Microsoft® System Center Virtual Machine Manager 2012
Storage Automation
With the IBM XIV Storage System Gen3

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Date: February 2012
Version: 1.0
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Executive Summary
This technical white paper reviews key concepts and provides step-by-step implementation examples for Microsoft System Center Virtual Machine Manager (SCVMM) 2012 new storage automation features. In order to take advantage of these enhanced features, storage providers must meet minimum Common Information Model (CIM) framework requirements which are also detailed. A close examination of popular IBM XIV Storage System Gen3 enterprise-class storage solutions reveals extensibility and performance improvements which align with the Microsoft SCVMM 2012 new features.

Microsoft SCVMM 2012 now provides all administrators, including virtualization, database, systems, storage, etc., the ability to perform a full spectrum of core storage management tasks within a true central administrative interface. Within SCVMM’s graphical user interface (GUI), administrators can discover, classify, allocate, provision, map, assign and decommission storage associated with clustered and standalone virtualization hosts. In the past, many of these common tasks required multiple steps and applications but are now streamlined using a unique combination of Microsoft SCVMM 2012 and IBM XIV Gen3 storage automation attributes.

Target Audience
This white paper is intended for solutions architects, system administrators and all engineers involved in the Microsoft System Center Virtual Machine Manager (SCVMM) 2012 operation and management of private cloud solutions using the IBM XIV Storage System Gen3. Today’s virtualization environments looking to minimize and simplify administrative workloads should benefit most from this end-to-end virtualization solution. Additionally, XIV technical sales teams and mid-to-large size businesses evaluating or pursuing simplification and consolidation through virtualization will benefit.

Advanced comprehension of the required solution components including Microsoft SCVMM, Microsoft Failover Clustering, Hyper-V technology, Microsoft SQL Server, and XIV Storage System Gen3 administration is recommended. However, there are technical reviews as well as supplemental references in the remaining sections below.

Introduction
In anticipation of continued growth and customer demand in virtualized data centers, Microsoft enhances numerous features in the latest System Center Virtual Machine Manager (SCVMM) 2012 release. Microsoft improves the SCVMM 2012 end-user experience by providing additional control from a single, intuitive central management interface where IT administrators can configure and manage both physical and virtual machines (VMs). SCVMM broad administrative control and flexibility is augmented with new automation features including extensive PowerShell capabilities. Rather than examine all of the SCVMM 2012 new features, this white paper focuses on storage automation using the IBM XIV Storage System Gen3.
To benefit fully from the SCVMM 2012 storage automation enhancements, the IBM XIV Storage System Gen3 must meet minimum SNIA and CIM requirements. In a move to standardize storage management, Microsoft requires storage vendors to comply with Storage Networking Industry Association (SNIA) standards to take advantage of the SCVMM 2012 full feature set. Specifically, storage solutions must use SNIA Storage Management Initiative Specification (SMI-S) 1.4 or greater. XIV Storage System Gen3 compliance is satisfied in microcode revision 11.1.0.0.

Unlike the majority of storage solutions which require multi-tier SMI-S provider solutions that commonly use additional servers to host the SMI-S provider, this provider functionality is built into the single-tier design of the IBM XIV Storage System Gen3. Thus, the XIV single-tier storage design decreases solution complexity and administrative overhead while providing direct communication for SCVMM and other storage management and monitoring applications. Understanding how SCVMM-to-XIV communication works first requires a brief review of the Common Information Model (CIM) framework below.

Common Information Model Framework
CIM is an open standard that assigns common definitions to management information systems, networks, applications and services represented as a common set of objects easily interpreted by non-exclusive management applications. Being an open model or standard, it also accommodates storage vendor extensions. This framework allows proprietary devices to be treated as open system devices by applications such as SCVMM 2012. Common CIM definitions enable the IBM XIV Storage System Gen3 to exchange detailed management information between systems throughout the network using the XIV Open Application Programming Interface (API).

The exchange of detailed management information includes logical and physical storage device metadata extracted by the Common Information Model Object Manager (CIMOM) component from the IBM XIV Storage System native SMI-S provider. The XIV SMI-S provider is predicated on CIM and Web-based Enterprise Management (WBEM) standards and is configured and enabled by default for all XIV Storage System Gen3s. Thus there is no need to manage the XIV built-in CIM components.

