Unisphere and Unisphere Central 2019 R1

Administrator's Guide



Preface

About This Guide

This guide describes how to use Unisphere and Unisphere Central for SC Series to manage and monitor your storage infrastructure.

Revision History

Document number: 680-122-005

Revision	Date	Description
А	April 2019	Initial release
В	February 2020	Update for Unisphere 2019 R1.10
С	May 2020	Update space reporting descriptions

Audience

Storage administrators make up the target audience for this document. The intended reader has a working knowledge of storage and networking concepts.

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Unisphere Overview

Unisphere is a Web application that allows you to connect to a single Storage Center or multiple Storage Centers. Managing multiple Storage Centers requires the installation of a Data Collector. Unisphere allows you to monitor, manage, and analyze Storage Centers from a centralized management console.

- Unisphere for SC Series is used to connect directly to a single Storage Center.
- Unisphere Central for SC Series connects to multiple Storage Centers through a Storage Manager Data Collector. The Storage Manager Data Collector stores data it gathers from Storage Centers in a database. Unisphere Central connects to the Data Collector to perform monitoring and administrative tasks.

Topics:

- Unisphere Components
- Software and Hardware Requirements
- Default Ports Used by Unisphere Central
- IPv6 Support
- Unisphere Features

Unisphere Components

Unisphere and Unisphere Central consists of the following components:.

Table 1. Unisphere and Unisphere Central Components

Component	Description	Setup Documentation
Primary Storage Manager Data Collector	Service that gathers reporting data and alerts from managed storage systems.	Storage Manager Installation Guide
Unisphere Central for SC Series	Web interface that is displayed when connecting to the Storage Manager Data Collector. Unisphere Central for SC Series provides a centralized management interface for one or more Storage Centers.	Unisphere and Unisphere Central for SC Series Administrator's Guide
Unisphere for SC Series	Web interface that is displayed when connecting directly to a Storage Center. Unisphere for SC Series provides a management interface to the Storage Center.	Unisphere and Unisphere Central for SC Series Administrator's Guide
Remote Storage Manager Data Collector	A secondary Storage Manager Data Collector that is connected to the primary Storage Manager Data Collector. The remote Storage Manager Data Collector can be used to activate a disaster recovery site if the primary Storage Manager Data Collector becomes unavailable.	Storage Manager Installation Guide and Storage Manager Administrator's Guide
Storage Manager Server Agent	Software installed on a Windows server that enables the Storage Manager Data Collector to gather information about storage objects on a Windows server.	Storage Manager Administrator's Guide

Software and Hardware Requirements

The following sections list the requirements for the Storage Center, Storage Manager Data Collector, Unisphere, and Storage Manager Server Agent.

Storage Center OS Compatibility

Unisphere 2019 R1 is compatible with Storage Center OS versions 7.1 and later.

Data Collector Requirements

The following table lists the Storage Manager Data Collector requirements.

i NOTE: For best results, install the Data Collector on a Windows Server VM using a traditional volume source from shared storage. Do not use a VVol for the Windows Server VM on which the Data Collector is installed.

Component	Requirements
Operating system	 Any of the following 64-bit operating systems with the latest service packs: Windows Server 2012 R2 Windows Server 2016 Windows Server 2019
	i NOTE: Windows Server Core is not supported.
Windows User Group	Administrators
CPU	64-bit (x64) microprocessor with two or more cores
	The Data Collector requires a microprocessor with four cores for environments that have 100,000 or more Active Directory members or groups.
Memory	Varies based on size of the storage environment:
	 4 GB – One to ten Storage Centers, or up to 3000 total volumes 8 GB – More than ten Storage Centers, or up to 6000 total volumes 16 GB – More than ten Storage Centers, or up to 12,000 total volumes 32 GB – More than ten Storage Centers, or more than 12,000 total volumes
Disk space	At least 20 GB ; additional space is required to manage FluidFS cluster software updates. () NOTE: Using an embedded database requires an additional 64 GB to store the database on the file system. However, an embedded database is not recommended for a production environment.
Software	Microsoft .NET Framework 4.5 or later, full installation
Web browser	Any of the following web browsers:
	Google Chrome
	Internet Explorer 11
	NOZINA FIFETOX NOTE: Google Chrome is the recommended browser. Other web browsers might work but are not officially supported.
External database	One of the following databases:
	 Microsoft SQL Server 2016 Microsoft SQL Server 2016 Express (limited to 10 GB) Microsoft SQL Server 2017 Microsoft SQL Server 2017 Express (limited to 10 GB) MySQL 5.6 MySQL 5.7

Requirements

() NOTE: The embedded database stored on the file system can be used instead of an external database. However, the embedded database is limited to 64 GB and retains only the last 30 days of data. The embedded database is not recommended for a production environment.

Unisphere Web Browser Requirements

Unisphere is supported on the following web browsers:

- Google Chrome
- Internet Explorer 11
 - (i) NOTE: Unisphere might fail to function correctly if website caching is enabled in Internet Explorer 11. To disable website caching in Internet Explorer 11, open the Internet Options dialog box and click Settings in the Browsing history area to display the Website Data Settings dialog box. Then, select the Every time I visit the webpage radio button on the Temporary Internet Files tab and clear the Allow website caches and databases checkbox on the Caches and databases tab.
- Mozilla Firefox

(i) NOTE: Google Chrome is the recommended browser. Other web browsers might work but are not officially supported.

Server Agent Requirements

The following table lists the requirements for running the Storage Manager Server Agent on Windows servers.

Component	Requirements		
Operating system	Any of the following 64-bit operating systems with the latest service packs:		
	 Windows Server 2012 R2 (full or core installation) Windows Server 2016 Windows Server 2019 		
CPU	64-bit (x64) microprocessor		
Software	Microsoft .NET Framework 4.5 Full		

Default Ports Used by Unisphere Central

The Unisphere Central components use network connections to communicate with each other and with other network resources. The following tables list the default network ports used by the Storage Manager Data Collector, Unisphere Central for SC Series, and Storage Manager Server Agent. Many of the ports are configurable.

(i) NOTE: Some ports might not be needed for your configuration. For details, see the Purpose column in each table.

Data Collector Ports

The following tables list the default ports that are used by the Storage Manager Data Collector:

Inbound Data Collector Ports

i NOTE: Configure the firewall rules on the server that the Data Collector is installed to enable inbound connections on the inbound Data Collector ports.

The Data Collector accepts connections on the following ports:

Port	Protocol	Name	Purpose
3033	TCP	Web Server Port	Receiving:

Port	Protocol	Name	Purpose
			 Communication from clients, including the Unisphere Central for SC Series, Unisphere Central, and Dell Storage Replication Adapter (SRA)
			Communication with tiebreaker for Automatic FailoverAlerts from FluidFS clusters
3034	ТСР	Web Server Port	Receiving vCenter/ESXi communication for VASA and VVol provisioning and administration
8080	TCP	Legacy Web Services Port	Receiving:
			Storage Manager Server Agent communicationAlerts forwarded from Storage Center SANs
5989	TCP	SMI-S over HTTPS	Receiving encrypted SMI-S communication

Outbound Data Collector Ports

The Data Collector initiates connections to the following ports:

Port	Protocol	Name	Purpose
25	TCP	SMTP	Sending email notifications
443	TCP	SSL	 Communicating with the Storage Manager Data Collector Sending diagnostic data with SupportAssist
1199	TCP	SIMS RMI	Communicating with managed PS Series groups
1433	TCP	Microsoft SQL Server	Connecting to an external Microsoft SQL Server database
3033	TCP	SSL	Communicating with managed Storage Centers
3306	TCP	MySQL	Connecting to an external MySQL database
8080	TCP	VMware SDK	Communicating with VMware servers
27355	TCP	Server Agent Socket Listening Port	Storage Manager Server Agent communication
35451	TCP	FluidFS	Communicating with managed FluidFS clusters
44421	TCP	FluidFS diagnostics	Retrieving diagnostics from managed FluidFS clusters

Client Ports

Unisphere Central clients use the following ports:

Inbound Ports

Unisphere Central does not use any inbound ports.

Outbound Ports

Unisphere Central initiates connections to the following port:

Port	Protocol	Name	Purpose
3033	TCP	Web Server Port	Communicating with the Storage Manager Data Collector

Server Agent Ports

The following tables list the ports used by the Storage Manager Server Agent.

Inbound Server Agent Port

The Server Agent accepts connections on the following port.

Port	Protocol	Name	Purpose
27355	TCP	Server Agent Socket Listening Port	Receiving communication from the Data Collector

Outbound Server Agent Port

The Server Agent initiates connections to the following port.

Port	Protocol	Name	Purpose
8080	TCP	Legacy Web Services Port	Communicating with the Data Collector

IPv6 Support

The Storage Manager Data Collector can use IPv6 to accept connections from Unisphere and to communicate with managed Storage Center SANs.

To use IPv6, assign IPv6 addresses as described in the following table.

IPv6 Connection	Requirements
Unisphere to Data Collector	 Unisphere computer must have an IPv6 address. Data Collector server must have both an IPv4 address and an IPv6 address.
Data Collector to Storage Center	 Data Collector server must have both an IPv4 address and an IPv6 address.
	 Storage Center SAN must have both an IPv4 address and an IPv6 address on the management interface.

Unisphere Features

Unisphere provides the following features.

Storage Center Management

Unisphere allows you to centrally manage multiple Storage Centers. For each Storage Center, you can configure volumes, snapshot profiles, and storage profiles. You can also present configured storage to servers by defining server objects and mapping volumes to them.

Related concepts

Storage Center Administration

SMI-S

Unisphere Central supports the Storage Management Initiative Specification (SMI-S), a standard interface specification developed by the Storage Networking Industry Association (SNIA). SMI-S allows Unisphere Central to interoperate with storage management software and hardware from other vendors.

i NOTE: The Storage Manager Data Collector must be installed in a Microsoft Windows environment. SMI-S is not supported on a Virtual Appliance.

Log Monitoring

The Log Monitoring feature provides a centralized location to view Storage Center alerts, indications, and logs collected by the Storage Manager Data Collector and system events logged by Unisphere.

Related concepts

Storage Center Monitoring

Performance Monitoring

The Performance Monitoring feature provides access to summary information about the managed Storage Centers and historical/current I/O performance information. Use this information to monitor the health and status of Storage Centers.

Related concepts

Viewing Storage Center Information

Getting Started

To manage multiple Storage Centers, open a web browser and connect to the Data Collector.

To manage a single Storage Center, open a web browser and connect directly to the Storage Center.

Topics:

- Connect to Multiple Storage Centers Using Unisphere Central
- Connect Directly to a Storage Center Using Unisphere
- Next Steps

Connect to Multiple Storage Centers Using Unisphere Central

Start a web browser and use it to connect to the Data Collector.

About this task

By default, you can log on as a local Data Collector user. If the Data Collector is configured to use an external directory service, you can log on as an Active Directory or Open LDAP user. If Kerberos authentication is configured, you can log on automatically using your Windows session credentials without typing them manually.

Steps

- 1. Open a web browser.
- 2. Type the address of the Data Collector in the following format: https://Data Collector host name or IP address:3033/ui/home
- 3. Type the user name and password of a Data Collector user in the User Name and Password fields.
- 4. Click Log In.

The web browser connects to the Data Collector and displays the Unisphere Central **Home** page.

Connect Directly to a Storage Center Using Unisphere

Start a web browser and use it to connect directly to the Storage Center.

About this task

By default, you can log on as a local Storage Center user. If the Storage Center is configured to use an external directory service, you can log on as an Active Directory or Open LDAP user. If Kerberos authentication is configured, you can log on automatically using your Windows session credentials without typing them manually.

Steps

- 1. Open a web browser.
- 2. Type the address of the Storage Center in the following format:

https://Storage Center host name or IP address/

- 3. Type the user name and password of a Storage Center user in the User Name and Password fields.
- 4. Click Log In.

The web browser connects to the Storage Center and displays the Unisphere Summary page.

Next Steps

This section describes some basic tasks that you may want to perform after your first log on to Unisphere. These tasks are configuration dependent and not all tasks are required at all sites.

Add Unisphere Users

Depending on your configuration, you can add users to your system using the Data Collector or you can create local users on the Storage Center using Unisphere.

- Data Collector The Data Collector controls user access to Unisphere Central functions and associated Storage Centers based on the privileges assigned to users: Reporter, Volume Manager, or Administrator. New users and the associated Storage Centers are created and managed only by the Data Collector. If you want to grant Storage Centers access to other members of your organization, use Unisphere Central to grant them access using either of the following methods:
 - · Create local Data Collector users.
 - Configure the Data Collector to authenticate users using an external Active Directory or OpenLDAP directory service, and then grant access to specific directory users and/or user groups.
- Unisphere When connected directly to a Storage Center, use local user groups to control the storage objects that can be viewed by a Storage Center user. The privilege level of a Storage Center user controls what a user can do on a Storage Center.

Add Storage Centers

Add Storage Centers to the Data Collector so that they can be managed and maintained using Unisphere Central.

Related concepts

Adding and Organizing Storage Centers

Configure Storage Center Volumes

After you have added Storage Centers to the Data Collector or connected directly to a single Storage Center, you can create and manage volumes on the Storage Centers.

You can also manage snapshot profiles and storage profiles on the Storage Centers.

Related concepts

Managing Volumes Managing Snapshot Profiles

Add Servers to the Storage Centers

Use Unisphere to add servers that use Storage Center volumes to the associated Storage Centers.

Related concepts

Storage Center Server Administration

Configure Email Notifications

The Data Collector can send emails to notify you when alerts occur and automated reports are ready. To enable email notifications, configure the SMTP settings on the Data Collector and add an email address to your user account on the Data Collector.

Related concepts

Configuring Email Alerts for Unisphere Central Events

Storage Center Overview

Storage Center Hardware Components

Storage Center consists of one or two controllers, switches, and might include one or more disk enclosures.

Controllers

A Storage Center controller provides the central processing capability for the Storage Center Operating System and managing RAID storage. A Storage Center is typically configured with a pair of controllers. In a dual-controller Storage Center configuration, the two controllers must be the same model.

I/O cards in the controller provide communication with disk enclosures and servers that use the storage. Controllers provide two types of I/O ports:

- Front-end ports Hosts, servers, or Network Attached Storage (NAS) appliances access storage by connecting to controller Fibre Channel I/O cards, FCoE I/O cards, or iSCSI I/O through one or more network switches. Some storage systems contain SAS ports that are designated as front-end ports, which can be connected directly to a server. Ports for front-end connections are located on the back of the controller, but are configured as front-end ports.
- Back-end ports Enclosures, which hold the physical drives that provide back-end storage, connect directly to the controller. Fibre
 Channel and SAS transports are supported through ports designated as back-end ports. Back-end ports are in their own private
 network between the controllers and the drive enclosures.

Switches

Switches provide robust connectivity to servers, allowing for the use of multiple controllers and redundant transport paths. Cabling between controller I/O cards, switches, and servers is referred to as front-end connectivity.

Enclosures

Enclosures house and control drives that provide storage. Enclosures are connected directly to controller I/O cards. These connections are referred to as back-end connectivity.

Fibre Channel Switched Bunch of Disks (SBOD) and Serial Advanced Technology Attachment (SATA) enclosures are supported for existing Storage Centers and for controller migrations only.

How Storage Virtualization Works

Storage Center virtualizes storage by grouping disks into pools of storage called Storage Types, which hold small chunks (pages) of data. Block-level storage is allocated for use by defining volumes and mapping them to servers. The storage type and storage profile associated with the volume determines how a volume uses storage.

Storage Center combines the following features to provide virtualized storage.

- Volumes Allocate storage for use.
- Storage Types Define a datapage size and redundancy levels for the disk folder.
- Data Progression Moves pages between tiers and drive types, as well as among multiple RAID levels within the same tier.
- Storage Profiles Define how data progression moves pages between tiers.

Volumes

A Storage Center volume is a logical unit of storage that can represent more logical space than is physically available on the Storage Center. Before data can be written to a volume, it must be mapped to a server, then formatted as a drive. Depending on the configuration of the server, data can be written to the volume over iSCSI, Fibre Channel, or SAS.

The storage type and storage profile selected when the volume is created determines how a volume behaves. The storage type sets the datapage size and redundancy levels. The storage profile determines how data progression moves pages on the volume between tiers and RAID levels.

Storage Types

A Storage Type is a pool of storage with a single datapage size and specified redundancy levels. Storage Center assesses the disks available in a disk folder and presents the applicable storage type options. Once the selection is made, it cannot be changed without assistance from technical support, even when disk types change.

() NOTE: SCv2000 series storage systems manage storage types automatically by assigning each disk class to a new storage type. SSD storage types have a 512 K datapage size and HDD storage types have a 2 MB datapage size. These Storage Types cannot be modified and non-redundant storage types are not allowed.

Disk Types

The type of disks present in a Storage Center determines how Data Progression moves data between tiers. Storage Center supports write-intensive SSDs, and 7K, 10K, and 15K HDDs. A minimum number of disks are required, which may be installed in the controller or in an expansion enclosure:

- An all-flash array requires a minimum of four SSDs of the same disk class, for example four write-intensive SSDs.
- A hybrid array requires a minimum of seven HDDs or four SSDs of the same disk class, for example seven 10K HDDs.

Datapage Size

By default, data is migrated between tiers and RAID levels in 2 MB blocks. Data can be moved in smaller or larger blocks to meet specific application requirements. These blocks are referred to as datapages.

- **2 MB** Default datapage size, this selection is appropriate for most applications.
- 512 KB Appropriate for applications with high performance needs, or in environments in which snapshots are taken frequently under heavy I/O. Selecting this size increases overhead and reduces the maximum available space in the storage type. All-flash storage systems use 512 KB by default.
 - 4 MB Appropriate for systems that use a large amount of disk space with infrequent snapshots.
 - CAUTION: Before changing the datapage setting, contact technical support to discuss the impact on performance and for advice about how to ensure that system resources remain balanced.

Redundancy

Redundancy provides fault tolerance for a drive failure. Two redundancy options are available.

• Redundant: Protects against the loss of any one drive (if single redundant) or any two drives (if dual redundant).

Non-Redundant: Uses RAID 0 in all classes, in all tiers. Data is striped but provides no redundancy. If one drive fails, all data is lost.

NOTE: Non-Redundant is not recommended because data is not protected against a drive failure. Do not use non-redundant storage for a volume unless the data has been backed up elsewhere.

Redundancy levels per tier include single or dual redundant. The options may be restricted depending on the disk size.

Single Redundant: Single-redundant tiers can contain any of the following types of RAID storage:

- RAID 10 (each drive is mirrored)
- RAID 5-5 (striped across 5 drives)
- RAID 5-9 (striped across 9 drives)
- **Dual redundant**: Dual redundant is the recommended redundancy level for all tiers. It is enforced for 3 TB HDDs and higher and for 18 TB SSDs and higher. Dual-redundant tiers can contain any of the following types of RAID storage:
- · RAID 10 Dual-Mirror (data is written simultaneously to three separate drives)
- RAID 6-6 (4 data segments, 2 parity segments for each stripe)
- RAID 6-10 (8 data segments, 2 parity segments for each stripe.)

Redundancy Requirements

Drive size is used to determine the redundancy level to apply to a tier of drives. If any drive in a tier surpasses a threshold size, a specific redundancy level can be applied to the tier containing that drive. If a redundancy level is required, the Storage Center operating system sets the level and it cannot be changed.

Table 2. HDD Redundancy Recommendations and Requirements

Disk Size	Level of Redundancy Recommended or Enforced
Up to 3 TB	Dual redundant is the recommended level i NOTE: Non-redundant storage is not an option for SCv2000 Series storage systems.
3 TB and higher	Dual redundant is required and enforced
Table 3. SSD Redundancy Reco	ommendations and Requirements
Disk Size	Level of Redundancy Recommended or Enforced
Up to 18 TB	Dual redundant is the recommended level i NOTE: Non-redundant storage is not an option for SCv2000 Series storage systems.
18 TB and higher	Dual redundant is required and enforced

Disk Management

Storage Center manages both physical disks and the data movement within the virtual disk pool. Disks are organized physically, logically, and virtually.

- Physically Disks are grouped by the enclosure in which they reside, as shown in the Enclosures folder.
- Logically Disks are grouped by class in disk folders. Storage Center enclosures may contain any combination of disk classes.
- Virtually All disk space is allocated into tiers. The fastest disks reside in Tier 1 and slower drives with lower performance reside in Tier 3. Data that is accessed frequently remains in Tier 1, and data that has not been accessed for the last 12 progression cycles is gradually migrated to Tiers 2 and 3. Data is promoted to a higher tier after three days of consistent activity. Disk tiering is shown when you select a Storage Type.

For SCv3000, SC5020, and SC7020 storage systems, Storage Center uses the Automatic Drive Placement function to manage drives automatically. When configuring a storage system, Storage Center manages the disks into folders based on function of the disk. FIPS-certified Self-Encrypting Drives (SEDs) are managed into a separate folder than other disks. When Storage Center detects new disks, it manages the disk into the appropriate folder.

In Storage Center version 7.3 and later, the Automatic Drive Placement function can be turned on or off for all Storage Centers (except SCv2000 series storage systems) using the Storage Center Storage settings.

Disk Management on SCv2000 series Storage Systems

Storage Centers with SCv2000 series storage systems manage disks automatically, limiting the disk management options. After adding disks, Storage Center recognizes the new disks, creates a new disk folder if necessary, then manages the disks in the disk folder. If a disk is intentionally down for testing purposes, then is deleted, you can restore the disk to manage the disk again in a disk folder.

The following disk management options are not available for SCv2000 series storage systems:

- Creating disk folders
- Adding disks to disk folders
- Managing disk spares

Disk Folders

A disk folder contains both managed drives and spare disk space. Managed drives are used for data storage. Spare disk space is held in reserve to automatically replace a drive if a drive fails. By default, the **Assigned** disk folder is the parent disk folder for all drives. Drives are further grouped by class in subordinate folders.

Disk Classes

Disks are classified based on their performance characteristics. Each class is shown in a separate folder within the Assigned disk folder.

- Hard Disk Drives (HDDs) For HDDs, the disk classification describes its spindle speed and can be any of three disk types.
 - 7K (RPM)
 - 10K (RPM)
 - 15K (RPM)
- Solid State Drives (SSDs) SSDs are differentiated by read or write optimization.
 - Write-intensive (SLC SSD)
 - Read-intensive (MLC SSD)

Drive Spares

Drive spares are drives or drive space reserved by the Storage Center to compensate for a failed drive. When a drive fails, Storage Center restripes the data across the remaining drives.

Distributed Sparing

When updating to Storage Center version 7.3, a banner message prompts you to optimize disks. Clicking the link guides you through the process of optimizing disks for Distributed Sparing. When disks are optimized, spare disk space is distributed across all drives in a drive folder and is designated as Spare Space. This allows the system to use all disks in a balanced and optimized manner, and ensures the fastest recovery time following a disk failure. Distributed Sparing is the default for systems shipping with Storage Center version 7.3.

Reserved Spare Drive

Prior to Storage Center version 7.3, a spare drive is used as a replacement for the failed drive. Storage Center designates at least one drive spare for each disk class. Storage Center groups drives into groups of no more than 21 drives, with one drive in each group designated as a spare drive. For example, a disk class containing 21 drives will have 20 managed drives and one spare drive. A disk class with 22 drives will have 20 managed drives and two spare drives. Storage Center designates the one additional drive as a spare drive. Storage Center designates the largest drives in the disk class as spare drives.

When Storage Center consumes a spare drive, a feature called Drive Spare Rightsizing allows Storage Center to modify the size of a larger capacity spare drive to match the capacity of the drive being replaced in the tier. After modifying the size of the drive in this manner, it cannot be modified to its original size. Drive Spare Rightsizing is enabled by default for all controllers running Storage Center version 7.2 beginning with version 7.2.11. It allows Technical Support to dispatch larger capacity drives of the same disk class when the same size drive is not available, providing faster delivery times.

Data Progression

Storage Center uses Data Progression to move data within a virtualized storage environment. Data Progression moves data between tiers and drive types, as well as among multiple RAID levels within the same tier, for a constant balance of performance and cost.

How Data Progression Works

Once every 24 hours, Storage Center assesses disk use and moves data to disk space that is more efficient for the data usage. By default, Data Progression runs each day at 7 PM system time, but the timing of the run can be changed in the Storage Center settings. Data Progression behavior is determined by the storage profile applied to each volume. Data progression runs until it completes or reaches the maximum run time.

i NOTE: On SCv2000 series storage systems, Data Progression moves data between RAID 10 and RAID 5/6 and restripes RAID, but it does not move data between storage tiers.

Data Progression and Snapshots

Storage Center also uses Data Progression to move snapshots. When a snapshot is created, either as scheduled or manually, the data is frozen and moved to the tier specified by the storage profile to hold snapshots.

Snapshots can occur as a scheduled event according to the snapshot profile, manually by creating a snapshot, or on demand by Storage Center to move data off of Tier 1 in a flash-optimized storage type.

Low Space Modes

A Storage Center enters Conservation mode when free space becomes critically low, and enters Emergency mode when the system can no longer write to the disks because there is not enough free space.

Prior to entering Conservation mode, the Storage Center displays alerts indicating that disk space is running low. The alert reflects the amount of space left, beginning with 10%, before the system stops operating. The alert updates each time the remaining space decreases by 1%.

Conservation Mode

A Storage Center enters Conservation mode when free space becomes critically low. Immediate action is necessary to avoid entering Emergency mode.

i NOTE: Because of Conservation mode's proximity to the emergency threshold, do not use it as a tool to manage storage or to plan adding disks to the Storage Center.

In Conservation mode, Unisphere responds with the following actions:

- · Generates a Conservation mode alert.
- · Prevents new volume creation.
- Expires snapshots at a faster rate than normal (Storage Center version 7.2 and earlier).

Emergency Mode

Storage Center enters Emergency mode when the system can no longer operate because it does not have enough free space.

In Emergency mode, Storage Center responds with the following actions:

- · Generates an Emergency Mode alert.
- · Expires snapshots at a faster rate than normal (Storage Center version 7.2 and earlier)
- · Prevents new volume creation.
- · Volumes become either inaccessible or read-only.
- Prevents restart or shutdown operation

CAUTION: Do not turn off the storage controllers in emergency mode. Contact technical support for assistance in recovering from Emergency mode.

CAUTION: Because Emergency mode prevents all server I/O, Emergency mode is service affecting. Administrators must take special care to continually monitor free space on the Storage Center and add or free up space as needed to avoid reaching the Emergency mode threshold.

Troubleshoot Conservation or Emergency Mode

To resolve Conservation or Emergency mode, reclaim consumed disk space.

About this task

Perform each step, then wait a few minutes and check available disk space.

Steps

- 1. Delete any unnecessary volumes and then empty the recycle bin.
- 2. Expire unnecessary snapshots.

Next steps

If these steps do not resolve Conservation or Emergency mode, contact technical support.

Preventing Low Space Modes

Manage disk space to prevent a Storage Center from entering Conservation or Emergency mode.

Prevent low space issues using these tips:

- Empty the recycle bin regularly.
- · Lower the frequency of snapshots or set snapshots to expire earlier.

- Change the storage profile to a more space-efficient profile. Available profiles might include Low Priority (Tier 3) and Maximize Efficiency.
- · Configure a threshold definition to create an alert when space starts to get low.
- · Migrate volumes from a pagepool with a full tier to a different pagepool with more free space.
- Delete unnecessary volumes.
- · If Data Reduction is licensed, enable Compression or Deduplication with Compression on some volumes.

Storage Profiles

Storage profiles control how Storage Center manages volume data. For a given volume, the selected storage profile dictates which disk tier accepts initial writes, as well as how data progression moves data between tiers to balance performance and cost. Predefined storage profiles are the most effective way to manage data in Storage Center. The storage profiles available are determined by the storage type.

Storage Profiles for Standard Storage Types

The table below summarizes the storage profiles available for standard storage types. Each profile is described in more detail following the table.

Name	Initial Write Tier	Tier (T) and RAID Levels	Progression
Recommended (All Tiers)	1	Writes: T1 RAID 10 Snapshots: RAID 5/RAID 6	Yes - to all Tiers
High Priority (Tier 1)	1	Writes: T1 RAID 10 Snapshots: T1 RAID 5/RAID 6	No
Medium Priority (Tier 2)	2	Writes: T2 RAID 10 Snapshots: T2 RAID 5/RAID 6	No
Low Priority (Tier 3)	3	Writes: T3 RAID 10 Snapshots:	No

i NOTE: The Recommended, High Priority, and Medium Priority profiles are not available for the Flash Optimized storage type.

Recommended (All Tiers)

The Recommended storage profile is available only when data progression is licensed. Cost and performance are optimized when all volumes use the Recommended storage profile. The Recommended profile allows automatic data progression between and across all storage tiers based on data type and usage.

When a volume uses the Recommended profile, all new data is written to Tier 1 RAID level 10 storage. Data progression moves less active data to Tier 1 RAID 5/ RAID 6 or a slower tier based on how frequently the data is accessed. In this way, the most active blocks of data remain on high-performance drives, while less active blocks automatically move to lower-cost, high-capacity SAS drives.

Because SSDs are automatically assigned to Storage Tier 1, profiles that include Storage Tier 1 allow volumes to use SSD storage. If you have volumes that contain data that is not accessed frequently, and do not require the performance of Tier 1 SSDs, use a Medium or Low Priority profile or create and apply a new profile that does not include Storage Tier 1.

High Priority (Tier 1)

The High Priority storage profile provides the highest performance by storing data on Tier 1. It is efficient in terms of using RAID 5 or 6, but it uses more expensive media to store the data. A volume created using the High Priority profile stores written data on Tier 1 RAID 10. Snapshot data is stored on Tier 1 RAID 5/RAID 6. Storage Center does not migrate data to lower storage tiers unless Tier 1 storage becomes full.

If data progression is not licensed, the default storage profile is High Priority. Without data progression, you must configure volumes to use a specific tier of storage, because data will not migrate between tiers.

Medium Priority (Tier 2)

The Medium Priority storage profile provides a balance between performance and cost efficiency. A volume created using the Medium Priority profile stores written data on Tier 2 RAID 10. Snapshot data is stored on Tier 2 RAID 5/RAID 6. Storage Center does not migrate data to other storage tiers unless Tier 2 storage becomes full.

Low Priority (Tier 3)

The Low Priority profile provides the most cost efficient storage. Creating a volume using the Low Priority profile stores written data on Tier 3 RAID 10. Snapshot data is stored on Tier 3 RAID 5/6. Storage Center does not migrate data to higher tiers of storage unless Tier 3 storage becomes full.

Storage Profiles for Flash-Optimized Storage

The table below summarizes storage profiles available for flash-optimized storage types. Each profile is described in more detail following the table.

Name	Initial Write Tier	Tier (T) and RAID Levels	Progression
Low Priority (Tier 3)	3	Writes: T3 RAID 10 snapshots: T3 RAID 5/6	No
Flash Optimized with Progression (Tier 1 to All Tiers)	1	Writes: T1 RAID 10 snapshots: T2/T3 RAID 5/6	Yes to all tiers
Write Intensive (Tier 1)	1	Writes: T1 RAID 10 snapshots: T1 RAID 10	No
Flash Only with Progression (Tier 1 to Tier 2)	1	Writes: T1 RAID 10 snapshots: T2 RAID 5	Yes to Tier 2 only
Low Priority with Progression (Tier 3 to Tier 2)	3	Writes: T3 RAID 10 snapshots: T3 RAID 5/6 or T2 RAID 5	Yes to Tier 2 only

Low Priority (Tier 3)

The Low Priority profile provides the most cost efficient storage. Creating a volume using the Low Priority profile stores written data on Tier 3 RAID 10. Snapshot data is stored on Tier 3 RAID 5/6. Storage Center does not migrate data to higher tiers of storage unless Tier 3 storage becomes full.

Flash-Optimized with Progression (Tier 1 to All Tiers)

The Flash Optimized with Progression storage profile provides the most efficient storage for an enclosure containing both read-intensive and write-intensive SSDs. When a storage type uses this profile, all new data is written to write-intensive Tier 1 drives. Snapshot data is moved to Tier 2, and less-active data progresses to Tier 3.

If Tier 1 fills to within 95% of capacity, Storage Center creates a space-management snapshot and moves it immediately to Tier 2 to free up space on Tier 1. The space-management snapshot is moved immediately and does not wait for a scheduled data progression. Spacemanagement snapshots are marked as Created On Demand and cannot be modified manually or used to create View volumes. Spacemanagement snapshots coalesce into the next scheduled or manual snapshot. Storage Center creates only one on demand snapshot per volume at a time.

Write-Intensive (Tier 1)

The Write-Intensive storage profile directs all initial writes to write-intensive SSDs on Tier 1 (RAID 10). The data does not progress to any other tier. This profile is useful for storing transaction logs and temporary database files.

Flash Only with Progression (Tier 1 to Tier 2)

The Flash Only with Progression storage profile performs initial writes on high-performance Tier 1 drives. Less active data progresses to Tier 2, but remains on SSDs. This profile is useful for storing volumes with data that requires optimal read performance, such as golden images, linked clones, and some databases.

Low Priority with Progression (Tier 3 to Tier 2)

The Low Priority with Progression storage profile directs initial writes to less expensive Tier 3 (RAID 10) drives, and then allows frequently accessed data to progress to Tier 2. This profile is useful for migrating large amounts of data to Storage Center without overloading Tier 1 SSDs.

Storage Virtualization for SCv2000 Series Storage Systems

SCv2000 series storage systems automatically manage many of the storage virtualization options.

Disk Management on SCv2000 Series Storage Systems

SCv2000 series storage systems manage disks automatically, limiting the disk management options. After adding disks, Storage Center recognizes the new disks, creates a new disk folder if necessary, then manages the disks in the disk folder. If a disk is intentionally down for testing purposes, then is deleted, you can restore the disk to manage the disk again in a disk folder.

The following disk management options are not available for SCv2000 series storage systems:

- Creating disk folders
- Adding disks to disk folders
- · Managing disk spares

Storage Types for SCv2000 Series Storage Systems

SCv2000 series controllers create a storage type for each disk class, and manage storage types automatically.

SCv2000 series series storage systems manage storage types automatically in the following ways:

- · Storage types are created automatically for each disk class
- Storage types have a 2MB page size for HDD folders and a 512 KB page size for SSD folders
- · Storage types cannot be modified
- · Non-redundant storage types are not allowed

RAID Tiering for SCv2000 Series Storage Systems

RAID tiering for SCv2000 series storage systems moves data between RAID 10 and RAID 5/6, but it does not move data between storage tiers.

Storage Profiles for SCv2000 Series Storage Systems

The following table summarizes the storage profiles available to SCv2000 series storage systems:

Name	Initial Write Tier	Tier (T) and RAID Levels	RAID Tiering
Balanced	1	Writes: T1 RAID 10	Between RAID types only
		Snapshots: T1 RAID 5/6	
Maximize Performance	1	Writes: T1 RAID 10	No
		Snapshots: T1 RAID 10	
Maximize Efficiency	1	Writes: T1 RAID 5/6	No
		Snapshots: T1 RAID 5/6	

Balanced

The Balanced storage profile balances efficiency and performance for any volume using that storage profile.

When a volume uses the Balanced storage profile, all new data is written to RAID 10. When Storage Center creates a snapshot, Data Progression moves snapshot data from RAID 10 to RAID 5/6.

Maximize Performance

Maximize Performance keeps new data and snapshot data on RAID 10 to increase performance. Maximize Performance is useful for volumes with important and frequently used data.

Maximize Efficiency

Maximize Efficiency writes new data to RAID 5/6 and keeps snapshot data on RAID 5/6. Use Maximize Efficiency for volumes with less-important data and infrequently used data.

User Interface for Storage Center Management

The user interface varies depending on whether you connect directly to a Storage Center or connect through a Data Collector.

Unisphere Views

The following Unisphere views are displayed when you connect a web browser to a Storage Center.

Summary View

The Summary view is a dashboard that displays summarized information about the Storage Center.





Storage Menu

- Volumes view Used to create and manage volumes and volume folders on the selected Storage Center.
- Servers view Used to create and manage server mappings to the selected Storage Center.
- Profiles view Used to view, modify, and create snapshot, storage, and QoS profiles for the selected Storage Center and apply them to selected volumes. QoS profile management is only available if it is enabled in the Storage Center settings.
- Disks view Used to view and manage disks and disk folders, including rebalancing RAID and scanning for new disks.
- Storage Types view Use this page to view information about current type usage, and add or edit types for the Storage Center.

System Menu

- · Hardware view Used to view hardware status and cabling information, and to configure or modify hardware settings.
- Ports view Used to view status and configuration information about controller ports and fault domains.

Data Mobility Menu

- Imports view Used to create and view Remote iSCSI connections to storage controllers for which you have access. This view also allows you to locate and import data from external devices.
- Bandwidth Controls view Used to define I/O priority.

Monitoring Menu

- Alerts view Used to view and acknowledge alerts that have been issued for the Storage Center.
- Logs view Used to view logs sent from the Storage Center.
- Thresholds view Used to view I/O usage and storage threshold alerts for the Storage Center.
- Performance view Used to view the historical I/O performance statistics for the selected Storage Center and associated storage objects.
- Growth view Used to view growth charts for storage objects on the Storage Center.

Reports Menu

Contains the Realtime view used to view current volume status and statistics.

Unisphere Central Pages and Views

The following Unisphere Central pages and views are displayed when you connect a web browser to a Data Collector:

Home Page

The Home page is a dashboard that displays information about the Storage Centers managed by the Data Collector.



Figure 2. Home Page Dashboard

Storage

The following views are accessible under the Storage menu:

- Storage Centers view Used to view the status of the Storage Centers managed by the Data Collector.
- Volumes view Used to view and create volumes on the Storage Centers managed by the Data Collector.

Data Mobility

The following views are accessible under the Data Mobility menu:

- Imports view Used to view and create connections to external devices that are connected to the Storage Centers managed by the Data Collector.
- Bandwidth Controls view Used to view and create I/O bandwidth controls on the Storage Centers managed by the Data Collector.

Monitoring

The following views are accessible under the Monitoring menu:

- Alerts view Used to view and acknowledge alerts that have been issued for Storage Centers or the Data Collector.
- Logs view Used to view and export logs that are sent from the Storage Centers managed by the Data Collector.
- **Thresholds** view Used to view thresholds alerts, create threshold definitions, and create threshold queries for Storage Centers managed by the Data Collector.

Reports

The following view is accessible under the Reports menu:

• Historical view – Used to view and generate historical reports for the Storage Centers managed by the Data Collector.

Data Collector

The Data Collector view provides access to all Data Collector management options, including system-wide user access, SupportAssist and data collection options, and other overall system functions.

Storage Center Deployment

Use the Initialize Storage Center wizard in Unisphere Central to discover and configure Storage Centers.

If you do not have access to Unisphere Central, use the Unisphere Discovery Utility to discover and configure Storage Centers.

Topics:

- Initialize a Storage Center
- Unisphere Discovery Utility

Initialize a Storage Center

Use the Initialize Storage Center wizard to discover and deploy unconfigured Storage Centers.

Open the Initialize Storage Center Wizard

Perform the following steps to open the Initialize Storage Center wizard.

Steps

- To access the Initialize Storage Center wizard from the Data Collector:
 - a) Open a web browser.
 - b) Type the address of the Data Collector in the browser using the following format: https://Data Collector host name or IP address:3033/

(i) NOTE: The computer accessing the Data Collector must be on the same subnet as the Data Collector.

- c) Type the user name and password of a Data Collector user in the User Name and Password fields.
- d) Click Log In.

The web browser connects to the Data Collector and displays the Unisphere Central **Home** page.

e) From the Unisphere Central Home page, click + (New), and select Initialize Storage Center. The Initialize Storage Center wizard opens and the Introduction page is displayed.

If the Storage Center is installed on a network with DHCP enabled, you can access the Initialize Storage Center wizard by connecting directly to a Storage Center.

- a) Open a web browser.
- b) Type the service tag or IP address of the Storage Center in the browser using the following format: https://Storage Center service tag or IP address/
- c) Type Admin in the User Name field.
- d) Type mmm in the **Password** field.
- e) Click Log In.

The web browser connects to the Storage Center and the Change Password dialog box is displayed in the Unisphere interface.

- f) Type mmm in the **Current Password** field.
- g) Type a new password for the Admin user in the New Password and Confirm New Password fields.
- h) Click OK.

The Initialize Storage Center wizard opens and the Welcome page is displayed.

If you do not have access to a Data Collector and you are unable to connect directly to a Storage Center, use the Unisphere Discovery Utility to discover and initialize a Storage Center.

Install Tab

Use the Install tab to configure the management network and security settings on a Storage Center.

Connected to the Initialize Storage Center Wizard on the Data Collector

- Discover Storage Centers
- Welcome to the Storage Center
- Configure the Management Network Settings
- Set a Password
- Confirm the Storage Center Configuration
- Complete the Installation

Connected to the Initialize Storage Center Wizard on the Storage Center

- Welcome to the Storage Center
- Configure the Management Network Settings
- (SC9000 only) Create a Disk Folder

Introduction to Storage Center Initial Configuration

The Storage Center Initial Configuration page provides a list of prerequisite actions that must be performed and information that is required to configure a Storage Center.

Steps

- 1. Make sure the prerequisites that are listed on the Storage Center Initial Configuration page are met.
- 2. Make sure the information that is required to configure the Storage Center is gathered.
- 3. Click Next. The Discover Storage Centers page is displayed and it lists the unconfigured Storage Centers.
 - () NOTE: If the wizard does not discover the Storage Center that you want to configure, perform the following actions:
 - Make sure that the Storage Center hardware is physically attached to all necessary networks.
 - Click C (Refresh) to rediscover the unconfigured Storage Centers.

Discover Storage Centers

Use the Discover Storage Centers page to select the Storage Center to initialize .

Steps

- 1. (Optional) To refresh the list of unconfigured Storage Centers, click C (Refresh).
- 2. Select the Storage Center to initialize.
- **3.** (Optional) To blink the indicator light on the front of the selected Storage Center, click **Enable Indicator Light**. You can use the indicator light to visually verify that you have selected the correct Storage Center.
- 4. To view the drives detected by the selected Storage Center, click View Disks.
- 5. If the selected Storage Center is partially initialized and security is enabled:
 - a) Click **Provide Password**. The **Provide Password** dialog box opens.
 - b) Type the password for the Storage Center Admin user in the **Password** field.

i NOTE: The default password for the Storage Center Admin user is mmm.

6. Click Next.

Welcome to the Storage Center

Use the Welcome page to specify a name for the Storage Center and view the End User License Agreement.

Steps

- 1. Type a name for the Storage Center in the Name field.
- 2. Verify that the service tag or serial number that are displayed on the Welcome page match the Storage Center to initialize.
- 3. Select the language of the End User License Agreement to view from the drop-down menu, and click **Terms of Use** to open the agreement.
- 4. To authorize the installation of the Storage Center, type the customer name and title in the **Approving Customer Name** and **Approving Customer Title** fields.
 - i NOTE: The Approving Customer Name and Approving Customer Title fields are not displayed for SCv3000 series storage systems.
- 5. Click Next.

Configure the Management Network Settings

Use the Management Network page to configure the management network settings for the Storage Center.

Steps

- 1. Select how to configure the management network from the Network Configuration Source drop-down menu.
 - **DHCP IPv4 Only** IP addresses are dynamically assigned.
 - Static IP addresses must be specified manually.
- 2. If the network configuration source is set to Static, specify the management network settings in the following fields:

Management IPv4 Settings

- a) Type the IPv4 management address for the Storage Center in the Virtual Address field. The IPv4 management address is the IP address that is used to manage the Storage Center and it is different than the IPv4 management address of the storage controllers.
- b) Type a IPv4 management address for each storage controller in the associated fields.
- c) Type the IPv4 subnet mask of the management network in the Subnet Mask field.
- d) Type the IPv4 gateway address of the management network in the Gateway Address field.

(Optional) Management IPv6 Settings

- a) Type the IPv6 management address for the Storage Center in the Virtual Address field. The IPv6 management address is the IP address that is used to manage the Storage Center and it is different than the IPv6 management address of the storage controllers.
- b) Type a IPv6 management address for each storage controller in the associated fields.
- c) Type the IPv6 address prefix in the **Prefix** field.
- d) Type the IPv6 gateway address the **Gateway Address** field.

Network Settings

- a) Type the domain name of the management network in the Domain Name field.
- b) Type the DNS server addresses of the management network in the DNS Server and Secondary DNS Server fields.
- c) (Optional) Type a secondary DNS server addresses of the management network in the Secondary DNS Server fields.

3. Click Next.

(SC9000 only) Create a Disk Folder

Create a disk folder to manage unassigned disks.

Steps

- 1. Type a name for the disk folder.
- 2. (Optional) To create a secure disk folder, select the Create as a Secure Data Folder checkbox.

i NOTE: This option is available only if all drives support Secure Data.

- 3. Select the drives to assign to the disk folder.
- 4. Click Finish.

Set a Password

Use the Security page to set a password for the Storage Center Admin user.

Steps

- 1. Type a password for the Storage Center Admin user in the New Password field.
- 2. Retype the password for the Storage Center Admin user in the Confirm Password field.
- 3. Click Next.

Confirm the Storage Center Configuration

Make sure that the configuration information shown on the Summary page is correct before continuing. If you selected DHCP IPv4 as the network configuration source, the dynamically assigned IP addresses are displayed on this page.

Steps

- 1. Verify that the Storage Center settings are correct.
- 2. If the configuration information is correct, click Next.

If the configuration information is incorrect, click **Back** and provide the correct information.

i NOTE: After you click the Next button, the configuration cannot be changed until after the Storage Center is fully deployed.

Complete the Installation

Use the Installation Complete page to connect to the Storage Center after the settings on the Summary page are applied to the Storage Center.

Steps

Click Finish.

The **Configure** tab of the Initialize Storage Center wizard is displayed.

Configure Tab

Use the Configure tab to deploy the Storage Center and configure additional Storage Center settings.

- Deploy the Storage Center
- Enter Key Management Server Settings
- Create a Storage Type
- Select the Types of Ports to Configure
- Configure Time Settings
- Configure SMTP Server Settings

Deploy the Storage Center

The Initialize Storage Center wizard performs system deployment tasks.

Steps

- 1. (SC9000 only) To add a second controller to the storage system:
 - a) Select the Add Second Controller check box.
 - b) Type the hardware serial number of the second controller in the New Controller HSN field.
 - c) Type the IPv4 adddress for the management port on the second controller in the Eth0 IPv4 Address field.
 - d) Type the IPv4 address for the Eth1 port on the second controller in the Eth1 IPv4 Address field.
 - e) Type IPv6 address for the management port on the second controller in the Eth0 IPv6 Address field.
 - f) Type the IPv6 subnet prefix for the management port on the second controller in the Eth0 IPv6 Prefix field.
 - g) Click Start Deployment.
- 2. Wait until all of the Storage Center deployment tasks are complete.
- 3. Click Next.

Enter Key Management Server Settings

Specify key management server settings, such as hostname and port.

Steps

- 1. In the **Hostname** field, type the host name or IP address of the key management server.
- 2. In the Port field, type the number of a port with open communication with the key management server.
- 3. In the **Timeout** field, type the amount of time in seconds after which the Storage Center should stop attempting to reconnect to the key management server after a failure.
- 4. To add alternate key management servers, type the host name or IP address of another key management server in the Alternate Hostnames area, and then click Add.
- 5. If the key management server requires a user name to validate the Storage Center certificate, enter the name in the Username field.
- 6. If the key management server requires a password to validate the Storage Center certificate, enter the password in the **Password** field.
- 7. Click Browse next to the Root CA Certificate. Navigate to the location of the root CA certificate on your computer and select it.
- 8. Click **Browse** next to the certificate fields for the controllers. Navigate to the location of the controller certificates on your computer and select them.
- 9. Click Next.

Create a Storage Type

Use the New Storage Type page to create a storage type for the Storage Center.

Steps

- 1. (Optional) To create the storage type after the initial configuration, clear the Create a storage type checkbox.
- 2. Select the redundancy level for the storage type.
- 3. Select the page size for the storage type from the Page Size drop-down menu.
- 4. Select the redundancy level for each tier from the Tier drop-down menus.

i NOTE: Dual redundancy may be forced for a tier based on the drive sizes occupying the tier.

5. Click Next.

Select the Types of Ports to Configure

Use the Fault Tolerance page to select the types of ports that to configure on the Storage Center.

Steps

- 1. Select the checkboxes of the types of ports to configure.
- 2. Click Next.

Configure Fibre Channel Ports

The Fibre Channel - Fault Domain Configuration Page allows you to create fault domains for Fibre Channel ports.

Steps

- 1. To automatically generate a fault domain configuration based on the detected Fibre Channel zoning, click Generate Configuration.
- 2. If Fibre Channel zones have not been configured, click + (New) to manually create a Fibre Channel fault domain.

The Create Fibre Channel Fault Domain dialog box opens.

- a) Type the name of the fault domain in the Name field.
- b) (Optional) Type notes about the fault domain in the Notes field.
- c) Select the ports to include the fault domain.
- d) Click OK.
- 3. Click Next.
 - The Fibre Channel Fault Domain Summary page is displayed.
- 4. If Fibre Channel zones have not been configured, use the software from your switch vendor to create zones for each Fibre Channel fault domain.

5. Click Next.

(SCv3000 Series only) Configure Fibre Channel Ports

Use the Fibre Channel - Fault Domain Review page to view the automatically generated fault domains.

Steps

- 1. If the wizard displays an error message about Fibre Channel port cabling, correct the issue with the cabling and click C (Regenerate) to regenerate the Fibre Channel fault domains.
- Click Next. The Fibre Channel - Fault Domain Summary page is displayed.
- 3. Use the software from your switch vendor to create zones for each Fibre Channel fault domain.
- 4. Click Next.

