

HP StoreEasy 1000 Storage Administrator Guide

This document describes how to install, configure, and maintain all models of HP StoreEasy 1000 Storage and is intended for system administrators. For the latest version of this guide, go to <http://www.hp.com/support/StoreEasy1000Manuals>.

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Contents

1 HP StoreEasy 1000 Storage.....	6
Features.....	6
Hardware components.....	6
HP StoreEasy 14x0 Storage hardware components.....	6
HP StoreEasy 15x0 Storage hardware components.....	9
HP StoreEasy 16x0 Storage hardware components.....	11
HP StoreEasy 18x0 Storage hardware components.....	14
Drive LED definitions.....	16
Systems Insight Display LED combinations.....	17
Software components.....	18
2 Installing and configuring the storage system.....	20
Setup overview.....	20
Verify the kit contents.....	20
Locate the serial number, Certificate of Authenticity, and End User License Agreement.....	20
Install the storage system hardware.....	20
Cabling the storage system	21
I/O modules	21
Cabling guidelines.....	23
Single domain cabling diagrams with D6000 Disk Enclosures	23
Single domain cabling diagrams with D2000 Disk Enclosures	26
Dual domain cabling diagrams with D6000 Disk Enclosures	31
Dual domain cabling diagrams with D2000 Disk Enclosures	31
Connect to the storage system.....	36
Power on the server and log on.....	36
Configure the storage system.....	37
Configure networking.....	37
Provisioning storage.....	37
Complete system configuration.....	46
Using Server Core.....	47
Configuring failover properties for multi-site environments.....	48
Additional access methods.....	48
Using the Remote Desktop method.....	48
Using the Telnet method.....	48
3 Administration tools.....	49
Microsoft Windows Storage Server 2012 and 2012 R2 administration tools.....	49
Remote Administration.....	49
File and Storage Services.....	49
Data Deduplication.....	50
Print Management.....	51
Network File System (NFS) User Mapping.....	51
4 Storage management overview.....	52
Storage management elements.....	52
Storage management example.....	52
Physical storage elements.....	53
Arrays.....	54
Fault tolerance.....	54
Online spares.....	55
Logical storage elements.....	55
Logical drives (LUNs).....	55
Partitions.....	56

Volumes.....	56
File system elements.....	56
File sharing elements.....	57
Volume Shadow Copy Service overview.....	57
Using storage elements.....	57
Network adapter teaming.....	57
Management tools.....	57
HP Systems Insight Manager.....	57
Management Agents.....	58
5 File server management.....	59
File services management.....	59
Storage management utilities.....	59
Array management utilities.....	59
Array Configuration Utility.....	59
Disk Management utility.....	60
Guidelines for managing disks and volumes.....	60
Scheduling defragmentation.....	60
Disk quotas.....	61
Adding storage.....	61
Expanding storage.....	62
Extending storage using Windows Storage Utilities.....	62
Extend volumes using Disk Management.....	62
Volume shadow copies.....	62
Shadow copy planning.....	63
Identifying the volume.....	63
Allocating disk space.....	64
Identifying the storage area.....	64
Determining creation frequency.....	65
Shadow copies and drive defragmentation.....	65
Mounted drives.....	65
Managing shadow copies.....	65
The shadow copy cache file.....	66
Enabling and creating shadow copies.....	67
Viewing a list of shadow copies.....	67
Set schedules.....	68
Viewing shadow copy properties.....	68
Redirecting shadow copies to an alternate volume.....	68
Disabling shadow copies.....	69
Managing shadow copies from the storage system desktop.....	69
Shadow Copies for Shared Folders.....	69
SMB shadow copies.....	70
NFS shadow copies.....	71
Recovery of files or folders.....	72
Recovering a deleted file or folder.....	72
Recovering an overwritten or corrupted file.....	72
Recovering a folder.....	72
Backup and shadow copies.....	73
Shadow Copy Transport.....	73
Folder and share management.....	73
Folder management.....	74
Share management.....	80
Share considerations.....	80
Defining Access Control Lists.....	80
Integrating local file system security into Windows domain environments.....	80

Comparing administrative (hidden) and standard shares.....	81
Managing shares.....	81
File Server Resource Manager.....	81
Quota management.....	82
File screening management.....	82
Storage reports.....	82
6 Troubleshooting, servicing, and maintenance.....	83
Accessing Event Notifier Configuration Wizard.....	83
Maintaining your storage system.....	83
Determining the current storage system software version.....	84
HP System Management Homepage.....	84
Starting the System Management Homepage application.....	85
System Management Homepage main page.....	85
Certificate of Authenticity.....	87
Known issues.....	87
Verifying services are running.....	90
Error codes.....	91
Storage Management Provider error codes.....	91
Pool Manager Provider error codes.....	97
Management Web Service error codes.....	98
HP Support websites.....	99
Autonomy LiveVault.....	99
Microsoft Systems Center Operations Manager.....	100
Removing and replacing hardware components.....	100
7 Storage system recovery.....	101
System Recovery DVD.....	101
Drive letters are not assigned after a restore.....	101
Restoring the factory image with a DVD or USB flash device.....	101
Using a USB flash drive for storage system recovery.....	102
Restoring the system with Windows Recovery Environment.....	103
8 Support and other resources.....	105
Contacting HP.....	105
HP technical support.....	105
Subscription service.....	105
Related information.....	105
HP websites.....	105
Rack stability.....	106
Customer self repair.....	106
9 Documentation feedback.....	107
A Operating system logical drives.....	108
B Regulatory information.....	110
Belarus Kazakhstan Russia marking.....	110
Turkey RoHS material content declaration.....	110
Ukraine RoHS material content declaration.....	110
Warranty information.....	110
Glossary.....	112
Index.....	114

1 HP StoreEasy 1000 Storage

The HP StoreEasy 1000 Storage system provides multi-protocol file sharing and application storage for a range of business environments. The 14x0 and 15x0 platforms are ideal for small businesses or workgroups or a remote office. The 16x0 and 18x0 can accommodate medium and large IT environments.

NOTE: The HP StoreEasy 1000 Administrator Guide provides information on all models within the StoreEasy 1000 Storage product family. The product name is listed generically where the same information is applicable to different models. For example, if the same information applies to 1430 and 1440, the model is listed as 14x0.

Features

The HP StoreEasy 1000 Storage provides the following advantages:

- Efficiently maximizing resources through file and data management without increasing costs.
- HP and Microsoft management integration, including Microsoft Server Manager and System Center and HP Systems Insight Manager and Integrated Lights Out (iLO).
- Each system ships from the factory with preintegrated hardware and preloaded software, to significantly reduce the time and complexity of installation.

For more information about HP StoreEasy 1000 Storage features, go to:

<http://www.hp.com/go/StoreEasy1000>

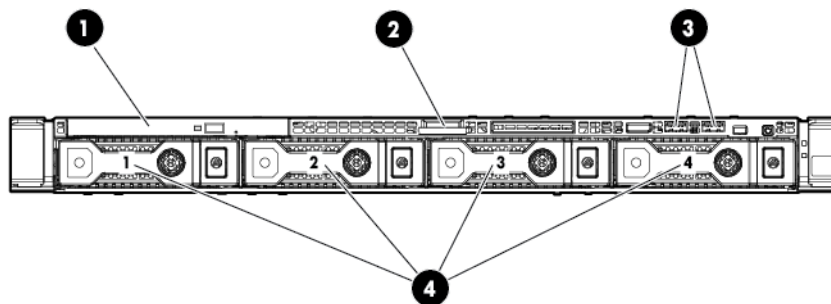
Hardware components

This section provides illustrations of the storage system hardware components.

HP StoreEasy 14x0 Storage hardware components

The following figures show components and LEDs located on the front and rear panels of the HP StoreEasy 14x0 Storage.

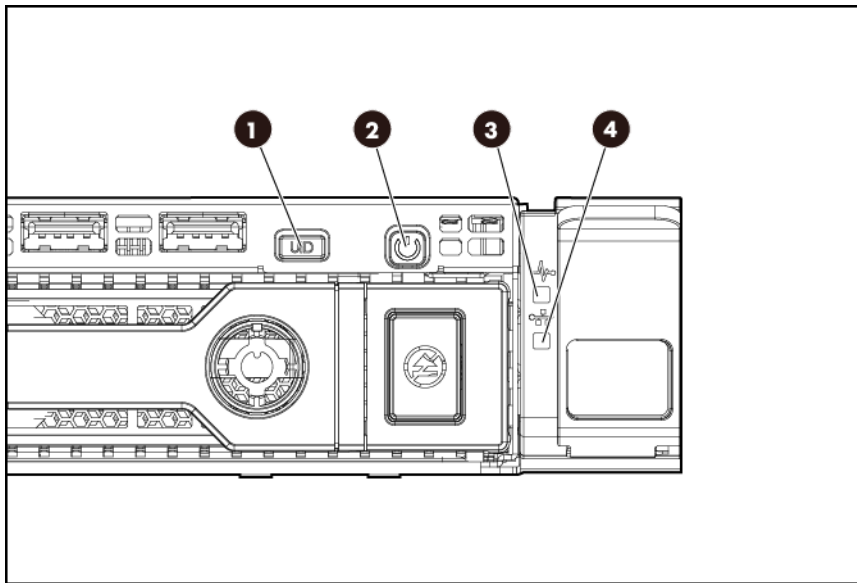
Figure 1 HP StoreEasy 14x0 Storage front panel components



- 1. Optical drive
- 3. USB connectors

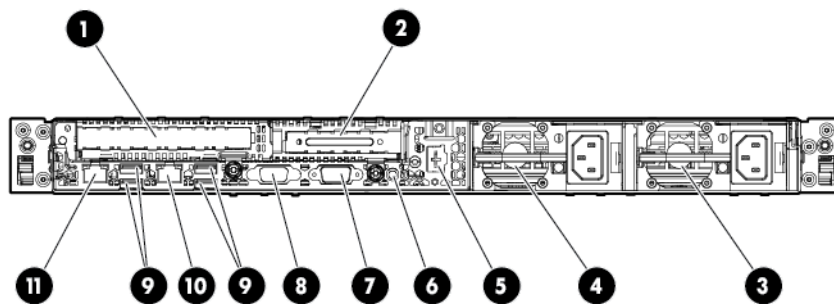
- 2. Serial label pull tab
- 4. LFF drives

Figure 2 HP StoreEasy 14x0 Storage front panel LEDs and buttons



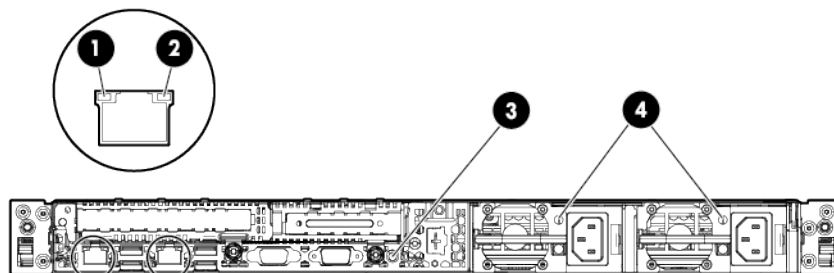
Item	Description	Status
1	UID LED/button	Blue = Identification is activated. Flashing blue = System is being managed remotely. Off = Identification is deactivated.
2	Power On/Standby button and system power LED	Green = System is on. Flashing green = Waiting for power. Amber = System is in standby, but power is still applied. Off = Power cord is not attached or power supply failed.
3	Health LED	Green = System is on and system health is normal. Flashing amber = System health is degraded. Flashing red = System health is critical. Off = System is off.
4	NIC status LED	Green = Linked to network Flashing green = Network activity Off = No network link

Figure 3 HP StoreEasy 14x0 Storage rear panel components



- | | |
|----------------------------------|---|
| 1. Slot 2 PCIe x16 (16, 8, 4, 1) | 2. Slot 1 PCIe x8 (4,1) (P222) |
| 3. Power supply 1 | 4. Power supply 2 |
| 5. Dedicated iLO management port | 6. UID LED button |
| 7. Serial connector | 8. Video connector |
| 9. USB connectors | 10. NIC 1/shared iLO management connector |
| 11. NIC connector 2 | |

Figure 4 HP StoreEasy 14x0 Storage rear panel LEDs and buttons

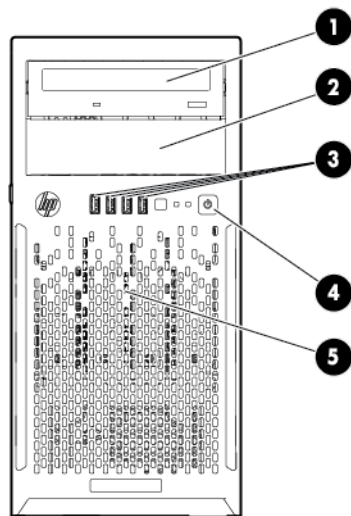


Item	Description	Status
1	NIC link LED	Green = Link exists Off = No link exists
2	NIC status LED	Green = Activity exists Flashing green = Activity exists Off = No activity exists
3	UID LED/button	Blue = Activated. Flashing blue = System is being managed remotely. Off = Deactivated.
4	Power supply LEDs	Green = Normal Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply exceeded current limit

HP StoreEasy 15x0 Storage hardware components

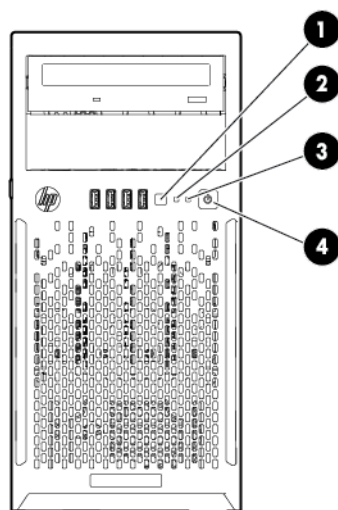
The following figures show components and LEDs located on the front and rear panels of the HP StoreEasy 15x0 Storage.

Figure 5 HP StoreEasy 15x0 Storage front panel components



- | | |
|-----------------------------|---|
| 1. Optical drive (optional) | 2. Media drive bay |
| 3. USB connectors | 4. Power On/Standby button and system power LED |
| 5. Drive bays (inside) | |

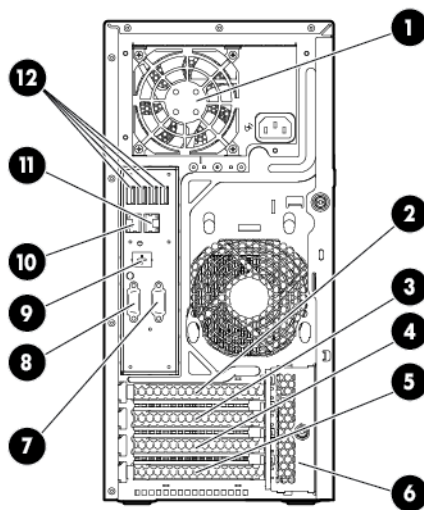
Figure 6 HP StoreEasy 15x0 Storage front panel LEDs and buttons



Item	Description	Status
1	UID LED/button	Blue = Identification is activated. Flashing blue = System is being managed remotely. Off = Identification is deactivated.
2	Health LED	Green = System is on and system health is normal.

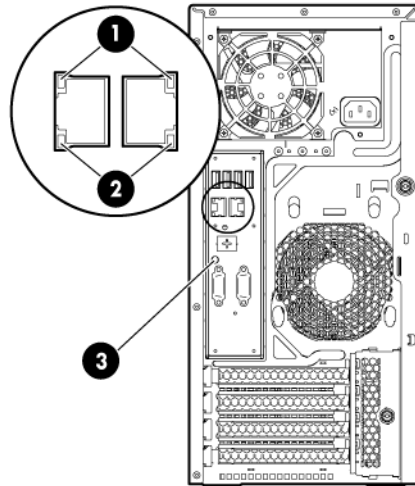
Item	Description	Status
		Flashing amber = System health is degraded. Flashing red = System health is critical. Off = System is off.
3	NIC status LED	Green = Linked to network Flashing green = Network activity Off = No network link
4	Power On/Standby button and system power LED	Green = System is on. Flashing green = Waiting for power. Amber = System is in standby, but power is still applied. Off = Power cord is not attached or power supply failed.

Figure 7 HP StoreEasy 15x0 Storage rear panel components



- | | |
|------------------------------------|---|
| 1. Non-hot-plug power supply | 2. Slot 4 PCIe x16 (8, 4, 1) |
| 3. Slot 3 PCIe x8 (8, 4, 1) (P222) | 4. Slot 2 PCIe x8 (4, 1) |
| 5. Slot 1 PCIe x4 (1) | 6. Expansion slot cover retainer |
| 7. Serial connector | 8. Video connector |
| 9. Dedicated iLO management port | 10. NIC 1/shared iLO management connector |
| 11. NIC connector 2 | 12. USB connectors |

Figure 8 HP StoreEasy 15x0 Storage rear panel LEDs and buttons

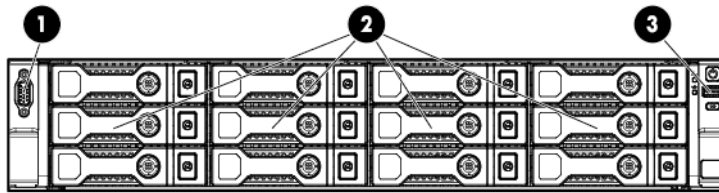


Item	Description	Status
1	NIC link LED	Green = Link exists Off = No link exists
2	NIC status LED	Green = Activity exists Flashing green = Activity exists Off = No activity exists
3	UID LED/button	Blue = Activated Flashing blue = System is being managed remotely. Off = Deactivated
4	Power supply LEDs	Green = Normal Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply error

HP StoreEasy 16x0 Storage hardware components

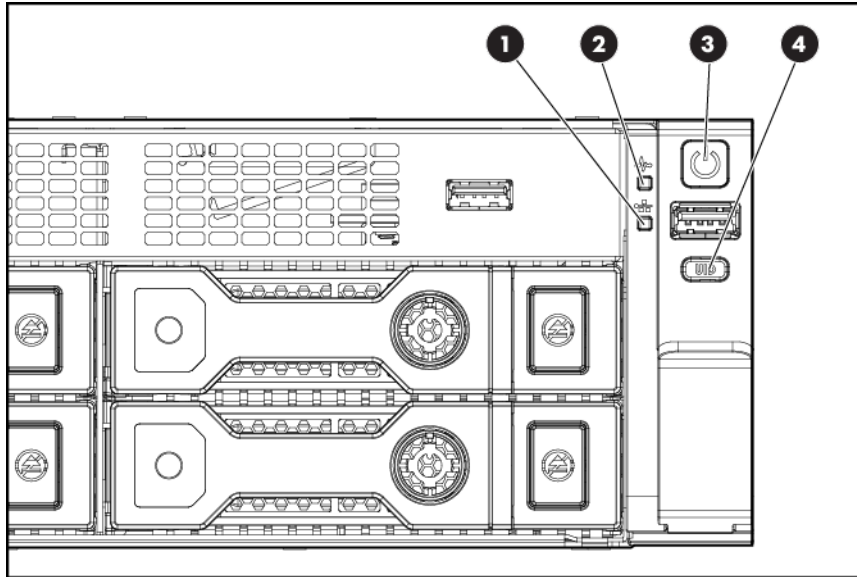
The following figures show components and LEDs located on the front and rear panels of the HP StoreEasy 16x0 Storage.

Figure 9 HP StoreEasy 16x0 Storage front panel components



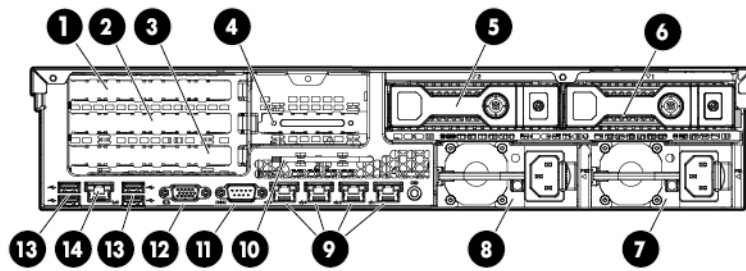
- 1. Video connector
- 2. LFF drives
- 3. USB connector

Figure 10 HP StoreEasy 16x0 Storage front panel LEDs and buttons



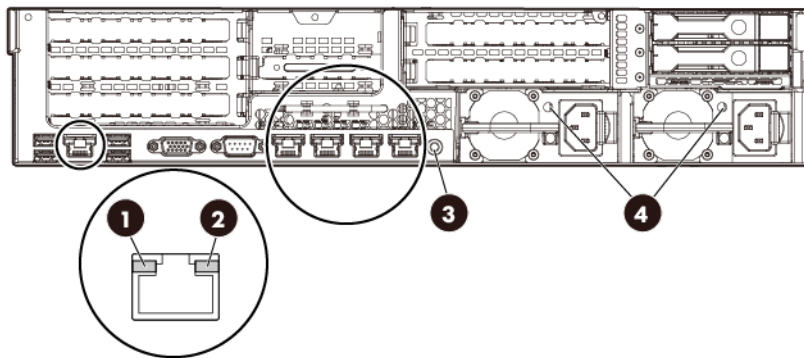
Item	Description	Status
1	NIC status LED	Green = Linked to network Flashing green = Network activity Off = No network link
2	Health LED	Green = System is on and system health is normal. Flashing amber = System health is degraded. Flashing red = System health is critical. Off = System is off.
3	Power On/Standby button and system power LED	Green = System is on. Flashing green = Waiting for power. Amber = System is in standby, but power is still applied. Off = Power cord is not attached or power supply failed.
4	UID LED/button	Blue = Identification is activated. Flashing blue = System is being managed remotely. Off = Identification is deactivated.

Figure 11 HP StoreEasy 16x0 Storage rear panel components



1. Slot 1 PCIe3 x8 (4, 1)
 2. Slot 2 PCIe3 x16 (8, 4, 1)¹
 3. Slot 3 PCIe3 x8 (8, 4, 1)²
 4. Slot 4 PCIe2 x8 (4, 1)
 5. Rear LFF drive 1
 6. Rear LFF drive 2
 7. Power supply 1
 8. Power supply 2
 9. NIC connectors (4-1)
 10. Torx tool
 11. Serial connector
 12. Video connector
 13. USB connectors
 14. iLO 4 connector
- ¹ HP StoreEasy 1630 Storage Slot 2 PCIe3 x16 (8, 4, 1) (P822)
- ² HP StoreEasy 1640 Storage Slot 3 PCIe3 x8 (P822)

Figure 12 HP StoreEasy 16x0 Storage rear panel LEDs and buttons



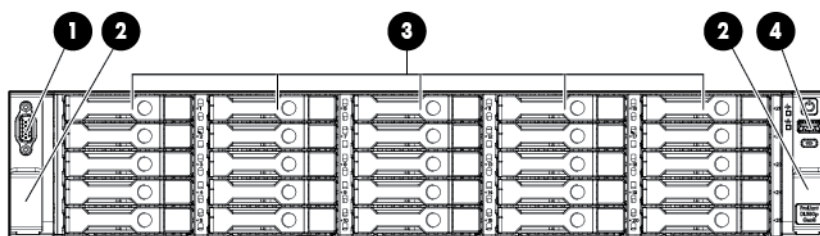
Item	Description	Status
1	NIC status LED	Green = Activity exists Flashing green = Activity exists Off = No activity exists
2	NIC link LED	Green = Link exists Off = No link exists
3	UID LED/button	Blue = Activated Flashing blue = System is being managed remotely. Off = Deactivated.
4	Power supply LEDs	Green = Normal Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • Power is unavailable • Power supply failed

Item	Description	Status
		<ul style="list-style-type: none"> Power supply is in standby mode Power supply exceeded current limit

HP StoreEasy 18x0 Storage hardware components

The following figures show components and LEDs located on the front and rear panels of the HP StoreEasy 18x0 Storage.

Figure 13 HP StoreEasy 18x0 Storage front panel components



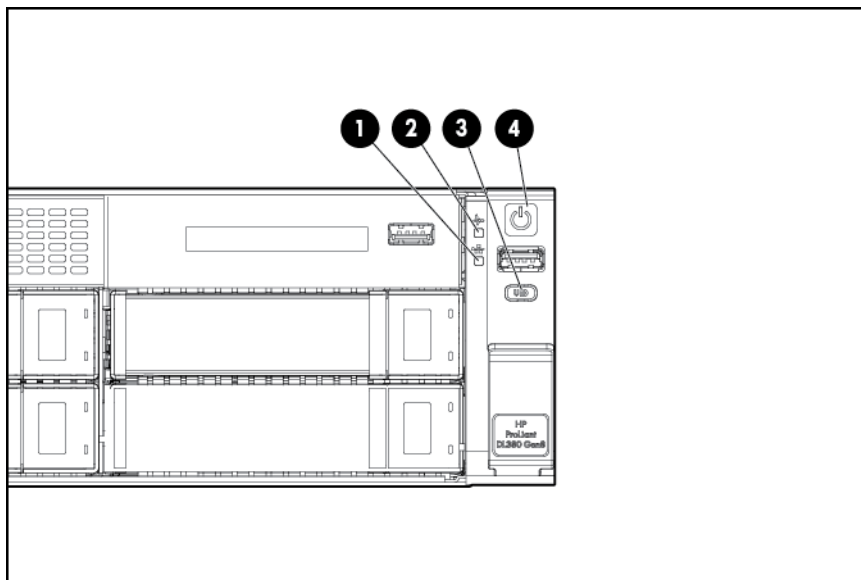
1. Video connector

2. Quick release levers (2)

3. Drive bays

4. USB connector

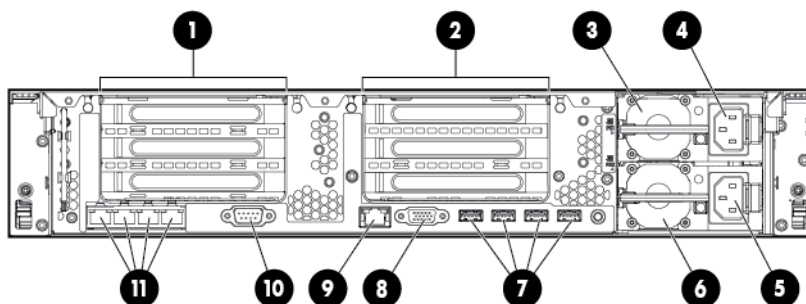
Figure 14 HP StoreEasy 18x0 Storage front panel LEDs and buttons



Item	Description	Status
1	NIC status LED	Off = No network link Solid green = Link to network Flashing green = Network activity
2	System health LED	Green = Normal Flashing amber = System degraded Flashing red = System critical

Item	Description	Status
		To identify components in degraded or critical state, see “Systems Insight Display LED combinations” (page 17)
3	UID LED and button	Solid blue = Activated Flashing blue = System being remotely managed Off = Deactivated
4	Power On/Standby button and system power LED	Off = Power cord not attached or power supply failure Solid Amber = System is in standby; Power On/Standby Button service is initialized. Flashing Green = Power On/Standby Button has been pressed; system is waiting to power on. Solid Green = System on

Figure 15 HP StoreEasy 18x0 Storage rear panel components



- | | |
|--|-----------------------------------|
| 1. PCIe slots 1–3 (top to bottom) ¹ | 2. PCIe slots 4–6 (top to bottom) |
| 3. Power supply 1 (PS1) | 4. PS1 power connector |
| 5. PS2 power connector | 6. Power supply 2 (PS2) |
| 7. USB connectors (4) | 8. Video connector |

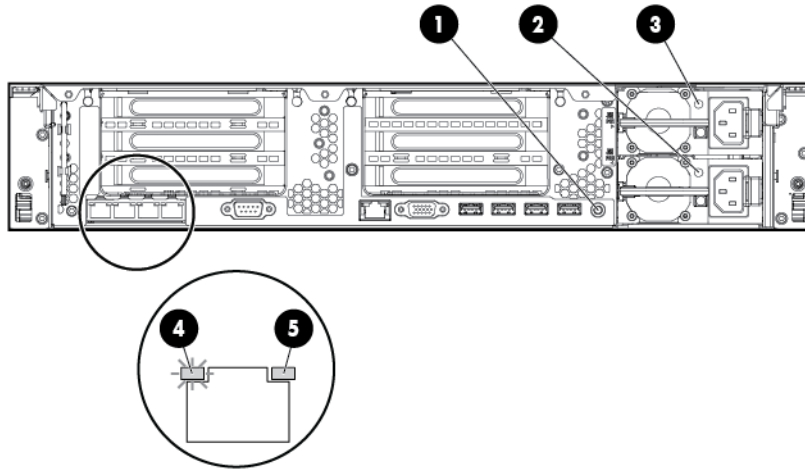
9. iLO connector

10. Serial connector

11. FlexibleLOM ports (Shown: 4x1Gb/Optional: 2x10Gb); port 1 on right side

¹ HP StoreEasy 18x0 Storage Slot 2 (P822)

Figure 16 HP StoreEasy 18x0 Storage rear panel LEDs and buttons

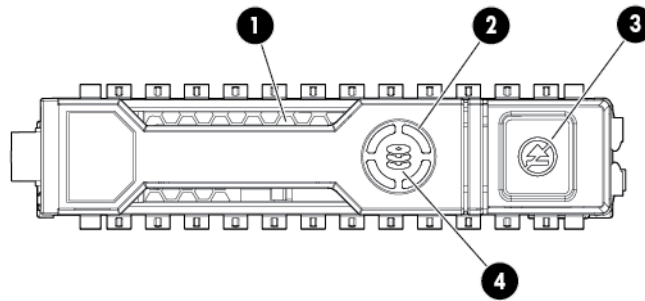


Item	Description	Status
1	UID LED/button	Blue = Activated. Flashing blue = System is being managed remotely. Off = Deactivated.
2	Power supply 2 LED	Off = System is off or power supply has failed. Solid green = Normal
3	Power supply 1 LED	Off = System is off or power supply has failed. Solid green = Normal
4	NIC activity LED	Green = Activity exists Flashing green = Activity exists Off = No activity exists
5	NIC link LED	Green = Link exists Off = No link exists

Drive LED definitions

The following figure shows the drive LEDs. These LEDs are located on all HP ProLiant hot plug hard drives.

