

Storage Center™

Enterprise Manager 5.5

User Guide



Enterprise Manager 5.5 User Guide

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Revision	Date	Description
A	March 2011	Initial release.
B	April 2011	Updated to include new locations for contacting Dell technical support, downloading product manuals, as well as miscellaneous corrections. This edition obsoletes all previous revisions.

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Contents

Preface

- Purpose [ix](#)
- Related Publications [ix](#)
- Contacting Dell Support Services [ix](#)

1 Welcome

- Introduction [2](#)
- What's New in this Release [3](#)
- Enterprise Manager Requirements [4](#)

2 Getting Started

- Starting and Exiting the Client [6](#)
- Adding and Removing Storage Centers [8](#)
- Viewing the Main Window [9](#)
- Using Storage Center Menus [10](#)
- Setting User Properties [12](#)
 - General [12](#)
 - Default Views [14](#)
 - Manage Events [15](#)
 - Change Password [15](#)
- Setting Data Collector Properties [16](#)
 - General [16](#)
 - SMTP Server [17](#)
 - Phone Home [18](#)
 - Automated Reports [21](#)
 - Server Agent [21](#)
 - Schedules [21](#)
- Setting Storage Center Properties [22](#)
 - General [22](#)
 - Licenses [23](#)
 - Preferences [23](#)
 - Storage [25](#)
 - Data Collector [27](#)
 - Phone Home [29](#)
 - Automated Reports [29](#)

Opening Storage Center Manager	30
Using Common Report Options	31

3 Working with Views and Viewers

Introduction	34
Storage Center Summary	36
Storage Center Status	38
Storage Summary	39
Front End IO Summary	40
Current Alerts	40
Replication Validation	40
Top 10 Fastest Growing Volumes	41
Current Threshold Alerts	41
Multi-System Summary Viewer	42
Table View	42
Storage Chart	43
Object Chart	43
Current Alerts	44
Current Alerts Viewer	45
Current Alerts Information	45
Historical Alerts	46
Log Viewer	47
Remote Data Collector	48

4 Storage Center Tasks

Introduction	52
Opening the Storage Management View	52
Setting Storage Management Properties	54
Managing Volumes	55
Volume Attributes	55
Mapping Attributes—General	56
Mapping Attributes—Advanced	56
Creating One or More Volumes	57
Editing a Volume	57
Expanding a Volume	58
Deleting a Volume	58
Creating a Volume Folder	59
Modifying a Volume Folder	59
Deleting a Volume Folder	59
Creating a Replay for a Volume	59
Creating a Boot from SAN Copy	60
Creating Replay from a Replay Profile	60
Applying a Replay Profile to a Volume	60
Applying a Replay Profile to all Volumes Mapped to a Server	60
Creating a Local recovery volume from a replay	61
Expiring a Replay	61
Managing Servers	62
Server Attributes	62
Creating a Server Folder	63
Modifying a Server Folder	63
Deleting a Server Folder	63

Creating a Physical Server	63
Creating a Virtual Server	64
Creating a Server Cluster	64
Modifying a Server	64
Mapping a Server to a Volume	64
Removing Server Mappings	65
Adding HBAs to a Server	65
Manually Add HBA to Server	65
Removing HBAs from a Server	65
Deleting a Server	66
Applying a Replay Profile to a Server	66
Working with NAS and zNAS Servers	66
Managing Replay Profiles	67
Creating a Replay Profile	68
Modifying a Replay Profile	69
Applying a Replay Profile to Volume(s)	69
Applying a Replay Profile to Server(s)	69
Deleting a Replay Profile	69
Modifying Replay Profile Expiration for Remote Replays	70
Managing Storage Profiles	71
Creating a Storage Profile	71
Deleting a Storage Profile	71
Exporting Objects	72

5 Using Live Volumes

Introduction	74
Creating and Managing Live Volumes	76
Creating a Live Volume	76
Editing Live Volume Settings	76
Modifying Live Volume Replication Settings	76
Swapping Live Volume Roles	77
Canceling a Swap Primary Operation	77
Removing Live Volume Settings	77
Converting a Replication to Live Volumes	77
Converting a Volume to a Live Volume	77
Monitoring Live Volume Replication	78

6 Working with Portable Volumes

Introduction	80
Portable Volume and Erase Portable Volume Attributes	81
Managing Portable Volumes	82
Starting a Replication Baseline to a Portable Volume	82
Adding a Disk to Replication Baseline	83
Adding a Volume to a Portable Volume	84
Modifying a Portable Volume Schedule	84
Editing an Encryption Security Key	85
Changing the Name of a Portable Volume	85
Erasing a Portable Volume	86
Canceling a Portable Volume Replication	87

-
- Monitoring Portable Volume Replication Progress **88**
 - Restoring a Portable Volume at the Destination Storage Center **88**
 - Monitoring Portable Volume Restore Progress **89**

7 Reports Viewer

- Using the Reports Viewer **92**
- Scheduling Automated Report Generation **94**
- Generating a Report Now **96**

8 Working with the IO Usage Report

- Introduction **98**
- Comparing IO Usage Objects **99**

9 Managing Replications

- Introduction **102**
 - Replication, Live Volume, and Move Attributes **103**
- Configuring iSCSI Connections **105**
- Working with Quality of Service (QoS) Definitions **106**
 - Creating a Quality of Service (QoS) Definitions **106**
 - Editing a Quality of Service (QoS) Node **107**
 - Deleting a Quality of Service (QoS) Node **107**
- Creating Simulated Replications **108**
- Creating Replications **109**
- Saving and Validating Replication Restore Points **110**
- Editing Replication Properties **111**
- Moving Volumes **112**
- Importing Volumes from External Devices **114**
- Validating Replication Restore Points **115**
- Viewing Replications for a Single System **116**
 - Replications Tab **116**
 - QoS Nodes Tab **117**
- Using the Replication Viewer **119**
 - Replication Information Frame **119**
 - Editing a Replication Definition **121**
 - Deleting a Replication **122**
 - Pausing a Replication **123**
 - Resuming a Replication **123**

10 Charting Viewer

- Introduction **126**
- Downloading and Installing Charting Viewer **127**
 - Charting Viewer Requirements **127**
 - Charting Viewer Installation Process **127**
- Using Charting Viewer **129**
 - Starting Charting Viewer **129**
 - Using Charting Viewer Controls **130**
 - Setting Charting Viewer Properties **131**
- Viewing Storage Center Charts **132**
 - Viewing the System Chart **132**

Viewing Volume Charts	132
Viewing Server Charts	132
Viewing Disk Charts	133
Viewing Controller and Local Ports Charts	133
Saving a Chart as a PNG Image	134
Printing a Chart	135
Zooming In and Out	136

11 Using Chargeback

Introduction	138
Configuring Chargeback	139
Adding or Modifying Departments	144
Creating a Department	144
Editing a Department	146
Deleting a Department	146
Viewing Chargeback Reports	147
Running Chargeback to Create New Reports	147
Viewing An Existing Chargeback Report	147
Chargeback Report Descriptions	148
Departments Chart	148
Departments Table	148
Savings vs. Traditional SAN	149
Green Reports	151
Setting Green Properties	151
Guidelines for Setting Green Properties	152
Viewing Green Reports	153

12 Using Threshold Alerts

Introduction	156
Creating and Applying Threshold Definitions	157
Creating a Threshold Definition	158
Applying a Defined Threshold	160
Editing a Threshold Definition	160
Deleting a Threshold Definition	160
Running Threshold Queries	161
Using the Threshold Alert Viewer	162
Current Threshold Alerts	162
Historical Threshold Alerts	163

13 Using the Servers Viewer

Introduction	166
Registering a Server	168
Manually Mapping a Server Agent to a Storage Center Server	169
Creating Folders for Servers	170
Moving a Server to Another Folder	171
Assigning a Virtual Server to a Storage Center	172
Setting Global Properties for all Server Agents	173
Scheduling Automatic Space Recovery	174
Enabling Space Recovery and Setting a Global Space Recovery Schedule	175
Scheduling Space Recovery for All Volumes on a Server	176

Allowing a Volume to Schedule Space Recovery	177
Scheduling Space Recovery for an Individual Volume	178
Removing a Volume from a Space Recovery Schedule	179
Setting Up Email Notification for Space Recovery	180
Running Space Recovery	181
Viewing Space Recovery History	182
Viewing Server Agent Information	183
Viewing and Managing a NAS or zNAS Server	186
Server Information Tab	187
NAS Tab	188
NAS Control Options	188
Server Agent Properties Dialog	189
Server Agent Server Properties Dialog	190
Server Agent Volume Properties Dialog	192

14 Disaster Recovery

Preparing for Disaster Recovery	196
Activating Disaster Recovery	198
Restarting or Recovering to the Source Site	199
Restarting a Replication	199
Restoring a Failed Volume	199
Restoring to an Alternate Site	202

15 Remote Data Collector

Introduction	204
Logging on to the Remote Data Collector	205
Setting Up Events for the Remote Data Collector	206
Using DR Options from the Remote Data Collector Viewer	207
Using DR Options from the Remote Data Collector	208
Removing a Remote Data Collector	209

16 Storage Replication Adapter

Introduction	212
Enterprise Manager SRA Requirements	213
Software Requirements	213
VMware SRM Configuration Requirements	213
Enterprise Manager and Replication Prerequisites	214
Enterprise Manager SRA Configuration	215
SRM Failback Procedure	216

Glossary 219

Preface

Purpose

Dell™ Compellent™ Enterprise Manager allows an administrator to manage multiple Dell Compellent Storage Centers. This guide assumes the user is familiar with basic storage concepts and with Storage Center administration.

Related Publications

In addition to this guide, users may need to refer to the following related publications:

- *Dell Compellent Storage Center Enterprise Manager Installation and Setup Guide*
Provides step-by-step instructions for installing and setting up all Enterprise Manager components. In addition, describes how to use the Data Collector Manager and the Server Agent Manager.
- *Dell Compellent Storage Center System Manager User Guide*
Describes how to use Storage Center Manager to configure and manage storage on a Compellent Storage Center.

To download Dell Compellent product manuals, go to:

<http://www.dell.com/manuals>

Contacting Dell Support Services

Please contact Dell Technical Support Services from the following address if you need support assistance:

<http://support.dell.com/compellent>



1 Welcome

Introduction [2](#)

What's New in this Release [3](#)

Enterprise Manager Requirements [4](#)

Introduction

Congratulations on making the move to Fluid Data storage from Dell Compellent. The new Fluid Data architecture combines a powerful data movement engine, virtualized software applications, and an agile hardware platform to intelligently manage data at a more granular level. Get ready to take back your nights and weekends as our patented technology optimizes performance, lowers costs, and increases storage utilization.

Enterprise Manager provides comprehensive management and monitoring of local and remote Storage Centers. Enterprise Manager consists of the following components:

- **Primary Data Collector**
The primary Data Collector runs as a service on a dedicated server, collecting data from one or more Storage Centers.
- **(Optional) Remote Data Collector**
In addition to the primary Data Collector, a site can install a remote Data Collector on a remote server. The remote Data Collector connects to the primary Data Collector as a shadow service. If the primary Data Collector is unavailable, the remote Data Collector can activate a DR site.
- **Enterprise Manager Client(s)**
Enterprise Manager clients can reside on any local or remote PC. A client connects to the primary Data Collector to display and manage Storage Centers connected to the primary Data Collector service.
- **(Optional) Server Agent for Windows**
A Server Agent can be installed on each Storage Center server running a Microsoft Windows Operating System. Once installed, a Server Agent can register with Enterprise Manager and allow Enterprise Manager to collect and report operating-specific storage data. In this way, Enterprise Manager can periodically recover storage from Windows NTFS.

For complete information on installing primary and remote Data Collectors, Enterprise Manager clients, and Server Agents, refer to the *Enterprise Manager Installation and Setup Guide*.

What's New in this Release

Enterprise Manager 5.5 introduces the following features and enhancements.

Feature	Description
Support for Storage Center 5.5	Enterprise Manager 5.5 supports all features available with the Storage Center 5.5 release.
Performance Improvements and Storage Profile IO Usage Reports	Enterprise Manager 5.5 provides performance improvements to the Storage Center IO Usage tab. In addition, IO/Sec, KB/Sec, Latency, and IO Pending reports are now available for Storage Profiles.

Enterprise Manager Requirements

All Enterprise Manager components (Data Collector, Database, Server Agent, and Client) can be run on either x86-32 or x86-64 processors. For 64-bit processors, only AMD64-compatible, including Intel 64, are supported. Itanium 32 and Itanium 64 are not supported.

The following table lists requirements for Enterprise Manager components:

Component	Requirements
Data Collector	<ul style="list-style-type: none">• Microsoft Windows Server 2003 or 2008 with the latest service packs• Minimum 1GB of RAM• Minimum 20 GB of available storage• Microsoft .NET Framework 2.0 (included)• Java Runtime Environment (JRE) 1.6
Database	<p>One of the following:</p> <ul style="list-style-type: none">• Flat file (no database)• MySQL (4.1, or 5.0)• Microsoft SQL Server 2005• Microsoft SQL Server 2008• Microsoft SQL Server 2005 Express Edition <hr/> <p>Note The Enterprise Manager Installation CD provides an option for installing Microsoft SQL Server 2005 Express Edition.</p> <hr/> <p>Note Databases in Microsoft SQL Server 2005 Express are limited to 4GB.</p> <hr/>
Enterprise Manager Client	<ul style="list-style-type: none">• Microsoft Windows XP or Microsoft Windows Vista• Java Runtime Environment (JRE) 1.6
Server Agent	<ul style="list-style-type: none">• Microsoft .NET Framework 2.0 (included)• Microsoft Windows Server 2003 or 2008 with the latest service packs <hr/> <p>Note The Free Space Recovery feature works with Windows Basic volumes only.</p> <hr/>

This document assumes you have correctly installed the Enterprise Manager Data Collector and at least one client. Refer to the *Enterprise Manager 5.5 Installation and Setup Guide* for installation and setup instructions.

2 Getting Started

- Starting and Exiting the Client **6**
- Adding and Removing Storage Centers **8**
- Viewing the Main Window **9**
- Using Storage Center Menus **10**
- Setting User Properties **12**
- Setting Data Collector Properties **16**
- Setting Storage Center Properties **22**
- Opening Storage Center Manager **30**
- Using Common Report Options **31**

Starting and Exiting the Client

⇒ *To start Enterprise Manager*

- From the Windows Start menu, select **All Programs > Compellent Technologies > Compellent Enterprise Manager > Compellent Enterprise Manager Client**. The Enterprise Manager login window appears.

⇒ *To log on for the first time*


For first-time logon, create an Enterprise Manager user and a connection to a Data Collector.

Note If Enhanced Security is enabled, you cannot create a new user when you log on to a Data Collector. Contact your Enterprise Manager administrator to get a username and password for Enterprise Manager.

1 On the login window:

- **User:** Enter a user name.
- **Password:** Enter a password.
- **Create New User:** For first-time logon, this option is enabled. That is, you must create a new user.
- **Re-enter Password:** Re-enter the password.
- **Create New Connection:** For first-time logon, this option is enabled. That is, you must create a connection.
- **Name or Host IP:** Enter the host name or IP address of the server running the Data Collector.
- **Port:** Enter the port the Data Collector is using in the Port Field. The port is set when the Data Collector is installed. The default port is 7342.

2 Click **Login**. The Enterprise Manager Explorer is displayed.

3 Click  to add a Storage Center to be managed. See [Adding and Removing Storage Centers on page 8](#).

⇒ *To log on as an existing user*

1 On the logon window, enter your **user name** and **password**.

2 Click **Login**.

Enterprise Manager retains data collector information from the last login.

 **To log on and connect to another Data Collector**

- 1 On the login window, enter:
 - **User:** Enter a user name.
 - **Password:** Enter a password.
 - **Create New User:** Enable this option.
 - **Re-enter Password:** Re-enter the password.
 - **Create New Connection:** Enable this option to create a new connection.
 - **Name or Host IP:** Enter the host name or IP address of the server running the Data Collector.
 - **Port:** Enter the port the Data Collector is using in the Port Field. The port is set when the Data Collector is installed. The default port is 7342.
- 2 Click **Login**.

 **To exit Enterprise Manager**

- 1 From the **Management** menu, select **Close**.
- 2 If you are prompted to minimize the application, click **Yes** to minimize Enterprise Manager or click **No** to exit.

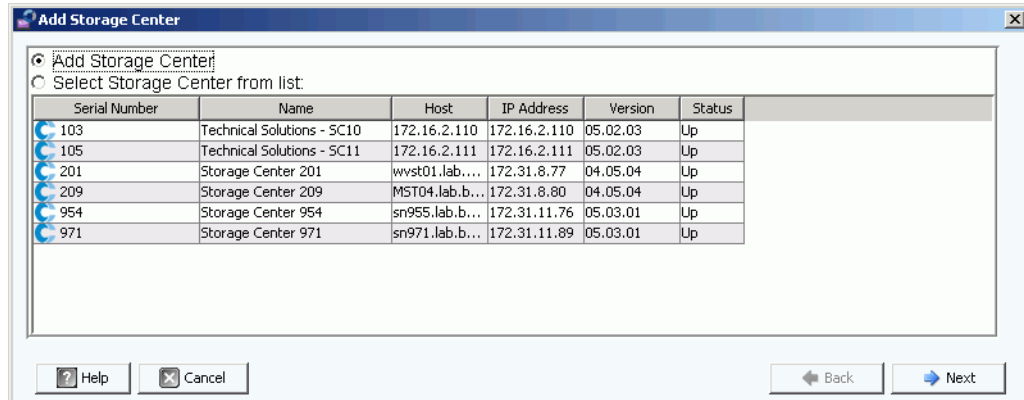
Note If you want Enterprise Manager to prompt you to minimize the application to the system tray when you close the application, see [Setting User Properties on page 12](#) to enable this option. Rebooting a PC closes the client application.

Adding and Removing Storage Centers

Note If Enhanced Security is enabled, you cannot add or delete Storage Center from the Enterprise Manager Client. Contact the Enterprise Manager administrator to add Storage Centers to the Client.

⇒ To add a Storage Center

- 1 From the **Management** menu, choose **Add Storage Center**.



- 2 Select one of the following:
 - **Add Storage Center:** Select this option to add a Storage Center that does not appear in the list of Storage Centers.
 - **Select Storage Center from list:** Select this option to add a Storage Center that appears in the list of Storage Centers, and then select the Storage Center from the list.
- 3 Click **Next**.
- 4 Enter Storage Center login information:
 - **Host Name:** For a new Storage Center only. Enter the host name or IP address of a Storage Center controller. For a dual-controller Storage Center, enter the IP address or host name of the management controller.
 - **User Name** and **Password:** Enter an Administrative Storage Center user name and password.
- 5 Click **Finish**.

⇒ To remove a Storage Center

- 1 From the Enterprise Manager explorer, right-click on a Storage Center listed in the Storage Centers pane.
- 2 From the short-cut menu, select **Remove**.
- 3 Click **OK**.

Viewing the Main Window

The composition of the Enterprise Manager Explorer changes depending on actions, selections, and user defaults.

The screenshot displays the Enterprise Manager Explorer interface. The top navigation bar includes Management, Replication Recovery, Storage Center View, Storage Center Tasks, and Help. The main window is divided into two sections: Storage Centers and Viewers.

Storage Centers: Lists SC 201 (4.5.6), SC 209 (4.5.6), Storage Center 989, and Storage Center 990. The selected Storage Center 990 is highlighted.

Storage Center Status (as of 03/02/2011 13:32:17):

- Total Disk Space: 10.01 TB
- Free Disk Space: 9.55 TB (95.42%)
- Used Disk Space: 469.18 GB (4.58%)

Alerts Summary:

Category	Current	Error	Warning	# Alerts
Storage Threshold	4 % Used	[Not Set]		3
FE IO Threshold	0 IO/Sec	[Not Set]		1
FE KB Threshold	0 KB/Sec	[Not Set]		0
Current Alerts				3
Storage Alerts				1
Disk Alerts				0
Hardware Alerts				1
System Alerts				1
Connectivity Alerts				0
Replication Restore Point Alerts				3

Viewers: Lists Multi Storage Center, Current Alerts, Replications, Reports, Chargeback, Threshold Alerts, Servers, and Remote Data Collector.

Storage Summary (as of 03/02/2011 13:32:17):

Object Count:

- # Volumes: 8
- # Servers: 17
- # Disks: 12
- # Controllers: 1
- # Replications: 1
- # Replays: 20

Bar Chart (GB):

Category	Value (GB)
Configured Volume Space	4,540
Total Disk Space	10,010

Enterprise Manager displays information for a selected Storage Center or for multiple Storage Centers. Single-Storage Center displays are called Views; Multi-Storage Center displays and functions are called Viewers.

- **Storage Centers:** Lists Storage Centers that are managed by Enterprise Manager. Click on a Storage Center to display Views for the selected Storage Center.
- **Storage Center Views:** Display data for the selected Storage Center. The default view is the Storage Summary.
- **Viewers:** Lists multi-Storage Center Viewers. Click on a Viewer to display views for all Managed Storage Centers. For example, click on Threshold Alerts to view threshold alerts for all managed Storage Centers.

Using Storage Center Menus

The following menus are available when a Storage Center is selected in the left Storage Center pane. Menus that appear with Viewers are described with the Viewer.

Menu	Description
Management	Displays the following options: <ul style="list-style-type: none">• User Properties• Data Collector Properties• Properties (for selected Storage Center)• Add Folder• Add Storage Center• Remove• Close
Replication Recovery	Displays the following options: <ul style="list-style-type: none">• Save Restore Points• Validate Restore Point• Restore/Restart Volumes to Original Storage Center• Activate Disaster Recovery Site• Test Activate Disaster Recovery Site• Predefine Disaster Recovery Site• Delete Test DR Activated Volumes
Storage Center View	Displays the following options <ul style="list-style-type: none">• System Summary• Current Alerts• Historical Alerts• Logs• IO Usage• Storage Management• Replications• Charting• Update All Visible Tabs

Menu	Description
Storage Center Tasks	Displays management tasks:
	<ul style="list-style-type: none"> • Edit Settings
	<ul style="list-style-type: none"> • Volume <ul style="list-style-type: none"> > Create Volume > Create Multiple Volumes > Create Volume Folder
	<ul style="list-style-type: none"> • Server <ul style="list-style-type: none"> > Create Server > Create Server Cluster > Create Server Folder
	<ul style="list-style-type: none"> • Replay Profile <ul style="list-style-type: none"> > Create Replay Profile
	<ul style="list-style-type: none"> • Storage Profile <ul style="list-style-type: none"> > Create Storage Profile
	<ul style="list-style-type: none"> • Replication <ul style="list-style-type: none"> > Replicate volumes > Simulate Replicate Volumes > Move Volumes > Import Volumes from External Devices > Create QoS Node > Configure iSCSI Connections > Start Replication Baseline
	<ul style="list-style-type: none"> • Export Objects
Help	Displays the following options: <ul style="list-style-type: none"> • About • Webhelp

Setting User Properties

User properties set defaults for the current user. User Properties include:

- **General**
General properties include setting up an email address for notifications, as well as default client application settings, chart markers, and chart colors.
- **Default Views**
Default Views properties specify defaults for Enterprise Manager views and viewers.
- **Manage Events**
Manage Events properties specify the events for which you want to be notified via email.
- **Change Password**
Change Password allows you to change your user password.

Note To change a property setting, click **Change** in the lower-right corner of a properties display. After making changes, click **Apply Changes**.

General

⇒ *To set up email notification*

Email notification instructs the Data Collector to email information and automated reports. To use Email, you must set up Data Collector with an SMTP server. For more information, see [To configure an SMTP server on page 17](#).

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **General**.
- 3 In the lower right corner, click **Change**.
- 4 Enter the following:
Email Address: Enter the email address to which to send information.
Email in HTML: Select to send email in HTML format.
Test Email: Click **Test Email** to send a test email.
- 5 Click **Apply Changes**.
- 6 Click **OK** to close User Properties

⇒ *To set client application defaults*

- 1 From the **Management** menu, choose **User Properties**.
- 2 From the menu, click **General**.
- 3 In the lower right corner, click **Change**.
- 4 Under **Client Application Settings**, enable or disable the following options:
 - **Minimize to System Tray on Close:** Automatically minimizes the Enterprise Client to the Windows system tray. Default is to prompt before minimizing.

- **Start Application on Startup:** Automatically starts the Enterprise Client on system startup. Default is to not automatically start the Client.
- **Prompt to Minimize on Close:** When you close the Client, a window appears asking if you want to exit Enterprise Client or minimize the Client to the system tray. Default is to prompt to minimize on Close.

5 Click **Apply Changes**.

6 Click **OK** to close User Properties.

⇒ *To select chart markers*

1 From the **Management** menu, choose **User Properties**.

2 Click **General**.

3 In the lower right corner, click **Change**.

4 Under **Select Chart Markers**:

- **Show Threshold Alert Levels on Charts:** View a horizontal line parallel to the X axis, showing the relationship between the reported data and the threshold level. The default is to hide threshold alerts.
- **Show Storage Center Alerts on Charts:** Select this option to show a vertical line parallel to the Y axis, showing the relation between reported data and Storage Center Alerts. The default is to hide Storage Center Alerts.

5 Click **Apply Changes**.

6 Click **OK** to close User Properties.

⇒ *To select chart colors*

1 From the **Management** menu, choose **User Properties**.

2 Click **General**.

3 In the lower right corner, click **Change**.

4 Under **Select Chart Colors**, click on the **Modify** button next to the color you want to change:

- **Background**
- **Gridline**
- **Crosshair**

5 Select a color:

- To select a Swatch color - Click on the **Swatch** tab and then click on the color you want to select
- To select a color based on an HSB value - Click on the **HSB** tab and then enter the HSB value by identifying hue (**H**), saturation (**S**), and brightness (**B**)
- To select a color based on an RGB value - Click on the **RGB** tab. Enter the RGB value by identifying red (**R**), green (**G**), or blue (**B**)

6 Click **OK** to close the **Select Color** dialog

7 Click **Apply Changes**

8 Click **OK** to close the User Properties dialog. New color settings appear the next time a chart is updated.

Default Views

Default Views configure:

- **Client View:** The Client View configures the way in which the added Storage Centers are displays in the Storage Centers pane.
- **Default Storage Center Tab:** Although you can display a Storage Center window by selecting it from the Storage Center View menu, Default Storage Center tabs select windows that will open automatically when you open Enterprise Manager. You can also choose to view a filter when clicking on a Storage Center tab.
- **Default Viewers:** Default Viewers select the viewers that are displayed in the Viewers pane (lower left corner of the EM window).

⇒ *To change the Storage Centers navigation pane*

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **Default Views**.
- 3 In the lower right corner, click **Change**.
- 4 Under **Client View**, select one of the following:
 - List View:** Displays Storage Centers in a list.
 - Tree View:** Displays Storage Centers in a tree.
 - Menu View:** Displays only menus.
- 5 Click **Apply Changes**.
- 6 Click **OK** to close the window.

⇒ *To select the Storage Center tabs to be opened automatically*

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **Default Views**.
- 3 In the lower right corner, click **Change**.
- 4 Under **Default Storage Center Tabs**, select defaults for Storage Center tabs.
- 5 Click **Apply Changes**.
- 6 Click **OK** to close the window.

⇒ *To select default Viewers to be displayed in the Viewers pane*

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **Default Views**.
- 3 In the lower right corner, click **Change**.
- 4 Under **Default Viewers**, click **Show** next to the viewers you want to show by default.
- 5 Select a default window to display when viewers are selected. If you show Storage Centers, choose a default Storage Center.
- 6 Click **Apply Changes**.
- 7 Click **OK** to close the window.

Manage Events

⇒ *To select events to be emailed to you*

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **Manage Events**.
- 3 In the lower right corner, click **Change**.
- 4 Select the events for which you want email notification.
- 5 Click **Apply Changes**
- 6 Click **OK** to close the window.

Change Password

⇒ *To change a password*

- 1 From the **Management** menu, choose **User Properties**.
- 2 Click **Change Password**.
- 3 In the lower right corner, click **Change**.
- 4 Enter your user name and password.
- 5 Re-enter the new password.
- 6 Click **Apply Changes**.
- 7 Click **OK** to close the window.

Setting Data Collector Properties

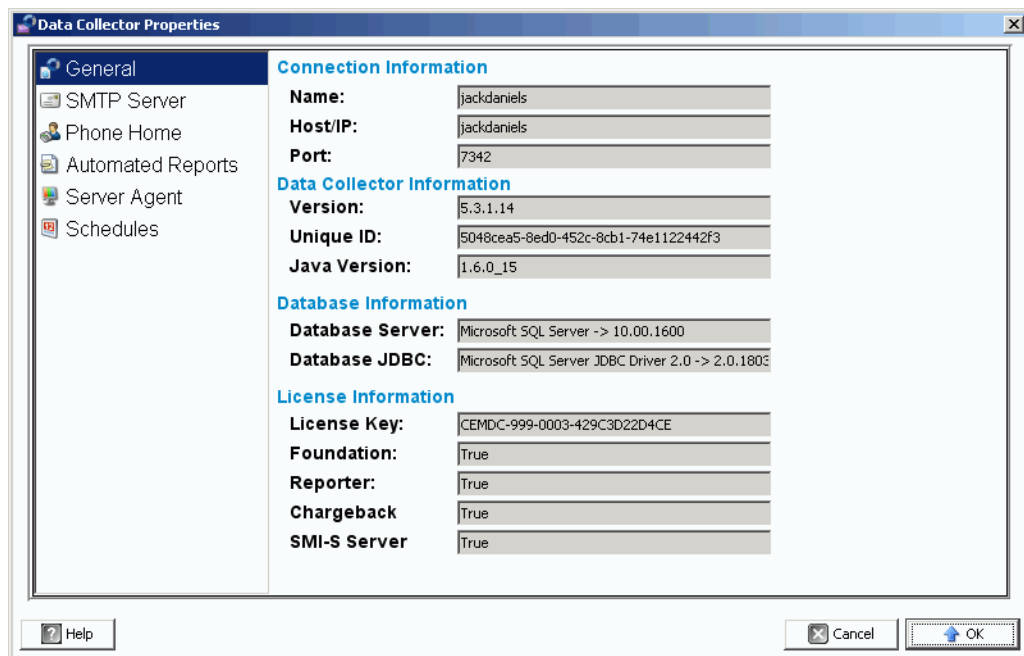
Data Collector Properties are initially set up during Enterprise Manager installation. After installation you can change Data Collector properties.

- [General](#)
- [SMTP Server](#)
- [Phone Home](#)
- [Automated Reports](#)
- [Server Agent](#)
- [Schedules](#)

General

⇒ *To view general Data Collector information, including licenses*

- 1 From the **Management** menu, choose **Data Collector Properties**.
- 2 Click **General**.



General Data Collector Information is display only.

Connection Information: Name, host/IP address, and port.

Data Collection Information: Revision level, unique ID, and Java revision level.

Database Information: Database server and **JDBC** revision level.

License Information: Foundation is the main Enterprise Manager. License Information displays the license key. If the system is licensed for additional products, the license information indicates **True**.

- For more information about the Reporter, refer to [Reports Viewer on page 91](#).
- For more information about [Using Chargeback on page 137](#).
- For more information about the SMI-S server, refer to the *Enterprise Manager 5.3 Setup and Installation Guide*.

3 Click **OK** to close the window.

SMTP Server

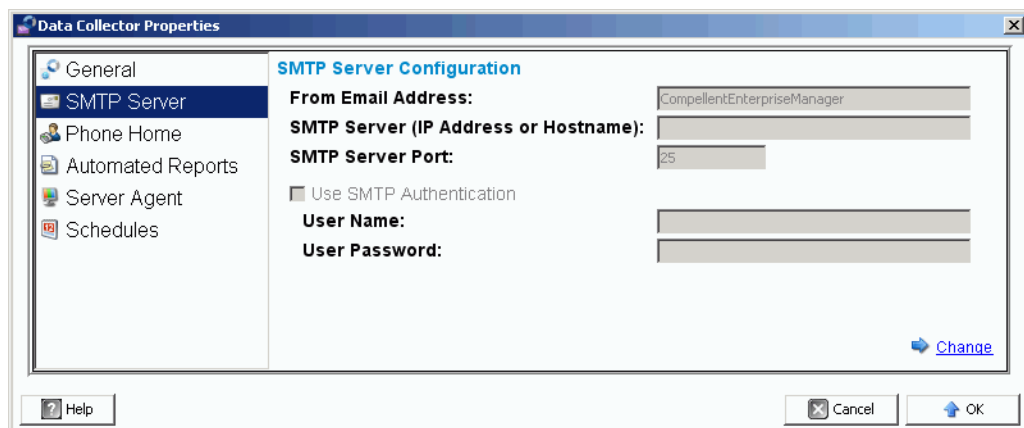
Simple Mail Transfer Protocol (SMTP) is a protocol for sending email messages between servers. Storage Center uses SMTP to send automated emails to an administrators account when management is required.

⇒ [To configure an SMTP server](#)

Note Before you can change any Data Collector properties, you must click the [Change](#) link in the lower-right corner of the Properties window.

To get email notification of alerts and events to users, set up an SMTP server. (Each user must enter his or her own email address (see [To set up email notification on page 12](#)).

- 1 From the **Management** menu, select **Data Collector Properties**.
- 2 Click **SMTP Server**.



3 In the lower right corner, click **Change**. The SMTP Server Configuration is enabled.

4 Set up the following:

- **From Email Address:** Enter the email address to display when a user receives an email from the Data Collector.
- **SMTP Host/IP Address:** Enter the host name or IP address of the SMTP server.
- **Use SMTP Authentication:** Select this option if the SMTP server requires authentication.
- **User:** If SMTP authentication is used, enter the SMTP server User Name.

