# IBM Storage Management Console for VMware vCenter
Version 3.2.1

*User Guide*

GA32-0929-10

**Note**
Before using this document and the product it supports, read the information in "Notices" on page 99.

**Edition notice**

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# About this guide

This guide describes how to install, configure, and use the IBM® Storage Management Console for VMware vCenter.

## Who should use this guide

This guide is intended for system administrators who are familiar with the VMware vCenter and vSphere environments, and with the specific IBM storage system that is in use.

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These notices are used in this guide to highlight key information.

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You can find additional information and publication related to the IBM Storage Management Console for VMware vCenter on the following IBM, VMware, and Microsoft websites.

- IBM Storage Host Software Solutions Information Center (publib.boulder.ibm.com/infocenter/strhosts/ic)
- IBM Flex System™ Information Center (publib.boulder.ibm.com/infocenter/flexsys/information)
- IBM Scale Out Network Attached Storage (SONAS) Information Center (publib.boulder.ibm.com/infocenter/sonasic/sonas1ic)
- IBM Storwize® V3500 Information Center (publib.boulder.ibm.com/infocenter/storwize/v3500_ic)
- IBM Storwize V3700 Information Center (publib.boulder.ibm.com/infocenter/storwize/v3700_ic)
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- IBM System Storage DS8000® Information Center (publib.boulder.ibm.com/infocenter/dsichelp/ds8000ic)

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- IBM XIV® Storage System Information Center (publib.boulder.ibm.com/infocenter/ibmxiv/r2)
- VMware ESXi and ESX Info Center (www.vmware.com/products/vsphere/esxi-and-esx)
- VMware Product Support for VMware vSphere (www.vmware.com/support/product-support/vsphere), including support for ESX, ESXi, and vCenter
- VMware Technical Resources (www.vmware.com/technical-resources)
- VMware Documentation (www.vmware.com/support/pubs)
- VMware knowledgebase (kb.vmware.com)
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# Chapter 1. Introduction

The IBM Storage Management Console for VMware vCenter is a software plug-in that integrates with the VMware vCenter Server platform and enables VMware administrators to independently and centrally manage their storage resources on the following IBM storage systems:

- IBM Flex System V7000
- IBM Scale Out Network Attached Storage (SONAS)
- IBM Storwize V3500
- IBM Storwize V3700
- IBM Storwize V7000
- IBM Storwize V7000 Unified Storage System
- IBM System Storage DS8000
- IBM System Storage SAN Volume Controller
- IBM XIV Storage System

Depending on the IBM storage system in use, administrators can self-provision volumes (LUNs) in selected predefined storage pools, or self-provision file shares in selected predefined file systems. The volumes or file shares are mapped to VMware ESX and ESXi hosts, clusters, or datacenters as logical drives that can be used for storing VMware datastores (virtual machine data containers).

## Main features and benefits

The IBM Storage Management Console for VMware vCenter runs as a Windows Server service on the vCenter server.

Any VMware vSphere client that connects to the vCenter server detects the service on the server and automatically enables the IBM storage management features on the vSphere client.

After the plug-in is installed and configured, the IBM Storage Management Console enables full integration with the VMware vSphere graphical user interface (GUI), in the form of an IBM Storage resource management tool and a dedicated IBM Storage management tab.

When using any supported IBM storage system except SONAS, the IBM Storage Management Console features and enables the following capabilities:

- Full control over storage volumes, including volume creation, resizing, renaming, migration to a different storage pool, mapping, unmapping, multipath policy enforcement, and deletion.
- Easy and integrated allocation of volumes to VMware datastores, used by virtual machines that run on ESX and ESXi hosts, clusters, or datacenters.

When using the IBM Storwize V7000 Unified and SONAS storage systems (as opposed to the other supported storage systems), the IBM Storage Management Console features and enables the following capabilities:

- Full control over file shares, including file share creation, setting file share quota, disabling file share quota, exporting to hosts, removing from hosts, and deletion.

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- Easy and integrated allocation of file shares to VMware datastores used by virtual machines that run on ESX and ESXi hosts, clusters, or datacenters.

## Concept diagram

The following concept diagram illustrates how IBM storage systems are accessed and controlled through the VMware environment.

It also shows the primary relationships and interaction between the VMware components and the IBM storage systems that provide the storage pools and file systems in which the volumes and file shares are created.

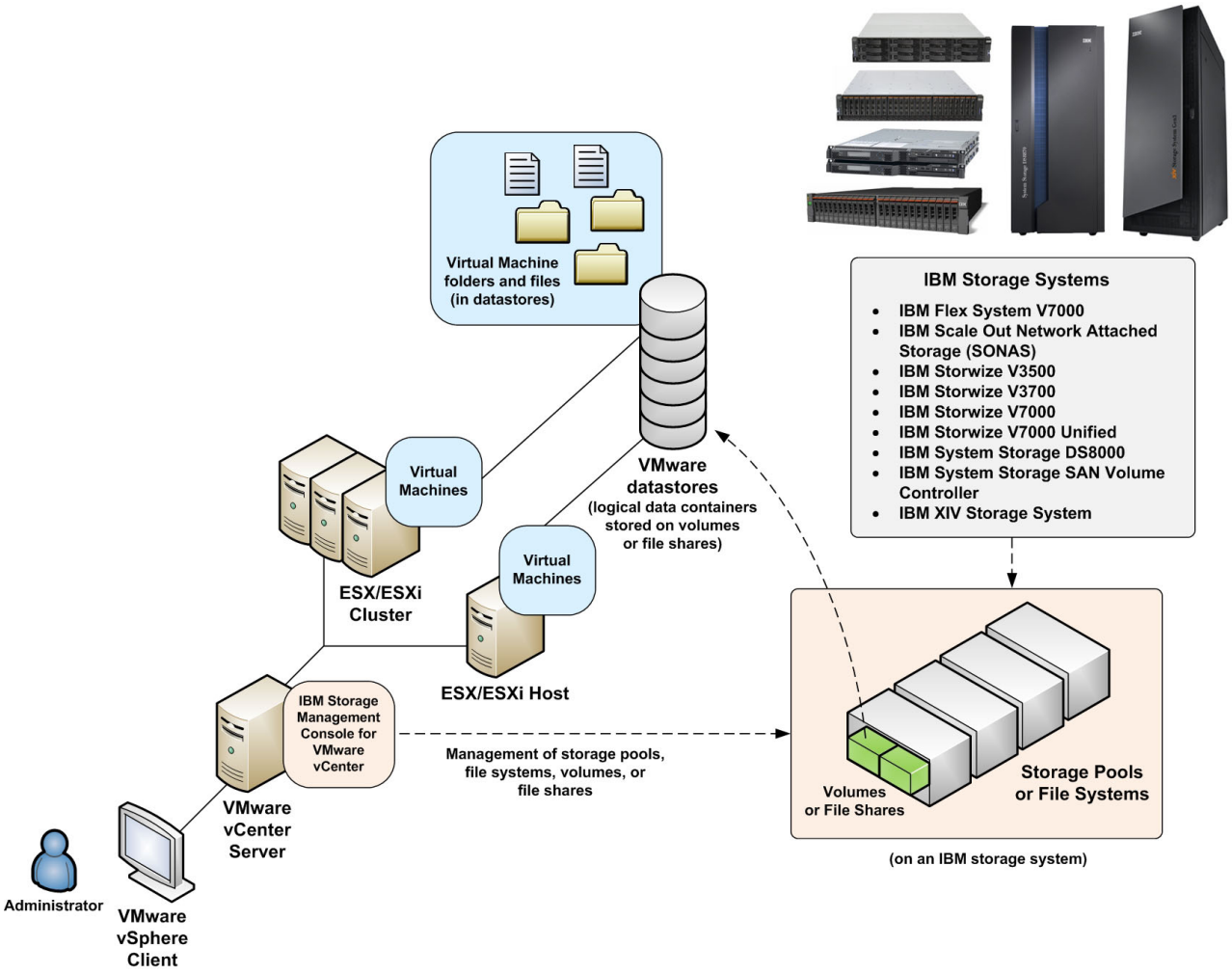


*Figure 1. Primary relationships and interaction between components*

**Note:** The IBM Storage Management Console for VMware vCenter can use only predefined storage pools or file systems. New storage pools or file systems cannot be created from the IBM Storage Management Console.

## Compatibility and requirements

For complete and up-to-date information about the compatibility and requirements of the IBM Storage Management Console for VMware vCenter, refer to the latest release notes.

You can find the latest release notes on the IBM Storage Host Software Solutions Information Center (publib.boulder.ibm.com/infocenter/strhosts/ic) or on the IBM Fix Central (www.ibm.com/support/fixcentral).

**Note:** Refer to the relevant VMware documentation for information about how to install the compatible versions of vCenter Server and vSphere Client. You should also refer to the latest installation and configuration instructions for ESX and ESXi servers.

## Download site

The IBM Storage Management Console for VMware vCenter is available as a free plug-in for VMware vCenter.

You can download the latest version at any time from the IBM Fix Central (www.ibm.com/support/fixcentral).

# Chapter 2. Installation

After downloading the IBM Storage Management Console software package, you can begin the installation as described in the following sections.

- "First-time installation vs. upgrade"
- "Running the installation wizard"
- "Removing the IBM Storage Management Console software" on page 7

## First-time installation vs. upgrade

When you run the installation on a system with an existing installation of the IBM Storage Management Console, the uninstallation wizard is automatically invoked and you must uninstall the existing version.

The installation wizard of the new version (see "Running the installation wizard") starts only after the previous version has been uninstalled. During the uninstallation, the existing database is not removed, but kept for use by the new software version. However, if you have been using your own private SSL key and a signed SSL certificate, you should replace these files again after the upgrade, as described in "Replacing the common SSL certificate with a private certificate" on page 14.

**Note:** The upgrade of the IBM Storage Management Console for VMware vCenter takes effect only after you close and restart the VMware vSphere client software.

## Running the installation wizard

Perform the following procedure to install the IBM Storage Management Console on the VMware vCenter server.

### Procedure

1. Depending on the operating system architecture, run the installation package file.
   - On x86 architectures, run:
     `IBM_Storage_Management_Console_for_VMware_vCenter-3.2.1-x86.exe`
   - On x64 architectures, run:
     `IBM_Storage_Management_Console_for_VMware_vCenter-3.2.1-x64.exe`
2. From the language selection dialog box, select the language that you want to use in the installation wizard, and then click **OK**.

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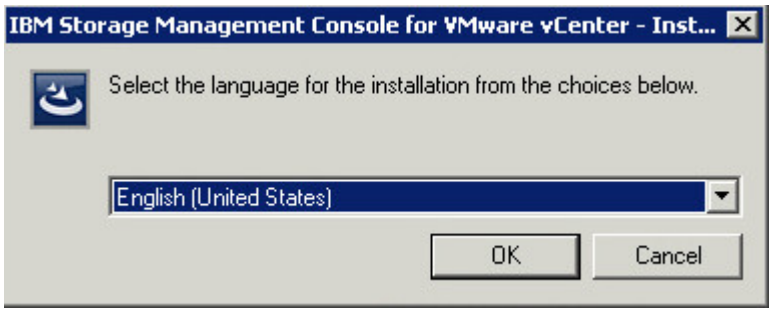


*Figure 2. Language selection dialogue box*

**Note:** The language selection affects only the text that is displayed on the installation wizard, including the language used in the IBM license agreement. It does not affect the configuration wizard and GUI of the IBM Storage Management Console for VMware vCenter, which are available in English only.

The installation wizard of the IBM Storage Management Console for VMware vCenter starts.

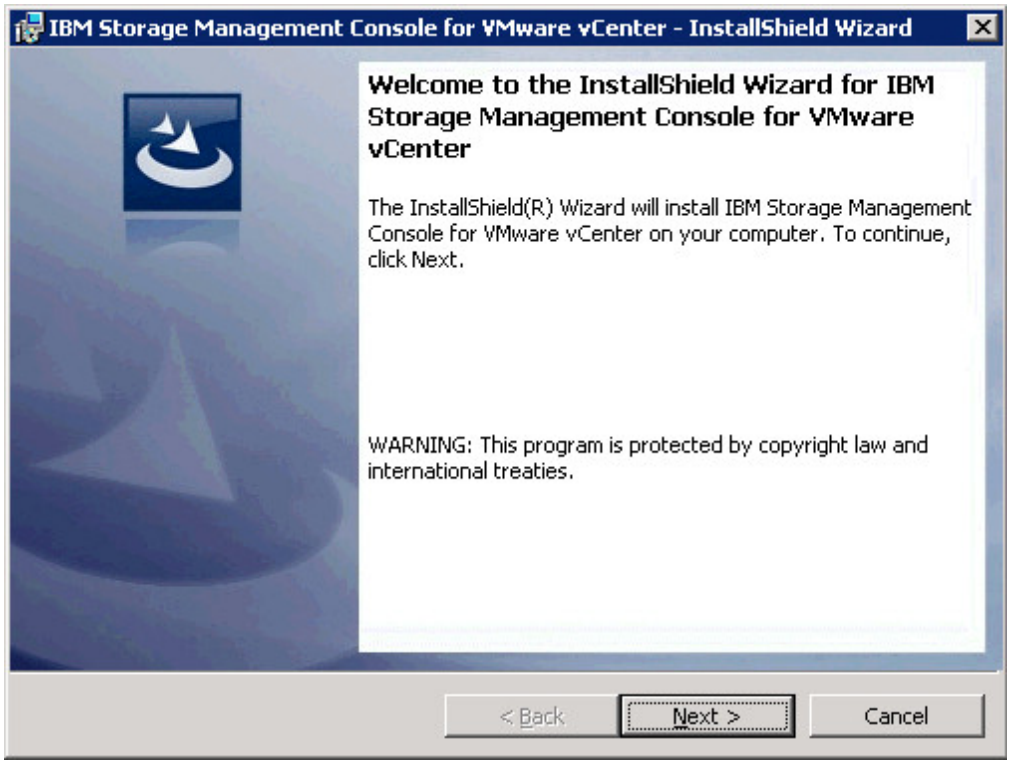


*Figure 3. IBM Storage Management Console for VMware vCenter - installation wizard*

3. Click **Next**. The License Agreement panel is displayed.
4. Read the IBM License Agreement and then select **I accept the terms in the license agreement**.
5. Click **Next**. The Destination Folder panel is displayed.

6. Use the default installation directory (`C:\Program Files\IBM\IBM` Management Console for VMware vCenter) or click **Change** to install in a different directory.

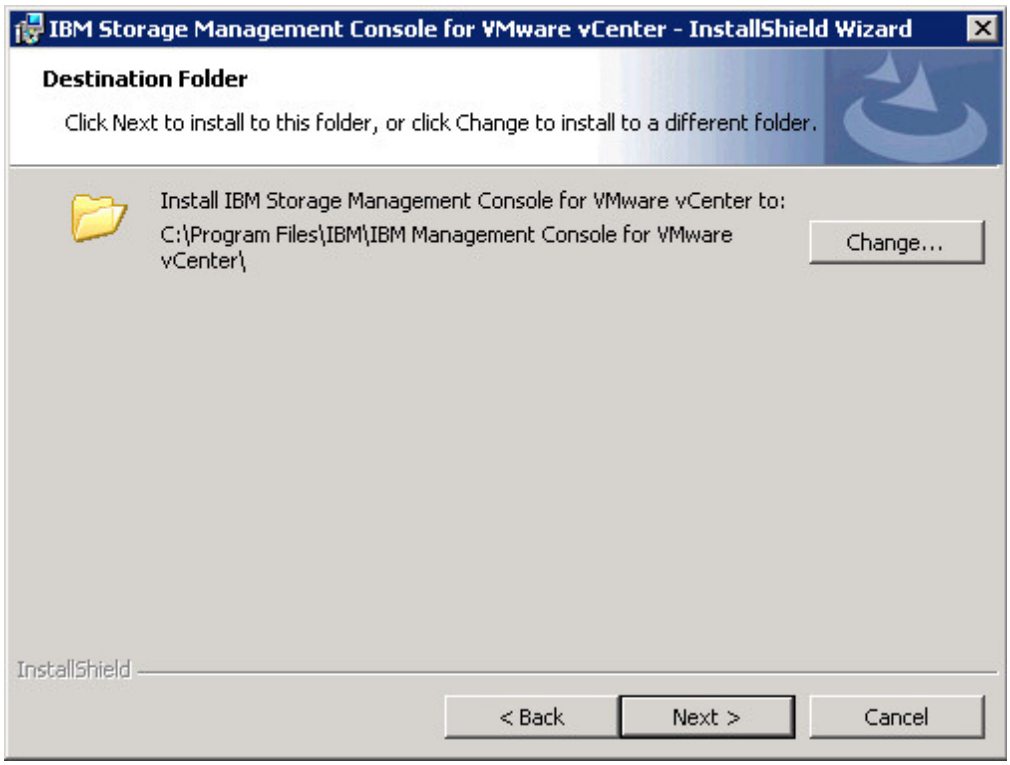


*Figure 4. Destination Folder panel - default installation directory*

7. Click **Next**. The Ready to Install the Program panel is displayed.
8. Click **Install** to begin the installation. After the installation is complete, the Completed panel is displayed.
9. Select **Launch the Configuration Wizard**, and then click **Finish**.

**Note:** Select the **CLI configuration wizard** option to start it automatically (see "Using the CLI configuration wizard" on page 9) after the installation.

## Removing the IBM Storage Management Console software

If you want to remove the IBM Storage Management Console from the vCenter server, perform the following procedure.

### Procedure

1. Close the vSphere Client application.

**Important:** Do not uninstall the IBM Storage Management console software before closing the vSphere Client application.

2. Go to **Control Panel** > **Programs** > **Programs and Features**, select the IBM Storage Management Console for VMware vCenter from the list of installed programs, and then click **Uninstall**. The uninstallation wizard guides you through the remaining uninstallation steps.

## What to do next

After the uninstallation, if you want to clear the locally saved configurations, perform the following steps.

1. Go to the `Windows/Temp` directory.
2. Delete the `keys_temp` folder, along with the following files:
   - `vc_plugin.db`
   - `vc_plugin_reg.bck`

# Chapter 3. Configuration

Before you start using the IBM Storage Management Console for VMware vCenter, different configuration and verification procedures are required, as detailed in the following sections.

- "Using the CLI configuration wizard"
- "Restarting vSphere Client and verifying the installation" on page 10
- "Assigning the required vCenter privileges" on page 16

In addition, refer to "Modifying the Management Console settings in the Windows Server registry" on page 12 for information about optional configuration.

## Using the CLI configuration wizard

Use the command-line interface (CLI) configuration wizard to log in to the vCenter server and register extensions on the server.

### About this task

The CLI configuration wizard starts right after the installation if the option to launch it was selected. If the option was not selected and the wizard does not start, you can start it from the IBM folder that is located on the **All Programs** list of the **Windows Start** menu.

The Welcome message is displayed when the configuration wizard starts.

```
Welcome to the IBM Storage Management Console for VMware vCenter setup wizard,
version 3.2.1.
Use this wizard to configure the IBM Storage Management Console for VMware vCenter.
Press [Enter] to proceed.
```

### Procedure

Perform the following steps to configure the IBM Storage Management Console for VMware vCenter:

1. Press **Enter**. The following message is displayed:

   ```
   The Wizard will now install the IBM Storage Management Console service and register
   the extension in the vCenter server.
   Do you want to continue? [default: yes]:
   ```

2. Press **y** to proceed. The following message is displayed:

   ```
   The IBM Storage Management Console requires a valid username for connecting
   to the vCenter server.
   This user should have permission to register the Plug-in in the Plug-in Manager.
   Please enter a username:
   ```

3. Enter the user name for accessing the VMware vCenter server. Then, enter your password.

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**Note:** You must have permission to register extensions on the vCenter server. If the password that you enter is not correct, you are prompted to enter your user name and password again.

After you successfully log in to the vCenter server with your user name and password, the following message is displayed:

```
The IBM Storage Management Console for VMware vCenter web component requires
a valid network port number.
Please enter a port number for the web component [default: 8880]:
```

4. Enter the port number that should be used for HTTP requests, from the vSphere client. The following message is displayed:

```
The IBM Storage Management Console for VMware vCenter is now configured.
Press [ENTER] to proceed.
```

5. Press **Enter**. An extension is registered and verified on the vCenter server and the installation is complete.

**Note:** If any error occurs during the configuration, a record is added to the log file (see "Viewing the log file" on page 88).

## Restarting vSphere Client and verifying the installation

After you install and configure the IBM Storage Management Console for VMware vCenter with the CLI configuration wizard, you must restart the vSphere Client application.

After the vSphere Client restarts, the IBM Storage icon becomes available on the vSphere management tools.

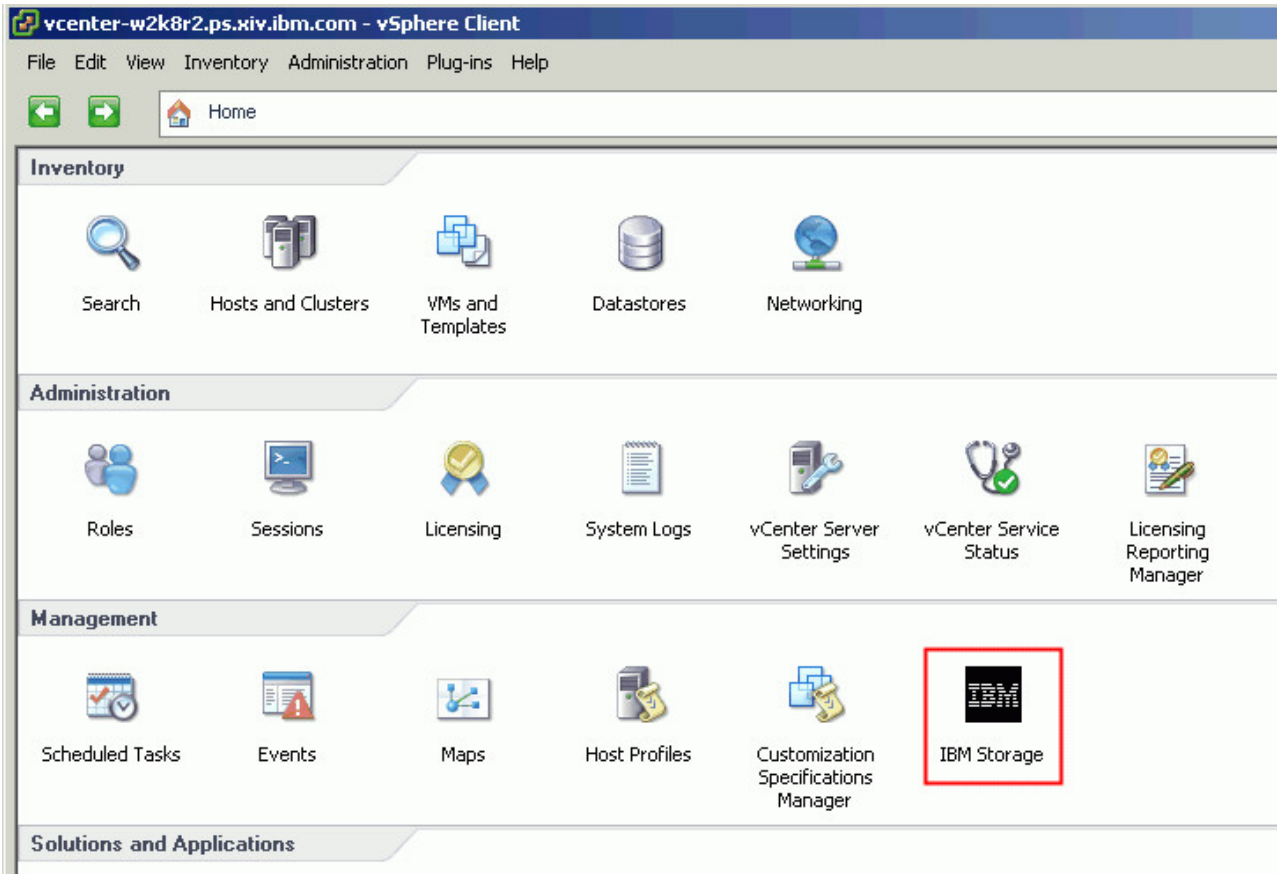



*Figure 5. IBM Storage icon on the vSphere Client management tools*

In addition, the IBM Storage plug-in appears on the Installed Plug-ins list of the vCenter Plug in Manager.

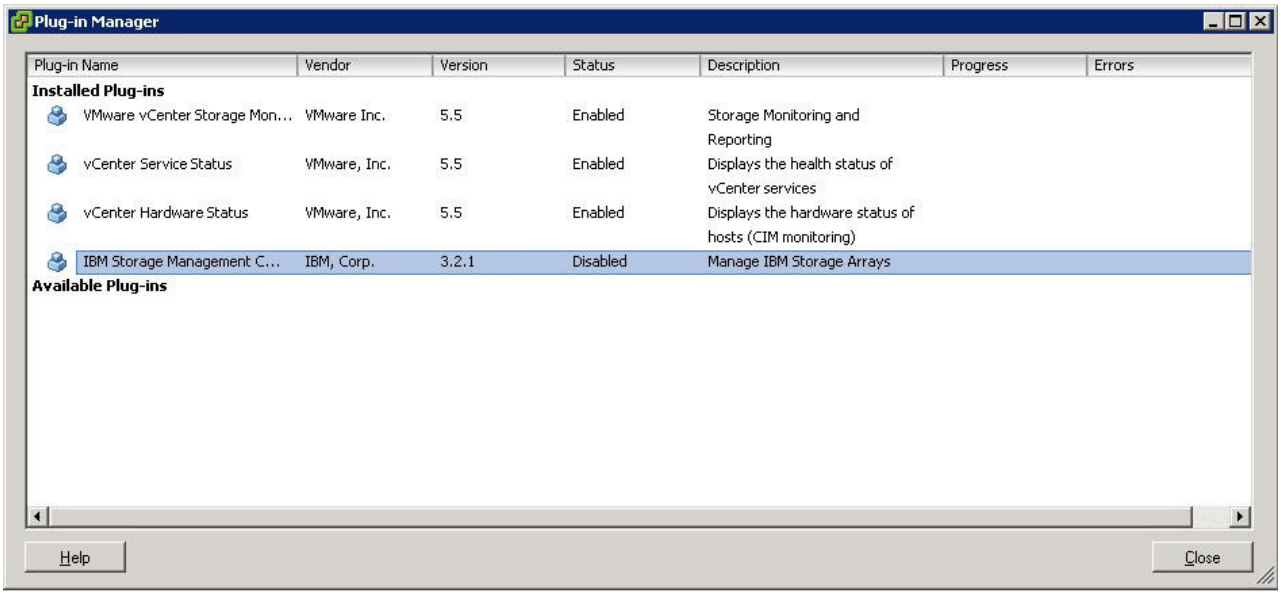



*Figure 6. IBM Storage plug-in listed in the Plug-in Manager*

When the IBM Storage Management Console is properly installed, the IBM Storage tab is added to the vSphere management GUI. You can access the tab from the Datacenter, Cluster, Host, Datastore, and Virtual Machine inventory views. From the IBM Storage tab, you can view and fully manage storage volumes and file shares, as explained in the next chapters.

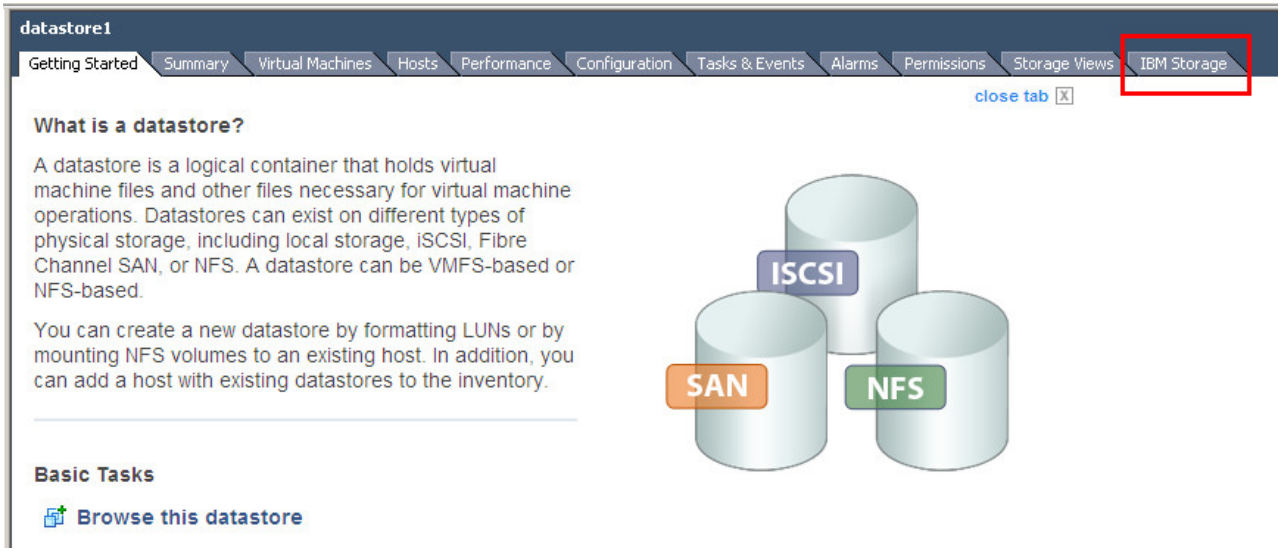



*Figure 7. IBM Storage tab added to the vSphere GUI*

## Modifying the Management Console settings in the Windows Server registry

You can modify different functionalities of the IBM Storage Management Console by changing registry keys of the Windows Server upon which the VMware vCenter software is installed.

**Attention:** Perform registry changes with caution. All changes that apply to the IBM Storage Management Console must be performed on the vCenter server and not on the vSphere client. Before making any change, it is recommended to back up the Windows Server registry.

This section describes:

- "Modifying general settings"
- "Replacing the common SSL certificate with a private certificate" on page 14
- "Setting the storage pool or file system usage alert thresholds (color indications)" on page 15

### Modifying general settings

Perform the following steps to access the relevant registry keys and change general settings of the IBM Storage Management Console for VMware vCenter.

#### Procedure

1. From the Windows taskbar, select **Start** > **Run**. The Run dialog box is displayed.
2. Type **regedit** and then press **Enter**. The Registry Editor is displayed.

3. Go to the following registry tree path:HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\IBMConsoleForvCenter\Parameters

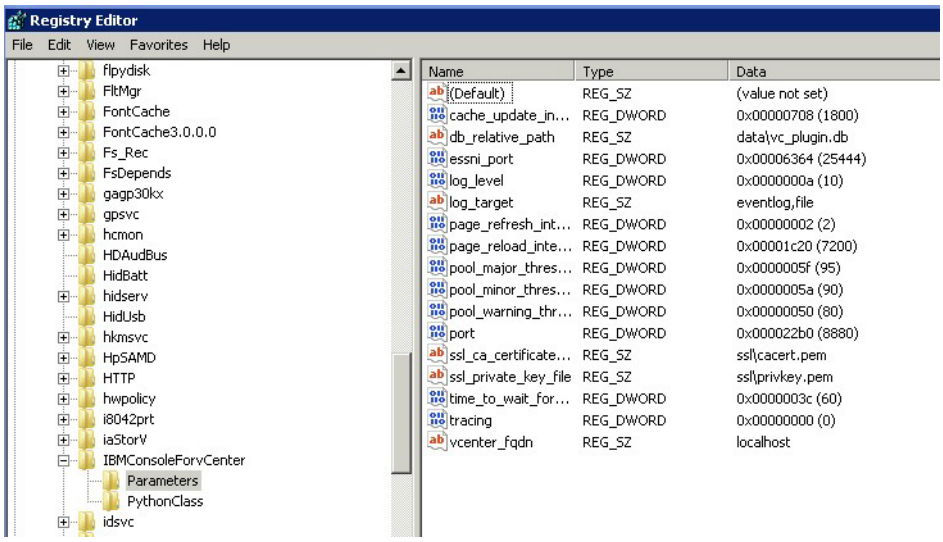



*Figure 8. Windows Registry Editor*

4. Use the following table to determine the parameters that you want to change. In addition, refer to the following subsections to change additional parameters.

