Oracle® Site Guard

Administrator's Guide

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Oracle Site Guard Administrator's Guide, Release 13.1.1.0

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Preface

The Oracle Site Guard guide introduces you to the Oracle Fusion Middleware Disaster Recovery solution offered by Oracle Enterprise Manager Cloud Control (Cloud Control), and describes in detail how you can use the product to manage sites to manage your data center.

Audience

This guide is primarily meant for administrators who want to use Oracle Site Guard features offered by Cloud Control to meet their Oracle Fusion Middleware disaster-recovery solution. As an administrator, you can be either a Designer, who performs the role of a system administrator and does critical data center operations, or an Operator, who runs the default as well as custom deployment procedures, patch plans, and patch templates to manage the enterprise configuration.

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Related Documents

For more information, see the following documents in the Oracle Other Product One Release 7.0 documentation set or in the Oracle Other Product Two Release 6.1 documentation set:

- *Oracle Fusion Middleware Disaster Recovery Guide*
- *Oracle Fusion Middleware High Availability Guide*
- *Oracle Data Guard Broker*
- *Automating Disaster Recovery Using Oracle Site Guard for Oracle Exalogic*
- *Oracle Enterprise Manager Lifecycle Management Administrator's Guide*
- *Oracle Enterprise Manager Command Line Interface Guide*

Conventions

The following text conventions are used in this document:

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

1

Introduction to Oracle Site Guard

This chapter provides describes the benefits of using Oracle Site Guard as a disaster-recovery solution, and the new features in this an previous releases.

This chapter includes the following sections:

1.1 What is Oracle Site Guard

Oracle Site Guard is a disaster-recovery solution that enables administrators to automate complete site switchover or failover.

Oracle Site Guard orchestrates the coordinated failover of Oracle Fusion Middleware, Oracle Fusion Applications, and Oracle Databases. It is also extensible to include other data center software components.

Oracle Site Guard integrates with underlying replication mechanisms that synchronize primary and standby environments and protect mission critical data. It comes with a built-in support for Oracle Data Guard for Oracle database, and Oracle Sun ZFS. Oracle Site Guard can also support other storage replication technologies.

1.2 Benefits of Oracle Site Guard

Oracle Site Guard offers the following benefits:

Minimizes disaster-recovery time

Oracle Site Guard operates at the site level, and therefore eliminates the need to tediously perform manual disaster recovery for individual site components like applications, middleware, databases, and so on. The traffic of an entire production site can be redirected to a standby site in a single operation.

Reduces human errors

Disaster recovery involves a complicated orchestration of many precise, interdependent procedures. Oracle Site Guard automates and sequences these procedures to provide fast and seamless disaster-recovery operations across sites without any human interaction.

Flexible and customizable

Oracle Site Guard can be adapted for use in any enterprise deployment by customizing and tuning disaster-recovery plans. Oracle Site Guard provides mechanisms for customizing operations and handling errors.

Eliminates the need for special skills

Oracle Site Guard operators and administrators do not require any special skills or domain expertise in areas like databases, applications, and storage replication. Oracle Site Guard can continuously monitor disaster-recovery readiness and it can do this without disrupting the production site.

1.3 What's New in this Guide

The following sections list the main features introduced in this and previous Oracle Site Guard releases:

- What's New in Release 13.1.1.0.0
- What's New in Release 12.1.0.7.0

1.3.1 What's New in Release 13.1.1.0.0

The following new features are available with Oracle Site Guard release 13.1.1.0:

Standby Site Validation

Convert your Standby site to a fully functional site in order to validate and test the site in preparation for a disaster recovery event. Increase your confidence in your disaster recovery plans and procedures.

Create Execution Groups

Create execution groups to customize the sequence in which you want to handle targets in your operation plan. Execution groups contain targets which are handled in parallel within the group. Use this feature to orchestrate the parallel and serial aspects of your disaster recovery plan.

Customize Step-level Timeouts for Operation Plans

Customize the timeout for each step in an operation plan based on the needs of your DR environment.

Database Disaster Recovery Enhancements

- Enable diagnostic tracing at the Data Guard level for database switchover and failover
- Configure immediate failover of databases at the Data Guard level
- Ignore warnings and force a database failover

Support for Multi-Tenant Databases

Protect multi-tenant databases in your enterprise.

ZFS Disaster Recovery Enhancements

Configure ZFS disaster recovery to use ZFS public or singleton interfaces instead of private interfaces. Leverage ZFS clustering to provide a more resilient disaster recovery plan.

Detect and Analyze ZFS Replication Lags

Analyze ZFS Replication Lags. Use bundled scripts to analyze lags in ZFS replication configurations before and during execution of disaster recovery plans.

Assign Tags to Operation Plans

Assign one or more tags to operation plans and use combinations of these tags to filter and display your operation plans. Use this feature to search, organize, and catalog, your operation plans.

Customize Database and Storage Disaster Recovery Stages

Customize Site Guard operation plans to perform Database or Storage Disaster Recovery actions at any stage of your plan.

Support for NetApp MetroCluster Storage Deployments

For details, see MOS note in Oracle Site Guard Feature For NetApp MetroCluster (Doc ID 1964220) at https://support.oracle.com.

1.3.2 What's New in Release 12.1.0.7.0

The following new features are available with Oracle Site Guard release 12.1.0.7.0:

Customize Prechecks

Enhance the Prechecks and Health Checks performed by Oracle Site Guard by adding your own Custom Precheck scripts. Use this feature to customize and improve the Prechecks and Health Checks that precede any operation plan.

Add User Scripts to Oracle Enterprise Manager's Software Library

Add your own scripts to Oracle Enterprise Manager's software library and use them in Oracle Site Guard work flows. This leverages the ability of Oracle Site Guard to automatically deploy the scripts at runtime, thereby eliminating the need to manually pre-deploy your scripts on the hosts where they need to run.

Configure Custom Credentials for Script Execution

Configure an alternate set of credentials for executing any configured script. This allows you to execute scripts using credentials that are different than the credentials configured for the script host.

Provide Credentials as Parameters to Scripts

Provide one or more credentials as parameters for configured scripts. This allows you to securely pass credentials to any configured script when the script needs to perform additional authentication functions.

Stop the Primary Site during a Failover Operation

Configure Oracle Site Guard to optionally stop the primary site during a failover operation. Oracle Site Guard attempts to stop the primary site components on best effort basis before failing over to the standby site.

Clone Operation Plans

Using the **Create Like** feature, create a new operation plan by cloning existing plans. This saves time during configuration, especially when the new operation plan is very similar to an existing plan or script.

Clone Configured Scripts

Using the **Create Like** feature, configure a new script by cloning an existing script configuration. This saves time during configuration, especially when the new script configuration is very similar to an existing script configuration.

Support for Oracle Fusion Middleware 12c

Protect your Oracle Fusion Middleware 12*c* deployment with Oracle Site Guard.

Support for Oracle Database 12c

Protect your Oracle Database 12*c* deployment with Oracle Site Guard.

2

Understanding Oracle Site Guard Concepts

This chapter introduces Oracle Site Guard terminology and the architecture of a site in an Enterprise Manager Cloud Control Console, and it provides an overview of the workflow of the different operations that Oracle Site Guard performs.

This chapter incudes the following sections:

2.1 Oracle Site Guard Terminology

The following terms are used throughout this document:

- **Target**

  Targets are core Enterprise Manager entities that represent the infrastructure and business components in an enterprise. These components need to be monitored and managed for efficient functioning of the business. An example of a target is an Oracle Fusion Middleware farm or an Oracle Database Instance. Oracle Site Guard disaster-recovery operations are designed to protect one or more targets at a site.

- **Site**

  A logical grouping of related entities in a data center. For example, software components in a Web tier, the Middleware tier, and Database tier, along with associated storage may all together comprise a Site. Oracle Site Guard performs disaster-recovery operations on a Site. A datacenter may have more than one Site defined by Oracle Site Guard and each of them can be managed independently for disaster-recovery operations.

- **Primary Site**

  The site currently hosting the active application (a set of targets) that Oracle Site Guard is configured to protect. The Primary Site is also referred to as the Production Site.

- **Standby Site**

  The site that is intended to host the protected application (a set of targets) in the event of a disaster-recovery operation.

- **Role**

  The current designation of a site. The role can be either Primary or Standby.

- **Switchover**

  The process of reversing the roles of the production site and standby site is termed as a *switchover*. Switchovers are planned operations done for periodic validation or to perform planned maintenance on the current production site. During a switchover, the current standby site becomes the new production site, and the current production site becomes the new standby site.

- **Failover**

  The process of making the current standby site the new production site after the production site becomes unexpectedly unavailable (for example, due to a disaster at the production site), is termed as a *failover*.

- **Open For Validation**

  The process of converting (opening) the current standby site into a fully functional site in order to test and validate operations at the standby site. When a site is opened for validation, it is not available as a standby site.

- **Revert to Standby**

  The process of reverting (closing) a site that has been opened for validation back to a standby site so that it is available as a standby site in disaster recovery operations.

- **Operation Plan**

  An operation plan contains the flow of execution for a particular Oracle Site Guard operation. It defines the order in which the steps of a disaster-recovery operation should be executed, in addition to other attributes, such as serial, parallel, and so on.

- **Prechecks**

  Prechecks are a pre-ordered set of checks that determine whether an operation plan is compliant with the environment it is supposed to protect. Prechecks are used to assess disaster-recovery readiness, and are performed on demand.

- **Health Checks**

  A pre-ordered set of checks, health checks can be programmed to run periodically based on a user-defined schedule. Health checks are used to maintain an ongoing assessment of disaster-recovery readiness.

- **Custom Precheck Scripts**

  Custom Precheck scripts are user-defined scripts that are executed as part of the Precheck procedure for an Oracle Site Guard operation plan. The number of Precheck Scripts and the sequence of their execution can be defined as part of an operation plan.

- **Pre Script**s

  Pre scripts are site-specific, user-defined scripts that are executed at a site at the beginning of an Oracle Site Guard operation. The number of Pre Scripts and the sequence of their execution can be defined as part of an operation plan.

- **Post Script**s

  Post scripts are site-specific, user-defined scripts that are executed at a site at the end of an Oracle Site Guard operation. The number of Post Scripts and the sequence of their execution can be defined as part of an operation plan.

- **Global Pre Scripts**

Global Pre Scripts are operation-specific, user-defined scripts that are executed at the beginning of an Oracle Site Guard operation plan. The number of Global Pre Scripts and the sequence of their execution can be defined as part of an operation plan.

- **Global Post Scripts**

  Global Post Scripts are operation-specific, user-defined scripts that are executed at the end of an Oracle Site Guard operation plan. The number of Global Post Scripts and the sequence of their execution can be defined as part of an operation plan.

- **Execution Groups**

  Operation plan "Execution Groups" extend Site Guard's functionality for buckets (operation plan groups) whose Execution Mode setting is "parallel". Operation plan steps in the same execution group execute in parallel, but finish execution before any operation steps in a subsequently numbered execution group begin execution.

- **Tags**

  A tag is a user-defined alphanumeric string that can be associated with an operation plan. Tags can be used to search for operation plans that match one or more specified tags.

- **Super Administrator**

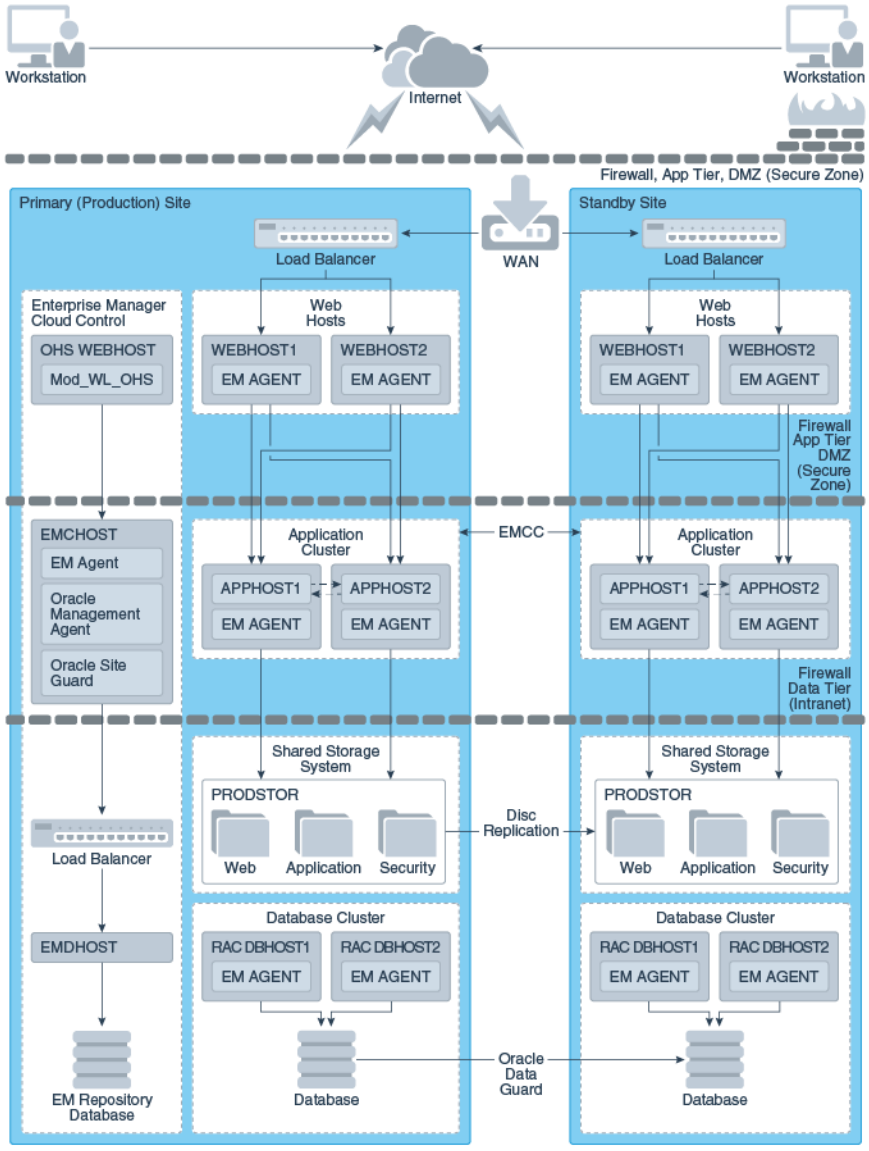
  A super administrator is a privileged user who has access to all Enterprise Manager targets, and to all Oracle Site Guard configurations, operations, and activities.

2.2 Representation of a Site in Enterprise Manager Cloud Control Console

A site is a logical grouping of software components and associated hardware that run one or more user applications. For example, a site could consist of a collection of servers (hosts) that are used to deploy Oracle Fusion Middleware instances, Oracle Fusion Application instances, Oracle databases, along with the associated storage for these software components. Oracle Site Guard uses the Enterprise Manager Cloud Control generic system target to represent a site. Every site, whether primary or standby, is represented as a **Generic System**, which is a collection of other target types, such as Oracle Database and Oracle Fusion Middleware Domain. Oracle Site Guard only supports Enterprise Manager deployments where both primary and standby sites are managed by the same Enterprise Manager Cloud Control deployment.

Figure 2–1 shows an overview of an Oracle Fusion Middleware Disaster Recovery topology managed by the same Enterprise Manager Cloud Control deployment.

Figure 2–1 Primary (Production) and Standby Site for Oracle Fusion Middleware Disaster Recovery Topology Managed by Enterprise Manager Cloud Control



The main aspects of the Oracle Fusion Middleware Disaster Recovery topology are as follows:

- A single Enterprise Manager Cloud Control monitors the primary site and the standby site.
- Oracle Management Agent (EM Agent) is installed on local (non-replicated) storage on all hosts on the primary site and the standby site.

  For example:

  - Web Tier managed system components (`WEBHOST1` and `WEBHOST2`)
  - Oracle Fusion Middleware Applications (`APPHOST1` and `APPHOST2`)
  - Oracle RAC Database (`RAC DBHOST1` and `RAC DBHOST2`)

Oracle Management Agent (EM Agent) is one of the core components of Enterprise Manager Cloud Control that enables you to convert an unmanaged host to a managed host in the Enterprise Manager system. The Management Agent works in conjunction with Enterprise Manager plug-ins to manage the targets running on that managed host.

2.3 Oracle Site Guard Features

The following sections describe the main Oracle Site Guard features:

- Extensibility
- Prechecks and Health Checks
- Storage Integration
- Standby Site Validation
- Creating Execution Groups
- Monitoring Executions and Managing Errors
- Credential Management
- Role-Based Access Control
- Software Library Integration
- Custom Credentials for Script Execution
- Passing Credentials as Script Parameters

2.3.1 Extensibility

Oracle Site Guard provides the ability to extend the built-in disaster-recovery functionality by allowing you to insert custom scripts at specific points in the operation workflow. This provides a mechanism for performing customized, site-specific, or operation-specific activities during a disaster-recovery operation.

Any number of scripts can be configured for extensibility. The time and manner in which these user-defined scripts are executed and the sequence in which they are executed can be configured by selecting the script type.

This section contains the following topics:

- Types of Scripts for Extensibility
- Sequence of Script Execution
- Configuring Script Path

2.3.1.1 Types of Scripts for Extensibility

For customizing and extending Oracle Site Guard functionality, the following types of scripts are available:

- Custom Precheck Scripts
- Pre Scripts
- Post Scripts
- Global Pre Scripts
- Global Post Scripts

- Mount/Unmount Scripts
- Storage Scripts

Custom Precheck Scripts

These scripts are provided by the user. They are used to perform user-defined activities during the Precheck or Health Check phase that occurs before an operation plan executes. Custom Precheck Scripts are executed as part of a Precheck or Health Check.

Pre Scripts

These scripts are provided by the user. They are used to perform user-defined activities at the beginning of site-specific operations in an operation plan. Pre Scripts are executed before Oracle Site Guard performs any target-related operations at a site.

Post Scripts

These scripts are provided by the user. They are used to perform user-defined activities at the end of site-specific operations in an operation plan. Post scripts are executed after Oracle Site Guard performs any target-related operation at a site.

Global Pre Scripts

These scripts are provided by the user. They are used to perform user-defined operation-specific activities at the beginning of an operation plan. Global Pre Scripts are executed before Oracle Site Guard begins any operation at the first site (usually the primary site).

Global Post Scripts

These scripts are provided by the user. They are used to perform user-defined operation-specific activities at the end of an operation plan. Global Post Scripts are executed after Oracle Site Guard has completed performing operations on the last site (usually a standby site).

Mount/Unmount Scripts

These scripts are bundled with Oracle Site Guard, but you can also define your own scripts. They are used to perform mount and un-mount operations on file systems during an operation. Unmount scripts are executed after all services and applications have been stopped at the primary site. Mount scripts are executed before any services or applications are started at the standby site.

Storage Scripts

These scripts are bundled with Oracle Site Guard, but you can also define your own storage scripts. They are used to perform storage role-reversal activities for Oracle Sun ZFS Appliance during a disaster-recovery operation. Storage Switchover scripts are executed during a switchover operation and they execute at the standby site before any mount scripts are executed. Storage Failover scripts are executed during a failover operation and they execute at the standby site before any mount scripts are executed.

Table 2–1 provides an overview of the various types of scripts used when you set up sites with Oracle Site Guard.

Figure 2–2 and Figure 2–3 provide a visual representation of the source of the scripts and their functions.

Table 2–1 Types of Scripts Used by Oracle Site Guard

Type of Script	Provided by the User? (Custom Scripts)	Provided with Oracle Site Guard? (Bundled Scripts)
Custom Precheck Script	Yes (optional)	No
Pre Script, Post Script, Global Pre Script, Global Post Script	Yes (optional)	No
Mount and Unmount Scripts	Yes (optional)	Yes.; must be configured by user.
Storage Switchover and Storage Failover Scripts	Yes (optional)	Yes; only for Oracle Sun ZFS and NetApp MetroCluster. To be configured by user.)

Figure 2–2 Oracle Site Guard Scripts: What They Do

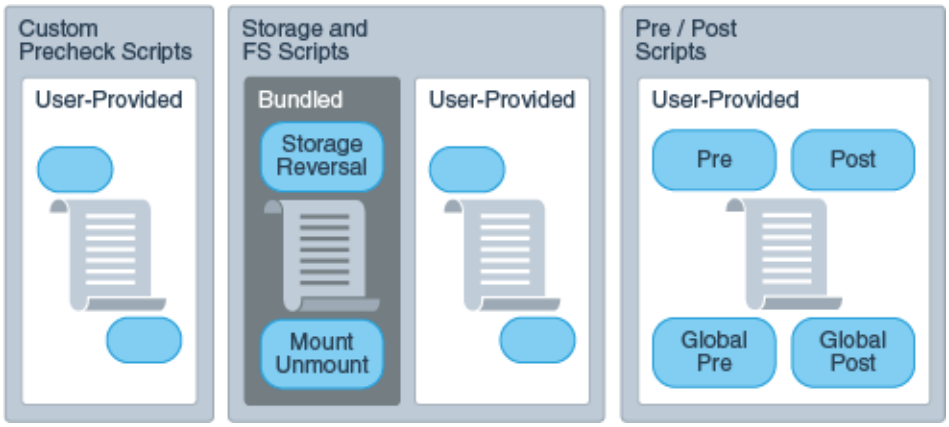
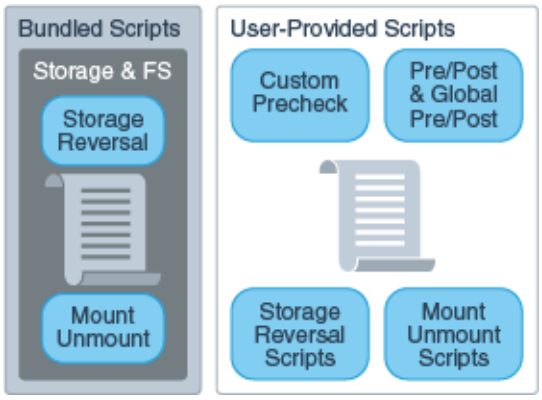


Figure 2–3 Oracle Site Guard Scripts: Who Provides Them

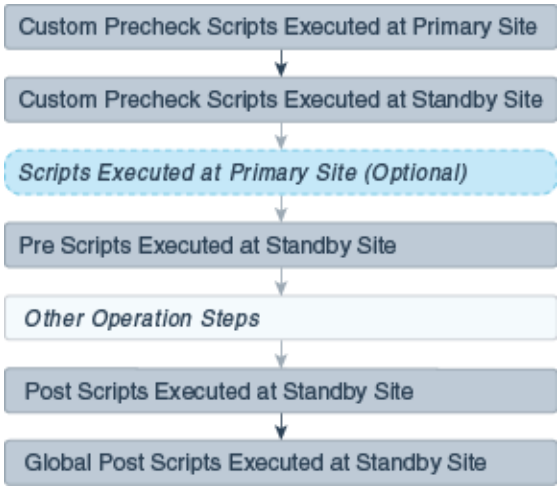


2.3.1.2 Sequence of Script Execution

Figure 2–4, Figure 2–5, and Figure 2–6 show the sequence in which Oracle Site Guard executes various types of user-defined scripts for different operations.

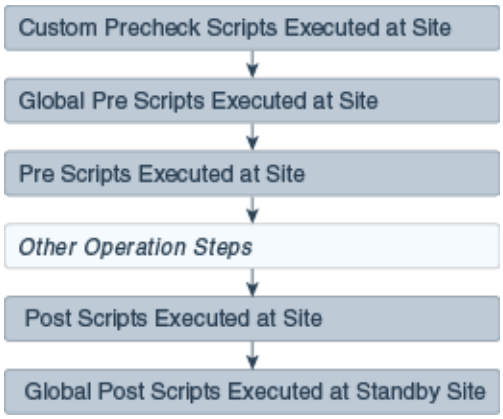
Figure 2–4 Executing Sequence of Scripts for Switchover Operation

Figure 2–5 Execution Sequence of Scripts for Failover Operation



Note: The optional scripts that are executed at the Primary site during a failover, are the same as that executed at the Primary site during a switchover operation. The scripts at the primary site are only executed as part of the failover operation if the user chooses to stop the Primary site during the failover.

Figure 2–6 Execution Sequence of Scripts for Start or Stop Operation



Note: Custom Precheck scripts are scheduled to run on the Primary site for a Failover operation. But, since the Primary site might be inaccessible or non-operational, these scripts are set to run with a **Continue on Error** mode.

2.3.1.3 Configuring Script Path

Depending on the type of script and the desired runtime behavior, you must configure the path of the script with the appropriate format. Oracle Site Guard determines the location (path) of the script using the configuration path and type of script provided by the user. Table 2–2 shows examples of how to configure the various types of scripts, the corresponding script path that the user needs to specify, and the component that is extracted and used by Oracle Site Guard. Script path formats, other than those listed in the following tables are not supported.

Table 2–2 Script Paths in Enterprise Manager Software Library

Script Type	User Configured Path	Script Path Extracted by Oracle Site Guard
Shell script	`sh swlib_script.sh`	`swlib_script.sh`
	`sh ./swlib_script.sh`	
	`sh ./swlib_script.sh -`	
	`sh ./swlib_script.sh -option1 -option2`	
	`/home/bash swlib_script.sh`	
	`/home/bash swlib_script.sh -a param1 -b param2`	
Perl script	`perl swlib_script.pl`	`swlib_script.pl`
	`perl swlib_script.pl -a param1 -b param2`	
	`/home/perl swlib_script.pl`	
	`/home/perl swlib_script.pl -a param1 -b param2`	
Python script	`python swlib_script.py`	`swlib_script.py`
	`python swlib_script.py -a param1 -b param2`	
	`/home/python swlib_script.py`	
	`/home/python swlib_script.py -a param1 -b param2`	

Table 2–3 Script Paths in Custom Scripts

Script Type	User Configured Path	Script Path Extracted by Oracle Site Guard
Shell script	`sh /home/oracle/custom_script.sh`	`/home/oracle/custom_script.sh`
	`/home/oracle/custom_script.sh`	
	`/home/bash /home/oracle/custom_script.sh`	
	`/home/bash /home/oracle/custom_script.sh -a param1 -b param2`	
	`/home/bash /home/oracle/custom_script`	
	`/home/oracle/custom_script`	`/home/oracle/custom_script`
Perl script	`perl /home/oracle/custom_script.pl`	`/home/oracle/custom_script.pl`
	`/home/perl /home/oracle/custom_script.pl -a param1 -b param2`	
Python script	`/home/python /home/oracle/custom_script.py`	`/home/oracle/custom_script.py`
	`/home/python /home/oracle/custom_script.py -a param1 -b param2`	

2.3.2 Prechecks and Health Checks

The success of a disaster-recovery plan depends on how accurately the plan represents the environment it is supposed to protect. Topology changes and configuration drift in the protected site can cause the disaster-recovery operation plan to lose synchronization with the environment, and can render the plan partially or completely ineffective. Frequently, this divergence, between the disaster-recovery plan and the environment being protected, is not discovered until an actual disaster-recovery attempt is in progress. It is also very important to ensure that the standby site is ready to perform the production role, before initiating any disaster recovery operation.

Oracle Site Guard provides a solution to this problem with the Precheck and Health Check features.

2.3.2.1 Prechecks

A Precheck provides a convenient and fully automated mechanism for assessing disaster-recovery readiness on demand. A Precheck can be executed by itself (stand-alone mode) to check if a selected operation plan will succeed. It can also be invoked before an operation plan is executed. In the latter case, if the Precheck fails, the operation plan is not executed. Prechecks invoked before an operation plan are optional and can be skipped if desired.

2.3.2.2 Health Checks

Health Checks are a special category of Prechecks. They are Prechecks that can be scheduled to run periodically. Thus, health checks provide a mechanism to perform an ongoing assessment of disaster-recovery readiness.

A health check must be configured for a specified operation plan and must have a user-specified schedule associated with it.

For example, you might set up a health check associated with the `Switchover to Standby Site` plan to run every Wednesday and Saturday at 12:30 am to monitor the fidelity of that operation plan on an ongoing basis. You can also choose to be notified of health check results through e-mail.

Each configured operation plan can have an associated health check, and health checks for different plans execute independent of each other. You can stop health checks for an operation plan at any time

Oracle Site Guard performs the following checks during Prechecks and Health Checks:

- Checks whether all the hosts involved in the planned disaster-recovery operation are reachable. During this check, Oracle Site Guard logs into each host using the credentials configured for that host. This ensures that the host is reachable and can be accessed for executing directives and scripts.
- Checks whether the primary and standby databases are configured correctly and Data Guard protection is functioning correctly. This check verifies the following:
  - The primary and standby database names are correct.
  - The database login credentials are correct.
  - Data Guard broker is ready to switchover the database.
  - Database Flashback status is set to **ON**.
  - Data Guard Redo and Transport Lags are within the limits specified by the user.
- Checks whether the ZFS storage replication is functioning correctly. This check verifies the following:
  - The replication lags are within the limits specified by the user.
  - The source and destination ZFS appliances are reachable.
  - The login credentials are valid.
  - The replication action is configured correctly.
- Checks whether user scripts are configured correctly by verifying whether each configured user script is found at the correct location.
- Checks whether replicated file systems can be mounted during a switchover or failover. To confirm this, the check verifies that the file system mount points exist and can be accessed for mount operations.
- Checks whether the Data Guard and ZFS replication lag checks are within the bounds specified by the user.

Note: An associated Precheck is automatically created for every operation plan that is created. However, a health check must be explicitly scheduled for an operation plan.

2.3.2.3 Customizing Prechecks and Health Checks

The Precheck process can be customized by adding custom (user-defined) scripts that will execute as part of the Precheck, and also as part of any Health Checks that are then scheduled. This allows users to enhance the Precheck and Health Check capabilities of Oracle Site Guard by adding Prechecks for third-party components that need to be included in the disaster recovery workflow. Custom Precheck scripts function in the same way that built-in Prechecks function. If a user-defined Precheck script detects an anomaly and returns an error to Site Guard, that Precheck step is regarded as failed, and depending on how the Precheck script is configured (for example, if the script execution step is configured with the attribute **Stop on Error**), the disaster recovery operation may be aborted.

2.3.2.4 Lag Checks

Disaster Recovery configurations typically include one or more storage appliances and data stores that are used for data storage by the application and database tiers. To make this data available at the standby site in the event of disaster recovery, these data stores are replicated from the primary to standby site, using either continuous or periodic replication. To perform a successful site switchover or failover, Oracle Site Guard must also perform storage role reversal as part of the disaster-recovery process.

The efficiency and timeliness of the data replication between the primary and standby sites is highly variable and depends on many factors, including network bandwidth, congestion, latency, storage appliance load, amount of replicated data, and so on. It is not uncommon for a certain amount of lag to be present between the source data at the primary site and the replicated data at the standby site. Oracle Site Guard provides a mechanism to configure the amount of replication lag that is permissible before a disaster-recovery operation can begin execution. During the Precheck phase of a disaster-recovery operation, Oracle Site Guard checks the current replication lag. If the lag exceeds the user-specified threshold, Oracle Site Guard does not execute the disaster-recovery operation.

