



# Automation and Integration with Microsoft System Center Virtual Machine Manager 2012 SP1 and Dell EqualLogic Storage

This deployment and configuration guide will describe the extensive integration of Dell EqualLogic arrays with Microsoft System Center Virtual Machine Manager.

Dell Storage Engineering  
October 2013



## Revisions

The following table describes the release history of this Deployment and Configuration Guide.

Report	Date	Document Revision
1.0	October	Initial Release

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## Acknowledgements

Authored By: Chuck Farah

[WWW.DELL.COM/PSseries](http://WWW.DELL.COM/PSseries)

## Dell EqualLogic storage solutions

To learn more about Dell EqualLogic products and new releases being planned, visit the Dell EqualLogic TechCenter site: <http://delltechcenter.com/page/EqualLogic>. Here you can also find articles, demos, online discussions, technical documentation, and more details about the benefits of our product family.

For an updated Dell EqualLogic compatibility list please visit the following URL:  
<https://eqsupport.dell.com/compatibility>

## Software information

The following table shows the software and firmware used for the preparation of this Technical Report.

Vendor	Model	Software Revision
Dell	Host Integration Tools for Microsoft, includes Auto-Snapshot Manager/ME, PowerShell tools for De	V4.5, V4.6
Dell	Dell EqualLogic Firmware	V6.0+

## Referenced documentation

The following table lists the documents referred to in this Technical Report. All Dell EqualLogic Technical Reports are available on the Customer Support site at: [eqsupport.dell.com](http://eqsupport.dell.com)

Vendor	Document Title
Dell	TR1089 Windows Command-line Automation Techniques
Dell	Understanding Microsoft Offloaded Data Transfer on Dell EqualLogic Arrays



# 1 Introduction

Microsoft Virtualization is becoming more important as the adoption for cloud technologies increases. The technology that is brought together to accommodate the new burden on virtualization can be a huge challenge for information professionals to manage, protect and scale. In addition the administration of multiple user interfaces to accomplish day to day storage operations adds to this challenge. With tight integration with Windows Server 2012 and System Center Virtual Machine Manager (SCVMM) 2012 SP1, Dell is able to provide simplified management while retaining the resilience and scalability through Dell EqualLogic and Compellent SAN storage.

This document will outline the processes and techniques to take advantage of these features for Dell EqualLogic storage so the organization may benefit from the simplicity and flexibility offered by this additional functionality for virtualized Windows environments.

## 1.1 Audience

The information in this guide is intended for IT professionals who administer Dell storage products with Windows virtual environments.

## 1.2 Windows Server 2012 storage functionality enhancements

Windows Server 2012 and Windows 8 offer additional storage functionality to enable efficiencies, improve performance and simplify management. Dell has collaborated with Microsoft to provide support in the Dell EqualLogic product portfolio for these latest storage innovations:

Storage system enhancements for Windows Server 2012 and Windows 8 include:

- Storage Management Architecture – enables the operating system and applications to seamlessly integrate into the storage subsystem such as File and Storage Services, System Center Virtual Machine Manager (SCVMM) and PowerShell storage management cmdlets.
- Unmap - The ability to notify the storage subsystems to reclaim space freed up by the operating system.
- Offloaded Data Transfers (ODX) – large data transfers managed by the SAN infrastructure to improve performance and lighten the burden on the networks and servers.

The focus of this document will be on SCVMM with the intention of describing how to use SCVMM in a Dell EqualLogic environment.



## 1.3 Conventions used in this document

The following table will list the conventions for acronyms used throughout this document

Full Description	Acronym
System Center Virtual Machine Manager	SCVMM
User Interface	UI
System Center Virtual Machine Manager Console	SCVMM UI
Storage Management Provider	SMP
Host Integration Tools for Microsoft	HIT/Microsoft®
Auto-Snapshot Manager/Microsoft Edition	ASM/ME
Dell EqualLogic Group	PS Series Group
Dell EqualLogic Pool	PS Series Pool
virtual machine	VM



## 2 Storage management architecture

Windows Server 2012 and Windows 8 introduced a new Storage Management Architecture to help reduce management complexity as well as optimize storage through native Windows Storage Management Applications.

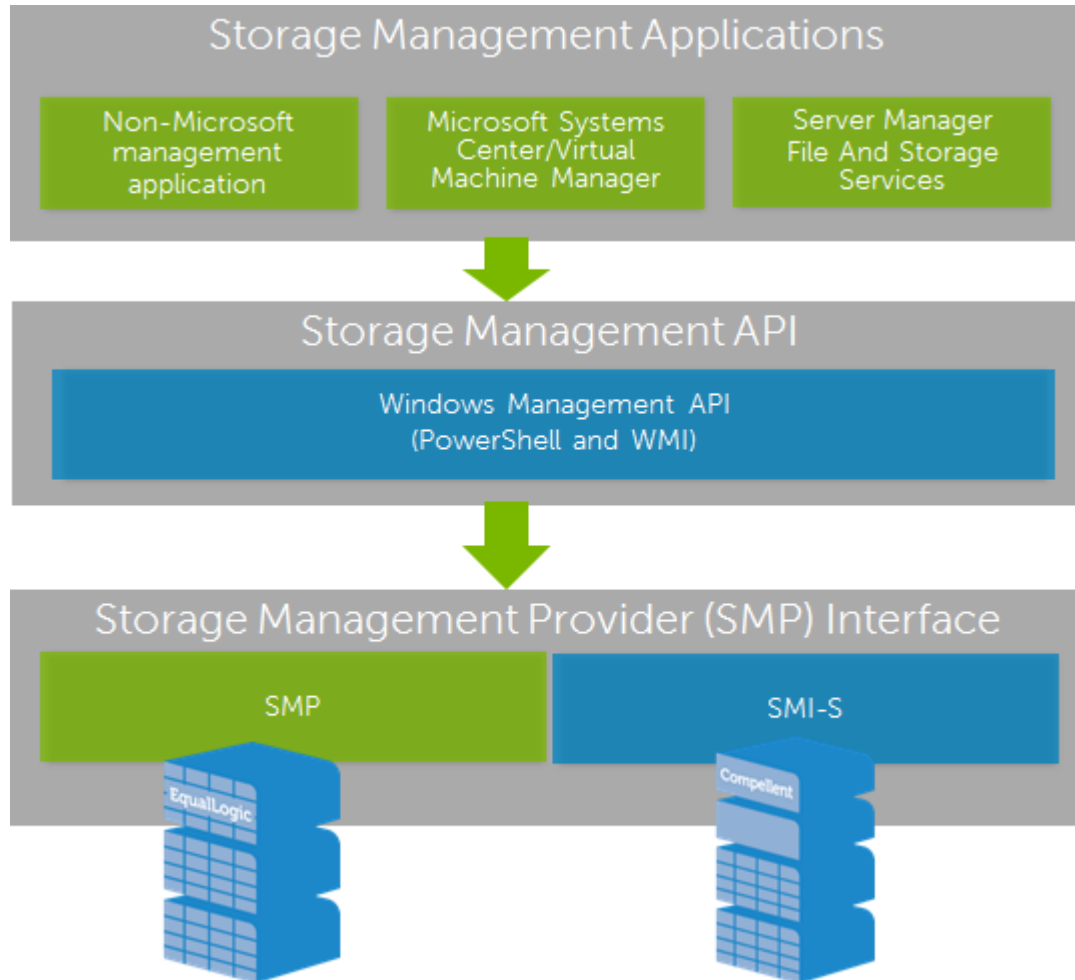


Figure 1 Windows Server 2012 Storage Management Architecture

Figure 1 shows that Storage Management Applications such as SCVMM 2012 SP1, File and Storage Services and PowerShell will use a common interface to manage storage subsystems that have vendor supplied providers based on SMP or SMI-S.

Dell EqualLogic is an SMP compliant storage subsystem while Dell Compellent storage is SMI-S compliant. Regardless of whether an SMP or SMI-S provider is used the management processes are the same. The differences are the subsystem commands that communicate to the operation system and the initial provider configuration.



## 2.1 Microsoft System Center Virtual Machine Manager (SCVMM)

Virtual Machine Manager is one of the core components for the System Center suite of applications that help administrators to comprehensively manage their applications, services, physical resources, hypervisors, software defined networks and storage resources in order to create and deploy virtual machines and services to hosts and private clouds that have been established.

SCVMM fits into System Center application and infrastructure management framework and provides simplified deployment and management capabilities. SCVMM is tightly integrated into supporting storage infrastructures. SCVMM 2012 SP1 also has support for the Storage Management Application interface (SM API) to allow for seamless communication with Dell EqualLogic storage.

For more information about SCVMM please see the appropriate Microsoft documentation and TechNet articles such as: <http://technet.microsoft.com/en-us/library/gg671827.aspx>



## 2.2 System Center Virtual Machine Manager (SCVMM) and Dell EqualLogic Storage functionality

SCVMM uses the Dell EqualLogic Storage Management Provider (SMP) to communicate with the PS Series groups. The Dell EqualLogic SMP enables management of Dell EqualLogic storage directly through native Windows storage interfaces such as PowerShell cmdlets, File and Storage Services user interface (UI) in the Server Manager console, standard Windows Management Instrumentation (WMI) API and SCVMM 2012 SP1.

Host Integration Tools for Microsoft v4.5 (HIT/Microsoft®) includes the SMP for Windows 8, Windows Server 2012. Support for SCVMM 2012 SP1 is included with HIT/Microsoft® v4.6.

The Dell EqualLogic SMP is an optional component installed by default by the HIT/Microsoft installer. The provider is hosted by the Dell EqualLogic SMP Host Service (EqLSMPHost).

The following are tasks supported for Dell EqualLogic storage with SCVMM:

### **Storage Resource manipulation:**

- Discovery, creation and deletion of Dell EqualLogic volumes on the configured PS Series groups
- Creation and deletion of snapshots or clones
- Assigning Dell EqualLogic volumes to host groups (Hyper-V hosts) in SCVMM
- Registering (unregistering) Dell EqualLogic volumes to the managed hosts or clusters (including CSVs to a cluster)

### **Virtual Machine specific functions:**

- Creation of VM Templates which are "SAN Copy capable"
- Rapid VM provisioning
- VM Migration
- VM Storage Migration

[SAN Copy Capable](#) – is a virtual machine template which is capable of the SAN transfer method which takes advantage of the efficiencies and intelligence of Dell EqualLogic storage.

[Rapid VM provisioning](#) – is the method of provisioning virtual machines based on SAN Copy Capable VM templates. The deployment of those virtual machines will leverage the Dell EqualLogic storage for the most effective way to provision the virtual machines storage.

### **Automation:**

- Windows native PowerShell cmdlets
- SCVMM cmdlets
- Dell EqualLogic specific PowerShell cmdlets (installed with HIT/Microsoft®)



## 2.3 Considerations for SCVMM installation and integration with Dell EqualLogic storage

For a successful installation the following should be considered for SCVMM 2012 SP1 integration with Dell EqualLogic storage.

Server Hardware and Software requirements from Microsoft are located at <http://technet.microsoft.com/en-us/library/gg610562.aspx>

Summary of SCVMM and Dell EqualLogic integration Pre-Requisites:

- Install Host Integration Tools for Microsoft v4.6 (HIT/Microsoft®) available from the Dell EqualLogic support site <https://eqlsupport.dell.com>.
- Install the Windows Automated Installation kit (WAIK) for Windows 7
- Install SQL Server (2008 R2 or 2012)
- Install Windows Assessment and Deployment Kit (WADK) for Windows 8 (after SQL Server has been installed).
- Install SCVMM 2012 SP1. The SCVMM Server will need access to the Dell EqualLogic group that will be deploying the virtual machines.
- The Hyper-V servers and the SCVMM servers will need to have access to the same Dell EqualLogic storage resources.

### Host Integration Tools for Microsoft® and Auto-Snapshot Manager/Microsoft® Edition

The HIT/Microsoft® includes Auto-Snapshot Manager/Microsoft® (ASM/ME) – enabling the ability to create data- and application-consistent Smart Copies of NTFS volumes, Exchange Server databases, Hyper-V virtual machines, SharePoint databases and Farms, and SQL Server databases. ASM/ME offers application-consistent Smart Copies utilizing the built-in snapshot, clone and replication facilities in PS Series arrays.

The HIT/Microsoft® (with included ASM/ME) provides advanced MPIO for Dell EqualLogic storage for availability and performance as well as the ability to configure SMP communication.

**Note:** The Dell PS Series groups should be accessible by the SCVMM Server, SCVMM Library Servers and all managed Hyper-V hosts. PS Series Group access is established through the HIT/Microsoft® tools.



### 3 Objective

Various common SCVMM operations will be reviewed with the intent to demonstrate simplicity of management. Most operations may be accomplished using either a GUI or by using PowerShell cmdlets and will be differentiated appropriately throughout the guide.

The following Windows Server 2012 and SCVMM 2012 SP1 operations will be described:

- Enabling the SMP Provider for EqualLogic through Auto-Snapshot Manager/Microsoft Edition
- Importing the SMP provider for EqualLogic through SCVMM UI
- Allocating Storage pools through SCVMM UI
- Volume Provisioning through SCVMM UI
- Volume Provisioning through Windows File and Storage Services
- Creating a SAN Copy Capable Virtual Machine Template through SCVMM UI
- Rapid Provisioning of Virtual Machines through SCVMM UI
- VM Migration through SCVMM UI
- VM Storage Migration through SCVMM UI

PowerShell operations are described in the [Appendix A](#) for the following:

- Enabling the SMP Provider for EqualLogic using PowerShell
- Importing the SMP provider for EqualLogic using PowerShell
- Volume Provisioning through SCVMM using PowerShell
- Volume Provisioning through File and Storage Services using PowerShell
- Creating a SAN Copy Capable Virtual Machine Template using PowerShell
- Rapid Provisioning of Virtual Machines using PowerShell



## 3.1 Lab Environment and Setup

For the deployment demonstrations of this document the following Lab environment was configured.


- 1 x Dell M1000e Blade Chassis
- 2 x Dell M620's Hyper-V Blade servers (Windows Server 2012 Datacenter)
- 2 x Intel(R) Xeon(R) CPU E5-2640 0 @ 2.50GHz and 128GB memory
- 2 x M6220 Blade GigE switches
- 1 x PS5000XV 16x300GB 15K GigE Dell EqualLogic storage array

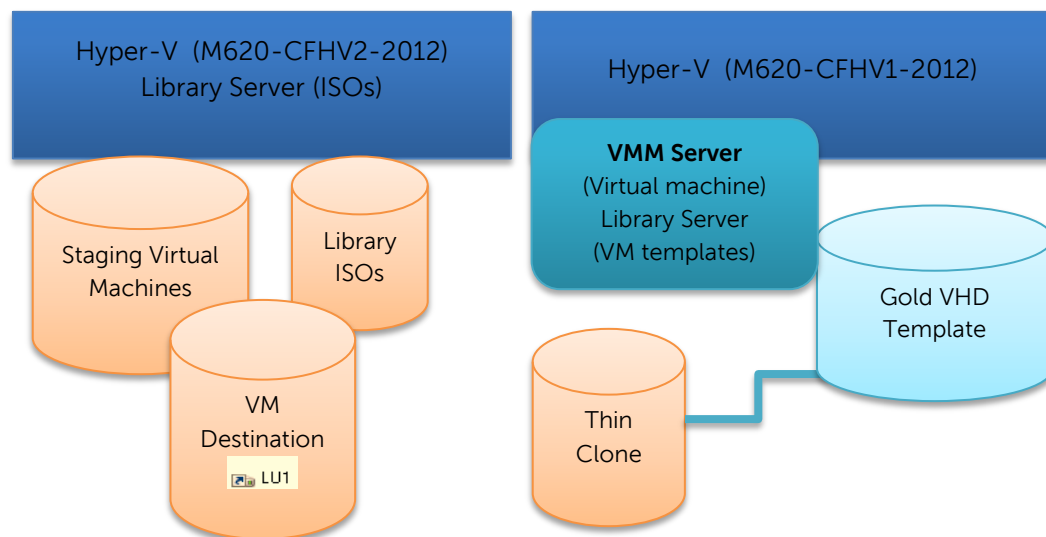
One Hyper-V host (CFHV1-2012) had a Windows Server 2012 virtual machine which SCVMM 2012 SP1 was installed.

For this setup the SCVMM Library server for the rapid provisioning template is also located on the SCVMM virtual machine.

**Note:** The SCVMM Library server may be separate from the management host.

In addition one Hyper-V host (CFHV2-2012) served as both a staging area for initial gold virtual hard disk preparation and a Library server for ISO disk images of Windows operating systems to create virtual machines from a blank disk.

The diagram below represents the LAB environment. All storage is on the PS5000XV, VM Templates are stored on Dell EqualLogic Template volumes. Thin Clones will contain the deployed virtual machines while the virtual machine destination will have mounted volumes  LU1 to those Thin Clones. This process is discussed further in the "Creating VM Templates" section [here](#).



## Volumes used for SCVMM

The following volumes were allocated on Dell EqualLogic storage to provide a flexible environment for the purposes of this document. Below is a list of the volumes used in this LAB environment for reference and convenience.

Optional:

- An ISO volume to be used as a convenient container of the images needed to create golden VM copies from blank VMs. More information on how to create VMs from an ISO is located in [Appendix B](#).
- A staging volume for the initial VM created (Syspreped source for the VHDX).

Required: (for VM provisioning and migration)

- A volume which will contain the gold image and a "SAN Copy Capable" VM template (Dell EqualLogic "Template" volume)
- A Destination volume(s) for all rapidly provisioned VMs (per Hyper-V host as needed).

These volumes were created through SCVMM or File and Storage Services; however the volumes below may be created through any of the provisioning methods available.

Table 1 Volumes used in this document for reference

Purpose	Volume Label (Drive Letter)	Virtual Disk = Dell EqualLogic Volume name	Server	SCVMM Library	Share name
ISOs	HV1_ISO (E:)	CFISOsForVMM	CFHV1-2012	Yes	HV1_ISO
Prepare VM	StagingWin2012 (S:)	CFVMTemplates	CFHV1-2012	No	
VM Destination (Required)	CFHV2-VMDest (V:)	CFHV2VmStores	CFHV2-2012	No	
SAN Copy Capable VM Template (Required)	CFWin2012SP1 (J:)	CFWin2012SP1	CFVMMonHV1	Yes	CFWin2012SP1

**Note:** The SCVMM library is a catalog of resources that provides access to virtual hard disks, virtual floppy disks, ISO images, scripts, driver files, virtual machines and service templates and profiles stored on the SCVMM database. To provision a library share volumes with those items must be shared and configured in the SCVMM Library server.



## 4 Configure SMP for Dell EqualLogic

Once SCVMM and the Dell™ EqualLogic Host Integration Tools for Windows® (HIT/Microsoft®) are installed the Storage Management Provider (SMP) may then be imported into SCVMM to expose the storage subsystems that will need to be managed. The HIT/Microsoft® and Auto-Snapshot Manager/Microsoft® Edition (ASM/ME) needs to be installed on the SCVMM Server and each Hyper-V host that will be managed by SCVMM and participate in VM provisioning, migration or assignment of logical units to the SCVMM host groups. SCVMM 2012 SP1 requires at least v4.6 of the HIT/Microsoft®.

**Note:** Auto-Snapshot Manager/Microsoft® Edition has the ability to remotely install HIT/Microsoft® and centrally manage Windows servers that are using Dell EqualLogic storage. Please see the *Auto-Snapshot Manager Microsoft® Edition v4.6 User Guide* for more information.

For SCVMM to manage external storage from Dell the provider needs to be imported which is performed after the HIT/Microsoft® is installed and PS Series group access is established. In the SCVMM UI a user defined "Classification" to identify the discovered and allocated storage will then allow for SCVMM UI or PowerShell to manage the Dell EqualLogic storage.

The process flow below indicates the steps needed to register and enable the SMP interface for SCVMM storage management.

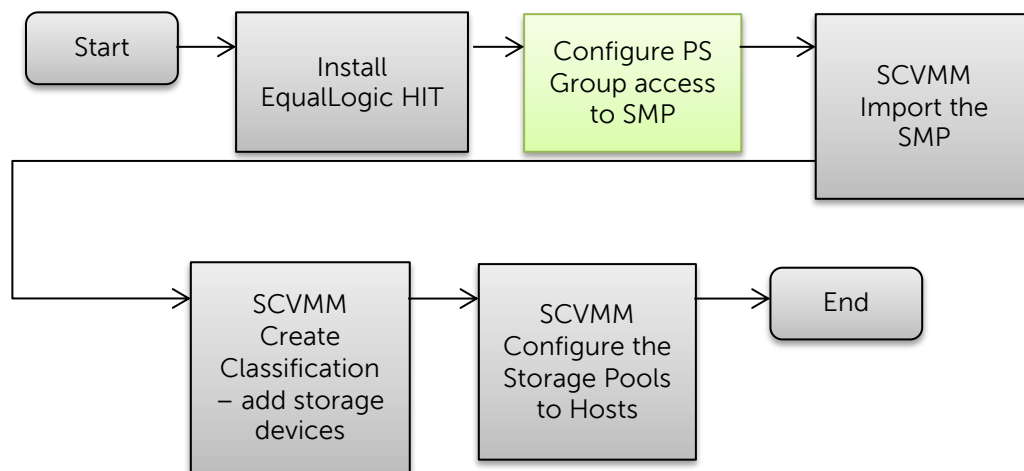
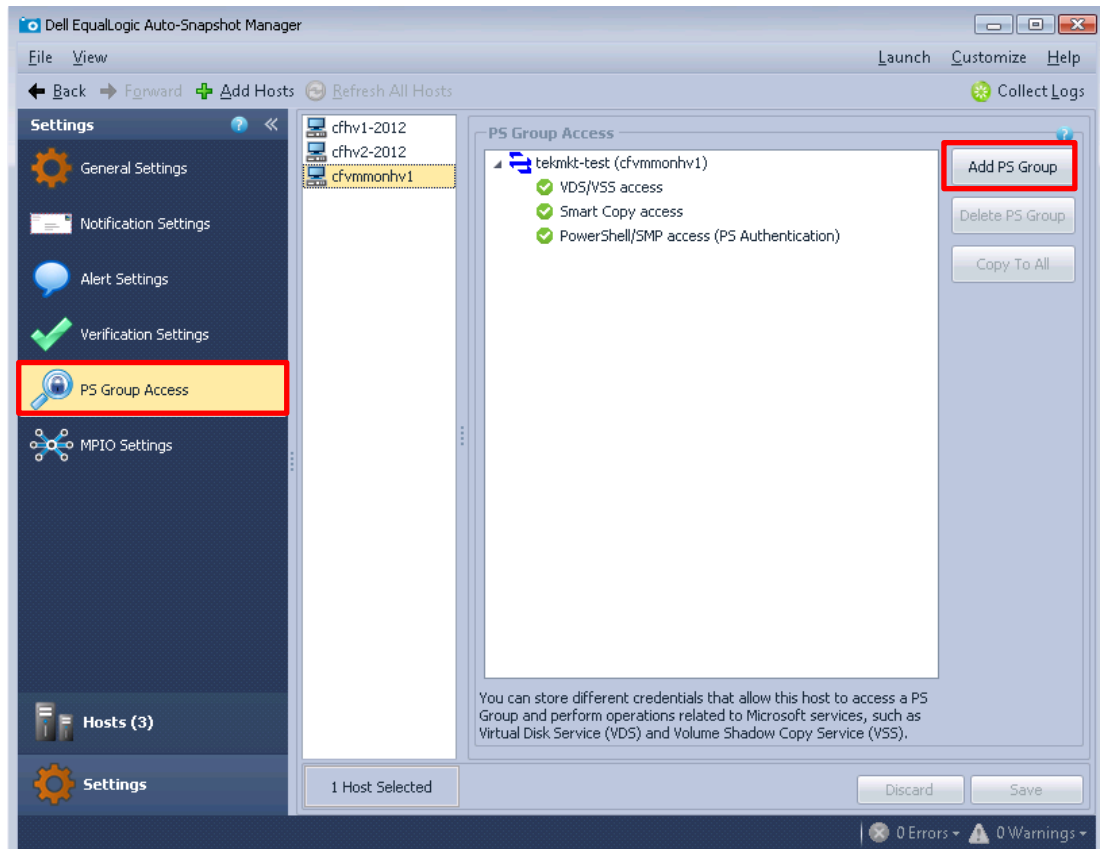


Figure 2 Process to import the SMP provider.

## 4.1 Configuring PS Series Group access for SMP through Auto-Snapshot Manager/Microsoft® Edition

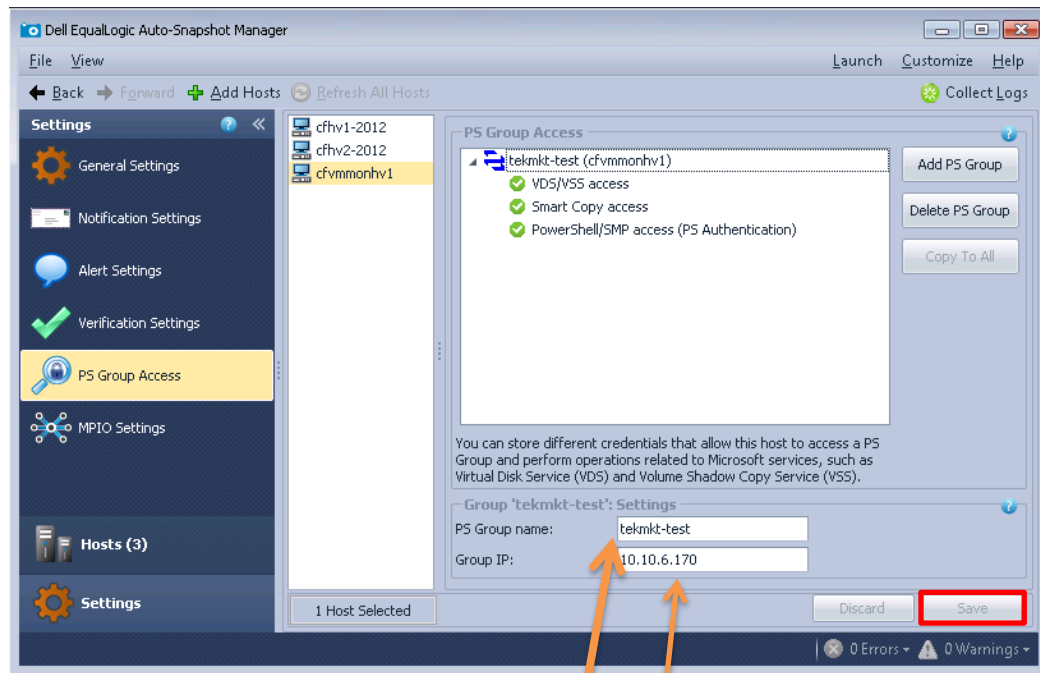
1. Install the HIT/Microsoft® on each Hyper-V server managed by SCVMM as well as the SCVMM Server. HIT/Microsoft® will install ASM/ME by default.



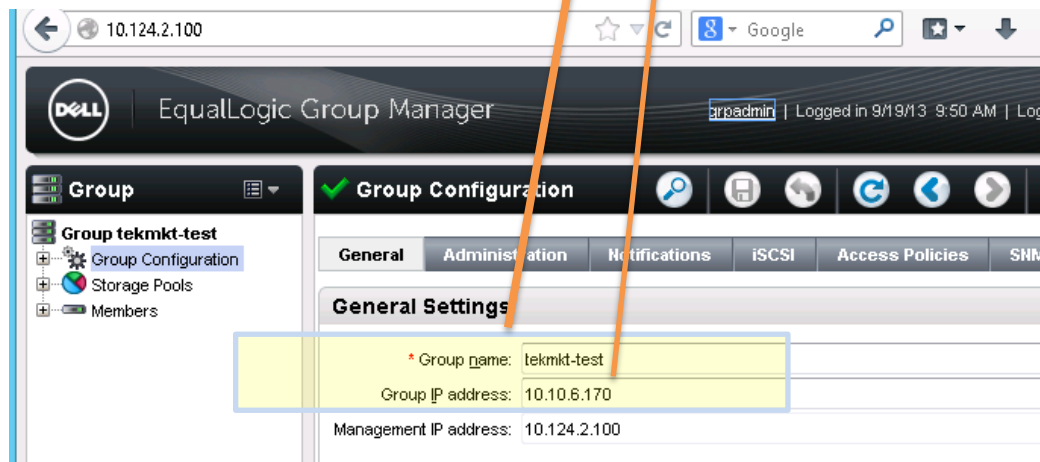
2. For Each Hyper-V server and SCVMM Server:  
Launch Auto-Snapshot Manager (ASM/ME) and click on Settings-> **PS Group Access**.
3. Click **Add PS Group**.



Group Name and IP are located in the Group Manager GUI.



Auto-Snapshot Manager Settings



Location of PS Group Name and Group IP address from the EqualLogic Group Manager:  
**Group Configuration > General Settings > General tab**

4. Enter the **PS Group Name**, **Group IP** address and then Click **Save** to verify the connection to the PS Group



## PowerShell/SMP access configuration

PS Group Access

- tekmkt-test (cfvmonhv1)
  - ✓ VDS/VSS access
  - ✓ Smart Copy access
  - ✓ PowerShell/SMP access (PS Authentication)

Credentials used by PowerShell/SMP to authenticate access Group.

Group 'tekmkt-test' PowerShell/SMP Settings

PS Group Management IP 10.124.2.100

☐ Use Single Sign On

PS Group Username grpadmin

PS Group Password .....

5. Enter the credentials for PowerShell/SMP access (PS Authentication)

**Note:** If the PS Series group has a Management network enter the PS Group Management IP address instead of the Group IP.

Select **Use Single Sign On** if desired to allow for Active Directory authentication to be used for PS Group administration.

**Note:** For **Single Sign-On** (SSO) access for a particular PS Series group, the logon account for the SCVMM service (vmmservice.exe) must be enabled for management on that group. Alternatively, you can enable an AD user group on the group if the SCVMM service account is part of that AD user group. See the "*Dell EqualLogic Auto-Snapshot Manager/Microsoft Edition User's Guide*" for more information located on the Dell EqualLogic support site: <https://eqsupport.dell.com>.

Smart Copy and VDS/VSS will use CHAP authentication as required by Microsoft services and should be authenticated as well to enable Smart Copy protection of the Hyper-V VMs.

This process should be repeated for each Hyper-V host that is managed by SCVMM as well as the SCVMM server. A single ASM/ME interface may be used to manage all hosts connected to Dell EqualLogic arrays.

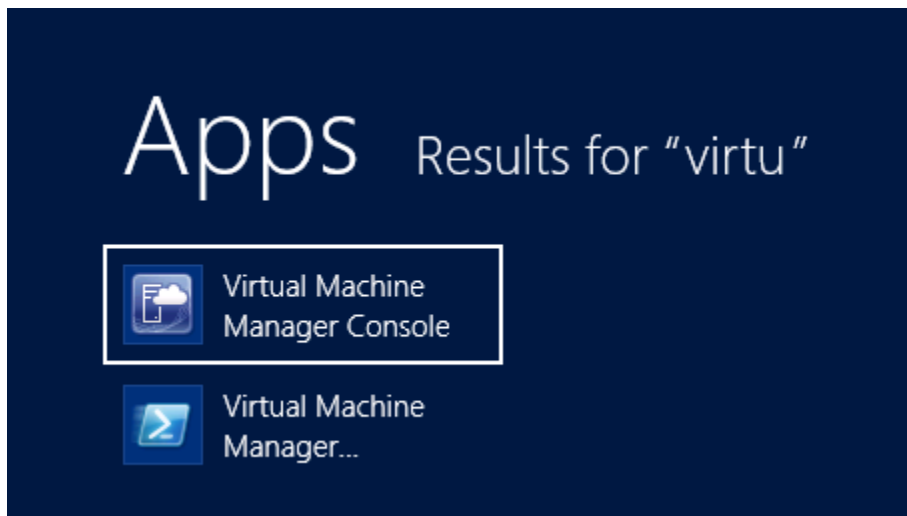


## 5 Using the SMP provider with SCVMM

The Windows Server 2012 Storage Management architecture communicates to the Dell EqualLogic Storage through the SMP provider. In order to access the Dell EqualLogic storage resources the Dell EqualLogic SMP provider will need to be imported into the SCVMM environment. The following process will show how to add PS Series arrays and pools by importing the SMP provider for Dell EqualLogic through the SCVMM UI.

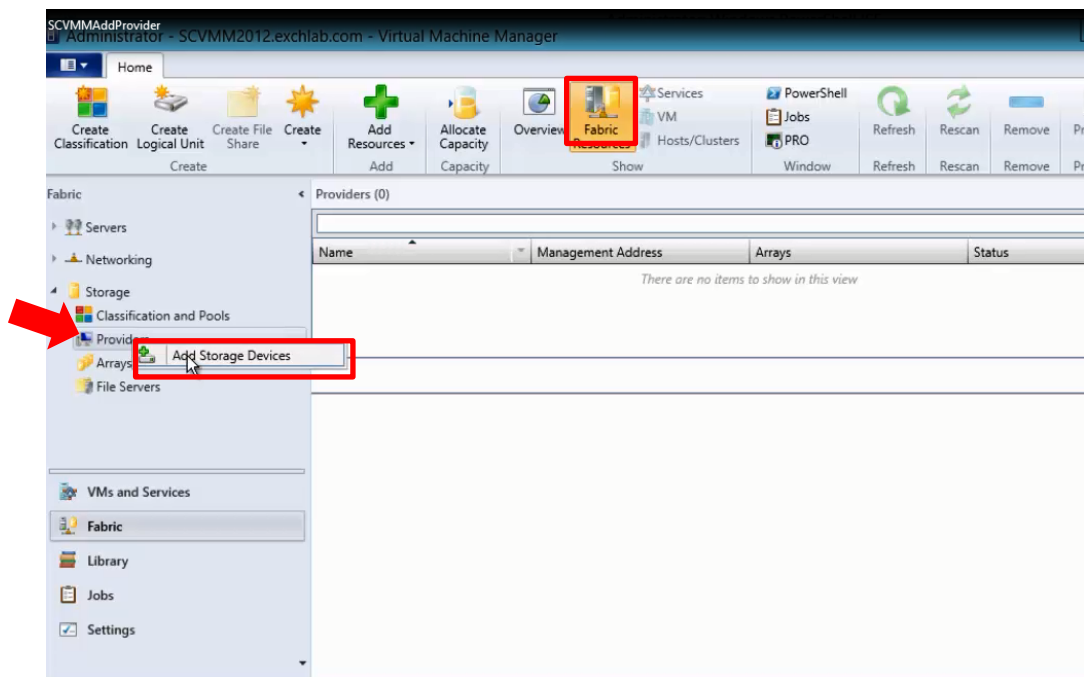
### 5.1 Adding Dell EqualLogic storage with the SMP provider through the SCVMM UI

Adding storage devices to SCVMM management occurs through the storage Providers feature which upon import will allow for discovery of available Dell EqualLogic storage resources.



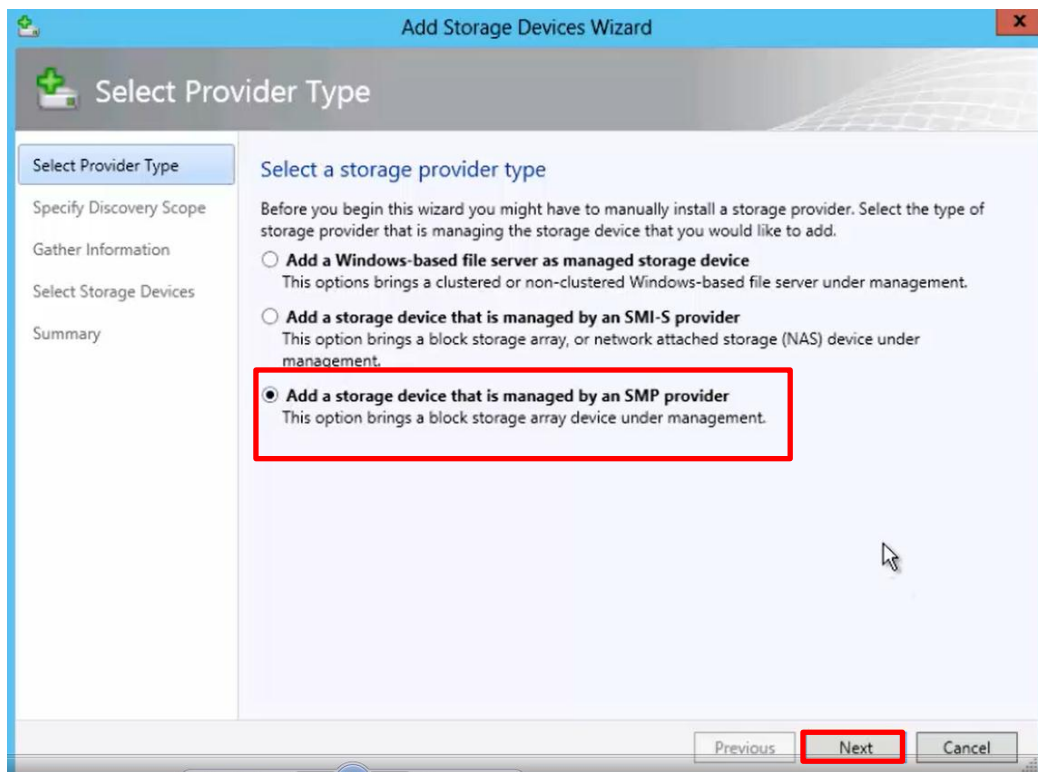
1. Launch SCVMM UI (Virtual Machine Manager Console)

## Add Storage Devices



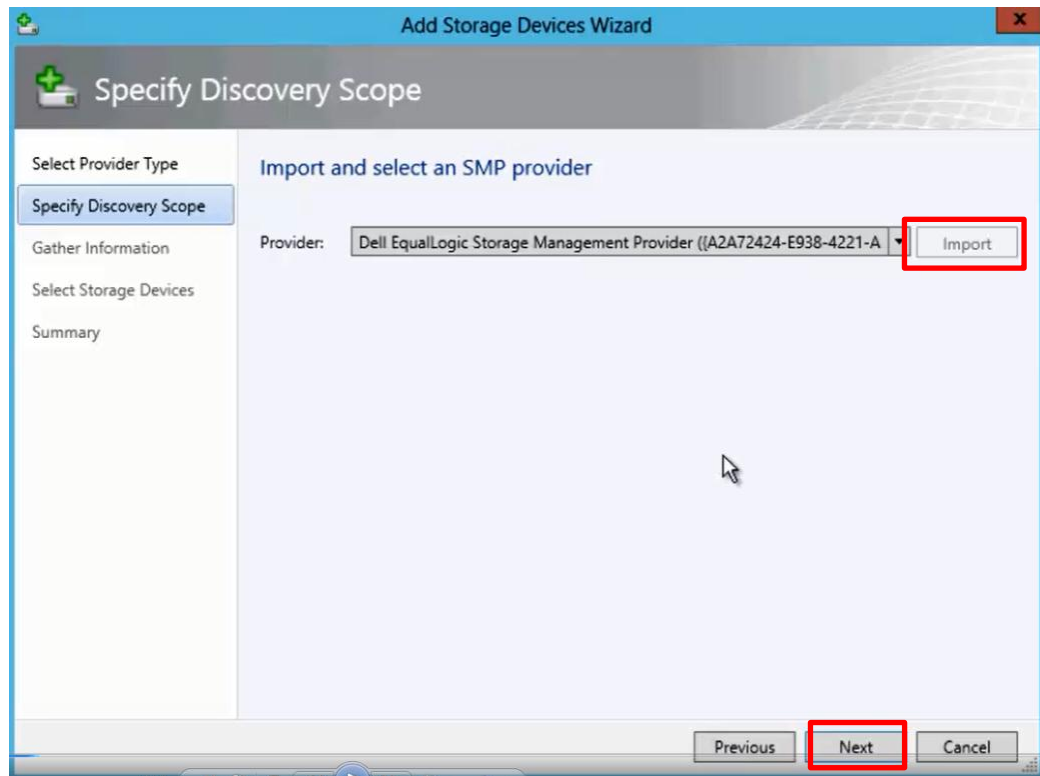
2. Click on **Fabric Resources** from the top of the Home Tab then navigate to **Storage** -> **Providers**. Right mouse click on **Providers** and Click "Add Storage Devices".

## Select storage provider type



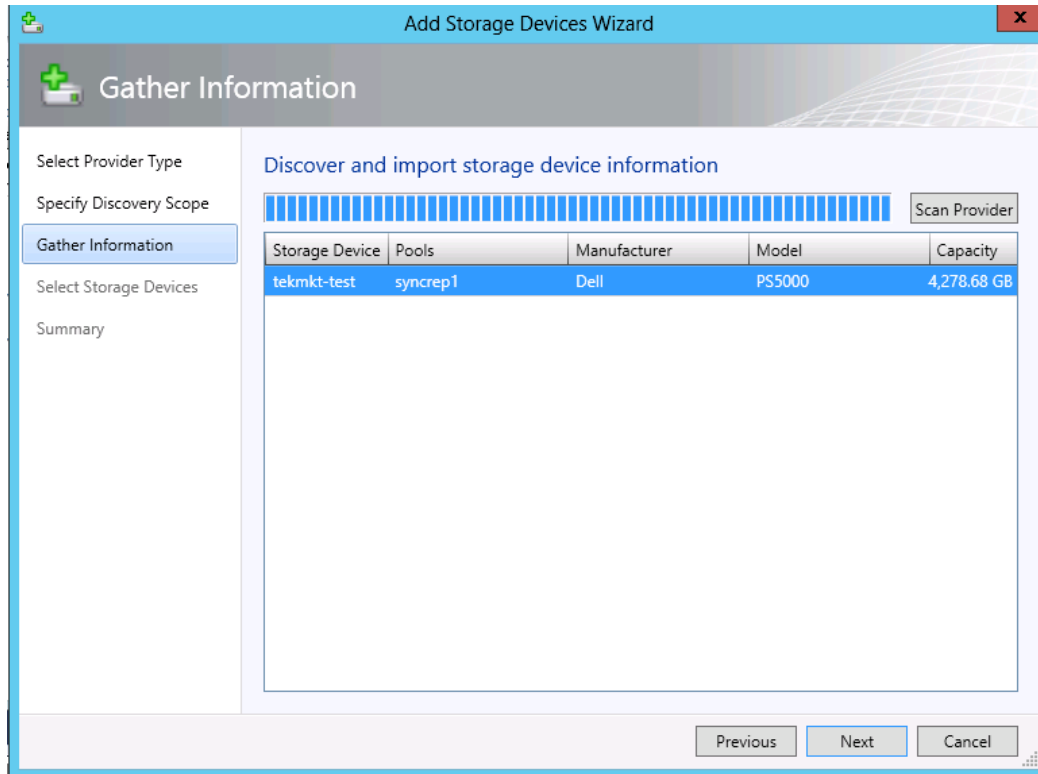
3. Select **Add a storage device that is managed by an SMP provider**, and click **Next**.

