

Unisphere and Unisphere Central 2020 R1

Administrator's Guide

Preface

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

Revision History

Table 1. Document Revision History

Revision	Date	Description
A	November 2020	Initial release
B	May 2021	Updated for the release of Storage Center 7.5.1
C	July 2022	Updated for the release of Storage Manager 2020 R1.10

Audience

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

Contacting Dell

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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:

- [Environmental and System Requirements](#)
- [Unisphere Components](#)
- [Default Ports Used by Unisphere Central](#)
- [IPv6 Support](#)
- [Unisphere Features](#)

Environmental and System Requirements

To view the latest environmental and system requirements for Unisphere Central 2020 R1, see the *Storage Manager 2020 R1 Release Notes* on <https://www.dell.com/support>.

Unisphere Web Browser Requirements

Unisphere is supported on the following web browsers:

- Google Chrome
- Internet Explorer 11

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

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

Storage Center OS Compatibility

Unisphere 2020 R1 is compatible with Storage Center version 7.2 and later.

Unisphere Components


Unisphere and Unisphere Central consists of the following components:

Table 2. 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.	<i>Storage Manager Installation Guide</i>
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.	<i>Unisphere and Unisphere Central for SC Series Administrator's Guide</i>
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.	<i>Unisphere and Unisphere Central for SC Series Administrator's Guide</i>
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.	<i>Storage Manager Installation Guide and Storage Manager Administrator's Guide</i>
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.	<i>Storage Manager Administrator's Guide</i>

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.

 **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

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	<ul style="list-style-type: none">• Communication from clients, including the Unisphere Central for SC Series, Unisphere Central, and Dell Storage Replication Adapter (SRA)• Communication with tiebreaker for Automatic Failover• Alerts from FluidFS clusters
3034	TCP	Web Server Port	Receiving vCenter/ESXi communication for VASA and VVol provisioning and administration
8080	TCP	Legacy Web Services Port	Receiving: <ul style="list-style-type: none">• Storage Manager Server Agent communication• Alerts 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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](#) on page 45

Servers


Unisphere allows you to manage the storage that is allocated to servers.

There are two ways to manage servers in Unisphere:

- Add the servers to a Storage Center
- Register Windows and VMware servers with the Storage Manager Data Collector.

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.

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

VVols

Unisphere Central supports the VMware virtual volumes (VVols) framework. VMware administrators use vCenter to create virtual machines and VVols. You must be connected to a Data Collector to use VVols.

When properly configured, you can use Unisphere Central to manage and view VVols, storage containers, datastores, and other aspects of VMware infrastructure.

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](#) on page 269

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](#) on page 262

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](#) on page 45

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](#) on page 49

[Managing Snapshot Profiles](#) on page 88

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](#) on page 102

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](#) on page 274

Storage Center Overview

Storage Center is a storage area network (SAN) that provides centralized, block-level storage that can be accessed by Fibre Channel, iSCSI, or Serial Attached SCSI (SAS).

Topics:

- [Storage Center Hardware Components](#)
- [How Storage Virtualization Works](#)
- [User Interface for Storage Center Management](#)

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 3. HDD Redundancy Recommendations and Requirements



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

Table 4. SSD Redundancy Recommendations and Requirements

Disk Size	Level of Redundancy Recommended or Enforced
Up to 18 TB	Dual redundant is the recommended level  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. During disk optimization, a meter displays the progress in the **Disks** view. 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 or later.

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.

 **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.

 **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

Name	Initial Write Tier	Tier (T) and RAID Levels	Progression
Low Priority (Tier 3)	3	Writes: T3 RAID 10 Snapshots: T3 RAID 5/RAID 6	No

 **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

Name	Initial Write Tier	Tier (T) and RAID Levels	Progression
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. Space-management snapshots are marked as `Created On Demand` and cannot be modified manually or used to create View volumes. Space-management 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 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 Snapshots: T1 RAID 5/6	Between RAID types only
Maximize Performance	1	Writes: T1 RAID 10 Snapshots: T1 RAID 10	No
Maximize Efficiency	1	Writes: T1 RAID 5/6 Snapshots: T1 RAID 5/6	No

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.

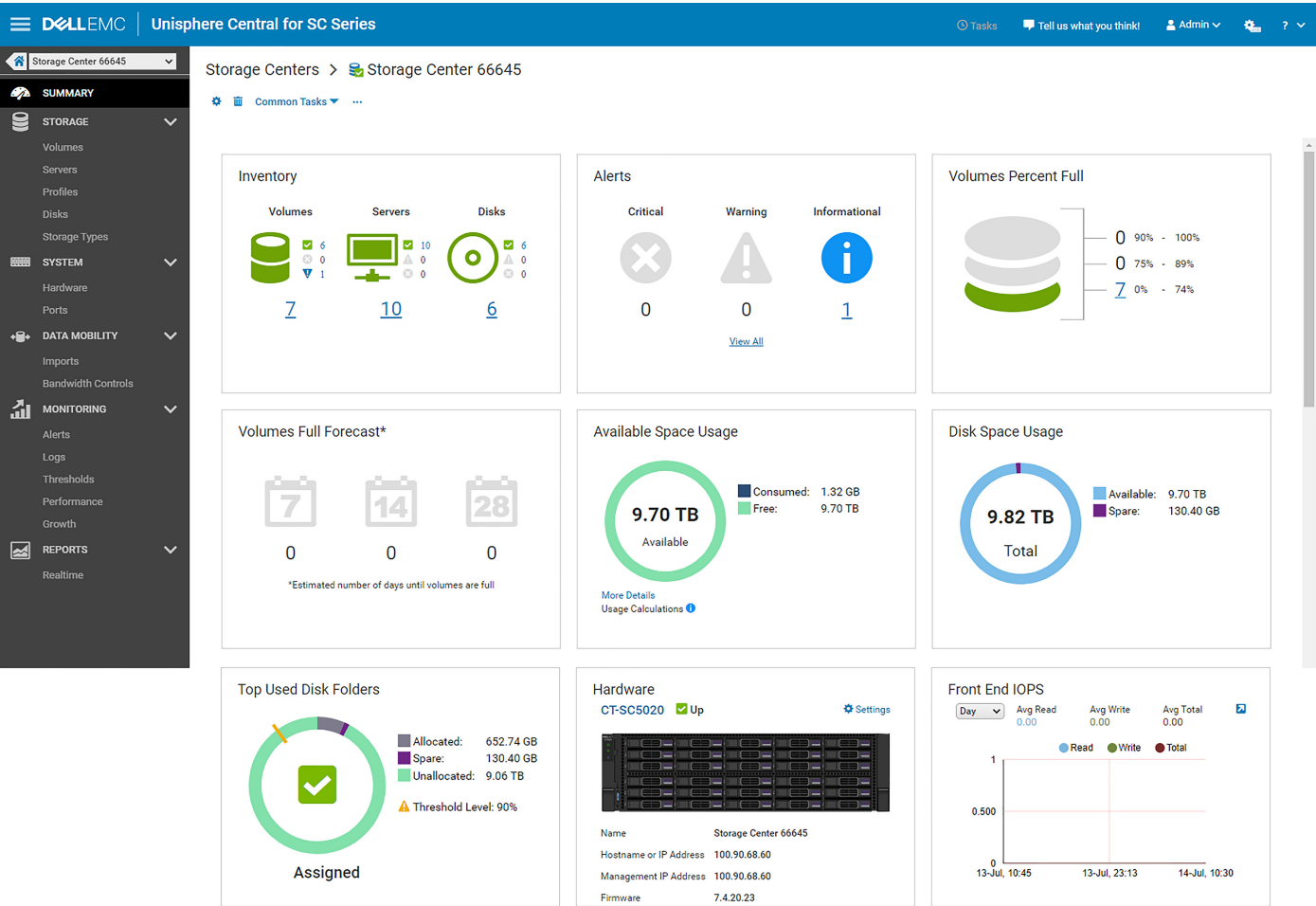


Figure 1. Summary View Dashboard

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.

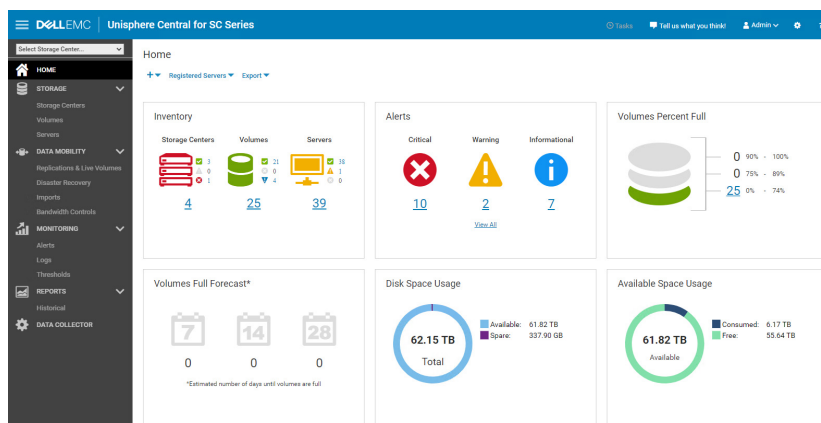


Figure 2. Home Page Dashboard

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.
- **Servers** view - Used to create and manage servers connected to the the Storage Centers managed by the Data Collector.

Data Mobility

The following views are accessible under the Data Mobility menu:

- **Replications & Live Volumes** view – Used to view and create replications and data migrations between Storage Centers managed by the Data Collector. Also used to manage connections to remote Storage Centers.
- **Disaster Recovery** view – Used to view and create disaster recovery options for Storage Centers managed by the Data Collector.
- **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:
 1. Open a web browser.
 2. Type the address of the Data Collector in the browser using the following format:
`https://Data Collector host name or IP address:3033/`

 **NOTE:** The computer accessing the Data Collector must be on the same subnet as the Data Collector.

 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.
 5. 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.
 1. Open a web browser.
 2. 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/`
 3. Type **Admin** in the **User Name** field.
 4. Type **mmm** in the **Password** field.
 5. Click **Log In**.
The web browser connects to the Storage Center and the **Change Password** dialog box is displayed in the Unisphere interface.
 6. Type **mmm** in the **Current Password** field.
 7. Type a new password for the Admin user in the **New Password** and **Confirm New Password** fields.
 8. 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](#) on page 34
- [Welcome to the Storage Center](#) on page 35
- [Configure the Management Network Settings](#) on page 35
- [Set a Password](#) on page 36
- [Confirm the Storage Center Configuration](#) on page 36
- [Complete the Installation](#) on page 36

Connected to the Initialize Storage Center Wizard on the Storage Center



- [Welcome to the Storage Center](#) on page 35
- [Configure the Management Network Settings](#) on page 35
- (SC9000 only) [Create a Disk Folder](#) on page 35

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  (**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  (**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.


 **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.

 **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.

 **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.

 **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](#) on page 36
- [Enter Key Management Server Settings](#) on page 37
- [Create a Storage Type](#) on page 37
- [Select the Types of Ports to Configure](#) on page 37
- [Configure Time Settings](#) on page 39
- [Configure SMTP Server Settings](#) on page 40

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 address 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.
-  **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 **↺ (Regenerate)** to regenerate the Fibre Channel fault domains.
2. 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.
3. 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 **IPv4 Address** 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**.
2. 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](#) on page 40
- [Provide Contact Information](#) on page 40
- [Provide Onsite Address Information](#) on page 41
- [Validate SupportAssist Connection](#) on page 41
- [Update the Storage Center](#) on page 41

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**.

 **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.

Steps

- 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 7.3 and 7.6
- Red Hat Enterprise Linux 7.5, 7.6, and 8.0
- SUSE Linux Enterprise 12 and 15
- 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  (**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  (**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.

 **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.



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.



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

Storage Center provides centralized, block-level storage that can be accessed by Fibre Channel, iSCSI, or SAS connections.

Topics:


- [Adding and Organizing Storage Centers](#)
- [Managing Volumes](#)
- [Migrating Volumes](#)
- [Reset a Controller to Factory Default](#)
- [Run the Space Reclamation Wizard](#)
- [Managing Virtual Volumes With Unisphere Central](#)
- [Managing Storage Containers](#)
- [Managing Data Reduction](#)
- [Managing Snapshot Profiles](#)
- [Managing Storage Profiles](#)
- [Managing QoS Profiles](#)
- [Importing Volumes from an External Storage Array](#)

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 your Unisphere Central user account has the Reporter privilege, you must specify a Storage Center user account that has the Reporter privilege.

 **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](#) on page 321

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.

Adding and Removing Storage Centers

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


 **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.

 **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  **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. 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.
 **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.
4. (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](#) on page 329

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.
2. 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.




 **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.
4. 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.

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

Create a Storage Center Folder

Use folders to group and organize 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. 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.
2. 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.
4. 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.

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, select the Storage Center folder to delete.
4. Click  (**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](#) on page 88

Creating Volumes




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

 **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.
3. 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.
The storage units are Bytes, KB, MB, GB, or TB.
7. In the **Volume Folder** pane, select the parent folder for the volume.
8. (Optional) Configure the remaining volume attributes as needed.
 - **Import To Lowest Tier**—Select this check box to force all data that is written to the volume to the lowest storage tier configured for the volume. Enabling this option decreases performance for the volume.
 **NOTE:** When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles.
 - **Show In Live Migration Recommendation**—Select this check box to add the volume to the list volumes available for Live Migration.
 - **Server**—Select a server to which to map the volume.
 - **Advanced Mapping**—When a server is selected, click **Advanced Mapping** to configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only.
 - **Preallocate Storage**—When a server is selected, select the **Preallocate Storage** check box to allocate storage to the volume before the volume is mapped to the server.
 **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.
 - **Snapshot**—Click **Change** to select snapshot profiles for the volume.
The following **GoS Profiles & Tiering** options are available only if they are enabled in the Storage Center Settings dialog box:
 - **Storage Profile**—Select the storage profile to assign to the volume. Selecting the **Recommended (All Tiers)** storage profile allows the volume to take full advantage of data progression.
 - **Storage Type**—Select the storage type to assign to the volume.
 - **Volume QoS Profile**—Select the volume QoS profile to assign to the volume.
 - **Group QoS Profile**—Select the group QoS profile to assign to the volume.




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

 - Select **Compression** to enable data compression and reduce disk space usage.
 - Select **Deduplication with Compression** to apply deduplication and compression to new volumes.
 **NOTE:** The data compression setting is 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.
3. 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.
The storage units are Bytes, KB, MB, GB, or TB.
7. In the **Volume Folder** pane, select the parent folder for the volumes.
8. (Optional) Configure the remaining volume attributes as needed.
 - **Import To Lowest Tier**—Select this check box to force all data that is written to the volume to the lowest storage tier configured for the volume. Enabling this option decreases performance for the volume.
 **NOTE:** When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles.
 - **Show In Live Migration Recommendation**—Select this check box to add the volume to the list volumes available for Live Migration.
 - **Server**—Select a server to which to map the volume.
 - **Advanced Mapping**—When a server is selected, click **Advanced Mapping** to configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only.
 - **Preallocate Storage**—When a server is selected, select the **Preallocate Storage** check box to allocate storage to the volume before the volume is mapped to the server.
 **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.
 - **Snapshot**—Click **Change** to select snapshot profiles for the volume.

The following **QoS Profiles & Tiering** options are available only if they are enabled in the Storage Center Settings dialog box:


 - **Storage Profile**—Select the storage profile to assign to the volume. Selecting the **Recommended (All Tiers)** storage profile allows the volume to take full advantage of data progression.
 - **Storage Type**—Select the storage type to assign to the volume.
 - **Volume QoS Profile**—Select the volume QoS profile to assign to the volume.
 - **Group QoS Profile**—Select the group QoS profile to assign to the volume.

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

 - Select **Compression** to enable data compression and reduce disk space usage.
 - Select **Deduplication with Compression** to apply deduplication and compression to new volumes.
 **NOTE:** The data compression setting is 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**.

Modifying Volumes



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

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

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.
4. 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.


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 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**.

 **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** check box.
For volumes using SSD storage, test applications before enabling or disabling read cache.
 - Select or clear the **Write Cache** check box.
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.

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. 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.
4. 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.

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.
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**.

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.



Prerequisites

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

About this task

When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles. After the import is complete, clear the **Import To Lowest Tier** check box to avoid potential performance degradation caused by writing to the lowest tier of drives. New writes from a host to the volume will follow the Storage Profile for the volume after the **Import To Lowest Tier** check box is cleared.



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. Select the **Import to lowest tier** checkbox.
6. Click **OK**.

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.
4. 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. Click **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.

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  **(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.
4. 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.

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 **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](#) on page 49

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](#) on page 49


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.
2. From the  **STORAGE** menu, click **Volumes**.
The **Volumes** view is displayed.
3. 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.

 **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

 **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.
3. 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.
4. 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.

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 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.

 **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.



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.
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.
 - **Name**—Type a new name for the volume.
 - **Volume Folder**—Select a parent folder for the volume.
 - **Import To Lowest Tier**—Select this check box to force all data that is written to the volume to the lowest storage tier configured for the volume. Enabling this option decreases performance for the volume.
 **NOTE:** When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles.
 - **Show In Live Migration Recommendation**—Select this check box to add the volume to the list volumes available for Live Migration.
 - **Server**—Select a server to which to map the volume.
 - **Advanced Mapping**—When a server is selected, click **Advanced Mapping** to configure LUN settings, restrict mapping paths, or present the volume as read-only.
 - **Snapshot**—Click **Change** to select snapshot profiles for the volume.
 - **Group QoS Profile**—Click **Change** to select the group QoS profile to assign to the volume.
 - **Volume QoS Profile**—Select the Volume QoS profile to assign to the volume.
 - **Group QoS Profile**—Select the Group QoS profile to assign to the volume.
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.
4. 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.
4. Click  **(Edit)**.
The **Edit Volume** dialog box opens.
5. 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](#) on page 88

Mapping Volumes to Servers


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

 **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.


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. 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.


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 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.
4. 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 change the parent folder for the volume, select a folder in the **Volume Folder** pane.
 - To display this volume as available for Live Migrations, select **Show In Live Migration Recommendation**.
 - To map the volume to a server, select a server from the list.
 - 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.



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.
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.
5. 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.
5. 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.


 **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.

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 to delete.

4. Click  (**Delete**).

The **Delete Folder** dialog box opens.

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



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**.
4. 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.

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 delete.

4. Click  (**Delete**).
The **Delete Folder** dialog box opens.
5. Click **OK** to delete the folder.

Migrating Volumes



Volumes can be moved to other volumes and to other Storage Centers. The three options for migrating volumes are:

- Migrate to a new volume.
- Migrate to another Storage Center using **Live Migrate**.
- Migrate to another Storage Center using a **One Time Copy**.

Migrate a Volume

Migrating a volume copies a source volume with its server-to-volume mappings to a destination volume. After migrating the volume, the destination volume is mapped to all servers previously mapped to the source 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. On the **Volumes** view, select the volume you want to copy.
4. Click  (**More Actions**) and select **Migrate Volume**.
The **Migrate 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) Click **Copy Snapshots** to also copy the snapshots from the source volume.
7. From the **Priority** drop-down menu, select a priority level for the copy operation.
8. (Optional) Select a post-migrate action.
 - **Do Nothing** – Migrates the volume without any post-migration actions
 - **Delete Source** – Deletes the source volume after migrating
 - **Reverse Mirror** – Mirrors the destination volume to the source volume
9. (Optional) Select **Schedule Start Time** to set a time for the copy to be created.
10. Click **OK**.

Migrating Volumes With Live Migrate

Live Migration moves a volume from one Storage Center to another Storage Center with no down time.

Live Migration Requirements

To create Live Migrations, the requirements listed in the following table must be met:

Requirement	Description
Storage Center version	The source and destination Storage Centers must be running version 7.1 or later.  NOTE: Dell recommends that both Storage Centers run the same version of Storage Center software.
Storage Center license	No additional license is necessary.

Requirement	Description
Unisphere Central configuration	The source and destination Storage Centers must be added to Unisphere Central.
Storage Center communication	<p>The source and destination Storage Centers must be connected using Fibre Channel or iSCSI, and each Storage Center must be defined on the other Storage Center.</p> <ul style="list-style-type: none"> On the source Storage Center, the destination Storage Center must be defined as a remote Storage Center. On the destination Storage Center, the source Storage Center must be defined as a remote Storage Center.
Replication bandwidth controls	Replication Bandwidth Controls must be defined on the source Storage Center.
Server	<ul style="list-style-type: none"> The source and destination Storage Centers must be mapped to a server. MPIO must be enabled on the destination server to prevent I/O interruption during a Live Migration.

Live Migration Roles

Live Migrations have two roles: source and destination. These roles determine the active volume that is servicing I/O. The roles can be swapped one time, either automatically or manually.

In the following examples, the server sends an I/O request that modifies the source volume. The changes to the source volume are replicated to the destination Storage Center over Fibre Channel or iSCSI.

Before Live Migration

Before a Live Migration, the server sends I/O requests only to the volume to be migrated.

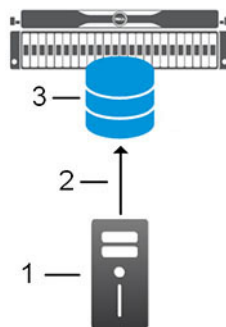


Figure 3. Example of Configuration Before Live Migration

1. Server
2. Server I/O request to volume over Fibre Channel or iSCSI
3. Volume to be migrated

Live Migration Before Swap Role

In the following diagram, the source Storage Center is on the left and the destination Storage Center is on the right.

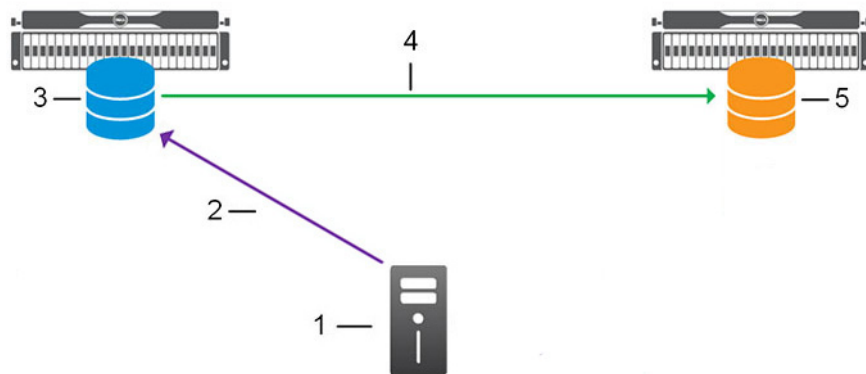


Figure 4. Example of Live Migration Configuration Before Swap Role

1. Server
2. Server I/O request to destination volume (forwarded to source Storage Center by destination Storage Center)
3. Source volume
4. Replication over Fibre Channel or iSCSI
5. Destination volume

Live Migration After Swap Role

In the following diagram, a role swap has occurred. The destination Storage Center is on the left and the new source Storage Center is on the right.

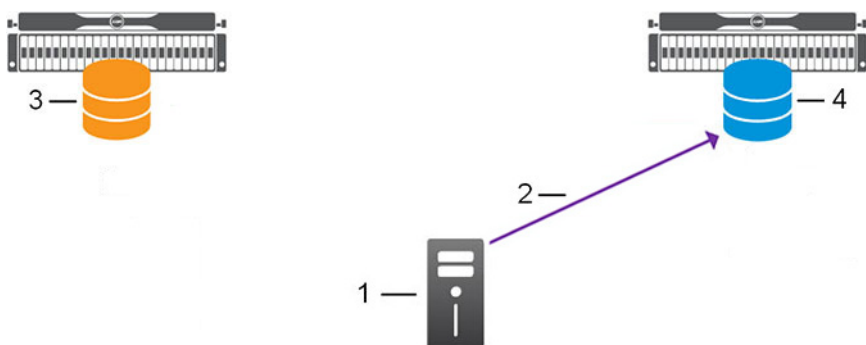


Figure 5. Example of Live Migration Configuration After Swap Role

1. Server
2. Server I/O request to destination volume (forwarded to source Storage Center by destination Storage Center)
3. Destination volume
4. New source volume

Live Migration After Complete

In the following diagram, the Live Migration is complete. The server sends I/O requests only to the migrated volume.




Figure 6. Example of Live Migration Configuration After Complete

- | | |
|--------------------|--|
| 1. Server | 2. Old destination volume |
| 3. Migrated volume | 4. Server I/O request to migrated volume over Fibre Channel or iSCSI |

Creating a Live Migration

Create a Live Migration to move a volume to another Storage Center without any down time.

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


Create a New Live Migration




Use Live Migration to move one or more volumes from one Storage Center to another Storage Center with limited or no downtime.

Prerequisites

- The volume or volumes to migrate must be mapped to a server.
- The volume or volumes cannot be part of a replication, Live Volume, or Live Migration.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Migrations** tab.
4. In the **Migrations** view, click  **(New)** and select **New Live Migration**.
The **New Live Migration** wizard opens.
5. On the **Select Source Storage Center** page, select the Storage Center that contains volume or volumes to migrate and click **Next**.
6. On the **Select Source Volume** page, select the volume or volumes to migrate and click **Next**.
7. On the **Select Target Storage Center** page, select the Storage Center to which you want to replicate the volume and click **Next**.
If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.

