Cisco Solution for EMC VSPEX Microsoft Fast Track 3.0

Microsoft Hyper-V Small Implementation

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Cisco Validated Design

Building Architectures to Solve Business Problems

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Executive Summary

Private cloud technologies have proven themselves in large data centers and hosting organizations. The ability to quickly deploy new virtual machines, make configuration changes to virtual machines, live migrate virtual machines to different hosts before performing maintenance on physical components, and other benefits like this have cut operational expenses.

The benefit has not been quite as easy to attain in smaller configurations. Often the installation of cloud technologies require the purchase of large management infrastructures in order to provide the benefits listed above. With the advent of the improved built-in management capabilities of Windows Server 2012, the improved Hyper-V that comes with it, and the Cisco UCS PowerTool PowerShell module, it is now possible to bring some of the benefits of cloud technologies to small and medium businesses or remote offices of larger businesses.

This guide will provide the steps necessary to configure a Microsoft Fast Track Small Implementation cloud built on EMC VSPEX, which is built on Cisco Unified Computing System and EMC VNXe technologies.

Benefits of Cisco Unified Computing System

Cisco Unified Computing System is the first converged data center platform that combines industry-standard, x86-architecture servers with networking and storage access into a single converged system. The system is entirely programmable using unified, model-based management to simplify and speed deployment of enterprise-class applications and services running in bare-metal, virtualized, and cloud computing environments.

The system's x86-architecture rack-mount and blade servers are powered by Intel Xeon processors. These industry-standard servers deliver world-record performance to power mission-critical workloads. Cisco servers, combined with a simplified, converged architecture, drive better IT productivity and superior price/performance for lower total cost of ownership (TCO). Building on Cisco's strength in enterprise networking, Cisco Unified Computing System is integrated with a standards-based, high-bandwidth, low-latency, virtualization-aware unified

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fabric. The system is wired when to support the desired bandwidth and carries all Internet protocol, storage, inter-process communication, and virtual machine traffic with security isolation, visibility, and control equivalent to physical networks. The system meets the bandwidth demands of today's multicore processors, eliminates costly redundancy, and increases workload agility, reliability, and performance.

Cisco Unified Computing System is designed from the ground up to be programmable and self-integrating. A server's entire hardware stack, ranging from server firmware and settings to network profiles, is configured through model-based management. With Cisco virtual interface cards, even the number and type of I/O interfaces is programmed dynamically, making every server ready to power any workload at any time. With model-based management, administrators manipulate a model of a desired system configuration, associate a model's service profile with hardware resources, and the system configures itself to match the model. This automation speeds provisioning and workload migration with accurate and rapid scalability. The result is increased IT staff productivity, improved compliance, and reduced risk of failures due to inconsistent configurations.

The power of this programmability is demonstrated in how quickly this configuration can be deployed. Cisco UCS PowerTool is used to configure the converged fabric and define the required pools, templates, and profiles needed to implement a small business or branch implementation of Hyper-V. After editing a text file to define customer specific values, a PowerShell script is run. This takes a few minutes instead of a couple hours working in front of a GUI. It ensures consistency in deployment, while at the same time not requiring a high level of expertise in UCS in order to deploy the solution.

Cisco Fabric Extender technology reduces the number of system components to purchase, configure, manage, and maintain by condensing three network layers into one. It eliminates both blade server and hypervisor-based switches by connecting fabric interconnect ports directly to individual blade servers and virtual machines. Virtual networks are now managed exactly as physical networks are, but with massive scalability. This represents a radical simplification over traditional systems, reducing capital and operating costs while increasing business agility, simplifying and speeding deployment, and improving performance.

Cisco Unified Computing System helps organizations go beyond efficiency: it helps them become more effective through technologies that breed simplicity rather than complexity. The result is flexible, agile, high-performance, self-integrating information technology, reduced staff costs with increased uptime through automation, and more rapid return on investment.

Benefits of EMC VNXe3300 Storage Array

The EMC VNXe series redefines networked storage for the small business to small enterprise user, delivering an unequaled combination of features, simplicity, and efficiency. These unified storage systems provide true storage consolidation capability with seamless management and a unique application driven approach that eliminates the boundaries between applications and their storage. VNXe systems are uniquely capable of delivering unified IP storage for NAS and iSCSI while simplifying operations and reducing management overhead. While for the Fast Track configuration only iSCSI is defined, the system can be extended to include CIFS and NFS to enable NAS environments.

The VNXe3300 is equipped with two controllers for performance, scalability, and redundancy. The high-availability design, including mirrored cache and dual active controllers, is architected to eliminate single points-of-failure. If an outage occurs, data in the VNXe write cache is safely stored in Flash memory, eliminating time-limited battery backup and external power supplies.

The VNXe hardware platforms take advantage of the latest processor technology from Intel, and include features that help meet future needs for growth and change. This includes Flex I/O expansion which provides the capability of adding 1 Gb/s or 10 Gb/s ports to extend connectivity and performance. Also the latest 6 Gb/s serial-attached SCSI (SAS) drives and enclosures are used to enable enterprise performance and end-to-end data integrity features. The VNXe systems also support Flash drives for performance-intensive applications.

The system can grow from as small as 6 drives to as large as 150 to allow for extreme flexibility in growth and performance for changing environments. The drives presented to the system are organized into pools for simple capacity management and ease of expansion. Advanced storage efficiency can be achieved through the use of the VNXe's thin provisioning capability, which enables on-demand allocation of storage. In NAS environments file-level deduplication and compression can be used to reduce physical capacity needs by 50 percent or more.

VNXe systems were designed with a management philosophy in mind: keep it simple. It's storage from the application's point of view with one clear way to handle any task. From initial installation to creating storage for virtual servers, the bottom line is the VNXe management interfaces, including Unisphere, will help to save steps and time. Provisioning storage for 500 mailboxes or 100 GB of virtual server storage can be done in less than 10 minutes. Application-driven provisioning and management enables you to easily consolidate your storage.

Benefits of Microsoft Private Cloud Fast Track Small Implementation

Microsoft Fast Track private cloud solutions, built on Microsoft Windows Server and System Center, dramatically change the way that enterprise customers produce and consume IT services by creating a layer of abstraction over pooled IT resources. But small and medium businesses might not need all the features provided by a full System Center implementation. Enter the Fast Track Small Implementation, a design specifically for small/medium businesses and branch locations of larger businesses.

The Microsoft Hyper-V Cloud Fast Track Program provides a reference architecture for building private clouds on each organization's unique terms. Each fast-track solution helps organizations implement private clouds with increased ease and confidence. Among the benefits of the Microsoft Hyper-V Cloud Fast Track Program are faster deployment, reduced risk, and a lower cost of ownership.

Faster deployment:

- End-to-end architectural and deployment guidance
- Streamlined infrastructure planning due to predefined capacity
- Enhanced functionality and automation through deep knowledge of infrastructure
- Integrated management for virtual machine (VM) and infrastructure deployment
- Self-service portal for rapid and simplified provisioning of resources

Reduced risk:

- Tested, end-to-end interoperability of compute, storage, and network
- Predefined, out-of-box solutions based on a common cloud architecture that has already been tested and validated
- High degree of service availability through automated load balancing

Lower cost of ownership:

- A cost-optimized, platform and software-independent solution for rack system integration
- High performance and scalability with Windows Server 2012 operating system advanced platform editions of Hyper-V technology
- Minimized backup times and fulfilled recovery time objectives for each business critical environment

Audience

This document describes the architecture and deployment procedures of an infrastructure comprised of Cisco, EMC, and Microsoft virtualization. The intended audience of this document includes, but is not limited to, sales engineers, field consultants, professional services, IT managers, partner engineering, and customers who want to deploy the VSPEX architecture.

Architecture

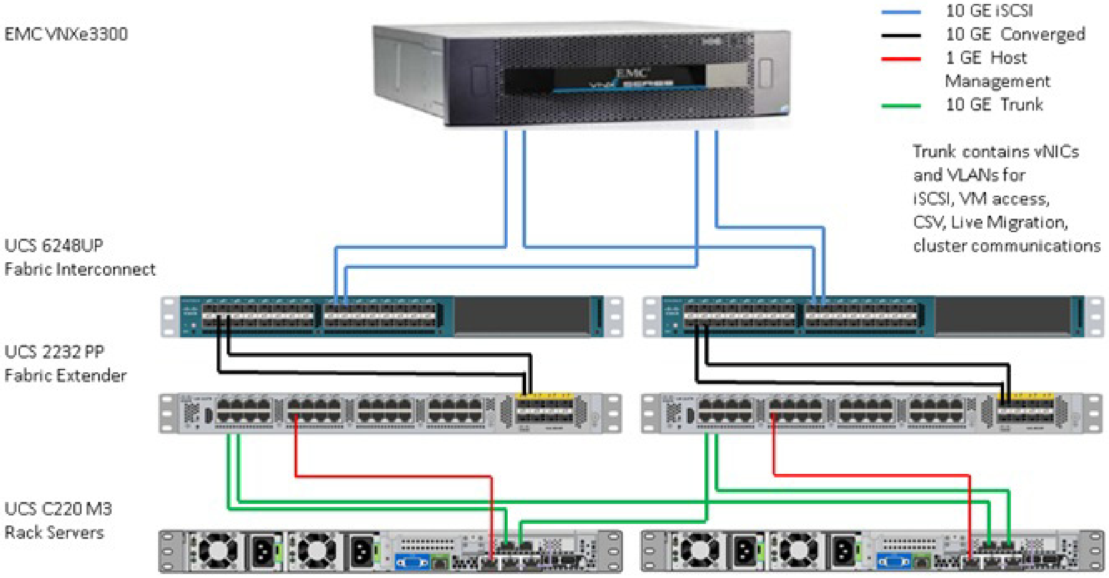
There are two reference architectures for the Fast Track Small Implementation. The first is based on a Cluster-in-a-Box design which utilizes low-cost storage options connected to clustered RAID controllers. The second architecture is built on a storage solution that off-loads storage processing to a SAN. The Cisco/EMC solution is based on the clustered SAN design.

The Clustered SAN design pattern uses the highly available Windows Server 2012 Hyper-V clustered architecture with traditional SAN storage. The Clustered SAN design pattern enables the storage network and network paths to be combined over a single medium, which requires fewer infrastructures by offering a converged network design. The design pattern employs an Ethernet infrastructure that serves as the transport for the management and failover networks, and provides logical separation between these networks.

This topology utilizes a traditional SAN based solution with 2 to 4 server nodes connected and clustered. The virtual machines all run within the Hyper-V cluster and utilize the networking infrastructure; whether using converged or non-converged design as mentioned previously. The requirement of Microsoft's Fast Track architecture maps on top of the VSPEX program of validated configurations of the Cisco UCS Server and EMC VNX storage.

The Cisco/EMC solution uses local on motherboard LAN connections for management of the hosts. All other networking is handled through a converged fabric which configures the redundant connections into multiple, individual LANs for use by the different functions, for example, Live Migration and iSCSI.

Figure 1 Cisco Unified Computing System and EMC Reference Design Pattern


EMC VNXe3300
UCS 6248UP Fabric Interconnect
UCS 2232 PP Fabric Extender
UCS C220 M3 Rack Servers
10 GE iSCSI
10 GE Converged
1 GE Host Management
10 GE Trunk
Trunk contains vNICs and VLANs for iSCSI, VM access, CSV, Live Migration, cluster communications

Bill of Materials

This solution is designed to scale from a small configuration of two Cisco UCS C220 M3 servers to a maximum of four servers. The associated VNXe330 Storage Array can also scale from the 22 disks shown in the below table, up to 150 disks, depending on storage requirements.

Cisco Bill of Materials

Table 1lists the bill of materials for Cisco.

Table 1 Cisco Bill of Material

Item	Qty
Hardware	
Cisco UCS C220 M3 blade servers with 64 GB of memory and 2 Intel E5-2650 CPUs	4
Redundant Power Supplies (C220 M3)	4
P81E adapters	4
Cisco UCS 2232PP Fabric Extenders	2
Redundant Power Supplies (UCS 2232)	2
Cisco UCS 6248UP Fabric Interconnects	2
Redundant Power Supplies (FI)	2
3M LC-LC Fiber Optic Cables	8
1 Foot Cat6 Cables	2
3M Cat6 Cables	10
1M Twinax Cables to connect UCS 2232 to Fabric Interconnect	4
3M Twinax Cables to connect C220 to UCS 2232	8

SFP-10G-SR Fiber Transceivers	8
GLC-T Transceivers	12
KVM cable for connecting keyboard, video, and mouse to the C220s	1

EMC Bill of Materials

Table 2 lists the bill of materials for EMC.

Table 2 EMC Bill of Materials

Item	Qty
Hardware	
VNXE3300 Rack	1
300GB 15K SAS Drive	22
2X 10 GB Ethernet Optical Ultraflex IO Module	2
VNXE3300 3U DAE; 15X3.5 w/rack	1
VNXE3300;2XSP DPE;15X3.5 DS;8X300GBSAS;AC; w/rack	1
RACK-40U-60 power cord US	1
Software	
VNXE3300 Base OE V2.0 (EMC ECOSYS) =IC	1
VNXE3300 Software Features	1

Configuration Guidelines

This document provides details for configuring a fully redundant, highly-available configuration. Therefore, references are made as to which component is being configured with each step, whether A or B. For example, Fabric Interconnect A and Fabric Interconnect B are used to identify the two Cisco UCS 6248UP Fabric Interconnect switches. Service Process A and Service Processor B (or SP-A and SP-b) are used to identify the two service processors in the EMC VNXe3300 Storage Array. o indicate that the reader should include information pertinent to their environment in a given step, <italicized text> appears as part of the command structure.

This document is intended to allow the reader to fully configure the customer environment. In order to expedite the configuration of the UCS environment, PowerShell command scripts are included in Appendix A. The Create-UcsHyperVFastTrack.ps1 script contains generic values for variables at the beginning of the script. Values for these variables will have to be tailored for the customer environment. The following table can be used to record the appropriate values for the customer installation. Note that many of these values may be used as is, but optionally can be altered.

Table 3 Customer Worksheet for Create-UcsHyperVFastTrack.ps1

Variable	Purpose	Provided Value	Actual Value
$ucs	VIP address of UCSM	192.168.171.129	
$ucsuser	Administrator user name	Admin	
$ucspass	Administrator password	admin	
$ucsorg	Organization unit into which UCSM components are stored	org-root	
$mgtippoolblockfrom	Starting IP addresses for pool of management IPs	10.10.199.10	
$mgtippoolblockto	Ending IP addresses for pool of management IPs	10.10.199.19	
$mgtippoolgw	IP address for gateway for management	10.10.199.1	
$serverports	Ports on Fabric Interconnect A and B serving as server ports	3,4,5,6	
$applianceport1	Port on Fabric Interconnects A and B to be used as first appliance (iSCSI) port	29	
$applianceport2	Port on Fabric Interconnects A and B to be used as second appliance (iSCSI) port	30	
$tenantname	Unique identifier for creating UCS objects	FastTrack3	
$tenantnum	Two hex characters to distinguish pool values	F3	
$macpoolblockfrom	Starting value for block for pool of MAC addresses	00:25:B5:$tenantnum:01:01	
$macpoolblockto	Ending value for block for pool of MAC addresses	00:25:B5:$tenantnum:01:FF	
$wwpnpoolblockfrom	Starting value for block for pool of WWPN addresses	20:00:00:25:B5:$tenantnum:02:01	
$wwpnpoolblockto	Ending value for block for pool of WWPN addresses	20:00:00:25:B5:$tenantnum:02:10	
$wwnnpoolblockfrom	Starting value for block for pool of WWNN addresses	20:00:00:25:B5:$tenantnum:03:01	
$wwnnpoolblockto	Ending value for block for pool of WWNN addresses	20:00:00:25:B5:$tenantnum:03:10	
$uuidpoolblockfrom	Beginning value for pool of UUIDs	00$tenantnum-000000000001	
$uuidpoolblockto	Ending value for pool of UUIDs	00$tenantnum-000000000008	
$maintpolicy	Type of maintenance policy to enforce	immediate	
$vnicarray	Array entry for vNIC definitions. Values are Name, MTU size, SwitchID, VLAN tag, order	"CSV", "9000", "A-B", "12", "5"	
$vnicarray	Array entry for vNIC definitions. Values are Name, MTU size, SwitchID, VLAN tag, order	"ClusComm", "9000", "A-B", "16", "3"	
$vnicarray	Array entry for vNIC definitions. Values are Name, MTU size, SwitchID, VLAN tag, order	"LiveMigration", "9000", "B-A", "11", "4"	

$vnicarray	Array entry for vNIC definitions. Values are Name, MTU size, SwitchID, VLAN tag, order	"Mgmt", "1500", "A-B", "1", "1"	
$vnicarray	Array entry for vNIC definitions. Values are Name, MTU size, SwitchID, VLAN tag, order	"VMaccess", "1500", "A-B", "1", "2"	
$iSCSIAVlan	VLAN name for iSCSI-A	iSCSI-A	
$iSCSIAVlanId	VLAN ID for iSCSI-A VLAN	24	
$iSCSIBVlan	VLAN name for iSCSI-B	iSCSI-B	
$iSCSIBVlanId	VLAN ID for iSCSI-B VLAN	25	
$qoslivemigration	QoS system class for Live Migration (value is case-sensitive)	platinum	
$qosiscsi	QoS system class for iSCSI (value is case-sensitive)	gold	

A second sample PowerShell script, Create-UcsHyperVIscsi.ps1, creates the service profiles necessary to enable the servers to boot from iSCSI. This script uses the following variables. Again, the customer will have to change values to reflect their environment.

Table 4 Customer Worksheet for Create-UcsHyperVIscsi.ps1

Variable	Purpose	Provided Value	Actual Value
$ucs	VIP address of UCSM	192.168.171.133	
$ucsuser	Administrator user name	Admin	
$ucspass	Administrator password	admin	
$ucsorg	Organization unit into which UCSM components are stored	org-root	
$tenantname	Sub-organization name	FastTrack3	
$tenantfirstIP	Last digits of first server's IP address. Incremented for subsequent servers.	31	
$iSCSICiscoIQNPrefix	Starting string for unique IQN for hosts	iqn.1992-05.com.cisco	
$iSCSICiscoIQNSuffix	Ending string for unique IQN for hosts	be6evmhost	
$iSCSICiscoIQNSuffixStartNumber	Start number for unique IQN for hosts	1	
$iSCSICiscoIQNSuffixCount	Number of unique IQNs to create	30	
$iSCSITargetIPControllerAPort1	SPA eth01 IP address	10.10.18.1	
$iSCSITargetIPControllerAPort2	SPA eth11 IP address	10.10.19.1	
$iSCSITargetIPControllerBPort1	SPB eth01 IP address	10.10.18.2	
$iSCSITargetIPControllerBPort2	SPB eth11 IP address	10.10.19.2	

$iSCSITargetIQNA	Retrieved from the VNXe.	iqn.1992-05.com.emc:apm001203006930000-4-vnxe	
$iSCSITargetIQNB	Currently blank. Added after system has MPIO installed	blank	
$iSCSIInitiatorIP	String for building iSCSI initiator addresses	10.10	
$iSCSIVlanAId	VLAN tag value for iSCSI A	18	
$iSCSIVlanBId	VLAN tag value for iSCSI B	19	
$iSCSIIPPoolAStartingIP	iSCSI IP pool starting address	10.10.18.201	
$iSCSIIPPoolAEndingIP	iSCSI IP pool ending address	10.10.18.219	
$iSCSIIPPoolANetMask	iSCSI IP pool net mask	255.255.255.0	
$iSCSIAdapterPolicyName	iSCSI adapter policy name	Windows-VIC	
$iSCSIVlanA	iSCSI A VLAN name	iSCSI-A	
$iSCSIVlanB	iSCSI B VLAN name	iSCSI-B	
$iSCSIvNICNameA	iSCSI A vNIC name	iSCSI-A	
$iSCSIvNICNameB	iSCSI B vNIC name	iSCSI-B	
$iSCSIOverlayvNicA	iSCSI A overlay vNIC name	iSCSI-A	
$iSCSIOverlayvNicB	iSCSI B overlay vNIC name	iSCSI-B	
$VMHostNamePrefix	Prefix to assign to created service profiles	VMHost0	
$VMHostCount	Number of service profiles to create	4	
$VMHostBootLunId	LUN IDs created on VNXe for booting	0,1,2,3	

Active Directory Domain Services

Active Directory Domain Services (AD DS) is a required foundational component that is provided as a component of Windows Server 2012. Previous versions are not directly supported for all workflow provisioning and de-provisioning automation. It is assumed that AD DS deployments exist at the customer site and deployment of these services is not in scope for the typical deployment.

- AD DS in guest virtual machine. For standalone, business in-a-box configurations, the preferred approach is to run AD DS in a guest virtual machine, using the Windows Server 2012 feature that allows a Windows Failover Cluster to boot prior to AD DS running in the guest. For more information on deploying Domain Services within virtual machines, see Microsoft TechNet article on Things to consider when you host Active Directory domain controllers in virtual hosting environments.

- Forests and domains. The preferred approach is to integrate into an existing AD DS forest and domain, but this is not a hard requirement. A dedicated resource forest or domain may also be employed as an additional part of the deployment. This solution supports multiple domains or multiple forests in a trusted environment using two-way forest trusts.
- Trusts (multi-domain or inter-forest support). This solution enables multi-domain support within a single forest in which two-way forest (Kerberos) trusts exist between all domains.

The Cisco/EMC solution is designed to integrate with an existing AD DS infrastructure. If this is for a new installation that does not have an AD infrastructure, virtual machines can be built as virtual machines on the cluster hosts. If using a 2008 or earlier AD DS infrastructure, the virtual machines running AD DS should not be configured as highly available virtual machines.

Configure the Workstation

It is recommended to have a Windows 8 or Windows Server 2012 workstation configured with certain pre-requisite software and joined to the same domain as the Hyper-V servers will be joined. Using a properly configured workstation makes the job of installing the solution easier. Here is the recommendation for software to be installed on the workstation.

- Java 7 - required for running UCS Manager. Version 2.0(3a) and later will work with Java 7. http://java.com/en/download/ie_manual.jsp?locale=en
- Cisco UCS PowerTool for UCSM, version 0.9.10.0. http://developer.cisco.com/web/unifiedcomputing/pshell-download
  - Cisco UCS PowerTool requires the presence of Microsoft's .NET Framework 2.0. If using Windows 8 or Windows Server 2012, this will need to be installed, as it is older software.
- PuTTY - an SSH and Telnet client helpful in initial configuration of the Cisco UCS 6248UP Fabric Interconnects. http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
- PL-2303 USB-to-Serial driver - used to connect to the Cisco UCS 6248UP Fabric Interconnects through a serial cable connected to a USB port on the workstation. http://plugable.com/drivers/prolific/
- Windows Server 2012 system
  - Install the Hyper-V Management Tools by issuing this PowerShell cmdlet: Install-WindowsFeature -Name RSAT-Hyper-V-Tools -IncludeAllSubFeature
  - Install the Windows Failover Clustering Tools by issuing this PowerShell cmdlet: Install-WindowsFeature -Name RSAT-Clustering -IncludeAllSubFeature

You will also need to have copies of the Windows Server 2012 installation media and the Cisco drivers 2.0(4a) for the P81E (www.cisco.com/cisco/software/type.html?mdfid=283862063&flowid=25886). Store these in a directory on your configuration workstation.

Install the Remote Server Administration Toolkit (RSAT) on the Configuration Workstation

There are several PowerShell scripts contained in Appendix A of this document. These are sample scripts. They have been tested, but they are not warranted against errors. They are provided as is, and no support is assumed. But they assist greatly in getting the Hyper-V implementation configured properly and quickly. Some of the scripts will require editing to reflect customer-specific configurations. It is best to create a file share on the configuration workstation and place all the PowerShell scripts on that file share. Most of the scripts will run from the configuration workstation, but there may be some that have to be run locally on the server being configured. Having them available on a file share makes it easier to access them.

For each of the PowerShell scripts contained in Appendix A, do the following:

1. Open Notepad.
2. Copy the contents of a section in Appendix A.
3. Paste into Notepad.
4. Save the file using as the name of the file the name of the section in Appendix A. While saving, ensure to set the "Save as type:" field to "All files (*)". For example, section Create-UcsHyperVFastTrack.ps1 should be saved as "Create-UcsHyperVFastTrack.ps1".

Deployment

This document details the necessary steps to deploy base infrastructure components as well as provisioning Microsoft Hyper-V as the foundation for virtualized workloads. At the end of these deployment stops, you will be prepared to provision applications on top of a Microsoft Hyper-V virtualized infrastructure. The outlined procedure includes:

- Cabling Information
- Cisco Unified Computing System Deployment Procedure
- Initial EMC VNXe3300 Configuration
- Installation of Windows Server 2012 Datacenter Edition
- Configuration of Hyper-V Failover Cluster

The VSPEX solution provides for a flexible implementation. This guide will provision a basic configuration. Specific customer installations may vary slightly. For example, this guide will show how to configure a two-node Microsoft Server 2012 Hyper-V Failover Cluster. Adding a third and fourth node is just a matter of adding the name of the third and fourth nodes into the cluster configuration wizard or PowerShell commands. Although a specific customer implementation may deviate from the information that follows, the best practices, features, and configurations listed in this section should still be used as a reference for building a customized Cisco UCS with EMC VNXe3300 Microsoft Private Cloud Fast Track Small Implementation.

Cabling Information

The following information is provided as a reference for cabling the physical equipment in a Cisco/EMC VSPEX environment. The tables include both local and remote device and port locations in order to simplify cabling requirements. The PowerShell command file in Appendix A is written to conform to this cabling information. Changes made to the customer cabling need to be reflected in the command file by editing the associated variables.

Table 5 Cisco UCS C220 M3 Server 1 Cabling Information

Local Port	Connection	Remote Device	Remote Port
LoM #1	1 GE (Cat6)	UCS 2232PP A	Eth 1/17
LoM #2	1 GE (Cat6)	UCS 2232PP B	Eth 1/17
P81E #1	10 GE (Twinax)	UCS 2232PP A	Eth 1/1
P81E #2	10 GE (Twinax)	UCS 2232PP B	Eth 1/1

Table 6 Cisco UCS C220 M3 Server 2 Cabling Information

Local Port	Connection	Remote Device	Remote Port
LoM #1	1 GE (Cat6)	UCS 2232PP A	Eth 1/18
LoM #2	1 GE (Cat6)	UCS 2232PP B	Eth 1/18
P81E #1	10 GE (Twinax)	UCS 2232PP A	Eth 1/2
P81E #2	10 GE (Twinax)	UCS 2232PP B	Eth 1/2

Table 7 Cisco UCS 2232PP Fabric Extender A Cabling Information

Local Port	Connection	Remote Device	Remote Port
Eth 1/1	10 GE (Twinax)	C220 M3 Server 1	P81E #1
Eth 1/2	10 GE (Twinax)	C220 M3 Server 2	P81E #1
Eth 1/17	1 GE (Cat6)	C220 M3 Server 1	LoM #1
Eth 1/18	1 GE (Cat6)	C220 M3 Server 2	LoM #1
Eth 2/1	10 GE (Twinax)	UCS 6248UP A	Eth 1/15
Eth 2/2	10 GE (Twinax)	UCS 6248UP A	Eth 1/16

Table 8 Cisco UCS 2232PP Fabric Extender B Cabling Information

Local Port	Connection	Remote Device	Remote Port
Eth 1/1	10 GE (Twinax)	C220 M3 Server 1	P81E #2
Eth 1/2	10 GE (Twinax)	C220 M3 Server 2	P81E #2
Eth 1/17	1 GE (Cat6)	C220 M3 Server 1	LoM #2
Eth 1/18	1 GE (Cat6)	C220 M3 Server 2	LoM #2
Eth 2/1	10 GE (Twinax)	UCS 6248UP B	Eth 1/15
Eth 2/2	10 GE (Twinax)	UCS 6248UP B	Eth 1/16

Table 9 Cisco UCS 6248UP Fabric Interconnect A Cabling Information

Local Port	Connection	Remote Device	Remote Port

Eth 1/1	10 GE (Twinax)	C220 M3 Server 1	P81E #2
Eth 1/2	10 GE (Twinax)	C220 M3 Server 2	P81E #2
Eth 1/17	1 GE (Cat6)	C220 M3 Server 1	LoM #2
Eth 1/18	1 GE (Cat6)	C220 M3 Server 2	LoM #2
Eth 2/1	10 GE (Twinax)	UCS 6248UP B	Eth 1/15
Eth 2/2	10 GE (Twinax)	UCS 6248UP B	Eth 1/16

Table 10 Cisco UCS 6248UP Fabric Interconnect B Cabling Information

Local Port	Connection	Remote Device	Remote Port
Eth 1/15	10 GE (Twinax)	UCS 2232PP B	Eth 2/1
Eth 1/16	10 GE (Twinax)	UCS 2232PP B	Eth 2/2
Eth 1/25	10 GE (Fibre)	VNXe SPA	Eth 1
Eth 1/26	10 GE (Fibre)	VNXe SPB	Eth 1
Eth 1/32	1 GE (Cat6)	Network switch	

Table 11 EMC VNXe3300 Service Processor A Cabling Information

Local Port	Connection	Remote Device	Remote Port
Eth 0	10 GE (Fibre)	UCS 6248UP A	Eth 1/25
Eth 1	10 GE (Fibre)	UCS 6248UP B	Eth 1/25

Table 12 EMC VNXe3300 Service Processor B Cabling Information

Local Port	Connection	Remote Device	Remote Port
Eth 0	10 GE (Fibre)	UCS 6248UP A	Eth 1/26
Eth 1	10 GE (Fibre)	UCS 6248UP B	Eth 1/26

Cisco Unified Computing System Deployment Procedure

Initial Cisco UCS Configuration

The following section provides a detailed procedure for configuring the Cisco Unified Computing System. These steps should be followed precisely because a failure to do so could result in an improper configuration.

Cisco UCS 6248 A

1. Connect to the console port on the first Cisco UCS 6248 fabric interconnect.
2. At the prompt to enter the configuration method, enter **console** to continue.
3. If asked to either do a new setup or restore from backup, enter **setup** to continue.
4. Enter **y** to continue to set up a new fabric interconnect.
5. Enter **y** to enforce strong passwords.
6. Enter the password for the admin user.
7. Enter the same password again to confirm the password for the admin user.
8. When asked if this fabric interconnect is part of a cluster, answer y to continue.
9. Enter **A** for the switch fabric.
10. Enter the cluster name for the system name.
11. Enter the Mgmt0 IPv4 address.

12. Enter the Mgmt0 IPv4 netmask.
13. Enter the IPv4 address of the default gateway.
14. Enter the cluster IPv4 address.
15. To configure DNS, answer **y**.
16. Enter the DNS IPv4 address.
17. Answer **y** to set up the default domain name.
18. Enter the default domain name.
19. Review the settings that were printed to the console, and if they are correct, answer yes to save the configuration.
20. Wait for the login prompt to make sure the configuration has been saved.

Cisco UCS 6248 B

1. Connect to the console port on the second Cisco UCS 6248 fabric interconnect.
2. When prompted to enter the configuration method, enter **console** to continue.
3. The installer detects the presence of the partner fabric interconnect and adds this fabric interconnect to the cluster. Enter **y** to continue the installation.
4. Enter the admin password for the first fabric interconnect.
5. Enter the Mgmt0 IPv4 address.
6. Answer **yes** to save the configuration.
7. Wait for the login prompt to confirm that the configuration has been saved.

Log into Cisco UCS Manager

These steps provide details for logging into the Cisco UCS environment.

1. Open a web browser and navigate to the Cisco UCS 6248 fabric interconnect cluster address.
2. Select the **Launch** link to download the Cisco UCS Manager software.
3. If prompted to accept security certificates, accept as necessary.
4. When prompted, enter **admin** for the username and enter the administrative password and click **Login** to log in to the Cisco UCS Manager software.

Scripted Configuration for Fast Track

Appendix A contains a PowerShell script that can be run to configure the Microsoft Private Cloud Fast Track Small Implementation environment. It contains default values that should be edited to reflect what has been captured in the customer worksheet shown in Table 3. Only the variables at the beginning of the script should be edited. This script makes extensive use of Cisco UCS PowerTool.

Note This script contains a section for defining a server qualification policy. That policy will need to be edited to reflect the customer's particular server models.

1. Connect your configuration workstation to the network. Ensure proper network access to the Cisco UCS Manager by pinging the fabric interconnect network address.
2. Open a PowerShell window. Enter the command **Get-ExecutionPolicy.**

3. If the above command returns the value "Restricted", enter the command **Set-ExecutionPolicy RemoteSigned**. Enter **Y** at the confirmation prompt. By default, PowerShell is set up to prevent the execution of script files. Setting the execution policy to RemoteSigned will enable the execution of the Create-UcsHyperVFastTrack script.
4. Connect to the directory in which you stored the PowerShell scripts.
5. Type.**\Create-UcsHyperVFastTrack.ps1.**‘
6. You can use the UCS Manager GUI that you opened earlier to view the configuration just built.

Initial EMC VNXe3300 Configuration

Unpack, Rack, and Install

The VNXe base system included with this Fast Track solution includes one VNXe disk processor enclosure (DPE) and one disk-array enclosures (DAE). The system will also include 30 300GB 15K SAS drives.

The VNXe system package will include the 3U DPE with capacity for 15 disk drives, an adjustable rail kit, power cords, a service cable, and a front bezel with key. The 3U DAE package also has capacity for 15 disk drives, includes an adjustable rail kit, power cords, serial attached SCSI (SAS) cables, and a front bezel with key.

The VNXe System installation guide (available online at http://www.emc.com/vnxesupport) provides detailed information on how to rack, cable, and power-up the VNXe system. At a high level, the process includes the following:

- When applicable, install VNXe components in a rack - install included rail kits and secure the VNXe components inside the rack. It is ideal to have two people available for lifting the hardware, due to the weight of the system.
- Install the 2 10Gb Optical Ultraflex I/O modules, one into each service processor - Detailed information on how to add the I/O modules can be found in the "EMC VNXe3300 Adding Input/Output Modules" document available at www.emc.com/vnxesupport
- Connect the dual port 10Gb I/O modules to the switch ports as outlined in the Cabling Information tables in this document.
- Connect cables to the VNXe system components - connect cables between the DPE and DAE and connect the DPE management ports, one per service processor, to the appropriate "top of rack" switch to be used for external connectivity.
- Connect power cables and power up the system - connect power to the VNXe components and wait until the LEDs indicate that the system is ready.

Connect to the VNXe

Option 1 - Automatic IP Address Assignment for the VNXe Management Port

If you are running the VNXe on a dynamic network that includes DHCP servers, DNS servers, and Dynamic DNS services, the management IP address can be assigned automatically. By default, the VNXe system management port is configured to use DHCP for IP assignment and will accept an IP address broadcast by a network DHCP server.

Perform the following steps to automatically assign an IP address to your VNXe system management port:

After you power up the VNXe system check the status of the SP fault/status LEDs. If the SP fault/status LEDs are solid blue, a management IP address has been assigned. If the fault/status LEDs are blue and flash amber every three seconds, no management IP address has been assigned. If the SP Fault/Status LEDs are blue and flashing, check the connectivity between the system, the DNS server, and the DHCP server.

Open a web browser and access the VNXe management interface specifying the following as a URL in the browser's address bar serial_number.domain.

Where:

URL string	Description
Serial_number	Serial number of your VNXe. You can find this in the packing materials (for example, FM100000000017,) or on the PSNT tag on the back of the DPE
domain	Network domain on which the VNXe system is located (for example, mylab.emc.com)

Option 2 - Manual Static IP Address Assignment for the VNXe Management Port

To manually assign a static IP address for the VNXe system management port, the VNXe Connection Utility is required. To use the VNXe connection utility to assign a network address to the VNXe system, perform the following steps:

1. Download and run the VNXe Connection Utility software.
   a. Download the software from www.emc.com/vnxesupport (under **Downloads**)
   b. Install the VNXe connection utility on a Windows computer. To use the Auto Discover method discussed below, install on a computer connected to the same subnet as the VNXe management port.
   c. Launch the VNXe Connection Utility

Use the connection utility to assign a management IP address to the VNXe system. After running the utility, select one of the following options

   d. Select Auto Discover and click Next to assign an IP address to a VNXe on the local subnet
   - View the VNXe systems, select the Product ID/SN of the desired system and click Next. If you do not see your VNXe, click Discover to scan the subnet again.
   - Specify a name, an IP address, subnet mask and gateway, click Next
   - The Configuration Summary screen appears. When all entries are complete, click Finish. The Configuring the VNXe Device screen will appear while the settings are implemented. The setup can take up to 10 minutes.
   - Click the Start Unisphere button to log in to Unisphere on the selected system.

   e. Or select Manual Configuration and click Next to assign a Management IP address to a VNXe system.
   - Specify a name, an IP address, subnet mask, and default gateway for the VNXe system and then click Save file to flash drive
   - Connect the flash drive to the USB port on either storage processor of the VNXe system to assign the IP address to the system.
   - Open a web browser to the IP address assigned to the VNXe system in order to connect to Unisphere.

Initial VNXe Configuration

Upon connecting to the VNXe system in the previous steps, log into Unisphere using the following credentials

- Username: admin
- Password: Password123#

The first time Unisphere is launched, the Unisphere Configuration wizard will run. The wizard provides the steps necessary to configure the following system settings:

- Passwords for the default system administrator and service accounts
- Advanced proactive EMC support through the ESRS and ConnectEMC features
- DNS and NTP time synchronization support settings
- Storage pool configuration: automatic or customer storage pool configuration: more details on this in the following sections
- Unisphere Storage Server settings for managing iSCSI and shared folder storage: more details on this in the following sections

Storage Pool Considerations

The VNXe 3300 supports a range of drive technologies and RAID protection schemes. For the proposed solution, Cisco and EMC have implemented a base configuration that utilizes a single drive type and RAID protection scheme. The solution implements a total of 30 300 GB 15K RPM SAS drives in a RAID 5 configuration.