You can configure the following lag-check parameters:

Database Lag Check

This parameter specifies the permissible lag for Redo Apply and Redo Transport which is managed by Oracle Data Guard.

ZFS Lag Check

This parameter specifies the permissible lag for application-tier storage replication which is managed by ZFS.

2.3.3 Storage Integration

Storage-management operations are an essential part of disaster-recovery operations. During disaster recovery, storage replication direction must be reversed and storage appliances must be reconfigured before applications can be migrated to a standby site. Oracle Site Guard offers storage integration options for various storage technologies.

The following sections describe the Oracle Site Guard storage integration options:

- Oracle Sun ZFS
- NetApp MetroCluster
- Integrating Other Storage Types
- Mount and Unmount Scripts

2.3.3.1 Oracle Sun ZFS

Oracle Site Guard provides built-in integration capabilities for Oracle Sun ZFS storage. If you are deploying Oracle Sun ZFS storage appliances, you can use the bundled storage management `zfs_storage_role_reversal.sh` script to orchestrate Sun ZFS storage role reversal as part of Oracle Site Guard disaster-recovery operations.

2.3.3.2 NetApp MetroCluster

Oracle Site Guard provides built-in integration capabilities for NetApp MetroCluster storage. If you have deployed a NetApp MetroCluster Disaster Recovery configuration, you can use the bundled NetApp storage management `siteguard_netapp_control.sh` script to orchestrate NetApp MetroCluster storage role reversal as

part of Oracle Site Guard disaster-recovery operations. For details, see MOS note titled Oracle Site Guard Feature For NetApp MetroCluster (Doc ID 1964220) at https://support.oracle.com.

2.3.3.3 Integrating Other Storage Types

Oracle Site Guard offers integration capabilities for other storage technologies by providing a script integration framework that allows you to incorporate your own custom storage management scripts into Oracle Site Guard operation plans. You can implement storage role reversal for third-party storage technologies by invoking your own custom storage management scripts during the storage script execution phase of the operation plan execution.

2.3.3.4 Mount and Unmount Scripts

In addition to the capability for integrating storage management scripts, Oracle Site Guard also offers the capability for integrating user scripts for mounting and unmounting file systems. For example, during a switchover operation, file systems that are used by a multi-tier application are unmounted at the primary site after the application is stopped; and replicated versions of those file systems are then mounted at the standby site before the application is started. These unmount and mount operations for application servers at the primary and standby sites can be orchestrated using the built-in mechanism for integrating scripts. Oracle Site Guard provides the `mount_umount.sh` script for file system mount and unmount operations. Alternately, you can define your own custom script to be invoked at appropriate points in the operation plan.

2.3.4 Standby Site Validation

In a normal Site Guard disaster recovery configuration, the standby site is offline and unavailable for business operations. The Standby Site Validation feature allows you to convert your standby site into a fully functional site for testing and validation. To open a standby site for validation, configure and execute a *Open for Validation* type of operation plan for the site. After testing and validation are complete, you can revert the site back to a standby role by configuring and executing a *Revert to Standby* type of operation plan.

To open a standby site for validation, Oracle Site Guard performs the following steps:

- Converts the standby database from a physical standby database to a snapshot standby database. In this mode, the Data Guard redo logs are still shipped from the primary to the standby, but the logs are not applied to the standby database. The accumulated redo logs are applied after the database converts back to a physical standby database (after executing a Revert to Standby operation in Oracle Site Guard).
- Clones ZFS replicated projects that are part of this Site Guard configuration to create a readable and writable copy of the replicated project. The file systems in this cloned project are then mounted for use by applications at the standby site. While the cloned project is being read to or written from by applications at the standby site, the ZFS replication from the primary site to the standby site (that was originally configured) continues with no interruptions. When the opened for validation standby site is closed with a Revert to Standby operation, the cloned file systems are un-mounted and the ZFS clones that were created as part of the Open for Validation operation are destroyed.

- Executes all configured Global Prescripts and Global Postscripts, Prescripts and Postscripts, and Custom Precheck Scripts as they would be in any other operation plan.

When a standby site is opened for validation, the Recovery Point Objective (RPO) remains unaffected because database redo transport and ZFS storage replication continue uninterrupted as configured. No transaction data at the primary site is lost. However, the Recovery Time Objective (RTO) is affected because the standby site is not immediately available to accept an incoming switchover or failover. The standby site must first be reverted back to a (normal) Standby mode before the primary site can switchover or failover to the standby site.

The ability to open a standby site in validation mode offers the following benefits:

- It increases your confidence that the disaster recovery configuration is correct and provides a way to verify that the standby site can become operational and meets your expectations.
- It increases resource utilization by using standby sites for testing patches, validating new configurations, and generating analytics and reports.

Caution: Note the following important points regarding a standby site opened for validation:

- *A standby site that is opened for validation is not available as a disaster recovery site. It must be reverted back to a standby role (with Revert to Standby) before it can accept an incoming switchover or failover from the primary site.*
- *A standby site that is opened for validation must not be used for production activities (customer traffic) because any transactions that occur in the site will be discarded when the site reverts to a standby site.*

2.3.5 Creating Execution Groups

Site Guard operation plans consist of separate buckets for handling a common functional areas or target types when the plan executes; for example, all database instances for a site will be in a single bucket. Each of these buckets typically consists of one or more steps which process the target type or functionality for which that bucket is intended. Additionally, the *Execution Mode* of a bucket specifies whether the steps in a bucket should be executed in *Serial* or *Parallel*.

For example, a typical operation plan will contain separate buckets that contain all the steps for each of the following functional areas in a site:

- Shutting down all Oracle WebLogic Server domains
- Switching over all databases
- Executing all the Pre Scripts
- Executing all the Mount or Unmount scripts

Execution Groups provide the ability to customize the execution sequence of steps within a bucket when that bucket's execution mode is set to *Parallel*. This allows you to define a precise orchestration sequence within a bucket. For example, operation plan steps that are in Execution Group 3 will all execute in parallel only after all the steps in Execution Group 2 have finished execution. Similarly, Site Guard will ensure that all the operation plan steps in Execution Group 3 finish executing before any steps in Execution Group 4 are started. This allows you to place each operation plan step in a

given bucket in a specific group in order to determine when that operation plan step will be executed.

When you create an operation plan, Site Guard initially marks the Execution Mode for each bucket as Parallel, and will place all the steps in the bucket in Execution Group 1. However, you can edit the operation plan and customize the Execution Group for each step to determine its execution sequence.

> **Note:** *If a bucket has an Execution Mode of Serial, then Execution Groups become irrelevant because all the steps in that bucket will be executed sequentially. This is the equivalent of putting each step in its own execution group. Site Guard allows you to edit the operation plan and re-order the sequence of steps in a Serial execution bucket.*
>
> *When viewing or editing plans in the Site Guard UI, the Execution Group column is hidden by default.*
>
> *Custom pre checks can be placed into execution groups, however regular pre checks cannot and will always execute in parallel.*

2.3.6 Monitoring Executions and Managing Errors

When you execute an Oracle Site Guard operation plan, you can customize the plan before you execute it, monitor the execution of the plan, manage any errors you encounter during plan execution, and retry plan execution after making changes.

This section contains the following topics:

- Customizing Operations
- Monitoring Executions
- Operation Error Modes
- Retrying Failed Operations

2.3.6.1 Customizing Operations

Oracle Site Guard operation plans can be customized according to the topology and environment. Each step in an operation plan can be customized as follows:

- Specifying whether the step should be enabled or disabled for execution (disabled steps are skipped during execution)
- Moving the step to another point in the execution sequence (for example, changing the order of managed servers to be brought up within a domain group)
- Specifying how errors for a step need to be handled (that is, stopping or continuing the execution of an operation if an error is encountered)
- Specifying whether the steps of a given group need to be executed serially or in parallel (for example, attempting to start up all the managed servers at the same time (in parallel), in a given domain group)

2.3.6.2 Monitoring Executions

Oracle Site Guard disaster-recovery operations are executed as Oracle Enterprise Manager Deployment Procedures, and the results of each operation can be monitored on the Procedure Activity page in Oracle Enterprise Manager Cloud Control Console. The procedure activity screen for an Oracle Site Guard operation displays each operation plan as a hierarchy of steps with a graphical icon showing the result of each

step as it is executed. A check mark is displayed if the step succeeds, or a cross is displayed if the step fails.The icon, , indicates that the step was skipped and not configured for execution. This mechanism provides a visual summary of the progress of the operation plan.

When viewed in the Operation Activity page, the execution details for each operation plan or precheck are organized as a hierarchy of top-level steps with consequent sub-steps. Initially, only the top-level steps are visible to the user. The consequent sub-steps are collapsed and hidden within each top-level step. However, each top-level step in the operation activity can be further inspected in detail by clicking on the step to expand it, and navigating down into the hierarchy to select a constituent sub-step. The execution log for each sub-step can also be examined for additional details. This hierarchical organization of operation activity allows you to examine the results of the operation plan at any desired level of detail.

2.3.6.3 Operation Error Modes

Each step in an Oracle Site Guard operation plan has an error mode an associated with it, and it is configurable. This error mode defines how Oracle Site Guard handles any error that is encountered during the execution of that step.

The following error modes are available:

Stop on Error

This mode specifies that Oracle Site Guard should stop executing the operation plan if it encounters an error while executing the current step.

Continue on Error

This mode specifies that Oracle Site Guard should continue with the execution of the next step if it encounters an error while executing the current step.

2.3.6.4 Retrying Failed Operations

If Oracle Site Guard encounters an error during an operation and stops the operation, you can resolve the issue that caused the failure, and then retry the failed operation. Oracle Site Guard resumes execution of the failed operation at the step where the failure occurred. You can also ignore the failed step, by clicking **remove**, and retry the operation. In this case, Oracle Site Guard will ignore the failed step, and resume execution of the operation plan starting with the step immediately following the failed step.

2.3.6.5 Suspending and Resuming Operations

You can suspend the operation at any point in time, when an Oracle Site Guard operation is in progress. You can then resume the suspended operation and Oracle Site Guard will resume execution of the operation at the point where it was suspended. Additionally, you can also stop an operation that is currently in progress.

Note: Stopped operations cannot be resumed.

2.3.7 Credential Management

The following sections describe the comprehensive credential management framework that Oracle Site Guard offers:

- Enterprise Manager Credential Framework

- Oracle Site Guard Credential Configuration

2.3.7.1 Enterprise Manager Credential Framework

Oracle Enterprise Manager provides a comprehensive Credential Management framework to manage identities and ensure that access to Enterprise Manager targets is authorized and authenticated. Typically, you can set up Named Credentials in Enterprise Manager before configuring Oracle Site Guard to use these credentials. After the credentials are configured, Oracle Site Guard uses them to access all managed targets at protected sites.

Depending on the topology of the site, Oracle Site Guard may need to use Named Credentials for different targets such as hosts, Oracle Database instances, WebLogic Servers, and other target types. For information about setting up credentials in Enterprise Manager, see "Setting Up Credentials" in *Enterprise Manager Lifecycle Management Administrator's Guide*.

2.3.7.2 Oracle Site Guard Credential Configuration

After the required target credentials have been configured in Enterprise Manager's Credential Management framework, you can utilize these credentials during Oracle Site Guard's credential configuration process. Oracle Site Guard credential configuration requires that targets that are accessed and controlled by Oracle Site Guard for disaster-recovery operations, have valid credentials associated with the target. For information about setting up and associating credentials, see Section 4.4, "Creating Credential Associations".

2.3.8 Role-Based Access Control

Oracle Site Guard provides Role-Based Access Control (RBAC) with the User Accounts framework provided by Enterprise Manager. Enterprise Manager provides pre-configured roles for different areas or functions within Enterprise Manager. One of these administrator roles, `EM_SG_ADMINISTRATOR`, is customized for Oracle Site Guard-focused activities within Enterprise Manager. You can utilize this built-in role to create users focused on Oracle Site Guard administration tasks. Alternately, you can create your own customized roles and users that allow for greater flexibility in tuning role-based access to Oracle Site Guard functionality.

For information about setting up role-based access control, see Section 3.2.2, "Creating Oracle Site Guard Administrator Users".

2.3.9 Software Library Integration

Oracle Site Guard includes ready-to-use (bundled scripts) scripts for performing activities that are typically required while executing a disaster-recovery operation, such as switching over an Oracle Database, and starting or stopping an Oracle Weblogic Server. These scripts are included as part of the Enterprise Manager Software Library, and all required scripts are automatically deployed to the applicable hosts during operation execution. However, in addition to the bundled scripts, you may require other custom scripts to be automatically deployed and executed as part of an operation. Oracle Site Guard provides a mechanism for you to upload your own custom scripts to the Enterprise Manager Software Library and to add these scripts to your operation plan when you create the plan.

An additional advantage of using scripts that are part of the Enterprise Manager Software Library is that these scripts are automatically deployed to all configured script hosts at runtime. On the other hand, user scripts that are not part of the

Enterprise Manager Software Library must be manually deployed on each configured script host before the operation plan begins execution.

For more information about the various types of scripts that a user can add to the Enterprise Manager Software Library, see Section 2.3.1, "Extensibility."

2.3.10 Custom Credentials for Script Execution

User-defined scripts that are either externally deployed or deployed through the Software Library are typically executed using the credentials configured for the host on which the script will execute. These credentials are configured and maintained in the Enterprise Manager credential management framework, and are referred to as the **Host Normal Credentials** or **Host Privileged Credentials**. However, you can also add other sets of credentials to the credential repository and configure a script to execute with this alternate set of credentials. This is useful in cases where the script requires credential privileges that are different from the standard (Host Normal) or privileged (Host Privileged) credentials configured for the script host. For example, a script that must be executed with a specific user ID to shut down a server process on that host.

2.3.11 Passing Credentials as Script Parameters

User defined scripts frequently perform actions that require them to first authenticate with some other entity and they require one or more sets of credentials to perform this authentication. To avoid hard-coding credentials into the script or passing them insecurely as clear-text parameters to the script, Oracle Site Guard provides a mechanism to securely pass one or more sets of credentials to a configured script. These credentials are stored and maintained in a secure manner in Oracle Enterprise Manager's credential management framework. Once these credentials are configured and associated as parameters for the user script, Oracle Site Guard will encrypt and pass these credentials to the user script at execution time. The user script can then extract these credentials and use them for authentication.

For details about extracting encrypted credentials inside a user script, see Appendix A, "Passing Credentials as Parameters."

2.4 Oracle Site Guard Workflows

Oracle Site Guard workflows, also referred to as operations, are modeled as Enterprise Manager deployment procedures.

When there is a failure or planned outage of the primary site, Oracle Site Guard automates the following steps to enable the standby site to assume the production role in the topology:

1. Stops the services and applications running on the primary site, and unmounts the storage on the primary site.
2. Disables ongoing replication from primary site to standby site and performs role reversal.
3. Performs a failover or switchover of the Oracle Databases with Oracle Data Guard Broker.
4. Mounts the replicated storage (file systems) on the standby site.
5. Starts the services and applications on the standby site. At this point, the standby site assumes the production role.

Note: If continuous storage replication is not configured, Oracle recommends that you perform a final storage replication from the primary site to the standby site, before you initiate the Site Guard operation. However, if the primary site has failed, it may not be possible to perform this final replication.

Oracle Site Guard workflow can be monitored, suspended, resumed, and stopped, with Enterprise Manager's Procedure Management framework.

Oracle Site Guard provides the following distinct types of workflows for disaster-recovery operations:

- Switchover Workflow
- Failover Workflow
- Start Workflow
- Stop Workflow
- Open for Validation Workflow
- Revert to Standby Workflow

2.4.1 Switchover Workflow

The switchover workflow provides the ability to perform a controlled transition of the production activity from the primary site to a standby site. Figure 2–7 shows an example of the steps executed during a typical switchover operation.

Figure 2–7 Switchover Workflow

2.4.2 Failover Workflow

The failover workflow provides the ability to perform a forced transition of production activity to a standby site. When a failover operation is launched, Oracle Site Guard assumes that the primary site is unavailable, and starts all protected applications at the standby site. Figure 2–8 shows an example of the steps executed during a typical failover operation:

Figure 2–8 Failover Workflow

2.4.3 Start Workflow

The start workflow provides the ability to start production activities at a site. This workflow is typically used to bring up a site after maintenance, or to test whether the site can be started as part of testing a larger workflow such as a switchover. Figure 2–9 shows an example of the steps executed during a typical start operation.

Figure 2–9 Start Workflow

2.4.4 Stop Workflow

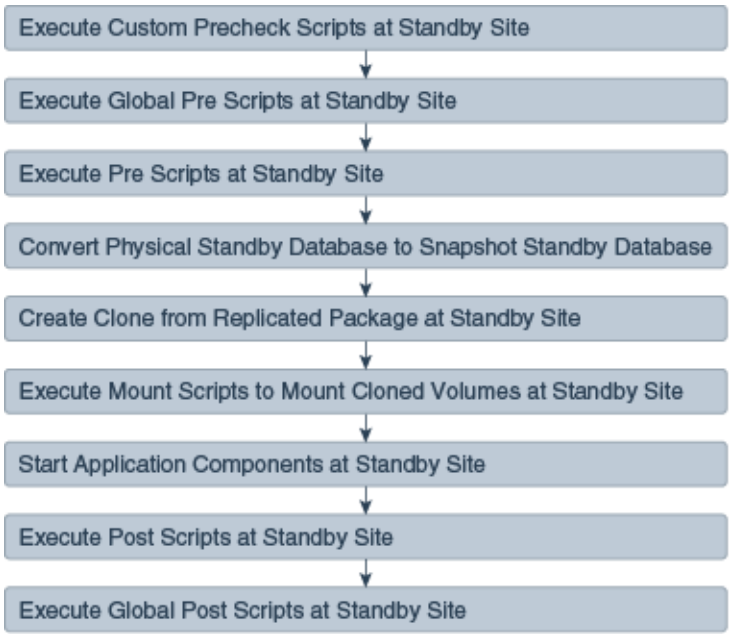
The stop workflow provides the ability to stop production activities at a site. This workflow is typically used to bring down a site for maintenance, or to test whether the site can be stopped as part of testing a larger workflow such as a switchover. Figure 2–10 shows an example of the steps executed during a typical stop operation.

Figure 2–10 Stop Workflow

2.4.5 Open for Validation Workflow

The Open for Validation workflow provides the ability to convert a standby site to a operational site. This workflow is typically used to convert a standby site to a functional site that can be used for validation and testing. Figure 2–11 shows an example of the steps executed during a typical Open for Validation operation.

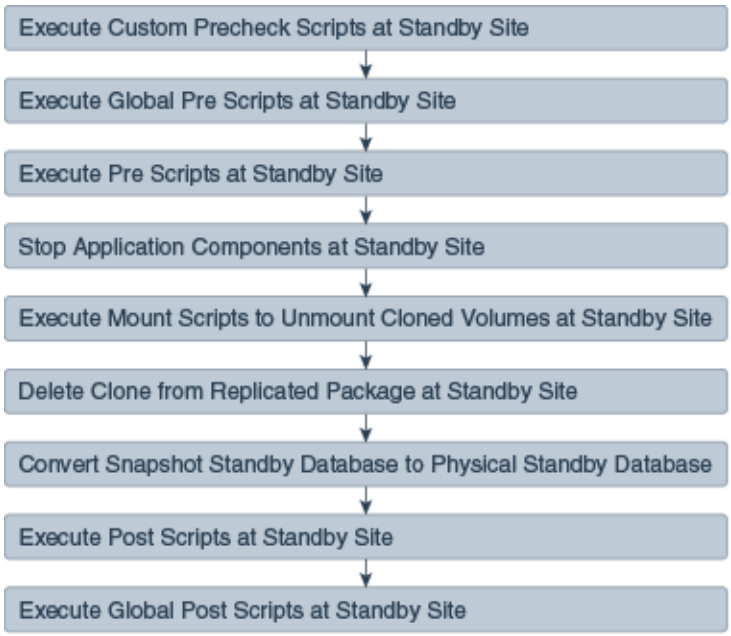
Figure 2–11 Open for Validation Workflow



2.4.6 Revert to Standby Workflow

The Revert to Standby workflow provides the ability to convert a site back to a standby site after you opened the site for validation. This workflow is typically used to convert a standby site that is has been opened for validation, back to a standby site so that it can be used for disaster recovery operations such as switchover or failover. Figure 2–12 shows an example of the steps executed during a typical Revert to Standby operation.

Figure 2–12 Revert to Standby Workflow



3

Installing and Preparing Oracle Site Guard

This chapter describes how to install Oracle Site Guard and how to prepare it for operation in an Enterprise Manager Cloud Control environment.

This chapter includes the following sections:

3.1 Installing Oracle Site Guard

Oracle Site Guard is included with Enterprise Manager Cloud Control 13cR1 Fusion Middleware Plugin 13.1.1.0.0.

You can manage an Oracle Site Guard configuration with Enterprise Manager Command-Line Interface (EMCLI), or with a compatible version of Oracle Enterprise Manager Cloud Control (Cloud Control).

To install Oracle Site Guard:

- Install Enterprise Manager Cloud Control 13cR1 Fusion Middleware Plugin 13.1.1.0.0 for your Oracle Fusion Middleware enterprise deployment. For information about installing Enterprise Manager Cloud Control 13cR1 Fusion Middleware Plugin 13.1.1.0.0, see *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

  Note: Ensure that you install Oracle Management Agent (Enterprise Manager Agent) on each of the hosts managed by Enterprise Manager, as described in "Installing Oracle Management Agent" in *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

- Install EMCLI, as described in *Oracle Enterprise Manager Command Line Interface Guide*.

  Note: Oracle recommends that you install EM CLI in the same Oracle home where Oracle Management Service is installed. For example, `OMS_HOME/bin/emcli`.

3.2 Preparing Oracle Site Guard for Operation

After installing Oracle Site Guard, complete the following pre-requisite tasks before beginning Oracle Site Guard Configuration:

- Discovering Targets on the Primary Site and the Standby Site
- Creating Oracle Site Guard Administrator Users
- Creating Primary and Standby Sites
- Creating Credentials
- Granting Credential Privileges to Oracle Site Guard Administrator Users
- Configuring Software Library Storage Location
- Verifying Database and Data Guard Configurations

3.2.1 Discovering Targets on the Primary Site and the Standby Site

As the first step towards getting started with Oracle Site Guard, you need to discover all the targets at the primary and standby sites that Oracle Site Guard will protect.

To discover targets at the primary and standby site, complete the steps described in "Discovering and Monitoring Targets" in the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

Discover the following target types in Oracle Enterprise Manager:

- Oracle Fusion Applications
- Oracle Fusion Middleware farm/ WebLogic Domain
- Oracle Fusion Middleware managed system components, such as Oracle HTTP Server and Oracle Internet Directory (part of the Oracle Fusion Middleware farm)
- Real Application Cluster (RAC) databases
- Single-instance database

A site should be up and running for its targets to be discovered. This means that the site would function as the production site. For a two-site deployment, the targets in the primary site should be discovered first, followed by the targets in the standby site. After you discover the targets in the primary site, you must manually perform a switchover operation, so that the standby site takes over the production role, as described in "Performing a Switchover" in *Oracle Fusion Middleware Disaster Recovery Guide*. Then you must discover the targets in the standby site, as you did for the primary site.

Note: After discovering the targets for the standby site, you can use Oracle Site Guard to switch back operations to the primary site, so that the primary site takes over the production role, as described in "Performing a Switchover" in *Oracle Fusion Middleware Disaster Recovery Guide*. You only need to switchover and switchback manually during the configuration process.

3.2.2 Creating Oracle Site Guard Administrator Users

It is recommended that you create Oracle Site Guard-focused users or administrators for managing disaster-recovery operations. Users who are not Enterprise Manager super users and who do not have `EM_SG_ADMINISTRATOR` role assigned, cannot access the Oracle Site Guard functionality.

Note the following privilege restrictions for Oracle Site Guard administrators and how it affects Enterprise Manager super users:

- Oracle Site Guard administrators can only view, modify and execute operation plans owned by them. An administrator cannot view, modify, or execute operation plans owned by another Oracle Site Guard administrator or super user.
- A super user can view, modify and execute operation plans owned by anyone, including all Oracle Site Guard administrators and other super users.

If these restrictions do not work in your deployment, skip the steps for creating Oracle Site Guard Administrator users and use the built-in super user roles to access Oracle Site Guard functionality.

To create one or more Oracle Site Guard Administrator users, use one of the following methods:

- Creating an Oracle Site Guard Administrator User with Enterprise Manager Cloud Control Console
- Creating an Oracle Site Guard Administrator User with Enterprise Manager Command-Line Interface

3.2.2.1 Creating an Oracle Site Guard Administrator User with Enterprise Manager Cloud Control Console

To create an Oracle Site Guard Administrator user with Enterprise Manager Cloud Control, complete the following steps:

1. Log in to Enterprise Manager as a super user.
2. From the Setup menu, select **Security**, then select **Administrators**.
3. On the Administrators page, click **Create**.
4. In the Create Administrator wizard, do the following:
   a. On the Properties page:

      1. Specify the name `SG_ADMIN`.

      2. Provide a password.

      3. Provide a password confirmation.

   b. Make changes to any other fields as appropriate, and then click **Next**.

   c. On the Roles page, select the `EM_SG_ADMINISTRATOR` role in the Available Roles pane on the left, and click **Move** to add the role to the Selected Roles pane on the right.

   d. If you discovered targets at the Primary and Standby sites as another user, assign target level privileges to the Oracle Site Guard Administrator user on the Target Privileges page.

      1. Assign **Full any Target** or **View any Target** privileges in the section **Privileges applicable to all Targets**.

      2. Alternately, assign view or full privileges for every target in the Primary and Standby sites by setting **Target Privileges**.

   e. On the Review page, review the information you have provided for the user account, and click **Finish**.

3.2.2.2 Creating an Oracle Site Guard Administrator User with Enterprise Manager Command-Line Interface

Create an Oracle Site Guard Administrator user by running the following EMCLI commands (located at `OMS_HOME/bin/emcli`) in the command-line interface:

```
emcli create_user
       -name="SG_ADMIN"
       -password=password
       -roles="EM_SG_ADMINISTRATOR;EM_USER;PUBLIC"
```

Parameter	Description
`-name`	Enter a name for the Oracle Site Guard Administrator user.
`-password`	Enter a password for the Oracle Site Guard Administrator user.
`-roles`	The list of roles assigned to this user. Enter `EM_SG_ADMINSTRATOR;EM_USER;PUBLIC`.

For more information about the `create_user` command, see "create_user" in *Oracle Enterprise Manager Command Line Interface Guide*.

3.2.3 Creating Primary and Standby Sites

A disaster-recovery site managed by Oracle Site Guard is modeled as a Generic System target type in Enterprise Manager. You can create a generic system to create primary and standby sites. Each generic system that you use, must include all targets, Oracle Fusion Middleware farms and Databases, pertaining to the site that it represents.

To create a generic system, use one of the following methods:

- Creating a Generic System with Enterprise Manager Cloud Control Console
- Creating a Generic System with EMCLI Commands

3.2.3.1 Creating a Generic System with Enterprise Manager Cloud Control Console

To create a generic system for the primary site with Enterprise Manager Cloud Control Console, complete the following steps:

1. Log in to Enterprise Manager as a super user.
2. From the **Targets** menu, click **Systems**.
3. Click **Add** and from the drop-down menu, select **Generic System**.
4. In the **General** section, enter the name for your primary system or site.
5. Select the time zone from the drop-down menu.
6. In the **Member** section, click **Add**.
7. Choose the targets that will be part of your primary system, and click **Select**. Following are examples of targets that are usually added:
   - Oracle Fusion Middleware Farm which includes:
     - Administration Server
     - Managed Servers

  - System components (for example, Oracle HTTP Server)
- If you are using Oracle RAC Database then you must associate it with a **Cluster Database** target. For a single database instance, you must associate it with a **Database Instance** target.

> **Note:** Ensure that the following target types are *not* added to the generic system:
>
> - Database System
> - Individual RAC Database instances

8. Click **Next**.

   The **Define Associations** page is displayed.

9. Click **Next**.

   The **Availability Criteria** page is displayed.

10. From **Availability Criteria**, select the Any Of The Key Members option, and double-click a target in the Members pane. The selected member is removed from the Members pane and added in the Key Members pane.

11. Click **Next**.

    The **Charts** page is displayed.

12. Click **Next**.

    The **Review** page is displayed.

13. Review your settings, and click **Finish**.

3.2.3.2 Creating a Generic System with EMCLI Commands

Create a generic system by running the following `emcli` commands (located at *`OMS_HOME`*`/bin/emcli`) in the command-line interface:

> **Note:** For information about setting up a new EMCLI client, see the Enterprise Manager Command-Line Interface Download page within the Cloud Control console. To access the page, in **Cloud Control**, from the **Setup** menu, click **Command Line Interface**.

```
emcli create_system
      -name="name"
      -type=generic_system
      -add_members="name1:type1;name2:type2;..."]...
      -timezone_region="actual_timezone_region"
```

> **Note:** To get status and alert information for targets, you can run `emcli get_targets` command. For more information, see the chapter "Verb Reference" in the *Oracle Enterprise Manager Command Line Interface Guide*.

Parameter	Description
-name	Enter a name for the system.
-type	Enter generic_system as the type.
-add_members	Add existing targets to the system. Each target is specified as a name-value pair target_name:target_type. You can specify this option more than once.
-timezone_region	Specify the time zone region. The time zone you specify here is used for scheduling operations such as jobs and blackouts, on the system.

See "create_system" in the *Oracle Enterprise Manager Command Line Interface Guide*.

3.2.4 Creating Credentials

You can create and delegate named credentials or preferred credentials for the following targets associated with Oracle Site Guard:

- Host (for normal or non-root user)
- Host (for user with root privileges)
- Oracle Node Manager (use Oracle Weblogic Domain as the Target Type and Node Manager as the Credential Type)
- Oracle Weblogic Server
- Oracle Database (SYSDBA)

This section contains the following topics:

- Creating Named Credentials
- Creating Preferred Credential

> **Note:** You must associate the credentials that you create with the Oracle Site Guard configuration. Oracle Site Guard supports specifying the same credentials for all targets of the same target type. For example, all databases in a system can have the same sysdba credentials. Oracle Site Guard also allows the targets of same type to have different credentials.
>
> You need not create credentials for the targets running at the standby site if the credentials are the same across all targets on the primary and standby sites.

3.2.4.1 Creating Named Credentials

To create a named credential, use one of the following methods:

- Creating Named Credentials with Enterprise Manager Cloud Control Console
- Creating Named Credentials with EMCLI Commands

Creating Named Credentials with Enterprise Manager Cloud Control Console

To create named credentials with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager, preferably as an EM_CLOUD_ADMINISTRATOR user.

2. From the Setup menu, select **Security**, then select **Named Credentials**.

   The Named Credentials page is displayed.