Configure iSCSI Ports

The iSCSI - Fault Domain Configuration page allows you to create fault domains for iSCSI ports.

Steps

- 1. Click + (New) to create an iSCSI fault domain.
- The Create iSCSI Fault Domain dialog box opens.
- 2. Type the name of the fault domain in the Name field.
- 3. Type the target address for the iSCSI control port in the Target IPv4 Address field.
- 4. Type the subnet mask of the iSCSI network in the Subnet Mask field.
- 5. Type the IP address of the iSCSI network default gateway in the Gateway IPv4 Address field.
- 6. (Optional) Type notes about the fault domain in the **Notes** field.
- 7. Configure the ports to include in the fault domain.
 - a) Click 🖊 (Edit).
 - b) Select the port to include in the fault domain.
 - c) Select the Include in Fault Domain checkbox.
 - d) Type the IP address for the port in the IPv4 Address field.
 - e) Click Set.
 - Repeat the previous steps to add additional ports to the fault domain.
- 8. Click OK.

Repeat the previous steps to create additional fault domains.

- 9. Click Next.
- 10. View the iSCSI fault domains that have been created, and click Next.

(SCv3000 Series only) iSCSI - Fault Domain Review

Use the iSCSI - Fault Domain Review page to view the automatically generated fault domain configurations.

Steps

- 1. If the wizard displays an error message about iSCSI port cabling, correct the issue with the cabling and click C (Regenerate) to regenerate the iSCSI fault domains.
- 2. Select the fault domain on which to specify IP addresses for the target and controller ports.
- Click Set IPv4 Addresses for Fault Domain.
 The Set IPv4 Addresses for Fault Domain dialog box opens.
- 4. Type the target address for the iSCSI control port in the Target IPv4 Address field.
- 5. Type the subnet mask of the iSCSI network in the Subnet Mask field.
- 6. Type the IP address of the iSCSI network default gateway in the Gateway IPv4 Address field.
- 7. To set IP addresses for the iSCSI ports:
 - a) Select a port to edit.
 - b) Click 🖍 (Edit).
 - c) Type the IP address for the port in the $\ensuremath{\text{IPv4}}\xspace$ field.
- d) Click Set.
 - Repeat the previous steps to add additional ports to the fault domain.
- 8. Click **OK**.

Repeat the previous steps for the other fault domains.

- 9. Click Next.
- 10. View the iSCSI fault domains that have been created, and click Next.

Configure SAS Ports

Perform the following steps to create fault domains for SAS ports:

Prerequisites

- · One port from each controller within the same fault domain must be cabled.
- · The ports for each fault domain must be cabled to the same server.

Steps

- 1. Review the information on the SAS Cable Ports page. If the Storage Center is not cabled correctly to create fault domains, fix the cabling and click **Refresh**.
- Click Next. View the fault domains that have been created.
- 3. Click Next.

Configure Time Settings

Configure an NTP server to set the time automatically, or set the time and date manually.

Steps

- 1. From the **Region** and **Time Zone** drop-down menus, select the region and time zone used to set the time.
- 2. Select Use NTP Server and type the host name or IPv4 address of the NTP server, or select Set Current Time and set the time and date manually.
- 3. Click Next.

Configure SMTP Server Settings

If you have an SMTP server, configure the SMTP email settings to receive information from the Storage Center about errors, warnings, and events.

Steps

- 1. By default, the **Enable SMTP Email** checkbox is selected and enabled. If you do not have an SMTP server you can disable SMTP email by clearing the **Enable SMTP Email** checkbox.
- 2. Alternatively, if you have an SMTP server, configure the SMTP server settings.
 - a) In the **Recipient Email Address** field, enter the email address where the information will be sent.
 - b) In the SMTP Mail Server field, enter the IP address or fully qualified domain name of the SMTP mail server.
 - c) (Optional) In the **Backup SMTP Mail Server** field, enter the IP address or fully qualified domain name of a backup SMTP mail server and click **OK**.
 - d) Click **Test Server** to verify connectivity to the SMTP server.
 - e) If the SMTP server requires emails to contain a MAIL FROM address, specify an email address in the Sender Email Address field.
 - f) (Optional) In the **Common Subject Line** field, enter a subject line to use for all emails sent by the Storage Center.
- 3. Click Finish.

Connect Tab

Use the Connect tab to configure SupportAssist and update the Storage Center software.

- Accept the SupportAssist Collection Agreement
- Provide Contact Information
- Provide Onsite Address Information

- Validate SupportAssist Connection
- Update the Storage Center

Accept the SupportAssist Collection Agreement

Use the Accept SupportAssist Collection Agreement page to accept to the terms of the agreement and enable SupportAssist.

Steps

- 1. To allow SupportAssist to collect diagnostic data and send this information to technical support, select the **By checking this box**, you accept the above terms and turn on SupportAssist checkbox.
- 2. Click Next.

i NOTE: If you chose to clear the By checking this box, you accept the above terms and turn on SupportAssist checkbox, a SupportAssist Recommended dialog box opens.

- To return to the Accept SupportAssist Collection Agreement page, click No.
- To opt out of SupportAssist, click Yes.

Provide Contact Information

Specify the contact information to provide to SupportAssist and technical support.

Steps

- 1. Specify general contact information.
- 2. Specify contact preferences.
- 3. Click Next.

Provide Onsite Address Information

Provide an address to which to dispatch parts in the event of a failure.

Steps

- 1. Type a shipping address where replacement Storage Center parts can be sent.
- 2. Click Next.

Validate SupportAssist Connection

The **Connect** page displays a summary of the SupportAssist contact information and confirms that the Storage Center is able to connect to SupportAssist.

Steps

· Click Next.

Update the Storage Center

The Storage Center attempts to contact the SupportAssist Update Server to check for updates. If you are not using SupportAssist, you must use the Storage Center Update Utility to update the Storage Center operating system before continuing.

- If no update is available, the Storage Center Up to Date page appears. Click Next.
- If an update is available, the current and available Storage Center versions are listed.
 - 1. Click Install to update to the latest version.
 - 2. If the update fails, click **Retry Update** to try to update again.
 - 3. When the update is complete, click Next.
- If the SupportAssist Data Collection and Storage Agreement was not accepted, the Storage Center cannot check for updates.
 - · To proceed without checking for an update, click Next.
 - To perform updates using the Storage Center Update Utility, click Use Update Utility.

- To accept the SupportAssist agreement and check for an update:
- 1. Click Use SupportAssist Server to review the agreement.
- 2. Select the By checking this box, you accept the above terms and turn on SupportAssist check box.
- 3. Click Next. The Storage Center attempts to contact the SupportAssist Update Server to check for updates.
- The **Setup SupportAssist Proxy Settings** dialog box appears if the Storage Center cannot connect to the SupportAssist Update Server. If the site does not have direct access to the Internet but uses a web proxy, configure the proxy settings:
- 1. Select Enabled.
- 2. Enter the proxy settings.
- 3. Click OK. The Storage Center attempts to contact the SupportAssist Update Server to check for updates.

Unisphere Discovery Utility

Use the Unisphere Discovery Utility to find and configure uninitialized Storage Centers.

The Unisphere Discovery Utility is supported on 64-bit versions of the following operating systems:

- Oracle Linux 7.0, 7.3, and 7.6
- Red Hat Enterprise Linux 7.1, 7.2, 7.3, 7.4, 7.6
- SUSE Linux Enterprise 12
- Windows 8.1 and 10
- Windows Server 2012 R2, 2016, and 2019

The computer running the Unisphere Discovery Utility must meet the following requirements:

- · The computer must be within the same broadcast domain as the unconfigured Storage Centers to discover
- The firewall on the computer must be configured to allow outbound communication on UDP port 5353
- DHCP or IPv6 must be enabled on the computer running the Unisphere Discovery Utility. If DHCP or IPv6 are not enabled, two IPv4 addresses must be configured on the computer:
 - · An IP address on the target subnet of the Storage Centers to discover
 - A link local IP address in the 169.254.x.x subnet
- To run the Unisphere Discovery Utility on a Linux operating system, you must grant the execute permission to the Unisphere Discovery Utility file

Before proceeding, make sure that the Storage Center hardware is physically attached to all networks and powered on.

Introduction to Storage Center Initial Configuration

The Storage Center Initial Configuration page provides a list of prerequisite actions that must be performed and information that is required to configure a Storage Center.

Steps

- 1. Make sure the prerequisites that are listed on the Storage Center Initial Configuration page are met.
- 2. Make sure the information that is required to configure the Storage Center is gathered.
- 3. Click Next. The Discover Storage Centers page is displayed and it lists the unconfigured Storage Centers.

() NOTE: If the wizard does not discover the Storage Center that you want to configure, perform the following actions:

- Make sure that the Storage Center hardware is physically attached to all necessary networks.
- Click C (Refresh) to rediscover the unconfigured Storage Centers.

Discover Storage Centers

Use the Discover Storage Centers page to select the Storage Center to initialize .

- 1. (Optional) To refresh the list of unconfigured Storage Centers, click C (Refresh).
- 2. Select the Storage Center to initialize.
- 3. (Optional) To blink the indicator light on the front of the selected Storage Center, click Enable Indicator Light.

You can use the indicator light to visually verify that you have selected the correct Storage Center.

- 4. To view the drives detected by the selected Storage Center, click View Disks.
- 5. If the selected Storage Center is partially initialized and security is enabled:
 - a) Click **Provide Password**.
 - The **Provide Password** dialog box opens.
 - b) Type the password for the Storage Center Admin user in the **Password** field.

i NOTE: The default password for the Storage Center Admin user is mmm.

6. Click Next.

Welcome to the Storage Center

Use the Welcome page to specify a name for the Storage Center and view the End User License Agreement.

Steps

- 1. Type a name for the Storage Center in the Name field.
- 2. Verify that the service tag or serial number that are displayed on the Welcome page match the Storage Center to initialize.
- 3. Select the language of the End User License Agreement to view from the drop-down menu, and click **Terms of Use** to open the agreement.
- 4. To authorize the installation of the Storage Center, type the customer name and title in the Approving Customer Name and Approving Customer Title fields.

i NOTE: The Approving Customer Name and Approving Customer Title fields are not displayed for SCv3000 series storage systems.

5. Click Next.

Configure the Management Network Settings

Use the Management Network page to configure the management network settings for the Storage Center.

Steps

- 1. Select how to configure the management network from the **Network Configuration Source** drop-down menu.
 - **DHCP IPv4 Only** IP addresses are dynamically assigned.
 - Static IP addresses must be specified manually.
- 2. If the network configuration source is set to Static, specify the management network settings in the following fields:

Management IPv4 Settings

- a) Type the IPv4 management address for the Storage Center in the Virtual Address field.
 The IPv4 management address is the IP address that is used to manage the Storage Center and it is different than the IPv4 management address of the storage controllers.
- b) Type a IPv4 management address for each storage controller in the associated fields.
- c) Type the IPv4 subnet mask of the management network in the Subnet Mask field.
- d) Type the IPv4 gateway address of the management network in the Gateway Address field.

(Optional) Management IPv6 Settings

 a) Type the IPv6 management address for the Storage Center in the Virtual Address field. The IPv6 management address is the IP address that is used to manage the Storage Center and it is different than the IPv6 management address of the storage controllers.

- b) Type a IPv6 management address for each storage controller in the associated fields.
- c) Type the IPv6 address prefix in the **Prefix** field.
- d) Type the IPv6 gateway address the Gateway Address field.

Network Settings

- a) Type the domain name of the management network in the **Domain Name** field.
- b) Type the DNS server addresses of the management network in the DNS Server and Secondary DNS Server fields.
- c) (Optional) Type a secondary DNS server addresses of the management network in the Secondary DNS Server fields.

3. Click Next.

Set a Password

Use the Security page to set a password for the Storage Center Admin user.

Steps

- 1. Type a password for the Storage Center Admin user in the New Password field.
- 2. Retype the password for the Storage Center Admin user in the Confirm Password field.
- 3. Click Next.

Confirm the Storage Center Configuration

Make sure that the configuration information shown on the Summary page is correct before continuing. If you selected DHCP IPv4 as the network configuration source, the dynamically assigned IP addresses are displayed on this page.

Steps

- 1. Verify that the Storage Center settings are correct.
- 2. If the configuration information is correct, click Next.

If the configuration information is incorrect, click **Back** and provide the correct information.

i NOTE: After you click the Next button, the configuration cannot be changed until after the Storage Center is fully deployed.

Complete the Installation

Use the Installation Complete page to connect to the Storage Center after the settings on the Summary page are applied to the Storage Center.

Steps

1. Click Connect.

The Unisphere interface opens in a web browser.

- 2. Log into Unisphere to continue Storage Center initialization:
 - a) Type Admin in the User Name field.
 - b) Type the password for the Storage Center Admin user in the **Password** field.
 - c) Click Log In.

The **Configure** tab of the Initialize Storage Center wizard is displayed.

Storage Center Administration

Adding and Organizing Storage Centers

Adding and organizing Storage Centers can only be done using Unisphere Central connected to a Data Collector.

Note the following restrictions about Unisphere Central user accounts:

- An individual Unisphere Central user can view and manage only the Storage Centers that have been mapped to his or her account. In other words, the Storage Centers that are visible to one Unisphere Central user are not necessarily visible to another user.
- When a Unisphere Central user adds a Storage Center, he or she must provide credentials for a Storage Center user. The privilege level and user groups assigned to the Storage Center user determine the access that is allowed on the Data Collector.
- The first time you add a Storage Center to the Data Collector, you must specify a Storage Center user account that has the Administrator privilege. When you subsequently add the Storage Center for other Unisphere Central users, you can specify Storage Center user accounts of any privilege level.
- If yourUnisphere Central user account has the Reporter privilege, you must specify a Storage Center user account that has the Reporter privilege.

i NOTE: A Unisphere Central Administrator can also use the Data Collector to grant Storage Center access to a Unisphere Central user with the Reporter privilege.

· Manage a Storage Center using one Data Collector only. Issues can occur if a Storage Center is managed by multiple Data Collectors.

Storage Center User Privileges and User Groups

Storage Center groups determine which storage objects can be viewed by the Storage Center user, and the privilege level defines what the user can do.

NOTE: Storage Center user privileges and Unisphere Central user privileges share the same names, but they are not the same. Storage Center user privileges control access to Storage Center functionality, and Unisphere Central user privileges control access to Unisphere Central functionality. A user may have a different role in Unisphere Central than in Storage Center. This role difference affects small details of that user's access.

Related concepts

Unisphere Central User Privileges

User Privilege Levels

Each user is assigned a single privilege level. Storage Center has three levels of user privilege.

Table 4. Storage Center User Privilege Levels

Privilege Level	Allowed Access
Administrator	Read and write access to the entire Storage Center (no restrictions). All Administrators have the same predefined privileges. Only Administrators can manage users and user groups.
Volume Manager	Read and write access to the folders associated with the assigned user groups. Users with this privilege level can create volumes in the allowed volume folders and map them to existing servers in the allowed server folders.
Reporter	Read-only access to the folders associated with the assigned user groups.

Adding and Removing Storage Centers

You must be connected to a Data Collector to add or remove Storage Centers.

(i) NOTE: For user interface reference information, click Help.

Add a Storage Center

Add a Storage Center to Unisphere Central to manage and monitor the Storage Center using the Unisphere Central dashboard.

Prerequisites

- The Data Collector must have network connectivity to the Storage Center management interface.
- You must have the user name and password for a Storage Center user account.
 - The first time you add a Storage Center to the Storage Manager Data Collector, you must specify a Storage Center user account that has Administrator privileges. When the Storage Center is added for other Unisphere Central users, you can specify Storage Center user accounts of any privilege level.
 - If your Unisphere Central user account has Reporter privileges, you must specify a Storage Center user account with Reporter privileges.

(i) NOTE: Users with Reporter level privileges have limited access to Storage Centers in Unisphere Central. To grant a Reporter user access to Storage Centers, add Storage Center mappings to that user in the Data Collector. Only Unisphere Central users with Administrator privileges can set mappings for Unisphere Central users.

Steps

1. Click the **MOME** menu.

The Unisphere Central **Home** page is displayed.

If a Storage Center is selected from the drop-down list in Unisphere Central, click 🎑 (Home).

- Click +
 (New) and select Add Storage Center. The Add Storage Center dialog box opens.
- 3. Type the information needed to add the Storage Center in the following fields.
 - Hostname or IP Address Type the host name or IP address of a Storage Center controller. For a dual-controller Storage Center, type the IP address or host name of the management controller.
 - User Name and User Password Type the user name and password for a Storage Center user.
 - i NOTE: If you specify a Storage Center user with the Reporter or Volume Manager privilege, access to the Storage Center from Unisphere Central is restricted based on the privilege and user groups assigned to the Storage Center user.
 - Folder Select the parent folder for the Storage Center.
- (Optional) Configure the Storage Center to use settings applied to another Storage Center by selecting the Inherit settings from an existing Storage Center checkbox. If this checkbox is selected, the Inherit Settings dialog box opens after the Add Storage Center dialog box closes.
- 5. Click **OK**.
 - If the Inherit settings from existing Storage Center checkbox was not selected, the Storage Center is added to Unisphere Central.
 - · If the Inherit settings from existing Storage Center checkbox was selected, the Inherit Settings dialog box opens.
- 6. (Inherit settings only) Choose the Storage Center settings to inherit.
 - a) Select the Storage Center from which you want to inherit settings.
 - b) Select the checkbox for each category of settings that you want to inherit.
 - c) Click OK.
 - If passwords are not configured for the SupportAssist proxy, Secure Console proxy, or SMTP server, the dialog box closes.
 - If a password is configured for the SupportAssist proxy, Secure Console proxy, or SMTP server, you are prompted to enter the required passwords.
 - d) Type the required passwords to complete the dialog box.

Related tasks

Set Storage Center Mappings for a Reporter User

Reconnect to a Storage Center

If Unisphere Central cannot communicate with or log in to a Storage Center, the Data Collector marks the Storage Center as down. Reconnect to the Storage Center to provide the updated connectivity information or credentials.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- From the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- **3.** In the **Storage Centers** view, click the name of a Storage Center with a status of Down. The **Reconnect to Storage Center** dialog box opens.
- 4. Type the information needed to reconnect to the Storage Center.
 - Host or IP Address Type the host name or IP address of a Storage Center controller. For a dual-controller Storage Center, type the IP address or host name of the management controller.
 - User Name and User Password Type the user name and password for a Storage Center user.
 - (i) NOTE: If you specify a Storage Center user with the Reporter or Volume Manager privilege, access to the Storage Center from Unisphere Central is restricted based on the privilege and user groups assigned to the Storage Center user.
- 5. Click OK.

Remove a Storage Center

Remove a Storage Center when you no longer want to manage it from Unisphere Central.

Steps

1. Click the HOME menu. The Unisphere Central Home page is displayed.

If a Storage Center is selected from the drop-down list in Unisphere Central, click 🞑 (Home).

- 2. From the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- 3. In the Storage Centers view, select the Storage Center you want to remove.
- Click (Delete).
 A confirmation dialog box opens.
- 5. Click **Yes** to remove the Storage Center.

Organizing Storage Centers

Use folders to group Storage Centers in Unisphere Central.

i NOTE: For user interface reference information, click Help.

Create a Storage Center Folder

Use folders to group and organize Storage Centers.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- 2. Under the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- 3. In the Storage Centers view, click + (New), and select New Folder.

The **Create Folder** dialog box opens.

- 4. In the Name field, type a name for the folder.
- 5. From the **Parent** drop-down list, select a parent folder.
- 6. Click OK.

Move a Storage Center Into a Folder

Storage Centers can be organized into folders.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Under the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- 3. In the Storage Center view, click ... (More Actions), and then select Move. The Move to Folder dialog box opens.
- **4.** Select the folder to which to move the Storage Center.
- 5. Click OK.

Rename a Storage Center Folder

Use the **Edit** dialog box to change the name of a Storage Center folder.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- Under the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- 3. In the Storage Centers view, select the Storage Center folder you want to modify.
- Click / (Edit). The Edit dialog box opens.
- 5. In the Name field, type a name for the folder.
- 6. Click OK.

Delete a Storage Center Folder

Delete a Storage Center folder if it is no longer needed.

Prerequisites

The Storage Center folder must be empty.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Under the STORAGE menu, click Storage Centers. The Storage Centers view is displayed.
- 3. In the Storage Center view, select the Storage Center folder to delete.
- Click iii (Delete). The Delete Folder dialog box opens.
- 5. Click Yes.

Managing Volumes

A Storage Center volume is a logical unit of storage that servers can access over a network. You can allocate more logical space to a volume than is physically available on the Storage Center.

Attributes That Determine Volume Behavior

When a volume is created, attributes are associated with the volume to control its behavior.

Attribute	Description
Storage Type	Specifies the disk folder, tier redundancy, and data page size of the storage used by the volume.
Storage Profile	Controls the RAID type, storage tiers, and data progression behavior for pages used by the volume.
Snapshot Profile	Describes when to take periodic snapshots (also known as point-in-time copies) for one or more volumes and the time at which snapshots are deleted (expired).
QoS Profile	Specifies a profile to apply to volumes, to potentially limit I/Os that the volumes can perform, and also defines their relative priority during times of congestion.

Related concepts

Managing Snapshot Profiles

Creating Volumes

Create volumes to present servers a logical unit of storage on a Storage Center.

(i) NOTE: For user interface reference information, click Help.

Create a Single Volume

Use the New Volume dialog box to create a single volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- In the Volumes view, click +

 (New), and select New Volume.
 The New Volume dialog box opens.
- 4. In the Volume Count field, type 1 to create a single volume.
- 5. In the Name field, type a name for the volume.
- 6. In the Configured Size field, type a size for the volume in kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB).
- 7. In the Volume Folder pane, select the parent folder for the volume.
- 8. (Optional) Configure the remaining volume attributes as needed.
 - Select the **The Import To Lowest Tier** checkbox to forces all data written to the volume to the lowest storage tier configured for the volume. Enabling this option decreases performance for the volume.
 - To map the volume to a server, select a server from the Server drop-down list.
 - To schedule snapshot creation and expiration for the volume, apply one or more Snapshot Profiles by clicking **Change** across from **Snapshot Profiles**.
 - To enable or disable snapshot functions, select or clear the following checkboxes:
 - Pause Snapshot Creation
 - Pause Snapshot Expiration
 - · Allow Snapshots to coalesce into active Snapshot

The following options are available only if the they are enabled in the Storage Center Settings dialog box:

- To use specific disk tiers and RAID levels for volume data, select the appropriate storage profile from the Storage Profile dropdown list located in the Tiering section. Using the Recommended storage profile allows the volume to take full advantage of data progression.
- If more than one storage type is defined on the Storage Center, select the storage type to provide storage from the Storage
 Type drop-down list located in the Tiering section.
- To set a volume QoS profile, select a profile from the Volume QoS Profile drop-down list located in the QoS Profiles section.
- To set a group QoS profile, select a profile from the Group QoS Profile drop-down list located in the QoS Profiles section.
- To enable Data Compression to reduce disk space usage, select **Compression** from the **Data Reduction Profile** drop-down list.

i NOTE: The Data Compression setting will be applied to all volumes that share one or more snapshots with this volume. These shared volumes are referred to as siblings in the message displayed.

9. Click OK.

Create Multiple Volumes Simultaneously

You can create multiple volumes at a time.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- In the Volumes view click +

 (New), and select New Volume.
 The New Volume dialog box opens.
- 4. In the Volume Count field, type the number of volumes to create.
- 5. In the **Name** field, type a base name for the volumes. Each volume is named with a combination of the base name and the volume number.
- 6. In the Configured Size field, type a size for the volumes in kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB).
- 7. In the Volume Folder pane, select the parent folder for the volumes.
- 8. (Optional) Configure the remaining volume attributes as needed.
 - Select the **The Import To Lowest Tier** checkbox to force all data written to the volume to the lowest storage tier configured for the volume. Enabling this option decreases performance for the volume.
 - · To map the volume to a server, select a server from the Server drop-down list.
 - To schedule snapshot creation and expiration for the volume, apply one or more snapshot profiles by clicking **Change** across from **Snapshot Profiles**.
 - To enable or disable snapshot functions, select or clear the following checkboxes:
 - Pause Snapshot Creation
 - Pause Snapshot Expiration
 - · Allow Snapshots to coalesce into active Snapshot

The following options are available only if they are enabled in the Storage Center Settings dialog box:

- To use specific disk tiers and RAID levels for volume data, select the appropriate storage profile from the Storage Profile dropdown list located in the Tiering section. Using the Recommended storage profile allows the volume to take full advantage of Data Progression.
- If more than one storage type is defined on the Storage Center, select the storage type from the **Storage Type** drop-down list located in the **Tiering** section.
- To set a volume QoS profile, select a profile from the Volume QoS Profile drop-down list located in the QoS Profiles section.
- To set a group QoS profile, select a profile from the Group QoS Profile drop-down list located in the QoS Profiles section.
- To enable Data Compression to reduce disk space usage, select **Compression** from the **Data Reduction Profile** drop-down list.

i NOTE: The Data Compression setting is applied to all of the volumes that share one or more snapshots with this volume. These shared volumes are referred to as sibling volumes.

9. Click OK.

Modifying Volumes

You can rename, move, or expand a volume after it has been created. You can also modify advanced volume attributes if needed.

Rename a Volume

A volume can be renamed without affecting its availability.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. In the Name field, type a new name for the volume.
- 6. Click OK.

Move a Volume to a Different Volume Folder

Volumes can be organized by placing them in folders.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Click Move. The Move to Folder dialog box opens.
- 5. In the navigation pane, select a new parent volume folder.
- 6. Click OK.

Move Multiple Volumes to a Different Volume Folder

Right-click a selection of volumes to move them to a different folder.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volumes you want to move.
 - To select contiguous volumes, select the first volume, then hold down Shift and select the last volume.
 - To select individual volumes, hold down Control while selecting them.
- 4. Click Move. The Move to Folder dialog box opens.
- 5. In the navigation pane, select a new parent volume folder.
- 6. Click OK.

Expand a Volume

Expand the size of a volume if more space is needed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to expand.
- 4. Click ... (More Actions) and select Expand Volume.
- The **Expand Volume** dialog box opens.
- 5. Type a new size for the volume, then click **OK**.

i NOTE: Expanding a volume to a configured size greater than half the supported maximum volume size, as defined in the *Storage Center Release Notes*, will no longer support view volumes

Enable or Disable Read/Write Caching for a Volume

Read and write caching generally improves performance. To improve performance, disable write caching on volumes that use SSD storage.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Make sure Allow Cache Selection is enabled for volumes in the Storage Center user preferences.
 - a) In the upper right corner, click 🌣 (Storage Center Settings).
 - The Storage Center Settings dialog box opens.
 - b) Click the **Preferences** tab.
 - c) Make sure the Allow Cache Selection checkbox is selected.
 - d) Click OK.
- 3. From the STORAGE menu, click Volumes.
 - The **Volumes** view is displayed.
- 4. In the Volumes view select the volume you want to modify.
- 5. Click 🖍 (Edit).
- The Edit Volume dialog box opens.

6. Expand Advanced Settings.

- 7. Enable or disable the cache options as needed.
 - · Select or clear the **Read Cache** checkbox.

For volumes using SSD storage, test applications before enabling or disabling read cache.

- · Select or clear the Write Cache checkbox.
 - To improve performance, disable write caching on volumes that use SSD storage for most applications.
- 8. Click OK.

Assign Snapshot Profiles to a Volume

Assign one or more snapshot profiles to a volume if you want snapshots to be created on an automated schedule.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. From the Volumes view, select the volume you want to modify.

- 4. Select ...(More Actions) and select Set Snapshot Profiles. The Set Snapshot Profiles dialog box opens.
- 5. Select the snapshot profiles to apply to the volume.
- 6. Click OK.

Assign Snapshot Profiles to Multiple Volumes

Snapshot profiles can be assigned to multiple volumes in one operation.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the **Volumes** view, select the volumes you want to modify.
 - To select contiguous volumes, select the first volume, then hold down Shift and select the last volume.
 - To select individual volumes, hold down Control while selecting them.
- Click ...(More Actions) and select Set Snapshot Profiles. The Set Snapshot Profiles dialog box opens.
- 5. Select each snapshot profile you want to assign to the volumes.
- 6. To remove the snapshot profiles that were previously assigned to the volume, select Replace Existing Snapshot Profiles .
- 7. Click OK.

Assign a Different Storage Profile to a Volume

The storage profile determines the RAID type and storage tiers used by the volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Click ...(More Actions) and select Set Storage Profile. The Set Storage Profile dialog box opens.
- 5. From the Storage Profile drop-down menu, select a storage profile.
- 6. Click OK.

Assign a Different Storage Profile to Multiple Volumes

The storage profile determines the RAID type and storage tiers used by the volume. A storage profile can be assigned to multiple volumes in one operation.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volumes you want to modify.
 - · To select contiguous volumes, select the first volume, then hold down Shift and select the last volume.
 - · To select individual volumes, hold down Control while selecting them.
- Click ... (More Actions) and select Set Storage Profile. The Set Storage Profile dialog box opens.
- 5. From the Storage Profile drop-down menu, select a storage profile.

6. Click OK.

Force Writes to the Lowest Storage Tier for a Volume

The **Import to lowest tier** option forces all data written to the volume to the lowest storage tier configured for the volume. This option is typically used when importing data to a new volume from an external source. New writes to the volume from a host after the import is complete will follow the Storage Profile for the volume. It is important to change the Storage Profile once the import is complete to avoid potential performance degradation by writing to the lowest tier of drives.

Prerequisites

The volume must use a standard storage type. The Import to lowest tier option is not available for flash-optimized storage types.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 5. Select the Import to lowest tier checkbox.
- 6. Click OK to close the Edit Volume dialog box.

Configure a Space Consumption Limit for a Volume

Set a space consumption limit to specify the maximum space that can be used on the volume. This option is not available for SCv2000 or SCv3000 series storage systems.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand Advanced Settings.
- 6. Configure the Space Consumption Limit options.
 - a) Select the Space Consumption Limit checkbox.
 - b) In the field, type the maximum space that can be used on the volume in kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB).
- 7. Cllick OK to close the Edit Volume dialog box..

Configure an OpenVMS Unique Disk ID for a Volume

Configure an OpenVMS unique disk ID to identify the volume to servers running the OpenVMS operating system. You might need to reset this value when recovering a volume from a snapshot. For example, if you map a volume to a server, create a snapshot, and then mount a new view volume to the server, the new view volume has a new disk ID. To allow the server to recognize it as the same volume, you must modify the disk ID to match the original value.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. On the Volumes view, select the volume you want to modify.

- 4. Click 🖍 (Edit).
- The Edit Volume dialog box opens.
- 5. Expand Advanced Settings.
- 6. In the OpenVMS Unique Disk ID field, type a new disk ID.
- 7. Click **OK** to close the **Edit Volume** dialog box.

Configure Related View Volume Maximums for a Volume

For a given volume, you can configure the maximum number of view volumes, including the original volume, that can be created for volumes that share the same snapshot. You can also configure the maximum combined size for these volumes.

Prerequisites

Consult with technical support before changing these limits.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. On the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand Advanced Settings.
- 6. In the **Maximum Volume Count** field, type the maximum number of view volumes, including the original volume, that can be created for volumes that share the same snapshot history as this volume.
- 7. Click OK to close the Edit Volume dialog box.

Copying Volumes

Copy a volume to create an identical volume for back-up or reuse of the data.

The destination volume of a copy, mirror, or migrate must meet the following requirements:

- Must not be mapped to a server.
- · Must be the same size or larger than the source volume.
- · Cannot be active on another controller.

Copy a Volume

Copying a volume copies the data from a source volume to a destination volume. Changes made to the source volume during the copy process are also made to the destination volume.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. On the Volumes view, select the volume you want to copy.
- Click ... (More Actions) and select Copy Volume. The Copy Volume dialog box opens.
- 5. Select an existing volume or create a new volume for the destination volume.
 - · To select an existing volume, select a volume from the **Destination Volume** table.
 - · To create a new volume for the destination volume, click Create Volume.
- 6. (Optional) Select Copy Snapshots.
- 7. From the **Priority** drop-down menu, select a priority level for the copy operation.
- 8. (Optional) Select Schedule Start Time to set a time for the copy to be created.

9. Click OK.

Related tasks

Creating Volumes

Create a Mirroring Volume

A mirroring volume is a copy of a volume that also dynamically changes to match the source volume. The source and destination volumes are continuously synchronized.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. On the Volumes view, select the volume you want to copy.
- 4. Click ... (More Actions) and select Mirror Volume. The Mirror Volume dialog box opens.
- 5. Select an existing volume or create a new volume for the destination volume.
 - To select an existing volume, select a volume from the **Destination Volume** table.
 - To create a new volume for the destination volume, click Create Volume.
- 6. (Optional) Select Copy Snapshots.
- 7. From the Priority drop-down menu, select a priority level for the copy operation.
- 8. (Optional) Select Schedule Start Time to set a time for the copy to be created.
- 9. Click OK.

Related tasks

Creating Volumes

View Copy/Mirror/Migrate Information

The Summary tab displays information for any copy, mirror, or migrate relationship involving the selected volume. Copy and migrate information is displayed in the Summary tab only during the copy or migrate operation.

Prerequisites

The volume must be in a copy, mirror, or migrate relationship.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Volumes. The Volumes view is displayed.
- In the Volumes view, select the volume you want to view.
 The Copy/Mirror/Migrate area in the Summary tab displays information for any copy, mirror, or migrate relationship involving the selected volume.

Creating and Managing Volume Folders

Use volume folders to organize volumes or to restrict access to volumes.

i NOTE: For user interface reference information, click Help.

Create a Volume Folder

Create a volume folder either to organize volumes or to restrict access to volumes.

About this task

(i) NOTE:

Members of a user group can only access volume folders that have been assigned to their user group, regardless of how the folders are organized. For example, a sub-folder created with Administrator privileges in a Volume Manager folder will not be visible to a user in the Volume Manager user group.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- In the Volumes view, click +

 (New) and select New Folder.
 The New Volume Folder dialog box opens.
- 4. In the Name field, type a name for the folder.
- 5. In the **Parent** field, select a parent folder.
- 6. Click OK.

Rename a Volume Folder

Use the **Edit Settings** dialog box to rename a volume folder.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view Select the volume folder you want to rename.
- Click / (Edit icon). The Edit Volume Folder dialog box opens.
- 5. In the Name field, type a new name for the volume folder.
- 6. Click OK.

Move a Volume Folder

Use the Edit Settings dialog box to move a volume folder. Folders can be nested in other folders.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume folder you want to move.
- 4. Click Move.
 - The **Move to Folder** dialog box opens.
- **5.** Navigate to the appropriate folder.
- 6. Click OK.

Creating and Managing Volume Snapshots

Use snapshots to create a point-in-time copy (PITC) of one or more volumes. Creating volumesnapshots allows the volume to take full advantage of data progression.

(i) NOTE: For user interface reference information, click Help.

Manually Create a Snapshot for a Volume

Create a manual snapshot to copy data for a point in time if you do not want to create a snapshot schedule.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume.
- 4. Click ... (More Actions) and select New Snapshot. The New Snapshot dialog box opens.
- 5. If a confirmation dialog box opens:
 - · Click Yes to create snapshots for all volumes associated with the consistent Snapshot Profile.
 - · Click **No** to create a snapshot for the selected volume only.
- 6. In the Expire Time field, type the number of minutes, hours, days, or weeks to keep the snapshot before deleting it. If you do not want the snapshot to expire, select Do Not Expire.
- 7. (Optional) In the Description field, type a description of the snapshot. The default descriptive text is "Manually Created."
- 8. Click OK.

View Snapshots on a Volume

Click the **Snapshots** tab to see information about snapshots, such as freeze time, expiration time, size, and description. You can also view the snapshots on a volume in a tree view.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume.
- 4. Click the **Snapshots** tab.

Create a Local Recovery Volume (View Volume) from a Snapshot

Create a recovery volume (view volume) from a snapshot to access data that is contained in the snapshot. A volume created from a snapshot accesses the same data and consumes the same amount of space as the original volume. It will consume more space when new data is written to the new volume.

Prerequisites

QoS Profile options are shown only if Allow QoS Profile Selection has been enabled on the Storage Center Preferences dialog box.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume.

- 4. Click the Snapshots tab.
- 5. Select the snapshot from which you want to create a local recovery volume, then click **Create Volume from Snapshot**. The **Create Volume from Snapshot** dialog box opens.
- 6. (Optional) Modify default settings for the recovery volume as needed.
 - To change the volume name, type a new name for the volume in the Name field.
 - To force all data written to the volume to the lowest storage tier, select Import To Lowest Tier.
 - To schedule snapshot creation and expiration for the volume, apply one or more snapshot profiles by clicking **Change** across from **Snapshot Profiles**.
 - To add a volume QoS profile to be applied to the volume, click **Change** across from **Volume GoS Profile**. When the list of defined QoS profiles opens, select a profile, then click **OK**. You can also apply the default QoS profile to a volume.
 - To add a group QoS profile to be applied to the volume, click **Change** across from **Group QoS Profile**. When the list of defined QoS profiles opens, select a profile, then click **OK**.
- 7. Click OK to create the local recovery volume.

Pause Snapshot Creation for a Volume

Pause snapshot creation for a volume to temporarily prevent snapshot profiles from creating automatic snapshots for the volume. When snapshot creation is paused, the **Create Snapshot** option is not available when you right-click any volume on the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand the Snapshot options.
- 6. Select the Pause Snapshot Creation checkbox.
- 7. Click OK.

Pause Snapshot Expiration for a Volume

Pause snapshot expiration for a volume to temporarily prevent Snapshot Profiles from expiring snapshots for the volume. When snapshot expiration is paused, the **Create Snapshot** and **Delete** options are not available when you right-click any volume on the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- Expand the Snapshot options.
- 6. Select the Pause Snapshot Expiration checkbox.
- 7. Click OK.

Allow the Most Recent Snapshot for a Volume to be Expired

If you do not need to keep at least one snapshot for a given volume at all times, you can allow the most recent volume snapshot to be expired by a Snapshot Profile.

Steps

1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.

- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Click 🖍 (Edit).

The Edit Volume dialog box opens.

- 5. Expand the **Snapshot** options.
- 6. Select the Allow Snapshots to coalesce into active Snapshot checkbox.
- 7. Click OK.

Expire a Snapshot Manually

If you no longer need a snapshot and you do not want to wait for it to be expired based on the snapshot profile, you can expire it manually.

Steps

- 1. Click the **Storage** tab.
- 2. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- **3.** From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 4. On the Volumes pane, select the volume you want to modify.
- 5. Click the Snapshots tab.
- 6. Select the snapshot you want to expire, then click **Expire**. The **Expire** dialog box opens.
- 7. Click Yes to expire the selected snapshot.

Related concepts

Managing Snapshot Profiles

Mapping Volumes to Servers

Mapping a volume to a server allows the server to access the volume.

i NOTE: For user interface reference information, click Help.

Map a Volume to a Server

Map a volume to a server to allow the server to use the volume for storage.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Select the Mappings tab.
- 5. Above the Mapped Servers section click +. The Map Volume to Server wizard opens.
- 6. Select the server to which you want to map the volume, then click Next. The wizard advances to the next page.
- 7. (Optional) Expand Advanced Mapping to configure LUN settings, restrict mapping paths, or present the volume as read-only.
- 8. Click Finish.

Map Multiple Volumes to a Server

Multiple volumes can be mapped to a server in a single operation.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volumes you want to map.
 - To select contiguous volumes, select the first volume, then hold down Shift and select the last volume.
 - To select individual volumes, hold down Control while selecting them.
- **4.** Click ... (More Actions) and select Map Volume to Server. The Map Volume to Server wizard opens.
- 5. Select the server to which you want to map the volumes, then click Next. The wizard advances to the next page.
- 6. (Optional) Expand Advanced Mapping to configure LUN settings, restrict mapping paths, or present the volume as read-only.
- 7. Click Finish.

Unmap a Volume from a Server

Unmap a volume from a server if the server no longer needs to access the volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volume view, click the name of the volume you want to unmap from a server to open the Volume view.
- 4. Click the Mappings tab.
- 5. Select the server(s) to unmap from the volume, then click **(Delete)**. The **Remove Mappings** dialog box opens.
- 6. Click Yes to unmap the volume from the server.

Promote a Volume Mapping from a Server to a Server Cluster

If a volume is mapped to a server that belongs to a server cluster, you can promote the mapping to the server cluster so that it is mapped on all servers in the cluster.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volume view, click the name of the volume you want to promote.
- 4. Click the Mappings tab.
- 5. Select the server for which you want to promote the mapping, then click **Promote to Cluster**. The **Promote to Cluster** dialog box opens.
- 6. Click OK.

Demote a Mapping from a Server Cluster to an Individual Server

If a volume is mapped to a server cluster, you can demote the mapping so that it is mapped to one of the servers that belongs to the cluster.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volume view, click the name of the volume you want to unmap from a server to open the Volume view.
- 4. Click the Mappings tab.
- 5. Select the server for which you want to demote the mapping, then click **Demote from Cluster**. The **Demote from Cluster** dialog box opens.
- 6. Click OK.

Deploy a Bootable Volume Image to a New Server

Copy a bootable volume image and map it to a new server to streamline the server deployment process.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the **Volumes** view, select the volume you want to copy.
- Click ... (More Actions) and select New Boot from SAN Copy. The New Boot from SAN Copy dialog box opens.
- 5. (Optional) Modify default settings for the volume copy as needed.
 - To change the volume name, modify the Name field.
 - To schedule snapshot creation and expiration for the volume, apply one or more snapshot profiles by clicking **Change** across from **Snapshot Profiles**.
- 6. Click OK.

Change the LUN Used by a Volume/Server Mapping

The logical unit number identifies the volume to the server operating system.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Click the Mappings tab.
- 5. Select the server for which you want to modify mapping settings, then click 🖍 (Edit). The Edit Volume Mapping Settings dialog box opens.
- 6. Configure the LUN settings:
 - To specify a specific LUN number, clear the **Use next available LUN** checkbox, then type the LUN in the **LUN to use when** mapping to Volume field.
 - To assign the next unused LUN for the server, select the **Use next available LUN** checkbox.
 - To make the volume bootable, select the Map volume using LUN 0 checkbox.
- 7. Click OK.

Limit the Number of Paths That Can Be Used for a Volume/Server Mapping

You can specify the maximum number of paths used by servers that support multipath I/O.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- 4. Click the Mappings tab.
- Select the server for which you want to modify mapping settings, then click (Edit). The Edit Volume Mapping Settings dialog box opens.
- 6. Use the arrows next to the Maximum number of paths per Server field to increase or decrease the path limit.
- 7. Click OK.

Change a Volume/Server Mapping to Read-Only

To prevent a server from writing to a volume, change the volume/server mapping to read-only.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. On the Volumes view, select the volume you want to modify.
- 4. Click the Mappings tab.
- Select the server for which you want to modify mapping settings, then click / (Edit). The Edit Volume Mapping Settings dialog box opens.
- 6. Select the The volume should be presented as read-only to the server checkbox.
- 7. Click OK.

Deleting Volumes and Volume Folders

Delete volumes and volume folders when they are no longer needed.

(i) NOTE: For user interface reference information, click Help.

Delete a Volume

A deleted volume is moved to the Recycle Bin by default.

Prerequisites

Delete all associated replications, Live Volumes, or Live Migrations before deleting a volume.

CAUTION: You can recover a deleted volume that has been moved to the Recycle Bin. However, a deleted volume cannot be recovered after the Recycle Bin is emptied.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.

- 3. In the Volumes view, select the volume to delete.
- Click (Delete).
 The Delete Folder dialog box opens.

The Delete Folder dialog box (

5. Click Delete.

The **Delete** dialog box opens.

CAUTION: Do not select Skip Recycle Bin and permanently delete volumes unless you want to immediately delete the volume without saving the metadata in the Recycle Bin. This option permanently deletes the volume, preventing you from recovering the data.

6. Click **OK** to delete the volume.

The volume is marked for deletion and moved to the Recycle Bin.

Restore a Volume from the Recycle Bin

Restore a volume from the Recycle Bin if you need to retain the volume instead of deleting it.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. Expand the Recycle Bin, then select the volume in the Recycle Bin that you want to restore.
- 4. Click **Restore Volume**. The volume is moved from the Recycle Bin to its previous location.

Empty the Recycle Bin

Empty the Recycle Bin if you are sure you want to delete the recycled volumes.

About this task

 \wedge CAUTION: After the Recycle Bin is emptied, data in recycled volumes cannot be recovered.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, expand the Recycle Bin.
- Click Empty Recycle Bin. The Empty Recycle Bin dialog box opens.
- 5. Click **OK** to confirm that you want to permanently delete all volumes in the Recycle Bin.

Delete a Volume Folder

A volume folder must be empty before it can be deleted. If the deleted volumes from the folder are in the Recycle Bin, the volume folder is not considered empty and cannot be deleted.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume folder you want to delete.
- Click iii (Delete). The Delete Folder dialog box opens.
- 5. Click **OK** to delete the folder.

Reset a Controller to Factory Default

Reset a controller to apply the factory default settings, erase all data stored on the controller, and erase all data on the drives.

Prerequisites

The Storage Center must be an SCv2000 or SCv3000 series storage system.

About this task

CAUTION: Resetting the controller to factory defaults erases all information on the controller and all data on the drives.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the ... (More Actions) drop-down menu, select Factory Reset. The Factory Reset Storage Center dialog box opens.
- 3. In the Factory Reset Token field, type the text above the Factory Reset Token field exactly as it appears in the dialog box.
- 4. In the **Storage Center Administrator Username** field type the username of a Storage Center user with administrator-level privileges.
- 5. In the **Storage Center Administrator Password** field type the password of a Storage Center user with administrator-level privileges.
- 6. To restart the controller after the reset, select the Power on the Storage Center after resetting to factory defaults checkbox.
- 7. Click OK.

The Storage Center resets to the factory default settings.

Run the Space Reclamation Wizard

If a Storage Center enters Conservation mode, use the Space Reclamation wizard to analyze the Storage Center and perform space recovery.

About this task

The Space Reclamation wizard is dynamic and displays only the pages for which volumes exist and can be deleted.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary.
 The Summary view is displayed.
- 3. Click ... (More Actions) and select Space Reclamation. The Space Reclamation wizard opens.
- 4. Select the storage type on which to perform a space reclamation assessment and click Next.
- 5. (Optional) If the wizard finds volumes in the recycle bin, select the volumes to delete, and click Next.
- 6. (Optional) If the wizard finds unmapped volumes, select the volumes to delete, and click Next.
- 7. (Optional) If the wizard finds volumes that are destinations for replication, select the volumes to delete, and click Next.
- 8. (Optional) If the wizard finds volumes with snapshot overhead that is larger than 1 GB, select the volumes with snapshots that can be expired, and click **Next**.

For each volume selected, select the snapshots to expire and click Next.

(i) NOTE: The active snapshot and the latest snapshot cannot be expired.

- 9. (Optional) If the wizard finds volumes that can be migrated to another storage type, select the destination storage type, select the volumes to migrate, and click **Next**.
- On the Confirmation page, review the selected space reclamation actions.
 To perform the actions, select the I have reviewed all of the actions checkbox and click Next.
- 11. On the Summary page, view the status of the space reclamation actions and click Finish when the actions are complete.

Managing Storage Containers

A storage container is a pool of storage that is used in a VMware environment that supports VVols. Once created, you can view storage container summary, volume, and growth information. To use the storage container for VVols you must register the VMware vCenter Server and register the VASA provider using Dell Storage Manager client.

After a storage container has been created, you can use vCenter to create a datastore and map it (mount it) to the storage container. The datastore can then be used to create VVol-based VMs.

Details about storage containers are shown in the **Summary** tab when you select the **Volumes** node.

Create a Storage Container

Create a storage container to define storage options for virtual volumes (VVols).

About this task

i NOTE: Storage Center supports a maximum of 50 storage containers per Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- In the Volumes view, click +
 (New), and select New Storage Container. The Create Storage Container dialog box opens.
- **4.** Specify general information about the storage container:
 - a) In the Name field, type the name of the storage container.
 - b) In the Size field, type the size and select the unit of measurement from the drop-down menu.
 - c) To specify a volume folder as the location for the new storage container, select a folder from the **Volume Folder** drop-down menu.
 - d) In the **Storage Type** field, select a storage type from the drop-down list.
- 5. Specify the advertised capabilities for new volumes created within the storage container:
 - a) Specify whether to allow compression by selecting or clearing the **Compression Allowed** checkbox.
 - b) Specify whether to allow deduplication by selecting or clearing the **Deduplication Allowed** checkbox.
 - c) Specify whether to allow encryption by selecting or clearing the **Use Encryption** checkbox.
 - d) To specify the storage profiles to allow for new volumes created within the storage container, select profiles from the **Allowed Storage Profiles** table.
- 6. Specify the default settings for new volumes created within the storage container:
 - a) Select the default snapshot profile setting from **Snapshot Profile** drop-down menu.
 - b) Select the default storage profile setting from the Storage Profile drop-down menu.
 - c) Select the default data reduction profile setting from the Data Reduction Profile drop-down menu.
 - d) Select the default data reduction input setting from the Data Reduction Input drop-down menu.
- 7. Click OK.

Edit a Storage Container

Modify a storage container to edit its settings.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. Click the name of the storage container to modify.

- 4. Click 🖍 (Edit).
- The Edit Storage Container dialog box opens.
- 5. Modify the fields of the storage container as needed.
- 6. Click OK.

Delete a Storage Container

You can delete a storage container if it is not being used.

About this task

i NOTE: The Delete Storage Container task fails if you try to delete a storage container while any virtual volumes are associated with it.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. Click the name of the storage container to delete.
- Click iii (Delete).
 The Delete Storage Containers dialog box opens.
- 5. Click Yes.