8. On the **Select Target Volume** page, set the volume attributes as needed. For information about the settings click Help.
9. On the **Select Target Volume Server Mapping** page, select the server to which the target volume is mapped.
10. Review and adjust the **Advanced Mapping** settings as needed and click **Next**.
11. On the **Settings** page, select the Live Migration settings.
 - In the **Transport and Transfer Attributes** area, select the transport type.
 - In the **Replication Attributes** area, configure options that determine how replication behaves.
 - In the **Live Migration Attributes** area, enable or disable automatic role swap. When automatic role swap is enabled, Live Migrate swaps the roles immediately after the volume is synced. When it is disabled, you may swap the roles manually before completing the migration when the volume is ready to be swapped.
12. Click **Next**.
13. On the **Summary** page, review the Live Migration settings summary.
 - Click **Finish** to create the Live Migration and close the wizard.
 - Click **Back** to change your settings.

Next steps

Complete a Live Migration.


Create a Live Migration from a Volume



Use this procedure to create a Live Migration directly from an existing volume.

Prerequisites

- The volume or volumes to migrate must be mapped to a server.
- The volume or volumes cannot be part of a replication, Live Volume, or Live Migration.

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 **Volumes**.
The **Volumes** view is displayed.
3. Select the volume to migrate.
4. Click **... (More Actions)** and select **Live Migrate**.
The **New Live Migration** wizard opens.
5. On the **Select Target Storage Center** page, select the Storage Center to which you want to replicate the volume and click **Next**.
If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.
6. On the **Select Target Volume** page, set the volume attributes as needed. For information about the settings click Help.
7. On the **Select Target Volume Server Mapping** page, select the server to which the target volume is mapped.
8. Review and adjust the **Advanced Mapping** settings as needed and click **Next**.
9. On the **Settings** page, select the Live Migration settings.
 - In the **Transport and Transfer Attributes** area, select the transport type.
 - In the **Replication Attributes** area, configure options that determine how replication behaves.
 - In the **Live Migration Attributes** area, enable or disable automatic role swap. When automatic role swap is enabled, Live Migrate swaps the roles immediately after the volume is synced. When it is disabled, you may swap the roles manually before completing the migration when the volume is ready to be swapped.
10. Click **Next**.
11. On the **Summary** page, review the Live Migration settings summary.
 - Click **Finish** to create the Live Migration and close the wizard.
 - Click **Back** to change your settings.

Next steps

Complete a Live Migration.



Complete a Live Migration

Complete a Live Migration to stop server I/O requests to the source Storage Center and send all I/O requests only to the new destination Storage Center. You can complete a single Live Migration or multiple Live Migrations at one time.

Prerequisites

- A rescan for volumes, or rescan for disks has been performed on the destination server.
- The Live Migration must be in the **Ready to be Completed** state.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Select the Live Migration or Migrations to complete and click **Complete Live Migration**.
The **Complete Live Migration** dialog box opens.
5. Review the information in the dialog box and ensure that a rescan for volumes on the destination server has been performed.
6. Select **I confirm that rescan for disks on destination servers is completed**.
7. Click **OK**.
The Live Migration finishes. The server stops sending I/O requests to the volume on the old source Storage Center and the Live Migration is removed from the **Live Migrations** tab. The old source volume receives a new device ID and all mappings are removed.

Modifying Live Migrations

Modify a Live Migration if you want to swap the source Storage Center, change Live Migration properties, or delete the Live Migration.



Swap a Source Volume for the Live Migration Volume

If you did not elect to swap roles automatically, you must swap roles before completing a Live Migration.

Prerequisites

The Live Migration must be in the **Ready to Be Swapped** state.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Click the Live Migration to review.
5. Click **... (More Actions)** and select **Swap Source Storage Center**.
6. Click **OK**.




Enable or Disable Deduplication for a Live Migration

Deduplication reduces the amount of data transferred and enhances the storage efficiency of the remote Storage Center. Deduplication copies only the changed portions of the snapshot history on the source volume, rather than all data captured in each snapshot.

Prerequisites

The Live Migration must be in either the **Syncing** or **Ready to Be Swapped** state.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Select the Live Migration to change and click  (**Edit**).
The **Edit Live Migration** dialog box opens.
5. Select or clear the **Replication Deduplication** check box.
6. Click **OK**.




Change the Replication Bandwidth for a Live Migration

Select a different replication bandwidth to change how the Live Migration uses bandwidth.

Prerequisites

The Live Migration must be in either the **Syncing** or **Ready to Be Swapped** state.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Select the Live Migration to change and click  (**Edit**).
The **Edit Live Migration** dialog box opens.
5. Select a new bandwidth from the **Replication Bandwidth Control** list.
6. Click **OK**.

Delete a live Migration


Use the Live Migrations view to delete a Live Migration when the source and destination Storage Center have not been swapped.

Prerequisites




The Live Migration must be in one of the following states:

- Syncing
- Ready to be swapped
- Error

About this task

 **NOTE:** Delete a Live Migration only when both the source and destination Storage Centers show their status as Up.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Select the Live Migration to delete and click  (**Delete**).
The **Delete** dialog box opens.
5. Click **OK** to delete the Live Migration.





Viewing Live Migration Information

Use the Live Migration view to review Live Migration summary information, snapshot information, and access the source and target volumes. The Live Migration view is available until the Live Migration is complete.

View a Live Migration Summary

Use the Live Migration view to see summary information about the Live Migration.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Click the Live Migration to review.
The **Live Migration** view opens with the **Summary** tab visible.
 - If the **Live Migration** has not yet been completed, you can select **Complete Live Migration** to finish the migration.
 - If the Live Migration is not set up to automatically swap roles after synchronizing, you can either manually swap roles or change the automatic swap setting:
 - Click  (**More Actions**) and select **Swap Source Storage Center**.
 - Click  (**Edit**) to open the **Edit Live Migration Dialog** box and change the setting.

View Live Migration Source or Target Volume Information

Use the Live Migration view to review information about the source or target volume.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Click the Live Migration to review.
The **Live Migration** view opens.
5. Click the source or target volume to open the **Volume** view.

6. In the **Volume** view, click the Live Migration in the **Replications & Live Volumes** area to return to the **Live Migration** view.

View Live Migration Snapshots

Use the Live Migration view to review information about the source and target volume Snapshots.


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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Migrations** tab.
The **Migrations** view is displayed.
4. Click the Live Migration to review.
The **Live Migration** view opens.
5. Click the **Snapshots** tab.

Migrate a Volume Using One Time Copy

Use **One Time Copy** to move data in a volume from one Storage Center to another. **One Time Copy** is available only on volumes that are not mapped to servers.

About this task

 **NOTE:** An SCv2000 series storage system running Storage Center 7.3 or later and all other storage systems running Storage Center 7.1 or later can move a volume to another Storage Center using the Live Migration feature.

Steps

1. Create a snapshot for the volume you want to migrate.
2. In the **Snapshots** tab for the volume, select the snapshot and click **Create Volume From Snapshot**.
A view volume is created.
3. In the Summary tab for the view volume, click **... (More Actions)** and select **Create One Time Copy**.
The **New One Time Copy** dialog box opens.
4. On the **Select Target Storage Center** page, select the Storage Center on which you want to copy the volume and click **Next**.
5. On the **Select Target Volume** page, select whether to **Create a New Volume** or **Use an Existing Volume**.
 - If using an existing volume, select the destination volume.
 - If creating a new volume, set the volume attributes as needed. For information about the settings click Help.
6. On the **Settings** page, set the **Transport and Transfer Attributes** and the **Replication Attributes** and click **Next**. For information about the settings click Help.
7. On the **Summary** page, review the settings summary.
 - Click **Finish** to create the one-time copy and close the wizard.
 - Click **Back** to change your settings.

Related concepts

[Replication Requirements](#) on page 217


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.
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.



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.
2. 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**.
 **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**.

10. 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 Virtual Volumes With Unisphere Central

VVols is VMware's storage management and integration framework, which is designed to deliver a more efficient operational model for attached storage. This framework encapsulates the files that make up a virtual machine (VM) and natively stores them as objects on an array.

The VVols architecture enables granular storage capabilities to be advertised by the underlying storage. Storage containers, which define the available storage capabilities, can be created for vSphere Storage Policy-Based Management.

Configuring VVols in Unisphere Central

VMware vSphere 6 or later is required to run VVols in a storage environment with Unisphere Central.

Requirements and Recommendations for Configuring VVols in Unisphere Central

The following requirements and recommendations apply to setting up Unisphere Central to use VVols:

- Unisphere Central must be used on a clustered hypervisor of choice with high-availability (HA) enabled.
- Fault Tolerance is recommended.
- VVols is supported with the iSCSI and Fibre Channel interfaces only. FCoE and front end SAS are not supported for VVols.
- The network card must support the Secondary LUNID feature. For more information, search for I/O Devices with the Secondary LUNID in the *VMware Compatibility Guide*, available from <http://www.vmware.com/resources/compatibility/search.php>.

Safeguarding VVols Data

A critical component of the total VVols solution is the VM metadata. VMware's ESXi reads and writes this metadata to each VVol during control plane operations, such as power-on, power-off, and snapshots.

The Data Collector stores the VVols metadata written by the VASA provider in a database.

During Data Collector deployment (installation or migration) and during VASA provider registration, the production user is reminded to use an external database.

Use of the internal database is a consideration for lab deployments only. Depending upon the protection model used in deployment, failure to use the external database could result in the loss of some or all VVols metadata when the Data Collector is uninstalled or deleted. Use of the external database negates this risk during uninstall or delete.

The external database is expected to be deployed in a highly available manner including redundant switching connectivity.

Lab Experimentation Use of VVols

In a preproduction lab environment, a user could experiment with VVols and choose to purge all data on the array and restart with the intention of redeploying another VVols lab environment for experimentation purposes.

The proper steps for purging data in a LAB environment only are:

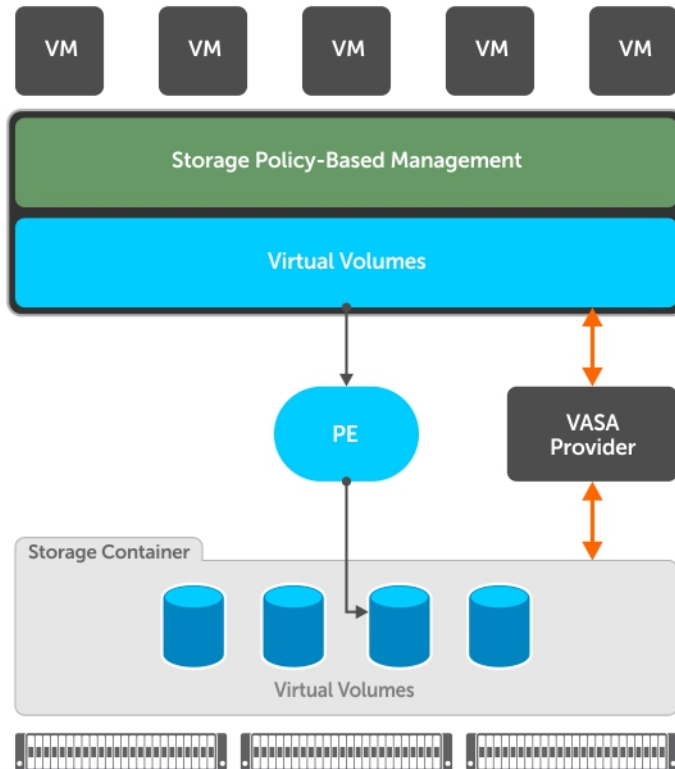
1. Using VMware vCenter — Delete all respective VVols VMs
2. Using Storage Center—Perform Purge

In the event the order is reversed, VVols metadata remains in the database even if the Data Collector is uninstalled. This metadata must be deleted to ensure a robust operating environment if a new lab environment is to be set up to use VVols. Failure to do so results in failures to some VVols VM operations to reference incorrect metadata.

If the order is reversed, contact technical support to work through the purge process.

VMware Virtual Volume Concepts

The following figure shows the virtual volumes (VVols) model defined by VMware.



The VVol framework introduces these components:

- VASA provider — A VASA provider (VP) is a software component that acts as a storage awareness service for vSphere. Storage vendors develop VASA providers to work with their specific storage arrays.
- Protocol endpoint (PE) — A protocol endpoint is the connection used for VVol storage, and the means by which you can access VVol storage containers. The protocol endpoint is also where access controls are placed and initiators are queried to ensure that they are permitted access to the storage containers and virtual volumes. Protocol endpoints are created and presented by Unisphere Central when a VMware ESXi 6.0 server type is created in Unisphere Central.

vSphere recognizes them as protocol endpoints after the VASA provider is registered and a Storage Container is created using Unisphere Central.

- Storage container — A storage container is a quantity of storage made available for the placement of virtual volumes-based VMs. Each array has at least one storage container. Each storage container has one or more protocol endpoints associated with it.

NOTE: Storage containers are not supported outside of the virtual volumes context.

You must use Unisphere Central (connected to a Data Collector) to create storage containers.

Setting Up VVols Operations on Unisphere Central

To set up and run operations for virtual volumes (VVols) in Unisphere Central, you must:

- Register VMware vCenter Server in Unisphere Central.
- Register VMware vCenter Server in Storage Center either by using **Auto manage Storage Center** option in Unisphere Central or by manually adding vCenter server in Storage Center.
- Register the VASA provider on a vCenter server
- Create storage containers that are used to store the VVols objects created by the vCenter administrator

- Use Unisphere Central to create datastores of type **VVOL**, which are mapped to the storage containers on the array using Unisphere Central
- Use vCenter to create VVol-backed VMs

Unisphere Central provides **Summary** and **Storage** views that provide information about storage containers, datastores, VVols, and protocol endpoints. These objects are managed using Unisphere Central. Protocol endpoints are created automatically by Unisphere Central and cannot be modified in any way.

Virtual Volumes Restrictions

Volume operations on virtual volumes (VVols) are restricted to specific operations.

Storage administrators use Unisphere Central to create storage container-backed vSphere datastores, also known as datastores of type **VVOL**. From within the vSphere web client these VVol datastores look no different from VMFS or NFS datastores. However, virtual machines stored within or on these VVol datastores are stored as virtual volumes on the array, organized within the storage container. Many of the same operations that can be performed again on traditional volumes can be performed against virtual volumes.

These volume operations are supported for VVols:

- Show
- Create Snapshot
- Set Snapshot Profiles
- Set Threshold Definitions

These volume operations are not supported for VVols:

- Edit Name
- Edit Properties
- Map Volume to Server
- Expand Volume
- Delete
- Migrate
- Copy
- Mirror
- Replicate

Thick provisioning is not supported for operations such as creating or cloning a VVol VM. Only thin provisioning is supported.

VASA Provider

The VASA provider enables support for VMware VVols operations.

A VASA provider is a software interface between the vSphere vCenter server and vendor storage arrays. Dell provides its own VASA provider that enables vCenter to work with Dell storage. This VASA provider supports the VMware VASA 2.0 API specifications.

When the VASA provider is registered, vCenter can be used to create and manage VVols on the Storage Center.

You must configure the VASA provider if you intend to use VVols in your environment.

VASA Provider Restrictions

The following restrictions apply to the VASA provider:


- The Unisphere Central VASA provider can be registered to only one vCenter Server.
- All ESXi and vCenter Server requests to the VASA provider are mapped to a single Unisphere Central user.
- The VASA provider does not support user-defined storage profiles. Only default system-defined storage profiles can be used in VM Storage Policies.

Register the VASA Provider

You can register the VASA provider on a vCenter server, and manage it from the **Servers** view of Storage Center.

Register the VASA provider using one of the following methods:

- When initially registering a vCenter Server in the Unisphere Central client, select the **Register VASA Provider** check box.
- For a vCenter Server that is already registered in the Unisphere Central client, select **Edit Settings** and then select the **Register VASA Provider** check box.

 **NOTE:** After a software update, the follow error might occur:

```
Error registering VASA provider: Error running VMware method  
[Method: RegisterVasaProvider] [Message: The VASA provider did not  
respond]
```

Follow these steps to fix the error and register the VASA provider:

1. Open the file `:msaservice\plugins\module_manager\product-metadata.json`.
2. Change the VASA status to `deploy`.
3. Restart the Data Collector.

Unregister a VASA Provider

Unregister a VASA provider to remove it from vCenter.

Prerequisites

 **CAUTION:** The VASA provider must be unregistered before you initiate any of these tasks:

- Any action related to uninstallation, migration, upgrade, reinstalling of Unisphere Central on same host with same IP address
- Uninstalling Unisphere Central with the intention of reinstalling on another host
- Changing the Unisphere Central FQDN
- Changing the Unisphere Central IP address

Unregistering VASA will affects control plane operations on virtual volume VMs and datastores which are in use. It does not affect data transfer between an ESXi host and the respective SAN storage.

Unregistering the VASA provider results in powered-off VVol VMs being shown as inaccessible and datastores as inactive. To avoid prolonged control plane down time, minimize the period where the VASA provider remains unregistered. After re-reregistration, there could be a delay for powered-off VMs and datastores to recover from being inaccessible and inactive respectively.

Steps

1. Click the **Servers** view.
2. Select the **Servers** folder in the **Servers** pane.
3. Right-click the icon for the vCenter Server, and select **Edit Settings**.
The **Edit VMware vCenter Server Settings** dialog box opens.
4. Click **Unregister VASA Provider**.
5. Click **OK**.

Using Unisphere Central Certificates With VASA Provider

When you run the **Register VASA Provider** wizard, the URL of the VASA provider is automatically generated. This URL identifies the host on which the Data Collector is installed. The host is identified as either an IP address or fully qualified domain name (FQDN). Depending on how you installed or upgraded Unisphere Central or if you changed the host for the Data Collector, you might need to take additional steps to update the certificates.

New Installation of Dell Unisphere Central

If Unisphere Central is registered with a name lookup service such as DNS server or Active Directory server, Unisphere Central certificates are generated based on its FQDN. Any IP address changes do not affect certificates. If you change the FQDN, Unisphere Central must be manually restarted if it is a Windows-based installation. It is automatically rebooted for the Virtual Appliance installation. If you were using the VASA provider before the IP changes, you must unregister and then register VASA Provider manually.

Upgrade of Dell Unisphere Central

In Dell Unisphere Central, certificates are based on IP addresses. After an upgrade to Dell Unisphere Central, the existing certificates remain unchanged. If you need to modify the IP address of the host, the certificates need to be updated as described in the following table:

IP Change	Action Required
IP changes on Windows-based Unisphere Central	If Unisphere Central is not registered with a name lookup service such as DNS server or Active Directory, then Unisphere Central and VASA certificates are based on the IP address of the Windows host. Before the IP address of the Windows host is changed, you must first unregister the VASA Provider. Then modify the IP address of the Windows host. Then manually restart Unisphere Central to regenerate certificates based on the new IP address. After the restart, you must re-register the VASA Provider.
IP changes on the Virtual Appliance	On a Dell Unisphere Central Virtual Appliance, network changes such as IP address happen through the Unisphere Central and hence Unisphere Central is aware of the changes. You must first unregister and the VASA Provider, then make the changes to the IP address. After the changes are done, Unisphere Central restarts itself to regenerate certificates based on the new IP address. You then must re-register the VASA Provider.
Switch from an IP Address to an FQDN on Dell Unisphere Central	To switch the certificates to use the FQDN instead of the IP address of the host, you must first unregister and the VASA Provider. Then register the Unisphere Central host with a name lookup service. Then configure the networking properties on the host. Then follow the Dell Unisphere Central procedure for deleting existing certificates and restart the Unisphere Central. After the restart, re-register the VASA Provider.
FQDN changes on Windows or Virtual Appliance	If certificates are already using FQDN and you want to change the FQDN, unregister VASA Provider first. Then make changes to the name lookup service or Unisphere Central host (or both) for the new FQDN. Then follow the old procedure for deleting certificates and restart Storage Manager. Re-register VASA Provider after Unisphere Central is running. NOTE: Failure to unregister the VASA Provider before making changes in name lookup service results in initialization errors on vCenter for certain services and causes VASA registration to fail.
Switching from FQDN to IP Address on Dell Unisphere Central	If you want to stop using FQDN and go back to using IP addresses, unregister the VASA Provider first. Then make changes to the name lookup service or Unisphere Central host (or both) to remove FQDN configuration. Restart Unisphere Central for the changes to take effect and register VASA Provider again. NOTE: Failure to unregister the VASA Provider before making changes in name lookup service results in initialization errors on vCenter for certain services and causes VASA registration to fail.

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 the Unisphere Central for SC Series.


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

 **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.
3. 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.

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 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

 **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.
4. Click  (**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.
4. 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.

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  **(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](#) on page 49

[Modifying Volumes](#) on page 52

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

 **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.
4. 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.
3. 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.
2. 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.

 **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.
4. 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

 **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.


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 **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. <ul style="list-style-type: none">• SC8000, SC9000, SC7020, and SC7020F: 100• SC5020 and SC5020F: 50	No limit to the number of volumes to which the snapshot profile is attached

Consistent Snapshot Profile	Non-Consistent Snapshot Profile
<ul style="list-style-type: none"> SC4020: 40 SCv2000 and SCv3000 series: 25 	
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.

 **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**.
4. Click  **New** 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.


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 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.

 **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.

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

Rename a Snapshot Profile

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





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 rename in the Snapshot section.
5. 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.
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.
5. 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  **(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.



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 modify in the Snapshot section.
5. 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.
2. 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.
6. 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.


 **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.
5. 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.

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 the **Remote Expiration Rules** subtab.
5. 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.

 **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

 **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.
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 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

 **NOTE:** SCv2000 series storage systems 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.
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 .
5. 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 .
5. 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.
5. 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 **QoS Profiles**.
4. In the **Qos Profiles** 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 in 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.
2. 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.
5. 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.
2. 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  (**Delete**).


Apply a QoS Profile to a Volume

Apply a previously defined QoS profile to a volume.

Prerequisites

The QoS profile must already exist.


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. 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, use Unisphere 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
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

 **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

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


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. 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.

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 **Restart External Device Import**.
A confirmation dialog box is displayed.
5. Click **Yes**.

Storage Center Server Administration

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 Registered Servers](#)

Managing Servers on a Storage Center

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

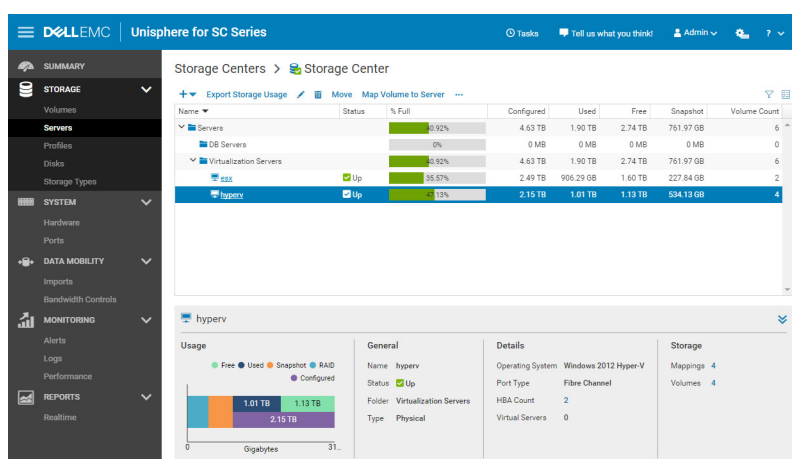


Figure 7. Unisphere Servers View

NOTE: Server Agent features are not supported in Unisphere.

Related concepts

[Creating Servers](#) on page 102

[Modifying Servers](#) on page 105

[Mapping Volumes to Servers](#) on page 108

[Creating and Managing Server Folders](#) on page 111

[Deleting Servers and Server Folders](#) on page 112

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.


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.
4. 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.

 **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 \(Fibre Channel and SAS\)](#) on page 164

[Configure Front-End I/O Ports \(iSCSI\)](#) on page 164


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.

5. Click **+▼ (New)** and select **New Virtual Server**.

The **New Virtual Server** dialog box opens.

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 \(Fibre Channel and SAS\)](#) on page 164

[Configure Front-End I/O Ports \(iSCSI\)](#) on page 164

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.


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. 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.


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 **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.
4. 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.
2. 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.


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 virtual server to convert to a physical server.
4. 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.
5. 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.

 **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 \(Fibre Channel and SAS\)](#) on page 164

[Configure Front-End I/O Ports \(iSCSI\)](#) on page 164

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.
4. 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.
4. 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.

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 which to map a new volume.
4. 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 storage units are Bytes, KB, MB, GB, or 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 **Import to Lowest Tier**.
 **NOTE:** When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles.
10. To display this volume as available for Live Migrations, select **Show In Live Migration Recommendation**.
11. (Optional) Configure the remaining volume attributes as needed.
 - **Server**—Select a server to which to map the volume.
 - **Advanced Mapping**—Click **Advanced Mapping** to configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only.
 - **Preallocate Storage**—Select the **Preallocate Storage** checkbox to allocate storage to the volume before the volume is mapped to the server.
 **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.
 - **Snapshot Profiles**—Click **Change** to select snapshot profiles for the volume.
 - **Pause Snapshot Creation**—Select this checkbox to prevent snapshots from being created of the volume.
 - **Pause Snapshot Expiration**—Select this chec box to temporarily stop snapshot expiration for the volume.
 - **Allow Snapshots to coalesce into active Snapshot**—Select this checkbox to allow space management snapshots to be combined into the next scheduled or manual snapshot.
 - **Storage Profile**—Select the storage profile to assign to the volume. Selecting the **Recommended (All Tiers)** storage profile allows the volume to take full advantage of data progression.
 - **Storage Type**—Select the storage type to assign to the volume.
 - **Volume QoS Profile**—Select the volume QoS profile to assign to the volume.
 - **Group QoS Profile**—Select the group QoS profile to assign to the volume.
 - **Data Reduction Profile**—Select **Compression** or **Deduplication with Compression** as the data reduction profile for the volume. **None** is selected by default.
12. Click **OK**.




