Hitachi Embedded SMI-S Provider for Virtual Storage Platform

Implementation Guide

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Hitachi Embedded SMI-S Provider for Virtual Storage Platform

Implementation Guide

This white paper provides implementation steps and best practices for deployment of Hitachi Embedded SMI-S Provider on Hitachi Virtual Storage Platform (VSP). Implementation examples are also provided for the Microsoft® System Center Virtual Machine Manager (SCVMM) 2012 SP1 new automation features for storage.

SCVMM 2012 SP1 provides the ability to automatically discover storage resources and enables automated administration of these resources. SCVMM 2012 SP1 now provides system administrators to perform core storage management tasks with a central administrative interface. With the new user interface, administrators can discover, classify, allocate, provision, map and assign storage associated with clustered and standalone Microsoft Hyper-V® hosts. Hitachi Embedded SMI-S Provider provides the following functionality for SCVMM 2012 SP1:

- Create and delete LUNs on VSP and unmask them to the Hyper-V hosts. Options are also available to mount these LUNs and create virtual machines on these LUNs or allocate them to Hyper-V Failover clusters as Cluster Shared Volumes (CSVs).

- Create snapshots for Rapid Provisioning. Using sysprepped VHDs along with SCVMM 2012 SP1 templates, Hitachi Embedded SMI-S Provider can be used to create snapshots using Hitachi Thin Image software.

Hitachi Virtual Storage Platform takes full advantage of the SCVMM 2012 SP1 storage automation features by meeting the Storage Networking Industry Association (SNIA) and Common Information Model (CIM) requirements. CIM-XML is the protocol used as the communication mechanism between SCVMM 2012 and the SMI-S provider. The Hitachi Embedded SMI-S Provider function is built into the Service Processor (SVP) of Virtual Storage Platform, thus reducing complexity and overhead. This is commonly referred to as an embedded provider.

This implementation guide tells you how to configure the following:

- Hitachi Virtual Storage Platform
- SCVMM 2012 SP1
**Note** — These procedures were developed in a lab environment. Many things affect production environments beyond prediction or duplication in a lab environment. Follow recommended practice by conducting proof-of-concept testing for acceptable results before implementing this solution in your production environment. Test the implementation in a non-production, isolated test environment that otherwise matches your production environment.

Although this document does not provide step-by-step, detailed instructions for every task and activity required to deploy the solution, it does serve as a resource where readers can easily locate related materials needed to build a functional solution. It is written for SCVMM 2012 SP1 and storage administrators charged with implementing Hitachi Embedded SMI-S Provider. It assumes working knowledge of SCVMM 2012 SP1 and Microsoft Windows Server® 2012 operating systems and a basic understanding of SAN-attached storage concepts.
Solution Components

Figure 1 shows the high level architecture and main components used in these solutions:

Table 1 lists detailed information about the hardware components required for this implementation.

Table 1. Hardware Components

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Hitachi Virtual Storage Platform | ■ 16 × Fibre Channel ports  
                          | ■ 256GB of cache  
                          | ■ 64 SAS 600 GB 10k RPM HDDs  
                          | ■ Microcode level 07-05-11 or higher | 1 |
| Dell 1950 Server          | ■ 12GB RAM  
                          | ■ 2 × Nic Cards  
                          | ■ Qlogic 2562 HBA Dual Port | 16 |
| Brocade SAN Switch        | ■ Brocade 5100 Switch |          |

Figure 1

Hardware Components
Software Components

Table 2 lists detailed information about the software components required for this implementation.

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi Storage Navigator</td>
<td>Microcode Dependent</td>
</tr>
<tr>
<td>Hitachi Dynamic Provisioning</td>
<td>Microcode Dependent</td>
</tr>
<tr>
<td>Hitachi Thin Image</td>
<td>Microcode Dependent</td>
</tr>
<tr>
<td>Hitachi Embedded SMI-S Provider</td>
<td>Microcode Dependent</td>
</tr>
<tr>
<td>Microsoft Multipath I/O (MPIO)</td>
<td>006.0001.7600.16385</td>
</tr>
<tr>
<td>Microsoft Windows Server 2012</td>
<td>Datacenter edition</td>
</tr>
<tr>
<td>Microsoft SQL Server® 2012</td>
<td>Enterprise edition SP1</td>
</tr>
<tr>
<td>Microsoft System Center Virtual Machine Manager</td>
<td>2012 SP1</td>
</tr>
</tbody>
</table>
Solution Implementation

