

Cisco Virtualization Solution for EMC VSPEX with VMware vSphere 5.1 for 100-125 Virtual Machines

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1

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EMC²

Cisco Virtualization Solution for EMC VSPEX with VMware vSphere 5.1 for 100-125 Virtual Machines

Executive Summary

Cisco solution for EMC VSPEX is a pre-validated and modular architecture built with proven best of-breed technologies to create complete end-to-end virtualization solutions that enable you to make an informed decision while choosing the hypervisor, compute, storage and networking layers. VSPEX drastically reduces server virtualization planning and configuration burdens. VSPEX infrastructures accelerate your IT Transformation by enabling faster deployments, greater flexibility of choice, efficiency, and lower risk. This Cisco Validated Design document focuses on the VSPEX VMware architecture for small to medium size business segments with less than 125 typical Virtual Machines load.

Introduction

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Virtualization is a key and critical strategic deployment model for reducing the Total Cost of Ownership (TCO) and achieving better utilization of the platform components like hardware, software, network and storage. However choosing the appropriate platform for virtualization can be a tricky task. The platform should be flexible, reliable and cost effective to facilitate the virtualization platform to deploy various enterprise applications. Also ability to slice and dice the underlying platform to size the application requirement is essential for a virtualization platform to utilize compute, network and storage resources effectively. In this regard, Cisco solution implementing EMC VPSEX provide a very simplistic yet fully integrated and validated infrastructure for you to deploy VMs in various sizes to suite your application needs.



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Target Audience

The reader of this document is expected to have the necessary training and background to install and configure VMware vSphere, EMC VNXe series storage arrays, and Cisco Unified Computing System (UCS) and Unified Computing Systems Manager (UCSM). External references are provided where applicable and it is recommended that the reader be familiar with these documents.

Readers are also expected to be familiar with the infrastructure and database security policies of the customer installation.

Purpose of this Document

This document describes the steps required to deploy and configure a Cisco solution for EMC VSPEX for VMware architectures to a level that will allow for confirmation that the basic components and connections are working correctly. The document covers VMware architectures for Small- to Medium-sized Businesses, typically having 100 to 125 VMs or less. This document show cases two variants of the solution: one involving EMC VNX series storage array using FC for storage access, and one involving EMC VNXe series storage array using iSCSI for storage access. While readers of this document are expected to have sufficient knowledge to install and configure the products used, configuration details that are important to this solution's deployment s are specifically mentioned.

Business Needs

VSPEX solutions are built with proven best-of-breed technologies to create complete virtualization solutions that enable you to make an informed decision in the hypervisor, server, and networking layers. VSPEX infrastructures accelerate your IT transformation by enabling faster deployments, greater flexibility of choice, efficiency, and lower risk.

Business applications are moving into the consolidated compute, network, and storage environment. Cisco solution for EMC VSPEX for VMware helps to reduce complexity of configuring every component of a traditional deployment. The complexity of integration management is reduced while maintaining the application design and implementation options. Administration is unified, while process separation can be adequately controlled and monitored. The following are the business needs for the Cisco solution of EMC VSPEX VMware architectures:

- Provide an end-to-end virtualization solution to take full advantage of unified infrastructure components.
- Provide a Cisco VSPEX for VMware ITaaS solution for efficiently virtualizing virtual machines for varied customer use cases.
- Show implementation progression of VMware vCenter 5.1 design and results.
- Provide a reliable, flexible and scalable reference design

Solution Overview

Cisco solution for EMC VSPEX VMware architecture

This solution provides an end-to-end architecture with Cisco, EMC, VMware, and Microsoft technologies that demonstrate support for up to 100 generic virtual machines and provide high availability and server redundancy.

The following are the components used for the design and deployment:

- Cisco Unified Compute System (UCS) 2.1
- Cisco B-series or C-series Unified Computing System servers, as per customer choice
- Cisco UCS VIC adapters
- EMC VNXe3300 or VNX5300 storage components as per the scale needs
- VMware vCenter 5.1
- Microsoft SQL database
- VMware DRS
- VMware HA

The solution is designed to host scalable, mixed application workloads. The scope of this CVD is limited to the Cisco solution for EMC VSPEX VMware solutions for SMB market segment only.