- **Password:** If SMTP authentication is used, enter the SMTP password.

5 Click **OK** to close the window.

Phone Home

Phone Home sends a copy of a Storage Center configuration to Copilots to enable them to support a system. The initial configuration is sent to Dell Compellent when the Storage Center system is first installed. If you have questions about your system, Phone Home to report your current configuration.

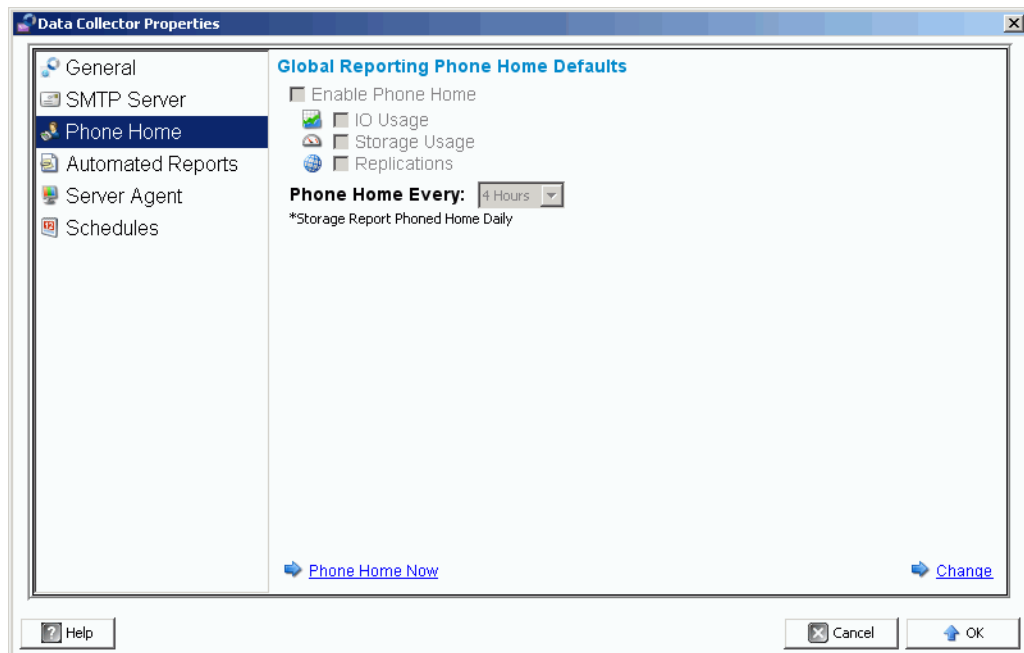
The Phone Home wizard initiates Phone Home process, and displays whether a Phone Home process is in progress. To initiate the Phone Home process, Select Phone Home Now. If you select Phone Home Now while a Phone Home process is already in progress, you will be warned and given the opportunity to restart the Phone Home process.

Once the initial Phone Home process is finished, you can start another Phone Home by selecting Phone Home Now.

The Phone Home wizard displays the status of each of the items that are being phoned home. Items that are being phoned home display In Progress. Once completed, this state changes to Success if the Phone Home is successful, or Failure if the Phone Home could not be completed.

⇒ *To enable global Phone Home*

- 1 From the **Management** menu, select **Data Collector Properties**
- 2 Select **Phone Home**. The **Global Reporting Phone Home Defaults** window appears.



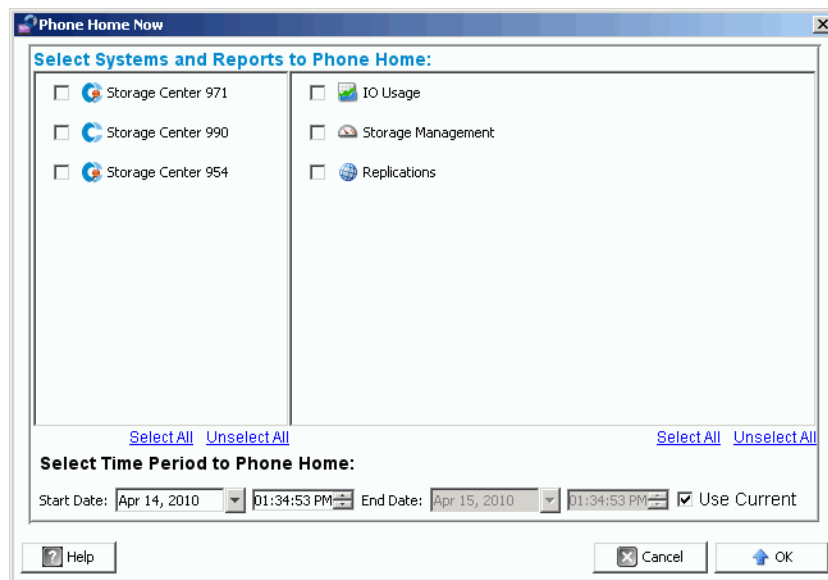
- 3 Click **Change**.
- 4 Click **Enable Phone Home**.

- 5 Select the reports to send: **IO Usage**, **Storage Usage**, and/or **Replications**.
- 6 Select a period to phone home, such as 4 hours, 12 hours, or daily.
- 7 Click **OK**.

Note Setting Global Phone Home properties does not actually send reports to the Data Collector. To send reports to the Data Collector, refer to [To set phone home options for a single Storage Center on page 20](#).

⇒ **To phone home now**

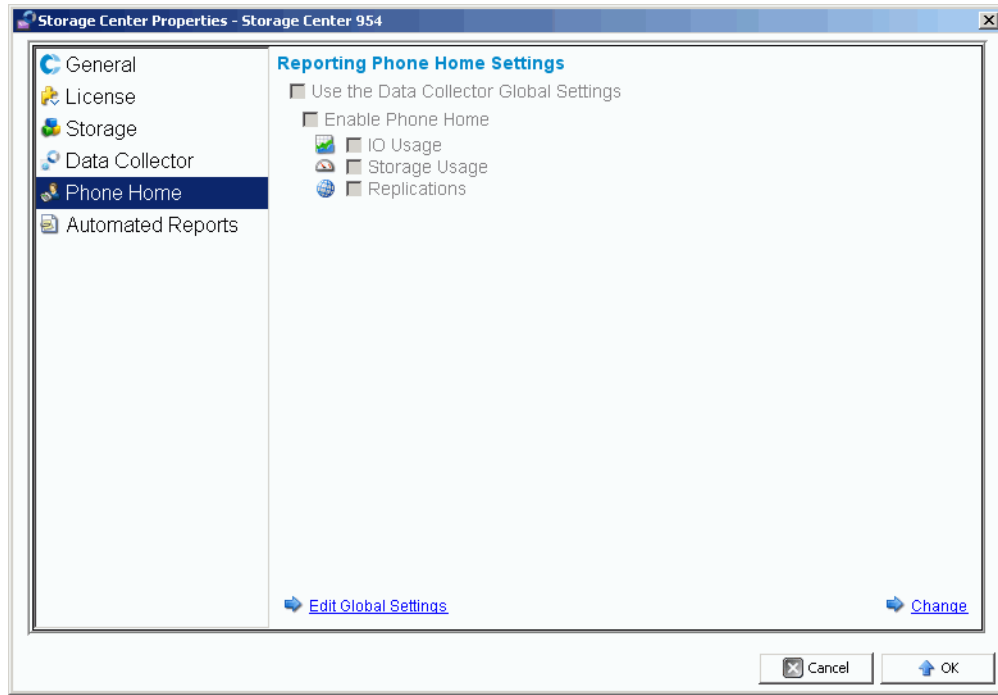
- 1 From the **Management** menu, select **Data Collector Properties**.
- 2 Select **Phone Home**.
- 3 In the Phone Home window, click **Phone Home Now**.



- 4 On the left side of the display, select the Storage Centers for which you want to phone home data. In the right side of the display, select the reports to phone home. You can return to this window to phone home different reports for different Storage Centers.
- 5 **Select Time Period to Phone Home:** Select a time period to phone home or check **Use Current** for the current time and date.
- 6 Click **OK**. The Phone Home window reappears.
- 7 Click **OK** to close the window.

⇒ **To set phone home options for a single Storage Center**

- 1 From the **Management** menu, select **Properties**.
- 2 Click **Phone Home**. The **Reporting Phone Home Settings** window appears.



- 3 In the lower right corner, click **Change**.
- 4 Select either **Use the Data Collector Global Settings** or **Enable Phone Home**.
 - If you select **Use the Data Collector Global Settings**, you can change the global settings by clicking **Edit Global Settings**.
 - If you select **Enable Phone Home**, select the reports to include in Phone Home - **IO Usage** (refer to [IO Usage on page 46](#)), **Storage Usage** (Refer to [Storage Management on page 50](#)), **Replications** - Refer to [Managing Replications on page 101](#).
- 5 Click **Apply Changes**.
- 6 Click **OK** to close the window.

Automated Reports

Data Collector Automated Reports properties set global report settings for all Storage Centers managed by the Enterprise Manager client. To set report options for a specific Storage Center, see [Automated Reports on page 29](#). For complete information on automated reports, see [Reports Viewer on page 91](#).

Server Agent

Data Collector Server Agent properties set global properties for all Server Agents. For complete information on Server Agents, see [Using the Servers Viewer on page 165](#).

Schedules

Data Collector Schedules establish schedules for replication restore points and gathering data for usage reports.

⇒ *To set a schedule for automatically saving and validating restore points*

- 1 From the **Management** menu, select **Data Collector Properties**.
- 2 Click **Schedules**.
- 3 Click **Change**.
- 4 Set the following:

Automatically Save and Validate Restore Points: Enable this option to automatically save and validate restore points.

Check every/At time: Enter the schedule for automatically saving and validating restore points.

- 5 Click **Apply Changes**.

⇒ *To set a schedule for gathering IO, Replication, and/or Storage Usage*

- 1 From the **Management** menu, select **Data Collector Properties**.
- 2 Click **Schedules**.
- 3 Click **Change**.
- 4 Set schedules for automatically gathering **IO Usage**, **Replication Usage**, and/or **Storage Usage**.
- 5 Click **Apply Changes**.

Setting Storage Center Properties

Enterprise Manager provides options for changing default properties for each individual Storage Center that is managed by Enterprise Manager.

- [General](#)
- [Licenses](#)
- [Preferences](#)
- [Storage](#)
- [Data Collector](#)
- [Phone Home](#)
- [Automated Reports](#)

General

⇒ *To change a Storage Center name or operating mode*

- 1 In the Storage Centers pane, select a Storage Center.
- 2 From the **Management** menu, select **Properties**.
- 3 Click **General**.
- 4 Click **Change**.
- 5 In the **Storage Center Name** field, enter a new name.
- 6 In the **Operating Mode** field select **Normal**, **Maintenance**, or **Install**. Selecting Install or Maintenance isolates alerts from those that would occur during normal operation.
- 7 Enter any notes.
- 8 Click **Apply Changes**.
- 9 Click **OK** to close the window.

Note Storage Center properties can also be changed by right-clicking a Storage Center in the Storage Centers pane, and choosing **Edit Settings**.

Licenses

⇒ *To view Storage Center license information*

This window is informational only. To change Storage Center licensing, contact a Dell Compellent representative.

- 1 In the Storage Centers pane, select a Storage Center.
- 2 From the **Management** menu, select **Properties**.
- 3 Click **License** to display license information for the selected Storage Center system.
- 4 Click **OK** to close the window.

Preferences

Preference properties establish Storage Center user defaults for new volumes.

⇒ *To set the default size for new volumes*

- 1 In the Navigation pane, right-click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 Do the following:
 - **Default Volume Size:** Enter a default size for new volumes in **GB**, **TB**, or **PB**.
 - **Show block size option in volume wizards:** Enable this option if you want to display volume size in blocks.
- 5 Click **Apply Changes**.

⇒ *To set default cache settings for new volumes*

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 Select the following cache options for new volumes:
 - Read Cache Enabled:** Select this option to enable read cache for new volumes.
 - Write Cache Enabled:** Select this option to enable write cache for new volumes.
 - Allow Cache option selection:** Select this option to allow cache options to be selected when a volume is created.
- 5 Click **Apply Changes**.

⇒ *To set default base volume name for new volumes*

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 In the **Base Volume Name** area, enter a name to use as a base for new volumes. The default base is **New Volume**.
- 5 Click **Apply Changes**.

⇒ *To set default Replay options for new volumes*

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 Select the following Replay options:
 - Replay Profile(s)**: Select one or more **Replay Profiles** to apply to new volumes.
 - Minimum Replay Interval**: Specify the minimum interval in minutes at which Replays can be taken. The default is 5 minutes.
- 5 Click **Apply Changes**.

⇒ *To set default server operating system for new volumes*

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 Select a server **Operating System** to use as the default for new volumes.
- 5 Click **Apply Changes**.

⇒ *To set default Storage Profile for new volumes*

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Preferences**.
- 3 Click **Change**.
- 4 Select the following:
 - Storage Profile**: Select the Storage Profile to use as the default for new volumes.
 - Allow Storage Profile selection**: Select this option to allow the selection of a Storage Profile when a volume is created.
- 5 Click **Apply Changes**.

 **To set default Storage Type for new volumes**

1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.

2 Select **Preferences**.

3 Click **Change**.

4 Select the following:

Storage Type: Select the Storage Type to use as the default for new volumes.

Allow Storage Type selection: Select this option to allow the selection of a Storage Type when a volume is created.

5 Click **Apply Changes**.

Storage

 **To set Storage Center cache options**

Global cache settings overwrite cache settings for individual volumes. To enable caching for some volumes and not others, enable caching system-wide. Disable caching for individual volumes.

1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.

2 Select **Storage**.

3 Click **Change**.

4 Set cache options:

- **Read Cache Enabled:** Select this option to enable read cache.
- **Write Cache Enabled:** Select this option to enable write cache.

5 Click **Apply Changes**.

6 Click **OK** to close the window.

⇒ **To schedule or limit Data Progression (For version 5.1 or above)**

Data Progression leverages cost and performance differences between storage tiers, allowing the maximum use of lower-cost drives for stored data, while maintaining high-performance drives for frequently-accessed data. Storage Center polls blocks to see if they have been accessed. Blocks of data are then migrated up or down depending on use. The amount of time the migration takes depends on the amount of data to be migrated.

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Storage**.
- 3 Click **Change**.
- 4 Under the **Storage Center Data Progression Settings**, click in the **Run Everyday at** field. Select or enter a time as **hh:mm AM** or **PM**.
- 5 In the **Maximum Run Time** field, set the maximum time for Data Progression to run.
- 6 Click **Apply Changes**.
- 7 Click **OK** to close the window.

⇒ **To set stripe width**

The default stripe width for storage profiles is 10 wide (RAID 6-10). Modifying this value updates the RAID 6 selections for all system Storage Profiles. It also modifies the RAID 6 selections for user created Storage Profiles unless Manual Storage Mode is enabled for the system.

In a standard Storage Center system, a percentage of most-used data is storage on RAID 10 (striped and mirrored). Data that is used less is stored on RAID 6-10 (which uses an algorithm to rebuild data if one drive in the logical unit should fail). For RAID 5, the stripe width determines whether the logical unit is comprised of five or nine drives. For RAID 6, the stripe width determines whether the logical unit is comprised of six or ten drives. Distributing data across more drives is marginally more efficient, but increases vulnerability. Distributing data across fewer drives is less efficient, but marginally decreases vulnerability.

- 1 In the Navigation pane, right click on a Storage Center and select **Edit Settings**.
- 2 Select **Storage**.
- 3 Click **Change**.
 - **RAID 5 Stripe Width:** Select a stripe width of either 5 disks or 9 disks.
 - **RAID 6 Stripe Width:** Select a stripe width of either 6 disks or 10 disks.
- 4 Click **Apply Changes**.
- 5 Click **OK** to close the window.

Data Collector

⇒ *To send Storage Center alerts and logs to the Data Collector*

- 1 In the navigation pane, right-click on a Storage Center and select **Edit Settings**.
- 2 Click **Data Collector** to display Storage Center properties for the Data Collector.
- 3 Click **Change** to change the following:

Send Alerts to This Data Collector: Enable this option to send alerts from this Storage Center to the Data Collector to which you are currently connected.

Send Logs to This Data Collector: Enable this option to send logs from this Storage Center to the Data Collector to which you are currently connected.

- 4 Click **Apply Changes**.
- 5 Click **OK** to close the window.

⇒ **To forward Storage Center log messages to a syslog server**

Enterprise Manager can forward logs received from Storage Centers to another syslog server. When you set up syslog forwarding, note the following:

- For pre-5.1 Storage Center versions, Enterprise Manager Data Collector overwrites the syslog server setting for Storage Centers connected to the Data Collector. If you want to use a syslog server and Enterprise Manager, you must set up syslog forwarding for each Storage Center within Enterprise Manager to direct the logs to the syslog server. For Storage Center versions 5.1 and above, Enterprise Manager Data Collector does not overwrite the system log server settings.
- On the Enterprise Manager Data Collector server, UDP port 514 must be open for syslog forwarding.

To forward Storage Center log messages to a syslog server:

- 1 Right-click on a Storage Center, and select **Edit Settings**.
- 2 Click **Data Collector** to display Storage Center properties for the Data Collector.
- 3 Click **Change** to change settings.

To create a new Syslog Forward:

- a Click **New**. The Create Syslog Forward dialog appears.
- b Enter the following:
 - **Host Name:** Enter the host name or IP address of your syslog server.
 - **Facility:** Select a facility.
- c Click **OK**.
- d Click **Apply Changes**.

To test a Syslog Forward:

- Select a Syslog Forward to test, and click **Test**.

View the syslog server to make sure the message was successfully forwarded to the server.

To delete a Syslog Forward:

- a Select a Syslog Forward to delete, and click **Delete**.
- 4 Click **Apply Changes**.
 - 5 Click **OK** to close the window.

Phone Home

For information on setting up and using phone home, see [Phone Home on page 18](#).

Automated Reports

For information on setting up and using automated reports, see [Reports Viewer on page 91](#).

Opening Storage Center Manager

From Enterprise Manager, you can go directly to the Storage Center Manager.

⇒ *To go directly to Storage Center Manager*

- 1 Select a Storage Center.
- 2 Click the **Storage Center Manager** button in the upper right corner. The system opens the System Manager for that Storage Center in a new window.

Using Common Report Options

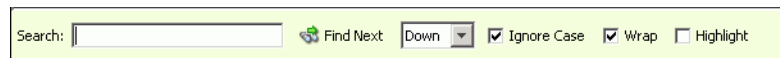
Reports display data from selected Storage Center systems.

⇒ *To save a report to a file*

- 1 When the report is displayed, click **Save**. The Export Report dialog appears.
- 2 Select a file type for the output - **CSV** (.csv), **Text** (.txt), **Excel** (.xls), **HTML** (.htm), **XML** (.xml), and **PDF** (.pdf).
- 3 Browse to a directory in which to save the exported file. Enter a filename.
- 4 Click **OK**.

⇒ *To search for an item in a report*

Use the **Search Toolbar** to locate items in the report display.



⇒ *To filter report results*

- 1 When the report is displayed, click **Filter**. The **Filter** dialog appears.
- 2 Select filter options:
 - **Show Last:** Shows only the specified last number of days.
 - **Start Date:** Specifies a start date for the results.
 - **End Date:** Specifies an end date for the results.
 - **Subsystem:** Specifies the subsystem by which to filter results.
 - **>= Log Level:** Specifies a greater than or equal level by which to filter results.
- 3 Click **OK**.

⇒ *To update data displayed in a report*

- 1 Click **Update**.
- 2 Select the start and end time for the data, and click **OK**.

⇒ *To set update frequency for a report or display*

Some displays allow you to set the frequency for automatically updating displayed data. To set the frequency by which data is updated in a display:

- 1 Click **Set Update Frequency**.
- 2 Select the frequency at which to update the display: **Off** (no automatic update), **1 minute**, **5 minutes**, or **10 minutes**.



3 Working with Views and Viewers





- Introduction [34](#)
- Storage Center Summary [36](#)
- Multi-System Summary Viewer [42](#)
- Current Alerts [44](#)
- Current Alerts Viewer [45](#)
- Historical Alerts [46](#)
- Log Viewer [47](#)
- Remote Data Collector [48](#)





Introduction

Enterprise Manager displays information for a selected Storage Center or for multiple Storage Centers.

- Single-Storage Center displays are called Views.
- Multi-System displays and functions are called Viewers.

The following table shows the single Storage Center views and multi-system viewers.

Single-System Views	Multi-System Viewers
System>View>System Summary See Storage Center Summary on page 36	 Multi-System See Multi-System Summary Viewer on page 42
System>View>Current Alerts See Current Alerts on page 44	 Current Alerts See Current Alerts Viewer on page 45
System>View>Historical Alerts See Historical Alerts on page 46	n/a
System>View>Log Viewer See Log Viewer on page 47	n/a
System>View>IO Usage See Working with the IO Usage Report on page 97	n/a
System>View>Storage Management See Storage Center Tasks on page 51	n/a
System>View>Replication Validation See Managing Replications on page 101	 Replications See Managing Replications on page 101
System>View>Charting See Charting Viewer on page 125	n/a
n/a	 Reports See Reports Viewer on page 91


Single-System Views	Multi-System Viewers
n/a	 Chargeback See Using Chargeback on page 137
n/a	 Threshold Alerts See Using Threshold Alerts on page 155
n/a	 Servers See Using the Servers Viewer on page 165
n/a	 Remote Data Collector See Remote Data Collector on page 203 .

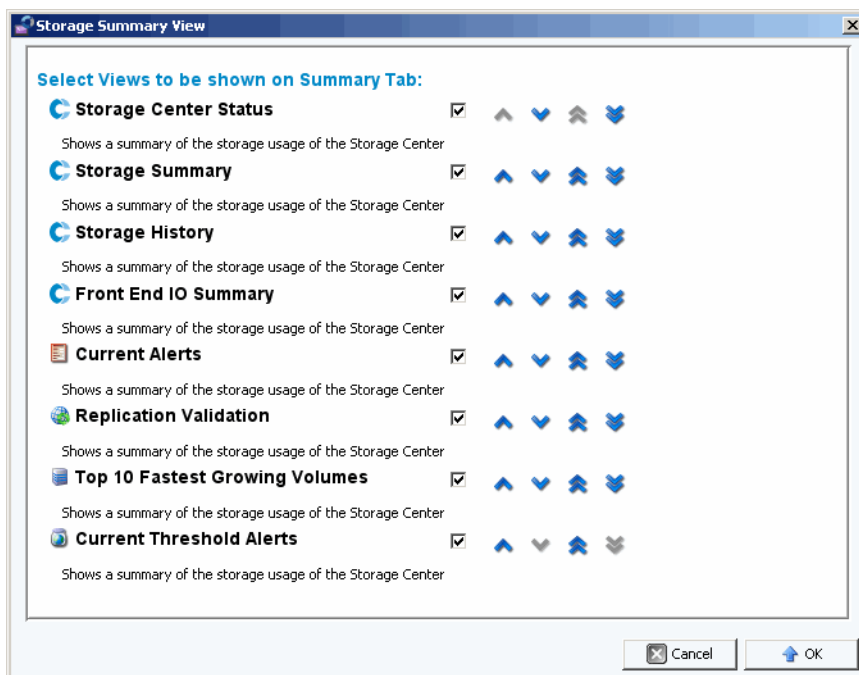
Storage Center Summary

The Storage Center Summary is the default view. The view can include the following summary reports:

- [Storage Center Status](#)
- [Storage Summary](#)
- [Front End IO Summary](#)
- [Current Alerts](#)
- [Replication Validation](#)
- [Top 10 Fastest Growing Volumes](#)
- [Current Threshold Alerts](#)

⇒ *To select the summaries to include*

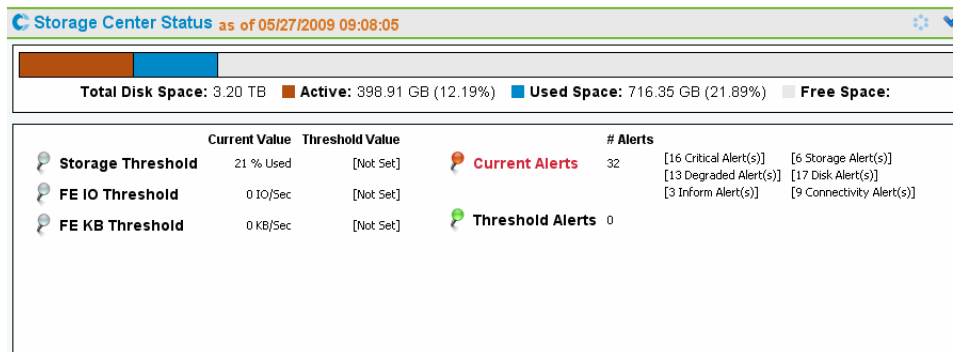
- 1 When the **Storage Center Summary** report is displayed, click . The **Storage Summary View** dialog appears.



- 2 Select the reports to include in the display:
 - **Storage Center Status:** Shows current status for a Storage Center.
 - **Storage Summary:** Shows summary reports for storage savings.
 - **Storage History:** Shows summary reports for historical storage usage.
 - **Front End IO Summary:** Shows summary reports for front end (FE) kilobyte per second read/write and IO per second.
 - **Current Alerts:** Shows summary report for current alerts.

- **Replication Validation:** Shows summary report for replications.
 - **Top 10 Fastest Growing Volumes:** Shows summary report for top 10 fastest growing volumes.
 - **Current Threshold Alerts:** Shows all Storage Center objects for which thresholds have been reached.
- 3 Use the up and down arrows to position the reports within the display.
 - 4 Click **OK** to close the dialog.

Storage Center Status



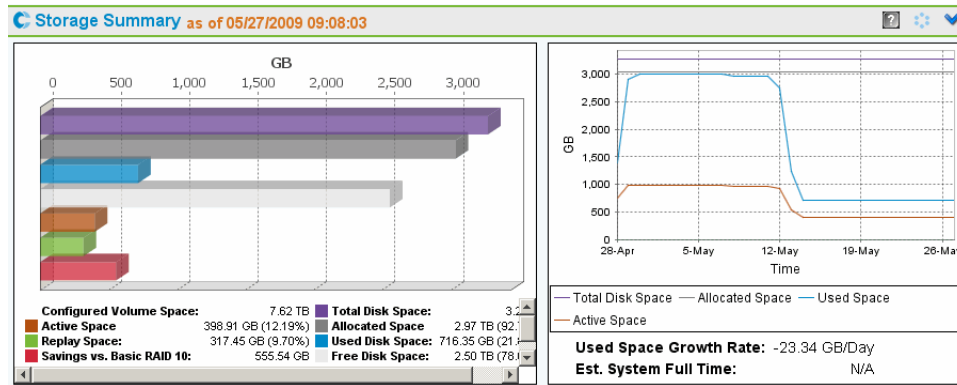
The **Storage Center Status** Summary gives an at-a-glance summary of Storage Center resource usage, as well as a summary of alerts.

- Storage Threshold
- FE IO Threshold
- FE KB Threshold
- Current Alerts
- Threshold Alerts

To go to the details page for a given status, click on the status indicator. For example, to go to the Storage Management display, click on the Storage Threshold indicator. The following table describes the status indicators.

Status Indicator	Description
	Indicates the resource is currently well below its usage threshold.
	Indicates the resource is close to reaching its usage threshold.
	Indicates the resource has exceeded its usage threshold and an alert has been issued.
	Indicates the resource has no defined threshold.

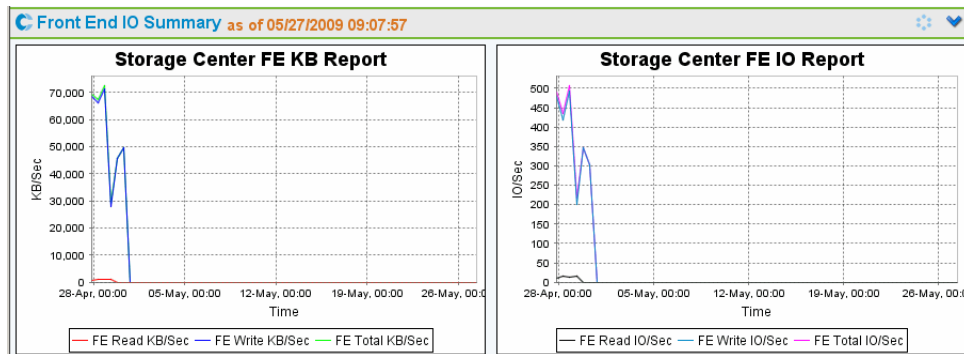
Storage Summary



Storage Summary displays two summary charts:

- **Storage Savings:** Bar chart that shows Configured Volume Space, Active Space, Replay Space, Savings vs. RAID 10, Total Disk Space, Allocated Space, Used Disk Space, and Free Disk Space.
- **Historical Storage Usage:** Graph comparing Total Disk Space, Allocated Space, Used Space, and Active Space. Also reports the Used Space Growth Rate and an Estimated System Full Time (if possible).

Front End IO Summary



Front End IO Summary displays front end IO from the servers for the last two weeks in **KB/sec** and **IO/sec**. Graph lines represent:

- Front End Read
- Front End Write
- Front End Total

Current Alerts

Current Alerts as of 05/27/2009 09:07:58

Object Name	Date/Time	Message	Status
5000D310000CA04	05/18/2009 09:39:07 AM	Local FC Port 5000D310000CA04 is down - Loop Down	Down
5000D31000036D20	05/18/2009 09:49:22 AM	Remote FC Port 5000D31000036D20 Down on Local Port 5000D3100000CA05 - Failed awaiting PLOGI response	Down
5000D31000036D20	05/18/2009 09:49:23 AM	Remote FC Port 5000D31000036D20 Down on Local Port 5000D3100000CA09 - Failed awaiting PLOGI response	Down
5000D31000036D35	05/18/2009 08:14:35 AM	Remote FC Port 5000D31000036D35 Down on Local Port 5000D3100000CA05 - Trgt Port not in SNS	Down
5000D31000036D35	05/18/2009 08:14:35 AM	Remote FC Port 5000D31000036D35 Down on Local Port 5000D3100000CA04 - Trgt Port not in SNS	Down
5000D31000036D35	05/18/2009 08:14:35 AM	Remote FC Port 5000D31000036D35 Down on Local Port 5000D3100000CA09 - Trgt Port not in SNS	Down

Current Alerts shows all objects that are currently alerting the Storage Center. (**Current Alerts** reports information only from Storage Center version 3.6 or above.)

Replication Validation

Replication Validation as of 05/27/2009 09:14:58

Source Volume	Source Storage Center	Destination Storage Center	State	Message
Anchor.Win2003.1	WVST01	MST04	Good	Destination volume (1339) is not th
Anchor.Win2008.1	WVST01	MST04	Good	Destination volume (1407) is not th
Bacardi Vol 0003	WVST01	MST04	Error	Source volume (3) and destination
Bacardi Vol 0003	WVST01	MST04	Error	Source volume (3) and destination
Bacardi Vol 0007	WVST01	MST04	Good	Destination volume (1467) is not th
Bacardi Vol 0007	WVST01	MST04	Good	Destination volume (1477) is not th
Bacardi Vol 0008	WVST01	MST04	Good	Destination volume (1468) is not th
Bacardi Vol 0008	WVST01	MST04	Good	Source volume is still replicating
Bacardi Vol 0010	WVST01	MST04	Good	Destination volume (1464) is not th
Bacardi Vol 0010	WVST01	MST04	Good	Destination volume (1469) is not th
Bacardi Vol 0010	WVST01	MST04	Good	Source volume is still replicating

Replication Validation displays a list of replications and corresponding statuses.

Top 10 Fastest Growing Volumes

Top 10 Fastest Growing Volumes as of 05/27/2009 09:12:24								
Name	Configured	Active				Replay		
		Size	Growth Rate	% Full	Estimated Full Time	Size	Growth Rate	Size
New Volume 2	600.00 GB	100.00 GB	0.00 MB/Day	16%		199.98 GB	0.00 MB/Day	299.98
New Volume 3	500.00 GB	58.73 GB	0.00 MB/Day	11%		58.73 GB	0.00 MB/Day	117.46
New Volume 4	500.00 GB	58.73 GB	0.00 MB/Day	11%		58.73 GB	0.00 MB/Day	117.46
Copy of New Volume 1	600.00 GB	0 MB	0.00 MB/Day	0%		0 MB	0.00 MB/Day	0
New Volume 5	500.00 GB	0 MB	0.00 MB/Day	0%		0 MB	0.00 MB/Day	0
New Volume 6	500.00 GB	0 MB	0.00 MB/Day	0%		0 MB	0.00 MB/Day	0
New Volume 7	500.00 GB	0 MB	0.00 MB/Day	0%		0 MB	0.00 MB/Day	0
New Volume 8	500.00 GB	0 MB	0.00 MB/Day	0%		0 MB	0.00 MB/Day	0

Displays the top ten fastest growing volumes based on overall storage usage:

- **Configured size:** Displays the virtual size of the volume.
- **Active:** Lists Actual Size, Growth Rate, the percentage of the Actual Size compared to the Configured Size amount of space, and, based on the rate of growth, when the Actual Size will equal the Configured Size.
- **Replay:** Displays the amount of storage space on a volume that is taken up by Replays, and the growth rate over the last defined period.
- **Actual Size:** Displays the average amount of storage space taken up per day by data with Replays, but without RAID overhead. Growth rate is the actual growth over the last defined period.
- **Last Updated:** Displays the date and time the data in this Summary was last updated.

