

Oracle Flash Storage System

Administrator's Guide



FLASH STORAGE
SYSTEMS

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Preface

Oracle Resources

Important: For the latest version of this document, visit the [SAN Storage – Oracle Flash Storage Systems](http://www.oracle.com/goto/fssystems/docs) section at the Oracle Help Center (<http://www.oracle.com/goto/fssystems/docs>).

Table 1: Oracle resources

For help with...	Contact...
Support	http://www.oracle.com/support (www.oracle.com/support)
Training	https://education.oracle.com (https://education.oracle.com)
Documentation	<ul style="list-style-type: none">• SAN Storage – Oracle Flash Storage Systems: (http://www.oracle.com/goto/fssystems/docs)• From Oracle FS System Manager (GUI): Help > Documentation• From Oracle FS System HTTP access: (<i>system-name-ip</i>/documentation.php where <i>system-name-ip</i> is the name or the public IP address of your system)
Documentation feedback	http://www.oracle.com/goto/docfeedback (http://www.oracle.com/goto/docfeedback)
Contact Oracle	http://www.oracle.com/us/corporate/contact/index.html (http://www.oracle.com/us/corporate/contact/index.html)

Related Documentation

Familiarize yourself with the following related documents:

- [Oracle Flash Storage System Glossary](#)
- [Oracle Flash Storage System CLI Reference](#)
- [Oracle FS1-2 Flash Storage System Release Notes](#)

Welcome to Oracle FS System Administration

Oracle FS System Manager

Oracle FS System Manager (GUI), pictured below, allows you to deploy, to provision, to manage, and to maintain an Oracle FS System.

Figure 1: Oracle FS System Manager



The GUI eliminates the complexity of provisioning tiered storage. For example, you can select the appropriate application storage profile to provision and to tune the storage easily by preselecting the appropriate QoS parameters.

Using the storage attributes that you provide through the GUI, the system implements predictive application performance characteristics before it physically provisions the storage. This feature puts you in control of resource allocation.

The Pilot runs the management interface for the Oracle FS System. The GUI, along with the other software that is implemented in the Oracle FS System, enables policy-based provisioning that has the following features:

- QoS Plus, which automatically places parts of a SAN LUN onto appropriate storage tiers with the goal of balancing the needs of the business with the management of system resources
- Fault management, which automatically moves system resources to a partner component to accommodate component failure or replacement while maintaining data availability
- Guided Maintenance, which guides you through every step of replacing a hardware component, including the recabling of the component

Note: If you prefer a command line interface for configuring and monitoring the Oracle FS System, you can use the Oracle FS CLI (FSCLI) to manage the system.

Related Links

[Controller Management](#)

[Creating Auto-Tiered LUNs](#)

[Hardware Management](#)

[Oracle FS System CLI](#)

[QoS Plus Overview](#)

Accessing Oracle FS System Applications

You can access and download the Oracle FS System applications using the FS Portal. Applications include Oracle FS System Manager (GUI), Oracle MaxMan, Oracle FS CLI (FSCLI), and various other utilities. In addition, the FS Portal provides both information about the status of the Oracle FS System and links to technical documentation.

A username and password are not required to access the FS Portal web pages that contain the Management Software, Utilities, and Documentation sections. A username and password are required to access the Alerts & Events and Information & Status sections.

The following table summarizes the type of content that is available from the FS Portal.

Table 2: Software and system information

Category	Description
Oracle FS System Applications	<p>Provides links to the installation files for Oracle FS System Manager (GUI) and the Oracle MaxMan applications.</p> <p>These applications are available in the following formats:</p> <ul style="list-style-type: none"> • Windows Installer: Provides the download link for the Windows installer in MSI format. • JAR and Run Scripts: Provides the download links to the self-contained JAR (Java archive) file and scripts in ZIP and TAR archive formats.
Technical Documentation	Provides links to the Oracle FS System technical documentation in PDF format.
Utilities	<p>Provides links to the following downloads:</p> <ul style="list-style-type: none"> • Oracle FS CLI • Oracle FS Virtual Disk Service Provider • Oracle FS Volume Shadow Copy Service Provider • The management information base (MIB) text file for the Oracle Small Network Management Protocol (SNMP). • Oracle FS System Statistics Tools
Recent System Alerts and Events	Provides a list of system alerts that require administrator action and a list of the last 20 system events.
System Information and Status	Provides a summary of the Oracle FS System information and status.

Note: The FS Portal web page configuration provided by the web server on the Pilot is simple HTML. You can download this content to a mobile device, which allows you to check for system alerts and the system status.

Related Links

[Download the Oracle FS System Application](#)

[Install Oracle FS System Software \(MSI\)](#)

[Install Oracle FS System Software \(JAR\)](#)

Client Application Download Formats

The client application packages are available in a variety of formats for both Microsoft Windows and Linux operating systems. For archived file formats, you

must decompress the files to your workstation before you can begin the installation.

Select from the following file formats:

MSI

Specifies a Microsoft Windows installer file. Use this file type to start the software installation in automatic mode.

ZIP

Specifies a compressed archive file. Use this file type to decompress the files into a workstation folder for manual installation.

TAR

Specifies a non-compressed tape file archive method. Use this file type to extract the files into a workstation folder for manual installation.

TGZ

Specifies a compressed tape file archive method. Use this file type to decompress and extract the files into a workstation folder for manual installation.

TXT

Specifies a text file that can be used in any operating system environment. This file type is not compressed and usually contains other information, such as configuration details.

Related Links

[Download the Oracle FS System Application](#)

[Install Oracle FS System Software \(MSI\)](#)

[Install Oracle FS System Software \(JAR\)](#)

Download the Oracle FS System Application

The software for Oracle FS System Manager (GUI) is available on the Pilot, which is accessed from a web browser.

- 1 Start a web browser on your workstation.
- 2 In the address field, specify your Oracle FS System.
Valid address options:
 - The IP address of the Pilot
 - The name of the Oracle FS System, if DNS name resolution is available
- 3 Click **Management Software**.

- 4 Select the link for the software that you want to download.
- 5 Save the file to your client workstation.

In the next steps you will do one of the following:

- Start the installation, if you selected an automatic installation file format
- Decompress the archived files, if you selected an archive file format

Related Links

[Install Oracle FS System Software \(MSI\)](#)

[Install Oracle FS System Software \(JAR\)](#)

Install Oracle FS System Software (MSI)

After you download the Windows installer for Oracle FS System Manager (GUI) or Oracle MaxMan, install the files onto the workstation by running the Microsoft Windows installation package.

Note: Verify that you are permitted to run an automatic installation.

- 1 Locate the client software file on the workstation.

For an automatic installation on Microsoft Windows platforms, the file extension is `.msi`.

***_x64.msi**

For 64-bit hardware

***_x86.msi**

For 32-bit hardware

- 2 Double-click the file to begin the installation.
- 3 Follow the instructions for the installation.

When the installation is complete, the following objects are created:

Oracle FS System Manager

A shortcut on the Windows desktop that permits you to run Oracle FS System Manager.

Oracle MaxMan

A shortcut on the Windows desktop that permits you to run Oracle MaxMan.

`c:\Program Files\Oracle Corporation`

A directory that stores all of the files that are necessary to run Oracle FS System Manager and Oracle MaxMan.

Related Links

[Install Oracle FS System Software \(JAR\)](#)

Install Oracle FS System Software (JAR)

After you download the Oracle FS System application archive, extract the files to a workstation before using the software. The archive contains a self-contained JAR (Java archive) file and the scripts needed to run Oracle FS System Manager (GUI) and Oracle MaxMan applications.

- 1 Locate the client software archive file on the workstation.
- 2 Extract the contents of the archive file to a directory of your choosing on the client host where you expect to be using the software.
 - For ZIP files, use a ZIP utility to extract the files.
 - For TAR or TGZ files, use TAR or a similar utility to extract the files.
- 3 (Optional) Add the directory where you extracted the contents of the archive files to your PATH environment variable.

This allows you to run the executable from any directory on your system.

Linux or Unix

Edit your login shell to add the directory to your PATH statement.

Windows

Edit the PATH variable by navigating to **My Computer > Properties > Advanced > Environment Variables**.

The extraction step creates the following objects for Oracle FS System Manager:

jar

The folder containing the jar files for Oracle FS System Manager

runOracleFSSystemManager.bat

(Windows only) The client batch file to run Oracle FS System Manager

runOracleFSSystemManager.sh

The client shell file to run Oracle FS System Manager

runOracleFSSystemManager.command

(Mac OS only) The client shell file to run Oracle FS System Manager

The extraction step creates the following objects for Oracle MaxMan:

jar

The folder containing the jar files for Oracle MaxMan

runOracleFSMaxMan.bat

(Windows only) The client batch file to run Oracle MaxMan

runOracleFSMaxMan.sh

The client shell file to run Oracle MaxMan

runOracleMaxMan.command

(Mac OS only) The client shell file to run Oracle MaxMan

Related Links

[Download the Oracle FS System Application](#)

[Install Oracle FS System Software \(MSI\)](#)

Accessing the Oracle FS System

After you have installed Oracle FS System Manager (GUI) software package on a client workstation, you can run the application to access an Oracle FS System.

Unless the default values have been changed during installation, use the following values the first time that you use the Primary administrator account to log in to the GUI:

Table 3: Default login values

Field	Default value
Pilot IP address	10.0.0.2
Login Name	administrator
Password	pillar

If the default value has been changed for the Pilot, use one of the following options in the **Oracle FS name** field:

- If the Pilot IP address has been changed to a customer-specific address, use that address.
- If you configured the IP address to a DNS host name, you can use that host name to log into the Oracle FS System.

The login name does not change.

The password does not change. However, after you login with the default password, you will be prompted to enter a new password.

Passwords must adhere to the following security policy:

- Must be eight characters to 16 characters in length
- Cannot contain dictionary words
- Cannot be any of the last 50 passwords

Note: The system retains recent passwords for one year.

- Must contain at least one uppercase letter, one lowercase letter, one numeric character, and one special character

The following list summarizes the tasks that you should perform immediately after you change the password and log in to the system:

- Document the password and keep the password secure.
- Ensure that the Primary Administrator also obtains this password.

- Set up and test an email address for the Primary Administrator.
- Create one additional Administrator 1 account with a valid email address. Use the additional Administrator 1 or appropriate level accounts for routine system administration rather than the Primary administrator account.

If you exceed the maximum number of administrator login attempts, your account will disable. Use an Administrator 1 account, if one exists, to reset the password. The Primary Administrator and administrators who are assigned to the Administrator 1 role can change the password of any customer-defined administrator account without knowing the previous password. A Support administrator cannot reset the Primary Administrator password.

At any given time, the following number of administrator sessions can be active:

- Five active sessions for each administrator account
- 25 total at any given time

Note: The default time-out period is 20 minutes. When a session is inactive for more than the time-out period, the system terminates that session, and prompts you to log in again.

Related Links

[Change Administrator Passwords](#)

[Modify Security Settings](#)

Providing a Password

In order to protect your security, Oracle enforces strict rules for choosing passwords for access to Oracle FS System Manager (GUI).

Passwords must adhere to the following security policy:

- Must be eight characters to 16 characters in length
- Cannot contain dictionary words
- Cannot be any of the last 50 passwords

Note: The system retains recent passwords for one year.

- Must contain at least one uppercase letter, one lowercase letter, one numeric character, and one special character

If you forget the Primary system administrator password, you can reset it using one of the following methods:

- Use an Administrator 1 account, if one exists, to reset the password. The Primary Administrator and administrators who are assigned to the Administrator 1 role can change the password of any customer-defined administrator account without knowing the previous password. A Support administrator cannot reset the Primary Administrator password.

- Click **Forgot password** on the Login screen and follow the instructions in the Forgot Password dialog. You must have an email address associated with your account. The system sends a password reset token to the email address associated with your account. If you receive an email with a password reset token and you did not request a password reset token, notify your system administrator.

To reset your Primary Administrator password, use one of the following methods:

- Use an Administrator 1 account, if one exists, to reset the password. The Primary Administrator and administrators who are assigned to the Administrator 1 role can change the password of any customer-defined administrator account without knowing the previous password. A Support administrator cannot reset the Primary Administrator password.
- Click **Reset password** on the Login screen and follow the instructions in the Reset Password dialog. You must have either your old password or your password token to reset your password. If you do not have your password token, click **Forgot password** on the Login screen and follow the instructions in the Forgot Password dialog.

Note: The **Forgot password** mechanism requires that an email account has been configured for the account for which the password has been forgotten. The system sends the instructions to that email address. Follow the instructions recorded in that email.

Related Links

[Log In to Oracle FS System Manager](#)

Log In to Oracle FS System Manager

Logging in to Oracle FS System Manager (GUI) gives you access to the Oracle FS System so that you can perform administrative tasks, such as provisioning and tuning storage.

Prerequisites:

- The GUI software package has been installed on your client workstation.
- The TCP port 26012 on the Oracle FS System is open and not blocked.

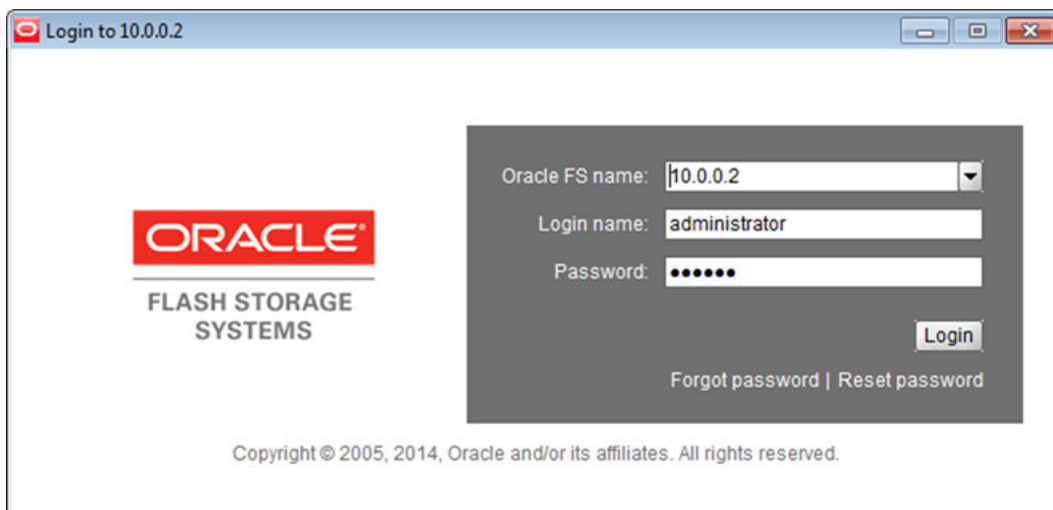
1 Start the GUI application.

- For the Windows executable, double-click one of the following:
 - The Oracle FS System Manager.exe file located at C:\Program Files\Oracle Corporation\
 - The Oracle FS System Manager (GUI) shortcut on the Windows desktop
- For the Windows archive, run the `runOracleFSSystemManager.bat` batch script.

- For Linux and Unix, run the `runOracleFSSystemManager.sh` shell script.
- For Mac OS, run the `runOracleFSSystemManager.command` shell script.

The login screen appears. If you have an existing installation of the GUI, you might be prompted to update the install to match the software version of the Oracle FS System.

Figure 2: Oracle FS System Manager Login screen



- 2 For **Oracle FS name**, specify the Oracle FS System to which you want to connect.

Valid values:

- IP address of the Pilot
- Oracle FS System name as configured in your site naming services for the Pilot

- 3 For **Login name**, enter your login name.
- 4 For **Password**, enter your password.
- 5 Click **Login**.

The GUI opens to the System Information overview page, or the last page you visited when you last logged off.

Related Links

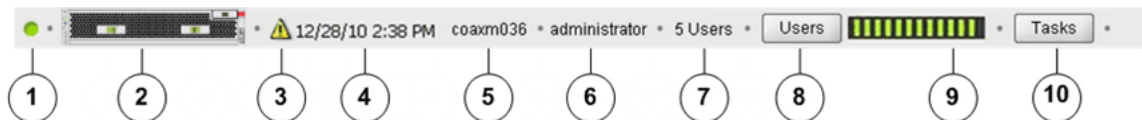
[Accessing Oracle FS System Applications](#)

[Download the Oracle FS System Application](#)

Status Bar Description

Oracle FS System Manager (GUI) displays information about the operation of the Oracle FS System in the status bar at the bottom of each overview window.

Figure 3: Oracle FS System Manager status bar



Legend

1 System status	6 Account that is currently logged in
2 Hardware status	7 Number of accounts that are currently logged in
3 System alert	8 Displays all accounts that are currently logged in
4 Last system alert	9 Progress of current background task
5 System name	10 Displays all background tasks

The following table describes each status bar component.

Table 4: Status bar details

Status bar component	Description
System status	Displays the overall system status. A status of Normal (green) requires no action. If, however, the status is Warning (yellow) or Critical (red), click the icon to view the System Summary page to identify the cause of the status.
Hardware status	Displays the overall system status of the hardware components. A status of Normal (uncolored) requires no action. If, however, the status is Warning (yellow) or Critical (red), click the icon to view the Hardware overview page so the cause of the status can be identified.
System alert	To open the System Alerts overview page and to respond to any events that require intervention, click this icon. The icon displays only when an active system alert is present on the Oracle FS System.
Last system alert	If an alert exists, displays the date and time of the last system alert. This information lets you know, especially when multiple events exist, whether a new system alert has been generated. The date and time displays when an active system alert is present on the Oracle FS System.
System name	If a system name has been configured, displays the system name. If no system name has been configured, displays the serial number.

Table 4: Status bar details (continued)

Status bar component	Description
Account that is currently logged in	Displays the name of the account that is currently logged in to the system.
Number of accounts that are currently logged in	Displays the number of accounts currently logged in to the system.
Displays all accounts that are currently logged in	Click this icon to open the Current User Session dialog and to view details of the accounts that are currently logged in to the system.
Progress of current background tasks	Displays the progress of the currently running tasks.
Displays all background tasks	Click this icon to open the Background Processes dialog.

Related Links

[View Currently Logged-In Accounts](#)

Configure Automatic Screen Updates

You can disable automatic screen refresh if your Oracle FS System takes a long time to refresh the screen contents.

If you have a very large system configuration or a large configuration that experiences heavy activity, the system might take a few minutes to refresh the screen contents. This delay might interrupt normal operations on the system. You can disable the automatic screen refresh and manually update the screen contents, as necessary.

- 1 Navigate to **Tools > Configure Automatic Screen Updates**.
- 2 Select the option to either enable or disable automatic screen updates.

Tip: To refresh the screen when the automatic updates is disabled, press Ctrl-Alt-R on your keyboard.

View Currently Logged-In Accounts

You can view the details of the accounts that are logged into the system to see information such as login name, role, full name, login time, and IP address.

Prerequisite:

You must be logged into the Oracle FS System.

You should view a list of accounts logged into the system to decide whether you need to contact the account owners before you shut down or restart the system.

- 1 From the Status Bar, click **Users**.
The Users dialog appears.

- 2 Review the accounts that are logged into the Oracle FS System.
- 3 Click **Close** when you are finished reviewing the list.

Log Out of Oracle FS System Manager

When you have completed your administrative tasks, log out of Oracle FS System Manager (GUI) to prevent unauthorized users from gaining access to the Oracle FS System from your workstation.

To log out, navigate to one of the following menu items:

Oracle FS > Connect to

Allows you to choose another Oracle FS System to log in to. You are disconnected from the current system and prompted to log in to the new Oracle FS System.

Oracle FS > Log off

Disconnects from the current Oracle FS System, allowing you to log in to another system.

Oracle FS > Exit

Disconnects from the current Oracle FS System and closes the GUI application.

Licensing the Optional Premium Features

All embedded software and all data services for the Oracle FS System are enabled at the factory and included in the purchase price, including Oracle MaxRep for NAS - Terabyte Perpetual. You can purchase additional Oracle MaxRep premium features.

The following optional premium features are available on the Oracle MaxRep Replication Engine:

- Oracle MaxRep Asynchronous Replication
- Oracle MaxRep Asynchronous Replication with Application Protection
- Oracle MaxRep Synchronous Replication
- Oracle MaxRep Synchronous Replication with Application Protection

Oracle FS System CLI

The Oracle FS CLI is the command line interface for configuring, operating, and monitoring an Oracle FS System. The Oracle FS CLI provides the same capabilities as Oracle FS System Manager (GUI), allowing configuration and management of the Oracle FS System performed from the command line or through custom scripts.

The following features are available with Oracle FS CLI:

- Runs as a command-line interface
- Communicates from the host system to the Oracle FS System Pilot

- Uses familiar conventions for parameters and options, and provides reasonable default values where possible
- Checks for required sets of parameters and displays error messages if the required values are missing
- Supports automation through custom scripts using common scripting languages
- Provides help for each of its commands and subcommands

Manage Global Settings

Global Settings Configuration

The first time you log into the Oracle FS System you should perform several configuration tasks.

The following list summarizes the tasks that help you to configure the system-wide settings:

- Set and synchronize the Oracle FS System time with external time servers.
- Define the networking properties, which include the following tasks:
 - Define and configure the IP addressing and the IP characteristics of the management ports.
 - Define an email server in your network that can receive Oracle FS System alerts and can forward them to administrator email accounts, for example, to be used to recover account credentials.
 - Enable Call-Home, a feature that notifies Oracle about issues in the system. The Call-Home feature of Oracle FS System Manager (GUI) is integrated with Oracle Auto Service Request (ASR).
- Create extra Storage Profiles, if needed.
- Define session time-out periods and failed login attempts.
- Create extra administrator accounts, especially an account assigned the Administrator 1 role.
- Define SNMP host settings.

The success of other configuration tasks depends on the system-wide settings. For example, if you do not configure the email server, the system cannot send alerts or the information needed to reset an administrator password.

Related Links[System Time Synchronization](#)[Network Interfaces](#)[System Notifications](#)[Settings for ASR \(Call-Home\)](#)[Controller Ports](#)[Storage Profiles](#)[Modifying Security Settings](#)[Administrator Account Management](#)[SNMP Trap Host Management](#)

System Time Synchronization

You can set the properties of the system time to synchronize the Oracle FS System clock time with a Network Time Protocol (NTP) server or you can set the date and time manually.

To set the Oracle FS System time, use one of the following options:

Use External Time Source

Synchronizes the system time with an external NTP server.

Important: Do not attempt to use a Windows system as an NTP server unless that system has a third-party NTP service such as Meissner installed. Alternatively, use a Linux- or Unix-compatible NTP server and sync both the Oracle FS System server and the Windows Time Service to that server. For more information about configuring time services, refer to [Appendix H: Configuring Time Services for a Heterogeneous UNIX and Windows Environment](http://technet.microsoft.com/en-us/library/bb463171.aspx) (<http://technet.microsoft.com/en-us/library/bb463171.aspx>).

Note: If the primary NTP server is not available, the Oracle FS System consults the secondary servers in round-robin fashion until a connection is made.

Use Internal Hardware Clock

Allows you to set the system time manually.

Related Links[Modify the Oracle FS System Time](#)

Modify the Oracle FS System Time

Configure the Oracle FS System time so that event timestamps and logging timestamps are accurate and so that time-dependent applications work properly.

- 1 Navigate to **System > Global Settings > System Time**.
- 2 Select **Actions > Modify**.
- 3 Select an option for configuring the system time.
- 4 Depending on which option you select, enter the NTP server details or choose the system time using the date and time dialog.

Important: If either option you choose changes the time to be prior to the current time, the Pilot restarts to implement the new time.

- 5 Click **OK**.

After approximately 15 minutes, navigate to **System > Alerts and Events** and ensure that there are no Oracle FS System alerts and events indicating that the NTP sync has failed.

Related Links

[Modify System Time Dialog](#)

[System Time Synchronization](#)

Network Interfaces

Configure the Oracle FS System management network interfaces to ensure proper communication with devices on the customer network.

Configuring the system network affects the following types of communication:

- Management traffic between the Pilot and other devices on the customer network
- The sending of the alerts, notifications of system events, and password recovery information to an email server

The management interface provides connectivity between the customer management network and the Oracle FS System Pilot. You can choose from the following methods to assign the IP addresses to the management interface on the Pilot:

- Dynamic Host Configuration Protocol (DHCP), which assigns a public IP address dynamically when the Pilot starts. This address only applies to the public IP address of the Oracle FS System. DHCP is not supported for the individual Pilot CU addresses.
- Static IP address, which assigns a permanent, public IP address to the Oracle FS System, and assigns unique IP addresses to each of the Pilots. If the management client cannot access the public IP address, the client can access one of the unique IP addresses of the active Pilot.

The primary and secondary DNS servers provide the name resolution for the following Oracle FS System features:

- Call-Home
- Email
- Password recovery

The Call-Home feature, when enabled, allows the Oracle FS System to send to the Oracle Call-Home server (callhome.support.pillardata.com) the following types of information:

- System log bundles (for use by Oracle Customer Support)
 - System status
 - System configuration information
 - System statistics
 - Internal system logs
- System event notifications (for use by Oracle Auto Service Request (ASR))
 - System status
 - System configuration information

To send the Call-Home information, the Pilot uses a DNS server to resolve the names of the recipients.

You can define a primary DNS server and a secondary DNS server. The system uses the primary DNS server to resolve host names into IP addresses. If the primary server cannot be reached, the system uses the secondary DNS server.

Related Links

[Configure the Management Interface](#)

[Configure DNS Settings](#)

Configure the Management Interface

Configuring the management interface might involve, for example, specifying the static or dynamic IP addressing method for the Pilot.

You need to choose one of the following options when selecting how you want the Oracle FS System to assign IP addresses:

Enable DHCP

Use if your system assigns IP addresses automatically using a Dynamic Host Configuration Protocol (DHCP).

Static IP Address

Use to manually configure the IP addresses. Enter the values into the appropriate fields.

Important: When providing static IP addresses for the management interface, be sure that you enter the correct addresses and that the addresses are reachable over the management network. Otherwise, you and management clients will not be able to access the Oracle FS System. If you enter unreachable addresses or have forgotten the addresses, contact Oracle Customer Support for assistance. To facilitate the recovery of the network settings, be sure to have a USB keyboard and a VGA monitor available to your service provider.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 Select **Actions > Modify**.
- 3 From the **Interfaces** tab, select how you want the Oracle FS System to assign IP addresses.

- 4 (Optional) Select the **Transmit Setting**.

Note: When your Ethernet network contains an auto-negotiation feature, leave this option at the default setting, **Auto**.

- 5 Click **OK**.

Related Links

[Modify Network Settings, Interfaces Tab](#)

Configure DNS Settings

DNS servers are used by the Pilot to resolve the address of the Oracle Auto Service Request (ASR) server and to locate mail servers for sending password recovery instructions.

You can set the primary and secondary DNS server to resolve host names to IP addresses, for example. Also, the DNS settings allow the Oracle FS System to send Call-Home information, password recovery instructions, and event notifications to designated email recipients.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 Select **Actions > Modify**.
- 3 From the **Interfaces** tab, enter the **Primary DNS Server** IP address.
- 4 Enter the **Secondary DNS Server** IP address.
- 5 Click **OK**.

Related Links

[Modify Network Settings, Interfaces Tab](#)

System Notifications

Setting up system notifications allows you to define recipients for the event notifications and the system alerts, and to define the Call-Home settings that integrate with Oracle Auto Service Request (ASR).

The Oracle FS System provides various methods of setting up system notifications, including the following options:

Event Notifications

Simple Mail Transfer Protocol (SMTP) email messages that notify recipients of specified system events. System events include informational events, warning events, and critical events such as the creation of a logical volume or the occurrence of a hardware problem or software problem. Event notifications are optional and, when enabled, supplement normal event logging and Call-Home notification.

System Alerts

System Alerts are the notifications that the Oracle FS System generates to identify conditions that warrant investigation *and* action.

System Alerts include the following examples:

- Notifications about resources that are not fully operational, indicating a need for maintenance.
- Notifications about insufficient storage, indicating a need for a reallocation of resources, a cleanup of resources, or possibly the purchase of additional storage. This kind of information is important when an administrator has implemented thin provisioning for one or more logical volumes.

Password Recovery

The notifications that the Oracle FS System generates to send users a password token which allows them to reset forgotten passwords. An email server must be set up and the user must have a valid email address associated with the user account.

Call-Home

A feature of an Oracle FS System that, when enabled, allows the system to send the system status information, the appropriate logs, and the system configuration information to Oracle Customer Support. If the Auto Service Request (ASR) feature is enabled, Call-Home also notifies Oracle Customer Support about critical issues that exist in the Oracle FS System.

You must define an email server to receive the alerts and the event notifications and to send the email messages to designated recipients.

The Oracle FS System supports the Simple Network Management Protocol (SNMP) protocol for monitoring the configuration of various system components.

Related Links

[Managing Event Notifications](#)

[Managing System Alerts](#)

[Auto Service Requests](#)

[Settings for ASR \(Call-Home\)](#)

[Configure Email Notification Settings](#)

Auto Service Requests

Oracle Auto Service Request (ASR) is a feature of Oracle hardware warranty and Oracle Premier Support for Systems. The ASR feature automatically generates a service request for specific Oracle FS System software and hardware events. This automated feature securely expedites system diagnostics, prioritizes your service requests, and dispatches parts, if needed.

The ASR feature performs the following activities automatically:

- Generates a service request (SR) when needed
- Handles service requests according to priority
- Dispatches parts when needed
- Attaches Call-Home logs and log bundles to the SR

My Oracle Support (MOS) allows you, or a customer user administrator (CUA), to associate your Oracle FS System with a customer support identifier (CSI), which indicates that your system is licensed for Oracle Customer Support. The CSI information includes the Oracle FS System serial number, organization, and the level of support. The CUA is typically a technical representative from your organization.

The ASR feature relies on the Call-Home feature of the Oracle FS System to communicate system events to MOS. After you configure and activate the ASR in MOS, your system is ready to notify Oracle Customer Support of certain system events.

For additional ASR support information, refer to [Oracle Auto Service Request](http://www.oracle.com/us/support/auto-service-request/index.html) (<http://www.oracle.com/us/support/auto-service-request/index.html>) on the Oracle Support website.

Related Links

[Settings for ASR \(Call-Home\)](#)

Configure Email Notification Settings

Configuring email notifications allows selected individuals to receive the messages that are generated by the Oracle FS System.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 Select **Actions > Modify**.
- 3 Click the **Notification** tab.
- 4 (Optional) To be notified by email of each Call-Home event, select **Enable Email Notification**.
- 5 (Optional) Enter the configuration settings for the email server.
- 6 Click **OK**.

Related Links

[Modify Network Settings, Notification Tab](#)

Settings for ASR (Call-Home)

Call-Home is a feature that, when enabled, works with the Auto Service Request (ASR) feature to send all notifications and associated logs about specific Oracle FS System events to My Oracle Support (MOS). Configure the Call-Home settings correctly to ensure that the MOS system properly manages the events.

Note: No customer data is sent in a Call-Home transmission.

The Oracle FS System sends log bundles that contain information about the system event. The log bundles assist Oracle Customer Support to diagnose the system event. The collection of the log bundles is initiated by one of the following methods:

Manual

The administrator has requested a log bundle collection. You can manually send the logs to MOS and associate the logs with an existing SR number.

Event-triggered

When a system event occurs, the Oracle FS System triggers the following activities:

- Collects log bundles that contain information about the event
- Uploads the logs to MOS

If necessary, MOS creates an SR for the system event and then dispatches replacement parts, if appropriate.

Periodic

The system sends a notification as scheduled in Oracle FS System Manager (GUI) configuration.

After the ASR feature is activated, MOS expects to receive an event, known as a heartbeat, each day from the Oracle FS System. The daily heartbeat keeps the ASR feature in an active state. The following options ensure that MOS receives daily and weekly heartbeat event notifications:

- Standard periodic Call-Home
- Larger periodic Call-Home

For both options, do not change the option schedules.

If the daily heartbeats are not received, MOS creates an SR indicating that the periodic heartbeat is overdue. MOS then dispatches the SR to Oracle Customer Support for resolution.

The Oracle FS System maintains a directory of log collections, each of which represents an event or a manual log bundle. You can select a log bundle file, a range of log bundle files, or a group of log bundle files to download or transmit to MOS. The name of each log bundle indicates the reason, date, and time (GMT) that the bundle was created, as well as the reason, date, and time the previous bundle was created.

Oracle Customer Support might request that you send multiple log bundles to MOS. When you create a manual log bundle, you can add an SR number in the **Notes** field. MOS then automatically associates that log bundle with your active SR.

You can send the log bundles to a local server, if necessary. However, sending log bundles to the local server disables all ASR functionality.

Related Links

[Managing Event Logs](#)

[System Log Bundles](#)

Configure Call-Home for ASR

Configure the Call-Home options to ensure that the Oracle FS System sends specific event notifications to My Oracle Support (MOS). MOS then receives these notifications and, if necessary, initiates a service request (SR).

Prerequisites

- If the Oracle FS System is configured for Call-Home options and Auto Service Request (ASR), and the connection to the Call-Home server is direct, without a proxy, then all firewalls must allow all three Pilot IP addresses to make outbound connections on TCP Port 443 to the Call-Home server at Oracle.
- If the Oracle FS System is configured for Call-Home options and ASR, but is configured to use a proxy, then the proxy must be configured to accept connections from all three Pilot IP addresses and allow them to connect from the proxy to the Oracle Call-Home server on port 443.
- Any firewalls between the Pilots and the proxy must allow the TCP port configured for the Pilot to the proxy connections to pass through firewalls for all three Pilot IP addresses.

You also configure Call-Home options that keep the ASR feature active. MOS expects to receive an event, known as a heartbeat, each day from the Oracle FS System. This heartbeat is controlled by the **Enable standard periodic Call-Home** option.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 Select **Actions > Modify**.
- 3 Click the **Notification** tab.
- 4 Select the **Enable event triggered Call-Home** option.
- 5 Select the **Enable standard periodic Call-Home** option.

Note: Accept the default daily periodic interval. The ASR feature expects a daily Call-Home notification.

- 6 Select the **Enable larger periodic Call-Home** option.
Accept the default weekly periodic interval.
- 7 Verify that the **Use Oracle Server** option is selected.
- 8 Accept the default settings for the **Use Oracle Server** option.

Note: Do not alter the server name of the **HTTP Server** address.

Note: If your environment does not use a proxy, you must configure at least one DNS server. Ensure that the DNS server resolves to the host name of the Oracle server: `callhome.support.pillardata.com`.

- 9 (Optional) Select **Use Proxy** and enter the proxy server address, port number, and protocol type as provided by your proxy administrator.

Note: Ensure that the proxy server, if used, resolves the host name of the Oracle server: `callhome.support.pillardata.com`.

- 10 Select **Enable large file transfers**.

Note: This option ensures that Oracle Customer Support receives the detailed logs that are created for an event.

- 11 Accept the default value for the **Number of recent events to send in header** option.

Note: An Oracle Customer Support professional might request that you change this value for a specific purpose.

- 12 Click **OK**.

You can test the Call-Home settings from the Networking overview page of the **System** tab.

Related Links

[Modify Network Settings, Notification Tab](#)

[Configure the Management Interface](#)

[Settings for ASR \(Call-Home\)](#)

[Configure Call-Home for ASR](#)

[Activate ASR \(Test Call-Home\)](#)

[Upload the Call-Home Matrix](#)

Activate ASR (Test Call-Home)

After you have configured Call-Home for the Auto Service Request (ASR) feature, send an ASR activation request to My Oracle Support (MOS).

Prerequisites:

- Call-Home is configured to access the ASR functions in MOS.
- Event triggering and periodic triggering for Call-Home are enabled and, the parameters are set to the default settings.
- Administrator privileges exist to the ASR asset that is registered in MOS.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 To send the ASR activation request, select **Actions > Test Call-Home**.
- 3 Confirm that you want to send test Call-Home information, and click **OK**.

The Call-Home test is an ASR activation request in MOS. MOS should receive your request in a few minutes, but no longer than 60 minutes.

Note: You can repeat the activation request again, as necessary.

You or the customer user administrator (CUA) performs the following steps to verify that the ASR activation request was successful.

- 4 Verify the receipt of an email from MOS with instructions to complete the ASR activation process.

For information that describes how to complete the activation process, login to [My Oracle Support](https://support.oracle.com/) (https://support.oracle.com/). Search for the

article titled “How to complete Auto Service Request (ASR) asset activation using My Oracle Support.”

- 5 Log in to MOS and verify that the ASR asset status shows “pending”. An “inactive” state means that MOS has not received your activation request.

If you did not receive an email from MOS, or if the ASR asset in MOS is “inactive”, then perform the detailed ASR activation (Call-Home) troubleshooting.

Note: Do not contact Oracle Customer Support until you have completed the troubleshooting checks.

Related Links

[Networking Overview Page](#)

ASR Activation (Call-Home) Troubleshooting

You might need to troubleshoot the Oracle Auto Service Request (ASR) activation request when you have not received an email from My Oracle Support (MOS) in response to an activation request.

You can check the following resources to troubleshoot where the ASR activation request communications might be failing.

Call-Home Succeeded A `Call-Home Succeeded` Event Log message means that the Oracle FS System has successfully sent the Call-Home event or activation request.

If you see the `Call-Home Succeeded` Event Log message, check the following items:

- Receipt of an email notification from MOS within 60 minutes
- ASR asset in MOS has a “pending” status

If either of these checks fail, and your system has a proxy configured, then check the proxy logs to determine if the connection to the Oracle server was successful. If the proxy logged an error, correct the proxy settings in your network or correct the Oracle FS System proxy configuration. Verify your updates by running the ASR activation request again.

Call-Home Failed A `Call-Home Failed` event creates a System Alert and an Event Log records the system fault.

View the properties of the event. If you received the error `EventParameters.Callhome.error.1:HTTPS_UNKNOWN_HOST`, then Call-Home failed to locate a server.

Verify the following criteria:

- The Oracle FS System can contact the configured DNS servers.

- The DNS servers can resolve the host name of the Oracle server, callhome.support.pillardata.com.

If another error message is present, save the event message by using the **Copy to Clipboard** option from the Event Properties dialog.

Contact Oracle Customer Support, if further assistance is required.

Related Links

[Settings for ASR \(Call-Home\)](#)

[Activate ASR \(Test Call-Home\)](#)

[Display the Event Properties](#)

[Manage the System Alerts](#)

Upload the Call-Home Matrix

Upload a custom Call-Home matrix to update the list of events that trigger a Call-Home event, or to update the logs that are collected for the event.

Prerequisites:

- You must be logged in as a Support administrator to access a Call-Home matrix.
- You must obtain an updated Call-Home matrix from Oracle Customer Support.

Important: A software update overwrites the Call-Home matrix. You might either need to upload the custom matrix after a software update or to obtain a new matrix after the software update. Contact Oracle Customer Support for information about the impact that the new Call-Home matrix might have on your system.

- 1 Navigate to **System > Global Settings > Networking**.
- 2 Select **Actions > Upload Call-Home Matrix**.
- 3 From the Upload Call-Home Matrix dialog, click the browse button [...] to proceed.
- 4 Navigate to and select the Call-Home matrix file that you received from Oracle Customer Support.
- 5 Click **Open**.
- 6 From the Upload Call-Home Matrix dialog, click **OK** to upload the matrix file.

Verify your Call-Home settings after uploading any custom matrix file.

Related Links

[Networking Overview Page](#)

Controller Ports

Oracle FS System Manager (GUI) allows you to update the protocol properties of a Controller for Ethernet or Fibre Channel.

You can modify the following aspects of the Controller ports:

- The protocol that is used
- Whether link aggregation is enabled
- The management priority value used in link negotiation and identification for the aggregated ports

You can change port provisioning except for the following caveats:

- Cannot change the port provisioning for Ethernet ports or for SAS ports.
- All HBA ports must be provisioned identically. For example, if Port 0 is FC, the Port 1 must also be FC.

The system allows you to change port provisioning while the system is running. The system applies the port provisioning to both nodes in a Controller pair.

Important: Do not change port provisioning unless you are prepared for all clients to temporarily lose access. Changing port provisioning restarts the controller pair. This is a system restart.

Related Links

[Managing SAN Host Entries](#)

[View a Summary of all the Controller Ports](#)

[View the Port Details for all the Controllers](#)

[View the Port Details for a Controller](#)

[View the Settings for a Controller Port](#)

[Manage Port Aggregation for a Controller](#)

View a Summary of all the Controller Ports

The Controller Ports overview page displays the topology properties of the network ports for each of the Oracle FS System Controllers.

From the Controller Ports overview page, you have the option to view and to modify the properties of selected Controllers and selected ports.

- 1 Navigate to **System > Global Settings > Controller Ports**.
- 2 Verify that the summary information is what you expect.

Related Links

[Controller Ports Overview Page](#)

[View the Port Details for all the Controllers](#)

[View the Port Details for a Controller](#)

[View the Settings for a Controller Port](#)

[Manage Port Aggregation for a Controller](#)

View the Port Details for all the Controllers

You can use Oracle FS System Manager (GUI) to view the port details for the Controllers in one screen. Also, you can view separately the various protocols that the Controller supports.

- 1 Navigate to **System > Global Settings > Controller Ports**.
- 2 Select **Actions > View Port Settings**.
The View Controller Port Settings dialog appears, displaying all of the port details for all of the Controllers.
- 3 Click the appropriate tab to view the Controller port settings.
- 4 Verify that the summary information is what you expect.
- 5 Click **Close**.

Related Links

[View Controller Port Settings, Ethernet Tab](#)

[View a Summary of all the Controller Ports](#)

[View the Port Details for a Controller](#)

[View the Settings for a Controller Port](#)

[Manage Port Aggregation for a Controller](#)

View the Port Details for a Controller

You can use Oracle FS System Manager (GUI) to view the port details for the Controllers in one screen. Also, you can view separately the various protocols that the Controller supports.

- 1 Navigate to **System > Global Settings > Controller Ports**.
- 2 Select a Controller.
- 3 Select **Actions > View Port Settings**.
The View Controller Port Settings dialog appears displaying each of the port types on a different tab.
- 4 Click the appropriate tab to view the details of the Controller port.
- 5 Verify the summary information is what you expect.
- 6 Click **Close**.

Related Links

[View Controller Port Settings, Ethernet Tab](#)

[View a Summary of all the Controller Ports](#)

[View the Port Details for all the Controllers](#)

[View the Settings for a Controller Port](#)

[Manage Port Aggregation for a Controller](#)

View the Settings for a Controller Port

The Controller Ports overview page displays the topology properties of the network ports for each of the Oracle FS System Controllers.

- 1 Navigate to **System > Global Settings > Controller Ports**.
- 2 Select a Controller port.
- 3 Select **Actions > View Port Settings**.
- 4 Verify that the summary information is what you expect.
- 5 Click **Close**.

Related Links

[View Controller Port Settings, Ethernet Tab](#)

[View a Summary of all the Controller Ports](#)

[View the Port Details for all the Controllers](#)

[View the Port Details for a Controller](#)

[Manage Port Aggregation for a Controller](#)

Manage Port Aggregation for a Controller

You can specify whether the Ethernet ports are to be aggregated into a single link and the aggregation priority.

- 1 Navigate to **System > Global Settings > Controller Ports**.
- 2 Select a Controller.
- 3 Select **Actions > Manage Port Aggregation**.
- 4 Select the option, Aggregate HBA Ports.
- 5 Set the aggregation priority.
- 6 Click **OK**.

Related Links

[Manage Port Aggregation Dialog](#)

[View a Summary of all the Controller Ports](#)

[View the Port Details for all the Controllers](#)

[View the Port Details for a Controller](#)

[View the Settings for a Controller Port](#)

Storage Profiles

When configuring a logical volume, you can select a collection of predefined properties to apply to that volume. This collection of properties is called a *Storage Profile*.

When using a specific Storage Profile, you can select a profile that you have previously created and saved, one of the pre-configured profiles, or create a new profile.

After a volume is created using a Storage Profile, removing the profile does not affect the performance characteristics of that volume.

The following properties define a Storage Profile:

RAID level

Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives.

Read ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache.

Priority

Identifies the priority that the system gives to various operational aspects of a logical volume, such as the Controller processing queue. The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume. Identifies as well where the data is striped on rotating drives.

Stripe width

Identifies the number of drive groups over which the data is written.

Writes

Identifies the write-caching rules to use for the profile.

Preferred Storage Classes

Identifies the type of physical media on which the data is stored.

Related Links

[Managing Storage Profiles](#)

[Storage Tiers and Storage Profiles](#)

Storage Tiers and Storage Profiles

For all of the predefined Storage Profiles, the most preferred Storage Class and the RAID level always correspond to a valid storage tier.

For any Storage Domain, seven different types of storage tiers are possible for holding auto-tiered LUNs. The following table summarizes the possible storage tiers in a Storage Domain:

Table 5: Possible storage tiers in a Storage Domain

Storage Class	Storage tier	
	Tier 1	Tier 2
Capacity HDD	RAID 6	Not available
Capacity SSD	RAID 5	RAID 10
Performance HDD	RAID 5	RAID 10
Performance SSD	RAID 5	RAID 10

In any given Storage Domain, however, only some of those tiers are present.

When creating or modifying an auto-tiered LUN, if you use a Storage Profile to define the QoS characteristics of the LUN, the system determines the starting storage tier for the LUN by evaluating the desired Storage Classes and the RAID level using the following process:

- First, from the desired Storage Classes, the system selects the best Storage Class that is present in the Storage Domain.
- If none of the desired Storage Classes are present, the system returns an error.

Note: This condition can only occur for custom storage profiles.

- Using that Storage Class, the system changes the RAID level from RAID 5 to RAID 6 or from RAID 6 to RAID 5, depending on whether the change is necessary to match one of the tiers.

Managing Storage Profiles

You can use a Storage Profile to configure the Quality of Service (QoS) properties automatically when you create a logical volume.

A Storage Profile is defined as follows: A set of QoS attributes that can be used to configure a logical volume. Oracle provides a collection of Storage Profiles that are optimized for specific uses within an application context. Administrators can select one of the available profiles, create a new profile, or modify an existing profile.

The Performance Benchmark Storage Profile is designed for *performance testing purposes only*. This Storage Profile is *not* recommended for most applications because it uses the system resources in a way that negatively impacts other applications and interferes with the functioning of other volumes in the Storage Domain. After creating a volume that uses the Performance Benchmark Storage Profile, delete the Performance Benchmark volume before you configure normal volumes for applications.

Related Links[Create a Storage Profile](#)[Duplicate a Storage Profile](#)[View Storage Profiles](#)[Delete a Storage Profile](#)**Create a Storage Profile**

You can create a Storage Profile that defines a collection of Quality of Service (QoS) properties that differ in some way to the Storage Profiles that have been predefined in the system.

Important: When creating a Storage Profile, you should be familiar with the interactions among the attributes and the potential effects on system performance.

Oracle-supplied profiles are displayed with a type of *System*. Custom profiles are displayed with a type of *Custom*.

- 1 Navigate to **System > Global Settings > Storage Profiles**.
- 2 Select **Actions > Create Storage Profile**.
- 3 Set the QoS properties as needed.
For the name of the Standard Profile, enter an appropriate value. For all other properties, select the desired value from the drop-down list.
- 4 Click **OK**.
After saving a profile, you cannot make changes to it. You can only delete the profile.

Related Links[Create Storage Profile Dialog](#)[Duplicate a Storage Profile](#)[View Storage Profiles](#)[Delete a Storage Profile](#)**Duplicate a Storage Profile**

You can create a new Storage Profile by duplicating an existing profile.

Duplicating a profile copies the properties of the original profile to a new profile. You can then customize the new profile by changing any of the existing properties.

- 1 Navigate to **System > Global Settings > Storage Profiles**.
- 2 Select the Storage Profile you want to duplicate.
- 3 Select **Actions > Duplicate Storage Profile**.
- 4 Change the existing QoS properties as needed.

For the name of the Standard Profile, enter an appropriate value. For all other properties, select the desired value from the drop-down list.

- 5 Click **OK**.

Related Links

[Duplicate Storage Profile Dialog](#)

[Create a Storage Profile](#)

[View Storage Profiles](#)

[Delete a Storage Profile](#)

View Storage Profiles

Before using a Storage Profile to create a logical volume, you can display the Quality of Service (QoS) properties of the profile to determine whether those properties are appropriate for your needs.

Oracle FS System Manager (GUI) lists two types of Storage Profiles:

Custom

A custom profile that was created by a storage administrator.

System

An Oracle-provided profile.

- 1 Navigate to **System > Global Settings > Storage Profiles**.
The system displays a complete list of QoS properties for all available profiles.
- 2 To view a specific storage profile setting, choose a profile and then select **Actions > View Storage Profile**.
- 3 Verify that the property information is what you expect.
- 4 Click **Close**.

Related Links

[View Storage Profile Dialog](#)

[Create a Storage Profile](#)

[Duplicate a Storage Profile](#)

[Delete a Storage Profile](#)

Delete a Storage Profile

When a custom Storage Profile is no longer needed, you can remove it from the system. You cannot delete Oracle-supplied profiles (type of *System*).

- 1 Navigate to **System > Global Settings > Storage Profiles**.
- 2 Select the custom Storage Profile that you want to delete.
- 3 Select **Actions > Delete Storage Profile**.

The Delete Storage Profile dialog appears.

- 4 Click **OK**.

The custom Storage Profile is deleted from the system.

Note: Volumes that were created using the profile are not affected when the storage profile is deleted. The volumes created using the profile continue to function normally.

Related Links

[Create a Storage Profile](#)

[Duplicate a Storage Profile](#)

[View Storage Profiles](#)

Modifying Security Settings

You can update the account security properties and the login welcome message using the security settings in Oracle FS System Manager.

You can change the following global security settings for system administrator accounts:

- Set the number of consecutive failed login attempts that the Oracle FS System allows. When the threshold is exceeded, the system disables the account and writes an entry in the event log. Only a Primary Administrator or an Administrator 1 can re-enable the account. After the account is re-enabled, the system resets the counter upon a successful login. The failed login attempts value must be between 1 and 20.
- Set the session time-out so that the Oracle FS System terminates a session after a given period of inactivity. The session time-out value must be between 1 and 999 minutes (the default is 20 minutes).

Related Links

[Modify Security Settings](#)

[Modify the Login Screen Message](#)

Modify Security Settings

Configure the Oracle FS System security by limiting the number of failed login attempts and by setting a time limit for inactive login sessions.

- 1 Navigate to **System > Global Settings > Security**.
- 2 Select **Actions > Modify**.
- 3 Enter the values in the failed login attempts field and the session time-out field.

The value for the number of failed login attempts must be between 1 and 20 (the default is 10 minutes). The session time-out value must be between 1 and 999 minutes (the default is 20 minutes).

- 4 Click **OK**.

Related Links

[Modify Security Settings Dialog](#)

Modify the Login Screen Message

You can add a customized message to the Oracle FS System Manager login screen. For example, you might want to announce that system maintenance or system downtime will be occurring at a specific time to notify administrators to log out before that time.

- 1 Navigate to **System > Global Settings > Security**.
- 2 Select **Actions > Modify**.
- 3 Enter a login screen message.

You can enter up to 256 Unicode characters. The login message appears on the login screen when an administrator first starts Oracle FS System Manager.

- 4 Click **OK**.

Related Links

[Modify Security Settings Dialog](#)

Administrator Account Management

Oracle FS System administrators have specific privileges that are based on their assigned role for their account.

At times, you might need to modify the attributes of other accounts. A Primary Administrator and users who are assigned to the Administrator 1 role can modify their own account or the accounts of another administrator. Such modification includes, for example, resetting of passwords when needed.

Important: When creating or modifying an account, be sure to provide an email address for the account to which system notifications can be sent. Specifying an email address for the Primary Administrator account and for the Oracle Support account is particularly crucial for password recovery.

Some changes take effect immediately. For example, a login session is terminated when you disable or delete the login account.

Other changes affect the account the next time an individual or a client logs in. For example, when you modify a password for an account or modify the global session time-out value, those changes take effect the next time a session is started.

Related Links

[Creating Administrator Accounts](#)

[Managing Administrator Accounts](#)

[Administrator Account Types](#)

[Create an Administrator Account](#)

[Display Administrator Account Details](#)

[Delete an Administrator Account](#)

Administrator Account Types

Administrator login accounts have certain privileges, which depend on the role of the account.

To administer an Oracle Flash Storage System, you must log in using an administrator account. Every account performs a specific role that defines system privileges.

Table 6: Administrator privileges by role

Administrator role	Built-In account?	Login name	Privileges
Primary Administrator	Yes	<code>administrator</code>	Can perform all configuration, management, and monitoring tasks, including modifying all other accounts. This account cannot be deleted or disabled.
Administrator 1	No	Customer defined	Can perform all configuration, management, and monitoring tasks except for running commands in the Drive Enclosure console or running commands using the <code>enclosure_console</code> Oracle FS CLI command.

Table 6: Administrator privileges by role (continued)

Administrator role	Built-In account?	Login name	Privileges
Administrator 2	No	Customer defined	<p>Can perform all tasks with the following caveats:</p> <ul style="list-style-type: none"> • Cannot create or manage administrator accounts. • Cannot modify software configurations or hardware configurations. • Cannot shut down the system. • Cannot run commands by means of the Drive Enclosure console or the <code>enclosure_console Oracle FS CLI</code> command.
Monitor	No	Customer defined	Can display system information only; cannot modify the configuration. Administrators using this role can modify their own account attributes.
Oracle Support	Yes	pillar	<p>Can perform limited customer service-only functions; cannot modify the configuration. This account cannot be deleted or disabled.</p> <p>Note: Only the Oracle Customer Support personnel, including authorized service providers, can use this account.</p>
Support	No	Customer defined	Can perform only those functions that are related to customer service; cannot modify the system configuration.
FSPM	Yes	fspm	Used by SAN hosts that are running Oracle FS Path Manager. This account cannot be deleted or disabled.
Replication	Yes	replication	Used by Oracle MaxRep Replication Engines. This account cannot be deleted or disabled.

Related Links

[Creating Administrator Accounts](#)

[Managing Administrator Accounts](#)

[Create an Administrator Account](#)

[Modify an Administrator Account](#)

Creating Administrator Accounts

You can create new administrator accounts, each with different roles that are authorized to perform different functions. For example, you can create a Monitor account that has the authority to perform read-only management tasks and the ability to modify only their own account attributes.

You can create multiple accounts in an Oracle FS System. More accounts are useful, for example, if you want to delegate responsibilities. For example, you might choose to create the following accounts:

- At least one additional administration account. In this way, a designated person can assume responsibility while the Primary Administrator is unavailable. Assign the Administrator 1 role to this account.

Tip: For day-to-day operations, do not use the built-in Primary Administrator account (**administrator**). Instead, be sure that an Administrator 1 account is set up and use that account for the day-to-day operations. One reason is that, besides the Primary Administrator, only an Administrator 1 can modify an account password (including that for the Primary Administrator) without knowing the previous password.

- One or more administration accounts with read-only privileges. In this way, managers can monitor the system but they cannot change configuration details. Assign the Monitor role to these accounts.

If you delegate administrative tasks, you can have the other administrators perform certain tasks, including:

- Modify account attributes. For example, change the password of an account or disable an account.
- Change the security settings of accounts.
- Delete obsolete accounts.

Important: Specify an email address for all administrator accounts, which allows the system to send critical notifications to those accounts. Such a notification is important, for example, when the password for an account is about to expire. If you do not enter an email address for an account, administrators cannot reset their own passwords using the **Reset password** feature.

You can create a maximum of 128 administration accounts. Only 25 user-created account sessions can be logged in at any given time. Only five accounts are permitted to be logged in at the same time. A Primary Administrator can forcefully log in to free up an account session if necessary.

Related Links

[Managing Administrator Accounts](#)

[Administrator Account Types](#)

[Create an Administrator Account](#)

[Modify an Administrator Account](#)

[Delete an Administrator Account](#)

Create an Administrator Account

Create additional accounts to allow other administrator to perform various tasks on the Oracle FS System.

- 1 From Oracle FS System Manager (GUI), navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select **Actions > Create**.
- 3 Enter the name of the account in the **Login Name** field.
- 4 Select a role from the **Role** list.

Note: Refer to the **Administrator Account Description** that is provided on the dialog for a full description of each role.

- 5 Enter the remaining information about the account owner.

Additional information:

Required	Password
	Confirm Password
Optional	Full Name
	Email Address (<i>highly recommended</i>)
	Phone Number

Important: Setting the email address is crucial should a password expire. If you do not enter an email address for an administrator account, administrators cannot reset their own passwords using the **Reset password** feature. Furthermore, if the password for the Primary Administrator account or for the Oracle Support account is changed from the factory setting, the changed password has been forgotten, and the email address is not configured, you will need to contact Oracle Customer Support for assistance.

- 6 (Optional) To disable the account, select the **Disable Account** option. Use the **Disable Account** option when you want to create accounts that you want to enable later.
- 7 Click **OK**.

Related Links

[Create Administrator Account Dialog](#)

[Administrator Account Management](#)

[Administrator Account Types](#)

[Delete an Administrator Account](#)

Managing Administrator Accounts

You can change the properties of selected administrator accounts. For example, you might want to change the role of an administrator account to give the administrator more or fewer system privileges.

If you delegate administrative tasks, you can have the other administrators perform certain tasks, including:

- Modify account attributes. For example, change the password of an account or disable an account.
- Change the security settings of accounts.
- Delete obsolete accounts.

At times, you might need to modify the attributes of other accounts. A Primary Administrator and users who are assigned to the Administrator 1 role can modify their own account or the accounts of another administrator. Such modification includes, for example, resetting of passwords when needed.

Some changes take effect immediately. For example, a login session is terminated when you disable or delete the login account.

Other changes affect the account the next time an individual or a client logs in. For example, when you modify a password for an account or modify the global session time-out value, those changes take effect the next time a session is started.

Related Links

[Modify an Administrator Account](#)

[Change Administrator Passwords](#)

[Reset the Primary Administrator Password](#)

Modify an Administrator Account

You can modify the administrator account details, disable the account, or change the user password.

- 1 Navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select an account name from the list of login names.
- 3 Select **Actions > Modify**.
- 4 Enter values for the attributes that you want to modify.

Note: You cannot disable the Primary system administrator account or the Oracle Support account.

- 5 Click **OK**.

Related Links

[Modify Administrator Account Dialog](#)

[Managing Administrator Accounts](#)

[Change Administrator Passwords](#)

[Reset the Primary Administrator Password](#)

Change Administrator Passwords

You can change the administrator password as necessary when, for example, an administrator forgets the password.

Passwords must adhere to the following security policy:

- Must be eight characters to 16 characters in length
- Cannot contain dictionary words
- Cannot be any of the last 50 passwords

Note: The system retains recent passwords for one year.

- Must contain at least one uppercase letter, one lowercase letter, one numeric character, and one special character

- 1 Navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select a login name from the Administrator Accounts list.
- 3 Select **Actions > Modify**.
- 4 Enter the new password in both the **Password** and **Confirm Password** fields.
- 5 Click **OK**.

Related Links

[Modify Administrator Account Dialog](#)

[Managing Administrator Accounts](#)

[Modify an Administrator Account](#)

[Reset the Primary Administrator Password](#)

Reset the Primary Administrator Password

If you forget the Primary Administrator password, an Administrator 1 can reset it.

To reset your Primary Administrator password, use one of the following methods:

- Use an Administrator 1 account, if one exists, to reset the password. The Primary Administrator and administrators who are assigned to the

Administrator 1 role can change the password of any customer-defined administrator account without knowing the previous password. A Support administrator cannot reset the Primary Administrator password.

- Click **Reset password** on the Login screen and follow the instructions in the Reset Password dialog. You must have either your old password or your password token to reset your password. If you do not have your password token, click **Forgot password** on the Login screen and follow the instructions in the Forgot Password dialog.

Note: The **Forgot password** mechanism requires that an email account has been configured for the account for which the password has been forgotten. The system sends the instructions to that email address. Follow the instructions recorded in that email.

If you are an Administrator 1, use the following steps to reset the password.

- 1 Navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select an account name from the list of login names.
- 3 Select **Actions > Modify**.
- 4 Enter the new password in both the **Password** and **Confirm Password** fields.
- 5 Click **OK**.

Related Links

[Modify Administrator Account Dialog](#)

[Managing Administrator Accounts](#)

[Modify an Administrator Account](#)

[Change Administrator Passwords](#)

Recover From Expired Passwords

A scenario might arise in which the password for one of the built-in accounts (Primary Administrator, Oracle Support, or Replication) has expired. Recovering from this scenario is crucial to maintaining your Oracle FS System.

Table 7: Resolution scenarios for expired passwords

Login account	Scenario	Resolution
Primary Administrator	Password is set to the factory default.	Perform Steps 1 through 4 below.
	All of the following is true: <ul style="list-style-type: none"> • Password has been changed. • Password is not known. • Email has not been configured. 	Contact Oracle Customer Support for assistance.

Table 7: Resolution scenarios for expired passwords (continued)

Login account	Scenario	Resolution
Oracle Support	Password is set to the factory default	Perform Steps 1 through 4 below.
	All of the following is true: <ul style="list-style-type: none"> • Password has been changed. • Password is not known. • Email has not been configured. 	Contact Oracle Customer Support for assistance.
Replication	Password is not known.	Contact Oracle Customer Support for assistance.

If the password for Primary Administrator account or the Oracle Support account has expired and the password was not changed from the factory setting, perform the steps that are described below.

If the password for the Replication account has expired and you do not know the password, contact Oracle Customer Support for assistance.

Important: If however the following conditions are true, contact Oracle Customer Support for assistance:

- The password has been changed from the factory setting.
- You do not know the current password.
- No email address has been configured.

In the preceding scenario, Oracle Customer Support can assist you in running a special utility that resets the Primary Administrator account or the Oracle Support account.

- 1 Launch Oracle FS System Manager.
- 2 In the login dialog, enter the login name.
Enter **administrator** or **pillar**, depending on the account for which the password has expired.

If you know the password for the built-in account, perform Step 3; otherwise perform Step 4.

- 3 (Password is known) Enter the original password and then click **Reset Password**.

Perform the steps that are described for resetting the Primary Administrator password.

- 4 (Password is not known) Click **Forgot Password**.

If you created an email account for the built-in account, the system sends password reset instructions to that email account. Follow the directions in that email.

The built-in account should now be reset and accessible.

Display Administrator Account Details

You can display details about all login accounts or about a specific login account. You can also review the accounts that are disabled or have incomplete contact information.

- 1 Navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select the account you want to view, and then select **Actions > View**.
- 3 Review the displayed information to ensure that the account details are what you expect.
- 4 Click **OK**.

Related Links

[View Administrator Account Dialog](#)

Delete an Administrator Account

You might want to delete a login account when, for example, someone who has an account leaves the company.

- 1 Navigate to **System > Global Settings > Administrator Accounts**.
- 2 Select an account name from the Administrator Accounts list to that you want to remove.
- 3 Select **Actions > Delete**.
The system displays the Delete Account dialog.
- 4 Click **OK**.

Related Links

[Creating Administrator Accounts](#)

[Managing Administrator Accounts](#)

[Create an Administrator Account](#)

[Modify an Administrator Account](#)

SNMP Trap Host Management

If you use Simple Network Management Protocol (SNMP) applications to monitor network devices, you can define SNMP trap hosts to receive Oracle FS System traps. Any workstation that has an SNMP-based management application installed on it can be a trap host.

Oracle Flash Storage Systems support SNMP version 2c. SET operations from SNMP management applications are not supported.

A management information base (MIB) table is a plain text file that provides the details on all system objects for which Oracle provides management information. To use the MIB file, you first download the file from the Utilities page of the Pilot

management interface, and then import the file in to the SNMP management application.

Note: You can define event notifications as an alternative to SNMP.

Related Links

[Download the MIB From the Pilot](#)

System Objects That Can Be Monitored

The management information base (MIB) is self-documenting and lists the Oracle FS System resources that you can monitor. You can download the text-based MIB from the Utilities page of the Pilot management interface or using Oracle FS System Manager (GUI).

Some of the Oracle FS System resources that a system administrator can monitor are listed below. Some of this information can be used, for example, to graph or otherwise track the trend lines of certain resources, such as that for storage space and its utilization and for I/O operations for each second (IOPS) over certain time periods.

System Alerts

System Alerts are the notifications that the Oracle FS System generates to identify conditions that warrant investigation *and* action.

System Alerts include the following examples:

- Notifications about resources that are not fully operational, indicating a need for maintenance.
- Notifications about insufficient storage, indicating a need for a reallocation of resources, a cleanup of resources, or possibly the purchase of additional storage. This kind of information is important when an administrator has implemented thin provisioning for one or more logical volumes.

Call-Home or Manual Log Collection

Querying these resources, the administrator can check the following information:

- The time of collection
- The availability status
- The type of information that is contained in the logs

Running Tasks

Some tasks that are running in the background are normal management jobs such as scheduled clone replications or scheduled upgrades, or are the result of some administrative action. Other tasks, however, might indicate a condition in the Oracle FS System that is worth investigating, such as any of the following conditions:

- Pilot restarts
- System restarts
- Topology rediscovery

This category is also useful for seeing when a planned task has completed or might need recovery, such as when replicating a very large logical volume.

Scheduled Tasks

Querying this resource allows the administrator to determine which tasks are scheduled and when they are scheduled. Knowing this information can be useful in determining whether some traps or events can be expected.

Software Versions

Capturing software versions is useful in a large data center. To determine which Oracle FS System requires updates or to discover whether a software update is complete, you must access each system individually. Those multiple accesses can be combined into a single task by using an SNMP management utility to perform the queries.

Storage Usage

Monitoring short term trends and long term trends in capacity usage helps the system administrator avoid getting System Alerts warnings, for example, that Clone LUNs are being deleted to free up capacity. Because you can over-allocate logical volumes when using the thin provisioning feature, such volumes need to be monitored and can require additional physical storage.

System Configuration

Use a central SNMP resource to view the configuration and the status of the resources of multiple systems, including:

- LUNs
- Interfaces
- Clones
- LUN mapping and masking

Traps

Traps are equivalent to email-based administrator alerts and provide another means of alerting system administrators to unfavorable storage conditions, which might result in a system alert.

Related Links

[*Download the MIB From the Pilot*](#)

Create SNMP Hosts

You can configure any workstation as a Simple Network Management Protocol (SNMP) host. When you set up an SNMP host, you can also set the threshold of the monitored event that will trigger a trap message to the SNMP host.

If you want to configure the SNMP server to monitor but not receive trap messages, clear the **Receive Traps** option.

- 1 Navigate to **System > Global Settings > SNMP**.
- 2 Select **Actions > Create**.
- 3 Enter a **Name** for the SNMP host.
- 4 Enter the values in the **Host IP** field and the **Community String** field to specify where the traps are directed.
The community string must contain at least six characters.
- 5 (Optional) Select the **Receive traps** option to enable the **Trap Port Number** field.
- 6 (Optional) Enter the **Trap Port Number**.

Valid values:

- For SNMP queries, use port 161
- For SNMP traps, use port 162

- 7 (Optional) Select the **Severity threshold** from the list of possible filters:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

- 8 Click **OK**.

Related Links

[Create SNMP Host Dialog](#)

[Modify SNMP Hosts](#)

[Delete SNMP Hosts](#)

[View SNMP Hosts](#)

Modify SNMP Hosts

You can modify the hosts that receive Simple Network Management Protocol (SNMP) traps. You might, for example, need to modify the IP address of the trap

host if you install your SNMP-based management application on a different workstation.

- 1 Navigate to **System > Global Settings > SNMP**.
- 2 From the SNMP Hosts overview page, select an SNMP host.
- 3 Select **Actions > Modify**.
- 4 Enter values for the attributes that you want to modify.
- 5 Click **OK**.

Related Links

[Modify SNMP Host Dialog](#)

[Create SNMP Hosts](#)

[Delete SNMP Hosts](#)

[View SNMP Hosts](#)

Delete SNMP Hosts

You can delete a host from the Simple Network Management Protocol (SNMP) configuration. For example, you might want to delete a host after you uninstall an SNMP-based management application from that host.

- 1 Navigate to **System > Global Settings > SNMP**.
- 2 From the SNMP Hosts overview page, select an SNMP host to delete.
- 3 Select **Actions > Delete**.
- 4 Click **OK**.

Related Links

[Create SNMP Hosts](#)

[Modify SNMP Hosts](#)

[View SNMP Hosts](#)

View SNMP Hosts

You can review a list of Small Network Management Protocol (SNMP) hosts that are configured on the Oracle FS System. For example, you might want to know the community string that a host uses for receiving traps.

- 1 Navigate to **System > Global Settings > SNMP**.
- 2 Review the list of SNMP trap hosts and ensure that the SNMP host details are what you expect.
- 3 To view details about a specific host, select a host from the list and select **Actions > View**.
- 4 Verify that the SNMP information is what you expect.
- 5 Click **Close**.

Related Links

[View SNMP Host Dialog](#)

[Create SNMP Hosts](#)

[Modify SNMP Hosts](#)

[Delete SNMP Hosts](#)

Download the MIB

The management information base (MIB) table that supports the Simple Network Management Protocol (SNMP) table lists the Oracle FS System resources that you can monitor. The file is available on the Pilot, but you can download it using Oracle FS System Manager (GUI).

- 1 Navigate to **System > Global Settings > SNMP**.
- 2 From the SNMP Hosts overview page, select an SNMP host.
- 3 Select **Actions > Download Oracle FS System MIB**.
- 4 From the Download Oracle FS System MIB dialog, click the browse button [...] to proceed.
- 5 Navigate to the desired target download path and specify a filename.
- 6 Click **OK**.

Download the MIB From the Pilot

The management information base (MIB) table that supports the Simple Network Management Protocol (SNMP) table lists the Oracle FS System resources that you can monitor. The file is available on the Pilot, which can be accessed from a web browser.

- 1 Start a web browser from your workstation.
- 2 Specify the public IP address of the Pilot or the name of the Oracle FS System as the address to open.
- 3 Click **Utility Software**.
- 4 Click **Download Oracle FS System SNMP MIB**.
- 5 From the web browser, save the file to your client workstation.

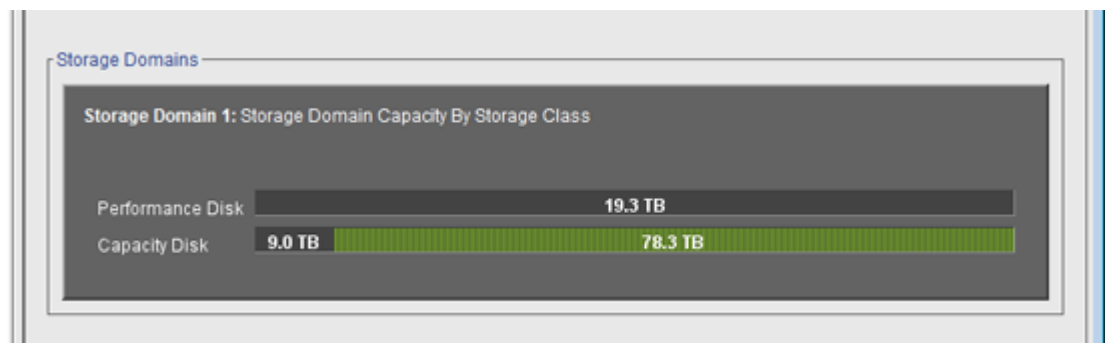
Manage Storage Groups

Display Capacity Usage

You can display the capacity usage of all Storage Domains by Storage Class and compare that usage to the total system capacity and to the assigned capacity limits of the Oracle FS System.

- 1 Navigate to **System > Dashboard**.
The Dashboard shows the storage capacity for each Storage Domain in the system.
- 2 Review the displayed capacity usage for each Storage Domain.

Figure 4: Usage summary



Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

1 MB = 1024^2 (1,048,576) bytes

1 GB = 1024^3 (1,073,741,824) bytes

1 TB = 1024^4 (1,099,511,627,776) bytes

Related Links

[Dashboard Overview Page](#)

Volume Groups

A volume group is an administrative system object that is used to organize logical volumes and, possibly, other volume groups. Volume groups can span Storage Domains. A volume group can contain logical storage objects, such as other volume groups, LUNs, and Clone LUNs.

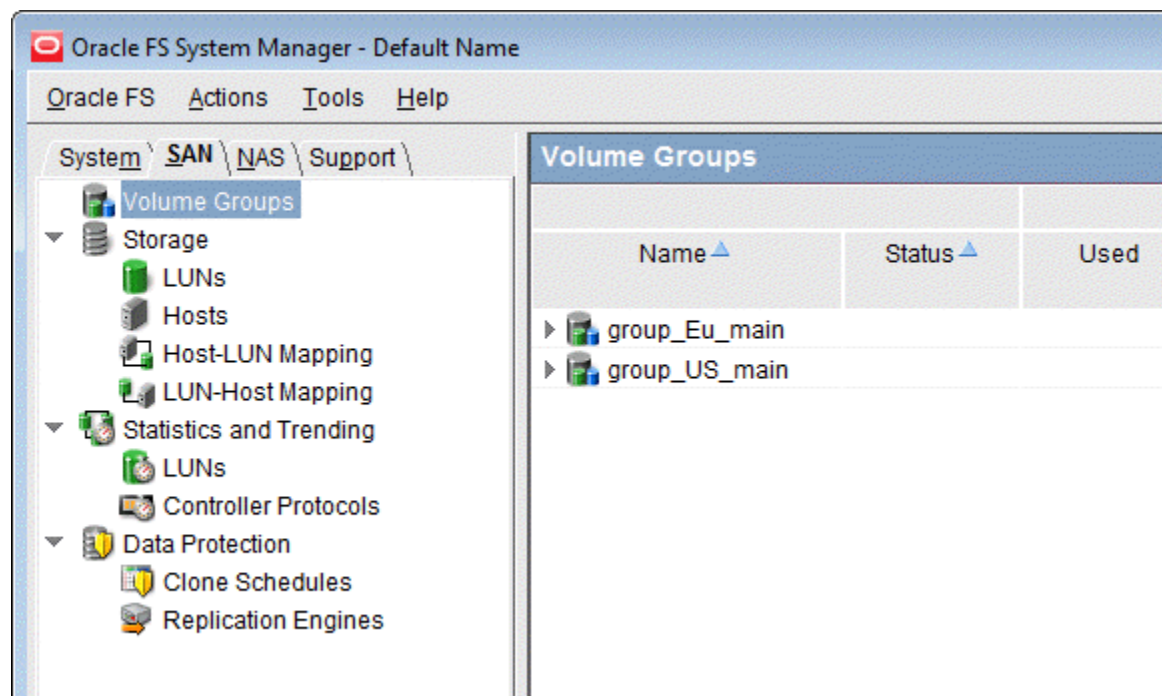
Volume groups have the following properties:

- Each volume group must have a unique name. No two volumes groups in an Oracle FS System can have the same name.
- The total number of volume groups is limited to 5000.
- The system allows up to 10 volume groups nested in a parent volume group.
- Volume groups allow you to group logical storage objects that reside in different Storage Domains.
- When deleting a volume group any nested objects, such as child volume groups, or LUNs, will be deleted also.

You can use volume groups to organize the storage objects that parallel your organizational structure. For example, you might want to group all of your LUNs that are located in the United States in one volume group, and the LUNs for the European sites in another volume group.

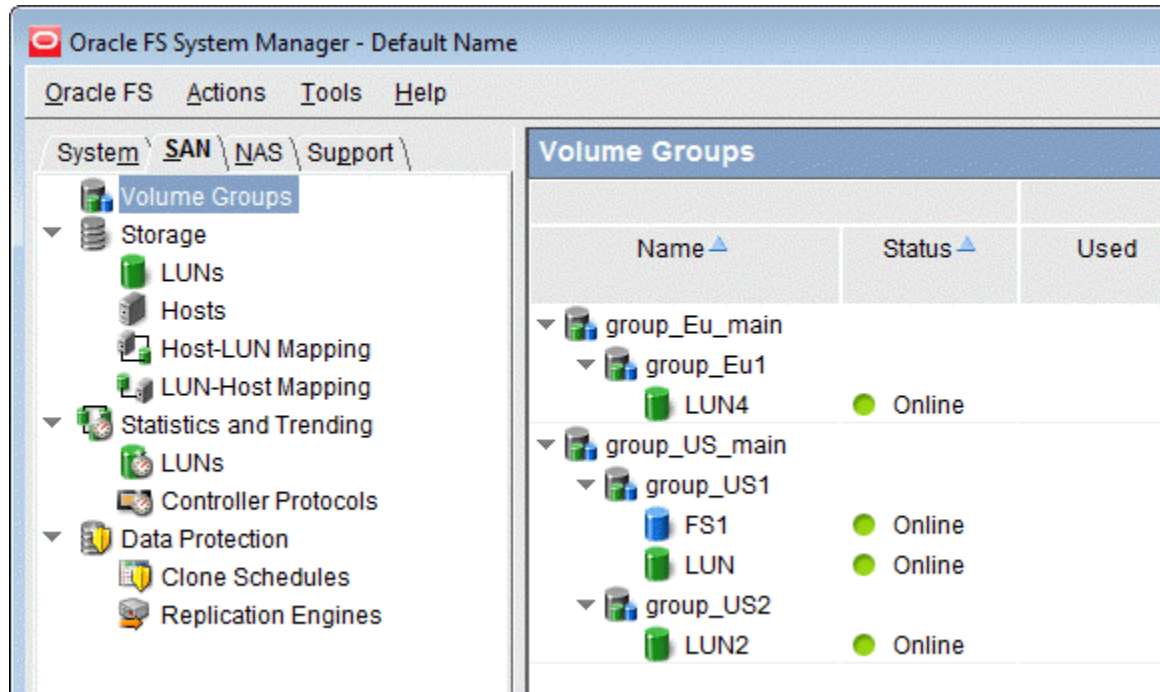
If you do not create nested volume groups, create all volumes within the default volume group to create a broad, shallow hierarchy.

Figure 5: Default volume group example



Create nested volume group by creating a parent volume group, and then assign logical volumes or other volume groups to the parent volume group.

Figure 6: Nested volume groups



Related Links

[Display Volume Group Details](#)

[Create Volume Groups](#)

Display Volume Group Details

You can view the hierarchal relationship of the volume groups and the assigned logical volumes.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Review the characteristics of all of the available volume groups.

If necessary, you can reorganize and rename these groups.

Related Links

[Volume Groups Overview Page](#)

[Volume Groups](#)

[Create Volume Groups](#)

[Delete a Volume Group](#)

[Rename a Volume Group](#)

Create Volume Groups

Create volume groups when you want to organize logical volumes into organizational units.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 Click **Create**.
The system creates a row for the volume group.
- 4 Enter the **Volume Name** for the volume group.
- 5 (Optional) From the **Parent Volume Group Name** list, select the volume group that you want to be the parent.
- 6 (Optional) To immediately delete the selected row, click **Remove**.
- 7 Click **OK**.

Related Links

[Create Volume Group Dialog](#)

[Volume Groups](#)

[Add Volumes to a Volume Group](#)

[Add Volume Groups to a Volume Group](#)

Add Volumes to a Volume Group

You can add logical volumes to an existing volume group as your system environment changes.

As you assign LUNs and possibly other volume groups to a selected volume group, Oracle FS System Manager (GUI) provides you with a preview of your selected change in the Volume Groups overview page.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 From the Volumes tab, select the LUN to add to the volume group.
- 4 From the **Volume Group** list, select the volume group in which you want to place the LUN.

You can repeat Step 3 and Step 4 to add more volumes to the volume group.

- 5 Click **OK**.

Related Links

[Manage Volume Groups, Volumes Tab](#)

[Create Volume Groups](#)

[Add Volume Groups to a Volume Group](#)

Add Volume Groups to a Volume Group

You can add volume groups to an existing volume group as your system environment changes.

As you assign the volume group to the volume group, Oracle FS System Manager (GUI) provides you with a preview of your selected change in the Volume Groups overview page.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 From the Volume Groups tab, select the volume group to modify.
- 4 Click **Modify**.
- 5 From the **Parent Volume Group Name** list, select the volume group that you want to be the parent.
- 6 Click **OK**.
- 7 Click **OK**.

Related Links

[Manage Volume Groups, Volume Groups Tab](#)

[Create Volume Groups](#)

[Add Volumes to a Volume Group](#)

Rename a Volume Group

If needed, you can modify the name of a volume group as the organization of your volume group changes.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 From the Volume Groups tab, select the volume group that you want to rename.
- 4 Click **Modify**.
- 5 In **Volume Name** enter the new name for the volume group.
- 6 Click **OK**.

Related Links

[Manage Volume Groups, Volume Groups Tab](#)

[Volume Groups](#)

[Delete a Volume Group](#)

[Display Volume Group Details](#)

Delete a Volume Group

You can delete a volume group after you have reassigned all of its logical volumes to different volume groups.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.

- 3 From the Volume Groups tab, select a volume group to delete.

Note: If the volume group contains any objects, move or delete those objects before you delete the volume group.

- 4 Click **Delete**.

Related Links

[Manage Volume Groups, Volume Groups Tab](#)

[Volume Groups](#)

[Display Volume Group Details](#)

Move a Volume to a Different Volume Group

If needed, you can modify the association of your volumes to your volume groups. For example, after you create a volume group you can move one or more logical volumes from an existing volume group to the new volume group.

As you assign LUNs and possibly other volume groups to a selected volume group, Oracle FS System Manager (GUI) provides you with a preview of your selected change in the Volume Groups overview page.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 From the Volumes tab, select a LUN to move.
- 4 Select a **Volume Group** entry to modify the hierarchical structure where your volume is a child of the selected parent.

Tip: To move the volume outside of all custom volume groups, select **<none>**.

- 5 Click **OK**.

Related Links

[Manage Volume Groups, Volumes Tab](#)

[Add Volumes to a Volume Group](#)

[Create Volume Groups](#)

Move a Volume Group to a Different Volume Group

If needed, you can reorganize your volume groups. For example, you can remove the child volumes from a parent volume group.

As you assign LUNs and possibly other volume groups to a selected volume group, Oracle FS System Manager (GUI) provides you with a preview of your selected change in the Volume Groups overview page.

- 1 Navigate to **SAN > Volume Groups**.
- 2 Select **Actions > Manage Volume Groups**.
- 3 From the Volume Groups tab, select the volume group that you want to move.

- 4 Click **Modify**.
- 5 From the **Parent Volume Group Name** list, select the volume group that you want to be the parent.

Tip: To move the volume group outside of all custom volume groups, select **<none>**.

- 6 Click **OK**.
- 7 Click **OK**.