*Table 1. Registry keys for general settings of the IBM Storage Management Console*

| Registry key | Description | Default value |
|---|---|---|
| cache_update_interval | The time interval (in seconds) between each cache update operation. Information from the vCenter server is updated in the cache upon each update operation. | 1800 (30 minutes) |
| essni_port | Relevant only to the DS8000 storage system.<br><br>The Java™ Daemon ESSNI port number through which the DS8000 system information is retrieved in order to carry out DS8000 operations from the IBM Storage Management Console GUI. | 25444 |
| log_level | The type of messages to be logged in the log file:<br>• 10 – Debug messages – Use this value only if instructed to do so by IBM support.<br>• 20 – Info messages<br>• 30 – Warning messages<br>• 40 – Error messages<br><br>**Note:** Do not modify this key manually unless you are requested to do so by IBM Support.<br><br>For more information, see “Viewing the log file” on page 88 and “Event messages in Windows Server” on page 91. | 20 (info) |

*Table 1. Registry keys for general settings of the IBM Storage Management Console (continued)*

| Registry key | Description | Default value |
|---|---|---|
| `log_target` | The target of the logging operation. By default, the log is written to a file and to the Event Viewer application log.<br>**Note:** Do not modify this key manually unless you are requested to do so by IBM Support. | `eventlog, file` |
| `page_refresh_interval` | The refresh interval in seconds for updating the information displayed on the vSphere client.<br><br>This parameter does not reload cache information. | 2 |

**Important:** After you have made the required registry modifications:

1. Close the vSphere client application.
2. Restart (end and then start) the Windows service of the IBM Storage Management Console.
3. Start the vSphere client application.

## Replacing the common SSL certificate with a private certificate

The IBM Storage Management Console uses a Secure Sockets Layer (SSL) protocol for communication between the vSphere client and the vCenter server.

### About this task

The installation package includes a private SSL key and an unsigned SSL certificate. For non-interruptible management from vSphere Client, it is recommended to replace the provided key and certificate with your own private key and a signed certificate.

**Important:** If you choose to replace these files, you should repeat this file replacement action after installing a newer version of the IBM Storage Management Console. For more information, see "First-time installation vs. upgrade" on page 5.

### Procedure

Perform the following procedure to replace the SSL private key and certificate.

1. Copy a private key file and a certificate file to the SSL subdirectory of the installation directory.
2. Go to the following registry tree path: `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\IBMConsoleForvCenter\Parameters`
3. Modify the following registry keys with the relative path to your own SSL files (the ones that you copied to the SSL subdirectory):
   - `ssl_ca_certificate_file` – Contains the relative path to the certificate file.
   - `ssl_private_key_file` – Contains the relative path to the private key file.

## Setting the storage pool or file system usage alert thresholds (color indications)

You can change the usage alert triggering thresholds for storage pools and file systems by modifying the relevant registry keys.

### Procedure

If necessary, change the following registry keys:

- **pool_warning_threshold** – Contains the pool size limit percentage beyond which the storage pool or file system bar color changes to yellow, notifying you about over-the-limit use of pool space. The default limit value is 80%.
- **pool_minor_threshold** – Contains the size limit percentage beyond which the storage pool or file system bar color changes to orange, notifying you about near-critical over-the-limit use of pool space. The default limit value is 90%.
- **pool_major_threshold** – Contains the size limit percentage beyond which the storage pool or file system bar color changes to red, alerting you about critical over-the-limit use of pool space. The default limit value is 95%. These registry keys are located under the same registry path that is used for all other settings:`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\IBMConsoleForvCenter\Parameters`

  The following figure shows how different colors are displayed for storage pools and file systems.

**Note:** Storage pools are applicable to all storage systems except SONAS. File systems are applicable to Storwize V7000 Unified and SONAS.

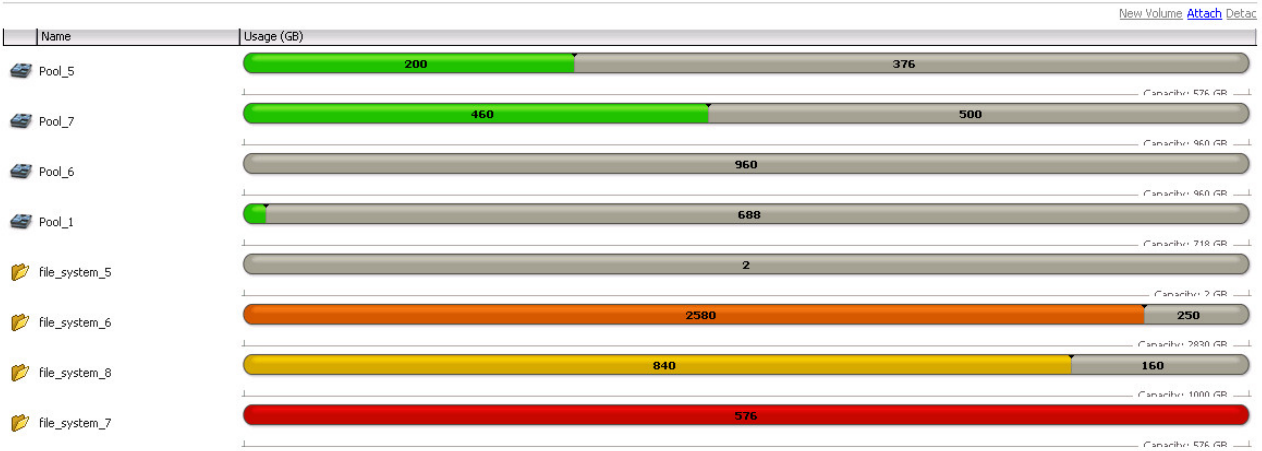



*Figure 9. Different colors displayed for storage pools and file systems*

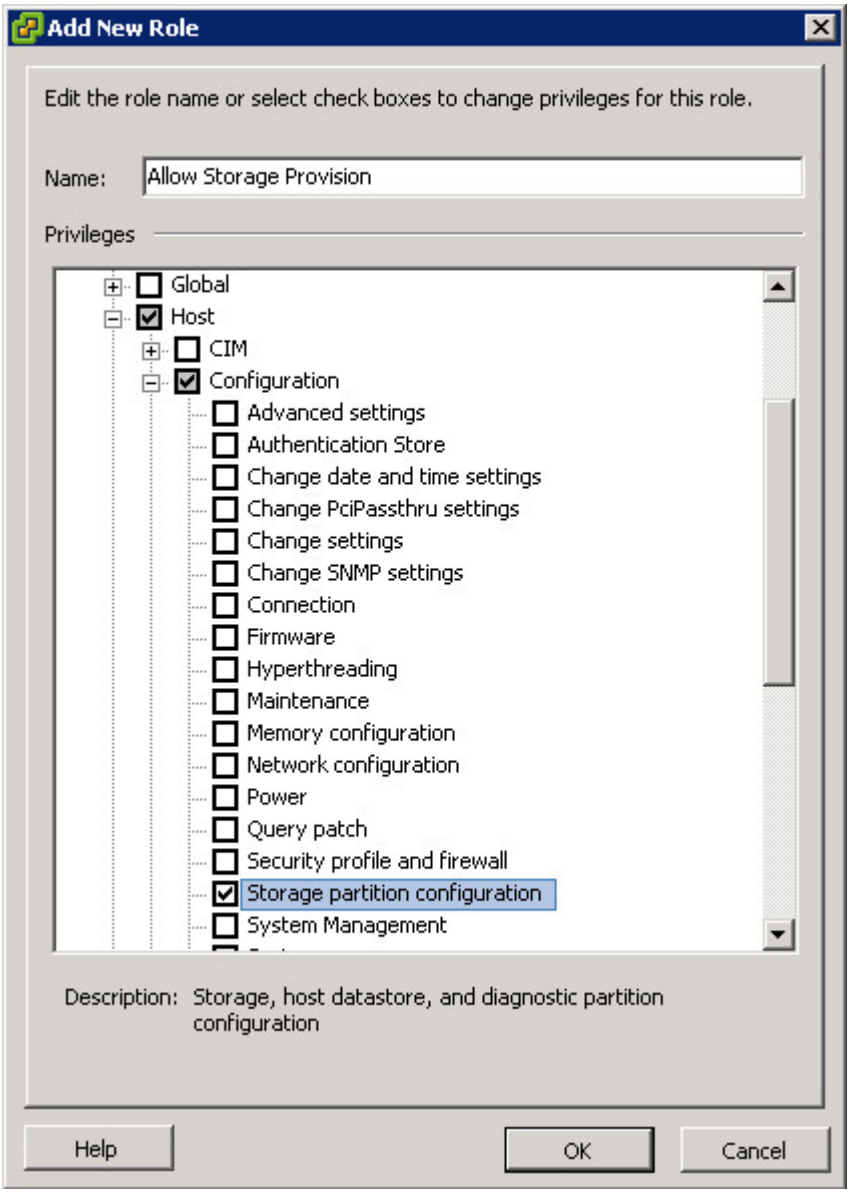
**Note:** For more information about storage pools and file systems, refer to Chapter 5, “Attaching and detaching storage pools or file systems,” on page 31.

## Assigning the required vCenter privileges

Depending on your actual usage of the IBM Storage Management Console for VMware vCenter, you must have minimum vCenter user privileges, as detailed in the following table.

*Table 2. Required vCenter privileges*

| Actual usage | Required vCenter user privilege |
|---|---|
| Monitoring only | • **Extension** - Select all privileges in this category.<br>• **Global** - In this category, select **Log Event**.<br>• **Tasks** - Select all privileges in this category. |
| Storage provisioning | • All privileges required for monitoring only (see above).<br>• Host - In this category, select **Configuration** > **Storage partition configuration**. |



For more detailed information about how to set vCenter privilege types, refer to the VMware publication (www.vmware.com/pdf/vi3_vc_roles.pdf ).

# Chapter 4. Connecting to (adding) IBM storage systems

Before you can create volumes or file shares for datastores, you must first connect to (add) at least one IBM storage system, by using appropriate credentials.

Accordingly, this chapter describes:


- "Adding an IBM storage system"
- "Modifying access credentials for an IBM storage system" on page 24
- "Setting multipath policy enforcement for a storage system" on page 25
- "Removing an IBM storage system" on page 28


## Adding an IBM storage system

Perform the following procedure to add an IBM storage system on which you can create and manage storage volumes (LUNs) or file shares.

### Procedure

1. Click the IBM Storage icon located on the vSphere Client management tools (see Figure 5 on page 11). The IBM Storage management panels are displayed.

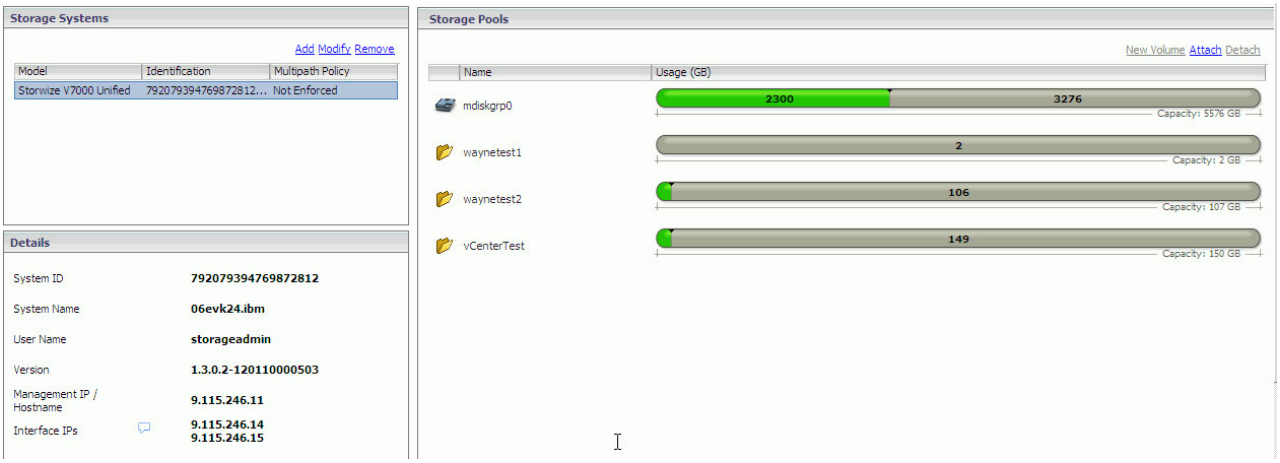



*Figure 10. IBM Storage management panels*

- The **Storage Systems** panel shows the IBM storage systems that are currently connected to the IBM Storage Management console for VMware vCenter.
- The **Details** panel shows the details of the selected (highlighted) storage system.
- The **Storage Pools** panel shows the storage pools that are attached to the selected (highlighted) storage system. For Storwize and SONAS systems, it also shows the file systems that are attached to the selected (highlighted) storage system.

2. On the Storage Systems panel, click **Add**. Alternatively, right-click the storage systems table heading and click **Add** on the pop-up menu.

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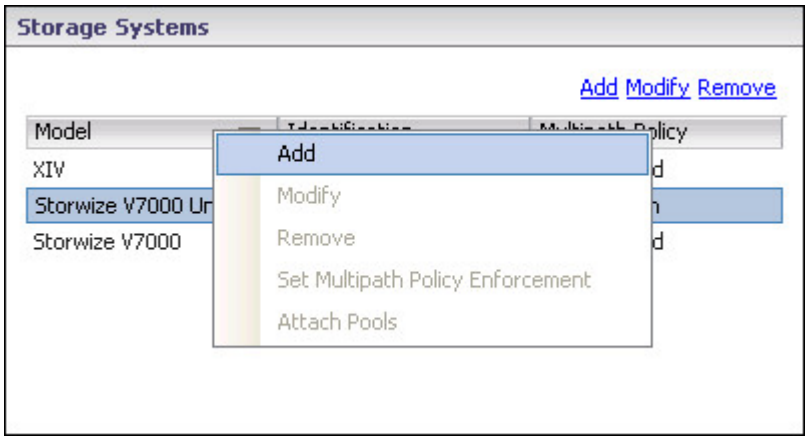


*Figure 11. Clicking Add on the pop-up menu*

The **Add an IBM Storage System** wizard is displayed.

3. From the drop-down list box, select the brand of the IBM storage system that you want to add, and then click **Next**.
   The **Set Credentials** panel is displayed.

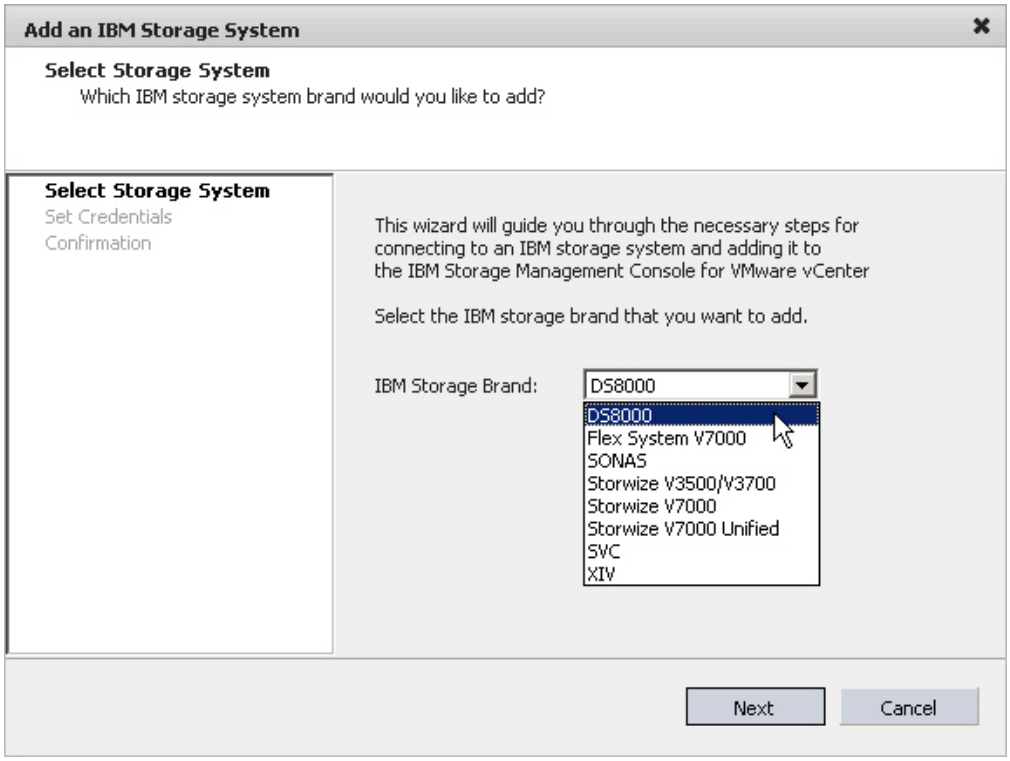


*Figure 12. Add an IBM Storage System wizard*

4. Enter the required credentials for the storage brand that you have selected, as detailed in the following table.

*Table 3. Credentials required for accessing a storage system*

| Credential type | Description | Required and displayed for |
|---|---|---|
| Authentication method | Select an authentication method:<br>• **Authenticate the user name with a key file** – Authenticate your user name with a key file (the default option).<br>• **Authenticate the user name with a password** – Authenticate your user name with a password. This option is applicable only to SAN Volume Controller or Storwize with microcode version 6.3 or later.<br>**Note:** Based on your selection, other credentials that are relevant to the selected authentication method are displayed. | • Flex System V7000<br>• SAN Volume Controller<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000 |
| IP Address / Hostname | IP address or hostname (properly formatted domain address) of the IBM storage system to which you want to connect. | • DS8000<br>• Flex System V7000<br>• SAN Volume Controller<br>• SONAS<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000<br>• Storwize V7000 Unified<br>• XIV |
| User Name | User name for accessing the specified IBM storage system.<br>**Important:** If you are using SAN Volume Controller or Storwize V7000 system with microcode version 6.2 or earlier, enter "**admin**" as your user name. Using "**admin**" does not necessarily mean that you have administrator credentials, but rather a user name spelled as "**admin**". It also does not mean that the matching user name defined on the storage system is also "**admin**". The pairing between the vSphere user and the storage system user account is performed only by the SSH key pairing (any valid SSH key grants access; see info below). | • DS8000<br>• Flex System V7000<br>• SAN Volume Controller<br>• SONAS<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000<br>• Storwize V7000 Unified<br>• XIV |

*Table 3. Credentials required for accessing a storage system (continued)*

| Credential type | Description | Required and displayed for |
|---|---|---|
| Password | Password for accessing the specified IBM storage system. | • DS8000<br>• Flex System V7000<br>• SAN Volume Controller<br>• SONAS<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000<br>• Storwize V7000 Unified<br>• XIV<br>**Note:** For Storwize V7000 and SAN Volume Controller with microcode version 6.3.0 or later, this credential appears only if you chose to **authenticate the user name with a password**. |
| SSH Private Key | To access the specified IBM storage system with a private SSH key, click **Browse** to locate the SSH key file.<br>**Important:** The private SSH key must be in OpenSSH file format. If your key is not in OpenSSH file format, you can use a certified OpenSSH conversion utility. For more information, refer to the OpenSSH website (www.openssh.org). | • Flex System V7000<br>• SAN Volume Controller<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000<br>**Note:**<br>• For Storwize V7000 and SAN Volume Controller with microcode version 6.2.0 or earlier, this credential always appears.<br>• For Storwize V7000 and SAN Volume Controller with microcode version 6.3.0 or later, this credential appears only if you chose to **authenticate the user name with a key file**. |
| Passphrase | If the private SSH key requires a passphrase for accessing the specified IBM storage system, enter the passphrase in this text box.<br>Otherwise, if the private SSH key does not require a passphrase, leave this text box blank. | • Flex System V7000<br>• SAN Volume Controller<br>• Storwize V3500<br>• Storwize V3700<br>• Storwize V7000<br>**Note:**<br>• For Storwize V7000 and SAN Volume Controller with microcode version 6.2.0 or earlier, this credential always appears.<br>• For Storwize V7000 and SAN Volume Controller with microcode version 6.3.0 or later, this credential appears only if you chose to **authenticate the user name with a key file**. |

5. Click **Next**. For all storage systems except SONAS, the **Select Storage Pools** panel is displayed (see Figure 13 on page 23); for SONAS, the Select File Systems panel is displayed (see Figure 14 on page 23).

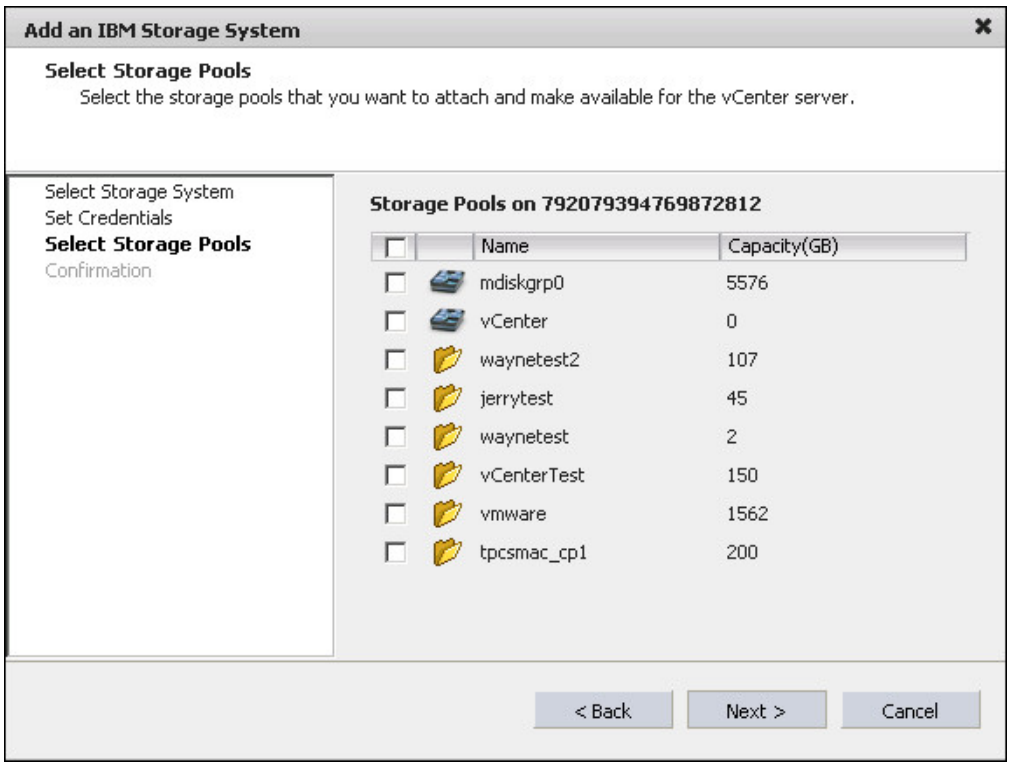


*Figure 13. Select Storage Pools panel*

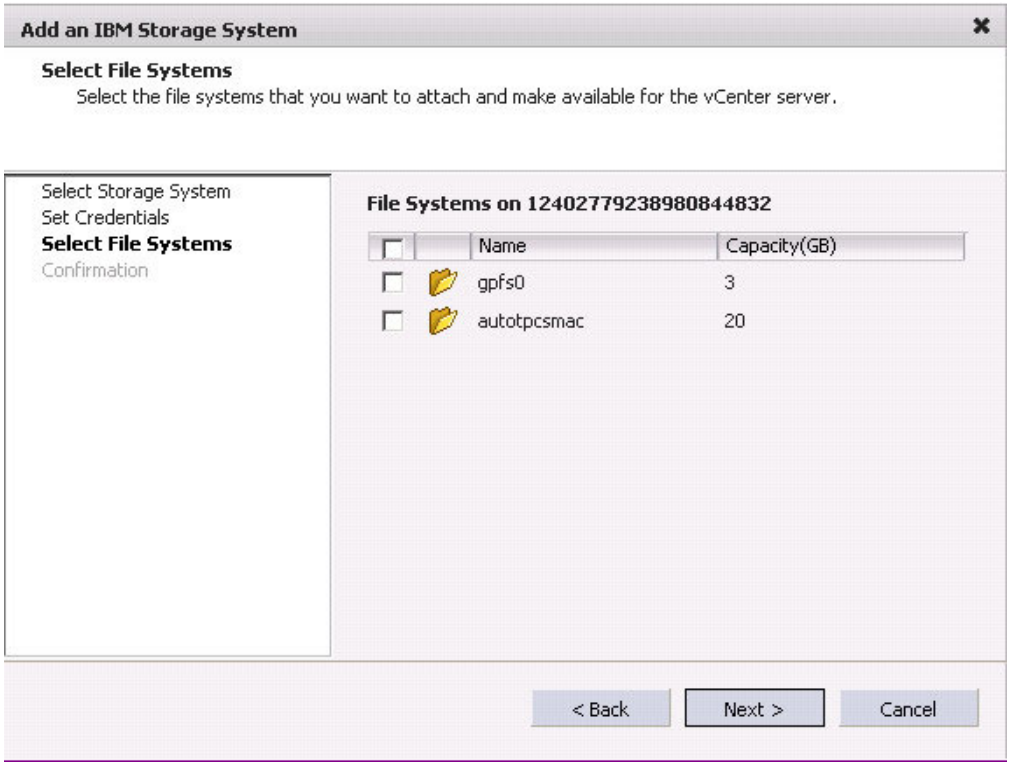


*Figure 14. Select File Systems panel*

6. If you have provided admin-level credentials, you can attach predefined storage pools or file systems that are available on the IBM storage system that you are adding. Select the name of the storage pool or file system that you want to add.

**Note:** For more information about attaching or detaching storage pools and file systems, and the admin-type credentials required to do so, refer to Chapter 5, "Attaching and detaching storage pools or file systems," on page 31.

7. Click **Next**. The Confirmation panel is displayed.
8. Review the details of the storage system that is about to be added, and then click **Finish** to confirm its addition as detailed. If you want to change any detail that was set in a previous step, click **Back**.

## Modifying access credentials for an IBM storage system

Whenever needed, you can modify the IP address or hostname of any storage system that was added, as well as the user credentials for connecting to that storage system.

### Procedure

Perform the following procedure to modify the details of an added storage system.

1. Click the IBM Storage icon located on the vSphere Client management tools (see Figure 5 on page 11). The Storage Systems and Storage Pools management panels are displayed.
2. Select (highlight) the name of the storage system that you want to modify, and then click **Modify**. Alternatively, right-click the name of the storage system and then click **Modify** on the pop-up menu.

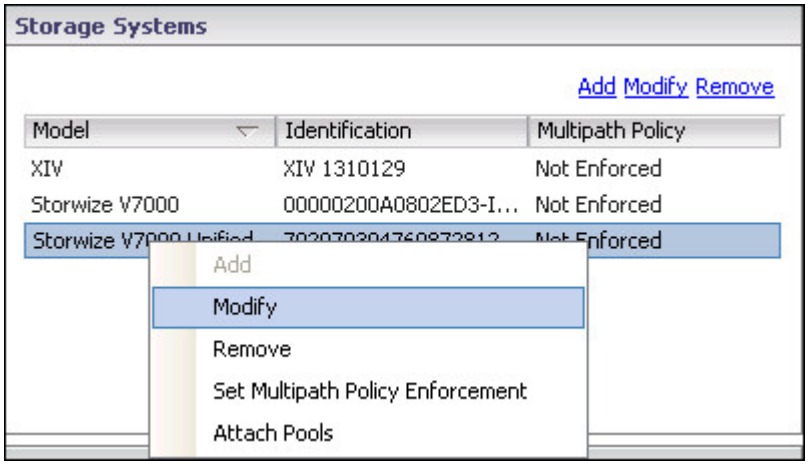


*Figure 15. Clicking Modify on the pop-up menu*

3. In the Update Storage System Credentials dialog box, edit the storage system details (described in Table 3 on page 21), and then click **Update**. The modified system details appear in the Details pane. The different storage systems have different details.

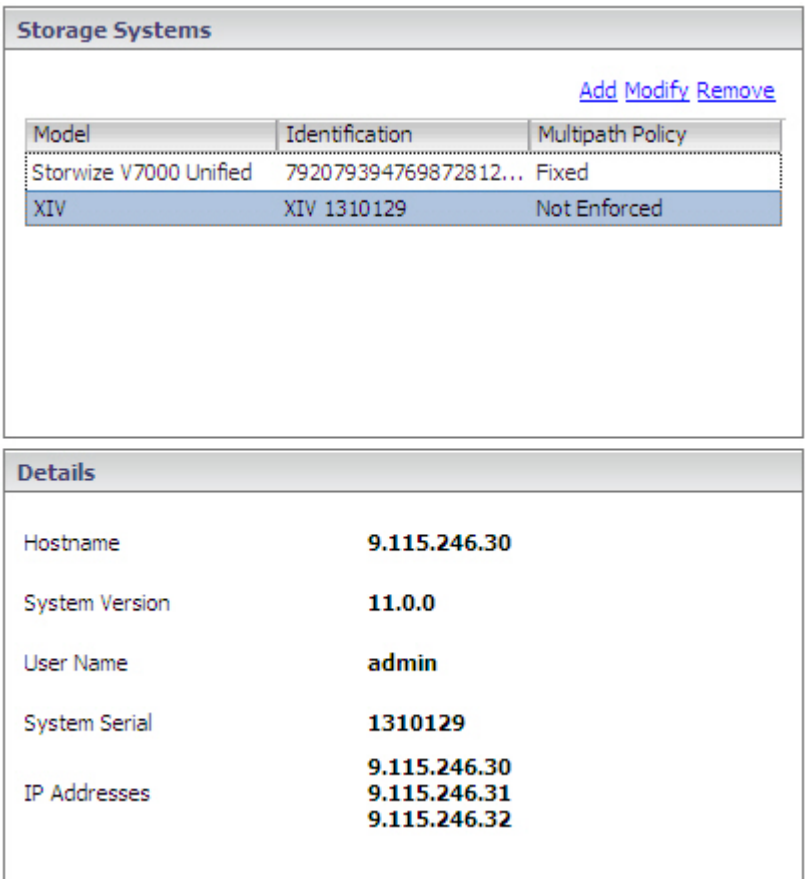


*Figure 16. Storage system details*

## Setting multipath policy enforcement for a storage system

You can set multipath policy enforcement at the storage system level, by setting a multipath policy for a specific storage system.

This policy is then enforced on any volume that you create from the management console.

**Note:** You can also set multipath enforcement on individual volumes. See "Setting multipath policy enforcement for a storage volume" on page 68.

Setting the policy at the storage system level enforces it on any volume that you create from the management console from the time that this enforcement is set. It does not apply automatically to volumes that are already located on this storage system.

**Important:** For DS8000, Flex System, SAN Volume Controller, and Storwize systems, the **Round Robin** multipath policy is enforced by default. For SONAS and XIV, no multipath policy is enforced by default.

The Storage Systems panel displays one of the following values under the **Multipath Policy** column, for each defined storage system (see Figure 16):

- **Not Enforced** – Multipath policy enforcement is disabled.
- Any of the following multipath policies that has been assigned to the storage system:
  - **Most Recently Used**
  - **Round Robin**
  - **Fixed**

---

**Note:** For more detailed information about multipath policy enforcement, refer to the relevant VMware article on the VMware Knowledge Base website (kb.vmware.com/selfservice/microsites/search.do?language=en_US &cmd=displayKC&externalId=1011340)

---

Refer to the following sections for information about the multipath enforcement options that are available for all storage systems:

- "Enabling multipath policy enforcement"
- "Changing the multipath policy" on page 27
- "Disabling multipath policy enforcement" on page 27

## Enabling multipath policy enforcement

You can enable multipath policy enforcement on a storage system, so that a specified policy is enforced on newly created volumes in the storage system.