Current Threshold Alerts

Current Threshold Alerts as of 05/27/2009 09:14:18									
Date/Time	Storage Center	Object	Definition	Type	Class	Threshold	Current	Total	

Displays all current threshold alerts for the Storage Center. See [Using Threshold Alerts on page 155](#) for information on setting up threshold alerts.

Multi-System Summary Viewer

The **Multi-System Viewer** displays data for all Storage Centers managed by the Enterprise Manager. To view multi-system data, in the list of Viewers, click **Multi-System**. The Multi-System View compares overall Storage Center storage and the number of objects on each Storage Center.

Table View

The default view for Multi-System is a table view of all Storage Centers monitored by the Client. Tabs at the top of the window display a Multi-System Storage Chart and a Multi-Storage Center Object Chart.

All Storage Centers

For all Storage Centers, the top frame displays a table that lists aggregate data for all systems, followed by a list of systems monitored by Enterprise Manager.

- **Name:** All Systems or name of individual system.
- **Configured:** Total size for all volumes present to servers.
- **Oversubscribed:** Configured space minus the total available space.
- **Available:** Amount of disk space available on all drives on the system.
- **Allocated:** Amount of disk space allocated to all the disks on the system (in MB, GB, or TB).
- **Used:** Amount of space written to by servers or consumed in Replays.
- **Replay:** Amount of space used by Replays.
- **Savings:** Amount of space saved by effective use of RAID 5.
- **Controllers:** Number of controllers on the System.
- **Servers:** Number of servers on the System.
- **Volumes:** Number of volumes on the System.
- **Replays:** Number of Replays on the volumes of the System.
- **Disks:** Number of disks attached to the system on the System.
- **Managed:** Number of managed disks (does not include spare disks) on the Storage Center.
- **External:** Number of disks attached as External devices.
- **Replications:** Number of volumes being actively Replicated from this system.

In the bottom frame, use the pull-down menu at the right of the pane to select the Storage Center view you want to display for all systems:

- **Storage Center Status**
- **Storage History**
- **Storage Summary**
- **Front IO Summary**
- **Current Alerts**

- **Replication Validation**
- **Top 10 Fastest Growing Volumes**
- **Current Threshold Alerts**

By default, **Storage Center Status** is displayed for all Storage Centers.

Storage Chart

To view a Multi-System storage chart, in the **Multi-System** viewer window, click the **Storage Chart** tab. Enterprise Manager displays a bar chart showing the amount of storage available and consumed by each system.

Object Chart

To view a Multi-System object chart, in the **Multi-System** viewer window, click the **Object Chart** tab. Enterprise Manager displays a bar chart showing the number of controllers, servers, volumes, disks, and replications in bar chart format.

Current Alerts

⇒ *To view current alerts for one Storage Center*

- 1 Right-click on a Storage Center.
- 2 From the shortcut menu, select **View > Current Alerts**. The **Current Alerts** window appears.

⇒ *To acknowledge an alert*

- On the **Current Alerts** view or viewer, right-click on the Storage Center alert you want to acknowledge, and click **Acknowledge**.

Current Alerts Viewer

The Current Alerts Viewer displays a summary of all current alerts for all Storage Center.

⇒ *To view current alerts for all Storage Centers*

- In **Viewers** pane, click **Current Alerts**.

⇒ *To acknowledge an alert*

- On the **Current Alerts** view or viewer, right-click on the Storage Center alert you want to acknowledge, and click **Acknowledge**.

Current Alerts Information

- **Storage Center:** Name of the Storage Center that generated the alert.
- **Object Name:** Name of component. Go to the Storage Center Manager for more information about the object.
- **Date/Time:** Date and time alert was recorded.
- **Message:** Detailed alert message.
- **Status:** Current status of the alert.
- **Definition:** Alert definition.

Historical Alerts

To view historical alerts:

- 1 Right-click on a Storage Center.
- 2 Select **View > Historical Alerts**. The Historical Alerts view appears.

Note Historical Alerts displays a maximum of 500 messages.

Log Viewer

To view the logs:

- 1 In the Storage Centers frame, right-click on a Storage Center.
- 2 From the short-cut menu, select **View > Log Viewer**. The Log viewer appears.

Note Logging displays a maximum of 500 messages.

Remote Data Collector

The **Remote Data Collector** Viewer displays connection information for the Remote Data Collector.

Management Options Help

Storage Centers

- Storage Center 954
- Storage Center 971

Viewers

- Multi Storage Center
- Current Alerts
- Replications
- Reports
- Chargeback
- Threshold Alerts
- Servers
- Remote Data Collector

Remote Data Collector

IP Address: 172.31.110.25 [Test Activate DR Site](#)

State: Connected [Activate DR Site](#)

Last Connection: 06/16/2009 07:39:31 [Validate Restore Points](#)

Last Sync: 06/16/2009 07:39:31

Storage Center 954

Version: 05.00.01

Primary Host: sn955.lab.beer.town **Remote Host:** sn955.lab.beer.town

Primary IP Address: 172.31.11.76 **Remote IP Address:** 172.31.11.76

Primary State: Connected **Remote State:** Connected

Source Volume	Source Storage Center	Destination Storage Center	State	
Live Volume Test #2	Storage Center 954	Storage Center 971	Warning	Destination volume (
Live Volume Test #2	Storage Center 954	Storage Center 971	Warning	Destination volume (
Live Volume Test #2	Storage Center 954	Storage Center 971	Warning	Destination volume (
Live Volume Test #3	Storage Center 954	Storage Center 971	Warning	Destination volume (
Live Volume Test #3	Storage Center 954	Storage Center 971	Warning	Destination volume (
Live Volume Test #4	Storage Center 954	Storage Center 971	Error	Source volume (314
New Live Volume	Storage Center 954	Storage Center 971	Warning	Destination volume (

Storage Center 971

Version: 05.00.01

Primary Host: sn971.lab.beer.town **Remote Host:** sn971.lab.beer.town

Primary IP Address: 172.31.11.89 **Remote IP Address:** 172.31.11.89

Primary State: Connected **Remote State:** Connected

Source Volume	Source Storage Center	Destination Storage Center	State	
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The top panel shows information on the Remote Data Collector connection and provides DR options.

Field/Option	Description
IP Address	Shows the IP address of the Remote Data Collector.
State	Shows the current state of the Remote Data Collector: Connected or Not Connected.
Last Connection	Shows the date and time when the Remote Data Collector last connected to the Primary Data Collector.
Last Sync	Shows the date and time when the remote and primary Data Collectors last synchronized data.
DR Options	
Test Activate DR Site	Tests the activate DR site routine and returns results. See Preparing for Disaster Recovery on page 196 for information on testing activation of a DR site.
Activate DR Site	Activates a DR site. See Activating Disaster Recovery on page 198 for information on activating a DR site.
Validate Restore Points	Validates restore points. See Saving and Validating Replication Restore Points on page 110 for information on validating restore points.

Subsequent panels display Primary/Remote Data Collector information for each Storage Center in the Enterprise Manager client, and information on replicating volumes.

Field/Option	Description
Version	Shows the Storage Center version running on the Storage Center.
Primary Host	Shows the name or IP address of the primary Storage Center.
Remote Host	Shows the name or IP address of the remote Storage Center.
Primary IP Address	Shows the IP address of the primary Storage Center.
Remote IP Address	Shows the IP address of the Remote Storage Center.
Primary State	Shows Connected or Not Connected.
Remote State	Shows Connected or Not Connected.
Replicating Volumes	
Source Volume	Shows the name of the source volume.
Source Storage Center	Shows the Storage Center for the source volume.
Destination Storage Center	Shows the destination Storage Center.
State	Shows the state of the replication: Good or Warning.
Status/Reason	Provides an explanation of the state.
Validate Restore Points	Validates restore points. See Saving and Validating Replication Restore Points on page 110 for information on validating restore points.

For information on installing and connecting a remote Data Collector, refer to the Enterprise Manager Installation and Setup Guide. For information on connecting a client to the remote Data Collector, see [Remote Data Collector on page 203](#).

4 Storage Center Tasks

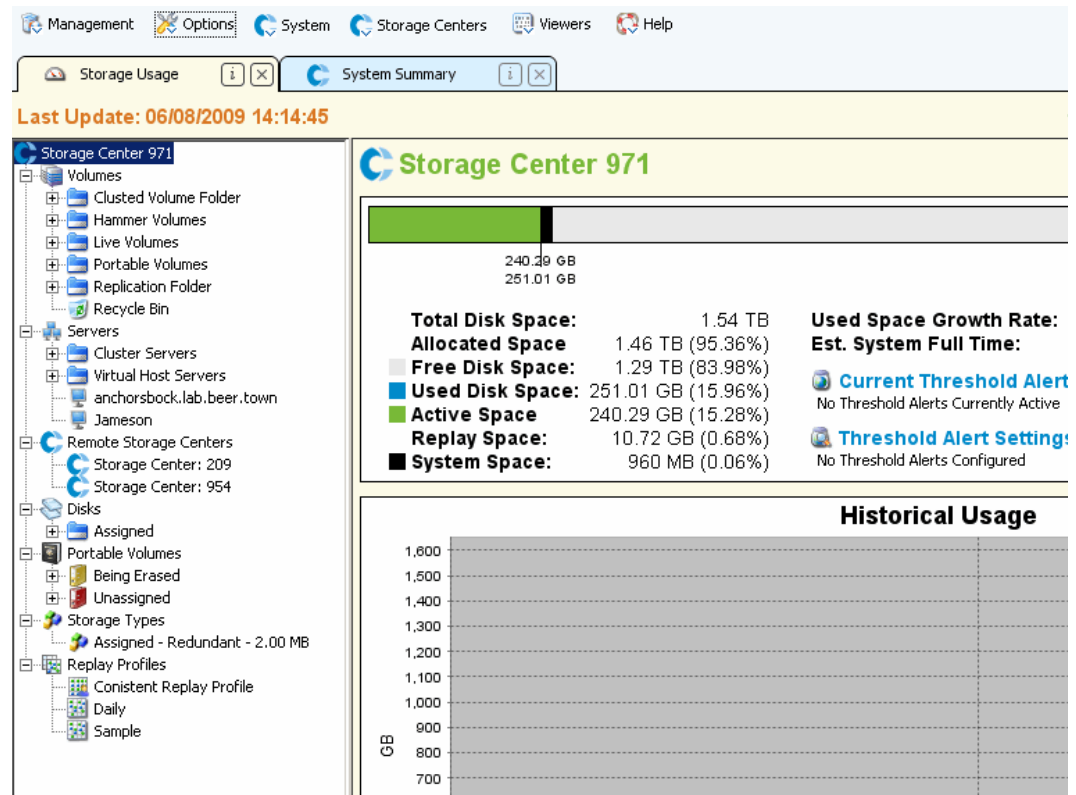
- Introduction [52](#)
- Managing Volumes [55](#)
- Managing Servers [62](#)
- Managing Replay Profiles [67](#)
- Managing Storage Profiles [71](#)
- Exporting Objects [72](#)

Introduction

The **Storage Management** view allows you to view and manage storage on the selected Storage Center. The view displays a navigation pane similar to the Storage Center Manager navigation pane and a display pane.

Opening the Storage Management View

- 1 In the Storage Centers frame, right-click on a Storage Center for which you want a report.
- 2 From the short-cut menu, select **View > Storage Management**.



The Storage Center and components tree is displayed in the left pane of the report. The right pane displays information for the selected component.

Navigation Pane

The Storage Management navigation pane shows the following nodes:

- **Storage Center:** Shows a summary of current and historical storage usage on the selected Storage Center.
- **Volumes:** Allows you to create and manage volumes and volume folders, as well as create a local recovery from a volume Replay. For information on creating and managing volumes, see [Managing Volumes on page 55](#).
- **Servers:** Allows you to create and manage physical and virtual servers, server clusters, and server folders. For information on creating and managing servers, see [Managing Servers on page 62](#).
- **Remote Storage Centers:** Allows you to create and view iSCSI connections to remote Storage Centers for which you have access. For information on creating iSCSI connections, see [Configuring iSCSI Connections on page 105](#).
- **Disks:** Allows you to view disk folders on the Storage Center. For information on Storage Center disk folders, refer to the *Storage Center System Manager User Guide*.
- **Portable Volumes:** Allows you to view and manage portable volumes. For information on creating and managing portable volumes, see [Working with Portable Volumes on page 79](#).
- **Storage Types:** Allows you to view the Storage Types prepared on the Storage Center. For information on Storage Types, refer to the *Storage Center System Manager User Guide*.
- **Replay Profiles:** Allows you to view, modify, and create Replay profiles for the Storage Center, as well as apply Replay Profiles to one or more volumes. For complete information on Replay Profiles, refer to the *Storage Center System Manager User Guide*.
- **Storage Profiles:** Allows you to view Storage profiles defined on the Storage Center. If the logon user account for the Storage Center permits modifying Storage Profiles, allows creating and modifying Storage Profiles. For complete information on Storage Profiles, refer to the *Storage Center System Manager User Guide*.

Display Pane

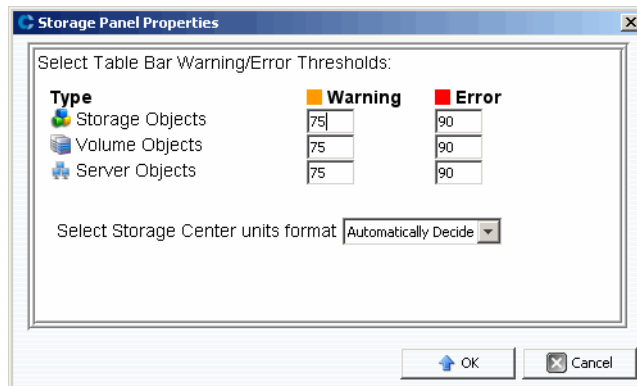
The right side of the display shows one or more display tabs with information for the node or object selected in the navigation pane.

Setting Storage Management Properties

Use the Storage Panel Properties dialog to specify warning and error thresholds to display for Storage Objects, Volume Objects, and Server Objects in the Storage Management display. In addition, you can select the unit format (Automatic, MB, GB, or TB) for the displays.

To select the warning and error thresholds

- 1 Click the **Properties** button at the top right of the Storage Management display. The Storage Panel Properties dialog appears.



- 2 Enter the **warning** and **error** threshold markers to display for **Storage**, **Volume**, and **Server objects**. **Storage objects** include disks, disk classes and disk tiers; **volume objects** include volumes and volume folders; **server objects** include servers and server folders.
- 3 Select the unit formats for the displays: **Automatic**, **MB**, **GB**, or **TB**.
- 4 Click **OK**.

Managing Volumes

A volume is logical storage repository. Volumes can be created only from an assigned folder of managed disks. Note that you can allocate more logical space to a volume than is physically available. It is crucial that you monitor system alerts so that you know when you need to add more physical space to a Storage Center.

Volume Attributes

When you create a volume, you are prompted to specify attributes for the volume. The following descriptions list all available volume attributes.

Allocation Size

For volumes mapped to Server Agents only. Select the amount of space to allocate to the volume. Default is to allocate the volume size.

Controller

For a dual-controller Storage Center, select the controller for mapping the volume.

Create as Live Volume

If you enable the Create as Live Volume option, Enterprise Manager displays the Convert to Live Volume Wizard. See [Creating and Managing Live Volumes on page 76](#) for details on creating a Live Volume.

Enforce Volume Space Consumption Limit

Allows you to enforce a specified volume space consumption limit.

Format Volume on Server

For volumes mapped to Server Agents only. To format and mount the volume, enable Format Volume and then select either a drive or folder to which to mount the volume on the server.

Import to Lowest Tier

Allows you to force all data written to the volume to the lowest storage tier configured for the volume. By default, this option is disabled and data is written to the highest storage tier configured for the volume per the Storage Profile attached to the volume. This option is available only via the Edit Settings options for the volume; this option is not available during volume creation.

Name

Enter a name for the volume.

Parent Folder

Click **Change** and select a parent folder for the volume.

Pause Replay Creation

Pauses Replay creation for the volume.

Pause Replay Expiration

Pauses both Replay creation and expiration for the volume.

Read Cache Enabled

Enables read cache for the volume.

Replay Profiles

Click **Change** and select the Replay Profiles to apply to the volume.

Replicate Volume to Another Storage Center

If you enable the **Replicate Volume to Another Storage Center** option, Enterprise Manager displays the Create Replication wizard. See [Creating Replications on page 109](#) for details on creating a replication. When you have finished, continue with the Create Volume dialog.

Server

Click **Change** to select or change the server to which you want to map the volume. Click **Advanced Mapping** to select paths and LUNs for the mapping. Note if you are creating a volume via the Servers Viewer, you cannot change the server.

Size

Enter the volume size in GB (gigabytes) or TB (terabytes).

Storage Profile

Select the Storage Profile for the volume.

Storage Type

Select the type of storage for the volume. Options available are dependent on the storage types available on the Storage Center.

Windows Format Type

For volumes mapped to Server Agents only. Select the Microsoft Windows format type MBR or GPT.

Windows Volume Label

For volumes mapped to Server Agents only. Enter text to use as the Windows volume label.

Write Cache Enabled

Enables write cache for the volume.

Mapping Attributes—General**Server**

Server (physical or virtual) or server cluster to which to map a volume.

Volume

Volume to be mapped to a server.

Mapping Attributes—Advanced**Use Next Available LUN**

Enable this option to allow the Storage Center to use the next available LUN to map the volume.

LUN to use when mapping to Volume

Specifies a LUN to use to map the volume.

Use the next available LUN if specified LUN is unavailable

Enable this option to allow the Storage Center to use the next available LUN to map the volume if the specified LUN is not available.

Volume used as Boot Volume

Enable this option to map a volume as a boot volume.

Maximum number of paths per server

For multi-pathed servers, specify a limit for the number of paths to use for mapping the volume.

Allow the Storage Center to automatically determine best controller for activating the volume

For dual-controller Storage Centers. Enable this option to allow the Storage Center to determine the controller on which to activate the volume.

Volume presented to server as read-only

Enable this option to map a volume as read only.

Creating One or More Volumes

Use the Create Volume or Create Multiple Volumes dialogs to create, map, mount, and replicate a volume to another Storage Center in one step.

- 1 Select a Storage Center in which to create volumes.
- 2 From the Storage Center Tasks menu, select **Volumes > Create Volume** or **Create Multiple Volumes**.
- 3 Enter information for the volume(s). For information on volume options, see [Volume Attributes on page 55](#). For information on mapping options, see [Mapping Attributes—General on page 56](#) and [Mapping Attributes—Advanced on page 56](#).
- 4 When you have finished specifying options for the volume, click **OK** to create the volume.

Editing a Volume

You can change the name, parent folder, import option, or Replay profile for a volume using the Edit Settings options. See [Volume Attributes on page 55](#) for information on volume attributes. To change mappings for a volume, see [Removing Server Mappings on page 65](#) or [Mapping a Server to a Volume on page 64](#).

- 1 In the navigation pane of Storage Management display, right-click a volume.
- 2 Select **Edit Settings**.
- 3 Change settings for the volume, and click **OK**.

Expanding a Volume

- 1 In the navigation pane of the Storage Management display, right-click on the volume you want to expand.
- 2 Select **Expand Volume**.
- 3 Enter a new size for the volume.
- 4 Click **OK**.

Deleting a Volume

- 1 In the navigation pane of either the Storage Management display or the Servers Viewer, right-click on the volume you want to delete, and select **Delete**. The Delete Volumes window appears.

Note By default, a deleted volume is moved to the Recycle Bin. You can recover the volume from the Recycle Bin, but once the Recycle Bin is emptied, data on that volume cannot be recovered.

- 2 (Optional - and not recommended) You can immediately delete the volume and not save the metadata in the Recycle Bin by checking **Purge Volume (Delete from Recycle Bin)**.
- 3 Click **OK** to delete the volume. The volume is marked for deletion and moved to the Recycle Bin.

Creating a Volume Folder

Note Create volume folders either to organize volumes or to restrict access to volumes. For more information on restricting access to users and groups, refer to the *Storage Center System Manager User Guide*.

- 1 In the Storage Center Tasks menu, select **Volumes > Create Volume Folder**. The Create Volume Folder dialog appears.
- 2 Enter the following:
 - Name:** Enter a name for the volume folder.
 - Notes:** Optionally enter notes for the volume folder.
 - Parent Folder:** Click **Change** to select the parent for the new folder.
- 3 Click **OK**.

Modifying a Volume Folder

- 1 In the navigation pane of the Storage Management display, right-click on an empty volume folder and select **Edit Settings**.
- 2 Change any of the following:
 - Name:** Enter a new name for the volume folder.
 - Notes:** Optionally enter notes for the volume folder.
 - Parent Folder:** Click **Change** to change the parent folder of the folder.
- 3 Click **OK**.

Deleting a Volume Folder

Note Only empty volume folders can be deleted.

- 1 In the navigation pane of the Storage Management display, right-click on an empty volume folder and select **Delete**.
- 2 Click **OK** to delete the folder.

Creating a Replay for a Volume

- 1 In the navigation pane of the Storage Management display, right-click on the volume for which you want to create a Replay and select **Create Replay**. The Create Replay dialog appears.
- 2 Enter the following:
 - Expiration:** Enter the number of minutes, hours, days, or weeks at which you want to expire the Replay. If you do not want to expire the Replay, enable **Never Expire**.

Description: Enter a description of the Replay. The default descriptive text is “Manually Created.”

- 3 Click **OK**.

Creating a Boot from SAN Copy

- 1 In the navigation pane of the Storage Management display, right-click on the volume for which you want to create a boot from SAN copy, and select **Create Boot from SAN Copy**.
- 2 Enter information for the boot from SAN copy. For information on volume options, see [Volume Attributes](#).
- 3 Click **OK** to create the boot from SAN copy.

Creating Replay from a Replay Profile

- 1 In the navigation pane of the Storage Management display, right-click on a Replay profile and select **Create Replay**.
- 2 Enter the following:

Expiration: Enter the number of minutes, hours, days, or weeks at which you want to expire the Replay. If you do not want to expire the Replay, enable **Never Expire**.

Description: Enter a description of the Replay. The default descriptive text is “Manually Created.”
- 3 Click **OK**.

Applying a Replay Profile to a Volume

- 1 In the navigation pane of the Storage Management display, right-click on a Replay profile and select **Apply to Volume(s)**.
- 2 Select one or more volumes to which you want to apply the Replay profile.
- 3 If you want to replace the existing Replay profiles for the volume(s), select **Replace Existing Replay Profiles**.
- 4 Click **OK**.

Applying a Replay Profile to all Volumes Mapped to a Server

- 1 In the navigation pane of the Storage Management display, right-click on a Replay profile and select **Apply to Server**.
- 2 Select the server to which you want to apply the Replay profile.
- 3 If you want to replace the existing Replay profiles for the volume(s), select **Replace Existing Replay Profiles**.
- 4 Click **OK**.

Creating a Local recovery volume from a replay

- 1 In the navigation pane of the Storage Management display, click on the volume for which you want to use a Replay to create a local recovery volume.
- 2 Click the **Replays** tab.
- 3 From the list of available Replays, right-click on the Replay from which you want to create a local recovery volume, and select Create Local Recovery. The Create Local Recovery dialog appears.
- 4 Enter information for recovery volume. For information on volume options, see [Volume Attributes on page 55](#).
- 5 Click **OK** to create the local recovery volume.

Expiring a Replay

- 1 In the navigation pane of the Storage Management display, click on a volume.
- 2 Click the **Replays** tab.
- 3 Select one or more Replays to expire, right-click, and select **Expire Replay**.
- 4 Click **Yes** to expire the selected Replays.

Managing Servers

Enterprise Manager provides two views of Storage Center servers:

- **Storage Management View**
Shows all servers for the selected Storage Center.
- **Servers Viewer**
Shows all registered servers for all Storage Centers.

You can manage servers via either of the displays. This section describes managing servers on the Storage Management View. For information on registering servers on the Servers viewer and gathering operating system information for the servers, see [Using the Servers Viewer on page 165](#).

Server Attributes

When you create a server, you are prompted to specify attributes for the server. The following descriptions list all available server attributes.


Name

Enter a name for the server.

Notes

Optionally enter notes for the server.

Operating System

Select the operating system of the server. To see operating system characteristics for the selected operating system, click .

Parent Folder

Click **Change** to select the parent folder for the new server.

Select the Servers Host Bus Adapters

Select one or more host bus adapters (HBAs) for the server from the list of displayed HBAs or manually enter HBAs for the server.

Select Server to Add to Cluster

To add an existing server to the cluster, click **Add Existing Server** and select a server. To remove a server from the cluster, select the server and click **Remove Selected**.

iSCSI Name

Check to display the iSCSI name. Uncheck to display the iSCSI IP Address.

Note You can add an IP address for an HBA that will be installed on the server in the future and display the server under the iSCSI name. When the iSCSI HBA that uses that IP address is installed, it will be configured and ready to use.

Creating a Server Folder

- 1 In the navigation pane of the Storage Management display, right-click on the Servers icon and select Create Server Folder. The Create Server Folder dialog appears:
- 2 Enter the following:
 - Name:** Enter a name for the folder.
 - Notes:** Optionally, enter notes to describe the folder.
 - Parent Folder:** Click **Change** to select a parent folder for the new folder.
- 3 Click **OK** to create the folder.

Modifying a Server Folder

- 1 In the navigation pane of the Storage Management display, right-click on the server folder you want to modify and select **Edit Settings**.
- 2 Modify any of the following:
 - Name:** Enter a new name for the folder.
 - Notes:** Optionally, enter notes to describe the folder.
 - Parent Folder:** Click **Change** to select a parent folder for the new folder.
- 3 Click **OK**.

Deleting a Server Folder

Note You can delete only empty server folders. To move servers to another server folder, go to the Storage Center System Manager.

- 1 In the navigation pane of the Storage Management display, right-click on the server folder you want to delete and select **Delete**.
- 2 Click **OK** to delete the folder.

Creating a Physical Server

- 1 In the navigation pane of the Storage Management display, right-click on the Servers icon or a server folder and select **Create Server**. The Create Server dialog appears.
- 2 Enter information for the new server. For information on server options, see [Server Attributes on page 62](#).
- 3 Click **OK**.

Creating a Virtual Server

- 1 In the navigation pane of the Storage Management display, right-click on the physical server on which to create a virtual server, and select **Create Virtual Server**. The Create Virtual Server dialog appears.
- 2 Enter the information for the virtual server. For information on server options, see [Server Attributes on page 62](#).
- 3 Click **OK**.

Creating a Server Cluster

The cluster server operation allows you to group servers into a server cluster. Once servers are grouped in a cluster, volumes mapped to individual servers in the cluster are mapped to all servers in the cluster.

Note All servers in a server cluster must be running the same operating system.

- 1 From the Storage Center Tasks menu, select **Server > Create Server Cluster**. The Create Server Cluster dialog appears.
- 2 Enter information for the server cluster. For information on server options, see [Server Attributes on page 62](#).
- 3 Click **OK**.

Modifying a Server

- 1 In the navigation pane of the Storage Management display, right-click on the server you want to modify, and click **Edit Settings**.
- 2 Edit the server settings, and click **OK**.

Mapping a Server to a Volume

- 1 In the navigation pane of the Storage Management display, right-click on the server or volume you want to map, and click **Map Server to Volume**.
- 2 Select a volume to map to the server, and click **Next**.
- 3 To specify advanced mapping options, click **Advanced Mapping**. Specify Advanced Mapping options, and click Next.
- 4 Click **OK** to create the mapping.

Removing Server Mappings

- 1 In the navigation pane of the Storage Management display, right-click on the server for which you want to remove volume mappings, and select **Remove Mappings**.
- 2 Select the mappings to remove, and click **OK**.
- 3 a volume to map to the server, and click **Next**.

Adding HBAs to a Server

- 1 In the navigation pane of the Storage Management display, right-click the server for which you want to add an HBA. Select **Add HBAs to Server**. The Add HBAs to Server dialog appears.
- 2 From the list of available HBAs, select one or more host bus adapters (HBAs) to add to the server.
- 3 Check to display the iSCSI name (IQN). Uncheck to display the iSCSI IP Address.
- 4 Click **OK**.

Manually Add HBA to Server

- 1 In the navigation pane of the Storage Management display, right-click the server for which you want to add an HBA. Select **Add HBAs to Server**. The Add HBAs to Server dialog appears.
- 2 Click **Manually Add HBA**. The Manually Add HBA to Server window appears.
- 3 Enter the name of an HBA.
- 4 Select a transport type: **FC** or **iSCSI**.
- 5 Click **Back**.
- 6 In the Add HBAs to Server dialog, click **OK**.

Removing HBAs from a Server

- 1 In the navigation pane of the Storage Management display, right-click on the server from which to remove the HBA. Select **Remove HBAs from Server**. The Remove HBAs from Server dialog appears.
- 2 From the list of current server HBAs, select one or more host bus adapters (HBAs) to remove.
- 3 Click **OK**.

Deleting a Server

Warning When you delete a server, all volume mappings to the server are also deleted.

- 1 In the navigation pane of the Storage Management display, right-click on the server you want to delete and select **Delete**.
- 2 Click **OK**.

Applying a Replay Profile to a Server

- 1 In the navigation pane of the Storage Management display, right-click on the server for which you want to apply one or more Replay profiles, and select **Apply Replay Profiles to Server**.
- 2 Select one or more Replay profiles to apply to server volumes.
- 3 If you want to replace the existing Replay profiles for the volume(s), select **Replace Existing Replay Profiles**.
- 4 Click **OK**.

Working with NAS and zNAS Servers

Enterprise Manager communicates with Dell Compellent NAS and zNAS servers via the IP address of the Intelligent Platform Management Interface (IPMI) card. In Enterprise Manager 5.3:

- The Microsoft-based NAS server ships with Generation 2 hardware
- The Open-Source-based zNAS server ships with Generation 3 hardware.

For information on setting up and using a Dell Compellent NAS server, refer to:

- *Storage Center NAS Setup Guide*
- *Storage Center NAS User Guide*.

For information on setting up and using a Dell Compellent zNAS server, refer to:

- *Storage Center zNAS Setup Guide*
- *Storage Center zNAS User Guide*

For information on configuring IPMI on the NAS and zNAS servers and configuring IPMI on Dell Compellent Hardware, refer to the *Enterprise Manager 5 Installation and Setup Guide*.

Managing Replay Profiles

What are Replays and Replay Profiles?

A Replay is a point-in-time copy of one or more volumes. A Replay Profile is a collection of rules describing when to take periodic Replays for one or more volumes and the time at which Replays are deleted (expired). By default, Storage Center provides two standard Replay Profiles: Daily and Sample. These Replay Profiles cannot be modified or deleted.

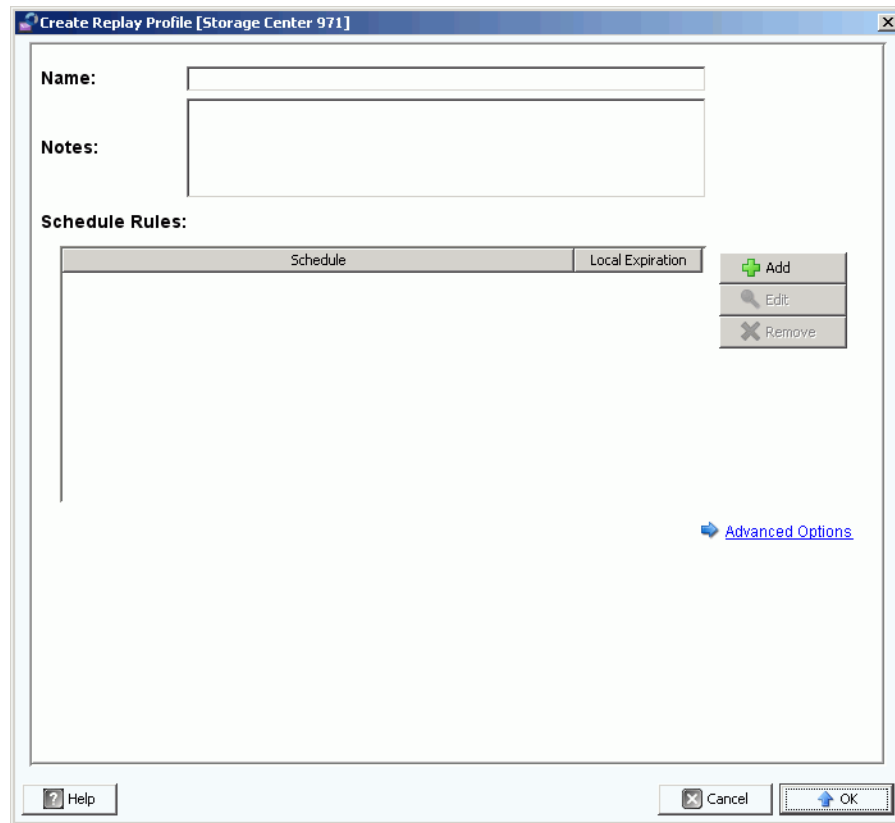
Non-Consistent and Consistent Replays

A Consistent Replay Profile halts IO to all volumes to which the Replay Profile is attached until Replays are taken for each volume.

Consistent Replay Profile	Non-Consistent Replay Profile
Halts IO 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 Replay
Limited to 40 volumes	No limit to the number of volumes to which the Replay Profile is attached
Replays are taken of all volumes simultaneously	Choose between Serial (one volume at a time) or Parallel (all volumes simultaneously)
Can set an Alert if Replays cannot be completed within a defined time. Replays not completed before alert is generated are not taken. (This can lead to incomplete groups of Replays across volumes.)	All Replays are taken
Can delete incomplete group of Replays	All Replays are taken
Can be converted to Non-Consistent Replay Profile	Can be converted to Consistent Replay Profile

Creating a Replay Profile

- 1 Right-click on a Storage Center and select **Tasks>Replay Profile>Create Replay Profile**. The Create Replay Profile window appears.