Related Links

[Manage Volume Groups, Volume Groups Tab](#)

[Create Volume Groups](#)

[Add Volumes to a Volume Group](#)

Storage Domains

Storage Domains give you the flexibility to store your data into logical groups that meet your storage requirements. Examples of such groups can include geographical location, or departmental function within your organization. You can also group your data by access frequency, or group your data by levels of confidentiality.

A Storage Domain is a virtual storage pool that consists of an assortment of drive groups. Each drive group contains drives of a particular Storage Class and of a particular capacity. The drive groups that comprise a Storage Domain can be of different Storage Classes. A Storage Domain can contain from 0 to 1024 drive groups.

An administrator can allocate a particular drive group to a specific administrator-defined Storage Domain. When no administrator-defined domains exist, all of the drive groups reside in the default Storage Domain.

Volume groups allow you to logically organize your data based on the data content or geographical location. Storage domains allow you organize your content based on physical properties of the storage pool, such as Storage Class or auto-tiering capabilities.

Storage Domain Examples

Storage Domains enable storage administrators to assign logical volumes to specific Storage Domains. Such assignments can be made to reduce contention among volumes, to implement different levels of security for those volumes, or both. When more storage capacity is required, the administrator can add drive groups to the Storage Domain.

Storage administrators typically use Storage Domains for the following reasons:

User group separation

In this scenario, storage administrators can isolate application data to specific drive groups on a department basis (for internal cloud environments) or on a customer basis (in external cloud environments). This isolation eliminates interapplication contention for I/O services and provides charge-back capabilities.

Protocol separation

In this scenario, storage administrators can place application data on separate drive groups that are based on protocol and connectivity. This separation eliminates any chance of interapplication contention for I/O services. For example, an administrator could create a NAS domain and a SAN FC domain.

Application I/O isolation

Storage administrators can create Storage Domains for use in specific applications and tiers of storage to eliminate unwanted drive group contention. For example, an administrator can place the Oracle DB indexes in a dedicated, SSD-based Storage Domain to isolate all other work from the indexes. The data table space and other components can be in a different Storage Domain.

Data security

Storage administrators can place logical volumes that contain sensitive data on a particular Storage Domain. If the data must be destroyed, the drives within those drive groups can be destroyed without the administrator having to be concerned with preserving less sensitive data. Placing those volumes in their own Storage Domain ensures that those volumes do not share drive groups with less sensitive material.

Drive group or hardware retirement

As drives age, the probability of failure increases. Storage Domains can efficiently move data to newer drive groups that have larger capacities.

Auto-tiering

Storage administrators can place all auto-tiered LUNs in a Storage Domain that is dedicated to the QoS Plus feature. The administrator can adjust the properties of the QoS Plus feature until the optimum configuration is found. The optimum configuration can then be used on other Storage Domains in the system.

Related Links

[*Volume Groups*](#)

[*Managing Storage Domains*](#)

[*Storage Domain Objects Illustrated*](#)

[*Create a Storage Domain*](#)

Storage Domain Compaction

The Oracle FS System compacts fragmented storage capacity, which is caused by deleted auto-tiered LUNs, and makes the capacity available for use.

The system allocates storage capacity for QoS Plus. During normal operations, storage capacity can become fragmented when capacity is freed from deleted

auto-tiered LUNs, but that freed capacity is not made available. Fragmented capacity makes inefficient use of the available storage capacity.

As needed, the system compacts the storage capacity in the drive groups that comprise of the Storage Domain. You can manually compact the Storage Domain to make the fragmented storage capacity available for use. During compact operations, any QoS Plus data migration is suspended. Compacting the Storage Domain cannot occur when there is insufficient storage capacity in the drive group.

Related Links

[Compact a Storage Domain](#)

[Storage Domains](#)

[Compact a Storage Domain](#)

Storage Domain Integrity Check

The Oracle FS System continuously monitors and verifies the integrity of the data that is stored or changed on the Storage Domain. For auto-tiered LUNs, the system runs the integrity check to verify that the LUN data and the LUN address locations, which describes where the data resides, are not lost or corrupted.

In the event that the system detects a problem with the auto-tier address location, the system sends a `Volumes Have Lost Mappings` system alert. Lost mappings is a condition in which data on the auto-tiered LUNs might not be accessible or available. The integrity check on the Storage Domain begins immediately after the discovery of the lost mappings. This check cannot be cancelled by the administrator. The integrity check can take several minutes to several hours to complete. The actual time depends on the number of LUNs and the amount of data that the system checks.

During the integrity check, the system verifies that the locations to the auto-tier data is correctly reported. If the Storage Domain has the Tier Reallocation option disabled, then the integrity check does not apply.

The system also automatically runs the integrity check in the following circumstances:

- After a restart operation resulting from the system not shutting down cleanly.
- After a Controller failover.
- After a warmstart, if the administrator does not respond to a `Lost Data` system alert.
- After a warmstart, if the system did not complete its data mappings or data migrations.
- After detecting a media error on a metadata volume. The media error can also result in `Volumes Have Lost Mappings` but the system does not wait for your response before proceeding with the integrity check.

You can initiate an integrity check on the Storage Domain at any time, or as instructed by Oracle Customer Support. If you initiate the integrity check while the system is already performing the check, the system ignores your request.

Related Links

[Storage Domains](#)

[Check the Integrity of a Storage Domain](#)

Storage Domain Objects Illustrated

Storage organization can be illustrated using a diagram that includes various components of the Storage Domain, drive groups, volume groups, and logical volumes.

Storage Domain Management

Storage administrators can perform regular management actions for any logical volume residing in a Storage Domain, including:

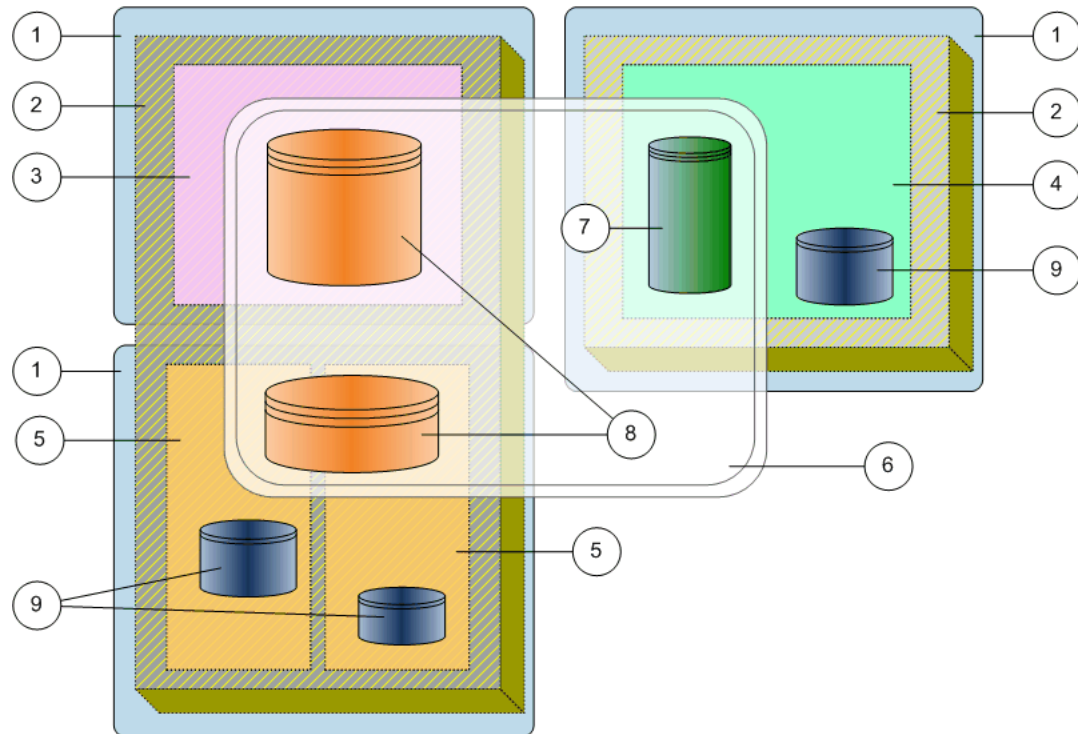
- Create logical volumes within a domain.
- Create volume copies within the same or different domain.
- Create clones of logical volumes contained in a domain.
- Move logical volumes to a different volume group or a different Storage Domain.
- Delete logical volumes from a domain.

Note: All allocation for a logical volume is confined to the drive groups within a Storage Domain.

Storage Domain Illustration

The following figure illustrates two Storage Domains and six logical volumes that are distributed across those domains. This illustration also shows the relationships among those Storage Domains and other storage objects.

Figure 7: Storage Domains and other storage objects



Legend

1 Drive groups	6 Volume group
2 Storage Domains	7 Single-tier SAN LUN
3 Capacity HDD drive group	8 Auto-tier SAN LUNs
4 Performance HDD drive group	9 Filesystem data tiers
5 Performance SSD drive groups	

In the illustration, a volume group (annotation 6) contains three logical volumes (annotations 7 and 8), which spans two Storage Domains (annotation 2). A volume group can contain logical storage objects, such as other volume groups, LUNs, and Clone LUNs.

You can have a drive group that is not assigned to any Storage Domain. This unassigned state is usually temporary. While in this state, the capacity of the drive group is not included as free or available capacity. The causes of an unassigned state for a drive group include:

- Drives have been added to a Drive Enclosure.
- A drive group was removed from a Storage Domain.

Related Links

[Storage Domains](#)

[Volume Groups](#)

[Moving Volumes](#)

[Create a Storage Domain](#)

Managing Storage Domains

Occasionally, a storage administrator must perform certain management actions on a Storage Domain.

When an Oracle FS System starts up for the first time after installation, that system has one Storage Domain that contains all of the drive groups that are available in the system. That domain is referred to as the *default* Storage Domain. You can create additional Storage Domains by removing one or more of those drive groups from the default domain and adding them to new Storage Domains.

When you create a Storage Domain, ensure that sufficient storage capacity exists. You can add capacity to the Storage Domain in the following ways:

- Remove drive groups from the default Storage Domain and add those drive groups to the Storage Domain.
- Add more drives to an existing Drive Enclosure.
- Add more Drive Enclosures.

You can create a Storage Domain without drive groups. Such a Storage Domain contains no storage capacity and therefore cannot be assigned to a logical volume.

Managing your Storage Domains involves the following activities:

- Creating, modifying, and deleting the Storage Domains
- Adding drive groups to the Storage Domain
- Removing drive groups from the Storage Domain
- Compacting and verifying the Storage Domains
- Generating an auto-tier effectiveness report
- Viewing the auto-tier storage capacity

The Oracle FS System provides some advanced options for controlling the QoS Plus feature, which is called *Auto-tier* in the GUI. Use caution when performing any of the following activities:

- Disabling the tier reallocation feature
- Disabling the collection of tier reallocation statistics
- Optimizing auto-tier performance
- Allocating the auto-tier storage capacity

Related Links

[Capacities](#)

[Data Migration](#)

[Effectiveness of QoS Plus](#)

[Provisioning Storage Domains](#)

[Create a Storage Domain](#)

[Optimize Auto-Tier Scans](#)

[Compact a Storage Domain](#)

[Delete a Storage Domain](#)

Provisioning Storage Domains

When logical volumes already exist on a Storage Domain, provisioning the Storage Domain by adding or removing drive groups can cause data migration. Data migration can occur when a drive group that contains a volume is moved to another Storage Domain.

The system notifies you that attempting to perform any of the following actions causes data migration:

- When moving an existing volume to another Storage Domain, the target Storage Domain must have sufficient capacity for the volume. If sufficient capacity exists, the system migrates the volume data.
- When moving a drive group from one Storage Domain to another, you must allow the system to migrate all of the volumes off of the source drive group. Then, the drive group can be added to the target Storage Domain.
- If the drive group contains volumes, when you remove the drive group from the source Storage Domain, then the system migrates the volumes from the drive group to another drive group in the Storage Domain. Ensure that sufficient free capacity exists on the Storage Domain to move the volumes from one drive group to another.
- When reassigning a drive group that contains part or all of a volume, the existing Storage Domain that contains that drive group must have sufficient free capacity in other drive groups. This free capacity accommodates the loss of the drive group that is being moved to another Storage Domain. When the drive group is moved, the system migrates the volume data onto the remaining drive groups.
- When you add a drive group to the Storage Domain, you have the option to rebalance the existing volumes in the Storage Domain. Enable rebalance is the default, which maximizes the performance of the existing volumes that might not have sufficient capacity in the drive groups.

Important: The Storage Domain must have sufficient free capacity on the target Storage Domain to hold the entire volume that is being migrated. For a drive group, both the source and target drive groups must have sufficient storage capacity to hold the data that is being migrated.

The system also provides you the following information:

- A list of the volumes (and their associated repositories) that will require data migration
- A message indicating whether enough capacity exists to move those volumes into the selected Storage Domain
- A message indicating whether enough capacity exists for the remaining volumes to reside in an existing Storage Domain

Related Links

[Moving Volumes](#)

[Storage Domains](#)

[Drive Groups](#)

[Create a Storage Domain](#)

Create a Storage Domain

Storage Domains allow you to assign logical volumes to a specific collection of drive groups. For example, Storage Domains allow administrators to partition storage for specific users or departments in a public or private cloud storage environment.

Assigning volumes to specific Storage Domains can reduce I/O contention among volumes.

- 1 Navigate to **System > Storage Domains**.
- 2 Select **Actions > Create Storage Domain**.
- 3 Enter the name of the Storage Domain.
- 4 (Optional) Select the **Background Process Priority** that the system uses to respond to migrating data.

Possible choices:

- **System Chooses**
- **Minimize Impact**
- **Maximize Speed**

- 5 (Optional) Select the tier reallocation options.

Possible choices:

- **Enable Tier Reallocation**
- **Enable Tier Reallocation Statistics Collection**

- 6 (Optional) Optimize the **Auto-Tier Scan Options**.

Possible choices:

- **Performance-Optimizing Scan Cycle**
- **Number of n-hour Scan Cycles**

Note: Select the lock icon to unlock and lock the fields.

The system calculates the **Cost-Optimizing Scan Cycle** value.

- 7 (Optional) In the **Allowable Storage Capacity for Auto-Tiered LUNs** field, enter the percentage of the storage capacity to allocate for each available Storage Class that is listed.
- 8 Click **OK**.

The Storage Domain now appears in the list of domains.

After you create a Storage Domain, add one or more drive groups to the domain so you can assign logical volumes in the domain. The number of drive groups that you add to a Storage Domain and the Storage Classes available in those drive groups directly affect the performance of the volume that is on that domain.

Related Links

[Create Storage Domain Dialog](#)

[Storage Domains](#)

[Managing Storage Domains](#)

[Moving Volumes](#)

[Delete a Storage Domain](#)

Rename a Storage Domain

Sometimes you might want to change the name of a Storage Domain to a more meaningful name.

Changing the name of a Storage Domain does not affect the data or other configurations of the domain.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Modify Storage Domain**.
- 4 Update the **Name** of the Storage Domain.
- 5 Click **OK**.

Related Links

[Modify Storage Domain Dialog](#)

[Create a Storage Domain](#)

[View the Properties of a Storage Domain](#)

Update the Background Process Priority

You might need to adjust the background process priority for the Storage Domain because your system is not migrating data efficiently. For example, you can lower the migration priority to provide more resources for user data operations.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Modify Storage Domain**.
- 4 Select the **Background Process Priority** that the system uses to respond to migrating data.

Possible choices:

- **System Chooses**
- **Minimize Impact**
- **Maximize Speed**

- 5 Click **OK**.

Related Links

[Modify Storage Domain Dialog](#)

[Managing Storage Domains](#)

[Optimize Auto-Tier Scans](#)

View the Properties of a Storage Domain

You can view the properties of a Storage Domain, such as the capacity for each Storage Class, the settings for the background activity, and properties for auto-tier (QoS Plus).

You can view the following properties of a Storage Domain from the View Storage Domain dialog:

- Storage capacities by Storage Class
- Priority of background processes
- Tier reallocation and the collection of statistics
- Scan cycling for QoS Plus
- Limits to the QoS Plus storage capacity

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to view.
- 3 Select **Actions > View Storage Domain**.
- 4 Review the displayed information.
- 5 Click **Close**.

Related Links

[View Storage Domain Dialog](#)

[Limit the Storage Capacity for QoS Plus](#)

[Update Tier Reallocation Options](#)

[Optimize Auto-Tier Scans](#)

[Update the Background Process Priority](#)

Limit the Storage Capacity for QoS Plus

When premium storage capacity is limited, you can specify that the Storage Domain use only a specified percentage of the capacity for the QoS Plus feature.

Note: Reducing the amount of QoS Plus storage capacity below the amount of capacity that is currently being used causes the system to migrate data to available Storage Classes only if the storage capacity is available. You might need to free some storage capacity before the system can use the desired allocated percentage of your storage capacity.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Modify Storage Domain**.
- 4 In the **Allowable Storage Capacity for Auto-Tiered LUNs** field, enter the percentage of the storage capacity to allocate for each available Storage Class that is listed.
- 5 Click **OK**.

Related Links

[Modify Storage Domain Dialog](#)

[View Storage Allocation Details](#)

[Optimize Auto-Tier Scans](#)

Update Tier Reallocation Options

You can temporarily disable one or both of the following aspects of storage tier reallocation: the migration of data and the collection of statistics. For example, disabling the migration of data allows you to suspend data tier reallocation for all of the auto-tiered LUNs in the Storage Domain.

Important: Disabling the tier reallocation options affects data migration for all of the LUNs that are assigned to the selected Storage Domain. Use caution before disabling these features.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Modify Storage Domain**.
- 4 (Optional) Deselect the **Enable Tier Reallocation** option.
- 5 (Optional) Deselect the **Enable Tier Reallocation Statistics Collection** option.
- 6 Click **OK**.

To resume normal tier reallocation operations, remember to enable the tier reallocation and statistics options.

Related Links

[Modify Storage Domain Dialog](#)

[Data Migration](#)

[View Storage Allocation Details](#)

[Optimize Auto-Tier Scans](#)


Optimize Auto-Tier Scans

For the selected Storage Domain, you might need to optimize the frequency with which the Oracle FS System scans the data access patterns of the auto-tiered LUNs.

The Oracle FS System scans the data access patterns of the auto-tier LUNs to determine the best time to place data in the Storage Classes within the Storage Domain. You can optimize the auto-tier scans by lengthening or shortening the time between scans. A shorter time span increases the number of scans and results in frequent data migration. A longer time span might represent the actual data access patterns of your system.

Important: Adjusting the auto-tier scans might affect the efficiency of the QoS Plus feature. Use caution before adjusting the scan options.

For example, setting the **Number of n-hour Scan Cycles** too low can move data that is accessed frequently over a long time period to be moved to a lower performance drive.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Modify Storage Domain**.
- 4 Select the lock icon () to unlock the **Auto-Tier Scan Options**.
- 5 (Optional) In the **Performance-Optimizing Scan Cycle** field, enter the frequency value.
- 6 (Optional) In the **Number of n-hour Scan Cycles** field, enter the cycles value.
The system calculates the **Cost-Optimizing Scan Cycle** value.
- 7 Click **OK**.

Reset the auto-tier scan options to the default values when the custom settings are no longer needed.

Related Links

[Modify Storage Domain Dialog](#)

[Data Migration](#)

[Effectiveness of QoS Plus](#)

[View Storage Allocation Details](#)

[Managing Storage Domains](#)

Compact a Storage Domain

You might want to compact the storage tier capacity that is unavailable in the Storage Domain. After the compacting is complete, the system has free capacity that is available for use.

The Oracle FS System compacts the QoS Plus storage capacity on a regular basis. However, you can manually compact the Storage Domain as needed. For example, you might want to compact the Storage Domain after you have deleted a number of auto-tier LUNs and need to quickly release any unavailable storage capacity.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to update.
- 3 Select **Actions > Compact Storage Domain**.

The Storage Domain status changes to **Background Activity**.

- 4 Click **OK**.
- 5 Click **OK**.

When the compact process is complete, the Storage Domain status changes to **Normal**. You can monitor the compaction process by selecting **Tasks** from the status bar. The free storage capacity should increase after you have compacted the unavailable storage capacity.

If the compacting process is taking too long, or if the process impacts system performance, you can cancel the process by selecting **Actions > Cancel Compact Storage Domain**.

Related Links

[Storage Domains Overview Page](#)

[Storage Domain Compaction](#)

[Storage Domains](#)

[Storage Domain Compaction](#)

[Managing Storage Domains](#)

Check the Integrity of a Storage Domain

You can check the integrity of a Storage Domain when you suspect that the auto-tier data might be lost or corrupted. You might also be requested by Oracle Customer Support to run an integrity check.

Note: The Oracle FS System automatically runs the integrity check when the system has encountered a `Volumes Have Lost Mappings` system alert.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain on which to run the integrity check.
- 3 Select **Actions > Verify Storage Domain**.

The Storage Domain status changes to **Background Activity**.

- 4 Click **OK**.

When the integrity check is complete, the Storage Domain status changes to **Normal**. You can monitor the process by clicking **Tasks** on the status bar.

If the verification process that you initiated is taking too long, or if the process impacts system performance, you can cancel the process by selecting **Actions > Cancel Verify Storage Domain**.

Note: Cancelling the verification process does not affect the system or data.

Related Links

[Storage Domains Overview Page](#)

[Storage Domain Integrity Check](#)

[Storage Domains](#)

[Managing Storage Domains](#)

View Storage Allocation Details

You might want to view the allocated storage capacity in a Storage Domain, which includes both capacities by RAID type and immobile storage capacity. If the capacities are nearly full, you might consider increasing the storage capacity in the Storage Domain.

If you notice that both RAID 10 and immobile capacities are nearly full, consider one or all of the following actions:

- Increase the high performance storage capacity in your Storage Domain for auto-tiered LUNs.
- Increase the percentage storage capacity limit that is set for auto-tier LUNs.
- Reduce immobile capacity by allowing the system to use low cost storage capacity for auto-tier LUNs.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to view.
- 3 Select **Actions > View Storage Allocation Details**.
- 4 Review the displayed information.
- 5 Click **Close**.

Related Links

[Storage Domains Overview Page](#)

[Managing Storage Domains](#)

[Storage Domains](#)

[Limit the Storage Capacity for QoS Plus](#)

Delete a Storage Domain

When you no longer need a Storage Domain, you can delete it.

Prerequisites

- The Storage Domain that you want to delete must not contain any logical volumes. If the Storage Domain contains any logical volumes, delete those volumes or move those volumes to another Storage Domain.
- The Storage Domain that you want to delete must not have any drive groups assigned to the domain. If any drive groups are assigned to the Storage Domain, perform the following actions:
 - If any of the drive groups contain any logical volumes, delete those volumes or move them to another Storage Domain.
 - Remove the drive groups from the Storage Domain.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to delete.
- 3 Select **Actions > Delete Storage Domain**.
- 4 Click **OK**.

One of the following occurs:

- If the operation is successful, the Storage Domain is removed from the system.
- If the operation is unsuccessful, the system does not remove the Storage Domain and displays an appropriate error dialog:
 - The Storage Domain contains one or more logical volumes.
 - The Storage Domain has one or more drive groups assigned to it.

If the operation is unsuccessful, move any volumes residing on the Storage Domain to another Storage Domain, if appropriate. Then remove the drive groups.

Related Links

[Storage Domains Overview Page](#)

[Managing Storage Domains](#)

[Create a Storage Domain](#)

Moving Volumes

Sometimes you might want to move a logical volume from one Storage Domain to another Storage Domain to improve the performance of that volume.

For example, if a Storage Domain is being used to support an Oracle DB application, you might want to move the database indexes into a higher-performance Storage Domain that is separate from the Storage Domain in which the database tables are located.

When you move a volume to a different Storage Domain, the system prompts you to select another Storage Domain for the volume. If sufficient free capacity exists to migrate the data to the other domain, the move request succeeds;

otherwise, the system returns an error. The system successfully moves the volume when the following conditions are met:

- Sufficient free storage capacity exists in the target Storage Domain.
- For QoS Plus volumes, the target Storage Domain contains lower Storage Classes.

When the system migrates a volume with a populated clone repository to another Storage Domain, the system does not migrate the repository to the other Storage Domain. Instead, the clones remain in the original Storage Domain.

If the clone repository is empty, the system creates a repository in the other Storage Domain after the migration is complete.

Related Links

[Storage Domains](#)

[Move a Volume to Another Storage Domain](#)

Move a Volume to Another Storage Domain

Move a logical volume to another Storage Domain, for example, when you want to remove the drive group on which the volume resides. You also might want to move a volume to a Storage Domain that is dedicated for a specific purpose, such as storing database indexes.

Prerequisite

A target Storage Domain with sufficient free capacity to accept the logical volume.
The target Storage Domain can contain the same or different Storage Class.

Note: Moving logical volumes and removing the drive groups from the Storage Domain are performed as separate actions.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to move.
- 3 Select **Actions > Modify**.
- 4 In the Storage Domain list, select the Storage Domain to which you want to move the LUN.
- 5 (Optional) Select a Storage Class from the available list for the target Storage Domain.
- 6 Click **OK**.

One of the following occurs:

- If the operation is successful, the system begins a background task to migrate the volume to the new Storage Domain. Also, the system releases and reconditions the storage in the previous domain.
- If the operation is unsuccessful, the system does not migrate the volume but instead displays an appropriate error dialog:

- The target Storage Domain has insufficient free capacity of the selected Storage Class. To resolve, remove unneeded volumes that consume capacity on the drive groups of that Storage Class. You can also add drive groups or add more storage capacity to the drive group.
- The target Storage Domain does not contain enough storage capacity. To resolve, add to the target Storage Domain one or more drive groups of the desired Storage Class.

Related Links

[Modify SAN LUN, Quality of Service Tab, Auto Tier](#)

[Modify SAN LUN, Quality of Service Tab, Single Tier](#)

[SAN LUNs Overview Page](#)

[Moving Volumes](#)

Drive Groups

A drive group is a logical object that manages a collection of drives of the same Storage Class, all of which are from the same Drive Enclosure. The maximum number of drive groups in the Oracle FS System is 1024.

A drive group belongs to a single Storage Domain. A drive group can also be unassigned, which means that the group can be assigned to any Storage Domain.

Managing the drive groups involves the following activities:

- Assigning the primary drive group to another drive group in the system
- Removing drive groups from a Storage Domain
- Adding drive groups to a Storage Domain
- Viewing the status of the drives in a drive group
- Viewing the RAID status across all of the volumes that occupy the drive groups

Related Links

[Configure Drive Group Real-Time Statistics](#)

[Assigning Drive Groups](#)

[View the Properties of a Drive Group](#)

[Make a Drive Group the Primary Drive Group](#)

Drive Group Data Protection

The Oracle FS System copies data away from a drive that is predicted to fail.

The data of a logical volume is striped across the drives in several drive groups. The data from several volumes can even be located on the same drive group. The data from all of these volumes is protected by one or more levels of RAID.

Because of this striping, a given drive can contain data from multiple volumes. As a result, a particular drive might be supporting several levels of RAID.

When one of the drives within a drive group fails or is about to fail, the system assigns an appropriate status to the data blocks that are located on the affected drive. The status of one data block might differ from the status of another data block, even though both data blocks reside on the same drive. If the statuses differ, the difference in the statuses results from the RAID level of those data blocks being different.

Within a given drive group, the system treats all of the data blocks that are protected by the same RAID level as a group. The system groups them by RAID level for reporting purposes.

Related Links

[Data Integrity on the Drives](#)

[High Availability](#)

[Priority Level and Performance](#)

[Drive Groups](#)

[View the Properties of a Drive Group](#)

List Drive Groups in a Storage Domain

You might want to know the state of each drive group and the state of the drives in those drive groups.

The Storage Domains overview page lists all of the drive groups, by Storage Domain.

- 1 Navigate to **System > Storage Domains**.
- 2 Review the displayed information.
- 3 Click **OK**.

Related Links

[Storage Domains Overview Page](#)

[Drive Groups](#)

[Assigning Drive Groups](#)

[Storage Domains](#)

[View the Properties of a Drive Group](#)

View the Properties of a Drive Group

You can view the properties of a drive group and its included drives to determine, for example, whether a particular drive might need to be replaced.

You can view the drive group properties, such as whether a drive group is primary. Use the **Modify Drive Group** action to view drive details and status.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the drive group that want to view.
- 3 Select **Actions > Modify Drive Group**.
- 4 From the list of Replaceable Units, select a drive in the drive group.
- 5 Review the drive properties on the right side of the dialog.
- 6 Click **OK**.

Related Links

[Modify Drive Group Dialog](#)

[Storage Domains Overview Page](#)

[Drive Groups](#)

Primary Drive Group Description

The primary drive group is the drive group in an Oracle FS System that contains the system-wide Persistence volume. The Persistence volume is the internal name of the volume that contains the system configuration database. The system contains one primary drive group that is assigned automatically by the Oracle FS System or manually by the administrator.

For a new Oracle FS System, or after a system reset, the following sequence occurs:

- The system starts with no system configuration database.
- When powered up, the system discovers all of the Drive Enclosures and creates drive groups to contain the discovered drives.
- The system assigns one of the drive groups as the primary drive group.
- The system assigns all of the remaining drive groups that it created to a default Storage Domain.
- The system then writes the initial configuration to the Persistence volume in the primary drive group.

If the Oracle FS System contains only one drive group, then that drive group is the primary drive group. If the system contains more than one drive group, the system selects one of the drive groups to be primary.

You can change the primary drive group at any time. When assigning a non-primary drive group as the primary, the Oracle FS System migrates the system data to the new primary drive group. The administrator cannot cancel this special data migration.


Related Links

[Assigning Drive Groups](#)

[Make a Drive Group the Primary Drive Group](#)

Make a Drive Group the Primary Drive Group

You can make another drive group the primary when, for example, you plan to replace drives in the existing primary drive group.

The primary drive group is identified by the  icon.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the drive group that you want to become the primary drive group.
- 3 Select **Actions > Modify Drive Group**.
- 4 Select the **Make this drive group the primary drive group** option.
- 5 Click **OK**.

The system runs a background process to move the system configuration database to the new primary drive group. When the background process completes, the system moves the primary drive group icon to the new primary drive group.

Related Links

[Modify Drive Group Dialog](#)

[Drive Groups](#)

[Primary Drive Group Description](#)

Assigning Drive Groups

Sometimes you might need to assign an existing drive group to another Storage Domain.

You can add multiple drive groups to a Storage Domain at one time. Wait for any background processes to complete before assigning existing drive groups to a Storage Domain. You can view the background processes from the **Tasks** button on the status bar.

Reassigning drive groups from one Storage Domain to another is a two step process:

Step one

Remove the drive groups from the first Storage Domain.

You can remove multiple drive groups from a Storage Domain at one time, but you can only remove drive groups from one Storage Domain at a time. When this step completes, the drive groups are designated as **unassigned**.

Note: The system allows you to perform one operation to remove drive groups from a Storage Domain (or add drive groups to a Storage Domain). The add or remove operation can include multiple drive groups.

Removing the drive groups requires that the Oracle FS System migrate the data to the other drive groups in the Storage Domain. If sufficient storage capacity does not exist on the other drive groups, then the drive group removal fails.

Migrating drive group data from the drive groups can take many hours to complete, and the system migrates only one drive group at a time. To conserve system resources, plan your drive group removals carefully. You can specify the resource priority that the system uses to migrate your data. The following priorities are available to complete your request:

System Chooses

(Default) Specifies that the system balances the resources that are needed for background data movement with the resources that are needed to service the incoming client I/O.

Minimize Impact

Specifies that the system restricts the amount of system resources that are given to the background data movement operation. This option minimizes the impact on client I/O. Recommended for highly-loaded Storage Domains.

Maximize Speed

Specifies that the system grants resource priority to the background data movement operation. This option reduces the amount of system resources that are available for client I/O. Recommended for lightly-loaded Storage Domains.

Step two

Assign the unassigned drive groups to the second Storage Domain.

Related Links

[Drive Groups](#)

[List Drive Groups in a Storage Domain](#)

[Remove Drive Groups From a Storage Domain](#)

[Add Drive Groups to a Storage Domain](#)

Remove Drive Groups From a Storage Domain

Remove drive groups from a Storage Domain when you need to remove drive groups of a particular Storage Class. You might also need to remove the drive groups to assign the drive groups to another Storage Domain.

Prerequisite

Sufficient Storage Domain capacity to receive the data that is migrating from the removed drive group.

When you remove a drive group from the Storage Domain, the system migrates any volume data to the remaining drive groups in the Storage Domain, if sufficient free capacity exists on the remaining drive groups. This migration can take several hours to complete. Plan to remove the drive groups when the system is idle or when the system has minimal I/O activity.

- 1 Navigate to **System > Storage Domains**.
- 2 Select all of the drive groups that you want to remove from the Storage Domain.

- 3 Select **Actions** > **Remove from Storage Domain**.
- 4 Select the **Migration Priority** for the drive group removal.
- 5 Click **OK**.
- 6 (Optional) Click **Tasks** from the status bar to view the detailed status of the task that is removing the drive group.

The system places the drive groups that were successfully removed into an **unassigned** category. You can now add the unassigned drive groups to another Storage Domain.

Related Links

[Remove from Storage Domain Dialog](#)

[Storage Domains Overview Page](#)

[Assigning Drive Groups](#)

Add Drive Groups to a Storage Domain

Add drive groups when you need to add particular Storage Classes to a Storage Domain. You might also need to add the drive groups to a Storage Domain to increase storage capacity.

Prerequisite

Drive groups with an **unassigned** status.

- 1 Navigate to **System** > **Storage Domains**.
- 2 Select all of the drive groups that you want to add to a Storage Domain.
- 3 Select **Actions** > **Add to Storage Domain**.
- 4 Select the **Storage Domain** to which you want the drive group to be assigned.
- 5 (Optional) To distribute data from the other drive groups in the Storage Domain to the drive groups that you are adding, select the **Rebalance volume data** option.
- 6 Confirm that the drive groups that you selected are listed in the **Drive groups to be included** list.
- 7 (Optional) Select the **Include** check box for any **Additional Drive Groups to Include** in the Storage Domain.
- 8 Click **OK**.
The system begins assigning the drive groups to the selected Storage Domain.
- 9 (Optional) Click **Tasks** from the status bar to view the detailed status of the task that is adding the drive groups.

Related Links

[Add to Storage Domain Dialog](#)

[Storage Domains Overview Page](#)

[Assigning Drive Groups](#)

About QoS and Provisioning

QoS Policies

Quality of Service (QoS), in general, defines a set of attributes for a logical volume that affects how the volume utilizes storage and the priority that the Oracle FS System gives to the I/O requests that target the volume.

When creating a logical volume, the administrator can select for the volume *regular* QoS features or *enhanced* QoS features (which are collectively referred to as *QoS Plus*):

- The administrator creates a regular QoS volume by selecting the **Single tier** option in the GUI. Such a volume is sometimes referred to as a *single-tiered* volume.
- The administrator creates a QoS Plus volume by selecting the **Auto-tier** option in the GUI. Such a volume is sometimes referred to as an *auto-tiered* volume.

When defining a logical volume, an administrator can set the QoS policies for the following properties of the volume:

Storage Class

The preferred type of storage media on which to place the user data initially. For QoS Plus volumes, the Storage Class and the RAID level of a volume determine the initial placement of the data.

Subsequently, the data usage statistics determine whether the data is migrated to another storage tier. Infrequently used data is moved to more cost-effective but lower-performance storage, while frequently used data is moved to a storage tier that has better performance characteristics.

Priority

A relative attribute that the system uses to set the importance and the treatment of logical volumes. A volume with a higher priority than another volume receives precedence in the handling of access requests. A higher priority also allows a larger share of typically finite resources, such as the storage tiers and the system cache.

Because the priority setting is relative, setting priorities to all low values or to all high values has the same effect, which nullifies the opportunity to distinguish between the service levels of volumes.

RAID level

The type of data protection and the degree of data protection from drive failures. The type of protection influences the performance characteristics of the volume. The degree of protection determines the number of failures that can occur in a RAID group before having to restore the data from a backup of some kind.

Read-ahead policy

The degree to which the storage system anticipates continuing read requests beyond an outstanding request. Correct anticipation greatly improves performance, while incorrect anticipation can waste system resources. By specifying a read-ahead policy, the administrator can provide an effective hint to the system to get the desired results of reading additional data blocks.

The RAID level and the read-ahead policy comprise the advanced view of the QoS properties for a volume. The RAID level and the read-ahead policy can be defined indirectly through the basic view of QoS. The basic view consists of the following properties:

- The level of redundancy (single or double)
- The predominant access method (random, sequential, or a mix of the two access methods)
- The predominant type of I/O request (read, write, or a mix of the two request types)

You can access the basic view of QoS by selecting a custom Storage Profile for the volume.

Related Links

[Access Bias](#)

[Defining QoS Properties](#)

[I/O Bias](#)

[Priority Level and Performance](#)

[QoS Plus Overview](#)

[Redundancy and Data Protection](#)

[Storage Class Description](#)

Defining QoS Properties

In addition to the Storage Class and the priority level for a logical volume, you must also define two other Quality of Service (QoS) properties for the volume: the RAID level and the read-ahead policy. The Oracle FS System provides two approaches to defining the RAID level and the read-ahead policy.

Note: When you create a LUN, the system automatically sets the RAID level and the read-ahead policy. You can override those default properties from the Create SAN LUN dialog by selecting **Custom** in the **Storage Profile** field.

You can customize the settings for the RAID level and for the read-ahead policy by using one of the following approaches:

Basic approach

Using the basic approach, you indirectly specify the RAID level and the read-ahead policy for the volume. Using this approach, you specify the data redundancy, the I/O bias, and the access bias of a logical volume. These QoS properties are referred to as the *basic* QoS properties of the volume.

Advanced approach

Using the advanced approach, you directly specify the RAID level and the read-ahead policy for a logical volume. These QoS properties are referred to as the *advanced* QoS properties of the volume.

Note: In Oracle FS System Manager (GUI), when customizing the QoS properties of a logical volume, you can set the basic QoS properties of the volume and then map them to the advanced QoS properties. You cannot, however, set the advanced QoS properties and then map them to the basic QoS properties.

The following table summarizes how the basic QoS properties map to the advanced QoS properties of a volume.

Table 8: Mapping QoS properties

Initial Storage Class	Initial redundancy	Basic QoS properties		Advanced QoS properties	
		Initial typical access	Initial I/O bias	Initial RAID level	Initial read-ahead
Capacity disk	Double	Sequential	Read	RAID 6	Aggressive
		All others	All others	RAID 6	Normal
All other Storage Classes	Single	Sequential	Read	RAID 5	Aggressive
		Random	Write	RAID 10 (mirrored)	Normal
		All others	All others	RAID 5	Normal

Related Links

[Managing SAN LUNs](#)

[Access Bias](#)

[I/O Bias](#)

[Priority Level and Performance](#)

[Redundancy and Data Protection](#)

[Storage Class Description](#)

Storage Class Description

The Storage Class QoS property allows you to specify the preferred storage media to use for a logical volume.

A Storage Class is a specific categorization of SAS physical storage, each category having distinct characteristics with regard to capacity and to data access performance. Available Storage Classes:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

A Storage Class relates to storage objects in the following ways:

- A newly created LUN that is using regular QoS (a single-tiered LUN) is associated with one Storage Class.
- A newly created LUN that is using QoS Plus (an auto-tiered LUN) is associated initially with one Storage Class. At a later time, an auto-tiered LUN migrates fully or partially onto the most cost-effective and the most performance-effective Storage Classes according to the use patterns and to the QoS priority level of the LUN.
- Oracle FS System Manager (GUI) shows the capacity that is available for each Storage Domain. For a given Storage Domain, the GUI displays the capacity by Storage Class and by drive group.

Related Links

[*Priority Level and Performance*](#)

[*QoS Plus Overview*](#)

[*Redundancy and Data Protection*](#)

Priority Level and Performance

The priority level of a logical volume determines the characteristics of the system response to the incoming I/O requests against the volume. In general, the higher

the priority level that is associated with a volume, the faster the system can respond to an access request.

Available priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue

High

Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

The time that the Oracle FS System takes to respond to an incoming I/O request depends on the factors that are listed in the following sections.

Queue Priority

The SAN interface of a Controller has one processing queue for each of the five QoS priority levels. The SAN interface places each incoming I/O request for a LUN into the processing queue that corresponds to the QoS priority that is associated with the LUN.

If the SAN interface of a Controller is overcommitted, the Oracle FS System allocates the processing resources of the Controller to each queue according to the priority of the queue. The Premium queue gets the largest allocation of processing resources. The other priority queues get proportionally smaller allocations of resources, depending on the priority level of the queue.

Data Migration

For logical volumes that use QoS Plus, the Oracle FS System adjusts the QoS bias that the system uses when determining whether and when to migrate the user data across the storage tiers. This adjustment causes the higher priority volumes to be given a greater opportunity to occupy the higher performance Storage Classes.

For example, if two data blocks have the same access statistics but one block has a higher QoS Priority setting, the block having the higher Priority migrates sooner than the block having the lower Priority.

Thin Provisioning

For a logical volume that uses QoS Plus and is thinly provisioned, the Oracle FS System selects the initial Storage Class that the system uses for infilling based on the Storage Class and the RAID level that the administrator selected for the volume.

Striping

For LUNs using regular QoS (single-tiered LUNs), if a sufficient number of drive groups exist in the Storage Domain that hosts a logical volume, the Oracle FS System places a higher priority volume on a greater number of drive groups than the system does for a lower priority volume. Placing a high priority volume on more drive groups enhances the performance of the volume.

For example, for a logical volume that has a priority level of Premium or High, the system stripes the volume across four drive groups. If, however, that volume has a priority level of Low or Archive, the system stripes the volume across only two drive groups.

For LUNs that are using QoS Plus (auto-tiered LUNs), the system creates appropriate storage tiers on which to place the auto-tiered LUNs before creating the LUNs. Because storage tiers span all of the drive groups within a Storage Domain, auto-tiered LUNs can utilize all of those drive groups, independent of priority level.

Related Links

[Data Migration](#)

[Growing Thin Volumes](#)

[QoS Plus Overview](#)

[Redundancy and Data Protection](#)

[Thin Provisioning](#)

Redundancy and Data Protection

The redundancy level of a logical volume determines the number of copies of the parity bits that the Oracle FS System creates for the volume. The number of copies of the parity bits determines the level of protection for the volume data if a drive that contains any data for the volume fails.

Important: Contact Oracle Customer Support for assistance with sizing your system and with creating your logical volumes.

The redundancy Quality of Service (QoS) property provides the following choices for parity:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity

is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

A drive group is a logical object that manages a collection of drives of the same Storage Class, all of which are from the same Drive Enclosure. The number of drives in the drive group depends on the drive type. A drive group containing hard disk drives (HDDs) consists of 12 drives. A drive group containing solid state drives (SSDs) consists of six drives.

The following list shows the number of drive groups across which the Oracle FS System allocates capacity for a logical volume that is using regular QoS (a single-tiered volume). The number of drive groups depends only on the priority level that you have chosen for the volume:

- Premium: 4 drive groups
- High: 4 drive groups
- Medium: 3 drive groups
- Low: 2 drive groups
- Archive: 2 drive groups

Note: For solid-state drives (SSDs), the system uses all of the assigned SSDs in the Storage Domain when striping a volume, regardless of the priority level chosen for the volume.

The number of drive groups that the Oracle FS System uses to stripe a single-tiered volume can, at times, be fewer than what is shown in the above list. The system might use fewer drive groups because, for example, many of the drive groups in the Storage Domain are nearing full capacity or are at full capacity. When either situation exists, the system might allocate more than one stripe for a new volume in the same drive group, degrading the overall performance for that volume.

When performance is degraded because the striping for the volume is across fewer drive groups than would normally be used, you can re-establish high performance for the volume by including additional drive groups in the Storage Domain.

Adding drive groups allows the Oracle FS System to rebalance the allocations so that the volume utilizes the proper number of drive groups. The rebalancing is achieved by the system moving the extra stripes from the drive group to the newly added drive group.

Related Links

[Priority Level and Performance](#)

Access Bias

Requests for I/O operations on a logical volume can be biased toward sequential access, random access, or a balanced mix of the two types of access. You can use the bias of these requests (in conjunction with the I/O bias property) to help optimize the performance of the volume.

As a Quality of Service (QoS) property, the access bias indicates to the system the expected pattern that is typically used to access the data in a volume:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Note: Access bias specifies an optimization bias. Access bias is not a requirement that all data operations conform to the specified access method.

Related Links

[I/O Bias](#)

I/O Bias

Requests for I/O operations on a logical volume can be biased toward read operations, write operations, or a balanced mix of the two types of operation. You can use the bias of the type of I/O operation (in conjunction with the access bias property) to help optimize the performance of a logical volume.

As a Quality of Service (QoS) property, the I/O bias indicates to the system the type of I/O operation that is the most common or is the most expected for a particular volume:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Important: If you choose **Random** as the access bias and **Write** as the I/O Bias, and if you choose single redundancy for data protection, the Oracle FS System creates the logical volume using RAID 10 (mirrored data). This RAID level enhances the write performance but uses twice the capacity.

For write requests, the system stores all of the user data and all of the system metadata in mirrored copies of the journal. One copy is maintained in the regular cache on the owning Controller. The mirror copy is maintained in one of the following locations:

- The memory of the partner Controller that is backed by an energy storage module (ESM). All host write operations are copied to the ESM-backed, non-volatile cache in the partner Controller. This type of operation is often referred to as a write back cache.
- The virtual LUN (VLUN) that is reserved on the physical storage for the logical volume, if the partner Controller is unavailable for the write operation. Write operations to this copy are equivalent to write-through cache.

Write operations from the journal to permanent physical storage are equivalent to write-through cache. The system flushes the user data and the corresponding metadata as a unit to the physical storage.

Related Links

[Access Bias](#)

[Faster Random-Write Operations](#)

Faster Random-Write Operations

You can enhance the performance of random-write operations on a logical volume under certain circumstances.

Using the QoS-based management tools that are provided in Oracle FS System Manager (GUI), you can improve the overall performance of random-write intensive applications by taking advantage of RAID 10 data protection, which replaces four I/O operations with a parallel mirrored-write operation.

The system utilizes this RAID level when you set the optimization settings for a logical volume to random access with a write I/O bias. In this case, the system allocates space on a RAID 10 array on which the system performs parallel mirrored-write operations (two writes).

In addition, because the data resides on two independent drives, RAID 10 allows the Oracle FS System to optimize read operations. In this case, the system can select the least busy of the two drives when performing the read operation.

Related Links

[Access Bias](#)

[I/O Bias](#)

QoS Plus Overview

Enhanced QoS, called QoS Plus, automatically adapts the location of data blocks to optimize the storage efficiencies, to yield a higher performance, and to lower the cost of storage. The QoS Plus features result in an optimal cost/IOP and the cost/TB over time by means of specific usage characteristics and specific QoS levels.

Note: Volumes that have a large number of access requests that are skewed to a relatively small portion of the user data benefit the most from the features of QoS Plus.

When configuring QoS Plus for a LUN (by selecting the **Auto-tier** option), the administrator configures the initial settings for the LUN and then lets the system manage the placement of the data from that point forward. Besides initially creating the auto-tiered LUN, an administrator needs to adjust little else, if anything, after the LUN is created.

Related Links

[Storage Performance Statistical Data Overview](#)

[Data Migration](#)

[Affect of Statistics on Data Migration](#)

Storage Tiers

A *storage tier* is a collection of blocks of contiguous storage, all of which have the same RAID level. This collection is spread across one or more drive groups within a given Storage Domain. Storage tiers are used by administrators and by the Oracle FS System to provision logical volumes.

When an administrator initially creates a LUN, the administrator defines a number of QoS properties for the volume, including the initial Storage Class for the volume. If the LUN uses QoS Plus, the Oracle FS System creates one or two storage tiers in the Storage Domain that the administrator selects for the volume:

- For capacity HDDs, the system creates a RAID 6 storage tier, which implements double redundancy.
- For all other drives, the system creates a RAID 5 storage tier, which implements single redundancy, and a RAID 10 storage tier, which implements mirroring.

Note: The RAID level of the storage tiers depends on the Storage Class that is selected for the LUN.

The storage tier on which the system places the LUN depends on the Storage Class and on the redundancy level (single parity, double parity, or mirroring) that the administrator selects for the volume.

Related Links

[Redundancy and Data Protection](#)

[Storage Class Description](#)

Data Migration

Data migration that results from the QoS Plus feature occurs when the system, after an analysis of the historical usage information for the block of data, determines that another Storage Class or RAID level can better service that block of data.

When optimizing for system performance, QoS Plus moves frequently accessed data blocks of a LUN to a faster, more expensive Storage Class, such as high-performance solid-state drives (SSDs). Conversely, when optimizing for cost, QoS Plus moves infrequently accessed data blocks to a slower, less expensive Storage Class, such as high-capacity hard disk drives (HDDs).

Note: When data migration occurs, the Oracle FS System gives the higher priority volumes a greater opportunity to occupy the higher performance Storage Classes. To migrate the data, the system initiates a task that runs as a background process.

You can limit data migration to use only designated Storage Classes. When you create a LUN using QoS Plus, you can specify the Storage Classes to include for data migration and to exclude for data migration. QoS Plus moves infrequently accessed data to a lower performance Storage Class, such as Capacity Disk.

Excluding less expensive Storage Classes and including high performance Storage Classes causes *immobile* storage capacity. Immobile data occurs when the system cannot migrate the data to a lower Storage Class. Data that cannot migrate to a lower Storage Class is considered immobile and the storage capacity that this data occupies is immobile. Data migration is efficient when 100% of the system capacity is available.

Note: If the preferred Storage Class is full, data might be placed temporarily in a non-preferred Storage Class.

Provide sufficient storage for data migration and allow the system to use all of that storage capacity. Oracle FS System Manager (GUI) provides a graph that shows all of your allocated storage capacities and immobile storage capacities from the Storage Domain page.

Related Links

[Affect of Statistics on Data Migration](#)

[Priority Level and Performance](#)

[QoS Plus Controls](#)

[Redundancy and Data Protection](#)

[Storage Class Description](#)

Affect of Statistics on Data Migration

The Oracle FS System collects an extensive set of statistics that cover many aspects of the performance of the overall system, including data usage.

The Oracle FS System monitors and analyzes the data activity statistics of the LUN to determine if the initial properties make the best use of the available storage resources. If, for example, the system determines that data within a LUN has not been accessed for several days, the system moves 640 KB blocks of data from the LUN to high-capacity, low-cost drives that are suitable for archival purposes. If the volume experiences a high amount of data activity, the Oracle FS System migrates the LUN data to higher-performance drives.

For a LUN that is using QoS Plus, the Oracle FS System gathers and stores statistics about the access requests as I/O is performed on the LUN. At specific times, which can be set by the administrator for a Storage Domain, the system analyzes those statistics. From this analysis, if the system determines that certain data within the auto-tiered LUN can benefit by placing the data on a different storage tier, the system migrates that data to the storage tier that best matches the use of the data.

Related Links

[QoS Plus Controls](#)

[QoS Plus Overview](#)

QoS Plus Controls

The QoS Plus feature consumes resources that might affect overall system performance. You can control certain aspects of this feature to mitigate some of those effects.

The Oracle FS System monitors the I/O activity to determine the best time to migrate the data to another storage tier. When the system activity is low, tier migration efforts increase. Conversely, when the system load is heavy, tier migration efforts decrease, but do not cease.

Scanning

Oracle FS System Manager (GUI) provides various options that together optimize your storage utilization costs and the overall performance of the I/O operations. The options affect when QoS Plus scans your data and when QoS Plus moves the data among the available Storage Classes.

To match your application activity, you can provide delays to the scan frequency that is used by QoS Plus.

Tier Reallocation

You can disable the data migration feature at both the Storage Domain and LUN levels. Disabling data migration at the Storage Domain prevents data migration for all LUNs that are assigned to that Storage Domain. You can prevent data migration for a single LUN by deselecting the **Tier Reallocation** option in the

Additional Options dialog. The options for disabling data migration at the Storage Domain and LUN levels are independent. For example, if you make a data migration change to the Storage Domain, that change does not affect the settings for the LUN.

Capacity Limits

By default, QoS Plus uses all of the available storage capacity in a Storage Domain. For each Storage Class in a given Storage Domain, you can specify the percentage of storage capacity that the Oracle FS System can use for QoS Plus LUNs. Specifying a percentage of the capacity that can be used for QoS Plus is most useful for the Storage Classes that are relatively expensive.

You can allocate, for example, 80% of your performance HDD capacity for auto-tiered LUNs, which then leaves 20% of that capacity for LUNs using regular QoS.

Note: Reducing the amount of QoS Plus storage capacity below the amount of capacity that is currently being used causes the system to migrate data to available Storage Classes only if the storage capacity is available. You might need to free some storage capacity before the system can use the desired allocated percentage of your storage capacity.

Related Links

[Limit the Storage Capacity for QoS Plus](#)

[Update Tier Reallocation Options](#)

[Optimize Auto-Tier Scans](#)

[Data Migration](#)

[Affect of Statistics on Data Migration](#)

[Storage Tiers](#)

Effectiveness of QoS Plus

Distribution charts and effectiveness reports provide detailed information about the efficiency of the QoS Plus feature that is applied to a set of auto-tiered LUNs. The QoS Plus feature optimizes the placement of data blocks to yield higher system performance and to lower the cost of storage.

Effectiveness Graphics for QoS Plus

The **View Auto Tier Graphs** dialog displays all the auto-tiered LUNs in the Storage Domain. You can select up to 10 of the LUNs from which to view the effectiveness graphics. When you click **Update Graphs**, the following graphs display:

Data Transferred By Number of Accesses

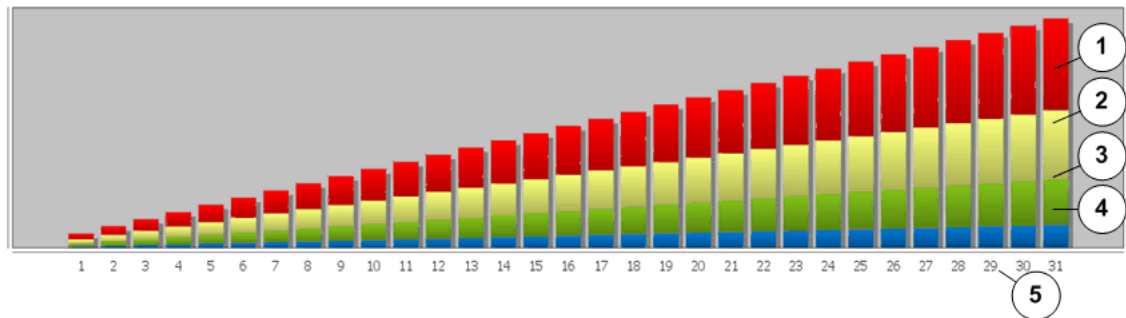
Indicates a histogram of the different regions of all the LUNs in the Storage Domain by the frequency of I/O access. The histogram bar height represents the amount of data transferred. The y-axis is not labeled.

Tier Structure By Storage Class and Priority

Indicates a graph of the Storage Class and the capacity of the LUN regions for the selected auto-tiered LUNs. The chart also shows a number that represents the QoS priority for the auto-tiered LUN. A table at the bottom of the chart provides the list of selected LUNs. The table is also a legend for the LUNs that are represented on the graph.

The two graphs permit you to observe the placement of the data blocks and determine the effectiveness of the QoS Plus feature that is applied to the selected auto-tiered LUNs.

Figure 8: Data Transferred By Number of Accesses histogram



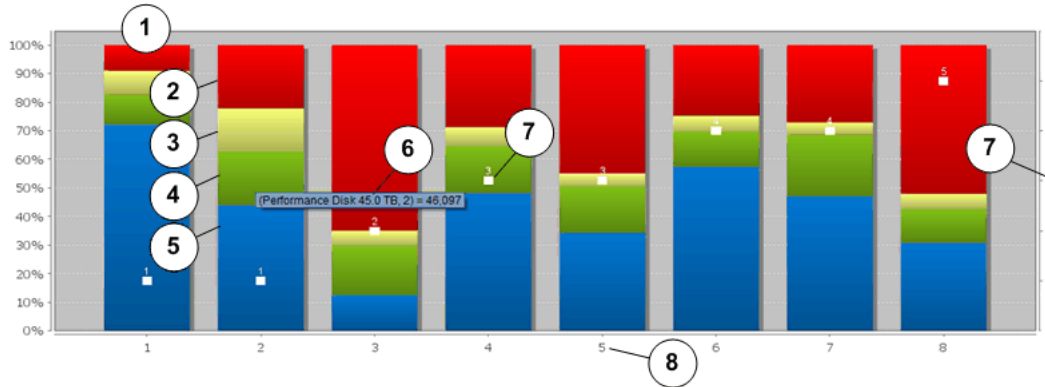
Legend

1 I/O activity of the LUN region that occupies the Performance SSD	4 I/O activity of the LUN region that occupies the Capacity HDD
2 I/O activity of the LUN region that occupies the Capacity SSD	5 LUN region
3 I/O activity of the LUN region that occupies the Performance HDD	

The histogram represents the I/O distribution and the data transfer activity for all the auto-tiered LUNs in the Storage Domain. The system counts the number of I/O accesses that was necessary to transfer data to and from the auto-tiered LUNs. The information is then plotted on the graph from the lowest I/O activity to the highest. The system categorizes different regions of a LUN by the frequency of access and by Storage Class. The graph shows the amount of data transferred to each of these categories.

QoS Plus is most effective if the regions of the LUN that receive most of the I/O are in the best Storage Class. The graph shows that the storage is used effectively when the regions of the LUN that receive the most number of accesses are also in the most efficient Storage Class that is available, which is the Performance solid-state drives (SSDs). If the regions of the LUN with the most number of accesses are not in SSD, the performance could be improved by adding Performance SSD capacity to the Storage Domain.

Figure 9: Tier Structure by Storage Class and QoS Priority graph



Legend

1 Allocated capacity of the LUN	5 Relative LUN storage capacity that occupies the Capacity HDD
2 Relative LUN storage capacity that occupies the Performance SSD	6 Tooltip
3 Relative LUN storage capacity that occupies the Capacity SSD	7 QoS Priority value: 1 = Premium 2 = High 3 = Medium 4 = Low 5 = Archive
4 Relative LUN storage capacity that occupies the Performance HDD	8 LUN Row number that corresponds to the list of LUNs below the graph

The previous figure shows how the QoS Plus feature distributes data in the selected auto-tiered LUNs. Each bar of the graph represents 100% of the allocated capacity of the LUN and provides the following information about the LUNs:

- The Storage Class of each region within the LUN
- The storage capacity of each region
- A value that represents the QoS priority of the LUN

The graph information helps you determine if your LUNs are placed in the optimum Storage Class and assigned the appropriate QoS priority. Ideally, you want your LUNs with heavy I/O loads and larger capacity requirements assigned to the premium Storage Class and using the highest QoS priority level. Conversely, you want the LUNs with low I/O loads assigned to the low-cost Storage Class using a low QoS priority level.

Effectiveness Reports for QoS Plus

The **Generate Auto-Tier Effectiveness Report** dialog allows you to view the Auto-Tier Effectiveness report. The report summarizes the results of the analysis

that the QoS Plus feature has performed on the auto-tiered LUNs in the Storage Domain.

The report contains the following information about each auto-tiered LUN:

Constrained skew Indicates the degree of uniformity of the data distribution and the I/O activity across all the Storage Classes that are available to the auto-tiered LUN. The report provides a value from 0 through 100. Use the information in the following table as a guide in interpreting the constrained-skew value.

Table 9: Constrained skew

Approximate constrained skew value	Description
Is close to 100	<p>Indicates that the I/O activity and that the LUN data are unevenly distributed across all the available Storage Classes.</p> <p>The LUN contains a small amount of data, which resides on high-cost Performance SSDs, that are receiving all the I/O activity. The same LUN also contains a majority amount of data that resides on low-cost storage, such as Capacity drives, that is never accessed.</p> <p>QoS Plus can benefit the LUN.</p>
Is close to 0	<p>Indicates that the I/O activity and data are evenly distributed across all the available Storage Classes.</p> <p>QoS Plus can provide little benefit for the LUN.</p>

Average IOPS Indicates the number of IOPS that is averaged over the previous auto-tier scan cycle.

Peak IOPS Indicates the number of IOPS for a two-minute time frame where the IOPS were the greatest during the previous auto-tier scan cycle.

Related Links

[Example to Determine the Effect of Adding an Application](#)

[Example to Determine Performance During Peak Usage](#)

[Storage Performance Statistical Data Overview](#)

[Generate Auto-Tier Effectiveness Report](#)

[View the Auto-Tier Graphs](#)

View the Auto-Tier Graphs

After your system has processed your data for a period of time, you might want to view how the QoS Plus feature distributes the data in your auto-tiered LUNs. Two graphs display information that helps you decide whether to add Performance solid-state drive (SSDs).

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to view.
- 3 Select **Actions > View Auto-Tier Graphs**.
- 4 Select up to 10 auto-tiered LUNs.
- 5 To display the graphs, click **Update Graphs**.
The dialog displays the following graphs:
 - Data Transferred By Number of Accesses
 - Tier Structure By Storage Class and Priority
- 6 Use the arrow buttons to adjust the size of the chart window.
- 7 To update the chart with current information or with other LUNs, repeat Step 4 and Step 5.
- 8 Click **Close**.

Related Links

[View Auto-Tier Graphs Dialog](#)
[Effectiveness of QoS Plus](#)

Generate Auto-Tier Effectiveness Report

Installing more storage capacity to the Oracle FS System can affect the values that are used in the Auto-Tier Effectiveness Report. You can update the storage cost values that represents your system, if necessary. You can view the report immediately, or you can download the report in one of many common formats.

- 1 Navigate to **System > Storage Domains**.
- 2 Select the Storage Domain to report.
- 3 Select **Actions > Generate Auto-tier Effectiveness Report**.
- 4 (Optional) Update a value in the Storage Costs table.
To update a value, double-click the cell.
- 5 Generate the report.
Available options:
 - To create and view the report immediately, click **Generate and View Report**.
 - To create and view the report at a later time, click **OK**.

To view your effectiveness report later, navigate to **System > Reporting & Statistics > Generated Reports** and select the effectiveness report. You can then download the report in one of many common formats.

Related Links

[Storage Domains Overview Page](#)

[Generate Auto-Tier Effectiveness Report Dialog](#)

[Effectiveness of QoS Plus](#)

Capacities

Depending on the context, the term *capacity* can refer to logical space or to actual, physical space.

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

1 MB = 1024^2 (1,048,576) bytes

1 GB = 1024^3 (1,073,741,824) bytes

1 TB = 1024^4 (1,099,511,627,776) bytes

Logical capacity

The space that you request that the system set aside for a logical volume. In Oracle FS System Manager (GUI), logical capacities are used in the following contexts:

addressable

The size limit that you established for the volume. The addressable capacity is sometimes referred to as the *maximum* size of a volume. Addressable capacity includes the space that is needed for the repository when you specify clone-based data protection for the volume.

allocated

The amount of space that the system has set aside for a specific volume.

used

The amount of the allocated space in a volume that contains user data.

Note: Logical capacities do not include the overhead that is needed for implementing RAID protection (parity data and mirroring).

Physical capacity

The actual space that the system assigns to the volume or has available for assignment. Values that the system reports for physical capacities refer to the actual space on the physical media.

The value that is reported for the physical capacity of a volume is greater than the value that is reported for the logical capacity of the volume. The physical capacity of a volume is greater because of the overhead that is used to implement the volume.

For example, the physical capacity takes into account the space that is needed for the clones of the volume and for RAID protection.

Related Links

[Growing Thin Volumes](#)

[Overhead for Capacity Allocation](#)

Free Capacity and Volume Creation

A minimum amount of free space in the selected Storage Domain is required to create a logical volume.

When you create a new volume, the actual amount of physical capacity that is consumed from the free space in the Storage Domain includes the capacity that is needed to accommodate the system overhead that is associated with the volume, such as the capacity that is required for RAID protection.

A request to create a logical volume can fail because of one of the following reasons:

- Insufficient capacity remains in the Storage Class or Storage Domain that you specified for the volume.
- The system needed to round your request to a larger value, and the rounded value is greater than the available capacity.

Related Links

[Capacities](#)

[Overhead for Capacity Allocation](#)

[Reclaiming Capacity](#)

Overhead for Capacity Allocation

Your plans for the provisioning of logical volumes must take into account the extra capacity that the Oracle FS System allocates to accommodate various needs. Together, these extra capacities comprise what is called *system overhead*.

Oracle FS System Manager (GUI) reports the physical capacities for the Storage Domains, for the drive groups, and for the logical volumes that exist in an Oracle FS System.

Overhead for RAID Protection

To account for the data protection overhead, the Oracle FS System increases the requested capacity by a certain amount when creating a volume. The amount of additional capacity depends on the RAID level of the volume that is being created and on the initial Storage Class that is selected for the volume:

- RAID 5, solid state drive (SSD): 20%
- RAID 5, hard disk drive (HDD): 10%

Note: In the GUI, the physical capacity and the logical capacity for RAID 5 HDDs appears to be 20% because the system includes the spare space in the overhead calculation.

- RAID 6, capacity HDD: 20%
- RAID 10, all Storage Classes: 100%

For example, assume that you request 250 GB of capacity for a new volume. If you select single redundancy on any HDD Storage Class, the system uses a RAID 5 geometry for the new volume and allocates an additional 10% (25 GB) of capacity. If, however, you select double redundancy on capacity HDDs, the system uses a RAID 6 geometry for the new volume and allocates an additional 20% (50 GB) of capacity.

Note: These overhead percentages are approximate and can vary somewhat for different reasons.

The capacity that a volume consumes and the capacity that the system reports for the volume both include the overhead for RAID protection.

Overhead for Infill Reserve

For each Storage Domain that contains hard disk drives (HDDs), the Oracle FS System reserves 50 GB of physical capacity as a reserve that can be used, if needed, for infilling thin volumes. This reserve is available to all SAN LUNs that are located partly or wholly on those HDDs.

Note: The system includes the infill reserve capacity in the free physical capacities that are reported for the Storage Domains and for the drive groups.

The Oracle FS System reserves this infill reserve capacity to help prevent an inadvertent exhaustion of the physical capacity when thinly provisioned volumes grow. When a thinly provisioned volume needs to grow, the system uses this reserve capacity when all of the regular HDD capacity in the Storage Domain has been allocated.

Related Links

[Capacities](#)

[Growing Thin Volumes](#)

[Redundancy and Data Protection](#)

[Storage Class Description](#)

Thin Provisioning

Traditionally, when a system allocates storage for a logical volume, the allocation is dedicated to that volume. This dedication prevents other volumes from accessing this storage, even when the amount that is allocated is never used by the owning volume.

Thin provisioning allows you to leverage this unused storage. To leverage unused storage, perform the following actions:

- Allocate capacity based on future needs.
- Draw from a common pool of storage as the allocated capacity is consumed.

Thin provisioning on an Oracle FS System allows you to create a logical volume of any size without committing the requested capacity at the time that you create the volume. Each volume appears to have all of the storage that the volume needs for ongoing operations. The difference is that the physical capacity is not actually locked to a particular volume.

All logical volumes in an Oracle FS System have two properties that are related to the logical capacity of the volumes. Also, whether a logical volume is thinly provisioned depends on the relationship between the initial values of those two capacities.

Capacity

Addressable logical capacity

The maximum amount of storage to which the logical volume can grow. Because of the rounding that the system performs internally, the value of this property can be up to 2 GB less than the value for the allocated logical capacity.

Allocated

Allocated logical capacity

The amount of storage that the system dedicates to the logical volume. The allocated logical capacity can be any value up to and including the addressable logical capacity. When you create a SAN LUN, you specify this value, which becomes the initial capacity that the system allocates to the LUN.

Tip: If you do not want thin provisioning for the single-tier LUN, set the allocated logical capacity equal to the addressable logical capacity.

Note: All auto-tiered LUNs are thinly provisioned.

Related Links

[Capacities](#)

[Growing Thin Volumes](#)

Provisioning Thin Volumes

The capacity that is reserved for thin provisioning, which is a part of the system overhead, is accounted for in the available capacity that Oracle FS System Manager (GUI) reports. Because the system has already accounted for this reserve capacity, what the GUI reports as available capacity is fully available for the provisioning of logical volumes.

For SAN LUNs, the degree to which a LUN is thinly provisioned depends on the nature of the host applications that access the LUN. If only specific portions of a LUN are ever accessed by applications, the thinness of that volume remains the same. As applications attempt to access increasingly diverse areas of the LUN,

however, the Oracle FS System allocates additional physical space for the LUN, causing the thinness of the volume to decrease.

Some applications access most or all of the addressable space for a volume. In these cases, the volume transitions from being thinly provisioned to being fully provisioned while the application executes.

The Microsoft Windows operating system reserves a substantial amount of metadata for a filesystem that has been formatted as a New Technology File System (NTFS) volume. The layout of this metadata causes an early allocation of thinly provisioned space. The primary NTFS metadata consists of the following objects:

- The boot record, which is written to both the beginning and the end of the volume
- The master file table (MFT), which is written to both the beginning of the volume and the middle of the volume

To prevent the MFT from becoming fragmented, Windows reserves a buffer around the MFT. The size of this buffer can be configured to be 12.5%, 25%, 37.5%, or 50% of the drive space. Windows does not create new files in this buffer region until the unused space is consumed. Each time the remainder of the drive space becomes full, the buffer size is halved. This strategy provides new space for additional write operations.

Oracle does not recommend creating a thinly provisioned LUN that consumes more than 90% of the maximum capacity on the first infill, especially when using NTFS. NTFS writes throughout the LUN, causing allocations that do not match the amount of data that is written.

A heavily used NTFS filesystem running without much free capacity eventually uses up all of the capacity unless the filesystem is defragmented periodically. NTFS favors writing into newly allocated space instead of reusing previously written space. NTFS works with thin provisioning initially but can quickly use up more allocation than the amount of data that the filesystem shows as used.

Because thin provisioning uses Controller resources and affects performance, a good use of thin provisioning is for a LUN that has the following characteristics:

- The initial allocation is equal to the amount of existing data, plus 10%. This value becomes the allocated logical capacity.
- The addressable logical capacity is as large as you expect that the LUN will ever need.

For example, given 420 GB of file data, the administrator should configure the allocated logical capacity of the LUN to be approximately 470 GB and the addressable logical capacity to be approximately 1 TB.

Note: How much capacity NTFS uses depends on many factors, including the amount of data involved in the write operations, where the write operations are performed, and other factors such as the type of storage used in the storage pool.

On Linux platforms, EXT2 and EXT3 filesystems write metadata over the entire range of logical block addresses (LBAs) of the LUN. The drive is organized into block groups and metadata exists at the beginning of each block group. This configuration typically causes the entire LUN to be provisioned when the administrator creates a filesystem. This full provisioning occurs because the metadata write is below the minimum allocation unit that is used by the Oracle FS Systems. This condition causes the system to expand every allocation extent to the maximum size.

In summary, the success of utilizing thin provisioning depends on the filesystem or the application using the LUN.

Related Links

[Thin Provisioning](#)

Growing Thin Volumes

When a thinly provisioned volume needs additional capacity, the Oracle FS System automatically allocates the capacity at that point in time, which *grows* (or *infills*) the thin volume.

Note: The additional capacity that is allocated, however, might not be contiguous with the previous allocations.

Growth Increments

When the Oracle FS System infills a logical volume, the system divides the allocation into slices that are called *growth increments*. The system uses as many of the slices as are needed to fulfill the allocation.

For LUNs using regular QoS (single-tiered LUNs), the size of a growth increment is between 1 GB and 2 GB. For example, if the volume is 2 TB, the system uses a number of increments between 1024 and 2048 for the allocation. The exact number depends on the results of an algorithm that utilizes the following storage properties of the single-tiered volume:

- The Storage Class of the drive groups on which the volume is placed
- The RAID level of the volume
- The number of drive groups across which the volume is striped, which is controlled by the Priority QoS property

Note: For LUNs using QoS Plus (auto-tiered LUNs), the size of a growth increment is 640 KB.

Growing LUNs

SAN LUNs reside in a single Storage Domain and utilize the capacity that is provided by the Storage Classes that you specify for the LUNs. For a thinly provisioned LUN, the following rules also apply:

- The growth of a single-tiered LUN using regular QoS is confined to the drive groups that support the Storage Class that is assigned to the LUN.

- The growth of an auto-tiered LUN can grow by utilizing the capacity in any of the storage tiers, independent of Storage Class.

Related Links

[Priority Level and Performance](#)

[Redundancy and Data Protection](#)

[Storage Class Description](#)

[Storage Tiers](#)

[Thin Provisioning](#)

Reclaiming Capacity

When you delete a logical volume, the Oracle FS System reconditions the space (by writing a predefined bit pattern) before reclaiming the space for reuse. As the previously allocated capacity frees up, the capacity becomes available for allocation.

When you delete a large volume, the operation can take awhile for all of the capacity to be reclaimed. When deleting auto-tiered LUNs, you can quickly reclaim the allocated capacity by manually compacting the Storage Domain. Compacting releases unused allocated space for autotiered LUNs and makes that space available to the Oracle FS System. The system automatically compacts the Storage Domain when the allocated space for auto-tiered LUNs reaches 20%.

Because of the additional time that is needed to recondition the drives holding the volume data, the amount of physically allocated capacity plus the amount of physically free capacity in the owning drive groups might not equal the total physical capacity in those drive groups. Therefore, while the deleted capacity is being reconditioned, Oracle FS System Manager (GUI) displays the amount of physical capacity that remains to be reconditioned as “preparing.”

Related Links

[Storage Domain Compaction](#)

[Compact a Storage Domain](#)

[Capacities](#)

Manage SAN Volumes

Managing SAN LUNs

A LUN is defined as the following:

A logical volume that is defined over a collection of drive groups and is addressed using SCSI protocol in a SAN. An administrator defines the QoS attributes of the LUN.

Use the Oracle Flash Storage System (GUI) to perform the following actions:

- Create a single tier or auto-tiered LUN.
- Modify the properties of a LUN.
- Map a LUN to specific SAN host entries or multiple host entries.
- Move a LUN from one Storage Domain to another.
- Enable and disable the data path to a LUN.
- Provide clone and copy operations on a LUN for various purposes, including data protection.

You assign the storage resources and QoS attributes when you create the LUN. As needs change, you can later modify the QoS attributes of the LUN, the storage capacity that is assigned to the LUN, or both. You can designate the LUN as auto-tier. With an auto-tiered LUN, the system continuously monitors its I/O and gathers statistics for analysis. From this analysis, data is placed on the tier that best matches its use.

Note: When you create a LUN, the system automatically sets the tiering level of the LUN to single tier. If you want to allow for automatic data migration to higher data tiers, change the LUN to an auto-tiered LUN. If you create an auto-tiered LUN when the system contains only one Storage Class, no data migration occurs until other Storage Classes are added to the system.

The Oracle FS System creates two storage tiers for each Storage Class that is present in the Storage Domain. Depending on the type of Storage Class, the system assigns a RAID level for each tier. The administrator views the properties of the storage tier by accessing the QoS properties and Storage Class. The following table defines the RAID levels by Storage Class.

Table 10: RAID level by Storage Class and storage tier

Storage Class	Storage tier	
	Tier 1	Tier 2
Capacity HDD	RAID 6	Not available
Capacity SSD	RAID 5	RAID 10
Performance HDD	RAID 5	RAID 10
Performance SSD	RAID 5	RAID 10

You can use the Oracle FS System Manager (GUI) to disable the data path to the LUN. Disabling the data path makes the LUN inaccessible to the SAN host.

To provide data protection for a LUN, you can clone the volume. You can manually clone or copy a LUN. You can also create a schedule so that the system automatically creates cloned LUNs at times that you define.

Related Links

[Data Migration](#)

[LUN Statistics and Trending Overview](#)

[QoS Policies](#)

[Storage Class Description](#)

[Storage Tiers](#)

[Creating Auto-Tiered LUNs](#)

[Single-Tier QoS for LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Disable the Data Path of a LUN](#)

Creating Auto-Tiered LUNs

When you create an auto-tiered LUN, you select the initial properties for QoS and Storage Class, and you provide the capacity requirements for the LUN. By default, the system has access to all of the available Storage Classes for data migration.

An auto-tiered LUN is a LUN that uses the auto-tier (QoS Plus) feature. This feature uses the configured Storage Class within the Storage Domain to optimally store the data and to make the best use of the available storage types and capacities. Even though the system sets the LUN initially to single tier, you can select the auto-tier option, if desired.

As data is stored and retrieved in the LUN, the Oracle FS System migrates that portion of the data to the appropriate Storage Classes. This process is called *data migration*. Data migration that results from the QoS Plus feature occurs when the system, after an analysis of the historical usage information for the block of data, determines that another Storage Class or RAID level can better service that block of data.

Auto-tiered LUNs can access all of the configured Storage Classes in the Storage Domain. When you create an auto-tiered LUN, you are presented with a graphical representation of the Storage Domain capacities and the storage allocation by Storage Class. The graphs provide an overview of the potential storage usage for the LUN so that you can plan your storage requirements appropriately.

Administrators can create Storage Domains in the system. When the system contains more than one Storage Domain, the Storage Domain field displays on the GUI screen. Otherwise this field is not present in the GUI and the system assigns the LUN to the default Storage Domain.

The Oracle FS System calculates whether enough storage resources are available to create a new logical volume. Oracle FS System Manager (GUI) provides graphs that represent the Storage Domain capacity requirements for the volume and a second graph that represents the storage capacity by Storage Class. The system updates the graphs as you adjust the QoS values for Storage Class and redundancy.

Note: The capacity values displayed in the usage graphs represent the sizes of the largest volume that you can create in a particular Storage Class, given one of two performance configurations.

The Create LUN dialog contains three tabs for entering the QoS information and mapping the LUN to a host entry.

Quality of Service

(Required) The Quality of Service tab allows you to define the QoS attributes for a LUN, assign your LUN to a volume group and a Storage Domain. You can also create a volume group from this tab and view the Storage Domain properties.

Note: If no custom Storage Domains have been defined, the Storage Domain option does not appear on the tab.

Enter the LUN volume name, and then select a Storage Profile that contains predefined QoS attributes. If necessary, choose the custom QoS attributes. The system contains two levels of QoS settings: Basic and Advanced.

The QoS settings that you enter for your LUN help the system determine the initial placement of the data. When enough statistics and usage history is collected about the data, the system determines whether to move some of the data to a different storage tier.

When you create an auto-tiered LUN and request a non-zero amount of capacity to be allocated, the Oracle FS System takes a few minutes to reserve that capacity. Until the capacity allocation process completes, the system reports the allocated capacity as zero (0). After the allocation process completes, the system reports the amount of allocated capacity that you originally requested.

Mapping

(Optional) The Mapping tab allows you to specify which SAN host entries can access the LUN.

You can map the LUN using one of the following methods:

- Map the LUN to a SAN host entry using a specific LUN number.
- Map all SAN host entries to access the LUN using the same LUN number. This method is not recommended.

Data Protection

(Optional) The Data Protection tab allows you to allocate the storage capacity for the Clone LUNs repository. You can apply unique QoS properties to the Clone LUN repository and assign the maximum storage capacity for the repository. You can also create a clone schedule to perform data protection at regular intervals.

Related Links

[Free Capacity and Volume Creation](#)

[QoS Plus Overview](#)

[Storage Domains](#)

[Storage Profiles](#)

[Volume Groups](#)

[Modifying Auto-Tiered LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Create Auto-Tiered LUN: Define Data Protection](#)

Create Auto-Tiered LUN: Define Quality of Service

Define the Quality of Service (QoS) attributes to allocate the storage resources that are necessary to create the auto-tiered LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click **Auto Tier**.
- 4 (Optional) From the **Storage Domain** list, select the Storage Domain that you want to assign to the LUN.

If necessary, click the browse button, [...] to display a list of available Storage Domains.

Note: The Storage Domain list displays only when administrator-defined Storage Domains exist. If no administrator-defined Storage Domains exist or you do not assign the LUN to a specific Storage Domain, then the system assigns the LUN to the default Storage Domain.

- 5 Enter a name in the **LUN Name** field.
- 6 (Optional) From the **Volume Group** list, select the volume group that you want the LUN to belong.

Note: If necessary, click the browse button, [...] to create a volume group.

- 7 To use the QoS properties of an existing Storage Profile, select the **Use Storage Profile** field, and then select the desired profile from the list.

Selecting a Storage Profile sets the remaining QoS property fields to read-only and displays the Advanced QoS settings that are associated with the Storage Profile.

- 8 Select the **Initial Storage Class** where you want to store the LUN.

Possible classes:

- **Capacity Disk**
- **Capacity SSD**
- **Performance Disk**
- **Performance SSD**

- 9 (Optional) Select the **Basic** link.

The indirect QoS properties display. Available selections:

- **Initial Typical Access**
- **Initial I/O Bias**
- **Initial Redundancy**

- 10 (Optional) From the **Initial Typical Access** list, select the common access method for this LUN.

Available access methods:

- **Sequential**
- **Random**
- **Mixed**

- 11 (Optional) From the **Initial I/O Bias** list, select the typical read-write ratio for this LUN.

Available biases:

- **Read**
- **Write**
- **Mixed**

- 12 (Optional) Select the **Advanced** link.

The direct QoS properties display. Available selections:

- **Initial RAID Level**
- **Initial Read Ahead**

Important: Selecting Advanced QoS properties clears the Basic QoS selections.

- 13 (Optional) From the **Initial RAID Level** list, select the RAID level to associate with this LUN.

Possible RAID levels:

- **Single Parity**
 - **Double Parity**
 - **Mirrored**
- 14 (Optional) From the **Initial Read Ahead** list, select the read-ahead policy to apply to this LUN.
Valid policies:
- **Normal**
 - **Aggressive**
 - **Conservative**
- 15 (Optional) From the **Priority Level** field, select the desired option for the LUN.
Valid choices:
- **Premium**
 - **High**
 - **Medium**
 - **Low**
 - **Archive**
- 16 (Optional) From the **Migration/Copy Priority** list, select the priority to define how the system performs background copies.
Valid choices:
- **System Chooses**
 - **Minimize Impact**
 - **Maximize Speed**
- 17 (Optional) Click the **Additional Options** button.
The Additional Options dialog appears.
- 18 (Optional) From the Additional Options dialog, select the desired Storage Classes that you want the auto-tier LUN to use.
- 19 (Optional) To enable auto-tiering, select the **Tier Reallocation Enabled** check box.
- 20 Click **Close**.
- 21 In the **Allocated** and **Addressable** fields, specify the logical capacities for this volume.
- Note:** Use the storage capacity usage graphs to determine the impact on the storage requirements for the LUN.
- 22 To create the LUN now, click **OK**.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.
- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create SAN LUN, Quality of Service Tab, Auto-tier](#)

[QoS Plus Overview](#)

[Managing SAN LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Auto-Tiered LUN: Define Data Protection](#)

Create Auto-Tiered LUN: Define Data Protection

You can allocate clone capacity for an auto-tier LUN and create a schedule to perform clone operations on a regular basis. The Data Protection page also allows you to either use custom QoS settings for your clones or use the LUN settings.