Deploying this solution includes the following procedures:

1. Configure Hitachi Virtual Storage Platform Platform
2. Configure System Center Virtual Machine Manager 2012 SP1 (SCVMM)
3. Discover Virtual Storage Platform with System Center Virtual Machine Manager 2012 SP1 (SCVMM)

Your implementation checklist may vary based on your environment and business requirements. This implementation guide assumes the following prerequisites before you start the implementation:

- Hitachi Virtual Storage Platform is Fibre connected to Windows Server 2012 Hyper-V failover clusters or Windows Server 2012 stand-alone hosts.
- Microsoft MPIO feature is enabled on all Windows 2012 servers.
- System Center Virtual Machine Manager 2012 SP1 is installed.
- Network connectivity between all nodes in the Hyper-V failover cluster and the SCVMM 2012 SP1 VMM server.
- Network connectivity between the SCVMM 2012 SP1 server and the Hitachi Virtual Storage Platform Service Processor.

Configure Hitachi Virtual Storage Platform

Configuration of Hitachi Embedded SMI-S Provider

This section describes how to configure Hitachi Virtual Storage Platform for use by SCVMM 2012 SP1 and Hitachi Embedded SMI-S provider.

Hitachi Embedded SMI-S Provider for Virtual Storage Platform is installed when the firmware is at or above the level specified in the Hardware Components section

A license key is required to enable the SMI-S function on Virtual Storage Platform.

Configure Userid on Virtual Storage Platform

A userid with storage administrator rights must be defined within VSP. This userid along with its associated password will be used by SCVMM to discover VSP and Hitachi Embedded SMI-S Provider.
To create a userid with storage administrator rights on VSP do the following.

1. Login to Storage Navigator Modular 2.
2. In the Explorer pane on the left side click **Administration**.
3. Expand **User Groups**.
4. Click on **User Groups**.

The **User Groups** window will display as shown in Figure 2 below.

5. Click on **Storage Administrator (View & Modify) User Group**.

The **Storage Administrator (View & Modify) User Group Window** Displays.

6. Click on **Create User**.

The **Create User** dialog displays as shown in Figure 3 below.
7. Enter **User Name** and **Password** for SCVMM 2012 to use for access to VSP.

8. Click **Finish** to create the new user.

**SAN Configuration**
Each server has two paths to VSP through a Brocade fabric, spread across 16 external ports on the VSP. The zoning is single-initiator, single-port. Each host initiator also is mapped to a single Host Group on VSP.

Table 3 below describes the zoning configuration.

<table>
<thead>
<tr>
<th>Server</th>
<th>Hyper-V Host</th>
<th>HBA Name</th>
<th>Storage Host Group Name</th>
<th>Storage Port</th>
<th>Zone Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>H1_HBA1_1</td>
<td>H1_Hyper-V_HBA1_1</td>
<td>1A</td>
<td>Hyper_V1_HBA1_1_1A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H1_HBA1_2</td>
<td>H1_Hyper-V_HBA1_2</td>
<td>2A</td>
<td>Hyper_V1_HBA1_1_2A</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>H2_HBA1_1</td>
<td>H2_Hyper-V_HBA1_1</td>
<td>1B</td>
<td>Hyper_V2_HBA1_1_1B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H2_HBA1_2</td>
<td>H2_Hyper-V_HBA1_2</td>
<td>2B</td>
<td>Hyper_V2_HBA1_1_2B</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>H3_HBA1_1</td>
<td>H3_Hyper-V_HBA1_1</td>
<td>1C</td>
<td>Hyper_V3_HBA1_1_1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H3_HBA1_2</td>
<td>H3_Hyper-V_HBA1_2</td>
<td>2C</td>
<td>Hyper_V3_HBA1_1_2C</td>
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<tr>
<td>4</td>
<td>4</td>
<td>H4_HBA1_1</td>
<td>H4_Hyper-V_HBA1_1</td>
<td>1D</td>
<td>Hyper_V4_HBA1_1_1D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H4_HBA1_2</td>
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<td>2D</td>
<td>Hyper_V4_HBA1_1_2D</td>
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<td>5</td>
<td>5</td>
<td>H5_HBA1_1</td>
<td>H5_Hyper-V_HBA1_1</td>
<td>1E</td>
<td>Hyper_V5_HBA1_1_1E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H5_HBA1_2</td>
<td>H5_Hyper-V_HBA1_2</td>
<td>2E</td>
<td>Hyper_V5_HBA1_1_2E</td>
</tr>
</tbody>
</table>
Configure Host Groups

Each host initiator is mapped to a single Host Group on VSP. Do the following to create host groups on Virtual Storage Platform.

