Dell Compellent Storage Center

Microsoft Server 2008 R2 Hyper-V Best Practices for Microsoft SCVMM 2012

Document Revisions

Date	Revision	Comments
05/18/2012	A	First Revision

Contents

Tables

Figures

General Syntax

Table 1. Document syntax

Item	Convention
Menu items, dialog box titles, field names, keys	**Bold**
Mouse click required	Click:
User Input	`Monospace Font`
User typing required	Type:
Website addresses	http://www.compellent.com
Email addresses	info@compellent.com

Conventions

Notes are used to convey special information or instructions.

Timesavers are tips specifically designed to save time or reduce the number of steps.

Caution indicates the potential for risk including system or data damage.

Warning indicates that failure to follow directions could result in bodily harm.

Preface

Audience

This document is highly technical and intended for storage and server administrators, as well as other information technology professionals interested in learning more about best practices for implementing Microsoft Server Hyper-V R2 as part of a private cloud using SCVMM 2012 with Dell Compellent Storage Center.

This document assumes the reader has read, has formal training, or has advanced working knowledge of the following:

- Dell Compellent Storage Center
- Dell Compellent Enterprise Manager Client and Data Collector Server
- Microsoft SCVMM 2012
- Microsoft Server 2008 R2 Hyper-V (hosts, guests, clustering, etc.)

References

Reviewing the following documentation is highly recommended prior to referencing this best practices guide:

- Microsoft System Center Technical Documentation Library

http://technet.microsoft.com/en-us/library/cc507089.aspx

- Microsoft SCVMM 2012 Technical Documentation Library

http://technet.microsoft.com/en-us/library/gg610610.aspx

- Dell Compellent Documentation
  - Enterprise Manager Installation and Users Guides
  - Storage Center Users Guide
  - Microsoft Server 2008 R2 Hyper-V Best Practices Guide
  - Disaster Recovery Best Practices Guide for Microsoft Server 2008 R2 Hyper-V
  - Dell Compellent SMI-S Best Practices for SCVMM 2012

http://knowledgecenter.compellent.com

Purpose

The purpose of this document is to provide best practices for how to configure SCVMM 2012 to deploy and manage Hyper-V hosts and guest VMs on Dell Compellent Storage Centers.

Please note that the information contained within this document provides general recommendations only and may not be applicable to all configurations or environments. Configurations may vary based upon individual circumstances, environments, or business needs.

Introduction

Dell Compellent Storage Center Overview

The Dell Compellent Storage Center is an enterprise class storage area network (SAN) that significantly lowers capital expenditures, reduces storage management and administration time, provides continuous data availability and enables storage virtualization. Storage Center's industry-standard hardware and sophisticated software manage data at the block level, maximizing utilization, automating tiered storage, simplifying replication and speeding data recovery.

Dell Compellent SMI-S Provider

Storage Management Initiative Specification (SMI-S) is a standard interface specification developed by the Storage Networking Industry Association (SNIA). Based on the Common Information Model (CIM) and Web-Based Enterprise Management (WBEM) standards, SMI-S defines common protocols and data models that enable interoperability between storage vendor software and hardware.

The Dell Compellent SMI-S Provider version 1.4 works with the open source OpenPegasus CIM Server, which is included with the Enterprise Manager Data Collector version 5.5.5. SMI-S can be configured during initial Data Collector installation or post-installation by modifying the Data Collector Manager properties. When SMI-S is enabled and configured, the Data Collector automatically installs and manages the Dell Compellent SMI-S Provider and the OpenPegasus CIM Server. No additional installation is required.

For more information about Dell Compellent SMI-S, please refer to the Dell Compellent Enterprise Manager Installation and Setup Guide, and the Dell Compellent SMI-S Best Practices for SCVMM 2012 Guide (see **References** on page 10).

Microsoft SCVMM 2012

Microsoft System Center 2012 is a cloud and datacenter management solution that provides a common management toolset for public and private cloud services and applications.

Storage Center Virtual Machine Manager (SCVMM) 2012 is a component of the Microsoft System Center 2012 cloud and datacenter management suite and it allows administrators to:

- Deliver Infrastructure as a Service (IaaS). Datacenter resources such as processing, networking, and storage can be pooled and virtualized and made available via self-service role-based user access.
- Apply cloud principles to provisioning and servicing datacenter applications with techniques like service modeling, service configuration and image based management.
- Server application virtualization allows applications and services to be managed independently from the underlying infrastructure.
- Optimize and manage multi-hypervisor environments (Hyper-V, Citrix Xen and VMware).
- Dynamic optimization of datacenter resources based on workload demands.

A full deployment of SCVMM 2012 includes the following components, which may be installed on the same server in smaller environments, or different servers in larger environments:

- SCVMM 2012 server (the database component - requires SQL 2008)
- SCVMM 2012 Manager console (the management GUI)
- SCVMM 2012 library server
- SCVMM command shell
- SCVMM 2012 self-service portal (SPP) (which is now optional)

Prerequisites

This best practices guide assumes that the following components have been installed, configured and are functioning correctly. For assistance with the installation or configuration of these components, please refer to the list of documents and URLs listed under **References** (see page 10).

- One or more Dell Compellent Storage Centers has been made available for management by SCVMM 2012 (via SMI-S).
- One or more Dell Compellent Storage Center SAN arrays have been added to the SCVMM 2012 fabric as available storage pools, and a storage classification has been assigned to each pool.
- A Microsoft Active Directory (AD) domain is in place.
- A Dell Compellent Data Collector server, version 5.5.5 (or higher), has been installed and configured (as a physical or virtual AD member server). This server must have access to the Dell Compellent Storage Center(s) that SCVMM 2012 will manage.
- Dell Compellent SMI-S (a component of Enterprise Manager 5.5.5) has been enabled and configured on the Dell Compellent Data Collector server.
- An SCVMM 2012 server (the SQL component) has been installed and configured per Microsoft best practices (as a physical or virtual AD member server).


Note

SCVMM 2012 (the database component) and the Dell Compellent Data Collector must be installed on separate servers. These separate servers can be physical or virtual servers.

- An SCVMM 2012 library server has been configured with adequate space for library files. In this example, the library server was installed on the same server as the SCVMM 2012 server (which is the default configuration when installing SCVMM 2012). In larger environments it may be necessary to install the library server on a separate server for performance reasons per Microsoft best practices.


Note

Some SAN management functions in SCVMM 2012 that are associated with creating VM templates for rapid provisioning will not work if the SCVMM 2012 library server is installed on a virtual server. To avoid these limitations, it is recommended that the library server be installed on a physical Hyper-V host server that is (1) managed by SCVMM 2012, and (2) has access to the Dell Compellent Storage Centers managed by SCVMM 2012. The work-a-round requires using SAN management tools (e.g. Dell Compellent Storage Center Manager) outside of SCVMM 2012 for some SAN management steps. For more information see **Rapid Provisioning Prerequisites** in the Microsoft SCVMM 2012 TechNet library (see the URL listed under **References** on page 10 of this document).

- Physical Hyper-V host servers are available to be managed by SCVMM 2012 (standalone and/or clustered). These hosts must also have connectivity (fiber channel or iSCSI) to the Dell Compellent Storage Center(s) that are managed by SCVMM 2012.

Overview

This best practices guide will demonstrate how to configure an environment for test or production use for SCVMM 2012 to manage Hyper-V hosts and guests when utilizing Dell Compellent storage, including rapid provisioning.

In SCVMM 2012, the “fabric” includes all the underlying hardware components and other resources that are required for administrators and self-service role users to create and manage SAN-based standalone and clustered Hyper-V hosts and guest VMs.

In addition to physical Hyper-V host servers, the fabric includes SAN storage that supports SMI-S (Dell Compellent in this example), networking components, load balancers, hardware profiles, OS profiles, and VM templates. A well-designed fabric in SCVMM 2012, when used with rapid provisioning, allows for quick, intuitive, and efficient (thinly provisioned) deployment and management of Hyper-V guests from a gold image (see **Configure Rapid Provisioning with Dell Compellent** on page 81 of this document).

The primary user interface for SCVMM 2012 is the SCVMM Manager console. The SCVMM Manager console is a client based GUI that is installed by default on the SCVMM 2012 server. The SCVMM Manager console can also be installed on other servers or workstations that have a supported OS. Both administrators and self-service users can use the SCVMM 2012 Manager console.

The other user interface for SCVMM 2012 is the Self Service Portal (SSP). The SSP is a web-based interface that enables self-service role users to manage and deploy Hyper-V guest VMs in a SCVMM 2012 private cloud. While the SSP does not include all the functionality of the SCVMM 2012 Manager console GUI, it allows convenient access from any supported web browser over the network. While self-service user roles that have been granted access to manage private clouds can use either the SSP or the SCVMM 2012 Manager console to manage their Guest VMs, the best practices recommendation is to use the SCVMM 2012 Manager console.

A new feature with SCVMM 2012 is the ability for administrators to create private clouds. A private cloud is a logical grouping of SCVMM 2012 fabric components that provides an environment for administrators and self-service users to create and manage their own guest VMs based on hardware profiles, OS profiles and VM templates.

When deploying Hyper-V guests to a private cloud, a user does not have to wait for the SAN storage administrator to provision LUNs, for the network administrator to allocate static IPs, or for the systems administrator to allocate physical hypervisor host capacity. All of these hardware parameters and capacities are defined and allocated in advance as part of creating a private cloud environment. The steps to create a private cloud will be demonstrated below.

Configuring the SCVMM 2012 Fabric

Central to the functionality of SCVMM 2012 is the configuration of the fabric. Configuring the basic elements of the fabric is necessary before being able to deploy guests or create a private cloud. The following components are part of the basic fabric configuration:

- Host Group: a logical grouping of one more clustered or standalone physical hypervisor host servers
- Physical Hypervisor Hosts: VMware ESX, XenServer and Hyper-V are supported (this guide will focus on Hyper-V)
- Library Server: contains a catalog of files, scripts, installers, IOSs, VHDs, hardware templates, OS templates, and guest VM templates used for deploying host and guest servers
- Networking Components: logical IP networks, static IP pools, MAC address pools and load balancers
- SAN Storage: one or more Dell Compellent Storage Centers, including Enterprise Manager 5.5.5 (which supports SMI-S)

The configuration of each of these fabric components will be described below.

Define a Host Group Structure

A host group allows administrators to group physical host servers logically according to such identifiers as location, level of redundancy, type of hosted application, type of hypervisor, or business unit.

In the below example, a host group called **Test Host Group 1** will be created.

1) Launch the SCVMM 2012 Manager console and log in as an administrator.

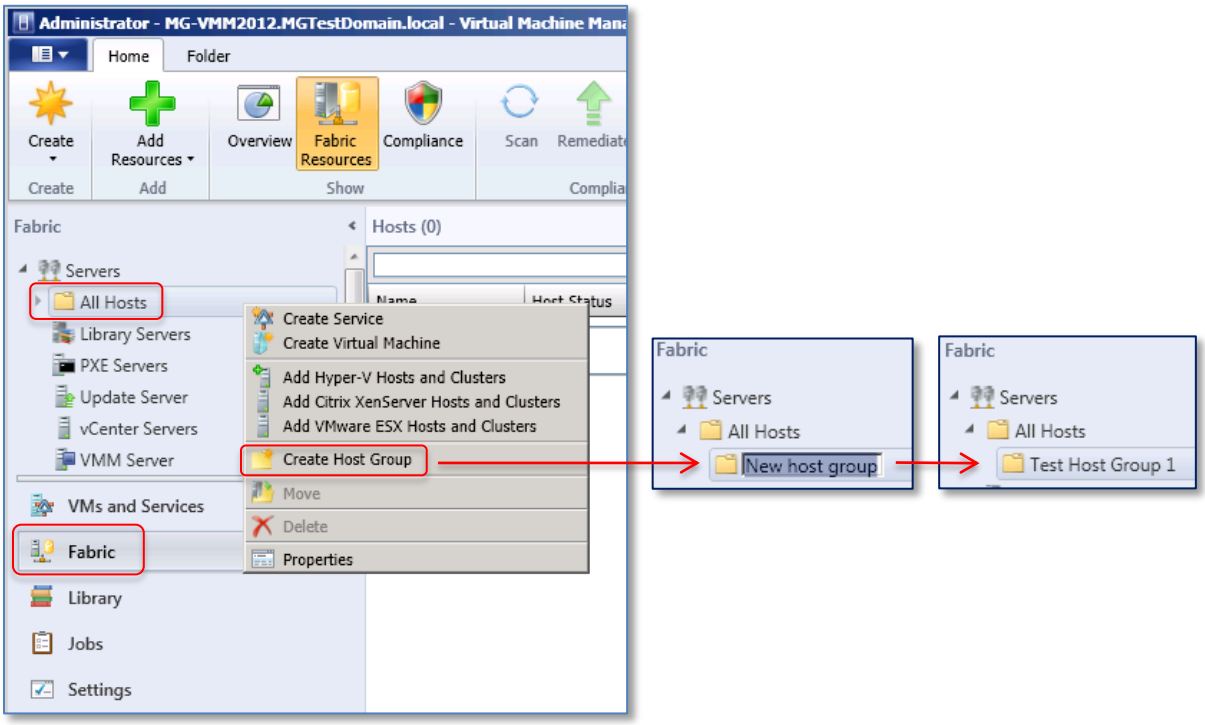

Figure 1: Create a new SCVMM 2012 host group

2) In the left pane, click on the **Fabric** workspace as shown in Figure 1.

3) Expand **Servers**, right click on **All Hosts**, select **Create Host Group,** provide a name, and then press **Enter**.

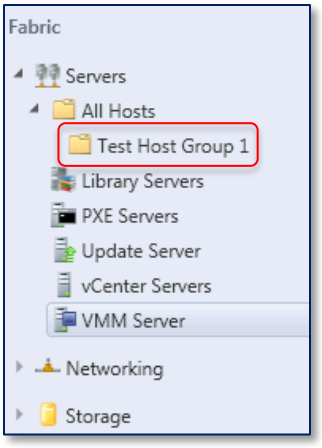

Figure 2: New SCVMM 2012 host group created

4) As shown in Figure 2, the new host group folder should now be listed under the **All Hosts** folder. The actual physical host servers themselves will be assigned to this host group folder below.

Configure a Library Server

A library server provides a way to define a catalog of resources that are available for deploying and configuring both host and guest VM servers. Many kinds of common file types (as well as custom install packages) and templates can be added to a library server.

Table 2. SCVMM 2012 library server resources

Types of Library Server Resources		Details
File-based	Automatically-indexed file types. These files are indexed and added automatically during library server refreshes in SCVMM 2012.	Includes many common file types such as virtual hard disks (VHDs), ISOs, PowerShell scripts, and driver files
	Custom file types (folders with .CR extension)	Might include a custom installation package
Non-file-based		Templates and profiles (stored in the SCVMM 2012 database) that are used to standardize host and guest installations

As shown in Table 2, many types of resources can be added to a library server. By default, the SCVMM 2012 server installation will create a local instance of a library server on the same server. For larger environments, a separate (or additional) library servers can be configured as needed.

The default location for the library server resources (a shared folder) is:

```
C:\ProgramData\Virtual Machine Manager Library Files
```

Copy Resources to a Library Server

Because the C:\ProgramData folder is a hidden folder by default, it is not possible to use Windows explorer to navigate directly to the share location without first removing the hidden attribute on the

ProgramData folder (not recommended). The suggested way to copy resources to the library server share is to access the folder by its share name:

1) Click on **Start→ Run.**

2) Type the following path and press **Enter:**

```
\\localhost\MSSCSCVMMLibrary
```

3) If the library server is on another server, then substitute that server's name for "localhost".

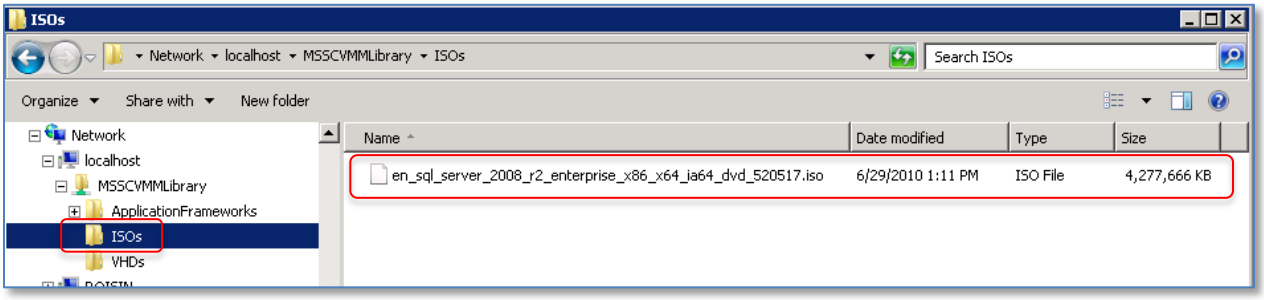

Figure 3: Location of SCVMM 2012 library server files

4) Files and other resources must be copied to the library server's share manually outside of SCVMM 2012. As shown in the example in Figure 3, create one more folders under this share and copy file resources to them. In this example, a folder called **ISOs** was created as a place to contain the ISO files to be made available to SCVMM 2012 users, and a SQL ISO file was copied there.

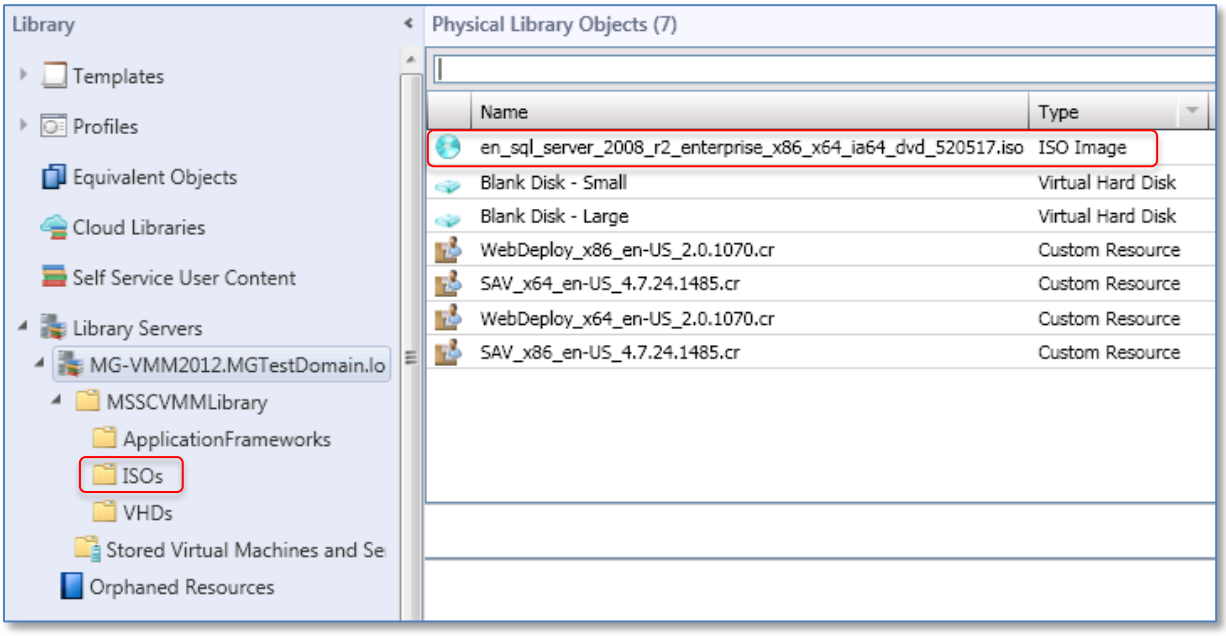

Figure 4: SCVMM 2012 automatically discovers common file types

5) Once resources have been copied to subfolders under the library server's share, allow time for SCVMM 2012 to refresh the library server's contents. This happens every hour by default. During a refresh, the new folders and file resources will be automatically discovered. Once

discovered, these resources will be visible from within SCVMM 2012. To view these resources, click on the **Library** workspace in the left pane, then expand **Library Servers** as shown in Figure 4.

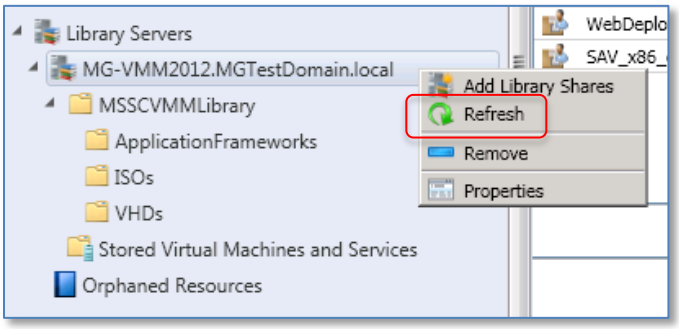

Figure 5: Refresh the library server to import resources

6) To force a refresh of the library server, right click on the library server object in SCVMM 2012 and click on **Refresh** as shown in the example in Figure 5.

Assign a Library Server to a Host Group

After a library server has been configured, it needs to be assigned to a server host group. This will allow the physical Hyper-V host servers in the host group access to the library server's resources.

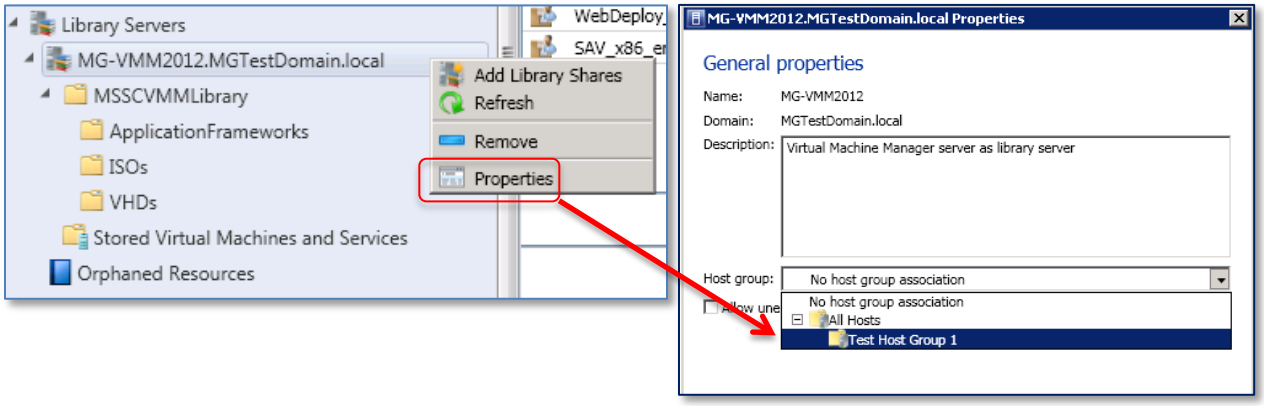

Figure 6: Assign a library server to a Host group

1) To assign a library server to host group, highlight the library server, right click on it, and select **Properties** as shown in Figure 6.

2) In this example, the library server is assigned to the host group named **Test Host Group 1**.

Configure Networking

SCVMM 2012's global network configuration settings are configured by default to automatically create and assign logical networks and network sites to new server hosts and guests when they are managed by SCVMM 2012. This ensures basic functionality "out of the box" in cases where DHCP is in place and dynamically assigned IPs are allowable or desired for Hyper-V hosts or guests. These default global networking configuration settings can be modified as needed, for example, to specify static IP pools.

In this example, a new logical network will be configured. Once a logical network is configured, then within that network, a small number of contiguous IPs will be configured as a static IP pool and made available to the host group so they can be assigned to Hyper-V guest VMs. The steps to do this are detailed below.

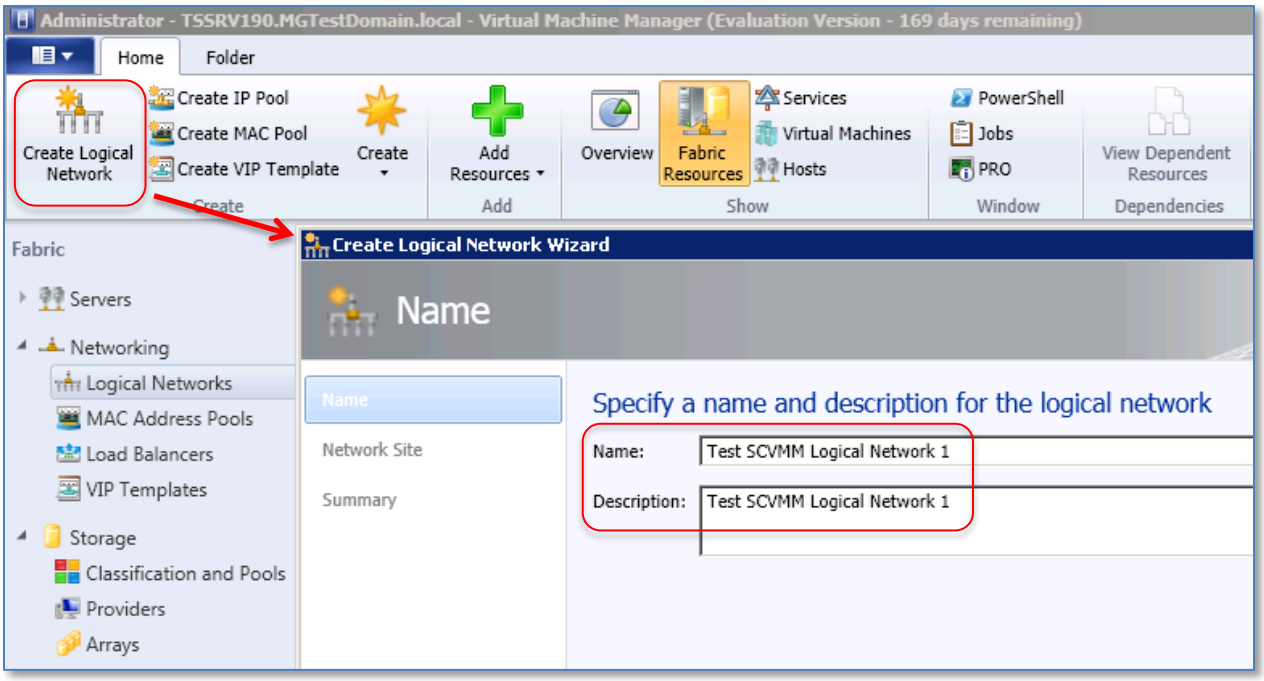

Figure 7: Launch the Create Logical Network Wizard

1) In the SCVMM 2012 Manager console, click on the **Fabric** workspace in the left pane. Expand **Networking** and highlight **Logical Networks**. Then click on **Create Logical Network** on the ribbon bar under **Home** to launch the **Create Logical Network Wizard** as shown in Figure 7.

2) Provide a **Name** and **Description** for the logical network. In this example, the logical network is named **Test SCVMM Logical Network 1**. Then click on **Next**.

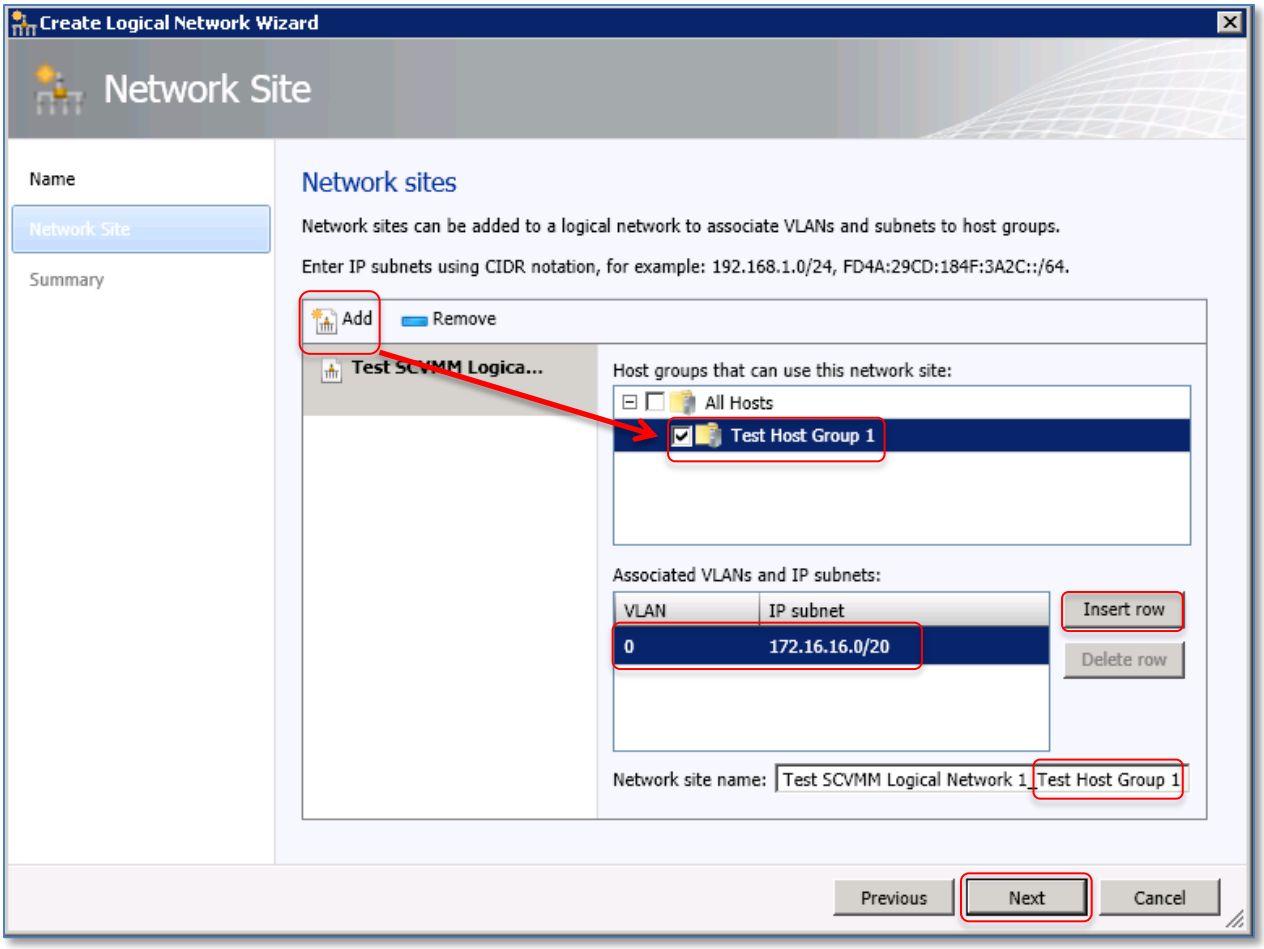

Figure 8: Define a network site for a logical network and assign it to a host group

3) The next wizard step is to define a network site as shown in Figure 8. The purpose of a network site is to associate the necessary VLANs and IP subnets to a SCVMM 2012 host group.
   a) Click on the **Add** button.
   b) Check the box for the desired host group (in this example, **Test Host Group 1**).
   c) Click on **Insert row** to add the desired VLANs and IP subnets.
   d) Modify the **Network site name**. By default, the wizard appends "**_0**" to the network site name. In the example shown in Figure 8, the "**0**" was replaced with **Test Host Group 1**.
   e) When finished, click on the **Next** button.

4) Confirm the settings on the **Summary** screen and then click on **Finish** to complete the wizard.

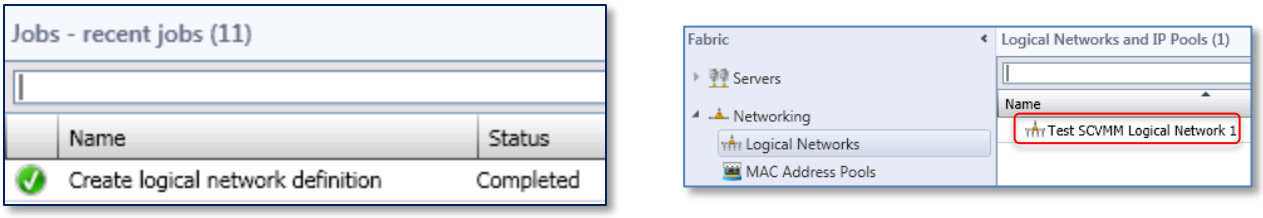

Figure 9: Verify completion of the job to create a logical network

5) As shown in Figure 9, verify that the **Create logical network definition** job completes successfully and that the logical network is listed in the **Logical networks and IP Pools** window after clicking on the **Fabric Resources** button on the ribbon bar.

6) If DHCP will be used in your environment, then the rest of this section can be skipped. If setting aside a pool of static IPs is desired for your servers, then continue with the steps below.

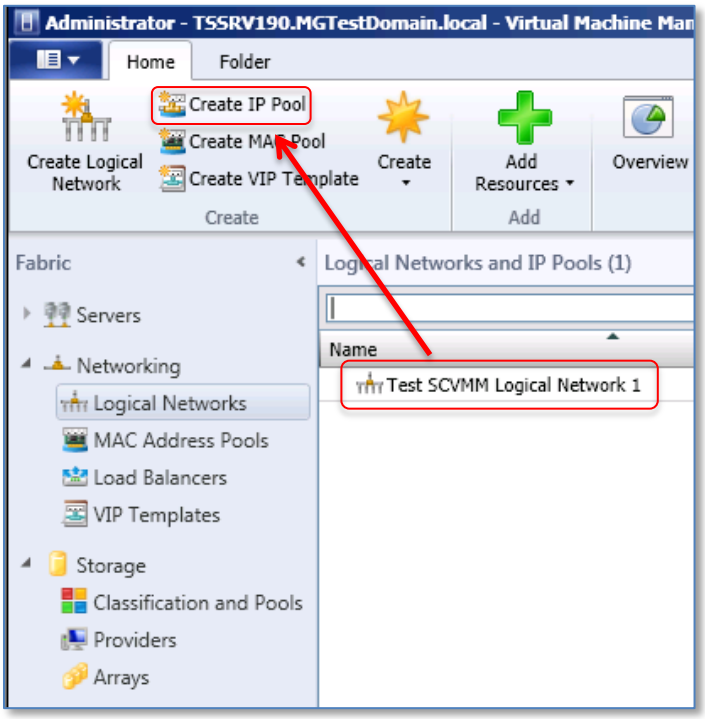

Figure 10: Create IP pool for a logical network

7) To create a static IP pool, click on the logical network just created (**Test SCVMM Logical Network 1** in this example) and then click on **Create IP Pool** as shown in Figure 10 to start the **Create Static IP Address Pool Wizard**.

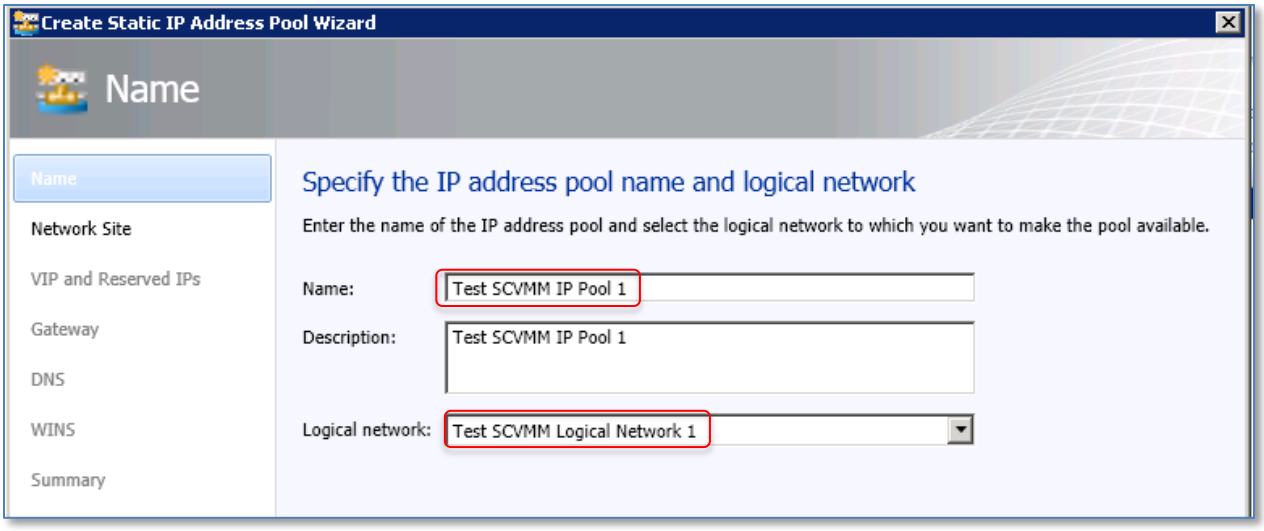

Figure 11: Provide a name for a static IP address pool

8) On the **Name** screen as shown in figure 11:
   a) Provide a descriptive name for this static IP Pool.
   b) Enter a description if desired.
   c) From the drop-down list, select the logical network this static IP pool will be associated with (**Test SCVMM Logical Network 1** in this example).
   d) Click on the **Next** button.

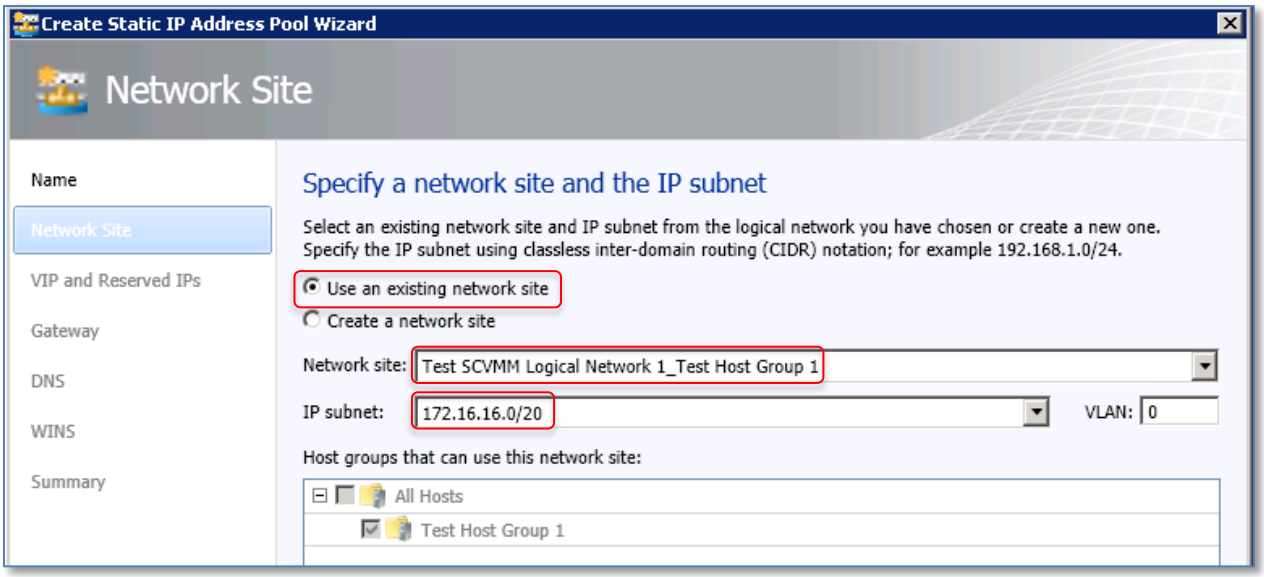

Figure 12: Provide network site settings for static IP address pool

9) For **Network Site**, choose the desired network site from the drop down list (if not already selected), and the desired IP subnet as shown in Figure 12. Then click on **Next**.

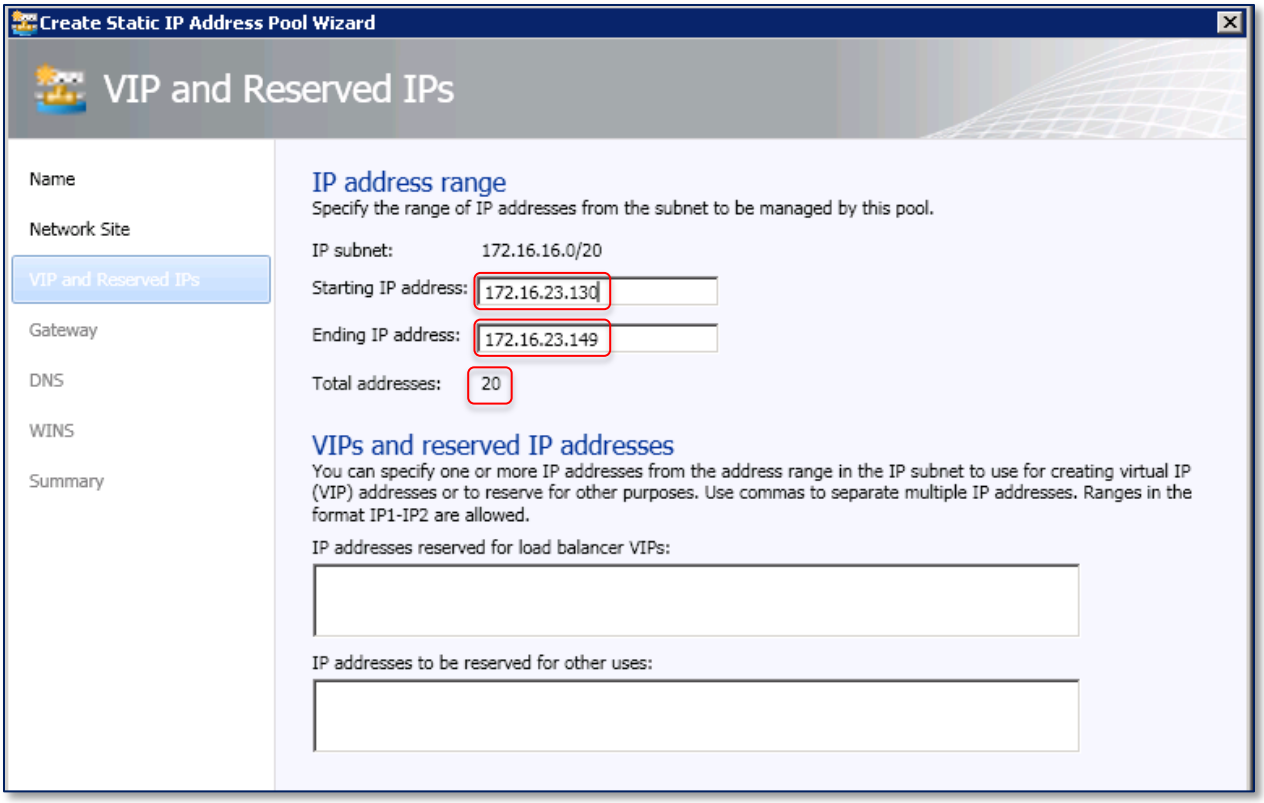

Figure 13: Set IP address range, VIP and reserved IPs for static IP address pool

10) The wizard will initially suggest a static IP pool with a **Starting IP address** and an **Ending IP address** that will consume the entire IP subnet. In this example, the full /20 subnet (mask of 255.255.240.0) would allow for up to 4094 IP addresses.