After the clone is created, you can change the priority level and other properties of the clone. When creating a Clone LUN, make sure that enough repository space exists for the clone. The system stores in the clone repository only the changes that are made to the source volume or to the clone.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click **Auto Tier**.
- 4 Click the **Data Protection** tab.
- 5 To allow the system to create Clone LUNs, select the **Enable Clones** check box.
Selecting this option enables the remaining options on the page.
- 6 In the **Maximum Capacity** field, enter a value for the Capacity for Clone Storage. The system sets a default of 110% of the LUN storage capacity. Selecting a value of 100% provides enough capacity to avoid strict control over the storage capacity without using up unnecessary capacity.

Caution: Allocate sufficient repository or clone storage capacity to minimize the chances of running out of this space (which could lead to data inconsistency or loss). To set sufficient capacity, use a value equal to the source volume capacity multiplied by the number of replicas multiplied by the maximum rate of change. For example, for a 100 GB

volume that is projected to have 20 active replicas at a time and no more than a 20% rate of change, use a value of 400 GB for the storage capacity.

- 7 (Optional) Select the **Match Repository QoS to LUN QoS** check box. Selecting the **Match Repository QoS to LUN QoS** option applies the LUN QoS properties to the clones and disables the Clone Storage QoS fields.
- 8 (Optional) From the **Storage Domain** list, select the Storage Domain that you want to assign the LUN.
- 9 Select the **Initial Storage Class** where you want to store the LUN.

Possible classes:

- **Capacity Disk**
- **Capacity SSD**
- **Performance Disk**
- **Performance SSD**

- 10 (Optional) Select the **Basic** link.

The indirect QoS properties display. Available selections:

- **Initial Typical Access**
- **Initial I/O Bias**
- **Initial Redundancy**

- 11 (Optional) From the **Initial Typical Access** list, select the common access method for this LUN.

Available access methods:

- **Sequential**
- **Random**
- **Mixed**

- 12 (Optional) From the **Initial I/O Bias** list, select the typical read-write ratio for this LUN.

Available biases:

- **Read**
- **Write**
- **Mixed**

- 13 (Optional) Select the **Advanced** link.

The direct QoS properties display. Available selections:

- **Initial RAID Level**

Important: Selecting Advanced QoS properties clears the Basic QoS selections.

- 14 (Optional) From the **Initial RAID Level** list, select the RAID level to associate with this LUN.

Possible RAID levels:

- **Single Parity**
- **Double Parity**
- **Mirrored**

- 15 (Optional) From the **Priority Level** field, select the desired option for the LUN.

Valid choices:

- **Premium**
- **High**
- **Medium**
- **Low**
- **Archive**

- 16 (Optional) Click the **Additional Options** button.
The Additional Options dialog appears.

- 17 (Optional) From the Additional Options dialog, select the desired Storage Classes that you want the auto-tier LUN to use.

- 18 Click **Close**.

- 19 (Optional) To create a Clone LUN data protection schedule, click **Create**.
See the procedure for creating Clone LUNs on a scheduled basis.

- 20 (Optional) Click **OK**.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.
- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create SAN LUN, Data Protection Tab, Auto Tier](#)

[Managing SAN LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Auto-Tiered LUN: Define Quality of Service](#)

Modifying Auto-Tiered LUNs

You might need to modify the current Quality of Service (QoS) attributes for an auto-tiered LUN. Modifications include increasing the capacity and allocating space for Clone LUNs. You can also modify the mapping of a LUN as well as change the Controller to which the LUN is assigned. If necessary, you can also convert the auto-tiered LUN to single-tier.

Note: When you change the Storage Class of a logical volume, the volume is migrated to the new Storage Class. Any existing clones of that volume are not migrated to the new Storage Class.

You modify a LUN by entering the QoS attributes on the Oracle FS System Manager screen. The Modify LUN screen contains three tabs for entering QoS information and mapping the LUN to a host entry.

Important: Before modifying a LUN, verify that the "QoS Rebalance" background task is not active. This task will prevent you from modifying your LUN.

Quality of Service

(Required) The Quality of Service tab allows you to change the assigned volume group or Storage Domain. You can also create a group if one does not exist. This tab also allows you to customize QoS attributes, including selecting a Storage Profile, Storage Class, redundancy, and other properties, depending on the selected parameters. You can also set the capacity limits for the LUN and view the effects that the selected QoS attributes would have on the Storage Class and overall system storage capacities.

Mapping

(Optional) The Mapping tab allows you to specify which SAN host entries can access the LUN.

You can map the LUN using one of the following methods:

- Map the LUN to a SAN host entry using a specific LUN number.
- Map all SAN host entries to access the LUN using the same LUN number. This method is not recommended.

Data Protection

(Optional) The Data Protection tab allows you to allocate the storage capacity for the Clone LUNs repository. You can apply unique QoS properties to the Clone LUN repository and increase, but not decrease, the maximum clone capacity of your clone. You can also create a clone schedule to perform data protection at regular intervals.

Related Links

[QoS Plus Overview](#)

[Modify Auto-Tiered LUN: Define Quality of Service](#)

[Modify Auto-Tiered LUN: Change to Single-Tier QoS](#)

[Modify Auto-Tiered LUN: Define Data Protection](#)

Modify Auto-Tiered LUN: Define Quality of Service

You might need to modify the current QoS attributes for an auto-tiered LUN. Modifications include increasing the capacity or allocate space for Clone LUNs.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 From the Quality of Service tab, modify the necessary QoS attributes.
- 5 To save your changes to the LUN, click **OK**.

Related Links

[Modify SAN LUN, Quality of Service Tab, Auto Tier QoS Plus Overview](#)
[Modifying Auto-Tiered LUNs](#)

Modify Auto-Tiered LUN: Change to Single-Tier QoS

You might want to change an auto-tiered LUN to single-tier LUN when you want to use fixed QoS resources and Storage Classes.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 Click the **Quality of Service** tab.
- 5 Click **Single Tier**.
- 6 Update the QoS properties, as necessary.
- 7 To save your changes to the LUN, click **OK**.

The Tier Reallocation column of the LUNs overview page changes states from an auto-tier state, such as **Enabled**, to a dash (- -). This state change indicates that the LUN is now single-tier.

Related Links

[Modify SAN LUN, Quality of Service Tab, Single Tier](#)
[Modifying Auto-Tiered LUNs](#)

Modify Auto-Tiered LUN: Define Data Protection

You can modify the allocated clone capacity and QoS properties for your auto-tiered LUN and manage the data protection schedules.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.

- 4 Click the **Data Protection** tab.
- 5 Update the fields, as necessary.
- 6 (Optional) To create a Clone LUN data protection schedule, click **Create**. See the procedure for creating Clone LUNs on a scheduled basis.
- 7 (Optional) To update an existing data protection schedule, select the schedule from the Clone Schedules list and then click **Modify**. See the procedure for modifying the schedule for details.
- 8 (Optional) To remove an existing data protection schedule, select the schedule from the Clone Schedules list and then click **Delete**.

Note: You are not prompted to confirm the removal of the data protection schedule.

- 9 To save your changes to the LUN, click **OK**.

Related Links

[Modify SAN LUN, Data Protection Tab, Auto Tier](#)

[Create a LUN Data Protection Schedule](#)

[Modifying Auto-Tiered LUNs](#)

Single-Tier QoS for LUNs

Single-tier LUNs have QoS properties that specify the Storage Class and other performance parameters for storing data on the LUN on the Oracle FS System.

The QoS properties of a single-tier LUN remains unchanged until the administrator changes these properties. An auto-tier LUN monitors the data activity and automatically adjusts the QoS properties based on system performance and data activity. For some applications, you might not want the Oracle FS System to make changes to your QoS properties. In this case a single-tier is preferred.

Consider creating a single-tier LUN when the following reasons apply:

- Your application requires low latency for all I/O. A single-tier allows you to specify the Storage Class, such as a Performance SSD. Specifying the Storage Class ensures that the system uses this class regardless of the access frequency by your application.
- Your application is accessed frequently but has no particular performance requirement. A single-tier allows you to isolate your long-term data to a high-capacity drive, which has regular performance characteristics.
- You are migrating an application from an existing system to the Oracle FS System and the existing system has LUNs configured for specific performance requirement of your applications.

If needed, you can change the tier type to auto-tier after you create the LUN.

Related Links

[QoS Policies](#)

[Managing SAN LUNs](#)

[Creating Single-Tier LUNs](#)

[Modifying Single-Tier LUNs](#)

Creating Single-Tier LUNs

The Oracle FS System creates LUNs in a single storage tier, which consists of Quality of Service (QoS) properties and Storage Classes.

When you create a LUN, the Oracle FS System calculates whether there is enough storage resources available to create a new logical volume. The Oracle FS System Manager (GUI) provides graphs that represent the storage capacity requirements for the volume and a second graph that represents the overall system capacity requirements. The system updates the graphs as you adjust the QoS values for Storage Class and redundancy.

Note: The capacity values displayed in the usage graphs represent the sizes of the largest volume that you can create in a particular Storage Class, given one of two performance configurations.

Administrators can create Storage Domains in the system. When the system contains more than one Storage Domain, the Storage Domain field displays on the GUI screen. Otherwise this field is not present in the GUI and the system assigns the LUN to the default Storage Domain.

You can also assign a LUN to a volume group. If a volume group is not available, you can create one on the screen. administrative system object that is used to organize logical volumes and, possibly, other volume groups. Volume groups can span Storage Domains.

The Create LUN dialog contains three tabs for entering the QoS information and mapping the LUN to a host entry.

Quality of Service

(Required) The Quality of Service tab allows you to define the QoS attributes for a LUN, assign your LUN to a volume group and a Storage Domain. You can also create a volume group from this tab and view the Storage Domain properties.

Note: If no custom Storage Domains have been defined, the Storage Domain option does not appear on the tab.

Enter the LUN volume name, and then select a Storage Profile that contains predefined QoS attributes. If necessary, choose the custom QoS attributes. The system contains two levels of QoS settings: Basic and Advanced.

Mapping

(Optional) The Mapping tab allows you to specify which SAN host entries can access the LUN.

You can map the LUN using one of the following methods:

- Map the LUN to a SAN host entry using a specific LUN number.
- Map all SAN host entries to access the LUN using the same LUN number. This method is not recommended.

Data Protection

(Optional) The Data Protection tab allows you to allocate the storage capacity for the Clone LUNs repository. You can apply unique QoS properties to the Clone LUN repository and assign the maximum storage capacity for the repository. You can also create a clone schedule to perform data protection at regular intervals.

Related Links

[Free Capacity and Volume Creation](#)

[Storage Domains](#)

[Storage Profiles](#)

[Volume Groups](#)

[Single-Tier QoS for LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Single-Tier LUN: Define Quality of Service](#)

[Create Single-Tier LUN: Define Data Protection](#)

Create Single-Tier LUN: Define Quality of Service

Define the Quality of Service (QoS) attributes to allocate the storage resources that are necessary to create the Single-Tier LUN.

Oracle FS System Manager (GUI) provides a list of Storage Profiles that contain QoS attributes. When you select a Storage Profile, the system automatically fills in the QoS fields with the values defined for the Storage Profile. Selecting a Storage Profile disables the custom QoS settings. To define custom QoS settings, you can create your own Storage Profile. A custom Storage Profile can then be selected from the Storage Profile list.

Storage Domains enable storage administrators to assign logical volumes to specific Storage Domains. Such assignments can be made to reduce contention among volumes, to implement different levels of security for those volumes, or both. When more storage capacity is required, the administrator can add drive groups to the Storage Domain.

Volume groups allow you to group logical volumes into one administrative unit. You can then treat this volume group as a single, large volume.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click **Single Tier**.
- 4 (Optional) From the **Storage Domain** list, select the Storage Domain that you want to assign to the LUN.
If necessary, click the browse button, [...] to display a list of available Storage Domains.

Note: The Storage Domain list displays only when administrator-defined Storage Domains exist. If no administrator-defined Storage Domains exist or you do not assign the LUN to a specific Storage Domain, then the system assigns the LUN to the default Storage Domain.

- 5 Enter a name in the **LUN Name** field.
- 6 (Optional) From the **Volume Group** list, select the volume group that you want the LUN to belong.

Note: If necessary, click the browse button, [...] to create a volume group.

- 7 To use the QoS properties of an existing Storage Profile, select the **Use Storage Profile** field, and then select the desired profile from the list.

Selecting a Storage Profile sets the remaining QoS property fields to read-only and displays the Advanced QoS settings that are associated with the Storage Profile.

- 8 Select the **Storage Class** where you want to store the LUN.

Possible classes:

- **Capacity Disk**
- **Capacity SSD**
- **Performance Disk**
- **Performance SSD**

- 9 (Optional) Select the **Basic** link.

The indirect QoS properties display. Available selections:

- **Typical Access**
- **I/O Bias**
- **Redundancy**

- 10 (Optional) From the **Typical Access** list, select the common access method for this LUN.

Available access methods:

- **Sequential**
- **Random**
- **Mixed**

- 11 (Optional) From the **I/O Bias** list, select the typical read-write ratio for this LUN.

Available biases:

- **Read**
- **Write**
- **Mixed**

- 12 (Optional) From the **Redundancy** list, select the number of parity bits to copy for this LUN.

Available redundancies:

- **Single**
- **Double**

- 13 (Optional) Select the **Advanced** link.

The direct QoS properties display. Available selections:

- **RAID Level**
- **Read Ahead**

Important: Selecting Advanced QoS properties clears the Basic QoS selections.

- 14 (Optional) From the **RAID Level** list, select the RAID level to associate with this LUN.

Possible RAID levels:

- **Single Parity**
- **Double Parity**
- **Mirrored**

- 15 (Optional) From the **Read Ahead** list, select the read-ahead policy to apply to this LUN.

Valid policies:

- **Normal**
- **Aggressive**
- **Conservative**

- 16 (Optional) From the **Priority Level** field, select the desired option for the LUN.

Valid choices:

- **Premium**
- **High**
- **Medium**
- **Low**
- **Archive**

- 17 (Optional) From the **Migration/Copy Priority** list, select the priority to define how the system performs background copies.

Valid choices:

- **System Chooses**

- **Minimize Impact**
- **Maximize Speed**

18 In the **Allocated** and **Addressable** fields, specify the logical capacities for this volume.

Note: Use the storage capacity usage graphs to determine the impact on the storage requirements for the LUN.

19 To create the LUN now, click **OK**.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.
- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create SAN LUN, Quality of Service Tab, Single Tier](#)

[Managing SAN LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Single-Tier LUN: Define Data Protection](#)

Create Single-Tier LUN: Define Data Protection

You can allocate clone capacity for a single-tier LUN and create a schedule Clone LUN to perform clone operations on a regular basis. The Data Protection page also allows you to use custom QoS settings for your clones or use the LUN settings.

After the clone is created, you can change the priority level and other properties of the clone. When creating a Clone LUN, make sure that enough repository space exists for the clone. The system stores in the clone repository only the changes that are made to the source volume or to the clone.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click **Single Tier**.
- 4 Click the **Data Protection** tab.
- 5 To allow the system to create Clone LUNs, select the **Enable Clones** check box.
Selecting this option enables the remaining options on the page.

- 6 In the **Maximum Capacity** field, enter a value for the Capacity for Clone Storage. The system sets a default of 110% of the LUN storage capacity. Selecting a value of 100% provides enough capacity to avoid strict control over the storage capacity without using up unnecessary capacity.

Caution: Allocate sufficient repository or clone storage capacity to minimize the chances of running out of this space (which could lead to data inconsistency or loss). To set sufficient capacity, use a value equal to the source volume capacity multiplied by the number of replicas multiplied by the maximum rate of change. For example, for a 100 GB volume that is projected to have 20 active replicas at a time and no more than a 20% rate of change, use a value of 400 GB for the storage capacity.

- 7 (Optional) Select the **Match Repository QoS to LUN QoS** check box. Selecting the **Match Repository QoS to LUN QoS** option applies the LUN QoS properties to the clones and disables the Clone Storage QoS fields.
- 8 (Optional) From the **Storage Domain** list, select the Storage Domain that you want to assign the LUN.
- 9 Select the **Storage Class** where you want to store the LUN.

Possible classes:

- **Capacity Disk**
- **Capacity SSD**
- **Performance Disk**
- **Performance SSD**

- 10 (Optional) Select the **Basic** link.

The indirect QoS properties display. Available selections:

- **Typical Access**
- **I/O Bias**
- **Redundancy**

- 11 (Optional) From the **Typical Access** list, select the common access method for this LUN.

Available access methods:

- **Sequential**
- **Random**
- **Mixed**

- 12 (Optional) From the **I/O Bias** list, select the typical read-write ratio for this LUN.

Available biases:

- **Read**
- **Write**

- **Mixed**

13 (Optional) From the **Redundancy** list, select the number of parity bits to copy for this LUN.

Available redundancies:

- **Single**
- **Double**

14 (Optional) Select the **Advanced** link.

The direct QoS properties display. Available selections:

- **RAID Level**
- **Read Ahead**

Important: Selecting Advanced QoS properties clears the Basic QoS selections.

15 (Optional) From the **RAID Level** list, select the RAID level to associate with this LUN.

Possible RAID levels:

- **Single Parity**
- **Double Parity**
- **Mirrored**

16 (Optional) From the **Priority Level** field, select the desired option for the LUN.

Valid choices:

- **Premium**
- **High**
- **Medium**
- **Low**
- **Archive**

17 (Optional) To create a Clone LUN data protection schedule, click **Create**. See the procedure for creating Clone LUNs on a scheduled basis.

18 (Optional) Click **OK**.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.

- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create SAN LUN, Data Protection Tab, Single Tier](#)

[Managing SAN LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

[Create Single-Tier LUN: Define Quality of Service](#)

Modifying Single-Tier LUNs

You might need to modify the current Quality of Service (QoS) attributes for a Single-Tier LUN, such as increase the capacity or allocate space for Clone LUNs. You can also modify the mapping of a LUN as well as change the Controller to which the LUN is assigned.

Note: When you change the Storage Class of a logical volume, the volume is migrated to the new Storage Class. Any existing clones of that volume are not migrated to the new Storage Class.

You modify a LUN by entering the QoS attributes on the Oracle FS System Manager screen. The Modify LUN screen contains three tabs for entering QoS information and mapping the LUN to a host entry.

Quality of Service

(Required) The Quality of Service tab allows you to change the assigned volume group or Storage Domain. You can also create a group if one does not exist. This tab also allows you to customize QoS attributes, including selecting a Storage Profile, Storage Class, redundancy, and other properties, depending on the selected parameters. You can also set the capacity limits for the LUN and view the effects that the selected QoS attributes would have on the Storage Class and overall system storage capacities.

Mapping

(Optional) The Mapping tab allows you to specify which SAN host entries can access the LUN.

You can map the LUN using one of the following methods:

- Map the LUN to a SAN host entry using a specific LUN number.
- Map all SAN host entries to access the LUN using the same LUN number. This method is not recommended.

Data Protection

(Optional) The Data Protection tab allows you to allocate the storage capacity for the Clone LUNs repository. You can apply unique QoS properties to the Clone LUN repository and increase, but not decrease, the maximum clone capacity of your clone. You can also create a clone schedule to perform data protection at regular intervals.

Related Links

[Modify Single-Tier LUN: Quality of Service](#)

[Modify Single-Tier LUN: Change to Auto-Tiered LUN](#)

[Modify Single-Tier LUN: Data Protection](#)

Modify Single-Tier LUN: Quality of Service

You might need to modify the current QoS attributes for a LUN, such as increase the capacity or allocate space for Clone LUNs.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 From the Quality of Service tab, modify the necessary QoS attributes.
- 5 To save your changes to the LUN, click **OK**.

Related Links

[Modify SAN LUN, Quality of Service Tab, Single Tier](#)

[Modifying Single-Tier LUNs](#)

Modify Single-Tier LUN: Change to Auto-Tiered LUN

You might want to change a single-tier LUN to an auto-tiered LUN when you want to make efficient use of the Oracle FS System resources.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 Click the **Quality of Service** tab.
- 5 Click **Auto Tier**.
- 6 (Optional) Click the **Additional Options** button.
The Additional Options dialog appears.
- 7 (Optional) From the Additional Options dialog, select the desired Storage Classes that you want the auto-tier LUN to use.
- 8 (Optional) To enable auto-tiering, select the **Tier Reallocation Enabled** check box.
- 9 Click **Close**.
- 10 Update the QoS properties, as necessary.
- 11 To save your changes to the LUN, click **OK**.

The Tier Reallocation column of the LUNs overview page changes states from a dash (-) to some other state, such as **Enabled**. This state change indicates that the LUN is now auto-tier.

Related Links

[Modify SAN LUN](#), [Quality of Service Tab](#), [Auto Tier Modifying Single-Tier LUNs](#)

Modify Single-Tier LUN: Data Protection

You can modify the allocated clone capacity and QoS properties for your single-tier LUN. You can also manage the data protection schedules.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 Click the **Data Protection** tab.
- 5 Update the fields, as necessary.
- 6 (Optional) To create a Clone LUN data protection schedule, click **Create**. See the procedure for creating Clone LUNs on a scheduled basis.
- 7 (Optional) To update an existing data protection schedule, select the schedule from the Clone Schedules list and then click **Modify**. See the procedure for modifying the schedule for details.
- 8 (Optional) To remove an existing data protection schedule, select the schedule from the Clone Schedules list and then click **Delete**.

Note: You are not prompted to confirm the removal of the data protection schedule.

- 9 To save your changes to the LUN, click **OK**.

Related Links

[Modify SAN LUN](#), [Data Protection Tab](#), [Single Tier Modifying Single-Tier LUNs](#)

Display LUN Details

You can display details about a selected LUN.

The LUN details include:

- Single-tier LUN or auto-tier LUN
- Quality of Service (QoS) attributes
- Allocated storage capacity
- Volume group and Storage Domain associations
- SAN host entry mapping details and Controller port masking assignments
- Clone capacity and cloning schedules

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN you want to view.
- 3 Select **Actions > View**.
- 4 Select any of the tabbed pages to view the LUN properties.
- 5 Click **Close**.

Related Links

[View SAN LUN, Data Protection Tab, Single Tier](#)

[View SAN LUN, Mapping Tab](#)

[View SAN LUN, Quality of Service Tab, Single Tier](#)

[Controller Ports](#)

[QoS Policies](#)

[Storage Domains](#)

[Volume Groups](#)

[Modifying Auto-Tiered LUNs](#)

[Modifying Single-Tier LUNs](#)

[Mapping LUNs and SAN Host Entries](#)

Disable the Data Path of a LUN

You might want to remove the ability of a SAN host to access a LUN or Clone LUN.

Disabling the data path to the logical volume prevents I/O operations on the volume. However, mappings to the SAN host entries are retained.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to disable from the data path.
- 3 Select **Actions > Disable Data Path**.
A confirmation dialog displays.
- 4 To disable the data path for the LUN, click **OK**.

On the LUN overview page, the Host Access status of the volume changes to *Inactive*. You must enable the LUN to start I/O and make the LUN accessible on the network

Related Links

[SAN LUNs Overview Page](#)

[Managing SAN LUNs](#)

[Enable the Data Path of a LUN](#)

Enable the Data Path of a LUN

Enabling the data path to a LUN restores the communication between the mapped SAN host and the volume. When the data path to a LUN has been

disabled, you can provide the ability of a SAN host to access that LUN using the host mappings already established.

The LUN overview page identifies the Host Access status of a disabled LUN as *Inactive*.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to enable.
- 3 Select **Actions > Enable Data Path**.
- 4 To enable the data path, click **OK**.

On the LUN overview page, the Host Access status of the volume changes from *Inactive* to the original status.

Related Links

[SAN LUNs Overview Page](#)

[Managing SAN LUNs](#)

[Disable the Data Path of a LUN](#)

Relocating LUNs

You can relocate a LUN from its assigned Controller to another Controller.

If you relocate a LUN from one Controller to another, the system reconfigures the volume at the new location while attempting to maintain the integrity of the data.

Caution: If a client attempts to modify that LUN while the LUN is being relocated, the client loses its connection and data becomes corrupted or lost. Before you relocate a LUN to another Controller, clients unmount the LUN to ensure data integrity during the move.

Keep LUN copies on the same Controller as the source LUN until the background copy has completed. You can monitor the status of this task from the Task window.

Important: If the LUN is a member of a SAN replication pair, isolate the pair before relocating the LUN to a different Controller. For more information, see the *Oracle MaxRep for SAN User's Guide*.

Related Links

[Data Replicas and System Capacity](#)

[Managing SAN LUNs](#)

[Change the LUN Location on a Controller](#)

Change the LUN Location on a Controller

You can relocate a LUN from one Controller to another.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 Click the **Mapping** tab.
The current Controller assignment is displayed in the **Current Controller** field.
- 5 From the **Assigned Controller** list, select the desired Controller.
- 6 To save your changes, click **OK**.

Related Links

[Modify SAN LUN, Mapping Tab](#)

[Relocating LUNs](#)

Delete a LUN

When a LUN is longer needed, you can delete it.

Note: When you delete a LUN, any clones that are in process or completed are also deleted.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to delete.
- 3 Select **Actions > Delete**.
The system displays the Delete LUN dialog. The Delete LUN dialog lists the LUN and the affected clones that the system identifies for deletion.
Note: The system displays the option, **Delete LUNs and existing host mappings** when the LUN you are deleting contains host mappings. Deleting a LUN with host mappings causes each of those hosts to lose access to the LUN and clones.
- 4 To acknowledge that you want to delete the LUN, along with any clones and host mappings, select the option **Delete LUNs and existing host mappings**.
- 5 Click **OK**.

Related Links

[Delete LUN](#)

[Creating Auto-Tiered LUNs](#)

[Creating Single-Tier LUNs](#)

Mapping LUNs and SAN Host Entries

After creating your LUNs, map them to the SAN host entry so that the volumes can be used by the Oracle FS System.

Mapping allows you to specify which SAN host entries can access the LUN. Mapping your LUN to a host entry makes the LUN available to the Oracle FS System.

You can map the LUN using one of the following methods:

- Map the LUN to a SAN host entry using a specific LUN number.
- Map all SAN host entries to access the LUN using the same LUN number. This method is not recommended.

Related Links

[Create LUN: Define Mapping by Selected Host Entries](#)

[Create LUN: Define Mapping by LUN Number](#)

[Modify LUN: Define Mapping by Selected Host Entries](#)

[Modify LUN: Define Mapping by LUN Number](#)

Create LUN: Define Mapping by Selected Host Entries

Mapping your LUN makes the LUN available to the host entry. You can specify that your LUN map to a specific host entry and LUN number.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click the **Mapping** tab.
- 4 Select the **Access Protocol** that permits access to the LUN.
Valid options:
 - **Fibre Channel (FC)**
- 5 Select the option **Only selected hosts (via maps)**.
The system displays the Hosts mapping table.
- 6 From the LUN Controller Assignment controls, allow the Oracle FS System to assign the Controller, by leaving the Assigned Controller option set to the default, which is **<auto assign>**.
- 7 Click **Create**.
- 8 From the Create LUN Map dialog, define the mapping for the LUN, then click **OK** or click **OK and Continue**.

Valid options:

- **LUN Name**
- **Host Name**
- **LUN Number**

Tip: If network clients use Windows 2000 or 2003 platforms, and you want those clients to be able to access the LUN, do not select LUN number 255.

Note: Clicking **OK and Continue** allows you to map more hosts to this LUN. Clicking **OK** creates the LUN mapping and closes the dialog.

- 9 (Optional) From the Ports Masked for this LUN table, select **Yes** for each Controller port that you want to mask.

When you mask a port, the LUN cannot be accessed from the specified ports.

Note: If you use Oracle FS System LUN masking or switch zoning and do not use LUN assignment, you could create a situation in which a LUN is not exposed on the ports through which you want the clients to be able to access the LUN. To avoid this situation, assign the LUN to the Controller on which you have the mapping set.

- 10 Click **OK**.

If the host entry that you want to allow access to the LUN is not displayed in the list, add the host entry by associating the host initiator to the host entry.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.
- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create LUN Map Dialog](#)

[Create SAN LUN, Mapping Tab](#)

[Mapping LUNs and SAN Host Entries](#)

[Creating Auto-Tiered LUNs](#)

[Creating Single-Tier LUNs](#)

Create LUN: Define Mapping by LUN Number

Mapping a LUN makes the LUN available to the host. You can specify that the LUN map to a specific LUN number that any SAN host entry can use.

You might want all SAN host entries to be able to access a LUN using the same unique LUN number. This approach requires that you not map any host to this LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create**.
- 3 Click the **Mapping** tab.
- 4 Select the **Access Protocol** that permits access to the LUN.
Valid options:
 - **Fibre Channel (FC)**
- 5 Select the option **All hosts may access the LUN using LUN number**.
- 6 Select a LUN number from the drop-down list to assign to the LUN.
Tip: If network clients use Windows 2000 or 2003 platforms, and you want those clients to be able to access the LUN, do not select LUN number 255.
- 7 From the LUN Controller Assignment controls, allow the Oracle FS System to assign the Controller, by leaving the Assigned Controller option set to the default, which is **<auto assign>**.
- 8 (Optional) From the Ports Masked for this LUN table, select **Yes** for each Controller port that you want to mask.
When you mask a port, the LUN cannot be accessed from the specified ports.
Note: If you use Oracle FS System LUN masking or switch zoning and do not use LUN assignment, you could create a situation in which a LUN is not exposed on the ports through which you want the clients to be able to access the LUN. To avoid this situation, assign the LUN to the Controller on which you have the mapping set.
- 9 Click **OK**.

Clicking **OK** creates the LUN using the default settings on the remaining tabs. You can perform the tasks associated with the other tabs to fine-tune the remaining LUN properties. The default properties include:

- The LUN is assigned to the default Volume Group and the default Storage Domain.
- The LUN is mapped to the same host entry as the most recent LUN mapping.
- The system does not create repository capacity for Clone LUNs.
- The system does not create schedules for automatic Clone LUNs.

Related Links

[Create LUN Map Dialog](#)

[Mapping LUNs and SAN Host Entries](#)

[Creating Auto-Tiered LUNs](#)

[Creating Single-Tier LUNs](#)

Modify LUN: Define Mapping by Selected Host Entries

You might need to modify the LUN mapping properties of a host entry when the host is offline (for example, for maintenance).

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 From the Mapping tab, select the host mapping to modify, and then click **Modify**.
- 5 From the Modify LUN Number dialog, select a new LUN to map for this LUN, then click **OK**.

Tip: If network clients use Windows 2000 or 2003 platforms, and you want those clients to be able to access the LUN, do not select LUN number 255.

- 6 To save your changes, click **OK**.

If the host entry that you want to allow access to the LUN is not displayed in the list, add the host entry by associating the host initiator to the host entry.

Related Links

[Modify LUN Number Dialog](#)

[Modify SAN LUN, Mapping Tab](#)

[Mapping LUNs and SAN Host Entries](#)

[Modifying Auto-Tiered LUNs](#)

[Modifying Single-Tier LUNs](#)

Modify LUN: Define Mapping by LUN Number

You might want to modify the LUN number that all SAN host entries use to access the LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to modify.
- 3 Select **Actions > Modify**.
- 4 From the Mapping tab, select a LUN number from the drop-down list to assign to the LUN.

Tip: If network clients use Windows 2000 or 2003 platforms, and you want those clients to be able to access the LUN, do not select LUN number 255.

- 5 To save your changes, click **OK**.

Related Links

[Modify SAN LUN, Mapping Tab](#)

[Mapping LUNs and SAN Host Entries](#)

[Modifying Auto-Tiered LUNs](#)

[Modifying Single-Tier LUNs](#)

Oracle FS VDS Provider

The Oracle FS Virtual Disk Service Provider (VDS Provider) software provides a plug-in that allows administrators to manage LUNs on the Oracle FS System. The software is available from the Pilot management interface.

The Oracle FS System Pilot management interface provides links that allow you to download and install the Oracle FS Virtual Disk Service Provider software. During the installation process, you can register a single Oracle FS System. After installation, you can register more systems.

Note: Verify the VDS software installation before registering any systems.

Related Links

[Managing SAN LUNs](#)

[Download and Install the VDS Provider](#)

[Verify the VDS Provider Installation](#)

[Register an Oracle FS System with the VDS Provider](#)

Download and Install the VDS Provider

The Pilot management interface provides links to download the Oracle FS Virtual Disk Service Provider software. The software is available for both 32- and 64-bit systems.

Prerequisites

- An Oracle FS System configured with FC protocol.
- You need the following information to register the Oracle FS System with the Oracle FS Virtual Disk Service Provider software:
 - System serial number
 - Login account: username
 - Login account: password

The software installer allows the configuration of an Oracle FS System. Additional systems can be configured from a command-line tool, called `registerAxiom`.

- 1 Start a web browser.
- 2 Specify the IP address of the Pilot or the name of the Oracle FS System as the address to open.
- 3 Click the **Utility Software** tab.
- 4 Download the VDS software and save the file to your server.
Select the software version that is appropriate for your system architecture.
 - **Download Oracle FS VDS Provider - 32 bit**
 - **Download Oracle FS VDS Provider - 64 bit**

- 5 Locate the file on your server and double-click the file to begin the installation.
- 6 Follow the instructions to install the software on the server.
Note: You are prompted for the Oracle FS System serial number, user name, and password during the installation.
- 7 To close the installation wizard, click **Close** from the Installation Complete page.
- 8 Restart the Windows server.

Next, verify that the software is installed correctly.

Related Links

[Oracle FS VDS Provider](#)

[Verify the VDS Provider Installation](#)

Verify the VDS Provider Installation

After you install the Oracle FS Virtual Disk Service Provider software, verify the installation. After you have verified the installation, you can register more Oracle FS Systems.

Prerequisite

Installed Oracle FS Virtual Disk Service Provider software.

Use the Windows `diskRAID` program to verify that the Oracle FS Virtual Disk Service Provider software is installed on your workstation.

- 1 Navigate to **Start > run** from your workstation.
- 2 From the Open field, type `diskraid`.
- 3 Click **OK**.
You are prompted to confirm access to your workstation.
- 4 To continue, click **Yes**.
A new console window opens with the prompt `DISKRAID>`.
- 5 From the command prompt, type `list providers`.
Verify that the VDS provider name is listed. If VDS provider name is not listed, install the software again, or contact your system administrator.
- 6 To close the `DISKRAID` command window, type `exit`.

Related Links

[Oracle FS VDS Provider](#)

[Download and Install the VDS Provider](#)

Register an Oracle FS System with the VDS Provider

After you install the Oracle FS Virtual Disk Service Provider software, you can register additional Oracle FS Systems with the software.

Prerequisite

- Installed Oracle FS Virtual Disk Service Provider plug-in
- You need the following information to register each Oracle FS System with the Oracle FS Virtual Disk Service Provider plug-in:
 - System serial number
 - Login account: user name
 - Login account: password

The Oracle FS Virtual Disk Service Provider installs a utility that adds and removes Windows registry entries for the Oracle FS System.

- 1 Start a command prompt from your workstation.
- 2 Change the directory to the `bin` folder of the VDS provider installation.
- 3 (Optional) To view a list of acceptable usage options, type `registerAxiom`.
- 4 To register a Oracle FS System, type `registerAxiom sample-serial user-name user-password`.

Note: Enter the required information in the order listed.

- 5 (Optional) To remove the registered Oracle FS System, type `registerAxiom sample-serial`.

Related Links

[Oracle FS VDS Provider](#)

[Download and Install the VDS Provider](#)

Manage SAN Host Entries

SAN Host Entries

A SAN host entry is a record in the internal table within the Oracle FS System that represents a group of one or more *initiators*. An *initiator* is the World Wide Name (WWN) of an FC HBA port. You create host entries manually using the GUI, or automatically using Oracle FS Path Manager (FSPM).

Note: The GUI uses the term *host* to refer to SAN host entries. Also, the term *SAN host* refers to any computer that is connected to the Oracle FS System by way of a Storage Area Network.

The Oracle FS System can contain the following types of SAN host entries:

Unassociated host

The Oracle FS System automatically creates unassociated SAN host entries when an initiator is discovered on the SAN. The name of the initiator and the unassociated SAN host entry are the same.

Associated host

A host entry that an administrator associates with one or more host initiators. Use the **Associate Hosts** option to manually associate the initiators as associated hosts. After associating the initiators to the host, the associated host is a host entry, referred to in the GUI as a *host*.

FSPM host

A host that FSPM associates with one or more host initiators after logging in to the Pilot. FSPM manages the association of the initiators on the FSPM host to the FSPM host name.

The FSPM host entry contains the following information:

- The name of the FSPM host, which is the SAN host that runs FSPM
- The list of initiators, which includes the FC ports in the host system

If the Oracle FS System has LUNs, you can map them to any type of host entry. Mapping the LUNs makes them visible to all of the initiators that the host entry owns.

You can move initiators into associated host entries as necessary. When you move an initiator from an unassociated host to an associated host, the system adds the unassociated initiator to the host entry and deletes the unassociated host entry.

The system moves the mapped LUNs to the host entry and retains the LUN mappings.

For example, you want to move a LUN (mapped to LUN number 3) to a host that contains a LUN (mapped to LUN number 5). After the move, the associated host contains both LUNs, each mapped to its respective LUN number. If the new and existing LUN numbers are the same, the Oracle FS System assigns a new LUN number to the newly mapped LUN.

Moving initiators from one associated host entry to another requires the following actions:

- Remove the initiator from the first host entry.
- Associate the initiator to the new host entry.

The LUN mappings from the original host entry are not applied to the new host entry. If, after moving the initiator, there are no more initiators that are associated with the original host entry, then the Oracle FS System removes that entry.

When you delete a SAN host entry, the Oracle FS System creates an unassociated host for each initiator that is connected to the system. When deleting a host, you have the following options:

- Keep all of the LUN mappings that belong to the deleted host with each new unassociated host. Keeping the LUN mappings allows you to map a LUN to another host.
- Delete all of the LUN mappings that belong to the deleted host.

Related Links

[Managing SAN Host Entries](#)

[FSPM on SAN Hosts](#)

FSPM on SAN Hosts

Oracle FS Path Manager (FSPM) monitors the initiator ports on the SAN host and the data paths between the SAN host and the Oracle FS System.

For many operating systems, FSPM performs the following key functions:

- Enables the use of multiple paths between HBA ports on the host and Controller ports
- Balances the load across HBA channels and Controller ports
- Monitors path failure and transfers traffic to different paths if a failure occurs
- Maps LUNs to host volumes
- Reports the status of host drivers and paths in Oracle FS System Manager (GUI)

- Collects logs to include in Call-Home files when SAN hosts are selected
- Automates the recognition and configuration of the FSPM host in the GUI

A host system accesses LUNs through a SCSI-over-FC driver. These drivers are provided with the operating system or by the HBA manufacturer.

Related Links

[Controller Ports](#)

[Managing Event Logs](#)

[Mapping LUNs and SAN Host Entries](#)

[FSPM Hosts Management](#)

FSPM Hosts Management

Oracle FS Path Manager (FSPM) runs on a SAN host to create FSPM hosts and monitor data paths on the Oracle FS System.

When FSPM logs in to the Pilot, FSPM provides the name of the SAN host and the list of host initiators. If necessary, the Oracle FS System creates any FSPM hosts that are not found on the system and assigns the available initiators to the FSPM host.

FSPM is operating normally when the following conditions apply:

- FSPM successfully logs in to the Pilot.
- The Pilot has registered the host initiators as an FSPM host.
- An active TCP connection exists between the Pilot and FSPM daemon.

The FSPM host entry contains the following information:

- The name of the FSPM host, which is the SAN host that runs FSPM
- The list of initiators, which includes the FC ports in the host system

When you need to change the name of the FSPM host entry, change the name of the SAN host that is running FSPM.

Caution: If you improperly change the name of the FSPM host, you could lose access to your data.

FSPM that is running on the SAN host provides information to the Oracle FS System on a continuous basis. For example, FSPM reports for each LUN the number of optimized and non-optimized paths that are currently usable at the host.

You can perform the following actions using FSPM:

- Monitor the multiple data paths to the Oracle FS System Controllers.
- Verify the connection status of each initiator on the host.
- Balance the load traffic among the multiple paths.

FSPM sends a list of SAN host initiators to the Pilot. If any of the SAN host initiators are not currently associated with the FSPM host entry, then they are added to it. As a result, all the LUN mappings that are associated with the FSPM host entry are applied to the new initiators.

Deleting FSPM host entries releases the initiators that are members of that FSPM host. However, a new FSPM host is created the next time that FSPM logs in to the Pilot.

For more information about FSPM, refer to the *Oracle FS Path Manager Installation Guide* and to the *Oracle FS Path Manager Release Notes* for the appropriate SAN host platform.

Related Links

[SAN Host Entries](#)

[Rename an FSPM Host](#)

Rename an FSPM Host

You can rename the Oracle FS Path Manager (FSPM) host by deleting the old host entry and renaming the SAN host that is running FSPM. FSPM creates a new host entry with the new SAN host name.

The FSPM host name contains the name of the SAN host that is running FSPM. To change the name of the FSPM host, delete the FSPM host and then rename the SAN host. FSPM creates a new FSPM host when you restart FSPM. Correctly renaming the FSPM host ensures that the Oracle FS System maintains the internal record of the FSPM host.

- 1 Stop FSPM.
For instructions, refer to *Oracle FS Path Manager Installation Guide*.
- 2 To view the list of SAN host entries, including the FSPM host, from Oracle FS System Manager (GUI), navigate to **SAN > Storage > Hosts**.
- 3 Verify that at least one initiator is connected to the FSPM host.
- 4 Select the FSPM host that you want to delete.
- 5 Select **Actions > Delete Host**.
The system displays the FSPM host and any LUN mappings.
- 6 Verify that the **Delete mappings and initiators?** option is not selected.
Because you did not select the **Delete mappings and initiators?** option, the Oracle FS System retains any mappings to the host initiators. FSPM uses these initiators when the system creates the FSPM host using the new SAN host name.
- 7 To delete the FSPM host, click **OK**.
- 8 Rename the SAN host on which you have installed the FSPM software.

The process for renaming the SAN host varies depending on the host operating system. Check the documentation for your host operating system.

9 Restart FSPM.

For instructions, refer to *Oracle FS Path Manager Installation Guide*.

FSPM logs in to the Pilot and reports the new SAN host name. Then, the Oracle FS System creates an FSPM host entry with the new SAN host name. The FSPM host contains the host initiators and any LUN mappings.

Related Links

[Hosts Overview Page](#)

[FSPM Hosts Management](#)

[Rename an Associated Host Entry](#)

Managing SAN Host Entries

Use Oracle FS System Manager (GUI) to manage SAN host entries. If you have installed the Oracle FS Path Manager (FSPM), FSPM creates FSPM host entries for you.

The configuration of the Controller and SAN hosts includes the following tasks:

- Configure the FC ports in the Controller for network access. When these ports are configured, a successful connection can be made from the initiator ports on the SAN host to the target ports on the Controller.
- Provide an alias for the SAN host initiator ports. An alias makes the ports easier to identify.
- Enable the HP-UX compatibility option that allows the system to use the HP-UX addressing scheme for LUNs.
- Configure the FSPM load balancing settings on some operating systems.
- Map a LUN to a selected host entry. Mapping is the mechanism that enables the SAN host to identify and access the LUN.
- Optionally mask a Controller port so that the LUN cannot be accessed through that port.
- Associate the host entry to a host group, which is a named, logical collection of hosts.

When you delete a host entry, by default the Oracle FS System retains the mappings to the initiators of that deleted entry. These retained mappings allow you to transfer the mappings to another host entry. You can optionally remove these mappings when deleting a host entry. When you delete a host entry, the Oracle FS System creates new unassociated host entries for any initiators that are discovered by the system. You might need to refresh the screen (Ctrl-Alt-R) to view the new initiators.

You can group hosts together using host groups. A *host group* is a named, logical collection of one or more host entries. Host groups are a convenient way to associate many SAN host entries into a single, manageable object. Host groups are compatible with associated hosts and FSPM hosts.

Related Links

[Mapping LUNs and SAN Host Entries](#)

[Manage Port Aggregation for a Controller](#)

Create an Associated Host Entry

When you do not have Oracle FS Path Manager (FSPM) installed on the SAN host system, you create associated host entries by associating one or more initiators to a named host entry.

Associate initiators to a host when the Host overview page lists that host in one of the following manners:

- Unknown state
 - By a world wide name (WWN) for FC initiators
- 1 Navigate to **SAN > Storage > Hosts**.
 - 2 Select **Actions > Associate Hosts**.
The Associate Hosts dialog appears.
 - 3 Specify the name of the host in the **Host Name** field.
 - 4 Select the initiators from the **Create Association** list.
Valid methods:
 - Select the initiators from the discovered WWN name list.
 - Enter a WWN of an initiator on the SAN network.
 - 5 To associate the initiators to the host entry, click **Add**.
The selected initiator moves to the Associations table.
 - 6 Continue adding initiators to the Associations table, as necessary.
 - 7 (Optional) To remove an entry from the Associations table, select the item and then click **Remove**.
 - 8 Click **OK**.

The Host overview page displays the host entry name with the desired associated initiators.

Related Links

[Associate Hosts Dialog](#)

[Hosts Overview Page](#)

[SAN Host Entries](#)

Rename an Associated Host Entry

You can rename an associated host entry without affecting associated mappings.

You cannot rename FSPM host entries and unassociated host entries directly. For these host entry types, the **Host Name** field is not enabled.

- If you want to rename an unassociated host entry, create an associated host entry with the desired name.
- If you want to rename an FSPM host entry, you must rename the FSPM host.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select the associated host that you want to rename.
- 3 Select **Actions > Modify Host**.
- 4 From the **Host Name** field, enter a new name for the host.
- 5 Click **OK**.

Related Links

[Hosts Overview Page](#)


[Modify Host, Ports Tab](#)

Delete a Host Entry

Delete the host entry when you want to disassociate the initiators from the entry.

The Oracle FS System retains your LUN mappings to the initiators of your deleted host entry. You can remove the mappings, as necessary.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select a host from the list to delete.
- 3 Select **Actions > Delete Host**.
The system displays the Delete Host dialog.
- 4 (Optional) Select the **Delete mappings and initiators?** option.
By selecting the **Delete mappings and initiators?** option, the system removes any LUN mappings and from the associated initiators, and does not immediately create unassociated host entries for the initiators. In this case, the system creates unassociated host entries for any of the discovered initiators on the SAN.
- 5 Click **OK**.

If necessary, refresh the screen to view the unmapped host initiators by clicking the refresh icon (.

Related Links

[Hosts Overview Page](#)

[Managing SAN Host Entries](#)

View SAN Host Entry Settings

You can view the SAN host entry status and associated initiators. If Oracle FS Path Manager (FSPM) is installed, you can also view details about load balance and communication status.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select a host from the list to view.
- 3 Select **Actions > View Host**.
- 4 Select any of the tabbed pages to view the host settings.
- 5 Click **Close**.

Related Links

[Hosts Overview Page](#)

[View Host, Advanced Tab](#)

[View Host, Oracle FS Path Manager Tab](#)

[View Host, Ports Tab](#)

[Managing SAN Host Entries](#)

Modifying SAN Host Entries

You can modify information about a host including adding an alias name for a host HBA port and setting the HP-UX compatibility option.

You can change the FSPM settings of the FSPM host entries only when FSPM is installed and communicating with the Oracle FS System.

Also, if you have hosts that are running the HP-UX Operating System, enable the HP-UX compatibility you can option for these hosts. When this option is enabled, the system presents LUN numbers using the HP-UX addressing scheme, allowing up to 4095 LUNs. When enabled, the host cannot have a visible LUN using ID 0.

Modify the host by using the following tabbed pages as necessary:

Ports

Allows you to create or modify an HBA port alias and view FC port information.

Oracle FS Path Manager

Allows you to view the installed FSPM version and path manager settings. From this page, you can modify the load balancing settings and view the number of optimized and non-optimized data paths.

Advanced

If the SAN host is running the HP-UX operating system, you can set the HP-UX compatibility mode option from this page.

Related Links

[FSPM on SAN Hosts](#)

[Modify a Host: Assign a Port Alias](#)

[Modify a Host: FSPM Load Balancing](#)

[Modify a Host: Reconfigure Advanced Settings](#)

Modify a Host: Assign a Port Alias

Assign an alias to an HBA port to make the host and the port easier to identify.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select a host from the list to modify.
- 3 Select **Actions > Modify Host**.
- 4 From the Ports tab, select a port from the list.
- 5 Enter an **Alias** name for the port you wish to modify.
- 6 Click **OK**.

Related Links

[Modify Host, Ports Tab](#)

[Modifying SAN Host Entries](#)

Modify a Host: FSPM Load Balancing

You can change the load balancing method that Oracle FS Path Manager (FSPM) uses to access LUNs.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select a host from the list to modify.
- 3 Select **Actions > Modify Host**.
- 4 From the Oracle FS Path Manager tab, select a LUN, then select an option from the **Load Balancing** list.

Available methods:

- Static
- Round Robin

Note: Some operating systems do not allow you to update this option.

- 5 Click **OK**.

Related Links

[Modify Host, Oracle FS Path Manager Tab](#)

[Modifying SAN Host Entries](#)

Modify a Host: Reconfigure Advanced Settings

If you have hosts that are running the HP-UX Operating System, enable the HP-UX compatibility option. When the HP-UX compatibility option is enabled, the system presents the LUN numbers by using the HP-UX addressing scheme.

The LUN numbers by using the HP-UX addressing scheme allows you to access up to 4095 LUNs.

Note: When enabled, the HP-UX host cannot have a visible LUN using ID 0.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select a host from the list to modify.
- 3 Select **Actions > Modify Host**.
- 4 Select the **Advanced** tab.
- 5 To enable HP-UX LUN addressing scheme, select the **HP-UX Compatibility Mode** option.
- 6 Click **OK**.

Related Links

[Modify Host, Advanced Tab](#)

[Modifying SAN Host Entries](#)

Initiator-to-Controller Connectivity

Oracle FS System Manager (GUI) provides the connectivity status of each Controller ports and host initiator. After you have mapped LUNs to the hosts, you can view the connectivity status of every data path in the system.

The inter-connectivity among the Controllers and host initiators creates highly redundant data paths. This redundancy ensures that data reliably transfers among the host, the Controller, and the mapped LUNs. The Oracle FS System provides connectivity status among the various data paths. Such states might indicate that an FC switch is offline.

You can view the connectivity status from the **Initiator-to-Controller Connectivity** menu items that are available from various locations in the GUI. Depending on the object that you have selected, the GUI shows the state of the initiator that is assigned to the host entry, host initiator, or LUN. The following table summarizes the connectivity information among the Controllers ports, LUNs, hosts, and initiators.

Table 11: Initiators-to-Controller connectivity information in the GUI

GUI page source	Selected object	Connectivity information
Hosts overview	Host	Displays connectivity between all Controller ports and all host initiators that are assigned to the host entries.
Hosts overview	Host initiator	Displays connectivity between all Controller ports and selected host initiator.
LUN-to-Host Mapping overview	LUN	The page provides connectivity status between the LUN and host. The page also, displays connectivity between the host initiators and all Controller ports.
Host-to-LUN Mapping overview	Host	The page provides connectivity status between the host and LUN. The page also, displays connectivity between the host initiators and all Controller ports.

Related Links

[Controller Ports](#)

[Mapping LUNs and SAN Host Entries](#)

[SAN Host Entries](#)

[Managing SAN Host Entries](#)

Host Groups

You can easily manage the mapping of a LUN to hosts by assigning the host entries to a specific group. This group is a named, logical collection of hosts.

Your system might contain the following hosts:

- Hosts that Oracle FS Path Manager (FSPM) registered, called *FSPM host entries*
- Hosts that an administrator created by associating various initiators, called *associated host entries*

You can create more hosts by either using the FSPM service or manually creating host entries. Creating host groups is useful if you have SAN host clusters, each of which contains many SAN hosts and each SAN host contains a few initiators.

If this SAN host cluster is not defined in the GUI as a host group, when you want to map a LUN to the cluster, map each host to the LUN one at a time.

Furthermore, if you must move a SAN host to a different cluster, manually update each LUN mapping, also one at a time.

A more efficient method, however, is to define the cluster as a host group and then assign the hosts to the host group. When you later move a host from one

host group to another, all the initiators that are associated with that host inherit the LUN mappings associated with that host group.

Note: The Pilot automatically manages the deletion of the old mappings and the creation of the new initiator mappings.

Host groups have the following properties:

- A host can belong to only one host group.
- You can map unlimited hosts to a host group.
- A host group can have zero or more mappings.
- You can map a LUN to either a host or a host group.
- If a host group has mappings, then all hosts in the host group have all of the mappings of the host group, but any given host may also have other mappings. No mappings may conflict with other mappings.
- When assigning a host with mappings to a host group without mappings, you are prompted to migrate mappings on the host to the host group. Migrating these mappings make them available to all hosts in the group, not just the single host.

For example, consider the following host group (cluster) configuration:

Host group Alpha

LUN1 is mapped to this host group as LUN number 0.

Host A

Initiators A1 and A2 are mapped to LUN1. The LUN number is 0.

Host B

Initiators B1 and B2 are mapped to LUN1. The LUN number is 0.

Host group Omega

LUN2 is mapped to this host group as LUN number 0.

Host C

Initiators C1 and C2 are mapped to LUN2. The LUN number is 0.

If you move Host B from host group Alpha to host group Omega, the LUN mappings for Host B are automatically adjusted, as shown below:

Host group Alpha

LUN1 is mapped to this host group as LUN number 0.

Host A

Initiators A1 and A2 are mapped to LUN1. The LUN number is 0.

Host group Omega

LUN2 is mapped to this host group as LUN number 0.

Host B

Initiators B1 and B2 are mapped to LUN2. The LUN number is 0.

Host C

Initiators C1 and C2 are mapped to LUN2. The LUN number is 0.

Related Links

[Managing Host Groups](#)

[Create a Host Group](#)

Managing Host Groups

Managing host groups involves understanding the host mappings to the hosts groups and host access to the LUNs.

To use the host group feature, first create the host group, then assign your hosts to the group. After the host group is created and the hosts are assigned to the group, you can map your LUNs to the host group. A host that is assigned to a host group is still available for mapping by way of the host or the host group to which the host is assigned.

When deleting a host group, remove the host members first. Ideally, you would delete an empty host group that contains no host memberships. Emptying a host group involves moving each host to another group or removing the host from the group. This action might affect the current host-to-LUN mapping. After moving a mapped host to another host group, you will receive a confirmation to unassociate the host from the host group.

The system displays the confirmation to unassociate a host from a host group when there are LUNs mapped to a group. You can decide how you want the system to process the residual mappings. You are presented with two options:

Retain Host Mappings

Allows you to copy all mappings for the deleted host group to the hosts that belong to the group. The hosts that belonged to the deleted host group retains access to any LUNs to which they had access while a member of their host group.

Delete Mappings

Allows you to remove all mappings for the deleted host group. The hosts that belonged to the deleted host group lose access to any LUNs to which they had access while a member of the host group. Choosing this option causes the message *No Mappings* to appear in the LUNs overview page if the LUN is not assigned to a host or host group. The Delete Mappings option does not affect any LUNs that are mapped to the host (and not to the host group).

Related Links

[Host Groups](#)

[Create a Host Group](#)

[Delete a Host Group](#)

Create a Host Group

You can create a host group that allows you to associate host entries into logical organizational units.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select **Actions > Manage SAN Host Groups**.
The system displays the Manage SAN Host Groups dialog.
- 3 Click **Create**.
- 4 Enter a name for the host group.
- 5 (Optional) From the Hosts tab, assign the host entries to an available host group.
- 6 Click **OK**.

The system organizes the host entries into the new host group.

Related Links

[Manage SAN Host Groups, Groups Tab](#)

[Host Groups](#)

[Managing Host Groups](#)

Modify a Host Group

You can modify a host group by changing its name, removing SAN host entries, or by assigning SAN host entries to the group.

You can modify a host group in the following ways:

- Update the host group name
 - Assign a host to a host group
 - Remove a host entry from a host group
- 1 Navigate to **SAN > Storage > Hosts**.
 - 2 Select **Actions > Manage SAN Host Groups**.
The system displays the Manage SAN Host Groups dialog.
 - 3 To change the host group name, select a host group and update the name from the Group tab.
 - 4 To reassign a host to a new host group, select a host and choose a new host group from the **Host Group** list from the Hosts tab.
 - 5 To remove a host entry from a host group, select the Hosts tab, and then select a host and select [--] from the **Host Group** list.
Note: Specify how the LUN mappings are processed for the mapped hosts.
 - 6 Click **OK**.

Related Links

[Manage SAN Host Groups, Groups Tab](#)

[Host Groups](#)

[Create a Host Group](#)

[Delete a Host Group](#)

Delete a Host Group

Delete a host group when the group is no longer needed.

When possible, delete a host group that contains no host entries. If you delete a host group that contains host entries, the system prompts you for more action on how to map the entries.

- 1 Navigate to **SAN > Storage > Hosts**.
- 2 Select **Actions > Manage SAN Host Groups**.
The system displays the Manage SAN Host Groups dialog.
- 3 From the Manage SAN Host Groups, Groups tab, select a host group from the available list.
- 4 Click **Delete**.
The host group is removed from the list.
- 5 Click **OK**.
If the host group was empty when you deleted it, the system deletes the host group from the system. However, if the host group contains mapped host entries, more information is required about how to map the LUNs that were mapped to the host entry that you deleted from the host group.
- 6 (Optional) From the Confirm SAN Host Group Unassociation of Hosts dialog, specify how to process the LUN mappings for the mapped host entries.
Valid options:
 - Retain Host Mappings
 - Delete Mappings
- 7 Click **OK**.

Review the *Host Access* status from the LUNs overview page for the affected LUNs. Verify that the host mapping are correct.

Related Links

[Manage SAN Host Groups, Groups Tab](#)

[Host Groups](#)

[Create a Host Group](#)

Manage Data Protection

Data Replicas and System Capacity

You can create online data replicas in different ways. Each method consumes the capacity in the storage array differently.

Oracle FS System Manager (GUI) displays the relationship of the Clone LUNs and associated parent LUNs in a hierarchal relationship called a replica tree. A replica tree can also include clones of clones.

The Oracle FS System ensures that all of the logical volumes that are associated with a particular replica tree reside on the same Controller.

Note: This discussion of replica trees on a Controller does not apply to replicated objects created by the Oracle MaxRep for SAN.

If you change the home Controller of any of these logical volumes, the system changes the home Controller for all of them. The system updates the home Controller on the following objects:

- Clone LUNs
- Volume copies

Volume copies and logical volumes that are being migrated because of QoS changes continue to reside in the original replica tree until the data operations are complete. After the volume copy or the migration completes, the volume is removed from the original replica tree and becomes the root of a new replica tree.

After you start a volume copy operation or the system starts a data migration operation, if you rehome any object that is in the replica tree, the method for rehoming the Controller differs by replica type. If the system has not yet detached the copy from its source volume, the system rehomes the copy. If, however, the system has already detached the copy, the copy is no longer in the original replica tree; therefore the copy is not rehomed.

The following table summarizes the replica types and capacity usage.

Table 12: Capacity usage by online data replicas

Replica type	Description	Capacity usage
Clone LUN	Creates a readable and writable point-in-time snapshot of a LUN that only stores the delta between the source LUN and the clone. The Clone relies on the source LUN for unmodified LUN data.	Consumes system space allocated for clones. Only changes to the source or clone are stored.
volume copy	Creates a block-level, full-image, read-write copy of a logical volume. QoS attributes for a volume copy can differ from the QoS attributes of the original.	Consumes free space from system capacity that is equal to the current size of the volume.

The online data replicas have the following characteristics:

- The replicas require no prior configuration (other than initial QoS allocation).
- The system creates the replicas as an explicit one-time operation.
- The system creates the replicas on the same Oracle FS System as the source volume.
- The system creates independent replicas from the source volumes. When data changes in the source volume, those changes are not reflected in the replica.

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

1 MB = 1024^2 (1,048,576) bytes
 1 GB = 1024^3 (1,073,741,824) bytes
 1 TB = 1024^4 (1,099,511,627,776) bytes

Related Links

[Create an Immediate Clone LUN](#)

[Copy a LUN](#)

Copying and Cloning LUNs

You can make a copy of a LUN or create a point-in-time clone of a LUN. When creating a copy, you copy all of the LUN data to the new LUN. You also have the option to copy the LUN properties to a new LUN without copying the source data.

Create a Clone LUN when you want to create an exact image of the original LUN. A Clone LUN is a point-in-time, read-write copy of a LUN that you can immediately use. A Clone LUN retains the same QoS parameters as the source LUN and consumes storage capacity from the Clone LUN storage space created

for the source LUN. A Clone LUN only stores the differences between the source LUN and the clone. The Clone LUN uses the source LUN for most data. A Clone LUN is available immediately after creation. Clone LUNs provide a convenient method to branch from the source data without the need to do a full block-level copy.

Another reason to create a clone or a copy is to preserve a point-in-time view of the data. If you create a clone for this purpose, you can later restore the data to the source LUN.

Copy a LUN when you need a new LUN with the same starting data as an existing LUN.

Before creating a Clone LUN or a copy of a LUN, ensure that changes to the source LUN are minimized. For best results, pause the host applications that access the LUN, or use host software, such as Oracle FS Volume Shadow Copy Service Provider (VSS), before creating the Clone LUN. When the system displays the replica in the Oracle FS System Manager (GUI), you can resume writing to the LUN.

Unlike a clone, the new blocks for the copy might be on a different drive group or on a drive group of a different Storage Class. For example, a volume copy of a LUN that uses a high performance Storage Class, such as a Performance solid-state drive, premium priority LUN may be created in a low performance Capacity drive.

You can also create a LUN that has the QoS and storage capacity settings of an existing LUN. Creating a LUN in this manner copies the properties of the LUN without copying the associated data. After you create a LUN with the desired properties, you can use the LUN as a template for creating LUNs.

Related Links

[Data Replicas and System Capacity](#)

[Managing Clone LUNs](#)

[Copy a LUN](#)

[Create a LUN Like an Existing LUN](#)

Copy a LUN

You can copy an existing LUN and give the new LUN different QoS properties. Copying a LUN allows system resources to be maximized for the task at hand.

For example, if you have a volume copy that is used for reporting purposes, you might want to assign to the copy a lower performance Storage Class and a higher read-centric access pattern than you would assign to the source volume.

You can also copy a Clone LUN. The copy then is independent of the source LUN from which the clone was created. You might want to copy a Clone LUN when you do not want to recover any changes to the source LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select a LUN from the list that you want to copy.
- 3 Select **Actions > Copy LUN**.
- 4 Enter a new, unique name for the LUN.
- 5 Update the QoS parameters and remaining fields, selecting the tabs as necessary.
- 6 Click **OK**.

Related Links

[Capacities](#)

[QoS Policies](#)

[Data Replicas and System Capacity](#)

[Copying and Cloning LUNs](#)

Create a LUN Like an Existing LUN

You can create a LUN using the QoS properties of an existing LUN as a template. Creating a LUN from a template does not copy any data to the new LUN.

Creating a LUN from an existing LUN copies the QoS properties from the existing LUN to the new LUN. The following properties are not copied to the new LUN:

- LUN host mappings
Map your new LUN to a host entry.
- Clone LUN schedules
If you want to create automated Clone LUNs, create a data protection schedule for the LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select a LUN from the list that contains the QoS properties that you want to copy.
- 3 Select **Actions > Create LUN like selected**.
The system displays the Create SAN LUN dialog with a unique LUN name.
- 4 (Optional) Enter a new, unique name for the LUN.
Note: The system creates a new LUN name that is based on the name of the source LUN.
- 5 Make any necessary changes to the LUN properties.
- 6 (Optional) Select the Mapping tab and map the LUN to a host entry.

- 7 (Optional) Select the Data Protection tab and create a data protection schedule.
- 8 Click **OK**.

Related Links

[Create SAN LUN, Data Protection Tab, Auto Tier](#)

[Create SAN LUN, Data Protection Tab, Single Tier](#)

[Create SAN LUN, Mapping Tab](#)

[Create SAN LUN, Quality of Service Tab, Auto-tier](#)

[Create SAN LUN, Quality of Service Tab, Single Tier](#)

[QoS Policies](#)

[Copying and Cloning LUNs](#)

[Copy a LUN](#)

Managing Clone LUNs

Clone LUNs are writable snapshot images of a LUN using partial-block snapshot technology. This technology allows the Oracle FS System to use the modified information in the clone and the unmodified information from the source LUN. You can create clones of clones. You can create a Clone LUN at any time.

A Clone LUN is defined as: A point-in-time, read-write, partial-block snapshot of a LUN that can be accessed immediately.

Before creating a Clone LUN, ensure that changes to the source LUN are minimized. For best results, pause the host applications that access the LUN, or use host software, such as Oracle FS Volume Shadow Copy Service Provider (VSS), before creating the Clone LUN. When the system displays the replica in the Oracle FS System Manager (GUI), you can resume writing to the LUN.

Important: Make sure that the clone repository does not fill up, consuming the maximum amount of space allocated. Monitor the amount of space available and modify the volume to allocate more clone capacity, as needed. If a clone requires more space from the repository, but space is not available, the clone is taken offline and a System Alert is generated.

Deleting a LUN or Clone LUN, affects the associated clones:

- Deleting a LUN also deletes any clones of the LUN.
- Deleting a Clone LUN retains any clones of the Clone LUN.

Related Links

[Oracle FS VSS Provider Plug-In](#)

[Delete a Clone LUN](#)

[Create an Immediate Clone LUN](#)

Create an Immediate Clone LUN

You can create Clone LUNs from an existing LUN or from a Clone LUN.

After the clone is created, you can change the priority level and other properties of the clone. When creating a Clone LUN, make sure that enough repository space exists for the clone. The system stores in the clone repository only the changes that are made to the source volume or to the clone.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the LUN that you want to clone.
- 3 Select **Actions > Clone**.
- 4 Enter a new, unique name for the Clone LUN.
- 5 (Optional) Make any necessary changes to the QoS properties.
- 6 (Optional) Select the Mapping tab and map the Clone LUN to a host entry.
- 7 (Optional) Select the Data Protection tab and create a data protection schedule.
- 8 Click **OK**.

The name of the new Clone LUN appears on the LUN overview page.

Related Links

[Create SAN Clone LUN, Mapping Tab](#)

[Create SAN Clone LUN, Quality of Service Tab](#)

[Data Replicas and System Capacity](#)

[Managing Clone LUNs](#)

[Create a Clone LUN Schedule](#)

Delete a Clone LUN

You can delete a single Clone LUN when the clone is no longer needed.

When you delete a Clone LUN, only the target clone is deleted. When the target clone is the parent or source for other clones, the child clones are not deleted. Instead, the child clones become children of the next higher parent in the hierarchy.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the Clone LUN that you want to delete.
- 3 Select **Actions > Delete**.

Note: The system displays the Delete LUN dialog. This dialog indicates that, if this clone is a parent or source of Clone LUNs, those Clone LUNs are not deleted.

- 4 To acknowledge that you want to delete the LUN, along with any clones and host mappings, select the option **Delete LUNs and existing host mappings**.
- 5 Click **OK**.
If the deleted Clone LUN has child clones, the child clones move up one level in the hierarchy of clones.

Related Links[Delete LUN](#)[Managing Clone LUNs](#)[Delete All Clone LUNs](#)**Delete All Clone LUNs**

When a collection of Clone LUNs that are derived from a common source LUN are no longer needed, you can delete the entire collection.

When you delete a collection of clones that have a common parent LUN, the system determines the most efficient and quickest order of deletion.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the parent LUN of all of the Clone LUNs that you want to delete.
- 3 Select **Actions > Delete Clones**.
The system displays the Delete Clone LUNs dialog with a list of all the clones to delete.
- 4 To acknowledge that you want to delete the LUN, along with any clones and host mappings, select the option **Delete LUNs and existing host mappings**.
- 5 Click **OK**.

Related Links[Managing Clone LUNs](#)[Delete a Clone LUN](#)**Display Clone LUN Details**

You can view specific information about a Clone LUN, such as the host mappings for the clone.

The details of a Clone LUN includes information about the following properties:

- QoS attributes
- Allocated storage capacity
- Volume group and Storage Domain memberships
- SAN host mapping details and Controller port masking assignments
- Clone capacity and cloning schedules

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the Clone LUN that you want to view.
- 3 Select **Actions > View**.
- 4 Select any of the tabbed pages to view the LUN properties.
- 5 Click **Close**.

Related Links

[View SAN LUN, Data Protection Tab, Auto Tier](#)

[View SAN LUN, Data Protection Tab, Single Tier](#)

[View SAN LUN, Mapping Tab](#)

[View SAN LUN, Quality of Service Tab, Auto Tier](#)

[View SAN LUN, Quality of Service Tab, Single Tier](#)

[Create an Immediate Clone LUN](#)

Restore a LUN From a Clone LUN

You can restore a LUN to its state when the Clone LUN was created.

Important: Before restoring a Clone LUN remove all mappings from the SAN hosts. If you choose not to remove these LUN mappings, ensure that the source LUN is not used during the Clone LUN restoration process.

Restoring a LUN from a Clone LUN results in returning the LUN to the exact point-in-time image of the clone, plus any changes made to the clone. This method quickly restores the data online, especially when compared to copying the entire data set back from a tape backup. Furthermore, restoring from the clone allows access to the data while the restore is in progress.

You might want to restore a Clone LUN if the following scenarios apply:

- Some undesirable changes to the data were made.
- An external client application or virus corrupted the LUN.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select the Clone LUN that you want to restore.

Note: The restoration process resets the creation date of the LUN to that of the selected Clone LUN.

- 3 Select **Actions > Restore from Clone**.
- 4 Click **OK**.

The system restores the LUN, during which time system performance might be slightly degraded. The system starts a task in the background to perform the restore operation. When the background task completes, the system writes an event to the event log and removes the “In Progress” status from the LUN overview page.

Related Links[Data Replicas and System Capacity](#)[Display Clone LUN Details](#)

LUNs Data Protection Schedules

A data protection schedule defines the following parameters:

- The time units in which the data protection event occurs, such as hourly, daily, or weekly.
- The time intervals at which a replica is created, such as every hour or every two hours.
- If you perform a data protection job only one time, use the **Run Once** option when you create or modify your job schedule. After the system runs this job, the system deletes the schedule. Check the event log for the completion status of your job.

You can modify an existing data protection schedule or delete a schedule when the schedule is no longer needed.

Related Links[Data Replicas and System Capacity](#)[Managing Clone LUNs](#)[Create a Clone LUN Schedule](#)

Create a Clone LUN Schedule

When you create a LUN, you can also create a schedule that instructs the system to clone your LUN at regular intervals.

Note: A schedule should be synchronized with the host applications that access the logical volume so that all data I/O is quieted before the replication operation starts.

- 1 Navigate to **SAN > Storage > LUNs**.
- 2 Select **Actions > Create LUN**.
- 3 From the Data Protection tab, select the **Enable Clones** option.
- 4 To display the Create Job Schedule dialog, click **Create**.
- 5 Enter a **Schedule Name**.
- 6 (Optional) To start protecting your data at the scheduled time, select **Enabled**.

If you do not enable the schedule now, you can do so later by modifying the schedule.

- 7 From the **Select a Volume to Protect** table, select a LUN from which to create the Clone LUN.

Note: Select a volume that has allocated capacity for clones.

- 8 Click the expansion button to the right of **Start Time** and select the starting day and time for your schedule.
- 9 To select the date and time, use the Modify Date/Time controls.
- 10 To close the Modify Date/Time dialog, click **OK**.
- 11 Select a repeat interval for the schedule.
- 12 Select a frequency value for the schedule.

Valid frequencies:

- **Run Once**
- **Days**
- **Hours**
- **Months**
- **Weeks**

If you chose a frequency of **Weeks**, select the day of the week that you would like the schedule to run.

- 13 Click **OK**.
The schedule is listed on the Clone Schedules table and the Clone Schedules overview page.

Related Links

[Create Job Schedule Dialog](#)

[Data Replicas and System Capacity](#)

[Managing Clone LUNs](#)

Create a LUN Data Protection Schedule

You can create a data protection schedule that in turn creates a clone of a protected volume (LUN or Clone LUN) at regular intervals.

- 1 Navigate to **SAN > Data Protection > Clone Schedules**.
- 2 Select **Actions > Create**.
- 3 Enter a name for the data protection schedule.
- 4 (Optional) Select a Volume Group in which to create the clone.
- 5 (Optional) To start protecting your data at the scheduled time, select **Enabled**.

If you do not enable the schedule now, you can do so later by modifying the schedule.

- 6 From the **Select a Volume to Protect** table, select a LUN from which to create the Clone LUN.

Note: Select a volume that has allocated capacity for clones.

- 7 Click the expansion button to the right of **Start Time** and select the starting day and time for your schedule.

- 8 To select the date and time, use the Modify Date/Time controls.
- 9 To close the Modify Date/Time dialog, click **OK**.
- 10 Select a repeat interval for the schedule.
- 11 Select a frequency value for the schedule.

Valid frequencies:

- **Run Once**
- **Days**
- **Hours**
- **Months**
- **Weeks**

If you chose a frequency of **Weeks**, select the day of the week that you would like the schedule to run.

- 12 Click **OK**.
The schedule is listed on the SnapFS Schedules overview page.

Related Links

[Create Data Protection Schedule Dialog](#)

[Data Replicas and System Capacity](#)

[Managing Clone LUNs](#)

Modify a LUN Data Protection Schedule

You can modify characteristics of a data protection schedule, such as its frequency to reduce the number of clones.

- 1 Navigate to **SAN > Data Protection > Clone Schedules**.
- 2 From the available list, select a data protection schedule that you want to modify.
- 3 Select **Actions > Modify**.
- 4 (Optional) Enter a new name for the data protection schedule.
- 5 (Optional) Select a Volume Group in which to create the clone.
- 6 (Optional) To start protecting your data at the scheduled time, select **Enabled**.
- 7 (Optional) Update the **Start Time** and the **Recurrence** for the data protection schedule.
- 8 Click **OK**.

Related Links

[Modify Data Protection Schedule Dialog](#)

[Create a LUN Data Protection Schedule](#)

[Delete a LUN Data Protection Schedule](#)

Delete a LUN Data Protection Schedule

You can delete a data protection schedule when data protection requirements change. After deleting the schedule, no automatic data protection occurs on the affected LUN.

- 1 Navigate to **SAN > Data Protection > Clone Schedules**.
- 2 From the available list, select a data protection schedule that you want to delete.
- 3 Select **Actions > Delete**.
- 4 Click **OK**.

Related Links

[Clone Schedules Overview Page](#)

[Create a LUN Data Protection Schedule](#)

[Modify a LUN Data Protection Schedule](#)

View a LUN Data Protection Schedule

You can display the details of a data protection schedule. For example, you can view the volume group that is associated with the Clone LUNs, or you can review the schedule details.

- 1 Navigate to **SAN > Data Protection > Clone Schedules**.
- 2 From the available list, select a data protection schedule that you want to display.
- 3 Select **Actions > View**.
- 4 Review the displayed information and ensure that the data protection schedule details are what you expect.
- 5 Click **Close**.

Related Links

[View Data Protection Schedule Dialog](#)

[Create a LUN Data Protection Schedule](#)

[Modify a LUN Data Protection Schedule](#)

Manage Software Components

Display Software and Firmware Versions

Before performing an update of the Oracle FS System software and firmware, check the current version of the system software and firmware to ensure that you stage the correct package.

The following modules include version information:

- Drive firmware and Enclosure (EBOD) Firmware in the Drive Enclosures
- Application software and operating system in the Pilots
- Controller software and Controller BIOS

Note: For administrator accounts that have the Support or the Oracle Support role, the system displays complete packaging information, including the compatibility matrix for the software and firmware. For all other administrator accounts, the system displays only the release number of the software and firmware.

- 1 Navigate to **Support > Software and Firmware**.

The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.

- 2 Verify that the current version of the installed system software and firmware to ensure that you stage the correct package.

You should stage a newer version of the software than the software that is installed.

Related Links

[Software and Firmware Overview Page](#)

[View the Upgrade Paths to the Staged Package](#)

[View the Upgrade Paths From the Installed Package](#)

Download Software and Firmware Updates

Download the latest software and firmware updates from My Oracle Support (MOS) to ensure that your Oracle FS System is up to date. You can download

general availability releases, as well as patches specific to your system, from MOS.

Prerequisites:

- Ensure that you are registered on MOS.
- For restricted patches, contact Oracle Customer Support to request the password.
- Have available the serial number for the Oracle FS System for which you want the software or firmware update.
- Have available the patch number for the Oracle FS System for which you want the software or firmware update.

- 1 Using your registered username and password, log in to [My Oracle Support](https://support.oracle.com) (<https://support.oracle.com>).

For more information about all the features and functionality of MOS, including information about patches and updates, see [My Oracle Support Documentation](http://docs.oracle.com/cd/E25290_01/index.htm) (http://docs.oracle.com/cd/E25290_01/index.htm).

- 2 In the menu bar, select **Patches and Updates**.

- 3 In the Patch Search pane, choose one of the following search methods:

Number/Name or Bug Number (Simple)

Search for the patch name, the patch number, or the platform.

Product or Family (Advanced)

Search for the product, the release, and the platform, as well as other criteria.

Note: The product you want to search for is *Oracle FS1-2 Flash Storage System*.

Recommended Patch Advisor

Search for recommended patches for products, releases, and platforms.

- 4 Complete all the fields necessary to perform your search.

- 5 Click **Search**.

- 6 On the Patch Search window, review all patch information.

Check the file size of the download and ensure that your workstation has sufficient space for the download.

- 7 Click the row of the patch that you want to download, and then click **Read Me**.

Important: Always review the Read Me file before downloading the patch or update to ensure that you are downloading the correct version.

- 8 To download the software and firmware package, click **Download**.

The system displays a dialog box that identifies the software package to be downloaded. A single patch or software update can contain multiple files.

Tip: If your browser window displays an information bar that states that the download is blocked, click the appropriate options to allow the download to proceed.

- 9 On the File Download screen, click **Show Digest Details** to display the SHA-1 and MD5 checksums for each of the ZIP files.
- 10 To begin the download, click the filename of the selected file.
- 11 To save the software package on your workstation, click **Save**.
After you successfully download the software update package, close the original dialog box.
- 12 Using the Digest Information from the Patch Download screen, verify the integrity of the downloaded files before proceeding.
- 13 Extract the ZIP files.

Important: You cannot stage the ZIP file. You must stage the RPM Package Manager (.rpm) file.

Upload (stage) the extracted software or firmware RPM Package Manager (.rpm) file to the Oracle FS System.

Related Links

[Upload the Software and Firmware Package](#)

Upload the Software and Firmware Package

After downloading a software and firmware update package from My Oracle Support (MOS), and extracting the RPM files from the ZIP archive, you can stage (upload) the RPM files on the Pilot to prepare the system for the software and firmware update. You can perform the update immediately or schedule the update for a later time.

Prerequisite:

- Place the update package on a workstation or client located on the same network as the Pilot or on a workstation located on a network that has a LAN connection speed to the Pilot of at least 100 Mb/s. The workstation must support either Oracle FS System Manager or Oracle FS CLI.
 - If the above recommendation is not possible, modify the session time-out period in the security settings of the Oracle FS System Manager to a time-out of at least 90 minutes before staging the software. At the very minimum, the end-to-end connection speed should be 5 Mb/s, at which speed it will take approximately an hour to upload the software. Do not attempt to stage the software on connections that are not at least 5 Mb/s end-to-end.
- 1 Navigate to **Support > Software and Firmware**.
The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.
 - 2 From the Software and Firmware page, click **Upload Software Package**.
 - 3 From the Upload Software Package dialog, click the browse button [...].

- 4 In the **Upload Software Package** dialog, navigate to the software package you downloaded, highlight it, and click **Open**.
- 5 Click **OK**.
The software package is placed onto the Pilot. When the upload is complete, the update package displays in the Staged Software and Firmware panel.

Tip: Click **Tasks** on the Software and Firmware screen to view the staging progress in Oracle FS System Manager. The staging task only appears on the screen after the RPM file has been uploaded.

After staging is complete, verify that the software or firmware module and the version number of a software or firmware module match what you intended to upload.

Related Links

[Software and Firmware Overview Page](#)

Updating the Software and Firmware

An update operation installs a new version of software or firmware onto an Oracle FS System. You can manually update the software or the firmware using Oracle FS System Manager (GUI).

You must download the software and firmware updates from My Oracle Support (MOS) to your local host, stage the software and firmware updates on the Pilot to prepare the system for the update, ensure that there are no system alerts and that all statuses are normal in the GUI, and then update the software and firmware.

An update affects one or more of the following components:

- Drive Enclosure
 - Drive firmware
Note: Drive firmware is listed by drive type (for example, Hitachi 300Gb HDD or SanDisk 1600GB SSD). Updating the drive firmware requires a system restart.
 - Enclosure Firmware
Note: Enclosure Firmware is listed by type and version (for example, Enclosure Firmware Xrtx Ebod 7044319).
- Pilot
 - Pilot Software
 - Pilot OS
- Controller
 - Oracle FS1-2 Controller Software
 - Controller BIOS

Note: Controller BIOS is listed by model number (for example, M3 Controller BIOS). Updating the Controllers requires a system restart.

Note: A software update always includes the Pilot Software and the Oracle FS1-2 Controller Software. The Pilot Software and the Oracle FS1-2 Controller Software must be installed at the same time and their versions must match.

Related Links

[Software and Firmware Update Prerequisites](#)

[Software Update Options](#)

[Download Software and Firmware Updates](#)

[Upload the Software and Firmware Package](#)

[Upload Storage Class Mapping File](#)

View the Upgrade Paths to the Staged Package

You can review a history of the software and firmware packages that have been staged on your Oracle FS System to see which upgrades are available, as well as whether an upgrade causes Pilot or data disruption.

Note: For administrator accounts that have the Support or the Oracle Support role, the system displays complete packaging information, including the compatibility matrix for the software and firmware. For all other administrator accounts, the system displays only the release number of the software and firmware.