## Import and select the discovered SMP provider



4. Click **Import** then select the "Dell EqualLogic Storage Management Provider {...}" from the dropdown and click **Next**.

**NOTE:** The provider will appear if the HIT/Microsoft® has been installed and PowerShell/SMP is configured.



5. The "Add Storage Devices Wizard" will scan for the connected PS Series Groups and Pools. Click **Next** when the storage devices are listed in the table.

**Note:** The ASM/ME PS Series Group access and PowerShell/SMP access must be configured to allow SCVMM to discover the Dell EqualLogic storage.



## Select the target Storage Device and pool

**Add Storage Devices Wizard**

**Select Storage Devices**

Select Provider Type  
Specify Discovery Scope  
Gather Information  
**Select Storage Devices**  
Summary

**Select file shares to place under management**  
Bringing file shares under management will make them available for use in computers managed by Virtual Machine Manager.

Storage Device	Pool ID	Classification	Total Capacity	Available Capacity
tekmkt-test				
<input checked="" type="checkbox"/> syncprep1	08A09006-020...	syncprep1-tekmkt-test	4,278.68 GB	3,075.70 GB

**Create classification...**

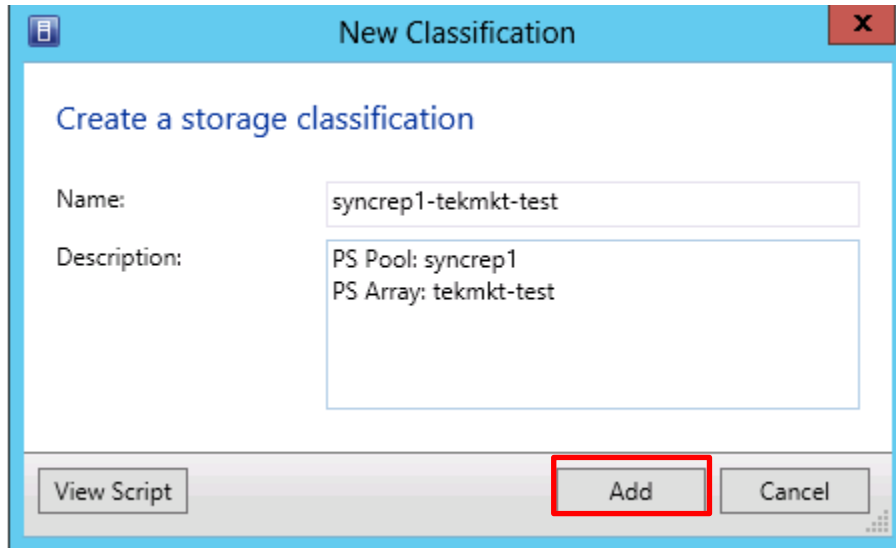
Previous Next Cancel

6. Check the desired Storage Device (s) then Click on **Create classification...**

**Note:** The Storage Devices may be configured on this page by checking the boxes next to the appropriate PS Series pools for access. If desired a separate classification may be created for each pool.

### Create a storage classification

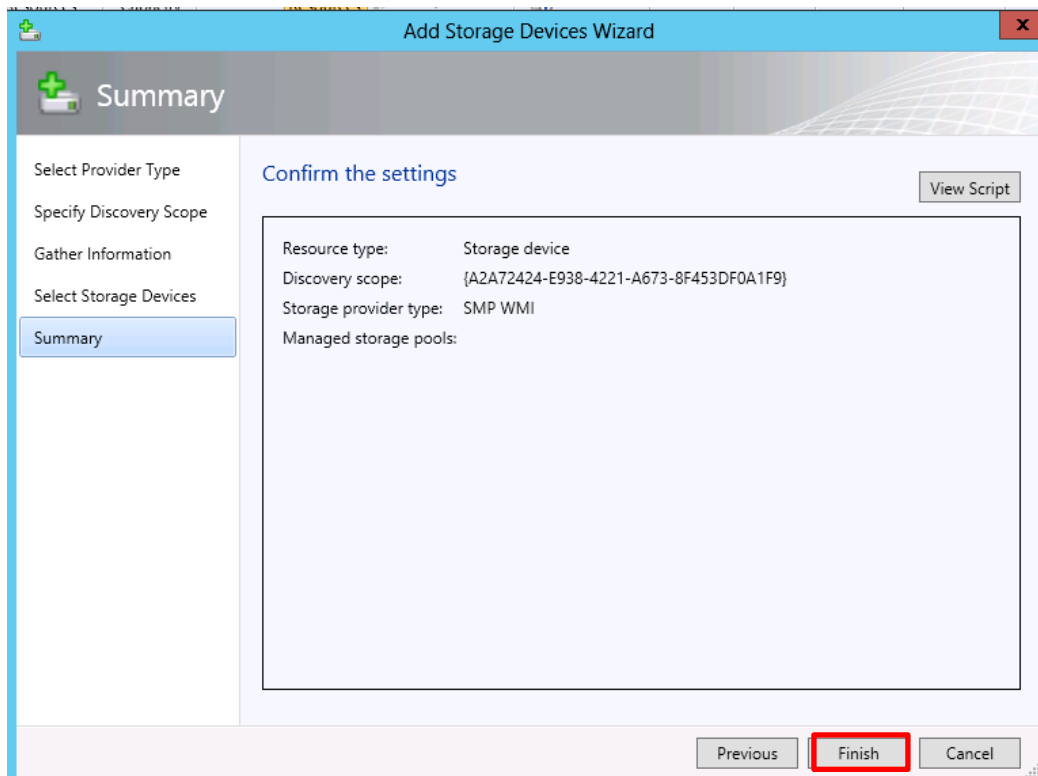
Storage classification is a user defined way to categorize different properties of storage pools or devices based on criteria such as SLA, use case or even identification of a storage pool. Standards for these types of storage devices may be developed for instance a classification of "Gold" may represent SSD or 15K disks in the pool. In the example below the classification is based on the identity of the device. For this Classification "syncprep1" is the PS Series Pool which is located on a PS Series Group "tekmkt-test".



7. Specify the **Name** and **Description** then click **Add**

More information on Storage Classification may be found here <http://technet.microsoft.com/en-us/library/gg610685.aspx>

## Complete the Add storage device process



8. Click **Finish** to complete adding the storage devices to SCVMM management.

## Verify the SMP provider has been imported correctly

Name	Status	Start Time	Result Name	Owner
Creates new Storage...	Completed	9/11/2013 8:39:59 AM	syncprep1-tekmt-test	SPARTAN\cfvmm

Creates new Storage Classification
------------------------------------

Status: Completed

Command: New-SCStorageClassification

Result name: syncprep1-tekmt-test

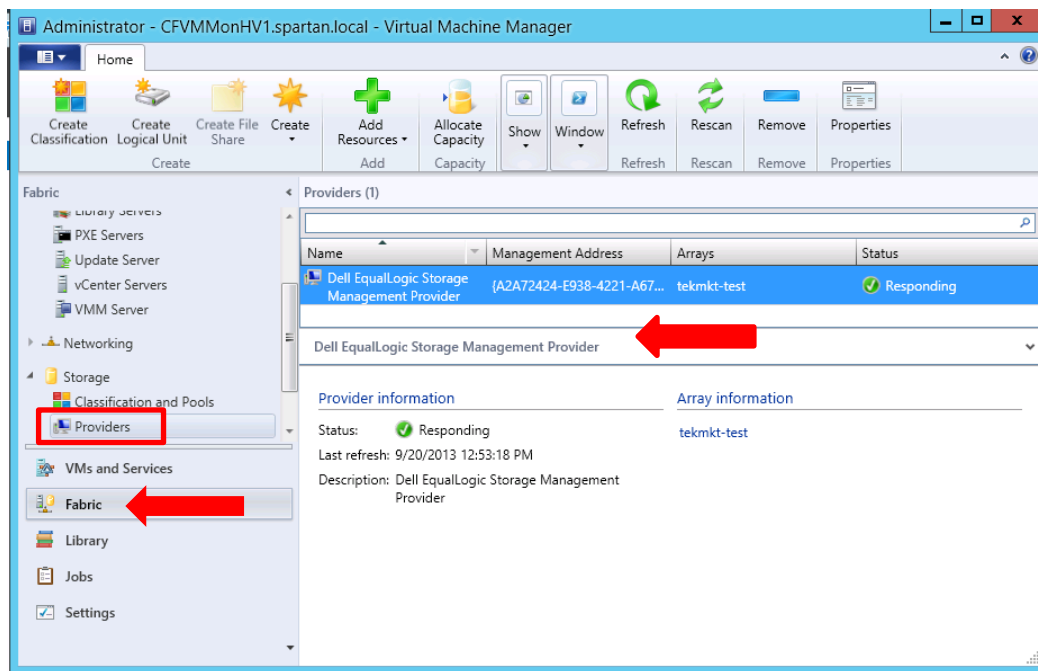
Started: 9/11/2013 8:39:59 AM

Duration: 00:00:00

Owner: SPARTAN\cfvmm

Property	Previous Value	New Value
Storage Classification - syncprep1-tekmt-test		
Name	(none)	syncprep1-tekmt-test

**Note:** The Jobs work space, "History - Recent Jobs" window will show the status for the import and Classification creation



The Providers will be show in the **Fabric** workspace, **Providers** panel under the **Storage** node

## Compare SCVMM storage discovery to Dell EqualLogic Group Manager

The screenshot displays the SCVMM console on the left and the Dell EqualLogic Group Manager on the right. The SCVMM console shows a list of storage pools and logical units under the 'Classifications (1), StoragePools (1), and Logical Units' view. The 'CFISOsForVMM' logical unit is highlighted with a red box. The Dell EqualLogic Group Manager shows a list of volumes, with 'CFISOsForVMM' also highlighted by a red box, demonstrating the mapping between the two systems.

Name	Type
syncprep1-tekmkt-test	Classification
syncprep1	Storage pool
CFHV1VMS	Logical unit
CFHV2vmStorage	Logical unit
<b>CFISOsForVMM</b>	Logical unit
CFSSDISK1	Logical unit
CFSSDISK2	Logical unit
CFSSDISK3	Logical unit
CFSSDISK4	Logical unit
CFVMMLibrary	Logical unit
CFWin2012SP1	Logical unit
FogV3	Logical unit
FS7500-vol1	Logical unit
FS7500-vol2	Logical unit

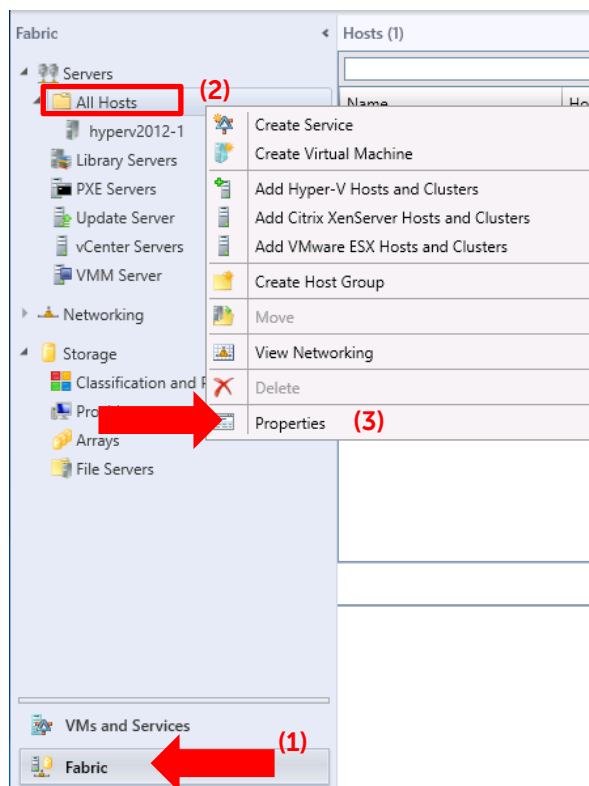
**Note:** Under Classification and Pools all Pools will be listed by the Classification created. "Logical unit" in SCVMM equates to "Volume" on Dell EqualLogic storage.

See also [Appendix A: "Enabling the SMP Provider for EqualLogic using PowerShell"](#) and ["Importing the SMP provider for EqualLogic using PowerShell"](#)

## 6 Allocate Storage Pools to a Host Group through SCVMM UI

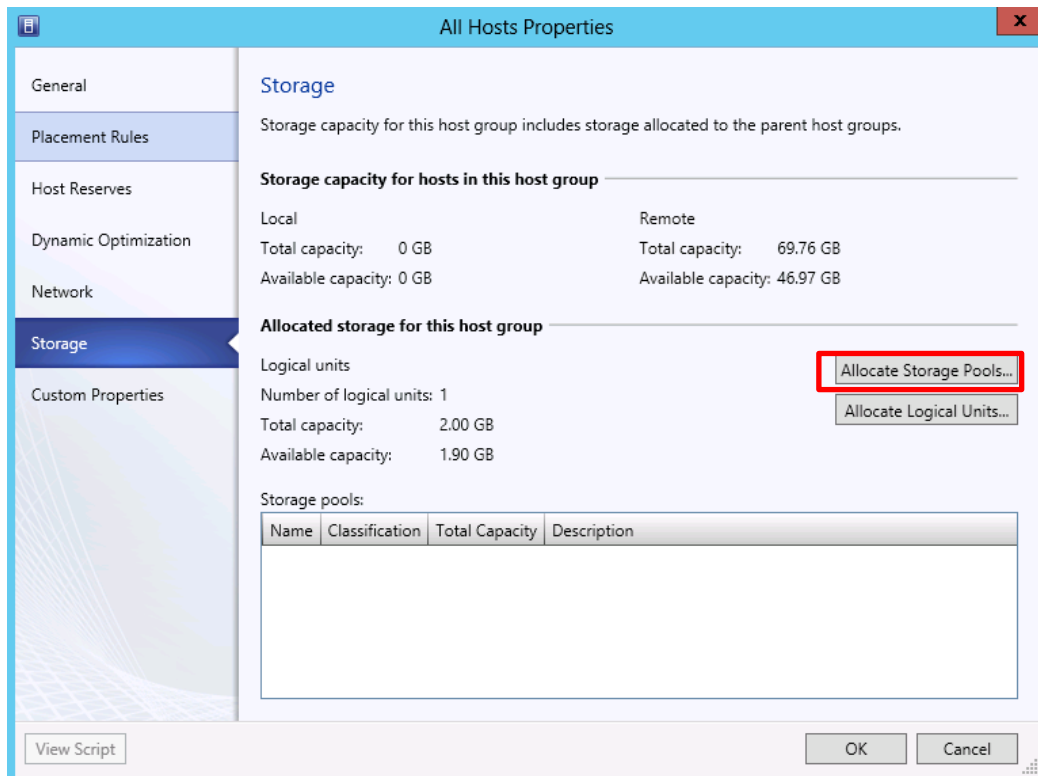
Dell PS Series pools and groups must be allocated to SCVMM host groups (Hyper-V hosts managed by SCVMM) allowing for the creation and assignment of volumes and rapid provisioning of virtual machines.

For more information see Microsoft's TechNet library <http://technet.microsoft.com/en-us/library/gg610635.aspx>



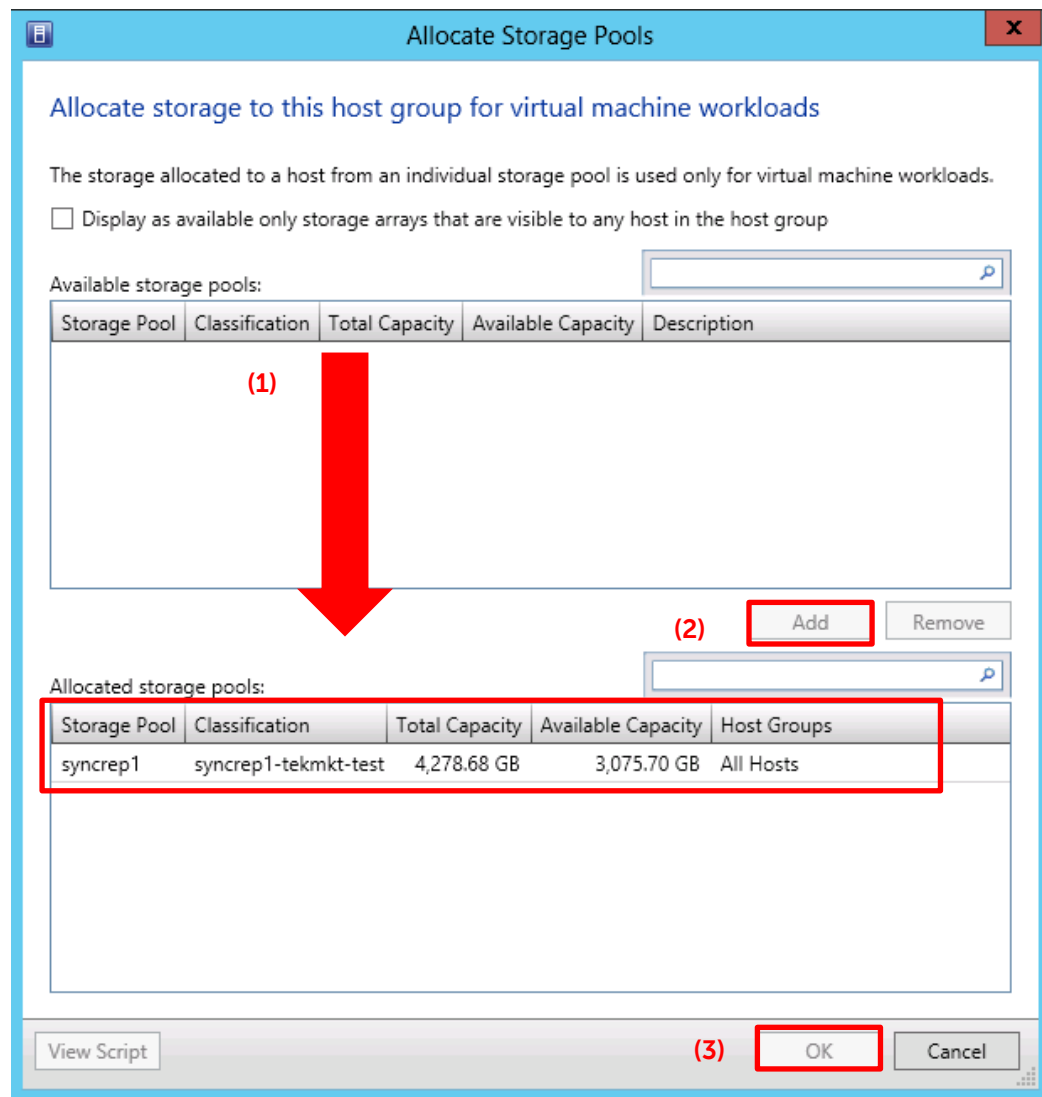
1. In the **Fabric (1)** workspace, click on **All hosts (2)** Right mouse click and then Click **Properties (3)**.

## Allocating Storage pools through SCVMM



2. Click on "Allocate Storage Pools" which will open the "Allocate Storage Pools" window shown in the next step.

## Allocating Storage pools through SCVMM



3. In the top grid table of the window the available storage pools will appear. Click on each available storage pool (1) then click **Add** (2) until they move to the bottom part of the window in the "Allocated storage pools" grid table. Click **OK** (3).

**Note:** The **Add** button will be enabled only when **Available storage pools** are present.



## 7 Volume Provisioning Methods

Several methods of provisioning volumes are available with Dell EqualLogic Storage. The volumes used in this document are provisioned through SCVMM or File and Storage Services user interfaces. However the legacy options are available but will not be demonstrated.

### Option 1: Dell EqualLogic Group Manager

- In EqualLogic Group Manager create a volume with the appropriate access
- Use the Windows iSCSI Initiator tool to connect the iSCSI Target (the volume)
- Use Windows "Disk Manager" would bring the volume online, format and partition, drive letter or mount point assignment.

### Option 2: Windows Server 2012 native applications

- [Create a volume through SCVMM UI](#)
- [Create a volume through Windows File and Storage Services](#)

### Option 3: PowerShell or API

- Dell EqualLogic PowerShell cmdlets or PSAPI CLI
- [Windows Server 2012 PowerShell cmdlets](#)

The following section will show options for Windows Server 2012 (Option 2 and 3) as a reference for the available volume provisioning functionality.



## 7.1 Volume Provisioning using native Windows applications

The SMP provider allows for storage allocation on Dell EqualLogic arrays through SCVMM and File and Storage Services. These steps will show how to create new volumes through SCVMM and File and Storage Services and bring those volumes online to the hosts.

**Note:** The following volume provisioning sections are simply to demonstrate some of the new integrations with Dell EqualLogic storage. Alternatively traditional methods of Dell EqualLogic volume provisioning may be used.

## 7.2 Volume Provisioning through SCVMM UI

The process to provision a Dell EqualLogic volume through SCVMM involves the following:

1. Select the Hyper-V host (or cluster) for the Dell EqualLogic volume to be created
2. Add the logical unit from the storage option under properties for that Hyper-V host (or cluster)
3. Specify the storage pool, name, size and thick or thin provisioning for the volume
4. Format, specify the volume label and assign a drive letter

The benefit of using this process to create a volume assigned to the Hyper-V host is the avoidance of switching between multiple user interfaces such as the Microsoft iSCSI Initiator tool, Windows Disk manager or Dell EqualLogic Group Manager providing ease and simplicity for management.

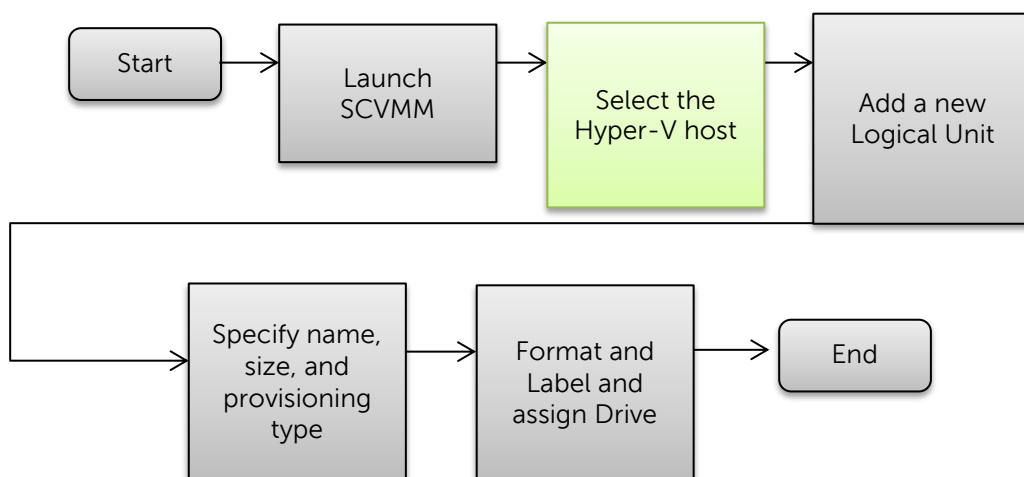
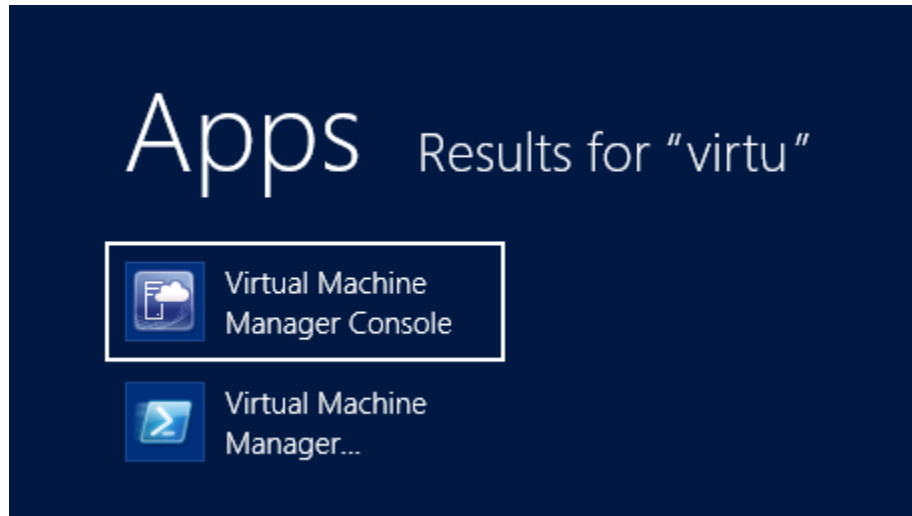


Figure 3 VMM volume creation process

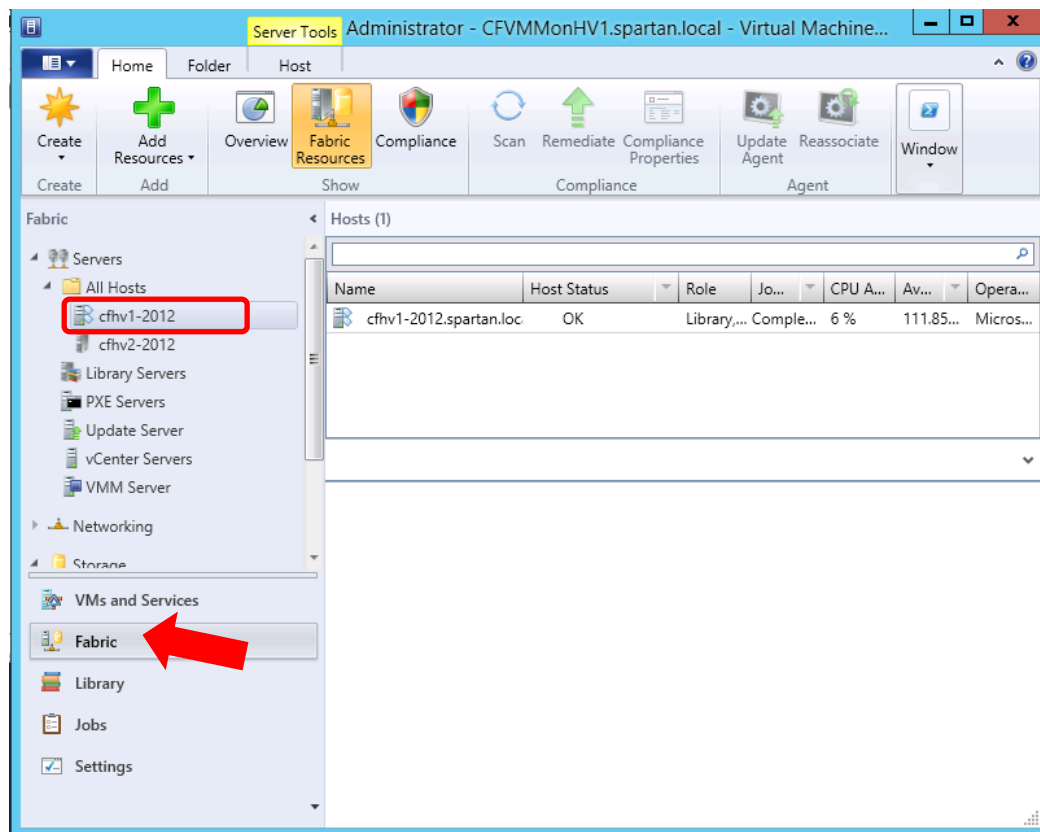
This section will use SCVMM exclusively to create a volume on a Hyper-V host that will be used to store and stage gold images. See [Table 1](#) for the "Prepare VM" volume.

**Pre-requisites:** HIT/Microsoft® on Hyper-V and SCVMM Server with SMP enabled and imported to SCVMM.



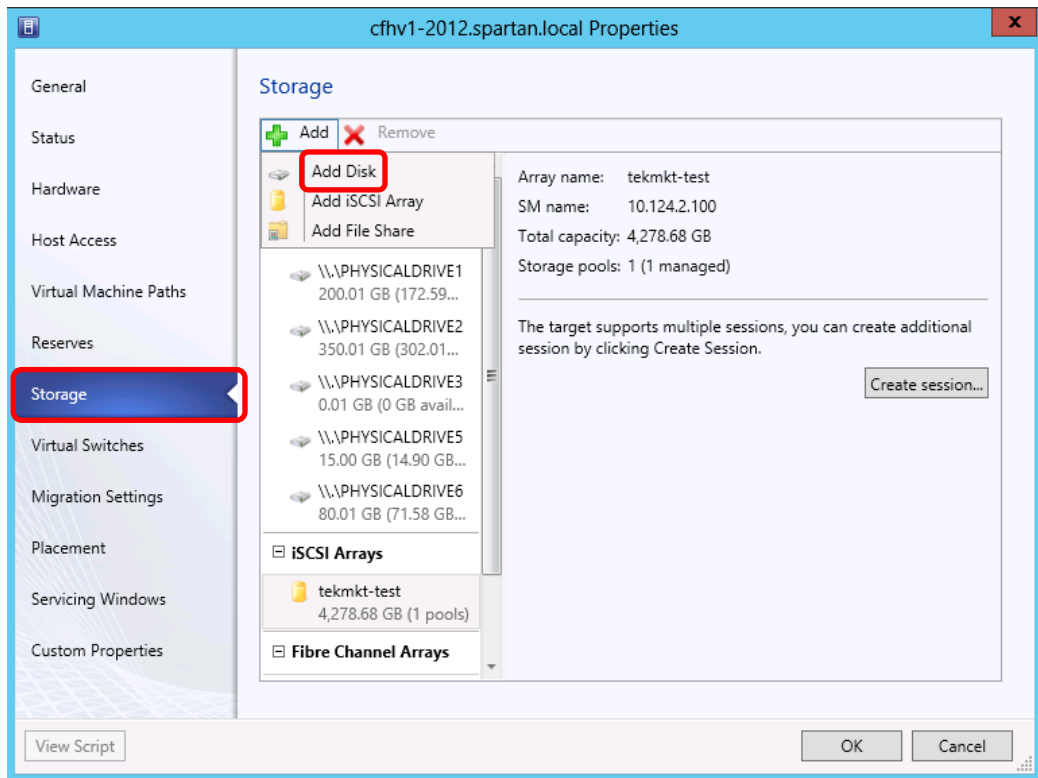
1. Launch SCVMM UI (Virtual Machine Manager Console)

## Choose the host to provision the volume on



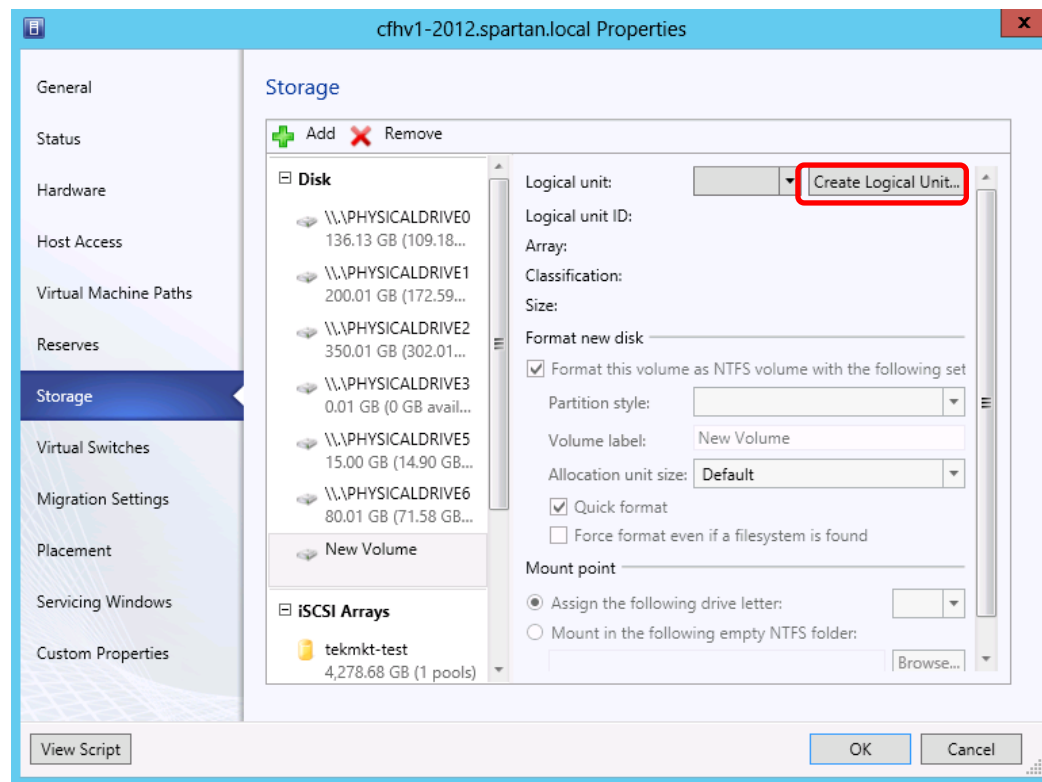
2. In the **Fabric** workspace under **Servers -> All Hosts** expand and select the desired host to provision the volume on. In the example above "cfhv1-2012" will be the Hyper-V host assigned to the volume.

### Add a disk to the selected host



3. Right click and select **Properties** on the Hyper-V host which will be connected to this new volume. Select **Storage** then click **Add** and from the drop down **Add Disk**.

## Create the Logical Unit



4. Next to Logical unit click **Create Logical Unit**

**Note:** Logical Unit is the same as the volume on Dell EqualLogic storage

### Specify the volume parameters

**Create Logical Unit**

Specify the settings for the new logical unit

Storage pool: syncprep1

Classification: syncprep1-tekmkt-test

Available capacity: 3,044.56 GB

Allocation percentage: 53 %

Name: CFVMTemplates

Description: Location of Staging VHDS on HV1

Size (GB): 80

☒ Create thin storage logical unit with capacity committed on demand

☐ Create a fixed size storage logical unit with capacity fully committed

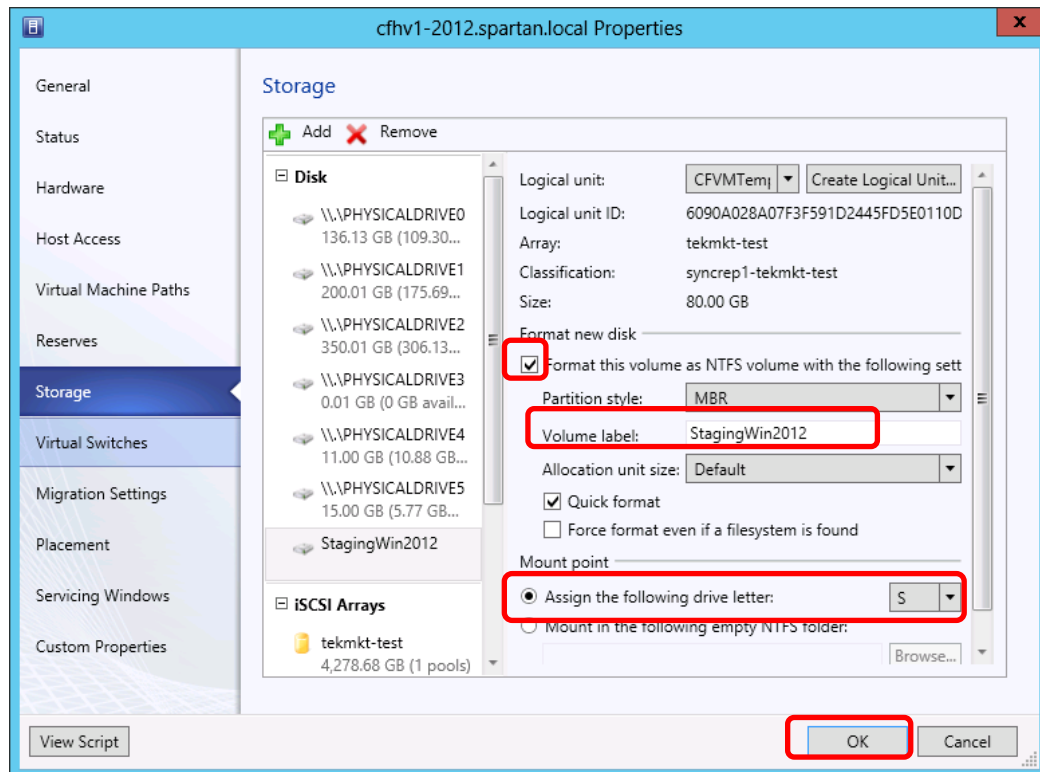
View Script OK Cancel

5. Enter the name of the new volume and description  
Enter the size of the volume. This volume will contain the OS and ISO initially.  
Click on "Create thin storage logical unit..." if desired  
Click **OK**.

**Note:** In this example the logical unit size has enough capacity for both the new virtual hard disk file and the installer ISO that will be used to stage the VM. See [Appendix B](#) for steps to stage golden virtual machines.

Logical unit size calculation example: (75 GB VHDX file) + (5 GB for the ISO) = (80 GB logical unit)

## Format the volume and assign mappings



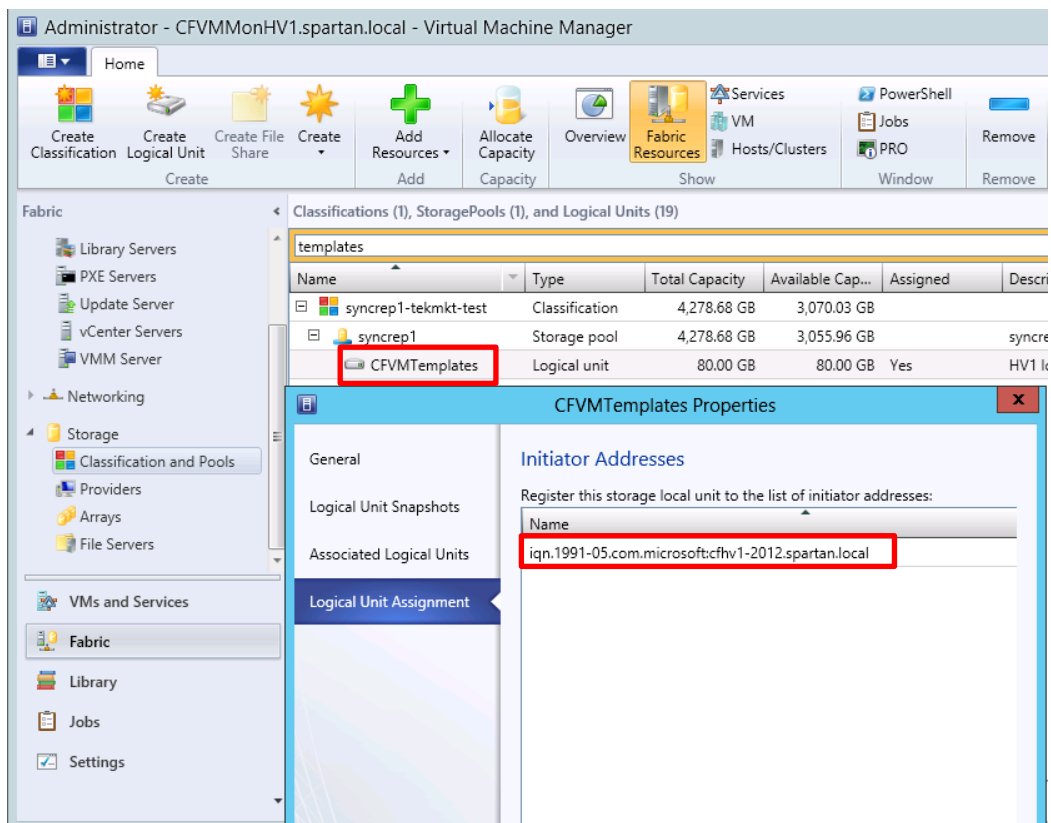
6. Check **"Format this volume as NTFS volume with the following settings"**
7. Enter a volume label (StagingWin2012 in this example)
8. Assign the drive letter (this example is using S:) and then click **OK**.

Status:	<div><div></div></div> 99 %	Step	Name	Status	Start...	End...
Command:	Set-SCVMHost	1	Change properties of virtual machine...	<div><div></div></div> 99 %	9/24/...	9/24/...
Result name:	cfhv1-2012.spartan.local	1.1	Registers Storage Logical Unit to host...	Completed	9/24/...	9/24/...
Started:	9/24/2013 2:13:20 PM	1.2	Mounts storage disk on cfhv1-2012.sp...	Completed	9/24/...	9/24/...
Duration:	00:00:05					
Owner:	SPARTAN \Administrator					

**Note:** Use the Jobs workspace to view the status of the creation of the volume.



## Verify the provisioned volume on the host



The properties page **Logical Unit Assignment** will indicate the initiator addresses assigned to this volume which in our case is to the CFHV1-2012 Hyper-V host.

This process may be repeated for other volumes connected to this host such as the destination for VMs and ISOs.