- 2 Enter the following:
 - Name:** Enter a name for the Replay Profile.
 - Notes:** Optionally, enter notes for the profile.
 - Scheduled Rules:** Add one or more rules to the profile.
 - Advanced Options:** Select the Replay profile type: Serial, Parallel, or Consistent. For information on Replay Profile types, see [Non-Consistent and Consistent Replays on page 67](#).
- 3 When you have finished defining the Replay Profile, click **OK**.

Modifying a Replay Profile

Note Changes to a Replay Profile affect only new Replays taken with the modified Replay Profile. Existing Replays are not changed.

- 1 Right-click on a user-defined Replay Profile and select **Edit Settings**.
- 2 Edit the following:
 - Name:** Enter a name for the Replay Profile.
 - Notes:** Optionally, enter notes for the profile.
 - Scheduled Rules:** Add, Edit, or Remove rules for the profile.
 - Advanced Options:** Select the Replay profile type: Serial, Parallel, or Consistent. For information on Replay Profile types, see [Non-Consistent and Consistent Replays on page 67](#).
- 3 When you have finished defining the Replay Profile, click **OK**.

Applying a Replay Profile to Volume(s)

- 1 Right-click on a Replay Profile and select **Apply to Volume(s)**.
- 2 Select one or more volumes to which you want to apply the Replay Profile.
- 3 Click **OK**.

Applying a Replay Profile to Server(s)

- 1 Right-click on a Replay Profile and select **Apply to Server(s)**.
- 2 Select one or more servers to which you want to apply the Replay Profile.
- 3 Click **OK**.

Deleting a Replay Profile

- 1 Click on the user-defined Replay Profile you want to delete.
- 2 Make sure the Replay Profile is not in use by any volumes.
- 3 Right-click on the Replay Profile you want to delete, and select **Delete**.
- 4 Click **Yes**.

Modifying Replay Profile Expiration for Remote Replays

By default, Replay 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.

- 1 Click on the Replay Profile for which you want to modify expiration rules for remote Replays.
- 2 In the **Rules** tab of the display, right-click on the schedule and select **Edit Remote Replay Expiration**.
- 3 Do the following:
 - a Select the remote Storage Center for which you want to specify an expiration rule for the Replays.
 - b Enter a time for the **Remote Expiration**.
 - c Click **OK**.

Managing Storage Profiles

Storage Profiles describe the RAID level and tiers on which data is stored. If disk space is not available within a selected tier, space in other tiers is used until space becomes available in the selected tier. All Storage Centers provide a set of standard Storage Profiles.

- Data can be migrated between RAID levels within a tier and between tiers. The system displays the Recommended Storage Profile to migrate data between tiers. The default Storage Profile for a system with Data Progression is the Recommended Storage Profile.
- If Data Progression is not licensed and a system uses RAID 10 and RAID 5, data is migrated up or down within a Tier (drive class) but cannot be migrated between Tiers.
- If Data Progression is not licensed, a system has access only to Storage Profiles that use a single tier of storage; Storage Profiles with multiple tiers are not available. The default Storage Profile for a system without Data Progression is the High Priority Storage Profile.

By default, Storage Profiles are applied automatically and do not appear when you create a volume. To select a Storage Profile, your User Volume Defaults determine options for configuring volume defaults. Refer to the *Storage Center System Manager User Guide* for information on changing User Volume Defaults.

Creating a Storage Profile

Note To create a Storage Profile, your Storage Center User Volume Default must allow you to create

- 1 Select a Storage Center.
- 2 From the Storage Center Tasks menu, select **Storage Profile > Create Storage Profile**. The Create Storage Profile window appears.
- 3 Enter the following:
 - Name:** Enter a name for the storage profile.
 - RAID Level Used:** Select the RAID levels for use by the storage profile.
 - Storage Tiers Used:** Select one or more tiers for use by the storage profile.
 - Notes:** Optionally, enter notes about the storage profile.
- 4 Click **OK**.

Deleting a Storage Profile

- 1 In the Storage Management navigation pane, right-click a user-created storage profile.
- 2 Select **Delete**. The system asks you to confirm.
- 3 Click **OK**.

Exporting Objects

Exporting objects copies User, Server, Replay Profiles, and QoS Definitions from one Storage Center to another.

⇒ **To export objects**

- 1 Select a Storage Center, and select **Tasks > Export Objects**. The Import/Export Wizard appears.
- 2 Select a destination Storage Center for the exported objects, and click **Next**.
- 3 Select one or more objects to export: Users, Server Definitions, Replay Profiles, and QoS Definitions.
- 4 Click **Next**. The confirmation window appears.
- 5 Click **Finish**. The Export Results window appears, which lists the total number of objects exported.

Note Only server objects visible on both the source and destination Storage Centers are exported.

- 6 Click **OK**.

5 Using Live Volumes

Introduction [74](#)

Creating and Managing Live Volumes [76](#)

Introduction

Note In Storage Center 5.0 thru 5.1, Live Volume, a separately licensed Storage Center feature, is intended for evaluation/demonstration purposes only. Full functionality and support for Live Volume is provided in Storage Center 5.2 (and above).

Storage Center Live Volumes are a pair of replicating volumes: a source volume on a primary Storage Center that is replicating to a destination volume on a secondary Storage Center. Both volumes of the Live Volume replication pair can be active at the same time—that is, the source volume on the primary Storage Center can be mapped and active on the primary Storage Center at the same time the destination volume on the secondary Storage Center is mapped and active on the secondary Storage Center.

The primary/secondary Storage Center roles that determine the direction of the replication can be swapped automatically or manually.



Note By default, data is replicated from the source volume on the primary Storage Center to the lowest storage tier configured for the destination volume on the secondary Storage Center. Use the Edit Live Volume Settings to change this default. See [Editing Live Volume Settings on page 76](#).

Requirements

To create Live Volumes requires the following:

Requirement	Description
Enterprise Manager	<ul style="list-style-type: none">Enterprise Manager 5.0 or above.
Storage Centers	<ul style="list-style-type: none">Primary and secondary Storage Centers must be running Storage Center 5.0.2 or above.Primary and secondary Storage Centers must be licensed for Live Volume and Asynchronous Replications.
Connectivity	<ul style="list-style-type: none">Enterprise Manager client must have access to the primary and secondary Storage Centers. That is, the Storage Centers must be added to the Enterprise Manager client.Primary and secondary Storage Centers must be connected to each other by FC connections.

Live Volume Icons

Icon	Description
	Primary Live Volume—that is, the Live Volume that is currently replicating to the secondary Live Volume.
	Secondary Live Volume—that is, the Live Volume to which the primary Live Volume is replicating.

Live Volume Roles and Role Swapping

By default, a new set of live volumes—a Primary Live Volume and a Secondary Live Volume—are set up to automatically swap roles. An automatic role swap of Live Volumes occurs when the following conditions are met:

- **Minimum time as Primary Live Volume:** A minimum amount of time as the primary Live Volume. The minimum amount of time is set by the **Time as Primary before Swap** attribute. See [Replication, Live Volume, and Move Attributes on page 103](#).
- **Minimum Storage Space Written to Secondary Live Volume:** A minimum amount of storage space is written on the Secondary Live Volume. The minimum amount is set by the **Min Amount for Swap** attribute, which specifies the minimum storage space in KB. See [Replication, Live Volume, and Move Attributes on page 103](#).
- **Minimum Percentage of IO on Secondary Live Volume:** A minimum percentage of IO takes place on the Secondary Live Volume. The minimum IO on the Secondary Live Volume is set by the **Min Secondary % Usage for Swap** attribute. See [Replication, Live Volume, and Move Attributes on page 103](#).

Creating and Managing Live Volumes

This section gives step-by-step instructions for creating and managing Live Volumes. For information on creating and managing standard Storage Center volumes, see [Managing Volumes on page 55](#).

Creating a Live Volume

- 1 Right-click on a Storage Center, and select **Tasks > Replication > Create Live Volume**.
- 2 Select the secondary Storage Center, and click **Next**.
- 3 Select the volumes to replicate, and click **Next**.
- 4 Specify all replication, destination, and Live Volume options. For information on options, see [Replication, Live Volume, and Move Attributes on page 103](#).
- 5 Click **Next**.
- 6 To start replicating the volumes, click **Start**. Enterprise Manager starts the replication, and the Replication Results window appears.
- 7 Click **Next**. The Replication wizard asks if you want to save the restore points. Dell Compellent recommends saving the restore points.
- 8 Click on **Save Replication Restore State**. The Save Replication Recover State Wizard appears. See [Saving and Validating Replication Restore Points on page 110](#).

Editing Live Volume Settings

- 1 Go to the **Storage Management** view of the Storage Center for which you want to change mappings of a Live Volume.
- 2 Right-click on the **Live Volume** you want to change, and click **Edit Settings**.
- 3 Edit the volume **Name**, **Parent Folder**, or **Replay Profile(s)**.
- 4 Click **OK**.

Modifying Live Volume Replication Settings

- 1 Go to the **Replications** viewer.
- 2 In the **Replications** tab, right-click on a **Live Volume** replication and select **Edit Settings**.
- 3 Edit the Live Volume settings, and click **OK**. See [Replication, Live Volume, and Move Attributes on page 103](#) for details on Live Volume settings.

Swapping Live Volume Roles

- 1 Go to the **Replications** viewer.
- 2 In the **Replications** tab, right-click on a **Live Volume** replication and select **Swap Primary Storage Center of Live Volume**. A summary of screen appears.
- 3 Click **OK** to swap the primary Storage Center with the secondary Storage Center.

Canceling a Swap Primary Operation

- 1 Go to the **Replications** viewer.
- 2 In the **Replications** tab, right-click on a **Live Volume** replication that is currently swapping roles and select **Cancel Swap Roles**.
- 3 Click **OK** to cancel the swap roles operation.

Removing Live Volume Settings

- 1 Go to the **Replications** viewer.
- 2 In the **Replications** tab, right-click on the **Live Volume** replication for which you want to remove Live Volume settings and select **Remove Live Volume Settings**.
- 3 Click **OK** to remove the settings.

Converting a Replication to Live Volumes

- 1 Go to the **Replications** viewer.
- 2 In the **Replications** tab, right-click on the replication you want to convert to a **Live Volume** replication and select **Convert to Live Volume**.
- 3 Enter Live Volume settings, and click **OK**. For details on Live Volume settings, see [Replication, Live Volume, and Move Attributes on page 103](#).

Converting a Volume to a Live Volume

- 1 Go to the Storage Management view of the Storage Center volume you want to convert.
- 2 Right-click on the volume, and select **Convert to Live Volume**. The Convert to Live Volume wizard appears.
- 3 Select the destination Storage Center for the Live Volume replication, and click **Next**.
- 4 Enter settings for the Live Volume replication. For information on options, see [Replication, Live Volume, and Move Attributes on page 103](#).
- 5 Click **OK**.

Monitoring Live Volume Replication

- 1 Go to the Replication viewer.
- 2 In the Replications tab, click on the Live Volume for which you want to monitor the replication.

For detailed information on viewing replications, see [Using the Replication Viewer on page 119](#).

6 Working with Portable Volumes

Introduction **80**

Managing Portable Volumes **82**

Introduction

Portable volumes allow a site to replicate volumes from a source Storage Center to a destination Storage Center using removable USB disks. Portable volumes are set up and managed via the Enterprise Manager Storage Management display.

The general process of using portable volumes includes:

- 1 Starting a baseline replication from one or more source volumes on one Storage Center to another Storage Center on a USB disk.
- 2 When the replication completes, bring the USB disks to the destination site and restore the data to the destination Storage Center.
- 3 After the restore is complete, the source and destination volumes are synchronized.

Requirements

Requirement	Description
Enterprise Manager	<ul style="list-style-type: none">• Enterprise Manager 5.0 and above.
Storage Centers	<ul style="list-style-type: none">• Source and destination Storage Centers must be running Storage Center 5.0.1 or above.• Source and destination Storage Centers must be licensed for asynchronous replication.
Connectivity	<ul style="list-style-type: none">• Source and destination Storage Centers must be visible to Enterprise Manager.• Source Storage Center must have the destination Storage Center set up as a Remote Storage Center; Destination Storage Center must have the source Storage Center set up as a Remote Storage Center. In addition, the source and destination Storage Centers must be visible to each other.
Removable Media	Dell Compellent USB disks.

Portable Volumes Nodes

Portable Volume Node	Description
Unassigned	Shows USB disks on the Storage Center that are currently unassigned.
Repl Baseline To [dest]	Shows USB disks on the Storage Center that contain baseline replications for which the Storage Center is the source.
Repl Baseline From [source]	Shows USB disks on the Storage Center that contain baseline replications for which the Storage Center is the destination.
Invalid	Shows USB disks on the Storage Center that contain replications for which the Storage Center is neither the source or destination of the replications.
Being Erased	Shows USB disks on the Storage Center that are currently being erased.

Portable Volume and Erase Portable Volume Attributes

1 Pass Full

Erase Portable Volume option: Performs one write pass on the disk and overwrites all data with zeroes.

7 Pass Secure Erase

Erase Portable Volume option: Performs seven write passes on the disk, first overwriting the data with zeroes and then overwriting the disk six more times with sequences of data. The secure erase requires significant time to complete.

Encryption Type

If encryption is selected, the encryption type is AES (Advanced Encryption Standard).

Security Key

If **Use Encryption** is enabled, enter text to use as a security key. A security key ensures that the encryption key is not sent as plain data between the two Storage Centers. A security key can up to 128 characters in length.

Select Portable Volumes

Select one or more USB disks from the list of available disks.

Quick Erase

Erase Portable Volume option: Erases the directory for the data.

Use Encryption

Enable this option if you want to encrypt data on the USB disk.

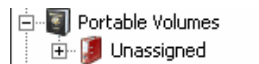
Managing Portable Volumes

Before starting a replication to a portable volume, verify the following:

- Source and destination Storage Centers are at version 5.0.1 or above.
- Source and destination Storage Centers are visible (added) to the Enterprise Manager client.
- Destination Storage Center is defined as a remote Storage Center on the source Storage Center. If not, configure an iSCSI connection for the destination Storage Center. See [Configuring iSCSI Connections on page 105](#) for details.
- USB disk is plugged into an available USB port on the source Storage Center.

Starting a Replication Baseline to a Portable Volume

- 1 Right-click on the source Storage Center, and select **View >Storage Management**. The **Portable Volumes** node appears in the navigation pane with an **Unassigned** node.

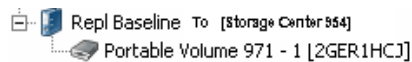


Note The **Portable Volumes** node displays only when there are one or more Dell Compellent USB disks present on the Storage Center.

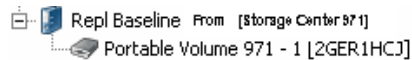
- 2 Right-click on the **Portable Volumes** node and select **Start Replication Baseline**.
- 3 Select the destination Storage Center and click **Next**.
- 4 Specify portable volume attributes and disks. For information on portable volume attributes, see [Portable Volume and Erase Portable Volume Attributes on page 81](#).
- 5 Click **Next**.
- 6 Select volumes to replicate and click **Add Volumes**. Each time you add a volume, the Estimated Space Used by Volumes is updated.

- 7 When you have finished adding volumes, click **Next**.
- 8 Specify replication options. For information on replication options, see [Replication, Live Volume, and Move Attributes on page 103](#).
- 9 Click **Next**. The Replicate Volume(s) with Attributes window appears.
- 10 If you want to change replication settings for a volume:
 - a Select the volume.
 - b Click **Edit Selected**.
 - c Select new options for the volume and click **OK**.
- 11 To start replicating the volumes, click **Start**. The Replication Results window appears.
- 12 Click **Finish**.

On the source Storage Center, Enterprise Manager creates a **Portable Volume** node for the replication to the destination Storage Center. For example:



On the destination Storage Center, Enterprise Manager creates a **Portable Volume** node for the replication from the source Storage Center. For example:



Adding a Disk to Replication Baseline

After you have created an initial replication baseline to a destination Storage Center, you can add more removable disks to the replication on which to write the replication.

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, right-click on the **Repl of Baseline To [dest]** node, and select **Add Portable Volumes**.
- 3 Select an available portable volume, and click **Finish**.

Adding a Volume to a Portable Volume

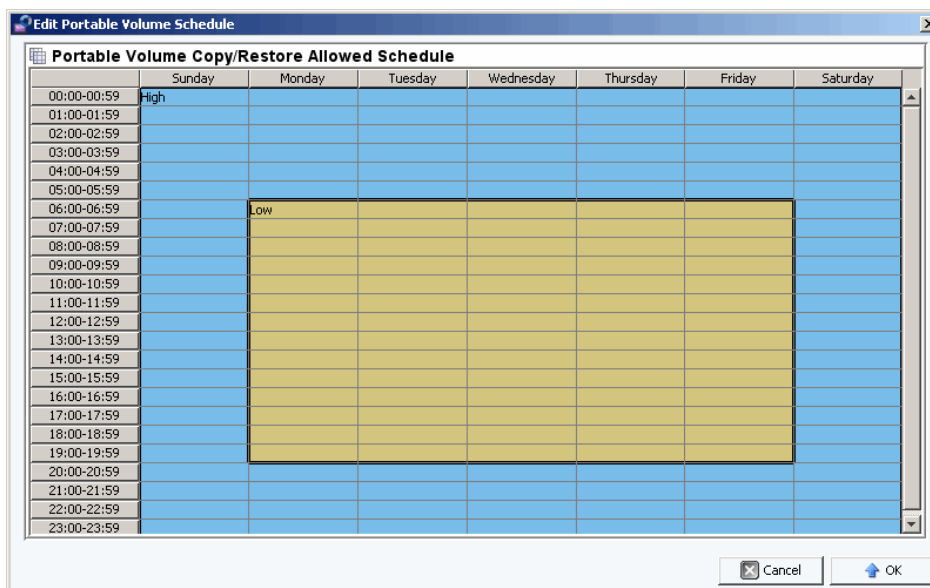
After you have created an initial baseline replication to a destination Storage Center, you can add volumes to include in the replication.

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, right-click on the **Repl Baseline To [dest]** node for the replication to which you want to add volumes, and select **Add Volumes**.
- 3 Select volumes to replicate and click **Add Volumes**. Each time you add a volume, the Estimated Space Used by Volumes is updated.
- 4 Click **Next**. The Replicate Volume(s) with Attributes window appears.
- 5 If you want to change replication settings for a volume:
 - a Select the volume.
 - b Click **Edit Selected**.
 - c Select new options for the volume and click **OK**.
- 6 To start replicating the volumes, click **Start**. The Replication Results window appears.
- 7 Click **Finish**.

Modifying a Portable Volume Schedule

The Portable Volume Schedule allows you to define when portable volume copy and restore operations are allowed, as well the priority (Not Allowed/Low/Medium/High) for the operations. By default, the Portable Volume Schedule does not restrict portable volume copy/restore operations. To set up a schedule for portable volume operations:

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 Right-click on the **Portable Volumes** node, and select **Edit Portable Volume Schedule**.



- 3 Use the mouse to select time slots on the grid and right-click to select a setting for the selected slots: **Not Allowed**, **Low**, **Medium**, or **High**.
- 4 Click **OK** when you have finished modifying the schedule.

Editing an Encryption Security Key

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, right-click on the **Repl Baseline to [dest]** for which you want to change the security key.



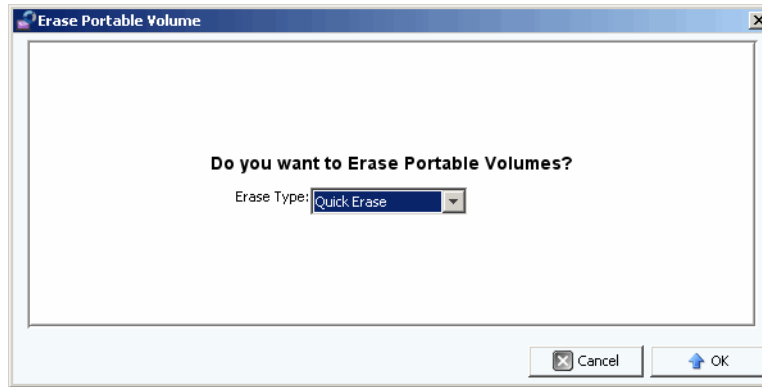
- 3 Enter a new security key, and click **OK**.

Changing the Name of a Portable Volume

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, open the **Repl Baseline To [dest]** node, right-click on the portable volume you want to change and select **Edit Settings**.
- 3 Enter a new name for the portable volume, and click **OK**.

Erasing a Portable Volume

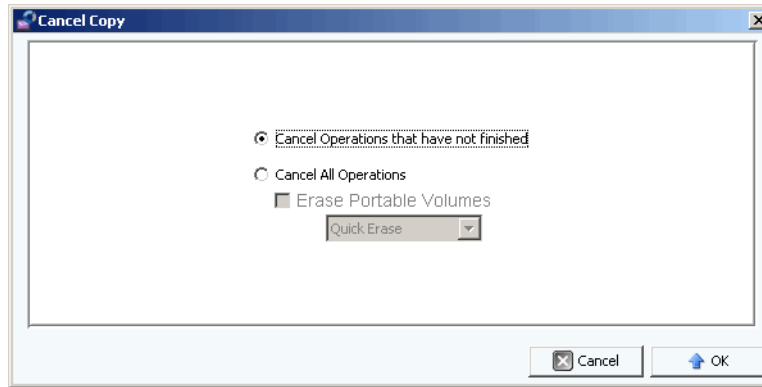
- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, right-click on the portable volume in the **Unassigned** folder you want to erase and select **Erase**.



- 3 Select the type of erase. For information on options for erasing portable volumes, see [Portable Volume and Erase Portable Volume Attributes on page 81](#).
- 4 Click **OK**.

Canceling a Portable Volume Replication

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, click on the replication you want to cancel, and select **Cancel Copy**.



- 3 Select one of the following:
 - Cancel Operations that have not finished:** Select this option to cancel only the copy operations that have not yet finished.
 - Cancel All Operations:** Select this option to cancel all operations.
- 4 If you selected **Cancel All Operations**, you can also erase the portable volumes.
For information on options for erasing portable volumes, see [Portable Volume and Erase Portable Volume Attributes on page 81](#).
- 5 Click **OK**.

Monitoring Portable Volume Replication Progress

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, click on the **Repl Baseline To [dest]** node. Information on the replication is displayed in the view pane.

The screenshot displays the 'Repl Baseline To [Storage Center 954]' interface. It includes a summary of replication attributes, a table of portable volumes, and a table of current copying jobs.

Repl Baseline To [Storage Center 954]

Source Storage Center: Storage Center 971
 Destination Storage Center: Storage Center 954

Type: Copying
 Purpose: Replication Baseline
 State: Copying
 Encryption Enabled: False

Portable Volume Space

Used Space: 180.89 GB
 Free Space: 1.19 TB
 Total Space: 1.36 TB

Volume Copying Space

Copied Space: 8.68 GB
 Remaining Space: 26.58 GB
 Total Copying Space: 35.25 GB

Portable Volumes

Name	Classification	Available	Allocated	% Full	Free	Control Type	Health	Vend
Portable Volume 971 - 1 [...]	USB	1.36 TB	180.89 GB	12%	1.19 TB	ManagedRem...	Healthy	Seagate

Current Copying Jobs

Volume	State	Position	Size	Finished	Expire Time	Purpose
IBM Tivoli Volume	Copying	8.68 GB	25.06 GB	34%		Copy
VMWare ESX 4.0 Boot	Not Started	0 MB	10.20 GB	0%		Copy

The display shows the following:

- **Summary of Replication Attributes:** Shows the source and destination Storage Center, as well as bar charts showing portable volume space used and copying space.
- **Portable Volumes Table:** Shows all portable volume attributes in table form.
- **Current Copying Jobs Table:** Shows all copying job details in table form.

Restoring a Portable Volume at the Destination Storage Center

- 1 Go to the **Storage Management** display for the source Storage Center.
- 2 In the **Portable Volumes** node, click on the **Repl Baseline To [dest]** node and view the summary for the replication.
- 3 When all copying is complete and the portable volume state shows **Ready to be Removed**, remove the portable volumes.
- 4 On the destination Storage Center, plug in the source replication portable volumes on available USB ports. You can plug in the portable volumes in any order.
- 5 Once the portable volumes are plugged into the destination Storage Center, the Storage Center immediately reads in the replications and begins creating the replicated volumes.

Monitoring Portable Volume Restore Progress

- 1 Go to the **Storage Management** display for the destination Storage Center.
- 2 In the **Portable Volumes** node, click on the **Repl Baseline From [source]** node. Information on the restore is displayed in the view pane.

The display shows the following:

- **Summary of Replication Attributes:** Shows the source and destination Storage Center, as well as bar charts showing portable volume space used and copying space.
- **Portable Volumes Table:** Shows all portable volume attributes in table form.
- **Current Restore Jobs Table:** Shows all restore job details in table form.



7 Reports Viewer

Using the Reports Viewer [92](#)

Scheduling Automated Report Generation [94](#)

Generating a Report Now [96](#)

Using the Reports Viewer

The **Reports** viewer uses technology from **Business Objects Crystal Reports** to create and display reports.

⇒ **To open the Reports viewer**

- In the **Viewers** pane, click the **Reports** icon. The **Reports** viewer window appears.

The screenshot shows the Reports Viewer interface. The top menu bar includes Management, Options, Help, and a Help icon. The left pane is titled 'Storage Centers' and lists WYST01 and MST04. Below it is the 'Viewers' pane with icons for Multi Storage Center, Current Alerts, Replications, Reports (selected), Chargeback, Threshold Alerts, and Servers. The main area is split into two panes: 'Report Viewer Pane' (top) and 'Saved Reports Pane' (bottom). The Report Viewer Pane displays 'No report data yet' with an 'Open From File' button. The Saved Reports Pane contains a table of saved reports.

Date/Time	Storage Center	Type	Includes
01/05/2009 10:20:02	MST04	Daily	Volume Storage, Replications, Alerts
01/05/2009 10:19:39	WYST01	Daily	Volume Storage, Replications, Alerts
01/04/2009 23:57:32	MST04	Weekly	Disk Class, Volume Storage, Replications, Alerts, Storage Center Summary
01/04/2009 23:57:00	MST04	Daily	Volume Storage, Replications, Alerts
01/04/2009 23:56:37	WYST01	Weekly	Disk Class, Volume Storage, Replications, Alerts, Storage Center Summary
01/04/2009 23:56:02	WYST01	Daily	Volume Storage, Replications, Alerts
01/03/2009 23:55:41	MST04	Daily	Volume Storage, Replications, Alerts
01/03/2009 23:55:41	WYST01	Daily	Volume Storage, Replications, Alerts
01/02/2009 23:56:48	MST04	Daily	Volume Storage, Replications, Alerts
01/02/2009 23:56:26	WYST01	Daily	Volume Storage, Replications, Alerts
01/01/2009 23:56:31	MST04	Daily	Volume Storage, Replications, Alerts
01/01/2009 23:56:08	WYST01	Daily	Volume Storage, Replications, Alerts
12/31/2008 23:57:30	MST04	Monthly	Disk Class, Volume Storage, Replications, Storage Center Summary
12/31/2008 23:57:00	MST04	Daily	Volume Storage, Replications, Alerts
12/31/2008 23:56:39	WYST01	Monthly	Disk Class, Volume Storage, Replications, Storage Center Summary
12/31/2008 23:55:57	WYST01	Daily	Volume Storage, Replications, Alerts
12/30/2008 23:56:31	MST04	Daily	Volume Storage, Replications, Alerts
12/30/2008 23:56:04	WYST01	Daily	Volume Storage, Replications, Alerts
12/29/2008 23:56:49	MST04	Daily	Volume Storage, Replications, Alerts
12/29/2008 23:56:26	WYST01	Daily	Volume Storage, Replications, Alerts








The **Reports** viewer displays two panes:

- **Report Viewer:** Displays an opened report.
- **Saved Reports:** Lists all saved reports in a table.


⇒ **To view a saved report**

The **Saved Reports** pane lists all saved reports. To view a saved report:


- Double-click the report name in the **Saved Reports** pane. The report is displayed. Buttons available in the Report Viewer include:

Button	Description
	Export Report Exports a report to a file. Format options include Crystal Report (.rpt), Adobe Acrobat Portable Document (.pdf), rich text format (.rpt), and comma-separated values (.csv).
	Print Report Sends the report to the selected printer.
	Stop Refresh Stops refresh data.
	Refresh Data Refreshes the data in the displayed report.
	Scroll Bar Scrolls page-by-page through the report.
	Search Text Searches for text within the report.
	Magnification Specifies the magnification level for the report display.

⇒ **To delete a saved report**

- 1 In the **Saved Reports** pane, click on the report you want to delete.
- 2 Click  Delete.

⇒ **To update a saved report**

- 1 In the **Saved Reports** pane, click on the report you want to update.
- 2 Click  Update.

Scheduling Automated Report Generation

Data Collector automatically generates reports based on the following:

- Globally via the **Data Collector Properties—Automated Reports**.
- Per Storage Center in the **Storage Center Properties—Automated Reports**.

All automated reports are saved in the database and can be viewed at a later time via the Report Viewer. The reports can also be emailed to users or saved in a public directory so users can receive reports without having to log into Data Collector.

Note By default, Data Collector runs as a service without a user account. To save automated reports to a public directory that requires domain authentication, set up the Data Collector service with a domain user account through Windows Management Services.

⇒ *To set up an email address for receiving automated reports*

Note Before setting an email address to which you want to email automated reports, set up an SMTP server. See [SMTP Server on page 17](#) for information on setting up an SMTP server.

- 1 From the **Management** menu, select **User Properties**.
- 2 In the **General Properties**, click **Change**.
- 3 Enter the email address to which you want to send automated reports. Click **Test Email** to verify the address.
- 4 Click **Apply Changes**.

⇒ *To be notified when a New Automated Report is available*

- 1 From the **Management** menu, select **User Properties**.
- 2 Click **Manage Events**.
- 3 Click **Change**.
- 4 Select **New Automated Report**.
- 5 Click **Apply Changes**.

⇒ *To be notified when report generation causes an error*

- 1 From the Management menu, select **User Properties**.
- 2 Click **Manage Events**.
- 3 Click **Change**.
- 4 Select **Automated Report Generation Errors**.
- 5 Click **Apply Changes**.

⇒ **To set up automated reports for all Storage Centers (global settings)**

1 From the Management menu, select **Data Collector Properties**.

2 Click **Automated Reports**.

3 Click **Change**.

4 Set the following:

Global Automated Report Default Settings: Select the reports you want to automatically generate for all Storage Centers, as well as the frequency of the report generation.

Global Automated Table Report Default Settings: Specify settings for IO Reports and Storage Reports.

Chargeback Automated Report Settings: Select Chargeback reports to generate: Chargeback and/or Chargeback Savings.

Automated Report Options:

- **Store report in public directory:** Stores automated reports in a public directory.
- **Directory:** Specifies the public directory in which to save automated reports.
- **Attach automated report to email:** Attaches and emails automated reports. Reports are emailed in PDF format.
- **Attach table report to email:** Attaches and emails table reports.
- **Select file type for table reports:** Specifies the file type for table reports.

Note Enterprise Manager sends emails to the email address specified in the User Properties. For instructions on specifying the Enterprise Manager email address, see [To set up email notification on page 12](#).

5 Click **Apply Changes**.

⇒ **To set up automated reports for a Storage Center**

1 Right-click on the Storage Center for which you want to set up automated reports and select **Edit Settings**.

2 Click **Automated Reports**.

3 Click **Change**.

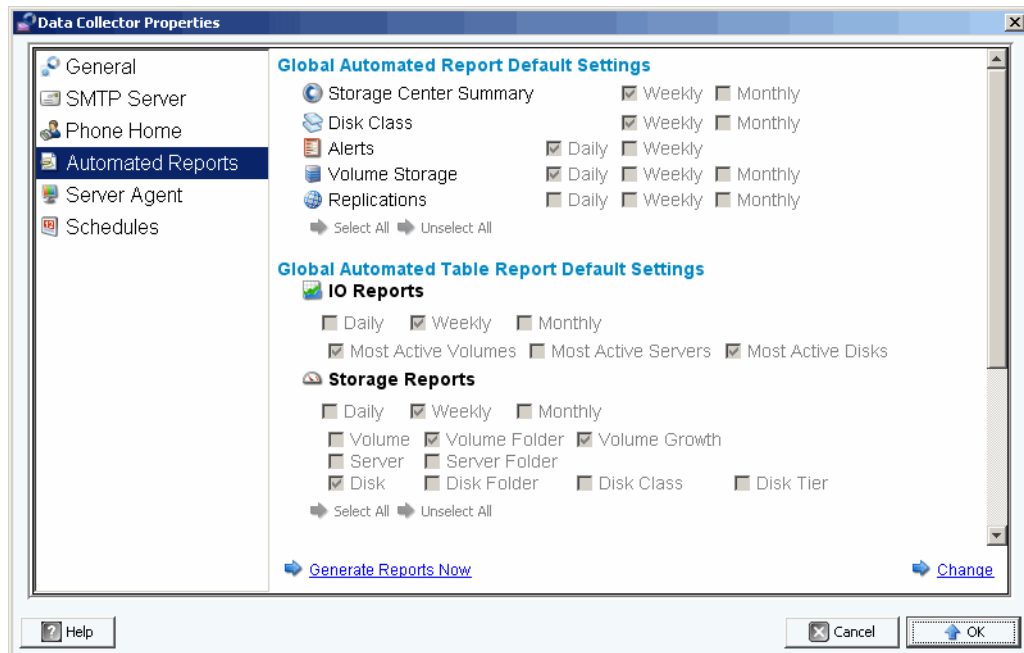
4 Deselect **Use the Data Collector Global Settings** option.

