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As part of its effort to continuously improve and enhance the performance and capabilities of the EMC product line, EMC periodically releases revisions of its hardware and software. Therefore, some functions described in this document may not be supported by all revisions of the software and hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If a Virtual Storage Integrator feature does not function properly or does not function as described in this guide, please contact the EMC Customer Support Center for assistance.

**Audience**

This guide is part of the EMC Virtual Storage Integrator for vSphere Client documentation set and is intended for use by VMware administrators and storage administrators during installation, system setup, and routine operations.

Storage administrators working with Virtual Storage Integrator must be proficient in the use of the following products:

- **VMware products:**
  - vSphere Client 4.0/4.1, with VMware vCenter Server 4.0, VMware ESX 4.0, and VMware ESXi 4.0 as installed

- **EMC Symmetrix, CLARiiON, or Celerra storage arrays, as per your Virtual Storage Integrator supported product version and the following applicable software:**
  - Solutions Enabler (SYMCLI/SYMAPI)
  - EMC Symmetrix Remote Data Facility (SRDF)
  - EMC PowerPath/VE, if installed
The following documentation is part of the EMC Virtual Storage Integrator for vSphere Client documentation set, and is required for Virtual Storage Integrator depending on your installed feature:

- EMC VSI for VMware vSphere: Storage Viewer Version 4.0 Product Guide and Release Notes
- EMC VSI for VMware vSphere: Path Management Version 4.0 Product Guide and Release Notes
- EMC VSI for VMware vSphere: Symmetrix SRA Utilities Version 4.0 Product Guide and Release Notes

The following EMC documentation contains information that may be helpful in a Virtual Storage Integrator environment and are available on the EMC Powerlink website:

**EMC Solutions Enabler:**
- EMC Solutions Enabler Symmetrix Array Controls CLI Product Guide
- EMC Solutions Enabler Symmetrix Array Management CLI Product Guide
- EMC Solutions Enabler Symmetrix SRDF Family CLI Product Guide
- EMC Solutions Enabler Symmetrix TimeFinder Family CLI Product Guide
- EMC Solutions Enabler Installation Guide

**EMC Symmetrix array:**
- Using EMC Symmetrix Storage in VMware Virtual Infrastructure Environments TechBook
- Storage Pool Management TechBook Solutions Guide
- Using VMware vSphere with EMC Symmetrix Storage white paper
- Enabling SPC-2 Compliancy on EMC Symmetrix DMX Devices Connected to VMware VI3 Environments white paper

**EMC ControlCenter:**
- EMC ControlCenter Planning and Installation Guide
- Symmetrix SRDF Host Component Product Guide
EMC PowerPath:
- *EMC PowerPath Product Guide*

Fibre Channel:
- *Symmetrix Fibre Channel Product Guide*

Conventions used in this document

EMC uses the following conventions for special notices.

**Note:** A note presents information that is important, but not hazard-related.

**CAUTION**

A caution contains information essential to avoid data loss or damage to the system or equipment. The caution may apply to hardware or software.

**IMPORTANT**

An important notice contains information essential to operation of the software. The important notice applies only to software.
Typographical conventions

EMC uses the following type style conventions in this document:

Normal: Used in running (nonprocedural) text for:
- Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)
- Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, filenames, functions, utilities
- URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, notifications

Bold: Used in running (nonprocedural) text for:
- Names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system call, man pages

Used in procedures for:
- Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus)
- What user specifically selects, clicks, presses, or types

Italic: Used in all text (including procedures) for:
- Full titles of publications referenced in text
- Emphasis (for example a new term)
- Variables

Courier: Used for:
- System output, such as an error message or script
- URLs, complete paths, filenames, prompts, and command syntax.

Courier bold: Used for:
- Specific user input (such as commands)

Courier italic: Used in procedures for:
- Variables on command line
- User input variables

< > Angle brackets enclose parameter or variable values supplied by the user

[ ] Square brackets enclose optional values

| Vertical bar indicates alternate selections - the bar means “or”

{ } Braces indicate content that you must specify (that is, x or y or z)

... Ellipses indicate nonessential information omitted from the example
Where to get help

EMC support, product, and licensing information can be obtained as follows.

**Product information** — For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to the EMC Powerlink website (registration required) at:

http://Powerlink.EMC.com

**Technical support** — For technical support, go to EMC Customer Service on Powerlink. To open a service request through Powerlink, you must have a valid support agreement. Please contact your EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Please send your opinion of this document to:

techpub_comments@EMC.com
This chapter provides a high-level overview of the EMC Virtual Storage Integrator for VMware vSphere.

**Important:** EMC recommends reading this chapter in its entirety before installing and configuring the Virtual Storage Integrator for vSphere Client plug-in.

- Virtual Storage Integrator for VMware vSphere overview........ 14
- Storage Pool Management overview .............................................. 16
- Software requirements ...................................................................... 19
EMC Virtual Storage Integrator (VSI) for VMware vSphere version 4.0 is a plug-in to VMware’s vSphere Client that provides a single management interface used for managing EMC storage within the vSphere environment. Features can be added and removed from VSI independently, providing flexibility for customizing VSI user environments. Features are managed using the VSI Feature Manager. VSI provides a unified user experience, allowing each of the features to be updated independently, and new features to be introduced rapidly in response to changing customer requirements.

Examples of features available for VSI are Storage Viewer (SV), Path Management, Storage Pool Management (SPM), Symmetrix SRA Utilities, and Unified Storage Management.

The SV feature extends the vSphere Client to facilitate the discovery and identification of EMC Symmetrix, CLARiiON, Celerra, and VPLEX storage devices that are allocated to VMware ESX/ESXi hosts and virtual machines. SV presents the underlying storage details to the virtual datacenter administrator, merging the data of several different storage mapping tools into a few seamless vSphere Client views.

The Path Management feature for VMware Native Multipathing and PowerPath/VE provides a mechanism for changing the multipath policy for groups of LUNs based on storage class and virtualization object.

The SPM feature simplifies the provisioning of Symmetrix VMAX storage by a VMware administrator. SPM allows a VMware administrator to allocate storage as a resource using Symmetrix Virtual Pools for ESX Servers, Clusters, and Resource Pools.