1. Navigate to **Support > Software and Firmware**.
The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.
2. Select **Actions > View Upgrade Paths to Staged Package**.
The Upgrade Paths to Staged Package dialog displays the packages that have been staged to the Pilot.
3. Verify that the information is what you expect.
If the list shows more than one upgrade version, install the earliest software version first, followed by the subsequent versions.

Related Links

[Software and Firmware Overview Page](#)

View the Upgrade Paths From the Installed Package

You can review a history of the software and firmware packages that are installed on your Oracle FS System. Knowing which software and firmware packages that

are installed on your Oracle FS System helps you decide which upgrades are needed.

Note: For administrator accounts that have the Support or the Oracle Support role, the system displays complete packaging information, including the compatibility matrix for the software and firmware. For all other administrator accounts, the system displays only the release number of the software and firmware.

- 1 Navigate to **Support > Software and Firmware**.

The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.

- 2 Select **Actions > View Upgrade Paths from Installed Package**.

The Upgrade Paths from Installed Package dialog displays the upgrade path information.

Related Links

[Software and Firmware Overview Page](#)

Types of Software Updates

Both standard (non-disruptive) software updates and disruptive software updates can be performed to the Oracle FS System. You need to understand the different update types before you perform an update.

Standard (non-disruptive) software updates do not require a restart of the entire system. Disruptive software updates require a restart of the entire system.

Note: In addition to software updates that you perform, the system performs automatic updates to hardware components using firmware already stored in the system.

For example, when replacement hardware is installed and the replacement hardware is at a lower firmware version than the current system version, the firmware in the new hardware is automatically updated. Automatic updates also occur during a system, Controller, or Drive Enclosure restart where a system software update contains non-critical hardware firmware updates and the update has been purposely ignored by the system during non-disruptive updates due to the additional time needed for installation.

Drive firmware updates are never installed on a system restart unless an administrator specifies that the drive firmware is to be updated.

As system software updates are installed, only one type of update can be performed at a time. You can either update the system software or update the drive firmware but not both at the same time. For drive firmware updates, install all updates unless instructed not to install all updates by Oracle Customer Support.

Related Links

[Standard Software Updates](#)

[Disruptive Software Updates](#)

Standard Software Updates

You should be aware of which software updates are standard before you perform them. The Oracle FS System implements standard software updates by installing both the Oracle FS1-2 Controller Software and the Pilot Software, and if applicable, the Pilot OS.

Standard updates interrupt data access for a few seconds. However, the software can be updated without restarting the entire system and user applications do not lose access to the Oracle FS System storage arrays during the software update.

The Pilot does shut down and restart. When the Pilot shuts down, the connection between the Oracle FS System and Oracle FS System Manager (GUI) is disconnected. A message stating that the connection has been lost displays, followed by the login panel from which you can log back in. If the update is still in progress after you log back in, navigate to the Status Summary screen to view the status of the Pilots, Controllers, and Drive Enclosures.

Tip: To check the overall status of the system, go to the System Information screen. If the status is *BOOT_STATE_PILOT*, the update is still in progress.

Related Links

[Disruptive Software Updates](#)

Disruptive Software Updates

You should be aware of which software updates are disruptive before you perform them. Oracle FS Systems implement disruptive software updates by restarting the entire system to bring up the new software. User applications lose access to the Oracle FS System storage arrays during a disruptive software update.

Examples of disruptive updates include drive updates and Controller BIOS component updates. You choose to perform a disruptive update by selecting **Restart and update software** or **Shutdown Controller**.

Note: If the upgrade package includes enclosure firmware updates, and you do not select **Restart and update software** or **Shutdown Controller**, the update proceeds without restarting the system. The enclosure firmware updates are not applied until the next system restart. If you do select **Restart and update software** or **Shutdown Controller**, the system installs the enclosure firmware on the resulting system startup.

You need to perform disruptive updates under the following conditions:

- The system is not reporting a Normal state
- Pinned data is found within the system

- The compatibility matrix validation needs to be overridden to complete the installation
- System alerts are active
- A previous software update failed
- The new Controller BIOS version is a newer version than the current version installed on the system
- Another task fails to complete within 10 minutes of starting the update

Related Links

[Standard Software Updates](#)

Software Update Options

You can choose to ignore certain system conditions in order to perform an update.

You might choose to ignore certain system conditions in the following circumstances:

- System conditions are preventing you from performing an upgrade
- To recover from a failed upgrade
- To perform an upgrade to recover from a system condition
- To install an older release than the one that is installed

Whether you are performing a standard software update or a disruptive software update, you can choose to ignore system conditions, to force a controller shutdown, and to override a previously failed software update. Select any of the following overrides:

Ignore compatibility

Ignoring the compatibility matrix validation should be performed only if all other attempts to correct system configuration have failed and you have been instructed by the release notes, a My Oracle Support Knowledge article, or Oracle Customer Support to ignore the validation.

Shutdown the Controller

Disrupts data access and forces a system restart. The Controllers shut down and then restart with the new software installed. Only use this option if you have been instructed to do so by the release notes, a My Oracle Support Knowledge article, or Oracle Customer Support.

Ignore hardware status (except Pilots)

Used to upgrade a system with a minor issue, such as a single failed drive. If the issue is in a Controller, do not use the option unless instructed to do so by Oracle Customer Support or the release notes.

Ignore system alerts

An upgrade of any type will be blocked if there are any system alerts unless this option is selected. System alerts for issues that do not affect the operation of the system do not affect the ability to perform a standard update, for example, a failed

email, a failed Call-Home, a failed FTP server, or task failure due to an invalid requested configuration change.

For system alerts indicating topology issues or hardware conditions, contact Oracle Customer Support or resolve the condition before attempting a standard update.

Important: Always check the details of all the system alerts before using this option.

Ignore current requests

Used to cancel Pilot software tasks in progress, such as log collection or Call-Home. For any task that is modifying storage, host access, or system software, do not use this option without advice from Oracle Customer Support. The system waits for up to 10 minutes for running tasks to complete. If non-upgrade tasks do not complete within 10 minutes, the upgrade fails with a *Failed To Drain Operation Pool* error unless this option is selected.

Override previously failed software updates

Used to retry a software update after the issue involved in the prior failed attempt is corrected. Using this option does not cause a disruptive update. Do not use this option more than once for any software update without advice from Oracle Customer Support.

Related Links

[Update the Oracle FS System Software](#)

[Cancel a Scheduled Software Update](#)

Software and Firmware Update Prerequisites

Ensure that all prerequisites are met before performing any software and firmware update so that your software and firmware update is successful.

Important: Always read the Release Notes for any patch or update for a complete list of upgrade requirements and prerequisites.

Prerequisites:

- For minor updates (for example, R6.1 to R6.2) and patch release updates (for example, R6.1.1 to R6.1.2), perform the following actions:
 - On the Software and Firmware page, verify the currently installed release to ensure that you staged the correct package. Your staged release should be more recent than your installed release.
 - On the System Alerts page, check for system alerts and resolve all issues by performing the recommended actions. Contact Oracle Customer Support if you require assistance.
 - On the Status Summary page, ensure that all Oracle FS System Manager statuses are Normal.
 - On the Tasks page, check for tasks that are pending. If you have tasks that are pending, the system waits for the existing tasks to complete before running the update.

- For a major update (for example, R6.x to R7), read the release notes and complete any of the following necessary tasks:
 - Ensure that all prerequisites are met for any minor and patch release updates.
 - Halt all data path I/O.
 - Open a service request with Oracle Customer Support to ensure that a system audit is not required.
- For a Pilot BIOS update, ensure that you have a USB keyboard and VGA monitor, as well as the login credentials for the Pilot `root` password and the Oracle Integrated Lights Out Manager (ILOM) `root` password. See *Oracle FS1-2 Flash Storage System Field Service Guide* for more information.

Related Links

[Update the Oracle FS System Software](#)

[Cancel a Scheduled Software Update](#)

Update the Oracle FS System Software

After staging a software package on the Pilot, you can update the system software. You can perform the update immediately or schedule the update for a later time.

Note: Perform the update operation as the Primary administrator and in an Administrator 1 role.

Important: When logged into the system as a support administrator, you can select individual components to update from the software module package. You can also select **Always Install**, **Install if newer version**, or **Do not install**. Contact Oracle Customer Support before installing individual software components.

- 1 Navigate to **Support > Software and Firmware**.

The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.

- 2 Select **Actions > Update Software**.

- 3 (Optional) Select the individual software module you want to update, using the Install Action column at the top of the screen.

Valid options are:

- Do not install
- Install if newer version
- Always Install

Important: Only update individual software modules under the direction of Oracle Customer Support.

- 4 Unless explicitly directed to select **Restart and update software (disrupts data access)** by the Read Me file, Release Notes, or Oracle Customer Support, select the option **Update software without restarting system**.
- 5 (Optional) Select any of the other options available in the Software Update Options pane.

Note: A software update validation errors message appears on the bottom of this page if you select an option that cannot be performed. You must clear any software update validation errors before proceeding. Some options will cause data access disruptions. Be sure to read each option carefully.

- 6 (Optional) To schedule your software update for a later time, click the **Schedule** tab and enter the time on which the system should perform the operation. You can schedule updates to occur within 72 hours.
- 7 Click **OK**.
- 8 Click **Yes**.

If you selected any of the upgrade options, you need to accept the agreements for all those options.

Related Links

[Update Software](#)

[Restart the Oracle FS System](#)

Schedule the Software Update

You can schedule software updates to occur at a specified time. For example, you can schedule an update to occur during off-peak hours when there is less I/O activity.

Prerequisites:

- Software updates uploaded and ready to install.
- Logged in to Oracle FS System Manager (GUI) using the Administrator role.

You can schedule updates to occur within 72 hours.

- 1 Navigate to **Support > Software and Firmware**.
The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.
- 2 Select **Actions > Update Software**.
- 3 (Optional) Select the individual software module that you want to update. The default action is **Install if newer version**.

Valid options are:

- Do not install

- Install if newer version
- Always Install

Important: Only update individual software modules under the direction of Oracle Customer Support.

- 4 To enable a software update schedule for a later time, click the **Schedule software update to occur at a later time** option.
- 5 Click the ellipsis control (...) and enter the date and time on which the system should perform the operation. You can schedule updates to occur within 72 hours.
- 6 Click **OK**.
After clicking **OK**, the Software and Firmware page displays the scheduled software update.

Important: At the scheduled time of the update, the system status must be normal with no system alerts. If the system status is not normal or the system has alerts, the scheduled update fails.

You can click **Cancel Scheduled Update** at any time to cancel the scheduled software update.

Related Links

[Cancel a Scheduled Software Update](#)

Cancel a Scheduled Software Update

You can cancel a scheduled software update, for example, if you need to reschedule the update for an earlier or later time.

- 1 Navigate to **Support > Software and Firmware**.
The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.
- 2 Click **Cancel Scheduled Update**.
If a scheduled software update is active, a notice appears on the page.
- 3 Confirm that you want to cancel the update and click **OK**.
The system deletes the scheduled task and removes the software update notice from the Software and Firmware page.

Related Links

[Software and Firmware Overview Page](#)

Update the Drive Firmware

Update the drive firmware so that the drive performs at an optimum level as specified by the manufacturer.

- 1 Navigate to **Support > Software and Firmware**.

The summary page displays the software and firmware packages currently installed on the Drive Enclosures, Drives, Pilots, and Controllers, as well as any staged software and firmware packages.

- 2 Confirm that the correct firmware version is staged on the Oracle FS System.
- 3 Select **Actions > Update Drive Firmware**.
- 4 To choose the firmware that you want to update, select the **Install** checkbox in the Pending Drive Firmware Updates pane.
- 5 When you are ready to update the drive firmware and disrupt data access to the system, click **OK**.

The system updates the firmware of the drives that match the criteria specified in the firmware package. One drive is taken offline and the firmware updated. Then the drive is placed online and the RAID information updated. The process repeats for each drive. When the update completes, the Oracle FS System restarts. During restart, the system updates any drives that contain outdated firmware.

If the update fails, the update for the rest of the drives is cancelled, and the Oracle FS System displays a system alert. To resolve the issue, you can either try the update process again or replace the affected drive. If the problem continues, contact Oracle Customer Support.

Related Links

[Update Drive Firmware Dialog](#)

Manage Hardware Components

Pilot Management

The Pilot is a hardware component that provides system management services, system restart services, Call-Home services, administrative access, and maintenance access. Administrators can connect to the Pilot nodes over the Ethernet using Oracle FS System Manager (GUI) or Oracle FS CLI.

You manage the Pilot by performing the following tasks:

- Troubleshooting network connectivity to the Pilot
- Identifying, troubleshooting, and repairing a Pilot hardware
- Ensuring that network access is configured to necessary external applications
- Ensuring that Call-Home and Auto Service Request (ASR) is configured and enabled

Pilot management also includes ensuring that certain network ports needed by either the client applications or the Pilot are open.

Related Links

[View the Properties of the Pilots](#)

[View the Network Connectivity of a Pilot](#)

[Identify a Pilot](#)

[Repair a Pilot](#)

Pilot Overview

The Pilot is an out-of-band management controller (1U) that directs and manages all system activity.

Each Oracle FS System has one active Pilot and one standby Pilot.

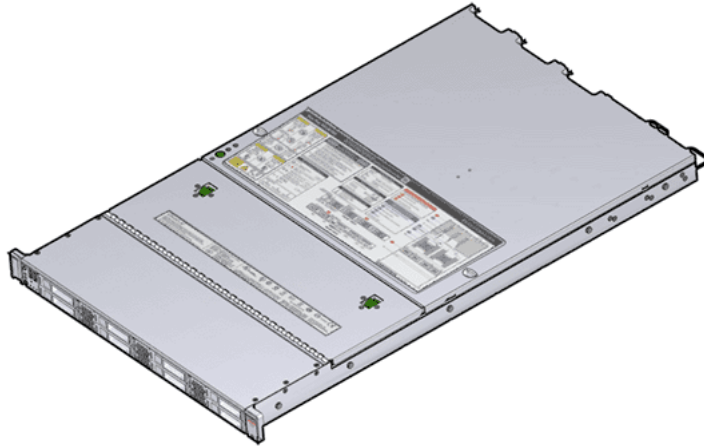
The Pilot provides access to the following:

- All management functions for the Oracle FS System
- System monitoring, alerts, log collection, and automatic log transmission
- Management for restarting, replacing, updating, and recovering Controller and Drive Enclosure resources

The two models available for the Pilot are X4-2 and X5-2. The following figure is an isometric illustration of the Pilot.

Note: The X4-2 and X5-2 Pilot models cannot coexist in the same Oracle FS System. Both Pilots must be X4 or both Pilots must be X5.

Figure 10: Pilot

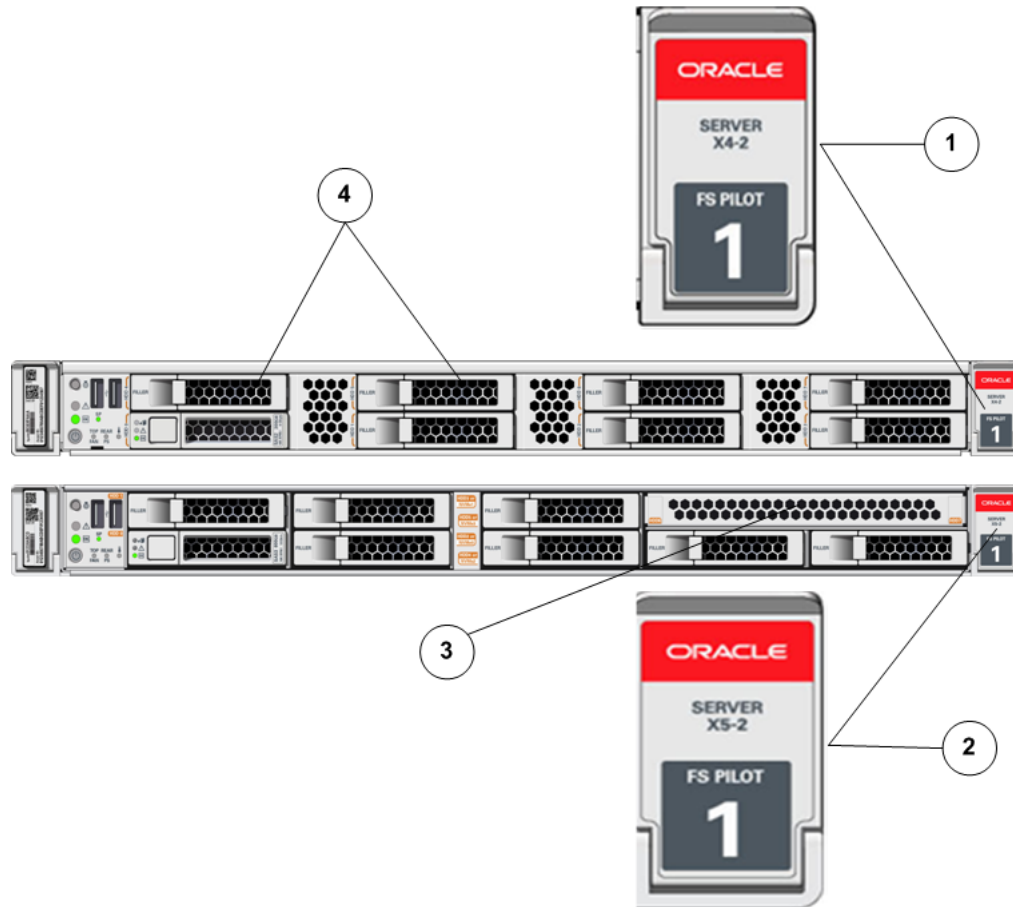


You can distinguish between the X4-2 and X5-2 models of the Pilot by using the Oracle FS System Manager (GUI) or identifying the visual differences on the Pilot chassis.

The drive slot spacing on the front panel of the Pilot is different for the X4-2 and the X5-2 models. The X4-2 Pilot has eight drive bays that are evenly spaced along the front with vent holes between groups of two drive bays. The X5-2 Pilot has six drive bays on the left and center of the chassis and no vent holes except in the drive carrier. In the X5-2 Pilot, there is a DVD blank panel at the top right corner of the front panel and two drive bays directly below.

The right ear nameplate indicates the model name (X4-2 or X5-2).

Figure 11: Front panel differences to identify the Pilot model (X4-2 vs X5-2)



Legend

1 X5-2 Pilot right ear nameplate	3 DVD blank panel
2 X4-2 Pilot right ear nameplate	4 Drive bays

The service label on the top cover of the Pilot also indicates the model name.

Figure 12: Service labels to identify the Pilot model (X4-2 vs X5-2)



View the Properties of the Pilots

You can view the properties of the Pilots on your Oracle FS System. For example, you might want to know the status and OS version of both the standby and the active Pilot node.

Ensure that one Pilot is in active mode and the other Pilot in standby mode, and that the displayed OS versions and server versions for both Pilots are the same.

- 1 Navigate to **System > Hardware > Pilots**.
- 2 Verify that the information is what you expect.

If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.

Related Links

[Pilot Overview Page](#)

View the Network Connectivity of a Pilot

You can view the network connectivity of a Pilot to determine which network interfaces are connected, as well as the status of the network interfaces for the management of the system and for the servicing of the system.

- 1 Navigate to **System > Hardware > Pilots**.
- 2 Select a Pilot.
- 3 Select **Actions > View Pilot**.
- 4 Verify that the information is what you expect.

If you see a status other than Connected and Consistent, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support. If the Consistency of Status shows Intermittent for any interface, check both ends of the cable to make sure they are securely inserted.

- 5 Click **Close**.

Related Links

[View Pilot Dialog](#)

[Configure the Management Interface](#)

[Pilot Management](#)

[View the Properties of the Pilots](#)

[Identify a Pilot](#)

[Repair a Pilot](#)

Identify a Pilot

You can identify a specific Pilot. The system uses flashing LEDs to identify hardware components. In a crowded data center, the flashing LEDs allow you to locate the Pilot on which you want to perform maintenance.

- 1 Navigate to **System > Hardware > Pilots**.
- 2 Select a Pilot.
- 3 Select **Actions > Identify Pilot**.
The Identify dialog is displayed.
- 4 Follow the instructions provided by Guided Maintenance to identify the hardware component.
- 5 Click **Finish**.

Related Links

[Pilot Management](#)

[View the Properties of the Pilots](#)

[View the Network Connectivity of a Pilot](#)

[Repair a Pilot](#)

Repair a Pilot

Guided Maintenance enables you to replace components on either your active or your standby Pilot nodes.

- 1 Contact Oracle Customer Support prior to replacing a Pilot component. Oracle Customer Support identifies the failed component on the Pilot for you.
- 2 Navigate to **System > Hardware > Pilots**.
- 3 Select the Pilot you want to repair.
- 4 Select **Actions > Repair Pilot**.
Guided Maintenance displays the list of Pilot components.
- 5 Based on the information from your Oracle Customer Support representative, select the correct component from the list.
- 6 Click **Next**.
Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.
- 7 Click **Next**.
Guided Maintenance displays a link that you use to access the instructions for component replacement.
- 8 Click the link to open and print the procedure.
- 9 Click **Next**.

- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Related Links

[Pilot Management](#)

[View the Properties of the Pilots](#)

[View the Network Connectivity of a Pilot](#)

[Identify a Pilot](#)

Management Network Ports

If there are any firewalls located between the Pilot and the source or destination of a service, the ports must be open for that service to function.

The following table lists all of the software ports that are used by the Pilot for communicating with other components within the Oracle FS System and with services running on the network.

Table 13: Pilot TCP ports

Port number	Application	Description
22	SSH	Used by Oracle Customer Support. This port is disabled by default and may be opened only in rare situations if required during a service call. In those cases, Oracle Customer Support will notify the will be notified that this port needs to be opened.
25	Simple Mail Transfer Protocol (SMTP)	Used by the Pilot for email notifications that are sent by the Oracle FS System and for account password recovery. This port is only used for outbound communication to a configured mail server.

Table 13: Pilot TCP ports (continued)

Port number	Application	Description
53	DNS	Used by the Oracle FS System for name resolution of other servers and services in the environment, for example, to resolve the name of an external mail server as needed for email notifications.
80	HTTP	Used by the Oracle FS System for status monitoring and the download from the Pilot of documentation and various applications, such as Oracle FS System Manager (GUI).
123	Network Time Protocol (NTP)	Used by the Oracle FS System to synchronize the system time with an external time service provider.
161	Simple Network Management Protocol (SNMP)	Used by a host SNMP Management Server to monitor the Oracle FS System.
162	SNMP traps	Used by the Oracle FS System to transmit SNMP traps to an external management application or by UPS devices to send notifications to an Oracle FS System. For example, used by compliant UPS devices to warn the Oracle FS System that the UPS device is running on battery power.
443	HTTPS	Used by the HTTPS Call-Home option on the Pilot. This port must be open on all three Pilot ports to the Oracle Call-Home server. Also used by HTTPS for checking status and alerts, using a web browser.
8083	Oracle FS CLI interface	Used by the Oracle FS System for the Oracle FS CLI interface and for application integration.
8085	REST interface	Used by the Oracle FS System for application integration with a REST-based management application. This port is disabled by default.
26012	Oracle FS System Manager	Used by Oracle FS System Manager (GUI) and Oracle FS Path Manager (FSPM) to communicate with the Oracle FS System.

Controller Management

A Controller is one of the nodes in an active-active pair of nodes, each of which provides access to user data and mirrors the cached data and the state of the partner node. When a Controller fails or when a Controller is taken offline

through Guided Maintenance, the Oracle FS System uses failover and failback to return the Oracle FS System to a normal state. Failover transfers all of the resources of the offline node to the node that remains online. Failback transfers those resources back to the node that was offline when the node comes back online.

Managing Controllers consists of the following tasks:

- Viewing the overall status of all Controllers, as well as the details of specific Controllers
- Modifying comments, chassis IDs, and the service types of each Controller
- Identifying Controllers
- Replacing failed components
- Monitoring Controller failover and failback

Related Links

[Controller Diagnostics and Command Testing](#)

[SAN Controller Statistics and Trending Overview](#)

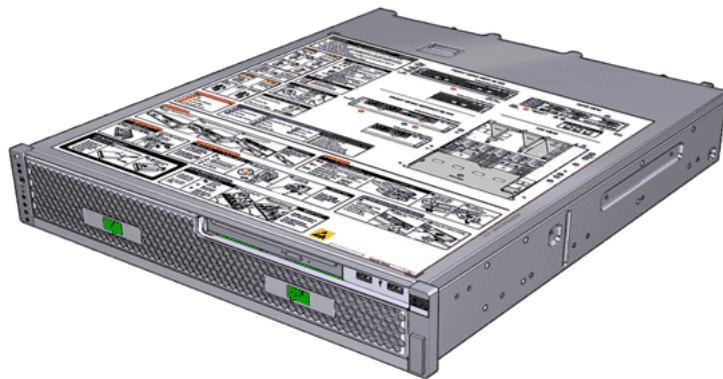
[Controller Commands](#)

Controller Overview

Controllers provide I/O access to the customer LAN or SAN and provide an internal SAS interface that is used to interconnect all Drive Enclosures and other Controllers. The Oracle FS System supports two storage Controllers.

The following figure shows an Oracle FS System Controller.

Figure 13: Oracle FS System Controller



View the Status of the Controllers

Viewing the status of the Controllers can help you to respond quickly to problems that can occur on a Controller.

- 1 Navigate to **System > Hardware > Controllers**.

The Controllers overview page displays the status summary of each Controller, the chassis, the comment, the service type, the failover Controller , temperature, and a summary of the FRUs and CRUs.

- 2 Verify that the information is what you expect.

If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.

Related Links

[Controllers Overview Page](#)

View the Details of a Controller

You can view the details of any Controller. For example, you might want to view the status of each field replaceable unit (FRU) and customer replaceable unit (CRU) to determine whether Guided Maintenance is needed to replace a component. You can also view the status of the I/O ports.

The Controller details include the following information:

- Controller identifier, memory size, and model
- Replaceable unit part number, serial number, location, and specifications

- 1 Navigate to **System > Hardware > Controllers**.

The Controllers overview page displays the status summary of each Controller, the chassis, the comment, the service type, the failover Controller , temperature, and a summary of the FRUs and CRUs.

- 2 Select a Controller.

- 3 Select **Actions > View**.

- 4 Verify that the information is what you expect.

If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.

- 5 Click **Close**.

Related Links

[View Controller, Components Tab](#)

[View Controller, I/O Ports Tab](#)

[Controller Ports](#)

Modify the Controller Comment

The Controller comment is the descriptive text that is assigned to a Controller. You can change or assign unique, meaningful comments to help you more easily

locate specific Controller components. The Controller comment can contain up to 255 alphanumeric characters.

- 1 Navigate to **System > Hardware > Controllers**.
The Controllers overview page displays the status summary of each Controller, the chassis, the comment, the service type, the failover Controller , temperature, and a summary of the FRUs and CRUs.
- 2 Select a Controller.
- 3 Select **Actions > Modify**.
- 4 In the **Comment** field, enter a string of text that associates a comment with the Controller.
You can enter up to 255 alphanumeric characters.
- 5 Click **OK**.

Related Links

[Modify Controller, Components Tab](#)

Modify a Chassis ID

The chassis ID is the Controller Name as displayed in the Controllers summary. Chassis IDs are unique, numeric identifiers that are displayed on the Controllers and the Drive Enclosures. You can use Oracle FS System Manager (GUI) to modify the chassis IDs.

- 1 Navigate to **System > Hardware > Controllers**.
The Controllers overview page displays the status summary of each Controller, the chassis, the comment, the service type, the failover Controller , temperature, and a summary of the FRUs and CRUs.
- 2 Select a Controller.
- 3 Select **Actions > Modify Chassis ID**.
The **Modify Chassis ID** dialog is displayed.
- 4 From the **Desired ID** list, select a new Chassis ID number.
- 5 Click **OK**.

Related Links

[Modify Chassis ID Dialog](#)

[Pilot Management](#)

Identify a Controller

You can identify a specific Controller. The system uses flashing LEDs to identify hardware components. In a crowded data center, the flashing LEDs allow you to locate the Controller on which you want to perform maintenance.

- 1 Navigate to **System > Hardware > Controllers**.

The Controllers overview page displays the status summary of each Controller, the chassis, the comment, the service type, the failover Controller, temperature, and a summary of the FRUs and CRUs.

- 2 Select a Controller.
- 3 Select **Actions > Identify**.
The **Identify** dialog is displayed.
- 4 Select one of the identification options.
- 5 Click **Next**.
- 6 Follow the instructions provided by Guided Maintenance to identify the hardware component.
- 7 Click **Finish**.

Related Links

[Pilot Management](#)

Drive Enclosure Management

You can expand the storage pool that is available to an Oracle FS System to accommodate increased storage demands by adding additional Drive Enclosures. Additionally, moving drive groups from one Storage Domain to another can help balance the capacity provisioning across domains.

Managing Drive Enclosures consists of the following tasks:

- Viewing the overall status of all Drive Enclosures, as well as the details of specific Drive Enclosures
- Modifying comments and chassis IDs
- Identifying Drive Enclosures
- Replacing failed components

Related Links

[Drive Groups](#)

[Storage Domains](#)

[Run the Drive Enclosure Commands](#)

[Upload Storage Class Mapping File](#)

Drive Enclosure Overview

Drive Enclosures are used as back-end storage for the Oracle Flash Storage System. The Oracle FS System can be configured for as many as 30 Drive Enclosures. The two types of Drive Enclosure are the DE2-24P Drive Enclosure

and the DE2-24C Drive Enclosure. Both Drive Enclosure types can co-exist in the same system.

Drive Enclosure are high-availability, serial-attached SCSI (SAS-2) storage enclosures. The DE2-24P Drive Enclosure has a 2U chassis that supports the following types of drives:

- Twenty four small form factor (SFF), 2.5-inch (6.35-cm) hard disk drives (HDDs)
- Configurations of seven or 13 performance solid state drives (SSDs)
- Configurations of seven, 13, or 19 capacity SSDs

The DE2-24C Drive Enclosure has a 4U chassis that supports 24 large form factor (LFF), 3.5-inch (8.89-cm) HDDs.

The following figures show the front of the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure.

Figure 14: DE2-24P Drive Enclosure (front view)

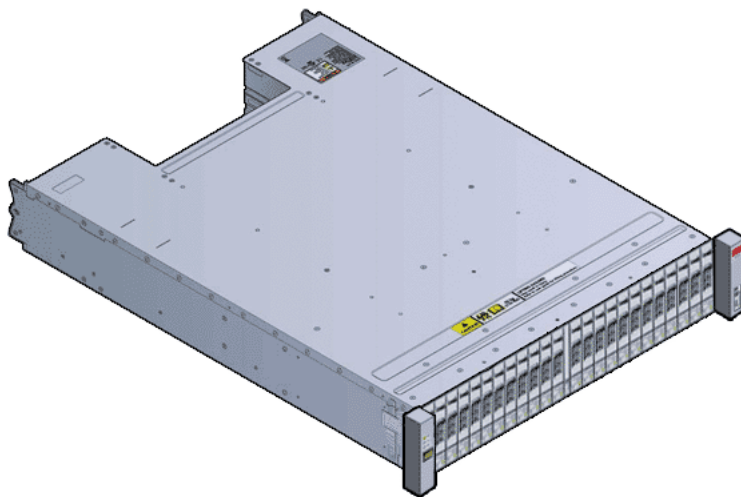
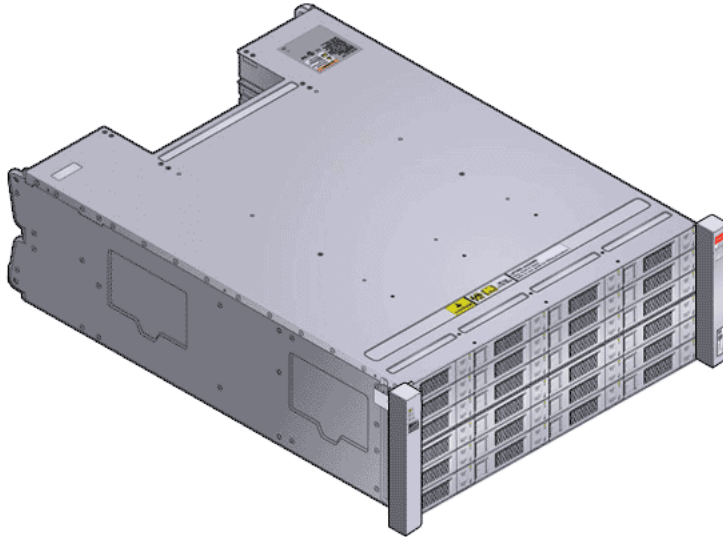


Figure 15: DE2-24C Drive Enclosure (front view)



Both types of Drive Enclosures have the following physical configuration:

- Two hot-serviceable I/O modules with two interface slots that comply with the Storage Bridge Bay (SBB) standard
- Two hot-serviceable 580W power cooling modules with dual load-sharing power supplies and integrated fans
- 19-inch rack-compatible enclosure
- Front access to all drives
- Back access to the I/O modules and the power cooling modules
- LEDs with status information for the I/O modules, the drives, and the power cooling modules

The following figures show the back of the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure.

Figure 16: DE2-24P Drive Enclosure (back view)

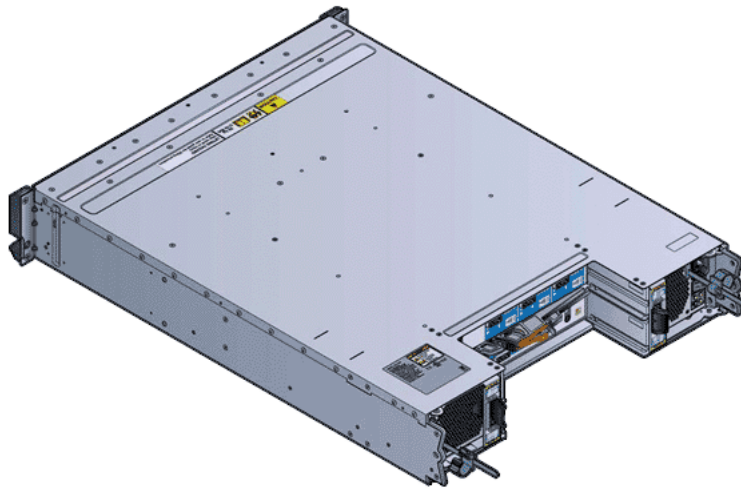
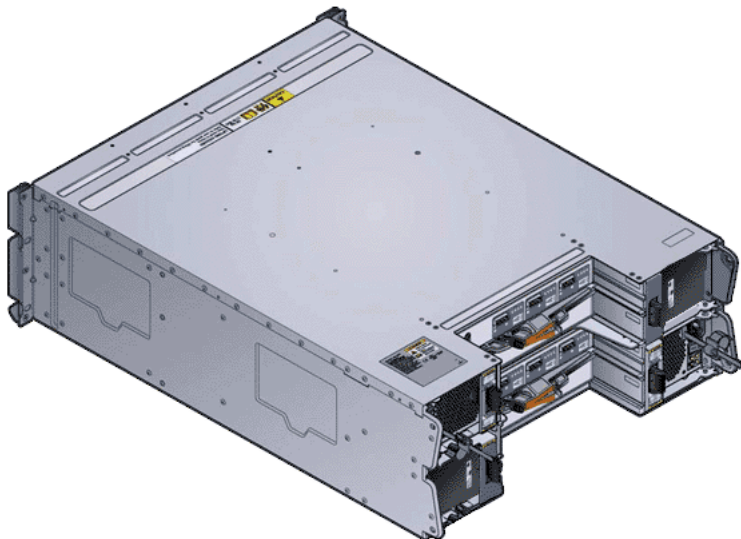


Figure 17: DE2-24C Drive Enclosure (back view)



Related Links

[High Availability](#)

[HDD Failure and Recovery](#)

[SSD Failure and Recovery](#)

High Availability

The high availability features of the Oracle FS System allow the system to respond gracefully to an unexpected hardware or software failure that has the potential for service disruption. This feature keeps customer data accessible even during hardware replacement procedures.

The Oracle FS System includes the following high-availability features:

copyback

Moves data from a temporary location to a newly replaced drive. For HDDs, the temporary location is an active spare strip. For SSDs, the temporary location is a dedicated spare drive.

double parity

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

dynamic spare

Unallocated strips on high-capacity hard disk drives (HDDs) in a given drive group. This spare capacity is striped across all of the HDDs in the drive group. Dynamic spares are used to support the RAID 5 protection level and the RAID 10 protection level. Dynamic spares cannot cross drive group boundaries.

mirroring

A RAID level in which the Oracle FS System maintains an exact duplicate of a logical volume at a different location. No parity data is used. Mirroring protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented using RAID 10 technology.

Oracle Pre-Emptive Copy

A feature of the Oracle FS System firmware that copies the data on a drive that has been predicted to fail to a spare drive or to a dynamic spare. This operation occurs before the suspect drive fails and is subsequently taken offline for replacement. This feature avoids the performance degradation and the potential exposure to data loss when the drive does fail. This feature optimizes overall performance by avoiding the overhead of rebuild operations. Sometimes referred to as *copyaway*.

As a benefit, the copyaway operation is performed while the data on the failing drive is redundant so that any errors that might exist can be corrected using the parity data. Also, because the failing drive remains online, data loss cannot occur if a second drive fails while the copyaway operation is in process.

single parity

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

spare drive

An unused solid state drive (SSD) that can support the rebuilding of a drive group by means of copy-away operations. Drive Enclosures and drive groups do not contain an SSD that is dedicated only to this purpose. If, however, an unused SSD exists in a Drive Enclosure and if an SSD in that Drive Enclosure fails, is predicted to fail, or is removed, the system uses that unused drive to rebuild the problematic drive.

Furthermore, if no unused SSD exists, the system can use its parity data to continue functioning with a lost SSD.

write coalescing

A RAID optimization technique that groups multiple, small write operations to a particular stripe into a single write operation. This single write operation affects all LUNs that have unwritten data on that stripe. Write coalescing can increase the performance of random write operations that involve small amounts of data.

This optimization technique particularly benefits RAID 5 and RAID 6 storage arrays and auto-tiered LUNs.

Related Links

[Priority Level and Performance](#)

[Redundancy and Data Protection](#)

SSD Failure and Recovery

If a solid state drive (SSD) fails, the Oracle FS System uses RAID 5 (single parity) and the RAID 10 (mirroring), along with the dedicated spare drives, to recover lost data.

SSD arrays are configured with a dedicated spare drive. If the Oracle FS System detects a failing SSD, the system performs an *Oracle Pre-emptive Copy*, which copies the data from the failing SSD to the spare drive. This feature protects the system from performance degradation and potential data loss when an SSD fails. A spare drive can have different performance and data retention characteristics.

After the failing SSD is replaced, the system performs a copyback operation. The copyback operation copies the data from the spare drive to the replacement SSD. This operation restores the SSD array to its original capabilities with a normal rebuild to spare and copyback from spare.

Note: You can view the remaining life expectancy (in months) and replace the drive on a proactive basis by using Guided Maintenance in Oracle FS System Manager (GUI).

Related Links

[Redundancy and Data Protection](#)

HDD Failure and Recovery

If a hard disk drive (HDD) fails, the Oracle FS System uses the parity and the mirroring features of RAID technology, along with the dynamic spares, to ensure that data is not lost.

HDD arrays are configured with dynamic spares. In a RAID configuration, an HDD failure triggers a rebuild operation. During a rebuild operation, the reconstructed data is built on the spare HDD that is within the rebuilt stripe. When the failed HDD is replaced, the data held in the spare HDD is copied back to the replacement HDD.

Related Links

[Redundancy and Data Protection](#)

View the Status of the Drive Enclosures

Viewing the status of the Drive Enclosures helps you to identify and to respond to problems that can occur on a Drive Enclosure.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Verify that the information is what you expect.

If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.

Related Links

[Drive Enclosures Overview Page](#)

View the Details of a Drive Enclosure

Viewing the details of a Drive Enclosure helps you to identify and to respond to problems that can occur on each field replaceable unit (FRU) and customer replaceable unit (CRU), as well as on the I/O ports within the Drive Enclosure.

The Drive Enclosure details include the following information:

- The properties of the Drive Enclosure
 - A list of all the FRUs and CRUs
 - A list of all the I/O ports and the I/O port properties
- 1 Navigate to **System > Hardware > Drive Enclosures**.
 - 2 Select a Drive Enclosure.
 - 3 Select **Actions > View**.
 - 4 Verify that the information is what you expect.

If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.

- 5 Click **Close**.

If you see a status other than Normal for any of the FRUs or CRUs, you might need to replace that component. Select a FRU or CRU to replace it.

Related Links

[View Drive Enclosure, Components Tab](#)

[View Drive Enclosure, I/O Ports Tab](#)

[Drive Enclosure Management](#)

[View the Details of a Drive Enclosure](#)

Modify the Drive Enclosure Comment

The Drive Enclosure comment is the descriptive text that is assigned to a Drive Enclosure. You can change or assign unique, meaningful comments to help you more easily locate specific Drive Enclosure components. The Drive Enclosure comment can be up to 255 alphanumeric characters.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Select a Drive Enclosure.
- 3 Select **Actions > Modify**.
- 4 In the **Comment** field, enter a string of text that describes the Drive Enclosure.
You can enter up to 255 alphanumeric characters.
- 5 Click **OK**.

Related Links

[Modify Drive Enclosure, Components Tab](#)

Identify a Drive Enclosure

You can identify a specific Drive Enclosure. The system uses flashing LEDs to identify hardware components. In a crowded data center, the flashing LEDs allow you to locate the Drive Enclosure on which you want to perform maintenance.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Select a Drive Enclosure.
- 3 Select **Actions > Identify**.
The **Identify** dialog is displayed.
- 4 Select one of the identification options.
- 5 Click **Next**.
- 6 Follow the instructions provided by Guided Maintenance to identify the hardware component.
- 7 Click **Finish**.

Related Links

[Drive Enclosure Management](#)

[Modify the Drive Enclosure Comment](#)

[Modify a Chassis ID](#)

Modify a Chassis ID

The Chassis ID is the Drive Enclosure Name as displayed in Drive Enclosures summary. Chassis IDs are unique, numeric identifiers that are displayed on the Controllers and the Drive Enclosures. You can use Oracle FS System Manager (GUI) to modify the chassis IDs.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Select a Drive Enclosure.
- 3 Select **Actions > Modify Chassis ID**.
The **Modify Chassis ID** dialog is displayed.
- 4 From the **Desired ID** list, select a new Chassis ID number.
- 5 Click **OK**.

Related Links

[Modify Chassis ID Dialog](#)

[Drive Enclosure Management](#)

[Modify the Drive Enclosure Comment](#)

[Identify a Drive Enclosure](#)

Data Integrity on the Drives

The SCSI Protection Information field is a mechanism to prevent silent data corruption. SCSI Protection Information ensures that any data that is successfully read by a host from an Oracle FS System is the intended data, and that the data is the same as when it was last written by a host. This integrity check is only internal to the Oracle FS System.

The RAID firmware in the Oracle FS System formats all of the drives in the storage arrays to a sector size of 520 bytes. As SAN data is received from the host, eight bytes of integrity metadata is generated for every 512 bytes of host data. The integrity metadata is appended to the host data to form the internal 520-byte sector. When data is transferred back to the host, the eight bytes of metadata is stripped off and used to check that the 512 bytes of host data is correct. If the check fails, a read error is reported to the host.

The eight bytes of metadata includes a Cyclic Redundancy Check (CRC) of the host data and a Reference Tag that identifies the offset of the sector within the host LUN or file. These two pieces of information allow the firmware to check that the data being transferred belongs to the location that the host requested and that the data is the same as it was when last written.

Reference Tag checking is one part of the normal data integrity processing that is performed by the RAID firmware. However, if a client application reads a large number of sectors that have never been written, the client application might experience degraded performance when reading these sectors. Such client applications can include:

- Sector level backup applications
- Replication applications

If unusual performance issues exist for such client applications, you can disable Reference Tag checking on any given LUN to see if you can improve the performance of those applications. If Reference Tag checking is disabled, the Oracle FS System continues to validate CRCs for these sectors but bypasses the Reference Tag checking.

Related Links

[Drive Enclosure Management](#)

Hardware Management

Even if you do not manage the hardware in the Oracle FS System yourself, it is important that you understand some details about hardware management in the Oracle FS System.

Hardware management consists of drive replacement, component replacement, and system expansion. Both drive replacement and component replacement can be performed using Guided Maintenance in the GUI. Guided Maintenance in the GUI is the preferred method of hardware replacement. System expansion is not a performed using Guided Maintenance in the GUI.

Related Links

[Drive Enclosure Management](#)

Hardware Replacement

Your Support Services contract provides guidelines to replace field replaceable units (FRUs) and customer replaceable units (CRUs) in your Oracle FS System.

Based on the terms of your contract, you can perform the following actions:

- Replace the FRU or CRU yourself.
- Place a service request so that a service technician comes to your site to replace the FRU.

Tip: You can enable Auto Service Request (ASR) in My Oracle Support (MOS) to automatically create a service request for you.

Important: Replacement of a FRU or a CRU requires that you use Guided Maintenance in Oracle FS System Manager (GUI) or the Oracle FS CLI to perform the following actions:

- Prepare the system for the FRU or the CRU replacement.
- Integrate the new FRU or the new CRU into the system.

Note: Guided Maintenance in the GUI provides a step-by-step graphical representation of the hardware replacement process. Guided Maintenance in the GUI is the preferred method of hardware replacement.

Consult the appropriate *Oracle FS System Service Guide* for details.

Check the power supply fan filters annually for accumulated dust. If needed, vacuum the power supplies, even if no component replacement or repair is required. This type of maintenance does not require Guided Maintenance.

Related Links

[Replace a Component](#)

Drive Replacement

Drive replacement is a procedure performed using Guided Maintenance. The replacement drive can be a new drive or a drive previously used in a Drive Enclosure.

Important: The Oracle FS System accepts only Oracle-supplied drives. The capacity and the type of a replacement drive must be same as the other drives in the Drive Enclosure.

The Oracle FS System considers all drives as foreign drives until you accept the drives into the Drive Enclosure. If data exists on the drive you are inserting, all the data is lost when the drive is accepted.

You start the drive replacement process using Guided Maintenance. Guided Maintenance prepares the system and the Drive Enclosure for the drive replacement. After you have inserted a replacement drive into a Drive Enclosure, continue using Guided Maintenance to complete the process.

Replace a Component

To maintain or to restore reliability to an Oracle FS System, you sometimes need to replace a component.

Oracle supports only Oracle-supplied components in an Oracle FS System.

Guided Maintenance in Oracle FS System Manager (GUI) provides you a step-by-step graphical representation of the hardware replacement process. Guided Maintenance in the GUI is the preferred method of hardware replacement.

Caution: Hardware that does not conform to Oracle specifications or is not an Oracle-supplied component might compromise data integrity and voids the warranty of the Oracle FS System.

- 1 Navigate to **System > Hardware** and then select Controllers or Drive Enclosures.
- 2 In the overview page, click the Controller or Drive Enclosure that contains the component that you want to replace.
- 3 Select **Actions > View**.
- 4 On the **Components** tab in the View dialog, select the component that you want to replace and click **Replace Component**.
- 5 Follow the instructions provided by Guided Maintenance to repair the component.
Refer as well to the appropriate *Oracle FS System Service Guide* for detailed instructions.
- 6 Click **Finish**.

Related Links

[View Controller, Components Tab](#)

[View Drive Enclosure, Components Tab](#)

System Expansion

To accommodate increased storage demands and to expand the storage pool available to the Oracle FS System, you can add Drive Enclosures to the system. You can combine additional DE2-24P Drive Enclosures and DE2-24C Drive Enclosures in the same system.

Before adding a Drive Enclosure, make sure that the system has the latest software version installed:

- In Oracle FS System Manager (GUI), log in with a support administrator account and select **Support > Software and Firmware**.
- In Oracle FS CLI, run the `software_update -list -installed` command.

Additionally, determine whether sufficient space exists in the rack for the new Drive Enclosures. The PDUs installed in the rack must have enough free circuits. If the PDUs cannot accommodate more Drive Enclosures or if the rack lacks space for more Drive Enclosures, then you must set up additional racks.

Note: Adding Drive Enclosures can be disruptive to the system in the following circumstances:

- The existing PDU arrangements are insufficient to fulfill power requirements. The system must be powered off to add PDUs to the existing PDU arrangement.

Note: If the system uses Oracle-supplied racks with PDUs designed for the system, you rarely need additional PDUs to fulfill power requirements. It might be necessary to enable the second half of an Oracle PDU in order to utilize additional power receptacles. Enabling the second half of an Oracle PDU is not disruptive to the system.

- The current layout of the hardware in the racks requires changes to accommodate the length limits for cables that are used for Controller-to-Drive Enclosure connections and Drive Enclosure-to-Drive Enclosure connections.

Based on the configuration of Drive Enclosure strings, adding Drive Enclosures to the system requires one of the following scenarios:

- Distribute the new Drive Enclosures across the existing Drive Enclosure strings that contain less than five Drive Enclosures. Adding to an existing Drive Enclosure string is non-disruptive to the system.

When adding Drive Enclosures to an existing Drive Enclosure string, attach the new Drive Enclosure to the last Drive Enclosure on the string.

- Create a new Drive Enclosure string. You can add up to five Drive Enclosures to a new string. A new Drive Enclosure string requires an available SAS HBA port.

Related Links

[Display Software and Firmware Versions](#)

UPS Devices

UPS devices provide backup power to the Oracle FS System in the event of a power failure. The system monitors the UPS activities and reports the health of the device.

Typically, enterprise class products like the Oracle FS System do not use a UPS and rely on generator backed power supply in the data centers. However, if you use a UPS, it must be based on the maximum wattage requirements of the sum total of all the Oracle FS System components. The UPS, if used, should conform to the APC PowerNet MIB specifications so that it can send SNMP traps to the Oracle FS System to indicate that it is operating in battery mode or in normal mode and that the Oracle FS System should be configured to receive the traps. For more information about managing APC products that can be monitored and configured with SNMP, see the *Schneider Electric MIB Reference Guide* (http://www.apcmedia.com/salestools/JGAY-83UPH9/JGAY-83UPH9_R0_EN.pdf). In short, a UPS system must be based on the maximum wattage requirements of the sum total of all the Oracle FS System components. Up to four devices can be monitored by the system. The information gathered from the UPS includes:

- Communication status
- Power source
- Battery status

In the event of a power failure, the UPS device switches from AC to battery power, and then sends an SNMP Trap message to the Oracle FS System indicating that the UPS is on battery power. The Oracle FS System then switches to a conservative operating state, where all data writes are to the storage arrays to protect data should the UPS battery drain before normal power can be restored. This conservative state is exited when the UPS device sends an SNMP Trap message to the Oracle FS System indicating that the UPS is not on battery and returns the Oracle FS System to normal cached operation.

Related Links

[Create a UPS Device](#)

[View a UPS Device](#)

[Modify a UPS Device](#)

[Delete a UPS Device](#)

Create a UPS Device

You can create a connection to a UPS device that is connected to the Oracle FS System to allow you to see the battery status, the communication status, and the properties of the UPS. Up to four UPS devices can be configured for the system.

- 1 Navigate to **System > Hardware > UPSs**.
- 2 Select **Actions > Create UPS**.

Do not use the community strings "public" or "private" if the UPS device allows configuration of more secure strings.

- 3 Enter the information in the fields that are provided.
- 4 Click **OK**.

Related Links

[Create UPS Dialog](#)

View a UPS Device

You can review the properties, the battery status, and the communication status of a UPS device that is connected to the Oracle FS System.

- 1 Navigate to **System > Hardware > UPSs**.
- 2 Select a UPS.
- 3 Select **Actions > View UPS**.
The View UPS dialog appears.
- 4 Verify that the information is what you expect.
If you see a status other than Normal, view the details of that hardware component to diagnose and to resolve the issue. If you encounter an issue that you cannot resolve, contact Oracle Customer Support.
- 5 Click **Close**.

Related Links

[View UPS Dialog](#)

Modify a UPS Device

You can modify the properties of a UPS device. For example, you can update the name of the UPS device or change the name of the community string that is used to receive traps that monitor the device activities.

- 1 Navigate to **System > Hardware > UPSs**.
- 2 Select a UPS.
- 3 Select **Actions > Modify UPS**.
Do not use the community strings "public" or "private" if the UPS device allows configuration of more secure strings.
- 4 Update the properties for the UPS connection.
- 5 Click **OK**.

Related Links

[Modify UPS Dialog](#)

Delete a UPS Device

If a UPS device is removed from the Oracle FS System, you can no longer monitor the device activities. Because you can no longer monitor the device

activities, you should remove the connection from Oracle FS System Manager (GUI).

- 1 Navigate to **System > Hardware > UPSs**.
- 2 Select a UPS.
- 3 Select **Actions > Delete UPS**.
The Confirm Delete dialog appears.
- 4 Click **OK**.

Related Links

[UPSs Overview Page](#)

Manage Alerts and Events

View a Summary of the System Status

Oracle FS System Manager (GUI) provides a summary of all the hardware components in the system and a list of the events, alerts, and notifications that have occurred.

The System Summary page allows you to quickly access the hardware status pages and view the number of system alerts and system events.

Tip: You can also obtain a brief set of the same information by pointing your browser to the IP address or name of the Oracle FS System. The web server on the Oracle FS System is a convenient facility when you want to download this information to a mobile device.

- 1 Navigate to **System > Alerts and Events > Status Summary**.
- 2 Verify that the hardware status and event information are what you expect.
- 3 (Optional) If you detect a situation that needs to be addressed, you can click on the item in question.
The system displays the appropriate page where you can view more details about the situation.

Related Links

[Status Summary Overview Page](#)

[Managing System Alerts](#)

[Managing Event Logs](#)

[Managing Event Notifications](#)

Managing System Alerts

Some configuration events in an Oracle FS System require administrator intervention to resolve the underlying issue.

The system notifies you of a system alert by displaying a flashing exclamation-point icon (⚠) on Oracle FS System Manager (GUI) status bar. When this flashing icon is displayed, the GMT time of the most recent alert is displayed to the right of the icon. When you click the icon, the GUI displays the System Alerts page that includes the following information:

- The name of system alert.

- Information about the alert and the time that it occurred. Some of the alerts include recommended actions.
- The date and time that the alert occurred.

To resolve the issue, perform the recommended action.

Related Links

[System Notifications](#)

[Display the System Alerts](#)

[Manage the System Alerts](#)

[Delete a System Alert](#)

Display the System Alerts

If the Oracle FS System has any system alerts, you can view details about the alerts and perform any required action. You can sort the available list of system alerts by category. You can also manage the system alerts from this page.

- 1 Navigate to **System > Alerts and Events > System Alerts**.
- 2 Review the system alert list to ensure that the information is what you expect.

If the alert is resolved, the system deletes the alert from the list. If the alert persists, the alert remains on the System Alerts page.

Related Links

[System Alerts Overview Page](#)

[Managing System Alerts](#)

[Manage the System Alerts](#)

[Delete a System Alert](#)

Manage the System Alerts

You can view the details of a system alert that is generated by the Oracle FS System. You can also copy the alert information to your workstation clipboard.

- 1 Navigate to **System > Alerts and Events > System Alerts**.
- 2 Select an alert from the list.
- 3 To display details about the alert, select **Actions > Manage**.

Tip: You can also double-click the alert.

- 4 Read the information about the system alert.
- 5 (Optional) Click **Copy to Clipboard** to save the alert information to your workstation clipboard.
- 6 Click **OK**.

If you copied the alert information to your workstation clipboard, then you can use this information in an email, for example.

Related Links

[System Alerts Overview Page](#)

[Managing System Alerts](#)

[Delete a System Alert](#)

Delete a System Alert

You can delete a single alert or multiple alerts that are generated by the Oracle FS System. However, before deleting the alert, ensure that you first address the source of the alert.

- 1 Navigate to **System > Alerts and Events > System Alerts**.
- 2 Select one or more alerts from the list.
- 3 Select **Actions > Delete**.
- 4 Click **OK**.

Related Links

[System Alerts Overview Page](#)

[Display the System Alerts](#)

[Manage the System Alerts](#)

Clearing Pinned Data

Pinned data can occur when issues arise regarding the Drive Enclosure storage array. In such a case, data that is to be written to that array remains in the flash-backed memory of the Controller.

Each LUN maintains a sequential record of committed transactions (a set of modified blocks) that are guaranteed to be written to the underlying drive group storage. The Oracle FS System maintains one cache for each LUN. In the background, the system asynchronously flushes each cache to permanent storage. These records are managed within what are called *write cache*.

The system maintains two copies of the cache in flash-backed memory. The primary copy exists on the same Controller node on which the LUN resides. The secondary copy (a mirror) exists in the flash-backed memory in the partner node to allow recovery in the event of a failure of the home Controller.

Pinned data is modified data that the system cannot flush from memory to physical storage due to a system failure or a power failure. The Oracle FS System protects this in-memory data until the system can flush the data to physical storage. To resolve any pinned data, you can perform the following actions:

- Fix the issue, which would then let the system flush the pinned data.
- Discard the pinned data.

An administrator-initiated shutdown request fails if any user data is still cached and has not yet been written to physical storage. Pinned data causes the shutdown to fail. If the Controllers cannot communicate with the Drive

Enclosures to flush the cached data, the Oracle FS System retains, or *pins*, the data in cache.

If you receive a system alert about pinned data when you initiate a shutdown request, navigate to **System > Hardware > Drive Enclosures** to review the details about the Drive Enclosures. Resolve any hardware issues that might exist. Hardware issues can prevent communication between Controllers and Drive Enclosures and can prevent the system from flushing the cached data to storage.

Related Links

[Controller Management](#)

[Drive Enclosure Overview](#)

[Managing System Alerts](#)

[Display the System Alerts](#)

Managing Event Logs

Event logs display the events of the Oracle FS System. Events include management actions such as the creation or deletion of LUNs and any problems encountered by the Oracle FS System, such as hardware issues or other problems detected in the Controller or Oracle FS System Manager (GUI). You can set filters for severity and category types.

When you encounter an issue that you cannot resolve, you can bundle a collection of the logs and send the bundle to your Call-Home server. From there, Oracle Customer Support can analyze the logs to help you resolve the issue.

Possible event severities:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

Possible event categories:

Security

Events to notify of a security problem, such as an unauthorized request.

Audit

Events that track what users are doing, such as the operations that they performed.

System

Events to notify of system problems, such as a missing Drive Enclosure or Controller.

Related Links

[Create a Log Bundle](#)


[View a Summary of the System Status](#)

[Display the Event Log Entries](#)

[Delete the Event Logs](#)

Display the Event Log Entries

Review the event log to monitor events that have occurred in the Oracle FS System. If too many events display on the screen, you can filter the list of events.

- 1 Navigate to **System > Alerts and Events > Event Log**.
- 2 Review the event log details to ensure that the information is what you expect.
- 3 (Optional) Click the **Events per page** list to select the maximum number of events to display on each page.
- 4 (Optional) Click the page number on the upper right side of the page to navigate quickly to a desired page.
- 5 (Optional) Select **Actions > Set Event Log Filter** to specify the types of events to display in the list.
- 6 (Optional) Click the **Refresh** icon () on the upper right side of the page to update the list.

Related Links

[Event Log Overview Page](#)

[Set Event Log Filter Dialog](#)

[Managing Event Logs](#)

[Display the Event Log Entries](#)

[Delete the Event Logs](#)

Display the Event Properties

You can review the event properties from the Oracle FS System and copy the properties to the clipboard. Copying the event properties permits you to capture the event details and send them to Oracle Customer Support, for example.

- 1 Navigate to **System > Alerts and Events > Event Log**.
- 2 Select an event from the list.
- 3 Select **Actions > Event Properties**.

Tip: You can also double-click the event.

- 4 (Optional) To copy the event properties to the clipboard, click **Copy to Clipboard**.
- 5 Click **Close**.

You can now paste the contents of the event property information in an email and send the information to Oracle Customer Support, if requested.

Related Links

[Events Properties Dialog](#)


[Display the Event Log Entries](#)

[Delete the Event Logs](#)

[Filter Event Log Entries](#)

Filter Event Log Entries

You might want to view only certain types of entries in the event log. Filter the events to limit the type of events that appear.

- 1 Navigate to **System > Alerts and Events > Event Log**.
- 2 Select **Actions > Set Event Log Filter**.
- 3 Set the filter type.
Valid types:
 - **Event Categories:** Select all that apply.
 - **Event Severities:** Select all that apply.
 - **Event Date Range:** Select the **Display Events that occur in a date range** option, and then select the **Beginning date** and **Ending date**.
- 4 (Optional) To reset the dialog to its default state, click **Reset to Defaults**.
- 5 Click **OK**.
- 6 (Optional) Click the **Refresh** icon () on the upper right side of the page to update the list.

The Event Log overview page displays the **(filtered)** label at the top of the list, indicating that the events match your filtered criteria.

Related Links

[Set Event Log Filter Dialog](#)

[Managing Event Logs](#)

[Display the Event Log Entries](#)

[Delete the Event Logs](#)

Delete the Event Logs

If the number of events becomes too large, you can remove all of the events in one operation.

Prerequisite:

Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.

Important: Deleting the event logs removes all of the logs from the system, including logs that are not shown because a filter is in effect.

- 1 Navigate to **System > Alerts and Events > Event Log**.
- 2 Select **Actions > Delete Event Logs**.
- 3 Click **OK**.

Related Links

[Event Log Overview Page](#)

[Managing Event Logs](#)

[Display the Event Log Entries](#)

[Display the Event Properties](#)

Managing Event Notifications

Create event notifications so that certain individuals can be notified when specific Oracle FS System events occur. You can display the details of an event and make changes as needed. You can also test notifications to make sure that the specified email addresses are correct.

Event notifications are Simple Mail Transfer Protocol (SMTP) email messages that notify recipients of specified system events. System events include informational events, warning events, and critical events such as the creation of a logical volume or the occurrence of a hardware problem or software problem. Event notifications are optional and, when enabled, supplement normal event logging and Call-Home notification.

You must designate one or more email recipients to receive event notifications. You must have a configured and functioning email server to send the notifications.

Note: The email server is also used to notify recipients of any Call-Home notifications.

Related Links

[System Notifications](#)

[Display Event Notifications](#)

[Create an Event Notification](#)

[Delete an Event Notification](#)

Display Event Notifications

You can view a list of existing event notifications and determine if any changes are needed. Use the Event Notification overview page to create, modify, delete, or view the event notifications.

- 1 Navigate to **System > Alerts and Events > Event Notification**.
- 2 Review the event notification details to ensure that the information is what you expect.

Related Links

[Event Notification Overview Page](#)

[Managing Event Notifications](#)

[Display the Event Notification Details](#)

[Create an Event Notification](#)

[Modify an Event Notification](#)

[Delete an Event Notification](#)

Create an Event Notification

Create event notifications so that the system can generate email when specific events occur in the Oracle FS System. You can specify the types of system events that trigger alerts, as well as designate the recipients who receive the notices.

If you do not set up notices, you can still monitor system events using the event log. Call-Home notifications are independent of email notifications and will be sent to Oracle Customer Support about issues in the Oracle FS System.

- 1 Navigate to **System > Alerts and Events > Event Notification**.
- 2 Select **Actions > Create**.
- 3 Enter a name for the event notification.
- 4 Enter a description for the event notification.
- 5 To enable the notification, select **Enable Event Notification**.
- 6 Review the list of events.

Tip: To sort the list by severity, click **By severity, then category**. To sort the list by category, click **By category, then severity**.

Tip: To expand or collapse the list of events, click the expand (▸) or collapse (▾) symbols.

- 7 From the Monitored Events list, select the events that you want to trigger the notification.
- 8 To add one or more event notification recipients, click **Add**.

For example, to be notified of any login failures, in the **Events Not Monitored** column navigate to the **Informational > Audit** list. Select **Login Failed**, and then click the right-facing arrow to move the item to the **Monitored Events** column.

Tip: To add an entire event type, select the severity or category name and move that event type to the **Monitored Events** column.

For example, to monitor all Critical events, select **Critical** and move the event type to the **Monitored Events** column.

- 9 Enter the email address of each notification recipient.

Note: Specify the email addresses of one to four subscribers or externally defined mailing lists.

- 10 (Optional) Click **Test Email** to make sure that the alert is sent to the correct email addresses and that the SMTP server is properly configured.

Note: Allow at least 10 minutes between email tests.

- 11 (Optional) To remove an email address from the list, select the address and click **Remove**.

- 12 Click **OK**.

Related Links

[Create Event Notification Dialog](#)

[Configure Email Notification Settings](#)

[Managing Event Notifications](#)

[Display the Event Notification Details](#)

[Modify an Event Notification](#)

[Delete an Event Notification](#)

Display the Event Notification Details

You can view the details of an event notification and determine if any changes are needed.

- 1 Navigate to **System > Alerts and Events > Event Notification**.
- 2 Select the name of the event notification you want to view.
- 3 Select **Actions > View**.
- 4 Review the event notification details to ensure that the information is what you expect.
- 5 Click **Close**.

If any changes to an event notification are needed, you can modify the notification entry.

Related Links

[View Event Notification Dialog](#)

[Managing Event Notifications](#)

[Display the Event Notification Details](#)

[Modify an Event Notification](#)

[Delete an Event Notification](#)

Modify an Event Notification

You can modify the properties of an event notification. For example, for a given notification, you can change the events that are monitored or the email address to which the notification is sent.

- 1 Navigate to **System > Alerts and Events > Event Notification**.
- 2 Select the name of the event notification that you want to modify.

- 3 Select **Actions** > **Modify**.
- 4 (Optional) Enter a new name for the event notification.
- 5 (Optional) Enter a new description for the event notification.
- 6 (Optional) Update the **Event Notification Recipient Email Addresses** list.
Possible choices:
 - To add an email recipient, click **Add**.
 - To remove an email recipient, click **Remove**.
- 7 (Optional) Select new event categories or severities to monitor.
- 8 Click **OK**.

Related Links

[Modify Event Notification Dialog](#)

[Configure Email Notification Settings](#)

[Managing Event Notifications](#)

[Create an Event Notification](#)

[Delete an Event Notification](#)

Delete an Event Notification

You can delete an existing event notification. For example, you might want to delete an event notification if someone leaves the company and you no longer want event notifications to be sent to an inactive email account.

- 1 Navigate to **System** > **Alerts and Events** > **Event Notification**.
- 2 Select the event notification that you want to delete.
- 3 Select **Actions** > **Delete**.
- 4 Click **OK**.

Related Links

[Event Notification Overview Page](#)

[Managing Event Notifications](#)

[Display Event Notifications](#)

[Create an Event Notification](#)

Perform Diagnostic Operations

Oracle FS System Diagnostics

Someone from the Oracle Customer Support might request that you run one or more of the support tools and send the diagnostic output to Oracle.

The Oracle FS System is fault tolerant. The system detects anomalies and automatically fails over to a partner component to maintain data availability. No intervention is required, unless a technician is needed to replace a hardware component.

Even fault-tolerant systems with a long mean time between failure (MTBF) rate cannot avoid component failure forever. If a component failure results in system instability, support tools are available to diagnose and to fix the issue.

To support the Oracle FS System, you can perform any of the following actions:

- Collect system information and download the system log bundle from the Pilot to a local host or send the bundle to the Call-Home server
- Diagnose Controller hardware and software issues
- Run Controller commands
- Access the Drive Enclosure console to check and diagnose drive groups
- Shut down and restart the Oracle FS System
- Set halt points that pause the system startup process
- Reset the system to its factory configuration

Related Links

[Create a Log Bundle](#)

[Run Controller Diagnostics](#)

[Run Controller Command](#)

[View the Drive Enclosure Console](#)

[Shut Down the Oracle FS System](#)

[Restart the Oracle FS System](#)

[Manage System Halt Points](#)

[Reset the Oracle FS System](#)

System Log Bundles

To help diagnose a situation that might exist, Oracle Customer Support might request that you collect into a single bundle certain logs and other diagnostic information. Then you can send the bundle to My Oracle Support (MOS) for analysis.

System information can be collected from the following sources and placed into the system log bundle:

- Pilot hardware component
- Controller hardware components
- Drive Enclosure hardware components
- Hosts
- Statistics
- Replication appliances
- System configuration

When you create a system log bundle, you can indicate the extent of information coverage for each of the above selected sources. You can specify that all logs are to be included, or just the more recent logs. For the recent logs, you can specify the number of hours back in time for which information is to be collected.

You can also include in the log bundle the statistics and the existing configuration of the Oracle FS System. All log bundles contain the time and date at which the bundle was collected.

If you have an open service request (SR) and know the SR number, you can use that number in the log notes and send the bundle to the Call-Home server. The SR number must be the first entry in the **Notes** field, followed by any other notes for that bundle. The log bundles that you send to Call-Home will then be associated with that SR number with Oracle Customer Support.

You can send the log bundle directly to the Oracle server, or you can download the bundle and then attach that bundle to an existing SR in MOS. In either case, the logs are transferred securely using encryption.

Note: Downloaded log bundles cannot be sent directly to the Oracle server.

Related Links

[Create a Log Bundle](#)

[Send Logs to the Call-Home Server](#)

View UI Client Logs

You can display a folder of client logs that contain a history of the Oracle FS System Manager (GUI) activities that have been performed on the Oracle FS System.

- 1 Navigate to **Support > System Logs**.

- 2 Select **Actions** > **View UI Client Logs**.

Tip: You can use **Alt-Ctrl-L** to view all of the logs and **Alt-Ctrl-Z** to create a zip archive containing all of the logs.

Depending on your operating system, one of the following actions occurs:

- Windows: The system opens Windows Explorer and displays the location of the client logs.
- Linux: The system changes the directory to the location of the client logs.

Use a text editor or reader to view the contents of any of the client logs.

Related Links

[System Logs Overview Page](#)

[System Log Bundles](#)

Create a Log Bundle

Oracle Customer Support might request that you create a log bundle and send the bundle to Oracle for analysis. You can specify that the log bundle be associated with an existing service request (SR).

- 1 Navigate to **Support** > **System Logs**.

- 2 Select **Actions** > **Create**.

The Create Log Bundle dialog is displayed with all of the components selected for data collection.

- 3 Click **Select All**.

Note: Oracle Customer Support might request that you select specific components.

- 4 (Optional) To send the log files to the Oracle server, select the **Send to Call-Home server** option.

- 5 (Optional) To specify a collection period of the last hours or last days, select **Most Recent Logs**.

- 6 (Optional) Enter the desired value, and then select the units in **Hours** or **Days**.

- 7 (Optional) To select a collection period from the last log collection to the present, select **All Logs Since Last Log Collection**.

- 8 (Optional) To collect logs from the SAN hosts that are running Oracle FS Path Manager (FSPM), click **Select Host** and then select the hosts from the list.

Note: The SAN host must have FSPM installed and the host must be in a communicating state.

When you are finished selecting the hosts, click **OK**.

- 9 (Optional) To download the log bundle to your workstation, select the **Download to** option, and then specify the file path for the log bundle.
- 10 (Optional) Enter a short description for the log collection in the **Notes** field (for example, you can enter a service request (SR) number).

Note: If you use an SR number, it must be the first entry in the **Notes** field, but can be followed by additional information about the log bundle.

- 11 To create the log bundle, click **OK**.

The system begins collecting the data logs and displays the log bundle in the System Logs overview page. If you selected the **Send to Call-Home server** option, then the log bundle is sent directly to the Oracle server.

From the System Logs overview page, you can download the log bundle to your workstation or, if you are logged in using a Support role, you can send the log bundle to the Oracle server.

Related Links

[Create Log Bundle Dialog](#)

[Configure Call-Home for ASR](#)

[System Log Bundles](#)

[Settings for ASR \(Call-Home\)](#)

[Send Logs to the Call-Home Server](#)

[Download Log Bundles](#)

[Delete Log Bundles](#)

Collect Statistics

The Oracle FS System generates performance statistics for logical volumes and for SAN protocols. The statistics also include capacity usage and system health information. Oracle Customer Support might request that you collect the system performance statistics and transmit the data to Oracle for analysis.

The downloaded statistics can be reviewed using the Oracle FS System Statistics Tool. For more information, review the *Oracle Flash Storage System Statistics Tools User's Guide*.

- 1 Navigate to **Support > System Logs**.
- 2 Select **Actions > Create**.
The Create Log Bundle dialog is displayed with all of the components selected for data collection.
- 3 Click **Deselect All**.
- 4 From the Component or Item table, select the **Statistics** option.
- 5 (Optional) To specify a collection period of the last hours or last days, select **Most Recent Logs**.
- 6 (Optional) Enter the desired value, and then select the units in **Hours** or **Days**.

- 7 (Optional) To select a collection period from the last log collection to the present, select **All Logs Since Last Log Collection**.
- 8 (Optional) To collect logs from the SAN hosts that are running Oracle FS Path Manager (FSPM), click **Select Host** and then select the hosts from the list.

Note: The SAN host must have FSPM installed and the host must be in a communicating state.

When you are finished selecting the hosts, click **OK**.

- 9 (Optional) Enter a short description for the log collection in the **Notes** field (for example, you can enter a service request (SR) number).

Note: If you use an SR number, it must be the first entry in the **Notes** field, but can be followed by additional information about the log bundle.

- 10 (Optional) To download the log bundle to your workstation, select the **Download to** option, and then specify the file path for the log bundle.
- 11 Click **OK**.

To delete a log, you must be logged in with support login privileges.

Related Links

[Create Log Bundle Dialog](#)

[Storage Performance Statistical Data Overview](#)

[Storage Performance Statistical Data Overview](#)

[Delete Log Bundles](#)

Download Log Bundles

When an Oracle FS System system event occurs, the system records the incident information in system logs. These logs are useful when troubleshooting.

A log bundle contains a number of system logs and is formatted as a TAR file, which you can download to your workstation. Oracle Customer Support might request that you collect the logs and send them to Oracle for analysis.

- 1 Navigate to **Support > System Logs**.
- 2 Select a log bundle to download from the System Logs list.
- 3 Select **Actions > Send to > Download**.
- 4 To select the file location on your workstation, click the browse button [...].
- 5 Click **OK**.

Send the log bundles to Oracle Customer Support, if requested.

You can also attach the log bundle to an existing service request (SR). Access the SR in My Oracle Support (MOS) and upload the logs.

Related Links[System Logs Overview Page](#)[System Log Bundles](#)[Send Logs to the Call-Home Server](#)**Send Logs to the Call-Home Server**

If a significant Oracle FS System event occurs, the system writes logs that contain information about the incident. Support administrators and administrators with Support role privileges can manually send the system log bundles to the Oracle server.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.

Logs are generated by the system when a significant event occurs, or manually created by the administrator. Oracle Customer Support might request that you create a log bundle and send the bundle to Oracle for analysis. If you want to automatically send the logs to the Call-Home server, select the **Send to Call-Home server** option when you create the log bundle.

- 1 Navigate to **Support > System Logs**.
- 2 From the System Logs list, select a log bundle to send to the Call-Home server.
- 3 Select **Actions > Send to > Call-Home Server**.
- 4 Click **OK**.

If Oracle Customer Support requested the log bundle, confirm that the file was received.

Related Links[System Logs Overview Page](#)[Configure Call-Home for ASR](#)[System Log Bundles](#)[Settings for ASR \(Call-Home\)](#)[Download Log Bundles](#)**Clear the System Logs**

If you are instructed by Oracle Customer Support, you can delete all of the Controller logs and log bundles from the Oracle FS System.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.

Clearing the system logs removes log collections and Controller logs. To remove an individual log bundle, use the **Delete Log Bundles** option.

Important: Deleting the system logs permanently removes all record of the past system behavior.

- 1 Navigate to **Support > System Logs**.
- 2 Select **Actions > Clear Logs**.
- 3 Select the types of logs to delete.
Valid choices:
 - **Controller Logs**
 - **Log Collections**
- 4 Click **OK**.

Related Links

[Create Log Bundle Dialog](#)

[System Log Bundles](#)

[Delete Log Bundles](#)

Delete Log Bundles

If you are instructed by Oracle Customer Support, you can remove some or all of the log bundles that have been created by the system and by the administrators of the Oracle FS System.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.

Important: Deleted log bundles cannot be recovered.

- 1 Navigate to **Support > System Logs**.
- 2 Select one or more of the log bundles from the System Logs list.

Tip: Use the **Ctrl** or **Shift** keys to select and deselect multiple log bundles.

- 3 Select **Actions > Delete**.
- 4 Click **OK**.

Related Links

[System Log Bundles](#)

[Create a Log Bundle](#)

Data Consistency

The data consistency test verifies the integrity of the RAID parity data, not the integrity of user-created data.

You might want to run the data consistency test after replacing a drive in a Drive Enclosure. Also, Oracle Customer Support might request that you run a data consistency test for diagnostic purposes.

Running the data consistency test impacts Oracle FS System performance. You have two options to choose from when performing this test:

- **High priority:** The verification check could affect I/O performance by up to 30%. The high-priority option yields faster results, but has a greater impact on system performance.
- **Low priority:** The verification check could affect I/O performance by up to 10%. The low-priority option is recommended if you want to check the Drive Enclosure after replacing a drive.

Data consistency failures are typically isolated to the drive or drive group error handling. The Oracle FS System compensates for some of the errors that are encountered during the tests. However, if an error persists that cannot be fixed, the system displays **Fail** on the Data Consistency overview page. In this case, collect the Oracle FS System data logs and contact Oracle Customer Support.

Related Links

[Data Integrity on the Drives](#)

[Verify the Data Consistency of a Drive Group](#)

Verify the Data Consistency of a Drive Group

You can verify the integrity of the RAID parity data that is maintained by the Oracle FS System software by running the data consistency test on a selected drive group. The Oracle FS System writes and maintains the parity data on various drives within a certain drive group. After replacing a drive in one of those drive groups, you might want to confirm that the parity data is consistent on that drive group.

- 1 Navigate to **Support > Data Consistency**.
- 2 Select a drive group that you want to verify.
- 3 Select **Actions > Data Consistency**.
- 4 From the Verify Data Consistency dialog, specify how much I/O time to give to this operation.

Valid choices:

- **High Priority**
- **Low Priority**

For example, if you specify High Priority, this operation could impact Drive Enclosure performance by up to 30%.

- 5 To start the data verification, click **OK**.

After data verification completes, the results appear on the Data Consistency page. Use the refresh button (🔄) to update the page, if necessary. The system displays the date and time of the most recent integrity test results.

Related Links

[Data Consistency Overview Page](#)

[Data Consistency](#)

Controller Diagnostics and Command Testing

Administrators can use two features of the Oracle FS System Manager (GUI) to help characterize and isolate the source of Controller issues. These issues can be related to Controller hardware or software, or can be related to the connections between the Controller and the public data network.

The Controller diagnostics feature performs a suite of diagnostic tests on the hardware components and the software modules in a Controller. The hardware that is tested includes, for example, the motherboard, the network interface cards, the fans, and the power supplies that are contained within the Controller.

Note: During startup, the Oracle FS System always performs diagnostics on the Controller nodes.

The diagnostic tests on the hardware and software return detailed information to help a support administrator to characterize and to isolate specific faults in the system. With this information, the support administrator can more easily determine which field replaceable unit (FRU) needs to be replaced.

Important: Close all of the applications that are using the Controller before running diagnostics, then disconnect the Controller from the public data network.

While the diagnostic tests are being run, the status of the Controller appears as Failed Over. When the tests are complete, the status changes to Normal.

To run diagnostics on a Controller, the system disables the write cache in the target Controller, moves all the resources of the Controller to its partner Controller, and takes the target Controller offline. All of the LUNs that are assigned to the Controller are put into Conservative mode. During the diagnostic period, the performance of the partner Controller is diminished because all I/O is performed directly to disk.

Related Links

[Controller Management](#)

[Run Controller Diagnostics](#)

[Run Controller Command](#)

Run Controller Diagnostics

Oracle Customer Support might request that you run diagnostics on a selected Controller to test its hardware components. The results of these tests can help you take the appropriate steps to ensure data integrity and to reduce downtime.

Prerequisites

- Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.
- All of the clients that are connected to the target Controller are idle. Alternatively, ensure that the zoning and client configuration are set up to handle the condition of the Controller going offline with all data access moved to the partner Controller.

You can run hardware diagnostics in response to various conditions such as certain hardware faults, the crossing of critical statistics thresholds, and certain generated events. The goal of these diagnostics is to isolate the cause of that condition. After a hardware diagnostic is invoked, it performs a particular test and returns a Pass status or a Fail status. For a Fail status, the diagnostic test returns detailed information about the failure.

Caution: Do not initiate diagnostics on a Controller that is currently serving data. If you do, data loss could occur.

During the diagnostic period, the performance of the partner Controller is diminished because all I/O is performed directly to disk.

- 1 Navigate to **System > Hardware > Controllers**.
- 2 Select **Actions > Run Diagnostics**.
- 3 Select the Controller on which you want to run diagnostics.
- 4 Read the warning on the **Controller Diagnostics** dialog box, then click **Next**.
After the diagnostics is completed, the **Success** dialog appears.
- 5 To display the diagnostics test results, click **Next**.
- 6 Review the results of the diagnostics test.
- 7 To close the diagnostics dialog, click **Finished**.

Related Links

[Controllers Overview Page](#)

[Controller Diagnostics and Command Testing](#)

[View Controller Diagnostics](#)

View Controller Diagnostics

Administrators who are logged in with one of the support roles can review the results of the latest Controller diagnostics.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Oracle Support role or the Support role.

- 1 Navigate to **System > Hardware > Controllers**.
- 2 Select **Actions > View Diagnostics**.
- 3 Select the Controller for which you want to view the diagnostic results.
- 4 To display the diagnostics test results, click **Next**.
- 5 Review the results of the diagnostics test.
- 6 To close the diagnostics dialog, click **Finished**.

Related Links

[Controller Diagnostics and Command Testing](#)

[Run Controller Diagnostics](#)

Controller Commands

You can run commands on a Controller to obtain internal information about the Controller, such as a failed component or a list of failed field replaceable units (FRUs) or to diagnose other issues.

You can also use the Controller statistics tool that by navigating to **System > Reporting & Statistics > CPU Statistics**.

Note: Use the prefix command `ipmi_fm` when entering commands in the Controller command line.