### Procedure

Perform the following procedure to set multipath policy enforcement on a storage system.

1. Click the IBM Storage icon located on the vSphere Client management tools (see Figure 5 on page 11). The Storage Systems and Storage Pools management panels are displayed.
2. Right-click the name of the storage system for which you want to set a multipath policy, and then click **Set Multipath Policy Enforcement** on the pop-up menu. The Set Multipath Policy dialog box is displayed.

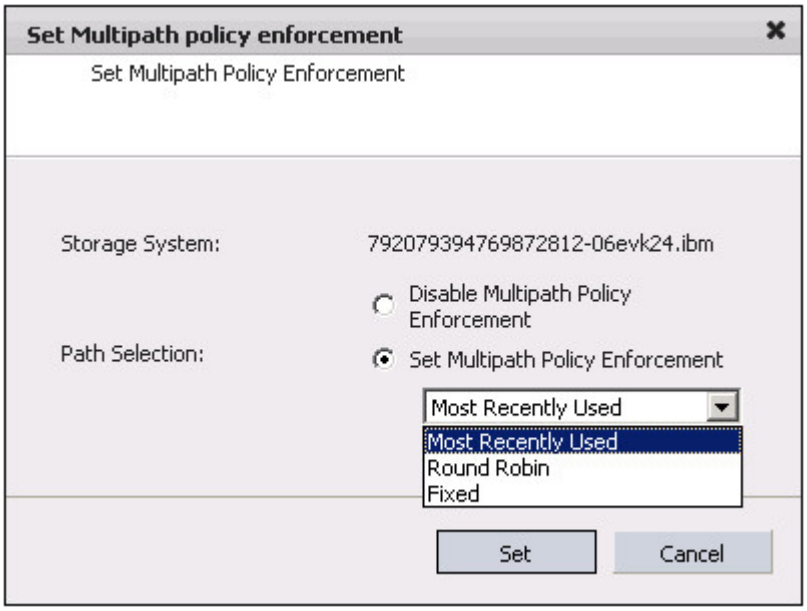


*Figure 17. Set Multipath Policy Enforcement dialog box*

3. Select the **Set Multipath Policy Enforcement** option, and from the drop-down list that appears, select the required policy (for more information about these policy types, see "Setting multipath policy enforcement for a storage system" on page 25).
4. Click **Set** to apply the selected policy.

## Changing the multipath policy

For any storage system with multipath policy enforcement, you can change the policy that is to be enforced on newly created volumes in the storage system.

### Procedure

Perform the following procedure to change the multipath policy.

1. Click the IBM Storage icon located on the vSphere Client management tools (see Figure 5 on page 11). The Storage Systems and Storage Pools management panels are displayed.
2. Right-click the name of the storage system for which you want to change the multipath policy, and then click Set Multipath Policy Enforcement on the pop-up menu. The Set Multipath Policy dialog box is displayed (as shown in "Enabling multipath policy enforcement" on page 26).
3. From the drop-down list under **Set Multipath Policy Enforcement**, select a different policy.
4. Click **Set** to apply the selected policy.

## Disabling multipath policy enforcement

You can disable multipath policy enforcement so that a specific policy is not enforced on newly created volumes. The policy is not changed on volumes that have already been created.

### About this task

**Important:** Disabling multipath policy enforcement does not modify the policy in any way.

### Procedure

Perform the following procedure to disable multipath policy enforcement on a storage system.

1. Click the IBM Storage icon located on the vSphere Client management tools (see Figure 5 on page 11). The Storage Systems and Storage Pools management panels are displayed.
2. Right-click the name of the storage system for which you want to disable multipath policy, and then click **Set Multipath Policy Enforcement** on the pop-up menu. The Set Multipath Policy dialog box is displayed (as shown in "Enabling multipath policy enforcement" on page 26).
3. Select the **Disable Multipath Policy Enforcement** option, and click **Set** to apply the disabling.

## Removing an IBM storage system

When a storage system is no longer needed, you can remove it from the list of added storage systems.

### About this task

**Attention:** If you remove a storage system that contains working volumes, file shares, and datastores, the information of these volumes, file shares, and datastores is no longer displayed in the IBM Storage tab. However, these volumes and/or file shares and datastores **remain active and functional**.

### Procedure

Perform the following procedure to remove a storage system.

1. Click the IBM Storage icon located on the vSphere Client management tools. The Storage Systems and Storage Pools management panels are displayed.
2. Select (highlight) the name of the storage system that you want to remove, and then click **Remove**. Alternatively, right-click the name of the storage system and then click **Remove** on the pop-up menu.

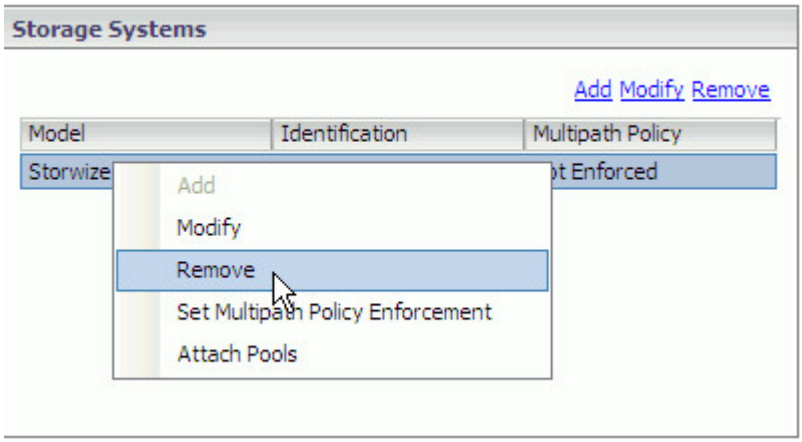


*Figure 18. Clicking Remove on the pop-up menu*

3. In the removal confirmation dialog box, click **Yes**.

**Note:** You can add again any storage system that you have removed.

# Chapter 5. Attaching and detaching storage pools or file systems

After the required IBM storage systems are added, you can start attaching the predefined storage pools or file systems with which you want to work.

Accordingly, this chapter describes:

- "Viewing the details of currently attached storage pools and file systems"
- "Attaching storage pools or file systems" on page 34
- "Detaching storage pools or file systems" on page 35

**Important:**

- When working with IBM storage systems, storage pools can be attached only with **Admin**, **Storage Admin**, **System Admin**, or **Security Admin** user credentials.
- When working with Storwize V7000 Unified or SONAS, file systems can be attached only with **Admin**, **Storage Admin + Export Admin**, or **Security Admin** user credentials.
- When working with DS8000, storage pools can be attached only with **Admin** or **Logical Operator** user credentials.

Any other type of user credentials (read-only, application admin) cannot perform storage pool or file system attachment. If your credentials are not sufficient to perform pool or file system attachment, contact your storage administrator for assistance.

## Viewing the details of currently attached storage pools and file systems

Attached storage pools or file systems are predefined storage areas that were specifically chosen to be used for volumes and VMware datastores.

For each added storage system (see "Adding an IBM storage system" on page 19), you can view the details of the storage pools and file systems that are defined on that system and are currently attached to the vCenter server.

**Note:**

- DS8000, SAN Volume Controller, Storwize V3500, Storwize V3700, Storwize V7000, and XIV systems use **storage pools**.
- Storwize V7000 Unified and SONAS systems use **file systems**.

Click the name of a storage system to view its currently attached storage pools or file systems (see Figure 19 on page 32).

**Note:** If the selected storage system has incorrect credentials or its system ID has been changed, an alert dialog box is displayed. In such a case, modify the storage system credentials (see "Modifying access credentials for an IBM storage system" on page 24) or remove the storage system (see "Removing an IBM storage system" on page 28).

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**Important:** Storage pools and file systems that were not yet attached (or were detached) are not displayed, even if these pools and file systems were predefined on the storage system for use in the VMware environment.

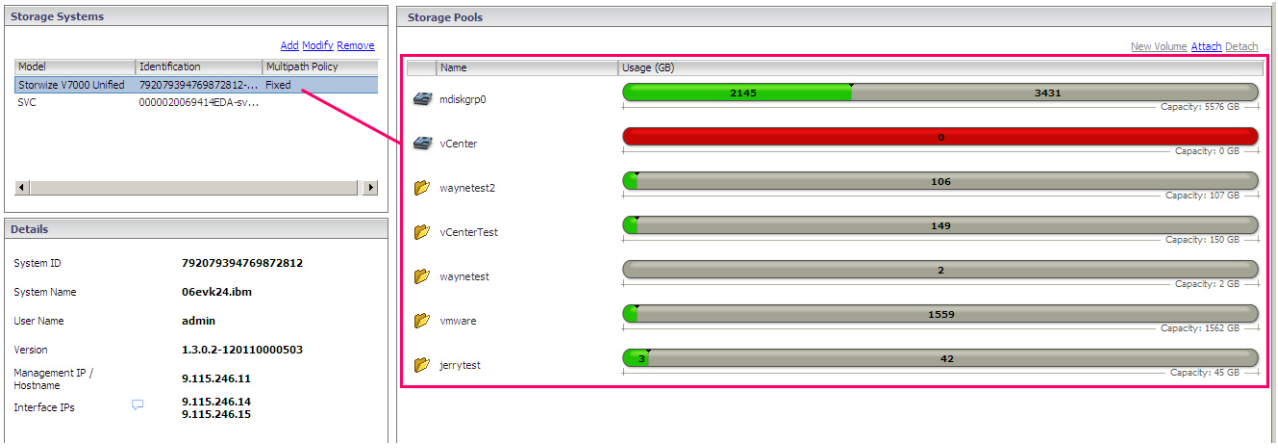


*Figure 19. Viewing attached storage pools and file systems of the selected storage systems*

By placing the mouse pointer over different areas of any displayed storage pool or file system, you can view different types of information, as shown in the following figures.

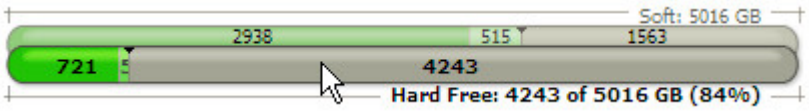


*Figure 20. XIV – Amount (GB) and percentage of free hard disk space on the storage pool*

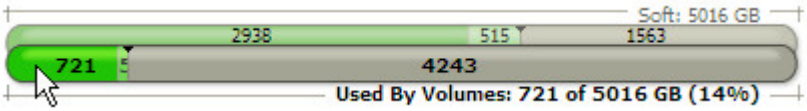


*Figure 21. XIV – Amount (GB) and percentage of used hard disk space on the storage pool*

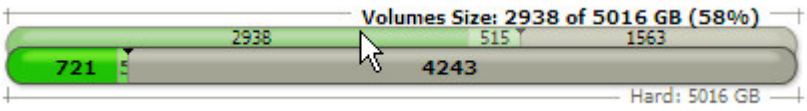


*Figure 22. XIV – Amount (GB) and percentage of soft space used for volumes (LUNs)*

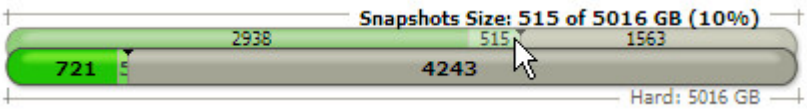


*Figure 23. XIV – Amount (GB) and percentage of soft space reserved for snapshots*

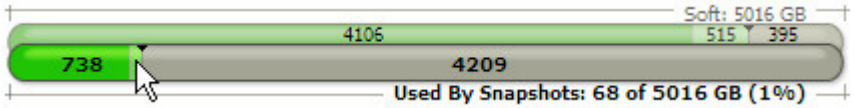


*Figure 24. XIV – Amount (GB) and percentage of hard disk space currently in use by snapshots*

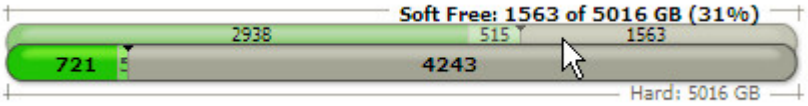


*Figure 25. XIV – Amount (GB) and percentage of free soft space remaining for thin provisioning and snapshots*

*Figure 26. DS8000, Storwize, and SAN Volume Controller – Amount (GB) and percentage of real used capacity on the storage pool*

*Figure 27. DS8000, Storwize, and SAN Volume Controller – Amount (GB) and percentage of free capacity on the storage pool*

*Figure 28. DS8000, Storwize, and SAN Volume Controller – Amount (GB) of total capacity on the storage pool*

*Figure 29. Storwize V7000 Unified and SONAS – Amount (GB) of used capacity on the storage pool or file system*

*Figure 30. Storwize V7000 Unified and SONAS – Amount (GB) of total capacity on the file system*

**Important:** You cannot create storage pools and file systems from vSphere Client. To create storage pools and file systems, connect directly to the IBM storage system via its dedicated storage management interface. Alternatively, contact your storage system administrator and ask for storage pools or file systems to be defined.

# Attaching storage pools or file systems

You must attach to the vCenter server any predefined storage pool (predefined by the storage administrator) that you want to use for volume (LUN) and datastore management operations, as well as any predefined file system that you want to use for file share and datastore management operations.

## About this task

**Note:**

- DS8000, SAN Volume Controller, Storwize V3500, Storwize V3700, Storwize V7000, and XIV systems use **storage pools**.
- Storwize V7000 Unified and SONAS systems use **file systems**.

## Procedure

Perform the following procedure to attach storage pools or file systems to the vCenter server.

1. In the **Storage Systems** management panel (see Figure 16 on page 25), click the name of the storage system to which you want to attach storage pools or file systems.
2. In the **Storage Pools** management panel, click **Attach** (see Figure 31). Alternatively, right click the name of the storage system and then click **Attach Pools** on the pop-up menu (see Figure 32).
   The available storage pools or file systems are displayed in the **Attach Storage Pools or File Systems** dialog box.
3. Select the name of a storage pool(s) or file system(s) that you want to add, and then click **Add Pools**.

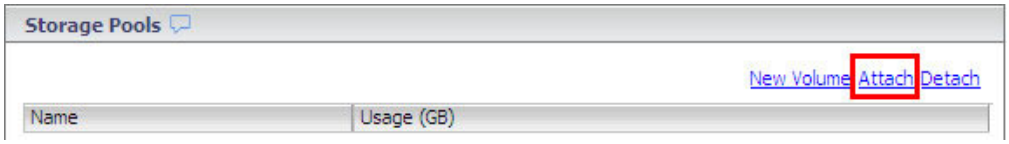


*Figure 31. Attach button*

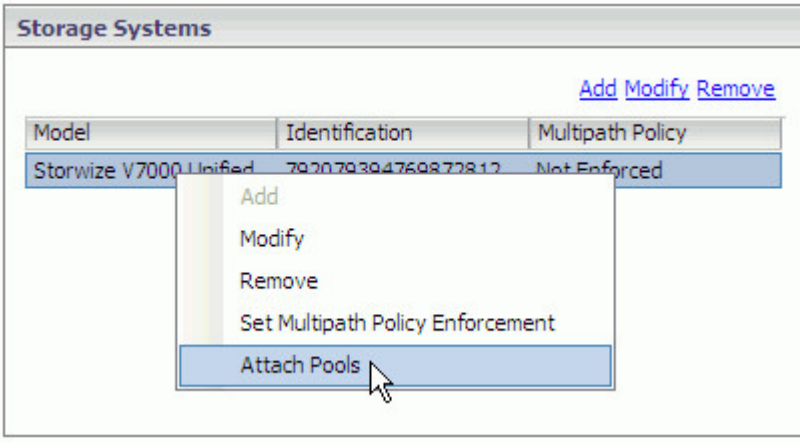


*Figure 32. Clicking Attach Pools on the pop-up menu*

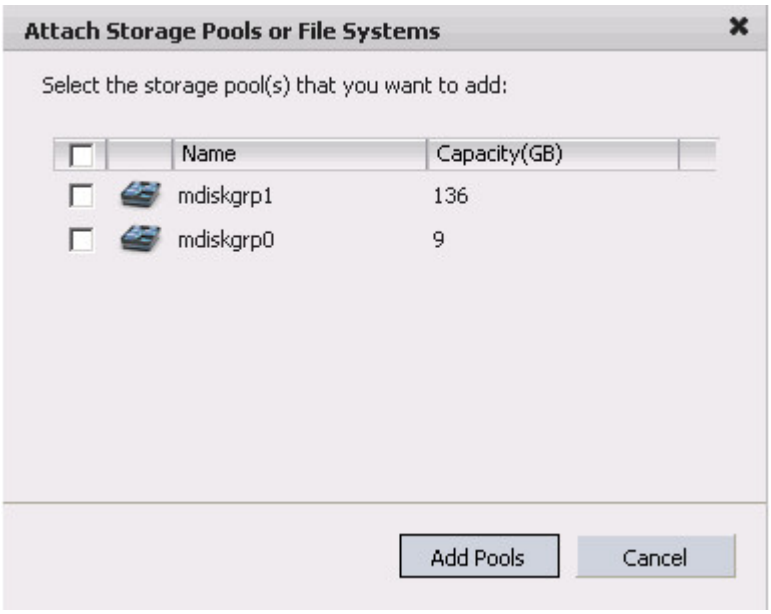


*Figure 33. Attach Storage Pools or File Systems dialog box*

**Note:** For the Storwize V7000 Unified and SONAS storage systems, the subtitle in the dialog box is:

```
Select the file system(s) that you want to add:
```

4. Enter the required credentials for the storage system from which you are attaching storage pools or file systems, as detailed in Table 3 on page 21.
5. Click **Finish**.

## Detaching storage pools or file systems

You can detach from the vCenter server any storage pool or file system that you no longer need.

### About this task

**Attention:**

- If you detach a storage pool that contains working volumes and datastores, the information of these volumes and datastores is still displayed in the IBM Storage tab; however, you are not able to perform volume management operations on these pools.
- If you detach a file system that contains working file shares that are not used by datastores, the information of these file shares is not displayed in the IBM Storage tab. If these file shares are used by datastores, the relevant information is displayed in the IBM Storage tab, but you cannot perform operations on these file shares.
- If you detach a DS8000 storage pool that contains working volumes and datastores, the information of these volumes and datastore is displayed in the IBM Storage tab only until the next scheduled cache update (defined by the `cache_update_interval` registry key; see "Modifying general settings" on page 12), or until the **Update** button on the IBM Storage tab is clicked.

## Procedure

Perform the following procedure to detach storage pools or file systems.

1. In the **Storage Pools** management panel, click and highlight the name of the storage pool or file system that you want to detach, or use the CTRL or SHIFT keyboard keys to select and detach multiple storage pools or file systems.
2. Click the **Detach** button (located at the top right corner). Alternatively, right-click the selected storage pools or file systems, and then click **Detach** on the pop-up menu.

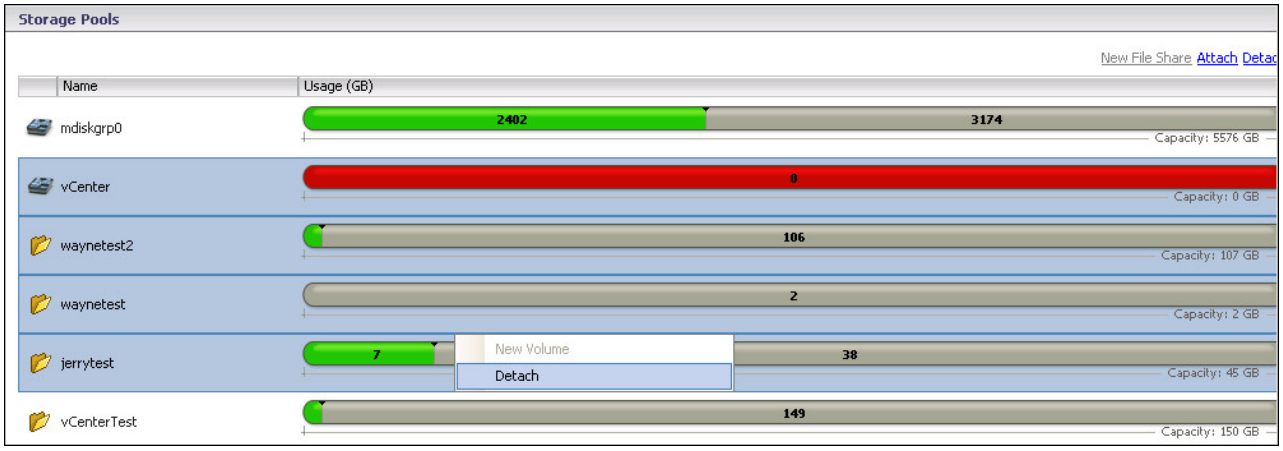


*Figure 34. Pop-up menu for selected storage pools and file systems*

**Note:** The **Detach** label on the pop-up menu changes depending on your selection:

- If you select to delete storage pools only, the label is changed to **Detach Storage Pool**.
- If you select to detach file systems only, the label is changed to **Detach File System**.

3. In the Detachment Confirmation dialog box, click **Yes**.

# Chapter 6. Creating, viewing, and managing volumes or file shares

After the IBM storage systems are added and the storage pools are attached to the vCenter server, you can start the volume (LUN) creation and management operations (relevant for all storage systems except SONAS).

For the Storwize V7000 Unified and SONAS storage systems, you can also create file shares after the file systems have been attached to the vCenter server.

To learn about these different tasks, refer to the following sections:


- "Performing a target connectivity check"
- "Creating a new storage volume (LUN)" on page 38
- "Creating a new file share" on page 43
- "Viewing volume and file share details" on page 46
- "Managing storage volumes (LUNs)" on page 60
- "Managing file shares" on page 71


## Performing a target connectivity check

Before you create a new volume, verify that the iSCSI or FC target connectivity between the ESX/ESXi hosts and the newly defined IBM storage system is properly set.

### Procedure

Perform this one-time procedure for each ESX/ESXi host (you do not need to perform this more than once per host), before creating the first volume on an IBM storage system.

1. Contact the storage administrator to obtain the list of WWPNs or iSCSI IQNs of the newly connected IBM storage system.
2. From the vSphere Home page, go to **Inventory** > **Hosts and Clusters**.
3. On the left-pane Datacenter tree, click on a single host, and then click the **Configuration** tab.
4. Click **Storage Adapters**. The details of the adapters in use are displayed.

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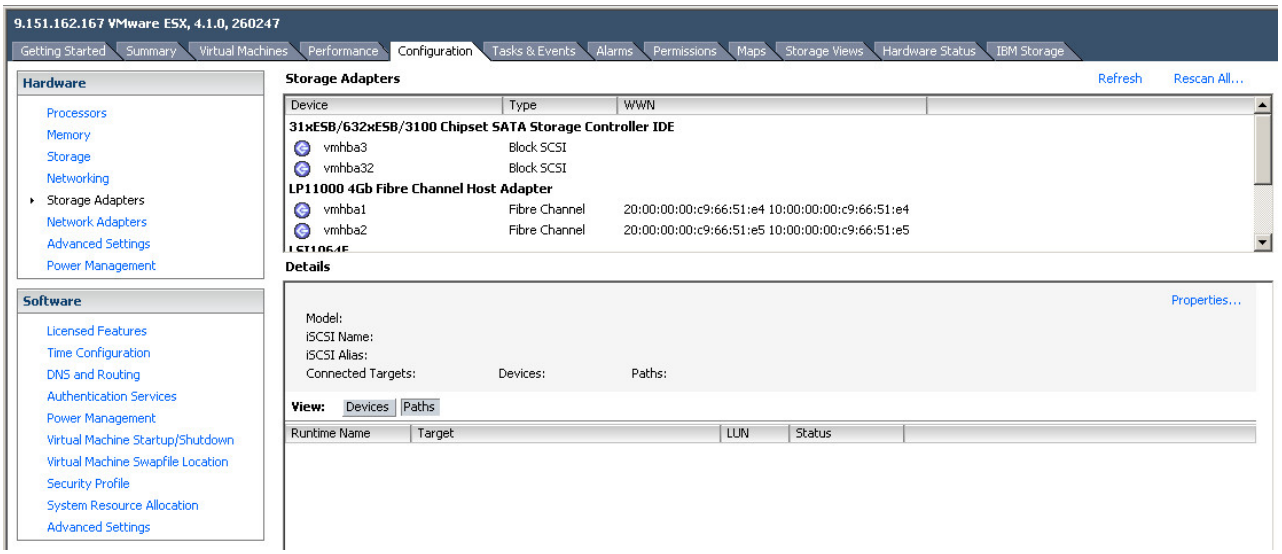


*Figure 35. Displaying the storage adapters of a host*

5. Perform the following checks:
   - For Fibre Channel (FC) connected storage, click each FC host bus adapter (HBA) and then click **Paths**. Then, verify that at least one of the storage system WWPNs appears in the table.
   - For iSCSI connected storage, click on the iSCSI software adapter ports. Then, click **Properties** and verify that the storage system IQNs appear in the **Static Discovery** tab.

# Creating a new storage volume (LUN)

On all IBM storage systems except SONAS, you can create new volumes (LUNs) on which you can save datastores or raw mapped volumes.

## About this task

Any volume can be mapped to ESX hosts, clusters, or datacenters, so that the virtual machines on these hosts, clusters, or datacenters are able to save datastore information on that volume. For the concept illustration, see "Concept diagram" on page 2.

In addition to single volume creation, you can create multiple volumes simultaneously. In this case, the created volumes are assigned with different number postfixes that are automatically generated by the system in consecutive order.

**Note:**

- You can create volumes only on storage pools that have been attached to the vCenter server. For more information, see Chapter 5, "Attaching and detaching storage pools or file systems," on page 31.
- The Host, Cluster, and Datacenter views in vSphere Client are similar to each other; each queries information from the relevant vCenter entity.

**Important:**

- You must perform the target connectivity verification prior to creating a new volume. Without this verification, volumes that you create may be non-detectable. For more information, see "Performing a target connectivity check" on page 37.
- The ESX hosts and clusters to which you map the created volumes must be predefined on the storage system side. For more information, refer to your IBM storage system documentation.

## Procedure

Perform the following procedure to create a new storage volume.

1. In the **Storage Pools** management panel, click and highlight the storage pool on which you want to create a new volume, and then click **New Volume**. Alternatively, right click the storage pool and click **New Volume** on the pop-up menu.

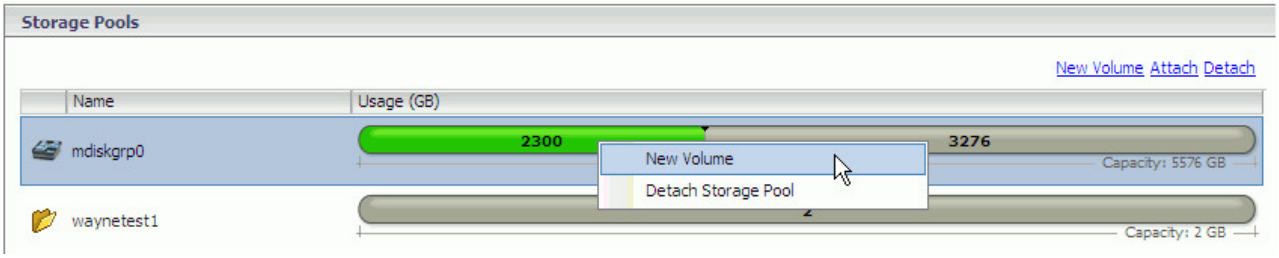


*Figure 36. Clicking New Volume on the pop-up menu*

**Note:** The New Volume option is not available when:

- There is no free space in the storage pool.
- More than one storage pool is selected.
- You have read-only permissions (on either vSphere or the IBM storage system).

The Create New Volume wizard is displayed.

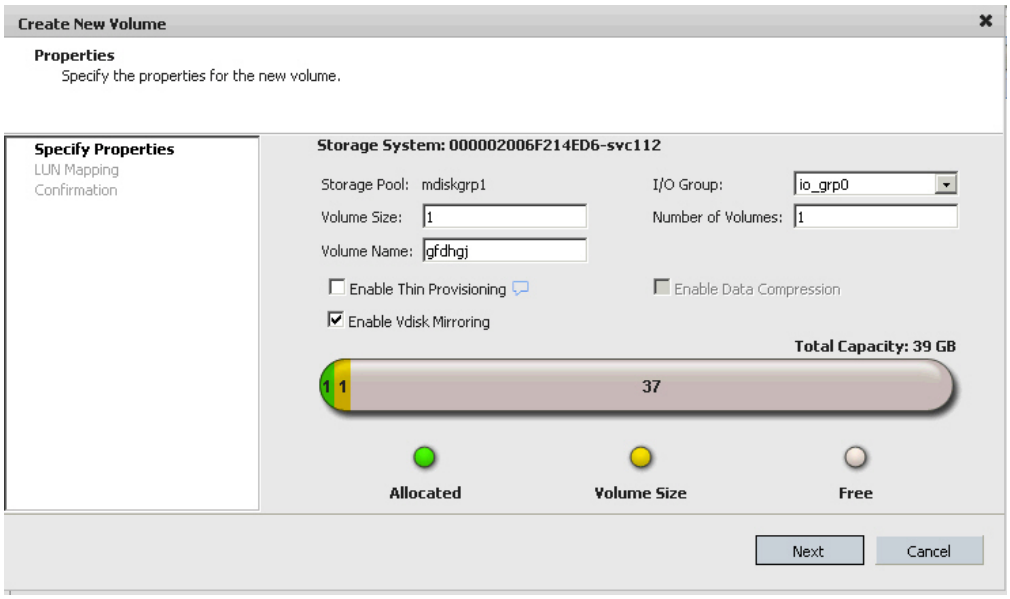


*Figure 37. Create New Volume wizard (SAN Volume Controller example)*

2. In the **Volume Size** text box, enter the size for the new volume (for IBM XIV – in **Gigabytes**; for IBM Flex System, Storwize, SAN Volume Controller, and DS8000 – in **Gibibytes**). Alternatively, place the mouse pointer on the graphic image of the storage pool, and then click and slide the space marker rightward to set the new volume size (marked in yellow). The numerical value in Volume Size is automatically updated accordingly.

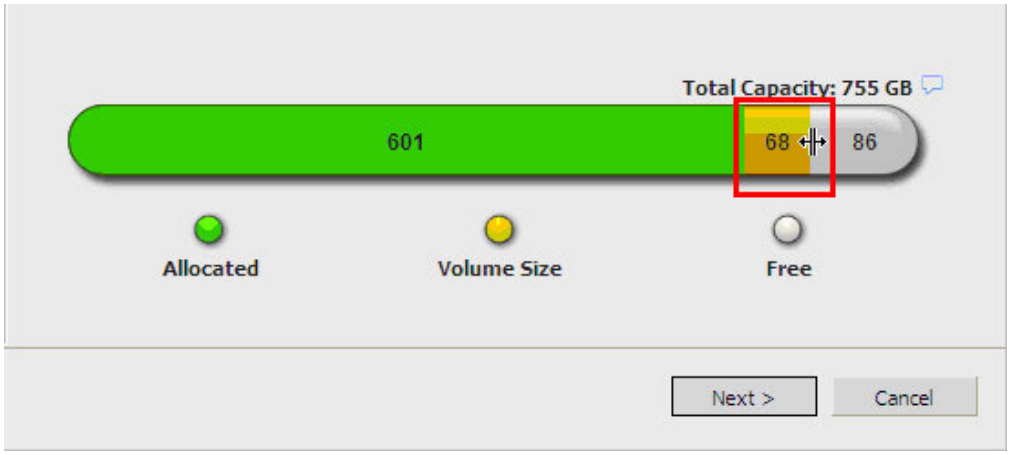


*Figure 38. Setting the volume size with the graphic space marker*

**Note:** XIV volume sizes are automatically rounded to the next multiple of 17 GB.

3. In the **Volume Name** text box, enter the name that you want to assign to the new volume. This also becomes the display name of the LUN in vSphere.
4. If you want to create multiple volumes simultaneously (if not, skip to step 5 on page 41): In the **Number of Volumes** text box, enter the number of volumes that you want to create simultaneously. Two small text boxes appear next to the **Volume Name** text box and display a range of postfix values (see Figure 39 on page 41). You can change the postfix of the volume to be created first.