The Symmetrix SRA Utilities feature helps users to more efficiently manage vCenter Site Recovery Manager (SRM) configurations in Symmetrix Remote Data Facility (RDF) environments. It provides SRM diagnostic tools that help users to easily identify configuration errors. SRA Utilities allows users to view and create consistency groups and perform storage failback operations to restore a workload site back to the protection site after being failed over to a recovery site.
The Unified Storage Management VSI feature provides array-based storage management and provisioning for CLARiiON and Celerra storage arrays, and allows for virtual machine deduplication, compression, cloning, and extending storage for Celerra arrays.
Storage Pool Management overview

The EMC Storage Pool Management (SPM) feature simplifies the task of provisioning storage in VMware environments. In Virtual Computing Environments, IT is offered as a service, user requirements change dynamically, and the underlying infrastructure is transparent to the end user. For example, in a VMware environment, Virtual Machines (VM) can be provisioned in minutes to meet the demands of the users. As such, any underlying infrastructure, for example, storage that supports the new VM needs to be provisioned quickly to meet the IT Service Level Agreement of the user. EMC Virtual Storage Integrator (VSI) and Symmetrix Management Console (SMC), together manage storage as a shared resource pool that accelerates storage provisioning, so the IT service is available to the end-user faster.

Using SMC’s Storage Pool Management feature, an administrator creates a Virtualization Domain that corresponds to a vCenter instance with physical pooled storage defined by drive type and RAID protection type. A Virtualization Domain is a set of boundaries defined by a storage administrator to limit the physical Symmetrix array storage (thin pools) in which a VMware user can create LUNs. Each thin pool contains storage of a particular type, defined by the Storage Type with which they are labeled. A Storage Type is simply a label for a particular type of storage. It is defined by a storage administrator during SPM configuration and is utilized by a VMware user when provisioning storage.

This pooled storage resource is made accessible through the VSI, enabling the VMware administrator to allocate as needed to the VMware resources, similar to the way that CPU and memory resources are subdivided. With the combination of VSI and SMC, storage resources are provisioned dynamically and the storage administrator is able to meet the dynamic requirements of the end user faster. SPM simplifies the storage provisioning process through integration with Symmetrix VMAX hardware, SMC, and the Virtual Storage Integrator for vSphere Client plug-in software. Figure 1 on page 17 provides a depiction of VSI with SPM feature components. Virtual Provisioning capability is required on the Symmetrix VMAX storage array. SMC provides the mechanism through which a storage administrator creates a Virtualization Domain that corresponds to a vCenter instance, and then adds physical pooled storage to it according to each pool’s Storage Type.
How VSI allocates storage

The Virtual Storage Integrator for vSphere Client plug-in enables the VMware administrator to allocate storage directly from the available Storage Types to the desired VMware resources, including data centers, ESX Servers, clusters, and resource pools.

Note: Detailed instructions for performing storage administrator functions are documented in the SMC version 7.2 online help and the Storage Pool Management TechBook Solutions Guide.

Figure 1  Virtual Storage Integrator with Storage Pool Management feature components
A client connection must be registered with the SMC server. “Configuring Storage Pool Management” on page 30 describes how to register a SPM server connection and configure the SPM feature for storage provisioning with Virtual Storage Integrator.

“Overview of roles for Storage Pool Management” on page 38 provides an overview of the roles and responsibilities of the Symmetrix VMAX storage administrator and the VMware administrator in the context of using the SPM feature.
Software requirements

This section describes the software requirements for Virtual Storage Integrator for VMware vSphere version 4.0.

VMware vSphere Client 4.0

Virtual Storage Integrator for VMware vSphere version 4.0 requires VMware vSphere Client V4.0 Update 1 or later. The VMware software must be installed prior to installing VSI features.

EMC Symmetrix Management Console

EMC Symmetrix Management Console version 7.1.2 or later is required for Storage Pool Management functionality. It is installed on the SMC Server in the storage environment and configured to communicate with SPM clients. SPM functionality with Virtual Storage Integrator is optional and SMC software is not a requirement for installing other VSI features.

Operating Systems

Virtual Storage Integrator for VMware vSphere is supported on the same operating systems supported by the VMware vSphere Client. Currently, this includes only Microsoft Windows operating systems. The VMware Infrastructure Compatibility Matrixes with the complete list of supported operating systems can be found at the VMware website:

http://www.vmware.com

Note: For x64 operating systems, all installed software components will be x86 images running in compatibility mode.
About EMC Virtual Storage Integrator for VMware vSphere

VMware vCenter Server

Typically, the vSphere Client is used to connect to a vCenter Server which manages the entire virtual datacenter, including any number of ESX or ESXi hosts. Virtual Storage Integrator for VMware vSphere version 4.0 is supported with VMware vCenter Server 4.0 Update 1 or later.

Attempting to connect to a version of VMware vCenter Server earlier than this results in changes to the vSphere Client that VSI does not support.

VMware ESX and ESXi

As mentioned previously, the vSphere Client is typically used to connect to a vCenter Server, however, it is possible and sometimes necessary to connect directly to an ESX/ESXi host. In this case, Virtual Storage Integrator for VMware vSphere version 4.0 is supported with VMware ESX/ESXi Server with VMware ESX 4.0 Update 1 or later.

Attempting to connect to a version of VMware ESX or ESXi other than this results in changes to the vSphere Client that VSI does not support.

**Note:** It is possible for VSI to operate with versions of VMware ESX or ESXi other than those mentioned above by using a VMware vCenter Server version 4.0/4.1 to manage those ESX/ESXi hosts. In this case, the vSphere Client must always connect to the vCenter Server and never connect directly to the ESX/ESXi host. Reference the VMware vCenter Server documentation for information on the supported versions of VMware ESX and ESXi.
This chapter explains how to install, enable, disable, and uninstall the Virtual Storage Integrator for VMware vSphere plug-in features.

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- Installing VSI features ................................................................. 23
- Enabling Virtual Storage Integrator ............................................ 24
- Disabling Virtual Storage Integrator .......................................... 24
- Uninstalling Virtual Storage Integrator ..................................... 25
### Installation overview

This chapter describes how to install Virtual Storage Integrator (VSI) for VMware vSphere version 4.0 plug-in features, enable/disable the VSI plug-in, uninstall the VSI for VMware vSphere version 4.0, and disable/uninstall separate VSI features using the Feature Manager.

### Before you begin

Before you begin to install a VSI feature, read the following installation requirements and considerations:

**VSI for VMware vSphere**

VSI for VMware vSphere version 4.0 is a plug-in to VMware vCenter that provides a single management interface used for managing EMC storage within the vSphere environment. VSI features can be added and removed from VSI independently, providing flexibility for customizing VSI user environments. Features install separately and contain the complete VSI plug-in framework for using that feature. Features can be managed using the VSI Feature Manager.

**Install VMware vSphere Client 4.0**

VMware vSphere Client version 4.0, VMware vSphere Client version 4.0 Update 1, or version 4.1 must be installed on the same host as VSI. No other version of VMware vSphere Client is supported with this version of VSI. VSI will not install if the VMware vSphere Client is not already installed.
Installing VSI features

After you have installed the VMware vSphere Client, you can install VSI for VMware vSphere features.