Upon closer examination of the CIM exchange between SCVMM 2012 and the XIV SMI-S provider, a secure communication channel is established. SCVMM administrators select an XIV interface module (IM) IP address and TCP port 5989. Three XIV management IP addresses are available in a fully loaded 15-module frame and those three XIV IMs run the SMI-S provider or CIM agent. Using HTTPS, only SCVMM user-defined and authenticated run-as accounts can establish the necessary storage interlink. In effect, SCVMM taps into a secure, extensible and interoperable management CIM framework for compliant network storage devices such as the XIV. As a result, systems and storage administrators can accomplish core XIV management and configuration tasks conveniently within the SCVMM single interface.
A few additional important SCVMM 2012 host-to-storage communication concepts, regarding the CIM framework are notable. With the XIV single tier design, the SMI-S provider and CIM agent are treated identically due to the CIM component collective functionality. The SMI-S provider is also referred to as the SCVMM storage provider to align with the SCVMM application interfaces and documentation. For a general solution-specific CIM framework reference, see Figure 1 below:

![Figure 1: SCVMM 2012 CIM Communication with the IBM XIV Storage System Gen3](image)

For further XIV Open API and CIM framework details, please review the following: [https://www-304.ibm.com/support/docview.wss?uid=ssg1S7003246](https://www-304.ibm.com/support/docview.wss?uid=ssg1S7003246)

**Microsoft System Center Virtual Machine Manager 2012**

Microsoft SCVMM 2012 offers a one-stop shop approach for central administration using a single graphical user interface (GUI). SCVMM 2012 provides vast private cloud management services and greater feature parity with comparable VMware® offerings. Even though it has numerous physical and virtual machine management and monitoring capabilities, SCVMM 2012 is primarily used as a Microsoft software VM deployment hub. This principal function allows administrators to rapidly and intelligently
deploy VMs for a variety of uses including Infrastructure as a Service (IaaS) to preferred destination cluster and standalone hosts. The majority of deployments are to Microsoft Hyper-V hosts, though SCVMM supports VMware® ESX and other host interoperability. Such flexibility improves simplified central administration for diverse virtualized environments that offer compute, network and storage resources for customer consumption. However as previously mentioned, SCVMM 2012 storage automation is the focal point of its new features covered in this document.

SCVMM 2012 storage automation provides users an essential range of core functions including the ability to discover, provision, and assign IBM XIV Storage System Gen3 resources in a virtualized environment. SCVMM 2012 automation helps minimize key storage workflows such as mapping new volumes or increasing capacity for existing Hyper-V hosts or clusters. Moreover by using XIV snapshot capabilities or cloning technologies, rapid provisioning of new VMs using SAN rather than network transfers is possible. Using this rapid provisioning method significantly reduces network and CPU use, freeing valuable resources for other high priority business tasks. Consequently, cloud administrators directly profit from SCVMM storage automation features which streamline and expedite virtual machine deployments for cloud service providers and customers.

**IBM XIV Storage System Gen3**

The IBM XIV Storage System Gen3 is well-suited for IT organizations looking to simplify and enrich virtualization environments using SCVMM 2012. The IBM XIV is already known for its highly acclaimed storage management simplicity while still offering enterprise-class reliability and performance. However when combined with SCVMM storage automation features, customer environments further benefit from a single, user-friendly storage management interface delivering a complete virtualization solution that all administrators can utilize with minimal effort. Ultimately, grouping the XIV with SCVMM 2012 provides uncomplicated VM storage management to help substantially lower an organization’s total cost of ownership (TCO).

Contributing to a lower TCO and the backbone of the solution, the XIV modular architecture delivers virtual storage which self-tunes while integrating seamlessly with SCVMM. The XIV automatically self-tunes in response to application I/O patterns and configuration and capacity changes commonly associated with virtual environments, and requires no intervention, custom software or specialized consulting. Accordingly, businesses save considerable time and resources compared to building traditional, complex RAID configurations. Furthermore, virtualized environments benefit from the XIV incomparable self-healing features which promote high availability and data protection.

XIV data protection employs active/active N+1 redundancy of all data modules, disks, interconnect switches, and uninterruptible power supply (UPS) units. The XIV also contains multipath FC and iSCSI host connections for each interface module. Three built-in UPS units protect all disks, cache and electronics with redundant power supplies and fans, which further promote hardware and software
business critical availability and reliability. The XIV uses predetermined data distribution algorithms which help ensure fast recovery from major and minor faults using pre-failure detection and proactive corrective healing. In the event of module or disk failures, global spares striped across all disks quickly redistribute data back to a fully redundant state. During such events, the performance impact is notably minimized.