See also [Appendix A: "Volume Provisioning through SCVMM using PowerShell"](#)

## 7.3 Volume Provisioning through Windows File and Storage Services

This method will be used to create a volume on the SCVMM library server which is not a managed Hyper-V host. The purpose of this volume in relation to this document will be to store the golden prepared virtual hard disk image.

**Note:** The following is an example of creating the Dell EqualLogic volume for the VM Templates as a target for the Staging virtual hard disk.

The Dell EqualLogic array volume will be created through Windows File and Storage Services. The volume created will be converted to a Dell EqualLogic “Template” volume to be used as the source of the gold VM template.

The steps to create a Dell EqualLogic volume with Windows File and Storage Services are as follows:

On the SCVMM Server (or Library Server)

- Select the Dell EqualLogic storage pool
- Create a virtual disk on Windows File and Storage Services (which creates a Dell EqualLogic volume)
- Create a Volume from the virtual disk with Windows File and Storage Services
- Format, label and assign a drive letter or mount the volume
- Share the volume - which is necessary in order to add to the SCVMM Library Server and store the VM template.

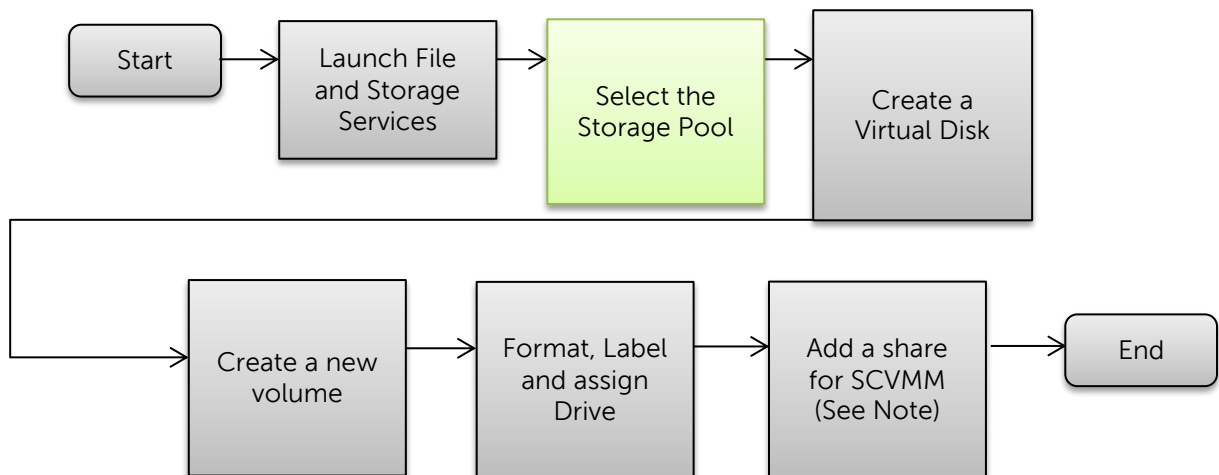
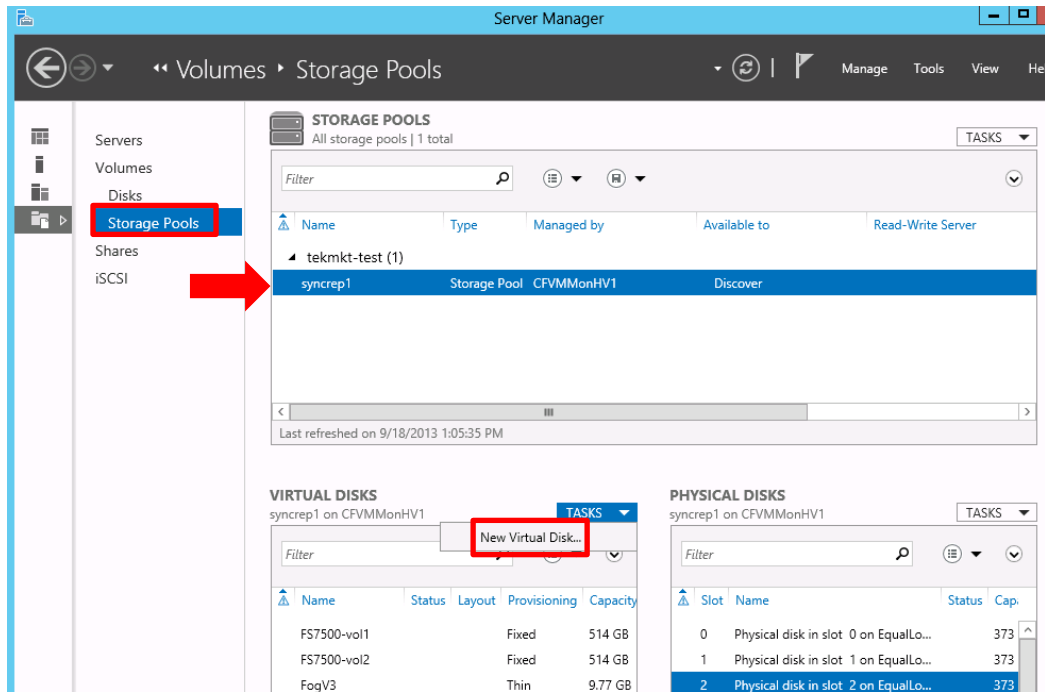


Figure 4 Process flow for creating a volume exclusively through File and Storage Services

**Note:** Since the purpose of this volume is for later use as a template volume a share will need to be created so the SCVMM Library server will be able to have access. Adding a share may be optional for other use cases.

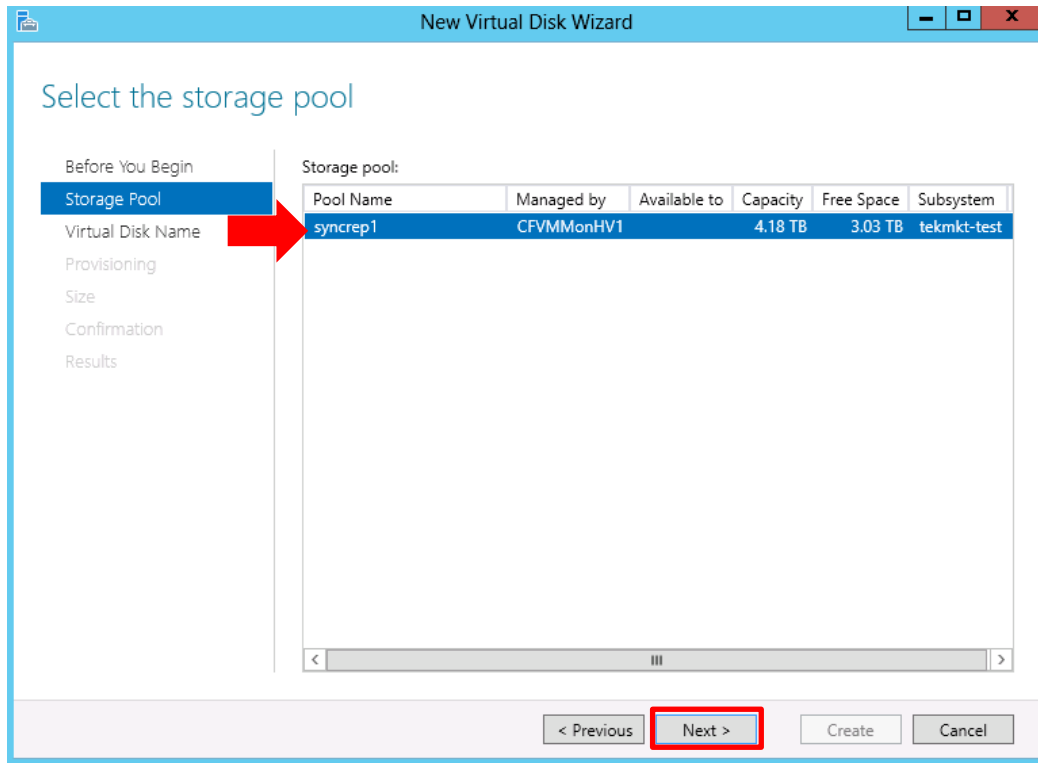
## Volume Provisioning through Windows File and Storage Services



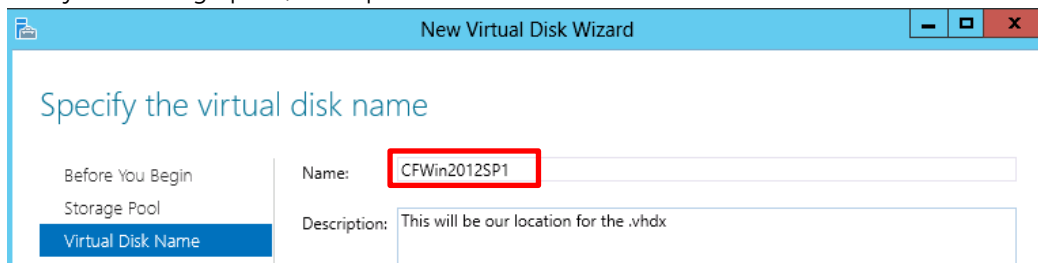
1. On the SCVMM Servers' Server Manager UI, "File and Storage Services" click **Storage Pools** -> then select the appropriate Dell EqualLogic storage pool (syncrep1 in this example), drop down **TASKS** under **VIRTUAL DISKS** and click on "**New Virtual Disk...**"

The Storage Pools will be discovered through Windows File and Storage Services since the SMP provider was enabled through [ASM/ME earlier](#).

## Select an available storage pool

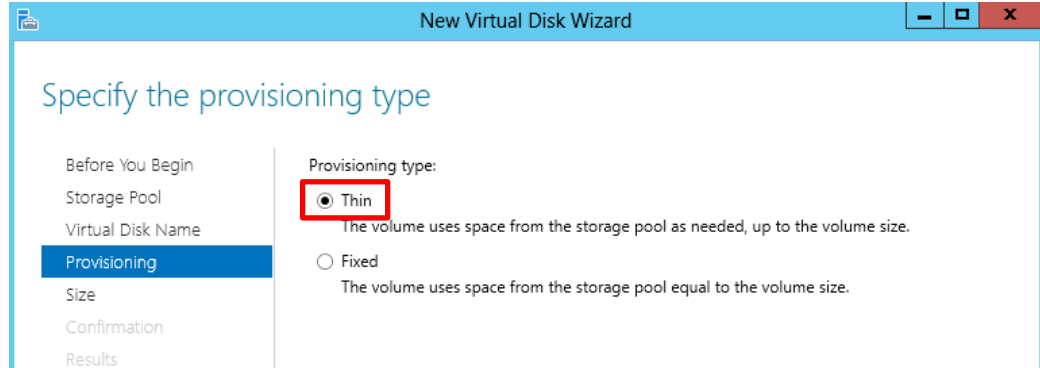


2. Verify the Storage pool, free space and click **Next**

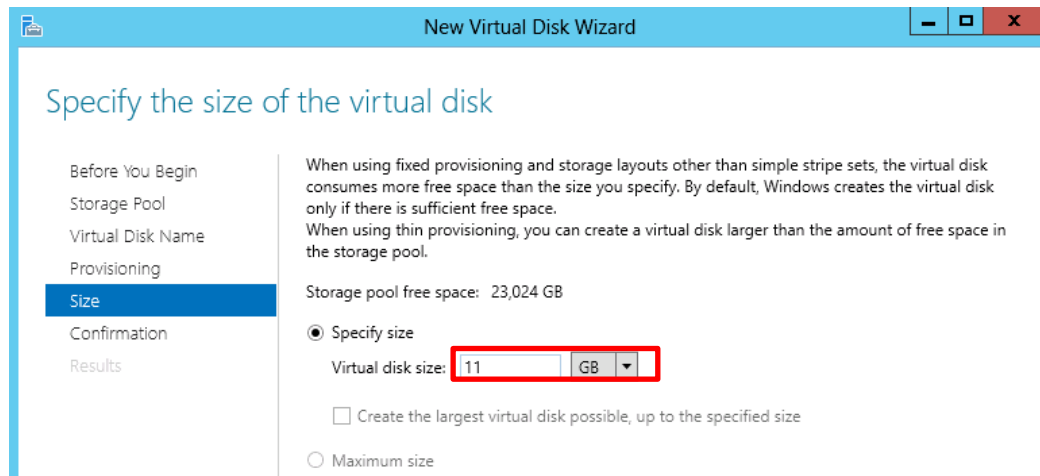


3. Enter a unique virtual disk name and click **Next**.

## Specify the volume provisioning type



4. Select Provisioning type. Thin for the most efficient means of provisioning storage. Click **Next**.



5. Select the appropriate unit from the dropdown and enter the appropriate size to contain the .vhdx of the prepared VM.

**Note:** The unit defaults to TB (Terabyte)

## Confirm Virtual Disk details

The screenshot shows the 'New Virtual Disk Wizard' window with the 'Confirm selections' step selected in the left-hand navigation pane. The main area displays the following information:

Confirm that the following are the correct settings, and then click Create.

VIRTUAL DISK LOCATION	
Server:	CFSCVMM2K12SP1
Subsystem:	tekmlab
Storage pool name:	R6
Status:	OK
Free space:	22.5 TB

VIRTUAL DISK PROPERTIES	
Name:	CFWin2012SP1
Description:	This will be our location for the .vhdx
Storage layout:	RAID6
Provisioning type:	Thin
Requested size:	11.0 GB

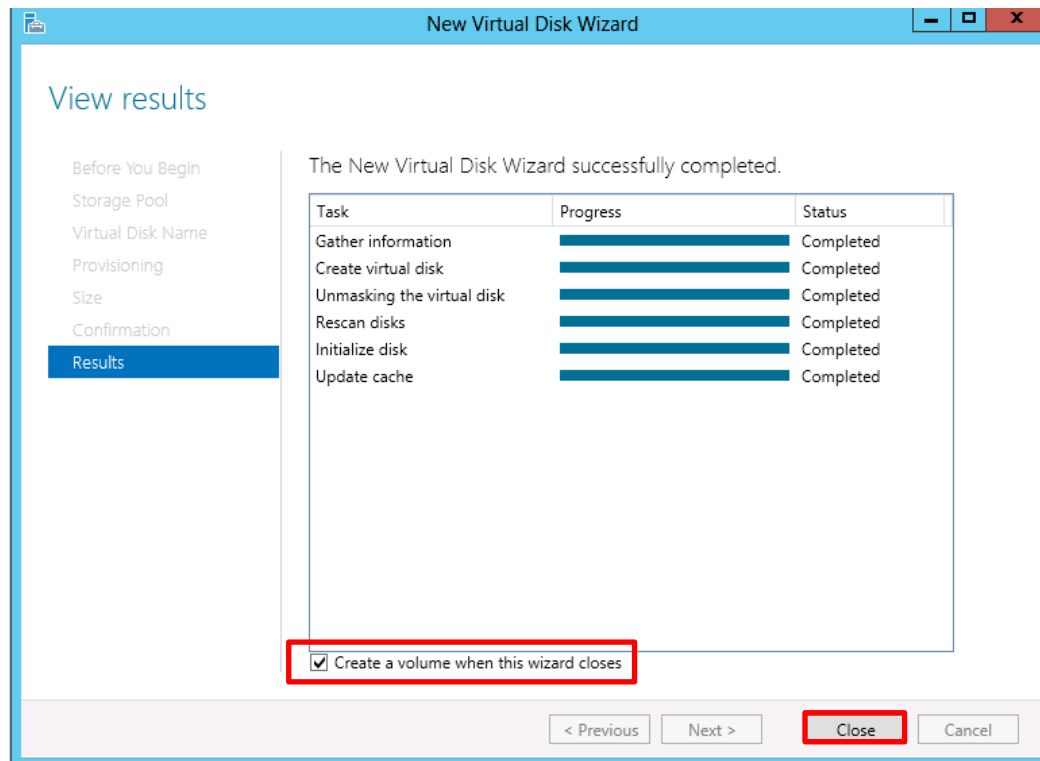
UNMASK VIRTUAL DISK	
Initiator Port:	iqn.1991-05.com.microsoft:cfscvmm2k12sp1.dm.tme.com
Servers:	CFSCVMM2K12SP1
Targets:	Auto iSCSI

At the bottom of the window, there are four buttons: '< Previous', 'Next >', 'Create' (highlighted with a red rectangle), and 'Cancel'.

6. Review the selections and click **Create**.

**Note:** The virtual disk locations indicate the Subsystem (PS Series Group) and Storage Pool (PS Series Pool).

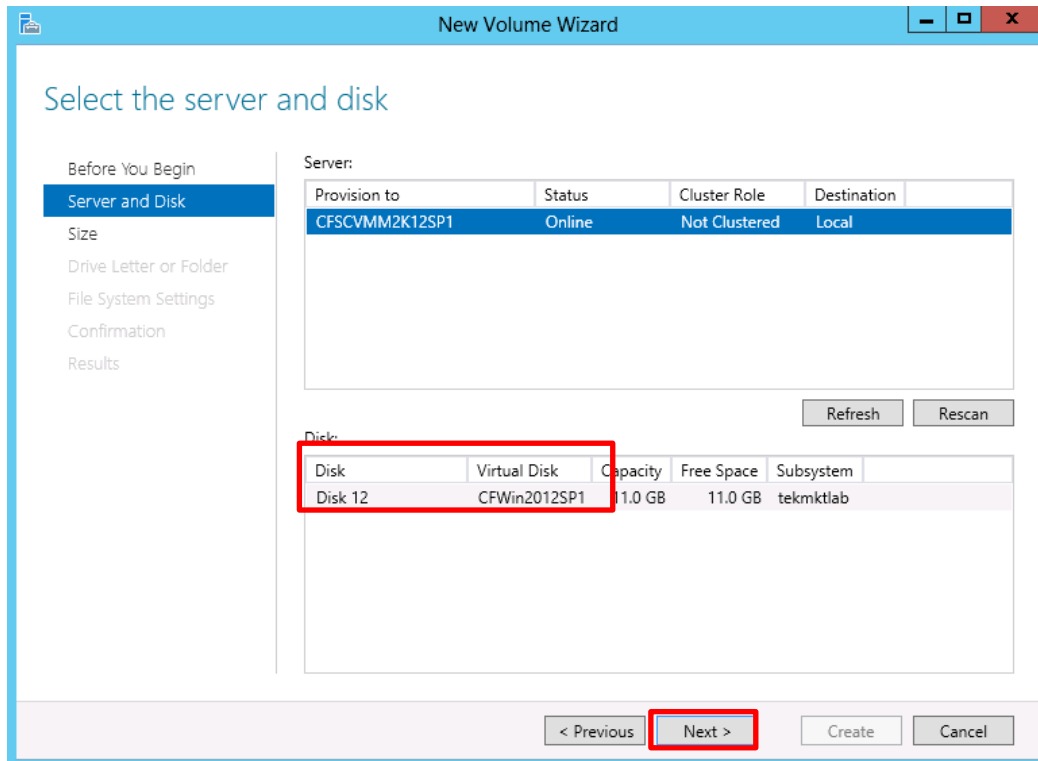
## Create the volume



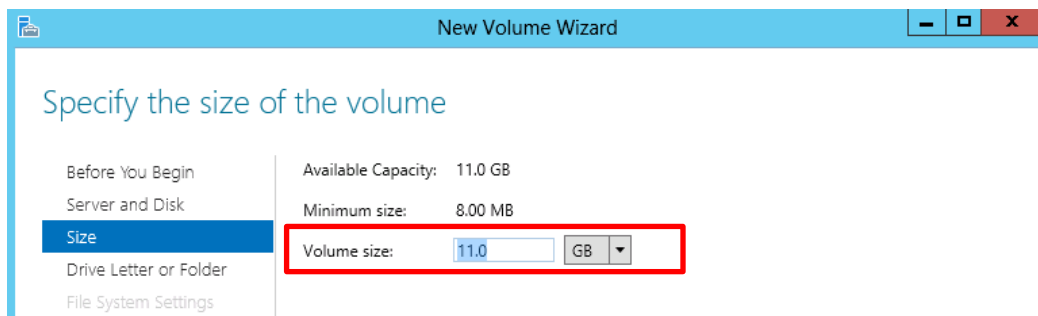
7. Be sure the check box is on for **"Create a volume when this wizard closes"** and click **Close** (will prompt for the create volume wizard).

**Note:** The virtual disk created will create the Dell EqualLogic volume on the PS Series pool specified. The volume from the File and Storage Services perspective is the storage visible to the Operating System and applications.

## Verify the disk is present



8. Verify the Virtual Disk (note the Disk number is provided). Click **Next**.



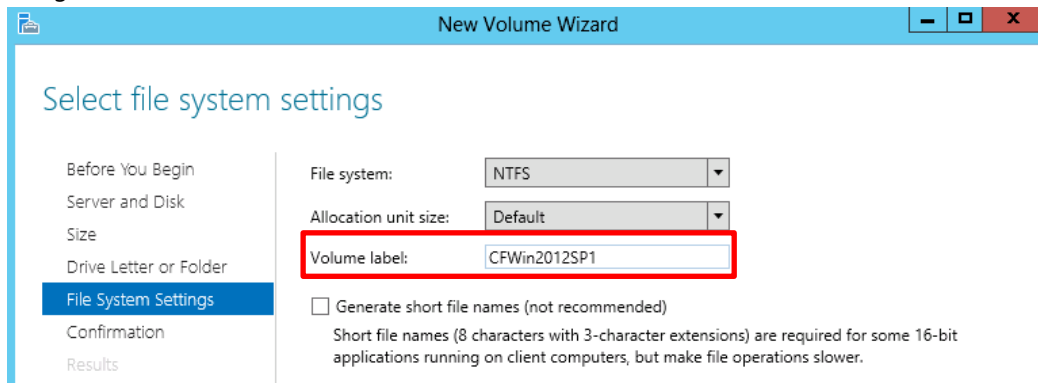
9. Confirm or adjust the size and click **Next**.



## Assign drive letter or folder mount

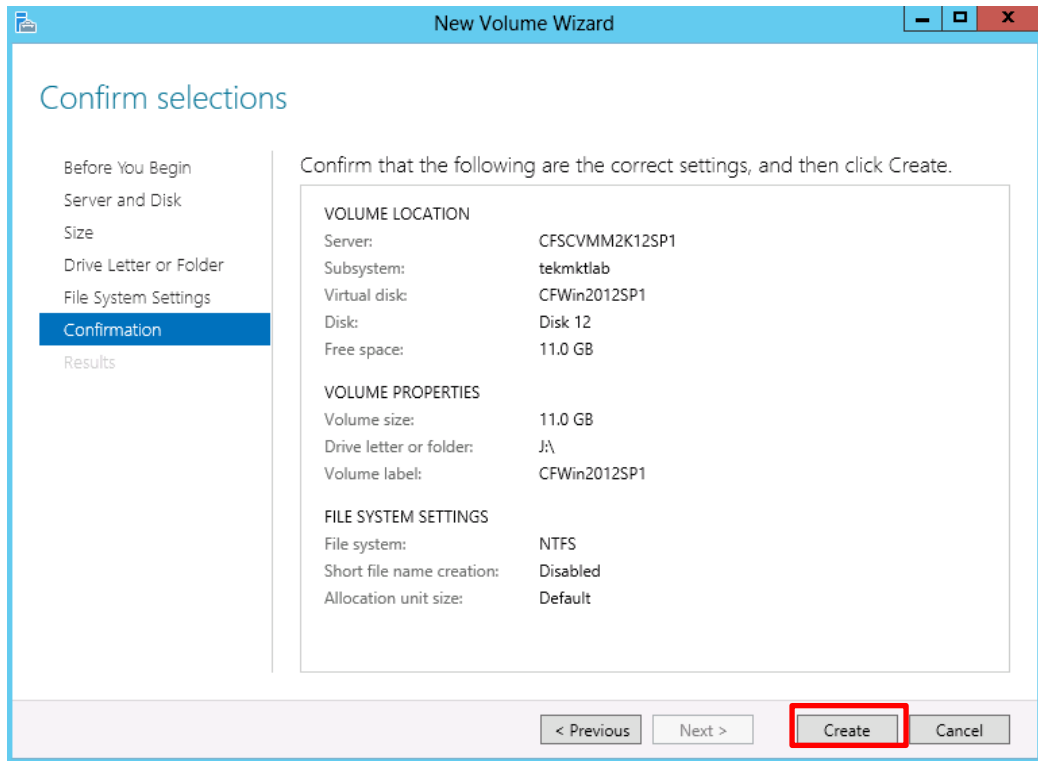


10. Assign the Drive letter and click Next



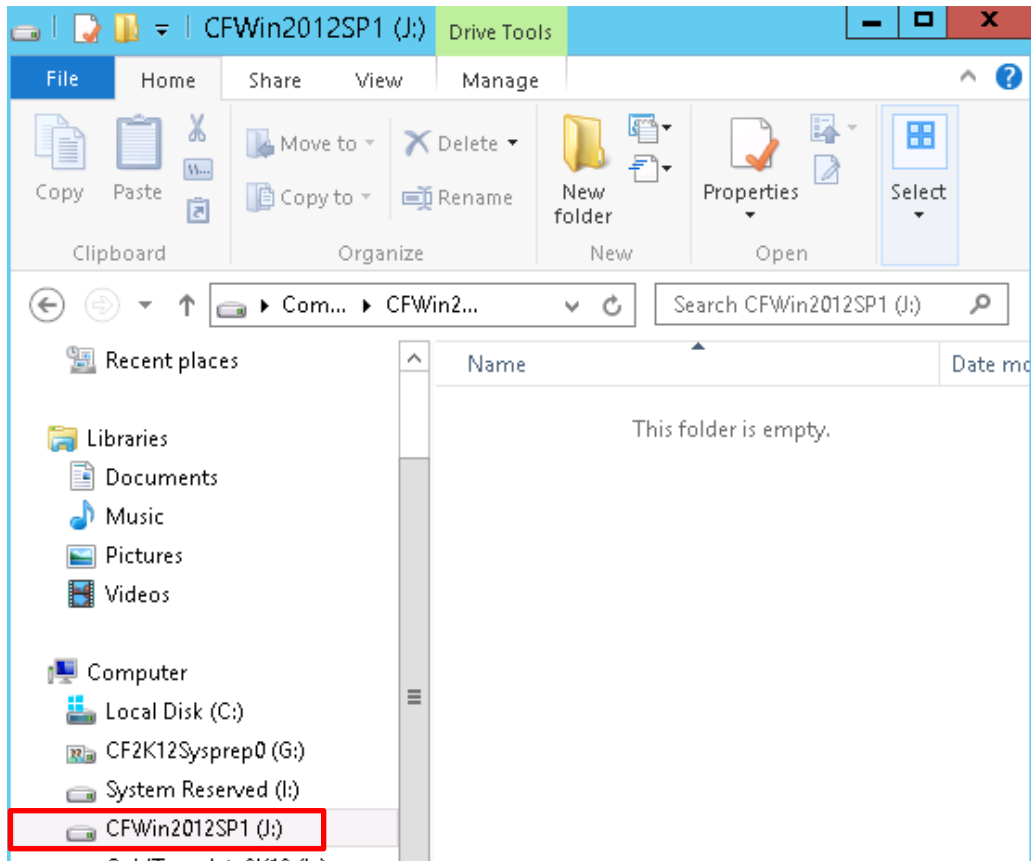
11. Enter a volume label and click **Next**.

## Verify configuration settings



12. Confirm the selections and click **Create**. When the results display click **Close** (not shown).

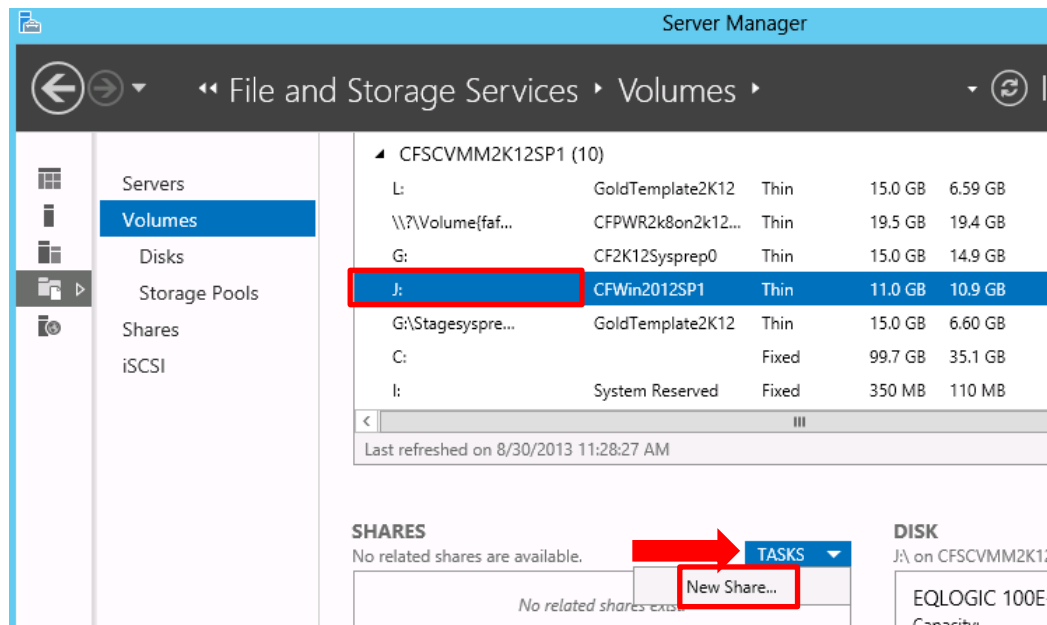
## View the new volume in Windows Explorer



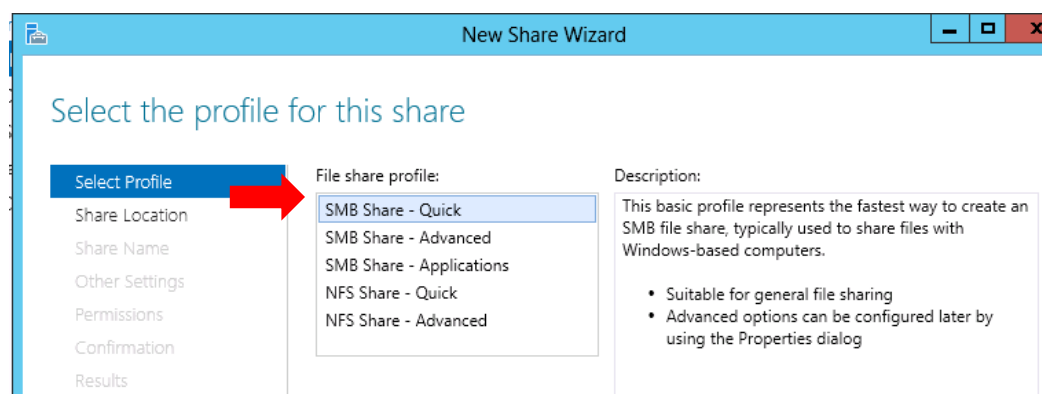
See also [Appendix A: "Volume Provisioning through File and Storage Services using PowerShell"](#)

## 7.4 Add a Share to the volume for SCVMM Library access

The purpose of the volume created in the previous step is to be able to access the virtual hard disk from the SCVMM Library server to create a VM template. The volume must be shared for the SCVMM Library Server to access and manage the virtual hard disk file. For other use cases sharing the volume may be optional.



13. Share the folder by clicking on the new volume "J:" in our case in the **Volumes** panel. Then in the **SHARES** section click **TASKS** and then "New Share..."



14. Click on the appropriate File share profile. For this example "SMB Share –Quick". Then click **Next**.

## Select the share location

The screenshot shows the 'New Share Wizard' window with the 'Share Location' step selected in the left-hand navigation pane. The main area displays the 'Server' information and the 'Share location' options. The 'Server' table lists the server name, status, cluster role, and owner node. The 'Share location' section has two radio buttons: 'Select by volume' (selected) and 'Type a custom path'. Under 'Select by volume', a table lists available volumes with their free space, capacity, and file system. The 'J:' volume is highlighted with a red arrow. Below the table, a note states that the share location will be a new folder in the \Shares directory on the selected volume. At the bottom, the 'Next >' button is highlighted with a red box.

Server Name	Status	Cluster Role	Owner Node
CFSCVMM2K12SP1	Online	Not Clustered	

Volume	Free Space	Capacity	File System
G:\Stagesysprep2k12\LUN1	6.60 GB	15.0 GB	NTFS
I:	110 MB	350 MB	NTFS
J:	10.9 GB	11.0 GB	NTFS

The location of the file share will be a new folder in the \Shares directory on the selected volume.

☐ Type a custom path:

< Previous **Next >** Create Cancel

15. In the New Share Wizard verify the Volume location and click **Next**.  
The path will be on the volume just created under the folder named \Shares (default) which will be created through the New Share Wizard.

## Choose a name for the share

The screenshot shows the 'New Share Wizard' window with the 'Specify share name' step selected in the left-hand navigation pane. The 'Share name' field is highlighted with a red box and contains the text 'CFWin2012SP1'. Below it, the 'Share description' field contains the text: 'This Share will be for the template volume so SCVMM Library server will be able to access and provision VMs.' The 'Local path to share' field contains 'J:\Shares\CFWin2012SP1' and includes a note: 'If the folder does not exist, the folder is created.' The 'Remote path to share' field contains '\\CFVMMonHV1\CFWin2012SP1'. At the bottom right, the 'Next >' button is highlighted with a red box, along with 'Previous <', 'Create', and 'Cancel' buttons.

16. Provide a share name and click **Next**

The screenshot shows the 'Other Settings' step in the 'New Share Wizard'. The 'Other Settings' option is selected in the left-hand navigation pane. The 'Allow caching of share' checkbox is checked. Below it, the text reads: 'Caching makes the contents of the share available to offline users. If the BranchCache for Network Files role service is installed, you can enable BranchCache on the share.' The 'Enable BranchCache on the file share' checkbox is unchecked. Below it, the text reads: 'BranchCache enables computers in a branch office to cache files downloaded from this share, and then allows the files to be securely available to other computers in the branch.' A link 'Learn more about configuring SMB cache settings' is provided at the bottom.

17. Leave defaults or make changes as needed then click **Next**.

## Customize permissions on the share to allow for the SCVMM Library Server access

### Specify permissions to control access

Select Profile

Share Location

Share Name

Other Settings

**Permissions**

Confirmation

Results

Permissions to access the files on a share are set using a combination of folder permissions, share permissions, and, optionally, a central access policy.

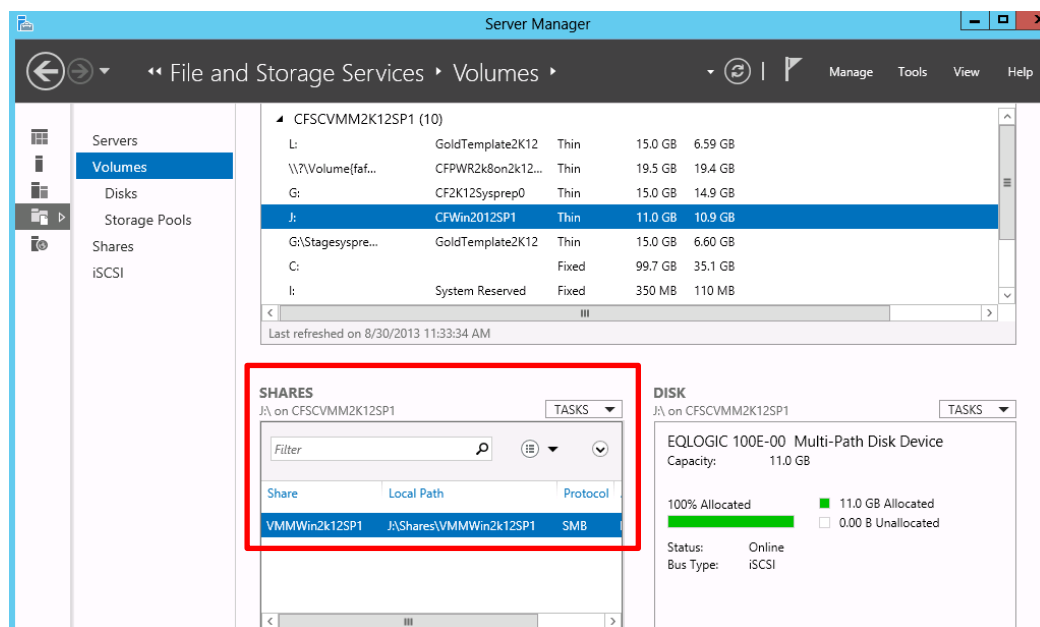
Share permissions: Everyone Full Control

Folder permissions:

Type	Principal	Access	Applies To
Allow	BUILTIN\Users	Special	This folder and subfolders
Allow	BUILTIN\Users	Read & execute	This folder, subfolders, and files
Allow	CREATOR OWNER	Full Control	Subfolders and files only
Allow	NT AUTHORITY\SYSTEM	Full Control	This folder, subfolders, and files
Allow	BUILTIN\Administrators	Full Control	This folder, subfolders, and files
Allow	BUILTIN\Administrators	Full Control	This folder only

Customize permissions...

18. In the New Share Wizard verify the appropriate Share permissions are set. Click **Next**. Then on the Confirmation Click **Create** and finally **Close** after the share has been successfully created.



Share is now visible in Windows File and Storage Services in the SHARES section

**Note:** This share will be later added the SCVMM Library server for SAN Copy capable VM Templates



## 8 Creating VM Templates

VM Templates provides an efficient means to quickly deploy standardized, approved virtual machines according to the organizations policies and compliance criteria. The ability to create a golden copy of an operating system with predefined hardware and guest operating system profile settings and then provision that copy throughout the infrastructure enables the efficiencies, availability and performance offered by intelligent storage subsystems.

Dell EqualLogic arrays offer the ability to provision new virtual machines using high performing and space efficient Thin Clone technology. Thin Clones are read write links to the original volume (which is referred to as a Template volume) and will contain the changes or differences. On the destination Hyper-V host this Thin Clone will be mounted to the target Dell EqualLogic volume specified and iSCSI connections to the thin clone will be established.

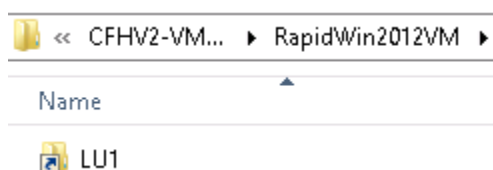


Figure 5 Example of the mount to the Thin Clone on the destination Hyper-V host

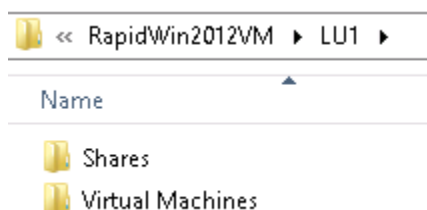


Figure 6 Example of the contents of the mount for the Thin Clone on the destination Hyper-V host

More information on Template volumes and Thin Clones may be found in the document *"Dell EqualLogic Template Volumes and Thin Clones: How and When to Use Them"* <http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19861241.aspx>





### VM template types:

SCVMM has the ability to create both Network copy and SAN Copy Capable VM Templates. SAN Copy capable implies the use of the SAN Subsystem to provision the target virtual machine through a process known as rapid VM provisioning. This will be the technique described in this document because of the efficiencies this method provides. Network copy deployment is also available for Dell Storage solutions however the network and a fully provisioned volume will be used as the delivery mechanism.

### VM transfer type usage examples:

#### Network copy transfer

- To create the blank virtual machine from an ISO will use the Network copy method. An example of this is provided in [Appendix B](#) when the staging VM is created.

#### SAN Copy Capable transfer

- Rapid provisioning of virtual machines whose VM templates resides on Dell EqualLogic storage.

**Note:** Rapid provisioning describes the underlying process for transferring data when deploying virtual machines. SCVMM only briefly displays "Rapid deploy using SAN copy" during the Create virtual machine operation in the Job viewer.




Step	Name	Status
 1	Create virtual machine	 81 %
 1.1	Rapid deploy using SAN copy	Completed

Figure 7 Rapid deploy progress during Create virtual machine

For more information on rapid VM provisioning see the TechNet Library article:

<http://technet.microsoft.com/en-us/library/gg610594.aspx>



## Process for creating VM templates on Dell EqualLogic "Template" volumes

1. Create a Dell EqualLogic volume on SCVMM using File and Storage Services or EqualLogic Group Manager
2. Options to create the gold image virtual hard disk:
  - a. Create a VM from an ISO and Sysprep – [Click here for steps](#)
  - b. Use an existing virtual hard disk file

**Note:** The steps below will outline how to create a VM Template with a pre-existing virtual hard disk on a Dell EqualLogic volume.