In a VNXe 3300 RAID 5 is implemented in multiples of 7 (6 data + 1 parity) drive sets. For a total of 30 drives, there will be 4 X 6+1 RAID 5 sets. The remaining 2 drives are meant to be configured as Hot Spares.

When using the **automatically configure pools** option, the VNXe will allocate existing disks into capacity, performance and/or extreme performance pools, depending on the number and type of available disks. The rules used are the following:

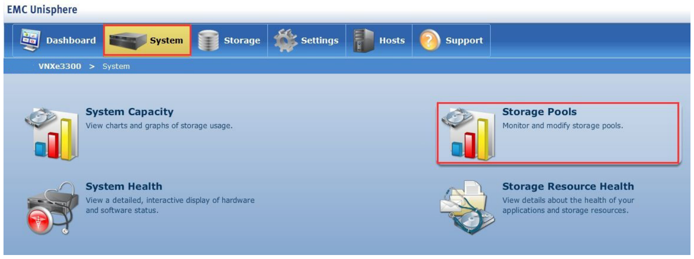
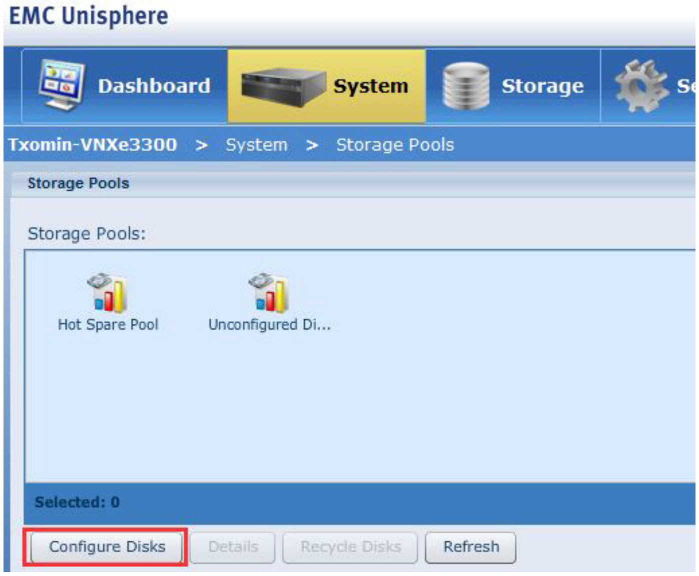
- NL-SAS disks are allocated in multiples of six in RAID6 (4+2) groups with no assigned spare disks. For example, if 45 NL-SAS disks are available, the capacity pool uses 42 of the disks, does not allocate any spare disks and leaves three disks unassigned. If needed, you can manually create a hot spare with NL-SAS disks.
- In a VNXe3300 system, SAS disks are assigned in multiples of seven in RAID 5 (6+1) groups. One spare disk is assigned for the first 0-30 disks, and another spare disk is assigned for each additional group of 30 disks. For the base Fast Track configuration of 30 SAS disks, a performance pool would be created with 28 disks (4 groups of seven-disks,) one hot spare would be allocated and one disks would be unassigned. The unassigned disk can be added manually as a second hot spare.
- In a VNXe3300, Flash drives are assigned in multiples of five in RAID 5 (4+1) groups. A spare disk is assigned if there are leftover drives. For example, if 11 Flash drives are available, the extreme performance pool uses 10 disks (in two groups of five-disks) and allocates one spare disk.

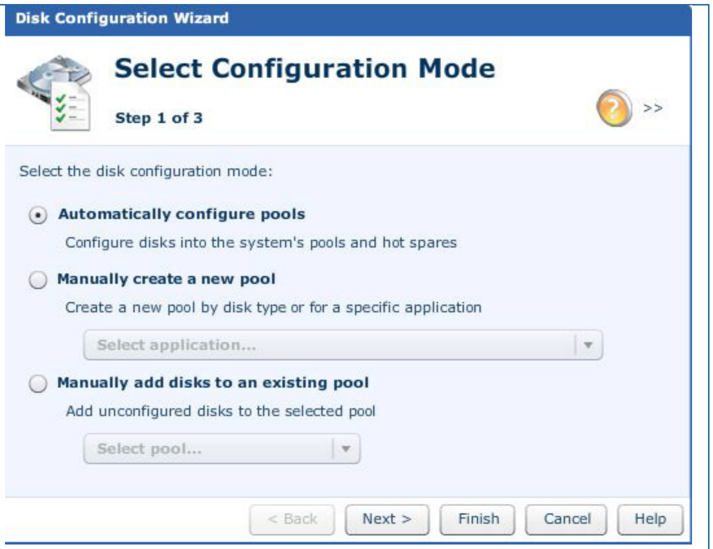
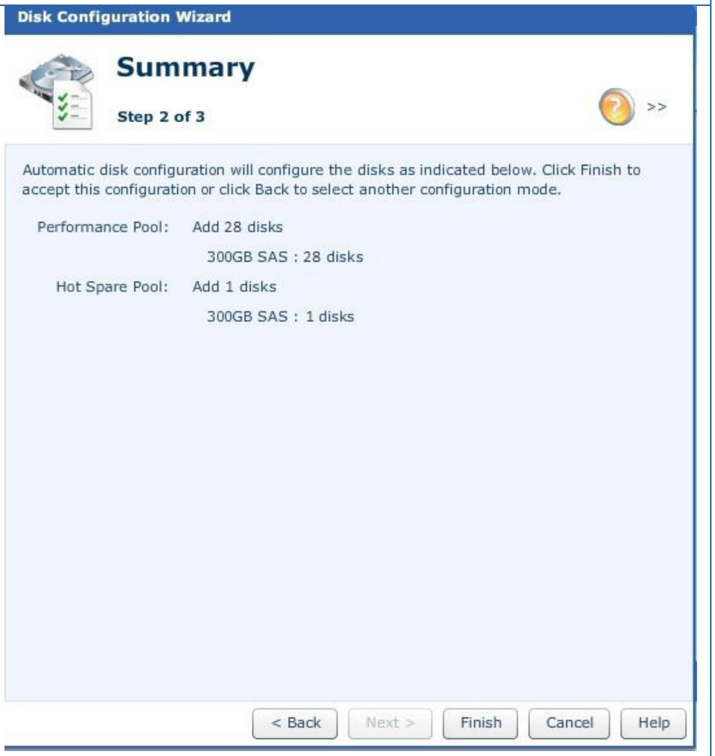
Instead of configuring the storage pools automatically, custom storage pools can be created with the **manually create a new pool** option. Custom pools can be used to optimize storage for an application with specific performance, capacity or cost efficiency requirements. The pool RAID types that can be configured, dependent on drive technology, can be seen in the following table:

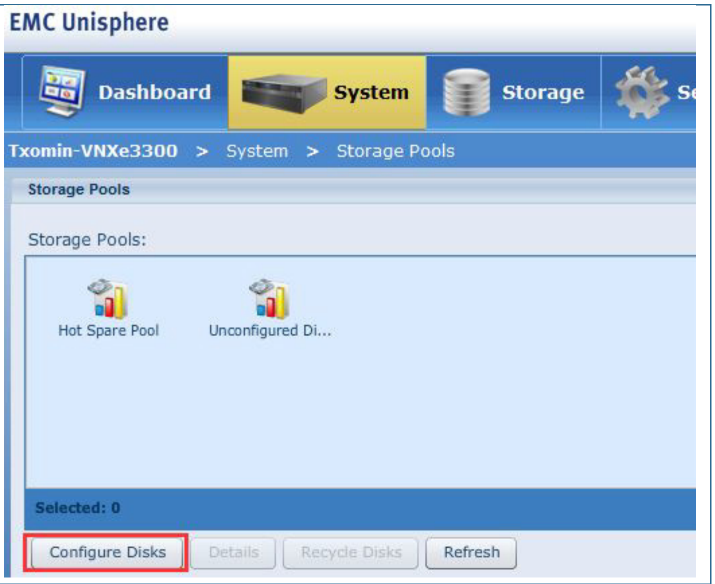
Table 13 Storage Pool Options

Types of storage pools	VNXe3300
Extreme performance pool (Default)	4+1 RAID 5 (Flash)
Performance pool (Default)	6+1 RAID 5 (SAS)
Capacity pool (Default)	4+2 RAID 6 (NL-SAS)
Custom pool	6+1 RAID 5 (SAS) 3+3 RAID 1/0 (SAS) 4+2 RAID 6 (NL-SAS)

It is recommended to use the **automatically configure pools** option with the base configuration. If this is not done as a part of the initial VNXe configuration during the first time Unisphere is launched, it can be done with the following steps:

From within Unisphere go to **System** and then **Storage Pools.**	 EMC Unisphere Dashboard System Storage Settings Hosts Support VNXe3300 > System System Capacity View charts and graphs of storage usage. Storage Pools Monitor and modify storage pools. System Health View a detailed, interactive display of hardware and software status. Storage Resource Health View details about the health of your applications and storage resources.
Hi-light **Unconfigured Disk Pool** then select **Configure Disks**.	 EMC Unisphere Dashboard System Storage Se Txomin-VNXe3300 > System > Storage Pools Storage Pools Storage Pools: Hot Spare Pool Unconfigured Di... Selected: 0 Configure Disks Details Recycle Disks Refresh

Select **Automatically configure pools** and click **Next**	 Disk Configuration Wizard **Select Configuration Mode** Step 1 of 3 Select the disk configuration mode: ● **Automatically configure pools** Configure disks into the system's pools and hot spares ○ **Manually create a new pool** Create a new pool by disk type or for a specific application Select application... ○ **Manually add disks to an existing pool** Add unconfigured disks to the selected pool Select pool...
The disk configuration wizard will return and provide the recommended pool configuration. For the base Fast Track configuration of 30 SAS disks, a **performance pool** will be created with 28 disks (4 groups of seven-disks,) one hot spare will be allocated and one disk will be unassigned. Select **Finish**	 Disk Configuration Wizard **Summary** Step 2 of 3 Automatic disk configuration will configure the disks as indicated below. Click Finish to accept this configuration or click Back to select another configuration mode. Performance Pool: Add 28 disks 300GB SAS : 28 disks Hot Spare Pool: Add 1 disks 300GB SAS : 1 disks

From within the **Storage Pools** menu, hi-light **Hot Spare Pool** then select **Configure Disks**. Follow the wizard to add the remaining unconfigured disk as a hot spare.	 EMC Unisphere Dashboard System Storage Se Txomin-VNXe3300 > System > Storage Pools Storage Pools Storage Pools: Hot Spare Pool Unconfigured Di... Selected: 0 Configure Disks Details Recycle Disks Refresh

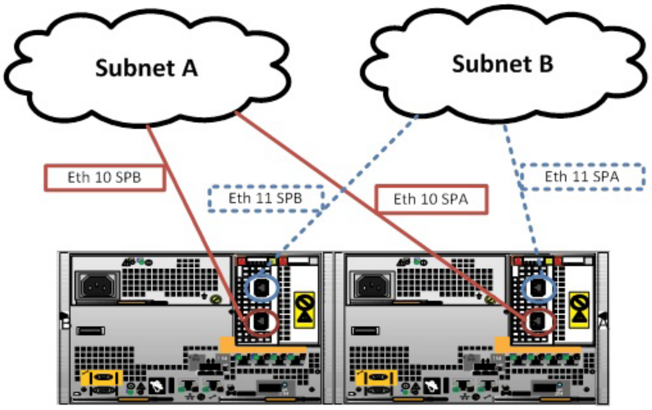
iSCSI Server Configuration

The iSCSI Storage Server is the portal through which storage will be accessed by the hosts within the Fast Track configuration. The goal of the proposed iSCSI server configuration is to provide redundancy, multi-pathing and balanced access across all 10 GE connections and both storage processors. Each 10 GE I/O module will have 2 ports, referred to as eth10 and eth11. Considering there is an I/O module for each service processor, both SPA and SPB will have eth10 and eth11 connections.

iSCSI servers will run on either SPA or SPB. This means storage assigned to a given iSCSI server will only be available to one SP at a given time. To utilize both SPA and SPB concurrently, two iSCSI servers will be created.

With respect to iSCSI server high availability, the eth10 and eth11 connections are paired across the service processors. If an iSCSI server running with an IP address dedicated to eth10 on SP A needs to move to SP B, for maintenance as an example, the IP address will move to the corresponding eth10 port on SPB. Therefore subnet connectivity will need to be the same for the associated eth10 and eth11 connections across the service processors. The following figure shows a logical example of the connections.

Figure 2 Logical Network Connections



The iSCSI server configuration will also have redundant connectivity while running against its respective service processor. This means both Eth10 and Eth11 will be assigned an IP addresses for each iSCSI server. This allows each iSCSI server to have both redundant ports and redundant fabric connections when running on either SPA or SPB. The following table provides an example.

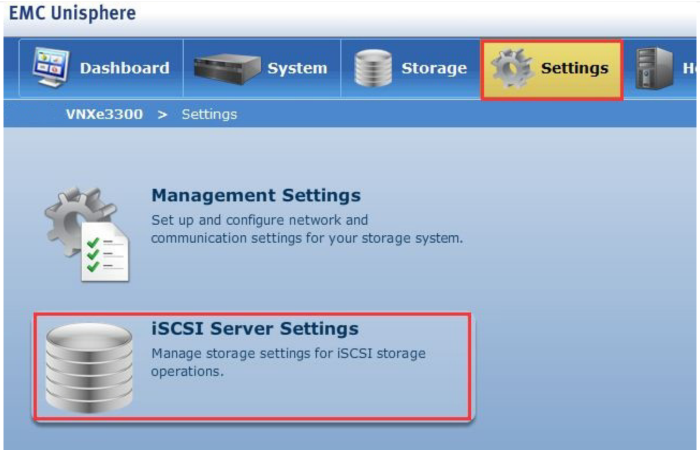
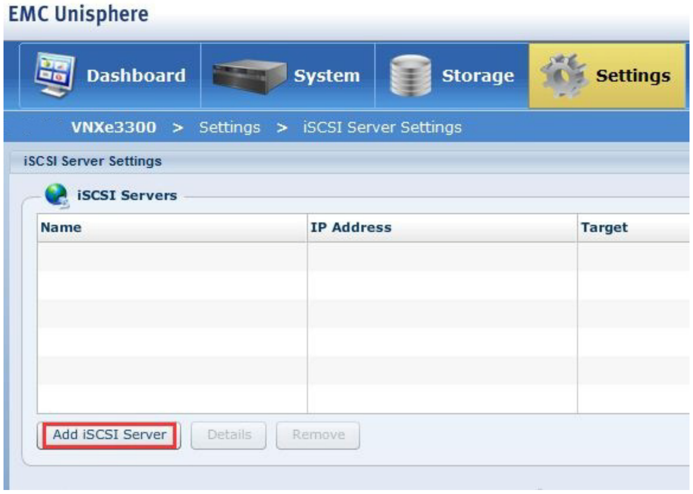
Table 14 Sample IP Configuration

iSCSI Server A	iSCSI Server B
IP Address Eth10 Subnet A (10.10.18.1/24)	IP Address Eth10 Subnet A (10.10.18.2/24)
IP Address Eth11 Subnet B (10.10.19.1/24)	IP Address Eth11 Subnet B (10.10.19.2/24)

In summary, the key considerations for configuring iSCSI connectivity and the iSCSI storage servers are the following:

- VNXe Generic iSCSI storage is presented to only one SP at a given time. To ensure both SP's are active, two iSCSI Storage Servers are created.
- Two IP interfaces are configured for an iSCSI Storage Server. These IP interfaces should be associated with two separate physical interfaces on the same SP
- Network switches for the two physical interfaces used per iSCSI Storage Server will be on separate subnets.

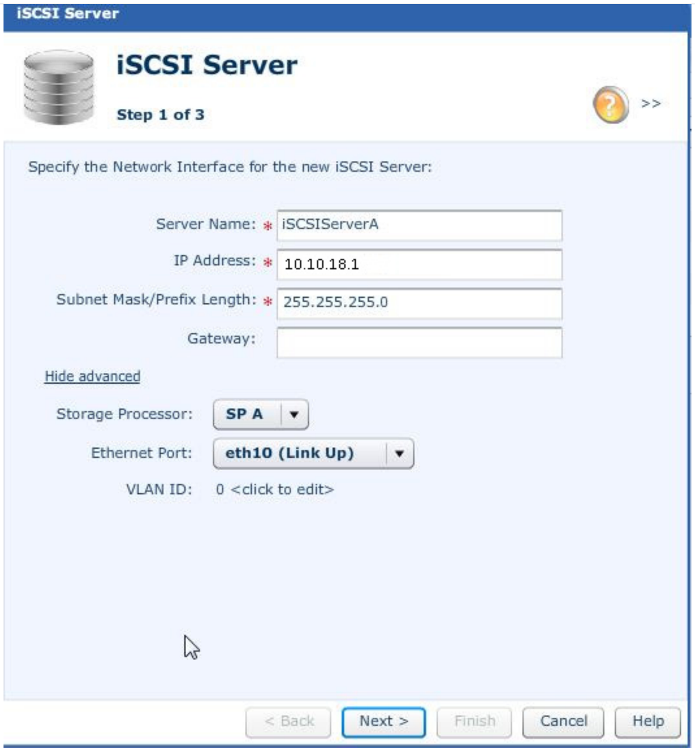
To configure iSCSI Storage Servers, do the following:

From within Unisphere go to **Settings** and then **iSCSI Server Settings.**	 EMC Unisphere Dashboard System Storage Settings H VNXe3300 > Settings Management Settings iSCSI Server Settings Set up and configure network and communication settings for your storage system. Manage storage settings for iSCSI storage operations.
Select **Add iSCSI Server**.	 EMC Unisphere Dashboard System Storage Settings VNXe3300 > Settings > iSCSI Server Settings iSCSI Server Settings iSCSI Servers Name IP Address Target Add iSCSI Server Details Remove

Enter the desired **Server Name**, **IP Address**, **Subnet Mask,** and **Gateway.**

Also select **Show advanced** to specify the appropriate **Storage Processor** (SP A) and **Ethernet Port** (eth10)

Repeat these steps to create a second iSCSI Server on **SP B** and **eth10**



iSCSI Server

Step 1 of 3

Specify the Network Interface for the new iSCSI Server:

Server Name: * iSCSIServerA

IP Address: * 10.10.18.1

Subnet Mask/Prefix Length: * 255.255.255.0

Gateway:

Hide advanced

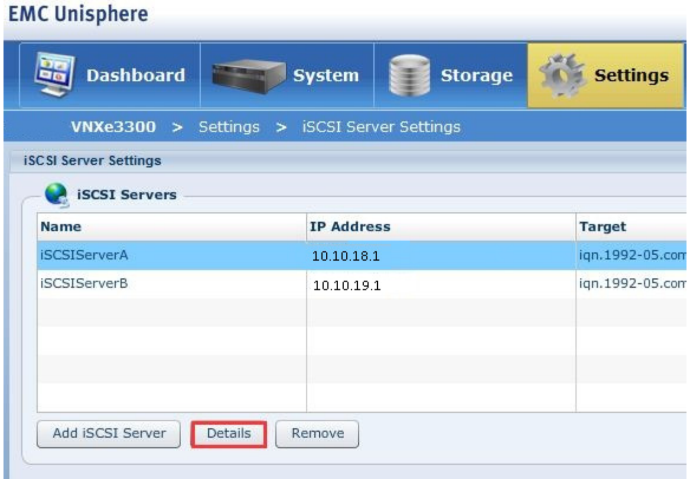
Storage Processor: SP A

Ethernet Port: eth10 (Link Up)

VLAN ID: 0 <click to edit>

Select the previously created iSCSI server and select **Details**.

Note: The IQNs for SPA and SPB shown in this window are needed for the Create-UcsHyperVIscsi.ps1 script. Enter values in Table 4.



EMC Unisphere

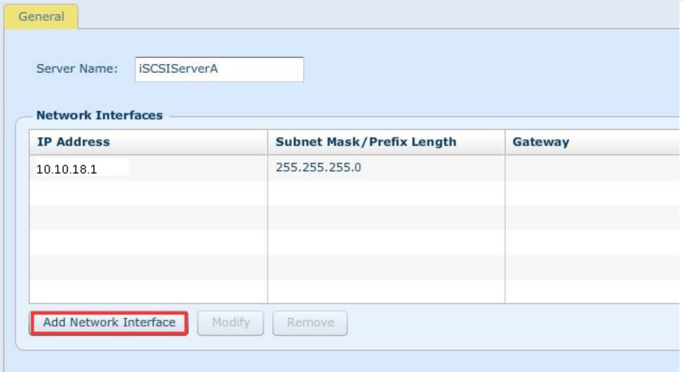
VNXe3300 > Settings > iSCSI Server Settings

iSCSI Server Settings

iSCSI Servers

Name	IP Address	Target
iSCSIServerA	10.10.18.1	iqn.1992-05.com
iSCSIServerB	10.10.19.1	iqn.1992-05.com

From within the **iSCSI Server Details** page select **Add Network Interface**



General

Server Name: iSCSIServerA

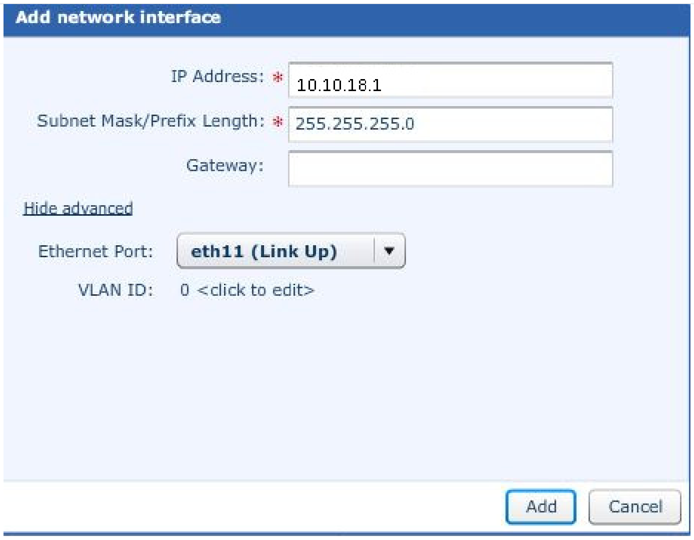
Network Interfaces

IP Address	Subnet Mask/Prefix Length	Gateway
10.10.18.1	255.255.255.0	

Enter the appropriate **IP Address**, **Subnet Mask** and **Gateway** information.

Select **Show advanced** and select **eth11**.

Repeat the last three steps for the iSCSI Server instance assigned to the other storage processor



Add network interface

IP Address: * 10.10.18.1

Subnet Mask/Prefix Length: * 255.255.255.0

Gateway:

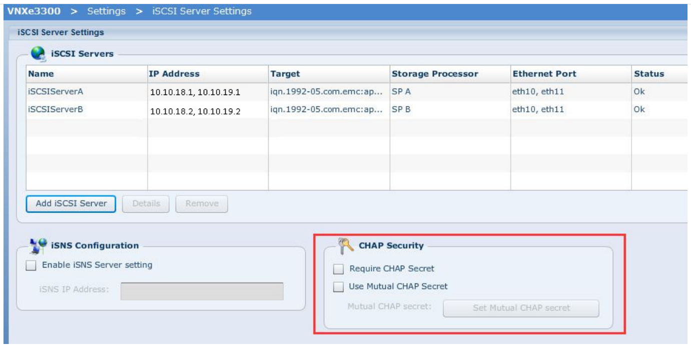
Ethernet Port: eth11 (Link Up)

VLAN ID: 0 <click to edit>

From within the **iSCSI Server Settings** screen, optionally configure **CHAP Security**

Require CHAP Secret will enforce the one-way CHAP secret specified in the VNXe Host Configuration

Use Mutual CHAP Secret can also be configured.



VNXe3300 > Settings > iSCSI Server Settings

iSCSI Server Settings

iSCSI Servers

Name	IP Address	Target	Storage Processor	Ethernet Port	Status
iSCSIServerA	10.10.18.1, 10.10.19.1	iqn.1992-05.com.emc:ap...	SP A	eth10, eth11	Ok
iSCSIServerB	10.10.18.2, 10.10.19.2	iqn.1992-05.com.emc:ap...	SP B	eth10, eth11	Ok

iSNS Configuration

□ Enable iSNS Server setting

iSNS IP Address:

CHAP Security

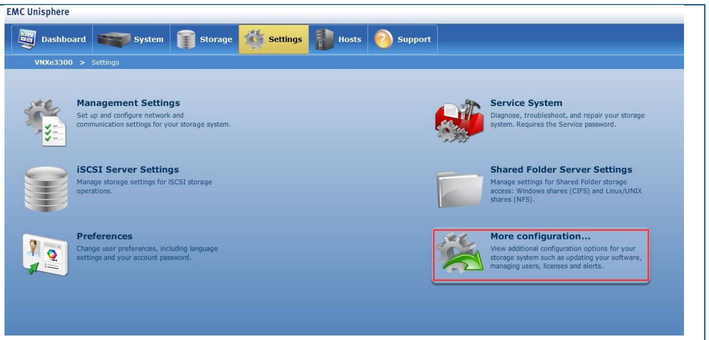
□ Require CHAP Secret

□ Use Mutual CHAP Secret

Mutual CHAP secret:

The Cisco networking environment will have a Maximum Transmission Unit (MTU) size of 9000 for the iSCSI connections to the VNXe. An example script to change the MTU through the VNXe Unisphere CLI is in the appendix. In order to match the configured MTU size through Unisphere, do the following steps:

From within Unisphere go to **Settings** and then **More configuration…**



EMC Unisphere

VNXe3300 > Settings

Management Settings Set up and configure network and communication settings for your storage system.

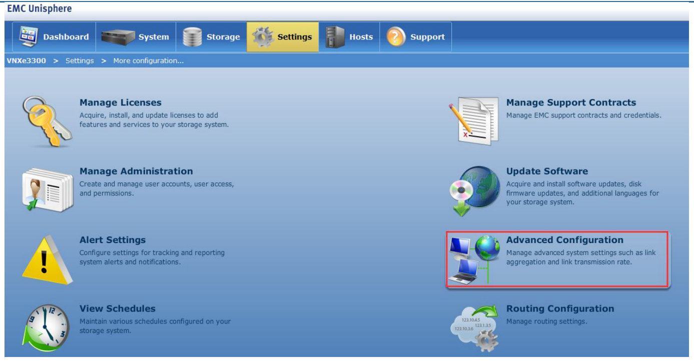
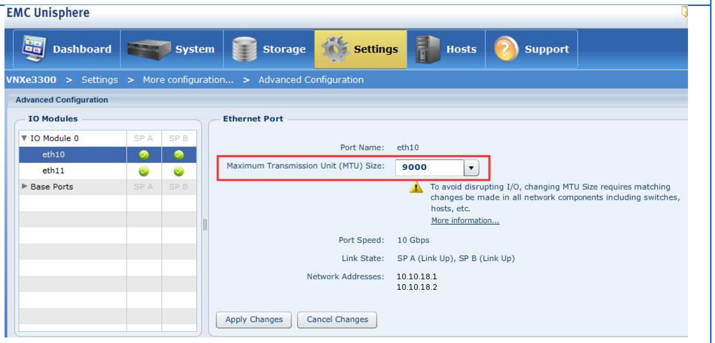
iSCSI Server Settings Manage storage settings for iSCSI storage operations.

Preferences Change user preferences, including language settings and your account password.

Service System Diagnose, troubleshoot, and repair your storage system. Requires the Service password.

Shared Folder Server Settings Manage settings for Shared Folder storage access: Windows shares (CIFS) and Linux/UNIX shares (NFS).

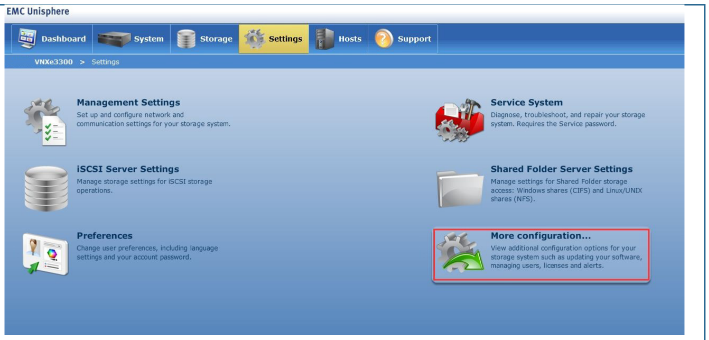
More configuration... View additional configuration options for your storage system such as updating your software, managing users, licenses and alerts.

From within **Settings > More configuration…** select **Advanced Configuration**	 EMC Unisphere Dashboard System Storage Settings Hosts Support VNXe3300 > Settings > More configuration... **Manage Licenses** Acquire, install, and update licenses to add features and services to your storage system. **Manage Support Contracts** Manage EMC support contracts and credentials. **Manage Administration** Create and manage user accounts, user access, and permissions. **Update Software** Acquire and install software updates, disk firmware updates, and additional languages for your storage system. **Alert Settings** Configure settings for tracking and reporting system alerts and notifications. **Advanced Configuration** Manage advanced system settings such as link aggregation and link transmission rate. **View Schedules** Maintain various schedules configured on your storage system. **Routing Configuration** Manage routing settings.
Select the appropriate I/O Module and Port, then change the MTU to **9000** Select **Apply Changes**	 EMC Unisphere Dashboard System Storage Settings Hosts Support VNXe3300 > Settings > More configuration... > Advanced Configuration Advanced Configuration IO Modules IO Module 0 SP A SP B eth10 eth11 Base Ports Ethernet Port Port Name: eth10 Maximum Transmission Unit (MTU) Size: 9000 To avoid disrupting I/O, changing MTU Size requires matching changes be made in all network components including switches, hosts, etc. More information... Port Speed: 10 Gbps Link State: SP A (Link Up), SP B (Link Up) Network Addresses: 10.10.18.1 10.10.18.2 Apply Changes Cancel Changes

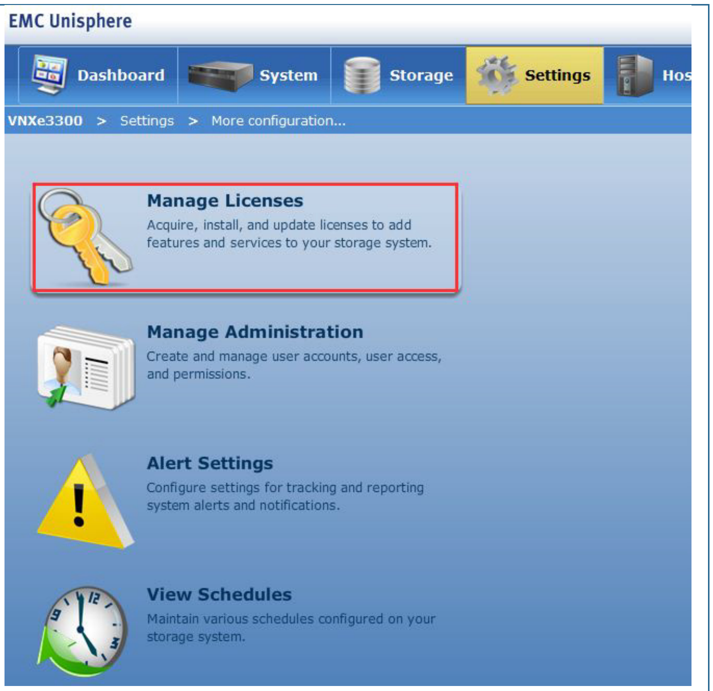
Note Make sure to change the Windows Server 2012 MTU size the on the appropriate network interfaces to match the network topology. This can be accomplished with the Set-NetIpInterface PowerShell command. See the appendix for an example script.

Licensing

Obtaining a license file as well as uploading and installing the file can be accomplished from within Unisphere: under **Settings** > **More configuration...** > **Manage Licenses.**

From within Unisphere go to **Settings** and then **More configuration…**	 EMC Unisphere Dashboard System Storage Settings Hosts Support VNXe3300 > Settings **Management Settings** Set up and configure network and communication settings for your storage system. **Service System** Diagnose, troubleshoot, and repair your storage system. Requires the Service password. **iSCSI Server Settings** Manage storage settings for iSCSI storage operations. **Shared Folder Server Settings** Manage settings for Shared Folder storage access: Windows shares (CIFS) and Linux/UNIX shares (NFS). **Preferences** Change user preferences, including language settings and your account password. **More configuration...** View additional configuration options for your storage system such as updating your software, managing users, licenses and alerts.

From within **Settings > More configuration…** select **Manage Licenses**



EMC Unisphere

VNXe3300 > Settings > More configuration...

Manage Licenses
Acquire, install, and update licenses to add features and services to your storage system.

Manage Administration
Create and manage user accounts, user access, and permissions.

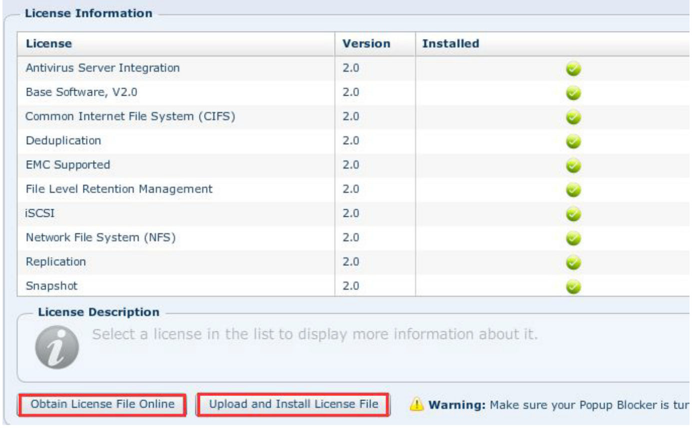
Alert Settings
Configure settings for tracking and reporting system alerts and notifications.

View Schedules
Maintain various schedules configured on your storage system.

Select the appropriate option:

Obtain License File Online: assumes internet access from the computer form where Unisphere is launched.

Upload and Install License File: assumes a.license exists on the computer from where Unisphere is launched



License Information

License	Version	Installed
Antivirus Server Integration	2.0	✓
Base Software, V2.0	2.0	✓
Common Internet File System (CIFS)	2.0	✓
Deduplication	2.0	✓
EMC Supported	2.0	✓
File Level Retention Management	2.0	✓
iSCSI	2.0	✓
Network File System (NFS)	2.0	✓
Replication	2.0	✓
Snapshot	2.0	✓

License Description

Select a license in the list to display more information about it.

Warning: Make sure your Popup Blocker is tur

Update the VNXe Operating Environment

Depending on availability, please ensure the VNXe Operating Environment is updated to the MR4 release, which is not available as of the writing of this document. If this release is not available, please update the VNXe software as instructed below.

For Windows Server 2012 support with Windows Failover Clustering, the VNXe operating environment must be at **MR3 SP1.1 - 2.3.1.20356** and include **hotfix 2.3.1.20364.1.2.001.192**. More information regarding the required hotfix can be found in knowledge base article **emc306921**.

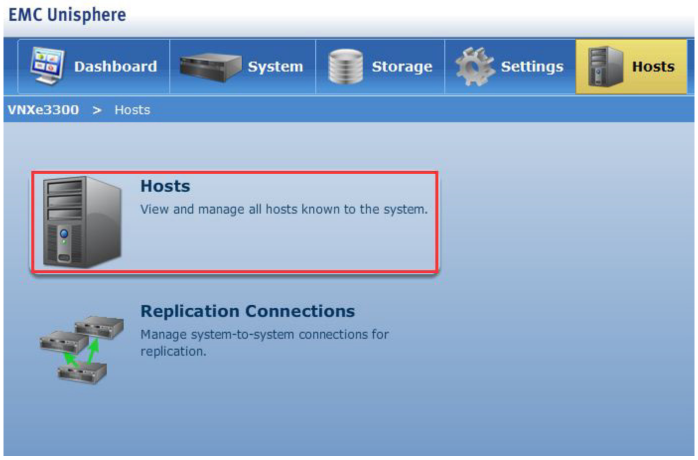
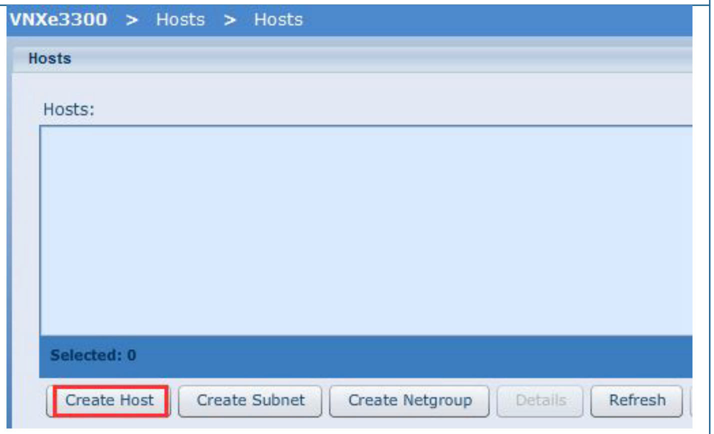
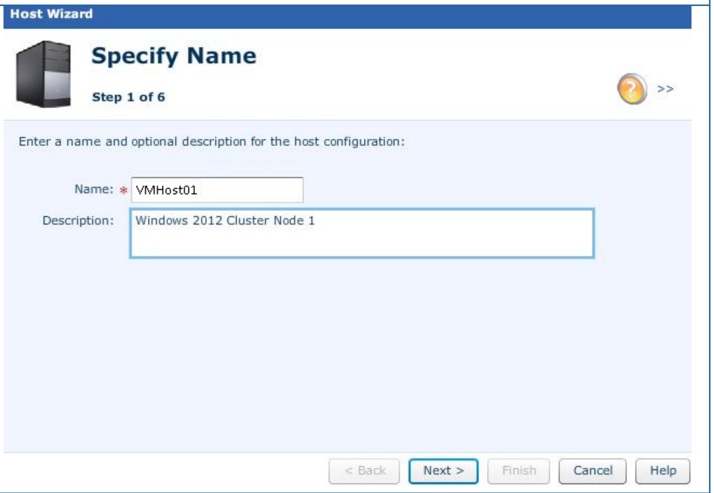
VNXe software can be updated from within Unisphere at **Settings** > **More configuration…** > **Update Software.**

First ensure MR3 SP1.1 at a minimum is installed. Then install the aforementioned hotfix.