This minimal performance impact is due to the IBM XIV Storage System Gen3 extremely competitive performance characteristics which readily meet demanding cloud-based workloads. The XIV highly scalable, distributed architecture provides a combined total of up to 360 GB of cache and individual modules powered by quad-core Intel Xeon processors. Up to six dedicated host interface modules ensure optimal, balanced data distribution among all 180 2TB or 3TB disks to eliminate hot spots. This data distribution feature is quite significant due to the popularity of using larger LUNs for multiple VMs typically deployed in cloud environments. In addition to data integrity benefits, since every LUN is striped across all 180 disks, the chance of saturating storage IO is greatly reduced when compared to conventional architectural approaches using RAID sets and hot spares.

This unique evolutionary architecture is vastly improved with XIV Storage System Gen3 and helps provide the following key cloud environment benefits:

- Up to 4 times the throughput (10 GB/sec) of the previous XIV generation, improving performance for business intelligence, archiving and other I/O-intensive applications
- Up to 3 times improved response time of the previous XIV generation, enabling faster transaction processing and greater scalability for online transaction processing, database and email applications
- Industry-leading rebuild times in the event of disk or module failures (less than 60 minutes for 2 TB drives)
- Innovative snapshot functionality that includes snap-of-snap, restore-of-snap and a nearly unlimited number of snapshots
- Non-disruptive maintenance and upgrades
- Per host/cluster QoS capability to prioritize workloads based on business criticality
- Power to serve even more applications from a single system with a substantial hardware upgrade that includes an InfiniBand interconnect, larger cache (up to 360 GB of combined memory), faster SAS disk controllers and increased processing power—plus, each Gen3 interface module delivers 8 Gb FC and 1 Gb iSCSI connectivity
- Option for upgradeability to solid-state drive (SSD) Caching for breakthrough SSD performance levels at a fraction of typical SSD storage costs (planned availability 1H12 for Gen3)
- With the XIV family’s “all-inclusive” pricing model, there are no hidden costs for multipath software or replication features — specifically, every XIV includes the following with purchase: snapshot capability, thin provisioning, asynchronous and synchronous data replication, advanced management, performance reporting, monitoring and alerting, and full support of Microsoft technologies including GeoClustering, Volume Shadow Copy Services (VSS) and MPIO
IBM XIV Storage Sizing for Microsoft Hyper-V

Prior to implementing Microsoft SCVMM 2012 in the IBM XIV Gen3 storage environment, administrators should account for the XIV unique storage design described above. The IBM XIV Storage System distributed architecture performs best when a smaller number of large LUNs or volumes are used for cluster or standalone host allocation. This is mainly due to each LUN being striped across all 180 physical disks as previously mentioned. Consequently, users have fewer volumes to manage which lessens administrative overhead. However, additional considerations are required for the type of Hyper-V host configuration – clustered vs. standalone.

As implied, both cluster and standalone Hyper-V hosts should use large XIV volumes for tenant VMs. However, volume allocation and functional definition determine subtle yet unique considerations between the two Hyper-V host types. For Microsoft failover cluster Hyper-V hosts, the volumes are mapped to all cluster members and Microsoft recommends using clustered shared volumes (CSVs). Furthermore, consider spreading the VMs and CSVs across participating cluster members. Such active/active cluster configurations maximize hardware resource utilization by the VMs. However, ensure each physical server contains adequate resources to handle all VMs on individual cluster members in the event of planned or unplanned migrations.

Also consider using separate large CSVs which contain only VM operating system files and promote workload balance across Microsoft Cluster nodes. Always ensure a comfortable degree of granularity when determining the number of VMs to assign to each CSV to protect against potential logical or physical CSV failures. Similarly, consider using separate large CSVs for application use such as dedicated SQL data vs. dedicated SQL logs. While not much of a performance consideration with the XIV Storage System Gen3, this measure simply provides an additional fail-safe and potentially expedites disaster recovery.

When creating VMs that reside on CSVs, consider using fixed virtual hard disks (VHDs) to maximize performance. Even though pass-through disks perform marginally better, in the interest of lower administrative overhead, increased functionality, and individual preference, fixed VHDs are placed on all CSVs for SCVMM 2012 storage automation testing. Likewise, select the appropriate virtualization storage options that work best for individual requirements noting the XIV considerations shared previously.

For Hyper-V standalone hosts as well as VMs, the aforementioned XIV storage sizing considerations also apply. However, XIV volumes are mapped exclusively to a single host or VM. Additionally, the disks only require NTFS formatting and no further steps, short of Windows disk partition alignment considerations which are application-dependent. To emphasize, CSVs cannot be enabled on standalone hosts or VMs.

In the reference architecture, Microsoft cluster and standalone Hyper-V hosts are used to test the SCVMM 2012 broad storage automation capabilities. For production Hyper-V cluster host environments,
it is recommended to use Large (2+ TB) XIV volumes configured as CSVs (CSVs) as well as traditional physical disk resources. Large (2+ TB) XIV volumes should also be used for Hyper-V standalone hosts.