Related concepts

[Modifying Volumes](#) on page 52

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.

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 which to map new volumes.
4. 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 storage units are Bytes, KB, MB, GB, or 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 **Import to Lowest Tier**.
 **NOTE:** When the **Import To Lowest Tier** check box is selected, snapshots are no longer automatically created, snapshot profiles cannot be edited, and the volume does not adhere to storage profiles.
10. To display this volume as available for Live Migrations, select **Show In Live Migration Recommendation**.
11. (Optional) Configure the remaining volume attributes as needed.
 - **Server**—Select a server to which to map the volume.
 - **Advanced Mapping**—Click **Advanced Mapping** to configure LUN settings, restrict mapping paths, configure multipathing, or present the volume as read-only.
 - **Preallocate Storage**—Select the **Preallocate Storage** checkbox to allocate storage to the volume before the volume is mapped to the server.
 **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.
 - **Snapshot Profiles**—Click **Change** to select snapshot profiles for the volume.
 - **Pause Snapshot Creation**—Select this checkbox to prevent snapshots from being created of the volume.
 - **Pause Snapshot Expiration**—Select this chec box to temporarily stop snapshot expiration for the volume.
 - **Allow Snapshots to coalesce into active Snapshot**—Select this checkbox to allow space management snapshots to be combined into the next scheduled or manual snapshot.
 - **Storage Profile**—Select the storage profile to assign to the volume. Selecting the **Recommended (All Tiers)** storage profile allows the volume to take full advantage of data progression.
 - **Storage Type**—Select the storage type to assign to the volume.
 - **Volume QoS Profile**—Select the volume QoS profile to assign to the volume.
 - **Group QoS Profile**—Select the group QoS profile to assign to the volume.
 - **Data Reduction Profile**—Select **Compression** or **Deduplication with Compression** as the data reduction profile for the volume. **None** is selected by default.
12. Click **OK**.

Related concepts

[Modifying Volumes](#) on page 52

Creating and Managing Server Folders



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

 **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.
3. 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.



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 folder to rename.
4. 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.
2. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Select the server folder to move.
4. 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.

 **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.
4. 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.

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 folder to delete.
4. Click  (**Delete**).
The **Delete Server Folder** dialog box opens.
5. Click **Yes**.



Managing Registered Servers

Use the **Registered Servers** view to register servers to Unisphere Central and provision storage for registered servers.

Server Types That Can Be Centrally Managed

Servers running Windows and VMware operating systems can be registered to Unisphere Central.

Server Type	Supported Versions/Models
Windows	<ul style="list-style-type: none">• Windows Server 2012 R2 (full or core installation)• Windows Server 2016 (full)• Windows Server 2019

Server Type	Supported Versions/Models
	 NOTE: The Storage Manager Server Agent must be installed on a Windows server before it can be registered.
VMware	<ul style="list-style-type: none"> • ESXi 6.5 and later • vCenter Server 6.5 and later  NOTE: SAS protocol for host connections is supported beginning in VMware ESXi version 6.5, and VMware vCenter Web Client Server version 6.5.

Storage Manager Server Agent for Windows Servers

To register a Windows server to Unisphere Central, the Storage Manager Server Agent must be installed on the server. The Server Agent allows Unisphere Central to communicate with the Windows server to retrieve information and streamline storage management for the server.

The Server Agent is required for Windows servers only. Other supported server types do not require the Server Agent.

Registering Servers with Unisphere Central

Register a physical or virtual server with Unisphere Central to streamline the storage provisioning process.






Register a Windows-Based Server

Register the Storage Manager Server Agent on a Windows server to manage it on the **Servers** view.

Prerequisites

The Storage Manager Server Agent must be installed and running on the server.






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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click  **(New)**, then select **Add Windows Server Agent**.
The **Add Windows Server Agent** dialog box opens.
5. Enter the host name or IP address of a Windows server in the **Host or IP Address** field.
 **NOTE:** If the server is a member of a server cluster, enter the host name or IP address of a server, not a server cluster.
6. Enter the port number of the socket listening port on the Server Agent in the **Port** field.
7. Enter a connection timeout value in seconds.
8. Configure automatic management settings for the Storage Center to which the server is connected.
 - To automatically create and manage the server on the Storage Center, select the **Auto Manage Storage Centers** check box.
 - To automatically create and manage virtual machines hosted by the server on the Storage Center(s), select **Auto Manage Virtual Machines On Storage Centers**.
 **NOTE:** If the server has physical iSCSI HBAs, Unisphere Central may not automatically recognize the WWNs for the server. In this situation, configure the iSCSI HBA(s) to target the Storage Center, create a server on the Storage Center, then manually map the Storage Center server to the Server Agent.
9. Select a parent folder for the server in the **Folder** navigation tree.
10. Click **OK**.

Register a VMware vSphere ESXi Server

Register a VMware vCenter Server to manage it on the **Servers** view.





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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click  (**New**), then select **Add VMware vSphere ESXi Host**.
The **Add VMware vSphere ESXi Host** dialog box opens.
5. Enter the host name or IP address of a Windows server in the **Host or IP Address** field.
 **NOTE:** If the server is a member of a server cluster, enter the host name or IP address of a server, not a server cluster.
6. Enter the User Name and Password of an administrative user on the server.
7. Select the **HTTPS** check box to use HTTPS to connect to the server.
8. Configure automatic management settings for the Storage Center to which the server is connected.
 - To automatically create and manage the server on the Storage Center, select the **Auto Manage Storage Centers** check box.
 - To automatically create and manage virtual machines hosted by the server on the Storage Center(s), select **Auto Manage Virtual Machines On Storage Centers**. **NOTE:** If the server has physical iSCSI HBAs, Unisphere Central may not automatically recognize the WWNs for the server. In this situation, configure the iSCSI HBA(s) to target the Storage Center, create a server on the Storage Center, then manually map the Storage Center server to the Server Agent.
9. Select a parent folder for the server in the **Folder** navigation tree.
10. Click **OK**.

Register a VMware vCenter Server

Register a VMware vCenter Server to manage it on the **Servers** view.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click  (**New**), then select **Add VMware vCenter Server**.
The **Add VMware vCenter Server** dialog box opens.
5. Enter the host name or IP address of a Windows server in the **Host or IP Address** field.
 **NOTE:** If the server is a member of a server cluster, enter the host name or IP address of a server, not a server cluster.
6. Enter the User Name and Password of an administrative user on the server.
7. Select the **HTTPS** check box to use HTTPS to connect to the server.
8. Configure automatic management settings for the Storage Center to which the server is connected.
 - To automatically create and manage the server on the Storage Center, select the **Auto Manage Storage Centers** check box.
 - To automatically create and manage virtual machines hosted by the server on the Storage Center(s), select **Auto Manage Virtual Machines On Storage Centers**.

 **NOTE:** If the server has physical iSCSI HBAs, Unisphere Central may not automatically recognize the WWNs for the server. In this situation, configure the iSCSI HBA(s) to target the Storage Center, create a server on the Storage Center, then manually map the Storage Center server to the Server Agent.

9. Select a parent folder for the server in the **Folder** navigation tree.


10. To register a VASA provider, select the **Register VASA Provider** check box.


A VASA provider must be registered to use VMware virtual volumes (VVols) in your storage environment.

a. Select the version of VASA to use:


- Select **VASA 1** for an ESXi 5.5 host. The format of the URL for VASA 1.0 is `https://host ID:3034/vasa-provider/vasa1/vasa-version.xml`
- Select **VASA 2** for an ESXi 6.0 or later host. The format of the URL for VASA 2.0 is `https://host ID:3034/vasa-provider/vasa2/vasa-version.xml`

The *host ID* is either the IP address or the Fully Qualified Domain Name (FQDN) of the host on which the Data Collector is installed.

 **CAUTION:** The host must use an FQDN known by DNS so that IP address changes do not cause vCenter to lose connection to the VASA provider. If FQDN use is not possible, IP address changes will not automatically be known by vCenter, and unregistering and reregistering the VASA provider will be required after each change. For this reason, nonphysical address locked DHCP addressing is discouraged.


 **NOTE:** If the VASA provider is unregistered and reregistered, the option for selecting VASA1 or VASA2 during VASA registration no longer displays because the Storage Manager Data Collector automatically selects the latest version of VASA that is supported by the ESXi host.


b. Type the user name and password of the Unisphere Central associated with the VASA provider.

 **CAUTION:** The user name for the VASA Provider should be a service account, not a user account. If a user account is specified in this field, and the user is deleted, the VASA information could be lost.

11. Click **OK**.

Results

 **NOTE:** After a Unisphere Central update, the VASA version number displayed in vCenter is not updated unless the VASA provider is unregistered and reregistered with that vCenter.

 **NOTE:** If the VASA provider loses network access to the external database, the VASA provider needs to be unregistered and reregistered to continue with VVols operations.




Organizing and Removing Registered Servers

Use server folders to organize servers into groups.

Create a Registered Server Folder

Create a server folder to group registered servers together.

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  **STORAGE** menu, click **Servers**. The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click  **(New)**, then select **Create Registered Server Folder**. The **Create Registered Server Folder** dialog box opens.
5. Type a name for the folder in the **Name** field.
6. Select a parent folder for the new folder from the **Parent** drop-down menu.

7. Click **OK**.

Rename a Registered Server Folder

Follow these steps to change the name of a registered server 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.
2. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select a registered server folder and click  (**Edit**).
The **Edit Registered Server Folder** dialog box opens.
5. Type a new name for the folder in the **Name** field.
6. (Optional) Select a parent folder for the registered server folder from the **Parent** drop-down menu.
7. Click **OK**.

Move a Registered Server Folder

Use the **Edit Settings** dialog box to move a server 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.
2. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select a registered server folder.
5. Click  (**Edit**).
The **Edit Registered Server Folder** dialog box opens.
6. Select a new parent folder for the registered server folder from the **Parent** drop-down menu.
7. Click **OK**.

Move a Registered Server to a Different Folder

Use the **Edit Settings** dialog box to move a registered server to a different 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.
2. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select a registered server.
5. Click  (**Edit**).
The **Edit Registered Server** dialog box opens.
6. Select a new parent folder from the **Parent** drop-down menu.
7. Click **OK**.

Enable or Disable Automatic Management of Storage Center Server Objects

You can configure Unisphere Central to automatically create and manage the server and hosted virtual servers on the Storage Centers to which it is connected.




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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select a registered server folder.
5. Click  (**Edit**).
The **Edit Registered Server Folder** dialog box opens.
6. Configure automatic management settings for the Storage Centers to which the server is connected.
 - To automatically create and manage the server on the Storage Centers, select the **Auto Manage Storage Centers** check box.
 - To automatically create and manage virtual machines hosted by the server on the Storage Centers, select **Auto Manage Virtual Machines On Storage Centers**.
7. Click **OK**.

Delete a Registered Server

Remove a registered server from the **Servers** view if you no longer want to manage it from Unisphere Central. If **Auto Manage Storage Centers** is enabled for the server, deleting it removes the HBAs from the corresponding Storage Center server objects.




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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select the server to delete and click  (**Delete**).
5. Click **OK**.

Delete a Registered Server Folder

Delete a server folder if it is no longer 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. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select a registered server folder.
5. Click  (**Delete**).
The **Delete** dialog box opens.
6. Click **OK**.



Updating Server Information

You can retrieve current information from servers and scan for new volumes on servers.

Retrieve Current Information from a Single Server

Refresh the view to see the most current server data.



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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click the server to update.
The **Summary** page for that server opens.
5. Click **... (More Actions)**, then select **Update Information**.
6. Click **Yes** at the confirmation prompt.

Scan for New Volumes on a Single Server

If volumes have been added to a server, scan the server to display them on the **Server** view.




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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click the server to update.
The **Summary** page for that server opens.
5. Click **... (More Actions)**, then select **Rescan for Volumes**.
6. Click **Yes** at the confirmation prompt.

Retrieve Current Information from All Servers

Trigger Unisphere Central to refresh the data that is displayed for all servers. If **Auto Manage Storage Centers** is enabled one or more servers, this action adds corresponding server objects to the associated 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. From the  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click  then select **Update Information (All Servers)**.
5. Click **Yes** at the confirmation prompt.

Scan for New Volumes on All Servers

If volumes have been added to multiple servers, scan all servers to display the volumes on the **Servers** view.




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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click , then select **Rescan for Volumes (All Servers)**.
5. Click **Yes** at the confirmation prompt.

Change the Connection Timeout for a Registered Windows Server

You can configure the maximum time in seconds that Unisphere Central waits for a response for queries that are sent to the Server Agent.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. In the **Registered Servers** view, select a Windows Server.
5. Click  (**Edit Windows Server**).
6. In the **Connection Timeout** field, type a new timeout in seconds.
 - The default is 300 seconds.
 - The minimum value is 180 seconds.
 - The maximum value is 1200 seconds.
7. Click **OK**.



Managing Server Data Collection and Reporting Settings

Data collection and reporting settings apply to all servers added to the **Server** view.

Automatically Retrieve Information for All Registered Servers

If automated updating is enabled, information is updated 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, then click the **Server Agent** subtab.
4. Click **Edit**.
The **Server Agent** dialog box opens.
5. Select the **Periodically Update Usage Data** check box.



When the **Periodically Update Usage Data** check box is selected, the information that is displayed for all registered servers is updated every 30 minutes.

6. Click **OK**.

Configure Reporting Settings for All Registered Servers

You can specify the number of days for which data is gathered for all servers.

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, then click the **Server Agent** subtab.
4. Click **Edit**.
The **Server Agent** dialog box opens.
5. In the **Usage Data Range** field, enter the number of days of data to gather from registered servers.
6. Click **OK**.



Creating Server Volumes and Datastores

Creating a volume on a Windows server or creating a datastore on a VMware server automatically creates a Storage Center volume and maps it to the server in one operation.

Create a Volume and Map it to a Windows Server

You can create a volume, map it to a Windows server, format it, and mount it on the server in one operation.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Select the Windows server on which to create the volume.
5. Click **... (More Actions)** and select **Create Windows Volume**.
The **Create Windows Volume** dialog box opens.
6. Enter a name for the volume in the **Label** field. The name is displayed as the disk label in Windows.
7. Select a unit of storage from the drop-down menu and enter the size for the volume in the **Total Space** field. The available storage units are kilobytes (KB), megabytes (MB), gigabytes (GB), and terabytes (TB).
8. Select the smallest amount of disk space that can be allocated for a file in the **Allocation Size** drop-down menu. The default allocation value is dependent on the size of the volume.
9. Select how to format the volume from the **Format Type** drop-down menu:
 - **GPT**: Formats the volume using the GUID Partition Table disk partitioning scheme.
 - **MBR**: Formats the volume using the master boot record disk partitioning scheme.
10. Specify how to mount the volume in the **Drive or Mount Point** area:
 - **Use Next Available Drive Letter**: The volume is mounted on the server using the next unused drive letter.
 - **Drive Letter**: The volume is mounted on the server using the drive letter selected from the drop-down menu. To update the list of drive letters that are available on the server, click **Refresh**.
 - **Mount Point**: The volume is mounted to an empty folder on the server. The path to the folder must be entered in the text field. To verify the path entered is valid, click **Verify mount point is available**.

11. Select the Storage Center on which to create the volume.
 - To manually choose a Storage Center, select it from the **Storage Center** drop-down menu.
 - To automatically choose a Storage Center based on capacity and performance, click **Recommend**. The drop-down menu displays the recommended Storage Center.
12. If you want to specify a custom LUN, restrict mapping paths, configure multipathing, or make the volume read-only, click **Advanced Mapping**.
13. To configure settings for the Storage Center volume that will be created, click **Volume Settings**. In the **Volume Settings** dialog box that appears, modify the options as needed, then click **OK**.
 - a. Select the folder in which to create the volume from the **Volume Folder** drop-down menu.
 - b. Type notes in the **Notes** field as needed.
 - c. To schedule snapshot creation and expiration for the volume, apply one or more Snapshot Profiles by clicking **Change** across from **Snapshot Profiles**.
 - d. To enable caching for reads on the volume, select the Enabled check box across from **Read Cache**.
 - e. To enable caching for writes on the volume, select the Enabled check box across from **Write Cache**.
 - f. To enable compression on eligible data in the volume, select a **Data Reduction Profile** from the drop-down list.
 - g. To use specific tiers and RAID levels for volume data, select the appropriate Storage Profile from the **Storage Profile** drop-down menu. Using the **Recommended** Storage Profile allows the volume to take full advantage of data progression.
 - h. 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 use a QoS profile, select a **Volume QoS Profile** or **Group QoS Profile** from the drop down lists.
14. Click **OK**.



Create an RDM Volume

You can create a volume, map it to a VMware virtual machine, and create a raw device mapping to the virtual machine in one operation.

Prerequisites

In order for the **Create RDM Volume** option to appear in Unisphere Central, the virtual machine must be powered on. If Unisphere Central determines that the VM is not powered on, the **Create RDM Volume** menu option is not displayed.

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  **STORAGE** menu, click **Servers**. The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click on the Server that contains the Virtual Machine. The server **Summary** view opens.
5. Click the **Virtual Machines** tab.
6. Select the virtual machine on which to create the datastore.
7. Click **Create RDM Volume**. The **Create RDM Volume** dialog box opens.
8. Select the Storage Center on which to create the volume.
9. To configure advanced volume-mapping options, click **Advanced Mapping**.
10. Enter a name for the volume in the **Volume Name** field.
11. Enter the size of the volume in the **Configured Size** field and select the units of measure from the drop-down menu.
12. Select the folder in which to create the volume from the **Volume Folder** area.
13. Type notes in the **Notes** field as needed.
14. To schedule snapshot creation and expiration for the volume, apply one or more Snapshot Profiles by clicking **Change** across from **Snapshot Profiles**.
15. To enable compression on eligible data in the volume, select Compression from the **Data Reduction Profile** drop-down menu.

16. Click **OK**.

Create a Datastore and Map it to VMware ESX Server

You can create a datastore, map it to a VMware ESX environment, and mount it to the cluster in one operation.



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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. In the **Registered Servers** view, select the VMware ESXi cluster or host on which to create the datastore.
5. Click **... (More Actions)** and select **Create Datastore**.
The **Create Datastore** dialog box opens.
6. Type a name for the datastore in the **Name** field.
7. Select the type of datastore to create:
 - **Standard Datastore (VMFS)**
 - **VVol Datastore**
8. Click **Next**.
9. If you selected **Standard Datastore (VMFS)**, complete the following steps:
 - a. Select the Storage Center on which to create the datastore from the **Storage Center** drop-down menu.
 - b. Select the folder in which to create the datastore from the **Volume Folder** drop-down menu.
 - c. Enter the size for the datastore in the **Total Space** field and select a unit of storage from the drop-down menu.
The available storage units are bytes, kilobytes (KB), megabytes (MB), gigabytes (GB), and terabytes (TB).
 - d. Select the size limit for virtual disks within the datastore from the **Max File Size** drop-down menu.
 - e. Add notes in the **Notes** field as needed.
 - f. Select a data reduction profile from the **Data Reduction Profile** drop-down menu.
 - g. To specify a snapshot profile, click **Change**, select a profile in the **Select Snapshot Profiles** dialog box, and click **OK**.
 - h. If you want to specify a custom LUN, restrict mapping paths, configure multipathing, or make the datastore read-only, click **Advanced Mapping**.
10. If you selected **VVol Datastore**, select the storage container to use for the VVol datastore
 - **Use Existing New Storage Container** – If you selected this option, a list of existing storage containers is displayed.
Select the storage container to use, and click **Finish**.
 - **Create a New Storage Container** – If you selected this option, complete the following steps:
 - a. Select the Storage Center on which to create the datastore from the **Storage Center** drop-down menu.
 - b. Select a unit of storage from the drop-down menu and type the size for the datastore in the **Size** field. The available storage units are bytes, kilobytes (KB), megabytes (MB), gigabytes (GB), and terabytes (TB).
 - c. To specify the folder in which to create a datastore, click **Change**, select a folder from the **Select Volume Folder** dialog box, and click **OK**.
 - d. Specify whether to allow compression by selecting or clearing the **Compression Allowed** check box.
 - e. Specify whether to allow deduplication by selecting or clearing the **Deduplication Allowed** check box.
 - f. Specify whether to allow encryption by selecting or clearing the **Use Encryption** check box.
 - g. (Optional) To specify the storage profiles to allow for new datastores, click **Change**, select the storage profiles to allow from the **Select Storage Profile** dialog box, and click **OK**.
 - h. Select the default snapshot profile setting from the **Default Snapshot Profile** drop-down menu.
 - i. Select the default data reductions profile setting from the **Default Data Reduction Profile** drop-down menu.
 - j. Select the default storage profile setting from the **Default Storage Profile** drop-down menu.
 - k. Select the default data reduction input setting from the **Default Data Reduction Input** drop-down menu.
11. Click **Finish**.

Expand a Datastore

Expand a VMware datastore if it is running out of space.




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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. In the **Registered Servers** view, click on the VMware ESXi cluster or host on which the datastore is located.
The server **Summary** view opens.
5. Click on the **Datastores** tab.
6. Select the datastore to expand and click **Expand Datastore**.
The **Expand Datastore** dialog box opens.
7. Type a new size for the datastore in the **New Size** field.
8. Click **OK**.

Delete a Volume or Datastore

If a volume or datastore if it is no longer needed by the server, delete it from the **Registered Servers** view. Volumes that are not hosted on a Storage Center cannot be deleted.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. In the **Registered Servers** view, click the server on which the volume or datastore is located.
The server **Summary** view opens.
5. Click the **Volumes** or **Datastores** tab as applicable.
6. Select the volume or datastore to delete click  (**Delete**).
The **Delete** dialog box opens.
7. Select the options that apply:
 - **Remove Mappings from the Storage Center**—deletes the mappings between the datastore or volume and the server on the Storage Center
 - **Put the Storage Center Volume in the Recycle Bin**—moves the datastore or volume to the Storage Center recycle bin.
 - **Delete the Storage Center Volume**—permanently deletes the datastore or volume from the Storage Center
8. Click **OK**.



Assigning/Creating Virtual Servers on Storage Centers

Virtual machines that are not automatically managed on a Storage Center must be manually assigned to server objects on the Storage Center(s) that provide storage.

Assign a Virtual Machine to a Storage Center Server Object

If a virtual server object has already been created on the Storage Center, assign the virtual server to a virtual machine.



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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click on the Server that contains the Virtual Machine
The server **Summary** view opens.
5. Click the **Virtual Machines** tab.
6. Select the virtual machine on which to assign the virtual server.
7. Click **Assign to Virtual Server**.
The **Assign to Virtual Server** dialog box opens.
8. Select the Storage Center on which the virtual server is located.
9. Select the name of the virtual server to assign to the virtual machine.
10. Click **OK**.

Create a Storage Center Server Object for a Virtual Machine

If there is no virtual object on the Storage Center, create one for the virtual machine.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click the Server that contains the Virtual Machine.
The server **Summary** view opens.
5. Click the **Virtual Machines** tab.
6. Select the virtual machine on which to create the virtual server.
7. Click **Create Virtual Server**.
The **Create Virtual Server** dialog box opens.
8. Select the Storage Center on which the virtual server is located.
9. Select the operating system of the virtual server.
10. Click **OK**.





Manually Mapping a Windows Server to a Storage Center Server

If the WWNs of a server are not correctly associated with the appropriate Storage Center server objects, you can manually create the mappings.

Map a Windows Server to a Storage Center Server Object

If Unisphere Central did not automatically recognize the WWNs of a Windows server when it was registered, manually associate the server with a Storage Center server.





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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click the Windows Server.
The server **Summary** view opens.
5. Click  (**Edit**).
The server **Edit Windows Server** dialog box opens.
6. In the **Manual Storage Center Server Mapping** area, click .
The **Manual Storage Center Server Mapping** dialog box opens.
7. Select the server object on the Storage Center to map and click **OK**.
8. Click **OK**.

Remove a Mapping Between a Windows Server and a Storage Center Server Object

If a Windows server no longer uses storage on a manually mapped Storage Center, you can delete the association.

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  **STORAGE** menu, click **Servers**.
The **Servers** view is displayed.
3. Click the **Registered Servers** tab.
4. Click the Windows Server.
The server **Summary** view opens.
5. Click  (**Edit**).
The server **Edit Windows Server** dialog box opens.
6. In the **Manual Storage Center Server Mapping** area, select the mapping to delete and click  (**Delete**).
7. Click **OK** at the prompt to delete the mapping.
8. Click **OK**.

Storage Center Maintenance

Unisphere can manage Storage Center settings, users and user groups, and apply settings to multiple Storage Centers. Storage Center maintenance includes operations performed on a production system such as changing the operation mode, updating software, and managing hardware.