After the hotfix is installed, file parameters need to be updated on the service processor. Please see **emc289415** for details.

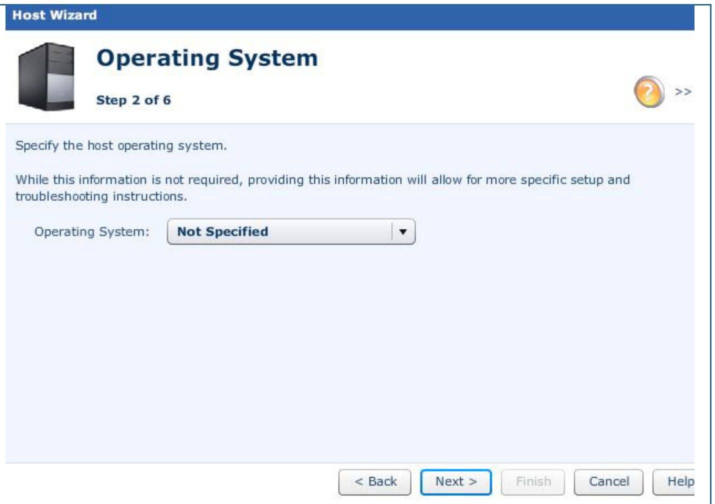
Create Host Configurations

In order to present storage from the VNXe to the servers in the Fast Track environment, a host configuration profile must be created on the VNXe. The host profile will define the iSCSI Qualified Name (IQN) used by each server. It will also define the one-way Challenge-Handshake Authentication Protocol (CHAP) secret for the IQN(s) associated with the Host. Follow the next steps to configure the host:

From within Unisphere go to **Hosts** and then **Hosts**	 EMC Unisphere Dashboard System Storage Settings Hosts VNXe3300 > Hosts Hosts View and manage all hosts known to the system. Replication Connections Manage system-to-system connections for replication.
Select **Create Host**	 VNXe3300 > Hosts > Hosts Hosts Hosts: Selected: 0 Create Host Create Subnet Create Netgroup Details Refresh
Specify the Host **Name** and **Description** then select **Next**	 Host Wizard Specify Name Step 1 of 6 >> Enter a name and optional description for the host configuration: Name: * VMHost01 Description: Windows 2012 Cluster Node 1 < Back Next > Finish Cancel Help

Specify the **Operating System** then select **Next**

As of the writing of this document Windows Server 2012 is not an option within Operating System. Using **Not Specified** is sufficient.



Host Wizard

Operating System

Step 2 of 6

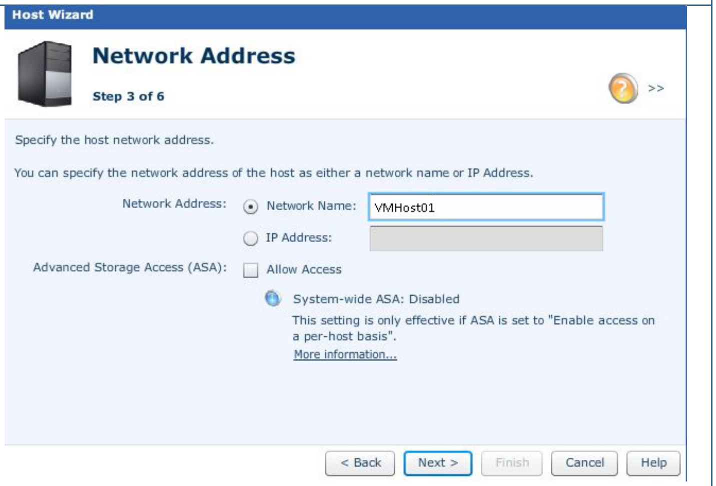
Specify the host operating system.

While this information is not required, providing this information will allow for more specific setup and troubleshooting instructions.

Operating System: Not Specified

Specify the **Network Address** then select **Next**

The Network Address is not required for iSCSI connectivity.



Host Wizard

Network Address

Step 3 of 6

Specify the host network address.

You can specify the network address of the host as either a network name or IP Address.

Network Address: ● Network Name: VMHost01

○ IP Address:

Advanced Storage Access (ASA): □ Allow Access

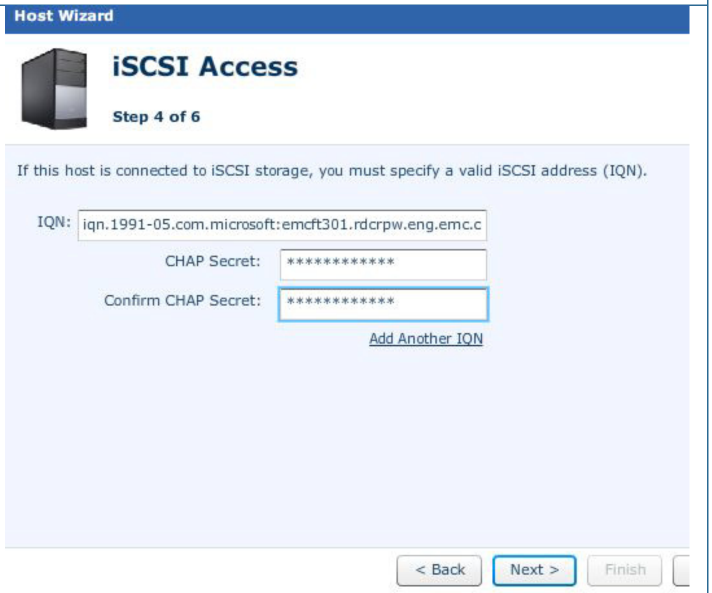
System-wide ASA: Disabled

This setting is only effective if ASA is set to "Enable access on a per-host basis".

More information...

Specify the **IQN** of the initiators associated with the defined host. Optionally enter a one-way **CHAP Secret.** **S**elect **Next**

The IQN can be obtained from the Cisco UCS service profile defined for the host.



Host Wizard

iSCSI Access

Step 4 of 6

If this host is connected to iSCSI storage, you must specify a valid iSCSI address (IQN).

IQN: iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.c

CHAP Secret: ************

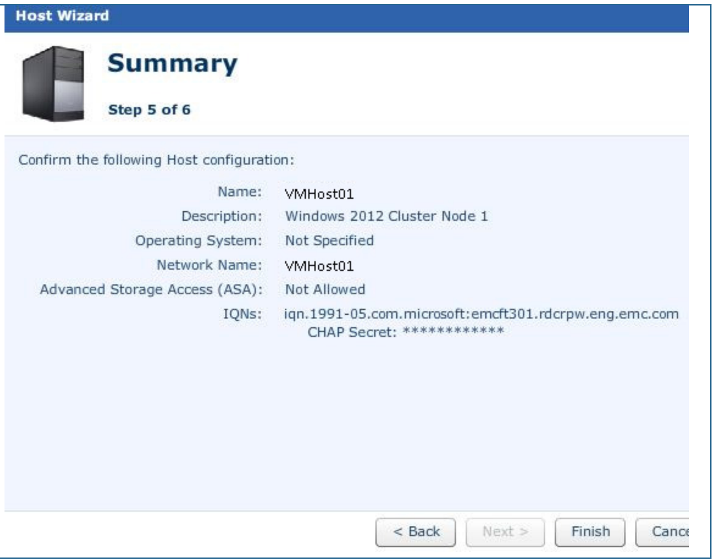
Confirm CHAP Secret: ************

Add Another IQN

Confirm the settings in the **Summary** screen and select **Finish**

Select **Close** upon completion

Repeat as necessary for each server in the environment.



Host Wizard

Summary

Step 5 of 6

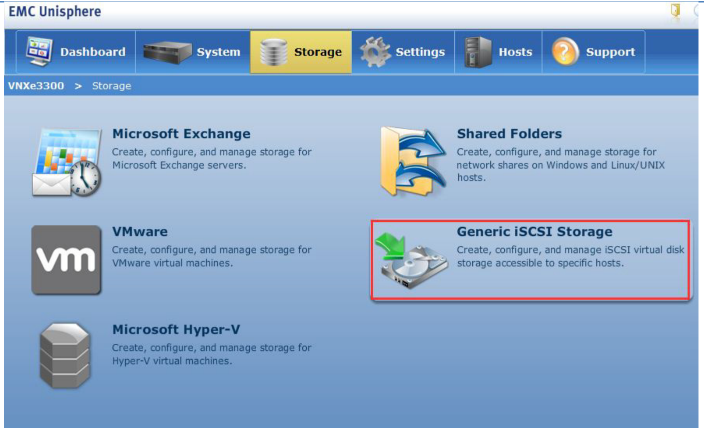
Confirm the following Host configuration:

Name: VMHost01
Description: Windows 2012 Cluster Node 1
Operating System: Not Specified
Network Name: VMHost01
Advanced Storage Access (ASA): Not Allowed
IQNs: iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com
CHAP Secret: ************

Provisioning Storage

Potentially repetitive tasks, like provisioning storage, can be accomplished through Unisphere or can be scripted. EMC offers PowerShell cmdlets through a free product called EMC Storage Integrator (ESI). The appendix provides an example script on how to use ESI version 2.1 to provision storage. More information on ESI can be found on support.emc.com by searching for "ESI". The following table provides an example on how to use Unisphere to provision storage:

From within Unisphere go to **Storage** and then **Generic iSCSI Storage**



Microsoft Exchange
Create, configure, and manage storage for Microsoft Exchange servers.

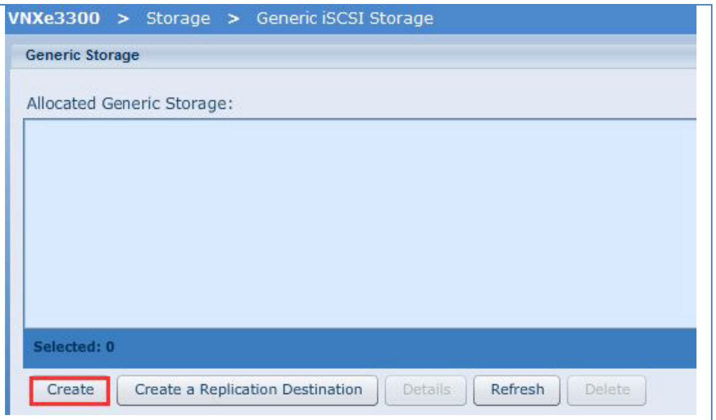
Shared Folders
Create, configure, and manage storage for network shares on Windows and Linux/UNIX hosts.

VMware
Create, configure, and manage storage for VMware virtual machines.

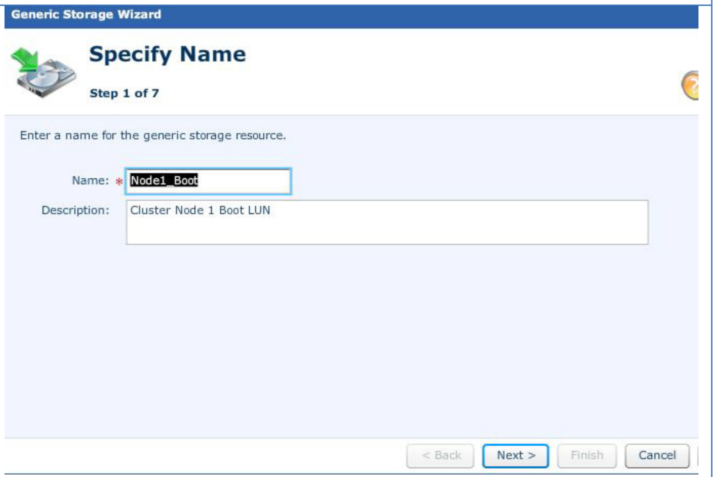
Generic iSCSI Storage
Create, configure, and manage iSCSI virtual disk storage accessible to specific hosts.

Microsoft Hyper-V
Create, configure, and manage storage for Hyper-V virtual machines.

Select **Create**


VNXe3300 > Storage > Generic iSCSI Storage
Generic Storage
Allocated Generic Storage:
Selected: 0
Create
Create a Replication Destination
Details
Refresh
Delete

Specify the device **Name** and **Description** then select **Next**



Enter a name for the generic storage resource.

Name: * Node1_Boot

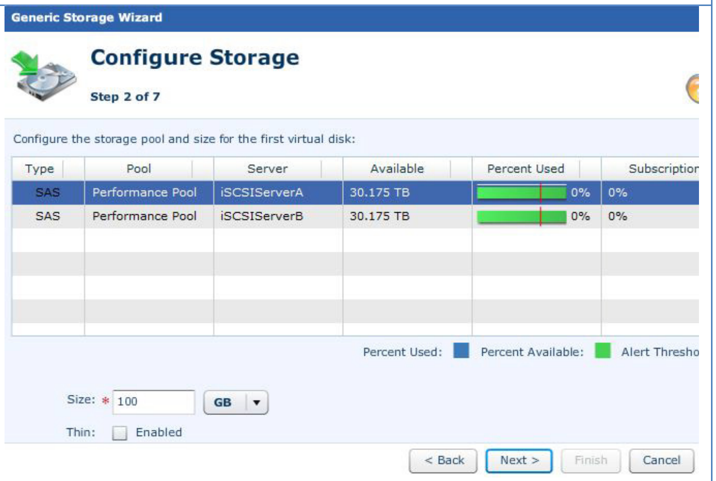
Description: Cluster Node 1 Boot LUN

Specify the iSCSI **Server** that will host the LUN being created. The LUN will only be accessible through a connection to that specific iSCSI Server instance.

Note: It is recommended to create the boot LUNs first so they will have the lowest LUN numbers in the system. LUN numbers are automatically assigned by the VNXe and increment as each new LUN is created. They cannot be specified by a user.

Also select the **Size** and whether the LUN should be **Thin** then select **Next**

Note: The boot LUN numbers are needed for the Create-UcsHyperViscso.ps1 script. Enter in Table 4.



Configure the storage pool and size for the first virtual disk:

Type	Pool	Server	Available	Percent Used	Subscriptio
SAS	Performance Pool	iSCSIServerA	30.175 TB	0%	0%
SAS	Performance Pool	iSCSIServerB	30.175 TB	0%	0%

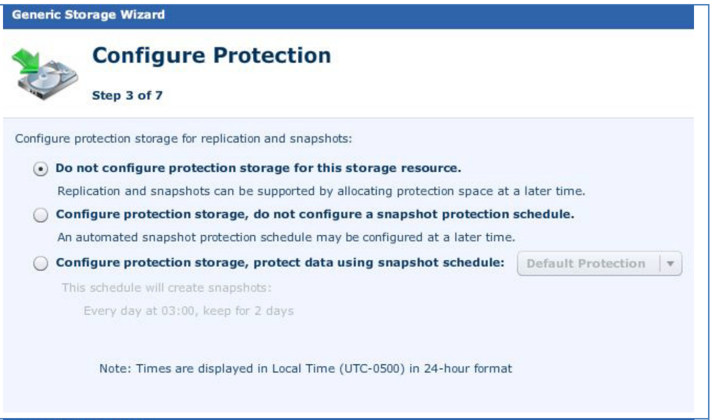
Percent Used: 🟦 Percent Available: 🟩 Alert Thresho

Size: * 100 GB

Thin: □ Enabled

If licensed, the snapshot configuration can optionally be configured for the LUN. If no snapshots are desired, select **Do not configure protection storage for this storage resource.**

Select **Next**


Generic Storage Wizard

Configure Protection

Step 3 of 7

Configure protection storage for replication and snapshots:

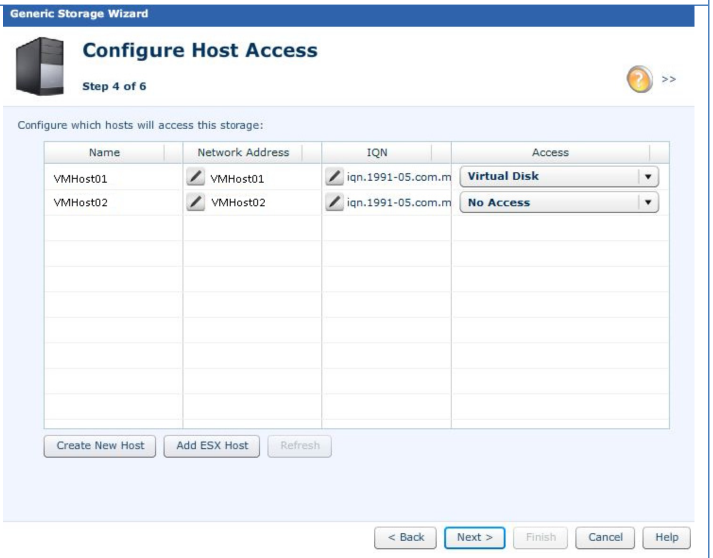
● **Do not configure protection storage for this storage resource.**
Replication and snapshots can be supported by allocating protection space at a later time.

○ **Configure protection storage, do not configure a snapshot protection schedule.**
An automated snapshot protection schedule may be configured at a later time.

○ **Configure protection storage, protect data using snapshot schedule:** Default Protection
This schedule will create snapshots:
Every day at 03:00, keep for 2 days

Note: Times are displayed in Local Time (UTC-0500) in 24-hour format

Choose the **Host(s)** that should have access to the storage device being created. This is specified by selecting **Virtual Disk** from the **Access** drop down menu. Then choose **Next**


Generic Storage Wizard

Configure Host Access

Step 4 of 6

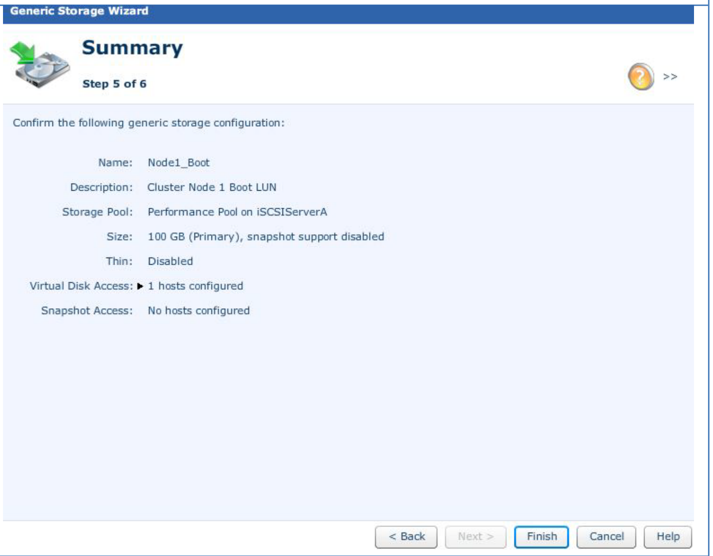
Configure which hosts will access this storage:

Name	Network Address	IQN	Access
VMHost01	VMHost01	iqn.1991-05.com.m	Virtual Disk
VMHost02	VMHost02	iqn.1991-05.com.m	No Access

Confirm the settings in the **Summary** screen and select **Finish**

Select **Close** upon completion

Repeat as necessary for each required device in the environment


Generic Storage Wizard

Summary

Step 5 of 6

Confirm the following generic storage configuration:

Name: Node1_Boot
Description: Cluster Node 1 Boot LUN
Storage Pool: Performance Pool on iSCSIServerA
Size: 100 GB (Primary), snapshot support disabled
Thin: Disabled
Virtual Disk Access: ▸ 1 hosts configured
Snapshot Access: No hosts configured

Cisco UCS Service Profile Creation

The Create-UcsHyperVIscsi.ps1 script in Appendix A is used to create service profiles based on the values entered in tables 3 and 4.

This script file is designed to be run from the configuration workstation or server.

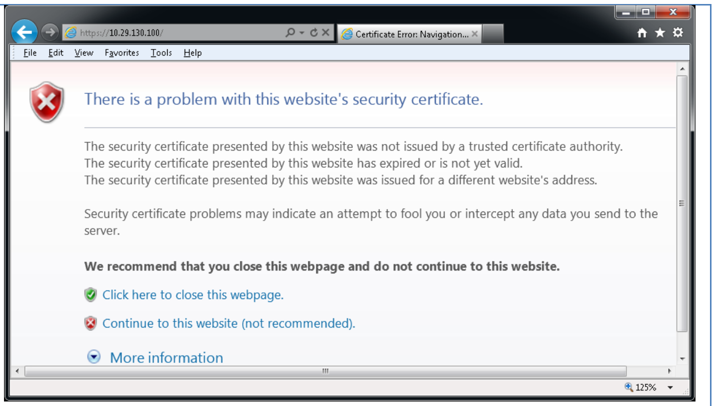
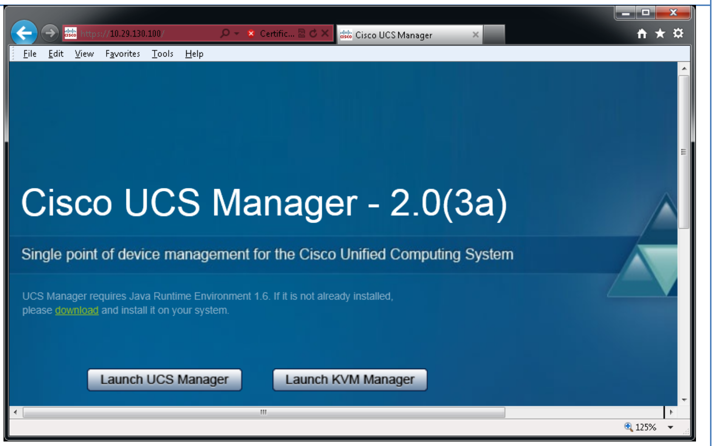
1. Connect your configuration workstation to the network. Ensure proper network access to the UCS Manager by pinging the fabric interconnect network address.
2. Edit the **Create-UcsHyperVIscsi.ps1** file to contain the customer values entered in Table 4.
3. Save the file.
4. Connect to the directory in which you stored the PowerShell script file. Type.**\Create-UcsHyperVIscsi.ps1**

Server Configuration

Installation of Windows Server 2012 Datacenter Edition

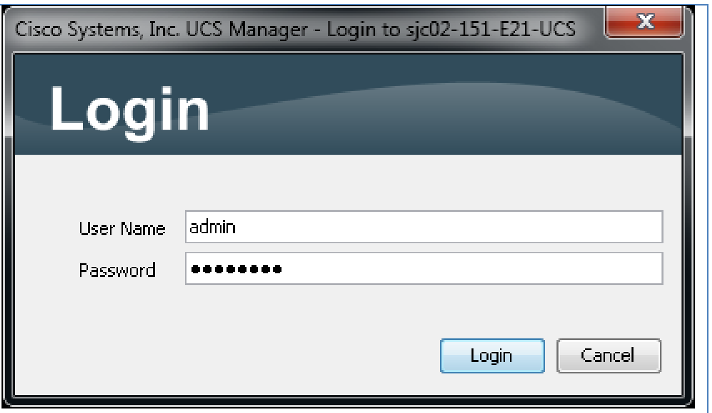
The instruction for install Windows Server 2012 Datacenter Edition presented here make the assumption that this is an installation from the Microsoft installation DVD. If the customer already has an automated deployment process in place, such as Windows Deployment Server, follow the customer installation procedure.

You will install Windows Server 2012 Datacenter Edition to the Cisco UCS C220 M3 servers by working through the UCSM KVM.

Open your browser. Enter the IP address of your fabric interconnect cluster with an **https://** prefix. Click on **Continue to this website (not recommended).**	 https://10.29.130.100/ There is a problem with this website's security certificate. The security certificate presented by this website was not issued by a trusted certificate authority. The security certificate presented by this website has expired or is not yet valid. The security certificate presented by this website was issued for a different website's address. Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server. **We recommend that you close this webpage and do not continue to this website.** Click here to close this webpage. Continue to this website (not recommended). More information Certificate Error: Navigation... File Edit View Favorites Tools Help 125%
Click **Launch UCS Manager.**	 https://10.29.130.100 Cisco UCS Manager - 2.0(3a) Single point of device management for the Cisco Unified Computing System UCS Manager requires Java Runtime Environment 1.6. If it is not already installed, please download and install it on your system. Certific... Cisco UCS Manager File Edit View Favorites Tools Help Launch UCS Manager Launch KVM Manager 125%

Enter **admin** as the user name.

Enter the password specified in the initial setup.



Cisco Systems, Inc. UCS Manager - Login to sjc02-151-E21-UCS

Login

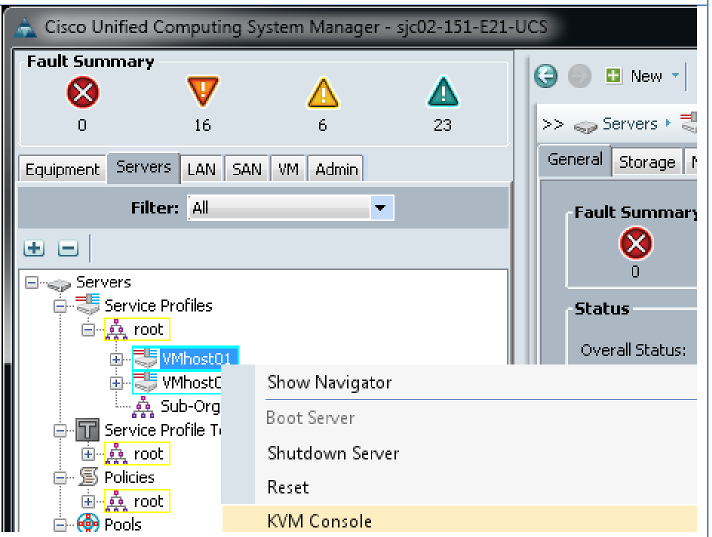
User Name: admin

Password: ●●●●●●●●●

Select the **Servers** tab.

Navigate the tree Servers > Service Profiles > root > VMhost01.

Right-click VMhost01 and select KVM Console.



Cisco Unified Computing System Manager - sjc02-151-E21-UCS

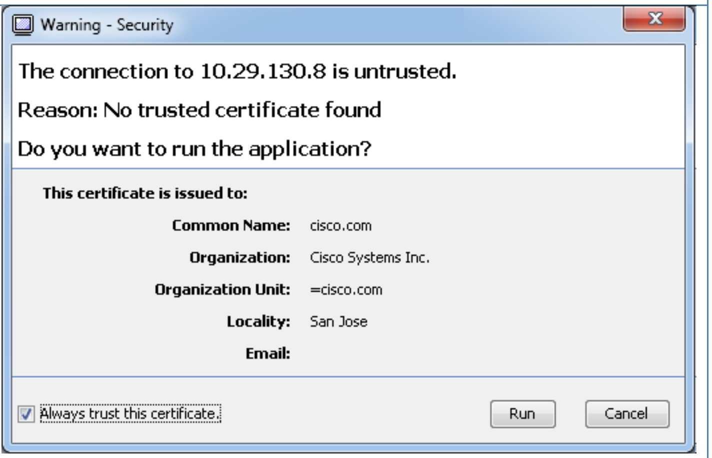
Fault Summary: 0, 16, 6, 23

Filter: All

You are likely to get a warning due to lack of certificates.

Click the **Always trust this certificate check box.**

Click **Run.**



Warning - Security

The connection to 10.29.130.8 is untrusted.

Reason: No trusted certificate found

Do you want to run the application?

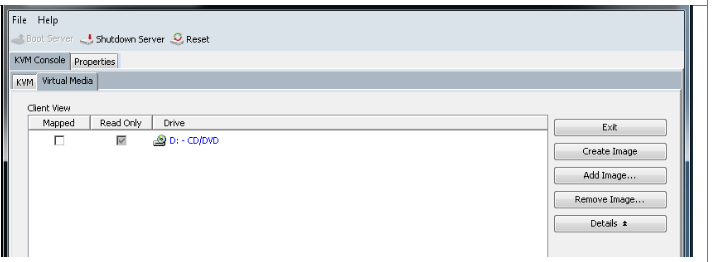
This certificate is issued to:

Common Name:	cisco.com
Organization:	Cisco Systems Inc.
Organization Unit:	=cisco.com
Locality:	San Jose
Email:	

☑ Always trust this certificate.

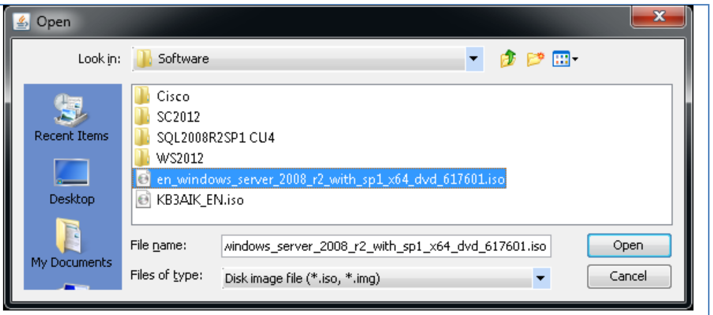
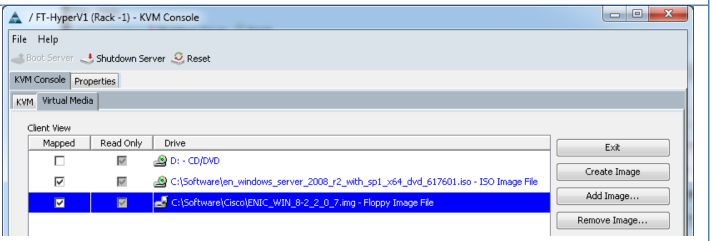
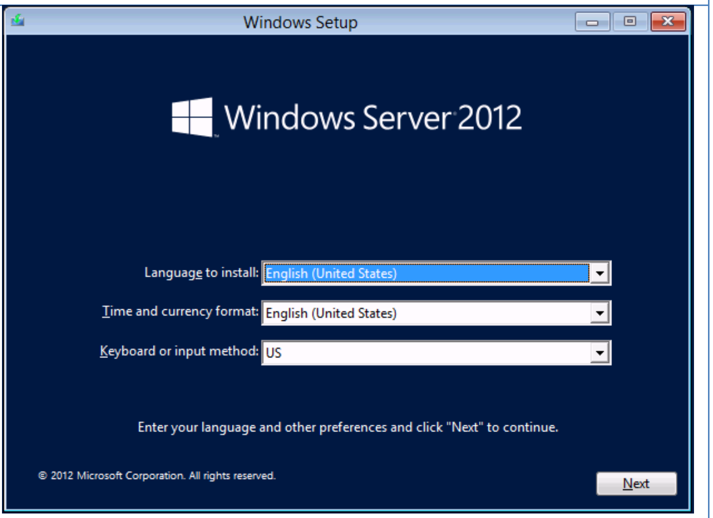
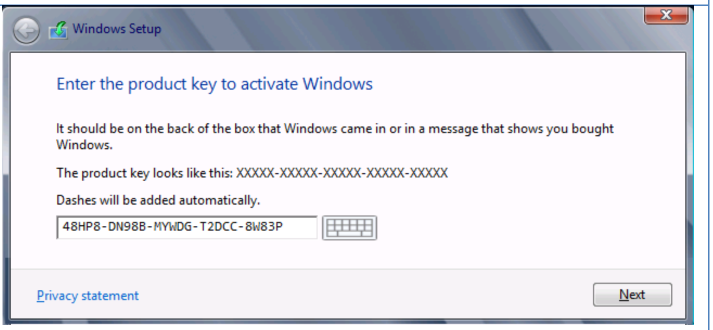
Click on the **Virtual Media** tab of the KVM console.

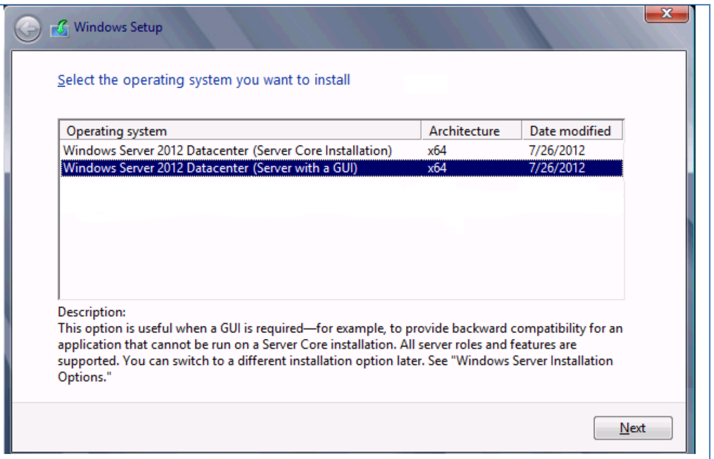
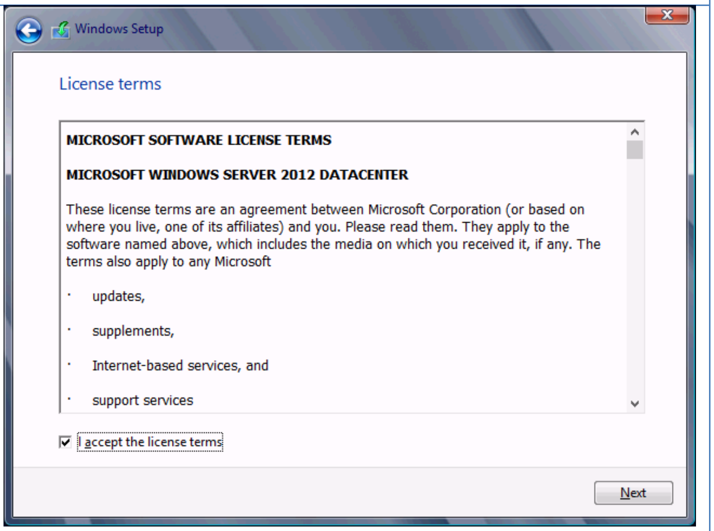
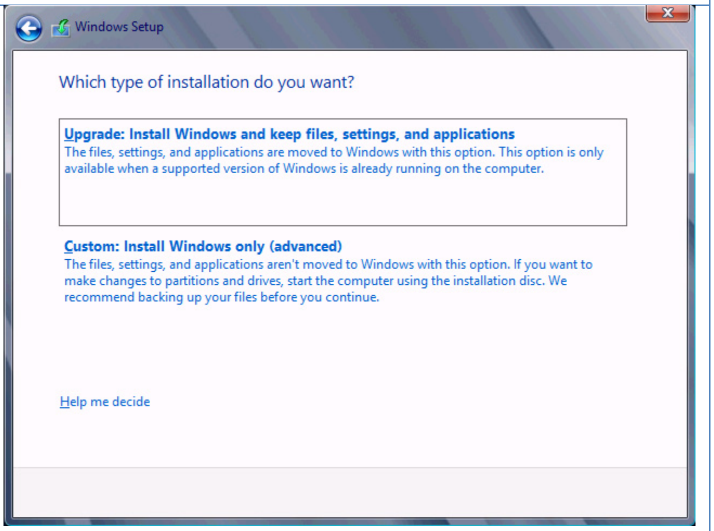
Then click the **Add Image...** button on the right.