3. Copy a virtual hard disk file (.vhd or .vhdx) to a Dell EqualLogic volume
4. Select the method of rapid virtual machine provisioning
5. Convert the volume to a Dell EqualLogic "Template" volume
6. Share the volume from the SCVMM Management host then add the share to the SCVMM Library server
7. Verify the host groups have access to the share
8. Create the VM template in SCVMM

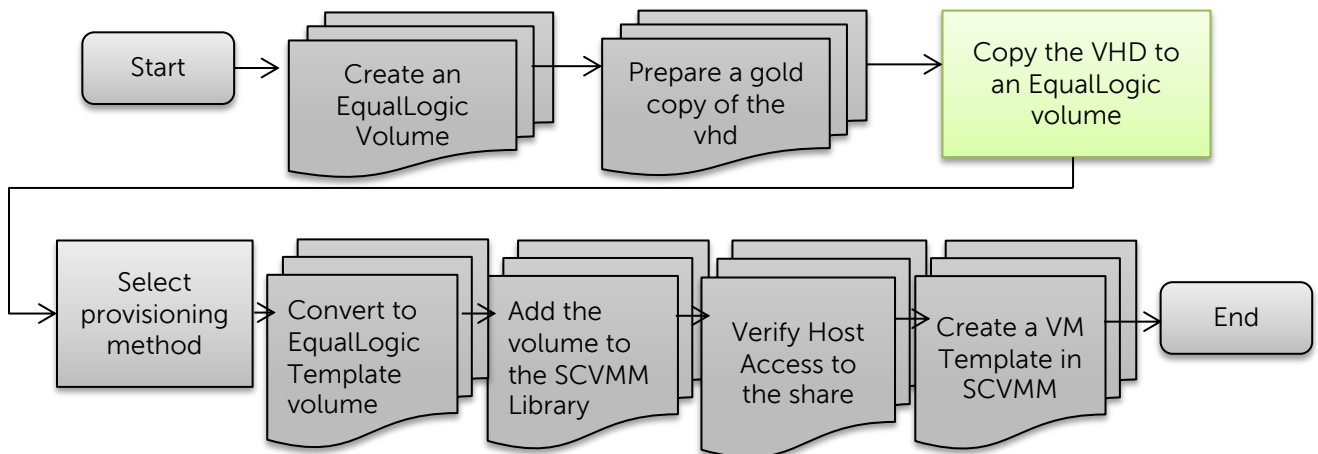


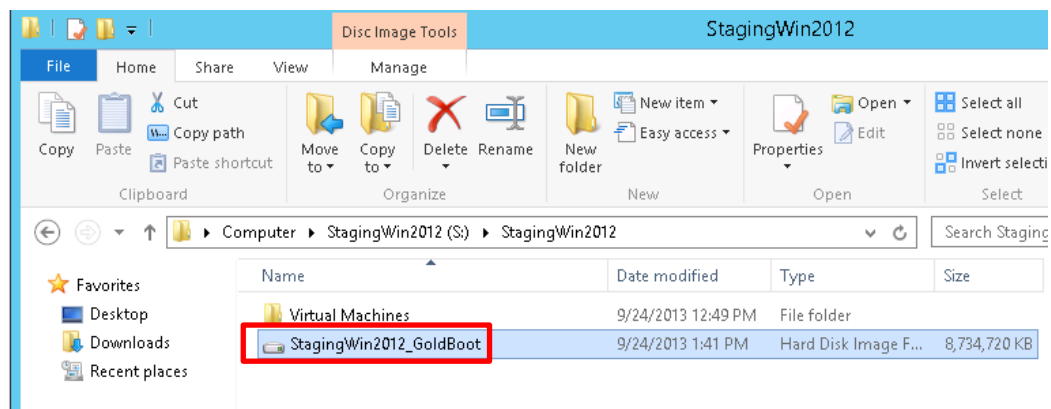
Figure 8 Process to Create VM Template on Dell EqualLogic Storage

## 8.1 Copy the virtual hard disk to the Dell EqualLogic volume on the SCVMM Library server

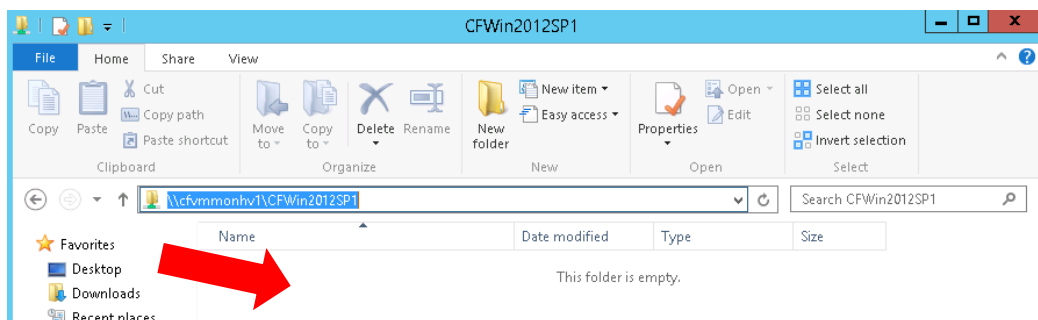
Below is an example of copying a virtual hard disk between the sources staging volume to the target volume (which is located on the SCVMM server in this demonstration). Once a gold virtual hard disk is available; copy the file (.vhd or .vhdx) to the final location to be used as a VM template.

The process below should be used as an example. The gold VM preparation from an ISO is described in [Appendix B](#).

1. From the SCVMM Server open File Explorer and navigate to the Hyper-V server which has the shared volume containing the golden image of the operating system virtual hard disk.

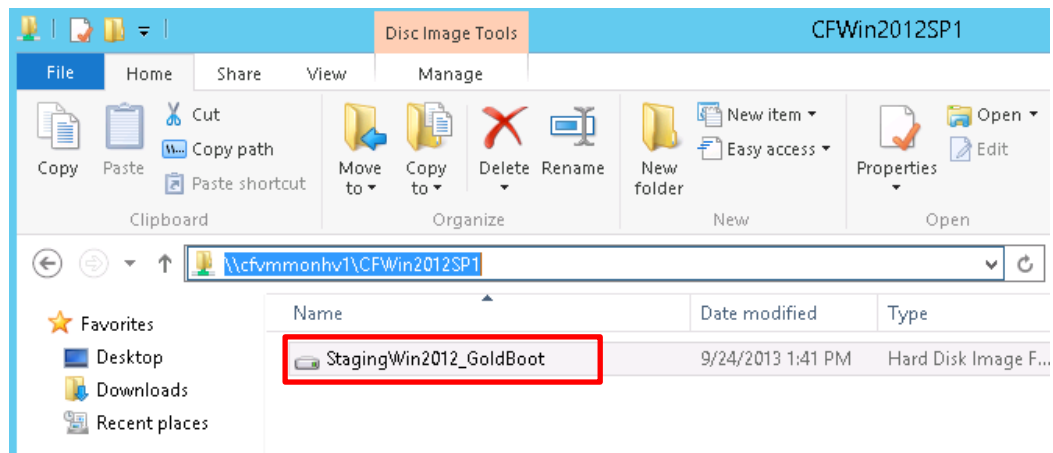


2. Browse to the location of the virtual machine and select the Hard Disk Image file and copy. In this example the vhdx file which is located on the Hyper-v server is \\CFHV2-2012\CFHV2-VMDes\StagingWin2012



3. Navigate to the Dell EqualLogic volume that will be used as a Library Server. In this example the library share is located on the SCVMM server "CFVMMonHV1" here: (\\cfvmmmonhv1\CFWin2012SP1).

Paste the .vhdx file and monitor the copy process until completion.

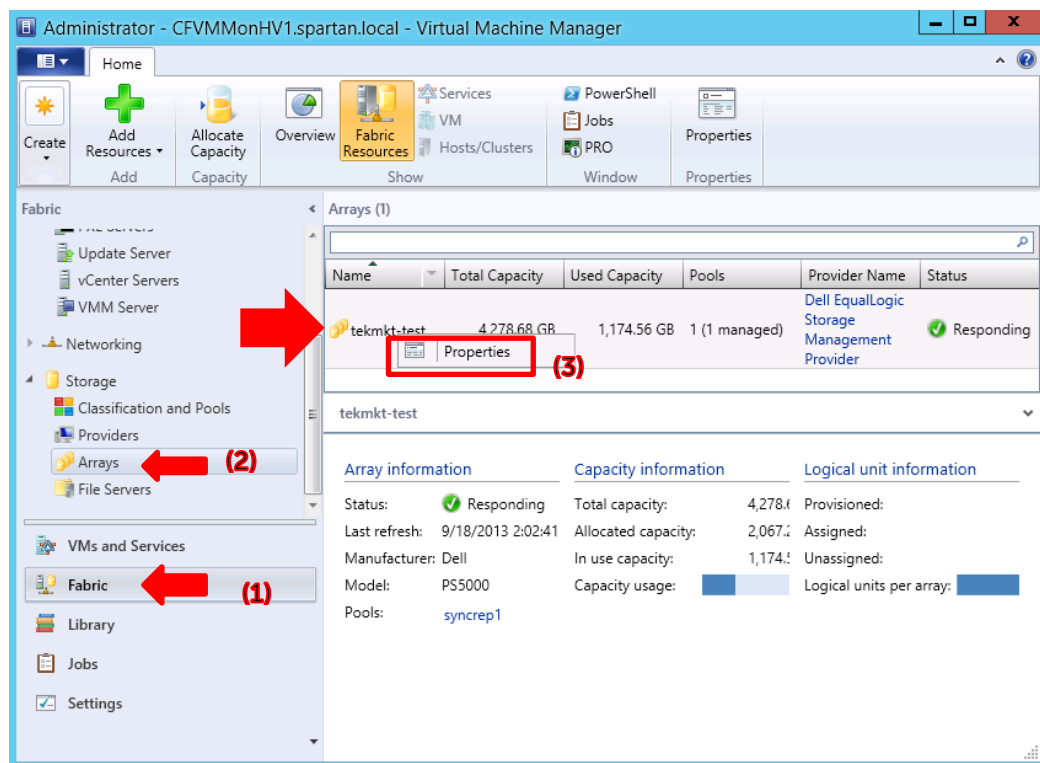


The .vhd or .vhdx file should now be located on the SCVMM Library server (in this case the SCVMM server also serves as a library server). The volume is located on the PS Series pool imported previously.

## 8.2 Select the method of rapid VM provisioning

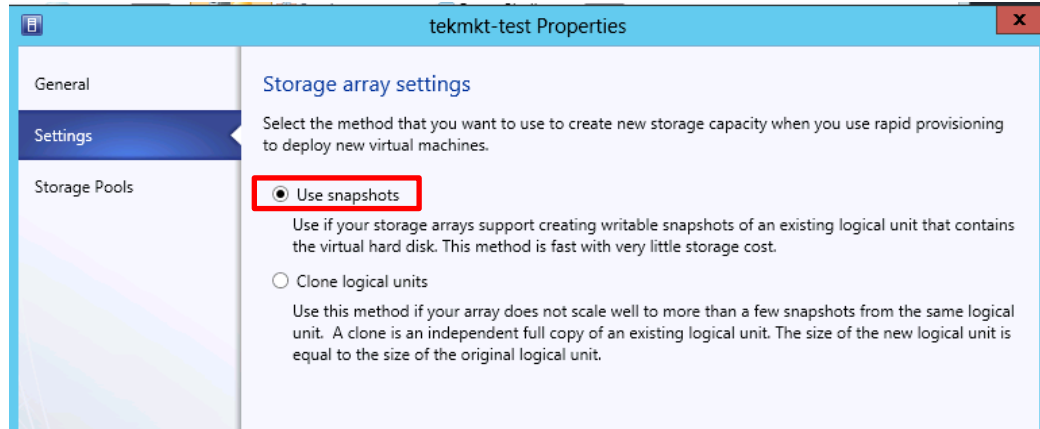
Dell EqualLogic SMP supports rapid VM provisioning through the use of Thin Clones of template volumes. Since the thin clone contains the differences from the template volume the provisioning method recommended will be to use snapshots.

**Note:** This use of snapshots in this reference is terminology that Microsoft uses with SCVMM and does not imply using the Dell EqualLogic snapshot or Smart Copy technology.



1. Launch SCVMM UI and navigate to the **Fabric** workspace (1), expand the **Storage** node, click on **Arrays** (2). In the Arrays display area right mouse click on the Dell EqualLogic array that is intended to store the virtual machines, right mouse click and then click **Properties** (3).





2. In the settings tab, make sure the provisioning method is set to "Use Snapshots" for the group intended for rapid provisioning. These storage settings need to be set for each PS Series Group. Specifying snapshots will take advantage of the [Dell EqualLogic "Thin Clone"](#) technology for efficient deployment of VMs. Click **Ok**.

**Note:** "Clone logical units" is not recommended for rapid provisioning using Dell EqualLogic SMP in SCVMM because of the possible performance impact during provisioning and scale limitations due the space needed.

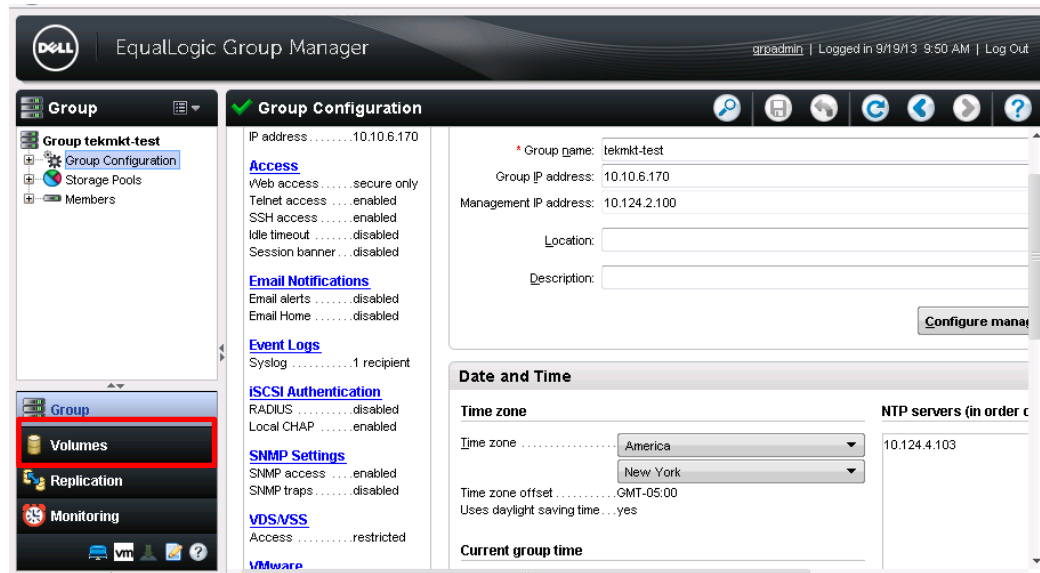
## Dell EqualLogic Template Volumes

The process to provision Virtual machines through Dell EqualLogic SANs requires a Read-only "Template" volume which creates linked Read-Write "Thin Clones" for each provisioned virtual machine. The "Template" volume will contain the prepared golden image of the operating system which will act as the source to SCVMM as a SAN Copy Capable VM Template.

The process to convert a volume to a "Template" volume will change the properties of the volume to Read-only so the .vhd or .vhdx file should be completely prepared and in a powered down state before proceeding.

**Note:** Since SCVMM does not have a native SMP command to convert a Dell EqualLogic volume to a Dell EqualLogic "Template" volume the next steps will have to use either the Dell EqualLogic Group Manager or PowerShell cmdlets.

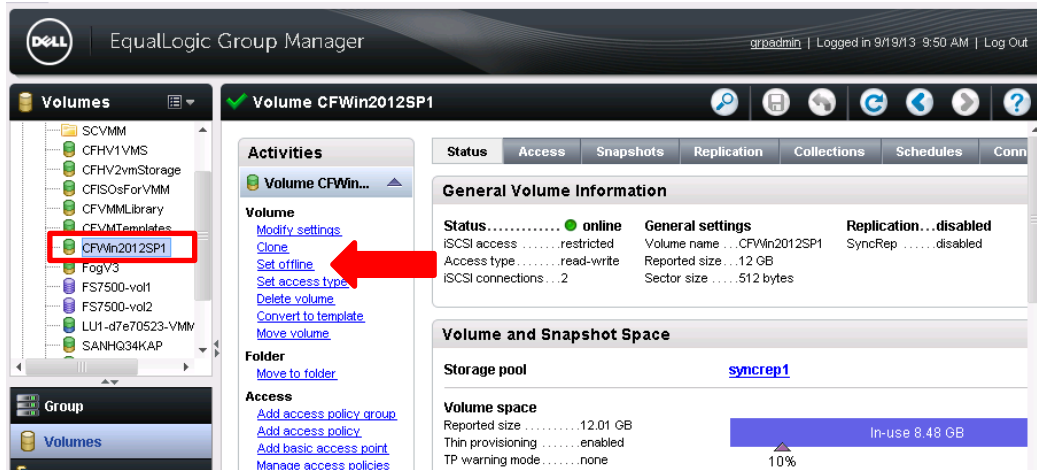
## 8.3 Option 1: Convert to “Template” volume with the Dell EqualLogic Group Manager



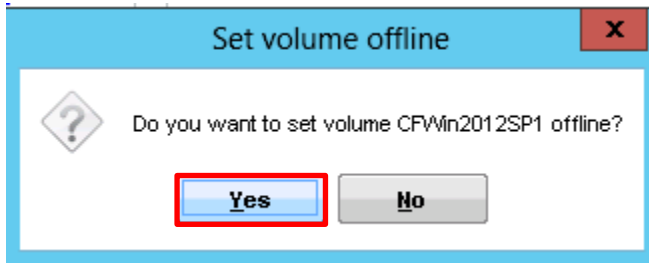
1. Launch the Dell EqualLogic Group Manager and navigate to **Volumes**



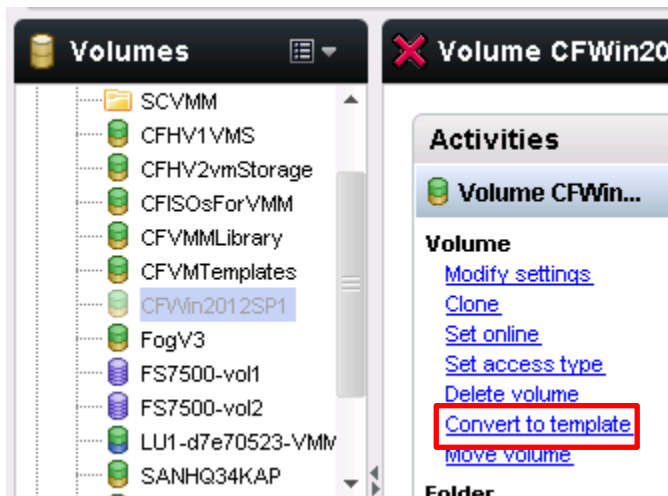
## Select the volume to convert, set offline and convert to template



2. Select the volume created for the template volume, [CFWin2012SP1](#) in this example.
3. Click on the **Set offline** under the Activities



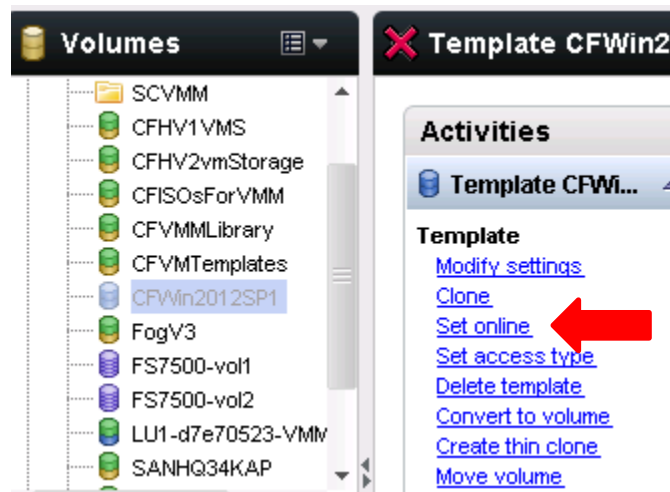
4. Click **Yes** for the confirmation warning.



5. Click **Convert to template** then **Yes** to the "Read only..." warning.



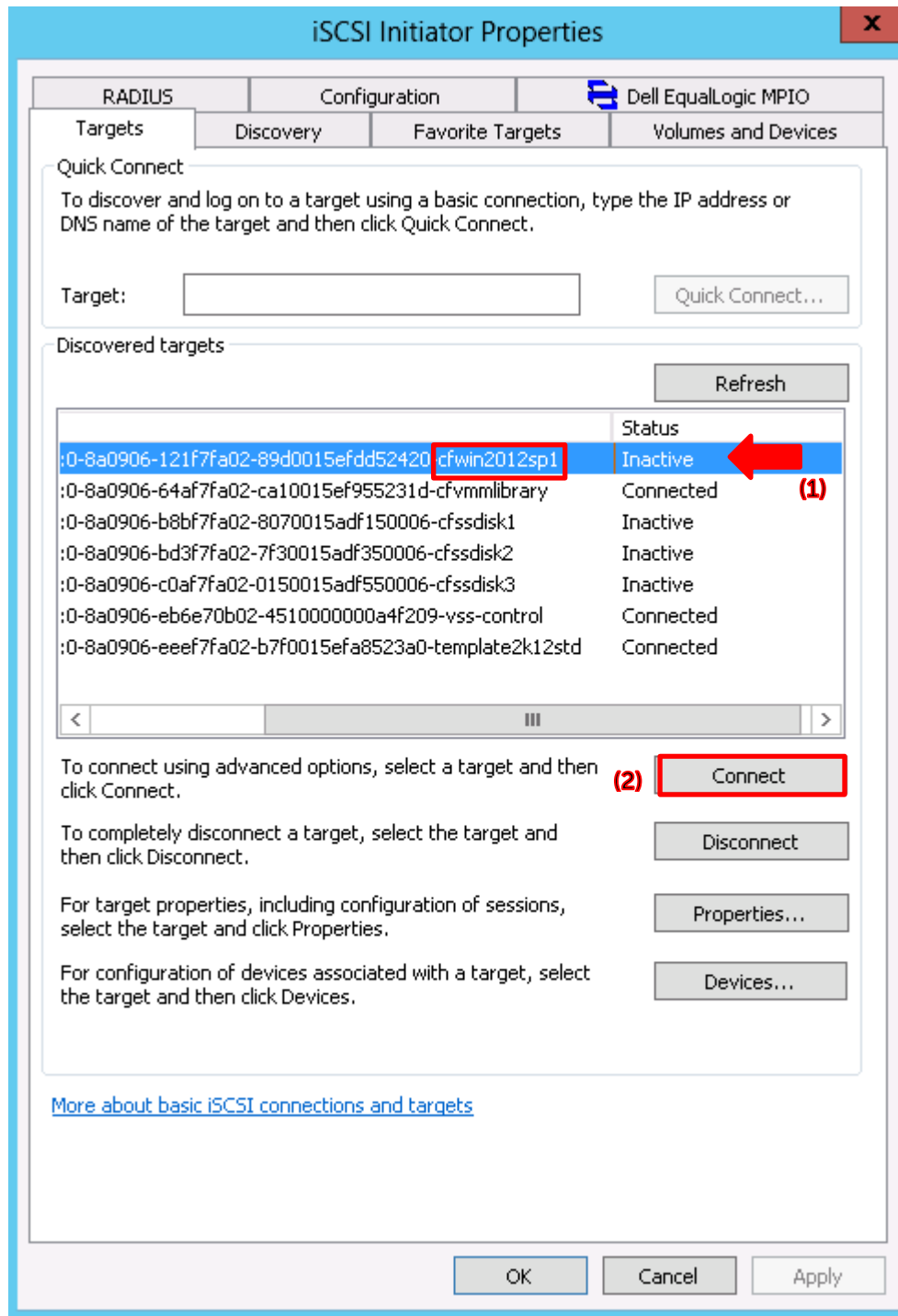
## Set the volume back online



6. Click **Set Online**. The Access should be enabled to the Microsoft iSCSI initiator for the SCVMM Library server.

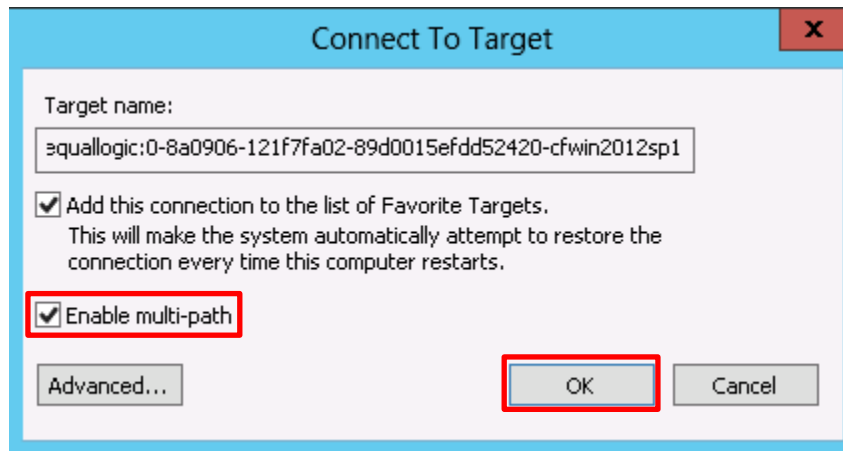
The volume is now read only and will need to be re-connected to the host.

## Reconnect using the Microsoft iSCSI Initiator



7. Launch the Microsoft iSCSI initiator tool select the target (volume) (1) and click **Connect** (2).

### Set connection parameters



8. Click on **Enable multi-path** then **OK**. If the steps were followed to [share this volume](#) previously then the share will be brought back online.

**Note:** If the volume is not online then use Windows Disk Management or File and Storage Services to bring the disk back online.

## 8.4 Option 2: Convert to “Template” volume with Dell EqualLogic PowerShell cmdlets

The steps below walk through each PowerShell cmdlet to convert a volume to a read only template volume. For a complete listing of this script please see the PowerShell section in [Appendix A](#).

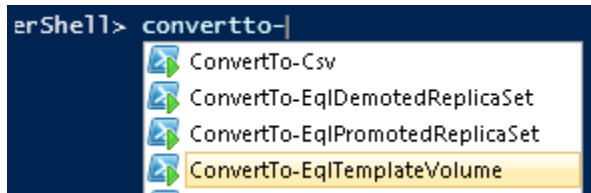


Figure 9 Intellisense available with Windows ISE

**Note:** Helpful ability of Windows ISE intellisense to show cmdlet options when only partial strings are entered.

1. Launch the PowerShell ISE

```
Import-Module -name "C:\Program Files\EqualLogic\bin\EqlPSTools.dll"
```

2. Import the Dell EqualLogic PowerShell module as shown above

Alternatives: launch the “EqualLogic PowerShell Tools” or use the [Dell EqualLogic Group Manager](#) GUI.

```
Get-StorageSubSystem|ft -Property `
    Friendlyname,Healthstatus,OperationalStatus -AutoSize
```

Friendlyname	HealthStatus	OperationalStatus
tekmt-test	Healthy	OK
Storage Spaces on CFVMMonHV1	Healthy	OK

3. Verify the connectivity to the PS Series group with the “*Get-StorageSubSystem*” cmdlet above

**Note:** Get-StorageSubsystem is a Windows Server 2012 PowerShell cmdlet



```
Set-EqlVolume -VolumeName CFWin2012SP1 `
-RaidTypePreference no_raid_type_preference
```

Volume 'CFWin2012SP1' changed successfully

4. Change the default Raid Preference to "Automatic" with the appropriate modifications to the cmdlet above.

**Note:** Dell EqualLogic PowerShell cmdlet. Modify the **VolumeName** as needed. The volume here contains the golden virtual hard disk file. See a list of the volumes used in this document [here](#).

When creating the volume through the windows interfaces the "Raid Preference" on Dell EqualLogic volumes will default to Raid 50. A "Raid Preference" of **Automatic** is needed for the creation of Thin Clones.

```
Set-EqlVolume -VolumeName CFWin2012SP1 -GroupName `
tekmt-test -StoragePoolName syncprep1 -OnlineStatus offline
```

Volume 'CFWin2012SP1' changed successfully

**Note:** Dell EqualLogic PowerShell cmdlet. Modify the **VolumeName**, **GroupName** and **StoragePoolName** as needed.

5. Enter cmdlet above with the appropriate modifications to take the Dell EqualLogic Volume offline:

```
ConvertTo-EqlTemplateVolume -VolumeName CFWin2012SP1 -GroupName `
tekmt-test
```

PSAPI.Cmdlets.ConvertToTemplateVolume CFWin2012SP1 completed successfully.

**Note:** Dell EqualLogic PowerShell cmdlet. Modify the **VolumeName** and **GroupName** as needed.

6. Convert the volume to template with the above cmdlet and necessary modifications.

```
Set-EqlVolume -VolumeName CFWin2012SP1 -GroupName `
tekmt-test -StoragePoolName syncprep1 -OnlineStatus online
```

Volume 'CFWin2012SP1' changed successfully

**Note:** Dell EqualLogic PowerShell cmdlet. Modify the **VolumeName**, **GroupName** and **StoragePoolName** as needed.

7. Enter the above cmdlet with the necessary modifications to bring the volume back online for use



```
$initaddress=(get-initiatorport)
$starport=(get-targetportal)
```

**Note:** Windows Server 2012 PowerShell cmdlet.

8. Enter the above cmdlets to obtain the Initiator ports to un mask this volume back to the OS

```
$IQN = (Get-VirtualDisk -FriendlyName "CFWin2012SP1" | Get-TargetPort).NodeAddress
$iSCSISession = Connect-iSCSITarget -NodeAddress $IQN
```

**Note:** Windows Server 2012 PowerShell cmdlet. Modify the **FriendlyName** as needed.

9. Enter the above cmdlets with appropriate modifications to connect the SCVMM host initiator to the Dell EqualLogic volume (iSCSI Target).

**Note:** Windows Server 2012 PowerShell cmdlet

```
Show-VirtualDisk -FriendlyName "CFWin2012SP1" `
-TargetPortAddresses $starport.PortNumber `
-InitiatorAddress $initaddress.NodeAddress
```

**Note:** Windows Server 2012 PowerShell cmdlet. Modify the **FriendlyName** as needed.

10. Enter the above cmdlet to bring the volume online

The above process will change the properties of the Dell EqualLogic volume to read-only and allow for links to Thin Clones for each provisioned VM.

## 8.5 Verify the template volume is shared

The volume containing the virtual hard disk was shared previously during the [volume provision through Windows File and Storage Services](#) process. However, if that step was not completed the volume will need to be shared using File and Storage Services, Windows Explorer (traditional method) or PowerShell.

The SCVMM Library Server will need access to this share in order to add the virtual hard disk to the SCVMM catalog for management.



## Verify the Share for the template volume

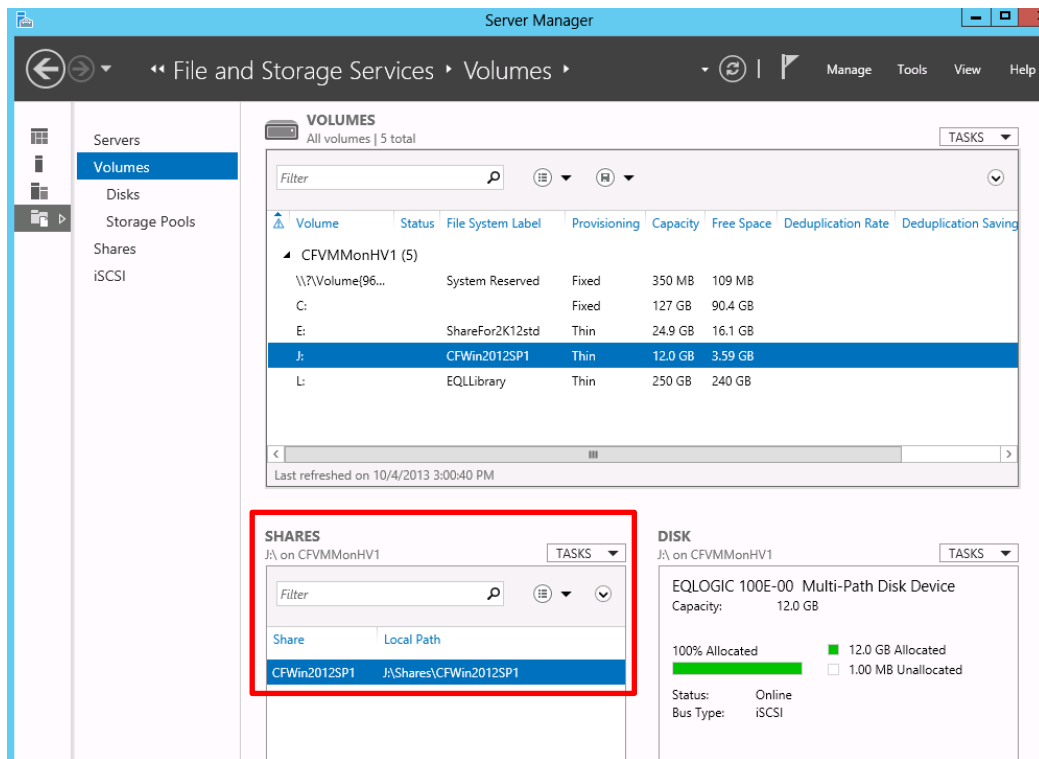
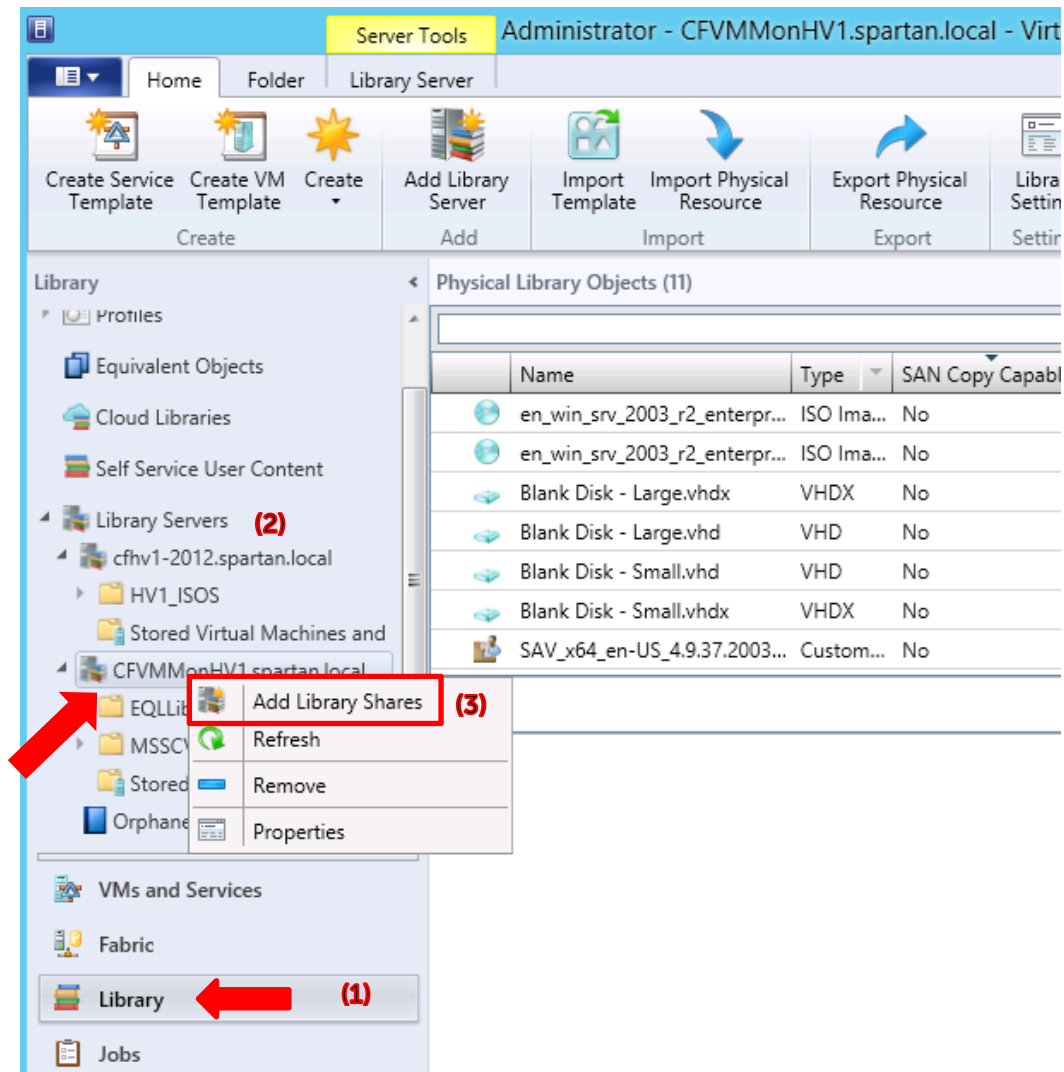


Figure 10 Share for the template volume

**Note:** For multiple VM templates the option is available to mount each Dell EqualLogic volume associated with the VM template under a single existing Share. This would allow for several operating systems to use fewer shares.

## 8.7 Add the template volume as a Library share

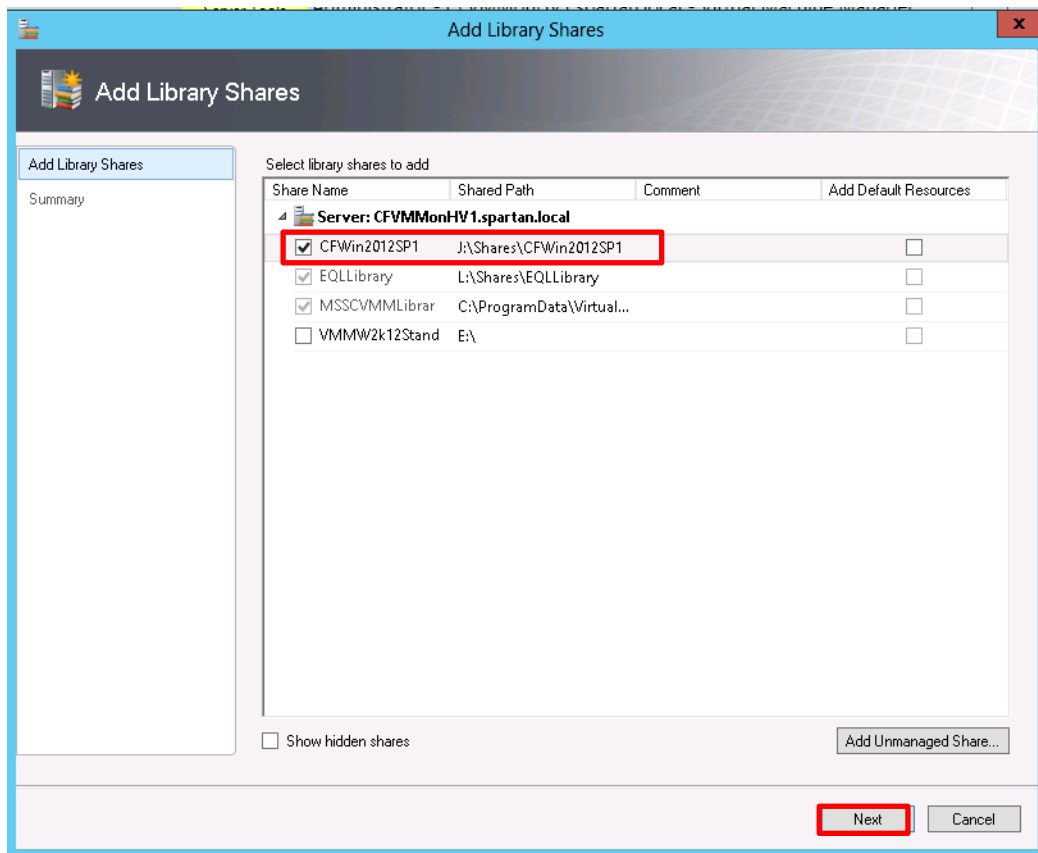
The share that contains the golden image of the virtual machine will be added to the SCVMM Library server (in this case the SCVMM server).



1. In SCVMM click on the **Library** (1) workspace and open the **Library Servers** (2) and then click the library server which this template volume is shared (in this case CFVMMonHV1). Right mouse click and then click "**Add Library Shares**" (3).



## Add the template volume as a Library share



2. Check the box next to the share that is the Dell EqualLogic template volume (CFWin2012SP1 in this example). Click **Next**.