Figure 17 Drive LEDs



Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

Systems Insight Display LED combinations

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated Systems Insight Display LEDs, the system power LED, and the health LED indicate system status.

Table 1 Systems Insight Display LEDs and internal health LED combinations

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> Processor in socket X has failed. Processor X is not installed in the socket. Processor X is unsupported. ROM detects a failed processor during POST.
	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.

Table 1 Systems Insight Display LEDs and internal health LED combinations *(continued)*

Systems Insight Display LED and color	Health LED	System power LED	Status
	Amber	Green	DIMM in slot X is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or is removed.
	Red	Green	Two or more fans have failed or are removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> Only one power supply is installed and that power supply is in standby. Power supply fault System board fault
	Amber	Green	One or more of the following conditions may exist: <ul style="list-style-type: none"> Redundant power supply is installed and only one power supply is functional. AC power cord is not plugged into redundant power supply. Redundant power supply fault Power supply mismatch at POST or power supply mismatch through hot-plug addition
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
	—	Green	Power is available.

NOTE: For more information on troubleshooting, refer to the hardware platform information. The following list identifies the ProLiant model for each HP StoreEasy 1000 Storage product:

- 1440: ProLiant DL360e Gen8
- 1550: ProLiant ML310e Gen8 v2
- 1640: ProLiant DL380e Gen8
- 1840: ProLiant DL380p Gen8

The ProLiant documentation is available at:

<http://www.hp.com/go/proliantgen8/docs>

Software components

Windows Storage Server 2012 or 2012 R2 Standard Edition comes preinstalled and activated on the HP StoreEasy 1x30 Storage. Windows Storage Server 2012 R2 Standard Edition comes preinstalled and activated on the HP StoreEasy 1x40 Storage. The storage system configuration also includes the HP Initial Configuration Tasks window, Windows Server Manager, and HP StoreEasy tools, which are used to set up and manage your storage system.

NOTE: Windows Storage Server 2012 or 2012 R2 Standard Edition is installed in Server with a GUI mode by default. You can switch to Server Core Installation mode; however, Server Core Installation mode is only supported on an HP StoreEasy 1000 Storage system when the operating environment does not require user interaction (such as in a data center). Any activity that requires the use of a GUI must be done in Server with a GUI mode. For more information about installation options, see the “Windows Server Installation Options” article on Microsoft TechNet at:

<http://technet.microsoft.com/library/hh831786.aspx>

To switch to Server Core mode, see “Using Server Core” (page 47) for more information.

The Initial Configuration Tasks window assists during the initial out of box setup by configuring items such as time zone, networking, domain join, and provisioning storage. The HP StoreEasy Pool Manager is used to create storage pools and assign spare drives. Select **Windows Server Manager**→**File and Storage Services** to create virtual disks and place volumes on the virtual disks. Also, the **Windows Server Manager**→**Tools**→**HP StoreEasy** menu provides a collection of HP and Microsoft utilities that are useful for managing the storage system.

2 Installing and configuring the storage system

Setup overview

The HP StoreEasy 1000 Storage comes preinstalled with the Microsoft Windows Storage Server 2012 R2 Standard Edition operating system with Microsoft iSCSI Software Target included.

Verify the kit contents

Remove the contents, ensuring that you have all of the following components. If components are missing, contact HP technical support.

Hardware

- HP StoreEasy 1000 Storage system (with operating system preloaded)
- Power cords
- Rail kit

Media and documentation

- *HP StoreEasy 1000 Storage Quick Start Guide*
- Safety and Disposal Documentation CD
- HP System Recovery DVD
- End User License Agreement
- Certificate of Authenticity Card
- HP ProLiant Essentials Integrated Lights-Out Advanced Pack

Locate the serial number, Certificate of Authenticity, and End User License Agreement

For technical support purposes, locate the storage system's serial number, Certificate of Authenticity (COA), and End User License Agreement (EULA). Record the serial number and COA product key and make a print copy of the EULA as needed.

The storage system's serial number is located in several places:

- Top of the storage system or blade
- Back of the storage system
- Inside the storage system shipping box
- Outside of the storage system shipping box

The storage system's Certificate of Authenticity (COA) card is located inside the storage system shipping box. There is also a COA sticker with product key affixed to the top of the storage system or blade.

There is an electronic copy of the EULA installed with the storage system at `C:\Windows\System32\license.rtf`.

Install the storage system hardware

If your storage system is fully racked and cabled, go to [“Connect to the storage system” \(page 36\)](#).

For the 14x0, 16x0, and 18x0 systems, install the rail kit and insert and secure the storage system into the rack by following the *HP Rack Rail Kit Installation Instructions*.

If you ordered the HP Tower to Rack Conversion Tray Universal Kit for the purpose of installing the 15x0 tower model in a rack, use the provided tower-to-rack conversion kit installation instructions to install the tower hardware into the rack.

Cabling the storage system

The StoreEasy systems support both single domain and dual domain cabling using D2000 and D6000 disk enclosures, depending on the SmartArray RAID controller that is installed in the system. See [Table 2 \(page 21\)](#) for details. In a single domain, external disk enclosures are connected, using a single data path, to the SmartArray RAID controller in the StoreEasy system. In a dual domain, external disk enclosures are connected, using two data paths, to a single SmartArray RAID controller in the StoreEasy system. For more detailed information about single and dual domains, see the technology brief entitled, "Redundancy in enterprise storage networks using dual-domain SAS configurations" located at: <http://h20565.www2.hp.com/portal/site/hpsc/public/kb/docDisplay/?docId=c01451157>.

NOTE: Microsoft Storage Spaces are not supported on HP StoreEasy 1000 Storage.

Table 2 Controller, disk enclosure, and single/dual domain support

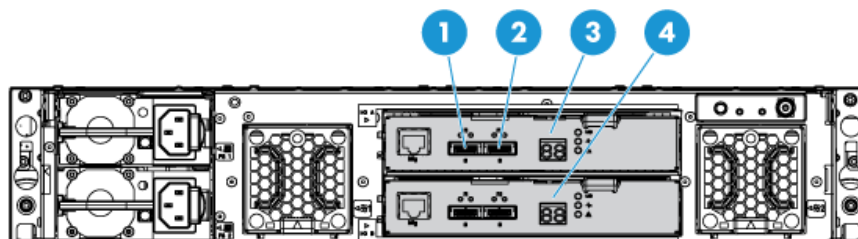
Controller model	Supported in StoreEasy systems	Disk enclosure supported	Single domain support	Dual domain support
P222	14x0, 15x0	D2000	Y	N
P421	14x0	D2000, D6000	Y	Y
P822	14x0, 16x0, 18x0	D2000, D6000	Y	Y
P700m series	N		Y	Y

NOTE: If the dual domain support is required for show platforms, you can replace the P222 controller found in the 1440 and 1540 storage systems with a P822 controller.

I/O modules

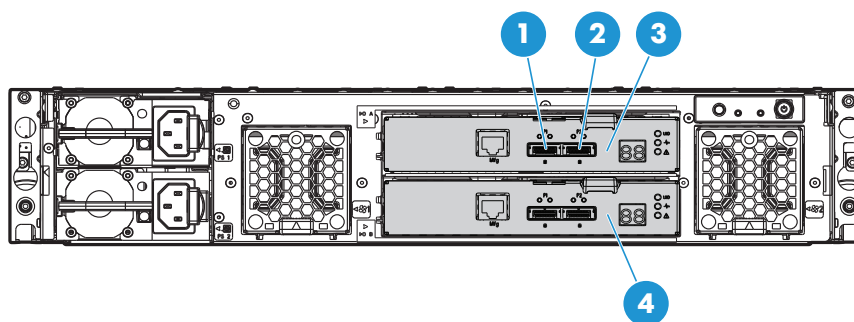
The StoreEasy systems connect to the I/O modules on the D6000 and D2000 disk enclosures. [Figure 18 \(page 21\)](#) shows the I/O module ports on the D2600 disk enclosure, [Figure 19 \(page 22\)](#) shows the I/O module ports on the D2700 disk enclosure, and [Figure 20 \(page 22\)](#) shows the I/O module ports on the D6000 disk enclosure.

Figure 18 HP D2600 Disk Enclosure I/O module ports



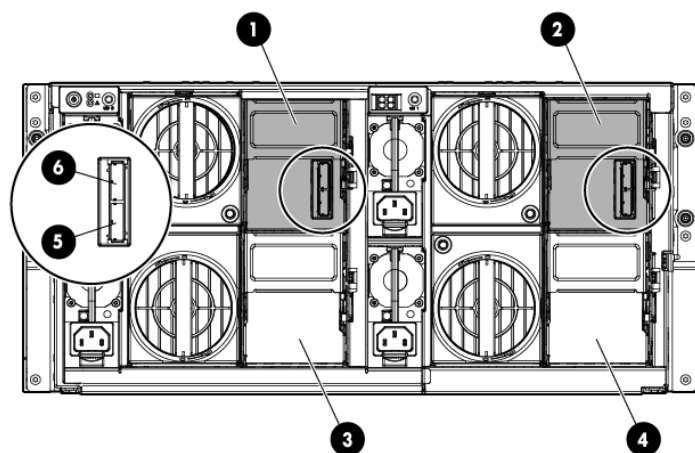
1. Port 1
2. Port 2
3. I/O module A
4. I/O module B

Figure 19 HP D2700 Disk Enclosure I/O module ports



1. Port 1
2. Port 2
3. I/O module A
4. I/O module B

Figure 20 D6000 I/O modules



1. Primary I/O module (Drawer 2)
2. Primary I/O module (Drawer 1)
3. Secondary I/O module or blank (Drawer 2)
4. Secondary I/O module or blank (Drawer 1)
5. SAS port 1 connector
6. SAS port 2 connector

Cabling guidelines

When connecting disk enclosures to the StoreEasy system, consider the following guidelines:

- In a single domain configuration, the secondary I/O modules on the D6000 are not used, so they may or may not be installed. The cabling diagrams in this section show the secondary I/O modules installed.
- For single domain configurations, the maximum number of disk enclosures supported by controller model are:
 - P222: 4 D2000s (up to 104 drives total)
 - P421: 1 D6000; 4 D2000s (up to 104 drives total)
 - P822: 8 D2000s (up to 227 drives total); 2 D6000s
- For dual domain configurations, the maximum number of disk enclosures supported by controller model are:
 - P222: No support for dual domain
 - P421: 1 D6000 (1/2 utilized)
 - P822: 1 D6000; 8 D2000s (up to 227 drives total)

NOTE: The maximums listed are based on the number of drives per controller. Any StoreEasy system could have additional or alternate controllers installed, which would affect the overall number of supported disk enclosures. The maximum number of enclosures that can be connected to a controller is eight.

- In the cabling diagrams for the D2000 disk enclosure, the D2600 Disk Enclosure is used. Be aware that the cabling is exactly the same for the D2700 Disk Enclosure.
- The D6000 does not support the use of SAS daisy chains; the D2000 does support SAS daisy chains. In a SAS daisy chain, the D2000 disk enclosures are connected to each other – I/O module A from each disk enclosure is connected together and I/O module B of each disk enclosure is connected together.
- Only supported, documented cabling configurations are shown. Only cabling configurations shown in this document or in related D2000 or D6000 documentation are supported configurations.

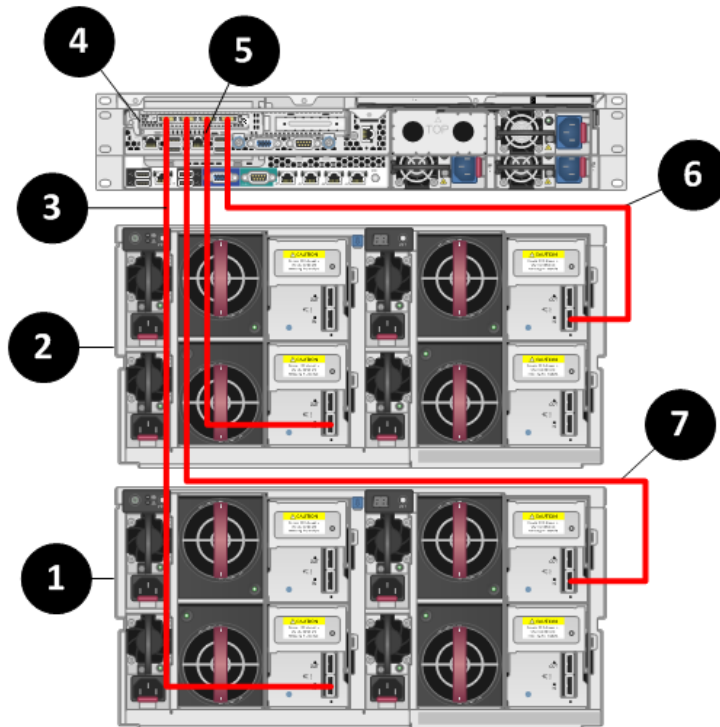


CAUTION: When cabling a dual domain configuration, ensure that you do not connect both controllers in the StoreEasy system to the same disk enclosure; this is an unsupported configuration and might result in data loss. If the StoreEasy system is configured incorrectly, and you attempt to use Pool Manager, Pool Manager will detect the configuration and display an error message. The controllers can be connected to different disk enclosures.

Single domain cabling diagrams with D6000 Disk Enclosures

The following diagrams show different StoreEasy systems in single domain configurations with D6000 Disk Enclosures.

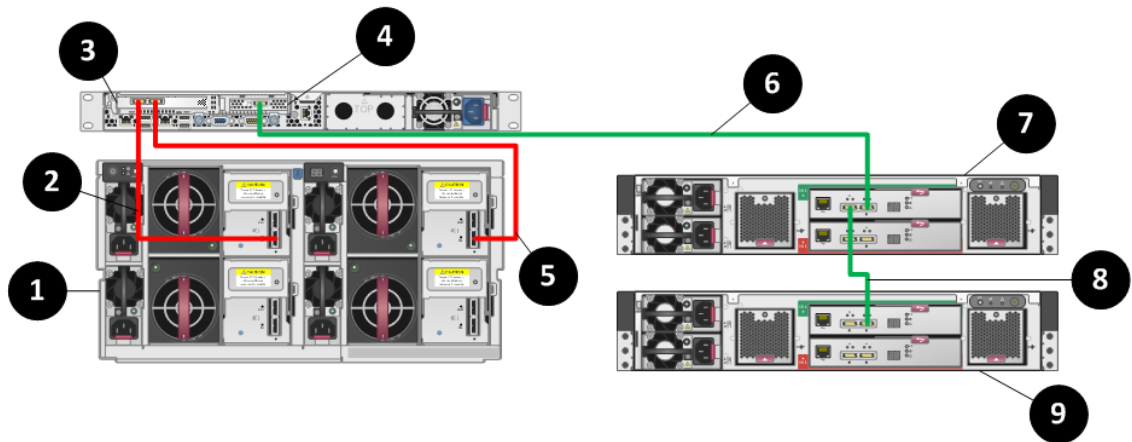
Figure 21 HP StoreEasy 14x0 with the P822 controller



1. D6000 enclosure 1
2. D6000 enclosure 2
3. Connection to SAS port 1 on the primary I/O module (Drawer 2) of D6000 enclosure 2
4. P822 controller
5. Connection to SAS port 1 on the primary I/O module (Drawer 2) of D6000 enclosure 1
6. Connection to SAS port 1 on the primary I/O module (Drawer 1) of D6000 enclosure 1
7. Connection to SAS port 1 on the primary I/O module (Drawer 1) of D6000 enclosure 2

Figure 22 (page 25) shows an example of a 14x0 system with one P421 controller and one P222 controller; each connected to a different disk enclosure.

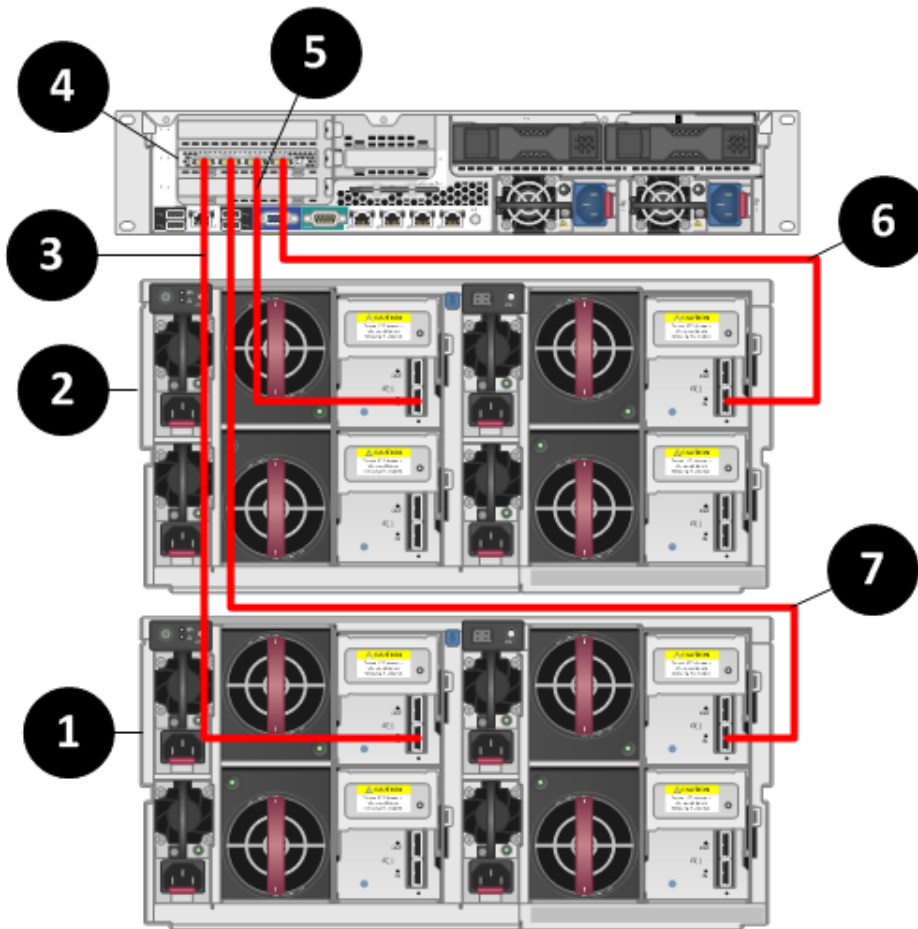
Figure 22 HP StoreEasy 14x0 with P421 and P222 controllers



1. D6000 Disk Enclosure
2. Connection between SAS port 1 on the primary I/O module (Drawer 2) and the P421 controller
3. P421 controller
4. P222 controller
5. Connection between SAS port 1 on the primary I/O module (Drawer 1) and the P421 controller
6. Connection between the P222 controller and port 2 on I/O module of D2600 Disk Enclosure 1
7. D2600 Disk Enclosure 1
8. Connection between port 1 of I/O module B on D2600 Disk Enclosure 1 and port 2 of I/O module A on D2600 Disk Enclosure 2
9. D2600 Disk Enclosure 2

NOTE: The cabling diagram shown in [Figure 23 \(page 26\)](#) is exactly the same for the HP StoreEasy 18x0 using the P822 controller.

Figure 23 HP StoreEasy 16x0 with the P822 controller



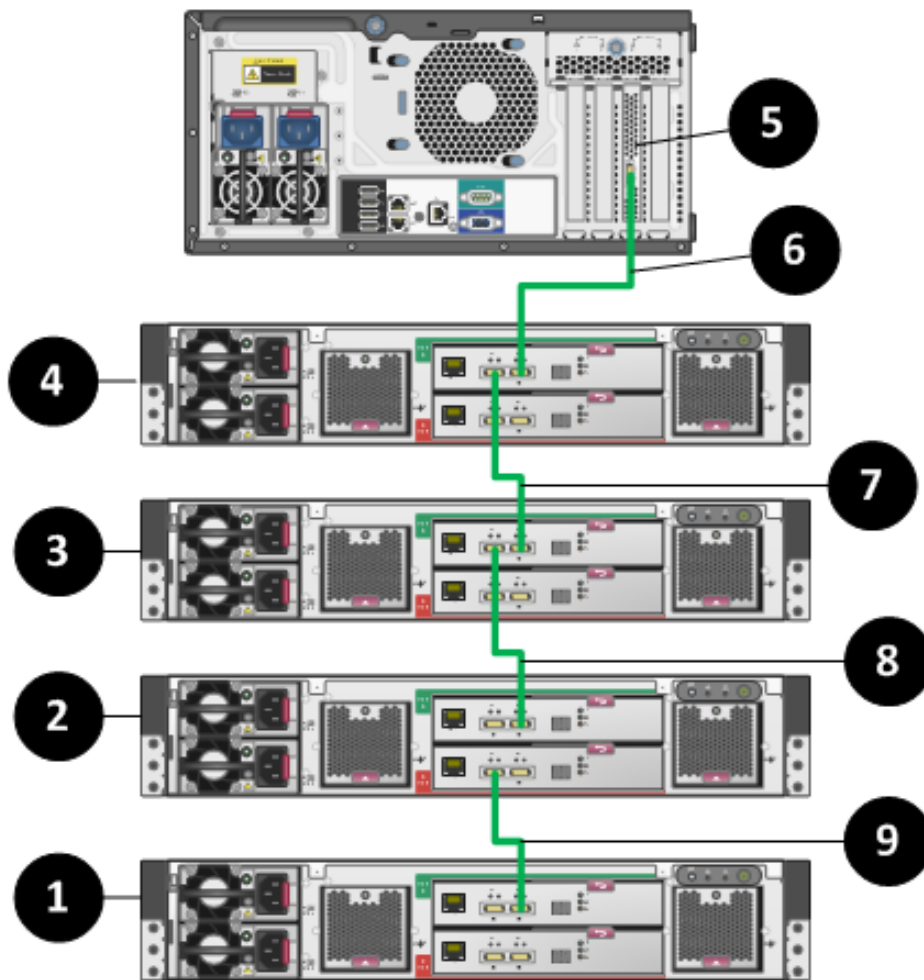
1. D6000 Disk Enclosure 1
2. D6000 Disk Enclosure 2
3. Connection between the P822 controller and SAS port 1 on the primary I/O module (Drawer 2) of D6000 Disk Enclosure 1
4. P822 controller
5. Connection between the P822 controller and SAS port 1 on the primary I/O module (Drawer 2) of D6000 Disk Enclosure 2
6. Connection between the P822 controller and SAS port 1 on the primary I/O module (Drawer 1) of D6000 Disk Enclosure 2
7. Connection between the P822 controller and SAS port 1 on the primary I/O module (Drawer 1) of D6000 Disk Enclosure 1

Single domain cabling diagrams with D2000 Disk Enclosures

The following diagrams show different StoreEasy systems in single domain configurations with the D2000 Disk Enclosure. With these cabling diagrams, SAS daisy chains are used to connect the disk enclosures together.

NOTE: The cabling diagram in [Figure 24 \(page 27\)](#) is exactly the same for the HP StoreEasy 14x0 using the P222 controller.

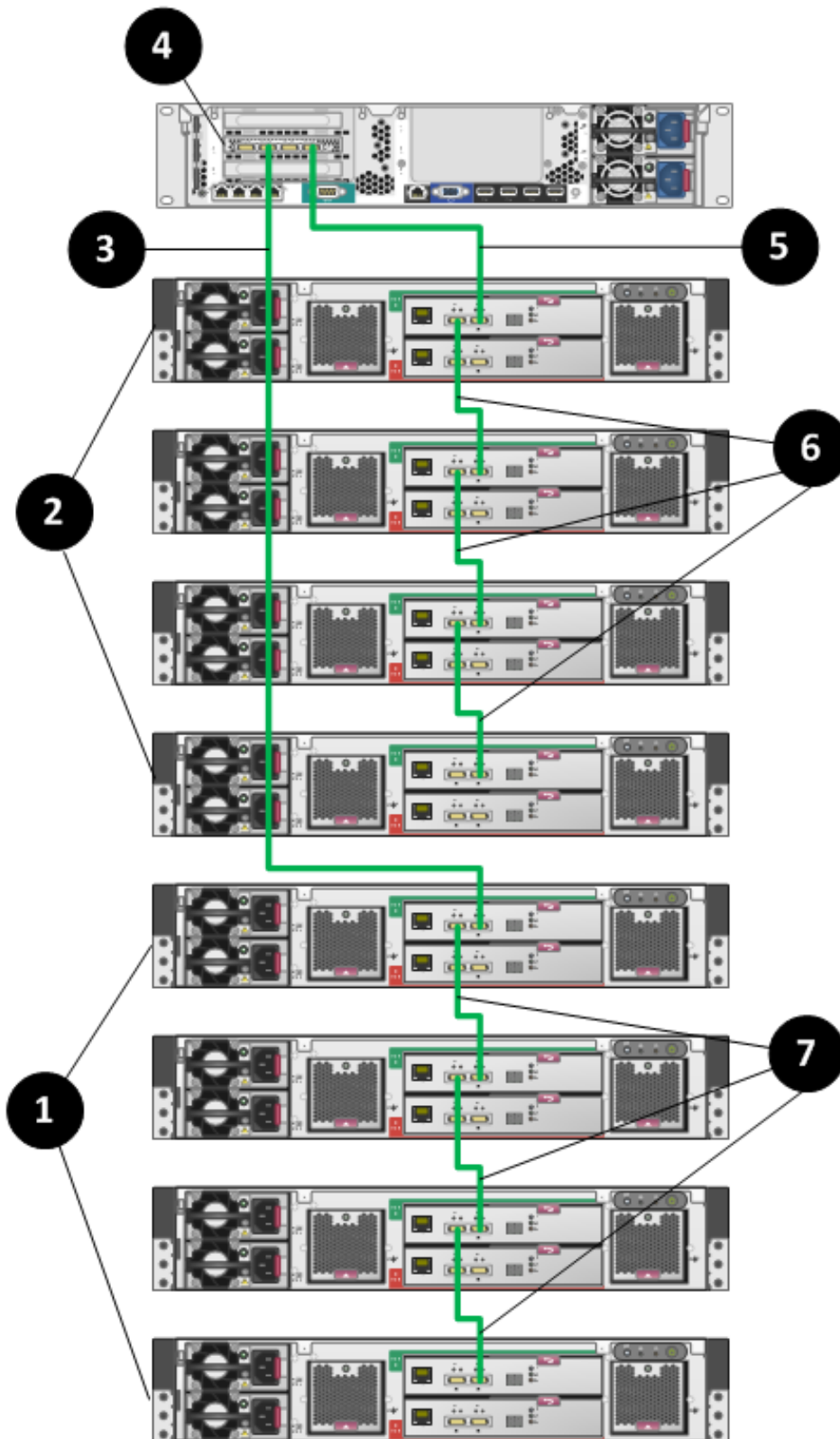
Figure 24 HP StoreEasy 15x0 with the P222 controller



1. D2600 Disk Enclosure 1
2. D2600 Disk Enclosure 2
3. D2600 Disk Enclosure 3
4. D2600 Disk Enclosure 4
5. P222 controller
6. Connection from P222 controller to port 2 of I/O module A on disk enclosure 4
7. Connection from port 1 of I/O module A on disk enclosure 4 to port 2 of I/O module A on disk enclosure 3
8. Connection from port 1 of I/O module A on disk enclosure 3 to port 2 of I/O module A on disk enclosure 2
9. Connection from port 1 of I/O module A on disk enclosure 2 to port 2 of I/O module A on disk enclosure 1

NOTE: The cabling diagram in [Figure 25 \(page 28\)](#) is exactly the same for the HP StoreEasy 14x0 and 16x0 using the P822 controller.