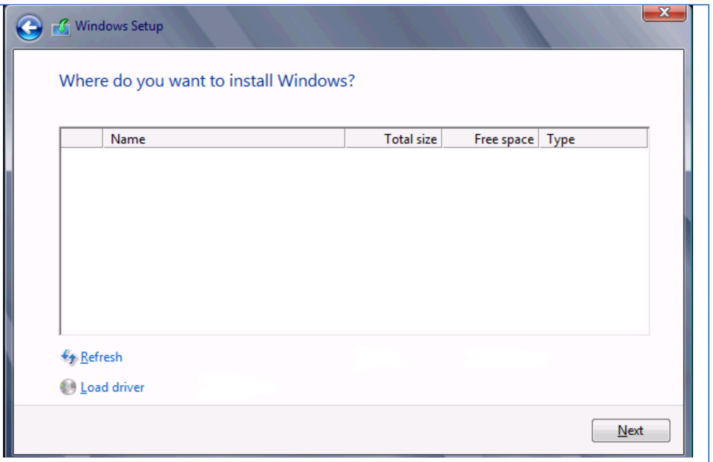
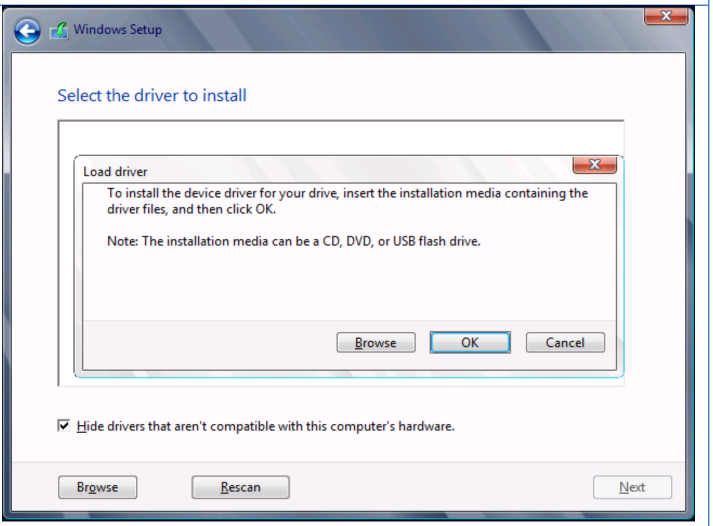
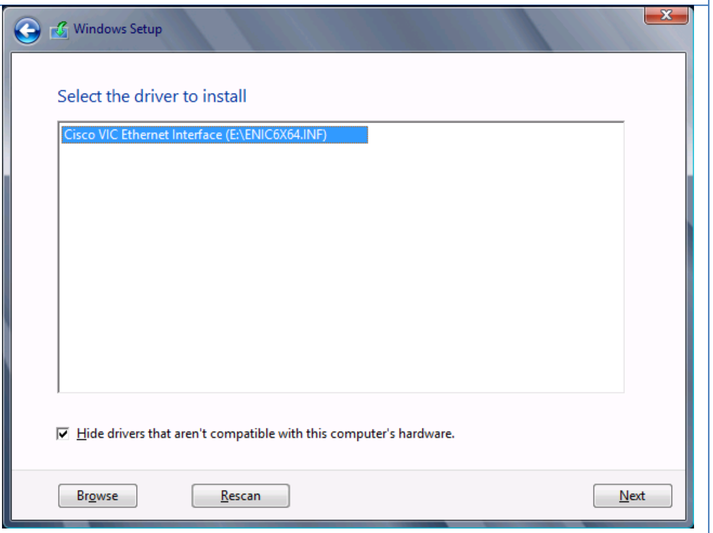


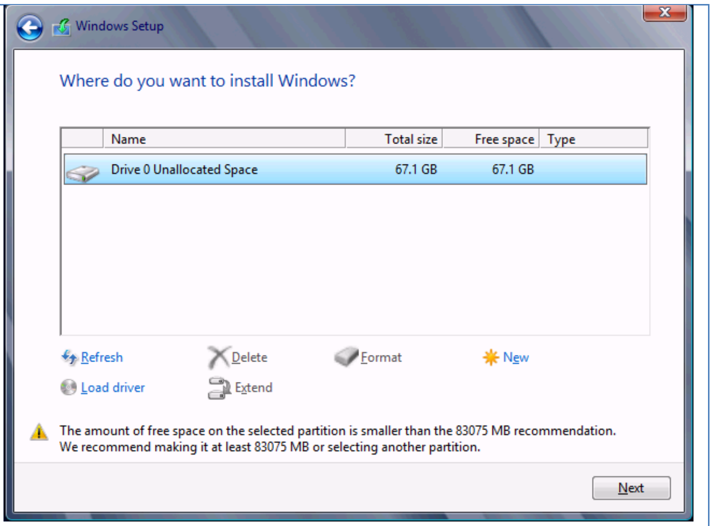
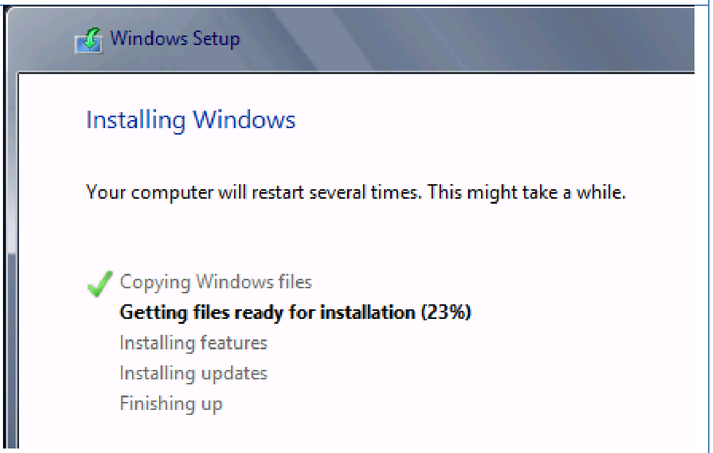
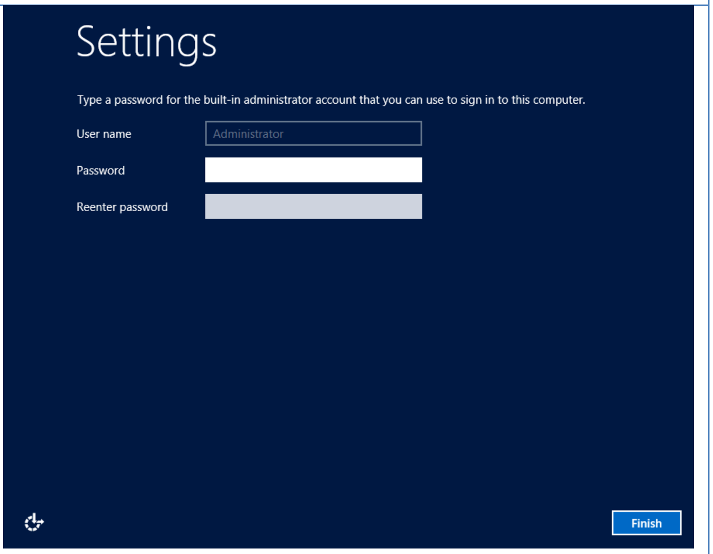
Client View

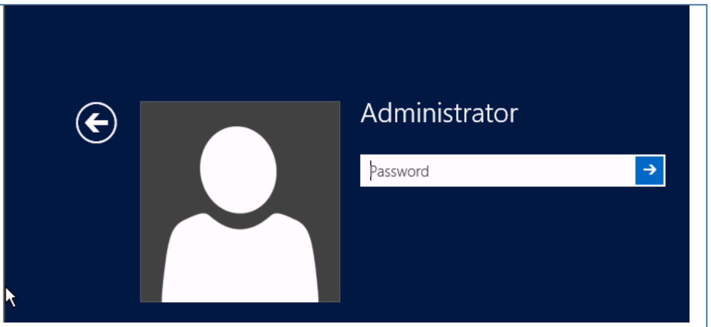
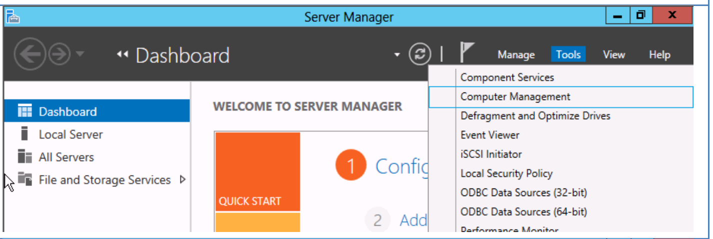
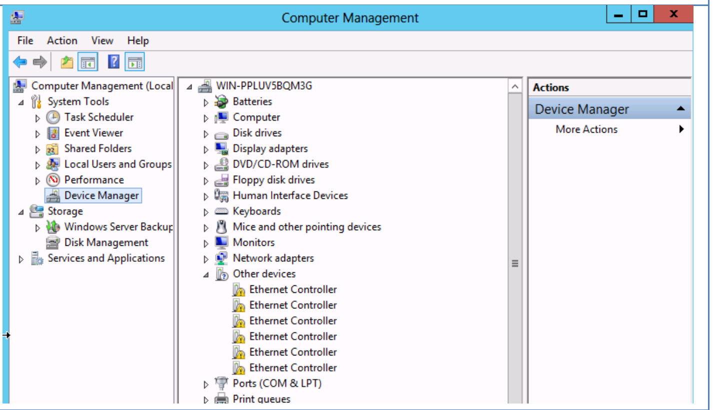
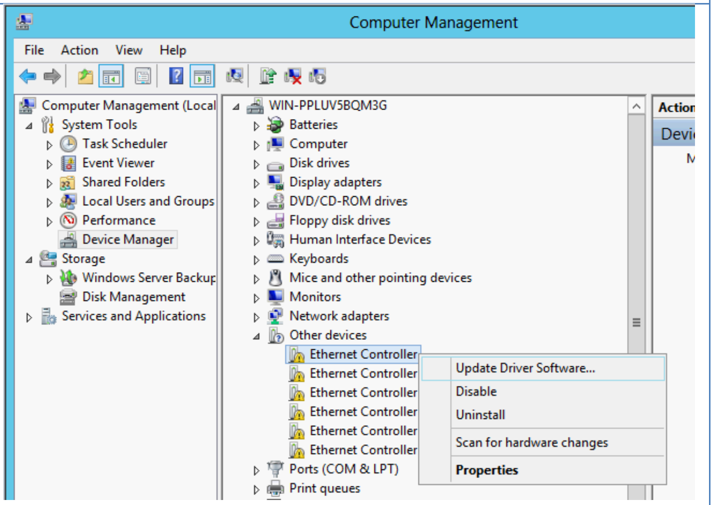
Mapped	Read Only	Drive
☐	☑	D: - CD/DVD

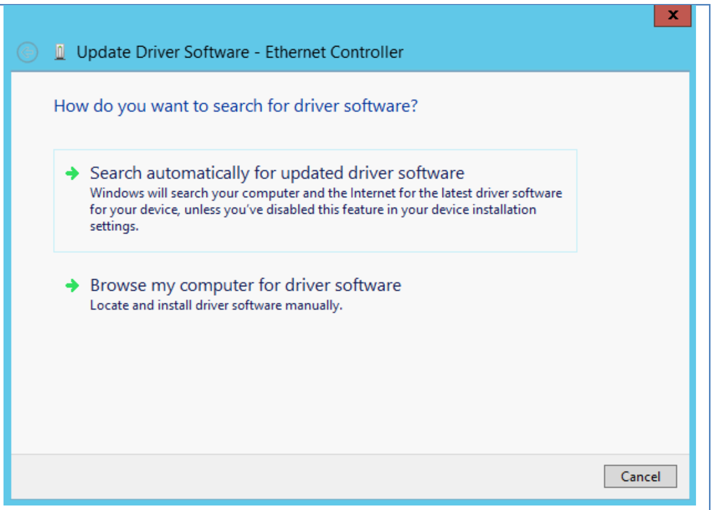
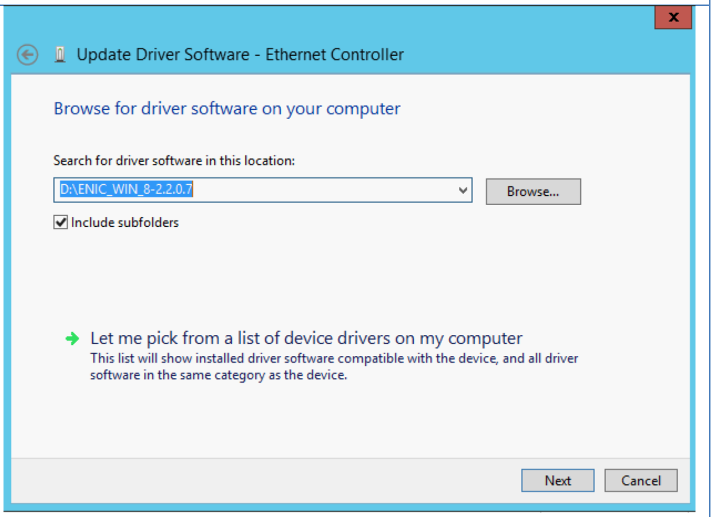
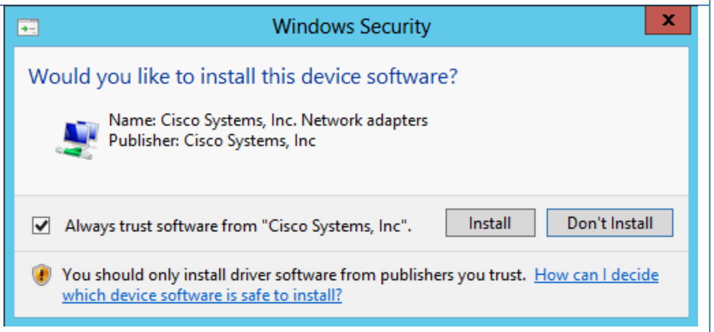
Browse to the location on your configuration workstation where you have stored a copy of the Windows Server 2012 installation media. Click **Open**.	 Open Look in: Software Cisco SC2012 SQL2008R2SP1 CU4 WS2012 en_windows_server_2008_r2_with_sp1_x64_dvd_617601.iso KB3AIK_EN.iso File name: windows_server_2008_r2_with_sp1_x64_dvd_617601.iso Files of type: Disk image file (*.iso, *.img) Open Cancel
Click the **Mapped** box in the Virtual Media window. Repeat the process to load an.img or.iso file containing the P81E drivers. Click the KVM tab to return to the KVM window. Click Reset to cause the server to boot to the installation media. The installation will start.	 / FT-HyperV1 (Rack -1) - KVM Console Client View Mapped / Read Only / Drive ☐ ☑ D: - CD/DVD ☑ ☑ C:\Software\en_windows_server_2008_r2_with_sp1_x64_dvd_617601.iso - ISO Image File ☑ ☑ C:\Software\Cisco\ENIC_WIN_8-2_2_0_7.img - Floppy Image File
Select the appropriate localization features. Click **Next**. On next screen, click **Install Now.**	 Windows Setup Windows Server 2012 Language to install: English (United States) Time and currency format: English (United States) Keyboard or input method: US Enter your language and other preferences and click "Next" to continue. © 2012 Microsoft Corporation. All rights reserved. Next
Depending upon the distribution you are using, you may or may not see this window. If you are using a Retail copy, you will see this window. If you are using a volume license copy, you will not see this window. If you are using a Retail copy, enter the 25-character key that came with your software.	 Windows Setup Enter the product key to activate Windows It should be on the back of the box that Windows came in or in a message that shows you bought Windows. The product key looks like this: XXXXX-XXXXX-XXXXX-XXXXX-XXXXX Dashes will be added automatically. 48HP8-DN98B-MYWDG-T2DCC-8W83P Privacy statement Next

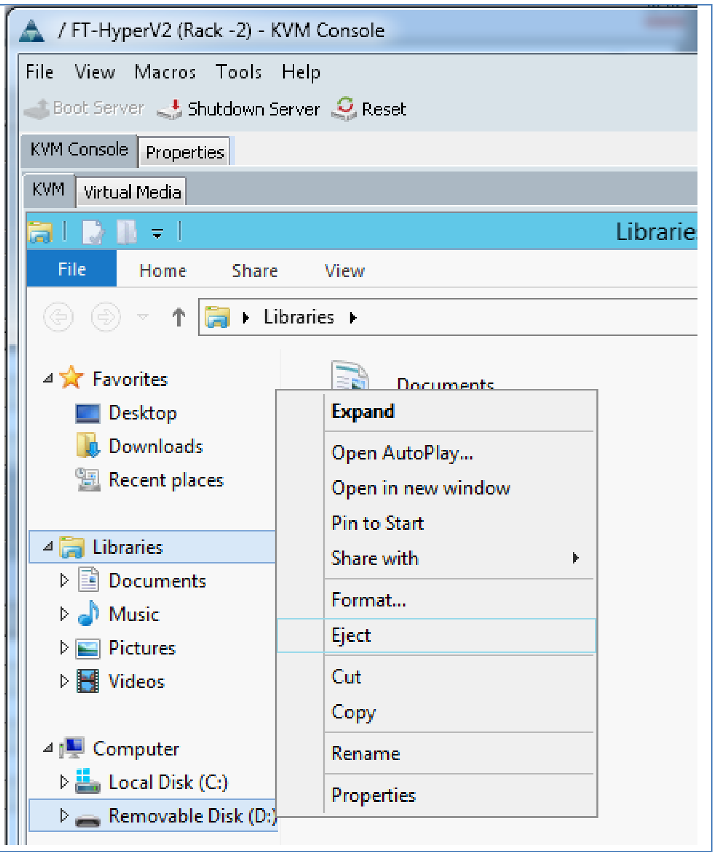
Select the **Windows Server 2012 Datacenter (Server with a GUI)** option. Click **Next.**	 Windows Setup Select the operating system you want to install Operating system / Architecture / Date modified Windows Server 2012 Datacenter (Server Core Installation) / x64 / 7/26/2012 Windows Server 2012 Datacenter (Server with a GUI) / x64 / 7/26/2012 Description: This option is useful when a GUI is required—for example, to provide backward compatibility for an application that cannot be run on a Server Core installation. All server roles and features are supported. You can switch to a different installation option later. See "Windows Server Installation Options." Next
Click the check box to accept the license terms. Click **Next.**	 Windows Setup License terms MICROSOFT SOFTWARE LICENSE TERMS MICROSOFT WINDOWS SERVER 2012 DATACENTER These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft · updates, · supplements, · Internet-based services, and · support services ☑ I accept the license terms Next
Click on **Custom: Install Windows only (advanced)**	 Windows Setup Which type of installation do you want? **Upgrade: Install Windows and keep files, settings, and applications** The files, settings, and applications are moved to Windows with this option. This option is only available when a supported version of Windows is already running on the computer. **Custom: Install Windows only (advanced)** The files, settings, and applications aren't moved to Windows with this option. If you want to make changes to partitions and drives, start the computer using the installation disc. We recommend backing up your files before you continue. Help me decide

You will not see any disks because the P81E drivers are not included as part of the Windows Server2012 installation media. You will have to manually load them. Click **Load driver**.	 Where do you want to install Windows? Name · Total size · Free space · Type
Click the **Browse** button to browse to the virtual media containing your Cisco UCS P81E drivers.	 Select the driver to install Load driver To install the device driver for your drive, insert the installation media containing the driver files, and then click OK. Note: The installation media can be a CD, DVD, or USB flash drive. ☑ Hide drivers that aren't compatible with this computer's hardware.
Click **Next** to install the driver.	 Select the driver to install Cisco VIC Ethernet Interface (E:\ENIC6X64.INF) ☑ Hide drivers that aren't compatible with this computer's hardware.

When the driver installation is complete, you will be returned to this window. You may have to click Refresh to get the driver to show up. Ignore the size warning at the bottom of the window. Click **Next.**	 Windows Setup Where do you want to install Windows? Name / Total size / Free space / Type Drive 0 Unallocated Space / 67.1 GB / 67.1 GB The amount of free space on the selected partition is smaller than the 83075 MB recommendation. We recommend making it at least 83075 MB or selecting another partition.
Windows will now proceed through its initial setup. As noted, Windows will reboot during this process. You may see a message to **Press any key to boot from CD or DVD ....** Do not enter any key as it will start the installation process from the beginning again. (You can ensure this message does not appear by removing the Windows Server 2012 virtual media. If you do this, make sure you leave the Cisco driver media assigned. It will be needed in a future step.)	 Windows Setup Installing Windows Your computer will restart several times. This might take a while. ✓ Copying Windows files **Getting files ready for installation (23%)** Installing features Installing updates Finishing up
Enter password for local administrator account. Re-enter password to validate.	 Settings Type a password for the built-in administrator account that you can use to sign in to this computer. User name: Administrator Password Reenter password

Login to the new machine.	
Start the Computer Management tool by clicking the **Tools** menu and selecting **Computer Management.**	 Server Manager Dashboard Manage Tools View Help Dashboard Local Server All Servers File and Storage Services WELCOME TO SERVER MANAGER QUICK START 1 Config 2 Add Component Services Computer Management Defragment and Optimize Drives Event Viewer iSCSI Initiator Local Security Policy ODBC Data Sources (32-bit) ODBC Data Sources (64-bit)
Click on **Device Manager.** Expand **Other** Devices. During the installation, the device driver for the P81E was loaded just for the iSCSI NIC. You now have update the driver for each of the other networks defined on the host.	 Computer Management File Action View Help Computer Management (Local System Tools Task Scheduler Event Viewer Shared Folders Local Users and Groups Performance Device Manager Storage Windows Server Backup Disk Management Services and Applications WIN-PPLUV5BQM3G Batteries Computer Disk drives Display adapters DVD/CD-ROM drives Floppy disk drives Human Interface Devices Keyboards Mice and other pointing devices Monitors Network adapters Other devices Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ports (COM & LPT) Print queues Actions Device Manager More Actions
Right-click on the first Ethernet Controller that shows in the Other Devices section. Select **Update Driver Software....**	 Computer Management File Action View Help Computer Management (Local System Tools Task Scheduler Event Viewer Shared Folders Local Users and Groups Performance Device Manager Storage Windows Server Backup Disk Management Services and Applications WIN-PPLUV5BQM3G Batteries Computer Disk drives Display adapters DVD/CD-ROM drives Floppy disk drives Human Interface Devices Keyboards Mice and other pointing devices Monitors Network adapters Other devices Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ethernet Controller Ports (COM & LPT) Print queues Update Driver Software... Disable Uninstall Scan for hardware changes Properties Action Devi

Select **Browse my computer for driver software.**	 Update Driver Software - Ethernet Controller How do you want to search for driver software? Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings. Browse my computer for driver software Locate and install driver software manually. Cancel
If it is not automatically selected, browse to your virtual media that contains the Cisco drivers. Click **Let me pick from a list of device drivers on my computer.**	 Update Driver Software - Ethernet Controller Browse for driver software on your computer Search for driver software in this location: D:\ENIC_WIN_8-2.2.0.7 Browse... ☑ Include subfolders Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device. Next Cancel
Click **Install.** Click **Close** in the next window. Repeat process for all Ethernet Controller entry within Other devices.	 Windows Security Would you like to install this device software? Name: Cisco Systems, Inc. Network adapters Publisher: Cisco Systems, Inc ☑ Always trust software from "Cisco Systems, Inc". Install Don't Install You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

Eject the virtual media from the operating system. Click on the **Windows Explorer** icon on the task bar. Right-click **Removable Disk** and select **Eject.**	

Local Configuration Tasks

When the computer has the operating system installed, there are some tasks that are performed to ensure the ability for the hosts to be remotely managed for the rest of these instructions. In an existing customer environment, the customer may handle some of these tasks through Active Directory group policy objects. Setting up these tasks to be handled by group policies is beyond the scope of this document, so they should be reviewed with the customer.

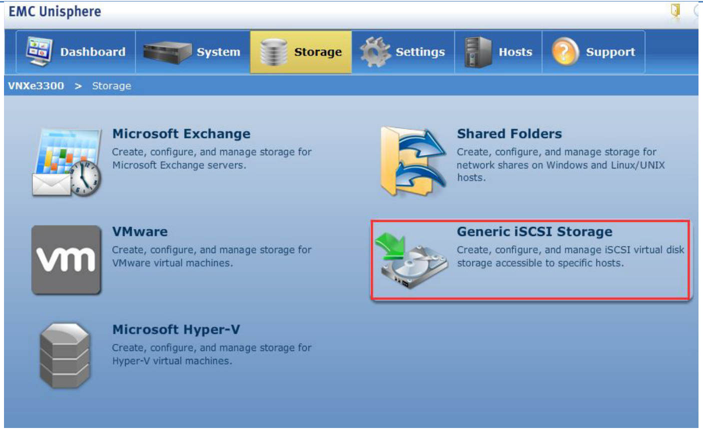
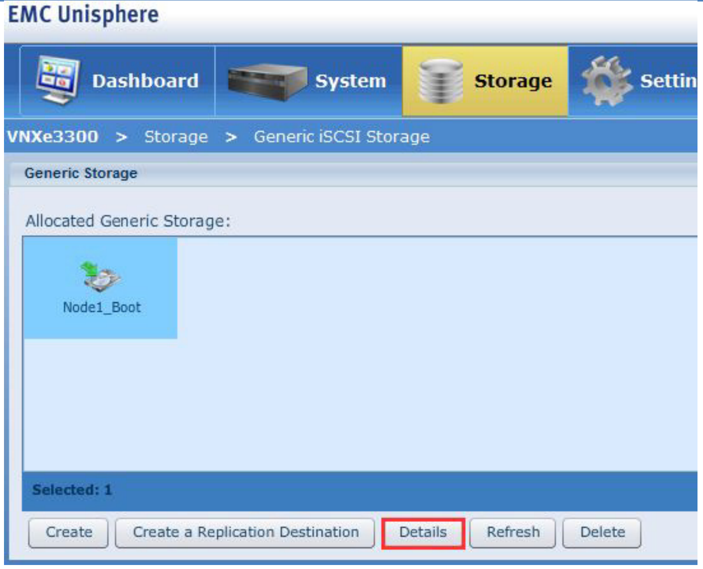
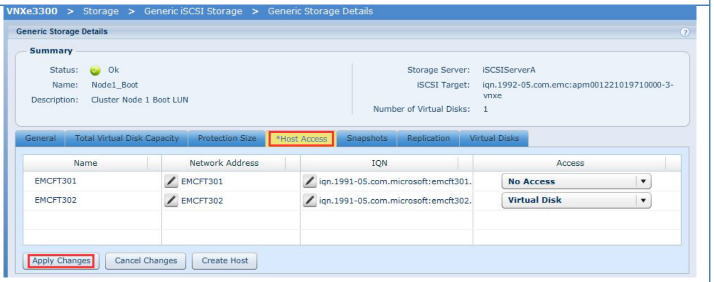
Remote Management

The server needs to be configured to ensure its ability to be remotely managed. This requires setting some specific firewall rules, so the setting of these rules should be agreed to by the customer's security department.

1. Log into the server you have just configured, connect to the file share on the configuration workstation.
2. Open a PowerShell window. Enter the command **Get-ExecutionPolicy**.
3. If the above command returns the value “Restricted”, enter the command **Set-ExecutionPolicy Unrestricted**. Enter **Y** at the confirmation prompt. By default, PowerShell is set up to prevent the execution of script files. Setting the execution policy to Unrestricted will enable the execution of the Create-UcsHyperVFastTrack script.
4. Connect to the file share directory on the configuration workstation.
5. Type **.\Create-UcsHyperVRemoteMgmt.ps1**

Assigning Storage To Hosts

If the storage device was created but not assigned to any hosts, access can be specified at a later time through the storage device details area of Unisphere. Additionally, the appendix provides an example script, using ESI, for how to assign storage to a host. The following table provides an example on how to use Unisphere to assign storage.

From within Unisphere go to **Storage** and then **Generic iSCSI Storage**	 EMC Unisphere Dashboard System Storage Settings Hosts Support VNXe3300 > Storage Microsoft Exchange Shared Folders VMware Generic iSCSI Storage Microsoft Hyper-V Create, configure, and manage storage for Microsoft Exchange servers. Create, configure, and manage storage for network shares on Windows and Linux/UNIX hosts. Create, configure, and manage storage for VMware virtual machines. Create, configure, and manage iSCSI virtual disk storage accessible to specific hosts. Create, configure, and manage storage for Hyper-V virtual machines.
Hi-light the storage device and select **Details**	 EMC Unisphere Dashboard System Storage Settin VNXe3300 > Storage > Generic iSCSI Storage Generic Storage Allocated Generic Storage: Node1_Boot Selected: 1 Create Create a Replication Destination Details Refresh Delete
Select the **Host Access** tab, make the appropriate changes in the **Access** column, then select **Apply Changes**	 VNXe3300 > Storage > Generic iSCSI Storage > Generic Storage Details Generic Storage Details Summary General Total Virtual Disk Capacity Protection Size *Host Access Snapshots Replication Virtual Disks Apply Changes Cancel Changes Create Host Status: Ok Name: Node1_Boot Description: Cluster Node 1 Boot LUN Storage Server: iSCSIServerA iSCSI Target: iqn.1992-05.com.emc:apm001221019710000-3-vnxe Number of Virtual Disks: 1 Name | Network Address | IQN | Access EMCFT301 | EMCFT301 | iqn.1991-05.com.microsoft:emcft301. | No Access EMCFT302 | EMCFT302 | iqn.1991-05.com.microsoft:emcft302. | Virtual Disk

Modify Windows Server 2012 iSCSI registry parameters

The registry settings in the following table should be modified on each server running iSCSI to the VNXe. The settings apply for both the native Windows Server 2012 MPIO DSM and PowerPath unless otherwise noted.

1. In Windows, run the regedit.exe command to start the Windows Registry Editor.
2. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet
3. Right click on the key and select **Find**
4. Search for the registry values in the table below. The values will be within the following folder
    a. HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\{***}***\Parametes
    b. *** indicates a unique value to a given computer.

Table 15 Registry Setting Values

Registry Value	Instructions
LinkDownTime	Set to 600 (Decimal)
AsyncLogoutPauseTimeout (New Value)	Add this REG_DWORD value to the same key as **LinkDownTime**. Set it to 600 (Decimal)
PortRetryCount	Find the **DelayBetweenReconnect** value. Set the **PortRetryCount** based on the following formula: 600 / **DelayBetweenReconnect** = **PortRetryCount**
MaxRequestHoldTime	Verify the **MaxRequestHoldTime** value is set to 600 (Decimal)
SrbTimeoutDelta	If PowerPath is used, set this to 100 (Decimal)

Prepare Disks for Clustering

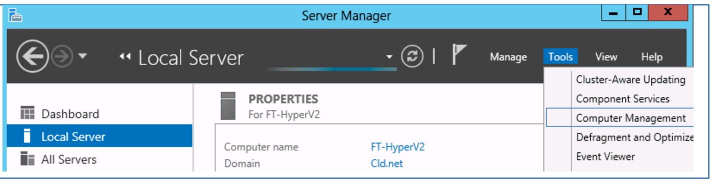
Earlier iSCSI LUNs were created and zoning/masking performed to present multiple LUNs to the servers for use by the cluster. It is a good practice to ensure each server that is going to participate in the cluster is able to properly access and mount the presented LUNs. Also, Microsoft Failover Cluster Services expects the LUNs to be formatted as NTFS volumes. These steps ensure the disks are ready for use by the cluster and that each node has access to them.

All the following steps should be performed only from the first server that will be a cluster node. These steps prepare the disks for clustering.

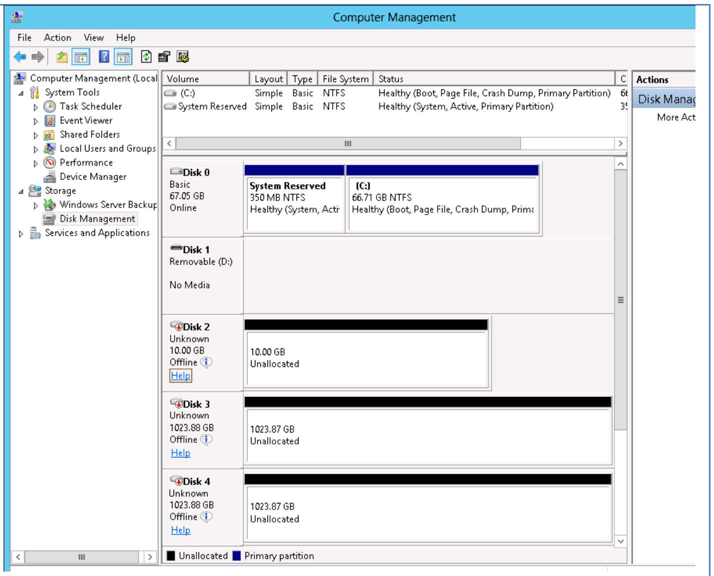
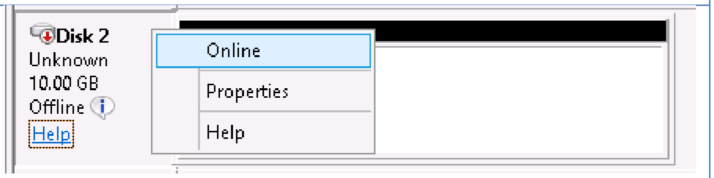
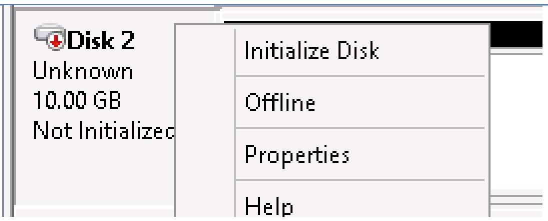
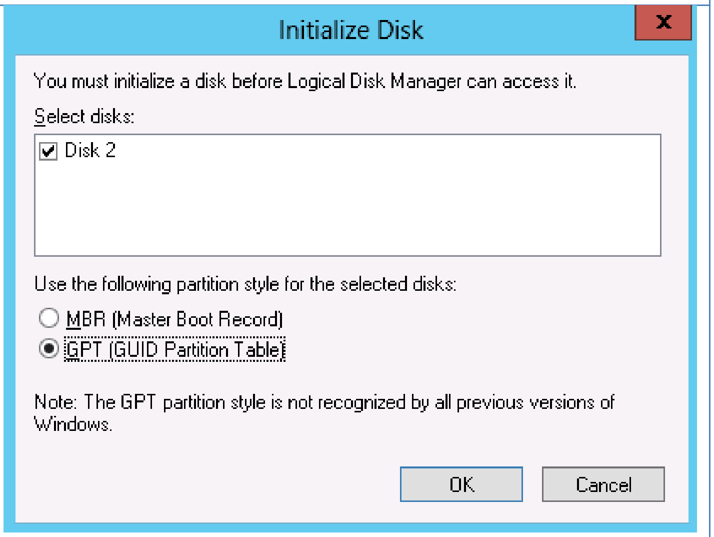
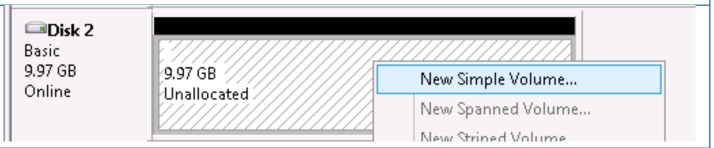
On subsequence servers, simply follow the steps to bring the disks online and then take them offline. This ensures that disks are accessible from each node in the cluster. If you run into an error bring the disks online and offline, you will most likely need to troubleshoot your iSCSI configuration for that particular server.

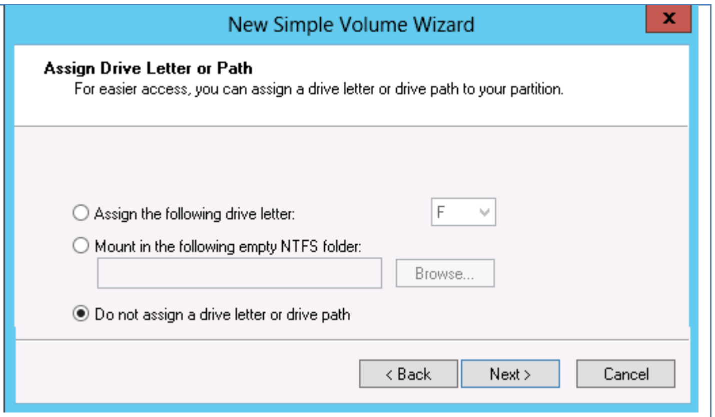
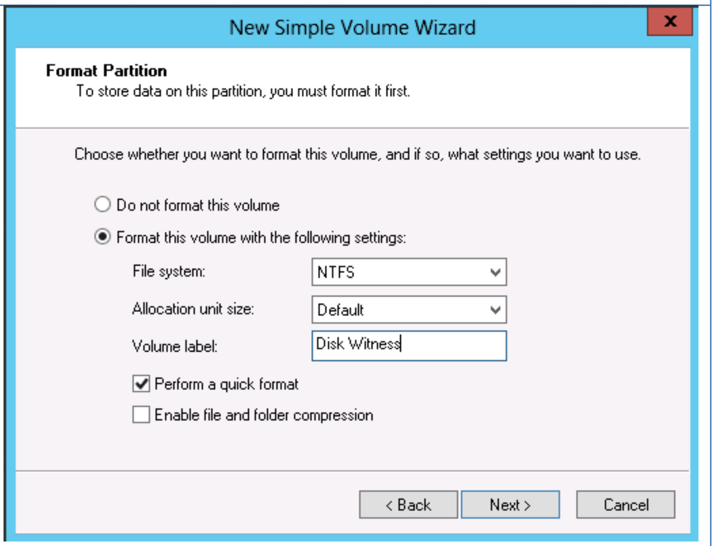
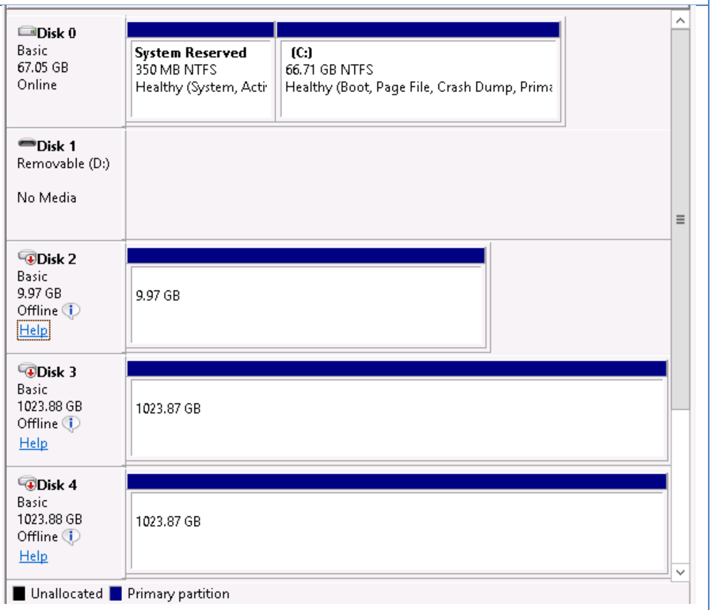
From **Server Manager**, select **Local Server**.

From the **Tools** menu, select **Computer Management**.