3. Click **Create**.

   The Create Credential page is displayed.

4. In the General Properties section, specify the following:

   - **Credential name**: Enter a name for the credential.
   - **Credential description**: Enter the credential description.
   - **Authenticating Target Type/ Credential type/ Scope**: Enter the details as specified in the following table:

Element	Host	Host (`root`-User Privileges)	Oracle Node Manager	Oracle WebLogic Server	Database Instance
Authenticating Target Type	Host	Host	Oracle Weblogic Domain	Oracle WebLogic Server	Database Instance
Credential type	Host Credentials	Host Credentials	Node Manager Credentials	Oracle WebLogic Credentials	Database Credentials
Scope	Global	Global	Global	Global	Global

   - If these credentials are valid for all targets of the selected **Authenticating Target Type**, then set **Scope** to **Global**.

     If these credentials are only valid for a specific target, then set **Scope** to **Target**, and set the **Target Type** and **Name** fields to match the specific target.

5. In the Credential Properties section, specify the following:

   - **UserName**: Enter the user name.
   - **Password**: Enter the password.
   - **Confirm Password**: Enter the password again.
   - **Run Privilege**: Enter the details as specified in the following table:

Element	Host	Host (Users with `root` privileges)	Oracle WebLogic Server	Database Instance
Run Privilege	None	Select **Sudo** and enter values in the **Run As** fields	Oracle WebLogic Server Administration user credentials	Oracle Database SYS user credential

> **Note:** When the credentials used by Oracle Site Guard are configured to use `sudo` privileges to run as `root`, the `sudo` privilege must be configured as PDP (Privilege Delegation Provider) on all the agents running on the respective hosts of the target.
>
> PDP can be configured from Enterprise Manager Cloud Control console. To configure PDP, go to **Setup** -> **Security** -> **Privilege Delegation** in the Enterprise Manager Cloud Control console.

6. If you are creating this credential as a user other than the Oracle Site Guard Administrator, you must grant view credential access to the Oracle Site Guard Administrator who will use the credential. To provide access, use the procedure in Granting Credential Privileges to Oracle Site Guard Administrator Users.

   To provide access, complete the following steps in the Access Control section.

   a. Click **Add Grant**. The Add Grant pop-up window appears.

   b. Select the rows for all the Oracle Site Guard Administrator users you created while creating Oracle Site Guard Administrator users. See Creating Oracle Site Guard Administrator Users.

   c. Click **Select**.

   d. Verify that the users you selected appear in the list of Grantees in the Access Control table.

7. Click **Test and Save**. To test credentials, select the appropriate **Test Target Type** from the drop-down menu for which you want to test the credentials, and specify **Test Target Name**.

Creating Named Credentials with EMCLI Commands

You can create a named credential by running the following EMCLI commands in the command-line interface:

```
emcli create_named_credential
         -cred_name="cred_name"
         -auth_target_type="auth_target_type"
         -cred_type="cred_type"
         -attributes="p1:v1;p2:v2"
```

Parameter	Description
`cred_name`	Sets the name for this credential set.
`auth_target_type`	Set the authenticating target type.
`cred_type`	Set the credential type for the target/credential set.
`attributes`	Enter the following credential column values: `colname:colvalue;colname:colvalue` To change the value of the separator, use `-separator=attributes=`*`newvalue`*. To change the value of the sub-separator, use `-subseparator=attributes=`*`newvalue`*. Note: For more information about the values of this parameter, see *Oracle Enterprise Manager Command Line Interface Guide*.

3.2.4.2 Creating Preferred Credential

To create a preferred-credential association, use one of the following methods:

- Creating Preferred Credentials with Enterprise Manager Cloud Control Console
- Creating Preferred Credentials with EMCLI Commands

Creating Preferred Credentials with Enterprise Manager Cloud Control Console

To create preferred credentials with the Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as a super user or `EM_CLOUD_ADMINISTRATOR`.
2. From the Setup menu, select **Security**, then select **Preferred Credentials**.

   The Preferred Credentials page is displayed.
3. Select a target type, and click **Manage Preferred Credentials**. The target specific Preferred Credentials page is displayed.
4. Select the credential type from the Default Preferred Credentials table, and click **Set**. The Select Named Credential pop-up window is displayed.
5. Select an existing named credential to be the Preferred Credential and click **Save**.

   Select **New** to create a new named credential to be set as Preferred Credential.

   Enter a user name and password for the credential.

   Enter a credential name, and select **Save As**. The credential will be saved with the name that you have provided.

   Click **Test and Save**.

Creating Preferred Credentials with EMCLI Commands

To set a named credential as a target preferred credential, run the following `emcli` commands in the command-line interface:

> **Note:** Oracle recommends that you to create preferred credentials with the `emcli` commands.

```
emcli set_preferred_credential
        -set_name="set_name"
        -target_name="target_name"
        -target_type="type"
        -credential_name="name"
        [-credential_owner ="owner"]
```

> **Note:** `[ ]` indicates that the parameter is optional.

Parameter	Description
`set_name`	Sets the preferred credential for this credential set.
`target_name`	Sets the path for the software library location.
`target_type`	Target type for the target/credential set.
`credential_name`	Name of the credential.

Parameter	Description
credential_owner	Owner of the credential. This defaults to the currently logged-in user.

Example:

```
emcli set_preferred_credential
        -set_name="HostCredsNormal"
        -target_name="test.example.com"
        -target_type="host"
        -credential_name="MyHostCredentials"
        -credential_owner="Admin"
```

3.2.5 Granting Credential Privileges to Oracle Site Guard Administrator Users

The named credentials configured as described in Section 3.2.4.1, "Creating Named Credentials", are used to access and manage targets for disaster-recovery operations. If you have assigned Oracle Site Guard Administrator users as described in Section 3.2.2, "Creating Oracle Site Guard Administrator Users", you must also assign privileges to use these named credentials.

To grant credential privileges to Oracle Site Guard Administrators, see Granting Credential Privileges with Enterprise Manager Cloud Control Console.

3.2.5.1 Granting Credential Privileges with Enterprise Manager Cloud Control Console

To grant credential privileges with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as a super user or EM_CLOUD_ADMINISTRATOR.
2. From the Setup menu, select **Security**, then select **Named Credentials**.

   The Named Credentials page is displayed.
3. Select the named credential for which privilege is to be granted, and click **Manage Access**. The Manage Access page for that credential is displayed.
4. Click **Add Grant**.
5. In the pop-up window, select the Oracle Site Guard Administrator user to whom the privilege is to be granted. Then click **Select**
6. Click **Save** to save the privilege granted.

3.2.6 Configuring Software Library Storage Location

The Oracle Enterprise Manager Software Library (Software Library) is a repository that stores scripts and artifacts used by Enterprise Manager and its plug-ins. This includes storing the scripts required to execute Site Guard operation plans. The storage location for the Software Library needs to be configured only once when you initially install and set up Oracle Enterprise Manager.

For information about the Software Library and how to determine whether a storage location for the Software Library is already configured, see section "Configuring a Software Library" in *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

If you determine that a storage location is not configured, configure it using one of the following methods:

- Configuring Software Library Storage Location with Enterprise Manager Cloud Control Console
- Configuring Software Library Storage Location with Enterprise Manager Command-Line Interface

3.2.6.1 Configuring Software Library Storage Location with Enterprise Manager Cloud Control Console

To configure the storage location for the Oracle Software Library:

> **Note:** Configuring Oracle Software Library is a one-time process. Enterprise Manager requires you to configure Oracle Software Library before proceeding with any deployment-procedure related tasks. Perform the steps listed in this section after confirming that Oracle Software Library is not already configured.

1. Log in to Enterprise Manager as an `EM_CLOUD_ADMINISTRATOR` user.
2. From the Setup menu, select **Provisioning and Patching**, then select **Software Library**.

   The Software Library: Administration page is displayed.
3. Select **OMS Shared File System** from the Storage Type drop-down box.
4. Click **Add**.
5. Specify a name and location that is accessible to all OMS users, and click **OK**.

> **Note:** As the storage location for the Software Library must be accessible to all OMS as local directories, in a multi-OMS scenario, you must set up a clustered file system using OCFS2 or NFS. For single OMS systems, any local directory is sufficient.

Oracle Enterprise Manager begins execution of a new job to upload Software Library content to the specified location.

> **Note:** For more information, see "Configuring Software Library" in the *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

3.2.6.2 Configuring Software Library Storage Location with Enterprise Manager Command-Line Interface

To configure storage location in the software library with EMCLI, run the following command in the command-line interface:

```
emcli add_swlib_storage_location
       -name="name_of_software_library"
       -path="path_to_the_software_library_location"
```

Parameter	Description
`name`	Sets the name for the software library.
`path`	Sets the path to the software library location.

For example:

```
emcli add_swlib_storage_location
       -name="Softlib"
       -path="/u01/em/swlib"
```

3.2.7 Verifying Database and Data Guard Configurations

Oracle Site Guard uses Oracle Data Guard to perform database switchover and failover. To ensure that Oracle Site Guard can correctly perform database operations as part of disaster recovery workflows, perform the following steps:

1. Ensure that Flashback Recovery is configured and enabled on both, the primary and the standby databases. If Flashback is not correctly configured, the standby database will have to be recreated after a failover operation. Whereas if Flashback is correctly configured the standby database can be easily reinstated after a failover operation with Data Guard Broker. Flashback need to be enabled only for failover operations and it is not required for switchovers.
2. Verify the status and its configuration by ensuring that Oracle Data Guard is functional on the primary and standby databases (either single-instance or RAC).
3. Ensure that you can perform Oracle Data Guard switchover and failover operations outside Site Guard (for example, with the `DGMGRL` utility).

Note: For more information about viewing the summary and status of the Data Guard Broker configuration, see "SHOW CONFIGURATION" in the *Oracle Data Guard Broker* guide.

4

Configuring Oracle Site Guard

This chapter explains how to configure Oracle Site Guard, including the configuration of scripts, auxiliary hosts, and database lag checks.

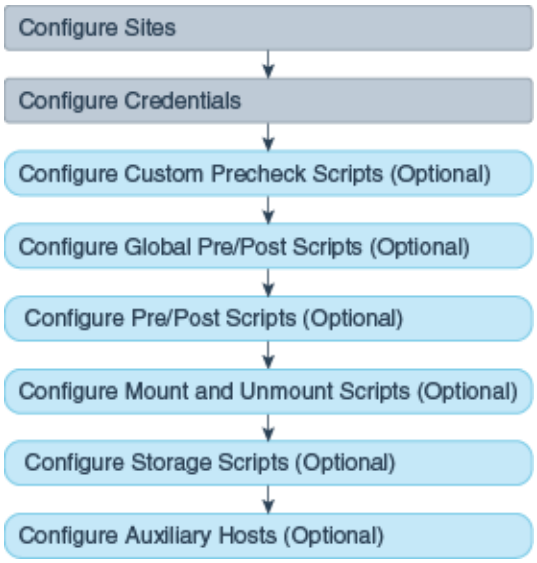
This chapter includes the following sections:

4.1 Overview

Before you create operation plans for disaster recovery, you must first configure Oracle Site Guard. After configuring Oracle Site Guard, you can create operation plans that use the configuration you have created.

Figure 4–1 shows the roadmap for configuring Oracle Site Guard. Steps marked *optional* are required if the site topology and operation plans require a specific type of configuration. However, since most enterprise deployments are large and complex, they typically require all the configuration steps listed in the figure.

Figure 4–1 Workflow of Oracle Site Guard Configuration



Note:

- Before you configure Oracle Site Guard, ensure that you complete the tasks described in Section 3.2, "Preparing Oracle Site Guard for Operation".
- You must log in using the `EM_SG_ADMINISTRATOR` role privilege to perform configuration tasks. Ensure that you have created the required user credentials as described in Section 3.2.4, "Creating Credentials".

4.2 Configuring Sites

As the first step towards setting up a disaster-recovery configuration, you must configure sites, and designate roles to the configured sites. The configured sites must be designated as the primary (production) sites and standby sites.

To configure sites, use one of the following methods:

- Configuring Sites with Enterprise Manager Cloud Control Console
- Configuring Sites with EMCLI Commands

4.2.1 Configuring Sites with Enterprise Manager Cloud Control Console

To create an Oracle Site Guard configuration and associate a standby system with the primary system, complete the following steps:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. Click the name of the system (**Generic System**) for the primary site created as described in Section 3.2.3, "Creating Primary and Standby Sites".

   The Generic System page for the primary site is displayed.

4. On the system's home page, from the **Generic System** menu, select **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.

5. On the General tab, in the **Standby System(s)** section, click **Add**.

   The Search and Select: Standby Systems page is displayed.

6. Choose the standby system, and click **Select**.

7. Click **Create**. Or, if an Oracle Site Guard configuration already exists, click **Save**.

8. Click **OK** to confirm the action.

   Site Guard saves the standby system configuration.

4.2.2 Configuring Sites with EMCLI Commands

To add the configuration for the primary and standby sites, you must run the following `emcli` commands in the command-line interface:

> **Note:** For information about logging in to `emcli`, see chapter "Command Line Interface Concepts and Installation" in the *Oracle Enterprise Manager Command Line Interface Guide*.

```
emcli create_siteguard_configuration
      -primary_system_name="system_name1"
      -standby_system_name="system_name2"
```

Parameter	Description
`-primary_system_name`	Enter the name of your system, which is associated with the primary site.
`-standby_system_name`	Enter the name of your system, which is associated with the standby site.

To display information about the association between existing primary and standby sites, run the following `emcli` commands in the command-line interface:

```
emcli get_siteguard_configuration
         [-primary_system_name="name_of_the_primary_system"]
         [-standby_system_name="name_of_the_standby_system"]
```

> **Note:** `[ ]` indicates that the parameter is optional.

4.3 Updating Site Configuration

You can update site configuration (role) after a site has been created and set up as a primary or standby site. In this way, you designate a site's role as *Primary*, *Standby*, or *ValidateStandby*. This is useful when you have performed actions outside Site Guard that modify or reverse the roles of sites in a Site Guard configuration and you want to update the Site Guard configuration to correctly reflect the site's new role.

You can update site configuration with Enterprise Manager Cloud Control Console or with EMCLI commands, as explained in the following sections:

- Updating Site Configuration with Enterprise Manager Cloud Control Console

- Updating Site Configuration with EMCLI Commands

4.3.1 Updating Site Configuration with Enterprise Manager Cloud Control Console

To update a site's role with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the Targets menu, click Systems.

   The Systems page is displayed.
3. 3.Click the name of the system (**Generic System**) for the standby site created as described in Section 3.2.3, "Creating Primary and Standby Sites."

   The Generic System page for the standby site is displayed.
4. On the system's home page, from the **Generic System** menu, select **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.
5. On the General tab, click the **Set as Primary** button on the upper right.
6. Click **Yes** to acknowledge the confirmation dialog.

   This designates the standby site as the new primary site and will automatically designate it's paired primary site as the new standby site. Effectively, the site roles are reversed.

Note: Reversing site roles cancels all configured health checks for the sites involved in the role reversal.

4.3.2 Updating Site Configuration with EMCLI Commands

To update a site's role with EMCLI commands:

1. Login to `emcli`. For information about how login to `emcli`, see chapter "Using EM CLI" in *Oracle Enterprise Manager Command Line Interface Guide*.
2. Run the `update_siteguard_configuration` command. The syntax and parameter description of this command follows:

```
emcli update_siteguard_configuration
      -primary_system_name="system_name1"
      -standby_system_name="system_name2"
      -reverse_role="flag specifying whether system roles should be reversed"
      -role="new role of the standby system"
```

Table 4–1

Parameter	Description
`-primary_system_name`	The name of your system associated with the primary site.
`-standby_system_name`	The name of your system associated with the standby site.
`-reverse_role`	Reverse roles between primary and standby systems. Optional. If this option is specified, only one standby system can be specified in the `-standby_system_name` parameter.

Table 4–1 (Cont.)

Parameter	Description
`-role`	The new role for the site. Optional. Specify one of the following: ■ *Primary* - the roles of the primary and standby are swapped. ■ *Standby* - the role of the standby site is changed from ValidateStandby to Standby. ■ *ValidateStandby* - the role of the standby site is changed from Standby to ValidateStandby.

4.4 Creating Credential Associations

This section describes how to associate credentials for use in Site Guard operation plans. These credentials are the ones that you created in Section 3.2.4, "Creating Credentials."

Note:

- If you are using Named Credentials or Preferred Credentials, ensure that you have created all the necessary credentials for managing targets as described in Section 3.2.4, "Creating Credentials".
- Ensure that you have created a user with `EM_SG_ADMINISTRATOR` privileges, as described in Section 3.2.2, "Creating Oracle Site Guard Administrator Users", and granted credential privileges to that user as described in Section 3.2.5, "Granting Credential Privileges to Oracle Site Guard Administrator Users".

It is essential that you set up named or preferred credential associations for the following targets:

- Each host, where Oracle Fusion Middleware and Oracle Database are installed and configured (for normal user and users with root privileges)
- Oracle WebLogic Administration Server
- Oracle Database
- Oracle WebLogic Node Manager

4.4.1 Creating Named or Preferred Credential Associations

To create Named or Preferred Credential associations, use one of the following methods:

- Creating Named or Preferred Credential Associations with Enterprise Manager Cloud Control Console
- Creating Named or Preferred Credential Associations with EMCLI Commands

4.4.1.1 Creating Named or Preferred Credential Associations with Enterprise Manager Cloud Control Console

To create named credentials with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the Targets menu, click **Systems**.

3. On the Systems page, click the name of the system for which you want to configure credential associations.
4. On the system's home page, from the Generic System menu, select **Site Guard** > **Configure**.
5. Click the Credentials tab.

   Associate the different types of credentials as described:

   Associate Normal Host Credentials

   Associate normal host credentials to run specific commands or scripts on the target host.

   To associate normal host credentials, follow these steps:

   a. In the Credential tab, in the **Normal Host Credentials** section, click **Add**.

      The Add Normal Host Credentials dialog appears.

   b. Select the target for which you want to associate normal host credentials. Select **All** to select all the systems in the list.

      You can select the credentials set, by default, by selecting the **Preferred** option on the page. On selecting **Preferred**, the Named Credentials section is disabled. To select named credentials, deselect Preferred.

   c. Click **Save**.

   Associate Privileged Host Credentials

   Associate privileged host credentials to mount or unmount storage on the target host.

   To associate privileged host credentials, follow these steps:

   a. In the Credential tab, in the **Privileged Host Credentials** section, click **Add**.

      The Add Privileged Host Credentials dialog appears.

   b. Select the target for which you want to associate privileged host credentials. Select **All** to select all the targets in the list.

      You can select the credentials set, by default, by selecting the **Preferred** option on the page. On selecting **Preferred**, the Named Credentials section is disabled. To select named credentials, deselect **Preferred**.

   c. Click **Save**.

   Associate Oracle Node Manager Credentials

   Associate Oracle Node Manager credentials to connect node manager targets. You must associate Oracle Node Manager credentials for each site that has a Oracle Weblogic Server target.

   To associate Oracle Node Manager credentials, follow these steps:

   1. In the Credential tab, in the **Oracle Node Manager Credentials** section, click **Add**.

      The Add Oracle Node Manager Credentials dialog appears.

   2. Select the target host for which you want to associate Oracle Node Manager credentials. Select **All** to select all the target hosts in the list.

You can select the credentials set, by default, by selecting the **Preferred** option on the page. On selecting **Preferred**, the Named Credentials section is disabled. To select named credentials, deselect **Preferred**.

3. Click **Save**.

Associate Oracle WebLogic Administration Credentials

Associate Oracle WebLogic Administration credentials to connect to the administration server, or to start or stop managed servers.

To associate Oracle WebLogic administration credentials, follow these steps:

a. In the Credential tab, in the **Oracle WebLogic Administration Credentials** section, click **Add**.

   The Add Oracle WebLogic Administration Credentials dialog appears.

b. Select the target for which you want to associate Oracle WebLogic administration credentials. Select **All** to select all the targets in the list.

   You can select the credentials set, by default, by selecting the **Preferred** option on the page. On selecting **Preferred**, the Named Credentials section is disabled. To select named credentials, deselect **Preferred**.

c. Click **Save**.

Associate SYSDBA Database Credentials

Associate SYSDBA database credentials to perform switchover or failover operations through Data Guard Broker.

To associate database credentials, follow these steps:

a. In the Credential tab, in the **SYSDBA Database Credentials** section, click **Add**.

   The Add Database Credentials dialog appears.

b. Select the target for which you want to associate SYSDBA Database credentials. Select **All** to select all the targets in the list.

   You can select the credentials set, by default, by selecting the **Preferred** option on the page. On selecting **Preferred**, the Named Credentials section is disabled. To select named credentials, deselect **Preferred**.

c. Click **Save**.

4.4.1.2 Creating Named or Preferred Credential Associations with EMCLI Commands

To reate a named or preferred credential associations for targets with EMCLI, run the following command in the command-line interface:

```
emcli create_siteguard_credential_association
         -system_name="name_of_the_system"
         [-target_name="name_of_the_target"]
         -credential_type="type_of_credential"
         [-credential_name="name"]
         [-use_preferred_credential="true_or_false"]
         -credential_owner="owner"
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-system_name	The name of the system.
-target_name	The name of the target. This parameter is optional and required to associate the credential with a specific target only.
-credential_type	The type of the credential. Example: HostNormal, HostPrivileged, NodeManager, WLSAdmin, or DatabaseSysdba.
-credential_name	The name of the credential. If the value for credential_name is not specified, then use_preferred_credential has to be set to true.
-credential_owner	The owner of the credential.
-use_preferred_credential	If you are using Preferred Credentials, then specify true. The default value is false. If you do not specify the use of preferred credentials, then to use named credentials you must specify the credential_name parameter.

4.5 Configuring Scripts

Oracle Site Guard provides a mechanism for users to configure different types of scripts for managing disaster-recovery operations. Depending on their function, these scripts either come bundled with Oracle Site Guard, or you can be provided them. You must configure these scripts while configuring Oracle Site Guard. Note that you must add these scripts to the Enterprise Manager software library so that they can be automatically staged (deployed) on the hosts where they need to run. Scripts that are not part of the software library are manually staged (deployed) on each host where they are defined to run.

You can configure the following scripts with Oracle Site Guard:

- Custom Precheck Scripts

  Custom Precheck scripts are used to extend the Precheck and Health Check functionality that Oracle Site Guard provides. For information about Precheck and Health Check functionality of Oracle Site Guard, see Section 2.3.1, "Extensibility."

- Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts

  Pre scripts, Post Scripts, Global pre scripts, and Global Post Scripts are used for extending the functionality of Oracle Site Guard when executing operation plans. For more information, see Section 2.3.1, "Extensibility."

- Mount and Unmount scripts

  Mount and Unmount scripts as described in Section 2.3.3, "Storage Integration," are needed for Filesystem mount and unmount operations that are performed during operations. You can use the mount_unmount.sh script or provide your own scripts.

- Storage scripts

  Storage scripts as described in Section 2.3.3, "Storage Integration", are needed for storage management that must be performed during operations. You can use the scripts bundled with Oracle Site Guard or provide your own scripts.

Note:

- A user-defined script must be an executable script, and must have clearly defined return codes. The script must return `0` on success, and non-zero values on failure.
- Ensure that you configure the required privileges to run all user-defined scripts.

This section contains the following topics:

- Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts
- Configuring Mount and Unmount Scripts
- Configuring Storage Scripts
- Configuring Credentials as Parameters for Scripts
- Cloning a Script with Existing Scripts

4.5.1 Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts

The following attributes are available for customizing a Pre Script, Post Script, Global Pre Script, and Global Post Script:

Parameter	Description
script path	The location where the script resides. Note that the script must reside at the same path location on each host specified in the `target hosts` parameter.
software library path (component)	Path to the entity in software library. If component is specified, path should contain only the file name and its parameters. This parameter is optional.
target hosts	The list of hosts where the script will run.
run on	Whether the script should run on `Any` or `All` of the hosts specified in the `target hosts` parameter. The first available host in the `target_hosts` list is chosen. `Any` executes the script on any one of the available hosts specified in the `target_hosts` parameter. `All` executes the script on each and every host specified in the `target_hosts` parameter.
operation type	The operation type that the script is configured for (switchover, failover, start, or stop).
role	The role of the site during which the script will run (primary or standby). For example, a script configured for a `primary` role will only run when the site has a primary role.
runtime	Whether the script is a runtime script. Runtime scripts are not expected to be available before operation execution begins. Using this flag tells Site Guard not to check for the script existence during the Precheck phase.

Parameter	Description
credential type	The type of credential to use to execute the script on the specified hosts (Normal Host Credentials or Privileged Host Credentials). For information about various types of credentials, see Creating Credential Associations.
credential parameters	One or more sets of credentials to pass to the script. This option is only available in the Cloud Control Console. To configure credential parameters with EMCLI, use the command `add_siteguard_script_credential_params`.

To configure Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts, follow one of these methods:

- Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts with Enterprise Manager Cloud Control Console
- Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts with EMCLI Commands

4.5.1.1 Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts with Enterprise Manager Cloud Control Console

To configure Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts for the primary site:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the **Targets** menu, click **Systems**.

   The Systems page is displayed.
3. Select the system name (**Generic System**) for which the script must be configured.

   The Generic System page for that site is displayed.
4. Click **Generic System** > **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.
5. Click the **Pre/Post Scripts** tab.
6. Click **Add**.

   The **Add Pre/Post Scripts** page is displayed.
7. Enter the following details:
   - **Software Library Path**: Enter the path to the software library entity that contains the script. Alternately, browse for the entity in the software library by clicking on the icon. This only applies if the script has already been added to the Enterprise Manager software library.

     The entity in the Software Library must be present in a folder which is not locked. The symbol,  , indicates that the folder is locked.
   - **Script Path**: Enter the path to the script, or click the search icon and browse the Filesystem for the script. You can also browse Filesystems on the remote host after specifying the login credentials.
   - **Target Host**s: Select one or more target hosts, or select **All** to configure the script to run on all hosts.

- **Script Type**: Select one of the following options depending on the type of script being configured:
  - **Custom Precheck Script**
  - **Pre Script**
  - **Post Script**
  - **Global Pre Script**
  - **Global Post Script**
- **Operation Type**: The operation during which this script will run. Choose from the options - **Switchover**, **Failover**, **Start**, **Stop, Open for Validation**, or **Revert to Standby**.
- **Role**: Select **Primary**, **Standby**, or **Stanby (Open for Validation)** based on the system role. The script only runs when the system has the specified role.

Note: For **Global Pre-Script** and **Global Post-Script** script types, the site **Role** cannot be changed.

For **Pre-Script**, **Post-Script** and **Custom Precheck Script** the **Role** cannot be changed when the operation type is **Start** or **Stop**.

- To configure additional options, click the arrow next to **Advanced Options** region. The following advanced options are available:
  - **Runtime Script**: Select if this is a Runtime script that will only be available during operation execution. Normally, scripts that are part of the Software Library should be designated as Runtime scripts, however any user script may be designated a Runtime script.

    Note that during a Precheck or Health Check, Oracle Site Guard checks the existence of runtime scripts that have been added to the Software Library. However, if the scripts are not part of the Software Library, Oracle Site Guard does not check for their existence before an operation plan is executed
  - **Run On**: Select **All Hosts** to run the script on all selected hosts, or to run the script on any one of the selected target hosts, select **Any Host**.
- **Credential Type**: Select one of the following credential types for executing the script:
  - **Normal Host Credentials**

    Select the Normal (non-root) privileges configured for the script host
  - **Privileged Host Credentials**

    Select the Privileged (root) privileges configured for the script host
  - **Custom Host Credentials**

    Select an alternate set of named credentials. If this option is chosen, select the named credential from the Named Credential drop-down menu.
- **Named Credential**: Select the named credential to use when executing the script. This selection is only applicable if **Credential Type** is set to **Custom Host Credentials**.

- **Credential Parameters**: Select one or more configured credentials to pass as parameters to this script. To select the credentials to pass to the script, move those credentials from the **Available Values** column to the **Selected Values** column. The selected credential parameters will be passed to this script in the order selected. This credential order is important for scripts that expect a list of credentials in a specified order.

8. Click **Save**.

4.5.1.2 Configuring Custom Precheck Scripts, Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts with EMCLI Commands

To configure Pre Scripts, Post Scripts, Global Pre Scripts, and Global Post Scripts with Oracle Site Guard, run the following `emcli` commands in the command-line interface:

```
emcli create_siteguard_script
         -system_name=name_of_the_system
         -operation=name_of_the_operation
         -script_type=type_of_the_script
         [-host_name=name_of_the_host_where_the_scripts_are_run]
         -path=path_of_the_script
         [-component="path_of_the_entity_in_software_library"]
         [-runtime_script="flag_to_specify_if_prechecks_to_check_availability_of_
this_script"]
         [-run_on=flag_specifying_the_host]
         [-all_hosts=flag_to_run_script_on_all_the_hosts_in_the_system]
         [-role=role_associated_with_the_system]
         [-credential_type=type_of_the_credential]
         [-credential_name="name_of_the_credential"]
         [-credential_owner=credential_owner]
```

Note:

- A parameter enclosed in `[ ]` indicates that the parameter is optional.
- You can specify the `-host_name` parameter more than once.
- Specifying the value `true` for the parameter `-all_hosts=true` overrides any host selected using the `-host_name` option.

Parameter	Description
`-system_name`	The name of the system.
`-operation`	The name of the operation: `Switchover`, `Failover`, `Start`, `Stop`, `Open for Validation`, or `Revert to Standby`.
`-script_type`	The type of the script. It can be `Custom Precheck Script`, `Global-Pre-Script`, `Global-Post-Script`, `Pre-Script`, or `Post-Script`.
`-host_name`	The name of the host where this script will be executed. This parameter is optional and can be specified more than once.
`-path`	The path to the script.

Parameter	Description
-component	The path to the entity in the software library. If component is specified, path should contain only the file name and its parameters. This parameter is optional.
-runtime_script	The value as true or false. If the script is designated as a runtime script, Precheck will not verify the existence of script. This parameter is used when the script is dynamically mounted or generated as part of execution of operation plan. By default, all scripts staged from the software library are designated as runtime scripts. The default value for scripts that are not staged from software library is false. This parameter is optional.
-run_on	Whether the script needs to be executed on only one of the available hosts (enter any) or on all hosts (enter all). This parameter is optional and default value is all.
-all_hosts	Optional flag to allow the script to run on all the hosts in the system. This parameter overrides the host_name. Enter true or false.
-role	Optional flag to configure script based on the system role. By default, the script is configured for both primary and standby roles for a given system. For example: Primary or Standby.
-credential_type	HostNormal or HostPrivileged if you have root privileges.
-credential_name	The name of the credential that is used to execute this script. If the value for the parameter credential_name is not specified, then the value for the parameter credential_type needs to be specified.
-credential_owner	The owner of the credential. If target_storage_credential_name and source_storage_credential_name are specified then the attribute credential_owner must be specified. This argument need not be specified if the owner of the credential is same as logged in user.

Note:

- [ ] indicates that the parameter is optional.
- You may specify the option host_name more than once.
- -all_hosts=true overrides any hosts specified with the -host_name option.
- The -role option is only applicable for Pre-Script or Post-Script.

To configure credentials to be passed to a script, first configure the script and then refer to Configuring Credentials as Parameters for Scripts to configure one or more credentials to be passed as parameters to the configured script.

4.5.2 Configuring Mount and Unmount Scripts

Mount and Unmount scripts are storage scripts that come in two flavors:

- **Bundled**

  Oracle Site Guard provides a bundled script for handling Filesystem mount and unmount operations. The `mount_umount.sh` script is part of the Enterprise Manager Software Library. Oracle Site Guard automatically deploys bundled scripts on all hosts on which the scripts are defined to run.

- **User-defined**

  You can define your own custom script for the Filesystem mount and unmount operations.

  You can add your own scripts to the Enterprise Manager software library. If you do this, Oracle Site Guard will deploy your scripts to all configured hosts at runtime. This is similar to how Oracle Site Guard automatically deploys bundled scripts such as `mount_umount.sh`. However, if your scripts are not part of the software library, then you must deploy them on all hosts where they need to run.

4.5.2.1 mount_umount.sh

This section provides the syntax and usage for the `mount_umount.sh` script.

For mounting and unmounting Filesystems, configure the bundled `mount_umount.sh` script as shown in Example 4–1.

Example 4–1 Usage of the mount_umount.sh Script