Technology Overview

Cisco Unified Computing System

The Cisco Unified Computing System is a next-generation data center platform that unites compute, network, and storage access. The platform, optimized for virtual environments, is designed using open industry-standard technologies and aims to reduce total cost of ownership (TCO) and increase business agility. The system integrates a low-latency; lossless 10 Gigabit Ethernet unified network fabric with enterprise-class, x86-architecture servers. It is an integrated, scalable, multi chassis platform in which all resources participate in a unified management domain.

The main components of Cisco Unified Computing System are:

- Computing—The system is based on an entirely new class of computing system that incorporates blade servers based on Intel Xeon E5-2600/4600 and E7-2800 Series Processors.
- **Network**—The system is integrated onto a low-latency, lossless, 10-Gbps unified network fabric. This network foundation consolidates LANs, SANs, and high-performance computing networks which are separate networks today. The unified fabric lowers costs by reducing the number of network adapters, switches, and cables, and by decreasing the power and cooling requirements.
- Virtualization—The system unleashes the full potential of virtualization by enhancing the scalability, performance, and operational control of virtual environments. Cisco security, policy enforcement, and diagnostic features are now extended into virtualized environments to better support changing business and IT requirements.

- **Storage access**—The system provides consolidated access to both SAN storage and Network Attached Storage (NAS) over the unified fabric. By unifying the storage access the Cisco Unified Computing System can access storage over Ethernet, Fibre Channel, Fibre Channel over Ethernet (FCoE), and iSCSI. This provides customers with choice for storage access and investment protection. In addition, the server administrators can pre-assign storage-access policies for system connectivity to storage resources, simplifying storage connectivity, and management for increased productivity.
- **Management**—The system uniquely integrates all system components which enable the entire solution to be managed as a single entity by the Cisco UCS Manager. The Cisco UCS Manager has an intuitive graphical user interface (GUI), a command-line interface (CLI), and a robust application programming interface (API) to manage all system configuration and operations.

The Cisco Unified Computing System is designed to deliver:

- A reduced Total Cost of Ownership and increased business agility.
- Increased IT staff productivity through just-in-time provisioning and mobility support.
- A cohesive, integrated system which unifies the technology in the data center. The system is managed, serviced and tested as a whole.
- Scalability through a design for hundreds of discrete servers and thousands of virtual machines and the capability to scale I/O bandwidth to match demand.
- Industry standards supported by a partner ecosystem of industry leaders.

Cisco UCS Manager

Cisco UCS Manager provides unified, embedded management of all software and hardware components of the Cisco Unified Computing System through an intuitive GUI, a command line interface (CLI), or an XML API. The Cisco UCS Manager provides unified management domain with centralized management capabilities and controls multiple chassis and thousands of virtual machines.

Cisco UCS Fabric Interconnect

The Cisco[®] UCS 6200 Series Fabric Interconnect is a core part of the Cisco Unified Computing System, providing both network connectivity and management capabilities for the system. The Cisco UCS 6200 Series offers line-rate, low-latency, lossless 10 Gigabit Ethernet, Fibre Channel over Ethernet (FCoE) and Fibre Channel functions.

The Cisco UCS 6200 Series provides the management and communication backbone for the Cisco UCS B-Series Blade Servers and Cisco UCS 5100 Series Blade Server Chassis. All chassis, and therefore all blades, attached to the Cisco UCS 6200 Series Fabric Interconnects become part of a single, highly available management domain. In addition, by supporting unified fabric, the Cisco UCS 6200 Series provides both the LAN and SAN connectivity for all blades within its domain.

From a networking perspective, the Cisco UCS 6200 Series uses a cut-through architecture, supporting deterministic, low-latency, line-rate 10 Gigabit Ethernet on all ports, 1Tb switching capacity, 160 Gbps bandwidth per chassis, independent of packet size and enabled services. The product family supports Cisco low-latency, lossless 10 Gigabit Ethernet unified network fabric capabilities, which increase the reliability, efficiency, and scalability of Ethernet networks. The Fabric Interconnect supports multiple traffic classes over a lossless Ethernet fabric from a blade server through an interconnect. Significant TCO savings come from an FCoE-optimized server design in which network interface cards (NICs), host bus adapters (HBAs), cables, and switches can be consolidated.