Port security must be enabled on the VSP front end ports before you create host groups.

Port security does the following:

- Isolates traffic from multiple servers
- Groups servers in common configurations.
- Allows multiple servers to share a port on VSP.

### Table 3. Zone Configuration

<table>
<thead>
<tr>
<th>Server</th>
<th>Hyper-V Host</th>
<th>HBA Name</th>
<th>Storage Host Group Name</th>
<th>Storage Port</th>
<th>Zone Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>H6_HBA1_1</td>
<td>H6_Hyper-V_HBA1_1</td>
<td>Hyper_V6_HBA1_1_1F</td>
<td>1F</td>
<td>Hyper_V6_HBA1_1_1F</td>
</tr>
<tr>
<td></td>
<td>H6_HBA1_2</td>
<td>H6_Hyper-V_HBA1_2</td>
<td>Hyper_V6_HBA1_1_2F</td>
<td>2F</td>
<td>Hyper_V6_HBA1_1_2F</td>
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<tr>
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<td>3A</td>
<td>Hyper_V7_HBA1_1_3A</td>
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<tr>
<td></td>
<td>H7_HBA1_2</td>
<td>H7_Hyper-V_HBA1_2</td>
<td>Hyper_V7_HBA1_1_4A</td>
<td>4A</td>
<td>Hyper_V7_HBA1_1_4A</td>
</tr>
<tr>
<td>8</td>
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<td>H8_Hyper-V_HBA1_1</td>
<td>Hyper_V8_HBA1_1_5A</td>
<td>5A</td>
<td>Hyper_V8_HBA1_1_5A</td>
</tr>
<tr>
<td></td>
<td>H8_HBA1_2</td>
<td>H8_Hyper-V_HBA1_2</td>
<td>Hyper_V8_HBA1_1_6A</td>
<td>6A</td>
<td>Hyper_V8_HBA1_1_6A</td>
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<tr>
<td>9</td>
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<td>Hyper_V9_HBA1_1_1A</td>
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<tr>
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<td>Hyper_V10_HBA1_1_1B</td>
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<td>2E</td>
<td>Hyper_V13_HBA1_1_2E</td>
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<tr>
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<td>H14_Hyper-V_HBA1_1</td>
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<td>6A</td>
<td>Hyper_V15_HBA1_1_6A</td>
</tr>
</tbody>
</table>
To create a host group using Hitachi Storage Navigator Modular 2, follow these steps:

1. From the **Actions** menu, point to **Ports/Host Groups** and click **Create Host Groups**.
   
   The **Create Host Groups** window opens.

2. Type a name for the group in **Host Group Name**.

3. From the **Host Mode** list, click 2C[Windows].

4. In the **Available Hosts** area, select a host.

5. In the **Available Ports** pane, select one or more ports.

6. Click **Add**.

   The **Selected Host Groups** area is populated with the selected port.

7. Click **Finish**.

   The **Create Host Groups** window opens.

8. Click **Apply**.

Use Table 4 below as a guide to create the host groups.

**Create Dynamic Provisioning Pools**

For this implementation of Hitachi Embedded SMI-S Provider two Hitachi Dynamic Provisioning pools were created on Virtual Storage Platform for use by SCVMM 2012. All HDP pools were created using SAS 600GB 10K RPM drives.

Table 4 describes the configuration of the HDP pools used for this implementation.

<table>
<thead>
<tr>
<th>Dynamic Provisioning Pool</th>
<th>Number of RAID Groups</th>
<th>Number of Drives</th>
<th>Usable Capacity (TB)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>32</td>
<td>12.85</td>
<td>SCVMM 2012 Storage Space</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>64</td>
<td>25.7</td>
<td>SCVMM 2012 Storage Space</td>
</tr>
</tbody>
</table>

**Create Hitachi Thin Image Snapshot Pools**

To use the rapid provisioning feature of SCVMM 2012 SP1, one or more Hitachi Thin Image snapshot pools must be created and snapshot target volumes prepared. For information on creating Hitachi Thin Image pools, please reference the Hitachi Virtual Storage Platform Thin Image Users Guide.
Snapshot target volumes must be mapped to an unused array port on the VSP. The target volume size must be exactly the same number of blocks as the source volume.