1. Download the desired VSI for VMware vSphere feature .exe file from the support link on Powerlink at:
   Home > Support > Software Downloads and Licensing > Downloads V> Virtual Storage Integrator

2. Run the setup file that you downloaded from Powerlink. The installation wizard copies all of the necessary files.

   Each feature installs separately and contains all of the necessary components for that feature.

   If vSphere Client was open during the install, then it must be closed and re-opened in order for VSI to be enabled. No configuration or input is required during the installation other than accepting the prompts to move forward with the install. The installation directory cannot be changed due to the fact that the vSphere Client requires the plug-in files to be placed in a specific location.

Upgrading

When VSI version 3.x or later is installed, you can upgrade the software to a newer version using the install wizard. The upgrade retains all of the custom settings and options files, as well as any log files for Storage Viewer and the Solutions Enabler server.

IMPORTANT

After upgrading VSI version 3.x, it is possible that certain features will be removed and must be re-installed. For example, if you were previously using the Storage Pool Management (SPM) functionality in VSI 3.x and you installed the VSI 4.0 Storage Viewer feature, you will lose the SPM functionality. You will need to install the VSI 4.0 SPM feature separately to restore that functionality.
Enabling Virtual Storage Integrator

1. To enable the VSI plug-in, launch VMware vSphere Client and from the top menu select Plugins > Manage Plugins. Locate the EMC Virtual Storage Integrator in the list of available plug-ins. Right-click the EMC Virtual Storage Integrator listing and select Enabled. The status will change from Disabled to Enabled. The VSI loads automatically. This process does not require a restart of vSphere Client.

2. Select Close to exit the Plug-in Manager.

Disabling Virtual Storage Integrator

If you no longer want to use the VSI plug-in, but do not want to un-install it, you can simply disable it.

1. To disable the plug-in, launch vSphere Client and from the top menu select Plugins > Manage Plugins. Locate the EMC Virtual Storage Integrator in the list of available plug-ins. Right-click the EMC Virtual Storage Integrator listing and select Disable. The status will change from Enabled to Disabled. This process does not require a restart of vSphere Client.

2. Select Close to exit the Plug-in Manager.
Uninstalling Virtual Storage Integrator

VSI can be uninstalled by using the Windows Add or Remove Programs utility. This will remove the VSI framework as well as the VSI feature. Before uninstalling VSI, exit VMware vSphere Client in all user sessions on the client host.

To uninstall VSI using the Add or Remove Programs utility, follow these steps:

1. Open the Add or Remove Programs utility in the Control Panel by selecting Start > Settings > Control Panel.
2. When the list of currently installed programs loads, select EMC Virtual Storage Integrator for VMware vSphere.

   **Note:** Using the Add/Remove Programs to uninstall the VSI plug-in removes all installed VSI features at once. No individual selection is possible.

3. Select Change/Remove and follow the dialogs presented.

Uninstalling the Storage Viewer Feature

The VSI feature can be repaired or removed by running the installer .exe that was downloaded from PowerLink. If the remove option is selected, this will remove the VSI feature only. The VSI framework remains installed and listed under Add\Remove Programs.
Using VSI Feature Manager

After enabling the VSI plug-in, click the **EMC VSI** icon located in the Solutions and Applications menu to open the VSI home view. Select **Feature Manager** from the Settings tree menu. Installed VSI features display in a list. **Figure 2** shows an example.

The feature status automatically displays as enabled. To disable or uninstall a particular feature, use the right click menu and select **Disable** or **Uninstall**.

Disabled features remain fully installed and can be enabled for later use. Uninstalled features are permanently removed and must be reinstalled separately.

To enable a disabled feature at a later time, use the Feature Manager right-click menu again and select **Enable**.

---

**Figure 2** VSI Feature Manager

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Vendor</th>
<th>Version</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Path Management</strong></td>
<td>EMC Corporation</td>
<td>4.0.0.143</td>
<td>Enabled</td>
<td>A VSI Feature that multi-path settings</td>
</tr>
<tr>
<td><strong>Storage Pool</strong></td>
<td>EMC Corporation</td>
<td>4.0.0.87</td>
<td>Enabled</td>
<td>A VSI Feature that storage pools</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Storage Viewer</strong></td>
<td></td>
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<tr>
<td><strong>Symmetric SRA</strong></td>
<td></td>
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<tr>
<td><strong>Utilities</strong></td>
<td></td>
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**Figure 2** VSI Feature Manager

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<td><strong>Storage Viewer</strong></td>
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<tr>
<td><strong>Symmetric SRA</strong></td>
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<td><strong>Utilities</strong></td>
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This chapter explains the configuration options available for Virtual Storage Integrator for VMware vSphere.

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- Configuring Storage Pool Management ................................................................. 30
VSI for vSphere Client provides a feature logging function for configuring log levels and storing logs. Select **Logging** from the Settings tree menu to display logging configuration options. Figure 3 shows an example. The various VSI log files are located on disk at:

```
$APPDATA\%\EMC\Virtual Storage Integrator\vSphere4\Logs
```

![General/Logging](image)

**Setting logging options**

The General/Logging display provides the following options:

- Select a **Logger** from the Loggers drop down box for the desired VSI loaded feature.

- Log files are stored by date and can be selected using the Log Files drop down box.

- Select the **Auto-Load** icon to enable/disable auto-load. When enabled a log file will be monitored and loaded into the viewer as it is modified.
Select the **Scroll Lock** icon to enable/disable scroll lock. When enabled, the scroll lock feature causes the log viewer to not automatically scroll to the bottom of the log file whenever it is appended.

All loggers can be set to one of several different log levels:

- **Off** — No log entries will be written.
- **Fatal** — Only fatal errors will be written.
- **Error** — Only error messages will be written.
- **Warn** — Warning and error messages will be written.
- **Info** — All information including error and warning messages will be written. This is the default value.
- **Debug** — Informative messages as well as errors and warnings will be written for any general operations that occur.
Configuring Storage Pool Management

This section describes how to configure the Storage Pool Management feature for storage provisioning with VSI.

Registering a SPM server connection

All communication between VSI and Symmetrix Management Console (SMC) is performed securely over HTTPS. Clients to SMC servers must register with each server using a Client ID and password, which is provided to them by an SMC administrator. The VSI registration is created on a per user and per host basis. Therefore, if a currently registered user attempts to communicate with SMC from another host, or if a new user tries to communicate with SMC from the same host, a new registration will be required with SMC. Registration in this manner ensures trust that allows for messages to be digitally signed by VSI.