Figure 25 HP StoreEasy 18x0 with the P822 controller



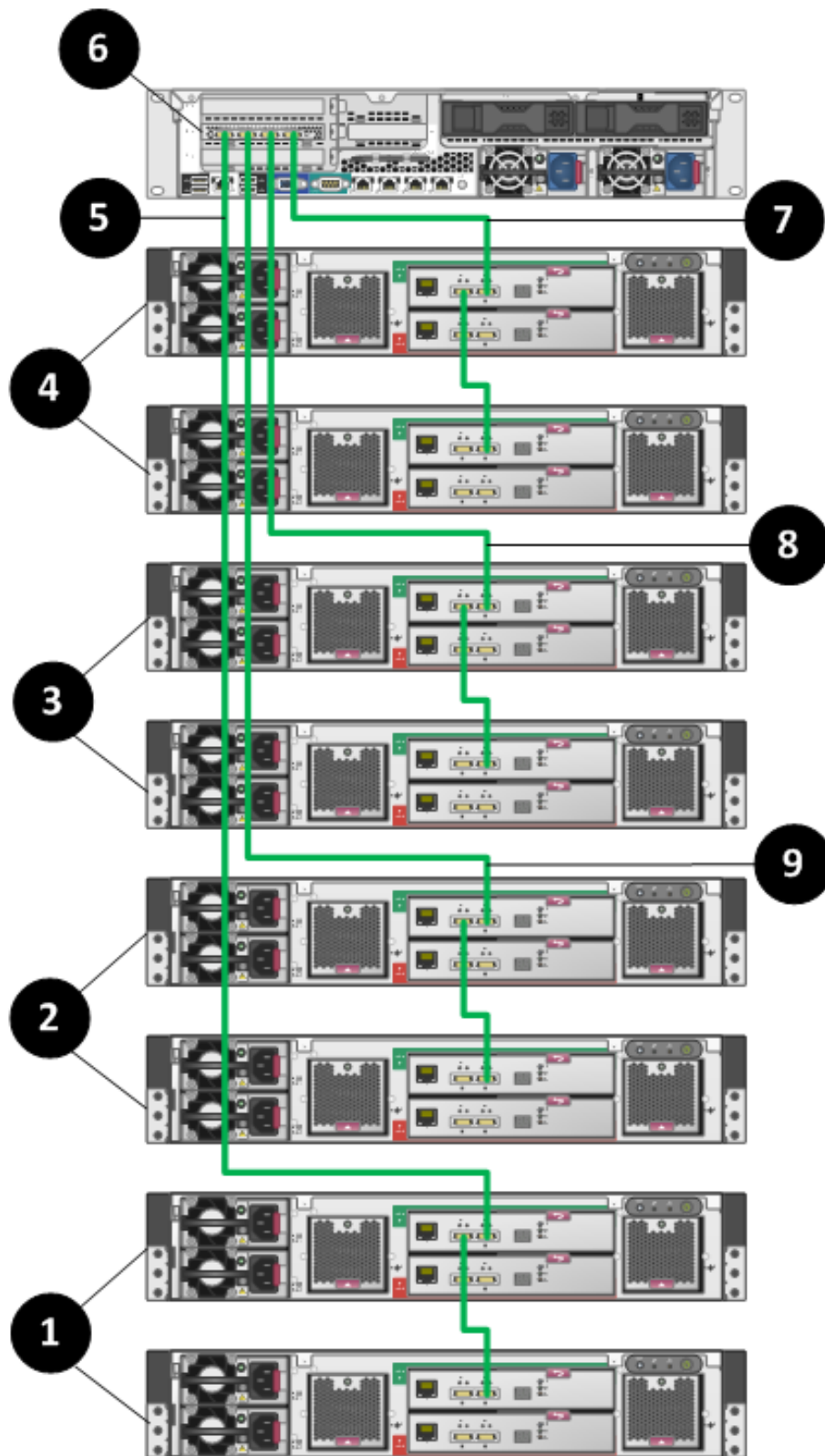
1. Group 1 of 4 D2600 Disk Enclosures
2. Group 2 of 4 D2600 Disk Enclosures
3. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 1
4. P822 controller

5. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 2
6. Connections between the disk enclosures in Group 2
7. Connections between the disk enclosures in Group 1

An alternate way of connecting the D2000 disk enclosures to the P822 controller is to have 4 groups of 2 disk enclosures each. This cabling option provides better fault tolerance because the worst case scenario (besides a controller failure) is losing access to two disk enclosures if one disk enclosure goes down. In [Figure 26 \(page 30\)](#), the worst case scenario is losing access to all four disk enclosures in a group if one disk enclosure goes down.

NOTE: The cabling diagram in [Figure 26 \(page 30\)](#) illustrates the HP StoreEasy 16x0 but the cabling is exactly the same for the HP StoreEasy 14x0 and 18x0 using the P822 controller.

Figure 26 Alternate single domain configuration for better fault tolerance



1. Group 1 of 2 D2600 Disk Enclosures
2. Group 2 of 2 D2600 Disk Enclosures
3. Group 3 of 2 D2600 Disk Enclosures
4. Group 4 of 2 D2600 Disk Enclosures

5. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 1
6. P822 controller
7. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 4
8. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 3
9. Connection from P822 controller to port 2 of I/O module A on the top disk enclosure in Group 2

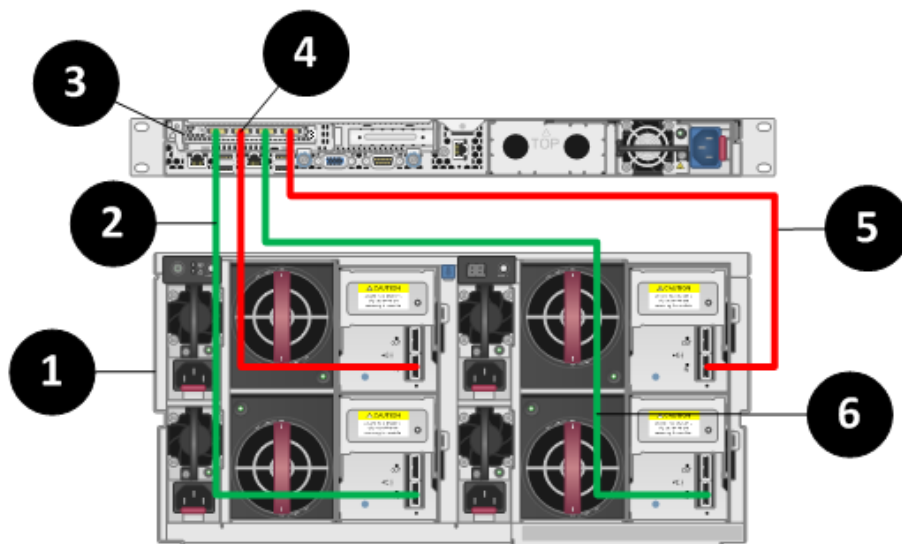
Dual domain cabling diagrams with D6000 Disk Enclosures

The following diagrams show different StoreEasy systems in dual domain configurations with D6000 Disk Enclosures.

Figure 27 (page 31) shows the HP StoreEasy 14x0 system with the P822 controller in a dual domain configuration. In this configuration, the worst case scenario (besides a controller failure) is losing ½ of the D6000 if there is an I/O module failure.

NOTE: The cabling diagram in Figure 27 (page 31) is exactly the same for the HP StoreEasy 16x0 and 18x0 using the P822 controller.

Figure 27 HP StoreEasy 14x0 with the P822 controller in a dual domain



1. D6000 Disk Enclosure
2. Connection between the P822 and SAS port 1 on the secondary I/O module (Drawer 2)
3. P822 controller
4. Connection between the P822 and SAS port 1 on the primary I/O module (Drawer 2)
5. Connection between the P822 and SAS port 1 on the primary I/O module (Drawer 1)
6. Connection between the P822 and SAS port 1 on the secondary I/O module (Drawer 1)

Dual domain cabling diagrams with D2000 Disk Enclosures

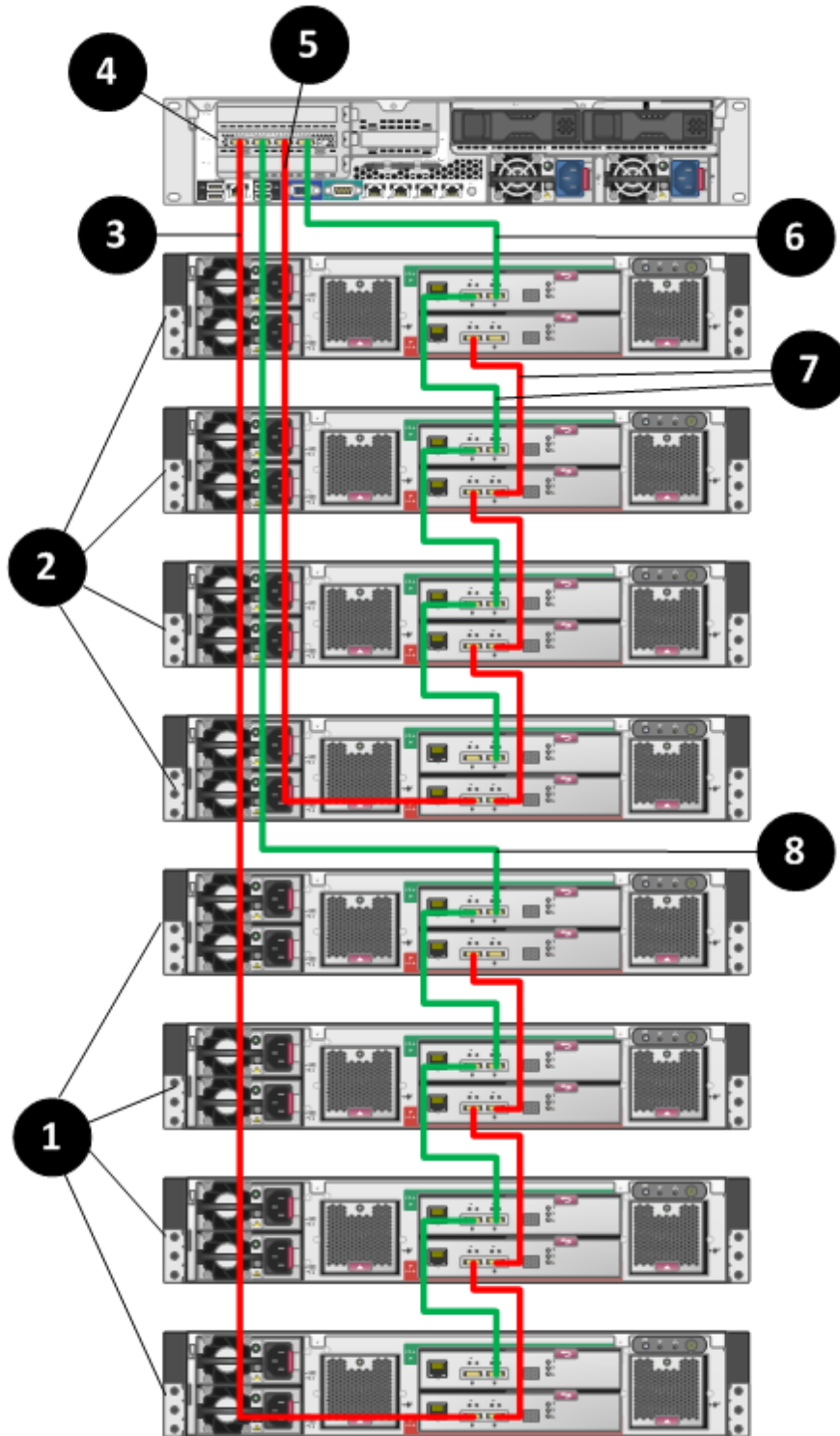
In dual domain configurations with the D2000 Disk Enclosures, you have the option of cabling for best fault tolerance or best performance.

Figure 28 (page 33) illustrates best fault tolerance, which provides the best data protection in the event of an I/O module failure. The disk enclosures are put into two groups of four disk enclosures each. There is always one path to the disk enclosure from the controller (from either the top disk enclosure in the group or the bottom disk enclosure in the group). The green path carries the data

if the red path is broken. Besides a controller failure, the worst case scenario is losing access to one I/O module if an I/O module fails. [Figure 28 \(page 33\)](#) also illustrates the SAS daisy chain between disk enclosures. Besides a controller failure, the worst case scenario is losing access to one I/O module in a disk enclosure if any I/O module fails.

NOTE: The cabling diagram in [Figure 28 \(page 33\)](#) is exactly the same for the HP StoreEasy 14x0 and 18x0 using the P822 controller.

Figure 28 HP StoreEasy 16x0 with the P822 controller in a dual domain configuration (best fault tolerance)



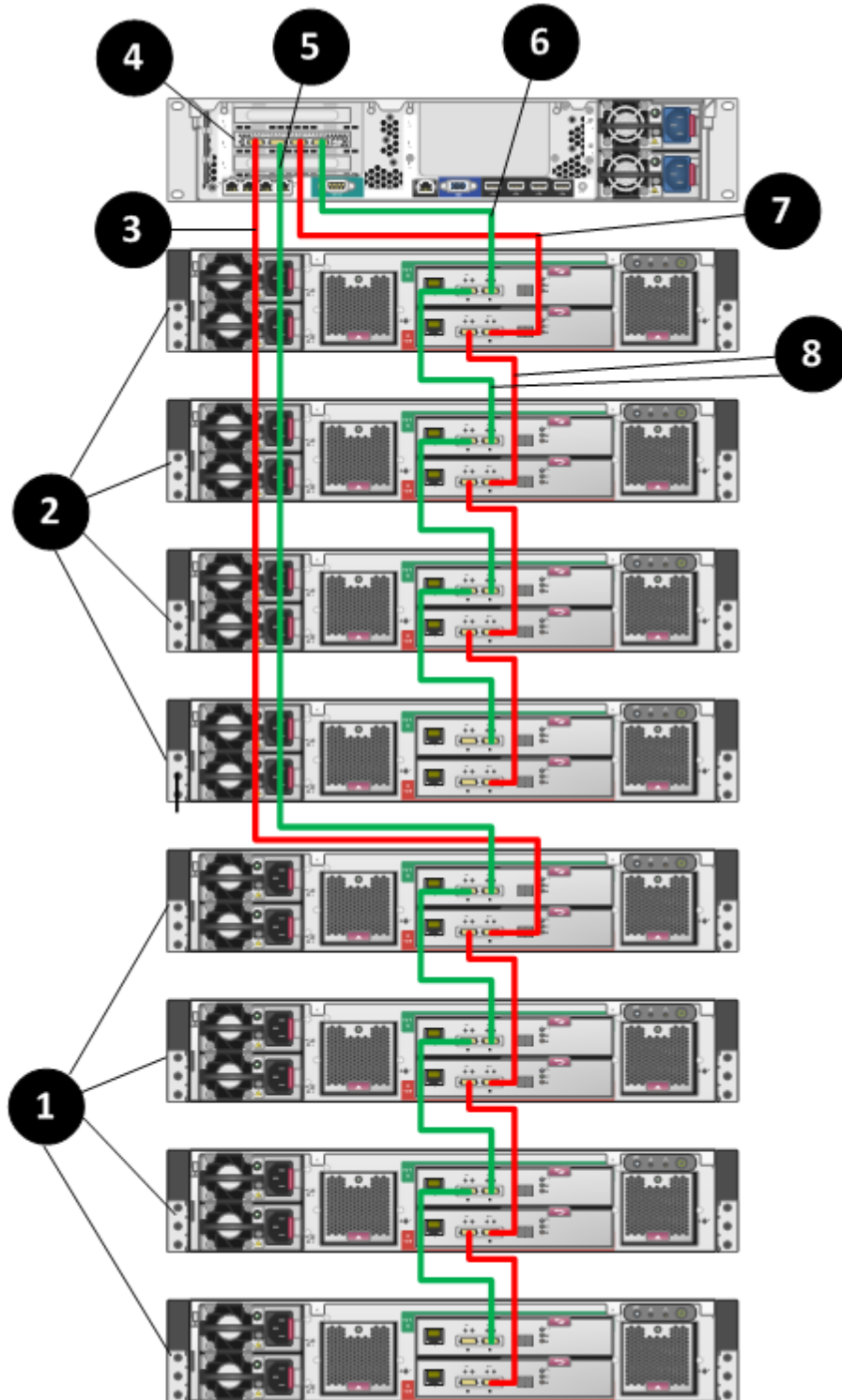
1. Group 1 of 4 D2600 Disk Enclosures
2. Group 2 of 4 D2600 Disk Enclosures
3. Connection from the P822 controller to port 1 of I/O module B on the bottom D2600 in Group 1
4. P822 controller
5. Connection from the P822 controller to port 1 of I/O module B on the bottom D2600 in Group 2
6. Connection from the P822 controller to port 2 of I/O module A on the top D2600 in Group 2

7. SAS daisy chain – port 1 of I/O module B on the top D2600 connects to port 2 of I/O module B on the bottom D2600 and port 1 of I/O module A on the top D2600 connects to port 2 of I/O module A on the bottom D2600
8. Connection from the P822 controller to port 2 of I/O module A on the top D2600 in Group 1

Figure 29 (page 35) illustrates best performance. The difference between this cabling and fault tolerance cabling is that the beginning and ending connections from the controller to a disk enclosure are always to the first disk enclosure in the group. Essentially, the request from the controller to a disk enclosure moves faster because it does not have to travel through a series of disk enclosures. However, this cabling does not provide fault tolerance. If an I/O module in the first disk enclosure fails, you will lose access to all disk enclosures in the group.

NOTE: The cabling diagram in Figure 29 (page 35) is exactly the same for the HP StoreEasy 14x0 and 16x0 using the P822 controller.

Figure 29 HP StoreEasy 18x0 with the P822 controller in a dual domain configuration (best performance)



1. Group 1 of 4 D2600 Disk Enclosures
2. Group 2 of 4 D2600 Disk Enclosures
3. Connection from the P822 controller to port 2 of I/O module B on the top D2600 in Group 1
4. P822 controller
5. Connection from the P822 controller to port 2 of I/O module A on the top D2600 in Group 1

6. Connection from the P822 controller to port 2 of I/O module A on the top D2600 in Group 2
7. Connection from the P822 controller to port 2 of I/O module B on the top D2600 in Group 2
8. SAS daisy chain – port 1 of I/O module B on the top D2600 connects to port 2 of I/O module B on the bottom D2600 and port 1 of I/O module A on the top D2600 connects to port 2 of I/O module A on the bottom D2600

Connect to the storage system

Use either the direct attach or remote management method to connect to the storage system.

- ❗ **IMPORTANT:** Only the direct attach and remote management access methods can be used to install the storage system. After the storage system installation process is complete and the server's IP addresses have been assigned, you can then additionally use the remote desktop method to access the storage system.

- **Direct attach** —This access method is mandatory if your network does not have a Dynamic Host Configuration Protocol (DHCP) server. Connect the following cables to the back panel of the storage system in the following sequence: keyboard, mouse, network cables, monitor cable, and power cable.

NOTE: The keyboard, mouse, and monitor are not provided with the storage system.

- **Remote management**—Access the storage system using the Integrated Lights-Out (iLO) remote management method:
 1. Connect the desired network cables to network adapter ports on the back of the storage system.
 2. Connect a network cable to the iLO port located on the back of the storage system.
 3. Connect a power cable to the storage system.
 4. Locate the iLO Network Settings tag attached to the storage system and record the default user name, password, and DNS name.
 5. From a remote computer, open a standard Web browser and enter the iLO management hostname of the storage system.

NOTE: By default, iLO obtains the management IP address and subnet mask from your network's DHCP server. The hostname found on the iLO tag is automatically registered with your network's DNS server.

6. Using the default user information provided on the iLO Network Settings tag, log on to iLO, and then launch a remote console to the storage system.

For detailed instructions on using iLO remote management software, see the *HP iLO 4 User Guide*.

Power on the server and log on

1. Power on the system by pushing the power button on the front panel. If using iLO, click **Momentary Press** under the Power Switch menu of the remote console.

The storage system starts and displays the Setup Windows wizard, in which you select language and regional settings and accept the license agreement. The storage system installation process takes approximately 10–15 minutes.
2. When the storage system installation process nears completion, the Windows Storage Server 2012 Standard Edition desktop displays the following message: **The user's password must be changed before logging on the first time** indicating that you must set a new password. Log on to the storage system by establishing an Administrator password:
 - a. Click **OK**.
 - b. Enter the Administrator password in the New password box.

- c. Re-enter the Administrator password in the Confirm password box.
- d. Click the blue arrow next to the Confirm password box.
- e. Click **OK**.

After the Administrator password has been set, the storage system completes the installation process.

3. When prompted, press **CTRL+ALT+DELETE** to log on to the system. If using iLO, click the **Ctrl-Alt-Del** menu item in the Keyboard menu of the remote console.

Configure the storage system

The ICT (Initial Configuration Tasks) window launches automatically at logon for any user who is a member of the local administrators group.

Use ICT to perform the following tasks:

- Update system settings, such as changing the local administrator password, time zone, and so on.
- Launch Network Configuration wizard to configure and validate the network configuration.
- Configure email alerts and register for HP proactive notifications.
- Add and save reseller information.
- Create storage pools and volumes.
- Enable software updates and enhancements directly from Windows update.
- Register for a free trial of Autonomy LiveVault and get more information on Vision Solution Double-Take Availability Information products.

For more information on any of these tasks, click the help button for the respective task group in the ICT window.

Configure networking

The NCT (Network Configuration Tool) wizard enables you to configure the network interfaces on HP StoreEasy 1000 Storage. NCT analyzes all available network interfaces of the StoreEasy system and allows you to choose different network configurations to reduce the chances of any incorrect configuration. It also validates the configuration to help troubleshoot errors in the networking environment. HP strongly recommends that you use this tool to configure network interfaces.

Use NCT to perform the following tasks:

- Change the network interface settings.
- Configure network teams.
- Configure VLAN assignments and assign VLAN IDs.
- Configure the IP address for the selected interface.
- Confirm network settings and diagnose environmental network issues using the network validation system.

For more information on any of these tasks, click **Help** for the respective task in the NCT window.

Provisioning storage

Storage provisioning involves the following tasks:

- Create storage pools
- Create virtual disk
- Create volumes

HP StoreEasy Pool Manager is used to create one or more storage pools from the internal drives of the StoreEasy system. If any external storage enclosures are attached, Pool Manager is used to create storage pools there as well. The internal drives of StoreEasy models 14x0 and 15x0 are already pooled and contain the operating system, so no further pool management is necessary on these drives.

Once storage pools have been created, **File and Storage Services** in Windows Server Manager are used to create virtual disks and volumes.

NOTE: If changes are made to the storage configuration using a tool other than Windows Server Manager, StoreEasy Pool Manager, or PowerShell Cmdlet, it will be necessary to update the storage cache. Update the storage cache using the following method:

- Open PowerShell and run `Update-StorageProviderCache`.

NOTE: You may see a message when using the Provision Storage wizard indicating RAID6 is not supported. The Smart Array controller that is used to control the operating system drives is not licensed for RAID6. A RAID6 license is included with the system that is shipped from the factory and the license key is delivered in printed form in the system packaging. If for some reason the SmartArray controller is replaced, you must re-enter the license key. For instructions, see "Installing the license key with ACU" in the *Configuring Arrays on HP Smart Array Controllers Reference Guide* at <http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf>.

For replacement instructions, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* at <http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01608507/c01608507.pdf>.

The following pool sets are available while creating storage pools:

Pool Set	Pool	Drive Bays used	Spare required	Spare drive bays	Max allowable drive size	RAID Levels / Pool type offered
StoreEasy 1440 LFF SATA						
1	4 drive pool	1-4	No	None	6 TB	6 / Capacity
StoreEasy 1540 LFF SATA						
1	4 drive pool	1-4	No	None	6 TB	6 / Capacity
StoreEasy 1640 LFF Midline SAS						
1	14 drive pool	1-14	No	None	6 TB	60 (2) / Capacity
2	13 drive pool	1-14	Yes	1	4 TB	6 / Capacity
3	12 drive pool	1-14	Yes	1,2	4 TB	50 (2) or 60 (2) / Balanced
4	11 drive pool	1-14	Yes	1	4 TB	6 / Capacity
5	6 drive pool	1-14	Yes	1	5 TB	6 / Capacity 10 / Performance
	7 drive pool	1-14	Yes	1	5 TB	6 / Capacity
6	8 drive pool	1-14	Yes	1	4 TB	6 / Capacity 10 / Performance
	5 drive pool	1-14	Yes	1	4 TB	6 / Capacity
StoreEasy 1640 LFF Enterprise SAS						
1	13 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced

2	12 drive pool	1-14	Yes	1,2	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
3	11 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced
4	10 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
5	6 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	7 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced
6	7 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced
	6 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
7	5 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced
	8 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
8	8 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	5 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced
9	4 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-14	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
StoreEasy 1640 LFF Midline SAS with dedicated OS drives						
1	12 drive pool	1-12	No	None	4 TB	6 / Capacity 50 (2) or 60 (2) / Balanced
2	11 drive pool	1-12	Yes	1	4 TB	6 / Capacity
3	10 drive pool	1-12	Yes	1,2	4 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
4	5 drive pool	1-12	Yes	1	6 TB	6 / Capacity
	6 drive pool	1-12	Yes	1	6 TB	6 / Capacity 10 / Performance
5	6 drive pool	1-12	Yes	1	6 TB	6 / Capacity 10 / Performance

	5 drive pool	1-12	Yes	1	6 TB	6 / Capacity
6	6 drive pool	1-12	No	None	6 TB	6 / Capacity 10 / Performance
	6 drive pool	1-12	No	None	6 TB	6 / Capacity 10 / Performance
7	4 drive pool	1-12	No	None	4 TB	5 or 6 / Balanced 10 / Performance
	7 drive pool	1-12	Yes	1	4 TB	6 / Capacity
8	7 drive pool	1-12	Yes	1	4 TB	6 / Capacity
	4 drive pool	1-12	No	None	4 TB	5 or 6 / Balanced 10 / Performance
9	8 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
	4 drive pool	1-12	No	None	5 TB	6 / Capacity 10 / Performance
10	4 drive pool	1-12	No	None	5 TB	6 / Capacity 10 / Performance
	8 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
StoreEasy 1640 LFF Enterprise SAS with dedicated OS drives						
1	12 drive pool	1-12	No	None	2 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
2	11 drive pool	1-12	Yes	1	2 TB	6 / Capacity
3	10 drive pool	1-12	Yes	1,2	2 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
4	5 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
	6 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
5	6 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	5 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
6	6 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance

	6 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
7	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	7 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
8	7 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
9	8 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
10	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
D2600 LFF Midline SAS						
1	12 drive pool	1-12	No	None	4 TB	6 / Capacity 50 (2) or 60 (2) / Balanced
2	11 drive pool	1-12	Yes	1	4 TB	6 / Capacity
3	10 drive pool	1-12	Yes	1,2	4 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
4	5 drive pool	1-12	Yes	1	6 TB	6 / Capacity
	6 drive pool	1-12	Yes	1	6 TB	6 / Capacity 10 / Performance
5	6 drive pool	1-12	Yes	1	6 TB	6 / Capacity 10 / Performance
	5 drive pool	1-12	Yes	1	6 TB	6 / Capacity
6	6 drive pool	1-12	No	None	6 TB	6 / Capacity 10 / Performance
	6 drive pool	1-12	No	None	6 TB	6 / Capacity 10 / Performance
7	4 drive pool	1-12	No	None	4 TB	5 or 6 / Balanced 10 / Performance

	7 drive pool	1-12	Yes	1	4 TB	6 / Capacity
8	7 drive pool	1-12	Yes	1	4 TB	6 / Capacity
	4 drive pool	1-12	No	None	4 TB	5 or 6 / Balanced 10 / Performance
9	8 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
	4 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
10	4 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
	8 drive pool	1-12	No	None	5 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
D2600 LFF Midline SAS						
1	12 drive pool	1-12	No	None	2 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
2	11 drive pool	1-12	Yes	1	2 TB	6 / Capacity
3	10 drive pool	1-12	Yes	1,2	2 TB	6 / Capacity 50 (2) or 60 (2) / Balanced 10 / Performance
4	5 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
	6 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
5	6 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	5 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
6	6 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
7	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance

	7 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
8	7 drive pool	1-12	Yes	1	2 TB	5 or 6 / Balanced
	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
9	8 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
10	4 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-12	No	None	2 TB	5 or 6 / Balanced 10 / Performance 50 (2) or 60 (2) / Balanced
D2700 SFF Midline SAS						
1	12 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	12 drive pool	1-25	Yes	1	2 TB	6 / Capacity
2	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
3	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	9 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	7 drive pool	1-25	Yes	1	2 TB	6 / Capacity
4	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	7 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	9 drive pool	1-25	Yes	1	2 TB	6 / Capacity
5	7 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity
	9 drive pool	1-25	Yes	1	2 TB	6 / Capacity
6	24 drive pool	1-25	Yes	1	2 TB	60 (3) / Capacity
D2700 SFF Enterprise SAS						
1	12 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	12 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
2	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity 10 / Performance
	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity

						10 / Performance
	8 drive pool	1-25	Yes	1	2 TB	6 / Capacity 10 / Performance
3	6 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
4	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
5	8 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	9 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced
	7 drive pool	1-25	Yes	1	2 TB	5 or 6 / Balanced
6	24 drive pool	1-25	Yes	1	2 TB	50 (3) / Capacity
StoreEasy 1840 SFF Midline SAS						
1	22 drive pool	1-23	Yes	1	2 TB	60 (2) / Capacity
2	13 drive pool	1-23	Yes	1	2 TB	6 / Capacity
	9 drive pool	1-23	Yes	1	2 TB	6 / Capacity
3	9 drive pool	1-23	Yes	1	2 TB	6 / Capacity
	13 drive pool	1-23	Yes	1	2 TB	6 / Capacity
4	11 drive pool	1-23	Yes	1	2 TB	6 / Capacity
	11 drive pool	1-23	Yes	1	2 TB	6 / Capacity
5	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance

	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	No	None	2 TB	5 or 6 / Balanced 10 / Performance
6	6 drive pool	1-23	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
7	6 drive pool	1-23	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	7 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
	9 drive pool	1-23	Yes	1	2 TB	6 / Capacity
StoreEasy 1840 SFF Enterprise SAS						
1	22 drive pool	1-23	Yes	1	2 TB	10 / Performance 50 (2) or 60 (2) / Balanced
2	16 drive pool	1-23	Yes	1	2 TB	6 / Capacity 10 / Performance 50 (2) or 60 (2) / Balanced
	7 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
3	7 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
	16 drive pool	1-23	Yes	1	2 TB	6 / Capacity 10 / Performance 50 (2) or 60 (2) / Balanced
4	13 drive pool	1-23	Yes	1	2 TB	6 / Capacity
	9 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
5	9 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
	13 drive pool	1-23	Yes	1	2 TB	6 / Capacity
6	11 drive pool	1-23	Yes	1	2 TB	6 / Capacity
	11 drive pool	1-23	Yes	1	2 TB	6 / Capacity
7	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance

	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
8	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
9	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	8 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
10	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
11	4 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
	6 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced 10 / Performance
12	6 drive pool	1-23	No	None	2 TB	5 or 6 / Balanced 10 / Performance
	7 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced
	9 drive pool	1-23	Yes	1	2 TB	5 or 6 / Balanced

Complete system configuration

After the storage system is physically set up and you have completed all of the required tasks in the Initial Configuration Tasks window, you may want to complete additional setup tasks. Depending

on the deployment scenario of the storage system, these steps can vary. These additional steps can include:

- Running Microsoft Windows Update—HP highly recommends that you run Microsoft Windows updates to identify, review, and install the latest, applicable, critical security updates on the storage system.
- Creating and managing users and groups—User and group information and permissions determine whether a user can access files. If the storage system is deployed into a workgroup environment, this user and group information is stored locally on the device. By contrast, if the storage system is deployed into a domain environment, user and group information is stored on the domain.
- Adjusting logging for system, application, and security events.
- Installing third-party software applications—For example, these might include an antivirus application that you install.
- Registering the server — To register the server, see the HP registration website (<http://register.hp.com>).