**IBM System x3550 M2 Servers**

All test hosts consist of IBM System x3550 M2 servers connected to the XIV Storage System Gen3. Designed with IBM X-Architecture innovation, these x64 servers offer flexible configurations equipped with enhanced memory, high-speed I/O and industry-leading availability and reliability features. This combination of features helps reduce operating costs, simplify management and keep virtualized infrastructures up and running.

A fully loaded x3550 M2 also houses Intel® Xeon® 5500 Series 4-core processors with 8MB of shared cache and up to 128GB of memory. Moreover, there are up to 4 integrated Gigabit Ethernet controllers including an Integrated Management Module (IMM) which provides system administrators remote server control, ideal for common tasks which typically require local attention.

Due to lab space limitations, the x3550 M2 is selected for its minimal data center footprint and simple coupling with the IBM XIV Storage System Gen3. All combined, the IBM x3550 M2 harbors ample horsepower in a small form factor to deliver the necessary performance and reliability required for building a Microsoft SCVMM 2012 private cloud testing environment. For IBM System x server selections optimally designed for virtualization, review the following:


**Solution Layout**

The following key components are used to successfully implement and test Microsoft SCVMM 2012 new storage automation features:

- Microsoft SQL Server 2008 R2 – hosts the SCVMM database, VirtualManagerDB
- Microsoft System Center Virtual Machine Manager 2012 RC
- Microsoft Windows Server 2008 R2 Hyper-V Standalone and Cluster Hosts
- IBM System x 3550 M2 servers
- Brocade 825 Dual-port FC HBAs
- IBM XIV Storage System Gen3 with microcode version 11.1.0.0
- IBM XIV Host Attachment Kit for Windows Version 1.7.0
- IBM XIV VSS Provider 2.3.1

**Note:** Detailed installation and configuration steps for all required components are beyond the scope of this document. Please review the web-based references located at the end of this document in the Appendix.
The overall SCVMM 2012 solution layout used in the testing environment is illustrated in Figure 2 below:

![SCVMM 2012 Solution Layout](image)

Figure 2: SCVMM 2012 Solution Layout

**SCVMM 2012 Storage Automation Step-by-Step Processes**

SCVMM 2012 step-by-step processes with screenshots reveal these new storage automation features. The following SCVMM 2012 key features using IBM XIV Gen3 storage are demonstrated below:

- **Storage Device Discovery** – While SCVMM 2012 can discover both local and remote storage, only remote storage examples for IBM XIV Gen3 resources are examined. SCVMM 2012 has the ability to discover arrays, pools, logical units (XIV volumes or LUNs), disks, volumes, and virtual disks.

- **Storage Pool Classification** – By applying a useful naming convention when classifying storage pools, end-users can recognize the performance attributes of the underlying storage. This simplifies the virtual machine deployment process for internal and external customers taking advantage of the private cloud resource model.

- **Allocation** – SCVMM 2012 administrators can allocate available storage pools or volumes to defined host groups which represent business groups, locations, etc. Storage must be allocated before it becomes available for host assignment. Host group storage allocation promotes greater granular control of abstract storage resources for end-user consumption.

- **Provisioning** - SCVMM 2012 can create new XIV volumes or LUNs to be used for Hyper-V host or cluster assignment. There are three XIV volume provisioning methods – creating a volume from available capacity, creating read/write snapshots of an existing volume, and creating a clone of an existing volume.

  1. When storage pools are allocated to host groups, end-users can create new XIV volumes from available capacity. This enables complete control of the quantity and size of new
volumes being created which allows convenient storage consumption within the SCVMM 2012 administrative console.

2. SCVMM 2012 offers the ability to rapidly provision VMs using SAN read/write copies of an existing virtual disk. Today only XIV snapshots of a single VM to single volume (LUN) mapping are currently supported by SCVMM 2012. This new feature allows multiple VMs to be provisioned very quickly using SAN rather than network transfers which place minimal load on the Hyper-V host. This space efficient use of XIV snapshots is near-instantaneous and requires the XIV VSS Hardware Provider to be installed on all Hyper-V hosts.

3. This capability is identical to creating read/write copies of an existing volume, but instead of using snapshots, VMs are rapidly provisioned using XIV clones. Cloning existing volumes offloads copy workloads to the XIV, boosting host performance. While faster than the operating system copy process, the full XIV cloning duration is longer than the snapshot operation and depends on the size of the source VM and its volume.