Before you can access the assigned pooled storage, a connection to an SMC server must be established by using the Register with Server connection wizard. This wizard enables you to register a new SMC server for use with SPM.

To register an SMC server:

1. Click the EMC VSI icon to access the Features navigation panel as shown in Figure 4 on page 31. Select the Storage Pool Management Servers link, then click the blue Register New Server... link located in the right side of the window to open the wizard.

**Note:** For the Register New Server... link to be enabled, the VMware user must be granted the following permissions in the vCenter: Task.Create and Task.Update.
2. The first page (SPM Server settings) of the wizard prompts you to enter the following connection settings:

- **Hostname/IP Address** — The hostname or IP address of the SMC server to which you want to connect.
- **Secure Port** — The port number must be the secure (HTTPS) communication port configured for the SMC server by the storage administrator. Values must be in the range 1-65535.
- **Client ID** — The Client ID is provided by a storage administrator and may not contain the forward slash (/) character. The client ID field is used to manage certificates for communicating with SMC servers.
- **Password** — The password must be entered for a Client ID and should be provided by the storage administrator.
- **Certificate Name** — The certificate name is used to select a certificate from the Microsoft Windows certificate store to ensure the integrity of all messages with the SMC server. The value provided is used to retrieve a certificate from the certificate store, where the **Subject > CN** field contains the same value. If no certificate with this value exists, a self-signed certificate will be generated automatically.
If you have a certificate, such as one from a trusted certificate authority (CA), you may input the CN value and that certificate will be used instead of the auto-generated certificate. The certificate name may not contain the forward slash (/) character.

3. Click the **Test Connectivity** button to test connectivity to the server address. While connecting, a processing indicator appears below the server list and displays an indicator upon success. Upon error, an indicator will display below the server list along with a message describing the problem. The connection made does not test the registration with the server and is simply a test to ensure that the server is available and listening at the address and port provided. If the connectivity test fails, the **Next** button is disabled until some of the connection settings have been modified.

4. The final page (**Ready to Complete**) of the wizard summarizes the SPM Server settings inputs. Click **Finish** to register the plug-in with the new SMC server.

---

**Editing SPM server settings**

Registered SPM server settings can be edited. Select a **registered server** and right-click to select the **Edit** context menu. When clicked, a wizard opens allowing you to edit connection details for the selected SMC server. The wizard is similar to the wizard described in “Registering a SPM server connection” on page 30.

The previously registered Address, Port, Client ID, and Certificate Name fields display for the selected server. Modifying these fields and completing the wizard steps re-registers the client with the server using the new settings. The password field is not populated because it is not persisted by the client. You must enter the password to re-register with the server.

---

**Note:** For the context menu to be enabled, the VMware user must be granted the following permissions on the vCenter: Task.Create and Task.Update.
Removing a SPM server

Registered SPM servers can be removed. Select a registered server and right-click to select the Remove context menu. When clicked, the selected server is removed from the list and a warning message displays to verify the change.

Testing SPM server connectivity

The same functionality of the Test Connectivity button as described in “Registering a SPM server connection” on page 30 is available by right-clicking on a registered server and selecting the Test Connectivity context menu.

When clicked, a test connection is made to the selected server to test connectivity to the server address. While connecting, a processing indicator appears below the server list and displays an indicator upon success. Upon error, an indicator will display below the server list along with a message describing the problem. The connection made does not test the registration with the server, it ensures that the server is available and listening at the address and port provided.

Refreshing SPM server configuration information

To refresh SPM server information, click the blue Refresh Configuration link, located in the lower Tasks box of the Storage Pool Management\Servers window, as shown in Figure 4 on page 31.

When clicked, an operation begins to update each of the registered servers with the current VMware inventory hierarchy environment. Refreshing the SPM server configuration should also be done when adopting LUNs to repair an SPM configuration that has been corrupted or lost, or to put an existing VMware configuration under SPM control. When LUNs are adopted, the storage capacity is added to the total and used capacity of the Virtualization Domain, keeping the available capacity of the Virtualization Domain the same.

Note: For this functionality to execute, the VMware user must be granted the following permissions on the vCenter: Task.Create, and Task.Update.
vCenter server permissions for SPM

Storage Pool Management functionality requires certain vCenter permissions to be granted. Custom tasks can only be enabled when the vSphere client is connected to a vCenter Server. Connecting directly to an ESX host disables all SPM functionality. Custom tasks can only be enabled when the VMware user is granted Extension.Register, Extension.Unregister, Task.Create, and Task.Update permissions on the vCenter. A role containing these permissions should be set for the VMware user at the vCenter level and be set to propagate. If these permissions are not set, all SPM functionality is disabled.

Note: Specific SPM functionality task permissions are also noted throughout this guide in the pertinent sections.

Exporting VMware environment details

To aid SMC administrators in configuring SMC to share storage with a vCenter environment, the VMware administrator must provide details about the vCenter environment. This data includes the name of the vCenter server, a vCenter GUID, and Fibre Channel port information. To simplify this process, the VMware administrator can export a file containing this information and forward it to the SMC administrator.

To export a file containing your VMware environment details, click the blue Export Environment link located in the lower Tasks box of the Storage Pool Management\Servers window, as shown in Figure 4 on page 31.

When clicked, this enables the export of various VMware environmental details to a file. A save file dialog box opens allowing you to choose the file format (XML or text) and the location for the exported file. This file can be used by a storage administrator to acquire vCenter information and masking details for creating Virtualization Domains within SMC.
This chapter explains how to use the Virtual Storage Integrator for VMware vSphere plug-in feature software with the VMware vSphere client interface.

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◆ Storage Pool Management............................................................. 38
◆ Provisioning available storage from SMC servers ...................... 44
Getting started with VSI

Use the EMC Virtual Storage Integrator (VSI) for VMware vSphere to connect to either a vCenter Server or directly to an ESX/ESXi host. Open the VMware vSphere Client and click the **EMC VSI** icon located in the Solutions and Applications menu to open the VSI plug-in. Select **Feature Manager** from the Settings tree menu. All installed VSI features display in a list. Figure 5 shows an example with multiple features installed and enabled. “Using VSI Feature Manager” on page 26 provides information on using Feature Manager to disable or uninstall features.

**Figure 5** VSI plug-in features

- **Settings** — This panel provides access to the Feature Manager function, which can be used to manage the separate plug-in features. It also provides access to logging information for each installed feature. “VSI logging” on page 28 provides information for using the VSI logging function.
Getting started with VSI

- **Features** — With Storage Viewer installed, this panel lists all of the storage arrays that VSI has knowledge of, and allows for the discovery of new arrays and the deletion of previously discovered arrays.