11) As shown in Figure 13, the static IP pool in this example will be limited to a small contiguous block of 20 static IP addresses within the 172.16.16.0/20 subnet:
    a) Enter the desired **Starting IP Address** (172.16.23.130 in this example).
    b) Enter the desired **Ending IP address** (172.16.23.149 in this example).
    c) The wizard will indicate the **Total addresses** in the pool (20 in this example).

Make sure the IPs in this static pool do not conflict with other resources on the network.

12) Define any virtual IPs (none will be defined in this example) and then click on the **Next** button.

13) Complete the rest of the wizard screens by adding a gateway IP, DNS server(s), and WINs server(s) as appropriate for the environment.

14) On the **Summary** screen, confirm the settings and click on the **Finish** button to exit.

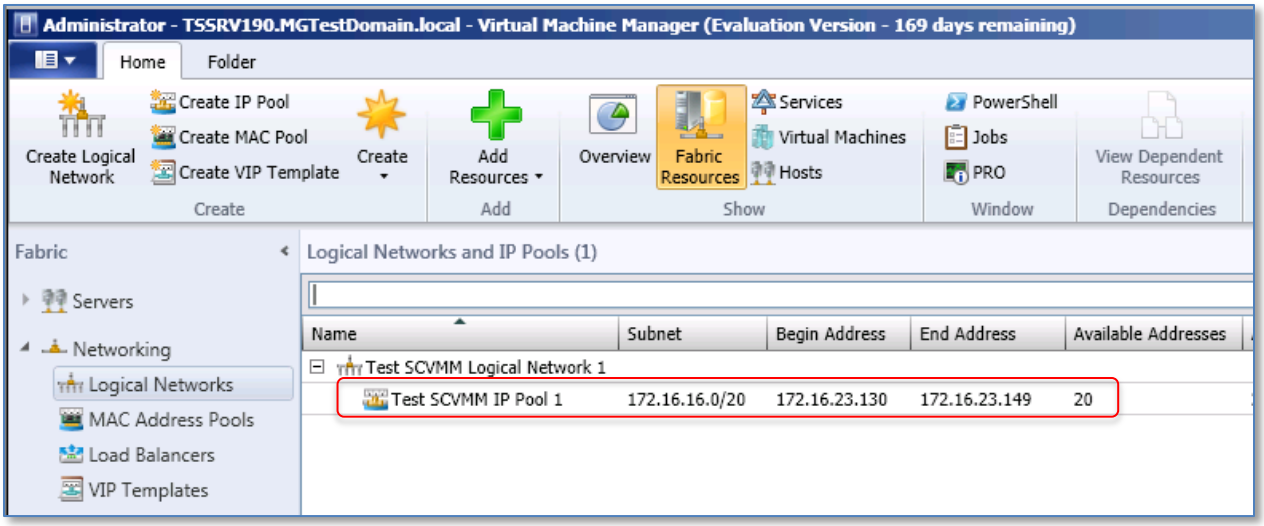

Figure 14: Verify creation a static IP pool

15) Verify that the **Create Static IP Pool** job completes successfully. The static IP pool will now show as an object under the logical network as shown in Figure 14.

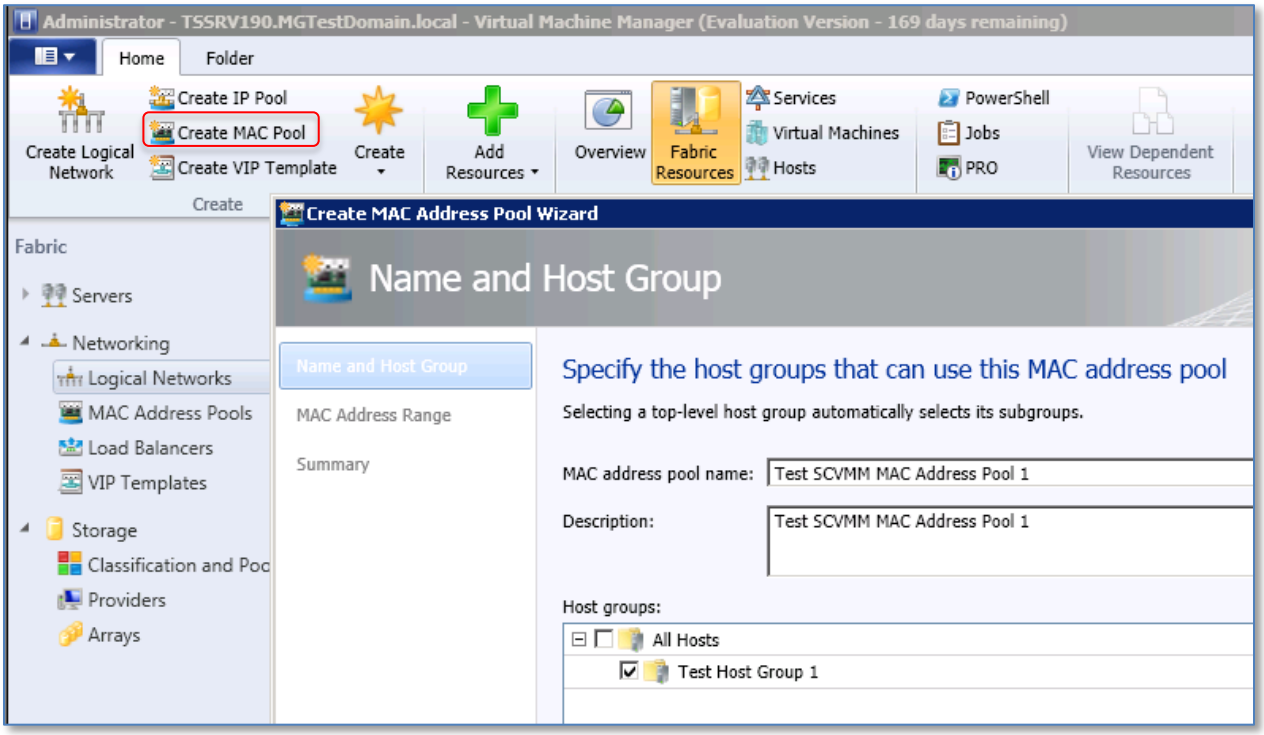

Figure 15: Create MAC address pool wizard

16) The default SCVMM 2012 MAC address pool will be used in this example. If a specific MAC address pool is desired for your environment, click on **Create MAC Pool** to launch the **Create MAC Address Pool Wizard** as shown in Figure 15, and provide a custom MAC address range for your host group to use.

Verify the Configuration of Dell Compellent Storage in SCVMM 2012

In this example, three Dell Compellent Storage Centers are available in SCVMM 2012. Each Storage Center has its own classification assigned.

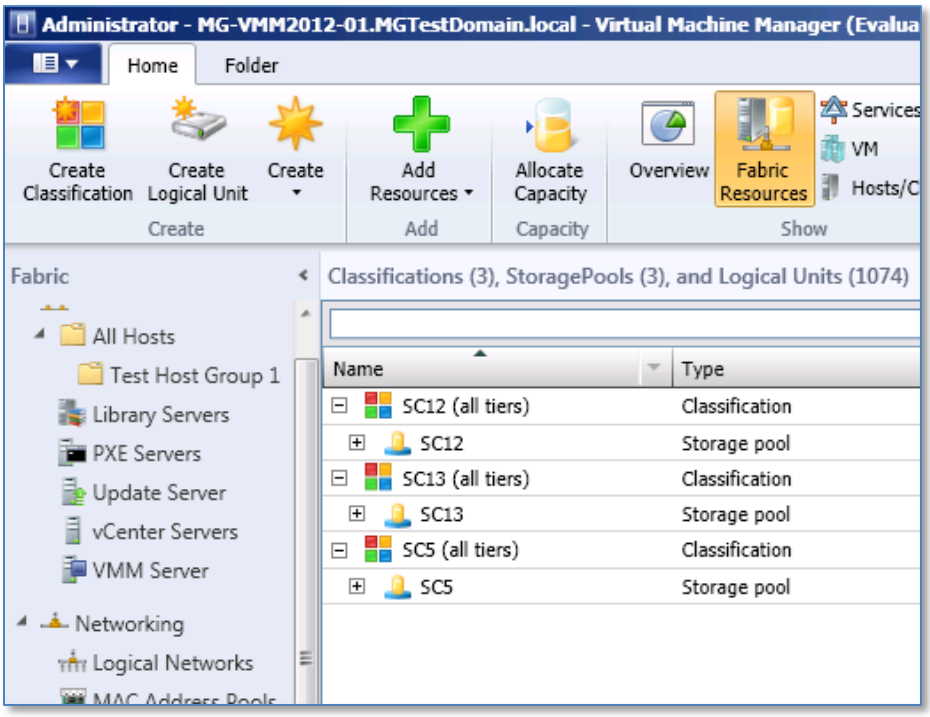

Figure 16: Verify the configuration of Dell Compellent storage in SCVMM 2012

Note

For more information on adding a Dell Compellent Storage Center array to the SCVMM 2012 fabric and assigning it a classification, please refer to the **Dell Compellent SMI-S Best Practices for SCVMM 2012** user guide (see **References** on page 10).

1) Launch the SCVMM 2012 Manager console and log on as an administrator.

2) In the left navigation pane, click on the **Fabric** workspace, and then expand **Storage**. Under **Classifications and Pools**, each Dell Compellent Storage Center (in this example, SC12, SC13 and SC5) should be listed under a classification as shown in Figure 16.

Allocate a Storage Pool to a Host Group

There are two ways to assign SAN storage to a host group in SCVMM 2012:

- Allocate an entire storage pool (a managed Dell Compellent Storage Center SAN array) to a host group. With a storage pool assigned to a host group, individual logical units (SAN volumes or LUNs) can then be created in this storage pool for managed Hyper-V hosts in the hosts group.
- Using SCVMM 2012, create and assign individual logical units (SAN Volumes or LUNs) on a SAN storage pool to a host group.

The steps to allocate an entire storage pool or a logical unit to a host group will be shown below.

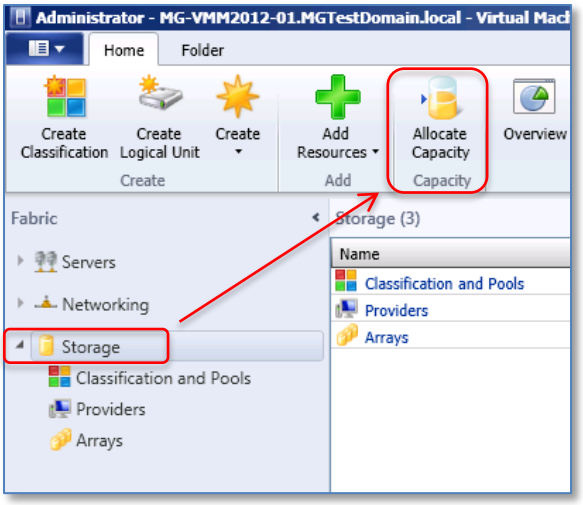

Figure 17: Allocate capacity to a host group

1) To allocate an entire storage pool to a host group, from the SCVMM 2012 Manager console, click on the **Fabric** workspace, click on **Storage** on the left pane, and then on **Allocate Capacity** as shown in Figure 17.

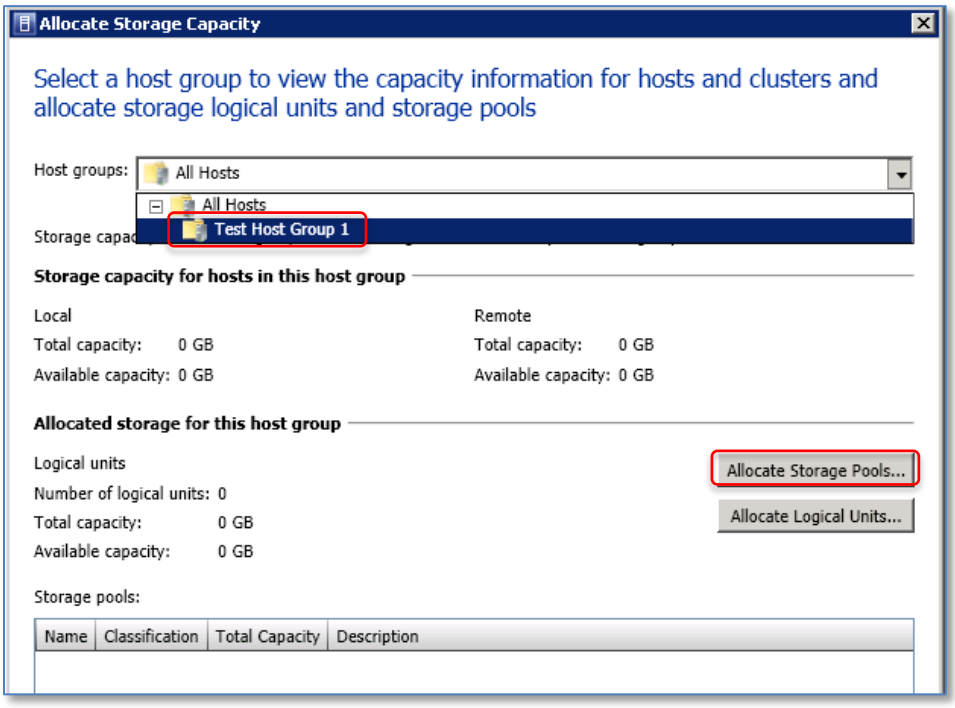

Figure 18: Allocate storage capacity configuration screen

2) Select the desired host group from the drop down list (**Test Host Group 1** in this example). Then click on the **Allocate Storage Pools** button.

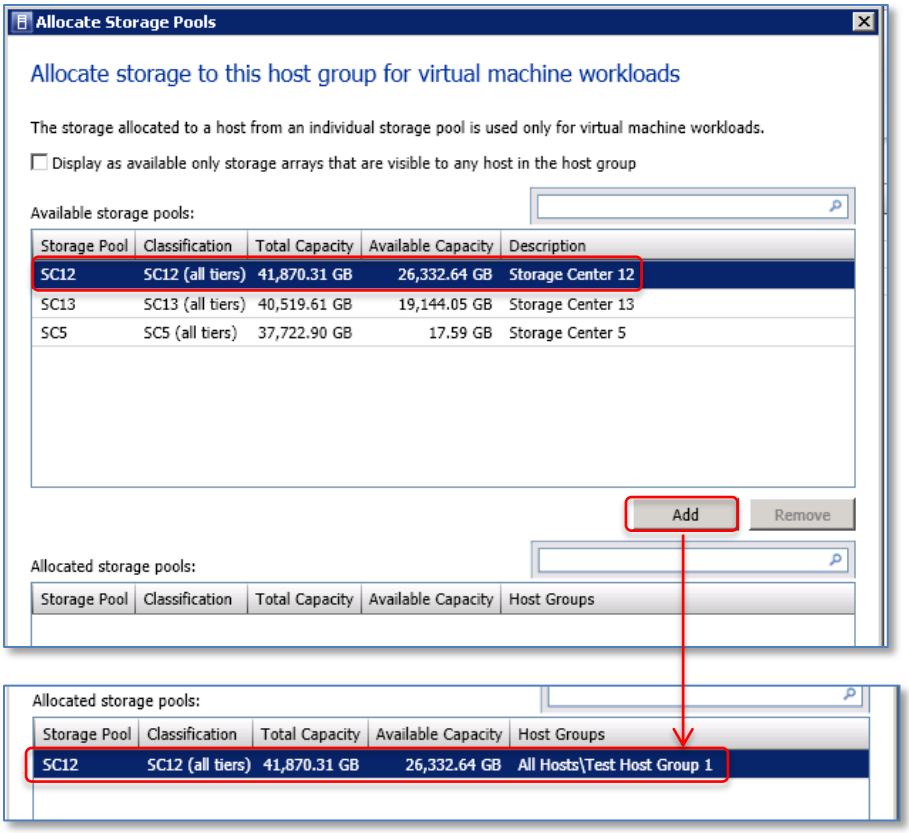

Figure 19: Select the desired storage pool

3) Click on the desired storage pool (**SC12** in this example) and then click on the **Add** button as shown in Figure 19. The storage pool will then be displayed under **Allocated storage pools**. Add other Dell Compellent Storage Centers as storage pools if desired.

4) Click on **OK**, and then on **Close** to return to the SCVMM 2012 Manager console.

Use SCVMM 2012 to Create and Allocate a Logical Unit to a Host Group

As was stated in the previous section, there are two ways to allocate Dell Compellent SAN storage to a host group in SCVMM 2012.

The steps to allocate an entire storage pool were shown in the preceding section. The steps to create and assign a logical unit (SAN volume or LUN) will be shown below.

When creating a logical unit on the SAN by using SCVMM 2012, there are a few limitations to be aware of:

- At the time of creation, the **Name** field in SCVMM 2012 for a logical unit on the SAN allows only the numbers 0-9 and the letters A-Z. No spaces or special characters such as dashes or underscores are allowed. This is an SCVMM 2012 limitation, not at Dell Compellent limitation. Volumes created by using Dell Compellent management tools such as Storage Center Manager allow spaces and special characters.
- Once the logical unit has been created in SCVMM 2012, the name of the logical unit can be changed in SCVMM 2012 to include spaces and special characters for ease of

management if desired. The steps to do this are indicated below (see Figure 23). However, the name change made in SCVMM 2012 for a logical unit will not propagate to the corresponding LUN on the Dell Compellent Storage Center. The LUN on the storage center will retain the original name it was given when it was created.

- When a logical unit is created using SCVMM 2012, the matching Dell Compellent SAN volume will be placed at the root of the **Volumes** folder (as viewed from Dell Compellent Storage Center Manager or Enterprise Manager). For ease of management, administrators may optionally choose to move these SAN volumes to subfolders.

The steps in SCVMM 2012 to create a logical unit on a Dell Compellent storage pool are as follows:

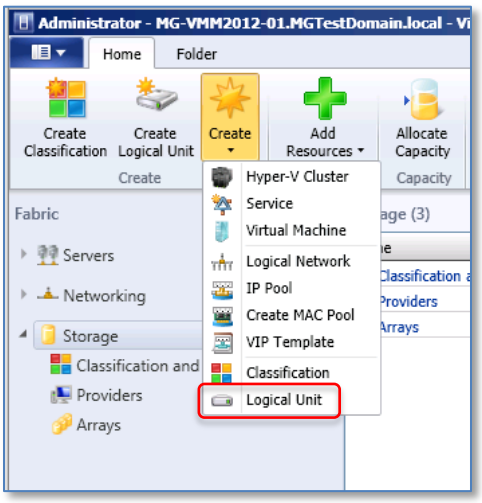

Figure 20: Create a logical unit from the SCVMM 2012 manager console

1) From the SCVMM Manager console, click on the **Fabric** workspace, click on **Storage**, then under the **Home** tab, click on **Create.** From the drop-down list, select **Logical Unit** as shown in Figure 20.

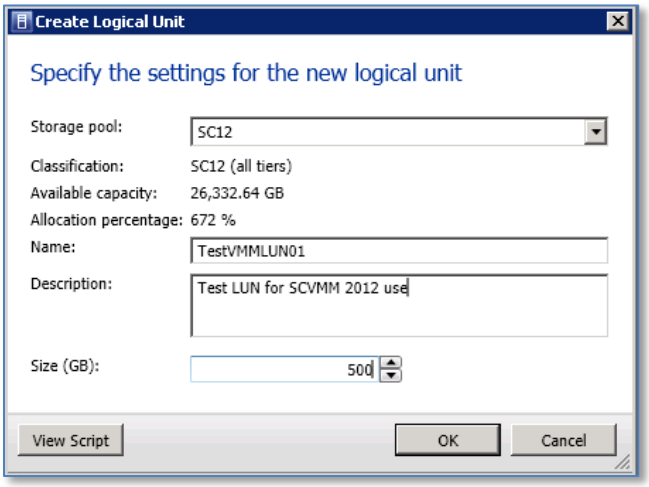

Figure 21: Specify logical unit parameters

2) Select the desired **Storage pool** (**SC12** in this example) from the drop-down list, and specify the **Name**, **Description**, and **Size (GB)** for the logical unit. In this example as shown in Figure 21, the logical unit is named **TestVMMLUN01** with a capacity of 500 GB. Note that the name field allows the characters 0-9 and A-Z only. Then click on **OK**.

3) Monitor the **Creates new storage logical unit** job until it completes successfully.

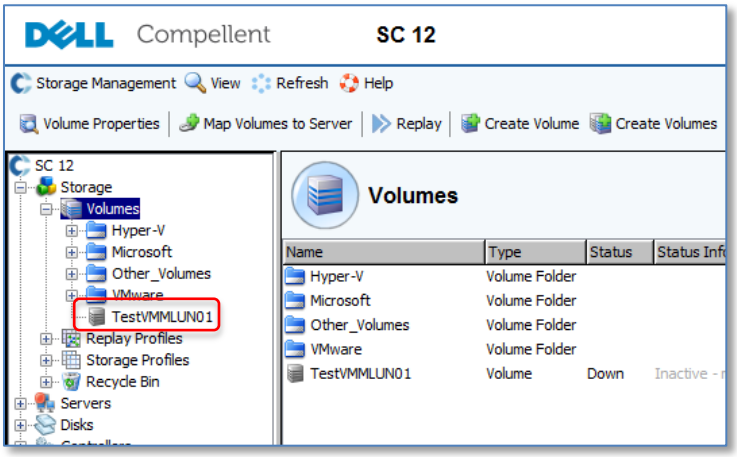

Figure 22: Logical unit (SAN volume) on the Storage Center as created by SCVMM 2012

4) When a new logical unit is created in SCVMM 2012, a SAN volume with the same name is created on the Dell Compellent Storage Center at the root of the Volumes folder, as shown in Figure 22.

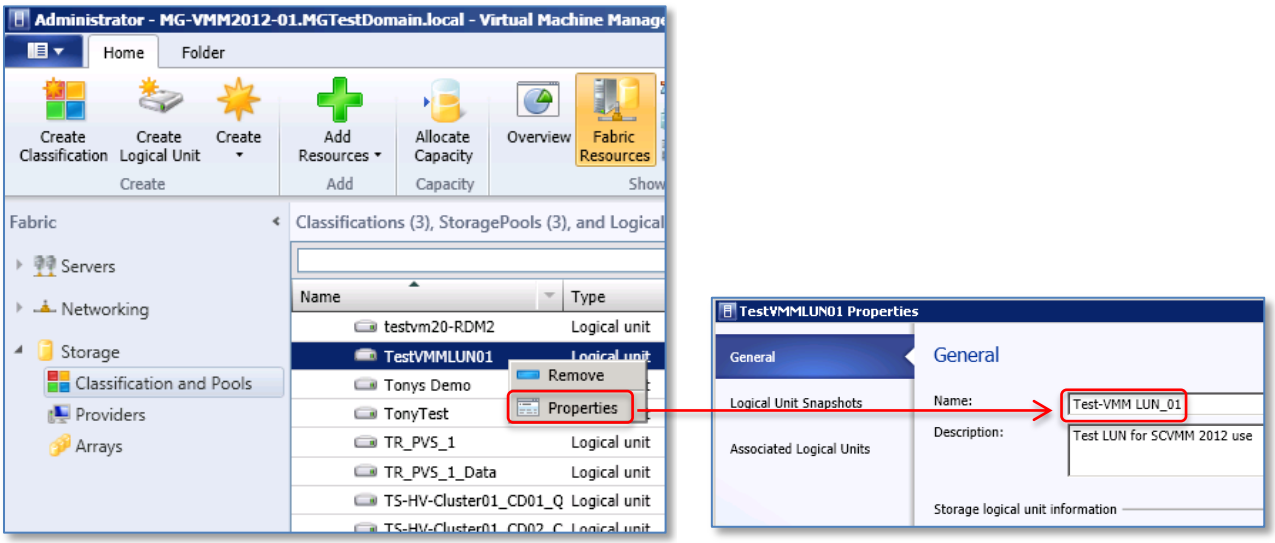

Figure 23: Change the name of a logical unit in SCVMM 2012

5) If renaming a logical unit in SCVMM 2012 is desired (e.g. to add spaces or special characters), then from the SCVMM 2012 Manager console, click on the **Fabric** workspace, expand **Storage**, and click on **Classifications and Pools.** Scroll to the desired logical unit, right click on it, and

select **Properties**. Under the **General** tab, change the name as desired. In this example, the Name was changed by adding a dash, a space, and an underscore as shown in figure 23.

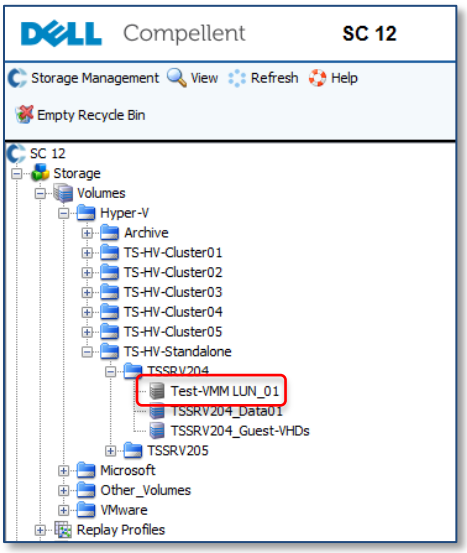

Figure 24: Corresponding SAN volume renamed and moved to a volume subfolder

6) For ease of management, if a logical unit is renamed in SCVMM 2012, then the corresponding SAN volume on the Dell Compellent Storage Center may also be renamed so that it matches. Since a name change to a logical unit in SCVMM 2012 does not propagate to the matching SAN volume, the SAN volume has to be renamed manually. In this example, the SAN volume was renamed and moved to a subfolder using Dell Compellent Storage Center Manager. Renaming these volumes so they match and moving them to subfolders is optional.

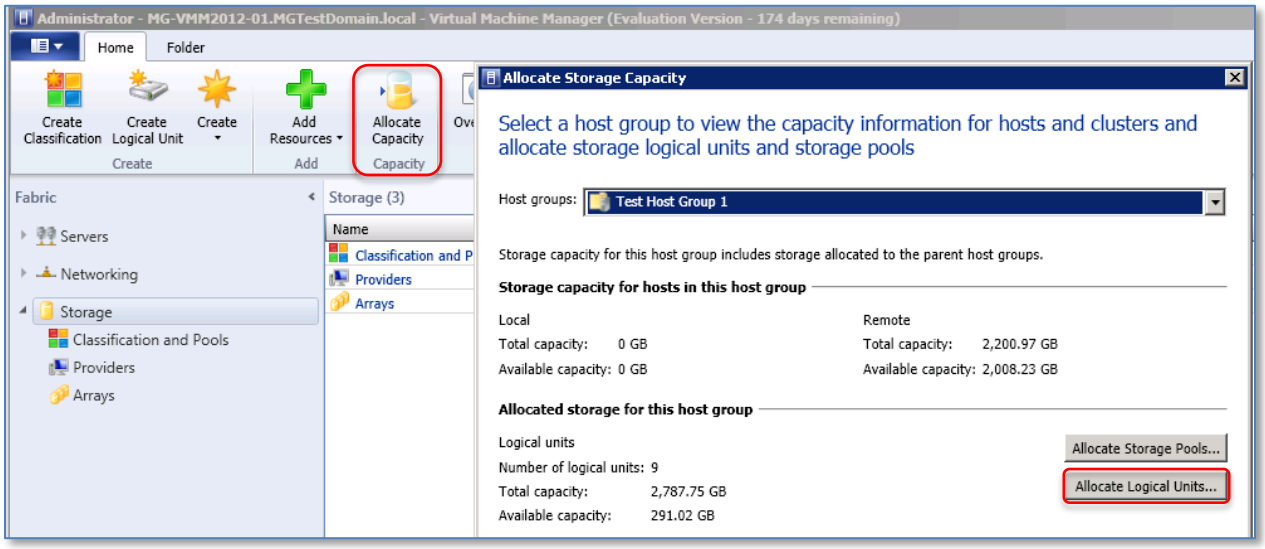

Figure 25: Allocate logical units to a host group

7) To allocate this new logical unit to a host group, from the **Fabric** workspace, click on **Storage**, then on click on **Allocate Capacity** under the **Home** tab to open the **Allocate Storage Capacity** Window. From the **Host groups** drop down list, select the desired host group (**Test Host Group 1** in this example), and then click on the **Allocate Logical Units** button as shown in Figure 25.

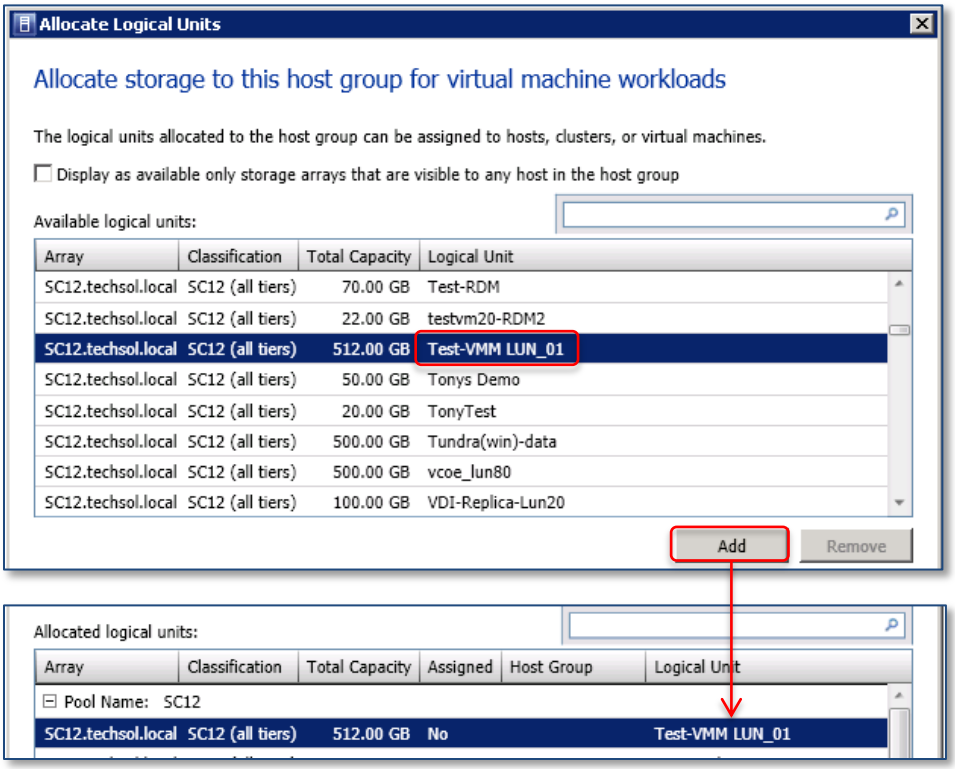

Figure 26: Adding a logical unit

8) Scroll down the list to locate the new logical unit, click on it to highlight it, and then click on the **Add** button to assign it. Once added, it will be listed in the **Allocated logical units** window as shown in Figure 26.

9) If a new SAN volume is created on a Dell Compellent Storage Center outside of SCVMM 2012 (by using Storage Center Manager or Enterprise Manager) after that Storage Center has already been discovered and assigned a classification in SCVMM 2012, then that new SAN volume will not show up as an available logical unit in SCVMM 2012 until after the **Storage Provider** in SCVMM 2012 is refreshed. A storage refresh happens automatically once per day (by default). It can also be run manually at any time.

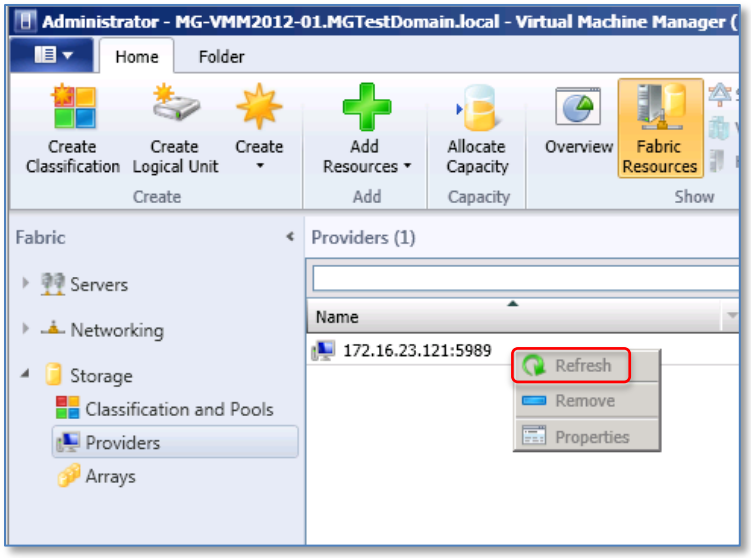

Figure 27: Refresh the storage provider to view new Dell Compellent volumes

10) To force a refresh of the Dell Compellent storage provider in SCVMM 2012 so that any recently created SAN volumes will show up as available logical units, complete the following steps:
    a) From the **Fabric** workspace in SCVMM 2012, expand **Storage.**
    b) Click on **Providers.**
    c) In the **Providers** window, right-click on the storage provider for the Dell Compellent Storage and select **Refresh** as shown in Figure 27.

11) Monitor the **Reads Storage Provider** job in SCVMM 2012 until it completes. This job may require significant time to complete (up to an hour or more), depending on the number of Dell Compellent Storage Centers managed by SCVMM 2012 and the number of existing volumes on them.

12) Once the **Reads Storage Provider** job has finished, any new SAN volumes should now be available as logical units in SCVMM 2012. See steps 7 and 8 above in this section to allocate these new SAN volumes (as logical units) to a host group.

Add Physical Hyper-V Hosts to SCVMM 2012

Verify Consistent and Intuitive Naming for Virtual Networks on Hyper-V Hosts

Before adding existing physical Hyper-V host servers to SCVMM 2012, it is best practices to ensure that clear, consistent and intuitive naming is in place for all the virtual network and network connection components on each Hyper-V host server. This is especially important for Hyper-V failover clusters or standalone Hyper-V hosts that may be clustered later. This will:

- Minimize confusion and networking configuration errors later when managing these Hyper-V network components in SCVMM 2012
- Is required in order for these Hyper-V network components to be considered as "highly available" by SCVMM 2012 for Hyper-V failover clusters
- Make it easier to add standalone Hyper-V servers to a failover cluster using SCVMM 2012

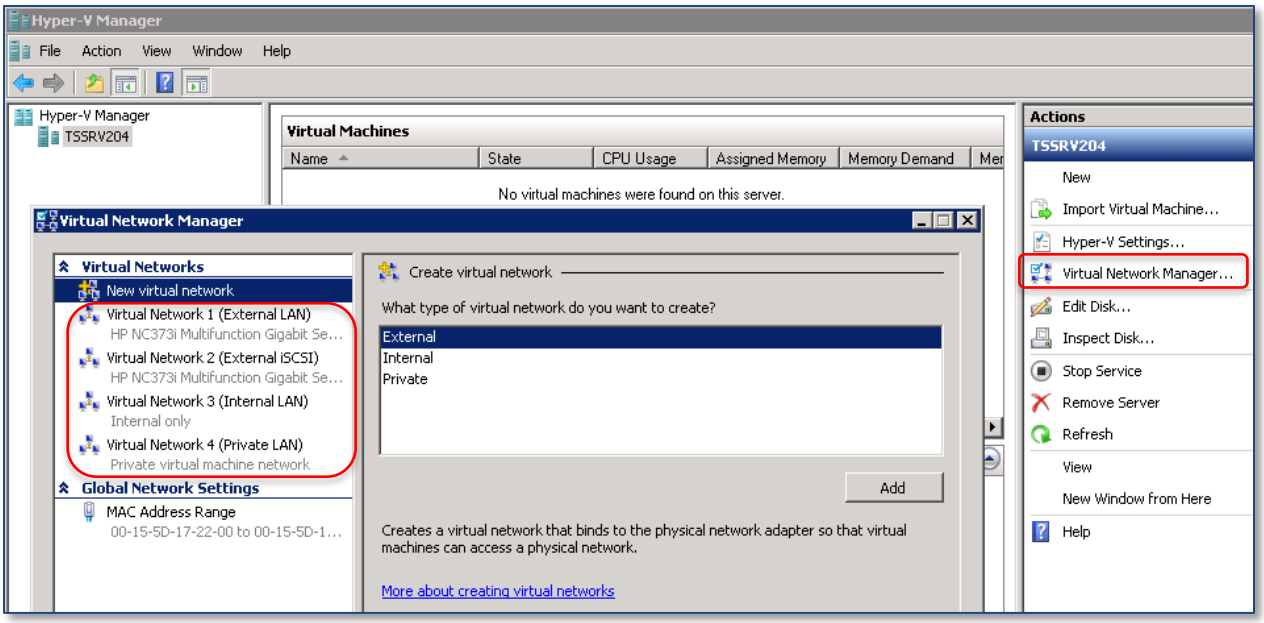

Figure 28: Create virtual networks with Hyper-V Manager

1) When Hyper-V Manager is installed on a Hyper-V host server, one or more **Virtual Networks** (virtual switches) need to be created for Hyper-V guests to use. In the example shown in Figure 28, a total of four virtual networks are defined for Hyper-V guest use on the standalone Hyper-V host TSSRV204: virtual networks 1, 2, 3, and 4. An intuitive identifier (in parenthesis) has been appended to each virtual network name (e.g. **External LAN**) to make it easier to identify the role of each virtual network now and later on.

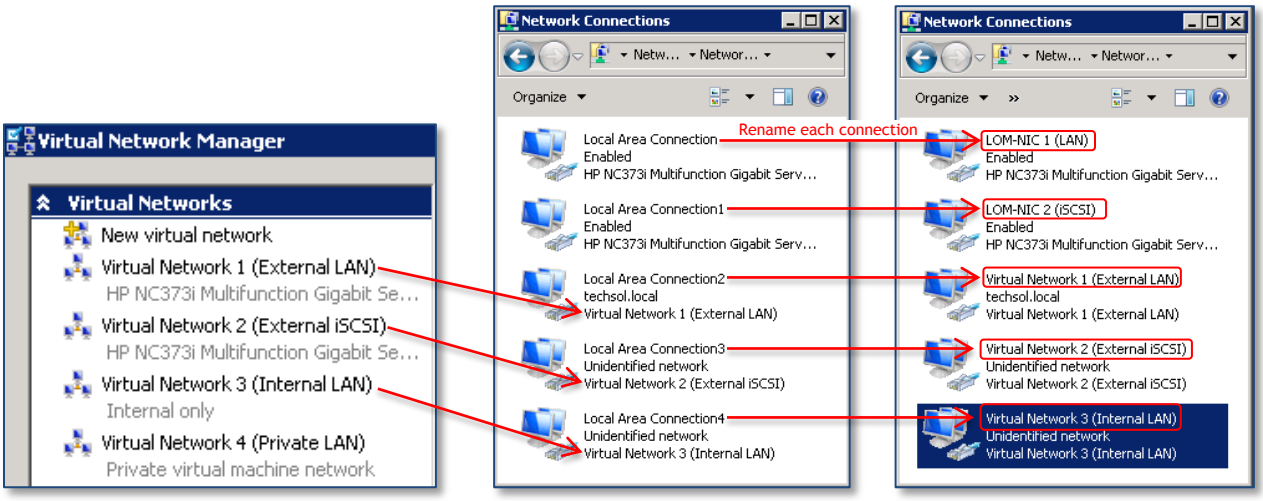

Figure 29: Rename network connections to ensure consistency

Caution

Changes to network settings in Hyper-V's Virtual Network Manager may cause brief interruptions to network connectivity for both Hyper-V host and guest servers. To avoid a service outage, make any changes to Hyper-V's Virtual Network Manager during a maintenance window. Simply renaming existing virtual networks or network connection objects will not cause interruptions to network connectivity.

2) Once one or more virtual networks have been created by using Hyper-V Manager, one additional step is needed inside of **Network Connections** to ensure intuitive and consistent naming. By default (as shown by the middle screen in Figure 29), each new virtual network created with Hyper-V Manager is given a default generic name such as **Local Area Connection 2**. To make it easier to correctly identify connection roles and manage them in SCVMM 2012, provide more intuitive naming as shown in the right window in Figure 29.
    - The top two objects shown in **Network Connections** (in the middle and right screens in Figure 29) are the physical LOM (LAN on Motherboard) NICs. Each external and internal virtual network (as defined in Hyper-V Manager) is bound to one of these physical NICs.
    - Because **Virtual Network 4 (Private LAN)** as shown in the left screen in Figure 29 is a private network, it is not bound to a physical NIC; therefore, no corresponding network connection exists for it (this is by design).

3) Referring to Figure 29, for Hyper-V hosts in a failover cluster, verify that the names used for each virtual network and each network connection object are configured and named exactly the same across all of the hosts in the cluster. In order for the virtual networks to be considered highly-available in SCVMM 2012, the naming for these components must be identical across all nodes in a cluster.

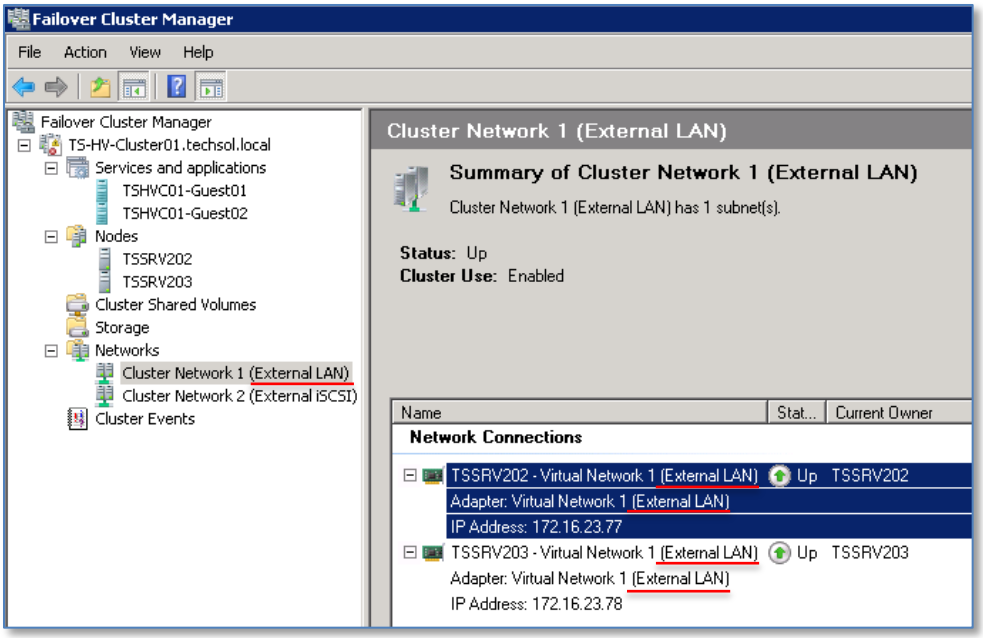

Figure 30: Naming cluster networks in Failover Cluster Manager

4) In Failover Cluster Manager, each **Cluster Network** (in the left pane) should have matching **Network Connections** (in the center pane) for each Hyper-V node of the cluster. In this example **Cluster Network 1 (External LAN)** is associated with a matching and intuitively named **Virtual Network** for each of its two nodes TSSRV202 and TSSRV203, as shown in Figure 30. The same is true for **Cluster Network 2 (External iSCSI)**.