Topics:

- [Managing Storage Center Settings](#)
- [Configuring a Storage Center to Inherit Settings](#)
- [Managing Storage Center Users and Groups](#)
- [Managing Front-End I/O Ports](#)
- [Managing Back-End I/O Port Hardware](#)
- [Grouping Fibre Channel I/O Ports Using Fault Domains](#)
- [Grouping iSCSI I/O Ports Using Fault Domains](#)
- [Grouping SAS I/O Ports Using Fault Domains](#)
- [Managing Disks and Disk Folders](#)
- [Managing Secure Data](#)
- [Managing Data Redundancy](#)
- [Managing Disk Enclosures](#)
- [Managing Storage Center Controllers](#)
- [Updating Storage Center](#)
- [Shutting Down and Restarting a Storage Center](#)
- [Managing Field Replaceable Units \(FRU\)](#)

Managing Storage Center Settings

This section describes how to configure general Storage Center settings.

Related concepts

[Configuring Storage Center User Preferences](#) on page 128

[Configuring Storage Center Data Settings](#) on page 132

[Configuring Storage Center Secure Console Settings](#) on page 138

[Configuring Filters to Restrict Administrative Access](#) on page 136


Related tasks

[Viewing and Modifying Storage Center Information](#) on page 126

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

 **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.
3. Click  **(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**.


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 **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.
3. 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.
3. 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.
3. Click  **(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.

 **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.
3. 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.



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. 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.
2. 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.



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. 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.
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 **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.
3. 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.



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. 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.
3. 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.
3. Click  **(Settings)**.
The **Storage Center Settings** dialog box opens.
4. Click the **Preferences** tab.
5. 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.
3. 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.


 **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.

3. 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.
3. 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.



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 **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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. 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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. Click  **(Settings)**.
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.
 **NOTE:** The directory must be located on the same server as the Data Collector.
 **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.
 **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.
3. Click  **(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 **Current 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.



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 **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.
3. Click  **(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** drop-down 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.

 **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.
3. 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 drop-down 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.



 **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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. Click  **(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 drop-down 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.



 **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.
3. Click  **(Settings)**.
The **Storage Center Settings** dialog box opens.

4. Click the **IP Filtering** tab.
5. 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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. 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.


 **NOTE:** Do not modify the secure console configuration without the assistance of technical support.

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.
3. 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.



 **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.
3. Click  **(Settings)**.
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

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

 **NOTE:** For user interface reference information, click **Help**

Steps

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 6. 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.


 **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.
 **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.
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 **More Actions > Default User Preferences**.
The **Configure Default User Preferences** dialog box opens.
6. Modify the user preferences as needed, then click **OK**.
 **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](#) on page 144

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.
3. 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 **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.
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, 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.
3. 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.
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, 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.

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, 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.
- 3. 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. Click **Configure User Preferences**.
The **Configure User Preferences** dialog box opens.
- 7. Modify the user preferences as needed, then click **OK**.

 **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](#) on page 141

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.
- 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, 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**.



 **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.
3. 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.
3. 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.

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 **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.
 **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.

 **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.
3. 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.
3. 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.
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 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.
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 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

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

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 **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.

 **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.
3. Click  **(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.
3. Click  **(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.
3. Click  **(Settings)**.
The **Storage Center Settings** dialog box opens.
4. Click the **Directory Services** tab.
5. 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.

 **NOTE:** Use the fully qualified domain name (FQDN) of the servers.


Example URIs for two servers:

ldap://server1.example.com ldap://server2.example.com:1234

 **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.


 **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.
3. Click  **(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.

 **NOTE:** Use the fully qualified domain name (FQDN) of the servers.

Example URIs for two servers:

`ldap://server1.example.com ldap://server2.example.com:1234`

 **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:

, + " \ < > ; = / 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.
- (Optional) Click **Test Server** to verify that the Storage Center can communicate with the specified directory servers using the selected protocol.
 - (Optional) If Transport Layer Security (TLS) is enabled, upload a Certificate Authority PEM file.
 - Click **Upload Certificate**.
 - 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.
 - Click **OK** to upload the certificate.
 - Click **Next**. The **Kerberos Settings** page opens.
 - (Optional) Select the **Enabled** checkbox to enable Kerberos authentication.
 - 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.
 - Click **Next**.
The **Join Domain** page opens.
 - Type the user name and password of a domain administrator.
 - 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.

 **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 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.
3. Click  **(Settings)**.
The **Storage Center Settings** dialog box opens.
4. Click the **Users and User Groups** tab.
5. 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 principal name for the directory user. The following formats are supported:
 - *username@domain*
 - *domain\username*
7. In the **Real Name** field, type the real name of the directory user.
8. To the right of the **Distinguished Name** field, click **Get DN**.
The distinguished name of the user is generated from the principal name of the directory user.
Optionally, type the distinguished name for the directory user in the **Distinguished Name** field.
For example: `CN=Firstname Lastname,CN=Users,DC=example,DC=com`
9. 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.
10. 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.
11. (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.
12. (Optional) Specify more information about the user in the **Details** area. For user interface reference information, click **Help**.
13. Click **OK**.
The **Grant Access to Directory User** dialog box closes.

14. 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.



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 **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.
7. 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.
3. 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.

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 **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.
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 **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.
3. 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**.



 **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.
3. 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 **Real Name** field as necessary.
8. Modify the fields in the **Details** area as necessary, then click **OK**.



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

9. Click **OK**.
The local user **Edit Settings** dialog box closes.
10. Click **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.
3. 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 **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.

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 **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.
 **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.

 **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.
3. Click  **(Settings)**.
The **Storage Center Settings** dialog box opens.
4. Click the **Users and User Groups** tab.
5. 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.

3. 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 **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.



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 **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.
3. 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


Fibre Channel (FC), iSCSI, and SAS ports on a storage system may be designated for use as front-end I/O ports. Front-end I/O ports can connect to Fibre Channel fabrics or Ethernet networks that contain servers that require storage, or directly to a server using SAS connections.

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.

 **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.

 **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.


 **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

 **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.
- 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 7. 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.	<ul style="list-style-type: none"> • Primary ports pass I/O. • Reserved ports remain in a standby mode until a controller failure. 	<ul style="list-style-type: none"> • 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.

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.


Rebalance Front-End Ports

If a controller has been restarted, front-end ports can become unbalanced. If front-end ports are unbalanced, a message at the top of the Summary view prompts you to rebalance the ports.

About this task


NOTE: Front-end ports are automatically rebalanced when using SCv2000 and SCv3000 series controllers. Manual port rebalance is not necessary.

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 **Rebalance Ports** in the banner message and click **OK**.
A Rebalance Ports message is displayed in **Tasks**.

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.

 **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.
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  **(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.
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  **(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.
 **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](#) on page 175

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 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 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.
2. 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.

 **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 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. After the ports are configured, they can be used to connect enclosures.

Prerequisites

- Supported only on CT-SC040, SC8000, or SC9000 storage systems.
- 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.
2. From the  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. 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

A back-end port must be configured before the port can be used for back-end connectivity.



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 **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.
2. From the  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Back 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.

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.

 **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

 **NOTE:** Fibre Channel ports are always configured in Virtual Port Mode on SCv2000 and SCv3000 series storage systems. Legacy Mode is not supported.



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 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.
5. 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**.

Remove Ports from an Fibre Channel Fault Domain



To repurpose front-end Fibre Channel ports, remove the ports from the fault domain.

About this task

- If the front-end ports are configured for virtual port mode, the storage system must be running Storage Center 7.5.1 or later to remove all ports from a fault domain.
- If the front-end ports are configured for virtual port mode, but the storage system is running a version of Storage Center earlier than Storage Center 7.5.1, an error occurs if the port being removed is the last port in the fault domain.
- If front-end ports are configured for legacy mode, all the ports in a fault domain can be removed from a storage system running any supported version Storage Center.

 **NOTE:** You cannot remove the last port in the fault domain for an SCv2000 Series or SCv3000 Series 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. From the  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Front End Ports** tab.
4. Select the Fibre Channel fault domain to view and click  **(Edit)**.
The **Edit Fibre Channel Fault Domain** dialog box opens.
5. In the **Select Ports for the Fault Domain** table, clear the check boxes of the ports to remove from the fault domain, and click **OK**.
6. Click **OK** to save changes and close the **Edit Fibre Channel Fault Domain** dialog box.

Delete a Fibre Channel Fault Domain



Delete a Fibre Channel fault domain if all ports have been removed and it is no longer needed.

About this task

- If the front-end ports were configured for virtual port mode, the storage system must be running Storage Center 7.5.1 or later to remove a fault domain.
- If the front-end ports were configured for legacy mode, a fault domain can be removed from a storage system running any supported version Storage Center.


 **NOTE:** You cannot delete fault domains on SCv2000 Series 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  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Front End Ports** tab.
4. Expand **Fibre Channel** and select the fault domain to delete.
5. Click  **(Delete)**.
The **Delete Fault Domain** dialog box opens.
6. Click **Yes**.

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.

 **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.

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 **+** (**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.

 **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](#) on page 169

Related tasks

[Set or Modify the IP Address for a Single iSCSI Port](#) on page 163

[Add a VLAN ID to a Physical iSCSI Fault Domain](#) on page 172



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.

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. 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.

 **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.
5. 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.
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. 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.
5. 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](#) on page 169

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.
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. 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.



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 **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.
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 **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.

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 **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.
5. 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.
5. 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.
 **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](#) on page 164

Remove Ports from an iSCSI Fault Domain




To repurpose front-end iSCSI ports, remove the ports from the fault domain.

About this task

- If the front-end ports are configured for virtual port mode, the storage system must be running Storage Center 7.5.1 or later to remove all ports from a fault domain.
- If the front-end ports are configured for virtual port mode, but the storage system is running a version of Storage Center earlier than Storage Center 7.5.1, an error occurs if the port being removed is the last port in the fault domain.
- If front-end ports are configured for legacy mode, all the ports in a fault domain can be removed from a storage system running any supported version Storage Center.

 **NOTE:** You cannot remove the last port in the fault domain for an SCv2000 Series or SCv3000 Series 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. From the  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Front End Ports** tab.
4. Expand **iSCSI**, select an iSCSI fault domain, and click  **(Edit)**.
The **Edit iSCSI Fault Domain** dialog box opens.
5. In the **Select Ports for the Fault Domain** table, click  **(Edit)**.
6. Select the port to remove from the table, then clear the **Include in Fault Domain** check box, and click **Set**.
Repeat this step to remove additional ports from the fault domain.
7. Click **OK**.

Delete an iSCSI Fault Domain



Delete an iSCSI fault domain if all ports have been removed and it is no longer needed.

About this task

- If the front-end ports were configured for virtual port mode, the storage system must be running Storage Center 7.5.1 or later to remove a fault domain.
- If the front-end ports were configured for legacy mode, a fault domain can be removed from a storage system running any supported version Storage Center.

 **NOTE:** You cannot delete fault domains on SCv2000 Series 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  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Front End Ports** tab.
4. Expand **iSCSI** and select the fault domain to delete.
5. Click  (**Delete**).
The **Delete Fault Domain** dialog box opens.
6. Click **Yes**.

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.

 **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.

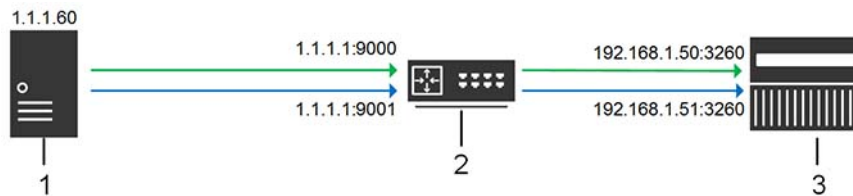


Figure 8. iSCSI NAT Port Forwarding Diagram

Item	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.
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, 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.

 **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. In the **Remote CHAP Secret** field, type the shared secret that the remote initiator must provide when challenged by the Storage Center (target).
 - e. (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.
 - 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.

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. 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.
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 **Remove**.
The CHAP configuration is removed from the table.
7. Click **OK**.
The **Configure CHAP** dialog box closes.


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.

 **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.


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 **+ (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.
2. From the  **SYSTEM** menu, click **Ports**.
The **Ports** view is displayed.
3. Click the **Front End Ports** tab.
4. 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

 **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.
3. 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.



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 a disk folder, then click  **(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.
3. 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.
2. From the  **STORAGE** menu, click **Disks**.
The **Disks** view is displayed.
3. Expand **Disks** and select an unassigned disk folder.
4. 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**.


 **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.


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 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

 **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.

4. 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.
4. 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.
4. 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  (**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.
4. 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 Disk dialog box identifies the disk to replace and provides steps for replacing the disk.

Prerequisites

The status of the disk must be Down to be 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, expand the Storage Center and select **Disks**.
The **Disks** view is displayed.
5. In the disks table, select the failed disk and click **Replace Disk**.
The **Replace Disk** wizard opens.
6. Locate the failed disk in the enclosure.
7. Follow the instructions to physically remove the failed disk from the enclosure.
8. Follow the instructions to insert the replacement disk into the enclosure.
9. Click **OK**.
Storage Center attempts to recognize the replacement disk.


If the disk replacement succeeds, Storage Center confirms that the disk replacement occurred successfully and displays information about the replacement disk.

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.

 **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.

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 **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  **(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.

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 **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.
2. 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.
2. 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.

 **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 8. HDD Redundancy Recommendations and Requirements



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

Table 9. SSD Redundancy Recommendations and Requirements

Disk Size	Level of Redundancy Recommended or Enforced
Up to 18 TB	Dual redundant is the recommended level  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

 **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.
2. 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.
3. 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

 **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.

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 **+ (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

 **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.

 **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.
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.

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. 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**.
11. 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.
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 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.


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 **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.
 **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.


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**.

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.
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 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.
4. 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.

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 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.
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 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.


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 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.
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.

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.