5 Select the reports you want to automatically generate.

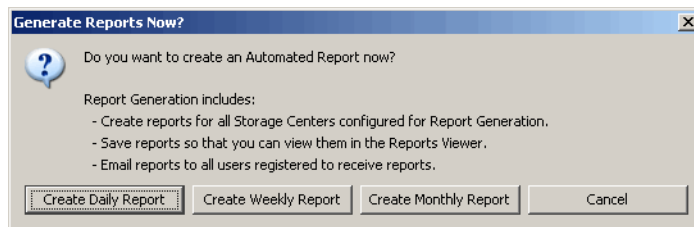
6 Click **Apply Changes**.

Generating a Report Now

- 1 From the **Management** menu, select **Data Collector Properties**.
- 2 Click **Automated Reports**.



- 3 Click **Generate Reports Now**. The **Generate Report Now** dialog appears.



- 4 Select the reports you want to generate now.

Note The daily, weekly, and monthly reports created depend on the current Report Generation Settings. See [Scheduling Automated Report Generation on page 94](#) for information on Report Generation Settings.

- 5 When report generation is complete, a message is displayed. Click **Ok** to close the message dialog.
- 6 Click **OK** to close the Data Collector Properties dialog.

8 Working with the IO Usage Report

Introduction [98](#)

Comparing IO Usage Objects [99](#)

Introduction

The IO Usage report is a history report displaying performance rates. Use the IO Usage Report to compare IO rates and monitor the Storage Center to ensure there are no performance related problems.


⇒ *To view IO Usage Reports*

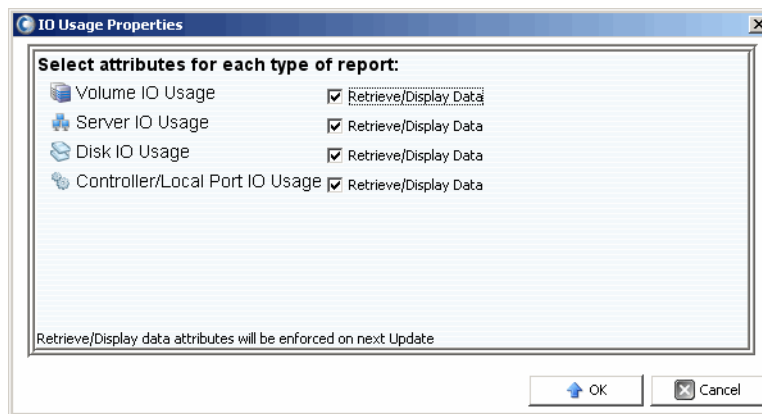
- 1 Right-click on a Storage Center, and select **View > IO Usage Report**.
- 2 Select a time period to view, and click **OK**. The **IO Usage Report** appears:

Explorer Mode: Shows components of a Storage Center — volumes, servers, disks, and controllers — in a tree to the left of the report.

Object Comparison Mode: Displays the Object Comparison view. See [Comparing IO Usage Objects](#) on page 99.

⇒ *To select objects displayed in the IO Usage Reports*

- 1 When the IO Usage Report is displayed, click . The **IO Usage Properties** dialog appears.



- 2 Select (or de-select) objects to display in the report.

Note Reducing the number of objects to view reduces the time required to update the **IO Usage Report**.

- 3 Click **OK**.

⇒ *To change the IO Usage Report view mode*

- When the IO Usage Report is displayed, select either **Explorer View** or **Object Comparison View** from the pull-down menu located at the top right of the display.

Comparing IO Usage Objects

Object Selector Pane

Selected Objects Pane

The screenshot shows the IO Usage Report interface. At the top, there are checkboxes for 'Read KB/Sec', 'Write KB/Sec', 'Total KB/Sec', 'Read IO/Sec', and 'Write IO/Sec'. The 'Total KB/Sec' and 'Write IO/Sec' checkboxes are checked. Below this is the 'Object Selector Pane' which contains a tree view of servers. The 'Servers' folder is expanded, showing sub-folders: 'Compellent Servers', 'MST04 - FC', 'MST04 - iSCSI', 'FC Servers', 'Linux Servers', 'VMWare Servers', and 'iSCSI Servers'. The 'Compellent Servers' folder is selected. Below the tree view are buttons for 'Add Selected' and 'Remove Selected'. Below these buttons is the 'Selected Objects:' section, which contains a red square icon and the text 'Compellent Servers'. At the bottom of the Object Selector Pane are 'Save' and 'Load' buttons. To the right of the Object Selector Pane is the 'Selected Objects Pane', which is currently empty. The main area of the interface displays two line graphs. The top graph is labeled 'Total KB/Sec' and the bottom graph is labeled 'Total IO/Sec'. Both graphs show a red horizontal line at the value 0.00000000. The x-axis for both graphs shows two time points: '11-Mar, 08:00' and '11-Mar, 12:00'. Two vertical green dashed lines are drawn at these time points.

⇒ To select objects to compare

- 1 Make sure the IO Usage Report is displayed in **Object Comparison View**.
- 2 In the **Object Selector** pane, select the object group: **Volumes, Servers, Disks**, or **Controllers**.
- 3 Select the individual objects to compare using the **Add Selected** and **Remove Selected** buttons.

⇒ **To save an object comparison setting**

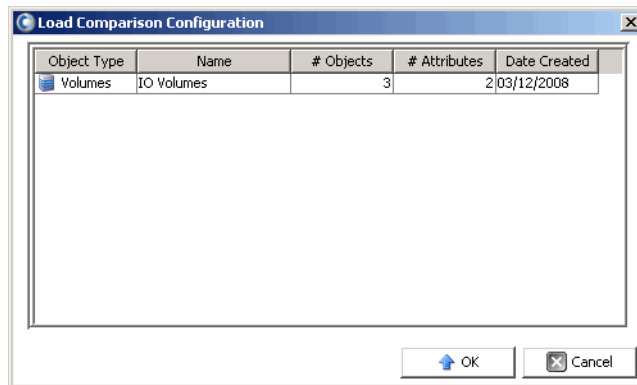
- 1 After selecting the objects to compare, click **Save**.



- 2 Enter a name for the **Comparison Configuration**, and click **OK**.

⇒ **To load a Comparison Configuration**

- 1 Click **Load**.



- 2 Select the configuration to load, and click **OK**.

9 Managing Replications

Introduction	102
Configuring iSCSI Connections	105
Working with Quality of Service (QoS) Definitions	106
Creating Simulated Replications	108
Creating Replications	109
Saving and Validating Replication Restore Points	110
Editing Replication Properties	111
Moving Volumes	112
Importing Volumes from External Devices	114
Validating Replication Restore Points	115
Viewing Replications for a Single System	116
Using the Replication Viewer	119

Introduction

As part of an overall Disaster Recovery Plan, replication copies volume data from one Storage Center to another Storage Center to safeguard data against local or regional data threats.

Note By default, data is replicated from the source volume to the lowest storage tier of the destination volume. Use the **Edit Replication Properties** to change this default. See [Editing Replication Properties on page 111](#).

Using Enterprise Manager, an administrator can set up a replication plan for Storage Centers that supports an overall Disaster Recovery strategy.

Replication Requirements

To replicate volumes from one Storage Center to another using Enterprise Manager requires the following:

Requirement	Description
Storage Centers	Both the source and destination Storage Centers must be added to the Enterprise Manager client. See Adding and Removing Storage Centers on page 8 for details.
iSCSI Remote Systems	<ul style="list-style-type: none">On the source Storage Center, the destination Storage Center must be defined as an iSCSI Remote System.On the destination Storage Center, the source Storage Center must be defined as an iSCSI Remote Connection. See Configuring iSCSI Connections on page 105 for details.
QoS Definition	A quality of service (QoS) definition must be set up for the replication. See Creating a Quality of Service (QoS) Definitions on page 106 for details.

Using the Portable Volume Option

To jump-start volume replications between Storage Centers, Enterprise Manager offers the Portable Volumes feature. The Portable Volume feature allows a site to replicate one or more volumes from one Storage Center to another via a removable USB disk. For information on using the Portable Volume feature, see [Working with Portable Volumes on page 79](#).

Live Volume Option

To automatically swap the primary and secondary Storage Center roles of a pair of replicating volumes, Enterprise Manager offers the Live Volume feature. For more information on creating and managing Live Volumes, see [Using Live Volumes on page 73](#).

Replication, Live Volume, and Move Attributes

Refer to the following list for descriptions of all replication, Live Volume, and move attributes.

Automatically Swap Roles

For Live Volumes only. Select this option to allow Enterprise Manager to automatically swap the roles of the primary and secondary volumes.

Controller

For individual destination volumes only. On a dual-controller Storage Center, specify the controller on which to activate the replicated volume.

Create Volume Folder Path on Destination

Creates the same folder structure for the replicated volume on the destination Storage Center.

Deduplication

For Asynchronous replication only. Enable this option to copy only the changed portions of the Replay history on the source volume, rather than all data captured in each Replay.

Delete Source volume mappings automatically when move starts

Deleting Source volume mappings means that no more traffic is coming into the source volume and the move can be finished quicker. If this option is not selected, the Source volume mappings must be deleted manually when the move is in progress. The move is not finished until the Source volume mappings are deleted.

Delete Source volumes automatically when move is complete

Specify whether to delete source volumes automatically when move is complete.

Destination Volume Name Prefix

Enter a prefix to use for the replication. For replication operations, the default is **Repl of**. For Move operations, the default is **Move of**.

Destination QoS Definition

For Live Volumes only. Specifies the QoS definition to use on the destination Storage Center.

Folder

Destination folder for the replicated volume. Click **Change** and select a folder.

Min Amount for Swap

For Live Volumes with **Automatically Swap Roles** enabled. Specifies the minimum amount of storage space (in KB) required to be written on the secondary Storage Center before Enterprise Manager will swap roles.

Min Secondary % Usage for Swap

For Live Volumes with **Automatically Swap Roles** enabled. Specifies the minimum percentage of IO required on the secondary Storage Center before Enterprise Manager will swap roles.

Name

For individual volumes only. Specify the name for the replicated volume on the destination Storage Center.

QoS Definition

Select a QoS definition to use for the simulated replication. For information on creating a QoS definition, see [Creating a Quality of Service \(QoS\) Definitions on page 106](#).

Replicate Active Replay

For Asynchronous replication only. Enable this option to copy all writes from the active Replay area of the volume. Note that replicating active Replays can require significant bandwidth. For Live Volumes, the default is to Replicate Active Replays. If you disable this option for a Live Volume, the option is automatically enabled when Live Volumes swap roles either manually or automatically.

Replicate to Lowest Tier

Specifies how data is written to the destination volume of a replication. By default, data is replicated to the lowest tier.

Replication type

Select **Synchronous** or **Asynchronous**. Dell Compellent recommends using Asynchronous replication.

Save Restore Points

Enable this option to automatically save restore points. This is the default setting and Dell Compellent recommends always saving restore points.

Servers

Click **Change** and select the server to which you want to map the moved volumes.

Skip Initial Synchronization

Skips the initial data copy of Replays. Use this option to verify that the selected QoS definition can support the volume activity.

Storage Type

Select the storage type (available storage types depend on the destination Storage Center configuration).

Time as Primary before Swap

For Live Volumes with **Automatically Swap Roles** enabled. Specifies the minimum amount of time (in minutes) that the primary Live Volume must function as the Primary Live Volume before a swap is allowed. The default is 30 minutes.

Configuring iSCSI Connections

⇒ *To configure an iSCSI connection for a remote Storage Center*

- 1 Make sure the Storage Centers for which you want to configure iSCSI connections are available in Enterprise Manager. (For information on adding Storage Centers, see [Adding and Removing Storage Centers on page 8.](#))
- 2 Select the Storage Center for which you want to create a Remote Storage Center iSCSI connection, and display the **Storage Management** view.
- 3 On the **Storage Management** view, right-click on the **Remote Storage Centers** node, and select **Configure iSCSI Connections**. A list of Storage Centers appears.
- 4 Select the Storage Center for which you want to configure the connection, and click **Next**.
- 5 Select the following:
 - Remote iSCSI Ports:** Select the iSCSI ports on the remote Storage Center to connect to the local iSCSI ports.
 - Local iSCSI Ports:** Select the iSCSI ports on the local Storage Center to connect to the remote iSCSI ports.
 - Network Speed:** Select the speed for the network: **T1**, **T3/100 Megabit**, or **Gigabit or greater**.
 - Sync Remote Port Connections on Both Storage Centers:** Enable this option to synchronize remote port connections on both Storage Centers.
 - Configure using NAT:** Enable this option to configure the connection using Network Address Translation (NAT).
- 6 If you are using **NAT**, click **Next**.
- 7 Set up the **NAT IP address** for the iSCSI ports on both Storage Centers. When you are finished, click **Next**.
- 8 Click **OK** to complete the configuration.

Working with Quality of Service (QoS) Definitions

A Quality of Service (QoS) definition defines the following:

- Link characteristics used to break up IO for a fair distribution of link resources.
- Bandwidth limits (optional). A QoS definition can restrict replication to time periods you select. Because bandwidth limits require system overhead, use limits only when the link is shared with other traffic.

Note The **Create QoS** wizard appears automatically when you simulate or create a replication and no QoS definition exists for the source Storage Center.

Creating a Quality of Service (QoS) Definitions

⇒ *To create a QoS definition*

- 1 Display the **Replications** viewer.
- 2 Select the Storage Center for which you want to create a QoS definition, and click **Create QoS Node**.
- 3 When the **Create QoS** wizard appears, enter the following:
 - **Name:** Enter a name for the QoS Definition.
 - **Link Speed:** Select a link speed that most closely represents your link or select **Other** to enter the appropriate link speed in the field presented. The link speed value is used to appropriately size and utilize replication link resources to the remote system. This setting defines the link attributes only.
 - **Number of Links:** Enter the number of links. If you have more than one link to the remote system, enter that number here. This adjusts the maximum bandwidth allowed without changing the communication link settings.
 - **BW Limited:** Enable or disable bandwidth limits.
- 4 If you enabled bandwidth limits, click **Next**. A grid showing hours and days appears. Right-click on a time slot and/or days to set a limits.
- 5 Click **Finish**.

Editing a Quality of Service (QoS) Node

⇒ *To edit a QoS node*

- 1 Display the **Replications** viewer.
- 2 Select a Storage Center, and then click the **QoS Definitions** tab. A list of QoS definitions is displayed.
- 3 Right-click on the definition you want to edit, and select **Edit Settings**. The **Edit QoS Node** dialog appears.
- 4 Change the **name**, **link speed**, or **bandwidth limits** settings. If **bandwidth limits** is enabled, click **Next** to define the limits.
- 5 When you've finished editing the definition, click **Finish**.

Deleting a Quality of Service (QoS) Node

Note You can delete a QoS node only when the node is not currently used by a replication operation.

⇒ *To delete a QoS node*

- 1 Display the **Replications** viewer.
- 2 Select a Storage Center, and then click the **QoS Definitions** tab. A list of QoS definitions is displayed.
- 3 Right-click on the definition you want to delete, and select **Delete**.
- 4 Click **OK** to confirm the delete.

Creating Simulated Replications

Simulated replications allow you to estimate system requirements for replication. Simulate replications to determine an optimal balance of volumes, Replay schedules, bandwidth schedules, and recovery.

⇒ **To create a simulated replication**

- 1 Right-click on a Storage Center, and select **Tasks>Replication>Simulate Replicate Volumes**. The **Replication** wizard appears.

Note If a Quality of Service (QoS) definition has not been defined, the QoS Wizard appears. See [Creating a Quality of Service \(QoS\) Definitions on page 106](#) to create a QoS definition.

- 2 Select the volumes for which you want to simulate replications, and click **Next**.

- 3 Specify replication options, and click **Next**.

For information on replication options, see [Replication, Live Volume, and Move Attributes on page 103](#).

- 4 When the **Simulate Volume(s) with Attributes** window appears, verify the **Simulate Replication** settings, and click **Start** to begin the **Simulated Replication**. The **Replication Results** window appears.

- 5 When the status for each volume included in the replication has started successfully, click **Finish**.

Creating Replications

Note If a Quality of Service (QoS) definition has not been defined, the QoS Wizard appears during the Create Replication wizard. See [Creating a Quality of Service \(QoS\) Definitions on page 106](#) to create a QoS definition.

⇒ **To replicate volumes**

- 1 Right-click on a Storage Center, and select **Tasks>Replication>Replicate Volumes**. The **Replication** wizard appears.
- 2 Select the destination Storage Center to which you want to replicate volumes, and click **Next**. The **Select Volumes to Replicate** dialog appears.
- 3 Select volumes to replicate, and click **Next**.
- 4 Specify replication options to apply to all volumes.

For information on replication options, see [Replication, Live Volume, and Move Attributes on page 103](#).

Note If more than one volume is included in the replication, these settings apply to the replication for all the volumes. You can edit individual volume replication settings before starting the replication.

- 5 Click **Next**. A summary of the replication settings appears.
- 6 If you want to edit the replication settings for a volume:
 - a Select the volume, and click **Edit Selected**.
 - b Edit the replication settings for the volume, and click **OK**.
- 7 To start replicating the volumes, click **Start**. Enterprise Manager starts the replication, and the Replication Results window appears.
- 8 Click **Next**. The Replication wizard asks if you want to save the restore points. Dell Compellent recommends saving the restore points.
- 9 Click on **Save Replication Restore State**. The Save Replication Recover State Wizard appears. See [Saving and Validating Replication Restore Points on page 110](#).

Saving and Validating Replication Restore Points

Replication restore points include all information about current replications, including volumes being replicated, destination Storage Centers for the replications, and the QoS definitions used for the replications. If a Storage Center goes down, this information becomes the basis of a disaster recovery.

⇒ *To save replication restore points for one or more Storage Centers*

- 1 Access the **Save Restore Points** wizard:
 - From the **Replications** viewer, click on the **Save Restore Points** option in the top right of the display.
 - or
 - Select **Replication Recovery>Save Restore Points**.
- 2 Select the Storage Centers for which you want to save replication restore points.
- 3 Click **Next**.
- 4 If you did not delete or abort replications, the system notifies you that it finished saving restore points.
- 5 If you deleted or aborted replications, the **Inactive Replication** window appears.

To delete inactive restore points:

 - Select replications that are no longer active, and click **Delete selected Restore Points**.

To validate replications:

 - a Click **Validate Replications**. Enterprise Manager displays a list of replications.
 - b Click on the replication you want to restore/restart, and click **Restore/Restart Replication**.
 - c Click on a valid replication for which restore points are already saved, and click **Activate DR Site**.
- 6 Click **OK**.

Editing Replication Properties

⇒ *To edit properties for an existing replication*

- 1 Display the **Replications** viewer.
- 2 Click on the **Replications** tab.
- 3 Right-click on a replication, and then select **Edit Settings**. The Replication Properties dialog appears. For details on replication attributes, see [Replication, Live Volume, and Move Attributes on page 103](#).
- 4 Edit the replication properties, and click **OK** to close the dialog.

Moving Volumes

Moving volumes is similar to replication. However, when a volume is completely moved to the destination system, the replication stops. Use **Move Volumes** if you are doing either of the following:

- Completely replacing the current Storage Center with a new Storage Center and want all the volumes to move with it.
- Installing a second Storage Center controller and want to balance the load between the two systems.

⇒ **To move volumes to another Storage Center**

- 1 In the Storage Center frame, right-click on the source Storage Center. From the shortcut menu, choose **Task>Replication>Move Volumes**.

Note If a QoS has not been defined, the QoS Wizard appears. Follow the steps in [Creating a Quality of Service \(QoS\) Definitions on page 106](#) to create a QoS definition.

- 2 When the **Move Volumes** wizard appears, select a Storage Center to which you want to move the volumes, and click **Next**.
- 3 Select volumes to move, and click **Next**.
- 4 Select **Move** attributes, and click **Next**. For details on **Move** attributes, see [Replication, Live Volume, and Move Attributes on page 103](#). A summary screen appears that shows all the volumes to be moved and the corresponding move attributes.
- 5 To change **Move** attributes for a volume:
 - a Select a volume from the list, and click **Edit Settings**.
 - b Edit the **Move** attributes for the volume, and click **OK**.
- 6 When you are ready to move the volumes, click **Start**.

The **Replication Move Progress** window appears, displaying the name of the volume to be moved and the name of the destination volume.

- **Volume:** Lists source volumes that are being moved.
- **Destination Volume:** Lists name(s) of the volumes at the destination Storage Center.
- **State:** Indicates the state of the Move process. **Waiting, Mapping Broken, Replicating, Finished** or **Error**.
- **CMM Total:** Amount of data that has been moved.
- **Remaining:** Amount of data on the volume that is left to be moved.
- **Finished:** Percentage of data that has been moved.
- **Status:** Gives details on the **State** of the **Move** process.
- If you did not select to have mappings deleted in the **Select Attributes of Move** window, delete them now by clicking **Delete Mappings on Source Volume**. The move is not complete until mappings are deleted.

- If you did not select to delete the source volume in the **Select Attributes of Move** window, you can click Delete Source Volume. Deleting Source volumes is optional.

7 Click **Finish**.

Importing Volumes from External Devices

The **Import Volumes from External Devices** option moves data located on third-party (non-Dell Compellent) storage arrays into a Dell Compellent Storage Center in an organized and controlled manner.

Warning Do not load volumes from a Storage Center with this process. To move data from another Storage Center, use **Move Volumes**. See [Moving Volumes on page 112](#).

Before you start the load process, make sure that the Storage Center into which you are importing external data meets the following requirements:

- For pre-5.1 Storage Centers, the Storage Center must be licensed for synchronous replication.
- Storage Center has a disk folder with a prepared storage type for receiving the external data.
- Storage Center objects used in the load process—servers, volume folders, Replay profiles, and user properties—are already defined on the Storage Center.

⇒ **To load volumes from external devices onto a Dell Compellent Storage Center**

- 1 Right-click on a Storage Center, and select **Tasks>Replication>Import Volumes from External Devices**. The **Import External Devices** wizard displays an informational screen that details prerequisites for loading external data. When all prerequisites are met, click **Next** to start the wizard.
- 2 Select one or more external disks to load, and click **Next**. The **Select Volume Properties** window appears.
- 3 Select volume properties including **name**, **volume folder**, **server**, **cache setting**, **Storage profile**, and **Replay profile**. The default volume name is **Volume of [serial number of external disk]**. Cache setting, Storage profile, and Replay profile use the Storage Center defaults for those volume attributes. You can select multiple volumes at once when changing settings.
- 4 Click **Next**. The **Load Properties** window appears. Select Load properties:
 - Select the maximum number of volumes to load. To load all volumes at once, enter 0. To load a smaller number of volumes, enter the number of volumes to load. Because the load process can be processor-intensive, do not load more than five loads at a time. The system loads volumes in the order in which they appear on the list. Move a volume up and down the list by selecting a volume and clicking the up and down arrow.
 - Select a **QoS Node** to use for the load.
 - Select a **disk folder** in which to create the volumes.
- 5 Click **Next**. The **Load From External Devices** window appears. The window monitors the load process for each external device including the amount of data that is left to load.

Validating Replication Restore Points

⇒ *To validate replication restore points*

- 1 From the Options menu, select **Replication Recovery > Validate Replication Restore Points**. Enterprise Manager reviews all saved replications and makes sure that they are still running. If they are not, the system presents disaster recovery options, including:
 - **Good:** The replication is up and running normally.
 - **Warning:** There is something wrong with the replication. Refer to the Status/Reason column for reasons why the replication is no longer running. This replication is eligible for disaster recovery.
 - **Error:** The replication is not running. Refer to the Status/Reason for reasons why the 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.
- 2 If a replication is in the Warning or Error state, click **Delete Non-Active Restore Points** if you intended the replication to be deleted or aborted.
- 3 If a replication is in the Warning state, you can:
 - Click **Activate a Disaster Recovery Site**. This takes you to the activate disaster recovery wizard. Refer to [Activating Disaster Recovery on page 198](#) for more information.
 - Click **Restore or Restart to Original System**. This takes you to the restart/restore to the original system wizard. Refer to [Restarting or Recovering to the Source Site on page 199](#) for more information.

Viewing Replications for a Single System

The **Replications** view shows historical and current replication data, presents the progress of replications, and compares replications.

- Right-click on a Storage Center, and select **View > Replications**. The **Replications** view appears.

In the upper left corner, click on either the **Replication** or **QoS Definition** tab.

Replications Tab

In the Replications window, click on the **Replications** tab. The Replications View appears.

⇒ *To Save Restore Points*

- Click **Save Restore Points**. Refer to [Saving and Validating Replication Restore Points on page 110](#).

⇒ *To Validate Restore Points*

- Click **Validate Restore Point**. Refer to [Validating Replication Restore Points on page 115](#).

Replication attributes

- **Source System Attributes:** Name and volume of the Source volume.
- **Destination System Attributes:** Name, Volume, and Restore Time of the destination system. The Restore Time is the date and time of the last frozen Replay. If you activate a disaster recover site or a Restore from the disaster recover site, this is the time of the Replay that will be restored.
- **CMM Attributes:**
 - **Type:** Replication type: Mirror or Copy.
 - **State:** Replication object state: If the state is synced, the replication is up to date.
 - **Replay:** Replay currently being Replicated. Active means that all frozen Replays have been Replicated.
 - **Left:** Amount of space left to get the replication into the synced state (in MB or GB).
 - **Finished:** Percentage of the replication that is finished. At 100%, the replication is synced.
- **Replication Attributes:**
 - **Type:** Async or Sync.
 - **State:** Asynched copy, synced copy, or idle.
 - **Behind:** An Async Replication can lag behind what is sent to the Destination volume. This is the amount of data lagging behind in KB, MB, or GB.
 - **QoS Node:** The QoS Definition that the replication is running through.
 - **Copy Active:** True if the replication copies the active Replay; false if it does not.
 - **Deduplicate:** True if the replication copies only the changed portions of the Replay history; false if it captures all data.

- **Live Volume:** Indicates whether the replicating volume is a Live Volume and shows the source and destination statuses.

When a replication is selected, the information pane displays data from the selected replication:

Replays

- To the left, a table displays the Replays that are available on the Source volume. The Replay that is currently being Replicated displays a green arrow next to it.
- To the right, a table displays the Replays on the Destination volume. The Destination Volume Replay displays the size, freeze time, and expire time. If you select a Replay on either table it automatically selects the corresponding Replay in the other table.

Historical Progress

- The CMM MB Remaining chart shows the number of MB that are remaining for the replication to finish.
- The CMM Percent Done chart gives you the percentage complete of the replication.
- The Replication Behind chart shows you how far behind an Async Replication is at any given point in time.

Historical IO Reports

Shows two charts for an historical perspective on how much IO each replication is doing.

- The Replication IO Per Second chart shows the amount of IO operations the replication is doing in a second.
- The Replication KB Per Second chart shows the amount of KB transferred by the replication in a second.

QoS Nodes Tab

- **Name:** The name of the QoS definition.
- **Link Speed:** The defined speed of the QoS definition.
- **BW Limited:** True if the QoS limits the bandwidth.
- **BW Limit:** If the QoS limits the bandwidth, the bandwidth limit.
- **# Replications:** The number of replications that use this QoS node.
- **CMM Left:** The aggregate of value of the CMM left of all the replications that use this QoS definition.
- **Async Behind:** The aggregate of value of the Async Behind value for all replications using this QoS definition.
- **CMM Finished:** The aggregate of value of the percentage complete of all the replications that use this QoS definition.

When a Replay is selected, the following information is displayed via tabs at the bottom of the display.

Replications

- Displays a table of all the replications associated with the QoS node. By double clicking on a replication it displays the Replication window with this replication selected.

Schedule

- Displays a grid of the schedule of the percentage usage of the Link Speed for the QoS node for all times throughout the week.

Progress Reports

Displays three charts, showing the historical progress of all the aggregate replications in the QoS definition.

- The CMM MB Remaining chart displays the number of MB that are remaining for the replication to finish.
- The CMM Percent Done chart displays the percentage complete of the replication.
- The Replication Behind chart displays how far behind the Async Replication is at a given point in time.

IO Reports

Displays historical perspective on the amount of IO in all replications in the QoS definition.

- The Replication IO per Second chart shows the amount of IO the replication is transmitting in a second.
- The Replication KB per Second chart shows the amount of KB transferred by the replication in a second. A line displays the bandwidth limit for the QoS definition at a given time so you can see how much of the bandwidth the QoS definition is using.

Using the Replication Viewer

The Replication Viewer shows replications for all Storage Centers. To view replications for all Storage Centers:

- In the Viewers frame, click **Replications**.

The Replication Viewer displays information in two frames:

- **Replication Information:** Middle frame displays information about replications.
- **Source Volume Replays:** The bottom frame displays Replays, Historical Progress Reports, and Historical IO Reports.

Replication Information Frame

The information pane changes depending on whether you select a Storage Center or a QoS definition.

Source System Information

Click on a system in the topology frame to display replication information about that system. The information is the same whether you click on a Replicating system (left frame) or Destination system (right frame).

To view all the replications and moves from the selected system, click the **Replications from Systems** tab. The Replications table displays:

- **Source System Replications:** Name and volume of the Source volume.
- **Destination System Attributes:** Name, volume, and Restore Time of the destination system. The Restore Time is the date and time of the last frozen Replay. If you activate a Disaster Recovery site or a Restore from the Disaster Recovery site, this is the time of the Replay that will be restored.

CMM Attributes

- **Type:** Replication type: Mirror or Copy.
- **State:** Replication object state. If the state is synced, the replication is up to date.
- **Replay:** Replay currently being Replicated. Active means that all frozen Replays have been Replicated.
- **Left:** Amount of space left to get the replication into the synced state (in MB or GB).
- **Finished:** Percentage of the replication that is finished. At 100%, the replication is synced.

Replication Attributes

- **Type:** Replication type: Async or Sync.
- **State:** Replication state: Async copy, synced copy, and so on.
- **Behind:** An Async Replication can lag behind the data that is sent to the Destination volume. This is the amount of data lagging behind in KB, MB, or GB.
- **QoS Node:** The QoS Definition that the replication is running through.
- **Copy Active:** True if the replication copies the active Replay; false if it does not.

-
- **Deduplicate:** True if the replication copies only the changed portions of the Replay history; false if it captures all data.

To view the Replays of a specific replication, click on a replication in the Replication table, then click the **Replays** tab at the bottom of the window.

- The left frame of the System Information Replays table displays Replays that are available on the source volume. A Replay that is currently being Replicated is indicated by a green arrow.
- The right frame of the System Information Replays table displays Replays on the Destination volume, including date and time the Replay froze data, the expiration time of the Replay, and the size of the Replay. Selecting a Replay on either table automatically displays the corresponding Replay in the other table.

To view historical progress of a specific replication, click on a replication in the Replication table, then click the **Historical Progress Reports** tab at the bottom of the window.

- **CMM MB Remaining** chart displays the number of MB that remain in the replication.
- **CMM Percent Done** chart displays the percentage complete of the replication.
- **Replication Behind** chart displays the amount of data the systems lags in an Async Replication, for any point in time.

To view historical IO of a specific replication, click on a replication in the Replication table, then click the **Historical IO Reports** tab at the bottom of the window.

- **Replication IO Per Second** chart displays the amount of IO per second is being Replicated.
- **Replication KB Per Second** chart displays the amount of KB transferred by the replication per second.

QoS Definition Tab

To view QoS information click on a system in the top topology frame. Then click the **QoS** tab. The system displays a list of QoS definitions defined for this system, including:

- **Name:** Name of the QoS definition.
- **Link Speed:** Defined speed of the QoS definition.
- **BW Limited:** True if the QoS limits the bandwidth.
- **BW Limit:** If the QoS limits the bandwidth, the bandwidth limit.
- **# Replications:** The number of replications that use this QoS node.
- **CMM Left:** The aggregate of value of the CMM left of all the replications that use this QoS definition.
- **Async Behind:** The aggregate of value of the Async behind value for all replications using this QoS definition.
- **CMM Finished:** The aggregate of value of the percentage complete of all the replications that use this QoS definition.

Editing a Replication Definition

To edit properties for an existing replication:

- 1 Display the **Replication** viewer.
- 2 Click on the **Replications** tab.
- 3 Right-click on a replication, and then select **Properties**. The Replication Properties dialog appears.
- 4 Change the following:
 - Copy Active:** Enable or disable copying active data.
 - Deduplication:** Enable or disable deduplication.
 - QoS Node:** Select a QoS Node for the replication.
- 5 Click **OK** to close the dialog.

Deleting a Replication

To delete a replication:

- 1 Display the **Replication** viewer.
- 2 Click on the **Replications** tab.
- 3 Right-click on a replication, and then select **Delete**. The Delete Replication dialog appears.
- 4 Select options for the delete:

Put Destination Volume in Recycle Bin: Enable this option if you want to move the destination volume to the Recycle Bin on the destination Storage Center.

Purge Destination Volume (Delete from Recycle Bin): Enable this option if you do not want to retain the deleted destination volume in the Recycle Bin.

Warning If you purge the destination volume, you cannot recover the volume—it is permanently deleted from the Storage Center.

Delete Saved Replication Restore Point: Enable this option to delete all saved restore points for the replication.

- 5 Click **OK** to complete the delete.

Pausing a Replication

Note Only replications currently in a Running state can be paused.

To pause a replication:

- 1 Display the **Replication** viewer.
- 2 Click on the **Replications** tab.
- 3 Right-click on a replication, and then select **Pause**.

Enterprise Manager pauses the replications. In the Replication Viewer, the replication shows a state of Paused.