Cisco UCS 6248UP Fabric Interconnect

The Cisco UCS 6248UP 48-Port Fabric Interconnect is a one-rack-unit (1RU) 10 Gigabit Ethernet, FCoE and Fiber Channel switch offering up to 960-Gbps throughput and up to 48 ports. The switch has 32 1/10-Gbps fixed Ethernet, FCoE and FC ports and one expansion slot.



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Cisco UCS Fabric Extenders

Fabric Extenders are zero-management, low-cost, low-power consuming devices that distribute the system's connectivity and management planes into rack and blade chassis to scale the system without complexity. Designed never to lose a packet, Cisco fabric extenders eliminate the need for top-of-rack Ethernet and Fibre Channel switches and management modules, dramatically reducing infrastructure cost per server.

Cisco UCS 2232PP Fabric Extender

The Cisco Nexus® 2000 Series Fabric Extenders comprise a category of data center products designed to simplify data center access architecture and operations. The Cisco Nexus 2000 Series uses the Cisco® Fabric Extender architecture to provide a highly scalable unified server-access platform across a range of 100 Megabit Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, unified fabric, copper and fiber connectivity, rack, and blade server environments. The platform is ideal to support today's traditional Gigabit Ethernet while allowing transparent migration to 10 Gigabit Ethernet, virtual machine-aware unified fabric technologies.

The Cisco Nexus 2000 Series Fabric Extenders behave as remote line cards for a parent Cisco Nexus switch or Fabric Interconnect. The fabric extenders are essentially extensions of the parent Cisco UCS Fabric Interconnect switch fabric, with the fabric extenders and the parent Cisco Nexus switch together forming a distributed modular system. This architecture enables physical topologies with the flexibility and benefits of both top-of-rack (ToR) and end-of-row (EoR) deployments.

Today's data centers must have massive scalability to manage the combination of an increasing number of servers and a higher demand for bandwidth from each server. The Cisco Nexus 2000 Series increases the scalability of the access layer to accommodate both sets of demands without increasing management points within the network.

Figure 2 Cisco UCS 2232PP Fabric Extender



Cisco C220 M3 Rack Mount Servers

Building on the success of the Cisco UCS C220 M3 Rack Servers, the enterprise-class Cisco UCS C220 M3 server further extends the capabilities of the Cisco Unified Computing System portfolio in a 1-rack-unit (1RU) form factor. And with the addition of the Intel® Xeon® processor.



The Cisco UCS C220 M3 also offers up to 256 GB of RAM, eight drives or SSDs, and two 1GE LAN interfaces built into the motherboard, delivering outstanding levels of density and performance in a compact package.

Cisco UCS Blade Chassis

The Cisco UCS 5100 Series Blade Server Chassis is a crucial building block of the Cisco Unified Computing System, delivering a scalable and flexible blade server chassis.

The Cisco UCS 5108 Blade Server Chassis, is six rack units (6RU) high and can mount in an industry-standard 19-inch rack. A single chassis can house up to eight half-width Cisco UCS B-Series Blade Servers and can accommodate both half-width and full-width blade form factors.

Four single-phase, hot-swappable power supplies are accessible from the front of the chassis. These power supplies are 92 percent efficient and can be configured to support non-redundant, N+ 1 redundant and grid-redundant configurations. The rear of the chassis contains eight hot-swappable fans, four power connectors (one per power supply), and two I/O bays for Cisco UCS 2204XP Fabric Extenders.

A passive mid-plane provides up to 40 Gbps of I/O bandwidth per server slot and up to 80 Gbps of I/O bandwidth for two slots. The chassis is capable of supporting future 40 Gigabit Ethernet standards. The Cisco UCS Blade Server Chassis is shown in Figure 4.



Figure 4 Cisco Blade Server Chassis (front and back view)

Cisco UCS Blade Servers

Delivering performance, versatility and density without compromise, the Cisco UCS B200 M3 Blade Server addresses the broadest set of workloads, from IT and Web Infrastructure through distributed database.