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 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
```

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. 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.
5. 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 **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
- 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 controllers have 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**.

 **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 uninterruptable 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.

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 **UPS**.
The **UPS** view is displayed.
5. 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.
 3. 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. (Optional, Storage Center version 7.4.2 and later.) Click **Run Health Checks** to verify that the Storage Center is performing optimally before updating the software.
Results are displayed after the health check is finished. Fix any errors found before updating the Storage Center software.
 6. 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.
 7. 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**.
-  **NOTE:** Service-affecting installation types require a controller outage. Service will be interrupted.
8. Click **Install Update**.
 9. (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.
 10. 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.
3. 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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. 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.
3. 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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. Click **... (More Actions)** and select **Shutdown/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.
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 **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.


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 **... (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.

 **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.

 **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.
3. 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.

Steps

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**.

Remote Storage Centers and Replication Bandwidth Controls

A remote Storage Center is a Storage Center that is configured to communicate with the local Storage Center over the Fibre Channel and/or iSCSI transport protocols. Replication Bandwidth Controls control how bandwidth is used to send replication and Live Volume data between local and remote Storage Centers.

Topics:

- [Connecting to Remote Storage Centers](#)
- [Creating and Managing Replication Bandwidth Controls Definitions](#)

Connecting to Remote Storage Centers

A remote Storage Center is a Storage Center that is configured to communicate with the local Storage Center over the Fibre Channel and/or iSCSI transport protocols.

Storage Centers can be connected to each other using Fibre Channel, iSCSI, or both. Once connected, volumes can be replicated from one Storage Center to the other, or Live Volumes can be created using both Storage Centers.

Connecting Storage Centers Using Fibre Channel

When Storage Centers are connected to the same Fibre Channel fabric and zoning is configured correctly, each Storage Center automatically appears as a remote Storage Center; no additional configuration steps are required.

Steps

1. Connect both Storage Centers to the same Fibre Channel fabric.
2. Configure Fibre Channel zoning to allow the Storage Centers to communicate. When communication is established, each Storage Center automatically appears as a remote Storage Center.

Configure an iSCSI Connection for Remote Storage Systems

Add an iSCSI connection to a remote Storage Center to transfer replication and/or Live Volume data using the iSCSI protocol.


Prerequisites

- The Storage Center for which you want to configure iSCSI connections must be added to Unisphere Central.
- Remote connections from Storage Center require virtual fault domains.
- In virtual port mode, when the ports are located behind a router that performs NAT, NAT port forwarding must be configured for the iSCSI fault domain.
- If you intend to use CHAP authentication for iSCSI replication traffic, the iSCSI fault domains that are used for replication on each Storage Center have CHAP enabled.



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  **Data Mobility** menu, click **Replications & Live Volumes**.

The **Replications & Live Volumes** view opens to the **Replications** tab.

3. Click the **Connections** tab.
4. Select the Storage Center from which to create the remote connection.
5. Click .
The **New Remote Connection** wizard opens.
6. Select the Storage Center for which you want to configure an iSCSI connection, then click **Next**. The wizard advances to the next page.
7. Select the source and remote ports to use for the iSCSI connection and then click **Next**.
The **Connection Settings** page opens.
8. Configure the connection settings:
 - a. From the **iSCSI Network Type** drop-down menu, select the option that corresponds to the speed of the connection between the Storage Centers.
 - b. (Optional) Select **Network Address Translation (NAT)**.
 **NOTE:** NAT port forwarding is supported only in virtual port mode.
 - c. (CHAP only) If the local iSCSI fault domain, remote iSCSI fault domain, or both, have CHAP enabled, type a shared secret in the **CHAP Secret** field.
 - d. (CHAP only) If you have selected fault domains on both Storage Centers that have bi-directional CHAP enabled, select the **Use Bidirectional CHAP** check box. This option causes the Storage Centers to challenge the fault domains on each Storage Center for a shared secret.
 - e. Click **Next**.
If you have selected NAT port forwarding, the Source NAT Targets page opens.
 - f. (NAT only) In the **Port Forwarding** area select one or more local and remote iSCSI ports or click **Add** to configure a new port.
 - In virtual port mode, the **NAT IP Address** and **NAT Public Port** fields display the translated public IP address and port.
 - g. (NAT only) In the **Public Network/Initiator Port** area, select one or more ports or click **Add** to configure a new port.
 - h. Click **Next**.
The Remote NAT Targets page opens.
 - i. (NAT only) In the **Port Forwarding** area select one or more local and remote iSCSI ports or click **Add** to configure a new port.
 - j. (NAT only) In the **Public Network/Initiator Port** area, select one or more ports or click **Add** to configure a new port.
9. Click **Next**.
The Summary page opens.
10. Review the connection settings and click **Finish** to complete the connection.


Remove an iSCSI Connection to a Remote Storage Center



If no replications or Live Volumes are defined for a remote Storage Center, the iSCSI connection to the remoteStorage Center can be removed.



Prerequisites

- The Storage Center for which you want to configure iSCSI connections must be added to 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  **Data Mobility** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Connections** tab.
4. Expand the source Storage Center.
5. Select the remote connection to delete.

6. Click  (**Edit**).
The **Edit Remote Connection** wizard opens.
7. Clear the check box next to the source and remote ports to remove and then click **Next**.
The **Connection Settings** page opens.
8. On the **Connection Settings** page, click **Next**.
9. Review the Summary page and verify that the removed ports are no longer present.
10. Click **Finish**.
When the connection has been removed, the port status is indicated as **Down** on the **Connections** tab.
11. Select the down port and click  (**Delete**).
A confirmation dialog box opens.
12. Click **Yes** to delete the iSCSI connection.

Creating and Managing Replication Bandwidth Controls Definitions

Replication Bandwidth Controls definitions control how bandwidth is used for replications, Live Volumes, and Live Migrations. Create a bandwidth control definition before you create a replication, Live Volume, or Live Migration.


Create a Bandwidth Control



Create a Bandwidth Control to manage the bandwidth used to send replication and Live Volume data between local and remote Storage Centers. A Bandwidth Control is also required to create a Live Migration or One Time Copy of a volume.


Prerequisites

The Storage Center for which you want to configure a Bandwidth Control must be added to 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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Click **+** (**New**).
The new **Bandwidth Control** dialog box opens.
4. Configure the attributes of the Bandwidth Control.
 - a. Select the Storage Center to which to apply the definition.
 - b. In the **Name** field, type a name for the Bandwidth Control.
 - c. In the **Link Speed** field, specify the speed of the link in Mbps or Gbps.
5. Configure bandwidth limits for replications and Live Volumes that is associated with the Bandwidth Control.
 - a. Select the **Use Limiting Schedule** check box.
 - b. Limit bandwidth for a time range by clicking the first cell in the range and dragging to the last cell in the range. Then right-click the selection and select the percentage of available bandwidth that can be used.




 **NOTE:** If you select **Blocked** for a time range, no data is transferred during that period for all replications, Live Volumes, and Live Migrations that are associated with the Bandwidth Control. This condition can cause synchronous replications to become unsynchronized. Live Migrations that use only blocked Bandwidth Controls cannot be completed.
 - c. Limit bandwidth for other time ranges as needed.
6. Click **OK**.

Rename a Bandwidth Control

Use the **Edit Bandwidth Control** dialog box to rename a Bandwidth Control.

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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Select the Bandwidth Control.
4. Click  **(Edit)**.
The **Edit Bandwidth Control** dialog box opens.
5. In the **Name** field, type a name for the Bandwidth Control.
6. Click **OK**.

Change the Link Speed of a Bandwidth Control

Use the **Edit Bandwidth Control** dialog box to change the link speed of a Bandwidth Control.

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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Select the Bandwidth Control.
4. Click  **(Edit)**.
The **Edit Bandwidth Control** dialog box opens.
5. In the **Link Speed** field, specify the speed of the link in Mbps or Gbps.
6. Click **OK**.

Enable or Disable Bandwidth Limiting for a Bandwidth Control

Use the **Edit Bandwidth Control** dialog box to enable or disable bandwidth limiting for a Bandwidth Control.

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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Select the Bandwidth Control.
4. Click  **(Edit)**.
The **Edit Bandwidth Control** dialog box opens.
5. Select or clear the **Limiting Schedule** check box.
6. Click **OK**.


Modify the Bandwidth Limit Schedule for a Bandwidth Control

Use the **Edit Bandwidth Control** dialog box to change the bandwidth limit schedule for a Bandwidth Control.

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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Select the Bandwidth Control.
4. Click  (**Edit**).
The **Edit Bandwidth Control** dialog box opens.
5. Select the **Use Limiting Schedule** check box.
6. (Optional) To reset the bandwidth limit schedule to the default, click and drag to select all of the cells, then right-click the table and select **100%**.
7. Configure bandwidth limits for replications and Live Volumes that is associated with the Bandwidth Control.
 - a. Limit bandwidth for a time range by clicking the first cell in the range and dragging to the last cell in the range. Then right-click the selection and select the percentage of available bandwidth that can be used.

 **NOTE:** If you select **Blocked** for a time range, no data is transferred during that period for all replications, Live Volumes, and Live Migrations that are associated with the Bandwidth Control. This condition can cause synchronous replications to become unsynchronized. Live Migrations that use only blocked Bandwidth Controls cannot be completed.
 - b. Limit bandwidth for other time ranges as needed.
8. Click **OK**.


Delete a Bandwidth Control




Delete Bandwidth Controls that are no longer used by any replications, Live Volumes, or import from external device.

Prerequisites

The Bandwidth Control must not be associated with any object.

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  **Data Mobility** menu, click **Bandwidth Controls**.
3. Select the Bandwidth Control.
4. Click  (**Delete**).
A confirmation dialog box opens.
5. Click **OK**.

Storage Center Replications and Live Volumes

A replication copies volume data from one Storage Center to another Storage Center to safeguard data against local or regional data threats. A Live Volume is a replicating volume that can be mapped and active on a source and destination Storage Center at the same time.

To perform replications, a Remote Instant Replay (Replication) license must be applied to the source and destination Storage Centers.

To create a Live Volume from a replication, a Live Volume license must be applied to the source and destination Storage Centers.

NOTE: The Live Volume feature is not supported on storage systems with front-end SAS connectivity.

Topics:

- [Storage Center Replications](#)
- [Storage Center Live Volumes](#)

Storage Center Replications

A Storage Center can replicate volumes to a remote Storage Center and simultaneously be the target of Replication from a remote Storage Center. Using Unisphere Central, an administrator can set up a replication plan for Storage Centers that supports an overall Disaster Recovery strategy.

In the following example, a server sends an I/O request that modifies the source volume. The changes to the source volume are replicated to the destination Storage Center over Fibre Channel (FC) or iSCSI.

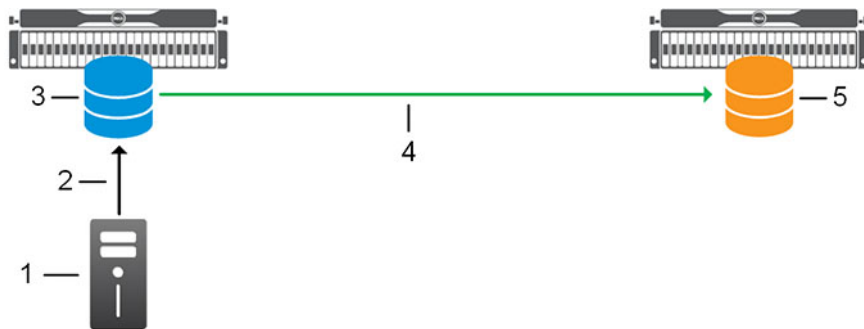


Figure 9. Example Replication Configuration

- | | |
|-----------------------|---|
| 1. Server | 2. Server I/O request to source volume over FC or iSCSI |
| 3. Source volume | 4. Replication over FC or iSCSI |
| 5. Destination volume | |


Replication Types

There are two replication types: asynchronous and synchronous.

Asynchronous replication periodically copies snapshot data to the destination volume after a snapshot is frozen. Synchronous replication writes data to both the source and destination volumes simultaneously to make sure they are synchronized at all times.

Asynchronous Replication

Asynchronous replication copies snapshots from the source volume to the destination volume after they are frozen.

 **NOTE:** By default, data is replicated from the source volume to the lowest storage tier of the destination volume. To change this default, modify the settings for a replication.

For asynchronous replication, you can enable the following options:

- **Replicate Active Snapshot:** Attempts to keep the Active Snapshots (current, unfrozen volume data) of the source and destination volumes synchronized, which could require more bandwidth. Data that is written to the source volume is queued for delivery to the destination volume. If the local Storage Center or site fails before the write is delivered, it is possible that writes will not be delivered to the destination volume. When this feature is disabled, snapshots are copied to the destination after they are frozen.
- **Deduplication:** Reduces the amount of data required to transfer snapshots to the destination Storage Center by copying only the changed portions of the snapshot history. This is accomplished by comparing the changed data in the snapshot being replicated with the previous data block by block, and transmitting only blocks that differ. While deduplication can be resource-intensive, it is useful when replicating volumes over lower bandwidth WAN links.

Synchronous Replication

Synchronous replication makes sure that both the source volume and the destination volume are fully synchronized and there is no data loss in the event of a failure on the source Storage Center.

Synchronization of the source and destination volumes is achieved by making sure that each write is successfully written to both the source volume and the destination volume before responding to the server. Because writes are written to both the source and destination volume, write performance is limited by the speed of the connection to the remote Storage Center.

Synchronous replication copies the volume Active Snapshot (current, unfrozen volume data) and any snapshots to the destination Storage Center. When the source and destination volume are synchronized, new snapshots are created by pausing IO and creating snapshots for both the source volume and the destination volume, and then resuming IO.

Synchronous Replication Modes

The synchronous replication mode controls how the source volume behaves when the destination volume is unavailable.

There are two synchronous replication modes:

- **High Availability Mode:** Accepts IO requests to the source volume when the destination volume is unavailable (or when latency is too high) to avoid interrupting service. However, if writes are accepted to the source volume, the destination volume data becomes stale.
- **High Consistency Mode:** Prevents IO requests to the source volume when the destination volume is unavailable to make sure that the volumes remain identical. However, the source volume cannot be modified during this time, which can interrupt operations.

When the destination volume comes back online, both modes resume transferring snapshots and Active Snapshot data from the source volume.

Deduplication for Synchronous Replication

Deduplication reduces the amount of data required to transfer snapshots to the destination Storage Center by copying only the changed portions of the snapshot history. This is accomplished by comparing the changed data in the snapshot being replicated with the previous data block by block, and transmitting only blocks that differ. While deduplication can be resource-intensive, it is useful when replicating volumes over lower bandwidth WAN links.

NOTE: When you enable replication deduplication, the Storage Center creates a secondary 'Delta' volume. This secondary volume adds to the overall volume memory usage and therefore will reduce the amount of configurable volume space that can be deployed. The additional volume memory usage affects the overall System Scalability Guidelines that are documented in the Storage Center Release Notes.

Replication Requirements

To replicate a volume from one Storage Center to another Storage Center, the requirements listed in the following table must be met.

Requirement	Description
Storage Center license	The source and destination Storage Centers must be licensed for Remote Instant Replay (Snapshot).
Unisphere Central configuration	The source and destination storage system must be added to Unisphere Central Data Collector. NOTE: Replications cannot be created or managed when Unisphere is connected directly to a Storage Center.
Storage Center communication	The storage systems must be connected using Fibre Channel or iSCSI, and each storage system must be defined on the other storage system.
Replication Bandwidth Control	A Replication Bandwidth Control must be defined on the source Storage Center.

Replication Behavior When a Destination Volume Fails

When the destination volume becomes unavailable, each replication type behaves slightly differently. The replication types also recover differently when the destination volume comes back online.

Scenario	Asynchronous Replication	Synchronous Replication
Destination volume is unavailable	Allows IO requests to the source volume	<ul style="list-style-type: none">• High Consistency mode: Fails IO requests to the source volume• High Availability mode: Allows IO requests to the source volume
Destination volume comes back online	Resumes transferring snapshots from the source volume and re-copies Active Snapshot data (if enabled)	<ul style="list-style-type: none">• High Consistency mode: Resumes accepting IO requests to the source volume• High Availability mode: Resumes transferring snapshots from the source volume and copies the Active Snapshot data that was missed while the destination volume was unavailable

Replicating a Single Volume to Multiple Destinations

Multiple replications can be configured for a single source volume. Two topologies are supported:

- **Mixed mode:** A source volume is replicated in parallel to multiple Storage Centers.
Example: Two replications are created in parallel:
 - Replication 1: Storage Center A → Storage Center B
 - Replication 2: Storage Center A → Storage Center C
- **Cascade mode:** A source volume is replicated in series to multiple Storage Centers.

Example: Two replications are created in series:

- Replication 1: Storage Center A → Storage Center B
- Replication 2: Storage Center B → Storage Center C

Topology Limitations for Volumes Associated with Multiple Replications

The following limitations apply to volumes that are associated with multiple replications.

- Only one synchronous replication can be configured per source volume. Subsequent replications must be asynchronous.
- For cascade mode (replications configured in series), only the first replication can be a synchronous replication. Subsequent replications in the series must be asynchronous.

Disaster Recovery Limitations for Volumes Associated with Multiple Replications

The following disaster recovery limitations apply to volumes that are associated with multiple replications.


- Activating disaster recovery for a volume removes other cascade mode replications associated with the volume.
- Restoring a replication removes all other associated mixed mode replications.

Replications that are removed by disaster recovery must be manually recreated. To use the original destination volumes for the secondary replications, remove the remote Storage Center mappings, then select the **Use an Existing Volume** check box when recreating the replications.

Replication on SCv2000 Series Storage Systems

SCv2000 series storage systems have limited replication functionality. The following replication limitations apply to SCv2000 series storage systems:

- Live Volume is not supported
- High Availability is not supported
- High Consistency is not supported

 **NOTE:** All replications require a Data Collector. When directly connected to a Storage Center, replication options are not available.

Simulating Replications

Simulated replications allow you to estimate requirements for replication and determine an optimal balance between volumes, snapshot schedules, bandwidth schedules, and your recovery plan.

About this task

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


Simulate a Replication



Run a synchronous replication simulation to verify bandwidth requirements and optimal data movement.

Prerequisites

You must be connected to a Data Collector to run or simulate a replication.


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  **Data Mobility** menu click **Replications & Live Volumes**.
3. (Optional) Filter the view by Storage Center.
 - a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.

- b. Click **Apply**.

The options selected persist throughout the browser session.

4. In the **Replications & Live Volumes** view click  **(New)** and select **New Simulated Replication**. The **New Simulated Replication** wizard opens.
5. On the **Select Source Storage Center** page, select the Storage Center that contains the volume to replicate and click **Next**.
6. On the **Select Source Volume** page, select whether to **Create a New Volume** or **Use an Existing Volume**.
 - If using an existing volume, select a volume or volumes to replicate.
 - If creating a new volume, set the volume attributes as needed. For information about the settings click Help
7. Click **Next**.
 - If a Replication Bandwidth Control has been defined, the **Settings** page opens.
 - If a Replication Bandwidth Control has not been defined, the **Bandwidth Control** page opens, enabling you to create a new Bandwidth Control.
8. On the **Settings** page, select the transfer type and set the replication attributes. For information about the settings click Help.
9. Click **Next**.
10. On the **Summary** page, review the replication settings summary.
 - Click **Finish** to create the simulated replication and close the wizard.
 - Click **Back** to change your settings.


Convert a Simulated Replication to a Replication

If you are satisfied with the outcome of a simulated replication, you can convert it to a real replication.



Prerequisites

The replication requirements must be met.

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  **Data Mobility** menu click **Replications & Live Volumes**.
3. (Optional) Filter the view by Storage Center.
 - a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.
 - b. Click **Apply**.

The options selected persist throughout the browser session.
4. In the **Replications & Live Volumes** view, select the simulated replication to convert.
5. Click **... (More Actions)** and select **Convert to Replication**. The **Convert to Replication** wizard opens.
6. On the **Select Target Storage Center** page, select the Storage Center to which you want to replicate the volume and click **Next**.

If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.
7. On the **Select Target Volume** page, select whether to **Create a New Volume** or **Use an Existing Volume**.
 - If using an existing volume, select the volume or volumes to replicate.
 - If creating a new volume, set the volume attributes as needed. For information about the settings click Help.
8. On the **Settings** page, select the transfer type and click **Next**.
9. On the **Summary** page, review the replication settings summary.
 - Click **Finish** to create and start the replication.
 - Click **Back** to change your settings.

Replicating Volumes

Create a replication to copy a volume from one Storage Center to another Storage Center to safeguard data against local or regional data threats.


Create a Replication




Create replications to copy one or more volumes from one Storage Center to another Storage Center.

Prerequisites

The replication requirements must be met.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. (Optional) Filter the view by Storage Center.
 - a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.
 - b. Click **Apply**.
The options selected persist throughout the browser session.
4. In the **Replications & Live Volumes** view, click  **(New)** and select **New Replication**.
The **New Replication** wizard opens.
5. On the **Select Source Storage Center** page, select the Storage Center that contains volume or volumes to replicate and click **Next**.
6. On the **Select Source Volume** page, select whether to **Create a New Volume** or **Use an Existing Volume**.
 - If using an existing volume, select the volume or volumes to replicate.
 - If creating a new volume, set the volume attributes as needed. For information about the settings click Help.
7. Click **Next**.
8. On the **Select Target Storage Center** page, select the Storage Center on which you want to replicate the volume and click **Next**.
If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.
9. On the **Select Target Volume** page, set the volume attributes as needed. For information about the settings click Help.
10. On the **Settings** page, select the transfer type and set the replication attributes and click **Next**. For information about the settings click Help.
11. On the **Summary** page, review the replication settings summary.
 - Click **Finish** to create the replication and close the wizard.
 - Click **Back** to change your settings.

Related concepts

[Replication Requirements](#) on page 217


Create a Replication from a Volume



Use this procedure to create a Replication directly from an existing volume.

Prerequisites

The replication requirements must be met.

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 **Volumes**.
The **Volumes** view is displayed.
3. Select the volume to replicate.
4. Click **...** (**More Actions**) and select **Replicate**.
The **New Replication** wizard opens.
5. On the **Select Target Storage Center** page, select the Storage Center on which you want to replicate the volume and click **Next**.
If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.
6. On the **Select Target Volume** page, set the volume attributes as needed. For information about the settings click Help.
7. On the **Settings** page, select the transfer type and set the replication attributes and click **Next**. For information about the settings click Help.
8. On the **Summary** page, review the replication settings summary.
 - Click **Finish** to create and start the replication.
 - Click **Back** to change your settings.




Modifying Replications

Modify a replication if you want to enable or disable replication options, convert it to a Live Volume, or delete it.

Change the Transfer Type for a Replication

Use the **Edit Replication** dialog box to change the transfer type or the replication attributes for a replication or a simulated replication. A replication can be changed from synchronous to asynchronous or asynchronous to synchronous with no service interruption.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change and click  (**Edit**).
4. Edit any of the following settings as needed:
 - **Asynchronous**: When selected, copies snapshots from the source volume to the destination volume. If **Replicate Active Snapshot** is enabled, data that is written to the source volume is queued for delivery to the destination volume. If the local Storage Center or site fails before the write is delivered, it is possible that writes will not be delivered to the destination volume.
 - **Synchronous**: When selected, keeps the source and destination volume fully synchronized at all times by making sure that each write is successfully written to both the source volume and the destination volume before responding to the server.
 - **High Availability Mode**: Accepts IO requests to the source volume when the destination volume is unavailable (or when latency is too high) to avoid interrupting service. However, if writes are accepted to the source volume, the destination volume data becomes stale.
 - **High Consistency Mode**: Prevents IO requests to the source volume when the destination volume is unavailable to ensure that the volumes remain identical. However, the source volume cannot be modified during this time, which can interrupt operations.




Change the Synchronization Mode for a Replication

Use the **Edit Replication** dialog box to change the sync mode of a synchronous replication or a synchronous simulated replication. The synchronization mode can be changed with no service interruption. The replication temporarily becomes unsynchronized when the synchronization mode is changed.

Prerequisites

The replication or simulated replication must be a synchronous replication.




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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change and click  (**Edit**).
4. Select the **Sync Mode**.
 - **High Availability Mode:** Accepts IO requests to the source volume when the destination volume is unavailable (or when latency is too high) to avoid interrupting service. However, if writes are accepted to the source volume, the destination volume data becomes stale.
 - **High Consistency Mode:** Prevents IO requests to the source volume when the destination volume is unavailable to ensure that the volumes remain identical. However, the source volume cannot be modified during this time, which can interrupt operations.

Change the Replication Attributes

Use the **Edit Replication** dialog box to change replication attributes such as bandwidth control, deduplication, and whether to include active snapshot data.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change and click  (**Edit**).
4. Edit any of the following settings as needed:
 - **Replication Bandwidth Control**—Provides a list of definitions that control bandwidth usage between the local and remote Storage Centers.
 - **Replication Deduplication**—When selected, copies only the changed portions of the snapshot history on the source volume, rather than all data captured in each snapshot. Deduplication saves bandwidth but is more resource intensive for the Storage Center.
 - **Replicate Active Snapshot**—When selected, copies all the current, unfrozen volume data on the volume. This option cannot be disabled for synchronous replication.
 - **Replicate Storage To Lowest Tier:**—When selected, forces all data to be written to the lowest storage tier of the target volume.

 **NOTE:** This option is only available when the transfer type is asynchronous and only when the feature is enabled on the Data Collector.

Pause a Replication

Pausing a replication temporarily prevents volume data from being copied to the remote Storage Center. Pausing a synchronous replication can cause it to become unsynchronized.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change.
4. Click **...** (**More Actions**) and select **Pause**.

Resume a Paused Replication

Resume a paused replication to allow volume data to be copied to the remote 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. From the  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change.
4. Click **...** (**More Actions**) and select **Resume**.

Convert a Replication to a Live Volume

If servers at both the local and remote site need to write to a volume that is currently being replicated, you can convert a replication to a Live Volume.


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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the replication to change.
4. Click **...** (**More Actions**) and select **Convert to Live Volume**.
The **Convert to Live Volume** dialog box is displayed.
5. Modify the Live Volume attributes as necessary. Click Help for more information about the options in the dialog box.
6. Click **OK**.

Delete a Replication



Use the Replications tab to delete a Replication.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.


The **Replications & Live Volumes** view opens to the **Replications** tab.

3. Select the Replication to delete.
 4. Click  (**Delete**).
The **Delete** dialog box opens.
 5. Select deletion options:
 - **Delete Restore Point**—Select this check box to delete the restore point for the replication.
 - **Remove Destination Volume**—Select this check box to show options for removing the destination volume.
 - **Recycle Destination Volume**—Enable this check box if you want to move the destination volume to the Recycle Bin on the destination Storage Center.
 - **Permanently Delete Destination Volume**—Select this check box if you do not want to retain the deleted destination volume in the Recycle Bin (not recommended).
-  **WARNING: If you delete the destination volume, you cannot recover the volume—it is permanently deleted from the Storage Center.**
6. Click **OK**.

Monitoring Replications

Monitor a replication to determine how much progress has been made.




About this task

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

Filter Replications in the Replication tab

You can filter content in the **Replication** tab to view only specific replications.




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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. If the **Replications** view is not displayed, click the **Replications** tab.
4. Click .
Select the options to display in the **Replication** view. For example select **Target Storage Center** and identify the name or part of the name of the Storage Center to include and click **Apply**.

View the Managing Live Volume for a Managed Replication

A managed replication replicates a Live Volume primary volume to a third 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. From the  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Select the managed replication to view.
The **Replication** view opens to the **Summary** tab.
4. Click  and select **View Managing Live Volume**.

View the Snapshots for a Replication

Use the **Snapshots** tab in the **Replication** view to view snapshots for the source and target volumes.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the replication to view.
The **Replication** view opens to the **Summary** tab.
4. Select the **Snapshots** tab.
Source volume snapshots are listed on the left and Target volume snapshots are listed on the right.

View the Growth Chart for a Replication

Use the **Growth** tab in the **Replication** view to the progress of the volume replication.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the replication to view.
The **Replication** view opens to the **Summary** tab.
4. Select the **Growth** tab.
5. Choose the data range for the charts:
 - Select a predefined date range from the **Display** list.
 - Select **Custom** from the **Display** list and set the specific **Start Time** and **End Time** to show in the charts, then click **Update**.

View the Threshold Definitions for a Replication

Use the **Thresholds** tab in the **Replication** view to view the threshold definitions that are set for replications and to create new thresholds.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the replication to view.
The **Replication** view opens to the **Summary** tab.
4. Select the **Thresholds** tab.
5. To create a new threshold, click **Set Thresholds**.



Related concepts

[Configuring Threshold Definitions](#) on page 278

View the I/O Performance of a Replication

Use the **Performance** tab in the **Replication** view to view I/O performance of the volume replication from the primary Storage Center to the secondary 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. From the  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the replication to view.
The **Replication** view opens to the **Summary** tab.
4. Select the **Performance** tab.
5. Choose the data range for the charts:
 - Select a predefined date range from the **Display** list.
 - Select **Custom** from the **Display** list and set the specific **Start Time** and **End Time** to show in the charts, then click **Update**.

Storage Center Live Volumes

A Live Volume is a replicating volume that can be mapped and active on a source and destination Storage Center at the same time. While both Storage Centers can accept writes, when a server writes to the destination volume, the writes are redirected to the source volume before being replicated back to the destination.

Unlike replicated volumes, Live Volume primary and secondary volumes share the same volume identity, which means that servers recognize the primary and secondary volumes as the same volume.


 **NOTE:** The Live Volume feature is not supported on storage systems with front-end SAS connectivity.

Behavior of Volume QoS Settings in Live Volume Operations

Any Volume or Replication QoS settings that have been defined are enforced only on the primary side of a Live Volume. If the secondary Storage Center becomes primary Storage Center as the result of a swap or DR Activate, the Volume QoS attributes and Replication QoS settings from that Storage Center are enforced. This behavior differs from how Volume QoS settings are enforced for a replication.

Live Volume Requirements

To create Live Volumes, the requirements listed in the following table must be met.

Requirement	Description
Storage Center version	The primary and secondary Storage Centers must be running the same version of Storage Center software.
Storage Center license	The primary and secondary Storage Centers must be licensed for Live Volume.
Unisphere Central configuration	The primary and secondary Storage Centers must be added to Unisphere Central.  NOTE: A Live Volume must use the same LUN number on both the primary and secondary Storage Centers.
Storage Center communication	The primary and secondary Storage Centers must be connected using Fibre Channel or iSCSI, and each Storage Center must be defined on the other Storage Center. <ul style="list-style-type: none">• On the primary Storage Center, the secondary Storage Center must be defined as a remote Storage Center.• On the secondary Storage Center, the primary Storage Center must be defined as a remote Storage Center.

Requirement	Description
Replication Bandwidth Controls	Replication Bandwidth Controls must be defined on the primary and secondary Storage Centers.
Server	<ul style="list-style-type: none"> MPIO must be enabled on the server to prevent I/O interruption.

Live Volume Types

Live Volumes can be created using asynchronous replication or synchronous replication.

Storage Center version 7.3 and later provides support for ALUA optimization of Live Volumes.

Live Volume ALUA allows the Storage Center to report path priority to servers for Live Volumes. The servers can make use of this path priority to prefer sending I/O to the better performing paths. In practice, I/O is directed towards the paths of the Primary Live Volume.

In Unisphere Central, the Summary tab of a Live Volume reports whether a Live Volume is ALUA optimized. If Live Volumes exist that are not ALUA optimized, Unisphere Central displays an alert and provides a link to a guided process to update Live Volumes to ALUA optimized.

Live Volume Roles

There are two roles for Live Volumes: primary and secondary. These roles determine the direction of the replication, and they can be swapped automatically or manually. Write performance is reduced for the secondary volume because the primary volume must also acknowledge these writes.

Live Volume Role	Description
Primary	<ul style="list-style-type: none"> Hosts the primary volume, which is like the source volume for a conventional replication Replicates the primary volume to the secondary volume Processes all I/O from both the primary and secondary site
