last Ping to Target:    2 seconds ago
```


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```
Observer "ob1" - Backup

   Host Name:              observer1.example.com
   Last Ping to Primary:   1 second ago
   Last Ping to Target:    3 seconds ago

Observer "ob3" - Backup

   Host Name:              observer3.example.com
   Last Ping to Primary:   4 seconds ago
   Last Ping to Target:    5 seconds ago
```

SHOW ObserverConfigFile

The `SHOW ObserverConfigFile` command shows the value of the `ObserverConfigFile` property.

Format

SHOW *`ObserverConfigFile`*;

Command Parameters

None.

Usage Notes

- If the value of the `ObserverConfigFile` property is an empty string, then the output is *`current_working_directory`*`/observer.ora`.
- The `SHOW ObserverConfigFile` command attempts to parse the file pointed by the `ObserverConfigFile` property. If the file does not exist or parsing fails, then a message is returned that the file is not usable.

Command Example

```
DGMGRL> SHOW ObserverConfigFile;
ObserverConfigFile=/usr/oracle/observer
observer configuration file parsing succeeded
```

SHOW OBSERVERS

The `SHOW OBSERVERS` command shows information about all observers for all broker configurations in a specific configuration group.

The `SHOW OBSERVERS` command displays the observer name, the host name where the observer is running, whether the observer is the master observer, and the last time the observer pinged the primary and standby.

Format

SHOW OBSERVERS [FOR <*`configuration_group_name`*>];

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Command Parameters

configuration_group_name
The name of a valid broker configuration group file for which you want to show information about all running observers. Specifying this parameter results in information being shown about observers for all configurations in the specified group. The information shown by this command is the same as that shown by a `SHOW OBSERVER` command on an individual configuration.
If a group name is not specified, then `SHOW OBSERVERS` alone is also a valid command. It shows observer information for all broker configuration groups defined in the observer configuration file.
The configuration group name cannot be `ALL`.

Usage Notes

- This command can be used to verify that a manually performed switch to a new master observer was successful.

Command Example

```
DGMGRL> SHOW OBSERVERS;
ObserverConfigFile=observer.ora
observer configuration file parsing succeeded
Submit command SHOW OBSERVER using the connect identifier 'North_Sales'.
Connected to "North_Sales"

Configuration - DrSolution1

  Primary:            North_Sales
  Target:             South_Sales

Observer DRSolution1_Observer - Master

  Host Name:                    observer1.example.com
  Last Ping to Primary:         3 seconds ago
  Last Ping to Target:          3 seconds ago

Submit command SHOW OBSERVER using the connect identifier 'East_Sales'.
Connected to "East_Sales"

Configuration - DRSolution2

  Primary:            East_Sales
  Target:             West_Sales

Observer DRSolution2_Observer - Master

  Host Name:                    observer2.example.com
  Last Ping to Primary:         3 seconds ago
  Last Ping to Target:          3 seconds ago
```


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SHOW PLUGGABLE DATABASE

This command displays the information or property values of the specified pluggable database (PDB).

Format

```
SHOW PLUGGABLE DATABASE <pdb_name> AT <target_db_unique_name> [ALL];
SHOW ALL PLUGGABLE DATABASE AT <target_db_unique_name>
```

Command Parameters

pdb_name
Name of the PDB whose details must be displayed.

target_db_unique_name
Name of the database that contains the PDB specified in `pdb_name`. Include the `ALL` keyword to display information about all source PDBs and target PDBs at the database specified by `database_name`

Examples

Example 10-11 Displaying Details of a PDB

This example shows details about the PDB `sales` in an abbreviated format.

```
DGMGRL> SHOW PLUGGABLE DATABASE 'sales' AT boston;
Pluggable database 'sales' at database 'boston'
  Data Guard Role: Physical Standby
  Con_ID: 7
  Source: con_id 6 at newyork
  Transport Lag: +00 00:00:00 seconds
  Intended State: APPLY-ON
  Apply State: Running
  Apply Instance: boston
  Average Apply Rate: 16 KByte/s
  Real Time Query: OFF
```

SHOW RECOVERY_APPLIANCE

The `SHOW RECOVERY_APPLIANCE` command displays information, property values, or initialization parameter values of the specified Zero Data Loss Recovery Appliance (Recovery Appliance).

Format

SHOW RECOVERY_APPLIANCE [VERBOSE] <*db_unique_name*> [<`property_name`>;

Command Parameters

db_unique_name
The name of the Recovery Appliance for which you want to display information. The `VERBOSE` keyword, if used, must come before the Recovery Appliance name or an error is returned.

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property_name
The name of the property for which you want to display a value. If a property name is specified, the output shows only the specified property (not all properties of the Recovery Appliance), regardless of whether or not the VERBOSE keyword is specified.

Usage Notes

- The SHOW RECOVERY_APPLIANCE command shows a brief summary of the Recovery Appliance. The SHOW RECOVERY_APPLIANCE VERBOSE command shows properties of the Recovery Appliance in addition to the brief summary. They both show the status of the database.
- The SHOW RECOVERY_APPLIANCE VERBOSE command shows Recovery Appliance-specific properties.

Command Examples

Example 1: Recovery Appliance Information in Abbreviated Format

The following example shows Recovery Appliance information in an abbreviated format.

```
DGMGRL> SHOW RECOVERY_APPLIANCE 'EnterpriseRecoveryAppliance';
 Recovery Appliance - EnterpriseRecoveryAppliance

Recovery Appliance Status:
ENABLED
```

Example 2: Recovery Appliance Information in Extended Format

The following example uses the VERBOSE parameter to show Recovery Appliance information in an extended format.

```
DGMGRL> show member verbose 'EnterpriseRecoveryAppliance';

Recovery Appliance - EnterpriseRecoveryAppliance

  Properties:
    Binding = 'OPTIONAL'
    DGConnectIdentifier = 'RA.example.com'
    LogShipping = 'ON'
    LogXptMode = 'ASYNC'
    MaxFailure = '0'
    NetTimeout = '30'
    RedoCompression = 'DISABLE'
    ReopenSecs = '300'

Recovery Appliance Status:
ENABLED
```

SHUTDOWN

Shuts down a currently running Oracle instance.

Format

```
SHUTDOWN [ ABORT | IMMEDIATE | NORMAL ];
```


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Command Parameters

None.

Usage Notes

- Using the SHUTDOWN command with no arguments is equivalent to using the SHUTDOWN NORMAL command.
- The following list describes the options to the SHUTDOWN command:
  - ABORT

    Proceeds with the fastest possible shutdown of the database without waiting for calls to complete or for users to disconnect from the database. Uncommitted transactions are not rolled back. Client SQL statements being processed are terminated. All users connected to the database are implicitly disconnected, and the next database startup will require instance recovery. You must use this option if a background process terminates abnormally.

    > **⚠ Caution**
    >
    > If you use the ABORT option on the primary database when fast-start failover is enabled and the observer is running, a fast-start failover may ensue. Use the IMMEDIATE or NORMAL option to prevent an unexpected fast-start failover from occurring.

  - IMMEDIATE

    Does not wait for current calls to complete or users to disconnect from the database. Further connections are prohibited. The database is closed and dismounted. The instance is shut down, and no instance recovery is required on the next database startup.

  - NORMAL

    This is the default option. The process waits for users to disconnect from the database. Further connections are prohibited. The database is closed and dismounted. The instance is shut down, and no instance recovery is required on the next database startup.

Command Example

The following command shuts down the primary database in normal mode.

```
DGMGRL> SHUTDOWN;

Database closed.
Database dismounted.
Oracle instance shut down.
```

SPOOL

The SPOOL command records the input and output of DGMGRL to a file.

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Format

The SPOOL command has three possible formats:

```
SPOOL;

SPOOL spool_file_name [CREATE | REPLACE | APPEND];

SPOOL OFF;
```

If you simply enter SPOOL at the DGMGRL command prompt, then the current spool file name is displayed.

Otherwise, the available spooling options are defined as follows:

- CREATE—Create a new log file. If a spool file with the specified name already exists, the SPOOL command fails.
- REPLACE—Replace the existing spool file of the name specified. This is the default behavior if no option is specified.
- APPEND—Append the new log into the specified log file, if it exists. Otherwise create a new one.
- OFF—Turns spooling off.

Command Parameters

spool_file_name
The name of the file to which DGMGRL input and output will be written.

Usage Notes

- None

Command Example

The following example shows the output of the SPOOL command before and after spooling is started.

```
DGMGRL> SPOOL;
not spooling currently

DGMGRL> SPOOL mysession;

DGMGRL> SPOOL;
currently spooling to "mysession"

DGMGRL>
```

SQL

The SQL command executes a SQL statement or a PL/SQL stored procedure.

Format

SQL "<*sql_statmement*>"

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Command Parameters

sql_statement
The SQL statement or PL/SQL stored procedure to be executed.

Usage Notes

- The SQL statement or PL/SQL stored procedure is executed on the database instance to which DGMGRL is connected and must be enclosed within double quotation marks.
- Pure SQL statements must be entered without a semicolon (;) and execution of SELECT statements is not supported.
- If the command contains a filename, then the filename must be enclosed in single quotation marks and the entire command string must be enclosed in double quotation marks. For example, use the following syntax:

  ```
  SQL "CREATE TABLESPACE temp1 DATAFILE '?/oradata/trgt/temp1.dbf' SIZE 10M TEMPORARY"
  ```

- PL/SQL stored procedures must be entered within standard PL/SQL `begin…; end;` anonymous block syntax.

Command Example

The following command opens all the pluggable databases.

```
DGMGRL> SQL "alter pluggable database all open"
```

The following command executes a stored PL/SQL procedure to wait for 30 seconds.

```
DGMGRL> SQL "begin dbms_drs.sleep(30); end;"
```

START OBSERVER

The `START OBSERVER` command starts a fast-start failover observer on this host (where the DGMGRL session is running), if there is no registered observer running on this host for this configuration.

Before using this command, you must first issue a `CONNECT` command to log into a specific broker configuration. Otherwise, an error message is returned stating that you are not logged on.

Format

```
START OBSERVER [<observer_name>] [FILE IS <observer_file>] [LOGFILE IS
<observer_log_file>] [TRACE_LEVEL IS { USER | SUPPORT }];
```

Command Parameters

observer_name
A name to identify observers within the same Data Guard broker configuration.

- No two observers on the same Data Guard broker configuration can have the same name.
- If no name is specified for the observer then a default observer name, the host name of machine where the `START OBSERVER` command is issued, is used.
- An observer name is case-insensitive.

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- The strings "NONAME" and "ALL" cannot be used as an observer name.

observer_log_file
Specifies the path and name of the runtime data file. If you specify only a file name, the path used is `$DG_ADMIN/config_ConfigurationSimpleName/dat` . If you omit both the path and file name, the file name defaults to `fsfo_hostname.dat` and the path is `$DG_ADMIN/config_ConfigurationSimpleName/dat`. If the `DG_ADMIN` environment variable is not defined, the default path is the current working directory.

log_file
The full path name of the observer log file. Each observer has its own log file.

Usage Notes

- You can register up to four observers to monitor a single Data Guard broker configuration. Each observer is identified by a name that you supply when you issue the `START OBSERVER` command. See Installing and Starting the Observer.
- The optional clause `TRACE_LEVEL IS` lets you control the amount of tracing done and written to the observer log file. The default value is `USER`, which limits the observer log contents to tracing information about fast-start failover, status changes of the primary and target standby database, and error/warning messages. Setting `TRACE_LEVEL` to `SUPPORT` increases the amount of tracing information to include lower-level information needed by Oracle Support Services.
- The Oracle Client Administrator kit, or the full Oracle Database Enterprise Edition or Oracle Personal Edition kit must be installed on the observer computer to monitor a broker configuration for which fast-start failover is to be enabled. See Prerequisites for Enabling Fast-Start Failover for more information.
- The `START OBSERVER` command must be issued on the observer computer. Once the observer is successfully started, control is not returned to the user until the observer is stopped (for example, by issuing the STOP OBSERVER command from a different client connection). If you want to perform further interaction with the broker configuration, you must connect through another client.

  For information about how to start the observer in the background, see START OBSERVER IN BACKGROUND.
- If the `LOGFILE IS` clause is used, then all observer output is recorded in the specified file. Observer output is useful for troubleshooting problems with the observer and with fast-start failover in general.

  If a complete path, with file name, is provided, the file is stored in the specified path.

  If only a file name is provided and the `DG_ADMIN` environment variable is defined, the specified file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/log` directory. If the `DG_ADMIN` environment variable is not defined, the file is stored in the current working directory.

  If `LOGFILE IS` clause is omitted, the log file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/log` directory using the name `observer_hostname.log`. If the `DG_ADMIN` environment variable is not defined, the log file is stored as `observer_hostname.log` in the current working directory. `ConfigurationSimpleName` is the name of the broker configuration.

  If the specified log file is not accessible, the observer output is sent to standard output.
- If a complete directory path and file name is specified with the `FILE IS` clause, the observer runtime data file is created in this directory. If a relative path and file name is specified, the file is created in the specified path under the current working directory.

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If only a file name is specified, the file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/dat/` directory. If the `DG_ADMIN` environment variable is not defined, the file is stored in the current working directory. `ConfigurationSimpleName`, which is a configuration property, is the name of the broker configuration.

If this clause is omitted, the file is stored as `$DG_ADMIN/config_ConfigurationSimpleName/dat/FSFO_hostname.dat`. If the `DG_ADMIN` environment variable is not defined, the file is stored in the current working directory as `fsfo.dat`.

- The primary and target standby database `DB_UNIQUE_NAME` initialization parameter and connect identifiers are stored in the `fsfo.dat` configuration file. Oracle recommends you ensure this file is protected from unauthorized access.
- The order of the `FILE IS`, `LOGFILE IS`, and `TRACE LEVEL IS` clauses is interchangeable.
- Fast-start failover does not need to be enabled before you issue this command.
  - If fast-start failover is enabled, the observer will retrieve primary and target standby connect identifiers from the broker configuration and begin monitoring the configuration.
  - If fast-start failover is not enabled, the observer continually monitors for when fast-start failover is enabled.
- Only the primary database needs to be running when you issue this command; the standby database that will be the target of a fast-start failover does not need to be running in order for this command to complete successfully.
- Use the `SHOW OBSERVER` command or the `SHOW CONFIGURATION VERBOSE` command, or query the `V$FS_FAILOVER_OBSERVERS` view on the primary database to see the status of the observer and its host computer.
- If the primary and target standby databases stay connected but they lose the connection to the observer, then the primary database goes into an unobserved state. This state is reported by the broker's health check capability.
- The `SHOW OBSERVER` command indicates whether one or more observers have already been started.

  If the `SHOW OBSERVER` command shows one or more registered observers, but some of them are no longer running for some reason, then you can do either of the following:

  - Issue the `START OBSERVER` command on the same observer computer where it was started originally, with the observer configuration file used when the observer was first started.
  - Issue the `STOP OBSERVER` command and then the `START OBSERVER` command on any computer to start the observer.

  If the `SHOW OBSERVER` command shows one or more observers and one observer is already running at one location, then an attempt to start an observer at that location again will fail with the following error:

  ```
  Unable to open the observer file
  ```

  If the `SHOW OBSERVER` command shows four registered observers and you attempt to start an observer at a different location, then the command will fail with the following error:

  ```
  ORA-16647: could not start more than four observers
  ```

Command Examples

Example 1: Starting the Observer

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The following example shows how to start the observer.

```
DGMGRL> CONNECT sysdg@North_Sales.example.com;
Password: password
Connected to "North_Sales"
Connected as SYSDG.
DGMGRL> START OBSERVER;
Observer started
```

Example 2: Starting the Observer Without Showing Credentials

The following example shows how to start the observer using `CONNECT '/'` so that connection credentials are not visible on the command line:

```
DGMGRL> CONNECT /@North_Sales.example.com;
Connected to "North_Sales"
DGMGRL> START OBSERVER;
Observer started.
```

You must set up Oracle Wallet or SSL to use `CONNECT '/'`. By setting up Oracle Wallet or SSL, you can write a script to securely start and run the observer as a background job without specifying database credentials in the script. When using Oracle Wallet as a secure external password store, be sure to add credentials for both the primary and fast-start failover target standby databases. The database connect string that you specify when adding the credentials for each database must match the `ObserverConnectIdentifer` or `DGConnectIdentifier` database property.

START OBSERVER IN BACKGROUND

The `START OBSERVER IN BACKGROUND` command starts a fast-start failover observer on this host (where this DGMGRL session is running) as a background process.

After this command is issued, DGMGRL reports whether the `START OBSERVER IN BACKGROUND` command submitted successfully. If yes, then control returns to the user. (This is different behavior from the `START OBSERVER` command, in which control does not return to the user after the observer is started.)

This command uses Oracle wallet to obtain credentials to log into the database server and register observers. Even if you have successfully connected to a database server in the broker configuration using the `CONNECT` command, this command ignores the existing connection and uses the credentials stored in Oracle wallet. If the wallet is not configured, then the command will fail to start the Observer.

Format

START OBSERVER [<*observer_name*>] IN BACKGROUND CONNECT IDENTIFIER IS <*connect_identifier*> [FILE IS <*observer_file*>] [LOGFILE IS <*log_file*>] [TRACE_LEVEL IS USER | SUPPORT];

Command Parameters

observer_name
The name to identify observers within the same data guard broker configuration.

- No two observers on the same Data Guard Broker configuration can have the same name.

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- If no name is specified for the observer then a default observer name, the host name of machine where the START OBSERVER command is issued, is used.
- An observer name is case-insensitive.
- The string "NONAME" cannot be used as an observer name.

connect_identifier
The connect identifier will be used to find the credentials in an Oracle wallet to connect to a member in the configuration.

observer_file
Specifies the path and name of the runtime data file. If not specified, then the file name defaults to fsfo.dat and the path is the current working directory.

log_file
The full path of the observer log file. Each observer has its own log file.

Usage Notes

- Even if the START OBSERVER command is submitted successfully, the observer might fail to start due to credential problems, intermittent network connections, or failure on observer registration. To verify that the observer started successfully, use the SHOW OBSERVERS command or check the observer log file.
- This command ignores any connections you have made to a specific configuration member using the CONNECT command. In other words, even if you have not connected to a specific member in the broker configuration, you can still start an observer by using the START OBSERVER IN BACKGROUND command.
- If you have connected to a specific configuration member before issuing the START OBSERVER IN BACKGROUND command, then you can continue to use the connection after the control is returned.
- If the observer_file parameter is not specified with the FILE IS parameter, then the observer searches the current working directory for the fsfo.dat file. If it is not found, then the observer creates a fsfo.dat file.
- For the LOGIFLE IS clause, if a complete path, with file name, is provided, the file is stored in the specified path.

  If only a file name is provided and the DG_ADMIN environment variable is defined, the specified file is stored in the $DG_ADMIN/config_ConfigurationSimpleName/log directory. If the DG_ADMIN environment variable is not defined, the file is stored in the current working directory.

  If LOGFILE IS clause is omitted, the log file is stored in the $DG_ADMIN/config_*ConfigurationSimpleName*/log directory using the name observer_*hostname*.log. If the DG_ADMIN environment variable is not defined, the log file is stored as observer_*hostname*.log in the current working directory. ConfigurationSimpleName is the name of the broker configuration.
- If a complete directory path and file name is specified with the FILE IS clause, the observer runtime data file is created in this directory. If a relative path and file name is specified, the file is created in the specified path under the current working directory.

  If only a file name is specified, the file is stored in the $DG_ADMIN/config_*ConfigurationSimpleName*/dat/ directory. If the DG_ADMIN environment variable is not defined, the file is stored in the current working directory. ConfigurationSimpleName, which is a configuration property, is the name of the broker configuration.

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If this clause is omitted, the file is stored as `$DG_ADMIN/config_ConfigurationSimpleName/dat/FSFO_hostname.dat`. If the `DG_ADMIN` environment variable is not defined, the file is stored in the current working directory as `fsfo.dat`.

- The optional clause `TRACE_LEVEL IS` lets you control the amount of tracing done and written to the observer log file. The default value is `USER`, which limits the observer log contents to tracing information about fast-start failover, status changes of the primary and target standby database, and error/warning messages. Setting `TRACE_LEVEL` to `SUPPORT` increases the amount of tracing information to include lower-level information needed by Oracle Support Services.
- The order of the optional clauses in the `START OBSERVER IN BACKGROUND` command is interchangeable.

Command Example

```
DGMGRL> START OBSERVER observer1 IN BACKGROUND
FILE IS  /net/sales/dat/oracle/broker/fsfo.dat
LOGFILE IS /net/sales/dat/oracle/broker/observer.log
CONNECT IDENTIFIER IS sales_p;
Submitted command "START OBSERVER" using connect identifier "sales_p"
```

START OBSERVING

The `START OBSERVING` command starts a new observer for each broker configuration in the specified group.

The effect of the `START OBSERVING` command is equivalent to submitting a `START OBSERVER` command on each individual configuration.

Format

START OBSERVING [<*configuration_group_name*>];

Command Parameters

configuration_group_name
The name of a broker configuration group, in which you want to start one observer for each broker configuration.

Usage Notes

- If no *configuration_group_name* is specified, then this command will start a new observer for each configuration defined in the observer configuration file.
- The *configuration_group_name* cannot be the keyword `ALL`.
- Information about the DGMGRL commands run and execution details are written to the log file, `superobserver.log`. This file is located in the `$DG_ADMIN/admin/` directory. If the `DG_ADMIN` environment variable is not defined, this file is located in the current working directory.

Command Example

```
DGMGRL> START OBSERVING;
ObserverConfigFile=/net/oracle/dataguard/observer.ora
observer configuration file parsing succeeded
```


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```
Submitted command “START OBSERVER” using connect identifier "cfg1_cid".
Submitted command “START OBSERVER”  using connect identifier "cfg2_cid".
Submitted command “START OBSERVER” using connect identifier "cfg3_cid".

Check superobserver.log and individual observer logs for execution details.

DGMGRL> START OBSERVING GRP_A;
ObserverConfigFile=/net/oracle/dataguard/observer.ora
observer configuration file parsing succeeded
Submitted command “START OBSERVER” using connect identifier "cfg1_cid".
Submitted command “START OBSERVER”  using connect identifier "cfg2_cid".

Check superobserver.log and individual observer logs for execution details.
```

STARTUP

The `STARTUP` command starts an Oracle database instance, and allows you to specify a number of options.

The options you can specify are as follows:

- `FORCE`: shuts down the current Oracle instance in the `SHUTDOWN ABORT` mode before restarting it.
- `RESTRICT`: allows only Oracle users with the `RESTRICTED SESSION` system privilege to connect to the instance.
- `PFILE`: specifies the `PFILE` initialization parameter file to be used when the database instance is started.
- `MOUNT`: mounts the database or far sync instance on the instance.
- `OPEN`: mounts and opens the instance on the specified database.
- `NOMOUNT`: starts the specified instance without mounting the database or far sync instance.

Format

STARTUP [FORCE] [RESTRICT] [PFILE=<*filename*>] [MOUNT | OPEN [<*open_options*>] | NOMOUNT];

Command Parameters

filename
The name of the initialization parameter file to be used when starting the database instance. If you do not specify the `PFILE` parameter option, then the default server parameter file (specific to your operating system) is used.

open-options
The mode of access in which you want the specified database to start. The possible modes are:

```
READ ONLY
READ WRITE
```

Usage Notes

- Using the `STARTUP` command with no arguments is equivalent to using the `STARTUP OPEN` command.

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- If you do not use the FORCE clause when you use the STARTUP command and the current database instance is running, an error results. The FORCE clause is useful when you are debugging or when error conditions are occurring. Otherwise, it should not be used.
- Use the RESTRICT clause to allow only Oracle users with the RESTRICTED SESSION system privilege to connect to the instance. Later, you can use the ALTER SYSTEM command through SQL*Plus to disable the restricted session feature.
- If you do not use the PFILE clause to specify the initialization parameter file, the STARTUP command uses the default server parameter file, if it exists. Otherwise, the STARTUP command uses the default initialization parameter file. The default files are platform specific.

  See your operating system-specific documentation for more information about the default parameter files.
- Use the OPEN clause to mount and open the specified database.
- The NOMOUNT clause starts the database instance without mounting the database. You cannot use the NOMOUNT clause with the MOUNT or OPEN options.
- The order of the optional clauses in the STARTUP command is interchangeable.

Command Examples

Example 1: Two Methods for Starting a Database Instance

The following examples show two different methods for starting a database instance. Each command starts a database instance using the standard parameter file, mounts the default database in exclusive mode, and opens the database.

```
DGMGRL> STARTUP;
DGMGRL> STARTUP OPEN;
```

Example 2: Shutting Down the Current Instance and Restarting Without Mounting or Opening It

The following command shuts down the current instance, immediately restarts it without mounting or opening the database, and allows only users with restricted session privileges to connect to it.

```
DGMGRL> STARTUP FORCE RESTRICT NOMOUNT;
```

Example 3: Starting (But Not Mounting) an Instance Using a Parameter File

The following command starts an instance using the parameter file testparm without mounting the database.

```
DGMGRL> STARTUP PFILE=testparm NOMOUNT;
```

Example 4: Starting and Mounting an Instance Without Opening It

The following example starts and mounts a database instance, but does not open it.

```
DGMGRL> STARTUP MOUNT;
```


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STOP OBSERVER

The `STOP OBSERVER` command stops the fast-start failover observer.

Format

STOP OBSERVER [<*observer_name*> | ALL];

Command Parameters

observer_name
The name of the observer you want to stop. If a name is not specified and there is only one registered observer for the configuration, then it will be stopped; if there is more than one registered observer in the configuration, then an error message is returned.

The `ALL` keyword stops all observers registered in this broker configuration.

Usage Notes

- You can issue this command while connected to any database in the broker configuration.
- This command does not disable fast-start failover, but a fast-start failover cannot be initiated in the absence of an observer.
- Fast-start failover does not need to be enabled when you issue this command.
- If fast-start failover *is enabled* when you issue the `STOP OBSERVER` command, then the primary and standby databases must be connected and communicating with each other. Otherwise the following error is returned:

  ```
  ORA-16636 fast-start failover target standby in error state, cannot stop observer
  ```

  If connectivity does not exist between the primary and standby databases, you can issue the `DISABLE FAST_START FAILOVER FORCE` command on the primary database and then issue the `STOP OBSERVER` command. Note that disabling fast-start failover with the `FORCE` option on a primary database that is disconnected from the observer and the target standby database does not prevent the observer from initiating a fast-start failover to the target standby database.
- If fast-start failover *is not enabled* when you issue the `STOP OBSERVER` command, then only the primary database must be running when you stop the observer.
- The observer does not stop immediately when the `STOP OBSERVER` command is issued. The observer does not discover it has been stopped until the next time the observer contacts the broker.

  As soon as you have issued the `STOP OBSERVER` command, you may enter the `START OBSERVER` command again on any computer. You can start a new observer right away, even if the old observer has not yet discovered it was stopped. Any attempt to restart the old observer will fail, because a new observer has been started for the broker configuration.
- The `STOP OBSERVER` command fails if a switch to a new fast-start failover target or new master observer is underway.
- The `STOP OBSERVER` command fails if there are two or more registered observers and you attempt to stop only the master.

Command Example

The following example stops all observers running in the broker configuration .

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```
DGMGRL> STOP OBSERVER ALL;
```

STOP OBSERVING

The `STOP OBSERVING` command stops all local observers running on this host (where this DGMGRL session is running) for all broker configurations in a specific group.