**Note:** The postfix number of the last volume is automatically displayed in the adjacent grayed-out text box, based on the total number of volumes to be created.

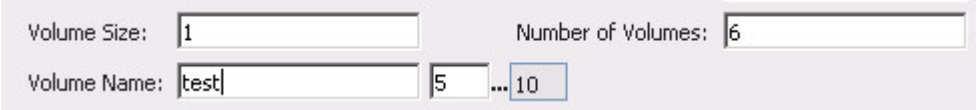


*Figure 39. Creating multiple volumes*

5. Only if you are creating the volume on an IBM Flex System, DS8000, SAN Volume Controller, or Storwize storage system (otherwise, skip to the next step):
   - Select the **I/O Group** to which the volume should belong. Not applicable to DS8000.
   - Optional: Select **Enable Thin Provisioning** if you want the volume to be defined as thin provisioned and not as a fixed hard disk allocation. When this option is selected, the available capacity and total capacity are displayed based on the requested volume size. For DS8000, the over-provision ratio information is also displayed.
   - Optional: Select **Enable Data Compression** if you use data compression on SAN Volume Controller or Storwize V7000 of microcode 6.4.0 or later, on Storwize V3500 or Storwize V3700 of microcode 6.4.1 or later, or on Storwize V7000 Unified of microcode 1.4.0 or later. Not applicable to DS8000.
   - Optional: Select **Enable Vdisk Mirroring** if you want to use virtual disk mirroring for the volume or volumes that you create. Not applicable to DS8000.

**Note:**

- XIV volumes are not associated with I/O groups and are always thin-provisioned.
- Compressed volumes SAN Volume Controller or Storwize storage systems (if supported by the microcode) are always thin-provisioned.

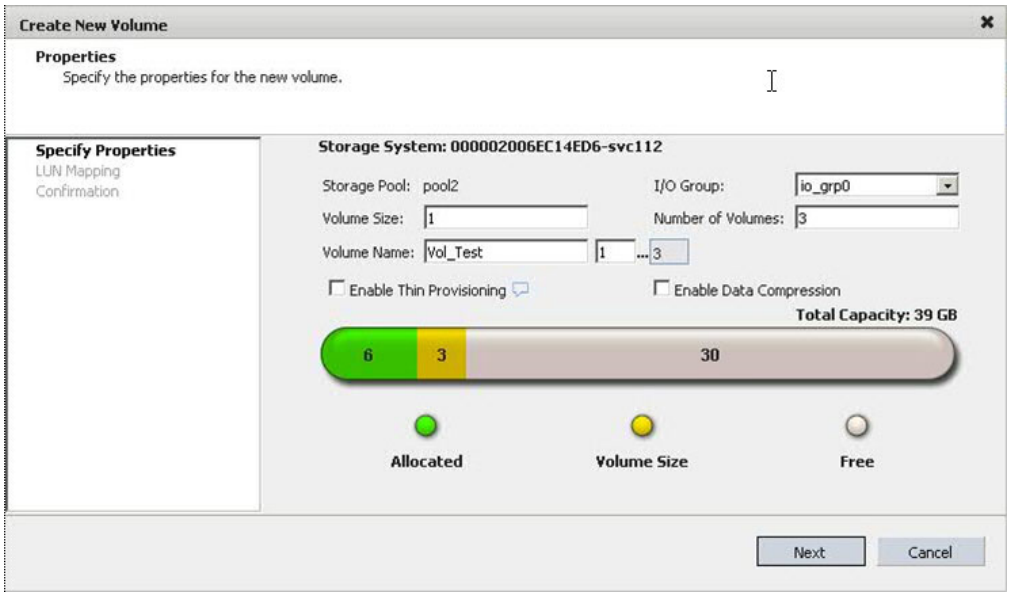


*Figure 40. SAN Volume Controller and Storwize volume properties*

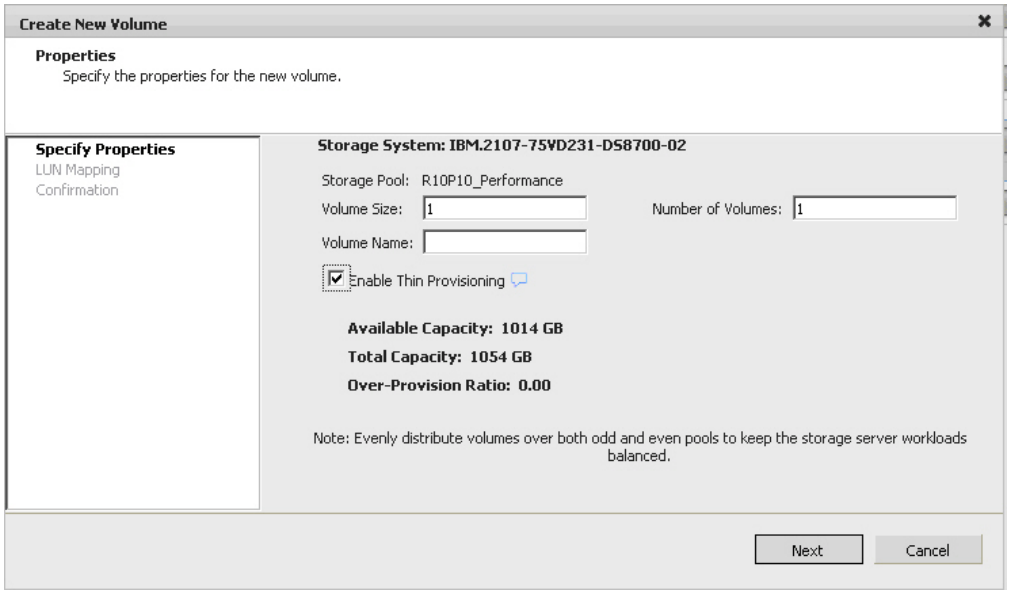


*Figure 41. DS8000 volume properties with Enable Thin Provisioning option selected*

6. Click **Next**. If you selected **Enable Vdisk Mirroring** on the previous step (otherwise, skip to the next step), a list of storage pools appears and you must select the secondary storage pool on which you want the mirrored volume or volumes to be created. Then, click **Next**.
7. In the Volume Mapping panel, select the host(s), cluster(s), or datacenter(s) to which you want to map the new volume. The selected host(s), cluster(s), or datacenter(s) are now able to utilize the new volume for datastores or raw mapped LUNs. If you select a datacenter, its member clusters and hosts are automatically selected.

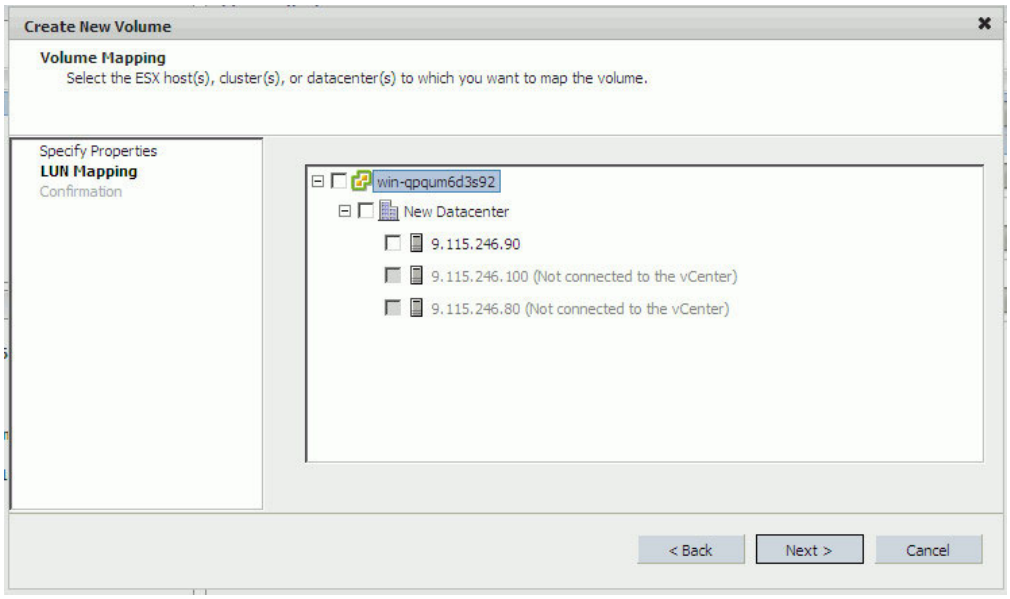


*Figure 42. Selecting the hosts, clusters, or datacenters for LUN mapping*

**Note:** ESX or ESXi hosts that were not defined on the storage system side, as well as disconnected or non-responsive hosts are grayed-out and cannot be selected. However, when creating a DS8000 volume, ESX or ESXi hosts that are properly connected to the DS8000 system are not grayed-out, even if these hosts were not yet defined on the DS8000 system. In such a case, these hosts can be selected, and IBM Storage Management Console automatically defines these hosts on the on the DS8000 system.

**Important:** You must map the volume to at least one ESX host, cluster, or datacenter in order to enable vSphere management of the created volume.

8. Click **Next**. The Confirmation panel is displayed.
9. Review the details of the new volume that is about to be created, and then click **Finish** to confirm its creation as detailed. If you want to change any detail that was set in a previous step, click **Back**.

## Creating a new file share

On Storwize V7000 Unified and SONAS, you can create a new file share from a selected file system, and create an NFS export of the file share to a list of ESX hosts or clusters.

### About this task

The created NAS file share is linked to the following path: `/<file system mount point>/<file share name>`. Any file share can be exported to ESX hosts, clusters, or datacenters, so that the virtual machines on these hosts, clusters, or datacenters are able to save datastore information on that file share.

**Note:**

- You can create file shares only on file systems that have been attached to the vCenter server. For more information, see "Viewing the details of currently attached storage pools and file systems" on page 31.
- The Host, Cluster, and Datacenter views are similar to each other; each one queries information from the relevant vCenter entity.

## Procedure

Perform the following procedure to create a new file share.

1. In the Storage Pools management panel, click and highlight the file system on which you want to create a new file share, and then click **New File Share**. Alternatively, right click the file system and click **New File Share** on the pop-up menu.

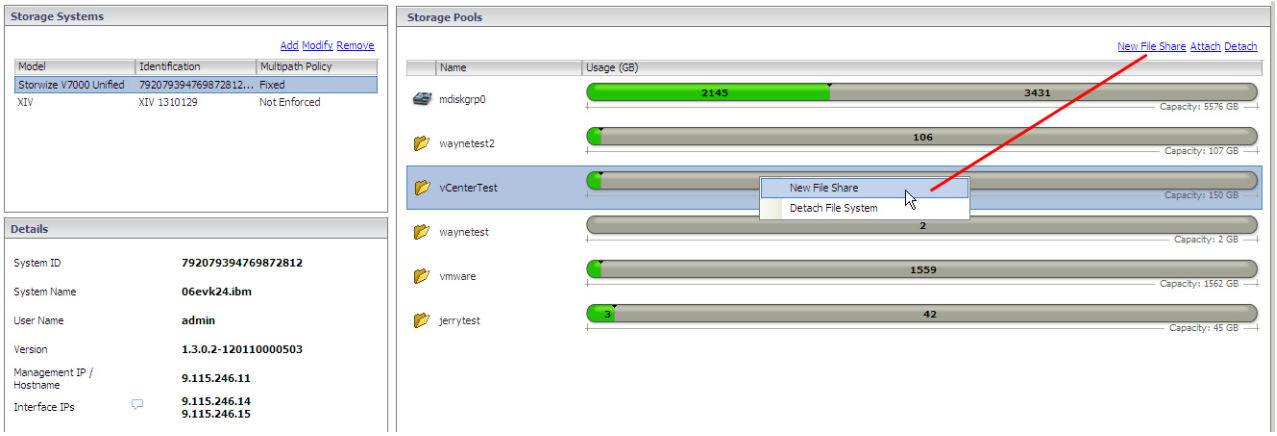


*Figure 43. Clicking New File Share on the pop-up menu*

**Important:** The New File Share option is not available when:

- There is no free space in the file system.
- More than one file system is selected.
- You have read-only permissions (on either vSphere or the IBM storage system).

The Create New File Share wizard is displayed.

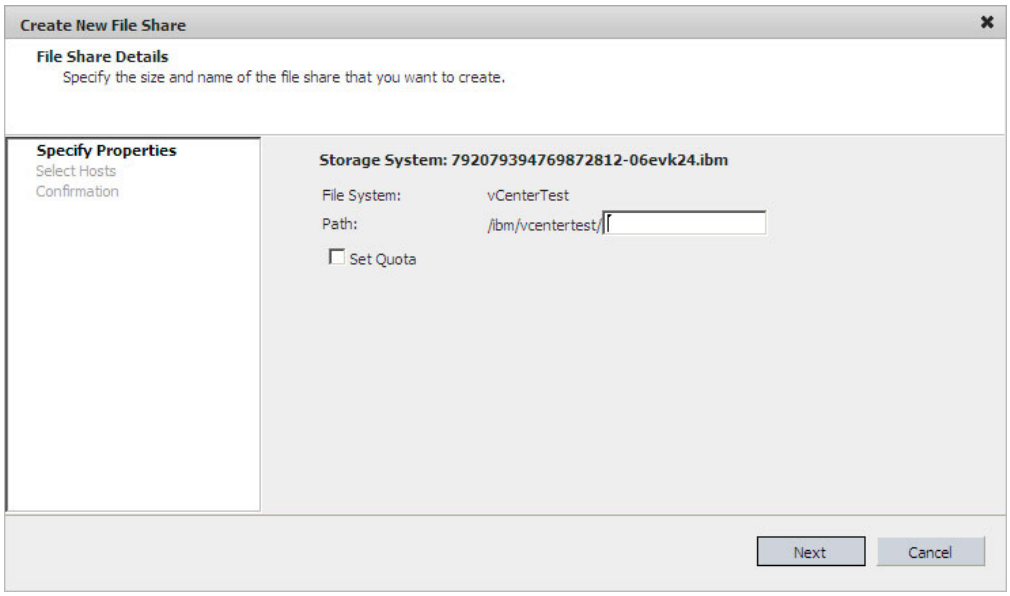


*Figure 44. Create New File Share wizard*

2. In the Path text box, enter the file share name.
3. If you want to set a quota for the file share (otherwise, skip to the next step), select **Set Quota**, and then set the maximum size of the file share by either entering a value in the text box, or by clicking and sliding the space marker rightward (marked in yellow). The numerical value in the text box is automatically updated accordingly.

**Important:** Without a quota, the entire capacity of the file system is used.

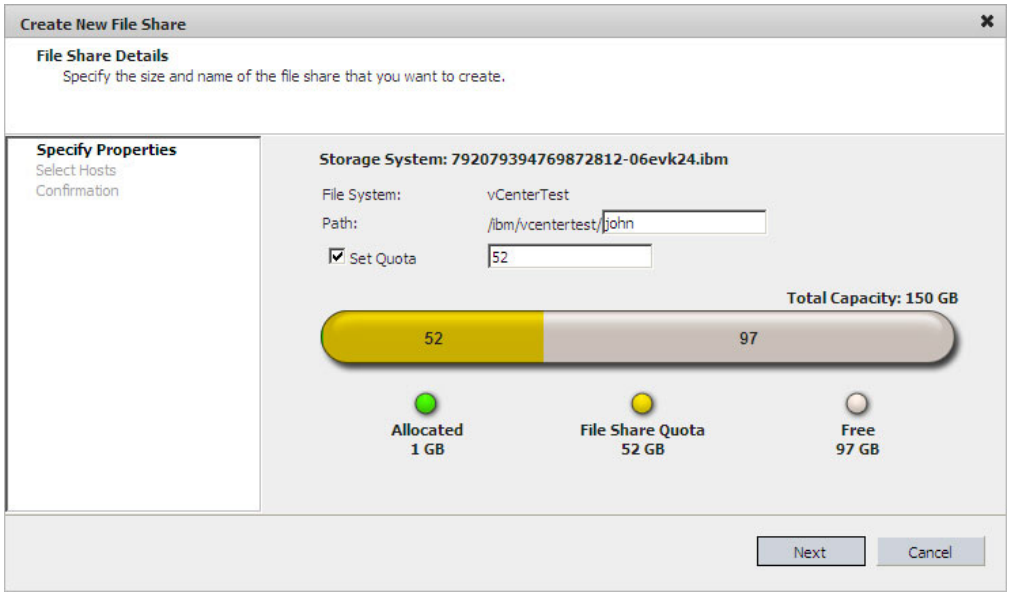


*Figure 45. Setting the file share details*

4. Click **Next**. The Select Hosts panel is displayed.

**Note:** If the file share name is already used by another file share, the following error message appears:

```
File share with this name was already defined.
```

In such a case, type a different path name and click **Next** again.

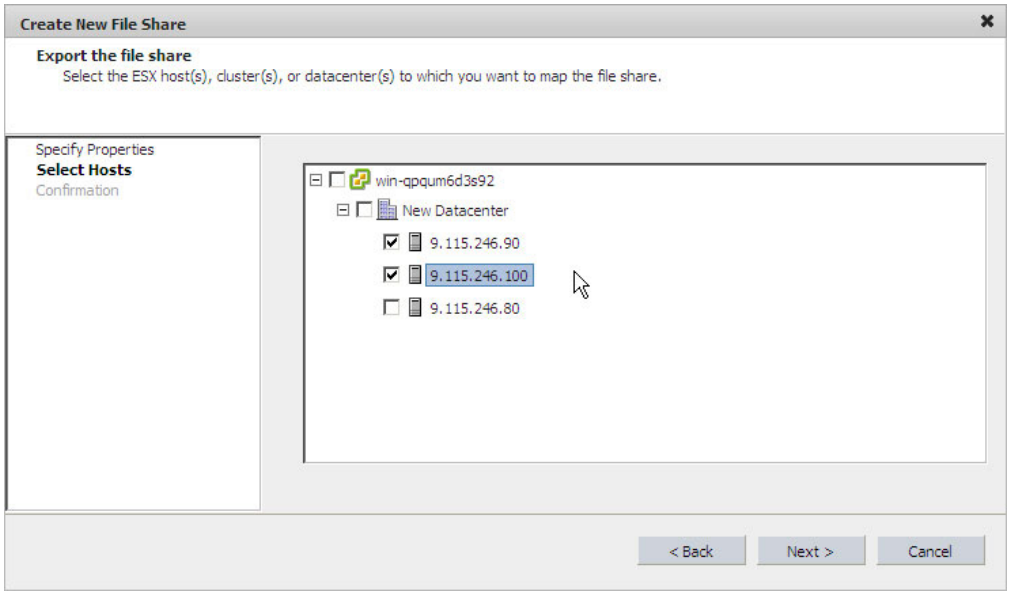


*Figure 46. Create New File Share Wizard - Selecting Hosts*

5. Select the ESX host(s), cluster(s), or datacenter(s) to which you want to export the file share. The selected host(s), cluster(s), or datacenter(s) are now able to utilize the new file share for datastores.

**Note:**

- If you select a datacenter, its member clusters and hosts are automatically selected.
- Disconnected or non-responsive ESX hosts are grayed-out and cannot be selected.

**Important:** You must export the file share to at least one ESX host, cluster, or datacenter in order to enable vSphere management of the created file share.

6. Click **Next**. The Confirmation panel is displayed.
7. Review the details of the new file share that is about to be created, and then click **Finish** to confirm its creation as detailed (otherwise, click **Back**). The file share is created and exported to ESX hosts over NFS (see Figure 45 on page 45).

## Viewing volume and file share details

As you navigate through the different vSphere inventory views, you can view the details of existing volumes and file shares on the IBM Storage tab, as described in the following sections.

- "Viewing volumes or file shares that are used by datastores" on page 47
- "Viewing unused volumes and file shares" on page 49

- "Viewing volumes or file shares that are used by virtual machines" on page 50
- "Choosing which volumes to show" on page 51
- "Viewing information in the LUN Details pane" on page 52
- "Viewing information in the File Share Details pane" on page 59


## Viewing volumes or file shares that are used by datastores

When you want to check which storage volumes or file shares are used by specific datastores or datastore clusters, and also view the specific details of these volumes or file shares, perform the following procedure.

### About this task

**Note:** A datastore can have either volumes or a file share; not both. A datastore can comprise only one NAS file share.

### Procedure

1. Go to **Home** > **Inventory** > **Hosts and Clusters**.
2. On the left-pane tree of datacenters, click an icon of a datacenter, cluster, or host, and then click the **IBM Storage** tab. The table on the right pane displays the details of the datastores that are used by the element that you selected in the tree (datacenter, cluster, or host).

**Note:** If you select a datacenter, its member clusters and hosts are automatically selected.

3. On the displayed datastores list (under **View: Datastores**), click the name of a datastore to display the storage volumes or file share that it uses.

**Note:**

- If the selected datastore contains volumes, the volumes are listed in the volumes list underneath the Datastores list (see Figure 47).
- If the datastore contains a NAS file share, it is listed in the File Share list underneath the Datastores list (see Figure 48 on page 49).

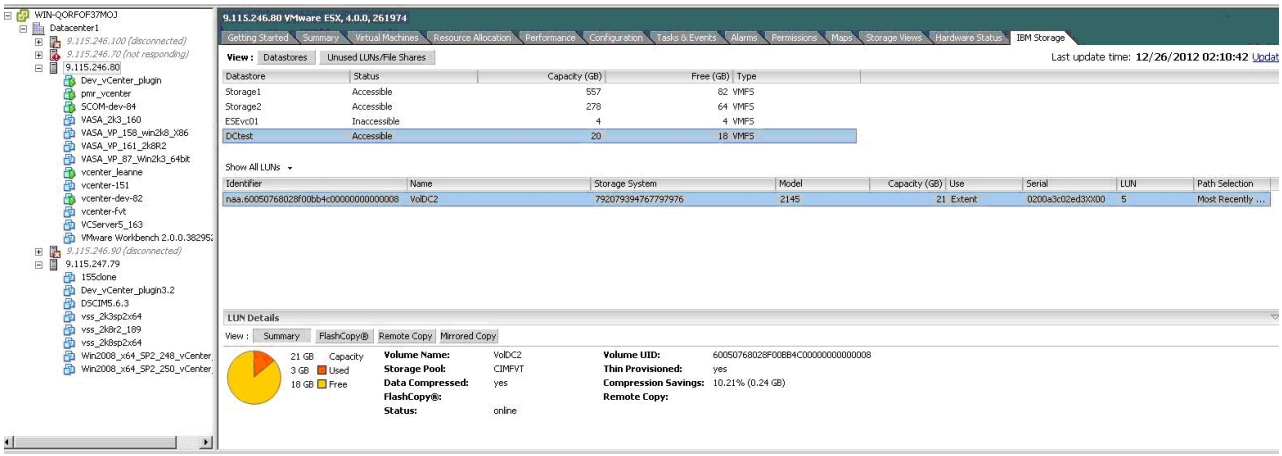


*Figure 47. Displaying volumes of a selected datastore and the details of a selected volume (LUN)*

The datastores list (above the volumes list) displays the following details per datastore:

**Datastore**
Name of the datastore.

**Status** Current® status of the datastore (valid per the last update time).

**Capacity (GB)**
Total size of the datastore in Gibibyte (not Gigabyte) units.

**Free (GB)**
Size of the free space remaining in the datastore, in Gibibyte units.

---

**Important:** The sizes of the total capacity and free space are displayed in Gibibyte (GiB) units and not in Gigabyte (GB) units because the datastore information is taken from the VMware hosts.

---

**Type** Type of file system used in the datastore.

If the selected datastore contains volumes (as in Figure 47 on page 47), a list of its volumes appears underneath the datastores list, and the following details are displayed per volume:

**Identifier**
Unique alphanumerical string (with a dot) that identifies the volume on the vCenter server.

**Name** Name of the volume. If the volume was created now and in this version, this is the name assigned by the user. Otherwise, if the volume was created in the past or with an earlier version of VC plug-in, the name displayed is a generic name assigned by VMware.

**Storage System**
Identification name of the IBM storage system on which the volume is defined.

---

**Note:** "Unknown" is a generic array name, automatically given to any non-IBM storage system or to any IBM system that is not currently added (for more information, see “Adding an IBM storage system” on page 19).

---

**Model** Model of the IBM storage system on which the volume is defined.

---

**Note:** Although not technically correct, the term "LUN" is also used to refer to the volume itself, because a LUN is widely referred to as a volume in the storage administration community.

---

For more information about the LUN Details pane (under the volumes list), see “Viewing information in the LUN Details pane” on page 52.

If the selected datastore contains a file share (as in Figure 48 on page 49), its details are displayed underneath the datastores list:

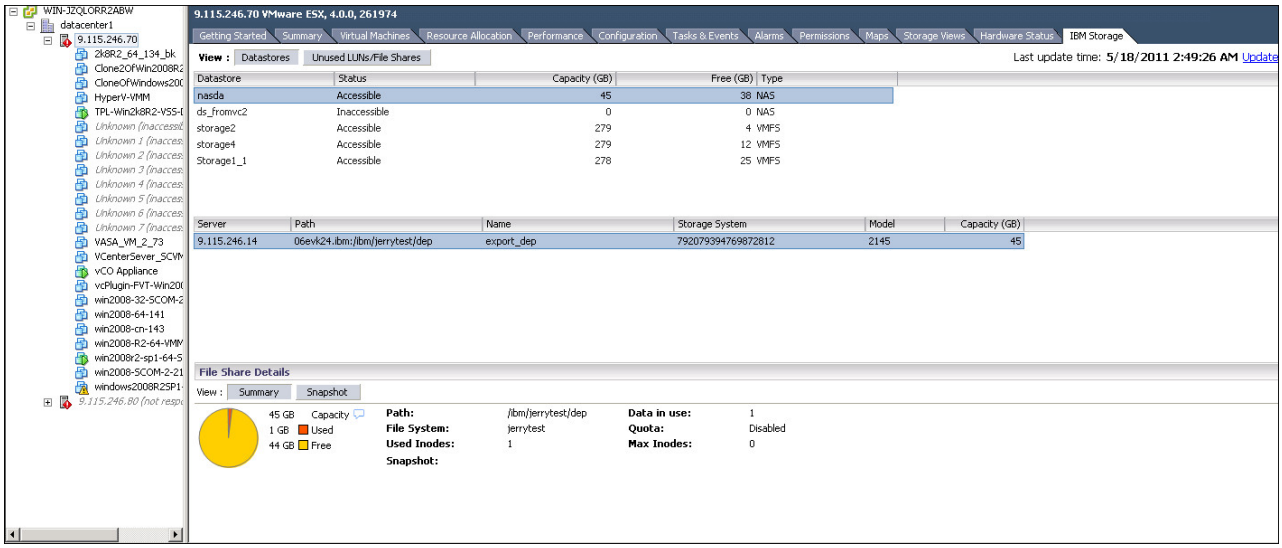


*Figure 48. Displaying file share of a selected datastore and file share details*

The following details are displayed for the file share:

**Server** NFS Server IP address.

**Path** Path to the file share.

**Name** Name of the file share (assigned by the user).

**Storage System**
Identification name of the IBM storage system on which the file share is defined.

---

**Note:** "Unknown" is a generic array name, automatically given to any non-IBM storage system or to any IBM system that is not currently added (for more information, see "Adding an IBM storage system" on page 19.

---

**Model** Model of the IBM storage system on which the file is defined.

**Capacity (GB)**
Total size of the file share in Gibibyte (not Gigabyte) units.

For more information about the File Share Details pane (under the File Share information), see "Viewing information in the File Share Details pane" on page 59

## Viewing unused volumes and file shares

Volumes that are not assigned to datastores as Datastore Extent or Mapped Raw LUN as well as file shares that are not assigned to datastores, are listed on the Unused LUNs/File Shares list, which you can view separately under **View: Unused LUNs/File Shares**.

These volumes and file shares can be accessed by the host.

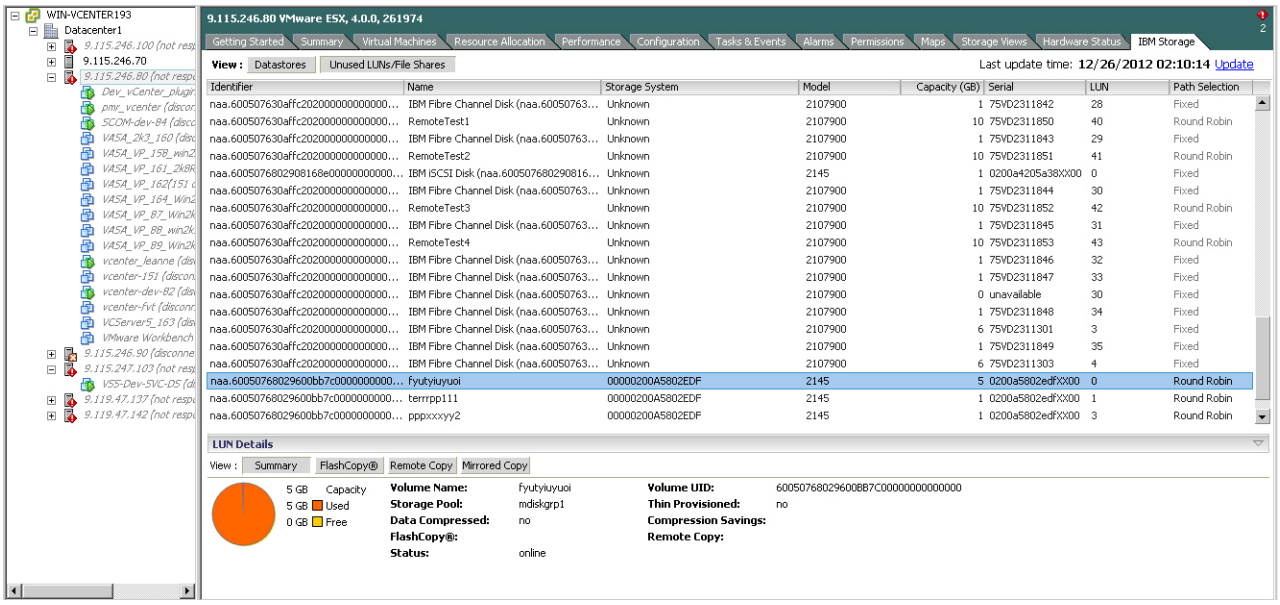


*Figure 49. List of unused volumes (LUN) and file shares*

Selecting (highlighting) a volume or file share in the Unused LUNS/File Shares displays its detailed information in the LUN Details pane or File Share Details pane on the bottom of the screen.

For more information about the LUN Details pane, see "Viewing information in the LUN Details pane" on page 52. For more information about the File Share Details pane, see "Viewing information in the File Share Details pane" on page 59.

## Viewing volumes or file shares that are used by virtual machines

When you want to check which storage volumes and file shares are in use by virtual machines, perform the following procedure.

### Procedure

1. Go to **Home** > **Inventory** > **VMS Templates**.
2. On the left-pane tree of virtual machines, click an icon of a virtual machine, and then click the **IBM Storage** tab. The table on the right pane displays the details of the virtual hard disks that are used by the virtual machine that you selected on the tree.
3. Click the name of a hard disk to display the storage volumes and file shares that are currently defined on it and are used by the datastores of the selected virtual machine.