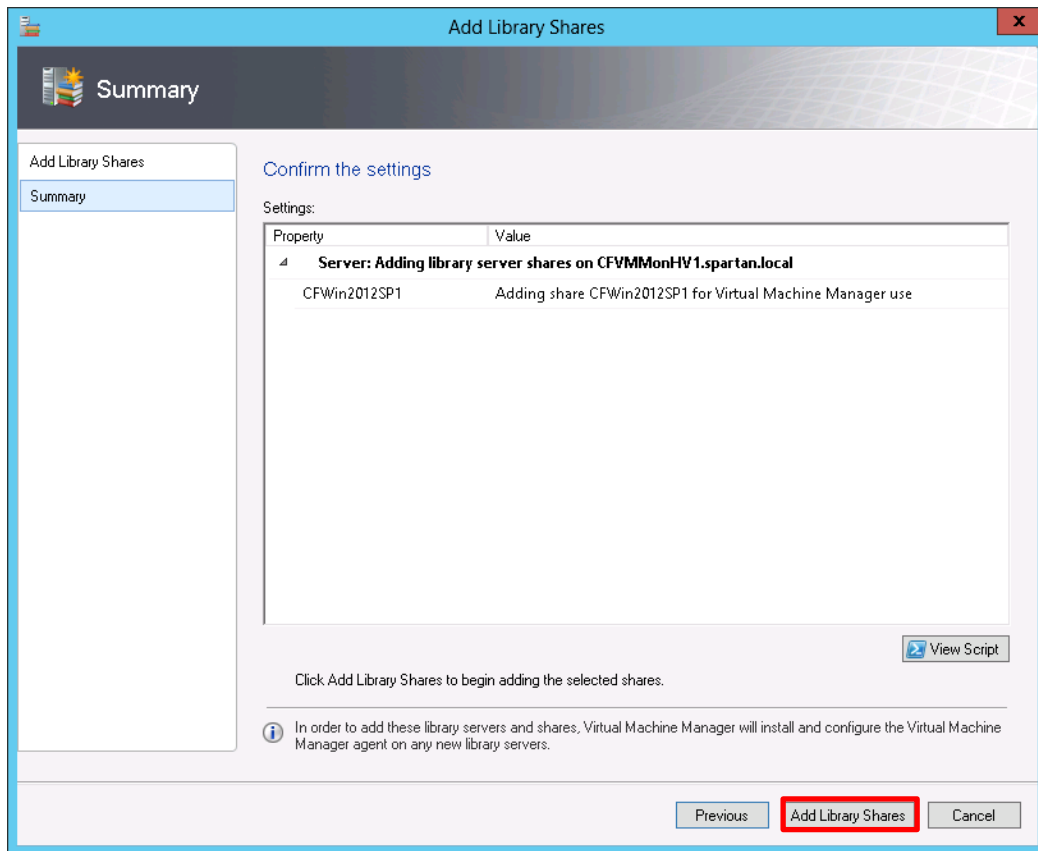
Table 2 Storage name mapping for this section

Share name	Volume Label (Drive Letter)	Virtual Disk = Dell EqualLogic Volume name	SCVMM Library Share	Server
CFWin2012SP1	CFWin2012SP1 (J:)	CFWin2012SP1	Yes	CFVMMonHV1

**Note:** The Windows Virtual Disk is the same name as the volume name on Dell EqualLogic storage.



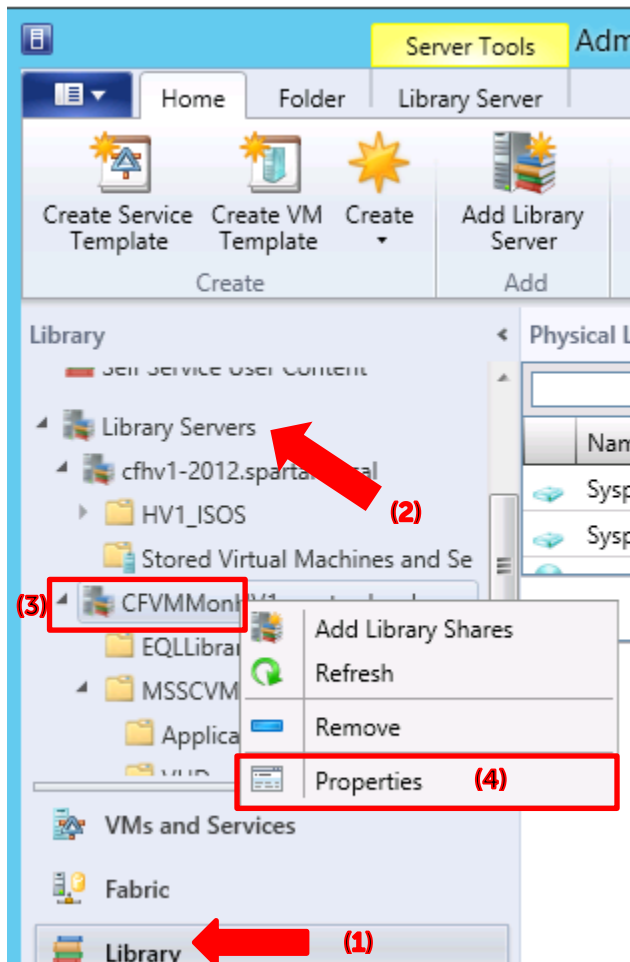
## Add the template volume as a SCVMM Library share



3. Click **Add Library Shares**. The jobs form will show the completed status of this task.

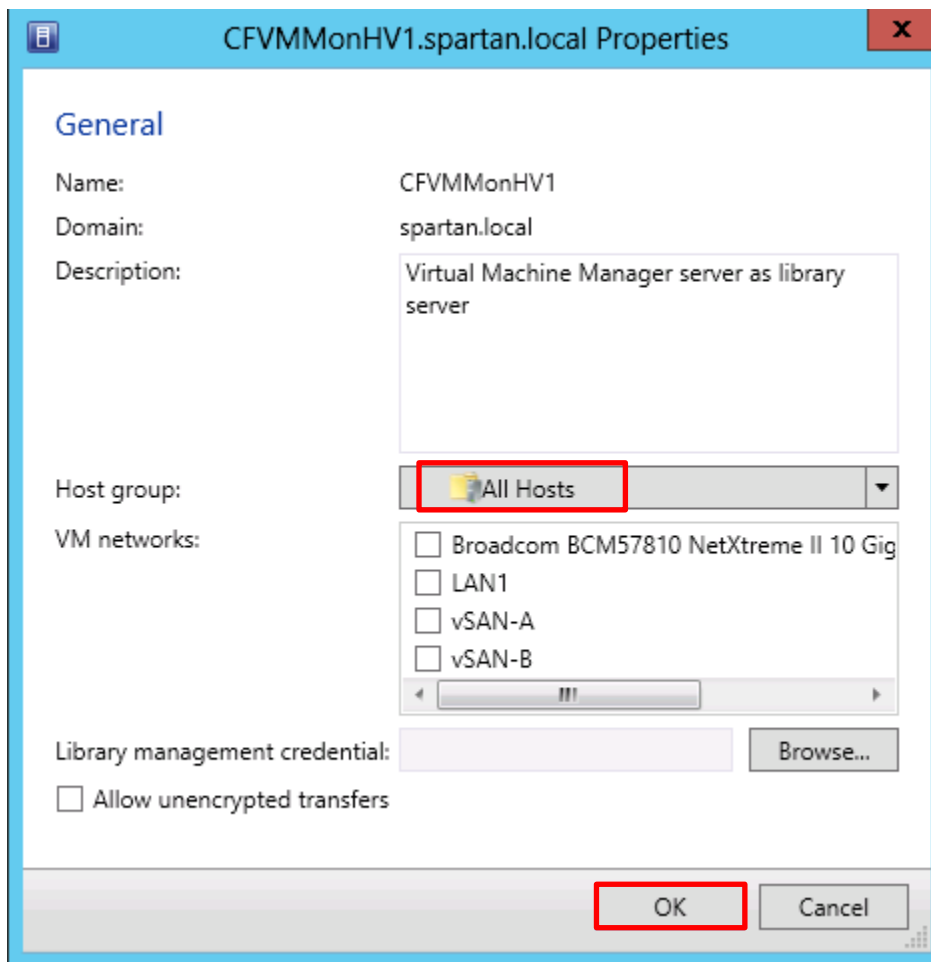
Wait a few minutes or from the Windows ISE execute the PowerShell cmdlet "Update-StorageProviderCache" to refresh the EqualLogic Provider resources.

Verify the library share is present under the SCVMM library servers



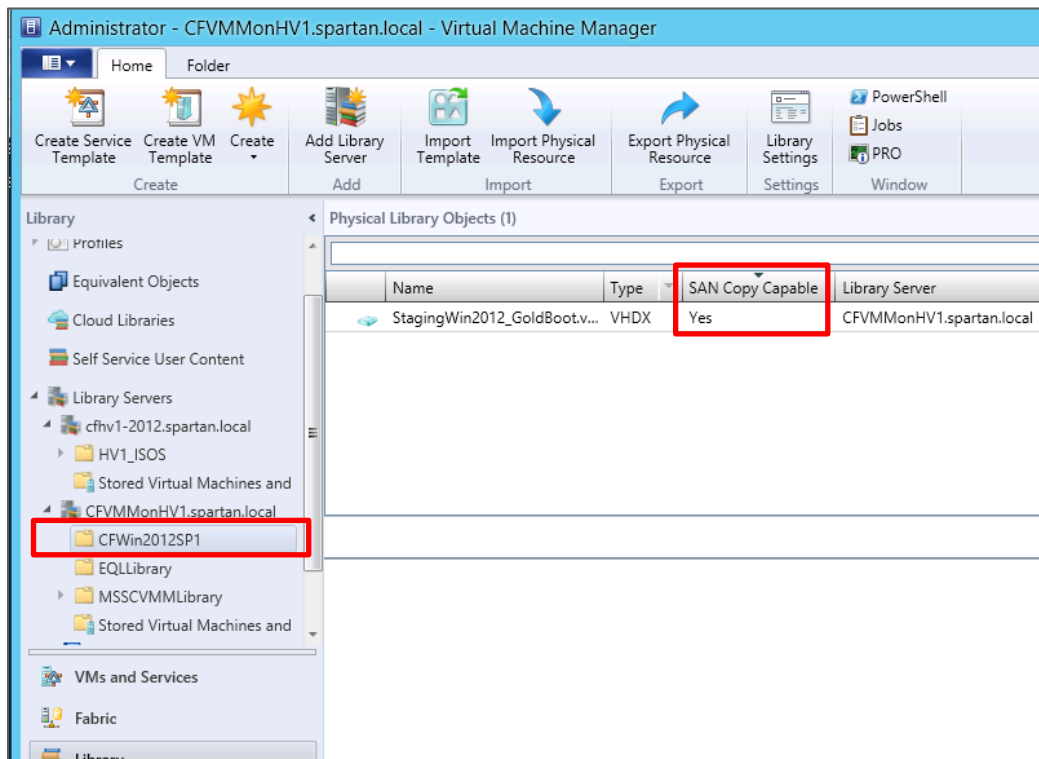
4. Navigate to the **Library** (1) workspace on the right then expand the **Library Servers** (2) and select the appropriate Library Server (CFHVMonHV1 (3) in this example). Right mouse then click **Properties** (4).

**Verify All Hosts have access to the share**

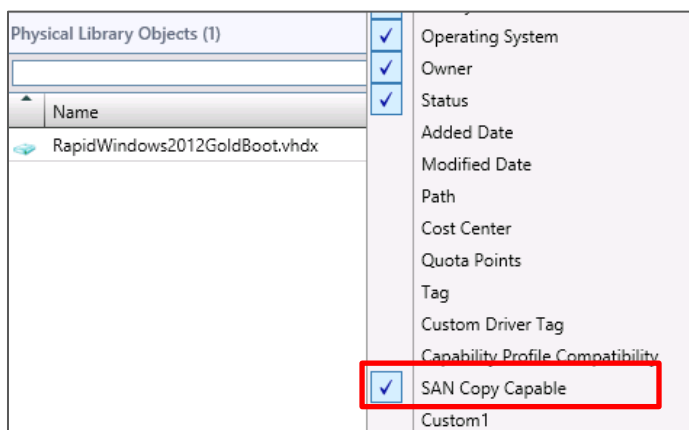


5. Be sure that the Library Server has **All Hosts** selected for the **Host Group**. If not drop down the Host group and select **All Hosts** then click **OK**.

## Verify the virtual hard disk is SAN Copy Capable



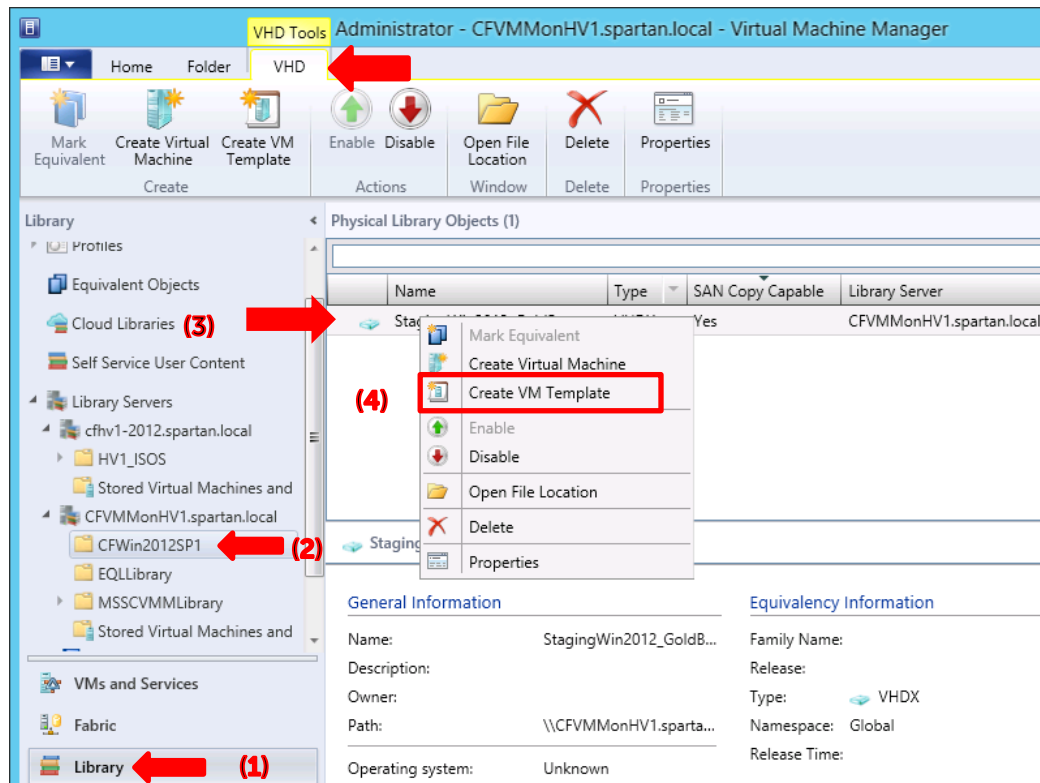
**Note:** The new library share will show up under the **Library** workspace, **Library Servers**. In this example we just added the new share "CFWin2012SP1". The VHDX file that we copied earlier to this Dell EqualLogic volume is now "SAN Copy Capable".



**Note:** if the SAN Copy capable column is not visible click in the table grid and right mouse click any column and check the option for "SAN Copy Capable"

## 8.8 Creating a SAN Copy Capable Virtual Machine Template through SCVMM UI

The “Create VM Template” wizard will prompt through the options to create a virtual machine template with Dell EqualLogic storage.



1. Right mouse click on the SAN Copy capable virtual hard disk (3) and click “**Create VM Template**” (4) or Click on the **Create VM Template** in the ribbon under **VHD** tab in the Menu. The Library workspace (1) and appropriate Library Server and Share (2) will need to be selected for this process.

## Name the VM Template

VM Template Identity

VM Template name:  
TemplateForRapidVM2K12

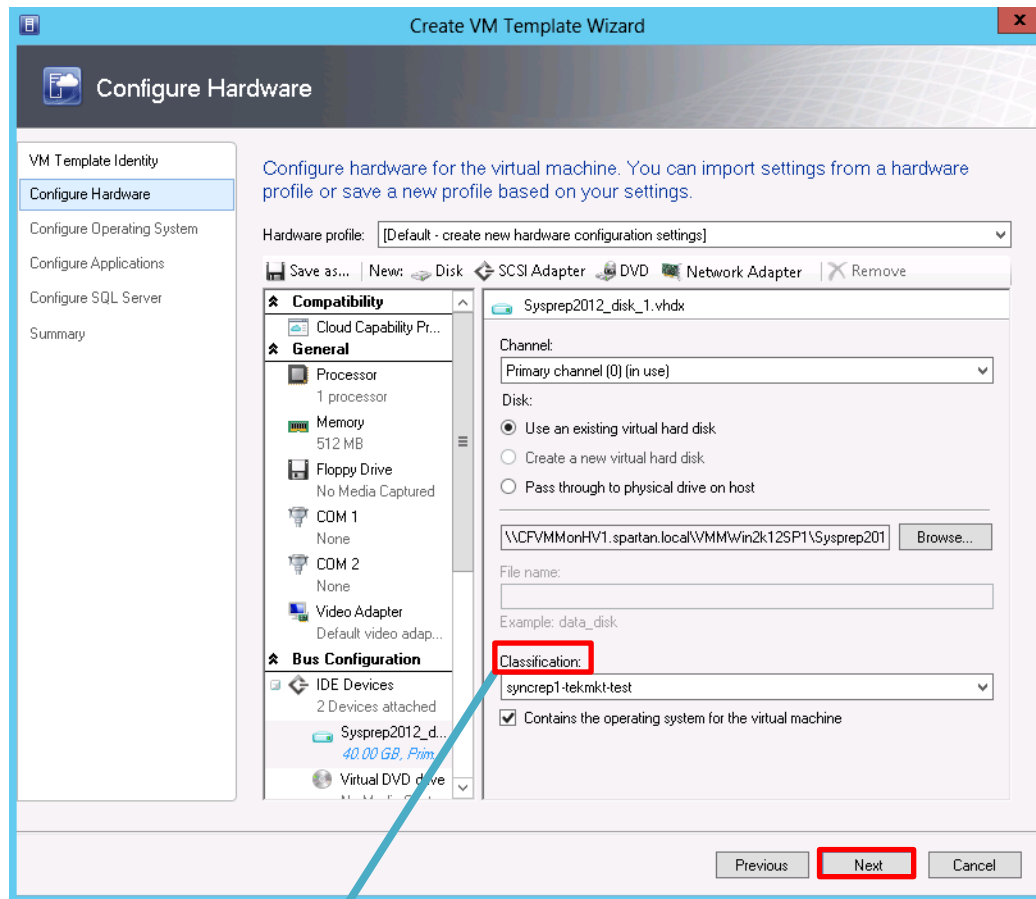
Description:  
this will be the vm template (note this is based on a equallogic template volume)  
- the VMs created from this will  
- Create a thin clone for each VM  
- Take up less capacity  
- Take less time to create

Next Cancel

2. Specify the template name and description then click **Next**.

**Note:** The recommendation is to name the template to reflect the organizations naming standards or identity of VM type and function.

### Configure settings and verify storage classification.



Classification:

syncprep1-tekmkt-test

☒ Contains the operating system for the virtual machine

3. In the Configure Hardware panel under **Classification** be sure to verify or select the appropriate classification representing the storage. Click **Next**.



## Review summary and create the VM Template

The screenshot shows the 'Create VM Template Wizard' window, specifically the 'Summary' step. The window has a blue title bar with the text 'Create VM Template Wizard'. On the left, there is a sidebar with a list of steps: 'VM Template Identity', 'Configure Hardware', 'Configure Operating System', 'Configure Applications', 'Configure SQL Server', and 'Summary'. The 'Summary' step is currently selected and highlighted. The main area of the window displays the text 'Before you create the new VM template, review the settings that you chose.' followed by a 'Summary:' label. Below this is a table with two columns: 'Property' and 'Value'. The table contains one row with the property 'VM Template' and the value 'TemplateForRapidVM2K12'. At the bottom right of the main area, there is a 'View Script' button. At the bottom of the window, there are three buttons: 'Previous', 'Create', and 'Cancel'. The 'Create' button is highlighted with a red rectangle. A small information icon and text at the bottom of the main area state: 'To create the VM template, click Create. You can track the progress of this job in the Jobs workspace.'

Property	Value
VM Template	TemplateForRapidVM2K12

4. Continue through the wizard making changes as necessary until the **Summary** form displays and then click **Create**.

## Verify the VM template

History – Recent Jobs (1)

Last refresh: 9/20/2013 3:50:22 PM

templatefor

Name	Status	Start Time	Result Name	Owner
Create template	Completed	9/18/2013 3:54:54 PM	TemplateForRapidV...	SPARTAN\Administr...

✓ Create template

Status: Completed

Command: New-SCVMTemplate

Result name: TemplateForRapidVM2K12

Started: 9/18/2013 3:54:54 PM

Duration: 00:00:00

Owner: SPARTAN\Administrator

Property	Previous Value	New Value
<b>VirtualDiskDrive - TemplateForRapidVM2K12</b>		
Name	(none)	TemplateForRapidVM2K12
Owner	(none)	SPARTAN\Administrator
BUS	(none)	0
Target	(none)	0
<b>Hardware Profile - Temporary Hardware Configba5d8217-0fff-454e-bf1</b>		
Name	Temporary Hardware Co...	(none)

Administrator - CFVMMonHV1.spartan.local - Virtual Machine Manager

Template Tools

Create Service Template Create VM Template Create Add Library Server Import Template Import Physical Resource Export Physical Resource Library Settings PowerShell Jobs PRO

Library

Templates (1)

rapid

Name	SAN Copy Capable	User R...	Type	Owner	Status	Rele...
TemplateForRapidVM2K12	Yes	Admini...	VM Template	SPAR...	OK	

TemplateForRapidVM2K12

General Information

Name: TemplateForRapidVM2K...

Type: VM Template

Description: this will be the vm template (note this is based on a equallogic template volume)  
- the VMs created from this will  
- Create a thin clone for each VM  
-Take up less capacity  
-Take less time to create

- View the template just created under **Library, Templates, VM Templates** (note: this example indicates a filter for the template name)

See also [Appendix A: "Creating a SAN Copy Capable Virtual Machine Template using PowerShell"](#)



## 9 Rapid Provisioning VMs on Dell EqualLogic arrays

Dell EqualLogic arrays can create copies of virtual disks very efficiently with minimal load on the host. SCVMM integration with Dell EqualLogic arrays leverages this capability to rapidly create virtual machines. When a virtual hard disk (.vhd or .vhdx) for a VM template is residing on a Dell EqualLogic Storage volume, SCVMM identifies the VM template as SAN Copy Capable. VM Templates that are SAN Copy capable will use the SAN Transfer method as opposed to network transfer improving performance and efficiency. On a Dell EqualLogic array the SAN Transfer method will communicate through the Dell EqualLogic SMP to create a "Thin Clone" which will be a Read-Write volume which will contain only the changes to the original Dell EqualLogic Template volume. SCVMM then exposes the storage to the host, mounting the file system, and associating the virtual hard disk to the virtual machine.

The following general steps are needed to create a Rapid Provisioned VM.

1. Create an operating system gold image or use an existing virtual hard drive that has been generalized. This VM will reside on Dell EqualLogic storage. [Appendix B](#) shows how to create a VM from an ISO image.
2. Create a VM template based on the prepared image (this may be stored in the default library server or other server as appropriate). The virtual hard disk (.vhd or .vhdx file) will need to be on the Dell EqualLogic array. See the previous steps to create a SAN Copy Capable [VM Template](#).

**Note:** The Dell EqualLogic Template volume should only contain one VHD or VHDX to provision.

The gold image virtual hard disk should be located on the [VMM Library Server](#) after the OS has been customized and configured.

3. Create the virtual machine through the wizard or PowerShell and select a unique VM name, Hyper-V host or cluster to deploy the VM and the target volume for the VM to reside.

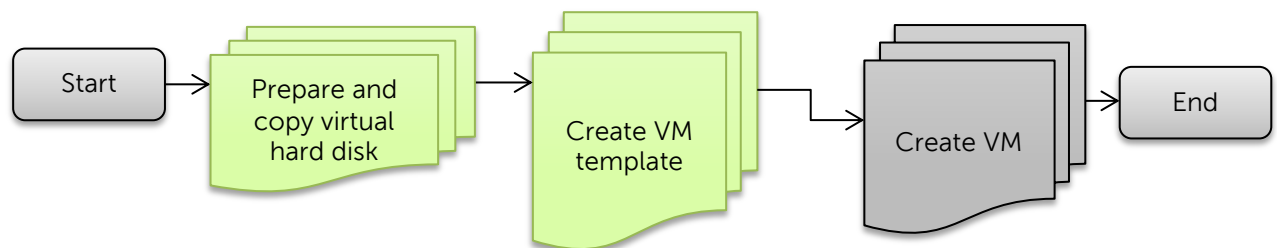
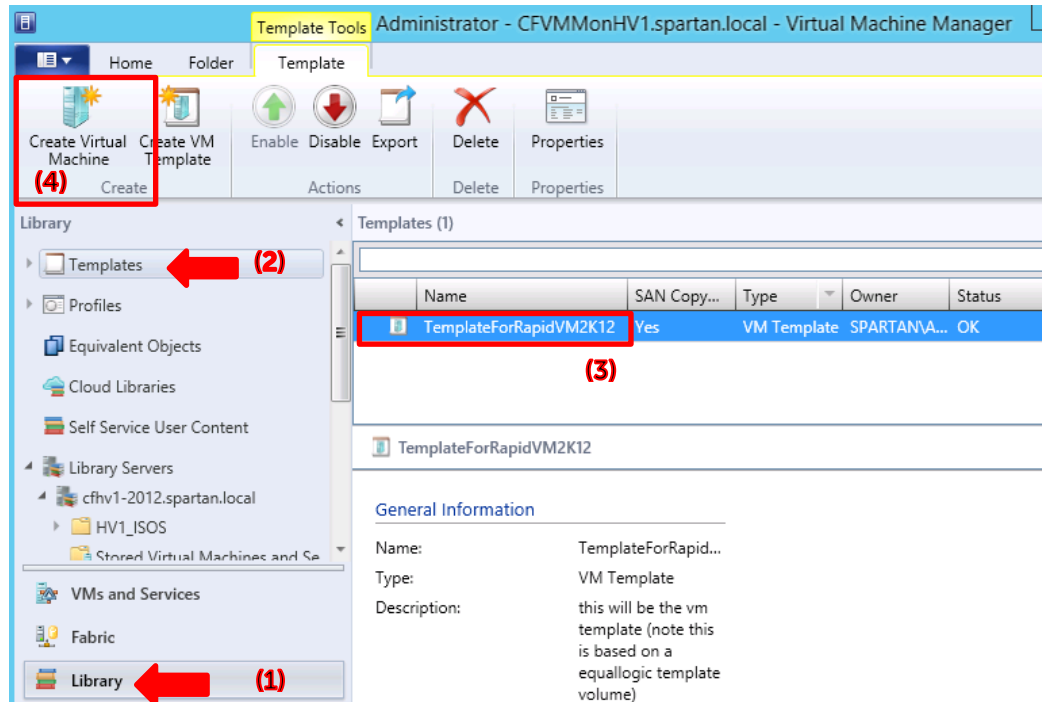


Figure 11 Process to Create a SAN Copy Capable VM

## 9.1 Rapid Provisioning of Virtual Machines through SCVMM UI

1. Launch the SCVMM UI



2. Navigate to the **VM Templates (not visible)** under **Library (1)** -> **Templates (2)**. Click on the SAN Copy template created earlier (3) and click **Create Virtual Machine (4)** in the Template Ribbon

### Specify a virtual machine name

The screenshot shows the 'Create Virtual Machine Wizard' window, specifically the 'Specify Virtual Machine Identity' step. The window has a blue title bar with the text 'Create Virtual Machine Wizard' and a close button. Below the title bar is a dark blue header with a cloud icon and the text 'Specify Virtual Machine Identity'. On the left side, there is a vertical list of steps: 'Specify Virtual Machine Identity' (highlighted), 'Configure Hardware', 'Configure Operating System', 'Select Destination', 'Select Host', 'Configure Settings', 'Add Properties', and 'Summary'. The main area of the wizard contains a 'Virtual machine name:' label followed by a text input field containing 'RapidWin2012VM'. Below this is a 'Description:' label followed by a text area containing the text: 'Create a VM based on a PS Series template volume', 'efficient and faster deployment using thin clones', and 'uses the SAN infrastructure as opposed to the Network'. At the bottom of the wizard, there is a 'Next' button and a 'Cancel' button. A red box highlights the 'Next' button. A red box also highlights the text input field for the virtual machine name.

Virtual machine name: RapidWin2012VM

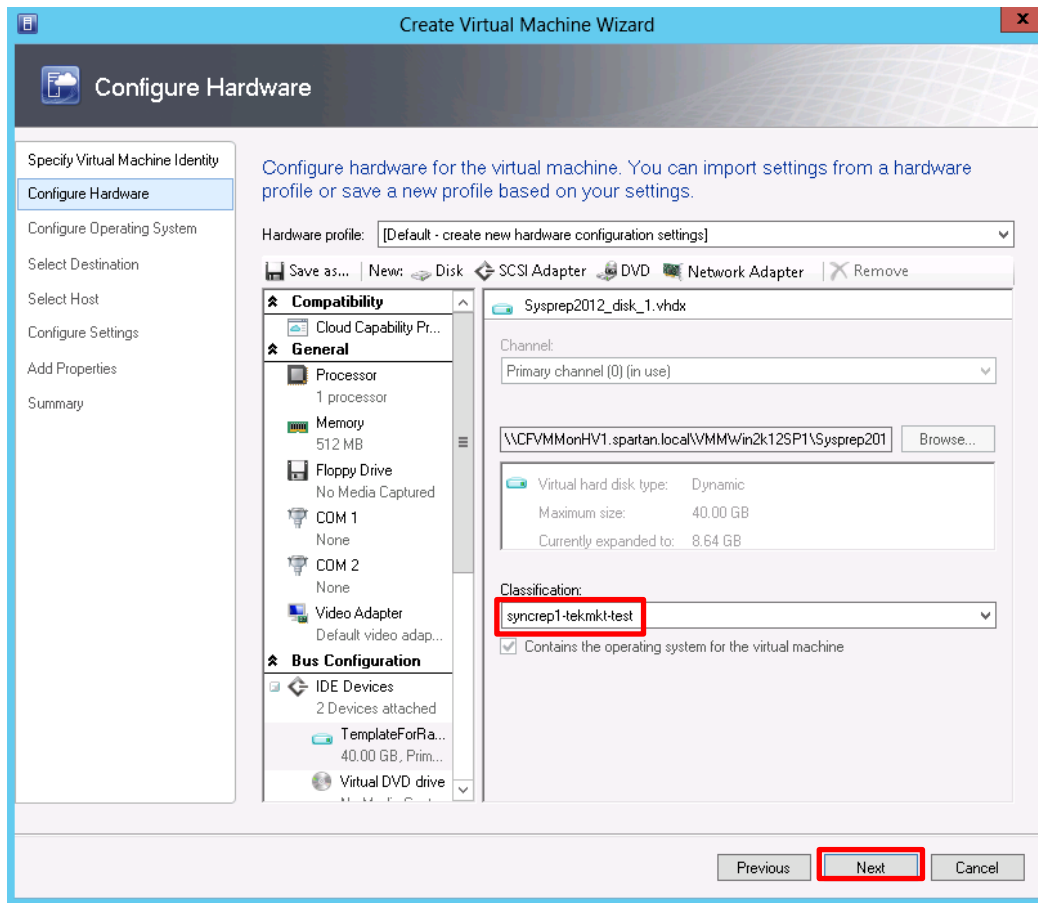
Description: Create a VM based on a PS Series template volume  
efficient and faster deployment using thin clones  
uses the SAN infrastructure as opposed to the Network

The virtual machine name identifies the virtual machine to VMM. The name does not have to match the computer name of the virtual machine. However, using the same name ensures consistent displays in System Center Operations Manager.

Next Cancel

3. Enter a unique virtual machine name (optionally description) and click **Next**.

## Configure settings



4. In the Configure Hardware wizard verify the classification is pointing to the storage pool intended. Click **Next** and fill out the Configure Operating system parameters as needed.

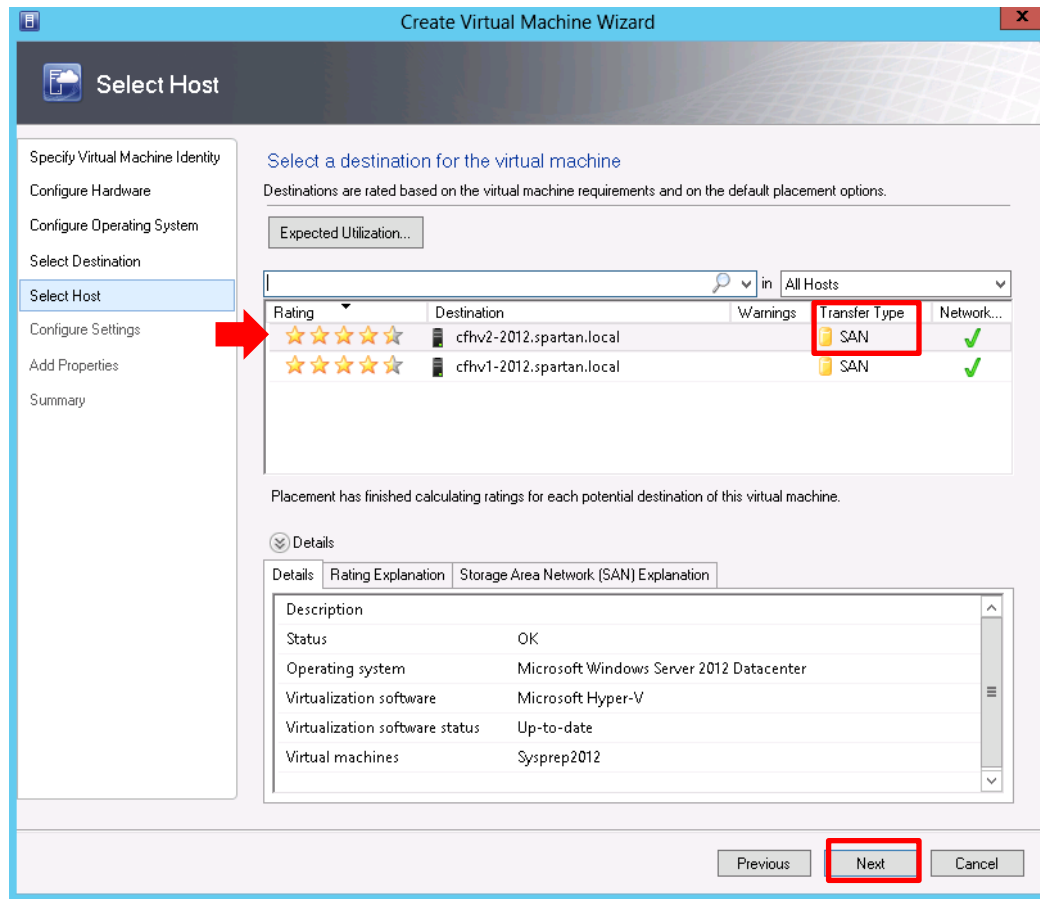
## Select destination

The screenshot shows the 'Create Virtual Machine Wizard' window, specifically the 'Select Destination' step. The left sidebar contains a list of steps: 'Specify Virtual Machine Identity', 'Configure Hardware', 'Configure Operating System', 'Select Destination' (highlighted), 'Select Host', 'Configure Settings', 'Add Properties', and 'Summary'. The main area has the title 'Select Destination' and a subtitle 'Choose whether to deploy or store the virtual machine.' Below this are three radio button options: 'Deploy the virtual machine to a private cloud', 'Place the virtual machine on a host' (selected), and 'Store the virtual machine in the library'. The 'Place the virtual machine on a host' option is highlighted with a red box. Below this option is a 'Destination' dropdown menu set to 'All Hosts'. The 'Next' button at the bottom right is also highlighted with a red box.

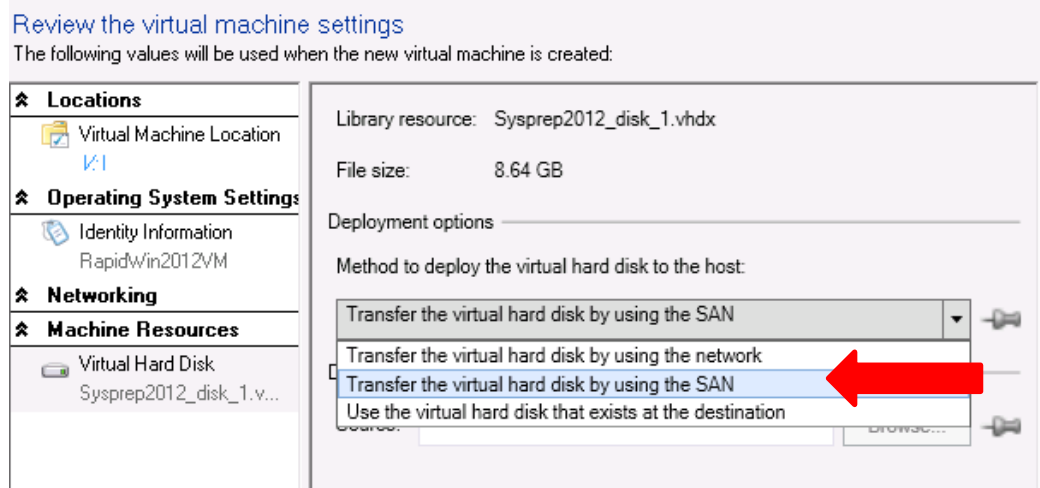
5. Select **Place the virtual machine on a host** option and verify destination is **All Hosts**.



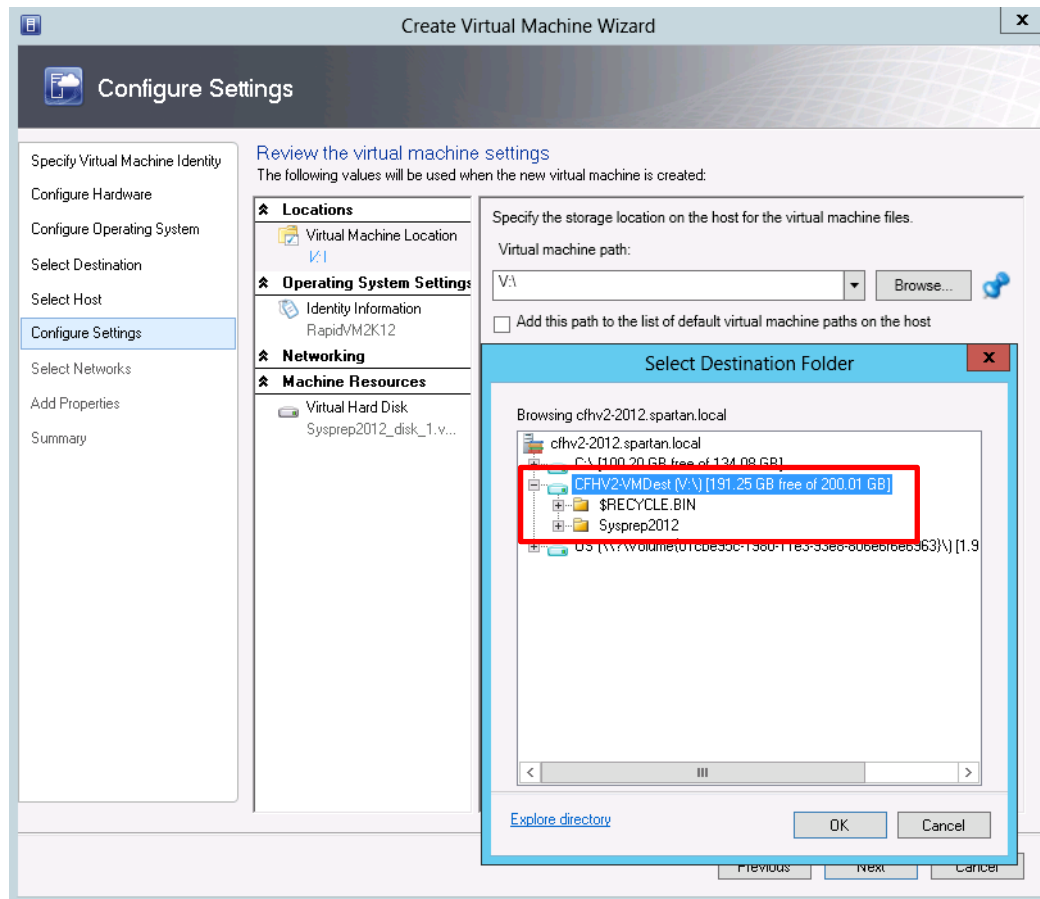
## Choose a host



6. Select the destination Host and verify the **Transfer Type** is **SAN**, Click **Next**.



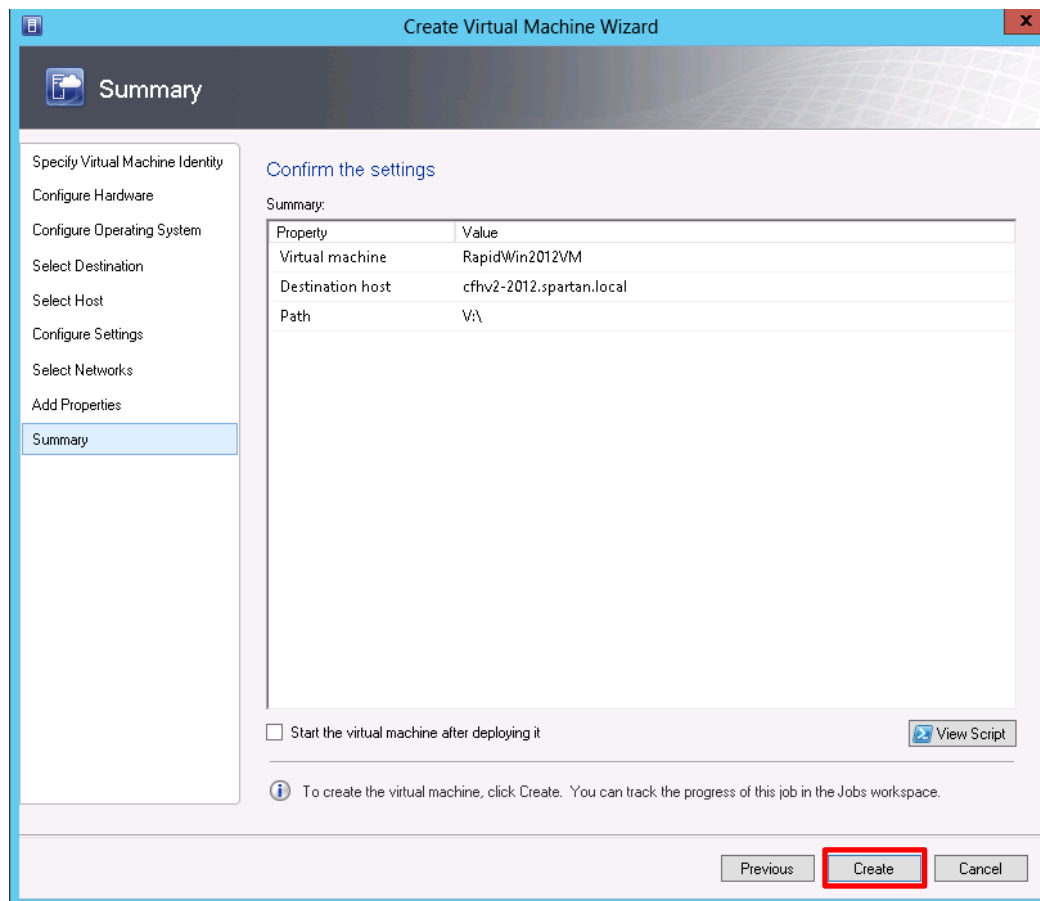
## Select VM storage destination



7. Configure the destination path if needed and continue through the wizard making appropriate choices for the network and any additional properties.