View Storage Container Information

Use the Volumes view to display information about storage containers and virtual volumes (VVols).

Storage containers are accessible from the **Volumes** view along with other volumes. To view information about a storage container, click the name of the storage container.

When viewing information about a storage container, you can select the Summary, Volumes, and Growth tabs.

Managing Data Reduction

Data Reduction uses compression and deduplication to decrease the amount of disk space used by volume data.

Compression reduces the amount of space used by a volume by encoding data. Deduplication finds duplicate pages and removes them, conserving the disk space that would be used by additional copies. When deduplication is used, compression is also applied to a volume.

Supported Hardware Platforms

The following controller series support Data Reduction:

- SCv3000 Series (Supports Compression only)
- · SC4020
- · SC5020
- · SC5020F
- · SC7020
- · SC7020F
- · SC8000
- · SC9000

Data Eligible for Data Reduction

To reduce the impact of data reduction on read and write operations, a limited amount of data is eligible for compression and deduplication. Data Reduction Input limits the type of data that is eligible for data reduction. The following options are available for Data Reduction Input:

- Inaccessible Snapshot Pages Allows Data Reduction to process data frozen by a snapshot and made inaccessible by new data written over the original data in the snapshot.
- All Snapshot Pages Allows Data Reduction to process data frozen by a snapshot.

Change the Data Reduction Input

Change the type of data that compression and deduplication reduces.

Prerequisites

Data Reduction must be applied to the volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand the Data Reduction menu.
- 6. From the Data Reduction Input drop-down menu, select a Data Reduction input.
 - Inaccessible Snapshot Pages Data frozen by a snapshot that has become inaccessible because other data has been written over it
 - All Snapshot Pages Data frozen by a snapshot
- 7. Click OK to close the Edit Advanced Volume Settings dialog box.
- 8. Click OK.

Compression

Compression reduces the amount of space used by a volume by encoding data. Compression runs daily with Data Progression. To change the time at which compression runs, reschedule Data Progression. Compression does not run with an on-demand Data Progression.

When compressed data is read, it is temporarily uncompressed in memory until the read is complete. When compression is disabled, pages are permanently uncompressed during the next compression cycle, and the original compressed page is deleted as time and resources permit. When a volume is deleted or a snapshot is coalesced, the related compressed data is also deleted.

Deleted data might create gaps in the compressed page, which can be filled with new compressed data. In addition, compressed pages are defragmented during Data Progression to remove gaps and use space more efficiently.

The Compression Savings amount is determined by comparing the total amount of space saved from all compressed pages to the total amount of used space that is eligible for compression. For example, if compression saves 1 GB on a volume with 10 GB of used space that is eligible for compression, the amount saved is 10 percent.

Apply Data Compression to a Volume

Apply Data Compression to a volume to reduce disk space usage for that volume.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.

- **3.** On the **Volumes** view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand Data Reduction.
- 6. From the Data Reduction Profile drop-down list, select Compression.
- 7. Click **OK**.

Related tasks

Creating Volumes Modifying Volumes

Deduplication

Deduplication reduces the space used by a volume by identifying and deleting duplicate pages. Deduplication requires SSD drives.

Apply Deduplication With Compression to a Volume

Apply Deduplication with Compression to reduce the size of the volume. Deduplication and compression run during daily Data Progression.

Prerequisites

Allow Data Reduction Selection must be enabled in the **Preferences** tab of the Edit Storage Center Settings dialog box.

About this task

i NOTE: The amount of space saved by Data Reduction is determined by the amount of data eligible for Data Reduction on the volume compared to the total amount of space used by that data on disk after Data Reduction.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand Data Reduction.
- 6. From the Data Reduction Profile drop-down menu, select Deduplication with Compression.

View Amount of Space Saved by Data Reduction

The total amount of space saved by Data Reduction depends on the amount of data eligible for data reduction and the type of data being processed. Certain types of data will be reduced more effectively than others. The amount of volume data eligible for data reduction is determined by the size of the data frozen by snapshots, and the Data Reduction Input setting.

Data Savings Ratios

System Data Reduction Ratio and System Data Efficiency Ratio show the data savings on the Storage Center using the available disk space-saving features.

System Data Reduction Ratio – Ratio that compares the amount of space that would be used by pages that are eligible for compression and deduplication to the amount of space actually used by those pages after Storage Center applies Data Reduction.

System Data Efficiency Ratio - Ratio that indicates the efficiency of compression, deduplication, RAID, and Thin Provisioning

View Amount of Space Saved for a Storage Type

Storage Center determines the total percentage of space saved for all volumes in a storage type by comparing the amount of space processed by Data Reduction to the amount of space used after data reduction.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- Select a storage type. The space saved by data reduction is displayed in the Data Reduction Savings section.

View Amount of Space Saved by Data Reduction on a Volume

The percentage of space saved by data reduction for a volume is an estimate found by comparing the total amount of space saved by compression and deduplication with the total amount of space processed by data reduction in the volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to view.
- 4. Click the Tiering tab. The amount of space saved by data reduction on that volume is displayed at the bottom of the Tiering page.

Change the Default Data Reduction Profile

The default Data Reduction profile determines the type of data reduction that is applied to new volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- In the Summary view, click (Settings). The Edit Storage Center Settings dialog box opens.
- 3. Click the **Preferences** tab.
- 4. From the Data Reduction Profile drop-down list, select the default profile for new volumes.
 - · Select Compression to apply compression to new volumes.
 - Select Deduplication with Compression to apply deduplication and compression to new volumes.
 - i NOTE: Selecting the Allow Data Reduction Selection checkbox enables users to select the data reduction option to apply to a volume.

Pause or Resume Data Reduction

Pause Data Reduction on a volume to prevent deduplication and/or compression from running during data progression. Pausing Data Reduction on a volume pauses deduplication and/or compression on all view volumes created from the original volume. After pausing Data Reduction, compression and deduplication stop running on new data but the existing data is not uncompressed.

Pause or Resume Data Reduction for a Volume

Pausing Data Reduction for a volume prevents compression and deduplication from happening until Data Reduction is resumed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click
 (Edit).
 The Edit Volume dialog box opens.
- 5. Expand the Data Reduction option.
- 6. Pause or resume Data Reduction on the volume.
 - To pause Data Reduction, select the **Data Reduction Paused** checkbox.
 - To resume Data Reduction, clear the Data Reduction Paused checkbox.
- 7. Click **OK**.

Pause or Resume Data Reduction for all Volumes

Pausing Data Reduction from the Storage Center Edit Settings dialog box pauses compression and deduplication for all volumes in that Storage Center.

About this task

i NOTE: Pause Data Reduction cannot be applied to other Storage Centers from the Storage Center Edit Settings dialog box using inherit settings.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click the HOME menu. The Unisphere Central Home page is displayed.
- **3.** In the **Summary** view, click the Settings icon. The **Edit Storage Center Settings** dialog box opens.
- 4. Click the Storage tab.
- 5. Pause or resume Data Reduction.
 - To pause Data Reduction, select the **Pause Data Reduction** checkbox.
 - To resume Data Reduction, clear the **Pause Data Reduction** checkbox.
- 6. Click OK.

Disable Data Reduction for a Volume

Disabling Data Reduction on a volume permanently uncompresses the reduced data starting the next data progression cycle.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- 3. In the Volumes view, select the volume you want to modify.
- Click / (Edit). The Edit Volume dialog box opens.
- 5. Expand the **Data Reduction** option.

- 6. From the Data Reduction Profile drop-down menu, select None.
- 7. Click OK.

Managing Snapshot Profiles

A Snapshot Profile is a collection of rules describing when to take periodic snapshots for one or more volumes and the time at which snapshots are deleted (expired).

A snapshot is a point-in-time copy (PITC) of one or more volumes. Storage Center snapshots differ from traditional snapshots/PITCs because blocks of data or pages are frozen and not copied. No user data is moved, making the process efficient in both time taken to complete the snapshot, and space used by snapshots.

NOTE: If two or more snapshots are scheduled to be created at the same time for a given volume, the Storage Center creates only one snapshot. The snapshot that has the longest expiration time is created, and the other scheduled snapshots are ignored.

Default Snapshot Profiles

By default, Storage Center provides two standard snapshot profiles that cannot be deleted.

- Daily Creates a snapshot every day at 12:01 AM, and expires the snapshot in one week.
- Sample Applies three schedule rules:
 - Creates a snapshot every 12 hours between 12:05 AM and 6 PM, expiring in five days.
 - Creates a snapshot on the first day of every month at 11:30 PM, expiring in 26 weeks.
 - Creates a snapshot every Saturday at 11:30 PM, expiring in 5 weeks.

Consistent and Non-Consistent Snapshot Profiles

When a snapshot is taken for a volume, I/O is halted to allow the operation to take place. A consistent snapshot profile halts I/O to all associated volumes until a snapshot is taken for each volume, ensuring that the snapshots contain data for the same time period. A non-consistent snapshot profile creates snapshots for associated volumes without guaranteeing that the snapshots will finish at the same time, which is less resource intensive.

Consistent Snapshot Profile	Non-Consistent Snapshot Profile	
Halts I/O across all volumes as a group	Halts I/O for each volume independently of other volumes.	
Resource intensive	Less resource intensive — depends on the amount of data written since the previous snapshot	
Number of volumes limited based on storage controller.	No limit to the number of volumes to which the snapshot profile is	
 SC8000, SC9000, SC7020, and SC7020F: 100 SC5020 and SC5020F: 50 SC4020: 40 SCv2000 and SCv3000 series: 25 	attached	
Snapshots are taken of all volumes simultaneously	Choose between standard (one volume at a time) or parallel (all volumes simultaneously)	
Can set an alert if snapshots cannot be completed within a defined time. Snapshots not completed before alert is generated are not taken. (This suspension can lead to incomplete groups of snapshots across volumes.)	All snapshots are taken	
Can delete incomplete group of snapshots	All snapshots are taken	
Can be converted to Non-Consistent snapshot profile	Can be converted to Consistent snapshot profile	

Creating and Applying Snapshot Profiles

To create and expire snapshots automatically, create a snapshot profile and apply it to one or more volumes or servers.

(i) NOTE: For user interface reference information, click Help.

Create a Snapshot Profile

Create a Snapshot Profile to define automated snapshot creation and expiration schedules that can be applied to volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click Snapshot Profiles.
- Click + Vew and select New Snapshot Profile from the menu. The New Snapshot Profile dialog box opens.
- 5. In the Name field, type a name for the snapshot profile.
- 6. Add a rule to the Snapshot Profile.
 - a) Click Add Rule. The Add Rule dialog box opens.
 - b) From the drop-down menu, select the frequency at which the rule runs.
 - c) Configure the dates and times at which you want snapshots to be created.
 - d) In the Expiration field, type the length of time to keep snapshots before deleting them.
 - e) Click OK. The Add Rule dialog box closes.
- 7. (Optional) Create additional rules as necessary.
- 8. From the **Snapshot Creation Method** drop-down menu, select an option to control how snapshots triggered by the snapshot profile are created.
 - Standard When selected, takes snapshots in series for all volumes associated with the snapshot.
 - **Parallel** When selected, takes snapshots simultaneously for all volumes associated with the snapshot.
 - Consistent When selected, halts I/O and takes snapshots for all volumes associated with the snapshot. Provides options for timing out snapshot creation and expiring incomplete snapshots.
- 9. Click OK.

Apply a Snapshot Profile to One or More Volumes

To add snapshot creation and expiration schedules to a volume, associate a snapshot profile with the volume.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click **Snapshot Profiles**.
- 4. Select the profile to use from the **Snapshot Profile** section.
- 5. Click Apply to Volumes. The Apply to Volumes dialog box opens.
- 6. Select the volumes to which you want to apply the snapshot profile. To select individual volumes in a volume folder, expand the folder and select each volume individually.
- 7. (Optional) To remove existing snapshot profiles from the selected volumes, select Replace existing Snapshot Profiles.
- 8. Click OK.

Apply a Snapshot Profile to a Server

To add snapshot creation and expiration schedules to all volumes mapped to a server, associate a Snapshot Profile with the server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click Snapshot Profiles.
- 4. Select the profile to use from the Snapshot Profile section.
- 5. Click Apply to Server. The Apply to Server dialog box opens.
- 6. Select the server to which you want to apply the Snapshot Profile. To select individual servers in a server cluster, expand the cluster and select each server individually.
 - i NOTE: If you apply a Snapshot Profile to a server cluster, the Snapshot Profile is applied only to the volumes that are mapped directly to the server cluster. Volumes that are mapped exclusively to servers that belong to the cluster are not affected.
- 7. (Optional) To remove existing Snapshot Profiles from the selected server, select Replace existing Snapshot Profiles.
- 8. Click OK.

Create a Snapshot for all Volumes Associated with a Snapshot Profile

You can create a snapshot for all volumes associated with a Snapshot Profile instead of manually creating a snapshot for each volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click Snapshot Profiles.
- 4. Click + and select New Snapshot Profile from the menu. The New Snapshot Profile dialog box opens.
- 5. In the Expire Time field, type the number of minutes, hours, days, or weeks to keep the snapshot before deleting it. If you do not want the snapshot to expire, select Do Not Expire.
- 6. (Optional) In the Description field, type a description of the snapshot. The default descriptive text is "Manually Created."
- 7. Click OK.

Modifying Snapshot Profiles

Modify a snapshot profile to change the automated snapshot creation and expiration schedules that are applied to the associated volumes. Changes to a snapshot profile affect only new snapshots taken with the modified snapshot profile. Existing snapshots are not changed.

i NOTE: For user interface reference information, click Help.

Rename a Snapshot Profile

Use the Edit Snapshot Profile dialog box to rename a snapshotprofile.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click Snapshot Profiles.

- 4. Select the profile to rename in the Snapshot section.
- Click / (Edit). The Edit Snapshot Profile dialog box opens.
- 6. In the Name field, type a new name for the snapshotprofile.
- 7. Click OK.

Modify Rules for a Snapshot Profile

Snapshot Profile rules determine when snapshots are created and expired.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the **Profiles** view, click **Snapshot Profiles**.
- **4.** Select the profile to modify in the Snapshot section.
- Click / (Edit). The Edit Snapshot Profile dialog box opens.
- 6. (Optional) Add a rule to the snapshot profile.
 - a) Click + under the Rules heading. The **Add Rule** dialog box opens.
 - b) In the **Expiration** field, type the length of time to keep snapshots before deleting them.
 - c) Select the **Schedule Type** to set the frequency at which the rule runs.
 - d) Configure the dates and times at which you want snapshots to be created.
 - e) Click **OK**.
- 7. (Optional) Modify the existing rules as needed.
 - To modify a rule, select the rule, then click 🖍 (Edit).
 - To remove a rule, select the rule, then click $\overline{\mathbf{m}}$ (Delete).
- 8. Click OK.

Change the Snapshot Creation Method for a Snapshot Profile

The snapshot creation method controls how snapshots triggered by the snapshotprofile are created.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles.
- The **Profiles** view is displayed.
- 3. In the **Profiles** view, click **Snapshot Profiles**.
- 4. Select the profile to modify in the Snapshot section.
- Click / (Edit). The Edit Snapshot Profile dialog box opens.
- 6. From the **Snapshot Creation Method** drop-down menu, select an option to control how snapshots triggered by the snapshotprofile are created.
 - Standard When selected, takes snapshots in series for all volumes associated with the snapshot.
 - Parallel When selected, takes snapshots simultaneously for all volumes associated with the snapshot.
 - **Consistent** When selected, halts I/O and takes snapshots for all volumes associated with the snapshot. Provides options for timing out snapshot creation and expiring incomplete snapshots.
- 7. Click OK.
Delete a Snapshot Profile

A snapshot profile cannot be deleted if it is being used by any volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click Snapshot Profiles.
- 4. Select the snapshot profile to delete.
- 5. Make sure the snapshot profile is not in use by any volumes.
- Click (Delete).
 A confirmation dialog box is displayed.
- 7. Click Yes.

Managing Expiration Rules for Remote Snapshots

By default, snapshot profiles applied to remote volumes have the same rules for expiration as for local volumes. However, you can specify different expiration rules for remote volumes if needed. Remote Snapshots are applicable only to Storage Centers that are managed by a Data Collector.

(i) NOTE: For user interface reference information, click Help.

Create Snapshot Profile Expiration Rules for Remote Snapshots

Create remote expiration rules for a snapshot profile if you want the remote snapshots to expire on a different schedule than the local snapshots.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view click the Snapshot Profiles tab.
- 4. Click Rules subtab.
- Click Edit Remote Snapshot Expiration. The Edit Remote Snapshot Expiration dialog box opens.
- 6. Configure the remote snapshot expiration rule.
 - a) Select one or more Storage Centers for which you want to specify an expiration rule for remote snapshots.
 - b) In the **Remote Expiration** field, specify the number of minutes, hours, days, or weeks to keep the remote snapshot before deleting it.
 - c) Click OK.

Modify a Snapshot Profile Expiration Rule for Remote Snapshots

Modify a remote expiration rule for a snapshot profile to change the time at which remote snapshots are expired.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click the Snapshot Profiles tab.
- 4. Click the Remote Expiration Rules subtab.

- Select the remote expiration rule to modify and click (Edit Remote Snapshot Expiration). The Edit Remote Snapshot Expiration dialog box opens.
- 6. Configure the remote snapshot expiration rule.
 - a) In the **Remote Expiration** field, specify the number of minutes, hours, days, or weeks to keep the remote snapshot before deleting it.
 - b) Click OK.

Managing Storage Profiles

Storage Profiles determine the RAID level and tiers on which data is stored.

(i) NOTE: For user interface reference information, click Help.

Create a Storage Profile (Storage Center 7.2.1 and Earlier)

Create a storage profile to specify custom RAID level and tier settings that can be applied to one or more volumes.

Prerequisites

In the Storage Center User Volume Defaults, the Allow Storage Profile selection checkbox must be selected.

About this task

i NOTE: SCv2000 series controllers cannot create storage profiles.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click the Storage Profiles tab.
- Click + (New).
 The New Storage Profile dialog box opens.
- **5.** Configure the storage profile.
 - a) Type a name for the storage profile in the **Name** field.
 - b) Select the RAID levels to use for volumes associated with the storage profile from the RAID Type Used drop-down menu.
 - c) In the **Tiers Used** area, select the checkboxes of the storage tiers (disk classes) that can be used for volumes associated with the storage profile.
- 6. Click OK.

Create a Storage Profile (Storage Center 7.2.10 and Later)

Create a storage profile to specify custom RAID level and tier settings that can be applied to one or more volumes.

Prerequisites

In the Storage Center User Volume Defaults area, the Allow Storage Profile selection checkbox must be selected.

About this task

(i) NOTE: SCv2000 series storage systems cannot create Storage Profiles.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles.

The **Profiles** view is displayed.

- 3. In the Profiles view, click the Storage Profiles tab.
- 4. Click + (New).
 - The **New Storage Profile** dialog box opens.
- 5. Configure the storage profile.
 - a) Type a name for the storage profile in the Name field.
 - b) Select the storage tier (disk class) that will be used for data writes for volumes associated with the storage profile from the **Write Tier** drop-down menu.
 - c) Select the RAID level to use for volumes associated with the storage profile from the Write RAID Type drop-down menu.
 - d) Select the RAID level to use for snapshot data in tier 1 from the **Tier 1** drop-down menu.
 - e) Select the RAID level to use for snapshot data in tier 2 from the Tier 2 drop-down menu.
 - f) Select the RAID level to use for snapshot data in tier 3 from the Tier 3 drop-down menu.
- 6. Click OK.

Apply a Storage Profile to One or More Volumes

Apply a storage profile to a volume to specify the RAID level and tiers used by the volume.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the **Profiles** view, click the **Storage Profiles** tab.
- 4. Select the storage profile to apply to a volume .
- Click Apply to Volumes. The Apply to Volumes dialog box opens.
- 6. Select the volumes to which you want to apply the storage profile.
- 7. Click OK.

Apply a Storage Profile to a Server

Apply a storage profile to a server to specify the RAID level and tiers used by all volumes that are mapped to the server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the **Profiles** view, click the **Storage Profiles** tab.
- 4. Select the storage profile to apply to a server .
- Click Apply to Server Volumes. The Apply to Server Volumes dialog box opens.
- 6. Select the server to which you want to apply the storage profile.
- 7. Click OK.

Delete a Storage Profile

Delete a storage profile if it is no longer needed.

Prerequisites

• The Allow Storage Profile Selection checkbox must be selected in the Configure User Preferences dialog box of the Storage Center user.

· The storage profile cannot be applied to any volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the **Profiles** view, click **Storage Profiles**.
- 4. In the Storage Profile section, select the storage profile to delete.
- Click (Delete).
 A confirmation dialog box is displayed.
- 6. Click Yes.

Managing QoS Profiles

QoS profiles describe QoS settings that can be applied to volumes.

By defining QoS profiles to apply to volumes, you potentially limit I/Os that the volumes can perform, and also define their relative priority during times of congestion.

You can also define a group QoS profile that can be applied to multiple volumes to limit the I/Os that the volumes can do in aggregate.

Create a QoS Profile

QoS profiles include a set of attributes that control the QoS behavior for any volume to which it is applied.

Prerequisites

- To enable users to set QoS profiles for a Storage Center, the **Allow QoS Profile Selection** option must be selected on the Storage Center Preferences settings.
- To enable QoS profiles to be enforced, the QoS Limits Enabled and Server Load Equalizer Enabled options must be selected on the Storage Center Storage settings.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles.

The **Profiles** view is displayed.

- 3. In the Profiles view, click **GoS Profiles**.
- $\textbf{4.} \quad \text{In the } \textbf{Gos Profiles} \text{ area, select the type of profile to create.}$
 - Volume
 - Group
- 5. Click + (New).
 - The New QoS Profile dialog box opens.
- 6. Configure the QoS profile.
 - a) In the **Name** field, type a name for the QoS profile.
 - b) (Optional for volume QoS profiles only) In the **Relative Priority** field, select the priority of profile in relation to other QoS profiles. To specify a custom relative priority, select **Custom** and type a number in the **Priority Value** field.
 - c) (Optional for volume QoS profiles only) Select **Enable Latency Threshold Alert**, then type a latency threshold alert value is ms.
 - d) (Optional) Select Limit by IOPS, then type a value for the maximum IOPS allowed.
 - e) (Optional) Select Limit by Bandwidth, then type a value for the maximum MB/sec allowed.
- 7. Click **OK**.

Edit a QoS Profile

Modify the QoS profile to change the attributes that control the QoS for any volume or group to which it is applied.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the **Profiles** view, click **Qos Profiles**.
- 4. In the QoS Profile section select the QoS profile you want to modify.
- Click (Edit). The Edit QoS Profile dialog box opens.
- 6. Where allowed, modify the values. The profile type field cannot be modified.
- 7. Click OK.

Delete a QoS Volume Profile

Delete a QoS profile for a volume.

Prerequisites

Only QoS profiles that are not currently in use by any volume can be deleted. The Default QoS Volume profile cannot be deleted even if there are no volumes assigned to it. Group QoS Profiles can be removed or reassigned; however, Volume QoS profiles can be reassigned only.

Steps

- 1. In the **Storage** tab navigation tab, expand **QoS Profiles** and select the profile to be deleted.
- Right-click the profile and select **Delete**. A confirmation dialog box opens to request approval for the deletion.
- 3. Click OK.
- 4. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 5. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 6. In the Profiles view, click QoS Profiles.
- 7. Select the QoS profile to delete and click iii (Delete).

Apply a QoS Profile to a Volume

Apply a previously defined QoS profile to a volume.

Prerequisites

The QoS profile must already exist.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click QoS Profiles.
- 4. In the QoS Profiles section select the profile to apply.
- 5. Select Apply to Volumes.

The Apply to Volumes dialog box opens.

- 6. Select the checkbox next to each volume to which you want to apply the QoS profile.
- 7. Click OK.

Remove a Group QoS Profile From a Volume

Remove a Group QoS profile previously associated with one or more volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Profiles. The Profiles view is displayed.
- 3. In the Profiles view, click QoS Profiles.
- 4. Select the Group QoS profile to be removed and click Remove Group Profile from Volume.
- 5. Select the checkbox next to each volume from which you want to remove the QoS profile.
- 6. Click OK.

Importing Volumes from an External Storage Array

Storage Center can import volumes from an EqualLogic PS Series Storage Array or an MD Series Storage Array. There are two methods for importing data from an external device, offline and online.

- · Offline import migrates a Volume from the source to the destination. The volume must then be mapped to the server after the import.
- Online import creates a destination volume, maps it to the server, then migrates the data to the destination volume. I/O from the server continues to both the destination and source volumes during the import process. Importing using the Online method can take longer than offline due to I/O continuing to the volume from the server.

Connect to an External Storage Array (iSCSI)

After cabling an external device to Storage Center using iSCSI, configure Storage Center to communicate with the external device.

Prerequisites

The external device must be connected to the controller using iSCSI.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **DATA MOBILITY** menu, click **Imports**. The **Imports** view is displayed.
- 3. Click the Connections tab.
- 4. Click Create iSCSI Remote Connection. The Create iSCSI Remote Connection dialog box opens.
- 5. In the **Remote IPv4 Address** field, type the IPv4 address of the external device.
- 6. From the **iSCSI Network Type** drop-down menu, select the speed of the iSCSI network.
- 7. Click OK.

Scan for External Devices

After connecting an external device to the controller, useUnisphere to locate the device and add it to the system.

Prerequisites

The external device must be connected to the controller using iSCSI.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the DATA MOBILITY menu, click Imports. The Imports view is displayed.
- 3. Click the External Devices tab.
- **4.** Click **Scan for External Devices**. A confirmation dialog box is displayed.
- 5. Click Yes.

Unisphere identifies external devices connected to the system and adds them to the External Devices view.

Rediscover an iSCSI Remote Connection

If a remote connection is lost, you can rediscover and reconnect to the external device.

Prerequisites

The external device must be connected to the controller using iSCSI.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the DATA MOBILITY menu, click Imports. The Imports view is displayed.
- 3. Click the Connections tab.
- **4.** Click **Rediscover iSCSI Remote Connections**. A confirmation dialog box is displayed.
- 5. Click Yes.

Unisphere identifies external devices connected to the system that allow discovery, and adds them to the Connections view.

Delete a Remote Connection

Use the Data Mobility menu to remove a remote connection when it is no longer needed.

Prerequisites

The external device must be connected to the controller using iSCSI.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the DATA MOBILITY menu, click Imports. The Imports view is displayed.
- 3. Click the Connections tab.
- 4. Select the connection to remove.
- 5. Click Delete iSCSI Remote Connection. A confirmation dialog box is displayed.
- 6. Click Yes.

Storage Center Import Requirements

A Storage Center storage system must meet the following requirements to import data from a PS Series storage array.

Component

Requirement

Storage Center

Version 7.1 or later

Component	Requirement
Connectivity	iSCSI
Network	Low-latency, high-bandwidth

Import Data from an External Device (Offline)

Importing data from an external device copies data from the external device to a new destination volume in Storage Center. Complete the following task to import data from an external device.

Prerequisites

- · An external device must be connected into the Storage Center.
- The destination volume must be unmapped from the server.

About this task

i NOTE: Before importing data from an external device, review *Data Migration from Dell PS Series or PowerVault MD3 to Dell EMC SC Series Storage using Thin Import* located in the Dell Knowledge Base.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the DATA MOBILITY menu, click Imports. The Imports view is displayed.
- 3. Click the External Devices tab.
- 4. Click Offline Import From External Device. The Offline Import From External Device dialog box opens.
- **5.** Modify the import settings as needed.
- 6. Click OK.

Import Data from an External Device (Online)

To import data from an external device in online mode, create a destination volume on the Storage Center and map it to the server. I/O from the server continues to both the destination and source volumes during the import. Importing using the Online method can take longer than offline due to I/O continuing to the volume from the server.

Prerequisites

- · An external device must be connected into the Storage Center.
- The destination volume must be unmapped from the server.

About this task

i NOTE: Before importing data from an external device, follow the instructions in the *Thin Import Data Migration Guide* located on Dell TechCenter.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the DATA MOBILITY menu, click Imports. The Imports view is displayed.
- 3. Click the External Devices tab.
- 4. From the Server drop down box select the server to map to the destination volume.
- 5. Click Online Import from External Device. The Online Import from External Device dialog box opens.
- 6. Modify the import settings as needed.

7. Click **OK**.

Restart an External Device Import

If an external device import becomes unresponsive, use this procedure to restart the process.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **DATA MOBILITY** menu, click **Imports**. The **Imports** view is displayed.
- 3. Click the External Devices tab.
- **4.** Click **Restart External Device Import**. A confirmation dialog box is displayed.
- 5. Click Yes.

Storage Center Server Administration

6

Unisphere allows you to allocate storage on a Storage Center to the servers in your SAN environment.

To present storage to a server, a server object must be added to the Storage Center.

Topics:

Managing Servers on a Storage Center

Managing Servers on a Storage Center

Use the **Servers** view to create and manage server objects for a Storage Center.

	Unispl	here for SC Series			() Tasks	🖵 Tell us wh	at you think!	🛓 Admin 🗸	🐮 ? Y
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		DB Servers		0%	0 MB	0 MB	0 MB	0 MB	0
		Virtualization Servers		40.92%	4.63 TB	1.90 TB	2.74 TB	761.97 GB	6
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Figure 3. Unisphere Servers View

(i) NOTE: Server Agent features are not supported in Unisphere.

Related concepts

Creating Servers Modifying Servers Mapping Volumes to Servers Creating and Managing Server Folders Deleting Servers and Server Folders

Creating Servers

Create a server to allow a Storage Center to pass I/O through the ports on that server. After a server is created, volumes can be mapped to it.

i NOTE: For user interface reference information, click Help.

Create a Physical Server

Create a physical server object to represent a physical server in your environment.

Steps

1. Make sure the server HBAs have connectivity to the Storage Center HBAs.

- **iSCSI** Configure the iSCSI initiator on the server to use the Storage Center HBAs as the target.
- Fibre Channel Configure Fibre Channel zoning to allow the server HBAs and Storage Center HBAs to communicate.
- SAS Directly connect the controller to a server using SAS ports configured as front-end connections.
- 2. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 3. From the STORAGE menu, click Servers. The Servers view is displayed.
- Click +
 (New), then select New Server. The New Server dialog box opens.

5. Configure the server attributes.

The server attributes are described in the online help.

- a) Enter a name for the server in the **Name** field.
- b) Select a server folder from the Server Folder drop-down menu.
- c) Select the operating system for the server from the **Operating System** drop-down menu.
- d) To generate Storage Center alerts when connectivity is lost between the Storage Center and the server, select **Alert On Lost Connectivity**.
- e) To generate Storage Center alerts when the Storage Center only has partial connection to the server, select **Alert On Partial Connectivity**.
- f) Select or define one or more HBAs for the server.
 - · If one or more server HBAs are visible to the Storage Center, select the checkboxes of the HBAs to add from the HBAs table.
 - If a server HBA is not visible to the Storage Center, click + (New) to define it manually. For SAS front-end connections, use the SAS device name as the World Wide Name (WWN) to manually add the HBA.

i NOTE: IP addresses can be added for HBAs that will be installed on the server in the future. When the HBA that uses that IP address is installed, it will be configured and ready to use.

6. Click OK.

Related tasks

Configure Front-End I/O Ports (Fibre Channel and SAS) Configure Front-End I/O Ports (iSCSI)

Create a Virtual Server

Create a virtual server object to represent a virtual machine in your environment.

Prerequisites

The server that hosts the virtual server must be added as a physical server.

Steps

- 1. Make sure the server HBAs have connectivity to the Storage Center HBAs.
 - **iSCSI** Configure the iSCSI initiator on the server to use the Storage Center HBAs as the target.
 - Fibre Channel Configure Fibre Channel zoning to allow the server HBAs and Storage Center HBAs to communicate.
 - SAS Directly connect the controller to a server using SAS ports configured as front-end connections.
- 2. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 3. From the STORAGE menu, click Servers.
 - The **Servers** view is displayed.
- 4. Select the server that hosts the virtual server in the Server view.
- 6. Configure the server attributes.

The server attributes are described in the online help.

- a) Enter a name for the server in the **Name** field.
- b) Select the operating system for the server from the **Operating System** drop-down menu.

- c) To generate Storage Center alerts when connectivity is lost between the Storage Center and the server, select **Alert On Lost Connectivity**.
- d) Select or define one or more HBAs for the server.
 - If one or more server HBAs are visible to the Storage Center, select the checkboxes of the HBAs to add from the HBAs table.
 - If a server HBA is not visible to the Storage Center, click + (New) to define it manually. For SAS front-end connections, use the SAS device name as the World Wide Name (WWN) to manually add the HBA.

i NOTE: IP addresses can be added for HBAs that will be installed on the host server in the future. When the HBA that uses that IP address is installed, it will be configured and ready to use.

7. Click **OK**.

Related tasks

Configure Front-End I/O Ports (Fibre Channel and SAS) Configure Front-End I/O Ports (iSCSI)

Create a Server Cluster

Create a server cluster object to represent a cluster of servers in your environment.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Click **+**▼ (New), then select New Server Cluster. The New Server Cluster dialog box opens.
- **4.** Configure the server cluster attributes.

The server attributes are described in the online help.

- a) Enter a name for the server in the Name field.
- b) Select a server folder from the Server Folder drop-down menu.
- c) From the **Operating System** drop-down menu, select the operating system for the cluster.

(i) NOTE: All servers in a server cluster must be running the same operating system.

- d) To generate Storage Center alerts when connectivity is lost between the Storage Center and the servers, select **Alert On Lost Connectivity**.
- e) To generate Storage Center alerts when the Storage Center only has partial connectivity to the servers, select **Alert On Partial Connectivity**.
- 5. Add servers to the server cluster.
 - To add existing servers to the cluster, select the checkboxes of the servers to add from the Servers table.
 - To define a new server, click + (New), configure the server attributes, and then click OK.
- 6. Click OK.

Modifying Servers

Modify a server to change its attributes, apply a Snapshot Profile, and add or remove HBAs.

Rename a Server

A server object can be renamed at any time, and the name does not need to match the host name or IP address of the server.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Servers. The Servers view is displayed.

- 3. Select the server.
- Click / (Edit). The Edit Server dialog box opens.
- 5. Type a name for the server in the Name field.
- 6. Click OK.

Move a Server to a Different Server Folder

For convenience, server objects can be organized by folders.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server.
- 4. Click Move.
 - The Move to Folder dialog box opens.
- 5. Select the folder to which to move the server.
- 6. Click OK.

Change the Operating System of a Server

If you installed a new operating system or upgraded the operating system on a server, update the corresponding server object accordingly.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Select the server.
- 4. Click 🖍 (Edit).

The Edit Server dialog box opens.

- 5. Select the operating system for the server from the Operating System drop-down list.
- 6. Click OK.

Apply One or More Snapshot Profiles to a Server

Associate a Snapshot Profile with a server to add snapshot creation and expiration schedules to all volumes that are currently mapped to a server. Volumes that are subsequently mapped to the server do not inherit the snapshot creation and expiration schedules.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server.
- Click ... (More Actions), then select Apply Snapshot Profiles. The Select the Snapshot Profiles dialog box opens.
- 5. Select the Snapshot Profiles to assign to the server from the top pane of the dialog box.
- 6. To replace the existing Snapshot Profiles for each volume mapped to the server, select the **Replace Existing Snapshot Profiles** checkbox.
- 7. Click OK.

Add a Server to a Server Cluster

You can add a server to a server cluster.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Select the server to add to the cluster.
- Click ... (More Actions), then select Add to Cluster. The Add Server to Cluster dialog box opens.
- 5. Select the server cluster to which to add the server.
- 6. Click OK.

Remove a Server from a Server Cluster

You can remove a server object from a server cluster at any time.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Expand the server cluster.
- 4. Select the server to remove from the server cluster.
- 5. Click ... (More Actions), then select Remove from Cluster. The Remove Server from Cluster dialog box opens.
- 6. Click Yes.

Convert a Physical Server to a Virtual Server

If you migrated a physical server to a virtual machine, change the physical server object to a virtual server object and select the host physical server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the physical server to convert to a virtual server.
- **4.** Click ... (More Actions), then select Convert to Virtual Server. The Convert to Virtual Server dialog box opens.
- 5. Select the parent server or server cluster that hosts the virtual server.
- 6. Click OK.

Convert a Virtual Server to a Physical Server

If you migrated a virtual machine to a physical server, modify the corresponding virtual server object accordingly.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Servers. The Servers view is displayed.

- 3. Select the virtual server to convert to a physical server.
- Click ... (More Actions), then select Convert to Physical Server. The Convert to Physical Server dialog box opens.
- 5. Click OK.

Add One or More HBAs to a Server

To map a volume to a server, the Storage Center must be able to communicate with at least one HBA on the server.

Steps

- 1. Make sure the server HBAs have connectivity with the Storage Center HBAs.
 - · Fibre Channel Configure Fibre Channel zoning to allow the server HBAs and Storage Center HBAs to communicate.
 - **iSCSI** Configure the iSCSI initiator on the server to use the Storage Center HBAs as the target.
 - **SAS** Directly connect the controller to a server using the SAS front-end connections.
- 2. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- **3.** From the STORAGE menu, click Servers. The Servers view is displayed.
- 4. Select the server.
- Click ... (More Actions), then select Add HBAs. The Add HBAs to Server dialog box opens.
- 6. Select or define one or more HBAs for the server.
 - If one or more server HBAs are visible to the Storage Center, select the checkboxes of the HBAs for the server.
 - If a server HBA is not visible to the Storage Center, click Manually Add HBA to define an HBA manually.
 - (i) NOTE: For SAS front-end ports, use the SAS device name as the world wide name to manually add the HBA.
- 7. Click OK.

Related tasks

Configure Front-End I/O Ports (Fibre Channel and SAS) Configure Front-End I/O Ports (iSCSI)

Remove One or More HBAs from a Server

If a server HBA has been repurposed and is no longer used to communicate with the Storage Center, remove it from the server object.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server.
- 4. Click ... (More Actions), then select Remove HBAs. The Remove HBAs from Server dialog box opens.
- 5. Select the checkboxes of the HBAs to remove from the server.
- 6. Click OK.

Mapping Volumes to Servers

Map a volume to a server to allow the server to use the volume for storage.

Map a Volume to a Server

Map a volume to a server to allow the server to use it.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server.
- Click Map Volume to Server. The Map Volume to Server wizard opens.
- 5. In the Volume area, select the volume you want to map to the server.
- 6. Click Next. The Map Volume to Server wizard advances to the next page.
- 7. (Optional) Configure LUN settings, restrict mapping paths, or present the volume as read-only.
- 8. Click Finish.

Unmap One or More Volumes From a Server

If a server no longer uses a volume, you can unmap the volume from the server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server.
- Click ... (More Actions), then select Remove Volume Mappings. The Remove Mappings dialog box opens.
- 5. Select the checkboxes of the volumes to unmap from the server.
- 6. Click OK.

Create a Volume and Map it to a Server

If a server requires additional storage and you do not want to use an existing volume, you can create and map a volume to the server in a single operation.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server to which to map a new volume.
- Click +

 (New), then select New Volume.
 The New Volume select box opens.
- 5. Leave the Volume Count field set to 1.
- 6. Type a name for the volume in the Name field.
- 7. Select a unit of storage from the drop-down menu and enter the size for the volume in the **Configured Size** field. The available storage units are bytes, kilobytes (KB), megabytes (MB), gigabytes (GB), and terabytes (TB).
- 8. Select a parent folder for the volume from the Volume Folder drop-down menu.
- 9. To force all data written to the to the lowest tier, select the Import to Lowest Tier checkbox.
- 10. (Optional) Configure the remaining volume attributes as needed.
 - To allocate storage to the volume before the volume is mapped to the server, select the Preallocate Storage checkbox.

- (i) NOTE: When a volume is preallocated, the Storage Center allocates all of the space on the volume to the server. The Free Space of the volume is 0 MB and the Used/Active Space of the volume is the equal to the size of volume on Storage Center. To keep the volume preallocated when it is formatted on the server, the SCSI UNMAP feature must be disable on the server.
- To schedule snapshot creation and expiration for the volume, apply one or more Snapshot Profiles by clicking **Change** located to the right of **Snapshot Profiles**. The default Snapshot Profile is Daily.
- To configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only, click **Advanced Mapping**.
- To prevent snapshots from being created by a Snapshot Profile, select the **Pause Snapshot Creation** checkbox.
- To temporarily stop snapshot expiration, select the **Pause Snapshot Expiration** checkbox.
- To allow space management snapshots to be combined into the next scheduled or manual snapshot, select the Allow Snapshots to coalesce into active Snapshot checkbox.
- To use specific disk tiers and RAID levels for volume data, select the appropriate Storage Profile from the **Storage Profile** dropdown menu.

i NOTE: Using the Recommended Storage Profile allows the volume to take full advantage of data progression.

- If more than one Storage Type is defined on the Storage Center, select the Storage Type to provide storage from the **Storage Type** drop-down menu.
- To change the volume QoS profile for the volume, select a profile from the Volume QoS Profile drop-down menu.
- To change the group QoS profile for the volume, select a profile from the **Group QoS Profile** drop-down menu.
- To enable Data Reduction, select the **Compression** checkbox and select either **Compression** or **Deduplication with Compression** from the **Data Reduction Profile** drop-down menu.

11. Click OK.

Related concepts

Modifying Volumes

Create Multiple Volumes Simultaneously and Map Them to a Server

If a server requires additional storage and you do not want to use existing volumes, you can create and map multiple volumes to the server in a single operation.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Select the server to which to map new volumes.
- Click +
 (New), then select New Volume.
 The New Volume dialog box opens.
- 5. In the **Volume Count** field, type the number of volumes to create.
- 6. Type a name for the volume in the Name field.
- 7. Select a unit of storage from the drop-down menu and enter the size for the volume in the **Configured Size** field. The available storage units are bytes, kilobytes (KB), megabytes (MB), gigabytes (GB), and terabytes (TB).
- 8. Select a parent folder for the volume from the **Volume Folder** drop-down menu.
- 9. To force all data written to the to the lowest tier, select the Import to Lowest Tier checkbox.
- **10.** (Optional) Configure the remaining volume attributes as needed.
 - To allocate storage to the volume before the volume is mapped to the server, select the **Preallocate Storage** checkbox.
 - (i) NOTE: When a volume is preallocated, the Storage Center allocates all of the space on the volume to the server. The Free Space of the volume is 0 MB and the Used/Active Space of the volume is the equal to the size of volume on Storage Center. To keep the volume preallocated when it is formatted on the server, the SCSI UNMAP feature must be disable on the server.
 - To schedule snapshot creation and expiration for the volume, apply one or more Snapshot Profiles by clicking **Change** located to the right of **Snapshot Profiles**. The default Snapshot Profile is Daily.
 - To configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only, click **Advanced Mapping**.

- To prevent snapshots from being created by a Snapshot Profile, select the Pause Snapshot Creation checkbox.
- To temporarily stop snapshot expiration, select the **Pause Snapshot Expiration** checkbox.
- To allow space management snapshots to be combined into the next scheduled or manual snapshot, select the Allow Snapshots to coalesce into active Snapshot checkbox.
- To use specific disk tiers and RAID levels for volume data, select the appropriate Storage Profile from the Storage Profile dropdown menu.

(i) NOTE: Using the Recommended Storage Profile allows the volume to take full advantage of data progression.

- If more than one Storage Type is defined on the Storage Center, select the Storage Type to provide storage from the Storage
 Type drop-down menu.
- To change the volume QoS profile for the volume, select a profile from the Volume QoS Profile drop-down menu.
- To change the group QoS profile for the volume, select a profile from the Group QoS Profile drop-down menu.
- To enable Data Reduction, select the **Compression** checkbox and select either **Compression** or **Deduplication with Compression** from the **Data Reduction Profile** drop-down menu.
- 11. Click OK.

Related concepts

Modifying Volumes

Creating and Managing Server Folders

Use server folders to group and organize servers defined on the Storage Center.

(i) NOTE: For user interface reference information, click Help.

Create a Server Folder

Create a server folder to group servers together.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- Click +
 (New), then select New Server Folder. The New Server Folder dialog box opens.
- 4. Type a name for the folder in the Name field.
- 5. (Optional) Type information about the server folder in the Notes field.
- 6. Select a parent folder for the new folder from the Parent drop-down menu.
- 7. Click OK.

Rename a Server Folder

Select a different name for a server folder.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server folder to rename.
- Click / (Edit). The Edit Server Folder dialog box opens.
- 5. Type a new name for the server folder in the Name field.
- 6. Click OK.

Move a Server Folder

Use the Edit Settings dialog box to move a server folder.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Select the server folder to move.
- Click ✓ (Edit). The Edit Server Folder dialog box opens.
- 5. Select a new parent folder from the Parent drop-down menu.
- 6. Click OK.

Deleting Servers and Server Folders

Delete servers and server folders when they no longer utilize storage on the Storage Center.

(i) NOTE: For user interface reference information, click Help.

Delete a Server

Delete a server if it no longer utilizes storage on the Storage Center. When a server is deleted, all volume mappings to the server are also deleted.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server to delete.
- Click (Delete).
 The Delete Servers dialog box opens.
- 5. Click OK.

Delete a Server Folder

Delete a server folder if it is no longer needed.

Prerequisites

The server folder must be empty.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- 3. Select the server folder to delete.
- Click iii (Delete).
 The Delete Server Folder dialog box opens.
- 5. Click Yes.

Storage Center Maintenance

Managing Storage Center Settings

This section describes how to configure general Storage Center settings.

Related concepts

Configuring Storage Center User Preferences Configuring Storage Center Data Settings Configuring Storage Center Secure Console Settings Configuring Filters to Restrict Administrative Access

Related tasks

Viewing and Modifying Storage Center Information

Viewing and Modifying Storage Center Information

Unisphere Central provides options for changing default properties for each individual Storage Center that is managed by Unisphere Central. You can change the Storage Center name, change the operation mode, modify network settings, and view or change license information using the Storage Center Settings dialog box.

About this task

(i) NOTE: For user interface reference information, click Help.

Rename a Storage Center

Rename a Storage Center when the purpose of the Storage Center has changed or the name no longer applies.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the General tab.
- 5. In the Name field, type a new name.
- 6. Click OK.

Change the Operation Mode of a Storage Center

Before performing maintenance or installing software updates, change the **Operation Mode** of a Storage Center to **Maintenance**.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.

- 3. Click 🌣 (Settings).
- The Storage Center Settings dialog box opens.
- 4. Click the General tab.
- 5. In the Operation Mode field, select Production or Maintenance.
- Selecting Maintenance hides alerts that occur during normal operation.
- 6. Click OK.

Modify the Storage Center Network Settings

In a dual-controller Storage Center, the shared management IP address is hosted by the leader under normal circumstances. If the leader fails, the peer takes over the management IP, allowing management access when the normal leader is down.

About this task

NOTE: A single-controller Storage Center does not have a shared management IP address by default, but it can be configured to facilitate a future transition to dual controllers.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Network tab.
- 5. In the Management IPv4 Settings area, type the IPv4 addresses for the management IP.
- 6. (Optional) In the Management IPv6 Settings area, type the IPv6 addresses for the management IP.
- 7. (Optional) In the Network Settings area, type the server addresses and domain name.
- 8. Click OK.

View Storage Center License Information

The Licence tab in the Storage Center Settings dialog box shows current license information. This information cannot be modified.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click [‡] (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage Center License tab to display license information.
- 5. Click OK.

Apply a New License to a Storage Center

If you add applications, or increase the number of disks licensed for your Storage Center, you may need to apply a new license. You can submit multiple licences in a zip file.

Prerequisites

· You must be able to access a Storage Center license file from the computer from which you are running Unisphere.

About this task

NOTE: Applying the Flex Port license requires the Storage Center to restart. After the restart, Storage Center creates a fault domain for the flex port.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage Center License tab.
- 5. Click Submit License File. The Submit License File dialog box opens.
- 6. Click Browse. The Choose File to Upload dialog box opens.
- 7. Browse to and select a Storage Center license file, then click **Open**. The **Choose File to Upload** dialog box closes.
- 8. Click Apply.
- 9. Click **OK**.

Configuring Storage Center User Preferences

Storage Center user preferences establish defaults for the Storage Center user account that was used to add the Storage Center to Unisphere. Unisphere honors these preferences.

(i) NOTE: For user interface reference information, click Help.

Set the Default Size for New Volumes

The default volume size is used when a new volume is created unless the user specifies a different value.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- 5. In the Volume Size field, type a default size for new volumes in bytes, kilobytes (KB), megabytes (MB), gigabytes (GB), or terabytes (TB).
- 6. Click OK.

Set the Default Base Volume Name for New Volumes

The default base name is used as the name for a new volume unless the user specifies a different name. If one or more volumes with the base name already exist, a number is appended to the base name to create the new volume name.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- 5. In the Base Volume Name field, type a name to use as a base for new volumes. The default base is New Volume.
- 6. Click OK.

Set Default Cache Settings for New Volumes

The default cache settings are used when a new volume is created unless the user changes them. You can prevent the default cache settings from being changed during volume creation by clearing the **Allow Cache Selection** checkbox.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- 3. Click 🌣 (Settings).
 - The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- 5. Select or clear the Read Cache Enabled and Write Cache Enabled checkboxes to set the default cache settings for new volumes.
- 6. Select or clear the Allow Cache Selection Enabled checkbox to allow or prevent users from configuring cache settings when creating volumes.
- 7. Click OK.