Secondary	<ul style="list-style-type: none"> Hosts the secondary volume Accepts I/O for the Live Volume and routes it to the primary volume on the primary Storage Center

Live Volume Roles Example

In the following examples, a server sends an IO request that modifies the primary volume. The changes to the primary volume are replicated to the secondary Storage Center over Fibre Channel or iSCSI. When a server connected to the secondary Storage Center sends an IO request to the secondary volume, the secondary Storage Center forwards the IO request to the primary volume on the primary Storage Center.

Live Volume Before Swap Role

In the following diagram, the primary Storage Center is on the left and the secondary Storage Center is on the right.

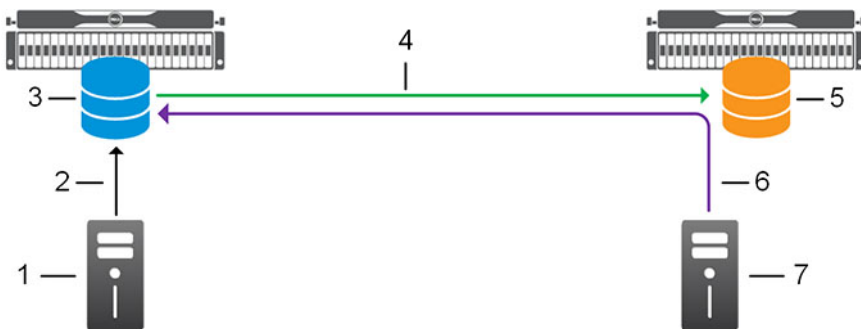


Figure 10. Example Live Volume Configuration

1. Server
2. Server IO request to primary volume over Fibre Channel or iSCSI
3. Primary volume
4. Live Volume replication over Fibre Channel or iSCSI
5. Secondary volume
6. Server IO request to secondary volume (forwarded to primary Storage Center by secondary Storage Center)
7. Server

Live Volume After Swap Role

In the following diagram, a role swap has occurred so the secondary Storage Center is on the left and the primary Storage Center is on the right.

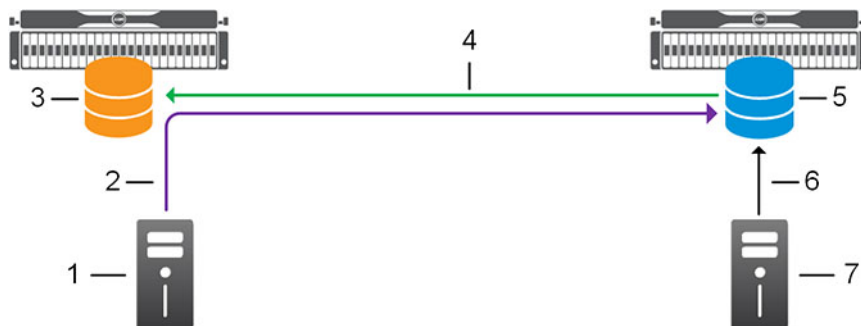


Figure 11. Example Live Volume Configuration After Swap Role

1. Server
2. Server IO request to secondary volume (forwarded to primary Storage Center by secondary Storage Center)
3. Secondary volume
4. Live Volume replication over Fibre Channel or iSCSI
5. Primary volume
6. Server IO request to primary volume over Fibre Channel or iSCSI
7. Server

Automatic Swap Role for Live Volumes

Live Volumes can be configured to swap primary and secondary volumes automatically when certain conditions are met to avoid situations in which the secondary volume receives more IO than the primary volume.

Attributes that Control Swap Role Behavior

When automatic swap role is enabled, the following limits determine when a role swap occurs.

Swap Role Limit	Description
Min Amount Before Swap	Specifies the minimum amount of storage space that must be written to the Live Volume on the secondary Storage Center before the roles can be swapped
Min Time As Primary Before Swap (Minutes)	Specifies the number of minutes that must pass before the roles can be swapped.
Min Secondary Percent Before Swap (%)	Specifies the minimum percentage of IO that must take place on the secondary volume before the roles can be swapped.

Triggering an Automatic Swap Role

For an automatic swap role to occur, the following events must take place.

Steps

1. The **Automatically Swap Roles** feature must be enabled for the Live Volume.
2. The timeout specified in the **Min Time As Primary Before Swap (Minutes)** field must expire.
3. Over a five minute period, one of the following limits must be exceeded for least 70% of the samples conducted during that time.
 - **Min Amount Before Swap**
 - **Min Secondary Percent Before Swap (%)**

Automatic Failover for Live Volumes

With Automatic Failover applied, the secondary Live Volume will automatically be promoted to primary in the event of a failure. After the primary Live Volume comes back online, Automatic Restore optionally restores the Live Volume relationship.

Live Volume Automatic Failover Requirements

The following requirement must be met to enable Automatic Failover on a Live Volume.

Component	Requirement
Live Volume attributes	<ul style="list-style-type: none">• Synchronous• High-Availability• Protected
Server host operating system	<ul style="list-style-type: none">• Any of the following operating systems:• VMware ESX 6.5• Windows Server 2012 R2 with Microsoft Hyper-V• Windows Server 2016 with Microsoft Hyper-V• Windows Server 2019 with Microsoft Hyper-V
Data Collector Ports	Enable inbound traffic on port 3033

Tiebreaker

The tiebreaker is a service running on the Data Collector that prevents the primary and secondary Live Volumes from simultaneously becoming active. If the secondary Storage Center cannot communicate with the primary Storage Center, it consults the tiebreaker to determine if the primary Storage Center is down. If the primary Storage Center is down, the secondary Live Volume activates.

Automatically Failing Over

Enabling Automatic Failover on a Live Volume allows the secondary Live Volume to automatically activate in the event of a failure. The following steps occur during an automatic failover.

Callout	Object	Callout	Object
1	Primary Storage Center	4	Primary Live Volume
2	Tiebreaker	5	Secondary Live Volume
3	Secondary Storage Center	6	Servers

1. The primary Storage Center fails.

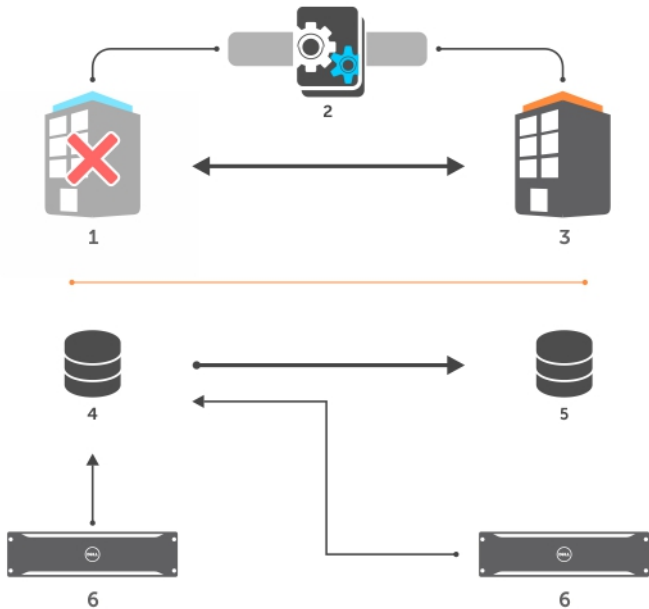


Figure 12. Step One

2. The secondary Storage Center cannot communicate with the primary Storage Center.
3. The secondary Storage Center communicates with the tiebreaker and receives permission to activate the secondary Live Volume.
4. The secondary Storage Center activates the secondary Live Volume.

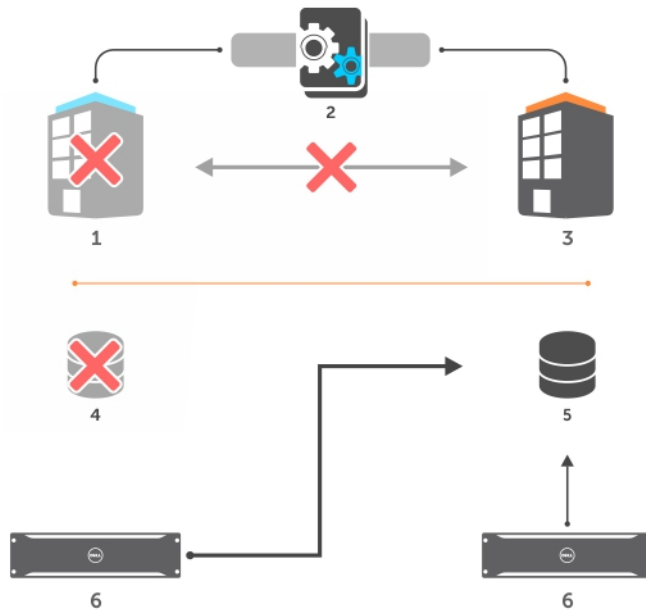


Figure 13. Step Four

NOTE: When the primary Storage Center recovers, Storage Center prevents the Live Volume from coming online.

Automatic Restore of a Live Volume

Enabling Automatic Restore repairs the Live Volume relationship between the primary and secondary Live Volumes after recovering from a failure. After an automatic restore, the original secondary Live Volume remains as the primary Live Volume. The following steps occur during an automatic repair of a Live Volume.

NOTE: The Live Volume will automatically restore only if the failover was automatically activated.

1. The primary Storage Center recovers from the failure.

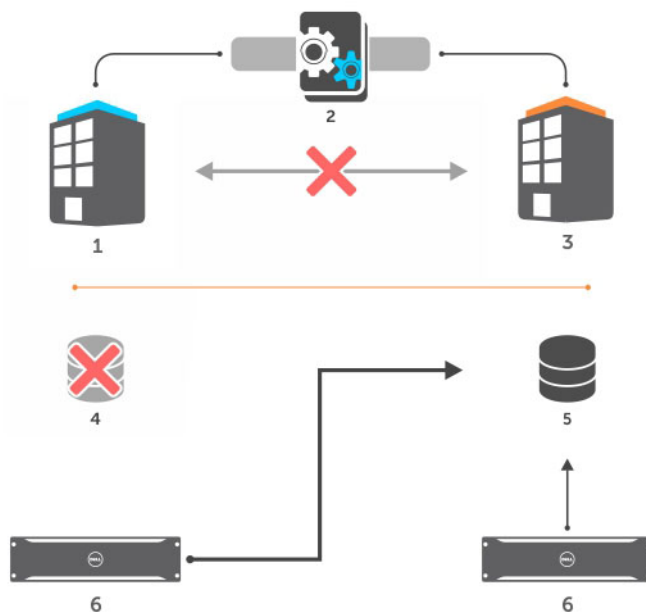


Figure 14. Step One

2. The primary Storage Center recognizes that the secondary Live Volume is active as the primary Live Volume.
3. The Live Volume on the secondary Storage Center becomes the primary Live Volume.

4. The Live Volume on the primary Storage Center becomes the secondary Live Volume.

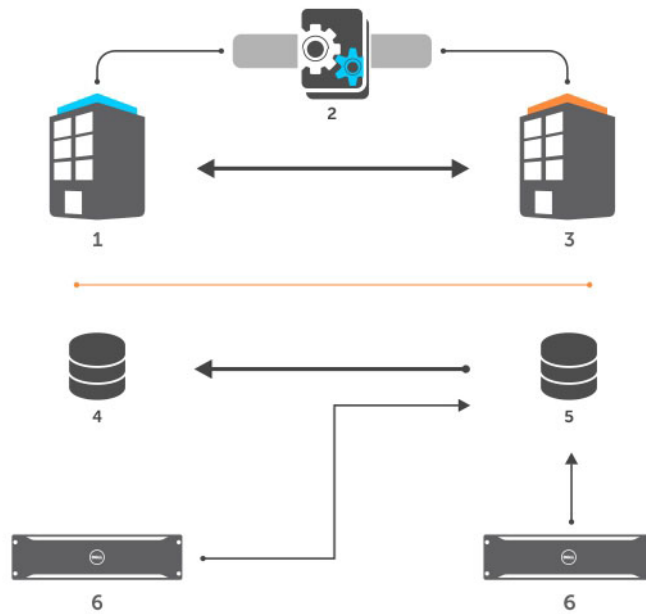


Figure 15. Step Four

Managed Replications for Live Volumes

A managed replication allows you to replicate a primary Live Volume to a third Storage Center, protecting against data loss in the event that the site where the primary and secondary Storage Centers are located goes down. When a Live Volume swap role occurs, the managed replication follows the primary volume to the other Storage Center.

Supported Live Volume with Managed Replication Topologies

Three specific combinations of Live Volume type and managed replication type are supported. The following table lists the supported combinations.

Live Volume Type	Managed Replication Type
Asynchronous	Synchronous
Asynchronous	Asynchronous
Synchronous	Asynchronous

Live Volume with Managed Replication Example Configuration

The following examples show how a managed replication behaves before and after a Live Volume swap role.

- Live Volume behavior:** When a server near the primary Storage Center sends an IO request that modifies the primary volume, the changes to the primary Live Volume are replicated to the secondary Storage Center over Fibre Channel or iSCSI. When a server near the secondary Storage Center sends an IO request to the secondary Live Volume, the secondary Storage Center forwards the IO request to the primary volume on the primary Storage Center. These changes to the primary volume are ultimately replicated to the secondary volume.
- Managed replication behavior:** The changes to the primary Live Volume are replicated to the third Storage Center over Fibre Channel or iSCSI. When a Live Volume swap role occurs, the managed replication follows the primary volume to the other Storage Center.

Managed Replication Before Live Volume Swap Role

In the following diagram, the primary Storage Center is on the left and the secondary Storage Center is located on the right.

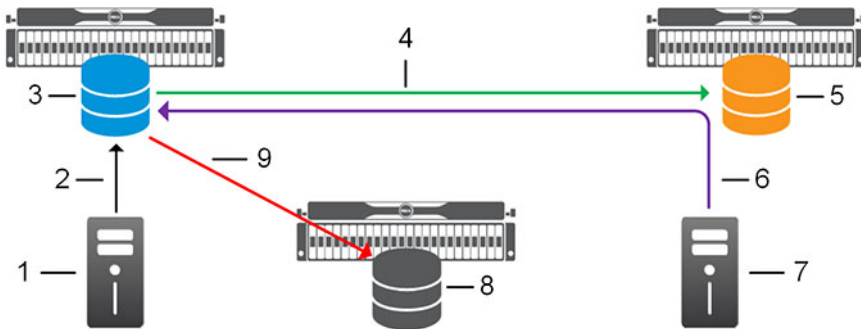


Figure 16. Live Volume with Managed Replication Example Configuration

- | | |
|---|--|
| 1. Server | 2. Server IO request to primary volume over Fibre Channel or iSCSI |
| 3. Primary volume (Live Volume and managed replication) | 4. Live Volume replication over Fibre Channel or iSCSI |
| 5. Secondary volume (Live Volume) | 6. Server IO request to secondary volume (forwarded to primary Storage Center by secondary Storage Center) |
| 7. Server | 8. Destination volume (managed replication) |
| 9. Managed replication over Fibre Channel or iSCSI | |

Managed Replication After Live Volume Swap Role

In the following diagram, a swap role has occurred so the secondary Storage Center is on the left and the primary Storage Center is located on the right. The managed replication has moved to follow the primary volume.

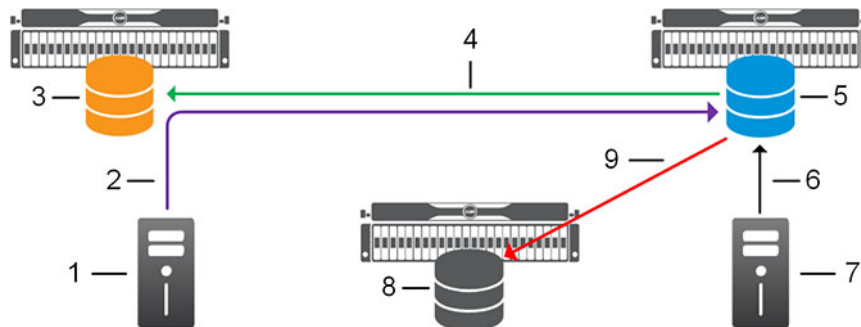


Figure 17. Live Volume with Managed Replication Example Configuration After Swap Role

- | | |
|---|--|
| 1. Server | 2. Server IO request to secondary volume (forwarded to primary Storage Center by secondary Storage Center) |
| 3. Secondary volume (Live Volume) | 4. Live Volume replication over Fibre Channel or iSCSI |
| 5. Primary volume (Live Volume and managed replication) | 6. Server IO request to primary volume over Fibre Channel or iSCSI |
| 7. Server | 8. Destination volume (managed replication) |
| 9. Managed replication over Fibre Channel or iSCSI | |

Managed Replication Requirements


Each Storage Center that participates in the Live Volume and managed replication configuration must meet specific requirements.

- The primary and secondary Storage Centers (Live Volume) must be running version 6.5 or later and meet the Live Volume requirements.
- The destination Storage Center (managed replication) must be running version 6.5 or later and meet the replication requirements.

Creating Live Volumes

Create a Live Volume to replicate a volume to another Storage Center while allowing servers to send IO for the volume to both Storage Centers. This additional flexibility can be used to perform planned outages without interrupting volume availability.

About this task

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


Create a Live Volume




Use the **Live Volumes** tab on the **Replications & Live Volumes** view to create Live Volumes.

Prerequisites

The Live Volume requirements must be met.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. (Optional) Filter the view by Storage Center.
 - a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.
 - b. Click **Apply**.
The options selected persist throughout the browser session.
5. In the **Live Volumes** tab, click  and select **New Live Volume**.
The **New Live Volume** wizard opens.
6. On the **Select Primary Storage Center** page, select the Storage Center that contains volume or volumes to convert to Live Volumes and click **Next**.
7. On the **Select Primary Volume** page, select whether to **Create a New Volume** or **Use an Existing Volume**.
 - If using an existing volume, select the volume or volumes to convert to Live Volumes.
 - If creating a new volume, set the volume attributes as needed. For information about the settings click **Help**.
8. Click **Next**.
9. On the **Select Secondary Storage Center** page, select the Storage Center on which you want to create the Live Volume the volume and click **Next**.
If Fibre Channel or iSCSI connectivity is not configured between the local and remote Storage Centers, a dialog box opens. Click **Yes** to configure iSCSI connectivity between the Storage Centers.
10. On the **Select Secondary Volume** page, set the volume attributes as needed. For information about the settings click **Help**.
11. On the **Select Target Volume Server Mapping** page, select the server to be mapped for each volume shown.
12. On the **Settings** page, select the transfer type, the replication attributes, and the Live Volume attributes and click **Next**. For information about the settings click **Help**.
13. On the **Summary** page, review the Live Volume settings summary.

- Click **Finish** to create the replication and close the wizard.
- Click **Back** to change your settings.

Related concepts

[Live Volume Requirements](#) on page 226

Modifying Live Volumes

Modify a Live Volume if you want to change replication attributes, Live Volume attributes, convert it to a replication, or delete it.


Swap the Primary Storage Center for a Live Volume



If the secondary Storage Center is receiving more I/O for a Live Volume than the primary Storage Center, swap roles to improve performance. If an outage is planned at the site where the primary Storage Center is located, swap roles before the outage to make sure there is no interruption to volume availability. After swapping roles, save restore points to make sure that the restore point for the Live Volume stays current.

Prerequisites

The Live Volume must be synchronized or in-sync.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. (Optional) Filter the view by Storage Center.
 - a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.
 - b. Click **Apply**.
The options selected persist throughout the browser session.
5. Select the Live Volume to edit.
6. Click **...** and select **Swap Primary Storage Center**.
A confirmation dialog box opens.
7. Verify the information and click **OK**.


Cancel the Storage Center Role Swap



To revert to the original Storage Center roles, cancel the role swap.

Prerequisites

The Live Volume must be in the process of swapping roles.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. (Optional) Filter the view by Storage Center.

- a. In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only replications and Live Volumes of interest.
 - b. Click **Apply**.
The options selected persist throughout the browser session.
5. Select the Live Volume to edit.
 6. Click **... (More Actions)** and select **Cancel Swap Primary Storage Center**.
A confirmation dialog box opens.
 7. Verify the information and click **OK**.


Change the Transfer Type for a Live Volume




The replication transfer type used by a Live Volume can be changed with no service interruption.

Prerequisites

If the Live Volume manages a synchronous replication, the replication transfer type for the Live Volume must be asynchronous.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. Select **Asynchronous** or **Synchronous** from the **Transfer Type** drop-down menu.
6. Click **OK**.


Change the Synchronization Mode for a Synchronous Live Volume




The synchronization mode for a Live Volume can be changed with no service interruption.

Prerequisites

The Live Volume must be a synchronous Live Volume.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. Select **High Availability** or **High Consistency** from the **Sync Mode** drop-down menu.
6. Click **OK**.


Add a Managed Replication to a Live Volume



Add a managed replication to a Live Volume to replicate the primary volume to a third Storage Center.

Prerequisites

The primary, secondary, and managed replication destination Storage Centers must meet the managed replication requirements.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit.
5. Click **...** (**More Actions**) and select **Add Managed Replication**.
The **New Managed Replication** wizard opens.
6. On the **Select Target Storage Center** page, select the Storage Center on which you want to add the Managed Replication and click **Next**.
7. On the **Select Target Volume** page, set the volume attributes as needed. For information about the settings click **Help**.
8. On the **Settings** page, select the transport and transfer attributes and the replication attributes and click **Next**. For information about the settings click **Help**.
9. On the **Summary** page, review the Managed Replication settings.
 - Click **Finish** to create the replication and close the wizard.
 - Click **Back** to change your settings.


Include Active Snapshot Data




The Active Snapshot represents the current, unfrozen volume data.

Prerequisites

The Live Volume transfer type must be asynchronous.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  (**Edit**).
The **Edit Live Volume** dialog box opens.
5. In the **Replication Attributes** area, select **Replicate Active Snapshot**.
6. Click **OK**.

Enable or Disable Deduplication for a Live Volume

Deduplication reduces the amount of data transferred and enhances the storage efficiency of the remote Storage Center by copying only the changed portions of the snapshot history on the source volume, rather than all data captured in each snapshot.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. In the **Replication Attributes** area, select or clear **Replication Deduplication**.
6. Click **OK**.

Change the Bandwidth Control for a Live Volume

Select a different bandwidth control for a Live Volume to change how the Live Volume uses bandwidth.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. In the **Replication Attributes** area, select a **Bandwidth Control**:
 - From the **Primary Bandwidth Control** drop-down menu, select a definition that will be used for the Live Volume by the primary Storage Center.
 - From the **Secondary Bandwidth Control** drop-down menu, select a definition that will be used for the Live Volume by the secondary Storage Center.
6. Click **OK**.


Configure a Live Volume to Write Data to the Lowest Tier at the Destination


The **Replicate Storage To Lowest Tier** option forces all data written to the destination volume to the lowest storage tier configured for the volume. By default, this option is enabled for asynchronous Live Volumes.



Prerequisites

- The Live Volume must be asynchronous. The **Replicate Storage To Lowest Tier** option is not available for synchronous Live Volumes.
- The option **Allow Select to Lowest Tier on Live Volume Create** must be set in the Data Collector replication settings.

Steps

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


If a Storage Center is selected from the drop sown list, click .



2. From the  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. Select the **Replicate Storage To Lowest Tier** check box.
6. Click **OK**.

Allow Replicate Storage to Lowest Tier Selection

To replicate data to the lowest storage tier, the option must be set in the Data Collector.

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. Click  **Data Collector**.
The **Data Collector** view is displayed.
3. Click the **General** tab, and then select the **Replication** subtab.
4. Click **Edit**. The **Replication Settings** dialog box opens.
5. Select the **Allow Select to Lowest Tier on Live Volume Create** check box.
6. Click **OK**.

Allow a Live Volume to Automatically Swap Roles

Live Volumes can be configured to swap primary and secondary volumes automatically when certain conditions are met. Swapping volumes automatically can avoid situations in which the secondary volume receives more IO than the primary volume.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(Edit)**.
The **Edit Live Volume** dialog box opens.
5. In the **Live Volume Attributes** area, Select the **Automatically Swap Roles** check box.
6. (Optional) Modify the default swap behavior by editing the **Min Amount Before Swap**, **Min Secondary Percent Before Swap (%)**, and **Min Time As Primary Before Swap (Minutes)** fields. These fields are described in the online help.
7. Click **OK**.

Revert a Live Volume to a Replication

If the remote Storage Center does not need to accept I/O for the Live Volume, you can convert the Live Volume to a conventional replication.


About this task

If the Live Volume manages a replication, the managed replication is converted into a non-managed replication when the Live Volume is reverted.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to revert.
5. Click **... (More Actions)** and select **Revert to Replication**.
The **Revert to Replication** dialog box opens.
6. Click **OK**.


Pause a Live Volume

Pausing a Live Volume temporarily prevents volume data from being copied from the primary volume to the secondary volume.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the Live Volume to pause.
5. Click **... (More Actions)** and select **Pause**.
The **Pause** dialog box opens.
6. Click **OK**.


Resume a Paused Live Volume

Resume a Live Volume to allow volume data to be copied to the secondary Storage Center.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Select the paused Live Volume.
5. Click **... (More Actions)** and select **Resume**.
The **Resume** dialog box opens.
6. Click **OK**.

Set Threshold Alert Definitions for a Live Volume

Configure one or more Threshold Alert Definitions for a Live Volume if you want to be notified when specific thresholds are reached. You can set threshold alerts such as the amount of replication data waiting to be transferred or the percentage of replication data that has been transferred.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
4. Click on the Live Volume to open the Live Volume view.
5. Click the **Thresholds** tab.
6. Select the alert definition for which you want to configure a threshold alert, then click **Set Thresholds**. The **Set Threshold Definitions** dialog box opens.
7. Configure the threshold definition attributes as needed, then click **OK**. These attributes are described in the online help.


Delete a Live Volume




Use the Live Volumes tab to delete a Live Volume.


About this task

If the Live Volume manages a replication, the managed replication is converted into a stand-alone replication when the Live Volume is deleted.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volume** tab.
4. Select the Live Volume to delete.
5. Click  **(Delete)**.
The **Delete** dialog box opens.
6. Select deletion options:
 - **Delete Restore Point**—Select this check box to delete the restore point for the replication.
 - **Remove Destination Volume**—Select this check box to show options for removing the destination volume.
 - **Recycle Destination Volume**—Enable this check box if you want to move the destination volume to the Recycle Bin on the secondary Storage Center.
 - **Permanently Delete Destination Volume**—Select this check box if you do not want to retain the deleted destination volume in the Recycle Bin (not recommended).

 **WARNING: If you delete the destination volume, you cannot recover the volume—it is permanently deleted from the Storage Center.**
7. Click **OK**.

Manually Bring Primary Live Volume Online


After a failure, the primary Live Volume may be offline preventing the Live Volume relationship from being restored. In this case, manually bring the primary Live Volume online to activate the Live Volume and restore the Live Volume relationship with




the secondary Live Volume. If both Live Volumes are down after a failover, **Bring Primary Online** selects the Live Volume to activate.

Prerequisites

- If visible to the Data Collector, the primary Live Volume must be down.
- If visible to the Data Collector, the secondary Live Volume must be down.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volumes** tab.
If one or more Live Volumes are down, a banner is displayed with a link to **Bring Primary Online**.
4. Do one of the following:
 - a. Click **Bring Primary Online** in the banner.
 - b. Select the Live Volume to bring online, and **... (More Actions)** and select **Bring Primary Online**
The **Bring Primary Online** dialog box appears.
5. Select one or more Live Volumes and click **Next**. (This option is available only when starting from the **Bring Primary Online** link in the banner).
6. Select the Storage Center where the Live Volume will be activated.
7. Click **Next**.
 **NOTE:** A warning page appears if Unisphere Central is managing only one of the Storage Centers.
8. Click **Finish**.

Force Delete a Live Volume

Force Delete is an option for Live Volumes in a fractured state or if Unisphere Central can view only one side of the Live Volume because the other side is down. A Live Volume is fractured if both secondary and primary Live Volumes are designated as primary.

Prerequisites


Both Live Volumes are inactive or Unisphere Central is managing only one of the Storage Centers.


About this task



The following scenarios allow force delete.


Live Volume to Delete	Failed Over	Active Live Volume	Visible to Unisphere Central
Primary	No	Primary	Primary only
Primary	Yes	Secondary	Primary and secondary
Secondary	No	Primary	Secondary only
Secondary	Yes	Secondary	Secondary only

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Select the **Live Volume** tab.
4. Select the Live Volume to delete.
5. Click  **(Delete)**.
The **Force Delete** dialog box opens.
6. Select the Storage Center that will retain the volume device ID.

 **NOTE:** Only managed Storage Centers can be selected.

7. Click **OK**.


Modifying Live Volumes with Automatic Failover




The following tasks apply to Live Volumes with Automatic Failover.

Update to the Local Tiebreaker

Updating to the local tiebreaker configures the Data Collector that Unisphere Central is connected to as the tiebreaker. Unisphere Central provides the option to update to the local tiebreaker when the current Data Collector is not configured as the tiebreaker. If another Data Collector is configured as the tiebreaker, such as a Remote Data Collector, do not configure the current Data Collector as the tiebreaker.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Live Volumes** tab and then select a Live Volume.
4. Click  **(More Actions)** and select **Update to Local Tiebreaker**.
The **Update to Local Tiebreaker** dialog box opens.
5. Select a Live Volume.
6. Click **OK**.


Enable Automatic Failover on a Live Volume




Enabling Automatic Failover allows the Live Volume to automatically failover to the secondary Live Volume after a failure. Automatic Restore recreates the Live Volume relationship between the two Live Volumes. The active (previously secondary) Live Volume will remain in the primary role and the original primary Live Volume will become the secondary Live Volume.

Prerequisites

- The Live Volume must be configured as synchronous and high-availability.
- Both primary and secondary Storage Centers must be managed by 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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Live Volumes** tab.
4. Select the Live Volume to edit and click  **(More Actions)**.
The **Edit Live Volume** dialog box opens.

5. Select the **Failover Automatically** check box.
6. To enable automatic restore, select the **Restore Automatically** check box.
7. Click **OK**.

Live Volume ALUA

Asymmetric Logical Unit Access (ALUA) is a set of SCSI concepts and commands that define path prioritization for SCSI devices. It allows paths to be described as fast, slow, or down and allows transitions between these states using a common standard. Live Volume ALUA reports Active/Optimized and Active/Non-optimized ALUA states on the primary and secondary volumes/storage systems, respectively.

Storage Center supports Live Volume ALUA beginning in version 7.3.

Live Volume ALUA Optimization Considerations

Live Volume ALUA is used to control the priority of paths for the Primary and Secondary Live Volume components. By default, volume mapping is Active/Optimized on the primary volume path and Active/Non-optimized on the secondary volume path. This section provides information about the design features of Live Volume ALUA.

- **ALUA is Automatically enabled:** Live Volume ALUA is automatically applied when creating Live Volumes in any of the following circumstances. Both the primary and secondary Storage Centers must support ALUA optimization.
 - Creating a new Live Volume
 - Converting a replicated volume to a Live Volume
 - Converting an existing volume to a Live Volume
 - Creating a Live Volume from a restore point (The restore point does not retain the new optimized ALUA information.)

When a Live Volume is created, the **Report Non-optimized Paths** feature is enabled by default.

- **ALUA is not automatically enabled:** Live Volume ALUA is not automatically enabled under the following circumstances:
 - Swapping Roles. However if ALUA is enabled on one or more of the systems, that status is reported and persists.
 - Existing Live Volumes after system upgrades. Use the ALUA optimization wizard to enable Live Volume ALUA.
- **ALUA Optimization Wizard:** If one or more Live Volumes are not ALUA optimized, a message is displayed in a banner at the top of the **Live Volume** tab in the **Replications & Live Volumes** view. Clicking the **Update to ALUA Optimized** link in the banner opens the ALUA optimization wizard. The wizard provides a guided process to enable ALUA optimization on existing Live Volumes.

NOTE: The system must undergo a service outage (such as server rescans or reboots) to fully enable Live Volume ALUA support. This requirement is due to the path information memory of Multipath Input Output (MPIO) drivers on various servers. Because it is a disruptive operation, enabling Live Volume ALUA on existing Live Volumes should be performed during a maintenance window.

- **Non-optimized path reporting:** Non-optimized path reporting is enabled or disabled using one of these methods:
 - In the **ALUA Optimization Wizard:** Disable or enable non-optimized path reporting by selecting or clearing the **Report Non-optimized Paths** check box (see [Enable Live Volume ALUA Optimization](#)).
 - In the **Edit Live Volume Settings** dialog box: Enable or disable non-optimized path reporting by clearing or selecting the **Report Non-optimized Paths** check box (see [Enable or Disable Non-Optimized Path Reporting](#)).
- **Microsoft Windows Environments:** Using non-optimized paths is not recommended in Microsoft Windows environments and reporting non-optimized path reporting should be disabled. When all paths are reported as non-optimized, MPIO drivers do not function in a round-robin as expected. Data transfer is reduced to a single path causing a delayed failover.

NOTE: Certain Windows Server 2016 versions can support non-optimized path reporting properly. For more information and best practice guidelines for configuring MPIO on Microsoft Server 2016, see the [Dell EMC SC Series Storage and Microsoft Multipath I/O](#) white paper on the Dell support site.


Enable Live Volume ALUA Optimization



Use the ALUA optimization wizard to enable ALUA optimization on existing Live Volumes that are eligible to be upgraded.


About this task


NOTE: Enabling Live Volume ALUA is a disruptive process and should be performed during a maintenance operation.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Live Volumes** tab.
The **Live Volumes** view is displayed. If a Live Volume is not optimized, a banner message is displayed. The message states that Live Volumes are available that are eligible for ALUA optimization.
4. Click **Update to ALUA Optimized**.
The **Update to ALUA Optimized** dialog box opens.
5. Select the Live Volumes that you want to optimize.
6. Select whether to reset the secondary server mappings.
 - If you select the **Reset Secondary Server Mappings** check box, the server mappings of the Secondary Live Volumes are reset and which causes an immediate outage. A manual rescan must be performed.
 - By default, the **Reset Secondary Server Mappings** check box is cleared and will not cause an outage. The secondary side servers must be restarted later during a maintenance operation.
7. Select whether to report non-optimized paths.
 - By default, the **Report Non-optimized Paths** check box is selected, and Live Volumes report non-optimized ALUA paths from the secondary system.
 - If you clear the **Reset Secondary Server Mappings** check box, Live Volumes does not report non-optimized ALUA paths from the secondary system.


 **NOTE:** Using non-optimized paths is not recommended in Microsoft Windows environments and reporting non-optimized path reporting should be disabled. When all paths are reported as non-optimized, MPIO drivers do not function in a round-robin as expected. Data transfer is reduced to a single path causing a delayed failover.




 **NOTE:** Certain Windows Server 2016 versions can support non-optimized path reporting properly. For more information and best practice guidelines for configuring MPIO on Microsoft Server 2016, see the [Dell EMC SC Series Storage and Microsoft Multipath I/O](#) white paper on the Dell support site.
8. Click **OK**.

Enable or Disable Non-Optimized Path Reporting

When Live Volume ALUA is enabled, non-optimized paths are reported by default. However, this setting can be enabled or disabled to optimize path I/O.

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  **Data Mobility** menu, click **Replications & Live Volumes**.
3. Click the **Live Volumes** tab.
4. Select the Live Volume to edit and click  (**Edit**).
The **Edit Live Volume** dialog box opens.
5. In the **Live Volume Attributes** area, select or clear the non-optimized path setting.
 - Select the **Report Non-optimized Paths** checkbox to enable Live Volumes to report non-optimized ALUA paths from the secondary system.
 - Clear the **Report Non-optimized Paths** checkbox to disable Live Volumes from reporting non-optimized ALUA paths from the secondary system.
6. Click **OK**.




Monitoring Live Volumes

Monitor a Live Volume to determine how much progress has been made.

Filter Live Volumes in the Live Volumes tab

You can filter content in the **Live Volumes** tab to view only specific Live Volumes.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Click .
Select the options to display in the **Live Volumes** view. For example, select **Primary Storage Center** and identify the name or part of the name of the Storage Center to include and click **Apply**.

View the Replication Managed by a Live Volume

A managed replication replicates a Live Volume primary volume to a third 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. From the  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Select the Live Volume.
5. Click **... (More Actions)** and select **Managed Replication**.
The **Replication** tab opens to the managed replication.

View the Snapshots for a Live Volume

Use the **Snapshots** tab in the **Live Volume** view to see the snapshots for the source volume and the target volume.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Click on the Live Volume.
The **Live Volume** view opens.
5. Select the **Snapshots** tab.
Snapshots for the source and target volumes are displayed in the view.

View the Live Volume Growth Chart

Use the **Growth** tab in the **Live Volumes** view the progress of a Live Volume replication.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Click on the Live Volume to view.
The **Live Volumes** view opens.
5. Select the **Growth** tab.
6. Choose the data range for the charts:
 - Select a predefined date range from the **Display** list.
 - Select **Custom** from the **Display** list and set the specific **Start Time** and **End Time** to show in the charts, then click **Update**.

View the Live Volume Threshold Definitions

Use the **Thresholds** tab in the **Live Volumes** view and set Thresholds.



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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Click on the Live Volume to view.
The **Live Volumes** view opens.
5. Select the **Thresholds** tab.
6. To create a new threshold, click **Set Thresholds**.

View the Live Volume I/O Performance

Use the **Performance** tab in the **Live Volumes** view the replication I/O performance.

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  **DATA MOBILITY** menu, click **Replications & Live Volumes**.
The **Replications & Live Volumes** view opens to the **Replications** tab.
3. Click the **Live Volumes** tab.
The **Live Volumes** view opens.
4. Click on the Live Volume to view.
The **Live Volumes** view opens.
5. Select the **Performance** tab.
6. Choose the data range for the charts:
 - Select a predefined date range from the **Display** list.

- Select **Custom** from the **Display** list and set the specific **Start Time** and **End Time** to show in the charts, then click **Update**.

Storage Center DR Preparation and Activation

Activate disaster recovery to restore access to your data in the event of an unplanned disruption.

Topics:

- [How Disaster Recovery Works](#)
- [Disaster Recovery Administration Options](#)
- [Preparing for Disaster Recovery](#)
- [Activating Disaster Recovery](#)
- [Restarting Failed Replications](#)
- [Restoring Replications and Live Volumes](#)
- [Deleting a Restore Point](#)

How Disaster Recovery Works

Disaster recovery (DR) is the process activating a replicated destination volume when the source site fails. When the source site comes back online, the source volume can be restored based on the volume at the DR site.

The following diagrams illustrate each step in the DR process. Although this example shows a replication, DR can also be used for a Live Volume.

Step 1: A Volume is Replicated to a DR Site

A volume is protected from disaster by replicating it to a Storage Center located at a DR site.

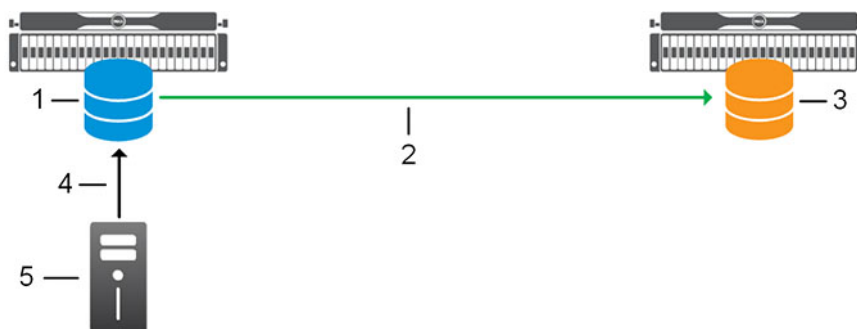


Figure 18. Volume Replicating to a DR Site

- | | |
|---------------------------------------|--|
| 1. Source volume | 2. Replication over Fibre Channel or iSCSI |
| 3. Destination volume | 4. Server mapping to source volume |
| 5. Server mapped to the source volume | |

Step 2: The Source Site Goes Down

When the source site goes down, the data on the source volume can no longer be accessed directly. However, the data has been replicated to the destination volume.

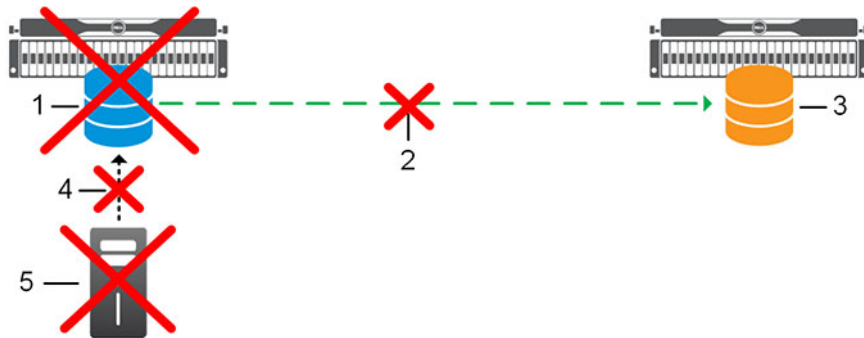


Figure 19. Replication When the Source Site Goes Down

1. Source volume (down)
2. Replication over Fibre Channel or iSCSI (down)
3. Destination volume
4. Server mapping to source volume (down)
5. Server mapped to the source volume (down)

Step 3: An Administrator Activates Disaster Recovery

An administrator activates DR to make the data in the destination volume accessible. When DR is activated, Unisphere Central brings the destination volume on line and maps it to a server at the DR site. The server sends IO to the activated DR volume for the duration of the source site outage.

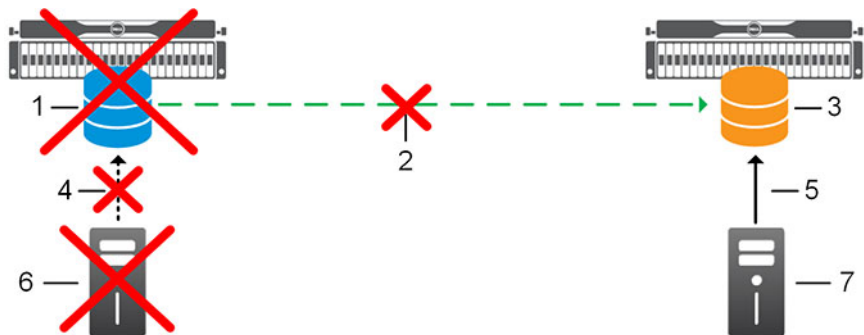


Figure 20. Replication When DR is Activated

1. Source volume (down)
2. Replication over Fibre Channel or iSCSI (down)
3. Destination volume (activated)
4. Server mapping to source volume (down)
5. Server mapping to activated DR volume
6. Server at source site
7. Server at DR site

Step 4: Connectivity is Restored to the Source Site

When the outage at the source site is corrected, Storage Manager Data Collector regains connectivity to the source Storage Center. The replication cannot be restarted at this time because the destination volume contains newer data than the original source volume.

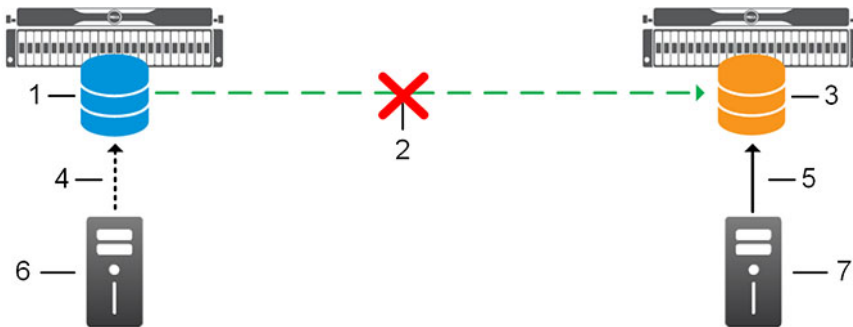


Figure 21. Replication After the Source Site Comes Back Online

- | | |
|--|--|
| 1. Source volume | 2. Replication over Fibre Channel or iSCSI (down) |
| 3. Destination volume (activated) | 4. Server mapping to source volume (may be up or down) |
| 5. Server mapping to activated DR volume | 6. Server at source site (may be up or down) |
| 7. Server at DR site | |

Step 5: An Administrator Restores the Source Volume

After verifying that the source site is back up and fully functional, an administrator begins the process of restoring the original source volume based on the activated DR volume. Administrator intervention is required during the restore process to make sure that IO is halted to the destination volume at the appropriate time.

Step 5A: The Destination Volume Replicates Back to the Source Site

When the restore operation is initiated, the activated destination begins replicating to the original source volume. The most recent common snapshot for the original source and activated DR volume is located, and subsequent snapshots are replicated to the original source volume. If all common snapshots expired after the destination volume was activated for DR, a new volume is created and the original is placed in the recycle bin so that it can be retrieved if necessary. During this time, the activated DR volume continues to accept IO.

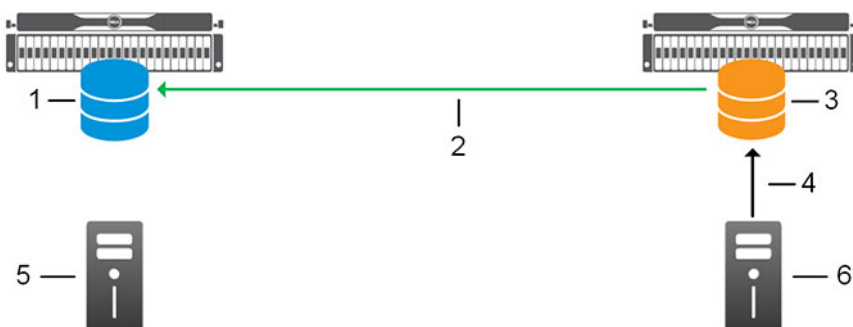


Figure 22. Activated DR Volume Replicating Back to the Source Site

- | | |
|---------------------------------------|--|
| 1. Source volume being recovered | 2. Replication over Fibre Channel or iSCSI |
| 3. Destination volume (activated) | 4. Server mapping to activated DR volume |
| 5. Server at source site (not mapped) | 6. Server at DR site |

Step 5B: The Activated DR Volume is Deactivated

After the replication from the activated DR volume to the original source volume is synchronized, Unisphere Central prompts the administrator to halt IO to the secondary volume.

NOTE: IO must be halted before the destination volume is deactivated because the deactivation process unmaps the volume from the server.

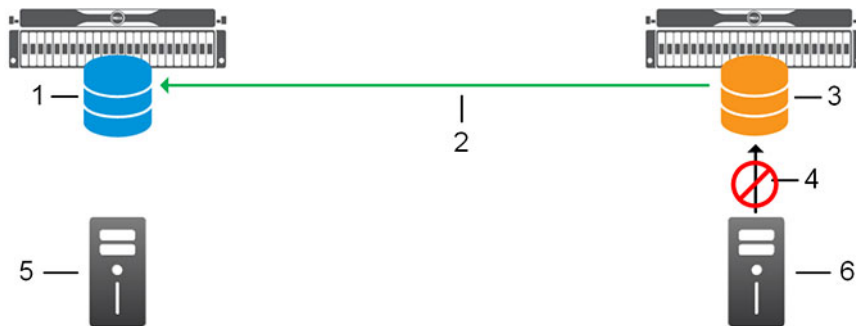


Figure 23. DR-Activated Volume is Deactivated

1. Source volume being recovered
2. Replication over Fibre Channel or iSCSI
3. Destination volume (activated)
4. Server mapping to activated DR volume (IO halted)
5. Server at source site (not mapped)
6. Server at DR site

Step 5C: The Source Volume is Activated

Unisphere Central prompts the administrator to deactivate and unmap the destination volume. The source volume resumes replicating to the destination volume, and the source volume is activated and mapped to the server at the source site.

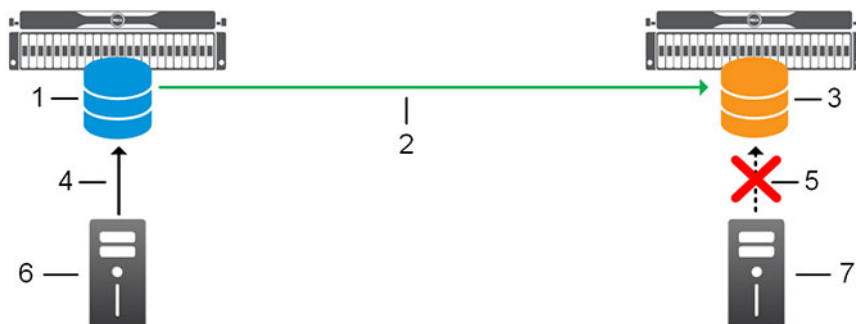


Figure 24. Recovered Source Volume is Activated

1. Recovered and activated source volume
2. Replication over Fibre Channel or iSCSI
3. Destination volume (deactivated)
4. Server at source site mapped to recovered and activated source volume
5. Server mapping removed from destination volume
6. Server at source site
7. Server at DR site

Disaster Recovery Administration Options

Use Unisphere Central to prepare for DR, activate DR, and restore failed volumes. To make sure that a site outage does not prevent you from accessing Unisphere Central to perform DR operations, you can optionally install a remote Data Collector at a DR site.