5) For ease of management, the descriptive identifiers **(External LAN)** and **(External iSCSI)** were added to the default names **Cluster Network 1** and **Cluster Network 2** as shown in Figure 30 to clearly identify their purpose now and in the future. With consistent and intuitive naming in place for all cluster networks, virtual networks, and network connections, it is much easier to manage and troubleshoot the networking aspects of a clustered environment.

Add Existing Physical Hyper-V Servers to SCVMM 2012

The steps below will demonstrate how to add existing physical Hyper-V host servers to the SCVMM 2012 fabric. In this example, a Hyper-V failover cluster consisting of two physical Hyper-V nodes, and a standalone physical Hyper-V host server will be added to the SCVMM 2012 fabric.


Note

It is very important to ensure that intuitive and consistent naming is in place for the networking components of your physical Hyper-V servers (both clustered and standalone) as detailed in the previous section of this document before continuing.

Per Table 3 below, SCVMM 2012 supports the management of Hyper-V hosts and failover clusters in a variety of AD and network situations.

Table 3. Server management options in SCVMM 2012

Type of existing Windows host server	In relation to the SCVMM 2012 server, the Windows host is on the following type of domain or network	Can it be managed by SCVMM 2012?
Standalone Hyper-V host	Trusted AD Domain	Yes
	Untrusted AD Domain	Yes
	Disjointed Namespace	Yes
	Perimeter network/Screened Subnet/DMZ	Yes
Hyper-V Failover Cluster	Trusted Domain	Yes
	Disjointed Namespace	Yes
	Untrusted Domain	Yes
	Perimeter network/Screened Subnet/DMZ	No


Note

To ensure full management capability, it is best practices to locate your SCVMM 2012 server and your managed physical Hyper-V hosts and nodes (standalone or clustered) on the same AD domain or on a trusted domain (two-way trust). While SCVMM 2012 can manage Hyper-V hosts and nodes on other networks such as an untrusted domain or a disjointed namespace, some management options (such as running Cluster Validation) are not available if the SCVMM 2012 server and managed Hyper-V hosts and nodes are not on the same domain or a trusted domain.

In this example, three physical Hyper-V servers (two nodes that are clustered and one host that is standalone) will be added to SCVMM 2012. All three are on an untrusted domain and so this example will show the necessary configuration steps required to manage these untrusted servers. For more information on how to add physical Hyper-V hosts or nodes that are on other types of networks, please refer to the Microsoft SCVMM 2012 documentation as listed in the **References** section of this document found on page 10.

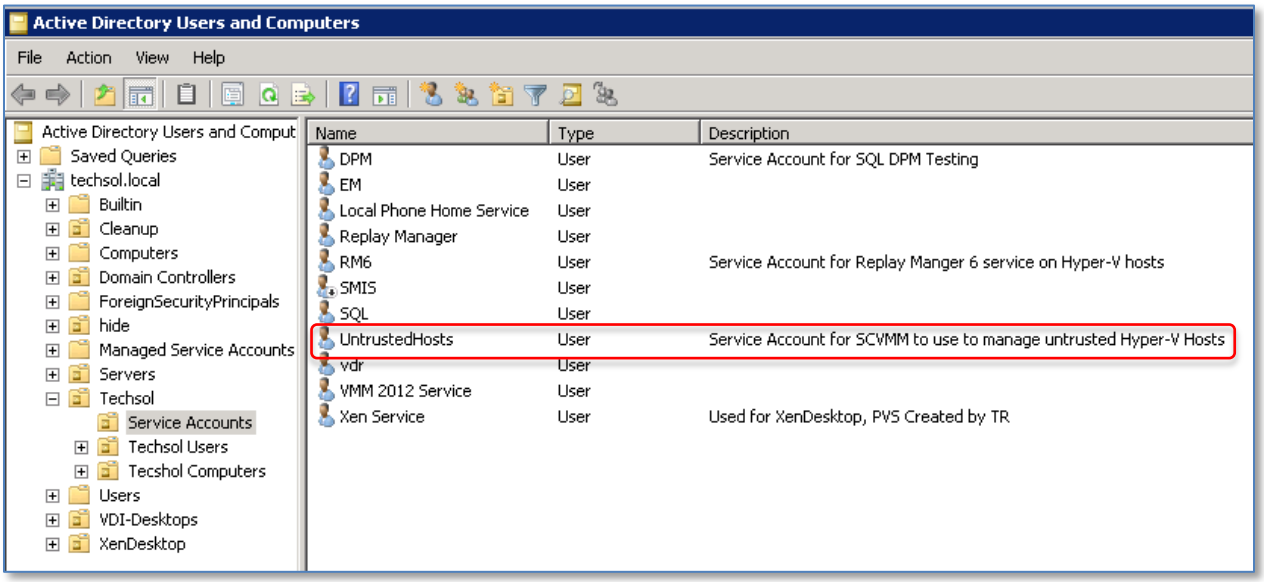

Figure 31: Create a domain service account user for untrusted Hyper-V hosts

1) As shown in Figure 31, on the untrusted domain's AD domain controller, complete the following steps:
   a) Launch **Active Directory Users and Computers**.
   b) Create a new domain user account with a name and description that intuitively identifies its purpose (for example, **UntrustedHosts**).
   c) Assign this new domain user account a password that meets minimum complexity requirements, and record it in a secure place for future reference.
   d) Because this user account is a service account that will not be used by actual users, the recommendation is to set this password to never expire to prevent possible service interruptions due to an expired password.

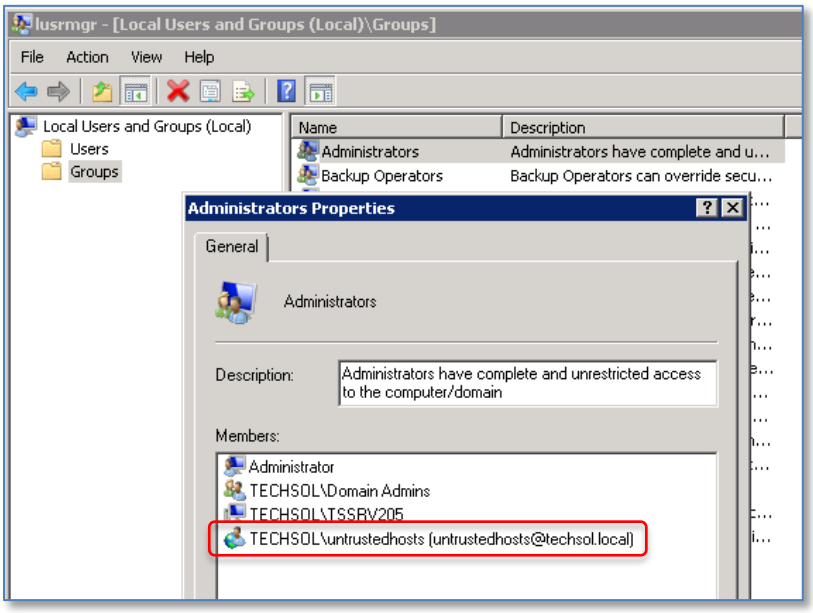

Figure 32: Add domain service account user to each Hyper-V host and node

2) As shown in Figure 32, on each physical Hyper-V node of the untrusted failover cluster, and on the untrusted standalone Hyper-V host, complete the following steps:
   a) Launch **Local Users and Groups**.
   b) Add the domain user service account (**UntrustedHosts** in this example) to the local administrators group.

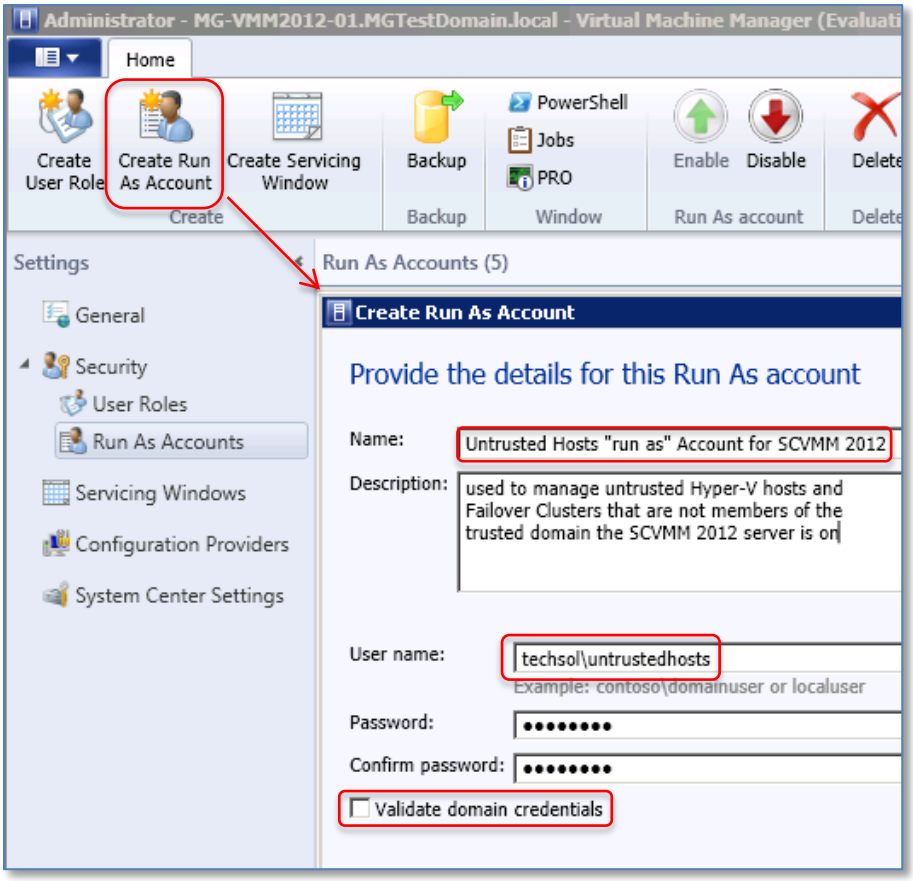

Figure 33: Create SCVMM 2012 "run as" account for untrusted hosts and nodes

3) As shown in Figure 33, create a "run as" account using the SCVMM 2012 Manager console:
   a) From the **Settings** workspace, expand **Security→ Run As Accounts**.
   b) Click on **Create Run As Account** under the **Home** tab.
   c) Provide a descriptive name for the Run As account and provide a description (if desired).
   d) For User Name, enter it in **<untrusted_domain_name>\<user_name>** format as shown, and provide the password. The domain name, user name and password entered here must match the domain name, user name, and password used to create the domain user service account in step 1 above.
   e) Uncheck the option for **Validate domain credentials.** Since this domain user account is on an untrusted domain relative to the SCVMM 2012 server, validation will fail if the box is left checked (this is by design).
   f) Click on **OK** to create the user.

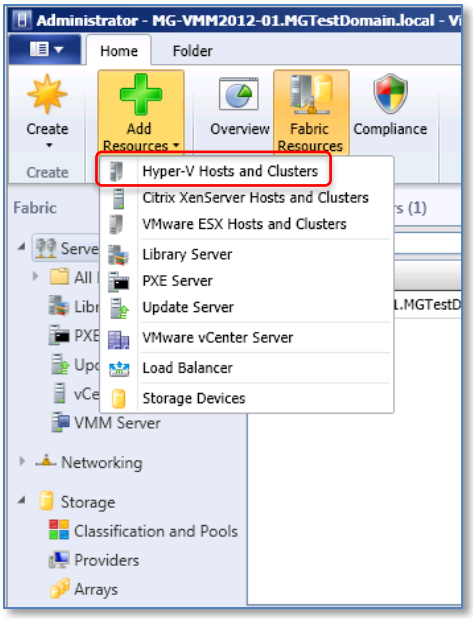

Figure 34: Launch Add Resources Wizard to add a Hyper-V host or cluster

4) To add physical Hyper-V host servers to SCVMM 2012, from the **Fabric** workspace, click on **Servers**, and then click on **Add Resources** from the ribbon bar under the **Home** tab as shown in Figure 34. Select **Hyper-V Hosts and Clusters** to launch the **Add a Resource Wizard.**

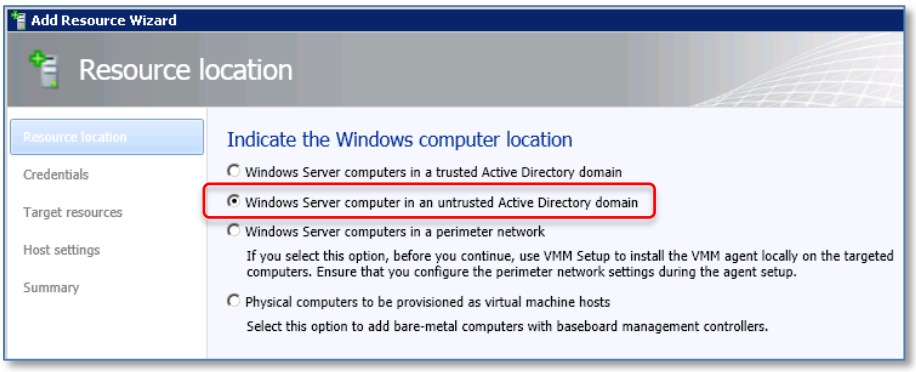

Figure 35: Specify the Hyper-V server's location

5) For **Resource Location**, select the location of the Hyper-V Host server to be added. In this example, since the two-node Hyper-V failover cluster and the standalone Hyper-V Host server are on an untrusted domain, that option is selected as shown in Figure 35.

Figure 36: Specify the correct "run as" account to access a Hyper-V host

6) Click on the **Browse** button and select the appropriate SCVMM 2012 run as account. In this example, the **Untrusted Hosts** run as account is selected. Then click on **Next**.

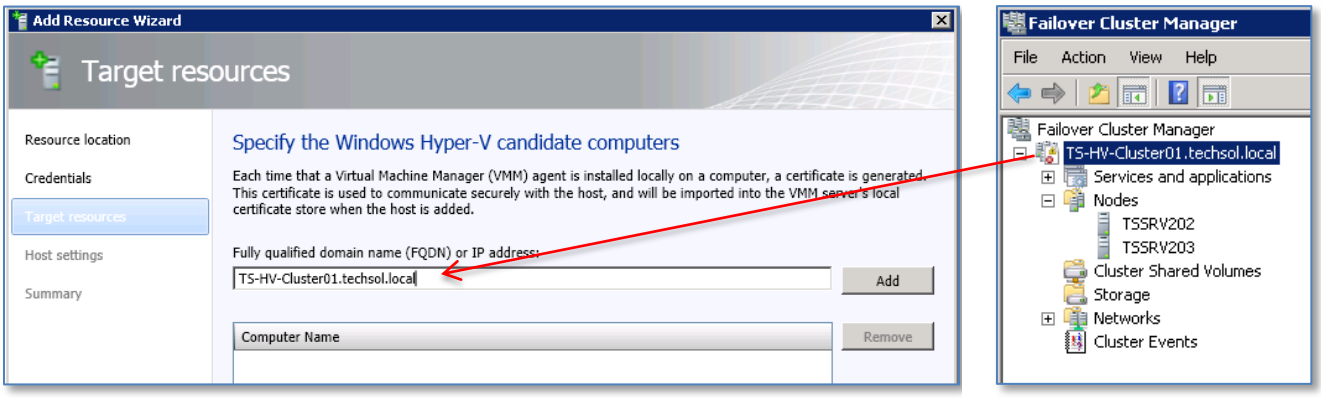

Figure 37: Specify the FQDN or IP address of a Hyper-V host server or cluster

7) Specify the IP address or fully qualified domain name (FQDN) for the Hyper-V host server to be managed by SCVMM 2012. In this example, since a two-node Hyper-V failover cluster is being added, it is timesaving step to provide the FQDN of the failover cluster object, as shown in Figure 37. This will allow SCVMM 2012 to install the agent on all the physical Hyper-V nodes in the cluster at the same time (TSSRV202 and TSSRV203 in this example). Then click on the **Add** button.


Note

Each host in the failover cluster can also be added individually to SCVMM 2012 by entering the IP address or the FQDN of each host one at a time. Other management functions, such as creating a failover cluster from individual Hyper-V Hosts are also possible from within SCVMM 2012. Note that some management functions, such as running cluster validation, are not possible from within SCVMM 2012 if the Hyper-V Hosts and the SCVMM 2012 server not on the same (or trusted) AD domain.

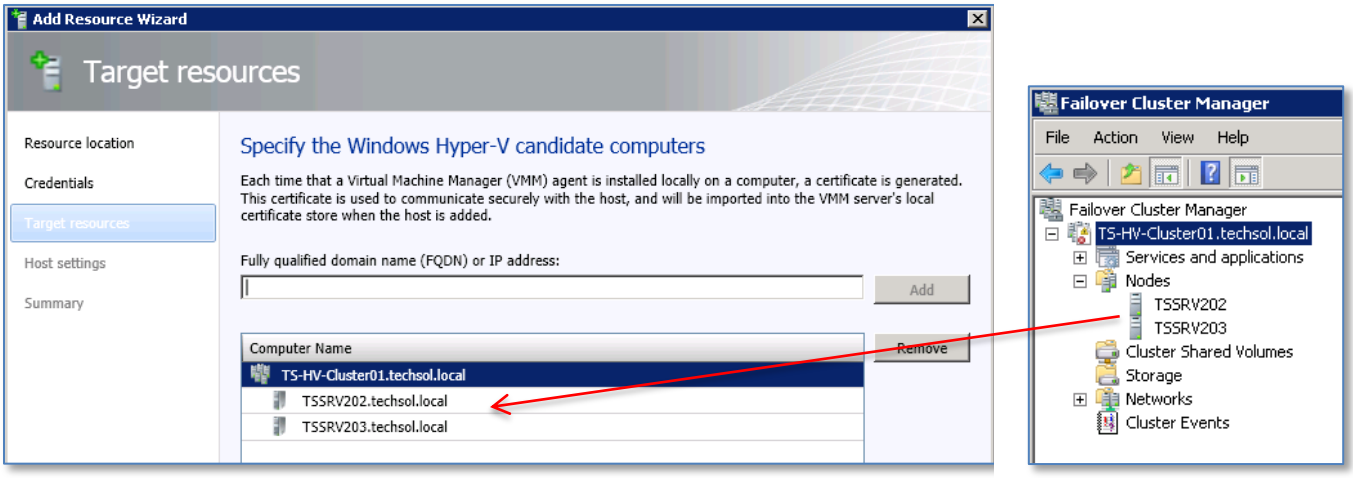

Figure 38: Failover cluster added to SCVMM 2012

8) Once SCVMM 2012 discovers the failover cluster or Hyper-V host, it will be displayed as shown in Figure 38. Note that in this example, since a failover cluster was added, both of the physical Hyper-V nodes in that cluster were added automatically. Click on **Next**.

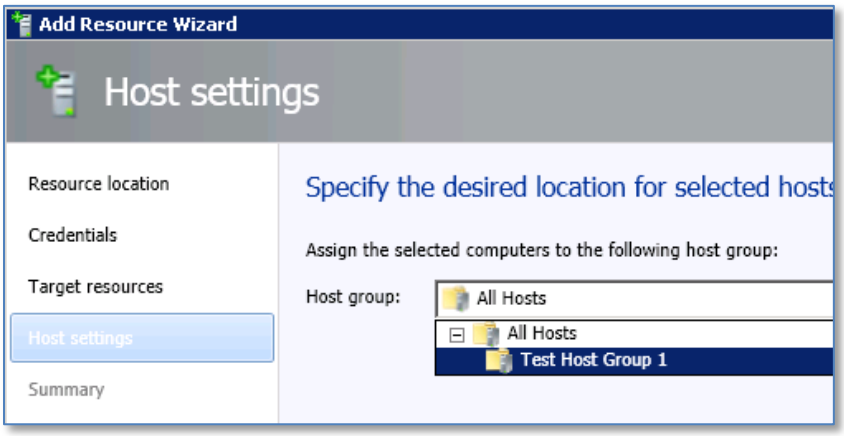

Figure 39: Assign the managed Hyper-V host or failover cluster to a host group

9) On the **Host Settings** screen, click the drop down arrow and select the desired host group to assign the selected Hyper-V nodes or hosts to. In this example, **Test Host Group 1** is selected as shown in Figure 39. Click on **Next** to continue.

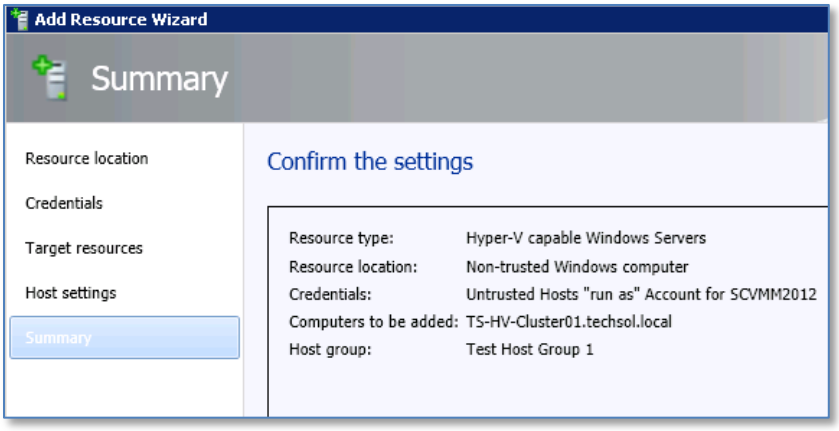

Figure 40: Confirm Add Resources Wizard summary

10) On the **Summary** screen, review the settings, and then click on the **Finish** button.

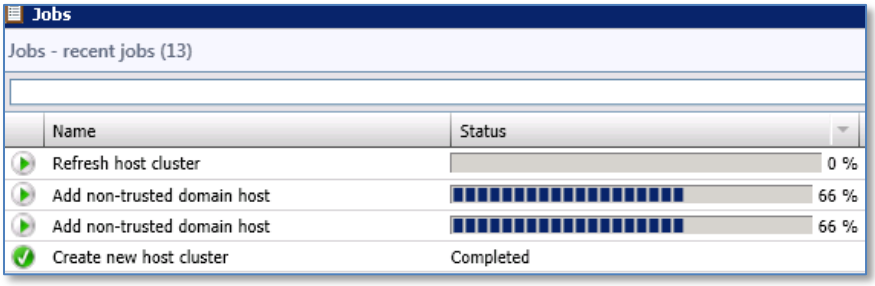

Figure 41: Add resources jobs

11) Monitor the status of any jobs until they complete successfully.

12) Repeat the above steps, starting with Step 4 in this section, to add other physical Hyper-V nodes or host servers. In this example, the standalone Hyper-V host server TSSRV204 was also added to the host group **Test Host Group 1**.

13) If adding a standalone Hyper-V host, once it has been added, right click on it, and under **Properties**, go to the **Placement** screen and specify a location for guests. In this example, the path **E:\VirtualGuests** was specified for the host server TSSRV204.

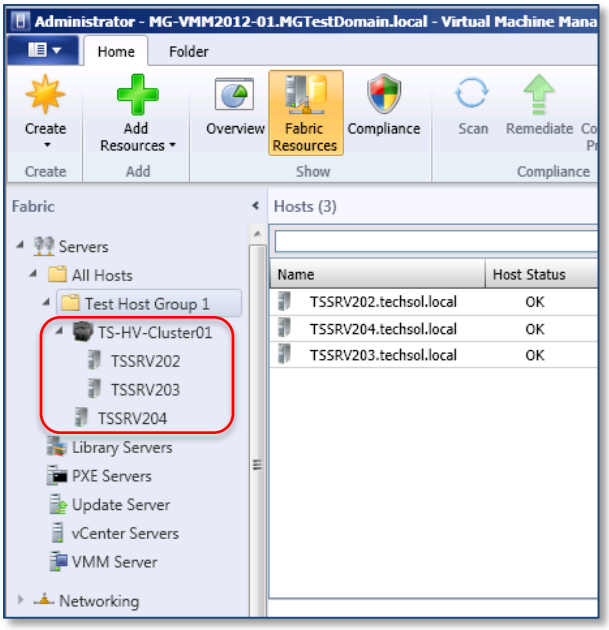

Figure 42: Failover Hyper-V cluster and Hyper-V host successfully added to SCVMM 2012

14) To verify the addition of the Hyper-V failover clusters and standalone Hyper-V host servers to SCVMM 2012, click on the **Fabric** workspace, expand **Servers**, and under **All Hosts,** expand the desired host group (**Test Host Group 1** in this example). As shown in the example in Figure 42, the two-node Hyper-V failover cluster consisting of TSSRV202 and TSSRV203, and a standalone Hyper-V host server TSSRV204 are now listed with a status of OK.

Configure Networking and Static IP Pools in SCVMM 2012

Assign a Logical Network and Static IP Pool to a Hyper-V Host

In the **Configure Networking** section of this document (see Page 19), a logical network named **Test SCVMM Logical Network 1** with an associated static IP pool named **Test SCVMM Logical Network 1_Test Host Group 1** (consisting of 20 static IPs) was created for Hyper-V guest use.

Now that several physical Hyper-V hosts are available in the host group in SCVMM 2012, this logical network and its associated static IP pool can now be associated with one or more physical Hyper-V hosts in the host group. In the below example, this logical network will be associated with the standalone Hyper-V host TSSRV204.

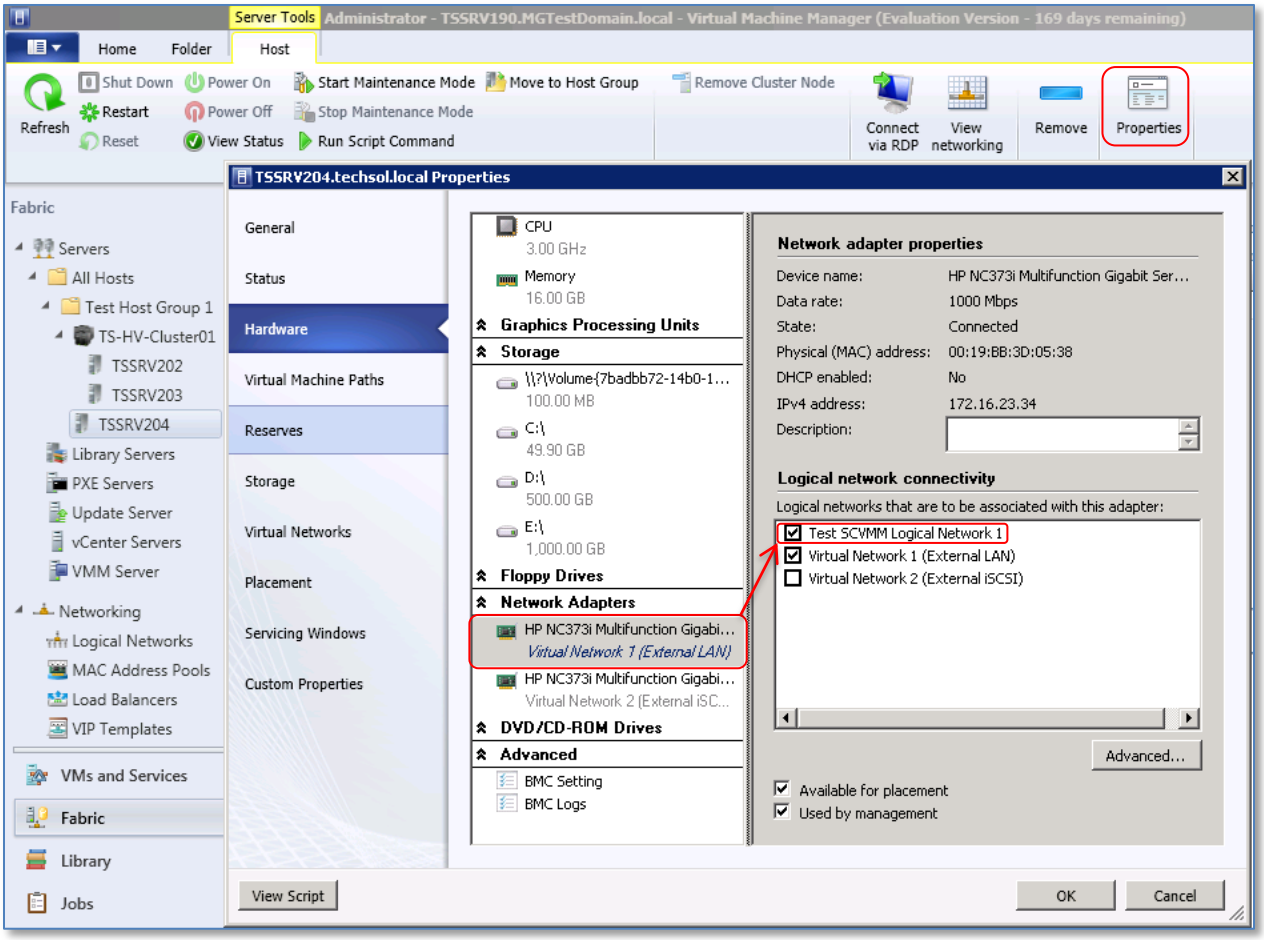

Figure 43: Assign a logical network and associated static IP pool to a Hyper-V host

1) From the **Fabric** workspace, expand **Servers**, **All Hosts**, and under the desired host group, click on the desired Hyper-V Host (in this example, TSSRV204).

2) Under the **Host** tab, click on **Properties** on the ribbon bar, and then on the **Hardware** screen.

3) On the **Hardware** screen, click on the physical NIC for the desired external network (**Virtual Network 1 (External LAN)** in this example).

4) In the **Logical network connectivity** window, note that the NIC is already associated with **Virtual Network 1 (External LAN)** in this example. In addition to that check box, check the box for the desired logical network (**Test SCVMM Logical Network 1** in this example) as shown in Figure 43.

5) In this example, access mode is being used (the default). If trunk mode is being used in your environment, then click on the **Advanced** button and configure trunk mode settings.

6) Click on the **OK** button, and verify that the **Change Properties of virtual machine host** job completes successfully.

7) If desired, associate this logical network with other Hyper-V hosts and nodes in the host group. In this example, **Test SCVMM Logical Network 1** was also associated with both nodes (TSSRV202 and TSSRV203) of the failover cluster **TS-HV-Cluster01**.

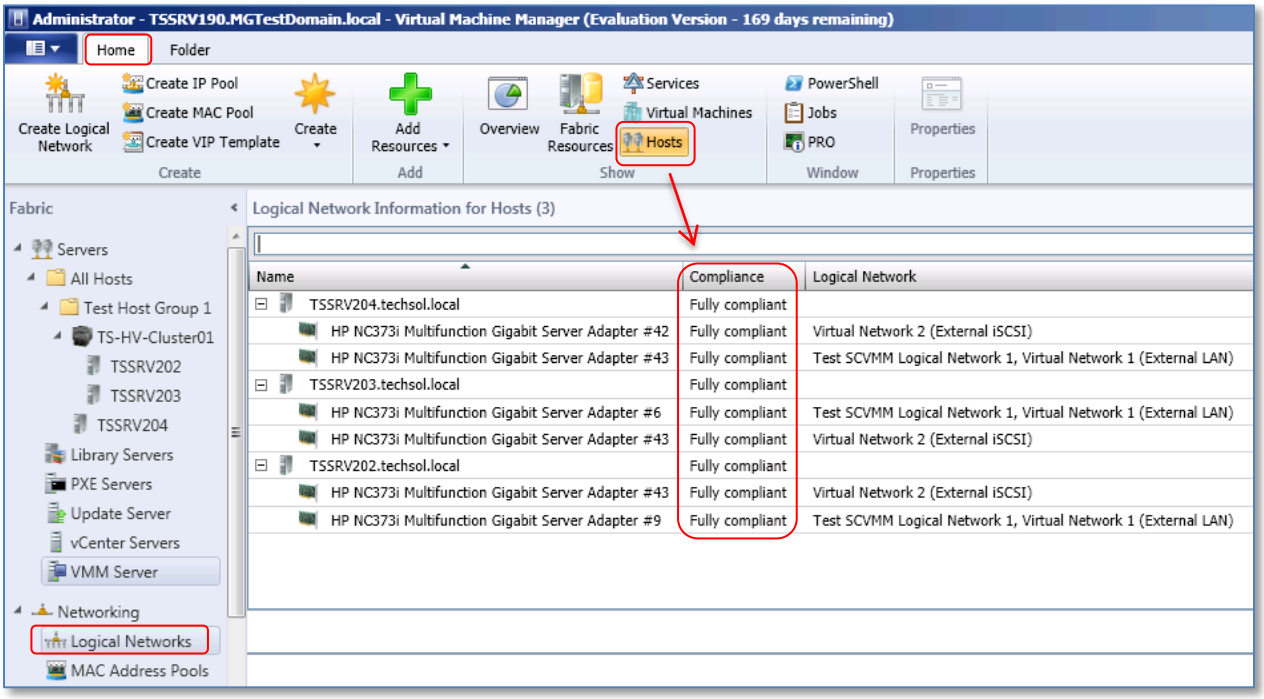

Figure 44: Verify that logical network information is fully compliant for all hosts

8) To verify the configuration, from the **Fabric** workspace, expand **Networking**, click on **Logical Networks**, and in the **Show** group under the **Home** tab on the ribbon bar, click on **Hosts**. Verify that the **Compliance** column shows a status of **Fully compliant** for each Hyper-V host's physical NIC, as shown in Figure 44.

Creating a Private Cloud

Now that all the essential elements of the SCVMM 2012 fabric are in place, a private cloud can now be created from a host group and its associated fabric components.

Review Fabric Settings

Before creating a private cloud, ensure that the steps in the preceding sections of this document have been completed to prepare the SCVMM 2012 fabric. As a quick review of the sections above, configuring the SCVMM 2012 fabric consisted of the following steps:

- Define a host group for physical Hyper-V hosts and nodes
- Configure a library server, copy resources to its default share location, and assign it to the host group
- Configure a logical network, network site, static IP Pool, and assign to the host group
- Discover Dell Compellent SAN storage, assign classifications, allocate storage pools and/or logical units from the Dell Compellent SAN to the host group
- Add one or more physical host servers to a host group (after verifying consistent and intuitive naming for all Hyper-V host and failover cluster networking components)
- Assign an SCVMM 2012 logical network (and associated pool of static IPs) to the physical Hyper-V hosts and nodes in the SCVMM 2012 host group.

Add New Read-write Library Shares to the Library Server

Before running the wizard to create a private cloud, a couple of new read-write library shares need be to be created as read-write locations for stored VMs and for user role shared data.

- When creating a private cloud, the wizard will prompt for a data path for Stored VMs. Since we want self-service SCVMM 2012 users to be able to store Hyper-V guest VMs, an additional library server share (named **StoredVMs** in this example) will need to be created ahead of time for this purpose. A separate library server share for stored VMs is required because it must be read-write (the default library server share is read-only).
- When creating a user role and assigning it to a private cloud, the wizard will prompt for a user role shared data path, which is a location where members of a user role can upload data to share with other role users. Since we want self-service role users to be able to upload and share data files, an additional library server share (named **UserRoleSharedData** in this example) will need to be created ahead of time for this purpose. This library share will also be read-write.

The example below will first walk through the necessary steps to create the **StoredVMs** share. Once that share is created, the same steps can be repeated (steps 3a – 3f below) to create the second share for **UserRoleSharedData**.

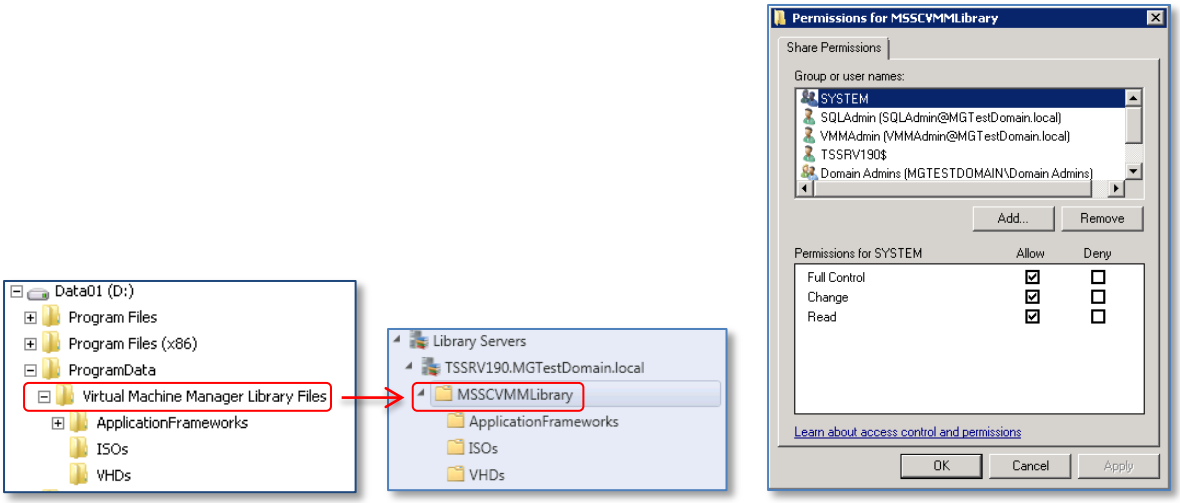

Figure 45: Default SCVMM 2012 library server share and permissions settings

1) The default instance of the library server in the SCVMM 2012 fabric in this example currently has one library shared folder on the D:\ drive as shown in Figure 45.

Note

By Default, this share is on the C:\ drive under the hidden folder C:\ProgramData. It is on the D:\ drive on this server because the default path was changed from C:\ to D:\ during the initial install of the SCVMM 2012 server so that it would not be on the same drive as the operating system.

2) The Windows folder is named **Virtual Machine Manager Library Files** and is shared as **MSSCVMMLibrary.** This folder appears in the SCVMM 2012 Manager console (under the library workspace) by its share name.

3) To add a new read-write SCVMM 2012 library share to an existing library server to hold stored VMs for your self-service users, complete the following steps:

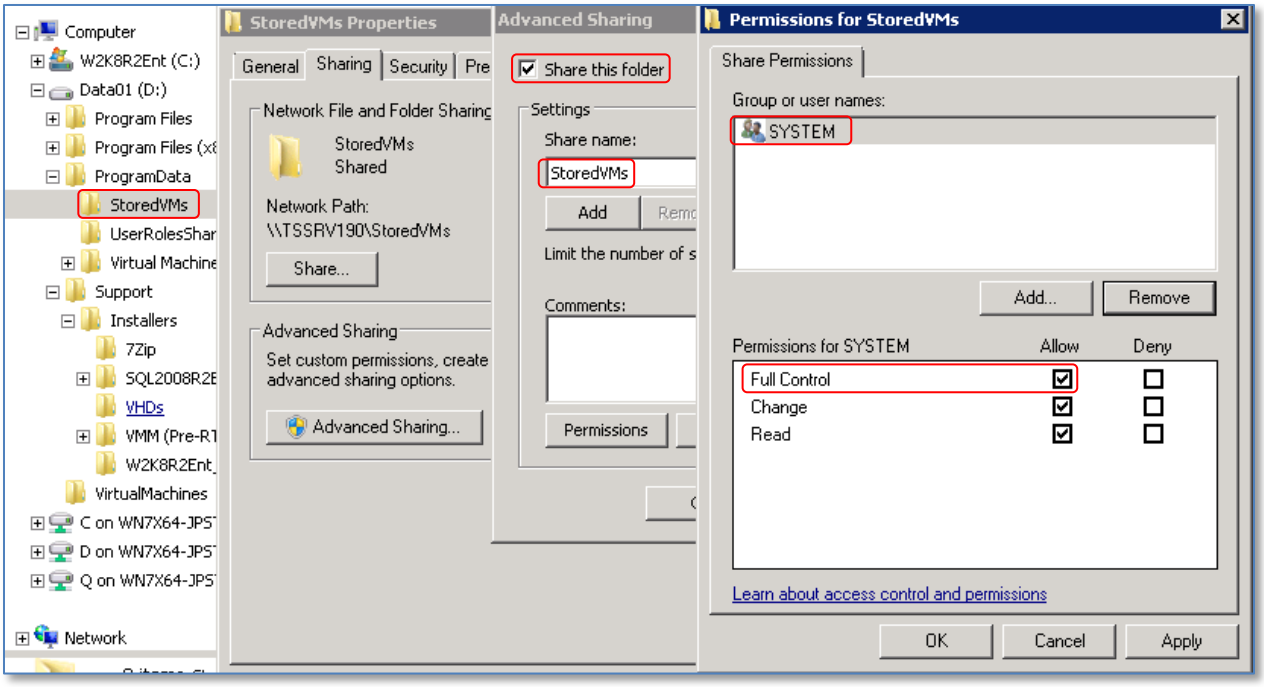

Figure 46: Configure a new Windows folder, share it, and set permissions

a) Use Windows Explorer to create the folder structure in the desired location. In this example, a new folder was created under D:\ProgramData called **StoredVMs**. Right-click on this folder and select **Properties**, click on the **Sharing** tab, click on the **Advanced Sharing** button, and check the box to **Share this folder.** Provide a desired share name or choose the default share name.

b) Click on the **Permissions** button and remove the **Everyone** group and add **SYSTEM** with **Full Control** permissions as shown in Figure 46 (adding the **SYSTEM** group is required).

c) Add other Windows users and groups as desired to allow administrators or other users access to this location by its Windows share name. As an example, see the permissions on the default **MSSCVMMLibrary** share in Figure 45.

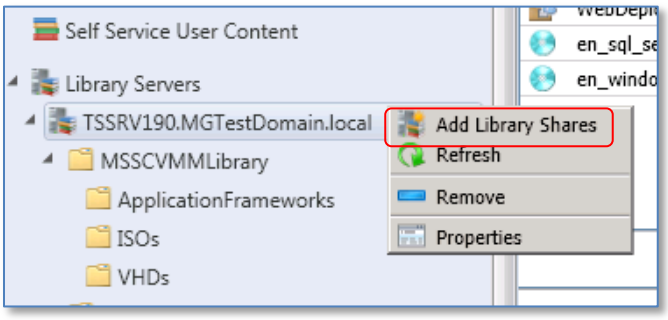

Figure 47: Add a new library share to the SCVMM library server for stored VMs

d) Now that the new Windows share location is in place, from the SCVMM 2012 Manager console, click on the **Library** workspace, expand **Library Servers**, right-click on the desired library server and select **Add Library Shares** as shown in Figure 47.