Note: Customer discretion is advised with rapid provisioning VMs using XIV snapshots or clones due to the current feature support limitations. Microsoft SCVMM 2012 supports only a single VM to single volume (LUN) mapping which excludes CSVs that contain multiple VMs. Additionally, consider using this rapid provisioning method for a lower number of VM deployments due to XIV storage sizing considerations referenced earlier. An alternate out-of-band solution for customers exploring Virtual Desktop Interface (VDI) or CSV rapid deployments using XIV snapshots or clones is offered in the latter storage automation step-by-step processes below.

- **XIV Volume Mapping** – When adding new or existing volumes to standalone or cluster Hyper-V hosts, the SCVMM administration console or PowerShell automates the XIV volume mapping process.

- **Assignment** - When end-users are ready to consume new storage, all allocated pools or volumes can be used for assignment to a Hyper-V host or cluster. The assignment process involves automated XIV and host operations which present, initialize, and format new volumes. For Hyper-V clusters, SCVMM 2012 maps the volume to all cluster hosts and even creates the necessary CSV and cluster physical disk resources.

- **Decommission** - SCVMM 2012 has the ability to decommission volumes it creates which help free up storage capacity for VM repurposing. The volume unmapping and deletion operations are fully automated.

**Discovery and Classification**

In order to ensure SCVMM 2012 discovery and classification storage automation features function properly, an additional step is required before adding storage devices. To prevent the SCVMM 2012 discovery from failing when adding the IBM XIV storage device, disable HTTPS name checking in the Windows registry:
Note: Ensure the registry is backed up prior to modifying it.

Add the following registry DWORD (32-bit) value and set it to 1:

HKEY_LOCAL_MACHINE/SOFTWARE/Microsoft/Storage Management/DisableHttpsCommonNameCheck

Note: Failure to perform the Windows registry change results in the following error:

Storage discovery of provider https://192.168.101.249 at TCPPort 5989 for user admin failed from scvmm1.xiv.kirkland.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 details, please refer to the following Microsoft Technet article, http://technet.microsoft.com/en-us/library/gg610563.aspx

Using the SCVMM 2012 console, perform the following steps to discover and classify storage:

1. At the bottom left pane of the SCVMM console, select Fabric.
2. At the top of the SCVMM console under the Home tab, expand Add Resources and select Storage Devices which launches the Add Storage Devices Wizard.
3. For the Specify Discovery Scope section of the Add Storage Devices Wizard, enter the IP Address or FQDN and port and click Browse to create a Run As Account.
4. Create a Run As Account that maps to an authenticated XIV user account. Existing or new XIV user accounts can be used. Once created, click **OK**.

   ![Create Run As Account](image)

   **Note:** As depicted by the screenshot above, the default XIV admin user account is used for testing. To map an XIV user account using LDAP authentication, review the following reference:


5. Select the newly created Run As Account and click **OK**.

   ![Select a Run As Account](image)
6. Once the XIV “IP address or FQDN and port” as well as “Run As account” fields are populated, click Next.

7. When SCVMM successfully establishes communication with the XIV storage device, the Import Certificate dialog box appears. Click Import.
8. Once SCVMM imports the certificate, the XIV storage device should show up in the following format. Confirm the Discover and import storage device information and click **Next**.

9. During the Select Storage Pools stage of the wizard, all existing XIV storage pools should be detected. Before storage pools can be managed, they must be classified. Click **Create classification**.
10. In the New Classification dialog box, designate a name and description and click Add.

![New Classification dialog box](image)

**Note:** Classifications can be assigned to storage pools based on current XIV Quality of Service (QoS) or XIV Gen 3 Solid-State Drive (SSD) support. For further information about XIV QoS, visit the following references:


**Note:** At this time, XIV Gen3 SSD support details are not publicly available.

11. Once classifications are created and assigned, ensure all Storage Device pools are selected and click Next.

![Select Storage Pools](image)
12. For the Add Storage Devices Wizard Summary section, confirm the settings and click **Finish**.

![Add Storage Devices Wizard Summary](image)

**Note:** Review the status using the SCVMM Jobs workspace...

13. In the SCVMM Fabric workspace under the Home tab, expand Storage and select **Providers**. Confirm the newly added XIV storage provider is listed with a responding status.

![SCVMM Fabric workspace](image)
14. Additionally, the newly added XIV storage provider can be confirmed by viewing Classification and Pools which reveals storage pool and volume details.

Allocation

In SCVMM 2012 once the XIV storage provider becomes available, storage must be allocated to host groups before it can be consumed by VMs. For the sake of simplicity, the following examples show how to allocate storage to the default, “All Hosts” group. If desired when allocating storage, use custom host groups based on individual preferences.

Note: SCVMM 2012 Host groups are used for VM organizational purposes.