Configure System Center Virtual Machine Manager 2012 SP1

This section describes the steps required to configure SCVMM 2012 SP 1 to use Hitachi Embedded SMI-S Provider.

Modifications to System Center 2012 SP1 for Hitachi Embedded SMI-S Provider

To ensure that SCVMM 2012 storage and classification discovery functions properly, a modification to the Windows® registry is required. This is done on the SCVMM server. This prevents the SCVMM 2012 discovery of Virtual Storage Platform from failing when adding the storage. This modification ensures that Disable HTTP name checking is set in the Windows registry.

Verify that the following registry key exists and the value is set to 1.

HKLM/SOFTWARE/Microsoft/Storage Management/DisableHttpsCommonNameCheck

Failure to perform the Windows registry change results in the error below:

Storage discovery of provider https://10.25.8.89 at TCPPort 5989 for user admin failed from VMM1.hds-cloud.com with error code SSLFailure Failed: SSL certificate common name is invalid.

Specify valid provider, port and user credentials for storage discovery.

ID: 26101

For further information, please reference the following Microsoft Technet article at:


Optimizing SCVMM 2012 SP1 for Hitachi Embedded SMI-S Provider

When using SCVMM 2012 SP1 and SMI-S provider to provision storage and perform advanced function operations such as virtual machine creation and rapid VM provisioning to large scale Hyper-V Failover clusters, there are configurations that should be modified to improve performance. SCVMM 2012 Sp1 relies on Windows Remote Management (WinRM) to orchestrate on the hosts in the Hyper-V Failover cluster.

For large 16-node clusters the requirement for a larger number of concurrent operations and threads within WinRM requires that the default settings for these values be modified.
These values should be changed on the SCVMM 2012 server only. There is no requirement to change these values on the hosts within the Hyper-V Failover cluster. Below are the suggested settings for WinRM and Windows Storage Management registry settings.

**Windows Remote Management Settings (WinRM)**

- Set MaxConcurrentOperationsPerUser value to "900".
  
  From elevated command prompt run the following command:
  ```
  < winrm set winrm/config/service@{MaxConcurrentOperationsPerUser="900"}>
  ```

- Set MaxConnections value to "900".
  
  From elevated command prompt run the following command:
  ```
  < winrm set winrm/config/service@{MaxConnections="900"}>
  ```

After these settings have been changed, restart the Windows Remote Management service for the changes to take effect.

**Windows Storage Management Registry Settings**

Using regedit modify the keys in the entries listed below:

- **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\StorageManagement**
  
  - Operation Timeout = 360
  - Connection Timeout = 360

- **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\StorageManagement\SMISDevice**
  
  - Threads = 255

**SCVMM 2012 Configuration for Hitachi SMI-S Embedded Provider**

The following section describes the steps required in SCVMM 2012 SP1 to import and discover Virtual Storage Platform. The high level steps required are:

1. Import Hitachi Embedded SMI-S Provider into SCVMM 2012 SP1. This adds Virtual Storage Platform as a managed array to SCVMM 2012 SP1.

2. Select storage pools on Virtual Storage Platform to be managed by SCVMM 2012.

3. Create storage classifications and assign them to storage pools under management by SCVMM 2012.

4. Configure rapid provisioning options
**Import Hitachi SMI-S Embedded provider into SCVMM 2012**

Follow this procedure to add Hitachi Embedded SMI-S Provider to SCVMM 2012.

1. At the bottom left pane of SCVMM console click **Fabric**.
2. Click **Providers**.
3. Click **Add Resources**.
4. Click **Storage Devices**.

The **Add Storage Devices Wizard** displays as shown in Figure 4 below.

![Add Storage Devices Wizard](image)

5. In the "IP address or FQDN and port field" enter the IP address of Virtual Storage Platform.

   Use secure port 5989 as shown above and check the "**Use Secure Sockets Layer**".

6. Select **Browse** to create a **Run As Account**.
7. The **Create Run As Account** window displays as shown in Figure 5 below.

![Figure 4](image)
8. Input a **name** for the Run As account.

9. Input the **User name** and **Password**.
   
   This must be a user account defined on VSP as having storage administrator rights and privileges.

10. Uncheck the **Validate domain credentials** box.

11. Click **OK**.

   The **Add Storage Device Wizard** displays.