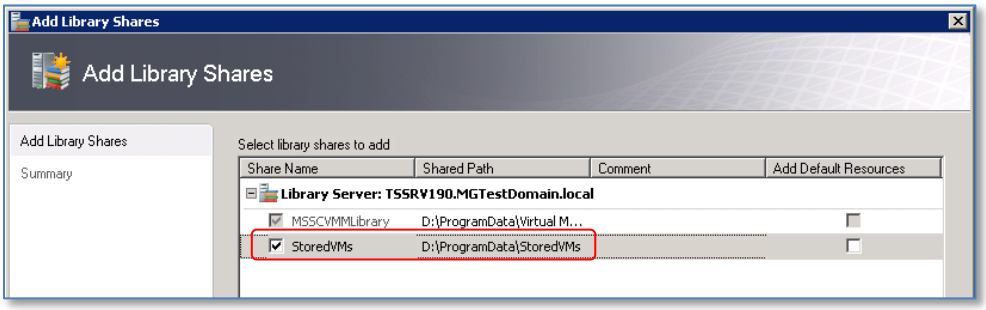

Figure 48: Add a new library share to SCVMM 2012 library server

e) The Windows share is now visible (as **StoredVMs** in this example). Check the box in front of the share name and click on **Next**, verify the configuration on the **Summary** screen, and then click on the **Add Library Shares** button to complete the wizard.

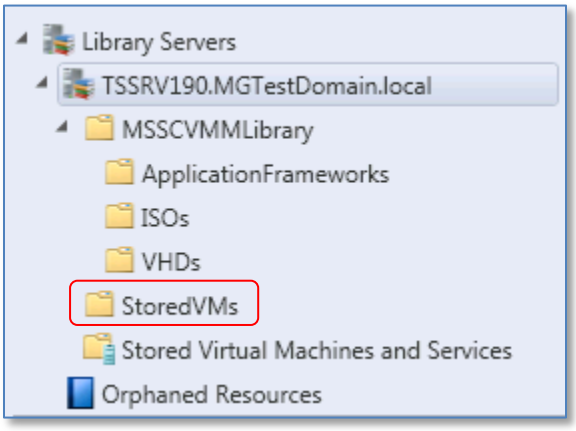

Figure 49: New library share now available in SCVMM 2012

f) Verify that the **Set Library Server** job completes successfully in SCVMM 2012, and then the new library share should be visible under the library server as shown in Figure 49.

4) Repeat steps 3a – 3f above to create the **UserRolesSharedData** library share. Once this additional share has been added to the library server, please continue with the steps below to create a private cloud.

Launch and Complete the Create Cloud Wizard

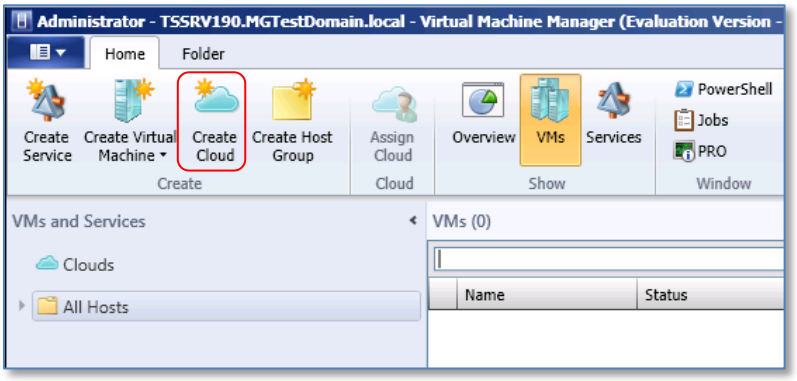

Figure 50: Launch the Create Cloud Wizard

1) From the SCVMM 2012 Manager console, click on the **VMs and Services** workspace, and then under **Home**, click on **Create Cloud** on the ribbon bar to launch the **Create Cloud Wizard** as shown in figure 50.

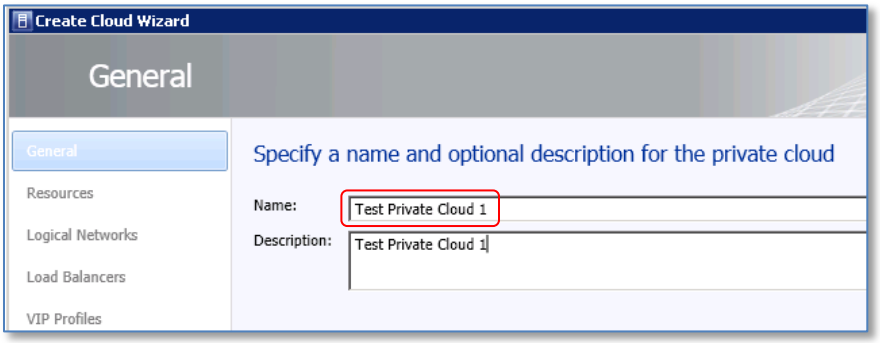

Figure 51: Provide a name for the private cloud

2) On the **General** screen, enter a name for the private cloud (**Test Private Cloud 1** in this example), a description if desired, and click on **Next**.

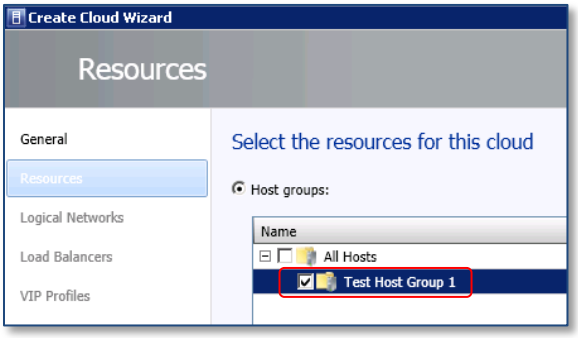

Figure 52: Select the resources (host group) for the private cloud

3) Check the box for the desired host group (**Test Host Group 1** in this example) as shown in Figure 52, and click on **Next**.

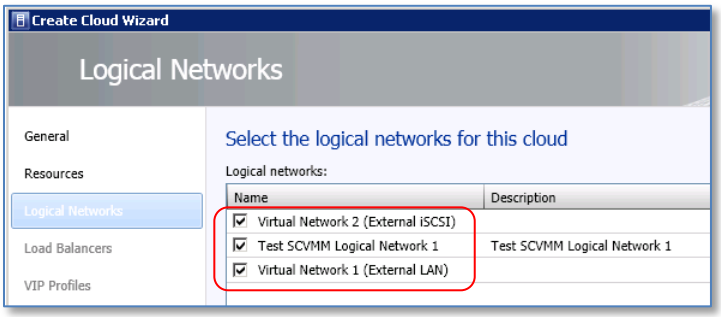

Figure 53: Select the logical networks for the private cloud

4) As shown in Figure 53, check the boxes in front of the desired logical networks to be made available to this private cloud. Recall from the steps above under **Configure Networking** (see page 19) that the **Test SCVMM Logical Network 1** was preconfigured as a fabric resource in SCVMM 2012 to define a small pool of static IPs for Hyper-V guest use. Note how the previous intuitive naming provided for the logical networks makes it easy now to quickly identify the role of each logical network (see **Configure Networking** on page 19, and **Verify Consistent and Intuitive Naming for Virtual Networks on Hyper-V** on page 33). Click on **Next**.

5) On the **Load Balancers** screen, check the box in front of any desired load balancers. In this example, no load balancers will be selected. Click on **Next.**

6) On the **VIP** (Virtual IP) **Profiles** Screen, select any desired VIP Profiles. In this example, no VIP profiles will be selected. Click on **Next**.

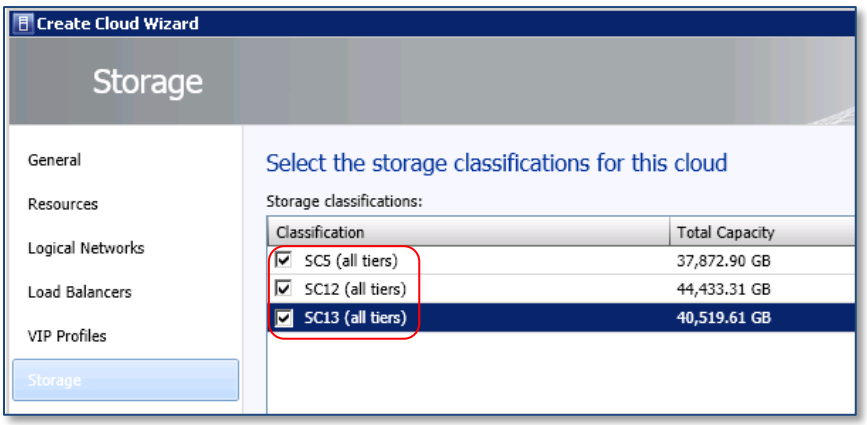

Figure 54: Select Storage for the private cloud

7) On the **Storage** screen, select the desired storage classifications for this private cloud. In this example, three Storage Centers, each assigned a classification, are selected as shown in Figure 54. Click on **Next**.

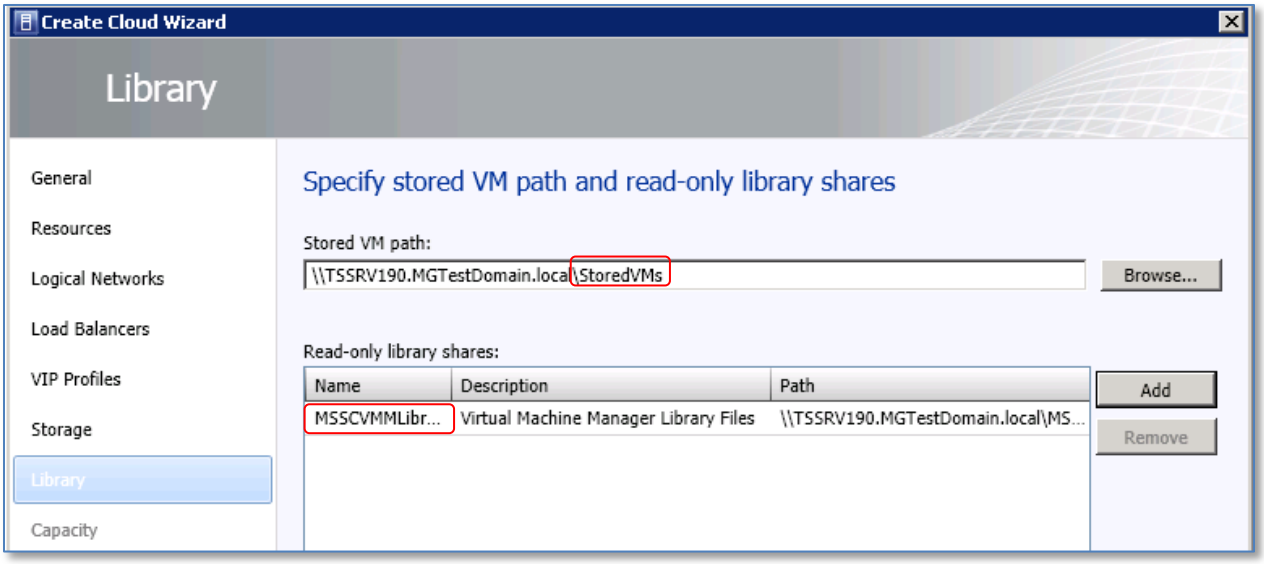

Figure 55: Specify stored VM path and read-only library shares

8) On the **Library** screen, for the **Stored VM path**, click on the **Browse** button and select the library share for **Stored VMs**. In this example, this library share was created previously (see **Add New Read-write library shares to the Library Server**) and was named **StoredVMs**.

9) For the **Read-only library share**, click on the **Add** button and select the **MSSCVMMLibrary** share, as shown in Figure 55. Then click on **Next**.

Note

The **Stored VM** path and the **Read-only library** cannot be set to the same share because the stored VM path must be a read-write path. This is the reason why (in this is example) the stored VM path was created above prior to running the **Create Private Cloud Wizard**.

10) On the **Capacity** screen, adjust the capacities if desired for virtual CPUs, memory, storage, etc., and then click on **Next**. In this example, the default values are left unchanged.

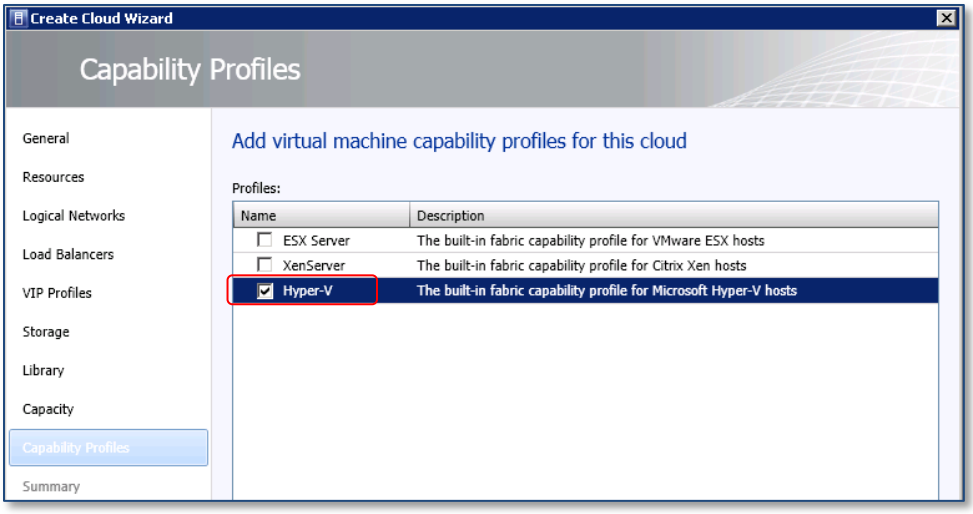

Figure 56: Select the Hyper-V capability profile

11) On the **Capability Profiles** screen, check the box for **Hyper-V** (Since this private cloud will only contain Hyper-V Servers) and click on **Next**.

12) On the **Summary** Screen, verify the settings summary and then click on **Finish**.

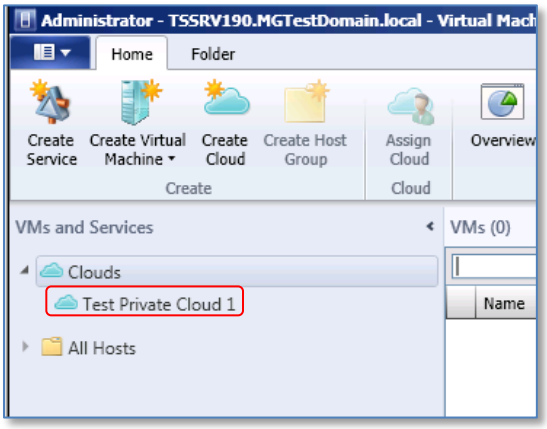

Figure 57: Private cloud successfully created

13) Verify that the **Create New Cloud** job completes successfully. Then click on the **VMs and Services** workspace, and the new private cloud (**Test Private Cloud 1** in this example) should be listed under **Clouds** as shown in Figure 57.

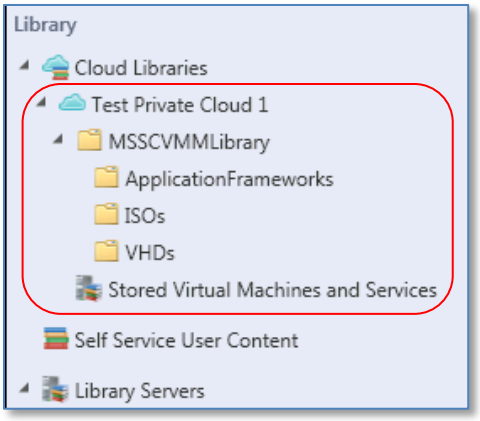

Figure 58: Verify cloud details under cloud libraries

14) Under the **Library** Workspace, expand **Cloud Libraries** and the new cloud should be listed with its read-only library shares and the **Stored Virtual Machines and Services** object, as shown in Figure 58.

Create Self-service User Role

There are two ways that SCVMM 2012 can be accessed by users:

- The SCVMM Manager console: this is installed by default on the SCVMM 2012 server during initial setup. The Manager console (a client-based GUI) can also be installed on other servers or workstations with a supported OS.
  - The SCVMM 2012 Manager console is used by SCVMM 2012 administrators or delegated administrators to configure and manage SCVMM 2012 resources, private clouds, and self-service roles.
  - The SCVMM 2012 Manager console can also be used by self-service role users to manage their own private cloud resources. As a result, the use of the Self Service Portal (SSP) with SCVMM 2012 is optional (see next bullet).

- The SCVMM 2012 Self Service Portal (SSP): this allows self-service roles users created by an administrator or delegated administrator to access and manage their own private cloud resources by using a supported web browser (no client required) over an http or https connection. However, functionality with SSP is limited. It is a best practices recommendation for self-service role users to use the Manager console where possible.

In this example, an SCVMM 2012 user role will be created, self-service role users will be added, and the user role will be assigned to the **Test Private Cloud 1** created above.

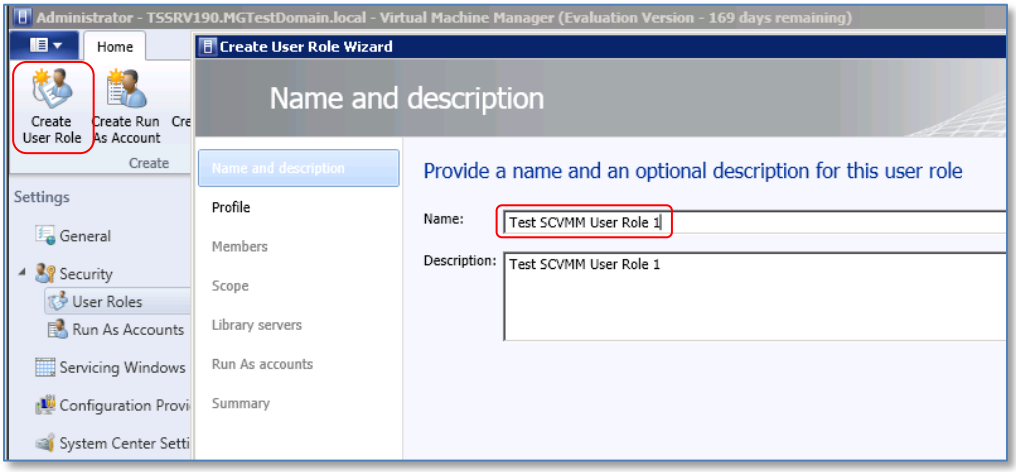

Figure 59: Launch the Create User Role Wizard

1) From the **Settings** workspace in the SCVMM 2012 Manager console, click on **Create User Role** under the **Home** tab on the ribbon bar to launch the **Create User Role Wizard** as shown in Figure 59.

2) Provide a **Name** and **Description** for the User Role. Since this user role will be associated with the **Test Private Cloud 1** created previously (see **Launch and Complete the Create Cloud Wizard** on page 50) the name and description fields named accordingly as shown in Figure 59.

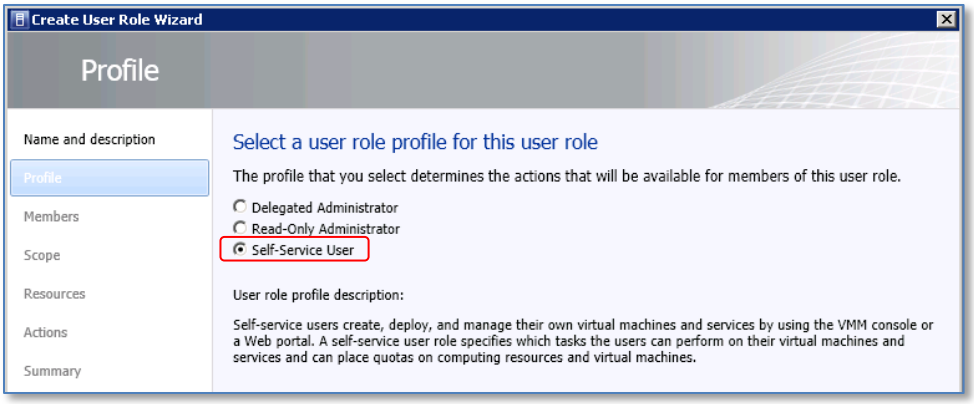

Figure 60: Select a profile for a self-service user role

3) On the **Profile** screen, select the option for **Self-Service User** and then click on **Next**.

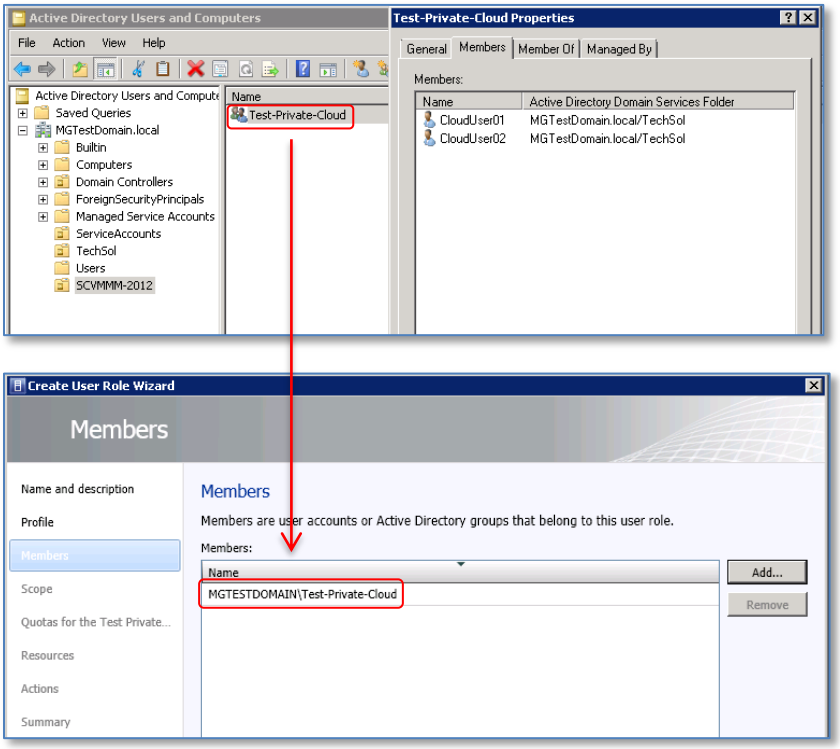

Figure 61: Assign AD users/groups to SCVMM 2012 self-service user role

4) On the **Members** Screen, select the Active Directory (AD) Users (and/or Groups) that will belong to this self-service user role. In this example, an AD group named **Test-Private-Cloud** was first created on the AD domain controller by using **Active Directory Users and Computers**. To this AD group, two self-service AD users were added (**CloudUser01** and **CloudUser02** in this example). As shown in Figure 61, the **Test-Private-Cloud** AD group was then added to the **Members** screen in the **Create Users Role Wizard**. Once the desired users or groups are listed, click on **Next**.

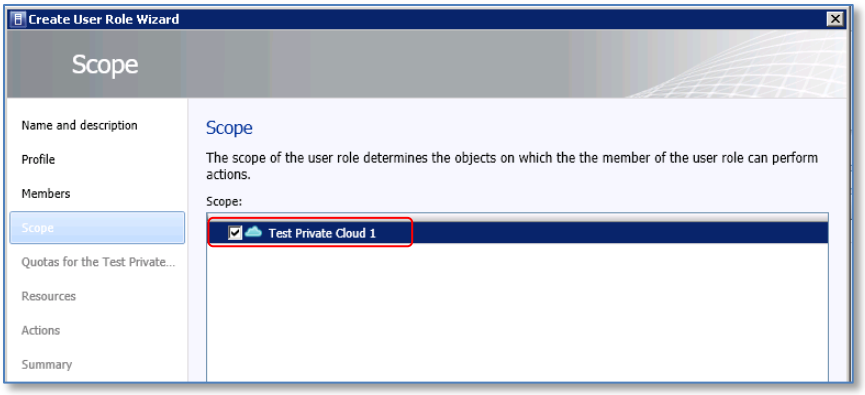

Figure 62: Specify a private cloud for the self-service user role

5) Check the box for the private cloud for which this self-service user role will be able to perform actions. In the example shown in Figure 62, **Test Private Cloud 1** is the only private cloud available. Click on **Next**.

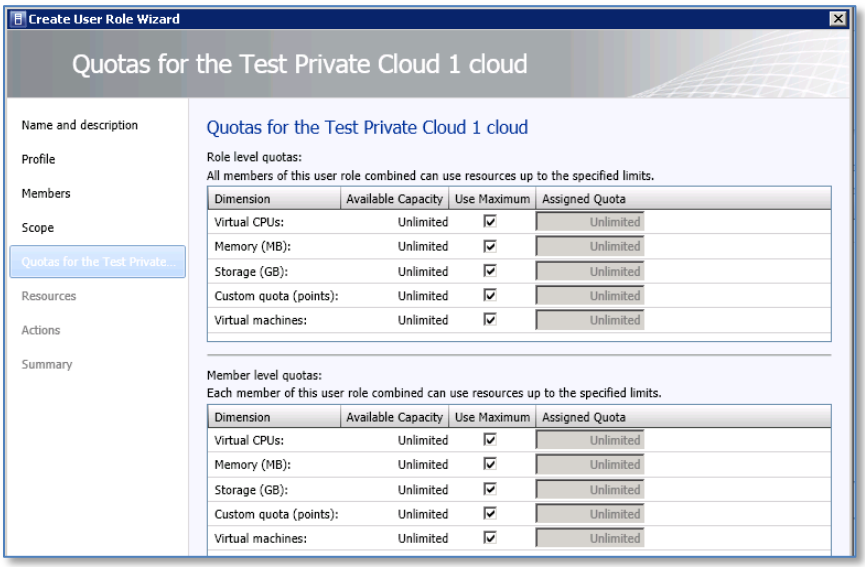

Figure 63: Set role and member level quotes for a private cloud

6) On the **Quotas** screen, adjust the role and member level quotas as desired. In this example, the default values are left in place as shown in Figure 63. Then click on **Next**.

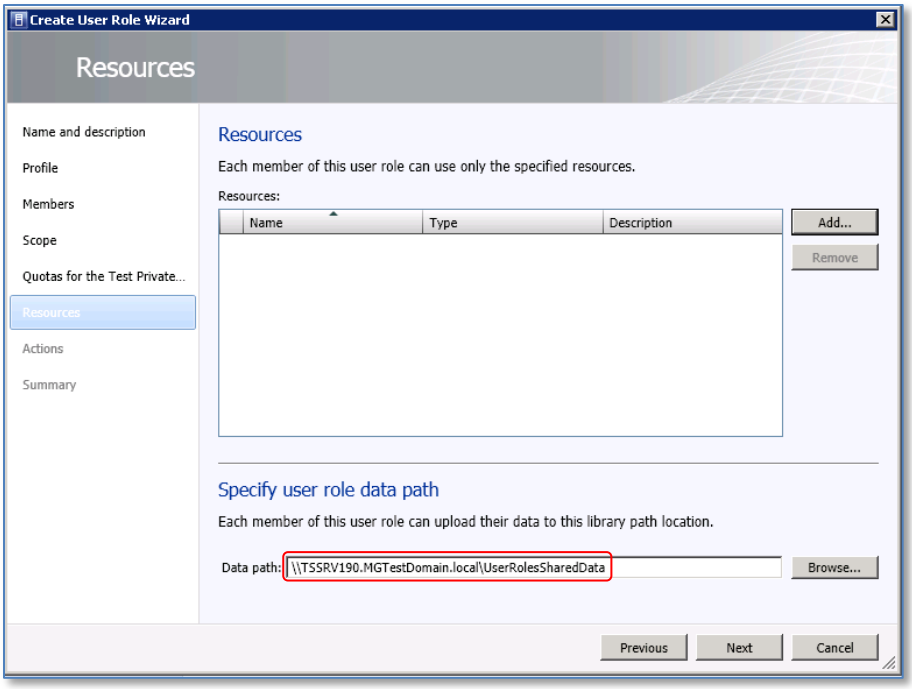

Figure 64: Assign resources and a data path to a user role

7) On the **Resources** screen, add any existing hardware profiles, OS profiles or templates these self-service users can use for Hyper-V guest VM creation. Since no profiles or template have been defined yet in this example, these will need to be added later on after they have been created (see **Create SCVMM 2012 Profiles and Templates** below on page 63).

8) For the **Data path**, click on **Browse** and choose a unique read-write library server share location that members of this self-service user role can use to upload and share their data files and share them with each other. In this example, a new library share called **UserRoleSharedData** was created for this purpose in the preceding section **Add New Read-write library shares to the Library Server**.

9) Once a data path is specified, then click on **Next**.

Note

The **Data path** chosen in Figure 64 must be unique. It cannot be the same as the library share created for Stored VMs.

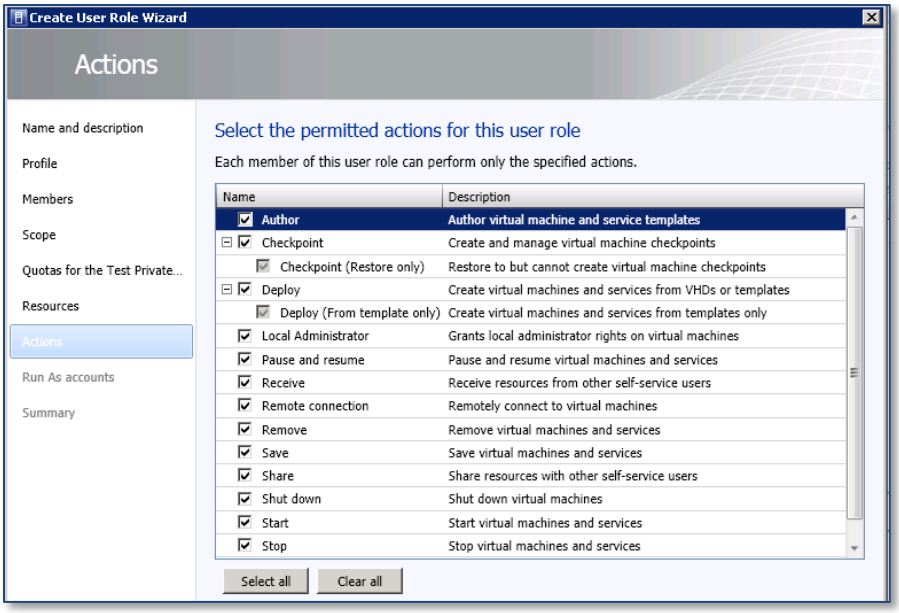

Figure 65: Select the permitted actions for the user role

10) On the **Actions** screen as shown in Figure 65, select the actions this user role will be permitted on the private cloud. In this example, all available actions were selected by clicking on the **Select All** button. Then click on **Next**.

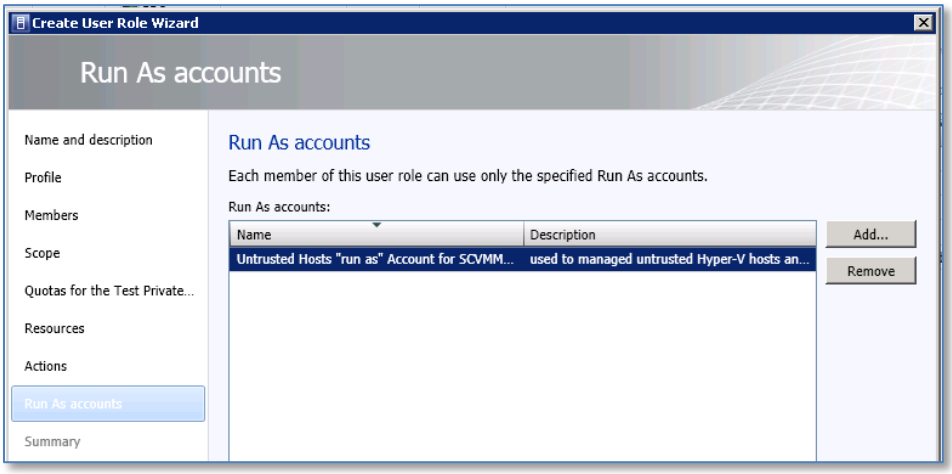

Figure 66: Add run-as accounts for self-service user role

11) Because the **Author** and **Deploy** actions were selected on the previous screen, the wizard will prompt for the addition of any necessary SCVMM 2012 "run-as" accounts on the **Run As accounts** screen. Run-as accounts may be needed to allow self-service role users to create VMs from templates and profiles. In this example, the **Untrusted Hosts run-as** account is added. Add other run as accounts as needed, then click on **Next**.

12) Verify the settings on the **Summary** screen and then click on **Finish**. Verify that the self-service user role is now listed under **Settings→Security→User Roles.**

Access the Self Service Portal (SSP)

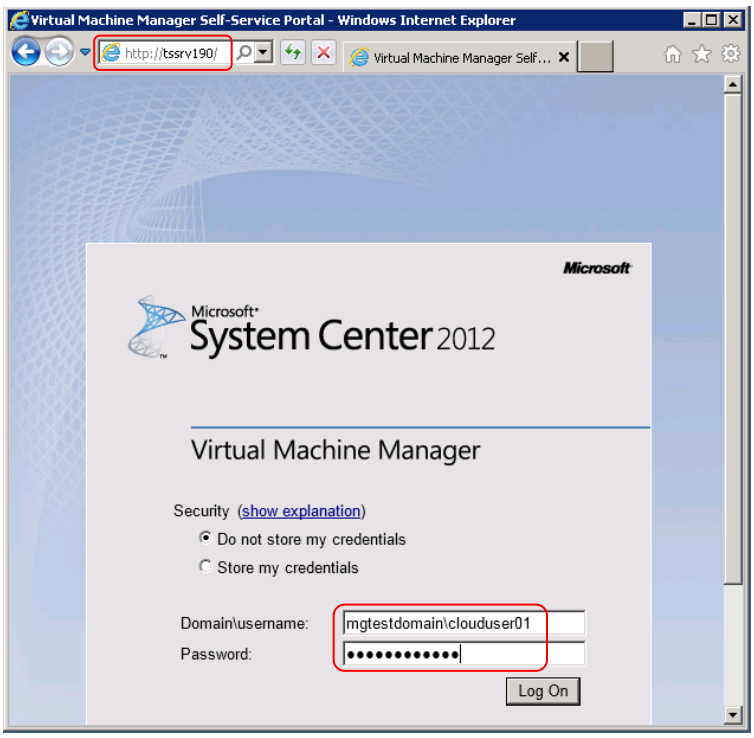

Figure 67: Self Service Portal (SSP) logon screen

1) To verify access to the SCVMM 2012 Self-Service Portal (SSP), from a server or workstation on the network, open Internet Explorer and provide the web URL for the SCVMM 2012 server and provide a valid domain, user name and password. In this example, the URL is **http://TSSRV190/** as shown in Figure 67.

2) In this example, the AD user **clouduser01** is a member of the AD group that is assigned to the SCVMM 2012 self-service user role. Then click on **Log On**.

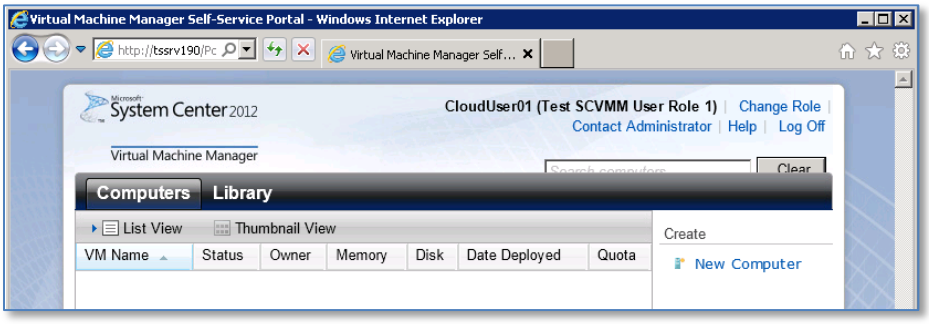

Figure 68: SCCVMM 2012 Self Service Portal main window

3) After successfully logging in to the SCVMM 2012 SSP, a list of VMs will be displayed (if any have been deployed to this private cloud and shared with this user role), along with any stored VMs under the **Library** tab. In this example, no guest VMs have been created or stored yet on the private cloud. Click on **Log Off** to close out of the SSP.

Figure 69: SCVMM 2012 Manager console logon

4) Due to limited functionality in the SSP, the best practices recommendation is for self-service users to access SCVMM 2012 with the Manager console instead of the Self Service Portal. To access SCVMM 2012 by using the Manager console, provide the self-service user credentials as shown in Figure 69.

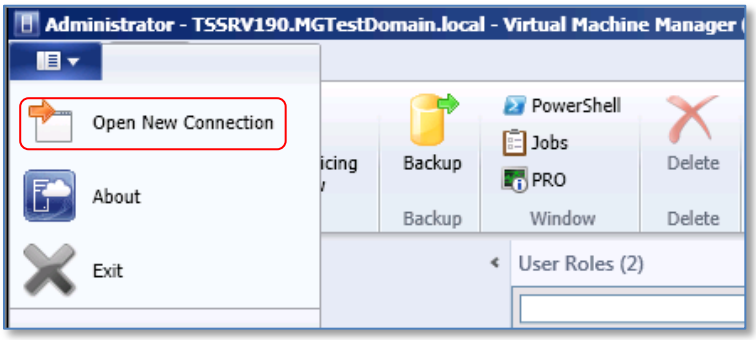

Figure 70: Launch another instance of the SCVMM Manager console

5) It is also possible to launch 2nd instance of the SCVMM 2012 Manager console from within the current Manager console session by clicking on the down arrow in the upper left from any SCVMM 2012 workspace, and selecting **Open New Connection**.

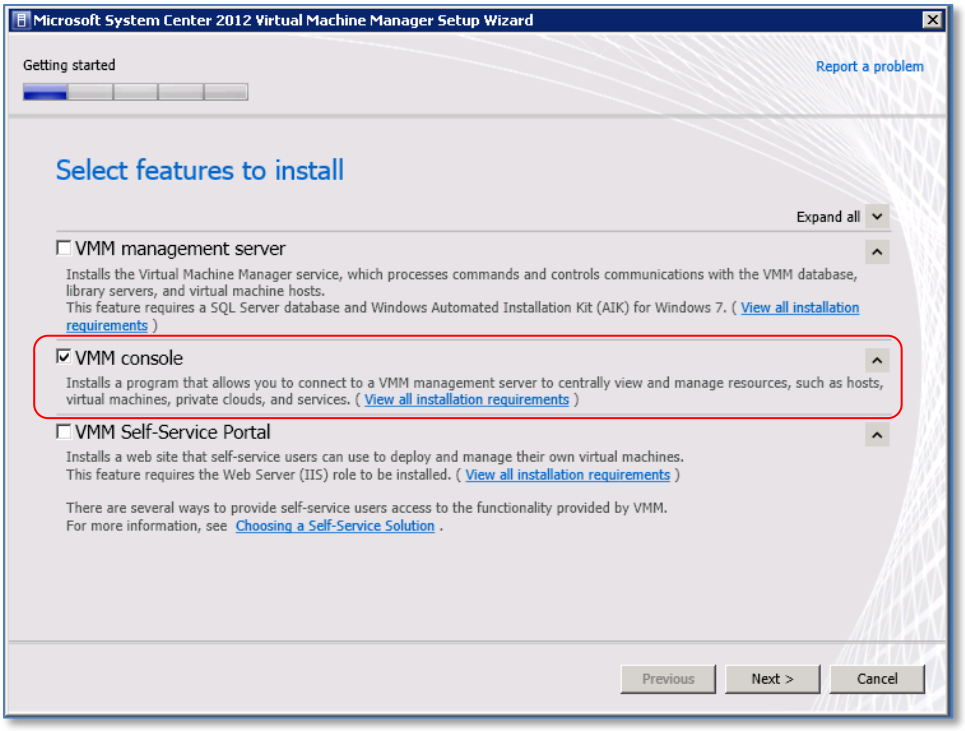

Figure 71: Install the VVM Manager console on another computer

6) The SCVMM 2012 Manager console GUI can be installed on additional servers or workstations by simply running the SCVMM 2012 setup.exe and choosing to install just the VMM console as shown in Figure 71.

Create SCVMM 2012 Profiles and Templates

Create a Hardware Profile

A hardware profile specifies the specific hardware parameters for guest VM creation, such as number of processors and the amount of RAM. Different hardware profiles can be created based on different guest VM deployment needs. In this example, an example of a basic hardware profile will be created that will specify 1 processor and 512MB of RAM.

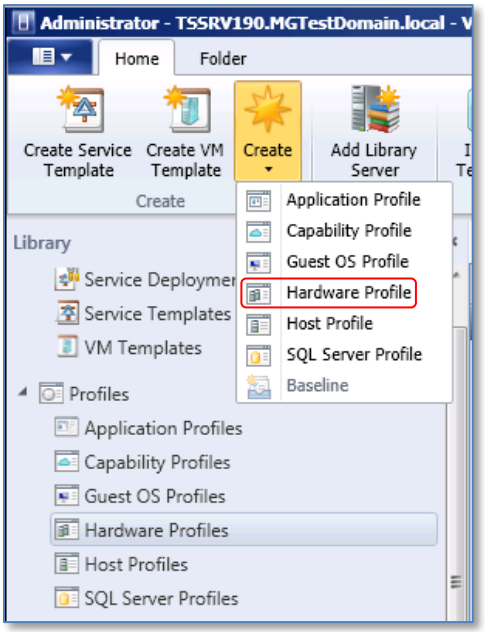

Figure 72: Select Create New Hardware Profile from the Create down-down list

1) From the **Library** workspace in the SCVMM 2012 Manager console, click on **Create** on the ribbon bar under the **Home** tab, and choose **Hardware Profile** as shown in Figure 72.

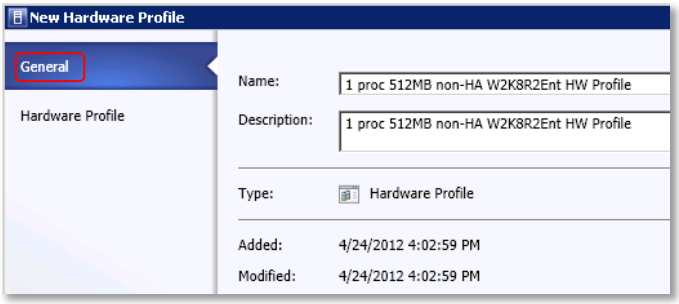

Figure 73: Provide a name and description for a new hardware profile

2) Under the **General** tab of the **New Hardware Profile** screen, provide a name and a description, similar to the example shown in Figure 73. Then click on **Hardware Profile** to view the **Hardware Profile** screen.