Using the SCVMM 2012 console, perform the following steps to allocate storage to a host group:

1. At the bottom left pane of the SCVMM console, select Fabric.
2. At the top of the SCVMM console under the Home tab, expand Servers and select All Hosts.
3. Right click All Hosts and select Properties.
4. In the left pane of the All Hosts Properties, select Storage.

![Image of SCVMM 2012 Storage Automation with IBM XIV Storage System Gen3](image)

**Note**: Even though there are two storage allocation options, Allocate Storage Pools is used the majority of time. However, administrators can allocate logical units to granular custom host groups. Since both options require virtually the same steps, only details pertaining to Allocate Storage Pools are shared below.

5. While still viewing the Storage section of the All Hosts Properties, click **Allocate Storage Pools** in the right pane.
6. In the Available storage pools field of the Allocate Storage Pools dialog box, select a storage pool and click **Add**.

   ![Allocate Storage Pools dialog box](image)

   **Note**: Use the XIVGUI to create storage pools prior to allocating them to host groups in SCVMM 2012. If adding new storage pools *after* the XIV storage device has been added, it is necessary to refresh the provider. Upon refreshing the provider, new storage pools become available for allocation.

   SCVMM → Fabric → Storage → Providers → Right click the XIV provider and select **Refresh**

7. Once the storage pool is added to the Allocated storage pools, click **OK**.
8. Confirm the allocation by viewing the Storage pools field and click **OK**.

![SCVMM 2012 Storage Automation with the IBM XIV Storage System Gen3](image_url)

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**Provisioning, XIV Volume Mapping and Assignment**

Provisioning, XIV volume mapping and assignment tasks are shared for clustered Hyper-V hosts only in the interest of streamlining similar documentation steps. As noted previously, SCVMM 2012 maps volumes to all cluster hosts and creates the necessary CSV and cluster physical disk resources. Once these tasks are completed, the VMs can access their corresponding NTFS file systems.

**Note:** The same initial steps, excluding cluster-specific ones, apply to standalone Hyper-V hosts.

Use the SCVMM 2012 console to perform the following steps to provision, map XIV volumes and assign them to a Hyper-V cluster. The addition of a cluster physical disk and CSV resource is demonstrated below.

**SCVMM 2012 Cluster Available Storage**

1. At the bottom left pane of the SCVMM console, select **Fabric**.
2. At the top of the SCVMM console under the Home tab, expand Servers and All Hosts and select a **Hyper-V cluster**.

   **Note:** Make sure to select the cluster and not its individual member hosts.

3. Right click the cluster and select **Properties**.
4. In the left pane of the cluster Properties, select **Available Storage** and click **Add**.

5. Add a new cluster disk by clicking **Create Logical Unit**.
6. In the Create Logical Unit dialog box, specify the settings for the new logical unit and click **OK**.

![Create Logical Unit dialog box](image)

**Note:** For additional sizing information, review the XIV Storage Best Practices section of the following white paper:

http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101840

7. Confirm the new SCVMM 2012 logical unit creation in the XIVGUI:

![XIVGUI volumen](image)

**Note:** The volume size difference is related to decimal vs. binary conversion factors. The reference in step 6 above provides information regarding how to calculate XIV volume sizes for the Windows operating system.
8. Confirm the disk to be added to the cluster Available Storage and leave the default values for the Partition Style [GUID Partition Table (GPT) for 2+TB volumes] and File System. Add a Volume Label, select Quick Format click **OK**.

9. Confirm the Available Storage selection and click **OK**.
10. Always check the Jobs workspace to confirm successful job completions. This helps prevent job errors or failures since some SCVMM 2012 console tasks appear to complete before they actually do.

11. Use the command line or Windows Failover Cluster Manager to confirm creation of the new cluster disk resource. Refer to the command line extract below:

```bash
C:\Users\erock>cluster resource
Listing status for all available resources:
Resource     Group            Node     Status
-----------------        -----------------    ----------
Cluster Disk 3     Available Storage      superlabr23e  Online
```
12. Repeat Step 3 to go to the cluster properties again and select Available Storage. In the screenshot below, notice the ability to convert Available Storage to a CSV. Creating CSVs using this method involves a multi-step approach but another convenient option to accomplish this task. A more direct approach for creating CSVs is revealed in the following section.

SCVMM 2012 Cluster Shared Volumes
It is also possible to jump directly to CSV or Shared Volume creations using a more direct approach which automatically takes care of the prerequisite Available Storage steps. The following steps detail this more direct approach:
1. Repeat Step 3 in the SCVMM 2012 Cluster Available Storage section above to go to the cluster properties again. Select Shared Volumes and click Add.