Format

STOP OBSERVING [<*`configuration_group_name`*>] [TRACE_LEVEL= USER | SUPPORT];

Command Parameters

configuration_group_name
The name of a broker configuration group, on which you want to stop local observers running on this host (where DGMGRL is running).

Usage Notes

- If no `configuration_group_name` is specified, then this command stops all `LOCAL` observers running on this host (where this DGMGRL session is running) for all broker configurations defined in the observer configuration file.
- The `configuration_group_name` cannot be the keyword `ALL`.
- Information about the DGMGRL commands run and execution details are written to the log file, `superobserver.log`. This file is located in the `$DG_ADMIN/admin/` directory. If the `DG_ADMIN` environment variable is not defined, this file is located in the current working directory.
- The optional clause `TRACE_LEVEL` IS lets you control the amount of tracing done and written to the observer log file. The default value is `USER`, which limits the observer log contents to tracing information about fast-start failover, status changes of the primary and target standby database, and error/warning messages. Setting `TRACE_LEVEL` to `SUPPORT` increases the amount of tracing information to include lower-level information needed by Oracle Support Services.

Command Example

```
DGMGRL> STOP OBSERVING;
ObserverConfigFile=/net/oracle/dataguard/observer.ora
observer configuration file parsing succeeded
Submitted command "STOP OBSERVER HOST IS OBM1" using connect identifier
cfg1_cid.
Submitted command "STOP OBSERVER HOST IS OBM1" using connect identifier
cfg2_cid.
Submitted command "STOP OBSERVER HOST IS OBM1" using connect identifier
cfg3_cid.

Check superobserver.log and individual observer logs for execution details.

DGMGRL> STOP OBSERVING GRP_A;
ObserverConfigFile=/net/oracle/dataguard/observer.ora
observer configuration file parsing succeeded
Submitted command "STOP OBSERVER HOST IS OBM1" using connect identifier
cfg1_cid.
```


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```
Submitted command "STOP OBSERVER HOST IS OBM1" using connect identifier
cfg2_cid.

Check superobserver.log and individual observer logs for execution details.
```

SWITCHOVER

When you issue the SWITCHOVER command, the current primary database becomes a standby database, and the specified standby database becomes the primary database. This is known as a switchover operation.

Format

SWITCHOVER TO <*db_unique_name*> [WAIT [<*timeout_in_seconds*>]];

The WAIT option specifies that you want to wait for sessions to drain before proceeding with the switchover. Use the timeout_in_seconds option to specify the wait time. The broker waits for the number of seconds specified, for sessions to drain, and then proceeds with the switchover. Any sessions that have not drained will be killed during the switchover process.

If you include the WAIT option, but omit timeout_in_seconds, the broker determines the maximum drain_timeout value for all currently active services, waits for up to that amount of time for all current client requests to be processed, and then proceeds with the switchover. The drain_timeout value is an option that is specified on the SRVCTL utility's add service or modify service commands.

The value specified for timeout_in_seconds overrides the value set using the drain_timeout option.

The WAIT option is valid only when services are configured with attributes related to Application Continuity in Oracle Clusterware.

> **Note**
>
> The WAIT option has been deprecated in 26ai. Use the DrainTimeout configuration property to specify a drain timeout for switchover.

Command Parameters

db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the standby database you want to change to the primary database role.

timeout_in_seconds
The time allowed for resource draining to be completed, in seconds, before the switchover operation proceeds.
Permitted values are 0 (zero) or any positive integer. The default value is an empty string indicating that this option is not set. If the value is zero, then draining occurs immediately and broker proceeds with the switchover. During the draining period, all current client requests are processed, but new requests are not accepted.

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Usage Notes

- If fast-start failover is enabled, you may switch over only to the fast-start failover target standby database.
- The broker verifies that the primary and standby databases are in the following states before starting the switchover:
  - The primary database must be enabled and in the `TRANSPORT-ON` state so redo transport services are started.
  - The standby database must be enabled and in the `APPLY-ON` state, with log apply services started.
- The broker allows the switchover to proceed as long as there are no redo transport services errors for the standby database that you selected to participate in the switchover. However, errors occurring for any other bystander standby database will not prevent the switchover from proceeding.
- Switchover to a logical standby database is not allowed when the configuration is operating in maximum protection mode.
- If the broker configuration is operating in either maximum protection mode or maximum availability mode, the switchover maintains the protection mode even after the operation (described in Before You Perform a Switchover Operation). The switchover will not be allowed if the mode cannot be maintained because the target standby database of the switchover was the only standby that satisfied the protection mode requirement.
- If the standby database that is assuming the primary role is a physical standby database, then the old primary database will be restarted after the switchover completes. Any client connections to the old primary are redirected to the physical standby database as shown in Example 10-14. If the standby database is a logical standby database, then neither the primary database nor the logical standby database is restarted.
- If the standby database that is assuming the primary role is a physical standby database, then the original primary becomes a physical standby database.
- If the standby database that is assuming the primary role is a logical standby database, then the original primary becomes a logical standby database.
- It is not possible to switchover to a snapshot standby database.
- If the standby database that is assuming the primary role is a logical standby database and there are physical standby databases in the configuration, after the switchover, the physical standby databases will be disabled.

> ⚠ **Caution**
>
> For this reason, Oracle generally recommends that you specify your physical standby database for switchover instead of your logical standby database. If you must switch over to your logical standby database, see Reenabling Disabled Databases After a Role Change to re-create your physical standby database.
>
> If you intend to switch back to the original primary database relatively soon, you may allow the physical and snapshot standbys to remain disabled. Once you have completed the switchover back to the original primary, you may then reenable the physical and snapshot standby databases since they are still viable standbys for the original primary database.

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- If the database is managed by Oracle Clusterware, the broker does not open any PDBs on any of the instances. Instead, the broker notifies the Clusterware agent after the switchover completes, and the Clusterware agent opens PDBs on particular instances based on the service configuration.

Command Examples

Example 10-12 Successful Switchover From Primary to Physical Standby

This example shows a successful switchover in which the physical standby database, `South_Sales`, transitions into the primary role.

```
DGMGRL> SWITCHOVER TO 'South_Sales';
2021-03-08T18:46:18.576-05:00
Performing switchover NOW, please wait...

2021-03-08T18:46:31.899-05:00
New primary database "South_Sales" is opening...

2021-03-08T18:46:31.901-05:00
Operation requires start up of instance "north_sales1" on database
"North_Sales"
Starting instance "north_sales1"...
Connected to an idle instance.
ORACLE instance started.
Connected to "north_sales1"
Database mounted.

Connected to "South_Sales"
2021-03-08T18:47:12.754-05:00
Switchover succeeded, new primary is "South_Sales"

2021-03-08T18:47:12.780-05:00
Switchover processing complete, broker ready.
```

Example 10-13 Unsuccessful Switchover Due to Use of O/S Authentication

If you connect to the database using operating system authentication, you can use any username and password to connect. However, DGMGRL may not be able to shut down and start up the primary and standby database automatically because it cannot remotely authenticate itself.

The following example shows a switchover that succeeded but returns an error because DGMGRL cannot shut down and start up the primary and standby databases.

```
DGMGRL> SWITCHOVER TO 'South_Sales';
Performing switchover NOW, please wait...
New primary database "South_Sales" is opening...
Operation requires shutdown of instance "north_sales1" on database "North_Sales"
Shutting down instance "north_sales1"...
ORA-01031: insufficient privileges

Warning: You are no longer connected to ORACLE.

Please complete the following steps to finish switchover:
        shut down instance "north_sales1" of database "North_Sales"
        start up and mount instance "north_sales1" of database "North_Sales"
```


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> **Note**
>
> For DGMGRL to restart instances automatically, you must connect to the database using the same credentials given in the last `CONNECT` command, even if the last `CONNECT` command was used to connect to another database.

You must manually issue the `SHUTDOWN` and `STARTUP` commands to restart the new primary and any standby instances that may have been shut down.

Example 10-14 Redirecting Client Connections to a Target Physical Standby Database

This example performs a successful switchover in which the physical standby database `South_Sales` transitions into the primary role. Connections to the old primary are automatically reconnected to the new primary database, `South_Sales`.

```
DGMGRL> SWITCHOVER TO South_Sales;
2021-03-08T18:42:38.906-05:00
Performing switchover NOW, please wait...

2021-03-08T18:42:39.704-05:00
Operation requires a connection to database "South_Sales"
Connecting ...
Connected to "South_Sales"
Connected as SYSDG.

2021-03-08T18:42:39.908-05:00
Continuing with the switchover...

2021-03-08T18:42:50.022-05:00
New primary database "South_Sales" is opening...

2021-03-08T18:42:50.023-05:00
Operation requires start up of instance "north_sales2" on database
"North_Sales"
Starting instance "north_sales2"...
Connected to an idle instance.
ORACLE instance started.
Connected to "North_Sales"
Database mounted.

Connected to "South_Sales"
2021-03-08T18:43:31.457-05:00
Switchover succeeded, new primary is "South_Sales"

2021-03-08T18:43:31.486-05:00
Switchover processing complete, broker ready.
```


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Example 10-15 Specifying a Zero Wait Time During Switchover

This example includes the `WAIT` option in the `SWITCHOVER` command and sets the wait time to zero seconds. Therefore, the broker does not wait for sessions to drain and proceeds with the switchover operation.

```
DGMGRL> SWITCHOVER TO 'South_Sales' WAIT 0;
2021-03-08T18:29:17.674-05:00
WAIT 0 does not wait for sessions to drain; proceeding with switchover...

2021-03-08T18:29:27.995-05:00
New primary database "South_Sales" is opening...

2021-03-08T18:29:27.995-05:00
Oracle Clusterware is restarting database "North_Sales" ...

Connected to "South_Sales"
2021-03-08T18:30:09.375-05:00
Switchover succeeded, new primary is "South_Sales"

2021-03-08T18:30:09.421-05:00
Switchover processing complete, broker ready.
```

Example 10-16 Using the WAIT Clause to Specify a Wait Time During Switchover

This example includes the `WAIT` option in the `SWITCHOVER` command and sets the wait time to 23 seconds. Therefore, the broker waits for 23 seconds for sessions to drain and then proceeds with the switchover.

```
DGMGRL> SWITCHOVER TO 'South_Sales' WAIT 23;
2021-03-08T18:26:29.412-05:00
Stopping services and waiting up to 23 seconds for sessions to drain...

2021-03-08T18:26:40.209-05:00
Done waiting for sessions to drain; proceeding with switchover now...

2021-03-08T18:26:54.411-05:00
New primary database "South_Sales" is opening...

2021-03-08T18:26:54.412-05:00
Oracle Clusterware is restarting database "North_Sales" ...

Connected to "South_Sales"
2021-03-08T18:27:39.045-05:00
Switchover succeeded, new primary is "South_Sales"

2021-03-08T18:27:39.084-05:00
Switchover processing complete, broker ready.
```


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SWITCHOVER PLUGGABLE DATABASE

This command switches the role of a source PDB with its designated target PDB.

Prerequisites

- Connect to the target database.
- The specified target PDB must exist in the target database and must be configured as a DG PDB.

Syntax

```
SWITCHOVER TO PLUGGABLE DATABASE <pdb_name> AT <target_db_unique_name>;
```

Command Parameters

pdb_name
Name of the target PDB to which source PDB operations must be switched. The name specified must the same as that used when you ran the `ADD PLUGGABLE DATABASE` command to set up the source PDB.

target_db_unique_name
Name of the target database that contains the target PDB.

Usage Notes

- The broker verifies that the source PDB is open.
- The broker verifies the named PDB is a DG PDB at the specified database and redo apply is running.

Examples

Example 10-17 Switching Over to a Target PDB

This example switches operations of the source PDB with the target PDB named `dgpdb_sales` that is contained in the target database `cdb_newyork`.

```
DGMGRL> SWITCHOVER TO PLUGGABLE DATABASE dgpdb_sales AT newyork;
```

VALIDATE DATABASE

The `VALIDATE DATABASE` command performs a comprehensive set of checks prior to a role change. The command gives the option of running basic checks indicating whether the specified standby is ready for switchover or failover. You may also include a stricter level of checks using options available for the `STRICT` clause.

The checks use information available in various Oracle Data Guard views.

Format

```
VALIDATE DATABASE [VERBOSE] <db_unique_name>
    [STRICT { ALL | APPLY_PROPERTY | DATAFILES_OFFLINE | FLASHBACK |
```


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```
    FORCE_LOGGING | LOG_FILES_CLEARED | LOG_FILE_CONFIGURATION |
    PDBS_OFFLINE | PDB_SAVE_STATE | TRANSPORT_PROPERTY }];
```

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database for which you want to perform validations for.

Usage Notes

The `VALIDATE DATABASE` command shows a brief summary of the database, and reports any errors or warnings that were detected. `VALIDATE DATABASE VERBOSE` shows everything in the brief summary plus all items that were validated.

To add a stricter level of validation use the `STRICT` clause and specify one or more of the `STRICT` option.

Table 10-3 Options for `STRICT` Clause

Option	Description
`ALL`	Use all of the strict options in the validation of the primary and specified standby database.
`APPLY_PROPERTY`	Check that the apply-related property settings between the primary and specified standby database are identical.
`DATAFILES_OFFLINE`	Check that the specified standby database does not have any data files that are offline. Datafiles that are offline are not updated with redo data received from the primary database.
`FLASHBACK`	Check that the primary and specified standby database have flashback database enabled.
`FORCE_LOGGING`	The primary and specified standby database have force logging enabled and whether there are any non-logged blocks on the primary database.
`LOG_FILES_CLEARED`	Check that the primary database's standby redo logs are cleared and the specified standby database (if it's a physical standby database) has its online logs cleared.
`PDBS_OFFLINE`	Check that the specified standby database does not have any pluggable databases that have recovery disabled. Pluggable databases that have recovery disabled are not an identical copy of the primary database's pluggable database.
`PDB_SAVE_STATE`	Check whether save state is enabled for one or more pluggable databases on the primary database. In RAC environments, having save state enabled for a pluggable database may result in discrepancies between the services started by the database and the services that Oracle Clusterware is expected to start based upon database role.

Command Examples

The examples in this section show what the `VALIDATE DATABASE` command output might look like in both the brief and verbose forms for primary and standby databases.

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Example 10-18 VALIDATE DATABASE Output in Brief Format for a Primary

The following example shows brief output for a primary database:

```
DGMGRL> VALIDATE DATABASE South_Sales;

  Database Role:    Primary database

  Ready for Switchover:  Yes

  Managed by Clusterware:
    South_Sales:  YES
```

Example 10-19 VALIDATE DATABASE Output in Brief Format for a Physical Standby

The following example shows brief output for a physical standby database:

```
DGMGRL> VALIDATE DATABASE North_Sales;

  Database Role:     Physical standby database
  Primary Database:  South_Sales

  Ready for Switchover:  Yes
  Ready for Failover:    Yes (Primary Running)

  Managed by Clusterware:
    South_Sales :  NO
    North_Sales:  NO
    The static connect identifier allows for a connection to database
"South_Sales".

  Parameter Settings:
    Parameter                      South_Sales Value        North_Sales Value
    DB_BLOCK_CHECKING              FALSE                    FALSE
    DB_BLOCK_CHECKSUM              TYPICAL                  TYPICAL
    DB_LOST_WRITE_PROTECT          AUTO                     AUTO
```

Example 10-20 VALIDATE DATABASE Output in Verbose Format for a Primary

The following example shows verbose output for a primary database:

```
DGMGRL> VALIDATE DATABASE VERBOSE South_Sales;

  Database Role:    Primary database

  Ready for Switchover:  Yes

  Flashback Database Status:
    Database         Status           Retention Target
    South_Sales      On               1440

  Capacity Information:
    Database         Instances        Threads
    South_Sales      1                1
```


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```
  Managed by Clusterware:
    South_Sales:  NO
    The static connect identifier allows for a connection to database
"South_Sales".

  Temporary Tablespace File Information:
    South_Sales TEMP Files:  1

  Data file Online Move in Progress:
    South_Sales:  No

  Transport-Related Information:
    Transport On:  Yes

  Log Files Cleared:
    South_Sales Standby Redo Log Files:  Cleared
```

Example 10-21 VALIDATE DATABASE Output in Verbose Format for a Physical Standby

The following command shows verbose output for a physical standby database:

```
DGMGRL> validate database verbose North_Sales

  Database Role:     Physical standby database
  Primary Database:  South_Sales

  Ready for Switchover:  Yes
  Ready for Failover:    Yes (Primary Running)

  Flashback Database Status:
    Database         Status           Retention Target
    South_Sales      On               1440
    North_Sales      On               1440

  Capacity Information:
    Database  Instances        Threads
    South_Sales      1                1
    North_Sales      1                1

  Managed by Clusterware:
    South_Sales :  NO
    North_Sales:   NO
    The static connect identifier allows for a connection to database
"South_Sales".

  Temporary Tablespace File Information:
    South_Sales TEMP Files:   1
    North_Sales TEMP Files:   1

  Data file Online Move in Progress:
    South_Sales:   No
    North_Sales:   No

  Standby Apply-Related Information:
    Apply State:      Running
```


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```
    Apply Lag:        0 seconds (computed 0 seconds ago)
    Apply Delay:      0 minutes

  Transport-Related Information:
    Transport On:  Yes
    Gap Status:    No Gap
    Transport Lag:  0 seconds (computed 0 seconds ago)
    Transport Status:  Success

  Log Files Cleared:
    South_Sales Standby Redo Log Files:   Cleared
    North_Sales Online Redo Log Files:   Cleared
    North_Sales Standby Redo Log Files:  Available

  Current Log File Groups Configuration:
    Thread #  Online Redo Log Groups  Standby Redo Log Groups
              (South_Sales)                 (North_Sales)
    1         4                      5

  Future Log File Groups Configuration:
    Thread #  Online Redo Log Groups  Standby Redo Log Groups
              (North_Sales)                 (South_Sales)
    1         4                      5

  Current Configuration Log File Sizes:
    Thread #   Smallest Online Redo      Smallest Standby Redo
               Log File Size             Log File Size
               (South_Sales)
(North_Sales)
    1          25 MBytes                 25 MBytes

  Future Configuration Log File Sizes:
    Thread #   Smallest Online Redo      Smallest Standby Redo
               Log File Size             Log File Size
               (North_Sales)
(South_Sales)
    1          25 MBytes                 25 MBytes

  Apply-Related Property Settings:
    Property                       South_Sales Value
North_Sales Value
    DelayMins                      0                      0
    ApplyParallel                  AUTO                   AUTO
    ApplyInstances                 0                      0

  Transport-Related Property Settings:
    Property                       South_Sales Value
North_Sales Value
    LogShipping                    ON                     ON
    LogXptMode                     ASYNC                  ASYNC
    Dependency                     <empty>                <empty>
    DelayMins                      0                      0
    Binding                        optional               optional
    MaxFailure                     0                      0
    ReopenSecs                     30                     30
    NetTimeout                     300                    300
```


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```
    RedoCompression                DISABLE                  DISABLE

  Parameter Settings:
    Parameter                      South_Sales Value
North_Sales Value
    DB_BLOCK_CHECKING              true                     true
    DB_BLOCK_CHECKSUM              true                     true
    DB_LOST_WRITE_PROTECT          NONE                     NONE
```

Example 10-22 `VALIDATE DATABASE STRICT` Option for a Primary

The following example shows `STRICT` Primary output:

```
DDGMGRL> VALIDATE DATABASE 'North_Sales' STRICT ALL;

  Database Role:    Primary database

  Ready for Switchover:  No

  Flashback Database Status:
    Database     Status           Retention Target
    North_Sales  Off              1440
    South_Sales  On               1440

  Managed by Clusterware:
    North_Sales:  NO
    The static connect identifier allows for a connection to database
"North_Sales".
```

Example 10-23 `VALIDATE DATABASE STRICT` Option for a Physical Standby

The following example shows `STRICT` Physical Standby output:

```
DGMGRL> VALIDATE DATABASE 'North_Sales' STRICT ALL;

  Database Role:     Physical standby database
  Primary Database:  'South_Sales'

  Ready for Switchover:  No
  Primary and standby databases do not have the same number of temp files.
    One or more pluggable databases have save state enabled.
    Standby database has one or more pluggable databases that are offline.
    Standby database has one or more data files that are offline.

  Ready for Failover:    Yes (Primary Running)
```

Example 10-24 `VALIDATE DATABASE` Option for a Physical Standby

The following example shows Physical Standby output without the`STRICT` clause:

```
DGMGRL> VALIDATE DATABASE 'North_Sales' ;

  Database Role: Physical standby database
  Primary Database: 'South_Sales'
```


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```
  Ready for Switchover: Yes
  Ready for Failover: Yes (Primary Running)

  Flashback Database Status:
    Database Status Retention Target
    South_Sales Off 1440
    North_Sales Off 1440

  Managed by Clusterware:
    North_Sales : NO
    South_Sales: NO
    The static connect identifier allows for a connection to database
"South_Sales".

  Parameter Settings:
    Parameter South_Sales Value North_Sales Value
    DB_BLOCK_CHECKING true true
    DB_BLOCK_CHECKSUM true true
    DB_LOST_WRITE_PROTECT AUTO AUTO
```

VALIDATE DATABASE DATAFILE

The `VALIDATE DATABASE DATAFILE` command performs validation of data files across the primary database and standby databases.

The validation of data files detects lost writes at either database.

Format

VALIDATE DATABASE [VERBOSE] <*db_unique_name*> | ALL] DATAFILE { <*datafile_name*> | <*datafile_number*> | ALL } OUTPUT=*"output_file_name"*;

Command Parameters

db_unique_name
The name of the database for which you want to display information. The `VERBOSE` keyword, if used, must come before the `DB_UNIQUE_NAME` or an error is returned.
If the database to be validated is either the primary or `ALL`, then the data files for all standby databases are compared with data files of the primary.
If the database to be validated is a standby database, then its data files are compared with the data files of the primary.

datafile_name | datafile_number
You can specify a data file to be compared by name (datafile_name) or by number (datafile_number).
The datafile_name is the name of a specific date file that you want validated.
The datafile_number is the file identification number of a data file (as shown in the `FILE#` column of the `V$DATAFILE` view).

output_file_name
A file generated on the server that you must check to determine if block comparison is completed and whether there were any lost writes. Output files are created in the diagnostics `trace` directory of the database being compared.

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Usage Notes

- When the `VALIDATE DATABASE` command is issued, it immediately returns a message that data file comparison has started on a database, but this does not mean that data file comparison completed or that there were no lost-writes between data files. You must check the output files that are generated to determine whether data file comparison was completed, or if there were lost writes.
- The `VERBOSE` option can be used to dump the block contents of the specified data file.

Command Example

Example: Using VALIDATE DATABASE DATAFILE to Compare Data Files

The following command would compare the data files on the standby to those on the primary. Output would be sent to a file named `dbcomp1.out`.

```
DGMGRL> VALIDATE DATABASE boston DATAFILE ALL OUTPUT=dbcomp1.out;
Operation requires a connection to database "boston"
Connecting ...
Output files are created in /path/to/trace on host "standby-host"
```

The following shows sample output from the command:

```
     Client is connected to database: boston. Role: physical standby.

    ****************************
    Remote database chicago.
    remote db role: primary database

    Slave Id  0
    Summary:
    Different data block pairs: 66617

    Details:
************************************************
    ID: Block Type Id
    TOTAL: Total number of blocks found
    DIFFV: Number of block pairs with different version
    LWLOC: Lost Writes at Local
    LWRMT: Lost Writes at Remote
    SAMEV: Number of block pairs with same version
    SAMEV&C: Number of block pairs with same version and checksum
    DIFFPAIR: Number of block pairs with same version but different contents
    ENCERR: Undecided blocks related to encryption/decrytion error.
            e.g. Wallet is not open.
    SKIPPED: Skipped blocks due to data corruption, direct load, etc

    ID TOTAL   DIFFV   LWLOC   LWRMT   SAMEV   SAMEV&C DIFFPAIR ENCERR SKIPPED
    02 0067698 0001032 0000000 0000000 0066666 0000049 0066617 0000000 0000000
    29 0000001 0000001 0000000 0000000 0000000 0000000 0000000 0000000 0000000
    30 0000125 0000001 0000000 0000000 0000124 0000124 0000000 0000000 0000000
    38 0000014 0000014 0000000 0000000 0000000 0000000 0000000 0000000 0000000
```


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VALIDATE DATABASE SPFILE

The `VALIDATE DATABASE SPFILE` command performs a comparison of server parameter file (SPFILE) entries between the primary database and a specified standby database.

The validation of the server parameter file detects parameter value discrepancies between the primary and the specified standby database so that they can be rectified before a role change, thus ensuring that after a role change the databases perform at the same level they did prior to the role change. Additionally, using this command frees you from having to restart a database to correct improperly set parameters.

Format

VALIDATE DATABASE [VERBOSE] <*db_unique_name*> SPFILE;

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the standby database whose SPFILE contents you want to compare to the primary database's SPFILE contents..
If the database to be validated is the primary database, then a message is returned saying the command cannot be issued on a primary database.
If the database to be validated is a standby database, then the server parameter file values on the primary database are compared with the server parameter file values on the standby database.

Usage Notes

- The `VALIDATE DATABASE SPFILE` command reports `No parameter differences found`if there are no differences. If differences are found, a list of the parameters with their differing values on the primary and the specified standby databases will be displayed.
- When the `VALIDATE DATABASE SPFILE` command is issued, it makes a connection to the primary database and the specified standby database based on the respective values of the `DGConnectIdentifier` property. The command fails if a connection attempt cannot complete successfully.
- Use the `VERBOSE` keyword to see the list of the parameter settings in the SPFILE for both databases.
- This command only checks for parameters that are set for all instance. It excludes parameters that are set for a specific instance.
  The following parameters are not checked because they are either managed by Data Guard broker or are allowed to have different values between databases:
  - `archive_lag_target, log_archive_config*, db_file_name_convert, log_archive_max_processes, log_archive_min_succeed_dest, log_file_name_convert, standby_file_management, log_archive_dest_n*, log_archive_dest_state_n*, db_unique_name, asm_diskgroups, asm_diskstring control_files fal_server*, db_create_file_dest, db_create_online_log_dest_1, db_create_online_log_dest_2, db_create_online_log_dest_3, db_create_online_log_dest_4, db_create_online_log_dest_5, db_recovery_file_dest, db_recovery_file_dest_size, dg_broker_config_file1, dg_broker_config_file2, dg_broker_start instance_groups, instance_mode instance_name, instance_number, instance_type, listener_networks,`

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```
local_listener, log_archive_duplex_dest, log_archive_format,
remote_listener, service_names spfile, standby_archive_dest
```

Command Example

Example: Using VALIDATE DATABASE SPFILE to Compare Server Parameter File Values

The following is sample output from the `VALIDATE DATABASE SPFILE` command when there are no differences between the server parameter file values on the specified standby database and the primary database:

```
DGMGRL> VALIDATE DATABASE chicago SPFILE;
Connecting to "boston".