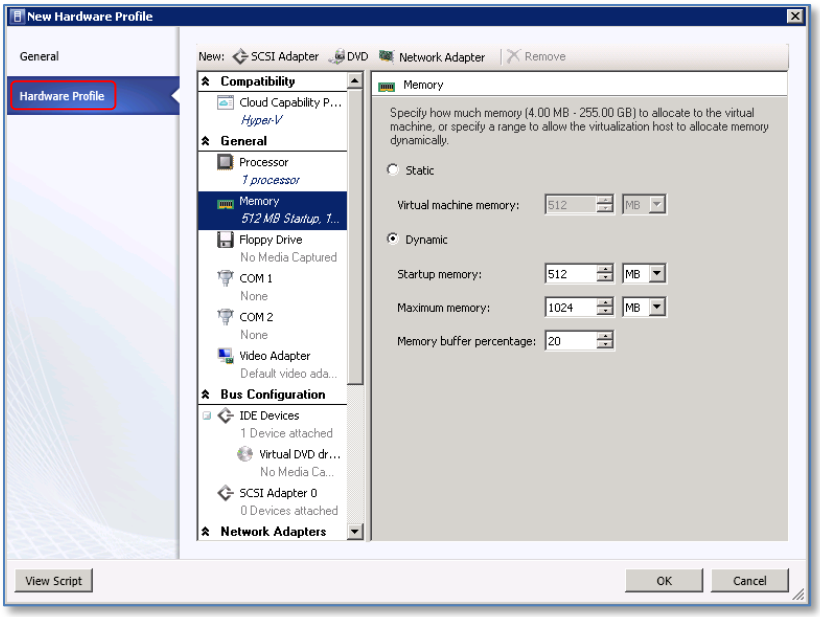

Figure 74: Set specific hardware parameters for a new hardware profile

3) Set the desired specifications for this new hardware profile. For this example, the hardware defaults will be used except for the following parameters:

   - Cloud Compatibility = **Hyper-V**
   - Processor = 1 (with **Allow migration to a virtual machine with a different processor version** checked)
   - Memory = dynamic (with a minimum of 512 MB and a maximum of 1024 MB)
   - Network Adapter: remove the **Legacy Network Adapter** and add back a regular **Network Adapter** with the following settings:
     - Connectivity = **Test Network** (as defined earlier in this document – select this from the **Logical network** drop-down list)
     - Set IP assignment method to **Static IP (from a static IP Pool)** and choose **IPv4 only** from the drop down list

4) Once the desired hardware settings are in place, click on OK to finish creating the hardware profile.


Note

If availability is set = **High,** SCVMM 2012 will deploy Hyper-V guest VMs created with this hardware profile to a Hyper-V failover cluster only.

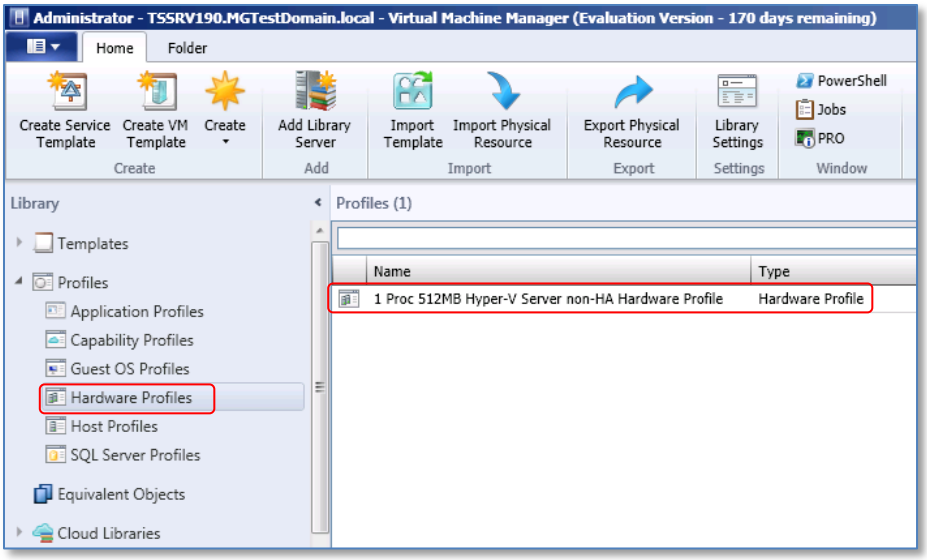

Figure 75: New hardware profile created successfully

5) Verify that the new hardware profile is displayed as shown in Figure 75 under **Profiles→Hardware profiles**.

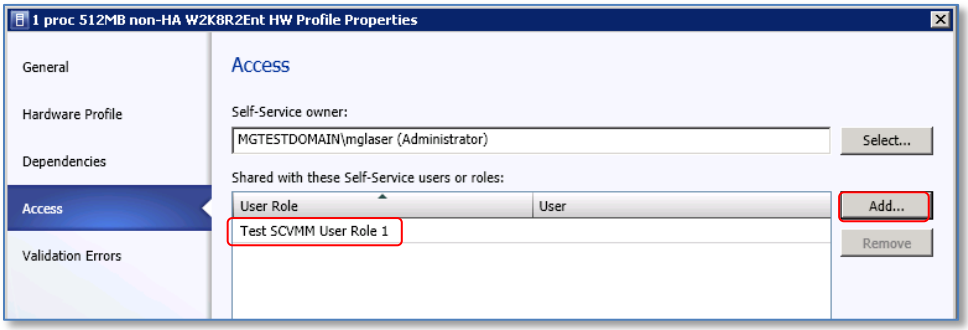

Figure 76: Share a hardware profile with a self-service user role

6) To assign this new hardware profile to a self-service role, right-click on the new hardware profile and select **Properties**. Under the **Access** tab, click on the **Add** button and select the desired users or roles. In the example shown in Figure 76, this hardware profile is shared with **Test SCVMM User Role 1** that was defined previously. Then click on **OK**.

Create a Guest Operating System Profile

Create a guest operating system profile to have SCVMM 2012 apply specific settings to the guest OS when new VMs are created.

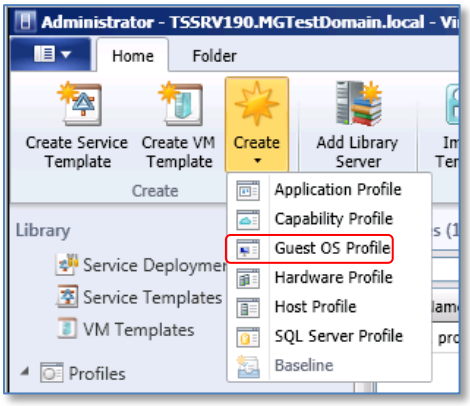

Figure 77: Create a guest OS profile

1) From the **Library** workspace in the SCVMM 2012 Manager console, click on **Create** under the **Home** tab, and choose **Guest OS Profiles** as shown in Figure 77.

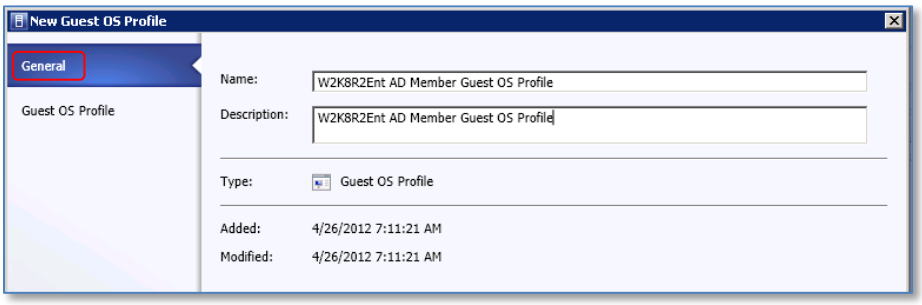

Figure 78: Provide a name and description for a new guest OS profile

2) Under the **General** screen of the **New Guest OS Profile** configuration wizard, provide an intuitive name and a description, similar to the example shown in Figure 78. Then click on **Guest OS Profile**.

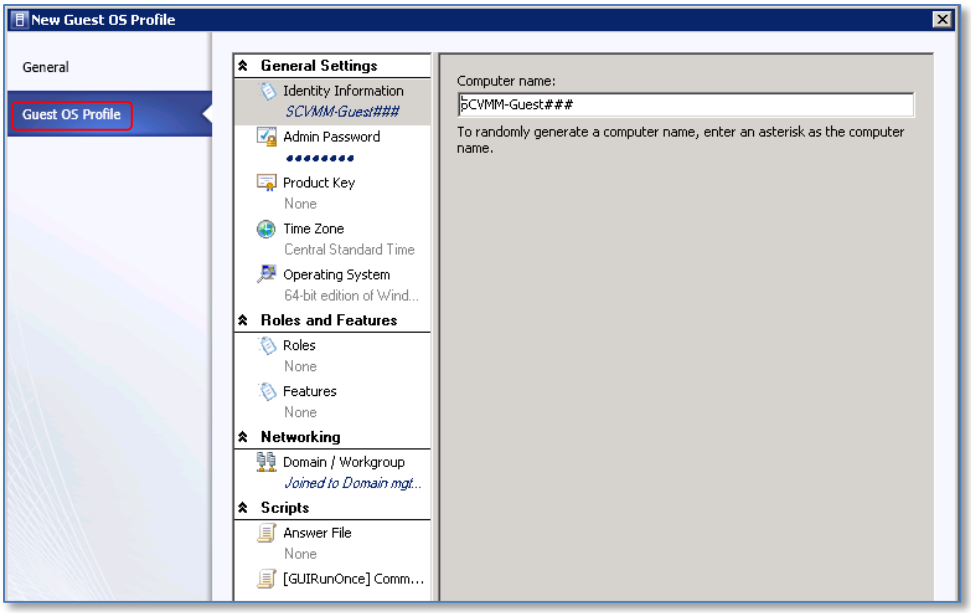

Figure 79: Provide settings and configuration details for a guest OS profile

3) Under the **Guest OS Profile** screen, adjust the options as desired under **General Settings**, **Roles and Features, Networking,** and **Scripts**. In this example, all the defaults will be used except as follows:

   - Under **Identity Information**, the computer name is changed from ***** (randomized) to **SCVMM-Guest###**. The **#** character acts as a wildcard for automatic guest VM numbering for new guest VMs. For example, the first Hyper-V Guest created with this OS profile would be assigned the name **SCVMM-Guest001**, the second guest would be assigned the name **SCVMM-Guest002** and so forth.
   - A local administrator password is set.
   - An installation key is specified.
   - Under **Networking**, a domain name and domain credentials are specified to join the new Hyper-V guest VMs created with this OS profile to a domain.

4) After setting the guest OS profile settings, click on **OK.**

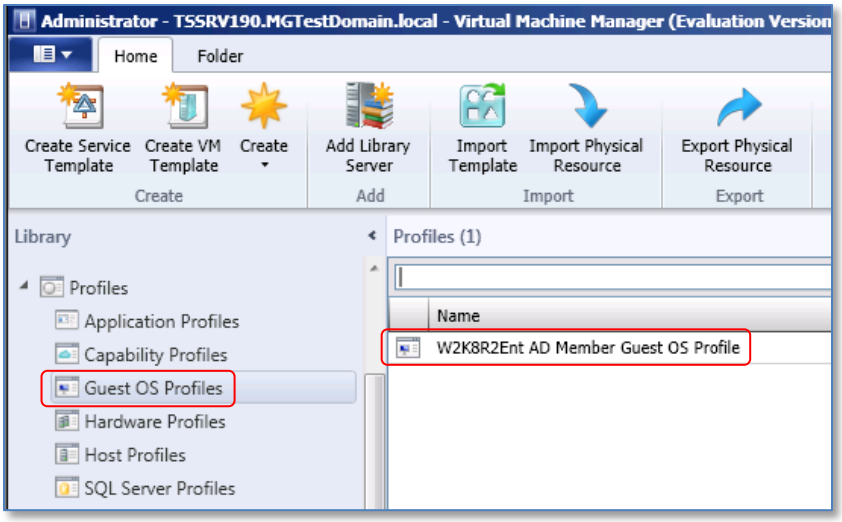

Figure 80: Verify creation of the Guest OS profile

5) Verify that the new Guest OS profile is displayed as shown in Figure 80.

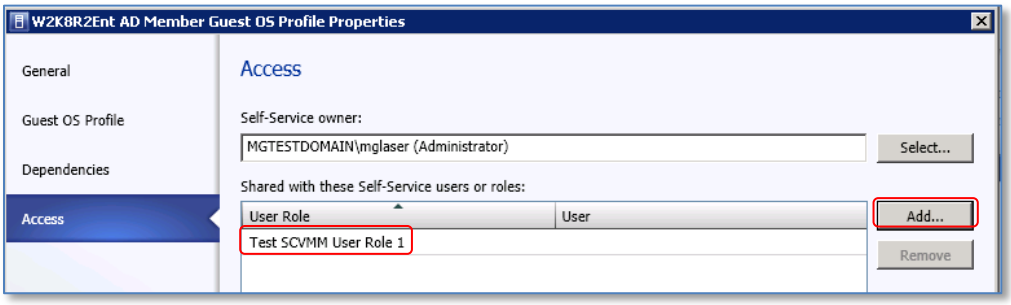

Figure 81: Share guest OS profile with a self-service user role

7) To assign this guest OS profile to a self-service role, right-click on the new guest OS profile, and select **Properties**.

8) Under the **Access** tab, click on the **Add** button and select the desired role. In the example shown in Figure 81, this guest OS profile is shared with the **Test SCVMM User Role 1** that was defined previously. Then click on **OK**.

Create a Hyper-V Guest VM Template

A guest VM template allows administrators and self-service users to quickly create new Hyper-V guest VMs according to predefined hardware and guest OS profile settings.

In this example, a new VM Template will be created that will use the following:

- The **W2K8R2Ent AD Member Guest OS Profile** (created previously above)
- The **1 proc 512MB non-HA W2K8R2Ent HW Profile** (created previously above)
- A sysprepped VHD on the library server will provide the base image for the new VMs created with this template

1. Using Windows Explorer, copy a sysprepped VHD to the **VHDs** folder on the library server. For steps to complete this, see **Copy Resources to a Library Server** starting on page 16. In this example the path is:

```
D:\ProgramData\Virtual Machine Manager Library Files\VHDs
```

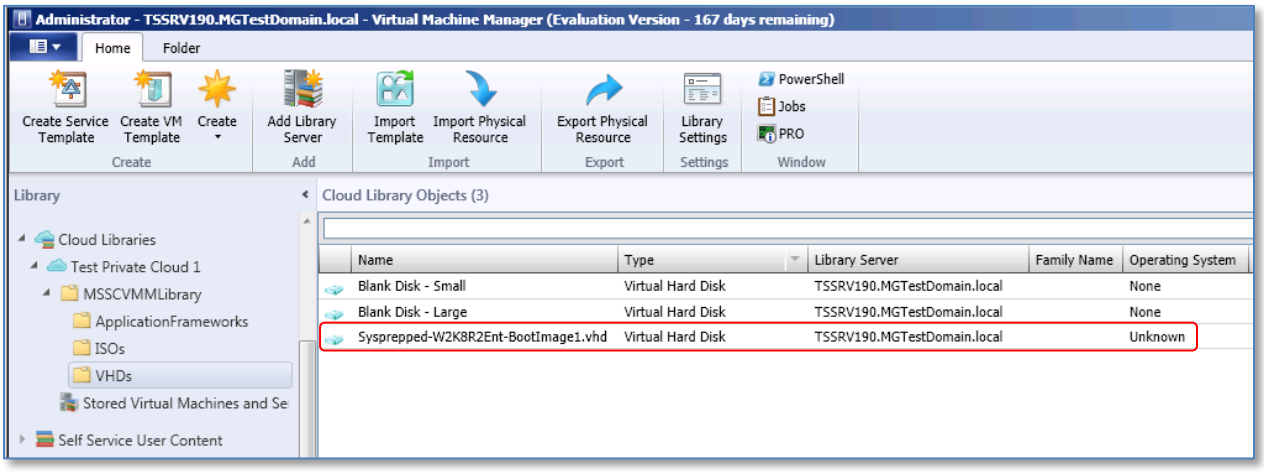

Figure 82: Sysprepped VHD added to the library server

2. Once the VHD has been copied to the library server using Windows Explorer, refresh the library server in SCVMM 2012 and verify that the new VHD shows up under the VHDs folder as shown in Figure 82.

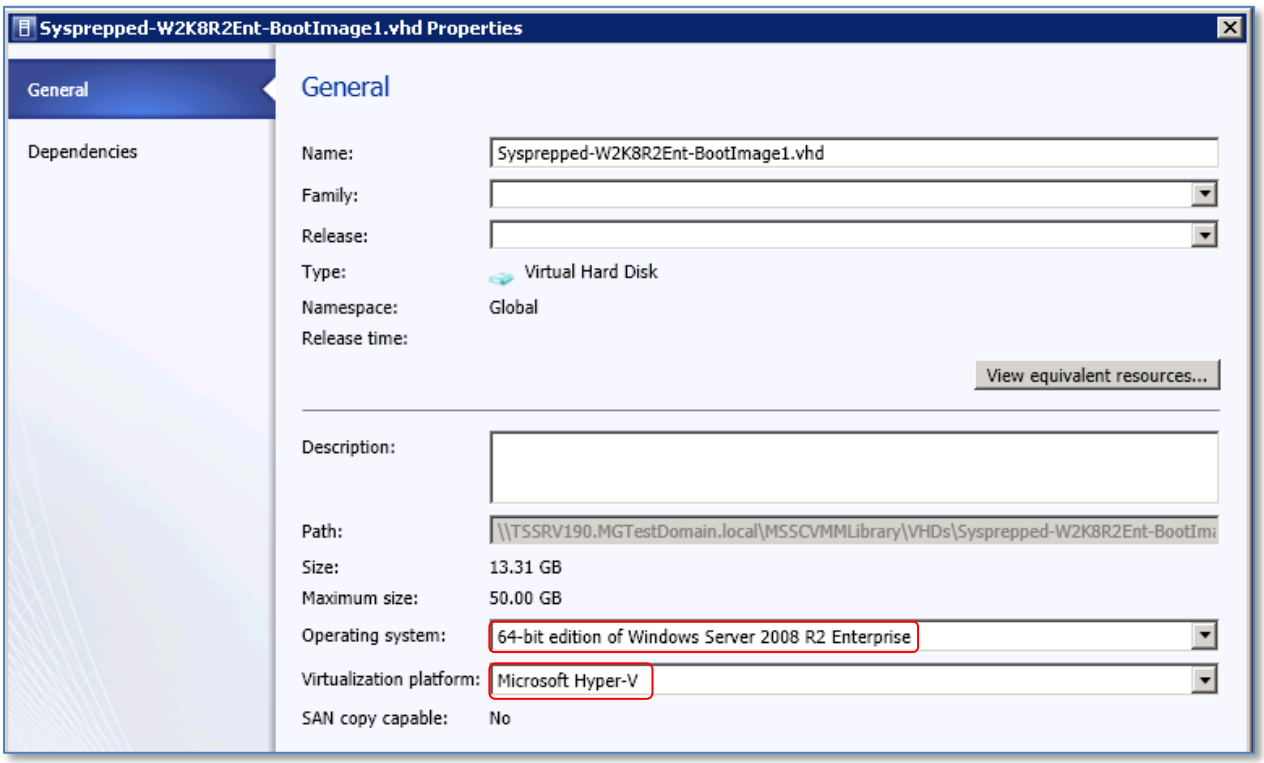

Figure 83: Define the operating system and virtualization platform for a VHD

3. Note that the **Operating System** column for this VHD in Figure 82 shows as **Unknown**. To associate an OS with this VHD, right click on the VHD object, select **Properties**, and under the **General** tab, set the operating system and the virtualization platforms as shown in Figure 83.

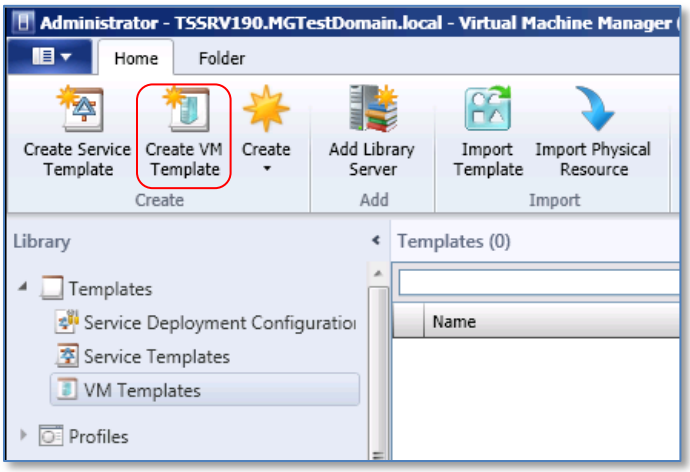

Figure 84: Launch the Create VM Template Wizard

4. In the **Library** workspace, click on **Create VM Template** on the ribbon bar under the **Home** tab as shown in Figure 84.

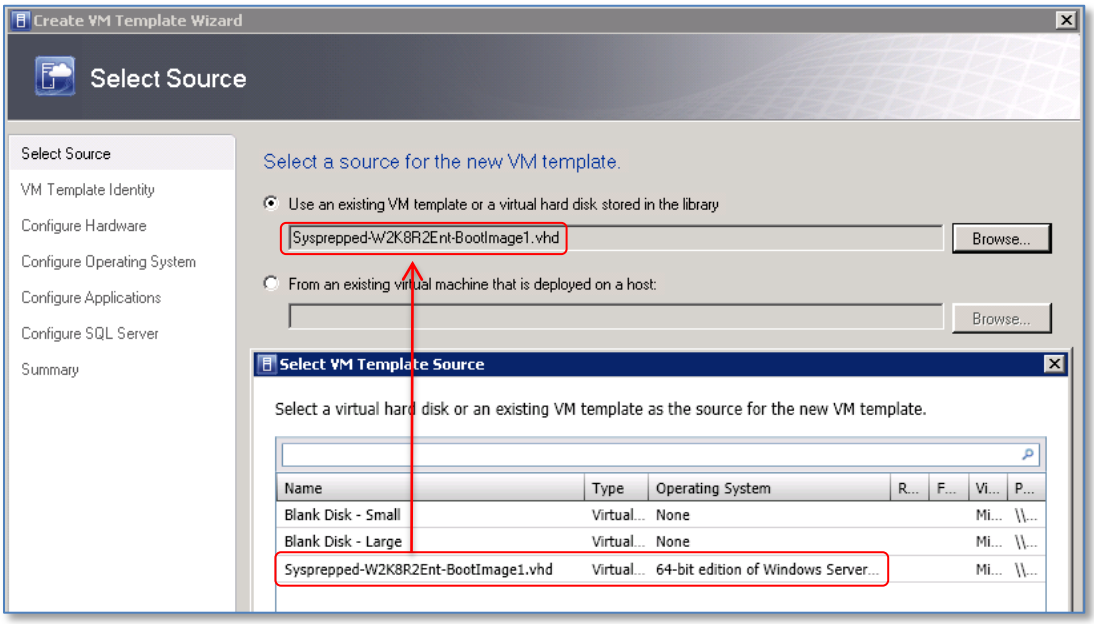

Figure 85: Select a source for the new VM template

5. Select **Use an Existing VM template or a virtual hard disk stored in the library**, click on the **Browse** button and choose the desired source. In this example the sysprepped VHD is selected that was just copied to the SCVMM library as shown in Figure 85. Then click on **Next**.

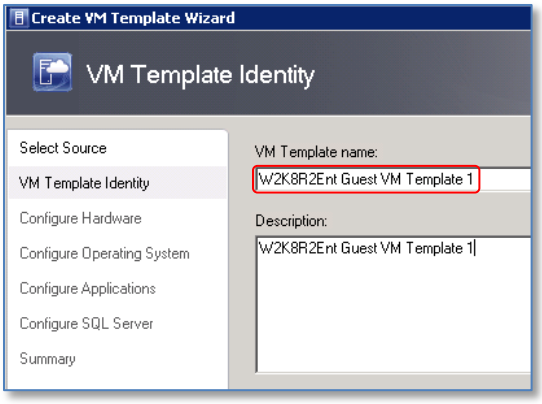

Figure 86: Provide a VM template name and description

6. For **VM Template Identify**, provide a descriptive name as shown in Figure 86. Then click on **Next**.

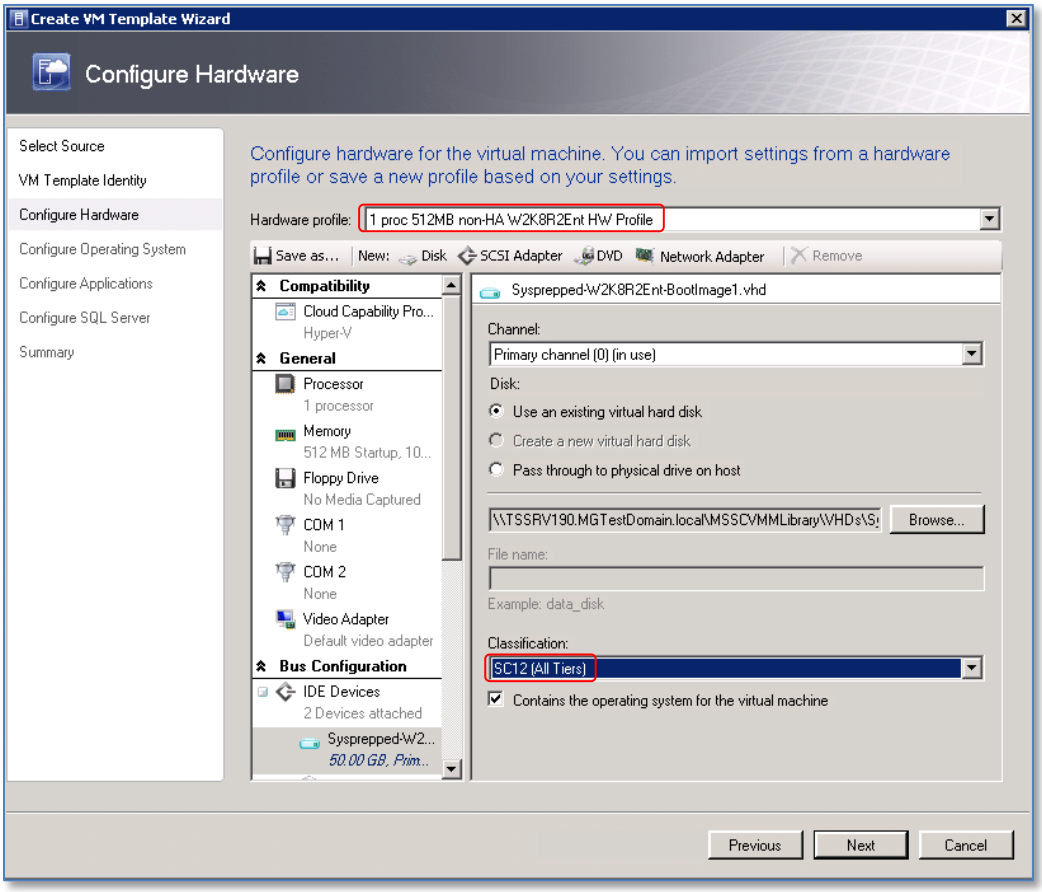

Figure 87: Configure hardware settings for a new template

7. Under **Configure Hardware**, choose the desired hardware profile from the drop-down list or change the default settings as desired. In this example, the existing hardware profile **1 proc 512 MB non-HA W2K8R2Ent HW Profile** is selected as shown in Figure 87. Choose the desired disk classification (in this example **SC12 (All Tiers).** Then click on **Next**.

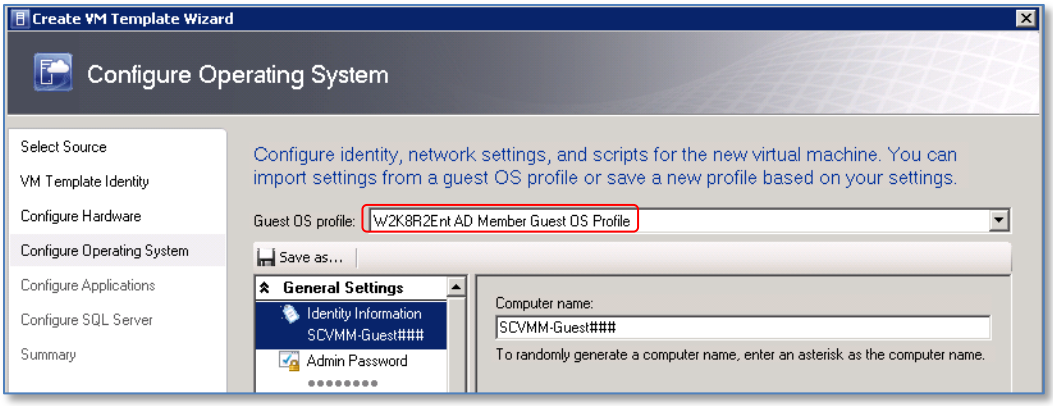

Figure 88: Configure operating systems settings for a new template

8. Under **Configure Operating System**, choose the desired operating System profile from the drop down list (or change the default settings) as shown in Figure 88. In this example, **W2K8R2Ent AD Member Guest OS Profile** is selected. Then click on **Next.**

9. On the **Configure Applications** and **Configure SQL Server** screens, define any desired settings and then click on **Next**. In this example, no settings are defined on these screens.

10. On the **Summary** screen, click on **Create** to finish the template wizard.

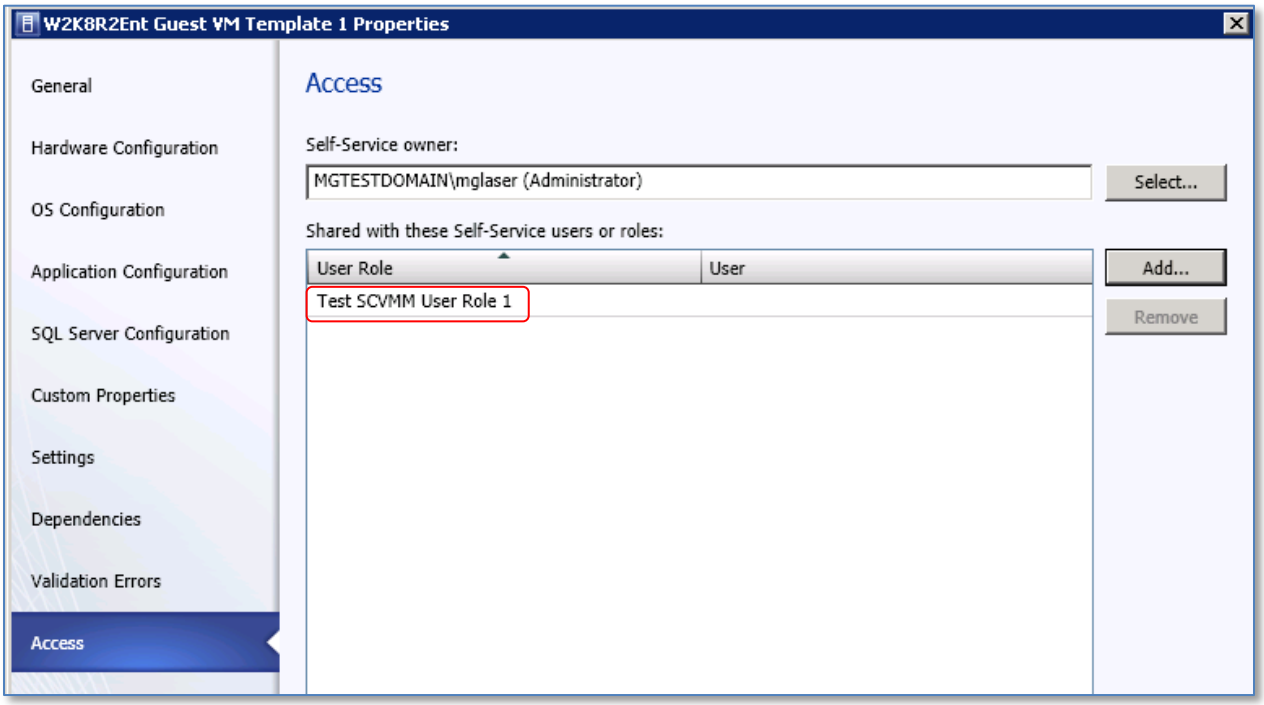

Figure 89: Grant a self-service user role access to a new VM template

11. Now that the new template has been created, assign it to a self-service user role if desired. Self-service user roles do not have access to new templates automatically. Access to new templates has to be explicitly granted. To do this, go to the **Library** work space and expand

Templates→VM Templates and in the **Templates** window, right click on the new template and select **Proprieties.** Under the **Access** tab, click on the **Add** button. In this example, the **Test SCVMM User Role 1** has been granted access to this template as shown in Figure 89.

Create Virtual Machine from a Template

Now that an SCVMM 2012 Hyper-V guest VM template has been created, it can be used by SCVMM administrators or assigned self-service role users to create guest VMs.

1) Launch the SCVMM Manager console and log in with an AD user that is a member of an SCVMM 2012 user role (or as an administrator). In this example, an administrator will provision a new guest to a private cloud using the template created above.

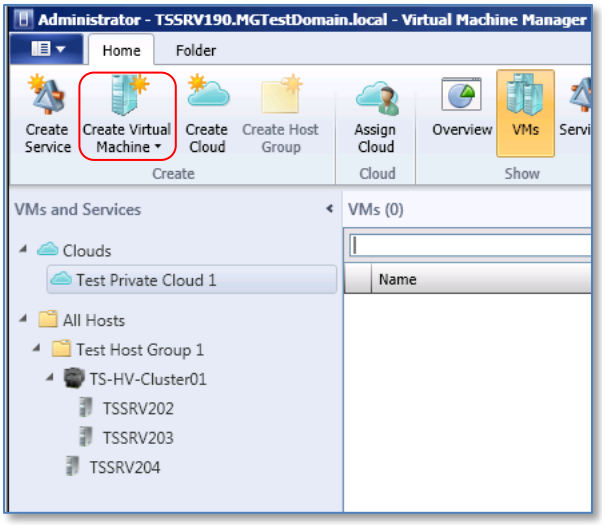

Figure 90: Launch the Create Virtual Machine Wizard

2) Under the **VMs and Services** workspace, expand **Clouds**, and click on the desired private cloud (**Test Private Cloud 1** in this example). Then click on **Create Virtual Machine** from the ribbon bar under the **Home** tab as shown in Figure 90.

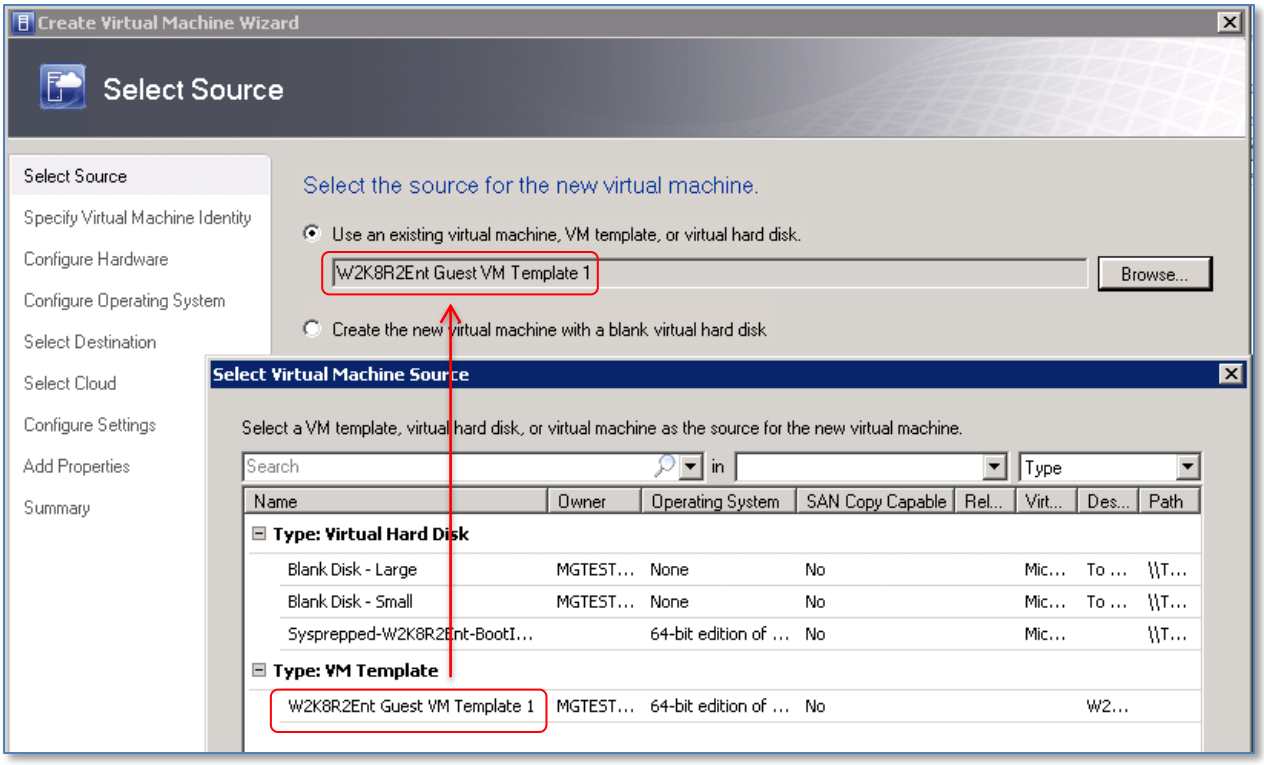

Figure 91: Select a virtual machine source

3) On the **Select Source** screen, click on the **Browse** button and choose the desired VM template. This example, **W2K8R2Ent Guest VM Template 1** is selected as shown in Figure 91. Then click on **Next**.

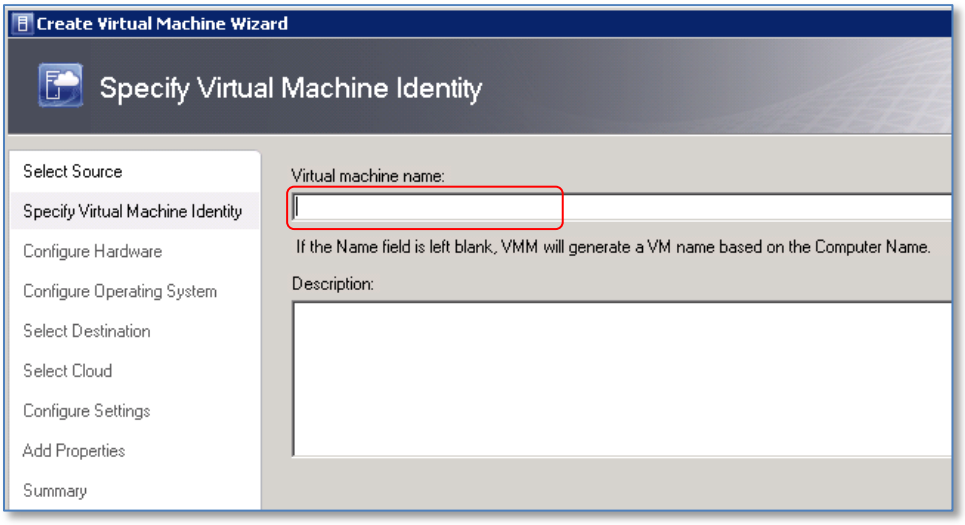

Figure 92: Provide a name for the virtual machine

4) On the **Specify Virtual Machine Identity** screen, choose a VM name. In this example, the field will be left blank and the name will be auto-generated based on the computer name

information in the OS profile that is associated with this template (in the format **SCVMM-Guest###**). Click on **Next**.

5) On the **Configure Hardware** and **Configure Operating System** screens, review the settings and change if desired. In this example, no changes will be made as the desired settings are already in place as defined by the hardware and OS profiles that were associated with this template when it was created. Click on **Next** on both screens.

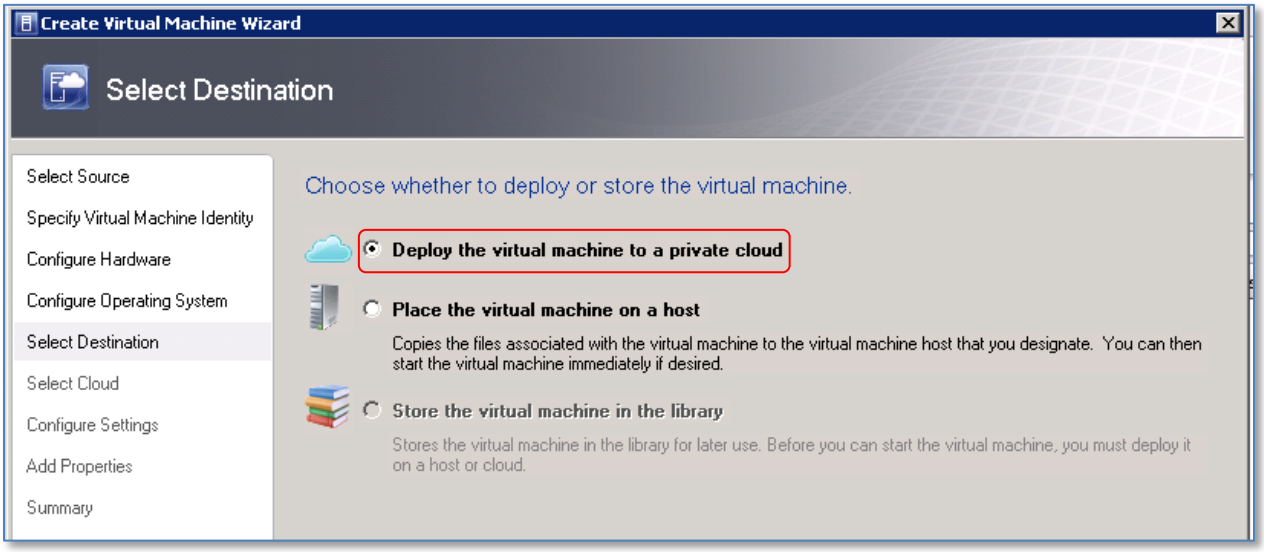

Figure 93: Select a destination for the virtual machine

6) Under **Select Destination**, choose where to deploy the new guest VM. In this example, **Deploy the virtual machine to a private cloud** is selected. Then click on **Next**.