**Note:** The destination volume may contain multiple VMs; however consider the impact on performance, capacity and iSCSI Session counts. Each thin clone will act as an individual volume with its own iSCSI sessions, therefore will need to be considered for situations where many VMs are deployed within the same PS Series Pool (a pool may have a maximum of 1024 iSCSI sessions established).

## Finish the process



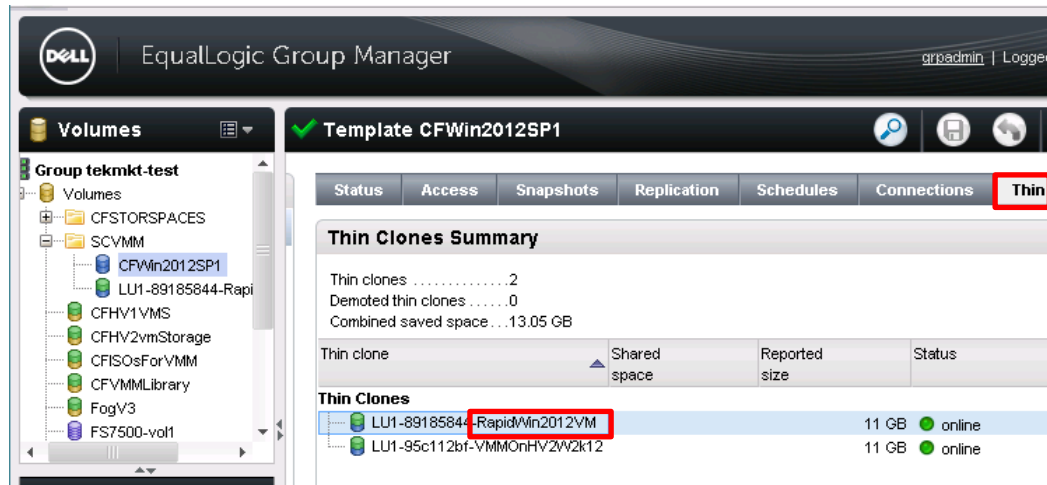
- Click **Create** to provision the virtual machine to the target Hyper-V server

Step	Name	Status	Start Time	End Time
1	Create virtual machine	81 %	9/20/2013...	
1.1	Rapid deploy using SAN copy	Completed	9/20/2013...	9/20/2013...
1.1.1	Parallel execution step	Completed	9/20/2013...	9/20/2013...
1.1.1.1	Creates new storage logical unit	Completed	9/20/2013...	9/20/2013...
1.1.2	Registers Storage Logical Unit to h...	Completed	9/20/2013...	9/20/2013...
1.1.3	Parallel execution step	Completed	9/20/2013...	9/20/2013...
1.1.3.1	Mounts storage disk on cfhv2-2012...	Completed	9/20/2013...	9/20/2013...
1.2	Create virtual machine	Completed	9/20/2013...	9/20/2013...

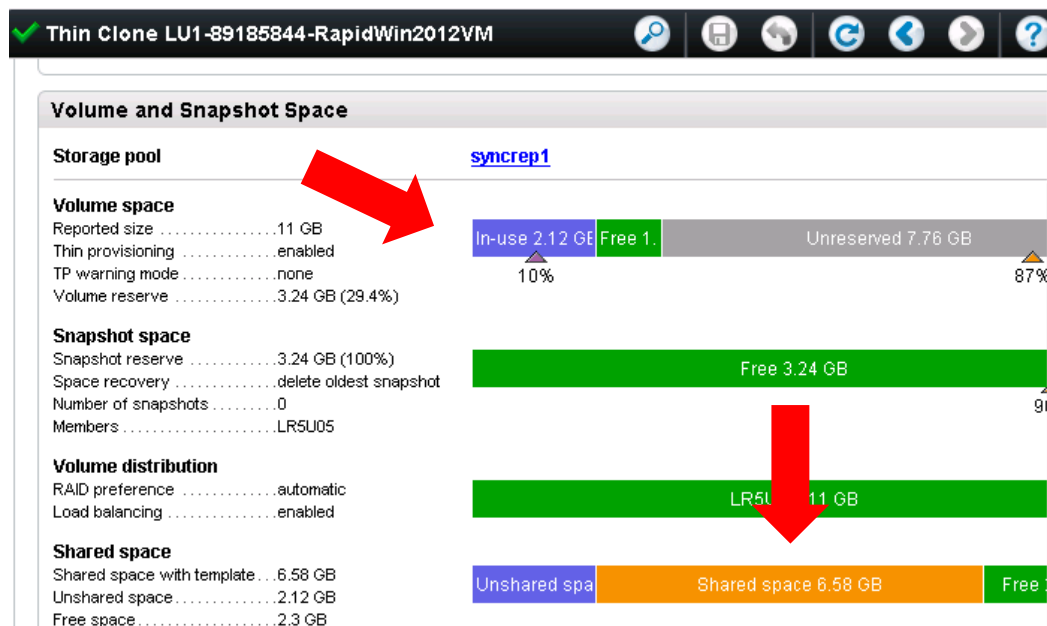
**Note:** "Rapid deploy using SAN Copy" will create a new linked thin clone for the virtual machine deployed.

## 9.2 Thin Clone creation monitoring

The following optional steps will simply demonstrate the behind the scenes processing of Template volumes and Thin Clones.



1. Launch the EqualLogic Group Manager GUI click on the template volume (under volumes workspace) and then the Thin Clones tab. Notice the new name suffix reflects the VM just provisioned (RapidWin2012VM).

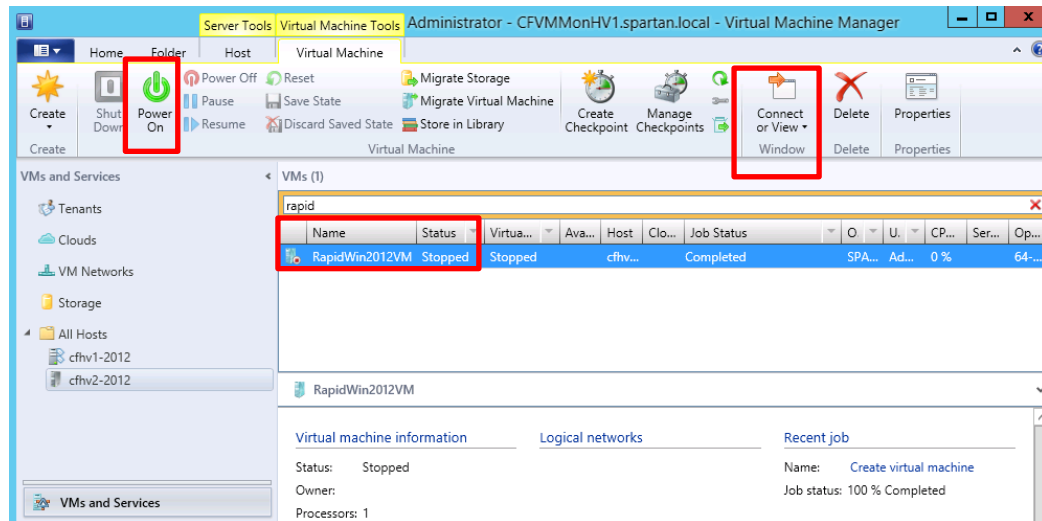


The **Shared space** is the unchanged data from the Template volume (with the VHD or VHDX). Notice that the **In-use** is only 2.12GB while the **Shared space** is 6.58GB.

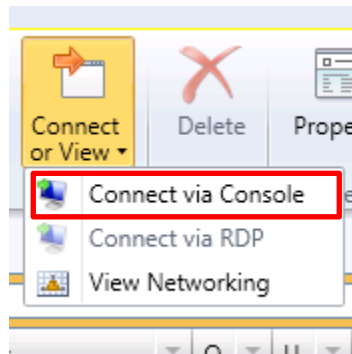


## 9.3 Provisioned Virtual Machine customization

SCVMM allows the administrator to manage the provisioned VMs without having to switch to the Hyper-V management console.



2. **Power on** the VM, and **Connect or View** to continue through the login process to make any additional customizations to the VM. You may perform these actions easily through the SCVMM UI.



See also [Appendix A: "Rapid Provisioning of Virtual Machines using PowerShell"](#)

## 10 Migration

SCVMM allows for resource optimization on Dell EqualLogic storage by relocating virtual resources such as virtual machines between clusters, to and from a cluster and a stand-alone Hyper-V host or between standalone Hyper-V hosts. Storage migration is also available to re assign, move or distribute available Dell EqualLogic storage to maximize efficiencies.

For more information see the Microsoft TechNet library for the article on "*Migrating Virtual Machines and Storage Overview*" <http://technet.microsoft.com/en-us/library/jj628158.aspx>

### 10.1 VM Migration

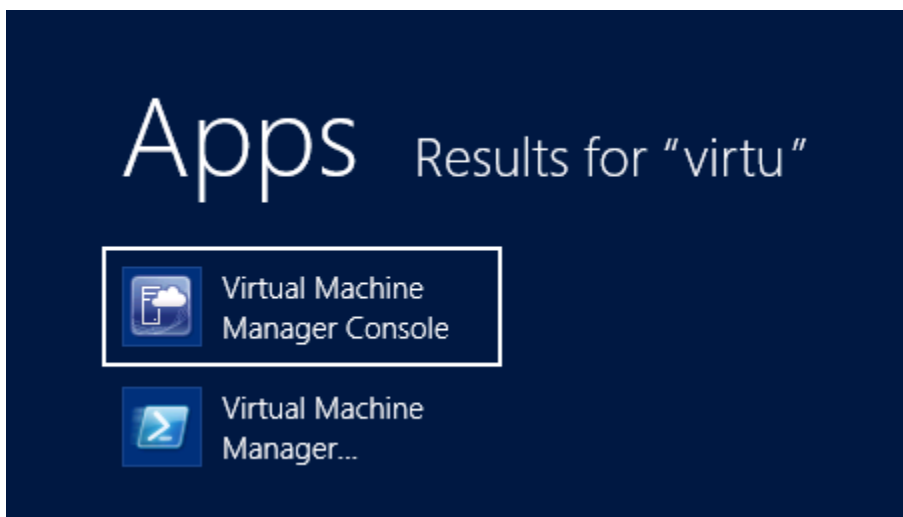
In a cluster on which VM is already running, SCVMM will use Live Migration to move VM resources across cluster nodes.

SAN migration will be used across different clusters or standalone hosts, and will be enabled if the access to the PS Series group for the template volume is correctly configured on the target host.

**Note:** With SAN Migration the VM is saved on the source host and restored on the target host.

The ability to migrate a particular VM depends on the availability setting and the properties of the target host (standalone or cluster node). See the Microsoft TechNet article for more information: <http://technet.microsoft.com/en-us/library/jj628163.aspx>

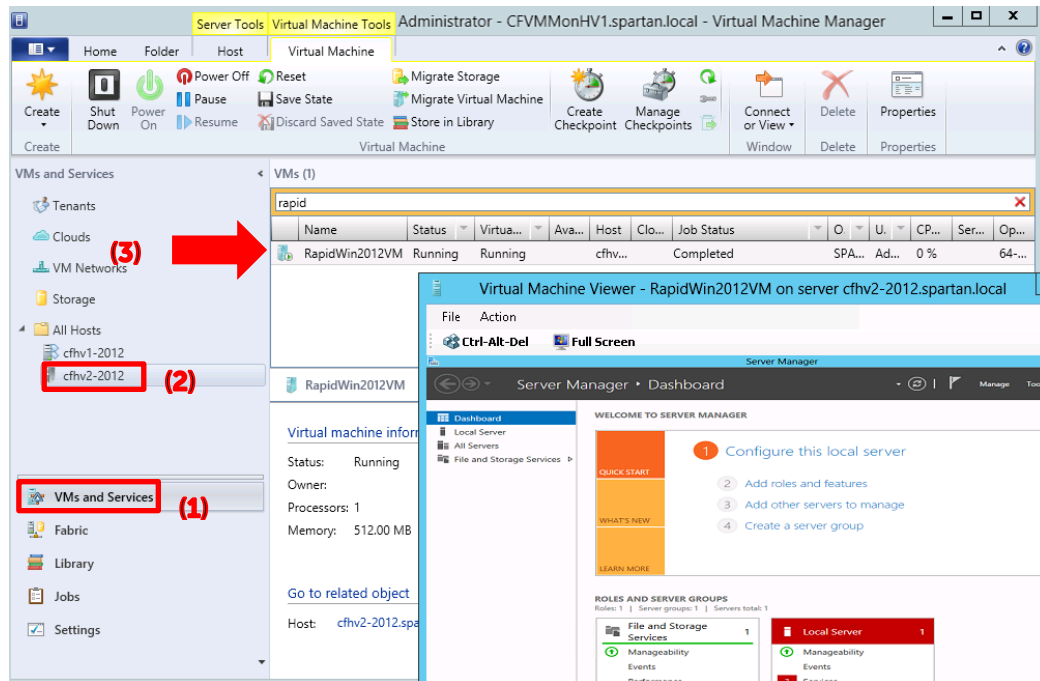
The following procedure will show standalone Hyper-V servers VM Migration.



1. Launch the SCVMM UI

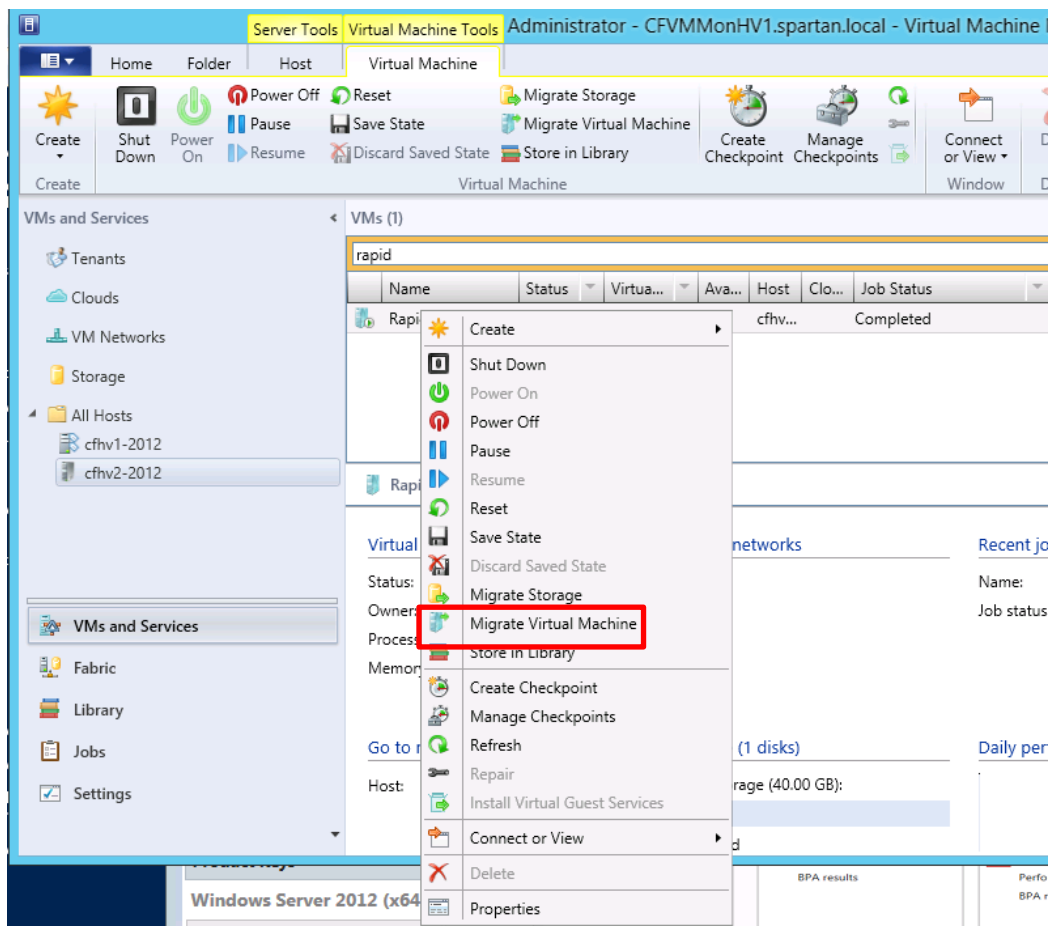


## Select the virtual machine to migrate



- To migrate "RapidWin2012VM" on cfhv2-2012 to cfhv1-2012 click on the VM to migrate (3). VMs and Services (1) and the Hyper-V host for the source virtual machine (2) should be selected prior to this operation.

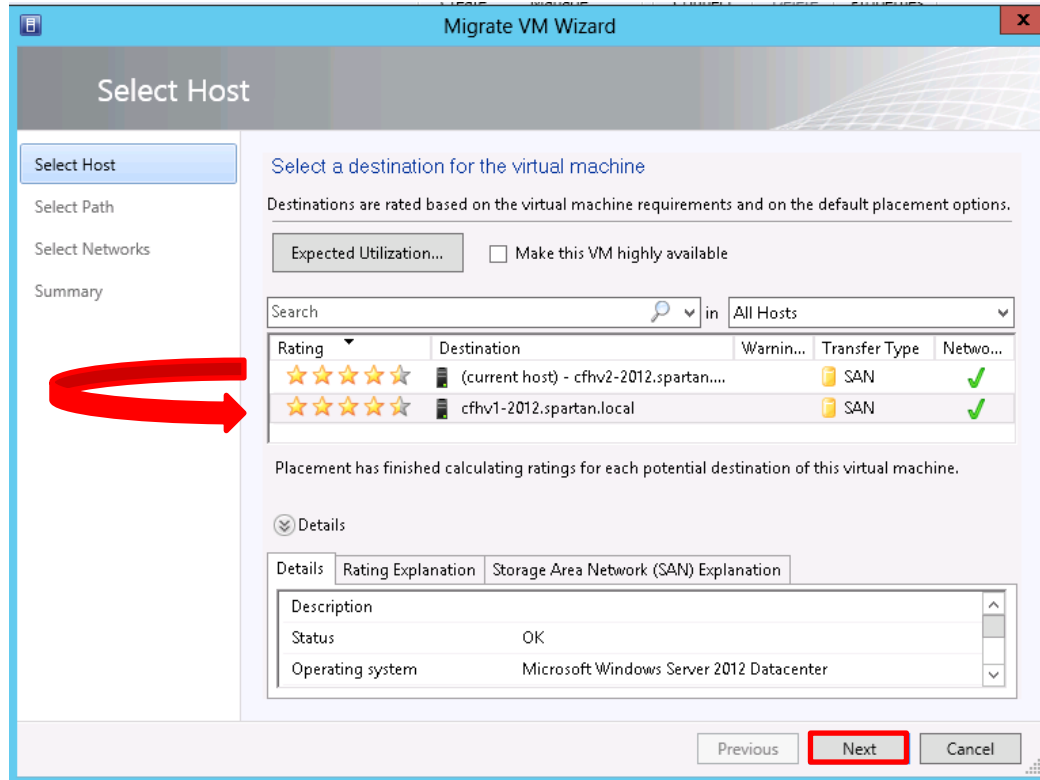
### Select the Migrate Virtual Machine wizard



3. With the source virtual machine selected, Right mouse click and then click "**Migrate Virtual Machine**"



## Select the target host to migrate the virtual machine to



**Select Host**

Select a destination for the virtual machine

Destinations are rated based on the virtual machine requirements and on the default placement options.

Expected Utilization... ☐ Make this VM highly available

Search  in All Hosts

Rating	Destination	Warnin...	Transfer Type	Netwo...
★★★★★	(current host) - cfhv2-2012.spartan...		SAN	✓
★★★★★	cfhv1-2012.spartan.local		SAN	✓

Placement has finished calculating ratings for each potential destination of this virtual machine.

Details

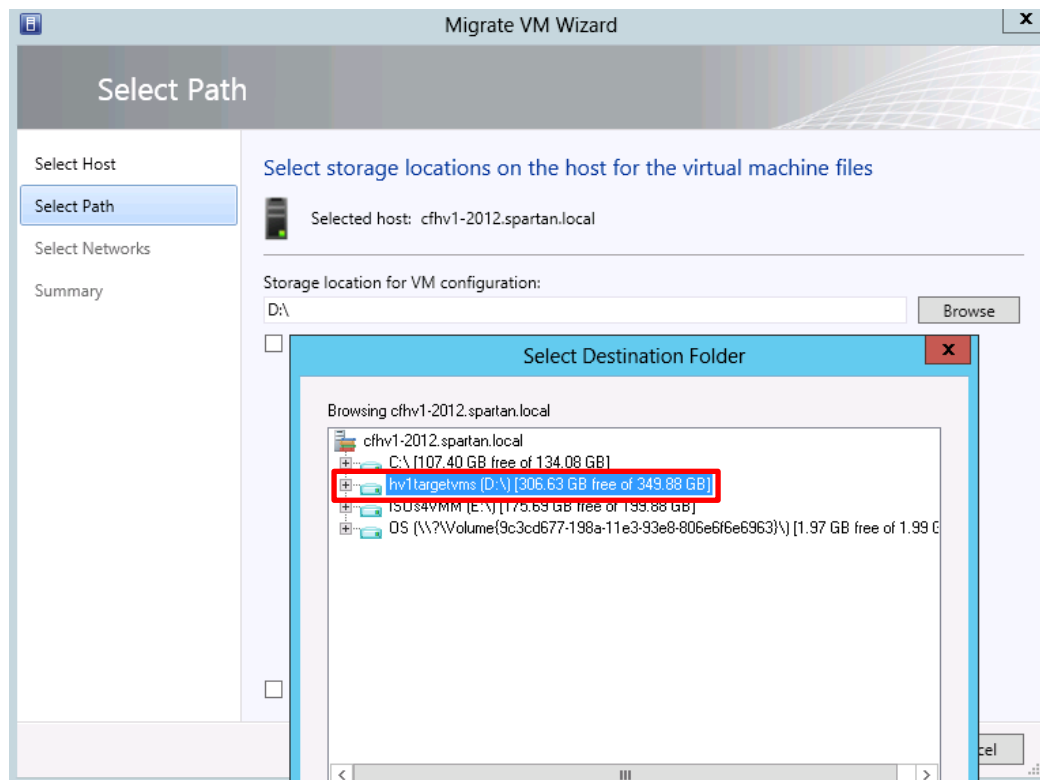
Details	Rating Explanation	Storage Area Network (SAN) Explanation
Description		
Status	OK	
Operating system	Microsoft Windows Server 2012 Datacenter	

Previous **Next** Cancel

- Click on the Target Hyper-V server (or cluster) for the new location of the VM. Click **Next**.

**Note:** Status and Ratings will indicate that the template volume is configured correctly (the hyper-v host has access to the storage pool).

## Select path for the virtual machine configuration files



5. Select the appropriate storage location for the virtual machine configuration. Continue through the wizard until the move option is available and click **Move** (not shown).

History – Recent Jobs (240)

Last refresh: 9/20/2013 5:37:12 PM

Name	Status	Start Time	Result Name	Owner
Deploy virtual machine	50 %	9/20/2013 5:37:08 PM	RapidWin2012VM	SPARTAN\Administr...
Refresh virtual machine	Completed	9/20/2013 5:29:32 PM	RapidWin2012VM	SPARTAN\cfvmm
Start virtual machine	Completed	9/20/2013 5:24:19 PM	RapidWin2012VM	SPARTAN\Administr...
Create virtual machine	Completed	9/20/2013 4:51:53 PM	RapidWin2012VM	SPARTAN\Administr...

Move virtual machine RapidWin2012VM from cfhv2-2012.spartan.local to cfhv1-2012.spartan.local using SAN

Status: 50 %

Command: Move-SCVirtualMachine

Result name: RapidWin2012VM

Started: 9/20/2013 5:37:08 PM

Duration: 00:00:05

Owner: SPARTAN\Administrator

Step	Name	Status	Start Ti...	End Ti...
1	Move virtual machine Ra...	50 %	9/20/2...	
1.1	Run pre checks for transfer	Completed	9/20/2...	9/20/2...
1.2	Change virtual machine s...	Completed	9/20/2...	9/20/2...
1.3	Export Hyper-V virtual m...	Completed	9/20/2...	9/20/2...
1.4	Deploy file (using LAN)	Completed	9/20/2...	9/20/2...
1.5	Deploy file (using SAN tr...	50 %	9/20/2...	
1.6	Import Hyper-V virtual m...	Not started		
1.7	Remove virtual machine	Not started		

Status of the move virtual machine job

Administrator - CFVMMonHV1.spartan.local - Virtual Machine Manager

Home Folder Host Virtual Machine

Create Service Create Virtual Machine Create Cloud Create Host Group Create VM Network Assign Cloud Overview VMs Services VM Networks PowerShell Jobs PRO

VMs and Services

Tenants

Clouds

VM Networks

Storage

All Hosts

cfhv1-2012

cfhv2-2012

VMs (1)

Name	Status	Virtual...	Avail...	Host	Clo...	Job Status	O...	U...	CP...	Ser...	Op...
RapidWin2012VM	Running	Running		cfhv...		Completed	SPA...	Ad...	0 %		64...

RapidWin2012VM

Virtual machine information Logical networks Recent job

Status: Running

Owner:

Processors: 1

Name: Change properties of virtual machine

Job status: 100 % Completed

Cfhv1-2012 is the new location of the VM (the destination Hyper-V server).

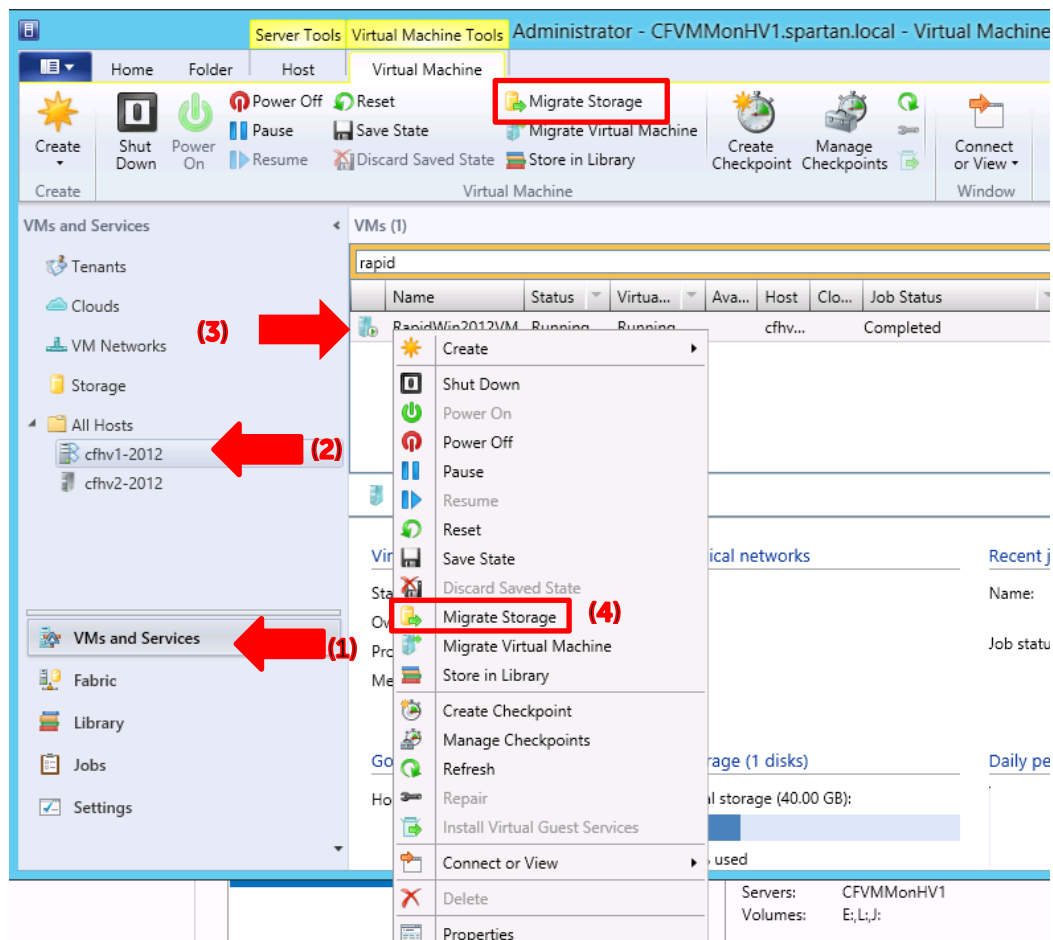


## 10.2 VM Storage Migration

Virtual machine storage migration provides the ability to move storage from one location to another without interrupting the workload of the virtual machine. Storage on standalone hosts may be moved to clustered hosts and between standalone hosts.

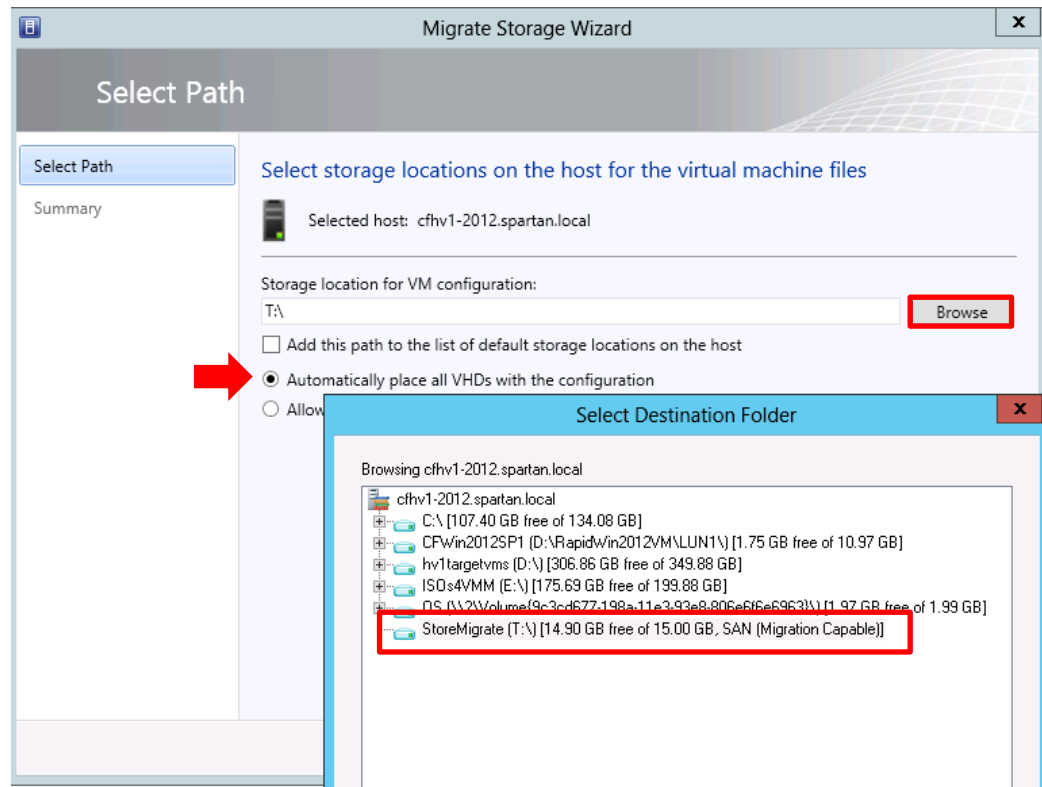
For PS Series arrays storage migration is also available between a CSV volume to a different CSV volume, or from a non-CSV volume to a CSV volume.

1. Launch the SCVMM GUI.



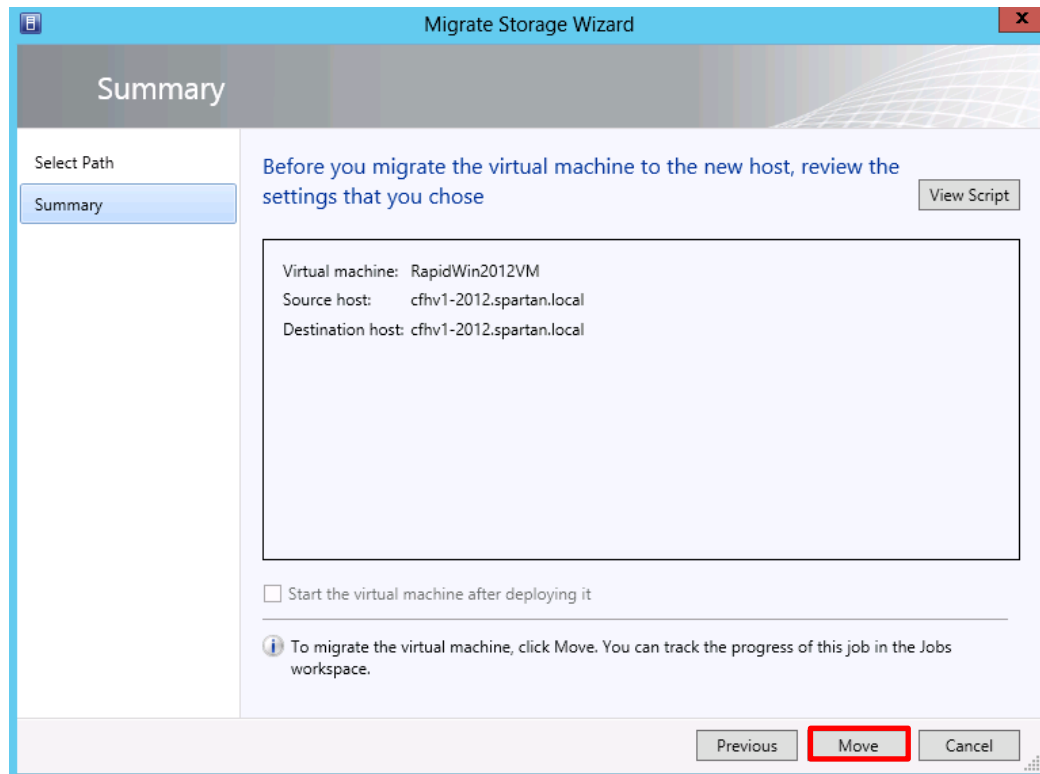
2. Select the Hyper-V host (2) which contains the source VM to migrate the storage. Under the list of VMs, right click on the virtual machine (3) from the **VM and Services** (1) workspace and click **Migrate Storage** (4).

### Select the New storage location



3. Verify the "Automatically place all VHDs with the configuration" option is selected and Browse and select the appropriate new volume or folder.

## Move the storage



4. Review the inputs and click **Move**

Step	Name	Status	Start Time	End Time
1	Move virtual machine RapidWin2012VM from cfhv1-2012.sparta...	33 %	9/20/2013...	
1.1	Run pre checks for transfer	Completed	9/20/2013...	9/20/2013...
1.2	Change virtual machine status	Completed	9/20/2013...	9/20/2013...
1.3	Create checkpoint	Completed	9/20/2013...	9/20/2013...
1.3.1	Create checkpoint	Completed	9/20/2013...	9/20/2013...
1.4	Create checkpoint	Completed	9/20/2013...	9/20/2013...
1.4.1	Create checkpoint	Completed	9/20/2013...	9/20/2013...
1.5	Deolov file (usina BITS over HTTP): 5 of 6 files (3.55 GB/9.01 GB)...	39 %	9/20/2013...	

5. Monitor the progress in Job status for a successful completion.

## 11 Conclusion

Dell EqualLogic Host Integration Tools for Microsoft® along with Auto-Snapshot Manager Microsoft® Edition (ASM/ME) provide robust integration and management capabilities for Dell EqualLogic storage and Microsoft Windows environments. The exercises in this document should provide some guidance on how Dell EqualLogic storage environments may be used along with Windows Server 2012 and Systems Center Virtual Machine Manager 2012 SP1 to offer improved efficiencies, optimization and performance on Dell EqualLogic arrays.



## A PowerShell automation and scripts

Dell EqualLogic provides advanced automation with Windows Server 2012 and SCVMM 2012 SP1. In addition Dell EqualLogic specific PowerShell cmdlets are also available with the Host Integration Tools for Microsoft® and provide advanced manipulation of the PS Series arrays.

The flexibility for PowerShell has provided an easy way to automate day to day tasks. The objective of this Section is to show the SCVMM and File and Storage Services functionality described earlier with PowerShell scripts and cmdlets.

Table 3 Types of PowerShell cmdlets represented in this document

Type of PowerShell cmdlet	Module Source
Windows Server 2012	Storage Module, iSCSI module (included)
System Center Virtual Machine Manager 2012 SP1	Virtual Machine Manager module (lic required)
Dell EqualLogic PowerShell Tools	EqualLogic PowerShell module (included with HIT)

PowerShell modules may be imported into Windows ISE for convenience with the following similar commands:

Dell EqualLogic PowerShell Tools:

```
Import-Module -name "PathToEQLInstall\EqlPSTools.dll"
```

Note: Typically the path is "C:\Program Files\EqualLogic\bin\"

System Center Virtual Machine Manager:

```
Import-Module 'C:\Program Files\Microsoft System Center Virtual Machine Manager 2012\bin\virtualmachinemanager.psd1'
```

**All PowerShell cmdlets are provided as reference only and imply no warranty or support.  
Please consider testing in non-production environments.  
Please modify the variables and scripts appropriately.**





## Configuring PS Series Group access using PowerShell

**Source:** Dell EqualLogic PowerShell Tools

```
New-EqlGroupAccess -Groupname <groupname> -GroupWKAddress <WellKnownIPAddress> -  
MgmtWKAddress <GroupManagementIP> -username <DOMAIN>\<username> -password  
<password> -VSSUserName <chapuserforvss> VSSPassword <chappassword>
```

Typical example:

```
$GroupName= 'MyEQLGroup'  
$GroupMgmtIP='xxx.xxx.xxx.xxx' #Group management IP  
$GroupIP= 'xxx.xxx.xxx.xxx' #Well-Known IP of the Group
```

```
New-EqlGroupAccess -GroupName $GroupName -GroupWKAddress $GroupIP -MgmtWKAddress  
$GroupMgmtIP -UserName MyGroupADMIN -Password MyAdminPass
```

## Importing the SMP provider for EqualLogic using PowerShell

**Source:** Windows Server 2012 modules,  
System Center Virtual Machine Manager 2012 SP1 – virtual machine manager module

```
#Shows the Group just registered - verify the group is connected  
Get-StorageSubSystem  
#Imports the Dell EqualLogic SMP Provider defaults to all Storage providers  
registered on the SCVMM server  
Import-SCStorageProvider  
#Refreshes all the cache for the storage provider  
Update-StorageProviderCache  
  
#Change Name and Description as needed  
New-SCStorageClassification -Name "MyPoolGroupID" `  
-Description "PS Pool: syncrepl PS Array: tekmt-test" -RunAsynchronously
```



## Volume Provisioning through SCVMM using PowerShell

**Source:** System Center Virtual Machine Manager 2012 SP1 Virtual Machine Manager Module

```
# Create a volume through SCVMM - modify for your environment
$MyVMM="MyVMMonHV1"
$NewVolName="MySCPWRSHELL"
$LookupPoolName ="MyPool"
$ThisEQLGroup = "MyGroup"
$TargetHV="MyTargetHV"
$VOLLABEL="Demo SCVMM LUN"
$DriveLetter="Z:\"

#set communication to the SCVMM server
Get-VMMServer -ComputerName $MyVMM

#if more than one array will need to specify unique parameter options
$mySCArray=Get-SCStorageArray -Name $ThisEQLGroup

#now we need to be sure of the Pool...be aware of default with multiple groups!

foreach ($i in ($myscarray.storagepools)) `
{
if ($i.Name -eq $LookupPoolName)
{
$PoolID=$i.id;
$PoolName=$i.SMDisplayName; `
Write-host "This is the PoolID:" $PoolID " the PoolName:" $PoolName;`
}
}

#now that we found the pool (caution must be unique)
$pool=get-scstoragepool -Name $PoolName -ID $PoolID #be sure this is
unique...or use PoolID fro get-scstoragepool

$newLun=New-SCStorageLogicalUnit -StoragePool $pool `
-DiskSizeMB 81920 -Name $NewVolName -Description "created completely from
SCVMM" -ProvisioningType "Thin" -RunAsynchronously

#
#pass the host group ID if necessary $hostGroup = Get-SCVMHostGroup -ID
"0e3ba228-a059-46be-aa41-2f5cf0f4b96e" -Name "All Hosts"
$hostGroup = Get-SCVMHostGroup -Name "All Hosts"

#Assigns the Lun to the SCVMM server
```



```

Set-SCStorageLogicalUnit -StorageLogicalUnit $newLun -VMHostGroup $hostGroup
#Get the hyper-v host information
$vmHost=Get-SCVMHost -ComputerName $TargetHV
$logicalUnits = @()
$logicalUnits += Get-SCStorageLogicalUnit -ID $newLun.ID -name $newLun.Name

$JobGroup = [Guid]::NewGuid().ToString()
#connect the iSCSI Session to the target host
Register-SCStorageLogicalUnit -StorageLogicalUnit $logicalUnits -VMHost $vmHost
-JobGroup $JobGroup

#Please mount your ponies
$lun = Get-SCStorageLogicalUnit -ID $newLun.ID -Name $newLun.Name

Mount-SCStorageDisk -MasterBootRecord -QuickFormat -VolumeLabel $VOLLABEL -
StorageLogicalUnit $lun `
-JobGroup $JobGroup -MountPoint $DriveLetter #"Z:\"

Set-SCVMHost -VMHost $vmHost -JobGroup $JobGroup -RunAsynchronously
write-host "Volume create on $TargetHV please review the job $jobgroup in SCVMM
or login to that server"

```

## Volume Provisioning through File and Storage Services using PowerShell

**Source:** Windows Server 2012 modules

```

$NewVolName="MyVol"
#This is the group that should have been initialized
# connect-eqlgroup or new-eqlgroupaccess should have already been performed
$ThisEQLGroup = "MyGroup"
#will create a thin volume with capacity specified
$useable = "10GB"
#Specify minimum free GB before allocating volumes
$MyPool = "MyPool"
#One time grabs for the initiator port
$initaddress=(get-initiatorport)
$starport=(get-targetportal)

#The following checks may be consider for later use

```



```

$GroupIsOK= get-storagesubsystem -FriendlyName $ThisEQLGroup -ErrorAction
SilentlyContinue
$PoolIsOK = get-storagepool -FriendlyName $MyPool -ErrorAction SilentlyContinue

New-VirtualDisk -FriendlyName $NewVolName -Size 10GB -ProvisioningType Thin -
StoragePoolFriendlyName $MyPool

Write-Host "Now adding the masking set to allow for this volume to be accessed
to by Server:" $initaddress.NodeAddress " to " $ThisEQLGroup
New-MaskingSet -StorageSubSystemFriendlyName $ThisEQLGroup -VirtualDiskNames
$NewVolName -InitiatorAddresses $initaddress.NodeAddress

#The Show-VirtualDisk cmdlet makes a virtual disk available to a host (by
initiator and target ports).
Show-VirtualDisk -FriendlyName $NewVolName -TargetPortAddresses
$tarport.PortNumber -InitiatorAddress $initaddress.NodeAddress
Write-Host "Now we will refresh the iscsi initiator which may take a few
minutes.."

#Below will take a considerable time for many targets....
##Update-IscsiTarget
#The alternative is to update the portal...much more efficient
#This will work if only one target portal is available...check iSCSI Initiators
GUI on the
# "Discovery" tab
Get-iSCSITargetPortal | Update-iSCSITargetPortal

Write-Host "Now we will connect each new volume to this host:"
$initaddress.NodeAddress " to " $ThisEQLGroup
Start-Sleep -Seconds 10

Write-Host "Connecting" $initaddress.NodeAddress " to " $NewVolName
#Get the target node address
$IQN = (Get-VirtualDisk -FriendlyName $NewVolName | Get-TargetPort).NodeAddress

if ($iqn.count -gt 1){ `
$Iqn=$iqn[0];`
write-host $iqn;}
$iSCSIsession = Connect-iSCSITarget -NodeAddress $IQN

$disk= ($iSCSIsession| Get-Disk)

initialize-disk -InputObject $disk

#partition and assign the next available drive letter

$partition = New-Partition -InputObject $disk -UseMaximumSize -AssignDriveLetter

```



```
#format the volume for access
Format-Volume -Partition $partition -FileSystem NTFS -NewFileSystemLabel
$NewVolName -Confirm:$false
$MyPath=$partition.DriveLetter + ":\\"
#Setup Share (modify as needed)
New-SmbShare -Name $NewVolName -Path $MyPath
write-host "volume: $NewVolName Created on $initaddress.NodeAddress"
```

**Note:** Volumes created through Windows native user interfaces such as SCVMM UI or the File and Storage Services will default the Raid Preference of the volume to Raid 50. This will need to be modified to "Automatic" through the EqualLogic Group Manager or PowerShell cmdlet as demonstrated [here](#).