Connecting to "chicago".

No parameter differences found.
```

The following is sample output from the `VALIDATE DATABASE SPFILE` command when there are differences (different values, or specified on one and not on the other) between the server parameter file values on the specified standby database and the primary database:

```
DGMGRL> VALIDATE DATABASE chicago SPFILE;
Connecting to "boston".

Connecting to "chicago".

Parameter settings with different values:

aq_tm_processes:
boston (PRIMARY) : 8
chicago          : 9

commit_point_strength:
boston (PRIMARY) : NOT SPECIFIED
chicago          : 255

sec_max_failed_login_attempts:
boston (PRIMARY) : 2
chicago          : NOT SPECIFIED

use_large_pages:
boston (PRIMARY) : TRUE
chicago          : NOT SPECIFIED
DGMGRL>
```

VALIDATE DGConnectIdentifier

The `VALIDATE DGConnectIdentifier` command enables users to check to see whether a connect identifier is valid for the `DGConnectidentifier` property.

The connect identifier for each connectivity check is generated based on the `DGConnectIdentifier` property of the associated database.

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Format

`VALIDATE DGConnectIdentifier <connect_identifier> ;`

Command Parameters

`connect_identifier`
An Oracle connect identifier to be validated.

Usage Notes

The DGMGRL command `VALIDATE DGConnectIdentfier` enables users to verfiy whether a connection identifier is valid for the `DGConnectidentifier` property or not. command.

if a configuration exists and is enabled, the command checks if it is able to make a connection using it on all configuration members.

This command can also be used prior to adding a member to the configuration. If no configuration exists, the command validates the connect identifier at the database and instance DGMGRL is connected to.

This command performs the following for each instance of all members:

- Print a translated network of the connection string at the instance
- Print environment variables related to network configuration at the instance
- Make a new connection using the translated network address at the instance
- If a connection test succeeds, the instance name and db_unique_name of the connected database will be printed

Command Examples

Example 1: When a configuration exists:

```
DGMGRL> validate dgconnectidentifier north_sales;
At instance sales1 of member 'South_Sales'
  north_sales translates to:
    (DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=north.example.com)
(PORT=2852)))(CONNECT_DATA=(SERVICE_NAME=north_sales.example.com)
(SERVER=DEDICATED)))

  Environment Variables:
             TNS_ADMIN: /oracle/south_sales/network
           ORACLE_HOME: /oracle/south_sales/home
           ORACLE_BASE: /oracle/south_sales/base

  Initialization Parameters:
        LOCAL_LISTENER: south_listener

  Connected to instance 'sales1' at member 'North_Sales'

At instance 'sales1' of member 'North_Sales'
  north_sales translates to:
    (DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=north.example.com)
(PORT=2852)))(CONNECT_DATA=(SERVICE_NAME=north_sales.example.com)
(SERVER=DEDICATED)))
```


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```
  Environment Variables:
            TNS_ADMIN: /oracle/north_sales/network
          ORACLE_HOME: /oracle/north_sales/home
          ORACLE_BASE: /oracle/north_sales/base

  Initialization Parameters:
        LOCAL_LISTENER: north_listener

  Connected to instance 'sales1' at member 'North_Sales'
```

Example 2: When no configuration exists:

```
DGMGRL> validate dgconnectidentifier north_sales;
At instance 'sales1' of member 'North_Sales'
  north_sales translates to:
    (DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=north.example.com)
(PORT=2852)))(CONNECT_DATA=(SERVICE_NAME=north_sales.example.com)
(SERVER=DEDICATED)))

  Environment Variables:
            TNS_ADMIN: /oracle/south_sales/network
          ORACLE_HOME: /oracle/south_sales/home
          ORACLE_BASE: /oracle/south_sales/base
            GRID_HOME:

  Initialization Parameters:
        LOCAL_LISTENER: south_listener

  Connected to instance 'sales1' at member 'North_Sales'
```

Example 3: With an unrecognized connect identifier:

```
DGMGRL> VALIDATE DGConnectIdentifier 'north_sales';
At instance 'NorthSales' of member 'North_Sales'
  north_sales translates to:
    (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = sales1.example.com)
(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
North_Sales.example.com)))

  Environment Variables:
            TNS_ADMIN:
          ORACLE_HOME: /sales/oracle/product/23.0.0/db_1
          ORACLE_BASE: /sales/oracle

  Initialization Parameters:
        LOCAL_LISTENER: LISTENER_NORTHSALES

  Connected to instance 'NorthSales' at member 'North_Sales'

At instance 'SouthSales' of member 'South_Sales'
  north_sales translates to:
    (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = sales1.example.com)
(PORT = 1522)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
North_Sales.example.com)))
```


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```
  Environment Variables:
            TNS_ADMIN:
          ORACLE_HOME: /sales/oracle/product/23.0.0/db_1
          ORACLE_BASE: /sales/oracle

  Initialization Parameters:
        LOCAL_LISTENER: LISTENER_SOUTHSALES

  DGM-17565: Failed to connect using 'north_sales'.

DGM-17488: Warning: DGConnectIdentifer 'north_sales' does not have the same
translation on all members.
```

Example 4: When a connection test fails:

```
DGMGRL> VALIDATE DGConnectIdentifier 'north_sales';
At instance 'NorthSales' of member 'North_Sales'
  north_sales translates to:
    (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = sales1.example.com)
(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME =
NorthSales.example.com)))

  Environment Variables:
            TNS_ADMIN:
          ORACLE_HOME: /sales/oracle/product/23.0.0/db_1
          ORACLE_BASE: /sales/oracle
            GRID_HOME:

  Initialization Parameters:
        LOCAL_LISTENER: LISTENER_NORTHSALES

  DGM-17565: Failed to connect using 'north_sales'.
```

VALIDATE FAR_SYNC

The `VALIDATE FAR_SYNC` command performs a comprehensive set of checks for a far sync instance.

The checks use information available in various Oracle Data Guard views.

Format

VALIDATE FAR_SYNC [VERBOSE] <*db_unique_name*>
[WHEN PRIMARY IS <*primary_db_unique_name*>];

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the database for which you want to perform validations for. If the `VERBOSE` option is specified, it must come before the db_unique_name command parameter or an error is returned.

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primary_db_unique_name
The validation of the far sync instance is performed based on the specified DB_UNIQUE_NAME initialization parameter value being the primary database.

Usage Notes

The VALIDATE FAR_SYNC command shows a brief summary of the far sync instance and reports any errors or warnings that were detected. The VALIDATE FAR_SYNC VERBOSE command shows everything in the brief summary plus redo transport-related information.

Command Examples

The examples in this section show what the VALIDATE FAR_SYNC command output might look like in various scenarios.

Example 1: Brief VALIDATE FAR_SYNC Output

The following example shows brief output for a far sync instance:

```
DGMGRL> VALIDATE FAR_SYNC FS;

    Member Role:        Far Sync Instance
    When Primary Is:    North_Sales

    Active Redo Source: North_Sales
    Redo Destinations:
                        South_Sales

    Thread #  Online Redo Log Groups  Standby Redo Log Groups Status
              North_Sales             FS
    1         4                       5                      Sufficient SRLs
```

Example 2: Verbose VALIDATE FAR_SYNC Output

The following example shows verbose output for a far sync instance:

```
DGMGRL> VALIDATE FAR_SYNC VERBOSE FS;

    Member Role:        Far Sync Instance
    When Primary Is:    North_Sales

    Active Redo Source: North_Sales
    Redo Destinations:
                        South_Sales

    Thread #  Online Redo Log Groups  Standby Redo Log Groups Status
              North_Sales             FS
    1         4                       5                      Sufficient SRLs

  Transport-Related Information:
    Transport On:      Yes
    Gap Status:        No Gap
    Transport Lag:     0 seconds (computed 0 seconds ago)
    Transport Status:  Success
```

Example 3: VALIDATE FAR_SYNC Output When South_Sales Is the Primary

The following example shows the output when the South_Sales database is specified as the primary database:

```
DGMGRL> VALIDATE FAR_SYNC FS WHEN PRIMARY IS 'South_Sales';
```


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```
Member Role:        Far Sync Instance
When Primary Is:    South_Sales
Redo Destinations:
                    North_Sales

Thread #  Online Redo Log Groups  Standby Redo Log Groups Status
          South_Sales             FS
1         4                       5                     Sufficient SRLs
```

VALIDATE FAST_START FAILOVER

The `VALIDATE FAST_START FAILOVER` command enables you to validate a fast-start failover configuration. It identifies misconfigurations, either while setting up or initiating fast-start failover.

Format

VALIDATE FAST_START FAILOVER;

Command Parameters

None.

Usage Notes

- This command validates the fast-start failover configuration and reports the following information:
  - Incorrectly set up fast-start failover properties
    For example, the fast-start failover threshold is not set appropriately.
  - Issues that prevent the enabling or initiating of fast-start failover

    This includes issues that prevent the usage of fast-start failover even when the conditions required for fast-start failover are met (for example, fast-start failover is enabled in Observe-Only mode).
  - Issues that affect actions taken after fast-start failover is initiated
  - Issues that could impact the stability of the broker configuration
  - Issues with fast-start failover callout configuration scripts

    Displays if the syntax of the fast-start failover configuration file `fsfocallout.ora` is correct and if the pre-callout and post-callout scripts are accessible.

Command Examples

Example 10-25 Validating a Fast-start Failover Configuration with Potentially Low Threshold Value

The following example validates the broker configuration that is in maximum performance mode and identifies issues that prevent fast-start failover from being enabled for the configuration.

```
DGMGRL> VALIDATE FAST_START FAILOVER;
  Fast-Start Failover:  Enabled in Potential Data Loss Mode
  Protection Mode:     MaxPerformance
  Primary:                   North_Sales
  Active Target:          South_Sales
```


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```
Fast-Start Failover Not Possible:
  Fast-Start Failover observer not started

Post Fast-Start Failover Issues:
  Flashback database disabled for database ‘dgv1’

Other issues:
  FastStartFailoverThreshold may be too low for RAC databases.

Fast-start failover callout configuration file "fsfocallout.ora" has the
following issues:
  Invalid lines
    foo=foo
  The specified file "./precallout" contains a path.
```

Example 10-26 Validating an Unsynchronized Fast-start Failover Configuration

This example validates a fast-start failover configuration that is enabled in regular mode. The callout scripts exist and are syntactically accurate. The only problem is that the configuration is unsynchronized.

```
DGMGRL> VALIDATE FAST_START FAILOVER;
  Fast-Start Failover:  Enabled in Observe-Only mode
  Protection Mode:     MaxPerformance
  Primary:                   North_Sales
  Active Target:           South_Sales

Fast-Start Failover not possible:
  Fast-start failover configuration is unsynchronized
```

VALIDATE NETWORK CONFIGURATION

The `VALIDATE NETWORK CONFIGURATION` command performs network connectivity checks between members of a configuration.

The connect identifier for each connectivity check is generated based on the `DGConnectIdentifier` property of the associated database.

Format

VALIDATE NETWORK CONFIGURATION FOR { ALL | <*db_unique_name*> };

Command Parameters

db_unique_name
The `DB_UNIQUE_NAME` initialization parameter value of the member whose network configuration is to be validated. Specify the keyword `ALL` if all members should be validated.

Usage Notes

- This command also performs a check for the static connect identifier.

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Command Examples

Example 1: Validating Network Configuration for a Specific Database

```
DGMGRL> VALIDATE NETWORK CONFIGURATION FOR North_Sales;

Connecting to instance "north_sales1" on database "North_Sales" ...

Checking connectivity from instance "north_sales1" on database "North_Sales
to instance "south_sales1" on database "South_Sales"...

Succeeded.

Connecting to instance "north_sales6" on database "North_Sales" ...

Checking connectivity from instance "north_sales6" on database "North_Sales
to instance "south_sales1" on database "South_Sales"...

Succeeded.

Connecting to instance "south_sales1" on database "South_Sales" ...

Checking connectivity from instance "south_sales1" on database "South_Sales
to instance "north_sales1" on database "North_Sales"...

Succeeded.

Checking connectivity from instance "south_sales1" on database "South_Sales
to instance "north_sales6" on database "North_Sales"...

Succeeded.

Oracle Clusterware on database "North_Sales" is available for database
restart.
```

Example 2: Validating Network Configuration For All Members

```
DGMGRL> VALIDATE NETWORK CONFIGURATION FOR ALL;

Connecting to instance "north_sales1" on database "North_Sales" ...

Checking connectivity from instance "north_sales1" on database "North_Sales
to instance "south_sales1" on database "South_Sales"...

Succeeded.

Connecting to instance "north_sales6" on database "North_Sales" ...

Checking connectivity from instance "north_sales6" on database "North_Sales
to instance "south_sales1" on database "South_Sales"...

Succeeded.

Connecting to instance "south_sales1" on database "South_Sales" ...
```


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```
Checking connectivity from instance "south_sales1" on database "South_Sales
to instance "north_sales1" on database "North_Sales"...

Succeeded.

Checking connectivity from instance "south_sales1" on database "South_Sales
to instance "north_sales6" on database "North_Sales"...

Succeeded.

Oracle Clusterware on database "North_Sales" is available for database
restart.

Oracle Clusterware is not configured on database "South_Sales".
Connecting to database "South_Sales" using static connect identifier
"(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=<nodename>)
((PORT=.*))))(CONNECT_DATA=(SERVICE_NAME=South_Sales_DGMGRL.example.com)
(INSTANCE_NAME=south_sales1)(SERVER=DEDICATED)(STATIC_SERVICE=TRUE)))" ...
Succeeded.

The static connect identifier allows for a connection to database
"South_Sales".
```

VALIDATE PLUGGABLE DATABASE

The `VALIDATE DATABASE` command performs a comprehensive set of database checks prior to a role change.

The checks use information available in various Oracle Data Guard views as well as the Automatic Diagnostic Repository.

Format

```
VALIDATE PLUGGABLE DATABASE <pdb-name> AT <db-unique-name>;
```

Command Parameters

database_name
The name of the database for which you want to display information.

Usage Notes

The `VALIDATE DATABASE` command shows a brief summary of the database, and reports any errors or warnings that were detected.

Command Examples

The examples in this section show what the `VALIDATE PLUGGABLE DATABASE` command output might look like.

```
DGMGRL>  validate pluggable database pdb1 at dglcp3;

DGM-17560: Pluggable database 'PDB1' at container database 'dglcp3' is not
protected.
```


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VALIDATE STATIC CONNECT IDENTIFIER

The `VALIDATE STATIC CONNECT IDENTIFIER` command validates the static connect identifier of a database.

To perform this validation, the broker makes a new connection to the database using a static connect identifier based on the `StaticConnectIdentifer` property of the database. A new attribute, `STATIC_SERVICE=TRUE` is added to the connect identifier to ensure that a connection to the database is established using only a static service, not a dynamic service.

Format

VALIDATE STATIC CONNECT IDENTIFIER FOR { ALL | *<db_unique_name>* };

Command Parameters

db_unique_name
The DB_UNIQUE_NAME initialization parameter value of the member whose network static connect identifier is to be validated. Specify the keyword `ALL` if all members should be validated.

Usage Notes

- None

Command Examples

Example 1: Validation of Static Connect Identifier For a Database on Which Oracle Clusterware Is Configured

```
DGMGRL> VALIDATE STATIC CONNECT IDENTIFIER FOR North_Sales;

Oracle Clusterware on database "North_Sales" is available for database
restart.
```

Example 2: Validation of Static Connect Identifier For a Database on Which Oracle Clusterware Is Not Configured

```
DGMGRL> VALIDATE STATIC CONNECT IDENTIFIER FOR South_Sales;

Oracle Clusterware is not configured on database "South_Sales".
Connecting to database "South_Sales" using static connect identifier
"(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=<nodename>)
((PORT=.*))))(CONNECT_DATA=(SERVICE_NAME=South_Sales_DGMGRL.example.com)
(INSTANCE_NAME=tkdg2_sid)(SERVER=DEDICATED)(STATIC_SERVICE=TRUE)))" ...

Succeeded.

The static connect identifier allows for a connection to database
"South_Sales".
```


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Example1: Validation of Static Connect Identifier For all Databases

```
DGMGRL> VALIDATE STATIC CONNECT IDENTIFIER FOR all;

Oracle Clusterware on database "North_Sales" is available for database
restart.

Oracle Clusterware is not configured on database "South_Sales".
Connecting to database "South_Sales" using static connect identifier
"(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=<nodename>)
((PORT=.*))))(CONNECT_DATA=(SERVICE_NAME=South_Sales_DGMGRL.example.com)
(INSTANCE_NAME=tkdg2_sid)(SERVER=DEDICATED)(STATIC_SERVICE=TRUE)))" ...

Succeeded.

The static connect identifier allows for a connection to database
"South_Sales".
```


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11

Oracle Data Guard DBMS_DG API Reference

Use the command reference to understand how you can use the DBMS_DG PL/SQL APIs to manage your broker configuration.

The `DBMS_DG` PL/SQL APIs can be used to create and manage broker configurations. In addition, there is also functionality to allow applications to notify the primary database or the fast-start failover target database in an Oracle Data Guard broker environment to initiate a fast-start failover when the application encounters a condition that warrants a failover.

Oracle Data Guard DBMS_DG API Summary

The Oracle Data Guard DBMS_DG APIs allow you to manage a broker configuration.

Table 11-1 DBMS_DG API Summary

API	Effect
ADD_DATABASE	Adds a standby database to the Data Guard broker configuration.
ADD_FAR_SYNC	Adds a far sync instance to the Data Guard broker configuration.
ADD_RECOVERY_APPLIANCE	Adds a Zero Data Loss Recovery Appliance to the Data Guard broker configuration.
CONVERT_TO_PHYSICAL	Used to convert a snapshot standby database to a physical standby database.
CONVERT_TO_SNAPSHOT	Converts a snapshot standby database to a physical standby database.
CREATE_CONFIGURATION	Used to create a Data Guard broker configuration.
DISABLE	Used to disable a configuration member.
DISABLE_CONFIGURATION	This function is used to disable broker management of a configuration.
DISABLE_FS_FAILOVER	Used to to disable fast-start failover.
DISABLE_FS_FAILOVER_CONDITION	Used to remove conditions for which a fast-start failover should be performed.
ENABLE	This function is used to to enable broker management of the specified member.
ENABLE_CONFIGURATION	Enables broker management of a configuration..

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Table 11-1 (Cont.) DBMS_DG API Summary

API	Effect
ENABLE_FS_FAILOVER	Is used to enable fast-start failover..
ENABLE_FS_FAILOVER_CONDITION	Can be used to specify additional conditions for which a fast-start failover should be performed.
FAILOVER	This function can be used to perform a database failover.
GET_CONFIGURATION_PROPERTY	Is used to get the value of a configuration property.
GET_PROPERTY	Is used to get the value of a member property.
HEALTH_CHECK	Is used to get the broker to evaluate the health of all configuration members.
REINSTATE	Can be used to reinstate a database after a failover operation.
REMOVE	Is used to remove a member the Data Guard broker configuration.
REMOVE_CONFIGURATION	Is used to remove the Data Guard broker configuration.
REMOVE_INSTANCE	Can be used to remove an instance from a member the Data Guard broker configuration.
RESET_CONFIGURATION_PROPERTY	Is used to reset a configuration property to its default value.
RESET_PROPERTY	Can be used to reset a member configurable property to its default value.
SET_CONFIGURATION_PROPERTY	Can be used to set a value for a configuration property.
SET_PROPERTY	Can be used to set a value for a member configurable property.
SET_PROTECTION_MODE	Can be used to set the configuration protection mode.
SET_STATE_APPLY_OFF	Is used to set the apply state to off for a logical or physical standby database.
SET_STATE_APPLY_ON	Is used to set the apply state to onfor a logical or physical standby database..
SET_STATE_TRANSPORT_OFF	Used to set the redo transport state to off for a primary database.
SET_STATE_TRANSPORT_ON	Can be used to set the redo transport state to on for a primary database.
STOP_OBSERVER	used to stop fast-start failover observers in a Data Guard broker configuration.

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Table 11-1 (Cont.) DBMS_DG API Summary

API	Effect
SWITCHOVER	Is used to perform a database switchover.
WAIT	Is used to wait for various Data Guard broker events to occur.

ADD_DATABASE

The `ADD_DATABASE` function can be used to add a standby database to the Data Guard broker configuration.

`ADD_DATABASE` Function

Format

```
DBMS_DG.ADD_DATABASE (
     database_name          IN VARCHAR2,
     database_ci            IN VARCHAR2,
     severity               OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`database_name`	The name that will be used by the broker to refer to this standby database. It must match (case-insensitive) the value of the corresponding database `DB_UNIQUE_NAME` initialization parameter.
`database_ci`	A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` database property.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database or an enabled standby database or far sync instance.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The standby database was successfully added to the Data Guard broker configuration.
`Other`	The Data Guard broker was unable to add the standby database to the configuration and the return value will indicate the reason for this failure.

ADD_FAR_SYNC

The `ADD_FAR_SYNC` function can be used to add a far sync instance to the Data Guard broker configuration. To use this command, Oracle wallet-based authentication must be configured and you must connect with SYSDBA privilege.

`ADD_FAR_SYNC` Function

Format

```
DBMS_DG.ADD_FAR_SYNC (
     far_sync_name          IN VARCHAR2,
     far_sync_ci            IN VARCHAR2,
     severity               OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`far_sync_name`	The name that will be used by the broker to refer to this far sync instance. It must match (case-insensitive) the value of the corresponding database `DB_UNIQUE_NAME` initialization parameter.
`far_sync_ci`	A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` database property.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database or an enabled standby database or far sync instance.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The far sync instance was successfully added to the Data Guard broker configuration.
`Other`	The Data Guard broker was unable to add the far sync instance to the configuration and the return value will indicate the reason for this failure.

ADD_RECOVERY_APPLIANCE

The `ADD_FAR_SYNC` function can be used to add a Zero Data Loss Recovery Appliance to the Data Guard broker configuration.

`ADD_RECOVERY_APPLIANCE` Function

Format

```
DBMS_DG.ADD_RECOVERY_APPLIANCE (
     ra_name          IN VARCHAR2,
     ra_ci            IN VARCHAR2,
     severity         OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`ra_name`	The name that will be used by the broker to refer to this Zero Data Loss Recovery Appliance. It must match (case-insensitive) the value of the corresponding database `DB_UNIQUE_NAME` initialization parameter.
`ra_ci`	A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` property.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database or an enabled standby database or far sync instance.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The Zero Data Loss Recovery Appliance was successfully added to the Data Guard broker configuration.
`Other`	The Data Guard broker was unable to add the Zero Data Loss Recovery Appliance to the configuration and the return value will indicate the reason for this failure.

CONVERT_TO_PHYSICAL

The `CONVERT_TO_PHYSICAL` function can be used to convert a snapshot standby database to a physical standby database.

`CONVERT_TO_PHYSICAL` Function

Format

```
DBMS_DG.CONVERT_TO_PHYSICAL (
     db_name          IN VARCHAR2,
     severity         OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`db_name`	The `DB_UNIQUE_NAME` initialization parameter value of the snapshot standby database to be converted to a physical standby database.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The client must be connected to the primary database to call this function.
- The snapshot standby database must be running in mount mode for the conversion to physical standby to complete.

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Return Values

Error	Description
ORA-00000: normal, successful completion	The snapshot standby database was successfully converted to a physical standby database.
ORA-16540: invalid argument	The name specified for the database was not a valid DB_UNIQUE_NAME value.
ORA-16732: Oracle Clusterware is restarting the database instance	Oracle Clusterware is restarting the database to the mode required by the broker to convert the snapshot standby database to a physical standby database. Wait for the database to complete restarting and then retry this function call.
ORA-16897: start database to mount mode	The conversion to physical standby could not be performed because the snapshot standby database was not running in mount mode. Restart the database to mount mode and retry this function call.
ORA-16899: Operation requires a connection to the primary database.	This function must be called while connected to the primary database to complete. Reconnect to the primary database and retry this function call.
Other	The Data Guard broker was unable to convert the database and the return value will indicate the reason for this failure.

CONVERT_TO_SNAPSHOT

The CONVERT_TO_SNAPSHOT function can be used to convert a snapshot standby database to a physical standby database.

CONVERT_TO_SNAPSHOT Function

Format

```
DBMS_DG.CONVERT_TO_SNAPSHOT (
     db_name          IN VARCHAR2,
     severity         OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
db_name	The DB_UNIQUE_NAME initialization parameter value of the physical standby database to be converted to a snapshot standby database.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

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Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The database was successfully converted to a snapshot standby database.
`ORA-16540: invalid argument`	The name specified for the database was not a valid `DB_UNIQUE_NAME` value.
`Other`	The Data Guard broker was unable to convert the database and the return value will indicate the reason for this failure.

CREATE_CONFIGURATION

The `CREATE_CONFIGURATION` function can be used to create a Data Guard broker configuration. The primary database will be automatically added to the configuration. The value of the primary database's `DB_UNIQUE_NAME` initialization parameter value will be fetched from the database.

`CREATE_CONFIGURATION` Function

```
DBMS_DG.CREATE_CONFIGURATION (
     config_name          IN VARCHAR2,
     primary_ci           IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`config_name`	A user-friendly name for the configuration you are creating. Valid names contain any alphanumeric characters. If spaces are included in the name, the name must be enclosed in double or single quotation marks. The name must consist of 30 or fewer bytes.
`primary_ci`	A fully specified connect descriptor or a name to be resolved by an Oracle Net Services naming method (for example, TNS). The value you specify is also used as the initial value of the `DGConnectIdentifier` database property.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

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Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The Data Guard broker configuration was created and the primary database has been added to the configuration.
`Other`	The Data Guard broker was unable to convert the database and the return value will indicate the reason for this failure.

DISABLE

The `DISABLE` function can be used to convert a snapshot standby database to a physical standby database.