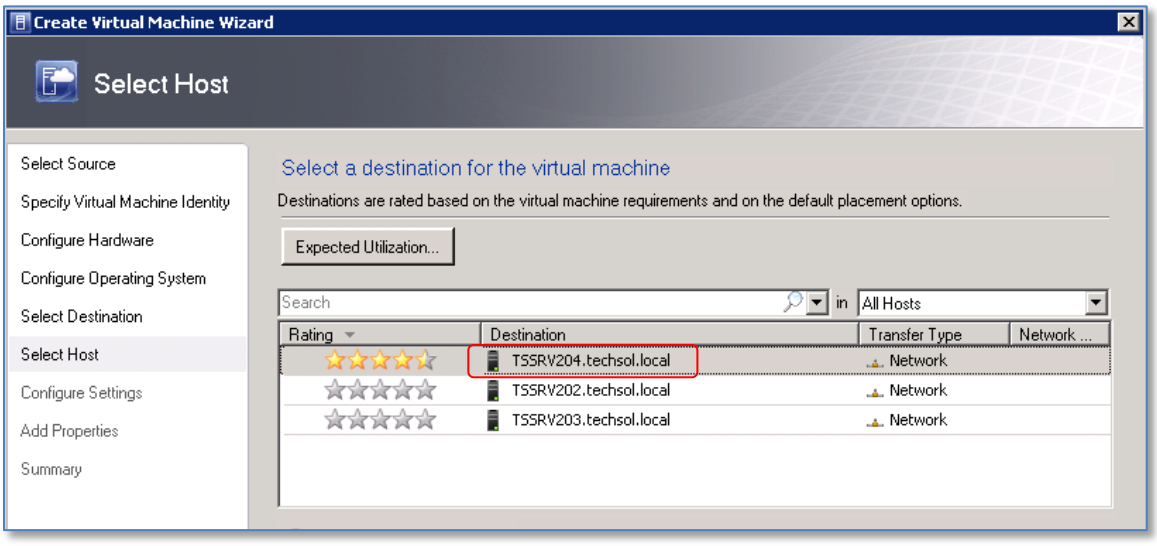

Figure 94: Choose a specific host or node for the new guest VM

7) On the **Select Host** (or Cloud) screen, choose the desired cloud or server as shown in figure 94. Self-service users see a list of clouds only. Administrator users can pick specific hosts or nodes in a cloud. In this example, since the template will create a new guest VM that is non-HA, the new Hyper-V guest will be installed on the standalone host TSSRV204. Click on **Next**.

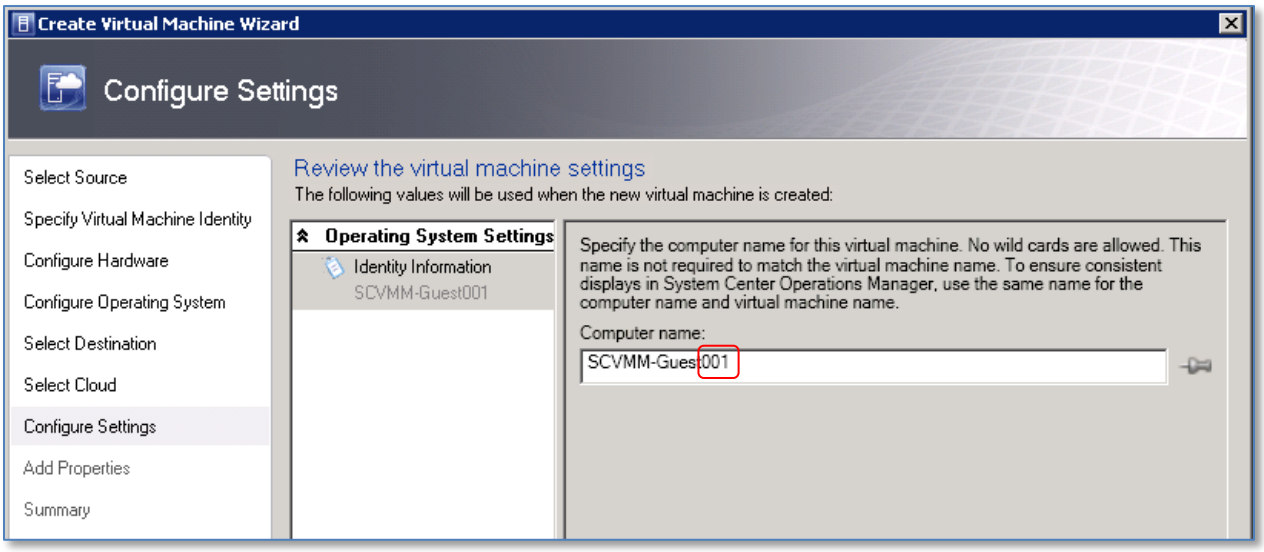

Figure 95: Specify a computer name for the new VM

8) On the **Configure Settings** screen, review the best practices instructions for keeping the computer name and the virtual machine name consistent for ease of management. Because the template includes an OS profile that auto-populates the computer name based on the format **SCVMM-Guest###**, the wizard will automatically fill in a computer name here starting with **SCVMM-Guest001**. This name can be changed if desired. Click on **Next**.


Note

While SCVMM 2012 should automatically insert the next number in line in place of any #'s for the **Computer name** in Figure 95, on occasion, this field may come up with the wild card characters still in place (e.g. "SCVMM-Guest**###**" instead of "SCVMM-Guest**001**"). If this occurs, simply return to the **Specify Virtual Machine Identity** screen (see Figure 92) which should now have an auto-generated name listed. Copy and paste that name into the **Computer Name** field, and then continue with the wizard.

9) On the **Add Properties** screen, review the automatic actions and make any desired changes. The default settings are used in this example. Then click on **Next**.

10) On the **Summary** screen, click on **Create**.

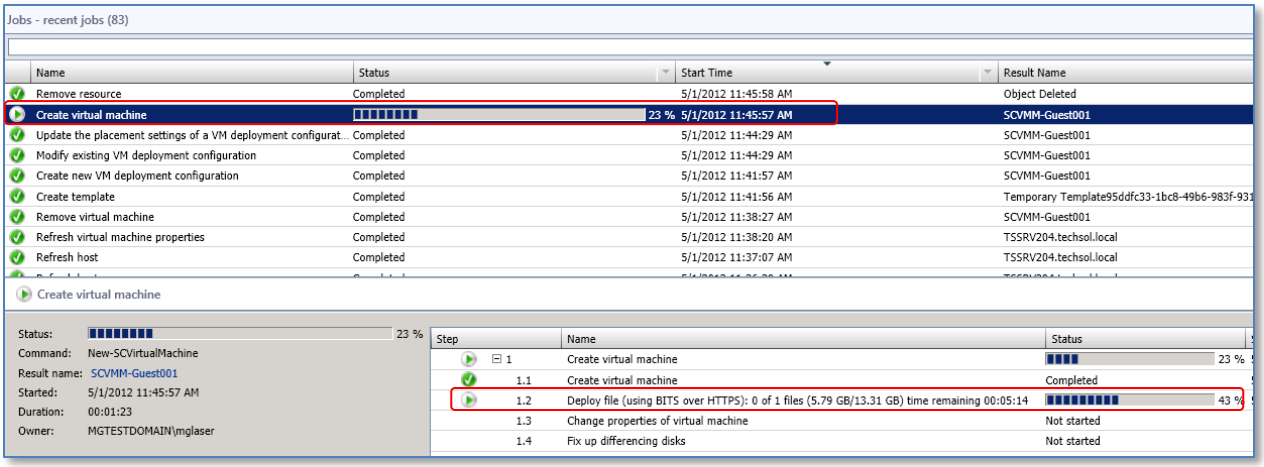

Figure 96: Monitor the create virtual machine job

11) In the **Jobs** workspace, the **Create virtual machine** job will launch and complete the various tasks associated with the creation of the new Hyper-V guest VM.

12) As shown in Figure 96, the VHD file has to be copied over the network from the library server to a destination volume on the target Hyper-V host server. This can require significant time if the VHD is large. It may also consume significant network bandwidth. And, redundant copies of the VHD consume extra space on the SAN. With rapid provisioning (as will be shown below) these three problems are eliminated.

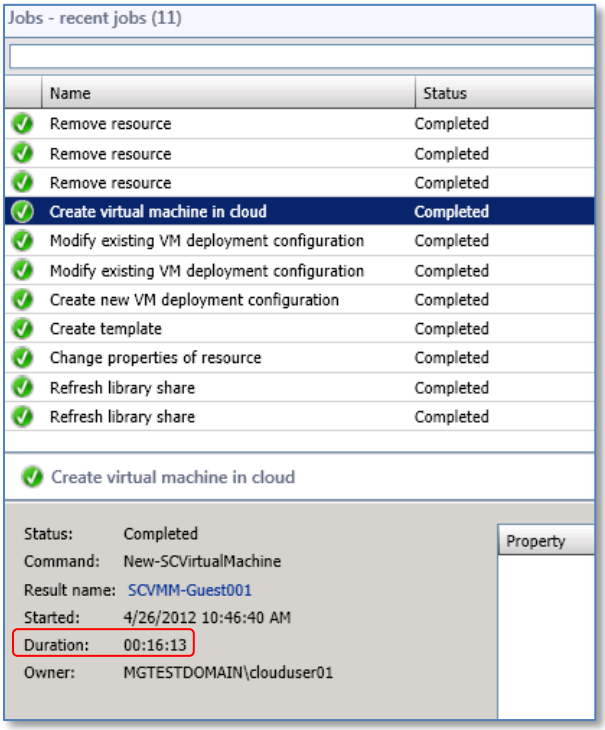

Figure 97: Job to create a virtual machine in the cloud completes successfully

13) As shown in Figure 97, the job has completed. In this example, it took just over 16 minutes for the guest to be created. This includes the time required to copy the VHD over the network from the library server to the host, and to boot the new guest and apply the template's settings to the hardware and the OS.

See the next section below under **Rapid Provisioning** to see how to avoid the network copy time by using Dell Compellent Replays (snapshots) to deploy new thinly-provisioned guests.

14) To summarize what the job accomplished:

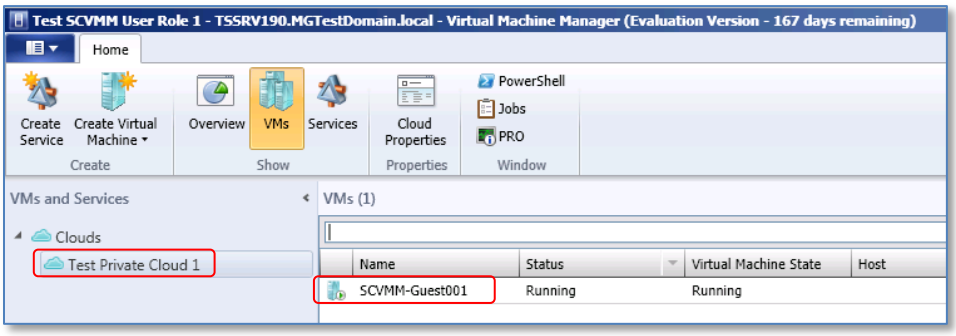

Figure 98: New guest VM in the private cloud

a) A new VM named **SCVMM-Guest001** was created in the **Test Private Cloud 1** cloud.

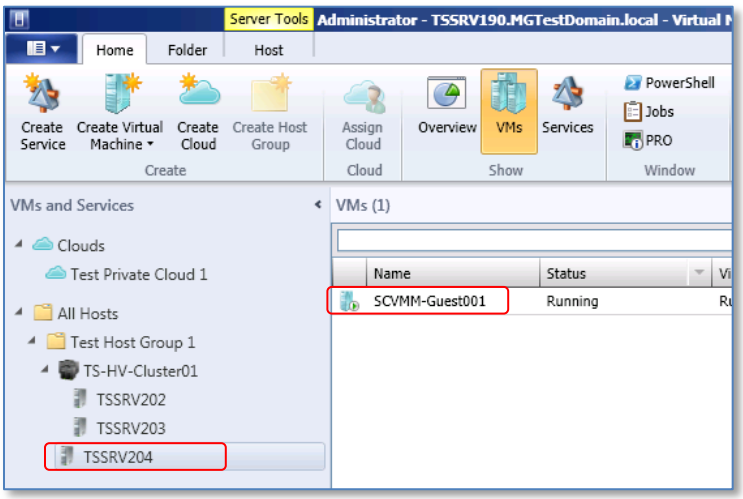

Figure 99: Guest VM placed on a Hyper-V host

b) As shown in Figure 99, the guest was placed on the standalone host TSSRV204. The wizard chose a standalone host in the private cloud because the template specified that this be a non-HA guest. If the template had specified that this guest VM be highly available (HA), it would have been placed on either TSSRV202 or TSSRV203 in the TS-HV-Cluster01 cluster.

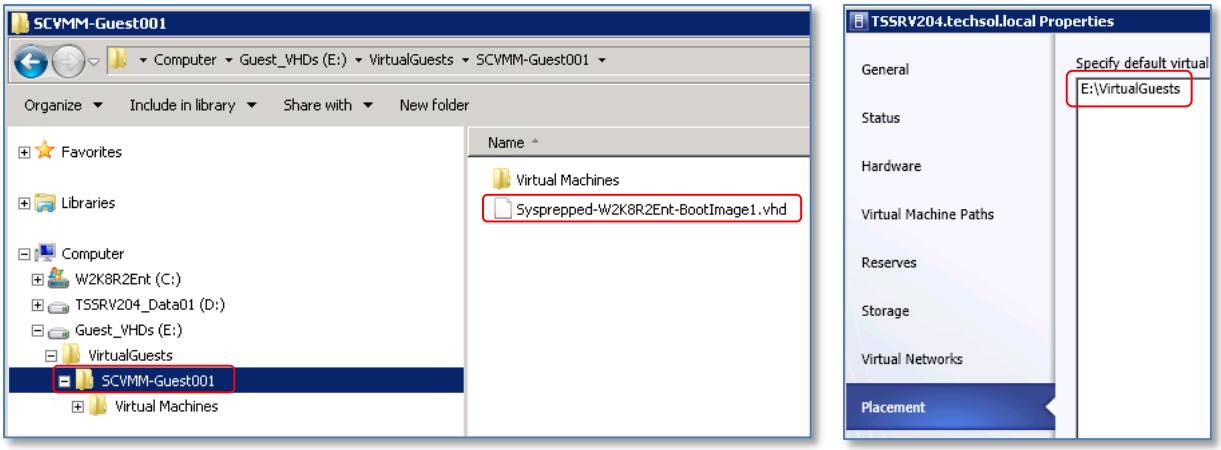

Figure 100: Placement of the guest VM's VHD and configuration files on the host

c) As shown in Figure 100, the new guest VM (its VHD and configuration files) was placed on the existing E:\ drive - a Dell Compellent SAN volume mapped to the host server TSSRV204. This VM location (E:\VirtualGuests) was specified when the Host TSSRV204 was added to SCVMM 2012 fabric as a managed Hyper-V host. See **Placement** under the properties for the host to verify or change this location.

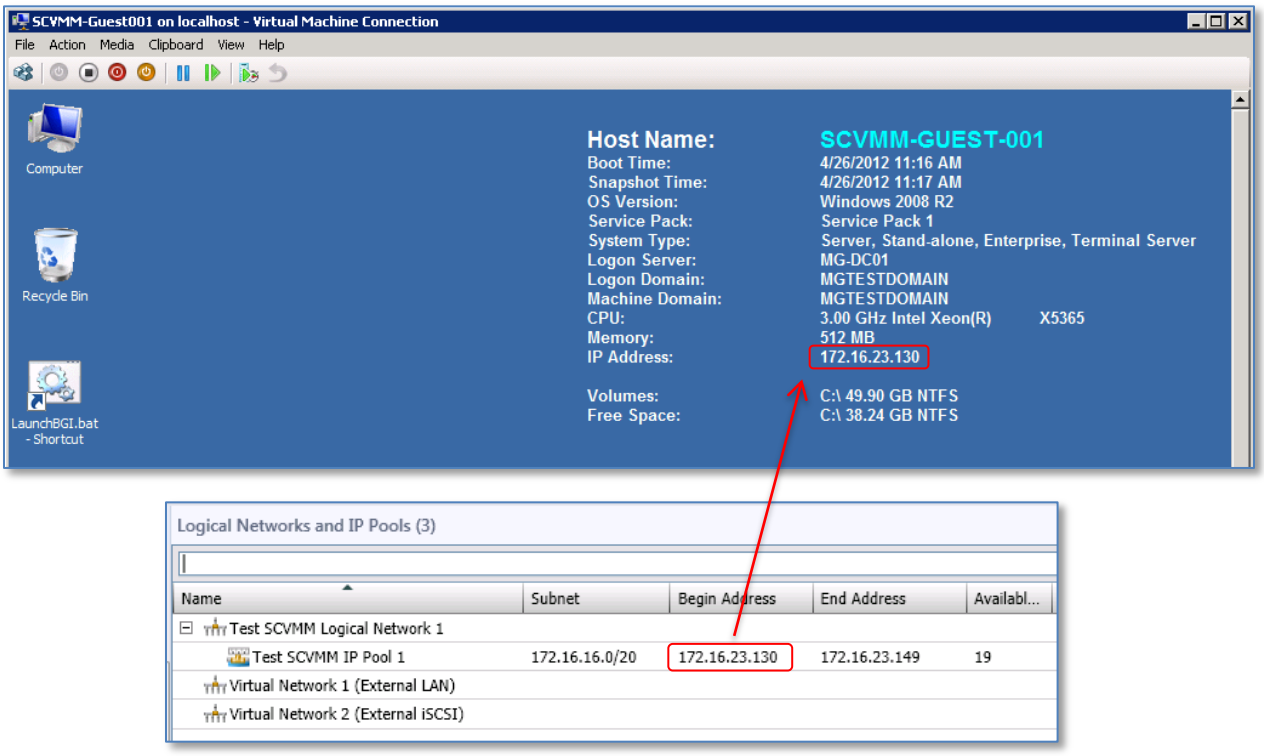

Figure 101: New guest VM server name, domain, CPU, RAM, and static IP settings

d) As shown in Figure 101, based on the settings in the hardware and OS profiles associated with this template:

- The VM computer name was set to **SCVMM-Guest-001**

- The VM was joined to the domain **MGTESTDOMAIN**
- The VM was allocated one processor with 512 MB of RAM
- The VM was assigned a static IP from the range specified previously in SCVMM 2012 under **Networking→Logical Networks** (see Figure 13 under **Configure Networking**)

Configure Rapid Provisioning with Dell Compellent

Overview

SCVMM 2012 rapid provisioning leverages Dell Compellent Storage Center Replays (snapshots) to quickly and efficiently deploy new guest VMs from a SAN copy-capable template.

Table 4. Rapid deployment (SAN copy-capable) compared to network copy

Type of VM Template	Provisioning Method	Pros	Cons	Observation
SAN Copy-capable Template	Rapid Provisioning: A new, thinly-provisioned read-write SAN volume is created from a gold image and mapped to the Hyper-V Host.	X		There is no impact on network bandwidth.
		X		New read-write SAN volumes from Storage Center Replays are created and mapped to the target Hyper-V host servers in just a few seconds.
		X		SAN volumes are thinly provisioned and consume no space initially. Only deltas are written to new blocks while unchanged blocks continue to be accessed from the gold image.
		X		New writes to new read-write volumes occur at RAID 10 on the highest tier disk for best performance.
		X		Reads of unchanged (frozen) data on the gold image can take advantage of the performance and cost savings of RAID 5 on lower tier disk.
		X		Many new guest VMs (up to 100) can be created from the same gold image further realizing SAN space usage efficiency.
Network Template	A complete copy of a source VHD (on a library server) is copied over the network to a Hyper-V host.		X	Requires significant network bandwidth which may force VM provisioning to take place outside of peak network usage times.
			X	Large VHDs may require a significant amount of time to copy over the network causing delays for administrators or self-service users as they wait for VMs to deploy.
			X	Duplicate data – full copies of source VHDs are copied every time a new guest VM is created – this redundant data consumes additional SAN space unnecessarily.

As shown in a previous section of this document, a network-copy template was created which was then used to deploy a new Hyper-V guest VM to a private cloud. Creating a SAN copy-capable template for rapid provisioning is similar but requires a few additional steps, which will be detailed below.

Prerequisites for Rapid Provisioning

Before configuring a SAN copy-capable template, a number of prerequisites must be in place first. Assuming the reader has been following this guide, most of these prerequisite were put in place in the preceding sections. These include:

- At least one Dell Compellent Storage Center is available to SCVMM 2012 (via SMI-S configuration) with classification(s) assigned.

- Dell Compellent storage pool(s) must be allocated to the host group where guest VMs will be rapid provisioned.
- All Hyper-V hosts (and the library server) must have access to Dell Compellent storage pools via the same connectivity method (fiber channel or iSCSI). A configuration where some physical servers access the SAN via fiber channel and other physical servers access the SAN via iSCSI is not supported.
- All physical hosts that will be used for rapid provisioned guest VMs must be allocated to the host group.
- If a SAN copy-capable template is to be created from a new guest VM, the physical host for that new VM must be a member of the host group.
- If a SAN copy-capable template is to be created from an existing virtual machine, then the library server must be on a physical Hyper-V host server that is a member of the host group.
- MPIO must be enabled for each physical server in the host group.
- All physical hosts in a host group (and the library server) must be zoned so that they can see all the Dell Compellent storage pools allocated to that host group.

Choose a Method for Creating a SAN Copy-capable Template

There are two methods for creating a SAN copy-capable template.

- Create a SAN copy-copy capable template from a new guest VM that is built using a blank VHD, patched, customized, and then imported into the library server.
- Create a SAN copy-capable template from an existing VM.

In the example below, a SAN copy-capable template will be created from a new guest VM.

Add the Library Server as a Physical Hyper-V Host.

To ensure that either option above can be used for creating and managing SAN copy-capable templates, it is best practices to have the library server be on a physical Hyper-V host server that can be allocated to a SCVMM 2012 host group. In this example, the library server was originally installed on the physical server TSSRV190 (with the Hyper-V role installed).

1) Add the additional physical Hyper-V server with the library server role (TSSRV190 in this example) to the host group. For more information on how to add a physical host to a host group, see **Add Physical Hyper-V Hosts to SCVMM 2012** on page 33).

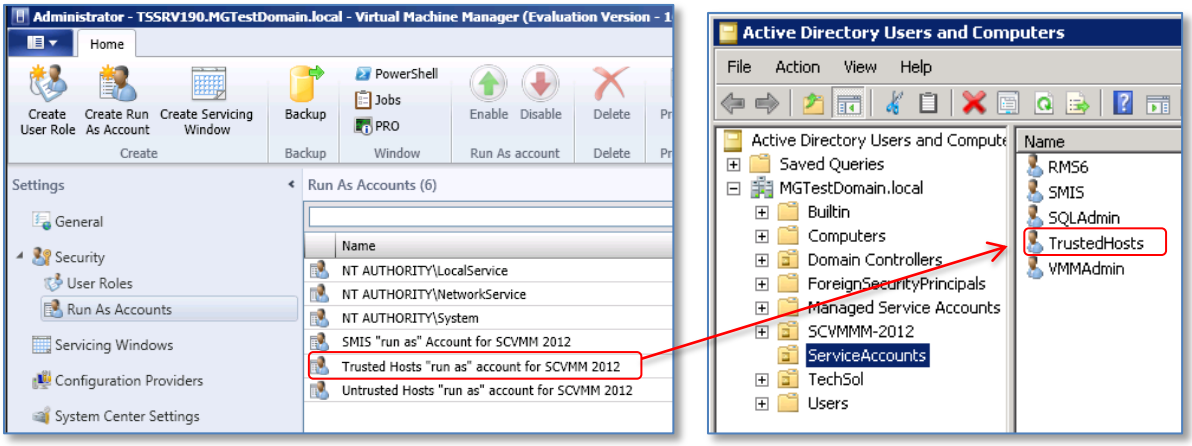

Figure 102: Create an additional "run as" account for trusted hosts

2) In this example, since the host TSSRV190 is on a trusted domain, an additional SCVMM 2012 "run-as" account was created that is associated with a matching AD service account user on the trusted AD domain controller. When adding the host, this run as account provided the necessary credentials.

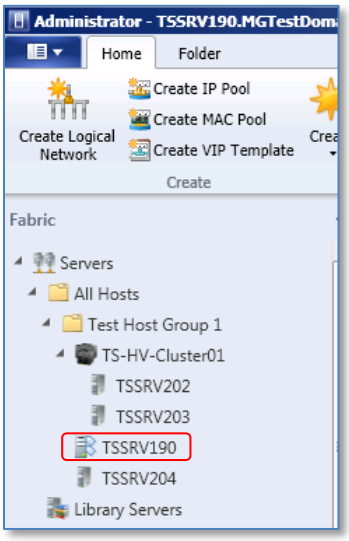

Figure 103: Verify the presence of the new host server in the host group

3) Once the server has been added to the SCVMM 2012 host group, it will show in the list with the other servers, as shown in Figure 103.

4) Right click on the new server (TSSRV190 in this example) and go to **Properties→Hardware →Network Adapters** and check the box to include **Test SCVMM Logical Network 1** for the network adapter **Virtual Network 1 (External LAN)**. This will ensure that the network settings for this server match the other hosts in the Hosts group.

5) Under the **Placement** screen, specify a placement path for guest VMs. In this example, the path **D:\VirtualMachines** was set as the path on TSSRV190.

Create a Logical Unit and Assign It to a Hyper-V Host.

The first step with creating a SAN copy-capable template from a new VM is to create a new logical unit for the gold image VHD and map the logical unit to a Hyper-V host.

In this example, the standalone host server TSSRV204 will be used to stage the new guest VM that will be imported into the library server as a gold image.

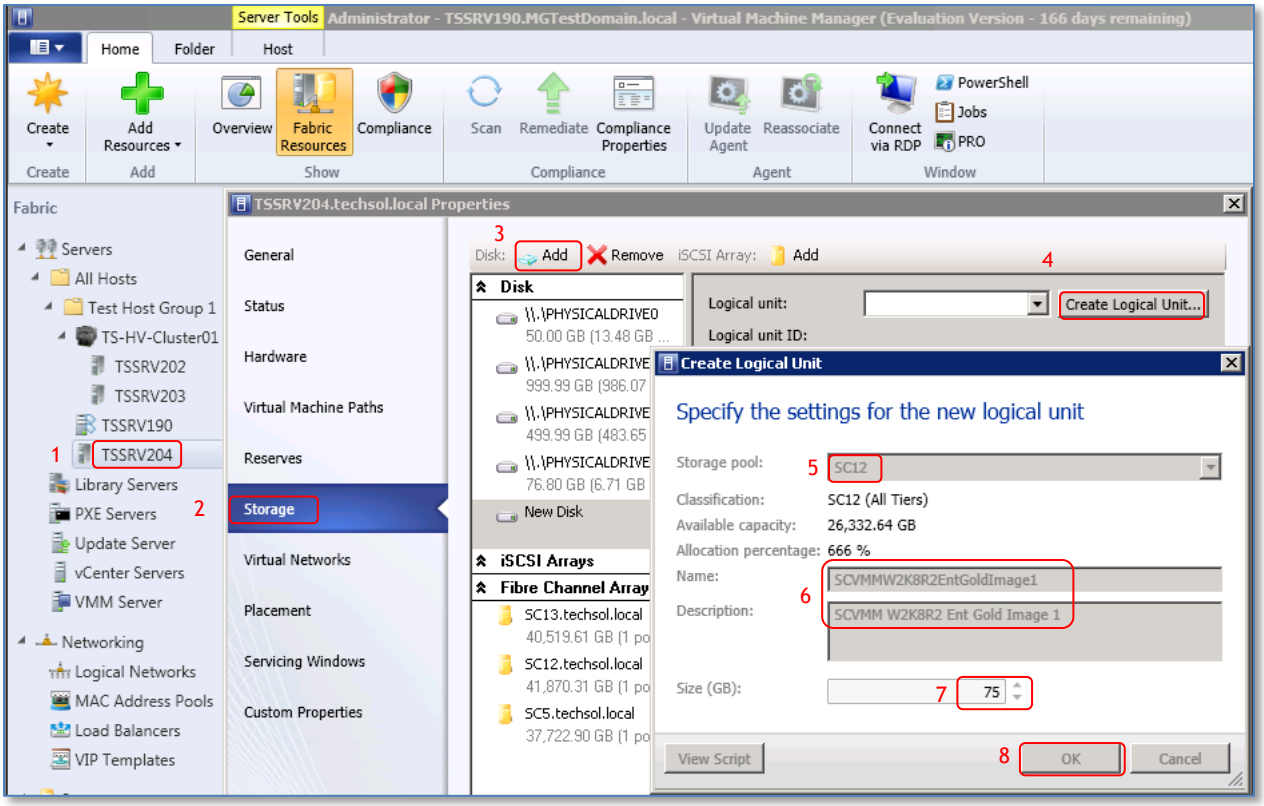

Figure 104: Add a new logical unit to a host server

1) In the **Fabric** workspace, under the desired host group, right click on the desired host server (TSSRV204 in this example) and go to **Properties→Storage**. Click on the **Add** button (for a fiber channel disk in this example), click on the **Create Logical Unit** button, select the desired storage pool from the drop down list (SC 12 in this example), provide a **Name** and **Description**, set a size in GB, and then click on **OK** as shown in Figure 104.

Note

Set a size for this boot volume that is unlikely to run out of space for any of the rapidly provisioned guests that will be created from the gold image VHD. Setting a slightly larger size for a boot volume (to avoid having to deal with expanding boot volumes that have filed up later on) will not consume more SAN space because Dell Compellent volumes are thinly provisioned. Only the actual data written to disk actually consumes SAN space even with fixed size VHDs.

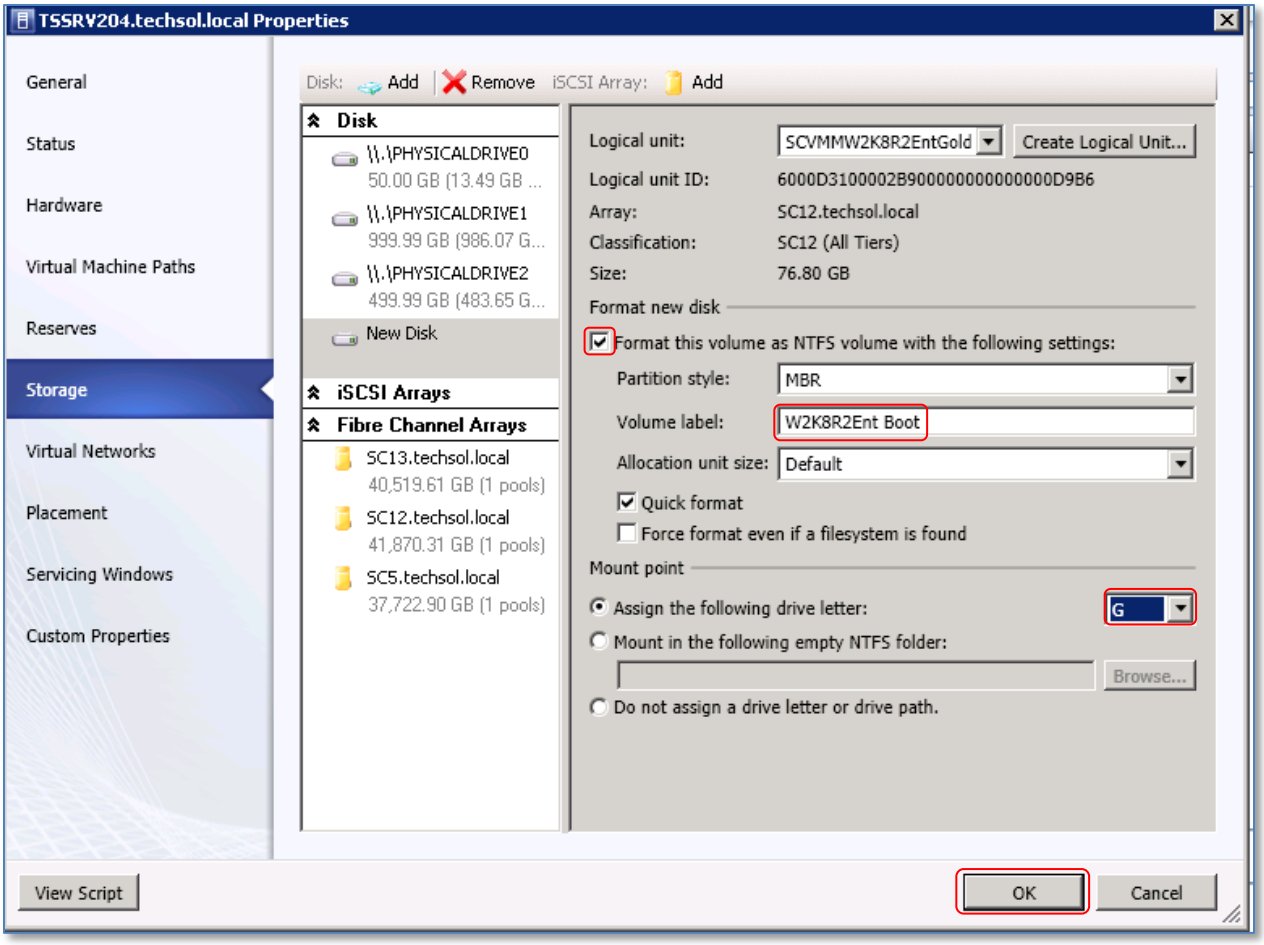

Figure 105: Specify new logical unit details and assign a drive letter

2) After a few seconds, the **Properties** screen fields will populate with the new logical unit information. The volume must be formatted as an NTFS volume, and a drive letter must be assigned. In the example shown in figure 105, the volume label is set to something more descriptive, and the drive letter was set to G. Then click on **OK**.

3) In the **Jobs** workspace, monitor the **Change Properties of virtual machine host** job until it completes. This job will create the logical unit, map it to the Hyper-V host, format the volume, and assign it the drive letter G.

Create SAN Copy-capable VHD File on the Gold Image Logical Unit

Now that the logical unit is in place that will be the volume for the gold image VHD, a Hyper-V guest VM can be provisioned, patched, and imported to the library server as a template for rapid provisioning.

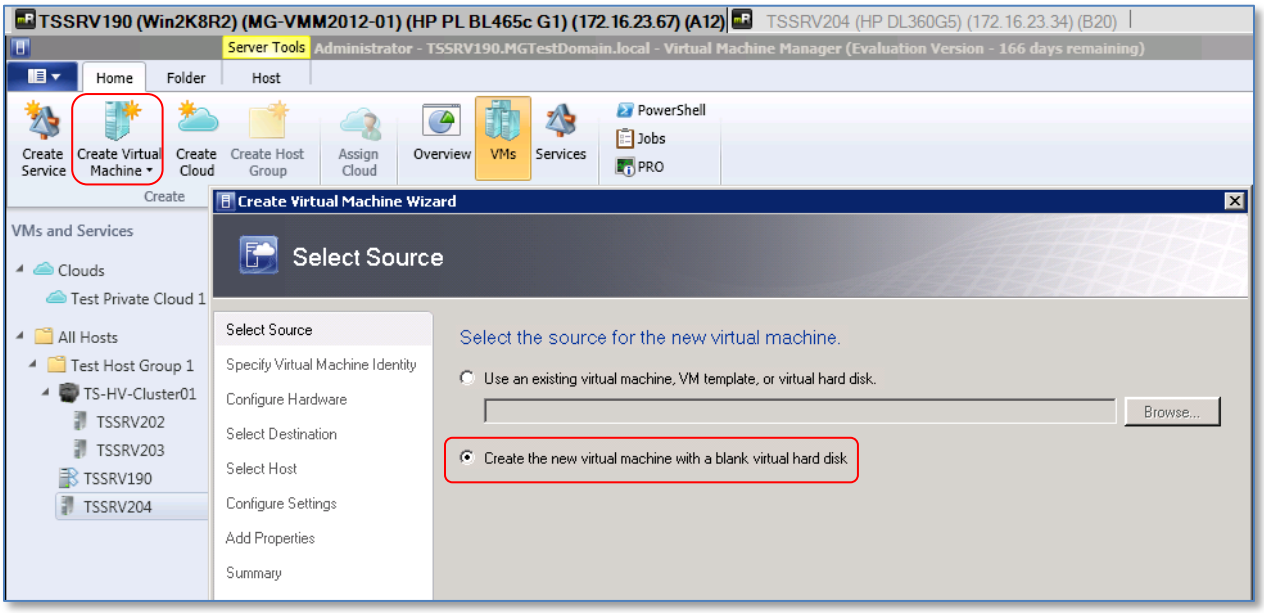

Figure 106: Launch the Create Virtual Machine Wizard

1) From the **VMs and Services** work space, click on **Create Virtual Machine** on the ribbon bar under **Home** to launch the **Create Virtual Machine Wizard**. On the **Select Source** screen, chose **Create the new virtual machine with a blank virtual hard disk**, and then click on **Next**. As shown in Figure 106.

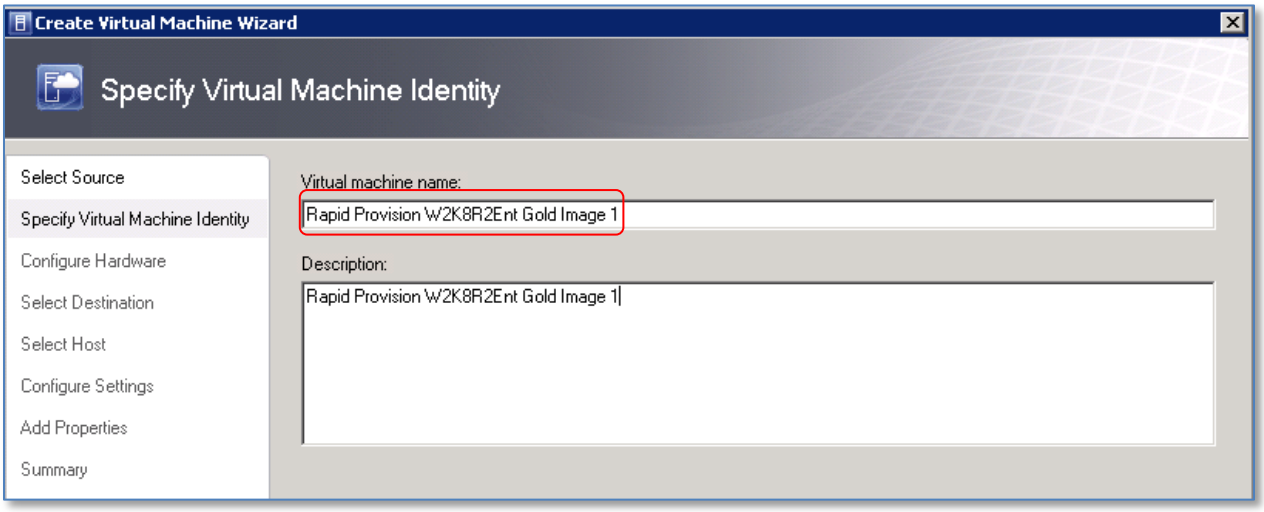

Figure 107: Provide a name and description for the new gold image guest VM

2) As shown in Figure 107, on the **Specify Virtual Machine Identity** screen, provide a descriptive name for the new VM and click on **Next**.

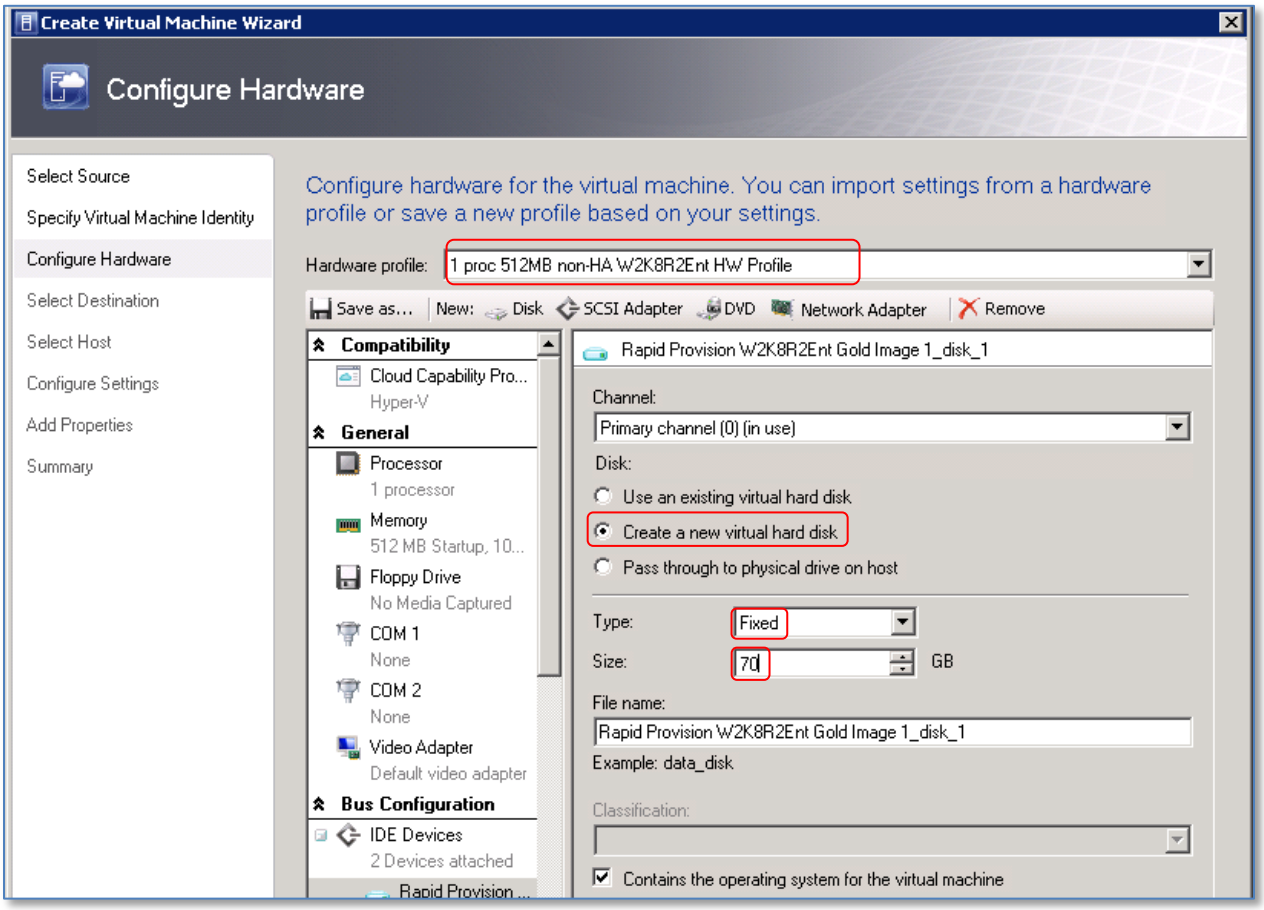

Figure 108: Configure hardware settings for the gold image VM guest

3) On the **Configure Hardware** screen, choose an existing hardware profile from the drop down or specify the desired hardware settings. In this example, the existing hardware profile, created earlier in this document, was selected.
   a. Because the logical unit that this VHD will be created on was set to 75 GB, the size of the VHD can be increased also from the default of 40 GB. Allow a little extra space on the volume for overhead. In this example the VHD was set to 70 GB.
   b. Because fixed VHDs are thinly provisioned on Dell Compellent Storage Centers, the recommendation is to create VHDs as fixed to ensure maximum performance.