Using the VMware vSphere Client interface

The VSI for vSphere Client provides context-sensitive storage information depending on the object that is selected from the navigation tree located in the left-hand pane. If an ESX/ESXi host is selected from the left-hand pane, as shown in Figure 6, information for the host displays in the right-hand pane. Different information appears when a virtual machine is selected in the left-hand pane.

![Figure 6 Opening an ESX or ESXi host view](image)

If a vCenter server is selected from the navigation tree, EMC storage information displays for the Assigned Pool storage. “Viewing available storage from SMC Servers” on page 40 provides more information. Also, if a Datacenter is selected from the navigation tree, EMC Storage information displays for the Storage Types.
Storage Pool Management

The Storage Pool Management feature allows you to view and allocate Symmetrix VMAX virtual pooled storage for data centers, ESX Servers, clusters, and resource pools.

The Symmetrix VMAX storage administrator must have previously created and assigned pooled storage to a Virtualization Domain that corresponds to a vCenter instance. The VMware administrator must have previously registered an SPM connection with the Symmetrix Management Console Server.

The Virtualization Domains contain Assigned Pools of storage. The assigned pool storage is made available in predetermined amounts by Storage Type, according to the storage disk type and RAID level.

Overview of roles for Storage Pool Management

Automated storage provisioning using the Storage Pool Management feature requires the joint cooperation of the Symmetrix VMAX storage administrator and the VMware administrator. This section defines the roles and responsibilities of each person in the context of using the SPM feature.

◆ **Storage administrator** — The Symmetrix VMAX storage administrator is primarily responsible for creating Virtualization Domains that correspond to a vCenter instance in the Symmetrix Management Console server and assigning the physical pooled storage to the Virtualization Domains. This person must have administrator and security administrator permissions on the Symmetrix VMAX storage array. The storage administrator is responsible for performing the following functions using the SMC software:
  
  • Creating masking views, including: initiator, port, and storage groups to VMware clusters.
  • Setting up authorizations on the thin pools and storage groups in the views.
  • Creating and deleting Virtualization Domains.
  • Creating and deleting Storage Types.
  • Assigning thin pools and previously created views to Virtualization Domains.
• Setting provisioning policies for Virtualization Domains. Policies include the maximum number of LUNS created from the Virtualization Domain and the minimum and maximum LUN size.

• Creation of thin devices.

• Assigning a Virtualization Domain to a vCenter server.

Note: Detailed instructions for performing the above storage administrator functions are documented in the SMC online help and the Storage Pool Management TechBook Solutions Guide.

◆ VMware administrator — The VMware administrator is primarily responsible for allocating storage to VMware objects including data centers, clusters, and resource pools from the Assigned Pool storage and the available Storage Types.

Note: Within the hierarchy of a vCenter environment, additional VMware users and administrators may have additional administrative privileges within their assigned data center, cluster, or resource pool. For brevity, all VMware user responsibilities are described in the context of the VMware Administrator role.

The VMware administrator is responsible for performing the following functions using the VSI for vSphere Client software:

• Registering a SPM server connection to the SMC Server
• Exporting VMware environment details
• Adding datastores
• Updating storage adapters
• Configuring storage allocations
• Creating, deleting and expanding storage for raw device mappings (RDMs) on a virtual machine
• Creating, deleting, and expanding VMware file system datastores for a cluster

Note: VMware administrators are restricted to assigning storage only to those VMware objects to which they have VMware authorization to administer and are restricted to provisioning storage only to those virtual machines to which they have VMware authorization to configure.
Viewing available storage from SMC Servers

The Assigned Pools view is accessed by selecting a **vCenter Server** in the navigation tree and then the **EMC VSI** tab on the right. Clicking **Assigned Pools** in the **Features** navigation panel provides details about the storage that is currently available from the registered SMC servers, as shown in Figure 7.

Assigned Pools are listed for each of the registered SMC servers and storage arrays to which you have access. Clicking the **Refresh** button refreshes the list of Assigned Pools entries. The Total Assigned Pools displayed in the top right-hand corner of the window shows the total number of Assigned Pools to which you have access.

The Assigned Pools window presents the following column information about the SMC servers and storage arrays:

- **Server** — Shows the network address of the SMC server providing the storage.
- **Array** — Shows the name of the storage array providing the storage.
- **Product** — Shows the model of the storage array providing the storage (for example, Symmetrix, CLARiiON, or Celerra arrays).
Storage Types

Selecting an Assigned Pool in the Assigned Pool window displays a list of all available Storage Types in the window below. The Total Storage Types displayed in the right corner of the Storage Types window shows the total number of Storage Types available within the selected Assigned Pool.

The Storage Types window presents the following column information about the SMC servers and storage arrays:

- **Name** — Shows the name (label) assigned to the Storage Type. If there are multiple Storage Types of the same name, the names include the storage array ID.
- **Available** — Shows the available capacity of remaining storage for that type.
- **Capacity** — Shows the total capacity of storage for that type.
- **Description** — Shows the description of the Storage Type as defined by the storage administrator.

Viewing Storage Type details

To access the Storage Types view, select a **Datacenter, Cluster, ESX/ESXi Host, or Resource Pool** in the navigation tree and then the **EMC VSI** tab on the right. Click **Storage Types** in the **Storage** navigation panel to view details about the storage that is currently available from the registered SMC servers, as shown in Figure 8 on page 42.

EMC context menus

When a datacenter, cluster, host, or resource pool is right-clicked in the navigation tree of the vCenter inventory, the available EMC Context menu displays showing available options. Depending on the object selected, available menu options such as expansion and deletion of LUNs and storage allocations configuration, etc. display.
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Figure 8 Storage Types view

Click the Refresh button to refresh the list of Storage Types entries. The Total Storage Types displayed in the top right corner of the window shows the total number of Storage Types to which you have access. Storage Types window column information is described in “Storage Types” on page 41.

Select a Storage Type in the Storage Types window to display additional details about the Storage Type in the window below. The following information is displayed in the Storage Type Details window:

- **Server** — Shows the name of the server that is providing the selected Storage Type.
- **Description** — Shows the description of the Storage Type.
- **Capacity** pie chart — Displays a graphic depicting the total capacity and current usage of the Storage Type.
- **Usage list** — Shows all of the sub-allocations of the Storage Type to VMware entities and displays all LUNs provisioned from this Storage Type that are currently in use. The following column information displays in the Usage list:
• **Name** — Shows sub-allocations and LUNs provisioned from the selected Storage Type. If an item is a sub-allocation to a VMware entity, the name of the entity displays along with an icon depicting the VMware entity type. If the item is a LUN, the array ID and device name displays along with an icon indicating that the item is a LUN.