`DISABLE` Function

```
DBMS_DG.DISABLE (
     member_name          IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`member_name`	The `DB_UNIQUE_NAME` initialization parameter value of the member to be disabled.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database.

Error	Description
`ORA-00000: normal, successful completion`	The member was successfully disabled.

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Error	Description
ORA-16540: invalid argument	The name specified for the member was not a valid DB_UNIQUE_NAME value.
Other	The Data Guard broker was unable to disable the member and the return value will indicate the reason for this failure.

DISABLE_CONFIGURATION

The DISABLE_CONFIGURATION function can be used to disable broker management of a configuration so that the so that the configuration and all of its databases are no longer managed by the broker.

DISABLE Function

```
DBMS_DG.DISABLE_CONFIGURATION (
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- This function can only be called while connected to a primary database.

Return Values

Error	Description
ORA-00000: normal, successful completion	The member was successfully disabled.
Other	The Data Guard broker was unable to disable the member and the return value will indicate the reason for this failure.

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DISABLE_FS_FAILOVER

The DISABLE_FS_FAILOVER function can be used to to disable fast-start failover. Using this function will prevent the observer from initiating a failover to the target standby.

DISABLE_FS_FAILOVER Function

```
DBMS_DG.DISABLE_FS_FAILOVER (
     force           IN BOOLEAN DEFAULT FALSE,
     severity        OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
force	A boolean value to indicate whether fast-start failover should be disabled with the FORCE option. A value of TRUE will cause this function to disable fast-start failover on the member the session is connected. A value of FALSE will cause this function to disable fast-start failover on the primary and current target standby. If both databases cannot disable fast-start failover, it will remain enabled.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- If the primary and target standby database have a network connection, specify FALSE for the force parameter to disable fast-start failover on all databases in the broker configuration. If errors occur during the disable operation, the broker returns an error message and stops the disable operation. You may need to reissue the call with a value of TRUE for the force parameter to override the error conditions and disable fast-start failover on the database to which you are connected.
- Use a value of TRUE for the force parameter when the network between the primary and target standby databases is disconnected or when the database upon which the function is called does not have a connection with the primary database. A value of TRUE for the force parameter disables fast-start failover on the database to which you are connected, even when errors occur.
- Calling this function using a value of TRUE for the force parameter on a primary database that is disconnected from the observer and the target standby database does not prevent the observer from initiating a fast-start failover to the target standby database.

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- You can call this function with a value of FALSE for the force parameter while connected to any database in the broker configuration so long as connectivity exists between that database and the primary.
- If this function is called with a value of TRUE for the force parameter at the target standby database and the connection subsequently resumes with the primary database, fast-start failover is disabled on all databases in the configuration.
- Calling this function with a value of TRUE for the force parameter while connected to the primary will disable fast-start failover on the target standby database if there is network connectivity between both databases

Errors	Description
ORA-00000: normal, successful completion	Fast-start failover was disabled according to the value specified by the force parameter.
Other	The Data Guard broker was unable to disable fast-start failover.

DISABLE_FS_FAILOVER_CONDITION

The DISABLE_FS_FAILOVER_CONDITION function can be used to remove conditions for which a fast-start failover should be performed.

DISABLE_FS_FAILOVER_CONDITION Function

```
DBMS_DG.DISABLE_FS_FAILOVER_CONDITION (
     condition            IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
condition	A fast-start failover condition to disable.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

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Return Values

Health Condition	Description
"Datafile Write Errors"	If fast-start failover is enabled and the Datafile Write Errors condition is specified, then a fast-start failover is initiated if write errors are encountered in any data files, including temp files, system data files, and undo files.
"Corrupted Controlfile"	Corrupted controlfile. This condition is enabled by default.
"Corrupted Dictionary"	Dictionary corruption of a critical database object. This condition is enabled by default.
"Inaccessible Logfile"	LGWR is unable to write to any member of a log group due to an I/O error.
"Stuck Archiver"	Archiver is unable to archive a redo log because device is full or unavailable.

Error	Description
`ORA-00000: normal, successful completion`	Fast-start failover condition was disabled.
`Other`	The Data Guard broker was unable to disable fast-start failover condition.

ENABLE

The `ENABLE` function can be used to to enable broker management of the specified member..

`ENABLE` Function

```
DBMS_DG.ENABLE (
     member_name          IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`member_name`	The `DB_UNIQUE_NAME` initialization parameter value of the member to be enabled.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The member was successfully disabled.
`ORA-16540: invalid argument`	The name specified for the member was not a valid `DB_UNIQUE_NAME` value.
`Other`	The Data Guard broker was unable to enable the member and the return value will indicate the reason for this failure.

ENABLE_CONFIGURATION

The `ENABLE_CONFIGURATION` function can be used to to enable broker management of a configuration.

`ENABLE_CONFIGURATION` Function

```
DBMS_DG.ENABLE_CONFIGURATION (
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- If the configuration is disabled, connect to the database whose control file role is `PRIMARY` and call this function to enable the configuration.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The configuration was successfully enabled.
`Other`	The Data Guard broker was unable to enable the configuration and the return value will indicate the reason for this failure.

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ENABLE_FS_FAILOVER

The ENABLE_FS_FAILOVER function can be used to enable fast-start failover. This enables the broker to fail over to a specifically-chosen standby database in the event of loss of the primary database, without requiring any manual steps..

ENABLE_FS_FAILOVER Function

```
DBMS_DG.ENABLE_FS_FAILOVER (
     observe_only    IN BOOLEAN DEFAULT FALSE,
     severity        OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
observe_only	A boolean value to indicate whether fast-start failover should be enabled in observer-only mode. A value of TRUE will cause this function to enable fast-start failover in observe-only mode. A value of FALSE will cause this function to enable fast-start failover without observe-only mode. In observe-only mode, the observer will print information about when a fast-failover would have been initiated without actually doing a failover to the target standby database.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The prerequisites described in Prerequisites for Enabling Fast-Start Failover must be met before you issue this command to enable fast-start failover.
- Issuing the ENABLE FAST_START FAILOVER command does not trigger a failover, it only allows the observer that is monitoring the configuration to initiate a fast-start failover if conditions warrant a failover.
- You can enable fast-start failover while connected to any database in the broker configuration.
- If you do not start the observer after you have enabled fast-start failover, the ORA-16819 warning is displayed for the primary and target standby databases.
- To enable fast-start failover for a broker configuration with multiple standby databases, the FastStartFailoverTarget configuration property on the primary database must specify one or more viable target standby databases. Both the primary database and the target standby databases must have:

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  - Standby redo logs configured
  - Redo transport must be properly configured at both databases for the configured protection mode

> **Note**
>
> Oracle also recommends Flashback Database be enabled on both the primary and standby databases to allow for reinstatement of the old primary database after a failover.

- Once you have enabled fast-start failover, you must comply with the restrictions described in Restrictions When Fast-Start Failover is Enabled.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	Fast-start failover was disabled according to the value specified by the force parameter.
`Other`	If the severity returned was `ORA-16501`, the Data Guard broker was unable to enable fast-start failover and the return value will indicate the reason. If the severity returned was `ORA-16501`, the Data Guard broker was able to enable fast-start failover and the return value will indicate information about how fast-start failover was enabled.

ENABLE_FS_FAILOVER_CONDITION

The `ENABLE_FS_FAILOVER_CONDITION` function can be used to specify additional conditions for which a fast-start failover should be performed.

`ENABLE_FS_FAILOVER_CONDITION` Function

```
DBMS_DG.ENABLE_FS_FAILOVER_CONDITION (
     condition            IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`condition`	A fast-start failover condition to enable.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

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Usage Notes

- This function returns a binary integer.
- This function can also be used to enable initiating a fast-start failover when there is an ORA-240 error.

Health Condition	Description
"Datafile Write Errors"	If fast-start failover is enabled and the Datafile Write Errors condition is specified, then a fast-start failover is initiated if write errors are encountered in any data files, including temp files, system data files, and undo files.
"Corrupted Controlfile"	Corrupted controlfile. This condition is enabled by default.
"Corrupted Dictionary"	Dictionary corruption of a critical database object. This condition is enabled by default.
"Inaccessible Logfile"	LGWR is unable to write to any member of a log group due to an I/O error.
"Stuck Archiver"	Archiver is unable to archive a redo log because device is full or unavailable.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	Fast-start failover condition was enabled.
`Other`	The Data Guard broker was unable to enable the fast-start failover condition and the return value will indicate the reason for this failure.

FAILOVER

The `FAILOVER` function can be used to perform a database failover.

`FAILOVER` Function

```
DBMS_DG.FAILOVER (
     db_name              IN VARCHAR2,
     failover_type,       IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`db_name`	The `DB_UNIQUE_NAME` initialization parameter value of the standby database to be fail over to.

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Parameter	Description
failover_type	The type of failover to perform. Accepted keywords are: • COMPLETE: complete failover where the target standby database applies all redo data it has received from the primary database before performing the failover operation. • IMMEDIATE: the failover operation is performed immediately without first applying any unapplied redo data. This option will most likely result in a data loss failover operation
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- Always try to perform a complete failover first unless Redo Apply has stopped at the failover target due to an ORA-752 or ORA-600 [3020] error. If one of these errors has occurred, then before proceeding follow the guidelines in "Resolving ORA-752 or ORA-600 [3020] During Standby Recovery" in My Oracle Support Note 1265884.1 at https://support.oracle.com. An immediate failover should only be performed when a complete failover is unsuccessful or in the error case just noted.
- The specified standby database must be enabled before the primary database fails. However, an enabled standby database that was shut down can be a candidate for the failover operation. In this case, restart the standby database, then retry this call.
- Before you call this function, verify that you are connected to the standby database that will become the new primary database. If necessary, issue a CONNECT command to connect to the standby database to which you want to failover.
- If the broker configuration is operating in maximum protection mode, a manual failover operation will force the protection mode to be maximum performance. The redo transport service settings are unaffected. You need to restore the desired protection mode for the resulting configuration after the failover operation.

> **Note**
>
> With fast-start failover, the broker preserves the protection mode that was in effect prior to the failover.

- If this function is called with the failover_type keyword of IMMEDIATE, no attempt is made to apply any unapplied redo that has been received. This option more likely results in lost application data even when standby redo log files are configured on the standby database. Additionally, any remaining standby databases in the configuration cannot function as such until they are reinstated or re-created. See Reenabling Disabled Databases After a Role Change for more information.Once you have enabled fast-start failover, you must comply with the restrictions described in Restrictions When Fast-Start Failover is Enabled.

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- You can perform a manual failover or set up the broker to perform a fast-start failover. See the `ENABLE FAST_START FAILOVER` command for information about allowing the broker to automatically invoke failover, when conditions warrant a failover.
- If fast-start failover is enabled, you can perform a complete manual failover only to the fast-start failover target standby database and only if the fast-start failover target standby database is synchronized with, or within the lag limit of, the primary database, and only when the observer is started. You cannot perform an immediate manual failover when fast-start failover is enabled. If Flashback Database was enabled on the former (failed) primary database prior to the failover, the former primary database can be reinstated using the broker's `REINSTATE` command. If failover was performed to a physical standby database, any other physical standby databases that were disabled by the failover can be reinstated if Flashback Database was enabled on the standby database and there are sufficient flashback logs available.
- The original primary database can only participate in the configuration as a standby database after it is reinstated or re-created. **Caution:** You should shut down the original primary database if it still has any active instances running prior to failing over.

Error	Description
`ORA-00000: normal, successful completion`	The failover completed successfully.
`Other`	The Data Guard broker was unable to complete the failover operation and the return value will indicate the reason for this failure.

GET_CONFIGURATION_PROPERTY

The `GET_CONFIGURATION_PROPERTY` function can be used to get the value of a configuration property.

`GET_CONFIGURATION_PROPERTY` Function

```
DBMS_DG.GET_CONFIGURATION_PROPERTY (
     property_name        IN VARCHAR2,
     value                OUT VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`property_name`	The name of the configuration property whose value is to be fetched.
`value`	The value of the specified configuration property is returned in this output parameter.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

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Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The value of the property was successfully fetched.
`Other`	The Data Guard broker was unable to fetch the configuration property value and the return value will indicate the reason for this failure.

GET_PROPERTY

The `GET_PROPERTY` function can be used to get the value of a member property.

`GET_PROPERTY` Function

```
DBMS_DG.GET_PROPERTY (
     member_name          IN VARCHAR2,
     property_name        IN VARCHAR2,
     value                OUT CLOB,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`member_name`	The `DB_UNIQUE_NAME` initialization parameter value of the member to be whose property value is to be fetched.
`property_name`	The name of the configuration property whose value is to be fetched.
`value`	The value of the specified configuration property is returned in this output parameter.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

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Error	Description
ORA-00000: normal, successful completion	The value of the property was successfully fetched.
Other	The Data Guard broker was unable to fetch the property value and the return value will indicate the reason for this failure.

HEALTH_CHECK

The HEALTH_CHECK function can be used to get the broker to evaluate the health of all configuration members..

HEALTH_CHECK Function

```
DBMS_DG.HEALTH_CHECK
RETURN BINARY_INTEGER;
```

Parameters

None

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
ORA-00000: normal, successful completion	The health check was successfully initiated.
Other	The Data Guard broker was unable to perform the health check and the return value will indicate the reason for this failure.

REINSTATE

The REINSTATE function can be used to reinstate a database after a failover operation.

REINSTATE Function

```
DBMS_DG.REINSTATE (
     db_name              IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
db_name	The DB_UNIQUE_NAME initialization parameter value of the database to be reinstated.

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Parameter	Description
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- If the conditions for reinstatement described in Reinstating the Former Primary Database in the Broker Configuration are not satisfied, the reinstatement will fail with an appropriate error status and the specified database will remain disabled.
- If the database name specified is that of the old primary and fast-start failover is enabled, the old primary database will be reinstated as a standby to the new primary, and the fast-start failover environment will be updated to reflect the availability of the new standby database. It will accept redo data from the new primary database and be the target of a fast-start failover should the new primary database fail. Reinstatement occurs automatically if the observer is running unless the FastStartFailoverAutoReinstate configuration property is set to FALSE.
- This function does not require that fast-start failover be enabled. It can be used to reinstate an old primary database after a complete manual failover has been performed. It can also be used to reinstate a bystander standby database that had been disabled after either a complete or immediate failover.
- Call this function while connected to any database in the broker configuration, except the database that is to be reinstated.

Return Values

Error	Description
ORA-00000: normal, successful completion	The database was successfully reinstated.
ORA-16540: invalid argument	The name specified for the database was not a valid DB_UNIQUE_NAME value.
ORA-16732: Oracle Clusterware is restarting the database instance	Oracle Clusterware is restarting the database to the mode required by the broker. Once the database has been restarted, retry this function call.
ORA-16897: start database to mount mode	Reinstatement was not performed because the database was not running in mount mode. Restart the database to mount mode and retry this function call.
ORA-16899: Operation requires a connection to the primary database.	A connection to the primary database is required to call this function.
Other	The Data Guard broker was unable to reinstate the specified database and the return value will indicate the reason for this failure.

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REMOVE

The REMOVE function can be used to remove a member the Data Guard broker configuration.

REMOVE Function

```
DBMS_DG.REMOVE (
     member_name          IN VARCHAR2,
     preserve_destination IN BOOLEAN DEFAULT FALSE,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the database to be reinstated.
preserve_destination	A boolean value to indicate whether the log_archive_dest initialization parameter setting should be preserved or clear when removing member from the configuration. A value of TRUE indicates that the parameter setting will not be cleared. A value of FALSE indicates the parameter setting will be cleared.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- An error is returned if you specify the name of the primary database in the broker configuration.
- By default, this function will cause all references to the specified member to be removed from all redo transport initialization parameters at each member of the configuration. To preserve these settings, specify TRUE for the preserve_destination parameter.
- This function cannot be called if fast-start failover is enabled and database-name specifies the name of the target standby database.

Return Values

Error	Description
ORA-00000: normal, successful completion	The member was successfully removed.

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Error	Description
Other	The Data Guard broker was unable to remove the member from the configuration and the return value will indicate the reason for this failure.

REMOVE_CONFIGURATION

The REMOVE_CONFIGURATION function can be used to remove the Data Guard broker configuration.

REMOVE_CONFIGURATION Function

```
DBMS_DG.REMOVE_CONFIGURATION (
     preserve_destinations IN BOOLEAN DEFAULT FALSE,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
preserve_destination	A boolean value to indicate whether the log_archive_dest initialization parameter setting should be preserved or clear when removing member from the configuration. A value of TRUE indicates that the parameter setting will not be cleared. A value of FALSE indicates the parameter setting will be cleared.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- When you remove a broker configuration, management of all the members associated with that configuration is disabled.
- By default, this function causes the corresponding broker settings of the LOG_ARCHIVE_DEST_n initialization parameter on the primary database and the LOG_ARCHIVE_CONFIG initialization parameters on all members of the configuration to be removed. To preserve these settings, specify a value of true for the preserve_destinations parameter.
- This command does not remove or affect the actual primary or standby database instances, databases, far sync instances, data files, control files, initialization parameter files, server parameter files, or log files of the underlying Oracle Data Guard configuration.
- You cannot remove the configuration when fast-start failover is enabled.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The configuration was successfully removed.
`Other`	The Data Guard broker was unable to remove the configuration and the return value will indicate the reason for this failure.

REMOVE_INSTANCE

The `REMOVE_INSTANCE` function can be used to remove an instance from a member the Data Guard broker configuration.

`REMOVE_INSTANCE` Function

```
DBMS_DG.REMOVE_INSTANCE (
     member_name           IN VARCHAR2,
     instance_name         IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`member_name`	The `DB_UNIQUE_NAME` initialization parameter value of the member whose instance is to be removed.
`instance_name`	The name of the instance (SID) that you want to remove the broker configuration.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The broker automatically adds started instances to the broker configuration. However, the broker does not automatically remove instances from the database. This function can be used to manually remove any instance that no longer exists from the configuration.
- This function returns an error for an instance that is currently active in the broker configuration.
- This function returns an error if this is the only instance currently associated with a database for far sync instance.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The configuration was successfully removed.
`Other`	The Data Guard broker was unable to remove the configuration and the return value will indicate the reason for this failure.

RESET_CONFIGURATION_PROPERTY

The `RESET_CONFIGURATION_PROPERTY` function can be used to reset a configuration property to its default value.

`RESET_CONFIGURATION_PROPERTY` Function

```
DBMS_DG.RESET_CONFIGURATION_PROPERTY (
     property_name         IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`property_name`	The name of the configuration property whose value is to be reset to its default value.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The configuration was successfully removed.
`Other`	The Data Guard broker was unable to remove the configuration and the return value will indicate the reason for this failure.

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RESET_PROPERTY

The RESET_PROPERTY function can be used to reset a member configurable property to its default value.

RESET_PROPERTY Function

```
DBMS_DG.RESET_PROPERTY (
     member_name           IN VARCHAR2,
     property_name         IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the member whose configurable property value is to be reset to its default value.
property_name	The name of the configuration property whose value is to be reset to its default value.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
ORA-00000: normal, successful completion	The specified configurable property's value was successfully reset to its default value.
Other	The Data Guard broker was unable to reset the specified configurable property to its default value and the return value will indicate the reason for this failure.

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SET_CONFIGURATION_PROPERTY

The `SET_CONFIGURATION_PROPERTY` function can be used to set a value for a configuration property.

`SET_CONFIGURATION_PROPERTY` Function

```
DBMS_DG.SET_CONFIGURATION_PROPERTY (
     property_name IN VARCHAR2,
     value         IN VARCHAR2,
     severity      OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`property_name`	The name of the configuration property whose value is to be set.
`value`	The value to set the specified configuration property to.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The specified configurable property's value was successfully reset to its default value.
`Other`	The Data Guard broker was unable to reset the specified configurable property to its default value and the return value will indicate the reason for this failure.

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SET_PROPERTY

The SET_CONFIGURATION_PROPERTY function can be used to set a value for a member configurable property.

SET_PROPERTY Function

```
DBMS_DG.SET_PROPERTY (
     member_name           IN VARCHAR2,
     property_name         IN VARCHAR2,
     value                 IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the member whose configurable property value is to be set.
property_name	The name of the configurable property whose value is to be set.
value	The value to set the specified configurable property to.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
ORA-00000: normal, successful completion	The specified configurable property's value was successfully reset to its default value.
Other	The Data Guard broker was unable to reset the specified configurable property to its default value and the return value will indicate the reason for this failure.

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SET_PROTECTION_MODE

The SET_PROTECTION_MODE function can be used to set the configuration protection mode.

SET_PROTECTION_MODE Function

```
DBMS_DG.SET_PROTECTION_MODE (
     protection_mode IN VARCHAR2,
     severity        OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
protection_mode	A character string containing the protection mode to be set. Valid values include: • MAXPERFORMANCE • MAXAVAILABILITY • MAXPROTECTION
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- Before you use the this function to set the protection mode, ensure that at least one standby is configured to receive redo via SYNC or FASTSYNC mode if it receives redo directly from the primary. If the standby receives redo via a far sync instance, the far sync instance must be configured to receive redo via SYNC or FASTSYNC mode and the standby must be configured to receive redo via ASYNC mode.
- The following table shows the configuration protection modes and the minimum corresponding settings for redo transport services:

Protection Mode	Redo Transport	Standby Redo Log FIles Needed?	Useable with Fast-Start Failover?
MAXPROTECTION	SYNC	Yes	Yes
MAXAVAILABILITY	SYNC or FASTSYNC	Yes	Yes
MAXPERFORMANCE	ASYNC	Yes	Yes

  The default protection mode for the configuration is MAXPERFORMANCE.
- This function cannot be called if fast-start failover is enabled.
- Upgrading from MAXPERFORMANCE to MAXPROTECTION is not allowed. You must first go to MAXAVAILABILITY and then to MAXPROTECTION.

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Return Values

Error	Description
`ORA-00000: normal, successful completion`	The configuration protection mode was successfully changed.
`Other`	The Data Guard broker was unable to change the protection mode and the return value will indicate the reason for this failure.

SET_STATE_APPLY_OFF

The `SET_STATE_APPLY_OFF` function can be used to set the apply state to off for a logical or physical standby database.

`SET_STATE_APPLY_OFF` Function

```
DBMS_DG.SET_STATE_APPLY_OFF (
     member_name           IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`member_name`	The `DB_UNIQUE_NAME` initialization parameter value of the standby database whose apply state should be set to `OFF`.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The apply state for a snapshot standby database cannot be set to `OFF`.
- All instances of an Oracle RAC database are affected by this database state change.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The apply state for the specified standby database was successfully set to `OFF`.

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Error	Description
Other	The Data Guard broker was unable to set the apply state to OFF for the specified standby database and the return value will indicate the reason for this failure.

SET_STATE_APPLY_ON

The SET_STATE_APPLY_ON function can be used to set the apply state to on for a logical or physical standby database.

SET_STATE_APPLY_ON Function

```
DBMS_DG.SET_STATE_APPLY_ON (
     member_name           IN VARCHAR2,
     apply_instance        IN VARCHAR2 DEFAULT NULL,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the standby database whose apply state should be set to ON.
apply_instance	A character string containing the SID of the instance you want to become the apply instance if this is an Oracle RAC standby database.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The apply state for a snapshot standby database cannot be set to ON.
- If the apply_instance argument is specified, that instance will become the apply instance.
- All instances of an Oracle RAC database are affected by this database state change.

Return Values

Error	Description
ORA-00000: normal, successful completion	The apply state for the specified standby database was successfully set to ON.

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Error	Description
Other	The Data Guard broker was unable to set the apply state to ON for the specified standby database and the return value will indicate the reason for this failure.

SET_STATE_TRANSPORT_OFF

The SET_STATE_TRANSPORT_OFF function can be used to set the redo transport state to off for a primary database.

SET_STATE_TRANSPORT_OFF Function

```
DBMS_DG.SET_STATE_TRANSPORT_OFF (
     member_name           IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the primary database.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The transport state can only be set to off for a primary database.
- All instances of an Oracle RAC database are affected by this database state change.

Return Values

Error	Description
ORA-00000: normal, successful completion	The transport state for the primary database was successfully set to OFF.
Other	The Data Guard broker was unable to set the transport state to OFF and the return value will indicate the reason for this failure.

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SET_STATE_TRANSPORT_ON

The SET_STATE_TRANSPORT_ON function can be used to set the redo transport state to on for a primary database.

SET_STATE_TRANSPORT_ON Function

```
DBMS_DG.SET_STATE_TRANSPORT_ON (
     member_name           IN VARCHAR2,
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
member_name	The DB_UNIQUE_NAME initialization parameter value of the primary database.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- The transport state can only be set to ON for a primary database.
- All instances of an Oracle RAC database are affected by this database state change.

Return Values

Error	Description
ORA-00000: normal, successful completion	The transport state for the primary database was successfully set to ON.
Other	The Data Guard broker was unable to set the transport state to ON and the return value will indicate the reason for this failure.

STOP_OBSERVER

The STOP_OBSERVER function can be used to stop fast-start failover observers in a Data Guard broker configuration.

STOP_OBSERVER Function

```
DBMS_DG.STOP_OBSERVER (
     ob_name               IN VARCHAR2,
```


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```
     severity              OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
ob_name	A character string containing the name of the observer to be stopped. Valid values are: • An observer name. See V$FS_FAILOVER_OBSERVERS for a list of all registered observers. • NULL or the empty string if only one observer is registered. • ALL to stop all registered observers.
severity	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • ORA-0: normal, successful completion • ORA-16501: The Oracle Data Guard broker operation failed. • ORA-16502: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- You can call this function while connected to any database in the broker configuration.
- This command does not disable fast-start failover, but a fast-start failover cannot be initiated in the absence of an observer.
- Fast-start failover does not need to be enabled when you issue this command.
- If fast-start failover is enabled when you call this function, then the primary and standby databases must be connected and communicating with each other. Otherwise the following error is returned:
  `ORA-16636 fast-start failover target standby in error state, cannot stop observer`

  If connectivity does not exist between the primary and standby databases, you can issue the disable fast-start failover with the `FORCE` option on the primary database and then call this function. Note that disabling fast-start failover with the `FORCE` option on a primary database that is disconnected from the observer and the target standby database does not prevent the observer from initiating a fast-start failover to the target standby database.
- If fast-start failover is not enabled when you issue call this function, then only the primary database must be running when you stop the observer.
- The observer does not stop immediately when you call this function. The observer does not discover it has been stopped until the next time the observer contacts the broker. As soon as you have called this function successfully, you can start an observer again on any computer. You can start a new observer right away, even if the old observer has not yet discovered it was stopped. Any attempt to restart the old observer will fail, because a new observer has been started for the broker configuration.
- This function will return an error if a switch to a new fast-start failover target or new master observer is in progress.

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- This function will return an error if there are two or more registered observers and you attempt to stop only the master.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The specified observer was successfully stopped.
`Other`	The Data Guard broker was unable to stop the specified observer and the return value will indicate the reason for this failure.