Using Server Core

The Server Core interface is a command prompt with PowerShell support. In Windows Server 2012 or 2012 R2, you can transition between Server with a GUI mode and Server Core mode without reinstalling the operating system.

Transition to Server Core mode

1. Open PowerShell and execute the following command:

```
PS C:\Users\Administrator> Remove-WindowsFeature Server-Gui-Shell,  
Server-Gui-Mgmt-Infra
```
2. When prompted, restart the server by executing the following command:

```
PS C:\Users\Administrator> shutdown -r -t 0
```

After the server restart, only the command prompt will be available, indicating the server is now in Server Core mode.

NOTE: If you close all command prompts, there will be no way to manage the server in Server Core mode. To resolve this issue, complete the following steps:

1. Press **CTRL+ALT+DELETE**.
2. Select **Start Task Manager**.
3. Select **File→Start New Task**, which opens a command prompt.
4. Enter `cmd.exe`.

Alternatively, you can log off and log back again. For more information, see the Microsoft TechNet article “Configure a Server Core Server” at:

<http://technet.microsoft.com/en-us/library/jj592692.aspx>

Transition to Server with a GUI mode

1. Open PowerShell and execute the following command:

```
PS C:\Users\Administrator> Add-WindowsFeature Server-Gui-Shell,  
Server-Gui-Mgmt-Infra
```

2. Reboot the server manually by entering one of the following commands:

```
PS C:\Users\Administrator> shutdown -r -t 0
```

or

```
PS C:\Users\Administrator> Install-WindowsFeature  
Server-Gui-Mgmt-Infra, Server-Gui-Shell -Restart
```

NOTE: Transitioning to Server Core mode disables the OEM-Appliance-OOBE feature. After transitioning back to Server with a GUI mode, you must manually enable this feature by executing the following command:

```
PS C:\Users\Administrator>dism /online /enable-feature  
/featurename:OEM-Appliance-OOBE
```

Then, install HP ICT from C:\hpnas\Components\ManagementTools.

Configuring failover properties for multi-site environments

You can configure failover properties for multi-site environments using DFS Management, which is available from the Tools menu in Windows Server Manager (**Tools→DFS Management**).

For detailed instructions, see the Microsoft TechNet article, DFS Step-by-Step Guide for Windows Server 2008, which is available at:

[http://technet.microsoft.com/en-us/library/cc732863\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc732863(v=ws.10).aspx)

NOTE:

- The information in the article applies to Windows Server 2012 and 2012 R2 as well.
 - The article provides instructions to configure both DFS Namespace and DFS Replication.
 - The prerequisites listed in the article are already installed with the StoreEasy software.
 - You can start at the section entitled, "Overview of the DFS Management Snap-in".
-

Additional access methods

After the storage system installation process is complete and the system's IP address has been assigned, you can then additionally use the Remote Desktop and Telnet methods to access the storage system.

Using the Remote Desktop method

Remote Desktop provides the ability for you to log on to and remotely administer your server, giving you a method of managing it from any client. Installed for remote administration, Remote Desktop allows only two concurrent sessions. Leaving a session running takes up one license and can affect other users. If two sessions are running, additional users will be denied access.

To connect the storage system to a network using the Remote Desktop method:

1. On the PC client, select **Start→Windows PowerShell**. Type `mstsc` and click **Enter**.
2. Enter the IP address of the storage system in the **Computer** box and click **Connect**.
3. Log on to the storage system with the administrator user name and password.

Using the Telnet method

Telnet is a utility that lets users connect to machines, log on, and obtain a command prompt remotely. By default, Telnet server is not installed.

3 Administration tools

HP StoreEasy 1000 Storage systems include several administration tools to simplify storage system management tasks.

Microsoft Windows Storage Server 2012 and 2012 R2 administration tools

Microsoft Windows Storage Server 2012 or 2012 R2 operating systems provide a user interface for initial server configuration, unified storage system management, simplified setup and management of storage and shared folders, and iSCSI targets. It is specially tuned to provide optimal performance for network-attached storage. Windows Storage Server 2012 and 2012 R2 provides significant enhancements in share and storage management scenarios, as well as integration of storage system management components and functionality.

Remote Administration

The following tools are available for remote management of the system:

- Remote Desktop
- Server Manager on a Windows 8 client via RSAT tools
- Remote PowerShell

After initial setup of the system is completed using the Initial Configuration Tasks window, Windows Server Manager launches automatically that can be used to manage the system.

Windows Server Manager can be launched from the storage system desktop by clicking the icon on the left end of the task bar. The local HP StoreEasy Storage system as well as other Windows servers may be managed, as described in the [Manage Multiple, Remote Servers with Server Manager](#) article on Microsoft TechNet.

Windows Server Manager can also be used for remote management of the storage system by installing it on a Windows 8 client as part of Remote Server Administration tools. To download the tools, go to the following Microsoft website:

[Download Center](#)

NOTE: The Tools menu of Windows Server Manager applies to local tools only, not a remote system under management.

Many storage related tasks are accomplished with the File and Storage Services content within Windows Server Manager. There is also a Tools menu where many of the common utilities familiar to Windows administrators can be launched. The **Tools→HP StoreEasy** menu groups the HP-specific management tools as well as some of the more commonly used Windows tools related to managing a StoreEasy system.

File and Storage Services

File and Storage Services includes technologies that help you set up and manage one or more file servers, which are servers that provide central locations on your network where you can store files and share them with users. If users need access to the same files and applications, or if centralized backup and file management are important to your organization, you should set up one or more servers as a file server by installing the File and Storage Services role and the appropriate role services.

Administrators can use the File and Storage Services role to setup and manage multiple file servers and their storage by using Server Manager or Windows PowerShell. Some of the specific applications include the following:

- Use Data Deduplication to reduce the disk space requirements of your files, saving money on storage.
- Use iSCSI Target Server to create centralized, software-based, and hardware-independent iSCSI disk subsystems in storage area networks (SANs).
- Use Server Manager to remotely manage multiple file servers from a single window.
- Use Windows PowerShell to automate the management of the majority of administration tasks for file servers.

For more information, see the Windows Storage Server 2012 or 2012 R2 Help.

Data Deduplication

Data deduplication involves finding and removing duplication within data without compromising its fidelity or integrity. The goal is to store more data in less space by segmenting files into small variable-sized chunks (32–128 KB), identifying duplicate chunks, and maintaining a single copy of each chunk. Redundant copies of the chunk are replaced by a reference to the single copy. The chunks are compressed and then organized into special container files in the System Volume Information folder.

After a volume is enabled for deduplication and the data is optimized, the volume contains the following:

- **Unoptimized files**—For example, unoptimized files could include files that do not meet the selected file-age policy setting, system state files, alternate data streams, encrypted files, files with extended attributes, files smaller than 32 KB, other reparse point files, or files in use by other applications.
- **Optimized files**—Files that are stored as reparse points that contain pointers to a map of the respective chunks in the chunk store that are needed to restore the file when it is requested.
- **Chunk store**—Location for the optimized file data.
- **Additional free space**—The optimized files and chunk store occupy much less space than they did prior to optimization.

To enable Data deduplication on a volume:

1. Open Windows Server Manager.
2. Select **File and Storage Services** and select **Volumes**.
3. Right-click a data volume and select **Configure Data Deduplication**.
The Deduplication Settings window is displayed.
4. Complete the following:
 - a. Select the **Enable data deduplication** checkbox.
 - b. Enter the number of days that should pass between file creation and when files are deduplicated.
 - c. Identify any file type extensions that should not be deduplicated.
 - d. Click **Add** to browse to any folders containing files that should not be deduplicated.
5. Click **Apply** to apply these settings, or click **Set Deduplication Schedule** to configure a deduplication schedule.

For more information, see the Windows Storage Server 2012 or 2012 R2 Help.

Print Management

Use Print Management to view and manage printers and print servers in your organization. You can use Print Management from any computer running Windows Storage Server 2012 or 2012 R2, and you can manage all network printers on print servers running Windows 2000 Server, Windows Server 2003, Windows Storage Server 2003, Windows Storage Server 2003 R2, Windows Storage Server 2008, Windows Storage Server 2008 R2, Windows Storage Server 2012, or Windows Storage Server 2012 R2.

Print Management provides details such as the queue status, printer name, driver name, and server name. You can also set custom views by using the Print Management filtering capability. For example, you can create a view that displays only printers in a particular error state. You can also configure Print Management to send e-mail notifications or run scripts when a printer or print server needs attention. The filtering capability also allows you to bulk edit print jobs, such as canceling all print jobs at once. You can also delete multiple printers at the same time.

Administrators can install printers remotely by using the automatic detection feature, which finds and installs printers on the local subnet to the local print server. Administrators can log on remotely to a server at a branch location, and then install printers remotely.

For more information, see the Windows Storage Server 2012 or 2012 R2 Help.

Network File System (NFS) User Mapping

Network File System (NFS) is a network file sharing protocol that allows remote access to files over a network and is typically used in networks with computers running UNIX, Linux, or Mac OS operating systems. NFS is supported on all HP StoreEasy 1000 Storage systems.

All of the following types of NFS account mapping are supported: Active Directory® Domain Services (AD DS) mapped user access, Active Directory® Lightweight Directory Services (AD LDS) mapped user access, unmapped anonymous user access, and unmapped UNIX user access.

For more information about NFS, see the following Microsoft website:

[The Storage Team at Microsoft – File Cabinet Blog](#)

4 Storage management overview

This chapter provides an overview of some of the components that make up the storage structure of the storage system.

Storage management elements

Storage is divided into four major divisions:

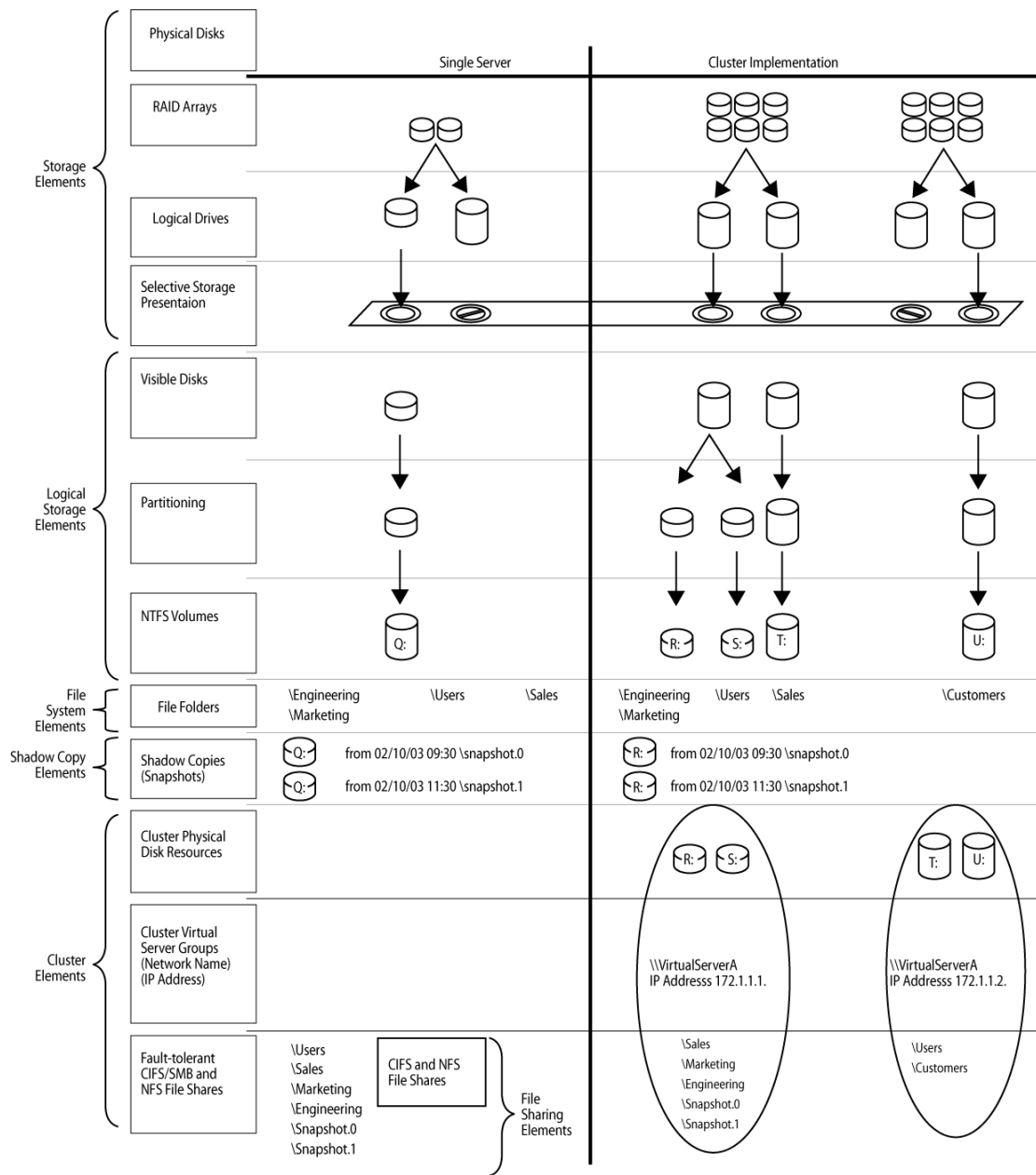
- Physical storage elements
- Logical storage elements
- File system elements
- File sharing elements

Each of these elements is composed of the previous level's elements.

Storage management example

[Figure 30 \(page 53\)](#) depicts many of the storage elements that one would find on a storage device. The following sections provide an overview of the storage elements.

Figure 30 Storage management process example



g10044

Physical storage elements

The lowest level of storage management occurs at the physical drive level. Minimally, choosing the best disk carving strategy includes the following policies:

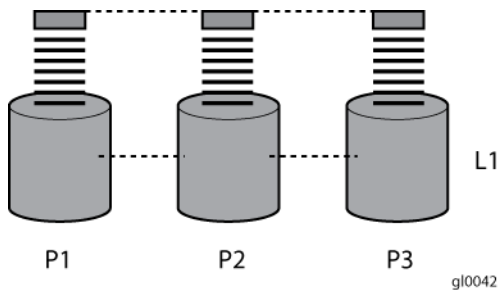
- Analyze current corporate and departmental structure.
- Analyze the current file server structure and environment.
- Plan properly to ensure the best configuration and use of storage.
 - Determine the desired priority of fault tolerance, performance, and storage capacity.
 - Use the determined priority of system characteristics to determine the optimal striping policy and RAID level.
- Include the appropriate number of physical drives in the arrays to create logical storage elements of desired sizes.

Arrays

See [Figure 31 \(page 54\)](#). With an array controller installed in the system, the capacity of several physical drives (P1–P3) can be logically combined into one or more logical units (L1) called arrays. When this is done, the read/write heads of all the constituent physical drives are active simultaneously, dramatically reducing the overall time required for data transfer.

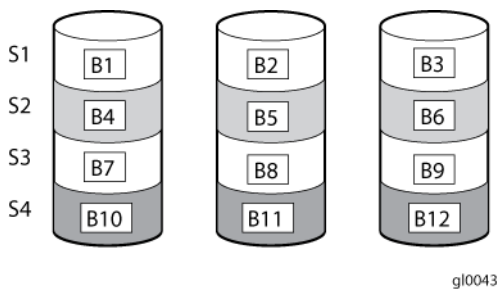
NOTE: Depending on the storage system model, array configuration may not be possible or necessary.

Figure 31 Configuring arrays from physical drives



Because the read/write heads are simultaneously active, the same amount of data is written to each drive during any given time interval. Each unit of data is termed a block. The blocks form a set of data stripes over all the hard drives in an array, as shown in [Figure 32 \(page 54\)](#).

Figure 32 RAID 0 (data striping) (S1–S4) of data blocks (B1–B12)



For data in the array to be readable, the data block sequence within each stripe must be the same. This sequencing process is performed by the array controller, which sends the data blocks to the drive write heads in the correct order.

A natural consequence of the striping process is that each hard drive in a given array contains the same number of data blocks.

NOTE: If one hard drive has a larger capacity than other hard drives in the same array, the extra capacity is wasted because it cannot be used by the array.

Fault tolerance

Drive failure, although rare, is potentially catastrophic. For example, using simple striping as shown in [Figure 32 \(page 54\)](#), failure of any hard drive leads to failure of all logical drives in the same array, and hence to data loss.

To protect against data loss from hard drive failure, storage systems should be configured with fault tolerance. HP recommends adhering to RAID 5 configurations.

The table below summarizes the important features of the different kinds of RAID supported by the Smart Array controllers. The decision chart in the following table can help determine which option is best for different situations.

Table 3 Summary of RAID methods

	RAID 0 Striping (no fault tolerance)	RAID 1+0 Mirroring	RAID 5 Distributed Data Guarding	RAID 6 (ADG)
Maximum number of hard drives	N/A	N/A	14	Storage system dependent
Tolerant of single hard drive failure?	No	Yes	Yes	Yes
Tolerant of multiple simultaneous hard drive failures?	No	If the failed drives are not mirrored to each other	No	Yes (two drives can fail)

Online spares

Further protection against data loss can be achieved by assigning an online spare (or hot spare) to any configuration except RAID 0. This hard drive contains no data and is contained within the same storage subsystem as the other drives in the array. When a hard drive in the array fails, the controller can then automatically rebuild information that was originally on the failed drive onto the online spare. This quickly restores the system to full RAID level fault tolerance protection. However, unless RAID Advanced Data Guarding (ADG) is being used, which can support two drive failures in an array, in the unlikely event that a third drive in the array should fail while data is being rewritten to the spare, the logical drive still fails.

Logical storage elements

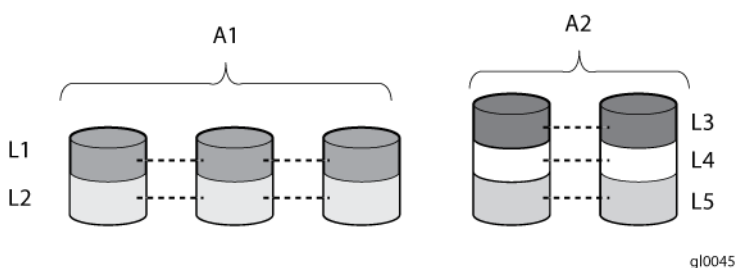
Logical storage elements consist of those components that translate the physical storage elements to file system elements. The storage system uses the Window Disk Management utility to manage the various types of disks presented to the file system. There are two types of LUN presentation: basic disk and dynamic disk. Each of these types of disk has special features that enable different types of management. The HP Pool Manager is used to create, edit, grow, shrink and delete storage pools.

Logical drives (LUNs)

While an array is a physical grouping of hard drives, a logical drive consists of components that translate physical storage elements into file system elements. A LUN may also be referred to as a virtual disk.

It is important to note that a LUN may span all physical drives within a storage controller subsystem, but cannot span multiple storage controller subsystems.

Figure 33 Two arrays (A1, A2) and five logical drives (L1 through L5) spread over five physical drives



NOTE: This type of configuration may not apply to all storage systems and serves only as an example.

Through the use of basic disks, you can create primary partitions or extended partitions. Partitions can only encompass one LUN. Through the use of dynamic disks, you can create volumes that span multiple LUNs. You can use the Windows Disk Management utility to convert disks to dynamic and back to basic and to manage the volumes residing on dynamic disks. Other options include the ability to delete, extend, mirror, and repair these elements.

Partitions

Partitions exist as either primary partitions or extended partitions. The master boot record (MBR) disk partitioning style supports volumes up to 2 terabytes in size and up to 4 primary partitions per disk (or three primary partitions, one extended partition, and unlimited logical drives). Extended partitions allow the user to create multiple logical drives. These partitions or logical disks can be assigned drive letters or be used as mount points on existing disks. If mount points are used, it should be noted that Services for UNIX (SFU) does not support mount points at this time. The use of mount points in conjunction with NFS shares is not supported.

The GUID partition table (GPT) disk partitioning style supports volumes up to 18 exabytes in size and up to 128 partitions per disk. Unlike MBR partitioned disks, data critical to platform operation is located in partitions instead of unpartitioned or hidden sectors. In addition, GPT partitioned disks have redundant primary and backup partition tables for improved partition data structure integrity.

On the **Volumes** tab in the disk properties dialog box in Disk Management, disks with the GPT partitioning style are displayed as GUID Partition Table (GPT) disks, and disks with the MBR partitioning style are displayed as Master Boot Record (MBR) disks.

Volumes

When planning dynamic disks and volumes, there is a limit to the amount of growth a single volume can undergo. Volumes are limited in size and can have no more than 32 separate LUNs, with each LUN not exceeding 2 terabytes (TB), and volumes totaling no more than 64 TB of disk space.

The RAID level of the LUNs included in a volume must be considered. All of the units that make up a volume should have the same high-availability characteristics. In other words, the units should all be of the same RAID level. For example, it would not be a good practice to include both a RAID 1+0 and a RAID 5 array in the same volume set. By keeping all the units the same, the entire volume retains the same performance and high-availability characteristics, making managing and maintaining the volume much easier. If a dynamic disk goes offline, the entire volume dependent on the one or more dynamic disks is unavailable. There could be a potential for data loss depending on the nature of the failed LUN.

Volumes are created out of the dynamic disks, and can be expanded on the fly to extend over multiple dynamic disks if they are spanned volumes. However, after a type of volume is selected, it cannot be altered. For example, a spanning volume cannot be altered to a mirrored volume without deleting and recreating the volume, unless it is a simple volume. Simple volumes can be mirrored or converted to spanned volumes. Fault-tolerant disks cannot be extended. Therefore, selection of the volume type is important. The same performance characteristics on numbers of reads and writes apply when using fault-tolerant configurations, as is the case with controller-based RAID. These volumes can also be assigned drive letters or be mounted as mount points off existing drive letters.

The administrator should carefully consider how the volumes will be carved up and what groups or applications will be using them. For example, putting several storage-intensive applications or groups into the same dynamic disk set would not be efficient. These applications or groups would be better served by being divided up into separate dynamic disks, which could then grow as their space requirements increased, within the allowable growth limits.

File system elements

File system elements are composed of the folders and subfolders that are created under each logical storage element (partitions, logical disks, and volumes). Folders are used to further subdivide the

available file system, providing another level of granularity for management of the information space. Each of these folders can contain separate permissions and share names that can be used for network access. Folders can be created for individual users, groups, projects, and so on.

File sharing elements

The storage system supports several file sharing protocols, including Distributed File System (DFS), Network File System (NFS), File Transfer Protocol (FTP), Hypertext Transfer Protocol (HTTP), and Microsoft Server Message Block (SMB). On each folder or logical storage element, different file sharing protocols can be enabled using specific network names for access across a network to a variety of clients. Permissions can then be granted to those shares based on users or groups of users in each of the file sharing protocols.

Volume Shadow Copy Service overview

The Volume Shadow Copy Service (VSS) provides an infrastructure for creating point-in-time snapshots (shadow copies) of volumes. VSS supports 64 shadow copies per volume.

Shadow Copies of Shared Folders resides within this infrastructure, and helps alleviate data loss by creating shadow copies of files or folders that are stored on network file shares at pre-determined time intervals. In essence, a shadow copy is a previous version of the file or folder at a specific point in time.

By using shadow copies, a storage system can maintain a set of previous versions of all files on the selected volumes. End users access the file or folder by using a separate client add-on program, which enables them to view the file in Windows Explorer.

Shadow copies should not replace the current backup, archive, or business recovery system, but they can help to simplify restore procedures. For example, shadow copies cannot protect against data loss due to media failures; however, recovering data from shadow copies can reduce the number of times needed to restore data from tape.

Using storage elements

The last step in creating the element is determining its drive letter or mount point and formatting the element. Each element created can exist as a drive letter, assuming one is available, and/or as mount points on an existing folder or drive letter. Either method is supported. However, mount points cannot be used for shares that will be shared using Microsoft Services for Unix. They can be set up with both but the use of the mount point in conjunction with NFS shares causes instability with the NFS shares.

Formats consist of NTFS, FAT32, and FAT. All three types can be used on the storage system. However, VSS can only use volumes that are NTFS formatted. Also, quota management is possible only on NTFS.

Network adapter teaming

Network adapter teaming is software-based technology used to increase a server's network availability and performance. Teaming enables the logical grouping of physical adapters in the same server (regardless of whether they are embedded devices or Peripheral Component Interconnect (PCI) adapters) into a virtual adapter. This virtual adapter is seen by the network and server-resident network-aware applications as a single network connection.

Management tools

HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device

management capabilities that consolidate and integrate management data from HP and third-party devices.

-
- ❗ **IMPORTANT:** You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SCSI hard drives, and memory modules.
-

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (<http://www.hp.com/go/hpsim>).

Management Agents

Management Agents provide the information to enable fault, performance, and configuration management. The agents allow easy manageability of the server through HP SIM software, and thirdparty SNMP management platforms. Management Agents are installed with every SmartStart assisted installation or can be installed through the HP PSP. The Systems Management homepage provides status and direct access to in-depth subsystem information by accessing data reported through the Management Agents. For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP website (<http://www.hp.com/servers/manage>).

5 File server management

This chapter describes the tasks and utilities that play a role in file server management.

File services management

Information about the storage system in a SAN environment is provided in the SAN Design Reference Guide, located on the HP web site at www.hp.com/go/SDGManuals.

Storage management utilities

The storage management utilities preinstalled on the storage system include the HP Array Configuration Utility (ACU). Initially, you can use the Provision Storage tasks to configure storage. For more information, see “Provisioning storage” (page 37).

Array management utilities

Storage devices for RAID arrays and LUNs are created and managed using the array management utilities mentioned previously. For HP Smart Arrays use the ACU.

NOTE: The ACU is used to configure and manage array-based storage. Software RAID-based storage systems use Microsoft Disk Manager to manage storage. You need administrator or root privileges to run the ACU.

Array Configuration Utility

The HP ACU supports the Smart Array controllers and hard drives installed on the storage system. To open the ACU from the storage system desktop:

NOTE: If this is the first time that the ACU is being run, you will be prompted to select the Execution Mode for ACU. Selecting Local Application Mode allows you to run the ACU from a Remote Desktop, remote console, or storage system web access mode. Remote service mode allows you to access the ACU from a remote browser.

1. Click **Start** and then click ↓. Select **HP System Tools→HP Array Configuration Utility**.
2. If the Execution Mode for ACU is set to Remote Mode, log on to the HP System Management Homepage. The default user name is **Administrator** and the password is the Windows Storage Server 2012 or 2012 R2 administrator password that is set by the storage system administrator. The password is case-sensitive.

To open the ACU in browser mode:

NOTE: Confirm that the ACU Execution Mode is set to remote service.

1. Open a browser and enter the server name or IP address of the destination server. For example, <http://servername:2301> or <http://192.0.0.1:2301>.
2. Log on to the HP System Management Homepage.
3. Click **Array Configuration Utility** on the left side of the window. The ACU opens and identifies the controllers that are connected to the system.

Some ACU guidelines to consider:

- Do not modify the single logical drive of the storage system; it is configured for the storage system operating system.
- Spanning more than 14 disks with a RAID 5 volume is not recommended.
- Designate spares for RAID sets to provide greater protection against failures.
- RAID sets cannot span controllers.

- A single array can contain multiple logical drives of varying RAID settings.
- Extending and expanding arrays and logical drives is supported.

The *HP Array Configuration Utility User Guide* is available for download at <http://www.hp.com/support/manuals>.

Disk Management utility

The Disk Management tool is a system utility for managing hard disks and the volumes, or partitions, that they contain. Disk Management is used to initialize disks, create volumes, format volumes with the FAT, FAT32, or NTFS file systems, and create fault-tolerant disk systems. Most disk-related tasks can be performed in Disk Management without restarting the system or interrupting users. Most configuration changes take effect immediately. A complete online help facility is provided with the Disk Management utility for assistance in using the product.