Table 14: Controller commands

Command	Syntax	Description
fmadm	<pre>ipmifm fmadm faulty [-afgiprsv]</pre> <p>-a</p> <p>Displays all faults. By default, the <code>fmadm faulty</code> command only lists output for resources that are currently present and not working correctly.</p> <p>If you specify the <code>-a</code> option, all resource information cached by the Fault Manager (FM) is listed, including faults that have been automatically corrected or when no recovery action is needed. The listing includes information for resources that might no longer be present in the system.</p> <p>-f</p> <p>Displays all field replaceable units (FRUs).</p> <p>-g</p> <p>Groups faults that have the same FRU, class, and fault message.</p> <p>-i</p> <p>Displays the persistent cache identifier for each resource in the Fault Manager.</p> <p>-p</p> <p>Pipes output and adds a page break between each fault message.</p> <p>-r</p> <p>Displays the Fault Management Resource with their Identifier (FMRI) and the fault management state.</p> <p>-s</p> <p>Displays a single-line summary of each fault event.</p> <p>-v</p> <p>Displays the full output of the fault.</p>	<p>Allows administrators and service personnel to view and to modify the system configuration parameters that are maintained by the Solaris FM.</p> <p>FM receives telemetry information relating to the problems that are detected by the system software, diagnoses these problems, and initiates proactive self-healing activities such as disabling faulty components.</p> <p>Example:</p> <p>The following example displays a single line fault summary and groups the faults by FRU:</p> <pre>ipmifm fmadm faulty -ags</pre>

Related Links

[Controller Management](#)

[Controller Diagnostics and Command Testing](#)

[Run Controller Diagnostics](#)

Run Controller Command

You might need to view information about a particular Controller. For example, you can obtain the fault management (FM) status of a Controller. The FM status provides details about a failed component.

- 1 Navigate to **Support > System Trouble**.
- 2 Select **Actions > Run Controller Command**.
- 3 Select a Controller from the list.
- 4 Enter the command in the **Command Line** field.
- 5 Enter any necessary variables in the **Environment Variables** field.
Enter the variables in the form of *variablename=value*, where *variablename* is the environment variable and *value* is the text passed to the operating system that is running in the Controller.
- 6 Click **Execute**.
The **Command Output** displays the results that are returned by the command that was executed.

Related Links

[Run Controller Command Dialog](#)

[Controller Diagnostics and Command Testing](#)

[Controller Commands](#)

Drive Enclosure Console

When checking or diagnosing drive group issues, a support administrator or a primary administrator can access the Drive Enclosure console. You can use the console to view RAID command output from the Oracle FS System. You can also run RAID commands to a particular Drive Enclosure and view the responses from those commands.

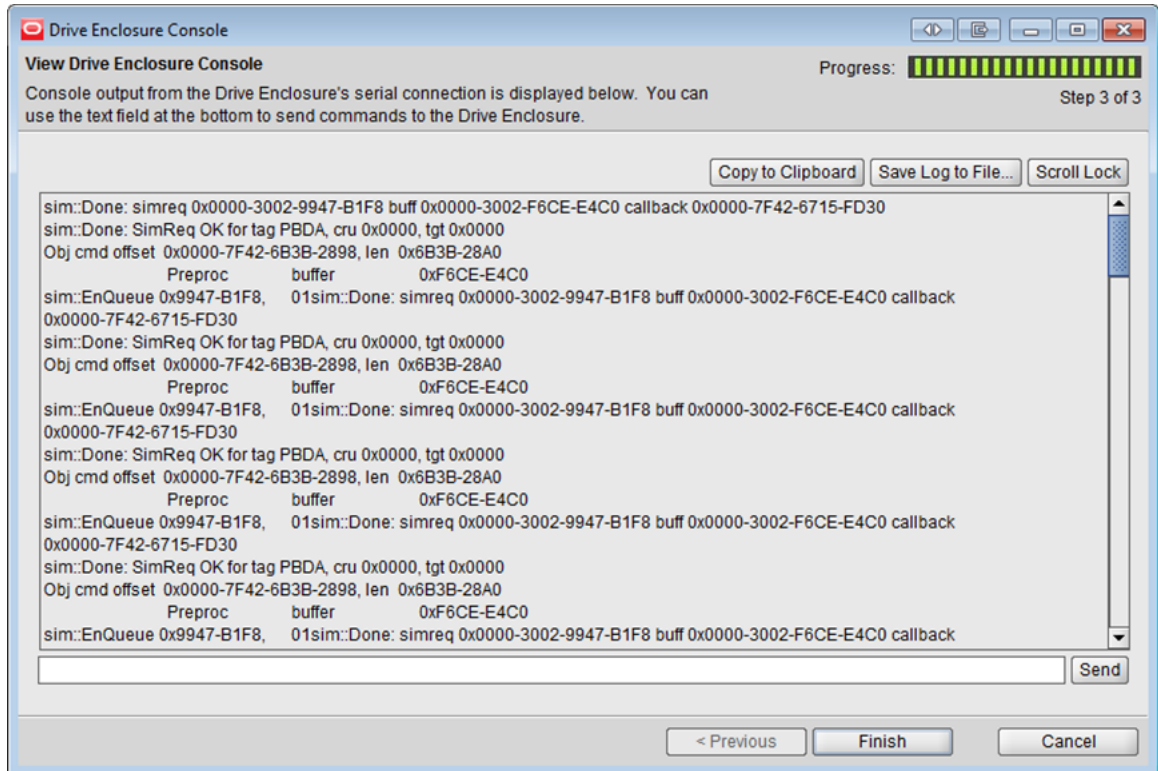
Warning: When troubleshooting, do not power-cycle a Drive Enclosure. Power-cycling a Drive Enclosure impacts the primary and secondary data paths in the Drive Enclosure and puts user data at risk.

Run the Drive Enclosure console commands under the direction of Oracle Customer Support. The support representative will supply the support administrator with the necessary commands to run in the console.

RAID output is generated by the Oracle FS System and written to the Drive Enclosure console. You can copy the output and, if requested, send that output to Oracle Customer Support.

When you use the Drive Enclosure console to access a Drive Enclosure, the output being generated by that Drive Enclosure appears in the console.

Figure 18: Drive Enclosure console



Note: The Drive Enclosure console can be used by only one login session at a time. When launching the console, the support administrator has the option of forcing other sessions to disconnect.

During a debug session, you have the option of capturing all generated output at any time, and copying that output to the clipboard or saving the output to a file. The name of the saved file contains the World Wide Name (WWN) of the Drive Enclosure and a timestamp, which can help in a review of the debug session.

When a fault, a failure, or a sub-optimum condition occurs within a Drive Enclosure, the recovery of that Drive Enclosure might require access to a number of RAID commands that can be run from the Drive Enclosure console. The Drive Enclosure console provides access to those commands.

Caution: Use Drive Enclosure console commands for recovery purposes or diagnostic purposes only, as instructed by Oracle Customer Support. These command are used to gather information or to clear conditions that cannot otherwise be accomplished. To avoid data loss, do not execute Drive Enclosure console commands without assistance from Oracle Customer Support.

Oracle Customer Support will provide you with the commands that you can run. These commands allows you to view, test, or debug the drives in the Drive Enclosure in some way.

Related Links

[Drive Enclosure Management](#)

[View the Drive Enclosure Console](#)

View the Drive Enclosure Console

After you replace a drive in the Drive Enclosure, you can view the RAID output in the Drive Enclosure console.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Administrator role, the Oracle Support role, or the Support role.

RAID output is generated by the Oracle FS System and written to the Drive Enclosure console. You can copy the output and, if requested, send that output to Oracle Customer Support.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Select **Actions > View Drive Enclosure Console**.
The Drive Enclosure Console dialog appears and an informational warning is displayed.
- 3 Click **Next**.
- 4 Select the Drive Enclosure that you want monitor.
- 5 Select the I/O Module that you want to monitor.
- 6 (Optional) To ensure that no other Drive Enclosure console session is running on the Oracle FS System, select the **Disconnect other users from the Drive Enclosure console** option.
- 7 Click **Next**.
Oracle FS System writes output from the Drive Enclosure to the console.
- 8 (Optional) To pause the display, click **Scroll Lock**.
To restart the display, click **Scroll Lock** again.
- 9 (Optional) Capture all of the output from the console.
Valid choices:
 - **Copy to Clipboard**
 - **Save Log to File**
- 10 To terminate the **Drive Enclosure** console session, click **Finish**.

If you selected the option **Save Log to File**, you might be asked to send the log file to Oracle Customer Support, or to attach the file to a service request in My Oracle Support (MOS).

Related Links

[Drive Enclosure Console](#)

[Run the Drive Enclosure Commands](#)

Run the Drive Enclosure Commands

You can run RAID code commands that control the Drive Enclosure. For example, you might need to run the commands to help in the recovery from a drive group error or a Drive Enclosure error.

Caution: Use Drive Enclosure console commands for recovery purposes or diagnostic purposes only, as instructed by Oracle Customer Support. These command are used to gather information or to clear conditions that cannot otherwise be accomplished. To avoid data loss, do not execute Drive Enclosure console commands without assistance from Oracle Customer Support.

Important: The Drive Enclosure continuously writes output to the console. When you run a Drive Enclosure command, always capture the output before and after running the command.

Prerequisite

Logged in to Oracle FS System Manager (GUI) using the Administrator role, the Oracle Support role, or the Support role.

- 1 Navigate to **System > Hardware > Drive Enclosures**.
- 2 Select **Actions > View Drive Enclosure Console**.
The Drive Enclosure Console dialog appears and an informational warning is displayed.
- 3 Click **Next**.
- 4 Select the Drive Enclosure that you want monitor.
- 5 Select the I/O Module that you want to monitor.
- 6 (Optional) To ensure that no other Drive Enclosure console session is running on the Oracle FS System, select the **Disconnect other users from the Drive Enclosure console** option.
- 7 Click **Next**.
Oracle FS System writes output from the Drive Enclosure to the console.
- 8 If instructed by Oracle Customer Support, enter a Drive Enclosure command, and then click **Send**.

The Oracle FS System runs the command and displays the results in the console.
- 9 (Optional) Capture all of the output from the console.
Valid choices:
 - **Copy to Clipboard**
 - **Save Log to File**
- 10 To terminate the **Drive Enclosure** console session, click **Finish**.

Related Links[Drive Enclosure Management](#)[Drive Enclosure Console](#)[View the Drive Enclosure Console](#)

Shut Down the Oracle FS System

Use the shut down option to systematically shut down all of the software that is running on the Oracle FS System. After the software is shut down, you can safely power off the hardware.

Note: Shutting down the host operating system on the Pilot and the Controller using the "standby power button" is not permitted. To remove power from a chassis completely, remove the power cords from the PDU. The "standby power button" only allows you to put the Pilot and the Controller into a standby mode for troubleshooting using the ILOM. To re-apply main power to the Oracle FS System, re-connect the power cords to the PDU. The green Power/OK LED on the front panel of both the Pilot and the Controller blinks steadily. As the Pilots and the Controllers complete booting, their OK LEDs become solid.

The Oracle FS System is composed of many hardware components and software processes that have dependencies on other components and processes. To ensure that all dependencies are satisfied and that the Oracle FS System is shut down in an orderly fashion, use the **Shut Down** option.

While the system is in a shutdown state, the Oracle FS System Manager (GUI) is still running and accessible. The only actions that you can perform from the GUI are to display system status, collect logs, and restart the Oracle FS System.

- 1 From Oracle FS System Manager (GUI), select **Oracle FS > Shut Down**.

The system displays the Confirm Shut Down dialog.

Important: Shutting down stops all software processes and closes the data path in an orderly fashion. While the system is shut down, users cannot access data.

- 2 Read the information on the Confirm Shut Down dialog.
- 3 To shut down the system, click **OK**.

The system status icon changes to a yellow triangle with the message: *Prepare for Shutdown*. The system continues to shut down all of the software processes, however the GUI remains running. After the software is shutdown, the System Information page displays, **Shutdown**.

When you are ready to restart the system, use the **Oracle FS > Restart** action.

If the shutdown fails, the system displays a System Alert indicating the shutdown failure. That System Alert presents an option to force the system shutdown.

Caution: Use of the force shutdown action will cause data loss.

The option to force a system shutdown should only be used when it is absolutely necessary and the normal shutdown process has stalled.

Related Links

[System Startup](#)

[Restart the Oracle FS System](#)

Restart the Oracle FS System

Restarting the Oracle FS System reinitializes all software components. Reinitializing the software is necessary, for example, when preparing for a disruptive software update process.

Caution: Data loss is possible if client I/O is active when the system restarts.

If the system is currently in an Online state, you might want to send a message to the system users that a system restart is about to begin. Stopping all user I/O 15 minutes before you restart a running system minimizes the risk of data loss. This time ensures that the flash backed memory is written to the storage arrays before the restart begins. You cannot schedule a system restart.

When you restart a running system, it begins a shutdown operation, which takes all data paths offline, writes all cached data to the storage arrays, and quiets the software modules. The system then begins the startup process. During this phase of the restart operation, the startup process verifies the system configuration and attempts to bring the system online.

Note: When restarting the system after the system has been shut down, the system initiates the startup process. This process verifies the system configuration and attempts to bring the system online.

- 1 Select **Oracle FS > Restart**.

The system displays the restart confirmation dialog.

- 2 Read the information on the confirmation dialog, and then click **OK**.

The system starts up and, when the startup process completes, the System Information page (**System > System Information**) displays *Status: Normal*.

If the Pilot cannot safely shut down the system to begin the restart process, a second dialog is displayed. Read the message, then do one of the following:

- To close the dialog so you can resolve the problem, click **Cancel**.
- To ignore the problem and continue with the system restart, click **Force Restart**.

Caution: Data loss is possible. Be certain you want to force a restart operation.

Related Links[System Startup](#)[Shut Down the Oracle FS System](#)

System Startup

The Oracle FS System starts up when the system is powered on, when the system undergoes a disruptive software update, or when a system administrator explicitly requests a restart.

Controlled by the Pilot management software, the startup process proceeds in an orderly way.

Note: When a system is starting up, the data paths are not available until the Controllers have completed the startup process.

During a system startup, the management software on the Pilot obtains heartbeats from the Controllers and verifies the configuration of the Oracle FS System

When the Oracle FS System starts, all Controller nodes progress through two stages. The first stage is controlled by the Controller BIOS that resides on the Controller. The second stage is controlled by Pilot software and the Configuration Manager (CM) software component on the Controller.

Related Links[Shut Down the Oracle FS System](#)[Restart the Oracle FS System](#)

System Halt Points

By enabling system halt points, you can more easily diagnose those situations in which you cannot get a Controller to start successfully because of some hardware or software condition.

Caution: Use system halt points for troubleshooting purposes only. System halt points are used to gather information or to clear conditions that cannot otherwise be accomplished. Never set or clear halt points without assistance from Oracle Customer Support. Only the Primary administrator and the Support administrator can manage system halt points.

When the Oracle FS System starts, all Controller nodes progress through two stages. The first stage is controlled by the Controller BIOS that resides on the Controller. The second stage is controlled by Pilot software and the Configuration Manager (CM) software component on the Controller.

First Startup Stage

A Controller node starts by executing page code that resides in its Controller BIOS. You can watch the Controller LEDs to monitor the progress of this stage.

(Refer to the *Oracle FS1-2 Flash Storage System Installation Guide* for an explanation of these LED startup codes.)

During the first stage, the page code in the Controller BIOS performs many actions, including the following sequence:

- First, the page code runs a set of power-on tests.
- Next, the code begins monitoring flash backed memory.
- Then, the code initializes the private management interface (PMI) on the Controller.
- Finally, the code passes control to *pxeboot*, which downloads the Controller software from the Pilot.

If this stage succeeds, the second stage begins, in which the Controller software components are initialized.

Second Startup Stage

In this second stage, the Pilot performs several checks on each Controller node and, if all is well, puts the node into an Initialization state. When the initialization of the software components finishes, the Pilot then, by sending commands in a defined sequence, brings the Controller software components to a Normal state.

Both the Oracle FS System Manager (GUI) and the Oracle FS CLI products identify the names of these Controller software components with a prefix of `PDS_COMP_`. This prefix is followed by the initials for the component. For example, `CM` identifies the Configuration Manager. Support administrators can selectively control the execution of these software components by enabling and disabling halt points on those software components.

If the Support administrator has previously enabled a halt point on one of these software components, the Controller boot process is halted at the specified halt point. The halt points are unique for each component.

When the startup process stops, the Support administrator can take various diagnostic actions, such as dumping a log file or reading an internal table.

After completing those actions, the Support administrator can instruct the startup process to continue. At this point, the Pilot now sends commands to each Controller to resume the startup process from the point at which it was halted. If there are multiple halt points, the system starts up to the next halt point

Related Links

[System Startup](#)

[Manage System Halt Points](#)

[Continue System Startup](#)

Manage System Halt Points

You can enable halt points for diagnostic purposes. Halt points pause the startup sequence of the Oracle FS System at the specified component step, allowing you to perform various diagnostics tasks.

Caution: Use system halt points for troubleshooting purposes only. System halt points are used to gather information or to clear conditions that cannot otherwise be accomplished. Never set or clear halt points without assistance from Oracle Customer Support. Only the Primary administrator and the Support administrator can manage system halt points.

- 1 Navigate to **Support > System Halt Points**.
- 2 Select **Actions > Manage Halt Points**.

The system displays a list of available halt points. The system displays a check mark in the **Paused on Halt Point** column where the startup sequence has halted.

- 3 (Optional) Select the **Active** box for each the step where you want the system to halt.

Note: You can enable up to eight halt points on your system.

- 4 (Optional) To remove all active halt points in the list, click **Clear**.
Clearing all active halt points enables the system, when you instruct it to continue, to resume the startup process without any additional system halts.
- 5 If you selected one or more halt points, click **OK**.

The selected halt points display in the System Halt Points overview page.

After the system restarts, the system pauses at the designated halt point. The System Halt Points overview page displays a check mark in the **Paused on Halt Point** column where the system has paused. You can perform diagnostic tasks such as collecting logs, reviewing the contents of system tables, and so forth. After you complete these tasks, you can direct the system to continue the startup process.

Related Links

[Manage Halt Points Dialog](#)

[System Halt Points](#)

[Continue System Startup](#)

Continue System Startup

After using system halt points to stop the Oracle FS System startup sequence at a specified component step, you can easily resume system startup.

Important: Use system halt points for troubleshooting purposes only. System halt points are used to gather information or to clear conditions that cannot otherwise be accomplished. Never set or clear halt points without assistance from Oracle

Customer Support. Only the Primary administrator and the Support administrator can manage system halt points.

- 1 Navigate to **Support > System Halt Points**.
The system displays a list of selected halt points. The currently halted step is indicated in the **Paused on Halt Point** column.
- 2 Select the halt point from the list.
- 3 To continue the startup sequence, select **Actions > Continue**.
The system continues the startup process and proceeds to the next halt point, if any.
- 4 Click **OK**.
- 5 Repeat Step 3 and Step 4 until the system has processed all of the halt points.

Related Links

[System Halt Points Overview Page](#)

[System Halt Points](#)

[Manage System Halt Points](#)

Reset the Oracle FS System

In extremely rare circumstances, you might need to reset your system serial number and system configuration.

Prerequisite

A special system reset file that is associated with the system serial number from Oracle Customer Support.

Warning: Because this action deletes all user data along with the system configuration, the system prompts you to confirm the system reset operation. Be absolutely sure you want to reset your system, because *all data in your system will be lost*.

The system reset file performs the following actions:

- Deletes all data stored on the Oracle FS System
 - Resets the configuration to an initial state
- 1 Navigate to **Support > System Trouble**.
 - 2 Select **Actions > Reset System**.
The Reset System dialog box is displayed.
 - 3 Read the WARNING text and, when you are ready, click the browse button (...) to proceed.
 - 4 Navigate to and select the system reset file that you received from Oracle Customer Support.

- 5 Click **OK**.
- 6 When prompted to confirm the deletion of all data and the system configuration, click **OK** to reset your system.

The Oracle FS System restarts and the user data is no longer available. Set the Controller service type as the system restarts. The startup process will not continue until you set the service type. When the startup is complete, the system is returned to an initial state.

Related Links

[*Reset System Dialog*](#)

[*System Startup*](#)

[*Oracle FS System Diagnostics*](#)

[*Restart the Oracle FS System*](#)

Manage Reports

Generated Reports Overview

Generated reports provide listings of configuration details, storage and performance information, and statistical information about your system that you can download to your client from the Oracle FS System.

You can generate a report immediately at the Generated Reports page, or you can schedule a report to be generated at a specified time at the **Scheduled Reports** page.

You can generate the following types of reports:

SAN Hosts

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers, firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

You can download reports in the following formats:

Table 15: Report download formats

Format	Usage
CSV	Comma-separated values. Import into any spreadsheet or database.
Excel	Import (XSL) directly into Microsoft Excel or compatible spreadsheet applications.
HTML	Display in a browser.
PDF	Printer-friendly online document.
XML	XML, tagged document.

Related Links

[Generate a Report](#)

[Download a Report](#)

[Delete a Report](#)

Generate a Report

You can generate predefined reports to view statistical information about the Oracle FS System.

An example where you can use generated reports is to generate and save a performance report and then generate and save a storage use report. This combination of reports provides information on trends to manage system storage capacity upgrades.

- 1 From the **System** tab, click **Reporting & Statistics > Generated Reports**.
- 2 Select **Actions > Generate**.
- 3 From the **Type** drop-down menu in the **Generate Report** dialog, select a report.
- 4 Click **OK**.

When the report is complete, the Generated Reports page displays the name of the report, the time the report was created, and the size of the report.

To see the contents of the report, select the name of the report in the Generated Reports Overview page and download it in your preferred format. You cannot view the report from the Generated Reports Overview page.

Related Links

[Generate Report Dialog](#)

[Download a Report](#)

[Delete a Report](#)

Download a Report

You can download generated reports to your client workstation in a variety of formats.

Only reports listed on the Generated Reports page can be downloaded.

Download reports to see their contents.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Generated Reports**.
- 2 Select the name of the report you want to download on the Generated Reports page.
- 3 Select **Actions > Download**.
- 4 Choose a file format from the **Format** drop-down menu in the Download Report dialog.

Valid formats:

- **CSV (comma-separated values)**
 - **Excel**
 - **HTML**
 - **PDF**
 - **XML**
- 5 Click the browse button (...) and choose the desired destination for the report.
 - 6 Enter a filename in the **File Name** field, and click **Save**.
The path, filename, and extension appear in the **Target Download Path** field in the **Download Report** dialog.
 - 7 Click **OK**.

The report is downloaded in the specified format to the target location.

You must have the appropriate viewer to view the downloaded report. For example, Adobe Reader is required to view PDF reports.

Related Links

[Download Report Dialog](#)

[Delete a Report](#)

Delete a Report

You can delete any generated report listed in the **Generated Reports** page. Deleting a report removes the report from the Oracle FS System.

Delete a report to make room for additional reports, or to remove older reports that are no longer needed.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Generated Reports**.
- 2 Select the name of the report you want to delete.
- 3 Select **Actions > Delete** from the menu.
- 4 Click **OK**.

Scheduled Reports Overview

You can schedule a report to be generated at a time and frequency that you specify.

You can use reporting schedules to generate different types of reports whenever you need them. The Oracle FS System generates these scheduled reports at the desired time and lists them on the Generated Reports page for you to download in the format of your choice.

All schedules for generating reports are listed on the Reporting Schedules page. You can create new reporting schedules, and view, modify, or delete existing schedules, from the Reporting Schedules page.

You can create a reporting schedule and enable the schedule to start generating reports immediately at the specified start time. Or, if you prefer, you can store the schedule on the Reporting Schedules page and enable the schedule later. You can also disable a schedule temporarily (if, for example, you want to keep it from interfering with scheduled maintenance) and then enable the schedule again. Deleting a schedule removes the schedule from the system, but disabling a schedule leaves the schedule available for enabling later on.

Scheduled reports continue to be generated until you disable or delete the reporting schedule.

Here are some examples of reports you can schedule; the frequency you schedule these reports depends upon your storage environment:

- *Storage Performance* report scheduled to run weekly to provide a performance summary over a period of time. You can archive these reports to create a historical storage performance record.
- *Storage Use* report scheduled to run every four weeks to monitor free capacity in a static environment where you are not adding or deleting LUNs often. In a more dynamic environment where you are adding or deleting LUNs often, you can schedule the *Storage Use* report to run more frequently, such as daily or weekly.

- *Storage Performance* and *Storage Use* reports scheduled to run at the same time and frequency if you want to compare storage performance with capacity.

Related Links

[Create a Reporting Schedule](#)

[View a Reporting Schedule](#)

[Modify a Reporting Schedule](#)

[Delete a Reporting Schedule](#)

[Create a Reporting Schedule](#)

[View a Reporting Schedule](#)

[Modify a Reporting Schedule](#)

[Delete a Reporting Schedule](#)

Create a Reporting Schedule

You can schedule a report to be generated at a time and frequency that you specify.

To generate a particular report on a regular basis, create a schedule for generating that report on the Reporting Schedules page.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Reporting Schedules**.
- 2 Select **Actions > Create**.
- 3 Enter a name for your schedule in the **Schedule Name** field.

If you do not provide a name, the system uses the default name `untitled`.

Note: The name you enter is for your use in identifying the schedule listed in the **Reporting Schedules**. For example, if you want to run a weekly report on storage use, you enter `weeklystorageuse` as the schedule name to help locate that report. When a report is generated, the system automatically creates a name for the report. The name the system creates is based on the report type, (for example `StorageUse_1374861600286`), not the name you assigned to the report schedule. The report name is displayed in the **Generated Reports** name column.

- 4 Select the type of report you want to generate from the **Report Type** menu. Choose one of:
 - **SAN Hosts**
 - **Storage Performance**
 - **Storage Use**
 - **Storage Use per Volume**
 - **System Configuration**
 - **System Configuration Summary**

- 5 (Optional) Select **Enabled** if you would like your schedule to start as soon as the schedule is created.
If you do not enable your schedule now, you can do so at a later time by modifying the schedule.
- 6 Click the expansion button to the right of **Start Time** to select the day and time for your schedule to start.
- 7 Use the controls in the **Modify Date/Time** dialog to select the date and time.
- 8 Select a frequency for your schedule:
 - **Run Once**
 - **Hourly**
 - **Daily**
 - **Weekly**
- 9 Select a recurrence value for your schedule.
If the schedule frequency is **Weekly**, specify to generate the report every one, two, three, or four weeks, and on which day of the week to generate the report. Select multiple days to generate the report on more than one day during each week.
- 10 Click **OK**.

Your schedule is listed on the Reporting Schedules page. If you enabled the schedule, the scheduled report is listed on the Generated Reports page when the report is generated.

Related Links

[Create Reporting Schedule Dialog](#)

[View a Reporting Schedule](#)

[Modify a Reporting Schedule](#)

[Delete a Reporting Schedule](#)

View a Reporting Schedule

View a reporting schedule to see the name, report type, enabled status, start time, frequency, and recurrence of the reporting schedule.

View reporting schedules from the Reporting Schedules page.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Reporting Schedules**.
- 2 Select the name of the reporting schedule you want to view.
- 3 Select **Actions > View**.

The View Reporting Schedule dialog lists the parameters of the selected schedule.

Related Links

[View Reporting Schedule Dialog](#)

[Modify a Reporting Schedule](#)

[Delete a Reporting Schedule](#)

Modify a Reporting Schedule

Modify a reporting schedule to change the name, report type, enabled status, start time, frequency, or recurrence of the reporting schedule.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Generated Reports**.
- 2 Select **Actions > Modify**.
- 3 (Optional) Enter a new name for the reporting schedule in the **Schedule Name** field.

Note: The name you enter is for your use in identifying the schedule listed in the **Reporting Schedules**. For example, if you want to run a weekly report on storage use, you enter `weeklystorageuse` as the schedule name to help locate that report. When a report is generated, the system automatically creates a name for the report. The name the system creates is based on the report type, (for example, `StorageUse_1374861600286`), not the name you assigned to the report schedule. The report name is displayed in the **Generated Reports** name column.

- 4 (Optional) Select a new type of report to generate from the **Report Types** menu.
- 5 (Optional) Click the expansion button to the right of **Start Time** to select a new start date and time.
- 6 (Optional) Select a new frequency.
- 7 (Optional) Select a new **Recurrence** value.

If the schedule frequency is **Weekly**, specify to generate the report every one, two, three, or four weeks, and on which day of the week to generate the report. Select multiple days to generate the report on more than one day during each week.

- 8 Click **OK** to save your modifications.

Your modified schedule is listed on the Reporting Schedules page. If you enabled the schedule, the scheduled report is listed on the Generated Reports page when the report is generated.

Related Links

[Modify Reporting Schedule Dialog](#)

[Delete a Reporting Schedule](#)

Delete a Reporting Schedule

Delete a reporting schedule when you no longer need to generate a report of this type on a regular basis.

- 1 From the **System** tab, navigate to **Reporting and Statistics > Reporting Schedules**.
- 2 Select the name of the reporting schedule you want to delete on the Reporting Schedules page.
- 3 Select **Actions > Delete**.
- 4 Click **OK** in the Confirm Delete Reporting Schedule dialog.

This removes the schedule name from the Reporting Schedules page, and no further reports are generated from this schedule. Reports that were generated from this schedule remain on the Generated Reports page until you delete them.

Manage Statistics and Trending

Storage Performance Statistical Data Overview

Statistical data is collected to help compare storage management objectives with storage performance. The statistical data is also used to supplement troubleshooting storage performance issues.

The Oracle FS System collects statistical data that enables you to perform the following tasks:

- Monitor system performance
- Review performance details by port, storage object, protocol, and Control Unit
- Analyze performance details to improve overall metrics

Performance data is available for the following functions:

- Drive Group
- CPU
- SAN LUNs
- SAN Controller Protocols

Statistical data is displayed as either performance or real-time data. The data is updated as follows:

Performance data

Performance data is refreshed every two minutes. An example of performance data is the data displayed under **SAN > Statistics and Trending > LUNs**, overview page.

Real-time data

Real-time data is refreshed every second. An example of real-time data is the **LUN Real Time Statistics** graph.

Note: Data is refreshed automatically if the **Configure Automatic Screen Updates** is set to the default value, **Enable Automatic Screen Updates**. If this is disabled, you need to use the keyboard combination of **Ctrl-Alt-R** to manually refresh the data. To change the settings, navigate to **Tools > Configure Automatic Screen Updates**.

You can also access the following statistical data:

Historical data

Historical data is available from a minimum of the previous one hour to a period you specify in hours or days. For further information on collecting and analyzing historical data, refer to the *Oracle Flash Storage System Statistics Tools User's Guide*.

Predefined report data

Statistical data is also available through predefined reports such as Storage Performance. These reports are available under **System > Reporting & Statistics > Generated Reports**.

Related Links

[Effectiveness of QoS Plus](#)

Storage Performance Statistical Data Terminology

Before reviewing performance data, review the key terminology used to describe storage performance as these terms form the base for understanding performance statistics.

These terms are used frequently to describe storage performance:

Input/Output per second

Measurement of the number of input and output operations completed per second. Input/Output per second (IOPS) is usually shown as read, write, and total IOPS.

Latency

When reading and writing data, latency is defined as the time it takes for a read operation or write operation to complete. Factors that contribute to latency include the amount of time to read data and write data from a disk, and the amount of time required to transfer the data over a storage link.

Queue Depth

Queue depth, sometimes referred to as I/O queue depth, is the number of I/O requests (pending or outstanding I/Os) waiting to be completed.

Response Time

Response time is the average time, in milliseconds, to complete an I/O operation.

Throughput

Throughput is measured as the amount of data, in megabytes per second, that is processed by the Oracle FS System. Throughput is also expressed in IOPS when measuring sequential data. Whether expressed as megabytes per second or as IOPS, throughput represents bandwidth.

Drive Group Statistics Overview

Access drive group statistics for real-time statistics that can be used to review performance.

When reviewing drive group statistics, consider the following information:

- The statistics include all drives contained within the drive group.

- The media type affects latency. For example, latency is higher for HDD and lower for SSD.

When reviewing drive group statistics, take note of the media type in the drive group as different media types have different performance characteristics. To determine the media type for a drive group, navigate to **System > Hardware > Drive Groups** and review the information under the **Media Type** column.

Note: Drive Group Statistics are only available as real-time statistics from the **Drive Group Real Time Statistics** graph which is accessed from **System > Reporting & Statistics > Drive Group Statistics > Actions > Drive Group Real Time Statistics**.

The available statistics that are displayed from the **Drive Group Real Time Statistics** include:

Drive Group Displays statistics for the selected drive group.

Valid statistics:

Read IOPS

Indicates the average number of read operations per second per drive group.

Write IOPS

Indicates the average number of write operations per second per drive group.

Total IOPS

Indicates the average number of read operations and write operations per second per drive group.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive group during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive group during write operations.

Total bytes per second

Indicates the total number of bytes for read and write activity per drive group.

Read latency

Indicates the average time to complete a read operation per drive group.

Write latency

Indicates the average time to complete a write operation per drive group.

Total latency

Indicates the average time to complete read operations and write operations at the frequency the operations occurred per drive group.

Read block size

Indicates the average read block size per drive group.

Write block size

Indicates the average write block size per drive group.

Total block size

Indicates the average block size per drive group.

Read queue depth

Indicates the number of read operations waiting to be completed for the drive group.

Write queue depth

Indicates the number of write operations waiting to be completed for the drive group.

Total queue depth

Indicates the number of read operations and write operations waiting to be completed for the drive group.

Related Links

[Configure Drive Group Real-Time Statistics](#)

Configure Drive Group Real-Time Statistics

You create a real-time statistics graph to display drive group statistics.

Prerequisite:

- Review the list of statistics that is available for the drive groups.

Statistics for drive groups are available in real-time and are updated every second.

- 1 To access real-time statistics for a drive group, navigate to **System > Reporting and Statistics > Drive Group Statistics**.
- 2 Select the drive group.
- 3 Select **Actions > Drive Group Real Time Statistics**.
- 4 Click **Add Graph**, select a statistic, and click **OK**.

If you want to display another statistic, select **Add Graph**, select a statistic, and click **OK**. A graph for that statistic is added to the **Drive Group Real Time Statistics** below the first graph.

You could also select another drive group and display a real-time statistic graph for that drive group. With both real-time graphs displayed, you can compare statistics between the drive groups.

- 5 To delete a graph, click **Remove Graph**

Related Links

[Display Multiple Real-Time Statistics Graphs](#)

Controller CPU Statistics Overview

Statistics are available for the selected Controller, which include percent time in kernel and total percent time busy. These statistics are used to identify system behaviors or variances in performance.

The two real-time statistics available are:

Percent Time in Kernel

Percentage of CPU utilization that occurred while executing commands at the system level. The scale is 0 to 100 percent.

Total Percent Time Busy

Percentage of time the CPU was busy on the Controller. The scale is 0 to 100 percent.

The measurements are used to identify trends in Controller usage. These statistics can be requested by Oracle Customer Support to help resolve potential system load issues, identify system capacity issues, or identify application issues.

Related Links

[Configure Controller CPU Real-Time Statistics](#)

[Display Multiple Real-Time Statistics Graphs](#)

Configure Controller CPU Real-Time Statistics

You can display statistics, which are percent time in kernel and total percent time busy, for a selected Controller CPU. The statistics and are used to identify performance issues in the system.

The CPU statistics are used to identify trends in Controller CPU usage.

- 1 To generate statistics about a Controller CPU, navigate to **System > Reporting and Statistics > CPU Statistics**.
- 2 Select a Controller.
- 3 Select **Actions > Controller CPU Real Time Statistics**.

When you select a real-time statistic, default statistics are automatically graphed and displayed. You can add or remove statistics as needed.

For Controller CPU real-time statistics, the default statistics graphed and displayed are percent time in kernel and total percent time busy.

- 4 Select **Add Graph**, then select either **Percent Time in Kernel** or **Total Percent Time Busy**.
- 5 Click **OK**.

After you select and display one statistic, you can select the other statistic to be displayed as a separate graph within the same panel. For example, you could select **Percent Time in Kernel** and display that graph and then choose **Total Percent Time Busy** and also display that graph in the same

panel. With both graphs displayed, you can view the statistics at the same time.

- 6 To delete a graph, click **Remove Graph**.

A graph displays the data for the statistic that you selected. The displayed data is updated every second.

Related Links

[Display Multiple Real-Time Statistics Graphs](#)

LUN Statistics and Trending Overview

The Oracle FS System collects statistics that provide information about storage network status and performance of the LUNs on the system.

LUN statistics are displayed in a table that is updated every two minutes, a detailed view that is updated every two minutes, or a real time statistics graph that is updated every second.

From the LUNs view, statistics are arranged by LUN name in the LUN statistics table. The statistics can be sorted by column by clicking on the column header.

Related Links

[Detailed LUN Statistics Descriptions](#)

[LUN Statistics Descriptions](#)

[LUN Real-Time Statistics Graphs Description](#)

[View LUN Statistics](#)

[Configure a Real-Time LUN Statistics Graph](#)

[View Detailed LUN Statistics](#)

[Display Multiple Real-Time Statistics Graphs](#)

LUN Statistics Descriptions

LUN statistics provide an overview of all LUNs present on your Oracle FS System.

You can review information and statistical data for each LUN. The data is refreshed every two minutes. You can manually refresh the data by pressing (entering) the keyboard combination of **Ctrl > Alt > R**.

Name

Identifies the name that is assigned to a LUN for administrative purposes.

Physical Allotted Capacity

Identifies the capacity, in gigabytes (GB), that is reserved for the LUN.

Priority Level

Identifies the priority level assigned to the specified LUN.

Valid levels:

- Archive
- Low
- Medium
- High
- Premium

IOPS

Indicates the average read and write operations per second.

Throughput

Indicates the data transfer rate in MB/s for read and write operations.

I/O Latency

Indicates the average time, in milliseconds, to complete the read operations or write operations.

I/O Size

Indicates the average size of the read operations and write operations.

Collection Period

Displays the start and the end time at which information was last collected from the Oracle FS System.

You can use this information to monitor the LUNs in your Oracle FS System or compare LUN performance and capacity for planning improvements to your system.

View LUN Statistics

You can view information and statistical data about all LUNs configured on the Oracle FS System on the LUN Statistics and Trending Overview page.

Prerequisite:

- One or more LUNs must be present on your Oracle FS System to create a LUN real-time statistics graph.
- 1 Navigate to **SAN > Statistics and Trending > LUNs**. All LUNs are presented in the table.
 - 2 (Optional) Click a column heading to sort the list by the contents of that column to view the information in a different order.

The displayed data is refreshed every two minutes.

Related Links

[LUNs Overview Page](#)

Detailed LUN Statistics Descriptions

Detailed statistics for each LUN is available from the **LUNs** page.

The following statistical data is refreshed every two minutes.

Name Identifies the name of the selected LUN.

Oracle FS System Performance

Specifies throughput and IOPS data divided by the CPU cycles needed to process those I/O requests from the LUN. The difference between **Oracle FS System Performance** and **System Load** is that **Oracle FS System Performance** includes the CPU cycles needed to perform read operations or write operations.

Read Throughput

Indicates the data transfer rate for read operations.

Write Throughput

Indicates the data transfer rate for write operations.

Total Throughput

Indicates the data transfer rate for read operations and write operations.

Read IOPS

Indicates the average number of read operations per second.

Write IOPS

Indicates the average number of write operations per second.

Total IOPS

Indicates the total read and writes operations per second.

System Load

Specifies throughput and IOPS data if the system devoted all resources to process those I/O requests from the LUN. The difference between **System Load** and **Oracle FS System Performance** is that the **System Load** does not include the CPU cycles needed to perform read operations or write operations.

Read Throughput

Indicates what the data transfer rate for data inputs, which are read operations, of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Write Throughput

Indicates the data transfer rate for data outputs, which are write operations, of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Total Throughput

Indicates the average data transfer rate for data read operations and write operations of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Read IOPS

Indicates the average number of read operations per second for read operations would be if the system devoted all of the CPU resources to the LUN.

Write IOPS

Indicates the average number of write operations per second for write operations would be if the system devoted all of the CPU resources to the LUN.

Total IOPS

Indicates the combined read and write operations per second would be if the system devoted all of the CPU resources to the LUN.

I/O Latency

Specifies the average time to complete a read or write operation (in milliseconds) and the average operation size (in KB).

Read Response Time

Identifies the average time to perform a read operation in the last sample period.

Write Response Time

Identifies the average time to perform a write operation in the last sample period.

Response Time

Identifies the average time to perform a read or write operation in the last sample period.

Read Operation Size

Identifies the average size of a read operation in the last sample period.

Write Operation Size

Identifies the average size of a write operation in the last sample period.

General

Specifies the I/O activity of the cache usage.

Cache Flushes per Second

Indicates the rate per second for which cache lines were flushed (written) to disk in the last sample period.

Cache Hit Ratio

Indicates the percentage of read operations that were completed from the read cache, which is also called cache hits, in the last sample period.

Read-Ahead IOPS

Indicates the average read operations per second from read-ahead fetching in the last sample period. Read-ahead fetching utilizes read access behavior in the sample period to determine read-ahead IOPS.

Non-Optimized IOPS

Indicates the total read operations and write operations per second that passed through non-optimized data paths in the last sample period. Optimized paths are preferred over non-optimized paths for performance. Non-optimized paths occur when there is no path management software used to manage data paths, the path management software is not configured correctly, or an optimized path is not available.

Path management software and applications provide load balancing and path management for improved performance

View Detailed LUN Statistics

You can view statistical information about all LUNs configured on the Oracle FS System on the LUN Statistics and Trending Overview page.

Prerequisite:

- One or more LUNs must be present on your Oracle FS System to create a LUN real-time statistics graph.
- 1 Navigate to **SAN > Statistics and Trending > LUNs**. All LUNs are listed in the LUN Statistics and Trending table.
 - 2 Select a LUN from the list.
 - 3 Navigate to **Actions > View Details** to view detailed information about the selected LUN.

The displayed statistics are refreshed every two minutes.

Related Links

[View LUN Statistics Detail](#)

LUN Real-Time Statistics Graphs Description

Real-time statistics collected from LUNs can be used to produce graphs that include performance data. Examples of performance data include read operations, write operations, latency, and queue depth.

The following real-time statistics are available for a LUN:

Read IOPS

Indicates the average number of read operations per second.

Write IOPS

Indicates the average number of write operations per second.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive during write operations.

Read latency

Indicates the average time to complete a read operation.

Write latency

Indicates the average time to complete a write operation.

Read block size

Displays the average amount of data read that are read in a read operation.

Write block size

Displays the average amount of data that are written in a write operation.

Total block size

Displays the average amount of data that are transferred in a read or write operation.

Read queue depth

Displays the number of read operations that are waiting to be fulfilled, on average.

Write queue depth

Displays the number of write operations that are awaiting to be processed, on average.

Total bytes per second

Displays the total bytes transmitted per second, on average.

Total IOPS

Indicates the total number of read and write operations per second.

Total latency

Indicates the average time to complete operations.

Total queue depth

Displays the total number of I/O operations that are queued for processing, on average.

Configure a Real-Time LUN Statistics Graph

LUN real-time statistics graphs provide a graphical view of the statistics available for the LUNs on your Oracle FS System.

To display a LUN real-time statistics graph, you need to select a LUN, and then select one or more statistics to display in the graph.

Prerequisite:

- One or more LUNs must be present on your Oracle FS System to create a LUN real-time statistics graph.

- 1 Navigate to **SAN > Statistics and Trending > LUNs**.
- 2 Select a LUN.
- 3 Select **Actions > LUN Real Time Statistics**.

When you select a real-time statistic, default statistics are automatically graphed and displayed. You can add or remove statistics as needed.

For LUN real-time statistics, the default statistics graphed and displayed are total latency and total I/O per second.

- 4 Click **Add Graph**, select a statistic, and click **OK**.

If you want to display another statistic, click **Add Graph**, select a statistic, and click **OK**. A graph for that statistic is added to the **LUN Real Time Statistics** below the first graph.

You could also select another LUN, and display a real-time statistic graph for that LUN. With both real-time graphs displayed, you could compare statistics between the LUNs.

- 5 To delete a graph, click **Remove Graph**.

The displayed statistical data is updated every second.

Related Links

[Display Multiple Real-Time Statistics Graphs](#)

SAN Controller Statistics and Trending Overview

The Oracle FS System collects statistics that can keep you informed about the storage network status and performance of the Controllers on the system.

SAN Controller statistics and details can be displayed for reference in static tables or displayed dynamically in a real-time statistics graph.

Statistics are arranged by Controller name in the SAN Controller Protocol Statistics table.

Related Links

[SAN Controller Statistics Descriptions](#)

[Detailed SAN Controller Protocol Statistics Descriptions](#)

[SAN Controller Real-Time Statistics Graph Description](#)

[View SAN Controller Protocols](#)

[View Detailed SAN Controller Protocols Statistics](#)

[Monitor the SAN Controller Statistics](#)

SAN Controller Statistics Descriptions

SAN Controller protocol statistics provide an overview of the Controller ports on your Oracle FS System.

You can review the status of the following:

Name	Identifies the name of the selected Controller.
Port Type	Identifies the Controller port protocol type, FC.
Slot Number	Identifies the Controller PCI slot assignment.
Port Number	Identifies the port numbers which are 0 or 1.
Negotiated Speed	Displays the transmission speed in Gbps/second for the port. The transmission speed is negotiated between the HBA or FC switch and the Controller.

Throughput (per Second)	Identifies the throughput in MB/second. Read Identifies the read throughput in MB/second. Write Identifies the write throughput in MB/second.
I/O Latency	Identifies the time in milliseconds to read or write data. Displays the following: Read Identifies the time to read data in milliseconds. Write Identifies the time to write data in milliseconds Combined Identifies the combined amount of time to read and write data in milliseconds.
I/O Size	Identifies the average size of the read and write operations.
Commands Received (per Second)	Displays the number of read and write commands received on the Oracle FS System each second over the last sampling period.
Channel Errors Since Activated	Displays the cumulative number of channel errors that have occurred since the Controller was activated.
Collection Period	Identifies the start and end times at which information was last collected from the Oracle FS System. Data is collected for a two-minute period and the data is refreshed every two minutes.

You can view more detailed information about Controllers by viewing details for a selected Controller. Detailed information is available for Fibre Channel (FC).

You can use this statistical information to monitor the Controllers or to compare Controller characteristics for planning improvements to your system.

View SAN Controller Protocols

You can view statistical information about all Controllers on the Oracle FS System at the **SAN Controller Protocols** page.

- 1 From the **SAN** tab, navigate to **Statistics and Trending > SAN > Controller Protocols**.
All Controllers are listed in the SAN Controller Protocol Statistics and Trending table.
- 2 Click the **Name** column heading to sort the list of Controllers.

Related Links

[Controller Protocol Statistics Overview Page](#)

Detailed SAN Controller Protocol Statistics Descriptions

Provides detailed statistics about Fibre Channel (FC) ports on a Controller.

The detailed information includes descriptions of FC ports on a Controller.

Name	Identifies the name of the Controller.
Slot	Identifies the HBA location (slots 1, 4, and 5) on the Controller.
Port Number	Identifies the HBA port numbers on the Controller.
Port Type	Identifies the HBA port type.

General Information

Read Throughput

Identifies the data transfer rate for data inputs (reads).

Write Throughput

Identifies the data transfer rate for data outputs (writes).

Total Throughput

Identifies the average combined input and output data transfer rates (reads and writes).

Total IOPS

Identifies the total number of I/O operations per second.

Performance

Max Read Throughput

Identifies the maximum input data transfer rate (reads).

Max Write Throughput

Identifies the maximum output data transfer rate (writes).

Max Total Throughput

Identifies the maximum combined input and output data transfer rate (reads and writes).

Max Read IOPS

Identifies the maximum number of input (read) I/O operations per second.

Max Write IOPS

Identifies the maximum number of output (write) I/O operations per second.

Max Total IOPS

Identifies the maximum total number of input and output (read and write) I/O operations per second.

SCSI Task Management Operations**Abort Task**

Indicates the number of abort task commands processed on the selected port.

Abort Task Set

Indicates the number of abort task set commands processed on the selected port.

A task set is a group of tasks.

Clear ACA

Indicates the number of Clear ACA (Auto Contingent Allegiance) commands processed on the selected port.

Clear Task Set

Indicates the number of clear task set commands processed on the selected port.

Logical Unit Reset

Indicates the number of reset logical unit commands processed on the selected port.

Target Reset

Indicates the number of target reset commands processed on the selected port.

I/O Latency

Specifies the average time to complete a read or write operation (in milliseconds) and the average operation size (in KB).

Read Response Time

Identifies the average time to perform a read operation in the last sample period.

Write Response Time

Identifies the average time to perform a write operation in the last sample period.

Response Time

Identifies the average time to perform a read or write operation in the last sample period.

Read Operation Size

Identifies the average size of a read operation in the last sample period.

Write Operation Size

Identifies the average size of a write operation in the last sample period.

FC Only

Channel Errors

Total Channel Errors

Indicates the total number of channel errors associated with this port.

Command Timeout Errors

Indicates the number of command timeout errors that have occurred on the channel associated with this port.

DMA Errors

Indicates the number of Direct Memory Access (DMA) errors that have occurred on the channel associated with this port.

Invalid RXID Errors

Indicates the number of invalid responder exchange identifier (RXID) errors that have occurred on the channel associated with this port.

Loop Init Errors

Indicates the number of loop initialization errors that have occurred on the channel associated with this port.

Overrun Errors

Indicates the number of overrun errors that have occurred on the channel associated with this port.

PCI Errors

Indicates the number of Peripheral Component Interconnect (PCI) errors that have occurred on the channel associated with this port.

Port Unavailable Errors

Indicates the number of port unavailable errors that have occurred on the channel associated with this port.

Reselection Timeout Errors

Indicates the number of reselection timeout errors that have occurred on the channel associated with this port.

Bad Frame Errors

Indicates the number of frames dropped from first-in or first-out buffer that have occurred on the channel associated with this port.

System Errors

Indicates the number of system errors that have occurred on the channel associated with this port.

Unacknowledged Host Event Errors

Indicates the number of unacknowledged host event errors that have occurred on the channel associated with this port.

Underrun Errors

Indicates the number of underrun errors that have occurred on the channel associated with this port.

Transfer Errors

Indicates the number of data transfer errors that have occurred on the channel associated with this port.

View Detailed SAN Controller Protocols Statistics

You can view statistical information about all Controllers configured on the Oracle FS System on the SAN Controller Protocols page.

- 1 From the **SAN** tab, navigate to **Statistics and Trending > SAN > Controller Protocols**.
All Controllers are listed in the SAN Controller Protocol Statistics and Trending table.
- 2 Click the **Name** column heading to sort the list of Controllers.
- 3 Select a Controller from the list.
- 4 To view detailed information about the selected Controller, select **Actions > View Details**.

Related Links

[View Details Dialog \(Fibre Channel\)](#)

SAN Controller Real-Time Statistics Graph Description

You can create charts of statistics collected from the Controller ports in your Oracle FS System to show trends in the data.

Statistics collected from Controller ports that can be used to produce trending charts include:

- The total amounts and rates of data read and written through a specified Controller port
- Statistics specific to the Fibre Channel (FC) protocol

The statistics that can be displayed include IOPS and bytes read and written:

Read IOPS

Indicates the number of read I/O operations per second.

Write IOPS

Indicates the number of write I/O operations per second.

Total IOPS

Indicates the total number of read and write IOPS.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive during write operations.

Total bytes per second

Displays the total number of bytes for read and write operations.

Monitor the SAN Controller Statistics

A real-time statistics graph for a SAN Controller provides a graphical view of the statistics available for the Controllers on your Oracle FS System.

Prerequisite:

- One or more Controllers must be accessible on your Oracle FS System to create a real-time statistics graph.

- 1 Navigate to **SAN > Statistics and Trending > Controller Protocols**.
- 2 Select a Controller.
- 3 Select **Actions > FC Port Real Time Statistics**.

When you select a real-time statistic, default statistics are automatically graphed and displayed. You can add or remove statistics as needed.

For FC port real-time statistics, the default statistic graphed and displayed is total I/O per second.

- 4 Click **Add Graph**, select a statistic, and click **OK** to display the graph. If you want to display another statistic, click **Add Graph**, select a statistic, and click **OK**.

A graph for that statistic is added to the **FC Port Real Time Statistics** below the first graph.

The displayed statistical data is updated every second.

Related Links

[Display Multiple Real-Time Statistics Graphs](#)

Example to Determine Performance During Peak Usage

The following example describes a process to measure Oracle FS System performance to determine if performance objectives are met in peak usage periods.

In this example, the administrator wants to determine if performance objectives are met during a peak usage period by reviewing latency and IOPS on key LUNs. The administrator needs to:

- measure system performance in real-time during a peak period when user activity is high.

- validate the performance of key LUNs used during the peak period.

The administrator needs to collect the following data in real-time:

- Latency on the selected LUNs that are most active during the peak period
- IOPS on the selected LUNs that are most active during the peak period
- Percentage CPU is busy on the Controller
- IOPS on the Fibre Channel ports
- Latency on all drive groups

Determine Performance During Peak Time

These are suggested steps to determine Oracle FS System performance using the Oracle FS System Manager (GUI) during a peak usage period to capture statistics. The statistics are used to determine the overall health of the system and of specific LUNs.

Prerequisite:

- Knowledge of LUNs and drive groups including host-to-LUN mapping.
- 1 To determine latency for a selected LUN, navigate to **SAN > Statistics and Trending > LUNs** and select the LUN. You can choose one of these methods to view the data:
 - 1 You can view the I/O latency data from the LUNs Overview page.
 - 2 For additional I/O latency data from the LUNs Overview page, select a LUN and then select **Actions > View Details** for more information.
 - 3 If you want to view the I/O latency in a real-time graph, select **Actions > LUN Real Time Statistics**. From the **LUN Real Time Statistics**, click **Add Graph**, select **Total Latency**, and click **OK**.
 - 2 To determine the IOPS for a selected LUN, navigate to **SAN > Statistics and Trending > LUNs** and select the LUN.
 - 1 You can view the IOPS data from the LUNs page.
 - 2 You can select **Actions > View Details** to display more details.
 - 3 If you want to view the IOPS in a real time graph, select **Actions > LUN Real Time Statistics**. From the **LUN Real Time Statistics**, click **Add Graph**, select **Total IO Per Second**, and click **OK**.
 - 3 To determine the percentage the CPU is busy on the Controller, navigate to **System > Reporting and Statistics > CPU Statistics**.
 - 1 Select the Controller.
 - 2 Select **Actions > Controller CPU Real Time Statistics**.
 - 3 Click **Add Graph** and select **Total Percent Time Busy**.
 - 4 Click **OK**.

- 4 To determine the IOPS for FC ports, navigate to **SAN > Statistics and Trending > Controller Protocols** and select the Controller.
 - 1 Select **Actions > View Details** to display IOPS data.
 - 2 If you want to view the IOPS in a real time graph, select **Actions > FC Port Real Time Statistics**.
 - 3 From the **FC Port Real Time Statistics**, click **Add Graph**, select **Total IO Per Second**, and click **OK**.
- 5 To determine the latency of a drive group, navigate to **System > Reporting and Statistics > Drive Group Statistics**.
 - 1 Select the Controller.
 - 2 Select **Actions > Drive Group Real Time Statistics**.
 - 3 Click **Add Graph**, select **Total Latency**.
 - 4 Click **OK**.

By checking latency and IOPS on the key LUNs, you can determine if performance meets performance objectives. If these values appear to be problematic, the other values already charted provide you with information on where to begin to identify the cause. The FC port information can provide insight into FC throughput. Latencies on LUNs or drive groups should not exceed a limit established by the administrator's guidelines. Based on experience, you can identify LUN values that are high or low.

Related Links

[CPU Statistics Overview Page](#)

[Drive Group Statistics Overview Page](#)

[View Details Dialog \(Fibre Channel\)](#)

[View LUN Statistics Detail](#)

[Display Multiple Real-Time Statistics Graphs](#)

Example to Determine the Effect of Adding an Application

This is an example of how to measure Oracle FS System performance to determine if adding an application to the system impacts application performance of other applications.

Before adding an application and after adding an application to a new LUN or existing LUNs, performance data, specifically latency and IOPS, is collected. The data is collected to create a baseline to determine if adding an application impacts performance or causes contention with other applications.

By checking latency and IOPS on existing LUNs, you can determine if data performance is acceptable on the LUNs after adding an application to a new LUN or existing LUNs. If the data performance is not acceptable, you might need to install the application on another LUN or you might need to move the LUN to another Storage Domain.

Determine if Adding an Application Impacts Performance

These steps provide an example of how to measure Oracle FS System performance using the Oracle FS System Manager (GUI) to determine if adding an application impacts performance.

Prerequisites:

- Name of the LUNs where the application is installed.
- Storage Domain for the application LUN or LUNs and existing LUNs.

The process begins when you capture real-time statistics for the existing LUNs in the Storage Domain before the application is installed and after the application is installed. If new a LUN or LUNs were created for the application, you would capture real-time statistics for the LUN or LUNs after the application is installed.

Note: This example assumes that the applications on the LUNs are generating the same amount of data before and after installation of the new application.

These steps describe the process for capturing total latency and total IOPS. You would capture this data before you added the application and after you added the application. If a new LUN or LUNs were added for the application, you would capture the data for that LUN or LUNs after the application was installed.

- 1 To determine the Storage Domain for the LUNs, navigate to **SAN > Storage > LUNs**. The Storage Domain is listed under the column **Groups**.
- 2 To determine latency for a LUN, navigate to **SAN > Statistics and Trending > LUNs** and select the LUN.
 - You can view the I/O latency data from the LUNs page.
 - You can select **Actions > View Details** to display more details.
 - If you want to view the I/O latency in a real-time graph, select **Actions > LUN Real Time Statistics**.
 - From **LUN Real Time Statistics**, click **Add Graph**, select **Total Latency**, and click **OK**.
- 3 To determine the IOPS for a LUN, navigate to **SAN > Statistics and Trending > LUNs** and select the LUN.
 - You can view the IOPS data from the LUNs page.
 - You can select **Actions > View Details** to display more details.
 - If you want to view the IOPS in a real-time graph, select **Actions > LUN Real Time Statistics**.
 - From **LUN Real Time Statistics**, click **Add Graph**, select **Total IO Per Second**, and click **OK**.

From the same LUN, you could first open the graph for **Total Latency** and then for **Total IO Per Second** so that both graphs appear within the same pane to compare statistics. You could also do this for other LUNs if you want to compare statistics for multiple LUNs at one time.

By checking latency, and IOPS, on the LUNs, the administrator determines if the performance changed and is acceptable after adding the application.

Related Links

[View LUN Statistics Detail](#)

[Display Multiple Real-Time Statistics Graphs](#)

Display Multiple Real-Time Statistics Graphs

Display multiple real-time statistics graphs in one panel to view or compare multiple statistics.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**
 - **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 For example, choose **LUN Real Time Statistics**, click **Add Graph**, select **Read Queue Depth**, and click **OK**.
- 4 After **Read Queue Depth** is displayed, click **Add Graph**, select **Write Queue Depth** and click **OK**.
- 5 After **Read Queue Depth** is displayed, click **Add Graph**, select **Total Queue Depth** and click **OK**.

Graphs for all three statistics are displayed in the same panel, and are refreshed every second. This process applies to all real time statistics graphs.

Note: You can delete a graph by clicking **Remove Graph** in order to view different statistics.

Customize the Display of a Statistics Graph

You can customize the appearance of any real-time statistic graph using the **Properties** function that is accessed from the graph.

Create a real-time statistics graph and then customize the labels, fonts, color, and plot line appearance displayed in the graph using graph's controls from the **Properties** function.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**
 - **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 Select a statistic and then click **Draw Graph**.
- 4 Click inside the graph, and then click the right mouse button to modify the graph.

A menu is displayed with choices for modifying the graph.
- 5 Select **Properties**.

The **Chart Properties** dialog is displayed.
- 6 Select **Title**, **Plot**, or **Other** to change labels, fonts, color, and plot line appearance used in the graph.
- 7 Click **OK** to save your changes.

The changes are saved during the time the graph is displayed. Once you close the graph, the changes to the graph are discarded.

Customize the View of a Real-Time Statistics Graph

You can customize the view of a real-time statistics graph by zooming in and zooming out to view details in the graph.

Create a real-time statistics graph and then modify the graph using controls available with the graph.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**

- **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 Click **Add Graph**, select a statistic, and click **OK**.
 - 4 Click inside the graph, and then click the right mouse button to modify the graph.
A menu is displayed with choices for modifying the graph.
 - 5 Click **Zoom In** or **Zoom Out** to expand or shrink the data displayed in the graph.
You can use the **Auto Range** to reset the graph.

Save a Real-Time Statistics Graph

You can save a real-time statistics graph as a Portable Network Graphic (PNG) file. The file you save is snapshot of the graphic displayed on your workstation and reflects what you see; no additional data is included in the graphic.

You can copy, save, or print a real-time statistics graph as a file when the graph is displayed in the **Real Time Statistic Graph** dialog. For example, if you are reviewing CPU Statistics, a graph for either Percent Time in Kernel or Total Time Busy is displayed in the **Controller CPU Real Time Statistics** dialog. You can copy, save, or print that graph as a PNG file.

Copied, saved, or printed graphs provide a snapshot of the statistics shown at one point in time.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**
 - **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 Click **Add Graph**, select a statistic, and click **OK**.
- 4 Click inside the graph, and then click the right mouse button to modify the graph.
A menu is displayed with choices for modifying the graph.
- 5 Click **Save as ...**.
- 6 Navigate to a location on your local workstation where you want to save the graph.

- 7 Enter a filename for the graph. For example, the statistic was percent real-time kernel from the **Controller CPU Real Time Statistics** graph. You could use the filename, `percentrealtimekernel`.
- 8 Click **OK**.

The graph is saved as a PNG file with a file extension of `png`.

Copy a Real-Time Statistics Graph

Copy a real-time statistics graph as a Portable Network Graphic (PNG) file to import the file directly into another program such as word processing application.

You can copy, save, or print a real-time statistics graph as a file when the graph is displayed in the **Real Time Statistic Graph** dialog. For example, if you are reviewing CPU Statistics, a graph for either Percent Time in Kernel or Total Time Busy is displayed in the **Controller CPU Real Time Statistics** dialog. You can copy, save, or print that graph as a PNG file.

Copied, saved, or printed graphs provide a snapshot of the statistics shown at one point in time.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**
 - **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 Click **Add Graph**, select a statistic, and click **OK**.
- 4 Click inside the graph, and then click the right mouse button to modify the graph.

A menu is displayed with choices for modifying the graph.
- 5 Click **Copy** and import the PNG file into the application, such as a word processing application.

The image file of the chart is inserted into the application.

Print a Real-Time Statistics Graph

Print real-time statistics graphs to provide a graphical snapshot of the trends shown at one point in time in the chart.

You can copy, save, or print a real-time statistics graph as a file when the graph is displayed in the **Real Time Statistic Graph** dialog. For example, if you are reviewing CPU Statistics, a graph for either Percent Time in Kernel or Total Time Busy is displayed in the **Controller CPU Real Time Statistics** dialog. You can copy, save, or print that graph as a PNG file.

Copied, saved, or printed graphs provide a snapshot of the statistics shown at one point in time.

- 1 Choose a function where real-time statistic graphs are available:
 - **System > Reporting and Statistics > Drive Group Statistics**
 - **System > Reporting and Statistics > CPU Statistics**
 - **SAN > Statistics and Trending > LUNs**
 - **SAN > Statistics and Trending > Controller Protocols**
- 2 Select one of the following actions to access the real-time graph function:
 - **Actions > Controller CPU Real Time Statistics**
 - **Actions > Drive Group Real Time Statistics**
 - **Actions > LUN Real Time Statistics**
 - **Actions > FC Port Real Time Statistics**
- 3 Click **Add Graph**, select a statistic, and click **OK**.
- 4 Click inside the graph, and then click the right mouse button to modify the graph.

A menu is displayed with choices for modifying the graph.
- 5 Select **Print** and then follow your operating system print instructions.

The system sends a print image of the real-time statistics graphic to the printer you selected.

Oracle FS System Limits

Operating Limits for an Oracle FS System

The following table lists the numbers of objects that can be configured for an Oracle FS System.

Table 16: System limits

Object	Quantity range
Storage Domains	Minimum: 1 (the default Storage Domain) Maximum: 32 per Oracle FS System
volume size	Maximum: System capacity

System Limits for SAN Objects

The following table lists the numbers of SAN-related objects that can be configured for an Oracle FS System.

Table 17: SAN operating limits

Object	Quantity range
SAN host connections (active)	Maximum: <ul style="list-style-type: none"> • 512 active connections per SAN Controller port • 3072 per SAN Controller (with 6 ports) • 6144 per Oracle FS System (with 12 ports)
SAN LUNs	Maximum: <ul style="list-style-type: none"> • 4096 visible for any given SAN Controller • 4096 visible across all SAN Controllers in a given system • 4096 visible per SAN host
SAN LUN size	Maximum: System capacity
Volume copies	Maximum: 13 volume copies (per volume) in progress at any given time

Table 17: SAN operating limits (continued)

Object	Quantity range
LUN clones (partial block snapshots)	Maximum: 1024 partial block snapshots of a single source volume active at a time Note: Internal Oracle FS System resources might prevent you from configuring maximum settings.
volume groups	Minimum: 1 (default volume group) Maximum: 5000 total
repositories ¹	Maximum: 4096

¹ A repository is a space reserved for clones and is associated with a logical volume. A repository holds metadata for the clones of that volume. A volume has at most one repository VLUN. For every SAN LUN that is not autotiered, a metadata VLUN exists. For every autotiered SAN LUN, a Progression Map (metadata) VLUN exists.

System Tab Reference Pages

Add to Storage Domain Dialog

Navigation: System > Storage Domains > Actions > Add to Storage Domain

Adds an unassigned drive group to a Storage Domain.

Before a drive group can be used, the drive group must be assigned (added) to a Storage Domain.

Note: For the most effective rebalancing and use of system resources, include as many drive groups as possible in a single request.

Storage Domain	Specifies the assigned Storage Domain for the selected drive groups.
Rebalance Volume Data	Specifies that the system balances the existing volumes across the drive groups when you add drive groups to the Storage Domain. When enabled, the system distributes the data of the existing volumes to all of the drive groups in the Storage Domain. Not selecting the option retains the data distribution across the existing drive groups in the Storage Domain. The system rebalances the volume data even when the Enable Automatic QoS Rebalancing is selected from the Create Storage Domain dialog.
Drive Groups to be Included	Displays the drive groups that are to be associated with the Storage Domain.
Additional Drive Groups to Include	Displays additional drive groups that are not associated with a Storage Domain. You can also add those drive groups to the Storage Domain. Select the drive groups you want to include. Note: If there is only one drive group, this list of additional drive groups to include is not displayed.

Related Links

[Assigning Drive Groups](#)

[Add Drive Groups to a Storage Domain](#)

Administrator Accounts Overview Page

Navigation: System > Global Settings > Administrator Accounts

Displays the user name, ID or Fully Qualified Name (FQN), role, full name, email address, phone number, and whether each account is enabled.

This page provides options to create, modify, delete, and view administrator accounts.

Up to 10 active administrator sessions can be defined. Of these 10 sessions, one is reserved for the Primary Administrator role and another one for the Administrator 1 role.

Login Name	Lists administrator login, or user names. Click a name to review or modify the administrator account.
Role	Identifies the role that is assigned to the administrator account. A role defines which permissions are granted to the administrator. <ul style="list-style-type: none"> • Primary Administrator • Administrator 1 • Administrator 2 • Monitor • Support • Oracle support
Disabled	Identifies whether the administrator account is disabled. <p>No</p> <p>Indicates that the account is active. Administrators whose accounts are enabled can log in to the Oracle FS System.</p> <p>Yes</p> <p>Indicates that the account is inactive. Administrators whose accounts are disabled cannot log in.</p>
Full Name	Identifies the first and last name associated with the administrator account.
Email Address	Identifies the email address of the recipient. The email server to which the Oracle FS System sends alerts must be able to receive messages at this address. The system does not validate this address.
Phone Number	Identifies the phone number associated with the administrator account. The Oracle FS System does not verify the validity of this entry. <p>Note: Enclose telephone numbers with spaces in quotes.</p>

Related Links

[Administrator Account Management](#)

Alerts and Events Overview

Navigation: *System > Alerts and Events*

Displays links for managing system alerts and events and for reviewing the system status and the hardware details.

Status Summary	Displays the overall system status allowing you, for example, to discover the status of individual hardware components.
System Alerts	Manages the system alerts allowing you, for example, to know when to allocate additional capacity to a volume.
Event Log	Manages the event logs and the event filters.
Event Notification	Manages the types of events to be monitored and the email addresses of the notification recipients.

Related Links

[System Notifications](#)

Controllers Overview Page

Navigation: System > Hardware > Controllers

Displays the properties of the Controllers that are a part of the Oracle FS System.

Options available from this page allow you to run diagnostics, locate Controllers on the Oracle FS System, and view Controller details.

Name	Lists the names of hardware components. Click a name to display details about that hardware component.
Comment	Displays descriptive text that is associated with a Controller. A comment can include up to 256 characters.
Service Type	Lists how much memory is optimized for I/O performance to support either SAN or NAS by reallocating the cache resources.
Failover Controller	Identifies the Controller that is used if the other Controller fails in the pair.
Status	Displays the current status of the Controller. A status of Normal requires no action.
Temperature	Displays the temperature status of the Controller.
Chassis	Displays the current status of the Controller chassis.
Motherboard	Displays the current status of the Controller motherboard assembly.
Power Supply	Displays the current status of the Controller power supply.
Fans	Displays the current status of the Controller fans.
Energy Storage Modules	Displays the current status of the Controller energy storage modules.
HBA Module	Displays the status of installed Host Bus Adapter (HBA) on the Controller. This includes HBAs that connect to host servers and HBAs that connect to Drive Enclosures.

Related Links[Controller Management](#)[View the Status of the Controllers](#)**Controller Ports Overview Page***Navigation: System > Global Settings > Controller Ports*

Lists the topology properties of the network ports for each of the Oracle FS System Controllers. An administrator can manage the properties of a Controller from this page.

Name	Identifies the information about the Controller. The column includes the following information: <ul style="list-style-type: none"> • Controller name • Adapter slot number • Adapter port number
Status	Identifies the HBA connection status. Valid states: <ul style="list-style-type: none"> • Normal • Connected • Not connected • Missing
Port Type	Indicates the type of HBA. Valid types: <ul style="list-style-type: none"> • Ethernet • Fibre Channel (FC) • Serial Attached SCSI (SAS)
Address	Identifies the unique address of the Oracle FS System Controller port on the network.
Network Link	<p>Negotiated Link Speed</p> <p>Indicates the port transmission speed in Gigabits each second.</p> <p>Medium Type</p> <p>Identifies the types of small form-factor pluggable (SFP) transceiver interface devices used for data path traffic between the customer network switches and the Controllers.</p> <p>Valid SFP interface types:</p>

- Copper
- Optical
- Long Wave Optical
- Short Wave Optical

Related Links

[Controller Ports](#)

[View a Summary of all the Controller Ports](#)

CPU Statistics Overview Page

Navigation: *System > Reporting and Statistics > CPU Statistics*

Provides access to details about statistics that are available for the selected Controller CPU. No statistics are displayed on this page; statistics are only available by selecting **Actions CPU Statistics**.

Valid choices:

Controller Identifies the selected Controller.

To generate statistics about a Controller CPU, select a Controller and then select **Actions > Controller CPU Real Time Statistics**. Click **Add Graph** and select a statistic (you can review the following list for details).

The two choices are:

Percent Time in Kernel

Percentage of CPU utilization that occurred while executing commands at the system level. The scale is 0 to 100 percent.

Total Percent Time Busy

Percentage of time the CPU was busy on the Controller. The scale is 0 to 100 percent.

This measurement can be used to identify trends in Controller CPU usage that can cause performance issues. For example, if the **Total Percent Time Busy** for the CPU exceeds 90%, there can be I/O bottleneck at the Controller. These statistics are generally requested by Oracle Customer Support to help resolve potential system load issues, identify system capacity issues, or application issues.

Related Links

[Controller CPU Statistics Overview](#)

Create Administrator Account Dialog

Navigation: *System > Global Settings > Administrator Accounts > Actions > Create*

Creates new administrator accounts.

Login Name Identifies the login name assigned to the administrator account. This field is limited to 20 characters.

Role Identifies the authorized privileges for an administrator account. Different roles are authorized to perform different functions:

admin1Administrator 1

The administrator role for a login account that provides the authority to perform all administrative tasks and all configuration tasks except for certain tasks that are reserved for the support roles.

admin2Administrator 2

The administrator role for a login account that provides the authority to perform most administrative and configuration tasks. A login account assigned to this role cannot, however, perform the following tasks:

- Manage the administrator accounts and other global system settings such as those settings for networking, the Controller ports, system security, and the system time.
- Perform software upgrades or use Guided Maintenance to replace hardware components.
- Shut down the Oracle FS System system.

monitorMonitor

An administrator role for login accounts that provides the authority for those accounts to perform read-only management tasks and to modify their own account properties.

supportSupport

A unique login account solely for support representatives. This login account is not authorized to modify or delete data resources, system alerts, or administrator accounts.

Important: Use this account only if you are familiar with it or instructed by Oracle Customer Support.

For the following predefined roles, you cannot assign administrators to them and you cannot delete them:

Primary system administratorprimaryadmin

A login account that has the same privileges as the `primaryadminAdministrator 1` role.

Primary support administratorPrimarySupport

A login account that has the same privileges as the `monitorMonitor` role, as well as privileges to perform support-related tasks.

Full Name	Identifies the first and last name associated with the administrator account.
Email Address	Identifies the email address associated with the administrator account. The email username can have up to 64 characters and the email domain can have up to 255 characters. The email server to which the Oracle FS System sends alerts must be able to receive messages at this address. The system does not validate this address. Note: An IP address cannot be entered as the email domain.
Phone Number	Identifies the phone number associated with the administrator account. The Oracle FS System does not verify the validity of this entry. Note: Enclose telephone numbers with spaces in quotes.
Password	Identifies the password of the administrator account. Enter the password; follow the password rules displayed on the dialog.
Confirm Password	Confirms that the password was entered correctly.
Password Duration	Select a duration between 1 to 180 days to determine when the password expires. Set the value to 0 to disable password expiration. When password expiration is disabled, the password never expires. Refer to your company's policy on password expiration to determine the duration you should set.
Disable Account	Indicates whether the administrative account is disabled. The Oracle FS System maintains disabled accounts but does not allow them to log in. A disabled account can be enabled later by modifying it. This setting takes effect immediately. If the administrator is logged in when you disable the account, the system logs out the administrator immediately. Note: You cannot disable the <code>primaryadmin</code> Primary system administrator account.

Related Links

[Create an Administrator Account](#)

Create Event Notification Dialog

Navigation: System > Alerts and Events > Event Notification > Actions > Create

Creates event notices when specified events occur.

When an event is triggered, the Oracle FS System sends a notification to the designated email recipients.

Name	Identifies the name of the event notification.
Description	Describes the event notification.

Enable Event Notification	Indicates whether event notification is enabled. Select this option to activate the notification when the event occurs on the Oracle FS System.
Event Notification Recipient Email Addresses	Identifies the email addresses of the recipients who are to receive event notifications. The email server to which the Oracle FS System sends notifications must be able to send messages to the email addresses.
Add	Allows you to add email addresses of one to four subscribers or externally defined mailing lists to the event notification.
Test Email	Sends a message to the specified email addresses to test the recipient email addresses. Recipients receive a message that is titled “[Oracle-QoS] Test email” in their email in-boxes. Note: Allow at least 10 minutes between email tests.
Remove	Deletes the selected email address from the list.

Monitored Events

By severity, then category	Sorts the list of events by severity with a list of event categories. The severity categories include: Informational Requires no action for events that are information only. Warning Requires no immediate action for minor conditions that you can address at your convenience. Critical Requires prompt action to prevent system failures or offline conditions.
By category, then severity	Sorts the list of events by categories with a list of event severity. The categories include: Security Events to notify of a security problem, such as an unauthorized request. Audit Events that track what users are doing, such as the operations that they performed. System Events to notify of system problems, such as a missing Drive Enclosure or Controller.
Events Not Monitored	Provides the list of events not set to be monitored. The Oracle FS System does not trigger a notification when an event listed occurs.

From the list, you can specify the events to be monitored. You can sort the list by severity or category.

Monitored Events

Provides the list of events that you specified to be monitored. The Oracle FS System triggers a notification each time an event that you specified occurs. The email addresses specified in the **Event Notification Recipient Email Addresses** field receive the event notifications. You can sort the list by severity or category.

Related Links

[Create an Event Notification](#)

Create Reporting Schedule Dialog

Navigation: *System > Reporting and Statistics > Reporting Schedules > Actions > Create*

Creates new schedules for generating reports.

Schedule Name

Enter a name for the schedule. The name is displayed in the **Name** column on the **Reporting Schedules** page. If you do not specify a name, the system uses the default name of `untitled`.

Note: The name you enter is for your use in identifying the schedule listed in the **Reporting Schedules**.

For example, if you want to run a weekly report on storage use, you might enter `weeklystorageuse` as the schedule name to help you locate that report. When a report is generated, the system automatically creates a name for the report, itself. The name the system creates is based on the report type, such as `StorageUse_1374861600286` not the name you assigned to the report schedule. The report name is displayed in the **Generated Reports** name column.

Report Type

SAN Hosts

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers, firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

Enabled	Specifies whether the scheduled report is active or inactive. To make a scheduled report active, check the Enable checkbox. If you do not want the scheduled report to be active, do not check the Enable checkbox. The scheduled report is still listed under Reporting Schedule but reports are not generated.
Start Time	Specifies the date and time to begin generating reports.
Schedule Frequency	Specifies the frequency at which the schedule generates reports. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Recurrence	Specifies how many hours, days, or weeks to wait before generating this scheduled report again. You can also specify a specific day on which you want the report to be generated.

Related Links[Create a Reporting Schedule](#)

Create SNMP Host Dialog

Navigation: System > Global Settings > SNMP > Actions > Create

Creates Simple Network Management Protocol (SNMP) trap hosts.

Name	Identifies the name for the SNMP host.
Host IP	Identifies the IP address or domain name of a client that receives the Oracle FS System SNMP information.
Community string	Identifies the community string for use when the Oracle FS System sends an event trap to the SNMP host. Note: When an administrator does not specify a community string for read-only access, SNMP servers and clients typically use <code>public</code> .
Receive traps	Indicates that the SNMP host receives event traps sent to it.
Trap Port Number	Identifies the SNMP host port number to use for sending an event trap. If you do not provide this option, no traps are sent to the SNMP host.
Severity threshold	Identifies the severity threshold for events that the system sends to the SNMP host by event traps. Severity levels: <ul style="list-style-type: none"> • Informational • Warning • Critical

Related Links[Create SNMP Hosts](#)

Create Storage Domain Dialog

Navigation: System > Storage Domains > Actions > Create Storage Domains

Creates and configures properties for a new Storage Domain.

Name	Specifies the name of this Storage Domain. This name must be unique within the Oracle FS System. Storage Domain names can consist of up to 82 UTF-8 printable characters. The name cannot include the following characters: <ul style="list-style-type: none"> • / (forward slash) • \ (backward slash)
-------------	--

- . (dot)
- .. (dot dot)
- tab

**Background
Process
Priority**

System Chooses

(Default) Specifies that the system balances the resources that are needed for background data movement with the resources that are needed to service the incoming client I/O.

Minimize Impact

Specifies that the system restricts the amount of system resources that are given to the background data movement operation. This option minimizes the impact on client I/O. Recommended for highly-loaded Storage Domains.

Maximize Speed

Specifies that the system grants resource priority to the background data movement operation. This option reduces the amount of system resources that are available for client I/O. Recommended for lightly-loaded Storage Domains.

**Enable
Automatic
QoS
Rebalancing**

Specifies that the system balances the existing volumes across the drive groups when you add drive groups to the Storage Domain. When enabled, the system distributes the data of the existing volumes to all of the drive groups in the Storage Domain. Not selecting the option retains the data distribution across the existing drive groups in the Storage Domain.

**Enable Tier
Reallocation**

Specifies that any tiered data that resides in this Storage Domain has data progression enabled. Individual objects might have tier reallocation disabled. Enabling tier reallocation at the Storage Domain level does not override any objects that have tier reallocation disabled. The default value is enabled.

**Enable Tier
Reallocation
Statistics
Collection**

Specifies that the Oracle FS System internally collects data usage patterns for the Storage Domain. The patterns are analyzed to determine the optimum Storage Classes for the data. The default value is enabled. Do not change this setting unless you need to test different profiles.

Disable this setting if you are modifying your Storage Profile for testing purposes and did not want to collect statistics during the test. You do not want to collect tier reallocation statistics during the test as this might distort future tier reallocation. After you complete testing, enable tier reallocation statistics collection.

Note: Enabling or disabling the tier reallocation statistics collection has no effect on statistics you can view for CPU, drive groups, LUNs. (Those are a different set of statistics.)

Auto-Tier Scan Options (Advanced)

Optimizes the auto-tier algorithm for moving data to different Storage Classes. You can specify the interval for when auto-tier moves frequently accessed data blocks and infrequently accessed data blocks to match your application activity.

Note: To unlock the auto-tier scan options, select the lock icon. Selecting the lock icon again resets the values to the state when the fields were unlocked.

Performance-Optimizing Scan Cycle

Specifies the frequency, in hours, that auto-tier scans to move frequently accessed data blocks to a high performance Storage Class.

For example, a value of 32 means that every 32 hours auto-tier scans the system to move frequently accessed data blocks to a high performance Storage Class.

Updates to this field affect the label of the **Number of *n*-hour Scan Cycles** field. For example, a value of 32 changes the label for the **Number of *n*-hour Scan Cycles** to **Number of 32-hour Scan Cycles**.

Enter a value from **1** through **168**.

Number of *n*-hour Scan Cycles

Specifies the frequency that auto-tier runs the performance-optimizing scan cycles before auto-tier runs the cost-optimizing scan cycle. The value entered in the **Number of *n*-hour Scan Cycles** field is multiplied by the value entered in the **Performance-Optimizing Scan Cycle** field to obtain the value set in the **Cost-Optimizing Scan Cycle** field.

For example, a value of 5 means that every fifth time that auto-tier runs the performance-optimizing scan cycle, auto-tier then runs the cost-optimizing scan cycle to move infrequently accessed data to a less expensive storage class.

Enter a value from **2** through **31**.

Cost-Optimizing Scan Cycle

(Read-only) Displays the frequency, in hours, that auto-tier scans to move infrequently accessed data blocks to a less expensive Storage Class.