Building on the success of the Cisco UCS B200 M2 blade servers, the enterprise-class Cisco UCS B200 M3 server, further extends the capabilities of Cisco's Unified Computing System portfolio in a half blade form factor. The Cisco UCS B200 M3 server harnesses the power and efficiency of the Intel Xeon E5-2600 processor product family, up to 768 GB of RAM, 2 drives or SSDs and up to 2 x 20 GbE to deliver exceptional levels of performance, memory expandability and I/O throughput for nearly all applications. In addition, the Cisco UCS B200 M3 blade server offers a modern design that removes the

need for redundant switching components in every chassis in favor of a simplified top of rack design, allowing more space for server resources, providing a density, power and performance advantage over previous generation servers. The Cisco UCS B200M3 Server is shown in Figure 5.

Figure 5 Cisco UCS B200 M3 Blade Server



Cisco I/O Adapters

Cisco UCS Blade Servers support various Converged Network Adapter (CNA) options. Cisco UCS Virtual Interface Card (VIC) 1240 is used in this EMC VSPEX solution.

The Cisco UCS Virtual Interface Card 1240 is a 4-port 10 Gigabit Ethernet, Fibre Channel over Ethernet (FCoE)-capable modular LAN on motherboard (mLOM) designed exclusively for the M3 generation of Cisco UCS B-Series Blade Servers. When used in combination with an optional Port Expander, the Cisco UCS VIC 1240 capabilities can be expanded to eight ports of 10 Gigabit Ethernet.

The Cisco UCS VIC 1240 enables a policy-based, stateless, agile server infrastructure that can present up to 256 PCIe standards-compliant interfaces to the host that can be dynamically configured as either network interface cards (NICs) or host bus adapters (HBAs). In addition, the Cisco UCS VIC 1240 supports Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology, which extends the Cisco UCS fabric interconnect ports to virtual machines, simplifying server virtualization deployment.



The Cisco UCS rack mount server has various Converged Network Adapters (CNA) options. The UCS 1225 Virtual Interface Card (VIC) option is used in this Cisco Validated Design.

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A Cisco® innovation, the Cisco UCS Virtual Interface Card (VIC) 1225 is a dual-port Enhanced Small Form-Factor Pluggable (SFP+) 10 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE)-capable PCI Express (PCIe) card designed exclusively for Cisco UCS C-Series Rack Servers.

UCS 1225 VIC provides the capability to create multiple vNICs (up to 128) on the CNA. This allows complete I/O configurations to be provisioned in virtualized or non-virtualized environments using just-in-time provisioning, providing tremendous system flexibility and allowing consolidation of multiple physical adapters.

System security and manageability is improved by providing visibility and portability of network policies and security all the way to the virtual machines. Additional 1225 features like VM-FEX technology and pass-through switching, minimize implementation overhead and complexity.





UCS 2.1 Singe Wire Management

Cisco UCS Manager 2.1 supports an additional option to integrate the C-Series Rack-Mount Server with Cisco UCS Manager called "single-wire management". This option enables Cisco UCS Manager to manage the C-Series Rack-Mount Servers using a single 10 GE link for both management traffic and data traffic. When you use the single-wire management mode, one host facing port on the FEX is sufficient to manage one rack-mount server, instead of the two ports you will use in the Shared-LOM mode. Cisco VIC 1225, Cisco UCS 2232PP FEX and Single-Wire management feature of UCS 2.1 tremendously increases the scale of C-series server manageability. By consuming as little as one port on the UCS Fabric Interconnect, you can manage up to 32 C-series server using single-wire management feature.

UCS Differentiators

Cisco's Unified Compute System is revolutionizing the way servers are managed in data-center. Following are the unique differentiators of UCS and UCS-Manager.

- 1. Embedded management—In UCS, the servers are managed by the embedded firmware in the Fabric Interconnects, eliminating need for any external physical or virtual devices to manage the servers. Also, a pair of FIs can manage up to 40 chassis, each containing 8 blade servers. This gives enormous scaling on the management plane.
- 2. Unified fabric—In UCS, from blade server chassis or rack server fabric-extender to FI, there is a single Ethernet cable used for LAN, SAN and management traffic. This converged I/O results in reduced cables, SFPs and adapters reducing capital and operational expenses of overall solution.