Set Default Data Reduction Settings for New Volumes

The default data reduction settings are used when a new volume is created unless the user changes them. You can prevent the default data reduction settings from being changed during volume creation by clearing the **Allow Data Reduction Selection** checkbox.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary.
 The Summary view is displayed.
- 3. Click 🌣 (Settings).
 - The Storage Center Settings dialog box opens.
- **4.** Click the **Preferences** tab.
- 5. Configure data reduction defaults.
 - In the **Data Reduction Profile** drop-down menu, set the data reduction profile default for new volumes.
 - · Select the Allow Data Reduction Selection checkbox to allow users to enable or disable data reduction when creating volumes.
- 6. Click OK.

Set the Default Snapshot Options for New Volumes

The default snapshot options are used when a new volume is created unless the user changes them.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- **5.** Choose default Snapshot Profiles.
 - a) In the **Snapshot** area, click **Change**. The **Select Snapshot Profiles** dialog box opens.
 - b) In the top pane, select the Snapshot Profiles to assign to new volumes by default.
 - c) Click OK.
 - The Select Snapshot Profiles dialog box closes.

- 6. In the **Minimum Snapshot Interval** field, type the number of minutes that must pass after a snapshot is taken before a subsequent snapshot can be taken.
- 7. Click OK.

Allow or Disallow Advanced Volume Mapping Settings

Advanced volume mapping options include LUN configuration, mapping path options, and making the volume read-only.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- 5. Select or clear the Allow Advanced Mapping Enabled checkbox to enable or disable advanced volume mapping options.
- 6. Click OK.

Set the Default Operating System for New Servers

The default operating system is used for new servers unless the user selects a different option. For convenience, choose the operating system that is most common in your environment.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Preferences** tab.
- 5. From the Operating System drop-down menu, select the default operating system for new servers.
- 6. Click OK.

Set the Default Storage Profile for New Volumes

The default Storage Profile is used when a new volume is created unless the user selects a different Storage Profile. You can prevent the Storage Profile from being changed during volume creation by clearing the **Allow Storage Profile Selection** checkbox.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- 3. Click 🌣 (Settings).
 - The Storage Center Settings dialog box opens.
- **4.** Click the **Preferences** tab.
- 5. From the Storage Profile drop-down menu, select the Storage Profile to use as the default for new volumes.
- 6. To allow users to select a Storage Profile when creating a volume, select Allow Storage Profile Selection.
- 7. Click OK.

Set the Default Storage Type for New Volumes

The default Storage Type is used when a new volume is created unless the user selects a different Storage Type. You can prevent the Storage Type from being changed during volume creation by clearing the **Allow Storage Type Selection** checkbox.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings).
 The Storage Center Settings dialog box opens.
- **4.** Click the **Preferences** tab.
- 5. From the Storage Type drop-down menu, select the Storage Type to use as the default for new volumes.
- 6. To allow users to select a Storage Type when creating a volume, select Allow Storage Type Selection.
- 7. Click OK.

Set Default Volume QoS Profile

Specify the default Volume QoS Profiles to be used for new volumes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Preferences tab.
- In the Quality of Service Profile area, click Change. The Select Volume QoS Profile dialog box opens, which shows all QoS profiles that have been defined.
- 6. Select one of the profiles by clicking its name.
- 7. Click OK.

Allow QoS Profile Selection

To enable users to select QoS Profiles, set the option to enabled.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings).
 The Storage Center Settings dialog box opens.
- **4.** Click the **Preferences** tab.
- 5. In the **Quality of Service Profiles** area, select the **Allow QoS Profile Selection** checkbox.
- 6. Click OK.

Configuring Storage Center Data Settings

You can configure cache, Data Progression, snapshot, and RAID stripe width settings for the Storage Center.

(i) NOTE: For user interface reference information, click Help.

Set Storage Center Cache Options

Global Storage Center cache settings override cache settings for individual volumes. Read cache improves read performance by anticipating the next read and holding it in volatile memory. Write cache increases write performance by holding written data in volatile memory until it can be safely stored on disk.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage tab.
- 5. Select or clear the Read Cache Enabled and Write Cache Enabled checkboxes.
- 6. Click **OK**.

Schedule or Limit Data Progression

Schedule when Data Progression runs and limit how long it is allowed to run.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage tab.
- 5. In the Data Progression Start Time field, select or type the time at which Data Progression starts running daily.
- 6. From the **Data Progression Max Run Time** drop-down menu, select the maximum time period that Data Progression is allowed to run.
- 7. Click OK.

Set RAID Stripe Width

The RAID stripe width controls the number of disks across which RAID data is striped. The stripe widths for RAID 5 and RAID 6 are independently configured.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^{\$\$} (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage tab.
- 5. From the **RAID 5 Stripe Width** drop-down menu, select a stripe width of 5 or 9 disks.
- 6. From the RAID 6 Stripe Width drop-down menu, select a stripe width of 6 or 10 disks.
- 7. Click OK.

Configure an iSNS Server

Set the host name or IP address of the Internet Storage Name Service (iSNS) server on your network.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Storage tab.
- 5. In the **iSNS Server Host or IP Address** field, type the host name or IP address of an iSNS server that provides name services for initiators and targets on your network.
- 6. Click OK.

Set Up Automated Reports for an Individual Storage Center

By default, Storage Centers are configured to use the global automated report settings that are specified for the Data Collector. If you want to use different report settings for a Storage Center, you can configure the automated report settings in the Storage Center properties.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click Cettings).
 The Storage Center Settings dialog box opens.
- 4. Click the Automated Reports tab.
- 5. Deselect the Use global settings checkbox.
- 6. Select the checkboxes in the **Automated Report Settings** area to specify which reports to generate and how often to generate them.
- 7. Select the checkboxes in the **Automated Table Report Settings** area to specify which reports to generate and how often to generate them.
 - NOTE: Automated table reports can be saved in a public directory or attached to automated emails but they do not appear in the Reports view.

8. Set the Automated Report Options

a) To export the reports to a public directory, select the **Store report in public directory** checkbox and enter the full path to the directory in the **Directory** field.

i NOTE: The directory must be located on the same server as the Data Collector.

(i) NOTE: Automated reports cannot be saved to a public directory when using a Virtual Appliance.

- b) To configure the Data Collector to email the reports when they are generated:
 - Select the Attach Automated Reports to email checkbox to email the reports specified in the Automated Reports Settings area.
 - Select the Attach Table Reports to email checkbox to email the reports specified in the Automated Table Reports Settings area.

i NOTE: Unisphere Central sends emails to the email address specified in the User Properties.

c) Select the file format for exported and emailed Table Reports from the File Type for Table Reports drop-down box.

9. Click **OK**.

Set the Date and Time for a Storage Center

Select the time zone, then set the date and time or configure the Storage Center to synchronize with an NTP server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Time Settings tab.
- 5. From the Region drop-down menu, select the region where the Storage Center is located.
- 6. From the **Time Zone** drop-down menu, select the time zone where the Storage Center is located.
- 7. Set the date and time.
 - To set the date and time manually, clear Use NTP Server, then select Set Current Time and set the date and time in the Curent Time fields.
 - To configure the Storage Center to synchronize the date and time with a Network Time Protocol server, select **Use NTP Server**, then type the host name or IP address of an NTP server in the **Server Host or IP Address** field.
- 8. Click OK.

Configure Storage Center SMTP Server Settings

Configure SMTP settings to allow the Storage Center to send alert message emails to users who have specified a recipient address in their contact properties.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- 3. Click 🌣 (Settings).
 - The Storage Center Settings dialog box opens.
- 4. Click the SMTP Server tab.
- **5.** Configure the SMTP server settings.
 - a) Select the Enable SMTP Email check box.
 - b) In the SMTP Mail Server field, type the IP address or fully qualified domain name of the SMTP email server.
 - c) (Optional) In the **Backup SMTP Server** field, type the IP address or fully qualified domain name of a backup SMTP email server.d) Click **OK**.
 - e) Open the SMTP Server tab and click Test Server to verify connectivity to the SMTP server.
 - f) If the SMTP server requires emails to contain a MAIL FROM address, specify an email address in the Sender Email Address field.
 - g) (Optional) In the **Common Subject Line** field, type a subject line to use for all emails sent by the Storage Center.
 - h) Configure how the Storage Center identifies itself to the SMTP server:
 - To use SMTP, type the Storage Center fully qualified domain name in the Hello Message (HELO) field.
 - To use ESMTP, select the **Send Extended Hello (EHLO)** check box, then type the Storage Center fully qualified domain name in the **Extended Hello Message (EHLO)** field.
- 6. Click OK.

Configure SNMP Settings for a Storage Center

Configure SNMP if you want to monitor the Storage Center with a network management system.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the SNMP Server tab.
- 5. From the SNMP Version drop-down menu, select the version of SNMP to configure.
- 6. If you selected SNMP v1/v2c, set the community strings that allow access to the Storage Center SNMP agent.
 - a) In the **Read Only Community String** field, type a password for allowing network management systems to read from the Storage Center SNMP agent.
 - b) In the **Read Write Community String** field, type a password for allowing network management systems to read from or write to the Storage Center SNMP agent.
- 7. If you selected SNMP v3, you can create an SNMP v3 user if one does not exist.
 - To create a new user:
 - a) Click Create SNMP v3 User.
 - The Create SNMP v3 User dialog box opens.
 - b) In the **Name** field, type a user name.
 - c) In the **Password** field, type a password.
 - d) Select an authentication method from the **Authentication Type** drop-down menu.
 - e) Select an encryption type from the **Encryption Type** drop-down menu.
 - f) Click OK.
 - g) Select the user from the SNMP v3 Settings table.
- 8. Specify settings for the network management system to which Storage Center will send SNMP traps.
 - a) Click Create SNMP Trap Destination. The Create SNMP Trap Destination dialog box opens.
 - b) In the **Trap Destination** field, type the host name or IP address of the network management system that is collecting trap information
 - c) From the Type drop-down menu, select the type of the SNMP trap request or SNMP inform request to use.
 - d) In the **Port** field, type the port number of the network management system.
 - e) If SNMPv1 Trap, SNMPv2 Trap, or SNMPv2 Inform is selected from the Type drop-down menu, type a password in the Community String field.
 - f) If SNMPv3 Trap or SNMPv3 Inform is selected from the Type drop-down menu, select a user from the SNMP v3 User dropdown menu.
 - g) Click OK.
- 9. If the SNMP Running status is No, click Start SNMP.
- 10. Click OK.

Configuring Filters to Restrict Administrative Access

Access filters can be created to selectively allow administrative access to a Storage Center based on IP address, user privilege level, or user name. When one or more access filters are defined, administrative connections that do not match an access filter are denied.

- Unisphere does not allow you to create an access filter policy that would reject your current administrative connection.
- · Access filters apply to new administrative connections only; existing administrative connections are not affected.

i NOTE: For user interface reference information, click Help.

Create an Access Filter for a Storage Center

Create an access filter to explicitly allow administrative connections from a user privilege level, specific user, IP address, or range of IP addresses.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- **4.** Click the **IP Filtering** tab.
- 5. Click Create Filter.
 - The Create IP Filter dialog box opens
- 6. Select the Storage Center user or user privilege level to allow.
 - To allow access to a Storage Center user privilege level, select **User Privilege Level**, then select a privilege level from the dropdown menu.
 - To allow access to an individual Storage Center user, select **Specific User**, then select a user from the drop-down menu.
- 7. Specify which source IP addresses to allow.
 - i NOTE: If network address translation (NAT) is enabled in your network environment, be sure to specify the IP address(es) visible to the Storage Center.
 - To allow all source IP addresses, select All Hosts.
 - To allow access to a specific IP address, select **Single IP Address**, then type the IP address in the field.
 - To allow access to a range of IP addresses, select **Range of IP Addresses**, then type the first and last IP addresses in the fields.
- 8. Click OK.

Modify an Access Filter for a Storage Center

Modify an access filter to change the users or IP addresses it allows.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary.
 The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the IP Filtering tab.
- 5. Select the access filter that you want to modify, then click **Modify Filter**. The **Modify IP Filter** dialog box opens.
- 6. Modify the access filter settings as needed. For user interface reference information, click Help.
- 7. (Optional) Modify the allowed Storage Center user or user privilege level.
 - To allow access to a Storage Center user privilege level, select **User Privilege Level**, then select a privilege level from the dropdown menu.
 - To allow access to an individual Storage Center user, select **Specific User**, then select a user from the drop-down menu.
- 8. (Optional) Modify the allowed source IP addresses.
 - i NOTE: If network address translation (NAT) is enabled in your network environment, be sure to specify the IP address(es) visible to the Storage Center.
 - To allow all source IP addresses, select **All Hosts**.
 - To allow access to a specific IP address, select **Single IP Address**, then type the IP address in the field.
 - To allow access to a range of IP addresses, select Range of IP Addresses, then type the first and last IP addresses in the fields.

9. Click **OK**.

Delete an Access Filter for a Storage Center

Delete an access filter if it is no longer needed or you want to revoke administrative access to the users and IP addresses that the filter matches.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- **4.** Click the **IP Filtering** tab.
- Select the access filter that you want to delete, then click Delete Filter. The Delete IP Filter dialog box opens.
- 6. Click OK to confirm.
- 7. Click OK.

View and Delete Access Violations for a Storage Center

View access violations to determine who has unsuccessfully attempted to log in. A maximum of 100 access violations are recorded and displayed for a Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click [‡] (Settings). The Storage Center Settings dialog box opens.
- 4. Click the IP Filtering tab.
- 5. Click Show Access Violations. The Show Access Violations dialog box opens.
- 6. (Optional) Delete access violations.
 - a) Select the corresponding checkbox for each violation that you want to delete.
 - b) Click Delete Selected Violations.
 - A confirmation dialog box opens.
 - c) Click **Yes**. The confirmation dialog box closes.
 - d) Click Close.
 The Show Access Violations dialog box closes.
- 7. Click OK.

Configuring Storage Center Secure Console Settings

The secure console allows support personnel to access the Storage Center console without connecting through the serial port.

Enable Secure Console Access

Enable the secure console to allow support personnel to access the Storage Center console without connecting through the serial port.

Steps

1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.

- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Secure Console tab.
- 5. Select the Enable secure console access checkbox.
- 6. In the **Reservation Server Host or IP Address**, type the host name or IP address of a secure console server provided by technical support.
- 7. In the Session Time to Live field, type the number of minutes, hours, or days to keep the session active.

(i) NOTE: The maximum time to live is 72 hours.

- 8. If a SOCKS proxy is required to allow the Storage Center to communicate with the secure console server specified in the previous step, configure the **Proxy Settings**.
 - a) From the Proxy Type drop-down menu, select SOCKS4 or SOCKS5.
 - b) In the **IP Address** field, type the IP address of the proxy server.
 - c) In the **Port** field, type the port used by the proxy server.
 - d) If the proxy server requires authentication, complete the User Name and Password fields.
- 9. Click OK.

Restart the Storage Center Secure Console Server

Troubleshooting an issue may require restarting the secure console server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click Cettings).
 The Storage Center Settings dialog box opens.
- 4. Click the Secure Console tab.
- 5. Click **Restart Server**. A confirmation dialog box opens.
- 6. Click OK to confirm.
- 7. Click OK.

Configuring a Storage Center to Inherit Settings

A Storage Center can be configured to inherit settings from another Storage Center to save time and ensure that Storage Centers are configured consistently.

About this task

i NOTE: This function applies to Unisphere Central connected to a Data Collector only.

(i) NOTE: For user interface reference information, click Help

- 1. Select a Storage Center from the drop-down list in the left navigation pane.
- 2. Click Summary. The Summary view is displayed.
- **3.** Click ... (More Actions) and select Inherit Settings from the drop-down menu. The Inherit Settings dialog box opens.
- 4. Select the Storage Center from which you want to inherit settings, then select the checkbox for each category of settings that you want to inherit.

5. Click OK.

- If you modified passwords for the SupportAssist proxy, Secure Console proxy, or SMTP server (or if passwords are not configured), the dialog box closes.
- If a password for the SupportAssist proxy, Secure Console proxy, or SMTP server was configured previously and not modified, you are prompted to reenter the required passwords.
- 6. Type the required passwords.

Managing Storage Center Users and Groups

Storage Center users have access to folders, volumes, views, and commands depending on their privilege level and the user groups to which they belong. User accounts can be created locally and/or exist externally in a directory service.

User Privilege Levels

Each user is assigned a single privilege level. Storage Center has three levels of user privilege.

Table 5. Storage Center User Privilege Levels

Privilege Level	Allowed Access
Administrator	Read and write access to the entire Storage Center (no restrictions). All Administrators have the same predefined privileges. Only Administrators can manage users and user groups.
Volume Manager	Read and write access to the folders associated with the assigned user groups. Users with this privilege level can create volumes in the allowed volume folders and map them to existing servers in the allowed server folders.
Reporter	Read-only access to the folders associated with the assigned user groups.

User Groups

User groups grant access to volume, server, and disk folders.

- Users with the Administrator privilege have access to all folders and cannot be added to user groups.
- Users with the Volume Manager or Reporter privilege must be associated with one or more user groups, and can access only the volume, server, and disk folders made available to them.

User Account Management and Authentication

Storage Center access is granted using either of the following methods:

- Local users and user groups: User accounts can be created and maintained on the Storage Center.
- External directory service: In environments that use Active Directory or OpenLDAP, Storage Center can authenticate directory users. Access can be granted to individual directory users and directory user groups. These users access the Storage Center using their domain credentials.

Managing Local Storage Center Users

This section describes how to create, manage, and delete local Storage Center users.

i NOTE: For user interface reference information, click Help.

Create a Local Storage Center User

Create a local Storage Center user to assign privileges to a new user.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary.

The **Summary** view is displayed.

- 3. Click 🌣 (Settings).
- The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, click New User. The Create Local User dialog box opens.
- 6. In the Name field, type a name for the user.
 - i NOTE: To avoid user name conflicts with directory service users, do not use the @ or \ characters in local user names.
- 7. From the **Privilege** drop-down menu, select the privilege level to assign to the user.
 - Administrator When selected, the local user has full access to the Storage Center.
 - Volume Manager When selected, the local user has read and write access to volumes, servers, and disks in the folders associated with the assigned user groups.
 - **Reporter** When selected, the local user has read-only access to volumes, servers, and disks in the folders associated with the assigned user groups.
- 8. From the **Session Timeout** drop-down menu, select the maximum length of time that the local user can be idle while logged in to the Storage Center System Manager before the connection is terminated.
- 9. From the Preferred Language drop-down menu, select a language. That language will be used for email alerts.
- 10. (Volume Manager and Reporter only) Add one or more local user groups to the local user.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **New Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the local user.
 - d) Click OK.
 - The Select Local User Groups dialog box closes.
- 11. Specify and confirm a password for the user in the **Password** and **Confirm Password** fields.
- 12. (Optional) Specify more information about the user in the Details area.
- 13. Click OK.
 - The Create Local User dialog box closes.
- 14. Click OK.

Configure the Default User Preferences for New Storage Center Users

The default user preferences are applied to new Storage Center users. The preferences can be individually customized further after the user is created.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, click More Actions > Default User Preferences. The Configure Default User Preferences dialog box opens.
- 6. Modify the user preferences as needed, then click OK.

i NOTE: For user interface reference information, click Help.

- 7. Click OK.
 - The Configure Default User Preferences dialog box closes.
- 8. Click OK.

Related tasks

Configure Preferences for a Local Storage Center User

Increase the Privilege Level for a Local Storage Center User

The privilege level can be increased for local users that have the Volume Manager or Reporter privilege. The privilege level for a user cannot be decreased.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. From the **Privilege** drop-down menu, select the privilege level to assign to the user.
 - Administrator When selected, the local user has full access to the Storage Center.
 - Volume Manager When selected, the local user has read and write access to the folders associated with the assigned user groups.
 - Reporter When selected, the local user has read-only access to the folders associated with the assigned user groups.
- 7. Click OK.
 - The local user Edit Local User Settings dialog box closes.
- 8. Click OK.

Change the Session Timeout for a Local Storage Center User

The session timeout controls the maximum length of time that the local user can be idle while logged in to the Storage Center before the connection is terminated.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary.
 The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. From the **Session Timeout** drop-down menu, select the maximum length of time that the local user can be idle while logged in to the Storage Center before the connection is terminated.
- 7. Click OK.
 - The Edit Settings dialog box closes.
- 8. Click OK.

Change the Preferred Language for a Storage Center User

The preferred language for a Storage Center user determines the languages used in email alerts from the Storage Center.

Prerequisites

The Storage Center must support the preferred language.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. From the Preferred Language drop-down menu, select a language.
- 7. Click OK.

Enable or Disable Access for a Local Storage Center User

When a local Storage Center user is disabled, the user is not allowed to log in.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. In the Allow User to Log In field, enable or disable access for the local user.
 - To enable access, select the **Enabled** checkbox.
 - To disable access, clear the **Enabled** checkbox.
- 7. Click OK.
- The local user Edit Settings dialog box closes.
- 8. Click OK.

Modify Local Group Membership for a Local Storage Center User

User groups grant access to volume, server, and disk folders for users with the Volume Manager or Reporter privilege level.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. Modify local group membership for the user.
 - a) In the Local User Groups field, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **New Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the local user.
 - d) To remove the local user from a local group, clear the checkbox for the group.
- e) Click OK.
- The Select Local User Groups dialog box closes.
- 7. Click OK.
 - The Edit Local User Settings dialog box closes.
- 8. Click OK.

Configure Preferences for a Local Storage Center User

By default, each Storage Center user inherits the default user preferences. If necessary, the preferences can be individually customized for a user.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. Click Configure User Preferences. The Configure User Preferences dialog box opens.
- 7. Modify the user preferences as needed, then click OK.

(i) NOTE: For user interface reference information, click Help.

- 8. Click OK.
- The Edit Local User Settings dialog box closes.
- 9. Click OK.

Related tasks

Configure the Default User Preferences for New Storage Center Users

Modify Descriptive Information About a Local Storage Center User

The descriptive information about a local user includes his or her real name, department, title, location, telephone numbers, email address(es), and notes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local Users subtab, select the user, then click Settings. The Edit Local User Settings dialog box opens.
- 6. Modify the Real Name field as necessary.
- 7. Modify the fields in the **Details** area as necessary, then click **OK**.

(i) NOTE: For user interface reference information, click Help.

- 8. Click OK. The Edit Local User Settings dialog box closes.
- 9. Click **OK**.

Change the Password for a Local Storage Center User

Changing the password for a local Storage Center user through Unisphere Central automatically updates any Storage Center mappings that were made using the user's credentials.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, select the user, then click Change Password. The Change Password dialog box opens.
- 6. Type the old password.
- 7. Type and confirm a new password for the local user, then click OK.
- 8. Click OK.

Delete a Local Storage Center User

Delete a Storage Center user if he or she no longer requires access. The local user that was used to add the Storage Center to Unisphere cannot be deleted. The last user with the Administrator privilege cannot be deleted because Storage Center requires at least one Administrator.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, select the user, then click Delete. The Delete dialog box opens.
- 6. Click OK to confirm.
- 7. Click OK.

Restore a Deleted Local Storage Center User

A new password must be provided when restoring a deleted user. If you are restoring a deleted user with the Volume Manager or Reporter privilege, the user must be added to one or more local user groups.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local Users subtab, click More Actions > Restore User. The Restore Deleted User wizard opens.
- 6. Select the local user that you want to restore, then click **Next**. The wizard advances to the next page.

- 7. (Volume Manager and Reporter only) Add the local user to one or more local user groups.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **Create Local User Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the local user.
 - d) Click **OK**. The **Select Local User Groups** dialog box closes.
- 8. Type and confirm a new password for the local user in the New Password and Confirm Password fields.
- **9.** Modify the remaining user settings as needed.

i NOTE: For user interface reference information, click Help.

- 10. Click Finish.
- 11. Click **OK**.

Managing Local Storage Center User Groups

User groups grant access to volume, server, and disk folders.

(i) NOTE: For user interface reference information, click Help.

Create a Local User Group

Create a local Storage Center user group to grant access to specific volume, server, and disk folders.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local User Groups subtab, click New Group. The Create Local User Group wizard opens.
- 6. In the Name field, type a name for the local user group, then click Next.
- 7. Add volume folders to the local user group.
 - a) If you need to create a volume folder, click New Volume Folder, then complete the fields in the New Volume Folder dialog box.
 - b) Click **OK** to create the volume folder.
 - c) Click **Next**. The wizard advances to the next page.
- 8. Add server folders to the local user group.
 - a) If you need to create a server folder, click New Server Folder, then complete the fields in the New Server Folder dialog box.
 - b) Click **OK** to create the server folder.
 - c) Click Next.

The wizard advances to the next page.

- **9.** Add disk folders to the local user group.
 - a) Select the disk folders you want to add to the local user group.
 - b) Click Finish.
- 10. Click OK.

Manage User Membership for a Local Storage Center User Group

Local Storage Center users and directory users that have been individually granted access can be added to local Storage Center user groups.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local User Groups subtab, select the local user group, then click Edit > Users.
- The **Manage Users** dialog box opens.
- 6. Manage user membership for the user group.
 - Place a check next to the names of users you want to add.
 - Remove the check next to the names of users you want to remove.
- 7. Click OK.
 - The Manage Users dialog box closes.
- 8. Click OK.

Manage Folder Access Granted by a Local Storage Center User Group

The folders that are associated with a local Storage Center user group determine the access that is granted by the user group.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Local User Groups subtab, select the local user group, then click Edit > Folders. The Manage Folders wizard opens.
- 6. Manage volume folders for the local user group.
 - a) If you need to create a volume folder, click New Volume Folder, then complete the fields in the New Volume Folder dialog box.
 - b) Click OK.
 - c) Click Next.

The wizard advances to the next page.

- 7. Manage server folders for the local user group.
 - a) If you need to create a server folder, click New Server Folder, then complete the fields in the New Server Folder dialog box.
 - b) Click OK.
 - c) Click Next.
 - The wizard advances to the next page.
- 8. Manage disk folders for the local user group.
 - a) Select the disk folders you want to add.
 - b) Click **Finish**. The wizard closes.
- 9. Click OK.

Delete a Local Storage Center User Group

Delete a local Storage Center user group if it is no longer needed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Local User Groups subtab, select the local user group, then click Delete. The Delete dialog box opens.
- 6. Click Yes to confirm.
- 7. Click OK.

Managing Local Storage Center User Password Requirements

Setting password requirements for local Storage Center users increases the password security for all Storage Center local users.

Configure Local Storage Center User Password Requirements

Set local user password requirements to increase the complexity of local user passwords and improve the security of the Storage Center.

About this task

(i) NOTE: For user interface reference information, click Help.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the **Password Configuration** tab.
- 5. Select the Enabled checkbox.
- 6. Configure the password requirements as necessary.
 - To set the number of previous passwords that Storage Center checks against when validating a password, type a value in the **History Retained** field. To disable previous password validation, type 0.
 - To set the minimum number of characters in a new password, type a value in the **Minimum Length** field. To match the Storage Center minimum password length, set the value to 1.
 - To set the number of login failures that lock out an account, type a number in the **Account Lockout Threshold** field. To disable the account lockout threshold, type 0.
 - i NOTE: Only administrator-level accounts can unlock other Storage Center accounts. Have more than one Storage Center administrator-level account so that other Storage Center accounts can be unlocked.
 - To require new passwords to follow complexity standards, select the **Complexity Enabled** checkbox. To disable the password complexity requirement, clear the **Complexity Enabled** checkbox.
 - To set the number of days before a user can change his or her password, type a value in the **Minimum Age** field. To disable the minimum age requirement, type 0.
 - To set the number of days after which a password expires, type a value in the **Maximum Age** field. To disable the maximum age requirement, type 0.

- To set the number of days before a password expires when the expiration warning message is issued, type a value in the **Expiration Warning Time** field. To disable the expiration warning message, type 0.
- To specify the password expiration warning message that a user receives, type a warning message in the **Expiration Warning Message**. The expiration warning message is blank if this field is left empty.
- 7. Click **OK**.

Reset the Password Aging Clock

The password aging clock determines when a password expires based on the minimum and maximum age requirements. Reset the password aging clock to start the password aging clock from the current date and time.

Prerequisites

Password Configuration must be enabled.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Password Configuration tab.
- 5. Select the Enabled checkbox.
- 6. Select the Reset Aging Clock checkbox.
- 7. Click OK.

Require Users to Change Passwords

The new password requirements apply to new user passwords only. Require users to change passwords at next login so the password complies with the new password requirements.

Prerequisites

Password Configuration must be enabled.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Password Configuration tab.
- 5. Select the Enabled checkbox.
- 6. Select the Requires Password Change checkbox.
- 7. Click OK.

Enabling Directory Services Authentication

Before you can grant Storage Center access to directory users and directory user groups, you must first configure Storage Center to communicate with one or more Active Directory/OpenLDAP servers. If you use Kerberos authentication, you must also configure Storage Center to communicate with the Kerberos Key Distribution Center (KDC).

Prerequisites

· An Active Directory or OpenLDAP directory service must be deployed in your environment.

- · Storage Center must have network connectivity to the directory service.
- You must be familiar with the Active Directory/OpenLDAP configuration of the directory service.
- Storage Center requires credentials from a directory service user that is allowed to query the directory service and who has sufficient privileges to perform a bind operation.
- (Active Directory only) Joining the controller to the domain requires credentials from a directory service user who is an administrator and who has sufficient privileges to create a computer record in the directory.
- (Active Directory only) To join the controller to the domain, forward and reverse DNS records for the Storage Center must be created in the domain. For a single-controller Storage Center system, create DNS records for the controller IP address. For a dual-controller Storage Center system, create DNS records for the management IP address.
- (OpenLDAP only) To use password authentication with OpenLDAP, an SSL certificate is required to communicate with the directory service using SSL/TLS.

Discover Directory Service Settings Automatically

Use the Configure Directory Service Automatic Discovery wizard to allow the Storage Center to discover available directory services automatically.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Directory Services tab.
- Click Configure Directory Services Automatic Discovery. The Storage Center automatically discovers directory server settings and displays the settings in the Directory Services Auto Configuration Wizard.
- 6. Type a new value into the field of any setting you want to change.
 - In the **URI** field, type the uniform resource identifier (URI) for one or more servers to which Storage Center connects.

(i) NOTE: Use the fully qualified domain name (FQDN) of the servers.

Example URIs for two servers:

Idap://server1.example.com Idap://server2.example.com:1234

- (i) NOTE: Adding multiple servers ensures continued authorization of users in the event of a resource outage. If Storage Center cannot establish contact with the first server, Storage Center attempts to connect to the remaining servers in the order listed.
- In the **Directory Server Connection Timeout** field, type the maximum time (in minutes) that Storage Center waits while attempting to connect to an Active Directory server. This value must be greater than zero.
- In the Base DN field, type the base distinguished name for the LDAP server. The Base DN is the starting point when searching for users.
- In the **Storage Center Hostname** field, type the fully qualified domain name (FQDN) of the Storage Center.
 - For a single-controller Storage Center system, this is the fully qualified host name for the controller IP address.
 - For a dual-controller Storage Center system, this is the fully qualified host name for the management IP address.
- In the **LDAP Domain** field, type the LDAP domain to search.
- 7. (Optional) Click **Test Server** to verify that the Storage Center can communicate with the specified directory servers using the selected protocol.
- 8. (Optional) If Transport Layer Security (TLS) is enabled, upload a Certificate Authority PEM file.
 - a) Click Upload Certificate.
 - b) Browse to the location of the PEM file, select the file, and click **Open**. The **Upload TLS Certificate** dialog box opens.

i NOTE: If you select the wrong PEM file, click Upload Certificate in the Upload TLS Certificate dialog box to select a new file.

- c) Click **OK** to upload the certificate.
- 9. Click Next.

The Kerberos Settings page opens.

- **10.** (Optional) Select the **Enabled** checkbox to enable Kerberos authentication.
- 11. To change any of the Kerberos settings, clear the Auto-Discover checkbox, and then type a new value into that field.
 - Kerberos Domain Realm: Kerberos domain realm to authenticate against. In Windows networks, this is the domain name in uppercase characters.
 - **KDC Hostname or IP Address**: Fully qualified domain name (FQDN) or IP address of the Key Distribution Center (KDC) to which Storage Center will connect.
 - **Password Renew Rate (Days)**: Number of days before the keytab is regenerated. The default value is 0, which equates to a password renew rate of 14 days.
- 12. Click Next.

The Join Domain page opens.

- 13. Type the user name and password of a domain administrator.
- 14. Click Next. The Summary page opens.
- 15. If you want to change any setting, click **Back** to return to the previous page.
- 16. Click Finish.
- 17. Click OK.

Configure Directory Services Manually

Use the Directory Service Manual Configuration wizard to enter directory service settings manually. Use manual configuration for OpenLDAP or special Active Directory configurations.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Directory Services tab.
- 5. Click Configure Directory Services Manually. The Directory Services Manual Configuration Wizard opens.
- 6. From the Directory Type drop-down menu, select Active Directory or OpenLDAP.
- 7. Type the settings for the directory server.
 - In the URI field, type the uniform resource identifier (URI) for one or more servers to which Storage Center connects.

(i) NOTE: Use the fully qualified domain name (FQDN) of the servers.

Example URIs for two servers:

Idap://server1.example.com Idap://server2.example.com:1234

- i NOTE: Adding multiple servers ensures continued authorization of users in the event of a resource outage. If Storage Center cannot establish contact with the first server, Storage Center attempts to connect to the remaining servers in the order listed.
- In the **Directory Server Connection Timeout** field, type the maximum time (in minutes) that Storage Center waits while attempting to connect to an Active Directory server. This value must be greater than zero.
- In the **Base DN** field, type the base distinguished name for the LDAP server. The Base DN is the starting point when searching for users.
- In the **Relative Base** field, type the Relative Base information. A Relative Base is a list of Relative Distinguished Names (RDN) prepended to the Base DN, indicating where the controller should be joined to the domain. An RDN contains an attribute and a value, such as:

OU=SAN Controllers

OU is the attribute, and SAN Controllers is the value.

The following special characters used within an RDN value must be escaped using a backslash:

, + " \backslash < > ; = / CR and LF

For example:

Relative Base:	OU=SAN Controllers
(No escapes necessary)	
Relative Base:	OU=SAN \ +Controllers

(The plus character is escaped)

Relative Base:

OU=Buildings A\,B\,C,OU=SAN \+Controllers

(Commas and plus sign are escaped *except* for the comma separating the RDNs.)

- In the **Storage Center Hostname** field, type the fully qualified domain name (FQDN) of the Storage Center.
 - For a single-controller Storage Center system, this is the fully qualified host name for the controller IP address.
 - For a dual-controller Storage Center system, this is the fully qualified host name for the management IP address.
- In the **LDAP Domain** field, type the LDAP domain to search.
- In the **Authentication Bind DN** field, type the Distinguished Name or User Principal Name of the user that the Storage Center uses to connect to and search the LDAP server.
- In the Authentication Bind Password field, type the password for the authentication bind Distinguished Name.
- 8. (Optional) Click **Test Server** to verify that the Storage Center can communicate with the specified directory servers using the selected protocol.
- 9. (Optional) If Transport Layer Security (TLS) is enabled, upload a Certificate Authority PEM file.

a) Click Upload Certificate.

- b) Browse to the location of the PEM file, select the file, and click Open. The Upload TLS Certificate dialog box opens.
 - i NOTE: If you select the wrong PEM file, click Upload Certificate in the Upload TLS Certificate dialog box to select a new file.
- c) Click **OK** to upload the certificate.
- 10. Click Next. The Kerberos Settings page opens.
- 11. (Optional) Select the **Enabled** checkbox to enable Kerberos authentication.
- 12. To change any of the Kerberos settings, clear the Auto-Discover checkbox, and then type a new value into that field.
 - Kerberos Domain Realm: Kerberos domain realm to authenticate against. In Windows networks, this is the domain name in uppercase characters.
 - **KDC Hostname or IP Address**: Fully qualified domain name (FQDN) or IP address of the Key Distribution Center (KDC) to which Storage Center will connect.
 - **Password Renew Rate (Days)**: Number of days before the keytab is regenerated. The default value is 0, which equates to a password renew rate of 14 days.
- 13. Click Next.
 - The Join Domain page opens.
- 14. Type the user name and password of a domain administrator.
- 15. Click Next.
 - The **Summary** page opens.
- 16. If you want to change any setting, click **Back** to return to the previous page.
- 17. Click Finish.
- 18. Click OK.

Managing Directory Service Users

Directory service users can be individually granted access to a Storage Center.

(i) NOTE: For user interface reference information, click Help.

Grant Access to a Directory User

Grant access to a directory user to allow the user to log in to the Storage Center using his or her directory credentials.

Prerequisites

· The Storage Center must be configured to authenticate users with an external directory service.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Directory Users subtab, click Add User. The Grant Access to Directory User dialog box opens.
- 6. In the User Principal Name field, type the directory user name assigned to the user. The following formats are supported:
 - username@domain
 - domain\username
- 7. In the Distinguished Name field, type the distinguished name for the user.

Example: CN=Firstname Lastname,CN=Users,DC=example,DC=com

- 8. From the **Privilege** drop-down menu, select the privilege level to assign to the user.
 - Administrator: When selected, the user has full access to the Storage Center.
 - Volume Manager: When selected, the user has read and write access to the folders associated with the assigned user groups.
 - Reporter: When selected, the user has read-only access to the folders associated with the assigned user groups.
- 9. From the **Session Timeout** drop-down menu, select the maximum length of time that the user can be idle while logged in to the Storage Center before the connection is terminated.
- 10. (Volume Manager and Reporter only) Add one or more local user groups to the user.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **New Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the user.

d) Click OK.

- The Select Local User Groups dialog box closes.
- 11. (Optional) Specify more information about the user in the **Details** area. For user interface reference information, click Help.
- 12. Click OK.
 - The Grant Access to Directory User dialog box closes.
- 13. Click OK.

Increase the Privilege Level for a Directory Service User

The privilege level can be increased for directory service users that have the Volume Manager or Reporter privilege. The privilege level for a user cannot be decreased.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.

- 5. On the **Directory Users** subtab, select the user, then click **Settings**. The **Edit Settings** dialog box opens.
- 6. From the **Privilege** drop-down menu, select the privilege level to assign to the user.
 - Administrator When selected, the local user has full access to the Storage Center.
 - Volume Manager When selected, the local user has read and write access to the folders associated with the assigned user groups.
- Reporter When selected, the local user has read-only access to the folders associated with the assigned user groups.
 Click OK.
 - The local user **Edit Settings** dialog box closes.
- 8. Click OK.

Change the Session Timeout for a Directory Service User

The session timeout controls the maximum length of time that the user can be idle while logged in to the Storage Center before the connection is terminated.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the **Directory Users** subtab, select the user, then click **Settings**. The **Edit Settings** dialog box opens.
- 6. From the **Session Timeout** drop-down menu, select the maximum length of time that the user can be idle while logged in to the Storage Center before the connection is terminated.
- 7. Click OK. The Edit Settings dialog box closes.
- 8. Click OK.

Enable or Disable Access for a Directory Service User

When a directory service user is disabled, the user is not allowed to log in.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings).
 The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the **Directory Users** subtab, select the user, then click **Settings**. The **Edit Settings** dialog box opens.
- 6. Enable or disable access for the directory service user.
 - To enable access, select the **Enabled** checkbox.
 - To disable access, clear the **Enabled** checkbox.
- 7. Click OK.
 - The local user Edit Settings dialog box closes.
- 8. Click **OK**.

Modify Local Group Membership for a Directory Service User

User groups grant access to volume, server, and disk folders for users with the Volume Manager or Reporter privilege level.

Prerequisites

• The directory service user must have been individually granted access to the Storage Center. Users that have been granted access based on a directory group inherit local group membership from the directory group settings.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^(*) (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the **Directory Users** subtab, select the user, then click **Settings**. The **Edit Settings** dialog box opens.
- 6. Modify local group membership for the user.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **Create Local User Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the local user.
 - d) To remove the local user from a local group, clear the checkbox for the group.
 - e) Click OK.
 The Select Local User Groups dialog box closes.
- 7. Click OK.

The local user Edit Settings dialog box closes.

8. Click OK.

Configure Preferences for a Directory Service User

By default, each Storage Center user inherits the default user preferences. If necessary, the preferences can be individually customized for a user.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings).
 The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Directory Users subtab, select the user, then click Settings.
- The Edit Settings dialog box opens.
- 6. Click Configure User Preferences. The Configure User Preferences dialog box opens.
- 7. Modify the user preferences as needed, then click **OK**.

(i) NOTE: For user interface reference information, click Help.

- 8. Click OK.
 - The local user Edit Settings dialog box closes.
- 9. Click **OK**.

Modify Descriptive Information About a Directory Service User

The descriptive information about a local user includes his or her real name, department, title, location, telephone numbers, email address(es), and notes.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Directory Users subtab, select the user, then click Settings. The Edit Settings dialog box opens.
- 6. Click Configure User Preferences. The Configure User Preferences dialog box opens.
- 7. Modify the Real Name field as necessary.
- 8. Modify the fields in the **Details** area as necessary, then click **OK**.

i NOTE: For user interface reference information, click Help.

- 9. Click OK.
 - The local user **Edit Settings** dialog box closes.
- 10. Click \mathbf{OK} .

Delete a Directory Service User

Delete a directory service user if he or she no longer requires access. The user that was used to add the Storage Center to Unisphere cannot be deleted. The last user with the Administrator privilege cannot be deleted because Storage Center requires at least one Administrator.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the **Directory Users** subtab, select the user, then click **Delete**. The **Delete** dialog box opens.
- 6. Click Yes to confirm.
- 7. Click OK.

Restore a Deleted Directory Service User

If you are restoring a deleted user with the Volume Manager or Reporter privilege, the user must be added to one or more local user groups.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click I (Settings). The Storage Center Settings dialog box opens.

- 4. Click the Users and User Groups tab.
- 5. On the Directory Users subtab, click More Actions > Restore User. The Restore Deleted User wizard opens.
- 6. Select the directory service user that you want to restore, then click **Next**. The wizard advances to the next page.
- 7. (Volume Manager and Reporter only) Add the local user to one or more local user groups.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **Create Local User Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the local user.
 - d) Click OK.
 - The Select Local User Groups dialog box closes.
- 8. Modify the remaining user settings as needed.

i NOTE: For user interface reference information, click Help.

- 9. Click Finish.
 - The **Restore Deleted User** wizard closes.
- 10. Click OK.

Managing Directory User Groups

Granting access to a directory user group grants access to all directory users that belong to the group.

i NOTE: For user interface reference information, click Help.

Grant Access to a Directory User Group

Grant access to a directory user group to allow directory users in the group to log in to the Storage Center.

Prerequisites

The Storage Center must be configured to authenticate users with an external directory service.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ^I (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Directory User Groups subtab, click Add Group. The Grant Access to Directory User Groups dialog box opens.
- 6. In the **Display Name** field, type a name to identify the directory user group.
- 7. In the **Distinguished Name** field, type the distinguished name for the directory user group.

Example: CN=Groupname,CN=Users,DC=example,DC=com

- 8. From the **Privilege** drop-down menu, select the privilege level to assign to the user group.
 - Administrator: When selected, directory users in the group have full access to the Storage Center.
 - Volume Manager: When selected, directory users in the group have read and write access to the folders associated with the assigned user groups.
 - **Reporter**: When selected, directory users in the group have read-only access to the folders associated with the assigned user groups.
- 9. (Volume Manager and Reporter only) Add one or more local user groups to the directory user group.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.

- b) (Optional) To create a new local user group, click **Create Local User Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
- c) Select the checkbox for each local user group you want to associate with the directory user group.
- d) Click **OK**.
 - The Select Local User Groups dialog box closes.
- 10. Click OK.
 - The Grant Access to Directory User Groups dialog box closes.
- 11. Click **OK**.

Increase the Privilege Level for a Directory User Group

The privilege level can be increased for directory service groups that have the Volume Manager or Reporter privilege. The privilege level for a directory service group cannot be decreased.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click Cettings).
 The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the Directory User Groups subtab, select the directory user group, then click Edit Settings.
 - The Edit Settings dialog box opens.
- 6. From the **Privilege** drop-down menu, select the privilege level to assign to the user group.
 - **Administrator** When selected, directory users in the group have full access to the Storage Center.
 - Volume Manager When selected, directory users in the group have read and write access to the folders associated with the assigned user groups.
 - **Reporter** When selected, directory users in the group have read-only access to the folders associated with the assigned user groups.
- 7. Click OK.
 - The Edit Settings dialog box closes.
- 8. Click OK.

Modify Local Group Membership for a Directory User Group

Local user groups grant access to volume, server, and disk folders for directory user groups with the Volume Manager or Reporter privilege level.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- 3. Click 🌣 (Settings).
 - The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- On the Directory User Groups subtab, select the directory user group, then click Edit Settings. The Edit Settings dialog box opens.
- 6. Modify local group membership for the directory user group.
 - a) In the Local User Groups area, click Change. The Select Local User Groups dialog box opens.
 - b) (Optional) To create a new local user group, click **Create Local User Group**, then complete the **Create Local User Group** wizard. For user interface reference information, click **Help**.
 - c) Select the checkbox for each local user group you want to associate with the directory user group.
 - d) To remove the directory user group from a local group, clear the checkbox for the local group.

- e) Click OK.
- The Select Local User Groups dialog box closes.
- 7. Click **OK**.
 - The Edit Settings dialog box closes.
- 8. Click OK.

Delete a Directory User Group

Delete a directory user group if you no longer want to allow access to the directory users that belong to the group.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click [‡] (Settings). The Storage Center Settings dialog box opens.
- 4. Click the Users and User Groups tab.
- 5. On the **Directory User Groups** subtab, select the directory user group, then click **Delete**. The **Delete** dialog box opens.
- 6. Click OK to confirm.
- 7. Click OK.

Managing Front-End I/O Ports

Front-end ports connect an Storage Center directly to a server using SAS connections or to the Ethernet networks and Fibre Channel (FC) fabrics that contain servers that use storage. iSCSI, FC, or SAS I/O ports can be designated for use as front-end ports.

Front-End Connectivity Modes

Storage Center uses either legacy mode, virtual port mode, or ALUA port mode to transport data to servers that use SAN storage. In legacy mode, front-end I/O ports are configured in pairs of primary and reserved ports. In virtual port mode, all ports are active, and if one port fails the load is distributed between the remaining ports within the same fault domain. In ALUA port mode, volumes are mapped using two paths, active and passive.

i NOTE: In Legacy mode, reserve ports and primary ports reside on separate controllers, providing controller-level failover only. Legacy mode does not provide port-level failover.

The front-end connectivity mode is configured independently for Fibre Channel and iSCSI. Both transport types can be configured to use the same mode or different modes to meet the needs of the network infrastructure. For example, a Storage Center can be configured to use virtual port mode for iSCSI and legacy mode for FC.

- The front-end connectivity mode for FC and iSCSI ports is initially selected during Storage Center deployment.
- After deployment, the front-end FC and iSCSI ports can be changed from legacy mode to virtual port mode.

After FC and iSCSI ports are configured for virtual port mode, they cannot be changed back to legacy mode.
 NOTE: Use legacy port mode only if the network environment does not meet the requirements for virtual port mode.

· The front-end connectivity mode for SAS front-end is always ALUA port mode and cannot be changed.

Virtual Port Mode

Virtual port mode provides port and controller redundancy by connecting multiple active ports to each Fibre Channel or Ethernet switch.

In virtual port mode, each physical port has a WWN (World Wide Name), and is also assigned an additional virtual WWN. Servers target only the virtual WWNs. During normal conditions, all ports process I/O. In the event of a port or controller failure, a virtual WWN will move to another physical WWN in the same fault domain. When the failure is resolved and ports are rebalanced, the virtual port returns to the preferred physical port.

Virtual port mode provides the following advantages over legacy mode:

• Increased performance: Because all ports are active, additional front-end bandwidth is available without sacrificing redundancy.

- Improved redundancy: Ports can fail over individually instead of by controller.
- **Simplified iSCSI configuration**: Each fault domain has an iSCSI control port that coordinates discovery of the iSCSI ports in the domain. When a server targets the iSCSI port IP address, it automatically discovers all ports in the fault domain.

ALUA Port Mode

Asymmetric Logical Unit Access (ALUA) provides port and controller redundancy for SAS front-end connections.

Volumes mapped to a server using SAS front-end also have port and controller redundancy. Volumes mapped over SAS are mapped to both controllers. The volume mapping is Active/Optimized on one controller and Standby on the other controller. If the port or controller fails on the active controller, the paths to the other controller become Active/Optimized. The mapping on the first controller switches to Standby. When the port or controller recovers, the mapping to the first controller returns to Active/Optimized and the mapping to the second controller returns to Standby status.

Legacy Mode

Legacy mode provides controller redundancy for a dual-controller Storage Center by connecting multiple primary and reserved ports to each Fibre Channel or Ethernet switch.

(i) NOTE: Legacy mode is not available on SCv2000 or SCv3000 series storage systems.

In Legacy mode, each primary port on a controller is paired with a corresponding reserved port on the other controller. During normal conditions, the primary ports process I/O and the reserved ports are in standby mode. If a controller fails, the primary ports fail over to the corresponding reserved ports on the other controller. This approach ensures that servers connected to the switch do not lose connectivity if one of the controllers fails. For optimal performance, the primary ports should be evenly distributed across both controllers. When possible, front-end connections should be made to separate controller I/O cards to improve redundancy.

About Fault Domains and Ports

Fault domains group front-end ports that are connected to the same transport media, such as a Fibre Channel fabric or Ethernet network. Ports that belong to the same fault domain can fail over to each other because they have the same connectivity.

Front-end ports are categorized into fault domains that identify the allowed port movement when a controller reboots or a port fails. Failure modes and port activity depend on whether the Storage Center is configured for Legacy mode, ALUA port mode, or Virtual port mode.

Fault Domains for SCv2000 Series Storage Systems

The Storage Center handles all fault domain creation and modification on SCv2000 series.