The value displayed in this field is calculated as the product of the value you entered in the **Performance-Optimizing Scan Cycle** field and the value you entered in the **Number of *n*-hour Scan Cycles** field.

For example, to set auto-tier to move infrequently accessed data blocks to a less expensive Storage Class every 200 hours, enter the following values:

- Performance Optimizing Scan Cycle: **25**
- Number of 25-hour Scan Cycles: **8**

The system displays **200** in the **Cost-Optimizing Scan Cycle** field. In this example, the values that you enter instruct auto-tier to run the performance-optimizing scan every 25 hours. Then, during

every eighth scan cycle (or every 200 hours), auto-tier runs a cost-optimizing scan to move infrequently accessed data blocks to a less expensive Storage Class.

Allowable Storage Capacity for Auto-Tiered LUNs

Indicates the maximum percentage of storage capacity to dedicate to auto-tier reallocation for each Storage Class of the Storage Domain. Enter a percentage for each available Storage Class.

The default value is 100%.

Related Links

[Create a Storage Domain](#)

Create Storage Profile Dialog

Navigation: System > Global Settings > Storage Profiles > Actions > Create Storage Profile

Adds a new Storage Profile with custom QoS. The Storage Profile can then be selected when managing a logical volume.

Name Identifies the name of the Storage Profile. The name includes, in some instances, the name of the application that is associated with the profile.

Storage Profile names can consist of up to 128 UTF-8 characters.

Enter Basic QoS Settings Opens the Enter Basic QoS Settings dialog where you can enter the following basic QoS parameters. The system converts the basic setting selections to the following advanced QoS settings:

- RAID Level
- Read Ahead

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

RAID Level

Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the

loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority

Identifies the priority that the system gives to various operational aspects of a logical volume, such as the Controller processing queue. The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume. Identifies as well where the data is striped on rotating drives. Valid priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue

High

Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

Advanced

Provides access to the QoS properties that might affect system performance.

Note: This option is recommended for expert administrators who understand the full range of QoS properties.

Writes Identifies the write-caching rules to use for the profile.

Valid options:

writeThrough

Writes data to the Controller cache and to the storage arrays before the write request completes. This rule ensures that the data is safely written to the storage before the write request returns to the application. Write-through caching performs more slowly than does write-back caching because the data is being written to the storage arrays as well as to the cache.

Write-back caching

Writes data to the Controller cache, and the write request returns immediately without waiting for the write-to-disk to complete. During idle cycles, the system writes the data from the cache to the storage arrays. Write-back caching performs faster than does write-through because the data only needs to be written to the cache before the write request returns.

Important: If the system goes down unexpectedly, the data in the cache that has not been written to the storage arrays could be lost.

During the shutdown process, the system writes all cached data to the storage arrays.

Default

Indicates that the Oracle FS System selects the appropriate write-caching rule based on the selected QoS settings.

Stripe Width

Identifies the number of drive groups over which the data is written.

For custom Storage Profiles, you can select a stripe width from the list of predefined values. You can also enter a value from **1** to **64**.

Predefined stripe widths values:

1

Indicates a stripe width of 1 drive group.

2

Indicates a stripe width of 2 drive groups.

3

Indicates a stripe width of 3 drive groups.

4

Indicates a stripe width of 4 drive groups.

6

Indicates a stripe width of 6 drive groups.

8

Indicates a stripe width of 8 drive groups.

64

Indicates a stripe width of 64 drive groups.

All

Indicates that the logical volume is striped across all of the available drive groups.

auto-select

Indicates that the Oracle FS System determines the stripe width based on the **Priority** option that you selected.

Note: We recommend that you use the **auto-select** option.

When you choose **auto-select** the system uses the following stripe widths for the **Priority** that you selected. However, the GUI displays **auto-select** not the actual stripe width that the system determines.

- Archive priority: The system uses a stripe width of 2 drive groups.
- Low priority: The system uses a stripe width of 2 drive groups.
- Medium priority: The system uses a stripe width of 3 drive groups.
- High priority: The system uses a stripe width of 4 drive groups.
- Premium priority: The system uses a stripe width of 4 drive groups.

Preferred Storage Classes

Allows you to specify the Storage Class media on which the logical volume resides and the preferred order that the Oracle FS System uses the media.

Preferred Order	<p>Indicates the preferred order in which the Oracle FS System uses the available Storage Classes.</p> <p>For example, if you are creating a profile for archiving database records, choose a Storage Class with large capacity as your first choice. For profiles that manage large data volumes, select a Storage Class that is optimized for read and write operations.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>

Related Links

[Create a Storage Profile](#)

Create UPS Dialog

Navigation: System > Hardware > UPSs > Actions > Create UPS

Creates and adds an uninterruptible power supply (UPS) device to the Oracle FS System using a simple network management protocol (SNMP).

Name	Identifies the name of the UPS device. UPS names must be unique across the Oracle FS System and must be 256 or fewer UTF-8 characters.
IP Address	Identifies the IP address that is assigned to the external UPS device.

**SNMP
Community**

The UPS device sends information to the Oracle FS System such as battery low.

Identifies a community for which a specific trap host should receive traps that the Oracle FS System generates. You can specify different community strings for each trap host so that multiple administrators can receive specific types of SNMP traps. The default community string is **public**`public` (lower case). It is recommend you change the default community string.

Note: This community string entered here must match the community string configured on the UPS device.

Related Links

[Create a UPS Device](#)

Dashboard Overview Page

Navigation: System > Dashboard

Displays the recent system alerts and event notifications for the Oracle FS System. The dashboard also provides bar graphs that represents the capacity for each Storage Class within the Storage Domains.

Recent Alerts and Events

Lists the recent system alerts and event notifications for the Oracle FS System.

Severity

Displays the 10 most recent alerts and error notifications for the Oracle FS System. The dashboard lists the system alerts first, followed by the severe event notifications. Select an item to display the details about the alert or event.

Possible severity levels:

Critical

Requires prompt action to prevent system failures or offline conditions.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Description

Displays the information about the system alert or event notification.

Creation Date

Indicates the date and time when the system alert or event notification occurred.

Storage Domains

Displays graphically the storage classes, and their capacities, for each Storage Domain of the Oracle FS System.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

For each storage class, the dashboard graphically displays the Storage Domain physical capacities. The graph uses colored bars of different thicknesses to indicate the capacity status of each storage class. Hover the mouse pointer over each graph to display the capacity type.

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

- 1 MB = 1024^2 (1,048,576) bytes
- 1 GB = 1024^3 (1,073,741,824) bytes
- 1 TB = 1024^4 (1,099,511,627,776) bytes

Possible physical storage capacities:

Free Space	Displays the amount of capacity that is available for allocation in the indicated Storage Class.
Used Capacity	Displays the amount of capacity that is consumed by data and system overhead.
Total Capacity	Displays the total amount of raw capacity provided by the drive groups that are defined within the indicated Storage Class.
Allocated Space	Displays the amount of capacity that has been assigned and designated to all storage classes residing on the indicated Storage Class.
Preparing Capacity	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This

value decreases over time while the value for free space correspondingly increases for the indicated Storage Class.

Allocated to Logical Maximum

Displays the maximum capacity to which the Storage Class can grow.

The dashboard provides a refresh button () in the upper-right corner of the page that allows you update the contents of the page.

Delete Drive Group Dialog

Navigation: System > Storage Domains > Actions > Delete Drive Group or System > Hardware > Actions > Delete Drive Group

Removes the selected drive group.

- OK** Removes the selected drive group. You can only select a drive group that is not associated with a Storage Domain. If the operation is successful, the drive group record is removed from the list of drive groups and data is migrated to other drive groups. If the operation is unsuccessful, the system does not remove the drive group and displays an appropriate error dialog:
- Cancel** Cancel the operation and close the dialog box.

Delete Storage Domain Dialog

Navigation: System > Storage Domains > Actions > Delete Storage Domain

Removes the selected Storage Domain.

- OK** Removes the selected Storage Domain. If the operation is successful, the Storage Domain is removed from the list of Storage Domains. If the operation is unsuccessful, the system does not remove the Storage Domain and displays an appropriate error dialog:
- The Storage Domain contains one or more logical volumes.
 - The Storage Domain has one or more drive groups that are assigned to the Storage Domain.
 - If the operation is unsuccessful, move the drive groups or logical volumes on the Storage Domain to another Storage Domain.
- Cancel** Cancel the operation and close the dialog box.

Related Links

[Delete a Storage Domain](#)

Download Report Dialog

Navigation: System > Reporting and Statistics > Generated Reports > Actions > Download

Specifies the file format to use when downloading a generated report, as well as the location to save the file on the client.

Format	Indicates the file format for the generated report. Available formats: <ul style="list-style-type: none"> • CSV (comma-separated values) • Excel • HTML • PDF • XML
Target Download Path	Indicates the filename and path for where to save the downloaded file.

Related Links

[Download a Report](#)

Drive Enclosures Overview Page

Navigation: System > Hardware > Drive Enclosures

Lists the Drive Enclosures that are installed on the Oracle FS System.

Displays the current status of the hardware components. A status of Normal requires no action.

Name	Identifies the name of the Drive Enclosure including the chassis ID, which is displayed on the front of the Drive Enclosure.
Comment	Displays the user-defined comment that helps identify the Drive Enclosure.
Overall	Displays the summary status of the Drive Enclosure.
Temperature	Displays the status of the Drive Enclosure temperature.
Chassis	Displays the status of the Drive Enclosure chassis.
I/O Modules	Displays the status of the I/O Modules within the Drive Enclosure.
Power Cooling Modules	Displays the status of the power cooling modules within the Drive Enclosure.
Drives	Displays the status of the drives within the Drive Enclosure.


Related Links

[View the Status of the Drive Enclosures](#)

Drive Groups Overview Page

Navigation: System > Hardware > Drive Groups

Lists the properties of each drive group that is defined on an Oracle FS System.

Drive Group Number	<p>Displays the number that uniquely identifies the drive group.</p> <p>Note: The primary drive group in a Storage Domain is indicated by this icon . The primary drive group contains system configuration information.</p>
Drive Group Status	<p>Indicates the operating condition of the drive group.</p> <p>Status conditions include:</p> <p>Normal</p> <p>The drives are accessible and no action is required.</p> <p>Degraded Warning</p> <p>A drive has failed but this is not yet critical. This applies only to double parity.</p> <p>Degraded Critical</p> <p>Two or more drives have failed. The loss of one more drive causes a failure.</p> <p>Failed</p> <p>Multiple drives have failed. The drives are offline and data may be lost.</p>
Media Type	<p>Specifies the category of physical media that comprises the drive group.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p>

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enclosure Chassis ID	Displays the numeric identifier of the Drive Enclosure. The Enclosure Chassis ID is located and displayed on the front of the Drive Enclosure. The numeric values range from 01 to 99; the hexadecimal values from A0 to FF.
Storage Domain	Displays the Storage Domain to which the drive group is assigned.

Physical Capacity

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

- 1 MB = 1024^2 (1,048,576) bytes
- 1 GB = 1024^3 (1,073,741,824) bytes
- 1 TB = 1024^4 (1,099,511,627,776) bytes

Allocated	Displays the amount of capacity that has been assigned and designated to all logical volumes residing on the indicated Storage Domain.
Free	Displays the amount of capacity that is available for allocation in the indicated Storage Class.
Preparing	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Class.
Total Capacity	Displays the total amount of raw capacity provided by the drive groups that are defined within the indicated Storage Class.
Physical Distribution	Provides a graphical representation of the capacity that is used compared to the maximum that is allocated

Drive Group Statistics Overview Page

Navigation: *System > Reporting and Statistics > Drive Group Statistics*

Provides access to details about drive group statistics including performance. No statistics are displayed on this page; statistics are only available by selecting **Actions > Drive Group Real Time Statistics**.

To generate statistics about a drive group, select a drive group, then select **Actions > Drive Group Real Time Statistics**. Click **Add Graph** and select a statistic (you can review the following list for details).

The available statistics that are displayed are:

Drive Group

Displays statistics for the selected drive group.

Valid statistics:

Read IOPS

Indicates the average number of read operations per second per drive group.

Write IOPS

Indicates the average number of write operations per second per drive group.

Total IOPS

Indicates the average number of read operations and write operations per second per drive group.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive group during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive group during write operations.

Total bytes per second

Indicates the total number of bytes for read and write activity per drive group.

Read latency

Indicates the average time to complete a read operation per drive group.

Write latency

Indicates the average time to complete a write operation per drive group.

Total latency

Indicates the average time to complete read operations and write operations at the frequency the operations occurred per drive group.

Read block size

Indicates the average read block size per drive group.

Write block size

Indicates the average write block size per drive group.

Total block size

Indicates the average block size per drive group.

Read queue depth

Indicates the number of read operations waiting to be completed for the drive group.

Write queue depth

Indicates the number of write operations waiting to be completed for the drive group.

Total queue depth

Indicates the number of read operations and write operations waiting to be completed for the drive group.

Related Links

[Drive Group Statistics Overview](#)

Duplicate Storage Profile Dialog

Navigation: System > Global Settings > Storage Profiles > Actions > Duplicate Storage Profile

Copies an existing Storage Profile.

Name Identifies the name of the Storage Profile. The name includes, in some instances, the name of the application that is associated with the profile.

Storage Profile names can consist of up to 128 UTF-8 characters.

Enter Basic QoS Settings Opens the Enter Basic QoS Settings dialog where you can enter the following basic QoS parameters. The system converts the basic setting selections to the following advanced QoS settings:

- RAID Level
- Read Ahead

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

RAID Level

Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level

protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority

Identifies the priority that the system gives to various operational aspects of a logical volume, such as the Controller processing queue. The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume. Identifies as well where the data is striped on rotating drives. Valid priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue

High

Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

Advanced

Provides access to the QoS properties that might affect system performance.

Note: This option is recommended for expert administrators who understand the full range of QoS properties.

Writes Identifies the write-caching rules to use for the profile.

Valid options:

writeThrough

Writes data to the Controller cache and to the storage arrays before the write request completes. This rule ensures that the data is safely written to the storage before the write request returns to the application. Write-through caching performs more slowly than does write-back caching because the data is being written to the storage arrays as well as to the cache.

Write-back caching

Writes data to the Controller cache, and the write request returns immediately without waiting for the write-to-disk to complete. During idle cycles, the system writes the data from the cache to the storage arrays. Write-back caching performs faster than does write-through because the data only needs to be written to the cache before the write request returns.

Important: If the system goes down unexpectedly, the data in the cache that has not been written to the storage arrays could be lost.

During the shutdown process, the system writes all cached data to the storage arrays.

Default

Indicates that the Oracle FS System selects the appropriate write-caching rule based on the selected QoS settings.

Stripe Width

Identifies the number of drive groups over which the data is written.

For custom Storage Profiles, you can select a stripe width from the list of predefined values. You can also enter a value from **1** to **64**.

Predefined stripe widths values:

1

Indicates a stripe width of 1 drive group.

2

Indicates a stripe width of 2 drive groups.

3

Indicates a stripe width of 3 drive groups.

4

Indicates a stripe width of 4 drive groups.

6

Indicates a stripe width of 6 drive groups.

8

Indicates a stripe width of 8 drive groups.

64

Indicates a stripe width of 64 drive groups.

All

Indicates that the logical volume is striped across all of the available drive groups.

auto-select

Indicates that the Oracle FS System determines the stripe width based on the **Priority** option that you selected.

Note: We recommend that you use the **auto-select** option.

When you choose **auto-select** the system uses the following stripe widths for the **Priority** that you selected. However, the GUI displays **auto-select** not the actual stripe width that the system determines.

- Archive priority: The system uses a stripe width of 2 drive groups.
- Low priority: The system uses a stripe width of 2 drive groups.
- Medium priority: The system uses a stripe width of 3 drive groups.
- High priority: The system uses a stripe width of 4 drive groups.
- Premium priority: The system uses a stripe width of 4 drive groups.

Preferred Storage Classes

Allows you to specify the Storage Class media on which the logical volume resides and the preferred order that the Oracle FS System uses the media.

Preferred Order

Indicates the preferred order in which the Oracle FS System uses the available Storage Classes.

For example, if you are creating a profile for archiving database records, choose a Storage Class with large capacity as your first choice. For profiles that manage large data volumes, select a Storage Class that is optimized for read and write operations.

Storage Class

Specifies the category of physical media on which the logical volume resides.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Related Links

[Duplicate a Storage Profile](#)

Event Log Overview Page

Navigation: System > Alerts and Events > Event Log

Displays the event logs that are associated with the Oracle FS System.

You can set a filter to display specific types of events if the list is too long.

Event	Displays the name of the event in the Oracle FS System event log.
Severity	Displays the severity level of entries in the Oracle FS System event log. Possible severity levels:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

Category	Identifies the type of event. Valid values: Security Events to notify of a security problem, such as an unauthorized request. Audit Events that track what users are doing, such as the operations that they performed. System Events to notify of system problems, such as a missing Drive Enclosure or Controller.
Time Occurred	Identifies the time at which the event was sent to the designated recipients.
Affected Item	Provides the specific object name affected by the Event Type. For example, if the Event reads Drive Enclosure Firmware Invalid, then the Affected Item column lists the Drive Enclosure name that caused the event to occur. Such details provide more information for troubleshooting purposes.
User	Identifies the name of the user logged in at the time the event occurred.
Description	Displays the event description text.

Related Links

[Display the Event Log Entries](#)

Event Notification Overview Page

Navigation: System > Alerts and Events > Event Notification

Displays the list of event notifications created for the Oracle FS System.

This page provides options to manage event notifications.

Name	Lists the name of event notification. Click a name to review, modify, or delete the notification settings.
Enabled	Indicates whether the event notification is enabled. <ul style="list-style-type: none"> • Checked: The event notification is actively collecting event information. • Unchecked: The event notification is inactive and not collecting event information.
Time Last Sent	Identifies the time at which the event was sent to the designated recipients.
Number of Events	Indicates the number of events collected by the notification.

Number of Recipients	Indicates the number of email recipients subscribed to the event notification.
Description	Displays the description of the event notification.

Related Links

[Display Event Notifications](#)

Events Properties Dialog

Navigation: System > Alerts and Events > Event Log > Actions > Event Properties

Views detailed information for a selected event.

Copy to Clipboard	Copies the contents of the event properties to your clipboard. For example, click Copy to Clipboard to copy the event properties to the clipboard. You can then paste the information into an email and send the email to a system administrator.
Event	Displays the name of the event in the Oracle FS System event log.
Category	Identifies the type of event. Valid values: <ul style="list-style-type: none"> Security <p>Events to notify of a security problem, such as an unauthorized request.</p> Audit <p>Events that track what users are doing, such as the operations that they performed.</p> System <p>Events to notify of system problems, such as a missing Drive Enclosure or Controller.</p>
Time Occurred	Identifies the time at which the event was sent to the designated recipients.
User	Identifies the name of the user logged in at the time the event occurred.
Affected Item	Provides the specific object name affected by the Event Type. For example, if the Event reads Drive Enclosure Firmware Invalid, then the Affected Item column lists the Drive Enclosure name that caused the event to occur. Such details provide more information for troubleshooting purposes.
Description	Displays the event description text. The Description also provides more information that Oracle Customer Support can use to help resolve the event.

Related Links

[Display the Event Properties](#)

Generate Auto-Tier Effectiveness Report Dialog

Navigation: System > Storage Domains > Actions > Generate Auto-Tier Effectiveness Report

Modifies the storage costs, per GB and I/O per second (IOPS), that are used to report the effectiveness of the QoS Plus feature.

Storage Costs

Provides the initial storage cost for each GB and for each IOPS of the Oracle FS System. Enter the actual costs for each Storage Class in your system.

Performance SSD

Cost per GB

Specifies the cost for each GB for the Performance solid-state drives (SSDs) that are in the system.

Cost per IOPS

Specifies the cost for each IOPS for the Performance SSDs that are in the system.

Capacity SSD

Cost per GB

Specifies the cost for each GB for the Capacity SSDs that are in the system.

Cost per IOPS

Specifies the cost for each IOPS for the Capacity SSDs that are in the system.

Performance HDD

Cost per GB

Specifies the cost for each GB for the Performance hard disk drives (HDDs) that are in the system.

Cost per IOPS

Specifies the cost for each IOPS for the Performance HDDs that are in the system.

Capacity HDD

Cost per GB

Specifies the cost for each GB for the Capacity HDDs that are in the system.

Cost per IOPS

Specifies the cost for each IOPS for the Capacity HDDs that are in the system.

Generate and View Report

Creates the Auto-Tier Effectiveness Report and displays the report in a dialog for review. The report is stored in the **Generated Reports** page under **System > Reporting & Statistics**.

OK

Creates the Auto-Tier Effectiveness Report in the **Generated Reports** page under **System > Reporting & Statistics**.

Related Links

[Generate Auto-Tier Effectiveness Report](#)

Generate Report Dialog

Navigation: *System > Reporting and Statistics > Generated Reports > Actions > Generate*

Generates reports based on pre-defined report types for the Oracle FS System.

Based on the report type you select, the system generates a real-time report containing information about SAN hosts, storage performance and use, or system configuration. The report provides a snapshot of the information available at the moment you generate the report.

Type Specifies the type of report to be generated:

SAN Hosts

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers,

firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

Related Links

[Generate a Report](#)

Generated Reports Overview Page

Navigation: *System > Reporting and Statistics > Generated Reports*

Manages generated reports. From this page, you can create, delete, and modify reports.

All reports, whether manually generated or generated by a reporting schedule, are stored on the Oracle FS System and listed on this page. The Generated Reports page lists the names, creation dates, and sizes of all currently available generated reports. Use the Generated Reports list to select reports for downloading in the format of your choice or to delete selected reports.

Name	Displays the name of the generated report.
Created	Displays the date and time that the report was created.
Size	Indicates the size of the raw report file in kilobytes (KB) or megabytes (MB).

Note: The size of the downloaded report will vary depending on the chosen format.

Global Settings Overview Page

Navigation: *System > Global Settings*

Displays links that allow you to select and modify system-wide settings for the Oracle FS System.

After you select a category of settings, you can review or modify the collection of settings for that category.

Networking	Review or modify various characteristics of the customer network, including for example:
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	<ul style="list-style-type: none"> • The Oracle FS System management interface • Call-Home configuration
Controller Ports	View the Controller and port topology. Controller port provisioning is also available from this page.
Storage Profiles	View and manage the Oracle FS System Storage Profiles. Note: Modifying or creating Storage Profiles is recommended for expert users.
Security	Manage account security settings including number of failed login attempts allowed and session time-out period.
Administrator Accounts	Create and manage the administrator accounts that are configured on the Oracle FS System.
SNMP	Manage and configure the Simple Network Management Protocol (SNMP) trap hosts.
System Time	Set and synchronize the time across all Oracle FS System components.

Hardware Overview Page

Navigation: System > Hardware

Displays links to pages that allow you to select options to display hardware components installed on the Oracle FS System. After you select a type, you can select and review the status and current configuration of a specific hardware component.

Lists hardware components by type. Click a component identifier to display details about the component.

Pilots	Allows you to review the Pilot status and properties.
Controllers	Allows you to review the Controller status and properties.
Drive Enclosures	Allows you to review the Drive Enclosure status and properties.
Drive Groups	Allows you to review the drive group status and properties.
UPS	Allows you to review the uninterruptible power supply (UPS) status and properties.
Component Status Overview	Displays the overall health status of the following hardware components. Click the graphic to display details about the component. <ul style="list-style-type: none"> • Pilots • Controllers • Drive Enclosures

Manage Port Aggregation Dialog

Navigation: System > Global Settings > Controller Ports > Actions > Manage Port Aggregation

Updates the Controller link aggregation properties for the Controller Ethernet HBA.

Note: This dialog is valid for Ethernet protocols only.

Link Aggregation

Specifies the link aggregation properties for the Ethernet HBA.

Aggregate HBA Ports	Specifies whether link aggregation is enabled on the HBA port. Link aggregation allows the Oracle FS System to group pairs of Ethernet ports and treat the group as though the physical links were one logical link. By default, link aggregation is disabled. When enabled, link aggregation allows the system and customer-supplied Ethernet switch to negotiate link aggregation priority.
Management Priority	Specifies the link aggregation management priority. A higher number indicates that the Ethernet switch has the priority to manage link aggregation; a smaller number indicates that the Oracle FS System is likely to assume this role.

Related Links

[Manage Port Aggregation for a Controller](#)

Modify Administrator Account Dialog

Navigation: System > Global Settings > Administrator Accounts > Actions > Modify

Changes the properties of a specific administrator account.

Login Name	Identifies the login name assigned to the administrator account. This field is limited to 20 characters.
Role	Identifies the authorized privileges for an administrator account. Different roles are authorized to perform different functions: <ul style="list-style-type: none"> admin1Administrator 1 <p>The administrator role for a login account that provides the authority to perform all administrative tasks and all configuration tasks except for certain tasks that are reserved for the support roles.</p> admin2Administrator 2 <p>The administrator role for a login account that provides the authority to perform most administrative and configuration</p>

tasks. A login account assigned to this role cannot, however, perform the following tasks:

- Manage the administrator accounts and other global system settings such as those settings for networking, the Controller ports, system security, and the system time.
- Perform software upgrades or use Guided Maintenance to replace hardware components.
- Shut down the Oracle FS System system.

monitorMonitor

An administrator role for login accounts that provides the authority for those accounts to perform read-only management tasks and to modify their own account properties.

supportSupport

A unique login account solely for support representatives. This login account is not authorized to modify or delete data resources, system alerts, or administrator accounts.

Important: Use this account only if you are familiar with it or instructed by Oracle Customer Support.

For the following predefined roles, you cannot assign administrators to them and you cannot delete them:

Primary system administratorprimaryadmin

A login account that has the same privileges as the `primaryadminAdministrator 1` role.

Primary support administratorPrimarySupport

A login account that has the same privileges as the `monitorMonitor` role, as well as privileges to perform support-related tasks.

Note: You cannot change the role on predefined administrator accounts such as the primary administrator; the **Role** drop-down box is disabled.

Full Name	Identifies the first and last name associated with the administrator account.
Email Address	Identifies the email address associated with the administrator account. The email username can have up to 64 characters and the email domain can have up to 255 characters. The email server to which the Oracle FS System sends alerts must be able to receive messages at this address. The system does not validate this address. Note: An IP address cannot be entered as the email domain.
Phone Number	Identifies the phone number associated with the administrator account. The Oracle FS System does not verify the validity of this entry.

Note: Enclose telephone numbers with spaces in quotes.

Password	Identifies the password of the administrator account. Enter the password; follow the password rules displayed on the dialog.
Password Duration	Select a duration between 1 to 180 days to determine when the password expires. Set the value to 0 to disable password expiration. When password expiration is disabled, the password never expires. Refer to your company's policy on password expiration to determine the duration you should set.
Confirm Password	Confirms that the password was entered correctly.
Disable Account	Indicates whether the administrative account is disabled. The Oracle FS System maintains disabled accounts but does not allow them to log in. A disabled account can be enabled later by modifying it. This setting takes effect immediately. If the administrator is logged in when you disable the account, the system logs out the administrator immediately. Note: You cannot disable the <code>primaryadmin</code> Primary system administrator account.

Related Links

[Modify an Administrator Account](#)

Modify Asset Information Dialog

Navigation: System > System Information > Actions > Modify

Updates the Oracle FS System asset and contact information.

Name	Indicates the name that is assigned to the Oracle FS System. The system name also appears in the status bar.
Description	Indicates the short description of the Oracle FS System. We recommend that you keep the description to less than 80 characters.
Location	Indicates the physical location of the Oracle FS System.
Contact Name	Lists the individual, or group of individuals, responsible for the Oracle FS System.
Contact Phone	Indicates the phone number of the individual or group of individuals responsible for the system.
Asset Number	Indicates the corporate asset number that is assigned to the Oracle FS System.

Modify Chassis ID Dialog

Navigation: System > Hardware > Controllers > Actions > Modify Chassis ID

Updates the chassis ID number of the Controller. The chassis number appears on the front of the Controller.

Current ID	Identifies the current chassis ID.
Desired ID	Select a chassis ID number from the pull-down list. You can choose from 1 to 99 or A0 to FF in hexadecimal. If you choose a chassis ID that is already in use, you can swap the numbers. For example, if you want to change chassis ID 15 to chassis ID 10 and chassis ID 10 is already assigned, you will be prompted to confirm you want to swap the chassis ID numbers. Chassis ID 15 becomes chassis ID 10 and chassis ID 10 becomes chassis ID 15.

Related Links

[Modify a Chassis ID](#)

Modify Controller, Components Tab

Navigation: System > Hardware > Controllers > Actions > Modify > Components

Displays the status of the selected Controller and the components.

If there is a hardware failure, select the component and click **Replace Component**. Oracle FS System Manager (GUI) starts Guided Maintenance. Guided Maintenance presents you with a sequence of dialogs that guides you through the process of replacing a component.

Note: For more information about Guided Maintenance, refer to *Oracle FS1-2 Flash Storage System Field Service Guide*.

Comment	Allows you to enter descriptive text that is associated with a Controller. A comment can include up to 256 characters.
Identifier	Displays the World Wide Number (WWN) associated with a Controller.
Memory	Displays the amount of random access memory (RAM) provided by the DIMMs configured in the Controller.
Model	Displays the model number of the Controller.
Replaceable Unit	Lists the Controller components that are replaceable through Guided Maintenance. Select a component, and then click Replace Component to start Guided Maintenance. Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU).

If the following fan fails	Replace the following CRU
Fan 0	
Power supply 0	
Fan 1	
Power supply 1	
Fans 2, 3	
Fan module 0	
Fans 4, 5	
Fan module 1	
Fans 6, 7	
Fan module 2	
Fans 8, 9	
Fan module 3	
Fans 10, 11	
Fan module 4	

Status Displays the current status of a hardware component. A status of Normal requires no action.

Related Links

[Modify the Controller Comment](#)

Modify Controller, I/O Ports Tab

Navigation: System > Hardware > Controllers > Actions > Modify > I/O Ports

Displays the I/O ports of the selected Controller.

Slot	Location of the HBA installed on the Controller
Port	HBA port number.
Connection Type	Identifies the types of network ports for data path traffic between the customer network switches and the Controllers:
	Copper
	Identifies copper interfaces.
	Long Wave Optical
	Identifies longwave optical small form-factor pluggable (SFP) transceiver interfaces.
	Short Wave Optical
	Identifies shortwave optical SFP transceiver interfaces.
	Unknown
	Indicates that the connection type cannot be determined.

Status	<p>Identifies the connection state between the HBA port and Controller.</p> <p>Possible states:</p> <p>Connected</p> <p>Indicates that the HBA port on the host is connected to the port on the Controller.</p> <p>In most operating systems, host ports log in to the Controller ports immediately after the two are physically connected and enabled and remain logged in until the physical connection is broken. So, Connected effectively means that there is an enabled physical connection between the ports.</p> <p>Not Connected</p> <p>Indicates that the HBA port on the host is not connected to the port on the Controller.</p> <p>Missing</p> <p>Indicates that the HBA is removed from the Controller.</p> <p>Note: On HP-UX platforms, however, some HBA device drivers use a different approach. These drivers log out of the connection when there is no traffic to send. The HP-UX initiator often logs out when the initiator does not discover any accessible LUNs attached to the target port. For these reasons, an HP-UX HBA port often shows as Not Connected even though there is an enabled physical connection between the ports.</p>
Bandwidth	Displays the data rate of the port interface.
SFP Status	<p>Displays the status of the SFP transceiver.</p> <ul style="list-style-type: none">• Bypassed• Bypassed-No SFP• Bypassed-Incorrect Speed• Bypassed-Read Error• Bypassed-Incorrect Type• Bypassed-Lost Sync <p>If the interface module itself should fail, the SFP status shows Hardware Failure.</p>
SFP Vendor	Displays the vendor's part number for the SFP. If that information is not available, the system displays Unknown .
SFP Part Number	Displays the vendor's part number for the SFP. If that information is not available, the field is blank or displays Unknown .
SFP Revision	Displays the part revision number for the SFP. If that information is not available, the field is blank or displays Unknown .

Modify Controller Port Settings Dialog

Navigation: System > Global Settings > Controller Ports > Actions > Modify Port Settings

Updates the Controller port properties. An administrator can also view port properties from this dialog.

Port Information

Controller Name	Identifies the name of the Controller.
Slot Number	Identifies the Controller HBA slot number.
Port	Identifies the HBA port number.
Slot	Identifies the Controller HBA slot number.
Status	Identifies the HBA connection status. Valid states: <ul style="list-style-type: none"> • Connected • Not connected • Offline
Type	Indicates the type of HBA. Valid types: <ul style="list-style-type: none"> • Ethernet • Fibre Channel (FC) • Serial Attached SCSI (SAS)
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.

Port Information

MAC Address	Identifies the unique identifier of the HBA port.
MTU Bytes Minimum	Indicates the minimum number of bytes supported by the maximum transmission unit (MTU).
MTU Bytes Maximum	Indicates the maximum number of bytes supported by the maximum transmission unit (MTU).

SFP Information

Status	Identifies the small form-factor pluggable (SFP) device port status. Valid SFP device states: <ul style="list-style-type: none"> • Enabled 1 Gb • Enabled 2 Gb
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- Enabled 4 Gb
- Enabled 8 Gb
- Enabled 10 Gb
- Enabled 16 Gb
- No SFP
- Incorrect Speed
- Read Error
- Incorrect Type
- Loss of Sync
- Other

Connection Type Identifies the types of SFP transceiver interface devices used for data path traffic between the customer network switches and the Controllers.

Valid SFP interface types:

- Copper
- Optical
- Long Wave Optical
- Short Wave Optical

Vendor Identifies the SFP device manufacturer.

Part Number Identifies the SFP device part number.

Revision Identifies the SFP device revision number.

Modify Controller Service Type Dialog

Navigation: System > Hardware > Controllers > Actions > Modify Controller Service Type

Modifies the Service Type of a selected Controller.

Desired Service Type The Service Type defines how much memory is optimized for I/O performance to support either SAN or NAS by reallocating cache resource. The cache allocations are approximate.

Note: Both Controllers must be set to the same Service Type.

Note: The service type can be selected based on the type of HBA installed. For example, if you are using the Ethernet port on the system, you would choose **NAS Only**. If you only have an FC HBA installed, you would use **SAN Only**.

Available Service Types:

SAN Only

Allocates 100 percent of cache allocated to SAN.

NAS Only

Allocates 100 percent of cache allocated to NAS.

Biased to SAN

Allocates 70 percent of cache allocated to SAN, and 30 percent of cache allocated to NAS.

Biased to NAS

Allocates 70 percent of cache allocated to NAS, and 30 percent of cache allocated to SAN.

Data Access Disruption Required

Shutdown	Controllers shut down to enable hardware to be removed and added as necessary. When the Controllers are powered on, the Desired Service Type is applied.
Restart	Controllers are restarted but no hardware can be removed or added.

Modify Drive Enclosure, Components Tab

Navigation: System > Hardware > Drive Enclosures > Actions > Modify > Components

Modifies the **Comment** field of the selected Drive Enclosure.





You can view the status of the selected Drive Enclosure and its components including chassis, drives, I/O modules, and power cooling module. You can also control the option for automatic Drive Enclosure operations.

If there is a hardware failure, select the failed component and then click **Replace Component**. The Oracle FS System Manager starts the Guided Maintenance, which begins a process of resolving the hardware failure.

Note: For more information on Guided Maintenance, refer to the *Oracle FS1-2 Flash Storage System Customer Service Guide*.

Comment Specifies the new name that is assigned to the Drive Enclosure. Use a unique, meaningful name to help you easily locate specific components. The Oracle FS System maps the assigned name to the component's serial number and updates the map if you modify the component name.

By default, the Drive Enclosures are assigned names such as `Enclosure 01`. This string is a logical Drive Enclosure name and does not necessarily reflect the physical location of the Drive Enclosure. You can use the **Comment** field to provide descriptive information such as the rack location where the Oracle FS System is located. For example, you could enter, Rack 07.

Model	Indicates the model number of the Drive Enclosure in which the drive resides.
Serial Number	Indicates the serial number of the selected Drive Enclosure.
Drive Enclosure ID	Indicates the unique identifier (the World Wide Name) of the selected Drive Enclosure.
Perform Automatic Drive Enclosure Operations	Indicates whether data protection operations, such as copyback, copy-away, and rebuild run in the background, as necessary. Deselect this option as instructed by Oracle Customer Support. You might also need to deselect this option as instructed in a My Oracle Support (MOS) Knowledge Article that is specific to your issue.
Replaceable Unit	Indicates the Drive Enclosure components that are replaceable.
Status (Chassis)	<p>Provides the operational state of the Drive Enclosure chassis. Oracle FS System Manager (GUI) displays a status icon followed by the chassis state.</p> <p>Possible states, by status icon:</p> <p> (Normal) The following operational states are associated with a normal chassis status:</p> <p style="padding-left: 40px;">Normal</p> <p style="padding-left: 80px;">The chassis is operating normally.</p> <p> (Warning) The following operational states are associated with a warning chassis status:</p> <p style="padding-left: 40px;">Unknown</p> <p style="padding-left: 80px;">The system is unable to read the chassis state.</p>
Status (Drives)	<p>Provides the operational state of the drive in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the drive state.</p> <p>Possible states, by status icon:</p> <p> (Normal) The following operational states are associated with a normal drive status:</p> <p style="padding-left: 40px;">Normal</p> <p style="padding-left: 80px;">The drive is a member of the drive group.</p> <p style="padding-left: 40px;">Not Used</p> <p style="padding-left: 80px;">The drive is operating normally, but is not a member of a drive group.</p> <p> (Warning) The following operational states are associated with a warning drive status:</p>

Booting

The drive is starting up.

Copy Away Source

The system has detected a failure on the drive and is currently copying the data to a target drive. The drive state changes to **Failed** when copying is complete.

Copy Away Target

The system has detected a failure on another drive and is currently copying the data to this target drive.

Copyback

An active spare drive is copying data to this drive.

Degraded Connectivity

The connection to the drive is limited to only a single Controller.

Foreign

The drive is not a member of this drive group. Accept this drive using the associated System Alert to make the drive a member of the drive group.

Missing

The drive is not found in the Drive Enclosure.

Rebuilding

The drive is a target of a rebuild operation for a drive group.

Recovered

The drive has failure history, but is now online and is not a member of a drive group.

Recovered In Use

The drive has failure history. The drive is now online and is a member of a drive group.

Shutdown

The system is in shutdown mode and cannot access the drive.

Unknown

The system is unable to read the drive state.



(Critical)

The following operational states are associated with a critical drive status:

Critical

The drive has experienced a failure.

Restore

The drive is currently being restored.

Status (I/O modules)

Provides the operational state of the I/O module in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the I/O module state.

Possible states, by status icon:



(Normal)

The following operational states are associated with a normal I/O module status:

Normal

The I/O module is operating normally.



(Warning)

The following operational states are associated with a warning I/O module status:

Offline

The I/O module is offline.

Missing

The I/O module is not found in the Drive Enclosure.

Unknown

The system is unable to read the I/O module state.



(Critical)

The following operational states are associated with a critical I/O module status:

Critical

The I/O module has experienced a failure.

Status (Power Cooling Module)

Provides the operational state of the Drive Enclosure power cooling module. Oracle FS System Manager (GUI) displays a status icon followed by the power cooling module state.

Possible states, by status icon:

 **(Normal)**

The following operational states are associated with a normal power cooling module status:

Normal

The power cooling module is operating normally.

 **(Warning)**

The following operational states are associated with a warning power cooling module status:

Offline

The system reports that the power cooling module is failed or is disabled.

Missing

The power cooling module is not found in the Drive Enclosure.

Warning

The power cooling module is functioning but shows signs of failure.

Unknown

The system is unable to read the power cooling module state.

 **(Critical)**

The following operational states are associated with a critical power cooling module status:

Critical

The power cooling module has experienced a failure.

Replace Component

Starts Guided Maintenance that steps you through the component replacement process.

The system displays details about the selected replaceable component.

Chassis information

Provides detailed information about the selected chassis.

Number

Indicates the number that uniquely identifies the chassis within the Drive Enclosure.

Status

Indicates the operational state of the component.

Part Number

Indicates the manufacturer part number of the component.

Serial Number

Indicates the serial number of the component.

Drive information

Provides detailed information about the selected drive.

Status

Indicates the operational state of the drive.

Model

Indicates the manufacturers model number of the drive.

Serial Number

Indicates the serial number of the drive.

Firmware Number

Indicates the firmware version number of the drive.

Drive Slot Number

Indicates the Drive Enclosure slot number where the drive is installed.

Storage Class

Specifies the category of physical media that comprises the drive group.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Drive Enclosure

Indicates the unique identifier of the Drive Enclosure.

Drive Capacity

Indicates the storage capacity of the drive.

Remaining Life Expectancy

(SSD only) Indicates the remaining months in the life of the drive.

I/O Module information

Provides detailed information about the selected I/O module.

Number

Indicates the number that uniquely identifies the I/O module within the Drive Enclosure.

Status

Indicates the operational state of the I/O module.

Part Number

Indicates the manufacturer part number of the I/O module.

Serial Number

Indicates the serial number of the I/O module.

Firmware Number

Indicates the firmware version number of the I/O module.

Power Cooling Module information

Provides detailed information about the selected Power Cooling Module.

Status

Indicates the operational state of the Power Cooling Module.

Model

Indicates the manufacturer model number of the Power Cooling Module.

Serial Number

Indicates the serial number of the Power Cooling Module.

Number of Fans

Indicates the number of cooling fans in the Power Cooling Module.

Number of Failed Fans

Indicates the number of failed cooling fans in the Power Cooling Module.

Related Links

[Modify the Drive Enclosure Comment](#)

Modify Drive Enclosure, I/O Ports Tab

Navigation: System > Hardware > Drive Enclosures > Actions > Modify > I/O Ports

Displays the status of the Serial Attached SCSI (SAS) interfaces of the selected Drive Enclosures. No changes can be made from this panel.

Port	Lists the <i>PHYs</i> that are associated with the I/O module port.
Phy State	Indicates the state of the PHY connection. A wide port has two or more of the PHY states indicate Link Up. A narrow port has only one PHY state is Link Up. Possible states: Link Up Indicates that the PHY connection is functioning properly. Link Down Indicates that the PHY connection is disconnected. Disabled Indicates that the PHY connection is disabled. Reset Indicates that the system is resetting the PHY connection.
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.

Modify Drive Group Dialog

Navigation:

- *System > Storage Domains > Actions > Modify Drive Group*
- *System > Hardware > Drive Groups > Actions > Modify*

Displays information about drives within a drive group. You can also set a drive group as the primary drive group.

Replaceable Units

Replaceable Unit	Displays the drives available in a drive group. The details about a selected drive are displayed on the right-hand side of the dialog.
Status (Drives)	Provides the operational state of the drive in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the drive state. Possible states, by status icon:

**(Normal)**

The following operational states are associated with a normal drive status:

Normal

The drive is a member of the drive group.

Not Used

The drive is operating normally, but is not a member of a drive group.

**(Warning)**

The following operational states are associated with a warning drive status:

Booting

The drive is starting up.

Copy Away Source

The system has detected a failure on the drive and is currently copying the data to a target drive. The drive state changes to **Failed** when copying is complete.

Copy Away Target

The system has detected a failure on another drive and is currently copying the data to this target drive.

Copyback

An active spare drive is copying data to this drive.

Degraded Connectivity

The connection to the drive is limited to only a single Controller.

Foreign

The drive is not a member of this drive group. Accept this drive using the associated System Alert to make the drive a member of the drive group.

Missing

The drive is not found in the Drive Enclosure.

Rebuilding

The drive is a target of a rebuild operation for a drive group.

Recovered

The drive has failure history, but is now online and is not a member of a drive group.

Recovered In Use

The drive has failure history. The drive is now online and is a member of a drive group.

Shutdown

The system is in shutdown mode and cannot access the drive.

Unknown

The system is unable to read the drive state.



(Critical)

The following operational states are associated with a critical drive status:

Critical

The drive has experienced a failure.

Restore

The drive is currently being restored.

Drive information

Provides detailed information about the selected drive.

Status

Indicates the operational state of the drive.

Model

Indicates the manufacturers model number of the drive.

Serial Number

Indicates the serial number of the drive.

Firmware Number

Indicates the firmware version number of the drive.

Drive Slot Number

Indicates the Drive Enclosure slot number where the drive is installed.

Storage Class

Specifies the category of physical media that comprises the drive group.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Drive Enclosure

Indicates the unique identifier of the Drive Enclosure.

Drive Capacity

Indicates the storage capacity of the drive.

Remaining Life Expectancy

(SSD only) Indicates the remaining months in the life of the drive.

Make this drive group the primary drive group

Make the drive group the primary drive group within the Drive Enclosure. The primary drive group contains system configuration data.

RAID Levels and Status

RAID Level Indicates the types of RAID data protection that is provided by the selected drive group.

Each entry in the table represents a particular set of minimum allocation units (MAUs) in the drive group. Each of the MAUs in a given set has the same level of RAID protection, forming a RAID protection segment for the drive group.

If a drive goes offline, the event affects all of the MAUs in the protection segment in the same way. Therefore, the reported status for a given RAID level applies to the entire protection segment.

Single Parity

Indicates that each of the MAUs in the RAID protection segment uses one set of parity bits to protect against the loss of one drive in the drive group. Single parity is implemented as a variant of the RAID 5 storage technology.

Double Parity

Indicates that each of the MAUs in the RAID protection segment uses two sets of parity bits to protect against the loss of one or two drives in the drive group. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that each of the MAUs in the RAID protection segment is written across two drives in the drive group. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

RAID Status

Possible states:

Normal

Indicates that the drive group is accessible and no action is required.

Degraded Warning

Indicates that the drive has failed in the drive group, but the drive group is still accessible. Replace the failed drive. If the drive group is the primary drive group, then replace the drive immediately. The primary drive group contains system overhead, including all system configuration data.

Degraded Critical

Indicates that two or more of the drives have failed. The drive group can become inaccessible unless you replace the drives.

Failed

Indicates that multiple drives have failed. The drive group is not accessible. Replace the failed drives. After the failed drives are replaced, the drive group becomes accessible.

Unknown

Indicates that the drive status information is not available to display.

Related Links

[Make a Drive Group the Primary Drive Group](#)

Modify Chassis ID Dialog

Navigation: System > Drive Enclosures > Actions > Modify Chassis ID

Updates the chassis ID number of the Drive Enclosure. The chassis ID appears on the Drive Enclosure.

Current ID	Identifies the current chassis ID.
Desired ID	Lists the available chassis ID numbers. You can select from 01 to 99 or A0 to FF in hexadecimal. If you select a chassis ID that is already in use, the system issues a message to indicate that the selected chassis ID is already in use. You can choose swap the two chassis ID numbers or cancel the operation.

Related Links

[Modify a Chassis ID](#)

Modify Event Notification Dialog

Navigation: System > Alerts and Events > Event Notification > Actions > Modify

Changes the selected event notification.

When an event is triggered, the Oracle FS System sends a notification to the designated recipients. You can change which notifications are monitored as well who receives the notification.

Name	Identifies the name of the event notification.
Description	Describes the event notification.
Enable Event Notification	Indicates whether event notification is enabled. Select this option to activate the notification when the event occurs on the Oracle FS System.
Event Notification Recipient Email Addresses	Identifies the email addresses of the recipients who are to receive event notifications. The email server to which the Oracle FS System sends notifications must be able to send messages to the email addresses.
Add	Allows you to add email addresses of one to four subscribers or externally defined mailing lists to the event notification.
Test Email	Sends a message to the specified email addresses to test the recipient email addresses. Recipients receive a message that is titled "[Oracle-QoS] Test email" in their email in-boxes. Note: Allow at least 10 minutes between email tests.
Remove	Deletes the selected email address from the list.

Monitored Events

By severity, then category Sorts the list of events by severity with a list of event categories. The severity categories include:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

By category, then severity

Sorts the list of events by categories with a list of event severity. The categories include:

Security

Events to notify of a security problem, such as an unauthorized request.

Audit

Events that track what users are doing, such as the operations that they performed.

System

Events to notify of system problems, such as a missing Drive Enclosure or Controller.

Events Not Monitored

Provides the list of events not set to be monitored. The Oracle FS System does not trigger a notification when an event listed occurs. From the list, you can specify the events to be monitored. You can sort the list by severity or category.

Monitored Events

Provides the list of events that you specified to be monitored. The Oracle FS System triggers a notification each time an event that you specified occurs. The email addresses specified in the **Event Notification Recipient Email Addresses** field receive the event notifications. You can sort the list by severity or category.

Related Links

[Modify an Event Notification](#)

Modify Network Settings, Interfaces Tab

Navigation: System > Global Settings > Networking > Actions > Modify > Interfaces

Updates the network and data-path interfaces for the Oracle FS System.

Management Interface**Enable DHCP**

Indicates whether you have a Dynamic Host Configuration Protocol (DHCP) server that automatically assigns IP addresses to network clients. This setting makes the Oracle FS System known to the DHCP software.

Static IP Address	Identifies whether to assign a permanent IP address to the Oracle FS System Pilot. Choose this option if you do not use DHCP. Note: Selecting this option enables the Public Interface fields.
Transmit Setting	Important: Use care when setting the transmit speed and duplex mode. If your external network does not support the management interface setting, a loss of access to the Pilot could result. If access is lost, contact Oracle Customer Support for assistance. Select from the drop-down list the speed and duplex mode that you want the Pilot management interface to use. Note: Auto negotiate is the default transmit setting. We recommend the default setting for all but special circumstances. Valid speeds: <ul style="list-style-type: none">• Auto• Half 10 Mbps• Full 10 Mbps• Half 100 Mbps• Full 100 Mbps• Half 1000 Mbps• Full 1000 Mbps• Full 10 Gbps
Speed	Displays the actual speed and duplex mode that the management interface uses.
Public Interface <i>(when Static IP Address is selected)</i>	Specifies the IP address that is permanently assigned to the public interface to the Pilot.
Pilot 1/Pilot 2	Specifies the IP addresses that are permanently assigned to the Pilot nodes. You can use these static IP addresses as an alternate method to access the active Pilot node.
Netmask	Specifies the subnet mask for the public IP address that is permanently assigned to the Oracle FS System.
Gateway	Specifies the public IP address of the gateway server in the subnet of which the Oracle FS System is a member.
DNS Settings	
Primary DNS Server	Specifies the Domain Name Server (DNS) that is used to resolve IP addresses.
Secondary DNS Server	Specifies the IP address of the secondary DNS server in the network if the primary DNS server cannot be reached.

Related Links

[Configure the Management Interface](#)

Modify Network Settings, Notification Tab

Navigation: System > Global Settings > Networking > Actions > Modify > Notification

Updates the email server that receives email and Call-Home notifications from the Oracle FS System and sends the email messages to the designated recipients.

Email Notifications

Specifies the email server details necessary to send notification from the Oracle FS System.

Enable Email Notifications	Identifies whether email is enabled. <ul style="list-style-type: none"> • Enable email if you intend to define alerts to send email notifications. • Disable email if you do not want to send email notifications from the Oracle FS System.
SMTP Server IP Address	Identifies the Simple Mail Transfer Protocol (SMTP) server to use for sending any emails. Valid options: <ul style="list-style-type: none"> • IP: The IP address for the SNMP server • DNS: The Domain Name Service (DNS) for the SNMP server
SMTP Server Port	Specifies the port to which the SMTP server listens for incoming email.
Email Domain	Specifies the sending domain identifier other than the Oracle FS System.
Email Flood Prevention	Identifies the time interval in which the system is permitted to send two subsequent emails when an event occurs on the Oracle FS System. The smaller the number, the more frequent the system sends event notification emails. The default time is 300 seconds (5 minutes).

Call-Home Triggering

Allows you to specify when events logs and messages are sent to the Call-Home server.

Enable event triggered Call-Home	Enables Call-Home support, which enables the Oracle FS System to send status messages to the designated server.
Enable standard	Enables the periodic sending of the Oracle FS System event logs to the Call-Home server.

**periodic
Call-Home****Start Date**

Indicates the time and date when to begin the periodic transfers.

Interval

Indicates the unit of occurrence at which the system performs the scheduled transfer. Valid options:

Daily

Performs the scheduled task on a daily basis.

Weekly

Performs the scheduled task on a weekly basis.

Monthly

Performs the scheduled task on a monthly basis.

Recurrence

Indicates the number of intervals to wait before starting the next scheduled Call-Home operation. Enter or select a value from 1 to 100.

The default interval is weekly.

**Enable
larger
periodic
Call-Home**

Enables large files to be sent to the Call-Home server so that trace logs and performance statistics are automatically included in the Call-Home logs.

Start Date

Indicates the time and date when to begin the periodic transfers.

Interval

Indicates the unit of occurrence at which the system performs the scheduled transfer. Valid options:

Daily

Performs the scheduled task on a daily basis.

Weekly

Performs the scheduled task on a weekly basis.

Monthly

Performs the scheduled task on a monthly basis.

Recurrence

Indicates the number of intervals to wait before starting the next scheduled Call-Home operation. Enter or select a value from 1 to 100.

The default interval is weekly.

Call-Home Configuration

Specifies the Call-Home server settings. You can configure an Oracle server or a local server to receive the event logs and messages.

Use Oracle Server

Specifies that Call-Home logs and messages should be sent to Oracle.

-serverServer Address

Identifies the IP address or the domain name of the Call-Home server, callhome.support.pillardata.com. Valid options:

- IP: The IP address for the SNMP server
- DNS: The Domain Name Service (DNS) for the SNMP server

-scpConnect via SCP

Specifies the use of secure copy (SCP) with 1024-bit encryption and secure keys to transfer files directly over the Internet to Oracle Customer Support.

-httpsConnect via HTTPS

Sends files either directly to the Oracle server through a secure Internet connection or to a proxy server.

-enableProxyUse Proxy

Sends Call-Home logs through a proxy server for security purposes or when the Oracle FS System does not have direct access to the Internet.

-disableProxy

Sends Call-Home logs without using a proxy server.

-proxyIpProxy Server Address

Identifies the DNS server name or IP address of the proxy server.

-proxyPortProxy Server Port

Identifies the port that the proxy server uses to send the Call-Home log files.

-proxyConnectionProtocol

Identifies the type of protocol that Call-Home uses to access the proxy server. Valid options:

HTTP
SOCKS4
SOCKS5
Unknown

Use Local Server	<p>Specifies that Call-Home status messages should be sent to a local server by providing the IP address or domain name of the local server.</p> <p>SCP Server</p> <p>Specifies the use of secure copy (SCP) with 1024-bit encryption and secure keys to transfer files directly over the Internet to Oracle Customer Support.</p> <p>Remote Directory</p> <p>Identifies the full directory path on the target server in which to store the Call-Home log files.</p>
Password Authentication	<p>Specifies that authentication is required to access the local server. Use login credentials or a customer-supplied certificate to authenticate access to the local server. If you specify the <code>-certificate</code> option, the customer certificate is used for authentication. If you do not specify the <code>-certificate</code> option, then specify the <code>-userName</code> and <code>-password</code> options to provide the proper credentials for authentication.</p> <p>Note: The <code>-pillarDestination</code> and <code>-localDestination</code> options are mutually exclusive.</p> <p>Username</p> <p>Specifies the name of the user.</p> <p>Password</p> <p>Specifies the password associated with the username.</p>
Enable large file transfers	<p>Identifies whether trace logs and performance statistics are included in Call-Home data transfers. The size of the log file is not limited and can become large.</p> <ul style="list-style-type: none">• Enable this option to allow large files so that trace logs and performance statistics are automatically included in the messages that are sent to Oracle Customer Support.• Disable this option to exclude trace logs and performance statistics from the Call-Home messages that are sent to Oracle Customer Support. You can collect, download, and transmit the trace logs separately if they are needed.
Number of recent events to send in header	<p>Specifies the maximum number of system events to include in the Call-Home status messages. The number of system events should be greater than or equal to zero.</p>

Related Links

[Configure Email Notification Settings](#)

Modify Reporting Schedule Dialog

Navigation: *System > Reporting and Statistics > Reporting Schedules > Actions > Modify*

Changes the properties of the selected reporting schedule.

Schedule Name Enter a name for the schedule. The name is displayed in the **Name** column on the **Reporting Schedules** page. If you do not specify a name, the system uses the default name of `untitled`.

Note: The name you enter is for your use in identifying the schedule listed in the **Reporting Schedules**.

For example, if you want to run a weekly report on storage use, you might enter `weeklystorageuse` as the schedule name to help you locate that report. When a report is generated, the system automatically creates a name for the report, itself. The name the system creates is based on the report type, such as `StorageUse_1374861600286` not the name you assigned to the report schedule. The report name is displayed in the **Generated Reports** name column.

Report Type **SAN Hosts**

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers, firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

Enabled	Specifies whether the scheduled report is active or inactive. To make a scheduled report active, check the Enable checkbox. If you do not want the scheduled report to be active, do not check the Enable checkbox. The scheduled report is still listed under Reporting Schedule but reports are not generated.
Start Time	Specifies the date and time to begin generating reports.
Schedule Frequency	Specifies the frequency at which the schedule generates reports. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Recurrence	Specifies how many hours, days, or weeks to wait before generating this scheduled report again. You can also specify a specific day on which you want the report to be generated.

Related Links

[Modify a Reporting Schedule](#)

Modify Security Settings Dialog

Navigation: System > Global Settings > Security > Actions > Modify

Updates the account security properties and the login welcome message.

Account Security

Consecutive failed login attempts allowed	Identifies the number of times that an administrator can attempt, and fail, to log in to the Oracle FS System. When the number of failed login attempts exceeds this limit, the system
--	--

locks out the account. Only the Primary system administrator and administrators having the role of Administrator 1 can unlock the account.

Session timeout period (in minutes) for all administrators

Identifies an inactivity time limit, after which an administrator session is terminated. Changing this value does not affect sessions that are in progress. Sessions that start after you change the value use the modified session time-out value.

The default for the session time-out is 20 minutes. The acceptable range is a value from 1 to 999.

If the administrator is inactive for the specified time period, then the Oracle FS System automatically notifies the administrator that the session is about to expire. If the administrator does not respond to the notification within 30 seconds, then the administrator is logged off the system.

The session time-out period applies only to property dialogs and popup windows in the Oracle FS System Manager. The session time-out period does not apply to the main window because of activity that occurs to verify the system status and health.

Login Screen Message

Specifies a message that is displayed when system administrators log in to the Oracle FS System. You can enter up to 256 Unicode characters.

Related Links

[Modify Security Settings](#)

Modify SNMP Host Dialog

Navigation: System > Global Settings > SNMP > Actions > Modify

Changes the properties of the Simple Network Management Protocol (SNMP) trap hosts.

Name	Identifies the name for the SNMP host.
Host IP	Identifies the IP address or domain name of a client that receives the Oracle FS System SNMP information.
Community String	Identifies the community string for use when the Oracle FS System sends an event trap to the SNMP host. Note: When an administrator does not specify a community string for read-only access, SNMP servers and clients typically use <code>public</code> .
Receive traps	Indicates that the SNMP host receives event traps sent to it.

Trap Port Number	Identifies the SNMP host port number to use for sending an event trap. If you do not provide this option, no traps are sent to the SNMP host.
Severity Threshold	Identifies the severity threshold for events that the system sends to the SNMP host by event traps. Severity levels: <ul style="list-style-type: none">• Informational• Warning• Critical

Related Links

[Modify SNMP Hosts](#)

Modify Storage Domain Dialog

Navigation: System > Storage Domains > Actions > Modify Storage Domain

Modifies the properties of the selected Storage Domain.

Storage Domain Capacity by Storage Class

Displays graphically the storage classes, and their capacities, for the selected Storage Domain.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

For each storage class, the system graphically displays the Storage Domain physical capacities. The graph uses colored bars of different thicknesses to

indicate the capacity status of each storage class. Hover the mouse pointer over each graph to display the capacity type.

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

1 MB = 1024^2 (1,048,576) bytes
 1 GB = 1024^3 (1,073,741,824) bytes
 1 TB = 1024^4 (1,099,511,627,776) bytes

Possible physical storage capacities:

Free Space	Displays the amount of capacity that is available for allocation in the indicated Storage Class.
Used Capacity	Displays the amount of capacity that is consumed by data and system overhead.
Total Capacity	Displays the total amount of raw capacity provided by the drive groups that are defined within the indicated Storage Class.
Allocated Space	Displays the amount of capacity that has been assigned and designated to all storage classes residing on the indicated Storage Class.
Preparing Capacity	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Class.
Allocated to Logical Maximum	Displays the maximum capacity to which the Storage Class can grow.
Name	<p>Specifies the name of this Storage Domain. This name must be unique within the Oracle FS System.</p> <p>Storage Domain names can consist of up to 82 UTF-8 printable characters. The name cannot include the following characters:</p> <ul style="list-style-type: none"> • / (forward slash) • \ (backward slash) • . (dot) • .. (dot dot) • tab
Background Process Priority	<p>System Chooses</p> <p>(<i>Default</i>) Specifies that the system balances the resources that are needed for background data movement with the resources that are needed to service the incoming client I/O.</p>

Minimize Impact

Specifies that the system restricts the amount of system resources that are given to the background data movement operation. This option minimizes the impact on client I/O. Recommended for highly-loaded Storage Domains.

Maximize Speed

Specifies that the system grants resource priority to the background data movement operation. This option reduces the amount of system resources that are available for client I/O. Recommended for lightly-loaded Storage Domains.

Enable Automatic QoS Rebalancing

Specifies that the system balances the existing volumes across the drive groups when you add drive groups to the Storage Domain. When enabled, the system distributes the data of the existing volumes to all of the drive groups in the Storage Domain. Not selecting the option retains the data distribution across the existing drive groups in the Storage Domain.

Enable Tier Reallocation

Specifies that any tiered data that resides in this Storage Domain has data progression enabled. Individual objects might have tier reallocation disabled. Enabling tier reallocation at the Storage Domain level does not override any objects that have tier reallocation disabled. The default value is enabled.

Enable Tier Reallocation Statistics Collection

Specifies that the Oracle FS System internally collects data usage patterns for the Storage Domain. The patterns are analyzed to determine the optimum Storage Classes for the data. The default value is enabled. Do not change this setting unless you need to test different profiles.

Disable this setting if you are modifying your Storage Profile for testing purposes and did not want to collect statistics during the test. You do not want to collect tier reallocation statistics during the test as this might distort future tier reallocation. After you complete testing, enable tier reallocation statistics collection.

Note: Enabling or disabling the tier reallocation statistics collection has no effect on statistics you can view for CPU, drive groups, LUNs. (Those are a different set of statistics.)

Auto-Tier Scan Options (Advanced)

Optimizes the auto-tier algorithm for moving data to different Storage Classes. You can specify the interval for when auto-tier moves frequently accessed data blocks and infrequently accessed data blocks to match your application activity.

Note: To unlock the auto-tier scan options, select the lock icon. Selecting the lock icon again resets the values to the state when the fields were unlocked.

Performance-Optimizing Scan Cycle

Specifies the frequency, in hours, that auto-tier scans to move frequently accessed data blocks to a high performance Storage Class.

For example, a value of 32 means that every 32 hours auto-tier scans the system to move frequently accessed data blocks to a high performance Storage Class.

Updates to this field affect the label of the **Number of *n*-hour Scan Cycles** field. For example, a value of 32 changes the label for the **Number of *n*-hour Scan Cycles** to **Number of 32-hour Scan Cycles**.

Enter a value from **1** through **168**.

**Number of
n-hour Scan
Cycles**

Specifies the frequency that auto-tier runs the performance-optimizing scan cycles before auto-tier runs the cost-optimizing scan cycle. The value entered in the **Number of n-hour Scan Cycles** field is multiplied by the value entered in the **Performance-Optimizing Scan Cycle** field to obtain the value set in the **Cost-Optimizing Scan Cycle** field.

For example, a value of 5 means that every fifth time that auto-tier runs the performance-optimizing scan cycle, auto-tier then runs the cost-optimizing scan cycle to move infrequently accessed data to a less expensive storage class.

Enter a value from **2** through **31**.

**Cost-
Optimizing
Scan Cycle**

(Read-only) Displays the frequency, in hours, that auto-tier scans to move infrequently accessed data blocks to a less expensive Storage Class.

The value displayed in this field is calculated as the product of the value you entered in the **Performance-Optimizing Scan Cycle** field and the value you entered in the **Number of n-hour Scan Cycles** field.

For example, to set auto-tier to move infrequently accessed data blocks to a less expensive Storage Class every 200 hours, enter the following values:

- Performance Optimizing Scan Cycle: **25**
- Number of 25-hour Scan Cycles: **8**

The system displays **200** in the **Cost-Optimizing Scan Cycle** field. In this example, the values that you enter instruct auto-tier to run the performance-optimizing scan every 25 hours. Then, during every eighth scan cycle (or every 200 hours), auto-tier runs a cost-optimizing scan to move infrequently accessed data blocks to a less expensive Storage Class.

Allowable Storage Capacity for Auto-Tiered LUNs

Indicates the maximum percentage of storage capacity to dedicate to auto-tier reallocation for each Storage Class of the Storage Domain. Enter a percentage for each available Storage Class.

The default value is 100%.

Related Links

[Limit the Storage Capacity for QoS Plus](#)

[Optimize Auto-Tier Scans](#)

[Rename a Storage Domain](#)

[Update the Background Process Priority](#)

[Update Tier Reallocation Options](#)

Modify System Time Dialog

Navigation: System > Global Settings > System Time > Actions > Modify

Changes the properties of the system time to synchronize the Oracle FS System clock time with a Network Time Protocol (NTP) server or to set the date and time manually.

Use External Time Source

Identifies that the Oracle FS System synchronizes its clocks with Network Time Protocol (NTP) servers. You can specify a primary NTP server and up to two alternate NTP servers with which the system synchronizes its clocks. Enter the IP addresses assigned to the primary NTP server and up to two alternate NTP servers into the following fields:

- **NTP Server 1**
- **NTP Server 2**
- **NTP Server 3**

If the primary NTP server is unavailable, the system polls the alternate NTP servers in a round-robin fashion until the Oracle FS System connects to an available NTP server. Enter IP addresses or DNS names for up to two alternate NTP servers.

Use Internal Hardware Clock

Identifies that the Oracle FS System synchronizes its clocks with a date and time that you set manually. Oracle FS System clocks are synchronized with each other, and their time may differ from other clocks in your network.

Date/Time

Presents a wizard that allows you to set the Oracle FS System date and time. The time that you set is converted internally to the Coordinated Universal Time (abbreviated UTC) format.

Related Links

[Modify the Oracle FS System Time](#)

Modify UPS Dialog

Navigation: System > Hardware > UPSs > Actions > Modify UPS

Changes the properties of a selected uninterruptible power supply (UPS) device. For example, you can assign the UPS device to an alternate simple network management protocol (SNMP) community string.

Name	Identifies the name of the UPS device. UPS names must be unique across the Oracle FS System and must be 256 or fewer UTF-8 characters.
IP Address	Identifies the IP address that is assigned to the external UPS device.
SNMP Community	Identifies a community for which a specific trap host should receive traps that the Oracle FS System generates. You can specify different community strings for each trap host so that multiple administrators can receive specific types of SNMP traps. The default community string is public <code>public</code> (lower case). It is recommend you change the default community string. Note: This community string entered here must match the community string configured on the UPS device.

Current Status

Provides read-only details and status about the UPS device.

Model	Identifies the model number of the UPS device.
Firmware Revision	Identifies the firmware version that is installed on the UPS device.
Serial Number	Identifies the serial number of the UPS device.
Power Source	Identifies the source of the UPS power. Valid sources: <ul style="list-style-type: none">• AC (alternating current)• Battery• Unknown
Battery Status	Identifies the status of the UPS batteries. Valid values: <ul style="list-style-type: none">• Normal• Warning• Critical• Unknown
Communication Status	Identifies the communication status between the UPS device and the Oracle FS System system. Valid values: <ul style="list-style-type: none">• OK• Failed

Related Links

[Modify a UPS Device](#)

Networking Overview Page

Navigation: System > Global Settings > Networking

Lists the networking properties for the Oracle FS System.

Management Interface

DHCP Enabled	Specifies whether the Dynamic Host Configuration Protocol (DHCP) is enabled.
IP Address	Identifies the public or the shared IP address that is assigned to the Pilot. This IP address is what the administrator uses to access the Oracle FS System over the management interface.
Subnet Mask	Assigns the subnetwork mask for the public IP address that is permanently assigned to the Pilot.
Gateway	Assigns the IP address of the gateway network node in the subnetwork of which the Oracle FS System (the Pilot) is a member.
MAC Address	Identifies the unique network identifier of the <i>active</i> Pilot node. When a Pilot node fails, the passive node becomes the active node. The MAC address changes to the unique network identifier of the formerly passive node
Speed	Identifies the actual port speed and duplex mode at which the management interface is running.

DNS Settings

Primary DNS Server	Identifies the IP address of the primary Domain Name Server (DNS) that is used to resolve the IP addresses.
Secondary DNS Server	Identifies the IP address of the secondary DNS server that should be used if the primary DNS server cannot be reached.

Notification

Email Enabled	Identifies whether email is enabled to notify recipients of system events.
Email Server IP	Identifies the IP address of the Simple Mail Transfer Protocol (SMTP) server that receives system event notifications.
Email Server Port	Identifies the port that the SMTP server listens to for incoming email requests.
Email Flood Preventions	(Optional) Specifies the interval, in seconds, that the Oracle FS System waits before sending event notification emails to the administrator for the same event.
Event Triggered	Indicates whether event-triggered Call-Home is enabled.
Standard Periodic	Indicates whether standard Call-Home messages are scheduled and enabled.

Larger Periodic	Indicates whether larger Call-Home messages are scheduled and enabled.
Large Files	Indicates whether large files are sent to the Call-Home server.
Call-Home Matrix Version	Indicates the revision level of the Call-Home matrix.

Pilot Overview Page

Navigation: System > Hardware > Pilots

Displays the status of the Pilots that are installed on the Oracle FS System.

Pilot	Identifies the Pilot which is labeled either 1 or 2.
Status	Displays the current status of the Pilot. A status of Normal requires no action.
Mode	Displays the current operational mode of the Pilot. Valid options: Active Indicates which Pilot performs all configuration tasks that administrators request. Standby Indicates which Pilot acts as a secondary device and does nothing unless the active Pilot fails over to this standby Pilot.
OS Version	Identifies the operating system version of the Pilot.
Server Version	Identifies the software version installed on the Oracle FS System.
Serial Number	Identifies the serial number that is assigned to the Pilot. Note: The serial number for the Oracle FS System, which is a different serial number than the Pilot serial number, is displayed in the System Information panel.

Related Links

[View the Properties of the Pilots](#)

Remove from Storage Domain Dialog

Navigation: System > Storage Domains > Actions > Remove from Storage Domain

Removes the selected drive group from a Storage Domain.

After a drive group is removed from a Storage Domain, the drive group is displayed as **unassigned**. If you want to move a drive group from one Storage Domain to another, remove the drive group from the Storage Domain and then add the drive group to a different Storage Domain.

Note: Removing drive groups from Storage Domains can take many hours and the system only processes one removal at a time. Therefore, it is recommended that you select all drive groups you need to remove and remove the drive groups in a single operation.

Migration Policy

System Chooses

(Default) Specifies that the system balances the resources that are needed for background data movement with the resources that are needed to service the incoming client I/O.

Minimize Impact

Specifies that the system restricts the amount of system resources that are given to the background data movement operation. This option minimizes the impact on client I/O. Recommended for highly-loaded Storage Domains.

Maximize Speed

Specifies that the system grants resource priority to the background data movement operation. This option reduces the amount of system resources that are available for client I/O. Recommended for lightly-loaded Storage Domains.

Related Links

[Remove Drive Groups From a Storage Domain](#)

Reporting Schedules Overview Page

Navigation: *System > Reporting and Statistics > Reporting Schedules*

Manages reporting schedules. From this page you can create, delete, and modify schedules.

Name Displays the user defined name of the schedule.

Report Type **SAN Hosts**

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers, firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

Start Time

Specifies the date and time to begin generating reports.

Frequency

Specifies the frequency at which the schedule generates reports. Frequencies include:

- **Run Once**
- **Hourly**
- **Daily**
- **Weekly**

Enabled

Specifies whether the scheduled report is active or inactive.

You can activate or deactivate a reporting schedule on the **Modify Reporting Schedule** dialog. If you want to stop the report from being generated, you can modify the report schedule to make the report inactive by unchecking the **Enable** checkbox. If a schedule is inactive, you can modify the schedule to make the report active by checking the **Enable** checkbox.

Reporting and Statistics Overview Page

Navigation: *System > Reporting and Statistics*

Displays links to the Reporting Schedules Overview page and the Generated Reports Overview page.

You can schedule a report to be generated at a specific time. You can also generate real-time reports.

The Oracle FS System collects the following information and makes the information available in reports:

- Statistical information about SAN hosts
- Storage and performance information
- System configuration information

Reporting Schedules	Opens the Reporting Schedules overview page. From this page, you can view reports that are scheduled, modify scheduled reports, and schedule a report to be generated at a specific time.
Generated Reports	Opens the Generated Reports overview page. From this page, you can view reports, generate a real-time report, and download reports to a location that you choose.
Drive Group Statistics	Opens the Drive Group Statistics overview page. From this page, you can generate and download drive group statistics to a location that you choose.
CPU Statistics	Opens the CPU Statistics overview page. From this page, you can generate and download Controller CPU statistics to a location that you choose.

Security Overview Page

Navigation: *System > Global Settings > Security*

Lists the security configuration for administrator accounts. An administrator can manage the security properties from this page.

Account Security

Consecutive failed login attempts allowed	Identifies the number of times that an administrator can attempt, and fail, to log in to the Oracle FS System. When the number of failed login attempts exceeds this limit, the system locks out the account. Only the Primary system administrator and administrators having the role of Administrator 1 can unlock the account.
Session timeout period (in minutes) for all administrators	Identifies an inactivity time limit, after which an administrator session is terminated. Changing this value does not affect sessions that are in progress. Sessions that start after you change the value use the modified session time-out value.

The default for the session time-out is 20 minutes. The acceptable range is a value from 1 to 999.

If the administrator is inactive for the specified time period, then the Oracle FS System automatically notifies the administrator that the session is about to expire. If the administrator does not respond to the notification within 30 seconds, then the administrator is logged off the system.

The session time-out period applies only to property dialogs and popup windows in the Oracle FS System Manager. The session time-out period does not apply to the main window because of activity that occurs to verify the system status and health.

Login Screen Message

Specifies a message that is displayed when system administrators log in to the Oracle FS System. You can enter up to 256 Unicode characters.

Set Event Log Filter Dialog

Navigation: System > Alerts and Events > Event Log > Actions > Set Event Log Filter

Creates and modifies the event filters that are configured on the Oracle FS System system.

Event Categories

Identifies a list of event categories. Choose from:

Security

Events to notify of a security problem, such as an unauthorized request.

Audit

Events that track what users are doing, such as the operations that they performed.

System

Events to notify of system problems, such as a missing Drive Enclosure or Controller.

Event Severities

Identifies a list of event types. Choose from:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

Event Date Range

Indicates whether to filter events by occurrence date.

Display Events that occur in a date range

Select this option to activate the Beginning date and Ending date options. To filter the events by type and by severity level only, then clear this option.

Beginning date

Specifies the date so that events that occurred on or after this date, and that match the selected filters, are displayed.

Ending date

Specifies the date so that events that occurred on or before this date, and that match the selected filters, are displayed.

Reset to Defaults

Resets the page to default values. Select this option to enable all of the Event Severities and Event Categories and to clear any set date range.

Related Links

[Filter Event Log Entries](#)

SNMP Hosts Overview Page

Navigation: System > Global Settings > SNMP

Displays whether any hosts were created to support the Simple Network Management Protocol (SNMP) software feature.

This page provides options to modify the SNMP host settings and delete SNMP hosts.

Name	Identifies the name for the SNMP host.
Authorized Host IP	Identifies the IP address or domain name of a client that receives the Oracle FS System SNMP information.
Community String	Identifies the community string for use when the Oracle FS System sends an event trap to the SNMP host. Note: When an administrator does not specify a community string for read-only access, SNMP servers and clients typically use <code>public</code> .
Receives Traps	Indicates that the SNMP host receives event traps sent to it.

Related Links

[View SNMP Hosts](#)

Status Summary Overview Page

Navigation: System > Alerts and Status > Status Summary

Displays the status and health of the Pilots, Controllers, and Drive Enclosures that are installed on the Oracle FS System.

If a Replication Engine (Oracle MaxRep for SAN or Oracle MaxRep for NAS) is configured for the Oracle FS System, information is also displayed about the Replication Engine.

If a uninterruptible power supply (UPS) is configured for the Oracle FS System, information is also displayed about the UPS.

Pilots

The Pilots table lists the following information:

Pilot Displays the operational status of the Pilot.

Mode Displays the current operational mode of the Pilot.

Active

Indicates which server currently functions as the active Pilot and performs all requested configuration tasks.

Standby

Indicates which server currently functions as the standby Pilot and only performs configuration tasks during a failover.

Status Displays the status of a Pilot.

 **(Normal)**

A Normal status requires no action.

 **(Warning)**

A Warning status requires action.

 **(Critical)**

A Critical status requires action.

Note: To obtain more information about the component status, select the component.

Controllers

The Controllers table lists the following information:

Controller Name Lists the names of hardware components.

Service Type Lists the type of Controller.

Status Identifies the status of the Controller.

 **(Normal)**

A Normal status requires no action.

 **(Warning)**

A Warning status requires action.

 **(Critical)**

A Critical status requires action.

Note: To obtain more information about the component status, select the component.

Replication Engines

Service Status	Identifies the health of the processes running on the Replication Engine.
Agent Status	Identifies the communication status of the Oracle MaxRep for SAN agents registered with the Oracle FS System.
Name	Identifies the name of the Replication Engine.
IP Address	Identifies the IP address of the Replication Engine or high availability Replication Engine cluster.

UPSs

The uninterruptible power supply (UPS) table lists the following information:

Name	Identifies the name assigned to the external UPS device.
Power Source	Identifies the source of the UPS power. Valid sources: <ul style="list-style-type: none"> • AC (alternating current) • Battery • Unknown
Battery Status	Identifies the status of the UPS batteries. Valid values: <ul style="list-style-type: none"> • Normal • Warning • Critical • Unknown

Drive Enclosures

The Drive Enclosures table lists the following information:

Drive Enclosure Name	Lists the names of hardware components.
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Status

 **(Normal)**

A Normal status requires no action.

 **(Warning)**

A Warning status requires action.

 **(Critical)**

A Critical status requires action.

Note: To obtain more information about the component status, select the component.

Event Log

The Event Log table lists the following information:

Severity Displays the severity level of entries in the Oracle FS System event log. Possible severity levels:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

Number of Events The number of events that have occurred on the Oracle FS System.

Event Notification

The Event Notification table lists the following information:

Number of Recipients Indicates the total number of email recipients.

Disabled Email Subscriptions Indicates the number of event notifications that are currently disabled.

Enabled Email Subscriptions Indicates the number of event notifications that are currently enabled.

Number of Monitored system Events Indicates the number of monitored events.


Refresh

Updates the page with current data.

Storage Domains Overview Page

Navigation: System > Storage Domains

Lists the properties of each Storage Domain that is defined on this Oracle FS System.

Name	<p>Specifies the name of the Storage Domain and the names of the drive groups that are assigned to the domain.</p> <p>Note: The primary drive group in a Storage Domain is indicated by this icon . The primary drive group contains system configuration information.</p>
Storage Domain Status	<p>Provides the operating condition of the Storage Domain.</p> <p>Status conditions include:</p> <p>Normal</p> <p>Indicates that no action is required.</p> <p>Background Activity</p> <p>Indicates that a process is running which effects the Storage Domain. For example, if you started a Compact Storage Domain process, the Storage Domain status would change from Normal to Background Activity.</p>
Drive Group Status	<p>Indicates the operating condition of the drive group.</p> <p>Status conditions include:</p> <p>Normal</p> <p>The drives are accessible and no action is required.</p> <p>Degraded Warning</p> <p>A drive has failed but this is not yet critical. This applies only to double parity.</p> <p>Degraded Critical</p> <p>Two or more drives have failed. The loss of one more drive causes a failure.</p> <p>Failed</p> <p>Multiple drives have failed. The drives are offline and data may be lost.</p>
Tier Reallocation	<p>Identifies the tier reallocation status of the Storage Domain. When tier reallocation is enabled, the Oracle FS System dedicates resources and uses statistical data and QoS priority property to migrate data from one storage tier to another.</p> <p>Valid states:</p>

Enabled

Indicates that the tier reallocation is active on the Storage Domain. Enabled makes possible the migration of high-usage data to higher performing storage tiers in this Storage Domain.

Disabled

Indicates that tier reallocation is not active on the Storage Domain. Disabled does not allow the migration of high-usage data to higher performing storage tiers in this Storage Domain.

Statistics Collection Disabled

Indicates that statistical data used by the Oracle FS System to migrate the data is not collected. Oracle recommends not using this option as the statistical data is required for the tier reallocation process.

Tier reallocation disabled

Indicates that the tier reallocation is not active. The statistics collection is active.

Media Type

Specifies the category of physical media that comprises the drive group.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enclosure Chassis ID	Displays the numeric identifier of the Drive Enclosure. The Enclosure Chassis ID is located and displayed on the front of the Drive Enclosure. The numeric values range from 01 to 99; the hexadecimal values from A0 to FF.
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Physical Capacity

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

- 1 MB = 1024^2 (1,048,576) bytes
- 1 GB = 1024^3 (1,073,741,824) bytes
- 1 TB = 1024^4 (1,099,511,627,776) bytes

Allocated	Displays the amount of capacity that has been assigned and designated to all logical volumes residing on the indicated Storage Domain.
Free	Displays the amount of capacity that is available for allocation in the indicated Storage Domain.
Preparing	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Domain.
Total Capacity	Displays the total amount of raw capacity provided by the Drive Enclosures that are defined within the indicated Storage Domain.
Physical Distribution	Provides a graphical representation of the capacity that is used compared to the maximum that is allocated

Storage Profiles Overview Page

Navigation: System > Global Settings > Storage Profiles

Lists the Quality of Service (QoS) settings for all of the available Storage Profiles on the system. Administrators can manage custom profiles from this page.

Type	Identifies the type of the Storage Profile. Valid profile types:
	Custom Indicates a Storage Profile that consists of administrator-defined QoS settings. Note: Custom profiles cannot be modified. Also, if a logical volume uses a custom profile, that profile cannot be deleted.
	System Indicates a Storage Profile that ships with the Oracle FS System.