```
sh mount_umount.sh [-o operation_type ][-f directories_to_mount_or_unmount]
```

Note:

- If there are multiple directories to be mounted or unmounted, use commas to separate the directories. Ensure that there are no spaces between the directory names.
- Ensure that the `/etc/fstab` file is updated with the entries that you want to mount or unmount.
- Ensure that you have the privileges to mount or unmount Filesystems.

To mount multiple directories, run the following command:

```
sh mount_umount.sh -o mount -f
'/u02/oracle/config,/u02/oracle/product,/u02/oracle/stage'
```

To mount a single directory, run the following command:

```
sh mount_umount.sh -o mount -f /u01/app/oracle/product/test
```

To unmount multiple directories, run the following command:

```
sh mount_umount.sh -o umount -f
'/u02/oracle/config,/u02/oracle/product,/u02/oracle/stage'
```

To unmount a single directory, run the following command:

```
sh mount_umount.sh -o umount -f /u01/app/oracle/product/test
```

To configure mount or unmount scripts, use one of the following options:

- Configuring Mount or Unmount Scripts with Enterprise Manager Cloud Control Console
- Configuring Mount or Unmount Scripts with EMCLI Commands

4.5.2.1.1 Configuring Mount or Unmount Scripts with Enterprise Manager Cloud Control Console

To configure a mount or unmount script with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the **Targets** menu, click **Systems**.

   The Systems page is displayed.
3. Select the system name (**Generic System**) on which the script must be configured.

   The Generic System page for that site is displayed.
4. Click **Generic System** > **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.
5. Click the **Storage Scripts** tab.
6. Click **Add**.

   The **Add Storage Scripts** page is displayed.
7. Enter the following details:
   - **Software Library Path**: Enter the path to the software library entity that contains the script. Alternately, browse for the entity in the software library by clicking the search icon. This only applies if the script has already been added to the Enterprise Manager software library.
   - **Script Path**: the bundled `mount_umount.sh` script with the appropriate options (see mount_umount.sh), or provide a path to your own user-defined script.

     To enter a user-defined script you can click the search icon, and browse the Filesystem. You can also browse Filesystems on the remote host after specifying login credentials.
   - **Target Hosts**: Select one or more target hosts, or select **All** to configure the script to run on all hosts.
   - **Script Type**: Select one of the following options:
     - **Mount**
     - **UnMount**
   - **Run On**: This option is disabled. The value is set to **All Hosts**.
   - **Operation Type**: The operation during which this script will run. Choose from the options - **Switchover**, **Failover**, **Open for Validation**, or **Revert to Standby**.
   - To configure additional options, click the arrow next to **Advanced Options** region. The following advanced options are available:
     - **Runtime Script**: Select whether this is a Runtime script that will only be available during operation execution. Normally, scripts that are part of the

Software Library should be designated as Runtime scripts, however any user script may be designated a Runtime script.

Note: During a Precheck or Health Check, Oracle Site Guard checks the existence of runtime scripts that have been added to the Software Library. However, if the scripts are not part of the Software Library, Oracle Site Guard does not check for their existence before an operation plan is executed.

- **Credential Type**: Select one of the following credential types while executing the script:
  - **Normal Host Credentials**: Select these credentials to use the Normal (non-root) privileges configured for that script host.
  - **Privileged Host Credentials**: Select these credentials to use the Privileged (`root`) privileges configured for that script host.
  - **Custom Host Credentials**: Select these credentials to use an alternate set of named credentials. If this option is chosen, select the named credential from the Named Credential drop-down menu.
- **Named Credential**: the named credential to be used when executing the script. This selection is only applicable if **Credential Type** is set to **Custom Host Credentials**.
- **Credential Parameters**: Select one or more configured credentials to be passes as parameters for this script. To select the credentials to be passed to the script, move those credentials from the Available Values column to the Selected Values column.

8. Click **Save**.

4.5.2.1.2 Configuring Mount or Unmount Scripts with EMCLI Commands

To configure a mount or unmount script, run the following `emcli` command:

```
emcli create_siteguard_script
        -system_name="system_name"
        -operation="operation_name"
        -script_type="type_of_script"
        [-host_name="name_of_the_host"]
        -path="path_of_the_script"
        [-component="path_of_the_entity_in_software_library"]
        [-runtime_script="flag_to_specify_if_prechecks_should_check_availability_
of_this_script"]
        [-run_on="flag_specifying_hosts_that_will_run_the_script"]
        [-all_hosts="flag_to_run_the_script_on_all_the_hosts_on_the_system"]
        [-role="role_associated_with_the_system"]
        [-credential_type="type_of_credential"]
        [-credential_name="name_of_the_credential"]
        [-target_storage_credential_name="target_storage_credential"]
        [-source_storage_credential_name="source_storage_credential"]
        [-credential_owner="credential_owner"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
-system_name	The system for which the script is being configured.
-operation	The function of the operation. Example: Switchover, Failover, Open for Validation, or Revert to Standby.
-script_type	The type of script. Depending on the function you want to perform, enter one of the following options: ■ Mount ■ UnMount
-host_name	The name of the host where the script will be run. To specify a list of hosts, separate host names with semi-colons, or provide the -host_name option multiple times. **Note**: Ensure that all hosts are part of the system specified in system_name.
-path	Enter the path to the script. If you are configuring the bundled mount_umount.sh script specify the path as described in mount_umount.sh. For example: sh mount_umount.sh -o mount -f /u02/oracle/config,/u02/oracle/product,/u02/oracle/stage If you are configuring a user-defined script that you have added to the Enterprise Manager software library, provide only the name of the script and any additional arguments that the script requires. For example: sh example_script.sh -a value1 -b value2 -c value3 If you are configuring a user-defined script that you will deploy on all the configured hosts, provide the full path to the script location and any additional arguments that the script requires. **Note**: The script must reside at the same path location on each host. For example: /path_to_the_script/example_script.sh -a value1 -b value2 -c value3
-component	The path to the entity in the software library. If the component is specified, the -path option should contain only the script name and its parameters.
-runtime	Whether the script is a runtime script. If the script is a runtime script, Prechecks will not verify the existence of script. This option can be used when the script is dynamically mounted or generated as part of execution of operation plan. By default, all scripts staged from the software library are designated as runtime scripts. For scripts that are not staged from the software library, the default value is false.
-run-on	Whether the script needs to be executed on only one of the available hosts (enter any) or on all hosts (enter all).

Parameter	Description
-all_hosts	Optional flag to enable the script to run on all the hosts in the system. This parameter overrides the -host_name parameter.
-role	This option is not applicable for scripts of type Mount and UnMount.
-credential_type	HostNormal credentials or HostPrivileged credentials for users with root privileges. If values for credential_type are not specified, then the values for credential_name must be specified.
-credential_name	An alternate named credential to use when executing this script. If the values for credential_name are not specified, then the values for credential_type must be specified.
-credential_owner	The owner of the credential. This argument need not be specified if the owner of the credential is same as logged in user.

To configure credentials to be passed to a script, first configure the script and then refer to Configuring Credentials as Parameters for Scripts to configure one or more credentials to be passed as parameters to the configured script.

4.5.3 Configuring Storage Scripts

Storage scripts are used for Storage Switchover and Storage Failover operations. There are two types of storage scripts:

- **Bundled**

  Oracle Site Guard provides a bundled script for handling Filesystem mount and unmount operations. The script, zfs_storage_role_reversal.sh, is part of the Enterprise Manager Software Library. Oracle Site Guard automatically deploys bundled scripts on all hosts on which the scripts are defined to run.

- **User-defined**

  You can define your own custom script for the Filesystem mount and unmount operations.

  You can add your own scripts to the Enterprise Manager software library. If you do this, Oracle Site Guard will deploy your scripts to all configured hosts at runtime. This is similar to how Oracle Site Guard automatically deploys bundled scripts like zfs_storage_role_reversal.sh. However, if your scripts are not part of the software library, you must deploy them on all hosts where they need to run.

  When configuring replication between ZFS storage appliances for a Site Guard disaster recovery configuration, follow these guidelines:

  – Ensure that you do not use private interface names as source and target appliance parameters when configuring the Site Guard ZFS storage role reversal script.

  – When replicating to a target appliance from a clustered source appliance, configure replication on each head of the source appliance head using different replication targets.

  – During replication configuration both source cluster heads should be in a CLUSTERED state (not STRIPPED for example).

– Do not use private interfaces for replication configuration. Creating static routes and verifying them on the source and target before setting up replication configuration will ensure that you use public interfaces, not private interfaces.

– Ensure that storage pools and IP addresses maintain their cluster node assignment.

4.5.3.1 zfs_storage_role_reversal.sh

This section explains the usage of the `zfs_storage_role_reversal.sh` script. This script comes bundled with Oracle Site Guard and can be used to perform storage role-reversal operations as part of a switchover or failover operation plan.

Note: The ZFS administrator account used for performing storage operations must have the following roles granted for the ZFS pool or project that is part of the Site Guard disaster recovery operation:

- `rrsource`, a role that allows administrators to create, edit, and destroy replication targets and actions, and send and cancel updates for replication actions.
- `rrtarget`, a role that allows administrators to manage replicated packages, including disabling replication at the package level, cloning a package or its members, modifying properties of received datasets, and severing or reversing replication. Other authorizations may be required for some of these operations, such as setting properties or cloning individual shares. See the available authorizations in the Projects and Shares scope for details.
- `destroy`, a role that you can configure at the project or pool level. Either level will work provided you assign it the pool or project being reversed. This role allows deleting an empty project right before attempting 'confirm reverse' on a package on the target appliance.
- `rename`, a role you can configure at the project or pool level. Either level will work provided you assign it to the pool or project being reversed. This role allows renaming non-empty project right before attempting 'confirm reverse' on a package on the target appliance.
- `changeProtocolProps`, this role is optional. If assigned, the scope must be `sas` and there must not be any further filters.

Configure these roles with the ZFS appliance BUI or CLI.

Configure the bundled `zfs_storage_role_reversal.sh` script as shown in Example 4–2 and the table following it. The operation types available are:

- `switchover`
- `switchover_prechecks`
- `failover`
- `failover_prechecks`
- `create_clone`

- create_clone_prechecks
- delete_clone
- delete_clone_prechecks

Example 4–2 Usage of zfs_storage_role_reversal.sh Script

```
zfs_storage_role_reversal.sh  [options]
```

Option	Description	Mandatory?
--target_appliance or -t	The host name of the target ZFS appliance. For example: zfssite1.example.com	Yes
--target_user or -w	The username on the target ZFS appliance with privileges to execute the script. If not specified, the username of the user executing the script will be used. For example: root	No
--source_appliance or -h	The host name of the source ZFS appliance. For example: zfsite2.example.com	Yes
--source_user or -u	The user name on the source ZFS appliance with privileges to execute the script. If not specified, the user name of the user executing the script will be used. For example: root.	No
--project_name or -j	The name of the replicated ZFS project. For example: ZFS-DR-Project.	Yes
--target_pool_name or -p	The name of the storage pool on the target ZFS appliance. For example: zfssite1-pool-0	Yes
--source_pool_name or -q	The name of the storage pool on the source ZFS appliance. For example: zfssite2-pool-0	Yes
--operation_type or -o	The operation for which this script is being configured. For example: switchover, switchover_prechecks, failover, failover_prechecks, create_clone, create_clone_prechecks, delete_clone, or delete_clone_prechecks.	Yes
--is_sync_needed or -c	Whether the replication package should be updated or synchronized before starting the role reversal. Applicable values are Y or N. If not provided, the default value is Y for switchover and N for failover operations.	No

Option	Description	Mandatory?
`--continue_on_sync_failure or -f`	Whether the role reversal should continue if the update or synchronization fails. Applicable values are `Y` or `N`. This option only applies if the parameter `-is_sync_needed` is enabled. The default value is `N`.	No
`--sync_timeout or -e`	The timeout value (in seconds) before declaring that the update or synchronization has failed. This option only applies if `-is_sync_needed` is enabled. For example: `600` (equivalent to ten minutes)	No
`--keep_log_file` or `-l`	Whether the script should send output to a log file. Applicable values are `Y` or `N`. If not specified, the default is N (no log output will be sent to log file).	No
`--zfs_lag_in_seconds` or `-z`	The ZFS replication lag threshold value (in seconds). If the replication lag exceeds this value, do not reverse storage roles. Example: `300` (equivalent to five minutes)	No
`--is_source_reachable` or `-x`	Whether Site Guard should check whether the source appliance is reachable. This option only applies to the failover case and should be used to prevent the script from trying to check source appliance reachability. Applicable values are `Y` or `N`. If not specified, the default value is `Y`.	No
`--source_user_equivalence` or `-m`	The SSH user name to use when establishing an SSH connection to the source appliance. If this is not specified, the script attempts an SSH connection without specifying an alternate user name. For example: `--source_user_equivalence user1`	No
`--target_user_equivalence` or `-n`	The SSH username to use when establishing an SSH connection to the target appliance. If this is not specified, the script attempts an SSH connection without specifying an alternate username. For example: `--target_user_equivalence user2`	No

To configure storage scripts, use one of the following options:

- Configuring Storage Scripts with Enterprise Manager Cloud Control Console
- Configuring Storage Scripts with EMCLI

4.5.3.2 Configuring Storage Scripts with Enterprise Manager Cloud Control Console

To configure storage scripts with Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.

2. From the **Targets** menu, click **Systems**.

   The Systems page is displayed.

3. Select the system name (**Generic System**) on which the script must be configured.

   The Generic System page for that site is displayed.

4. Click **Generic System** > **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.

5. Click the **Storage Scripts** tab.

6. Click **Add**.

   The **Add Storage Scripts** page is displayed.

7. Enter the following details:

   - **Software Library Path**: The path to the software library entity that contains the script. Alternately, browse for the entity in the software library by clicking the search icon. This only applies if the script has already been added to the Enterprise Manager software library.
   - **Script Path**: The bundled `zfs_storage_role_reversal.sh` script with the appropriate options (see Section 4.5.3.1, "zfs_storage_role_reversal.sh"), or provide a path to your own user-defined script. To browse for a user-defined script you can click the search icon and browse the Filesystem. You can also browse Filesystems on the remote host after specifying login credentials.

     For example:

     ```
     sh zfs_storage_role_reversal.sh -t zfssite1.mycompany.com -h
     zfssite2.mycompany.com -j ZFS-DR-Project -p zfssite1-pool-0 -q
     zfssite2-pool-0 -c N -f Y -z 300 -l Y -o switchover
     ```

   - **Target Hosts**: Select one or more target hosts, or select **All** to configure the script to run on all hosts.
   - **Script Type**: Select one of the following options depending on the function that Oracle Site Guard needs to perform:
     - **Storage Switchover**
     - **Storage Failover**
     - **Storage CreateClone**
     - **Storage DeleteClone**
   - **Operation Type**: The operation during which this script will run. Selecting the **Script Type** automatically sets the **Operation Type**. This field cannot be modified.
   - **Run On**: For mount or unmount operations this field is automatically set to **All Hosts**. For storage scripts, this field is automatically set to **Any Host**. This field cannot be modified.

8. Click the arrow next to the **Advanced Options** region to configure additional options if required. The following advanced options are available:

   - **Runtime Script**: Select to specify that this is a Runtime script that will only be available during operation execution. Normally, scripts that are part of the Software Library should be designated as Runtime scripts, however any user script may be designated a Runtime script.

Note: During a Precheck or Health Check, Oracle Site Guard checks the existence of runtime scripts that have been added to the Software Library. However, if the scripts are not part of the Software Library, Oracle Site Guard does not check for their existence before an operation plan is executed.

- **Credential Type**: Select one of the following credential types while executing the script:
  - **Normal Host Credentials**: Select to use the Normal (non-root) privileges configured for that script host.
  - **Privileged Host Credentials**: Select these credentials to use the Privileged (`root`) privileges configured for that script host.
  - **Custom Host Credentials**: Select to use an alternate set of named credentials. If you select this option, also select the named credential from the Named Credential drop-down menu.
- **Named Credential**: The named credential to use when executing the script. This selection is only applicable if **Credential Type** is set to **Custom Host Credentials**.
- **Credential Parameters**: Select one or more configured credentials to pass as parameters for this script, by moving credentials from the Available Values column to the Selected Values column.

Note: For ZFS storage scripts, you must pass the source and target appliance credentials as credential parameters to the configured script.

The order of credentials passed to the script is important. You must pass the source credential first, followed by that target credential.

9. Click **Save**.

4.5.3.3 Configuring Storage Scripts with EMCLI

To configure a storage script with EMCLI, run the following command:

```
emcli create_siteguard_script
        -system_name="name_of_the_system"
        -operation="name_of_the_operation"
        -script_type="type_of_the_script"
        [-host_name="name_of_the_host_where_the_script_will_be_run"]
        -path="path_of_the_script"
        [-component="path_of_the_entity_in_software_library"]
        [-runtime_script="flag_to_specify_if_prechecks_should_check_availability_
of_this_script"]
        [-run_on="flag_specifying_which_hosts_will_run_the_script"]
        [-all_hosts="flag_to_run_the_script_on_all_the_hosts_in_the_system"]
        [-role="role_associated_with_the_system"]
        [-credential_type="type_of_the_credential"]
        [-credential_name="name_of_the_credential"]
        [-target_storage_credential_name="target_storage_credential"]
        [-source_storage_credential_name="source_storage_credential"]
        [-credential_owner="credential_owner"]
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description.
-system_name	The system for which the script is being configured.
-operation	The function of the operation. Example: Switchover, Failover, Start, Stop, Open for Validation, or Revert to Standby.
-script_type	The type of script depending on the operation you want to perform. For example: Storage-Switchover, Storage-Failover, Storage-CreateClone, or Storage-DeleteClone..
-host_name	The name of the host where the script will be run. This option can be specified more than once to configure multiple hosts. Ensure that each host is part of the system specified in the parameter system_name.
-path	Enter the path to the script. If you are configuring the bundled zfs_storage_role.sh script specify the path as described in "zfs_storage_role_reversal.sh". For example: sh zfs_storage_role_reversal.sh -t zfssite1.mycompany.com -h zfssite2.mycompany.com -j ZFS-DR-Project -p zfssite1-pool-0 -q zfssite2-pool-0 -c N -f Y -z 300 -o switchover If you are configuring a user-defined script that you have added to the Enterprise Manager software library, provide only the name of the script and any additional arguments that the script requires. For example: sh example_script.sh -a value1 -b value2 -c value3 If you are configuring a user-defined script that you will deploy on all the configured hosts, provide the full path to the script location and any additional arguments that the script requires. **Note**: The script must reside at the same path location on each host. For example: /path_to_the_script/example_script.sh -a value1 -b value2 -c value3
-component	The path to the entity in software library. If component is specified, the -path option should contain only the script name and its parameters.

Parameter	Description.
-runtime_script	Whether script is a runtime script. If the script is designated a runtime script, Prechecks will not verify the existence of script. This option can be used when the script is dynamically mounted or generated as part of execution of operation plan. By default, all scripts staged from software library are designated as runtime scripts. The default value is false for scripts that are not staged from software library.
-run_on	Whether the script needs to be executed on only one of the available hosts (enter any) or on all hosts (enter all). This parameter is optional and default value is all.
-all_hosts	Optional flag to enable the script to run on all the hosts in the system. This parameter overrides the host_name.
-role	This option is not applicable for scripts of type **Storage Switchover** and **Storage Failover**.
-credential_type	The HostNormal credentials or HostPrivileged credentials for users with root privileges. If the values for the parameter credential_type are not specified, then the values for credential_name must be specified.
-credential_name	An alternate named credential to use when executing this script. If the values for the parameter credential_name are not specified, then the values for the parameter credential_type must be specified.
-credential_owner	The owner of the named credential for target_storage_credential and source_storage_credential.

To configure credentials to be passed to a script, first configure the script and then refer to Configuring Credentials as Parameters for Scripts to configure one or more credentials to be passed as parameters to the configured script.

4.5.4 Configuring Credentials as Parameters for Scripts

When you configure Site Guard scripts with Enterprise Manager Cloud Control Console, you can configure the credentials to pass as a parameter to the script. However, if you configure scripts with the Enterprise Manager CLI, you must use separate additional CLI commands to add, delete or get credential parameters for scripts. Before you configure a script to receive credentials as parameters, ensure that you have created these credentials as described in Section 3.2.4, "Creating Credentials." Also, ensure that the script for which you will configure credential parameters for, is already configured as described in Configuring Scripts.

To configure credentials as script parameters, perform any of the following tasks:

- Adding Credential Parameters to a Script
- Deleting Credential Parameters with a Script
- Getting Credential Parameters for a Script

4.5.4.1 Adding Credential Parameters to a Script

To add credentials parameters to a configured script, run the add_siteguard_secript_credential_params command using the command-line interface. You can either execute the command once for each set of credentials that need to be configured as

parameters to a script, or provide all the credentials in one invocation in a comma-separated list:

```
emcli add_siteguard_script_credential_params
        -script_id="id_associated_with_the_script"
        -credential_name="name_of_the_credential"
        [-credential_owner="credential_owner"]
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-script_id	The script ID.
-credential_name	The name of the credential. Use a comma-separated list enclosed in double quotes to specify more than one credential.
-credential_owner	The credential owner details. You need not specify the values of this parameter if the owner of the credential is same as that of the logged-in user.

4.5.4.2 Deleting Credential Parameters with a Script

To delete one or more credentials parameters already configured for a script, run the following EM CLI command using the command-line interface:

```
emcli delete_siteguard_script_credential_params
        -script_id="Id associated with the script"
        [-credential_name="name of the credential"]
        [-credential_owner="credential owner"]
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-script_id	The ID associated with the script.
-credential_name	The name of the credential. Use a comma-separated list enclosed in double-quotes to specify more than one credential. This parameter is optional. If unspecified, all credentials associated with the script are deleted.
-credential_owner	The owner of the credential. This parameter need not be specified if the owner of the credential is the same as the logged-in user.

4.5.4.3 Getting Credential Parameters for a Script

To get a list of one or more credentials parameters configured for a script, run the following EM CLI command using the command-line interface:

```
emcli get_siteguard_script_credential_params
        -script_id="Id_associated_with_the_script"
        [-credential_name="name_of_the_credential"]
        [-credential_owner="credential_owner"]
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-script_id	The ID associated with the script.
-credential_name	The name of the credential. If this argument is not specified, all credentials associated with the script will be deleted. This parameter is optional.
-credential_owner	The owner of the credential. This parameter need not be specified if the owner of the credential is the same as the logged-in user.

4.5.5 Cloning a Script with Existing Scripts

You can create and configure new scripts by cloning (copying) an existing script. This applies to all types of scripts.

To clone a script with the Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an EM_SG_ADMINISTRATOR user.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. Select the system name (**Generic System**) on which the script must be configured. The Generic System page for that site is displayed.
4. Click **Generic System** > **Site Guard** > **Configure**.

   The Site Guard Configuration page is displayed.
5. Click the **Pre/Post Scripts** tab or the **Storage Scripts** tab.

   The Pre/Post Scripts page or the Storage Scripts page is displayed.
6. Select a configured script from the Scripts table and click **Add Like**.
7. Modify any pre-configured values that you want to change.
8. Click **Save**.

4.6 Configuring Auxiliary Hosts

You can configure one or more hosts managed by Enterprise Manager, as an auxiliary host to the site. An auxiliary host needs to be managed by Enterprise Manager. It can be part of one or more sites. These hosts can be used to run Pre Scripts, Post Scripts, or Storage Scripts on a site.

The following actions can be performed:

- Adding an Auxiliary Host with EMCLI Commands
- Deleting an Auxiliary Host with EMCLI Commands
- Listing Auxiliary Targets with EMCLI Commands

4.6.1 Adding an Auxiliary Host with EMCLI Commands

To add an auxiliary host on a site, run the following EMCLI command in the command-line interface:

```
emcli add_siteguard_aux_hosts
          -system_name="system_name"
          -host_name="host_name"
```

Parameter	Description
`-system_name`	The system on which you are performing the operation.
`-host_name`	The name of the host where the script will be executed. **Note**: Ensure that the hostname is part of the system specified in `system_name`.

4.6.2 Deleting an Auxiliary Host with EMCLI Commands

To delete a auxiliary host on a site, run the following EMCLI command in the command-line interface:

```
emcli delete_siteguard_aux_host
        -system_name="system_name"
        [-host_name="name_of_the_host"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-system_name`	The system on which you are performing the operation.
`-host_name`	The name of the auxiliary host to delete. If unspecified, then all auxiliary hosts associated with the system are deleted. Optional. **Note**: Ensure that the host name is part of the system specified in `system_name`.

4.6.3 Listing Auxiliary Targets with EMCLI Commands

To view a list of all auxiliary targets for a system, run the following command:

```
emcli get_siteguard_aux_hosts
          -system_name="system_name"
```

Parameter	Description
`-system_name`	The system on which you are performing the operation.

4.7 Configuring Database Lag Checks

This section describes how to configure values of Apply Lag and Transport Lag for one or more Data Guard enabled databases.

It contains the following topics:

- Configuring Database Lag Checks with EMCLI Commands
- Updating Threshold Value for Database Lag with EMCLI Commands

- Deleting Threshold Value for Database Lag with EMCLI Commands
- Listing Database Lag Thresholds with EMCLI Commands

4.7.1 Configuring Database Lag Checks with EMCLI Commands

You can configure values of Apply Lag and Transport Lag for one or more Data Guard enabled databases by running the following commands:

```
emcli configure_siteguard_lag
        -system_name="system_name"
        [-target_name="database_target_name"]
        -property_name="lag_type"
        -value="max_limit"
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-system_name	The system on which you want to configure the threshold limit.
-target_name	The database target name for which the threshold limit is configured. If this parameter is not specified, then the threshold value is applied to all databases of the system.
-property_name	The property name. Valid values are ApplyLag and TransportLag.
-value	The threshold value to be configured (in seconds).

4.7.2 Updating Threshold Value for Database Lag with EMCLI Commands

To update the values of Apply Lag and Transport Lag threshold for one or more Data Guard enabled database, run the following commands:

```
emcli update_siteguard_lag
        -system_name="system_name"
        [-target_name="database_target_name"]
        -property_name="lag_type"
        -value="max_limit"
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-system_name	The system for which you want to configure the threshold limit.
-target_name	The database target name for which the threshold limit is configured. If this parameter is not specified, then the threshold value is applied to all databases of the system.
-property_name	The property name. Valid values are ApplyLag and TransportLag.
-value	The threshold value to be updated (in seconds).

4.7.3 Deleting Threshold Value for Database Lag with EMCLI Commands

To delete the values of Apply Lag and Transport Lag threshold configured for one or more Data Guard enabled databases, run the following EMCLI commands:

```
emcli delete_siteguard_lag
         -system_name="system_name"
         [-target_name="database_target_name"]
         -property_name="lag_type"
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-system_name`	The system for which you want to configure the threshold limit.
`-target_name`	The database target name for which the threshold limit is configured. If the database name is not specified, the configured lag limit is deleted for all databases in the system.
`-property_name`	The property name. Valid values are `ApplyLag` and `TransportLag`.