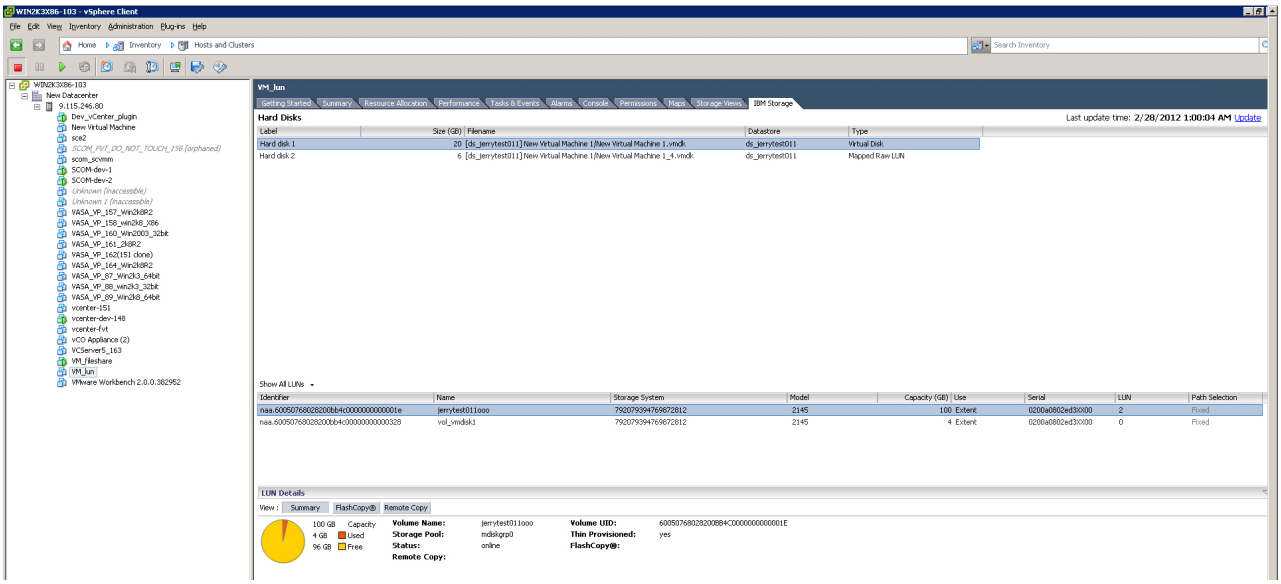


*Figure 50. Displaying volume details when a virtual machine is selected*

For more information about the LUN Details pane (under the Volumes list), see "Viewing information in the LUN Details pane" on page 52. For more information about the File Share Details pane (under the File Share), see "Viewing information in the File Share Details pane" on page 59.

## Choosing which volumes to show

In the different inventory views, you can choose which storage volumes to display for the entity (datacenter, cluster, host, or virtual machine) that you select on the left-pane tree.

Three viewing options are available:

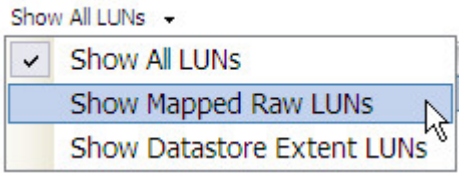


*Figure 51. LUN viewing options*

**Show all LUNs**
Show all volumes (LUNs) that are related to the selected entity.

**Show Mapped Raw LUNs**
Show only the Mapped Raw volumes (LUNs) that are related to the selected entity.

---

**Note:** In raw device mapping, a special file in a VMFS volume acts as a proxy for another raw storage device. The mapping file contains metadata that is used to manage and redirect disk accesses to the physical device.

---

**Show Datastore Extent LUNs**
Show only the Datastore Extent volumes (LUNs) that are related to the selected entity.

**Note:** The VMware file system (VMFS) allows you to extend the size of datastores whenever needed, by creating datastore extents. Volumes that contain extended datastores are regarded as Datastore Extent LUNs.

**Note:** NAS file shares cannot be used as "Mapped Raw LUN". Accordingly, for an NFS datastore, the **Show All LUNs** and **Show Mapped Raw LUNs** filtering are grayed out.

## Viewing information in the LUN Details pane

Depending on the IBM storage system on which the volumes reside, the LUN Details pane displays information of any recognized volume that is selected on the volumes list.

The displayed information is different in each case, as described in the following subsections:

- "Viewing XIV volume details"
- "Viewing DS8000 volume details" on page 54
- "Viewing Flex System, Storwize, or SAN Volume Controller volume details" on page 57

### Viewing XIV volume details

For XIV volumes there are three different information views: **Summary**, **Snapshots**, and **Mirroring**.

Click the view that you want to display.

**Summary view** (see Figure 52 and Figure 53) –

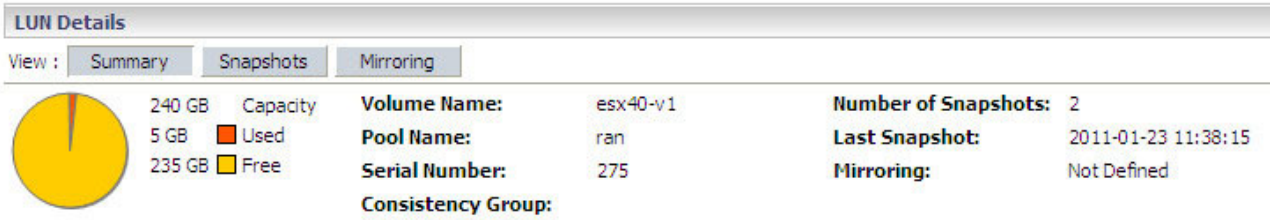


*Figure 52. Summary view for a regular XIV volume*

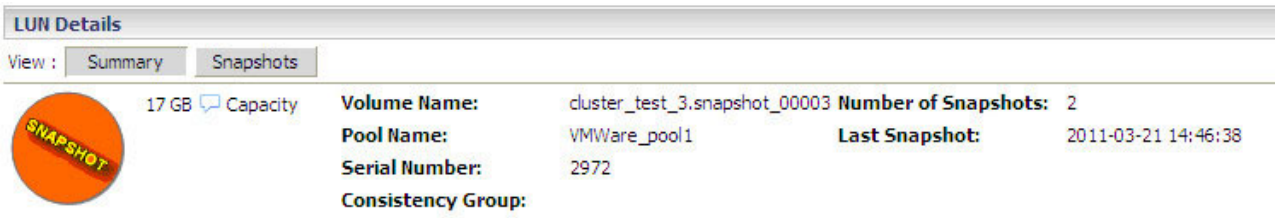


*Figure 53. Summary view for an XIV snapshot volume*

**LUN pie chart**
Graphic representation of the total capacity, used space (orange), and free space (yellow) in the selected volume. The pie chart is not displayed for snapshot volumes.

**Volume Name**
Name of the volume. If the volume was created now and in this version, this is the name assigned by the VMware administrator. Otherwise, if the volume was created in the past or with an earlier version of VC plug-in, the name displayed is a generic name assigned by VMware.

**Pool Name**
Name of the storage pool on which the volume was created.

**Serial Number**
Serial ID number of the volume.

**Consistency Group**
Indicates whether the volume belongs to a consistency group.

**Number of Snapshots**
Number of snapshots (if any) that exist for this volume.

**Last Snapshot**
Date and time at which the last snapshot was taken.

**Mirroring**
Indicates whether any mirroring is defined for this volume. Mirroring information is not available for snapshot volumes (see Figure 53 on page 52) or if you do not have storage admin permissions.

**Snapshots view** (see Figure 54) –

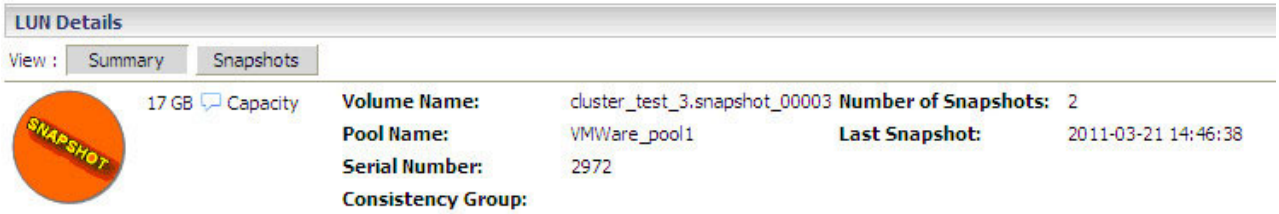


*Figure 54. Snapshots view for XIV snapshots*

**Name** Unique name of the snapshot file.

**Created**
Date and time at which the snapshot file was created.

**Modified**
Indicates whether the snapshot has been modified since its creation.

**Serial Number**
Serial ID number of the snapshot.

**Snapshot Group**
Indicates whether the snapshot belongs to a snapshot group. If yes, the name of the group is displayed.

**Mirroring view** (see Figure 55 on page 54) –

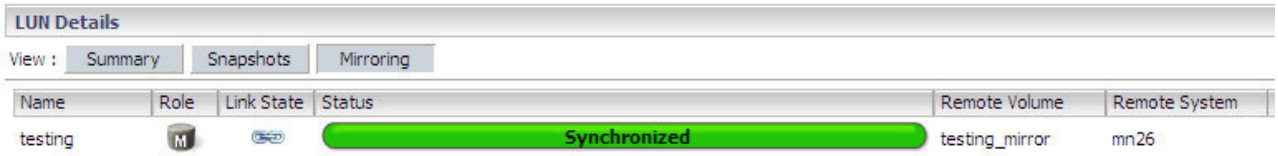


*Figure 55. Mirroring view for an XIV volume*

**Note:** The Mirroring view is not available for snapshot volumes (see Figure 53 on page 52).

**Name** Name of the mirroring operation.

**Role** Role of the mirroring operation.

**Link State**
Current state of the mirroring link.

**Status** Current status of the mirroring operation.

**Remote Volume**
Name of the mirrored remote volume.

**Remote System**
Name of the remote storage system on which the mirrored volume resides.

## Viewing DS8000 volume details

For DS8000 volumes there are three different information views: **Summary**, **FlashCopy**, and **Remote Copy**.

Click the view that you want to display.

**Summary view** (see Figure 56) –

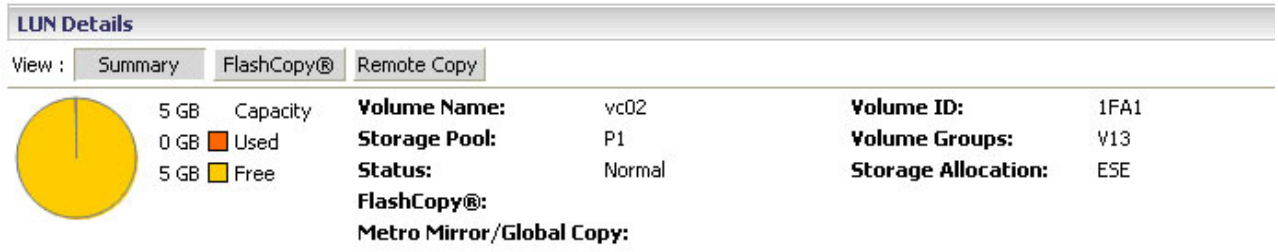


*Figure 56. Summary view for a regular DS8000 volume*

**LUN pie chart**
Graphic representation of the total capacity, used space (red), and free space (orange) in the selected volume. The pie chart is not displayed for snapshot volumes.

**Volume Name**
Name of the volume (given by the VMware administrator).

**Storage Pool**
Name of the storage pool on which the volume was created.

**Status** Status of the volume, which may be one of the following: `Normal`, `Pinned`, `Read Only`, `Inaccessible`, `Virtual Space Fault`, `Data Loss`, `Array Failed`, `Array Repairing`, `Array Repaired`, `Global Metadata Inaccessible`, `Global Metadata Lost`, `NVS Data Inaccessible`, `Configuring`, `Reconfiguring`, `Deconfiguring`, `Merging`, `Migrating`, `Migrating (Canceled)`, `Migrating (Paused)`, `Migration Error`, `Configuration Error`, `Reconfiguration Error`, `Deconfiguration Error`, `Transposition Error`. For more information about the meaning of these statuses, refer to the *IBM System Storage DS Command-Line Interface User's Guide for DS8000 series*, available on the IBM System Storage DS8000 Information Center (publib.boulder.ibm.com/infocenter/dsichelp/ds8000ic).

**Metro Mirror/Global Copy**
Name of the Metro Mirror or Global Copy group to which the volume belongs.

**Volume ID**
Identification number (ID) of the volume.

**Volume Groups**
the Volume group ID of with the volume are associated with

**Storage Allocation**
One of the following supported storage allocation types:

- Standard: The storage system fully allocated real extents to the volume upon its creation.
- ESE: Physical space for an extent space-efficient logical volume is dynamically allocated and then deallocated from the extent pool.

**FlashCopy® view** (see Figure 57) –

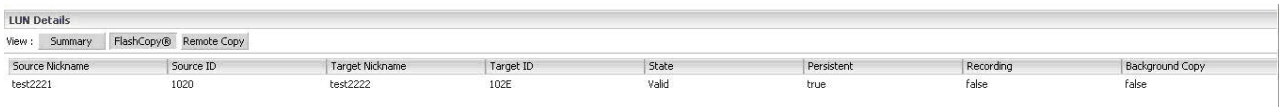


*Figure 57. FlashCopy replicas of a DS8000 volume*

**Source Nickname**
Source volume name of the FlashCopy relationship.

**Source ID**
Source volume ID of FlashCopy relationship.

**Target Nickname**
Target volume name of the FlashCopy relationship.

**Target ID**
Target volume ID of the FlashCopy relationship.

**State** State of the FlashCopy replica, which may be one of the following: , , , , .

- **Valid** – The FlashCopy relationship is in normal state.
- **Invalid** – A general internal error occurred when the query was processed.
- **Validation Required** – The FlashCopy relationship cannot be queried.
- **Volume Inaccessible** – The volume cannot be accessed and the query has failed.
- **Target Failed** – The FlashCopy relationship is in an error state.

**Persistent**
The FlashCopy relationship was established with the Persistent option

**Recording**
The FlashCopy relationship was established with the Record Changes option.

**Background Copy**
The FlashCopy relationship was established with the Run Background Copy option.

**Remote Copy view** (see Figure 58) –

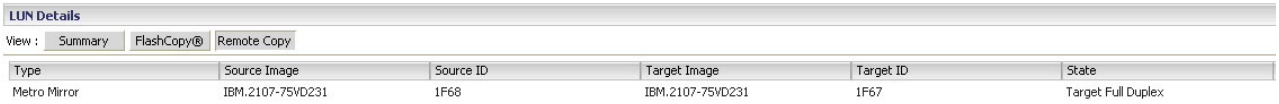


*Figure 58. Remote Copy details of a DS8000 volume*

**Type** The remote copy and mirror volume relationship type:
- Metro Mirror (synchronous)
- Global Copy (extended distance)
- Unknown

**Source Image**
Source image of a remote mirror and copy volume relationship.

**Source ID**
Source volume ID in the source image of a remote mirror and copy volume relationship.

**Target Image**
Target image of a remote mirror and copy volume relationship.

**Target ID**
Target volume ID in the source image of a remote mirror and copy volume relationship.

**State** The current remote mirror and copy volume relationship state, which may be one of the following:
- **Copy Pending** – The relationship is pending a copy operation. A Global Copy (extended distance) relationship is always copy pending.
- **Full Duplex** – The relationship is working in full duplex mode.
- **Suspended** – The relationship has been suspended. The 'Reason' attribute might indicate why the relationship is suspended.
- **Target Copy Pending** – A copy operation is pending on the target volume side.
- **Target Full Duplex** – The target volume is working in full duplex mode.
- **Target Suspended** – The target volume has been suspended.
- **Invalid State** – The source volume is unknown and cannot be queried, while Copy Pending, Full Duplex, or Suspended status cannot be assigned to it. Alternatively, this status might indicate that a general internal error occurred when the query was processed. When this status is displayed, only the following columns are relevant and display information: **Source ID**, **Target ID**. All the other information columns are displayed with a Null (–) value.

- **Validation Required** – The status of the volume cannot be determined and further validation is required.
- **Volume Inaccessible** – The volume could not be queried. Generally, this information means that the volume is fenced.

## Viewing Flex System, Storwize, or SAN Volume Controller volume details

For IBM Flex System, Storwize (V3500, V3700, V7000, V7000 Unified) and SAN Volume Controller volumes there are four different information views: **Summary**, **FlashCopy**, **Remote Copy**, and **Mirror Copy**.

Click the view that you want to display.

**Summary view** (see Figure 59) –

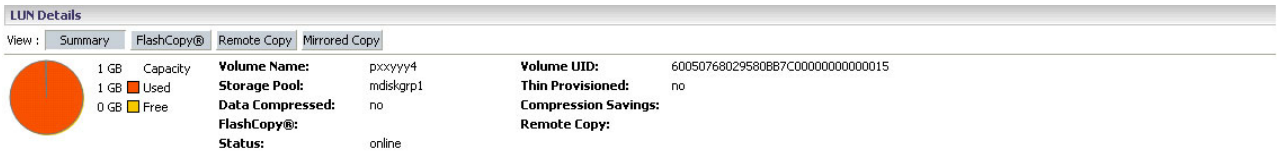


*Figure 59. Summary view for a regular Flex System, Storwize, or SAN Volume Controller volume*

**LUN pie chart**
Graphic representation of the total capacity, used space (red), and free space (orange) in the selected volume. The pie chart is not displayed for snapshot volumes.

**Volume Name**
Name of the volume (given by the VMware administrator).

**Storage Pool**
Name of the storage pool on which the volume was created.

**Data Compressed**
Indicates whether the volume is compressed. Applicable only to SAN Volume Controller or Storwize V7000 of microcode 6.4.0 or later, Storwize V3500 or Storwize V3700 of microcode 6.4.1 or later, and to Storwize V7000 Unified of microcode 1.4.0 or later.

**FlashCopy**
Name of the volume's FlashCopy replica. If the volume has multiple FlashCopy replicas, "Many" is displayed instead of a particular name.

**Status** Status of the volume, which may be one of the following:

- **Online** – The volume was set online by an administrator, and no failures have occurred. Authorized hosts can access the volume.
- **Offline** – The volume was set offline by an administrator, but no failures have occurred. Hosts cannot access the volume.
- **Degraded** – I/O errors have been detected on a region of a physical disk in the disk drive.

**Volume UID**
Unique identification number (UID) of the volume.

**Thin Provisioned**
Indicates whether the volume is thin-provisioned.

**Compression Savings**
The amount of storage saving percentage, if data compression is used.

**Remote Copy**
Name of the Remote Copy relationship group to which the volume belongs.

**FlashCopy view** (see Figure 60) –

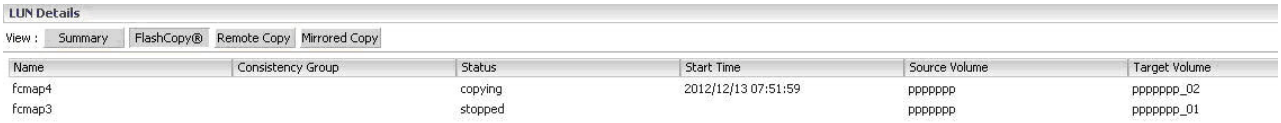


*Figure 60. FlashCopy replicas of a Flex System, Storwize, or SAN Volume Controller volume*

**Name** Name of the FlashCopy replica.

**Consistency Group**
Name of the consistency group to which the FlashCopy replica belongs.

**Status** Current status of the FlashCopy replica: `idle_or_copied`, `preparing`, `prepared`, `copying`, `stopped`, `suspended`, or `stopping`. For more information about these statuses, refer to the IBM Tivoli® Storage FlashCopy Manager documentation (publib.boulder.ibm.com/infocenter/tsminfo/v6/index.jsp?topic=/com.ibm.itsm.nav.doc/r_pdf_fcm.html).

**Source Volume**
Name of the source volume on which the original copy is located.

**Target Volume**
Name of the target volume on which the FlashCopy replica is located.

**Remote Copy view** (see Figure 61) –

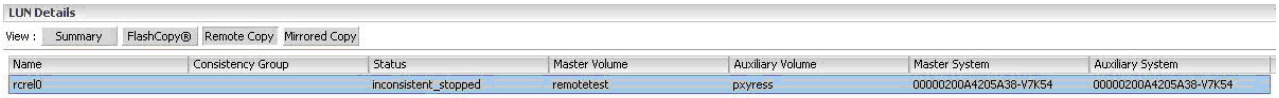


*Figure 61. Remote Copy details of a Flex System, Storwize, or SAN Volume Controller volume*

**Name** Name of the volume's remote copy.

**Consistency Group**
Name of the consistency group to which the remote copy belongs.

**Status** Current status of the remote copy: `inconsistent_stopped`, `inconsistent_copying`, `consistent_stopped`, `consistent_synchronized`, `idling`, `idling_disconnected`, `inconsistent_disconnected`, or `consistent_disconnected`. For more information about these statuses, refer to the storage system product documentation.

**Master Volume**
Name of the master volume in the remote copy.

**Auxiliary Volume**
Name of the auxiliary volume in the remote copy.

**Master System**
Name of the storage system on which the master volume resides.

**Auxiliary System**
Name of the storage system on which the auxiliary volume resides.

**Mirror Copy view** (see Figure 62) –

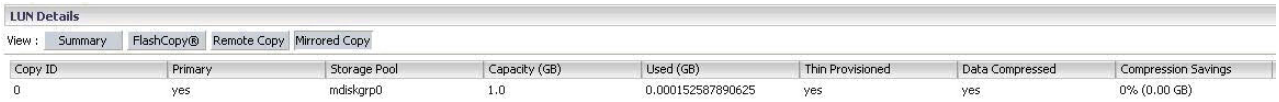


*Figure 62. Mirror Copy details of a Flex System, Storwize, or SAN Volume Controller volume*

**Copy ID**
ID of the mirror copy.

**Primary**
Indicates whether the mirror copy is the primary copy.

**Storage Pool**
Name of the storage pool in which the mirror copy is located.

**Capacity (GB)**
Total capacity of the mirror copy.

**Used (GB)**
Actual storage size that is used by the mirror copy.

**Thin Provisioned**
Indicates whether the mirror copy is thin-provisioned.

**Data Compressed**
Indicates whether the mirror copy uses data compression.

**Compression Savings**
The amount of storage saving percentage, if data compression is used.

## Viewing information in the File Share Details pane

Storwize V7000 Unified and SONAS storage systems can comprise an NAS File Share. File shares have two different information views: Summary and Snapshots. Click the view that you want to display.

**Summary view** (see Figure 63)

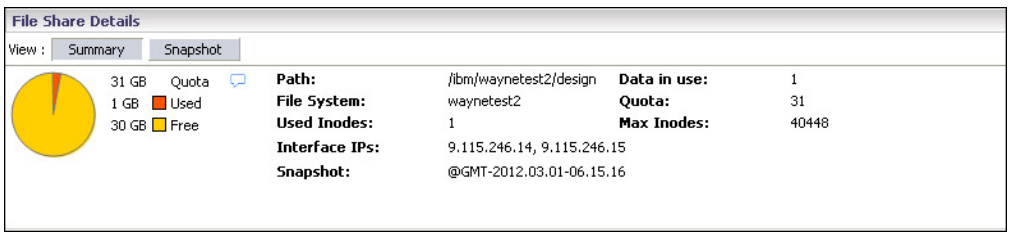


*Figure 63. Summary view for a NAS file share with quota*

**Note:** For a NAS file share without a quota, the legend of the pie chart shows **Capacity**, i.e. the total capacity of the file system, and **Quota** is disabled.

**NFS pie chart**

- For a NAS file share with quota – A graphic representation of the quota, used space (red), and free space (orange) in the selected NAS file share.
- For a NAS file share without a quota – A graphic representation of the total capacity of the file system, used space (red), and free space (orange) in the selected NAS file share.

**Path** Path to the NFS file system.

**File System**
Name of the file system, set by the user.

**Used Inodes**
Number of used inodes.

**Interface IPs**
IP addresses of network interfaces used to provide NAS services.

**Snapshot**
Date and time at which the last snapshot was taken.

**Data in use**
Size of the NAS file share used.

**Quota** Maximum size of the file share, for a file share with a quota; disabled for a file share without a quota.

**Max Inodes**
Maximum number available inodes.

**Snapshots view** (see Figure 64)

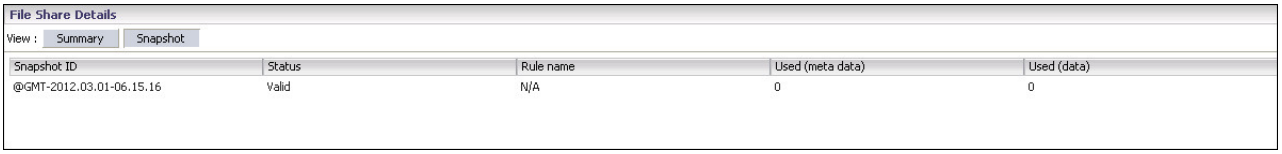


*Figure 64. Snapshots view for a NAS file share*

**Snapshot ID**
Identification of the snapshot, which includes the date and time at which the snapshot was created.

**Status** Indicates whether the snapshot is valid.

**Rule name**
Name of the rule, if applicable.

**Used (meta data)**
Size of the snapshot meta data.

**Used (data)**
Size of the snapshot data.

## Managing storage volumes (LUNs)

After you have created volumes, you can manage the volumes as needed, as detailed in the following sections.


- "Extending a volume" on page 61
- "Increasing datastore capacity on an extended volume" on page 62

- "Renaming a volume" on page 64
- "Moving a volume to another storage pool" on page 65
- "Mapping a storage volume to one or more ESX hosts" on page 66
- "Unmapping a storage volume from one or more hosts" on page 67
- "Setting multipath policy enforcement for a storage volume" on page 68
- "Changing the multipath policy enforcement for a storage volume" on page 69
- "Disabling the multipath policy enforcement for a storage volume" on page 70
- "Deleting an unused storage volume" on page 70


**Note:** You cannot manage volumes on storage arrays that are reported as "Unknown". Unknown is a generic array name, automatically given to any non-IBM storage system or to any IBM system that is not currently added (for more information, see "Adding an IBM storage system" on page 19).

**Important:** Before you begin managing volumes:

- You must have storage admin permissions on the relevant storage system.
- Check whether the volumes that you want to manage reside on attached storage pools.
- Check whether the volumes that you want to manage are used as Extent or RDM.

The **Map**, **Unmap**, and **Delete** options are not available for volumes that are used by a datastore as Extent or RDM.

## Extending a volume

If enough free space is available on the storage pools, you can extend the size of an existing volume.

### Procedure

Perform the following procedure to extend the size of a volume.

1. In one of the Inventory views, right-click the row of the volume that you want to extend, and then click **Extend** on the pop-up menu.
   The Extend Volume dialog box is displayed.

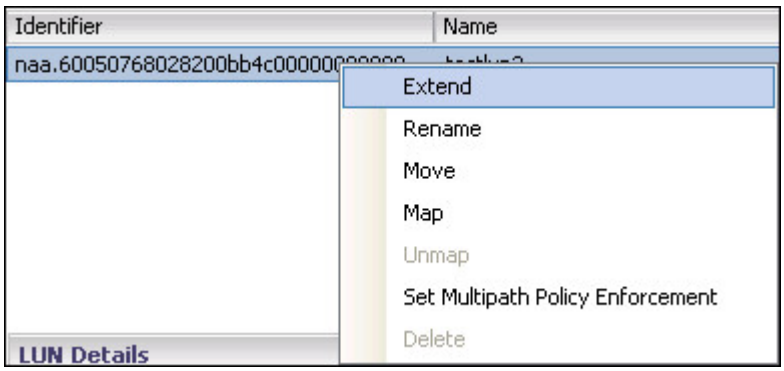


*Figure 65. Clicking Extend on the pop-up menu*

2. In the **Volume Size** text box, enter the new size for the volume. Alternatively, place the mouse pointer on the graphic image of the storage pool, and then click and slide the space marker rightward to set the new volume size (marked

in yellow). The numerical value in Volume Size is automatically updated accordingly.

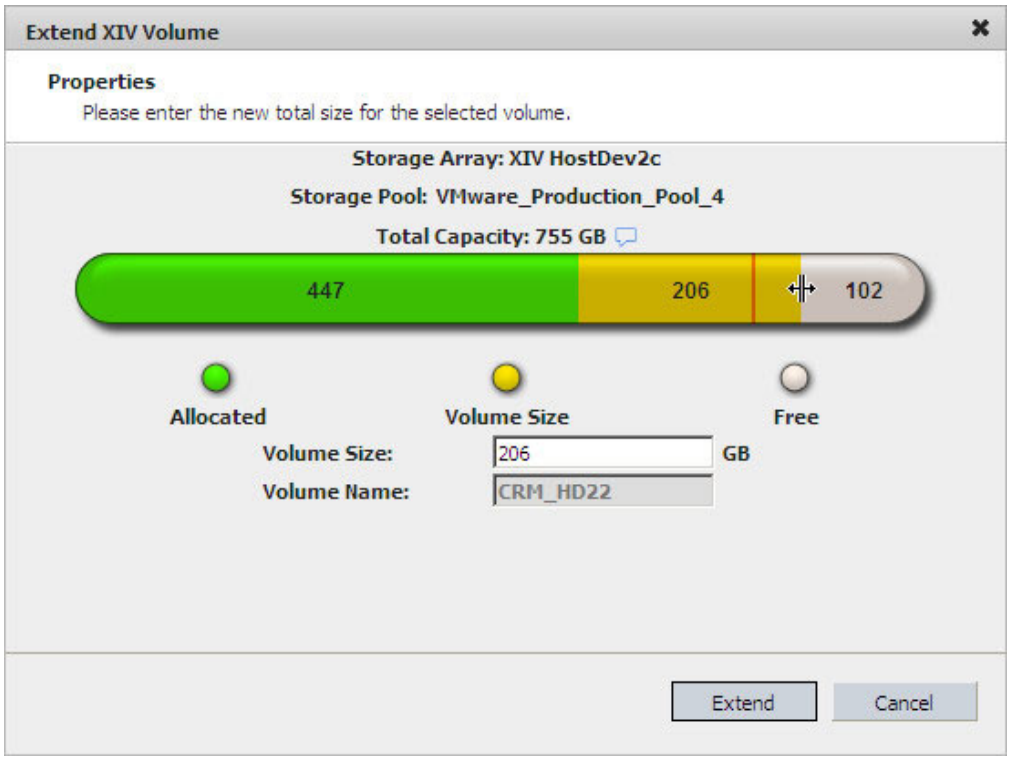


*Figure 66. Resize Volume dialog box - using the mouse pointer*

**Note:**

- The data measurement unit for the XIV storage system volume size is **Gigabytes**; for the Storwize and SAN Volume Controller storage systems, the data measurement unit is **Gibibytes**.
- XIV volume sizes are automatically rounded to the next multiple of 17 GB.

3. Click **Extend**.

**Important:** Extending the size of a volume does not automatically increase the datastore capacity. For more information, see "Increasing datastore capacity on an extended volume."

## Increasing datastore capacity on an extended volume

After you have extended the size of a volume (LUN), you can increase the capacity of any datastore that is stored on that volume.

### Procedure

Perform the following procedure to increase the size of a datastore.

1. Go to **Home** > **Inventory** > **Datastores**.
2. Click the datastore that you want to extend, click the Configuration tab, and then click **Properties**.