Computer name FT-HyperV2
Domain Cld.net

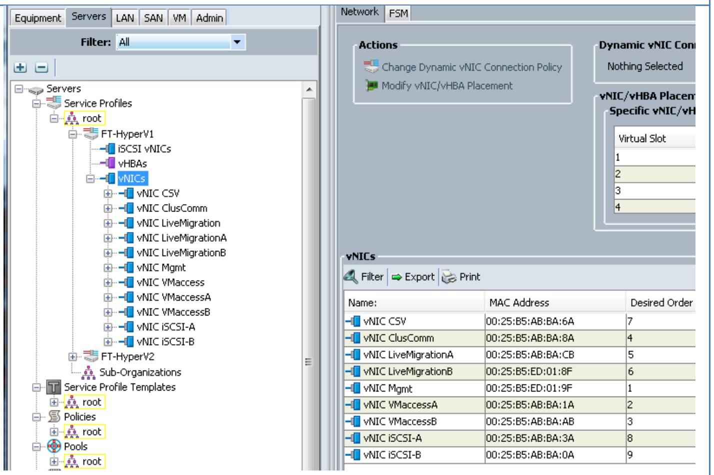
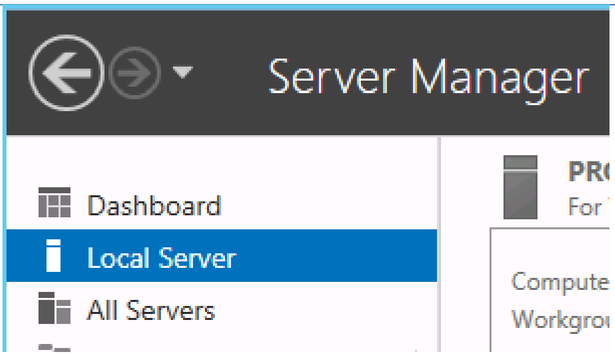
From **Computer Management**, select **Disk Management**. You will see the iSCSI LUNs listed as Unknown and Offline.	 Computer Management File Action View Help Computer Management (Local System Tools Task Scheduler Event Viewer Shared Folders Local Users and Groups Performance Device Manager Storage Windows Server Backup Disk Management Services and Applications Actions Disk Manag More Act Unallocated Primary partition Volume | Layout | Type | File System | Status (C:) | Simple | Basic | NTFS | Healthy (Boot, Page File, Crash Dump, Primary Partition) System Reserved | Simple | Basic | NTFS | Healthy (System, Active, Primary Partition) Disk 0 Basic 67.05 GB Online — System Reserved 350 MB NTFS Healthy (System, Acti — (C:) 66.71 GB NTFS Healthy (Boot, Page File, Crash Dump, Prima Disk 1 Removable (D:) No Media Disk 2 Unknown 10.00 GB Offline Help — 10.00 GB Unallocated Disk 3 Unknown 1023.88 GB Offline Help — 1023.87 GB Unallocated Disk 4 Unknown 1023.88 GB Offline Help — 1023.87 GB Unallocated
Right-click in the left-hand of the display for the first iSCSI LUN disk and select **Online**.	 Disk 2 Unknown 10.00 GB Offline Help
Right-click in the left-hand of the display for the same disk and select **Initialize Disk**.	 Disk 2 Unknown 10.00 GB Not Initialized
There are two options for creating a partition on the selected disk – MBR or GPT. If the volume is over 2 TB in size, MBR is not an option. GPT partitions have some additional fault tolerance that MBR partitions do not have. Either type of partition works, but you may want to choose GPT partitions for use in the cluster. Click **OK**.	 Initialize Disk You must initialize a disk before Logical Disk Manager can access it. Select disks: ☑ Disk 2 Use the following partition style for the selected disks: ○ MBR (Master Boot Record) ● GPT (GUID Partition Table) Note: The GPT partition style is not recognized by all previous versions of Windows.
Right-click in the right-hand of the display for the same disk. Select **New Simple Volume**.	 Disk 2 Basic 9.97 GB Online — 9.97 GB Unallocated New Simple Volume... New Spanned Volume... New Striped Volume...

Click **Next** on the welcome window of the New Simple Volume Wizard. Click **Next** on the Specify Volume Size window to create the maximum sized volume. Click **Do not assign a driver path** on the Assign Drive Letter or Path window. Click **Next.** Accept the defaults on the Format Partition window by clicking on **Next.** Click **Finish** on the Summary window.	 New Simple Volume Wizard **Assign Drive Letter or Path** For easier access, you can assign a drive letter or drive path to your partition. ○ Assign the following drive letter: F ○ Mount in the following empty NTFS folder: ● Do not assign a drive letter or drive path
It is a good practice to assign a Volume label as it can assist in troubleshooting in the future. Accept the other defaults on the Format Partition window by clicking on **Next.** Click **Finish** on the Summary window.	 New Simple Volume Wizard **Format Partition** To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to use. ○ Do not format this volume ● Format this volume with the following settings: File system: NTFS Allocation unit size: Default Volume label: Disk Witness ☑ Perform a quick format ☐ Enable file and folder compression
Right-click the left-hand side of the display for the disk and select **Offline.** Repeat the above steps for each of the iSCSI LUNs to be used by the cluster. When complete, you disk configuration will look something like the diagram to the right.	 **Disk 0** Basic 67.05 GB Online — **System Reserved** 350 MB NTFS Healthy (System, Acti — **(C:)** 66.71 GB NTFS Healthy (Boot, Page File, Crash Dump, Prima **Disk 1** Removable (D:) No Media **Disk 2** Basic 9.97 GB Offline Help — 9.97 GB **Disk 3** Basic 1023.88 GB Offline Help — 1023.87 GB **Disk 4** Basic 1023.88 GB Offline Help — 1023.87 GB ■ Unallocated ■ Primary partition

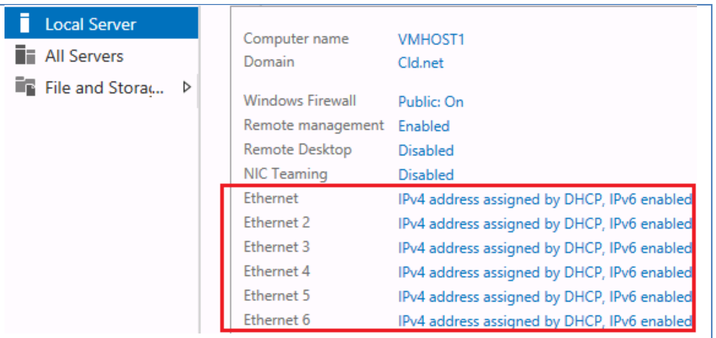
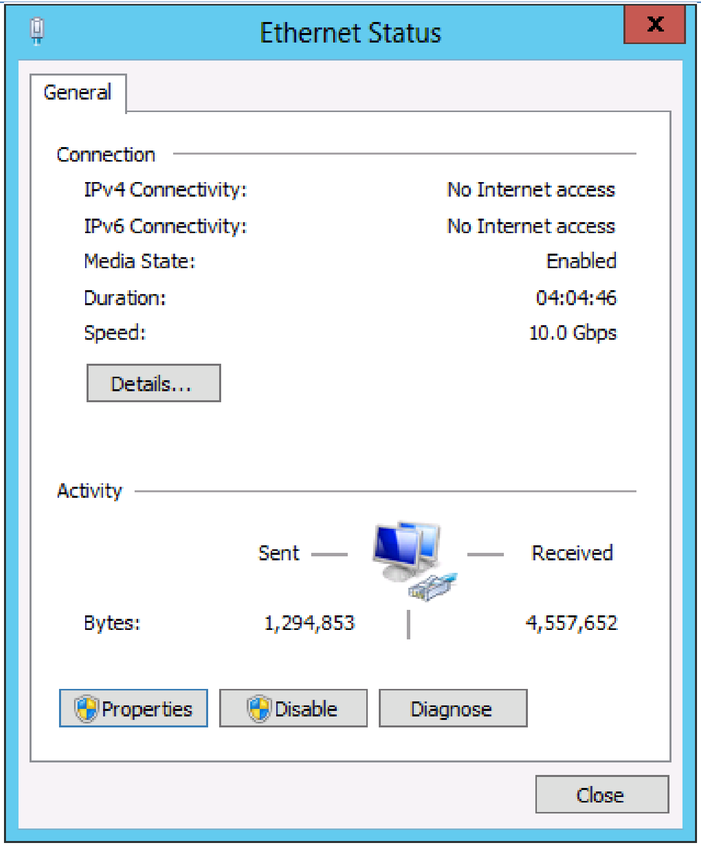
Initial Network Configuration

What is seen in the following sample screen shots may vary significantly from the actual customer environment. This is due to the fact that there are many variables in the potential customer network, and all variations are not covered in these samples. These samples assume that there is no DHCP server (which would make this a little easier, but is beyond the scope of this document). By assuming there is no DHCP server, all NICs will initially be configured with 169.254/16 APIPA addresses. These steps will assign fixed IP addresses to all the NICs.

The first that is necessary is to find the NIC through which host management is performed. This is not the out-of-band NIC used by UCSM, but the NIC dedicated to host management.

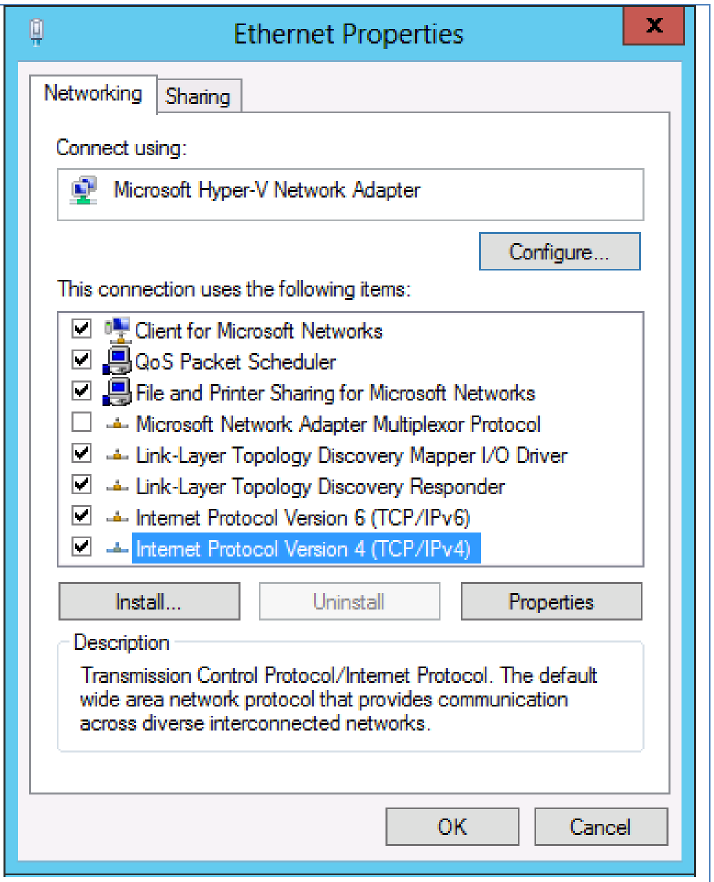
Log into the server. Enter the following PowerShell command. **Gwmi Win32_NetworkAdapter | Where {$_.MACaddress –ne $Null} | FT NetConnectionID, MACaddress** This returns a table of the network names and their associated MAC addresses.	
Go to the **Servers** tab in UCSM. Select **Servers** > **Service Profiles** > **root** and the service profile for the machine you are working on. Expand the Service Profile. Expand the vNICs. This enables you to see the MAC addresses for the Mgmt vNIC (in this example, Mgmt is the NIC used for host management). Find the MAC address in the table displayed in the previous step, and take note of the assigned name. For example purposes, assume it is “Ethernet”	
In **Server Manager** click on **Local Server.**	

Name:	MAC Address	Desired Order
vNIC CSV	00:25:B5:AB:BA:6A	7
vNIC ClusComm	00:25:B5:AB:BA:8A	4
vNIC LiveMigrationA	00:25:B5:AB:BA:CB	5
vNIC LiveMigrationB	00:25:B5:ED:01:8F	6
vNIC Mgmt	00:25:B5:ED:01:9F	1
vNIC VMaccessA	00:25:B5:AB:BA:1A	2
vNIC VMaccessB	00:25:B5:AB:BA:AB	3
vNIC iSCSI-A	00:25:B5:AB:BA:3A	8
vNIC iSCSI-B	00:25:B5:AB:BA:0A	9

Click on any one of the networks. This will bring up the Network Manager.window.	 Local Server All Servers File and Storag... Computer name VMHOST1 Domain Cld.net Windows Firewall Public: On Remote management Enabled Remote Desktop Disabled NIC Teaming Disabled Ethernet IPv4 address assigned by DHCP, IPv6 enabled Ethernet 2 IPv4 address assigned by DHCP, IPv6 enabled Ethernet 3 IPv4 address assigned by DHCP, IPv6 enabled Ethernet 4 IPv4 address assigned by DHCP, IPv6 enabled Ethernet 5 IPv4 address assigned by DHCP, IPv6 enabled Ethernet 6 IPv4 address assigned by DHCP, IPv6 enabled
Double-click the entry for “Ethernet”. This brings up the Status window for the Ethernet NIC. Click **Details...** to ensure you have the right MAC address. Click **Properties.**	 Ethernet Status General Connection IPv4 Connectivity: No Internet access IPv6 Connectivity: No Internet access Media State: Enabled Duration: 04:04:46 Speed: 10.0 Gbps Details... Activity Sent — Received Bytes: 1,294,853 | 4,557,652 Properties Disable Diagnose Close

Click on the **Internet Protocol Version 4 (TCP/IPv4)** line. (Leave the check box checked.)

Click **Properties.**



Ethernet Properties

Networking | Sharing

Connect using:

Microsoft Hyper-V Network Adapter

Configure...

This connection uses the following items:

- ☑ Client for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ File and Printer Sharing for Microsoft Networks
- □ Microsoft Network Adapter Multiplexor Protocol
- ☑ Link-Layer Topology Discovery Mapper I/O Driver
- ☑ Link-Layer Topology Discovery Responder
- ☑ Internet Protocol Version 6 (TCP/IPv6)
- ☑ Internet Protocol Version 4 (TCP/IPv4)

Install... | Uninstall | Properties

Description

Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

OK | Cancel

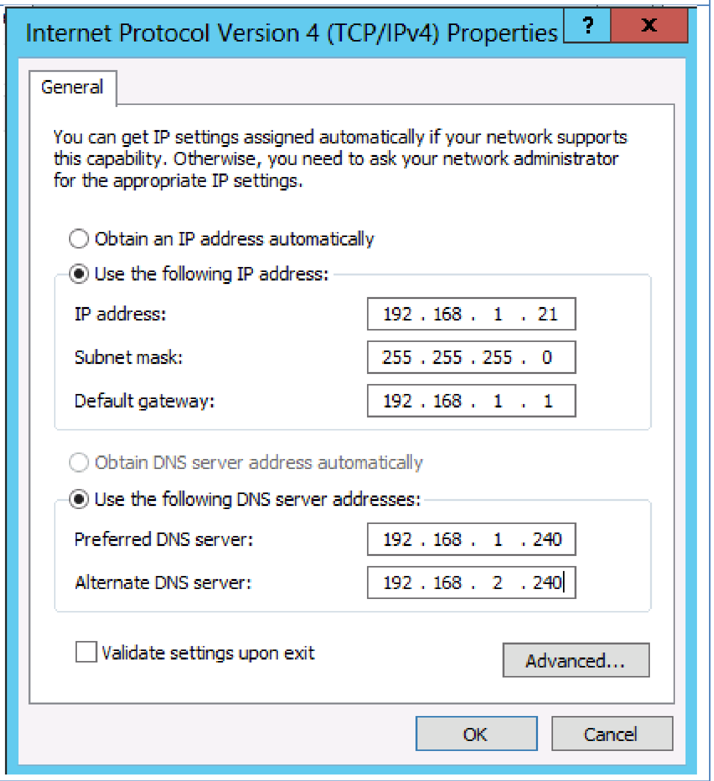
Configure the IP settings appropriately for the customer environment.

Click **OK.**

Click **Close.**

Click **Close.**

Back in the Windows PowerShell window, ping the Domain Controller by its name to ensure you have properly configured the network settings.



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 1 . 21

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 1 . 1

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: 192 . 168 . 1 . 240

Alternate DNS server: 192 . 168 . 2 . 240

□ Validate settings upon exit

Advanced...

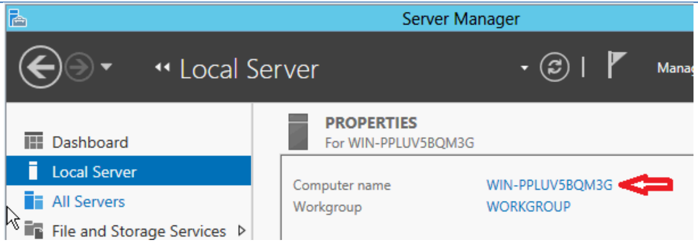
OK | Cancel

Join Computer to Domain

These next few steps assume that there is an existing Active Directory domain to join.

Within **Server Manager**, click on **Local Server** on the left-hand side of the window.

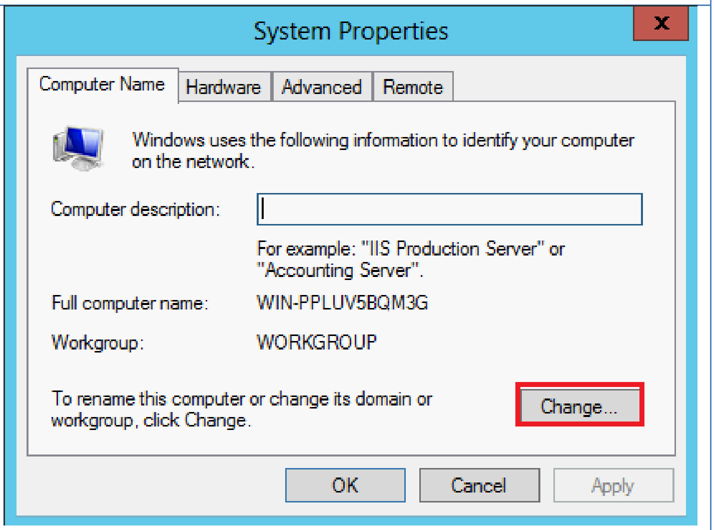
Click on the Computer Name.



PROPERTIES
For WIN-PPLUV5BQM3G

Computer name WIN-PPLUV5BQM3G
Workgroup WORKGROUP

Click **Change...**



Windows uses the following information to identify your computer on the network.

Computer description:

For example: "IIS Production Server" or "Accounting Server".

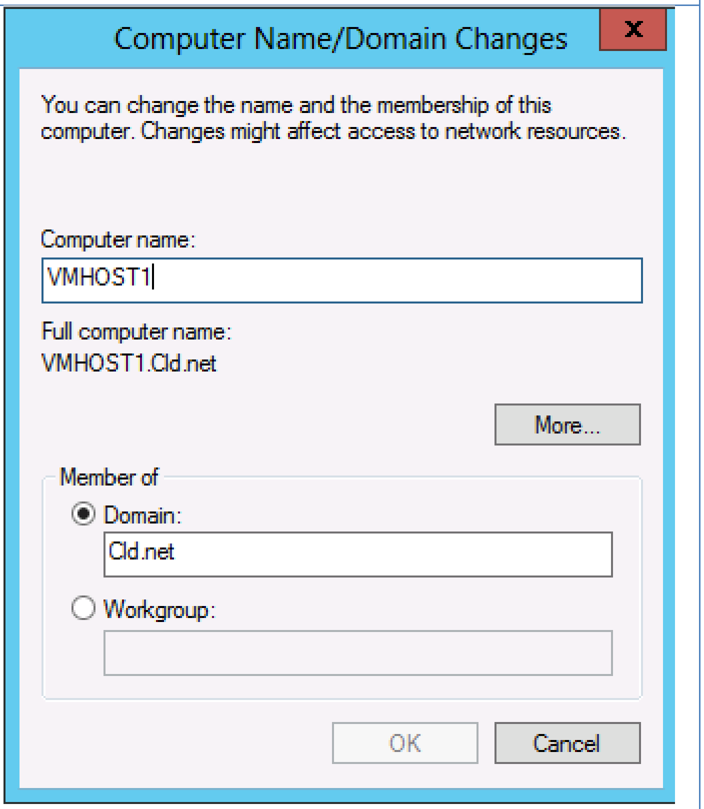
Full computer name: WIN-PPLUV5BQM3G

Workgroup: WORKGROUP

To rename this computer or change its domain or workgroup, click Change.

Enter the name of the computer. It is most practical to make this name the same as the name of the UCS profile used with this system. This allows PowerTool to be used to match the profile name to the Windows computer name for management purposes.

Enter the name of the domain to be joined.



You can change the name and the membership of this computer. Changes might affect access to network resources.

Computer name:
VMHOST1

Full computer name:
VMHOST1.Cld.net

Member of
● Domain:
Cld.net
○ Workgroup:

Enter user name and password of an account with permissions to join the domain.

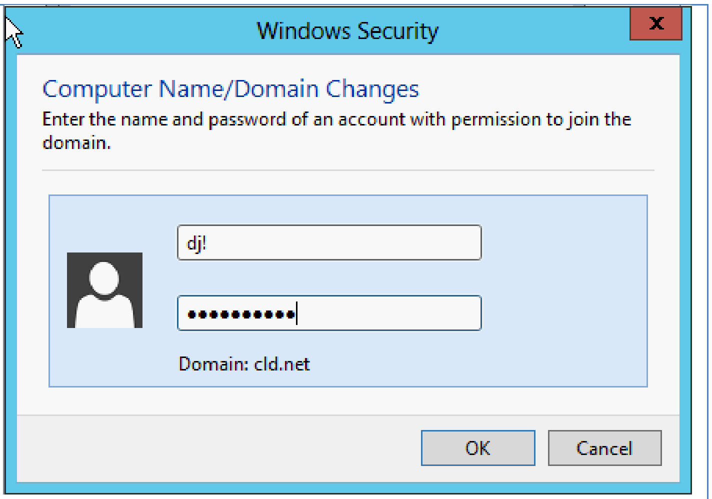
Click **OK**.

Click **OK** on the pop-up window that welcomes you to the domain.

Click **OK** on the pop-up window that states you must restart your computer to apply these changes.

Click **Close** on the System Properties window.

Click **Restart Now** to apply the changes.



Windows Security

Computer Name/Domain Changes

Enter the name and password of an account with permission to join the domain.

dj!

••••••••••

Domain: cld.net

Final Network Configuration

The configuration workstation contains a PowerShell script file that eases the process of renaming the NICs from the generic names assigned during the installation to names that match the Service Profile used on each server. It contains default values for accessing the UCS Manager. These variables will need to be edited to reflect the customer's configuration.

This script file is designed to be run from a domain-joined workstation or server.

1. Connect your configuration workstation to the network. Ensure proper network access to the UCS Manager by pinging the fabric interconnect network address.
2. Edit the **Rename-UcsHyperVNICs.ps1** file to contain the Admin username and password for the customer environment, and the VIP of the UCS Manager.
3. Save the file.
4. Connect to the directory in which you stored the PowerShell script file. Type**.\Rename-UcsHyperVNICs.ps1**

When the NIC teams have been renamed, you can configure static IP addresses for the NICs. Set-UcsHyperVIps.ps1 contains a PowerShell script file that will assign a fixed IP address to four NICs. The addresses assigned are in the format 192.168.<vlan>.<hostnum>, where <vlan> is the VLAN tag for the associated network, and <hostnum> is a value fixed across all IP addresses. It keeps things simpler if you assign the same value to <hostnum> as you used for the Mgmt NIC. The script also sets the NICs to not automatically register themselves in DNS.

This script file is designed to be run from a domain-joined workstation or server.

1. Connect your configuration workstation to the network.
2. Edit the script to reflect the names of the customer NIC names and VLAN tags.
3. Save the.script
4. Connect to the directory in which you stored the Set-UcsHyperVIps script file. Type**.\Set-UcsHyperVIps.ps1**

Role and Feature Installation

The Add-UcsHyperVFeatures.ps1 PowerShell script will add the Hyper-V role and the Failover Cluster and MPIO features. MPIO is required to create dual paths to the iSCSI LUNs. Adding the Hyper-V role requires that the server be rebooted. This is handled automatically by the script.

This script can be run from the configuration workstation.

1. Connect to the location of the PowerShell scripts
2. Type.**Add-UcsHyperVFeatures.ps1**

It will take a couple minutes for the features to be added. After the Hyper-V Server has rebooted, the virtual switches need to be created for use by the VMs.

1. Connect to the location of the PowerShell scripts
2. Type.**Create-UcsHyperVSwitches.ps1**

Configure MPIO on Windows Server 2012

MPIO can be configured from either the MPIO GUI after the feature is enabled, or from powershell. To configure the required settings from the MPIO GUI perform the following steps

1. Go to the Server Manager
2. Select **Tools** then **MPIO**
3. From the **MPIO** GUI, click the **Discover Multi-Path** tab
4. Select **Add support for iSCSI** devices, and click **Add**
5. Do not reboot the node when prompted
6. Click the **MPIO Devices** tab
7. Select **Add**
8. Enter “EMC Celerra“

Note EMC is followed by 5 spaces and Celerra is followed by 9 spaces

9. Select **OK** and reboot the server

Alternatively the following PowerShell commands can be used to configure MPIO.

Note A reboot is required after these commands even though there may not be a prompt to reboot.

10. Enable-MsdsmAutomaticClaim -BusType iSCSI
11. New-MsdsmSupportedhw -VendorID “EMC Celerra“

Configure the iSCSI Sessions to the VNXe

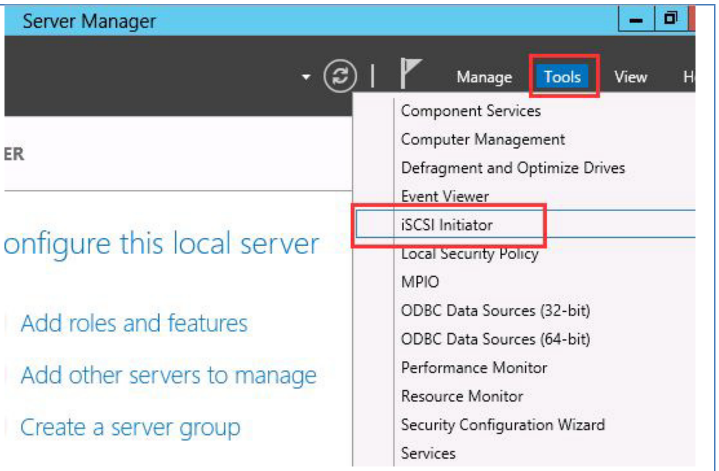
The following steps will show how to configure the iSCSI connections to the VNXe through the iSCSI Initiator Properties GUI. The appendix also includes a PowerShell script that can be used to accomplish the same task.

<table>
<tr>
<td>

From within **Server Manager** go to **Tools** and then **iSCSI Initiator**

If prompted select to start the Microsoft iSCSI Initiator Service automatically.

</td>
<td>



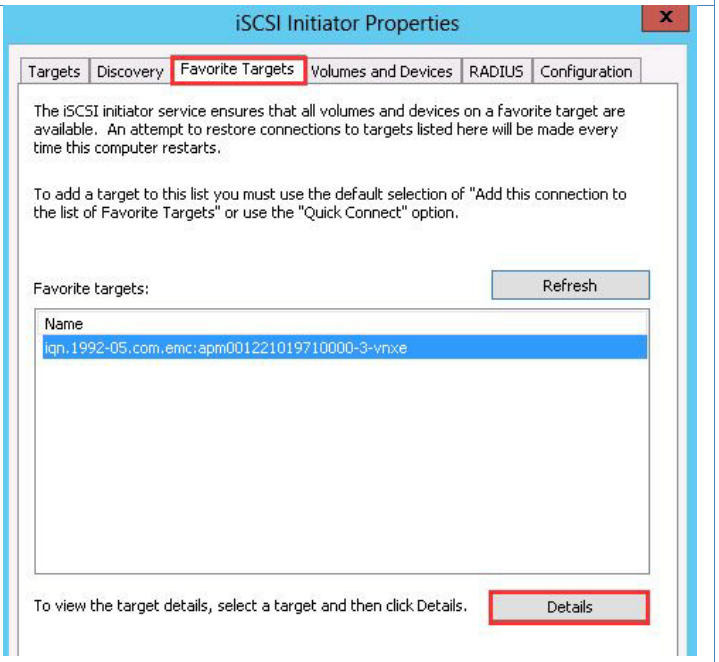
</td>
</tr>
<tr>
<td>

Go to the **Favorite Targets** tab

Hi-light the IQN which was automatically created thanks to the boot from iSCSI SAN configuration

Select **Details**

</td>
<td>



The iSCSI initiator service ensures that all volumes and devices on a favorite target are available. An attempt to restore connections to targets listed here will be made every time this computer restarts.

To add a target to this list you must use the default selection of "Add this connection to the list of Favorite Targets" or use the "Quick Connect" option.

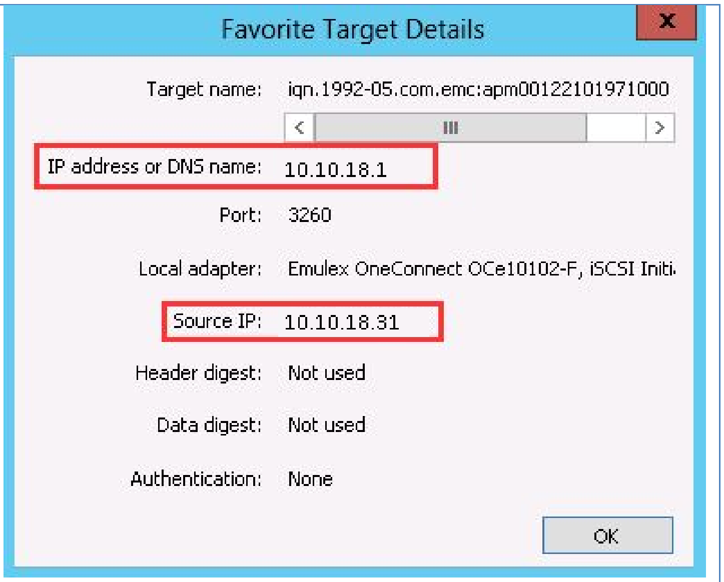
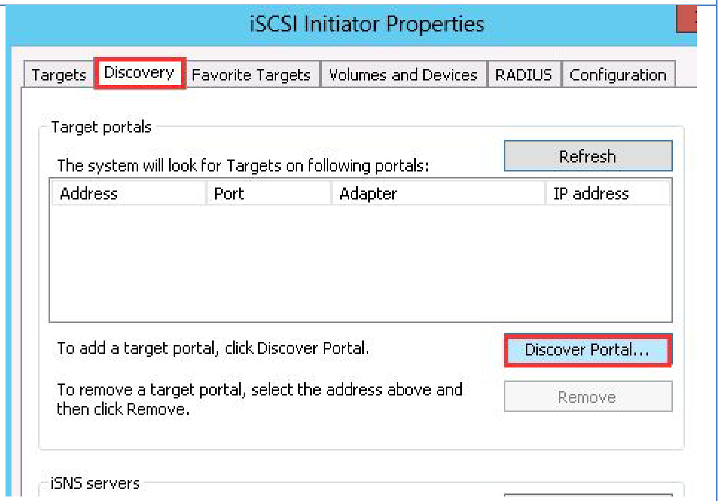
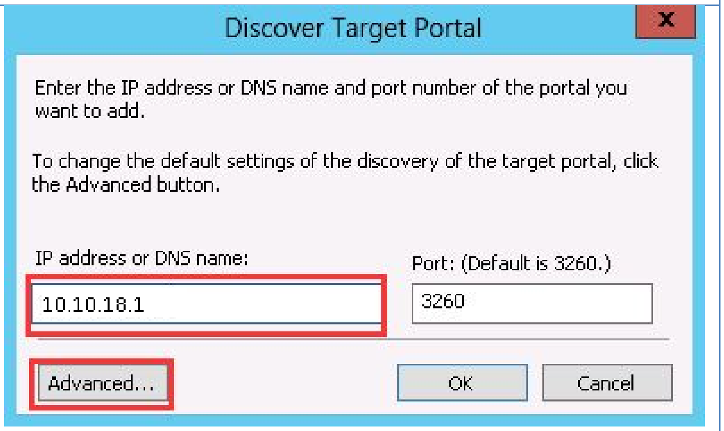
Favorite targets:

Name

iqn.1992-05.com.emc:apm001221019710000-3-vnxe

To view the target details, select a target and then click Details.

</td>
</tr>
</table>

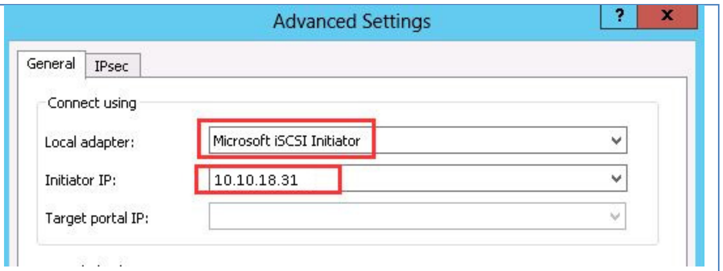
Note the **IP address** of the target and the **Source IP** of the host initiator. This initiator and target pair will be automatically placed into favorite targets and will connect each time the system boots. It is important not to add another persistent connection using these addresses. Adding another connection will cause an imbalance in the round-robin multi-pathing of the system.	 Favorite Target Details Target name: iqn.1992-05.com.emc:apm00122101971000 IP address or DNS name: 10.10.18.1 Port: 3260 Local adapter: Emulex OneConnect OCe10102-F, iSCSI Initi Source IP: 10.10.18.31 Header digest: Not used Data digest: Not used Authentication: None
Go to the **Discovery** tab and select **Discover Portal**	 iSCSI Initiator Properties Targets Discovery Favorite Targets Volumes and Devices RADIUS Configuration Target portals Refresh Address Port Adapter IP address Discover Portal... Remove iSNS servers The system will look for Targets on following portals: To add a target portal, click Discover Portal. To remove a target portal, select the address above and then click Remove.
Enter the first IP address of the VNXe iSCSI target and then click **Advanced**	 Discover Target Portal Enter the IP address or DNS name and port number of the portal you want to add. To change the default settings of the discovery of the target portal, click the Advanced button. IP address or DNS name: 10.10.18.1 Port: (Default is 3260.) 3260

Under **Advanced Settings** specify the local adapter as **Microsoft iSCSI Initiator**

For the **Initiator IP** enter the address of the iSCSI connection to be used to connect to the previously entered target portal.

Select **OK** to exit the advanced settings

Select **OK** again to commit the target portal



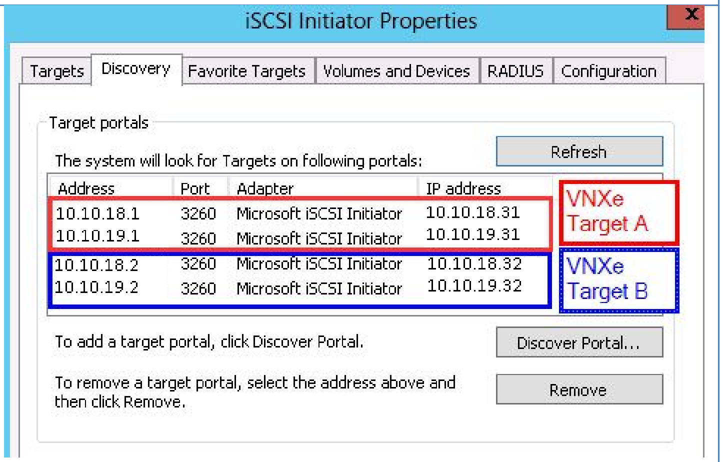
Local adapter: Microsoft iSCSI Initiator

Initiator IP: 10.10.18.31

Target portal IP:

Repeat the previous two steps until the target portal has 2 connections for each iSCSI Server.

For example, this screen shot shows the proper configuration for the 2 connections to be used against iSCSIServerA and iSCSIServerB as configured on the VNXe.



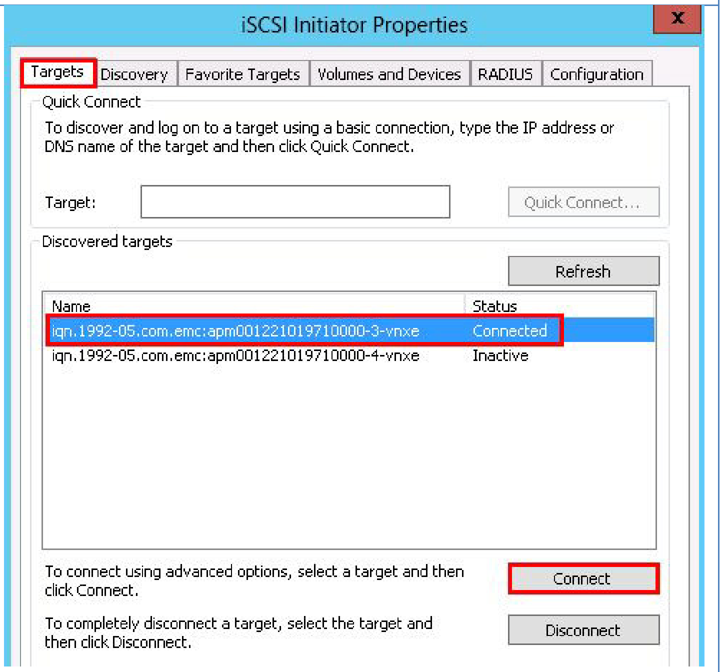
The system will look for Targets on following portals:

Address	Port	Adapter	IP address
10.10.18.1	3260	Microsoft iSCSI Initiator	10.10.18.31
10.10.19.1	3260	Microsoft iSCSI Initiator	10.10.19.31
10.10.18.2	3260	Microsoft iSCSI Initiator	10.10.18.32
10.10.19.2	3260	Microsoft iSCSI Initiator	10.10.19.32

To add a target portal, click Discover Portal.

To remove a target portal, select the address above and then click Remove.

Go to the **Targets** tab and select **Connect** for a VNXe target.