NOTE:

- When the Disk Management utility is accessed through a Remote Desktop connection, this connection can only be used to manage disks and volumes on the server. Using the Remote Desktop connection for other operations during an open session closes the session.
 - When closing Disk Management through a Remote Desktop connection, it may take a few moments for the remote session to log off.
-

Guidelines for managing disks and volumes

- The single logical drive is configured for the storage system operating system and should not be altered in any manner. If this logical drive is altered, the system recovery process may not function properly when using the System Recovery DVD. Do not tamper with the local C: volume. This is a reserved volume and must be maintained as it exists.
- HP does not recommend spanning array controllers with dynamic volumes. The use of software RAID-based dynamic volumes is not recommended. Use the array controller instead; it is more efficient.
- Use meaningful volume labels with the intended drive letter embedded in the volume label, if possible. (For example, volume e: might be named "Disk E:.") Volume labels often serve as the only means of identification.
- Record all volume labels and drive letters in case the system needs to be restored.
- When managing basic disks, only the last partition on the disk can be extended unless the disk is changed to dynamic.
- Basic disks can be converted to dynamic, but cannot be converted back to basic without deleting all data on the disk.
- Basic disks can contain up to four primary partitions (or three primary partitions and one extended partition).
- Format drives with a 16 K allocation size for best support of shadow copies, performance, and defragmentation.
- NTFS formatted drives are recommended because they provide the greatest level of support for shadow copies, encryption, and compression.
- Only basic disks can be formatted as FAT or FAT32.
- Read the online Disk Management help found in the utility.

Scheduling defragmentation

Defragmentation is the process of analyzing local volumes and consolidating fragmented files and folders so that each occupies a single, contiguous space on the volume. This improves file system

performance. Because defragmentation consolidates files and folders, it also consolidates the free space on a volume. This reduces the likelihood that new files will be fragmented.

Defragmentation for a volume can be scheduled to occur automatically at convenient times. Defragmentation can also be done once, or on a recurring basis.

NOTE: Scheduling defragmentation to run no later than a specific time prevents the defragmentation process from running later than that time. If the defragmentation process is running when the time is reached, the process is stopped. This setting is useful to ensure that the defragmentation process ends before the demand for server access is likely to increase.

If defragmenting volumes on which shadow copies are enabled, use a cluster (or allocation unit) size of 16 KB or larger during the format. Otherwise defragmentation registers as a change by the Shadow Copy process. This increase in the number of changes forces Shadow Copy to delete snapshots as the limit for the cache file is reached.

CAUTION: Allocation unit size cannot be altered without reformatting the drive. Data on a reformatted drive cannot be recovered.

For more information about disk defragmentation, read the online help.

Disk quotas

Disk quotas track and control disk space use in volumes.

NOTE: To limit the size of a folder or share, see [“Quota management” \(page 82\)](#).

Configure the volumes on the server to perform the following tasks:

- Prevent further disk space use and log an event when a user exceeds a specified disk space limit.
- Log an event when a user exceeds a specified disk space warning level.

When enabling disk quotas, it is possible to set both the disk quota limit and the disk quota warning level. The disk quota limit specifies the amount of disk space a user is allowed to use. The warning level specifies the point at which a user is nearing his or her quota limit. For example, a user's disk quota limit can be set to 50 megabytes (MB), and the disk quota warning level to 45 MB. In this case, the user can store no more than 50 MB on the volume. If the user stores more than 45 MB on the volume, the disk quota system logs a system event.

In addition, it is possible to specify that users can exceed their quota limit. Enabling quotas and not limiting disk space use is useful to still allow users access to a volume, but track disk space use on a per-user basis. It is also possible to specify whether or not to log an event when users exceed either their quota warning level or their quota limit.

When enabling disk quotas for a volume, volume usage is automatically tracked from that point forward, but existing volume users have no disk quotas applied to them. Apply disk quotas to existing volume users by adding new quota entries on the Quota Entries page.

NOTE: When enabling disk quotas on a volume, any users with write access to the volume who have not exceeded their quota limit can store data on the volume. The first time a user writes data to a quota-enabled volume, default values for disk space limit and warning level are automatically assigned by the quota system.

For more information about disk quotas, read the online help.

Adding storage

Expansion is the process of adding physical disks to an array that has already been configured. Extension is the process of adding new storage space to an existing logical drive on the same array, usually after the array has been expanded.

Storage growth may occur in three forms:

- Extend unallocated space from the original logical disks or LUNs.
- Alter LUNs to contain additional storage.
- Add new LUNs to the system.

The additional space is then extended through a variety of means, depending on which type of disk structure is in use.

Expanding storage

Expansion is the process of adding physical disks to an array that has already been configured. The logical drives (or volumes) that exist in the array before the expansion takes place are unchanged, because only the amount of free space in the array changes. The expansion process is entirely independent of the operating system.

NOTE: See your storage array hardware user documentation for further details about expanding storage on the array.

Extending storage using Windows Storage Utilities

Volume extension grows the storage space of a logical drive. During this process, the administrator adds new storage space to an existing logical drive on the same array, usually after the array has been expanded. An administrator may have gained this new storage space by either expansion or by deleting another logical drive on the same array. Unlike drive expansion, the operating system must be aware of changes to the logical drive size.

You extend a volume to:

- Increase raw data storage
- Improve performance by increasing the number of spindles in a logical drive volume
- Change fault-tolerance (RAID) configurations

For more information about RAID levels, see the *Smart Array Controller User Guide*, or the document titled *Assessing RAID ADG vs. RAID 5 vs. RAID 1+0*. Both are available at the Smart Array controller web page or at <http://h18000.www1.hp.com/products/servers/proliantstorage/arraycontrollers/documentation.html>.

Extend volumes using Disk Management

The Disk Management snap-in provides management of hard disks, volumes or partitions. It can be used to extend a dynamic volume only.

NOTE: Disk Management cannot be used to extend basic disk partitions.

Guidelines for extending a dynamic volume:

- Use the Disk Management utility.
- You can extend a volume only if it does not have a file system or if it is formatted NTFS.
- You cannot extend volumes formatted using FAT or FAT32.
- You cannot extend striped volumes, mirrored volumes, or RAID 5 volumes.

For more information, see the Disk Management online help.

Volume shadow copies

NOTE: Select storage systems can be deployed in a clustered as well as a non-clustered configuration. This chapter discusses using shadow copies in a non-clustered environment.

The Volume Shadow Copy Service provides an infrastructure for creating point-in-time snapshots (shadow copies) of volumes. Shadow Copy supports 64 shadow copies per volume.

A shadow copy contains previous versions of the files or folders contained on a volume at a specific point in time. While the shadow copy mechanism is managed at the server, previous versions of files and folders are only available over the network from clients, and are seen on a per folder or file level, and not as an entire volume.

The shadow copy feature uses data blocks. As changes are made to the file system, the Shadow Copy Service copies the original blocks to a special cache file to maintain a consistent view of the file at a particular point in time. Because the snapshot only contains a subset of the original blocks, the cache file is typically smaller than the original volume. In the snapshot's original form, it takes up no space because blocks are not moved until an update to the disk occurs.

By using shadow copies, a storage system can maintain a set of previous versions of all files on the selected volumes. End users access the file or folder by using a separate client add-on program, which enables them to view the file in Windows Explorer. Accessing previous versions of files, or shadow copies, enables users to:

- Recover files that were accidentally deleted. Previous versions can be opened and copied to a safe location.
- Recover from accidentally overwriting a file. A previous version of that file can be accessed.
- Compare several versions of a file while working. Use previous versions to compare changes between two versions of a file.

Shadow copies cannot replace the current backup, archive, or business recovery system, but they can help to simplify restore procedures. Because a snapshot only contains a portion of the original data blocks, shadow copies cannot protect against data loss due to media failures. However, the strength of snapshots is the ability to instantly recover data from shadow copies, reducing the number of times needed to restore data from tape.

Shadow copy planning

Before setup is initiated on the server and the client interface is made available to end users, consider the following:

- From what volume will shadow copies be taken?
- How much disk space should be allocated for shadow copies?
- Will separate disks be used to store shadow copies?
- How frequently will shadow copies be made?

Identifying the volume

Shadow copies are taken for a complete volume, but not for a specific directory. Shadow copies work best when the server stores user files, such as documents, spreadsheets, presentations, graphics, or database files.

NOTE: Shadow copies should not be used to provide access to previous versions of application or e-mail databases.

Shadow copies are designed for volumes that store user data such as home directories and My Documents folders that are redirected by using Group Policy or other shared folders in which users store data.

Shadow copies work with compressed or encrypted files and retain whatever permissions were set on the files when the shadow copies were taken. For example, if a user is denied permission to read a file, that user would not be able to restore a previous version of the file, or be able to read the file after it has been restored.

Although shadow copies are taken for an entire volume, users must use shared folders to access shadow copies. Administrators on the local server must also specify the `\\servername\sharename` path to access shadow copies. If administrators or end users want to access a previous version of a file that does not reside in a shared folder, the administrator must first share the folder.

NOTE: Shadow copies are available only on NTFS, not FAT or FAT32 volumes.

Files or folders that are recorded by using Shadow Copy appear static, even though the original data is changing.

Allocating disk space

When determining the amount of space to allocate for storing shadow copies, consider both the number and size of files that are being copied, as well as the frequency of changes between copies. For example, 100 files that only change monthly require less storage space than 10 files that change daily. If the frequency of changes to each file is greater than the amount of space allocated to storing shadow copies, no shadow copy is created.

Administrators should also consider user expectations of how many versions they will want to have available. End users might expect only a single shadow copy to be available, or they might expect three days or three weeks worth of shadow copies. The more shadow copies users expect, the more storage space administrators must allocate for storing them.

Setting the limit too low also affects backup programs that use shadow copy technology because these programs are also limited to using the amount of disk space specified by administrators.

NOTE: Regardless of the volume space that is allocated for shadow copies, there is a maximum of 64 shadow copies for any volume. When the 65th shadow copy is taken, the oldest shadow copy is purged.

The minimum amount of storage space that can be specified is 350 megabytes (MB). The default storage size is 10 percent of the source volume (the volume being copied). If the shadow copies are stored on a separate volume, change the default to reflect the space available on the *storage* volume instead of the *source* volume. Remember that when the storage limit is reached, older versions of the shadow copies are deleted and cannot be restored.

⚠ CAUTION: To change the storage volume, shadow copies must be deleted. The existing file change history that is kept on the original storage volume is lost. To avoid this problem, verify that the storage volume that is initially selected is large enough.

Identifying the storage area

To store the shadow copies of another volume on the same file server, a volume can be dedicated on separate disks. For example, if user files are stored on `H:\`, another volume such as `S:\` can be used to store the shadow copies. Using a separate volume on separate disks provides better performance and is recommended for heavily used storage systems.

If a separate volume will be used for the storage area (where shadow copies are stored), the maximum size should be changed to **No Limit** to reflect the space available on the storage area volume instead of the source volume (where the user files are stored).

Disk space for shadow copies can be allocated on either the same volume as the source files or a different volume. There is a trade-off between ease of use and maintenance versus performance and reliability that the system administrator must consider.

By keeping the shadow copy on the same volume, there is a potential gain in ease of setup and maintenance; however, there may be a reduction in performance and reliability.

- △ **CAUTION:** If shadow copies are stored on the same volume as the user files, note that a burst of disk input/output (I/O) can cause all shadow copies to be deleted. If the sudden deletion of shadow copies is unacceptable to administrators or end users, it is best to use a separate volume on separate disks to store shadow copies.

Determining creation frequency

The more frequently shadow copies are created, the more likely that end users will get the version that they want. However, with a maximum of 64 shadow copies per volume, there is a trade-off between the frequency of making shadow copies and the amount of time that the earlier files will be available.

By default, the storage system creates shadow copies at 0700 and 1200, Monday through Friday. However, these settings are easily modified by the administrator so that the shadow copy schedule can better accommodate end user needs.

Shadow copies and drive defragmentation

When running Disk Defragmenter on a volume with shadow copies activated, all or some of the shadow copies may be lost, starting with the oldest shadow copies.

If defragmenting volumes on which shadow copies are enabled, use a cluster (or allocation unit) size of 16 KB or larger. Using this allocation unit size reduces the number of copy outs occurring on the snapshot. Otherwise, the number of changes caused by the defragmentation process can cause shadow copies to be deleted faster than expected. Note, however, that NTFS compression is supported only if the cluster size is 4 KB or smaller.

NOTE: To check the cluster size of a volume, use the `fsutil fsinfo ntfsinfo` command. To change the cluster size on a volume that contains data, back up the data on the volume, reformat it using the new cluster size, and then restore the data.

Mounted drives

A mounted drive is a local volume attached to an empty folder (called a mount point) on an NTFS volume. When enabling shadow copies on a volume that contains mounted drives, the mounted drives are not included when shadow copies are taken. In addition, if a mounted drive is shared and shadow copies are enabled on it, users cannot access the shadow copies if they traverse from the host volume (where the mount point is stored) to the mounted drive.

For example, assume there is a folder `F:\data\users`, and the `Users` folder is a mount point for `G:\`. If shadow copies are enabled on both `F:\` and `G:\`, `F:\data` is shared as `\\server1\data`, and `G:\data\users` is shared as `\\server1\users`. In this example, users can access previous versions of `\\server1\data` and `\\server1\users` but not `\\server1\data\users`.

Managing shadow copies

The `vssadmin` tool provides a command line capability to create, list, resize, and delete volume shadow copies.

The system administrator can make shadow copies available to end users through a feature called "Shadow Copies for Shared Folders." The administrator uses the Properties menu (see [Figure 34 \(page 66\)](#)) to turn on the Shadow Copies feature, select the volumes to be copied, and determine the frequency with which shadow copies are made.

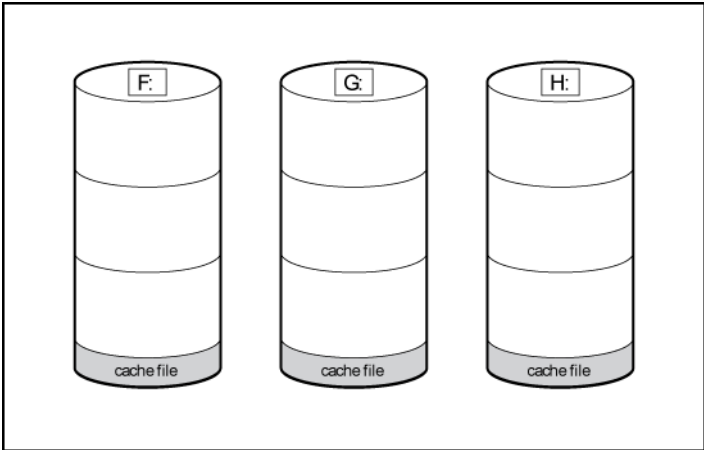
Figure 34 System administrator view of Shadow Copies for Shared Folders



The shadow copy cache file

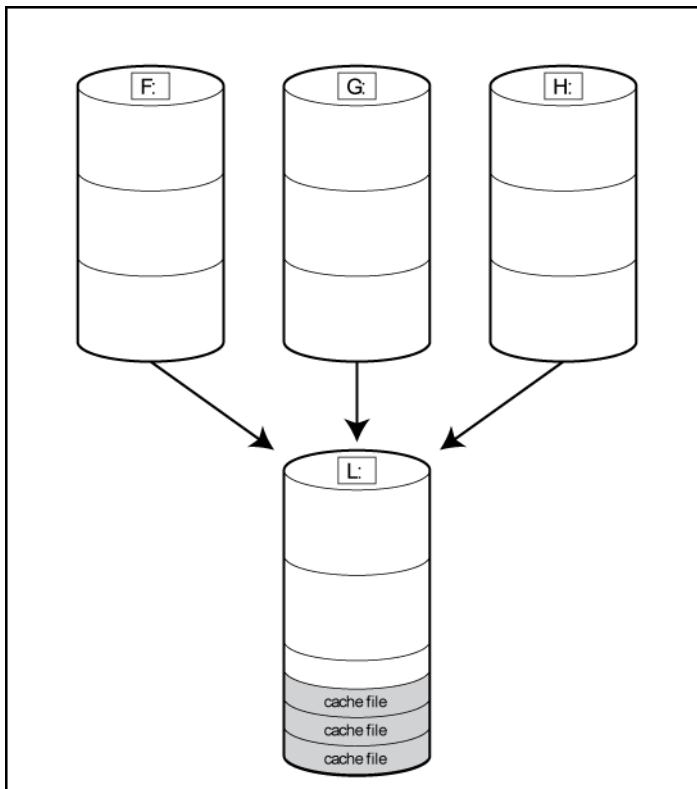
The default shadow copy settings allocate 10 percent of the source volume being copied (with a minimum of 350 MB), and store the shadow copies on the same volume as the original volume. (See [Figure 35 \(page 66\)](#)). The cache file is located in a hidden protected directory titled "System Volume Information" off of the root of each volume for which shadow copy is enabled.

Figure 35 Shadow copies stored on a source volume



The cache file location can be altered to reside on a dedicated volume separate from the volumes containing files shares. (See [Figure 36 \(page 67\)](#)).

Figure 36 Shadow copies stored on a separate volume



The main advantage to storing shadow copies on a separate volume is ease of management and performance. Shadow copies on a source volume must be continually monitored and can consume space designated for file sharing. Setting the limit too high takes up valuable storage space. Setting the limit too low can cause shadow copies to be purged too soon, or not created at all. By storing shadow copies on a separate volume space, limits can generally be set higher, or set to No Limit. See the online help for instructions on altering the cache file location.

CAUTION: If the data on the separate volume L: is lost, the shadow copies cannot be recovered.

Enabling and creating shadow copies

Enabling shadow copies on a volume automatically results in several actions:

- Creates a shadow copy of the selected volume.
- Sets the maximum storage space for the shadow copies.
- Schedules shadow copies to be made at 7 a.m. and 12 noon on weekdays.

NOTE: Creating a shadow copy only makes one copy of the volume; it does not create a schedule.

NOTE: After the first shadow copy is created, it cannot be relocated. Relocate the cache file by altering the cache file location under Properties prior to enabling shadow copy. See [Viewing shadow copy properties \(page 68\)](#).

Viewing a list of shadow copies

To view a list of shadow copies on a volume:

1. Access Disk Management.
2. Select the volume or logical drive, then right-click on it.
3. Select **Properties**.
4. Select **Shadow Copies** tab.

All shadow copies are listed, sorted by the date and time they were created.

NOTE: It is also possible to create new shadow copies or delete shadow copies from this page.

Set schedules

Shadow copy schedules control how frequently shadow copies of a volume are made. There are a number of factors that can help determine the most effective shadow copy schedule for an organization. These include the work habits and locations of the users. For example, if users do not all live in the same time zone, or they work on different schedules, it is possible to adjust the daily shadow copy schedule to allow for these differences.

Do not schedule shadow copies more frequently than once per hour.

NOTE: When deleting a shadow copy schedule, that action has no effect on existing shadow copies.

Viewing shadow copy properties

The Shadow Copy Properties page lists the number of copies, the date and time the most recent shadow copy was made, and the maximum size setting.

⚠ **CAUTION:** Use caution when reducing the size limit for all shadow copies. When the size is set to less than the total size currently used for all shadow copies, enough shadow copies are deleted to reduce the total size to the new limit. A shadow copy cannot be recovered after it has been deleted.

NOTE: For volumes where shadow copies do not exist currently, it is possible to change the location of the cache file. Managing the cache files on a separate disk is recommended.

Redirecting shadow copies to an alternate volume

❗ **IMPORTANT:** Shadow copies must be initially disabled on the volume before redirecting to an alternate volume. If shadow copies are enabled and you disable them, a message appears informing you that all existing shadow copies on the volume will be permanently deleted.

To redirect shadow copies to an alternate volume:

1. Access Disk Management.
2. Select the volume or logical drive, then right-click on it.
3. Select **Properties**.
4. Select the **Shadow Copies** tab.
5. Select the volume that you want to redirect shadow copies from and ensure that shadow copies are disabled on that volume; if enabled, click **Disable**.
6. Click **Settings**.
7. In the **Located on this volume** field, select an available alternate volume from the list.

NOTE: To change the default shadow copy schedule settings, click **Schedule**.

8. Click **OK**.
9. On the **Shadow Copies** tab, ensure that the volume is selected, and then click **Enable**.

Shadow copies are now scheduled to be made on the alternate volume.

Disabling shadow copies

When shadow copies are disabled on a volume, all existing shadow copies on the volume are deleted as well as the schedule for making new shadow copies.

- ⚠ **CAUTION:** When the Shadow Copies Service is disabled, all shadow copies on the selected volumes are deleted. Once deleted, shadow copies cannot be restored.

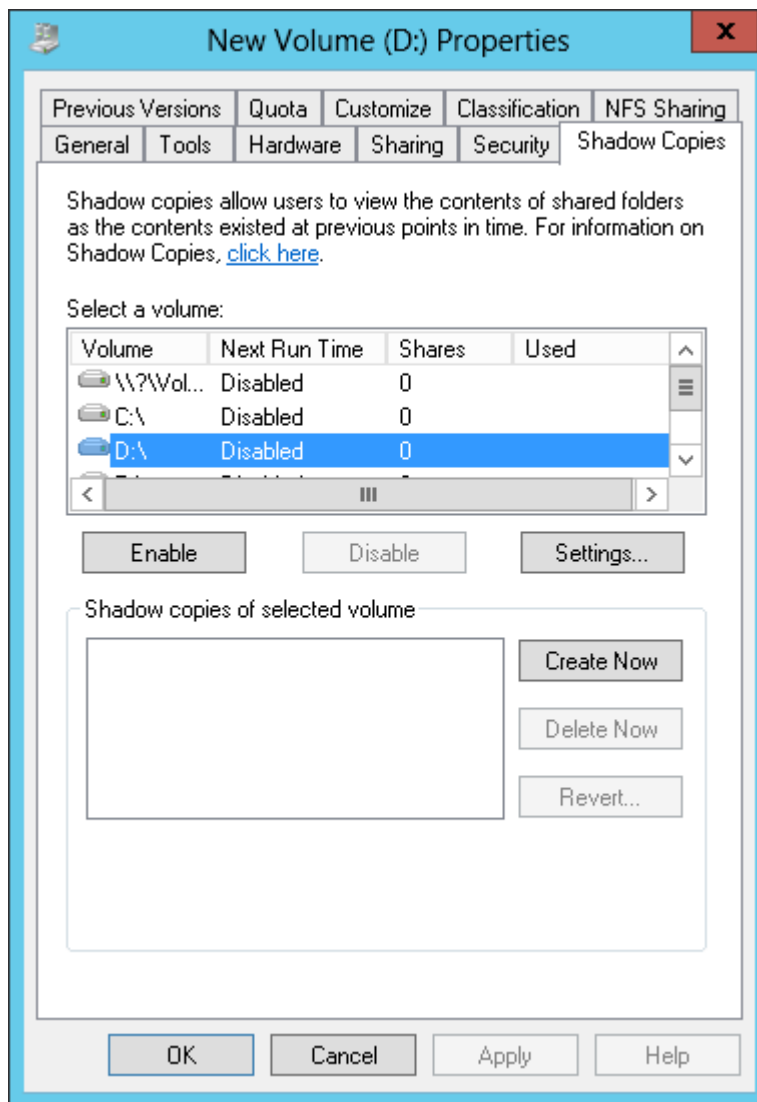
Managing shadow copies from the storage system desktop

To access shadow copies from the storage system desktop:

The storage system desktop can be accessed by using Remote Desktop to manage shadow copies.

1. Select **Start**→**Computer**.
2. Right-click the volume name, and select **Properties**.
3. Click the **Shadow Copies** tab. See [Figure 37 \(page 69\)](#).

Figure 37 Accessing shadow copies from My Computer



Shadow Copies for Shared Folders

Shadow copies are accessed over the network by supported clients and protocols. There are two sets of supported protocols, SMB and NFS. All other protocols are not supported, including HTTP, FTP, AppleTalk, and NetWare Shares. For SMB support, a client-side application denoted as

Shadow Copies for Shared Folders is required. The client-side application is available for Windows XP, Windows 2000 SP3+, and later operating system versions.

No additional software is required to enable UNIX users to independently retrieve previous versions of files stored on NFS shares.

NOTE: Shadow Copies for Shared Folders supports retrieval only of shadow copies of network shares. It does not support retrieval of shadow copies of local folders.

NOTE: Shadow Copies for Shared Folders clients are not available for HTTP, FTP, AppleTalk, or NetWare shares. Consequently, users of these protocols cannot use Shadow Copies for Shared Folders to independently retrieve previous versions of their files. However, administrators can take advantage of Shadow Copies for Shared Folders to restore files for these users.

SMB shadow copies

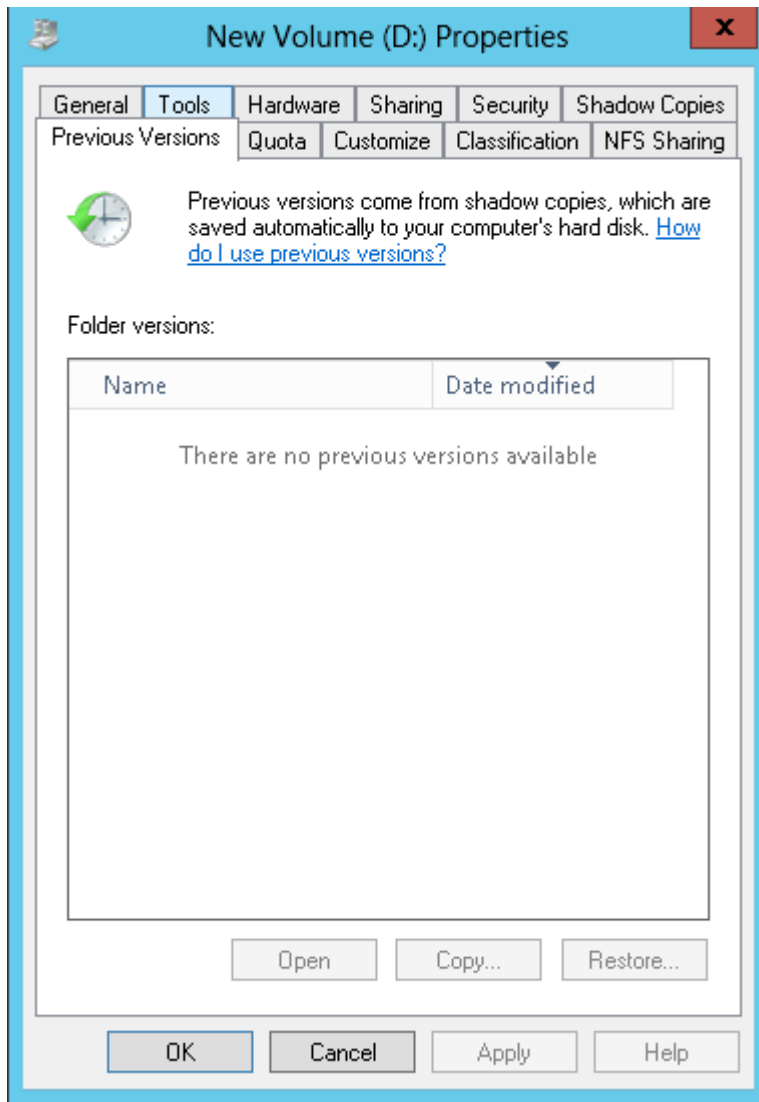
Windows users can independently access previous versions of files stored on SMB shares by using the Shadow Copies for Shared Folders client. After the Shadow Copies for Shared Folders client is installed on the user's computer, the user can access shadow copies for a share by right-clicking on the share to open its Properties window, clicking the **Previous Versions** tab, and then selecting the desired shadow copy. Users can view, copy, and restore all available shadow copies.

Shadow Copies for Shared Folders preserves the permissions set in the access control list (ACL) of the original folders and files. Consequently, users can only access shadow copies for shares to which they have access. In other words, if a user does not have access to a share, he also does not have access to the share's shadow copies.

The Shadow Copies for Shared Folders client pack installs a **Previous Versions** tab in the **Properties** window of files and folders on network shares.

Users access shadow copies with Windows Explorer by selecting **Open**, **Copy**, or **Restore** from the **Previous Versions** tab. (See [Figure 38 \(page 71\)](#)). Both individual files and folders can be restored.

Figure 38 Client GUI



When users view a network folder hosted on the storage system for which shadow copies are enabled, old versions (prior to the snapshot) of a file or directory are available. Viewing the properties of the file or folder presents users with the folder or file history—a list of read-only, point-in-time copies of the file or folder contents that users can then open and explore like any other file or folder. Users can view files in the folder history, copy files from the folder history, and so on.

NFS shadow copies

UNIX users can independently access previous versions of files stored on NFS shares via the NFS client; no additional software is required. Server for NFS exposes each of a share's available shadow copies as a pseudo-subdirectory of the share. Each of these pseudo-subdirectories is displayed in exactly the same way as a regular subdirectory is displayed.

The name of each pseudo-subdirectory reflects the creation time of the shadow copy, using the format `.@GMT-YYYY.MM.DD-HH:MM:SS`. To prevent common tools from needlessly enumerating the pseudo-subdirectories, the name of each pseudo-subdirectory begins with the dot character, thus rendering it hidden.

The following example shows an NFS share named "NFSShare" with three shadow copies, taken on April 27, 28, and 29 of 2003 at 4 a.m.