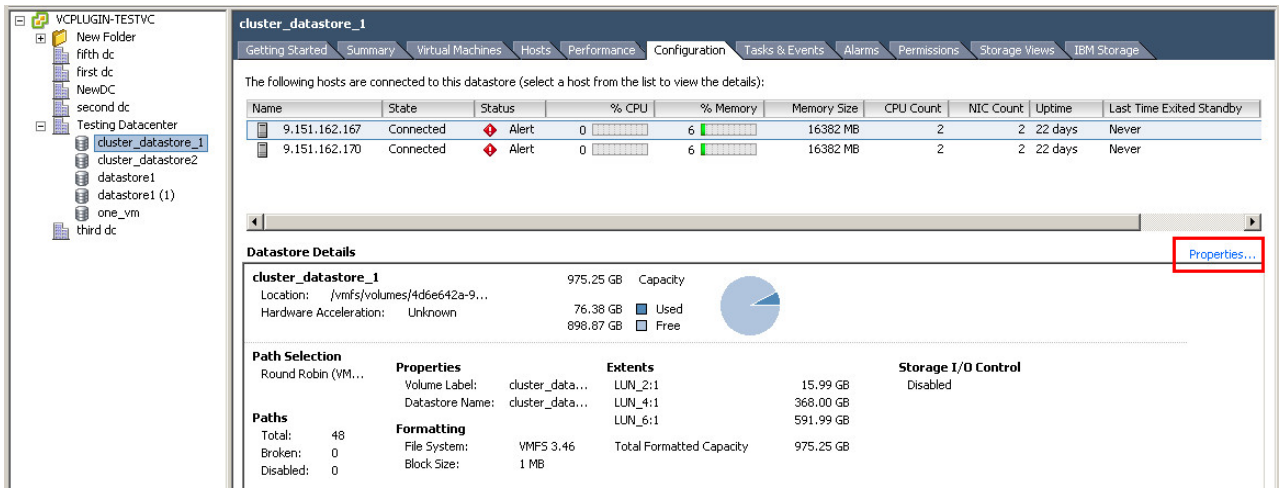


*Figure 67. Datastore Configuration Tab – Properties button*

The datastore Properties dialog box is displayed.

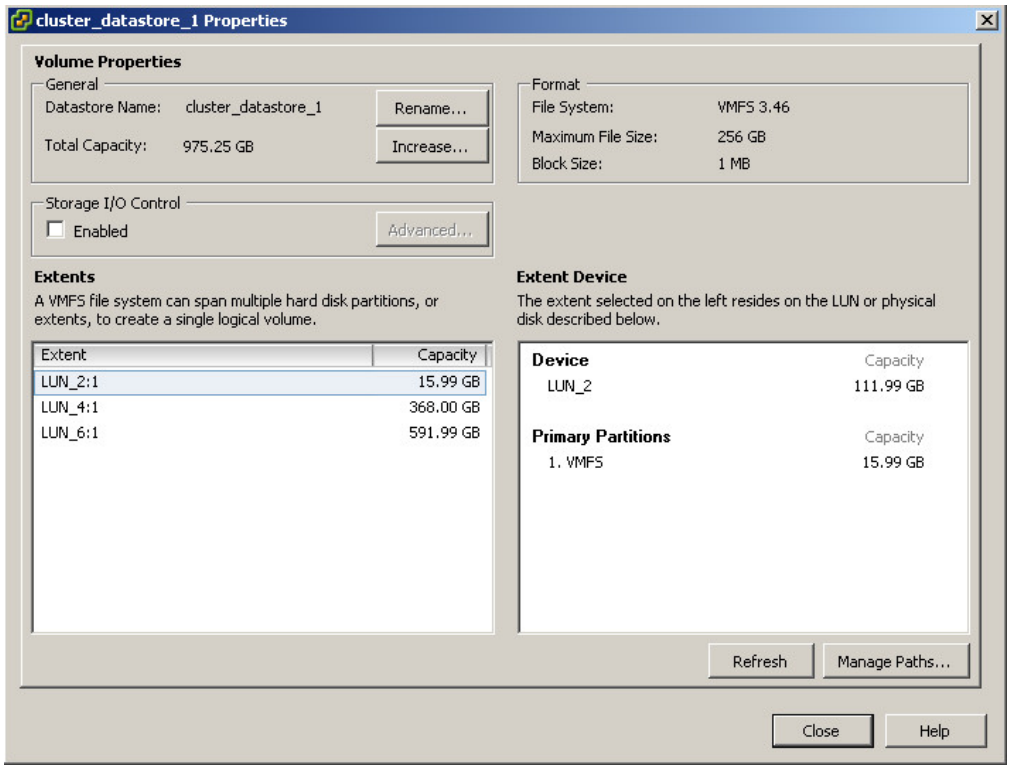


*Figure 68. Datastore Properties dialog box*

3. Click **Increase**. The Increase Datastore Capacity wizard is displayed.
4. Select the volume (referred to as Extent Device by vSphere) that you have resized, click **Next**, and then complete the remaining steps of the Increase Datastore Capacity wizard.

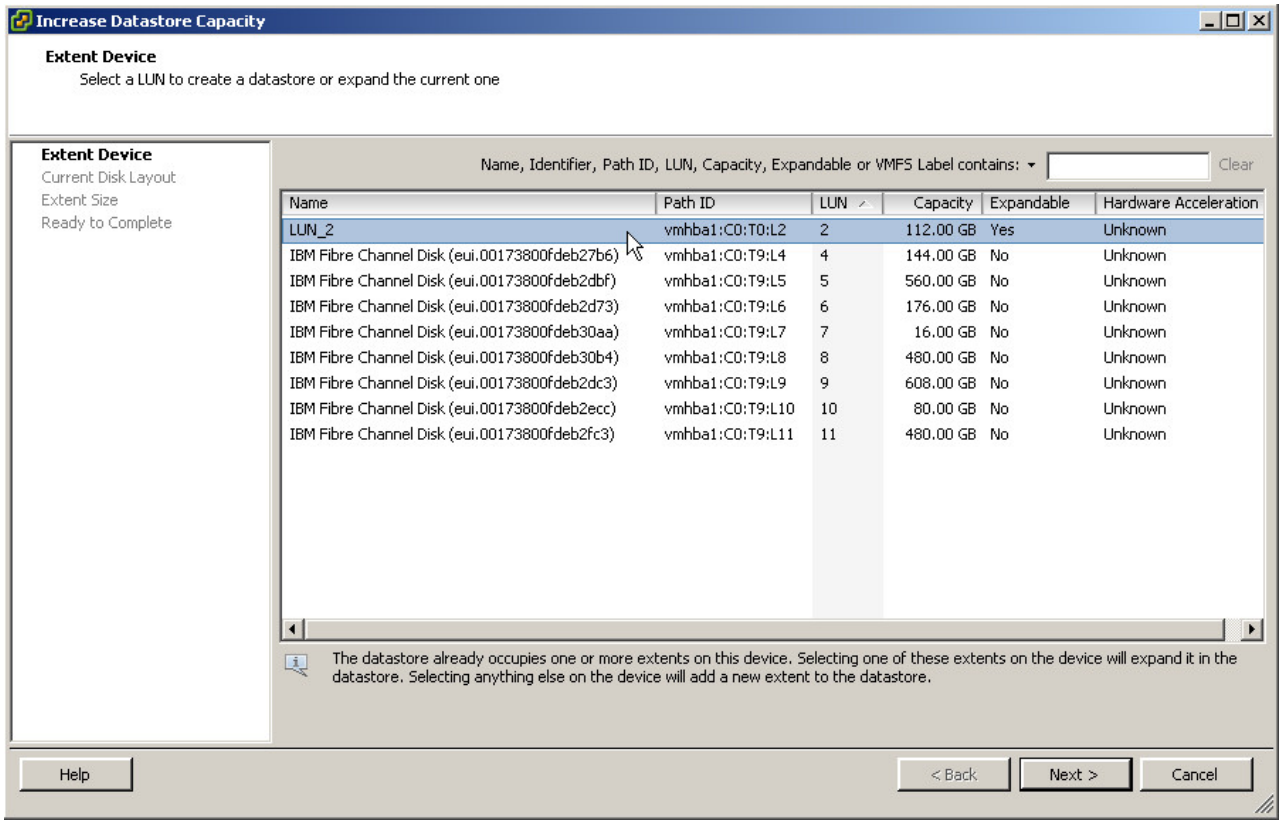


*Figure 69. Selecting the extended volume for the datastore size increase*

**Note:** When selecting the resized volume (Extent Device), a notification below the table indicates that the datastore already has an extent on that volume.

## Renaming a volume

Whenever required, you can rename any existing volume by performing the following procedure.

### About this task

**Note:** Renaming a volume is a logical action that does not have any physical effect on the volume or its logical connections. Renaming a volume also changes its display name.

### Procedure

1. In one of the Inventory views, right-click the row of the volume that you want to rename, and then click **Rename** on the pop-up menu.

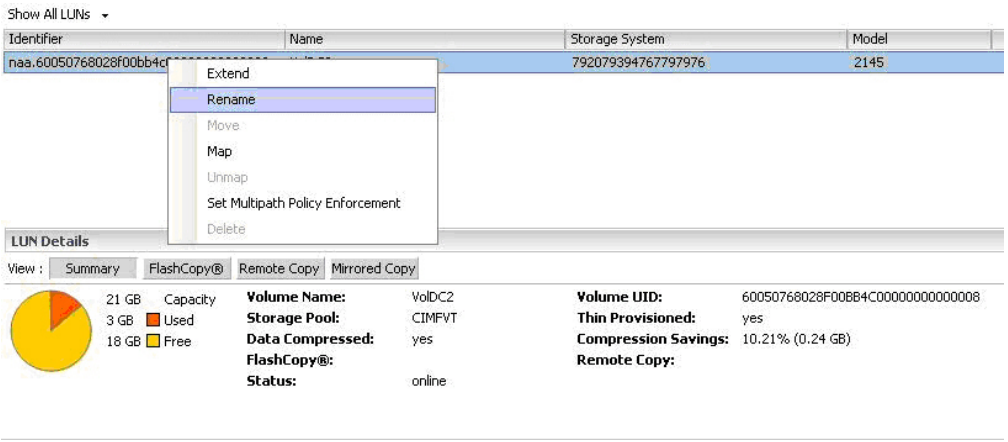


*Figure 70. Clicking Rename on the pop-up menu*

The Rename Volume dialog box is displayed.

2. In **New Name**, enter the new name that you want to assign to the volume.
3. Click **Rename**. The new Volume Name is updated in the LUN Details pane.

## Moving a volume to another storage pool

If you want to move a volume to a different storage pool (for example, when the current storage pool has run out of space), perform the following procedure.

### About this task

**Attention:**

- On XIV storage systems, moving a volume to another storage pool is a logical action. No data is actually moved on physical disks as a result.
- On DS8000, Storwize, and SAN Volume Controller storage systems, moving a volume to another storage pool is a **physical** action that causes data to move to a different physical disk. This may cause some performance overhead.
- On DS8000, Storwize, and SAN Volume Controller storage systems, moving a volume to another storage pool is an **asynchronous** action. The capacity of the source and target storage pools may not be updated after the task is completed in vCenter.
- When using mirrored volumes on SAN Volume Controller systems, only the primary copy volumes can be moved. In addition, these volumes can be moved only to the primary storage pool copy (not to the secondary copy).

### Procedure

1. In one of the Inventory views, right-click the row of the volume that you want to move, and then click **Move** on the pop-up menu.

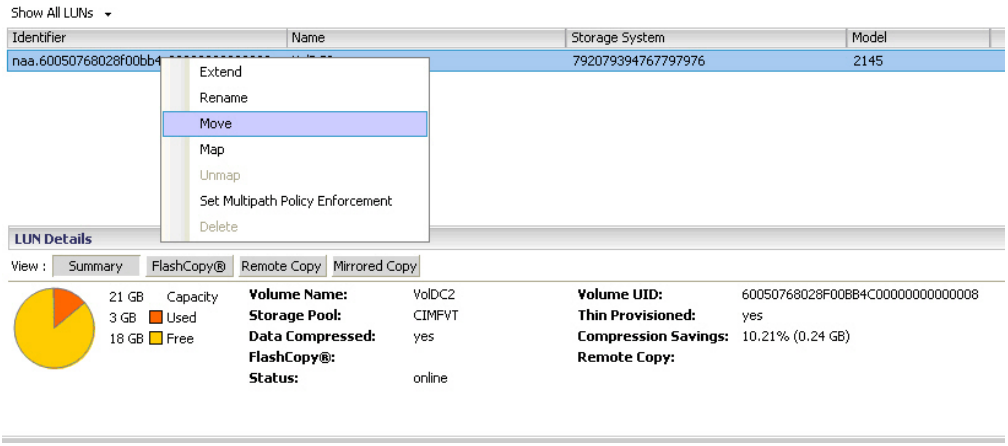


*Figure 71. Clicking Move on the pop-up menu to move the volume to another pool*

The Move Volume dialog box is displayed.

2. In the **New Storage Pool** drop-down list, select the storage pool to which you want to move the volume, and then click **Move**. The new storage pool location is updated in the LUN Details pane.

# Mapping a storage volume to one or more ESX hosts

Only volumes that are mapped to one or more ESX hosts can be used for creating datastores. Without the volume mapping operation, datastores cannot be created.

## About this task

**Important:** You can map volumes only to ESX hosts that were predefined on the storage system. Accordingly, contact your storage administrator if the mapping option is not available on your vSphere client. For more information, see "Creating VMware datastores in storage volumes" on page 77.

## Procedure

Perform the following procedure to map a storage volume to ESX hosts.

1. Access the view under View: Unused LUNs/File Shares (see "Viewing unused volumes and file shares" on page 49).
2. Right-click the volume that you want to map, and then click **Map** on the pop-up menu. The Map LUN to Hosts dialog box is displayed.

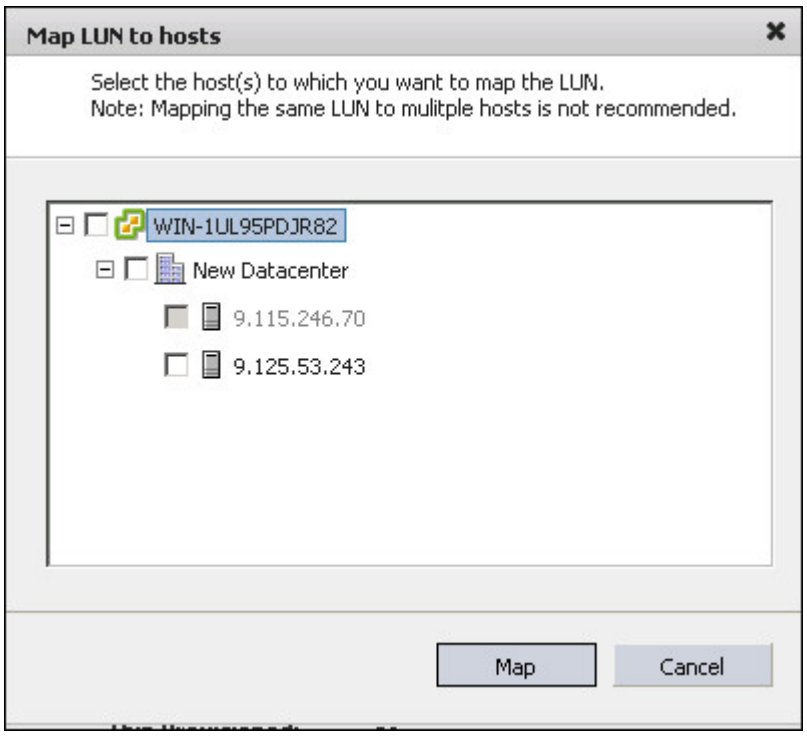


*Figure 72. Map LUN to Hosts dialog box*

3. Select the hosts or clusters to which you want to map the volume, and then click **Map**.

**Important:**

- Although possible, avoid mapping the same volume (LUN) to multiple hosts.
- Grayed-out hosts are either already mapped or not defined on the storage system, and therefore cannot be selected. Hosts that are disconnected or not responding are also grayed-out.

## Unmapping a storage volume from one or more hosts

When volumes or ESX hosts are no longer needed, or if new ones are to replace the current ones, you can unmap volumes from the hosts.

### About this task

**Important:**

- A volume (LUN) must remain mapped to at least one host. Otherwise, you cannot view the volume or perform any actions on it from the plug-in.
- If you no longer require a LUN for any host, delete the volume (see "Deleting an unused storage volume" on page 70).

### Procedure

Perform the following procedure to unmap a volume.

1. In one of the Inventory views, right-click the row of the volume that you want to unmap, and then click **Unmap** on the pop-up menu. The Remove LUN

Mapping dialog box is displayed.

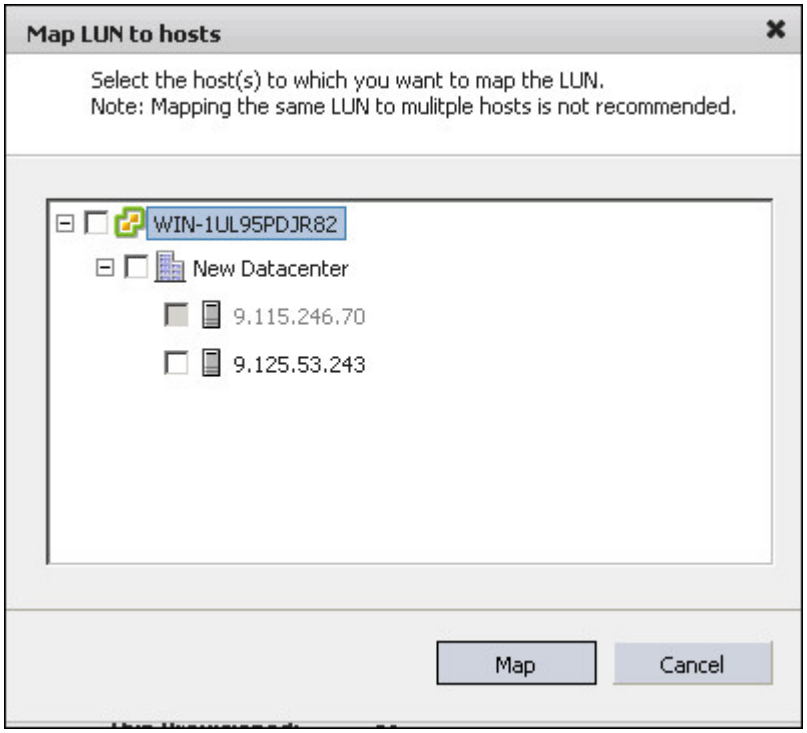


*Figure 73. Remove LUN Mapping Dialog box*

2. Select the hosts or clusters from which you want to unmap the volume, and then click **Unmap**.

---

**Note:** ESX hosts that are disconnected or not responding are grayed-out and cannot be selected.

---

## Setting multipath policy enforcement for a storage volume

This section describes how to set multipath policy enforcement for a single volume.

### About this task

---

**Note:** You can also set multipath policy enforcement for a storage system. For a general explanation on multipath policy enforcement and on how to set it at the storage system level, see "Setting multipath policy enforcement for a storage system" on page 25.

---

### Procedure

Perform the following procedure to set multipath policy enforcement for a volume.

1. In one of the Inventory views, right-click the row of the volume for which you want to set a policy, and then click **Set Multipath Policy Enforcement** on the pop-up menu.

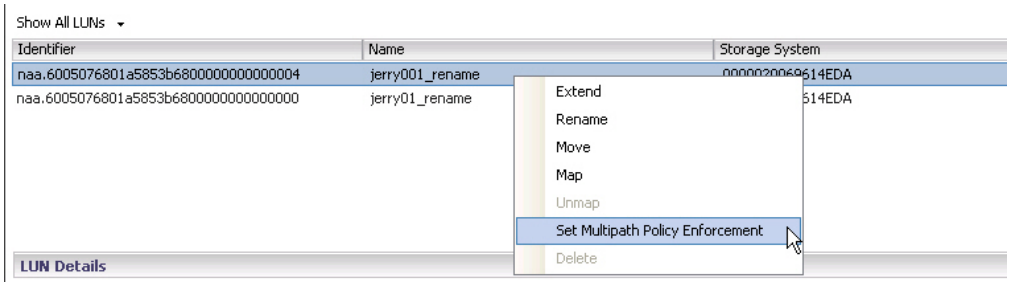


*Figure 74. Clicking Set Multipath Policy Enforcement on the pop-up menu*

The Multipath Policy dialog box is displayed.

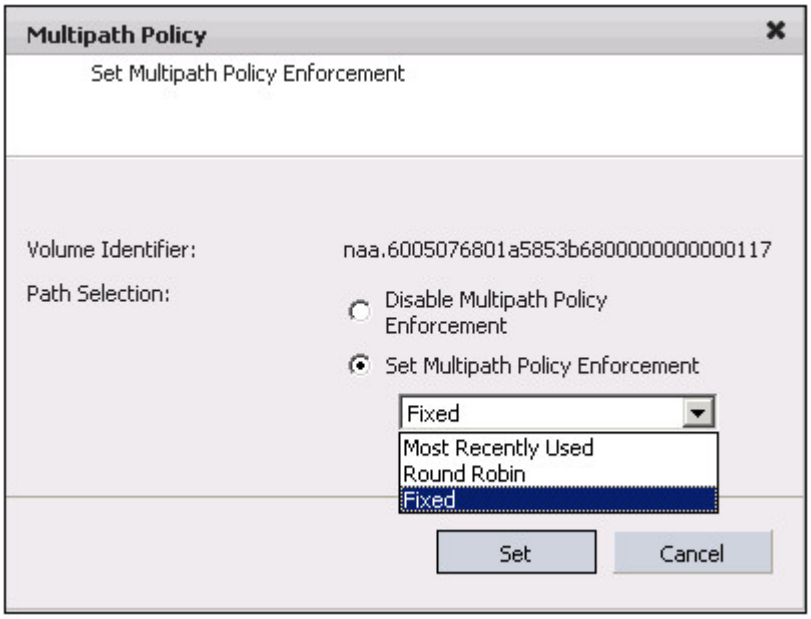


*Figure 75. Setting Multipath Policy Enforcement on a volume*

2. Select the **Set Multipath Policy Enforcement** option, and then select the required policy from the drop-down list.
3. Click **Set** to apply the selected policy.

**Important:** After the policy is set, the management console service enforces this policy by overriding any existing policy for this volume. This means that if the policy was previously modified from outside the management console user interface, the policy is enforced back to what you have specified from the management console GUI.

## Changing the multipath policy enforcement for a storage volume

For a volume that already has multipath policy enforcement, you can change the policy that is to be enforced on it.

### Procedure

Perform the following procedure to change the multipath policy.

1. In the Multipath Policy dialog box (see Figure 75 on page 69), select a different policy from the drop-down list under **Set Multipath Policy Enforcement**.
2. Click **Set**.

## Disabling the multipath policy enforcement for a storage volume

You can disable multipath policy enforcement so that no policy would be enforced on a volume.

### About this task

**Note:** Disabling multipath policy enforcement does not modify the policy in any way.

### Procedure

Perform the following procedure to disable multipath policy enforcement on a volume.

1. In the Multipath Policy dialog box (see Figure 75 on page 69), select **Disable Multipath Policy Enforcement**.
2. Click **Set**.

## Deleting an unused storage volume

When a storage volume is unused and no longer required, you can delete it.

### Before you begin

**Important:** You cannot delete volumes that are currently used by datastores.

### Procedure

Perform the following procedure to delete an unused volume (LUN).

1. On the **Unused LUNs/File Shares** list, right-click the row of the volume that you want to delete, and then select **Delete** from the pop-up menu.

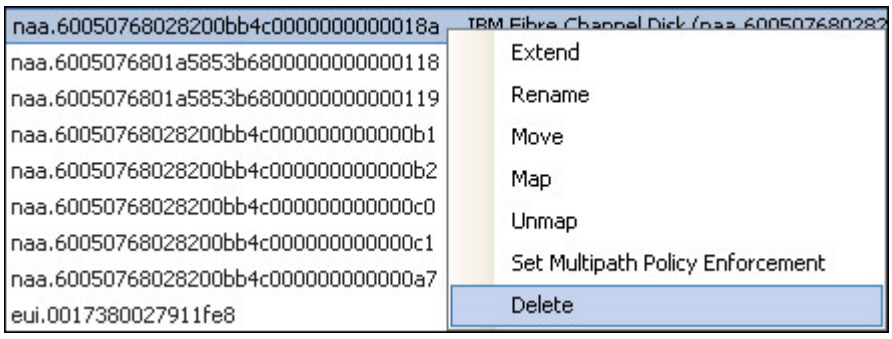


*Figure 76. Clicking Delete on the pop-up menu*

The Volume Delete Confirmation dialog box is displayed.

2. Click **Delete** to confirm the deletion, or **Cancel** to exit without deleting the volume.

# Managing file shares

After you have created file shares, you can manage the file shares as needed, as described in the following sections.


- "Setting a quota for a file share"
- "Disabling the quota of a file share" on page 72
- "Exporting a NAS file share to hosts" on page 72
- "Removing a NAS file share from hosts" on page 73
- "Deleting an unused file share" on page 74


**Note:** You cannot manage file shares on storage arrays that are reported as "Unknown". Unknown is a generic array name, automatically given to any non-IBM storage system or to any IBM system that is not currently added (for more information, see "Adding an IBM storage system" on page 19).

**Important:** Before you begin managing file shares:

- You must have **Admin**, **StorageAdmin+ExportAdmin**, or **SecurityAdmin** permissions on the relevant storage system.
- Check whether the file shares that you want to manage reside on attached file systems.

## Setting a quota for a file share

You can set an upper limit for the disk space that can be allocated to a file share, by setting a quota for the file share.

### About this task

Setting a quota allocates limited available disk space in a reasonable way, so that a single file share does not use up all the space of a file system, but only uses up to the amount of space set in the quota. It is especially important to set a quota for file shares of lesser importance, to ensure that important file shares have sufficient space.

### Procedure

Perform the following procedure to set or change the file share quota.

1. In one of the Inventory views, right-click the row of the file share for which you want to set a quota, and then click **Set Quota** on the pop-up menu.

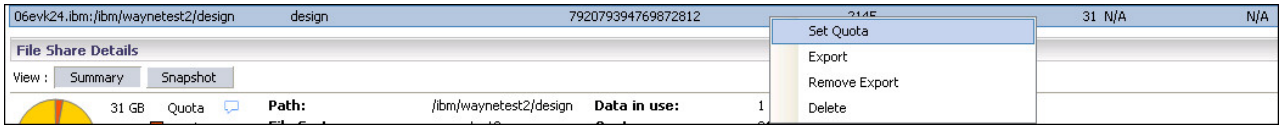


*Figure 77. Clicking Set Quota on the pop-up menu*

The Set Quota dialog box is displayed.

2. Select the **Set Quota** option.
3. In the Quota text box, enter the new quota for the file share. Alternatively, place the mouse pointer on the graphic image of the file share, and then click and slide the space marker **rightward** to set the new quota (marked in yellow).

The numerical value in New Quota is automatically updated accordingly.

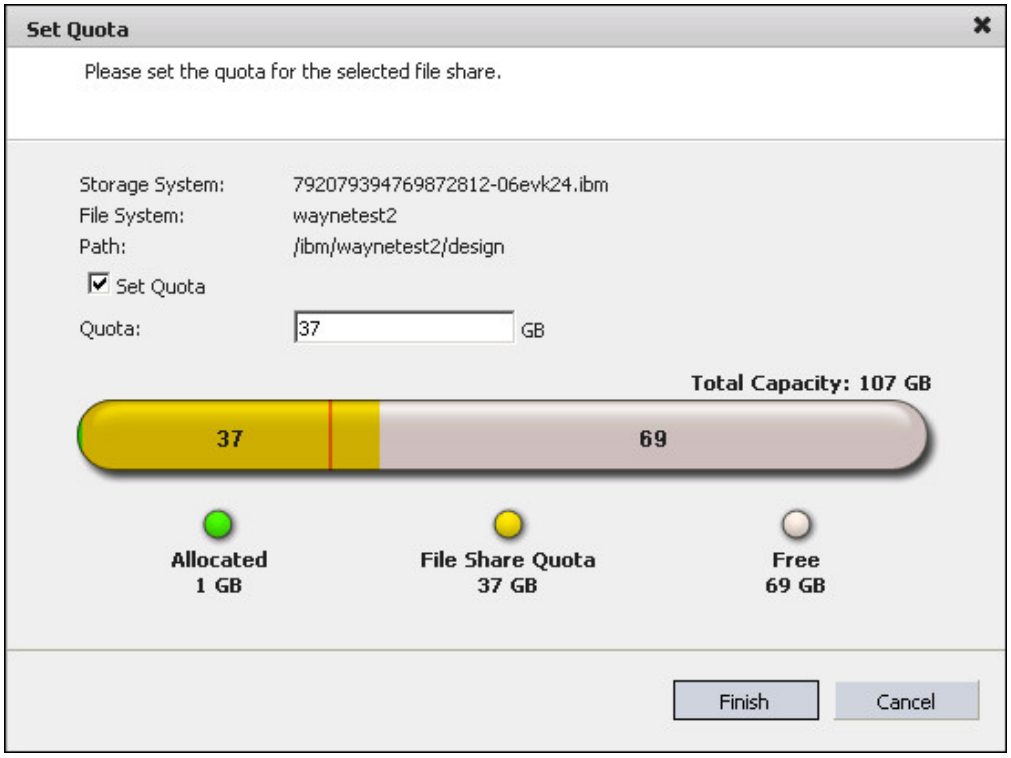


*Figure 78. Set Quota dialog box*

4. Click **Finish**.

## Disabling the quota of a file share

Whenever required, you can disable the quota of a file share.

### Procedure

Perform the following procedure to disable the file share quota.

1. In one of the Inventory views, right-click the row of the file share for which you want to disable a quota, and then click Set Quota on the pop-up menu (see Figure 77 on page 71). The Set Quota dialog box is displayed (see Figure 78).
2. Clear the **Set Quota** option.
3. Click **Finish**.

## Exporting a NAS file share to hosts

You can change the NFS client of any file share by exporting. If the file share belongs to a datastore, this allows the datastore to be shared with more hosts.

### About this task

You can only select hosts that are not currently being exported to. Multiple hosts can be selected.

**Important:** You can export only to ESX hosts that were connected to the vCenter server.

### Procedure

Perform the following procedure to export an NAS file share to hosts.

1. In one of the Inventory views, right-click the row of the file share which you want to export, and then click **Export** on the pop-up menu.

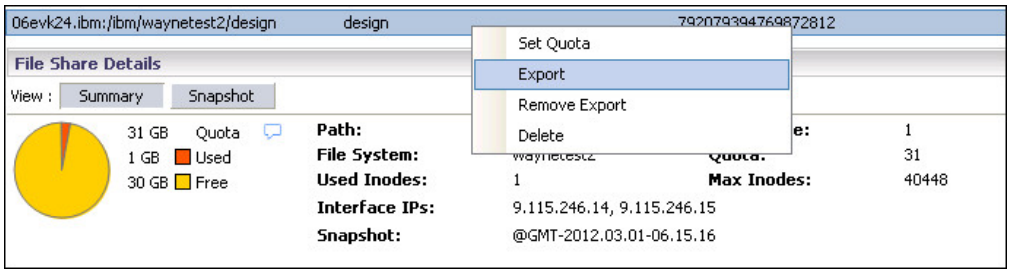


*Figure 79. Clicking Export on the pop-up menu*

The Export File Share to Host(s) dialog box is displayed.