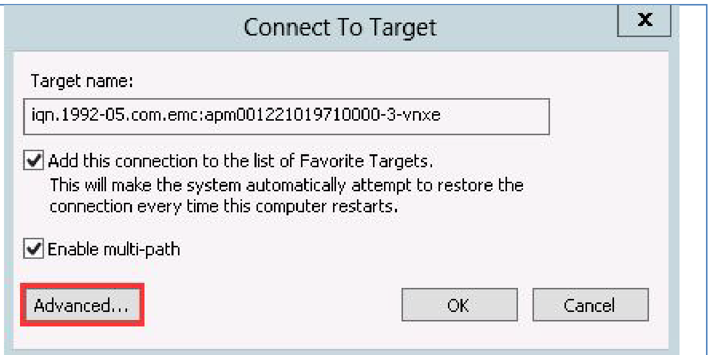
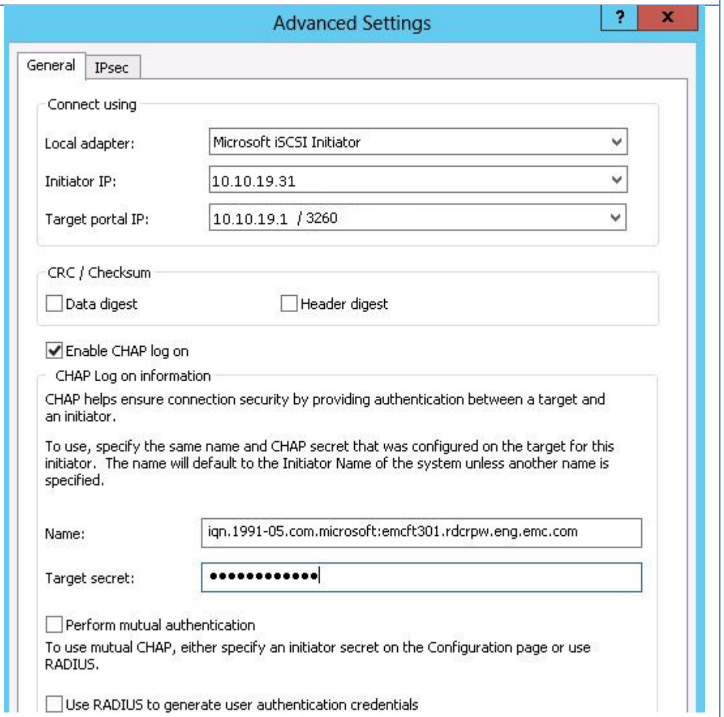
To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.

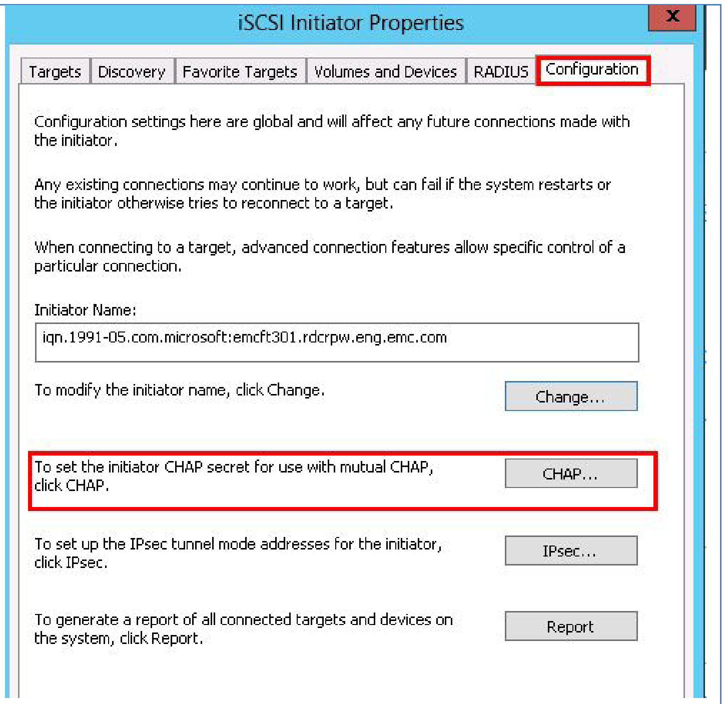
Target:

Name	Status
iqn.1992-05.com.emc:apm001221019710000-3-vnxe	Connected
iqn.1992-05.com.emc:apm001221019710000-4-vnxe	Inactive

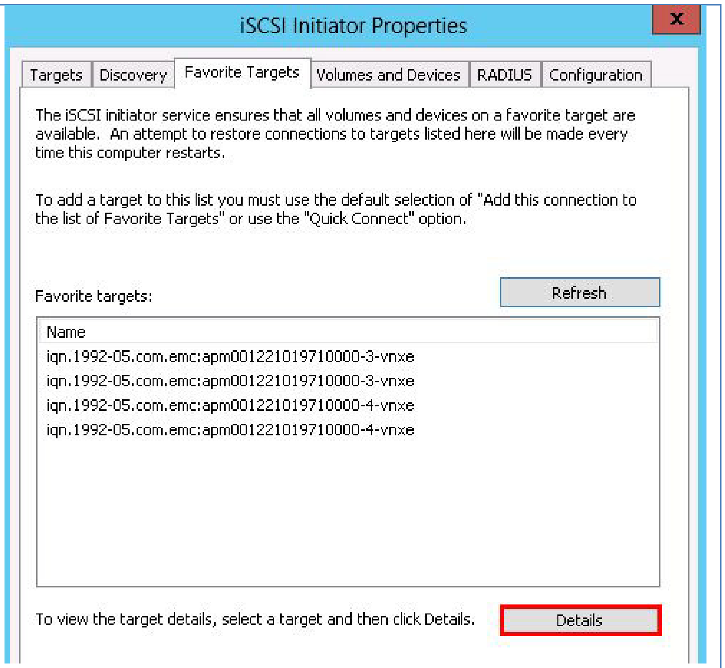
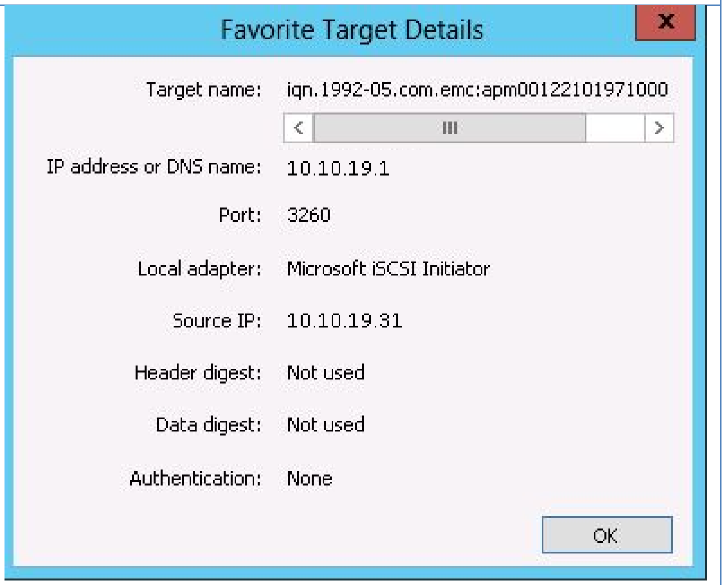
To connect using advanced options, select a target and then click Connect.

To completely disconnect a target, select the target and then click Disconnect.

Ensure **Add this connection to the list of Favorite Targets.** and **Enable multi-path** settings are checked, then select **Advanced**	 Connect To Target Target name: iqn.1992-05.com.emc:apm001221019710000-3-vnxe ☑ Add this connection to the list of Favorite Targets. This will make the system automatically attempt to restore the connection every time this computer restarts. ☑ Enable multi-path Advanced... OK Cancel
Select **Microsoft iSCSI Initiator** for the **Local adapter** For the **Initiator IP** and **Target portal IP** enter the connection on the subnet which was not automatically configured thanks to the boot from SAN configuration. Optionally select to **Enable CHAP log on** and specify the **Name** and **Target secret** specified for this IQN on the VNXe. Mutual CHAP can also be selected from this screen. Select **OK** when finished. Then select **OK** again to establish the session. For connections to a second iSCSI Server instance which is not a boot from SAN target for the host, repeat the previous two steps for **both** connections on each subnet.	 Advanced Settings General IPsec Connect using Local adapter: Microsoft iSCSI Initiator Initiator IP: 10.10.19.31 Target portal IP: 10.10.19.1 / 3260 CRC / Checksum ☐ Data digest ☐ Header digest ☑ Enable CHAP log on CHAP Log on information CHAP helps ensure connection security by providing authentication between a target and an initiator. To use, specify the same name and CHAP secret that was configured on the target for this initiator. The name will default to the Initiator Name of the system unless another name is specified. Name: iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com Target secret: •••••••••••• ☐ Perform mutual authentication To use mutual CHAP, either specify an initiator secret on the Configuration page or use RADIUS. ☐ Use RADIUS to generate user authentication credentials

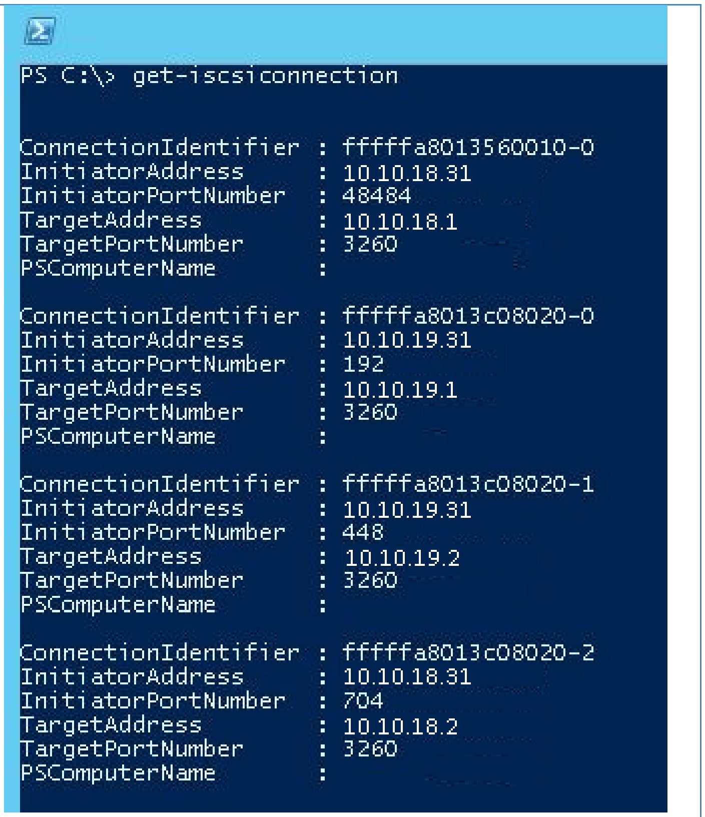
If Mutual CHAP was configured in the previous steps, ensure the Mutual CHAP password is set under the **Configuration** tab	 iSCSI Initiator Properties X Targets Discovery Favorite Targets Volumes and Devices RADIUS Configuration Change... CHAP... IPsec... Report Configuration settings here are global and will affect any future connections made with the initiator. Any existing connections may continue to work, but can fail if the system restarts or the initiator otherwise tries to reconnect to a target. When connecting to a target, advanced connection features allow specific control of a particular connection. Initiator Name: iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com To modify the initiator name, click Change. To set the initiator CHAP secret for use with mutual CHAP, click CHAP. To set up the IPsec tunnel mode addresses for the initiator, click IPsec. To generate a report of all connected targets and devices on the system, click Report.

Validate the Host iSCSI Configuration

From within **iSCSI Initiator Properties** go to **Favorite Targets** Ensure two favorite targets exist (one for each subnet) for each of the expected VNXe iSCSI storage servers.	 iSCSI Initiator Properties Targets | Discovery | Favorite Targets | Volumes and Devices | RADIUS | Configuration The iSCSI initiator service ensures that all volumes and devices on a favorite target are available. An attempt to restore connections to targets listed here will be made every time this computer restarts. To add a target to this list you must use the default selection of "Add this connection to the list of Favorite Targets" or use the "Quick Connect" option. Favorite targets: Refresh Name iqn.1992-05.com.emc:apm001221019710000-3-vnxe iqn.1992-05.com.emc:apm001221019710000-3-vnxe iqn.1992-05.com.emc:apm001221019710000-4-vnxe iqn.1992-05.com.emc:apm001221019710000-4-vnxe To view the target details, select a target and then click Details. Details
From the **Favorite Targets** tab Hi-light each connection and select **Details** Ensure each connection shows the appropriate **Source IP** and **IP Address or DNS name** pairing between the host iSCSI initiator and VNXe target.	 Favorite Target Details Target name: iqn.1992-05.com.emc:apm00122101971000 IP address or DNS name: 10.10.19.1 Port: 3260 Local adapter: Microsoft iSCSI Initiator Source IP: 10.10.19.31 Header digest: Not used Data digest: Not used Authentication: None OK

From an elevated powershell command window run **Get-IscsiConnection** and **Get-IscsiSession**

The result should show 2 sessions per VNXe iSCSI storage server



```
PS C:\> get-iscsiconnection


ConnectionIdentifier  : fffffa8013560010-0
InitiatorAddress      : 10.10.18.31
InitiatorPortNumber   : 48484
TargetAddress         : 10.10.18.1
TargetPortNumber      : 3260
PSComputerName        :

ConnectionIdentifier  : fffffa8013c08020-0
InitiatorAddress      : 10.10.19.31
InitiatorPortNumber   : 192
TargetAddress         : 10.10.19.1
TargetPortNumber      : 3260
PSComputerName        :

ConnectionIdentifier  : fffffa8013c08020-1
InitiatorAddress      : 10.10.19.31
InitiatorPortNumber   : 448
TargetAddress         : 10.10.19.2
TargetPortNumber      : 3260
PSComputerName        :

ConnectionIdentifier  : fffffa8013c08020-2
InitiatorAddress      : 10.10.18.31
InitiatorPortNumber   : 704
TargetAddress         : 10.10.18.2
TargetPortNumber      : 3260
PSComputerName        :
```

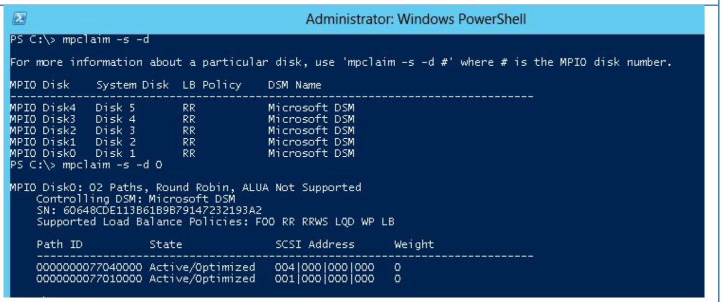
From an elevated powershell command window run:

mpclaim –s –d

Then choose and MPIO disk number and run:

mpclaim –s –d 0

Ensure the devices have 2 paths



Administrator: Windows PowerShell

```
PS C:\> mpclaim -s -d

For more information about a particular disk, use 'mpclaim -s -d #' where # is the MPIO disk number.

MPIO Disk    System Disk  LB Policy    DSM Name
-------------------------------------------------------------------------------
MPIO Disk4   Disk 5       RR           Microsoft DSM
MPIO Disk3   Disk 4       RR           Microsoft DSM
MPIO Disk2   Disk 3       RR           Microsoft DSM
MPIO Disk1   Disk 2       RR           Microsoft DSM
MPIO Disk0   Disk 1       RR           Microsoft DSM
PS C:\> mpclaim -s -d 0

MPIO Disk0: 02 Paths, Round Robin, ALUA Not Supported
    Controlling DSM: Microsoft DSM
    SN: 60648CDE113B61B9B79147232193A2
    Supported Load Balance Policies: FOO RR RRWS LQD WP LB

    Path ID          State              SCSI Address      Weight
    ---------------------------------------------------------------------------
    0000000077040000 Active/Optimized   004|000|000|000   0
    0000000077010000 Active/Optimized   001|000|000|000   0
```

Configuration of Hyper-V Failover Cluster

At this time you should have configured the physical Cisco UCS C-220 Rack-Mount servers to be ready to create a cluster. Preparation steps on each server included:

- Installation of Windows Server 2012 Datacenter Edition
- Prepared the installation for remote management
- Identified the management NIC and assigned a fixed IP address.
- Joined to the domain.
- Renamed the NICs to reflect the names of the service profile used to create the server instance
- Set fixed IP addresses on remaining NICs
- Ensured cluster disks are available and ready for use
- Installed requisite roles and features and configured virtual switches

Log on to the configuration workstation with an account that has privileges to create Computer Name Objects in the Active Directory. Definitely the domain administrator account will have these privileges.

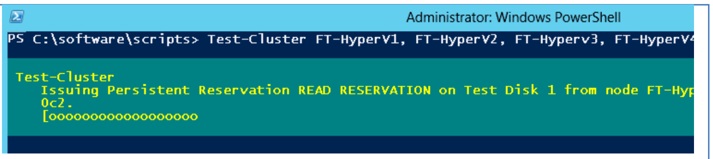
Note Some customers will limit access to the domain administrator account. Some customers also prepopulate Active Directory with the Computer Name Object for clusters before the clusters are created. Work with the customer domain administrators to ensure you are following their practices and modify the following steps accordingly.

The first step is to perform Cluster Validation. From an elevated PowerShell prompt, execute the following commands to test the cluster configuration:

Test-Cluster <Node1>, <Node2>, <Node3>, <node4>

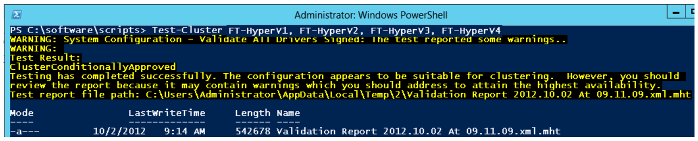
If successful the Test-Cluster cmdlet provides a validation report which can be opened in a local browser from the %TEMP% directory (C:\Users\Administrator\AppData\Local\Temp)
.

Note: The validation stage of the cluster creation may take up to an hour to complete, depending on the number of nodes and disks.



Administrator: Windows PowerShell

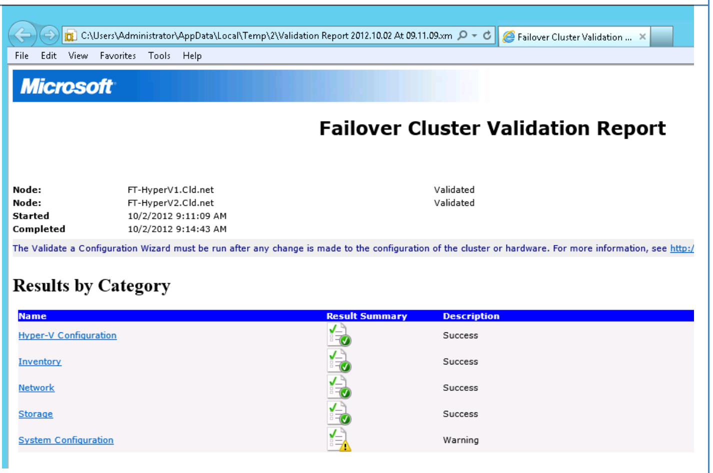
```
PS C:\software\scripts> Test-Cluster FT-HyperV1, FT-HyperV2, FT-Hyperv3, FT-HyperV4

 Test-Cluster
    Issuing Persistent Reservation READ RESERVATION on Test Disk 1 from node FT-Hyp
    0c2.
    [oooooooooooooooooooo
```



Administrator: Windows PowerShell

```
PS C:\software\scripts> Test-Cluster FT-HyperV1, FT-HyperV2, FT-HyperV3, FT-HyperV4
WARNING: System Configuration - Validate All Drivers Signed: The test reported some warnings..
WARNING:
Test Result:
ClusterConditionallyApproved
Testing has completed successfully. The configuration appears to be suitable for clustering.  However, you should
review the report because it may contain warnings which you should address to attain the highest availability.
Test report file path: C:\Users\Administrator\AppData\Local\Temp\2\Validation Report 2012.10.02 At 09.11.09.xml.mht

Mode                LastWriteTime     Length Name
----                -------------     ------ ----
-a---         10/2/2012   9:14 AM     542678 Validation Report 2012.10.02 At 09.11.09.xml.mht
```

Navigate to %TEMP% and review the **Failover Cluster Validation Report** for errors and warnings. Perform any required remediation and re-perform the cluster tests above as required.


C:\Users\Administrator\AppData\Local\Temp\2\Validation Report 2012.10.02 At 09.11.09.xm
Failover Cluster Validation ...
File Edit View Favorites Tools Help
Microsoft

Failover Cluster Validation Report

Node:	FT-HyperV1.Cld.net	Validated
Node:	FT-HyperV2.Cld.net	Validated
Started	10/2/2012 9:11:09 AM	
Completed	10/2/2012 9:14:43 AM	

The Validate a Configuration Wizard must be run after any change is made to the configuration of the cluster or hardware. For more information, see http:/

Results by Category

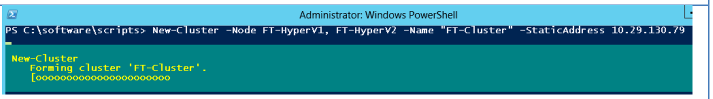
Name	Result Summary	Description
Hyper-V Configuration	✓	Success
Inventory	✓	Success
Network	✓	Success
Storage	✓	Success
System Configuration	⚠	Warning

The next step is to create the cluster. From the same elevated PowerShell prompt, execute the following commands to test the cluster configuration:

New-Cluster -Node <Node1>, <Node2>, <Node3>, <Node4> -Name <ClusterName> -StaticAddress <ClusterIPAddress>

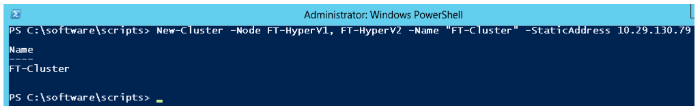
If successful the cluster name will be displayed as output when the process is complete.

Note: *If using DHCP for the cluster nodes the* ***–StaticAddress*** *parameter should not be used.*



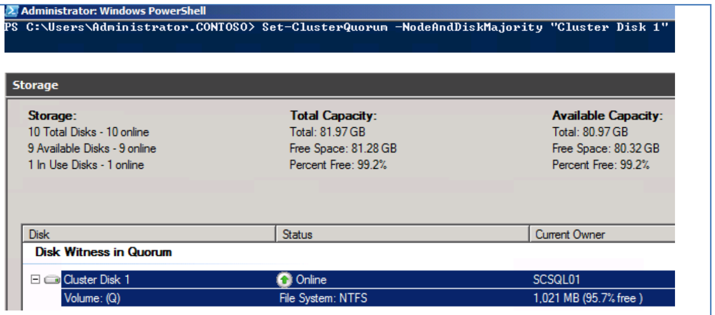
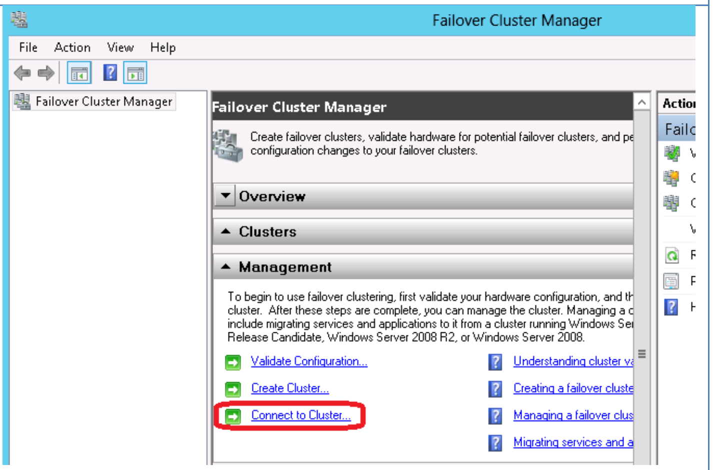
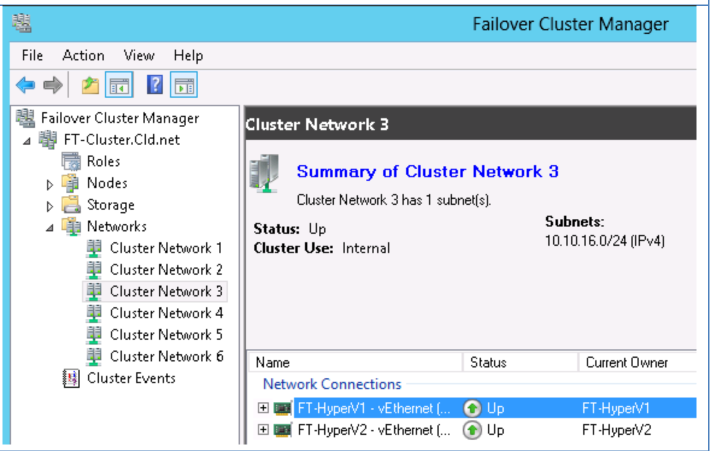
Administrator: Windows PowerShell

```
PS C:\software\scripts> New-Cluster -Node FT-HyperV1, FT-HyperV2 -Name "FT-Cluster" -StaticAddress 10.29.130.79

 New-Cluster
    Forming cluster 'FT-Cluster'.
    [oooooooooooooooooooooooo
```



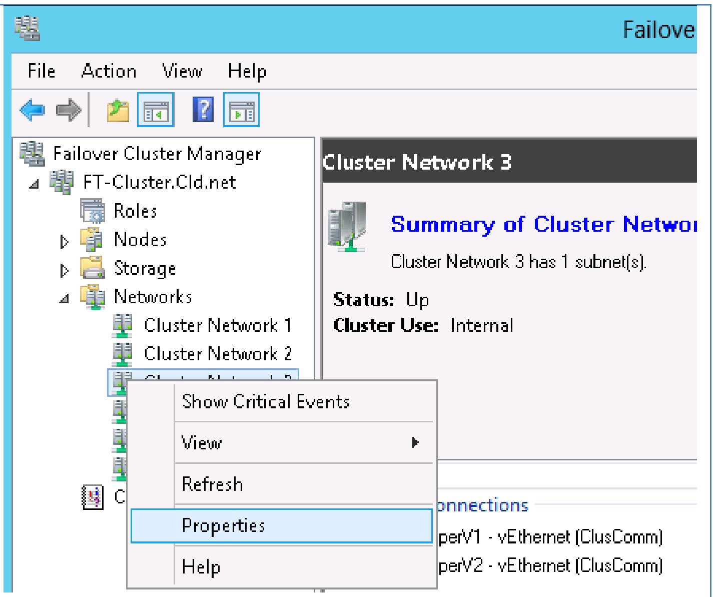
Administrator: Windows PowerShell

```
PS C:\software\scripts> New-Cluster -Node FT-HyperV1, FT-HyperV2 -Name "FT-Cluster" -StaticAddress 10.29.130.79

Name
----
FT-Cluster


PS C:\software\scripts> _
```

When Cluster creation is complete, verify the correct LUN was assigned as the quorum disk. If the incorrect disk was assigned, the correct assignment can be made using the following PowerShell cmdlet: Set-ClusterQuorum -NodeAndDiskMajority <ClusterQuorumDisk> ***Note:*** *For a three-node initial cluster install this command is not applicable.*	 Administrator: Windows PowerShell `PS C:\Users\Administrator.CONTOSO> Set-ClusterQuorum -NodeAndDiskMajority "Cluster Disk 1"` **Storage** **Storage:** 10 Total Disks - 10 online; 9 Available Disks - 9 online; 1 In Use Disks - 1 online **Total Capacity:** Total: 81.97 GB; Free Space: 81.28 GB; Percent Free: 99.2% **Available Capacity:** Total: 80.97 GB; Free Space: 80.32 GB; Percent Free: 99.2% Disk / Status / Current Owner **Disk Witness in Quorum** Cluster Disk 1 / Online / SCSQL01 Volume: (Q) / File System: NTFS / 1,021 MB (95.7% free)
Within **Server Manager** on the configuration workstation, click **Tools** and select **Failover Cluster Manager.** Select **Connect to Cluster...** In the **Select Cluster** window that opens, enter the name of the cluster you just created. Click **OK** to continue.	 Failover Cluster Manager File Action View Help Failover Cluster Manager Failover Cluster Manager Overview Clusters Management Validate Configuration... Create Cluster... Connect to Cluster... Understanding cluster va Creating a failover cluste Managing a failover clus Migrating services and a Actio Failc Create failover clusters, validate hardware for potential failover clusters, and pe configuration changes to your failover clusters. To begin to use failover clustering, first validate your hardware configuration, and th cluster. After these steps are complete, you can manage the cluster. Managing a c include migrating services and applications to it from a cluster running Windows Ser Release Candidate, Windows Server 2008 R2, or Windows Server 2008.
Verify all cluster networks are assigned properly, that is, the same networks from each node are matched. Take care to document which cluster network name is assigned to the public and private network interfaces.	 Failover Cluster Manager File Action View Help Failover Cluster Manager FT-Cluster.Cld.net Roles Nodes Storage Networks Cluster Network 1 Cluster Network 2 Cluster Network 3 Cluster Network 4 Cluster Network 5 Cluster Network 6 Cluster Events **Cluster Network 3** **Summary of Cluster Network 3** Cluster Network 3 has 1 subnet(s). **Status:** Up **Cluster Use:** Internal **Subnets:** 10.10.16.0/24 (IPv4) Name / Status / Current Owner Network Connections FT-HyperV1 - vEthernet (... / Up / FT-HyperV1 FT-HyperV2 - vEthernet (... / Up / FT-HyperV2

Though not a requirement, it is useful to rename the network names in the cluster to match the network names of the nodes. This makes it easier to identify for management and debugging purposes.

Right-click the network and select **Properties**.



Cluster Network 3 has 1 subnet(s).

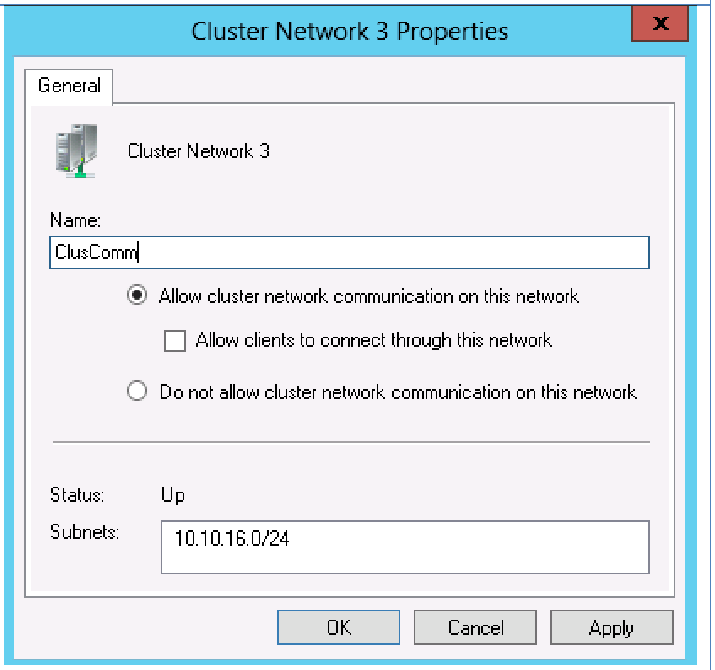
Status: Up
Cluster Use: Internal

perV1 - vEthernet (ClusComm)
perV2 - vEthernet (ClusComm)

Enter the name of the network as defined on the nodes.

Click **OK**.

Repeat for all networks.



Cluster Network 3

Name: ClusComm

● Allow cluster network communication on this network

□ Allow clients to connect through this network

○ Do not allow cluster network communication on this network

Status: Up

Subnets: 10.10.16.0/24

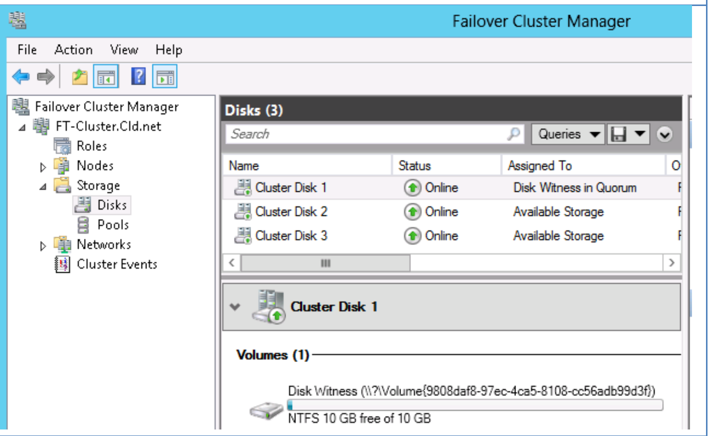
As with networks, it is a good idea (though not a requirement) to rename the generic disk names to reflect their purposes.

Expand the **Storage** tree in the left-hand section of Failover Cluster Manager.

Click on **Disks**.

Click on **Cluster Disk 1** in the center column.

At the bottom you will see more detailed information about the disk selected, including the Volume Name and GUID.

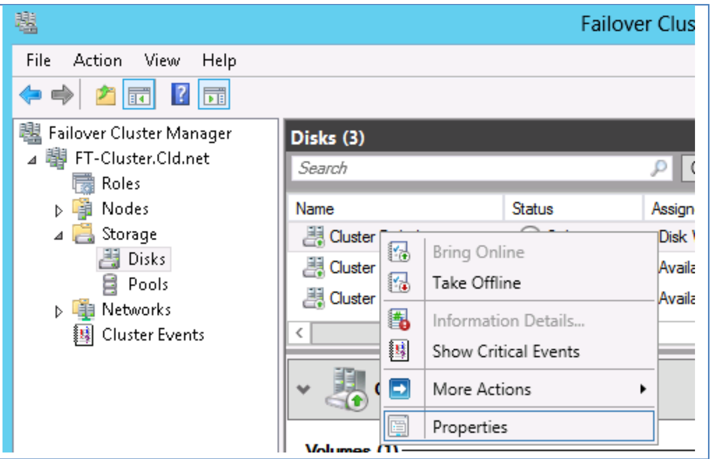
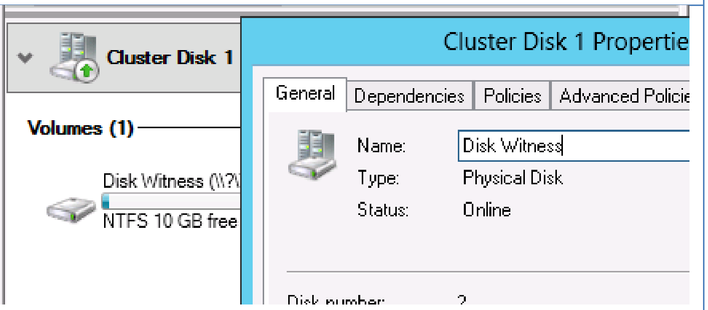
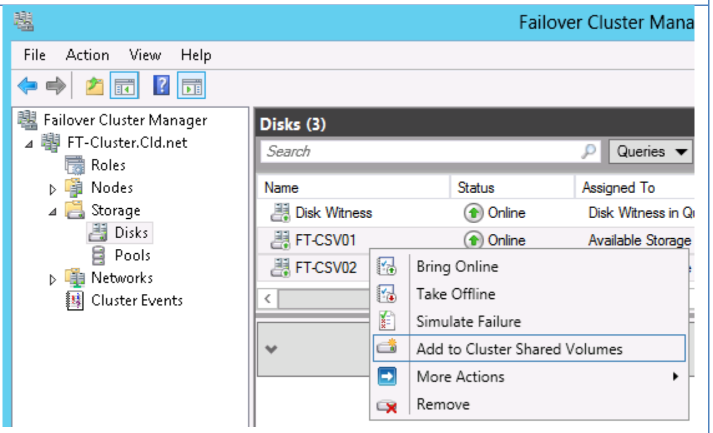


Name	Status	Assigned To
Cluster Disk 1	Online	Disk Witness in Quorum
Cluster Disk 2	Online	Available Storage
Cluster Disk 3	Online	Available Storage

Cluster Disk 1

Volumes (1)

Disk Witness (\\?\Volume{9808daf8-97ec-4ca5-8108-cc56adb99d3f})
NTFS 10 GB free of 10 GB

Right-click on **Cluster Disk 1** and select **Properties.**	 Failover Clus File Action View Help Failover Cluster Manager FT-Cluster.Cld.net Roles Nodes Storage Disks Pools Networks Cluster Events Disks (3) Search Name Status Assign Cluster Cluster Cluster Disk Availa Availa Bring Online Take Offline Information Details... Show Critical Events More Actions Properties Volumes (1)
In the **General** tab of the **Properties** window, change the **Name** to be the same as the Volume Name. **Note:** The customer may have their own naming convention. Click **OK** to continue. Repeat for all the disks.	 Cluster Disk 1 Volumes (1) Disk Witness (\\?\ NTFS 10 GB free Cluster Disk 1 Propertie General Dependencies Policies Advanced PolicieName: Disk Witness Type: Physical Disk Status: Online Disk number: 2
Select the disks that will be used for storing the virtual machines. Right-click and select **Add to Cluster Shared Volumes.**	 Failover Cluster Mana File Action View Help Failover Cluster Manager FT-Cluster.Cld.net Roles Nodes Storage Disks Pools Networks Cluster Events Disks (3) Search Queries Bring Online Take Offline Simulate Failure Add to Cluster Shared Volumes More Actions RemoveName / Status / Assigned To Disk Witness / Online / Disk Witness in Q FT-CSV01 / Online / Available Storage FT-CSV02

Set Cluster Network Purposes

The cluster automatically attempts to determine which network is to be used for which purpose. Though it does a good job most of the time, it is better to ensure that the networks are performing the functions you want them to. Microsoft Failover Clustering assigns a metric value to each network, and that metric value is used to determine each network's use. The network with the lowest metric value is always used for Cluster Shared Volumes. The next lowest metric is always used for the primary Live Migration network.

This script can be run from the configuration workstation. This script assumes that the CSV network is named “CSV” and the live migration network is named “LiveMigration”. If your networks have different names, you will need to modify the script to reflect your names.