NFSShare

.@GMT-2003.04.27-04:00:00
.@GMT-2003.04.28-04:00:00
.@GMT-2003.04.29-04:00:00

Access to NFS shadow copy pseudo-subdirectories is governed by normal access-control mechanisms using the permissions stored in the file system. Users can access only those shadow copies to which they have read access at the time the shadow copy is taken. To prevent users from modifying shadow copies, all pseudo-subdirectories are marked read-only, regardless of the user's ownership or access rights, or the permissions set on the original files.

Server for NFS periodically polls the system for the arrival or removal of shadow copies and updates the root directory view accordingly. Clients then capture the updated view the next time they issue a directory read on the root of the share.

Recovery of files or folders

There are three common situations that may require recovery of files or folders:

- Accidental file deletion, the most common situation
- Accidental file replacement, which may occur if a user selects **Save** instead of **Save As**
- File corruption

It is possible to recover from all of these scenarios by accessing shadow copies. There are separate steps for accessing a file compared to accessing a folder.

Recovering a deleted file or folder

To recover a deleted file or folder within a folder:

1. Access to the folder where the deleted file was stored.
2. Position the cursor over a blank space in the folder. If the cursor hovers over a file, that file is selected.
3. Right-click, select **Properties** from the bottom of the menu, and then click the **Previous Versions** tab.
4. Select the version of the folder that contains the file before it was deleted, and then click **Open**.
5. View the folder and select the file or folder to recover. The view may be navigated multiple folders deep.
6. Click **Restore** to restore the file or folder to its original location. Click **Copy** to allow the placement of the file or folder to a new location.

Recovering an overwritten or corrupted file

Recovering an overwritten or corrupted file is easier than recovering a deleted file because the file itself can be right-clicked instead of the folder. To recover an overwritten or corrupted file:

1. Right-click the overwritten or corrupted file, and then click **Properties**.
2. Click **Previous Versions**.
3. To view the old version, click **Open**. To copy the old version to another location, click **Copy** to replace the current version with the older version, click **Restore**.

Recovering a folder

To recover a folder:

1. Position the cursor so that it is over a blank space in the folder to be recovered. If the cursor hovers over a file, that file is selected.
2. Right-click, select **Properties** from the bottom of the menu, and then click the **Previous Versions** tab.

3. Click either **Copy** or **Restore**.

Clicking **Restore** enables the user to recover everything in that folder as well as all subfolders. Clicking **Restore** does not delete any files.

Backup and shadow copies

Shadow copies are only available on the network via the client application, and only at a file or folder level as opposed to the entire volume. Hence, the standard backup associated with a volume backup will not work to back up the previous versions of the file system. To answer this particular issue, shadow copies are available for backup in two situations. If the backup software in question supports the use of shadow copies and can communicate with underlying block device, it is supported, and the previous version of the file system will be listed in the backup application as a complete file system snapshot. If the built-in backup application NTBackup is used, the backup software forces a snapshot, and then uses the snapshot as the means for backup. The user is unaware of this activity and it is not self-evident although it does address the issue of open files.

Shadow Copy Transport

Shadow Copy Transport provides the ability to transport data on a Storage Area Network (SAN). With a storage array and a VSS-aware hardware provider, it is possible to create a shadow copy on one server and import it on another server. This process, essentially “virtual” transport, is accomplished in a matter of minutes, regardless of the size of the data.

A shadow copy transport can be used for a number of purposes, including:

- Tape backups

An alternative to traditional backup to tape processes is transport of shadow copies from the production server onto a backup server, where they can then be backed up to tape. Like the other two alternatives, this option removes backup traffic from the production server. While some backup applications might be designed with the hardware provider software that enables transport, others are not. The administrator should determine whether or not this functionality is included in the backup application.

- Data mining

The data in use by a particular production server is often useful to different groups or departments within an organization. Rather than add additional traffic to the production server, a shadow copy of the data can be made available through transport to another server. The shadow copy can then be processed for different purposes, without any performance impact on the original server.

The transport process is accomplished through a series of DISKRAID command steps:

1. Create a shadow copy of the source data on the source server (read-only).
2. Mask off (hide) the shadow copy from the source server.
3. Unmask the shadow copy to a target server.
4. Optionally, clear the read-only flags on the shadow copy.

The data is now ready to use.

Folder and share management

The storage system supports several file-sharing protocols, including DFS, NFS, FTP, HTTP, and Microsoft SMB. This section discusses overview information as well as procedures for the setup and management of the file shares for the supported protocols. Security at the file level and at the share level is also discussed.

NOTE: Select servers can be deployed in a clustered or non-clustered configuration. This section discusses share setup for a non-clustered deployment.

Folder management

Volumes and folders on any system are used to organize data. Regardless of system size, systematic structuring and naming conventions of volumes and folders eases the administrative burden. Moving from volumes to folders to shares increases the level of granularity of the types of data stored in the unit and the level of security access allowed.

Folders can be managed using Server Manager. Tasks include:

- Accessing a specific volume or folder
- Creating a new folder
- Deleting a folder
- Modifying folder properties
- Creating a new share for a volume or folder
- Managing shares for a volume or folder

Managing file-level permissions

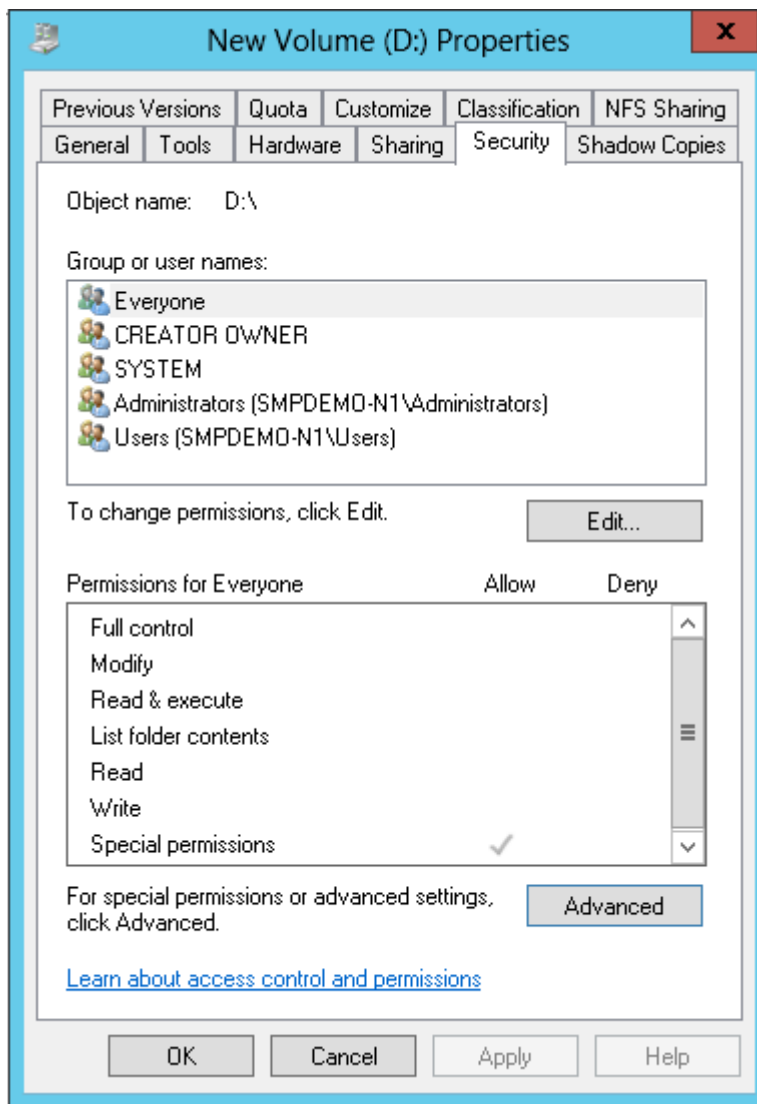
Security at the file level is managed using Windows Explorer.

File level security includes settings for permissions, ownership, and auditing for individual files.

To enter file permissions:

1. Using Windows Explorer, access the folder or file that needs to be changed, and then right-click the folder.
2. Click **Properties**, and then click the **Security** tab.

Figure 39 Properties screen, Security tab

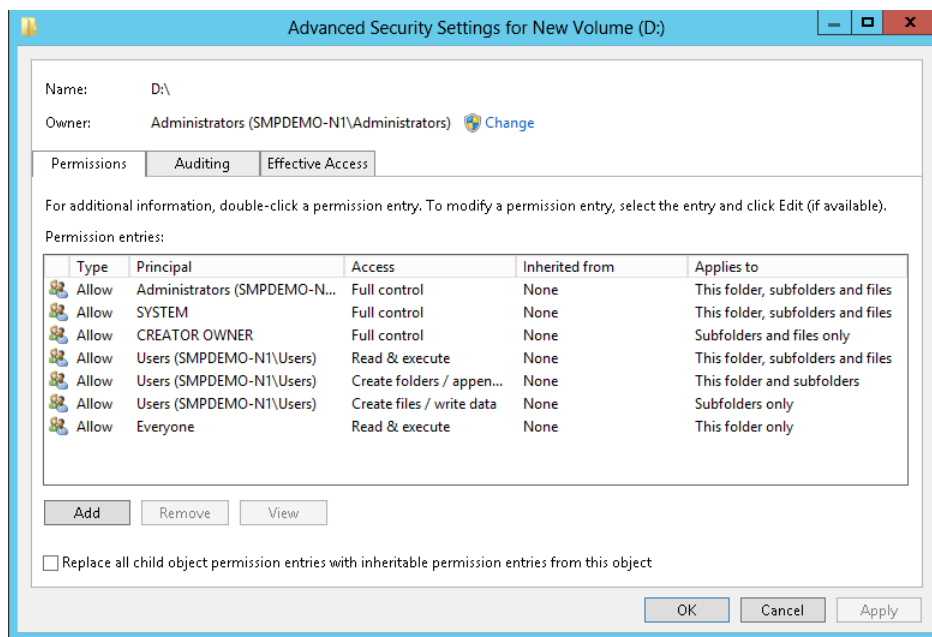


Several options are available on the **Security** tab:

- To add users and groups to the permissions list, click **Add**. Follow the dialog box instructions.
 - To remove users and groups from the permissions list, highlight the desired user or group, and then click **Remove**.
 - The center section of the **Security** tab lists permission levels. When new users or groups are added to the permissions list, select the appropriate boxes to configure the common file-access levels.
3. To modify ownership of files, or to modify individual file access level permissions, click **Advanced**.

Figure 40 (page 76) illustrates the properties available on the **Advanced Security Settings** screen.

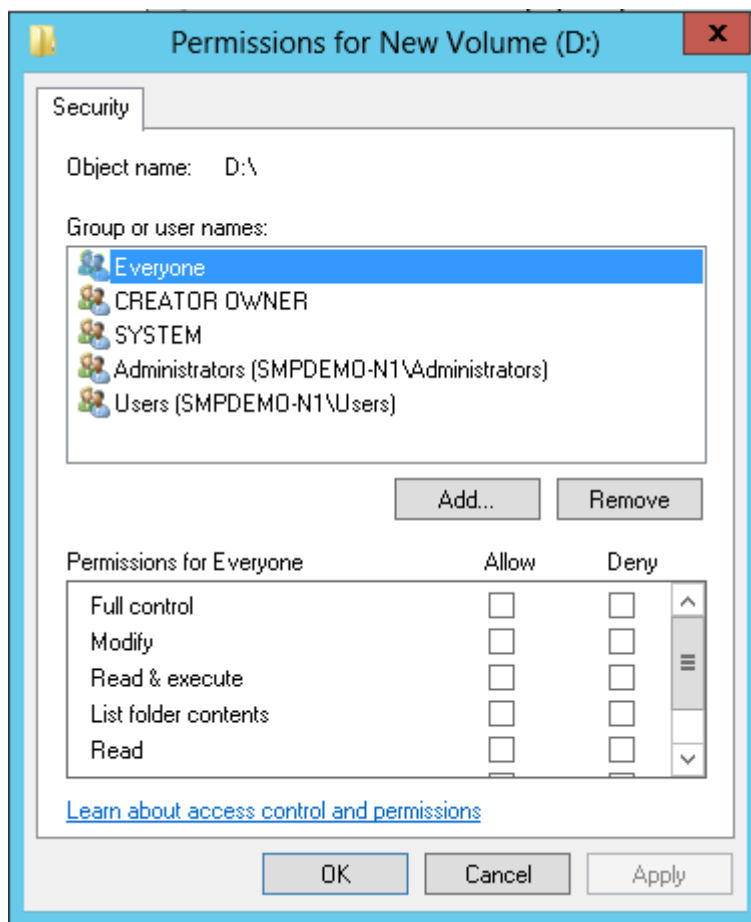
Figure 40 Advanced Security settings screen, Permissions tab



Other functionality available in the **Advanced Security Settings** screen is illustrated in [Figure 40 \(page 76\)](#) and includes:

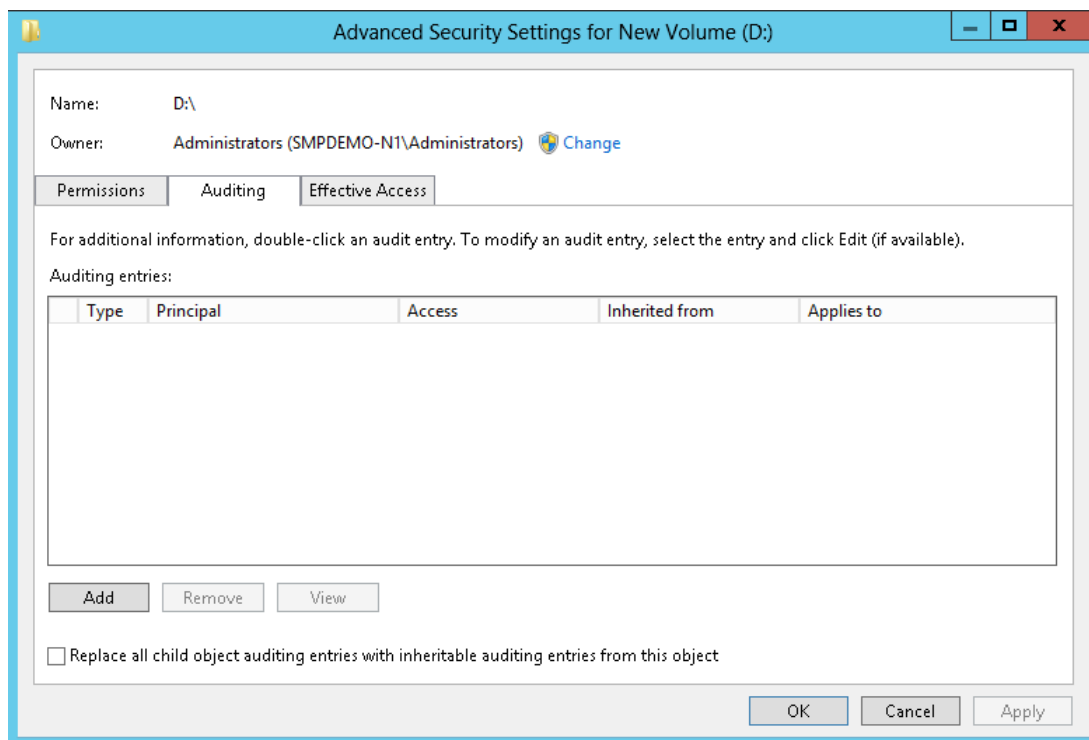
- Add a new user or group—Click **Add**, and then follow the dialog box instructions.
 - Remove a user or group— Click **Remove**.
 - Replace permission entries on all child objects with entries shown here that apply to child objects—This allows all child folders and files to inherit the current folder permissions by default.
 - Modify specific permissions assigned to a particular user or group—Select the desired user or group, and then click **Edit**.
4. Enable or disable permissions by selecting the **Allow** box to enable permission or the **Deny** box to disable permission. If neither box is selected, permission is automatically disabled. [Figure 41 \(page 77\)](#) illustrates the **Edit** screen and some of the permissions.

Figure 41 User or group Permission Entry screen



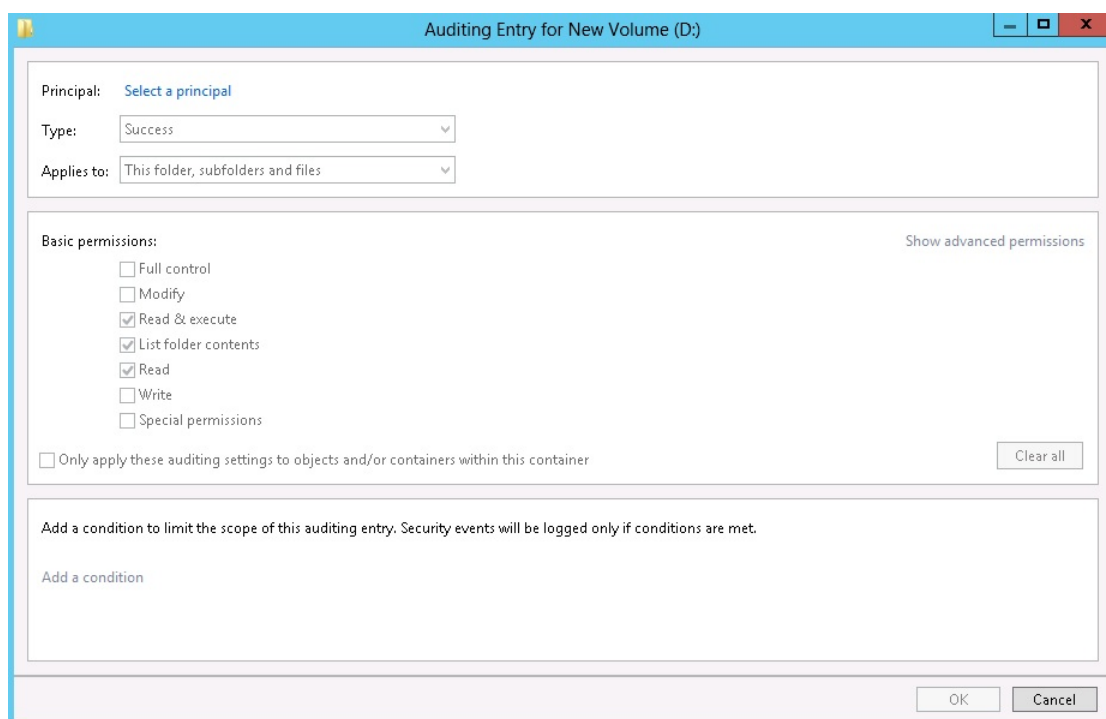
Another area of the **Advanced Security Settings** is the **Auditing** tab. Auditing allows you to set rules for the auditing of access, or attempted access, to files or folders. Users or groups can be added, deleted, viewed, or modified through the **Advanced Security Settings Auditing** tab.

Figure 42 Advanced Security Settings screen, Auditing tab



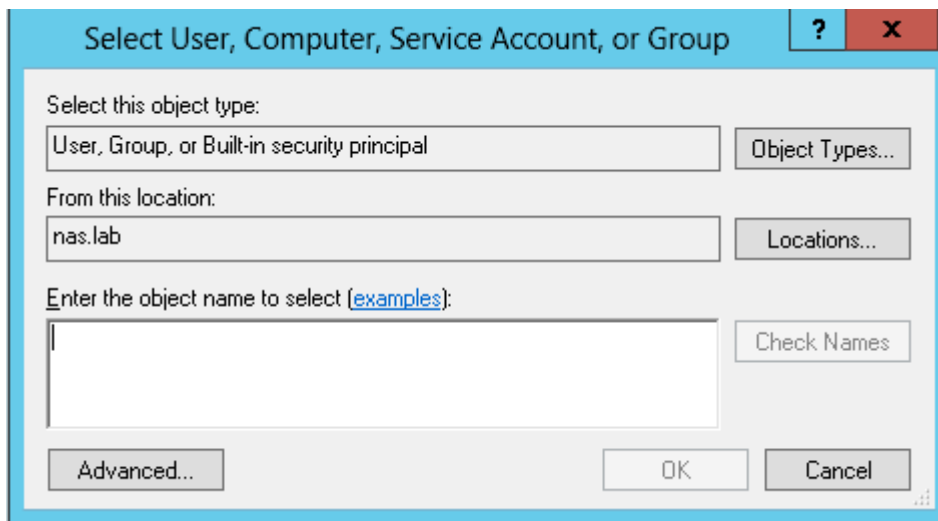
5. Click **Add** to display the **Auditing Entry** screen.

Figure 43 Auditing Entry for New Volume screen



6. Click **Select a principal** to display the Select User or Group screen.

Figure 44 Select User or Group screen



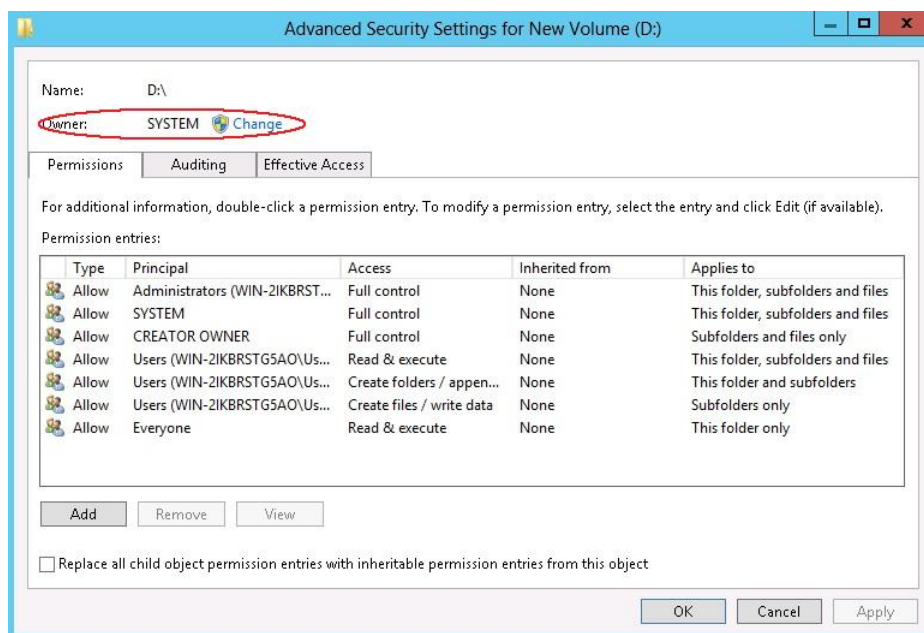
NOTE: Click Advanced to search for users or groups.

7. Select the user or group.
8. Click **OK**.
9. Select the desired **Successful** and **Failed** audits for the user or group.
10. Click **OK**.

NOTE: Auditing must be enabled to configure this information. Use the local Computer Policy Editor to configure the audit policy on the storage system.

The **Owner** tab allows taking ownership of files. Typically, administrators use this area to take ownership of files when the file ACL is incomplete or corrupt. By taking ownership, you gain access to the files, and then manually apply the appropriate security configurations.

Figure 45 Advanced Security Settings screen



The current owner of the file or folder is listed at the top of the screen. To take ownership:

1. Click the appropriate user or group in the **Change owner to** list.

2. If it is also necessary to take ownership of subfolders and files, enable the **Replace owner on subcontainers and objects** box.
3. Click **OK**.

Share management

There are several ways to set up and manage shares. Methods include using Windows Explorer, a command line interface, or Server Manager.

NOTE: Select servers can be deployed in a clustered as well as a non-clustered configuration. This chapter discusses share setup for a non-clustered deployment.

As previously mentioned, the file-sharing security model of the storage system is based on the NTFS file-level security model. Share security seamlessly integrates with file security. In addition to discussing share management, this section discusses share security.

Share considerations

Planning the content, size, and distribution of shares on the storage system can improve performance, manageability, and ease of use.

The content of shares should be carefully chosen to avoid two common pitfalls: either having too many shares of a very specific nature, or of having very few shares of a generic nature. For example, shares for general use are easier to set up in the beginning, but can cause problems later. Frequently, a better approach is to create separate shares with a specific purpose or group of users in mind. However, creating too many shares also has its drawbacks. For example, if it is sufficient to create a single share for user home directories, create a “homes” share rather than creating separate shares for each user.

By keeping the number of shares and other resources low, the performance of the storage system is optimized. For example, instead of sharing out each individual user's home directory as its own share, share out the top-level directory and let the users map personal drives to their own subdirectory.

Defining Access Control Lists

The Access Control List (ACL) contains the information that dictates which users and groups have access to a share, as well as the type of access that is permitted. Each share on an NTFS file system has one ACL with multiple associated user permissions. For example, an ACL can define that User1 has read and write access to a share, User2 has read only access, and User3 has no access to the share. The ACL also includes group access information that applies to every user in a configured group. ACLs are also referred to as permissions.

Integrating local file system security into Windows domain environments

ACLs include properties specific to users and groups from a particular workgroup server or domain environment. In a multidomain environment, user and group permissions from several domains can apply to files stored on the same device. Users and groups local to the storage system can be given access permissions to shares managed by the device. The domain name of the storage system supplies the context in which the user or group is understood. Permission configuration depends on the network and domain infrastructure where the server resides.

File-sharing protocols (except NFS) supply a user and group context for all connections over the network. (NFS supplies a machine-based context.) When new files are created by those users or machines, the appropriate ACLs are applied.

Configuration tools provide the ability to share permissions out to clients. These shared permissions are propagated into a file system ACL, and when new files are created over the network, the user creating the file becomes the file owner. In cases where a specific subdirectory of a share has different permissions from the share itself, the NTFS permissions on the subdirectory apply instead.

This method results in a hierarchical security model where the network protocol permissions and the file permissions work together to provide appropriate security for shares on the device.

NOTE: Share permissions and file-level permissions are implemented separately. It is possible for files on a file system to have different permissions from those applied to a share. When this situation occurs, the file-level permissions override the share permissions.

Comparing administrative (hidden) and standard shares

SMB supports both administrative shares and standard shares.

- Administrative shares are shares with a last character of \$. Administrative shares are not included in the list of shares when a client browses for available shares on a SMB server.
- Standard shares are shares that do not end in a \$ character. Standard shares are listed whenever a SMB client browses for available shares on a SMB server.

The storage system supports both administrative and standard SMB shares. To create an administrative share, end the share name with the \$ character when setting up the share. Do not type a \$ character at the end of the share name when creating a standard share.

Managing shares

Shares can be managed using Server Manager. Tasks include:

- Creating a new share
- Deleting a share
- Modifying share properties
- Publishing in DFS



CAUTION: Before deleting a share, warn all users to exit that share and confirm that no one is using that share.

NOTE: These functions can operate in a cluster on select servers, but should only be used for non-cluster-aware shares. Use Cluster Administrator to manage shares for a cluster. The page will display cluster share resources.

File Server Resource Manager

File Server Resource Manager (FSRM) is a suite of tools that allows administrators to understand, control, and manage the quantity and type of data stored on their servers. Some of the tasks you can perform are:

- Quota management
- File screening management
- Storage reports

Server Manager provides access to FSRM tasks.

For procedures and methods beyond what are described below, see the online help.

Quota management

On the Quota Management node of the File Server Resource Manager snap-in, you can perform the following tasks:

- Create quotas to limit the space allowed for a volume or folder and generate notifications when the quota limits are approached or exceeded.
- Generate auto quotas that apply to all existing folders in a volume or folder, as well as to any new subfolders created in the future.
- Define quota templates that can be easily applied to new volumes or folders and that can be used across an organization.

File screening management

On the File Screening Management node of the File Server Resource Manager snap-in, you can perform the following tasks:

- Create file screens to control the types of files that users can save and to send notifications when users attempt to save blocked files.
- Define file screening templates that can be easily applied to new volumes or folders and that can be used across an organization.
- Create file screening exceptions that extend the flexibility of the file screening rules.

Storage reports

On the Storage Reports node of the File Server Resource Manager snap-in, you can perform the following tasks:

- Schedule periodic storage reports that allow you to identify trends in disk usage.
- Monitor attempts to save unauthorized files for all users or a selected group of users.
- Generate storage reports instantly.

6 Troubleshooting, servicing, and maintenance

The storage system provides several monitoring and troubleshooting options. You can access the following troubleshooting alerts and solutions to maintain the system health:

- Notification alerts
- System Management Homepage (SMH)
- Hardware component LEDs
- HP and Microsoft support websites
- HP Insight Remote Support software
- Microsoft Systems Center Operations Manager (SCOM) and Microsoft websites
- HP SIM 6.3 or later, which is required for proper storage system/HP SIM integration.

NOTE: Integration with HP SIM is only supported using the WBEM/WMI interfaces. Do not attempt to configure HP SIM to use the ProLiant SNMP agents, because the configuration is untested and unsupported. The ProLiant SNMP agents are enabled on the storage system by default and should not be disabled as they are used for internal management functions. If they are enabled for external client consumption, HP SIM must be configured so it does not attempt to communicate with these agents.

Accessing Event Notifier Configuration Wizard

Use the Event Notifier Configuration Wizard to configure the storage system to automatically send email notifications about critical, warning, and information system statuses.

You can launch the Event Notifier Configuration Wizard:

- From Windows Server Manager, select **Tools**→**HP StoreEasy**→**Configure Email Alerts**.