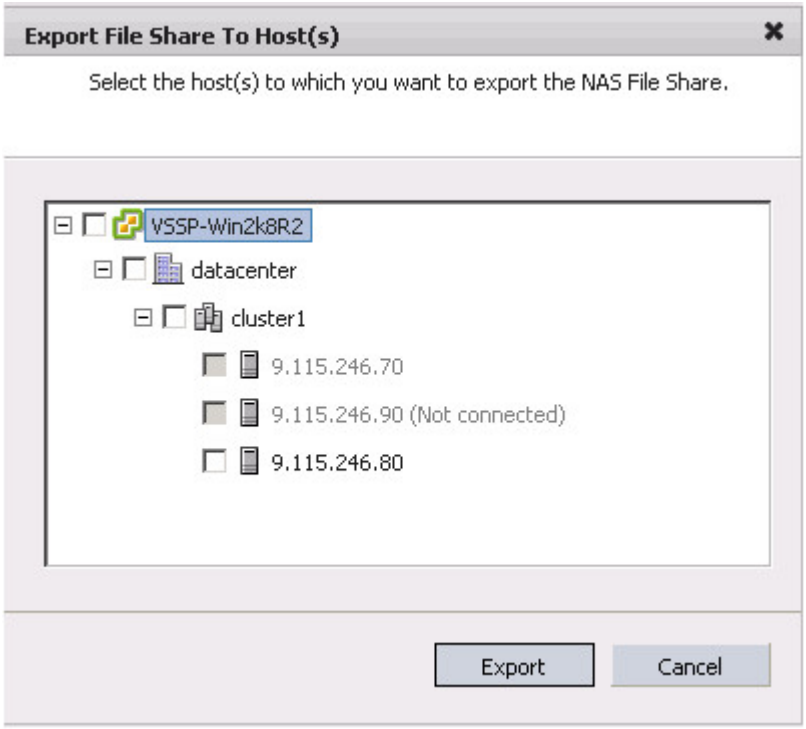


*Figure 80. Export NAS file share to hosts dialog box*

2. Select the hosts to which you want to export the NAS file share, and then click **Export**.

**Note:** Grayed-out hosts are already exported, and therefore cannot be selected. Hosts that are disconnected or not responding are also grayed-out.

## Removing a NAS file share from hosts

When a file share or ESX hosts are no longer needed, or if new ones are to replace the current ones, you can remove the hosts from the NAS file share exporting.

### About this task

**Important:** You can remove an NAS file share from hosts, provided that the file share is not being used in any datastore.

### Procedure

Perform the following procedure to remove the hosts from the NAS file share exporting.

1. In one of the Inventory views, right-click the row of the NAS file share from which you want to remove hosts, and then click **Remove Export** on the pop-up menu. The **Remove File Share Export from Host(s)** dialog box is displayed.

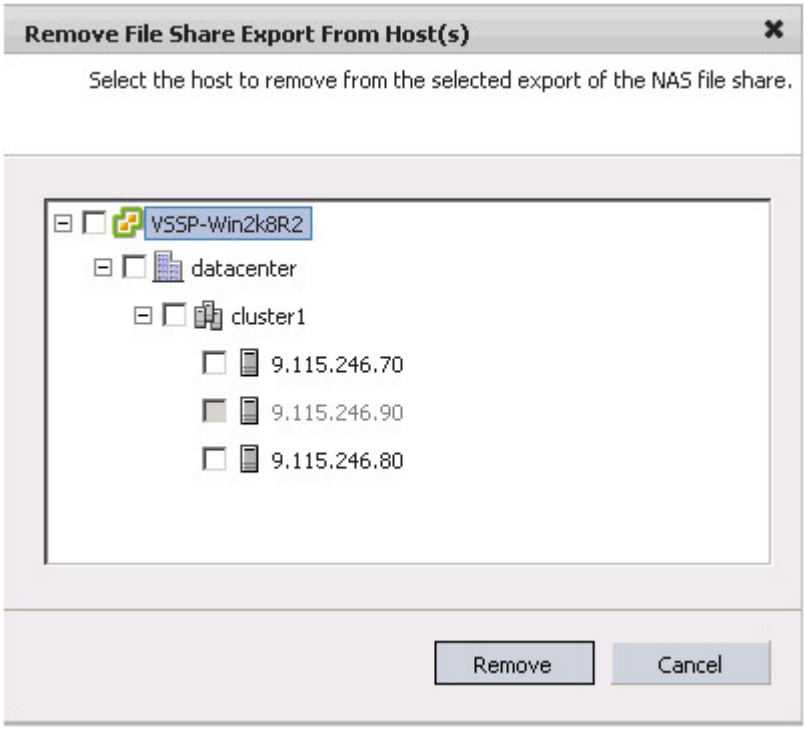


*Figure 81. Remove export of NAS file share to hosts dialog box*

2. Select the hosts which you want to remove from the NAS file share exporting, and then click **Remove**.

**Note:** ESX hosts that are disconnected or not responding are grayed-out and cannot be selected.

## Deleting an unused file share

When a file share is unused and no longer required, you can delete it. Deleting the file share deletes all data in the file directory, and all of its snapshot(s).

### About this task

For more information on unused file shares, see "Viewing unused volumes and file shares" on page 49.

**Attention:** You cannot delete file shares that are currently used by datastores.

## Procedure

Perform the following procedure to delete an unused file share.

1. On the Unused LUNs/File Shares list, right-click the row of the file share that you want to delete, and then select **Delete** from the pop-up menu.

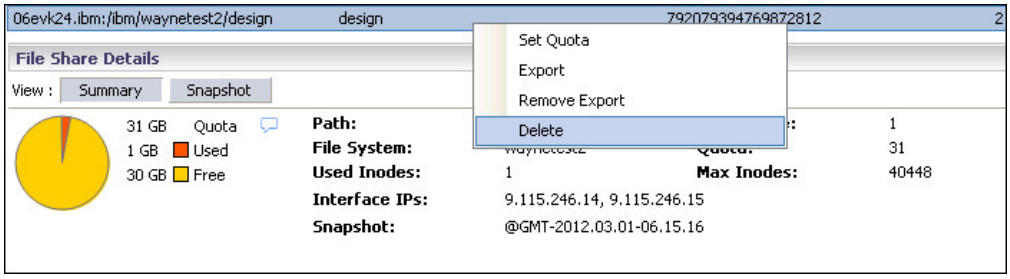


*Figure 82. Clicking Delete on the pop-up menu*

The File Share Delete Confirmation dialog box is displayed.

2. Click **Delete** to confirm the deletion, or **Cancel** to exit without deleting the file share.

# Chapter 7. Using volumes or file shares for datastores

The following sections briefly describe how to create VMware datastores on IBM storage volumes or file shares, and how to create a virtual machine that uses a datastore on an IBM storage system:

- "Creating VMware datastores in storage volumes"
- "Creating VMware datastores in file shares" on page 82
- "Creating a virtual machine and connecting it to a datastore" on page 85

**Reference to existing VMware documentation:**
**Note:** VMware already provides documentation for the standard datastore and VM creation operations described in this chapter. For more detailed information about basic and advanced vSphere operations, visit the VMware Documentation website (www.vmware.com/support/pubs).

## Creating VMware datastores in storage volumes

When the storage volumes that you have created are ready for use by datastores, you can start assigning the volumes to the new datastores that you create.

### About this task

Use the vSphere Add Storage wizard to create datastores on storage volumes that you have created (for more information, see "Creating a new storage volume (LUN)" on page 38).

**Note:** The following procedure applies to VMware vCenter version 4.0 or 4.1. For vCenter version 5.0 or later, refer to the VMware documentation.

### Procedure

1. Start the vSphere Add Storage wizard.
2. On the **Select Host** panel, select the ESX host to which storage volumes are mapped, and then click **Next**.

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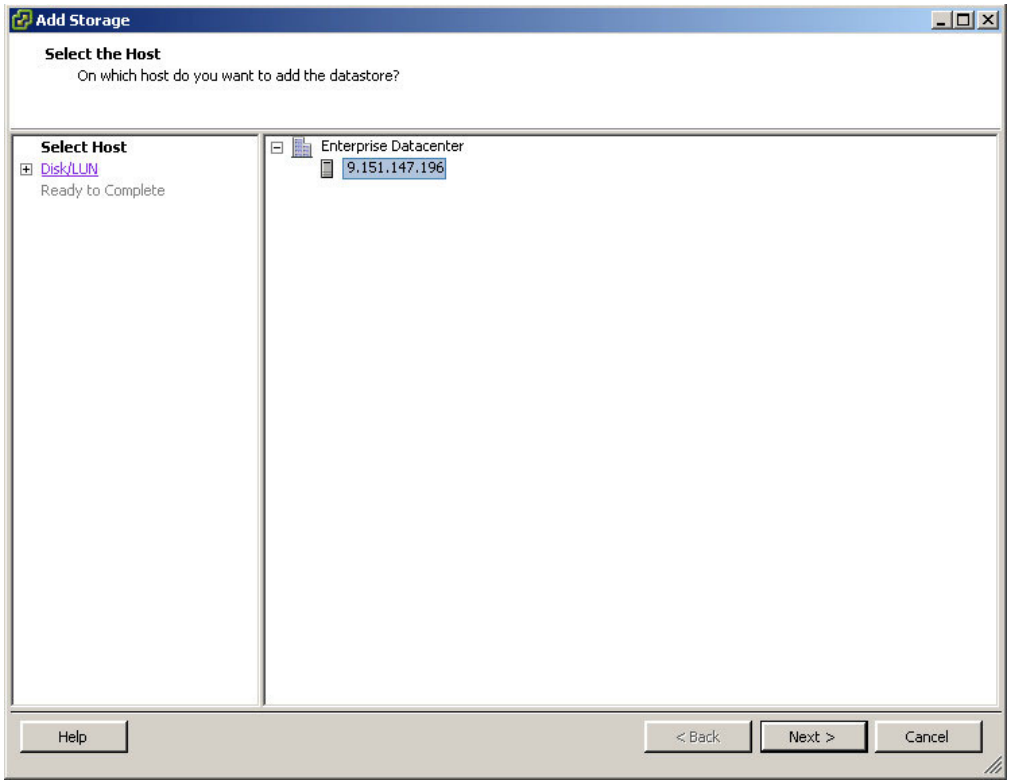



*Figure 83. Add Storage Wizard - Select Host Panel*

The Select Storage Type panel is displayed.

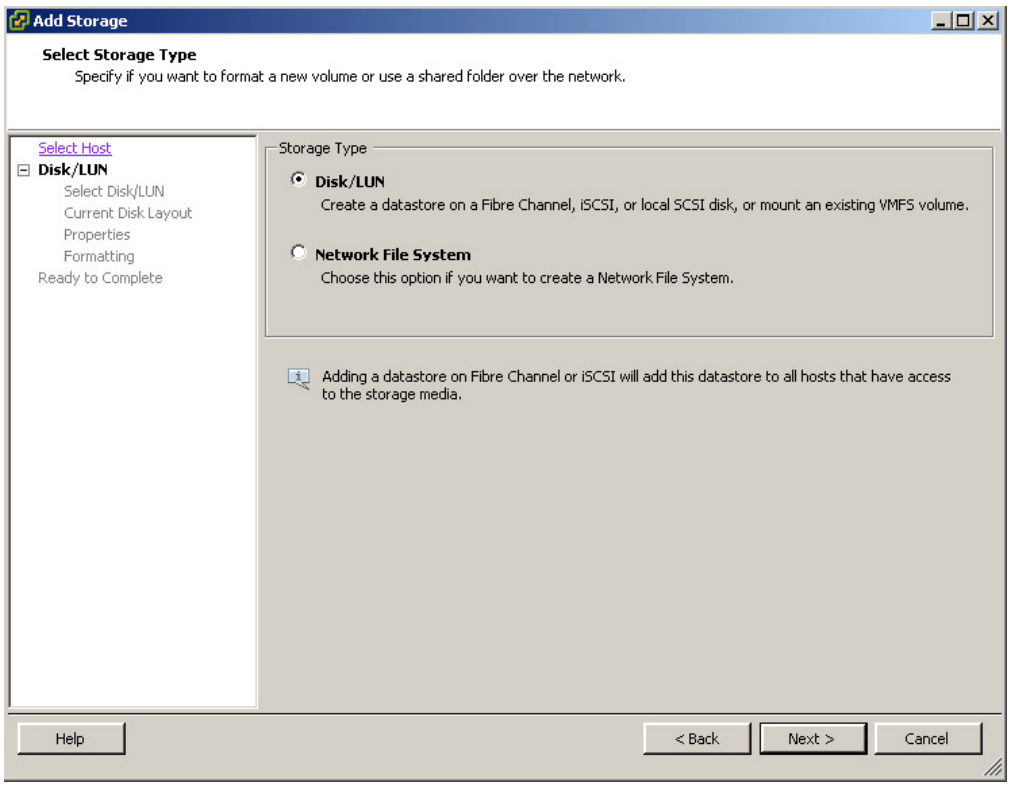



*Figure 84. Add Storage Wizard - Select Storage Type Panel*

3. Select **Disk/LUN**, and then click **Next**. The Select Disk/LUN panel is displayed.
4. From the list of available volumes (LUNs), select the volume on which you want to create the datastore, and then click **Next**.

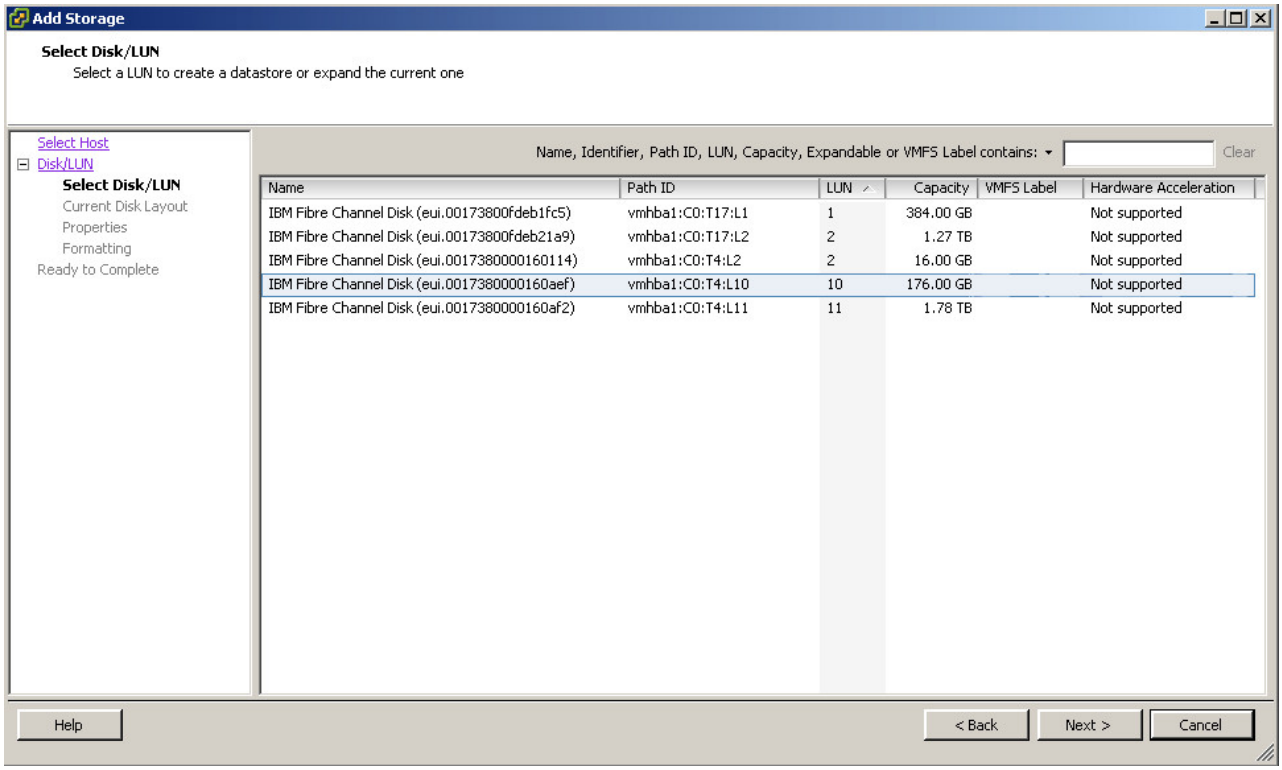



*Figure 85. Add Storage Wizard - Select Disk/LUN Panel*

The Current Disk Layout panel is displayed.

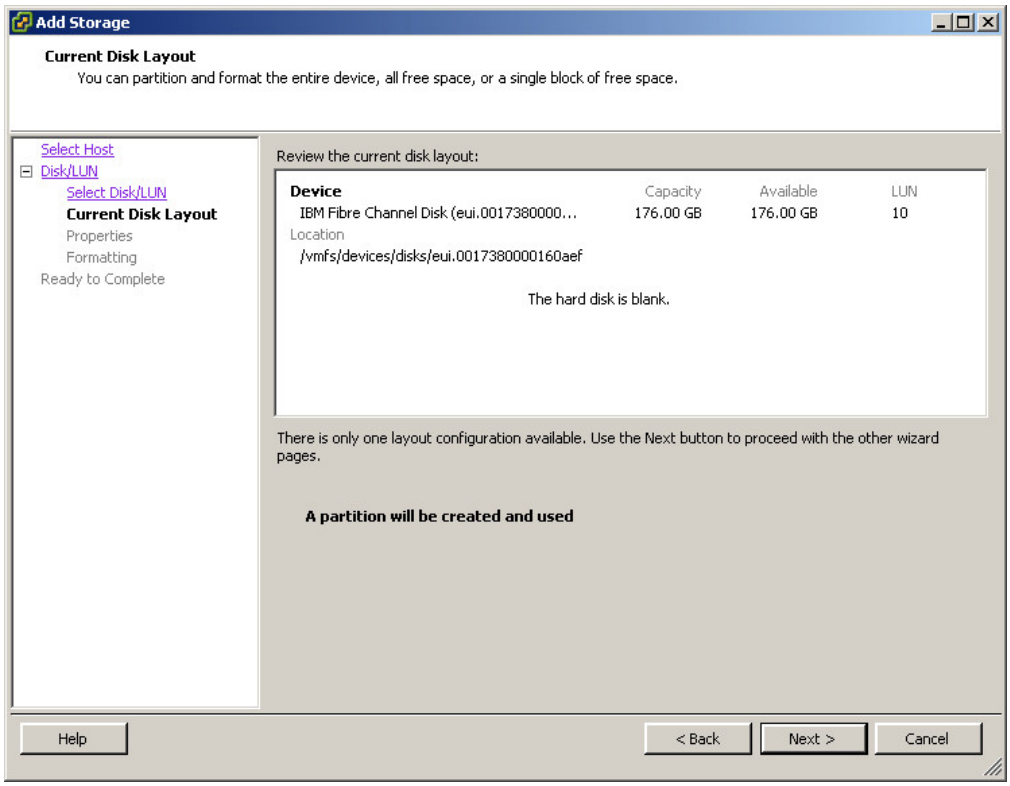



*Figure 86. Add Storage Wizard - Current Disk Layout Panel*

5. Click **Next**. The Properties panel is displayed.
6. Enter the name of the datastore that you want to create, and then click **Next**.

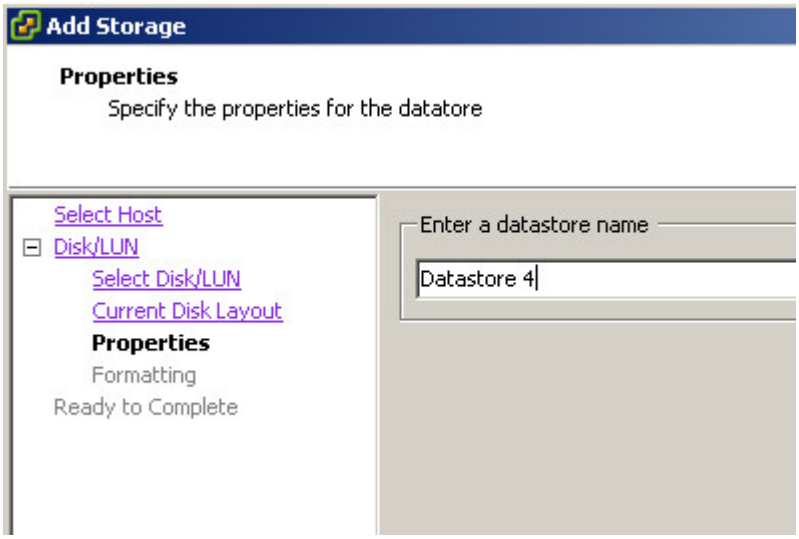



*Figure 87. Add Storage Wizard - Entering a datastore name*

The 'Disk/LUN – Formatting' panel is displayed.

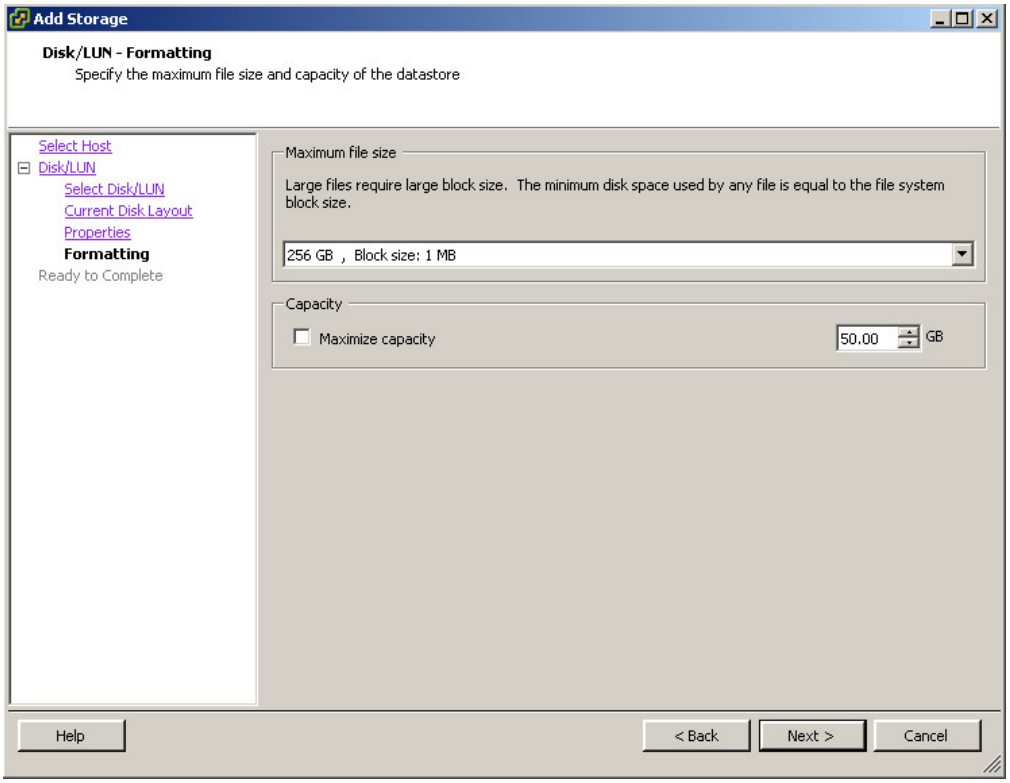



*Figure 88. Add Storage wizard – 'Disk/LUN – Formatting' panel*

7. From the drop-down list, select the maximum file size for the datastore, and specify any maximum capacity that you want to enforce on the datastore. Then, click **Next**. The Ready to Complete panel is displayed.

8. Click **Finish**. The new datastore is now created on the volume that you selected (in 4 on page 79 of this procedure).

# Creating VMware datastores in file shares

When the file shares that you have created are ready for use by datastores, you can start assigning the file shares to the new datastores that you create.

## About this task

**Note:** This section is relevant to Storwize V7000 Unified and SONAS only.

When the file shares that you have created are ready for use by datastores, you can start assigning the file shares to the new datastores that you create.

Use the vSphere Add Storage wizard to create datastores on file shares that you have created (for more information, see "Creating a new file share" on page 43).

## Procedure

**Note:** The following procedure applies to VMware vCenter version 4.0 or 4.1. For vCenter version 5.0 or later, refer to the VMware documentation.

1. Start the vSphere Add Storage wizard.
2. On the Select Host panel, select the ESX host to which file shares have been exported, and then click **Next**.
   The Select Storage Type panel is displayed.

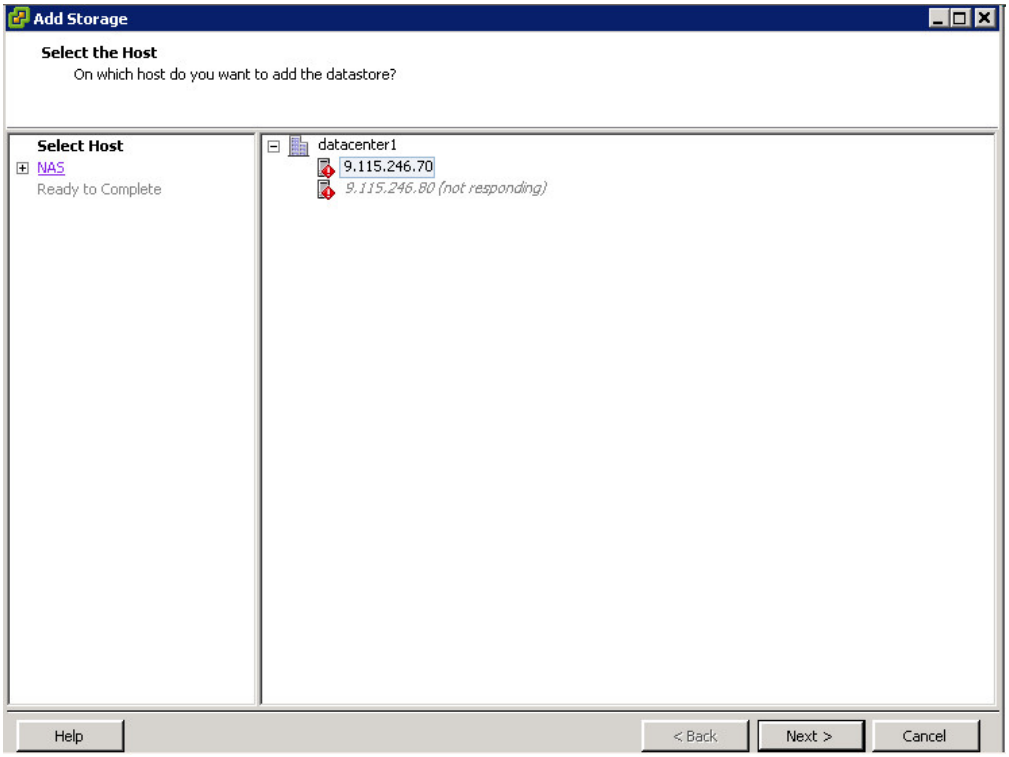



*Figure 89. Add Storage wizard – Select Host panel*

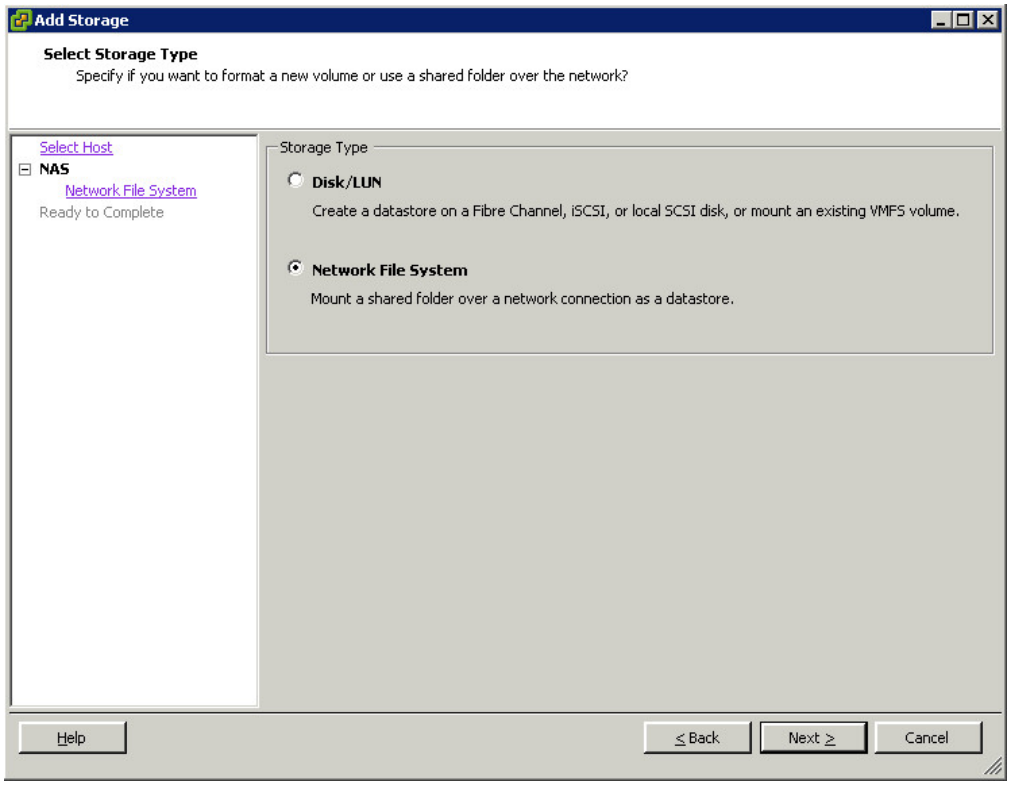



*Figure 90. Add Storage wizard – Select Storage Type panel*

3. Select Network File System, and then click Next. The Locate Network File System panel is displayed.

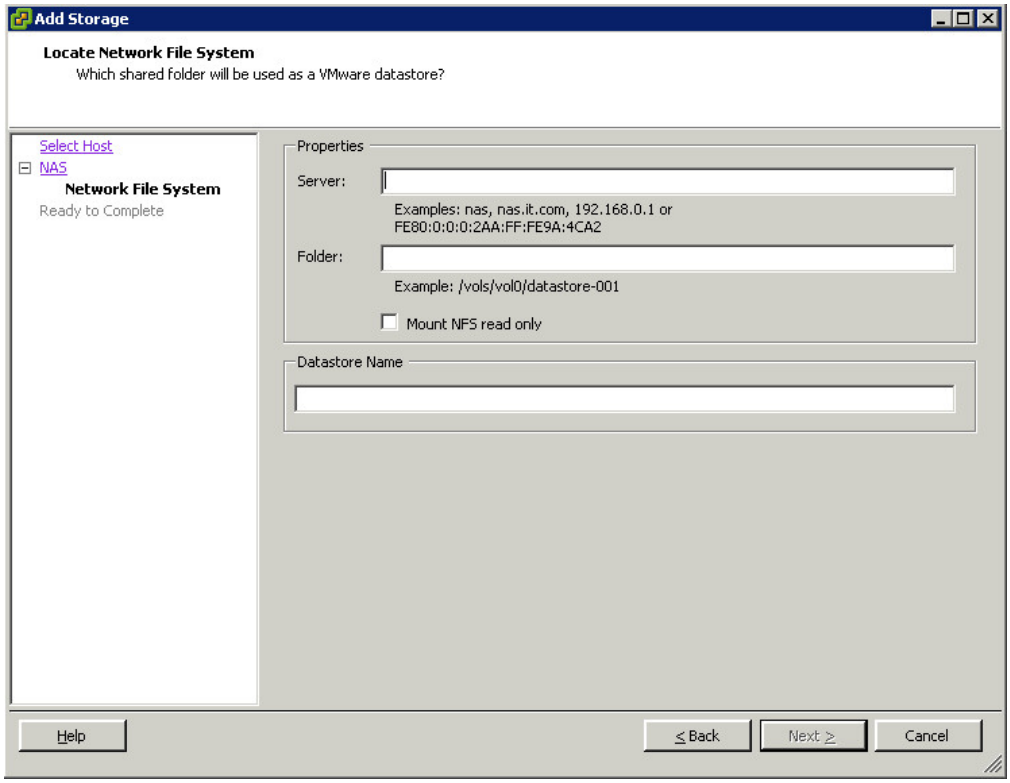
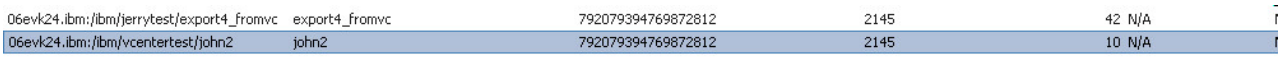



*Figure 91. Add Storage wizard – Entering a datastore name*

4. Enter the information required to locate the network file system – **Server** and **Folder**, from the File Share Details panel.



| | | | | | |
|---|---|---|---|---|---|
| 06evk24.ibm:/ibm/jerrytest/export4_fromvc | export4_fromvc | 792079394769872812 | 2145 | 42 | N/A |
| 06evk24.ibm:/ibm/vcentertest/john2 | john2 | 792079394769872812 | 2145 | 10 | N/A |

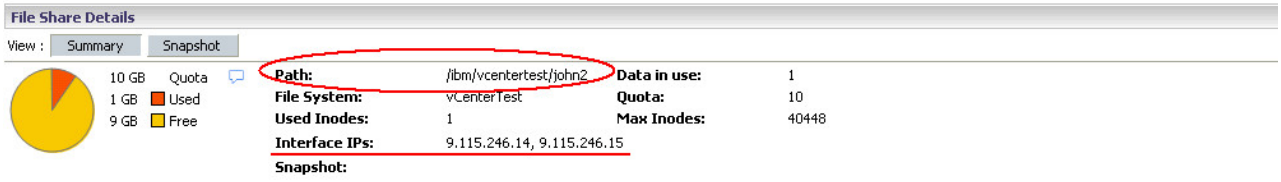



*Figure 92. Folder and Server Information for locating network file system*

- In **Server**, enter any of the interface IPs of the file share.
- In **Folder**, enter the path of your file share.