- **3. Auto Discovery**—By simply inserting the blade server in the chassis or connecting rack server to the fabric extender, discovery and inventory of compute resource occurs automatically without any management intervention. The combination of unified fabric and auto-discovery enables the wire-once architecture of UCS, where compute capability of UCS can be extended easily while keeping the existing external connectivity to LAN, SAN and management networks.
- 4. Policy based resource classification—Once a compute resource is discovered by UCSM, it can be automatically classified to a given resource pool based on policies defined. This capability is useful in multi-tenant cloud computing. This CVD showcases the policy based resource classification of UCSM.
- 5. Combined Rack and Blade server management—UCSM can manage B-series blade servers and C-series rack server under the same UCS domain. This feature, along with stateless computing makes compute resources truly hardware form factor agnostic. In this CVD, we are showcasing combinations of B and C series servers to demonstrate stateless and form-factor independent computing work load.
- 6. Model based management architecture—UCSM architecture and management database is model based and data driven. An open, standard based XML API is provided to operate on the management model. This enables easy and scalable integration of UCSM with other management system, such as VMware vCloud director, Microsoft System Center, and Citrix Cloud Platform.
- 7. Policies, Pools, Templates—The management approach in UCSM is based on defining policies, pools and templates, instead of cluttered configuration, which enables a simple, loosely coupled, data driven approach in managing compute, network and storage resources.
- 8. Loose referential integrity—In UCSM, a service profile, port profile or policies can refer to other policies or logical resources with loose referential integrity. A referred policy cannot exist at the time of authoring the referring policy or a referred policy can be deleted even though other policies are referring to it. This provides different subject matter experts to work independently from each-other. This provides great flexibility where different experts from different domains, such as network, storage, security, server and virtualization work together to accomplish a complex task.
- **9. Policy resolution**—In UCSM, a tree structure of organizational unit hierarchy can be created that mimics the real life tenants and/or organization relationships. Various policies, pools and templates can be defined at different levels of organization hierarchy. A policy referring to another policy by name is resolved in the organization hierarchy with closest policy match. If no policy with specific name is found in the hierarchy of the root organization, then special policy named "default" is searched. This policy resolution practice enables automation friendly management APIs and provides great flexibility to owners of different organizations.
- **10.** Service profiles and stateless computing—A service profile is a logical representation of a server, carrying its various identities and policies. This logical server can be assigned to any physical compute resource as far as it meets the resource requirements. Stateless computing enables procurement of a server within minutes, which used to take days in legacy server management systems.
- **11. Built-in multi-tenancy support**—The combination of policies, pools and templates, loose referential integrity, policy resolution in organization hierarchy and a service profiles based approach to compute resources makes UCSM inherently friendly to multi-tenant environment typically observed in private and public clouds.
- **12.** Extended Memory—The extended memory architecture of UCS servers allows up to 760 GB RAM per server allowing huge VM to physical server ratio required in many deployments, or allowing large memory operations required by certain architectures like Big-Data.
- **13.** Virtualization aware network—VM-FEX technology makes access layer of network aware about host virtualization. This prevents domain pollution of compute and network domains with virtualization when virtual network is managed by port-profiles defined by the network

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administrators' team. VM-FEX also off loads hypervisor CPU by performing switching in the hardware, thus allowing hypervisor CPU to do more virtualization related tasks. VM-FEX technology is well integrated with VMware vCenter, Linux KVM and Hyper-V SR-IOV to simplify cloud management.

14. Simplified QoS—Even though Fibre Channel and Ethernet are converged in UCS fabric, built-in support for QoS and lossless Ethernet makes it seamless. Network Quality of Service (QoS) is simplified in UCSM by representing all system classes in one GUI panel.