Maintaining your storage system

HP recommends the following maintenance guidelines for upgrading your system components (operating system, software, firmware, and drivers), depending on your environment:

- If your storage system is working properly, you are not required to install any updates.
- If security updates are important for your operating environment, you can:
 - Use Microsoft Windows Update to download updates.
 - Use Windows Update Server to update the server blades in the storage system.
 - Download and install specific security updates as needed from the Microsoft Security TechCenter website:
<http://technet.microsoft.com/security/default.aspx>
- If your maintenance policy is to only update servers to the most current and tested versions of the system components, you can install the latest HP service release. To find the latest service release, go to <http://www.hp.com/go/support> and search for your specific product. You can also register your product on the HP support and drivers page to receive notification of new service releases for your product.
- If your maintenance policy allows you to update servers to the most current versions of the system components for which HP has not completed testing and bundled as a service release,

go to <http://www.hp.com>. Search for your specific product or the underlying server platform (for example, ProLiant DL320 Gen8 server) to find specific updates.

- HP recommends updating the operating system, software, firmware, and NIC drivers simultaneously (in the same update window) to ensure proper operation of the storage system.

Determining the current storage system software version

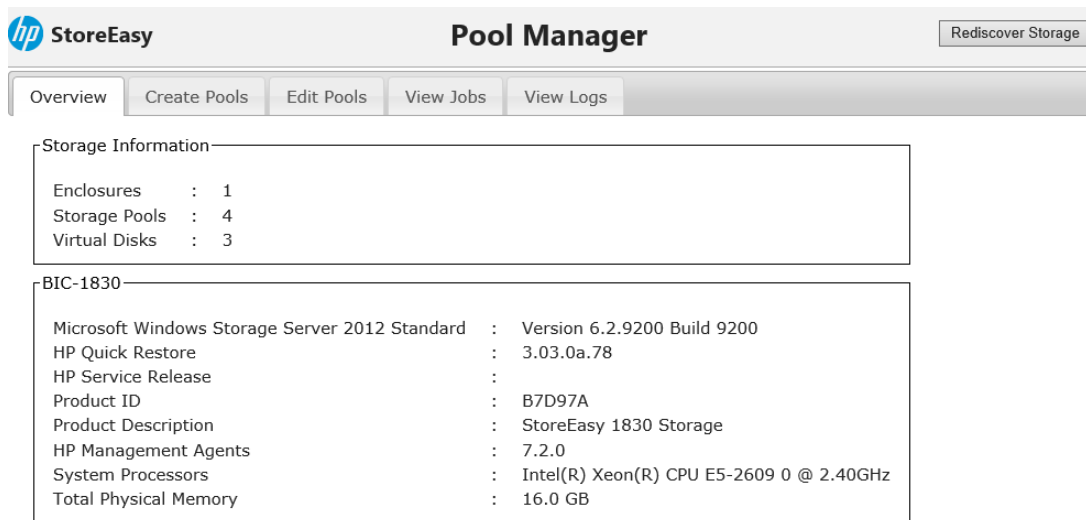
You can find the current version using the HP StoreEasy tools or the registry.

From the HP StoreEasy tools:

1. Open the HP StoreEasy tools from the **Tools** menu in Windows Server Manager.
2. Select **Manage Storage Pools**.
3. On the Overview tab, locate the version listed in the HP Quick Restore box.

NOTE: The versions shown in [Figure 46 \(page 84\)](#) may differ from the version you are currently running.

Figure 46 Pool Manager Overview



From the registry:

1. Log in to the server blade.
2. Open a command window.
3. Enter the `reg query` command as shown in the following example:

```
C:\> reg query HKLM\Software\Wow6432Node\Hewlett-Packard\StorageWorks /s
```

The following information appears:

```
HKEY_LOCAL_MACHINE\Software\Wow6432Node\Hewlett-Packard\StorageWorks\QuickRestore
    BASE     REG_SZ      3.00.0.11
    QRVersion REG_SZ      3.00.1a.118
```

The QRVersion field lists the version.

HP System Management Homepage

The HP System Management Homepage (SMH) is a web-based interface that consolidates and simplifies single system management for HP servers. The SMH is the primary tool for identifying and troubleshooting hardware issues in the storage system. You may choose this option to diagnose a suspected hardware problem. Go to the **SMH main page** and open the **Overall System Health Status** and the **Component Status Summary** sections to review the status of the storage system hardware.

By aggregating the data from HP web-based agents and management utilities, the SMH provides a common, easy-to-use interface for displaying the following information:

- Hardware fault and status monitoring
- System thresholds
- Diagnostics
- Software and firmware version control for an individual server

The SMH Help menu provides documentation for using, maintaining, and troubleshooting the application. For more information about the SMH software, go to www.hp.com/support/manuals and enter **System Management Homepage** in the Search box. A list of documents and advisories is displayed. To view SMH user guides, select **User Guide**.

Starting the System Management Homepage application

To start the application, double-click the **HP System Management Homepage** desktop shortcut or enter `https://hostname:2381/` in Internet Explorer. The *hostname* can be `localhost` or the IP address of the server you want to monitor. To log into SMH, enter the same username and password you use to log in to the server. Users who have administrative privileges on the server have the same privileges in the SMH application.

To view the SMH of one server from another server, you must modify the Windows firewall settings as follows:

1. Open the Control Panel and select **System Security**→**Windows Firewall**→**Allowed Programs**.
2. Select **Allow another program** and click **Browse** in the Add a Program dialog box.
3. Navigate to `C:\hp\hpsmh\bin` and select **hpsmhd**. Click **Open** and then click **Add**. HP System Management Homepage displays in the Allowed Programs and Features window.
4. Select **Home/work (Private)** and **Public** and click **OK**.
5. To access the SMH on another server, enter the following URL:

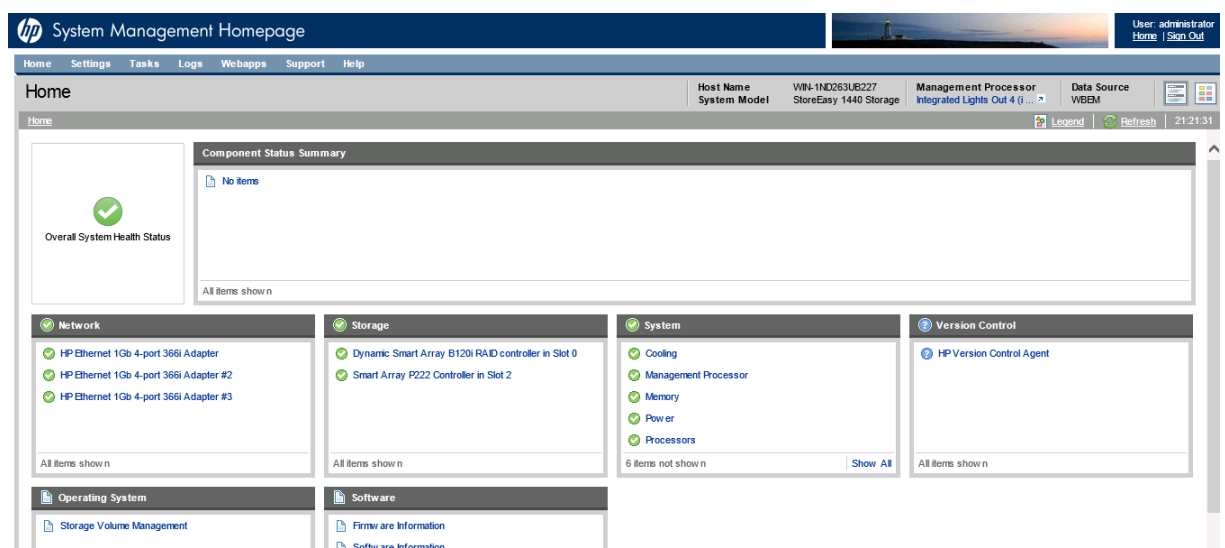
<https://<server IP address>:2381>

NOTE: Port 2381 may need to be opened in the system's firewall, if applicable.

System Management Homepage main page

Figure 47 (page 85) shows the SMH main page.

Figure 47 System Management Homepage main page



The page provides system, subsystem, and status views of the server and displays groupings of systems and their status.

NOTE:

- NICs will display with a failed status (red icon) if they are unplugged. To remove unused NICs from the system status, you can disable them by selecting **Control Panel**→**Hardware**→**Device Manager**, right-click on the specific NIC, and then select **Disable**.
- When you remove a disk or disconnect a cable, the SMH interface might not display alerts when you click the **Refresh** button. You can force a hard refresh by clicking the **Home** button or by navigating to the problem area. The default refresh interval is two minutes. To change the interval in the **Settings** menu, select **Autorefresh**, and then **Configure Page refresh settings**. The minimum interval is five seconds and the maximum is 30 minutes.

Overall System Health Status

A webapp sets the value of the **Overall System Health Status** icon by using a predefined heuristic. If no webapp can determine the status, the worst possible status is displayed in the **Component Status Summary** section.

Component Status summary

The **Component Status Summary** section displays links to all subsystems that have a critical, major, minor, or warning status. If there are no critical, major, minor or warning items, the **Component Status Summary** section displays no items.

Network

This section shows the status of the network connections.

Storage

This section displays information about the Smart Array and storage controllers within the storage system. The **Storage System** page is organized as a left panel and a main page:

Figure 48 Storage system

The screenshot displays the HP System Management Homepage interface. The top navigation bar includes links for Home, Settings, Tasks, Logs, Webapps, Support, and Help. The main content area is titled "Smart Array P222 Controller ...". On the left, a sidebar shows a tree view of the system components, including the Smart Array P222 Controller in Slot 2, Physical Drives, Logical Drives, Tape Drives, and Storage Boxes. The main panel shows the status of the Smart Array P222 Controller in Slot 2. It includes a table of controller details and a table of accelerator details.

Name	Value
Model:	Smart Array P222 Controller
Controller Status:	OK
Firmware Version:	3.42
Serial Number:	PBKTT0ARH2H1ER
Rebuild Priority:	Medium
Expand Priority:	Medium
Number Of Ports:	2
Internal SAS Ports:	1
External SAS Ports:	1

Name	Value
Status:	Temporarily Disabled
Error Code:	Cache Disabled ADG not enabled but ADG volumes found
Serial Number:	PBKUA0ARH2G12J
Total Memory:	311296 KB
Read Cache:	50%
Write Cache:	50%
Capacitor Status:	OK
Read Errors:	0
Write Errors:	0

The left panel provides links to information about the following items:

- **Controller**
Select a storage controller to view its type, status, firmware version, and serial number.
- **Physical Drives**
This section provides an overview of all disk drives attached to the controller. Drives are identified and grouped as assigned, unassigned, and spare drives. Each physical drive is listed as a separate entry in the Storage System submenu. Select any of the physical drives to display more information about the drive.

NOTE: Spare drives are only used when a disk drive fails. Until a spare drive is used, it remains offline and its LEDs will remain off.

- **Logical Drives**
A list of logical drives associated with the controller appears in the left panel tree view. Select one of the logical volume entries to display the status of the volume, fault tolerance (RAID level), and capacity (volume size). A link to the logical volume storage pool is also displayed.
- **Tape Drives**
This section provides information about tape drives, if they are included.
- **Storage Boxes**
This section provides an overview of the disk drives that are listed individually in the Physical Drives section.

System

This section displays status for various system components.

Version Control

This section provides information about the Version Control Agent.

Operating system

This section provides information about the operating system storage volumes.

Software

This section provides information about system firmware and software.

Certificate of Authenticity

The Certificate of Authenticity (COA) label is used to:

- Replace the main board/motherboard.
- Upgrade the factory-installed operating system using the Microsoft Upgrade program for license validation.
- Reinstall the operating system because of a failure that has permanently disabled it.

The COA label location varies by server model. On rack-mounted server models, the COA label is located either on the front section of the right panel or on the right front corner of the top panel. On tower models, the COA label is located toward the rear of the top panel of the server. On blade models, the COA label is located on top of the server or storage blade.

Known issues

Table 4 (page 88) identifies known issues with the storage system and provides workarounds to mitigate them.

Table 4 Known issues

Issue	Resolution
On some storage systems, a momentary press of the power button results in an operating system shutdown.	Confirm that the power settings for the storage system ignore the power button or disable the power button in the system BIOS.
There may be errors from DFS and NFS logged in the Event Viewer after the storage system is configured.	These errors can be ignored.
Mounted data volumes are not remounted after performing a system recovery. These data volumes are not damaged or destroyed but they are not visible after a system recovery operation.	<p>In order to restore the mount points to their original locations, you must record them prior to running system recovery.</p> <ol style="list-style-type: none"> 1. Using Windows Disk Manager, record the mount points of the volumes within the root directory of each volume. 2. After running system recovery, scan the system to find data volumes that are not assigned drive letters. 3. Temporarily mount the volumes that are not assigned drive letters. 4. Locate the recorded list of mount points and remount the temporarily mounted volumes to the correct locations according to the record.
<p>After replacing or upgrading the SmartArray controller in your storage system, the following message may be displayed:</p> <p>The SmartArray controller that supports the operating system drive is not licensed for RAID6. Please refer to the Administrator Guide for more information.</p>	<p>The license key is included as a hard-copy document when you first received your storage system. You can also locate the license key in the quick restore log file (qrlog.txt), which is located in C:\Windows\logs. You must keep the license key in a safe place and make a copy of the qrlog.txt file so the license key is easily available when needed. To install the license key, see "Installing a license key with ACU" in the <i>Configuring Arrays on HP Smart Array Controllers Reference Guide</i> which can be downloaded from the following website:</p> <p>http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf</p>
Network interfaces that are configured to use DHCP might not retrieve a DHCP address immediately if the configuration and network validation fails for these interfaces in the Network Configuration Tool.	<p>Perform the following steps to restart the network interface:</p> <ol style="list-style-type: none"> 1. Open a command prompt and enter <code>ncpa.cpl</code> to open the network control panel. 2. Right-click on the interface that is configured for DHCP and does not have an address, and then select Disable. 3. Right-click on the interface that is configured for DHCP and does not have an address, and then select Enable.
If you attempt to add another SmartArray controller to one of the slots in the 15x0, the following message may display during boot up: Unsupported Option Card Configuration	For the 15x0, only one SmartArray controller can be installed. For systems manufactured prior to June 23, 2013, the P222 SmartArray Controller is installed in slot 2 (see callout 4 in Figure 7 (page 10)). For systems manufactured after June 23, 2013, the P222 SmartArray Controller is installed in slot 3 (see callout 3 in Figure 7 (page 10)). For more information about the issue with slot 2, see the customer advisory, <i>HP StoreEasy 1530 Storage – The HP P222 Smart Array controller must be moved from PCI slot 2 to PCI slot 3</i> .
When starting the System Management Homepage, you may see a message that there is an error with the security certificate.	You can safely continue and log in. Once logged in, see the Local Server Certificate topic in the System Management Homepage online help to set up a trusted certificate.
Storage topology not displayed properly in other tools after making changes using the ACU.	<p>When using the Array Configuration Utility (ACU) to make storage configuration changes, the changes may not be displayed in Windows Server Manager, StoreEasy Pool Manager, or the Server Manager API.</p> <p>To resolve this issue, perform the following steps before using one of these tools after making changes from the ACU:</p>

Table 4 Known issues (continued)

Issue	Resolution
	<ol style="list-style-type: none"> 1. Close the ACU after making the changes. 2. Update the storage cache using one of the following methods: <ul style="list-style-type: none"> • Select Rediscover Storage from the HP StoreEasy desktop folder icon. • Open Windows Server Manager and select Tools→HP StoreEasy→Rediscover Storage. • Open PowerShell and run <code>Update-StorageProviderCache</code>.
The New Volume option is not enabled after extending a virtual disk.	<p>After extending a virtual disk, the New Volume option (visible when you right-click the virtual disk) is disabled in Windows Server Manager. This can occur if the space on the virtual disk was fully utilized (the Capacity and Allocated Space columns display the same value) before extending the virtual disk. To enable the New Volume option, do one of the following:</p> <ul style="list-style-type: none"> • In Disk Management, select Rescan Disks. • From the HP StoreEasy folder on the desktop, select Rediscover Storage. • Open a Windows PowerShell command prompt and execute the <code>Update-StorageProviderCache</code> command.
Status column on Storage Pools window in Windows Server Manager is blank.	<p>When viewing details about storage pools on the Storage Pools window in the Windows Server Manager, the Status column is always blank. However, you can view the health status and operational status. Health status is indicated by the icon to the left of the Name column. Operational status is a separate column. You can hide the Status column by right-clicking the column name and selecting Status, which removes Status from the list of column headings that display.</p>
Windows Server Manager indicates there are zero (0) storage pools but does not display any kind of error message about it.	<p>This issue can be caused by one of the following actions:</p> <ul style="list-style-type: none"> • The cache is out of date. • The discovery operation times out. • An operation fails because it requires a service restart or cache update. • The HP Storage Management Service has stopped running. <p>To resolve the issue, restart the HP Storage Management Service using one of the following methods:</p> <ul style="list-style-type: none"> • From the desktop, navigate to the Services window (services.msc) and locate HP Storage Management Service. Right-click the service and select Start. • Open a Windows PowerShell prompt and enter the following cmdlet: <code>net start hpstormsvc</code>
Windows Server Manager may display the free space for storage pools that contain a RAID 6 virtual disk as zero (0).	<p>This issue may be due to the RAID 6 license either not being installed or expired. The license key is included as a hard-copy document when you first received your storage system. You can also locate the license key in the quick restore log file (qrlog.txt), which is located in C:\Windows\logs. You should keep the license key in a safe place and make a copy of the qrlog.txt file so the license key is easily available when needed. To install the license key, see "Installing a license key with ACU" in the <i>Configuring Arrays on HP Smart Array Controllers Reference Guide</i> which can be downloaded from the following website:</p> <p>http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00729544/c00729544.pdf</p> <p>To obtain a new license key, go to the Smart Array Advanced Pack (SAAP) product page:</p> <p>http://www.hp.com/go/SAAP</p>
When creating a storage pool on a StoreEasy 1000 system, the following warning message may appear: The storage pool was created, but spare drives	<p>This can occur if the pool being created is not the last pool being managed by the controller. For example, you have Pool A, Pool B, and Pool C. You delete Pool B and then create a new storage pool. The new storage pool is considered "out of order" and its creation requires all storage pools to be re-ordered. The new pool is created successfully, but without a spare drive. You can add a spare drive using the Grow option on the Edit Pools tab of Pool Manager.</p>

Table 4 Known issues *(continued)*

Issue	Resolution
could not be added. Edit the pool to add spare drives.	
The Storage Management Provider displays the following error message: 0x26005054 The service failed to subscribe for events	<ol style="list-style-type: none"> 1. Open Add/Remove Programs and verify that HP Insight Management Agents is installed. 2. If it is installed, open the Run dialog box and enter WBEMTEST and click Connect. 3. Enter root\hpa as the namespace. Wait to see if the namespace connects. If it does not connect, the WBEM installation is corrupt. 4. Navigate to the C:\hpnas\components\PSP directory, which contains the WBEM installer. 5. Open the batch script file and search for "HP Insight Management Agents for Windows Server x64 Editions" and identify its executable name. Then, run the executable to re-install the agents.
On an HP StoreEasy 1000 system, if you are logged in as a local administrator and the system has been joined to a domain, the Initial Configuration Tasks (ICT) window displays "None" for Available Disks, Storage Pools, and Volumes.	To resolve this issue, you must log in as a domain user.

Verifying services are running

If an issue occurs and other troubleshooting efforts do not resolve it, verify that the following services are always running:

- HP Insight Event Notifier
- HP Insight Foundation Agents
- HP Insight NIC Agents
- HP Insight Server Agents
- HP Insight Storage Agents
- HP ProLiant Agentless Management Service
- HP ProLiant Health Monitor Service
- HP ProLiant System Shutdown Service
- HP Smart Array SAS/SATA Event Notification Service
- HP Storage Management Service
- HP System Management Homepage
- HP Version Control Agent
- HP Storage Management Service
- HP WMI Storage Providers

Additionally, verify that the user interfaces for REST and Pool Manager are installed and running:

1. Open IIS using one of the following methods:
 - In Windows Server Manager, select **IIS** in the left navigation pane. In the list of servers that display in the main content pane, right-click the applicable server and select **Internet Information Services (IIS) Manager**.
 - Select **Internet Information Services (IIS) Manager** from the Tools menu in Windows Server Manager.
 - Press **Windows** + **R** to open the Run window. Enter `inetmgr` and click **OK**.
2. Verify that the HP StoreEasy Management website contains the following entries:
 - `aspnet_client`
 - `help`
 - `rest`
 - `webui`
3. Right-click the **HP StoreEasy Management** website and select **Manage Website**. If it is running, the Start option will be disabled.

If these steps do not resolve the issue, contact HP Technical Support.

Error codes

This section contains the error codes that may occur.

Storage Management Provider error codes

The Storage Management Provider error codes are listed in [Table 5 \(page 91\)](#).

Table 5 Storage Management Provider errors

Error code	Error message	Recommended action
0x24005001	Error during discovery.	Please restart HP Storage Management Service.
0x24005003	Error while parsing CLI output.	Please restart HP Storage Management Service.
0x20005003	Error while parsing CLI output.	
0x25005008	The controller specified was not found.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x20005009	The specified RAID level is invalid.	
0x25005009	The specified RAID level is invalid.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2300500B	The operation is not supported because the storage pool is unhealthy.	Please retry the operation.
0x2300500C	The operation is not supported because the storage pool is transforming.	Please retry the operation.
0x2300500D	The physical drive specified is already in use.	Please retry the operation.
0x2300500E	Less than the minimum number of physical drives was specified.	Please retry the operation.
0x2300500F	The specified physical drives are unsupported for this operation. They may either be in use or are a mismatch.	Please retry the operation.
0x24005011	The physical disk was not found in the provider cache.	Please restart HP Storage Management Service.

Table 5 Storage Management Provider errors *(continued)*

Error code	Error message	Recommended action
0x25005011	The physical disk was not found in the provider cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005012	No physical disks were found in the logical drive.	Please restart HP Storage Management Service.
0x25005013	Failed to update pool in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005014	Failed to get the pool from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005015	Failed to delete the pool from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005016	Failed to get the pool IDs for the subsystem from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005017	Failed to get the associated pool for the LUN from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005018	Failed to update disk in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005019	Failed to get the disk from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500501A	Failed to get associated disks for the LUN from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500501B	Failed to get associated disks for the pool from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2000501C	Unknown type of storage object.	
0x2500501C	Unknown type of storage object.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2400501D	Failed to get the associated subsystem for the storage object from cache.	Please restart HP Storage Management Service.
0x2500501D	Failed to get the associated subsystem for the storage object from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500501E	Failed to get the storage object from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500501F	Failed to update the storage object in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005020	Failed to get the storage object from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .

Table 5 Storage Management Provider errors (continued)

Error code	Error message	Recommended action
0x25005021	Failed to copy storage objects.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x20005022	Error creating Pool.	
0x20005023	Error deleting LUN.	
0x20005024	The storage pool contains virtual disks.	
0x20005025	Failed to delete the reserved LUN.	
0x25005026	Failed to get the logical drive from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005027	Failed to convert from WCS to MBS.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005028	Failed to get proxy.	Please restart HP Storage Management Service.
0x2500502A	Failed to update the logical drive in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500502B	Failed to get volumes for the pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500502C	Failed to get the pool for the physical drive.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500502F	Failed to acquire the lock.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005030	Failed to add physical disk(s) to one of the LUNs in the pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005031	Failed to add physical disk(s) as data drive(s) to the pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005032	Failed to add physical disk(s) as spare drive(s) to the pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005033	The usage parameter is invalid.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x20005037	Access denied.	
0x25005037	Access denied.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005038	The cache is out of date.	Please restart HP Storage Management Service.
0x25005038	The cache is out of date.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005039	The logical drive was not found in cache.	Please restart HP Storage Management Service.

Table 5 Storage Management Provider errors *(continued)*

Error code	Error message	Recommended action
0x25005039	The logical drive was not found in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2400503A	The storage pool was not found in cache.	Please restart HP Storage Management Service.
0x2500503A	The storage pool was not found in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2400503B	The subsystem was not found in cache.	Please restart HP Storage Management Service.
0x2500503B	The subsystem was not found in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2300503D	Incompatible <code>ResiliencySetting</code> for this operation.	Please retry the operation.
0x23005040	Some of the parameter values supplied were invalid.	Please retry the operation.
0x20005040	Some of the parameter values supplied were invalid.	
0x25005040	Some of the parameter values supplied were invalid.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005041	Failed to get the logical drives in the pool.	Please restart HP Storage Management Service.
0x25005041	Failed to get the logical drives in the pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005043	Failed to get physical disk in the pool.	Please restart HP Storage Management Service.
0x25005045	Failed to get physical disk in the subsystem.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005046	Failed to get the pool for the physical drive.	Please restart HP Storage Management Service.
0x24005047	Failed to get the physical disks in the enclosure.	Please restart HP Storage Management Service.
0x20005048	Physical disks not supported as arguments to the method.	
0x25005049	The operation was successful, but it has resulted in the storage pools being renamed.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500504A	Failed to get all pools from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500504B	Failed to get the controller for the pool from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500504C	Failed to get the disk(s) for the pool from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500504D	Failed to add an association to cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .

Table 5 Storage Management Provider errors (continued)

Error code	Error message	Recommended action
0x2500504E	The physical disk is in use. It cannot be deleted from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500504F	Invalid relation type.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x21005051	Failed to find the MI Main module.	Please re-install HP Storage Management Provider.
0x21005052	Failed to initialize the MI Application.	Please re-install HP Storage Management Provider.
0x21005053	The Storage Management Service is not able to host the SMP.	Please re-install HP Storage Management Provider.
0x26005054	The service failed to subscribe for events.	Please refer to the troubleshooting guide.
0x24005055	Failed to get the proxy object.	Please restart HP Storage Management Service.
0x21005056	Failed to load the SMPProvider DLL. Either it is not registered or is unable to load its dependencies.	Please re-install HP Storage Management Provider.
0x25005059	Failed to get all LUNs for the disk from the controller.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500505A	Failed to remove association from the provider cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500505B	The operation was successful, but it has resulted in the storage pools being renamed.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500505C	The operation was successful, but it has resulted in the storage pools being renamed.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2000505D	The operation was successful, but it has resulted in the storage pools being renamed.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500505E	Failed to get all logical drives from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2500505F	Failed to get the controller for the logical drive from cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005060	The disk(s) cannot be added to this pool because it contains at least one LUN requiring RAID level migration.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x21005061	Failed to remove partition data from the logical drive. You must manually clear the disk or delete the partition. Otherwise, subsequent volume creation requests might fail.	Please re-install HP Storage Management Provider.
0x20005062	The format of the specified RAID level is invalid. Valid RAID levels are RAID 0, RAID 1, RAID 10, RAID 5, RAID 6, RAID 50, RAID 60, RAID 10 (ADM), RAID 50 (2), RAID 50 (3), RAID 50 (4), RAID 50 (5), RAID 1 (ADM), RAID 60 (2), RAID 60 (3), RAID 60 (4), RAID 60 (5).	

Table 5 Storage Management Provider errors *(continued)*

Error code	Error message	Recommended action
0x20005063	The format of the specified RAID level is invalid. Valid RAID levels are RAID 0, RAID 1, RAID 10, RAID 5, RAID 6.	
0x23005064	The length of the virtual disk friendly name exceeds the maximum supported length.	Please retry the operation.
0x24005065	Failed to get the pool from the logical drive.	Please restart HP Storage Management Service.
0x25005068	The virtual disk could not complete the operation because its health or operational status does not permit it.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005069	Enclosure not found in cache.	Please restart HP Storage Management Service.
0x2500506A	Failed to update enclosure in cache.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x2400506B	Failed to get the enclosure for the physical disk.	Please restart HP Storage Management Service.
0x2400506C	Failed to get WMI class names to subscribe.	Please restart HP Storage Management Service.
0x2100506D	SMP assembly file not found.	Please re-install HP Storage Management Provider.
0x2700506E	The registry key HKLM\HARDWARE\Description\System\BIOS was not found.	The system is in an invalid state. Please contact HP Support.
0x2700506F	The registry key HKLM\HARDWARE\Description\System\BIOS\ SystemProductName was not found.	The system is in an invalid state. Please contact HP Support.
0x21005070	SmartArray.dll file not found.	Please re-install HP Storage Management Provider.
0x21005071	Raptor.dll file not found.	Please re-install HP Storage Management Provider.
0x21005072	Failed to get the library name to load.	Please re-install HP Storage Management Provider.
0x25005073	Failed to release the lock.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x24005074	Failed to create the mutex.	Please restart HP Storage Management Service.
0x24005075	Failed to get the proxy to the controller library.	Please restart HP Storage Management Service.
0x25005076	The resiliency setting does not match the pool's resiliency setting.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005077	The operation was successful but the storage provider cache is out of date. You must update the storage provider cache before proceeding further.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x25005078	The specified friendly name already exists.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .
0x20005079	The Storage Pool could not complete the operation because its health or operational status does not permit it.	
0x2500507A	One of the physical disks specified is assigned to other storage pool.	Please update the storage management provider cache by invoking Windows PowerShell command <code>Update-StorageProviderCache</code> .

Table 5 Storage Management Provider errors *(continued)*

Error code	Error message	Recommended action
0x2300507B	This operation is supported only for spare drives.	Please retry the operation.
0x2000507C	The physical drive could not complete the operation because its health or operational status does not permit it.	
0x2000507D	One of the physical disks specified can not be configured by the subsystem.	
0x2300507E	The specified pool does not contain witness lun and hence cannot be shrunk.	Please retry the operation.
0x2300507F	This operation is not supported on primordial storage pools.	Please retry the operation.