4.7.4 Listing Database Lag Thresholds with EMCLI Commands

To view values of the configured database Apply Lag and Transport Lag threshold limits of a system, run the following command:

```
emcli get_siteguard_lag
        -system_name="system name"
        [-target_name="database_target_name"]
        -property_name="lag_type"
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-system_name`	The system for which you want to retrieve the threshold limit.
`-target_name`	The database target name for which the threshold limit is to be retrieved. If the database name is not specified, the property is obtained for all databases in the system.
`-property_name`	The property name. Valid values are `ApplyLag` and `TransportLag`.

5

Performing Oracle Site Guard Operations

This chapter explains how you create, execute and monitor Oracle Site Guard operation plans.

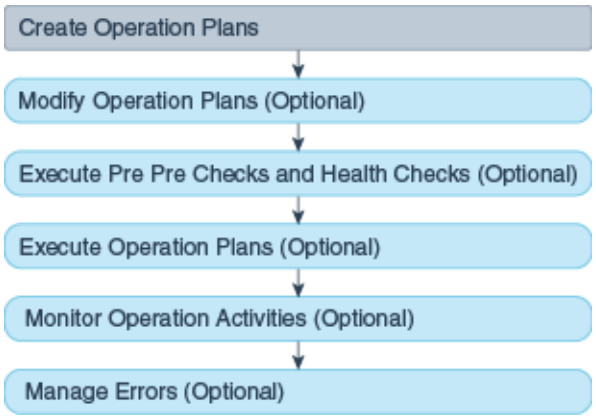
This chapter includes the following sections:

5.1 Overview

Oracle Site Guard operation plans contain steps that must be executed during a disaster-recovery activity. In addition to the steps defined in an operation plan, the operation plan allows for such concepts as serial and parallel execution of steps, ignoring or retrying steps upon error, and so on.

Figure 5–1 shows the roadmap for managing Oracle Site Guard operations. Steps marked *optional* are required if the site topology and operation plans require the configuration. However, since most enterprise deployments are large, they typically require all the configuration steps listed in the figure below.

Figure 5–1 Workflow for Oracle Site Guard Operations



Note:

- Before you create operation plans, ensure that you complete the tasks listed in Chapter 4, "Configuring Oracle Site Guard".
- You must log in using the `EM_SG_ADMINISTRATOR` role privilege to perform configuration tasks. Ensure that you have created the required user credentials as described in Section 3.2.2, "Creating Oracle Site Guard Administrator Users".

5.2 Managing Operation Plans

An operation plan contains the execution flow for the Oracle Site Guard operation. It is a pre-configured workflow consisting of a set of ordered actions (steps).

Before you execute any Oracle Site Guard disaster-recovery operation, you must create a plan for that operation.

Steps such as the following, can be included in an operation plan:

- Stopping Oracle HTTP Servers.
- Stopping the node managers, managed servers, and administration server in an Oracle WebLogic domain.
- Performing a database role reversal with Oracle Data Guard.
- Executing custom user scripts at certain points in the operation plan sequence.

Oracle Site Guard creates a default version of the operation plan based on the site topology and the Oracle Site Guard configuration. You can use this default operation plan or customize it depending on your configuration.

This section contains the following topics:

- Creating Operation Plans
- Creating New Operation Plans with Existing Plans
- Editing and Updating Operation Plans

5.2.1 Creating Operation Plans

To create an operation plan, use one of the following methods:

- Creating an Operation Plan with Enterprise Manager Cloud Control Console
- Creating an Operation Plan with EMCLI Commands

5.2.1.1 Creating an Operation Plan with Enterprise Manager Cloud Control Console

To create an operation plan with the Enterprise Manager Cloud Control Console, follow these tasks:

1. Log in to Enterprise Manager as a user with `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. On the Systems page, click the name of the system (**Generic System**) for which the plan is being created.

   The Generic System page for this site is displayed.
4. Click **Generic System** > **Site Guard** > **Operations**.

   The Site Guard Operations page is displayed.
5. Click **Create**.

   The **Create New Operation Plan** dialog is displayed.
6. Enter the following details:

   Plan Name: Enter a name for the plan.

   Operation Type: Select an operation type from the following options:

   - Switchover
   - Failover
   - Start
   - Stop
   - Open for Validation
   - Revert to Standby

   Note:

   - For information about Oracle Site Guard operation types, see Section 2.4, "Oracle Site Guard Workflows".
   - The options displayed in the dialog change depending on the operation type you select. For switchover and failover operation types, you must select the standby system for the plan. For start and stop operations, select the current role for the system.

   Primary System: This field displays the name of the system for which this plan is being created. You cannot change the values in this field.

   Standby System: Select a standby system from the list. Note that this option is enabled only when you select **Switchover** or **Failover** in the Operation Types field.

   Current Role: Select either **Primary** or **Standby**. This is the role of the system that this plan applies to. The plan can only run when the system is assigned a role. Note that this option is enabled only when you select **Start** or **Stop** in the Operation Type field.

7. Depending on the Operation Type you select, configure the standby system accordingly.
8. Click **Save**.

5.2.1.2 Creating an Operation Plan with EMCLI Commands

Run the following `emcli` commands in the command-line interface to create a new operation plan:

```
emcli create_operation_plan
         [-primary_system_name="name_of_primary_system"]
         [-standby_system_name="name_of_standby_system"]
         [-system_name="name_of_the_system"]
         [-operation="name_of_the_operation"]
         [-name="name_of_the_operation_plan"]
         [-role="role_associated_with_the_system"]
         [-like="name_of_the_operation_plan_from_which_the_steps_are_to_be_copied"
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-primary_system_name`	The name of your system associated with the primary site. This option is used for switchover or failover operations.
`-standby_system_name`	The name of your system associated with the standby site. This option is used for switchover or failover operations.
`-system_name`	The name of the system. This option is used for start or stop operations.
`-operation`	The function of the operation. Example: `switchover`, `failover`, `start`, `stop`, `openforvalidation`, or `reverttostandby`.
`-name`	The name of the operation plan.
`-role`	The role associated with a system, when you run an operation (`start` or `stop`).
`-like`	Name of the operation plan from which the steps are to be copied. If this option is specified, system name, operation, and role are ignored.

5.2.2 Creating New Operation Plans with Existing Plans

You can create and configure new operation plans by cloning (copying) an existing plan. This applies to all types of plans.

To clone a plan with the Enterprise Manager Cloud Control Console:

1. Log in to Enterprise Manager as an `EM_SG_ADMINISTRATOR` user.
2. From the **Targets** menu, click **Systems**.

   The Systems page is displayed.
3. Select the system name (**Generic System**) for which the operation plan is created. The Generic System page for that site is displayed.
4. Click **Generic System** > **Site Guard** > **Operations**.

   The Site Guard Operations page is displayed.

5. Select an existing operation plan from the table and click **Create Like**.
6. Enter a name for the new plan.
7. Click **Save**.

5.2.3 Editing and Updating Operation Plans

You can perform the following tasks to update or edit an operation plan:

- Change the order of the steps in an operation plan.
- Enable or disable individual steps in the operation plan.
- Choose to stop or continue a step in an operation plan if Oracle Site Guard encounters an error while running the operation plan.
- Customize each step to execute steps in a serial order or parallel on different hosts.
- Customize execution groups to sequence operation plan steps in a specific order.
- Change the timeout for an individual operation step.

You can modify the steps in an operation plan, and save the updated operation plan at any point in time.

To edit and update operation plans use one of the following methods:

- Editing and Updating Operation Plans with Enterprise Manager Cloud Control Console
- Editing and Updating Operation Plans with EMCLI Command
- Adding and Deleting Operation Plan Tags with EMCLI Commands

5.2.3.1 Editing and Updating Operation Plans with Enterprise Manager Cloud Control Console

To edit and update an operation plan with Enterprise Manager Cloud Control Console, follow these steps:

1. Log in to Enterprise Manager with `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. On the Systems page, click the name of the system (**Generic System**) for which this plan is being created.

   The Generic System page for that site is displayed.
4. On the system's home page, from the **Generic System** > **Site Guard** > **Operations**.

   The Site Guard Operations page is displayed.

   A list of configured operation plans is displayed in the Operation Plans tab.
5. Select an existing operation plan by clicking on the plan listed in the Plan Name column.

   The steps associated with the selected operation plan are listed in the Operation Details table located below the Operation Plan table. Each row in the table represents a step that is executed as part of the operation plan.
6. Select **View > Columns > Show All** to display all columns in the Operation Plan details table, including the additional columns for Script Id, Execution Group and Timeout (sec).

7. Click **Edit** to enable the options for updating and customizing the steps in the operation plan.
8. Select **Move Up** (green arrow), **Move Down** (red arrow), or **Delete Step** to sequence the steps in the operation plan.

   In addition, select the attribute from the **Error Mode**, **Execution Mode**, or **Run Mode** columns.

   An operation plan step cannot be moved out of the group it belongs to.
9. To use execution groups to sequence operation steps in a operation group:
   1. Set the **Execution Mode** for the operation group to **Parallel**.
   2. Select the **Execution Group** for each step in the operation group

   All the steps in an execution group are executed in parallel. All the steps that share an execution group will not begin execution until all the steps in the previous execution group have finished execution.

   If the execution mode is Serial, execution groups do not apply. The steps are always executed sequentially in the order they are listed.
10. To change the timeout for a step in the plan, type in a new timeout value for that step.
11. Click **Save** to update the plan.

5.2.3.2 Editing and Updating Operation Plans with EMCLI Command

To edit or update the operation plan, run the following emcli commands in the command-line interface:

1. Get the list of configured operation plans by running the following command:

```
emcli get_operation_plans
        [-name="name_of_the_operation_plan"]
        [-operation="type_of_operation"]
        [-system_name="name_of_the_system"]
        [-primary_system_name="name_of_the_primary_system"]
        [-standby_system_name="name_of_the_standby_system"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-name`	The name of the operation plan.
`-operation`	The name of the operation. For example, `switchover`, `failover`, `start`, `stop`, `openforvalidation`, or `reverttostandby`. This is an optional parameter. If you do not specify this parameter, then all the operation plans will be listed.
`-system_name`	The name of system used in the operation plan. If you specify this value, then you do not need to specify values for `-primary_system_name` and `-standby_system_name`.

Parameter	Description
-primary_system_name	The name of primary system used in the operation plan. You can specify the values for this parameter instead of the value -system_name. You can also use the -standby_system_name parameter for better filtering.
-standby_system_name	The name of the standby system used in the operation plan. You can specify the value for this parameter instead of the value for -system_name. The -primary_system_name parameter can also be additionally used for better filtering.

2. Get the details of an operation plan that you want to update by running the following command:

```
emcli get_operation_plan_details
      -name="name_of_the_operation_plan"
```

Parameter	Description
-name	The name of the operation plan.

3. Update the plan by running the following command:

```
emcli update_operation_plan
        -plan_name="name of the plan"
        -step_number="plan step number to update"
        -target_host="name of the target host"
        -target_name="name of the target"
        [-error_mode="the error mode"]
        [-enabled="flag specifying whether the step should be enabled"]
        [-execution_mode="execution mode"]
        [-execution_group="when execution_mode is parallel, then targets
sharing the same execution group will execute in parallel"]
        [-timeout="timeout in seconds"]
        [-move="direction in which to move step"]
        [-delete "flag specifying whether step should be deleted"]
```

Note: [ ] indicates that the parameter is optional.

Parameter	Description
-plan_name	The name of the operation plan.
-step_number	The number of the step that should be updated.
-target_host	The name of the system. Updates all the steps related to this target host.
-target_name	The database target name.
-error_mode	The function of the operation. For example:stop or continue.
-enabled	Enter true or false.
-execution_mode	The execution mode. For example: Serial or Parallel When set to Parallel, then targets sharing the same execution group execute in parallel.

Parameter	Description
-execution_group	The execution group (a value between 1 and n, where n is the number of targets in the bucket)
-timeout	The timeout in seconds for the execution of the step. Value must be between 1 and 86400 (24 hours).
-move	Change the order by specifying Up or Down.
-delete	Whether you want to delete steps. Enter true or false.

5.2.3.3 Adding and Deleting Operation Plan Tags with EMCLI Commands

You can assign tags (alphanumeric identifier strings) to operation plans, or delete tags already assigned to operation plans, as follows:

1. To assign one or more tags to an existing operation plan run the following emcli command in the command-line interface:

```
emcli add_operation_plan_tags
         -name="name_of_the_operation_plan"
         -tags="names_of_tags separated by ;"
```

Parameter	Description
-name	The name of the operation plan.
-tags	A semicolon-separated list of tags to add to the operation plan. The comma (,) is an invalid character.

2. To delete one or more tags assigned to an existing operation plan run the following emcli command in the command-line interface:

```
emcli delete_operation_plan_tags
         -name="name_of_the_operation_plan"
         -tags="names_of_tags separated by ;"
         -all
```

Parameter	Description
-name	The name of the operation plan.
-tags	A semicolon-separated list of tags to add to the operation plan. The comma (,) is an invalid character.
-all	Deleted all tags in the operation plan. Optional. This flag overrides all values passed to the tags argument.

5.2.4 Deleting an Operation Plan

To delete an operation plan, use one of the following methods:

- Deleting an Operation Plan with Enterprise Manager Cloud Control Console
- Deleting an Operation Plan with Command-Line Interface

5.2.4.1 Deleting an Operation Plan with Enterprise Manager Cloud Control Console

To delete an operation plan with Enterprise Manager Cloud Control Console, follow these steps:

1. Log in to Enterprise Manager with EM_SG_ADMINISTRATOR role privileges.

2. From the Targets menu, click **Systems**.

   The Systems page is displayed.

3. On the Systems page, click the name of the system (**Generic System**) for which this plan is being created.

   The Generic System page for that site is displayed.

4. On the system's home page, from the **Generic System** > **Site Guard** > **Operations**.

   The Site Guard Operations page is displayed.

   A list of configured operation plans is displayed in the Operation Plans tab.

5. Select an existing operation plan by clicking on the plan listed in the Plan Name column.

6. Click **Delete** to delete the selected operation plan.

   A confirmation pop-up window appears. Click **Yes** to confirm the action.

5.2.4.2 Deleting an Operation Plan with Command-Line Interface

To delete an operation plan, run the following `emcli` command in the command-line interface:

```
emcli delete_operation_plan
         -name="name_of_the_operation_plan"
```

Parameter	Description
`-name`	The name of the operation plan.

5.3 Running Prechecks

Oracle Site Guard runs the Precheck utility before performing any operation, by default. You can also run the Precheck utility separately, before executing any Oracle Site Guard operations.

Oracle Site Guard performs the following Prechecks:

- Checks the agent status on all hosts involved in the operation.
- Checks if any new targets are added to the generic system after the operation plan is created.
- Checks if all targets involved in the operation plan exist in the Enterprise Manager repository.
- Detects if any targets are moved out or deleted from the generic system after the operation plan is created.
- Performs Storage Role Reversal.
- Runs Oracle Data Guard Broker Prechecks to ascertain whether the Database is ready for role reversal (for switchover/failover operation).
- Performs Database Role Checks.
- Performs Database Lag (Apply and Transport) Checks.
- Runs checks on ZFS storage appliances to assert the role-change readiness.

To run the Precheck utility, use one of the following methods:

- Running Precheck Utility with Enterprise Manager Cloud Control Console
- Running Precheck Utility with Command-Line Interface

5.3.1 Running Precheck Utility with Enterprise Manager Cloud Control Console

To run a Precheck utility with Enterprise Manager Cloud Control follow these steps:

1. Log in to Enterprise Manager Cloud Console as a user with `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. On the Systems page, click the name of the system (**Generic System**) for which the Prechecks are to be run.
4. Click **Generic System** > **Site Guard** > **Operations**. The **Site Guard Operations** page is displayed.
5. Select an operation plan from the list by clicking on the plan name from the list.
6. Click **Run Prechecks**.

   A dialog box is displayed. Click **Yes** to confirm the action.

To track the progress and results of the Precheck, click the **click here** link in the Confirmation pane at the top of the page, or navigate to **Enterprise** > **Provisioning and Patching** > **Procedure Activity**.

For more details about monitoring a procedure activity see Section 5.6, "Monitoring Oracle Site Guard Operations".

5.3.2 Running Precheck Utility with Command-Line Interface

To run the Oracle Site Guard Precheck utility with EMCLI, run the following command:

```
emcli run_prechecks
       -operation_plan="operation_plan_name"
       [-database_lag_checks="true"|"false"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-operation_plan`	Enter the name of your operation plan.
`-database_lag_checks`	Run database lag checks as part of Prechecks for all data guard configured databases. This parameter is optional. The default value is `true`.

5.4 Scheduling and Stopping Health Checks

To schedule a health check for an operation plan, use one of the following methods:

- Scheduling a Health Check with Enterprise Manager Cloud Control Console
- Scheduling a Health Check with EMCLI

- Stopping a Health Check with Enterprise Manager Cloud Control Console
- Stopping a Health Check with EMCLI

5.4.1 Scheduling a Health Check with Enterprise Manager Cloud Control Console

To schedule Health Checks with Enterprise Manager Cloud Control follow these steps:

1. Log in to Enterprise Manager Cloud Console as a user with `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. On the Systems page, click the name of the system (**Generic System**) for which the Prechecks are run.
4. Click **Generic System** > **Site Guard** > **Operations**.The **Site Guard Operations** page is displayed.
5. Select an operation plan from the list by clicking on the plan name from the list.
6. Click **Schedule Health Checks**.

   The Schedule Health Checks for operation plan dialog box is displayed.

   Configure the schedule for the health check.
7. Click **Save**.

To inspect the results for each Health Check, navigate to **Enterprise** > **Provisioning and Patching** > **Procedure Activity**.

For more information about monitoring procedure activity see Section 5.6, "Monitoring Oracle Site Guard Operations".

5.4.2 Scheduling a Health Check with EMCLI

If the Enterprise Manager job system cannot start the execution of a job within a time period equal to the scheduled time plus grace period, it sets the job status to Skipped. By default, health check jobs are scheduled with indefinite grace periods.

To schedule a Health Check with EMCLI, run the following command in the command-line interface:

```
emcli schedule_siteguard_health_checks
        -operation_plan={name of the operation plan}
        -schedule=
           {
             start_time:yyyy/MM/dd HH:mm;
             [tz:{java timezone ID};]
             [frequency:interval/weekly/monthly/yearly;]
             [repeat:tx;]
             [end_time:yyyy/MM/dd HH:mm;]
             [grace_period:xxx;]
           }
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
-operation_plan	Enter the name of your operation plan.
-schedule	The schedule for the health check. Enter the values for the following parameters: - start_time: the time when health checks should begin. - tz: the time-zone ID. This parameter is optional. - frequency: the frequency of the health check (once/interval/weekly/monthly/yearly). This parameter is optional. If the frequency is set to interval, then you must specify the values for the parameter repeat. If the frequency is set to weekly or monthly, then you must specify the weekdays. If the frequency is set to yearly, both days and months must be specified. - repeat: the frequency with which health checks have to be repeated. These values are required only if the frequency is set to interval. - days: the list of days, separated by commas. These values are required only if the frequency is weekly, monthly, or yearly. If frequency is set to weekly, then the valid range is 1 to 7. If the frequency is set to monthly or yearly, then valid range is 1 to 30. - months: the list of months, separated by commas. These values are required only if the frequency is yearly (valid range 1 to 12). - end_time: the end time for execution of health checks. This parameter is optional. - grace_period: the grace period in minutes. This parameter is optional. For example: Examples: start_time:2014/06/10 15:45 start_time:2014/10/29 2:00;frequency:interval;repeat:1d start_time:2014/08/10 01:00;frequency:interval;repeat:1w start_time:2014/08/10 01:00;frequency:weekly;days:6,7;grace_period:60;tz:America/New_York
-notify	If set, a health check report is mailed.
-email	The email address to use for notifications. This email address must be a configured email address for the current user.

A grace period is a period of time that defines the maximum permissible delay when attempting to start a scheduled job (all health checks are scheduled as jobs).

When configuring the initial delay (grace period) for a health check ensure that you correctly calculate the grace period.

5.4.3 Stopping a Health Check with Enterprise Manager Cloud Control Console

To stop a scheduled Health Check with the Enterprise Manager Cloud Control:

1. Log in to Enterprise Manager Cloud Console as a user with EM_SG_ADMINISTRATOR role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.

3. On the Systems page, click the name of the system (Generic System) for which the Prechecks are run.
4. Click **Generic System** > **Site Guard** > **Operations**.The **Site Guard Operations** page is displayed.
5. Select an operation plan from the list by clicking on the plan name from the list. This operation plan must already have a health check scheduled.
6. Click the **Stop Health Checks** button.
7. Click **Yes** in the confirmation dialog.

5.4.4 Stopping a Health Check with EMCLI

To stop a Health Check with EMCLI, run the following command in the command-line interface:

```
emcli stop_siteguard_health_checks
        -operation_plan={name of the operation plan}
```

Parameter	Description
`-operaton_plan`	The name of your operation plan.

5.5 Executing Oracle Site Guard Operation Plans

Use one of the following methods to start an operation plan:

- Executing Oracle Site Guard Operation Plan with Enterprise Manager Cloud Control Console
- Executing Oracle Site Guard Operation Plan with EMCLI Command

5.5.1 Executing Oracle Site Guard Operation Plan with Enterprise Manager Cloud Control Console

To execute an operation plan with Enterprise Manager Cloud Control console, complete the following tasks:

1. Log in to Enterprise Manager using the `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. On the Systems page, click the name of the system (**Generic System**) for which the operation plan is being executed.
4. On the Generic System page, click **Generic System** > **Site Guard** > **Operations**.

   The Site Guard Operations page is displayed.
5. Select an operation plan from the list.
6. Click **Execute Operation**.

   A dialog box is displayed.

   Select **Run Prechecks** check box (selected by default) to run Prechecks before executing the operation plan.
7. Click **Yes** to confirm the action.

To track the progress and results of the operation, click the **click here** link in the Confirmation pane at the top of the page, or navigate to **Enterprise** > **Provisioning and Patching** > **Procedure Activity**.

For more details about monitoring a procedure activity see Section 5.6, "Monitoring Oracle Site Guard Operations".

5.5.2 Executing Oracle Site Guard Operation Plan with EMCLI Command

To execute an operation plan, run the following `EMCLI` command in the command-line interface:

```
emcli submit_operation_plan
         -name="name_of_operation_plan"
         [-run_prechecks="true | false"]
         [-stop_primary="flag_specifying_whether_primary_site_to_be_stopped_
during_failover"]
         [-database_lag_checks="true"|"false"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-name`	The name of the operation plan.
`-run_prechecks`	The `run_prechecks` value (`true` or `false`). By default, the value of this parameter is `true`. If you set the value to `false`, Prechecks will not be executed.
`-stop_primary`	Whether to stop targets on primary site during a Failover operation. Set value `true` or `false`.
`-database_lag_checks`	Run database lag checks as part of Prechecks for all Data Guard configured databases. This parameter is optional. The default value is `true`.

5.6 Monitoring Oracle Site Guard Operations

To monitor an operation activity, use one of the following methods:

- Monitoring an Operation Plan with Enterprise Manager Cloud Control Console
- Monitoring an Operation Plan with EMCLI

5.6.1 Monitoring an Operation Plan with Enterprise Manager Cloud Control Console

This section contains the following topics:

- Viewing an Operation Activity
- Suspending, Resuming, or Stopping an Operation

5.6.1.1 Viewing an Operation Activity

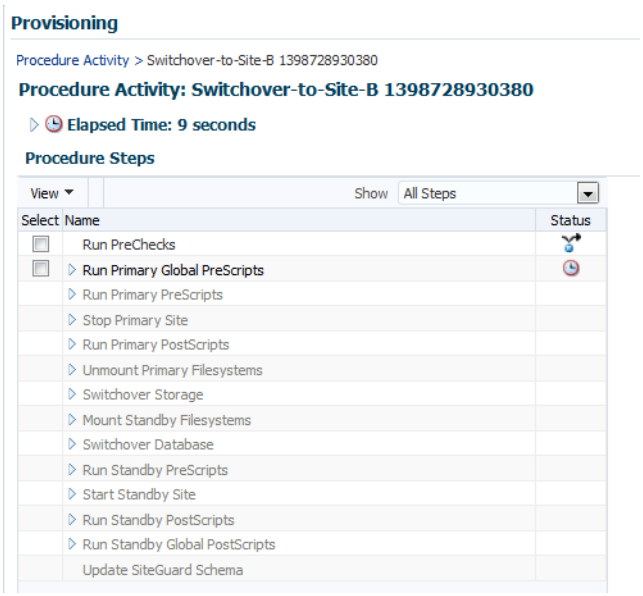
To monitor an operation activity submitted for execution, complete the following steps:

1. Log in to Enterprise Manager using the `EM_SG_ADMINISTRATOR` role privileges.

2. In the **Enterprise** menu, click **Provisioning and Patching** and then click **Procedure Activity**. The Provisioning page is displayed.
3. Alternately, navigate to a Site's operation activities page as follows:
   - On the Systems page, click the name of the system (Generic System) for which the operation plan was executed.
   - Click Generic System > Site Guard > Operations
   - Click the Operation Activities tab.
4. In the Procedure Activity table, click the name of the activity of operation you want to monitor.

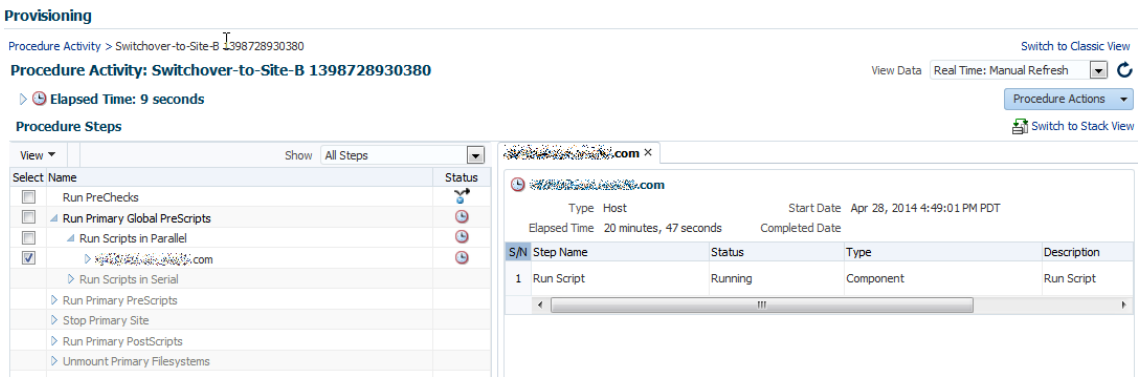
   The Procedure Activity page for that operation is displayed. See Figure 5–2.

Figure 5–2 Viewing an Operation Activity in the Enterprise Manager Cloud Control Console



5. Click the drop-down symbol next to the top-level step to view the sub-steps. The hierarchical steps of the activity are displayed. See Figure 5–3.

Figure 5–3 Viewing the Hierarchical Steps of an Operation Activity in the Enterprise Manager Cloud Control Console



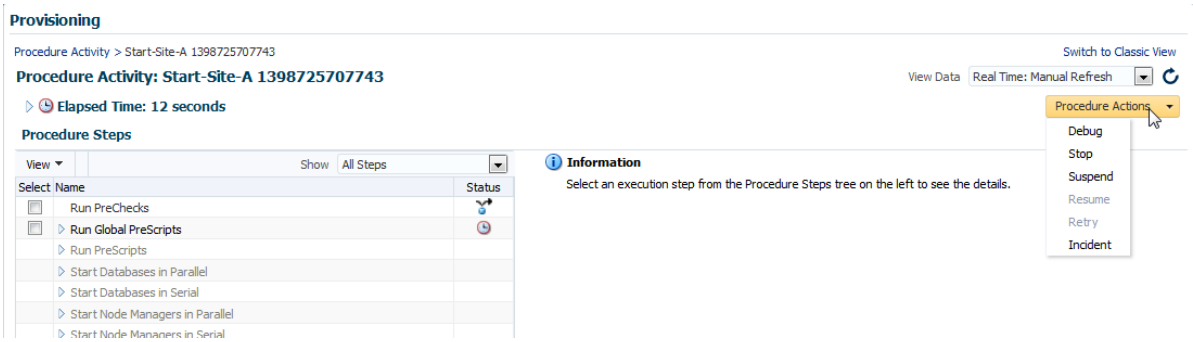
5.6.1.2 Suspending, Resuming, or Stopping an Operation

Operations in progress can be suspended and resumed later. You can also stop the operations that you do not want to resume. Follow these steps:

1. Log in to Enterprise Manager using the `EM_SG_ADMINISTRATOR` role privileges.
2. In the **Enterprise** menu, click **Provisioning and Patching** and then click **Procedure Activity**. The Provisioning page is displayed.
3. In the Procedure Activity table, click the name of the operation you want to monitor.

   The Procedure Activity page for that operation is displayed.
4. Click Procedure Actions located on the right-hand side of the page.
5. Click an action from the drop-down menu. See Figure 5–4.

Figure 5–4 Suspending, Resuming, or Stopping an Operation



5.6.2 Monitoring an Operation Plan with EMCLI

To monitor the status of an operation plan with EMCLI, complete the following steps in the command-line interface:

1. Get a list of procedures by running the following command:

```
emcli get_instances
       [-type={procedure type}]
       [-format=name:]
       [-script]
       [-noheader]
```

> **Note:** `[ ]` indicates that the parameter is optional.

Parameter	Description
`-type`	The procedure type. This parameter is optional.
`-format`	The output format of the list of instances. Enter `pretty`, `script`, or `csv`. This parameter is optional and the default value is `pretty`.
`-script`	Whether the output format is script or not. This parameter is optional.
`-noheader`	Do not display column headers. This parameter is optional.

2. Note down the GUID for the operation in the list of operations displayed by the emcli `get_instances` command.
3. Get the status of the operation:

```
emcli get_instance_status -instance="GUID"
```

5.7 Managing Execution Errors

Oracle Site Guard uses the Enterprise Manager Cloud Control deployment procedures framework to orchestrate disaster-recovery operations on remote hosts. The framework provides error management support through error modes.

Errors encountered during operation plan execution can be managed in multiple ways. Oracle Site Guard provides an option to define the error mode for individual steps, and also lets you enable or disable steps. For example, if an operation step has an associated error mode of 'Stop on Error', Oracle Site Guard stops the operation while executing that step.

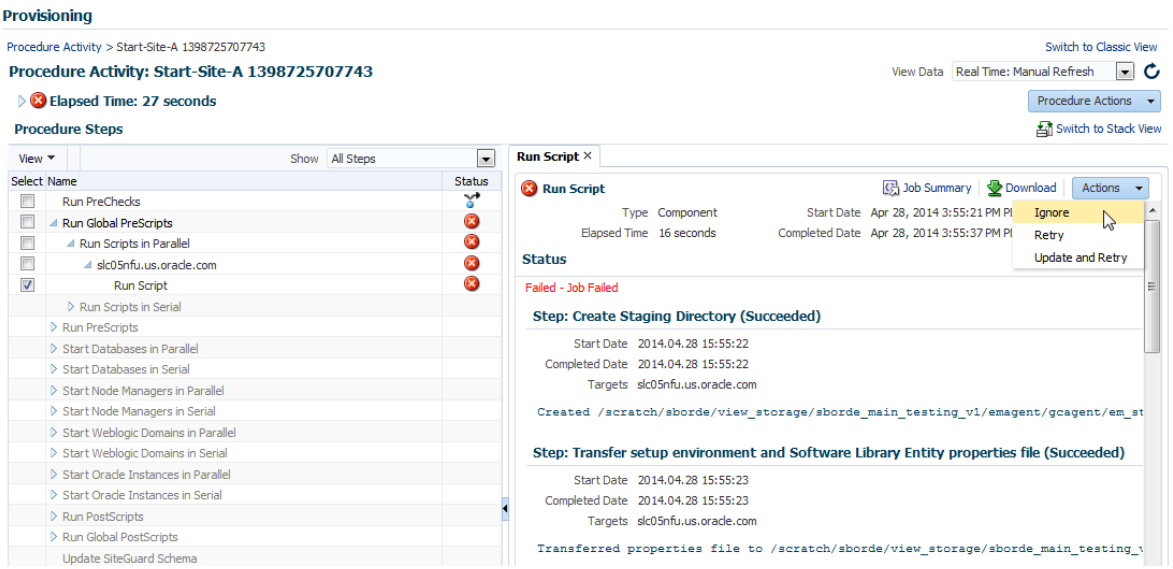
To retry that step and continue the operation, complete the following steps:

1. Log in to Enterprise Manager using the `EM_SG_ADMINISTRATOR` role privileges.
2. In the **Enterprise** menu, click **Provisioning and Patching** and then click **Procedure Activity**. The Provisioning page is displayed.
3. In the Procedure Activity table, click the name of the operation you want to change.

   The Procedure Activity page for that operation is displayed.
4. Click the drop-down symbol next to the top-level steps to view the sub-step. The hierarchical steps of the activity are displayed. Click the drop-down symbols at the hierarchical step until you reach the step that encountered the error.

   See Figure 5–5.

Figure 5–5 Status Details



5. Select the step, and click **Actions**. A drop-down menu is displayed.

6. From the drop-down menu, click the action that you want Oracle Site Guard to perform to manage this error.
   - Click **Ignore** to ignore the error, and continue with the other steps in the plan.
   - Click **Retry** to re-run the step.
   - Click **Update and Retry** to update the parameters for this step, and re-run the step.