## Convert to Template volume using PowerShell

**Source:** Dell EqualLogic PowerShell Tools  
Windows Server 2012 Modules

```
#VMM library for template
#Build a little script to convert a volume and bring it back to windows
#Setup variables
$MyEQLVol ="MyVHDVolume"
$MyEQLGroup="MyGroupName"
$MyEQLPool="MyPoolName"
$initaddress=(get-initiatorport)
$tarport=(get-targetportal)

#First we must take the volume offline- its ok the data will stay
Write-Host "Taking $myeqlvlvol offline"
Set-EqlVolume -VolumeName $MyEQLVol -GroupName `
    $MyEQLGroup -StoragePoolName $MyEQLPool -OnlineStatus offline
#Now we can convert to a template volume
Write-Host "converting $myeqlvlvol to a read-only template volume"
ConvertTo-EqlTemplateVolume -VolumeName $MyEQLVol -GroupName $MyEQLGroup
#Bring this template volume online
Write-Host "bringing the $myeqlvlvol online to the group"
Set-EqlVolume -VolumeName $MyEQLVol -GroupName `
    $MyEQLGroup -StoragePoolName $MyEQLPool -OnlineStatus online
#Show this volume back to the os
```



```

$IQN = (Get-VirtualDisk -FriendlyName $myEQLVol | Get-TargetPort).NodeAddress
$iSCSI Session = Connect-iSCSITarget -NodeAddress $IQN #will see connected in
iSCSI Initiator tool

Write-Host "Showing volume $myeqlvlol back to the OS"
Show-VirtualDisk -FriendlyName $myEQLVol -TargetPortAddresses
$tarport.PortNumber`
-InitiatorAddress $initaddress.NodeAddress

#Convert to template will change the color of the volume icon to blue in
EqualLogic Group Manager to indicate readonly
#will enable the ability to create linked thin clones (contains changes only)
#every Rapid provisioned VM will have an associated thin clone

```

## Creating a SAN Copy Capable Virtual Machine Template using PowerShell

**Source:** System Center Virtual Machine Manager 2012 SP1 Virtual Machine Manager Module

```

# -----
# Create VM Template Script
# Please modify the parameters as appropriate
# For additional help on cmdlet usage, type get-help <cmdlet name>
# -----
$JobGroup = [Guid]::NewGuid().ToString()
$HWProfile = "MyHWProfile"
$Owner = "MYDOMAIN\myUser"
$MyStorClass="myEQLStorageClassification"
$vhdlloc= "\\ServerIDofVHD\MyStagingWin2012_GoldBoot.vhdx"
$vhdos = "64-bit edition of Windows Server 2012 Standard"
$vmtemplatename = "MyVMTemplate"

write-host "you may follow this in SCVMM jobid: $JobGroup"

write-host "creating sc virtual scsi,dvd, netadapter,com port and floppy you may
follow this in SCVMM jobid: $JobGroup"

```



```

New-SCVirtualScsiAdapter -VMMServer localhost -JobGroup $JobGroup -AdapterID 7 -
ShareVirtualScsiAdapter $false -ScsiControllerType DefaultTypeNoType

New-SCVirtualDVDDrive -VMMServer localhost -JobGroup $JobGroup -Bus 1 -LUN 0

New-SCVirtualNetworkAdapter -VMMServer localhost -JobGroup $JobGroup -
MACAddressType Dynamic -Synthetic -EnableVMNetworkOptimization $false

Set-SCVirtualCOMPort -NoAttach -VMMServer localhost -GuestPort 1 -JobGroup
$JobGroup
Set-SCVirtualCOMPort -NoAttach -VMMServer localhost -GuestPort 2 -JobGroup
$JobGroup

Set-SCVirtualFloppyDrive -RunAsynchronously -VMMServer localhost -NoMedia -
JobGroup $JobGroup
$CPUType = Get-SCCPUType -VMMServer localhost | where {$_.Name -eq "3.60 GHz
Xeon (2 MB L2 cache)"}

New-SCHardwareProfile -Name $HWPProfile -Owner $Owner `
-Description "Temporary hardware profile used to create a VM Template" -MemoryMB
512 `
-JobGroup $JobGroup

$StorageClassification = Get-SCStorageClassification -VMMServer localhost |
where {$_.Name -eq $MyStorClass}
$VirtualHardDisk = Get-SCVirtualHardDisk -VMMServer localhost | where
{$_.Location -eq $vhdloc}

New-SCVirtualDiskDrive -VMMServer localhost -IDE -Bus 0 -LUN 0 -
StorageClassification $StorageClassification -JobGroup $JobGroup -
VirtualHardDisk $VirtualHardDisk -VolumeType BootAndSystem

$HardwareProfile = Get-SCHardwareProfile -VMMServer localhost | where {$_.Name -
eq $HWPProfile}

$OperatingSystem = Get-SCOperatingSystem -VMMServer localhost | where {$_.Name -
eq $vhdos}

$template = New-SCVMTemplate -Name $vmtemplatename -RunAsynchronously -
HardwareProfile $HardwareProfile `
-JobGroup $JobGroup -ComputerName "*" -TimeZone 35 -
LocalAdministratorCredential $null `
-FullName "" -OrganizationName "" -Workgroup "WORKGROUP" -AnswerFile $null -
OperatingSystem $OperatingSystem

write-host "VM Template: $template.name created successfully "

```



## Rapid Provisioning of Virtual Machines using PowerShell

**Note:** Due to the complexity of this process only a summary of the main PowerShell cmdlets will be provided.

**Source:** System Center Virtual Machine Manager 2012 SP1 Virtual Machine Manager Module

```
Function RapidDeployVM([String]$vmName, [String]$hostName,
[String]$TemplateName, [int]$vmCount, [String]$VMMIn, [String]$vhdxLocation)
{

# Get the VM template information
$template = Get-SCVMTemplate -VMMServer $vmmserver | where {$_.Name -eq
$templateName}

#Get the SCVMM server information
$myHost = Get-SCVMHost -ComputerName $hostName
#Create the new VM Configuration
$vmc = New-SCVMConfiguration -VMTemplate $template
$vhdc = $vmc.VirtualHardDiskConfigurations
$vhdc | Set-SCVirtualHardDiskConfiguration -DeploymentOption UseSAN
$voidobj = Set-SCVMConfiguration -VMConfiguration $vmc -Name $currentVmName -
ComputerName $currentVmName -VMHost $myHost -VMLocation $vhdxLocation

$vm = New-SCVirtualMachine -VMConfiguration $VMCArray[$i-1] -Name $currentVmName
-SkipInstallVirtualizationGuestServices -JobVariable "RapidCreateVM"
-RunAsynchronously

#Further logic will be needed however the main cmdlets are demonstrated above
}
```





## B How to prepare a gold copy of an operating system using the SCVMM user interface

This section will walk through the process to create a virtual machine from an ISO then use that as the source for the VM Template. This step may be skipped if a generalized virtual hard disk is already available. Once a prepared VHD or VHDX is ready, copy to a Dell EqualLogic volume and convert that volume to a "Template" volume as outlined in this [document](#).

The ultimate goal of this procedure is to create the virtual hard disk (VHDX) for the virtual machine Template. New with Windows Server 2012 is the VHDX format which is described below along with the previous virtual hard disk version.

**VHD (Virtual Hard Disk)** is a file format that represents a hard disk image. A VHD file is composed of sectors of 512 bytes each, and addressed by a 32-bit table which allows a maximum addressable size of 2TB (or 2040GB). VHD format is supported by all three generations of Microsoft Hyper-V technologies since Windows Server 2008, as well as other virtualization platforms. VHDs can only be mounted on NTFS/ReFS volumes (not FAT/FAT32), and should not be placed within a compressed folder or volume.

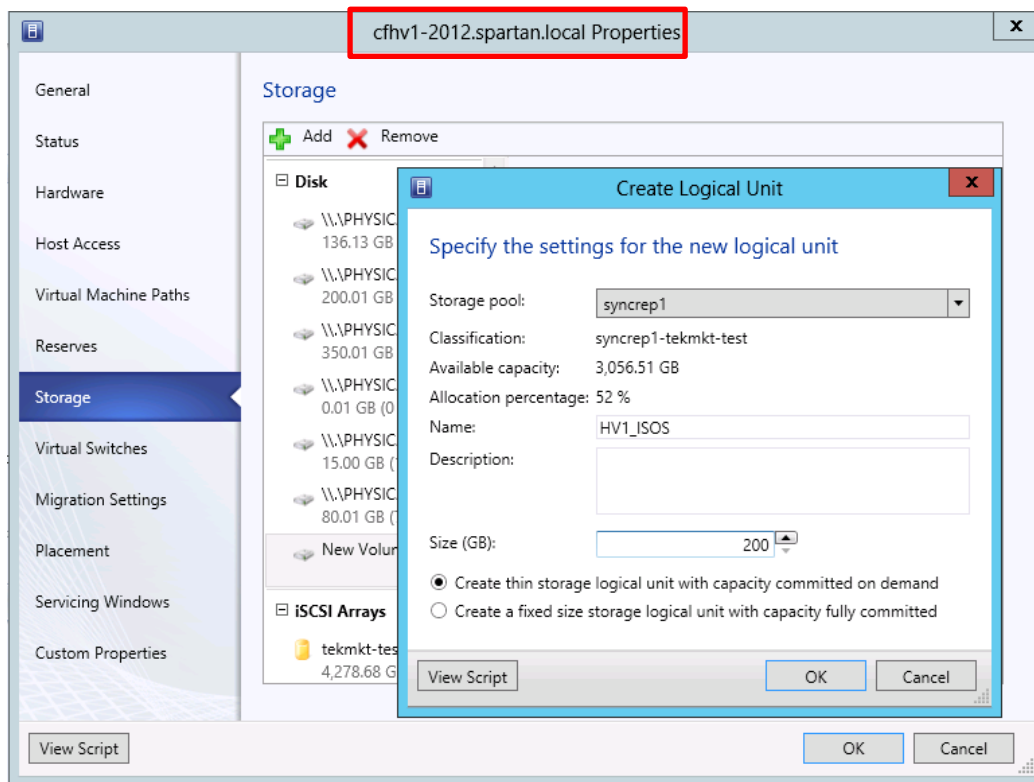
**VHDX (Virtual Hard Disk eXtended)** is the VHD enhanced file format representing a hard disk image, and is supported only on the latest generation of Microsoft Hyper-V in Windows Server 2012. VHDX format supports storage capacity up to 64TB by using 4KB sectors and provides protection against data corruption during power failure by logging changes in its own metadata structures. VHDX also supports reclaiming unused space ("unmap/trim") when working in combination with Dell EqualLogic firmware 6.0 (and up) and provides better disk alignment with an increased offset of 1MB (from 512Kb).

**Note:** Both VHD and VHDX are supported with Hyper-V 2012.

General steps for creating the virtual hard disk:

1. Create a Dell EqualLogic volume on the library server for ISOs (disk images) and copy the appropriate ISOs to this volume
2. Add the ISOs as a Library share to the SCVMM Library Server
3. Create a VM from that ISO
4. Generalize through Sysprep
5. Remove the ISO



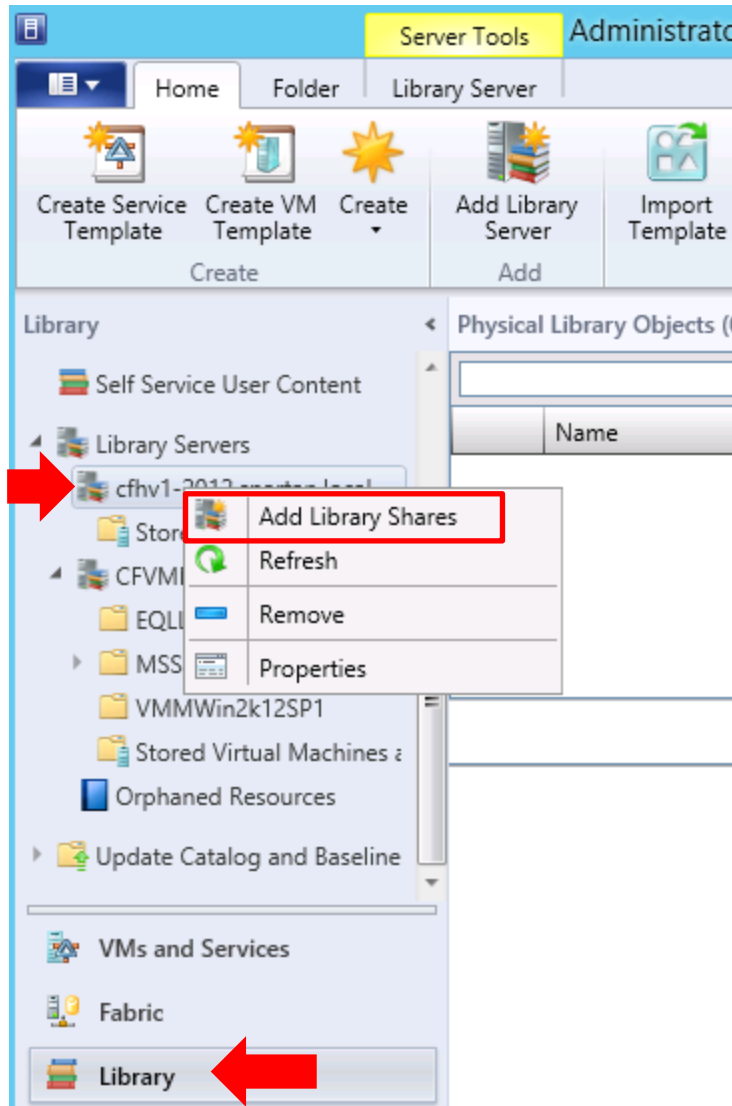


Example of creating a volume to contain ISOs through SCVMM

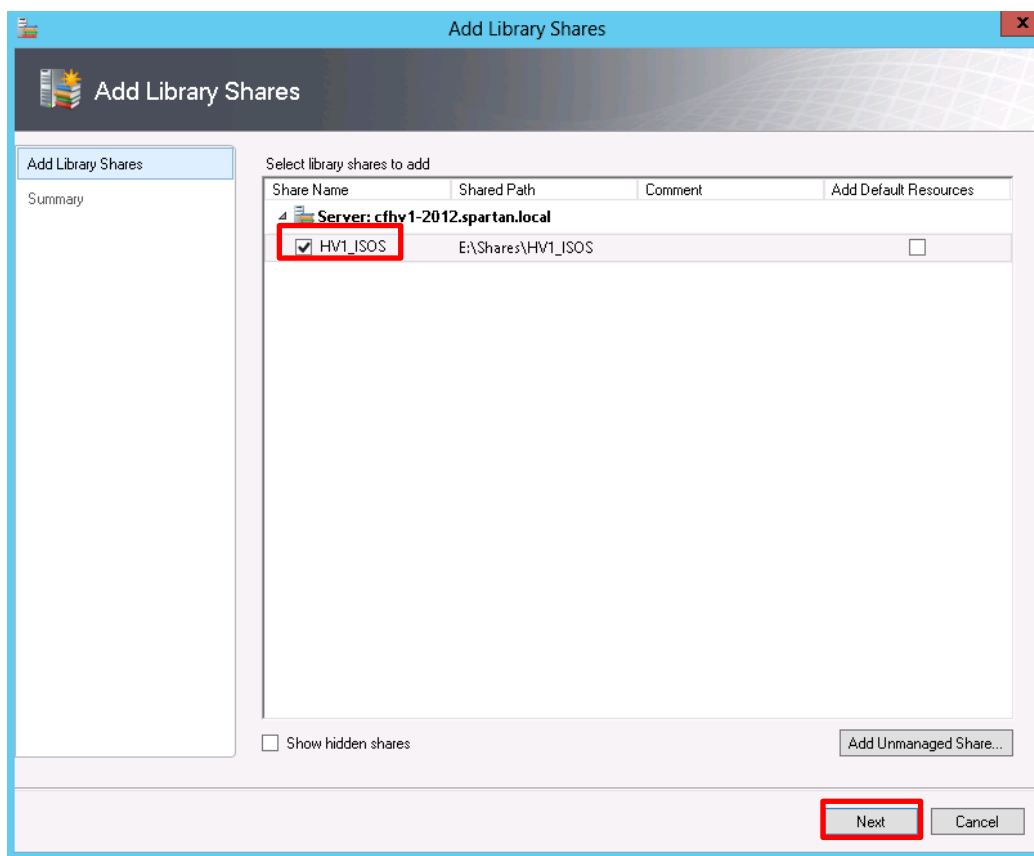
1. Create an EqualLogic volume and bring the volume online to the SCVMM Library Server and share the volume. In this example the CFHV1-2012 server is also a library server. The Library server may also be the same as the SCVMM server, a stand-alone server or a VM. For an example of using SCVMM to create a volume for the ISOs see the using SCVMM to provision volumes [section](#).

**Note:** The folder created from the SCVMM Library Server should be shared with Full Control permissions for "system" required to allow SCVMM 2012 SP1 to manage this share.

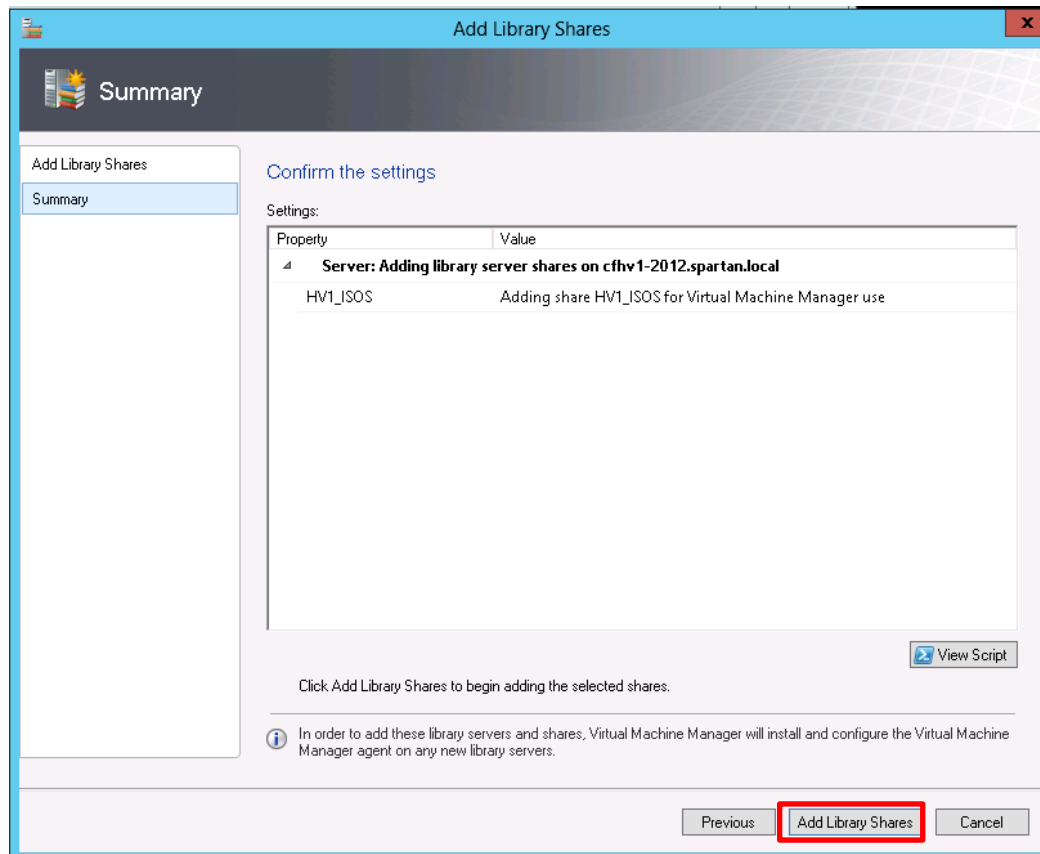
2. Launch SCVMM UI



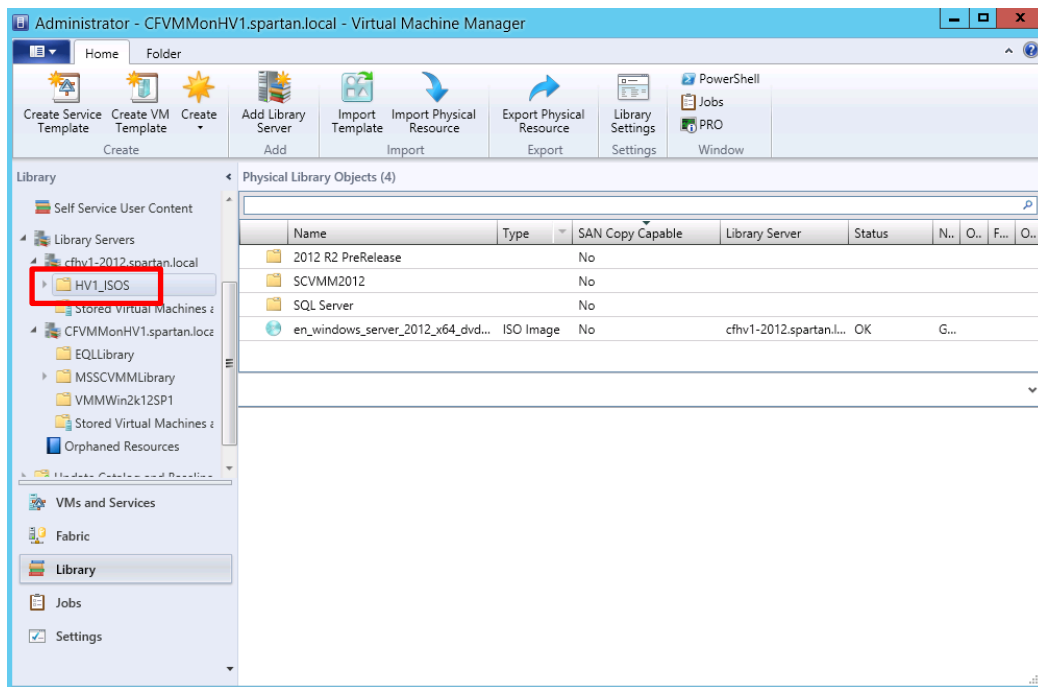
3. Click on the **Library** workspace, expand Library Servers, right-click on the desired library server and select **Add Library Shares**



4. Check the box next to the library share to add and then **Next**. This library will contain the Operating Systems ISO files.

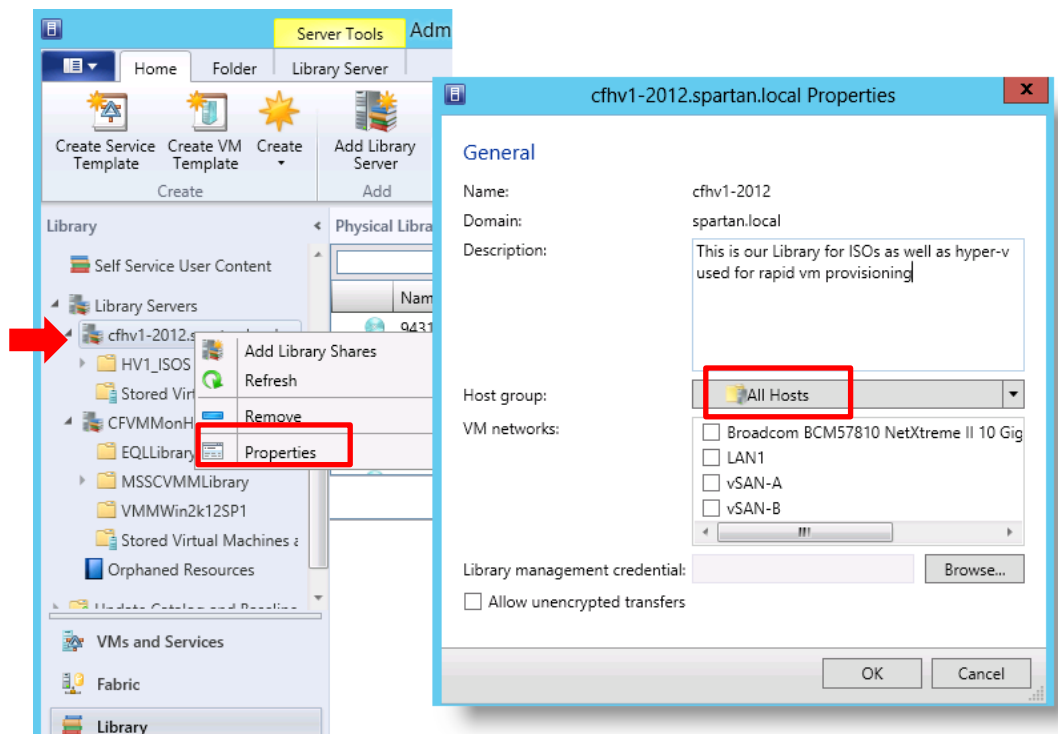


5. On the Summary page click **"Add Library Shares"**



Library Share view in SCVMM

**Note:** The ISO library share will be used to create a new VM from a blank virtual hard disk.



6. On the library Server verify that the host group or **"All hosts"** are assigned. In the Library workspace expand **Library Servers** then right mouse click on the appropriate library server then click **Properties**. The Host group dropdown should have **All Hosts** selected.

## Create a blank VM from an ISO image

The procedure below is provided to demonstrate how to create a VM from an ISO image using a blank virtual hard disk.

The resulting VM may then be:

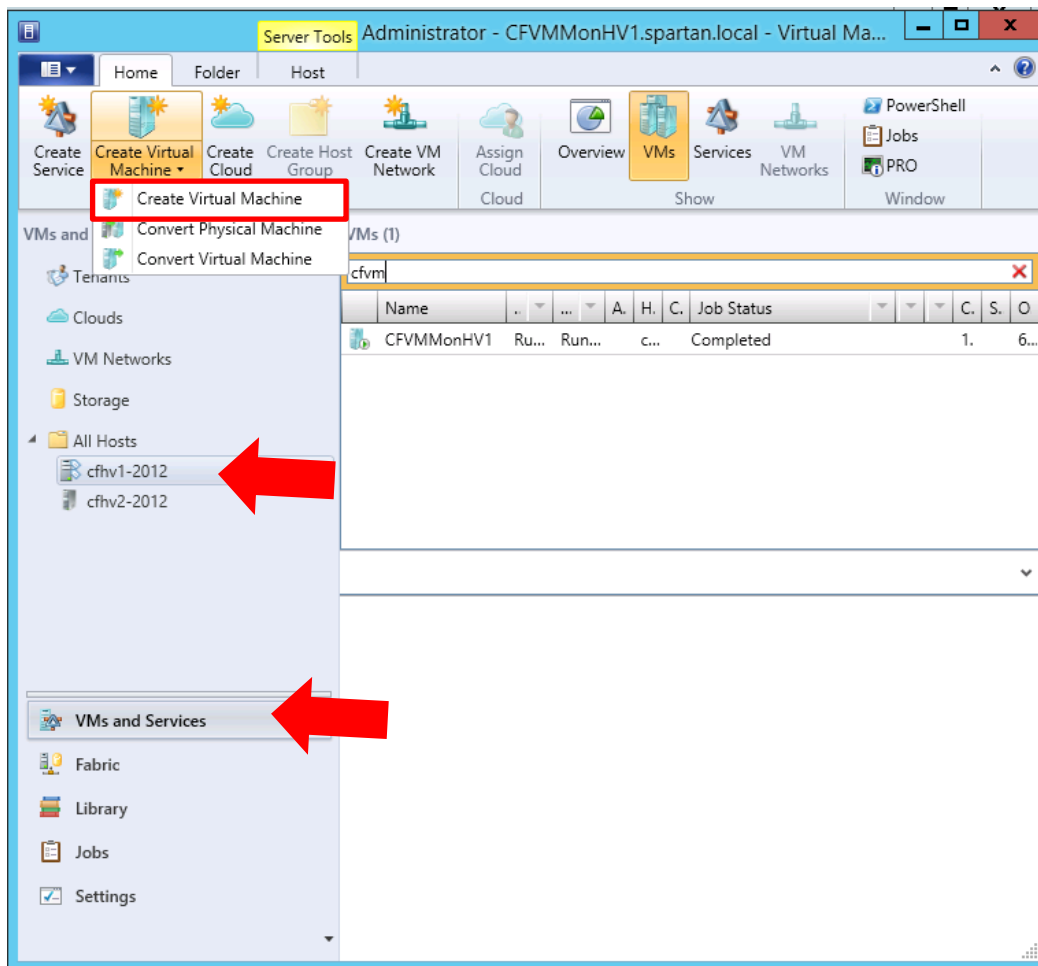
- Patched
- Customized
- Generalized
- Powered down

Then the virtual hard disk (.vhd or .vhdx) may be moved or copied to a Dell EqualLogic volume which will then be converted to a template volume for rapid VM deployment.

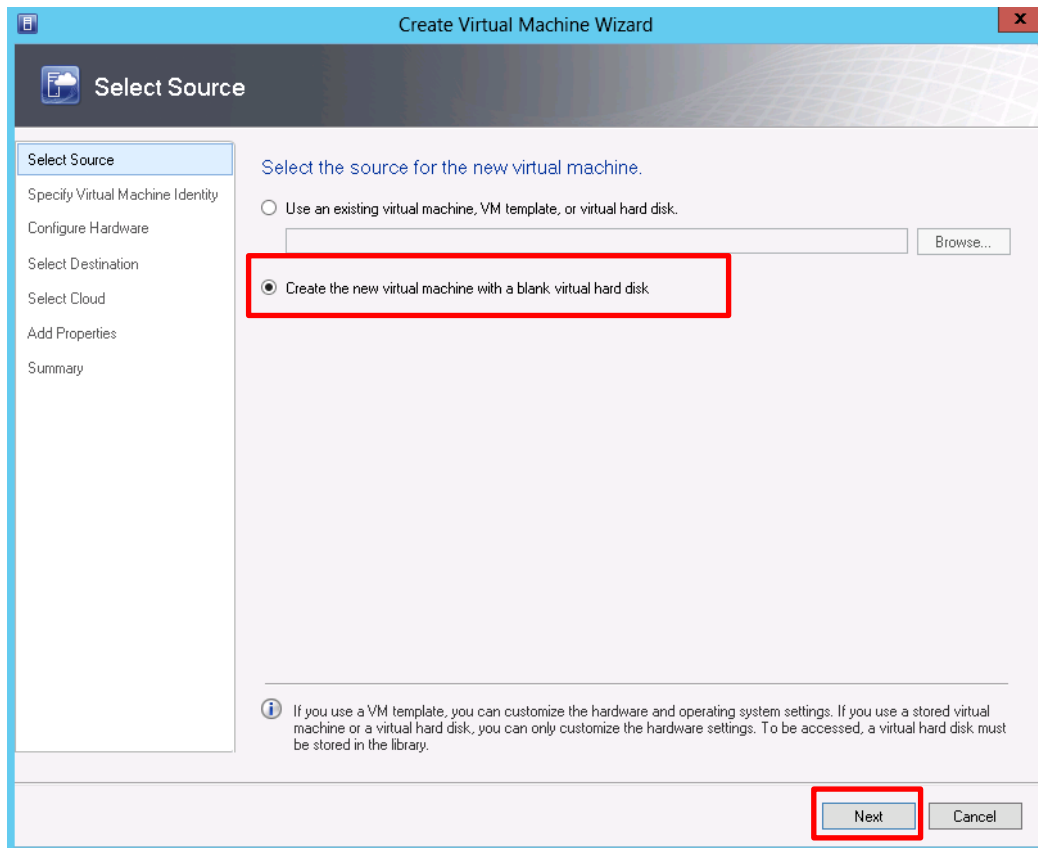




## Create Virtual Machine

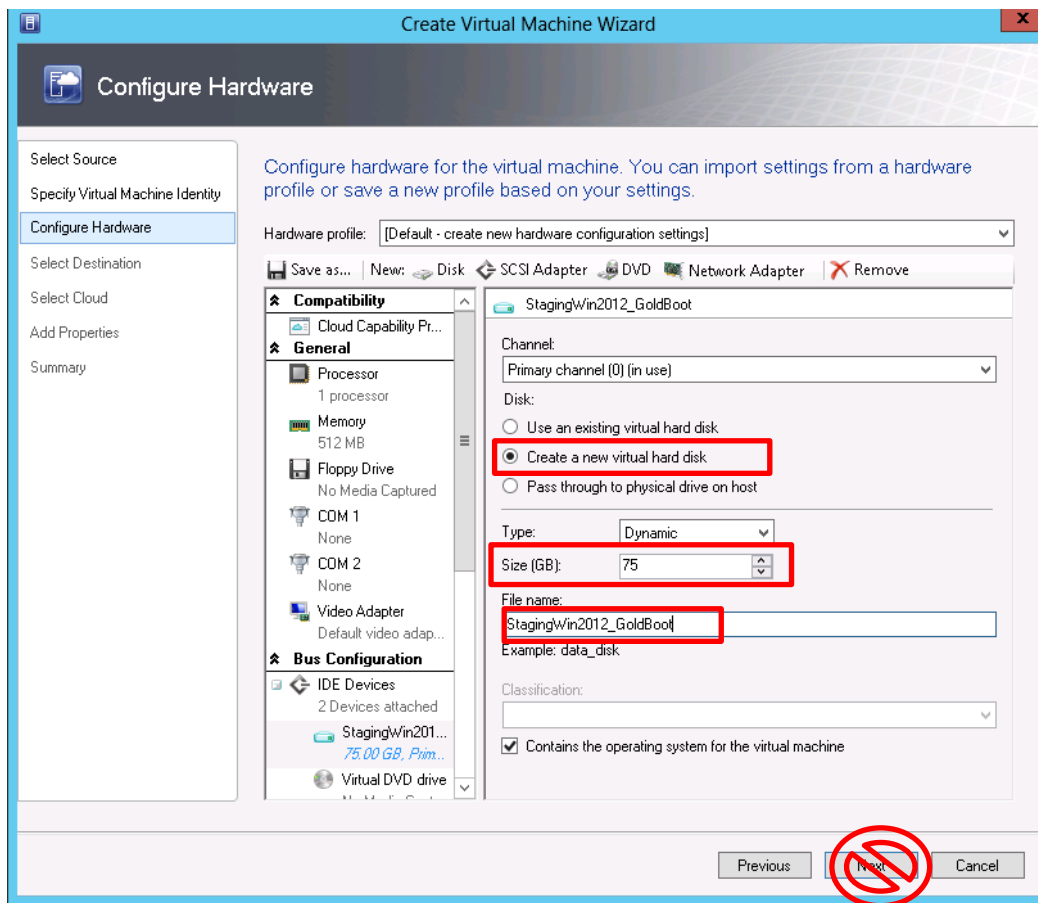


1. Click **Create Virtual Machine** on the Home tab of the ribbon bar –be sure to navigate to **All Hosts** then the target Hyper-V server selected in the **VMs and Services Workspace**.
2. **Create Virtual Machine** from the dropdown to start the wizard



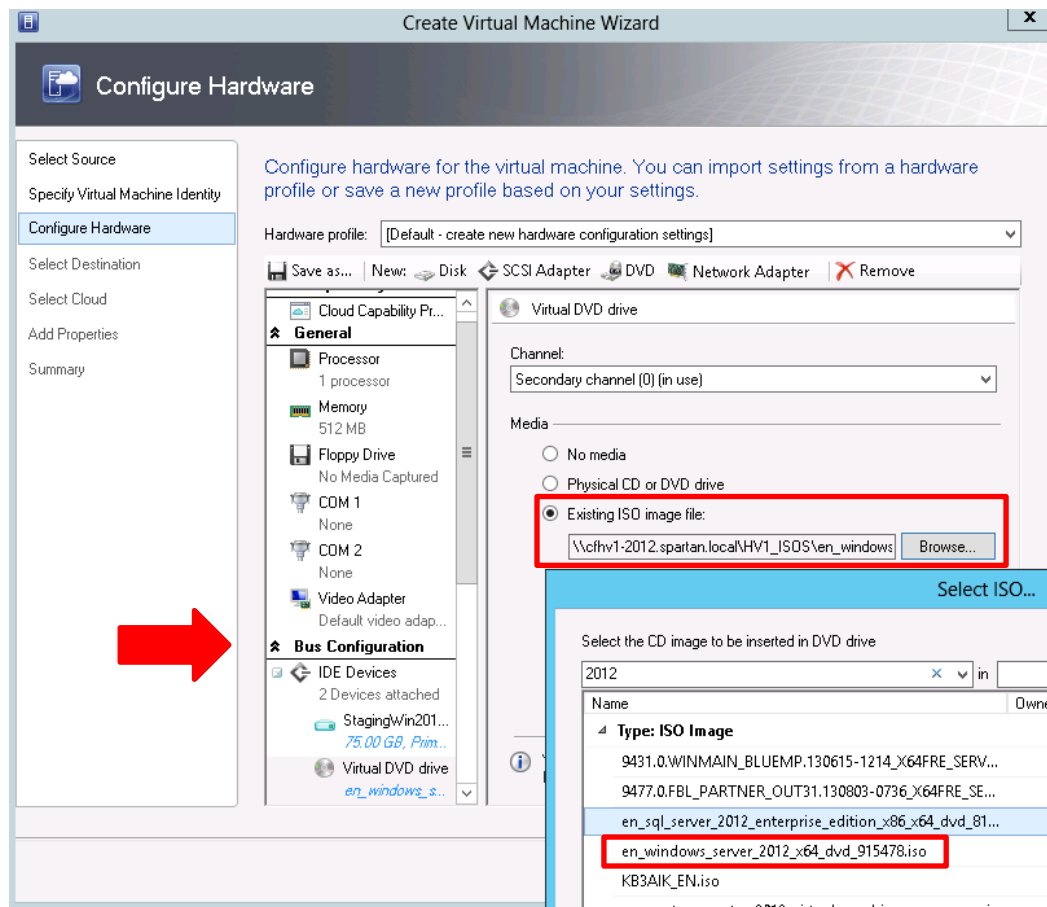
3. Click **"Create the new virtual machine with a blank virtual hard disk"** then **Next**.

4. Enter a descriptive unique machine name (this VM will be named StagingWin2012), optionally a description then click **Next**.

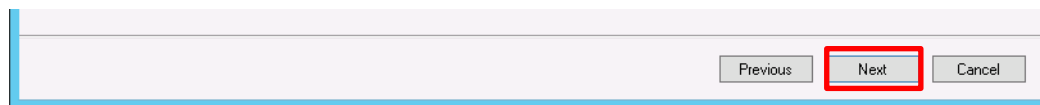


5. Configure the hardware (optionally use an existing profile), select **Create a new virtual hard disk**, increase the size to match the OS plus room to contain the ISO image.