Resuming a Replication

To resume a replication that was previously paused:

- 1 Display the **Replication** viewer.
- 2 Click on the **Replications** tab.
- 3 Right-click on a paused replication, and then select **Resume**.

Enterprise Manager resumes the replications.



10 Charting Viewer

- Introduction [126](#)
- Downloading and Installing Charting Viewer [127](#)
- Using Charting Viewer [129](#)
- Viewing Storage Center Charts [132](#)
- Saving a Chart as a PNG Image [134](#)
- Printing a Chart [135](#)
- Zooming In and Out [136](#)

Introduction

Storage Center Charting Viewer displays real-time IO performance statistics for volumes, servers, disks, and controllers. Charting Viewer is accessible via Enterprise Manager or as a stand-alone application:

- If you are using Enterprise Manager, you can access the Charting View via the Enterprise Manager client. See [Using Charting Viewer on page 129](#).
- If you do not have Enterprise Manager, download and install the stand-alone version of Charting Viewer. See [Downloading and Installing Charting Viewer on page 127](#).

Downloading and Installing Charting Viewer

Charting Viewer Requirements

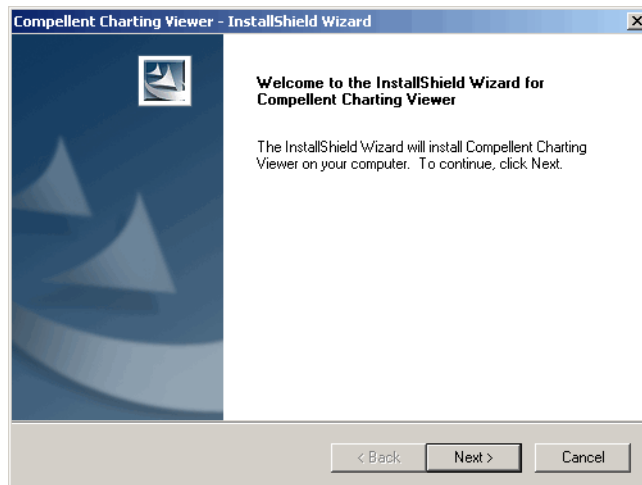
Storage Center Charting Viewer requires the following:

- Microsoft Windows XP, Microsoft Windows Vista, or Microsoft Windows 7.
- Microsoft .NET Framework 2.0 or later
- Java Runtime Environment (JRE) 1.6

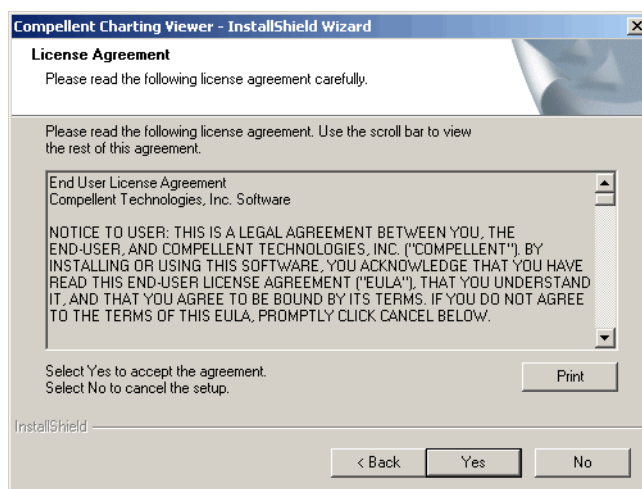
Charting Viewer Installation Process

To download and install Storage Center Charting Viewer:

- 1 Go to the Dell Compellent Customer Portal: <http://customer.compellent.com>
- 2 Locate and download the Charting Viewer Setup file.
- 3 Double-click on the setup file. The installation wizard appears.



- 4 Click **Next**. The License Agreement appears.



-
- 5 Click **Yes** to accept the license agreement. The installation wizard installs the Charting Viewer.
 - 6 When the installation is complete, click **Finish** to exit the wizard.

Using Charting Viewer

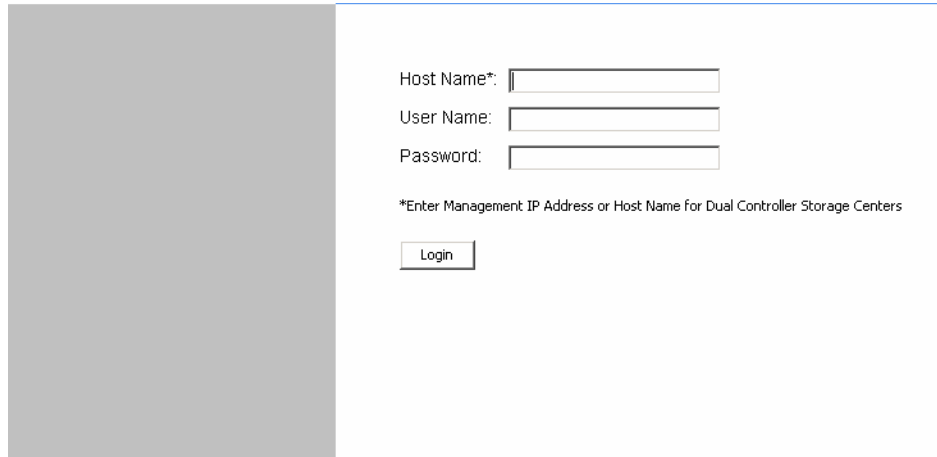
Starting Charting Viewer

To start Charting Viewer from Enterprise Manager:

- Right-click on a Storage Center, and select **View > Charting Viewer**.

To start Charting Viewer as a stand-alone application:

- 1 From the Windows Start menu, select **Compellent Technologies > Compellent Charting Viewer**. The Login dialog appears:



Host Name*:

User Name:

Password:

*Enter Management IP Address or Host Name for Dual Controller Storage Centers

Login

- 2 Enter the following:
 - **Host Name:** Enter the Storage Center host name for which you want to view charts.
 - **User Name/Password:** Enter the Storage Center user name and password.
- 3 Click **Login**.






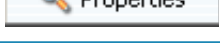
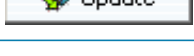
Using Charting Viewer Controls

The Charting Viewer provides tool bars for controlling the Charting Viewer display.

- [Data Gathering and Navigation Controls](#)
- [Charting Report Controls](#)

Data Gathering and Navigation Controls

Use the following buttons to control data gathering and navigation:

Click ...	To ...
	Page forward in the display.
	Page backwards in the display.
	Select a time increment for the display.
	Start data gathering.
	Stop data gathering.
	Select objects for which to gather information. See Setting Charting Viewer Properties on page 131 .
	Update data in all displayed charts.


Charting Report Controls

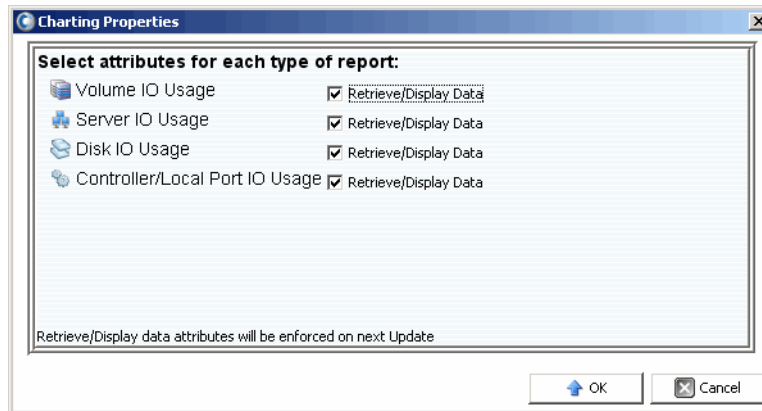
Use the following buttons to control how Charting Viewer reports are displayed:

Use ...	To ...
Single Tab	Display all statistics on one tab.
Auto-Scale	Auto-scale the IO, KB, and/or Lat displays. If auto-scale is not selected, enter the scale to use in the charts.
Layout	<ul style="list-style-type: none">• For the Storage Center: FE and BE Same. Display Front End (FE) and Back End (BE) in one chart. Deselect to show in different charts.• For individual objects: IO and KB Same. Display IO and KB data in one chart. Deselect to show in different charts.
Display	Select statistics to include or exclude.

Setting Charting Viewer Properties

To set Charting Viewer Properties:

- 1 When the Charting Viewer is displayed, click . The Charting Properties dialog appears.



- 2 Select the objects for which you want to gather and display information:
 - **Volume IO Usage:** Retrieves and displays IO statistics for all volumes, volume folders, and individual volumes.
 - **Server IO Usage:** Retrieves and displays IO statistics for all servers, server folders, and individual servers.
 - **Disk IO Usage:** Retrieves and displays IO statistics for all disks, disk folders, and individual disks.
 - **Controller/Local Ports IO Usage:** Retrieves and displays IO statistics for all controllers, individual controllers, and individual ports on a controller.

Note Charting Viewer always displays System IO Usage.

- 3 Click **OK** to close the dialog.

Viewing Storage Center Charts

Charting Viewer provides the following chart types:

- System Charts
- Volume Charts
- Server Charts
- Disk Charts
- Controller/Port Charts

Viewing the System Chart

To view the system chart:

- 1 In the Charting Viewer navigation tree, click on the **System** icon. The System Chart window appears.
- 2 Click on a tab to view:
 - KB Performance
 - IO Performance
 - System IO Pending

Viewing Volume Charts

To view the volumes chart:

- 1 In the Charting Viewer navigation tree, select the **Volume** icon, a volume folder or an individual volume. The Volume Chart window appears.
- 2 Click on a tab to view:
 - Volumes IO
 - Volumes latency
 - Volumes IO Pending

Viewing Server Charts

To view the server chart:

- 1 In the Charting Viewer navigation tree, select the **Server** icon, a server folder or an individual server. The Server Chart window appears.
- 2 Click on a tab to view:
 - Servers IO
 - Servers Latency

Viewing Disk Charts

To view the disks chart:

- 1 In the Charting Viewer navigation tree, select the disk icon, a disk folder or an individual disk. The Disk Chart window appears.
- 2 Click on a tab to view:
 - Disks IO/Sec
 - Disks KB/Sec

Viewing Controller and Local Ports Charts

To view the controller and local ports charts:

- 1 In the Charting Viewer navigation tree, select the **Controllers** icon, an individual controller, a port type icon, or an individual port. The Controller/Ports Chart window appears.
- 2 Click on a tab to view:
 - Local Ports IO
 - Local Ports Latency
 - CPU/Memory (for controllers only)

Saving a Chart as a PNG Image

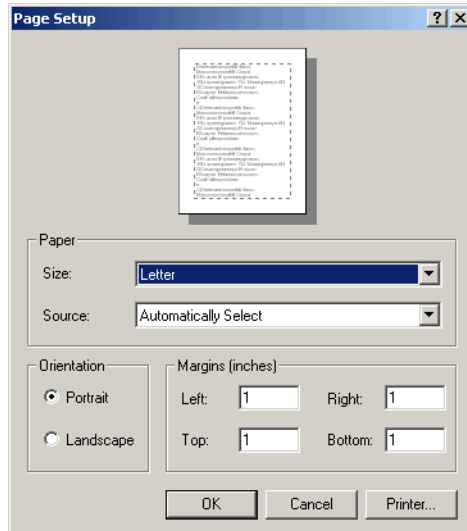
To save a chart as a PNG image:

- 1 Right-click on the chart you want to save, and select **Save As**.
- 2 Browse to and select the directory in which you want to save the chart image, and enter name for the file.
- 3 Click **OK**.

Printing a Chart

To print a chart:

- 1 Right-click on the chart you want to print, and select **Print**. The Page Setup dialog appears.



- 2 Select Page Setup options:
 - **Paper Size:** Select a paper size from the list of available options.
 - **Paper Source:** Select Automatically Select or Only One.
 - **Orientation:** Select Portrait or Landscape.
 - **Margins:** Set the left, right, top, and bottom margins.
- 3 Click **OK**.

Zooming In and Out

To zoom in on data in a chart:

- Click and drag to define the area you want to view.

To return the chart to default settings:

- Double-click on the chart.

11 Using Chargeback

- Introduction [138](#)
- Configuring Chargeback [139](#)
- Adding or Modifying Departments [144](#)
- Viewing Chargeback Reports [147](#)
- Green Reports [151](#)

Introduction


Chargeback allows you to charge for storage consumption on Dell Compellent Storage Centers based on global and departmental cost settings. With Chargeback, you can:

- Select how to charge for storage consumption. For example, you can charge by total used storage or total configured storage. In addition, you can set the base cost for storage by disk class or by storage tier level.
- Set up departments for the purpose of billing storage and assign volumes to departments. You can define premium or discounts to apply to the global base cost, and add line items for additional billing items.

Configuring Chargeback

Note Before configuring Chargeback, make sure all Storage Centers you want to manage with Chargeback have been added to Enterprise Manager. See [Adding and Removing Storage Centers on page 8](#) for instructions on adding and removing Storage Centers.

To configure Chargeback:

- 1 Select the **Chargeback** viewer.
- 2 Click . Enterprise Manager connects to all Storage Centers and gathers information. The Configure Chargeback wizard appears.

- 3 Select whether to charge on volume allocation or volume configuration:

Charge on Volume Allocation - Recommended: Charges storage consumption based on volume allocation. If you select this option, select one of the following:

- **Charge on difference between last automated Chargeback run:** Charges for volume storage consumption changes from the last automated Chargeback run.
- **Charge on the amount of space currently used by Volumes in Department:** Charges for all volume storage currently in use by the department.

Charge on Volume Configuration: Charges for total configured storage on volume.

- 4 Select the Currency Format.

Note Cost units in Chargeback are based on the Currency Format selection. For example, if the Currency Format is United States, cost units are in dollars.

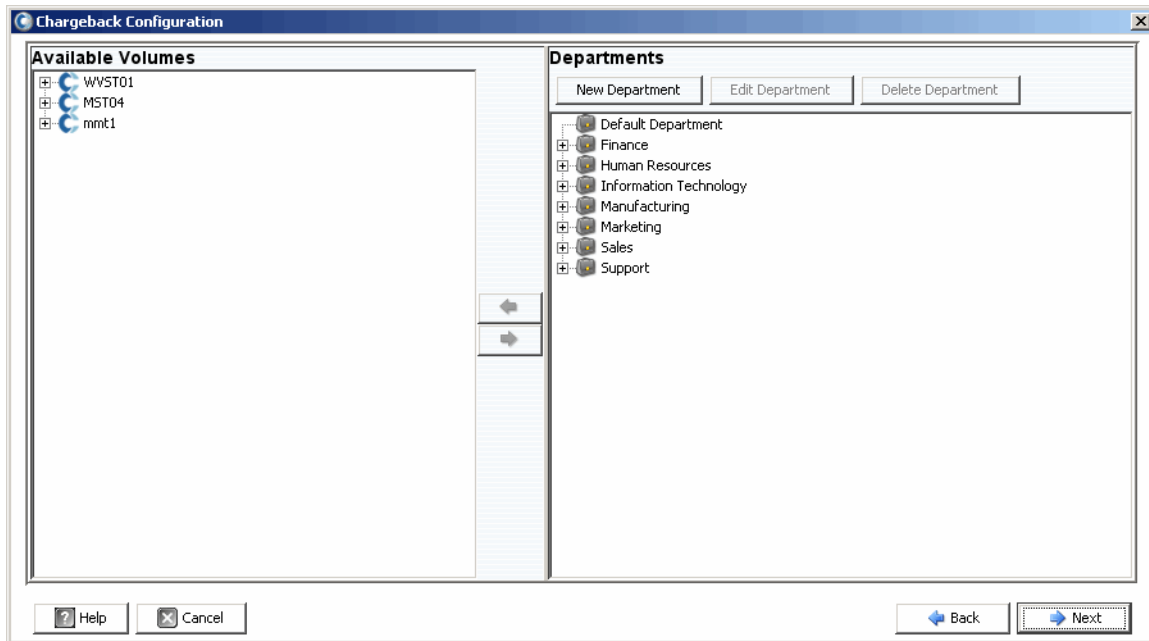
5 Specify Replay and Fast Track options:



- **Charge on Replay Usage for Volumes:** Charges for Replay usage on volumes. If selected, enter the **Cost per Replay**.
- **Charge Extra for volumes using Fast Track disk space:** Charges a higher rate for Fast Track disk space. If selected, enter the **% to increase cost if running on premium disk space**.

6 Click **Next**.

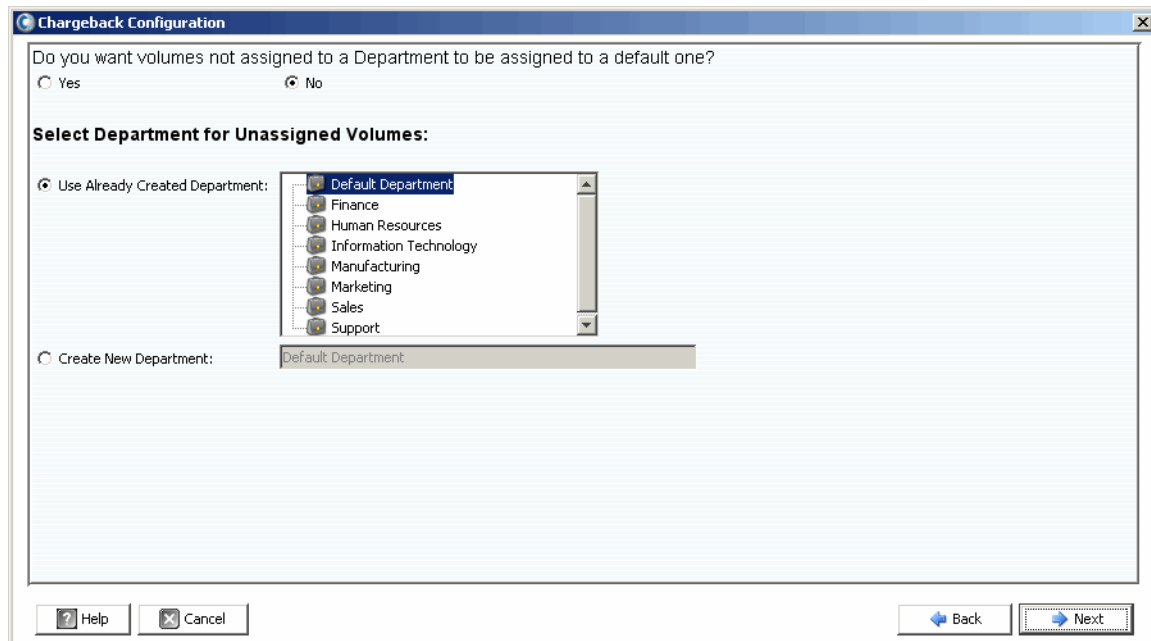
Class Name	Amount	# Disks	Total Space	Storage Centers Available On
SATA	3.29 Per GB	32	7.30 TB	WVST01, MST04
10K-RPM	10.44 Per GB	52	2.44 TB	WVST01, MST04, mmt1
FCATA	7.87 Per GB	15	6.82 TB	MST04

- 7 At the top right of the dialog, pull down the menu and select the method for assigning base cost to storage: **Disk Class** or **Advanced Options**.
 - **Disk Class:** For each available disk class, assign an amount to charge per specified storage space unit (megabyte (MB), gigabyte (GB) or terabyte (TB)). The unit for Amount is dependent on the **Currency Format**. For US, amount is in dollars.
 - **Advanced Options:** For each Storage Center, assign a cost for each available tier.
- 8 Click **Next**. The Chargeback Departments dialog appears:



- 9 Do the following:
 - In the right pane of the dialog, create, edit, or delete departments. See [Adding or Modifying Departments on page 144](#) for details.
 - For each department, add or remove volume assignments: Use the  and  buttons to assign and unassign individual volumes or volume folders.

10 Click **Next**.



11 Specify whether unassigned volumes should be assigned to a department:

- **Yes:** Assigns unassigned volumes to a department. Select the department for the unassigned disks:
 - Use Already Created Department:** Select a department to which you want to assign all unassigned volumes.
 - Create New Department:** Enter the name of a new department to assign unassigned volumes.
- **No:** Does not assign unassigned volumes to a department.

12 Click **Next**.

Chargeback Configuration

Chargeback Attributes:
 Run Chargeback: Select Day of Week:

Chargeback Reporting:
 Automatically save the Chargeback run in a report?
 Select type of file to save report in: CSV Text Excel HTML XML
 Select public directory to save report to:
 Directory must be created and be writable by the Data Collector
 Save individual department reports

Buttons: Help, Cancel, Back, Finish

13 Specify Chargeback Attributes:

- **Run Chargeback:** Select how often to automatically run Chargeback: Every Day, Once a Week, Once a Month, or Once a Quarter.
 Daily reports are run at midnight each day; weekly reports are run at midnight on the specified day; monthly reports are run at midnight on the last day of the month; and quarterly reports are run at midnight on the last day of the quarter (March 31, June 30, September 30, and December 31).
- **Select Day of Week:** For **Once a Week**. Select the day of the week to run Chargeback.

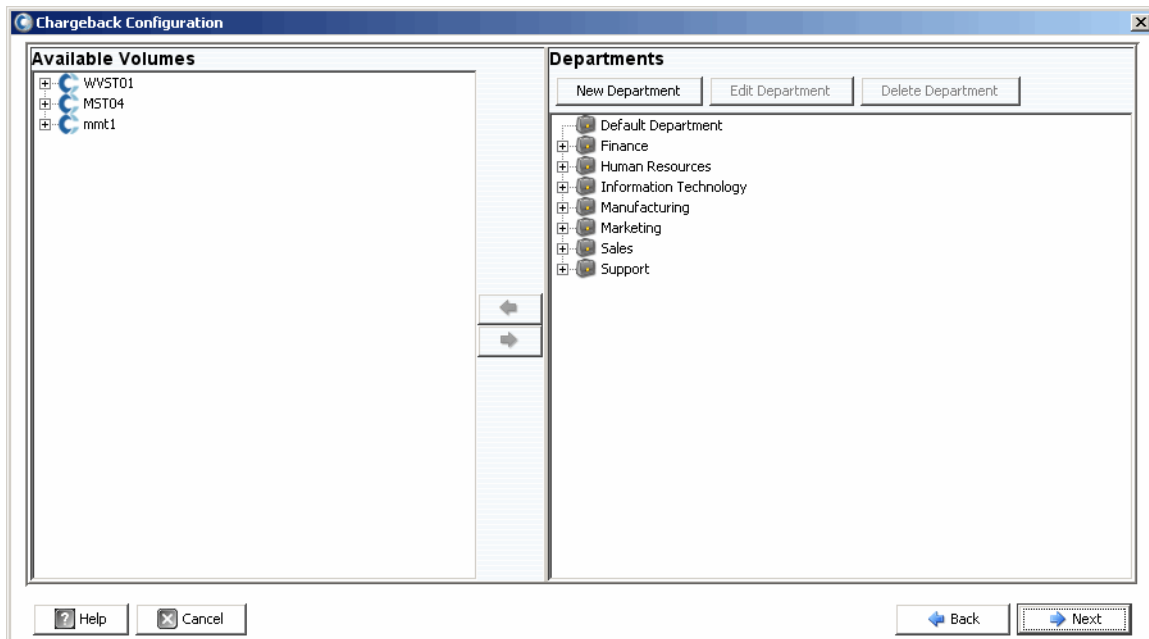
14 Specify Chargeback Reporting options:

- **Automatically save the Chargeback run in a report:** Automatically saves a report for each Chargeback run.
- **Select type of file to save report in:** Select the format for Chargeback Run reports: CSV, Text, Excel, HTML, or XML.
- **Select public directory to save report to:** Enter the complete path for an existing public directory in which you want to save reports. The directory must be on the same server as the Data Collector.
- **Save individual department reports:** Saves individual department reports.

15 Click **Finish**.

Adding or Modifying Departments

The Chargeback Configuration dialog for creating and modifying departments provides two frames: Available Volumes and Departments.



Creating a Department

To create a department:

- 1 In the Departments frame, click **New Department**. The Create New Department dialog appears.

The screenshot shows the 'Create New Department' dialog box. It contains several sections with input fields:

- Department Attributes:**
 - Department Name:
 - Account Number:
- Contact Information:**
 - Contact Name:
 - Contact Email:
 - Contact Phone Number:
- Pricing Settings:**
 - Price Multiplier:
 - Starting Base Price:
 - Base Price Covers 1st: GB
- Department Line Items:**

Name	Cost	Description
------	------	-------------

Buttons: Add, Edit, Remove

At the bottom are 'OK' and 'Cancel' buttons.

- 2 Enter Department Attributes: Department Name and Account Number.
- 3 Enter Contact Information: Contact Name, Contact Email, and Contact Phone Number.
- 4 Enter Pricing Settings:

- **Price Multiplier:** Enter a percent to apply to global cost (Disk Class or Advanced Options), and select Premium to increase the cost or Discount to decrease the cost.

Premium: To apply a premium charge, enter the percent by which to increase the global cost. For example, 10 applies a 10% surcharge.

Discount: To apply a discount, enter the percent by which to decrease the global cost. For example, enter 5 to apply a 5% discount.

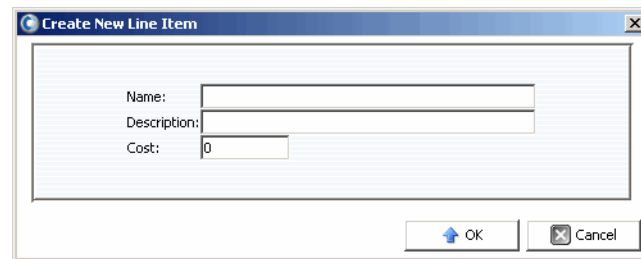
The default Price Multiplier is 100; that is, 100% of the global cost.

- **Starting Base Price:** Enter a base price for storage. The default is 0.
- **Base Price Covers 1st:** Enter an amount of storage after which global cost and price multipliers are applied.

- 5 Add or edit line items as needed:

To add a line item:

- a Click . The Add New Line Item dialog appears.



- b Enter the following:
 - **Name:** Enter a name for the line item.
 - **Description:** Enter a description for the line item.
 - **Cost:** Enter the cost for the line item.
- c Click **OK**.

To edit a line item:

- a Select the line item you want to edit, and click .
- b Edit the line item as needed, and click **OK**.

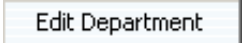
To delete a line item:

- Select the line item you want to delete, and click .

- 6 When you have finished defining the department, click **OK**.


Editing a Department

To edit a department:

- 1 In the Departments frame, click .
- 2 Edit the department as needed. For information on Department options, see [Creating a Department on page 144](#).
- 3 When you are finished editing the department, click **OK**.

Deleting a Department

To delete a department:

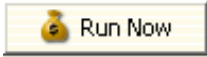
- 1 In the Departments frame, select a department and click .
- 2 Click Yes to delete the department.
- 3 Click **OK** to close the Department dialog.

Viewing Chargeback Reports

During Chargeback configuration (see [Configuring Chargeback on page 139](#)), the frequency of automatic Chargeback runs was set. You can view the Chargeback reports generated from a previous Chargeback run or you can run Chargeback to generate new reports.

Running Chargeback to Create New Reports

To create a new Chargeback report for the current date and time:

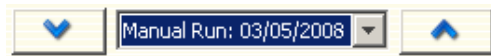
- 1 Select the **Chargeback** viewer.
- 2 In the top right of the display, click .

Chargeback runs and then displays the resulting reports.

Viewing An Existing Chargeback Report

To view Chargeback Reports for an existing run:

- 1 Select the **Chargeback** viewer.
- 2 In the top right of the display, use Chargeback Run selection toolbar to select the run for which you want to view reports:



The Chargeback reports for the selected run are displayed.

Chargeback Report Descriptions

For each Chargeback run, the following reports are generated:

- [Departments Chart](#)
- [Departments Table](#)
- [Savings vs. Traditional SAN](#)

Departments Chart

The Department Chart shows a bar chart of all the departments. For each department represented by a bar, the bar shows the sum of all charges to the department for the Chargeback run.

Departments Table

The Departments Table displays an expandable tree of Chargeback Departments and volumes associated with each Department.

The table contains the following columns:

- **Name:** Department or volume name.
- **NumVolumes:** Number of volumes associated with this department.
- **Total Cost:** Total amount charged by the department or volume.
- **Total Size:** Amount of space used by the department or volume.
- **Base Cost:** Base starting cost assigned to this department.
- **Base Size:** Amount of storage the base price covers before the department is charged for storage.
- **Tier 1, 2, 3 Cost:** Cost charged to the department or volume located in Tier 1, 2, or 3 storage.
- **Tier 1, 2, 3 Size:** The amount of space used by the department or volume located in Tier 1, 2, or 3 storage.
- **Contact Information:** Name, Phone, and Email of the contact person or department.
- **Account Number:** Unique number assigned when the department was created. Can be changed in Chargeback Department Properties.
- **Config Cost:** Cost the Department would be charged based on the configuration costs of the disk classes. Config cost does not include the cost of the Price Multiplier or the Starting Base Price).
- **Multiplier:** Amount by which cost is multiplied.
- **Line Items:** Cost of individual line items.

When a department or volume is selected, the bottom half of the window presents the total space and cost for the department. The chart indicates the amount a Department is being charged compared to the original configured cost.

To edit Department properties:

- 1 In the Departments table, right-click a **Department**, and select **Properties**. The Edit Department window appears.
- 2 Edit department properties, and click **OK**.

To save a Department report to a file:

- 1 In the Departments Table, right-click on a **Department**, and select **Save Report**.
- 2 Select an output type: CSV, Text, Excel, HTML, XML, or PDF.
- 3 Specify a name for the saved report, and click **OK**.

Savings vs. Traditional SAN

The Savings vs. Traditional SAN charts display estimated cost and storage space savings realized by using a Dell Compellent Storage Center as compared to a traditional SAN configuration. The estimated savings are computed on a per Storage Center basis.

Note All cost estimates for Storage Centers and traditional SANs used in the Savings vs. Traditional SAN reports are based on the costs currently configured in Chargeback. See [Configuring Chargeback on page 139](#) for information on setting up costs for Chargeback.

Dynamic Capacity Savings

The Dynamic Capacity Savings chart displays an estimated amount of cost and storage space savings realized by using a Storage Center with Dynamic Capacity as compared to a traditional SAN configuration.

Storage Centers allocate space as needed; whereas a traditional SAN allocates space when a volume is created. The Dynamic Capacity Savings Report displays:

- Total Cost for a Storage Center to store active data (all the active space used for all volumes using the prices set for Chargeback). This cost does not include Replays or space used by RAID overhead.
- Total Cost for a traditional SAN to have the same amount of space available to servers using the prices set for Chargeback.
- Cost Savings realized by using Dynamic Capacity rather than a traditional SAN.
- Storage space saved by using Dynamic Capacity rather than a traditional SAN.

Data Instant Replay Savings

The Data Instant Replay Savings chart shows the estimated cost and storage space savings realized by using Storage Center Data Instant Replays as compared to traditional SAN point-in-time-copies.

Data Instant Replay allocates space for a Replay only when data is written and saves only the delta between Replays; a traditional SAN allocates space for every point-in-time-copy.

Data Instant Replay Savings chart displays:

- Total Cost for a Storage Center to store historical data by adding all the actual space used for all volumes.
- Total Cost for a traditional SAN to have the same amount of historical data available.
- Estimated savings derived by subtracting the Total Cost from the Traditional SAN Total Cost.
- Estimated storage space savings derived by subtracting the Total Storage Space from the Traditional SAN Total Storage Space.

Data Progression Savings

The Data Progression Savings chart shows the estimated cost savings realized by using a Storage Center with Data Progression as compared to a traditional SAN. For information on how Storage Center Data Progression works, see the *Storage Center Manager User Guide*.

Data Progression Savings chart displays:

- For each storage tier, Storage Center cost and the cost saved compared to a traditional SAN if all data is stored on a single tier or RAID 10.
- Total cost for using Storage Center compared to the total cost of a tradition SAN.

Green Reports


Green Reports show the energy and CO2 savings realized by using a Storage Center as compared to a traditional SAN.

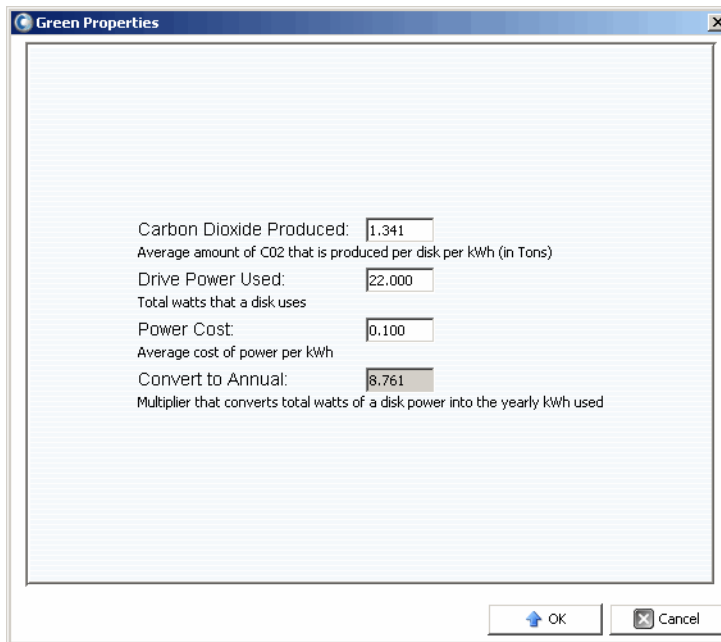
Setting Green Properties

Green Properties determine the values to use for calculating energy savings displayed on the Green Savings Report.

Note For details on Green Properties, refer to [Guidelines for Setting Green Properties on page 152](#).