5. In **Datastore Name**, enter the name of the datastore that you want to create, and then click **Next**. The Ready to Complete panel is displayed.

6. Click **Finish**. The new datastore is now created on the file share that you selected (in 4 on page 84 of this procedure).

## Creating a virtual machine and connecting it to a datastore

After you have created the required datastores, you can assign each datastore to a virtual machine.

### About this task

Use the Create New Virtual Machine wizard to create virtual machines and select the datastores for these virtual machines.

### Procedure

**Note:** The following procedure applies to VMware vCenter version 4.0 or 4.1. For vCenter version 5.0 or later, and for more detailed information about virtual machine creation, refer to the VMware documentation.

1. Start the vSphere Create New Virtual Machine wizard.
2. On the Datastore panel, select the datastore in which to store the virtual machine files, and then click **Next**.
   The Create a Disk panel is displayed.

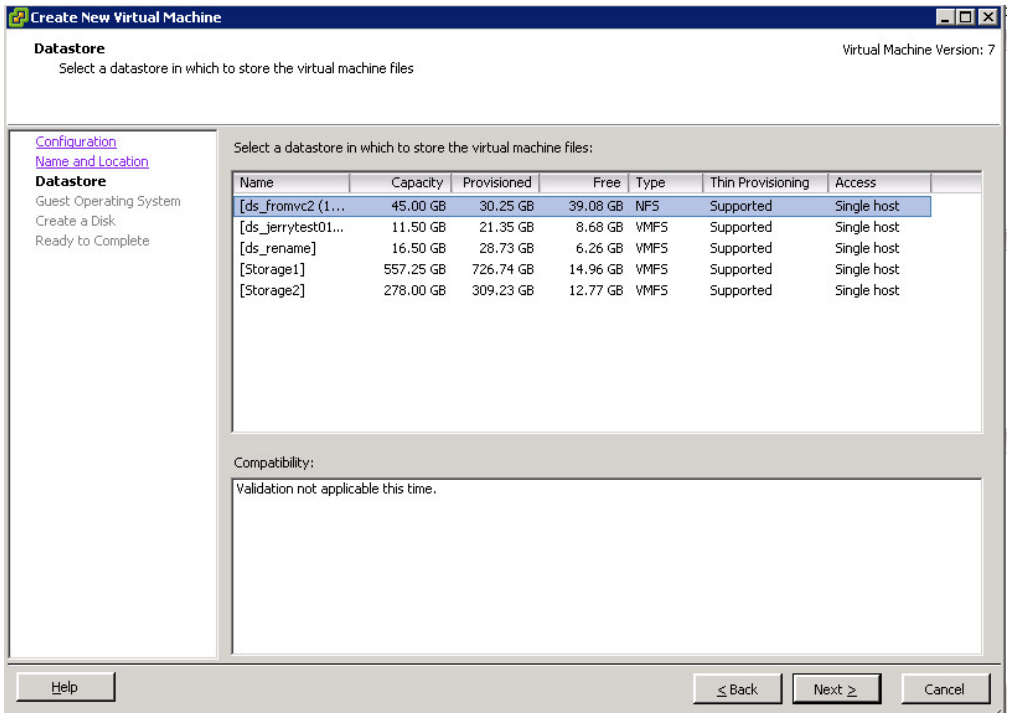



*Figure 93. Create New Virtual Machine wizard – Datastore selection panel*

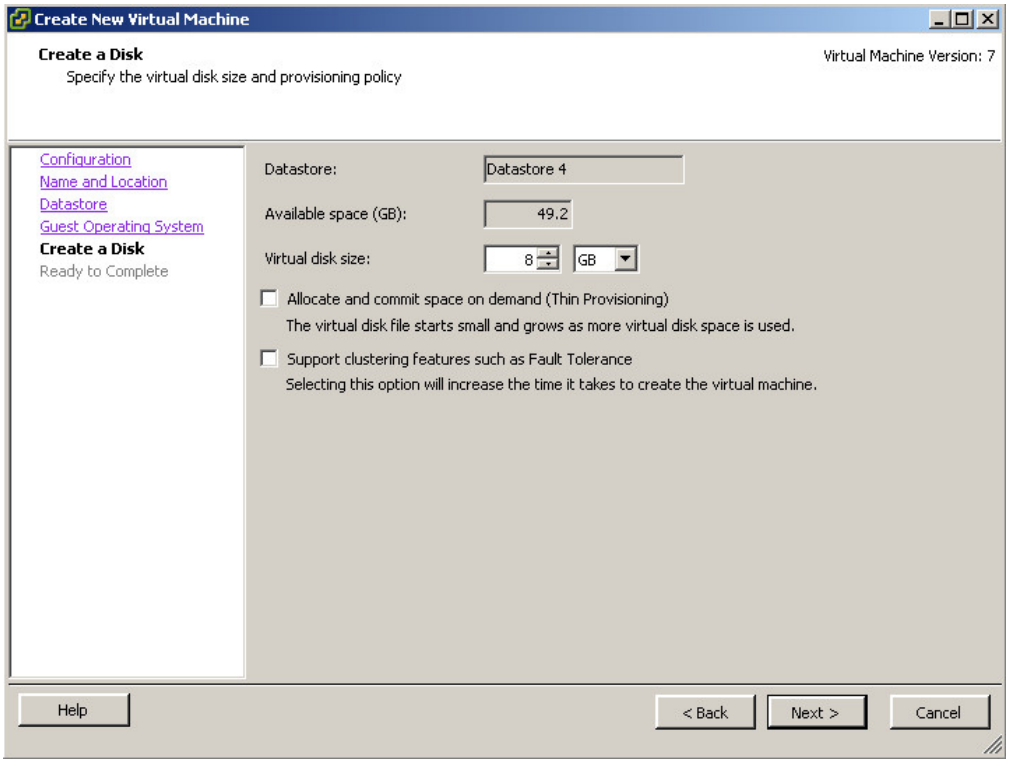



*Figure 94. Create New Virtual Machine wizard – Create a Disk panel*

3. Specify the **Virtual disk size**, select the provisioning policy, and then click **Next**. The Ready to Complete panel is displayed.
4. Click **Finish**. The new virtual machine is now created on the datastore that you selected (in 2 on page 85 of this procedure).

# Chapter 8. Monitoring and troubleshooting

The IBM Storage Management Console for VMware vCenter provides different monitoring capabilities, as described in the following sections.


- "Monitoring the status of recent tasks and triggered alarms"
- "Viewing the log file" on page 88
- "Event messages in vSphere" on page 88
- "Event messages in Windows Server" on page 91


## Monitoring the status of recent tasks and triggered alarms

As you work with the IBM Storage Management Console for VMware vCenter, use the vSphere Recent Tasks and Triggered Alarms monitoring panels to detect any possible error or malfunction in the storage usage.

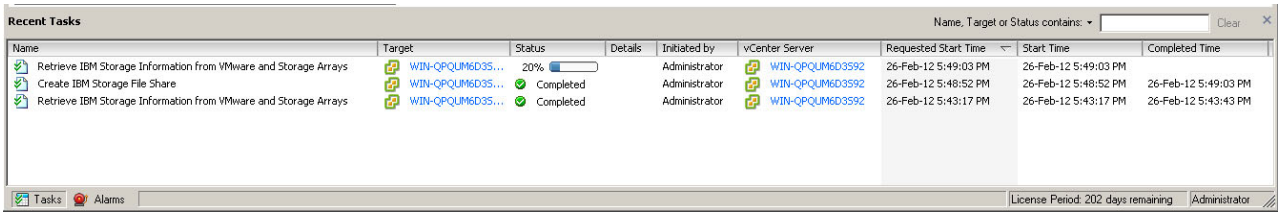



*Figure 95. vSphere Recent Tasks monitoring panel*

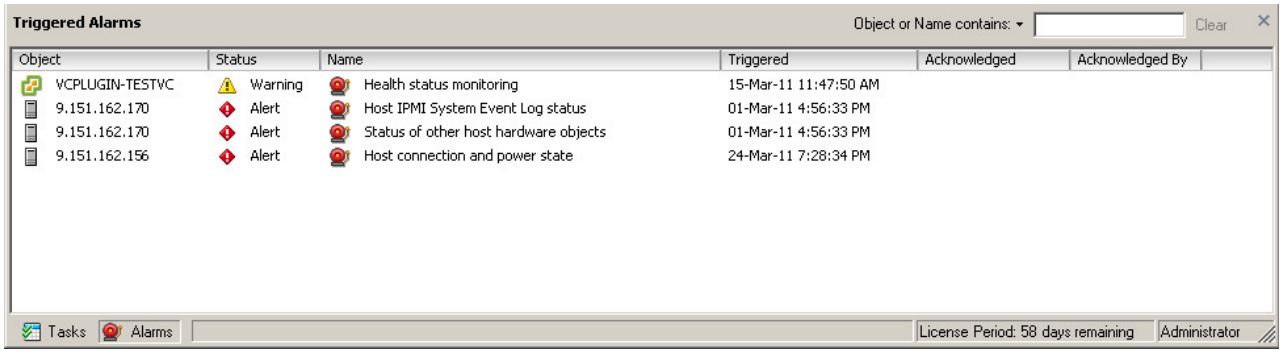



*Figure 96. vSphere Triggered Alarms monitoring panel*

For more information about the different messages that may be displayed in the monitoring panels, see "Event messages in vSphere" on page 88.

In addition, any event related to IBM storage processes or components appears in the Windows Application log (on the vCenter server), available through **Server Manager** > **Diagnostics** > **Windows Logs** > **Application**.

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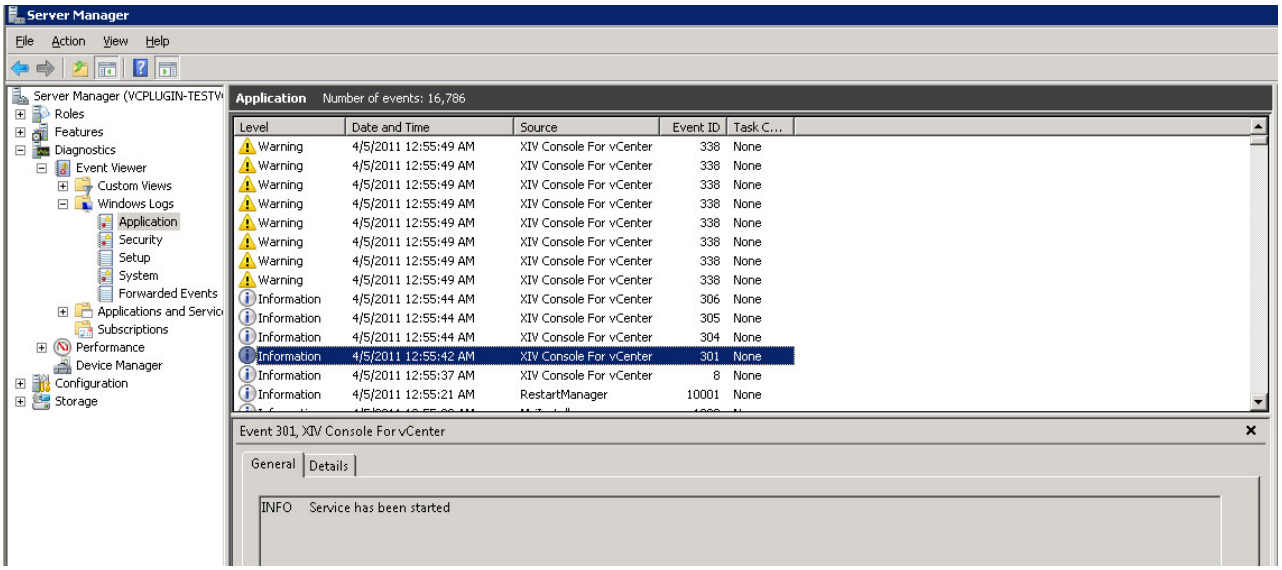


*Figure 97. Windows Application log*

For more information about the different message types and IDs, see "Event messages in Windows Server" on page 91.

## Viewing the log file

The IBM Storage Management Console log file is located at: `c:\windows\temp\ibm_console_for_vcenter.log`

You can view the contents of the file in any plain-text viewer or editor, such as Notepad.

**Note:** When the log file reaches a size of 4.76 MB, a new log file is created and named with a sequential number: `ibm_console_for_vcenter.log.1`, `ibm_console_for_vcenter.log.2`, and so on.

## Event messages in vSphere

This section summarizes the different event types that may be displayed on vSphere Client.

- "vSphere information event messages"
- "vSphere warning event messages" on page 89
- "vSphere error event messages" on page 90

**Note:** The events also appear in the event list of vCenter Server. The list is accessible from vSphere Client.

### vSphere information event messages

Information event messages are non-critical messages that notify you about the different performed operations.

The following table summarizes the information event messages that the IBM Storage Management Console may generate and display in the vSphere monitoring panels (see Figure 95 on page 87 and Figure 96 on page 87).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 4. vSphere information event messages*

| ID | Message | Description |
|---|---|---|
| 401 | Multipath policy for LUN < > has been modified from < > to < > | Indicates that the multipath policy of this LUN has been set |
| 402 | < > has been created | Indicates that a specific LUN was created |
| 403 | < > has been deleted | Indicates that a specific LUN was deleted |
| 404 | < > has been renamed to < > | Indicates that a specific LUN was renamed |
| 405 | < > has been resized, new size is < > | Indicates that a specific LUN was resized |
| 406 | < > has been relocated in the storage system, details: < > | Indicates that a specific LUN was relocated within the storage system |
| 407 | < > has been mapped to hosts: < > | Indicates that a specific LUN was mapped to a host |
| 408 | < > has been unmapped from hosts: < > | Indicates that a specific LUN was unmapped from a host |
| 409 | < > has been resized, expanded by < > GB | Indicates that a specific LUN was expanded |
| 410 | < > has been created | Indicates that a specific file share has been created |
| 411 | < > has been added export to hosts: < > | Indicates that a specific file share export has been added to specific host(s) |
| 412 | < > has been removed export from hosts: < > | Indicates that a specific file share export has been removed from specific host(s) |
| 413 | < > has been set quota | Indicates that a specific file share's quota has been set |
| 414 | < > has been deleted | Indicates that a specific file share has been deleted |

## vSphere warning event messages

Warning messages bring to your attention any condition that may result in an error or malfunction.

The following table summarizes the warning event messages that the IBM Storage Management Console may generate and display in the vSphere monitoring panels (see Figure 95 on page 87 and Figure 96 on page 87).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 5. vSphere warning event messages*

| ID | Messages | Description |
|---|---|---|
| 431 | Datastore Extent < > is inaccessible | This datastore extent cannot be probed. It might indicate that your host information is not updated. Rescan the host and refresh host information, and then click the **Update** link in the IBM Storage tab. |
| 432 | Virtual Machine < > has a Raw Mapping LUN filename < > with no matching LUN | Information could not be retrieved regarding a Raw mapped LUN. Click the **Update** link in the IBM Storage tab. |
| 433 | VPD information could not be found for LUN. Run the Rescan operation to fix this problem. | It might indicate that your host information is not updated. Rescan the host and refresh host information, and then click the **Update** link in the IBM Storage tab. |
| 434 | Storage Pool < >, which is attached to vCenter, has been deleted from Storage Array < >. Please work with the Storage Administrator to resolve this issue. Either recreate the Storage Pool in the Storage Array or detach it from vCenter. | The storage pool which is attached has been deleted from the storage. Contact the Storage administrator and either detach the storage pool or recreate it using the storage GUI. |
| 435 | Cannot retrieve Virtual Disk attributes for virtual machine < >. It may be inaccessible. Run the Rescan operation to fix this problem. | It might indicate that your host information is not updated. Rescan the host and refresh host information, and then click the **Update** link in the IBM Storage tab. |
| 436 | Path selection policy was not configured for volume < >. Use the LUN menu to configure a default path selection option for this volume. | Indicates that a multipath policy was not set for this volume. |
| 437 | File System < >, which is attached to vCenter, has been deleted from Storage Array < >. Please work with the Storage Administrator to resolve this issue. Either recreate the File System in the Storage Array or detach it from vCenter. | Indicates that the file system which is attached to vCenter has been deleted from the storage. Contact the Storage Administrator and either detach the file system or recreate it using the storage GUI. |

## vSphere error event messages

Error event messages are critical messages regarding errors or malfunctions that have occurred.

The following table summarizes the error event messages that the IBM Storage Management Console may generate and display in the vSphere monitoring panels (see Figure 95 on page 87 and Figure 96 on page 87).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 6. vSphere error event messages*

| ID | Message | Description |
|---|---|---|
| 461 | A general error has occurred: < > | Describes a general error that has occurred |
| 462 | Error while setting Multipath policy for < >: < >. | Describes an error that has occurred during a multipath policy setting |
| 463 | Failed while adding LUN on storage array < >: < > | LUN addition failure |
| 464 | Failed while deleting LUN on storage array < >: < > | LUN deletion failure |
| 465 | Failed while extending LUN on storage array < >: < > | LUN extent failure |
| 466 | Failed while moving LUN to another storage pool on storage array < >: < > | LUN move failure |
| 467 | Failed while mapping LUN on storage array < >: < > | LUN mapping failure |
| 468 | Failed while unmapping LUN on storage array < >: < > | LUN unmapping failure |
| 469 | Failed while renaming LUN on storage array < >: < > | LUN rename failure |
| 470 | Failed while trying to connect to storage array < >. Reason: < > | Describes an error which occurred while trying to connect to a storage array |
| 471 | Failed while creating File Share on storage array < >: < > | File Share create failure |
| 472 | Failed while adding Export to File Share on storage array < >: < > | File Share add export failure |
| 473 | Failed while removing Export to File Share on storage array < >: < > | File Share remove export failure |
| 474 | Failed while setting Quota to File Share on storage array < >: < > | File Share set quota failure |
| 475 | Failed while deleting File Share on storage array < >: < > | File Share deletion failure |

# Event messages in Windows Server

The IBM Storage Management Console for VMware vCenter generates event messages in the Windows Server application event log (located on the vCenter server), as detailed in the following sections.

- "Windows information event messages"
- "Windows warning event messages" on page 92
- "Windows error event messages" on page 94

## Windows information event messages

Information event messages are non-critical messages that notify you about the different performed operations.

The following table summarizes the information event messages that the IBM Storage Management Console may generate and display in the Windows Server application event log (see Figure 97 on page 88).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 7. Windows information event messages*

| ID | Message | Description |
|---|---|---|
| 301 | Service has started | IBM Storage plug-in service has started. |
| 302 | Service has stopped | IBM Storage plug-in service has stopped. |
| 303 | Service is stopping | Plug-in service is in the process of stopping. |
| 304 | Initializing cache maintainer | Cache maintainer initialization has started. |
| 305 | Cache maintainer has been initialized | Cache maintainer initialization has been completed. |
| 306 | Running cache maintainer | Cache maintainer is currently running. |
| 307 | Cache maintainer is stopping | Cache maintainer is in the process of stopping. |
| 308 | Multipath policy for LUN < > has been set to < > (was < >) | Multipath policy has been set. |
| 309 | IBM Management Console plug-in extension was unregistered | IBM Storage plug-in service has been unregistered. |

## Windows warning event messages

Warning messages bring to your attention any condition that may result in an error or malfunction.

The following table summarizes the warning event messages that the IBM Storage Management Console may generate and display in the Windows Server application event log (see Figure 97 on page 88).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 8. Windows warning event messages*. This table lists Window warning event messages.

| ID | Message | Description |
|---|---|---|
| 331 | Cache manager did not find any volume that matches extent < >. Please check your VMware environment for inaccessible datastore LUNs. | Volume not found |
| 332 | Datastore < > is of type < >, which is unsupported. Please notify IBM support. | Unsupported datastore type |
| 333 | Cache manager did not find any volume for Raw Mapping LUN with filename < >, which belongs to VM < >. | Volume has not been found by cache manager. |

*Table 8. Windows warning event messages (continued).* This table lists Window warning event messages.

| ID | Message | Description |
|---|---|---|
| 334 | Cache manager reported an error that might be temporary: < > | Temporary cache problem |
| 335 | Cache manager found a storage volume but cannot access its properties.<br><br>Volume serial = < ><br><br>The 'Rescan' operation from the host configuration tab may resolve this problem. | Storage volume cannot be accessed. |
| 336 | Timeout occurred while waiting for Cache update.<br><br>It appears that multiple updates to the Cache were initiated and did not finish within the timeout.<br><br>If this persists, please notify IBM support. | Cache timeout problem |
| 337 | Cache manager failed to connect to IBM storage system < >.<br><br>Reason: < ><br><br>Update the system properties using the IBM Storage link. | Connection failure due to a specified reason |
| 339 | Storage Pool < >, which is attached to vCenter, has been removed from Storage Array < >.<br><br>Please work with the storage administrator to resolve this issue. Either recreate the storage pool in the storage array or detach it from vCenter. | Storage pool is not attached. |
| 340 | Failed to match host HBA to a SCSI LUN topology. Searching interface adapter < > for host ID < >. | HBA does not match the SCSI LUN topology. |
| 341 | Cannot retrieve virtual disk attributes for virtual machine < >. It may be inaccessible. | Virtual disk attributes are not available. |
| 342 | Failed to keep registry keys during uninstallation. If you are upgrading, registry keys will be overridden by the defaults. | Failed to keep registry values |
| 343 | Failed to restore registry keys during uninstallation. If you are upgrading, registry keys will be overridden by the defaults. | Failed to restore registry values |
| 344 | Failed to keep SSH keys during unconfigure. If you are upgrading, you must provide the SSH keys for SVC / Storwize V7000 again. | Failed to keep SSH keys |

*Table 8. Windows warning event messages (continued).* This table lists Window warning event messages.

| ID | Message | Description |
|---|---|---|
| 345 | Failed to restore SSH keys from the backup. If you are upgrading, you must provide the SSH keys for SVC / Storwize V7000 again. | Failed to restore SSH keys |
| 346 | The cache manager found more than one LUN that matches SCSI LUN < >. Topology information is not available for this LUN.<br><br>To resolve this problem, perform rescanning for host: < >. | Duplicate volumes |
| 347 | Cache manager found a file share but cannot access its properties. File share path = < >.<br><br>The 'Rescan' operation from Host configuration tab might fix this problem. | Unrecognized file share |
| 348 | File System < >, which is attached to vCenter, has been deleted from Storage Array <>.Please work with the Storage Administrator to resolve this issue. Either recreate the File System in the Storage Array or detach it from vCenter. | File System has been deleted. |
| 349 | Rescan operation for host <> has reached timeout of < >. This may result in incomplete operation depending on the rescan results. | Rescan host has reached timeout. |

## Windows error event messages

Error event messages are critical messages regarding errors or malfunctions that have occurred.

The following table summarizes the error event messages that the IBM Storage Management Console may generate and display in the Windows Server application event log (see Figure 97 on page 88).

**Note:** "< >" stands for a dynamic content parameter that changes based on the context in which it appears.

*Table 9. Windows error event messages*

| ID | Message | Description |
|---|---|---|
| 361 | An error has occurred while updating the cache: < > | Cache error |

*Table 9. Windows error event messages (continued)*

| ID | Message | Description |
|---|---|---|
| 362 | The IBM Storage Management Console failed to unregister from vCenter server with message: < >.<br><br>You can remove the plug-in manually by using the extension manager, which is available in the `mob` directory of your vCenter Server DNS name. For example: `https://vcenter1main/mob`. | Plug-in removal failure |
| 363 | The IBM Storage Management Console failed to remove the service with message: < > | Service removal failure |
| 364 | The IBM Storage Management Console failed to register plug-in with message: < > | Plug-in registration failure |
| 365 | The IBM Storage Management Console failed to login to the vCenter Server with current credentials.<br><br>Please run the Configuration Wizard in order to change username and password. | Login failure due to credentials |
| 366 | The IBM Storage Management Console failed to set multipath policy for < >: < > | Multipath setting failure |
| 367 | The IBM Storage Management Console failed in LUN operation: < > | LUN operation failure |
| 368 | The IBM Storage Management Console failed while trying to use keyring: < > | Keyring error |
| 369 | IBM Storage Management Console for VMware vCenter failed in File Share operation: < > | File Share operation error |

## Disabling and enabling the IBM Storage plug-in

Whenever required, you can disable the IBM Storage Management Console from the vSphere Plug-in Manager.

In the Plug-in Manager, right-click the row of IBM Storage Management Console for VMware vCenter, and then click **Disable** to disable the functionality of the plug-in.

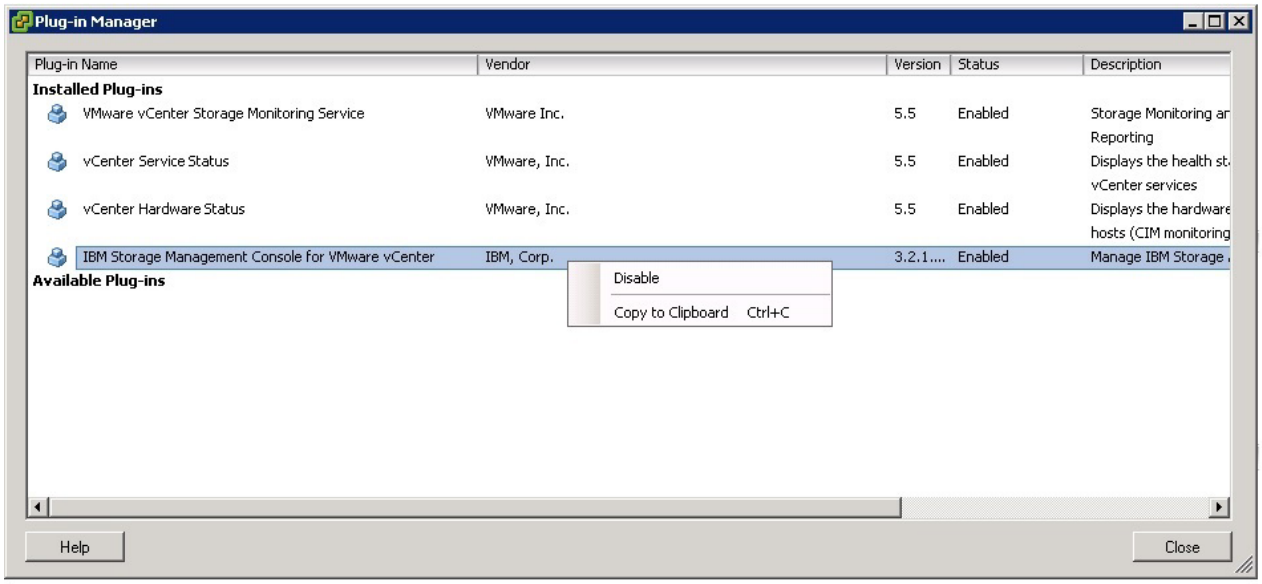


*Figure 98. vSphere Plug-in Manager – Disable option*

When you want to restore the IBM Storage Management Console plug-in functionary, right-click its row and then click **Enable**.

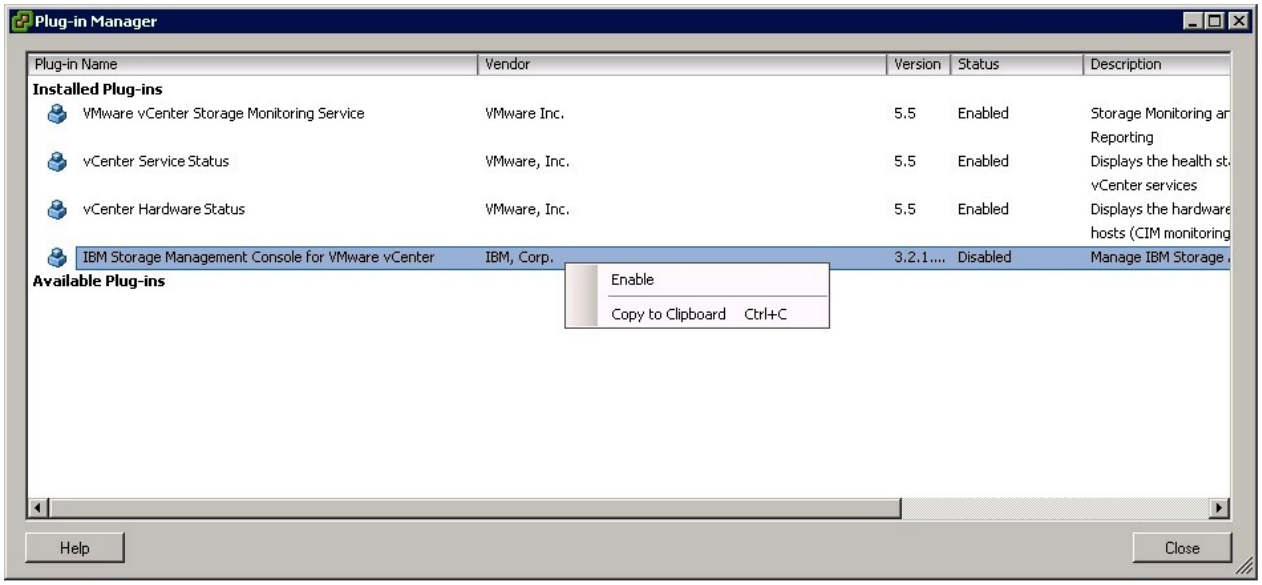


*Figure 99. vSphere Plug-in Manager – Enable option*

## Resolving miscellaneous issues

For up-to-date information about known issues and possible workarounds, refer to the latest release notes of the IBM Storage Management Console for VMware vCenter.

You can find the latest release notes on the IBM Storage Host Software Solutions Information Center (publib.boulder.ibm.com/infocenter/strhosts/ic) or on the IBM Fix Central (www.ibm.com/support/fixcentral).

# Chapter 9. Best Practices

Refer to the general guidance and best practices that are described in the following sections.

## Handling datastores

For best performance of VMware datastores:

- Create each datastore on a separate storage volume.
- If you use snapshots/mirroring for volumes, place all Datastore Extents volumes (the building block LUNs of a datastore) in a consistency group (defined by using the storage system GUI or CLI).

## Handling ESX hosts

For the best performance of ESX hosts that use XIV-based volumes, define all ESX hosts within a cluster as cluster hosts on the IBM XIV storage system as well.

Following this practice prevents situations in which a storage volume is mapped to different ESX hosts in a cluster using different LUN numbers, thus making this LUN unusable.

## Distributing volumes evenly for DS8000 systems

DS8000 storage systems have two rank groups, 0 and 1, each managed by a single server. In addition, each DS8000 extent pool is based on one rank group.

Accordingly, it is recommended to spread volumes (LUNs) evenly across the DS8000 servers. Spreading the volumes equally on the extent pools of rank groups 0 and 1 balances the workload across the DS8000 systems.

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