   Note:

   - You cannot change the error mode of a step with the steps provided in this section. To change an error mode of a step, edit the operation as described in Section 5.2.3, "Editing and Updating Operation Plans."
   - For further information about how to diagnose execution errors, see Chapter 6, "Troubleshooting Oracle Site Guard."

5.8 Manually Reversing Site Roles

While using Oracle Site Guard to test disaster recovery work flows or isolated parts of work flows, you might encounter a situation where you need to manually reconfigure site roles, and explicitly designate a site as the primary site. When you designate a site as a primary site, or manually reconfigure site roles, the other site is automatically designated as the Standby site.

To manually reconfigure site roles, use one of the following methods:

- Manually Reversing Site Roles with Enterprise Manager Cloud Control Console
- Manually Reversing Site Roles with EMCLI

5.8.1 Manually Reversing Site Roles with Enterprise Manager Cloud Control Console

To manually reconfigure site roles with Enterprise Manager Cloud Control Console, complete the following steps:

1. Log in to Enterprise Manager Cloud Console as a user with `EM_SG_ADMINISTRATOR` role privileges.
2. From the Targets menu, click **Systems**.

   The Systems page is displayed.
3. Click the name of the system (**Generic System**) that you want to designate as the primary site.

   The Generic System page for the site is displayed.
4. On the home page of the system, from the Generic System menu, click **Site Guard**, and then click **Configure**.

   The Site Guard Configuration page is displayed.
5. Click **Set as Primary**.

5.8.2 Manually Reversing Site Roles with EMCLI

To manually reverse the roles of the primary and standby sites, run the following EMCLI commands in the command-line interface:

Note: For information about logging in to the Enterprise Manager Command-Line Interface, see *Oracle Enterprise Manager Command Line Interface Guide*.

```
emcli update_siteguard_configuration
         -primary_system_name="primary_system_name"
         -standby_system_name="standby_system_name"
         [-reverse_role="flag_specifying_whether_system_roles_to_be_reversed"]
         [-role="new role for the standby site"]
```

Note: `[ ]` indicates that the parameter is optional.

Parameter	Description
`-primary_system_name`	The name of the system that is the current primary site and needs to be designated as the new standby site.
`-standby_system_name`	The name of the system that is the current standby site and needs to be designated as the new primary site.
`-reverse_role`	Reverse roles between primary and standby systems. Optional. If specified, only one standby system can be specified with the `-standby_system_name` parameter.
`-role`	The new role for the site. Optional. One of the following:Primary, Standby, or ValidateStandby. Optional flag. ■ *Primary* - the roles of the primary and standby are swapped. ■ *Standby* - the role of the standby site will be changed from ValidateStandby to Standby. ■ *ValidateStandby* - the role of the standby site will be changed from Standby to ValidateStandby.

6

Troubleshooting Oracle Site Guard

This chapter describes situations that you might encounter when deploying or managing Oracle Site Guard in disaster-recovery topologies, and how to workaround common issues.

This chapter includes the following topics:

6.1 Operation Plan Failure

This section provides tips for troubleshooting the following operation-plan failure issues:

- Operation Plan Fails Because of Inability to Copy WLS Utility Script to Domain Directory

6.1.1 Targets Not Discovered in Operation Plan Workflow

Issue

Targets like Oracle Database or Oracle Fusion Middleware farm, which are part of the system, might not be discovered in the operation plan workflow.

Description and Solution

This problem may occur if you have added targets to the system after creating the operation plan. Oracle Site Guard only includes those targets that are part of the system during the creation of the operation plan. If you have added new targets, re-create the operation plan. If you have customized the plan, make note of those customizations before you re-create the plan, and re-customize the new plan again after it is re-created.

6.1.2 Oracle WebLogic Server Managed-Server Target Not Identified

Issue

The Oracle WebLogic Server managed-server target, which is part of the Oracle WebLogic Server domain, is not updated or identified by Oracle Site Guard when creating the operation plan workflow.

Description and Solution

Ensure that the managed servers are running, before performing an automatic discovery in Enterprise Manager Cloud Control. If the managed servers are already running but are not visible in Enterprise Manager, try refreshing the WebLogic Domain target to discover the managed servers.

6.1.3 Manual Intervention Needed for Hung Operation Step

Issue

When an operation step (for example, database switchover or failover, custom scripts, and so on) hangs, manual intervention is needed.

Description and Solution

Suspend the operation from the Enterprise Manager Cloud Control console. Do not stop the operation.

Manually correct the condition that caused the operation plan to hang. After completing the manual procedures, resume the operation to complete the Oracle Site Guard operation. Do not re-submit the operation.

If Oracle Site Guard determines that the components are already in the desired state, it performs a 'no operation' for all the start or stop or database switchover operations. This appropriately ends the process, and updates the sites with the required roles. If an operation step fails, and if manual intervention is needed to resolve the issue, you can either retry the failed step or confirm the manual step, and proceed with the execution of the operation.

Note: Restart or resume the operation after every manual intervention. Ensure that you complete the operations that you have started.

6.1.4 OPMN Managed System Components Not Discovered In Operation-Plan Workflow

Issue

OPMN Managed System Components, which are part of the system, might not be discovered in the operation-plan workflow.

Description and Solution

Oracle Site Guard discovers only those OPMN managed system components represented in Enterprise Manager Cloud Control. For example, OPMN Managed System Components like Oracle HTTP Server and Oracle Web Cache are represented in Enterprise Manager Cloud Control. These components are discovered as part of the Oracle Fusion Middleware farm.

6.1.5 Oracle RAC Database Not Discovered in Operation-Plan Workflow

Issue

Oracle RAC Database, which is part of the system, may not be discovered in the operation plan workflow.

Description and Solution

Oracle RAC Databases are grouped and represented under RAC Database target in the Enterprise Manager Cloud Control. When RAC database instances are discovered, the RAC database target is created, and all the database instances in the RAC deployment are grouped below the RAC database target. This issue may occur if individual RAC instance targets are added to the system, instead of the RAC database target. Oracle Site Guard cannot identify individual RAC instances.

6.1.6 Failure of Operation Step When Accessed with Sudo Privileges

Issue

Site Guard operation step fails with the error `stageOmsFileEntry (Error)`, when using credentials with `sudo` privileges. You might encounter this issue during the Precheck operation as well.

Description and Solution

When the credentials used by Site Guard are configured to use `sudo` privileges to run as `root`, the `sudo` privilege must be configured as PDP (Privilege Delegation Provider) on all the agents running on the respective hosts of the target.

PDP can be configured from Enterprise Manager Cloud Control console. To configure PDP, go to **Setup** > **Security** > **Privilege Delegation** in the Enterprise Manager Cloud Control console.

6.1.7 Error While Creating Operation Plan Indicating Credential Association Not Configured

Issue

While creating an operation plan, you might encounter an error indicating that a target in the site does not have any credentials associated with it, despite having created and associated credentials for that target.

Description and Solution

This issue occurs when there are two targets with identical names in Enterprise Manger, and one of the targets is part of the site. For example, if a database instance

target and a database system target are both named db1, and the database instance target is added to your site.

Delete the targets with identical names, and rediscover them. When you rediscover the targets ensure that each target name is unique across all of the Enterprise Manager targets.

6.1.8 Inability to Associate Credentials for Targets Added to a Site

Issue

While configuring credentials for Oracle Site Guard, you might face issues when you attempt to associate credentials for a target. This occurs because the credential configuration for that target type is not enabled, or because the target does not show up in the list of targets for a specific target type. This error is seen despite adding the target to the site.

Description and Solution

This issue occurs when there are two targets with identical names in Enterprise Manger, and one of the targets is part of the site. For example, if a database instance target and a database system target are both named db1, and the database instance target is added to your site.

Delete the targets with identical names, and rediscover them. When you rediscover the targets ensure that each target name is unique across all of the Enterprise Manager targets.

6.1.9 Error While Deleting Or Updating Operation Plans

Issue

While deleting or updating an operation plan, you might encounter the following error:

```
Error:User does not have FULL_JOB privileges on execution with guid
XXXXXXXXXXXXXXXX
```

Description and Solution

This might occur when a user does not have the necessary privileges to delete or update the operation plan.

Log in using the credentials that were used while creating the operation plan, and then delete or update the plan.

6.1.10 Error Indicating Inability to Create Scalar Value While Creating Operation Plan

Issue

While creating an operation plan, you might encounter an error such as the following:

```
oracle.sysman.ai.siteguard.model.exception.ConfigurationException: Cannot create
scalar value for name [PropertyType = DB_VERSION]. Value argument to the method
getScalarValue() is null
```

Description and Solution

Oracle Site Guard reads and uses the DB_VERSION property maintained by Enterprise Manager for database targets protected by Oracle Data Guard. The DB_VERSION property for the database can display as NULL in Enterprise Manager if a Data Guard

switchover or failover occurred outside of Enterprise Manager (for example, if a Data Guard switchover was performed with `DGMGRL` or Site Guard.)

To correct this issue with Enterprise Manager Cloud Console, log in to the Data Guard Administration page of the database target, and reset the `DataGuardStatus` property from `NULL` to `true`. On resetting the `DataGuardStatus` property, the other Data Guard related properties are automatically refreshed.

6.1.11 Error While Creating Operation Plan Indicating Missing Node Manager Credentials

Note: This issue and workaround are specific to Site Guard 12.1.0.7.

Issue

While creating an operation plan, you might encounter an error such as the following:

```
Credential association for credential type NODEMANAGER is missing for target host_
name belonging to system site_name.
```

Description and Solution

In Enterprise Manager, the Node Manager of a host is not a target type, and therefore, Enterprise Manager does not directly interact with it. Oracle Site Guard, on the other hand, interacts with the Node Managers of hosts for managing disaster recovery operations of Oracle Fusion Middleware components. For this reason, Node Manager credentials must be configured and associated while configuring Oracle Site Guard. Since Enterprise Manager does not recognize Node Manager as a target type, you must create host credentials to be used with the node managers running on host targets, and associate these credentials with Oracle Site Guard using the Oracle Site Guard Credential Configuration page.

6.1.12 Error Indicating Inability to Stage SWLIB Artifacts Due To Insufficient Disk Space on Target Host

Issue

An operation plan may fail with an error similar to the following because of problems with disk space checks on a remote target host:

```
Value of property oracle.sysman.core.swlib.disableFreeSpaceOnDestCheck:falseERROR
[Wed Jun 03 07:29:31 PDT 2015]: Parameter validation failure. Reason: The space on
the destination host 'myhost.com' is not sufficient to stage the entity.
```

Description and Solution

The short-term solution to this issue is to ensure that the `/tmp` directory on the remote host has enough disk space available and then to disable the disk space check for Enterprise Manager jobs using `emcli`:

```
emctl set property -name oracle.sysman.core.swlib.disableFreeSpaceOnDestCheck
-value true
```

A more permanent solution to this issue is to inspect the Enterprise Manager logs (`emom.log` and `emoms.trc`) and determine the root cause for why this failure is occurring and fix that. The following example from the `emoms.trc` log file illustrates a disk space check failed on one particular VM host:

```
2015-06-03 10:53:16,628 [RJob Step 3818744] WARN swlib.storage logp.251 -
Unable to retrieve disk space details from agent myhost.com:/tmp/JOB_
17161DC66E0E5053BA46F40AE165',
output=[Error occurred during initialization of VM. Could not reserve enough space
for object heap
```

To determine the location of these log files, see section "Locating and Configuring Enterprise Manager Log Files" in the Enterprise Manager Cloud Control Administrator's Guide.

6.1.13 Operation Plan Fails Because of Inability to Copy WLS Utility Script to Domain Directory

Issue

An operation plan may fail because Site Guard fails to copy the WebLogic Server-related utility script (`siteguard_python_util.py`) to the WebLogic Server domain directory.

Description and Solution

This problem can occur if you use Privilege Delegation for the credential used to access the target host where the WebLogic Server resides. During WebLogic start/stop operations, Site Guard stages scripts to this host and then copies these scripts to the WebLogic Server domain directory. This copy process can fail if privilege delegation has not been set up correctly.

To avoid this issue, ensure that privileged credential delegation is correctly configured. For information about configuring privileged delegation for targets, see Oracle Enterprise Manager documentation. After this issue is corrected, you must delete the `siteguard_python_util.py` file from the WebLogic Server domain directory before you retry the failed operation.

6.2 Switchover or Failover Operations Failure

This section provides tips for troubleshooting the following issues that you may encounter during switchover or failover operations:

- WebLogic Administration Server Does Not Start After Performing Switchover or Failover Operation
- WebLogic Administration Server Fails to Restart After Performing Switchover or Failover Operations
- Host Not Available During Switchover or Failover Operations
- Switchover or Failover Operations Fail When Oracle RAC Database Instances Are Not Available

6.2.1 WebLogic Administration Server Does Not Start After Performing Switchover or Failover Operation

Issue

The WebLogic Administration Server might not start after performing switchover or failover operation. The output log file of the Administration Server reports an error, such as the following:

```
<Jan 19, 2012 3:43:05 AM PST> <Warning> <EmbeddedLDAP> <BEA-171520> <Could not
obtain an exclusive lock for directory: ORACLE_
```

```
BASE/admin/soadomain/aserver/soadomain/servers/AdminServer/data/ldap/ldapfiles.
Waiting for 10 seconds and then retrying in case existing WebLogic Server is still
shutting down.>
```

Description and Solution

The error appears in the Administration Server log file due to unsuccessful lock cleanup. To fix this error, delete the `EmbeddedLDAP.lock` file (located at, `ORACLE_BASE/admin/`*`domain_name`*`/aserver/`*`domain_name`*`/servers/AdminServer/data/ldap/ldapfiles/`).

There may be multiple WebLogic Administration Server lock files that need be deleted. Repeat the process by attempting to start the WebLogic Administration Server and identifying each stale lock file that must be deleted.

6.2.2 WebLogic Administration Server Fails to Restart After Performing Switchover or Failover Operations

Issue

The WebLogic Administration Server might not start after performing switchover or failover operation. The Administration Server output log file reports the following error:

```
<Sep 16, 2011 2:04:06 PM PDT> <Error> <Store> <BEA-280061> <The persistent store
"_WLS_AdminServer" could not be deployed: weblogic.store.PersistentStoreException:

[Store:280105]The persistent file store "_WLS_AdminServer" cannot open file _WLS_
ADMINSERVER000000.DAT.>
```

Description and Solution

This error might appear due to the locks from Network File System (NFS) storage. You must clear the NFS locks with the NFS utility of the storage vendor. You may also copy the `.DAT` file to a temporary location, and copy it back, to clear the locks.

6.2.3 Host Not Available During Switchover or Failover Operations

Issue

Some host on the new primary system might not be available, or might be down while performing switchover or failover operation. In such situations, Oracle Site Guard cannot perform any operation on these hosts.

Description and Solution

If the services running on these hosts are not mandatory, and the site can still be functional and active with the services running on the other nodes, the steps pertaining to the hosts, which are down, can be disabled by updating the operation plan. The Oracle Site Guard workflow skips all the disabled steps from the workflow.

6.2.4 Switchover or Failover Operations Fail When Oracle RAC Database Instances Are Not Available

Issue

If all the Oracle RAC Database instances are down, the switchover or failover operation fails.

Description and Solution

While creating an operation plan, Oracle Site Guard determines the Oracle RAC Database instance on which the switchover or failover operation is performed. RAC deployment can have multiple instances, and it is possible that some of the instances are down. Before running the switchover or failover operation, ensure that at least one instance is running. You can identify the name of the RAC instance, which is used by Oracle Site Guard to perform the role reversal operation, by running the `get_operation_plan_details` command.

6.3 Precheck or Healthcheck Failure

This section provides tips for troubleshooting the following Precheck or Healthcheck failures:

- Failure of Prechecks
- Prechecks Hang When Oracle Management Agent Is Not Available
- Healthchecks Cannot Be Retired or Resumed

6.3.1 Failure of Prechecks

Issue

Prechecks fail, displaying the following error:

```
Nmo setuid status NMO not setuid-root (Unix-only)
```

Description and Solution

After installing the Oracle Management Agent, ensure that you run the `root.sh` script from the Enterprise Manager Cloud host and all hosts managed by Enterprise Manager, as described in the section "After You Install" in the *Oracle Enterprise Manager Cloud Control Basic Installation Guide*.

6.3.2 Prechecks Hang When Oracle Management Agent Is Not Available

Issue

If the Oracle Management Agent is down, Prechecks hang while trying to run commands on the remote host.

Description and Solution

Ensure that all hosts involved in an operation are active, and all the configured scripts are available on remote hosts in the configured locations. If the Oracle Management Agent cannot be reached for some reason, then check the log files from the Enterprise Manager Cloud Control console. If you have identified the hosts that are down, skip the Precheck operation on those hosts.

6.3.3 Healthchecks Cannot Be Retired or Resumed

Issue

Healthchecks that fail cannot be retried or resumed.

Description and Solution

If a healthcheck fails, it cannot be retried or resumed. Either wait for the next healthcheck or execute a standalone precheck to verify a Site Guard operation plan's validity.

6.4 Oracle WebLogic Server Failure

This section provides troubleshooting tips for the following Oracle WebLogic Server failure issues:

6.4.1 Node Manager Fails to Restart

Issue

Node Manager might fail to start due to an error, like the following:

```
<Sep 13, 2011 8:45:37 PM PDT> <Error> <NodeManager> <BEA-300033> <Could not
execute command "getVersion" on the node manager. Reason: "Access to domain 'base_
domain' for user 'weblogic' denied".>
```

Description and Solution

This problem might occur if you have changed the Node Manager credentials and then have not run `nmEnroll` to ensure that the correct Node Manager username and password is supplied to each managed server.

To ensure that the correct Node Manager user name and password have been supplied, connect to WLST and execute the `nmEnroll` command using the following syntax:

```
nmEnroll(domain_directory, node_manager_home)
```

For example:

```
nmEnroll('C:/oracle/user_projects/domains/prod_domain',
'C:/oracle/wlserver_10.3/common/nodemanager')
```

Note: Restart Node Manager for the changes to take effect.

6.4.2 Node Manage Start or Stop Fails Due to Missing `nodemanager.properties` File

Issue

Node Manager Start or Stop operations may fail because of a missing `nodemanager.properties` file.

Description and Solution

Site Guard inspects the nodemanager.properties file to determine various properties of the Node Manager when starting or stopping the Node Managers during disaster recovery operations. If this file is missing, Node Manager start and stop operation steps will fail.

The `nodemanager.properties` file is created at a predetermined location the first time a Node Manager is started. Ensure that you have manually started all involved Node Managers at least once prior to executing any Site Guard operation plans that affect those Node Managers.

6.4.3 Managed Server Fails to Start

Issue

The managed server does not start due to a connection failure of the WLS Administration Server in Enterprise Manager Cloud Control.

Description and Solution

To start the managed server, Oracle Site Guard requires the Administration Server and the Node Manager. To start and stop managed servers successfully, ensure that the Administration Server is running.

6.4.4 Oracle Site Guard Does Not Include Oracle WebLogic Server Instances That Are Migrated to a Different Host

Issue

Oracle Site Guard does not include the WebLogic Server instances that are migrated to a different host in the workflow.

Description and Solution

After you create the operation plan, Oracle Site Guard does not include the WebLogic Server instances involved in the operation plan that are migrated to different hosts, as a result of server migration.

After you complete the server migration, refresh the WebLogic Server farm target from the Enterprise Manager Cloud Control console to uptake the latest target changes in the farm. This step is mandatory for Enterprise Manager to resume its farm monitoring capabilities after any changes in the farm like server migration happens. After the farm target is refreshed, you need to recreate the Oracle Site Guard operation plans to include all of the farm targets in the Oracle Site Guard workflow. Any customizations made to operation plans must also be recreated.

6.4.5 Error Displayed While Creating Operation Plan

Issue

While creating an operation plan, you might see an error, like the following:

```
oracle.sysman.ai.siteguard.model.common.exception.DAOException:
For hostName:
[2606:b400:800:89:214:4fff:fe46:2d52] credential of type HOSTNORMAL does not exist
for siteName: System1
```

Description and Solution

If you do not configure the listen address for the WebLogic Server instances running on the hosts where multiple IP addresses are configured, WebLogic Server randomly

picks up an IP address, and reports that as the listen address. This IP address might not be a valid one, and it could be an issue when creating operation plans. To fix the issue with the Administration Console, configure WebLogic Server properly, with a resolvable listen address. After configuring Oracle WebLogic Server, restart the server, and re-discovered it again from the Enterprise Manager Cloud Control. For more information about listen address configuration, refer to the *Oracle Fusion Middleware Disaster Recovery Guide.*

6.4.6 WebLogic Administration Server Able to Communicate With Node Manager When Site Guard Cannot

Issue

Oracle Site Guard is unable to access the Node Manager even though the Weblogic Administrator is able to log in to the Node Manager.

Description and Solution

This issue occurs when the user name used to authenticate with Node Manager is randomly generate by the WebLogic Administration Server.

To correct this, complete the following steps:

1. Log in to the WebLogic Administration Server console.
2. Click **Domain** listed in the left-hand pane.
3. Click on the **Security** tab, and then click **Advanced link**.

   The Node Manager user name is displayed. The user name might appear to be a randomly generated string.
4. Update the Node Manager log-in credentials with the correct information.

6.4.7 Unable to Associate More Than One Node Manager Per Host

Issue

Oracle Site Guard is unable to associate different credentials for different Node Managers running on the same host.

Description

This is a limitation in the current version of Oracle Site Guard. The current version can only support one set of credentials for all the Node Managers running on a host. Ensure that all the Node Managers on a given host have been configured with an identical set of credentials.

6.4.8 Weblogic Server Password Updates and Site Guard Credentials

Issue

WebLogic Server start/stop operations in Site Guard operation plans may fail after a WebLogic Server administration password update. This can occur even if Site Guard credential for the WebLogic Server target has been updated with the new password.

Description and Solution

In order for the updated Site Guard credentials to work with the updated WebLogic Server password, the WebLogic Administration Server must be restarted for the new password to be applicable for the administration functions that Site Guard performs. After each WebLogic Server password change, update the Site Guard credential and restart the WebLogic Administration Server.

6.5 Database Failure

This section provides tips for troubleshooting the following issues related to database operation failure:

- Prechecks for Database Switchover and Database Failover Operations Fail
- Databases Protected by Data Guard Included in the Incorrect Operation-Plan Category
- Database Is Not Accessible When Opening a Site for Standby Validation

6.5.1 Prechecks for Database Switchover and Database Failover Operations Fail

Issue

The Prechecks for database switchover or database failover operations fail, and display the following error:

```
Database Status:
DGM-17016: failed to retrieve status for database "racs"
ORA-16713: the Data Guard broker command timed out
```

Description and Solution

This error might occur if the Data Guard Monitor process (DMON) in the target database instance is down.

> **Note:** The Data Guard Monitor process (DMON) is part of the Oracle Data Guard Broker.

If this error occurs, restart the database instance, and ensure that the DMON process is running. You can also see the database log file for DMON-process errors. Use the `CommunicationTimeout` parameter to select an appropriate time-out value for the environment. For more information, see "CommunicationTimeout" in *Oracle Data Guard Broker*.

6.5.2 Databases Protected by Data Guard Included in the Incorrect Operation-Plan Category

Issue

Oracle Site Guard adds the Oracle Data Guard protected database targets to the Start/Stop category instead of Switchover/Failover category of the operation plan.

Description and Solution

Oracle Site Guard uses the `DataGuardStatus` property maintained by Enterprise Manager for database targets to determine whether the database is protected by Data Guard. This determines which operation plan category the database is added to. If the value of this property is `NULL` then Site Guard assumes that the database is not protected by Data Guard and adds the database target to the Start or Stop category of the operation plan, instead of the Switchover or Failover category.

The `DataGuardStatus` property for the database can display as `NULL` in Enterprise Manager if the Data Guard switchover or failover occurs outside of Enterprise Manager. For example, a Data Guard switchover is performed with `DGMGRL` or Site Guard.

Using the Enterprise Manager Cloud Console, log in to the Data Guard Administration page of the database target. Upon logging in, the Data Guard related properties are automatically refreshed.

6.5.3 Database Is Not Accessible When Opening a Site for Standby Validation

Issue

After opening a Site Guard site in Standby Validation mode, one or more databases in the site are not accessible even though a database snapshot has been created.

Description and Solution

This can occur if the standby database does not have a snapshot service associated with the database. When configuring the standby site database, ensure that you have specifically created a separate snapshot service for the database so that the database snapshots can be accessed in Standby Validation mode. Refer to Oracle Database documentation for details on configuring services for databases.

6.6 Storage Failures

This section provides tips for troubleshooting the following issues related to storage and storage appliances:

- Attempt to Log In to ZFS Storage Appliance Might Fail During Execution of Operation Plan
- Storage Role Reversal Operation Might Fail During Execution of Operation Plan While Deleting Empty Project on Target Appliance
- Storage Role Reversal Operation Might Fail During Execution of Operation Plan While Executing 'confirm reverse'
- ZFS Storage Role Reversal Operation Might Fail During Execution of Operation Plan Because of Insufficient Privileges
- Remote Replication Targets on Source ZFS Storage May List Multiple Target Appliances With The Same Name During Replication Configuration
- ZFS Storage Role Reversal May Fail If Storage Scripts Are Configured to Use Physical (Non-Portable) Addresses for Clustered ZFS Appliances

6.6.1 Attempt to Log In to ZFS Storage Appliance Might Fail During Execution of Operation Plan

Issue

During a storage switchover or failover step of an Oracle Site Guard operation, logging into a ZFS appliance might fail, and you might see the following error in the log file generated by the `zfs_storage_role_reversal.sh` script:

```
Wrong credentials. Make sure that the given credentials are correct and
does not contain any special characters.
```

Description and Solution

This occurs if the password for the ZFS appliance credential contains special characters. Update the appliance password so that it does not contain special characters. Then, update the storage appliance credentials in the Enterprise Manager Credential Management Framework, and retry the operation step.

6.6.2 Storage Role Reversal Operation Might Fail During Execution of Operation Plan While Deleting Empty Project on Target Appliance

Issue

During a storage switchover or failover step of an Oracle Site Guard operation, storage role reversal operation might fail, and you might see the following error in the log file generated by the `zfs_storage_role_reversal.sh` script:

```
Error: The action could not be completed because the the target (or one of its
descendants) has the 'nodestroy' property set. Turn off the property for '1_test'
and try again.
```

Description and Solution

This occurs if the project has the `nodestroy` property set. This property is called as **Prevent destruction** in the Enterprise Manager Cloud Control interface.

Turn off this property and retry the operation step.

6.6.3 Storage Role Reversal Operation Might Fail During Execution of Operation Plan While Executing 'confirm reverse'

Issue

During a storage switchover or failover step of an Oracle Site Guard operation, storage role reversal operation might fail while executing `confirm reverse`, and you might see the following error in the log file generated by the `zfs_storage_role_reversal.sh` script:

```
Error: The action could not be completed because the mountpoint of '<project_
name>/<share_name>' would conflict with that of '<project_name>/<share_name>'
(/export/<project_name>/<share_name>). Change the mountpoint of '<project_
name>/<share_name>' and try again.
```

This occurs if at least one of the shares inside all available packages for a given project, has exported as file system. Make sure that the `exported` property of all shares inside all packages for a given projects is turned off.

6.6.4 ZFS Storage Role Reversal Operation Might Fail During Execution of Operation Plan Because of Insufficient Privileges

Issue

During a storage switchover or failover step of an Oracle Site Guard operation, ZFS storage role reversal operation might fail because the credentials used to perform ZFS operations do not have the necessary privileges to perform these ZFS operations.

Description and Solution

Ensure that the credentials used for ZFS operations are assigned the roles/privileges required for performing ZFS storage role reversal. Refer to the ZFS storage configuration section of this guide for additional details.

6.6.5 Remote Replication Targets on Source ZFS Storage May List Multiple Target Appliances With The Same Name During Replication Configuration

Issue

When attempting to set up a replication configuration (action) on source ZFS storage appliance, you may see multiple instances of the same replication targets in the drop-down list. This is a known ZFS issue.

Description and Solution

Only one of these instances of the target appliance will actually work as a valid target appliance. The other invalid instances will not work and the replication configuration for those instances cannot be successfully saved. Try creating a configuration with each instance of the target appliance to determine which configuration succeeds. Note that creating a configuration or determining which instance succeeds is manual at storage level.

6.6.6 ZFS Storage Role Reversal May Fail If Storage Scripts Are Configured to Use Physical (Non-Portable) Addresses for Clustered ZFS Appliances

Issue

ZFS storage role reversal scripts may fail with errors like “Replication action not found for given project on <source> appliance” if they are configured with source and target appliance hostnames that are physical. This is especially true in the case of clustered (highly available) ZFS appliances.

Description and Solution

Physical hostnames or IP addresses are not relocated in a storage cluster when services failover from one storage head to another. If you use these physical addresses in your script configuration, and the storage appliance services relocate to a different head during an HA event, the storage script will be unable to find replication action id and its UUID.

Ensure that you use *management interfaces* (not physical interfaces) when configuring the source and target hostnames or IP addresses for Site Guard ZFS storage scripts.

7

Oracle Site Guard Command-Line Interface

Oracle Site Guard uses the Enterprise Manager Command Line Interface (EMCLI) to manage Site Guard configuration from the command line, or from batch programs or scripts.

This chapter lists the following EM CLI commands used for configuring Site Guard:

- add_operation_plan_tags
- add_siteguard_aux_hosts
- add_siteguard_script_credential_params
- add_siteguard_script_hosts
- configure_siteguard_lag
- create_operation_plan
- create_siteguard_configuration
- create_siteguard_credential_association
- create_siteguard_script
- delete_operation_plan
- delete_operation_plan_tags
- delete_siteguard_aux_host
- delete_siteguard_configuration
- delete_siteguard_credential_association
- delete_siteguard_lag
- delete_siteguard_script
- delete_siteguard_script_credential_params
- delete_siteguard_script_hosts
- get_operation_plan_details
- get_operation_plans
- get_siteguard_aux_hosts
- get_siteguard_configuration
- get_siteguard_credential_association
- get_siteguard_health_checks
- get_siteguard_lag

- get_siteguard_script_credential_params
- get_siteguard_script_hosts
- get_siteguard_scripts
- get_siteguard_supported_targets
- run_prechecks
- schedule_siteguard_health_checks
- stop_siteguard_health_checks
- submit_operation_plan
- update_operation_plan
- update_siteguard_configuration
- update_siteguard_credential_association
- update_siteguard_lag
- update_siteguard_script

Note: EMCLI commands are case-sensitive.

For more information about EMCLI, see *Oracle Enterprise Manager Command Line Interface*.

7.1 add_operation_plan_tags

Adds tags to the operation plan.

A tag allows grouping and searching operation plans across sites.