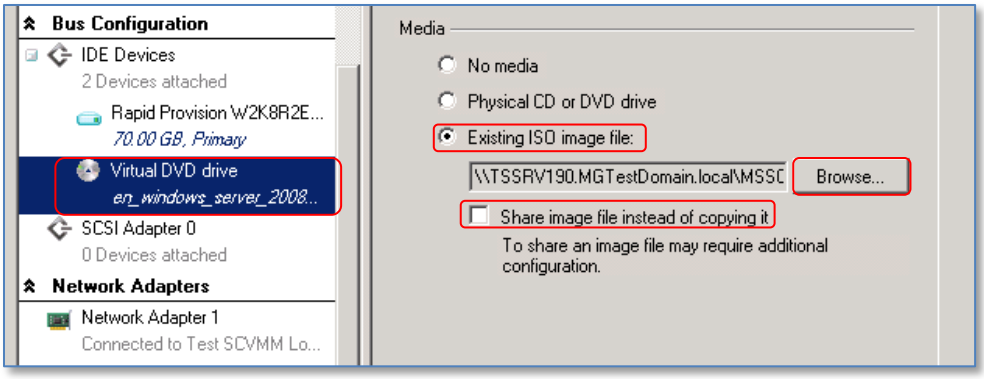

Figure 109: Attach an ISO file to the new guest VM for staging the OS

c. Under **Bus Configuration**, in this example, since the new guest VM will be staged using an ISO file that was previously copied to the library server, an ISO image is connected to the **Virtual DVD drive** as shown in Figure 109. An ISO file does not need to be attached at this point. This can be done later on if desired.

d. The checkbox for **Share image file instead of copying it** can be checked to prevent the ISO from being copied to the destination drive on the host over the network. If checked, the install from the ISO will occur over the network from the library server's share location. In this example, the box is left unchecked so the ISO file will be copied to the host server so the staging process from the ISO will occur quicker by being disk-based on the host server instead of over the network. However, the destination volume on the host must have space for the ISO file if this box is left unchecked. The mapping to this ISO file will be removed after the new guest VM is built and before it is converted to a SAN copy-capable template. The ISO file will also be deleted from the target drive on the host before it is converted to a SAN copy-capable template.

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

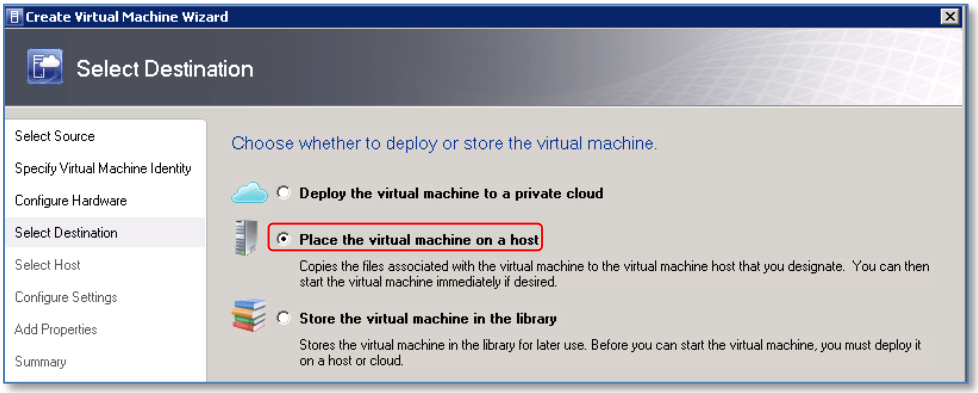

Figure 110: Select placement of the new virtual machine on a host

4) On the **Select Destination** screen, choose **Place the virtual machine on a host** and click on **Next**.

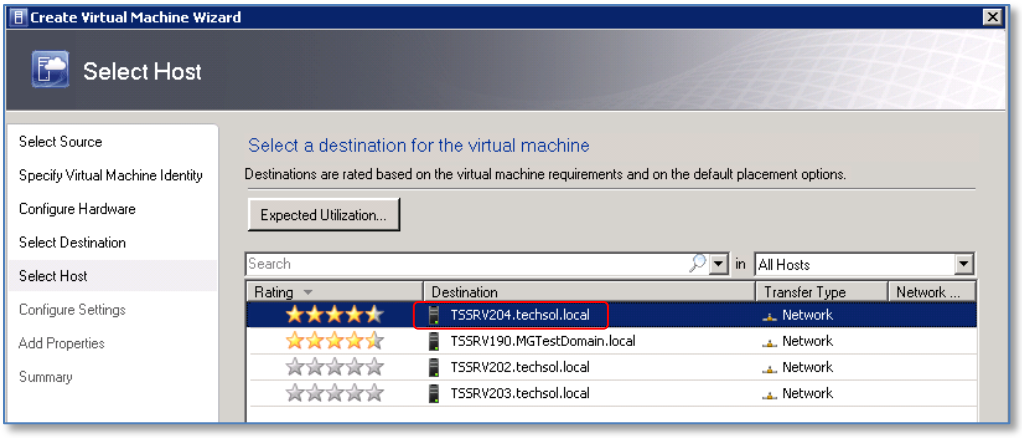

Figure 111: Select a host server for the new guest VM

5) The wizard will display a list of available hosts on the **Select a Host** screen. Choose the host server from the list that has the new logical unit for rapid provisioning as created in the previous section. In this example, the logical unit was assigned to TSSRV204 as the G drive so that server is chosen in Figure 111. Click on **Next**.

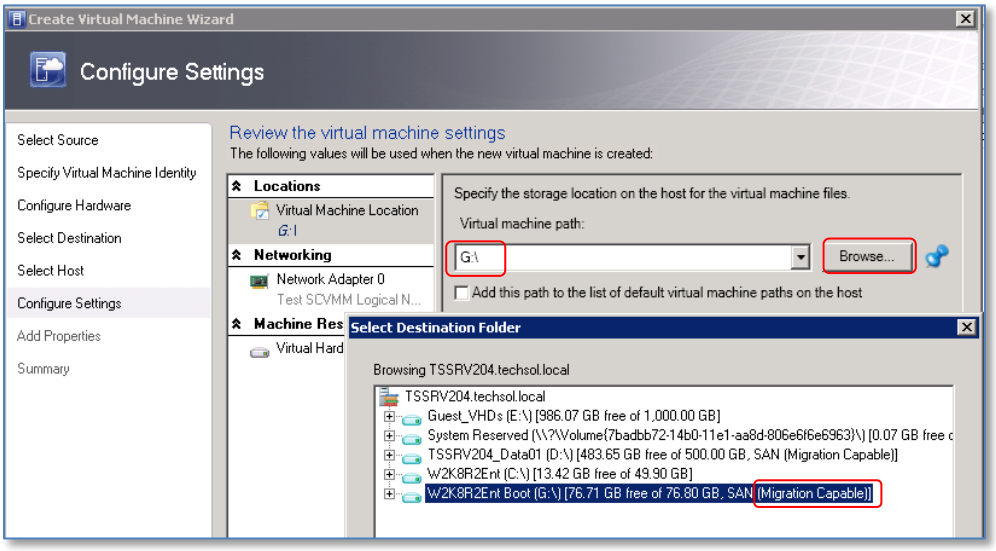

Figure 112: Select the host drive letter for the new guest VM

6) On the **Configure Settings** screen, set the following parameters:
   a. Under **Locations**, click on the **Browse** button and choose the destination drive. Make sure to set the path to the root of this drive. The wizard must indicate that the drive is **Migration Capable** (as shown for the G drive in this example in Figure 112) in order for rapid provisioning to work correctly.

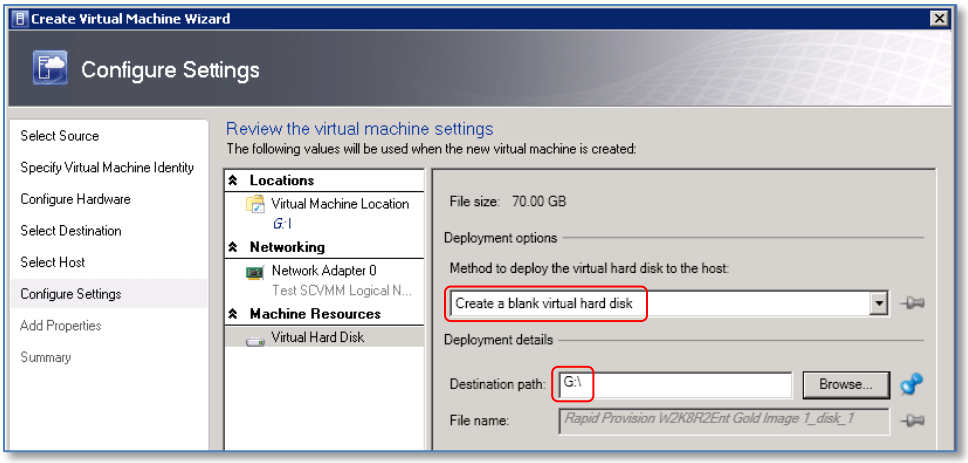

Figure 113: Verify machine resources settings for the new VM guest

b. Under **Machine Resources**, ensure that the option **Create a blank virtual hard disk** is selected, and that the **Destination path** is set to the root of the drive (the G drive in this example). Then click on **Next**.

7) If not previously defined as part of choosing the hardware profile, on the **Select Networks** screen, select the desired network options for this new guest VM. In this example, since a hardware profile was chosen above in step 3 that defines the network settings, the **Select Networks** screen is not presented at this stage of the wizard. Click on **Next**.

8) On the **Add Properties** screen, configure as desired, and then click on **Next**. In this example the default settings are used.

9) On the **Summary** screen, review the settings and then click on the **Create** button to launch the **Create virtual Machine** job. Monitor the progress from the **Jobs** workspace until it completes.

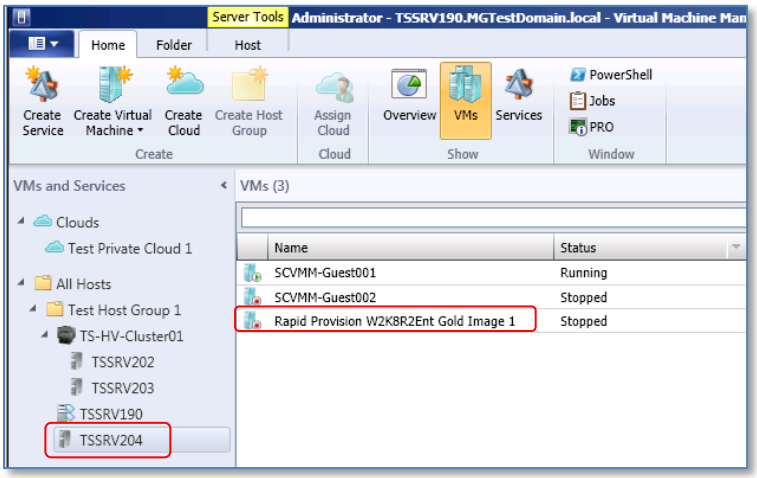

Figure 114: New VM guest successfully created

10) 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 TSSRV204 as shown in Figure 114.

11) Boot the new guest and install the OS, install any desired features, roles or applications, customize any settings, and patch to desired levels.

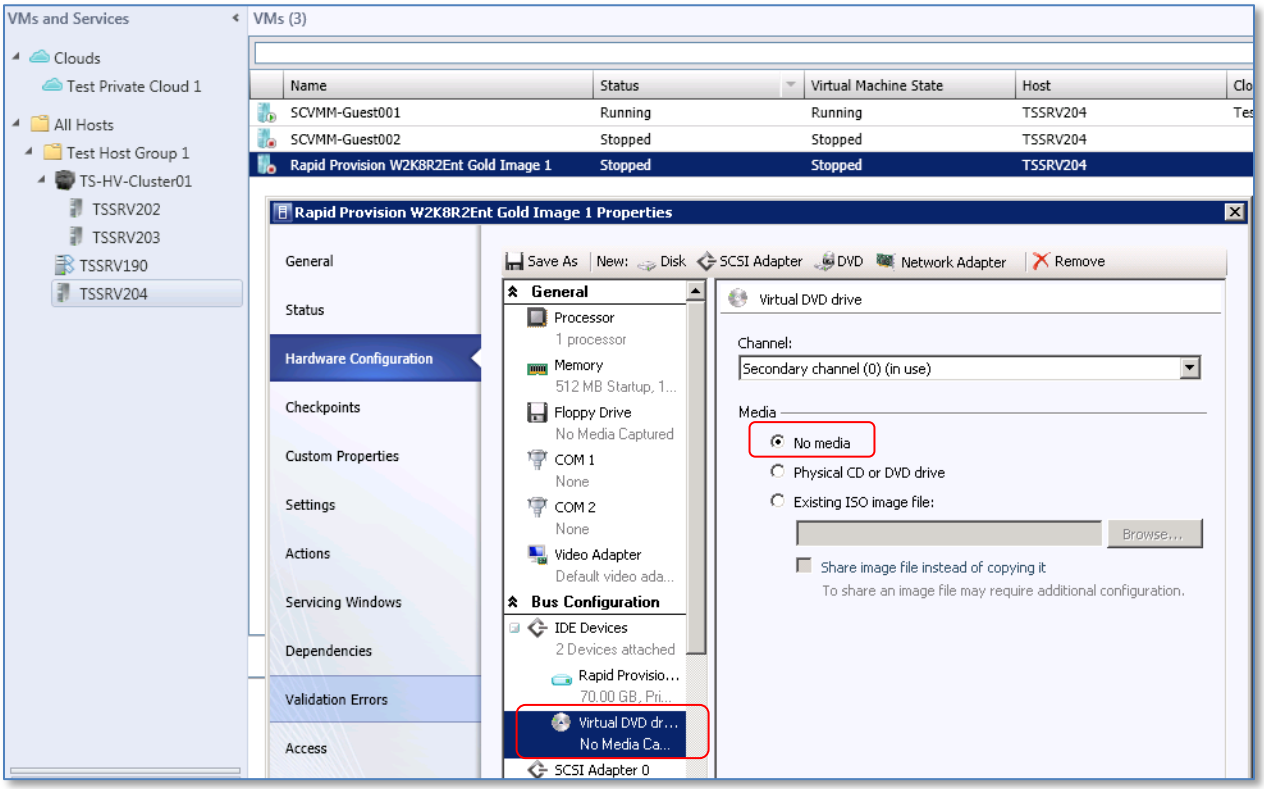

Figure 115: Remove the mapping to the ISO file used to stage the VM guest's OS

12) After the new guest has been fully provisioned, complete the following steps:
    a. Power down the guest VM (do NOT sysprep the guest before powering it down).

Caution

Do not sysprep the new rapid provision guest VM. It will be sysprepped automatically when new guests are deployed from it. If it is sysprepped beforehand, attempting to rapid provision new guest VMs from it will fail.

    b. Under the **VMs and Services** workspace, right click on the new guest (the rapid provision guest VM on the host TSSRV204 in this example), select **Properties**, and on the **Hardware Configuration** screen, remove the ISO image attached previously (see steps 4 and 5 above). If the ISO was copied to the physical host's local drive as part of the provisioning process, when removing the ISO here, SCVMM 2012 will automatically purge the ISO file from the target drive on the host to recover the space.

Caution

If the ISO is not removed before creating the rapid provision template, then this ISO file will become part of the template, and the ISO will be copied over the LAN for every new guest deployed from it.

Create a Clone of a Rapid-provision Guest VM

Because the process of creating a SAN copy-capable template from a new guest VM destroys the guest when the guest is imported to the library server, it is best practices to make a copy of the guest first. Otherwise the guest has to be restaged from scratch if changes need to be made to the gold image.

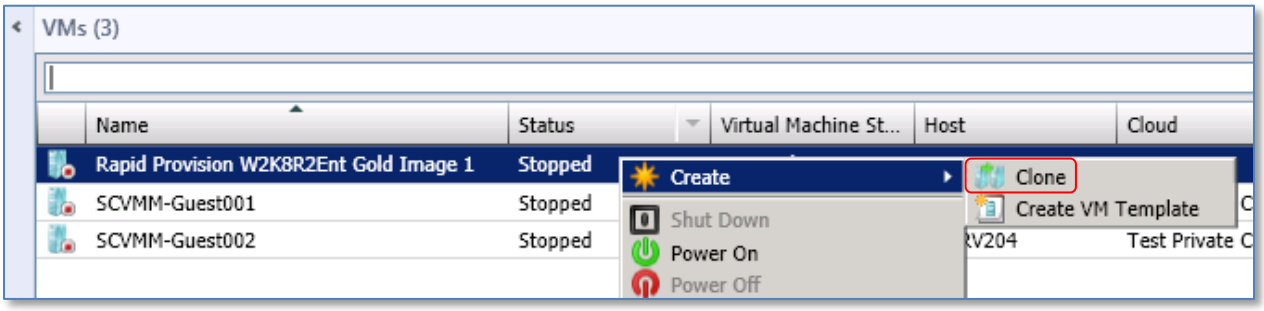

Figure 116: Create a guest VM clone

1) Shut down the rapid provision guest VM. Then under the **VMs and Services** workspace, navigate to the host server (TSSRV204 in this example) that is hosting the new rapid provision guest VM.

2) Right click on the new rapid provision guest VM, select **Create→Clone** as shown in figure 116.

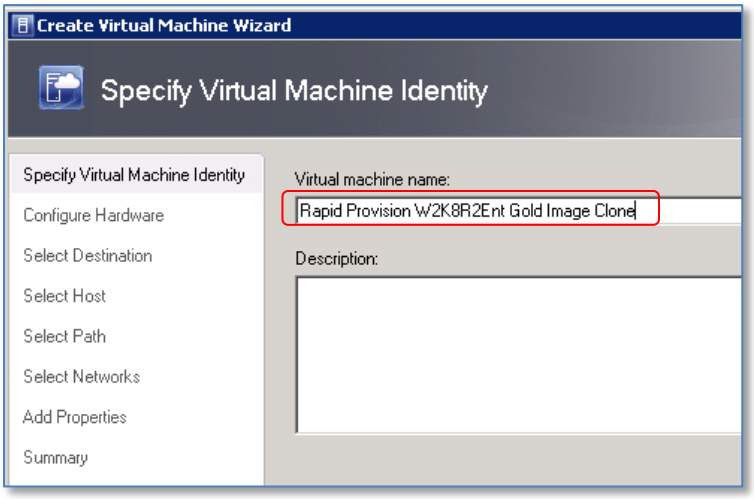

Figure 117: Provide a name for the cloned guest VM

3) On the **Specify Virtual Machine Identity** screen, provide a descriptive name for this clone as shown in the example in Figure 117. Then click on **Next**.

4) On the **Hardware** screen, click on **Next** (don't make any changes).

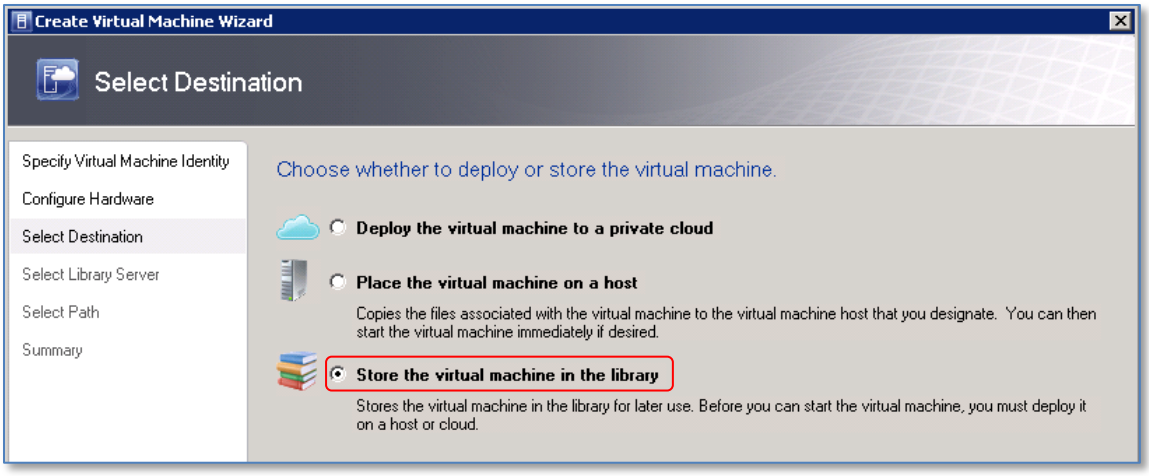

Figure 118: Select storage location for the cloned rapid provision guest VM

5) On the **Select Destination** screen, choose the **Store the virtual machine in the library** option and then click on **Next.**

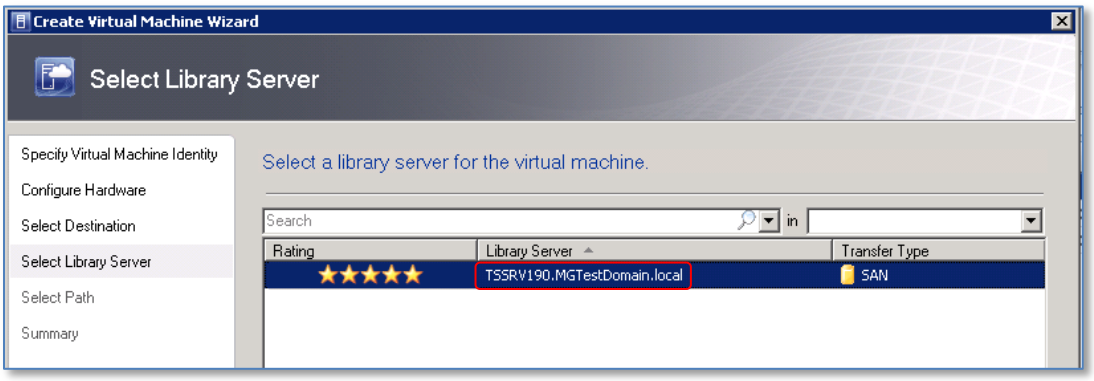

Figure 119: Select the library server to store the cloned rapid provision guest VM on

6) On the **Select a Library Server** screen, click on the desired library server (TSSRV190 in this example as shown in Figure 119), and then click on **Next.**

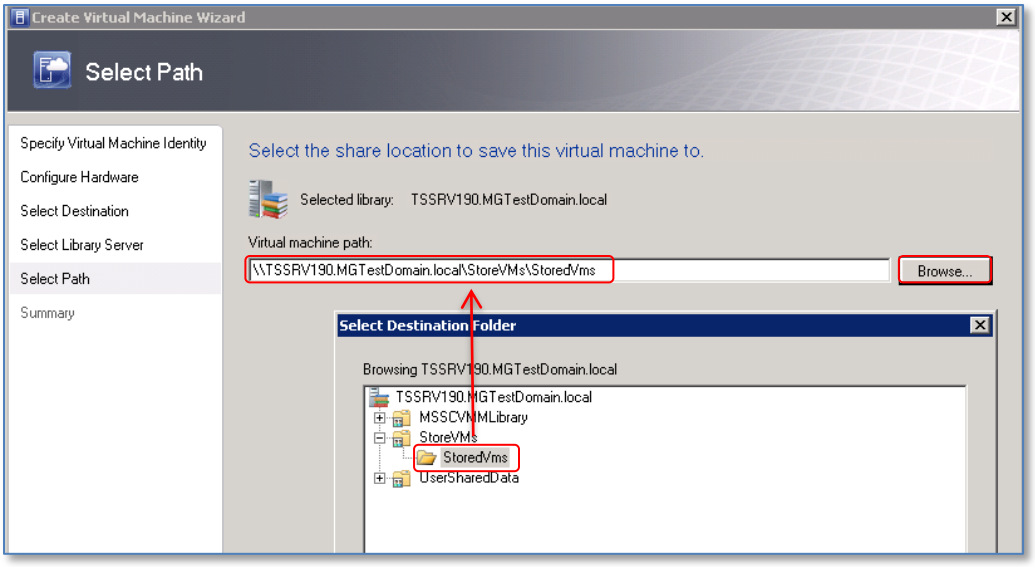

Figure 120: Select a path for the cloned rapid provision guest VM on the library server

7) On the **Select a Path** screen, click on the **Browse** button and select a share location on the library server for the cloned rapid provision guest VM as shown in Figure 120.

Note

The **Stored VMs** share path in Figure 120 does not exist on the library server by default. In this example, this share was created previously as a location to store guest VMs. See **Add New Read-write Library Shares to the Library Server** on page 46 of this guide for more information.

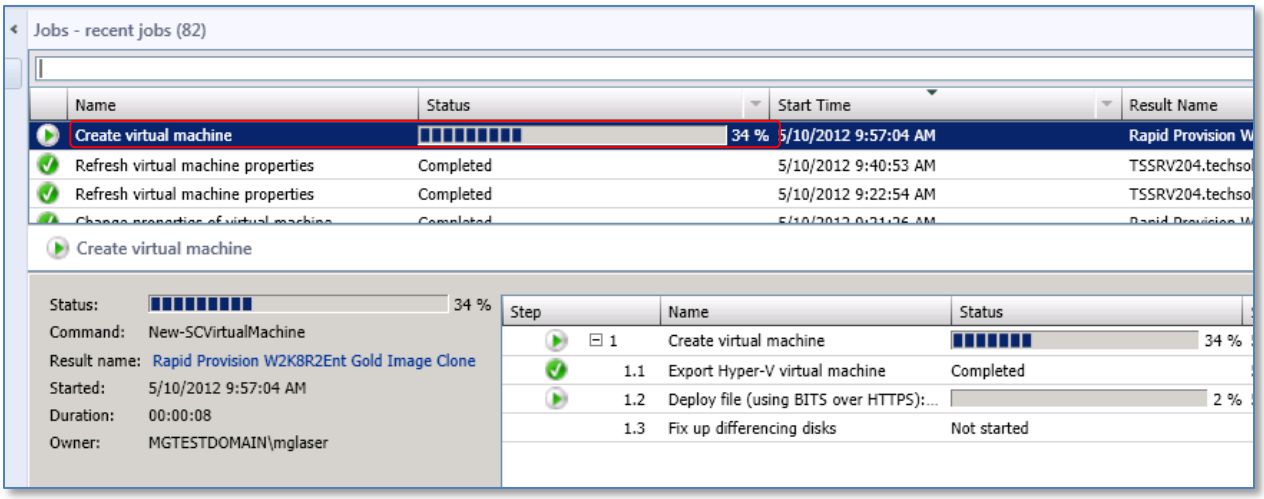

Figure 121: Create virtual machine job status

8) On the **Summary** screen, click on **Create** to launch the **Create virtual machine** job. Monitor the job until it completes.

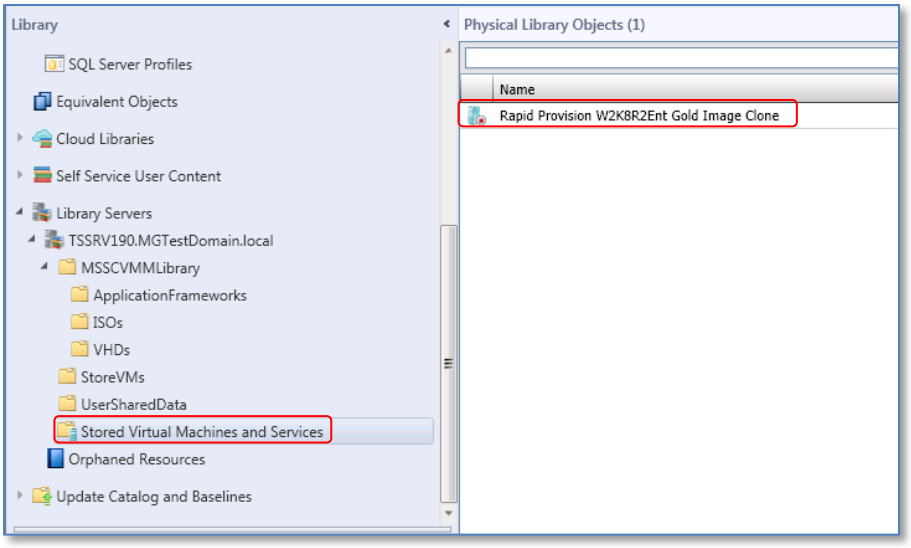

Figure 122: Verify the location of the cloned rapid provision guest VM

9) After the job finishes, from the **Library** view, expand **Library Servers** and verify the location of the cloned rapid provision guest VM, similar to the example shown in Figure 122.

10) Now that this cloned guest VM exists on the library server, it can be deployed to a host in the host group at a later time and updated, patched or changed as needed. This is useful in cases where an administrator may need to create a new SAN copy-capable guest VM template from an updated version of the rapid provision guest VM.

Create a SAN Copy-capable Template from a New Guest VM

Now that the new rapid provision source guest VM has been created and configured according to the steps in the previous section above, it can now be imported into the library server as a SAN copy-capable template for rapid provisioning of new guest VMs.

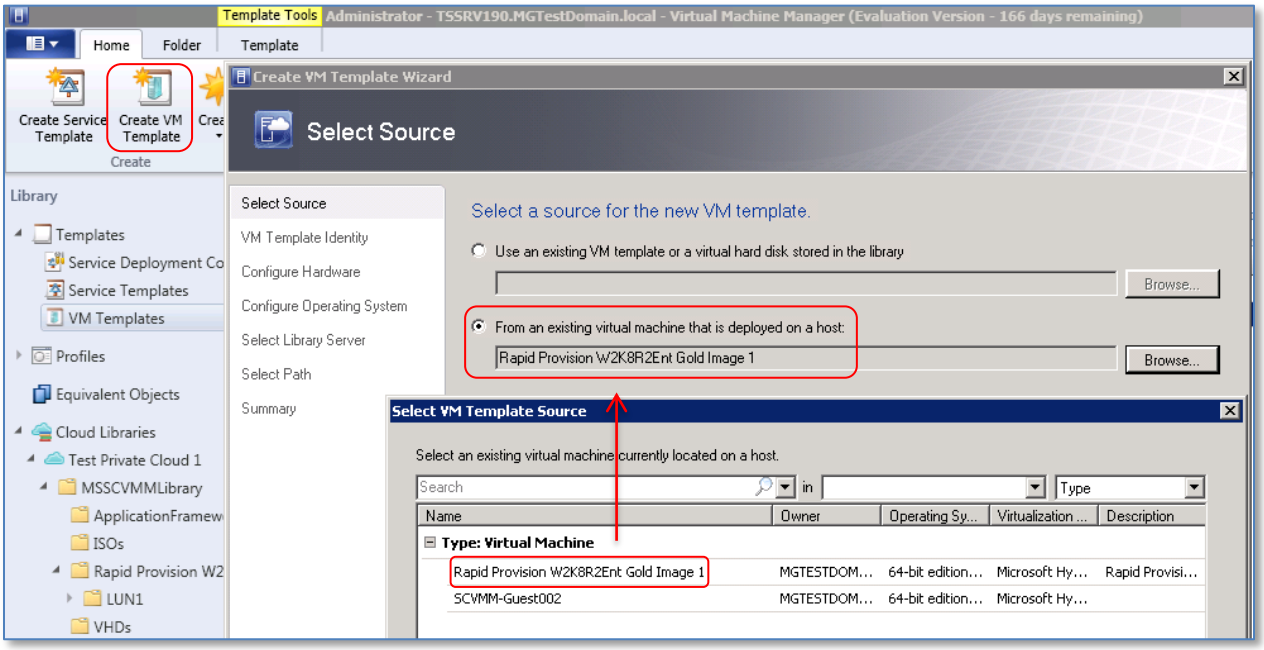

Figure 123: Select the source VM for the SAN copy-capable template

1) From the **Library** workspace, expand **Templates**, and click on **VM Templates**.

2) Click on **Create VM Template** on the ribbon bar under the **Home** tab to launch the **Create VM Template Wizard**.

3) On the **Select Source** page, select the option **From an existing virtual machine that is deployed on a host** and click on the **Browse** button to display a list of available VM template sources. In this example, the rapid provision gold image guest VM is selected as shown in Figure 123. Then click on **Next**.

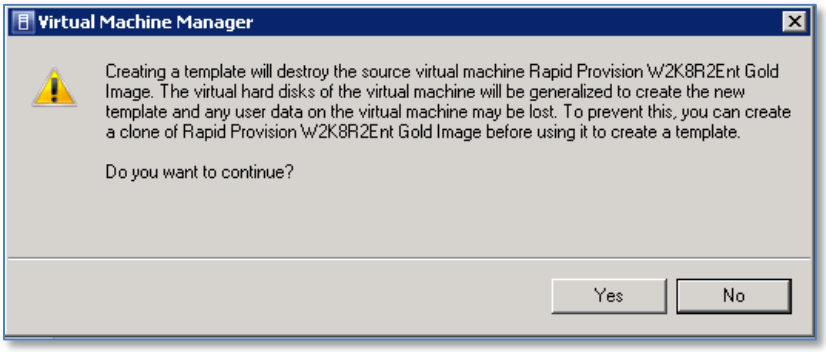

Figure 124: Review the template creation warning message

4) A warning message will appear. In this example a clone of the VM was created in the previous section (see **Create a Clone of a Rapid-provision Guest VM** on page 92). Click on **Yes**.

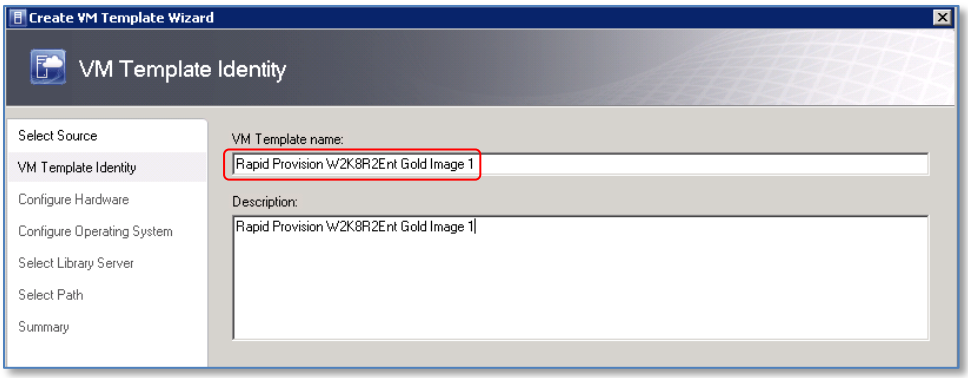

Figure 125: Provide a name and description for the SAN copy-capable template

5) On the **VM Template Identity** screen, provide a name (and description if desired) for the VM template. Then click on **Next**.

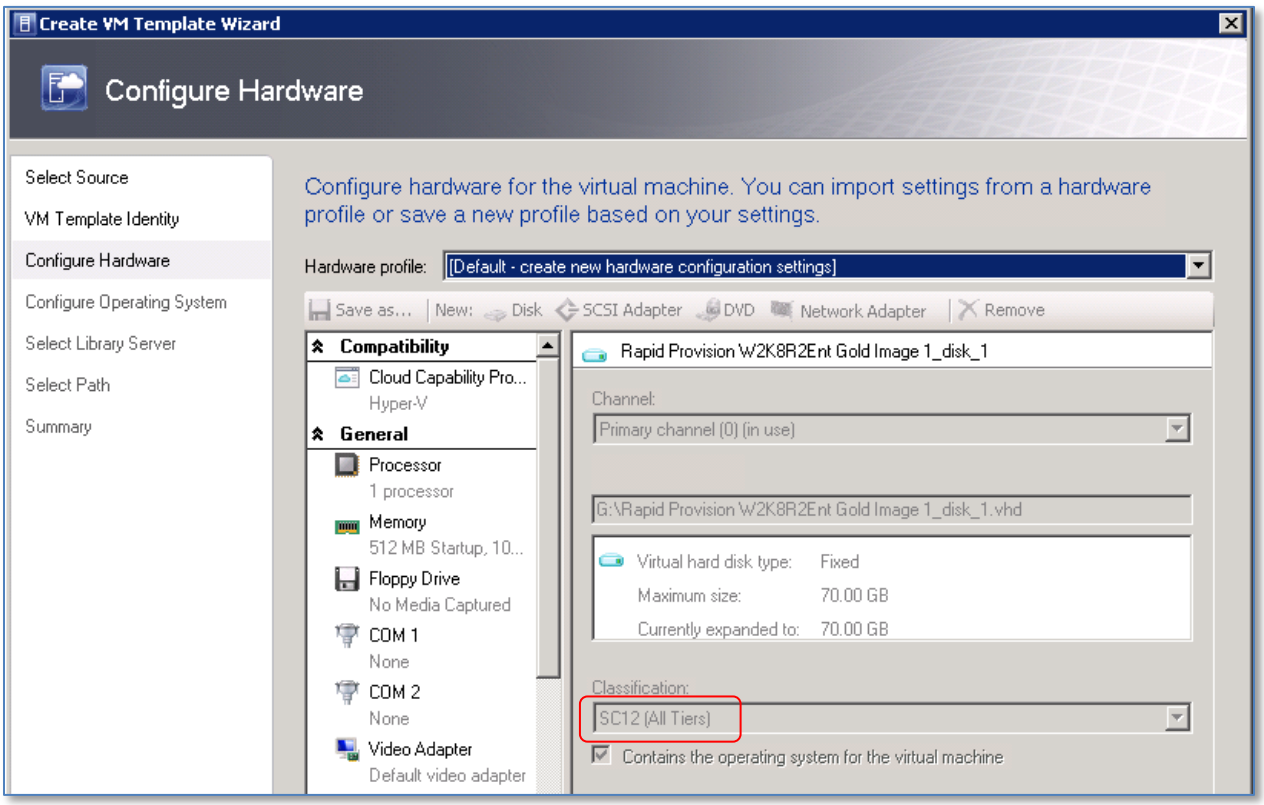

Figure 126: Create VM Template Wizard configure hardware screen

6) On the **Configure Hardware** screen, note that the settings here are inherited from the hardware profile that was chosen when the rapid provision guest VM was staged. In this example, since these hardware specifications are acceptable, no changes need to be made to the hardware settings on this screen. Optionally, choose a different hardware profile or change individual hardware settings as needed. Note that the **Classification** listed here (SC12) matches the classification chosen when the logic unit for the gold image VHD was created. When finished with the hardware settings, click on **Next**.

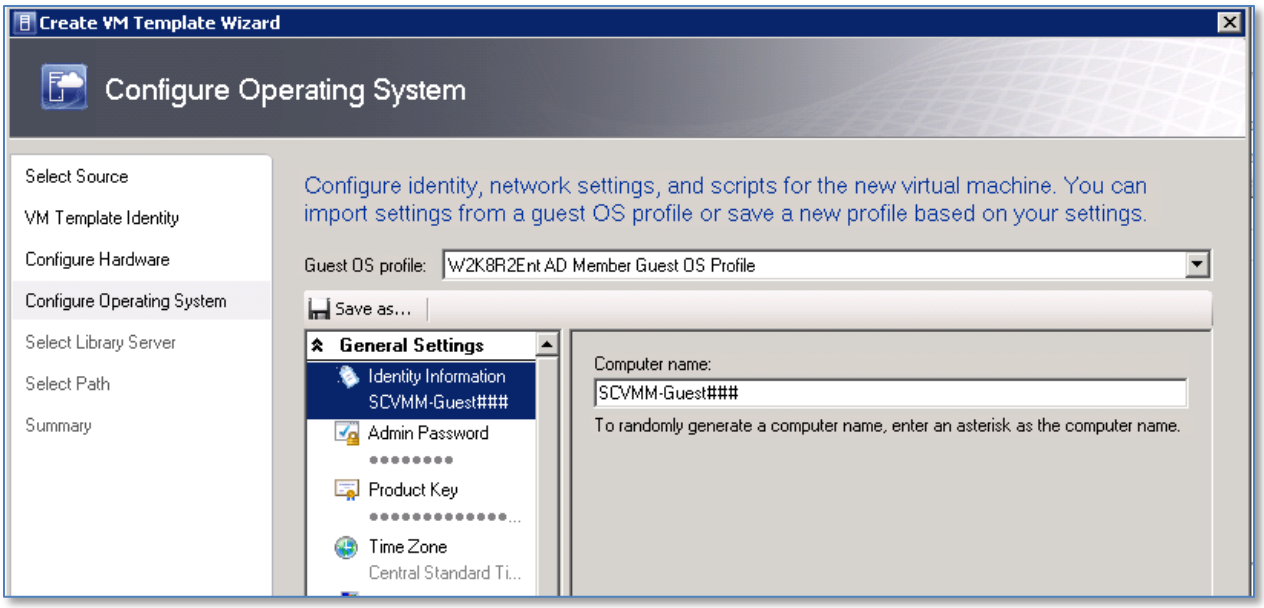

Figure 127: Provide OS settings for new SAN copy-capable guest VM template

7) On the **Configure Operating System** screen, the previously defined Guest OS profile is chosen from the drop down as shown in Figure 127. Optionally, modify the default settings as desired. Then click on **Next**.

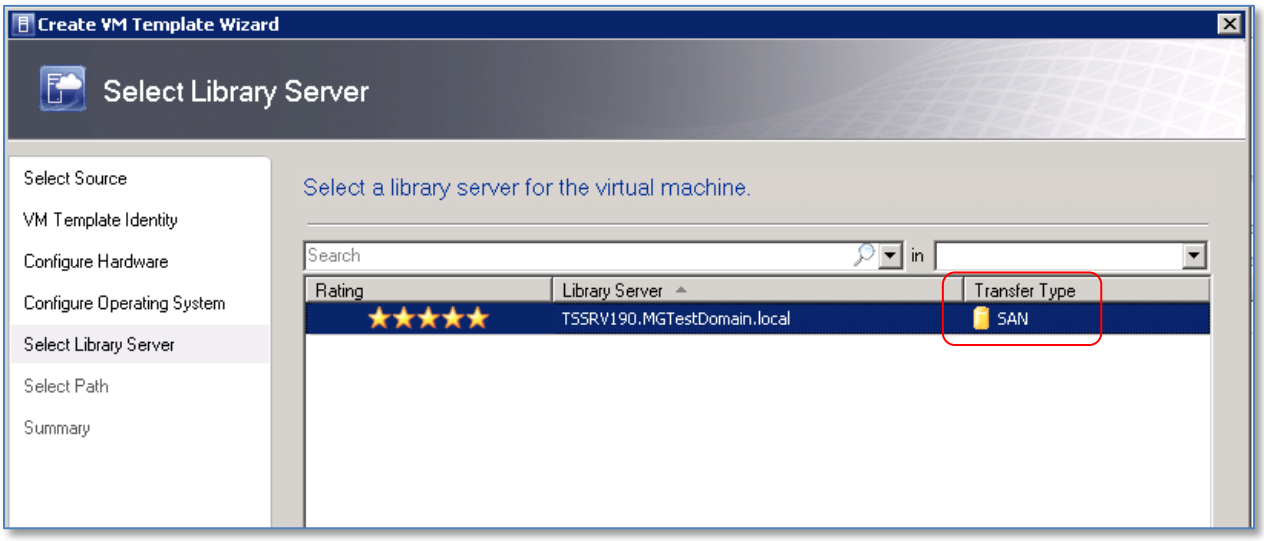

Figure 128: Select a library server that is capable of SAN copy-capable transfers

8) On the **Select Library Server** screen, select a library server that is SAN-transfer capable (not network) as indicated in Figure 128. Then click on **Next**.