Depending on the hardware configuration, the following fault domains are automatically created on SCv2000 series storage systems:

- For SCv2000 series storage systems with Fibre Channel HBAs, two fault domains are created for the Fibre Channel ports.
- For SCv2000 series storage systems with iSCSI HBAs, two fault domains are created for the iSCSI ports.
- For SCv2000 series storage systems with SAS HBAs, four fault domains are created for the SAS ports.
- · Fault domains are automatically created for Flex/Embedded Ethernet ports.

i NOTE: Additional front-end fault domains cannot be created on SCv2000 series storage systems . In addition, existing fault domains cannot be modified or deleted on SCv2000 series storage systems .

Fault Domains for SCv3000 Series Storage Systems

The Storage Center handles all fault domain creation and modification on SCv3000 series storage systems.

Depending on the hardware configuration, the following fault domains are automatically created on SCv3000 series storage systems:

- For SCv3000 series storage systems with Fibre Channel HBAs, two fault domains are created for the Fibre Channel ports.
- For SCv3000 series storage systems with iSCSI HBAs, two fault domains are created for the iSCSI ports.
- For SCv3000 series storage systems with SAS HBAs, four fault domains are created for the SAS ports.
- For SCv3000 series storage systems with iSCSI mezzanine cards, two fault domains are created for the iSCSI ports.
- For SCv3000 series storage systems with iSCSI mezzanine cards and iSCSI HBAs, four fault domains are created for iSCSI ports

i NOTE: Additional front-end fault domains cannot be created on SCv3000 series storage systems. In addition, existing fault domains cannot be modified or deleted on SCv3000 series storage systems.

Fault Domains in Virtual Port Mode

In virtual port mode, fault domains group front-end ports that are connected to the same Fibre Channel fabric or Ethernet network. All ports in a fault domain are available for I/O. If a port fails, I/O is routed to another port in the fault domain.

The following requirements apply to fault domains in virtual port mode:

- Fault domains are created for each front-end Fibre Channel fabric or Ethernet network.
- A fault domain must contain a single type of transport media (FC or iSCSI, but not both).
 - CAUTION: For iSCSI only, servers initiate I/O to iSCSI ports through the control port of the fault domain. If an iSCSI port moves to a different fault domain, its control port changes. This change disrupts any service initiated through the previous control port. If an iSCSI port moves to a different fault domain, you must reconfigure the server-side iSCSI initiators before service can be resumed.
- For each fault domain, it is a best practice to connect at least two cables from each controller to the Fibre Channel fabric or Ethernet network.

Fault Domains in Legacy Mode

In Legacy Mode, each pair of primary and reserved ports are grouped into a fault domain. The fault domain determines which ports are allowed to fail over to each other.

The following requirements apply to fault domains in legacy mode on a dual-controller Storage Center:

- · A fault domain must contain one type of transport media (FC or iSCSI, but not both).
- A fault domain must contain one primary port and one reserved port.
- · The reserved port must be located on a different controller than the primary port.
 - i NOTE: For a single-controller Storage Center, only one fault domain is required for each transport type (FC or iSCSI) because there are no reserved ports.

Failover Behavior

Legacy mode, ALUA port mode, and virtual port mode behave differently during failure conditions because they use different mechanisms to provide fault tolerance.

Table 6. Front-End I/O Ports Failover Behavior

Scenario	Virtual Port Mode	Legacy Mode	ALUA Port Mode
Normal operating conditions	All ports are active and pass I/O.	 Primary ports pass I/O. Reserved ports remain in a standby mode until a controller failure. 	 Active/Optimized ports pass I/O. Standby ports remain in a standby mode until a controller or port failure.
A controller fails in a dual- controller Storage Center	Virtual ports on the failed controller move to physical ports on the functioning controller.	Primary ports on the failed controller fail over to reserved ports on the functioning controller.	Active/Optimized ports on the failed controller fail over to the Standby ports on the functioning controller.
A single port fails (single- or dual-controller Storage Center)	¹ An individual port fails over to another port on the same controller in the same fault domain.	The port does not fail over because there was no controller failure. If a second path is available, MPIO software on the server provides fault tolerance.	The port fails over to the Standby port on the functioning controller.

i NOTE: ¹To support port level failover, a controller must have at least two ports in the same fault domain using the same transport media, such as FC or iSCSI.

Managing Front-End I/O Port Hardware

Front-end FC and iSCSI ports can be renamed and monitored with threshold definitions. iSCSI ports can be assigned network configuration and tested for network connectivity.

(i) NOTE: For user interface reference information, click Help.

Rename a Front-End I/O Port

Set a display name for a physical or virtual I/O port to make it more identifiable.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Select the I/O port, then click 🗸 (Edit). The Edit Port dialog box opens.
- 5. In the Name field, type a descriptive name for the I/O port.
- 6. Click OK. The Edit Port dialog box closes.

Set or Modify the IP Address for a Single iSCSI Port

Servers target the iSCSI port IP address to initiate iSCSI connections to the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- Select the I/O port, then click (Edit). The Edit Port dialog box opens.
- 5. In the IPv4 Address field, type the new IPv4 address for the iSCSI I/O port.
- 6. Click OK. The Edit Port dialog box closes.

Test Network Connectivity for an iSCSI Port

Test connectivity for an iSCSI I/O port by pinging a port or host on the network.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Select the I/O port, then click ... (More Actions) and select Ping from the drop-down menu. The Ping dialog box opens.
- 5. If the port uses an IPv4 address, in the IPv4 Address field, type the IP address of the host to which you want to test connectivity.
- 6. From the **Ping Size** drop-down menu, select a size in bytes for the ping packets, not including overhead. If you select **Other**, type a value between 1 and 17000 bytes in the field below the menu.

i NOTE: The Ping Size drop-down menu might not be displayed depending on the hardware I/O cards used by the Storage Center.

- 7. Click OK. A message displays the results of the test.
- 8. Click **OK**.

Related tasks

Test Network Connectivity for an iSCSI Port in a Fault Domain

Configure Front-End I/O Ports (Fibre Channel and SAS)

On SCv2000 series and SCv3000 series storage systems, unconfigured Fibre Channel and SAS ports must be configured before they can be used as front-end ports.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Select an unconfigured Fibre Channel or SAS I/O port.
- 5. Click Configure Port.

Configure Front-End I/O Ports (iSCSI)

On SCv2000 series and SCv3000 series storage systems, unconfigured iSCSI ports must be configured before they can be used as frontend ports.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Select an unconfigured iSCSI I/O port.
- 5. Click Configure Port.
- 6. Type an IP address for the port.
- 7. Click OK.

Unconfigure Front-End I/O Ports

On SCv2000 series and SCv3000 series storage systems, unconfigure I/O ports that are not connected to the storage network and are not intended for use.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- **4.** Select a down I/O port and click **Unconfigure Port**. The **Unconfigure Port** confirmation dialog box opens.
- 5. Click OK.

Convert Front-End Ports to Virtual Port Mode

Use Unisphere to convert all front-end iSCSI or Fibre Channel I/O ports to virtual port mode. After the conversion is complete, the ports cannot be converted back to legacy mode.

Prerequisites

The ports must be in legacy port mode.

i NOTE: This operation cannot be undone. After the ports are converted to virtual port mode, they cannot be converted back.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab, and then click the Fault Domain link.
 - The Fault Domain view opens.
- 4. Click Convert. The Convert drop-down menu opens.
- **5.** Select a conversion option.
 - iSCSI to Virtual Port Mode.
 - Fibre Channel to Virtual Port Mode
 - The Convert to Virtual Port Mode confirmation dialog box opens.
- 6. If converting an iSCSI port that is currently in a fault domain, type a new IP address to be used for the primary port of each iSCSI fault domain.
- 7. Click OK.

Managing Back-End I/O Port Hardware

Back-end SAS ports can be renamed and monitored with threshold definitions.

Configure Back-End Ports

Use the Generate Default Back End Port Configuration dialog box to configure back-end ports on CT-SC040, SC8000, or SC9000 controllers. After configuring the ports, they can be used to connect enclosures.

Prerequisites

- · Supports only CT-SC040, SC8000, or SC9000 controllers.
- · Back-end ports have not been previously configured during Storage Center configuration.
- · An enclosure must be connected to the ports.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- Click + (New) and select Default Storage Port Configuration.
 The Generate Default Back End Port Configuration dialog box opens and displays the status of all SAS ports.
- 4. Select the ports and click OK to configure the SAS ports with a status of Up as back-end ports.

Configure Individual Back-End I/O Ports

On CT-SC040, SC8000, or SC9000 controllers, a back-end port must be configured before the port can be used for back-end connectivity

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Back End Ports tab.
- **4.** Select a SAS I/O port from the **Unconfigured Ports** table, then click **Configure as Back End**. The port is configured as a back-end port.

Rename a Back-End I/O Port

Set a display name for an I/O port to make it more identifiable.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Back End Ports tab.
- Select the I/O port, then click / (Edit). The Edit Port dialog box opens.
- 5. In the Name field, type a descriptive name for the I/O port.
- 6. Click OK. The Edit Port dialog box closes.

Grouping Fibre Channel I/O Ports Using Fault Domains

Front-end ports are categorized into fault domains that identify allowed port movement when a controller reboots or a port fails. Ports that belong to the same fault domain can fail over to each other because they have connectivity to the same resources.

i NOTE: Fault domains cannot be added or modified on SCv2000 or SCv3000 series storage systems. Storage Center creates and manages fault domains on these systems.

Create a Fibre Channel Fault Domain

Create a Fibre Channel fault domain to group Fibre Channel ports for failover purposes.

Prerequisites

The Fibre Channel ports to add to the fault domain must be unconfigured. Ports that are already added to a fault domain or designated as back-end ports cannot be added to a new fault domain.

- In virtual port mode, all Fibre Channel ports that are connected to the same Fibre Channel fabric should be added to the same fault domain.
- In legacy mode, each pair of primary and reserved ports connected to the same Fibre Channel fabric should be added to a unique fault domain. The primary port should be located on a different controller than the secondary port.

About this task

i NOTE: Fibre Channel ports are always configured in Virtual Port Mode on SCv2000 and SCv3000 series storage systems. Legacy Mode is not supported.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab and select Fibre Channel.
- 4. Click + (New) and select Create Fibre Channel Fault Domain. The Create Fault Domain dialog box opens.
- 5. In the Name field, type a name for the fault domain.
- 6. In the **Ports** table, select the Fibre Channel ports to add to the fault domain. All Fibre Channel ports in the fault domain should be connected to the same Fibre Channel fabric
- 7. Click OK.

Rename a Fibre Channel Fault Domain

The fault domain name allows administrators to identify the fault domain.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- **3.** Click the **Front End Ports** tab.
- **4.** Expand **Fibre Channel** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click (Edit). The Edit Fibre Channel Fault Domain dialog box opens.
- 6. In the Name field, type a name for the fault domain.
- 7. Click OK.

Delete a Fibre Channel Fault Domain

Delete a Fibre Channel fault domain if all ports have been removed and it is no longer needed.

Prerequisites

- The Storage Center Fibre Channel front-end I/O ports must be configured for legacy mode. In virtual port mode, fault domains cannot be deleted.
- The fault domain must contain no FC ports.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand Fibre Channel and click the fault domain link. The FC Fault Domain view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Delete FC Fault Domain from the drop-down menu. The Delete FC Fault Domain dialog box opens.
- 6. Click OK.

Grouping iSCSI I/O Ports Using Fault Domains

Front-end ports are categorized into fault domains that identify allowed port movement when a controller reboots or a port fails. Ports that belong to the same fault domain can fail over to each other because they have connectivity to the same resources.

() NOTE: Fault domains cannot be added or modified on SCv2000 or SCv3000 series storage systems. Storage Center

creates and manages fault domains on these systems.

iSCSI VLAN Tagging Support

iSCSI ports in a fault domain can be configured to use a VLAN ID. For each Storage Center, one of two levels of VLAN functionality is available depending on the Storage Center OS version, Storage Center controller model, and iSCSI hardware. Basic VLAN functionality is referred to as single-VLAN tagging, and enhanced VLAN functionality is referred to as multi-VLAN tagging.

Single-VLAN Tagging

If a Storage Center supports single-VLAN tagging, a maximum of 1 VLAN ID can be configured for each iSCSI I/O port. An iSCSI I/O port can belong to only one fault domain, and all ports in the same fault domain use the same VLAN ID.

Single VLAN tagging is supported by all Storage Center versions compatible with Unisphere.

Multi-VLAN Tagging

If a Storage Center supports multi-VLAN tagging, a maximum of 64 VLAN IDs can be configured for each iSCSI I/O port. An iSCSI I/O port can belong to up to 64 fault domains—one for each VLAN.

Multi-VLAN tagging is supported by Storage Centers that meet the multi-VLAN tagging requirements.

Multi-VLAN Tagging Requirements

The following table lists the requirements that a Storage Center must meet to support multi-VLAN tagging.

Requirement	Description
Storage Center controller model	Multi-VLAN Tagging is not supported on SCv3000 or SCv2000 storage systems.
Storage Center iSCSI I/O card hardware	Chelsio T3, T5, or T6 iSCSI cards must be installed in the Storage Center.
Storage Center front-end connectivity mode	The Storage Center iSCSI ports must be configured for virtual port mode. Legacy mode is not supported.

Types of iSCSI Fault Domains

When a Storage Center meets the multi-VLAN tagging requirements, two types of iSCSI fault domains can be created.

- Physical The first fault domain configured for a given set of iSCSI ports.
 - · Physical fault domains do not require a VLAN ID, but can be configured to use a VLAN ID.
 - · Physical fault domains support iSCSI replication to and from remote Storage Centers.
- Virtual Subsequent VLAN fault domains configured for the same set of iSCSI ports are referred to as virtual fault domains.
 - · Virtual fault domains must be assigned a VLAN ID.
 - · Virtual fault domains do not support iSCSI replication.
 - · Virtual fault domains do not support IPv6.

Creating iSCSI Fault Domains

Create an iSCSI fault domain to group ports that can fail over to each other because they have connectivity to the same resources.

(i) NOTE: For user interface reference information, click Help.

Create an iSCSI Fault Domain

Create an iSCSI fault domain to group physical ports for failover purposes.

Prerequisites

- · In virtual port mode, all iSCSI ports that are connected to the same iSCSI network should be added to the same fault domain.
- In legacy mode, each pair of primary and reserved ports that are connected to the same iSCSI network should be added to a unique fault domain. The primary port should be located on a different controller than the secondary port.
- · Physical ports cannot be selected and added to a fault domain if they are already added to another fault domain.
- Each iSCSI port that you want to add to the fault domain must be assigned an IP address, subnet mask, and gateway in the same network as the iSCSI control port for the fault domain.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.

- Click + (New) and select Create iSCSI Fault Domain. The Create iSCSI Fault Domain dialog box opens.
- 4. In the Name field, type a name for the fault domain.
- 5. Configure an IP address and gateway for the iSCSI control port in the fault domain. Servers target this IP address using iSCSI initiators, and the Storage Center redirects individual iSCSI connections to the appropriate virtual port.
 - a) In the Target IPv4 Address field, type an IP address to assign to the iSCSI control port.
 - b) In the **Subnet Mask** field, type the subnet mask for the well-known IP address.
 - c) In the Gateway IPv4 Address field, type the IP address for the iSCSI network default gateway.
- 6. In the Ports table, select the iSCSI ports to add to the fault domain.

i NOTE: On SCv2000 or SCv3000 series storage systems, the iSCSI fault domains (iSCSI Fault Domain 1 and iSCSI Fault Domain 2) are predefined and the iSCSI ports are automatically assigned to the correct fault domains.

7. Click OK.

Related concepts

iSCSI VLAN Tagging Support

Related tasks

Set or Modify the IP Address for a Single iSCSI Port Add a VLAN ID to a Physical iSCSI Fault Domain

Create a VLAN Copy of an iSCSI Fault Domain

To add a VLAN ID to iSCSI ports that are already in use, use an existing iSCSI fault domain as the basis for a new VLAN iSCSI fault domain.

Prerequisites

- The Storage Center must meet the multi-VLAN tagging requirements.
- Virtual fault domains do not support IPv6.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link.. The **Fault Domain** view is displayed.
- 5. In the Summary tab, click ... (More Actions) and select Create VLAN Copy. The Create VLAN Copy dialog box opens.
- 6. In the Name field, type a name for the fault domain.
- 7. Configure an IP address and gateway for the iSCSI control port in the fault domain. Servers target this IP address using iSCSI initiators, and the Storage Center redirects individual iSCSI connections to the appropriate virtual port.
 - a) In the Target IPv4 Address field, type an IP address to assign to the iSCSI control port.
 - b) In the **Subnet Mask** field, type the subnet mask for the well-known IP address.
 - c) In the Gateway IPv4 Address field, type the IP address for the iSCSI network default gateway.
- 8. Configure VLAN tagging.
 - a) In the VLAN ID field, type the VLAN ID for the fault domain. Allowed values are 1–4096.
 - b) To assign a priority level to the VLAN, type a value from 0–7 in the **Class of Service Priority** field. 0 is best effort, 1 is the lowest priority, and 7 is the highest priority.
- 9. Click OK.

Modifying iSCSI Fault Domains

Modify an iSCSI fault domain to change its name, modify network settings for iSCSI ports in the domain, add or remove iSCSI ports, or delete the fault domain.

(i) NOTE: For user interface reference information, click Help.

Rename an iSCSI Fault Domain

The fault domain name allows administrators to identify the fault domain.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. In the Name field, type a name for the fault domain.
- 7. Click OK.

Modify iSCSI Fault Domain Control Port Network Settings

Configure an IP address and gateway for the iSCSI control port in the fault domain. Servers target this IP address using iSCSI initiators, and the Storage Center redirects individual iSCSI connections to the appropriate virtual port.

Prerequisites

The Storage Center iSCSI ports must be configured for virtual port mode.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. In the Target IPv4 Address field, type an IP address to assign to the iSCSI control port.
- 7. In the **Subnet Mask** field, type the subnet mask for the well-known IP address.
- 8. In the Gateway IPv4 Address field, type the IP address for the iSCSI network default gateway.
- 9. (Optional) If IPv6 is supported, in the Target IPv6 Address field, type an IP address to assign to the iSCSI control port.
- 10. Click OK.

Add a VLAN ID to a Physical iSCSI Fault Domain

Add a VLAN ID to an existing iSCSI fault domain if the ports in the fault domain are connected to a tagged network.

Prerequisites

The Storage Center iSCSI ports must be configured for virtual port mode.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. Select the VLAN Tagged checkbox.
- 7. In the VLAN ID field, type a VLAN ID for the fault domain. Allowed values are 1–4096.
- 8. (Optional) To assign a priority level to the VLAN, type a value from 0-7 in the **Class of Service Priority** field. 0 is best effort, 1 is the lowest priority, and 7 is the highest priority.
- 9. Click OK.

Related concepts

iSCSI VLAN Tagging Support

Modify the MTU for an iSCSI Fault Domain

The Maximum Transmission Unit (MTU) specifies the largest packet size supported by the iSCSI network.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. From the MTU drop-down menu, select the largest packet size supported by the iSCSI network.
- 7. Click OK.

Modify the TCP Port for an iSCSI Fault Domain

By default, iSCSI ports accept iSCSI connections on TCP port 3260. Modify the port as needed to integrate with iSCSI network infrastructure.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click / (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. Expand Advanced Port Settings.
- 7. In the **Port Number** field, type the TCP port to use for iSCSI traffic.
- 8. Click **OK**.

Modify the iSCSI Window Size for an iSCSI Fault Domain

The window size specifies the amount of data that can be in transit at any given time.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click / (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. Expand Advanced Port Settings.
- 7. In the Window Size field, type a value for the window size.
 - Allowed values are 16 KB to 32 MB.
 - The window size must be divisible by 16 KB.
- 8. Click OK.

Modify Digest Settings for an iSCSI Fault Domain

The iSCSI digest settings determine whether iSCSI error detection processing is performed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. Expand Advanced Port Settings.
- 7. In the Ports area, select or clear the Enable Immediate Data Write checkbox as needed.
- 8. Click OK.

Modify Timeout Settings for an iSCSI Fault Domain

iSCSI timeout settings determine how the Storage Center handles idle connections.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. Expand Advanced Port Settings.
- 7. In the Timeout Settings area, modify the timeout values as needed. These options are described in the online help.
- 8. Click OK.

Add Ports to an iSCSI Fault Domain

After you connect additional iSCSI ports to an existing iSCSI network, add the iSCSI ports to the fault domain that corresponds to the network.

Prerequisites

- If the fault domain is physical, the iSCSI ports that will be added to the fault domain must not belong to a fault domain.
- If the fault domain is physical, each iSCSI port that you want to add to the fault domain must be assigned an IP address, subnet mask, and gateway in the same network as the iSCSI control port for the fault domain.
- · If the fault domain is virtual, the iSCSI ports you want to add to the fault domain must support the Multi-VLAN Tagging feature.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. In the **Ports** table, select the iSCSI ports to add to the fault domain. All iSCSI ports in the fault domain should be connected to the same Ethernet network.
- 7. Click OK.

Test Network Connectivity for an iSCSI Port in a Fault Domain

Test connectivity for an iSCSI physical or virtual I/O port by pinging a port or host on the network.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand iSCSI, then select the physical port for which you want to test connectivity.
- Click ... (More Actions) and select Ping. The Ping dialog box opens.
- 6. Type the IP address of the host to which you want to test connectivity.
 - If the host uses either IPv4 or IPv6 addressing, type the IP address of the host to which you want to test connectivity in the IP Address field.
 - If the host uses IPv4 addressing only, type the IPv4 address in the IPv4 Address field.
- 7. From the **Ping Size** drop-down menu, select a size in bytes for the ping packets, not including overhead. If you select **Other**, type a value between 1 and 17000 bytes in the field below the menu.

i NOTE: The Ping Size drop-down menu might not appear depending on the hardware I/O cards used by the Storage Center.

- 8. Click OK. A message displays the results of the test.
- 9. Click **OK**.

Related tasks

Test Network Connectivity for an iSCSI Port

Remove Ports from an iSCSI Fault Domain

Before you repurpose one or more front-end iSCSI ports, remove them from the fault domains to which they belong.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- On the Summary tab, click ✓ (Edit). The Edit iSCSI Fault Domain dialog box opens.
- 6. In the Ports table, deselect the iSCSI ports to remove from the fault domain.
- 7. Click OK.

Configuring NAT Port Forwarding for iSCSI Fault Domains

Port forwarding allows iSCSI initiators (servers or remote Storage Centers) located on a public network or different private network to communicate with Storage Center iSCSI ports on a private network behind a router that performs Network Address Translation (NAT).

For each Storage Center iSCSI control port and physical port, the router performing NAT must be configured to forward connections destined for a unique public IP address and TCP port pair to the private IP address and TCP port for the iSCSI port. These port forwarding rules must also be configured in parallel on the Storage Center fault domains to make sure that iSCSI target control port redirection functions correctly. Fault domains can only be modified by administrators.

i NOTE: If Storage Center iSCSI ports are configured for legacy mode, the port forwarding rules do not need to be defined on the Storage Center because there is no control port redirection.

iSCSI NAT Port Forwarding Requirements for Virtual Port Mode

The following requirements must be met to configure NAT port forwarding for an iSCSI fault domain in virtual port mode.

- For each Storage Center iSCSI control port and virtual port, a unique public IP address and TCP port pair must be reserved on the router that performs NAT.
- The router that performs NAT between the Storage Center and the public network must be configured to forward connections destined for each public IP address and port pair to the appropriate Storage Center private target iSCSI IP address and private port (by default, TCP port 3260).

iSCSI NAT Port Forwarding Example Configuration

In this example, a router separates the Storage Center on a private network (192.168.1.0/24) from a server (iSCSI initiator) on the public network (1.1.1.60). To communicate with Storage Center iSCSI target ports on the private network, the server connects to a public IP address owned by the router (1.1.1.1) on ports 9000 and 9001. The router forwards these connections to the appropriate private IP addresses (192.168.1.50 and 192.168.1.51) on TCP port 3260.



Figure 4. iSCSI NAT Port Forwarding Diagram

ltem	Description
1	iSCSI initiator (server or remote Storage Center)
2	Router performing NAT/port forwarding

3 Storage Center

Configure NAT Port Forwarding for an iSCSI Fault Domain

Configure NAT port forwarding for a fault domain to make sure that control port redirection works correctly.

Prerequisites

When the router that performs NAT and port forwarding receives inbound iSCSI connections destined for the specified public IP and public port, it forwards the connections to the private Storage Center iSCSI IP address and private port (by default, TCP port 3260).

- The Storage Center iSCSI ports must be configured for virtual port mode.
- For each Storage Center iSCSI control port and virtual port, a unique public IP address and TCP port pair must be reserved on the router that performs NAT.
- The router that performs NAT between the Storage Center and the public network must be configured to forward connections destined for each public IP address and port pair to the appropriate Storage Center private iSCSI IP address and appropriate port (by default, TCP 3260).

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure NAT Port Forwarding. The Configure NAT Port Forwarding dialog box opens.
- 6. In the **Port Forwarding Configuration** area, configure port forwarding information for a Storage Center iSCSI port.
 - a) Click Add.
 - The Create iSCSI NAT Port Forward dialog box opens.
 - b) From the Name drop-down menu, select the iSCSI control port or a physical port.
 - · Control ports are labeled with the name of the fault domain.
 - · Physical ports are labeled with a WWN.
 - c) In the **Public IPv4 Address** field, type the IPv4 address that iSCSI initiators (servers and remote Storage Centers) communicate with on the public network to reach the Storage Center iSCSI port.
 - d) In the **Public Port** field, type the TCP port that iSCSI initiators communicate with on the public network to reach the Storage Center iSCSI port.
 - e) Click OK.

The Create iSCSI NAT Port Forward dialog box closes.

- 7. Repeat the preceding steps for each additional iSCSI control port and physical port in the fault domain.
- 8. In the **Public Networks/Initiators** area, define an iSCSI initiator IP address or subnet that requires port forwarding to reach the Storage Center because it is separated from the Storage Center by a router performing NAT.
 - a) Click Add.
 - The Create iSCSI NAT Public Network/Initiator dialog box opens.
 - b) In the **Public IPv4 Address** field, type the IPv4 address for the iSCSI initiator or subnet for which NAT port forwarding is required.
 - c) In the **Subnet Mask** field, type the subnet mask for the iSCSI initiator IP address or subnet.
 - d) Click OK.
 - The Create iSCSI NAT Public Network/Initiator dialog box closes.
- 9. Repeat the preceding steps for each additional iSCSI initiator IP address or subnet that requires port forwarding.
- 10. Click OK.

Modify NAT Port Forwarding for an iSCSI Fault Domain

Modify NAT port forwarding to change the port forwarding configuration or change the iSCSI initiators and subnets that require port forwarding.

Prerequisites

- The Storage Center iSCSI ports must be configured for virtual port mode.
- For each Storage Center iSCSI control port and virtual port, a unique public IP address and TCP port pair must be reserved on the router that performs NAT.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- Expand iSCSI and click the fault domain link. The Fault Domain view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure NAT Port Forwarding. The Configure NAT Port Forwarding dialog box opens.
- 6. In the Port Forwarding Configuration area, modify port forwarding information for a Storage Center iSCSI port.
 - · To add port forwarding information for an iSCSI port, click Add.
 - To modify port forwarding information for an iSCSI port, select the port, then click Edit.
 - To delete port forwarding information for an iSCSI port, select the port, then click **Remove**.
- 7. In the **Public Networks/Initiators** area, add or modify iSCSI initiator IP addresses or subnets that require port forwarding to reach the Storage Center because it is separated from the Storage Center by a router performing NAT.
 - To add an iSCSI initiator IP address or subnet, click Add.
 - To modify an iSCSI initiator IP address or subnet, select it, then click **Edit**.
 - To delete an iSCSI initiator IP address or subnet, select it, then click **Remove**.
- 8. Click OK.

Configuring CHAP for iSCSI Fault Domains

When Challenge Handshake Authentication Protocol (CHAP) authentication is enabled, the Storage Center challenges each iSCSI initiator in the fault domain for a shared secret (password). When CHAP is enabled it applies to all servers and remote Storage Centers that connect to the fault domain.

i NOTE: When CHAP is enabled for an iSCSI fault domain, all iSCSI initiators in the fault domain (servers and Storage Centers) must be configured to use CHAP. All iSCSI initiators that are not configured to use CHAP are no longer able to communicate with the Storage Center iSCSI ports in the fault domain.

Configure CHAP for Servers in an iSCSI Fault Domain

When Challenge Handshake Authentication Protocol (CHAP) authentication is enabled (for unidirectional CHAP only), the Storage Center (target) challenges each iSCSI initiator for a shared secret (password). Servers (remote initiators) must provide the correct shared secret to access Storage Center (target) volumes. To enable bidirectional CHAP authentication, unique shared secrets (passwords) must be configured for the remote initiator and the target Storage Center.

About this task

NOTE: Changing CHAP settings will cause existing iSCSI connections between SAN systems using the selected fault domain to be lost. You will need to use the Configure iSCSI Connection wizard to reestablish the lost connections after changing CHAP settings.

Steps

1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.

- 2. From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure CHAP. The Configure CHAP dialog box opens.
- 6. Select the CHAP Enabled checkbox.
- 7. (Bidirectional CHAP only) In the **Bidirectional CHAP Secret** field, type the shared secret that the Storage Center (target) must provide when challenged by the remote initiator. If this field is empty, bidirectional CHAP authentication is not enabled.
- 8. Define the CHAP configuration for each server in the fault domain that initiates iSCSI connections to the Storage Center.
 - a) Click **Add**.
 - The Add Remote CHAP Initiator dialog box opens.
 - b) In the **iSCSI Name** field, type the iSCSI name of the remote initiator.
 - c) In the **Remote CHAP Name** field, type the CHAP name of the remote initiator.
 - d) (Bidirectional CHAP only) In the Local CHAP Secret field, type the shared secret that the Storage Center (target) must provide when challenged by the remote initiator. This secret is required if bidirectional CHAP is enabled on the remote iSCSI initiator. This is the same shared secret that is typed into the Bidirectional CHAP Secret field for Local CHAP Configuration on the Configure CHAP dialog box.
 - e) In the **Remote CHAP Secret** field, type the shared secret that the remote initiator must provide when challenged by the Storage Center (target).
 - f) Click OK.

The Add Remote CHAP Initiator dialog box closes.

9. Click **OK**.

The **Configure CHAP** dialog box closes.

10. Configure each remote iSCSI initiator to use the shared secrets that you defined.

Modify CHAP Settings for a Server in an iSCSI Fault Domain

Modify CHAP settings for a server to change one or more shared secrets for the server.

About this task

() NOTE: Changing CHAP settings will cause existing iSCSI connections between SAN systems using the selected fault domain to be lost. You will need to use the Configure iSCSI Connection wizard to reestablish the lost connections after changing CHAP settings.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure CHAP. The Configure CHAP dialog box opens.
- 6. In the **Remote CHAP Configuration** table, select a CHAP configuration, then click **Edit**. The **Edit Remote CHAP Initiator** dialog box opens.
- 7. Modify the options as needed, then click **OK**. The **Edit Remote CHAP Initiator** dialog box closes.
- 8. Click OK.

Remove CHAP Settings for a Server in an iSCSI Fault Domain

Remove CHAP settings for a server to prevent it from targeting the Storage Center while CHAP is enabled for the fault domain.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- 4. Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure CHAP. The Configure CHAP dialog box opens.
- 6. In the **Remote CHAP Configuration** table, select a CHAP configuration, then click **Remove**. The CHAP configuration is removed from the table.
- 7. Click OK.

Enable Bidirectional CHAP for iSCSI Replication in a Fault Domain

When bidirectional CHAP is enabled for iSCSI replication, the source Storage Center (initiator) challenges the destination Storage Center (target) for a shared secret.

Prerequisites

CHAP must be enabled for the fault domain.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click the Front End Ports tab.
- **4.** Expand **iSCSI** and click the fault domain link. The **Fault Domain** view is displayed.
- 5. On the Summary tab, click ... (More Actions) and select Configure CHAP. The Configure CHAP dialog box opens.
- 6. Type a shared secret in the Bidirectional CHAP Secret field.

Grouping SAS I/O Ports Using Fault Domains

Front-end ports are categorized into fault domains that identify allowed port movement when a controller reboots or a port fails. Ports that belong to the same fault domain can fail over to each other because they have connectivity to the same resources.

i NOTE: Fault domains cannot be added or modified on SCv2000 or SCv3000 series storage systems. Storage Center creates and manages fault domains on these systems.

Create a SAS Fault Domain

Create a SAS fault domain to group SAS front-end ports for failover purposes on SC4020 or SC5020 controllers.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Ports**. The **Ports** view is displayed.
- 3. Click + (New) and select Create SAS Fault Domain.

The Create SAS Fault Domain dialog box opens.

- 4. In the Name field, type a name for the fault domain.
- 5. In the Ports table, select the SAS ports to add to the fault domain.
 - When pairing SAS ports into the fault domain:
 - Use one port from each controller.
 - · Make sure the paired ports have the same port number and are connected to the same server.

6. Click OK.

Delete a SAS Fault Domain

Delete a SAS fault domain if it is no longer needed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Ports. The Ports view is displayed.
- 3. Click the Front End Ports tab.
- Expand SAS and right-click the fault domain, then select Delete. The Delete SAS Fault Domain dialog box opens.
- 5. Click OK.

Managing Disks and Disk Folders

Manage disks by adding new disks and organizing disks in disk folders.

Add disks and enclosures to accommodate greater data needs. The supported number of enclosures attached to Storage Center depends on the controller and enclosure being used.

When adding disks be aware of the following.

- After disks are added, additional space may not be immediately available. Make sure to allow enough time for Unisphere to allocate space for writes.
- Create a new disk folder only to address specific application program requirements. Creating a second disk folder may cause storage to be used inefficiently.
- · Data cannot be written to unassigned disks.
- The Assigned disk folder was created during initial configuration of the Storage Center. Managing unassigned disks means moving the disk to a managed disk folder.
- When Unisphere detects self-encrypting drives (SEDs) that are Federal Information Processing Standard (FIPS) 140-2 certified, it formats the drives for Secure Data use.
 - If Self-Encrypting Drives is licensed, disks will be managed in a Secure Data folder.
 - If Self-Encrypting Drives is not licensed, disks will be treated as unsecured drives, but may be upgraded to Secure Data status if a license is purchased in the future.

Storage Center Disk Management

For SC7020, SC5020, and SCv3000 storage systems, Storage Center manages disks automatically. When configuring a storage system, Storage Center manages the disks into folders based on function of the disk. FIPS-certified Self-Encrypting Drives (SEDs) are managed into a separate folder than other disks. When Storage Center detects new disks, it manages the disk into the appropriate folder.

In Storage Center version 7.3 and later, the Automatic Drive Placement function can be turned on or off for all storage systems (except SCv2000 series) using the Storage Center Storage settings.

Disk Management on SCv2000 Series Storage Systems

SCv2000 series storage systems manage disks automatically, limiting the disk management options. After adding disks, Storage Center recognizes the new disks, creates a new disk folder if necessary, then manages the disks in the disk folder. If a disk is intentionally down for testing purposes, then is deleted, you can restore the disk to manage the disk again in a disk folder.

The following disk management options are not available for SCv2000 series storage systems:

- Creating disk folders
- Adding disks to disk folders
- Managing disk spares

Scan for New Disks

Scanning for disks recognizes new disks and allows them to be assigned to a disk folder.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Click **Scan For Disks**. The **Scan For Disks** dialog box opens.
- 4. Click Yes.

Create a Disk Folder

Creating a disk folder manages unassigned disks in the new disk folder.

About this task

i NOTE: Having multiple disk folders may cause storage to be used inefficiently.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- Click + (New).
 The New Disk Folder dialog box opens.
- 4. Type a name in the **Name** field.
- 5. Select the disks to be included in the disk folder.
- 6. Click OK.

Delete Disk Folder

Delete a disk folder if all disks have been released from the folder and the folder is not needed.

Prerequisites

The disk folder does not contain disks.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- Select a disk folder, then click iii (Delete). The Delete Disk Folder dialog box opens.
- 4. Click Yes.
Modify a Disk Folder

The disk folder Edit Settings dialog box allows you to change the name of the folder, add notes, or change the Storage Alert Threshold.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- Expand Disks, then select a disk folder and click / (Edit). The Edit Disk Folder dialog box opens.
- 4. Modify the following attributes as needed.
 - To change the name of the disk folder, type a name into the Name field.
 - To add notes to the disk folder, type text into the **Notes** field.
 - To change the percent of remaining data that initiates a threshold warning, select a value from the **Storage Alert Threshold** drop-down menu.
 - · If the folder is a Secure Data disk folder, enable or disable the Rekey option by clicking the Rekey checkbox.
 - If the folder is a Secure Data disk folder, specify a rekey interval by typing a value in the field.
- 5. Click OK.

Manage Unassigned Disks

Manage Unassigned Disks assigns disks to an existing disk folder. A RAID rebalance is required to complete managing disks.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- 3. Expand **Disks** and select an unassigned disk folder.
- Click Manage Unassigned Disks. The Manage Unassigned Disks dialog box opens.
- 5. From the **Disk Folder** drop-down menu, select a disk folder.
- 6. In the Select Unassigned Disks to Manage pane, select the disks to be assigned.
- 7. To schedule a RAID rebalance select one of the following options.
 - · To start a RAID rebalance after creating the disk folder, select Perform RAID rebalance immediately.
 - To schedule a RAID rebalance for a later time, select Schedule RAID rebalance then select a date and time.
- 8. To skip the RAID rebalance, select I will start RAID rebalance later.

i NOTE: To use all available space, perform a RAID rebalance.

9. Click OK.

Enable or Disable the Disk Indicator Light

The drive bay indicator light identifies a drive bay so it can be easily located in an enclosure.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the System tab navigation pane, click Disks.

The **Disks** view is displayed.

- 5. In the right pane, select a disk and click **Toggle Indicator**.
 - The **Toggle Indicator** dialog box opens.
- 6. Click OK.

Release a Disk

Release a disk before removing it from an enclosure. The disk is fully released after performing a RAID rebalance.

About this task

(i) NOTE: Do not release disks from a disk folder unless the remaining disks have enough free space for the re-striped data.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, expand the Storage Center and select Disks. The Disks view is displayed.
- 5. In the disks table, select a disk and click **Release Disk**. The **Release Disks** dialog box opens.
- 6. Schedule a RAID rebalance.
 - To start a RAID rebalance after releasing the disk, select **Perform RAID rebalance immediately**.
 - To schedule a RAID rebalance, select **Schedule RAID rebalance** then select a date and time.
- 7. To skip the RAID rebalance, select I will start RAID rebalance later.
- 8. Click OK.

Cancel Releasing a Disk

After releasing a disk, the data remains on the disk until the RAID rebalance is complete. Cancel releasing a disk if the RAID rebalance has not completed and the data is still on the disk. Canceling the release reassigns the disk to the disk folder to which it was previously assigned.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, expand the Storage Center and select Disks. The Disks view is displayed.
- 5. In the disks table, select a disk marked for release and click **Cancel Release Disk**. The **Cancel Release Disks** dialog box opens.
- 6. Click OK.

Delete a Disk

Deleting a disk removes that disk object from Unisphere. Before deleting the disk object, you must release the disk, moving the data off the disk.

Prerequisites

The disk failed and it does not have any allocated blocks.

- The disk was removed from the enclosure.
- · If the disk was in an enclosure that has been removed, that enclosure object must be deleted first.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, expand the Storage Center and select Disks. The Disks view is displayed.
- In the disks table, select the disk and click iii (Delete). The Delete Disks dialog box opens.
- 6. Click Yes.

Restore a Disk

After a disk fails, Storage Center does not allow that disk to be managed again. If the disk is down for testing purposes then deleted, the disk can be restored so that Storage Center can manage the disk again.

Prerequisites

The disk must be down, removed from the enclosure, and deleted from Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, expand the Storage Center and select Disks. The Disks view is displayed.
- 5. In the disks table, select the disk and click **Restore Disk**. The **Restore Disks** dialog box opens.
- 6. Click Yes.

Storage Center restores the disk and adds it to a disk folder.

Replace a Failed Disk

The Replace Failed Disk wizard identifies a disk and provides steps to replace the disk.

Prerequisites

The disk must be down

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**.
- The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, expand the Storage Center and select Disks. The Disks view is displayed.
- In the disks table, select the failed disk and click Replace Disk. The Replace Disk wizard opens.
- 6. Locate the failed disk and click Next.

- 7. Follow the instructions to physically remove the failed disk from the enclosure. Click Next.
- 8. Insert the new disk into the enclosure, following all instructions. Click **Next**. Storage Center attempts to recognize the replacement disk.
- 9. If the disk replacement succeeds, Storage Center confirms this. It also displays information about the new disk.
- 10. Click Finish to close the wizard.

Managing Secure Data

Secure Data provides data-at-rest encryption with key management for self-encrypting drives (SED). The Self-Encrypting Drives feature must be licensed to use Secure Data.

How Secure Data Works

Using Secure Data to manage SEDs requires an external key management server. If a key management server has not been configured or is unavailable, Storage Center allows SEDs to be managed; however, it will not secure the SEDs until the key management server is available and configured, at which point they will be secured.

i NOTE: Create a backup for the key management server before removing an SED and after managing an SED.

Each FIPS disk in Storage Center has an internal Media Encryption Key (MEK). The key resides on the disk, providing encryption for data written to the disk and decryption for data as it is read from the disk. Destroying the key makes any data on the disk immediately and permanently unreadable, a process referred to as a crypto erase. When you add an SED to, or release an SED from a Secure Data folder, the MEK is destroyed and a new key is generated. Creating a new key allows the disk to be reused, although all previous data is lost.

WARNING: Managing a FIPS SED and assigning it to a Secure Data folder destroys the encryption key on the disk, which makes any previous data on the disk unreadable.

Not to be confused with the MEK, the Storage Center manages a separate set of keys for providing data-at-rest encryption. These keys are referred to as authority credentials. The purpose of these keys is to protect the theft of any number of drives. If a secured drive from a Secure Data folder is removed from the system such that power is removed, the drive will be locked and customer data will be unreadable.

WARNING: Storage Center will not be able to manage a previously-managed drive as an SED if the key has been deleted from the drive or the key management server.

Authenticating to the drive using the authority credential is the only means of unlocking the drive while preserving customer data, which can only be obtained by successfully authenticating to the related key management server through a secure channel.

Use the **Copy Volumes to Disk Folder** operation to copy volumes from a Secure Data folder to another folder. The destination folder can be either a secure folder or a nonsecure folder.

To protect data at rest, all SEDs in a Secure Data disk folder lock when power is removed (lock on reset enabled). When power is removed from the drive, the drive cannot be unlocked without an authority credential.

When replicating from a Secure Data volume to a non-Secure Data folder, that volume is no longer secure after it leaves the Secure Data folder. When replicating a non-Secure Data volume to a Secure Data folder, that volume is not secure until it replicates to the Secure Data folder and Data Progression runs.

Configure Key Server

Before managing SEDs in a Secure Data folder, configure communication between Storage Center and the key management server.

Prerequisites

The Storage Center must have the Self-Encrypting Drives license.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- 3. Click 🌣 (Settings).

The Storage Center Settings dialog box opens.

- 4. Click the Secure Data tab.
- 5. In the Hostname field, type the host name or IP address of the key management server.
- 6. In the **Port** field, type the number of a port with open communication with the key management server.
- 7. In the **Timeout** field, type the amount of time in seconds after which Storage Center should stop attempting to reconnect to the key management server after a failure.
- 8. To add alternate key management servers, type the host name or IP address of another key management server in the Alternate Hostnames area. Then click Add.
 - () NOTE: Alternate hostnames should be added to the configuration after all drives in the system have initially been managed and fully secured. To ensure optimized access times during initial Key creation, alternate hostnames should be added only after the drives in the Storage Center have been initially managed and fully secured.
- 9. If the key management server requires a user name to validate the Storage Center certificate, type the name in the Username field.
- 10. If the key management server requires a password to validate the Storage Center certificate, type the password in the **Password** field.
- 11. Configure the key management server certificates.
 - a) Click Configure Key Management Server Certificates. The Configure Key Management Server Certificates dialog box opens.
 - b) Click Browse next to the Root CA Certificate. Navigate to the location of the root CA certificate on your computer and select it.
 - c) Click **Browse** next to the certificate fields for the controllers Navigate to the location of the controller certificates on your computer and select them.
 - d) Click **OK**.
- 12. Click **OK**.

Results

After you configure the key server, the Server Connectivity status is shown as Up on the Edit Storage Center Settings dialog box.

Configure Rekey Interval for Disk Folder

Specify a rekey interval for a Secure Disk folder. When that interval has been reached, a rekey is triggered on each disk in the folder.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Select the name of a Secure Disk folder and click \checkmark (Edit). The Edit Disk Folder dialog box opens.
- 4. If the Rekey option is not enabled, select the checkbox to enable it.
- 5. Type a value in the Rekey interval field to specify the amount of time after which a rekey will be triggered on each disk in the folder.
- 6. Click OK.

Rekey a Disk Folder

Perform an on-demand rekey of a Secure Disk folder.

Prerequisites

The disk or disk folder must be enabled as Secure Disk.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.

- **3.** Select the name of a Secure Disk folder and click **Rekey Disk Folder**. The **Rekey Disk Folder** dialog box opens.
- 4. Click Yes.

Rekey a Disk

Perform an on-demand rekey of a Secure Disk.

Prerequisites

The disk or disk folder must be enabled as Secure Disk disk.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Select the name of a Secure Disk disk and click **Rekey Disk**. The **Rekey Disk** dialog box opens.
- 4. Click Yes.

Copy Volumes to Disk Folder

Copy volumes from one Secure Disk folder to another folder. The target folder can be either a secure folder or a nonsecure folder.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Click ... (More Actions) and select Copy Volumes to Disk Folder. The Copy Volumes to Disk Folder dialog box opens.
- 4. Choose the source volume by selecting the checkbox next to the name of the disk folder.
- 5. Use the drop-down menu to select the destination disk folder.
- 6. Click OK.

Create Secure Data Disk Folder

A Secure Data folder can contain only SEDs that are FIPS certified. If the Storage Center is licensed for Self-Encrypting Drives and unmanaged SEDs are found, the Create Disk folder dialog box shows the Secure Data folder option.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- 3. In the right pane, right-click **Disks** and select **New Disk Folder** from the drop-down menu. The **New Disk Folder** dialog box opens. The dialog box displays all unmanaged disks and designates spare disks.
- 4. Select the Create as a Secure Data folder checkbox.

i NOTE: All non-SEDs must be removed from the Unmanaged Disks table before creating a Secure Data folder.

- 5. Type a name in the **Name** field.
- 6. Select the disks to be managed and click **OK**. The Secure Data Disk folder is created.

- 7. To modify the tier redundancy, select the **Create Storage Type** checkbox and then modify the redundancy for each tier as needed.
 - · Single Redundant: Single-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 (each drive is mirrored)
 - · RAID 5-5 (striped across 5 drives)
 - RAID 5-9 (striped across 9 drives)
 - **Dual redundant**: Dual redundant is the recommended redundancy level for all tiers. It is enforced for 3 TB HDDs and higher and for 18 TB SSDs and higher. Dual-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 Dual-Mirror (data is written simultaneously to three separate drives)
 - · RAID 6-6 (4 data segments, 2 parity segments for each stripe)
 - RAID 6-10 (8 data segments, 2 parity segments for each stripe.)
- 8. Click OK.

Managing Data Redundancy

Manage data redundancy by modifying tier redundancy or creating Storage Types.

Redundancy Requirements

Drive size is used to determine the redundancy level to apply to a tier of drives. If any drive in a tier surpasses a threshold size, a specific redundancy level can be applied to the tier containing that drive. If a redundancy level is required, the Storage Center operating system sets the level and it cannot be changed.

Table 7. HDD Redundancy Recommendations and Requirements

Disk Size	Level of Redundancy Recommended or Enforced	
Up to 3 TB	Dual redundant is the recommended level (i) NOTE: Non-redundant storage is not an option for SCv2000 Series storage systems.	
3 TB and higher	Dual redundant is required and enforced	
Table 8. SSD Redundancy Recommendations and Requirements		
Disk Size	Level of Redundancy Recommended or Enforced	
Up to 18 TB	Dual redundant is the recommended level	

(i) NOTE: Non-redundant storage is not an option for SCv2000 Series storage systems.

18 TB and higher

Dual redundant is required and enforced

Managing RAID

Modifying tier redundancy, or adding or removing disks can cause data to be unevenly distributed across disks. A RAID rebalance redistributes data over disks in a disk folder.

Rebalance RAID

Rebalancing RAID redistributes data over the disks according to the Storage Type. Rebalance the RAID after releasing a disk from a disk folder, when a disk fails, or after adding a disk.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.

3. Click Rebalance RAID.

The RAID Rebalance dialog box opens. If a RAID rebalance is needed, the dialog box shows RAID rebalance options.

- 4. Select Perform RAID Rebalance immediately.
- 5. Click OK.

Cancel a RAID Rebalance

Cancel a RAID rebalance to stop an on-going RAID rebalance. Cancelling a RAID rebalance does not cancel the need to rebalance. You will still be prompted to rebalance RAID.

About this task

i NOTE: The RAID rebalance stops after completing the current rebalance pass.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Click **Rebalance RAID**. The **RAID Rebalance** dialog box opens.
- 4. Click Stop Rebalancing. After rebalance stops, a confirmation dialog box opens.
- 5. Click OK.

Schedule a RAID Rebalance

Schedule a RAID rebalance to rebuild the data on all of the disks at a later date.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks.

The **Disks** view is displayed.