SWITCHOVER

The `SWITCHOVER` function can be used to perform a database switchover.

`SWITCHOVER` Function

```
DBMS_DG.SWITCHOVER (
     db_name              IN VARCHAR2,
     severity             OUT BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
`db_name`	The `DB_UNIQUE_NAME` initialization parameter value of the standby database to switch over to.
`severity`	The severity associated with the status returned by this function. Severity will be one of the following Oracle error numbers: • `ORA-0`: normal, successful completion • `ORA-16501`: The Oracle Data Guard broker operation failed. • `ORA-16502`: The Oracle Data Guard broker operation succeeded with warnings.

Usage Notes

- This function returns a binary integer.
- If fast-start failover is enabled, you may switch over only to the fast-start failover target standby database.
- The broker verifies that the primary and standby databases are in the following states before starting the switchover:
  - The primary database must be enabled and in the TRANSPORT-ON state so redo transport services are started.
  - The standby database must be enabled and in the APPLY-ON state, with log apply services started.
- The broker allows the switchover to proceed as long as there are no redo transport services errors for the standby database that you selected to participate in the switchover.

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However, errors occurring for any other bystander standby database will not prevent the switchover from proceeding.

- Switchover to a logical standby database is not allowed when the configuration is operating in maximum protection mode.
- If the broker configuration is operating in either maximum protection mode or maximum availability mode, the switchover maintains the protection mode even after the operation (described in Before You Perform a Switchover Operation). The switchover will not be allowed if the mode cannot be maintained because the target standby database of the switchover was the only standby that satisfied the protection mode requirement.
- If the standby database that is assuming the primary role is a physical standby database, then the old primary database will be restarted after the switchover completes. If the standby database is a logical standby database, then neither the primary database nor the logical standby database is restarted.
- If the standby database that is assuming the primary role is a physical standby database, then the original primary becomes a physical standby database.
- If the standby database that is assuming the primary role is a logical standby database, then the original primary becomes a logical standby database.
- If an Oracle RAC primary database is becoming a physical standby database, all but one instance of the primary database will be shut down before performing the switchover. See Switchover for details.
- You cannot switchover to a snapshot standby database.
- If the standby database that is assuming the primary role is a logical standby database and there are physical standby databases in the configuration, after the switchover, the physical standby databases will be disabled.
  Caution: For this reason, Oracle generally recommends that you specify your physical standby database for switchover instead of your logical standby database. If you must switch over to your logical standby database, see Reenabling Disabled Databases After a Role Change to re-create your physical standby database.

  If you intend to switch back to the original primary database relatively soon, you may allow the physical and snapshot standbys to remain disabled. Once you have completed the switchover back to the original primary, you may then reenable the physical and snapshot standby databases since they are still viable standbys for the original primary database.

Return Values

Error	Description
`ORA-00000: normal, successful completion`	The switchover completed successfully.
`ORA-16540: invalid argument`	The name specified for the database was not a valid `DB_UNIQUE_NAME` value.
`ORA-16600: not connected to target standby database`	This function cannot be called when connected to the primary database. Call this function while connected to the target standby database.
`ORA-16732: Oracle Clusterware is restarting the database instance`	Oracle Clusterware is restarting the database to the mode required by the broker. Once the database has been restarted, retry this function call.
`ORA-16897: start database to mount mode`	The switchover was completed successfully and the client must restart the old primary database to the mount mode.

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Error	Description
ORA-16897: start database to open mode	The switchover was completed successfully and the client must restart the old primary database to the open mode.
Other	The Data Guard broker unable to complete the switchover and the return value will indicate the reason for this failure.

WAIT

The WAIT function can be used to wait for various Data Guard broker events to occur.

WAIT Function

```
DBMS_DG.WAIT (
     wait_event            IN BINARY_INTEGER
     wait_time             IN BINARY_INTEGER)
RETURN BINARY_INTEGER;
```

Parameters

Parameter	Description
wait_event	A Data Guard broker wait event. This can be one of: • DBMS_DG.WAIT_START_BROKER: Wait for Data Guard broker to start and finish initialization. Specifying this wait event will also cause the DG_BROKER_START initialization parameter to be set to TRUE. • DBMS_DG.WAIT_STOP_BROKER: Wait for Data Guard broker to stop. Specifying this wait event will also cause the DG_BROKER_START initialization parameter to be set to FALSE.
wait_time	The number of seconds to wait for the specified wait event to occur.

Usage Notes

- This function returns a binary integer.

Return Values

Error	Description
ORA-00000: normal, successful completion	The event for which to wait on occurred within the number of seconds specified by the wait_time parameter.
ORA-16509: request timed out	The event for which to wait on did not occur within the number of seconds specified by the wait_time parameter.

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Error	Description
`Other`	The Data Guard broker unable to wait for the specified wait event and the return value will indicate the reason for this failure.

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12

Oracle Data Guard Broker Properties

Use Oracle Data Guard broker properties to manage instances or the entire configuration.

Broker configuration and database properties help you to view and control the behavior of entire broker configurations, individual configuration members, redo transport services, and log apply services.

- Configuration Properties
- Monitorable (Read-Only) Properties
- Configurable Properties

Properties have either configuration-wide scope, database-wide scope, far sync instance-wide scope, or instance-specific scope. Configuration-wide properties control the behavior of the broker on all members of the configuration. The values of such properties apply uniformly across all members of the configuration.

Database-wide properties allow you to view or control the behavior of a specific database. If the database (primary or standby) is an Oracle RAC database consisting of multiple instances, then the value of such a property applies uniformly across all instances of that database.

Far sync instance-wide properties allow you to view or control the behavior of a far sync instance.

Instance-specific properties allow you to view or control the behavior of an individual database instance. Such a property exists for all instances of an Oracle RAC database, but its value can differ from one specific instance to another.

> **Note**
>
> You can use the Oracle Data Guard broker command-line interface (DGMGRL) to view or modify broker properties.
>
> Oracle Enterprise Manager Cloud Control (Cloud Control) explicitly presents some broker properties on the Edit Properties page. Information from other properties can be implicitly incorporated into other Web pages displayed by Cloud Control. See the individual description of each property for information about how Cloud Control presents that property.

Configuration Properties

Configuration properties control the behavior of the broker configuration.

You can view and dynamically update the values of these properties using either DGMGRL or Cloud Control. However, some properties can only be updated through DGMGRL.

A configuration property has configuration-wide scope; meaning that the value you set for the property applies uniformly to each member in the configuration.

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Configuration properties are set using the `EDIT CONFIGURATION SET PROPERTY` command, as shown in the following examples.

Example 1

This example sets the `FastStartFailoverThreshold` configuration property to 90 seconds.

```
DGMGRL> EDIT CONFIGURATION SET PROPERTY FastStartFailoverThreshold=90;
```

Example 2

This example sets the `ExternalDestination1` configuration property to point to a redo transport destination with a service name of `Sales` and a `DB_UNIQUE_NAME` of `chicago`.

```
EDIT CONFIGURATION SET PROPERTY ExternalDestination1='SERVICE=Sales
DB_UNIQUE_NAME=chicago';
```

> **Note**
>
> In general, quotation marks are not necessary around property values unless the case you specify needs to be preserved. By default, DGMGRL lowercases any string you supply, unless it is placed within quotation marks.
>
> Quotation marks are required for any property values that include spaces or punctuation characters. For example, `RedoRoutes`.

The following sections describe the configuration properties:

- BystandersFollowRoleChange
- CommunicationTimeout
- ConfigurationWideServiceName
- ExternalDestination1
- ExternalDestination2
- FastStartFailoverAutoReinstate
- FastStartFailoverLagGraceTime
- FastStartFailoverLagLimit
- FastStartFailoverLagType
- FastStartFailoverPmyShutdown
- FastStartFailoverThreshold
- ObserverOverride
- ObserverPingInterval
- ObserverReconnect
- ObserverRetry
- OperationTimeout
- PreferredObserverHosts
- PrimaryDatabaseCandidates
- PrimaryLostWriteAction

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- TraceLevel

BystandersFollowRoleChange

The `BystandersFollowRoleChange` configuration property establishes whether bystander standby databases are evaluated *during* failover (value = `ALL`) or *after* failover (value = `NONE`).

Category	Description
Broker default	`ALL`
Configuration Type	Data Guard only
Datatype	String
Property Type	Configurable
Scope	Configuration
Valid Role	Primary, Physical Standby
Valid value	`ALL` or `NONE`

Descriptions of the `ALL` and `NONE` options are as follows:

- `ALL` - During the failover process, the broker determines whether the bystander standby databases are ahead of or behind the failover target standby (that is, the standby that will be the new primary).

  If the bystander standbys are ahead, they will be disabled with a status of `ORA-16661` as part of the failover operation. The bystander standbys must be reinstated after failover completes. The broker reinstates a standby through a flashback to the SCN at which the target standby became a primary database, and sets up the redo transport configuration from the new primary to the standby.

  If the bystander standbys are behind, then the broker simply sets up the redo transport configuration from the soon-to-be-new-primary to these standbys and completes the failover process.

- `NONE` - During the failover process, the broker does NOT evaluate the status of the bystander standbys as part of the failover operation. They are marked as disabled with a status of `ORA-16661` so that they can be evaluated later. The broker simply completes the failover to produce a new primary database as soon as possible.

  After the failover is completed, you can reinstate the bystander standbys. During reinstatement of a bystander, the broker determines whether the bystander is ahead of, or behind, the new primary. If the bystander is ahead of the new primary, then the broker automatically flashes back the standby to the SCN at which the target standby became a primary database and sets up redo transport from the new primary to the standby. (Even if a flashback is not required, the broker sets up the redo transport configuration from the new primary to these standbys.)

  The `NONE` option decreases the processing time for failover, but disables broker management of all bystander databases in the configuration. If fast-start failover is enabled, then the observer automatically reinstates the standby databases after failover has completed. Otherwise, you will have to manually reinstate the standby databases after failover has completed.

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CommunicationTimeout

The `CommunicationTimeout` configuration property allows you to decide how many seconds the broker should wait before timing out its network communication between members in the configuration.

Category	Description
Broker default	0 seconds
Configuration Type	Data Guard and Data Guard per Pluggable Database
Datatype	Integer
Property Type	Configurable
Scope	Configuration
Valid Role	Primary, Physical Standby
Valid value	>= 0

A value of zero indicates that a network communication should never be timed out.

ConfigurationSimpleName

The `ConfigurationSimpleName` configuration property is used to specify the directory that contains the observer runtime data file (`fsfo.dat`), observer log files, and callout configuration files that correspond to a specific broker configuration.

Category	Description
Broker default	If the configuration name contains 30 characters or less, and contains only the characters a-z or A-Z, numerals 0-9, or special characters _, #, $, the default value is the first 30 characters of configuration name. If the configuration name is longer than 30 characters, and its first 30 characters contain only the characters a-z or A-Z, numberals 0-9, or special characters _, #, or $, the default value is the forat 30 characters of the configuration name. If netiher of the above conditions is satisfied, the default value if the `DB_UNIQUE_NAME` of the primary database
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Configuration
Valid Role	Primary, Physical Standby
Valid value	>= 0

For databases that use versions lower than Oracle Database Release 21c, `ConfigurationSimpleName` cannot be explicitly set. This value is determined in real time, when the broker connects to the database, by combining the configuration name and the database's `DB_UNIQUE_NAME` (after removing any invalid characters).

The initial value of `ConfigurationSimpleName` is set using the following rules (in the order listed):

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- Broker configuration name, if the name is less than or equal to 30 characters and contains valid characters.
- First 30 characters of the broker configuration name, if the name is more than 30 characters and the first 30 characters contain valid values.
- `DB_UNIQUE_NAME`

This value is configurable and you can modify the initial value that is set.

ConfigurationWideServiceName

The `ConfigurationWideServiceName` configuration property is used to change the name of the configuration-wide service.

Category	Description
Broker default	`primarydbname_CFG`
Configuration Type	Data Guard
Datatype	String
Property Type	Configurable
Scope	Configuration
Valid Role	Primary, Physical Standby
Valid value	• The characters are limited to the following: [a...z], [A...Z], [0...9], and _ • The first character must be an alphanumeric character. • There is a 30–character maximum.

The broker publishes a service on each member of a configuration with a unified service name. The default service name of this configuration-wide service is *`primarydbname`*`_CFG`, where the primary database name is appended with a suffix of `_CFG`. The service name does not change after a role transition.

DrainTimeout

The `DrainTimeout` configuration property specifies the time to wait for sessions to drain before a switchover.

Category	Description
Broker default	0 seconds
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Broker configuration. This property will be consumed by broker on all databases in the configuration
Valid Role	Primary and standby
Valid value	`CONFIGURED`, or integer values >= 0

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The DrainTimeout configuration property specifies the number of seconds you want to wait for sessions to drain before the broker proceeds with switchover, including switchovers performed as part of a database rolling upgrade using DBMS_ROLLING.

Usage Notes:
A value of zero indicates that you do not want to wait for sessions to drain before a switchover operation.

A value of CONFIGURED indicates that you want to use the Clusterware configured drain time for the database services.

This property replaces the value specified for the WAIT option of SWITCHOVER because that option has been deprecated in 26ai.

Note that if the WAIT option is specified for a SWITCHOVER command, the specified wait value will override the value specified for the DrainTimeout property.

ExternalDestination1

The ExternalDestination1 configuration property is used to specify a redo transport destination that can receive redo data from the current primary database.

Category	Description
Broker default	Empty string
Configuration Type	Data Guard and Data Guard per Pluggable Database
Datatype	String
Property Type	Configurable
Scope	Configuration
Valid Role	Primary
Valid value	Any LOG_ARCHIVE_DEST_*n* attributes, except the following: • ALTERNATE • GROUP • PRIORITY • VALID_FOR See *Oracle Data Guard Concepts and Administration* for more information about the LOG_ARCHIVE_DEST_*n* parameter.

To set up transport of redo data to the specified destination, the broker uses the values specified for this parameter to define a LOG_ARCHIVE_DEST_*n* initialization parameter on the primary database. The broker also monitors the health of the transport to the specified destination.

After a role change, the broker automatically sets up a LOG_ARCHIVE_DEST_*n* initialization parameter on the new primary database to ship redo data to the specified destination.

> **Note**
>
> The ExternalDestination1 property requires that the database unique name (DB_UNIQUE_NAME) be specified.

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> **Note**
>
> The `Externaldestination1` configuration property is available only in Oracle Database 11*g* Release 2 (11.2.0.4) and in Oracle Database 12c Release 1 (12.1.0.2) and later.

ExternalDestination2

The `ExternalDestination2` configuration property is used to specify a redo transport destination that can receive redo data from the current primary database.

Category	Description
Broker default	Empty string
Configuration Type	Data Guard and Data Guard per Pluggable Database
Datatype	String
Property Type	Configurable
Scope	Configuration
Valid Role	Primary
Valid value	Any `LOG_ARCHIVE_DEST_`*n* attributes, except the following: • `ALTERNATE` • `GROUP` • `PRIORITY` • `VALID_FOR` See *Oracle Data Guard Concepts and Administration* for more information about the `LOG_ARCHIVE_DEST_`*n* parameter.

To set up transport of redo data to the specified destination, the broker uses the values specified for this parameter to define a `LOG_ARCHIVE_DEST_`*n* initialization parameter on the primary database. The broker also monitors the health of the transport to the specified destination.

After a role change, the broker automatically sets up a `LOG_ARCHIVE_DEST_`*n* initialization parameter on the new primary database to ship redo data to the specified destination.

> **Note**
>
> The `ExternalDestination2` property requires that the database unique name (`DB_UNIQUE_NAME`) be specified.

> **Note**
>
> The `Externaldestination2` configuration property is available only in Oracle Database 11*g* Release 2 (11.2.0.4) and in Oracle Database 12c Release 1 (12.1.0.2) and later.

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FastStartFailoverAutoReinstate

The `FastStartFailoverAutoReinstate` configuration property causes the former primary database to be automatically reinstated if a fast-start failover was initiated because the primary database was either isolated or had crashed.

Category	Description
Broker default	`TRUE`
Configuration Type	Data Guard only
Datatype	Boolean
Property Type	Configurable
Scope	`TRUE` or `FALSE`
Valid Role	Primary and standby
Valid value	`ALL` or `NONE`

To prevent automatic reinstatement of the former primary database in these cases, set this configuration property to `FALSE`.

The broker never automatically reinstates the former primary database if a fast-start failover was initiated because a user configuration condition was detected or was requested by an application calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.

FastStartFailoverLagGraceTime

The `FastStartFailoverLagGraceTime` configuration property specifies the maximum amount of time (in seconds) that can pass before the lag limit (`FastStartFailoverLagLimit`) is reached when the primary database requests permission to move to the lagging state.

Category	Description
Broker default	0
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Broker configuration
Valid Role	Primary and standby
Valid value	Integral number of seconds.

If the primary has been granted permission to move to the lagging state (by the observer or target standby) before the lag limit is reached, the primary will not stall. If the lag limit is reached, the primary will stall until either permission is granted or the fast-start failover threshold (specified by the FastStartFailoverThreshold property) has expired. This property is used when fast-start failover is enabled and the configuration is operating in maximum performance mode.

If the limit is reached, then a fast-start failover is not allowed. The lowest possible value is 5 seconds. A default value of 0 indicates that no lag limit grace period is in effect.

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Oracle recommends that this property be set in environments that are prone to transport or apply lags caused by periodic, but heavy workloads in otherwise healthy environments. Oracle does not recommend setting this property in environments with poor network performance.

> **Note**
>
> A side effect of this property is that the primary may go to the lagging state when it may have not been necessary because the database characteristics are such that the lag approaches but never exceeds the lag limit.

FastStartFailoverLagLimit

The `FastStartFailoverLagLimit` configuration property establishes an acceptable limit, in seconds, that the standby is allowed to fall behind the primary in terms of redo applied.

Category	Description
Broker default	Maximum performance mode: 30 seconds Maximum availability mode: 0 seconds
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Broker configuration
Valid Role	Primary and standby
Valid value	Must be greater than, or equal to, 5. The `FastStartFailoverLagLimit` property is not used in maximum protection mode.

If the limit is reached, then a fast-start failover is not allowed. The lowest possible value is 5 seconds.

This property is used when fast-start failover is enabled and the configuration is operating in maximum performance mode.

FastStartFailoverLagType

The `FastStartFailoverLagType` configuration property specifies the type of lag (apply lag or transport lag) the user wishes to use to specify their data loss threshold.

Category	Description
Broker default	`APPLY`
Configuration Type	Data Guard only
Datatype	String
Property Type	Configurable
Scope	Broker configuration
Valid Role	Primary and standby
Valid value	`APPLY` or `TRANSPORT`

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This property is used when fast-start failover is enabled and the configuration is operating in maximum performance mode.

FastStartFailoverPmyShutdown

The `FastStartFailoverPmyShutdown` configuration property causes the primary database to shut down under certain conditions.

Category	Description
Broker default	`TRUE`
Configuration Type	Data Guard only
Datatype	Boolean
Property Type	Configurable
Scope	Broker configuration
Valid Role	Primary and standby
Valid value	`TRUE` or `FALSE`

The primary database shuts down if fast-start failover is enabled and `V$DATABASE.FS_FAILOVER_STATUS` indicates the primary has been `STALLED` for longer than `FastStartFailoverThreshold` seconds. In such a situation, it is likely that the primary has been isolated and a fast-start failover has already occurred. A value of `TRUE` helps to ensure that an isolated primary database cannot satisfy user queries.

Setting this property to `FALSE` will not prevent the primary database from shutting down if a fast-start failover occurred because a user configuration condition was detected or was requested by an application by calling the `DBMS_DG.INITIATE_FS_FAILOVER` function.

Category	Description
Datatype	Boolean
Valid value	`TRUE` or `FALSE`
Broker default	`TRUE`
Imported?	No
Parameter class	Not applicable
Role	Primary and standby
Standby type	Not applicable
Corresponds to	Not applicable
Scope	Broker configuration. This property will be consumed by the primary database after fast-start failover has been enabled.
Cloud Control name	Automatically Shutdown Primary

FastStartFailoverThreshold

The `FastStartFailoverThreshold` configuration property defines the number of seconds the master observer attempts to reconnect to the primary database before initiating a fast-start failover.

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Category	Description
Broker default	30 seconds
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Configuration
Valid Role	Target standby database that is about to fail over to the primary role
Valid value	Integral number of seconds. Must be greater than, or equal to, 6.

(If there is only one observer, then by default it is considered the master. The time interval starts when the observer first loses connection with the primary database. If the observer is unable to regain a connection to the primary database within the specified time, then the observer initiates a fast-start failover to the target standby database. See Task 4 in Enabling Fast-Start Failover for more information about setting this property.

The observer ignores the threshold completely if a configurable fast-start failover condition is detected or an application has requested that fast-start failover be initiated.

For help in determining an appropriate value for this property, you can use the information provided in the `V$FS_OBSERVER_HISTOGRAM` view. This view displays statistics that are based on the frequency of successful pings between the observer and primary database for different time intervals. See *Oracle Database Reference* for a description of the `V$FS_OBSERVER_HISTOGRAM` view.

ObserverOverride

The `ObserverOverride` configuration property, when set to `TRUE`, allows an automatic failover to occur when the observer has lost connectivity to the primary.

Category	Description
Broker default	FALSE
Configuration Type	Data Guard only
Datatype	Boolean
Property Type	Configurable
Scope	Configuration
Valid Role	Primary and standby
Valid value	TRUE or FALSE

This is the behavior even if the standby has a healthy connection to the primary.

ObserverPingInterval

The `ObserverPingInterval` configuration property specifies how frequently the observer must ping the primary database.

Category	Description
Broker default	0 milliseconds

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Category	Description
Configuration Type	Data Guard only
Datatype	Integer
Property Type	Configurable
Scope	Broker configuration
Valid Role	Primary
Valid value	>= 100

This property is measured in milliseconds. The minimum value is 100 milliseconds. To achieve lower detection times for primary database failures, you must set the `ObserverPingInterval` and `ObserverPingRetry` properties before enabling fast-start failover.

The `FastStartFailoverThreshold` property is ignored when the `ObserverPingRetry` and `ObserverPingInterval` properties are set.

ObserverPingRetry

The `ObserverPingRetry` property specifies the number of times that the observer retries a failed ping before it initiates a failover to the target standby database.

Category	Description
Broker default	0
Configuration Type	Data Guard only
Datatype	Number
Property Type	Configurable
Scope	Configuration
Valid Role	Primary
Valid value	>=10

A failed ping is a ping to the primary database that failed or took longer than the time specified by the `ObserverPingInterval` property. You must set both the `ObserverPingRetry` and `ObserverPingInterval` properties to achieve lower detection times for primary database failures. The minimum value of `ObserverPingRetry` is 10. Therefore, the detection time can be reduced to nearly 1 second.

The `FastStartFailoverThreshold` property is ignored when the `ObserverPingRetry` and `ObserverPingInterval` properties are set.

ObserverReconnect

The `ObserverReconnect` configuration property specifies how often the observer establishes a new connection to the primary database.

Category	Description
Broker default	0
Configuration Type	Data Guard only
Datatype	Integer

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Category	Description
Property Type	Configurable
Scope	Configuration
Valid Role	Primary and standby
Valid value	Integral number of seconds. Must be greater than, or equal to, 0.

When this property is set to the default value of 0, the observer creates and maintains a connection to the primary database, but it does not periodically create a new connection to the primary database. While this eliminates the processing overhead associated with periodically establishing a new observer connection to the primary database, it also prevents the observer from detecting that it is not possible to create new connections to the primary database. Note that logging in and out of the database is a resource-intensive operation. Given that, Oracle recommends that this property be set so the value specified is small enough to allow timely detection of faults at the primary database, but large enough to limit the impact of logging in to and out of the primary database.

OperationTimeout

The `OperationTimeout` configuration property specifies the maximum amount of time the broker should wait for health check, get monitorable property, and set property operations to complete.

Category	Description
Broker default	30 seconds
Configuration Type	Data Guard and Data Guard per Pluggable Database
Datatype	Integer
Property Type	Configurable
Scope	Configuration
Valid Role	Primary and standby
Valid value	>= 30 and <= 3600

PrimaryDatabaseCandidates

The `PrimaryDatabaseCandidates` configuration property allows the restriction of switchover and failover to a list of databases.

Category	Description
Broker default	Thedefault value is an empty string that means no restriction.
Configuration Type	Data Guard only
Datatype	String
Property Type	Configurable
Scope	Configuration
Valid Role	Primary, Physical Standby
Valid value	Comma-seperated list of databases in the broker configuration. For example `'db1,db2,db3'`

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The PrimaryDatabaseCandidates property prevents switchover/failover to some specified databases in a Data Guard broker configuration. This property is a list of DB_UNIQUE_NAMEs of the databases to which Data Guard broker will allow switchover and failover when FSFO is disabled. Note that, when FSFO is enabled, thisproperty does not add any new restrictions since Data Guard Broker already has a property FastStartFailoverTarget that lists which databases can be new primary databases.

For example, assume there are six databases in a broker configuration:

db1, db2, db3, db4, db5, db6

If this property is set using the following command:

```
edit configuration set property PrimaryDatabaseCandidates= ‘db1, db2, db3’
```

Only the switchover and failover to db1, db2, or db3 will be allowed when FSFO is disabled. Data Guard Broker would reject any attempt to switchover or failover to b4, b5, or b6, or any newly added databases after setting the property PrimaryDatabaseCandidates.

If an attempt is made to modify this property, the attempt will be rejected if the one of the following conditions is true:

- One value in the list is not a member of the current broker configuration
- One value in the list is a member of the current broker configuration, but the member type is not primary/physical standby/logical standby/snapshot

If the value provided does not contain the primary database, broker will add the primary database automatically since it is natural for primary database to be in this property. In this case the command will return a warning message:

```
DGMGRL> edit configuration set property PrimaryDatabaseCandidates= 'DB2' ;
Warning: ORA-16580: The primary database was added to property
PrimaryDatabaseCandidates

Property "primarydatabasecandidates" updated
```

If a member from a broker configuration is removed and that member is in property PrimaryDatabaseCandidates, Data Guard Broker will remove it from the property value.

If an attempt is made to failover/switchover to a member that is not defined in PrimaryDatabaseCandidates and FSFO is disabled, Data Guard Broker will issue the following error message:

```
ORA-16529: Switchover and failover operations are restricted to databases
specified in the PrimaryDatabaseCandidates configuration property
```


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PrimaryLostWriteAction

The `PrimaryLostWriteAction` configuration property determines what action is taken if a primary or standby database detects that a lost write has occurred at the primary database.

> **Note**
>
> The `PrimaryLostWriteAction` configuration property is available only in Oracle Database 11*g* Release 2 (11.2.0.4) and in Oracle Database 12c Release 1 (12.1.0.2) and later.

The possible actions are as follows:

- `CONTINUE` - The primary database continues operating even if a primary or standby database detects that a lost write has occurred at the primary database. This is the default action.
- `SHUTDOWN` - If a primary or standby database detects that a lost write has occurred at the primary database, then fast-start failover is disabled and the primary database performs a shutdown abort. Automatic failover will not occur.
- `FAILOVER` - If fast-start failover is enabled in maximum performance mode, and the configuration is within the acceptable limit specified for the `FastStartFailoverLagLimit` property, then the observer initiates a failover.
- `FORCEFAILOVER` - If fast-start failover is enabled (in either maximum performance or maximum availability mode), then the observer initiates a failover. This option results in a data loss failover.

For both the `FAILOVER` and `FORCEFAILOVER` options, if fast-start failover is disabled then no failover occurs, but the primary is shut down.

If a primary or standby database detects that a lost write has occurred at the primary database, fast-start failover is disabled if any of the following conditions are true:

- `PrimaryLostWriteAction` is set to `CONTINUE`
- `PrimaryLostWriteAction` is set to `SHUTDOWN`
- `PrimaryLostWriteAction` is set to `FAILOVER` and protection mode is set to either maximum availability or maximum protection

Diagnostic information is written to the database alert and broker logs at the primary database and at the standby database where the lost write was detected.

If a lost write occurs at the primary database, then follow the guidelines in "Resolving ORA-752 or ORA-600 [3020] During Standby Recovery" in My Oracle Support Note 1265884.1 located at https://support.oracle.com.

> **Note**
>
> The `DB_LOST_WRITE_PROTECT` database initialization parameter must be set to `TYPICAL` or `FULL` at the primary database and at each standby database in the configuration to ensure that lost primary writes can be detected by all standby databases in the configuration.

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Category	Description
Datatype	String
Valid values	CONTINUE, SHUTDOWN, FAILOVER, or FORCEFAILOVER
Broker default	CONTINUE
Imported?	No
Parameter class	Not applicable
Role	Primary and standby
Standby type	Not applicable
Corresponds to	Not applicable
Scope	Broker configuration
Cloud Control name	Not applicable

TraceLevel

The TraceLevel configuration property is used to control the amount of tracing performed by the broker for every member in the configuration.

Category	Description
Broker default	USER
Configuration Type	Data Guard and Data Guard per Pluggable Database
Datatype	String
Property Type	Configurable
Scope	Database
Valid Role	Primary and standby
Valid value	USER, SUPPORT

Setting the property to USER limits the tracing to completed operations and to any warning or error messages resulting from an operation or health check. Setting the property to SUPPORT increases the amount of tracing to include lower-level information needed by Oracle Support Services.

Monitorable (Read-Only) Properties

Monitorable properties allow you to view information related to the database, database instance, or far sync instance.

You cannot change the values of monitorable properties. You can view all of them using the DGMGRL SHOW commands.

> **Note**
>
> Information for monitorable properties can be seen only when broker management of the entity is enabled. Cloud Control displays the information obtained from these properties on the Property page.

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If the database is an Oracle RAC database, the output values of some properties may also show instance-specific information. For example if the primary database is an Oracle RAC database, `LogXptStatus` may show `Instance1` transmitting redo data to `Standby2` has an error and `Instance2` transmitting redo data to `Standby4` has an error.

The following sections describe the monitorable properties:

- InconsistentLogXptProps (Inconsistent Redo Transport Properties)
- LogXptStatus (Redo Transport Status)
- LsbyFailedTxnInfo (Logical Standby Failed Transaction Information)
- LsbyParameters (Logical Standby Parameters)
- RecvQEntries (Receive Queue Entries)
- SendQEntries (Send Queue Entries)
- TopWaitEvents

InconsistentLogXptProps (Inconsistent Redo Transport Properties)

The `InconsistentLogXptProps` monitorable property returns a table that shows all properties related to redo transport services whose values are inconsistent between the broker configuration file and the runtime value.

Although the properties reported in this table are database-specific or far sync instance-specific properties, the inconsistency is reported on an instance-specific basis. A database or far sync instance-specific property only ensures that there is one value in the broker's configuration file for all instances of the database or far sync instance, but the runtime values can be different. This means that a database or far sync instance-specific property may be inconsistent only on some instances.

This property pertains to the primary database, a physical standby database that ships redo data, or a far sync instance. The table contains the following columns:

- `INSTANCE_NAME`

  The value identifying the SID for the instance.

- `STANDBY_NAME`

  The database unique name (`DB_UNIQUE_NAME`) of the standby database or far sync instance to which this redo transport services property pertains.

- `PROPERTY_NAME`

  The name of the redo transport services property with an inconsistent value.

- `MEMORY_VALUE`

  The runtime value being used in the database or far sync instance.

- `BROKER_VALUE`

  The value of the redo transport services property saved in the broker configuration file.

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LogXptStatus (Redo Transport Status)

The LogXptStatus monitorable property returns a table that contains the error status of redo transport services for each of the enabled configuration members.

This property pertains to the primary database, a physical standby database that ships redo data, or a far sync instance.

The table contains the following columns:

- PRIMARY_INSTANCE_NAME

  The value identifying the SID for the instance on the primary database.

- STANDBY_DATABASE_NAME

  The database unique name (DB_UNIQUE_NAME) of the standby database or far sync instance.

- ERROR

  The text of the redo transport error. If there is no error, the field is empty.

Each entry in the table indicates the status of redo transport services on one redo source to one redo destination.

The error status can be an empty string, which indicates there is no error.

In the following example, the STATUS from South_Sales is empty because there is no error for the South_Sales destination. The South_Report destination returned the ORA-01034 message.

```
DGMGRL> SHOW DATABASE 'North_Sales' 'LogXptStatus' ;
LOG TRANSPORT STATUS
PRIMARY_INSTANCE_NAME STANDBY_DATABASE_NAME              STATUS
         north_sales1          South_Sales
         north_sales1          South_Report    ORA-01034: ORACLE not available
```

LsbyFailedTxnInfo (Logical Standby Failed Transaction Information)

The LsbyFailedTxnInfo monitorable property identifies a failed transaction that caused log apply services to stop.

This property contains a string with the following values from the DBA_LOGSTDBY_EVENTS view:

- XIDUSN: Transaction ID undo segment number
- XIDSLT: Transaction ID slot number
- XIDSQN: Transaction ID sequence number
- STATUS_CODE: Status (or Oracle error code) belonging to the STATUS message
- STATUS: Description of the current activity of the process or the reason why log apply services stopped

The transaction IDs and status information are separated by a string of number signs (###).

This property pertains to a logical standby database.

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LsbyParameters (Logical Standby Parameters)

The `LsbyParameters` monitorable property contains a string that identifies the value of `MAX_SGA` and `MAX_SERVERS` specifically reserved for log apply services.

The `MAX_SGA` is the maximum system global area and `MAX_SERVERS` is the maximum number of parallel query servers. These values are separated by a string of number signs (###) in the `LsbyParameters` property.

This property pertains to a logical standby database.

> **Note**
>
> As of Oracle Database Release 19c, the `LsbyMaxEventsRecorded` property is deprecated and may be desupported in a future release.

RecvQEntries (Receive Queue Entries)

The `RecvQEntries` monitorable property returns a table indicating all log files that were received by the standby database but have not yet been applied.

If no rows are returned, it implies all log files received have been applied. This property pertains to a standby database.

The table contains the following columns in the order shown:

- `STATUS`

  The `STATUS` column is set to one of the following values for a log file on a logical standby database:

  - `NOT_APPLIED`: No redo records in this log file have been applied.
  - `PARTIALLY_APPLIED`: Some of the redo records in this log file have been applied while others have not.
  - `COMMITTED_TRANSACTIONS_APPLIED`: This status value only applies to a logical standby database. All redo records belonging to the committed transactions have been applied. Redo records belonging to uncommitted transactions have not been read by LogMiner and may still be needed when the transactions are committed in the future. Therefore, it is not safe yet to discard this online redo log file.

- `RESETLOGS_ID`

  Resetlogs identifier associated with the archived redo log file

- `THREAD`

  The redo thread number

- `LOG_SEQ`

  The online redo log file sequence number

- `TIME_GENERATED`

  The first time when the online redo log file was written to the primary database

- `TIME_COMPLETED`

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The next time when the log file was archived on the primary database (corresponds to the NEXT_CHANGE# column)

- FIRST_CHANGE#

  First change number in the archived redo log file

- NEXT_CHANGE#

  First change in the next log file

- SIZE (KBs)

  The SIZE of the online redo log file in kilobytes

For example:

```
DGMGRL> SHOW DATABASE 'South_Sales' 'RecvQEntries' ;
               STATUS     RESETLOGS_ID           THREAD
LOG_SEQ          TIME_GENERATED       TIME_COMPLETED    FIRST_CHANGE#
NEXT_CHANGE#        SIZE (KBs)
          NOT_APPLIED        497198843               1                   5
06/20/2023 14:55:38  06/20/2023 16:31:26          202138
210718             7364
          NOT_APPLIED        497198843               1                   6
06/20/2023 16:31:26  06/20/2023 16:31:39          210718
210753               13
          NOT_APPLIED        497198843               1                   7
06/20/2023 16:31:39  06/20/2023 16:31:54          210753
210758                1
          NOT_APPLIED        497198843               1                   8
06/20/2023 16:31:54  06/20/2023 16:31:59          210758
210789               11
```

> **Note**
>
> Cloud Control displays this information on the Log File Details page.

SendQEntries (Send Queue Entries)

The SendQEntries monitorable property returns a table that shows all log files on the primary database that were not successfully archived to one or more standby databases.

This property pertains to the primary database.

The table contains the following columns:

- STANDBY_NAME

  The value can be empty or it can contain the database unique name (DB_UNIQUE_NAME) of a standby database. If empty, the STATUS column will contain a value of CURRENT or NOT_ARCHIVED.

- STATUS

  The STATUS column is set to one of the following values:

  – CURRENT: A log file to which online redo is currently being written.

  – NOT_ARCHIVED: A completed online redo log file that has not been archived locally.

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  - ARCHIVED: A completed log file that has been archived locally but has not been transmitted to the standby database specified in the STANDBY_NAME column.

  The table contains exactly one row with the value of STATUS=CURRENT. There can be multiple rows with the value STATUS=ARCHIVED or STATUS=NOT_ARCHIVED.

- RESETLOGS_ID

  Resetlogs identifier associated with the archived redo log file

- THREAD

  The redo thread number.

- LOG_SEQ

  The log sequence number. Multiple rows may have the same LOG_SEQ value (for different STANDBY_NAME values).

- TIME_GENERATED

  The first time when the online redo log file was written to the primary database.

- TIME_COMPLETED

  The next time when the log file was archived on the primary database (corresponds to the NEXT_CHANGE# column).

- FIRST_CHANGE#

  First change number in the archived redo log file.

- NEXT_CHANGE#

  First change in the next log file.

- SIZE (KBs)

  The SIZE of the online redo log file in kilobytes.

For example, the following shows output from a SHOW DATABASE command:

```
DGMGRL> SHOW DATABASE 'North_Sales' 'SendQEntries' ;
PRIMARY_SEND_QUEUE
        STANDBY_NAME       STATUS     RESETLOGS_ID
THREAD              LOG_SEQ       TIME_GENERATED       TIME_COMPLETED
FIRST_CHANGE#     NEXT_CHANGE#       SIZE (KBs)
       South_Sales   ARCHIVED        497198843
1                    9  06/20/2003 16:31:59  06/20/2003 16:39:57
210789           211411              186
       South_Sales   ARCHIVED        497198843
1                   10  06/20/2003 16:39:57  06/20/2003 16:40:01
211411           211415                1
       South_Sales   ARCHIVED        497198843
1                   11  06/20/2003 16:40:01  06/20/2003 16:40:07
211415           211418                1
                         CURRENT        497198843
1                   12  06/20/2003 16:40:07
211418                                 1
```

> **Note**
>
> Cloud Control displays this information on the Log File Details page.

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TopWaitEvents

The `TopWaitEvents` monitorable property specifies the 5 events with the longest waiting time in the specified instance.

The events and their waiting time are retrieved from `V$SYSTEM_EVENT`. Each instance in the configuration has this property. This property is an instance-specific monitorable property. The table contains the following columns in the order shown:

- Event

  The system wait event.

- Wait Time

  The total amount of time waited for this event in hundredths of a second.

The following example shows output from a `SHOW INSTANCE` command:

```
DGMGRL> SHOW INSTANCE north_sales1 'TopWaitEvents';
TOP SYSTEM WAIT EVENTS
               Event            Wait Time
   rdbms ipc message               671350
SQL*Net message from client         62390
          pmon timer                47897
  Queue Monitor Wait                43016
 wakeup time manager                38508
```

Configurable Properties

Configurable properties control the behavior of broker configuration members.

You can view and dynamically update the values of these properties using either DGMGRL or Cloud Control. However, some properties can only be updated through DGMGRL.

These properties control certain database initialization parameters and SQL statements that the broker uses to manage an Oracle Data Guard broker configuration. Therefore, you should not manually set those initialization parameters or issue those SQL statements on a broker configuration.

In most cases, the configurable property is said to apply to the entire member, meaning the value you set for the property applies to each instance of the member (that is, database or far sync instance). However, in a few cases, the configurable property is said to have instance-specific scope which means that for a multiple-instance database or far sync instance, it is possible that the values of some particular properties may differ between instances. The following table lists each configurable property and indicates whether the scope of the property is member-wide or instance-specific. If the Scope column contains:

- Member—The value of the property is database or far sync instance-wide, not instance or configuration specific.
- Instance—The value of the property is instance specific.

  If there is an asterisk (*) present, it indicates that the property value can be set for all instances of an Oracle RAC database using the `EDIT INSTANCE * ON DATABASE` command.
- Configuration—The value of the property is configuration wide, not instance or member specific.

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Table 12-1 Configurable Properties

Configurable Property Name	Scope	Pertains To
AlternateLocation	Member	Redo transport services
ApplyInstances	Member	Redo Apply
ApplyInstanceTimeout	Member	Redo Apply and SQL Apply
ArchiveLocation	Member	Redo transport services
ApplyParallel	Member	Redo Apply
Binding	Member	Redo transport services
DelayMins	Member	Redo Apply and SQL Apply
DGConnectIdentifier	Member	Broker communication, Redo transport services
Encryption	Member	Redo transport services
FastStartFailoverTarget	Member	Fast-start failover
LogShipping	Member	Redo transport services
LogXptMode	Member	Redo transport services
MaxFailure	Member	Redo transport services
NetTimeout	Member	Redo transport services
ObserverConnectIdentifier	Member	Fast-start failover
PreferredApplyInstance	Member	Redo Apply and SQL Apply
PreferredObserverHosts	Member	Fast-start failover
RedoCompression	Member	Redo transport services
RedoRoutes	Member	Redo transport services
ReopenSecs	Member	Redo transport services
StandbyAlternateLocation	Member	Redo transport services
StandbyArchiveLocation	Member	Redo transport services
StaticConnectIdentifier	Instance	Instance Startup and Shutdown
TransportDisconnectedThreshold	Member	Redo transport services
TransportLagThreshold	Member	Redo transport services

Note

Starting with Oracle Database Release 19c, configurable properties that map directly to database initialization parameters and logical standby attributes are not maintained within the broker configuration file. See the "Deprecated Features" section in Changes in Oracle Database Release 21c for Oracle Data Guard Broker for a list of deprecated initialization parameters and logical standby attributes.

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> **Note**
>
> When a broker configuration with its primary database is created and members are added to the configuration, the broker imports existing settings from the members to set many of the properties. If importing an existing setting fails, or if a property value is not imported, then the broker uses a broker default value. The default values and whether or not a property is imported is indicated within each property description.

> **See Also**
>
> Managing the Members of a Broker Configuration for more information about property management

Broker Controlled Database Initialization Parameters and SQL Statements

The following database initialization parameters are controlled by broker configurable properties. Therefore, you should not set these parameters manually:

- `LOG_ARCHIVE_DEST_`*n*
- `LOG_ARCHIVE_DEST_STATE_`*n*

> **Note**
>
> If the `SERVICE` clause is not included, it is not subject to broker control and can be changed.

The broker also uses configurable property settings to manage how apply is to be started. Therefore, the following SQL statements are managed automatically by the broker:

- `ALTER DATABASE RECOVER MANAGED STANDBY DATABASE`
- `ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE`

AlternateLocation

The `AlternateLocation` configurable property specifies an alternate online redo log archive location for primary, logical, and snapshot standby databases when the location specified by the `ArchiveLocation` configurable property fails.

If the `StandbyArchiveLocation` property is not empty, the `AlternateLocation` property specifies an alternate online redo log archive location. If the `StandbyArchiveLocation` property is empty, the `AlternateLocation` property specifies an alternate online and standby redo log archive location.

This property has database-specific scope, and the location that it specifies is applicable to all instances in a database.

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> **Note**
>
> These properties allow you to have the broker automatically manage the local archival of online and standby redo logs to the specified local destination. Do not use set `log_archive_dest_n` initialization parameters for local archival specifying that same destination.

Category	Description
Datatype	String
Valid values	• An empty string when no alternate location is desired. • A directory specification that is accessible by the database. • A valid `LOG_ARCHIVE_DEST_n` parameter string with the `LOCATION` attribute specified, but no `VALID_FOR`, `ALTERNATE`, or `SERVICE` attributes.
Broker default	Empty string
Imported?	No
Parameter class	Dynamic
Role	Primary and standby
Standby type	Physical, logical, or snapshot standby
Corresponds to	On the primary or standby database, the `LOCATION` attribute for the `LOG_ARCHIVE_DEST_n` initialization parameter that represents an alternate destination of the local destination that matches the configurable property `ArchiveLocation`.
Scope	Member
Cloud Control name	There is no Cloud Control name

ArchiveLocation

The `ArchiveLocation` configurable property specifies the online redo log archive location for primary, logical, and snapshot standby databases.

If the `StandbyArchiveLocation` property is not empty, the `ArchiveLocation` property specifies an online redo log archive location. If the `StandbyArchiveLocation` property is empty, the `ArchiveLocation` property specifies an online and standby redo log archive location.

Set a value for this property if you want Oracle to manage local archiving.

> **Note**
>
> These properties allow you to have the broker automatically manage the local archival of online and standby redo logs to the specified local destination. Do not use set `log_archive_dest_n` initialization parameters for local archival specifying that same destination.

Category	Description
Datatype	String

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Category	Description
Valid values	• An empty string when you do not want broker to manage the online archive location. • A nonempty file specification of the redo log archive location for the database. Specify USE_DB_RECOVERY_FILE_DEST if a database recovery area is desired. • A valid LOG_ARCHIVE_DEST_*n* parameter string with the LOCATION attribute specified, but no VALID_FOR, ALTERNATE, or SERVICE attributes.
Broker default	Empty string
Imported?	No
Parameter class	Dynamic
Role	Primary and standby
Standby type	Physical, logical, or snapshot standby
Corresponds to	• LOCATION attribute of the LOG_ARCHIVE_DEST_*n* initialization parameter of the primary or standby database with VALID_FOR compatible with (ONLINE_LOGFILE, ALL_ROLES) • DESTINATION column of the V$ARCHIVE_DEST view of the primary or standby database
Scope	Member
Cloud Control name	There is no Cloud Control name

Note

When resetting ArchiveLocation, broker will change the property value to an empty string, but will not update the initialization parameter log_archive_dest_*n* that points to the location specified by the property ArchiveLocation before resetting it. The reasons are:

1. The redo log archiver must have an accessible location to archive the redo log. If the arching fails, the archiver will be stuck, then the database will be in restricted mode. Since broker does not have knowledge which archive location should be used, so intentionally does not update the parameter log_archive_dest_n corresponding to the archive location.
2. An empty value for property ArchiveLocation indicates that the user can manually manage the local archive destinations.

ApplyInstances

The ApplyInstances property lets you specify how many physical standby instances run Redo Apply.

This property is used to specifiy a value for the INSTANCES keyword used with the SQL ALTER RECOVER MANAGED STANDBY DATABASE statement (only for Oracle Real Application Clusters (Oracle RAC) or Oracle RAC One Node databases). When used, it causes Redo Apply to run on each active running physical standby instance that is running in the same mode as the instance on which Redo Apply was started. You can specify ALL or you can specify a specific number to restrict the number of instances that Redo Apply uses. If a database has already

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been set up to run Redo Apply on multiple instances, then you can use the Data Guard broker property `ApplyInstances` to restrict the number of instances that are involved in Redo Apply on an Oracle RAC physical standby database.

See Also

- *Oracle Data Guard Concepts and Administration* for more information about setting up multi-instance Redo Apply.

Category	Description
Datatype	Integer
Valid values	0 to 16, ALL • ALL: indicates that redo apply will be started on all currently active instances • 0 and 1: recovery will be started in single instance mode. • >1: indicates that redo apply should not run on any more than the number of instances specified.
Broker default	The default is 0.
Imported?	Yes
Parameter class	Not applicable
Role	Standby
Standby type	Physical standby
Corresponds to	`INSTANCES` keyword of `ALTER DATABASE RECOVER MANAGED STANDBY DATABASE` command.
Scope	Database
Cloud Control name	Not applicable

ApplyInstanceTimeout

The `ApplyInstanceTimeout` configurable property specifies the number of seconds the broker waits after detecting the current apply instance failed before initiating the apply instance failover.

Category	Description
Datatype	Integer
Valid values	`>=0` (seconds)
Broker default	`0` (results in immediate apply instance failover)
Imported?	No
Parameter class	Not applicable
Role	Standby, Recovery Appliance
Standby type	Physical, logical, Recovery Appliance
Corresponds to	Not applicable
Scope	Database
Cloud Control name	Not applicable

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ApplyLagThreshold

The `ApplyLagThreshold` configurable property generates a warning status for a logical or physical standby when the member's apply lag exceeds the value specified by the property.

The property value is expressed in seconds. A value of 0 seconds results in no warnings being generated when an apply lag exists.

Category	Description
Datatype	Number
Valid values	>=0
Broker default	30 seconds
Imported?	No
Parameter class	Not applicable
Role	Standby, Recovery Appliance
Standby type	Physical, logical
Corresponds to	Not applicable
Scope	Database
Cloud Control name	Not applicable

ApplyParallel

The `ApplyParallel` configurable property specifies whether Redo Apply should use multiple processes to apply redo data to the physical standby database.

If Redo Apply is shut off, then setting the property has no immediate effect. However, when Redo Apply is running again, the value of the property is used to determine the parallel apply behavior of Redo Apply.

Category	Description
Datatype	String
Valid values	• `AUTO`—the number of parallel processes used for Redo Apply is automatically determined by Oracle based on the number of CPUs that the system has. • `NO`—no parallel apply • 2, 3, and so on—manually specify the number of parallel processes used for Redo Apply. (Specifying `0` is the same as specifying `NO`; specifying `1` is the same as specifying `AUTO`.)
Broker default	`AUTO`
Imported?	No
Parameter class	Not applicable
Role	Standby
Standby type	Physical

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Category	Description
Corresponds to	• AUTO corresponds to the PARALLEL clause of the ALTER DATABASE RECOVER MANAGED STANDBY DATABASE statement • NO corresponds to the NOPARALLEL clause of the ALTER DATABASE RECOVER MANAGED STANDBY DATABASE statement • 2, 3, and so on corresponds to the PARALLEL *n* clause of the ALTER DATABASE RECOVER MANAGED STANDBY DATABASE statement
Scope	Database
Cloud Control name	Not applicable

Binding

The Binding configurable property specifies whether the destination is MANDATORY or OPTIONAL.

Category	Description
Datatype	String
Valid values	• MANDATORY You can specify a policy for reuse of online redo log files using the MANDATORY value. If the archiving operation of a mandatory destination fails, online redo log files cannot be overwritten. • OPTIONAL You can specify a policy for reuse of online redo log files using the OPTIONAL value. If the archiving operation of an optional destination fails, the online redo log files are overwritten.
Broker default	OPTIONAL
Imported?	No
Parameter class	Dynamic
Role	Standby database, Recovery Appliance, far sync instance[1]
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	• MANDATORY and OPTIONAL attributes for the LOG_ARCHIVE_DEST_*n* initialization parameter of the database or far sync instance that is sending redo data • BINDING column of the V$ARCHIVE_DEST view of the database or far sync instance that is sending redo data
Scope	Member
Cloud Control name	Not applicable

[1] Although this property is set for the redo destination, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify to the corresponding attributes of the LOG_ARCHIVE_DEST_*n* value of the database or far sync instance that is sending redo data.

DelayMins

The DelayMins configurable property specifies the number of minutes log apply services will delay applying the archived redo log data on the standby database.

When the DelayMins property is set to the default value of 0 minutes, log apply services apply redo data as soon as possible.

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If the DelayMins property is set to 0, start log apply services as follows:

- Start Redo Apply on physical standby databases using the following SQL statement:

  ```
  ALTER DATABASE RECOVER MANAGED STANDBY DATABASE;
  ```

- Start SQL Apply on logical standby databases using the following SQL statement:

  ```
  ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE;
  ```

Category	Description
Datatype	Integer
Valid values	>=0 (minutes) [1]
Broker default	0
Imported?	No
Parameter class	Dynamic
Role	Standby[2], Recovery Appliance
Standby type	Physical, logical, Recovery Appliance
Corresponds to	• DELAY attribute for the LOG_ARCHIVE_DEST_*n* initialization parameter of the database or far sync instance that is sending redo data • DELAY_MINS column of the V$ARCHIVE_DEST view of the database or far sync instance that is sending redo data • Options used to start Redo Apply and SQL Apply
Scope	Database
Cloud Control name	Apply Delay (mins)

1 The DelayMins property must be reset to 0 before attempting a switchover to a standby with DelayMins greater than 0.

2 Although this property is set for the standby database, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify on the standby database to the corresponding attributes of the LOG_ARCHIVE_DEST_*n* value of the database or far sync instance that is sending redo data.

DGConnectIdentifier

The DGConnectIdentifier configurable property specifies the connect identifier the broker uses when making connections to a configuration member.

If you are using DGMGRL, then you supply the value when you enter the CREATE CONFIGURATION, ADD DATABASE, or ADD FAR_SYNC command. If you are using Cloud Control, the value is supplied automatically. The connect identifier for a configuration member must:

- Allow all other members in the configuration to reach it.
- Allow the member to reach itself.
- Allow all instances of an Oracle RAC database to be reached.
- Specify a service that all instances dynamically register with the listeners so that connect-time failover on an Oracle RAC database is possible.

> ⚠ **Caution**
>
> The service should NOT be one that is defined and managed by Oracle Clusterware.

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- Have failover attributes set to allow the primary database's Redo Transport Services to continue shipping redo data to an Oracle RAC standby database, even if the receiving instance of that standby database has failed.
- Use the `VALIDATE NETWORK CONFIGURATION` and `VALIDATE DGConnectIdentifier` to confirm that the value specified for the `DGConnectIdentifier` is correctly configured.

The value of this property is specified in the `SERVICE` attribute of the `LOG_ARCHIVE_DEST_`*n* parameter when the broker configures redo transport services on the primary database.

> **Note**
>
> All instances of a database must be accessible via the service in MOUNT, READ WRITE, and READ ONLY modes. The service should NOT be one that is defined and managed by Oracle Clusterware or created via Server Control Utility (SRVCTL). For most users it will be sufficient to use the db_unique_name service.

Category	Description
Datatype	String
Valid values	A connect identifier that can be used to connect to this database
Broker default	Not applicable
Imported?	No
Parameter class	Not applicable
Role	Primary, standby, far sync instance, Recovery Appliance
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	`SERVICE_NAME` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the configuration member that is sending redo data
Scope	Database, far sync instance, Recovery Appliance
Cloud Control name	Not applicable

> **See Also**
>
> *Oracle Database Net Services Administrator's Guide*

Encryption

The `Encryption` configurable property is used to specify whether redo data is encrypted before transmitting it to a Recovery Appliance.

> **Note**
>
> Redo transport encryption can only be used with a Recovery Appliance.

Category	Description
Datatype	String

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Category	Description
Valid values	DISABLE, ENABLE • When ENABLE is specified, the redo data is encrypted before it is sent to a Recovery Appliance. • When DISABLE is specified, the redo data is not encrypted before it is sent to a Recovery Appliance.
Broker Default	DISABLE
Imported?	No
Parameter class	Dynamic
Role	Recovery Appliance
Standby type	Recovery Appliance
Corresponds to	• ENCRYPTION attribute for the LOG_ARCHIVE_DEST_*n* initialization parameter of the database or far sync instance that is sending redo data • ENCRYPTION column of the V$ARCHIVE_DEST view of the database or far sync instance that is sending redo data to the Recovery Appliance
Scope	Recovery Appliance
Cloud Control name	Not Applicable

FastStartFailoverTarget

The FastStartFailoverTarget configuration property specifies the DB_UNIQUE_NAME of one or more standby databases that can act as target databases in a fast-start failover situation when the database on which the property is set is the primary database.

These possible target databases are referred to as candidate fast-start failover targets. See Task 2 in Enabling Fast-Start Failover for more information about setting this property.

The FastStartFailoverTarget configuration property can only be set to the name of physical or logical standbys. It cannot be set to the name of a snapshot standby database, far sync instance, or Zero Data Loss Recovery Appliance.

Category	Description
Datatype	String
Valid value	DB_UNIQUE_NAME of the database that is the target of the fast-start failover. You can specify names of multiple standbys or the keyword ANY. If multiple names are specified, then the broker selects them in the order in which they are listed. If the property is set to ANY, then the broker can select any one of all viable standbys of the primary as the current FSFO target.
Broker default	If only one physical or logical standby database exists, then the broker selects that as the default value for this property on the primary database when fast-start failover is enabled. If more than one physical or logical standby database exists, then the broker selects one based on the order in which they are specified in the property definition. Targets are verified when fast-start failover is enabled. For the target standby database, the broker automatically selects the current primary database as the value for this property when fast-start failover is enabled.
Imported?	No
Parameter class	Not applicable

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Category	Description
Role	Primary or standby
Standby type	Physical or logical
Corresponds to	Not applicable
Scope	Database
Cloud Control name	Cloud Control displays the value for the current primary database on the Oracle Data Guard Overview page, along with whether or not fast-start failover has been enabled.

LogShipping

The broker uses the value of the `LogShipping` property when the primary database is in the `TRANSPORT-ON` state or when the physical standby or far sync instance forwards redo data to another member.

The other member can be a physical, logical, or snapshot standby, or a far sync instance.

- If the primary database is in the `TRANSPORT-ON` state and the value of the `LogShipping` property is `ON`, then redo transport services are enabled to send redo data to the particular configuration member. If the `LogShipping` property is `OFF`, then redo transport services are disabled to that member.
- If a configuration member that forwards redo data has its `LogShipping` property set to `ON` and the member to which it sends redo data also has its `LogShipping` property set to `ON`, then redo transport services are enabled from the member sending redo data to the member that is to receive redo data.

  If a member that forwards redo data has its `LogShipping` property set to `ON` but the member to which it sends redo data has its `LogShipping` property set to `OFF`, then redo transport services are disabled from the member sending redo data to the member that is to receive redo data.

Category	Description
Datatype	String
Valid values	`ON` or `OFF`
Broker default	`ON`
Imported?	No
Parameter class	Dynamic
Role	Standby database, Recovery Appliance, far sync instance[1]
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	`ENABLE` and `DEFER` values for the `LOG_ARCHIVE_DEST_STATE_`*n* initialization parameter of the database or far sync instance that is sending redo data
Scope	Database, Recovery Appliance
Cloud Control name	`Log Shipping`

[1] Although this property is set for a standby database or far sync instance, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify on the standby database to the corresponding attributes of the `LOG_ARCHIVE_DEST_`*n* value of the database or far sync instance that is sending redo data.

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LogXptMode

The LogXptMode configurable property enables you to set the redo transport service.

You set the redo transport services on each configuration member to one of the following modes:

- SYNC

  Configures redo transport services for this configuration member using the SYNC and AFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. Standby redo log files are required. This mode is required for the maximum protection or maximum availability data protection modes. This redo transport service enables the highest grade of data protection to the primary database, but also incurs the highest performance impact.

- ASYNC

  Configures redo transport services for this configuration member using the ASYNC and NOAFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. Standby redo log files are required. This mode enables a moderate grade of data protection to the primary database, and incurs a lower performance impact than SYNC.

- FASTSYNC

  Configures redo transport services for this configuration member using the SYNC and NOAFFIRM attributes of the LOG_ARCHIVE_DEST_*n* initialization parameter. This mode is only available in maximum availability protection mode. Because FASTSYNC transport mode uses the NOAFFIRM attribute of the LOG_ARCHIVE_DEST_n parameter, data loss is possible.

Category	Description
Datatype	String
Valid values	SYNC, ASYNC, or FASTSYNC
Broker default	ASYNC
Imported?	No
Parameter class	Dynamic
Role	Standby database, Recovery Appliance, far sync instance[1]
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	• SYNC, ASYNC, AFFIRM, and NOAFFIRM attributes for the LOG_ARCHIVE_DEST_*n* initialization parameter of the database or far sync instance that is sending redo data • ARCHIVER, TRANSMIT_MODE, and AFFIRM columns of V$ARCHIVE_DEST view of the database or far sync instance that is sendng redo data
Scope	Database, far sync instance, Recovery Appliance
Cloud Control name	Redo Transport Service

[1] Although this property is set for the standby database or far sync instance, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo. The broker propagates the setting you specify on the standby database or far sync instance to the corresponding attributes of the LOG_ARCHIVE_DEST_*n* value of the database or far sync instance that is sending redo data. Note that if a database receives redo from a database or far sync instance where the RedoRoutes property has been configured with a redo transport mode, then the mode specified by that RedoRoutes property value overrides the value of the LogXptMode property.

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> **See Also**
>
> Managing the Members of a Broker Configuration for more information about setting data protection modes for redo transport services

MaxFailure

The `MaxFailure` configurable property specifies the maximum number of contiguous archiving failures before the redo transport services stop trying to transport archived redo log files to the standby database.

A value of zero indicates that an unlimited number of failures are allowed.

Category	Description
Datatype	Integer
Valid values	>=0
Broker default	If the standby database is part of a group as specified with the broker `RedoRoutes` property, then the default value 1. Otherwise, the default value is 0.
Imported?	No
Parameter class	Dynamic
Role	Standby[1], Recovery Appliance
Standby type	Physical, logical, snapshot, Recovery Appliance
Corresponds to	• `MAX_FAILURE` attribute for the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the database or far sync instance that is sending redo data • `MAX_FAILURE` column of the `V$ARCHIVE_DEST` view of the database or far sync instance that is sending redo data
Scope	Database, Recovery Appliance
Cloud Control name	Not applicable

1 Although this property is set for a standby database or far sync instance, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify on the standby database or far sync instance to the corresponding attributes of the `LOG_ARCHIVE_DEST_`*n* value of the database or far sync instance that is sending redo data.

NetTimeout

The `NetTimeout` configurable property specifies the number of seconds the LGWR waits for Oracle Net Services to respond to a LGWR request.

It is used to bypass the long connection timeout in TCP.

Category	Description
Datatype	Integer
Valid values	0 to 1200
Broker default	30
Imported?	No
Parameter class	Dynamic

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Category	Description
Role	Primary, standby, far sync instance, Recovery Appliance
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	• `NET_TIMEOUT` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the database or far sync instance that is sending redo data • `NET_TIMEOUT` column of `V$ARCHIVE_DEST` view of the database or far sync instance that is sending redo data
Scope	Database, far sync instance, Recovery Appliance
Cloud Control name	Not applicable

ObserverConnectIdentifier

The `ObserverConnectIdentifier` configurable property specifies a connect identifier that can be used by the observer to connect to this database.

The connect identifier can pertain only to the primary database, or to the target standby database when fast-start failover is enabled.

> **Note**
>
> All instances of a database must be accessible via the service in MOUNT, READ WRITE, and READ ONLY modes. The service should NOT be one that is defined and managed by Oracle Clusterware or created via Server Control Utility (SRVCTL). For most users it will be sufficient to use the db_unique_name service.

Category	Description
Datatype	String
Valid Values	A connect identifier that observer can use to connect to this database
Broker Default	Empty String[1]
Imported?	No
Parameter Class	Not applicable
Role	Primary and Standby
Standby Type	Physical or logical
Corresponds to	Not applicable
Scope	Database
Cloud Control name	`Observer Connect Identifier`

[1] When this is Empty String (not set by the user), the connect identifier specified by this database's DGConnectIdentifier property will be used by the observer.

PreferredApplyInstance

The `PreferredApplyInstance` configurable property indicates that a particular instance is the preferred choice for serving log apply services.

It is only used when the database is a standby Oracle RAC database. The value could be an empty string (default) which means the broker chooses the apply instance.

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Category	Description
Datatype	String
Valid Values	The instance name (SID) or empty string. Note that on certain platforms, SIDs may be case-sensitive.
Broker Default	Empty string
Imported?	No
Parameter Class	Not applicable
Role	Standby, Recovery Appliance
Standby Type	Physical, logical, Recovery Appliance
Corresponds to	Not applicable
Scope	Database
Cloud Control name	`Apply Instance`

See Also

- *Oracle Database Administrator's Guide* for more information about SIDs
- Apply Services in an Oracle RAC Database Environment for information about apply services in an Oracle RAC environment

PreferredObserverHosts

The `PreferredObserverHosts` configurable property allows you to list the hosts that you would prefer as hosts for the master observer when that database is in the primary role.

The value of this property can be changed at any time, regardless of whether Fast-Start Failover is enabled or not, or whether the observer is in an OBSERVED state. The master observer will be changed automatically to an observer running on a higher priority host. Only observers running on hosts specified in the `PreferredObserverHosts` will observe databases and become the master observer which will initiate a failover in case of loss of the primary database. The observers can be prioritized. The priority range is from 1 to 8 and the default value of the priority is 8. A lower number has a higher priority.

Category	Description
Data type	String
Valid value	A character string that contains one or more host names with priority, separated by comma: *host_name_1*:1 [,*host_name_n*:*priority*] Each host name can be any character string for a valid network name, even if there is no observer running on this host when it is set.
Broker default	Null
Imported?	No
Parameter class	Not applicable

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Category	Description
Role	Primary, standby
Standby type	Physical standby and logical standby
Corresponds to	Not applicable
Scope	Database
Cloud Control name	Not applicable

RedoCompression

The `RedoCompression` configurable property is used to specify whether redo data is transmitted to a standby database or far sync instance in compressed or uncompressed form.

> **Note**
>
> Redo transport compression is a feature of the Oracle Advanced Compression option. You must purchase a license for this option before using the redo transport compression feature.

Category	Description
Datatype	String
Valid value	`DISABLE` ,`ENABLE`, `ZLIB`, or `LZO` • When `ENABLE` is specified, the default compression algorithm is `ZLIB`. • `LZO` is not supported when `LogXptMode` is set to `SYNC` or `FASTSYNC`.
Broker Default	`DISABLE`
Imported?	No
Parameter class	Dynamic
Role	Standby database, far sync instance[1], Recovery Appliance
Standby type	Physical, logical, or snapshot standby, far sync instance, Recovery Appliance
Corresponds to	• `COMPRESSION` attribute for the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the database or far sync instance that is sending redo data • `COMPRESSION` column of the `V$ARCHIVE_DEST` view of the database or far sync instance that is sending redo data
Scope	Database, far sync instance, Recovery Appliance
Cloud Control name	Not applicable

[1] Although this property is set for a standby database or far sync instance, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify on the standby database or far sync instance to the corresponding attributes of the `LOG_ARCHIVE_DEST_`*n* value of the database or far sync instance that is sending redo data.

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RedoRoutes

The `RedoRoutes` property lets you override the default behavior by which a primary database sends the redo that it generates to every other redo transport destination in the configuration.

You can use the `RedoRoutes` property to create a more complex redo transport topology, such as one in which a physical standby database or a far sync instance forwards redo received from the primary database to one or more destinations, or one in which the redo transport mode used for a given destination is dependent on which database is in the primary role.

The `RedoRoutes` property is set to a character string that contains one or more redo routing rules. Each rule contains one or more redo sources and one or more redo destinations. A redo routing rule becomes active when one of the redo sources in the rule is in the primary role. This results in redo from the primary database being sent to every redo destination in that rule.

> **Note**
>
> A member whose `MaxFailure` property is set to zero cannot be part of a RedoRoutes group.

Category	Description
Datatype	String
Valid values	A character string that contains one or more redo routing rules, each contained within a pair of parentheses: `(redo_routing_rule_1) [(redo_routing_rule_n)]` See "Redo Routing Rules" for more information about redo routing rules.
Broker default	Null
Imported?	No
Parameter class	Not applicable
Role	Primary, standby, far sync instance
Standby type	Physical standby and far sync instance
Corresponds to	`LOG_ARCHIVE_DEST_`*n*
Scope	Database, far sync instance
Cloud Control Name	RedoRoutes

Redo Routing Rules

The `RedoRoutes` property is set to a character string that contains one or more redo routing rules.

Each rule is contained within a set of parentheses, as follows:

```
(redo_routing_rule_1) [(redo_routing_rule_n)]
```

A redo routing rule contains a redo source field and a redo destination field separated by a colon:

```
(redo source : redo destination)
```


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The redo source field must contain the keyword LOCAL or ANY, or a comma-separated list of DB_UNIQUE_NAME values, as follows:

```
{LOCAL | ANY | db_unique_name_1,[,db_unique_name_n]}
```

- The LOCAL keyword is an alias for the local database name. This keyword cannot be used at a far sync instance.
- The ANY keyword is an alias for any database in the configuration.
- A database cannot be specified as a redo source in more than one redo routing rule defined at a given database, either explicitly or implicitly through use of the LOCAL keyword.

The redo destination field must contain the keyword ALL or a comma-separated list of redo destination groups, each of which consists of destination databases with optional priority attributes and optional redo transport mode attributes:

```
{ALL [xpt_mode] | redo_dest_group_1 [, redo_dest_group_n]}
```

- The ALL keyword is an alias for all possible destinations in the configuration.
- The redo_dest_group_*n* is:

  ```
  { db_unique_name_1 [xpt_mode] | ( db_unique_name_1 [xpt_mode] [PRIORITY=n]
  [,db_unique_name_n [xpt_mode] [PRIORITY=n]] ) }
  ```

  The optional xpt_mode specifies the redo transport mode to be used to send redo to the associated destination. It can have one of three values: ASYNC, SYNC, or FASTSYNC. If the redo transport attribute is not specified, then the transport mode used will be the one specified by the LogXptMode property for the redo destination.

  The optional [PRIORITY=*n*] can have *n* =1 ~ 8. The default value for far sync members is 1 and the default value for non-far sync members is 8. It is important to understand how different group and priority settings affect redo transport under various conditions. The following examples describe some sample situations.

Example 1: Different Priorities Within a Group

Assume there are three members in a broker configuration:

PRI (primary database)
SB1 (standby database)
FS1 (far sync instance)

The primary database PRI generates the redo log for use by the standby database SB1. Because there is a far sync instance, FS1, there are two possible redo delivery paths to the standby database:

(path 1) PRI —> FS1 —> SB1
(path 2) PRI —> SB1

Assume (path 1) is more desirable than (path 2). This can be expressed with the RedoRoutes property as follows:

```
PRI —RedoRoutes = (local : ( FS1 PRIORITY=1, SB1 PRIORITY=2 ) )
FS1 —RedoRoutes = ( PRI : SB1 )
```

As specified in the PRI RedoRoutes property, the primary (PRI) has two destinations : one for FS1 with PRIORITY=1 and one for SB1 with PRIORITY=2. Smaller priority numbers mean higher priority, so primary PRI tries to ship the redo log to FS1 first.

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If FS1 is available, then the primary ships to FS1 which has PRIORITY=1. If FS1 is unavailable, then the primary ships to SB1 which has PRIORITY=2. When FS1 becomes active again, the primary will ship to it again because priority 1 is higher than priority 2.

Example 2: The Same Priorities Within a Group

Suppose you add one more far sync instance, FS2, to the configuration set up in Example 1, and then update the RedoRoutes property as follows:

```
PRI — RedoRoutes = (local : ( FS1 PRIORITY=1, FS2 PRIORITY=1 ) )
FS1 — RedoRoutes = ( PRI : SB1 )
FS2 — RedoRoutes = ( PRI : SB1 )
```

The primary PRI now has two destinations, FS1 and FS2, with the same priority. The primary must choose either FS1 or FS2. Assume the primary chooses FS1.

If FS1 is available, then the primary ships to FS1. If FS1 is unavailable, then the primary ships to FS2. Even after FS1 becomes active again, the primary continues shipping to FS2 because FS1 and FS2 have the same priority. If FS2 fails, then the primary ships to FS1.

Example 3: Multiple Groups

Assume that you add one more standby, SB2, to the configuration, and then update the RedoRoutes property as follows so that the primary has two destination groups:

```
PRI — RedoRoutes = (local : ( FS1 PRIORITY=1, SB1 PRIORITY=2 ), ( FS2
PRIORITY=1, SB2 PRIORITY=2 ) )
FS1 — RedoRoutes = ( PRI : SB1 )
FS2 — RedoRoutes = ( PRI : SB2 )
```

The general rule is that there is one active redo path for each group. (See Example 4 for a scenario in which there are multiple active redo paths.) The primary establishes one redo delivery path for the first group (FS1 PRIORITY=1, SB1 PRIORITY=2), and establishes another redo delivery path for the second group (FS2 PRIORITY=1, SB2 PRIORITY=2).

- If both FS1 and FS2 are available, then the primary ships to FS1 and FS2.
- If FS1 is unavailable and FS2 is available, then the primary ships to SB1 and FS2.
- If FS1 is available and FS2 is unavailable, then the primary ships to FS1 and SB2.
- If both FS1 and FS2 are unavailable, then the primary ships to SB1 and SB2.

Example 4: The PRIORITY Attribute is Set to 8

Setting PRIORITY=8 has special meaning. If a primary ships redo to a destination with PRIORITY=8, then it must ship to every PRIORITY=8 destination. Suppose you update the RedoRoutes property as follows so that the primary has one group containing three destinations:

```
PRI — RedoRoutes = (local : ( FS1 PRIORITY=1, SB1 PRIORITY=8, SB2
PRIORITY=8 ) )
FS1 — RedoRoutes = ( PRI : SB1, SB2 )
```

These settings result in the following behavior:

- If FS1 is available, then the primary ships to FS1.
- If FS1 is unavailable, then the primary ships to both SB1 and SB2 because they both have PRIORITY=8
- If FS1 becomes active again, then the primary ships to FS1.

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Usage Notes for Advanced Redo Transport Settings

The following usage notes apply regarding advanced redo transport settings:

- The `RedoRoutes` property has a default value of NULL, which is treated as `(LOCAL : ALL)` at a primary database.
- A redo routing rule is active if its redo source field specifies the current primary database. If a rule is active, primary database redo is sent by the database at which the rule is defined to each destination specified in the redo destination field of that rule.
- The `ASYNC` redo transport attribute must be explicitly specified for a cascaded destination to enable real-time cascading to that destination.
- The `RedoRoutes` property cannot be configured such that when a physical standby database is converted to a snapshot standby, the snapshot standby would send redo data to another member.
- The `RedoRoutes` property can be set for a logical standby database only if the redo source field is set to `LOCAL`.

ReopenSecs

The `ReopenSecs` configurable property specifies the minimum number of seconds before the archiver process (ARC*n*, foreground, or log writer process) should try again to access a previously failed destination.

Category	Description
Datatype	Integer
Valid values	>=0 seconds
Broker default	`300`
Imported?	No
Parameter class	Dynamic
Role	Standby database, far sync instance[1], Recovery Appliance
Standby type	Physical, logical, snapshot standby, far sync instance, Recovery Appliance
Corresponds to	• `REOPEN` attribute for the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the database or far sync instance that is sending redo data • `REOPEN_SECS` column of the `V$ARCHIVE_DEST` view of the database or far sync instance that is sending redo data
Scope	Database, far sync instance, Recovery Appliance
Cloud Control name	Not applicable

[1] Although this property is set for a standby database or far sync instance, it is indirectly related to the redo transport services for the database or far sync instance that is sending redo data. The broker propagates the setting you specify on the standby database or far sync instance to the corresponding attributes of the `LOG_ARCHIVE_DEST_`*n* value of the database or far sync instance that is sending redo data.

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StandbyAlternateLocation

The `StandbyAlternateLocation` configurable property specifies an alternate standby redo log archive location to use when the location specified by the `StandbyArchiveLocation` configurable property fails.

The property has database-specific scope, and the location that it specifies is applicable to all instances in a database.

Category	Description
Datatype	String
Valid values	• An empty string, when no alternate location is desired. • A directory specification that is accessible by the instance. • A valid `LOG_ARCHIVE_DEST_`*n* parameter string with the LOCATION attribute specified, but no `VALID_FOR`, `ALTERNATE`, or `SERVICE` attributes.
Broker default	Empty string
Imported?	No
Parameter class	Dynamic
Role	Primary, standby, and far sync instance
Standby type	Physical, logical, or snapshot standby, or a far sync instance
Corresponds to	On the standby database or the far sync instance, the `LOCATION` attribute for the `LOG_ARCHIVE_DEST_`*n* initialization parameter that represents an alternate destination of the local destination that matches the configurable property `StandbyArchiveLocation`.
Scope	Member
Cloud Control name	`Alternate Standby Location`

Note

On a logical standby database, Oracle recommends the `LOCATION` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter for the local destination be different from the value of `StandbyAlternateLocation` configurable property.

These properties allow you to have the broker automatically manage the local archival of online and standby redo logs to the specified local destination. Do not use set `log_archive_dest_`*n* initialization parameters for local archival specifying that same destination.

StandbyArchiveLocation

The `StandbyArchiveLocation` configurable property specifies the standby redo log archive location. Oracle recommends that you always explicitly set the value.

Category	Description
Datatype	String

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Category	Description
Valid values	• An empty string when you do not want broker to manage the standby redo log archive location. • A nonempty file specification of the standby redo log archive location for the instance. Specify `USE_DB_RECOVERY_FILE_DEST` if a database recovery area is desired. • A valid `LOG_ARCHIVE_DEST_`*n* parameter string with the `LOCATION` attribute specified, but no `VALID_FOR`, `ALTERNATE`, or `SERVICE` attributes.
Broker default	Empty string
Imported?	No
Parameter class	Dynamic
Role	Primary, standby, and far sync instance
Standby type	Physical, logical, or snapshot standby, or a far sync instance
Corresponds to	• `LOCATION` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter of the standby database or far sync instance with `VALID_FOR` compatible with `(STANDBY_LOGFILE, ALL_ROLES)` • `DESTINATION` column of the `V$ARCHIVE_DEST` view of the standby database
Scope	Member
Cloud Control name	`Standby Archive Location`

Note

On a logical standby database, Oracle recommends the `LOCATION` attribute of the `LOG_ARCHIVE_DEST_`*n* initialization parameter for the local destination be different from the value of `StandbyArchiveLocation` property, unless you are using a database recovery area.

These properties allow you to have the broker automatically manage the local archival of online and standby redo logs to the specified local destination. Do not use set `log_archive_dest_`*n* initialization parameters for local archival specifying that same destination.

StaticConnectIdentifier

The `StaticConnectIdentifier` configurable instance-specific property specifies the connection identifier that the DGMGRL client will use when starting database instances.

If this property has a null value, then the `DGConnectIdentifier` value is used for operations that involve shutting down and starting up the instance.

Category	Description
Datatype	String
Valid values	A connect identifier that refers to a service that is statically registered.

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Category	Description
Broker default	Connect descriptor that is the concatenation of:[1] • The ADDRESS attribute value of the listener that is specified for the LOCAL_LISTENER initialization parameter • The value for the SERVICE_NAME attribute will be set to a concatenation of <*db_unique_name*>_DGMGRL.<*db_domain*>
Imported?	Yes, from the LOCAL_LISTENER and DB_UNIQUE_NAME initialization parameters.
Parameter class	Not applicable
Role	Primary and standby
Standby type	Physical, logical, or snapshot
Corresponds to	Not applicable
Scope	Instance
Cloud Control name	Not applicable

[1] If the instance specified by the InstanceName property is started with a different SID (read from the INSTANCE_NAME column of the V$INSTANCE view) than the SID with which it was previously started and/or it is started on a different host (read from the HOST_NAME column of the V$INSTANCE view) than the host on which it was previously started, then the broker automatically updates the default value of the StaticConnectIdentifier property to incorporate the current ADDRESS attribute of the listener that is specified for the LOCAL_LISTENER initialization parameter.

See Also

- See *Oracle Database Net Services Administrator's Guide* for more information about statically registered services
- See the My Oracle Support Note 1387859.1 at https://support.oracle.com for additional information about using static services and the StaticConnectIdentifier configurable property

TransportDisconnectedThreshold

The TransportDisconnectedThreshold configurable property can be used to generate a warning status for a logical, physical, or snapshot standby, or a far sync instance when the last communication from the primary database exceeds the property value.

The property value is expressed in seconds. A value of 0 seconds results in no warnings being generated.

Category	Description
Datatype	Number
Valid values	>=0
Broker default	30 seconds
Imported?	No
Parameter class	Not applicable
Role	Standby database, far sync instance

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Category	Description
Standby type	Physical, logical, or snapshot standby, or a far sync instance
Corresponds to	Not applicable
Scope	Database, far sync instance
Cloud Control name	Not applicable

TransportLagThreshold

The `TransportLagThreshold` configurable property can be used to generate a warning status for a logical, physical, or snapshot standby, or a far sync instance when the member's transport lag exceeds the property value.

The property value is expressed in seconds. A value of 0 seconds results in no warnings being generated when a transport lag exists.

Category	Description
Datatype	Number
Valid values	>=0
Broker default	30 seconds
Imported?	No
Parameter class	Not applicable
Role	Standby database, far sync instance
Standby type	Physical, logical, or snapshot standby, or a far sync instance
Corresponds to	Not applicable
Scope	Database, far sync instance
Cloud Control name	Not applicable

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13

Troubleshooting Oracle Data Guard

Use this information about common issues and resolutions to maintain your Oracle Data Guard environment.

- Sources of Diagnostic Information
- General Problems and Solutions
- Troubleshooting Problems During a Switchover Operation
- Troubleshooting Problems During a Failover Operation
- Troubleshooting Problems with the Observer

Sources of Diagnostic Information

The Oracle Data Guard broker provides information about its activities in several forms.

- Database status information (see Database Status)
- Oracle alert log files

  The broker records key information in the alert log file for each instance of each database in a broker configuration. You can check the alert log files for such information when troubleshooting Oracle Data Guard.
- Oracle Data Guard "broker log files"

  For each instance of each database in a broker configuration, the broker DMON process records important behavior and status information in a broker log file, useful in diagnosing Oracle Data Guard failures. The `TraceLevel` configuration property (see TraceLevel) is used to specify the level of diagnostic information reported in the broker log files.

  The broker log file is created in the same directory as the alert log and is named `drc<$ORACLE_SID>.log`.

General Problems and Solutions

These topics describe general problems and solutions when using Oracle Data Guard broker.

- ORA-16596: database not part of the Oracle Data Guard broker configuration
- Redo Accumulating on the Primary Is Not Sent to Some Standby Databases
- Many Log Files Are Received on a Standby Database But Not Applied
- The Request Timed Out or Cloud Control Performance Is Sluggish
- The Primary Database is Flashed Back
- Standby Fails to Automatically Start Up Due to Unknown Service (ORA-12514)

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ORA-16596: database not part of the Oracle Data Guard broker configuration

A request was issued to the broker, but the database instance through which you have connected is no longer a part of the broker configuration.

Solution

Reconnect to the configuration through another database that you know is part of the broker configuration. Confirm that a database exists in the broker configuration that has a name that matches the `db_unique_name` value of the database that returned the ORA-16596 error.

This problem can also occur if you attempt to enable a configuration, but the broker configuration file for one of its databases was accidentally removed or is outdated. In this case, remove the database from the broker configuration, manually delete the configuration file for that standby database (not for the primary database), and try again to enable the configuration. After the configuration is enabled, you can either use the Cloud Control Add Standby Database wizard and choose the Add existing standby database option, or you can use the DGMGRL command-line interface and issue the `ADD DATABASE` command.

Redo Accumulating on the Primary Is Not Sent to Some Standby Databases

By viewing the Log File Details page in Cloud Control, you have determined that log files are accumulating on the primary database and are not being archived to some of the standby databases in the broker configuration.

Solution

To narrow down the problem, do the following:

- Verify that the state of the primary database is in the `TRANSPORT-ON` state (not `TRANSPORT-OFF`).
- Verify that the value of the `LogShipping` database property of the standby database in question is `ON`.
- Check the status of the redo transport services on the primary database using the `LogXptStatus` monitorable property. If redo transport services have an error, then use the error message to determine further checking and resolution action. For example:
  - If the error indicates the standby database is not available, you need to restart the standby database.
  - If the error indicates no listener, you need to restart the listener.
  - If the error indicates the standby database has no local destination, you need to set up a standby location to store archived redo log files from the primary database.

Many Log Files Are Received on a Standby Database But Not Applied

By viewing the Performance page or Log File Details page in Cloud Control, you have determined that the standby database accumulates too many log files without applying them.

Solution

There are many possible reasons why archived redo log files might not be applied to the standby database. Investigate why the log files are building up and rule out the valid reasons.

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If the current status of the standby database is not normal:

- Determine whether or not the log apply services might be unexpectedly stopped. See the ORA-16766 (for physical standby databases) or ORA-16768 (for logical standby databases) error description and solution statement for more help.
- If this is a logical standby database, check to see if a failed transaction has occurred.
- If you want to suppress the error while you investigate the problem, you can temporarily disable broker management of the database.

> **See Also**
>
> Oracle Data Guard Command-Line Interface Reference for additional information about disabling the database using the DGMGRL command-line interface

If the current status of the standby database is normal:

- Verify the state of the standby database is `APPLY-ON` (not in the `APPLY-OFF` state).
- Verify the state of the primary database is `TRANSPORT-ON` (not in the `TRANSPORT-OFF` state).

> **See Also**
>
> Oracle Data Guard Broker Properties for additional information about the `LogShipping` database property

- Verify the standby database is not in the snapshot role (logs are received but not applied until the standby is converted back to a physical standby).
- Check to see if log files are building up because the value of the `DelayMins` property is set too large. (Log apply services will delay applying the archived redo log files on the standby database for the number of minutes specified.)

> **See Also**
>
> Oracle Data Guard Broker Properties for additional information about the `DelayMins` database property

- If you cannot see any errors, compare the redo generation rate to the apply rate to see if the apply rate is lower than the archive rate. The primary database redo generation rate is available in the `SHOW DATABASE` command output. Similarly, the standby's apply rate is available in the `SHOW DATABASE` output.

The Request Timed Out or Cloud Control Performance Is Sluggish

If the broker requests are not completing within the normal timeout parameters, try these actions to solve the problem.

1. Verify the network is operating appropriately.
2. Try to ping all of the nodes in the configuration.

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3. Try reconnecting through another database to retry the operation.
4. Run the `VERIFY` command to determine on which database the broker is unable to process the requests.

The Primary Database is Flashed Back

If the primary database is flashed back, then the standby databases in the configuration must be also be flashed back or re-created to be viable targets for switchovers or failovers.

The broker will report errors for the standby databases if the primary database has been flashed back.

For more information about restoring the viability of a standby database that was disabled by the broker, see Reenabling Disabled Databases After a Role Change.

Standby Fails to Automatically Start Up Due to Unknown Service (ORA-12514)

An `ORA-12514` error may be generated if the DGMGRL CLI fails to automatically start up an instance after a broker operation (for example, a switchover, reinstatement, or convert to physical standby).

The full error text is `ORA-12514: Cannot connect to database. Service %s is not registered with the listener at %s. (CONNECTION_ID=%s)`. If you receive this error, and your database is not managed by Oracle Clusterware, then you must manually start the instance to complete or continue the broker operation.

> **Note**
>
> The troubleshooting information in this section applicable only to databases that are not managed by Oracle Clusterware.

You can restart the instance before or after completing the following steps:

1. Issue the following DGMGRL CLI command to check the value of the `StaticConnectIdentifer` configurable property for the instance the DGMGRL CLI was unable to restart. (You will have to connect to another running instance to issue this command):

   ```
   SHOW DATABASE db_unique_name StaticConnectIdentifier;
   ```

2. The static service name specified in the value of the `StaticConnectIdentifer` instance property should be registered with the listener specified in the property value. The default value for the static service name is of the following form:

   ```
   <db_unique_name>_DGMGRL.<db_domain>
   ```

   See Prerequisites for more information about this, and other prerequisites, for using the broker.
3. Confirm that the static service name is registered with the listener specified in the `StaticConnectIdentifer` configurable property value by using the Listener Control utility's status command.

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```
lsnrctl status
```

The value of the `StaticConnectIdentifer` configurable property can be validated using the `VALIDATE STATIC CONNECT IDENTIFIER` command.

Troubleshooting Problems During a Switchover Operation

If the switchover fails due to problems with the configuration, then the broker reports any problems it encounters in the alert log files or in the broker log files.

See Sources of Diagnostic Information for more information about log files. If the reported problems can be corrected, you can retry the switchover operation and it will usually succeed. If the reported problems cannot be corrected or the switchover operation fails even after correcting the reported problems, then you can choose another database for the switchover or restore the configuration to its pre-switchover state and then retry the switchover.

If fast-start failover is enabled, the broker does not allow switchover to any standby database except to the target standby database. In addition, switchover to the target standby database is allowed only when the value of the `FS_FAILOVER_STATUS` column in the `V$DATABASE` view on the target standby database is either `READY` or `SUSPENDED`.

See Also

When Fast-Start Failover Is Enabled and the Observer Is Running

Troubleshooting Problems During a Failover Operation

Although it is possible for a failover operation to fail, it is unlikely. If an error does occur there are guidelines you can follow to fix the problem and then retry the broker failover.

Failed Failovers to Physical Standby Databases

These steps describe how to recover from a failed broker failover to a physical standby database.

Failed Broker Complete Physical Failovers

Examine the alert log file and the broker log file (drc*.log) on the target standby database to determine the cause of the failure and correct the problem.

If the reported problem can be corrected, then retry the failover operation. If the reported problem cannot be corrected or if the failover operation fails again after the reported problem has been corrected, then take the following steps:

1. Connect to the target standby database and disable fast-start failover using the `FORCE` option if it is enabled.
2. Then you can either:
   - Connect to another physical standby database and attempt a broker complete failover.
   - Perform a broker immediate failover to the target physical standby database.

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3. Reinstate the original primary database and any bystander physical standby databases that are disabled with a status of reinstatement required (`ORA-16661`).
4. Reenable fast-start failover if it was disabled in step 1.

Failed Broker Immediate Physical Failovers

Examine the alert log file and the broker log file (drc*.log) on the target standby database to determine the cause of the failure and correct the problem.

If the problem can be corrected, retry the broker immediate failover. Otherwise connect to another physical standby database and attempt either a broker complete or immediate failover.

Failed Failovers to Logical Standby Databases

These are the steps to follow if a failover to a logical standby database fails.

1. Examine the alert log file and the broker log file (drc*.log) on the target standby database to determine the cause of the failure and correct the problem.
2. Connect to the target standby database and disable fast-start failover using the `FORCE` option if it is enabled.
3. Retry the broker failover.
4. Reinstate the old primary database. All bystander standby databases will be re-created from a copy of the new primary database.
5. Reenable fast-start failover if it was disabled in step 1.

If broker failover continues to fail, you should stop the broker on all databases in the Oracle Data Guard configuration (set the `DG_BROKER_START` initialization parameter to `FALSE`). Remove the Oracle Data Guard broker configuration files from all databases. Attempt a manual failover using the guidelines for role transitions in *Oracle Data Guard Concepts and Administration*.

> **Note**
>
> You can enable or disable the broker configuration using DGMGRL `ENABLE CONFIGURATION` and `DISABLE CONFIGURATION` commands. You cannot disable the configuration using Cloud Control. You can only enable the configuration using Cloud Control if it was previously disabled using DGMGRL.

Troubleshooting Problems with the Observer

The observer continuously monitors the fast-start failover environment to ensure the primary database is available.

Installing and starting the observer is an integral part of using fast-start failover. The following sections describe techniques for troubleshooting the observer:

- Problems Because the Observer Has Stopped
- Capturing Observer Actions in the Observer Log File

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Problems Because the Observer Has Stopped

If the observer host machine crashes, the broker configuration is no longer observed and fast-start failover is no longer possible.

In this case, you may have to move the observer to a new host if the original host machine cannot be repaired in a timely fashion.

1. Issue the DGMGRL `STOP OBSERVER` command to sever the link between the original observer and the broker configuration:

```
DGMGRL> STOP OBSERVER;
Done.
```

2. Issue the DGMGRL `SHOW CONFIGURATION VERBOSE` command to verify that the configuration is no longer being observed:

```
DGMGRL> SHOW CONFIGURATION VERBOSE;

Configuration - DRSolution

  Protection Mode: MaxAvailability
  Members:
    North_Sales - Primary database
    Warning: ORA-16819: fast-start failover observer not started

    South_Sales - (*) Physical standby database
    Warning: ORA-16819: fast-start failover observer not started

(*) Fast-Start Failover target

Properties:
  FastStartFailoverThreshold     = '30'
  OperationTimeout               = '30'
  TraceLevel                     = 'USER'
  FastStartFailoverLagLimit      = '30'
  CommunicationTimeout           = '180'
  ObserverReconnect              = '0'
  FastStartFailoverAutoReinstate = 'TRUE'
  FastStartFailoverPmyShutdown   = 'TRUE'
  BystandersFollowRoleChange     = 'ALL'
  ObserverOverride               = 'FALSE'
  ExternalDestination1           = ''
  ExternalDestination2           = ''
  PrimaryLostWriteAction         = 'CONTINUE'
  ConfigurationWideService       = 'North_Sales_CFG'

Fast-Start Failover: ENABLED

  Threshold: 30 seconds
  Target: South_Sales
  Observer: (none)
  Lag Limit: 30 seconds (not in use)
  Shutdown Primary: TRUE
  Auto-reinstate: TRUE
  Observer Reconnect: (none)
  Observer Override: FALSE

Configuration Status:
WARNING
```


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3. Note that you do not need to issue the DGMGRL `SHOW CONFIGURATION` command to verify that the observer has actually stopped. Successful completion of the DGMGRL `STOP OBSERVER` command will allow a new observer to become associated with the configuration.

Capturing Observer Actions in the Observer Log File

You can use the `LOGFILE IS` option of the `START OBSERVER` command to capture the activity performed by the observer.

Start DGMGRL and issue the command:

```
DGMGRL> START OBSERVER observer1 IN BACKGROUND LOGFILE IS observer.log
CONNECT IDENTIFIER IS North_Sales TRACE_LEVEL IS SUPPORT;
```

When the `LOGFILE IS` clause is used, then all observer output is recorded in the specified file. If a complete path, with file name, is provided, the file is stored in the specified path. If only a file name is provided and the `DG_ADMIN` environment variable is defined, the specified file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/log` directory. If the `DG_ADMIN` environment variable is not defined, the file is stored in the current working directory. If `LOGFILE IS` clause is omitted, the log file is stored in the `$DG_ADMIN/config_ConfigurationSimpleName/log` directory using the name observer_hostname.log. If the `DG_ADMIN` environment variable is not defined, the log file is stored as `observer_hostname.log` in the current working directory. `ConfigurationSimpleName` is the name of the broker configuration.

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A

Upgrade and Downgrade Considerations for Data Guard for Container Databases

Use these topics to upgrade or downgrade Oracle databases and Oracle Enterprise Manager Cloud Control (Cloud Control) in a broker configuration.

See Also

Oracle Data Guard Installation

Considerations While Using the DBMS_ROLLING Package

When upgrading from Oracle Database Version 19c to a higher database version, broker management can remain enabled. However, some considerations must be kept in mind.

The considerations are as follows:

- The broker configuration files must be in a release-neutral location and accessible throughout the upgrade process.
- Make a copy of the current broker configuration files, as indicated by the following initialization parameters: `DG_BROKER_CONFIG_FILE1` and `DG_BROKER_CONFIG_FILE2`.
- After upgrading the leading group members, ensure broker communication between the leading group and the trailing group is successful before proceeding with the upgrade process.

  Communication may be disrupted if network files are either not moved to the upgraded `ORACLE_HOME` or need to be edited appropriately. In such cases, shut down the upgraded databases (transient logical standby and any other Leading Group Standby databases), stop the listener, copy the `listener.ora` and `tnsnames.ora` or fix them as appropriate, restart the listener, and restart the databases.
- Before you run the `DBMS_ROLLING` procedure, the physical standby databases must have been operating in Active Data Guard mode.

  If the physical standby databases were operating only in the mounted mode, and the primary database is a multitenant database, you must open the primary database including all its PDBs, and the temp file configuration must be confirmed before you run procedures in the `DBMS_ROLLING` package. This ensures that the necessary temp files are created and available during the upgrade process.

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> **Note**
>
> The observer that was started prior to the upgrade will automatically be stopped and unable to observe the configuration once the upgrade is complete. You must use an Oracle Database 19c, Oracle Database 21c, or Oracle AI Database 26ai version of the Oracle Observer software to observe Oracle databases running on Oracle AI Database 26ai. Oracle recommends using an Oracle AI Database 26ai version of the Oracle Observer software with an Oracle 26ai release database.

Upgrading from Oracle Database Version 21.7 Release

When upgrading from Oracle Database Version 21.7, the following considerations must be addressed if Data Guard for Pluggable Database was configured on this database:

The considerations are as follows:

1. Both databases that contain the primary and physical standby pluggable databases must be upgraded to be able to use Data Guard for Pluggable Database in the newer release.
2. To prepare for the upgrade:
   a. Close all pluggable databases that are in the source role and then, switch a couple of logs.
   b. Ensure managed recovery at the target container has caught up and all the changes have been applied at the target pluggable databases.
   c. Turn off managed recovery for each physical standby pluggable databases by setting their apply state to OFF (EDIT PLUGGABLE DATABASE <pdb-name> SET STATE=APPLY-OFF).
   d. Finally, stop redo transport between the two container databases (EDIT DATABASE <db-unique-name> SET STATE=TRANSPORT-OFF).
3. Upgrade the database software using the Oracle Database installation documentation that is appropriate for your operating system and release.
4. After all instances of both databases are started in the newer release:
   a. Start redo transport between the two container databases (EDIT DATABASE <db-unique-name> SET STATE=TRANSPORT-ON).
   b. Set each of the standby pluggable databases to the APPLY-ON state (EDIT PLUGGABLE DATABASE <pdb-name> SET STATE-APPLY-ON).

Downgrading from Oracle AI Database 26ai

If you have upgraded to Oracle AI Database 26ai Release and want to downgrade to your prior release 21.7 or higher, you must follow the same steps starting at step 3 as above (Downgrading for Data Guard for Container Database). Then do the following:

1. Both databases that contain the primary and physical standby pluggable databases must be downgraded to be able to configure Data Guard for Pluggable Database in the prior release.
2. To prepare for the downgrade:
   - Close all pluggable databases that are in the source role and then, switch a couple of logs.

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- Ensure recovery at the target container has caught up and all the changes have been applied at the target pluggable databases.
- Turn off managed recovery for each physical standby pluggable databases by setting their apply state to OFF (EDIT PLUGGABLE DATABASE <pdb-name> SET STATE=APPLY-OFF).
- Finally, stop redo transport between the two container databases (EDIT DATABASE <db-unique-name> SET STATE=TRANSPORT-OFF).

3. Downgrade the Oracle Database software to the prior Oracle release. See the Oracle Database documentation that is appropriate for your operating system.
4. After the databases are started in the prior release:
   - Start redo transport between the two container databases (EDIT DATABASE <db-unique-name> SET STATE=TRANSPORT-ON).
   - Set each of the standby pluggable databases to the APPLY-ON state (EDIT PLUGGABLE DATABASE <pdb-name> SET STATE-APPLY-ON).

   However, if you want to downgrade to Oracle Database Versions prior to 21.7 when Data Guard for Pluggable Database has been configured in 26ai, you must first remove the Data Guard for Pluggable Database setup. This is because releases prior to Oracle Database Versions 21.7 do not support this feature. The steps to follow to downgrade in this case are:

   a. Remove all pluggable databases that are in the physical standby role at both the databases.
   b. Remove the remote configurations from both databases/configurations.
   c. Downgrade the Oracle Database software to the prior Oracle release. See the Oracle Database documentation that is appropriate for your operating system.

   Note that in this case, you will no longer have any Data Guard protection, either at the Pluggable Database level, or at the Container level. Although Data Guard at the Pluggable Database level is not available in these earlier releases, Data Guard protection is still possible at the container level.

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Glossary

apply instance

In an Oracle Real Application Clusters (Oracle RAC) databases environment, the apply instance is the one instance applying archived redo data to a standby database.

broker

A distributed management framework that automates and simplifies most of the complex operations required to create, control, and monitor an Oracle Data Guard configuration.

broker configuration

A logical grouping of the primary and standby databases (including redo transport services and log apply services) of an Oracle Data Guard configuration.

See also Data Guard configuration.

bystander standby database

A standby database that is not the target of, or directly involved in, a switchover or failover operation.

configuration object

A named collection of database objects. It is an abstraction of an Oracle Data Guard configuration.

database guard

The database guard controls whether or not modifications can be made to the tables in a logical standby database.

database object

A named object that corresponds to a primary or standby database in an Oracle Data Guard configuration. The broker uses this object to manage and control the state of a single database and to associate properties with the database.

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Data Guard command-line interface

The Oracle Data Guard command-line interface (DGMGRL) enables you to control and monitor an Oracle Data Guard configuration from the DGMGRL prompt or within scripts.

Data Guard configuration

A distributed computing system that prevents or minimizes losses due to unplanned events (for example, human errors, environmental disasters, or data corruption) as well as to planned downtime (such as for routine maintenance tasks).

See also broker configuration.

Data Guard environment

The physical configuration of the primary, standby databases, and far sync instances. The environment depends on many factors, including the:

- Number of standby databases and far sync instances associated with a primary database
- Number of host systems used by the databases
- Directory structures of the machines used by the databases
- Network configuration
- Redo transport services
- Log apply services

The Oracle Data Guard environment can be managed manually by a DBA, automatically using Enterprise Manager or the Data Guard command-line interface (DGMGRL) or a combination of all of these.

Data Guard for Container Databases (DG CDB)

Data Guard for Container Databases (DG CDB) protects the whole primary database. A role change converts the whole database from a primary database to a standby database. The standby database includes all the pluggable databases (PDBs) within the primary database. One or more physical or logical standby databases are deployed to protect the redo stream of the primary database.

See Overview of Broker Configurations.

Data Guard for Pluggable Databases (DG PDB)

Data Guard for Pluggable Databases Protects one or more PDBs in a primary database. The destination for redo data is another primary database, referred to as a target database. When there is a failure in a protected PDB, the broker can switchover or failover to the corresponding PDB in the target database.

See Overview of Broker Configurations.

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default state

The initial runtime state in which the database object will run when you enable broker management of the configuration. The actual default state can vary depending on the role (primary or standby) in which the database is running.

See also intended state.

failover

Failover changes a standby database into the role of a primary database and disables the old primary database.

See also fast-start failover and manual failover.

far sync instance

A remote Oracle Data Guard destination that accepts redo from the primary database and redistributes that redo throughout the Oracle Data Guard configuration. It is similar to a physical standby database in that it manages a control file, receives redo into Standby Redo Logs (SRLs), and archives those SRLs to local Archived Redo Logs (ARLs). But unlike a standby database, a far sync instance does not manage data files, cannot be opened for access, and cannot run redo apply.

fast-start failover

Enables a failover *automatically* when the primary database becomes unavailable. When fast-start failover is enabled, the broker determines if a failover is necessary and automatically, quickly, and reliably fails over to a designated standby without requiring that you perform any manual steps to invoke the failover.

See also manual failover.

instance object

A named object; a database object is a collection of one or more named instance objects. The broker uses this object to manage and control the state of the database with which the instance is associated, and to associate instance-specific properties with this instance of the database.

intended state

The runtime state of a database object while it is enabled for management by the broker.

See also default state.

lights out computing

Refers to computing equipment or software whose operations are automated, requiring little to no intervention by human administrators.

The term "lights out" originated from when computing centers were located in one room and contained a number of servers that were kept under lock and key and in the dark. Under

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normal operation, the room was not entered by human administrators, and all operations in the room were automated.

logical standby database

A logical standby database takes standard Oracle archived redo log files, transforms them back into SQL transactions, and then applies them to an open standby database. Although changes can be applied concurrently with end-user access, the tables being maintained through regenerated SQL transactions allow read-only access to users of the logical standby database. Because the database is open to allow application of reconstructed SQL transactions, it is physically different from the primary database. The database tables can have different indexes and physical characteristics from their primary database peers, but the tables must maintain logical consistency from an application access perspective, to fulfill their role as a standby data source.

manual failover

A failover that is initiated by the DBA who first determines a failover is necessary and then invokes one by clicking `FAILOVER` in Enterprise Manager or by issuing the DGMGRL `FAILOVER` command. The word *manual* is used to contrast this type of failover with a fast-start failover.

See also fast-start failover.

observer

A DGMGRL client that continuously monitors the primary and target standby databases, evaluates whether failover is necessary, and initiates a fast-start failover when conditions warrant.

physical standby database

A physical standby database is an exact copy of a primary database. While the primary database is open and active, a physical standby database uses Redo Apply to apply redo data received from the primary database. Redo Apply can run on a physical standby database instance that is mounted. If a license for the Oracle Active Data Guard option has been purchased, Redo Apply can also run on a physical standby database instance that is open. See *Oracle Data Guard Concepts and Administration* for more details.

primary database

A production database from which one or more standby databases is created and maintained. Every standby database is associated with one and only one primary database. A single primary database can, however, support multiple standby databases. The Oracle Data Guard broker monitor (DMON) maintains the master copy of the binary configuration file with the primary database, ensuring that each standby database's copy of the file is kept up to date as changes are made.

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The broker refers to this database using the value in the `DB_UNIQUE_NAME` initialization parameter which is defined to be globally unique.

read-only mode

A mode in which a database can be opened that allows queries, but disallows modifications.

A physical standby database can be opened read-only so that queries may be performed. If a license for the Oracle Active Data Guard option has been purchased, a physical standby database can be open while Redo Apply is active. This capability is known as real-time query. See *Oracle Data Guard Concepts and Administration* for more details.

Redo Apply

A physical standby database is kept synchronized with the primary database through Redo Apply, which recovers the redo data received from the primary database and applies the redo to the physical standby database.

reinstatement

Reinstatement is the process of turning a database, including the old primary database, that had been disabled after a failover operation into a viable standby database for the new primary database. Flashback database must be enabled on a database in order to reinstate it.

snapshot standby database

A snapshot standby is a fully updatable standby database that is created from a physical standby database. On snapshot standby databases, redo data is received but not applied until the snapshot standby database is converted back to a physical standby database.

SQL Apply

A logical standby database is kept synchronized with the primary database through SQL Apply, which transforms the data in the redo received from the primary database into SQL statements and then executes the SQL statements on the standby database.

standby database

A copy of a primary database created using a backup of your primary database. Standby databases are kept synchronized with the primary database by applying archived redo data over time from the primary database to each standby database. The standby database can take over processing from the primary database, providing nearly continuous database availability. A standby database has its own server parameter file, control file, and data files. It also has a copy of the broker's configuration file, kept up to date at the direction of the DMON process running in the primary database instance.

The broker refers to a standby database by its globally unique name that is stored in its `DB_UNIQUE_NAME` initialization parameter.

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See also logical standby database, physical standby database and snapshot standby database.

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