Note

The **Transfer Type** column must indicate **SAN** (not network) in order for this template to function as a rapid provision template.

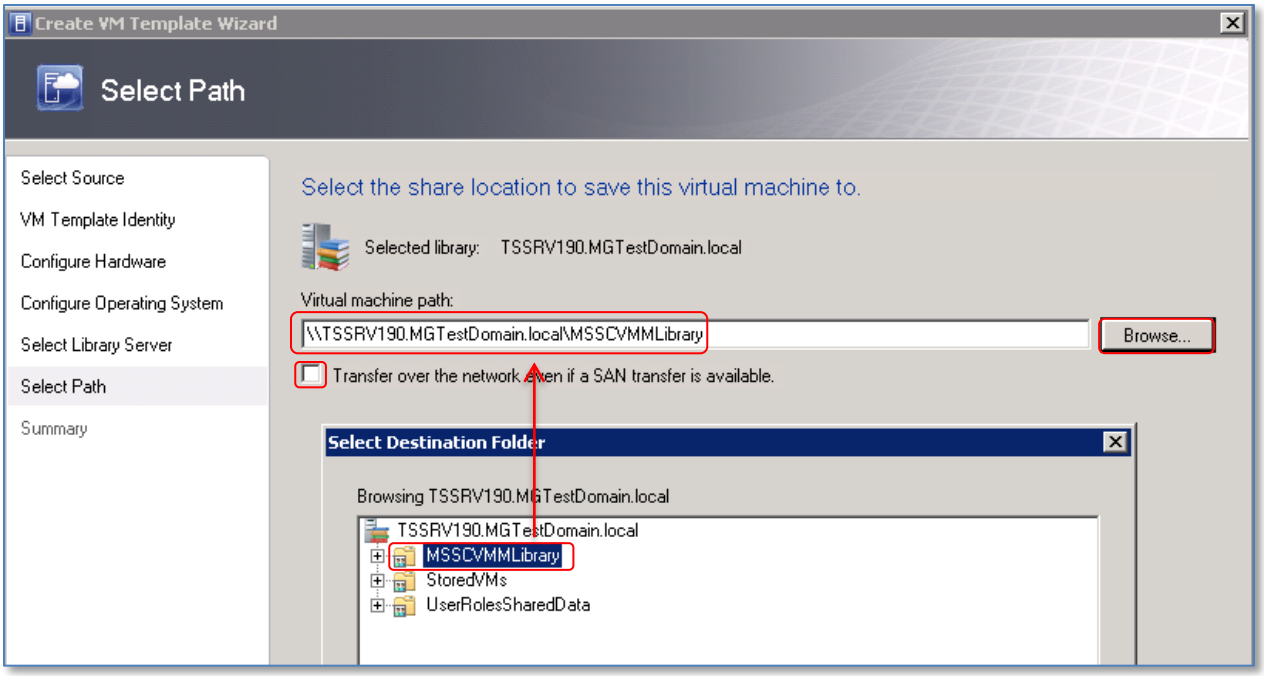

Figure 129: Select a path on the library server for the copy-capable VM template

9) On the **Select Path** screen, click on the **Browse** button and choose a destination on the library server for the rapid provision guest VM template. In the example shown in figure 129, the default **MSSCVMMLibrary** share path has been chosen. Make sure the box for **Transfer over the network** is unchecked. Then click on **Next**.

10) Review the **Summary** screen information and then click on **Create**. This will launch the **Create template** job. Monitor the progress in the **Jobs** workspace until it completes.

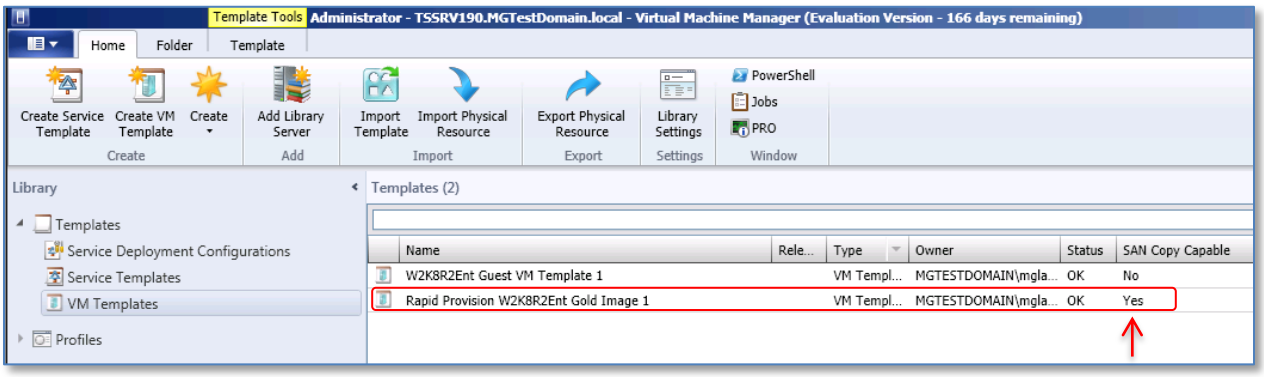

Figure 130: Verify availability of the new SAN copy-capable rapid provision template

11) From the **Library** workspace under **VM Templates**, verify that the new rapid provision template is now available. Make sure that **Yes** is indicated in the **San Copy Capable** column for this template as shown in Figure 130.

12) To make this template available to self-service users or roles, right click on it, select **Properties**, and under the **Access** screen, add any desired self-service users or roles.

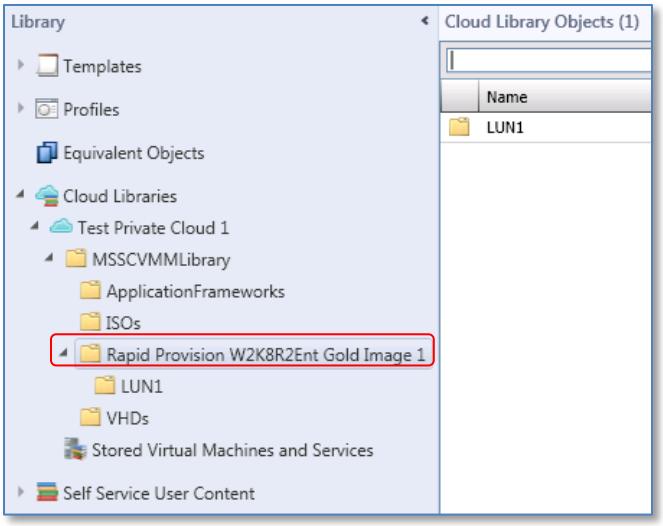

Figure 131: San copy-capable rapid provision VM template on the library server

13) The library server will now list a new folder where the rapid provision template resides as shown in Figure 131.

14) The template creation is now complete. To thin-provision new guest VMs from the rapid provision template, continue with the next section.

Deploy a New Hyper-V Guest from a SAN Copy-capable Template

Overview

Now that a SAN copy-capable template has been created from a gold image guest VM, thinly-provisioned guest VMs can now be deployed using Dell Compellent SAN Replays (snapshots). As was summarized in Table 4 on page 81, there are many advantages to using SAN copy-copy templates as compared to copy-over-the-network templates. In the steps below, a new guest VM will be created from a SAN copy-capable template of a gold image.

Run the Create Virtual Machine Wizard

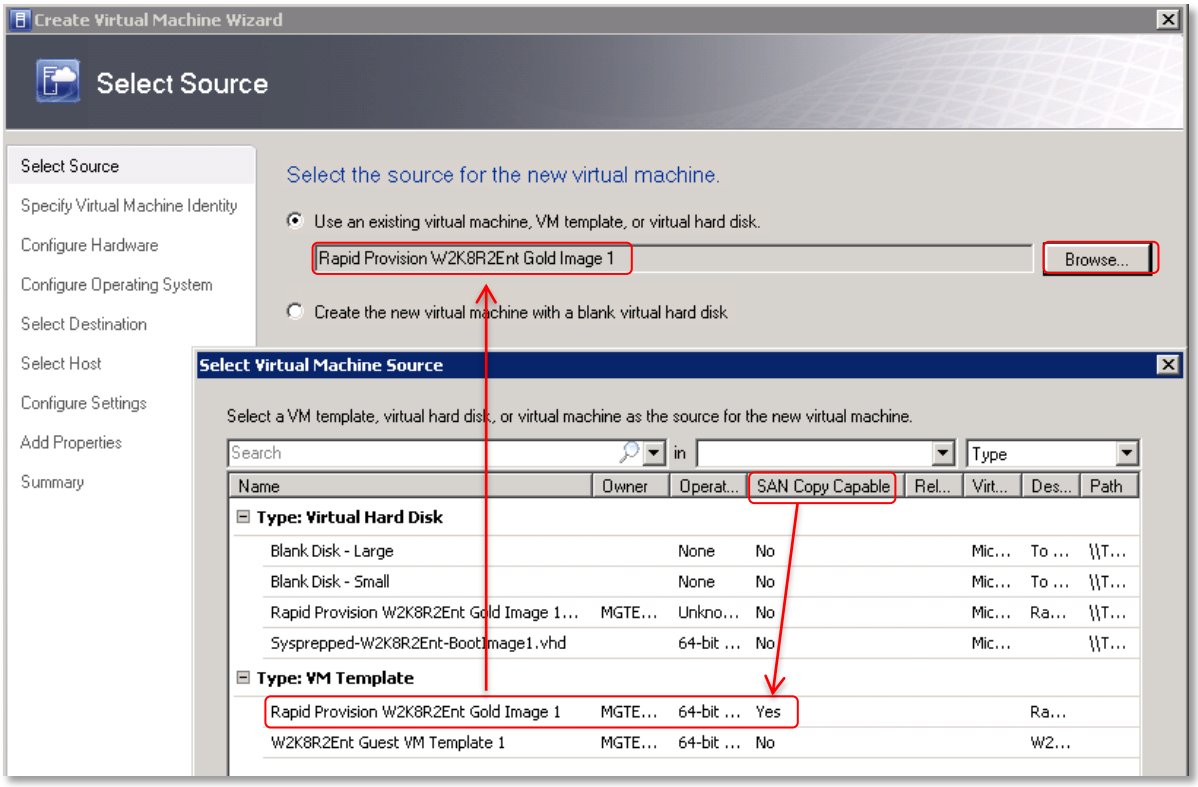

Figure 132: Select the source for a new rapid provisioned guest VM

1) From the **VMs and Services** workspace, click on **Create Virtual Machine** on the ribbon bar under the **Home** tab.

2) Select **Use an existing virtual machine, VM template, or virtual hard disk**, then click on the **Browse** button.

3) Choose a rapid provision template (in this example, the one just created in the preceding section was selected). Make sure the **SAN Copy Capable** column for the VM source template indicates **Yes** as shown in Figure 132. Then click on **Next**.

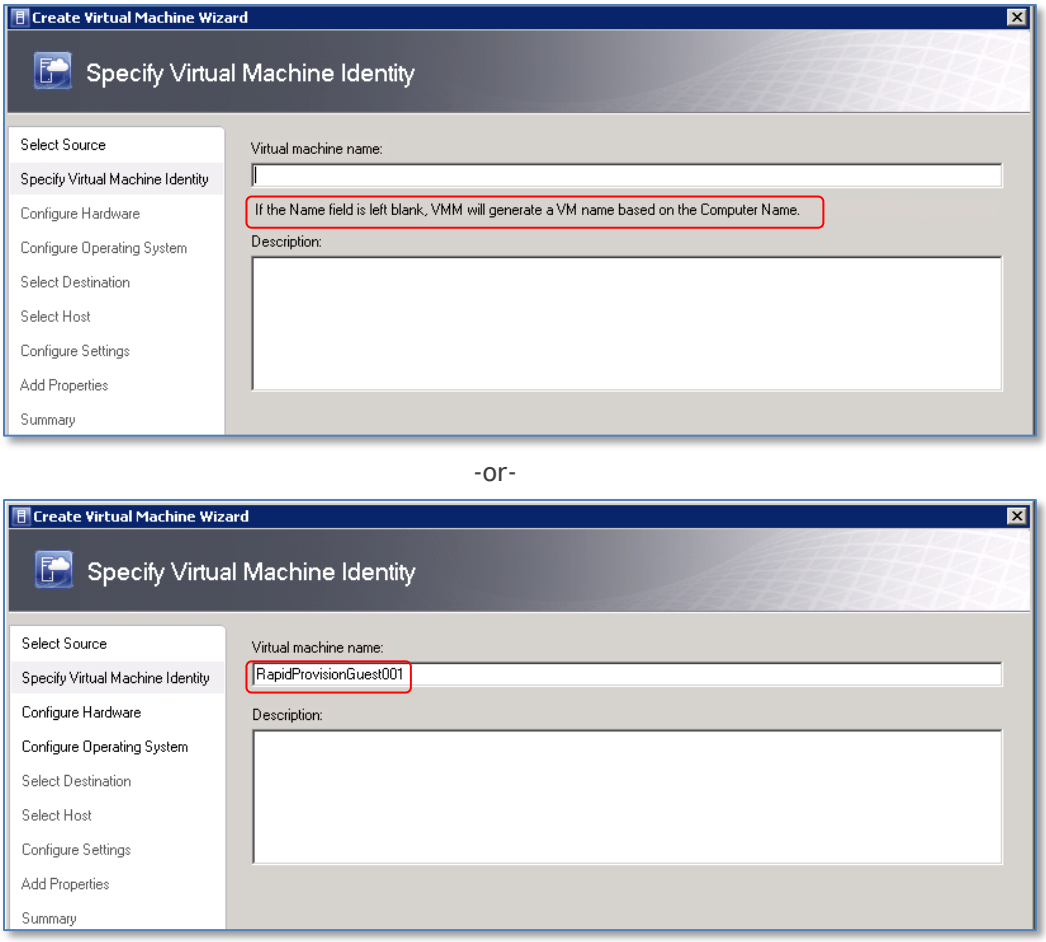

Figure 133: Provide a name and description for a new rapid provisioned guest

4) On the **Specify Virtual Machine Identity** screen, there are two options for providing the virtual machine name:
   - If the SAN copy-capable template was previously configured to automatically generate the name, then this screen will indicate that the virtual machine name field can be left blank. The presence of a caption under the virtual machine name field, as circled in the top view of Figure 133, indicates this.
     - Leave the field blank and allow the wizard to assign the name.
     - Provide a specific name to override the automatic name if desired.
   - If the template was configured without automatic naming, then the caption will be absent and a name must be manually entered here as shown in the bottom view of Figure 133.

5) The virtual machine name field will be left blank in this example as the SAN copy-capable template was previously configured to automatically provide a name. Click on **Next**.

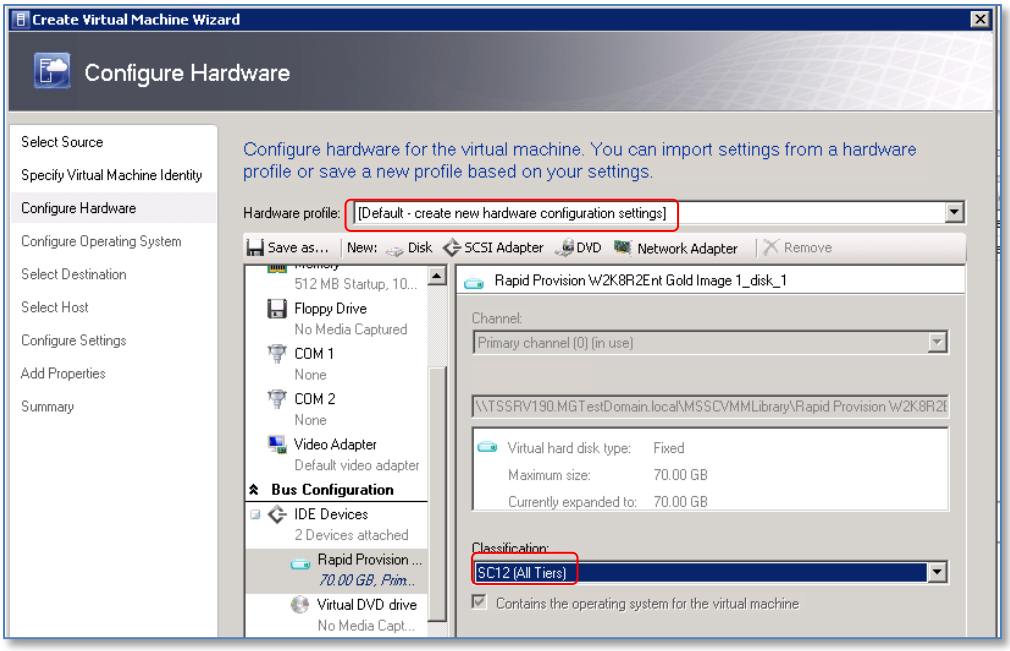

Figure 134: Configure the hardware settings or choose an existing hardware profile

6) On the **Configure Hardware** screen as shown in Figure 134, note that the hardware settings are inherited from the hardware profile that was associated with the template when it was created. Therefore no changes need to be made in this example. Optionally, choose a different hardware profile from the drop-down list or change individual hardware settings as needed.

7) Set the **Classification** field to the Dell Compellent Storage Center that was used to create the rapid provision VM template (**SC12 (All Tiers)** in this example). Then click on **Next.**

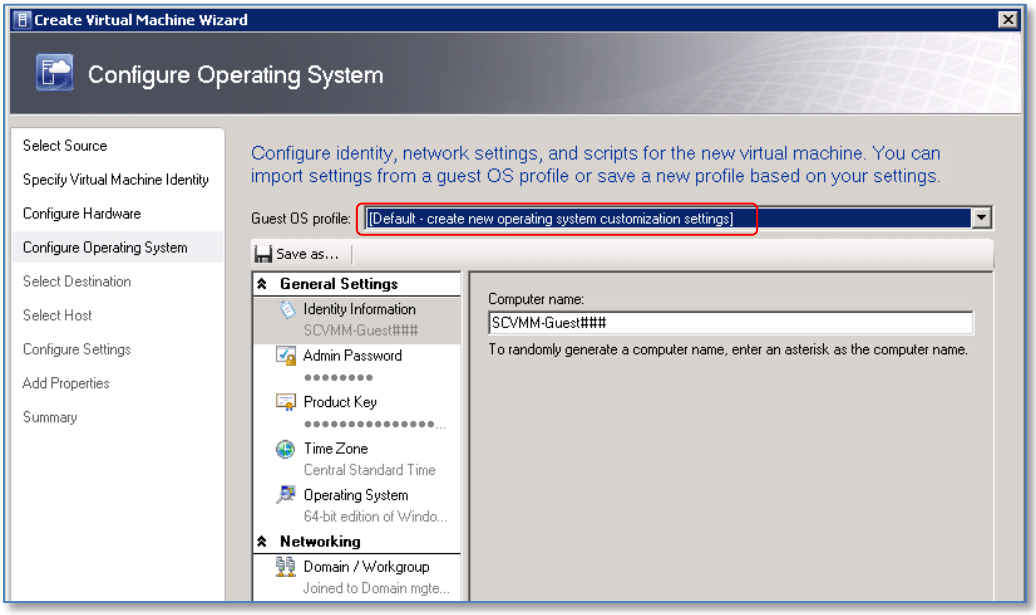

Figure 135: Configure the guest OS settings or choose an existing OS profile

8) On the **Configure Operating System** screen as shown in Figure 135, note that the guest OS settings are inherited from the guest OS profile that was associated with the template when it was created. Therefore no changes need to be made in this example. Optionally, choose a different guest OS profile from the drop-down list or change individual hardware settings as needed. In this example, no changes will be made. Click on **Next.**

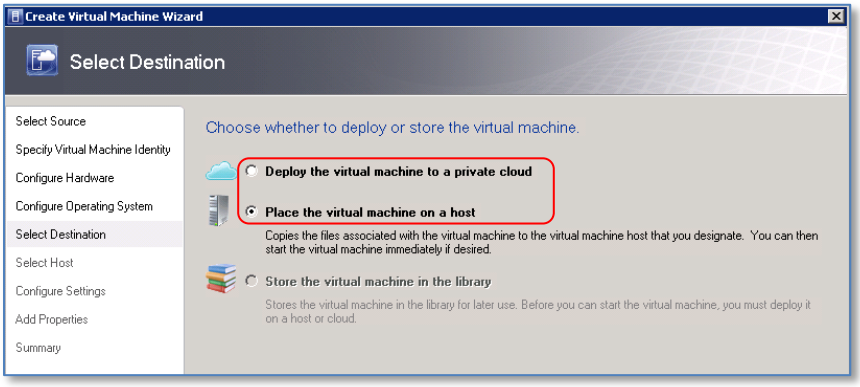

Figure 136: Choose a location for deployment of the new rapid provisioned guest VM

9) On the **Select Destination** screen, choose the deployment location for the new rapid provisioned guest (to a private cloud or to a specific host). In this example, **Deploy the virtual machine on a host** is selected as shown in figure 136. Then click on **Next**.

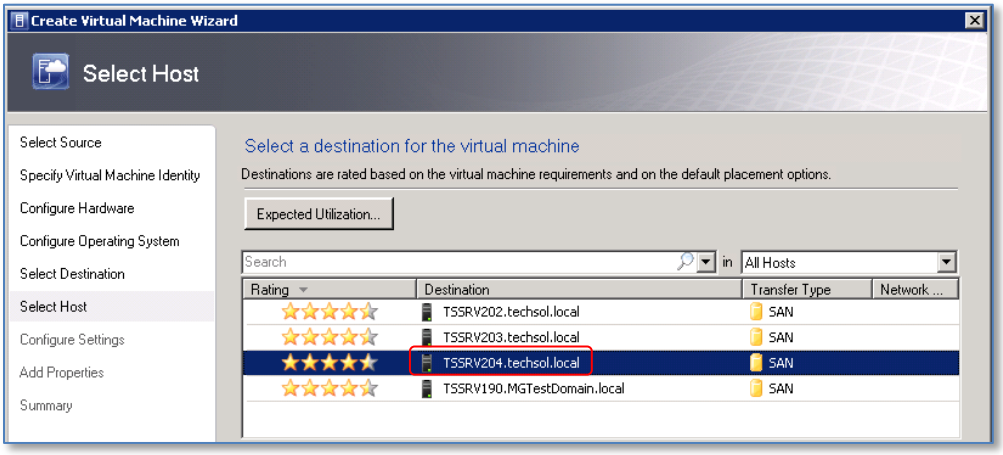

Figure 137: Select the host server for the new rapid provisioned guest VM

10) On the **Select Host** screen click on the desired host for the new rapid provisioned guest VM (TSSRV204 in this example). Then click on **Next**.

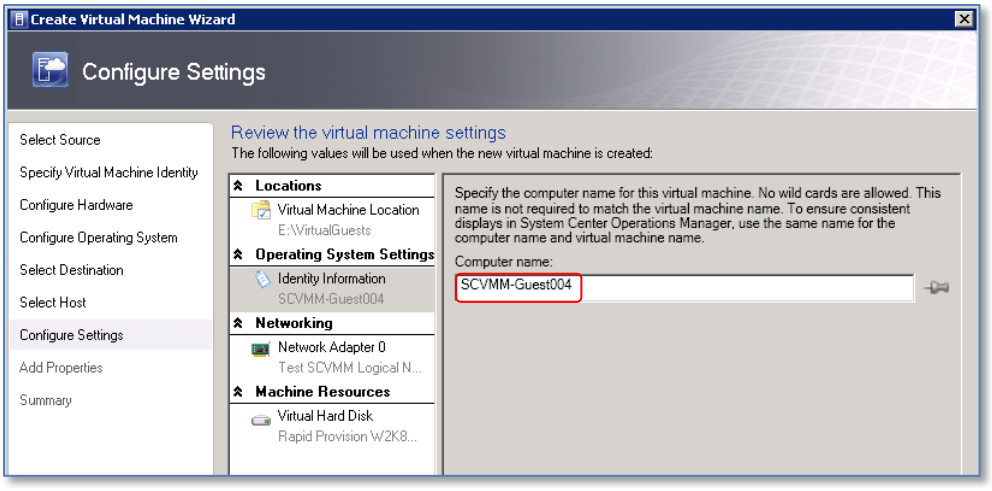

Figure 138: Verify the computer name for the new rapid provisioned guest VM

11) On the **Configure Settings** screen as shown in Figure 138, verify the following:
    a. Under **Operating System Settings**, since the SAN copy-capable template in this example is set to automatically generate a computer name, the wizard suggests the next name in line (SCVMM-Guest004 in this example). Keep the suggested name or provide a different name if desired.

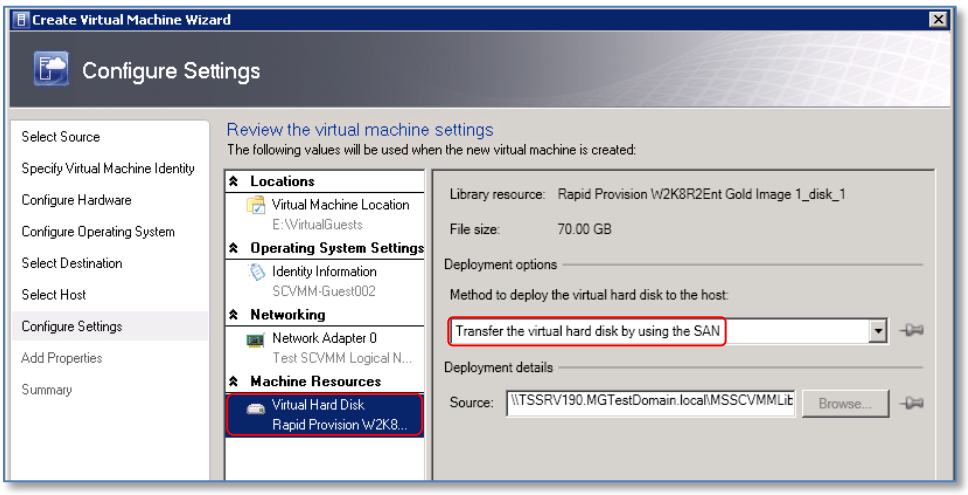

Figure 139: Verify that deployment method is set to transfer using the SAN

    b. Under **Machine Resources**, click on **Virtual Hard Disk** and verify that the **Method to deploy the virtual hard disk to the host** field is set to **Transfer the virtual hard disk by using the SAN**.

    c. Click on **Next**.

12) Review the settings on the **Add Properties** screen and then click on **Next**.

13) Click on **Create** on the **Summary** screen to launch the job to create the rapid-provisioned guest VM. Optionally, to see how the new volume is provisioned on the Dell Compellent Storage

Center, before clicking on **Create**, open the Storage Center Manager GUI per the steps in the following section to follow along as SCVMM 2012 leverages SMI-S to thinly provision the new volume.

Monitor the Creation of Rapid-provisioned Storage on Dell Compellent

1) To see how the new rapid-provisioned volume gets created on the Dell Compellent Storage Center, log on to the Storage Center Manager GUI for the Dell Compellent Storage Center the new logical unit will be created on.

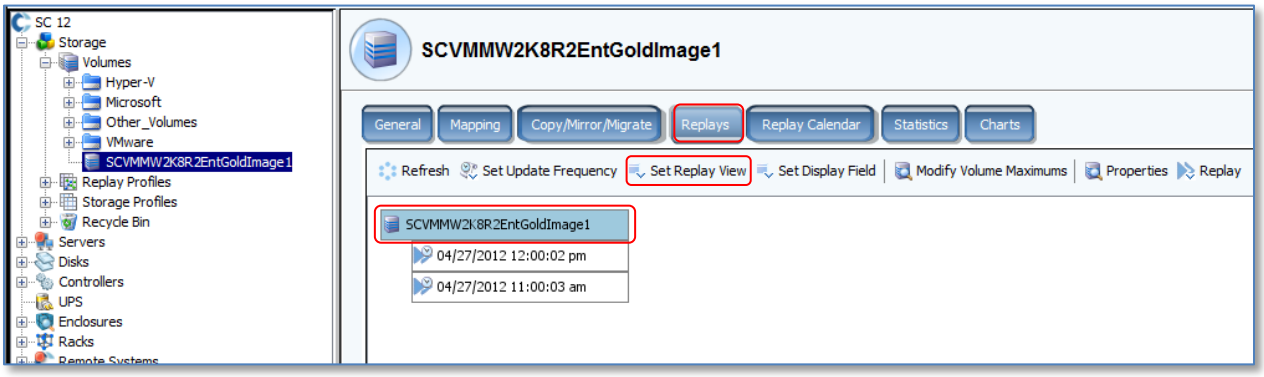

Figure 140: Gold image on Dell Compellent before creating a rapid provisioned guest

2) Once logged into Storage Center Manager:
   a. Expand **Storage→Volumes** and click on the desired gold image volume to highlight it.

   b. Click on the **Replays** tab

   c. Click on **Set Replay View** and change it to **Tree**. The gold image volume in this example is shown in Figure 140 with a couple of Replays right below it.

3) From the SCVMM 2012 **Create Virtual Machine Summary** screen, click on **Create** to kick off the job to create the new rapid provisioned guest VM.

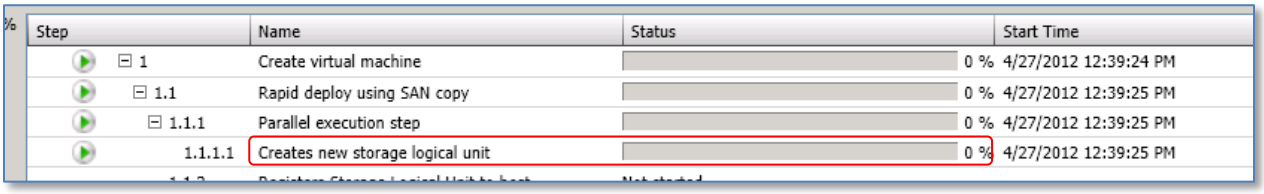

Figure 141: Monitor the creation of the new rapid provisioned guest

4) Go to the **Jobs** workspace to monitor the progress as the new guest VM is created. One of the incremental steps associated with provisioning a new rapid provisioned guest VM is the creation of a **new storage logical unit** (SAN volume) as shown in Figure 141. SCVMM 2012 leverages SMI-S to provision this logical unit in just a few seconds as a thinly provisioned SAN volume. It is created from a Replay of the gold image volume.

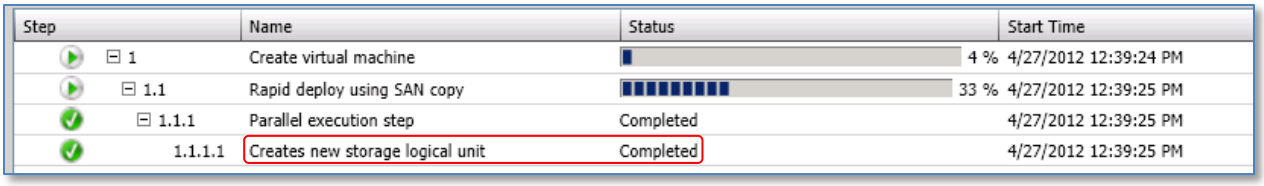

Figure 142: SCVMM 2012 creates a new rapid provisioned logical unit

5) The **Creates new storage logical unit** step of the job in SCVMM 2012 will complete in a few seconds as shown in Figure 142.

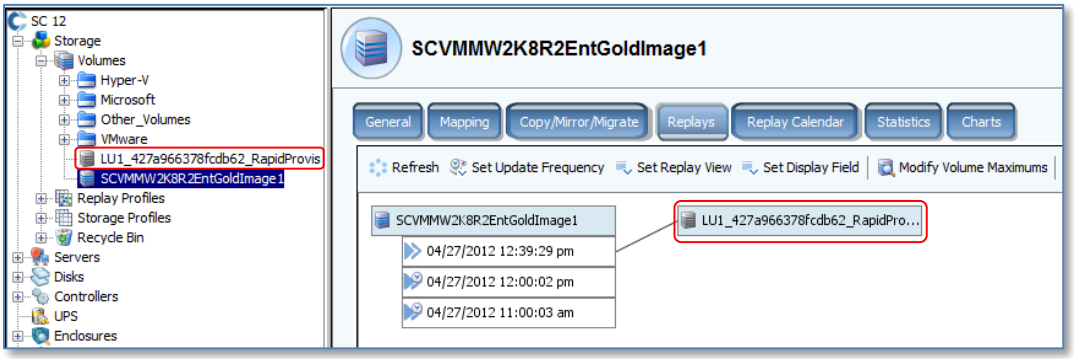

Figure 143: Thinly-provisioned SAN volume created for the new guest VM

6) Once the **Creates new storage logical unit** step in SCVMM 2012 completes, return to the Storage Center Manager GUI and refresh the view. A new thinly provisioned volume, created from the most recent Replay of the gold image volume, will appear in the Replay tree view as shown in Figure 143. When first created, the new thinly provisioned volume will consume no SAN space on the Storage Center.

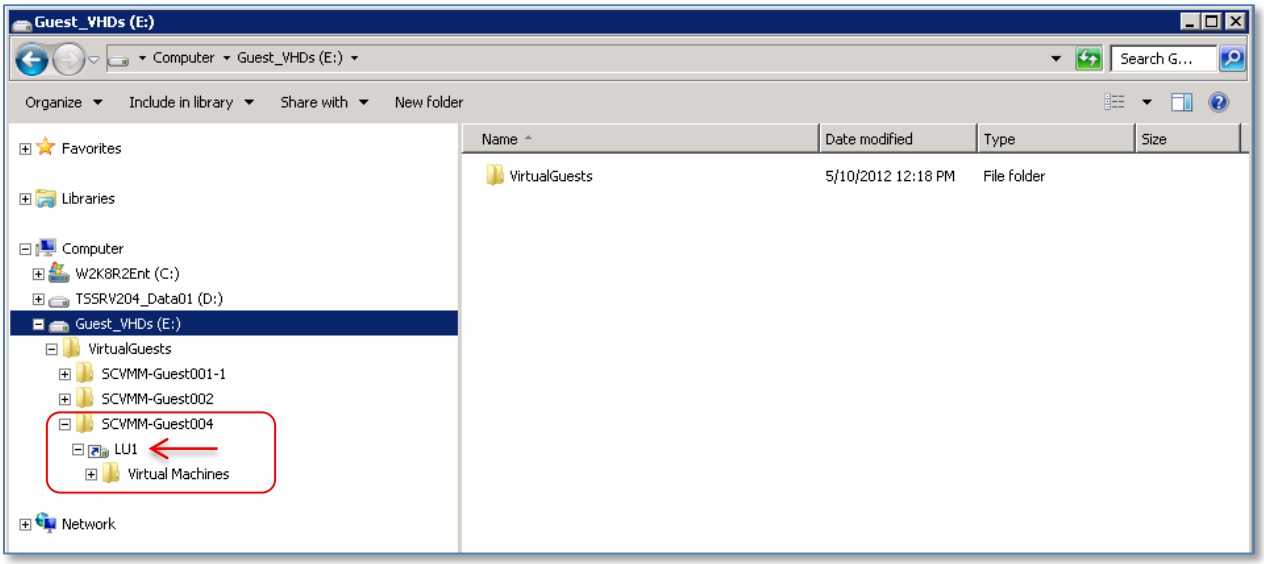

Figure 144: New logical unit for rapid provisioned guest assigned as a mount point

7) The SCVMM job will map this new logical unit (using fiber channel MPIO in this example) to the assigned Hyper-V host as a mount point as shown in Figure 144. If the new rapid provisioned guest VM were being created as an HA guest on a Hyper-V cluster, then the SCVMM 2012 job would map the new logical unit to all nodes of the Hyper-V cluster as a new cluster volume.

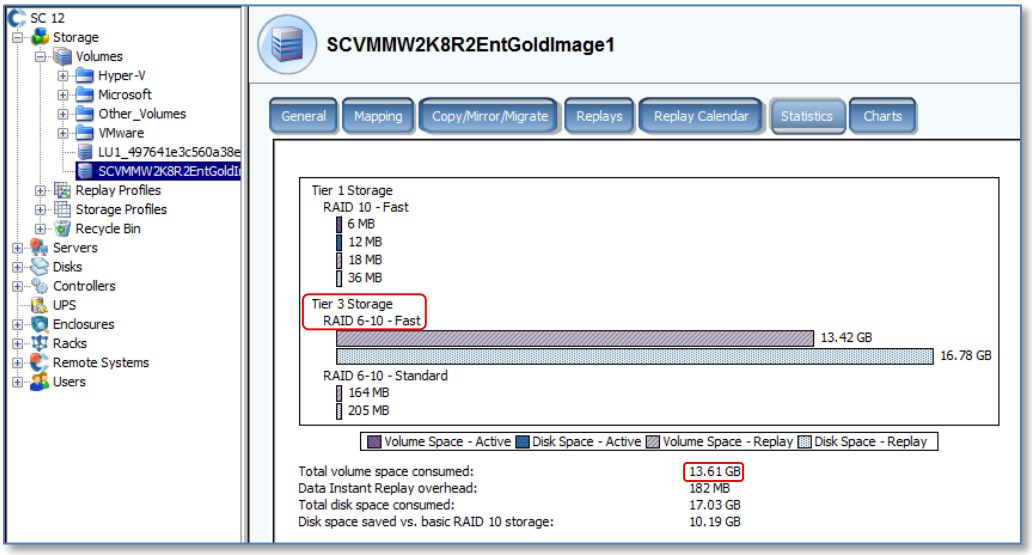

Figure 145: SAN space used by the gold image SAN volume on Dell Compellent

8) Highlight the gold image volume in Storage Center Manager and click on the **Statistics** tab. The gold image volume in this example is consuming a little less than 14 GB of SAN space (not including RAID or Replay overhead). Note how Data Progression has dynamically moved most of this data to RAID 6-10 on Tier 3 storage allowing it to take full advantage of the read performance of RAID 6 while leveraging the cost savings of Tier 3 storage. Data Progression will automatically move this data up or down between tiers and RAID levels to ensure optimal performance.

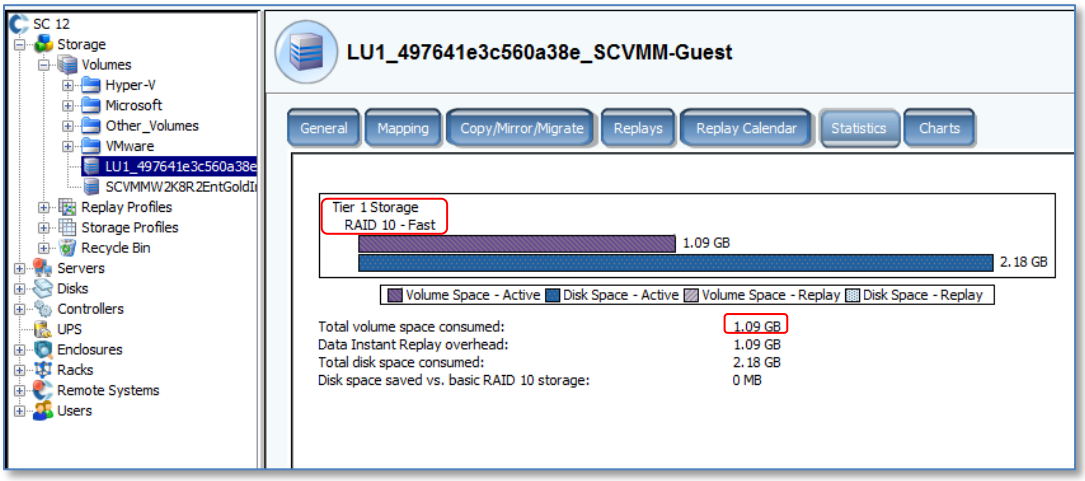

Figure 146: Only new data is written to the rapid provisioned SAN volume

9) Click on the new rapid provisioned volume in Storage Center Manager and examine its statistics. As the job in SCVMM 2012 maps the new storage to the Hyper-V host and begins to

configure the new rapid provisioned guest VM, any new data is written at RAID 10 to Tier 1 storage. This ensures maximum performance for new writes.

10) In this example, the new guest VM consumed about 1 GB of new storage, representing the new data blocks written as a part of provisioning the new guest VM from sysprepped gold image.

11) This new data is also subject to Data Progression so although it was written at RAID 10 for maximum performance, inactive data on this volume will eventually be moved down to RAID 6 on lower tier (more cost effective) storage space.

SAN Space Saved with Rapid Provisioning

Table 5. SAN space savings by using rapid provisioning

	Network copy template (VHDs copied over the LAN)	SAN copy-capable template (rapid provisioned logical units)
Source Image VHD size	14 GB	14 GB
New Guest VM 1	14 GB	1 GB
New Guest VM 2	14 GB	1 GB
New Guest VM 3	14 GB	1 GB
New Guest VM 99	14 GB	1 GB
New Guest VM 100	14 GB	1 GB
Total SAN space consumed	1414 GB	114 GB
Total SAN space saved	0 GB	**1300 GB**

1) As shown in Table 5, the SAN space savings can be significant when using rapid provisioning. In this example, provisioning 100 guest VMs from this SAN copy-capable template would realize a space savings of 1.3 TB on the SAN (not factoring in RAID or Replay overhead).

2) While there are no Dell Compellent Storage Center or SCVMM 2012-imposed limits on the maximum number of guest VMs that can be rapid-provisioned from a single SAN copy-capable template, factors such as the IO demands of the guest VMs will limit this number. As a best practices recommendation, plan for about 100 guests per rapid provision template.

Conclusion

Hopefully this document has proved helpful and has accomplished its purpose by providing administrators with answers to commonly asked questions associated with configuring the Dell Compellent Storage Center and SCVMM 2012 to quickly and efficiently deploy new Hyper-V guests to a private cloud using rapid provisioning.