- Click Rebalance RAID. The RAID Rebalance dialog box opens. If a RAID rebalance is needed, the dialog box shows RAID rebalance options. If a RAID rebalance is needed, the dialog box shows RAID rebalance options.
- 4. Select Schedule RAID rebalance.
- 5. Select a date and time.
- 6. Click OK.

Check the Status of a RAID Rebalance

The RAID Rebalance displays the status of an in-progress RAID rebalance and indicates whether a rebalance is needed.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Disks. The Disks view is displayed.
- 3. Click Rebalance RAID.

The **RAID Rebalance** dialog box shows the status of a RAID rebalance.

4. Click OK.

Managing Storage Types

Storage Types determine how Data Progression moves data within a disk folder. Each disk folder has a corresponding Storage Type. NOTE: Modifying tier redundancy requires a RAID rebalance to be completed, and should not be performed unless sufficient free disk space is available within the disk folder.

Create a Storage Type

Creating a Storage Type sets the redundancy level for each tier and assigns the Storage Type to a disk folder.

Prerequisites

SCv2000 series storage systems do not support creating new Storage Types.

About this task

i NOTE: Do not assign multiple Storage Types to one disk folder. Data Progression may not perform as intended with multiple Storage Types assigned to one disk folder.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- Click + (New). The New Storage Type dialog box opens.
- 4. Select a disk folder from the **Disk Folder** drop-down menu.
- 5. Select a redundancy type.
 - Redundant: Protects against the loss of any one drive (if single redundant) or any two drives (if dual redundant).
 - Non-Redundant: Uses RAID 0 in all classes, in all tiers. Data is striped but provides no redundancy. If one drive fails, all data is lost.
 NOTE: Non-Redundant is not recommended because data is not protected against a drive failure. Do not use non-redundant storage for a volume unless the data has been backed up elsewhere.
- 6. For Redundant Storage Types, you must select a redundancy level for each tier unless the drive type or size requires a specific redundancy level
 - · Single Redundant: Single-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 (each drive is mirrored)
 - RAID 5-5 (striped across 5 drives)
 - RAID 5-9 (striped across 9 drives)
 - **Dual redundant**: Dual redundant is the recommended redundancy level for all tiers. It is enforced for 3 TB HDDs and higher and for 18 TB SSDs and higher. Dual-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 Dual-Mirror (data is written simultaneously to three separate drives)
 - · RAID 6-6 (4 data segments, 2 parity segments for each stripe)
 - RAID 6-10 (8 data segments, 2 parity segments for each stripe.)
- 7. Select a Page Size:
 - Standard (2 MB Datapage Size): Default datapage size, this selection is appropriate for most applications.
 - High Performance (512 KB Datapage Size): Appropriate for applications with high performance needs, or in environments in which snapshots are taken frequently under heavy I/O. Selecting this size increases overhead and reduces the maximum available space in the Storage Type. All-Flash storage systems use 512 KB by default.
 - **High Density (4 MB Datapage Size)**: Appropriate for systems that use a large amount of disk space and take snapshots infrequently.
- 8. Drive Addition is selected by default. Leave this option selected.
- 9. Click **OK**.

Modify Tier Redundancy

Modify tier redundancy to change the redundancy level for each tier in a Storage Type. After modifying tier redundancy, a RAID rebalance is required to move data to the new RAID levels.

About this task

i NOTE: Do not modify tier redundancy if there is insufficient space in the tier for a RAID rebalance.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- **3.** In the **Storage Type** area, select the Storage Type to modify, then click *(Edit)*. The **Modify Tier Redundancy** dialog box opens.
- 4. Modify the redundancy for each tier as needed.
 - **Redundant**: Protects against the loss of any one drive (if single redundant) or any two drives (if dual redundant).
 - Non-Redundant: Uses RAID 0 in all classes, in all tiers. Data is striped but provides no redundancy. If one drive fails, all data is lost. i NOTE: Non-Redundant is not recommended because data is not protected against a drive failure. Do not use nonredundant storage for a volume unless the data has been backed up elsewhere.
- 5. For Redundant Storage Types, you must select a redundancy level for each tier unless the drive type or size requires a specific redundancy level
 - Single Redundant: Single-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 (each drive is mirrored)
 - RAID 5-5 (striped across 5 drives)
 - · RAID 5-9 (striped across 9 drives)
 - **Dual redundant**: Dual redundant is the recommended redundancy level for all tiers. It is enforced for 3 TB HDDs and higher and for 18 TB SSDs and higher. Dual-redundant tiers can contain any of the following types of RAID storage:
 - RAID 10 Dual-Mirror (data is written simultaneously to three separate drives)
 - RAID 6-6 (4 data segments, 2 parity segments for each stripe)
 - RAID 6-10 (8 data segments, 2 parity segments for each stripe.)
- 6. Drive Addition is selected by default. Leave this option selected.
- 7. Click OK.

A RAID rebalance starts.

Managing Disk Enclosures

Use the Hardware view to rename an enclosure, set an asset tag, clear the swap status for replaceable hardware modules in a disk enclosure, mute alarms, reset the temperature sensors, and delete an enclosure from a Storage Center.

Add an Enclosure

This step-by-step wizard guides you through adding a new enclosure to the system.

Prerequisites

This wizard is available only for SCv2000 series and SCv3000 series arrays. This procedure can be performed without a controller outage.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.

- 3. Click the System tab.
- 4. In the System tab navigation pane, click Enclosure. The Enclosure view is displayed.
- 5. Click Add Enclosure. The Add New Enclosure wizard opens.
- 6. Confirm the details of your current install, and click **Next** to validate the cabling.
 - If the cabling is wrong, an error message is displayed. You can proceed to the next step once the error is corrected and validated.
- 7. If prompted, select the enclosure type and click Next.
- 8. Follow the instructions to insert disks into the new enclosure and turn on the enclosure. Click Next when finished.
- 9. If displayed, follow the instructions to disconnect the A side chain cable from an existing enclosure.
- 10. Click Next.
- Connect the A side chain cables to the new enclosure by following the displayed instructions. Click Next to validate the cabling. If the enclosure cannot be detected, an error message is displayed. You can proceed to the next step once the cabling is validated.
- 12. If displayed, follow the instructions to disconnect the B side chain cables from the existing enclosure.
- 13. Click Next.
- 14. Connect the B side chain cables to the new enclosure by following the displayed instructions.
- 15. Click **Next** to validate the cabling.

If the enclosure cannot be detected, an error message is displayed. You can proceed to the next step once the cabling is validated.

16. Click Finish to exit the wizard.

Remove an Enclosure

This step-by-step wizard guides you through removing an enclosure to the system without a controller outage.

Prerequisites

- · This wizard is only available for the SCv2000 series controllers.
- The option will display only if Storage Center has the ability to remove enclosures and data has been removed from all disks in the selected enclosure.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click**Enclosure**. The **Enclosure** view is displayed.
- 5. Select the enclosure you want to remove and click **Remove Enclosure**. The **Remove Enclosure** wizard opens.
- 6. Confirm the details of your current install, and click Next.
- 7. Locate the enclosure in the Storage Center and click Next.
- 8. Follow the directions to disconnect the A side chain cables connecting the enclosure to the Storage Center. Click Next.
- 9. Reconnect the A side chain cables by following the directions to exclude the enclosure. Click Next.
- 10. Follow the directions to disconnect the B side chain cables connecting the enclosure to the Storage Center. Click Next.
- 11. Reconnect the B side chain cables by following the directions to exclude the enclosure. Click **Next** to validate the cabling and delete the enclosure.

If the cabling is invalid, an error message is displayed. You can proceed to the next step once the error is corrected and validated.

12. Click Finish to exit the wizard.

Replace an Enclosure

The Replace Enclosure wizard guides you through replacing an enclosure in the storage system.

Prerequisites

- · Requires a controller outage
- Available only for the SCv2000 series controller
- Available only if data has been released from all disks in the selected enclosure and the situation allows the replacement of an enclosure

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Hardware. The Hardware view is displayed.
- 3. Click the System tab.
- 4. In the System tab navigation pane, clickEnclosure. The Enclosure view is displayed.
- 5. Select the enclosure you want to replace and click **Replace Enclosure**. The **Replace Enclosure** wizard opens.
- 6. Click Next to accept the warning of service interruption.
- 7. Follow the instruction for locating the enclosure in the rack.
- 8. Click Next.
- 9. Follow all instructions to remove disks from the enclosure.
- 10. Click Next.
- 11. Disconnect the enclosure from the Storage Center.
- 12. Click Next.
- 13. Add disks to your enclosure by following the instructions.
- 14. Click Next.
- 15. Follow the instructions to connect the A-side chain.
- 16. Click Next.

The wizard checks that the enclosure is connected.

- 17. Follow the instructions to connect the B-side chain.
- 18. Click Next.

The wizard validates the cabling.

19. Click Finish to exit the wizard.

Rename a Disk Enclosure

Change the display name of a disk enclosure to differentiate it from other disk enclosures.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Enclosure**. The **Enclosure** view is displayed.
- 5. In the right pane, select an enclosure and click **Edit Settings**. The **Edit Settings** dialog box opens.
- 6. In the Name field, type a new name for the enclosure.
- 7. Click OK.

Set an Asset Tag for a Disk Enclosure

An enclosure asset tag can be used to identify a specific component for company records. .

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Enclosure**. The **Enclosure** view is displayed.
- 5. In the right pane, select an enclosure and click **Edit Settings**. The **Edit Settings** dialog box opens.
- 6. In the Asset Tag field, type an asset tag for the enclosure.
- 7. Click OK.

Delete an Enclosure

Delete an enclosure if it will be physically removed from the Storage Center.

Prerequisites

- · All data must be moved off the enclosure by releasing the disks and rebalancing RAID.
- · The enclosure must be down.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the System tab navigation pane, click Enclosure. The Enclosure view is displayed.
- 5. Select the enclosure you want to delete and click Delete Enclosure. The Delete Enclosure dialog box opens.
 (i) NOTE: If there are no disks currently in that enclosure, the dialog will not be displayed. The enclosure will be

removed without a request for confirmation.

6. Click OK.

Mute an Enclosure Alarm

Mute an enclosure alarm to prevent it from sounding.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Hardware. The Hardware view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Enclosure**. The **Enclosure** view is displayed.
- 5. In the right pane, select an enclosure.
- 6. Click Audible Alarms, then select Request Mute.

Unmute an Enclosure Alarm

Unmute an enclosure alarm to allow it to sound.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Enclosure**. The **Enclosure** view is displayed.
- 5. In the right pane, select an enclosure.
- 6. Click Audible Alarms, then select Request Mute Off.

Clear the Swap Status for an Enclosure Cooling Fan

Clear the swap status for an enclosure cooling fan to acknowledge that it has been replaced.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Hardware. The Hardware view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Fan Sensors**. The **Fan Sensors** view is displayed.
- 5. In the right pane, select the cooling fan, then click Request Swap Clear.

Clear the Swap Status for an Enclosure I/O Module

Clear the swap status for an enclosure I/O module to acknowledge that it has been replaced.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the **System** tab.
- In the System tab navigation pane, click I/O Modules. The I/O Modules view is displayed.
- 5. In the right pane, select the I/O module, then click Request Swap Clear.

Clear the Swap Status for an Enclosure Power Supply

Clear the swap status for an enclosure power supply to acknowledge that it has been replaced.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- **3.** Click the **System** tab.

- **4.** In the **System** tab navigation pane, click **Power Supplies**. The **Power Supplies** view is displayed.
- 5. In the right pane, select the power supply, then click **Request Swap Clear**.

Replace a Failed Power Supply

This step-by-step wizard guides you through replacing a failed power supply in an enclosure in the Storage Center.

Prerequisites

This wizard is only available for the SCv2000 series, and can be completed without a controller outage.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Power Supplies**. The **Power Supplies** view is displayed.
- 5. In the right pane, select the failed power supply, then click **Replace Power Supply**. The **Replace Failed Power Supply** wizard opens.
- 6. Refer to the graphic in the wizard to locate the failed power supply. Click Next.
- 7. Follow the instructions to remove the failed power supply. Click Next.
- 8. Follow the instructions to insert the replacement power supply. Click Next to verify the replacement.
- If this verification fails, an error message is displayed. You can proceed to the next step once the error is corrected and validated.
- 9. Click Finish to exit the wizard.

Clear the Under Voltage Status for a Power Supply

Clear the under voltage status for an enclosure power supply to acknowledge that you are aware of it.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the System tab navigation pane, click Power Supplies. The Power Supplies view is displayed.
- 5. In the right pane, select the power supply, then click Request DC Undervoltage Clear.

Clear the Swap Status for a Temperature Sensor

The swap status for a temperature sensor is set when the component that contains the sensor is replaced.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- In the System tab navigation pane, click Temp. Sensors. The Temp. Sensors view is displayed.

5. In the right pane, select the temperature sensor, then click Request Swap Clear.

Clear the Minimum and Maximum Recorded Values for Temperature Sensor

Clear the minimum and maximum recorded values for a temperature sensor to reset them.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the System tab navigation pane, click Temp. Sensors. The Temp. Sensors view is displayed.
- 5. In the right pane, select the temperature sensor, then click Request Min/Max Temps Clear.

Replace a Failed Cooling Fan Sensor

This step-by-step wizard guides you through replacing a failed cooling fan sensor in the Storage Center without a controller outage.

Prerequisites

This wizard is only available for the SCv2000 series and SCv3000 series Storage Centers.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Hardware. The Hardware view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Fan Sensors**. The **Fan Sensors** view is displayed.
- In the right pane. select the failed sensor and click Replace Failed Cooling Fan Sensor. The Replace Failed Cooling Fan Sensor wizard opens.
- 6. Refer to the graphic in the wizard to locate the failed cooling fan sensor. Click Next.
- 7. Follow the instructions to remove the power supply from the enclosure. Click Next.
- Follow the instructions to insert the replacement power supply. Click Next to verify the replacement.
 If this verification fails, an error message is displayed. You can proceed to the next step once the error is corrected and validated.
- 9. Click Finish to exit the wizard.

Enable or Disable the Disk Indicator Light

The drive bay indicator light identifies a drive bay so it can be easily located in an enclosure.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the SYSTEM menu, click Hardware. The Hardware view is displayed.
- 3. Click the System tab.
- 4. In the **System** tab navigation pane, click **Disks**. The **Disks** view is displayed.

- 5. In the right pane, select a disk and click **Toggle Indicator**. The **Toggle Indicator** dialog box opens.
- 6. Click OK.

Clear the Swap Status for a Disk

Clear the swap status for a disk to acknowledge that it has been replaced.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the **System** tab navigation pane, click **Disks**. The **Disks** view is displayed.
- 5. In the right pane, select a disk, then click Request Swap Clear.

Managing Storage Center Controllers

Unisphere can help you manage and maintain the controllers in your Storage Center by walking you through the process for adding a controller and replacing parts.

Add a Controller

This step-by-step wizard guides you through adding a new controller to the storage system.

Prerequisites

- · This wizard is only available for SC4020, SC8000, and SC9000 controllers.
- The new controller must have a Hardware Serial Number (HSN) and Eth 1 IP address assigned to it before starting this procedure. To see the new controller information, run the following command from the serial console:

controller show

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the **System** tab navigation pane, click **Controllers**. The **Controllers** view is displayed.
- 5. Click Add Controller. The Add New Controller wizard opens.
- 6. Confirm the details of your current install, and click Next.
- 7. Insert the controller into the existing enclosure. Click Next to validate the install.
- 8. Click Finish to exit the wizard.

Replace a Failed Controller

This step-by-step wizard guides you through replacing a failed controller in the Storage Center without an additional controller outage.

Prerequisites

This wizard is only available for the SCv2000 series controllers

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Controllers**. The **Controllers** view is displayed.
- In the right pane, select the controller you want to replace and click Replace Controller. The Replace Controller wizard opens.
- 6. Refer to the graphic in the wizard to located the failed controller. Click Next.
- 7. Follow the instructions to remove the battery from the failed controller. Click $\ensuremath{\text{Next}}$.
- 8. Follow the instructions to remove the failed controller from the Storage Center. Click Next.
- 9. Insert the battery from the failed controller into the new controller. Click Next.
- 10. Follow the instructions to insert the new controller into the Storage Center. Click Next to validate the installation. If the installation fails, an error message is displayed. You can proceed to the next step once the error is corrected and validated.
- 11. Click Finish to exit the wizard.

Enable or Disable a Controller Indicator Light

Enable a controller indicator light to assist in locating the controller in the rack.

Prerequisites

The controller indicator light is visible only on SC8000 or SC9000 storage controllers.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- **3.** Click the **System** tab.
- 4. In the System tab navigation pane, click Controllers. The Controllers view is displayed.
- 5. In the right pane, select a controller and click **Toggle Indicator**. The **Toggle Indicator** dialog box opens.
- 6. Click OK.

Replace a Failed Cooling Fan Sensor

This step-by-step wizard guides you through replacing a failed cooling fan sensor in the Storage Center without a controller outage.

Prerequisites

This wizard is only available for the SCv2000 series and SCv3000 series Storage Centers.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- **4.** In the **System** tab navigation pane, click **Fan Sensors**. The **Fan Sensors** view is displayed.
- 5. In the right pane. select the failed sensor and click **Replace Failed Cooling Fan Sensor**. The **Replace Failed Cooling Fan Sensor** wizard opens.
- 6. Refer to the graphic in the wizard to locate the failed cooling fan sensor. Click Next.
- 7. Follow the instructions to remove the power supply from the enclosure. Click Next.
- 8. Follow the instructions to insert the replacement power supply. Click **Next** to verify the replacement. If this verification fails, an error message is displayed. You can proceed to the next step once the error is corrected and validated.
- 9. Click Finish to exit the wizard.

Managing I/O Card Changes

The Configure I/O Card Changes wizard simplifies the task of moving, replacing, upgrading, or repurposing I/O cards in Storage Center controllers. The wizard is used to configure I/O card hardware changes on a per-port basis after physical I/O card changes have been made. The wizard is typically used when upgrading I/O cards or controllers.

About this task

For each local port, you can specify:

- Whether to link an I/O card to an existing configuration
- · Whether the I/O card is new hardware
- \cdot $\;$ Whether to delete the configuration for a removed I/O card

The wizard guides you through the following actions:

- · Associating I/O cards with existing port configurations
- Indicating which I/O cards are new hardware
- · Deleting configurations for I/O cards that have been removed

Before using the wizard, you should be aware of the following:

- · Changes should be performed by a certified installer or with the assistance of technical support.
- At least one back-end port must remain in its original location.
- A controller restart is required to implement changes.
- · Do not rebalance any ports until controllershave been replaced and all hardware configuration changes are complete.

Plan a Hardware Change

Upon boot, the Storage Center searches back-end targets for the configuration. Because a controller cannot boot without configuration information, back-end access must be maintained during the controller replacement procedure. This can be done in two ways:

About this task

- Keep at least one common back-end slot/port defined and connected in the same manner on the new hardware configuration as it was on the old hardware configuration.
- Connect the back-end to a port that is undefined on the new hardware configuration. Storage Center is able to detect iSCSI targets
 and acquire the boot configuration from the drives even though the slot/port is marked as undefined.

When the appropriate back-end slot/port is identified, record this information on the Port Usage Work Sheet and continue the upgrade process.

Change the Hardware

Changing hardware follows these general tasks. Refer to upgrade documentation for the specific change for more detailed instructions.

Steps

- 1. Power down and unplug the controller. This reduces downtime by facilitating re-cabling. In a dual-controller Storage Center, the second controller takes on all functions of the Storage Center, preventing a system outage.
- 2. Record/tag the cabling for the affected card.
- **3.** Disconnect the cables on the I/O card.
- 4. Replace, move, or remove the I/O cards and reconnect as recorded on the Port Usage Work Sheet.
- 5. Plug in and power on the controller.

Manage I/O Card Changes

After a change to an I/O card in a Storage Center controller, the Configure I/O Card Changes wizard applies old port configurations to the new or modified ports. Changes can include replacing an I/O card, moving the I/O card to a different PCI slot, and removing an I/O card. Use the Configure I/O Card Changes wizard to apply existing I/O card port configuration settings to new or modified I/O card ports.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. In the Hardware navigation pane, select a controller, then click Configure I/O Card Change.

i NOTE: If the controller must be restarted to move configurations to the other controller, the Configure I/O Card Changes wizard shows the option to restart the controller.

The Configure I/O Card Changes wizard opens.

- 4. (Optional) Click Restart Controller.
- 5. Click Next.
- 6. From the Fibre Channel, iSCSI, or SAS table, identify ports that have been modified.
- 7. From the Card Location drop-down menu, select a port configuration.
- 8. Click Finish.

Add a UPS to a Storage Center

An uninteruptable power supply (UPS) provides power redundancy to a Storage Center. When a UPS is added to a Storage Center, the status of the UPS is displayed in Unisphere.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 3. Click the System tab.
- 4. In the **System** tab navigation pane, click **UPS**. The **UPS** view is displayed.
- Click + (New).
 The Register UPS dialog box opens.
- 6. In the Community String field, type the community string configured on the UPS. The default is Public.
- 7. In the IPv4 Address field, type the IP address of the UPS.
- 8. In the **Type** field, select the brand of the UPS.
- 9. Click OK.

Updating Storage Center

Update a Storage Center to the latest version by connecting directly to the Storage Center or by connecting through a Data Collector. If the Storage Center to update does not have SupportAssist enabled you can use the Storage Center Update Utility to update software. For more information on the Storage Center Update Utility, see *Using the Storage Center Update Utility*.

NOTE: Updating from Storage Center version 6.6 to a later version is a separate guided process. See the *Storage Center OS Version 7 Software Update Guide* for details.

Update Storage Center Software

Follow this procedure if SupportAssist is enabled on the Storage Center.

Prerequisites

SupportAssist must be enabled on the Storage Center.

About this task

The options displayed in the Storage Center software update dialog boxes depend on the type of update performed on the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ... (More Actions) and select Check for Update. The Update Storage Center dialog box opens and checks for an update.
- **4.** (Optional) Click **Release Notes** for information about the update.
- 5. Select an Update Action:
 - · Select Download Update and click Download Update to download the update right away.
 - Select Download and Install Now to download and apply the update immediately.
- 6. Select an Installation Type:
 - · To apply only non-service affecting updates, select Apply non-service affecting updates.
 - To apply non-service affecting updates to required components, select Apply required components Non-Service Affecting.
 - To apply all updates including those affecting service, select Apply all updates Service Affecting.

i NOTE: Service-affecting installation types require a controller outage. Service will be interrupted.

- 7. Click Install Update.
- (Optional) If you select Apply all updates and Download and Install now, the Download and Install Update Confirmation dialog opens. Type the Storage Center Administrator Username and Password to continue. The Update Storage Center dialog opens. This dialog displays details of the installation process and updates those details every 30 seconds. This is also displayed as a blue message bar in the Summary tab, and in the update status column of the Storage Center details. In case of an update failure, click Retry to restart the interrupted process.
- 9. Click OK.

If the update is service affecting, the connection to the Storage Center will be lost.

Using the Storage Center Update Utility

The Storage Center Update Utility acts as an update server for Storage Centers without an internet connection or with SupportAssist disabled. To use the Storage Center Update Utility to update Storage Center software, install the utility, load an update package, and start the service. Then, if the Storage Center is configured to use the Storage Center Update Utility, manually check for an update and update the Storage Center software. If a Storage Center is configured to use the Storage Center Update Utility, you must check for updates manually.

For more information on installing and setting up the Storage Center Update Utility, see the Dell Storage Center Update Utility Administrator's Guide.

Configure Storage Center to Use the Storage Center Update Utility

If the Storage Center is not connected to the internet, configure it to use the Storage Center Update Utility when checking for updates. Before Storage Center can receive an update from the Storage Center Update Utility, a Storage Center distro must be loaded and the Storage Center Update Utility service must be running.

Prerequisites

The Storage Center Update Utility must be setup and running.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click (Settings).
 The Storage Center Settings dialog box opens.
- **4.** Click the **SupportAssist** tab.
- 5. Disable SupportAssist. Click Turn Off .
- 6. Under Use Update Utility, select the Enabled checkbox.
- 7. In the Update Utility Host or IP Address field, type the IP address of the Storage Center Update Utility.
- 8. In the Update Utility Port field, type the port of the Storage Center Update Utility.
- 9. Click OK.

Turn On SupportAssist

If SupportAssist is disabled to use the Storage Center Update Utility, it must be enabled.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ^{\$\$} (Settings). The Storage Center Settings dialog box opens.
- 4. Click the SupportAssist tab.
- 5. Click Turn On. The Turn On SupportAssist wizard opens.
- 6. Read the SupportAssist agreement, and click **Next** to accept the agreement.
- 7. Review and update the contact information if necessary, and click Next.
- 8. Review and update the on site address information if necessary, and click **Next**. A confirmation dialog box opens.
- 9. Click Yes.

The SupportAssist connection is validated.

- 10. Click Finish.
- 11. Click **OK**.
- 12. (Optional) Apply the settings to other Storage Centers.

Shutting Down and Restarting a Storage Center

Shutting down or restarting a Storage Center affects all controllers.

Shut Down All Controllers in Storage Center

Shutting down a Storage Center creates a system outage, during which time no I/O is processed. Use this process only as directed, for example to replace hardware, to move the Storage Center to another location, or to shut down for data center power maintenance.

Prerequisites

- · An outage must be scheduled so that halting I/O does not impact your network.
- I/O to the controllers must be halted.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- Click ... (More Actions) and select Shutdown/Restart. The Shutdown/Restart dialog box opens.
- 4. From the first drop-down menu, select Shutdown.
- 5. Click OK.
- 6. After the controllers have shut down, shut down the disk enclosures by physically turning off the power supplies.

Next steps

After the outage is complete, see the Owner's Manual for your controller for instructions on how to start the controllers in the proper order.

Restart All Controllers in a Storage Center

If the Storage Center has dual-controllers, the controllers can be restarted in sequence or simultaneously.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- Click ... (More Actions) and select Shuitdown/Restart. The Shutdown/Restart dialog box opens.
- 4. From the first drop-down menu, select Restart.
- 5. (Dual-controllers only) From the Restart options drop-down menu, choose how you want the controllers to restart.
 - To restart the controllers one after the other, avoiding an outage, select Restart in Sequence.
 - To restart the controllers at the same time, causing an outage, select Restart Simultaneously.
- 6. Click OK.

Shut Down a Controller

If the Storage Center has dual-controllers, the remaining controller continues to process I/O. If the Storage Center has only one controller, shutting it down creates an outage.

Steps

1. From the **SYSTEM** menu, click Hardware.

The Hardware view is displayed.

- 2. Click the System tab.
- **3.** In the **System** tab navigation pane, click **Controllers**. The **Controller** view is displayed.
- 4. In the right pane, select the controller and click **Shut Down/Restart Controller**. The **Shut Down/Restart Controller** dialog box opens.
- 5. From the drop-down menu, select Shutdown.
- 6. Click OK.

Restart a Controller

If the Storage Center has dual-controllers, the remaining controller continues to process I/O. If the Storage Center has only one controller, restarting it down creates an outage.

Steps

- 1. From the **SYSTEM** menu, click **Hardware**. The **Hardware** view is displayed.
- 2. Click the System tab.
- **3.** In the **System** tab navigation pane, click **Controllers**. The **Controller** view is displayed.
- In the right pane, select the controller and click Shut Down/Restart Controller. The Shut Down/Restart Controller dialog box opens.
- 5. From the drop-down menu, select Restart.
- 6. Click OK.

Reset a Controller to Factory Default

Reset a controller to apply the factory default settings, erase all data stored on the controller, and erase all data on the drives.

Prerequisites

The Storage Center must be an SCv2000 or SCv3000 series storage system.

About this task

CAUTION: Resetting the controller to factory defaults erases all information on the controller and all data on the drives.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the ... (More Actions) drop-down menu, select Factory Reset. The Factory Reset Storage Center dialog box opens.
- 3. In the Factory Reset Token field, type the text above the Factory Reset Token field exactly as it appears in the dialog box.
- 4. In the **Storage Center Administrator Username** field type the username of a Storage Center user with administrator-level privileges.
- 5. In the **Storage Center Administrator Password** field type the password of a Storage Center user with administrator-level privileges.
- 6. To restart the controller after the reset, select the Power on the Storage Center after resetting to factory defaults checkbox.
- 7. Click **OK**. The Storage Center resets to the factory default settings.

Managing Field Replaceable Units (FRU)

The FRU Manager maintains the status of FRUs and issues action tickets when a unit needs to be replaced. Unisphere displays FRU tickets that contain specific information on each FRU, and provides the ability to close tickets.

(i) NOTE: The FRU Manager is not supported on SC8000 or CT-SC040 series storage systems.

Managing FRU Tickets

Unisphere can display information on FRU tickets, and can also close FRU tickets.

(i) NOTE: If FRUs and FRU Manager are not enabled, Unisphere does not display options or tickets.

View a FRU Ticket

To view the status of a replacement Field Replacement Unit (FRU) view the FRU ticket from the Alerts tab.

Steps

- 1. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- 2. Select a FRU ticket.
- Click View FRU Ticket. The FRU Ticket Information dialog opens.
- 4. Click OK.

Close a FRU Ticket

Close a FRU ticket if the FRU ticket is not needed.

- 1. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- 2. Select a FRU ticket.
- 3. Click Close FRU Ticket. The Close FRU Ticket dialog opens.
- 4. Click OK.

Viewing Storage Center Information

Summary Information

Unisphere connected directly to a Storage Center provides summary information for that single Storage Center. To view summary information for the Storage Center, use the Storage Center SUMMARY page.

Unisphere Central connected through a Data Collector provides summary information for all of the Storage Centers managed by the Data Collector. To view summary information for all of the Storage Centers, use the Unisphere Central HOME dashboard.

Storage Center Widgets

The following widgets provide summary information for an individual Storage Center or multiple Storage Centers, depending on your configuration. The Storage Center widgets can be rearranged on the page.

Widget	Description	Home Page (Multiple Storage Centers)	Storage Center Summary Page (Single Storage Center)
Inventory	Summary information about the objects associated with the Storage Center or Storage Centers. Information includes numeric totals and graphical status indicators for each object.	х	×
Alerts	Summary of the most recent alerts detected by the Storage Center or Storage Centers. Alert information includes numeric totals and graphical status indicators for each alert. Clicking View All opens the Alerts View, which provides a list and description of all alerts.	x	х
Volumes Percent Full	A graphical representation of the amount of disk space being used in each volume.	Х	Х
Volumes Full Forecast	Volumes that are estimated to be full within 7 days, 14 days, and 28 days.	Х	Х
Disk Space Usage	Graphical representation of the total raw space on the system which includes the available space and spare space. Available space does not include RAID overhead.	x	x
Available Space Usage	Graphical representation of the available space on the system which includes the consumed space and free space. Free space does not include RAID overhead.	x	×
Top Used Disk Folders	Graphical representation showing used disk space versus available disk space by disk folder, including the threshold level. The threshold level is the point at which a disk space warning is triggered.	N/A	х
Hardware	Image of the hardware and identifying information such as IP addresses and firmware version. Clicking 🌣 (Settings) opens the Storage Center settings dialog box.	N/A	x
Front End IOPS	Transfer rate of read and write operations between the Storage Center and the host for the selected time frame. The arrow in the upper-right corner brings you to a page that provides more detailed information about IOPS.	N/A	х
Back End IOPS	Transfer rate of read and write operations between the Storage Center and the drives attached to the system. The	N/A	x

Widget	Description	Home Page (Multiple Storage Centers)	Storage Center Summary Page (Single Storage Center)
	arrow in the upper-right corner brings you to a page that provides more detailed information about IOPS.		
Front End Bandwidth	Communications bandwidth between the Storage Center and the host. The arrow in the upper-right corner brings you to a page that provides more detailed information about bandwidths.	N/A	x
Back End Bandwidth	Communications bandwidth between the Storage Center and the drives attached to the system. The arrow in the upper- right corner brings you to a page that provides more detailed information about bandwidths.	N/A	x
I/O Pending	Number of pending read and write operations.	N/A	×

Rearrange Widgets on the Summary Page

Rearrange the widgets on the **Summary** page to view the widgets in the order you want.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- **3.** Locate the widget you want to move.
- 4. Move the mouse cursor on the widget until the pointer appears as a four-sided arrow.
- 5. Drag and drop the widget to the new location.
- 6. Repeat these steps with any other widgets you want to move.

Status Indicators

Unisphere uses the following icons and alerts to indicate system status.

Icons

Icon Meani	ng
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V	Object is up and functioning normally.
<u>A</u>	Object is in a degraded state and should be investigated
8	Object is down and requires attention.

Alerts

Alert	Meaning
Critical	The object is in a critical state and may be nearing failure.
Warning	A condition on theStorage Center is affecting performance and can become critical if it is not corrected.
Informational	Information regarding an operation that is occurring or has occurred on the Storage Center.

Viewing Detailed Storage Usage Information

Detailed storage usage information is available for each Storage Type that is configured for a Storage Center.

View Storage Usage by Tier and RAID Type

Storage usage by tier and RAID type is displayed for each Storage Type.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- 3. Click the Tiers subtab to view storage usage by tier and RAID type.

View Storage Usage by Volumes

Storage usage by volume is displayed for each Storage Type.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- 3. Click the Volumes subtab to view storage usage by volume.

View a Data Progression Pressure Report

For each storage type, the data progression pressure report displays how space is allocated, consumed, and scheduled to move across different RAID types and storage tiers. Use the data progression pressure report to make decisions about the types of disks to add to a Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- 3. Click the **Pressure Report** subtab to view the data progression pressure report. By default, the most recent data gathered from the Storage Center is displayed.
- 4. To view a previously generated data progression report, select a report from the drop-down menu. Reports are identified by the date and time at which they were generated.

Viewing Growth Data

Use the **Growth** tab to display historical growth data for storage objects such as volumes, servers, disks, and storage types.

View Growth Data for a Volume

Use the Growth tab in the Volumes view to display historical growth data for a volume.

Steps

1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.

- 2. From the STORAGE menu, click Volumes. The Volumes view is displayed.
- **3.** Click the name of a volume. The **Summary** tab is displayed.
- Click the Growth tab.
 By default, the last week of growth data is displayed.
- 5. To change the period of growth data that is displayed, select a different time period from the **Display** drop-down menu.
 - Last Day Displays the past 24 hours of growth data.
 - Last 3 Days Displays the past 72 hours of growth data.
 - Last 5 Days Displays the past 120 hours of growth data.
 - Last Week Displays the past 7 days of growth data.
 - Last Month Displays growth data for the past month.
 - Custom Displays options that allow you to specify the start time and the end time of the growth data to display.

View Growth Data for a Server

Use the **Growth** tab in the **Server** view to display historical growth data for a server.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the STORAGE menu, click Servers. The Servers view is displayed.
- **3.** Click the name of a server. The **Summary** tab is displayed.
- 4. Click the **Growth** tab.
 - By default, the last week of growth data is displayed.
- 5. To change the period of growth data that is displayed, select a different time period from the **Display** drop-down menu.
 - Last Day Displays the past 24 hours of growth data.
 - Last 3 Days Displays the past 72 hours of growth data.
 - Last 5 Days Displays the past 120 hours of growth data.
 - Last Week Displays the past 7 days of growth data.
 - Last Month Displays growth data for the past month.
 - Custom Displays options that allow you to specify the start time and the end time of the growth data to display.

View Growth Data for a Disk

Use the Growth tab in the Disks view to display historical growth data for a disk.

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Disks. The Disks view is displayed.
- **3.** Click the name of a disk folder or disk. The **Details** tab is displayed in the bottom pane.
- **4.** Click the **Growth** tab in the bottom pane. By default, the last week of growth data is displayed.
- 5. To change the period of growth data that is displayed, select a different time period from the **Display** drop-down menu.
 - Last Day Displays the past 24 hours of growth data.
 - Last 3 Days Displays the past 72 hours of growth data.
 - Last 5 Days Displays the past 120 hours of growth data.
 - Last Week Displays the past 7 days of growth data.
 - Last Month Displays growth data for the past month.
 - Custom Displays options that allow you to specify the start time and the end time of the growth data to display.

View Growth Data for a Storage Type

Use the Growth tab in the Storage Types view to display historical growth data for a storage type.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the STORAGE menu, click Storage Types. The Storage Types view is displayed.
- **3.** Select a storage type from the **Storage Type** pane. The **Tiers** tab is displayed in the bottom pane.
- **4.** Click the **Growth** tab in the bottom pane. By default, the last week of growth data is displayed.
- 5. To change the period of growth data that is displayed, select a different time period from the **Display** drop-down menu.
 - Last Day Displays the past 24 hours of growth data.
 - Last 3 Days Displays the past 72 hours of growth data.
 - Last 5 Days Displays the past 120 hours of growth data.
 - Last Week Displays the past 7 days of growth data.
 - Last Month Displays growth data for the past month.
 - Custom Displays options that allow you to specify the start time and the end time of the growth data to display.

Export I/O Usage Data

You can export I/O usage data for systems, volumes, servers, ports, disks, controllers, storage profiles, and QoS profiles.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the MONITORING menu, click Performance. The Performance view is displayed.
- 3. Click the IO Charts tab and click the tab that contains the I/O usage data to export.
- 4. Click Export IO Usage. The Export IO Usage Data dialog box opens.
- 5. Select the output file type from the Output Type drop-down menu:
 - · Comma Separated Values (CSV)
 - HyperText Markup Language (HTML)
 - Portable Document Format (PDF)
 - Microsoft Excel Format
- 6. Select the storage objects with the I/O usage data to export from the IO Usage Options area.
- 7. Click OK.

Exporting Usage and Monitoring Data

You can export Storage Usage and Monitoring data to CSV, Text, Excel, HTML, XML, or PDF.

Export Storage Usage Data for a Single Storage Center

You can export storage usage data for an individual Storage Center and the volumes, and servers associated with the Storage Center.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. In the Storage Center Summary view, click ... (More Actions) and then select Export Storage Usage.

The Export Storage Usage Data dialog box opens.

- 3. Select the Output Type: CSV (.csv), HTML (.htm), PDF (.pdf), or Excel (.xls).
- Select or clear the Convert Size Data into Units (bytes by default) checkbox. Selecting this checkbox displays size data using the units that are the most appropriate for the displayed values. For example, 2097152 megabytes is displayed as 2 TB.
- 5. Select the storage usage data to export by selecting or clearing the checkboxes in the Storage Center, Volume , and Server tabs.
- By default, all of the storage usage data is selected to be exported.
- 6. Click **OK**.

Export Storage Usage Data for Multiple Storage Centers

Use Unisphere Central to export storage usage data for multiple Storage Centers and the volumes, and servers associated with each Storage Center.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- Click Export and select Export Storage Usage from the drop-down list. The Export Storage Usage Data dialog box opens.
- 3. Select the Output Type: CSV (.csv), HTML (.htm), PDF (.pdf), or Excel (.xls).
- Select or clear the Convert Size Data into Units (bytes by default) checkbox. Selecting this checkbox displays size data using the units that are the most appropriate for the displayed values. For example, 2097152 megabytes is displayed as 2 TB.
- 5. Select the Storage Centers for which to export storage data.
- 6. Select the storage usage data to export by selecting or clearing the checkboxes in the Storage Center, Volume, and Server tabs.

By default, all of the storage usage data is selected to be exported.

7. Click OK.

Export Monitoring Data for a Single Storage Center

You can export storage usage data for an individual Storage Center and the volumes, and servers associated with the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- In the Storage Center Summary view, click ... (More Actions) and then select Export Monitoring Data. The Export Monitoring Data dialog box opens.
- 3. Select the Output Type: CSV (.csv), HTML (.htm), PDF (.pdf), or Excel (.xls).
- 4. Select the alerts and log data to export by selecting or clearing the checkboxes in the Monitoring Data Options area.
- 5. Click OK.

Export Monitoring Data for Multiple Storage Centers

Use Unisphere Central to export monitoring data such as alerts and log, for multiple Storage Centers.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Export and select Export Monitoring Data from the drop-down list. The Export Monitoring Data dialog box opens.
- 3. Select the Output Type: CSV (.csv), HTML (.htm), PDF (.pdf), or Excel (.xls).
- 4. Select the Storage Centers for which to export monitoring data.
- 5. Select the alerts and log data to export by selecting or clearing the checkboxes in the Monitoring Data Options area.
- 6. Click OK.

9

Storage Center Monitoring

Alerts

Alerts represent current issues present on the storage system, which clear themselves automatically if the situation that caused them is corrected. Indications warn you about a condition on the storage system that might require direct user intervention to correct.

Status Levels for Alerts and Indications

Status levels indicate the severity of storage system alerts and indications.

Table 9. Alert and Indication Status Levels

Status	Description
Okay/Inform	Provide information regarding some operation that is occurring or has occurred on the Storage Center.
Degraded	Indicates an item on the Storage Center is currently operating in a degraded mode. Items in this condition may operate in degraded mode indefinitely, but are not functioning to their full capability.
Down	Indicates an item on the Storage Center is down and not currently operational.
Critical	Indicates an item on the Storage Center is in a critical state and may be nearing failure.
Complete	Indicates that an operation on the Storage Center has completed.
Emergency	Indicates an item on the Storage Center requires immediate attention in order to remain operational.
Deleting	Indicates that an item on the Storage Center has been deleted.
Unavailable	Indicates that an item on the Storage Center that is expected to be present cannot currently be found for use.
Undefined	Indicates a condition on the Storage Center that is not defined by one of the other categories.
Warning	Indicates a condition on the Storage Center that decreases performance or can become critical if it is not corrected.

View Storage Center Alerts

Alerts represent current issues present on a Storage Center.

Display Alerts for Multiple Storage Centers

View Alerts for multiple Storage Centers using Unisphere Central connected to a Data Collector.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central **Home** page is displayed.

- 2. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- **3.** Select the checkboxes of the Storage Centers to display and clear the checkboxes of the Storage Centers to hide. The **Alerts** view displays alerts for the selected Storage Centers.
- 4. To refresh the alert data, click C (Refresh).
- 5. To view more information about an alert, select the alert and click More Information.

A knowledge base article with information about the alert is displayed.

Related tasks

Acknowledge Storage Center Alerts Export Storage Center Alerts Delete Storage Center Alerts Select the Columns to Display

Display Alerts for a Single Storage Center

View Alerts for a single Storage Center in the **Alerts** view.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the MONITORING menu, click Alerts.

The Alerts view is displayed.

- **3.** To refresh the alert data, click **C** (**Refresh**).
- **4.** To view more information about an alert, select the alert and click **More Information**. A knowledge base article with information about the alert is displayed.

Related tasks

Acknowledge Storage Center Alerts Export Storage Center Alerts Delete Storage Center Alerts Filter the Storage Center Alerts Select the Columns to Display

Acknowledge Storage Center Alerts

Acknowledge alerts to indicate to the Storage Center that you have read the alert message and are aware of the problem.

Steps

- From the MONITORING menu, click Alerts. The Alerts view is displayed.
- 2. Select the alerts to acknowledge.

(i) NOTE: The option to acknowledge an alert does not appear if an alert has already been acknowledged.

- **3.** Click **Acknowledge**. The **Acknowledge** dialog box opens.
- 4. Click Yes.

Export Storage Center Alerts

To export alerts from the **Alerts** view:

- 1. From the MONITORING menu, click Alerts. The Alerts view is displayed.
- 2. Click Export. The Export dialog box opens.
- 3. Select an output type from the **Output Type** drop-down list.
- 4. Click OK.

Delete Storage Center Alerts

Delete alerts to remove them from the **Alerts** view.

Steps

- 1. From the MONITORING menu, click Alerts. The Alerts view is displayed.
- **2.** Select the alert to delete.

i NOTE: Some types of alerts cannot be deleted.

3. Click Delete.

The **Delete** dialog box opens.

4. Click Yes.

Filter the Storage Center Alerts

The Alerts view displays all unacknowledged Storage Center alerts by default. You can customize the view by filtering the alerts.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the MONITORING menu, click Alerts. The Alerts view is displayed.
- **3.** Click **∀** (Column Filters). The Filters dialog box opens.
- 4. Select one or more of the following filter categories:
 - · Severity
 - Status
 - Date & Time
 - Message
 - Storage Center (Unisphere Central view only)
 - Source Name
 - · Category
 - · Type
 - Acknowledged
 - Cleared
- 5. Select one or more filter values for the selected categories.
- 6. Click Apply.
- 7. Click X to close the Filters dialog box.

Select the Columns to Display

Show or hide columns to customize the view.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the MONITORING menu, click Alerts.

The **Alerts** view is displayed.

- 3. Click 🗉 (Show/Hide Columns). The Columns dialog box opens.
- 4. Select the checkboxes of the columns to show and clear the checkboxes of the columns to hide.
- 5. Click X to close the Columns dialog box.

Send Storage Center Alerts and Indications to the Data Collector Immediately

By default, the Data Collector retrieves alerts and indications from a Storage Center at a regular interval. If you want alerts and indications to be displayed in Unisphere Central immediately when they are triggered, configure a Storage Center to send them to the Data Collector.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the Summary tab, click 🌣 (Settings). The Storage Center Settings dialog box opens.
- 3. Click the Alerts and Logs tab.
- 4. Select the Send Alerts to Data Collector checkbox.
- 5. Click OK.

Data Collector Alerts

Data Collector alerts are a collection of messages that have been generated by events in Unisphere Central.

You can view alerts on the Data Collector tab or configure Unisphere Central to email you when events occur.

Data Collector Alert Types

Unisphere Central alerts are categorized by severity.

Table 10. Data Collector Alert Types

Status	Description
Inform	Provides information regarding an event that is occurring or has occurred on the Storage Center.
Warning	Indicates a condition on the Storage Center that decreases performance or can become critical if it is not corrected.
Error	Indicates an error has occurred on the Storage Center.
Exception	Indicates an exception occurred on the Storage Center.

View Data Collector Alerts

View Data Collector alerts from the Alerts tab.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- 3. Click Data Collector.
- 4. To refresh the alert data, click Refresh.
- 5. To export Data Collector alerts, Click **Export** and enter an output type.

Filter the Data Collector Alerts

The Alerts view displays all unacknowledged Storage Center alerts by default. Click the Data Collector tab to view Data Collector alerts.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- 3. Click the Data Collector tab from the Alerts view.
- Click Y (Column Filters). The Filters dialog box opens.
- 5. Select one or more of the following filter categories:
 - · Severity
 - Last Occurence
 - Source
 - Message
 - Type
- 6. Select one or more filter values for the selected categories.
- 7. Click Apply.
- 8. Click X to close the Filters dialog box.

Select the Date Range of Data Collector Alerts to Display

You can view Data Collector alerts for a specific time period.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Alerts**. The **Alerts** view is displayed.
- 3. Click the Data Collector tab from the Alerts view.
- 4. Click ∇ (Column Filters).
- The **Filters** dialog box opens.
- 5. Specify a start date and time in the Last Occurrence field.
 - a) Click the calendar icon and select a start date from the calendar.
 - b) Click the clock icon and select a start time from the drop-down list.
- 6. Specify an end date and time in the Last Occurrence field.
 - a) Click the calendar icon and select a end date from the calendar.
 - b) Click the clock icon and select a end time from the drop-down list.
- 7. Click Apply.
- 8. Click \mathbf{X} to close the Filters dialog box.

Configuring Email Alerts for Unisphere Central Events

Unisphere Central can be configured to send automated reports when monitored events occur.

About this task

To configure Unisphere Central to send automated reports by email:
Steps

- 1. Configure the SMTP server settings on the Data Collector.
- 2. Add an email address to your user account.
- 3. Configure email notification settings for your user account.

Configure SMTP Server Settings

The SMTP server settings must be configured to allow Unisphere Central to send notification emails.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and, then click the SMTP Server subtab.
- 4. Click Edit.
 - The SMTP Server Configuration dialog box opens.
- 5. Configure the SMTP server settings by performing the following steps:
 - a) In the **From Email Address** field, type the email address to display as the sender of emails from the Data Collector.
 - b) In the Host or IP Address field, type the host name or IP address of the SMTP server.
 - c) If the port number of the SMTP server is not 25, type the correct port number in the **Port** field.
 - d) If the SMTP server requires authentication, select the **Authentication** checkbox, then type the user name and password in the **SMTP User Name** and **SMTP User Password** fields.
- 6. Click OK.

Configure an Email Address for Your User Account

To receive email notifications, you must specify an email address for your user account.

Prerequisites

The SMTP server settings must be configured for the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.

Steps

- 1. In the top pane of Unisphere Central, click your user name and select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. Type an email address for the user account in the Email Address field.
- 3. Select the format for emails from the Email Format drop-down menu.
- 4. To send a test message to the email address, click Test Email and click OK.
 - Verify that the test message is sent to the specified email address,
- 5. Click OK.

Related tasks

Configure SMTP Server Settings

Configure Email Notification Settings for Your User Account

Make sure that Unisphere Central is configured to send email notifications to your account for the events that you want to monitor.

Prerequisites

- The SMTP server settings must be configured for the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.
- An email address must be configured for your user account.

Steps

- 1. In the top pane of Unisphere Central, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. Click the Manage Events tab.
- 3. Select the checkbox for each event you want to be notified about.
- 4. Click OK.

Related tasks

Configure SMTP Server Settings Configure an Email Address for Your User Account

Logs

Logs are records of event activity on the managed Storage Centers. Use the **Logs** tab to display and search for events in storage system logs.

View Storage Logs for Multiple Storage Centers

View Storage logs for multiple Storage Centers using Unisphere Central connected to a Data Collector.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Logs**. The **Logs** view is displayed.
- **3.** Select the checkboxes of the Storage Centers to display and clear the checkboxes of the Storage Centers to hide. The **Logs** view displays storage logs for the selected Storage Centers.
- 4. To refresh the log data, click C (Refresh).

View Storage Logs for a Single Storage Center

Storage logs for a single Storage Center are displayed in the Logs view.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Logs**. The **Logs** view is displayed.
- 3. To refresh the log data, click C (Refresh).