To set Green Properties:

- 1 Select the **Chargeback** viewer.
- 2 Click  **Green Properties**. The Green Properties dialog appears.



Carbon Dioxide Produced:	<input type="text" value="1.341"/>
Average amount of CO2 that is produced per disk per kWh (in Tons)	
Drive Power Used:	<input type="text" value="22.000"/>
Total watts that a disk uses	
Power Cost:	<input type="text" value="0.100"/>
Average cost of power per kWh	
Convert to Annual:	<input type="text" value="8.761"/>
Multiplier that converts total watts of a disk power into the yearly kWh used	

- 3 Specify values for the following items:
 - **Carbon Dioxide Produced:** Enter the average amount of CO2 produced per disk in kWh in pounds. The default is 1.341.
 - **Drive Power Used:** Enter the total amount of watts used per disk. The default is 22.00.
 - **Power Cost:** Enter the average cost of power per kWh. The default is 0.100.
 - **Convert to Annual:** Displays the fixed multiplier used to calculate annual kWh from disk watt usage. Fixed value is 8.761.
- 4 Click **OK** to close the dialog.

Guidelines for Setting Green Properties

Use the following resources as guidelines for setting Green Properties:

Average Power Cost per US Region

For average power cost per region in the United States:

http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html

Power Consumption Specifications for Storage Center Components

For specifications on Storage Center power consumption by component, refer to the following table:

Device	Power (watts)	
	Component [†]	Data Center ^{††}
15K.5 (146 GB)	24.00	80.00
10K.7 (146 GB)	22.00	73.30
15K.5 (300 GB)	26.50	88.30
10K.7 (300 GB)	25.00	83.30
NS 10K (400 GB)	17.25	57.50
ES.1 (750 GB)	19.00	63.30
ES.2 (1 TB)	19.00	63.30
SC 020 ^{†††}	353.00	1176.50
SC 030 ^{†††}	360.00	1199.90
NAS ^{†††}	187.00	623.30
[†] Assumes active IO with power supply and fan energy losses included.		
^{††} Assumes adjustment of 3.33 times component power consumption to compute total data center power consumption.		
^{†††} Assumes maximum hardware configuration.		

Viewing Green Reports

To view Green Reports.

- 1 Select the **Chargeback** viewer.
- 2 Click the **Savings vs. Traditional SAN** tab.
- 3 Click the **Green Savings Report** tab. The Green Savings Report appears.

12 Using Threshold Alerts

Introduction [156](#)

Creating and Applying Threshold Definitions [157](#)

Running Threshold Queries [161](#)

Using the Threshold Alert Viewer [162](#)

Introduction

The Threshold Alerts viewer allows you to do the following:

- Run threshold queries that allow you to gather up-to-the-minute usage data on IO, storage, and replications. See [Running Threshold Queries on page 161](#).
- Set up threshold definitions and then apply the thresholds to automatically monitor Storage Center IO, storage, and replication usage. See [Creating and Applying Threshold Definitions on page 157](#).
- View current and past threshold alerts. See [Using the Threshold Alert Viewer on page 162](#).

Creating and Applying Threshold Definitions

Enterprise Manager provides three types of thresholds, each of which corresponds to a Storage Center usage resource:

- IO Usage
- Storage Usage
- Replication Usage

Each threshold type, in turn, includes a target class of objects to which it can be applied. For example, an IO Usage threshold can be defined to apply to an entire Storage Center, volumes, servers, disks, controllers, or local ports; a Storage Usage threshold can be defined to apply to an entire Storage Center or volumes; a Replication Usage threshold can be defined to apply to Replications or QoS nodes.

After defining the threshold type and target object class, you then apply the threshold to one or more individual objects in the target class. For example, you can set up a Storage Usage threshold for the target object class Volumes, and then apply the threshold to specific volume folders or individual volumes. The following tables lists all threshold types and corresponding classes and threshold definitions.

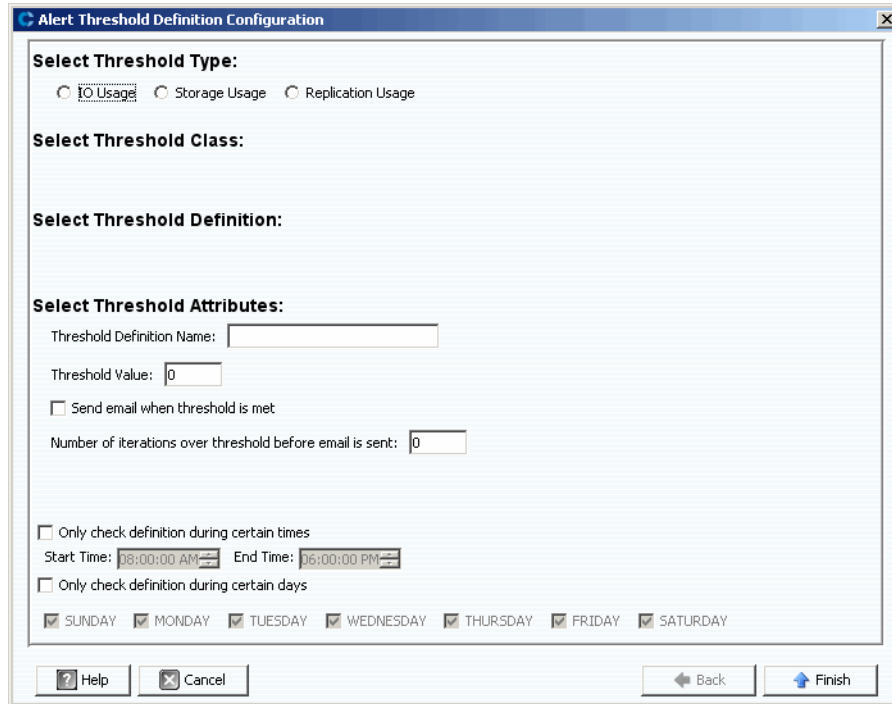
Threshold Type/Class	Available Threshold Definitions
IO Usage	
Storage Center	FE IO/Secs
	FE KB/Sec
	IO Pending
Volumes	IO/Sec
	KB/Sec
	Latency
	IO Pending
Servers	IO/Sec
	KB/Sec
	Latency
Disks	IO/Sec
	KB/Sec
	Latency
Controllers	IO/Sec
	KB/Sec
	CPU%
	Memory%

Threshold Type/Class	Available Threshold Definitions
Local Ports	IO/Sec
	KB/Sec
	Latency
Storage Usage	
Storage Center	Usage
	Growth
Volumes	Usage
	Active Growth
	Replay Growth
	Actual Growth
	Replay Space
	Actual Space
Replication Usage	
Replication	Amount Remaining
	Percent Complete
QoS Nodes	Percent Used

Creating a Threshold Definition

To create a Threshold Alert:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold window appears.
- 2 Click the **Threshold Definitions** tab at the top of the window.
- 3 Click **New Definition**. The **Alert Threshold Definition Configuration** window appears.



The image shows a dialog box titled "Alert Threshold Definition Configuration". It contains several sections for configuring a threshold:

- Select Threshold Type:** Three radio buttons are present: IO Usage, Storage Usage, and Replication Usage.
- Select Threshold Class:** This section is currently empty.
- Select Threshold Definition:** This section is currently empty.
- Select Threshold Attributes:**
 - Threshold Definition Name: [Text input field]
 - Threshold Value: [0] [Text input field]
 - Send email when threshold is met
 - Number of iterations over threshold before email is sent: [0] [Text input field]
 - Only check definition during certain times
 - Start Time: [08:00:00 AM] [Time picker]
 - End Time: [06:00:00 PM] [Time picker]
 - Only check definition during certain days
 - SUNDAY MONDAY TUESDAY WEDNESDAY THURSDAY FRIDAY SATURDAY

At the bottom of the dialog, there are buttons for Help, Cancel, Back, and Finish.

- 4 Set up the threshold:
 - a Select the threshold type **IO Usage**, **Storage Usage**, or **Replication Usage**.
 - b Select the threshold target object class.
 - c Select the Threshold Definition for the type and class.

-
- 5 Select Threshold attributes:
 - a Enter a unique Threshold Definition Name.
 - b Enter a value for the Threshold above which the system triggers an alert.
 - c Select to send an email when the threshold is met.
 - d Select the number times the threshold must be exceeded before sending out an email.
 - e Optionally, set a time and/or day constraint on when the threshold should be checked.
 - 6 Click **Finish**. The threshold definition is created and listed in the Threshold Definitions table.

Applying a Defined Threshold

After defining a threshold, apply the threshold to specific Storage Center components objects.

To apply a threshold to one or more Storage Center objects:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold window appears.
- 2 Click on **Threshold Definitions**.
- 3 In the list of Threshold Definitions, click on a definition that is not applicable to all objects. (That is, the **All Objects** column in the Threshold Definitions shows **False**.)
- 4 Click **New Objects**. The Alert Threshold Definition Configuration window appears, listing the available Storage Centers.
- 5 Select the objects for which you want to apply the threshold:
- 6 When you are finished selecting objects, click **Finish**.

Editing a Threshold Definition

To edit an existing threshold definition:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold window appears.
- 2 Click the **Edit Definition** tab at the top of the window. The Alert Threshold Definition Configuration window appears. You can edit the name of the definition, the error threshold value, email notification, number of threshold iterations before email is sent, and time/day concurrents for checking the threshold.
- 3 Click **Finish**.

Deleting a Threshold Definition

To delete a definition:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold window appears.
- 2 Click the **Delete Definition** tab at the top of the window.
- 3 The system asks you to confirm.
- 4 Click **Yes**.

Running Threshold Queries

In contrast to threshold definitions which Enterprise Manager constantly watches, you can create, save, and run threshold queries to immediately monitor Storage Center usage. To run a threshold query:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold window appears.
- 2 Click on the **Threshold Queries** tab. The Threshold Query window appears. (Previously saved queries appear in a frame to the left of the Query window.)
- 3 If you want to save the query:
 - a Enter a name for the query.
 - b Select **Public** to make the Query available to all users.
- 4 Set up the query:
 - a Select the scope of the threshold: either All Storage Centers or a specific Storage Center.
 - b Select the Threshold Type: IO Usage, Storage Usage, or Replication Usage.
 - c Select the Threshold Class. Available threshold classes are dependent on the selected Threshold Type.
 - d Select the Threshold Definition. Available Threshold Definitions are dependent on both the selected type and class.
 - e Select the start and end time for the query.
 - f Enter the threshold value.
- 5 Click **Run Query**. The results of the query appear in the table in the middle of the window. Right-click on a row in the table to view the data in a tree.
- 6 Using the Reset, Save, Edit, and Export features:
 - Click **Save** to save the query definition.
 - Click **Edit** to edit the definition of an existing query.
 - Click **Reset** to return all the values in the query toolbar to original values.
 - Click **Save Query Results** to export the results of a query.

Using the Threshold Alert Viewer

The Threshold Alerts Viewer displays alerts generated by Threshold Queries and Definitions.

Current Threshold Alerts

Alerts in the Current alert table are for Storage Center objects that currently exceed their assigned threshold definition.

To view Current Threshold Alerts:

- 1 In the Viewers frame, click **Threshold Alerts**. The Threshold Alerts window appears.
- 2 Click the **Current Threshold Alerts** tab. The current alerts tab shows all the objects (systems, disks, volumes) that have a value above a defined Threshold the last time Threshold Alerts were run. Storage Usage runs once a day; IO Usage runs every 15 minutes. By default, the system displays All Definitions and All Types.
- 3 Filter the list by selecting an individual Storage Center, Alert Definition, and/or Alert Type.

To save the alert data:

- 1 In the Threshold Alerts viewer, click on either the **Current Threshold Alerts** tab or the **Historical Threshold Alerts** tab.
- 2 Click **Save**. The Save Threshold Alerts window appears.
- 3 Enter the following:
 - Select **Current Threshold Alerts** and/or **Historical Threshold Alerts**.
 - Select the output type: CSV, text, Excel, HTML, XML, or PDF.
 - Browse to or enter a file name.
- 4 Click **OK**.

To update current alert data:

- 1 Select an Alert.
- 2 Click **Update**.

To view the Alert Definition that generated an Alert, in the Current Alerts window:

- 1 Right-click on an Alert. The current alert shortcut menu appears.
- 2 From the Alert shortcut menu, select **Go to Definition**.
- 3 The Threshold Definition window appears. The Alert Definition that triggered the Alert is highlighted.

To view the Storage Usage or IO Usage:

- 1 Right-click an Alert. The current alert shortcut menu appears.
- 2 From the Alert shortcut menu, select a Server, and then select either **Show in Storage Usage Tab** or **Show in IO Usage Tab**.

Historical Threshold Alerts

Alerts in the historical alert table are for Storage Center objects that no longer exceed their assigned threshold definition, but did at some point in the past.

To view Historical Threshold Alerts:

- 1 From the Viewers frame, click **Threshold Alerts**.
- 2 Click the **Historical Threshold Alerts** tab. The Historical Threshold Alerts window appears.
- 3 Right-click the Alert to view the Historical Threshold Alerts shortcut menu.
 - View the alert definition.
 - View the Storage Center window (either IO Usage, Storage Usage, or Storage Center Explorer) that displays all statistics for this object.
 - Delete the threshold alert from the database.

The upper left part of the tab allows you to qualify the number of alerts by selecting a threshold alert definition.

- Select All Definitions to filter the table by type, class, and definition.
- Save the data.

Update the table with current information.



13 Using the Servers Viewer

- Introduction [166](#)
- Registering a Server [168](#)
- Manually Mapping a Server Agent to a Storage Center Server [169](#)
- Creating Folders for Servers [170](#)
- Moving a Server to Another Folder [171](#)
- Assigning a Virtual Server to a Storage Center [172](#)
- Setting Global Properties for all Server Agents [173](#)
- Scheduling Automatic Space Recovery [174](#)
- Setting Up Email Notification for Space Recovery [180](#)
- Server Agent Properties Dialog [189](#)
- Viewing Server Agent Information [183](#)
- Viewing and Managing a NAS or zNAS Server [186](#)
- Server Agent Properties Dialog [189](#)
- Server Agent Server Properties Dialog [190](#)
- Server Agent Volume Properties Dialog [192](#)

Introduction

The Enterprise Manager Servers Viewer gathers and displays operating system views of physical and virtual servers on the Storage Centers.

Supported Server Types




Servers Viewer can gather, display, and manage information from the following server types:



Server Type	Description
Microsoft Windows Server 2003 Microsoft Windows Server 2008 (including Microsoft Hyper-V)	For Microsoft Windows Servers, Enterprise Manager gathers information via a Server Agent for Microsoft Servers.
Microsoft Windows Storage Server (WSS) 2008, SP 2, Enterprise Edition (x64) with Supermicro AOC-SIMSO – IPMI daughter card	For Microsoft Windows Storage Servers, Enterprise Manager gathers Fan Speed, Temperature, Voltage, and Power Supply information for the NAS. In addition, Enterprise Manager provides control options for the NAS: clearing the System Event Log (SEL), powering off, and resetting power. See Viewing and Managing a NAS or zNAS Server on page 186 .
VMware vCenter or ESX 3.5/4.0/4/1	For VMware vCenter or ESX virtual servers, Enterprise Manager gathers information from the VMware vCenter Management Server.
Dell Compellent zNas	For zNas, Enterprise Manager gathers and displays information for the Nas.

- For information on installing Server Agents, refer to the *Enterprise Manager Installation and Setup Guide*.
- For information on Storage Center NAS, refer to the *Storage Center NAS Storage Solution Setup Guide* and the *Storage Center NAS Storage Solution User Guide*.
- For information on Dell Compellent zNAS, refer to the *Storage Center zNAS Storage Solution User Guide*.

Server Icons

On the Servers Viewer, Enterprise Manager uses icons to denote the server type.

Icon	Server Type
	Microsoft Windows Servers Microsoft Windows Storage Servers
	Microsoft Windows 2008 Server Hyper-V Management Server
	Microsoft Windows Hyper-V Virtual Server

Icon	Server Type
	VMware vCenter Management Server
	Virtual Cluster

Registering a Server

To include a physical or virtual server in the Servers Viewer, you must register the server with the Enterprise Manager Data Collector. For Microsoft Windows Servers, including Microsoft Windows Storage Servers, you must install a Dell Compellent Server Agent for Microsoft Servers on the server before registering the server.

Note Before registering a Microsoft Windows Server, make sure the Server Agent for Microsoft Servers is installed and running on the server. See the *Enterprise Manager Installation and Setup Guide* for information on installing a Server Agent for Microsoft Servers.

To register a server:

- 1 In Enterprise Manager, display the **Servers** viewer.
- 2 Click **Register Server**. The Register Server dialog appears.
- 3 Enter the following:

Select Operating System: Select the operating system of the server: Microsoft Windows 2003/2008 or VMware vCenter or ESX 3.5/4.0/4.1 or zNas.

Host/IP: Enter either host name or IP address for the server. For VMware ESX servers, enter the IP address of the VMware vCenter Management Server.

Port: Enter the port for the server. The default is 27355.

User Name/Password: For non-Microsoft Windows Servers. Enter an administrator username and password for the server.

Use https protocol: For non-Microsoft Windows Servers. Select this option to use https protocol to connect to the server.

IPMI Interface IP Address: For Nas only. Enter the IP address of the IPMI interface card.

IPMI Interface User: For Nas only. Enter the IPMI username.

IPMI Interface Password: For Nas only. Enter the IPMI password.

Automatically Manage on Storage Center: Select this option to automatically create and manage the server (and all virtual servers) on the Storage Center.

Select Parent Folder: Select a Servers Viewer parent folder for the server.

- 4 Click **Finish**.

Enterprise Manager registers the server with the Data Collector and then displays the server in the Servers Viewer.

Manually Mapping a Server Agent to a Storage Center Server

If necessary, you can manually map a registered Server Agent to a Storage Center server using the Server Agent Server Properties Storage Center Server tab.

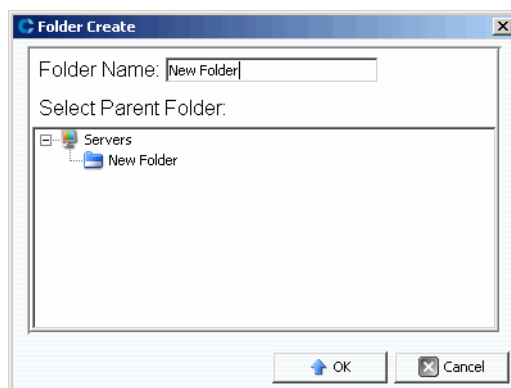
- 1 In the Servers Viewer, right-click on the server you want to manually map to a Storage Center server and click **Edit Settings**. The Server Agent Server Properties appear.
- 2 Click **Storage Center Servers**.
- 3 To add a mapping to a Storage Center server:
 - a Click **Add**.
 - b Select a Storage Center from the list of available Storage Centers, and click **OK**.
 - c Select the server to which you want to map the Server Agent, and click **OK**.
 - d Click **OK** to close the Server Agent Server Properties dialog.
- 4 To remove a mapping:
 - a Select the mapping you want to remove, and click **Remove**.
 - b Click **OK** to close the Server Agent Server Properties dialog.

Creating Folders for Servers

You can create folders for organizing servers in the Servers Viewer.

To create a folder:

- 1 In Enterprise Manager, display the **Servers** viewer.
- 2 Right-click on the Servers icon, and select **Create Folder**. The Folder Create dialog appears.



- 3 Enter a name for the folder, and select the location for the folder.
- 4 Click **OK**.

Moving a Server to Another Folder

To move a server to another folder:

- 1 In Enterprise Manager, display the **Servers** viewer.
- 2 Right-click on the server you want to move to another folder, and select **Edit Settings**. The Server Agent Server Properties dialog appears.
- 3 Click **Parent Folder**.
- 4 Click **Change**.
- 5 Select a parent folder for the server, and click **Apply Changes**.

Assigning a Virtual Server to a Storage Center

Note Only servers that are not set up to be automatically managed on a Storage Center can be assigned to a Storage Center. See [Server Agent Server Properties Dialog on page 190](#) for information on enabling or disabling the **Automatically Manage on Storage Center** option.

To assign a virtual server on the Servers Viewer to a Storage Center:

- 1 Right-click on a virtual server that is not automatically managed on the Storage Center.
- 2 Select **Assign Virtual Server - [Storage Center]**.

Enterprise Manager gathers information on the server from the Storage Center. If the server does not exist on the Storage Center, the server cannot be assigned to the Storage Center.

Setting Global Properties for all Server Agents

To set global properties for gathering Microsoft Windows server information from Server Agents for Microsoft Servers:

- 1 In the Viewers pane, click the **Servers** icon.
- 2 In the top right of the display, click **Edit Settings**. The Data Collector Properties dialog appears.
- 3 Click **Server Agent**.
- 4 Click **Change**.
- 5 Specify the following:
 - **Gather Server Agent Information automatically every hour:** Gathers Server Agent Information automatically every hour.
 - **Get Stats for last (# Days):** Enter the number of days for which you want to gather statistics.
 - **Allow Data Collector to automatically run Space Recovery:** Enable this option to allow the Data Collector to automatically run Space Recovery.
- 6 Click **Apply Changes**.

Scheduling Automatic Space Recovery

Note Free Space Recovery is available only for Microsoft Windows Servers on which a Dell Compellent Server Agent for Microsoft Servers is installed and running. For information on installing Server Agents, refer to the *Enterprise Manager Installation and Setup Guide*.

Note For servers running iSCSI HBAs, Enterprise Manager does not automatically recognize the WWNs for the server. To populate the list of WWNs and run Space Recovery, you must manually map the server to the Storage Center(s). See [Manually Mapping a Server Agent to a Storage Center Server on page 169](#) for details.

Space Recovery finds and recovers unused disk space as reported by Windows. The amount of space that can be recovered depends on the frequency and expiration of Storage Center Replays. In general, more frequent Storage Center Replays with shorter expiration times result in more recoverable space. To be eligible for release, a Replay must be expired with no Storage Center View Volumes attached.

Space Recovery Requirements

Space Recovery requires the following:

- Space Recovery can be run only on a Windows NTFS file system.
- Space Recovery can recover space only on disks initialized by Windows as Basic; that is, Space Recovery cannot recover space on disks initialized by Windows as Dynamic.
- Space Recovery cannot recover space from volumes that were striped or mirrored by Windows mirroring utilities.

Space Recovery Recommendations

Follow these guidelines for running Space Recovery:

- Schedule Space Recovery to run once per week during off hours. Although you can run Space Recovery immediately on any volume, to maximize the amount of space recovered, schedule Space Recovery to run once per week.
- View storage trends on volumes running Space Recovery to see progressive results. Because regularly-scheduled Space Recovery operations gradually result in more space recovery, view storage trends on volumes running Space Recovery to see progressive results.

Automatic Space Recovery Controls

Automatic Space Recovery is controlled by three hierarchical properties dialogs:

- **Data Collector - Server Agent Properties:** Use the Data Collector Server Agent Properties to enable automatic Space Recovery for all servers and volumes, and optionally set a global default schedule for all servers and all volumes. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).

- **Server Agent Server Properties:** If Space Recovery is enabled, use the Server Agent Server Properties to set a default Space Recovery schedule for all volumes on a server. In addition, use this dialog to specify whether a volume can also schedule automatic Space Recovery. See [Scheduling Space Recovery for All Volumes on a Server on page 176](#) and [Server Agent Server Properties Dialog on page 190](#).
- **Server Agent Volume Properties:** If automatic Space Recovery is enabled and the Server Properties allow volumes to schedule Space Recovery, use this dialog to set a Space Recovery schedule for the individual volume. See [Scheduling Space Recovery for an Individual Volume on page 178](#) and [Server Agent Volume Properties Dialog on page 192](#).

Enabling Space Recovery and Setting a Global Space Recovery Schedule

To enable Space Recovery and set a global schedule:

- 1 In the Viewers pane, click the **Servers** icon.
- 2 In the top right of the display, click **Edit Settings**. The Data Collector properties dialog appears.
- 3 Click **Server Agent**.
- 4 Click **Change**.
- 5 Specify the following:
 - Enable the **Allow Data Collector to automatically run Space Recovery** option.
 - Select a time to automatically run Space Recovery.
- 6 Click **Apply Changes**.

Scheduling Space Recovery for All Volumes on a Server

To schedule Space Recovery for all volumes on a server:

- 1 Make sure that Space Recovery is enabled. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).
- 2 In the Viewers pane, click the **Servers** icon.
- 3 Right-click on the server for which you want to set a schedule for all volumes, and select **Edit Settings**. The Server Agent Server Properties dialog appears.
- 4 Click **Space Recovery**.
- 5 Click **Change**.
- 6 Specify the following:
 - **Allow volumes on this server to schedule Space Recovery:** Enable this option to allow volumes on the server to schedule Space Recovery for the volume.
 - **Set default Space Recovery schedule for volumes on this server:** Select this option to set a default Space Recovery schedule for all server volumes.
 - **Run:** Select the default schedule run time: Every Day, Once a Week, or Once a Month. For Once a Week, select the day of the week to run Space Recovery; for Once a Month, select the day of the month to run Space Recovery.

Note Scheduled Space Recovery runs at the time specified on the Data Collector Server Agent Properties dialog. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).

- **Apply server settings to all volumes on this server:** Select this option to apply the new default schedule to all volumes on the server.
- 7 Click **Apply Changes**.

Allowing a Volume to Schedule Space Recovery

To allow an individual volume to schedule Space Recovery:

- 1 Make sure that Space Recovery is enabled. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).
- 2 In the Viewers pane, click the **Servers** icon.
- 3 Right-click on the server for which you want to allow one or more volumes to schedule Space Recovery, and select **Edit Properties**. The Server Agent Server Properties dialog appears.
- 4 Click **Space Recovery**.
- 5 Click **Change**.
- 6 Specify the following:
 - **Allow volumes on this server to schedule Space Recovery:** Select this option to allow volumes to schedule Space Recovery.
 - **Apply server settings to all volumes on this server:** Select this option to apply the new settings to all volumes on the server.
- 7 Click **Apply Changes**.

Scheduling Space Recovery for an Individual Volume

- 1 Make sure that Space Recovery is enabled. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).
- 2 Make sure that the volume is allowed to set a Space Recovery Schedule. See [Allowing a Volume to Schedule Space Recovery on page 177](#).
- 3 In the Viewers pane, click the **Servers** icon.
- 4 Right-click on the volume for which you want to schedule Space Recovery, and select **Edit Settings**. The Server Agent Volume Properties dialog appears.
- 5 Click **Space Recovery**.
- 6 Click **Change**.
- 7 Specify the following:
 - **Use volume Space Recovery Schedule:** Select this option to set a Space Recovery schedule for the volume.
 - **Schedule Space Recovery on this volume:** Select this option to set a Space Recovery schedule for the volume.
 - **Run:** Select the default schedule run time: Every Day, Once a Week, or Once a Month. For Once a Week, select the day of the week to run Space Recovery; for Once a Month, select the day of the month to run Space Recovery.

Note Scheduled Space Recovery runs at the time specified on the Server Agent Properties dialog. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).

- 8 Click **Apply Changes**.

Removing a Volume from a Space Recovery Schedule

To remove a volume from a Space Recovery schedule:

- 1 In the Viewers pane, click the **Servers** icon.
- 2 Right click on a volume, and select **Edit Settings**. The Server Agent Volume Properties dialog appears.
- 3 Click **Space Recovery**.
- 4 Click **Change**.
- 5 Make sure the following options are disabled:
 - Clear the **Use volume Space Recovery Schedule** option.
 - Clear the **Schedule Space Recovery on this volume** option.
- 6 Click **Apply Changes**.

Setting Up Email Notification for Space Recovery

To receive Space Recovery Reports via email:

- 1 From the Management menu, select **User Properties**. The User Properties dialog appears.
- 2 Click **Manage Events**.
- 3 Click **Change**.
- 4 Make sure **Space Recovery Report** is selected.
- 5 Click **Apply Changes**.

Running Space Recovery

To run Space Recovery immediately:

- 1 In the Viewers frame, click the **Servers** icon.
- 2 Right-click on a volume, and select **Run Space Recovery**.
- 3 Click **Yes** to run Space Recovery.

The system notifies you when Space Recovery is finished. For information on scheduling automatic Space Recovery, see [Scheduling Automatic Space Recovery on page 174](#).

Viewing Space Recovery History

- ⇒ *To view Space Recovery History for all servers*
 - 1 In the Viewers pane, click the **Servers** icon.
 - 2 Right-click on the Server Agents folder, and select **Space Recovery History**.
 - 3 Click **OK** to close the display.

- ⇒ *To view Space Recovery History for all volumes on a server*
 - 1 In the Viewers pane, click the **Servers** icon.
 - 2 Right-click on a server, and select **Space Recovery History**.
 - 3 Click **OK** to close the display.

- ⇒ *To view Space Recovery History for a volume*
 - 1 In the Viewers pane, click the **Servers** icon.
 - 2 Right-click on a volume, and select **Space Recovery History**.
 - 3 Click **OK** to close the display.

Viewing Server Agent Information

Viewing Information for All Server Agents

To view all Server information:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 In the navigation pane of the Servers Viewer, click on the **Servers** icon.
- 3 At the top right of the display, select the information you want to display from the pull-down menu:

Show Servers and Volumes: Shows information for all servers and volumes.

Show Servers: Shows server information only.

Show Volumes: Shows volume information only.

Information on the selected objects is displayed.

Viewing Information for an Individual Server

To view information for an individual server:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Click on an individual server. Information for the server appears. Information includes Operating System View, Server HBAs, and Volumes.

Viewing Server Information in the Storage Management Window

To view server information in the Storage Management window:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Right-click on a server, and select a Storage Center node, and then select **Show in Storage Management Tab**.
- 3 If the Reporting Time Filter dialog appears, select the **Starting Time** and **Ending Time**, and click **OK**.

Server information is displayed in the Storage Management window.

Viewing Server Information in the IO Usage Tab

To view server information in the IO Usage Report window:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Right-click on a server, select a Storage Center node, and then select **Show in IO Usage Tab**.
- 3 If the Reporting Filter dialog appears, select the **Starting Time** and **Ending Time**, and click **OK**.

Server information is displayed in the IO Usage Report window.

Viewing Server Information in Storage Center Manager

To view server information in Storage Center:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Right-click on a server, select a Storage Center node, and then select **Show in Storage Center Manager**.

Enterprise Manager automatically logs into the Storage Center and displays the General server information for that server.

Viewing Server Volume Information

To view volumes managed by the server:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Click on a volume. Information for that volume appears.

Volume View includes:

- Volume name and mount point
- Volume label
- Multipath policy (for multipathed volumes only)
- Server on which this volume is mounted
- Last update
- Time last space recovery was run
- Space Recovery schedule

Storage Center View includes:

- Name of the volume
- Configured space
- Used space
- Free Space

Viewing and Managing a NAS or zNAS Server

You can monitor and manage a Storage Center NAS or zNAS server via Enterprise Manager. To do so, you must install and register a Dell Compellent Server Agent on the server.

- For information on Storage Center NAS, refer to the *Storage Center NAS Storage Solution Setup Guide* and the *Storage Center NAS Storage Solution User Guide*.
- For information on Storage Center zNAS, refer to the *Dell Compellent zNAS User Guide* and *Dell Compellent zNAS System Setup Guide*
- For information on installing Server Agents, refer to the *Enterprise Manager Installation and Setup Guide*.
- For information on registering a server agent, see [Registering a Server on page 168](#).

To view NAS server information:

- 1 In the Viewers pane, click **Servers** to display Servers.
- 2 Click on a NAS or zNAS server.

Server Information Tab

Server Information | NAS |

[Server Agent Update Available]

Operating System: Windows Storage Server 2008 Enterprise (Service Pack 2)
IP Address: 172.31.10.55 **Last Update:** 11/16/2009 11:48:29
Server Agent Version: 5.2.1.4 **Space Recovery Support:** True (Not Scheduled)
Index: 1257778982120 **VDS Manager:** 04.01.00.005
Replay Manager: 05.01.00.000

Server HBAs

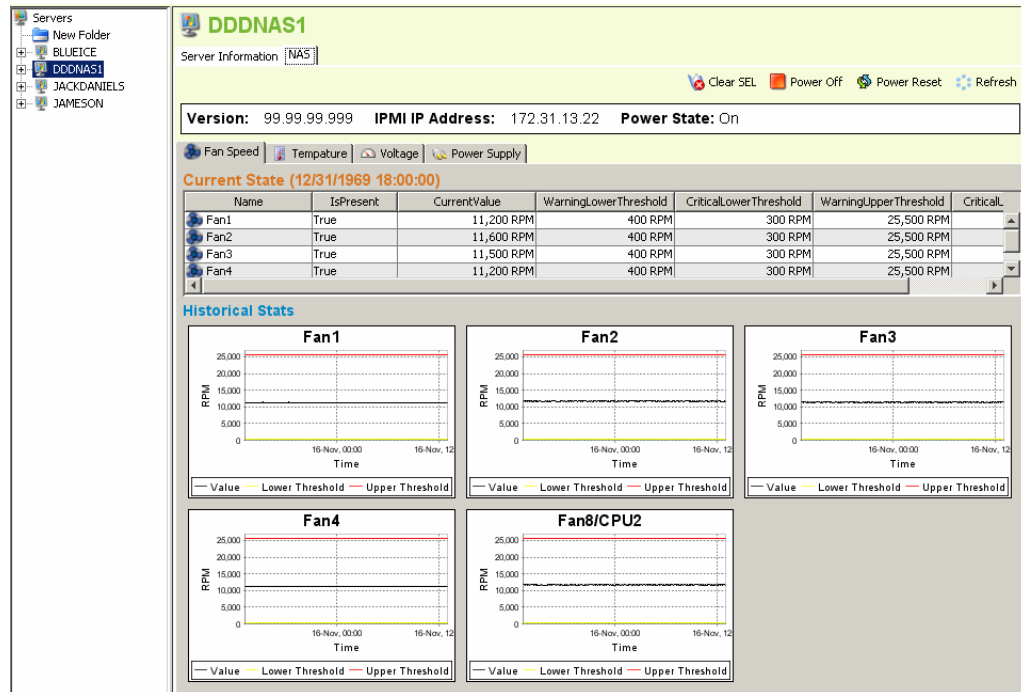
Server Port	Type	IP Address	Storage Center
10000000C97A5CB6	FC		Storage Center 201
10000000C97A5CB7	FC		
iqn.1991-05.com.microsoft:dddn...	iSCSI		

Name	Used Space	Total Space	% Full	Last Update	Last Recovery	Automated Reco
C:	23.41 GB	73.00 GB	32%	11/16/2009 11:48:29	Not Run Yet	Not Scheduled

The Server Information tab for a NAS displays the following:

- **Server Agent Information:** Shows the operating system, IP address, Server Agent version, Index, Last Update, Space Recovery Support, VDS Manager version (if installed), and Replay Manager version (if installed).
- **Server HBAs:** Lists all the HBAs associated with the server.
- **Storage Information:** Lists all volumes on the NAS, along with storage statistics for the volume.