• **Capacity** — Shows the capacity of the sub-allocation that has been allocated to a VMware entity. Shows the capacity of a LUN that has been provisioned from this Storage Type. Meta devices.

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**Meta devices**

Meta devices are supported with SPM when using SMC version 7.2 or higher and a Symmetrix VMAX array running Enginuity version 5875 or higher. Devices larger than ~240 GB will automatically be configured as a metavolume on the Symmetrix array. To determine the number of meta members, SPM takes the requested device size, divides it by ~240GB and then adds one to it if there is a remainder. Therefore, SPM rounds up to the nearest whole number. For example, if a request is made for an 800 GB device, that would be 800 divided by 240 which is 3.33 and rounding up to the nearest whole number would mean there would be 4 meta members, each 200 GB.

**Note:** The Autometa feature is not supported with Storage Pool Management.
Provisioning available storage from SMC servers

The Storage Pool Management feature simplifies the complicated task of provisioning storage in VMware virtualized server environments through integration with Symmetrix VMAX hardware and Symmetrix Management Console software. This feature provides the VMware administrator with the capability to provision storage directly to the desired VMware resources.

This allows VMware administrators to provision from the Assigned Pools of storage within the vSphere Client environment to which a Virtualization Domain exists, similar to the way that CPU and memory resources are subdivided. Virtual Provisioning capability is required on the Symmetrix VMAX storage array and the storage administrator is responsible for building the Virtualization Domains of assigned pool storage for allocation in the SMC server. The VMware administrator must register an SPM connection with the SMC server.

Allocating storage for VMware objects

Storage can be allocated for a Datacenter, Cluster, Host, or Resource Pool using the Allocate Storage wizard. The wizard allows you to allocate portions of storage from a particular Storage Type to a VMware object. The Allocate Storage wizard is accessed by using the right-click menu from an object located in the vCenter inventory navigation tree.

For the Configure Storage Allocations context menu to be enabled, you must be granted the following permissions for VMware objects:

- **Datacenter** — Task.Create, Task.Update, and Host.Inventory.AddStandaloneHost.
Follow these instructions to configure storage allocations to a VMware object:

1. Right-click on a **VMware object** (Datacenter, Cluster, Host, or Resource Pool) in the vCenter inventory navigation tree and scroll down to EMC and select **Configure Storage Allocations**.... The first page (**Configure Storage Type Allocations**) of the Allocate Storage wizard appears.

2. Enter the amount of each available Storage Type that you would like allocated to the selected entity. **Figure 9** shows an example. Enter the desired amount and click **Next**. The final page (**Ready to Complete**) of the Allocate Storage wizard appears prompting you to review your selected options.

   **Note:** At any point in the Allocate Storage wizard, click **Back** to return to a previous step.

By default, Storage Types are set to 0 capacity. However, if the entity already has storage allocated from a Storage Type, the current capacity will be populated. The capacity entry control restricts capacity values to the maximum available and sets a minimum if storage is in use by a lower item in the inventory, such as a LUN or a sub-allocation. If you enter an invalid capacity, it automatically corrects to the nearest valid value and displays a warning.

3. Click **Finish** to allocate the storage and close the wizard.
Adding a datastore for a cluster or host

Datastores can be added for a cluster or host using the Add Datastore wizard. Use the wizard to configure a new LUN to be provisioned and mapped to the cluster or host as a VMFS datastore. Access the Add Datastore wizard by using the right-click menu from the cluster or host located in the vCenter inventory navigation tree.

For this context menu to be enabled, you require the following permissions on the Cluster: Task.Create, Task.Update, Host.Inventory.EditCluster, and Host.Config.Storage (for each Host that is a member of the Cluster).

Note: For clustered ESX Servers, the Add Datastore context menu is disabled on the host and is instead enabled on the cluster.

Follow these instructions to add a VMFS datastore to a cluster or a host:

1. Right-click on a VMware object (cluster or host) in the vCenter inventory navigation tree and scroll down to EMC and select Add Datastore.... The first page (Select a Storage Type) of the Add Datastore wizard appears.

2. Select from the available Storage Types. Figure 10 shows an example. Select the Storage Type to create the new LUN from and click Next. The next page (Select a Capacity) of the Add Datastore wizard appears.

Note: At any point in the Add Datastore wizard, click Back to return to a previous step.

![Add Datastore](image)

Figure 10 Add Datastore, Select a Storage Type
3. Select a precreated capacity or enter a custom capacity for the new LUN. Figure 11 shows an example. Specify the desired capacity and click **Next**. The next page (**Properties**) of the Add Datastore wizard appears.

![Add Datastore, Select a Capacity](image)

**Figure 11** Add Datastore, Select a Capacity

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**Note:** If no precreated capacities are defined, the Precreated drop down box is disabled.

When configuring custom capacities, a capacity control is enforced to restrict capacity values based on the amount available, the maximum LUN size policy, and the minimum LUN size policy. If you enter an invalid capacity, it automatically corrects to the nearest valid value and a warning displays. If a policy is enabled to only allow provisioning of precreated capacities, the custom capacity options are disabled.

If the version of the SPM server doesn’t support meta devices, to support the creation of Datastores with capacities greater than the maximum LUN size, you can provide a capacity that generates multiple LUNs and use each LUN as a Datastore extent.

---

**Note:** The minimum extent size for a VMFS Datastore is 1.2 GB, therefore, you are prevented from selecting values less than 1.2 GB.
4. Enter a name for the new Datastore in the Properties wizard page. Enter a unique name and click Next. The next wizard page (Formatting) of the Add Datastore wizard appears.

5. The entered name is validated against the list of existing datastores to ensure that it is unique. Choose the block size for the datastore from the drop down box. The next wizard page (Ready to Complete) of the Add Datastore wizard appears.

6. Review your selected options and click Finish to create the Datastore and close the wizard. The capacity value indicates the number of LUNs to be provisioned if more than one is required.
Expanding a Datastore

Expand a Datastore by using the Expand Datastore wizard. Use the various wizards in this option to simply expand a datastore, expand a datastore with metas, or extend a datastore with a new extent. Access the Expand Datastore wizard by using the right-click menu from the datastore located in the vCenter inventory navigation tree. Figure 12 shows an example.

Figure 12 Datastore context menu

When Expand Datastore is selected, SPM logic determines what type of extension is possible, if expanding the capacity of a LUN is possible, the appropriate wizard is launched to expand. The following conditions govern the extension:

- The wizard supports expanding LUNs using Symmetrix meta devices and is available on VMAX array running a minimum of 5875 microcode and managed by an SMC Server running a minimum version of 7.2.
- The wizard supports expanding LUNs in three states: Standalone LUNs mapped to an ESX; LUNs mapped to a VM as an RDM; a LUN backing a VMFS datastore which consists of a single extent.