2. In the Create Logical Unit dialog box, specify the settings for the new logical unit and click OK.

Note: For additional sizing information, review the XIV Storage Best Practices section of the following white paper:

http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101840
3. Confirm the disk to be added as a CSV and leave the default values for the Partition Style (GPT for 2+TB volumes) and File System. Add a Volume Label, select Quick Format click **OK**.

4. Confirm the CSV selection and click **OK**.
5. Go to the Jobs workspace to confirm the successful CSV creation.

6. Use the Windows Failover Cluster Manager or command line to confirm creation of the new CSV resource.

Rapid Provisioning a VM using SAN Copies
SCVMM 2012 administrators now have the ability to deploy VMs using rapid provisioning via IBM XIV SAN-based transfers. This rapid provisioning takes advantage of the Microsoft VSS framework by using XIV read/write snapshots or clones from a source VM. The read/write XIV copy of the source VM is created and assigned to a destination Hyper-V cluster or standalone host. Since the source VM files are not transferred over the network, the VM deployment is much faster.
In order to benefit from this new feature, SCVMM 2012 VM templates must be used. Administrators have the option to create SAN copy-capable templates from new or existing VMs. The VM templates are stored in the SCVMM 2012 library and to simplify administration, users can update the SCVMM server to include the Hyper-V role.

By adding the Hyper-V role, the SCVMM server can unassign an XIV volume which contains a source host’s VM files and reassign it to itself using a SAN transfer. SCVMM defines a volume mount point for the new VM template which maps to a library share. Thus, the SCVMM library contains the original source volume with the newly created VM template which is used to generate XIV read/write snapshots or clones for rapid provisioning of new VMs. For this to work, SCVMM 2012 must be installed on a physical server, not a VM.

For the following rapid provisioning step-by-step example, XIV snapshots are used rather than clones. Select the desired SAN transfer type prior to attempting to rapidly provision a VM using SAN copies. Perform the following steps to define the XIV method for rapid provisioning storage capacity for deploying new VMs.

1. Go to the SCVMM Fabric workspace and expand Storage and select Arrays.
2. In the right pane, right click the array and select Properties.
3. In the left pane of the array properties, click Settings and in the right pane, select Use snapshots. Click OK to complete the SAN copy method.

For further prerequisites and VM template creation details, review the following Microsoft TechNet article:

Rapid Provisioning a Virtual Machine by Using SAN Copy Overview
As mentioned previously, use discretion when taking advantage of the SCVMM 2012 rapid provisioning feature. Microsoft SCVMM 2012 supports a single VM to single LUN (XIV volume) ratio for the required VM templates. As a result, SCVMM rapid provisioning does not support typical CSVs which contain multiple VMs. Additionally consider the XIV storage sizing best practices referenced above.

SCVMM 2012 rapid provisioning of a VM using an XIV snapshot is demonstrated below:

1. Using the Create Virtual Machine Wizard, select the source of the VM template by clicking **Browse**.
2. Browse the SCVMM library to select the desired VM Template and click **OK**.

![Select Virtual Machine Source](image)

**Note**: A highly available VM template is selected for this example.

3. Confirm the VM Template selection and click **Next**.

![Create Virtual Machine Wizard](image)
4. Enter the Virtual machine name and Description. Click **Next**.
5. Review the VM hardware configuration and ensure the **Advanced** setting, **Make this virtual machine highly available**, is selected. Click **Next**.
6. Review the Guest OS profile and modify accordingly. Click **Next**.

7. Ensure **Place the virtual machine on a host** is selected and click **Next**.
8. Ensure the Destination Rating has golden stars and the Transfer Type is SAN. Select the desired Hyper-V cluster member and click Next.

**Note:** Grayed out rating stars depict unsuitable destination hosts. In this case, the grayed out stars represent standalone hosts which cannot host HA VMs.

9. Review the VM settings and click Next.
10. Proceed with the default Performance and Resource Optimization (PRO) setting to allow PRO migrations or dynamic optimizations.

![Add Properties Wizard](image)

**Note:** No IBM Storage PRO Packs are currently available.

11. Review the Summary details and click **Create**.
12. Go to the Jobs workspace to confirm the rapid VM deployment and creation. In the screenshot below, the highlighted job task details the rapid deployment using the SAN.

13. Since the rapid provisioning of the VM uses an XIV SAN copy, confirm the snapshot creation in the XIVGUI.
14. In the SCVMM 2012 console, go to the VMs and Services workspace and select the destination Hyper-V cluster in the left pane. The newly created HA VM is displayed in the right pane.