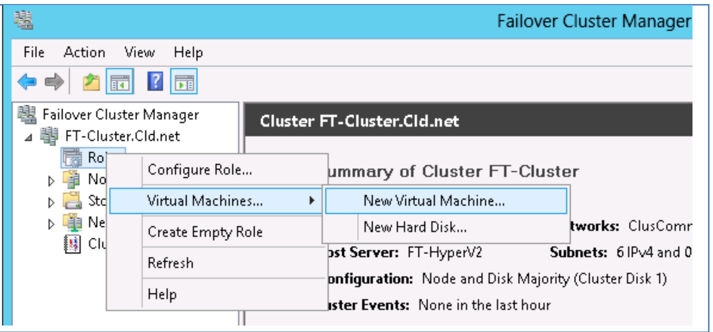
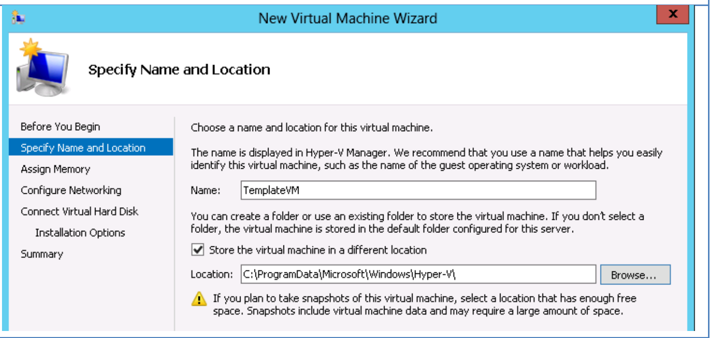
1. Connect to the location of the PowerShell scripts
2. Type.**\Set-UcsHyperVClusterMetric.ps1**

Create First Virtual Machine

This section describes how to create the first virtual machine. This first virtual machine will be turned into a template that can be used to quickly create additional virtual machines. The steps to build the template are as follows:

1. Create a generic virtual machine.
2. Install Windows Server 2012 Datacenter Edition.
3. Tailor the configuration to meet customer base standards, including things like firewall settings, management utilities, network definitions, and so forth.
4. Run Microsoft’s sysprep utility on the machine to prepare it for cloning. Microsoft only supports cloned machines if they have been built from a computer image that has been prepared by sysprep.
5. Store the virtual machine in a library location for later cloning.

The following steps MUST be performed from one of the nodes of the cluster.

From **Failover Cluster Manager**, right-click **Roles**, select **Virtual Machines**, then **New Virtual Machine...** In the **New Virtual Machine** window, select one of the nodes of the cluster – it does not make any difference which one you select. Click **Next** on the **Before You Begin** window of the New Virtual Machine Wizard.	 Cluster FT-Cluster.Cld.net ummary of Cluster FT-Cluster tworks: ClusComr ost Server: FT-HyperV2 Subnets: 6 IPv4 and 0 onfiguration: Node and Disk Majority (Cluster Disk 1) ster Events: None in the last hour
On the **Specify Name and Location** windows, enter a name for your VM Template. Check the box next to **Store the virtual machine in a different location.** Click **Browse** to select the location to store the virtual machine files.	 Specify Name and Location Choose a name and location for this virtual machine. The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload. Name: TemplateVM You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server. ☑ Store the virtual machine in a different location Location: C:\ProgramData\Microsoft\Windows\Hyper-V\ Browse... If you plan to take snapshots of this virtual machine, select a location that has enough free space. Snapshots include virtual machine data and may require a large amount of space.

New Virtual Machine Wizard
Before You Begin
Specify Name and Location
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Installation Options
Summary

The Browse will take you to a Windows Explorer window.

Expand the tree for the computer name.

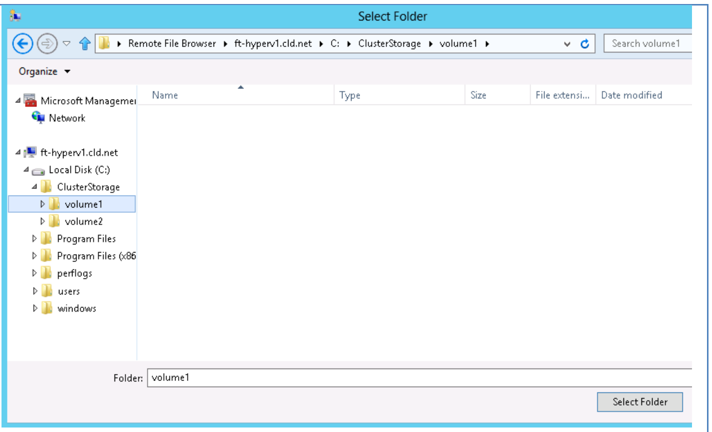
Expand **Local Disk (C:)**

Expand **ClusterStorage**

There is one subdirectory under ClusterStorage for each CSV. Select any one of them.

Click **Select Folder** to continue.

Back in the New Virtual Machine Wizard, click **Next.**

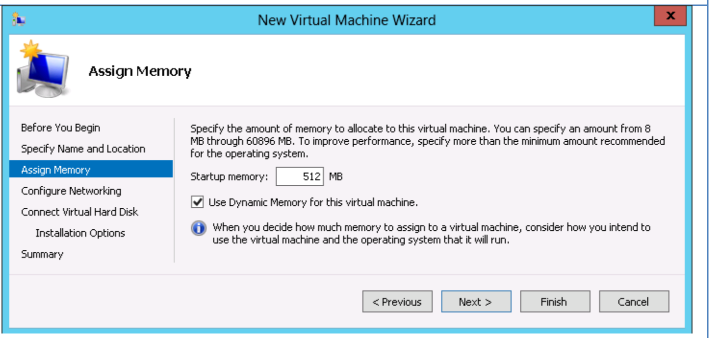


Folder: volume1

On the **Assign Memory** window, you can leave the value of Startup memory at the default of 512, or you can expand it to give it more memory at startup.

Check the box to **Use Dynamic Memory for this virtual machine.**

Click **Next** to continue.



Specify the amount of memory to allocate to this virtual machine. You can specify an amount from 8 MB through 60896 MB. To improve performance, specify more than the minimum amount recommended for the operating system.

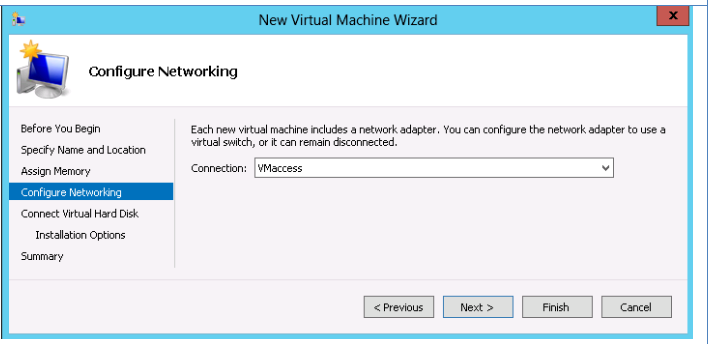
Startup memory: 512 MB

☑ Use Dynamic Memory for this virtual machine.

When you decide how much memory to assign to a virtual machine, consider how you intend to use the virtual machine and the operating system that it will run.

In the **Configure Networking** window, select the Connection from the drop-down list that matches the name of the virtual NIC used for accessing the VMs.

Click **Next** to continue.



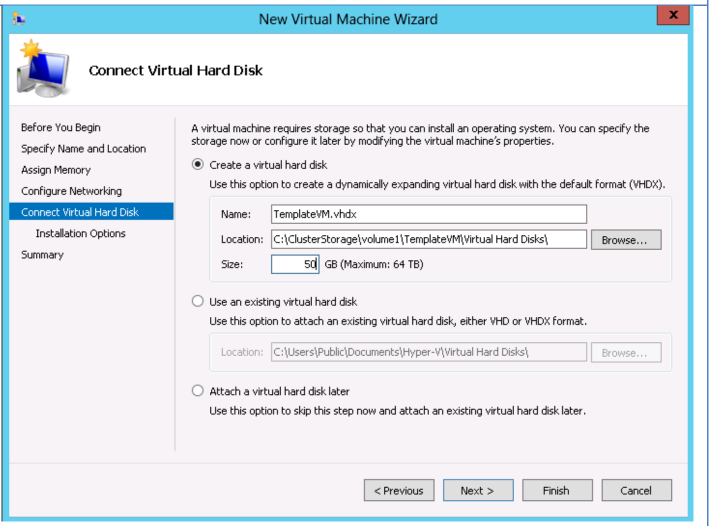
Each new virtual machine includes a network adapter. You can configure the network adapter to use a virtual switch, or it can remain disconnected.

Connection: VMaccess

In the **Connect Virtual Hard Disk** window, you can leave the default size of the virtual hard drive as 127 GB. That is more than enough memory for the system disk of most virtual machines.

If the customer has a standard size they want to use, enter that value.

Click **Next** to continue.



A virtual machine requires storage so that you can install an operating system. You can specify the storage now or configure it later by modifying the virtual machine's properties.

● Create a virtual hard disk

Use this option to create a dynamically expanding virtual hard disk with the default format (VHDX).

Name: TemplateVM.vhdx

Location: C:\ClusterStorage\volume1\TemplateVM\Virtual Hard Disks\

Size: 50 GB (Maximum: 64 TB)

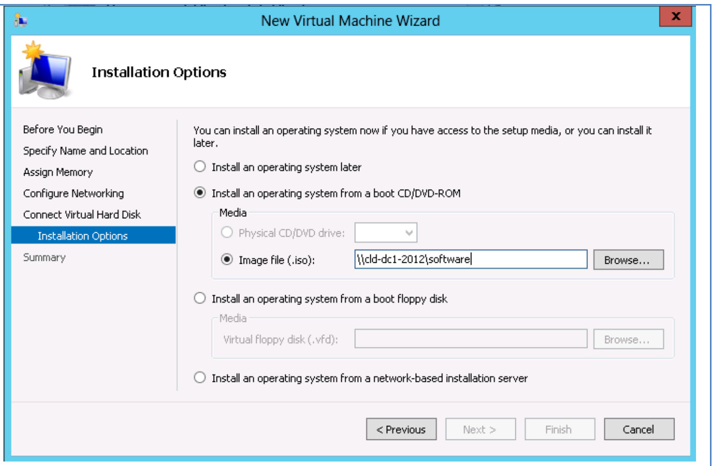
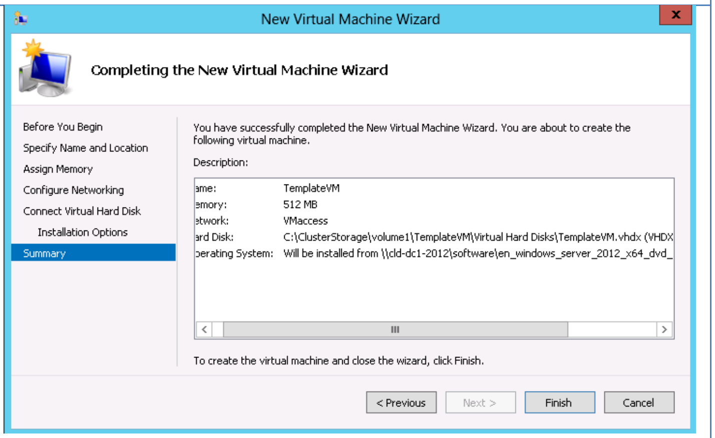
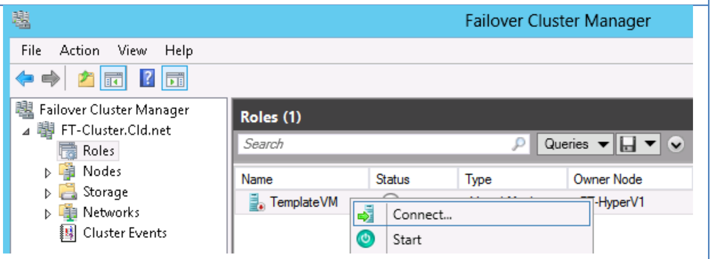
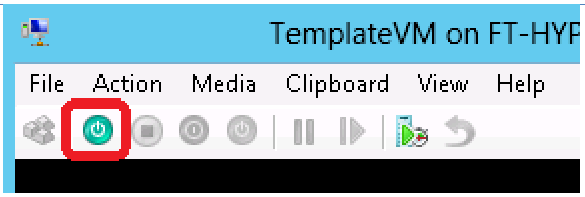
○ Use an existing virtual hard disk

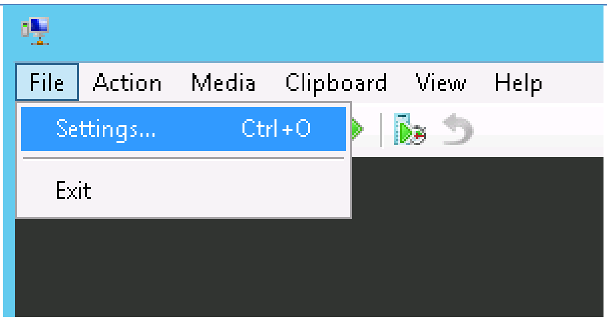
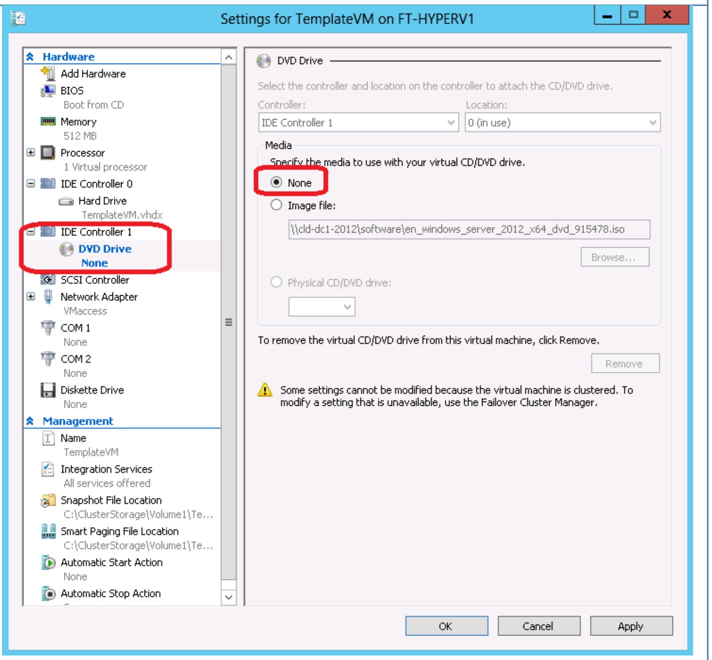
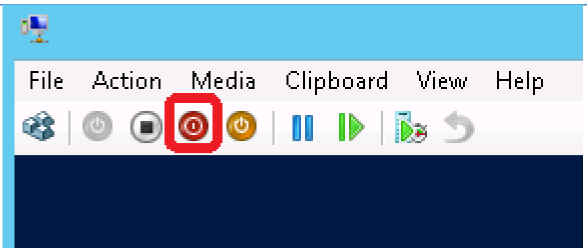
Use this option to attach an existing virtual hard disk, either VHD or VHDX format.

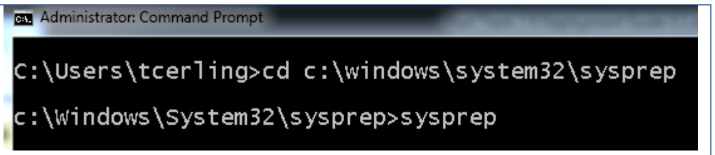
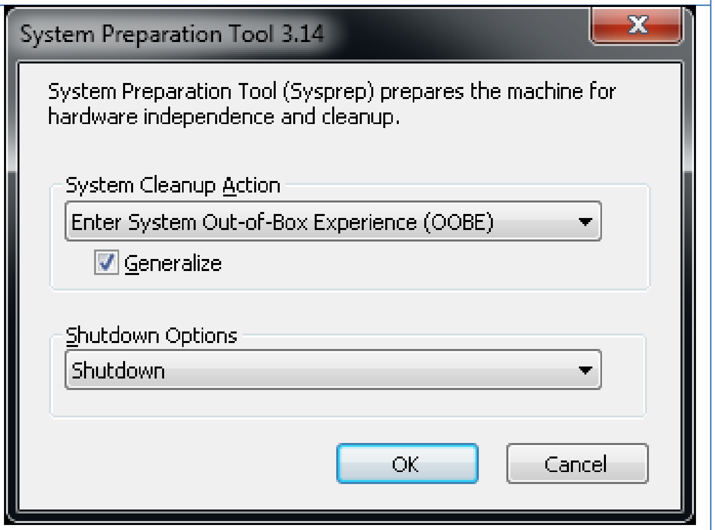
Location: C:\Users\Public\Documents\Hyper-V\Virtual Hard Disks\

○ Attach a virtual hard disk later

Use this option to skip this step now and attach an existing virtual hard disk later.

In the **Installation Options** window, select the radio button by **Install an operating system from a boot CD/DVD-ROM.** Ensure the radio button next to **Image File (.iso)** is selected. In the file location box next to the radio button, enter the network path to the network share location and then click **Browse.** Select the.iso file for the Windows Server 2012 installation media. Click **Next** to continue.	 New Virtual Machine Wizard Installation Options You can install an operating system now if you have access to the setup media, or you can install it later. ○ Install an operating system later ● Install an operating system from a boot CD/DVD-ROM Media ○ Physical CD/DVD drive: ● Image file (.iso): \\cld-dc1-2012\software ○ Install an operating system from a boot floppy disk Media Virtual floppy disk (.vfd): ○ Install an operating system from a network-based installation server Before You Begin Specify Name and Location Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary Browse... Browse... < Previous Next > Finish Cancel
Review the summary information in the **Completing the New Virtual Machine Wizard** window. If necessary use the **Previous** button to go back to fix any errors. Click **Finish** to create the virtual machine. Click **Finish** on the summary page of the **High Availability Wizard.**	 New Virtual Machine Wizard Completing the New Virtual Machine Wizard You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine. Description: ame: TemplateVM emory: 512 MB etwork: VMaccess ard Disk: C:\ClusterStorage\volume1\TemplateVM\Virtual Hard Disks\TemplateVM.vhdx (VHDX perating System: Will be installed from \\cld-dc1-2012\software\en_windows_server_2012_x64_dvd_ To create the virtual machine and close the wizard, click Finish. Before You Begin Specify Name and Location Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary < Previous Next > Finish Cancel
Back in **Failover Cluster Manager** expand **Roles.** Right-click on the virtual machine just created and select **Connect...** This brings up a remote connection to the virtual machine.	 Failover Cluster Manager Roles (1) Name: TemplateVM, Owner Node: FT-HyperV1 File Action View Help Failover Cluster Manager FT-Cluster.Cld.net Roles Nodes Storage Networks Cluster Events Search Queries Name Status Type Owner Node Connect... Start
Click the **Start** icon to start the virtual machine, which will start the installation process for Windows Server 2012.	 TemplateVM on FT-HYP File Action Media Clipboard View Help
Proceed with installing Windows Server 2012, similar to the method followed for installing it on the physical hosts. In this installation there is no need to add additional drivers. They are all included in the Windows Server 2012 installation media.	

After completing the installation, remove the installation DVD from the virtual machine. In the **Virtual Machine Connection** window, click **File** and select **Settings...**	 File Action Media Clipboard View Help Settings... Ctrl+O Exit
In the **Settings** windows, click on the DVD drive. Click the radio button next **None.** Click **OK** to continue.	Settings for TemplateVM on FT-HYPERV1 Hardware Add Hardware BIOS Boot from CD Memory 512 MB Processor 1 Virtual processor IDE Controller 0 Hard Drive TemplateVM.vhdx IDE Controller 1 DVD Drive None SCSI Controller Network Adapter VMaccess COM 1 None COM 2 None Diskette Drive None Management Name TemplateVM Integration Services All services offered Snapshot File Location C:\ClusterStorage\Volume1\Te... Smart Paging File Location C:\ClusterStorage\Volume1\Te... Automatic Start Action None Automatic Stop Action DVD Drive Select the controller and location on the controller to attach the CD/DVD drive. Controller: IDE Controller 1 Location: 0 (in use) Media Specify the media to use with your virtual CD/DVD drive. ● None ○ Image file: \\cld-dc1-2012\software\en_windows_server_2012_x64_dvd_915478.iso Browse... ○ Physical CD/DVD drive: To remove the virtual CD/DVD drive from this virtual machine, click Remove. Remove Some settings cannot be modified because the virtual machine is clustered. To modify a setting that is unavailable, use the Failover Cluster Manager. OK Cancel Apply
At this time, tailor the installation to the standards requested by the customer.	
When the installation is tailored, shut down the virtual machine. This can be done from within the virtual machine operating system or by clicking on the **Shutdown** icon.	
At this time it is a good practice to make a copy of the virtual hard drive of the tailored system. When it comes time to apply patches to the template, the patches can be made to this copy, save another copy, and sysprep for a new template.	

From a command prompt with elevated privileges, connect to **C:\Windows\System32\sysprep** Type **sysprep** **Note:** *If working within a PowerShell window, you will need to type.* ***.\sysprep.exe***	 C:\Users\tcerling>cd c:\windows\system32\sysprep c:\Windows\System32\sysprep>sysprep
In the sysprep tool, check the box for **Generalize.** Select **Shutdown** as the Shutdown Option. Click **OK** to continue. Sysprep will prepare the virtual machine for cloning and then power it off.	 System Preparation Tool 3.14 System Preparation Tool (Sysprep) prepares the machine for hardware independence and cleanup. System Cleanup Action: Enter System Out-of-Box Experience (OOBE) ☑ Generalize Shutdown Options: Shutdown
At this time it is a good practice to write-protect the files defining the virtual machine.	

Create Additional Virtual Machines

After the template has been made, a PowerShell script can be used to create as many virtual machines as possible. The Create-UcsHyperVSingleVM.ps1 PowerShell script contains the commands necessary to create new VMs. This is a sample script and it may need to be edited to reflect the customer environment.

By default this script copies the VHDX file of a virtual machine that has had sysprep run against it. It copies from CSV volume 1 to CSV volume 2. If these are not the desired locations, the script will need to be edited. It is best to run this script from the cluster that owns CSV volume 2, or other selected destination CSV, due to the way CSV works. It is not a strict requirement to run it from the owning node, but it is more efficient.

This script must be run from a cluster node.

1. Connect to the file share that stores the scripts.
2. Connect to the location of the PowerShell scripts
3. Type.**\Add-UcsHyperVSingleVM.ps1**
4. Start and connect to the newly created virtual machine to run the out-of-the-box experience to complete the cloning experience.
5. Tailor the operating system to the customer’s specification.

Appendix A: PowerShell Scripts

The following PowerShell scripts are provided as is and are not warranted to work in all situations. They are provided as samples that will have to be modified to reflect each installation. They have been tested and are known to work, but they do not include error checking. Incorrect changes to any one of the files can render the script inoperable, so some experience with PowerShell is recommended on the part of the person making the modifications.

Create-UcsHyperVFastTrack.ps1

```
# Global Variables - These need to be tailored to the customer
environment

$ucs      = "192.168.171.129"
$ucsuser  = "Admin"
$ucspass  = "admin"


$mgtippoolblockfrom  = "10.29.130.5"
$mgtippoolblockto    = "10.29.130.12"
$mgtippoolgw         = "10.29.130.1"

$maintpolicy = "immediate"# Possible values "immediate",
"timer-automatic", "user-ack"

$WarningPreference = "SilentlyContinue"

# vNIC information - build an array of values for working with vNICs,
vNIC templates, VLANS
# Values are: Name, MTU size, SwitchID, VLAN tag, order, QoS Policy

$vnicarray = @()
$vnicarray +=, ("CSV", "9000", "A-B", "12", "5", "")
$vnicarray +=, ("ClusComm", "9000", "A-B", "16", "3", "")
$vnicarray +=, ("LiveMigration", "9000", "B-A", "11", "4",
"LiveMigration")
$vnicarray +=, ("Mgmt", "1500", "A-B", "1", "1", "")
$vnicarray +=, ("VMaccess", "1500", "A-B", "1", "2", "")

# VLAN information for Appliance ports
$iScsiVlanA    = "iSCSI-A"
$iSCSIVlanAID = 18
$iScsiVlanB    = "iSCSI-B"
$iScsiVlanBID = 19

$serverports    = 3,4,5,6
$applianceport1 = 29
$applianceport2 = 30
```

```
$qoslivemigration = "platinum"
$qosiscsi         = "gold"

############
# The following variables are used for Tenant definitions
#
$tenantname = "FastTrack3"# Used to create sub-organization and resource
names
$tenantnum  = "F3"# Two hex characters to distinguish pool values

$macpoolblockfrom = "00:25:B5:" + $tenantnum + ":01:01"
$macpoolblockto   = "00:25:B5:" + $tenantnum + ":01:FF"

$wwpnpoolblockfrom = "20:00:00:25:B5:" + $tenantnum + ":02:01"
$wwpnpoolblockto   = "20:00:00:25:B5:" + $tenantnum + ":02:10"

$wwnnpoolblockfrom = "20:00:00:25:B5:" + $tenantnum + ":03:01"
$wwnnpoolblockto   = "20:00:00:25:B5:" + $tenantnum + ":03:10"

$uuidpoolblockfrom = "00" + $tenantnum + "-000000000001"
$uuidpoolblockto   = "00" + $tenantnum + "-00000000002F"


#####     -------------------------------------------------     #####
#
#  Start of code


# Import Modules
if ((Get-Module |where {$_.Name -ilike "CiscoUcsPS"}).Name -ine
"CiscoUcsPS")
      {
      Write-Host "Loading Module: Cisco UCS PowerTool Module"
      Import-Module CiscoUcsPs
      }

Set-UcsPowerToolConfiguration -SupportMultipleDefaultUcs $false |
Out-Null


Try {

      # Login to UCS
      Write-Host "UCS: Logging into UCS Domain: $ucs"
      $ucspasswd = ConvertTo-SecureString $ucspass -AsPlainText -Force
      $ucscreds = New-Object System.Management.Automation.PSCredential
($ucsuser, $ucspasswd)
      $ucslogin = Connect-Ucs -Credential $ucscreds $ucs

    $rootorg = Get-UcsManagedObject -Dn "org-root"

      # Create Server Ports
      Write-Host "UCS: Creating Server Ports"
      $mo = Get-UcsFabricServerCloud
      ForEach ($srvrprt in $serverports)
      {
            $mo | Add-UcsServerPort -PortId $srvrprt -SlotId 1   |
Out-Null
      }

      # Create Management IP Pool
      Write-Host "UCS: Creating Management IP Pool"
      Get-UcsOrg -Level root | Get-UcsIpPool -Name "ext-mgmt"
-LimitScope | Add-UcsIpPoolBlock -DefGw $mgtippoolgw -From
$mgtippoolblockfrom -To $mgtippoolblockto   | Out-Null

      # Create QoS for Live Migration, iSCSI, and Best Effort
      Write-Host "UCS: Creating QoS for Live Migration, iSCSI, and Best
Effort"
      Start-UcsTransaction
      $mo = Get-UcsQosClass -Priority $qosiscsi | Set-UcsQosClass
-AdminState enabled -Mtu 9000 -Force | Out-Null
      $mo = Get-UcsQosClass -Priority $qoslivemigration |
Set-UcsQosClass -AdminState enabled -Mtu 9000 -Force | Out-Null
      $mo = Get-UcsBestEffortQosClass | Set-UcsBestEffortQosClass -Mtu
9000 -Force | Out-Null
      $mo = $rootorg  | Add-UcsQosPolicy -Name LiveMigration
      $mo | Set-UcsVnicEgressPolicy -Prio $qoslivemigration -Force |
Out-Null
      $mo = $rootorg  | Add-UcsQosPolicy -Name iSCSI
      $mo | Set-UcsVnicEgressPolicy -Prio $qosiscsi -Force | Out-Null
      Complete-UcsTransaction | Out-Null

      # Create any needed VLANs
      Write-Host "UCS: Creating VLANs"
      Start-UcsTransaction
      $i = 0
      while ($i -lt $vnicarray.length)
      {
            $entry = $vnicarray[$i]
            Get-UcsLanCloud | Add-UcsVlan -Name $entry[0] -Id $entry[3]
| Out-Null
            $i++
      }

      Complete-UcsTransaction | Out-Null

      # Create VLANs for Appliance Ports
      Write-Host "UCS: Creating VLANs for Appliance Ports"
      Start-UcsTransaction
      Get-UcsFiLanCloud -Id "A" | Add-UcsVlan $iScsiVlanA -Id
$iScsiVlanAID -DefaultNet "no" -Sharing "none"   | Out-Null
      Get-UcsFiLanCloud -Id "B" | Add-UcsVlan $iScsiVlanB -Id
$iScsiVlanBID -DefaultNet "no" -Sharing "none"   | Out-Null
      Get-UcsFabricApplianceCloud -Id "A" | Add-UcsVlan -Id
$iScsiVlanAID -Name $iScsiVlanA   | Out-Null
```

```
      Get-UcsFabricApplianceCloud -Id "B" | Add-UcsVlan -Id
$iScsiVlanBID -Name $iScsiVlanB   | Out-Null
      Complete-UcsTransaction | Out-Null



#####
#
#  Create Tenant sub-organization, templates, pools, and policies
#
      # Create Tenant sub-organization
      Write-Host "UCS: $tenantname - Creating sub-organization"
      $tenantorg = Add-UcsOrg -Org root -Name $tenantname

      # Create Local Disk Configuration Policy
      Write-Host "UCS: Creating Local Disk Configuration Policy"
      $tenantorg | Add-UcsLocalDiskConfigPolicy -Mode
"any-configuration" -Name $tenantname -ProtectConfig "yes"   | Out-Null

      # Create Mac Pool
      Write-Host "UCS: $tenantname - Creating MAC Pool"
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsMacPool -Name $tenantname
      $mo | Add-UcsMacMemberBlock -From $macpoolblockfrom -To
$macpoolblockto | Out-Null
      Complete-UcsTransaction | Out-Null

      # Create WWPN Pool
      Write-Host "UCS: $tenantname - Creating WWPN Pool"
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsWwnPool -Name wwpn$tenantname -Purpose
"port-wwn-assignment"
      $mo | Add-UcsWwnMemberBlock -From $wwpnpoolblockfrom -To
$wwpnpoolblockto | Out-Null
      Complete-UcsTransaction | Out-Null

      # Create WWNN Pool
      Write-Host "UCS: $tenantname - Creating WWNN Pool"
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsWwnPool -Name wwnn$tenantname -Purpose
"node-wwn-assignment"
      $mo | Add-UcsWwnMemberBlock -From $wwnnpoolblockfrom -To
$wwnnpoolblockto | Out-Null
      Complete-UcsTransaction | Out-Null

      # Create UUID Suffix Pool
      Write-Host "UCS: $tenantname - Creating UUID Suffix Pool"
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsUuidSuffixPool -Name $tenantname
      $mo | Add-UcsUuidSuffixBlock -From $uuidpoolblockfrom -To
$uuidpoolblockto | Out-Null
      Complete-UcsTransaction | Out-Null
      # Create BIOS, Power, and Scrub Policies
      Write-Host "UCS: $tenantname - Creating BIOS and Scrub Policies"
      Add-UcsBiosPolicy -Name $tenantname | Set-UcsBiosVfQuietBoot
-VpQuietBoot disabled -Force | Out-Null
      Add-UcsPowerPolicy -Name $tenantname -Prio "no-cap" | Out-Null
      Add-UcsScrubPolicy -org $rootorg -Name $tenantname
-BiosSettingsScrub "no" -DiskScrub "no" | Out-Null
      Add-UcsMaintenancePolicy -org $rootorg -Name $tenantname
-UptimeDisr $maintpolicy | Out-Null

      # Create Server Pool
      Write-Host "UCS: $tenantname - Creating Server Pool"
      $serverpool =  $tenantorg | Add-UcsServerPool -Name $tenantname

#???**# Create Server Qualification Policy
      Write-Host "UCS: $tenantname - Creating Server Qualification
Policy"
      Start-UcsTransaction
      $serverqualpol = $tenantorg | Add-UcsServerPoolQualification -Name
$tenantname
      $serveradaptorqual = $serverqualpol | Add-UcsAdaptorQualification
      $serveradaptorcapqual = $serveradaptorqual |
Add-UcsAdaptorCapQualification -Maximum "unspecified" -Model
"N2XX-ACPCI01" -Type "virtualized-eth-if"
      $serverrackqual = $serverqualpol | Add-UcsRackQualification -MinId
1 -MaxId 8
      Complete-UcsTransaction | Out-Null

      # Create Server Pool Policy (for dynamic server pools based on
qualification policy)
      Write-Host "UCS: $tenantname - Creating Server Pool Policy"
      $serverpoolpol = $tenantorg | Add-UcsServerPoolPolicy -Name
$tenantname -PoolDn $serverpool.dn -Qualifier $serverqualpol.Name


      #Create VNIC templates
      Write-Host "UCS: $tenantname - Creating VNIC templates"
      Start-UcsTransaction
      $i = 0
      while ($i -lt $vnicarray.length)
      {
            $entry = $vnicarray[$i]
            $vnictemplate = $tenantorg | Add-UcsVnicTemplate
-IdentPoolName $tenantname -Name $entry[0] -Mtu $entry[1] -SwitchId
$entry[2] -Target "adaptor" -TemplType "updating-template"
-QosPolicyName $entry[5]
            Add-UcsVnicInterface -VnicTemplate $vnictemplate -DefaultNet
"yes" -Name $entry[0] | Out-Null
            $i++
      }
      $mo = $tenantorg | Add-UcsVnicTemplate -IdentPoolName $tenantname
-Mtu 9000 -Name $iSCSIVlanA  -QosPolicyName "iSCSI" -SwitchId "A"
-TemplType "updating-template"
      $mo | Add-UcsVnicInterface -DefaultNet "yes" -Name $iSCSIVlanA |
Out-Null
      $mo = $tenantorg | Add-UcsVnicTemplate -IdentPoolName $tenantname
-Mtu 9000 -Name $iSCSIVlanB  -QosPolicyName "iSCSI" -SwitchId "B"
-Target "adaptor"-TemplType "updating-template"
      $mo | Add-UcsVnicInterface -DefaultNet "yes" -Name $iSCSIVlanB |
Out-Null
      Complete-UcsTransaction | Out-Null

      # Create Appliance Ports for iSCSI connection.
      Write-Host "UCS: Creating Appliance Ports for iSCSI connectivity"
      Start-UcsTransaction
      Get-UcsFabricApplianceCloud -Id "A" | Add-UcsAppliancePort
-AdminSpeed "10gbps" -AdminState "enabled" -PortId $applianceport2
-PortMode "trunk" -Prio $qosiscsi -SlotId 1    | Out-Null
      Get-UcsFabricApplianceCloud -Id "A" | Add-UcsAppliancePort
-AdminSpeed "10gbps" -AdminState "enabled" -PortId $applianceport1
-PortMode "trunk" -Prio $qosiscsi -SlotId 1    | Out-Null
      Get-UcsApplianceCloud | Get-UcsVlan -Name vlan$iScsiVlanA
-LimitScope | Add-UcsVlanMemberPort -AdminState "enabled" -PortId
$applianceport1 -SlotId 1 -SwitchId "A"
      Get-UcsApplianceCloud | Get-UcsVlan -Name vlan$iScsiVlanA
-LimitScope | Add-UcsVlanMemberPort -AdminState "enabled" -PortId
$applianceport2 -SlotId 1 -SwitchId "A"
      Get-UcsFabricApplianceCloud -Id "B" | Add-UcsAppliancePort
-AdminSpeed "10gbps" -AdminState "enabled" -PortId $applianceport2
-PortMode "trunk" -Prio $qosiscsi -SlotId 1    | Out-Null
      Get-UcsFabricApplianceCloud -Id "B" | Add-UcsAppliancePort
-AdminSpeed "10gbps" -AdminState "enabled" -PortId $applianceport1
-PortMode "trunk" -Prio $qosiscsi -SlotId 1    | Out-Null
      Get-UcsApplianceCloud | Get-UcsVlan -Name vlan$iScsiVlanB
-LimitScope | Add-UcsVlanMemberPort -AdminState "enabled" -PortId
$applianceport1 -SlotId 1 -SwitchId "B"
      Get-UcsApplianceCloud | Get-UcsVlan -Name vlan$iScsiVlanB
-LimitScope | Add-UcsVlanMemberPort -AdminState "enabled" -PortId
$applianceport2 -SlotId 1 -SwitchId "B"
      Complete-UcsTransaction | Out-Null

      # Create Service Profile Template (using MAC, WWPN, Server Pools,
VLANs, etc. previously created steps) with desired power state to down
      Write-Host "UCS: $tenantname - Creating SP Template: $tenantname
in UCS org:" $tenantorg.dn
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsServiceProfile -ExtIPState "none"
-IdentPoolName $tenantname -LocalDiskPolicyName $tenantname
-PowerPolicyName $tenantname -ScrubPolicyName $tenantname -Name
$tenantname -Type "updating-template" -Uuid "0"
      $mo | Add-UcsVnicDefBeh -Action "none" -Type "vhba" | Out-Null
      $i = 0
      while ($i -lt $vnicarray.length)
      {
            $entry = $vnicarray[$i]
            $mo | Add-UcsVnic -AdaptorProfileName "Windows" -Addr
"derived" -AdminVcon "1" -Name $entry[0] -NwTemplName $entry[0] -order
$entry[4] | Out-Null
            $i++
      }
      Complete-UcsTransaction| Out-Null


      # Logout of UCS
      Write-Host "UCS: Logging out of UCS: $ucs"
      Disconnect-Ucs

}
Catch
{
       Write-Host "Error occurred in script:"
       Write-Host ${Error}
     exit
}
```