Selecting Expand Datastore includes the following submenus:

- *Expand Datastore context menu* — This context menu, when clicked, opens the Expand LUN wizard for the Datastore wizard to configure how to increase the Datastore capacity.
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- **Expand LUN Wizard** — This wizard launches with a wait dialog, while determining if the LUN backing a datastore can be expanded, and then allows the user to configure a larger capacity based on the LUN’s usage and the expansion options available.

To expand a Datastore:

1. Right-click on a **Datastore** in the vCenter inventory navigation tree and scroll down to **EMC** and select **Expand Datastore**... The first page (**Select a New Capacity**) of the Expand Datastore wizard appears.

2. Select the new capacity from the available Storage type shown. The LUN will be expanded using the same storage type from which it was provisioned. The capacity control restricts capacity values based on the amount available, the maximum LUN size policy, and the maximum size of a datastore extent. If invalid capacities are entered, it will be auto-corrected to the nearest valid value and display a warning. Click **Next**. **Figure 13** shows an example. The next page (**Ready to Complete**) of the Expand Datastore wizard appears.

   **Note:** At any point in the Expand Datastore wizard, click **Back** to return to a previous step.

![Expand Datastore](image)

**Figure 13** Expand Datastore wizard

3. The final page summarizes the options selected. Click **Finish** to expand the LUN.
When expanding a datastore extent, the VMFS filesystem will be expanded to utilize the new capacity of the LUN. After determining what type of extension is possible, if expanding the capacity of the datastore extent is not possible, the Extend Datastore wizard will be displayed that allowing you to configure a new LUN to use as a VMFS extent to the datastore. “Extend datastore with new extent” on page 52 provides instructions.

Expanding a Datastore with metas

When the Expand Datastore option is selected, SPM logic determines what type of extension is possible. If expanding a datastore with metas is possible, the appropriate wizard is launched to expand a datastore with metas. Similar to the Expand datastore wizard described above, follow the steps in the wizard to expand the datastore with metas.

After the validations are done, the number of devices that are required for the extension is calculated. If more than one device is needed, then these devices are created from scratch. If only one device is needed, then the virtualization domain precreation policies are examined. If the extension capacity matches one of these policies, then the thin pool is searched for an un-used SPM device. If none is found then a new device is created. If the current device is already a meta then it is simply extended with the new device(s), otherwise it is formed into a new meta with it as the meta head.
Extend datastore with new extent

When the Expand Datastore option is selected, SPM logic determines what type of extension is possible. If expanding a datastore with a new extent is possible, the Extend Datastore wizard is launched. Use the wizard to provision a new LUN and add it to the selected Datastore as a new extent.

For this context menu to be enabled, you require the following permissions on the vCenter: Task.Create, Task.Update, and Host.Config.Storage (for each Host that mounts the Datastore).

Note: This feature is not supported on datastores that reside on local ESX storage.

To extend a Datastore:

1. Right-click on a Datastore in the vCenter inventory navigation tree and scroll down to EMC and select Expand Datastore.... The first page (Select a Storage Type) of the Extend Datastore wizard appears.

2. Select from the available Storage Types. Figure 14 on page 52 shows an example. Select the Storage Type to create the new LUN from and click Next. The next page (Select a New Capacity) of the Extend Datastore wizard appears.

   Note: At any point in the Extend Datastore wizard, click Back to return to a previous step.

![Figure 14 Extend Datastore, Select a Storage Type](image)
Note: Select a precreated capacity or enter a custom capacity for the LUN. Figure 15 on page 53 shows an example. Specify the desired capacity and click **Next**. The final page (**Ready to Complete**) of the Extend Datastore wizard appears. When extending a datastore, it is not possible to select a precreated device that is a metavolume.

![Extend Datastore, Select the New Capacity](image)

**Figure 15** Extend Datastore, Select the New Capacity

Note: If no precreated capacities are defined, the Precreated drop down box is disabled.

When configuring custom capacities, a capacity control is enforced to restrict capacity values based on the amount available, the maximum LUN size policy, and the minimum LUN size policy. If you enter an invalid capacity, it automatically corrects to the nearest valid value and a warning displays. If a policy is enabled that only allows provisioning of precreated capacities, the custom capacity options are disabled.

If the version of the SPM server doesn’t support meta devices, to support the creation of Datastores with capacities greater than the maximum LUN size, you can provide a capacity that generates multiple LUNs and use each LUN as a Datastore extent.

Note: The minimum extent size for a VMFS Datastore is 1.2 GB, therefore, you are prevented from selecting values less than 1.2 GB.
3. Review your selected options. The capacity value indicates the number of LUNs to be provisioned if more than one is required. Review the selected options and click **Finish** to extend the Datastore and close the wizard.

---

### Removing a Datastore

You can remove a Datastore from all hosts that mount it by right-clicking on the Datastore in the vCenter inventory navigation tree and scrolling down to EMC and selecting **Remove Datastore**...

If the Datastore does not have any extents provisioned from an assigned pool, you are prompted to confirm to continue. If any extents are LUNs provisioned from an assigned pool, the LUNs are unmasked, deleted, and their used capacity becomes available again in the given Storage Type.

For this context menu to be enabled, you require the following permissions on the vCenter: Task.Create, Task.Update, and Host.Config.Storage (for each Host that mounts the Datastore).

---

### Updating storage adapters for a cluster or host

You can automatically update the storage adapters for a cluster or host by right-clicking on the cluster or host in the vCenter inventory navigation tree and scrolling down to EMC and selecting **Update Storage Adapters**. This action updates the list of Fibre Channel HBA ports in the cluster members to be sent to the SMC server.

For this context menu to be enabled, you require the following permissions on the Cluster: Task.Create, and Task.Update.

**Note:** For clustered ESX Servers, the Update Storage Adapters context menu is disabled on the host and is instead enabled on the cluster.

---

### Deleting a LUN

To delete a LUN that was previously added using the Storage Pool Management feature, right-click on the storage LUN in the EMC Storage LUNs view and select **Delete LUN**...
If the selected LUN is not an SPM device, an error indicates that the LUN cannot be deleted. If the LUN is an SPM device, the LUN is unmasked, deleted, and its used capacity becomes available again for use in the Storage Type.

**Note:** For this context menu to be enabled, you require the following permissions on the vCenter: Task.Create, Task.Update, and Host.Config.Storage (on the selected ESX, and if clustered, all ESXs in the Cluster).