NAS Tab







The NAS tab display shows the following:

- **Current State:** If the NAS is powered on, displays a series of tabs that display the current state for each sensor: Fan Speed, Temperature, Voltage, and Power Supply.
- **Historical Stats:** For each sensor, shows historical statistics.
- **Alerts:** If the NAS has issued alerts, shows a table of all current NAS alerts.

NAS Control Options

NAS controls include the following:

NAS Option	Description
 Clear SEL	Clears all entries in the system event log.
 Power Off	Powers off the NAS.
 Power Reset	Resets the NAS.
 Refresh	Refreshes information in the NAS display.

Server Agent Properties Dialog

To view Server Agent properties:

- 1 From the Management menu, select **Data Collector Properties**.
- 2 Click **Server Agent**. The Server Agent Properties dialog appears.

Gather Server Agent information automatically every hour: Gathers server agent information every hour. If this option is not selected, Server Agent will not gather information.

Gather stats for last [] days: Specifies the number of days for which Server Agent should gather historical statistics.

Allow Data Collector to automatically run Space Recovery: Enables automatic (scheduled) Space Recovery on all servers and volumes. If not selected, Space Recovery schedules are disabled for all servers and volumes.

Run Space Recovery at: Specify the time at which to run Space Recovery.

See Also

[Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#)

[Scheduling Space Recovery for All Volumes on a Server on page 176](#)

[Allowing a Volume to Schedule Space Recovery on page 177](#)

[Scheduling Space Recovery for an Individual Volume on page 178](#)

Server Agent Server Properties Dialog

To view server properties:

- 1 In the Viewers pane, click the **Servers** icon.
- 2 Right-click on a server, and select **Edit Settings**. The Server Agent Server Properties window appears.

General

The General properties displays information for the selected server:

- Host/IP, Port, and IP Address for the server.
- Name of the server.
- Operating system and service pack for the server.
- Domain for the server.
- Number of cluster nodes on server.
- **Automatically Manage on Storage Center:** When selected, the server is automatically created and managed on the Storage Center.

Space Recovery

Note The Space Recovery tab displays only on Windows Servers on which a Server Agent for Microsoft Servers is installed and running.

The Space Recovery properties provides the following options:

Note Automatic Space Recovery options for a server are available only when allowed by the Server Agent Properties Space Recovery settings. See [Server Agent Properties Dialog on page 189](#).

- **Allow volumes on this server to schedule Space Recovery:** Allows individual volumes on this server to schedule Space Recovery.
- **Set default Space Recovery schedule for volumes on this server:** Sets a default Space Recovery schedule for all volumes on this server.
- **Run:** Select the default schedule run time: Every Day, Once a Week, or Once a Month. For Once a Week, select the day of the week to run Space Recovery; for Once a Month, select the day of the month to run Space Recovery.

Note Scheduled Space Recovery runs at the time specified on the Server Agent Properties dialog. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).

- **Apply server settings to all volumes on this server:** Applies the new settings to all volumes on the server.

Storage Center Servers

The Storage Center Servers tab allows you to manually map a server agent server to a server on one or more Storage Centers.

- **Add:** Allows you to select a server on a Storage Center to map to the server agent.
- **Remove:** Allows you to remove a mapping to a Storage Center server.

See Also

[Manually Mapping a Server Agent to a Storage Center Server on page 169](#)

Parent Folder

The Parent Folder tab allows you to select a parent folder for the server.

See Also

[Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#)

[Scheduling Space Recovery for All Volumes on a Server on page 176](#)

[Allowing a Volume to Schedule Space Recovery on page 177](#)

[Scheduling Space Recovery for an Individual Volume on page 178](#)

[Creating Folders for Servers on page 170](#)

[Moving a Server to Another Folder on page 171](#)

Server Agent Volume Properties Dialog

To view volume properties reported by the server:

- 1 In the Viewers pane, click on the **Servers** icon.
- 2 Right-click on a volume, and select **Edit Settings**. The Server Agent Volume Properties dialog appears.

General

The Server Agent Volume Properties General tab displays:

- Volume name
- Volume label
- Volume serial number

Space Recovery

Note The Space Recovery tab displays only for volumes on Windows Servers on which a Server Agent for Microsoft Servers is installed and running.

The Space Recovery tab provides options for setting up Automatic Space Recovery.

Note Automatic Space Recovery options for a volume are available only when allowed by the Server Agent Server Properties Space Recovery settings. See [Server Agent Server Properties Dialog on page 190](#).

- **Use Servers Space Recovery schedule:** Uses the server schedule for Space Recovery if a server schedule is set.
- **Schedule Space Recovery on this volume:** Allows you to define a volume schedule for Space Recovery.
- **Run:** Specifies the volume Space Recovery schedule. Options include Every Day, Every Week, or Once a Month.

Note Scheduled Space Recovery runs at the time specified on the Server Agent Properties dialog. See [Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#).

See Also

[Enabling Space Recovery and Setting a Global Space Recovery Schedule on page 175](#)

[Scheduling Space Recovery for All Volumes on a Server on page 176](#)

[Allowing a Volume to Schedule Space Recovery on page 177](#)

[Scheduling Space Recovery for an Individual Volume on page 178](#)



14 Disaster Recovery

Preparing for Disaster Recovery [196](#)

Activating Disaster Recovery [198](#)

Restarting or Recovering to the Source Site [199](#)

Restoring to an Alternate Site [202](#)

Preparing for Disaster Recovery

Automatically Save Restore Points

To automatically save restore points:

- 1 From the Options menu, choose **Replication Recovery > Save Restore Points**. The Save Restore Points wizard appears.
- 2 Select the Storage Centers for which you want to save restore points, and click **Next**. Enterprise Manager saves restore points for the selected Storage Centers. When the restore points have been saved, the Save Restore Points wizard displays a summary screen.
- 3 Select the following:
 - Automatically Save and Validate Restore Points:** Enable this option to automatically save and validate restore points.
 - Check Every:** Select the interval at which you want to save restore points: **Once a Day**, **12 hours**, **4 hours**, or **Hour**.
 - At Time:** For **Once a Day**, set the time of day to save restore points.
- 4 Click **Finish**.

Predefine a Disaster Recovery Site

Predefining a disaster recovery site consists of assigning destination servers and Replay templates to destination volumes ahead of time, so that if you must activate a disaster recovery, the recovery site is ready. (If you do not intend to access data from a destination site, you do not need to predefine the disaster recovery site.)

- 1 From the Options menu, choose **Replication Recovery > Predefine Disaster Recovery Site**. The Predefine DR Site Wizard appears listing saved Replication points.
- 2 Select a source and destination system pair.
- 3 Click **Next**. A list of volume Replications appear.
- 4 For each volume:
 - a Click **Edit Settings**, and select settings for the destination site.
 - b Click **OK**.
- 5 When you have finished selecting settings for each volume, click **Finish**.

Test Disaster Recovery

Dell Compellent recommends that you periodically test a Disaster Recovery site.

To test a Disaster Recovery site:

- 1 From the Options menu, select the **Replication Recovery > Test Activate Disaster Recovery Site**. The Activate wizard appears, displaying source and destination systems of saved Replications.
- 2 Select a source and destination pair.
- 3 Click **Next**.
- 4 Select **Test Activation** and click **Next**.
- 5 From the list of volumes that can be tested, select volumes to test.
- 6 Click **Next**. The system displays the volumes you selected. Volumes that were predefined are ready to be restored. If a volume is not predefined, define a volume by following these steps:

For each volume:
 - a Click **Edit Settings**, and select options for the destination volume.
 - b Click **OK**.
- 7 Click **Next**. Enterprise Manager creates a View Volume from the last Replay on the Destination system. The system displays the restoration progress. When the test is complete, click **Finish**. You can see the View Volume by right-clicking on the Destination system in the Storage Centers frame. From the shortcut menu, select **View > Storage Management**. Expand the Volumes folder. The tested volume appears as DR View of Replication of [volume name].

Activating Disaster Recovery

Note For instructions on testing DR activation, see [Test Disaster Recovery on page 197](#).

If a Source volume fails, activate **Destination Site Replication Volume**. To activate Disaster Recovery:

- 1 From the Options menu, select **Replication Recovery > Activate Disaster Recovery Site**. The Activate wizard appears, displaying source and destination systems of saved Replications.
- 2 Select the source and destination of volumes that are no longer active and click **Next**.
- 3 Select **Activate the Destination System**, and click **Next**. The Activate DR Replication volumes window appears. In the top table, the system displays volumes that are still Replicating and do not need to be restored. In the second table, the system displays volumes that can be restored.
- 4 From the list of volumes that can be restored, select volumes to restore.
- 5 Click **Next**. The system displays the volumes you selected. Volumes that were predefined are ready to be restored. If a volume is not predefined, define a volume by following these steps:

For each volume:
 - a Click **Edit Settings**, and select options for the destination volume.
 - b Click **OK**.
- 6 Click **Next**. The system displays the restoration progress. When Restoration is complete, click Finish. You can see the restored volume by right-clicking on the destination system in the Storage Centers frame. From the shortcut menu, select **View > Storage Management**. Expand the Volumes folder. The volume appears as a Replicated volume.

Restarting or Recovering to the Source Site

For a Replication to be restarted or a Replicated volume to be restored, the Restore point must be saved. Refer to [Saving and Validating Replication Restore Points on page 110](#).

Restarting a Replication

If a Source volume is in a good state 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 (see [Validating Replication Restore Points on page 115](#)).

To restart a Replication:

- 1 From the Options menu, select **Replication Recovery > Recover/Restart Replication Volumes Back to Original System**. The Restore/Restart wizard appears with a list of Source and Destination systems and Saved Replication Points.
- 2 Select Source and Destination System pair and click **Next**. A warning message appears. Make sure you understand the rules for restarting a Replication.
- 3 Click **Next**.
- 4 At the top, the system displays volumes that are still Replicating and do not need to be restarted. At the bottom, the system displays volumes that can be restored. From the bottom list, select a Replication volume to be restarted.
- 5 Click **Next**. The Select Attributes window appears. To limit the number Replications to restart at once, enter a **Maximum Number of Restores**. To restart all Replications at once, enter 0. The system restarts Replications starting at the top of the list. Use the up and down arrows to move a volume up or down.
- 6 Click **Next**. Because the Restore Points were saved, the system re-creates the original Replication and displays the progress of the Restorations.
- 7 When the Replications are successfully restarted, click **Next**. The system advises you to save the Replication Recover State.
- 8 Click **Save Replication Recover**. The Save Replication Recover wizard appears.
- 9 Click **Next**. The system saves the restore points for the selected system.
- 10 Select **Do a Daily Save and Validate Replications**. Click **Finish**. The Replication is restarted and the restore points are saved. To view the restarted Replication, in the Viewers frame, click **Replications**.

Restoring a Failed Volume

Before a volume can be restored, at least one Replay must have been Replicated to the Destination system.

Non-active Disaster Recovery system: If a Source volume no longer exists, Enterprise Manager restores the data from the Destination volume by Replicating it back to a newly created Source volume. Once the Replication is complete, EM 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: Enterprise Manager 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, Enterprise Manager maps the Source volume to the selected server and restarts the Replication from the Source volume to the Destination volume.

To restore a failed volume:

- 1 From the Options menu, select **Replication Recovery > Recover/Restart Replication Volumes Back to Original System**. The Restore/Restart wizard appears with a list of Source and Destination systems and Saved Replication Points.
- 2 Select Source and Destination System pair and click **Next**. A warning message appears. Make sure you understand the rules for restoring a Volume.
- 3 Click **Next**.
- 4 At the top, the system displays volumes that are still Replicating and do not need to be restarted. At the bottom, the system displays volumes that can be restored. From the bottom list, select a Replication volume to be restarted.
- 5 Click **Next**. The system displays volumes that need to be restored.
 - a Select a volume, and click **Edit Settings**.
 - b Edit settings for the volume, and click **OK**.

If **Automatically Restart Replication** is selected, Enterprise Manager automatically restarts the Replication from the source system back to the Destination system.

If **Restore from Last Replay** is selected, the volume is restored from the last active Replay on the Destination system not from the active data on the Destination volume. This assures that the volume is restored to its original source state.
- 6 Click **Next**. The Select Attributes window appears. To limit the number volumes to restore at once, enter a **Maximum Number of Restores**. To restore all volumes at once, enter 0. The system restores volumes starting at the top of the list of volumes. Use the up and down arrows to move a volume up or down.
- 7 Click **Start**. The system displays the progress of the volume restoration.
- 8 When the system notifies you that the volumes have been restored, click **Next**. The system recommends that you save the Replication recover state.
- 9 Click **Save Replication Recover State**.
- 10 Select the original source system to save the Replication Recovery point. The system informs you that the Restore Points are saved.
- 11 Click **Next**. The system saves the restore points for the selected system.

12 Select **Do a Daily Save and Validate Replications**. Click **Finish**. The volume is restored. You can view the restored volume by right-clicking on the Source system in the Storage Centers pane.

13 From the shortcut menu, select **View > Storage Management**. Expand the Volumes folder. The Restore volume appears in the folder you selected.

If a restore needs to be done from a DR-activated site, the Delete Source Volume window appears. If you did not select to automatically delete Source volumes, you can optionally delete the original source.

Restoring to an Alternate Site

Do not use the Restore Replications command to move volumes to another system. Refer to [Moving Volumes on page 112](#).

To restore a volume to an alternate site, consult with Dell Support Services (see <http://support.dell.com/compellent>).

15 Remote Data Collector

Introduction [204](#)

Logging on to the Remote Data Collector [205](#)

Setting Up Events for the Remote Data Collector [206](#)

Using DR Options from the Remote Data Collector Viewer [207](#)

Using DR Options from the Remote Data Collector [208](#)

Removing a Remote Data Collector [209](#)

Introduction

A remote Data Collector provides access to Enterprise Manager DR options when the primary Data Collector is unavailable. If installed and connected to the primary Data Collector:

- A client connected to the primary Data Collector displays the remote Data Collector status using the Remote Data Collector Viewer.
- A client connected to the remote Data Collector displays only the remote Data Collector. This chapter describes how to connect and use the remote Data Collector.

Note For information on installing, connecting, and disconnecting a Remote Data Collector, refer to the *Enterprise Manager Installation and Setup Guide*.

Logging on to the Remote Data Collector

If the primary Data Collector is unavailable, you can perform Enterprise Manager DR tasks via the remote Data Collector. To log on to the remote Data Collector:

- 1 Start the Enterprise Manager client.
- 2 On the logon screen, specify the following:
 - **User/Password:** Enter an existing Enterprise Manager username/password. If enhanced security is enabled, the username must be a member of the administrator group.
 - **Create New Connection:** If you need to establish a new connect for the remote Data Collector, enable this option to create a new connection.
 - **Name or Host IP:** Enter the host name or IP address of the server running the remote Data Collector.
 - **Port:** Enter the port the Data Collector is using in the Port Field. The port is set when the Data Collector is installed. The default port is 7342.
- 3 Click **Login**.

Setting Up Events for the Remote Data Collector

To set up events on the remote Data Collector:

- 1 Start the Enterprise Manager client and log on to the remote Data Collector.
- 2 From the **Management** menu, select **User Properties**.
- 3 On the **Email** tab, enter an email address to which you want Enterprise Manager to send event alerts.
- 4 On the **Manage Events** tab, enable the events for which you want to receive emails:
 - Storage Center Down:** Sends an email whenever a Storage Center is no longer able to communicate with the primary Data Collector.
 - Remote Data Collector Down:** Sends an email whenever the primary Data Collector is no longer communicating to the remote Data Collector.
- 5 Click **OK**.

Using DR Options from the Remote Data Collector Viewer

To use DR options from the Remote Data Collector Viewer:

- 1 Start the Enterprise Manager client and log on to the primary Data Collector.
- 2 In the Viewers frame, click **Remote Data Collector Viewer**.
- 3 Verify that the Remote Data Collector state is **Connected**.
- 4 Select the DR task to perform:

Note DR options available via the Remote Data Collector function the same as the DR options available via the Options menu.

Test Activate DR Site: See [Test Disaster Recovery on page 197](#).

Activate DR Site: See [Activating Disaster Recovery on page 198](#).

Validate Restore Points: See [Automatically Save Restore Points on page 196](#).

Using DR Options from the Remote Data Collector

If the primary Data Collector is unavailable:

- 1 Start the Enterprise Manager client and log on to the Remote Data Collector.
- 2 Select the DR task to perform:

Note DR options available via the Remote Data Collector function the same as the DR options available via the Options menu.

Test Activate DR Site: See [Test Disaster Recovery on page 197](#).

Activate DR Site: See [Activating Disaster Recovery on page 198](#).

Validate Restore Points: See [Automatically Save Restore Points on page 196](#).

Removing a Remote Data Collector

To remove a remote Data Collector:

- 1 On the remote Data Collector server:
 - a Open the Remote Data Collector Manager.
 - b Click **Stop** to stop the service.
- 2 Start the Enterprise Manager client and log on to the primary Data Collector.
- 3 In the Viewers frame, click **Remote Data Collector**.
- 4 When the Remote Data Collector Viewer shows **Not Connected**, click **Remove Remote Data Collector**.



16 Storage Replication Adapter

Introduction [212](#)

Enterprise Manager SRA Requirements [213](#)

Enterprise Manager SRA Configuration [215](#)

SRM Failback Procedure [216](#)

Introduction

The VMware Site Recovery Manager (SRM) supports storage vendors via Storage Replication Adapters (SRA), also called SRA plugins. The Enterprise Manager SRA allows sites to use VMware Site Recovery Manager (SRM) on Dell Compellent Storage Centers.

This appendix provides an overview of using SRM on Storage Centers via Enterprise Manager and the Enterprise Manager SRA. In addition, this appendix provides a procedure for failback to the original protected site after a failover to the recovery site has occurred.

For complete information on installing and configuring VMware Site Recovery Manager (SRM) refer to the *Administrator Guide for Site Recovery Manager* available from VMware.

Enterprise Manager SRA Requirements

Note When you install the Enterprise Manager Storage Replication Adapter (SRA) for VMware Site Recovery Manager (SRM), check the **readme** file for the most up-to-date information regarding installing and setting up SRM with the Enterprise Manager SRA.

Software Requirements

- Storage Center version 4.0 (or above)
- Enterprise Manager version 3.3 (or above)
An Enterprise Manager Data Collector can be installed on only the recovery site or on both the protected and the recovery site.
- VMware Site Recovery Manager 1.x/4.x (or above)
- Microsoft .Net Framework version 2.0
- Port 8080. The Enterprise Manager SRA uses SOAP protocol over http to connect to the Enterprise Manager. The port gets set up when configuring Enterprise Manager and the default is port 8080. Because SOAP is used, you must configure the firewall (if any) between SRM and the Enterprise Manager to keep the corresponding port open.

VMware SRM Configuration Requirements

Note For complete information on installing and configuring VMware Site Recovery Manager, refer to the *Administrator Guide for Site Recovery Manager* available from VMware.

Site Recovery Manager must be configured with both a protected (primary) site and a recovery (secondary) site. Both the protected and recovery sites must include:

- VMware License Server (ESX 3.5 only)
- VMware vCenter Server
- VMware Site Recovery Manager
- VMware ESX Servers
- Dell Compellent Storage Centers

Enterprise Manager and Replication Prerequisites

The following table lists prerequisites for using the Enterprise Manager SRA with VMware Site Recovery Manager (SRM).

Requirement	Description
Data Collector	<p>An Enterprise Manager Data Collector must be visible to all Storage Centers within the SRM configuration. There are two possible configuration options:</p> <ul style="list-style-type: none">• Install and configure the Enterprise Manager Data Collector on the recovery SRM site only. <p>or</p> <ul style="list-style-type: none">• Install and configure Enterprise Manager Data Collectors on both the recovery and protected SRM sites.
Replications	<p>Using Enterprise Manager, create replications between the protected and recovery sites.</p>
Restore Points	<p>Using Enterprise Manager, save restore points for the replications. If you are using Data Collectors on both the recovery and protected sites, you must save restore points on both sites.</p>

Note For information on setting up replications and saving restore points, see [Creating Replications on page 109](#) and [Saving and Validating Replication Restore Points on page 110](#).

Enterprise Manager SRA Configuration

The Enterprise Manager SRA must be set up to connect to the Data Collector on which replication restore points are saved.

To configure the Enterprise Manager SRA:

- 1 Enter the following information on the **SRM Add Array Manager** dialog:

Field	Description
Display Name	Enter a name for the SRA to display in the Site Recovery Manager (SRM) Viewer.
Manager Type	Select Enterprise Manager SRA .
IPAddress:WebServices Port	Enter the IP Address of the Enterprise Manager Data Collector and the Web Services port separated by a colon (:). The default Web Services port is 8080. If you use the default port, you can omit the port. For example, the following are all valid entries: 172.31.2.125:8080 172.31.2.125 172.31.2.125:8081
Username	Enter the username of the Enterprise Manager.
Password	Enter the password for the Enterprise Manager username.

- 2 After entering the array information, click **Connect** to test the connection.

SRM Failback Procedure

Note A failback to the protected SRM server can be performed only after a successful failover to the recovery SRM server.

Failback Task	Details
Prepare the protected SRM server for failback	<p>On the protected site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Remove the virtual machines from the inventory. 3. Open the SRM tab. 4. Remove all the protection groups.
Prepare the recovery SRM server for failback	<p>On the recovery site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Power down all running virtual machines to which you want to fail back. 3. Open the SRM tab. 4. Remove all configured recovery plans.
Prepare the Storage Center for failback	<ol style="list-style-type: none"> 1. Log into the Storage Center on the protected site, and delete the original replications. 2. Log into Enterprise Manager, and delete the original restore points. <p>Note If you have an Enterprise Manager Data Collector running on both the protected and recovery sites, delete restore points on both the protected and the recovery sites.</p>
Set up replications from the recovery site to the protected site	<p>Using Enterprise Manager:</p> <p>Note Before a replication can start, there must be at least one Replay on the volume to be replicated.</p> <ol style="list-style-type: none"> 1. Create a replication from an existing volume on the Storage Center in the recovery site to the Storage Center in the protected site. By default, the replicated volumes are named <i>DR View of [Name of original replicated volume]</i>. 2. Save restore points for the new replications. <p>Note If you have an Enterprise Manager Data Collector running on both the protected and recovery sites, save restore points on both the protected and recovery sites.</p>
Wait for replications to complete	<p>Before continuing to the next step, wait until Enterprise Manager reports that the replications are complete. If necessary, continue to refresh the view to see the status of the replications.</p>

Failback Task	Details
Set up SRM for failback	<p>On the recovery site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Open the SRM tab. 3. Create protection groups for the new replications. By default, the replicated volumes are named <i>DR View of [Name of original replicated volume]</i>. <hr/> <p>Note You may need to rescan the arrays. To do so, open the Array Manager configuration screen, click through the first two screens, and then click the Rescan Arrays button.</p> <hr/> <p>On the protected site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Open the SRM tab. 3. Create recovery plans for the new protection groups.
Test the recovery plans	<p>On the protected site:</p> <ol style="list-style-type: none"> 1. In the VI client, open the SRM tab. 2. Test the recovery plan you created.
Fail back to the protected SRM server (run the recovery plan)	<p>On the protected site:</p> <ul style="list-style-type: none"> • In the VI client, run the recovery plan. <hr/> <p>Note Running the recovery plan automatically shuts down all running virtual machines on the recovery site.</p> <hr/>
Clean up the SRM servers	<p>On the recovery site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Remove from the inventory all the virtual machines that you failed over. 3. Open the SRM tab. 4. Remove the protection groups. <p>On the protected site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Open the SRM tab. 3. Remove the recovery plan(s) you created.

Failback Task	Details
Clean up Storage Center and Enterprise Manager	<ol style="list-style-type: none"> 1. Log into the Storage Center on the recovery site. 2. Remove the replications (replications should be down). 3. Log into Enterprise Manager. 4. Delete the restore points for the replications. <hr/> <p>Note If you have an Enterprise Manager Data Collector running on both the protected and recovery sites, delete restore points on both sites.</p> <hr/> <ol style="list-style-type: none"> 5. On the recovery Storage Center, unmap the volume to recovery ESX server.
Restart replications	<p>Using Enterprise Manager:</p> <ol style="list-style-type: none"> 1. Create a replication from an existing volume on the protected Storage Center to the recovery Storage Center. 2. Save restore points for the replications. <hr/> <p>Note If you have an Enterprise Manager Data Collector running on both the protected and recovery sites, save restore points on both sites.</p> <hr/>
Prepare SRM	<p>On the protected site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Open the SRM tab. 3. Create protection groups for the replicated virtual machines. <p>On the recovery site:</p> <ol style="list-style-type: none"> 1. Log into the VI client. 2. Open the SRM tab. 3. Create a recovery plan(s) for the protection groups.

Glossary

A

activate disaster recovery

Process of mapping a remote file to a server so that you can use it to run IO through.

active space

Amount of space that is used by a volume if the volume has no Replays attached to it. This number does not include RAID overhead.

actual space

Amount of active space plus Replay space.

assigned Disks

Disks that have been assigned to a folder and are part of the Storage Center page pool.

async/asynchronous Replication

A Write is written to the local system, then queued for delivery to the remote system. If the local system fails before the write is delivered, it is possible that Writes will not get delivered to the remote system. Note that Storage Center Data Instant Replay, which takes frequent point-in-time copies, mitigates loss of data.

available space

Amount of total storage available on all drives.

B

backup

Migration of data from a primary storage source to a secondary storage source to enable restoration of primary data in the event of a failure.

bandwidth

Amount of data that can be sent to or from Storage Center per internal time.

base price

Agreed upon price for basic storage

BE (back end)

Connection between controller and disks

C**cache**

A high speed memory or storage device used to reduce the effective time required to read data from or write data to a lower speed memory or device. Dell Compellent provides 2.5 GB of cache to minimize disk latencies. Storage Center cache has a 72 hour battery backup in the event of power loss.

CHAP (Challenge Handshake Authentication Protocol)

An option for authentication of iSCSI communications, particularly between two Storage Centers when Replicating over iSCSI.

client

Dell Compellent Enterprise Manager component that manages and displays Storage Centers.

Copilot Services

Combination of centralized support, product education and sales resources that proactively monitor the system and recommend corrective actions to improve performance and availability of the system.

copy volume

Copies data (and volume updates while the copy is in progress) to the remote volume. When the copy is complete, the Replication is complete.

D**Data Collector**

Dell Compellent Enterprise Manager component that runs in the background on a server, collecting information on all Storage Center systems connected to the server.

Data Instant Replay

Captures a point in time copy (PITC) of a volume, based on defined intervals, providing the ability to roll back a volume to a previous point in time.

Data Progression

Automatically migrates data to higher or to lower performance devices, based on data access requirements.

deduplication

Copies only the changed portions of the Replay history on the source volume, rather than all data captured in each Replay.

destination system

Storage Center system that volumes are being replicated to - same as Target System.

disk folder

A collection of physical disks that can be assigned attributes by the user. Performance is improved by maximizing the number of disk drives in a folder. Volumes draw storage from disk folders. Folders may be associated with multiple page pools.

E**enclosure**

A physical enclosure that provides a single interface, power and cooling to multiple disks. Also known as Just a Bunch of Disks (JBOD).

F**FC (Fibre Channel)**

High-speed, fully duplexed serial communication protocol permitting data transfer rates of up to 2 Gigabit per second with a roadmap extending up to 10 Gigabit.

FE (front end)

Connection between controller and server.

free space

Total available space minus used space.

H**HBA (Host Bus Adapter)**

An I/O adapter that provides connectivity from a server to the Storage Center.

I**IO (input/output)**

Moving data into a system memory, and moving data from system memory to another location.

IO pending

Amount of IO operations that are currently in the queue to be run for an object.

IO usage

Speed at which data is being transferred.

iSCSI

Specification that defines the encapsulation of SCSI packets over Ethernet using the TCP/IP transport protocol.

J

JDBC

An Application Programming Interface (API) for the Java programming language that defines the way in which a client accesses a database.

L

latency

Delay in data transmission measured in milliseconds.

M

management controller

In a clustered-controller environment, the port that is communicating with the server.

migrate volume

Copies data to a new volume, and then erases the original volume. Migrate has the same effect as moving a volume.

mirror volume

Copies volume data to the remote site and maintains updates between the local volume and the remote volume until the mirror is manually broken.

N

NAT (Network Address Translation)

Also known as network masquerading or IP masquerading. NAT involves rewriting the source or destination addresses of IP packets as they pass through a router or firewall. Most systems use NAT to enable multiple hosts on a private network to access the Internet using a single public IP address.

O

object

In Chargeback, defines what logical components of a system are monitored, such as a system, volume folder, or volume.

oversubscribed space

Configured space minus available space.

P**page pool**

Group of data pages taken from a disk folder. Page pools provide storage for dynamic volumes, manage storage allocations, and can have a variety of disk types and RAID selections.

price multiplier

In Chargeback: A number applied to the storage costs of this Department. to add a premium or discount to a Department.

Q**QoS (Quality of Service)**

Rules for Replications, including link speed, number of links, and Replication schedule

R**RAID 0**

Data is striped across the available disks providing improved performance. RAID 0 does not provide any data redundancy.

RAID 10

Data is striped across available disk drives and mirrored, providing data availability and improved performance. Maintains a minimum of one full copy of all data on the volume. RAID 10 provides optimum Read / Write performance, increased probability of withstanding multiple failures, and the quickest restoration of data.

RAID 5

Maintains a logical copy of the data using a mathematically derived rotating parity stripe. The parity stripe is derived from the data stripes. This method has less overhead for the redundant information than RAID 10 however write performance is slower than RAID 10 due to the calculation of the parity stripe for every write. Read performance is similar to RAID 10.

redundancy

Fault tolerance such that if some disks fail, all or part of the data stored by the array is not lost. The cost of providing this feature is most typically increased disk space; RAID 10 requires a duplication of the entire data set. RAID 5-5 and 5-9 contain an error-correcting algorithm stored on the array.

Remote Instant Replay

Point-in-time copy of a volume over a distance to a remote site. The sites can be active-active, with bidirectional remote copies that can either have matched or split intervals.

Replay

Fully usable copy of data that contains an image of the data as it appeared at the point in time at which the copy was initiated.

Replay space

Amount of space that is not actively being used by a volume and is contained in its Replays. This number does not include RAID overhead.

Replay profile

Collection of Replay rules that can be used for creating a Replay.

replicating system

Storage Center system being Replicated.

replication

Data backup to a remote location, online and in real time, via the internet or a corporate-leased line connection

restore points

Information stored by the Data Collector about the current state of Replications between Storage Centers, including what volumes are being replicated, to where, what QoS node Replications are using, and Source volume properties

S

SCSI (Small Computer Systems Interface)

Collection of ANSI standards which define I/O buses primarily intended for connecting storage devices to servers.

server

Name representing the actual WWNs installed on the server.

Space Recovery

Utility that recovers space that Windows reports as being used but is actually empty, available space that can be used by Storage Center.

spare disks

Disk reserved to replace a disk of same or smaller size in the event a disk in RAID 5 logical unit fails. The controller rewrites the data from the failed disk to the replacement disk on the fly.

starting base price

In Chargeback: The actual amount of storage that the base price covers before the Department is charged for storage.

Storage Center

Dell Compellent SAN system, consisting of a controller and a disk enclosure.

storage usage

Amount of space consumed by volumes on the disk (including Replays and RAID overhead).

synch (Synchronous Replication)

Each Write written to the local site is written to the remote site before the application receives an I/O complete message. The local volume and remote volume are fully synchronized at all times. This redundancy ensures a near-zero loss of data and very quick recovery times from failures at the local site.

T

target system

Storage Center system that volumes are being replicated to threshold alert definition: defines what action triggers an alert - can be IO/sec, latency, percentage of total storage space used, speed of storage growth, and so forth.

threshold alert object

Defines what logical objects are monitored, such as a system, volume folder, or volume.

total available space

Same as Available Space.

total storage

Actual Space plus the amount of space taken up by RAID overhead.

total storage space

Amount of space the volume takes of actual disk space, including RAID overhead.

U

unassigned disks

Drives not assigned to a folder. Unassigned disks are not unavailable to the system

used space

Storage written to by servers or consumed in Replays.

used space growth rate

Average amount of additional storage consumed per day (in GB). If number is negative, storage is being reclaimed for reuse.

V

volume

A virtual disk drive. A volume is created through and managed by Storage Center software.

W

WWN

World Wide Name.

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