Pool Manager Provider error codes

The Pool Manager Provider error codes are listed in [Table 6 \(page 97\)](#).

Table 6 Pool Manager Provider errors

Error code	Error message
0x20006001	Pool Manager Provider has been unloaded from memory.
0x20006002	The Pool Manager Rule XML file is invalid.
0x20006003	Pool configuration is not supported for this enclosure.
0x20006004	Failed to initialize logger.
0x20006005	Could not find ROM Check Library (<code>pssver.dll</code>), this is required to find pool template for any enclosure.
0x20006006	Failed to use WMI to call the SMP Provider.
0x20006007	Failed to connect to the SMP Provider.
0x20006008	General WMI error in the Pool Manager Provider.
0x20006009	The first healthy disk size within the virtual enclosure exceeded the maximum drive capacity allowed for a pool by the virtual enclosure.
0x2000600A	The proposed spare disk slot is empty.
0x2000600B	The first healthy disk type within the virtual enclosure does not match the disk type supported by the virtual enclosure.
0x2000600C	An empty disk slot was found.
0x2000600D	The OS pool was not found in the expected location.
0x2000600E	The proposed spare disk is unhealthy.
0x2000600F	The proposed spare disk is already in use.
0x20006010	The existing pool type does not match the virtual enclosure type.
0x20006011	The proposed pool cannot be created or grown because one of the concrete pools within the pool set cannot be grown.
0x20006012	The existing pool contains disks of different sizes or types.
0x20006013	The existing pool has a RAID level that is not supported for the proposed pool.
0x20006014	The global spare used by this existing pool is not in the current virtual enclosure.

Table 6 Pool Manager Provider errors *(continued)*

Error code	Error message
0x20006015	Some of the disks within the proposed pool are already part of another pool, which spans the current virtual enclosure.
0x20006016	Some of the disks within the proposed pool are unhealthy.
0x20006017	Some of the disks within the proposed pool are offline.
0x20006018	Some of the disks in the proposed pool are marked by the storage subsystem as cannot pool.
0x20006019	The number of existing pools exceeds the count specified in the rule file.
0x2000601A	The pool is unhealthy.
0x2000601B	Some of the disks in the proposed pool are a different type than the first disk of the virtual enclosure.
0x2000601C	Some of the disks in the proposed pool are a different size than the first disk of the virtual enclosure.
0x2000601D	Some of the disks in the proposed pool are a different spindle speed than the first disk of the virtual enclosure.
0x2000601E	Information on some of the disks in the proposed pool could not be read.
0x2000601F	The proposed spare disk is a different type than the first disk of the virtual enclosure.
0x20006020	The proposed spare disk is a different size than the first disk of the virtual enclosure.
0x20006021	The proposed spare disk is a different spindle speed than the first disk of the virtual enclosure.
0x20006022	Pool will be grown by adding spare disks only. No data disks will be added.
0x20006023	Some of the disks in the proposed pool are already used as spare(s).

Management Web Service error codes

The Management Web Service error codes are listed in [Table 7 \(page 98\)](#).

Table 7 Management Web Service errors

Error code	Error message	Recommended action
0x2000A001	You are not authorized to access the resource.	
0x2000A002	Received invalid input.	
0x2000A003	Failed to access WMI.	
0x2000A004	File not found.	
0x2000A005	Registry value not found.	
0x2000A006	The web service encountered an exception while performing the request. Check the web service log for more detail.	
0x2000A007	The storage pool was created, but spare drives could not be added. Edit the pool to add spare drives.	
0x2000A008	The operation on the storage pool failed because the storage provider cache was out of date. Please retry the operation.	
0x2000A009	The operation cannot be performed because a storage provider discovery is in progress. Please try the operation later.	

Table 7 Management Web Service errors *(continued)*

Error code	Error message	Recommended action
0x2000A00A	Failed to get the discovery status of the storage provider.	
0x2300A00B	The storage subsystem has indicated that one or more of the physical disks cannot be used in a storage pool.	Check the health and operational status of the physical drives. Please retry the operation.
0x2300A00C	One or more of the physical disks provided in the request was not found or cannot be used in a storage pool.	Check the health and operational status of the physical drives. Please retry the operation.

HP Support websites

Use the “Support and troubleshooting” task at the HP Support & Drivers website (<http://www.hp.com/go/support>) to troubleshoot problems with the storage system. After entering the storage system name and designation (for example, HP StoreEasy 1000 Storage) or component information (for example, SAS I/O module), use the following links for troubleshooting information:

- Download drivers and software—Provides drivers and software for your operating system.
- Troubleshoot a problem—Provides a listing of customer notices, advisories, and bulletins applicable for the product or component.
- Manuals—Provides the latest user documentation applicable to the product or component. User guides can be a useful source for troubleshooting information. For most storage system hardware platforms, the following ProLiant server manuals may be useful for troubleshooting assistance:

- **HP ProLiant Server User Guide** or **HP ProLiant Server Maintenance and Service Guide**
These guides contain specific troubleshooting information for the server.

- **HP ProLiant Servers Troubleshooting Guide**

- ❗ **IMPORTANT:** Some troubleshooting procedures found in ProLiant server guides may not apply to the storage system. If necessary, check with your HP Support representative for further assistance.

For HP StoreEasy 1000 Storage guides, go to <http://www.hp.com/support/StoreEasy1000Manuals>.

For specific ProLiant model documentation, go to:

<http://www.hp.com/go/proliantgen8/docs>

For software-related components and issues, online help or user guide documentation may offer troubleshooting assistance. Known issues, workarounds and service releases are addressed in this guide or the release notes.

- Customer notices—Address informational topics about the HP StoreEasy 1000 Storage.
- Customer advisories—Address known issues and solutions or workarounds.

NOTE: You must register for Subscriber's Choice to receive customer advisories and notices. See “Subscription service” (page 105) for more information.

Autonomy LiveVault

To use Autonomy LiveVault, which enables data protection in the cloud, see the following website:

<http://www.autonomy.com/storeeasy>

Microsoft Systems Center Operations Manager

Microsoft Systems Center Operations Manager (SCOM) provides comprehensive monitoring, performance management, and analysis tools to maintain Windows OS and application platforms. This solution allows you to monitor Microsoft Windows environments and HP storage products through a common OpsMgr console. To download HP management packs for Microsoft System Center Operations Manager, including installation, configuration, and usage documentation, visit the **HP Management Packs for Microsoft Systems Center** site at:

www.hp.com/go/storageworks/scom2007

Removing and replacing hardware components

For information on removing and replacing a hardware component, follow the component removal and replacement instructions in the appropriate storage system user guide.

NOTE: After replacing the system board, you must ensure that the correct product name is installed on the replacement part. The correct product name is important for applications such as System Insight Manager and Insight Remote Support. To install the correct product name, browse to the C:\hpnas\components\support\naming folder. Locate and run the Smart Component that applies to your system. After running the Smart Component, you must shut down and then restart your system for the changes to take effect. If you run the incorrect Smart Component, the product name will be set incorrectly, but it will not affect your system in any other way.

7 Storage system recovery

This chapter describes how to perform a system recovery. To restore the HP StoreEasy 1000 Storage system to the factory defaults, see “Restoring the factory image with a DVD or USB flash device” (page 101).

System Recovery DVD

The System Recovery DVD enables you to install an image or recover from a catastrophic failure.

At any time, you may boot from the DVD and restore the server to the factory condition. This enables you to recover the system if all other means to boot the server fail.

While the recovery process makes every attempt to preserve the existing data volumes, you should have a backup of your data before recovering the system.

- ❗ **IMPORTANT:** All data on the original OS logical drive is erased during the recovery process.

During system recovery, you can replace the existing drives with drives of the same size or larger. HP recommends that the replacement drives be the same type as the original drives, but it is not required. However, drives in the same RAID group must all be the same type (you cannot mix drive types in a RAID group).

If you replace any disk drives and then perform a system recovery, you must ensure that the replacement drives do not contain a logical drive. Use the Option ROM Configuration for Arrays (ORCA) utility to delete logical drives. For more information about ORCA, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide*, which is available at:

<http://www.hp.com/support/manuals>

Under servers, select **Server Management** and then select **HP Smart Array Advanced Pack Software** under Server Management Software.

Drive letters are not assigned after a restore

When a system that has existing data volumes (non-operating system volumes) is restored using the System Recovery DVD, the data volumes will not have drive letters assigned to them. This is by design. The volume labels are retained and can be used to identify the data volumes.

You can assign drive letters to volumes using `diskpart.exe` or Disk Management.

To use Disk Management:

1. Click **Start**→**Windows PowerShell**.
The Windows PowerShell window opens.
2. Enter `diskmgmt.msc` and press **Enter**.
The Disk Management window opens.
3. Right-click the disk and partition the one for which you want to assign a drive letter and select **Change Drive Letter and Paths**.

Restoring the factory image with a DVD or USB flash device

1. Do one of the following:
 - a. For direct access, insert the System Recovery DVD or a bootable USB flash device (prepared with a System Recovery image).
 - b. For remote management access, connect to the server using iLO from a client PC. Insert the System Recovery DVD in the client PC or attach a bootable USB flash device that has been prepared with a System Recovery image.

2. Reboot the server blade to either the USB flash device or USB DVD drive.
The system BIOS attempts to boot to the USB device first by default. Watch the monitor output during the boot as you may need to press a key to boot to the USB media.

NOTE: If directly connected, you may have to change the BIOS settings to ensure proper boot sequence. If connected remotely, you may have to change some iLO settings to ensure proper boot sequence.

3. Click **Restore Factory Image**.
The recovery process completes with minimal user intervention required. The server automatically reboots more than once.

- ① **IMPORTANT:** Do not interrupt the recovery process.

When the upgrade process is complete, the system automatically logs in as the Administrator using "HPinvent!" as the password, and then prompts you to change the Administrator password.
4. Remove the directly connected DVD or flash device (or remotely connected iLO virtual DVD or flash device) from the server.

Using a USB flash drive for storage system recovery

If you create a backup copy of the System Recovery DVD using a USB flash drive, you can also use it to restore the system.

To create a system recovery USB flash drive:

1. Obtain a blank 8 GB or larger USB flash drive.
2. Insert the USB flash device into your workstation or laptop.
3. Open an elevated command prompt with Administrator privileges.
4. At the command prompt, enter `diskpart`.
5. At the diskpart prompt, enter `list disk`.
6. Identify the disk number that corresponds to the flash drive. This is typically the last disk listed.
7. Enter `sel disk <USB drive number>` (for example, `sel disk 4`).
8. Enter `clean`. This deletes everything from the USB flash device, so ensure that you have the proper disk selected.
9. Enter `create par primary`.
10. Enter `sel par 1`.
11. Enter `format fs=fat32 quick`.

NOTE: If your USB flash drive does not support the FAT32 file system, format the drive as NTFS instead. Omitting the `quick` parameter lengthens the format time considerably.

12. Enter `active` to mark the partition as active.
13. Enter `assign letter=<drive letter>` to assign a drive letter to the USB drive (for example, `assign letter=U`).
14. Enter `exit` to quit diskpart context commands.
15. Insert the System Recovery DVD into the computer.
16. Using Windows Explorer or a comparable utility, open the DVD so that all contents are visible, including hidden and system files.
17. Select all of the files (including `bootmgr`) on the DVD.
18. Copy all of the selected files to the root of the USB flash drive.

Restoring the system with Windows Recovery Environment

NOTE: To use Windows Recovery Environment, you must have created a system backup with the Windows Server Backup utility.

1. Do one of the following:
 - a. For direct access, connect the cable and insert the System Recovery DVD in the client PC.
 - b. For remote management access, connect to the server using iLO from a client PC. Insert the System Recovery DVD in the client PC or attach a bootable USB flash device that has been prepared with a System Recovery image.
2. Reboot the server to either the USB flash device or USB DVD drive.

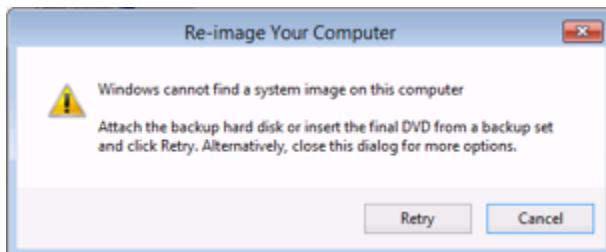
The system BIOS attempts to boot to the USB device by default. Watch the monitor output during the boot as you may need to press a key to boot to the USB media.

NOTE: If directly connected, you may have to change the BIOS settings to ensure proper boot sequence. If connected remotely, you may have to change some iLO settings to ensure proper boot sequence.

3. In **Windows Boot Manager**, select **Windows Recovery Environment**.

The recovery environment is loaded and the System Recovery Options wizard opens.
4. Select **Troubleshoot** to access the repair tools that allow you to recover or troubleshoot Windows and click **Next**.
5. Select **Advanced options** to access the advanced repair options and click **Next**.
6. Select **System Image Recovery** to restore the system using a previously created system recovery image and click **Next**.
7. Select **Windows Server 2012** or **Windows Server 2012 R2**.

The System Recovery Options wizard scans the computer for a system image. If it is unable to locate a system image, the following message is displayed:



8. Attach an external drive or insert a DVD that contains the backup files and click **Retry**. If you want to recover from the network, click **Cancel**.
9. Select one of the following options and click **Next**:
 - **Use the latest available image**—Select this option to use the backup image that was recently created. If you are restoring from the network, this option is unavailable.
 - **Select a system image**—Select this option to choose a different image to restore from or to restore from the network.
10. If you are restoring from the network, click **Advanced**, and then select **Search for a system image on the network**:
 - a. The utility automatically connects to an existing network (DHCP enabled).
 - b. Once connected to the network, enter the directory where the system image is located on the network and click **Next**.
11. Select the disks to which you want to restore data and click **Next**.
12. Enter the share path where the backup image is stored and click **OK**.

13. Enter the login credentials for authentication and click **OK**.
14. Select the date and time of the system image that you want to restore and click **Next**.
15. Select **Format and repartition disks** to delete existing partitions and reformat all disks during the restore process and click **Next**. If you do not want to restore certain disks, click **Exclude Disks**.

NOTE: If the **Format and repartition disks** option is unavailable, click **Install Drivers** to install the drivers for the disks that you want to restore.

16. Verify the system image details and click **Finish** to start the recovery process.
17. Click **Yes** on the confirmation message to proceed with Windows recovery.

① **IMPORTANT:** Do not interrupt the recovery process.

18. Remove the directly connected DVD or flash device (or remotely connected iLO virtual DVD or flash device) from the server.

8 Support and other resources

Contacting HP

HP technical support

For worldwide technical support information, see the HP support website:

<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

<http://www.hp.com/go/e-updates>

After registering, you receive email notification of product enhancements, new driver versions, firmware updates, and other product resources.

Related information

You can find related documentation at:

<http://www.hp.com/support/StoreEasy1000Manuals>

HP websites

For additional HP information, see the following HP websites:

- <http://www.hp.com>
- <http://www.hp.com/go/storage>
- <http://www.hp.com/go/hpsim>
- http://www.hp.com/service_locator
- <http://www.hp.com/support/manuals>
- <http://www.hp.com/support/downloads>
- <http://www.hp.com/storage/whitepapers>

Rack stability

Rack stability protects personnel and equipment.



WARNING! To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.
 - Ensure that the full weight of the rack rests on the leveling jacks.
 - Install stabilizing feet on the rack.
 - In multiple-rack installations, fasten racks together securely.
 - Extend only one rack component at a time. Racks can become unstable if more than one component is extended.
-

Customer self repair

HP customer self repair (CSR) programs allow you to repair your storage product. If a CSR part needs replacing, HP ships the part directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your HP-authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider, or see the CSR website:

<http://www.hp.com/go/selfrepair>

9 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hp.com). Include the document title and part number, version number, or the URL when submitting your feedback.

A Operating system logical drives

The logical disks reside on physical drives as shown in [Storage system RAID configurations \(page 108\)](#).

① **IMPORTANT:** The first two logical drives are configured for the storage system operating system.

The Operating System volume default factory settings can be customized after the operating system is up and running. The following settings can be changed:

- OS logical drive size can be changed to 60 GB or higher

If the Operating System volume is customized and the System Recovery DVD is run at a later time, the System Recovery process will maintain the custom settings as long as the above criteria are met (OS logical drive size of 60 GB or higher) and the OS volume is labeled **System**. If the storage system arrays are deleted and the System Recovery DVD is run, the System Recovery process will configure the storage system using the factory default settings listed in the table below.

HP StoreEasy 1000 Storage systems do not include preconfigured data volumes. The administrator must configure data storage for the storage system.

The system reserved partition contains the operating system boot loader and allows you to enable BitLocker Drive Encryption for the Operating System volume.

Table 8 Storage system RAID configurations

Server model	Logical Disk 1
<ul style="list-style-type: none">• HP StoreEasy 14x0 Storage (base model)• HP StoreEasy 14x0 8TB SATA Storage• HP StoreEasy 14x0 12000 SATA Storage	<ul style="list-style-type: none">• Operating System Volume (100 GB)• RAID 6• Physical Drives 1–4
<ul style="list-style-type: none">• HP StoreEasy 15x0 Storage (base model)• HP StoreEasy 15x0 8TB SATA Storage• HP StoreEasy 15x0 12000 SATA Storage	<ul style="list-style-type: none">• Operating System Volume (100 GB)• RAID 6• Physical Drives 1–4
<ul style="list-style-type: none">• HP StoreEasy 16x0 Storage (base model)• HP StoreEasy 16x0 28TB SATA Storage• HP StoreEasy 16x0 42000 SATA Storage	<ul style="list-style-type: none">• Operating System Volume (100 GB)• RAID 6• Physical Drives 2–8
<ul style="list-style-type: none">• HP StoreEasy 16x0 900GB SAS Storage	<ul style="list-style-type: none">• Operating System Volume (450 GB)• RAID 1• Physical Drives 13–14
<ul style="list-style-type: none">• HP StoreEasy 18x0 Storage (base model)• HP StoreEasy 18x0 12.6TB Storage• HP StoreEasy 18x0 20.7TB Storage	<ul style="list-style-type: none">• Operating System Volume (450 GB)• RAID 1• Physical Drives 24–25

Table 9 Storage system RAID configurations

Server model	Logical Disk 1
	<ul style="list-style-type: none">• Operating System Volume (450 GB)• RAID 1• Physical Drives 1–2

NOTE: In the HP Array Configuration Utility (ACU), mapping of logical disks begins at 1. In Microsoft Disk Manager, mapping begins at 0.

If the operating system has a failure that might result from corrupt system files, a corrupt registry, or the system hangs during boot, see [“Storage system recovery”](#) (page 101).

B Regulatory information

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at <http://www.hp.com/support/Safety-Compliance-EnterpriseProducts>.

Belarus Kazakhstan Russia marking



Manufacturer and Local Representative Information

Manufacturer's information:

- Hewlett-Packard Company, 3000 Hanover Street, Palo Alto, California 94304, U.S.

Local Representative information Russian:

- **HP Russia:** ЗАО "Хьюлетт-Паккард А.О.", 125171, Россия, г. Москва, Ленинградское шоссе, 16А, стр.3, тел./факс: +7 (495) 797 35 00, +7 (495) 287 89 05
- **HP Belarus:** ИООО «Хьюлетт-Паккард Бел», 220030, Беларусь, г. Минск, ул. Интернациональная, 36-1, офис 722-723, тел.: +375 (17) 392 28 18, факс: +375 (17) 392 28 21
- **HP Kazakhstan:** ТОО «Хьюлетт-Паккард (К)», 050040, Казахстан, г. Алматы, Бостандыкский район, ул. Тимирязева, 28В, 1 этаж, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Local Representative information Kazakh:

- **HP Kazakhstan:** ЖШС «Хьюлетт-Паккард (К)», Қазақстан, Алматы қ., Бостандық ауданы, Тимирязев к-сі, 28В, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Manufacturing date:

The manufacturing date is defined by the serial number.

CCSYWWZZZZ (HP serial number format for this product)

Valid date formats include:

- YWW, where Y indicates the year counting from within each new decade, with 2000 as the starting point; for example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- YYWW, where YY indicates the year, using a base year of 2000; for example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options

<http://www.hp.com/support/ProLiantServers-Warranties>

HP Enterprise Servers

<http://www.hp.com/support/EnterpriseServers-Warranties>

HP Storage Products

<http://www.hp.com/support/Storage-Warranties>

HP Networking Products

<http://www.hp.com/support/Networking-Warranties>

Glossary

The following glossary terms and definitions are provided as a reference for storage products.

Glossary terms

ACL	Access control list.
ADS	Active Directory Service.
array	A synonym of storage array, storage system, and virtual array. A group of disks in one or more disk enclosures combined with controller software that presents disk storage capacity as one or more virtual disks.
backups	<p>A read-only copy of data copied to media, such as hard drives or magnetic tape, for data protection.</p> <p>A full backup copies all the data selected to be backed up. An incremental backup copies only data selected to be backed up that has changed since the last full backup.</p> <p>Backups provide data protection in the event of system or hard drive failure, because the data is stored on media separate from the system hard drives.</p>
CIFS	Common Internet File System. The protocol used in Windows environments for shared folders.
CLI	Command-line interface. An interface comprised of various commands which are used to control operating system responses.
cluster	A group of logically integrated servers that enables high availability, increases capacity, or distributes processing.
CSR	Customer self repair.
data protection	A method of protecting data from being corrupted or lost as a result of hard drive failure. Methods used to provide data protection include RAID and backups.
DHCP	Dynamic Host Configuration Protocol.
DNS	Domain Name System.
fault tolerance	The capacity to cope with internal hardware problems without interrupting the system's data availability, often by using backup systems brought online when a failure is detected. Many systems provide fault tolerance by using RAID architecture to give protection against loss of data when a single disk drive fails. Using RAID 1, 3, 5, 6, 10, or 50 techniques, the RAID controller can reconstruct data from a failed disk drive and write it to a spare or replacement disk drive.
FTP	File Transfer Protocol.
HBA	Host bus adapter.
HDD	Hard disk drive.
ICT	Initial Configuration Tasks
iLO	Integrated Lights-Out.
iSCSI	Internet small computer system interface. Like an ordinary SCSI interface, iSCSI is standards-based and efficiently transmits block-level data between a host computer (such as a server that hosts Exchange or SQL Server) and a target device (such as the HP All-in-One Storage System). By carrying SCSI commands over IP networks, iSCSI is used to facilitate data transfers over intranets and to manage storage over long distances.
LAN	Local area network. A communications infrastructure designed to use dedicated wiring over a limited distance (typically a diameter of less than five kilometers) to connect to a large number of intercommunicating nodes. Ethernet and token ring are the two most popular LAN technologies. (SNIA)
logical disk	A logical disk contains one or more volumes and spans multiple hard drives in an array. RAID configuration of storage is performed at the logical disk level. Also known as a <i>LUN</i> .

LUN	Logical unit number. A LUN results from mapping a logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV and the number of LDEVs associated with the LUN.
mount point	A host's file system path or directory name where a host volume (device) is accessed.
NAS	Network attached storage.
NCT	Network Configuration Tool
NFS	Network file system. The protocol used in most UNIX environments to share folders or mounts.
NIC	Network interface card. A device that handles communication between a device and other devices on a network.
SAN	Storage area network. A network of storage devices available to one or more servers.
SAS	Serial Attached SCSI.
SATA	Serial Advanced Technology Attachment.
SNMP	Simple Network Management Protocol. A widely used network monitoring and control protocol. Data is passed from SNMP agents, which are hardware and/or software processes reporting activity in each network device (hub, router, bridge, and so on) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a data structure that defines what is obtainable from the device and what can be controlled (turned off, on, and so on).
volume	Volume on disk. An accessible storage area on disk, either physical or virtual.
volume mapping	The process by which volume permissions (read only, read/write, or none) and LUNs are assigned to a host port.

Index

A

- Accessing the storage system
 - Remote Desktop method, 48
- ACL, defining, 80
- Array Configuration Utility, 59
- array controller, purpose, 54
- arrays, defined, 54

B

- backup, with shadow copies, 73
- basic disks, 55, 56
- Belarus Kazakhstan Russia EAC marking, 110

C

- cache file, shadow copies, 66
- Certificate of Authenticity (COA), 20
- configuration
 - server, 37
- contacting HP, 105
- customer self repair, 106

D

- data blocks, 54
- Data Deduplication, 50
- data striping, 54
- Disk Management
 - extending volumes, 62
- documentation
 - providing feedback on, 107
- drive LED definitions, 16
- dynamic disks
 - spanning multiple LUNs, 56

E

- EAC marking
 - Belarus Kazakhstan Russia, 110
- End User License Agreement (EULA), 20
- error codes, 91
- extending volumes
 - Disk Management, 62

F

- factory image
 - restoring the system, 101
- failover properties for multi-site environments, configuring, 48
- fault tolerance, 54
- features, 6
- File and Storage Services, 49
- file level permissions, 74
- file recovery, 72
- file screening management, 82
- File Server Resource Manager, 81
- file services management, 59
- file system elements, 57

- file-sharing protocols, 57
- files, ownership, 79
- folder management, 74
- folder recovery, 72
- folders
 - auditing access, 77
 - managing, 74

G

- GPT partitions, 56
- groups, adding to permissions list, 75

H

- hardware components
 - HP StoreEasy 1430 Storage, 6
 - HP StoreEasy 1530 Storage, 9
 - HP StoreEasy 1630 Storage, 11
 - HP StoreEasy 1830 Storage, 14
- HP
 - Array Configuration Utility, 59
 - Storage Manager, 59
- HP Initial Configuration Tasks, 37
- HP StoreEasy 1430 Storage
 - hardware components, 6
- HP StoreEasy 1530 Storage
 - hardware components, 9
- HP StoreEasy 1630 Storage
 - hardware components, 11
- HP StoreEasy 1830 Storage
 - hardware components, 14

K

- kit contents, 20

L

- LEDs
 - drive definitions, 16
 - Systems Insight Display combinations, 17
- logical drives, 108
- logical storage elements, 55
- LUNs
 - described, 55

M

- Microsoft Disk Manager, 108
- Microsoft Services for Network File System (NFS), 51
- Microsoft Systems Center Operations Manager (SCOM)
 - using for monitoring and troubleshooting, 100
- monitoring tools
 - Microsoft Systems Center Operations Manager (SCOM), 100
 - System Management Homepage, 84
- mount points
 - creating, 56
 - not supported with NFS, 56
- mounted drives and shadow copies, 65

O

online spares, 55
operating system logical drives, 108
OpsMgr see Microsoft Systems Center Operations Manager (SCOM)

P

partitions
 extended, 56
 primary, 56
permissions
 file level, 74
 list
 adding users and groups, 75
 removing users and groups, 75
 modifying, 75
 resetting, 76
physical storage elements, 53
power on
 server, 36
Print Management, 51

Q

quota management, 82

R

rack stability
 warning, 106
RAID
 data striping, 54
 LUNs in volumes, 56
 summary of methods, 54
recovering the system, 101
 system recovery DVD, 101
 USB flash drive, 102
regulatory information, 110
 Turkey RoHS material content declaration, 110
 Ukraine RoHS material content declaration, 110
Remote Administration, 49
Remote Desktop access
 storage system, 48
Remote Desktop method
 connecting to network, 48
restoring the system
 factory image, 101

S

SAN environment, 59
security
 auditing, 77
 file level permissions, 74
 ownership of files, 79
serial number, 20
server
 power on, 36
Server Core, using, 47
Services for UNIX, 56, 57
services, verifying running, 90
setting up

 overview, 20
 setup completion, 46
shadow copies, 57
 backups, 73
 cache file, 66
 defragmentation, 65
 described, 63
 disabling, 69
 file or folder recovery, 72
 managing, 65
 mounted drives, 65
 on NFS shares, 71
 on SMB shares, 70
 planning, 63
 redirecting, 68
 scheduling, 68
 uses, 63
 viewing list, 67
Shadow Copies for Shared Folders, 70
share management, 80
shares
 administrative, 81
 managing, 80
 standard, 81
SMB, share support, 81
software components, 18
storage management
 elements, 52
 overview, 52
 process, 53
storage reports, 82
Subscriber's Choice for Business, 105
Support websites
 contacting HP, 105
 HP, 99, 105
 Subscribers's Choice for Business, 105
 Subscription service, 105
System Management Homepage
 description, 84
 Help menu, 85
 main page, 85
 starting, 85
 Storage System page, 86
system recovery
 DVD, 101
 USB flash drive, 102
Systems Insight Display LED combinations, 17

T

technical support see Support websites
Telnet , 48
troubleshooting tools
 Microsoft Systems Center Operations Manager (SCOM), 100
 System Management Homepage, 84
Turkey RoHS material content declaration, 110

U

Ukraine RoHS material content declaration, 110

- USB flash drive
 - system recovery, [102](#)
- users
 - adding to permission list, [75](#)

V

- verifying services are running, [90](#)
- Volume Shadow Copy Service, [63](#)
- volumes
 - planning, [56](#)
- vssadmin tool, [65](#)

W

- warning
 - rack stability, [106](#)
- warranty information
 - HP Enterprise servers, [110](#)
 - HP Networking products, [110](#)
 - HP ProLiant and X86 Servers and Options, [110](#)
 - HP Storage products, [110](#)
- websites
 - customer self repair, [106](#)