---

**Adding a Raw Device Mapping to a virtual machine**

Add a Raw Device Mapping (RDM) to a selected virtual machine by using the Add Raw Device Mapping wizard. Use the wizard to provision a new LUN and map it to a virtual machine as a Raw Device Mapping (RDM). Access the Add Raw Device Mapping wizard by using the right-click menu from the virtual machine located in the vCenter inventory navigation tree.

For this context menu to be enabled, you require the following permissions on the Virtual Machine: Task.Create, Task.Update, Host.Config.Storage (on each ESX associated with the VM) and VirtualMachine.Config.RawDevice.

To add a RDM to a virtual machine:

1. **Right-click on a virtual machine** in the vCenter inventory navigation tree and scroll down to EMC and select **Add Storage...** The first page (**Select a Storage Type**) of the Add Raw Device Mapping wizard appears.

2. Select from the available Storage Types. **Figure 16** shows an example. Select the **Storage Type** to create the new LUN from and click **Next**. The next page (**Select a Capacity**) of the Add Raw Device Mapping wizard appears.
Note: At any point in the Add Raw Device Mapping wizard, click Back to return to a previous step.

Figure 16 Add Raw Device Mapping, Select a Storage Type

3. Select a precreated capacity or enter a custom capacity for the new LUN. Figure 17 shows an example. Specify the desired capacity and click Next. The next page (Select a Datastore) of the Add Raw Device Mapping wizard appears.

Figure 17 Add Raw Device Mapping, Select a Capacity

Note: If no precreated capacities are defined, the Precreated drop down box is disabled.
When configuring custom capacities, a capacity control is enforced to restrict capacity values based on the amount available, the maximum LUN size policy, and the minimum LUN size policy. If you enter an invalid capacity, it automatically corrects to the nearest valid value and a warning displays. If a policy is enabled to only allow the provisioning of precreated capacities, the custom capacity options are disabled.

4. Specify which datastore to map the created LUN to. This step configures where the resulting RDM file will be stored. Figure 18 shows an example. Select the radio button for **Store with Virtual Machine** (default) or specify a different **datastore** from the list and click **Next**. The next page (**Select Compatibility Mode**) of the Add Raw Device Mapping wizard appears.

![Add Raw Device Mapping, Select a Datastore](image)
5. Specify which compatibility mode you want the virtual disk to use. Figure 19 shows an example. Select the radio button for either Physical or Virtual and click Next. The next page (Advanced Options) of the Add Raw Device Mapping wizard appears.

![Add Raw Device Mapping, Select Compatibility Mode](image)

**Figure 19** Add Raw Device Mapping, Select Compatibility Mode

6. Specify configuration settings for the Virtual Device Node and Mode of the RDM. Figure 20 on page 59 shows an example for Virtual Compatibility Mode. Select the Virtual Device Node or Mode selections and click Next. The final page (Ready to Complete) of the Add Raw Device Mapping wizard appears.

**Note:** The content of the Advanced Options page depends on the input values of the previous page. If Physical compatibility was selected, the Mode selection shown in Figure 20 on page 59 is hidden.

The Virtual Device Node is the location where the RDM is mapped to the virtual machine. You can select SCSI device nodes for up to four virtual SCSI controllers, and if a controller does not exist, it will be added to the VM at the same time as the RDM. IDE device nodes may be selected as well, however, hot-add of IDE devices is not permitted by VMware, so selection of IDE nodes is only allowed when the VM is powered off.
7. Review your selected options and click **Finish** to create the RDM and close the wizard.

**Removing a Raw Device Mapping**

You can remove a Raw Device Mapping that was previously added using SPM by right-clicking on the RDM in the Raw Device Mappings view and selecting **Remove Raw Device Mapping**.


This action unmaps the selected RDM from the Virtual Machine. If the RDM is a LUN provisioned from an assigned pool, you are
prompted with how to proceed. Based on the input, the LUN will be unmapped from the VM, but left visible to the VMware environment for reuse, or the LUN will be unmasked, deleted, and its used capacity will become available again for its Storage Type.

Configuring batch storage

You can add multiple Raw Device Mappings (RDMs) from multiple storage pools to a selected virtual machine by using the Configure Batch Storage option. Use the wizard to configure a batch of LUNs to be provisioned and mapped to the selected Virtual Machine as RDMs. LUNs of various storage types and capacities may be chosen and added to a batch. The batch LUNs are provisioned and then mapped as RDMs. The RDM settings chosen (such as compatibility and disk mode) are applied to all LUNs in the batch. Virtual device nodes are automatically assigned.

Access the Configure Batch Storage wizard by using the right-click menu from the virtual machine located in the vCenter inventory navigation tree. For this context menu to be enabled, you require the following permissions on the Virtual Machine: Task.Create, Task.Update, Host.Config.Storage (on each ESX associated with the VM) and VirtualMachine.Config.RawDevice.

To add multiple RDMs to a virtual machine:

1. Right-click on a virtual machine in the vCenter inventory navigation tree and scroll down to EMC and select Configure Batch Storage.

2. The batch configuration page that appears consists of two panels: LUNs and Settings. The LUNs panel describes the configuration of the LUNs to be added to the batch. The right panel provides selectable options similar to those of the Add Raw Device Mappings wizard, used to configure RDM settings. Figure 21 on page 61 shows an example.

Note: When the page opens, a loading indicator displays while the number of available nodes is being calculated. Once calculated, the OK button becomes enabled.
Click **Add**, to launch the Configuration LUNs wizard to configure several LUNs of one storage type and capacity. Click **Cancel** to close the wizard. Click **Remove** to remove the selected LUN configuration from the batch list. This button is disabled when no items exist in the LUN batch list. Under Settings, the Compatibility group box allows for setting the compatibility mode for the RDMs to Physical or Virtual.

The Mode group box allows for configuring the disk mode for RDMs as Persistent or Nonpersistent. The box is disabled when the compatibility mode is set to Physical. Virtual Device Nodes indicates the number of available virtual device nodes on the virtual machine’s vitual disk controllers.

When configured, click **OK** to close the wizard and begin provisioning the LUNs and mapping the RDMs as listed.

![Figure 21 Add Raw Device Mappings Batch](image-url)
3. Or click the **Add** button to open the Configure LUNs wizard.

4. Select from the available Storage. Select the **Storage Type** to create the new LUN from and click **Next**. The next page (**Select a Capacity**) of the Configure LUNs wizard appears.

   #### Note: At any point in the Configure LUNs wizard, click **Back** to return to a previous step.

5. Select a precreated capacity or enter a custom capacity for the new LUN. In the Disk Count box, select the number of LUNs for the specified capacity. Click **Finish** to close this wizard and return to the batch configuration page.

6. Check your configuration settings and click **OK** to close the wizard and begin provisioning the LUNs and mapping the RDMs as listed.