Format

```
emcli add_operation_plan_tags
          -plan_name="Name of the operation plan"
          -tags="names of the tags separated by ;"
```

Parameter	Description
-plan_name	Name of the operation plan
-tags	Semicolon-separated list of tags to be added to the operation plan. The comma (,) is an invalid character.

Example 7–1 Adding Operation Plan Tags

```
emcli add_operation_plan_tags -plan_name="austin-switchover-plan" -tags="rack1_
austin;created_by_john"

emcli add_operation_plan_tags -plan_name="austin-switchover-plan" -tags="created_
by_john"
```

See Also: create_operation_plan and delete_operation_plan_tags.

7.2 add_siteguard_aux_hosts

Associates new auxiliary hosts to a Site Guard system.

An auxiliary host can be any host that is not part of the system but is managed by Enterprise Manager Cloud Control. These hosts can be used to execute any script. Any other targets running on this host will not be part of Site Guard operation plan(s).

Format

```
add_siteguard_aux_hosts
          -system_name="sytem name"
          -host_name="host name"
```

Parameter	Description
-system_name	Name of the system.
-host_name	Name of the host.

Example 7–2 Adding Auxiliary Hosts

```
emcli add_siteguard_aux_hosts
       -system_name="austin-system"
       -host_name="host1.domain.com"

emcli add_siteguard_aux_hosts
       -system_name="austin-system"
       -host_name="host2.domain.com"
       -host_name="host3.domain.com"
```

See Also: delete_siteguard_aux_host and get_siteguard_aux_hosts.

7.3 add_siteguard_script_credential_params

Adds a named credential as a parameter for a Site Guard script. Values of user name and password of this credential can be accessed within the script.

Format

```
emcli add_siteguard_script_credential_params
        -script_id="id_associated_with_the_script"
        -credential_name="name_of_the_credential"
        [-credential_owner="credential_owner"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-script_id	The script ID.
-credential_name	The name of the credential.
-credential_owner	The credential owner details. You need not The values of this parameter if the owner of the credential is same as that of the logged in user.

Example 7–3 Adding Site Guard Script Credential Parameters

```
emcli add_siteguard_script_credential_params
       -script_id="1"
       -credential_name="NAMED_CREDENTIAL_X"
```

```
emcli add_siteguard_script_credential_params
       -script_id="2"
       -credential_name="NAMED_CREDENTIAL_Y"
       -credential_owner="SG_ADMIN"
```

See Also: delete_siteguard_script_credential_params and get_siteguard_script_credential_params.

7.4 add_siteguard_script_hosts

Adds a host to the Site Guard configuration scripts. You can add more than one host.

Format

```
emcli add_siteguard_script_hosts
         -script_id="script_id"
         -host_name="host_name"
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-script_id	The identification associated with the script.
-host_name	The host that you want to associate with the script. You can specify more than one host name.

Example 7–4 Adding Hosts

```
emcli add_siteguard_script_hosts
         -script_id="10"
         -host_name ="host1.domain.com"
```

See Also: create_siteguard_script and get_siteguard_script_hosts.

7.5 configure_siteguard_lag

Configures limit for Apply Lag and Transport Lag for one or all databases in a Site Guard system.

Format

```
emcli configure_siteguard_lag
        -system_name="system_name"
        -property_name="apply_lag or transport_lag"
        -value="maximum_lag_limit_in_seconds"
        [-target_name="database_target_name"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The system on which you want to configure the threshold limit.
-property_name	The property name. Valid values are apply_lag and transport_lag.
-value	The threshold value to be configured (in seconds).
-target_name	The database target name for which the threshold limit is configured. If this parameter is not specified, then the threshold value is applied to all databases of the system.

Example 7–5 Configuring Apply Lag and Transport Lag

```
emcli configure_siteguard_lag
       -system_name="example-system"
       -property_name="apply_lag"
       -value="1000"

emcli configure_siteguard_lag
       -system_name="example-system"
       -target_name="OID_db"
       -property_name="transport_lag"
       -value="2500"
```

See Also: get_siteguard_lag, update_siteguard_lag and delete_siteguard_lag.

7.6 create_operation_plan

Creates a new Site Guard operation plan.

Format

```
emcli create_operation_plan
         -system_name="name_of_the_system"
         [-primary_system_name="name_of_primary_system"]
         [-standby_system_name="name_of_standby_system"]
         [-operation="name_of_the_operation"]
         [-plan_name="name_of_the_operation_plan"]
         [-like="name_of_the_operation_plan_from_which_the_steps_are_to_be_
copied"]
         [-tags=list of tags separated by ; ]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system. This option is used for start or stop operations.
-primary_system_name	The name of your system associated with the primary site. This option is used for switchover or failover operations.
-standby_system_name	The name of your system associated with the standby site. This option is used for switchover or failover operations.

Parameter	Description
-operation	The function of the operation. Example: switchover, failover, start or stop.
-plan_name	The name of the operation plan.
-like	Name of the operation plan from which the steps are to be copied. If this option is specified, system name, operation, and role are ignored.
-tags	A semicolon-separated list of tags to delete from the operation plan. The comma (,) is an invalid character.

Example 7–6 Creating Operation Plans

```
emcli create_operation_plan
         -primary_system_name="austin"
         -standby_system_name="austin2"
         -operation="switchover"
         -name="austin-switchover-plan"


emcli create_operation_plan
         -system_name="austin"
         -operation="start"
         -name="austin-start-plan"
         -role="Primary"

emcli create_operation_plan
         -like="austin-start-plan"
         -name="austin-start-plan-copy"
```

See Also: get_operation_plans and submit_operation_plan.

7.7 create_siteguard_configuration

Creates a Site Guard configuration.

Format

```
emcli create_siteguard_configuration
         -primary_system_name="name_of_primary_system"
         [-standby_system_name="name_of_standby_system"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-primary_system_name	The name of the primary site system.
-standby_system_name	The name of the standby system. May be specified more than once.

Example 7–7 Creating Site Guard Configurations

```
emcli create_siteguard_configuration
         -primary_system_name="example1"
```

```
emcli create_siteguard_configuration
        -primary_system_name="example1"
        -standby_system_name="example2"
```

See Also: update_siteguard_configuration and delete_siteguard_configuration.

7.8 create_siteguard_credential_association

Associates the credentials with the targets in a site.

Format

```
emcli create_siteguard_credential_association
        -system_name="name_of_the_system"
        -credential_type="type_of_credential"
        -credential_owner="owner"
        [-target_name="name_of_the_target"]
        [-credential_name="name"]
        [-use_preferred_credential="true_or_false"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-credential_type	The type of the credential. Example: HostNormal, HostPrivileged, NodeManager, WLSAdmin, or DatabaseSysdba..
-credential_owner	The owner of the credential.
-target_name	The name of the target.
-credential_name	The name of the credential. If credential_name is not specified, then use_preferred_credential has to be set to true..
-use_preferred_credential	If you are using Preferred Credentials, then specify true. The default value is false. If you use the default value, then you must The -credential_name parameter to use named credentials.

Example 7–8 Creating Site Guard Credential Associations

```
emcli create_siteguard_credential_association
        -system_name="austin-system"
        -credential_type="HostNormal"
        -credential_name="HOST-SGCRED"
        -credential_owner="sysman"

emcli create_siteguard_credential_association
        -system_name="austin-system"
        -credential_type="HostPrivileged"
        -use_preferred_credential="true"
        -credential_owner="sysman"

emcli create_siteguard_credential_association
        -system_name="austin-system"
```

```
        -credential_type="HostNormal"
        -credential_owner="sysman"

emcli create_siteguard_credential_association
         -system_name="austin-system"
         -target_name="austin-database-instance"
         -credential_type="DatabaseSysdba"
         -credential_name="HOST-DBCRED"
         -credential_owner="sysman"
```

See Also: delete_siteguard_credential_association and update_siteguard_credential_association.

7.9 create_siteguard_script

Create scripts (Pre Script, Post Script and storage script) for the Site Guard configuration.

Format

```
emcli create_siteguard_script
        -system_name="name_of_the_system"
        -operation="name_of_the_operation"
        -script_type="type_of_the_script"
        -path="path_of_the_script"
        -role="role_associated_with_the_system"
        [-host_name="name_of_the_host_where_the_scripts_are_run"]
        [-component="path_of_the_entity_in_software_library"]
        [-runtime_script="if_prechecks_to_check_availability_of_this_script"]
        [-run_on="flag_specifying_the_host"]
        [-all_hosts="flag_to_run_script_on_all_the_hosts_in_the_system"]
        [-credential_type="type_of_the_credential"]
        [-credential_name="name_of_the_credential"]
        [-credential_owner="credential_owner"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-system_name`	The name of the system.
`-operation`	The name of the operation. Name of the operation: `Switchover`, `Failover`, `Start`, or `Stop`.
`-script_type`	The type of the script. It can be `Mount`, `UnMount`, `Global-Pre-Script`, `Global-Post-Script`, `Pre Script`, `Post-Script`, `Storage-Failover`, or `Storage-Switchover`.
`-path`	The path to the script.
`-role`	Flag to configure script based on the system role. By default, the script is configured for both primary and standby roles for a given system. For example: `Primary` or `Standby`.
`-host_name`	The name of the host where this script will be executed. Can be specified more than once.

Parameter	Description
-component	The path to the entity in the software library. If component is specified, path should contain only the file name and its parameters.
-runtime_script	The value is true or false. If the script is designated as a runtime script, Precheck will not verify the existence of script. This parameter is used when the script is dynamically mounted or generated as part of execution of operation plan. By default, all scripts staged from the software library are designated as runtime scripts. The default value for scripts that are not staged from software library is false.
-run_on	Whether the script needs to be executed on only one of the available hosts (enter any) or on all hosts (enter all). Default value is all.
-all_hosts	Flag to allow the script to run on all the hosts in the system. This parameter overrides the host_name. Enter true or false.
-credential_type	Specify HostNormal or HostPrivileged if you have root privileges.
-credential_name	The name of the credential that is used to execute this script. If the value for the parameter credential_name is not specified, then the value for the parameter credential_type needs to be specified.
-credential_owner	The owner of the credential. If target_storage_credential_name and source_storage_credential_name are specified then the attribute credential_owner must be specified.

Example 7–9 Creating Site Guard Scripts

```
emcli create_siteguard_script
          -system_name="austin-system"
          -operation="Switchover"
          -script_type="Precheck-Script"
          -role="Primary"
          -credential_type="HostNormal"
          -path="/tmp/prechecksscript"
          -all_hosts="true"

emcli create_siteguard_script
          -system_name="austin-system"
          -operation="Failover"
          -script_type="Post-Script"
          -role="Standby"
          -credential_name="MY_NAMED_HOST_CREDENTIAL"
          -path="/tmp/postscript"
          -host_name="host1.domain.com"
          -host_name="host2.domain.com"
          -run_on="any"
          -runtime_script="true"

emcli create_siteguard_script
          -system_name="austin-system"
          -operation="Switchover"
```

```
          -script_type="Pre-Script"
          -credential_type="HostNormal"
          -path="stop_mycomponent.sh"
          -component="/Components/MyScripts/LCM_Operations"
          -all_hosts="true"
          -role="Primary"

emcli create_siteguard_script
          -system_name="austin-system"
          -operation="Switchover"
          -script_type="Global-Pre-Script"
          -credential_type="HostNormal"
          -path="/tmp/prescript"
          -all_hosts="true"
          -target_storage_credential_name="SGCRED-TARGET-STORAGE"
          -source_storage_credential_name="SGCRED-SOURCE-STORAGE"
          -credential_owner="sysman"
```

See Also: update_siteguard_script, delete_siteguard_script, and get_siteguard_scripts.

7.10 delete_operation_plan

Deletes a Site Guard operation plan.

Format

```
emcli delete_operation_plan
         -plan_name="name_of_operation_plan"
```

Parameter	Description
-plan_name	The operation plan to delete.

Example 7–10 Deleting Operation Plans

```
emcli delete_operation_plan
         -plan_name="austin-switchover"
```

See Also: create_operation_plan and get_operation_plans.

7.11 delete_operation_plan_tags

Deletes tags to the operation plan. A tag allows grouping and searching of operation plans across sites.

Format

```
emcli delete_operation_plan_tags
        -plan_name="Name of the operation plan"
        [-tags="names of the tags separated by ;"]
        [-all="names of the tags separated by ;"]
```

Parameter	Description
-plan_name	The name of the operation plan.

Parameter	Description
-tags	A semicolon-separated list of tags to delete from the operation plan. The comma (,) is an invalid character.
-all	If specified, all tags of the operation plan are deleted. This value overrides any choices passed to the tags argument.

Example 7–11 Deleting Operation Plan Tags

```
emcli delete_operation_plan_tags -plan_name="austin-switchover-plan" -tags="rack1_
austin;created_by_john"

emcli delete_operation_plan_tags -plan_name="austin-switchover-plan" -all
```

See Also: add_operation_plan_tags, create_operation_plan, delete_operation_plan, get_operation_plans.

7.12 delete_siteguard_aux_host

Deletes an auxiliary host associated with a Site Guard system.

Format

```
emcli delete_siteguard_aux_host
        -system_name="system_name"
        [-host_name="name_of_the_host"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The system on which you are performing the operation.
-host_name	The name of the auxiliary host to delete. If it is not specified, then all auxiliary hosts associated with the system are deleted. **Note**: Ensure that the host name is part of the system specified in system_name.

Example 7–12 Deleting Auxiliary Hosts

```
emcli delete_siteguard_aux_host
       -system_name="austin-system"

emcli delete_siteguard_aux_host
       -system_name="austin-system"
       -host_name="example-host1.domain.com"

emcli delete_siteguard_aux_host
       -system_name="austin-system"
       -host_name="example-host2.domain.com"
```

See Also: add_siteguard_aux_hosts and get_siteguard_aux_hosts.

7.13 delete_siteguard_configuration

Deletes a Site Guard configuration. The entire configuration (scripts, credential associations, site associations, operation plans) pertaining to the specified system and all of the associated standby systems are deleted.

Formata

```
emcli delete_siteguard_configuration
        [-primary_system_name="name_of_the_primary_system"]
        [-standby_system_name="name_of_the_standby_system"]
        [-force="delete all Site Guard stale configurations"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-primary_system_name`	The name of the primary system.
`-standby_system_name`	The name of the standby system. If you do not specify this parameter, the Site Guard configuration of the specified primary system and all its standby system are deleted.
`-force`	Whether stale configuration(s) need to be deleted. Enter either `true` or `false`.

Example 7–13 Deleting Site Guard Configurations

```
emcli delete_siteguard_configuartion
         -primary_system_name="austin-system1"

emcli delete_siteguard_configuration
         -standby_system_name="austin2-system2"

 emcli delete_siteguard_configuration
         -force="true"
```

See Also: create_siteguard_configuration and get_siteguard_configuration.

7.14 delete_siteguard_credential_association

Deletes a credential association from the Site Guard configuration.

Format

```
emcli delete_siteguard_credential_association
         -system_name="name"
         -credential_type="type"
         [-target_name="name"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The system on which the service resides.
-credential_type	The credential type. It can be HostNormal, HostPrivileged, NodeManager, WLSAdmin, or DatabaseSysdba.
-target_name	The name of the target.

Example 7–14 Deleting Site Guard Credential Associations

```
emcli delete_siteguard_credential_association
         -system_name="austin-system"
         -credential_type="HostNormal"

emcli delete_siteguard_credential_association
         -system_name="austin-system"
         -credential_type="DatabaseSysdba"
         -target_name="austin-database-instance"
```

See Also: create_siteguard_credential_association, update_siteguard_credential_association, and get_siteguard_credential_association.

7.15 delete_siteguard_lag

Deletes values of Apply Lag and Transport Lag threshold configured for one or more Data Guard enabled databases of the system.

Format

```
emcli delete_siteguard_lag
         -system_name="system name"
         -property_name="lag value"
         [-target_name="database target name"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The system for which you want to configure the threshold limit.
-property_name	The property name. Valid values are apply_lag and transport_lag.
-target_name	The name of the target database for which the threshold limit is configured. If this parameter is not specified, then the threshold value is applied to all databases of the system.

Example 7–15 Deleting Apply Lag and Transport Lag

```
emcli delete_siteguard_lag
       -system_name="austin-system"
       -property_name="apply_lag"

emcli delete_siteguard_lag
       -system_name="austin-system"
       -target_name="OID_db"
```

```
-property_name="transport_lag"
```

See Also: update_siteguard_lag, configure_siteguard_lag, and get_siteguard_lag.

7.16 delete_siteguard_script

Deletes a script from the Site Guard configuration.

Format

```
emcli delete_siteguard_script
        -script_id="script id"
```

Parameter	Description
-script_id	The ID associated with the script.

Example 7–16 Deleting Site Guard Scripts

```
emcli delete_siteguard_script
        -script_id="10"
```

See Also: create_siteguard_script, get_siteguard_scripts, and update_siteguard_script.

7.17 delete_siteguard_script_credential_params

Deletes a named credential that is a parameter to a Site Guard script. Values of the user name and password of this credential can be accessed within the script.

Format

```
emcli delete_siteguard_script_credential_params
       -script_id="Id associated with the script"
       [-credential_name="name of the credential"]
       [-credential_owner="credential owner"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-script_id	The ID associated with the script.
-credential_name	The name of the credential. If this argument is not specified, all credentials associated with the script will be deleted.
-credential_owner	The owner of the credential. This parameter need not be specified if the owner of the credential is the same as the logged-in user.

Example 7–17 Deleting Site Guard Script Credential Parameters

```
emcli delete_siteguard_script_credential_params
       -script_id="1"
```

```
        -credential_name="NAMED_CREDENTIAL_X"

emcli delete_siteguard_script_credential_params
        -script_id="2"
        -credential_name="NAMED_CREDENTIAL_Y"
        -credential_owner="SG_ADMIN"

emcli delete_siteguard_script_credential_params
        -script_id="3"
```

See Also: add_siteguard_script_credential_params and get_siteguard_script_credential_params.

7.18 delete_siteguard_script_hosts

Deletes the host or hosts associated with a given script.

Format

```
emcli delete_siteguard_script_hosts
         -script_id="script id"
         -host_name="host_name"
```

Parameter	Description
-script_id	The ID associated with the script.
-host_name	The name of the host where this script will be executed. This parameter can be specified more than once.

Example 7–18 Deleting Site Guard Script Hosts

```
emcli delete_siteguard_script_hosts
         -script_id="10"
         -host_name="example-host.domain.com"
```

Output Columns

Step Number, Operation name, Target Name, Target Host, Error Mode

See Also: create_siteguard_script and add_siteguard_script_hosts.

7.19 get_operation_plan_details

Provides the step-by-step information for an operation plan.

Format

```
emcli get_operation_plan_details
         -plan_name="plan_name"
```

Parameter	Description
-plan_name	The name of the operation plan.

Example 7–19 Obtaining Operation Plan Details

```
emcli get_operation_plan_details
        -plan_name="austin-switchover"
```

See Also: create_operation_plan and get_operation_plans.

7.20 get_operation_plans

Lists all configured Site Guard operation plans.

Format

```
emcli get_operation_plans
       [-plan_name="name_of_the_operation_plan"]
       [-operation="type_of_operation"]
       [-system_name="name_of_the_system"]
       [-primary_system_name="name_of_the_primary_system"]
       [-standby_system_name="name_of_the_standby_system"]
       [-tags="tag names separated by ; ]"
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-plan_name`	The name of the operation plan.
`-operation`	The name of the operation. For example, `switchover`, `failover`, `start`, or `stop`. If you do not specify this parameter, then all the operation plans will be listed.
`-system_name`	The name of system used in the operation plan. If you These values, then the values for `-primary_system_name` and `-standby_system_name` need not be specified.
`-primary_system_name`	The name of primary system used in the operation plan. You can The values of this parameter instead of the values of `-system_name`. The `-standby_system_name` parameter can also be additionally used for better filtering.
`-standby_system_name`	The name of the standby system used in the operation plan. You can The values of this parameter instead of the values of `-system_name`. The `-primary_system_name` parameter can also be additionally used for better filtering.
`-tags`	Semicolon-separated list of tags to be added to the operation plan. The comma (,) is an invalid character.

Example 7–20 Obtaining Operation Plans

```
emcli get_operation_plans
       -operation="switchover"
       -system_name="austin-system"

emcli get_operation_plans
       -operation="switchover"
```

```
        -primary_system_name="austin-system"

emcli get_operation_plans
        -operation="failover"
        -standby_system_name="austin2-system"

emcli get_operation_plans
        -name="austin-switchover-plan"
        -system_name="austin-system"

emcli get_operation_plans
        -tags="rack1_austin"
```

Output Columns

Plan name, Operation name, Primary System Name, Standby System Name, Created On, Tags.

See Also: create_operation_plan and submit_operation_plan.

7.21 get_siteguard_aux_hosts

Get a list of all auxiliary hosts associated with a Site Guard system.

Format

```
emcli get_siteguard_aux_hosts
       -system_name="system_name"
```

Parameter	Description
-system_name	The system on which you are performing the operation.

Example 7–21 Listing Auxiliary Targets

```
emcli get_siteguard_supported_targets
       -system_name="example-system"
```

See Also: add_siteguard_aux_hosts and delete_siteguard_aux_host.

7.22 get_siteguard_configuration

Provides the Site Guard configuration.

Format

```
emcli get_siteguard_configuration
         [-system_name="name_of_the_system"]
         [-primary_system_name="name_of_the_primary_system"]
         [-standby_system_name="name_of_the_standby_system"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system used in the operation plan. If this is specified, then -primary_system_name and -standby_system_name should not be specified.
-primary_system_name	The name of the primary system.
-standby_system_name	The name of the standby system.

Output Columns

Primary System, Standby System(s)

Example 7–22 Obtaining Site Guard Configurations

```
emcli get_siteguard_configuartion
         -primary_system_name="austin-system"
         -standby_system_name="austin2-system"

emcli get_siteguard_configuration
         -system_name="austin-system"
```

See Also: create_siteguard_configuration and delete_siteguard_configuration.

7.23 get_siteguard_credential_association

Lists the credential associations configured for a system.

Format

```
emcli get_siteguard_credential_association
         -system_name="name_of_the_system"
         [-target_name="name_of_the_target"]
         [-credential_type="type_of_the_credential"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-target_name	The name of the target.
-credential_type	The type of the credential. One of HostNormal, HostPrivileged, NodeManager, WLSAdmin, or DatabaseSysdba.

Output Columns

Target Name, Credential Name, Credential Type.

Example 7–23 Obtaining Site Guard Credential Associations

```
emcli get_siteguard_credential_association
         -system_name="austin-system"
         -credential_type="HostNormal"
```

```
emcli get_siteguard_credential_association
         -system_name="austin-system"
         -target_name="austin-database-instance"
         -credential_type="DatabaseSysdba"
```

See Also: create_siteguard_credential_association and update_siteguard_credential_association.

7.24 get_siteguard_health_checks

Displays the schedule of health checks for an operation plan.

Format

```
emcli get_siteguard_health_checks
         -plan_name="name_of_the_operation_plan"
```

Parameter	Description
-plan_name	The name of the operation plan for which schedule of health checks has to be displayed.

Example 7–24 Obtaining Site Guard Health Checks

```
emcli get_siteguard_health_checks
         -plan_name="austin-switchover"
```

See Also: schedule_siteguard_health_checks, stop_siteguard_health_checks, and run_prechecks.

7.25 get_siteguard_lag

Retrieves configured limit for `apply_lag` and `transport_lag` for one or all databases of a system.

Format

```
emcli get_siteguard_lag
         -system_name="name_of_the_system"
         -property_name="lag_type"
         [-target_name="database_target_name"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-property_name	The name of the property. Valid values are `apply_lag` and `transport_lag`.
-target_name	The name of the database. If the database name is not specified, the property is obtained for all databases in the system.

Example 7–25 Obtaining Site Guard Lags

```
emcli get_siteguard_lag
        -system_name="austin-system"
        -property_name="apply_lag"

emcli get_siteguard_lag
        -system_name="austin-system"
        -target_name="OID_db"
        -property_name="transport_lag"
```

See Also: update_siteguard_lag, configure_siteguard_lag, and delete_siteguard_lag.

7.26 get_siteguard_script_credential_params

Provides all the credential parameters for a Site Guard script.

Format

```
emcli get_siteguard_script_credential_params
       -script_id="Id_associated_with_the_script"
       [-credential_name="name_of_the_credential"]
       [-credential_owner="credential_owner"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-script_id`	The ID associated with the script.
`-credential_name`	The name of the credential. If this argument is not specified, all credentials associated with the script will be deleted.
`-credential_owner`	The owner of the credential. This parameter need not be specified if the owner of the credential is the same as the logged-in user.

Example 7–26 Getting Site Guard Script Credential Parameters

```
emcli get_siteguard_script_credential_params
       -script_id="1"
       -credential_name="NAMED_CREDENTIAL_X"

emcli get_siteguard_script_credential_params
       -script_id="3"

emcli get_siteguard_script_credential_params
       -script_id="3"
       -credential_owner="SG_ADMIN"
```

See Also: add_siteguard_script_credential_params and delete_siteguard_script_credential_params.

7.27 get_siteguard_script_hosts

Lists the hosts in a Guard Site script.

Format

```
emcli get_siteguard_script_hosts
        -script_id="script_id"
```

Parameter	Description
-script_id	The ID associated with the script.

Output Columns

Host Name

Example 7–27 Obtaining Site Guard Script Hosts

```
emcli get_siteguard_script_hosts
        -script_id="10"
```

See Also: create_siteguard_script and add_siteguard_script_hosts.

7.28 get_siteguard_scripts

Gets the Site Guard scripts associated with the specified system.

Format

```
emcli get_siteguard_scripts
        -system_name="system_name"
        -operation="operation_name"
        -script_type="type_of_the_script"
        [-role="role_of_the_system"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-operation	The name of the operation. One of switchover, failover, start, or stop.
-script_type	The type of the script. One of mount, unmount, pre-script, post-script, global pre-script, global post-script, storage-failover, or storage-switchover.
-role	Filters the scripts based on the role associated with the system. One of Primary or Standby.

Output Columns

Script ID, Type, Operation, Path, Role.

Example 7–28 Obtaining Site Guard Scripts

```
emcli get_siteguard_scripts
        -system_name="austin-system"
        -operation="Switchover"
        -script_type="Pre-Script"
```

```
emcli get_siteguard_scripts
         -system_name="austin-system"
         -operation="Switchover"
         -script_type="Pre-Script"
         -role="Primary"
```

See Also: create_siteguard_script, delete_siteguard_script, and update_siteguard_script.

7.29 get_siteguard_supported_targets

Gets the list of all Site Guard supported targets in a system.

Format

```
emcli get_siteguard_supported_targets
       -system_name="system name"
       [-target_type="target type"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-target_type	The type of the target.

Example 7–29 Getting Supported Targets

```
emcli get_siteguard_supported_targets
          -system_name="austin-system"

emcli get_siteguard_supported_targets
          -system_name="austin-system"
          -target_type="weblogic"

emcli get_siteguard_supported_targets
          -system_name="austin-system"
          -target_type="database"
```

7.30 run_prechecks

Runs a Site Guard Precheck for an operation plan.

Format

```
emcli run_prechecks
         -plan_name="name_operation_plan"
         [-database_lag_checks="true or false"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-plan_name	The name of the operation plan.
-database_lag_checks	Run database lag checks as part of Prechecks for all Data Guard configured databases. One of true or false.

Example 7–30 Running Prechecks

```
emcli run_prechecks
          -plan_name="austin-switchover"

emcli run_prechecks
          -plan_name="austin-switchover"
          -database_lag_checks="true"
```

See Also: create_operation_plan, get_operation_plans, and submit_operation_plan.

7.31 schedule_siteguard_health_checks

Schedules health checks for an operation plan.

Format

```
emcli schedule_siteguard_health_checks
        -plan_name="name of the operation plan"
        -schedule= "start_time:yyyy/MM/dd HH:mm;
             tz:java timezone ID;
             frequency:interval/weekly/monthly/yearly;
             repeat:tx;
             end_time:yyyy/MM/dd HH:mm;
             grace_period:xxx;"
             [-notify="whether_to_send_email_notifications"]
             [-email="email_address_to_be_notified"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-plan_name	The name of the operation plan for which health checks have to be scheduled.

Parameter	Description
-schedule	The schedules at which health checks have to be scheduled. start_time - The time when health checks have to start executing. tz - The time-zone ID. frequency - Valid values are once/interval/weekly/monthly/yearly. If frequency is set to interval, then repeat has to be specified. If frequency is set to weekly or monthly, days has to specified. If frequency is set to yearly, both days and months have to specified. repeat - The frequency with which health checks have to be repeated. This is mandatory only if frequency is set to interval. days - The list of days separated by commas. This is required only if frequency is weekly, monthly, or yearly). If frequency is weekly, then valid range is 1 to 7. If frequency is monthly or yearly, then valid range is 1 to 30. months - The list of months separated by commas. This is required only if frequency is yearly. Valid range is 1 to 12. end_time - The end time for health check executions. If not specified, health checks will run indefinitely. grace_period - The grace period in minutes. If the value are set to false, Prechecks will not be executed.
-notify	Whether you want to be notified about the health-check report. If set to true, health check execution report are sent to the specified email address.
-email	The email address that needs to be used for notification of health-check report. This email address must be a configured email address for the current user.

Example 7–31 Scheduling Site Guard Health Checks

```
emcli schedule_siteguard_health_checks
          -plan_name="austin-switchover"
          -schedule="start_time:2014/06/10 15:45"

emcli schedule_siteguard_health_checks
          -plan_name="austin-switchover"
          -schedule="start_time:2014/10/29 2:00;frequency:interval;repeat:1d"
          -notify
          -email="admin@example.com"

emcli schedule_siteguard_health_checks
          -plan_name="austin-failover"
```

```
          -schedule="start_time:2014/08/10 01:00;frequency:interval;repeat:1w"

emcli schedule_siteguard_health_checks
          -plan_name="austin-failover"
          -schedule="start_time:2014/08/10
                    1:00;frequency:weekly;days:6,7;
                    grace period:60;tz:America/New_York"
```

See Also: get_siteguard_health_checks, stop_siteguard_health_checks, and run_prechecks.

7.32 stop_siteguard_health_checks

Stops all future health check executions of an operation plan.

Format

```
emcli stop_siteguard_health_checks
        -plan_name="name_of_the_operation_plan"
```

Parameter	Description
-plan_name	The name of the operation plan for which health check executions has to be stopped.

Example 7–32 Stopping Site Guard Health Checks

```
emcli stop_siteguard_health_checks
         -plan_name="austin-switchover"
```

See Also: schedule_siteguard_health_checks, get_siteguard_health_checks, and run_prechecks.

7.33 submit_operation_plan

Submits an operation plan for execution.

Format

```
emcli submit_operation_plan
         -plan_name="name_of_operation_plan"
         [-disable_run_prechecks="whether_or_not_to_run_prechecks"]
         [-stop_primary="whether_to_stop_the_primary_site_during_failover"]
         [-database_lag_checks="whether to run database lag checks"]
         [-database_trace_enable="whether to enable database tracing"]
         [-database_immediate_failover="whether to fail over the database
immediately"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-plan_name	The name of the operation plan.
-disable_run_prechecks	Not to run prechecks. One of true or false.