12. Ensure that the VSP "**IP address or FQDN and port**" as well as the "**Run As Account**" fields are populated and click **Next.**
When SCVMM successfully establishes connection with the VSP storage, the **Import Certificate** dialog box displays as shown in Figure 6 below.

1. Click **Import**.

![Import Certificate dialog box](image)

**Figure 6**

2. After SCVMM imports the certificate VSP will show up as displayed below in Figure 7. Confirm the **Discover and import storage device information** and then click **Next**.
The Select Storage Pools window will display. During this stage all existing VSP storage pools should be detected. In order for these pools to be managed by SCVMM they must be classified.

1. To create classification for the storage pools click **Create Classification**.

The New Classification dialog box displays as shown below in Figure 8.

2. Define a **name** for the storage classification, provide a **description**, and click **Add**.
Classifications can be assigned to the VSP storage pools based on class of service levels, such as pools comprised of SSD drives versus SAS or NL-SAS drives.

3. Once classifications are assigned to the VSP storage pools ensure that all Storage Device pools that are to be managed by SCVMM 2012 SP1 are selected and then click Next.

The Add Storage Device Wizard Summary window will display.

4. Confirm the settings and click Finish.

The time to execute this process may take up to an hour, and depends on the overall size of Virtual Storage Platform and the number of pools brought under SCVMM management.

5. To confirm that VSP has been successfully added to SCVMM go to the SCVMM console, expand Storage on the action pane on the left and click Providers.

The status of the VSP provider will be displayed as shown below in Figure 9. Ensure that the Status of the provider is Responding.

![Figure 9](image)

6. The details of Hitachi Embedded SMI-S Provider can be confirmed by clicking on Classification and Pools in the left action pane which displays the storage pools and volume details as shown in Figure 10 below.
SCVMM 2012 administrators now have the capability to deploy virtual machines using rapid provisioning using Virtual Storage Platform and SAN based transfers. A requirement to use this feature is that SCVMM 2012 virtual machine templates be implemented. These templates are stored on the SCVMM 2012 library server. The library server contains the templates along with a hosts VM files which are used to generate VSP read/write snapshots for rapid provisioning of new VMs. The Hitachi Thin Image feature enables the use of snapshots by SCVMM 2012.
Perform the following steps in SCVMM 2012 to define the VSP method for rapid provisioning support.

1. Go to the SCVMM console and expand the **Storage** tab on the left action pane and select **Arrays**.

2. In the right pane, right click on the VSP array and select **Properties**.

3. In the left pane of the array properties window click **Settings**. The **Storage array settings** window will display.

4. Select **Use Snapshots** and then click **OK** as shown in Figure 11 below.

For additional details on prerequisites and VM template creation details please reference the following Microsoft Technet article: **Rapid Provisioning of Virtual Machines Using SAN Copy**
Hitachi Embedded SMI-S Provider Management Considerations

It is important to understand that Hitachi Embedded SMI-S Provider should have exclusive control and management over the storage pools assigned to SCVMM 2012. If Storage Navigator Modular 2 is used to make any changes to the storage pools managed by SCVMM 2012 then a rescan will be required so that SMI-S provider will be in sync with the changes. This rescan is done within SCVMM 2012 and can take between 30 minutes to an hour (based on the size of VSP and number of pools under management).

To rescan the array to synchronize changes follow these steps:

1. Click on Provider in action pane as shown in Figure 12 below.
2. Right click on the VSP_Provider and select Rescan.

Management of Hitachi Virtual Storage Platform using Storage Navigator Modular 2 will lock the SVP and will prevent SMI-S provider from also modifying storage resources on VSP. Any jobs run by SMI-S provider will fail with an error indicating that the array is locked. SMI-S provider use should be coordinated with all storage administrators that will be accessing VSP to avoid conflicts.
Conclusion

Implementing Hitachi Embedded SMI-S Provider will allow customers to take advantage of the SCVMM 2012 SP1 storage automation features using Hitachi Virtual Storage Platform. The SCVMM 2012 SP1 console allows administrators to discover, classify, allocate, provision, map and assign storage from VSP to clustered and stand-alone Microsoft Hyper-V hosts.
For More Information

Hitachi Data Systems Global Services offers experienced storage consultants, proven methodologies and a comprehensive services portfolio to assist you in implementing Hitachi products and solutions in your environment. For more information, see the Hitachi Data Systems Global Services website.

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