Note: System profiles cannot be modified or deleted.

Name	Identifies the name of the Storage Profile. The name includes, in some instances, the name of the application that is associated with the profile.
RAID Level	<p>Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives.</p> <p>Possible RAID levels:</p> <p>Single parity</p> <p>Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.</p> <p>Double parity</p> <p>Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.</p> <p>Mirrored</p> <p>Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.</p>
Read Ahead	<p>Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:</p> <p>Normal and Default</p> <p>Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.</p> <p>Aggressive</p> <p>Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.</p> <p>Conservative</p> <p>Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.</p>
Priority	Identifies the priority that the system gives to various operational aspects of a logical volume, such as the Controller processing queue. The processing-queue priority defines the percentage of the Controller

CPU cycles that are dedicated to the volume. Identifies as well where the data is striped on rotating drives. Valid priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue

High

Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

Stripe Width

Identifies the number of drive groups over which the data is written.

Possible values:

1 through 64

Indicates the specified stripe width.

all

Indicates that the logical volume is striped across all of the available drive groups.

auto-select

Indicates that the Oracle FS System determines the stripe width based on the **Priority** option that you selected.

Writes

Identifies the write-caching rules to use for the profile.

Valid options:

writeThrough

Writes data to the Controller cache and to the storage arrays before the write request completes. This rule ensures that the data is safely written to the storage before the write request returns to the application. Write-through caching performs more slowly than does write-back caching because the data is being written to the storage arrays as well as to the cache.

Write-back caching

Writes data to the Controller cache, and the write request returns immediately without waiting for the write-to-disk to complete. During idle cycles, the system writes the data from the cache to the storage arrays. Write-back caching performs faster than does write-through because the data only needs to be written to the cache before the write request returns.

Important: If the system goes down unexpectedly, the data in the cache that has not been written to the storage arrays could be lost.

During the shutdown process, the system writes all cached data to the storage arrays.

Default

Indicates that the Oracle FS System selects the appropriate write-caching rule based on the selected QoS settings.

Preferred Storage

Indicates the preferred order in which the Oracle FS System uses the available Storage Classes.

System Alerts Overview Page

Navigation: System > Alerts and Events > System Alerts

Displays links that allow you to manage alerts that are generated when specific events occur.

You can copy the system alert information to your workstation clipboard or remove the alert as necessary.

Alert	Identifies item that caused the system alert.
Time Occurred	Indicates the date and time the system alert occurred.
Affected Items	Identifies the name of the system object that caused the system alert.
Description	Provides a brief description of the system alert.

Related Links

[Display the System Alerts](#)

System Information Page

Navigation: System > System Information

Displays the Oracle FS System information, including the name, administrator contact information, and software version. The page also provides an overview of the Controller configuration and the Storage Classes of the available Drive Groups.

The administrator controls the following fields on this page:

- Name
- Description
- Location
- Contact Name
- Contact Phone
- Asset Number

Name	Identifies the name that is assigned to the Oracle FS System. The system name also appears in the status bar.
Description	Displays the system description as defined by the system administrator.
Model	Displays the model number of Oracle FS System.
Status	Displays the overall health status of the Oracle FS System.
Controllers	Displays the number and service type of Controllers that are installed in the system. The Controller service types include: <ul style="list-style-type: none">• SAN Only• NAS Only• SAN and NAS with SAN bias• SAN and NAS with NAS bias
Drive Groups	Displays the available Storage Classes that are installed in the system and the number of drives in each Storage Class.
Manufacturer	Displays the manufacturer of the Oracle FS System.
Location	Displays the system location as defined by the system administrator.
Contact Name	Displays the primary contact person as defined by the system administrator.
Contact Phone	Displays the phone number of the primary contact person as defined by the system administrator.
Asset Number	Displays the system asset number as defined by the system administrator.
Serial Number	Identifies the system serial number (SSN) that Oracle assigned to the system.
IP Address	Identifies the public IP address of the Oracle FS System management interface. This interface provides access to the Oracle FS System Manager. The administrator provides this IP address in the Interfaces tab of the Global Settings > Networking page.
MAC Address	Identifies the Media Access Control (MAC) address of the currently active Pilot node.

Software Version Identifies the release level of the software and firmware modules that manage the entire Oracle FS System.

System Time Overview Page

Navigation: System > Global Settings > System Time

Displays the system time and any Network Time Protocol (NTP) servers with which the system clock is synchronized.

System Time Identifies the current Oracle FS System date, time, and time zone.

NTP Servers Identifies whether the Oracle FS System synchronizes its clocks with:

- Network Time Protocol (NTP) servers
- A manual time setting that you specify from the internal hardware clock

UPSs Overview Page

Navigation: System > Hardware > UPSs

Displays the current status of the uninterruptible power supply (UPS) battery and power.

The Oracle FS System retrieves information from each device using Simple Network Management Protocol (SNMP) over the Pilot Ethernet connection to monitor and report status. This page provides options to create and manage the UPS devices connected to the Oracle FS System.

Name Identifies the name assigned to the external UPS device.

IP Address Identifies the IP address that is assigned to the external UPS device.

Model Identifies the model number of the UPS device.

Power Source Identifies the source of the UPS power. Valid sources:

- AC (alternating current)
- Battery
- Unknown

Battery Status Identifies the status of the UPS batteries. Valid values:

- Normal
- Warning
- Critical
- Unknown

View Administrator Account Dialog

Navigation: System > Global Settings > Administrator Accounts > Actions > View

Displays details about the selected account from the **Administrator Accounts** list.

Login Name Identifies the login name assigned to the administrator account. This field is limited to 20 characters.

Role Identifies the authorized privileges for an administrator account. Different roles are authorized to perform different functions:

admin1Administrator 1

The administrator role for a login account that provides the authority to perform all administrative tasks and all configuration tasks except for certain tasks that are reserved for the support roles.

admin2Administrator 2

The administrator role for a login account that provides the authority to perform most administrative and configuration tasks. A login account assigned to this role cannot, however, perform the following tasks:

- Manage the administrator accounts and other global system settings such as those settings for networking, the Controller ports, system security, and the system time.
- Perform software upgrades or use Guided Maintenance to replace hardware components.
- Shut down the Oracle FS System system.

monitorMonitor

An administrator role for login accounts that provides the authority for those accounts to perform read-only management tasks and to modify their own account properties.

supportSupport

A unique login account solely for support representatives. This login account is not authorized to modify or delete data resources, system alerts, or administrator accounts.

Important: Use this account only if you are familiar with it or instructed by Oracle Customer Support.

For the following predefined roles, you cannot assign administrators to them and you cannot delete them:

Primary system administratorprimaryadmin

A login account that has the same privileges as the `primaryadmin`Administrator 1 role.

Primary support administratorPrimarySupport

A login account that has the same privileges as the `monitor`Monitor role, as well as privileges to perform support-related tasks.

Full Name	Identifies the first and last name associated with the administrator account.
Email Address	Identifies the email address associated with the administrator account. The email username can have up to 64 characters and the email domain can have up to 255 characters. The email server to which the Oracle FS System sends alerts must be able to receive messages at this address. The system does not validate this address. Note: An IP address cannot be entered as the email domain.
Phone Number	Identifies the phone number associated with the administrator account. The Oracle FS System does not verify the validity of this entry. Note: Enclose telephone numbers with spaces in quotes.
Disabled	Indicates whether the administrative account is disabled. The Oracle FS System maintains disabled accounts but does not allow them to log in. A disabled account can be enabled later by modifying it. This setting takes effect immediately. If the administrator is logged in when you disable the account, the system logs out the administrator immediately. Note: You cannot disable the <code>primaryadmin</code> Primary system administrator account.

Related Links

[Display Administrator Account Details](#)

View Auto-Tier Graphs Dialog

Navigation: System > Storage Domains > Actions > View Auto-Tier Graphs

Displays graphically the effectiveness of the QoS Plus feature for a collection of auto-tiered LUNs.

Provides details about a collection of auto-tiered LUNs in a Storage Domain. You can select up to 10 LUNs to analyze.

Name	Identifies the name that is assigned to the LUN.
LUID	Identifies the unique identifier of the LUN.
Priority Level	Identifies the assigned priority level of the volume at the time that it was created. Premium Indicates the highest priority for responding to requests in the processing queue High Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

Capacity Disk Capacity	Identifies the amount of capacity that is allocated to the auto-tiered LUNs that reside on RAID 6 and RAID 10 storage tiers.
Performance Disk Capacity	Identifies the amount of capacity that is allocated to the auto-tiered LUNs that reside on RAID 5 and RAID 10 storage tiers.
Capacity SSD Capacity	Identifies the amount of capacity that is allocated to the auto-tiered LUNs that reside on RAID 5 and RAID 10 storage tiers.
Performance SSD Capacity	Identifies the amount of capacity that is allocated to the auto-tiered LUNs that reside on RAID 5 and RAID 10 storage tiers.

Displays two graphs: a graph that depicts the number of data migration calculations that the system performed and another graph that summarizes the capacities by Storage Class.

Update Graphs Creates the following graphs that are based on the data from the selected auto-tiered LUNs. Click **Update Graphs** to refresh the contents of the graphs.

Data Transferred By Number of Accesses

Indicates a histogram of the different regions of all the LUNs in the Storage Domain by the frequency of I/O access. The histogram bar height represents the amount of data transferred. The y-axis is not labeled.

Tier Structure By Storage Class and Priority

Indicates a graph of the Storage Class and the capacity of the LUN regions for the selected auto-tiered LUNs. The chart also shows a number that represents the QoS priority for the auto-tiered LUN. A table at the bottom of the chart provides the list of selected LUNs. The table is also a legend for the LUNs that are represented on the graph.

Related Links

[View the Auto-Tier Graphs](#)

View Controller, Components Tab

Navigation: System > Hardware > Controllers > Actions > View > Components

Displays the status of the selected Controller and the components.

If there is a hardware failure, select the component and click **Replace Component**. Oracle FS System Manager (GUI) starts Guided Maintenance. Guided Maintenance presents you with a sequence of dialogs that guides you through the process of replacing a component.

Note: For more information about Guided Maintenance, refer to *Oracle FS1-2 Flash Storage System Field Service Guide*.

Comment	Displays descriptive text that is associated with a Controller. A comment can include up to 256 characters.																														
Identifier	Displays the World Wide Number (WWN) associated with a Controller.																														
Memory	Displays the amount of random access memory (RAM) provided by the DIMMs configured in the Controller.																														
Model	Displays the model number of the Controller.																														
Replaceable Unit	Lists the Controller components that are replaceable through Guided Maintenance. Select a component, and then click Replace Component to start Guided Maintenance. Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU). <table> <thead> <tr> <th>If the following fan fails</th> <th>Replace the following CRU</th> </tr> </thead> <tbody> <tr> <td>Fan 0</td> <td></td> </tr> <tr> <td>Power supply 0</td> <td></td> </tr> <tr> <td>Fan 1</td> <td></td> </tr> <tr> <td>Power supply 1</td> <td></td> </tr> <tr> <td>Fans 2, 3</td> <td></td> </tr> <tr> <td>Fan module 0</td> <td></td> </tr> <tr> <td>Fans 4, 5</td> <td></td> </tr> <tr> <td>Fan module 1</td> <td></td> </tr> <tr> <td>Fans 6, 7</td> <td></td> </tr> <tr> <td>Fan module 2</td> <td></td> </tr> <tr> <td>Fans 8, 9</td> <td></td> </tr> <tr> <td>Fan module 3</td> <td></td> </tr> <tr> <td>Fans 10, 11</td> <td></td> </tr> <tr> <td>Fan module 4</td> <td></td> </tr> </tbody> </table>	If the following fan fails	Replace the following CRU	Fan 0		Power supply 0		Fan 1		Power supply 1		Fans 2, 3		Fan module 0		Fans 4, 5		Fan module 1		Fans 6, 7		Fan module 2		Fans 8, 9		Fan module 3		Fans 10, 11		Fan module 4	
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Fan 0																															
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Fan module 2																															
Fans 8, 9																															
Fan module 3																															
Fans 10, 11																															
Fan module 4																															
Status	Displays the current status of a hardware component. A status of Normal requires no action.																														

Related Links

[View the Details of a Controller](#)

View Controller, I/O Ports Tab

Navigation: System > Hardware > Controllers > Actions > View > I/O Ports

Displays I/O port information for the selected Controller.

Slot	Location of the HBA installed on the Controller
Port	HBA port number.
Connection Type	Identifies the types of network ports for data path traffic between the customer network switches and the Controllers:
	<p>Copper</p> <p>Identifies copper interfaces.</p> <p>Long Wave Optical</p> <p>Identifies longwave optical small form-factor pluggable (SFP) transceiver interfaces.</p> <p>Short Wave Optical</p> <p>Identifies shortwave optical SFP transceiver interfaces.</p> <p>Unknown</p> <p>Indicates that the connection type cannot be determined.</p>
Status	Identifies the connection state between the HBA port and Controller.
	Possible states:
	<p>Connected</p> <p>Indicates that the HBA port on the host is connected to the port on the Controller.</p> <p>In most operating systems, host ports log in to the Controller ports immediately after the two are physically connected and enabled and remain logged in until the physical connection is broken. So, Connected effectively means that there is an enabled physical connection between the ports.</p> <p>Not Connected</p> <p>Indicates that the HBA port on the host is not connected to the port on the Controller.</p> <p>Missing</p> <p>Indicates that the HBA is removed from the Controller.</p>
	<p>Note: On HP-UX platforms, however, some HBA device drivers use a different approach. These drivers log out of the connection when there is no traffic to send. The HP-UX initiator often logs out when</p>

the initiator does not discover any accessible LUNs attached to the target port. For these reasons, an HP-UX HBA port often shows as **Not Connected** even though there is an enabled physical connection between the ports.

Bandwidth	Displays the data rate of the port interface.
SFP Status	Displays the status of the SFP transceiver. <ul style="list-style-type: none"> • Bypassed • Bypassed-No SFP • Bypassed-Incorrect Speed • Bypassed-Read Error • Bypassed-Incorrect Type • Bypassed-Lost Sync <p>If the interface module itself should fail, the SFP status shows Hardware Failure.</p>
SFP Vendor	Displays the vendor's part number for the SFP. If that information is not available, the system displays Unknown .
SFP Part Number	Displays the vendor's part number for the SFP. If that information is not available, the field is blank or displays Unknown .
SFP Revision	Displays the part revision number for the SFP. If that information is not available, the field is blank or displays Unknown .

Related Links

[View the Details of a Controller](#)

View Controller Port Settings, Ethernet Tab

Navigation: System > Global Settings > Controller Ports > Actions > View Port Settings > Ethernet

Displays the Controller Ethernet port properties.

Port Information

Controller Name	Identifies the name of the Controller.
Slot Number	Identifies the Controller HBA slot number.
Port Number	Identifies the HBA port number.
Status	Identifies the HBA connection status. Valid states: <ul style="list-style-type: none"> • Connected • Not connected • Offline

Type	Indicates the type of HBA. Valid types: <ul style="list-style-type: none">• Ethernet• Fibre Channel (FC)• Serial Attached SCSI (SAS)
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.

Ethernet Information

MAC Address	Identifies the unique identifier of the HBA port.
MTU Bytes Maximum	Indicates the maximum number of bytes supported by the maximum transmission unit (MTU).
MTU Bytes Minimum	Indicates the minimum number of bytes supported by the maximum transmission unit (MTU).

SFP Information

Status	Identifies the small form-factor pluggable (SFP) device port status. Valid SFP device states: <ul style="list-style-type: none">• Enabled 1 Gb• Enabled 2 Gb• Enabled 4 Gb• Enabled 8 Gb• Enabled 10 Gb• Enabled 16 Gb• No SFP• Incorrect Speed• Read Error• Incorrect Type• Loss of Sync• Other
Connection Type	Identifies the types of SFP transceiver interface devices used for data path traffic between the customer network switches and the Controllers. Valid SFP interface types: <ul style="list-style-type: none">• Copper• Optical

- Long Wave Optical
- Short Wave Optical

Vendor	Identifies the SFP device manufacturer.
Part Number	Identifies the SFP device part number.
Revision	Identifies the SFP device revision number.

Related Links

[View the Port Details for a Controller](#)

View Controller Port Settings, Fibre Channel Tab

Navigation: System > Global Settings > Controller Ports > Actions > View Port Settings > Fibre Channel

Displays the Controller Fibre Channel port properties.

Port Information

Controller Name	Identifies the name of the Controller.
Slot	Identifies the Controller HBA slot number.
Port	Identifies the HBA port number.
Status	Identifies the HBA connection status. Valid states: <ul style="list-style-type: none"> • Connected • Not connected • Offline
Type	Indicates the type of HBA. Valid types: <ul style="list-style-type: none"> • Ethernet • Fibre Channel (FC) • Serial Attached SCSI (SAS)
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.

Fibre Channel Information

Address	Identifies the unique address of the Oracle FS System Controller port on the network.
Topology	Identifies the FC transport topology in use by the ports in the network interface module (NIM) to connect to the storage area network (SAN) employed by the customer.

Valid types:

Fabric

Indicates that the port is an N_Port in a switched fabric (FC-SW).

Loop

Indicates that the port is an NL_Port in an arbitrated loop (FC-AL).

Point-to-Point

Indicates that the port is an N_Port that is connected to another N_Port, back to back (FC-P2P).

Public Loop

Indicates that the port is an NL_Port that is connected to a loop in which one port in the loop is an FL_Port in the fabric (FC-FLA).

Note: The topology used by the Backend SAS Interconnect between the Controllers and the Drive Enclosure is private and not reported.

SFP Information

Status Identifies the small form-factor pluggable (SFP) device port status.

Valid SFP device states:

- Enabled 1 Gb
- Enabled 2 Gb
- Enabled 4 Gb
- Enabled 8 Gb
- Enabled 10 Gb
- Enabled 16 Gb
- No SFP
- Incorrect Speed
- Read Error
- Incorrect Type
- Loss of Sync
- Other

Connection Type Identifies the types of SFP transceiver interface devices used for data path traffic between the customer network switches and the Controllers.

Valid SFP interface types:

- Copper
- Optical

- Long Wave Optical
- Short Wave Optical

Vendor	Identifies the SFP device manufacturer.
Part Number	Identifies the SFP device part number.
Revision	Identifies the SFP device revision number.

Related Links

[View the Port Details for a Controller](#)

View Controller Port Settings, SAS Tab

Navigation: System > Global Settings > Controller Ports > Actions > View Port Settings > SAS

Displays the Controller SAS port properties.

Port Information

Controller Name	Identifies the name of the Controller.
Slot	Identifies the Controller HBA slot number.
Port	Identifies the HBA port number.
Status	Identifies the HBA connection status. Valid states: <ul style="list-style-type: none"> • Connected • Not connected • Offline
Type	Indicates the type of HBA.
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.
WWN	Identifies the world-wide name (WWN) of the Controller port.




Related Links

[View the Port Details for a Controller](#)

View Drive Enclosure, Components Tab

Navigation: System > Hardware > Drive Enclosures > Actions > View > Components

Displays status of the selected Drive Enclosure, and its components including chassis, drives, I/O modules, and power control modules.

Comment	Identifies a descriptive name that is assigned to a hardware component.
Model	Indicates the model number of the Drive Enclosure in which the drive resides.
Serial Number	Indicates the serial number of the selected Drive Enclosure.
Drive Enclosure ID	Indicates the unique identifier (the World Wide Name) of the selected Drive Enclosure.
Perform Automatic Drive Enclosure Operations	Indicates whether data protection operations, such as copyback, copy-away, and rebuild run in the background, as necessary. This option is deselected under the direction of Oracle Customer Support or as directed in a My Oracle Support (MOS) Knowledge Article.
Replaceable Unit	Indicates the Drive Enclosure components that are replaceable.
Status (Chassis)	<p>Provides the operational state of the Drive Enclosure chassis. Oracle FS System Manager (GUI) displays a status icon followed by the chassis state.</p> <p>Possible states, by status icon:</p> <ul style="list-style-type: none">  (Normal) <ul style="list-style-type: none"> The following operational states are associated with a normal chassis status: <ul style="list-style-type: none"> Normal <ul style="list-style-type: none"> The chassis is operating normally.  (Warning) <ul style="list-style-type: none"> The following operational states are associated with a warning chassis status: <ul style="list-style-type: none"> Unknown <ul style="list-style-type: none"> The system is unable to read the chassis state.
Status (Drives)	<p>Provides the operational state of the drive in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the drive state.</p> <p>Possible states, by status icon:</p> <ul style="list-style-type: none">  (Normal) <ul style="list-style-type: none"> The following operational states are associated with a normal drive status: <ul style="list-style-type: none"> Normal <ul style="list-style-type: none"> The drive is a member of the drive group.



(Warning)

Not Used

The drive is operating normally, but is not a member of a drive group.

The following operational states are associated with a warning drive status:

Booting

The drive is starting up.

Copy Away Source

The system has detected a failure on the drive and is currently copying the data to a target drive. The drive state changes to **Failed** when copying is complete.

Copy Away Target

The system has detected a failure on another drive and is currently copying the data to this target drive.

Copyback

An active spare drive is copying data to this drive.

Degraded Connectivity

The connection to the drive is limited to only a single Controller.

Foreign

The drive is not a member of this drive group. Accept this drive using the associated System Alert to make the drive a member of the drive group.

Missing

The drive is not found in the Drive Enclosure.

Rebuilding

The drive is a target of a rebuild operation for a drive group.

Recovered

The drive has failure history, but is now online and is not a member of a drive group.

Recovered In Use

The drive has failure history. The drive is now online and is a member of a drive group.

Shutdown

The system is in shutdown mode and cannot access the drive.

Unknown

The system is unable to read the drive state.



(Critical)

The following operational states are associated with a critical drive status:

Critical

The drive has experienced a failure.

Restore

The drive is currently being restored.

Status (I/O modules)

Provides the operational state of the I/O module in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the I/O module state.

Possible states, by status icon:



(Normal)

The following operational states are associated with a normal I/O module status:

Normal

The I/O module is operating normally.



(Warning)

The following operational states are associated with a warning I/O module status:

Offline

The I/O module is offline.

Missing

The I/O module is not found in the Drive Enclosure.

Unknown

The system is unable to read the I/O module state.



(Critical)

The following operational states are associated with a critical I/O module status:

Critical

The I/O module has experienced a failure.

Status (Power Cooling Module)

Provides the operational state of the Drive Enclosure power cooling module. Oracle FS System Manager (GUI) displays a status icon followed by the power cooling module state.

Possible states, by status icon:



(Normal)

The following operational states are associated with a normal power cooling module status:

Normal

The power cooling module is operating normally.



(Warning)

The following operational states are associated with a warning power cooling module status:

Offline

The system reports that the power cooling module is failed or is disabled.

Missing

The power cooling module is not found in the Drive Enclosure.

Warning

The power cooling module is functioning but shows signs of failure.

Unknown

The system is unable to read the power cooling module state.



(Critical)

The following operational states are associated with a critical power cooling module status:

Critical

The power cooling module has experienced a failure.

The system displays details about the selected replaceable component.

Chassis information

Provides detailed information about the selected chassis.

Number

Indicates the number that uniquely identifies the chassis within the Drive Enclosure.

Status

Indicates the operational state of the component.

Part Number

Indicates the manufacturer part number of the component.

Serial Number

Indicates the serial number of the component.

**Drive
information**

Provides detailed information about the selected drive.

Status

Indicates the operational state of the drive.

Model

Indicates the manufacturers model number of the drive.

Serial Number

Indicates the serial number of the drive.

Firmware Number

Indicates the firmware version number of the drive.

Drive Slot Number

Indicates the Drive Enclosure slot number where the drive is installed.

Storage Class

Specifies the category of physical media that comprises the drive group.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Drive Enclosure

Indicates the unique identifier of the Drive Enclosure.

Drive Capacity

Indicates the storage capacity of the drive.

Remaining Life Expectancy

(SSD only) Indicates the remaining months in the life of the drive.

I/O Module information

Provides detailed information about the selected I/O module.

Number

Indicates the number that uniquely identifies the I/O module within the Drive Enclosure.

Status

Indicates the operational state of the I/O module.

Part Number

Indicates the manufacturer part number of the I/O module.

Serial Number

Indicates the serial number of the I/O module.

Firmware Number

Indicates the firmware version number of the I/O module.

Power Cooling Module information

Provides detailed information about the selected Power Cooling Module.

Status

Indicates the operational state of the Power Cooling Module.

Model

Indicates the manufacturer model number of the Power Cooling Module.

Serial Number

Indicates the serial number of the Power Cooling Module.

Number of Fans

Indicates the number of cooling fans in the Power Cooling Module.

Number of Failed Fans

Indicates the number of failed cooling fans in the Power Cooling Module.

Related Links

[View the Details of a Drive Enclosure](#)

View Drive Enclosure, I/O Ports Tab

Navigation: System > Hardware > Drive Enclosures > Actions > View > I/O Ports

Displays the status of I/O ports of the Serial Attached SCSI (SAS) of the selected Drive Enclosure.

Port	Lists the <i>PHYs</i> that are associated with the I/O module port.
Phy State	Indicates the state of the PHY connection. A wide port has two or more of the PHY states indicate Link Up. A narrow port has only one PHY state is Link Up. Possible states: Link Up Indicates that the PHY connection is functioning properly. Link Down Indicates that the PHY connection is disconnected. Disabled Indicates that the PHY connection is disabled. Reset Indicates that the system is resetting the PHY connection.
Negotiated Speed	Indicates the port transmission speed in Gigabits each second.
Maximum Speed	Indicates the maximum speed of the port.

Related Links

[View the Details of a Drive Enclosure](#)

View Drive Group Dialog

Navigation:

- *System > Storage Domains > Actions > View Drive Group*
- *System > Hardware > Drive Groups > Actions > View*

Displays information about the drive group.

Replaceable Unit

Replaceable Unit Displays the drives available in a drive group. The details about a selected drive are displayed on the right-hand side of the dialog.

Status (Drives) Provides the operational state of the drive in the drive group. Oracle FS System Manager (GUI) displays a status icon followed by the drive state.

Possible states, by status icon:



(Normal)

The following operational states are associated with a normal drive status:

Normal

The drive is a member of the drive group.

Not Used

The drive is operating normally, but is not a member of a drive group.



(Warning)

The following operational states are associated with a warning drive status:

Booting

The drive is starting up.

Copy Away Source

The system has detected a failure on the drive and is currently copying the data to a target drive. The drive state changes to **Failed** when copying is complete.

Copy Away Target

The system has detected a failure on another drive and is currently copying the data to this target drive.

Copyback

An active spare drive is copying data to this drive.

Degraded Connectivity

The connection to the drive is limited to only a single Controller.

Foreign

The drive is not a member of this drive group. Accept this drive using the

associated System Alert to make the drive a member of the drive group.

Missing

The drive is not found in the Drive Enclosure.

Rebuilding

The drive is a target of a rebuild operation for a drive group.

Recovered

The drive has failure history, but is now online and is not a member of a drive group.

Recovered In Use

The drive has failure history. The drive is now online and is a member of a drive group.

Shutdown

The system is in shutdown mode and cannot access the drive.

Unknown

The system is unable to read the drive state.



(Critical)

The following operational states are associated with a critical drive status:

Critical

The drive has experienced a failure.

Restore

The drive is currently being restored.

Make this drive group the primary drive group

Make the drive group the primary drive group within the Drive Enclosure. The primary drive group contains system configuration data.

RAID Levels and Status

RAID Level Indicates the types of RAID data protection that is provided by the selected drive group.

Each entry in the table represents a particular set of minimum allocation units (MAUs) in the drive group. Each of the MAUs in a given set has the same level of RAID protection, forming a RAID protection segment for the drive group.

If a drive goes offline, the event affects all of the MAUs in the protection segment in the same way. Therefore, the reported status for a given RAID level applies to the entire protection segment.

Single Parity

Indicates that each of the MAUs in the RAID protection segment uses one set of parity bits to protect against the loss of one drive in the drive group. Single parity is implemented as a variant of the RAID 5 storage technology.

Double Parity

Indicates that each of the MAUs in the RAID protection segment uses two sets of parity bits to protect against the loss of one or two drives in the drive group. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that each of the MAUs in the RAID protection segment is written across two drives in the drive group. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

RAID Status

Possible states:

Normal

Indicates that the drive group is accessible and no action is required.

Degraded Warning

Indicates that the drive has failed in the drive group, but the drive group is still accessible. Replace the failed drive. If the drive group is the primary drive group, then replace the drive immediately. The primary drive group contains system overhead, including all system configuration data.

Degraded Critical

Indicates that two or more of the drives have failed. The drive group can become inaccessible unless you replace the drives.

Failed

Indicates that multiple drives have failed. The drive group is not accessible. Replace the failed drives. After the failed drives are replaced, the drive group becomes accessible.

Unknown

Indicates that the drive status information is not available to display.

View Event Notification Dialog

Navigation: System > Alerts and Events > Event Notification > Actions > View

Displays event notices.

When an event is triggered, the Oracle FS System sends a notification to the designated email recipients.

Name	Displays the user-defined name of the event notification.
Description	Displays the user-defined description of the event notification.
Enable Event Notification	Displays whether the event notification is enabled. When checked, this option activates the notification when the event occurs on the Oracle FS System.
Event Notification Recipient Email Addresses	Displays the email addresses of the recipients who are to receive event notifications. The email server to which the Oracle FS System sends notifications must be able to send messages to these email addresses.

Monitored Events

By severity, then category Sorts the list of events by severity with a list of event categories. The severity categories include:

Informational

Requires no action for events that are information only.

Warning

Requires no immediate action for minor conditions that you can address at your convenience.

Critical

Requires prompt action to prevent system failures or offline conditions.

By category, then severity Sorts the list of events by categories with a list of event severity. The categories include:

Security

Events to notify of a security problem, such as an unauthorized request.

Audit

Events that track what users are doing, such as the operations that they performed.

System

Events to notify of system problems, such as a missing Drive Enclosure or Controller.

Events Not Monitored Displays the list of events not set to be monitored. The Oracle FS System does not trigger a notification when an event listed occurs.

Monitored Events Displays the list of events that you specified to be monitored. The Oracle FS System triggers a notification each time an event that you

specified occurs. The email addresses specified in the **Event Notification Recipient Email Addresses** field receive the event notifications.

Related Links

[Display the Event Notification Details](#)

View Pilot Dialog

Navigation: System > Hardware > Pilots > Actions > View Pilot

Displays the status of the selected Pilot management controller that is installed on the Oracle FS System.

Control Unit Number	Identifies the node of the Pilot, which is either 1 or 2.
Operation Mode	<p>Displays the current operational mode of the Pilot.</p> <p>Possible modes:</p> <p>Active</p> <p>Indicates which Pilot performs all configuration tasks that administrators request.</p> <p>Standby</p> <p>Indicates which Pilot acts as a secondary (passive) device and if the active Pilot fails over to this standby Pilot. The passive Pilot monitors the health of the active Pilot and Controller but is not active in managing the data resources of the Oracle FS System.</p> <p>Unknown</p> <p>Indicates that the Pilot operational state could not be determined.</p>
Status	<p>Displays the current operational state of the Pilot.</p> <p>Possible states:</p> <p>Normal</p> <p>Indicates that the Pilot is operating normally.</p> <p>Warning</p> <p>Indicates that the Pilot has a minor error that requires attention at your earliest convenience.</p> <p>Critical</p> <p>Indicates that the Pilot has a major error that requires prompt action.</p> <p>Booting</p> <p>Indicates that the Pilot is starting up.</p>

Upgrading

Indicates that the Pilot firmware is being updated.

Shutdown

Indicates that the Pilot is shutting down.

**Configuration
Server Status**

Indicates the state of the configuration server that runs from the active Pilot.

Pilot Network Connectivity

Provides the port status of the following network interfaces for the Pilot.

Ethernet 0

Indicates the connectivity status of the PilottoPilot interface connection.

Possible states:

Connected

Indicates that the port connection is normal and no administrator action is required.

Not Connected

Indicates that the port cannot connect.

Unknown

Connection state cannot be determined.

Ethernet 1

Indicates the connectivity status of the PilottoController interface connection.

Possible states:

Connected

Indicates that the port connection is normal and no administrator action is required.

Not Connected

Indicates that the port cannot connect.

Unknown

Connection state cannot be determined.

Management

Indicates the connectivity status of the external management network.

Possible states:

Connected

Indicates that the port connection is normal and no administrator action is required.

Not Connected

Indicates that the port cannot connect.

Unknown

Connection state cannot be determined.

Serial

Indicates the connectivity status of the internal Pilot-to-Pilot communication.

Possible states:

Connected

Indicates that the port connection is normal and no administrator action is required.

Not Connected

Indicates that the port cannot connect.

Unknown

Connection state cannot be determined.

Service Port

Indicates the connectivity status of the service port, which is reserved for Oracle use.

Possible states:

Connected

Indicates that the port connection is normal and no administrator action is required.

Not Connected

Indicates that the port cannot connect.

Unknown

Connection state cannot be determined.

Consistency of Status

Identifies the connection reliability of the network interfaces.

Possible states:

Consistent

Indicates that the connection is reliable.

Inconsistent

Indicates that the connection is not reliable. You will need to perform troubleshooting to resolve the problem. Inconsistent status might not be caused by network issues, particularly on the Ethernet and the Serial ports.

Related Links

[View the Network Connectivity of a Pilot](#)

View Reporting Schedule Dialog

Navigation: *System > Reporting and Statistics > Reporting Schedules > Actions > View Schedule*

Displays details about the selected reporting schedule.

Schedule Name Displays the user defined name of the schedule.

Report Type **SAN Hosts**

Provides detailed configuration information on the host servers and configured components currently included in your storage area network (SAN). The data includes the SAN Host operating system, Fibre Channel Initiator, Fibre Channel ports, load balancing settings, LUNs, and other information describing the SAN Hosts.

Storage Performance

Provides performance information about the LUNs on the Oracle FS System at the time the report was generated. The performance data includes: read operations per second, write operations per second, and total read and write operations per second; read MB per second, write MB per second, and total read and write MB per second for each LUN.

Additional storage performance data, including real-time statistics, is available for each LUN from the **SAN > Statistics and Trending > LUNs** feature.

Storage Use

Provides capacity information on the storage currently available on the Oracle FS System. The data includes the total, allocated, free, and preparing capacity for all available storage. The data for total, allocated, free, and preparing capacity is also presented per Storage Class.

Storage Use per Volume

Provides capacity information for each logical volume on the Oracle FS System. The data includes the allocated, maximum, and used capacity per volume.

System Configuration

Provides detailed information on the configuration and current status of the Oracle FS System and all of its components, such as serial numbers, firmware versions, ports, and status, for the Pilot, Controllers, and Drive Enclosures.

Note: You might want to generate and archive the *System Configuration* report as the report provides a record of your system configuration at the time the report was generated. A record of system changes would be useful for system planning and customer support.

System Configuration Summary

Provides a summary of the Pilot, Controllers, and Drive Enclosures information included in the detailed *System Configuration* report. The data includes the current status of the components listed above and system information.

Enabled	Specifies whether the scheduled report is active or inactive. To make a scheduled report active, check the Enable checkbox. If you do not want the scheduled report to be active, do not check the Enable checkbox. The scheduled report is still listed under Reporting Schedule but reports are not generated.
Start Time	Specifies the date and time to begin generating reports.
Schedule Frequency	Specifies the frequency at which the schedule generates reports. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Recurrence	Specifies how many hours, days, or weeks to wait before generating this scheduled report again. You can also specify a specific day on which you want the report to be generated.

Related Links

[View a Reporting Schedule](#)

View SNMP Host Dialog

Navigation: System > Global Settings > SNMP > Actions > View SNMP Host

Displays information about the selected Simple Network Management Protocol (SNMP) trap hosts.

Name	Identifies the name for the SNMP host.
Host IP	Identifies the IP address or domain name of a client that receives the Oracle FS System SNMP information.
Community string	Identifies the community string for use when the Oracle FS System sends an event trap to the SNMP host. Note: When an administrator does not specify a community string for read-only access, SNMP servers and clients typically use <code>public</code> .
Receive traps	Indicates that the SNMP host receives event traps sent to it.
Severity threshold	Identifies the severity threshold for events that the system sends to the SNMP host by event traps. Severity levels:

- **Informational**
- **Warning**
- **Critical**

Related Links

[View SNMP Hosts](#)

View Storage Allocation Details Dialog

Navigation: System > Storage Domains > Actions > View Storage Allocation Details

Displays, by Storage Class, the storage capacities for all of the single tier LUNs and auto-tier LUNs in the selected Storage Domain.

For each available Storage Class, the system displays a graph for the following storage capacities.

Single Tier	Indicates the allocated storage capacity for single tier LUNs.
Auto Tier	Indicates the allocated storage capacity for auto-tier LUNs. The solid portion of the graph identifies the allocated capacity that is using to RAID 5 or RAID 6. The shaded portion of the graph identifies the allocated capacity that is using to RAID 10. Note: RAID 6 is only available on a Capacity HDD Storage Class.
Immobile	Indicates that the storage capacity cannot move to a lower cost, lower performance Storage Class. You can reduce immobile capacity by including low performance Storage Classes in the LUNs. The solid portion of the graph identifies the allocated capacity that is using to RAID 5 or RAID 6. The shaded portion of the graph identifies the allocated capacity that is using to RAID 10. Note: RAID 6 is only available on a Capacity HDD Storage Class.
Free	Displays the amount of capacity that is available for allocation in the indicated Storage Domain.
Unused	Displays the amount of capacity that is allocated for, but not used by auto-tiered LUNs. The unused free capacity can only be used for auto-tiered LUNs. Compact the Storage Domain to release the unused space for non-auto-tiered LUNs.
Preparing	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Domain.

Related Links

[View Storage Allocation Details](#)

View Storage Domain Dialog

Navigation: System > Storage Domains > Actions > View Storage Domain

Displays information about the selected Storage Domain.

Storage Domain Capacity by Storage Class

Displays graphically the storage classes, and their capacities, for the selected Storage Domain.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

For each storage class, the system graphically displays the Storage Domain physical capacities. The graph uses colored bars of different thicknesses to indicate the capacity status of each storage class. Hover the mouse pointer over each graph to display the capacity type.

Note: Drive manufacturers often report drive capacities in decimal units (powers of 10). An Oracle FS System reports the capacity of physical storage and the size of logical volumes in binary units (powers of two):

1 MB = 1024^2 (1,048,576) bytes

1 GB = 1024^3 (1,073,741,824) bytes

1 TB = 1024^4 (1,099,511,627,776) bytes

Possible physical storage capacities:

Free Space

Displays the amount of capacity that is available for allocation in the indicated Storage Class.

Used Capacity	Displays the amount of capacity that is consumed by data and system overhead.
Total Capacity	Displays the total amount of raw capacity provided by the drive groups that are defined within the indicated Storage Class.
Allocated Space	Displays the amount of capacity that has been assigned and designated to all storage classes residing on the indicated Storage Class.
Preparing Capacity	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Class.
Allocated to Logical Maximum	Displays the maximum capacity to which the Storage Class can grow.
Name	Specifies the name of this Storage Domain. This name must be unique within the Oracle FS System.
Background Process Priority	<p>System Chooses</p> <p><i>(Default)</i> Specifies that the system balances the resources that are needed for background data movement with the resources that are needed to service the incoming client I/O.</p> <p>Minimize Impact</p> <p>Specifies that the system restricts the amount of system resources that are given to the background data movement operation. This option minimizes the impact on client I/O. Recommended for highly-loaded Storage Domains.</p> <p>Maximize Speed</p> <p>Specifies that the system grants resource priority to the background data movement operation. This option reduces the amount of system resources that are available for client I/O. Recommended for lightly-loaded Storage Domains.</p>
Enable Automatic QoS Rebalancing	Specifies that the system balances the existing volumes across the drive groups when you add drive groups to the Storage Domain. When enabled, the system distributes the data of the existing volumes to all of the drive groups in the Storage Domain. Not selecting the option retains the data distribution across the existing drive groups in the Storage Domain.
Enable Tier Reallocation	Specifies that any tiered data that resides in this Storage Domain has data progression enabled. Individual objects might have tier reallocation disabled. Enabling tier reallocation at the Storage Domain level does not override any objects that have tier reallocation disabled. The default value is enabled.
Enable Tier Reallocation	Specifies that the Oracle FS System internally collects data usage patterns for the Storage Domain. The patterns are analyzed to determine the optimum Storage Classes for the data. The default

Statistics Collection	<p>value is enabled. Do not change this setting unless you need to test different profiles.</p> <p>Disable this setting if you are modifying your Storage Profile for testing purposes and did not want to collect statistics during the test. You do not want to collect tier reallocation statistics during the test as this might distort future tier reallocation. After you complete testing, enable tier reallocation statistics collection.</p> <p>Note: Enabling or disabling the tier reallocation statistics collection has no effect on statistics you can view for CPU, drive groups, LUNs. (Those are a different set of statistics.)</p>
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Auto-Tier Scan Options (Advanced)

Optimizes the auto-tier algorithm for moving data to different Storage Classes. You can specify the interval for when auto-tier moves frequently accessed data blocks and infrequently accessed data blocks to match your application activity.

Performance-Optimizing Scan Cycle	<p>Specifies the frequency, in hours, that auto-tier scans to move frequently accessed data blocks to a high performance Storage Class.</p> <p>For example, a value of 32 means that every 32 hours auto-tier scans the system to move frequently accessed data blocks to a high performance Storage Class.</p> <p>Updates to this field affect the label of the Number of <i>n</i>-hour Scan Cycles field. For example, a value of 32 changes the label for the Number of <i>n</i>-hour Scan Cycles to Number of 32-hour Scan Cycles.</p>
Number of 24-hour Scan Cycles	<p>Specifies the frequency that auto-tier runs the performance-optimizing scan cycles before auto-tier runs the cost-optimizing scan cycle. The value entered in the Number of <i>n</i>-hour Scan Cycles field is multiplied by the value entered in the Performance-Optimizing Scan Cycle field to obtain the value set in the Cost-Optimizing Scan Cycle field.</p> <p>For example, a value of 5 means that every fifth time that auto-tier runs the performance-optimizing scan cycle, auto-tier then runs the cost-optimizing scan cycle to move infrequently accessed data to a less expensive storage class.</p>
Cost-Optimizing Scan Cycle	<p><i>(Read-only)</i> Displays the frequency, in hours, that auto-tier scans to move infrequently accessed data blocks to a less expensive Storage Class.</p> <p>The value displayed in this field is calculated as the product of the value you entered in the Performance-Optimizing Scan Cycle field and the value you entered in the Number of <i>n</i>-hour Scan Cycles field.</p>

Allowable Storage Capacity for Auto-Tiered LUNs

Indicates the maximum percentage of storage capacity to dedicate to auto-tier reallocation for each Storage Class of the Storage Domain.

Related Links

[View the Properties of a Storage Domain](#)

View Storage Domains Dialog

Navigation:

SAN > Storage > LUNs > Actions > Create LUN > View Storage Domains

Displays properties of the available Storage Domains and associated drive groups.

Name Specifies the name of the Storage Domain and lists the Drive Enclosures and drive groups that are assigned to the domain.

Status Displays the status of the Storage Domains and of the drive groups that are associated with those Storage Domains. Normal means that no action is required.

Normal

Indicates that the drive group is accessible and no action is required.

Degraded Warning

Indicates that the drive has failed in the drive group, but the drive group is still accessible. Replace the failed drive. If the drive group is the primary drive group, then replace the drive immediately. The primary drive group contains system overhead, including all system configuration data.

Degraded Critical

Indicates that two or more of the drives have failed. The drive group can become inaccessible unless you replace the drives.

Failed

Indicates that multiple drives have failed. The drive group is not accessible. Replace the failed drives. After the failed drives are replaced, the drive group becomes accessible.

Unknown

Indicates that the drive status information is not available to display.

Tier Reallocation Identifies the tier reallocation status of the Storage Domain. When tier reallocation is enabled, the Oracle FS System dedicates resources and uses statistical data and QoS priority property to migrate data from one storage tier to another.

Valid states:

Enabled

Indicates that the tier reallocation is active on the Storage Domain. Enabled makes possible the migration of high-usage data to higher performing storage tiers in this Storage Domain.

Disabled

Indicates that tier reallocation is not active on the Storage Domain. Disabled does not allow the migration of high-usage data to higher performing storage tiers in this Storage Domain.

Statistics Collection Disabled

Indicates that statistical data used by the Oracle FS System to migrate the data is not collected. Oracle recommends not using this option as the statistical data is required for the tier reallocation process.

Tier reallocation disabled

Indicates that the tier reallocation is not active. The statistics collection is active.

Media Type

Specifies the category of physical media that comprises the drive group.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enclosure Chassis ID	Displays the numeric identifier of the Drive Enclosure. The Enclosure Chassis ID is located and displayed on the front of the Drive Enclosure. The numeric values range from 01 to 99; the hexadecimal values from A0 to FF.
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Physical Capacity

Allocated	Displays the amount of capacity that has been assigned and designated to all logical volumes residing on the indicated Storage Domain.
Free	Displays the amount of capacity that is available for allocation in the indicated Storage Domain.
Unavailable	Displays the amount of capacity that is being initialized. This value typically results from a volume having been deleted. This value decreases over time while the value for free space correspondingly increases for the indicated Storage Domain.
Total Capacity	Displays the total amount of raw capacity provided by the Drive Enclosures that are defined within the indicated Storage Domain.
Physical Distribution	Provides a graphical representation of the capacity that is used compared to the maximum that is allocated.

Related Links

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Create Single-Tier LUN: Define Quality of Service](#)

View Storage Profile Dialog

Navigation: System > Global Settings > Storage Profiles > Actions > View Storage Profile

Displays the properties of a Storage Profile.

Name	Identifies the name of the Storage Profile. The name includes, in some instances, the name of the application that is associated with the profile.
RAID Level	Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives. Possible RAID levels: Single parity Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology. Double parity Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the

loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority

Identifies the priority that the system gives to various operational aspects of a logical volume, such as the Controller processing queue. The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume. Identifies as well where the data is striped on rotating drives. Valid priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue

High

Indicates the next highest priority for responding to requests in the processing queue

Medium

Indicates an intermediate priority for responding to requests in the processing queue

Low

Indicates the next to lowest priority for responding to requests in the processing queue

Archive

Indicates the lowest priority for responding to requests in the processing queue

Advanced

Displays addition QoS properties of the Storage Profile.

Writes Identifies the write-caching rules to use for the profile.

Valid options:

writeThrough

Writes data to the Controller cache and to the storage arrays before the write request completes. This rule ensures that the data is safely written to the storage before the write request returns to the application. Write-through caching performs more slowly than does write-back caching because the data is being written to the storage arrays as well as to the cache.

Write-back caching

Writes data to the Controller cache, and the write request returns immediately without waiting for the write-to-disk to complete. During idle cycles, the system writes the data from the cache to the storage arrays. Write-back caching performs faster than does write-through because the data only needs to be written to the cache before the write request returns.

Important: If the system goes down unexpectedly, the data in the cache that has not been written to the storage arrays could be lost.

During the shutdown process, the system writes all cached data to the storage arrays.

Default

Indicates that the Oracle FS System selects the appropriate write-caching rule based on the selected QoS settings.

Stripe Width

Identifies the number of drive groups over which the data is written.

Possible values:

1 through 64

Indicates the specified stripe width.

all

Indicates that the logical volume is striped across all of the available drive groups.

auto-select

Indicates that the Oracle FS System determines the stripe width based on the **Priority** option that you selected.

Preferred Storage Classes

Displays the Storage Class media on which the logical volume resides and the preferred order that the Oracle FS System uses the media.

Preferred Order Indicates the preferred order in which the Oracle FS System uses the available Storage Classes.

Storage Class Specifies the category of physical media on which the logical volume resides.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Related Links

[View Storage Profiles](#)

View UPS Dialog

Navigation: System > Hardware > UPSs > Actions > View UPS

Displays properties of a selected uninterruptible power supply (UPS) device.

Name Identifies the name of the UPS device. UPS names must be unique across the Oracle FS System and must be 256 or fewer UTF-8 characters.

IP Address Identifies the IP address that is assigned to the external UPS device.

SNMP Community Identifies a community for which a specific trap host should receive traps that the Oracle FS System generates. You can specify

different community strings for each trap host so that multiple administrators can receive specific types of SNMP traps. The default community string is **public**`public` (lower case). It is recommend you change the default community string.

Note: This community string entered here must match the community string configured on the UPS device.

Current Status

Provides read-only details and status about the UPS device. You cannot modify this information.

Model	Identifies the model number of the UPS device.
Firmware Revision	Identifies the firmware version that is installed on the UPS device.
Serial Number	Identifies the serial number of the UPS device.
Power Source	Identifies the source of the UPS power. Valid sources: <ul style="list-style-type: none">• AC (alternating current)• Battery• Unknown
Battery Status	Identifies the status of the UPS batteries. Valid values: <ul style="list-style-type: none">• Normal• Warning• Critical• Unknown
Communication Status	Identifies the communication status between the UPS device and the Oracle FS System system. Valid values: <ul style="list-style-type: none">• OK• Failed

Related Links

[View a UPS Device](#)

SAN Tab Reference Pages

Additional Options Dialog

Navigation: *SAN > Storage > LUNs > Actions > ... > Quality of Service > Auto-tier > Additional Options*

Lets you select the preferred Storage Classes that the Oracle FS System uses for tier migration. You can also specify whether tier migration is enabled for the auto-tiered LUN.

Storage Classes for Auto-Tiering

Use All Classes

Specifies that the auto-tiering feature uses all of the Storage Classes that are available on the Oracle FS System.

Note: Oracle recommends using the default value of **Use All Classes**.

Use only the following

Specifies the preferred Storage Classes that the system uses for auto-tiered LUNs. Deselecting a Storage Class from the list excludes that Storage Class and its capacity from normal tier migration.

Note: The system will use the deselected Storage Class if the selected Storage Classes reach capacity.

Excluding less expensive Storage Classes and including high performance Storage Classes causes *immobile* storage capacity. Immobile data occurs when the system cannot migrate the data to a lower Storage Class. Data that cannot migrate to a lower Storage Class is considered immobile and the storage capacity that this data occupies is immobile. Immobile capacity can significantly restrict the efficiency of tier migration.

Note: A Storage Class that contains the text “(not present)”, indicates that the particular class is not available in the Storage Domain. However, when the storage becomes available then the tier migration process uses that Storage Class.

Tier Reallocation Enabled

Specifies whether to apply storage tier migration to the LUN. Selecting the Tier Reallocation Enabled option does not override the disabled Tier Reallocation setting in the Storage Domain.

When enabled, the system moves data from one storage tier to another storage tier to achieve the best overall performance and

lowest overall cost. For the tier migration process to work, select the **Tier Reallocation Enabled** option and enable the same option in the Storage Domain.

Related Links

[Managing SAN LUNs](#)

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Modify Auto-Tiered LUN: Define Quality of Service](#)

Associate Hosts Dialog

Navigation: SAN > Storage > Hosts > Actions > Associate Hosts

Enables the Oracle FS System to recognize Fibre Channel (FC) hosts that do not have Oracle FS Path Manager installed.

Host Name Identifies the SAN host that accesses LUNs or Clone LUNs configured on the Oracle FS System.

Create Association

Specifies the name of the SAN initiator that is used for the SAN host association.

Valid options:

Specify WWN Specifies the Fibre Channel port world-wide name (WWN) that the Oracle FS System has not discovered.

Select from discovered WWNs Specifies the list Fibre Channel port WWNs that the Oracle FS System discovered on the network.

Associations

Type Identifies the type of initiator that is associated with the SAN host entry.

HBA Alias Identifies an alternative friendly name that is assigned to the host port.

Device / HBA Port Name Identifies the name of the device or initiator that is associated with the SAN host entry.

Controls

Remove Deletes the selected objects.

Related Links

[Create an Associated Host Entry](#)

Controller Protocol Statistics Overview Page

Navigation: SAN > Statistics and Trending > Controller Protocols

Displays statistics for storage area network (SAN) protocols. The SAN protocol is Fibre Channel (FC)

Name	Identifies the name of the selected Controller.
Port Type	Identifies the Controller port protocol type, FC.
Slot Number	Identifies the Controller PCI slot assignment.
Port Number	Identifies the port numbers which are 0 or 1.
Negotiated Speed	Displays the transmission speed in Gbps/second for the port. The transmission speed is negotiated between the HBA or FC switch and the Controller.
Throughput (per Second)	Identifies the throughput in MB/second. Read Identifies the read throughput in MB/second. Write Identifies the write throughput in MB/second.
I/O Latency	Identifies the time in milliseconds to read or write data. Displays the following: Read Identifies the time to read data in milliseconds. Write Identifies the time to write data in milliseconds Combined Identifies the combined amount of time to read and write data in milliseconds.
I/O Size	Identifies the average size of the read and write operations.
Commands Received (per Second)	Displays the number of read and write commands received on the Oracle FS System each second over the last sampling period.
Channel Errors Since Activated	Displays the cumulative number of channel errors that have occurred since the Controller was activated.
Collection Period	Identifies the start and end times at which information was last collected from the Oracle FS System. Data is collected for a two-minute period and the data is refreshed every two minutes.

To generate real-time statistics about an FC port, select the port, then select **Actions > FC Port Real Time Statistics**. Click **Add Graph** and select a statistic (you can review the following list for details).

The statistics displayed include:

Read IOPS

Indicates the number of read I/O operations per second.

Write IOPS

Indicates the number of write I/O operations per second.

Total IOPS

Indicates the total number of read and write IOPS.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive during write operations.

Total bytes per second

Displays the total number of bytes for read and write operations.

Related Links

[View SAN Controller Protocols](#)

Copy SAN LUN, Data Protection Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > Copy > Data Protection > Auto Tier

Adds data protection schedules to LUN copies. You can also manage data replication schedules from this page.

Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Enable Clones	Specifies whether to enable the Capacity for Clones options. Selecting this option also enables the Specify Clone QoS options.
----------------------	--

Capacity for Clone Storage

Maximum capacity	Specifies the percentage of storage space to allocate for Clone LUNs.
-------------------------	---

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Current Maximum Capacity	Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.
---------------------------------	---

Current Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Estimated Maximum Capacity	Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Estimated Available Capacity	Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Initial Storage Class Specifies the initial category of physical media on which the logical volume resides. For auto-tiered LUNs, the Oracle FS System determines the actual Storage Class that matches the data usage statistics on the volume to get the most optimal performance.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Initial Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Advanced Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

Initial RAID Level

Identifies the initial RAID level associated with the Storage Profile. The Oracle FS System determines the actual RAID Level that matches the data usage statistics on the volume to get the most optimal performance.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents

receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Additional Options Displays a dialog that allows you to select Auto Tier Storage Class options.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name Identifies the name of the schedule.

Start Time Identifies the date and time that the schedule begins.

Frequency Identifies the frequency at which the schedule runs. Frequencies include:

- **Run Once**
- **Hourly**
- **Daily**
- **Weekly**

Enabled Identifies whether the schedule is enabled.

Enabled

Indicates that the scheduled operation performs at the specified time.

Disabled

Indicates that the operation is not performed as scheduled.

Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.

Create Displays a dialog to create a scheduled operation.

Modify Displays a dialog to modify an existing schedule.

Delete Removes an existing schedule.

Related Links

[QoS Policies](#)

[Copy a LUN](#)

Copy SAN LUN, Data Protection Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Copy > Data Protection > Single Tier

Adds data protection schedules to LUN copies. You can also manage data replication schedules from this page.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity by Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enable Clones	Specifies whether to enable the Capacity for Clones options. Selecting this option also enables the Specify Clone QoS options.
----------------------	--

Capacity for Clone Storage

Maximum capacity	Specifies the percentage of storage space to allocate for Clone LUNs.
-------------------------	---

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Maximum Capacity	Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.
Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Estimated Maximum Capacity	Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Estimated Available Capacity	Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone QoS Storage

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
Storage Class	Specifies the category of physical media on which the logical volume resides. Valid media types: Performance SSD Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations. Capacity SSD Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name	Identifies the name of the schedule.
Start Time	Identifies the date and time that the schedule begins.
Frequency	Identifies the frequency at which the schedule runs. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Enabled	Identifies whether the schedule is enabled. <p>Enabled</p> <p>Indicates that the scheduled operation performs at the specified time.</p> <p>Disabled</p> <p>Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.</p>
Create	Displays a dialog to create a scheduled operation.
Modify	Displays a dialog to modify an existing schedule.
Delete	Removes an existing schedule.

Related Links

[Copy a LUN](#)

Copy SAN LUN, Mapping Tab

Navigation: SAN > Storage > LUNs > Actions > Copy > Mapping

Creates the LUN-to-host mapping settings for a logical volume.

Access Protocol Specifies the protocols that are allowed for accessing the logical volume.

Valid options:

Fibre Channel (FC)

Specifies that hosts can use the FC protocol to access this LUN.

Only selected hosts (via maps) Specifies that only designated SAN hosts can access this LUN using a specific, possibly different, LUN number on each of those hosts. If the LUN is mapped, the LUN number must be unique to the mapped SAN host.

All hosts may access this LUN using LUN Number	Specifies all SAN hosts accessing this LUN use the same LUN number. Select this option to activate the LUN number selection drop-down list.
---	---

LUN Controller Assignment

The LUN Controller Assignment option allows you to home the LUN copy on a Controller other than the Controller on which the source LUN is homed. The default is to home the copy on the same Controller as the source LUN.

Current Controller	Identifies the current Controller on which the LUN is homed. Note: For new source LUNs, this field is not available; instead, use the Assigned Controller option.
Assigned Controller	Identifies the Controller to which the system should assign the LUN. Choose an available Controller node from the list.

Ports Masked for this LUN

Displays the physical Controller ports to exclude (mask) so they cannot access the LUN.

Masked	Indicates whether the port for the LUN is masked.
Protocol	Identifies the type of access protocol.
Controller	Identifies the name of the Controller.
Slot	Identifies the slot number of the Controller HBA.
Port	Identifies the Controller port number.
Controller Port Address	Identifies the unique identifier of each Controller network port. For FC networks, this identifier is the World Wide Name (WWN).

LUN Mapping

Manages the LUN-to-Host mapping assignments.

Note: The LUN mapping table only displays when you select the **Only selected hosts (via maps)** option.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

Hosts Mapped to this LUN	Name
	Identifies the SAN host that accesses LUNs configured on the Oracle FS System. If the Oracle FS Path Manager is not installed, the system displays the WWN of the FC HBA.

Map via LUN Number

Identifies the number to assign to the LUN for the associated SAN host. This number must be unique for that particular host. It need not to be unique across all hosts.

Create	Opens the dialog that allows you to create the LUN-to-host mapping based on your selections for host name and assign the LUN number that the host uses.
Modify	Opens the dialog that allows you to change the LUN mapped to the associated host.
Remove	Removes the LUN mapping for the selected SAN host.

Related Links

[Copy a LUN](#)

Copy SAN LUN, Quality of Service Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Copy > Quality of Service > Single Tier

Copies an existing logical volume.

Selected Storage Class Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity By Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Storage Domain	<p>Specifies the name of the storage domain associated with the LUN.</p> <p>Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.</p>
View Storage Domains	Displays a dialog that lists the available Storage Domains.
LUN Name	<p>Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements:</p> <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters
Volume Group	<p>Allows you to assign the LUN to a volume group.</p> <p>[...]</p> <p>Opens the Manage Volume Groups dialog, which allows you to create a volume group.</p>
Use Storage Profile	<p>Specifies whether the logical volume uses a custom set of QoS properties. Selecting this option disables the remaining QoS properties on the page.</p> <p>[...]</p> <p>Opens the View Storage Profiles dialog, which allows you to review the profile details.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p>

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

**Migration/
Copy
Priority**

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

**Allocated
Logical
Capacity**

Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.

**Disable
Reference
Tag
Checking**

Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address

(LBA), as that which was written by the host. Data CRC integrity checking is not affected.

If you select the **Disable Reference Tag Checking** option, then the **Use as a Boot LUN** option has no effect.

If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:

- **Use as a Boot LUN**
- **Disable Reference Tag Checking**

When the host or application is finished, then deselect these options.

If your host or application has interoperability problems with the Oracle FS System, then you can use the **Disable Reference Tag Checking** option to temporarily work around the issue.

Note: For information that describes when to select the Disable Reference Tag Checking option, login to *My Oracle Support* (<https://support.oracle.com/>). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”

Use as a Boot LUN

Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.

Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.

Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The **Use as a Boot LUN** option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the **Use as a Boot LUN** option before using the **Disable Reference Tag Checking** option.

Capacity Estimates

Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.

Estimated Physical Capacity

Identifies the estimated physical capacity (allocated and maximum) for this logical volume.

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Copy a LUN](#)

Create Job Schedule Dialog

Navigation: SAN > Storage > LUNs > Actions > ... > Data Protection > Create

Creates a volume replication job schedule.

Note: A schedule should be synchronized with the host applications that access the logical volume so that all data I/O is quieted before the replication operation starts.

Schedule Name Identifies the unique name of a scheduled operation, which is an action that the Oracle FS System performs at the specified time or at regular intervals.

Volume Group Allows you to assign the clone volume to an existing volume group.

Enabled Indicates whether the schedule is enabled.

- Enable the schedule so that the operation is performed at the specified time.
- Disable the schedule so that operations are not performed. This option allows you to define a schedule before the source volume has been made available to users.

Start Time Identifies the date and time at which the Oracle FS System starts a scheduled operation.

Run Once Indicates that the replication runs immediately and only one time.

Repeat Interval Identifies how often the system performs the scheduled replication operation.

Valid intervals and frequencies are shown in the following table.

Table 18: Schedule repeat intervals

Interval	Frequency
1 through 7	Days
1 through 24	Hours
1 through 24	Months
1 through 52	Weeks

When selecting a weekly schedule, select the days of the week on which the replication occurs.

Related Links

[Create a Clone LUN Schedule](#)

Create Data Protection Schedule Dialog

Navigation: SAN > Data Protection > Clone Schedules > Actions > Create

Creates a data replication schedule on a selected logical volume.

Schedule Name	Identifies the unique name of a scheduled operation, which is an action that the Oracle FS System performs at the specified time or at regular intervals.
Volume Group for Created Clones	Allows you to assign the clone volume to an existing volume group.
Enabled	Identifies whether the schedule is enabled.
	Enabled
	Indicates that the scheduled operation performs at the specified time.
	Disabled
	Indicates that the operation is not performed as scheduled.

Select a Volume to Protect

Volume to Replicate	Identifies the name of the logical volume from which the scheduled clone is created.
Number of Existing Clones	Identifies the number of child Clone LUNs associated with the existing LUN.
Used Capacity Allocated for Clones	Displays the amount of space allocated for Clone LUNs.
Maximum Capacity Allocated for Clones	Displays the maximum space allocated for Clone LUNs.

Schedule

Start Time	Identifies the date and time that the schedule begins.
Run Once	Indicates that the replication runs immediately and only one time.
Repeat Interval	Identifies how often the system performs the scheduled replication operation.

Valid intervals and frequencies are shown in the following table.

Table 19: Schedule repeat intervals

Interval	Frequency
1 through 7	Days
1 through 24	Hours

Table 19: Schedule repeat intervals (continued)

Interval	Frequency
1 through 24	Months
1 through 52	Weeks

When selecting a weekly schedule, select the days of the week on which the replication occurs.

Related Links

[Create a LUN Data Protection Schedule](#)

Create LUN Map Dialog

Navigation: SAN > Storage > LUNs > Actions > ... > Mapping > Create

Establishes the LUN connections to a specified host.

LUN Name Identifies the name of the LUN or Clone LUN on the Oracle FS System.

Host Name Identifies the SAN host that accesses LUNs or Clone LUNs configured on the Oracle FS System.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

LUN Number Specifies the LUN number to which the logical volume is assigned.

Related Links

[Create LUN: Define Mapping by Selected Host Entries](#)

[Modify LUN: Define Mapping by Selected Host Entries](#)

Create SAN Clone LUN, Mapping Tab

Navigation: SAN > Storage > LUNs > Actions > Clone > Mapping

Creates the LUN-to-host mapping settings for a Clone LUN.

Access Protocol Specifies the protocols that are allowed for accessing the logical volume.

Valid options:

Fibre Channel (FC)

Specifies that hosts can use the FC protocol to access this LUN.

Only selected hosts (via maps)	Specifies that only designated SAN hosts can access this LUN using a specific, possibly different, LUN number on each of those hosts. If the LUN is mapped, the LUN number must be unique to the mapped SAN host.
All hosts may access this LUN using LUN Number	Specifies all SAN hosts accessing this LUN use the same LUN number. Select this option to activate the LUN number selection drop-down list.

LUN Controller Assignment

Current Controller	Identifies the current Controller on which the LUN is homed. Note: For new source LUNs, this field is not available; instead, use the Assigned Controller option.
Assigned Controller	Identifies the Controller to which the system should assign the LUN. Choose an available Controller node from the list.

Ports Masked for this LUN

Displays the physical Controller ports to exclude (mask) so they cannot access the LUN.

Masked	Indicates whether the port for the LUN is masked.
Protocol	Identifies the type of access protocol.
Controller	Identifies the name of the Controller.
Slot	Identifies the slot number of the Controller HBA.
Port	Identifies the Controller port number.
Controller Port Address	Identifies the unique identifier of each Controller network port. For FC networks, this identifier is the World Wide Name (WWN).

LUN Mapping

Manages the LUN-to-Host mapping assignments.

Note: The LUN mapping table only displays when you select the **Only selected hosts (via maps)** option.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

Hosts Mapped to this LUN	Name
	Identifies the SAN host that accesses LUNs configured on the Oracle FS System. If the Oracle FS Path Manager is not installed, the system displays the WWN of the FC HBA.

Map via LUN Number

Identifies the number to assign to the LUN for the associated SAN host. This number must be unique for that particular host. It need not to be unique across all hosts.

Create	Opens the dialog that allows you to create the LUN-to-host mapping based on your selections for host name and assign the LUN number that the host uses.
Modify	Opens the dialog that allows you to change the LUN mapped to the associated host.
Remove	Removes the LUN mapping for the selected SAN host.

Related Links

[Create an Immediate Clone LUN](#)

Create SAN Clone LUN, Quality of Service Tab

Navigation: SAN > Storage > LUNs > Actions > Clone > Quality of Service

Creates a Clone LUN from an existing LUN.

Clone Storage for Source Volume LUN

Displays the allocated and growth potential for the Clone LUN within the source LUN repository. The graph uses colored bars to indicate the capacity status of the logical volume you are creating.

LUN Name	Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements: <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters
Volume Group	Allows you to assign the LUN to a volume group. [...] Opens the Manage Volume Groups dialog, which allows you to create a volume group.
Storage Class	<i>(Read only)</i> Specifies the category of physical media on which the logical volume resides. Valid media types: Performance SSD Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

**Basic
(Read
only)**

Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

**Advanced
(Read only)**

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

**Migration/
Copy
Priority**

(Read only)

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

**Disable
Reference
Tag
Checking**

Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address (LBA), as that which was written by the host. Data CRC integrity checking is not affected.

If you select the **Disable Reference Tag Checking** option, then the **Use as a Boot LUN** option has no effect.

If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:

- **Use as a Boot LUN**
- **Disable Reference Tag Checking**

When the host or application is finished, then deselect these options.

If your host or application has interoperability problems with the Oracle FS System, then you can use the **Disable Reference Tag Checking** option to temporarily work around the issue.

Note: For information that describes when to select the Disable Reference Tag Checking option, login to [My Oracle Support](https://support.oracle.com/) (<https://support.oracle.com/>). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”

**Use as a
Boot LUN**

Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.

Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.

Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The **Use as a Boot LUN** option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the **Use as a Boot LUN** option before using the **Disable Reference Tag Checking** option.

Related Links

[Create an Immediate Clone LUN](#)

Create SAN LUN, Mapping Tab

Navigation: SAN > Storage > LUNs > Actions > Create > Mapping

Creates the LUN-to-host mapping settings for a LUN.

Access Protocol Specifies the protocols that are allowed for accessing the logical volume.

Valid options:

Fibre Channel (FC)

Specifies that hosts can use the FC protocol to access this LUN.

Only selected hosts (via maps) Specifies that only designated SAN hosts can access this LUN using a specific, possibly different, LUN number on each of those hosts. If the LUN is mapped, the LUN number must be unique to the mapped SAN host.

All hosts may access this LUN using LUN Number Specifies all SAN hosts accessing this LUN use the same LUN number. Select this option to activate the LUN number selection drop-down list.

LUN Controller Assignment

The LUN Controller Assignment option allows you to home the LUN copy on a Controller other than the Controller on which the source LUN is homed. The default is to home the copy on the same Controller as the source LUN.

Current Controller Identifies the current Controller on which the LUN is homed.

Note: For new source LUNs, this field is not available; instead, use the **Assigned Controller** option.

Assigned Controller Identifies the Controller to which the system should assign the LUN. Choose an available Controller node from the list.

Auto-assign

Assigns your LUN to an available Controller. This option allows the Pilot to move resources to the other Controller node in the event of a failover and maximizes performance by balancing the system load with existing logical volumes. You can modify this field after the LUN has been created.

Note: If you select this option, you cannot set up port masking and port mapping until after the LUN is created.

Controller Name

Select a Controller node from the drop-down list. Use this option when you want to access the data from a particular port (port masking).

Ports Masked for this LUN

Displays the physical Controller ports to exclude (mask) so they cannot access the LUN.

Masked	Indicates whether the port for the LUN is masked.
Protocol	Identifies the type of access protocol.
Controller	Identifies the name of the Controller.
Slot	Identifies the slot number of the Controller HBA.
Port	Identifies the Controller port number.
Controller Port Address	Identifies the unique identifier of each Controller network port. For FC networks, this identifier is the World Wide Name (WWN).

LUN Mapping

Manages the LUN-to-Host mapping assignments.

Note: The LUN mapping table only displays when you select the **Only selected hosts (via maps)** option.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

Hosts Mapped to this LUN	Name
	Identifies the SAN host that accesses LUNs configured on the Oracle FS System. If the Oracle FS Path Manager is not installed, the system displays the WWN of the FC HBA.

Map via LUN Number

Identifies the number to assign to the LUN for the associated SAN host. This number must be unique for that particular host. It need not to be unique across all hosts.

Create	Opens the dialog that allows you to create the LUN-to-host mapping based on your selections for host name and assign the LUN number that the host uses.
Modify	Opens the dialog that allows you to change the LUN mapped to the associated host.
Remove	Removes the LUN mapping for the selected SAN host.

Related Links

[Create LUN: Define Mapping by Selected Host Entries](#)

Create SAN LUN, Data Protection Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Create > Data Protection > Single Tier

Adds data protection schedules for creating Clone LUNs.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity by Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enable Clones Specifies whether to enable the Capacity for Clones options. Selecting this option also enables the Specify Clone QoS options.

Capacity for Clones

Maximum capacity Specifies the percentage of storage space to allocate for Clone LUNs.

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Current Maximum Capacity Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space

	is available. Capacity must be greater than or equal to the allocated logical capacity.
Current Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Estimated Maximum Capacity	Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Estimated Available Capacity	Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Domain	<p>Specifies the name of the storage domain associated with the LUN.</p> <p>Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p>

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller

processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name	Identifies the name of the schedule.
Start Time	Identifies the date and time that the schedule begins.
Frequency	Identifies the frequency at which the schedule runs. Frequencies include: <ul style="list-style-type: none">• Run Once• Hourly• Daily• Weekly

Enabled	Identifies whether the schedule is enabled.
	Enabled
	Indicates that the scheduled operation performs at the specified time.
	Disabled
	Indicates that the operation is not performed as scheduled.
	Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.
Create	Displays a dialog to create a scheduled operation.
Modify	Displays a dialog to modify an existing schedule.
Delete	Removes an existing schedule.

Related Links

[Create Single-Tier LUN: Define Data Protection](#)

[Modify Single-Tier LUN: Data Protection](#)

Create SAN LUN, Data Protection Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > Create > Data Protection > Auto Tier

Adds data protection schedules for creating Clone LUNs.

Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Enable Clones	Specifies whether to enable the Capacity for Clones options.
	Selecting this option also enables the Specify Clone QoS options.

Capacity for Clones

Maximum capacity	Specifies the percentage of storage space to allocate for Clone LUNs.
	Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.
Current Maximum Capacity	Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Current Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Estimated Maximum Capacity	Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Estimated Available Capacity	Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
Initial Storage Class	Specifies the initial category of physical media on which the logical volume resides. For auto-tiered LUNs, the Oracle FS System determines the actual Storage Class that matches the data usage statistics on the volume to get the most optimal performance. Valid media types: Performance SSD Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations. Capacity SSD Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity. Performance Disk Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Initial Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Advanced Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

Initial RAID Level

Identifies the initial RAID level associated with the Storage Profile. The Oracle FS System determines the actual RAID Level that matches the data usage statistics on the volume to get the most optimal performance.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Additional Options

Displays a dialog that allows you to select Auto Tier Storage Class options.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents

receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name	Identifies the name of the schedule.
Start Time	Identifies the date and time that the schedule begins.
Frequency	Identifies the frequency at which the schedule runs. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Enabled	Identifies whether the schedule is enabled. <p>Enabled</p> <p>Indicates that the scheduled operation performs at the specified time.</p> <p>Disabled</p> <p>Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.</p>
Create	Displays a dialog to create a scheduled operation.
Modify	Displays a dialog to modify an existing schedule.
Delete	Removes an existing schedule.

Related Links

[QoS Policies](#)

[Create Auto-Tiered LUN: Define Data Protection](#)

[Modify Auto-Tiered LUN: Define Data Protection](#)

Create SAN LUN, Quality of Service Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Create > Quality of Service > Single Tier

Creates and configures the capacity and performance settings for a single tier LUN.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity By Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Storage Domain

Specifies the name of the storage domain associated with the LUN.

Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.

View Storage Domains

Displays a dialog that lists the available Storage Domains.

LUN Name

Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements:

- Must be unique across the Oracle FS System
- Must be 82 or fewer UTF characters
- Must be 255 or fewer ASCII characters

Volume Group	<p>Allows you to assign the LUN to a volume group.</p> <p>[...]</p> <p>Opens the Manage Volume Groups dialog, which allows you to create a volume group.</p>
Use Storage Profile	<p>Specifies whether the logical volume uses a custom set of QoS properties. Selecting this option disables the remaining QoS properties on the page.</p> <p>[...]</p> <p>Opens the View Storage Profiles dialog, which allows you to review the profile details.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>
Basic	<p>Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.</p> <p>Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.</p>

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Migration/ Copy Priority

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Allocated Logical Capacity

Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.

Disable Reference Tag Checking

Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address (LBA), as that which was written by the host. Data CRC integrity checking is not affected.

If you select the **Disable Reference Tag Checking** option, then the **Use as a Boot LUN** option has no effect.

If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:

- **Use as a Boot LUN**
- **Disable Reference Tag Checking**

When the host or application is finished, then deselect these options.

If your host or application has interoperability problems with the Oracle FS System, then you can use the **Disable Reference Tag Checking** option to temporarily work around the issue.

Note: For information that describes when to select the Disable Reference Tag Checking option, login to *My Oracle Support* (<https://support.oracle.com/>). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”

Use as a Boot LUN

Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.

Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.

Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The **Use as a Boot LUN** option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the **Use as a Boot LUN** option before using the **Disable Reference Tag Checking** option.

Capacity Estimates

Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.

Estimated Physical Capacity

Identifies the estimated physical capacity (allocated and maximum) for this logical volume.

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Create Single-Tier LUN: Define Quality of Service](#)

Create SAN LUN, Quality of Service Tab, Auto-tier

Navigation: SAN > Storage > LUNs > Actions > Create > Quality of Service > Auto Tier

Creates and configures the capacity and performance settings for an auto-tier LUN.

Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Allocation By Storage Class and RAID Level

Indicates graphically the estimated physical capacity that is required for the following settings:

- **Allocated Logical Capacity**

- **Initial RAID Level**

The actual values display after the auto-tiered LUN is created.

Storage Domain Specifies the name of the storage domain associated with the LUN.
Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.

View Storage Domains Displays a dialog that lists the available Storage Domains.

LUN Name Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements:

- Must be unique across the Oracle FS System
- Must be 82 or fewer UTF characters
- Must be 255 or fewer ASCII characters

Volume Group Allows you to assign the LUN to a volume group.
 [...]

Opens the Manage Volume Groups dialog, which allows you to create a volume group.

Use Storage Profile Specifies whether the logical volume uses a custom set of QoS properties. Selecting this option disables the remaining QoS properties on the page.

[...]

Opens the View Storage Profiles dialog, which allows you to review the profile details.

Note: The Storage Class and RAID level that the system uses might be different that the Storage Class and RAID level that is specified by the Storage Profile. The difference, if any, depends on the available resources in the selected Storage Domain.

Initial Storage Class Specifies the initial category of physical media on which the logical volume resides. For auto-tiered LUNs, the Oracle FS System determines the actual Storage Class that matches the data usage statistics on the volume to get the most optimal performance.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write

performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

Initial RAID Level

Identifies the initial RAID level associated with the Storage Profile. The Oracle FS System determines the actual RAID Level that matches the data usage statistics on the volume to get the most optimal performance.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

**Migration/
Copy
Priority**

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

**Additional
Options**

Displays a dialog that allows you to select Auto Tier Storage Class options. The dialog also provides options for selecting tier reallocation, which allows data migration to the appropriate Storage Class based on data usage.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Allocated Logical Capacity	<p>Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.</p>
Disable Reference Tag Checking	<p>Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address (LBA), as that which was written by the host. Data CRC integrity checking is not affected.</p> <p>If you select the Disable Reference Tag Checking option, then the Use as a Boot LUN option has no effect.</p> <p>If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:</p> <ul style="list-style-type: none"> • Use as a Boot LUN • Disable Reference Tag Checking <p>When the host or application is finished, then deselect these options.</p> <p>If your host or application has interoperability problems with the Oracle FS System, then you can use the Disable Reference Tag Checking option to temporarily work around the issue.</p> <p>Note: For information that describes when to select the Disable Reference Tag Checking option, login to <i>My Oracle Support</i> (https://support.oracle.com/). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”</p>
Use as a Boot LUN	<p>Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.</p> <p>Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.</p> <p>Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The Use as a Boot LUN option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the Use as a Boot LUN option before using the Disable Reference Tag Checking option.</p>
Capacity Estimates	<p>Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.</p> <p>Estimated Physical Capacity</p> <p>Identifies the estimated physical capacity (allocated and maximum) for this logical volume.</p>

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Managing SAN LUNs](#)

[QoS Policies](#)

[Storage Tiers and Storage Profiles](#)

[Create Auto-Tiered LUN: Define Quality of Service](#)

Create Volume Group Dialog

Navigation:

SAN > Storage > LUNs > Actions > Create LUN > Quality of Service > Volume Group ... > Volume Groups > Create

Adds an organizational unit that can group a collection of logical volumes on the Oracle FS System.

Volume Name Identifies the ID or FQN name of the volume group. Valid volume group names consist of letters and numerals and can be up to 14 characters in length. Each volume group name must be unique within its parent volume group.

Parent Volume Group Name Identifies the name of the top-level node in a nested volume group relationship.

Related Links

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Create Single-Tier LUN: Define Quality of Service](#)

Delete LUN

Navigation: SAN > Storage > LUNs > Actions > Delete

Confirms the removal of a selected LUN.

Important: If the LUN is a member of a SAN replication pair, delete the Oracle MaxRep protection plan before deleting the LUN. For more information, see the *Oracle MaxRep for SAN User's Guide*.

Volumes to Delete Identifies the LUN, and any Clone LUNs, to remove from the Oracle FS System.

Caution: Data loss might occur. Carefully review the list before deleting the LUNs.

Related Links

[Delete a LUN](#)

Host to LUN Mapping Overview Page

Navigation: SAN > Storage > Host-LUN Mapping

Displays the mapping properties between the SAN hosts and the Oracle FS System LUNs with which the hosts are associated. This page also displays the status of the connections between these hosts and the associated Controller ports.

Host to LUN Map

HBA Port/Device

Displays the following for each host mapping:

- SAN LUN or Clone LUN name
- Host name or WWN
- Logical unit number
- Set of masked ports
- SAN LUN or Clone LUN name
- Host name or WWN
- Host group name

Controller-Initiator Connectivity

Identifies the connection status between the Controller and initiator port. The status might indicate masked Controller ports or disabled protocols.

Valid states:

- Connected
- Connected, Masked
- Connected, Masked, Protocol Disabled
- Connected, Partially Masked
- Connected, Partially Masked, Some Protocols Disabled
- Connected, Protocol Disabled
- Connected, Some Protocols Disabled
- Not Connected

Mapped Via LUN Number

Identifies the LUN number used for the SAN host mapping.

LUN Name on Host

Identifies the name used by the SAN host to identify the LUN, if known.

Initiator-to-Controller Connectivity Dialog

Navigation: SAN > Storage > Hosts > Actions > Initiator-to-Controller Connectivity

Displays information about connectivity between host initiators and Controller ports.

Name	Identifies the information about the Controller. The column includes the following information: <ul style="list-style-type: none"> • Controller name • Adapter slot number • Adapter port number
Port Type	Displays the Controller port type. FC is the valid port type.
Address	Identifies the unique address of the Oracle FS System Controller port on the network.
Host Name	Displays the host name and a column for each initiator port in the host. The contents of each column show the state of connectivity between that host initiator port and each Controller port.

Related Links

[Initiator-to-Controller Connectivity](#)

LUN-to-Host Mapping Overview Page

Navigation: SAN > Storage > LUN-to-Host Mapping

Displays the mapping properties between the Oracle FS System LUNs and the SAN hosts. This page also displays the status of the connections between the SAN hosts and the associated Controller ports.

LUN-to-Host Mapping

Name	Displays the following for each host mapping: <ul style="list-style-type: none"> • SAN LUN or Clone LUN name • Host name or WWN • Logical unit number • Set of masked ports • SAN LUN or Clone LUN name • Host name or WWN • Host group name
Controller-Initiator Connectivity	Identifies the connection status between the Controller and initiator port. The status might indicate masked Controller ports or disabled protocols.

Valid states:

- Connected
- Connected, Masked
- Connected, Masked, Protocol Disabled
- Connected, Partially Masked
- Connected, Partially Masked, Some Protocols Disabled
- Connected, Protocol Disabled
- Connected, Some Protocols Disabled
- Not Connected

Mapped via LUN Number

Identifies the LUN number used for the SAN host mapping.

LUN Name on Host

Identifies the name used by the SAN host to identify the LUN, if known.

LUNs Overview Page

Navigation: *SAN > Statistics and Trending > LUNs*

Displays performance statistics for LUNs.