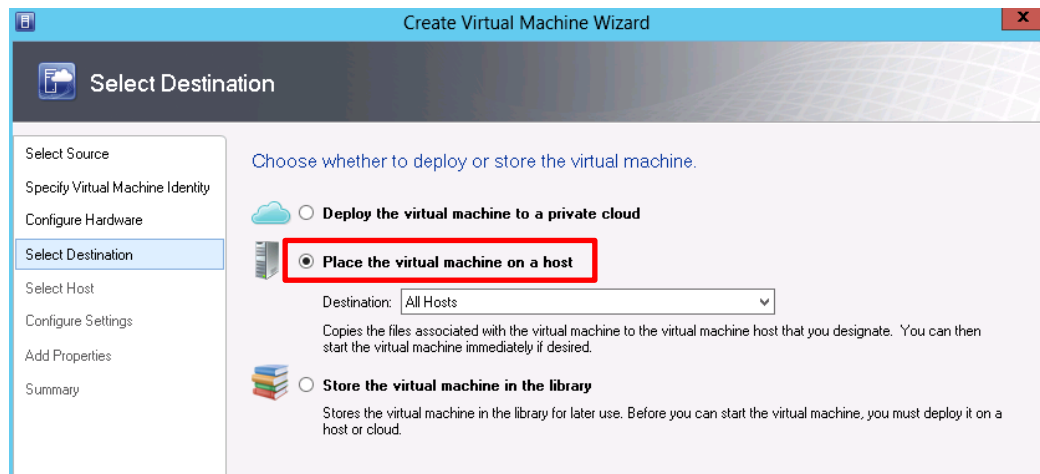
**Warning:** Please do not click next until the steps below are completed.



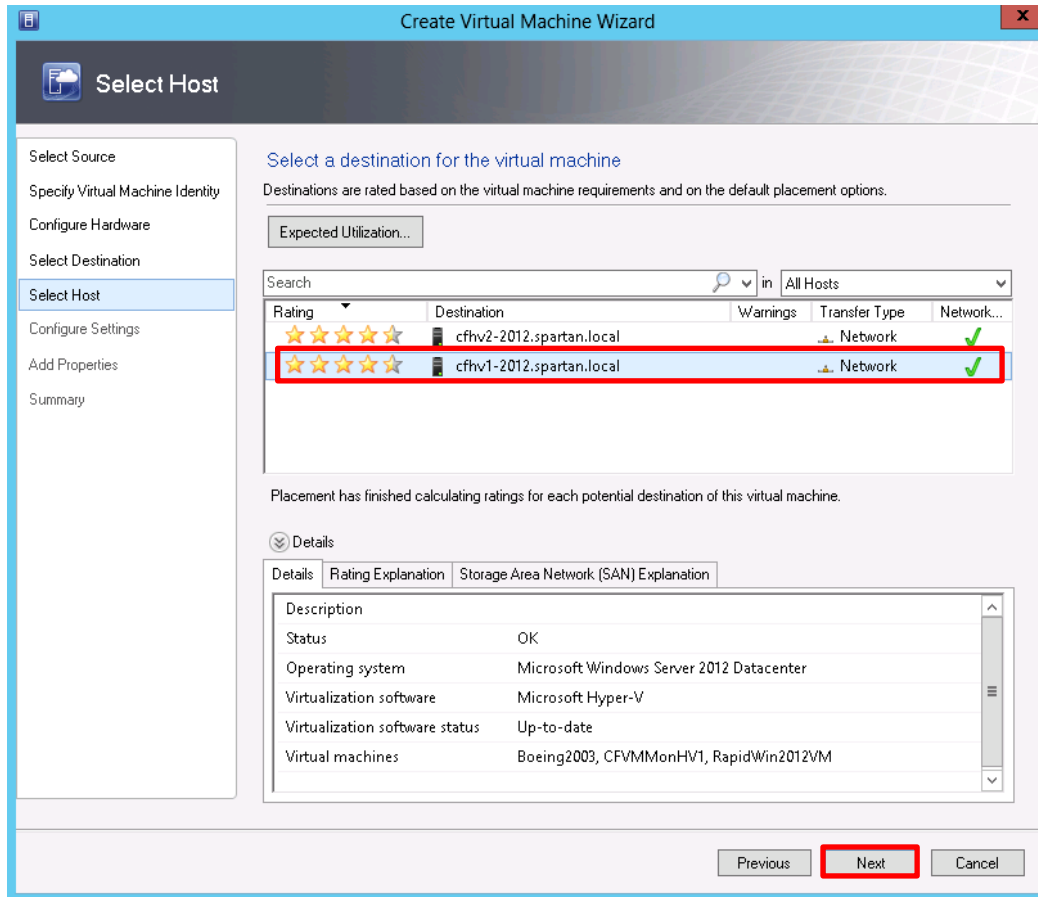
6. Under **Bus Configuration**, click the **Virtual DVD drive** then under **Media** click **Existing ISO image file** and browse to the ISO "library" share created earlier.
7. Select the Windows Server 2012 ISO (of course this will need to have the appropriate license and copied to the ISOs share prior to this action)



8. Click on **Next** when finished with the Configure Hardware settings

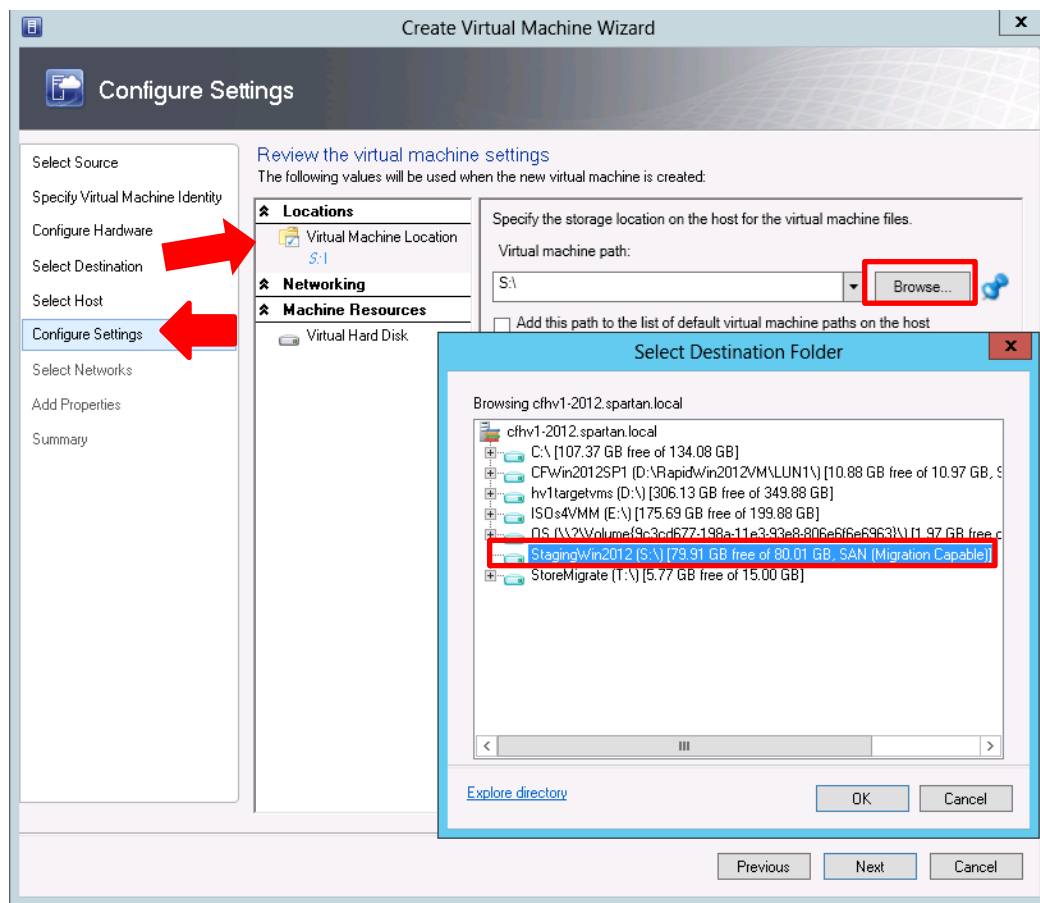


9. Select the deployment option of **Place the virtual machine on a host** and the destination of **All Hosts** to show the available hosts. Click Next.



- Click the Hyper-V host connected to the EqualLogic staging volume. In this example the Hyper-v host is cfhv1-2012. Click **Next**.

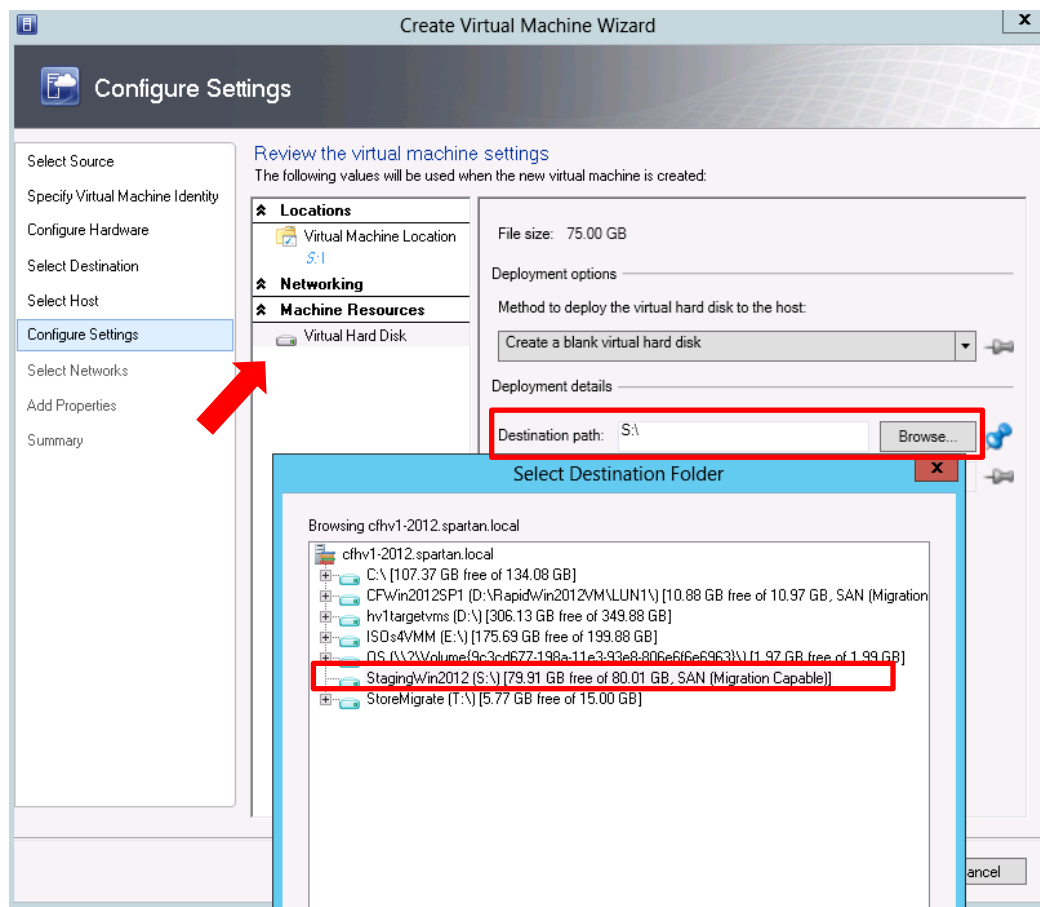
**Note:** The Transfer Type for this virtual machine will use the Network



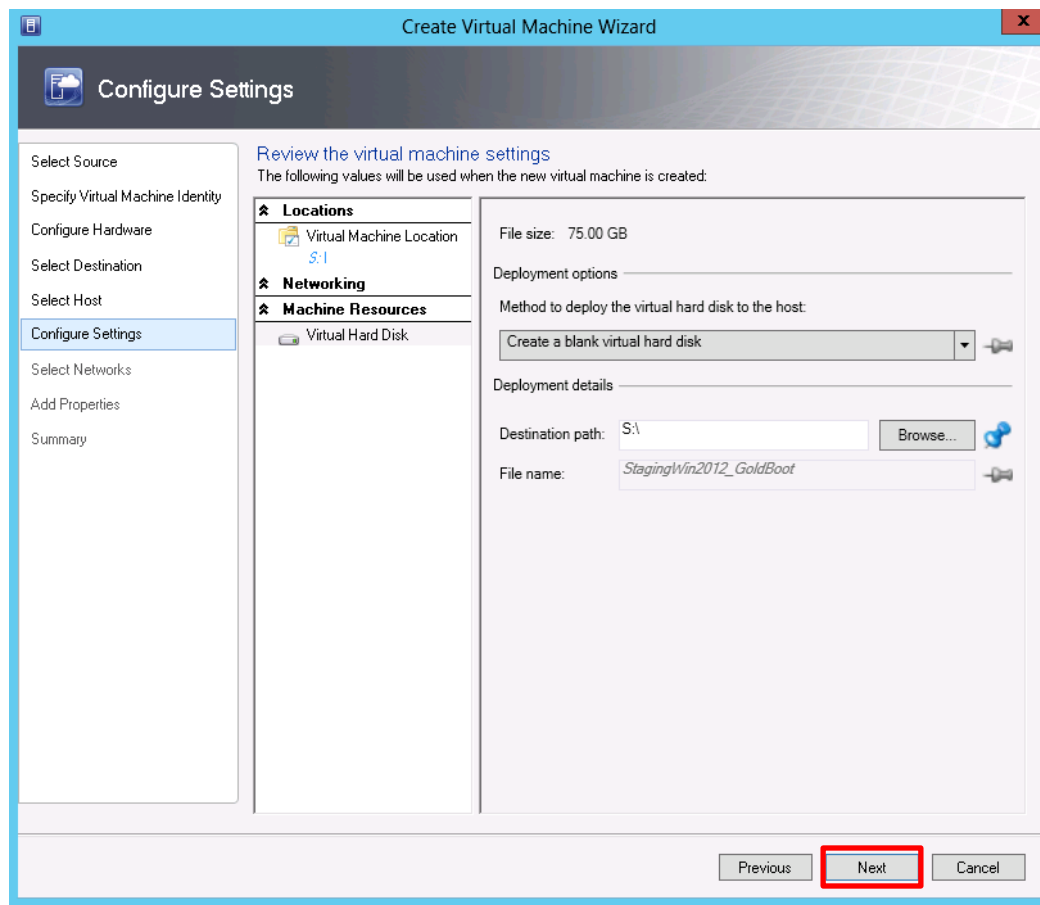
11. On the configuration settings under **Locations**->**Virtual Machine location**, click browse for the "Virtual Machine path" and select the volume intended for this Gold image (S: in this example) on the target Hyper-V server.

**Note:** Migration Capable should be indicated.





12. Under **Machine Resources** click on the **Virtual Hard Disk** icon and browse to the location used use as the source for the gold template or image.



13. Click **Next**

**Note:** Continue through the Wizard and customize as appropriate.

**Create Virtual Machine Wizard**

**Summary**

Select Source  
Specify Virtual Machine Identity  
Configure Hardware  
Select Destination  
Select Host  
Configure Settings  
Select Networks  
Add Properties  
Summary

[Confirm the settings](#)

Summary:

Property	Value
Virtual machine	StagingWin2012
Destination host	cfhv1-2012.spartan.local
Path	S:\
Operating System	64-bit edition of Windows Server 2012 Standard

☐ Start the virtual machine after deploying it [View Script](#)

To create the virtual machine, click Create. You can track the progress of this job in the Jobs workspace.

Previous **Create** Cancel

**Note:** On the Summary form you may optionally **View Script** to see the System Center PowerShell cmdlets used to build the virtual machine

14. Click **Create**

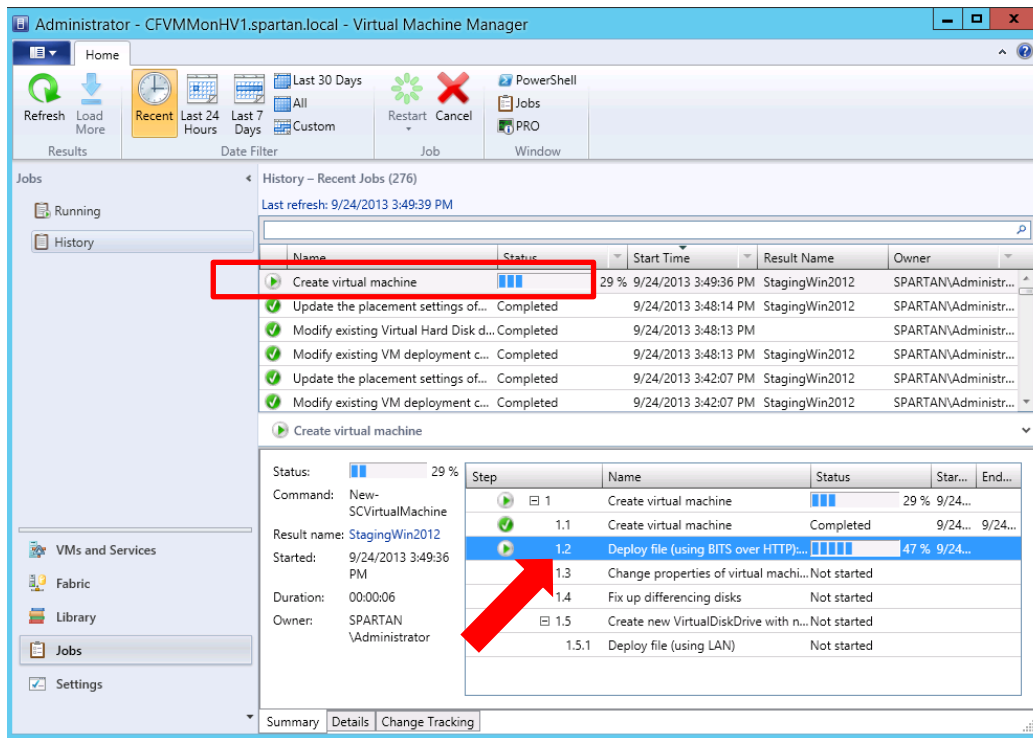
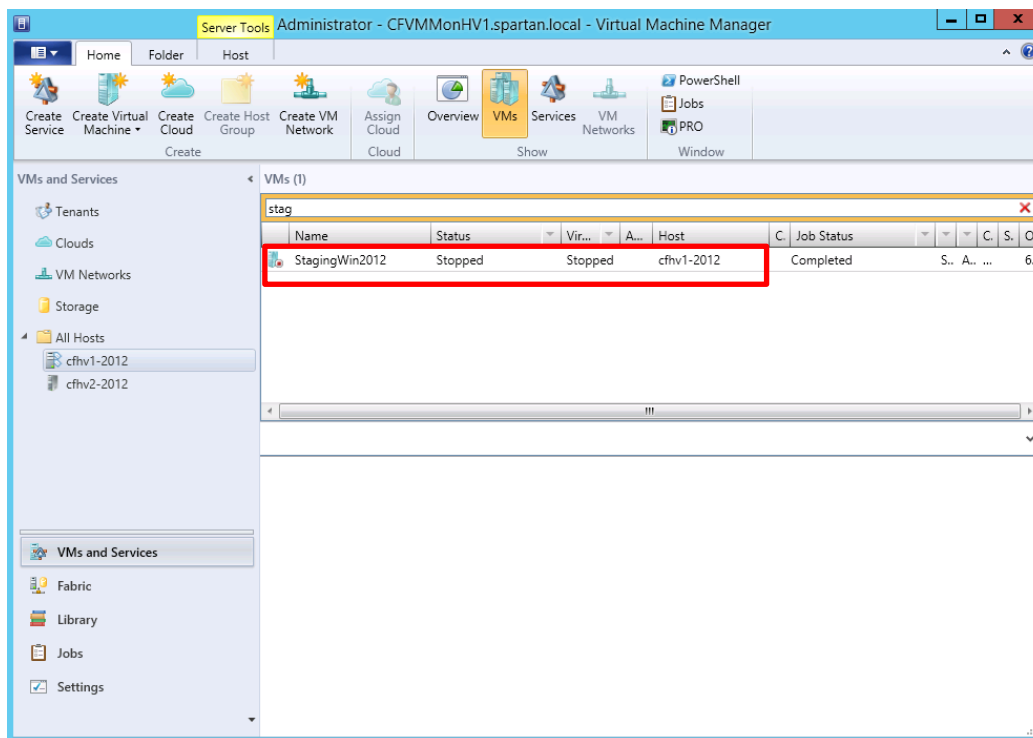


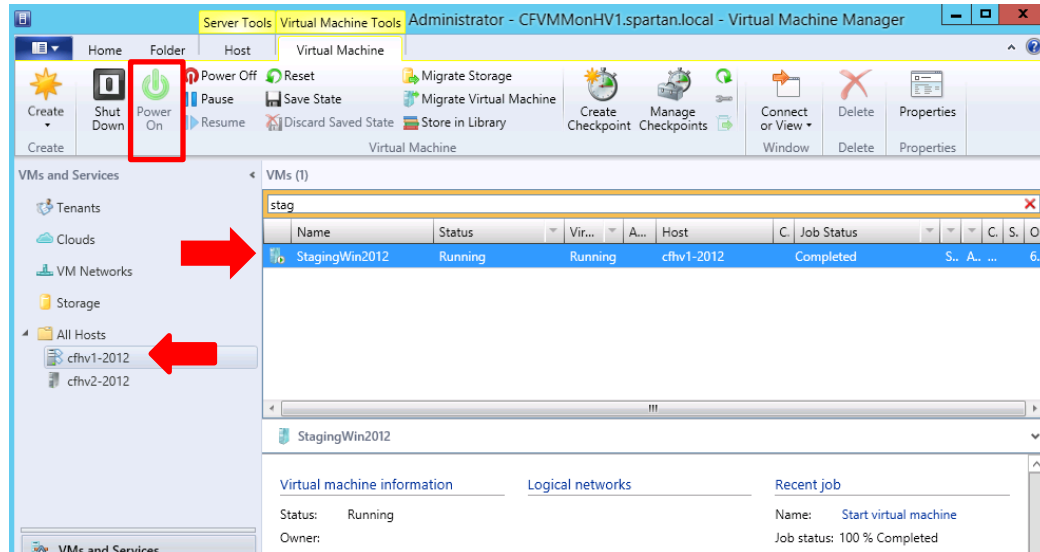
Figure 12 Job status viewed in the Jobs display



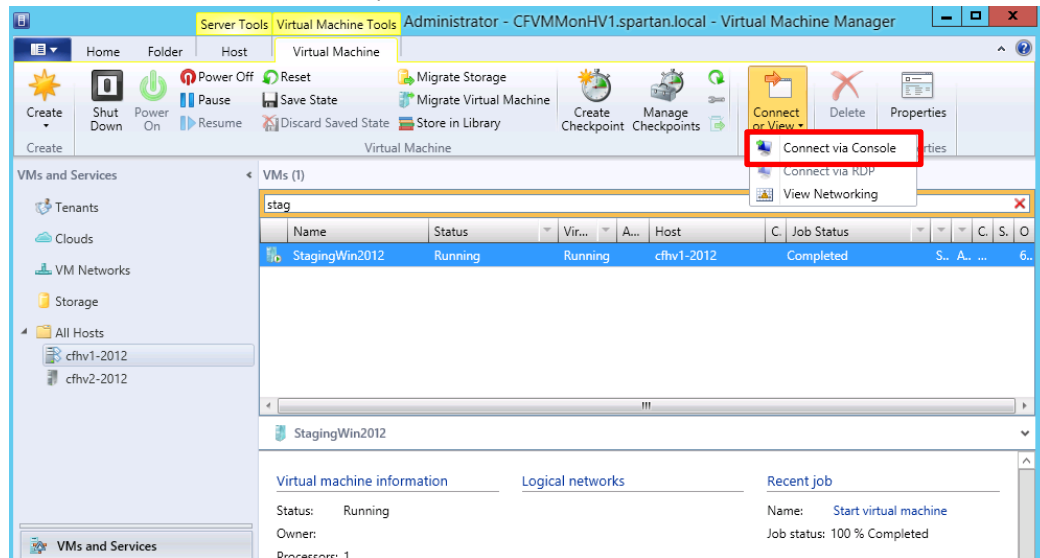
**Note:** Once the Create virtual Machine job completes, verify that the new guest VM is displayed under the target host in the VMs and Services workspace. In this example the new guest is listed under the host server cfhv1-2012 as shown.

## Configure the VM created from the ISO image

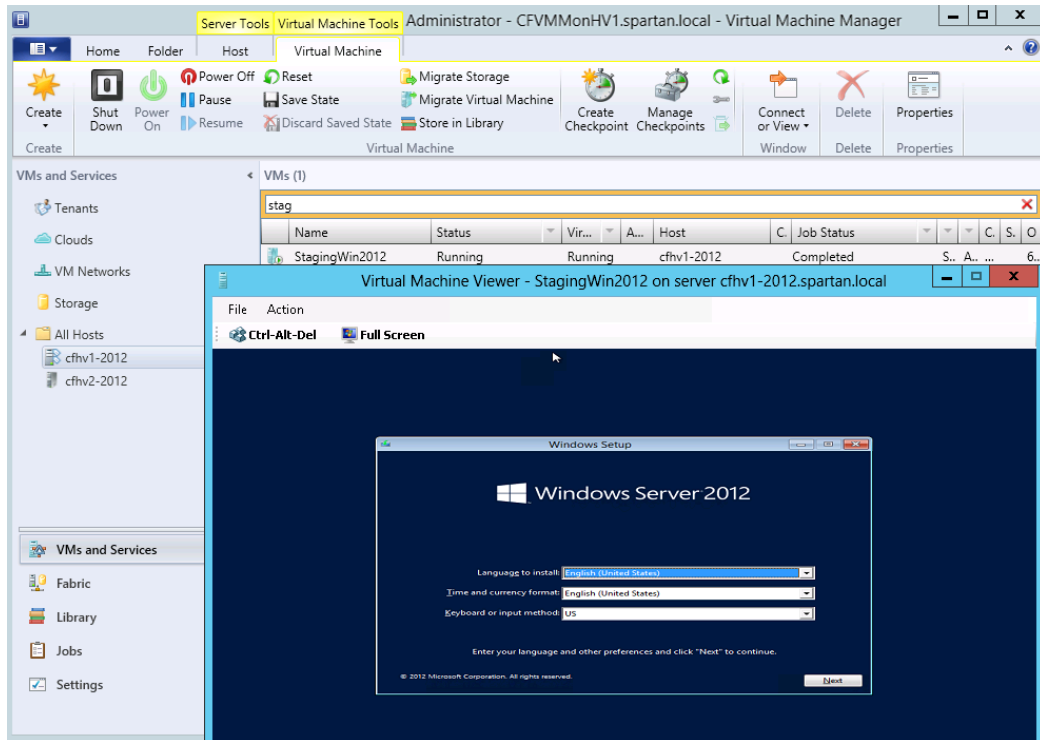
On the new guest complete the following:



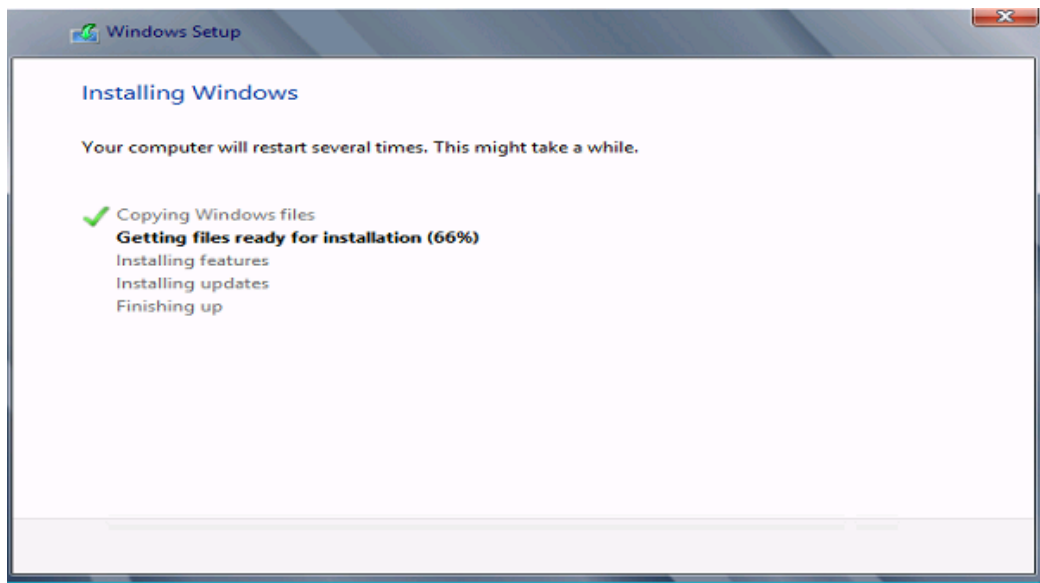
1. Click Power On from SCVMM process ribbon

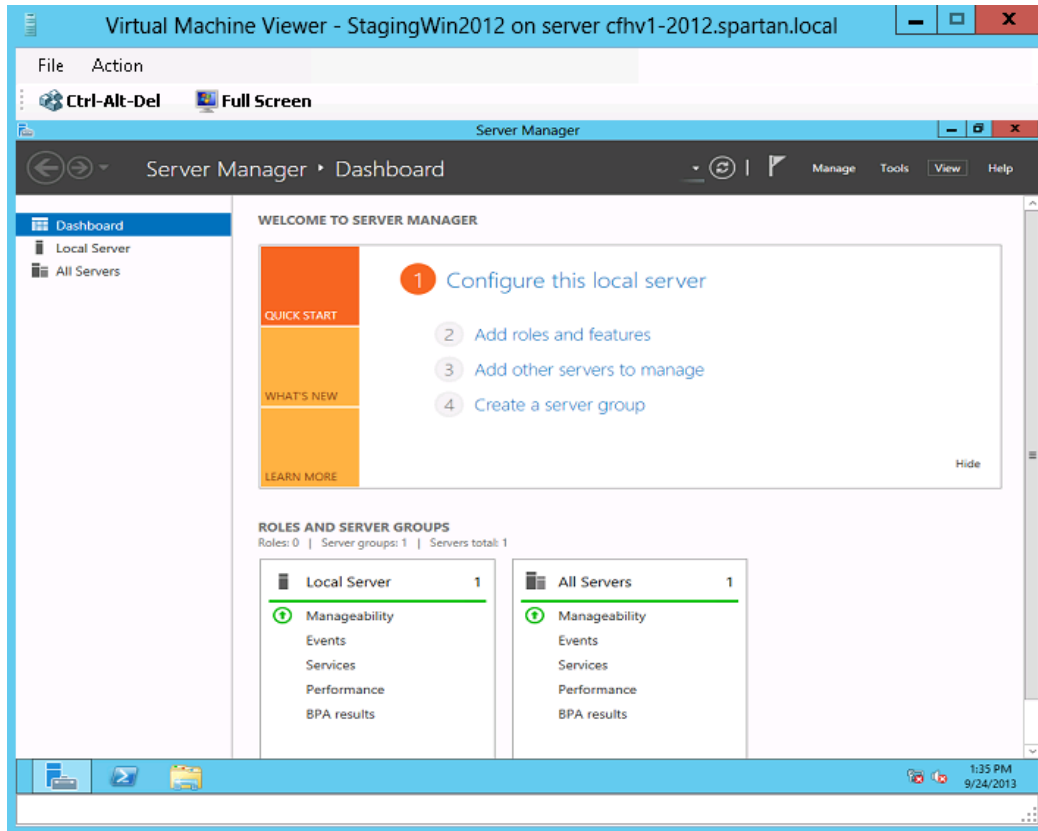


2. Connect to the VM via the console in SCVMM



3. Install the OS (may need the appropriate license keys)



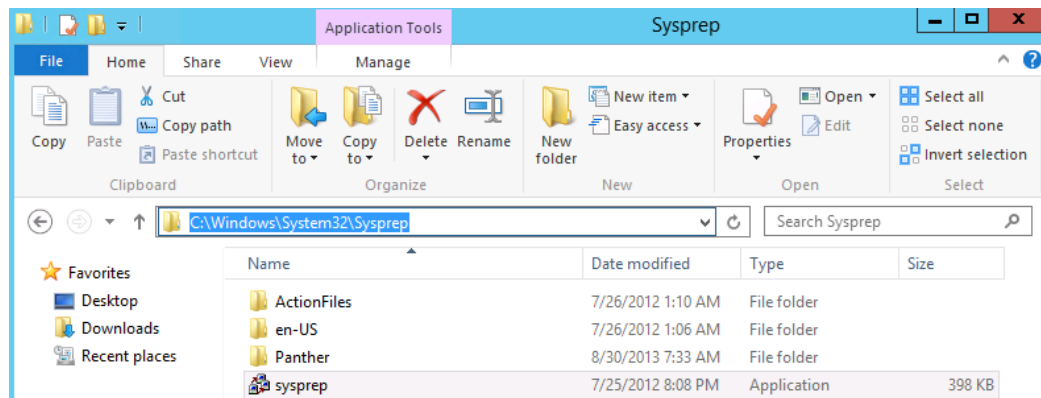


Server Manager Dashboard of gold image virtual machine

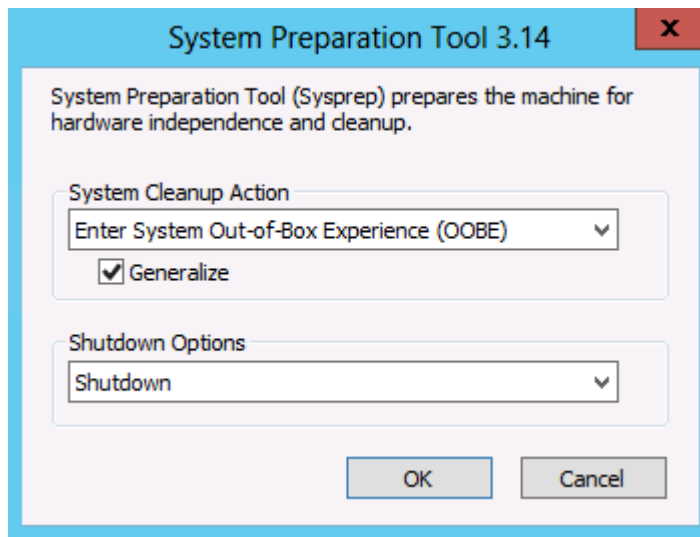
Complete the gold image virtual machine installation:

- Install any desired features, roles or applications
- Customize any settings
- Patch to desired level





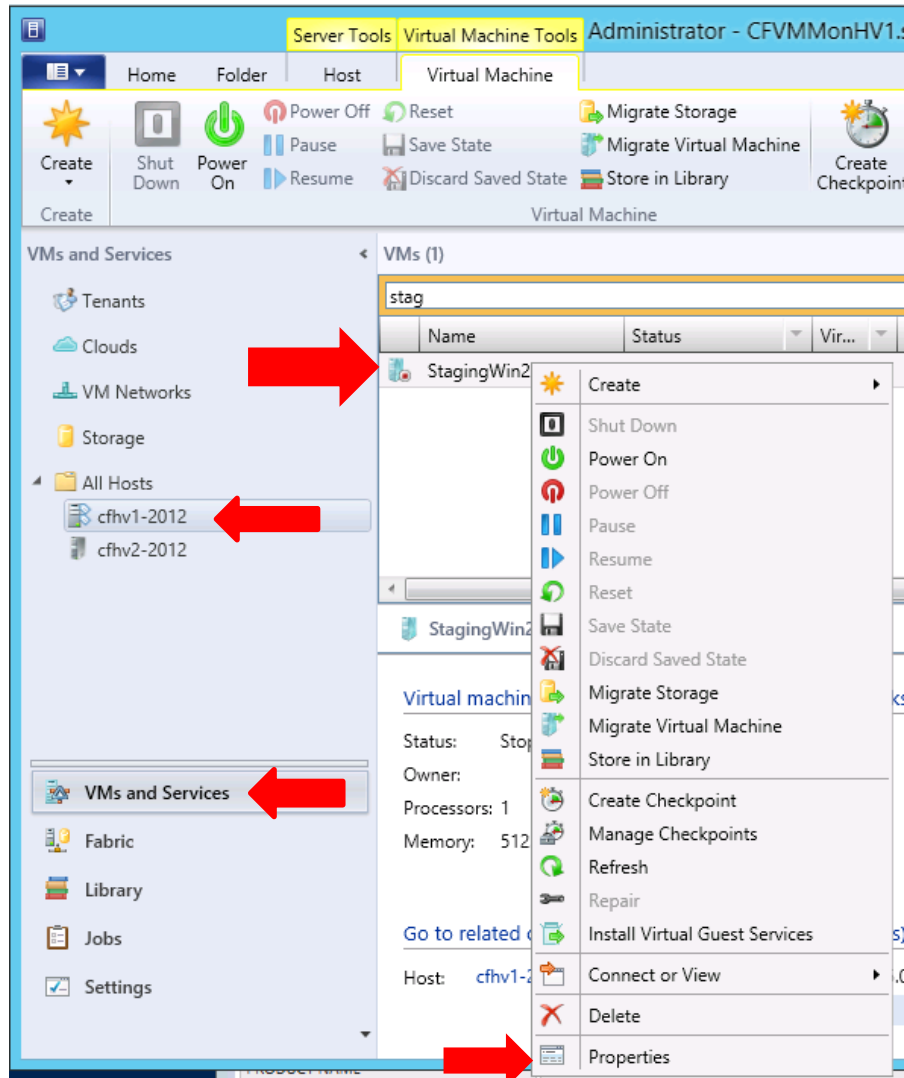
Sysprep tool location



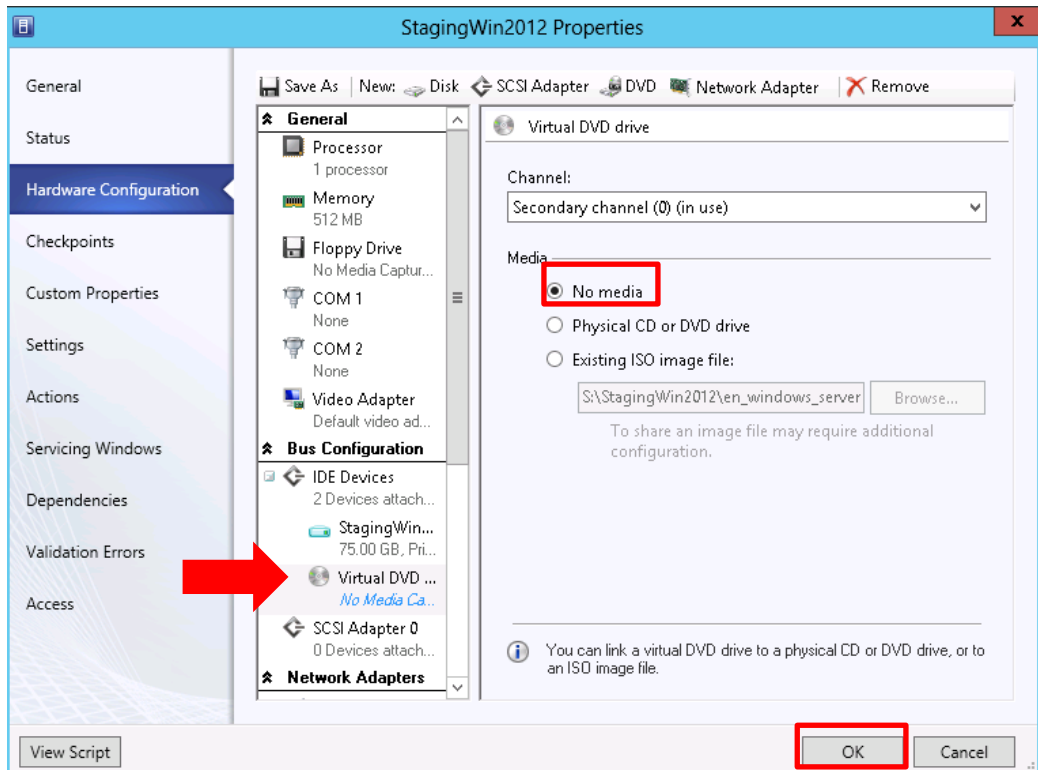
Sysprep Tool

4. Sysprep the system to generalize the OS for deployment. Check the "Generalize" box and select **Shutdown** from the "Shutdown Options" and Click **OK**.
5. After the new guest has been fully staged, power it down.

## Remove the ISO from the Virtual Machine




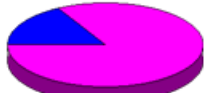


1. Right click on the new guest VM under VMs and Services and click **Properties**



2. On the **Hardware Configuration** action under **Bus Configuration** click on **Virtual DVD**. Click on the "No Media" option then OK.

Table 4 ISO Space usage

<div><div><div>StagingWin2012</div></div><div><div>Type:Local Disk</div><div>File system:NTFS</div></div><div><div><div>Used space:12,745,711,616 bytes11.8 GB</div><div>Free space:73,162,018,816 bytes68.1 GB</div></div><div><div>Capacity:85,907,730,432 bytes80.0 GB</div><div><div>Drive S:</div></div></div></div></div>	<div><div><div>StagingWin2012</div></div><div><div>Type:Local Disk</div><div>File system:NTFS</div></div><div><div><div>Used space:9,050,529,792 bytes8.42 GB</div><div>Free space:76,857,200,640 bytes71.5 GB</div></div><div><div>Capacity:85,907,730,432 bytes80.0 GB</div><div><div>Drive S:</div></div></div></div></div>
Used Space Before ISO is removed (11.8GB)	Used Space After ISO is removed (8.42 GB)
This is the amount needed for the gold template volume on the library server (in this case the SCVMM server).	

**Note:** If the ISO is not removed, then it will become part of the template, and this ISO will be copied over the LAN from the library server to the target host(s) for every new guest deployed from it. The result would be SAN space consumed unnecessarily, along with possible negative impact to network bandwidth.

For the next steps with this Staging virtual machine see the Creating VM templates section where the [Copy the virtual hard disk to the Dell EqualLogic volume](#) is described.