Parameter	Description
-stop_primary	Whether to stop targets on primary site during a Failover operation. One of true or false.
-database_lag_checks	Run database lag checks as part of Prechecks for all Data Guard configured databases. One of true or false.
-database_trace_enable	Send additional database trace messages to logs during Switchover or Failover operations. One of true or false.
-database_immediate_failover	Fail over the database immediately and do not apply redo logs. One of true or false.

Example 7–33 Submitting Operation Plans

```
emcli submit_operation_plan
         -plan_name="example-switchover"

emcli submit_operation_plan
         -plan_name="example-switchover"
         -disable_run_prechecks

emcli submit_operation_plan
         -plan_name="austin-switchover"
         -disable_run_prechecks="true"
         -database_trace_enable="true"

emcli submit_operation_plan
         -plan_name="austin-switchover"
         -database_lag_checks="true"

emcli submit_operation_plan
         -plan_name="austin-failover"
         -stop_primary="true"
         -database_immediate_failover="true"
```

See Also: "create_operation_plan" and get_operation_plans.

7.34 update_operation_plan

Updates a Site Guard operation plan.

Format

```
emcli update_operation_plan
        -plan_name="name of the plan"
        -step_number="plan step number to update"
        -target_host="name of the target host"
        -target_name="name of the target"
        [-error_mode="the error mode"]
        [-enabled="flag specifying whether the step should be enabled"]
        [-execution_mode="execution mode"]
        [-execution_group="when execution_mode is parallel, then targets sharing
the same execution group will execute in parallel"]
        [-timeout="timeout in seconds"]
        [-move="direction in which to move step"]
        [-delete "whether step should be deleted"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-plan_name	The name of the operation plan.
-step_number	The number of the step that should be updated.
-target_host	The name of the system. Specifying this will update all the steps related to this target host.
-error_mode	The function of the operation. One of stop or continue.
-enabled	One of true or false.
-execution_mode	The execution mode. One of Serial or Parallel.
-execution_group	The execution group of the target, all members of which to be executed in parallel, an integer between 1 and 10 with each group executed sequentially.
-timeout	Timeout in seconds for the execution of the step, between 1 second and 86400 seconds (24 hours).
-move	Change the order. One of Up or Down.
-delete	Whether you want to delete steps. One of true or false.

Example 7–34 Updating an Operation Plans

```
emcli update_operation_plan
         -name="austin-switchover"
         -step_number="1"
         -error_mode="Continue"
         -enabled="true"
         -execution_mode="Serial"
         -execution_group="2"
         -timeout="10800"

emcli update_operation_plan
         -name="austin-switchover"
         -step_number="5"
         -move="Up"

emcli update_operation_plan
         -name="austin-switchover"
         -target_host="myhost.domain.com"
         -error_mode="Continue"
         -enabled="true"

emcli update_operation_plan
         -name="example-switchover"
         -target_name="/Farm1/MyDomain"
         -delete="true"
```

See Also: create_operation_plan and get_operation_plan_details.

7.35 update_siteguard_configuration

Updates the Site Guard configuration to add additional standby systems. One primary system can be associated with one or more standby systems.

Format

```
emcli update_siteguard_configuration
         -primary_system_name="primary_system_name"]
         -standby_system_name="standby_system_name"]
         [-reverse_role="whether_to_reverse_system_roles"]
         [-role="new role of standby system"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-primary_system_name`	The name of the primary system.
`-standby_system_name`	The name of the standby system. This parameter can be specified more than once.
`-reverse_role`	Whether to reverse role of site from standby to primary. One of `true` or `false`. Default value is `false`. If this option is specified, only one standby system name can be submitted in the `-standby_system_name` parameter.
`-role`	The new role of the standby system. One of `Primary`, `Standby`, or `ValidateStandby`. If this option is specified, only one standby system name can be specified using `-standby_system_name`. If `Primary` is specified, roles of primary and standby systems will be swapped. If `Standby` is specified, role of standby system will be updated from Validate Standby to Standby. If `Validate Standby` is specified, role of standby system will be updated from `Standby` to `Validate Standby`.

Example 7–35 Updating Site Guard Configurations

```
emcli update_siteguard_configuartion
         -primary_system_name="austin-system"
         -standby_system_name="austin2-system"

emcli update_siteguard_configuration
         -primary_system_name="austin-system"
         -standby_system_name="austin2-system"
         -reverse_role

emcli update_siteguard_configuration
         -primary_system_name="austin-system"
         -standby_system_name="utah-system"
         -role="ValidateStandby"
```

See Also: create_siteguard_configuration and delete_siteguard_configuration.

7.36 update_siteguard_credential_association

Updates the credential association.

Format

```
emcli update_siteguard_credential_association
         -system_name="name_of_the_system"
         -credential_type="type_of_the_credential"
         -credential_owner="credential_owner"
         [-target_name="name_of_the_target"]
         [-credential_name="name_of_the_credential"]
         [-use_preferred_credential="whether to use a preferred credential"]
```

Note: [] indicates that the parameter is optional or conditionally optional.

Parameter	Description
-system_name	The name of the system.
-target_name	The name of the target.
-credential_type	The type of the credential. It can be HostNormal, HostPrivileged, WLSAdmin, or DatabaseSysdba.
-credential_name	The name of the credential.
-use_preferred_credential	If you are using Preferred Credentials, then specify true. If use_preferred_credential is false, then you must specify credential_name.
-credential_owner	The owner of the credential. You need not specify this argument if the owner of the credential is same as logged in user.

Example 7–36 Updating Site Guard Credential Associations

```
emcli update_siteguard_credential_association
         -credential_type="HostNormal"
         -credential_name="HOST-SGCRED"
         -credential_owner="sysman"

emcli update_siteguard_credential_association
         -credential_type="HostPrivileged"
         -use_preferred_credential="true"
         -credential_owner="sysman"

emcli update_siteguard_credential_association
         -target_name="austin-database-instance"
         -credential_type="DatabaseSysdba"
         -credential_name="HOST-DBCRED"
         -credential_owner="sysman"
```

See Also: delete_siteguard_credential_association and create_siteguard_credential_association.

7.37 update_siteguard_lag

Updates the values of apply lag and transport lag threshold for one or all databases of a system.

Format

```
emcli update_siteguard_lag
        -system_name="system_name"
        -property_name="lag_type"
        -value="max_limit"
        [-target_name="database_target_name"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-system_name`	The system for which you want to configure the threshold limit.
`-target_name`	The database target name for which the threshold limit is configured. If this parameter is not specified, then the threshold value is applied to all databases of the system.
`-property_name`	The property name. Valid values are `apply_lag` and `transport_lag`.
`-value`	The threshold value to be updated (in seconds).

Example 7–37 Updating Apply Lag and Transport Lag

```
emcli update_siteguard_lag
       -system_name="example-system"
       -property_name="apply_lag"
       -value="1000"

emcli update_siteguard_lag
       -system_name="example-system"
       -target_name="OID_db"
       -property_name="transport_lag"
       -value="2500"
```

See Also: `get_siteguard_lag`, configure_siteguard_lag, and delete_siteguard_lag.

7.38 update_siteguard_script

Updates the path and the `all_hosts` flag associated with any script.

Format

```
emcli update_siteguard_script
         -script_id="ID_associated_with_the_script"
         [-path="path_of_the_script"]
         [-component="path of the entity in Software library"]
         [-runtime_script="if_prechecks_to_check_availability_of_the_script"]
         [-credential_type="type_of_credential"]
         [-credential_name="name of the credential"]
         [-host_name="name_of_the_host_where_this_script_will_run"]
```

```
[-run_on="whether to run on ANY or ALL hosts"]
[-all_hosts="whether to run the script on all the hosts in the system"]
[-credential_owner="credential_owner"]
```

Note: `[]` indicates that the parameter is optional or conditionally optional.

Parameter	Description
`-script_id`	The script ID.
`-path`	The path to the script.
`-component`	The path to the entity in the software library. If the values for this parameter are specified, the path should contain only the file name and its parameters.
`-runtime_script`	Whether the script is a runtime script. If a script is designated as a runtime script, Precheck does not verify the script. This option can be used when the script is dynamically mounted or generated as part of execution of an operation plan. By default, all scripts staged from software library are designated as runtime scripts. Default value is false for scripts that are not staged from software library
`-credential_type`	The type of the credential. One of `HostNormal` or `HostPrivileged`.
`-credential_name`	The name of the credential. If no value is specified, then the values for the parameter `credential_type` must be specified.
`-host_name`	Name of the host where this script will be run. Can be specified more than once.
`-run_on`	Whether the script needs to be executed on one of the available hosts (`any`) or on all hosts (`all`); default value is `all`.
`-all_hosts`	Optional flag to allow the script to run on all the hosts in the system. Specify `true` or `false`. Overrides all values entered in the `host_name` parameter
`-credential_owner`	The owner of the credential. This argument need not be specified if the owner of the credential is same as logged in user.

Example 7–38 Updating Site Guard Scripts

```
emcli update_siteguard_script
             -script_id="10"
             -path="/tmp/script"
             -all_hosts="true"

emcli update_siteguard_script
             -script_id="10"
             -path="stop_mycomponent.sh"
             -component="/Components/MyScripts/LCM_Operations"
             -all_hosts="true"
```

```
emcli update_siteguard_script
          -script_id="10"
          -host_name="host1.domain.com"
          -host_name="host2.domain.com"
          -run_on="any"

    emcli update_siteguard_script
          -script_id="10"
          -all_hosts="false"
          -credential_name="MY_NAMED_HOST_CREDENTIAL"
          -host_name="host1.domain.com"

    emcli update_siteguard_script
          -script_id="16"
          -path="/tmp/script"
          -credential_type="HostPrivileged"
          -runtime_script="true"
```

See Also: create_siteguard_script, get_siteguard_scripts, and delete_siteguard_script.

8

Upgrading or Downgrading Oracle Site Guard

This chapter explains how to upgrade or downgrade Oracle Site Guard in an Enterprise Manager Cloud Control environment.

This chapter includes the following sections:

8.1 Upgrading Oracle Site Guard

To upgrade from Oracle Site Guard (12.1.0.7.0) to Oracle Site Guard (13.1.1.0.0), complete the following steps:

1. Delete all of the existing Oracle Site Guard operation plans by following the steps listed in Section 5.2.4, "Deleting an Operation Plan".

   Note: Oracle recommends that you make a note of the details of the operation plans that you are deleting, as you will need to recreate these plans after the upgrade.

2. Delete all of the existing Oracle Site Guard configurations that you created using the instructions provided in Chapter 4, "Configuring Oracle Site Guard."

   Delete the configurations in the following order:

   a. Delete all configured Storage Scripts
   b. Delete all configured Pre Scripts and Post Scripts
   c. Delete all credential associations
   d. Delete all configured standby systems
   e. Delete the Oracle Site Guard configuration

   Note: Oracle recommends that you make a note of the details of the configurations that you are deleting, as you will need to recreate these configurations after the upgrade.

3. Upgrade the Oracle Enterprise Manager Fusion Middleware plug-in (for example, from 12.1.0.6 to 12.1.0.7). For information about Oracle Enterprise Manager plug-ins, see "Managing Plug-Ins" in *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

4. Recreate the Oracle Site Guard configurations that you had deleted in step 2, using the configuration details that you noted down.

   Follow the procedure described in Chapter 4, "Configuring Oracle Site Guard."

5. Recreate the Oracle Site Guard operation plans that you had deleted in step 1, using the operation plan details that you noted down. Follow the instructions provided in Section 5.2.1, "Creating Operation Plans."

8.2 Downgrading Oracle Site Guard

To downgrade from Oracle Site Guard (12.1.0.7) to Oracle Site Guard (12.1.0.6), complete the following steps:

1. Delete all of the existing Oracle Site Guard operation plans by following the steps listed in Section 5.2.4, "Deleting an Operation Plan."

   Note: Oracle recommends that you make a note of the details of the operation plans that you are deleting, as you will need to recreate these plans after the upgrade.

2. Delete all of the existing Oracle Site Guard configurations that you created using the instructions provided in Chapter 4, "Configuring Oracle Site Guard."

   Delete the configurations in the following order:

   a. Delete all configured Storage Scripts

   b. Delete all configured Pre Scripts and Post Scripts

   c. Delete all credential associations

   d. Delete all configured standby systems

   e. Delete the Oracle Site Guard configuration

   Note: Oracle recommends that you make a note of the details of the configurations that you are deleting, as you will need to recreate these configurations after the upgrade.

3. Downgrade the Oracle Enterprise Manager Fusion Middleware plug-in (for example, from 12.1.0.7 to 12.1.0.6). For information about Oracle Enterprise Manager plug-ins, see "Managing Plug-Ins" in *Oracle Enterprise Manager Cloud Control Administrator's Guide*.

4. Recreate the Oracle Site Guard configurations that you had deleted in step 2, using the configuration details that you noted down.

   Follow the procedure described in Chapter 4, "Configuring Oracle Site Guard."

5. Recreate the Oracle Site Guard operation plans that you had deleted in step 1, using the operation plan details that you noted down. Follow the instructions provided in Section 5.2.1, "Creating Operation Plans."

A

Passing Credentials as Parameters

Credentials passed as parameters to user-defined scripts are available as an input stream. This appendix contains scripts illustrating how to pass and extract credential information.

This appendix includes the following sections:

A.1 Passing Credentials as Parameters

The following scripts illustrate how to pass credentials as parameters:

- extract_credentials_sample_script.sh
- extract_credentials_sample_script.py
- extract_credentials_sample_script.pl

Note: The scripts in this appendix are examples only. Change and adapt them to suit your environment.

extract_credentials_sample_script.sh

```
#!/bin/bash

all_users=
all_passwords=
no_of_users=
no_of_passwords=

get_user_name() {
local index=$(expr $1)

if [ "$no_of_users" -lt $index ]; then
echo ""
else
echo $(echo "$all_users" | awk -v userNameIndex="$index" -F'<<SiteGuard_User>>'
'{print $userNameIndex}')
fi
}

get_password() {
local index=$(expr $1)

if [ "$no_of_passwords" -lt $index ]; then
echo ""
else
echo $(echo "$all_passwords" | awk -v passwordIndex="$index" -F'<<SiteGuard_
Password>>' '{print $passwordIndex}')
fi
}

load_credentials() {
read -s all_credentials

all_users=$(echo "${all_credentials}" | awk -F'<<SiteGuard_Credentials>>' '{print
$1}')
all_passwords=$(echo "${all_credentials}" | awk -F'<<SiteGuard_Credentials>>'
'{print $2}')
no_of_users=$(expr $(echo "$all_users" | awk -F'<<SiteGuard_User>>' '{print NF}'))
no_of_passwords=$(expr $(echo "$all_passwords" | awk -F'<<SiteGuard_Password>>'
'{print NF}'))

if [ "$no_of_users" -ne "$no_of_passwords" ]; then
echo "INFO: Total no. of users : '$no_of_users'"
echo "INFO: Total no. of passwords : '$no_of_passwords'"
echo "ERROR: Number of User Names and number of Passwords do not match"
exit 1
else
echo "Total of '$no_of_users' credentials found"
fi
}

load_credentials

userName=$(get_user_name '1')
password=$(get_password '1')

echo "[1] UserName : '$userName', Password : '$password'"
```

```
userName=$(get_user_name '2')
password=$(get_password '2')

echo "[2] UserName : '$userName', Password : '$password'"

userName=$(get_user_name '3')
password=$(get_password '3')

echo "[3] UserName : '$userName', Password : '$password'"

userName=$(get_user_name '4')
password=$(get_password '4')

echo "[4] UserName : '$userName', Password : '$password'"
```

extract_credentials_sample_script.py

```
#!/usr/bin/python

# -*- coding: utf-8 -*-

import sys

class SiteGuardCredentialUtil(object):
    userNames = passwords = ''
    noOfUsers = noOfPasswords = 0
    credentialNotSet = False

    def __init__(self):
        credentialsIO = sys.stdin.readlines()[0]

        if credentialsIO :
            credentials = credentialsIO.split('<<SiteGuard_Credentials>>')
            self.userNames = credentials[0].split('<<SiteGuard_User>>')
            self.passwords = credentials[1].split('<<SiteGuard_Password>>')
            self.noOfUsers = len(self.userNames)
            self.noOfPasswords = len(self.passwords)
            self.credentialNotSet = True

            if self.noOfUsers != self.noOfPasswords :
                print("INFO: Total no. of users : '%s'"%self.noOfUsers)
                print("INFO: Total no. of passwords : '%s'"%self.noOfPasswords)
                print('ERROR: Number of User Names and number of Passwords do not
match')
                sys.exit(1)
            else :
                print("INFO: Total of '%s' credentials found"%self.noOfUsers)

    def getCredential(self, credential):
        if self.credentialNotSet :
            if self.noOfUsers < int(credential) :
                print("ERROR: Credential not found at index '%s'"%credential)
                sys.exit(1)
            else :
                credentialIndex = credential - 1;
                return self.userNames[credentialIndex],
self.passwords[credentialIndex]
        else :
            print('WARNING: SiteGuard Credentials not set')

            return '', ''

def main():
    sgUtil = SiteGuardCredentialUtil()
    myUser, myPassword = sgUtil.getCredential(1)
    print("[1] UserName : '"+ myUser + "', Password : '" + myPassword + "'")

    myUser, myPassword = sgUtil.getCredential(2)
    print("[2] UserName : '"+ myUser + "', Password : '" + myPassword + "'")

    myUser, myPassword = sgUtil.getCredential(3)
    print("[3] UserName : '"+ myUser + "', Password : '" + myPassword + "'")
```

```
    myUser, myPassword = sgUtil.getCredential(4)
    print("[4] UserName : '"+ myUser + "', Password : '" + myPassword + "'")


"""
    Starting point...
"""
main()
```

extract_credentials_sample_script.pl

```
#!/usr/local/bin/perl

use strict;
use warnings;

our @ALL_USERS     = undef;
our @ALL_PASSWORDS = undef;

our $NO_OF_USERS     = 0;
our $NO_OF_PASSWORDS = 0;

my $CREDENTIALS = <STDIN>;

load_credentials($CREDENTIALS);

my $userId1   = get_user_name(1);
my $password1 = get_password(1);

print_msg("[1] UserName : '$userId1', Password : '$password1'");

my $userId2   = get_user_name(2);
my $password2 = get_password(2);

print_msg("[2] UserName : '$userId2', Password : '$password2'");

my $userId3   = get_user_name(3);
my $password3 = get_password(3);

print_msg("[3] UserName : '$userId3', Password : '$password3'");

my $userId4   = get_user_name(4);
my $password4 = get_password(4);

print_msg("[4] UserName : '$userId4', Password : '$password4'");

sub load_credentials {
my ($credentials) = @_;
chomp($credentials);
if ( length($credentials) <= 0 ) {
print_msg("WARNING: Credentials not found");
return '';
}
else {
my @userIds   = split( /<<SiteGuard_Credentials>>/, $credentials );
my @passwords = split( /<<SiteGuard_Credentials>>/, $credentials );

@ALL_USERS     = split( /<<SiteGuard_User>>/,     $userIds[0] );
@ALL_PASSWORDS = split( /<<SiteGuard_Password>>/, $passwords[1] );

$NO_OF_USERS     = $#ALL_PASSWORDS + 1;
$NO_OF_PASSWORDS = $#ALL_PASSWORDS + 1;

if ( "$NO_OF_USERS" != "$NO_OF_PASSWORDS" ) {
print_msg("INFO: Total no. of users : '$NO_OF_USERS'");
print_msg("INFO: Total no. of passwords : '$NO_OF_PASSWORDS'");
print_msg("ERROR: Number of User Names and number of Passwords do not match.");
```

```
exit 1;
}
else {
print_msg("Total of '$NO_OF_USERS' credentials found.");
}
}
}

sub get_user_name {
my ($index) = @_;

my $userName = "";

if ( "$NO_OF_USERS" > $index - 1 ) {
$userName = $ALL_USERS[ $index - 1 ];
}
else {
print_msg("ERROR: Credential at index '$index' not found.");
exit 1;
}

return $userName;
}

sub get_password {
my ($index) = @_;

my $password = "";

if ( "$NO_OF_PASSWORDS" > $index - 1 ) {
$password = $ALL_PASSWORDS[ $index - 1 ];
}
else {
print_msg("ERROR: Credential at index '$index' not found.");
exit 1;
}
return $password;
}

sub print_msg {
my ($msg) = @_;
print("$msg \n");
}
```

B

Bundled Scripts

This appendix contains scripts illustrating database control, ZFS storage, and ZFS analysis scripts.

This appendix includes the following section:

- Bundled Scripts

B.1 Bundled Scripts

The following scripts are bundled with Oracle Site Guard:

- Database Control Script - db_control_wrapper.pl
- ZFS Storage Script - zfs_storage_role_reversal.sh
- ZFS Analysis Script - zfs_analysis.sh

Database Control Script - db_control_wrapper.pl

In previous versions of Site Guard, Oracle database operations were not directly available for configuration by users. You could not configure database operations outside the operation plan bucket where database disaster recovery occurred. This database operation bucket was configured and pre-inserted by Site Guard at a fixed point in the operation plan.

The `db_control_wrapper.pl` script solves this problem. The script is a ready-to-use script that allows you to add and configure custom database precheck or operation anywhere in the Pre or Post stages of an operation plan.

Name

```
db_control_wrapper.pl - Oracle Siteguard Database Control Wrapper Script
```

Description

Performs database start, stop, switchover, failover and convert operations, and additionally, it performs prechecks in these use cases.

Syntax

```
perl db_control_wrapper.pl
--usecase <usecase>
--oracle_home <oracle_home>
--oracle_sid <oracle_sid>
--is_rac_database  <true/false>
--timeout <3600>
--target_db <target_db>
--target_optional_parameters <target_optional_parameters>
--operation_optional_parameters <operation_optional_paramete
```

Table B–1 db_control_wrapper.pl Parameters

Parameter	Description
`--usecase`	One of the following: START, START_PRECHECK, STOP, STOP_PRECHECK, SWITCHOVER, SWITCHOVER_PRECHECK, FAILOVER, FAILOVER_PRECHECK, CONVERT_PHYSICAL_TO_SNAPSHOT_STANDBY, CONVERT_PHYSICAL_TO_SNAPSHOT_STANDBY_PRECHECK, REVERT_SNAPSHOT_TO_PHYSICAL_STANDBY, REVERT_SNAPSHOT_TO_PHYSICAL_STANDBY_PRECHECK
`--oracle_home`	The database `ORACLE_HOME`.
`--oracle_sid`	The database `ORACLE_SID`.
`--is_rac_database`	Set to `true` for RAC database; set to `false` for a non-RAC database.
`--timeout`	The time in seconds, for the database role reversal polling timeout.
`--target_db`	The target database name.
`--target_optional_parameters`	Target runtime optional parameters. Options: `apply_lag`, `transport_lag` Format: `'apply_lag=-1&transport_lag=-1'`

Table B–1 (Cont.) db_control_wrapper.pl Parameters

Parameter	Description

`--operation_optional_parameters`	Target operation optional parameters.
	Options
	`force=<true/false>`
	`enable_trace=<true/false>`
	`immediate_failover=<true/false>`
	`lag_check=<true/false>`
	
	Format
	`'force=false&lag_check=false&enable_trace=false'`

`--help`	Prints a brief help message.
`--usage`	Prints a brief usage message.
`--manual`	Prints the manual page.

ZFS Storage Script - zfs_storage_role_reversal.sh

In previous versions of Site Guard, ZFS storage role reversal operations were not directly available for configuration by users at any point in the operation plan. Although ZFS storage-related operations could be configured by users, you could not configure where these operations got inserted in the operation plan. This storage role reversal operation bucket was always pre-inserted by Site Guard at a fixed point in the operation plan.

You can now configure the `zfs_storage_role_reversal.sh` script (previously available only as a storage script) as a generic ready-to-use script and use it at any point in the Global Pre, Global Post, Pre, or Post areas of an operation plan to perform ZFS storage-related prechecks or operations.

For more information about the use of this script, see Section 4.5.3.1, "zfs_storage_role_reversal.sh."

ZFS Analysis Script - zfs_analysis.sh

This is a ready-to-use script that analyzes and reports the lag in a ZFS replication configuration. The script analyzes and prints all the occurrences when the replication lag exceeded the specified threshold (recovery point objective), and the amount of maximum lag during each of these occurrences. The script performs this analysis over the interval specified by the `start_time` and `end_time` parameters.

Oracle recommends that you use this script as a stand-alone tool for data collection and reporting in order to monitor the health of a ZFS replication configuration. You can also run this script as a Custom Precheck (and Health check) script in a traditional Site Guard operation plan, but you cannot depend on this script to trigger an operation plan failure, as you could with a traditional precheck script.

Script Usage

```
zfs_analysis.sh
[--zfs_appliance <ZFS Appliance>]
[--zfs_appliance_user <ZFS Appliance Username>]
[--zfs_appliance_password <ZFS Appliance Password>]
[--zfs_project_name <ZFS Project Name>]
[--start_time <Start Time>]
[--end_time <End Time>]
[--objective <Replica Objective>]
[--cluster_member_file <Cluster Member File>]
[--objective_file <Objective File>]
[--force <Force analytic start time>]

where,
--zfs_appliance : [mandatory] ZFS zppliance host
--zfs_appliance_user : [mandatory] ZFS zppliance username
--zfs_appliance_password : [mandatory] ZFS zppliance password
--zfs_project_name : [mandatory] Project name
--start_time : [mandatory] Start date/time
--end_time : [mandatory] End date/time
--objective : [mandatory] Replica lag threshold
--cluster_member_file : File that declares a common name to use for the two nodes
in each clustered storage appliance
--objective_file : File that declares replica lag thresholds for specific
replication actions
--force : Force the analysis interval to start at the specified date/time
```

To configure the script as a Site Guard Custom Precheck script:

1. Search for and select the entity "ZFS Lag Analysis Scripts" for the **Software Library Entity** field.
2. Set the **Script Path** as illustrated in the following example:

   ```
   sh zfs_analysis.sh --zfs_appliance zfsappl01.mycompany.com --zfs_project_name
   rproject01 --end_time 2015-07-07 --objective 30m --start_time 2015-07-08
   ```

3. Select the host(s) on which to run the script.
4. Under **Advanced Options**, select and configure the credential for the ZFS appliance to pass as a parameter to the script.

A sample script output follows:

```
Action: zfsappl01sn01&zfsappl02sn02:rproject01
```

```
Replication of rproject01 from zfsappl01sn01
to zfsappl02sn02(label=zfsappl02sn-fe)
during the 10172506 second analysis interval
beginning 2015-02-12 06:18:14 UTC and ending 2015-06-10 00:00:00 UTC.
Updates are manually initiated.
Recovery Point Objective is 1800 seconds (30 minutes).
Action UUID (unique identifier) = e1b57778-5e5a-4053-c96b-f5d6e15d3292
                                          |                             |  seconds
          replication update              | at completion, replica lag  |   spent
__________________________________________|_____________________________|   above
       started      |     completed       | had grown to | then became | objective
____________________|_____________________|______________|_____________|__________
2015-02-12 06:18:14 2015-02-12 06:18:24          10             10            0
2015-02-12 06:50:21 2015-02-12 06:50:30        1936              9          136
2015-02-12 06:51:45 2015-02-12 06:51:53          92              8            0
2015-02-15 21:10:59 2015-02-15 21:11:19      310774             20       308974
2015-02-15 21:19:32 2015-02-15 21:19:52         533             20            0
2015-02-16 06:17:34 2015-02-16 06:17:43       32291              9        30491
2015-02-16 06:21:36 2015-02-16 06:21:44         250              8            0
2015-02-16 06:25:12 2015-02-16 06:25:23         227             11            0
2015-02-16 06:27:18 2015-02-16 06:27:30         138             12            0
2015-02-16 06:29:23 2015-02-16 06:29:35         137             12            0
2015-02-16 06:32:07 2015-02-16 06:32:19         176             12            0
2015-02-16 06:33:27 2015-02-16 06:33:39          92             12            0
2015-02-16 06:36:07 2015-02-16 06:36:22         175             15            0
2015-02-16 06:40:17 2015-02-16 06:40:35         268             18            0
2015-02-16 07:03:11 2015-02-16 07:03:33        1396             22            0
2015-02-16 07:26:19 2015-02-16 07:26:29        1398             10            0
2015-02-16 07:28:03 2015-02-16 07:28:15         116             12            0
2015-02-17 00:50:24 2015-02-17 00:50:36       62553             12        60753
2015-02-17 00:55:57 2015-02-17 00:56:09         345             12            0
2015-02-17 01:55:01 2015-02-17 01:55:13        3556             12         1756
2015-02-17 04:25:21 2015-02-17 04:25:32        9031             11         7231
2015-02-18 10:22:19 2015-02-18 10:22:31      107830             12       106030
2015-02-18 10:23:31 2015-02-18 10:23:43          84             12            0
2015-02-23 05:02:22 2015-02-23 05:02:34      412743             12       410943
2015-02-23 07:06:26 2015-02-23 07:06:38        7456             12         5656
at end of interval  2015-06-10 00:00:00     9219214                     9217414


Replication actions that did not satisfy their Recovery Point Objective
at some point during the 10172506 second analysis interval
beginning 2015-02-12 06:18:14 UTC and ending 2015-06-10 00:00:00 UTC.

 replication updates |   total    |      |     peak replica lag        |
_____________________|  seconds   |      |______________________________|
       |    above    |   above    |      |          |                   |
 total |  objective  | objective | RPO | seconds |   date and time   |
source&target:project/share
______ |_____________|____________|_____|_________|___________________|___________
_________________
    59       48  81%   358352   4%  1800   340318  2015-06-08 17:47:55
zfsappl01sn01&zfsappl02sn02:1_WING
     3        2  67%  1493546  15%  1800   994866  2015-06-04 04:28:59
zfsappl01sn01&zfsappl02sn02:2_SG
     2        1  50%  1642394  16%  1800  1644194  2015-06-10 00:00:00
zfsappl01sn01&zfsappl02sn02:3_SG
     2        1  50%  1642180  16%  1800  1643980  2015-06-10 00:00:00
zfsappl01sn01&zfsappl02sn02:4_SG
     3        2  67%  1497621  15%  1800  1203470  2015-06-10 00:00:00
```

```
zfsappl01sn01&zfsappl02sn02:5_SG
     2       1  50%  6757712  66%  1800  6759512  2015-06-10 00:00:00
zfsappl01sn01&zfsappl02sn02:SiteGuard
    13       4  31%  9593787  94%  1800  9219201  2015-06-10 00:00:00
zfsappl01sn01&zfsappl02sn02:br_test
    26      10  38% 10149384 100%  1800  9219214  2015-06-10 00:00:00
zfsappl01sn01&zfsappl02sn02:rproject01
```