Filter the Storage Center Logs

You can customize the view by filtering the logs.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central **Home** page is displayed.

- 2. From the MONITORING menu, click Logs. The Logs view is displayed.
- **3.** Click **▼** (Column Filters). The Filters dialog box opens.
- 4. Select one or more of the following filter categories:
 - · Severity
 - Date & Time
 - Storage Center
 - Controller
 - Subsystem
 - Message
- 5. Click Apply.
- 6. Click \mathbf{X} to close the Filters dialog box.

Select the Date Range of Log Events to Display

You can view log events for a specific time period.

Steps

- 1. From the **MONITORING** menu, click **Logs**. The **Logs** view is displayed.
- Click
 [¬] (Column Filters).
 The Filters dialog box opens.
- 3. Select the Date & Time checkbox.
- 4. Specify a start date and time.
 - a) Click the calendar icon and select a start date from the calendar.
 - b) Click the clock icon and select a start time from the drop-down list.
- 5. Specify an end date and time.
 - a) Click the calendar icon and select a end date from the calendar.
 - b) Click the clock icon and select a end time from the drop-down list.
- 6. Click Apply.
- 7. Click X to close the **Filters** dialog box.

Export Storage Center Logs

To export Storage Center logs from the Logs view:

Steps

- From the MONITORING menu, click Logs. The Logs view is displayed.
- 2. Click Export.
- The **Export** dialog box opens.
- 3. Select an output type from the **Output Type** drop-down list.
- 4. Click OK.

Send Storage Center Logs to a Syslog Server

Modify the Storage Center to send logs to a syslog server.

Steps

1. In the Storage Center Summary view, click 🌣 (Storage Center Settings).

- 2. Click the Alerts and Logs tab.
- 3. Select Send Logs to Syslog Server.
- 4. In the Host or IP Address field, type the host name or IP address of the syslog server.
- 5. Click OK.

Stop Sending Logs To a Syslog Server

Modify Storage Center settings to stop sending logs to a Syslog server.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Storage Center Settings.
- 3. Select Alerts and Logs from the Storage Center Settings menu.
- 4. Click the **Do Not Send Logs** checkbox.
- 5. Click OK.

Thresholds

Threshold alerts are automatically generated when user-defined threshold definitions for storage object usage are crossed. Threshold queries allow you to query historical data based on threshold criteria.

Configuring Threshold Definitions

Threshold definitions monitor the usage metrics of storage objects and generate alerts if the user-defined thresholds are crossed.

The types of usage metrics that can be monitored are I/O usage, storage, and replication. Unisphere Central collects the usage metric data from managed Storage Centers. By default, Unisphere Central collects I/O usage and replication metric data every 15 minutes and storage usage metric data daily at 12 AM. Storage objects on the Storage Centers are assigned to threshold definitions and each threshold definition contains one or more threshold values. When the value of a monitored metric reaches a threshold value, an alert occurs. If an SMTP server is configured on the Data Collector, Unisphere Central sends an email with the threshold alert. It sends only one email alert every 24 hours.

i NOTE: Unisphere Central sends only one email per alert occurrence. If after 24 hours the metric is still at or above the threshold alert value, an alert email is not sent. The metric must fall below the threshold value and then exceed the threshold again to generate an alert email.

Perform the tasks in the following sections to set up and view threshold definitions:

- Setting Up Threshold Definitions
- Assigning Storage Objects to Threshold Definitions
- Assigning Threshold Definitions to Storage Objects

Setting Up Threshold Definitions

You can create, view, edit, and delete threshold definitions.

Create a Threshold Definition

Create a threshold definition to monitor IO usage, storage, or replications.

Prerequisites

To receive email notifications for threshold alerts, the following settings must be configured:

- · SMTP server settings for the Data Collector
- · Email address for your user account
- Notification settings for your user account

About this task

Unisphere Central generates threshold alerts after Storage Usage checks usage metrics and notices a threshold definition has been exceeded. Storage Usage runs daily at 12 AM by default.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the **Definitions** tab.
- 4. Click + (New). The General page of the Create Threshold Definition wizard opens.
- 5. Enter a name for the threshold definition in the Name field.
- 6. Select the type of threshold definition to create from the Type drop-down menu.
 - IO Usage: Read and write IO performance.
 - Storage: Use and growth of storage.
 - Replication: Status of replications.
- 7. Select the type of storage object to assign to the threshold definition from the Alert Object Type drop-down menu.
- 8. Select the type of usage metric to monitor from the Alert Definition drop-down menu.
- 9. (Optional) To assign the threshold definition to all of the storage objects that are of the type specified in the **Alert Object Type**, select the **All Objects** check box.

The **All Objects** setting cannot be modified after the threshold definition is created.

- 10. (Optional) To configure the threshold definition to generate Volume Advisor recommendations to move one or more volumes to a different Storage Center, select the **Recommend Storage Center** check box.
 - The Volume Advisor functionality in Unisphere Central does not support moving volumes to a different Storage Center.
 - The Recommend Storage Center checkbox is available only for threshold definitions that support Volume Advisor.
- 11. If the All Objects check box was not selected on the General tab:
 - a) Click Next.
 - The Add Storage Centers page is displayed.
 - b) Select the check boxes of the Storage Centers to add to the threshold definition.
- 12. Click Next.
 - The Settings page is displayed.
- 13. Specify the alert notification settings for the Error, Warning, and Inform thresholds:
 - Error Settings: Enter the threshold value that the usage metric must exceed to trigger an Error threshold alert. To email Error threshold alerts to the Unisphere Central administrators, select the **Email** check box. Then enter the number of concurrent events that must occur to trigger an alert email.
 - **Warning Setting**: Enter the threshold value that the usage metric must exceed to trigger a Warning threshold alert. To email Warning threshold alerts to the Unisphere Central administrators, select the **Email** check box. Then enter the number of concurrent events that must occur to trigger an alert email.
 - Inform Settings: Enter the threshold value that the usage metric must exceed to trigger an Inform threshold alert. To email Inform threshold alerts to the Unisphere Central administrators, select the Email check box. Then enter the number of concurrent events that must occur to trigger an alert email.
 - (i) NOTE: Unisphere Central sends only one threshold alert email for every 24-hour period. The number of threshold alert emails per 24-hour period cannot be configured. In addition, if the metric remains at or above the threshold alert value, a second alert email is not sent. The metric must fall below the threshold value and then exceed the threshold again to generate an alert email.
- 14. To specify which days of the week that Unisphere Central monitors the threshold definition:
 - a) Select the Day Constraint check box.

(i) NOTE: The days of the week that the threshold definition is monitored are displayed in blue.

- b) Click the days of the week to not monitor the threshold definition.
- **15.** To specify the time that Unisphere Central monitors the threshold definition:
 - a) Select the **Time Constraint** check box.
 - b) Specify the start of the time period in the **Start Time** field.
 - c) Specify the end of the time period in the End Time field.

16. Click OK to create the threshold definition.

- If you selected the **All Objects** check box, the threshold definition is created and the **Create Threshold Definition** dialog box closes.
- If you did not select the All Objects check box, the Add Objects dialog box opens.
- 17. Click Next.
 - The **Summary** page is displayed.
- 18. Click Finish.

View an Existing Threshold Definition

Select a threshold definition on the **Definitions** tab to view assigned objects, current threshold alerts, and historical threshold alerts.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- 3. Click the **Definitions** tab.
- 4. In the right pane of the **Definitions** tab, click the name of the threshold definition to view. The **Summary** tab for the threshold definition is displayed. The **Summary** tab displays the threshold definition settings and the storage objects assigned to the threshold definition.

The following tabs are also displayed in the **Thresholds** view:

- Active Alerts Displays the threshold alerts that are active for the selected threshold definition.
- Historical Alerts Displays recent threshold alerts that are no longer active for the selected threshold definition.

Edit an Existing Threshold Definition

Edit a threshold definition to change the name, notification settings, or schedule settings.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the **Definitions** tab.
- Select the threshold definition to edit and click (Edit). The Edit Threshold Definition wizard opens.
- 5. To change the name of the threshold definition, enter a new name in the Name field.
- 6. To generate Volume Advisor recommendations to move one or more volumes to a different Storage Center when the error threshold is exceeded, select the **Recommend Storage Center** check box.

i NOTE: The Recommend Storage Center check box is available only for threshold definitions that support the Volume Advisor.

- 7. Click Next.
- 8. To change the threshold value and email notification settings for the Error threshold alert, enter new values in the Error Settings fields.
- 9. To change the threshold value and email notification settings for the Warning threshold alert, enter new values in the **Warning Settings** fields.
- 10. To change the threshold value and email notification settings for the Info threshold alert, enter new values in the Inform Settings fields.
- **11.** To change the days of the week that Unisphere Central monitors the threshold definition:
 - a) Select or clear the Day Constraint check box to enable or disable the days of the week constrain
 - b) If the Day Constraint check box is selected, click the days of the week to not monitor the threshold definition.

(i) NOTE: The days of the week that the threshold definition is monitored are displayed in blue.

12. To change the period of time that Unisphere Central monitors the threshold definition

- Select or clear the **Time Constraint** check box to enable or disable the time constraint.
- If the **Time Constraint** check box is selected, specify the start of the time period in the **Start Time** field and specify the end of the time period in the **End Time** field.
- 13. Click Next.
 - The **Summary** page is displayed.
- 14. Click Finish.

Delete a Threshold Definition

If you no longer need a threshold definition, you can delete it.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- 3. Click the **Definitions** tab.
- Select the threshold definition to remove and click i (Delete). The Delete Threshold Alert Definitions dialog box opens.
- 5. Click OK.

Delete Multiple Threshold Definitions

If you no longer need multiple threshold definitions, you can delete them.

Steps

1. If you are connected to a Data Collector and a Storage Center is selected from the drop-down list in Unisphere Central, click (Home).

The Unisphere Central Home page is displayed.

- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- 3. Click the **Definitions** tab.
- 4. Use Shift+click or Control+click to select the threshold definitions to remove.

 Click iii (Delete). The Delete Threshold Alert Definitions dialog box opens.

6. Click OK.

Assigning Storage Objects to Threshold Definitions

You can add or remove the storage objects that are monitored by threshold definitions.

Assign Storage Objects to a Threshold Definition

Add storage objects to a threshold definition to monitor the storage objects.

About this task

Storage objects cannot be added to a threshold definition that has the All Objects checkbox selected.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.

- 3. Click the Definitions tab.
- 4. Select the threshold definition to which to assign storage objects.
- 5. Click Add Objects.
 - The **Add Objects** wizard is opens.
- 6. Select the storage objects to assign to the threshold definition.
- 7. Click Next.
 - The Summary page is displayed.
- 8. Click Finish.

Unassign Storage Objects from a Threshold Definition

Remove storage objects from a threshold definition to stop monitoring the storage objects.

About this task

Storage objects cannot be removed from a threshold definition that has the All Objects check box selected.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- 3. Click the Definitions tab.
- 4. Select the threshold definition from which you want to remove storage objects.
- 5. Click Remove Objects. The Remove Objects dialog box opens.
- 6. Select check boxes of the storage objects to remove from the threshold definition.
- 7. Click OK.

Assigning Threshold Definitions to Storage Objects

You can assign threshold definitions to storage objects that are accessible from the **STORAGE** menu in Unisphere Central.

View the Threshold Definitions Assigned to a Storage Object or Storage Center

View the threshold definitions assigned to a storage object or Storage Center in the Threshold Alerts tab.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. To display the threshold definitions assigned to a storage object, select one of the following storage objects from the STORAGE menu:
 - Volumes Click the Volumes view, click on the name of a volume, and click the Thresholds tab.
 - Servers Click the Servers view, click on the name of a server, and click the Thresholds tab.
 - Profiles Click the Profiles view, click the name of a storage profile, and click the Thresholds tab.
 - Disks Click the Disks view, click on the name of a disk, and click the Thresholds tab.
- 3. To display the threshold definitions assigned to the Storage Center, select **Thresholds** from the **MONITORING** menu.

Assign a Threshold Definition to a Controller

Select a controller and then click the Set Threshold Alert Definitions to assign a threshold definition.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **SYSTEM** menu, click **Hardware**.

The Hardware view is displayed.

- 3. Select the controller to which to assign a threshold definition.
- 4. Click Set Thresholds. The Set Threshold Definitions dialog box opens.
- 5. Select the alert definition to which to assign a threshold definition.
 - The threshold definitions that appear in the **Available Alert Definitions** pane depend on the type of alert definition selected.
- From the Available Alert Definitions pane, select the threshold definition to assign to the alert definition.
 If a threshold definition for the selected alert definition does not exist, create a threshold definition by clicking New Threshold Definition

7. Click Set Thresholds.

The selected threshold definition is assigned to the alert definition.

in the Available Alert Definitions pane and click Clear Definition.

8. Click Close.

Assign a Threshold Definition to a Storage Object or Storage Center

Select the storage object and then click the **Set Threshold Alert Definitions** to assign a threshold definition.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. To assign a threshold definition to the Storage Center, select **Thresholds** from the **MONITORING** menu and skip the next step.
- 3. Select the storage object to which to assign a threshold definition from the following views in the STORAGE menu:
 - Volumes Click the name of the volume to which to assign the threshold definition, and click the Thresholds tab.
 - Servers Click the name of the server to which to assign the threshold definition, and click the Thresholds tab.
 - Storage Profiles Click the Profiles view, click the Storage Profiles tab, select the storage profile to which to assign the threshold definition, and click the **Thresholds** tab.
 - **Disks** Select the disk to which to assign the threshold definition, and click the **Thresholds** tab.
- 4. Click Set Thresholds.
 - The Set Threshold Definitions dialog box opens.
- 5. In the top pane, select the alert definition to which to assign a threshold definition.
- 6. In the bottom pane, select the threshold definition to assign to the alert definition.
- 7. Click Set Thresholds

The selected threshold definition is assigned to the alert definition.

i NOTE: To unassign a threshold definition from the selected alert definition, select the assigned threshold definition in the Available Alert Definitions pane and click Clear Definition.

8. Click OK.

Viewing and Deleting Threshold Alerts

The current and historical threshold alerts for the managed Storage Centers are displayed on the Alerts tab.

The alerts are updated when the Storage Report report-gathering tasks are run. By default, IO Usage and Replication report gathering is performed every 15 minutes and Storage report gathering is performed daily at midnight.

View Current and Historical Threshold Alerts

The Alerts tab displays the threshold alerts that are currently active and the historical threshold alerts that are no longer active.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds.

The **Thresholds** view is displayed.

- 3. Click the Alerts tab.
 - The Active Alerts tab displays all of the threshold alerts that are currently active for the selected Storage Centers.
 - The Historical Alerts tab displays threshold alerts that are no longer active for the selected Storage Centers.

Filter Threshold Alerts by Storage Center

By default, alerts are displayed for all managed Storage Centers.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the Alerts tab.
- 4. Use the Filters pane to filter threshold alerts by Storage Center.
 - To hide threshold alerts for a single Storage Center, clear the checkbox for the Storage Center.
 - To display threshold alerts for a Storage Center that is deselected, select the checkbox for the Storage Center.
 - To hide threshold alerts for all of the Storage Centers, clear the **Storage Centers** checkbox.
 - To display threshold alerts for all of the Storage Centers, select the Storage Centers check box.

Export Threshold Alerts

Threshold alert data can be exported to CSV, HTML, PDF, or Excel file formats.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the Alerts tab.
- 4. Click Export. The Export Thresholds dialog box appears.
- 5. Select the type of file to export from the **Output Type** drop-down menu.
- 6. To export historical threshold alerts, select the Historical Thresholds checkbox.
- 7. To export active threshold alerts, select the **Realtime Thresholds** checkbox.
- 8. Click OK.

View the Threshold Definition that Generated an Alert

If you want to view the threshold definition that generated an alert in detail, you can go to the definition directly from the alert.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the Alerts tab.
- 4. Click the Active Alerts or Historical Alerts subtab.
- 5. In the **Definition** column, click the name of the threshold definition that generated the alert. The threshold definition that triggered the alert is displayed.

Delete Historical Threshold Alerts

If a historical alert is no longer needed, you can delete it.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the Alerts tab.
- **4.** Click **iii (Delete)**. The **Delete Alerts** dialog box opens.
- 5. Click OK.

Configuring Email Notifications for Threshold Alerts

Unisphere Central can be configured to send email notification when a threshold alert is exceeded.

To receive email notifications for threshold alerts:

- 1. Configure the SMTP server settings on the Data Collector.
- 2. Add an email address to your user account.
- 3. Configure your user account settings to send an email notification when a threshold alert is exceeded.
- i NOTE: Unisphere Central can send only one threshold alert email for every 24 hour period. The number of threshold alert emails per 24 hour period cannot be configured.

Configure SMTP Server Settings

The SMTP server settings must be configured to allow Unisphere Central to send notification emails.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and, then click the SMTP Server subtab.
- 4. Click Edit.

The SMTP Server Configuration dialog box opens.

- **5.** Configure the SMTP server settings by performing the following steps:
 - a) In the From Email Address field, type the email address to display as the sender of emails from the Data Collector.
 - b) In the Host or IP Address field, type the host name or IP address of the SMTP server.
 - c) If the port number of the SMTP server is not 25, type the correct port number in the **Port** field.
 - d) If the SMTP server requires authentication, select the **Authentication** checkbox, then type the user name and password in the **SMTP User Name** and **SMTP User Password** fields.
- 6. Click OK.

Configure an Email Address for Your User Account

To receive email notifications, you must specify an email address for your user account.

Prerequisites

The SMTP server settings must be configured for the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.

Steps

- In the top pane of Unisphere Central, click your user name and select User Preferences. The Edit User Settings dialog box opens.
- 2. Type an email address for the user account in the **Email Address** field.
- 3. Select the format for emails from the Email Format drop-down menu.
- **4.** To send a test message to the email address, click **Test Email** and click **OK**. Verify that the test message is sent to the specified email address,
- 5. Click OK.

Related tasks

Configure SMTP Server Settings

Configure Threshold Alert Notifications for Your User Account

Configure Unisphere Central to send threshold alert notifications to your user account.

Prerequisites

- The SMTP server settings must be configured on the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.
- · An email address must be configured for your user account.

Steps

- In the top pane of Unisphere Central, click your user name, then select User Preferences. The Edit User Settings dialog box opens.
- 2. Click the Manage Events tab.
- 3. Select the Threshold Alerts checkbox.
- 4. Click OK.

Performing Threshold Queries

Threshold queries allow you to query historical data based on threshold criteria.

For example, if a Storage Center experiences a spike of I/O usage, you can create a threshold query to discover the threshold criteria that can detect I/O usage spikes. When you find the correct threshold criteria, you can use create a threshold definition to monitor I/O usage on the Storage Center in the future.

View Saved Queries

Saved threshold queries are displayed in the **Gueries** pane.

About this task

Public queries are accessible to all of the Unisphere Central users. Private queries are accessible only to the user that created the query.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- Click the Queries tab. The public and private queries are displayed in the Queries area.
- 4. In the **Queries** area, select the query to view. Information about the query is displayed to the right of the **Queries** area.

Create a Threshold Query

Create a threshold query to test threshold definition settings against historical data. New queries can be run immediately or saved for future use.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- 3. Click the **Queries** tab.
- 4. Perform the following steps to create a query filter:
 - a) Click 🕇 (Create Query Filter).
 - The Create Query Filter dialog box opens.
 - b) Type a name for the query in the Name field.
 - c) (Optional) To make the query available to other Unisphere Central users, select the **Public** checkbox.
 - d) Select whether the query is for a specific Storage Centeror all Storage Centers.
 - To select a specific Storage Center for the query, select a Storage Center from the Storage Center drop-down menu.
 - To select all of the Storage Centers for the query, select the All Storage Centers checkbox.
 - e) Select type of query to create from the from the Type drop-down menu.
 - f) Select the type of storage object to query from the **Alert Object Type** drop-down menu.
 - g) Select the type of usage metric to query from the Alert Definition drop-down menu.
 - h) Select the period of time to query the data from the Start Time drop-down menu.
 - i) Type the threshold value that the usage metric must exceed in the **Threshold Value** field.
 - j) To specify the number of times that the usage metric must exceed the threshold value, type a value in the Occurrences field.
 To only return results that occurred consecutively, select the Consecutive check box.
 - k) Click OK.

Run a Saved Threshold Query

You can select and run a saved threshold query.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- **3.** Click the **Queries** tab. The public and personal queries are displayed in the **Queries** area.
- 4. In the **Queries** area, select the query to run.
- 5. Click Run.
 - The results of the query are displayed in the **Query Results** area.

Export the Results of a Threshold Query

The results of a threshold results can be exported to CSV, HTML, PDF, or Excel file formats.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the **MONITORING** menu, click **Thresholds**. The **Thresholds** view is displayed.
- 3. Click the **Gueries** tab.

The public and personal queries are displayed in the **Queries** area.

- **4.** Select a query from **Gueries** pane.
- 5. Click Run.

The results of the query are displayed in the **Query Results** area.

- 6. Select the type of file to export from the **Output Type** drop-down menu.
- 7. Click OK.

Related tasks

Create a Threshold Query

Edit a Saved Threshold Query

Modify a saved threshold query if you want to change the filter settings.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. From the MONITORING menu, click Thresholds. The Thresholds view is displayed.
- **3.** Click the **Queries** tab. The public and private gueries are displayed in the **Queries** area.
- **4.** In the **Queries** area, select the query to edit.
- 5. Click Edit.

The Edit Guery dialog box is open. Modify the settings of the query as needed.

6. Click OK.

I/O Charts

Use the **IO Charts** tab in the **Performance** view to display historical and real time performance data for a Storage Center and associated storage objects.

View Performance Data for a System

Use the IO Charts tab to display performance data for a Storage Center system.

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the MONITORING menu, click Performance. The Performance view is displayed.
- 3. Click the IO Charts tab, and click the System subtab.
 - The Front End charts display performance data for front-end communication.
 - The **Back End** charts display performance data for back-end communication.
 - The **IO Pending** chart displays the number of pending operations.
- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Data for Volumes

Use the Volumes tab to display performance data for Storage Center volumes.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the MONITORING menu, click Performance. The Performance view is displayed.
- Click the IO Charts tab, and click the Volumes subtab. The charts display performance data for all of the volumes by default.

To display performance data for a specific volume, select the volume from the Volumes navigation pane.

- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Data for Servers

Use the **Servers** tab to display performance data for servers and HBAs connected to a Storage Center.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- Click the IO Charts tab and click the Servers subtab. The charts display performance data for all of the servers by default.

To display performance data for a specific server or HBA, select the server or HBA from the Servers navigation pane.

- To view historical performance data, select the Historical radio button. To view real time performance data, select the Real Time radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Information for Ports

Use the **Ports** tab to display performance data for Storage Center fault domains and ports.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the MONITORING menu, click Performance. The Performance view is displayed.
- Click the IO Charts tab and click the Ports subtab. The charts display performance data for all of the fault domains by default.

To display performance data for a specific fault domain or port, select the fault domain or port from the **Fault Domains** navigation pane.

- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Information for Disks

Use the **Disks** tab to display performance data for Storage Center disks.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the MONITORING menu, click Performance. The Performance view is displayed.
- Click the IO Charts tab and click the Disks subtab. The charts display performance data for all of the disks by default.

To display performance data for a specific disk folder or disk, select the disk folder or disk from the **Disks** navigation pane.

- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Information for Controllers

Use the **Controllers** tab to display performance data for Storage Center controllers.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- Click the IO Charts tab and click the Controllers subtab. The charts display performance data for all of the controllers by default.

To display performance data for a specific controller or I/O card, select the controller or I/O card from the **Controllers** navigation pane.

- 4. To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Information for Storage Profiles

Use the **Storage Profiles** tab to display performance data for Storage Center storage profiles.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the MONITORING menu, click Performance. The Performance view is displayed.
- Click the IO Charts tab and click the Storage Profiles subtab. The charts display performance data for all of the storage profiles by default.

To display performance data for a specific storage profile, select the storage profile from the Storage Profiles navigation pane.

- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

View Performance Information for QoS Profiles

Use the **GoS Profiles** tab to display performance data for Storage Center QoS profiles.

Steps

- 1. Connect to a Data Collector, and select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- From the MONITORING menu, click Performance. The Performance view is displayed.
- Click the IO Charts tab and click the QoS Profiles subtab. The charts display performance data for all of the QoS profiles by default.

To display performance data for a specific QoS profile, select the QoS profile from the **QoS Profiles** navigation pane.

- **4.** To view historical performance data, select the **Historical** radio button. To view real time performance data, select the **Real Time** radio button.
- 5. To export performance data to a file, click Export IO Usage.

Export I/O Usage Data

You can export I/O usage data for systems, volumes, servers, ports, disks, controllers, storage profiles, and QoS profiles.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- 3. Click the IO Charts tab and click the tab that contains the I/O usage data to export.
- 4. Click Export IO Usage. The Export IO Usage Data dialog box opens.
- 5. Select the output file type from the **Output Type** drop-down menu:
 - · Comma Separated Values (CSV)
 - HyperText Markup Language (HTML)
 - Portable Document Format (PDF)
 - · Microsoft Excel Format
- 6. Select the storage objects with the I/O usage data to export from the IO Usage Options area.
- 7. Click OK.

Most Active Reports

Use the **Most Active Reports** tab in the **Performance** view to display the minimum, maximum, average, and standard deviation performance statistics for volumes, servers, or disks.

View the Most Active Report for Volumes

Use the most active report to display the minimum, maximum, average, and standard deviation performance statistics for volumes.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- 3. Click the Most Active Reports tab.
- 4. If you are connected to a Data Collector:

- · Select the Historical radio button to view historical data.
- · Select the **Real Time** radio button to view real time data.
- 5. Select the Volumes radio button.
- 6. Select the folder that contains the volumes to display from the drop-down menu. To display all of the volumes, select **Volumes** from the drop-down menu.
- 7. Select the usage metric to display from the drop-down menu.
- The **MB/s** usage metric is displayed be default.
- 8. To export the most active report to a file, click Export IO Usage.

View the Most Active Report for Servers

Use the most active report to display the minimum, maximum, average, and standard deviation performance statistics for servers.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- 3. Click the Most Active Reports tab.
- 4. If you are connected to a Data Collector:
 - · Select the Historical radio button to view historical data.
 - Select the **Real Time** radio button to view real time data.
- 5. Select the Servers radio button.
- 6. Select the folder that contains the servers to display from the drop-down menu. To display all of the servers, select **Servers** from the drop-down menu.
- 7. Select the usage metric to display from the drop-down menu.
- The **MB/s** usage metric is displayed be default.
- 8. To export the most active report to a file, click Export IO Usage.

View the Most Active Report for Disks

Use the most active report to display the minimum, maximum, average, and standard deviation performance statistics for disks.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the **MONITORING** menu, click **Performance**. The **Performance** view is displayed.
- **3.** Click the **Most Active Reports** tab.
- 4. If you are connected to a Data Collector:
 - · Select the Historical radio button to view historical data.
 - Select the **Real Time** radio button to view real time data.
- 5. Select the Disks radio button.
- Select the folder that contains the disks to display from the drop-down menu. To display all of the disks, select **Disks** from the drop-down menu.
- Select the usage metric to display from the drop-down menu. The MB/s usage metric is displayed be default.
- 8. To export the most active report to a file, click Export IO Usage.

Storage Center Reports

Storage Center Realtime Reports

The Realtime view allows users to view Storage Center Usage reports or Unmapped Volumes reports.

View Realtime Usage Reports

You can view realtime usage reports for volumes, servers, or disks.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the REPORTS menu, click Realtime. The Realtime Reports view is displayed.
- 3. Click the Usage tab.
- **4.** From the **Types** drop-down box, select **Volumes**, **Servers**, or **Disks**. A realtime usage report for the selected storage object is displayed.
- 5. To filter the information that is displayed in the tabular view, click ∇ (Column Filters), select one or more of the filter categories, and click Apply.
- 6. To select the columns that are displayed in the tabular view, click 🗉 (Show/Hide Columns) and select the columns to hide or display.
- 7. To filter the information that is displayed in the chart view, click ∇ (Column Filters), select or clear the storage objects to show or hide, and click OK.

View the Unmapped Volumes Report

The Unmapped Volumes report displays information about volumes that are not mapped to severs.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. From the REPORTS menu, click Realtime. The Realtime Reports view is displayed.
- Click the Unmapped Volumes tab. Information about the volumes that are not mapped to servers is displayed.
- 4. To filter the information that is displayed, click \forall (Column Filters), select one or more of the filter categories, and click Apply.
- 5. To select the columns that are displayed, click 🗉 (Show/Hide Columns) and select the columns to hide or display.

Historical Reports

The information displayed in the **Historical Reports** view depends on the type of report and report settings.

Table 11. Types of Reports

Report Frequency	Description
Daily	Generated at the end of each day and displays the following information:

Report Frequency	Description
Marth.	 Alerts - Displays Storage Center alerts. Volume Storage - Displays volume storage statistics. Replications - Displays information about volume replications.
VV EEKIY	 Storage Center Summary - Displays information about storage space and the number of storage objects on the Storage Center. Alerts - Displays Storage Center alerts. Volume Storage: Displays volume storage statistics. Disk Class - Displays information about storage space on each disk class. Replications - Displays information about volume replications. Disk Power On Time - Displays information about how long each disk has been powered on.
Monthly	 Generated at the end of each month and displays the following information: Storage Center Summary - Displays information about storage space and the number of storage objects on the Storage Center. Volume Storage - Displays volume storage statistics. Disk Class - Displays information about storage space on each disk class. Replications - Displays information about volume replications.

• **Disk Power On Time** - Displays information about how long each disk has been powered on.

View Historical Reports

The content of Historical reports are configured in the Reports Settings dialog box.

Steps

- 1. Click the Historical view. The Historical page is displayed
- 2. Click the name of the report to view in the **Reports** column.

Configuring Automated Report Generation

The settings for automated reports can be set up globally for all Storage Centers or customized for individual Storage Centers.

- The global automated report settings are defined on the Automated Reports tab in the Edit Data Collector Settings dialog box.
- The automated report settings for individual Storage Centers are defined on the Automated Reports tab in the Edit Settings dialog box of the selected Storage Center.

In addition to viewing automated reports in the **Report** view, Unisphere Central can be configured to email automated reports to users or save automated reports to a public directory.

i NOTE: Automated reports cannot be saved to a public directory when using a Virtual Appliance.

Set Up Automated Reports for All Storage Centers

Configure automated report settings on the Data Collector if you want to use the same report settings for all managed Storage Centers. Configure the global settings first, and then customize report settings for individual Storage Centers as needed.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the **Monitoring** tab and then click the **Automated Reports** subtab.

4. Click Edit.

The Automated Reports Settings dialog box opens.

- 5. Select the checkboxes in the **Automated Report Settings** area to specify which reports to generate and how often to generate them.
- 6. Select the checkboxes in the **Automated Table Report Settings** area to specify which reports to generate and how often to generate them.
 - i NOTE: Automated table reports can be saved in a public directory or attached to automated emails, but they do not appear in the Historical Reports view.

7. Set the Automated Report Options

a) To export the reports to a public directory, select the **Store report in public directory** checkbox and enter the full path to the directory in the **Directory** field.

(i) NOTE: The directory must be located on the same server as the Data Collector.

(i) NOTE: Automated reports cannot be saved to a public directory when using a Virtual Appliance.

- b) To email the reports selected in the Automated Reports Settings area, select the Attach Automated Reports to email checkbox.
- c) To email the reports selected in the **Automated Table Reports Settings** area, select the **Attach Table Reports to email** checkbox.
- d) Select the file format for exported and emailed Table Reports from the File Type for Table Reports drop-down menu.
- 8. Click OK.

Configure Unisphere Central to Email Reports

Unisphere Central can be configured to send automated reports by email.

About this task

To send automated reports by email:

Steps

- 1. Configure the SMTP server settings for the Data Collector.
- 2. Add an email address to your user account.
- 3. Configure email notification settings for your user account.

Configure SMTP Server Settings

The SMTP server settings must be configured to allow Unisphere Central to send notification emails.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The **Data Collector** view is displayed.

3. Click the Environment tab and, then click the SMTP Server subtab.

4. Click Edit.

- The SMTP Server Configuration dialog box opens.
- 5. Configure the SMTP server settings by performing the following steps:
 - a) In the From Email Address field, type the email address to display as the sender of emails from the Data Collector.
 - b) In the Host or IP Address field, type the host name or IP address of the SMTP server.
 - c) If the port number of the SMTP server is not 25, type the correct port number in the **Port** field.
 - d) If the SMTP server requires authentication, select the **Authentication** checkbox, then type the user name and password in the **SMTP User Name** and **SMTP User Password** fields.
- 6. Click OK.

Configure an Email Address for Your User Account

To receive email notifications, you must specify an email address for your user account.

Prerequisites

The SMTP server settings must be configured for the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.

Steps

- In the top pane of Unisphere Central, click your user name and select User Preferences. The Edit User Settings dialog box opens.
- 2. Type an email address for the user account in the **Email Address** field.
- 3. Select the format for emails from the **Email Format** drop-down menu.
- **4.** To send a test message to the email address, click **Test Email** and click **OK**. Verify that the test message is sent to the specified email address,
- 5. Click **OK**.

Related tasks

Configure SMTP Server Settings

Configure Email Notification Settings for Your User Account

Make sure that Unisphere Central is configured to send email notifications to your account for the events that you want to monitor.

Prerequisites

- The SMTP server settings must be configured for the Data Collector. If these settings are not configured, the Data Collector is not able to send emails.
- · An email address must be configured for your user account.

Steps

- 1. In the top pane of Unisphere Central, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. Click the Manage Events tab.
- 3. Select the checkbox for each event you want to be notified about.
- 4. Click OK.

Related tasks

Configure SMTP Server Settings Configure an Email Address for Your User Account

Data Collector Management

The Storage Manager Data Collector is a service that collects reporting data and alerts from managed Storage Centers.

When you access the Data Collector using a web browser, the Data Collector management program Unisphere Central for SC Series opens. Unisphere Central manages most functions of the Data Collector service.

Topics:

- Access the Data Collector View
- Configuring Data Collector Settings
- Managing Available Storage Centers
- Managing Available PS Series Groups
- Managing Available FluidFS Clusters
- Managing the Storage Manager Virtual Appliance
- Migrate a Microsoft SQL Server Database
- Uninstalling the Data Collector

Access the Data Collector View

Perform the following steps to access the Data Collector view in Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.

Configuring Data Collector Settings

Use Unisphere Central to configure and update Data Collector properties and settings.

Configuring General Settings

The Data Collector General settings include a configuration summary, security, settings, port identification and database selection.

Restart the Data Collector

Use Unisphere Central to stop and restart the Data Collector.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then select the Summary subtab.
- 4. Click OK.
 - The Data Collector Restart dialog box opens.
- 5. Click Yes.

The Data Collector service stops and restarts.

Enable the Chargeback Feature

To enable the Chargeback feature, add a Chargeback license file or product key to the Data Collector.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then click the Summary subtab.
- **4.** In the **License Information** section, click **Submit License**. The **License information** dialog box opens.
- 5. To enable the Chargeback feature using a license file:
 - a) Select the License File (*.lic) radio button.
 - b) Click Browse and navigate to the location of the license file.
 - c) Select the license file and click **Open**
 - d) Click OK.
- 6. To enable the Chargeback feature using a product key:
 - a) Select the **Product Key** radio button.
 - b) Type the product key in the **Product Key** field.
 - c) Click OK.

Change Storage Center Timeout Settings

Use the Edit Advanced Settings to set Storage Center timeout values.

About this task

(i) NOTE: The Data Collector must be restarted to apply timeout setting changes.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The **Data Collector** view is displayed.
- 3. Click the General tab, and then click the Summary subtab.
- 4. Expand the Advanced area located below the License Information section.
- 5. Click Edit.
 - The Edit Advanced Settings dialog box opens.
- 6. Set the timeout and delay settings as needed:
 - Storage Center Connection Timeout Maximum time that the Storage Center waits for a response for queries sent to the Data Collector.
 - Storage Center Connection Delay Maximum time that the Storage Center waits to successfully connect to the Data Collector.
 - Storage Center Ping Timeout Maximum time that the Storage Center waits for a response to a ping command to the Data Collector.
 - Storage Center Read Timeout Maximum time that the Storage Center waits while attempting read data from the Data Collector.
- 7. Click OK.

The Data Collector Restart dialog box opens.

8. Click Yes.

The Data Collector service stops and restarts.

Set the Maximum Memory for a Data Collector on a Windows Server

Use the Edit Advanced Settings dialog box to set the maximum amount of memory to allocate to a Data Collector on a Windows server.

About this task

(i) NOTE: The Data Collector must be restarted to save changes to the maximum memory setting.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- **3.** Click the **General** tab, and then click the **Summary** subtab.
- 4. Expand the Advanced area located below the License Information section.
- 5. Click Edit.
- The Edit Advanced Settings dialog box opens.
- 6. Type the maximum amount of memory to allocate to the Data Collector in the Maximum Server Memory Usage box.
- 7. Click OK. The Data Collector Restart dialog box opens.
- 8. Click Yes. The Data Collector service stops and restarts.

Set the Maximum Memory for a Data Collector on a Virtual Appliance

Use the **Edit Settings** dialog box the vSphere Web Client to set the maximum amount of memory to allocate to a Data Collector on a Virtual Appliance.

Steps

- 1. In the vSphere Web Client, right-click on the Storage Manager Virtual Appliance and select **Power > Shut Down Guest OS** to shut down the Virtual Appliance.
- Right-click on the Virtual Appliance and select Edit Settings. The Edit Settings dialog box opens.
- 3. Type the maximum amount of memory to allocate for the Virtual Appliance in the Memory field.
- 4. Right-click on the Storage Manager Virtual Appliance and select Power > Power On to start the Virtual Appliance

Select a Network Adapter

The Data Collector attempts to automatically select the network adapter to use by default. If the host server has multiple network adapters, automatic detection can fail and the network adapter must be selected manually.

Prerequisites

The network adapter must have connectivity to the devices managed by Unisphere Central for SC Series.

(i) NOTE: The Data Collector must be restarted to save network adapter changes.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The **Data Collector** view is displayed.

- 3. Click the General tab, and then click the Summary subtab.
- 4. Expand the Advanced area located below the License Information section.
- 5. Click Edit.

The Edit Advanced Settings dialog box opens.

- 6. To select a network adapter, clear the Automatically Select Network Adapter checkbox and select a network adapter from the drop-down menu.
 - To allow the Data Collector to select a network adapter, select the Automatically Select Network Adapter checkbox.
- 7. Click **OK**.
 - The Data Collector Restart dialog box opens.
- 8. Click Yes.
 - The Data Collector service stops and restarts.

Configure a Custom SSL Certificate

Configure a custom SSL certificate to avoid certificate errors when connecting to the Data Collector website. An SSL certificate is also required to communicate with a directory service using LDAP with the StartTLS extension or the LDAPS protocol.

Prerequisites

- The custom certificate must be signed by a Certificate Authority (CA) that is trusted by the hosts in your network.
- i NOTE: If the certificate is signed by an intermediate CA instead of a root CA, then the entire certificate chain must be imported in PEM format. The certificate chain must also include the root CA apart from all the intermediate CAs.
- The certificate public key file must be in DER or PEM format.
- The certificate private key file must be in PKCS #12 format.
- You must know the alias and password for the private key.

Steps

- 1. Connect to the Data Collector.
 - a) Open a web browser.
 - b) Type the address of the Data Collector in the web browser using the following format: https://data_collector_host_name_or_IP_address:3033/
 - c) Press Enter. The Unisphere Central login page is displayed.
 - d) Type the user name and password of a Data Collector user with Administrator privileges in the User Name and Password field.
 - e) Click Log In.

2. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.

3. Click Data Collector.

- The Data Collector view is displayed.
- 4. Click the General tab, and then click the Security subtab.
- 5. In the Registered Certificate section, click Edit.
 - The **Registered Certificate** dialog box opens.
- 6. Upload the public key file.
 - a) Click Choose File located to the right of the Public Key text.
 - b) Browse to the location of the public key file, and then select it.
 - c) Click Open.
 - The **Public Key** field is populated with the path to the public key file.
- 7. Upload the private key file.
 - a) Click Browse located to the right of the Private Key text.
 - b) Browse to the location of the private key file, and then select it.
 - c) Click Open.
 - The **Private Key** field is populated with the path to the public key file.
- 8. Type the name of the entry in the PKCS #12 private key file to use as the private key in the In the Alias field.
- 9. Type the password for the private key file in the **Password** field.
- 10. Click OK.
 - The Data Collector Restart dialog box opens.
- 11. Click Yes.

The Data Collector service stops and restarts.

Configure a Login Banner Message

Set a login banner to display a message to users when they connect to a Data Collector.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then click the Security subtab.
- 4. In the Login Message section, click Edit. The Login Message dialog box opens.
- 5. Type a message to display on the login screen in the Login Banner Message field.
- 6. Click OK.

Configure Data Collector Ports

Use the Ports tab to modify Data Collector ports to avoid port conflicts.

About this task

(i) NOTE: The Data Collector must be restarted to apply port changes.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then select the Ports subtab.
- **4.** Click **Edit**. The **Edit Port** dialog box opens.
- 5. Select the name of the service to edit.
 - Web Server Service (cannot be disabled)
 - Server Agent Service
 - · SMI-S Service (Windows installations only)
 - VASA Service
- 6. Select or clear the **Enabled** checkbox to enable or disable a port.
- 7. If the port is enabled, type a port number in the **Port** field.
- 8. Click OK. The Data Collector Restart dialog box opens.
- 9. Click Yes. The Data Collector service stops and restarts.

Change Data Collector Data Source

Change the data source if you want to use a different database to store Unisphere Central data.

About this task

The Change Data Source option re-configures an existing primary Data Collector to use a new database.

 \triangle CAUTION: To prevent data corruption, make sure that another Data Collector is not using the new database.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then click the Database subtab.
- 4. Click Change Data Source. The Change Data Source dialog box opens.
- 5. Select the type of database from the **Database Type** drop-down menu.
- 6. Type the host name or IP address of the database server in the Hostname or IP Address field.
- 7. Type the port number of the database server in the Port field.
- 8. Type the user name and password of a user account that has database administrator rights in the User Name and Password fields.
- If Auto-Create Database Password is selected, the default password for the compmsauser database user is R3p0r!cty4sgs.
 To specify a password for the compmsauser database user, select Specify Database Password and type the password in the DSM DB User Password and Confirm Password fieldd.
- 10. To migrate historical data from the current database to the new database, clear the **Do not migrate any data from previous data** source checkbox.
 - To migrate I/O usage data, select the **Migrate IO Usage Data** checkbox, then select either **Day** or **Week** from the drop-down menu and specify the number of days or weeks of I/O usage data to move in the **Migrate Last** field.
 - To migrate storage data, select the **Migrate Storage Usage Data** checkbox, then select either **Day** or **Week** from the dropdown menu and specify the number of days or weeks of storage data to move in the **Migrate Last** field.
 - To migrate replication data, select the **Migrate Replication Usage Data** checkbox, then select either **Day** or **Week** from the drop-down menu and specify the number of days or weeks of replication data to move in the **Migrate Last** field.
- 11. Click OK.

Change the Database Connection

Use this procedure to change database server information such as the hostname, IP Address, port, username, and password.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the General tab, and then click the Database subtab.
- Click Change Connection.
 The Change Data Connection dialog box opens.
- 5. Type the host name or IP address of the database server in the **Database Server** field.
- 6. Type port number of the database server in the Database Port field.
- 7. Type the user name and password of a user account that has database administrator rights in the User Name and Password fields.
- 8. Click **OK**.

The Data Collector Restart dialog box opens.

9. Click Yes.

The Data Collector service stops and restarts.

Configuring Environment Settings

The Data Collector Environment settings include remote data collector information, server settings and directory service settings.

View Remote Data Collector Settings

If a Remote Data Collector has been configured, use Unisphere Central to view the settings and status.

Prerequisites

Remote Data Collector has been configured for the system.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- **3.** Click the **Environment** tab, and then click the **Remote Data Collector** subtab. The settings and status of the Remote Data Collector are displayed.

Access the Remote Data Collector

If a Remote Data Collector has been configured, use Unisphere Central to access the Remote Data Collector.

Prerequisites

Remote Data Collector has been configured for the system.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- **3.** Click the **Environment** tab, and then click the **Remote Data Collector** subtab. The settings and status of the Remote Data Collector are displayed.
- Click the url in the RDC URL field. The Unisphere Central login page for the Remote Data Collector is displayed.

Configure SMTP Server Settings

The SMTP server settings must be configured to allow Unisphere Central to send notification emails.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and, then click the SMTP Server subtab.
- 4. Click Edit.
- The **SMTP Server Configuration** dialog box opens.
- 5. Configure the SMTP server settings by performing the following steps:
 - a) In the From Email Address field, type the email address to display as the sender of emails from the Data Collector.
 - b) In the Host or IP Address field, type the host name or IP address of the SMTP server.
 - c) If the port number of the SMTP server is not 25, type the correct port number in the **Port** field.
 - d) If the SMTP server requires authentication, select the **Authentication** checkbox, then type the user name and password in the **SMTP User Name** and **SMTP User Password** fields.
- 6. Click OK.

Configure Server Usage Data Update Frequency

Configure the Server Agent to update usage data every 30 minutes.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab, and then click the Server Agent subtab.
- 4. Click Edit. The Server Agent dialog box opens.
- 5. Select the **Periodically Update Usage Data** checkbox. When selected, server usage data is updated every 30 minutes.
- 6. Type the number of days of usage data to include in the Usage Data Range field
- 7. Click OK.

Configuring Monitoring Settings

The **Monitoring** settings include SupportAssist access and configuration, automated report generation, data collection settings, and support data configuration.

Configure a Proxy Server for a Data Collector

Configure the proxy server settings to allow the Data Collector to use a proxy server when sending diagnostic data using SupportAssist.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Monitoring tab, and then click the SupportAssist subtab.
- 4. Expand the Proxy Server area.
- Click Edit in the Proxy Server area. The Network Proxy Configuration dialog box opens.
- 6. Select the **Enabled** checkbox to enable the proxy server.

i NOTE: The proxy server must be enabled to configure the settings.

- 7. Type the host name or IP address of the proxy server in the Host or IP Address field.
- 8. Type the port number of the proxy server in the **Port** field.
- 9. If the proxy server requires a user name and password, type a user name and password in the User Name and Password fields.
- 10. Click OK.
- The Change Values dialog box opens, which states that the Data Collector service must be stopped and restarted.
- 11. Click Yes.

The Data Collector service stops and restarts.

Storage Center Automated Reports

The information that Storage Center displays in an automated report depends on the configured Automated Report settings.

Report Frequency – Automated reports are generated at the end of each day, week, or month, depending on the options selected in Automated Reports from the Storage Center Settings area. You can also generate automated reports manually, at any time.

The following table lists the available Storage Center reports related to volumes, servers, and disks:

Report Type	Description Generates a report for the following:	
Automated Reports		
	 Storage Center Summary: Displays information about storage space and the number of storage objects on the Storage Center. Disk Class: Displays information about storage space on each disk class. Disk Power On Time: Displays information about how long each disk has been powered on. Alerts: Displays Storage Center alerts. Volume Storage: Displays volume storage statistics. Replications: Displays information about volume replications. 	
Automated Table Reports	Generates a report for the following:	
	 I/O: Displays I/O information about the most active volumes, servers, and disks. Storage: Displays detailed information about the following: 	
	 Volume, volume folder, and volume growth Disk, disk folder, disk class, and disk tier Server, and server folder 	

Set Up Automated Reports for All Storage Centers

Configure automated report settings on the Data Collector if you want to use the same report settings for all managed Storage Centers. Configure the global settings first, and then customize report settings for individual Storage Centers as needed.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The Data Collector view is displayed.
- 3. Click the Monitoring tab and then click the Automated Reports subtab.
- 4. Click Edit.
 - The Automated Reports Settings dialog box opens.
- 5. Select the checkboxes in the **Automated Report Settings** area to specify which reports to generate and how often to generate them.
- 6. Select the checkboxes in the **Automated Table Report Settings** area to specify which reports to generate and how often to generate them.

i NOTE: Automated table reports can be saved in a public directory or attached to automated emails, but they do not appear in the Historical Reports view.

7. Set the Automated Report Options

a) To export the reports to a public directory, select the **Store report in public directory** checkbox and enter the full path to the directory in the **Directory** field.

i) NOTE: The directory must be located on the same server as the Data Collector.

(i) NOTE: Automated reports cannot be saved to a public directory when using a Virtual Appliance.

- b) To email the reports selected in the Automated Reports Settings area, select the Attach Automated Reports to email checkbox.
- c) To email the reports selected in the **Automated Table Reports Settings** area, select the **Attach Table Reports to email** checkbox.
- d) Select the file format for exported and emailed Table Reports from the File Type for Table Reports drop-down menu.
- 8. Click OK.

Testing Automated Reports Settings

You can manually generate reports to test the configured automated report settings without waiting for the reports to be generated automatically. By default, Unisphere Central generates reports into a folder named for the day when the report was generated.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The **Data Collector** view is displayed.
- 3. Click the Monitoring tab, and then click the Automated Reports subtab.
- 4. Review the current report settings:
 - · If the settings are acceptable, click Generate.
 - · To change the report settings, click Edit, adjust the settings, and click Generate.
 - The Generate Reports Now dialog box opens.
- 5. Select the checkboxes of the reports to generate.
- 6. Click OK. The reports are generated and the Generate Reports dialog box closes.
 - i NOTE: Generating a report overwrites previously generated reports in the folder for that day. To prevent these reports from being overwritten, specify a different directory in the Automated Report Options area of the Automated Reports dialog box.
- 7. Click OK.