A remote Data Collector provides access to Unisphere Central DR options when the primary Data Collector is unavailable.

Preparing for Disaster Recovery

Prepare for DR by saving restore points, predefining DR settings, and testing those settings.

Perform these tasks to implement a DR plan:

- [Saving and Validating Restore Points](#) on page 253
- [Defining Disaster Recovery Settings for Replications](#) on page 255
- [Test Activating Disaster Recovery](#) on page 256

Saving and Validating Restore Points


A restore point includes information about a replication or Live Volume, including the source and destination volumes, source and destination Storage Centers, and the Bandwidth Controls used. If a Storage Center goes down, this information becomes the basis for restoring the replication or Live Volume.



- A restore point for a Live Volume that manages a replication does not contain information about the managed replication.
 - If DR is activated for the Live Volume using the **Preserve Live Volume** option, the managed replication continues to operate and follows the DR-activated volume.
 - If DR is activated for the Live Volume without using the **Preserve Live Volume** option, the managed replication is removed and must be re-created manually.
- A restore point for a replication that is managed by a Live Volume does not contain information about the Live Volume. If DR is activated for the managed replication, the Live Volume must be re-created manually.

Save Restore Points for All Replications and Live Volumes

Save restore points for all replications and Live Volumes from the **Disaster Recovery** view.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Click **Save All**.
A confirmation dialog box opens.
4. Click **Ok**.
A restore point is saved for each replication and Live Volume.

Save a Single Restore Point

Save a single restore point on the **Restore Points** tab in the **Disaster Recovery** view.


Prerequisites

The restore point must show a status of **Up** in the **Restore Points** tab.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Select the restore point to save.
4. Click **Save**.
A confirmation dialog box opens.
5. Click **Ok**.

Set a Schedule for Automatically Saving and Validating Restore Points

Set a schedule for automatically saving and validating restore points to make sure that good restore points are always available to perform Disaster Recovery.


Steps



1. Click  **Data Collector**.
The **Data Collector** view is displayed
2. Click the **General** tab, and then select the **Replication** subtab.
3. Click **Edit**. The **Replication** dialog box opens.
4. Select the **Automatically save and validate restore points** check box.
5. From the **Frequency** drop-down menu, select how often you want restore points to be automatically saved and validated.
6. (Conditional) If you selected **Daily** in the previous step, select the time of day to save and validate restore points from the **Time** drop-down menu.
7. Click **OK**.

Validate Replication Restore Points

Validate replication restore points before testing or activating Disaster Recovery to ensure they can be used for Disaster Recovery.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Click **Validate All**.
Unisphere Central reviews all saved replications and ensure that they are still running and displays the results on the **Restore Points** tab. The **Status** column displays the results of the validation operation. Possible status values are:
 - **Up:** The replication is up and running normally.
 - **Degraded:** There is something wrong with the replication. The **State** column provides information about why the replication is no longer running. This replication is eligible for DR.
 - **Down:** The replication is not running. The **State** column provides information about why replication is no longer running. This could be because the destination system is no longer available or that the source and Destination volume are no longer up and running. This replication is not eligible for DR.
4. If one or more restore points are degraded or down, take corrective action such as:
 - Activate a DR site.
 - Restore or restart the replication to the source or destination Storage Center.
 - Delete the restore point if it is no longer needed.


Defining Disaster Recovery Settings for Replications



Predefining DR for a replication restore point is an optional step that configures DR activation settings for a replication restore point ahead of time, so that the DR site is ready if the destination volume needs to be activated. If you do not intend to access data from a destination site, you do not need to predefine DR settings. DR settings cannot be predefined for Live Volume restore points.

Predefine Disaster Recovery Activation

Use the **Restore Points** tab in the **Disaster Recovery** view to predefine a disaster recovery activation.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Select one or more replication from the list.
4. Click **Predefine Activate**.
The Predefine Activate wizard opens.
5. Review the information on the **Predefine Activation Information** page of the wizard and click **Next**.
6. On the **Predefine Activate** [*Storage Center—Storage Center*] page, configure DR settings for the restore point.
 - a. Select the restore point that you want to modify, then click **Edit Activation Settings**. The **Edit Activation Settings** dialog box opens.
 - b. Modify the recovery volume settings as needed, then click **OK**. These attributes are described in the online help.
7. Click **Next**.
If multiple restore points were selected to define, the [Predefine Activate *Storage Center - Storage Center*] wizard advances to the next restore point. Configure the DR settings and click **Next** for each restore point selected.
8. Review the DR settings summary and, click **Finish**.

Export Activate Settings

Export disaster recovery activation settings to use them on other Storage Centers or other disaster recovery plans.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Click **More Actions** , and then select **Export Activate Settings**.
The **Select Restore Points** page opens.
4. Select one or more restore points for which to save activation settings.
5. Click **Next**.
The **Confirmation** page opens.
6. Review the selections and click **Finish** to export the settings.
The settings are exported to a file with the file extension `.emrp`. The location of the file depends on your browsers settings. You may be prompted for a location, or the file may be saved to the browser's default location.


Import Activate Settings



Import disaster recovery activation settings that are created on other Storage Centers or for other disaster recovery plans.

Prerequisites

An exported Activate Settings file must exist. The exported file is named with the file extension `.emrp`.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Click **More Actions** ▼ and select **Import Activate Settings**.
The **Choose File** page opens.
4. Review the information that is presented and click **Yes, I want to import DR Activation information from file**.
5. Click **Choose File** and go to the `.emrp` file.
6. Select the activation file to use and click **Open**.
7. Click **Next**.
The **Select Restore Points** page opens.
8. Select one or more restore points to which to apply the activation settings.
9. Click **Next**.
The **Activate Settings** page opens.
10. (Optional) Configure activation settings for each restore point.
 - a. Select the restore point that you want to modify, then click **Edit Activation Settings**. The **Edit Activation Settings** dialog box opens.
 - b. Modify the recovery volume settings as needed, then click **OK**. These attributes are described in the online help.
11. Click **Next**.
The **Summary** page opens.
12. Review the settings and click **Finish** to import the settings.

Test Activating Disaster Recovery

Testing DR activation for a replication restore point creates a test-activated view volume and maps it to the appropriate server without interrupting service for the original volume. This allows you to make sure that your DR plan is viable.

- Periodically test-activate DR for restore points to ensure their the restore point is viable.
- DR activation settings specified for test activation are retained for future DR activation and test activation.
- Live Volume restore points cannot be tested.


Test Disaster Recovery Activation


Use the **Restore Points** tab in the **Disaster Recovery** view to test a disaster recovery activation.


Prerequisites

The restore point must show a status of **Up** in the **Restore Points** tab.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Select one or more replication from the list.
4. Click **Test Activate**.
The **Test Activate** wizard opens.
5. Review the information on the **Test Activation Information** page of the wizard and click **Next**.
6. Configure DR settings for each restore point.
 - a. Select the restore point that you want to modify, then click **Edit Activation Settings**. The **Edit Activation Settings** dialog box opens.
 - b. Modify the recovery volume settings as needed, then click **OK**. These attributes are described in the online help.
7. Click **Next**.
If multiple restore points were selected to define, the **Test Activate** [*Storage Center—Storage Center*] wizard advances to the next restore point. Configure the DR settings and click **Next** for each restore point selected.
8. Review the DR settings summary and, click **Finish**.

Delete Activation Test Volumes

Use the **Restore Points** tab in the **Disaster Recovery** view to delete test activation volumes.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Click **More Actions** ▼ and select **Delete Test DR Volumes**.
4. Select one or more test volumes from the list and then click **Next**.
5. Review the information on the Confirmation page of the wizard.
 - a. Click **Finish** to delete the select volumes and close the wizard.
 - b. Click **Back** to select different volumes.
 - c. Click **Cancel** to close the wizard without deleting any volumes.

Activating Disaster Recovery

Activate DR when a volume or site becomes unavailable. When DR is activated, a view volume of the original destination volume (replication) or secondary volume (Live Volume) is brought on line and mapped to a server at the DR site. Before DR can be activated for a volume, at least one snapshot must have been Replicated to the DR site.

Types of Disaster Recovery Activation for Live Volumes

Storage Center supports two types of Disaster Recovery for Live Volumes:

- **Preserve Live Volume:** Directs IO requests to the secondary volume by promoting it to primary. The Live Volume is not deleted and may be repaired when an administrator restores the volume after the source Storage Center comes back online. Volume identity is preserved so that administrator intervention is not required on the servers mapped to the volume. If a replication is managed by the Live Volume, the managed replication is preserved and follows the DR-activated volume.
- **Recreate Live Volume:** If **Preserve Live Volume** is not selected or not available, Unisphere Central deletes the Live Volume, creates a view volume, and maps it to a server. During the recovery process, the Live Volume is recreated. If a replication is managed by the Live Volume, the managed replication is removed during the recovery process.

Disaster Recovery Activation Limitations

Activating DR for a replication removes any replications that use the activated volume (original destination/secondary volume) as the source volume.

Planned vs Unplanned Disaster Recovery Activation

During disaster recovery activation, you may choose whether you want to allow planned DR activation. The following table displays some of the differences between planned and unplanned DR activation.

Planned DR Activation	Unplanned DR Activation
The servers on the production site are shut down.	The servers on the production site are not shut down.
The Storage Centers on the production site do not have to be shut down.	The Storage Centers on the production site are shut down.
The source volume is no longer mapped to the server.	The source volume is still mapped to the production servers.
You can copy any remaining data prior to activation, eliminating data loss.	Data may be lost, depending on the recovery point objective (RPO).
The production site will not come back online while service has switched to the DR site.	The production Storage Centers and the servers may come back online, creating the danger of a split brain.

Disaster Recovery Activation Procedures

If an entire site becomes unavailable, DR can be activated for all affected volumes in a single operation. If a single volume becomes unavailable, activate DR for the corresponding restore point.


Activate Disaster Recovery



Use the **Restore Points** tab in the **Disaster Recovery** view to activate a disaster recovery.

Prerequisites

Save and validate restore points.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Filter the restore points displayed using the Filters pane:
 - a. Select **Ready To be Activated** from the **Display** menu.
 - b. Select or clear the check boxes next to the Storage Centers in the list to show the restore points of interest.
4. Select one or more restore points from the list.
5. Click **Activate**.
The **Activate** wizard opens.
6. Review the information on the **Activation Warnings** page of the wizard and click **Next**.
7. Configure disaster recovery settings for each restore point.
 - a. Select the restore point that you want to modify, then click **Edit Activation Settings**. The **Edit Activation Settings** dialog box opens.
 - b. Modify the recovery volume settings as needed, then click **OK**. These attributes are described in the online help.
8. Click **Next**.

If multiple restore points were selected to define, the **Activate** [*Storage Center—Storage Center*] wizard advances to the next restore point. Configure the DR settings and click **Next** for each restore point selected.

- Review the **Activate** summary and, click **Finish**.


Restarting Failed Replications



If a source volume is current and functional, and the destination system is available but a Replication failed or was deleted, you can restart the Replication. To see if a Replication can be restarted, validate Restore Points.

Restart a Replication for a Restore Point

Use the **Restore Points** tab in the **Disaster Recovery** view to restart a replication for a restore point.

Steps

- 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**).
- From the  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
- Filter the restore points displayed using the Filters pane:
 - Select **Ready To be Restored/Restarted** from the **Display** menu.
 - Select or clear the check boxes next to the Storage Centers in the list to show the restore points of interest.
- Select one or more failed restore points from the list.
- Click **Restore/Restart**.
The **Restore/Restart** wizard opens.
- Review the **Restart Warning** and click **Next**.
- Configure restore settings for each restore point.
 - Select the restore point that you want to modify, then click **Edit Restore Settings**. The **Edit Restore Settings** dialog box opens.
 - Modify the volume and replications settings as needed, then click **OK**. These attributes are described in the online help.
- Click **Next**.
If multiple restore points were selected to restart, the **Restore/Restart Settings** [*Storage Center—Storage Center*] wizard advances to the next restore point. Configure the DR settings and click **Next** for each restore point selected.
- Review the **Restore/Restart** summary and, click **Finish**.


Restoring Replications and Live Volumes

A replication source volume or Live Volume primary volume can be restored from a replication destination volume or Live Volume secondary volume. Restoring a volume is necessary when it has been deleted or DR has been activated and data has been written to the activated volume.

Volume Restore Options

The options to restore a volume differ depending on whether DR was activated.

- Recover from a destination volume that was not activated:** If a source volume no longer exists, Unisphere Central restores the data from the destination volume by replicating it back to a newly created source volume. Once the replication is complete, Unisphere Central maps the new source volume to a selected server and restarts the replication back from the source system to the destination system.
- Recover from a destination volume that was activated:** Unisphere Central recovers data from the destination volume, including all new writes to the volume after it has been activated, to the original source volume. If the original source volume is no longer there it will be re-created. Once the restore is complete, Unisphere Central maps the source volume to the selected server and restarts the replication from the source volume to the destination volume.

 **NOTE:** To restore a volume to an alternate site, consult with technical support (see <https://www.dell.com/support>).

Volume Restore Limitations

The following limitations apply to the volume restore process.

- Restoring a volume removes replications that use it as a source volume.
- Restoring an original primary Live Volume volume using a managed replication removes the associated Live Volume.

Restoring a Live Volume and a Managed Replication

After a failover of a Live Volume with a Managed Replication, Unisphere Central creates a new managed replication for the secondary Live Volume. When the original primary Live Volume system is brought back online and the Live Volume is not restored, there will be two managed replications for the Live Volume. Restoring the Live Volume will delete the managed replications on the original primary Live Volume and keep the Managed Replication on the secondary Live Volume. Swapping the roles of the Live Volume will recreate the managed replication on the original primary Live Volume and delete the Managed Replication on the secondary Live Volume.


Volume Restore Procedures



If DR was activated for multiple replications and/or Live Volumes hosted by a Storage Center pair, the affected volumes can be restored in a single operation. If DR was activated for a single volume, use the corresponding restore point to restore it.

Restore a Failed Volume Restore Point

Use the **Restore Points** tab in the **Disaster Recovery** view to activate a disaster recovery.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. Filter the restore points displayed using the Filters pane:
 - a. Select **Ready To be Restored/Restarted** from the **Display** menu.
 - b. Select or clear the check boxes next to the Storage Centers in the list to show the restore points of interest.
4. Select one or more degraded or failed restore points from the list.
5. Click **Restore/Restart**.
The **Restore/Restart** wizard opens.
6. Review the **Restore Warnings** and click **Next**.
7. Select the restore point that you want to modify, then click **Edit Restore Settings**. The **Edit Restore Settings** dialog box opens.
8. Choose a recovery method:
 - If the **Recover Live Volume** check box is available, select it to repair the Live Volume by reestablishing connectivity between the original source volume and activated volume. This option must be selected to preserve volume identity. If the Live Volume manages a replication, this option must be selected to preserve the managed replication. When selected, the **New Source Volume Settings** and **Replication Settings** are not available because the existing Live Volume settings are used
 - If the **Recover Live Volume** check box is not available or not selected, the Live Volume is recreated using the **New Source Volume Settings** and **Replication Settings** you specify. Volume identity is lost, and if the Live Volume manages a replication, the managed replication is removed.
9. (Replication only) If a source volume is being restored:

- Select the **Mirror Back Only** check box to skip recreating the replication in the original direction and use the DR site as the source.
 - Select the **Automatically Deactivate Destination** check box to automatically remove server mappings from the activated volume without requiring administrator intervention. This option is available only if DR has been activated for the restore point. If this option is selected, IO to the activated volume should be halted before performing the restore.
10. Modify the **New Source Volume Settings** as needed. These settings are described in the online help.
 11. Modify the **Replication Settings** as needed. These settings are described in the online help.
 12. Click **OK**.
 13. Click **Next**.
If multiple restore points were selected, the **Restore/Restart Settings** [*Storage Center—Storage Center*] wizard advances to the next restore point. Configure the settings and click **Next** for each restore point selected.
 14. Review the **Restore/Restart** summary and, click **Finish**.
Unisphere Central restores the replication or Live Volume. Use the **Recovery Progress** tab to monitor the replication or Live Volume.
 15. On the **Recovery Progress** tab, when the restore point message displays **Mirror is synced waiting for destination to be deactivated**, halt IO to the destination volume.
 16. Deactivate the destination volume by selecting the restore point and clicking **Deactivate Destination**.
 17. Click **Yes** to confirm the deactivation.
The destination volume is deactivated, the recovered volume is activated and mapped to the configured server, and the replication direction is reversed so that the recovered volume becomes the source.


Deleting a Restore Point



If a replication or Live Volume has been deleted or is no longer functioning and you want to delete it permanently, delete the associated restore point.

Prerequisites

The Status for the restore point must be Degraded or Down.

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  **Data Mobility** menu, click **Disaster Recovery**.
The **Disaster Recovery** view opens to the **Restore Points** tab.
3. (Optional) In the **Filters** pane, select or clear check boxes next to the source and destination Storage Centers to show only restore points of interest.
4. Select one or more Degraded or Down restore points from the list.
5. Click **Delete**.
A confirmation dialog box opens.
6. Click **Yes** to confirm that you want to delete the restore points displayed in the dialog box.

Viewing Storage Center Information

Unisphere provides access to summary information about managed Storage Centers, including I/O performance and hardware status. Use this information to monitor the status of your Storage Centers.

Topics:

- [Summary Information](#)
- [Viewing Detailed Storage Usage Information](#)
- [Viewing Growth Data](#)
- [Export I/O Usage Data](#)
- [Exporting Usage and Monitoring Data](#)

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.	x	x
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	x
Volumes Percent Full	A graphical representation of the amount of disk space being used in each volume.	x	x
Volumes Full Forecast	Volumes that are estimated to be full within 7 days, 14 days, and 28 days.	x	x
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	x
Top Used Disk Folders	Graphical representation showing used disk space versus available disk space by disk folder, including the	N/A	x

Widget	Description	Home Page (Multiple Storage Centers)	Storage Center Summary Page (Single Storage Center)
	threshold level. The threshold level is the point at which a disk space warning is triggered.		
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	x
Back End IOPS	Transfer rate of read and write operations 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 IOPS.	N/A	x
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	x

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	Meaning
	Object is up and functioning normally.
	Object is in a degraded state and should be investigated.

Icon	Meaning
	Object is down and requires attention.

Alert	Meaning
Critical	The object is in a critical state and may be nearing failure.
Warning	A condition on the Storage 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.
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 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.


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 **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.
2. 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.


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. 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).
4. 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.
2. 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).
4. 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.
2. 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.

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 **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**.

Storage Center Monitoring

Unisphere provides a centralized location to view Storage Center alerts, indications, and logs collected by the Storage Center. System events logged by the Storage Center can also be viewed.

Topics:

- [Alerts](#)
- [Data Collector Alerts](#)
- [Logs](#)
- [Thresholds](#)
- [I/O Charts](#)
- [Most Active Reports](#)

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 10. 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  **(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](#) on page 271
[Export Storage Center Alerts](#) on page 271
[Delete Storage Center Alerts](#) on page 271
[Select the Columns to Display](#) on page 272

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  **(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](#) on page 271
[Export Storage Center Alerts](#) on page 271
[Delete Storage Center Alerts](#) on page 271
[Filter the Storage Center Alerts](#) on page 271
[Select the Columns to Display](#) on page 272

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

1. From the  **MONITORING** menu, click **Alerts**.
The **Alerts** view is displayed.
2. Select the alerts to acknowledge.
 **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:



Steps

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.
 **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 11. 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.

Example of a Storage Manager Data Collector alert



An alert is generated when the disk partition on which the Storage Manager Data Collector is located starts to run out of space.


- If the amount of disk space remaining is less than 25%, an event with a severity of **Warning** and the message **Disk partition containing Dell Storage Manager is running low on space** is displayed.
- If the amount of disk space remaining is less than 10%, an event with a severity of **Error** and the message **Disk partition containing Dell Storage Manager is running low on space** is displayed
- If the amount of disk space remaining is less than 3%, an event with a severity of **Exception** and the message **Disk partition containing Dell Storage Manager is full** is displayed.

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.

4. Click  (**Column Filters**).
The **Filters** dialog box opens.
5. Select one or more of the following filter categories:
 - Severity
 - Last Occurrence
 - 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 **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](#) on page 275

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](#) on page 275

[Configure an Email Address for Your User Account](#) on page 275




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  (**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  (**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 **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.
2. 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


1. 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 settings to send logs directly 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. In the Storage Center Summary view, click  (**Storage Center Settings**).
The **Storage Center Settings** dialog box opens.
3. Click the **Alerts and Logs** tag or the **Logs** tab.
4. Select **Send Logs to Syslog Server**.
5. In the **Host or IP Address** field, type the host name or IP address of the syslog server.
6. In the **Port** field, type the port number of the syslog server.
7. 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**.
The **Storage Center Settings** dialog box opens.
3. Click the **Alerts and Logs** tab or the **Logs** tab.
4. Select **Do Not Send Logs**.
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.

 **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](#) on page 279
- [Assigning Storage Objects to Threshold Definitions](#) on page 282
- [Assigning Threshold Definitions to Storage Objects](#) on page 283

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 **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.

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.

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  (**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.
 4. 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.
-  **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.

 **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  (**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 remove and click  (**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.
5. Click  (**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.

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 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.


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. 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.
6. 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.
 **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 **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.
-  **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.



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.
 - 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  (**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.




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 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  (**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.

 **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.

The combination of a 24 hour time period for threshold alert emails and a default Storage Usage collection interval of four hours might result in a day when a threshold alert email is not sent. The following table shows how a threshold alert email might not be sent on a Sunday, if the threshold alert emails started on a Monday at 12:00 AM:



Table 12. Example threshold alert email times

Weekday	Time of threshold alert email	Threshold alert email period + Storage Usage collection interval
Monday	12:00 AM (00:00) on Monday	24 hour period + 4 hr collection interval
Tuesday	04:00 AM (04:00) on Tuesday	24 hour period + 4 hr collection interval
Wednesday	08:00 AM (08:00) on Wednesday	24 hour period + 4 hr collection interval
Thursday	12:00 PM (12:00) on Thursday	24 hour period + 4 hr collection interval
Friday	04:00 PM (16:00) on Friday	24 hour period + 4 hr collection interval
Saturday	08:00 PM (20:00) on Saturday	24 hour period + 4 hr collection interval
Sunday / Monday	12:00 AM (00:00) on Monday	24 hour period + 4 hr collection interval

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](#) on page 275

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

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 **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 **Queries** 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.

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 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 Center or 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 **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.

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. Select a query from **Queries** 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 information

[Create a Threshold Query](#) on page 288

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 queries are displayed in the **Queries** area.
4. In the **Queries** area, select the query to edit.
5. Click **Edit**.
The **Edit Query** 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.

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.

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.
2. From the  **MONITORING** menu, click **Performance**.
The **Performance** view is displayed.
3. 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.
3. 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.
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 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.
2. From the  **MONITORING** menu, click **Performance**.
The **Performance** view is displayed.
3. 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.
2. From the  **MONITORING** menu, click **Performance**.
The **Performance** view is displayed.
3. 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.
3. 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.
3. 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 **QoS 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.
2. From the  **MONITORING** menu, click **Performance**.
The **Performance** view is displayed.
3. 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.


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 **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 by 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 by 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.

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 **Disks** radio button.
6. 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.
7. Select the usage metric to display from the drop-down menu.
The **MB/s** usage metric is displayed by default.
8. To export the most active report to a file, click **Export IO Usage**.

Storage Center Reports

The Reports view allows users to view realtime reports generated by Storage Center and historical reports Unisphere Central.

Topics:

- [Storage Center Realtime Reports](#)
- [Historical Reports](#)
- [View Historical Reports](#)
- [Configuring Automated Report Generation](#)
- [Configure Unisphere Central to Email 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 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  **REPORTS** menu, click **Realtime**.
The **Realtime Reports** view is displayed.
3. 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  (**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 13. Types of Reports

Report Frequency	Description
Daily	Generated at the end of each day and displays the following information: <ul style="list-style-type: none">• Alerts - Displays Storage Center alerts.• Volume Storage - Displays volume storage statistics.• Replications - Displays information about replications.• Live Volumes - Displays information about Live Volumes.
Weekly	Generated at the end of each week and displays the following information: <ul style="list-style-type: none">• 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 replications.• Disk Power On Time - Displays information about how long each disk has been powered on.• Live Volumes - Displays information about Live Volumes.
Monthly	Generated at the end of each month and displays the following information: <ul style="list-style-type: none">• 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 replications.• Disk Power On Time - Displays information about how long each disk has been powered on.• Live Volumes - Displays information about Live Volumes.

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.

 **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.

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

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](#) on page 275

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](#) on page 275

[Configure an Email Address for Your User Account](#) on page 275

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

 **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

 **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.
2. 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.

 **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. An SSL certificate is also required to communicate with a directory service using LDAP with the StartTLS extension or the LDAPS protocol.

Prerequisites

- The Subject CN value in the custom SSL certificate must contain the IP address or fully qualified domain name (FQDN) of the Data Collector server.
- The custom SSL certificate must be signed by a Certificate Authority (CA) that is trusted by the hosts in your network.
 **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. To generate SSL certificates:
 - a. Click **Generate Certificate**.
The **Generate Certificate** dialog box is displayed.
 - b. Select the type of certificate to generate from the **Certificate type** drop-down menu.
The options are:
 - **All certificates** - Generates Data Collector and VASA Provider certificates.

- **DSM Server** - Generates Data Collector certificates.
 - **VASA Server** - Generates VASA Provider certificates.
- c. Select the new IP address or FQDN of the Data Collector from the **Certificate Subject** drop-down menu.
 - d. If you are generating a VASA Provider certificate, type the username and password of a Data Collector user with Administrator privileges in the **DSM User Name** and **Password** fields.
 - e. Click **OK**.
6. To upload registered SSL certificates, click **Edit**.
The **Register Certificate** dialog box opens.
 7. To upload a 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.
 8. To 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.
 9. Type the name of the entry in the PKCS #12 private key file to use as the private key in the **Alias** field.
 10. Type the password for the private key file in the **Password** field.
 11. Click **OK**.
The **Data Collector Restart** dialog box opens.
 12. 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

 **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.

 **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.
9. 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** fields.
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 drop-down 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.
4. 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.
4. 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.



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 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.
5. Click **Edit** in the **Proxy Server** area.
The **Network Proxy Configuration** dialog box opens.
6. Select the **Enabled** checkbox to enable the proxy server.
 **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
Automated Reports	Generates a report for the following: <ul style="list-style-type: none">• 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 replications.• Live Volumes: Displays information about Live Volumes.
Automated Table Reports	Generates a report for the following: <ul style="list-style-type: none">• I/O Reports: Displays I/O information about the following:<ul style="list-style-type: none">○ Most Active Volumes

Report Type	Description
	<ul style="list-style-type: none"> Most Active Disks Most Active Servers Storage Reports: Displays detailed information about the following: <ul style="list-style-type: none"> Volume Reports: Volume, Volume Folder, Volume Growth, and Volume Profile Server Reports: Server and Server Folder Disk Reports: Disk, Disk Folder, Disk Class, and Disk Tier Storage Type Reports: Pressure Report

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


- 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.
- Click the **Monitoring** tab and then click the **Automated Reports** subtab.
- Click **Edit**. The Automated Reports Settings dialog box opens.
- Select the checkboxes in the **Automated Report Settings** area to specify which reports to generate and how often to generate them.
- 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 **Historical Reports** view.
- Set the **Automated Report Options**
 - 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.
 -  **NOTE:** The directory must be located on the same server as the Data Collector.
 -  **NOTE:** Automated reports cannot be saved to a public directory when using a Virtual Appliance.
 - To email the reports selected in the **Automated Reports Settings** area, select the **Attach Automated Reports to email** checkbox.
 - To email the reports selected in the **Automated Table Reports Settings** area, select the **Attach Table Reports to email** checkbox.
 - Select the file format for exported and emailed **Table Reports** from the **File Type for Table Reports** drop-down menu.
- 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

- 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.



 **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.
3. 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.
4. 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.

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 **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.
 **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.

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 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.

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. In the **User/PS Groups Maps** pane, select the user to unmap from the PS Series group.
5. Click  (**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.
5. Click  (**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.
6. 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

Steps

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 settings on 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.

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 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.

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 **compsauser**, but do not assign the user to a schema .
 - b. Set the password of the **compsauser** 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 **compsadb** database:

```
sp_change_users_login 'update_one', 'compsauser', 'compsauser'
```

6. After the query finishes, use the Data Collector to change the data source to the new database.



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 = 'compsauser';
```

```
DELETE FROM mysql.db WHERE user = 'compsauser';  
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 'compsauser';
```

2. Reinstall the Storage Manager Data Collector.

Data Collector User Management


Use the Data Collector to add users to and manage existing users on Unisphere Central.

Topics:

- [Unisphere Central User Privileges](#)
- [Authenticating Users with an External Directory Service](#)
- [Managing Local Users Through the Data Collector](#)
- [Managing Local User Password Requirements](#)
- [Managing User Settings with Unisphere](#)

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.

 **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.

 **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.

 **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.

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.

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.

 **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.
5. 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*)

 **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.

 **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.


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 **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 references

[Unisphere Central User Privileges](#) on page 321

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.
4. 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 references

[Unisphere Central User Privileges](#) on page 321

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.




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. 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.
4. 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.
5. 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  (**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.
6. Click  (**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.

 **NOTE:** If the locked account is a Storage Manager administrator account, contact technical support for assistance in unlocking the 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 **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.
4. Click **Edit**.
The **Password Configuration** dialog box opens.
5. Select **Enabled**.
6. Set the password requirements.
 **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 references

[Configure Local Unisphere Central User Password Requirements](#) on page 330



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 references

[Configure Local Unisphere Central User Password Requirements](#) on page 330



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 references

[Configure Local Unisphere Central User Password Requirements](#) on page 330

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.

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 **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.

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 **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

SupportAssist sends data to technical support for monitoring and troubleshooting purposes. You can configure SupportAssist to send diagnostic data automatically, or you can send diagnostic data manually using SupportAssist when needed. SupportAssist settings can be configured for all managed Storage Centers or individually for each Storage Center.

Topics:

- [Data Types that Can Be Sent Using SupportAssist](#)
- [Configure SupportAssist Settings for the Data Collector](#)
- [Configure SupportAssist Settings for a Single Storage Center](#)
- [Manually Sending Diagnostic Data Using SupportAssist](#)
- [Saving SupportAssist Data to a USB Flash Drive](#)
- [Managing SupportAssist Settings](#)
- [CloudIQ](#)

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.
 3. Click the **Monitoring** tab, and then click the **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.
-  **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.
3. 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**.

 **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.



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 **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.
3. In the **Summary** tab, click  (**Settings**).
The **Storage Center Settings** dialog box opens.
4. Click the **SupportAssist** tab.
5. 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.
-  **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

 **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](#) on page 337.
- Storage Center must recognize the USB flash drive.
- SupportAssist must be turned off.


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. 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.
 **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.
 **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.
 **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](#) on page 337.
 - d. Save SupportAssist data to the USB flash drive following the instructions in [Save SupportAssist Data to the USB Flash Drive](#) on page 338.



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.



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. 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.
2. Click  **Summary**.
The **Summary** view is displayed.
3. 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.
3. 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**.

 **NOTE:** It may take up to four hours for changes made to this checkbox to take effect.