Create-UcsHyperVIscsi.ps1

```
# Global Variables - These need to be tailored to the customer
environment

$ucs     = "192.168.171.129"
$ucsuser = "Admin"
$ucspass = "admin"


############
# The following variables are used for Tenant definitions
#
$tenantname = "FastTrack3"# Used to find sub-organization and resource
names
$tenantfirstIP = 31# Last digits of first server's IP address.
Incremented for subsequent servers.


############
# The following variables are used for setting up iSCSI booting
#
$iSCSICiscoIQNPrefix = "iqn.1992-05.com.cisco"
$iSCSICiscoIQNSuffix = "be6evmhost"
$iSCSICiscoIQNSuffixStartNumber = "1"
$iSCSICiscoIQNSuffixCount = "30"

$iSCSITargetIPControllerAPort1 = "10.10.18.1"
$iSCSITargetIPControllerAPort2 = "10.10.19.1"
$iSCSITargetIPControllerBPort1 = "10.10.18.2"
```

```
$iSCSITargetIPControllerBPort2 = "10.10.19.2"
$iSCSITargetIQNA = "iqn.1992-05.com.emc:apm001203006930000-4-vnxe"
#$iSCSITargetIQNB = "iqn.1992-05.com.emc:apm001203006930000-4-vnxe"
$iSCSITargetIQNB = ""

$iSCSIInitiatorIP = "10.10."
$iSCSIVlanAID = 18
$iScsiVlanBID = 19
$iSCSIInitiatorIP_iSCSI_A = $iSCSIInitiatorIP + $iSCSIVlanAId + "."
$iSCSIInitiatorIP_iSCSI_B = $iSCSIInitiatorIP + $iSCSIVlanBId + "."

$iSCSIIPPoolAStartingIP = "10.10.18.201"
$iSCSIIPPoolAEndingIP = "10.10.18.219"
$iSCSIIPPoolANetMask = "255.255.255.0"

$iSCSIAdapterPolicyName = "Windows-VIC"
$iScsiVlanA   = "iSCSI-A"
$iScsiVlanB   = "iSCSI-B"
$iSCSIvNICNameA = "iSCSI-A"
$iSCSIvNICNameB = "iSCSI-B"
$iSCSIOverlayvNicA = "iSCSI-A"
$iSCSIOverlayvNicB = "iSCSI-B"

$VMHostNamePrefix = "VMHost0"
$VMHostCount = 4

$VMHostBootLunId = 0,1,2,3


#####     -------------------------------------------------     #####
#
#  Start of code


# Import Modules
if ((Get-Module |where {$_.Name -ilike "CiscoUcsPS"}).Name -ine
"CiscoUcsPS")
      {
      Write-Host "Loading Module: Cisco UCS PowerTool Module"
      Import-Module CiscoUcsPs
      }

Set-UcsPowerToolConfiguration -SupportMultipleDefaultUcs $false |
Out-Null



Try {
      # Login to UCS
      Write-Host "UCS: Logging into UCS Domain: $ucs"
      $ucspasswd = ConvertTo-SecureString $ucspass -AsPlainText -Force
      $ucscreds = New-Object System.Management.Automation.PSCredential
($ucsuser, $ucspasswd)
```

```
      $ucslogin = Connect-Ucs -Credential $ucscreds $ucs

    $rootorg = Get-UcsManagedObject -Dn "org-root"

      $tenantorg = $rootorg | Get-UcsOrg -Name $tenantname

      # Create Windows iSCSI Adapter Policy for Cisco VIC
      Write-Host "Creating Windows iSCSI Adapter Policy for Cisco VIC"
      Start-UcsTransaction
      $mo = $rootorg | Add-UcsIScsiAdapterPolicy -Name 
$iSCSIAdapterPolicyName
      $mo | Set-UcsIScsiAdapterPolicyProperties -BootToTarget "no" 
-ConnectionTimeOut 0 -DhcpTimeOut 60 -HbaMode "no" -LunBusyRetryCount 0 
-TcpTimeStamp "no" -Force |Out-Null
      Complete-UcsTransaction | Out-Null

      # Create ISCSI IQN Pool
      Write-Host "Creating iSCSI IQN Pool"
      $tenantorg  | Add-UcsIqnPoolPool -Descr "" -Name $tenantname 
-Prefix $iSCSICiscoIQNPrefix | Out-Null

      # Create iSCSI IQN Block
      Write-Host "Creating iSCSI IQN Block"
      $tenantorg | Get-UcsIqnPoolPool -Name $tenantname -LimitScope | 
Add-UcsIqnPoolBlock -From $iSCSICiscoIQNSuffixStartNumber -Suffix 
$iSCSICiscoIQNSuffix -To $iSCSICiscoIQNSuffixCount | Out-Null

      # Create iSCSI Initiator IP Pool
      Write-Host "Creating iSCSI Initiator Pool"
      $rootorg | Get-UcsIpPool -Name "iscsi-initiator-pool" -LimitScope 
| Add-UcsIpPoolBlock -DefGw $iSCSITargetIPControllerAPort1 -From 
$iSCSIIPPoolAStartingIP -To $iSCSIIPPoolAEndingIP | Out-Null

    # Update SP Template with iSCSI boot information
    Write-Host "Updating $tenantname Service Profile Template"
      Start-UcsTransaction
      $mo = $tenantorg | Get-UcsServiceProfile -Name $tenantname | 
Set-UcsServiceProfile -BootPolicyName $tenantname -Force
      $mo_1 = $mo | Add-UcsVnic -AdaptorProfileName "Windows" -Addr 
"derived" -AdminVcon "1" -Name $iSCSIVlanA -NwTemplName $iSCSIVlanA 
-Order "6"
      $mo_2 = $mo | Add-UcsVnic -AdaptorProfileName "Windows" -Addr 
"derived" -AdminVcon "1" -Name $iSCSIVlanB -NwTemplName $iSCSIVlanB 
-Order "7"
      $mo_3 = $mo | Add-UcsVnicFcNode -Addr "pool-derived" 
-IdentPoolName "node-default"
      $mo_4 = $mo | Add-UcsServerPoolAssignment -Name $tenantname 
-Qualifier $tenantname -RestrictMigration "no"
      $mo_5 = $mo | Set-UcsServerPower -State "admin-down" -Force
      $mo_6 = $mo | Add-UcsFabricVCon -Fabric "NONE" -Id "1" -Placement 
"physical" -Select "all" -Share "shared" -Transport "ethernet","fc"
      $mo_7 = $mo | Add-UcsFabricVCon -Fabric "NONE" -Id "2" -Placement 
"physical" -Select "all" -Share "shared" -Transport "ethernet","fc"
```

```
      $mo_8 = $mo | Add-UcsFabricVCon -Fabric "NONE" -Id "3" -Placement
"physical" -Select "all" -Share "shared" -Transport "ethernet","fc"
      $mo_9 = $mo | Add-UcsFabricVCon -Fabric "NONE" -Id "4" -Placement
"physical" -Select "all" -Share "shared" -Transport "ethernet","fc"
      Complete-UcsTransaction | Out-Null

      # Create Boot Policy with iSCSI Boot
      Write-Host "UCS: Creating Boot Policy: $tenantname"
      Start-UcsTransaction
      $mo = $tenantorg | Add-UcsBootPolicy -EnforceVnicName "yes" -Name
$tenantname -RebootOnUpdate "no"
      $mo_1 = $mo | Add-UcsLsbootIScsi -Order "2"
      $mo_1_1 = $mo_1 | Add-UcsLsbootIScsiImagePath -ISCSIVnicName
$iSCSIvNICNameA -Type "primary"
      $mo_1_2 = $mo_1 | Add-UcsLsbootIScsiImagePath -ISCSIVnicName
$iSCSIvNICNameB -Type "secondary"
      $mo_2 = $mo | Add-UcsLsbootLan -Order "3" -Prot "pxe"
      $mo_2_1 = $mo_2 | Add-UcsLsbootLanImagePath -Type "primary"
-VnicName "Mgmt"
      $mo_3 = $mo | Add-UcsLsbootVirtualMedia -Access "read-only" -Order
"1"
      Complete-UcsTransaction | Out-Null

      # Create iSCSI vNIC for Fabric A
      Write-Host "Creating iSCSI vNIC for Fabric A"
      Start-UcsTransaction
      $mo = Get-UcsServiceProfile -Org $tenantorg.dn -Name $tenantname |
Add-UcsVnicIScsi -AdaptorProfileName $iSCSIAdapterPolicyName -Addr
"derived" -AdminVcon "any" -AuthProfileName "" -ConfProfileName ""
-ExtIPState "none" -IdentPoolName "" -InitiatorName "" -IqnIdentPoolName
"" -Name $iSCSIvNICNameA -NwTemplName "" -Order "unspecified"
-PinToGroupName "" -QosPolicyName "" -StatsPolicyName "default"
-SwitchId "A" -VnicName $iSCSIvNICNameA
      $mo_1 = $mo | Add-UcsVnicVlan -Name "" -VlanName $iScsiVlanA
      Complete-UcsTransaction | Out-Null

      # Create iSCSI vNIC for Fabric B
      Write-Host "Creating iSCSI vNIC for Fabric B"
      Start-UcsTransaction
      $mo = Get-UcsServiceProfile -Org $tenantorg.dn -Name $tenantname |
Add-UcsVnicIScsi -AdaptorProfileName $iSCSIAdapterPolicyName -Addr
"derived" -AdminVcon "any" -ExtIPState "none" -Name $iSCSIvNICNameB
-Order "unspecified" -QosPolicyName "" -StatsPolicyName "default"
-SwitchId "B" -VnicName $iSCSIvNICNameB
      $mo_1 = $mo | Add-UcsVnicVlan -Name "" -VlanName $iScsiVlanB
      Complete-UcsTransaction | Out-Null

      Write-Host "Setting iSCSI Boot Parameters for Fabric A"
      Start-UcsTransaction
      $mo = Get-UcsServiceProfile -Org $tenantorg.dn -Name $tenantname |
Add-UcsVnicIScsi -Name $iSCSIvNICNameA -AdaptorProfileName
$iSCSIAdapterPolicyName -Addr "derived" -AdminVcon "any" -ExtIPState
"none" -IqnIdentPoolName $tenantname -Order "unspecified" -QosPolicyName
```

```
"" -StatsPolicyName "default" -SwitchId "A" -VnicName $iSCSIvNICNameA
-ModifyPresent
      $mo_1 = $mo | Add-UcsVnicVlan -VlanName $iScsiVlanA -ModifyPresent
      $mo_1_1 = $mo_1 | Add-UcsVnicIScsiStaticTargetIf -IpAddress
$iSCSITargetIPControllerAPort1 -Name $iSCSITargetIQNA -Port 3260
-Priority 1
      $mo_1_1_1 = $mo_1_1 | Add-UcsVnicLun -Bootable "no" -Id 0
-ModifyPresent
      $mo_1_2 = $mo_1 | Add-UcsVnicIPv4If -ModifyPresent
      $mo_1_2_1 = $mo_1_2 | Add-UcsVnicIPv4Dhcp -ModifyPresent
      Complete-UcsTransaction | Out-Null

      Write-Host "Setting iSCSI Boot Parameters for Fabric B"
      Start-UcsTransaction
      $mo = Get-UcsServiceProfile -Org $tenantorg.dn -Name $tenantname |
Add-UcsVnicIScsi -Name $iSCSIvNICNameB -AdaptorProfileName
$iSCSIAdapterPolicyName -Addr "derived" -AdminVcon "any" -ExtIPState
"none" -IqnIdentPoolName $tenantname -Order "unspecified" -QosPolicyName
"" -StatsPolicyName "default" -SwitchId "B" -VnicName $iSCSIvNICNameB
-ModifyPresent
      $mo_1 = $mo | Add-UcsVnicVlan -VlanName $iScsiVlanB -ModifyPresent
      $mo_1_1 = $mo_1 | Add-UcsVnicIScsiStaticTargetIf -IpAddress
$iSCSITargetIPControllerAPort2 -Name $iSCSITargetIQNA -Port 3260
-Priority 1
      $mo_1_1_1 = $mo_1_1 | Add-UcsVnicLun -Bootable "no" -Id 0
-ModifyPresent
      $mo_1_2 = $mo_1 | Add-UcsVnicIPv4If -ModifyPresent
      $mo_1_2_1 = $mo_1_2 | Add-UcsVnicIPv4Dhcp -ModifyPresent
      Complete-UcsTransaction | Out-Null

      Write-Host "Create Service Profiles from Template"
      $mo = Get-UcsServiceProfile -Org $tenantorg.dn -Name $tenantname |
Add-UcsServiceProfileFromTemplate -Prefix $VMHostNamePrefix -Count
$VMHostCount -DestinationOrg $tenantorg.dn

      Write-Host "Unbind Service Profiles from Template and set static
IP address"
      Start-UcsTransaction
      $ProfileIP = $tenantfirstIP
      $j = 0
      $i = 1
      while ($i -le $VMHostCount)
      {
            $VMHostName = $VMHostNamePrefix + $i
            $iSCSIInitiatorIp_iSCSI_A_var = $iSCSIInitiatorIp_iSCSI_A +
$profileIP
            $iSCSIInitiatorIp_iSCSI_B_var = $iSCSIInitiatorIp_iSCSI_B +
$profileIP

       $tenantorg | Get-UcsServiceProfile -Name $VMHostName -LimitScope
| Set-UcsServiceProfile -AgentPolicyName "" -BiosProfileName ""
-BootPolicyName $tenantname -Descr "" -DynamicConPolicyName ""
-ExtIPState "none" -HostFwPolicyName "" -IdentPoolName $tenantname
```

```
-LocalDiskPolicyName $tenantname -MaintPolicyName ""
-MgmtAccessPolicyName "" -MgmtFwPolicyName "" -PowerPolicyName
$tenantname -ScrubPolicyName $tenantname -SolPolicyName "" -SrcTemplName
"" -StatsPolicyName "default" -UsrLbl "" -VconProfileName "" -Force

            $mo = $tenantorg | Get-UcsServiceProfile -Name $VMHostName
-LimitScope | Add-UcsVnicIScsi -Name $iSCSIvNICNameA -AdaptorProfileName
$iSCSIAdapterPolicyName -Addr "derived" -AdminVcon "any" -ExtIPState
"none" -IqnIdentPoolName $tenantname -Order "unspecified"
-StatsPolicyName "default" -SwitchId "A" -VnicName $iSCSIvNICNameA
-ModifyPresent
            $mo_1 = $mo | Add-UcsVnicVlan -Name "" -VlanName $iScsiVlanA
-ModifyPresent
            $mo_1_1 = $mo_1 | Add-UcsVnicIScsiStaticTargetIf -Priority 1
-IpAddress $iSCSITargetIPControllerAPort1 -Name $iSCSITargetIQNA -Port
3260 -ModifyPresent
            $mo_1_1_1 = $mo_1_1 | Add-UcsVnicLun -Bootable "no" -Id
$VMHostBootLUNID[$j] -ModifyPresent
            $mo_1_2 = $mo_1 | Add-UcsVnicIPv4If -Name "" -ModifyPresent
            $mo_1_2_1 = Get-UcsOrg -Level root | Get-UcsOrg -Name
$tenantname -LimitScope | Get-UcsServiceProfile -Name $VMHostName
-LimitScope | Get-UcsVnicIScsi -Name $iSCSIvNICNameA | Get-UcsVnicVlan |
Get-UcsVnicIPv4If | Get-UcsVnicIPv4Dhcp | Remove-UcsVnicIPv4Dhcp -Force
            $mo_1_2_2 = $mo_1_2 | Add-UcsVnicIPv4IscsiAddr -Addr
$iSCSIInitiatorIp_iSCSI_A_var -DefGw $iSCSITargetIPControllerAPort1
-PrimDns "0.0.0.0" -SecDns "0.0.0.0" -Subnet "255.255.255.0"
-ModifyPresent

            $mo = $tenantorg | Get-UcsServiceProfile -Name $VMHostName
-LimitScope | Add-UcsVnicIScsi -Name $iSCSIvNICNameB -AdaptorProfileName
$iSCSIAdapterPolicyName -Addr "derived" -AdminVcon "any" -ExtIPState
"none" -IqnIdentPoolName $tenantname -Order "unspecified"
-StatsPolicyName "default" -SwitchId "B" -VnicName $iSCSIvNICNameB
-ModifyPresent
            $mo_1 = $mo | Add-UcsVnicVlan -Name "" -VlanName $iScsiVlanB
-ModifyPresent
            $mo_1_1 = $mo_1 | Add-UcsVnicIScsiStaticTargetIf -Priority 1
-AuthProfileName "" -IpAddress $iSCSITargetIPControllerAPort2 -Name
$iSCSITargetIQNA -Port 3260 -ModifyPresent
            $mo_1_1_1 = $mo_1_1 | Add-UcsVnicLun -Bootable "no" -Id
$VMHostBootLUNID[$j] -ModifyPresent
            $mo_1_2 = $mo_1 | Add-UcsVnicIPv4If -Name "" -ModifyPresent
            $mo_1_2_1 = Get-UcsOrg -Level root | Get-UcsOrg -Name
$tenantname -LimitScope | Get-UcsServiceProfile -Name $VMHostName
-LimitScope | Get-UcsVnicIScsi -Name $iSCSIvNICNameB | Get-UcsVnicVlan |
Get-UcsVnicIPv4If | Get-UcsVnicIPv4Dhcp | Remove-UcsVnicIPv4Dhcp -Force
            $mo_1_2_2 = $mo_1_2 | Add-UcsVnicIPv4IscsiAddr
-ModifyPresent -Addr $iSCSIInitiatorIP_iSCSI_B_var -DefGw
$iSCSITargetIPControllerAPort2 -PrimDns "0.0.0.0" -SecDns "0.0.0.0"
-Subnet "255.255.255.0"

            $profileIP++
        $J++
            $i++
      }
      Complete-UcsTransaction


      # Logout of UCS
      Write-Host "UCS: Logging out of UCS: $ucs"
      $ucslogout = Disconnect-Ucs

}
Catch
{
       Write-Host "Error occurred in script:"
       Write-Host ${Error}
     exit
}
```

Rename-UcsHyperVNICs.ps1

```
<#

 Rename-UcsHyperVNICs.ps1

 Script to rename the NICs on the host to match the names on the Service
Profile

 NOTE: There are some variables that need to be changed to reflect your
environment.
     - change the IP address for accessing UCSM

      This script will work running between two systems that are in the
same domain or two
       systems that are in workgroups.  It will not work across
domain-workgroup.

      The following Windows firewall rules must be enabled on the target
machine.
         COM+ Network Access (DCOM-IN)
         Windows Management Instrumentation (WMI-IN)
#>

# Import required modules

if ((Get-Module |where {$_.Name -ilike "CiscoUcsPS"}).Name -ine
"CiscoUcsPS")
      {
      Write-Host "Loading Module: Cisco UCS PowerTool Module"
      Import-Module CiscoUcsPs
      }

set-ucspowertoolconfiguration -supportmultipledefaultucs $false
```

```
###  Variables to be tailored to customer environment ###

$UcsmAddress = "192.168.1.1"
$ucsuser = "admin"
$ucspass = "admin"

# Connect to UCSM

$ucspasswd = ConvertTo-SecureString $ucspass -AsPlainText -Force
$ucscreds = New-Object System.Management.Automation.PSCredential
($ucsuser, $ucspasswd)
$UCSMHandle = Connect-Ucs -Credential $ucscreds $UcsmAddress


# Get Name of server to work on

Write-Host "Enter server on which to rename default NIC names"
Write-Host "The name of the server and the name of the UCS Service
Profile must be the same"
$Srvr = Read-Host "NOTE: Case must be EXACTLY the same as the UCS
Service Profile"
$Org = Read-Host "Enter Sub-Organization name of Service Profile, or
'root'"
$OrgLevel = Get-UcsOrg -Name $Org
$SrvrProfile = $OrgLevel.DN + "/" + $Srvr

# Retrieve table of NICs from the UCS Profile

$UCSAdapters = Get-UcsVnic -ServiceProfile $SrvrProfile

ForEach ($UcsA in $UcsAdapters) {
    $NICindex = (Get-WMIobject Win32_NetworkAdapterConfiguration
-namespace "root\CIMV2" -computername $Srvr | Where-Object
{$_.MACaddress -eq $UcsA.Addr}).Index
    $NIC = (Get-WMIobject Win32_NetworkAdapter -computername $Srvr |
Where-Object {$_.Index -eq $NICindex})
    If ($NIC.NetconnectionID -ne $UcsA.name) {
        $NIC.NetconnectionID=$UcsA.name
        $NIC.Put()
    }
}

Disconnect-Ucs
```

Set-UcsHyperVRemoteMgmt.ps1

```
#
#   Set-UcsHyperVRemoteMgmt.ps1
#
```

```
# This script works on a variety of settings that are easiest done from
the local machine to make it
# remotely manageable by a management workstation.

# Set some firewall rules

#  Allow ping requests in
Set-NetFirewallRule -Name “FPS-ICMP4-ERQ-In” -Enabled True

#  Allow ping requests out
Set-NetFirewallRule -Name “FPS-ICMP4-ERQ-Out” -Enabled True

#  Allow remote disk management - firewall rules need to be set on both
source and destination computers
#  ***NOTE*** Policy must also be set on system to "Allow remote access
to the Plug and Play interface"
#  This is done with gpedit.msc locally or gpedit for domain policy
Set-NetFirewallRule -Name “RVM-VDS-In-TCP” -Enabled True
Set-NetFirewallRule -Name “RVM-VDSLDR-In-TCP” -Enabled True
Set-NetFirewallRule -Name “RVM-RPCSS-In-TCP” -Enabled True

#  Allow DCOM management requests in
Set-NetFirewallRule -Name “ComPlusNetworkAccess-DCOM-In” -Enabled True

#  Allow WMI management requets in
Set-NetFirewallRule -Name “WMI-WINMGMT-In-TCP” -Enabled True

#  Set some services to automatically start and start them.
Set-Service -Name PlugPlay -StartupType Automatic
Start-Service PlugPlay
Set-Service -Name RemoteRegistry -StartupType Automatic
Start-Service RemoteRegistrySet-Service -Name vds -StartupType Automatic
Start-Service vds

#  Enable Remote Desktop; Do not require NLA
(Get-WmiObject Win32_TerminalServiceSetting -Namespace
root\cimv2\TerminalServices).SetAllowTsConnections(1,1) | Out-Null
(Get-WmiObject -Class "Win32_TSGeneralSetting" -Namespace
root\cimv2\TerminalServices -Filter
"TerminalName='RDP-tcp'").SetUserAuthenticationRequired(0) | Out-Null
```

Set-UcsHyperVIps.ps1

```
#
# Set-UcsHyperVIPs.ps1
#
# This script will set the proper IP configuration values for the
following networks
#      ClusComm
#      CSV
#      LiveMigration
#      VMaccess
```

```
#

Write-Host "This script sets IP configuration for the ClusComm, CSV,
LiveMigration, and VMaccess networks."
Write-Host "It assumes that the above names are the names of the
networks to be set."
Write-Host "The addresses are configured as '192.168.vlan.host'.  The
value for host is used for all networks."
Write-Host "The value for vlan is entered for each network."
Write-Host " "

$target = Read-Host "Enter the name of the Hyper-V host to target"
$hostnum = Read-Host "Enter a numeric value between 1-254 to use as the
host number"
$cluscommID = Read-Host "Enter the VLAN for 'ClusComm'"
$csvID = Read-Host "Enter the VLAN for 'CSV'"
$livemigrationID = Read-Host "Enter the VLAN for 'LiveMigration'"
$vmaccessID = Read-Host "Enter the VLAN for 'VMaccess'"

$cluscommIP = "192.168." + $cluscommID + "." + $hostnum
$csvIP = "192.168." + $csvID + "." + $hostnum
$livemigrationIP = "192.168." + $livemigrationID + "." + $hostnum
$vmaccessIP = "192.168." + $vmaccessID + "." + $hostnum

      $nics = gwmi Win32_NetworkAdapter -ComputerName $target
      $i = 0
      while ($i -le $nics.length-1) {
            if ($nics[$i].netconnectionid -eq "ClusComm") {
                  $idx = $nics[$i].index
                  $netinf = gwmi Win32_NetworkAdapterConfiguration
-ComputerName $target| where {$_.Index -eq $idx}
                  $netinf.DHCPenabled = $False
                  $netinf.enablestatic($cluscommIP,"255.255.255.0") |
out-null
                  $netinf.SetDynamicDNSRegistration($false) | out-null
                  }

            if ($nics[$i].netconnectionid -eq "CSV") {
                  $idx = $nics[$i].index
                  $netinf = gwmi Win32_NetworkAdapterConfiguration
-ComputerName $target| where {$_.Index -eq $idx}
                  $netinf.DHCPenabled = $False
                  $netinf.enablestatic($csvIP,"255.255.255.0") |
out-null
                  $netinf.SetDynamicDNSRegistration($false) | out-null
                  }

            if ($nics[$i].netconnectionid -eq "LiveMigration") {
                  $idx = $nics[$i].index
                  $netinf = gwmi Win32_NetworkAdapterConfiguration
-ComputerName $target| where {$_.Index -eq $idx}
                  $netinf.DHCPenabled = $False
$netinf.enablestatic($livemigrationIP,"255.255.255.0") | out-null
                  $netinf.SetDynamicDNSRegistration($false) | out-null
                  }

            if ($nics[$i].netconnectionid -eq "VMaccess") {
                  $idx = $nics[$i].index
                  $netinf = gwmi Win32_NetworkAdapterConfiguration
-ComputerName $target| where {$_.Index -eq $idx}
                  $netinf.DHCPenabled = $False
                  $netinf.enablestatic($vmaccessIP,"255.255.255.0") |
out-null
                  $netinf.SetDynamicDNSRegistration($false) | out-null
                  }

            $i++
      }
```

Add-UcsHyperVFeatures.ps1

```
$Srvr = Read-Host "Enter computer name of server to receive features"
Install-WindowsFeature -Name Failover-Clustering -ComputerName $Srvr
-IncludeManagementTools
Install-WindowsFeature -Name Multipath-IO -ComputerName $Srvr
-IncludeManagementTools
Install-WindowsFeature -Name Hyper-V -ComputerName $Srvr
-IncludeManagementTools -Restart
```

Create-UcsHyperVSwitches.ps1

```
#
#  Create-UcsHyperVSwitches.ps1
#
#
#  Create the Hyper-V virtual switches on a specific host.
#
# This script may need to be edited to reflect customer naming
conventions
#

$cluscomm = "ClusComm"
$iscsia = "iSCSI-A"
$iscsib = "iSCSI-B"
$vmaccess = "VMaccess"

$target = Read-Host "Enter the name of the Hyper-V host on which virtual
switches will be created"
```

```
New-VMSwitch -Name $vmaccess -ComputerName $target -AllowManagementOS
$FALSE -NetAdapterName $vmaccess

# The following switches are needed only if there are plans for having
VM clusters

# New-VMSwitch -Name $cluscomm -ComputerName $target -AllowManagementOS
$TRUE -NetAdapterName $cluscomm
# New-VMSwitch -Name $iscsia -ComputerName $target -AllowManagementOS
$TRUE -NetAdapterName $iscsia
# New-VMSwitch -Name $iscsib -ComputerName $target -AllowManagementOS
$TRUE -NetAdapterName $iscsib
```

Set-UcsClusterMetrics.ps1

```
$clstr = Read-Host "Enter name of cluster"
Get-ClusterNetwork -Cluster $clstr | FT Name, Role, Metric
(Get-ClusterNetwork "CSV" -Cluster $clstr).Metric = 800
(Get-ClusterNetwork "LiveMigration" -Cluster $clstr).Metric = 900
Get-ClusterNetwork -Cluster $clstr | FT Name, Role, Metric
```

Create-UcsHyperVSingleVM.ps1

```
# This script is meant to be run from a clustered host.

#Import required modules

if ((Get-Module | where {$_.Name -ilike "FailoverClusters"}).Name -ine
"FailoverClusters")
      {
      Write-Host "Loading Module: FailoverClusters"
      Import-Module FailoverClusters
      }

if ((Get-Module | where {$_.Name -ilike "ServerManager"}).Name -ine
"ServerManager")
      {
      Write-Host "Loading Module: ServerManager"
      Import-Module ServerManager
      }

if ((Get-Module | where {$_.Name -ilike "Hyper-V"}).Name -ine "Hyper-V")
      {
      Write-Host "Loading Module: Hyper-V"
      Import-Module Hyper-V
      }

# Source for template VHDX file.  Ensure this matches customer
environment.
```

```
$TemplateSrc = "C:\ClusterStorage\Volume1\Template\Virtual Hard
Disks\Template.vhdx"

# Destination directory for target VHDX.  Ensure this matches customer
environment.
$TemplateDst = "C:\ClusterStorage\Volume2\" + $VMname + "\Virtual Hard
Disks\"

# Get the name of the VM to be created.
$VMname = Read-Host "Enter name of VM to create"
$NicName = Read-Host "Enter name of vNIC to add to VM (name is same as
virtual switch)"

$DestVhd = $TemplateDst + $VMname + ".vhdx"

# Create a VM with no vhd.  Capture VMinfo to pipe to other commands
$VMinfo = New-VM $VMname -Path C:\ClusterStorage\Volume2 -NoVhd

# Create Virtual Hard Disks subdirectory; Suppress the console output
md $TemplateDst | Out-Null

# Copy and rename the Template vhdx to the new location
Write-Host "Copying the base VHD.  This takes a few minutes."
Copy-Item $TemplateSrc $DestVhd

# Add the just copied vhdx file to the VM
$VMinfo | Add-VMHardDiskDrive -ControllerType IDE -ControllerNumber 0
-Path $DestVhd

#Remove the default "Network Adapter"
$VMinfo | Remove-VMNetworkAdapter -Name "Network Adapter"

# Add appropriate network adapters; one per line
$VMinfo | Add-VMNetworkAdapter -Name $NicName -SwitchName $NicName

# Enable Dynamic Memory
$VMinfo | Set-VMMemory -DynamicMemoryEnabled $True

# Make the VM highly available by adding to cluster
$VMinfo | Add-ClusterVirtualMachineRole
```

mpclaim.bat

```
@echo off

rem Display current storage devices that MS MPIO currently claims
mpclaim.exe -h

rem Check the existing devices claimed by Microsoft MPIO DSM
mpclaim.exe -s -d
```

```
rem Display the vendor product ID string for the connected array
mpclaim.exe -e

rem Add addition device IDs in case they are needed in the future
rem Reboot on last change
mpclaim.exe -n -i -d "DGC     DISK"
mpclaim.exe -n -i -d "DGC     LUNZ"
mpclaim.exe -n -i -d "DGC     RAID 0"
mpclaim.exe -n -i -d "DGC     RAID 1"
mpclaim.exe -n -i -d "DGC     RAID 10"
mpclaim.exe -n -i -d "DGC     RAID 5"
mpclaim.exe -r -i -d "DGC     VRAID"
```

Example VNXe Unisphere CLI Commands to Change the MTU size on the VNXe

```
#Specifying mtu for SPA ports will also change the SPB port
uemcli -d 10.0.0.1 -u Local/admin -p <password> /net/port -id eth10_SPA
set -mtuSize 9000
uemcli -d 10.0.0.1 -u Local/admin -p <password> /net/port -id eth11_SPA
set -mtuSize 9000
```

Example Script to Configure Maximum Transmission Unit (MTU) Size on Windows Server 2012

```
$Contents = get-content mtu.txt

Write-Host "There are" $Contents.Count "entries in the mtu configuration
file."
foreach ($Line in $Contents)
    {
            $hostname,$alias,$mtuval,$addfam =
[regex]::split($Line,'\s+')
            #Write-Host "Hostname:" $Hostname "Interface Alias:" $alias
"MTU:" $mtuval "IP Family:" $addfam
        invoke-command -computername $hostname -scriptblock
{param($1,$2,$3) set-netipinterface -InterfaceAlias $1 -NlMtuBytes $2
-AddressFamily $3} -argumentlist $alias, $mtuval, $addfam
        $?
        #Invoke-Command -ComputerName $hostname -ScriptBlock
{param($1,$2) Get-NetIpInterface -InterfaceAlias $1 -AddressFamily $2}
-argumentlist $alias, $addfam
     }
```

Sample mtu.txt File Used for Input with the MTU Script

```
EMCFT301 10Gb_1 9000 IPV4
EMCFT301 10Gb_2 9000 IPV4
EMCFT302 10Gb_1 9000 IPV4
EMCFT302 10Gb_2 9000 IPV4
```

Example Script to Configure MPIO

```
Enable-WindowsOptionalFeature -Online -FeatureName MultipathIO
Wnable-MsdsmAutomaticClaim -BusType iSCSI
#Ensure there are 5 spaces after EMC and 9 spaces after Celerra
New-MsdsmSupportedHw -VendorID "EMC     Celerra         "
```

Example Script to Configure iSCSI Sessions on Windows Server 2012

```
#Variables
$hostinitA1 = "192.168.15.100"
$hostinitA2 = "192.168.16.100"
$VNXetargetA1 = "192.168.15.10"
$VNXetargetA2 = "192.168.16.10"
$iscsitarget = "iqn.1992-05.com.emc:apm001221019710000-3-vnxe"
$ChapNameA = "iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com"
$ChapPasswordA = "EMCFT3021234"

#iSCSI service
Set-Service -Name msiscsi -StartupType automatic
Start-Service msiscsi

#iscsi targets
New-IscsiTargetPortal -TargetPortalAddress $VNXetargetA1
-InitiatorPortalAddress $hostinitA1
New-IscsiTargetPortal -TargetPortalAddress $VNXetargetA2
-InitiatorPortalAddress $hostinitA2

#Following connect string commented out due to automatic session created
during boot time
#connect-iscsitarget -nodeaddress $iscsitarget -AuthenticationType
ONEWAYCHAP -ChapUserName $ChapNameA -ChapSecret $ChapPasswordA
-InitiatorPortalAddress $hostinitA1 -TargetPortalAddress $VNXetargetA1
-IsMultipathEnabled $true -IsPersistent $true

Connect-IscsiTarget -NodeAddress $iscsitarget -AuthenticationType
ONEWAYCHAP -ChapUserName $ChapNameA -ChapSecret $ChapPasswordA
-InitiatorPortalAddress $hostinitA2 -TargetPortalAddress $VNXetargetA2
-IsMultipathEnabled $true -IsPersistent $true
```

Example Script to Create iSCSI LUNs Using ESI PowerShell

```
#Script assumes the VNXe was registered with ESI using:
#get-emcstoragesystemcredential | connect-emcsystem
# Script created using ESI V2.1

$Contents = Get-Content CFG_STORAGE.txt

$MyArray = "FTVNXe"

Function PoolExists {
      Param ($TGTPool)
      $Val = Get-EmcStoragePool $TGTPool -Silent
      if ($Val -eq $null) {return $false} else {return $true}
      }

Function LUNExists {
      Param ($TGTLUN)
      $Val = Get-EmcLUN $TGTLUN -Silent
      if ($Val -eq $null) {return $false} else {return $true}
      }

$StorageArray = Get-EMCStorageSystem -ID $MyArray
Update-EmcSystem $StorageArray

if ($Contents) {Write-Host "There are" $Contents.Count "entries in the
storage configuration file."}
foreach ($Line in $Contents)
    {
            $LUN,$Pool,$Size,$Servicenodeiqn = [regex]::split($Line,
'\s+')
            if ($Contents) {Write-Host "Name of LUN: " $LUN "Name of
Pool:" $Pool "Size of LUN:" $Size "IQN:" $Servicenodeiqn}


        if (($TGTServer -eq $null) -or ($TGTServer -eq $Server))
            {
                  If (PoolExists $Pool)
                  {
                        $MyPool = Get-EmcStoragePool $Pool -Silent
                        # Check for pre-existing LUN
                        IF (LUNExists $LUN) {Write-Host "LUN" $LUN
"already exists."}


                        else
                        { # We need to create the LUN

                   $ssn = Get-EmcStorageSystem -id $MyArray |
Get-EmcStorageServiceNode | where {$_.DisplayText -match
$servicenodeiqn}

                   $Size = Invoke-Expression $Size
                  $NewLUN = New-EmcLun -Pool $MyPool[0] -Name $LUN
-Capacity $Size -Description $LUN -StorageServiceNode $ssn
                        }
                  }
            else
                  {
                        # Pool not found, so we error
                        if ($DEBUG)
                        {
                              Write-Host "ERROR: Pool" $Pool "does not
exist in the array"

                        }
                        exit 1
                  }
            }
      }
```

Sample CFG_Storage.txt File Used for Input with the LUN Creation Script

```
Witness Performance 10gbiqn.1992-05.com.emc:apm001221019710000-3-vnxe
CSV01   Performance 1000gbiqn.1992-05.com.emc:apm001221019710000-4-vnxe
CSV02   Performance 1000gbiqn.1992-05.com.emc:apm001221019710000-3-vnxe
CSV03   Performance 1000gbiqn.1992-05.com.emc:apm001221019710000-4-vnxe
```

Example Script to Mask iSCSI LUNs to Hosts Using ESI Powershell

```
#Script assumes hosts were registered with ESI using:
#Get-EmcHostSystemCredential | Connect-EmcSystem

#Script assumes the VNXe was registered with ESI using:
#Get-EmcStorageSystemCredential | Connect-EmcSystem
# Script created using ESI V2.1

$Contents = Get-Content CFG_access.txt

$MyArray = "FTVNXe"

$StorageArray = Get-EMCStorageSystem -ID $MyArray
Update-EmcSystem $StorageArray

if ($Contents) {Write-Host "There are" $Contents.Count "entries in the
access configuration file."}
foreach ($Line in $Contents)
    {
            $LUN,$ESIHost,$IQN = [regex]::split($Line, '\s+')
            if ($Contents) {Write-Host "Name of LUN: " $LUN "Name of ESI
Host:" $ESIHost "Host IQN:" $iqn}

                  $ESIHost = Get-EmcHostSystem $ESIHost
```

```
                   $LUN = Get-EmcLun $LUN

                   $SetAccess = Set-EMCLunAccess -LUN $LUN -InitiatorID
$IQN -HostName $ESIHost -HostIpAddress $ESIHost -Available
                        }
```

Sample CFG_Access.txt File Used for Input with the LUN Masking Script

```
Witness EMCFT301iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com
CSV01   EMCFT301iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com
CSV02   EMCFT301iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com
CSV03   EMCFT301iqn.1991-05.com.microsoft:emcft301.rdcrpw.eng.emc.com
Witness EMCFT302iqn.1991-05.com.microsoft:emcft302.rdcrpw.eng.emc.com
CSV01   EMCFT302iqn.1991-05.com.microsoft:emcft302.rdcrpw.eng.emc.com
CSV02   EMCFT302iqn.1991-05.com.microsoft:emcft302.rdcrpw.eng.emc.com
CSV03   EMCFT302iqn.1991-05.com.microsoft:emcft302.rdcrpw.eng.emc.com
```