Configure Data Collection Schedules

Configure the interval at which the Data Collector collects monitoring data from Storage Centers.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The Data Collector view is displayed.

- 3. Click the Monitoring tab, and then click the Data Collection subtab.
- 4. Click Edit.
 - The Data Collection dialog box opens.
- 5. Configure the data collection schedules by performing the following steps:
 - a) To change how often I/O usage data is collected, select a period of time from the IO Usage drop-down menu.
 - b) To change how often replication usage data is collected, select a period of time from the **Replication Usage** drop-down menu.c) To change how often storage usage data is collected, select a period of time from the **Storage Usage** drop-down menu.

If **Daily** is selected from the Storage Usage drop-down menu, the time of the day that storage usage data is collected can be selected from the **Storage Usage Time** drop-down menu.

- d) To change the number of days after which a log is expired, set the number of days in the Alert Lifetime field.
- e) To change the number of days after which reporting data is expired, set the number of days in the **Reporting Data Lifetime** field.
- 6. Click OK.

Enable Debug Logs

Enable debug logs to gather additional information for troubleshooting purposes. Do not set debug log options unless instructed to do so by technical support.

Steps

1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.

2. Click Data Collector.

The Data Collector view is displayed.

- $\textbf{3.} \quad \text{Click the Monitoring tab, and then click the Support subtab.}$
- 4. Click Edit.
 - The Edit Support dialog box opens.
- 5. Select the checkboxes of the debug logs to enable.
- 6. Click OK.

Configure Log File Limits

Configure the size limits for the log files.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The Data Collector view is displayed.

- 3. Click the Monitoring tab, and then click the Support subtab.
- Click Edit.
 The Edit Support dialog box opens.
- 5. To modify the maximum file size of the Data Collector debug logs, change value in the Maximum Log File Size field.
- 6. To modify the maximum number of log files for each Data Collector debug log type, change the value in the Maximum Log Files Per Logger field.
- 7. To modify the number of days after which a log file is expired, change the period of time in the Log File Lifetime field.
- 8. Click OK.

Clear Debug Logs

Clear the debug log files to delete all Unisphere Central debug log files.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the **Monitoring** tab, and then click the **Support** subtab.
- **4.** Click **Clear All Debug Logfiles**. A confirmation dialog box opens.
- 5. Click Yes.

Export Configuration and Log Data for Troubleshooting

Export configuration and log data as a compressed file if it is requested by technical support.

- 1. Connect to the Data Collector.
 - a) Open a web browser.
 - b) Type the address of the Data Collector in the web browser using the following format:
 - https://data_collector_host_name_or_IP_address:3033/
 - c) Press Enter.
 - The Unisphere Central login page is displayed.
 - d) Type the user name and password of a Data Collector user with Administrator privileges in the User Name and Password field.
 - e) Click Log In.

- 2. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- Click Data Collector. The Data Collector view is displayed.
- 4. Click the **Monitoring** tab, and then click the **Support** subtab.
- 5. Click Gather Support Data. The Gather Support Data dialog box opens.
- 6. Choose the time period of the data to send by selecting the start time and end time.
- 7. To send the configuration and log data to technical support for evaluation, select Send to SupportAssist.
- 8. To save configuration and log data to the Data Collector, select Download to file system.
- 9. Click **OK**.
 - If you selected **Send to SupportAssist**, the data is gathered and sent to a SupportAssist server.
 - If you selected **Download to file system**, the support data is saved as a compressed file to the following location on the Data Collector server: C:\Program Files\Dell EMC\Storage Manager\msaservice\node\package\node_modules \dsm-ui-plugin\DsmSupportDump.

Configuring Virtual Appliance Settings

Use the Virtual Appliance tab to configure network, proxy server, and time settings for a Virtual Appliance.

Configure Network Settings for a Virtual Appliance

Use the Network Configuration dialog box to configure network settings and enable or disable SSH on the Virtual Appliance.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Virtual Appliance tab, and then click the Network subtab.
- 4. Click Edit.
 - The Network Configuration dialog box opens.
- 5. In the Hostname field, type the host name of the Virtual Appliance.
- 6. In the Domain field, type the domain name of the Virtual Appliance.
- 7. To enable the Secure Shell (SSH), select the Enable SSH checkbox.
- 8. Select the network configuration type from the Configuration drop-down menu.
 - **DHCP** Dynamic IP address
 - Static Static IP address
- 9. If the network configuration is set to Static:
 - a) Type the IP address of one or more Domain Name System (DNS) servers in the DNS field.

i NOTE: Separate multiple IP addresses using commas.

b) To configure IPv4 network settings, select the **IPv4** radio button, and type the IP Address, netmask, and gateway in the associated fields.

To configure IPv6 network settings, select the **IPv6** radio button, and type the IP Address, gateway, and prefix length in the associated fields.

10. Click OK.

Configure Time Settings for a Virtual Appliance

Configure the time settings to set the time zone and specify how to synchronize the time on the Virtual Appliance. It is recommended to set the time zone to the local time zone in which the Virtual Appliance is located.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Virtual Appliance tab, and then click the Time subtab.
- 4. Click Edit. The Time Configuration dialog box opens.
- 5. Select a time zone for the Virtual Appliance from the **Timezone** drop-down menu.
- 6. To sync the time on the Virtual Appliance with Network Time Protocol (NTP) servers, select Sync with NTP Servers (recommended) and type the name of one or more NTP servers in the NTP Servers field.
- 7. To sync the time on the Virtual Appliance with the ESX host select Sync with ESX Host.
- 8. Click OK.

Managing Available Storage Centers

Use the Data Collector **Users & System** tab to manage available Storage Centers that have been mapped to one or more Data Collector user accounts.

Delete an Available Storage Center

Remove a Storage Center when you no longer want to manage it from the Data Collector. If a Storage Center is removed from all Data Collector user accounts, historical data for the Storage Center is also removed.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, and then select the Storage Centers subtab.
- 4. Select the Storage Center to delete.
- 5. Click **Delete Storage Center**. A warning message is displayed.
- 6. Click Yes.

Clear All Data for a Storage Center

Clear data for a Storage Center to remove historical data from Unisphere Central.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
- The **Data Collector** view is displayed.
- 3. Click the Users & System tab, and then select the Storage Centers subtab.
- 4. Select the Storage Center for which you want to clear all data.
- 5. Click Clear Storage Center Data.

A warning message is displayed.

6. Click Yes.

Remove a Storage Center from a Data Collector User Account

To prevent the user from viewing and managing a Storage Center, remove the Storage Center from the Data Collector user account .

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, and then select the Storage Centers subtab.
- 4. Select the Storage Center from which you want to delete a User/Storage Center map.
- 5. In the User/Storage Center Maps pane, select the user to unmap from the Storage Center.
- 6. Click 🔟 (Delete).

A warning message is displayed.

7. Click Yes.

Managing Available PS Series Groups

Use the PS Groups subtab to manage available PS Series groups that have been mapped to a Data Collector user account.

Delete an Available PS Series Group

Remove a PS Series group when you no longer want to manage it from Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the PS Groups subtab.
- 4. Select the PS Series group to delete.
- 5. Click Delete PS Group.
- 6. Click Yes.

Remove a PS Series Group from a Data Collector User

To prevent a user from managing a PS Series group, remove the PS Series group from the Data Collector user account.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The **Data Collector** view is displayed.
- 3. Click the Users & System tab, then select the PS Groups subtab.
- 4. In the User/PS Groups Maps pane, select the user to unmap from the PS Series group.
- 5. Click iii (Delete User/PS Group Map).
- 6. Click Yes.

Managing Available FluidFS Clusters

Use the FluidFS Clusters subtab to manage available FluidFS clusters.

Delete an Available FluidFS Cluster

Remove a FluidFS cluster when you no longer want to manage it from Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the FluidFS Clusters subtab.
- **4.** Select the FluidFS cluster to delete.
- Click iii (Delete System). A confirmation dialog box is displayed.
- 6. Click Yes.

Remove a FluidFS Cluster from a Data Collector User Account

To prevent a user from viewing and managing the FluidFS cluster, remove the FluidFS cluster from the Data Collector user account.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the FluidFS Clusters subtab.
- 4. Select the FluidFS cluster for which you want to delete a User/FluidFS cluster map.
- 5. In the User/FluidFS Cluster Maps pane, select the user you want to unmap from the FluidFS cluster.
- Click (Delete User/FluidFS Cluster Map). A confirmation dialog box is displayed.
- 7. Click Yes.

Managing the Storage Manager Virtual Appliance

The Storage Manager Virtual Appliance console includes configuration options that allow you to configure network settings, view diagnostic data, and update the Storage Manager Virtual Appliance.

Log in to the Storage Manager Virtual Appliance CLI

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. At the login prompt, type em and press Enter.

- 3. At the EM Username prompt, type the user name of the Data Collector local admin user and press Enter.
- **4.** At the **EM Password** prompt, type the password of the Data Collector local admin user and press Enter. The Storage Manager Virtual Appliance CLI is displayed.

Configure Virtual Appliance Settings

Use the Configuration menu in the Storage Manager Virtual Appliance CLI to change network and partition settings for the Storage Manager Virtual Appliance.

Configure an NTP Server

A network time protocol (NTP) server provides the time and date to the Storage Manager Virtual Appliance.

Prerequisites

The NTP server must be accessible from the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 2 and Enter to enter the Configuration menu.
- 4. Press 1 and Enter to enter the NTP menu.
- 5. Press 1 and Enter to launch the **NTP** setup.
- 6. Type the IP address or host name of an NTP server.
- 7. Press Enter.

Configure IPv4 Settings

Use the Storage Manager Virtual Appliance console to modify the IPv4 network settings.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- **3.** Press 2 and Enter to display the **Configuration** menu.
- 4. Press 2 and Enter to start the Network IPv4 setup.
- 5. Press 1 or 2 to enable or disable DHCP, then press Enter.
- 6. To modify the IP address, type an IP address, and then press Enter.
- 7. To modify the netmask, type a new netmask, and then press Enter.
- 8. To modify the gateway address, type a new gateway address, and then press Enter.
- 9. To assign a new hostname, type a hostname, and then press Enter.
- 10. To modify the domain name used by the Storage Manager Virtual Appliance, type a new domain name, and then press Enter.
- 11. To add a new DNS server, type the IP address of one or more DNS servers. If there are multiple IP addresses, separate them with a comma, and then press Enter.
- **12.** Press 1 to confirm the changes and press Enter.
- **13.** Press Enter to complete the configuration.

Configure IPv6 Settings

Use the Storage Manager Virtual Appliance console to modify the IPv6 network settings.

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 2 and Enter to display the **Configuration** menu.
- 4. Press 2 then Enter to start the Network IPv6 setup.

- 5. Press 1 or 2 to enable or disable DHCP, then press Enter.
- 6. To assign a new hostname, type a hostname, then press Enter.
- 7. To modify the domain name used by the Storage Manager Virtual Appliance, type a new domain name, and then press Enter.
- 8. To add a new DNS server, type the IP address of one or more DNS servers. If there are multiple IP addresses, separate them with a comma, and then press Enter.
- 9. Press 1 to confirm the changes and press Enter.
- **10.** Press Enter to complete the configuration.

Enable SSH for the Virtual Appliance

Use the Storage Manager Virtual Appliance console to enable SSH communication with the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 2 and Enter to display the **Configuration** menu.
- **4.** Press 4 and Enter to display the SSH configuration.
- 5. Enable or disable SSH.
 - To enable SSH, press 1 and Enter.
 - To disable SSH, press 2 and Enter.
- 6. Press Enter.

Enable or Disable the Support Account for the Virtual Appliance

Use the Storage Manager Virtual Appliance console to enable or disable the support account for the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 2 and Enter to display the **Configuration** menu.
- 4. Press 5 and Enter to display the Support Account Enable/Disable setup.
- 5. Enable or disable the support account.
 - To enable the support account, press 1 and Enter.
 - To disable the support account, press 2 and Enter.
- 6. Press Enter.

Modify the Size of a Virtual Appliance Partition

There are three partitions for the Storage Manager Virtual Appliance: Data Collector, database, and root partitions.

About this task

The Data Collector partition contains data used for running the Storage Manager Virtual Appliance. The database partition contains database data stored for the Data Collector. The Storage Manager Virtual Appliance allows you to expand the Data Collector and database partitions. In the VMware vSphere Client the Data Collector partition is labeled Hard disk 2 and the database partition is labeled Hard disk 3.

- 1. Using the VMware vSphere Client, connect to the vCenter server hosting the Storage Manager Virtual Appliance.
- Rignt-click on the Storage Manager Virtual Appliance then select Edit Settings. The Virtual Hardware dialog box opens.
- 3. Select the hard disk for the partition you wish to expand.
 - For the Data Collector partition, select Hard disk 2.
 - · For the database partition, select Hard disk 3.
- 4. Modify the size of the disk to one of the suggested sizes.

- For the Data Collector partition, change the disk size to 15 GB, 20 GB, or 40 GB.
- For the database partition, change the disk size to 20 GB, 40 GB, or 80 GB.
- 5. Click **OK**.

The server expands the disk size.

- 6. Launch the console for the Storage Manager Virtual Appliance.
- 7. Log in to the Storage Manager Virtual Appliance.
- 8. Press 2 and Enter to display the Configuration menu.
- 9. Press 6 and Enter to resize a partition.
- 10. Select which partition to resize.
 - · Press 1 and Enter to select the Data Collector partition.
 - · Press 2 and Enter to select the database partition.

The Storage Manager Virtual Appliance expands the partition to the available size of the disk.

View a Summary of the Configuration Settings

Use the Storage Manager Virtual Appliance console to view a summary of the Storage Manager Virtual Appliance configuration settings.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 2 and Enter to display the Configuration menu.
- 4. Press 7 and Enter.
 - The Storage Manager Virtual Appliance CLI displays a summary of the configuration settings.
- 5. Press Enter to return to the Configuration menu.

View Diagnostic Information for the Virtual Appliance

Using the Diagnostic menu in the Storage Manager Virtual Appliance console you can view information used to diagnose network connectivity issues with the Storage Manager Virtual Appliance.

Ping an IP Address

Use the Storage Manager Virtual Appliance CLI to ping an IP address from the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 3 and Enter to display the **Diagnostics** menu.
- 4. Press 1 to ping an IPv4 address or press 2 to ping an IPv6 address, and then press Enter.
- 5. Type the host name or IP address to ping.
- 6. Press Enter.

The Storage Manager Virtual Appliance CLI displays the results of the ping command.

7. Press Enter to return the **Diagnostics** menu.

View Routing Information

Use the Storage Manager Virtual Appliance CLI to view routing information for the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- **3.** Press 3 and Enter to display the **Diagnostics** menu.
- 4. Press 3 and Enter.

The Storage Manager Virtual Appliance CLI displays a table of routing information.

5. Press Enter to return to the Diagnostics menu.

View the Hosts Table

Use the Storage Manager Virtual Appliance CLI to view the hosts table for the Storage Manager Virtual Appliance.

About this task

The hosts table shows network information for the Storage Manager Virtual Appliance.

Steps

- 1. Using the VMware vSphere Client, launch the console for the Storage Manager Virtual Appliance.
- 2. Log in to the Storage Manager Virtual Appliance CLI.
- 3. Press 3 and Enter to display the **Diagnostics** menu.
- **4.** Press 4 and Enter.

The Storage Manager Virtual Appliance CLI displays the hosts table.

5. Press Enter to return to the Diagnostics menu.

Migrate a Microsoft SQL Server Database

If the database server is Microsoft SQL Server 2012, 2014, or 2016, the Data Collector database can be migrated to a new Microsoft SQL Server.

Steps

- 1. Back up the database on the original Microsoft SQL Server.
- 2. Set up a new Microsoft SQL Server and configure it to use mixed mode authentication (SQL Server and Windows Authentication mode).
- 3. Perform a restore of the database on the new Microsoft SQL Server.
- 4. After the database is restored, create the required database user.
 - a) Create a database user named **compmsauser**, but do not assign the user to a schema .
 - b) Set the password of the compmsauser database user to the password it was assigned in the previous database.
 - If you did not previously change the password, the default password is R3p0r!cty4sgs.
 - If you do not remember the password or you want to use a different password, you must enter the new password when you run the **Change Data Source** wizard in Step 6.
- 5. Run the following query on the compmsadb database:

sp change users login 'update one', 'compmsauser', 'compmsauser'

6. After the query finishes, use the Data Collector to change the data source to the new database.

i NOTE: If you changed the password, select the Use Custom Password checkbox and type the password in the Custom Password field.

Uninstalling the Data Collector

On the server that hosts the Data Collector, use the Windows **Programs and Features** control panel item to uninstall the **Storage Manager Data Collector** application.

Deleting Old Data Collector Databases

Delete the old Data Collector database if you have migrated the database to a different database server or if you have removed the Data Collector from your environment.

Clean up a MySQL Database

Remove Unisphere Central data from the MySQL database and reinstall the Data Collector.

Steps

1. Enter the following SQL commands as an Admin user:

```
Drop Database compmsadb;
DELETE FROM mysql.user WHERE User = 'compmsauser';
DELETE FROM mysql.db WHERE user = 'compmsauser';
FLUSH PRIVILEGES;
```

2. Reinstall the Storage Manager Data Collector.

Clean up a Microsoft SQL Database

Remove Unisphere Central data from the database and reinstall the Data Collector.

Steps

1. Enter the following SQL commands as an Admin user:

Drop Database compmsadb;

EXEC SP DropLogin 'compmsauser';

2. Reinstall the Storage Manager Data Collector.

Data Collector User Management

Unisphere Central User Privileges

The Data Collector controls user access to Unisphere Central functions and associated Storage Centers based on the privileges assigned to users: Reporter, Volume Manager, or Administrator. The following tables define Unisphere Central user level privileges with the following categories.

() NOTE: Unisphere Central user privileges and Storage Center user privileges share the same names but they are not the same. Storage Center user privileges control access to Storage Centers, and Unisphere Central users control access to Unisphere Central functionality.

Administrator Privileges

The Administrator privilege level is the most powerful user profile in Unisphere Central.

An Administrator user has full access to all of the Unisphere Central features.

i NOTE: A user account that is created with Administrator access cannot be downgraded to Reporter / Volume Manager rights.

Volume Manager Privileges

The Volume Manager privilege level is similar to the Administrator level, but has more restrictions.

A Volume Manager user is able to view, manage, and add/create most objects in Unisphere Central. However, a Volume Manager user does not have access to Data Collector properties.

Reporter Privileges

The Reporter privilege level is the most limited type of user in Unisphere Central.

A Reporter user can view most features of Unisphere Central. However, a Reporter user is not able to manage, create, or edit any feature. In addition, a Reporter user cannot view SupportAssist properties, Data Collector properties, or Storage Profiles.

i NOTE: A Unisphere Central Reporter user can map Storage Centers to other Reporter users if they have Unisphere Central Reporter credentials.

Authenticating Users with an External Directory Service

The Data Collector can be configured to authenticate Unisphere Central users with an Active Directory or OpenLDAP directory service. If Kerberos authentication is also configured, users can log in with the Client automatically using their Windows session credentials.

Unisphere Central access can be granted to directory service users and groups that belong to the domain to which the Data Collector is joined. For Active Directory, access can also be granted to users and groups that belong to domains in the same forest, as well as domains that belong to forests for which one-way or two-way trusts are configured.

Configuring an External Directory Service

Before users can be authenticated with an external directory service, the Data Collector must be configured to use the directory service.

Configure the Data Collector to Use a Directory Service

Configure the Data Collector to use an Active Directory or OpenLDAP directory service.

Prerequisites

- · An Active Directory or OpenLDAP directory service must be deployed in your network environment.
- · The directory service must meet specific configuration requirements.
 - Active Directory: The directory service must be configured to use Kerberos authentication.
- **OpenLDAP**: The directory service must be configured to use LDAP with the StartTLS extension or LDAPS (LDAP over SSL).
- If the directory service is OpenLDAP, the SSL certificate public key file (DER or PEM encoding) for the directory server must be exported and transferred to the server that hosts the Data Collector.
- The Data Collector must have network connectivity to the directory service.
- DNS SRV records must be correctly configured in your environment to allow the Data Collector to determine how to interact with the directory service. If SRV records are not defined or are improperly configured, you must configure the directory service settings manually.
- The Data Collector requires a user that has permission to query the directory service. For Active Directory, this user must also have a User Principal Name attribute (*username@example.com*) on his or her entry in the directory.
- To use Kerberos authentication, you must provide the user name and password for a directory service user who has Administrator privileges or use an existing service account.
- If a directory service is configured and you want to reconfigure the Data Collector to use a directory service in a different domain, the directory services configuration must be disabled and applied before you continue.
- To authenticate Active Directory users that belong to domains in a different forest, a one-way or two-way trust must be configured between the local forest and remote forest.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and then select the Directory Service subtab.
- 4. Click Edit.

The Service Settings dialog box opens.

- 5. Configure LDAP settings.
 - a) Select the **Enabled** checkbox.
 - b) In the **Domain** field, type the name of the domain to search.

i NOTE: If the server that hosts the Data Collector belongs to a domain, the Domain field is automatically populated.

- c) In the Authentication Bind DN field, type the Distinguished Name or User Principal Name of the user that the Data Collector uses to connect to and search the LDAP server. The user name Administrator is not allowed.
 - Example Distinguished Name: CN=Firstname Lastname, CN=users, DC=corp, DC=Company, DC=COM
 - Example User Principal Name: username@example.com
- d) In the Authentication Bind Password field, type the password for the auth bind Distinguished Name.
- e) If you modified the **Domain** field, click **Discover** to locate the directory service for the specified domain.
- 6. (Optional) Manually configure the directory service settings.
 - a) From the Type drop-down menu, select Active Directory or OpenLDAP.
 - b) In the **Directory Servers** field, type the fully qualified domain name (FQDN) of each directory server on a separate line.
 - (i) NOTE: To verify that the Data Collector can communicate with the specified directory server(s) using the selected protocol, click Test.
 - c) In the **Base DN** field, type the base Distinguished Name for the LDAP server. This name is the starting point when searching for users.

- d) In the **Connection Timeout** field, type the maximum time (in minutes) that the Data Collector will wait while attempting to connect to an LDAP server.
- 7. (Optional) Configure Kerberos authentication. To allow users to log in with the Client automatically using his or her Windows session credentials, Kerberos authentication must be configured.
 - a) Select the Kerberos Enabled checkbox.
 - b) In the **Kerberos Domain Realm** field, type the Kerberos realm to authenticate against. In Windows networks, this realm is usually the Windows domain name in uppercase characters.
 - c) (OpenLDAP only) Type the host name or IP address of the Key Distribution Center (KDC) in the **KDC Host Name or IP Address** field.
 - d) In the Data Collector Host Name field, type the fully qualified domain name (FQDN) of the server that hosts the Data Collector.
- 8. (Optional Open LDAP only) If Transport Layer Security (TLS) is enabled, upload a Certificate Authority PEM file...
 - a) Browse to the location of the PEM file, select the file, and click Open. .
 - The Upload TLS Certificate dialog box opens. NOTE: If you select the wrong PEM file, click Upload Certificate in the Upload TLS Certificate dialog box to select a new file
 - b) c. Click **OK** to upload the certificate.
- 9. (Active Directory Only) To register the Data Collector on the domain, select **Register the Data Collector on the domain**.
 - a) Type the user name and password of a domain administrator.
 - These credentials are used only to register the Data Collector and are not saved.
 - b) Click **OK**.
- 10. To use an existing service account, select Use an existing service account for joining the domain.
 - a) Type the user name and password for the service account.
 - i NOTE: The existing service account must include a *servicePrincipalName* attribute with the following values in the form:

HTTP/<host name>dc.<domain>@<realm>

HTTP/<host name>dc.<domain>

- These values can be set using the Microsoft setspn.exe tool or the equivalent.
- b) Click OK.

Troubleshoot Directory Service Discovery

The Data Collector attempts to automatically discover the closest directory service based on the network environment configuration. Discovered settings are written to a text file for troubleshooting purposes. If discovery fails, confirm that the text file contains values that are correct for the network environment.

Steps

- 1. On the server that hosts the Data Collector, use a text editor to open the file C:\Program Files\Dell EMC\Storage Manager\msaservice\directory_settings.txt.
- 2. Confirm that the values listed in the directory settings.txt file match the network environment.
- 3. If the file contains incorrect values, make configuration changes to correct the issue.
 - a) Confirm that the server that hosts the Data Collector is joined to the correct Domain.
 - b) Make sure that DNS SRV records are correctly configured.
 - c) Use Data Collector to discover the directory service again.
- 4. If the previous step did not correct the issue, select the **Enable Manual Configuration** checkbox and manually configure directory service settings. If necessary, contact technical support for assistance.

Scan for Domains in Local and Trusted Forests

If domains are added or removed from the local forest, or if two-way forest trusts between the local forest and one or more remote forests are added or removed, use the Data Collector to scan for domains.

Prerequisites

The Data Collector must be configured to authenticate users with an Active Directory directory service and Kerberos.

(i) NOTE: Authentication attempts for Active Directory users may fail while a rescan operation is in progress.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and then select the Directory Service subtab.
- 4. Click Rescan. A message appears to inform you that scanning succeeded or failed.
- 5. Click OK.

Grant Access to Directory Service Users and Groups

To allow directory users to log in to Unisphere Central, add directory service users and/or user groups to Data Collector user groups.

Add Directory Groups to a Data Collector User Group

Add a directory group to a Data Collector user group to allow all users in the directory group to access Unisphere Central. Access can be granted to groups that belong to the domain to which the Data Collector is joined, domains in the same forest, and domains that belong to forests for which two-way forest trusts are configured. Directory service groups are not supported for one-way trust domains.

Prerequisites

The Data Collector must be configured to authenticate users with an external directory service.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The **Data Collector** view is displayed.

- 3. Click the Users & System tab and then select the Users & User Groups subtab.
- 4. Select the Data Collector user group to which you want to add directory groups.
- Click Add Directory User Groups. The Add Directory User Groups dialog box opens.
- 6. (Multi-domain environments only) From the **Domain** drop-down menu, select the domain that contains the directory groups to which you want to grant access.
- 7. Select each directory group that you want to add to the Unisphere Central user group.
- 8. When you are finished, click **OK**. The directory groups that are associated with the Data Collector group appear on the **User Groups** subtab.

Add a Directory User to a Data Collector User Group

Add a directory user to a Data Collector user group to allow the directory user to access Unisphere Central. Access can be granted to users that belong to the domain to which the Data Collector is joined, domains in the same forest, and domains that belong to forests for which one-way or two-way trusts are configured.

Prerequisites

The Data Collector must be configured to authenticate users with an external directory service.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.

The Data Collector view is displayed.

- 3. Click the Users & System tab and then select the Users & User Groups subtab.
- 4. Select the Data Collector user group to which you want to add a directory user.

5. Click Add Directory Users.

The Add Directory Users dialog box opens.

- 6. In the **Directory Users** field, type the name of each directory user that you want to add.
 - For OpenLDAP, the user name format is supported (example: user).
 - For Active Directory, the following user name formats are supported:
 - User name (example: user)
 - User Principal Name (example: *user@domain*)

i NOTE: To add users that belong to a domain other than the domain for which the Data Collector is configured, use the User Principal Name format.

7. Click Check Names to verify that the specified users exist in the directory service. A message appears.

i NOTE: Checking names is not supported on domains for which a one-way trust is configured.

- 8. Click OK to close the message.
- 9. If any of the specified directory user names could not be verified, correct the names and then click Check Names again.
- 10. When you are finished, click **OK**. The **Add Directory Users** dialog box closes, and the directory users that are associated with the selected Data Collector user group appear on the **User Groups** subtab.

Revoke Access for Directory Service Users and Groups

To revoke access to Unisphere Central for a directory service user or group, remove the directory group or user from Data Collector user groups.

Remove a Directory Service Group from a Data Collector User Group

Remove a directory service group from a Data Collector user group to prevent directory users in the group from accessing Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab and then select the Users & User Groups subtab.
- 4. Click the User Groups tab.
- 5. Select the Data Collector user group to which the directory group is added.
- 6. Click the Directory Groups subtab.
- 7. Select the directory service group for which you want to revoke access, then click **Delete**. The **Delete Directory User Group** dialog box opens.
- 8. Click Yes.

Remove a Directory Service User from a Data Collector User Group

Remove a directory service user from a Data Collector user group to prevent the directory user from accessing Unisphere Central.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab and then select the Users & User Groups subtab.
- 4. Click the **User Groups** tab.
- 5. Select the Data Collector user group to which the directory group is added.
- 6. Click the **Users** subtab.

- 7. Select the directory service group user for which you want to revoke access, then click **Delete User**. The **Delete Directory User** dialog box opens.
- 8. Click Yes.

Disable External Directory Service Authentication

Disable external directory service authentication to prevent directory users from authenticating.

About this task

CAUTION: Disabling directory service authentication removes all directory service users and groups from Unisphere Central. If you choose to reenable directory service authentication at a later time, all directory users and user groups must be granted access again.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Environment tab and then select the Directory Service subtab.
- 4. Click Edit.
 - The Service Settings dialog box opens.
- 5. Clear the Enabled checkbox.
- 6. Click OK.

Managing Local Users Through the Data Collector

Unisphere Central users and mappings to Storage Center can be configured on the Users tab on the Data Collector view.

Create a User

Create a user account to allow a person access to Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- 4. Click +(New User)
 - The **Create User** dialog box opens.
- 5. Enter information for the new user.
 - a) Type the user name of the user in the **User Name** field.
 - b) (Optional) Type the email address of the user in the Email Address field.
 - c) Select the role to assign to the user from the Role drop-down menu.
 - d) Select a language from the **Preferred Language** drop-down menu.
 - e) Enter a password for the user in the Password and Confirm Password fields.
 - f) To force the user to change the password after the first login, select the Requires Password Change checkbox.
- 6. Click OK.

Related reference

Unisphere Central User Privileges

Configure or Modify the Email Address of a User

An email address must be configured if you want Unisphere Central to send email notifications to the user.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- **4.** Select the user to modify and click ✓ (Edit Settings). The User Settings dialog box opens.
- 5. Enter the email address of the user in the Email Address field.
- 6. Click OK.

Change the Privileges Assigned to a User

You can change the privileges for a user account by changing the user role.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- Select the user to modify and click ✓ (Edit Settings). The User Settings dialog box opens.
- 5. Select the role to assign to the user from the Role drop-down menu.
- 6. Click OK.

Related reference

Unisphere Central User Privileges

Change the Preferred Language for a Unisphere Central User

The preferred language for a Unisphere Central user determines the language displayed in automated reports and email alerts from the Data Collector. Reports displayed in the UI and generated by a user request will not use the preferred language.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- Select the user to modify and click ✓ (Edit Settings). The User Settings dialog box opens.
- 5. From the Preferred Language drop-down menu, select a language.
- 6. Click OK.

Force the User to Change the Password

You can force a user to change the password the next time he or she logs in.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- Select the user to modify and click ✓ (Edit Settings). The User Settings dialog box opens.
- 5. Select the Requires Password Change checkbox.
- 6. Click OK.

Change the Password for a User

You can change the password for any user account using Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- **4.** Select the user to modify and click **Change User Password**. The **Change User Password** dialog box opens.
- 5. Type the admin password in the Authorization Password field
- 6. Enter a new password for the user in the New Password and Confirm Password fields.
- 7. Click OK.

Set Storage Center Mappings for a Reporter User

Storage Center mappings can be set only for users that have Reporter privileges. Users that have Administrator or Volume Manager privileges manage their own Storage Center mappings using Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users subtab.
- **4.** Select the Reporter user to modify.
- 5. In the lower pane on the **Storage Centers** tab, click + (Select Storage Center Mappings). The **Select Storage Center Mappings** dialog box opens.

6. Select the checkbox of each Storage Center to map to the user.

Clear the checkbox of each Storage Center to unmap from the user.

7. Click OK.

Delete a User

Delete a user account to prevent the user from viewing and managing the Storage Center.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- 4. Select the user you want to delete.
- Click (Delete User). A confirmation dialog box opens.
- 6. Click Yes.

Delete a Storage Center Mapping for a User

Remove a Storage Center map from a user account to prevent the user from viewing and managing the Storage Center.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- 4. Select the user for which you want to delete a Storage Center mapping.
- 5. Select the Storage Center to unmap from the user on the Storage Center pane.
- Click iii (Delete Storage Center Map). A confirmation dialog box opens.
- 7. Click Yes.

Unlock a Local User Account

After a user enters an incorrect password beyond the Account Lockout threshold, that user account is locked. Use Unisphere Central to unlock the account.

Prerequisites

- · Password Configuration is enabled.
- A user account is locked.

i NOTE: If the locked account is a Storage Manager administrator account, contact technical support for assistance in unlocking the account.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Users & User Groups subtab.
- 4. Select the locked user account.
- 5. Click Unlock User.

A confirmation dialog box opens.

6. Click Yes.

Managing Local User Password Requirements

Manage the password expiration and complexity requirements for Unisphere from the Data Collector view.

Configure Local Unisphere Central User Password Requirements

Set local user password requirements to increase the complexity of local user passwords and improve the security of Unisphere Central.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Password Configuration subtab.
- Click Edit. The Password Configuration dialog box opens.
- 5. Select Enabled.
- 6. Set the password requirements.

i NOTE: For user interface reference information, click Help.

7. Click OK.

Apply Password Requirements to Storage Center Users

Unisphere Central local user password requirements can be applied to Storage Center users.

Prerequisites

Password Configuration must be enabled.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Password Configuration subtab.
- 4. Click Edit. The Password Configuration dialog box opens.
- 5. Select the Storage Centers to which to apply the password requirements.
- 6. Click OK.

Related reference

Configure Local Unisphere Central User Password Requirements

Reset Password Aging Clock

The password aging clock determines when a password expires based on the minimum and maximum age requirements. Reset the password aging clock to start the password aging clock from the current date and time.

Prerequisites

Password Configuration must be enabled.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Password Configuration subtab.
- 4. Click Edit. The Password Configuration dialog box opens.
- 5. Select the **Reset Aging Clock** checkbox.
- 6. Click OK.

Related reference

Configure Local Unisphere Central User Password Requirements

Require Users to Change Passwords

The new password requirements apply to new user passwords only. Existing user passwords may not follow the password requirements. Require users to change passwords at next login so that the password complies with the password requirements.

Prerequisites

Password Configuration must be enabled.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Users & System tab, then select the Password Configuration subtab.
- 4. Click Edit. The Password Configuration dialog box opens.
- 5. Select the **Requires Password Change** checkbox.
- 6. Click OK.

Related reference

Configure Local Unisphere Central User Password Requirements

Managing User Settings with Unisphere

Use Unisphere to change preferences for your user account.

Change User Password

The password for the current user can be changed from the Edit User Settings dialog box.

Steps

- 1. In the top pane of Unisphere, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. On the User Information tab, click Change Password. The Change Password dialog box opens.
- 3. Type the current password of the user in the Current Password field.
- 4. Type a new password in the New Password and Confirm New Password fields.
- 5. Click OK to save changes to the password and close the Change Password dialog box.
- 6. Click OK to close the Edit User Settings dialog box.

Configure Email Settings

The email settings for the current user can be changed from the Edit User Settings dialog box.

Steps

- 1. In the top pane of Unisphere, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. Edit the email settings.
 - Email Address Type the email address for the current user.
 - Email Format Select Plain text or HTML.
 - (Optional) Test Email Click to send an email message to the address entered in the Email Address field.
- 3. Click OK.

Configure Client Options

The alert display settings and formatting of storage units can be configured for the current user in the Edit User Settings dialog box.

Configure Alert Display Settings

The alert display settings for the current user are located in the Edit User Settings dialog box.

- 1. In the top pane of Unisphere, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. On the Client Options tab, configure alert settings by selecting or clearing the following checkboxes:
 - Show Threshold Alert levels on charts Displays a horizontal line parallel to the X axis on charts, showing the relationship between the reported data and the threshold level.
 - Show Storage Center alerts on charts Displays a vertical line parallel to the Y axis, showing the relationship between reported data and Storage Center Alerts for failed controllers and down Remote Storage Centers.
- 3. Click OK.

Configure the Units for Display

Storage units can be shown in megabytes, gigabytes, terabytes, or an automatically chosen unit of measure that best fits the data.

- 1. In the top pane of Unisphere, click your user name, then select **User Preferences**. The **Edit User Settings** dialog box opens.
- 2. On the Client Options tab, select how to display the storage units from the Storage Units Formatting drop-down menu:
 - Automatic The units that are most appropriate for the displayed values are automatically selected.
 - Always show in MB All storage units are displayed in megabytes.
 - Always show in GB All storage units are displayed in gigabytes.
 - Always show in TB All storage units are displayed in terabytes.
- 3. Click OK.

SupportAssist Management

Data Types that Can Be Sent Using SupportAssist

Unisphere can send reports, Storage Center data, and FluidFS cluster data to technical support.

The following table summarizes the types of data that can be sent using SupportAssist.

SupportAssist Data Type	Description	SupportAssist Method
I/O Usage report	Summarizes read and write I/O performance for one or more Storage Centers	Automatic or manual
Storage Usage report	Summarizes storage use and growth for one or more Storage Centers	Automatic or manual
Replication report	Summarizes the status of replications	Automatic or manual
Storage Center configuration	Sends all Storage Center configuration information	Manual
Storage Center logs	Sends Storage Center logs	Manual
FluidFS cluster summary	Summarizes all FluidFS cluster configuration information	Automatic
FluidFS cluster events	Sends FluidFS cluster events	Automatic
FluidFS cluster diagnostics	Sends full system diagnostics, including summary information for the FluidFS cluster configuration, services, and logs	Automatically triggered on critical events. Manually triggered when an administrator runs the FluidFS cluster diagnostics

Configure SupportAssist Settings for the Data Collector

Modify the SupportAssist settings for the Data Collector.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector.
 - The **Data Collector** view is displayed.
- $\textbf{3.} \quad \text{Click the } \textbf{Monitoring tab, and then click the } \textbf{SupportAssist subtab}.$
- 4. Click Edit. The SupportAssist dialog box opens.
 - a) Select the frequency to send usage data from the Send Interval drop-down menu.
 - b) Select usage reports to send from the Global Reporting SupportAssist Settings area.

i NOTE: The Send Interval setting is ignored for Storage Usage reports. Instead, Storage Usage reports are sent to technical support on a daily basis.

5. Click OK.

Configure SupportAssist Settings for a Single Storage Center

Modify SupportAssist Settings for a single Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- In the Summary tab, click (Settings).
 The Edit Storage Center Settings dialog box opens.
- **4.** Click the **SupportAssist** tab. The SupportAssist settings dialog box opens.
- 5. Click Change global settings.
- 6. Select the frequency to send data from the Send Interval drop-down box.
- 7. Select usage reports to send in the Global Reporting SupportAssist Settings.
 - i NOTE: The default collection schedule for Storage Usage data is daily at midnight. Therefore, the default Send Interval setting of 4 Hours is ignored for Storage Usage reports. Instead, Storage Usage reports are sent to technical support on a daily basis by default.
- 8. Select your preference for receiving software updates from the Software Update Mode drop-down menu.
- 9. If your network requires hosts to use a proxy server to reach the Internet, configure a proxy server for SupportAssist:
 - a) Select the Enabled checkbox next to Web Proxy Settings to enable a proxy server.
 - b) Specify the IP address and port for the proxy server.
 - c) If the proxy server requires authentication, type valid credentials in the User Name and Password fields.
- 10. Click OK.

Manually Sending Diagnostic Data Using SupportAssist

You can send diagnostic data manually using SupportAssist for multiple Storage Centers or for a specific Storage Center.

Manually Send Diagnostic Data for Multiple Storage Centers

You can send diagnostic data for multiple Storage Centers from the Data Collector.

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click 4 (Home). The Unisphere Central Home page is displayed.
- Click Data Collector. The Data Collector view is displayed.
- 3. Click the Monitoring tab, and then click the SupportAssist subtab.
- 4. Click Send SupportAssist Data Now. The Send SupportAssist Data Now dialog box opens.
- 5. In the **Storage Centers** area, select the checkboxes of the Storage Centers for which you want to send SupportAssist data to technical support.
- 6. In the **Reports** area, select the checkboxes of the Storage Center reports to send.
- 7. In the Time Range area, choose the period of time for which you want to send data.

- a) In the Start Date fields, specify the start date and time.
- b) To specify an end date, clear the Use Current Time For End Date checkbox and specify a date and time in the End Date fields.
 To use the current date and time as the end date, select the Use Current Time For End Date checkbox.
- 8. Click OK.

Send Diagnostic Data for a Single Storage Center

You can send Storage Center diagnostic data using SupportAssist from the Storage Center settings.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane. The Storage Center must be added to Unisphere Central using a Storage Center user with the Administrator privilege.
- 2. Click Summary. The Summary view is displayed.
- In the Summary tab, click (Settings).
 The Storage Center Settings dialog box opens.
- 4. Click the **SupportAssist** tab.
- Click Send Data Now.
 The Send SupportAssist Data Now dialog box opens.
- 6. In the **Reports** area, select the checkboxes of the Storage Center reports to send.
- 7. In the Time Range area, specify the period of time for which you want to send data.
 - a) In the Start Date fields, specify the start date and time.
 - b) To specify an end date, clear the Use Current Time For End Date checkbox and specify a date and time in the End Date fields.
 To use the current date and time as the end date, select the Use Current Time For End Date checkbox.
- 8. In the Storage Center area, select the checkboxes for the types of Storage Center data to send.
- 9. Click OK.
- 10. Click OK to close the Storage Center Settings dialog box.

Save SupportAssist Data to a File

If your site does not have connectivity to SupportAssist servers, you can use the **Export Historical Data** option to save SupportAssist data to a file or email the data to technical support.

Steps

- 1. If a Storage Center is selected from the drop-down list in Unisphere Central, click (Home). The Unisphere Central Home page is displayed.
- 2. Click Data Collector. The Data Collector view is displayed.
- 3. Click the Monitoring tab, and then click the SupportAssist subtab.
- 4. Click Export Historical Data. The Export Historical Data dialog box opens.
- 5. In the Storage Center table, select the Storage Center for which you want to export data.
- 6. In the **Reports** section, select the type of data that you want to export.
- 7. In the Time Range section, specify the time period for which you want to export data.
- 8. Select whether to export the data to a file or to send the data via email.
 - To export the data to a file, select **Export historical data to file system**.
 - To export the data and send view email, select **Export historical data via email** and type the recipient email address in the **Email Address** field.

i NOTE: An SMTP server must be configured on the Data Collector to export historical data via email.

9. Click OK.

Saving SupportAssist Data to a USB Flash Drive

If the Storage Center is not configured to send, or is unable to send SupportAssist data to the SupportAssist server, you can save the SupportAssist data to a USB flash drive and then send the data to technical support.

USB Flash Drive Requirements

The flash drive must meet the following requirements to be used to save SupportAssist data:

- · USB 2.0
- · Minimum size of 4 GB

Prepare the USB Flash Drive

When the USB flash drive contains a file named phonehome.phy, the Storage Center recognizes that the drive will be used to save SupportAssist data.

Prerequisites

- This procedure requires a USB flash drive that contains a partition table with one partition formatted with an MSDOS/FAT32 filesystem. USB devices may come from the vendor formatted with or without partitions. Use Windows disk management or other third-party tools to create a partition if the flash drive does not have an MSDOS/FAT32 partition.
- · The USB flash drive cannot contain any other .phy marker files.

About this task

(i) NOTE: To save SupportAssist data from both controllers, you must use two separate USB flash drives.

Steps

- 1. Create a text file and name it: phonehome.phy changing the file type from .txt to .phy.
- 2. Save the file to the root of the MSDOS/FAT32 filesystem on the flash drive.
- 3. Insert the USB drive into a port on the lead controller.
- 4. To save SupportAssist data from both controllers, insert a second USB flash drive into the peer controller.
- 5. Wait five minutes to allow the controllers to recognize the USB flash drive.
- 6. Check the Storage Center logs in Unisphere to verify that Storage Center recognized the USB flash drive.

Save SupportAssist Data to the USB Flash Drive

Use the Send SupportAssist Information to USB dialog box to save data to the USB flash drive.

Prerequisites

- Prepare the USB flash drive according to Prepare the USB Flash Drive.
- · Storage Center must recognize the USB flash drive.
- SupportAssist must be turned off.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- In the Summary view, click * (Settings). The Edit Storage Center Settings dialog box opens.
- 4. Click Send Information to USB. The Send SupportAssist Information to USB dialog box opens.
- **5.** Review the License Agreement terms.

- 6. Place a check next to By checking this box, you accept the above terms to accept the terms.
- 7. Click Next.
- 8. Place a check next to **Detailed Logs** to save this information to the USB flash drive.

i NOTE: Unisphere Central saves the Storage Center configuration data to the USB flash drive automatically.

- 9. Click Finish. The dialog box displays SupportAssist progress and closes when the process is complete.
 - i NOTE: Do not remove the drive from the port on the controller until SupportAssist has completed saving data. This process may take up to five minutes.
- **10.** When SupportAssist has completed successfully, remove the drive from the controller port and send the SupportAssist data to technical support.

Troubleshooting SupportAssist USB Issues

Follow one of the following procedures to resolve issues sending SupportAssist data to a USB flash drive. Before sending the USB flash drive to SupportAssist, verify that Storage Center successfully wrote SupportAssist data to the drive.

After sending SupportAssist data to the USB flash drive, the drive should contain multiple files.

- 1. Verify that the USB flash drive contains the SupportAssist data.
 - a. Insert the USB flash drive into a computer.
 - **b.** Verify that the drive contains files.

(i) NOTE: The timestamp on the files must match the time that the SupportAssist data was sent.

- 2. If the USB flash drive does not contain new SupportAssist files:
 - a. Verify that the USB flash drive meets the minimum requirements.
 - b. Reformat the USB drive using MSDOS/FAT32 file system.
 - c. Prepare the USB flash drive following the instructions in Prepare the USB Flash Drive.
 - d. Save SupportAssist data to the USB flash drive following the instructions in Save SupportAssist Data to the USB Flash Drive.

Managing SupportAssist Settings

SupportAssist settings can be configured individually for each Storage Center or applied to multiple Storage Centers.

Edit SupportAssist Contact Information

Use the Storage Center settings to edit SupportAssist contact information.

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- In the Summary tab, click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the SupportAssist tab.
- 5. Click Edit Contact Information.
- The Edit Contact Information dialog box opens.
- 6. Enter the name, email, and phone number of the onsite contact in the General area.
- 7. Specify contact preferences in the **Contact Preferences** area.
 - a) Select the **Send me emails from SupportAssist...** checkbox to notify the onsite contact when a support alert is sent to technical support.
 - b) Select a preferred contact method from the Type drop-down menu.
 - c) Select a preferred language for emails from the Email Language drop-down menu.
 - d) Specify the working hours of the onsite contact in the **Time** fields.
 - e) Select the time zone for the onsite contact from the Time Zone drop-down menu.

- 8. Specify the site address in the **Onsite Address** area.
- 9. Click OK.

Configure SupportAssist to Automatically Download Updates

Configure SupportAssist to automatically download updates to the Storage Center.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- Click Summary. The Summary view is displayed.
- In the Summary view, click (Settings). The Storage Center Settings dialog box opens.
- 4. Click the SupportAssist tab.
- 5. In the Server area, select Notify me of updates and automatically download them from the Software Update Mode drop-down menu.
- 6. Click OK.

Configure a Proxy Server for SupportAssist

Use the Storage Center settings to configure a proxy server for SupportAssist.

Steps

- 1. If you are connected to a Data Collector, select a Storage Center from the drop-down list in the left navigation pane of Unisphere Central.
- 2. Click Summary. The Summary view is displayed.
- In the Summary view, click (Settings).
 The Storage Center Settings dialog box opens.
- 4. Click the SupportAssist tab.
- 5. Select the Use Web Proxy checkbox .
- 6. Specify the IP address for the proxy server in the IPv4 Address field.
- 7. Specify the port number for the proxy server in the **Port** field.
- 8. If the proxy server requires authentication, type the user name and password for the proxy server in the User Name and Password fields.
- 9. Click OK.

CloudIQ

CloudIQ provides storage monitoring and proactive service, giving you information tailored to your needs, access to near real-time analytics, and the ability to monitor storage systems from anywhere at any time. CloudIQ simplifies storage monitoring and service by providing:

- · Proactive serviceability that informs you about issues before they impact your environment.
- Centralized monitoring across your environment, using a dashboard that aggregates key information such as system health scores, performance metrics, and current capacity and trends.

CloudIQ requires the following:

- Storage Centers must be running software version 7.3 or later.
- · SupportAssist must be enabled on Storage Center.
- Each Storage Center must be connected to CloudIQ and initialized using the CloudIQ process referred to as onboarding. To onboard a Storage Center, you need the serial number, service tag, and Storage Center software version.

• Each user must be registered with support.emc.com for access to the Dell EMC support portal, which also includes access to CloudIQ.

For more information about CloudIQ, contact technical support or visit the Dell EMC CloudIQ Home Page.

Controlling Data Sent to CloudIQ

When a Storage Center has been onboarded to CloudIQ and SupportAssist is enabled, the **CloudIQ Enabled** option appears in the SupportAssist settings tab and is selected by default. When the **CloudIQ Enabled** checkbox is selected, the Storage Center sends data to CloudIQ more frequently than, and independent of, the SupportAssist schedule. You can remain connected to CloudIQ, but stop sending data by clearing the checkbox.

Steps

- 1. In the Summary tab, click 🌣 (Settings). The Edit Storage Center Settings dialog box opens.
- 2. Click the SupportAssist tab.
- **3.** Select or clear the **CloudIQ Enabled** checkbox.
- 4. Click OK.

i NOTE: It may take up to four hours for changes made to this checkbox to take effect.