15. Go to one of the destination Hyper-V cluster hosts and confirm the new VM creation using the Failover Cluster Manager.
Virtual Desktop Infrastructure (VDI) Considerations

Quite often customers seek to deploy a large number of VMs for VDI deployments in a timely fashion. Since SCVMM 2012 rapid provisioning of VMs using SAN copies has limitations associated with multiple VMs on a single disk as well as XIV storage best practice implications, alternative VDI strategies should be considered. The following general steps offer an alternative solution which can be used in conjunction with SCVMM 2012.

1. Create a large XIV volume or LUN using preferred methods.
2. Map the XIV volume to the Hyper-V cluster or standalone hosts.
3. Deploy a single, generalized (Microsoft Sysprep image) VM to the mapped volume on the destination host(s).
4. Using an out-of-band (non-SCVMM) method, create multiple copies of the same VHD.
5. Unmap the XIV volume and add descriptive metadata to the volume.
6. Create multiple XIV snapshots or clones of the VM source volume containing multiple VHD file copies.
7. Map the volume and snapshots/clones to the Hyper-V host to be used as a CSV, cluster disk, or standalone host disk.
8. Create VMs using the existing generalized VHDs on the CSV, cluster disk or standalone host disk.

Decommission

To help manage and prevent running out of storage capacity, SCVMM 2012 provides administrators the ability to decommission storage. Retired Hyper-V standalone or cluster disks and CSVs can be repurposed for new VM or other storage capacity requirements. Prior to decommissioning the storage, migrate or backup any necessary VM files since the disks will be removed. Additionally, the corresponding disks or CSVs to be retired must be removed from the Hyper-V standalone or cluster hosts. They cannot be assigned to a host prior to deleting them.

Using the SCVMM 2012 console, perform the following steps for a Hyper-V cluster to decommission storage:

1. At the bottom left pane of the SCVMM console, select Fabric.
2. At the top of the SCVMM console under the Home tab, expand Servers and All Hosts and select a Hyper-V cluster.
   
   **Note:** Make sure to select the cluster and not its individual member hosts.

3. Right click the cluster and select Properties.
4. In the left pane of the cluster Properties, select Available Storage.
5. In the right pane, select the Available Storage to decommission and click **Remove**.

6. Confirm the decommissioned Available Storage is no longer present and click **OK**.

7. Use the Failover Cluster Manager to confirm the cluster physical disk resource is deleted.

8. Next, in the Fabric workspace, expand Storage and select **Classification and Pools**.
9. Select the XIV volume or LUN to be decommissioned and click **Remove** in the top toolbar.

**Note:** For the volume being removed or deleted, confirm ‘No’ is listed in the Assigned column.

10. Acknowledge the permanent deletion prompt by clicking **OK**.

11. Use the SCVMM 2012 Jobs workspace and XCLI or XIVGUI to confirm the volume deletion. Also check for increased storage capacity available for new resource allocation requests.
Conclusion

Following the step-by-step processes as well as best practices should enable customers to take advantage of Microsoft SCVMM 2012 new storage automation features using the IBM XIV Storage System Gen3. Microsoft minimum SMI-S provider prerequisites are enabled automatically with XIV microcode version 11.1.0.0. The XIV storage provider single tier design lessens administrative overhead and helps lower TCO making it well-suited for SCVMM virtualization solutions.

SCVMM 2012 centralized administrative capabilities help increase virtualization administrator productivity when combined with the performance and reliability of an industry-leading, user-friendly management IBM XIV Storage System Gen3. Together, this end-to-end virtualization solution provides intuitive VM storage management from an extensible, single GUI. The SCVMM 2012 console allows administrators to easily discover, classify, allocate, provision, map, assign and decommission storage associated with clustered and standalone Microsoft Hyper-V hosts. To learn more about the benefits of this partner solution, see the appendix below.
Appendix

IBM XIV Storage System Gen3
http://www-03.ibm.com/systems/storage/disk/xiv/

For additional information about the IBM XIV Storage System Gen3, contact askxiv@us.ibm.com

XIV Storage System Application Programming Interface Reference
https://www-304.ibm.com/support/docview.wss?uid=ssg1S7003246

IBM XIV Host Attachment Kit Version 1.7.x Host Attachment Guide

IBM XIV Provider for Microsoft Windows Volume Shadow Copy Service 2.3.x Installation Guide

IBM System x3550 M2

Brocade 815 and 825 FC HBAs

How to: Install SQL Server 2008 R2 (Setup)

Hyper-V Getting Started Guide

Failover Clusters

Microsoft System Center Virtual Machine Manager 2012 - Server and Cloud Platform

Microsoft SCVMM 2012 – Preparing the Fabric in VMM

Rapid Provisioning a Virtual Machine by Using SAN Copy Overview