Name

Identifies the name that is assigned to a LUN for administrative purposes.

Physical Allocated Capacity

Identifies the capacity, in gigabytes (GB), that is reserved for the LUN.

Priority Level

Identifies the priority level assigned to the specified LUN.

Valid levels:

- Archive
- Low
- Medium
- High
- Premium

IOPS

Indicates the average read and write operations per second.

Throughput

Indicates the data transfer rate in MB/s for read and write operations.

I/O Latency

Indicates the average time, in milliseconds, to complete the read operations or write operations.

I/O Size

Indicates the average size of the read operations and write operations.

Collection Period

Displays the start and the end time at which information was last collected from the Oracle FS System.

To generate real-time statistics for a LUN, select a LUN, then select **Actions > LUN Real Time Statistics**. Click **Add Graph** and select a statistic (you can review the following list for details).

The statistics displayed include:

Read IOPS

Indicates the average number of read operations per second.

Write IOPS

Indicates the average number of write operations per second.

Read bytes per second

Indicates the rate at which the system has transferred bytes from a drive during read operations.

Write bytes per second

Indicates the rate at which the system has transferred bytes to a drive during write operations.

Read latency

Indicates the average time to complete a read operation.

Write latency

Indicates the average time to complete a write operation.

Read block size

Displays the average amount of data read that are read in a read operation.

Write block size

Displays the average amount of data that are written in a write operation.

Total block size

Displays the average amount of data that are transferred in a read or write operation.

Read queue depth

Displays the number of read operations that are waiting to be fulfilled, on average.

Write queue depth

Displays the number of write operations that are awaiting to be processed, on average.

Total bytes per second

Displays the total bytes transmitted per second, on average.

Total IOPS

Indicates the total number of read and write operations per second.

Total latency

Indicates the average time to complete operations.

Total queue depth

Displays the total number of I/O operations that are queued for processing, on average.

Related Links

[View LUN Statistics](#)

Manage SAN Host Groups, Groups Tab

Navigation: SAN > Storage > Hosts > Actions > Manage SAN Host Groups > Groups

Creates and modifies Storage Area Network (SAN) host groups. You can assign any SAN host to a host group.

A *host group* is a named collection of SAN hosts that the system manages as a group, which simplifies the task of associating hosts to LUNs.

Name	Indicates the name of the host group.
Create	Creates a new row in the table from which you can type the host group name.
Delete	Deletes the selected host group.

Related Links

[Create a Host Group](#)

[Modify a Host Group](#)

Manage SAN Host Groups, Hosts Tab

Navigation: SAN > Storage > Hosts > Actions > Manage SAN Host Groups > Hosts

Assigns registered Storage Area Network (SAN) hosts to a host group.

Note: Register at least one host to the Oracle FS System before assigning that host to your host group.

A *host group* is a named collection of SAN hosts that the system manages as a group, which simplifies the task of associating hosts to LUNs.

Name	Indicates the name of the SAN host that is available for host group assignment.
Host Group	Indicates the name of the host group to which the host is assigned.

Related Links

[Create a Host Group](#)

[Modify a Host Group](#)

Manage Volume Groups Dialog

Navigation:

SAN > Storage > LUNs > Actions > Create LUN > Quality of Service > Volume Group ... > Volume Group ... > Volume Groups

Manages the organizational units that group the collections of logical volumes on the Oracle FS System, including the nesting of volume groups.

Volume Group	Identifies the ID or FQN name of the volume group. Valid volume group names consist of letters and numerals and can be up to 14 characters in length. Each volume group name must be unique within its parent volume group.
Parent Volume Group Name	Identifies the name of the top-level node in a nested volume group relationship.
Logical Capacity (GB)	Provides an overview of the logical capacity usage and the logical capacity requirements of the volume group.
Used	<p>Indicates the amount of allocated capacity that is consumed.</p> <ul style="list-style-type: none"> For LUNs, this amount is the same as the allocated amount.
Allocated	Identifies the total amount of storage capacity that is reserved for this volume or this volume group.
Distribution	Displays a graphical comparison of the allocated capacity that this volume uses to the unused allocated capacity.
Create	Opens a dialog that allows you to add a volume group.
Modify	Opens a dialog that allows you to modify the properties of a volume group.
Delete	Removes the selected volume group.

Related Links

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Create Single-Tier LUN: Define Quality of Service](#)

[Modify Auto-Tiered LUN: Define Quality of Service](#)

[Modify Single-Tier LUN: Quality of Service](#)

Manage Volume Groups, Volume Groups Tab

Navigation:

SAN > Volume Groups > Actions > Manage Volume Groups > Volume Groups

Manages the organizational units that group the collections of logical volumes on the Oracle FS System, including the nesting of volume groups.

Volume Group	Identifies the ID or FQN name of the volume group. Valid volume group names consist of letters and numerals and can be up to 14
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	characters in length. Each volume group name must be unique within its parent volume group.
Parent Volume Group Name	Identifies the name of the top-level node in a nested volume group relationship.
Logical Capacity (GB)	Provides an overview of the logical capacity usage and the logical capacity requirements of the volume group.
Used	Indicates the amount of allocated capacity that is consumed. <ul style="list-style-type: none"> For LUNs, this amount is the same as the allocated amount.
	Allocated
	Identifies the total amount of storage capacity that is reserved for this volume or this volume group.
	Distribution
	Displays a graphical comparison of the allocated capacity that this volume uses to the unused allocated capacity.
Create	Opens a row for creating a volume group.
Modify	Opens a dialog that allows you to modify the properties of a volume group.
Delete	Removes the selected volume group.

Related Links

[Create Auto-Tiered LUN: Define Quality of Service](#)

[Create Single-Tier LUN: Define Quality of Service](#)

[Modify Auto-Tiered LUN: Define Quality of Service](#)

[Modify Single-Tier LUN: Quality of Service](#)

Manage Volume Groups, Volumes Tab

Navigation:

SAN > Volume Groups > Actions > Manage Volume Groups > Volumes

Reassigns the logical volumes on the Oracle FS System to different volume groups.

Volume Name	Identifies the names of the configured logical volumes.
Volume Group	Identifies the name of the volume group in which the logical volume resides. This field can be used to reassign the volume to another group.
Logical Capacity (GB)	Provides an overview of the logical capacity usage and the logical capacity requirements of the volume group.

Used

Indicates the amount of allocated capacity that is consumed.

- For LUNs, this amount is the same as the allocated amount.

Allocated

Identifies the total amount of storage capacity that is reserved for this volume or this volume group.

Maximum

Identifies the sum of the addressable capacity for the logical volume and its clone repository.

RAID Level**Single parity**

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Physical Capacity (GB)

Provides an overview of the physical capacity usage and the physical capacity requirements of all the volumes on the system.

Volume Overhead

Identifies the physical and logical storage capacity that is required to meet the logical volume Quality of Service (QoS) settings.

Used

Identifies the current capacity that the volume consumes.

Allocated

Specifies the amount of raw capacity in gigabytes (GB) that the system has assigned and designated to this logical volume.

Maximum

Identifies the maximum capacity for the volume group. The maximum capacity of the logical volumes and nested volume groups that are associated with the volume group cannot exceed this value. A value of 0 (zero) identifies that the volume group is configured with unlimited capacity. You can increase the maximum capacity of the associated logical volumes and the nested volume groups without constraints.

**Priority
Level****LUNs**

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Related Links

[Move a Volume to a Different Volume Group](#)

Modify Data Protection Schedule Dialog

Navigation: SAN > Data Protection > Clone Schedules > Actions > Modify

Updates the properties of an existing data protection schedule. You can also enable or disable the schedule from this page.

Schedule Name	Identifies the new name of the job schedule.
Volume Group for Created Clones	Allows you to assign the clone volume to an existing volume group.
Enabled	Identifies whether the schedule is enabled.
	<p>Enabled</p> <p>Indicates that the scheduled operation performs at the specified time.</p> <p>Disabled</p> <p>Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.</p>
Protected Volume	Identifies the name of the logical volume from which the scheduled clone is created.

Schedule

Start Time	Identifies the date and time that the schedule begins.
Run Once	Indicates that the replication runs immediately and only one time.
Repeat Interval	Identifies how often the system performs the scheduled replication operation.

Valid intervals and frequencies are shown in the following table.

Table 20: Schedule repeat intervals

Interval	Frequency
1 through 7	Days
1 through 24	Hours
1 through 24	Months
1 through 52	Weeks

When selecting a weekly schedule, select the days of the week on which the replication occurs.

Related Links

[Modify a LUN Data Protection Schedule](#)

Modify Host, Advanced Tab

Navigation: SAN > Storage > Hosts > Actions > Modify Host > Advanced

Enables HP-UX Compatibility mode to a host in a Storage Area Network (SAN).

HP-UX Compatibility Mode	Use this option when the SAN host is running the HP-UX operating system. When compatibility mode option is enabled, the system uses an alternative method to present LUNs on the SAN host. This alternative method is compatible with HP-UX. When this option is enabled, you might not have a LUN visible to the host as LUN number 0. HP-UX compatibility mode enables the full range of LUN numbers (other than 0) to be used with HP-UX operating systems. You can verify the current host mappings from the Flash Storage Path Manager tab.
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Related Links

[Modify a Host: Reconfigure Advanced Settings](#)

Modify Host, Oracle FS Path Manager Tab

Navigation: SAN > Storage > Hosts > Actions > Modify Host > Oracle FS Path Manager

Modifies the configuration settings for Oracle FS Path Manager (FSPM).

You can configure the load balancing settings of LUNs. You can also view the optimized (fastest paths) available to a LUN.

Host Information

Host Name	Identifies the name of the SAN host that has access to the Oracle FS System.
Management IP Address	Identifies the IP address of the SAN host. The system uses this address to exchange management requests and responses with the FSPM that is installed on the host. If FSPM is not installed, this field displays <i>N/A</i> .
Operating System	Identifies the operating system that is associated with the SAN host, when Oracle FS Path Manager is installed on that host; otherwise, this field displays <i>N/A</i> .
Oracle FS Path Manager Version	Identifies the version of the FSPM that is installed and running on the SAN host.

Path Manager Settings

LUN Name	Identifies the name of the LUN or Clone LUN on the Oracle FS System.
Name on Host	Identifies the name used by the SAN host to identify the LUN.
Load Balancing	Identifies the type of load balancing that the storage area network (SAN) hosts performs to access Oracle FS System LUNs.

Note: If the **Load Balancing** option is not selectable, then the version of FSPM does not allow load balancing on the host.

Valid types:

Static

Indicates load balancing across multiple paths to the configured LUNs.

The software selects the best available path, and all commands are sent over that path until the path is no longer operational, in which case the failed path fails over to another appropriate path.

Round Robin

Indicates load balancing across multiple paths to the configured LUNs.

The system sends the commands one by one using the best available paths, which ensures that LUN commands are evenly distributed over any path that is available to access the LUNs.

Optimized Paths	Identifies the number of optimized (fastest path available) access paths to the LUN.
Non-Optimized Paths	Identifies the number of non-optimized access paths to the LUN.

Related Links

[Modify a Host: FSPM Load Balancing](#)

Modify Host, Ports Tab

Navigation: SAN > Storage > Hosts > Actions > Modify Host > Ports

Modifies the host driver information of the storage area network (SAN).

Host Name	Identifies the name of the SAN host entry.
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FC Port Information

Alias	Identifies the HBA alternative, friendly, name for the port, which can be set to any useful value.
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Port	Identifies the WWN assigned to an FC HBA port.
Speed	Indicates the speed, in Gb/s, of the connection between the SAN host and the device to which the host is directly connected. That device is typically a network switch or possibly the Controller. Note: The actual data transfer rate between the SAN host and the Controller can be less than the reported speed. It can be less because the data transfer rate is governed by the slowest link on the path between the host and the Controller.
Manufacturer	Identifies the manufacturer of a hardware component.
HBA Model	Identifies the model number of a hardware component.
Driver Version	Identifies version of the HBA driver.
Firmware Version	Identifies the HBA firmware version.

Related Links

[Modify a Host: Assign a Port Alias](#)

Modify Job Schedule Dialog

Navigation: SAN > Storage > LUNs > Actions > ... > Data Protection > Modify

Updates a data replication schedule.

Schedule Name	Identifies the unique name of a scheduled operation, which is an action that the Oracle FS System performs at the specified time or at regular intervals.
Data Protection Type	Identifies the type of data protection, such as clone, that is used in the schedule.
Volume Group	Allows you to assign the clone volume to an existing volume group.
Enabled	Indicates whether the schedule is enabled. <ul style="list-style-type: none"> • Enable the schedule so that the operation is performed at the specified time. • Disable the schedule so that operations are not performed. This option allows you to define a schedule before the source volume has been made available to users.
Start Time	Identifies the date and time at which the Oracle FS System starts a scheduled operation.
Recurrence	Identifies how often the system should perform the scheduled operation. Valid values vary based on the recurrence interval and frequency of the schedule.

Related Links

[Modify Auto-Tiered LUN: Define Data Protection](#)

[Modify Single-Tier LUN: Data Protection](#)

Modify LUN Number Dialog

Navigation: SAN > Storage > LUNs > Actions > Create > Mapping > Modify

Updates the assigned LUN number that is assigned to host.

LUN Number Identifies the number to assign to the LUN for the associated host.

Related Links

[Modify LUN: Define Mapping by LUN Number](#)

[Modify LUN: Define Mapping by Selected Host Entries](#)

Modify SAN LUN, Data Protection Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Modify > Data Protection > Single Tier

Updates the storage capacity of a logical volume. You can also manage data replication schedules from this page.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity by Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enable Clones Specifies whether to enable the Capacity for Clones options. Selecting this option also enables the Specify Clone QoS options.

Capacity for Clone Storage

Maximum capacity Specifies the percentage of storage space to allocate for Clone LUNs.

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Current Maximum Capacity Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Current Available Capacity Identifies the amount of current storage capacity allocated for clones of this LUN.

Estimated Maximum Capacity Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.

Estimated Available Capacity Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.

Number of Clones Identifies the number of clones that have been created for this LUN and its clones.

Match Repository QoS to LUN QoS Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Domain	<p>Specifies the name of the storage domain associated with the LUN.</p> <p>Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>
Basic	<p>Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.</p> <p>Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.</p> <p>Typical Access</p> <p>Identifies the most common method of data access. Valid biases:</p> <p>Sequential</p> <p>Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.</p>

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name	Identifies the name of the schedule.
Start Time	Identifies the date and time that the schedule begins.
Frequency	Identifies the frequency at which the schedule runs. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Enabled	Identifies whether the schedule is enabled. <p>Enabled</p> <p>Indicates that the scheduled operation performs at the specified time.</p> <p>Disabled</p> <p>Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.</p>
Create	Displays a dialog to create a scheduled operation.
Modify	Displays a dialog to modify an existing schedule.
Delete	Removes an existing schedule.

Related Links

[Modify Single-Tier LUN: Data Protection](#)

Modify SAN LUN, Data Protection Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > Modify > Data Protection > Auto Tier

Updates the storage capacity of a logical volume. You can also manage data replication schedules from this page.

Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Enable Clones Specifies whether to enable the Capacity for Clones options. Selecting this option also enables the Specify Clone QoS options.

Capacity for Clones

Maximum capacity Specifies the percentage of storage space to allocate for Clone LUNs.

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Current Maximum Capacity Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Current Available Capacity Identifies the amount of current storage capacity allocated for clones of this LUN.

Estimated Maximum Capacity Specifies the estimated storage space to allocate for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.

Estimated Available Capacity Identifies the estimated available capacity for Clone LUNs. The value of this field changes as the Maximum Capacity percentage changes and as the Capacity value changes that you provided in the Quality of Service tab.

Number of Clones Identifies the number of clones that have been created for this LUN and its clones.

Match Repository QoS to LUN QoS Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Domain	<p>Specifies the name of the storage domain associated with the LUN.</p> <p>Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.</p>
Initial Storage Class	<p>Specifies the initial category of physical media on which the logical volume resides. For auto-tiered LUNs, the Oracle FS System determines the actual Storage Class that matches the data usage statistics on the volume to get the most optimal performance.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>
Basic	<p>Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.</p> <p>Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.</p> <p>Initial Typical Access</p> <p>Identifies the most common method of data access. Valid biases:</p> <p>Sequential</p> <p>Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.</p>

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

Initial RAID Level

Identifies the initial RAID level associated with the Storage Profile. The Oracle FS System determines the actual RAID Level that matches the data usage statistics on the volume to get the most optimal performance.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Additional Options Displays a dialog that allows you to select Auto Tier Storage Class options.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name Identifies the name of the schedule.

Start Time Identifies the date and time that the schedule begins.

Frequency Identifies the frequency at which the schedule runs. Frequencies include:

- **Run Once**
- **Hourly**
- **Daily**
- **Weekly**

Enabled Identifies whether the schedule is enabled.

Enabled

Indicates that the scheduled operation performs at the specified time.

Disabled

Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.

Create Displays a dialog to create a scheduled operation.

Modify Displays a dialog to modify an existing schedule.

Delete Removes an existing schedule.

Related Links

[QoS Policies](#)

[Modify Auto-Tiered LUN: Define Data Protection](#)

Modify SAN LUN, Mapping Tab

Navigation: SAN > Storage > LUNs > Actions > Modify > Mapping

Updates the LUN-to-host mapping settings for a logical volume.

Access Protocol	Specifies the protocols that are allowed for accessing the logical volume.
Only selected hosts (via maps)	Specifies that only designated SAN hosts can access this LUN using a specific, possibly different, LUN number on each of those hosts. If the LUN is mapped, the LUN number must be unique to the mapped SAN host.
All hosts may access this LUN using LUN Number	Specifies all SAN hosts accessing this LUN use the same LUN number. Select this option to activate the LUN number selection drop-down list.

LUN Controller Assignment

Current Controller	Identifies the current Controller on which the LUN is homed. Note: For new source LUNs, this field is not available; instead, use the Assigned Controller option.
Assigned Controller	Identifies the Controller to which the system should assign the LUN. Choose an available Controller node from the list.

Ports Masked for this LUN

Displays the physical Controller ports to exclude (mask) so they cannot access the LUN.

Masked	Indicates whether the port for the LUN is masked.
Protocol	Identifies the type of access protocol.
Controller	Identifies the name of the Controller.
Slot	Identifies the slot number of the Controller HBA.
Port	Identifies the Controller port number.
Controller Port Address	Identifies the unique identifier of each Controller network port. For FC networks, this identifier is the World Wide Name (WWN).

LUN Mapping

Manages the LUN-to-Host mapping assignments.

Note: The LUN mapping table only displays when you select the **Only selected hosts (via maps)** option.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

Hosts Mapped to this LUN	<p>Name</p> <p>Identifies the SAN host that accesses LUNs configured on the Oracle FS System. If the Oracle FS Path Manager is not installed, the system displays the WWN of the FC HBA.</p> <p>Map via LUN Number</p> <p>Identifies the number to assign to the LUN for the associated SAN host. This number must be unique for that particular host. It need not to be unique across all hosts.</p>
Create	Opens the dialog that allows you to create the LUN-to-host mapping based on your selections for host name and assign the LUN number that the host uses.
Modify	Opens the dialog that allows you to change the LUN mapped to the associated host.
Remove	Removes the LUN mapping for the selected SAN host.

Related Links

[Modify LUN: Define Mapping by LUN Number](#)

[Modify LUN: Define Mapping by Selected Host Entries](#)

Modify SAN LUN, Quality of Service Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > Modify > Quality of Service > Single Tier

Updates an existing logical volume.

Important: Before modifying a LUN, verify that the "QoS Rebalance" background task is not active. This task will prevent you from modifying your LUN.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity By Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
View Storage Domains	Displays a dialog that lists the available Storage Domains.
LUN Name	Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements: <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters
Volume Group	Allows you to assign the LUN to a volume group. [...] Opens the Manage Volume Groups dialog, which allows you to create a volume group.
Use Storage Profile	Specifies whether the logical volume uses a custom set of QoS properties. Selecting this option disables the remaining QoS properties on the page. [...] Opens the View Storage Profiles dialog, which allows you to review the profile details.
Storage Class	Specifies the category of physical media on which the logical volume resides. Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

**Migration/
Copy
Priority**

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Allocated Logical Capacity	<p>Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.</p>
Disable Reference Tag Checking	<p>Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address (LBA), as that which was written by the host. Data CRC integrity checking is not affected.</p> <p>If you select the Disable Reference Tag Checking option, then the Use as a Boot LUN option has no effect.</p> <p>If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:</p> <ul style="list-style-type: none"> • Use as a Boot LUN • Disable Reference Tag Checking <p>When the host or application is finished, then deselect these options.</p> <p>If your host or application has interoperability problems with the Oracle FS System, then you can use the Disable Reference Tag Checking option to temporarily work around the issue.</p> <p>Note: For information that describes when to select the Disable Reference Tag Checking option, login to <i>My Oracle Support</i> (https://support.oracle.com/). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”</p>
Use as a Boot LUN	<p>Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.</p> <p>Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.</p> <p>Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The Use as a Boot LUN option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the Use as a Boot LUN option before using the Disable Reference Tag Checking option.</p>
Capacity Estimates	<p>Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.</p> <p>Estimated Physical Capacity</p> <p>Identifies the estimated physical capacity (allocated and maximum) for this logical volume.</p>

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Modify Single-Tier LUN: Quality of Service](#)

Modify SAN LUN, Quality of Service Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > Modify > Quality of Service > Auto Tier

Updates an existing logical volume.

Important: Before modifying a LUN, verify that the "QoS Rebalance" background task is not active. This task will prevent you from modifying your LUN.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Allocation By Storage Class and RAID Level

Indicates graphically the actual physical capacity of the auto-tiered LUN plus the capacity that is required for RAID Level parity. The graph contains stacked bars that represent the sum of the Storage Class physical capacity and the RAID Level parity. A legend at the bottom of the graphic provides detailed information about each bar.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
View Storage Domains	Displays a dialog that lists the available Storage Domains.
LUN Name	Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements: <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters

Volume Group	<p>Allows you to assign the LUN to a volume group.</p> <p>[...]</p> <p>Opens the Manage Volume Groups dialog, which allows you to create a volume group.</p>
Use Storage Profile	<p>Specifies whether the logical volume uses a custom set of QoS properties. Selecting this option disables the remaining QoS properties on the page.</p> <p>[...]</p> <p>Opens the View Storage Profiles dialog, which allows you to review the profile details.</p>
Initial Storage Class	<p>Specifies the initial category of physical media on which the logical volume resides. For auto-tiered LUNs, the Oracle FS System determines the actual Storage Class that matches the data usage statistics on the volume to get the most optimal performance.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>
Basic	<p>Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.</p>

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Initial Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

Initial RAID Level

Identifies the initial RAID level associated with the Storage Profile. The Oracle FS System determines the actual RAID Level that matches the data usage statistics on the volume to get the most optimal performance.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level

protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Initial Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents

receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Migration/ Copy Priority

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is

Allocated Logical Capacity	available. Capacity must be greater than or equal to the allocated logical capacity.
Disable Reference Tag Checking	<p>Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.</p> <p>Disables a portion of the internal data integrity checks for the LUN. Selecting this option disables checking whether any given block of data has the same identity, known as the Logical Block Address (LBA), as that which was written by the host. Data CRC integrity checking is not affected.</p> <p>If you select the Disable Reference Tag Checking option, then the Use as a Boot LUN option has no effect.</p> <p>If necessary, when the LUN is being initialized or is being prepared by a host or an application, temporarily select the following options:</p> <ul style="list-style-type: none"> • Use as a Boot LUN • Disable Reference Tag Checking <p>When the host or application is finished, then deselect these options.</p> <p>If your host or application has interoperability problems with the Oracle FS System, then you can use the Disable Reference Tag Checking option to temporarily work around the issue.</p> <p>Note: For information that describes when to select the Disable Reference Tag Checking option, login to <i>My Oracle Support</i> (https://support.oracle.com/). Search for the article titled “When To Use “Use as Boot LUN” and “Disable Reference Tag Checking” Options For FS1-2 LUNs.”</p>
Use as a Boot LUN	<p>Modifies the default error response returned to the host or application when a block of data is read that has not been previously written by the host. There is no other effect on the LUN.</p> <p>Select this option if you have hosts and application that read data blocks that they have not written as part of a validation process, such as preparing the LUN for system boot.</p> <p>Reading a data block before it is written causes the reference tag check to fail, which returns an error to the host. After receiving this error, the host retries the operation, and inhibits the reference tag check. The Use as a Boot LUN option does not modify the reference tag check. This option only changes the error response because some hosts and applications modify the retry timing depending on the error that is returned. Always try both settings of the Use as a Boot LUN option before using the Disable Reference Tag Checking option.</p>
Capacity Estimates	Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.

Estimated Physical Capacity

Identifies the estimated physical capacity (allocated and maximum) for this logical volume.

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[QoS Policies](#)

[Modify Auto-Tiered LUN: Define Quality of Service](#)

Modify Volume Group Dialog

Navigation:

SAN > Storage > LUNs > Actions > Create LUN > Quality of Service > Volume Group ... > Volume Groups > Modify

Changes the properties of an organizational unit that groups a collection of logical volumes on the Oracle FS System.

Volume Name Identifies the ID or FQN name of the volume group. Valid volume group names consist of letters and numerals and can be up to 14 characters in length. Each volume group name must be unique within its parent volume group.

Parent Volume Group Name Identifies the name of the top-level node in a nested volume group relationship.

Related Links

[Modify Auto-Tiered LUN: Define Quality of Service](#)

[Modify Single-Tier LUN: Quality of Service](#)

Replication Engines Overview Page

Navigation: SAN > Data Protection > Replication Engines

Displays the status of the available Oracle MaxRep for SAN Replication Engines registered with the Oracle FS System. You can manage the Replication Engine from this page.

Service Status Identifies the health of the processes running on the Replication Engine.

Valid states:

	<ul style="list-style-type: none"> • Normal • Warning • Unknown
Agent Status	<p>Identifies the communication status of the Oracle MaxRep for SAN agents registered with the Oracle FS System.</p> <p>Valid states:</p> <ul style="list-style-type: none"> • All Communicating • Warning • Unknown
Name	Identifies the name of the Replication Engine.
IP Address	Identifies the IP address of the Replication Engine or high availability Replication Engine cluster.
Version	Identifies the Oracle MaxRep for SAN software version that is running on the Replication Engine.

Clone Schedules Overview Page

Navigation: SAN > Data Protection > Clone Schedules

Displays a summary of the data protection schedules. You can also create and manage the data protection schedules.

Name	Identifies the name of a schedule. Select a schedule name and use the Actions menu to review or modify the schedule settings.
Start Time	Identifies the time and date on which the Oracle FS System started a schedule recurrence.
Frequency	Identifies the interval at which the Oracle FS System starts a recurrent schedule.
Protected Volume	Identifies the name of the logical volume from which a Clone LUN was created.
Enabled	<p>Identifies whether the data protection schedule is enabled.</p> <p>Yes</p> <p>Indicates that the schedule is actively cloning the protected volumes.</p> <p>No</p> <p>Indicates that the schedule is not cloning the protected volumes.</p>

Data Protection Overview

Navigation: SAN > Data Protection

Displays links to pages that allow you to manage the data protection schedules and access connected Oracle FS System Replication Engines.

Clone Schedules Allows you to view the list of available data protection schedules.

Replication Engines Allows you to view a list of available Replication Engines.

Hosts Overview Page

Navigation: SAN > Storage > Hosts

Manages properties of the storage area network (SAN) hosts defined on an Oracle FS System.

Actions from this page allow you to manage the host on the system.

Host Name Identifies the name of the SAN host entry.

Controller-initiator Connectivity Identifies the connection status between the Controller and initiator port. The status might indicate masked Controller ports or disabled protocols.

Valid states:

- Connected
- Connected, Masked
- Connected, Masked, Protocol Disabled
- Connected, Partially Masked
- Connected, Partially Masked, Some Protocols Disabled
- Connected, Protocol Disabled
- Connected, Some Protocols Disabled
- Not Connected

Number of LUNs Mapped Identifies the number of LUNs that are mapped to that particular SAN host either because of specific mapping or because the LUN is available to all SAN hosts.

Oracle FS Path Manager

Identifies certain global characteristics associated with the Oracle FS Path Manager (FSPM).

Status Identifies whether FSPM is communicating, or if it is not registered.

Valid states:

Communicating

Indicates that the host control path is logged into the Pilot. Communicating status is required for the FSPM control path to

report path status, configure load balancing, and use the Oracle FS System to collect FSPM diagnostic logs.

Not Communicating

The FSPM host control path has previously logged in to the Pilot, but it is not currently logged in.

Not Registered

A control path from an FSPM host with this name has never logged in to the Pilot.

Version	Identifies the version of the FSPM that is installed and running on the SAN host.
Host IP Address	Identifies the IP address of the SAN host. The system uses this address to exchange management requests and responses with the FSPM that is installed on the host. If FSPM is not installed, this field displays <i>N/A</i> .

HBA

HBA Alias Name	Identifies an alternative friendly name that is assigned to the host port.
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SAN LUNs Overview Page

Navigation: SAN > Storage > LUNs

Displays various properties of the logical volumes that are configured on the Oracle FS System. Actions on this page allow you to manage those volumes as well as to create an immediate Clone LUN.

Name	Identifies the name that is assigned to the LUN.
Status	Identifies the status of each LUN. Valid states: Online Indicates that the volume is fully accessible. Offline Indicates that the volume is not accessible. Conservative Indicates that the write-back cache of the volume is disabled, which reduces system performance. A Conservative state might indicate a hardware problem. Prepared Indicates that the storage resources for the volume are reserved for the clone, but the clone is not committed to the storage device.

	Read Only Indicates that the volume is in write protect mode and is set to read-only.
	Unknown Indicates that not enough information is obtained from the volume to report its status.
Background Activity	Indicates the LUN creation and deletion status. Valid states: <ul style="list-style-type: none">• Idle• In-Progress
Tier Reallocation	Identifies the tier reallocation status of the Storage Domain. When tier reallocation is enabled, the Oracle FS System dedicates resources and uses statistical data and QoS priority property to migrate data from one storage tier to another. Valid states: Enabled Indicates that tier reallocation is active on the logical volume. Disabled Indicates that tier reallocation is not active on the logical volume. Storage Domain Disabled Indicates that tier reallocation is disabled on the Storage Domain and therefore disabled on the LUN.
Host Access	Identifies the SAN host mapping status associated with the LUN. Valid states: Mapped Indicates that the LUN is mapped to one or more SAN hosts. No Mappings Indicates that the LUN is not mapped to a SAN host. Inactive Indicates that the data path of the LUN is disabled, which makes the LUN inaccessible on the network. All Indicates that the LUN is accessible by all of the hosts on the network.
Protocol Access	Identifies the access protocol used to map the LUN to the Controller.

	Protocols include:
	<ul style="list-style-type: none">• FC only• No Access• All
Groups	Displays the volume group or storage domain to which the logical volumes belong.
	Volume Group Lists the name of the volume group where the logical volume is located.
	Storage Domain Specifies the name of the Storage Domain.
Logical Capacity (GB)	Displays the storage requirements for the logical volumes.
	Allocated Identifies the total amount of storage capacity that is reserved for this volume.
	Addressable Identifies the capacity limit to which the volume can grow.
	Logical Distribution Displays a graphical comparison of the allocated capacity that this volume uses to the allocated capacity that is unused.
QoS	Displays the RAID and priority levels.
	RAID Level Identifies the storage mechanism that is used to enhance the ability of the system to recover data from the loss of one or more drives. Possible RAID levels:
	Single Parity Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.
	Double Parity Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Valid priority levels:

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN

extends receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Capacity (GB)

Displays the physical storage usage for the Clone LUNs.

Logical Maximum

Identifies the amount of storage that was requested for the clone repository.

Physical Used

Identifies the amount of clone capacity that is allocated to the volume for clone data. The amount of capacity includes the overhead that is needed to create the logical volume. The overhead is parity for data protection.

Physical Allocated

Identifies the total amount of clone capacity that the system reserved for the logical volume. The amount of capacity includes the overhead that is needed to create the logical volume.

Physical Maximum

Identifies the maximum clone capacity allowed. For clones. This field identifies how much space is available for clone data.

Total Physical Capacity (GB)

Displays the total physical storage capacity for the logical volumes and Clone LUNs.

LUN Overhead

Identifies the physical and logical storage capacity that is required to meet the LUN Quality of Service (QoS) settings.

Allocated

Specifies the amount of raw capacity in gigabytes (GB) that the system has assigned and designated to this logical volume.

Maximum

Identifies the sum of the addressable capacity for the logical volume and its clone repository.

Physical Distribution

Displays a graphical comparison of the capacity that is used to the maximum capacity that is allocated.

Global LUN Number	Identifies the globally unique identifier of the LUN.
LUID	Identifies the unique identifier of the LUN.

Statistics and Trending Overview Page

Navigation: *SAN > Statistics and Trending*

Displays links to pages that provide access to statistics on LUNs and Controller protocols.

LUNs	Opens the LUNs statistics page. You can view details on LUN statistics as well as real time statistics.
Controller Protocols	Opens the Controller Protocol statistics page. You can view details on FC port statistics as well as real time statistics for those ports.

SAN Storage Overview Page

Navigation: *SAN > Storage*

Displays links that allow you to create and manage logical volumes and storage area network (SAN) hosts that are configured on the Oracle FS System.

LUNs	Allows the administrator to create, view, and modify a logical volume within a SAN. Administrators assign storage resources and Quality of Service (QoS) attributes to each LUN.
Hosts	Allows the administrator to manage the SAN hosts, including creating host groups, renaming hosts, and, if Oracle FS Path Manager is not installed, associating hosts with an HBA.
Host-to-LUN Mapping	Provides a topology overview of the hosts and associated mapped LUNs.
LUN-to-Host Mapping	Provides a topology overview of the LUNs and associated mapped hosts.

View Data Protection Schedule Dialog

Navigation: *SAN > Data Protection > Clone Schedules > Actions > View*

Displays the data protection schedule properties.

Schedule Name	Identifies the name of the scheduled job.
Volume Group for Created Clones	Identifies the volume group to which the clone is assigned.
Enabled	Identifies whether the schedule is enabled.

Enabled

Indicates that the scheduled operation performs at the specified time.

Disabled

Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.

Protected Volume

Identifies the name of the logical volume from which the scheduled clone is created.

Schedule**Start Time**

Identifies the date and time at which the Oracle FS System starts a scheduled operation.

Run Once

Indicates that the replication runs immediately and only one time.

Repeat Interval

Identifies how often the system performs the scheduled replication operation.

Valid intervals and frequencies are shown in the following table.

Table 21: Schedule repeat intervals

Interval	Frequency
1 through 7	Days
1 through 24	Hours
1 through 24	Months
1 through 52	Weeks

When selecting a weekly schedule, select the days of the week on which the replication occurs.

Related Links

[View a LUN Data Protection Schedule](#)

View LUN Statistics Detail

Navigation: *SAN > Statistics and Trending > LUNs > Actions > View Details*

Displays detailed information about the LUN you selected from the LUNs page.

If the dialog is kept open, the displayed information is refreshed, every two minutes.

Name

Identifies the name of the selected LUN.

Oracle FS System Performance

Read Throughput

Indicates the data transfer rate for read operations.

Write Throughput

Indicates the data transfer rate for write operations.

Total Throughput

Indicates the data transfer rate for read operations and write operations.

Read IOPS

Indicates the average number of read operations per second.

Write IOPS

Indicates the average number of write operations per second.

Total IOPS

Indicates the total read and writes operations per second.

System Load

Specifies the performance of the LUN while processing I/O requests.

Read Throughput

Indicates what the data transfer rate for data inputs, which are read operations, of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Write Throughput

Indicates the data transfer rate for data outputs, which are write operations, of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Total Throughput

Indicates the average data transfer rate for data read operations and write operations of the specified LUN would be if the system devoted all of the CPU resources to the LUN.

Read IOPS

Indicates the average number of read operations per second for read operations would be if the system devoted all of the CPU resources to the LUN.

Write IOPS

Indicates the average number of write operations per second for write operations would be if the system devoted all of the CPU resources to the LUN.

Total IOPS

Indicates the combined read and write operations per second would be if the system devoted all of the CPU resources to the LUN.

I/O Latency

Specifies the average time to complete a read or write operation (in milliseconds) and the average operation size (in KB).

Read Response Time

Identifies the average time to perform a read operation in the last sample period.

Write Response Time

Identifies the average time to perform a write operation in the last sample period.

Response Time

Identifies the average time to perform a read or write operation in the last sample period.

Read Operation Size

Identifies the average size of a read operation in the last sample period.

Write Operation Size

Identifies the average size of a write operation in the last sample period.

General

Specifies the I/O activity of the cache usage.

Cache Flushes per Second

Indicates the rate per second for which cache lines were flushed (written) to disk in the last sample period.

Cache Hit Ratio

Indicates the percentage of read operations that were completed from the read cache, which is also called cache hits, in the last sample period.

Read-Ahead IOPS

Indicates the average read operations per second from read-ahead fetching in the last sample period. Read-ahead fetching utilizes read access behavior in the sample period to determine read-ahead IOPS.

Non-Optimized IOPS

Indicates the total read operations and write operations per second that passed through non-optimized data paths in the last sample period. Optimized paths are preferred over non-optimized paths for performance. Non-optimized paths occur when there is no path management software used to manage data paths, the path management software is not configured correctly, or an optimized path is not available.

Path management software and applications provide load balancing and path management for improved performance

Related Links

[View Detailed LUN Statistics](#)

View Details Dialog (Fibre Channel)

Navigation: *SAN > Statistics and Trending > Controller Protocols > Actions > View Details*

Displays information about the Fibre Channel (FC) port you have selected on the Controller **Statistics** page.

The **View Details** panel displays data shown in the Controller **Protocol Statistics** page as well as additional information. The information displayed is refreshed, if the panel is kept open, every two minutes as this is the collection period time.

Name	Identifies the name of the Controller.
Slot	Identifies the HBA location (slots 1, 4, and 5) on the Controller.
Port Number	Identifies the HBA port numbers on the Controller.
Port Type	Identifies the HBA port type.

General Information

Read Throughput

Identifies the data transfer rate for data inputs (reads).

Write Throughput

Identifies the data transfer rate for data outputs (writes).

Total Throughput

Identifies the average combined input and output data transfer rates (reads and writes).

Total IOPS

Identifies the total number of I/O operations per second.

Performance

Max Read Throughput

Identifies the maximum input data transfer rate (reads).

Max Write Throughput

Identifies the maximum output data transfer rate (writes).

Max Total Throughput

Identifies the maximum combined input and output data transfer rate (reads and writes).

Max Read IOPS

Identifies the maximum number of input (read) I/O operations per second.

Max Write IOPS

Identifies the maximum number of output (write) I/O operations per second.

Max Total IOPS

Identifies the maximum total number of input and output (read and write) I/O operations per second.

SCSI Task Management Operations**Abort Task**

Indicates the number of abort task commands processed on the selected port.

Abort Task Set

Indicates the number of abort task set commands processed on the selected port.

A task set is a group of tasks.

Clear ACA

Indicates the number of Clear ACA (Auto Contingent Allegiance) commands processed on the selected port.

Clear Task Set

Indicates the number of clear task set commands processed on the selected port.

Logical Unit Reset

Indicates the number of reset logical unit commands processed on the selected port.

Target Reset

Indicates the number of target reset commands processed on the selected port.

I/O Latency

Specifies the average time to complete a read or write operation (in milliseconds) and the average operation size (in KB).

Read Response Time

Identifies the average time to perform a read operation in the last sample period.

Write Response Time

Identifies the average time to perform a write operation in the last sample period.

Response Time

Identifies the average time to perform a read or write operation in the last sample period.

Read Operation Size

Identifies the average size of a read operation in the last sample period.

Write Operation Size

Identifies the average size of a write operation in the last sample period.

Channel Errors**Total Channel Errors**

Indicates the total number of channel errors associated with this port.

Command Timeout Errors

Indicates the number of command timeout errors that have occurred on the channel associated with this port.

DMA Errors

Indicates the number of Direct Memory Access (DMA) errors that have occurred on the channel associated with this port.

Invalid RXID Errors

Indicates the number of invalid responder exchange identifier (RXID) errors that have occurred on the channel associated with this port.

Loop Init Errors

Indicates the number of loop initialization errors that have occurred on the channel associated with this port.

Overrun Errors

Indicates the number of overrun errors that have occurred on the channel associated with this port.

PCI Errors

Indicates the number of Peripheral Component Interconnect (PCI) errors that have occurred on the channel associated with this port.

Port Unavailable Errors

Indicates the number of port unavailable errors that have occurred on the channel associated with this port.

Reselection Timeout Errors

Indicates the number of reselection timeout errors that have occurred on the channel associated with this port.

Bad Frame Errors

Indicates the number of frames dropped from first-in or first-out buffer that have occurred on the channel associated with this port.

System Errors

Indicates the number of system errors that have occurred on the channel associated with this port.

Unacknowledged Host Event Errors

Indicates the number of unacknowledged host event errors that have occurred on the channel associated with this port.

Underrun Errors

Indicates the number of underrun errors that have occurred on the channel associated with this port.

Transfer Errors

Indicates the number of data transfer errors that have occurred on the channel associated with this port.

Loop Activity**LIPs**

Indicates the number of loop initialization primitive (LIP) sequences which are used to initialize or reset attached ports to a known state.

Loop Ups

Indicates the number of loop ports that are up and available.

Loop Downs

Indicates the number of loop ports that are down and not available.

Related Links

[View Detailed SAN Controller Protocols Statistics](#)

View Host, Advanced Tab

Navigation: SAN > Storage > Hosts > Actions > View Host > Advanced

Displays the HP compatibility option setting for the selected Storage Area Network (SAN) host.

**HP-UX
Compatibility
Mode**

Use this option when the SAN host is running the HP-UX operating system. When compatibility mode option is enabled, the system uses an alternative method to present LUNs on the SAN host. This alternative method is compatible with HP-UX. When this option is enabled, you might not have a LUN visible to the host as LUN number 0. HP-UX compatibility mode enables the full range of LUN numbers (other than 0) to be used with HP-UX operating systems. You can verify the current host mappings from the **Flash Storage Path Manager** tab.

Related Links

[View SAN Host Entry Settings](#)

View Host, Oracle FS Path Manager Tab

Navigation: SAN > Storage > Hosts > Actions > View Host > Oracle FS Path Manager

Displays configuration information about Oracle FS Path Manager that is running on the host.

Host Information

Host Name	Identifies the name of the SAN host entry.
Management IP Address	Identifies the IP address of the SAN host. The system uses this address to exchange management requests and responses with the FSPM that is installed on the host. If FSPM is not installed, this field displays <i>N/A</i> .
Operating System	Identifies the operating system that is associated with the SAN host, when Oracle FS Path Manager is installed on that host; otherwise, this field displays <i>N/A</i> .
Oracle FS Path Manager Version	Identifies the version of the FSPM that is installed and running on the SAN host.

Oracle FS Path Manager Settings

LUN Name Identifies the name of the LUN or Clone LUN on the Oracle FS System.

Name on Host Identifies the name used by the SAN host to identify the LUN.

Load Balancing Identifies the type of load balancing that the storage area network (SAN) hosts performs to access Oracle FS System LUNs.

Note: If the **Load Balancing** option is not selectable, then the version of FSPM does not allow load balancing on the host.

Valid types:

Static

Indicates load balancing across multiple paths to the configured LUNs.

The software selects the best available path, and all commands are sent over that path until the path is no longer operational, in which case the failed path fails over to another appropriate path.

Round Robin

Indicates load balancing across multiple paths to the configured LUNs.

The system sends the commands one by one using the best available paths, which ensures that LUN commands are evenly distributed over any path that is available to access the LUNs.

Number of Optimized Paths	Identifies the number of optimized (fastest path available) access paths to the LUN.
Number of Non-Optimized Paths	Identifies the number of non-optimized access paths to the LUN.

Related Links

[View SAN Host Entry Settings](#)

View Host, Ports Tab

Navigation: SAN > Storage > Hosts > Actions > View Host > Ports

Displays port information about a selected host.

Host Name Identifies the name of the SAN host entry.

FC Port Information

Alias Identifies an alternative friendly name that is assigned to the host port.

Port Identifies the WWN assigned to a Fibre Channel HBA port.

Speed Indicates the speed, in Gb/s, of the connection between the SAN host and the device to which the host is directly connected. That device is typically a network switch or possibly the Controller.

Note: The actual data transfer rate between the SAN host and the Controller can be less than the reported speed. It can be less because the data transfer rate is governed by the slowest link on the path between the host and the Controller.

Manufacturer Identifies the manufacturer of a hardware component.

HBA Model Identifies the model number of a hardware component.

Driver Version Identifies version of the HBA driver.

Firmware Version Identifies the HBA firmware version.

Related Links

[View SAN Host Entry Settings](#)

View SAN LUN, Data Protection Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > View > Data Protection > Single Tier

Displays the data replication schedules of a logical volume.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity by Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Enable Clones Indicates whether the Capacity for Clones option is set.

Capacity for Clone Storage

Maximum capacity Specifies the percentage of storage space to allocate for Clone LUNs.

Note: Changes to this field updates the Maximum and Available Capacity values. The capacity values are based on the Addressable Logical Capacity value that you provided in the Quality of Service tab.

Current Maximum Capacity	Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.
Current Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Number of Clones (of this clone)	Identifies the number of clones that have been created for this LUN.
Number of Clones (total)	Identifies the number of clones that have been created for this LUN and its clones.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Specifies the enhanced QoS settings to apply to the clone storage that are created by the data protection schedule, or manually created by the administrator.

Storage Class Specifies the category of physical media on which the logical volume resides.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.

Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced

Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name	Identifies the name of the schedule.
Start Time	Identifies the date and time that the schedule begins.
Frequency	Identifies the frequency at which the schedule runs. Frequencies include: <ul style="list-style-type: none"> • Run Once • Hourly • Daily • Weekly
Enabled	Identifies whether the schedule is enabled.

Enabled

Indicates that the scheduled operation performs at the specified time.

Disabled

Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.

Create	Displays a dialog to create a scheduled operation.
Modify	Displays a dialog to modify an existing schedule.
Delete	Removes an existing schedule.

Related Links

[Display Clone LUN Details](#)

View SAN LUN, Data Protection Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > View > Data Protection > Auto Tier

Displays the data replication schedules of a logical volume.

Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Enable Clones Indicates whether the Capacity for Clones option is set.

Capacity for Clones

Maximum capacity	Specifies the percentage of storage space to allocate for Clone LUNs.
Current Maximum Capacity	Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.
Current Available Capacity	Identifies the amount of current storage capacity allocated for clones of this LUN.
Number of Clones (of this clone)	Identifies the number of clones that have been created for this LUN.
Number of Clones (total)	Identifies the number of clones that have been created for this LUN and its clones.
Match Repository QoS to LUN QoS	Specifies whether to apply the clone storage QoS properties using a Data Protection schedule, or manually applied by the administrator.

Clone Storage QoS

Indicates the QoS settings that are applied to the logical volume.

Initial Storage Class

Indicates the category of physical media on which the logical volume resides.

Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Initial Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Advanced Initial RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Clone Schedules

Lists the data protection schedules that are associated with the logical volume.

Name Identifies the name of the schedule.

Start Time Identifies the date and time that the schedule begins.

Frequency Identifies the frequency at which the schedule runs. Frequencies include:

- **Run Once**
- **Hourly**
- **Daily**
- **Weekly**

Enabled Identifies whether the schedule is enabled.

Enabled

Indicates that the scheduled operation performs at the specified time.

Disabled

Indicates that the operation is not performed as scheduled. Disable the schedule, for example, when the source volume (LUN or Clone LUN) has not been made available to users.

Create Displays a dialog to create a scheduled operation.

Modify Displays a dialog to modify an existing schedule.

Delete Removes an existing schedule.

Related Links

[Display Clone LUN Details](#)

View SAN LUN, Mapping Tab

Navigation: SAN > Storage > LUNs > Actions > View > Mapping

Displays the LUN-to-host mapping settings for a logical volume.

Access Protocol Specifies the protocols that are allowed for accessing the logical volume.

Only selected hosts (via maps) Specifies that only designated SAN hosts can access this LUN using a specific, possibly different, LUN number on each of those hosts. If the LUN is mapped, the LUN number must be unique to the mapped SAN host.

All hosts may access this LUN using LUN Number Specifies all SAN hosts accessing this LUN use the same LUN number. Select this option to activate the LUN number selection drop-down list.

LUN Controller Assignment

Current Controller Identifies the current Controller on which the LUN is homed.

Note: For new source LUNs, this field is not available; instead, use the **Assigned Controller** option.

Assigned Controller Identifies the Controller to which the system should assign the LUN. Choose an available Controller node from the list.

Ports Masked for this LUN

Displays the physical Controller ports to exclude (mask) so they cannot access the LUN.

Masked	Indicates whether the port for the LUN is masked.
Protocol	Identifies the type of access protocol.
Controller	Identifies the name of the Controller.
Slot	Identifies the slot number of the Controller HBA.
Port	Identifies the Controller port number.
Controller Port Address	Identifies the unique identifier of each Controller network port. For FC networks, this identifier is the World Wide Name (WWN).

LUN Mapping

Manages the LUN-to-Host mapping assignments.

Note: The LUN mapping table only displays when you select the **Only selected hosts (via maps)** option.

You can map a LUN or Clone LUN to either a single host or a host group. The `-host` option specifies the ID or FQN of the customer host machine to be mapped to the LUN or Clone LUN. The `-hostGroup` option specifies the ID or FQN of the host group to be mapped to the LUN or Clone LUN.

Hosts Mapped to this LUN	Name Identifies the SAN host that accesses LUNs configured on the Oracle FS System. If the Oracle FS Path Manager is not installed, the system displays the WWN of the FC HBA.
	Map via LUN Number Identifies the number to assign to the LUN for the associated SAN host. This number must be unique for that particular host. It need not to be unique across all hosts.
Create	Opens the dialog that allows you to create the LUN-to-host mapping based on your selections for host name and assign the LUN number that the host uses.
Modify	Opens the dialog that allows you to change the LUN mapped to the associated host.
Remove	Removes the LUN mapping for the selected SAN host.

Related Links

[Display LUN Details](#)

View SAN LUN, Quality of Service Tab, Single Tier

Navigation: SAN > Storage > LUNs > Actions > View > Quality of Service > Single Tier

Displays the QoS properties of a selected logical volume.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Capacity By Storage Class

Identifies the type of physical media on which the data is stored. Valid media types (listed from the highest performance priority to the lowest performance priority):

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
View Storage Domains	Displays a dialog that lists the available Storage Domains.
LUN Name	Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements: <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters

Volume Group	<p>Allows you to assign the LUN to a volume group.</p> <p>[...]</p> <p>Opens the Manage Volume Groups dialog, which allows you to create a volume group.</p>
Uses Storage Profile	<p>Specifies whether the logical volume uses a custom set of QoS properties.</p> <p>[...]</p> <p>Opens the View Storage Profiles dialog, which allows you to review the profile details.</p>
Storage Class	<p>Specifies the category of physical media on which the logical volume resides.</p> <p>Valid media types:</p> <p>Performance SSD</p> <p>Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.</p> <p>Capacity SSD</p> <p>Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.</p> <p>Performance Disk</p> <p>Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.</p> <p>Capacity Disk</p> <p>Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.</p>
Basic	<p>Allows you to specify indirectly the parity level of the data and the read-ahead policy for the data. You specify those properties indirectly by selecting how the data is typically accessed and the level of data protection that is desired.</p> <p>Note: After you select how the data is typically accessed and the level of redundancy for the data, the system displays the parity level and the read-ahead policy for the volume that supports your selections.</p>

Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Redundancy

Identifies the number of copies of the parity bits that the Oracle FS System creates for the volume

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced Allows you to specify directly the parity level of the data and the read-ahead policy for the data.

Important: Use of this option clears the selections, if any, that were made in the **Basic** option.

RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

**Migration/
Copy
Priority**

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Allocated Logical Capacity

Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.

Disable Reference Tag Checking

Indicates that a portion of the internal data integrity checks is disabled for the LUN. If set, the **Use as a Boot LUN** option has no effect.

Use as a Boot LUN

Indicates the status returned from the LUN is modified for unwritten data blocks. Setting this option affects the host or application retry timing.

Capacity Estimates

Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.

Estimated Physical Capacity

Identifies the estimated physical capacity (allocated and maximum) for this logical volume.

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Display LUN Details](#)

View SAN LUN, Quality of Service Tab, Auto Tier

Navigation: SAN > Storage > LUNs > Actions > View > Quality of Service > Auto Tier

Displays the QoS properties of a selected logical volume.

Selected Storage Domain Capacity

Displays the storage capacity of the selected storage class and Storage Domain that is available for the logical volume. The graph uses colored bars of different thicknesses to indicate the capacity status of the logical volume you are creating as well as the overall system capacity.

Allocation By Storage Class and RAID Level

Indicates graphically the actual physical capacity of the auto-tiered LUN plus the capacity that is required for RAID Level parity. The graph contains stacked bars that represent the sum of the Storage Class physical capacity and the RAID Level parity. A legend at the bottom of the graphic provides detailed information about each bar.

Storage Domain	Specifies the name of the storage domain associated with the LUN. Note: All Storage Domain options appear when the Oracle FS System contains custom Storage Domains.
View Storage Domains	Displays a dialog that lists the available Storage Domains.
LUN Name	Identifies the name that is assigned to a LUN for administrative purposes. LUN names must meet the following requirements: <ul style="list-style-type: none"> • Must be unique across the Oracle FS System • Must be 82 or fewer UTF characters • Must be 255 or fewer ASCII characters
Volume Group	Allows you to assign the LUN to a volume group. [...] Opens the Manage Volume Groups dialog, which allows you to create a volume group.
Use Storage Profile	Specifies whether the logical volume uses a custom set of QoS properties. [...] Opens the View Storage Profiles dialog, which allows you to review the profile details.
Initial Storage Class	Specifies the category of physical media on which the logical volume resides. Valid media types:

Performance SSD

Specifies that the data is stored on solid state drives (SSDs) that are optimized for the performance of balanced read and write operations.

Capacity SSD

Specifies that the data is stored on SSDs that are optimized for the performance of capacity and for read operations. The write performance for this Storage Class is sacrificed somewhat to achieve the optimizations for read performance and for capacity.

Performance Disk

Specifies that the data is stored on high-speed hard disk drives (HDDs). This Storage Class sacrifices some capacity to reduce the access time and the latency of the read operations and of the write operations.

Capacity Disk

Specifies that the data is stored on high-capacity, rotating HDDs. This Storage Class optimizes capacity at some sacrifice of speed. For a storage system that does not include tape storage as an option, this Storage Class always provides the lowest cost for each GB of capacity.

Basic Initial Typical Access

Identifies the most common method of data access. Valid biases:

Sequential

Indicates that the read requests and the write requests operate on the data mostly by accessing the records one after the other in a physical order.

Random

Indicates that the read requests and the write requests operate on the data mostly by accessing the records in an arbitrary order.

Mixed

Indicates that the read requests and the write requests operate on the data sometimes in sequential order and sometimes in random order.

Initial I/O Bias

Identifies the typical read-write ratio. Valid I/O biases:

Read

Indicates that most of the access requests are for read operations.

Write

Indicates that most of the access requests are for write operations.

Mixed

Indicates that the number of access requests are similar for read operations and for write operations.

Initial Redundancy

Identifies the RAID level associated with the Storage Profile.

Valid redundancy levels:

Single

Stores the original user data plus one set of parity bits to help in the recovery of lost data. Access to the data is preserved even after the failure of one drive. Single parity is implemented using RAID 5 technology and is the default redundancy level for the Storage Classes that specify the performance-type media.

Double

Stores the original user data plus two sets of parity bits to help in the recovery of lost data. Access to the data is preserved even after the simultaneous failure of two drives. Double parity is implemented using RAID 6 technology and is the default redundancy level for the Storage Classes that specify the capacity-type media.

Advanced Initial RAID Level

Identifies the RAID level associated with the Storage Profile.

Possible RAID levels:

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Initial Read Ahead

Identifies the read-ahead policy that the system uses for sequential read operations. The policy determines the amount of additional data, if any, that the system places into the Controller cache. Valid policies:

Normal and Default

Indicates that the input requests and the output requests are accessing the data mostly in a random manner or in a mixed sequential and random manner.

Aggressive

Indicates that the input requests and the output requests are accessing the data mostly in a sequential manner and that the workload is biased toward read operations.

Conservative

Indicates that the input requests and the output requests are mostly sequential and that the workload is biased toward write operations.

Priority Level

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN

extends receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Migration/ Copy Priority

Identifies the strategy the system should use to control the impact on performance when background tasks need to copy or move data from one location in the storage pool to another.

Note: When the system is idle or lightly loaded, the background task maximizes the amount of work done regardless of the option selected.

Valid priorities:

System Chooses

Balances the background copy with the incoming client I/O. This option is the default.

Minimize Impact

Restricts the amount of work performed on a loaded system. This option is intended to have a minimal impact on client I/O throughput at the expense of longer copy times.

Maximum Speed

Prioritizes the background copy at the expense of client I/O throughput.

Capacity

Identifies the maximum capacity to which the logical volume can grow. For a clone, this field identifies how much addressable space is available. Capacity must be greater than or equal to the allocated logical capacity.

Allocated Logical Capacity

Identifies the amount of capacity that is reserved for the logical volume. The reserve capacity must be less than or equal to the maximum capacity.

Disable Reference Tag Checking

Indicates that a portion of the internal data integrity checks is disabled for the LUN. If set, the **Use as a Boot LUN** option has no effect.

Use as a Boot LUN

Indicates the status returned from the LUN is modified for unwritten data blocks. Setting this option affects the host or application retry timing.

Capacity Estimates

Provides an estimate of the physical storage capacity requirements, which are based on your QoS attribute selections.

Estimated Physical Capacity

Identifies the estimated physical capacity (allocated and maximum) for this logical volume.

Estimated Clone Capacity

Identifies the estimated capacity (allocated and maximum) for clones of this logical volume.

Estimated Total Capacity

Identifies the estimated total capacity (allocated and maximum) for this logical volume.

Related Links

[Display LUN Details](#)

Volume Groups Overview Page

Navigation:

SAN > Volume Groups

Manages the volume groups and the logical volumes that are configured on the Oracle FS System.

From this page you can create, modify, view, and delete volume groups and logical volumes. You can copy and clone the logical volumes. You can also change the QoS settings of any volume from standard to enhanced.

Note: A dash in a field signifies that the property does not apply to the volume.

Name Lists the names of the logical volumes and the names of the volume groups that are configured on this Oracle FS System. If a logical volume belongs to a volume group, the volume is listed beneath that group.

Status Identifies the accessibility of the logical volume.

LUNs

Valid states:

Online

Indicates that the volume is fully accessible.

Offline

Indicates that the volume is not accessible.

Conservative

Indicates that the write-back cache of the volume is disabled, which reduces system performance. A Conservative state might indicate a hardware problem.

Prepared

Indicates that the storage resources for the volume are reserved for the clone, but the clone is not committed to the storage device.

Read Only

Indicates that the volume is in write protect mode and is set to read-only.

Unknown

Indicates that not enough information is obtained from the volume to report its status.

Logical Capacity (GB)

Provides an overview of the logical capacity usage and the logical capacity requirements of the volume group.

Used

Indicates the amount of allocated capacity that is consumed.

- For LUNs, this amount is the same as the allocated amount.

Allocated

Identifies the total amount of storage capacity that is reserved for this volume or this volume group.

Addressable

Identifies the capacity limit to which the volume can grow.

Distribution

Displays a graphical comparison of the allocated capacity that this volume uses to the unused allocated capacity.

Logical Maximum

Identifies the sum of the addressable capacity for the logical volume and its clone repository.

Capacity (GB) for Clone LUNs

Provides an overview of the physical capacity usage and the physical capacity requirements of any Clone LUNs that might exist in the volume group.

Physical Used

Identifies the amount of clone capacity that is allocated to the volume for clone data. The amount of capacity includes the overhead that is needed to create the logical volume. The overhead is parity for data protection.

Physical Allocated

Identifies the total amount of clone capacity that the system reserved for the logical volume. The amount of capacity includes the overhead that is needed to create the logical volume.

Physical Maximum

Identifies the maximum clone capacity allowed. For clones. This field identifies how much space is available for clone data.

RAID Level

Single parity

Indicates that, in addition to the actual data, one set of parity bits exists for the logical volume. This parity level protects against the loss of one drive. Single parity is implemented as a variant of the RAID 5 storage technology.

Double parity

Indicates that, in addition to the actual data, two sets of parity bits exist for the logical volume. This parity level protects against the loss of one or two drives with a slight cost to write performance. Double parity is implemented as a variant of the RAID 6 storage technology.

Mirrored

Indicates that no parity bits exist for the volume. Instead, the system writes the data in two different locations. This RAID level protects against the loss of at least one drive and possibly more drives with an improvement of the performance of random write operations. Mirrored RAID is implemented as a variant of the RAID 10 storage technology.

Note: For LUNs, the system displays the RAID levels that are in use by each LUN.

Priority Level

LUNs

Identifies the priority that the system gives to various operational aspects of a logical volume. These operational aspects include the Controller processing queue, the SAN interface requests, and the migration of the auto-tiered LUN extents.

Note: The processing-queue priority defines the percentage of the Controller CPU cycles that are dedicated to the volume.

Premium

Indicates the highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the highest priority when the system migrates the data to the higher-performing storage tiers.

High

Indicates the next highest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next highest priority when the system migrates the data to the higher-performing storage tiers.

Medium

Indicates an intermediate priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive an intermediate priority when the system migrates the data to the higher-performing storage tiers.

Low

Indicates the next to lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the next to lowest priority when the system migrates the data to the higher-performing storage tiers.

Archive

Indicates the lowest priority for responding to requests in the processing queue. For auto-tiered LUNs, busy LUN extents receive the lowest priority when the system migrates the data to the higher-performing storage tiers.

Related Links

[Display Volume Group Details](#)

Support Tab Reference Pages

Clear Log Dialog

Navigation: Support > System Logs > Actions > Clear Logs

Clears (deletes) all existing collected log bundles from the Oracle FS System. This does not clear logs which are not contained in a log bundle.

Note: Clearing (deleting) system logs requires support administrator login privileges. Contact Oracle Customer Support before proceeding.

Controller Logs	Select this option if you want to clear (delete) only Controller logs. This leaves logs, like event log, intact.
Log Collections	Select this option to clear (delete) all logs displayed in the System Logs view.

Related Links

[Clear the System Logs](#)

Create Log Bundle Dialog

Navigation: Support > System Logs > Actions > Create

Defines the hardware components and system events to include in the log files.

You can define the collection period, select SAN hosts to gather information from, and choose if logs are sent to a Call-Home server or downloaded to a workstation. You can also associate the log file with a server request (SR).

Component or Item	Provides a list of available components and system events for data collection.
	Collect
	Indicates whether the object is selected for data collection
	Name
	Indicates the name of the object for data collection.
Select buttons	Specifies all or a group of system components.
	Select All
	Sets all object events in the list to Yes . This selection provides a record of all events on the system.

	<p>Deselect All</p> <p>Resets the available object events in the list to No so that no logs are collected.</p>
Collection Period	<p>Controls the extent of information coverage for each selected source.</p> <p>Most Recent Logs</p> <p>Indicates the age of the collected data logs. For example, a setting of four hours means that the logs are less than four hours old. (Four hours is the default value. You can also specify days instead of hours.)</p> <p>All Logs Since Last Log Collection</p> <p>Indicates that the data collection logs are continually updated.</p>
SAN Host Log Selection	<p>Allows you to select the SAN host for log collection:</p> <p>This feature is only available if the SAN host is running Oracle FS Path Manager and the SAN hosts are logged in at the time of collection.</p> <p>Number of hosts selected for log collection</p> <p>Indicates the number of hosts selected for log collection.</p> <p>Select Hosts</p> <p>Opens a dialog that allows you to select recognized SAN hosts on the system for log collection.</p> <p>Collect</p> <p>Indicates whether the host is selected for data collection.</p> <p>SAN host</p> <p>Indicates the name of the SAN host for data collection</p>
Notes	<p>Provides user-defined information about the system logs collection. This information appears in the Notes column. The notes information appears in the Notes column of the System Logs overview page for easily identification. This information is also included in the header of the log bundle for identification.</p> <p>The Notes field is also used to associate the log bundles with an open service request (SR). The SR number must be the first entry in the field. Add any other notes that are related to the log bundles after the SR number. Select the Send to Call-Home server option when using the SR number.</p>
Send to Call-Home server	<p>Collects the log and then transmits the log to the configured Call-Home server.</p>
Download to	<p>Creates the log bundle and then downloads that log bundle to a user specified directory on the workstation.</p>

Related Links

[Create a Log Bundle](#)

Data Consistency Overview Page

Navigation: Support > Data Consistency

Displays the data consistency check results for the Oracle FS System Drive Group or allows you to create tasks to verify data consistency. Data consistency refers to the integrity of the parity data and not the user-created data.

Note: The data consistency check requires significant system resources and is usually performed at the direction of Oracle Customer Support.

You can perform the data consistency check by selecting a Drive Group and then select **Actions > Verify Data Consistency**.

When you select **Verify Data Consistency**, you can choose whether to run the check at low priority or high priority. At low priority, there is a 10 percent potential system impact to the system and at high priority, there is a 30 percent potential to impact system performance. If you select low priority, the check takes longer to complete but with less potential system impact. If you do not see the results displayed after a period of time, refresh the page to display the results.

After you start a data consistency check, you cannot cancel the process. Also, the process might be shown as completed in the **Tasks** panel, the process can continue to run in the background until actual completion.

If the data consistency check fails, you may see the **Status** change to degraded. If you see a status of degraded, with or without a data consistency check, contact Oracle Customer Support.

Drive Group	Identifies the name of the Drive Group.
Status	Identifies the state of the Drive Group. Valid states: <ul style="list-style-type: none"> Normal Requires no action Warning Requires no immediate action for minor conditions. Critical Requires prompt action to prevent system failures or offline conditions Unknown Additional information is required.
Date of Result	Specifies the date and time when the data consistency test was completed.
Consistency Result	Specifies the result of the data consistency test. Valid results:

- Pass
- Fail

Errors Found	Identifies the number of consistency test errors.
Errors Fixed	Identifies the number of errors corrected during the test.

Manage Halt Points Dialog

Navigation: Support > System Halt Points > Manage Halt Points

Manages the system halt points that are available on the Oracle FS System. A halt point set for a software component causes the system to pause the startup sequence at a step associated with that component to enable troubleshooting and diagnostics.

Caution: Use system halt points for troubleshooting purposes only. System halt points are used to gather information or to clear conditions that cannot otherwise be accomplished. Never set or clear halt points without assistance from Oracle Customer Support. Only the Primary administrator and the Support administrator can manage system halt points.

Active	Indicates whether the startup process is to halt at the indicated step for this software component.
Order	Identifies where in the startup sequence the software component step is to be executed.
Paused on Halt Point	Indicates the step at which the startup sequence is halted.
Component Name	Identifies the name of the software component that is associated with the system halt point. The system lists the components in the normal startup sequence.
Step	Identifies the name of the software component step where the halt point is to occur. The system lists the steps in the normal startup sequence.
Clear	Deselects all of the selected halt points that appear in the Paused on Halt Point field.

Related Links

[Manage System Halt Points](#)

Reset System Dialog

Navigation: Support > System Trouble > Actions > Reset System

Resets the system configuration as directed by Oracle Customer Support. Do not use this feature unless directed by Oracle Customer Support. Resetting the

system changes the system serial number which can cause issues with service entitlement.

Requires an encrypted file provided by Oracle Customer Support for configuration information.

Caution: Because this action deletes all user data along with the system configuration, the system prompts you to confirm the operation. Be absolutely sure you want to take this action. All data in the system is lost. After you select OK, this action cannot be canceled or undone.

Resetting the system configuration, performs the following actions:

- Deletes all data stored on the Oracle FS System.
- Resets the configuration to an initial state.
- Resets the system serial number.

Reset File[...] Select the filename and folder location for the encrypted file provided by Oracle Customer Support.

Related Links

[Reset the Oracle FS System](#)

Software and Firmware Overview Page

Navigation: Support > Software and Firmware

Displays the software and firmware packages currently installed on the Drive Enclosures, Controllers, and Pilots.

Other information includes listing of all software and firmware packages staged for an upgrade and whether a given software module applies to current hardware installed in the system.

Software Update Scheduled

Note: The Software Update Scheduled information appears only if there is an active software update scheduled. The Scheduled Software Update allows you to update the software at a later time.

Task Name	Identifies the type of scheduled task: Software Update.
Scheduled Start Time	Indicates the date and time of the schedule software update.
Cancel Scheduled Update	Allows you to remove the scheduled software update.

Installed Software

Package Version	Identifies the version number of the currently installed software package. The package version is the version of the Red Hat Package Manger (RPM) package already installed.
Compatibility Matrix Version	Identifies the package version of the currently installed compatibility matrix. The matrix version is usually the same as the package version unless you have staged a higher revision package.
Module	Identifies the name of a software or firmware module that is installed on the Oracle FS System.

Table 22: Software module types

Name	Description
Pilot OS	Operating system for the Pilot.
Pilot Software	Software that runs on the Pilot, such as the GUI interface and web server, online help, and Simple Network Management Protocol (SNMP).
Controller BIOS	Programmable ROM (PROM), which includes BIOS and netboot code, for the Controllers.
Controller Software	Software that manages the Controllers.
Drive Enclosures Firmware	Firmware for Drive Enclosures.

Version	Identifies the version number of a software module. A value of <i>unsupported</i> indicates there is a problem with the individual software module. Contact Oracle Customer Support for assistance.
Applies to Current Hardware (<i>Support roles only</i>)	Indicates that the affected hardware component uses the software module. Note: The Applies to Current Hardware column is displayed only for user accounts set up with support role privileges.

Staged Software

Package Version	Identifies the version number of the currently installed software package. The package version is the version of the Red Hat Package Manger (RPM) package already installed.
Can Upgrade to Staged Version	Indicates that an upgrade path is available based on the installed software module version and the staged software package.

Upload Software Package	Permits you to select and upload a software update package. Software packages are downloaded from My Oracle Support (support.oracle.com). Contact Oracle Customer Support if assistance is needed.
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Related Links

[Display Software and Firmware Versions](#)

System Halt Points Overview Page

Navigation: Support > System Halt Points

Displays the system halt points, if any, that have been enabled on the Oracle FS System and allows you to set or clear a halt point.

The system halt points are used for diagnostics and typically requested by Oracle Customer Support to aid in isolating problems. In most instances, you should not create a system halt point unless instructed by Oracle Customer Support.

Order	Identifies where in the startup sequence the software component step is to be executed.
Paused on Halt Point	Indicates the step at which the startup sequence is halted.
Component Name	Identifies the name of the software component that is associated with the system halt point. The system lists the components in the normal startup sequence.
Step	Identifies the name of the software component step where the halt point is to occur. The system lists the steps in the normal startup sequence.

System Logs Overview Page

Navigation: Support > System Logs

Displays collected system information available on an Oracle FS System. You can view logs as well as create new logs from this page.

You can manage logs from this page, including sending logs to a Call-Home server, downloading logs to a user-defined location, deleting logs, and clearing logs.

File Name	Lists the name of the log file bundle containing the collected system information. (The logs are compressed in the tar format.)
------------------	---

Note: The log name includes two time stamps. In this example, **A990033ZIO-130714104814-130718095816-PCP_EVT_FOUND_PILOT_CORE_FILE-e-02-02.tar**, the two timestamps indicate:

- 1 The first field, 130714104814 is the time stamp of the previous log bundle created before the most recent log bundle was created. For example, if the last log file was created on July 14, 2013, at 10:48:14 am, that information is added to the first part of the log file bundle name.
- 2 The second field, 130718095816, is the time stamp of the log file that was created. For example, if a log file was created on July 18, 2013, at 9:58:16 am; the time and date is shown as 130718095816 in the log file name.

Time Collected	Identifies the time and date at which the download bundle was collected from the Oracle FS System.
Collection Type	Indicates the method by which the system logs are collected: Manual Indicates user initiated system logs. Event Generated Indicates event triggered system logs where the triggering event is also in the name of the log bundle. . Periodic Indicates periodic or schedule driven Call-Home system or test logs. The periodic method is used to produce a small log that contains the entire system configuration and last 100 events.
Content	Identifies the types of system information that have been collected and are included in the current download bundle.
Size	Identifies the size of the download bundle.
Notes	Provides user-defined information about the system logs collection. This information is transferred in the header of the log bundle and may be used to identify the reason for this collection. For example, the user-defined information could include the Service Request number for tracking purposes.

System Trouble Overview Page

Navigation: Support > System Trouble

Reviews the status and health of the Controllers that are installed on the Oracle FS System. The **Actions** menu options allow you to test the connectivity between the Oracle FS System and the customer network as well as reset the system to an initial state.

Controller Name	Identifies the name of the Controllers selected for test connectivity.
Comment	Displays descriptive text that is associated with a Controller. A comment can include up to 256 characters.

Service Type	Identifies the service type of Controller attached to Oracle FS System. The service type is displayed as SAN Only, Biased to SAN, NAS Only, or Biased to NAS for each Controller.
Failover Controller	Identifies the Controller that is used to provide services when the other Controller in the pair fails.
Status	Displays the status of the Controller. <ul style="list-style-type: none"> Normal Requires no action Warning Requires no immediate action for minor conditions. Critical Requires prompt action to prevent system failures or offline conditions Unknown Additional information is required.

Run Controller Command Dialog

Navigation: Support > System Trouble > Actions > Run Controller Command

Runs commands on a selected Controller.

Controller	Identifies the Controller that you want to run the commands.
Command Line	Identifies the command to perform on the specified Controller. <ul style="list-style-type: none"> fmadm Note: Use the prefix command <code>ipmi fm</code> when entering commands in the Controller command line.
Environment Variables	Identifies the space-delimited pairs of environment variables and values to use while executing the command.
Execute	Runs the specified command.
Command Output	Displays the results of the command that was run to resolve a connectivity issue. The command output cannot be saved to a file.

Related Links

[Run Controller Command](#)

Update Drive Firmware Dialog

Navigation: Support > Software and Firmware > Actions > Update Drive Firmware

Installs the firmware for all of the selected drive types in the Oracle FS System.

Pending Drive Firmware Updates

Provides information about the drives that match the specifications for the firmware update.

Install?	Indicates whether the Oracle FS System updates the firmware for the selected item.
Drive Type	Indicates the following information about the drive: <ul style="list-style-type: none"> • Manufacturer name • Storage capacity • Media type: HDD or SSD <p>The system updates the firmware for all of the drives that match the selected drive types.</p>
Current Firmware Version	Identifies the version number of the drive firmware.
Pending Firmware Version	Identifies the version number of the drive firmware staged for update.

Related Links

[Update the Drive Firmware](#)

Update Software

Navigation: Support > Software and Firmware > Actions > Update Software

Manages the software and firmware updates on the Oracle FS System. Enables you to create an update schedule or immediately update, and also allows you to select the upgrade options and system overrides.

The update process affects all software modules and firmware on the Oracle FS System. To specify which updates are installed on individual components, login as support administrator.

Important: When logged into the system as a support administrator, you can select individual components to update from the software module package. You can also select **Always Install**, **Install if newer version**, or **Do not install**. Contact Oracle Customer Support before installing individual software components.

Install Action	Identifies the action to perform on the selected module during the software update. The support administrator role allows you to select individual software packages to install.
-----------------------	--

Note: When you selectively update the software modules, the Oracle FS System cannot determine the current software module version and displays *unsupported* as the installed software version.

The choices include:

Do not install

Select this option to keep the existing module version.

Install if newer version

Select this option to upgrade the existing module only if the update is a later version. This is the default action and the only action available to administrators. This action does not require you to be logged in as a support administrator.

Always Install

Select this option always install the selected module.

Note: The Always Install option may cause an upgrade or downgrade to the currently installed module version. You may also use this feature to install a module that does not apply to your current hardware. For example, to prepare for new hardware to be installed.

Module	Identifies the name of a module that is in the staged package.
Installed Version	Identifies the version number of a software module. A value of <i>unsupported</i> indicates there is a problem with the individual software module. Contact Oracle Customer Support for assistance.
Staged Version	Identifies the version number of the staged software module. Staged software is a newer version of the software that can be installed.
Update Software without restarting	Updates the software on the Oracle FS System. The update is performed without a system restart and I/O data access is not disrupted unless Oracle Customer Support instructs you to choose the Shutdown Controller software update option. This the default setting for most updates. Based on the type of updated, the system recommends which update option to use. If this option is selected by the system, use this option. Note: You may need to change this value to the Restart and update software (disrupts data access) if requested to do so by Oracle Customer Support based on your system configuration.
Restart and update software (disrupts data access)	Updates the software on the Oracle FS System. The update performs a shutdown which disrupts I/O data access and the restarts the system to install the update. Based on the type of update, the system recommends which update option to use. If the option is selected by the system, use this option.

Software Update Options

Note: Only select any of the following options if instructed to by Oracle Customer Support or if the *Oracle FS1-2 Flash Storage System Release Notes* describes specific options or recovery from standard conditions.

The following options provide additional control of the software update. These options apply to all software modules that are ready for update.

Caution: Turning on some of these options disrupts data access.

Ignore compatibility (not recommended)

During the update process, the Oracle FS System verifies that the version of the staged module is compatible with existing hardware and software. Select this option to override a failed compatibility check. This option does not automatically change a non-disruptive upgrade to a disruptive upgrade.

Shutdown Controller

Select this option to force the software update to shutdown all Controller software components for the upgrade. This option affects data access and requires you to select **Restart and update software (disrupts data access)**.

Ignore hardware status (except for Pilots)

Select this option to force the software update regardless of the state of the system hardware. This option can affect data access, depending on the specific hardware and state of the Controller or Drive Enclosure hardware.

If the Controller has issues, do not use this option without first contacting Oracle Customer Support to determine whether the Shutdown Controller option should also be used.

Ignore system alerts

Select this option to proceed with the software upgrade and ignore any system alerts. An upgrade of any type is blocked if there are any system alerts unless this option is turned on. This option may or may not affect data access, depending on the specific system alert.

Ignore current requests

Select this option to proceed with the software upgrade regardless of pending system requests. This option allows you to begin the upgrade even if there are blocking tasks running which are visible in the **Tasks** list. (A blocking task is a task that normally would be completed before a system restart.)

If a task is running that is modifying storage, host access, or system software, contact Oracle Customer Support before turning on this option. This option may or may not affect data access, depending on the specific task.

Override failed software update

Select this option to overwrite a previous, failed software update. Once an upgrade fails, that status is kept, and you can only clear it by selecting this option and having a successful upgrade. Do not use this option unless instructed to by Oracle Customer Support or described in the *Oracle FS1-2 Flash Storage System Release Notes*.

Schedule Software Update

Adds scheduling capabilities to the software update.

Schedule software update to occur at a later time	<p>Enables you to select the upgrade and options and schedule it for a later time. Lists any existing scheduled updates with the options listed.</p> <p>Note: The Schedule software update to occur at a later time option is only available to users logged in with administrator role; users logged in with support role cannot access this feature.</p>
Time to Perform Software Update	<p>Note: This option is displayed whether or not there is a scheduled update. If there is an existing schedule, then that schedule is displayed.</p> <p>Identifies the time at which the Oracle FS System starts a scheduled software update.</p> <p>Note: The pop-up calendar that is used to set the software update schedule is limited to the next 72-hours. Note that not all of the drop-down lists and other features of this calendar are functional. This behavior is normal.</p>

Software Update Validation Errors

The **Software Update Validation Errors** appears if the options you selected cause a conflict with existing software or hardware. If there are no conflicts, the **Software Update Validation Errors** is not displayed.

Information is provided why the update is not allowed but for guidance on how to resolve the issue, contact Oracle Customer Support or review the *Oracle FS1-2 Flash Storage System Release Notes*

Note: If there is an issue with a software update and the issues results in a validation error, the scheduled upgrade is blocked, and a system alert is also created.

Related Links

[Update the Oracle FS System Software](#)

Upgrade Paths From Installed Package Dialog

Navigation: Support > Software and Firmware > Actions > View Upgrade Paths from Installed Package

Displays the software updates that are installed. The information also indicates if the upgrades will cause Pilot or data disruption. If you want to upgrade a software update, you review this panel to verify which upgrades are installed.

Package Version	Indicates the version of the software package which is installed and the upgrade paths supported for this installed package.
------------------------	--

Pilot Disruption Required	Indicates if the upgrade may disrupt activities on the Pilot. If just restarting the Pilot, this would not affect data access unless the data disruption flag is also set.
Data Disruption Required	Indicates if the upgrade may disrupt data path. The field will display one of: <ul style="list-style-type: none"> • Yes: Indicates that the upgrade interrupts data access and the upgrade should be performed during a maintenance period. • No: Indicates that the software upgrade does not disrupt data access.
Pilot Software	Lists the version number.
Pilot OS	Lists the version number.
Controller Software	Indicates the supported software package to which you can upgrade.
Controller BIOS	Indicates the supported software package to which you can upgrade.
Drive Enclosure Firmware	Indicates the supported software package to which you can upgrade.

Related Links

[View the Upgrade Paths From the Installed Package](#)

Upgrade Paths to Staged Package Dialog

Navigation: Support > Software and Firmware > Actions > View Upgrade Paths to Staged Package

Displays staged software which is the last version of software you staged. The version could be lower or the version could be a non-software firmware only package. When you upload a software package, if the upload and the internal staging of the software by the system was successful, that version is listed here. That version is ready to be installed on the system from the **Update Software** panel. The information also indicates if the upgrade causes Pilot or data disruption.

Package Version	Indicates the version of the staged package and the upgrade paths to that package. This might not include the current installed package. Also the version of the staged package might not be available for installation if the compatibility matrix does not allow the upgrade due to hardware incompatibility.
Pilot Disruption Required	Indicates if the upgrade may disrupt activities on the Pilot. If just restarting the Pilot, this would not affect data access unless the data disruption flag is also set.
Data Disruption Required	Indicates if the upgrade may disrupt data path. The field will display one of:

- Yes: Indicates that the upgrade interrupts data access and the upgrade should be performed during a maintenance period.
- No: Indicates that the software upgrade does not disrupt data access.

Pilot Software	Lists the version number.
Pilot OS	Lists the version number.
Controller Software	Indicates the supported software package to which you can upgrade.
Controller BIOS	Indicates the supported software package to which you can upgrade.
Drive Enclosure Firmware	Indicates the supported software package to which you can upgrade.

Related Links

[*View the Upgrade Paths to the Staged Package*](#)

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