VMware vSphere 5.1

VMware vSphere 5.1 is a next-generation virtualization solution from VMware which builds upon ESXi 4 and provides greater levels of scalability, security, and availability to virtualized environments. vSphere 5.0 offers improvements in performance and utilization of CPU, memory, and I/O. It also offers users the option to assign up to thirty two virtual CPU to a virtual machine—giving system administrators more flexibility in their virtual server farms as processor-intensive workloads continue to increase.

vSphere 5.1 provides the VMware vCenter Server that allows system administrators to manage their ESXi hosts and virtual machines on a centralized management platform. With the Cisco Fabric Interconnects Switch integrated into the vCenter Server, deploying and administering virtual machines is similar to deploying and administering physical servers. Network administrators can continue to own the responsibility for configuring and monitoring network resources for virtualized servers as they did with physical servers. System administrators can continue to "plug-in" their virtual machines into the network ports that have Layer 2 configurations, port access and security policies, monitoring features, and so on, that have been pre-defined by the network administrators; in the same way they need to plug in their physical servers to a previously-configured access switch. In this virtualized environment, the network port configuration/policies move with the virtual machines when the virtual machines are migrated to different server hardware.

EMC Storage Technologies and Benefits

This architecture has two variants:

- EMC VNX family based FC-variant of the solution
- EMC VNXe family based iSCSI-variant of the solution

The EMC VNXTM family is optimized for virtual applications delivering industry-leading innovation and enterprise capabilities for file, block, and object storage in a scalable, easy-to-use solution. This next-generation storage platform combines powerful and flexible hardware with advanced efficiency, management, and protection software to meet the demanding needs of today's enterprises.

VNX series is designed to meet the high-performance, high-scalability requirements of midsize and large enterprises. The EMC VNX storage arrays are multi-protocol platform that can support the iSCSI, NFS, Fibre Channel, and CIFS/SMB protocols depending on the customer's specific needs. This solution was validated using NFS for data storage of Virtual Machines and Fibre Channel for hypervisor SAN boot.

VNX series storage arrays have the following customer benefits:

- Next-generation unified storage, optimized for virtualized applications
- Capacity optimization features including compression, deduplication, thin provisioning, and application-centric copies

- High availability, designed to deliver five 9s availability
- Multiprotocol support for file and block
- Simplified management with EMC Unisphere[™] for a single management interface for all network-attached storage (NAS), storage area network (SAN), and replication needs

Software Suites

The following are the available EMC software suites:

- Remote Protection Suite—Protects data against localized failures, outages, and disasters.
- Application Protection Suite—Automates application copies and proves compliance.
- Security and Compliance Suite—Keeps data safe from changes, deletions, and malicious activity.

Software Packs

Total Value Pack—Includes all protection software suites, and the Security and Compliance Suite.

This is the available EMC protection software pack.

The EMC VNXeTM series is powered by Intel Xeon processor, for intelligent storage that automatically and efficiently scales in performance, while ensuring data integrity and security.

The EMC VNXe series is purpose-built for the IT manager in smaller environments. The EMC VNXe storage arrays are multi-protocol platforms that can support the iSCSI, NFS, and CIFS protocols depending on the customer's specific needs. The solution was validated using iSCSI for data storage.

EMC Avamar

EMC's Avamar® data deduplication technology seamlessly integrates into virtual environments, providing rapid backup and restoration capabilities. Avamar's deduplication results in vastly less data traversing the network, and greatly reduces the amount of data being backed up and stored; resulting in storage, bandwidth and operational savings.

The following are the two most common recovery requests used in backup and recovery:

- **File-level recovery**—Object-level recoveries account for the vast majority of user support requests. Common actions requiring file-level recovery are—individual users deleting files, applications requiring recoveries, and batch process-related erasures.
- **System recovery**—Although complete system recovery requests are less frequent in number than those for file-level recovery, this bare metal restore capability is vital to the enterprise. Some of the common root causes for full system recovery requests are viral infestation, registry corruption, or unidentifiable unrecoverable issues.

The Avamar System State protection functionality adds backup and recovery capabilities in both of these scenarios.

Architectural Overview

This CVD focuses on the architecture for EMC VSPEX for VMware private cloud, targeted for the SMB market segment, using EMC VNX and VNXe series storage arrays. There are two variants of the architecture: FC-variant and iSCSI-variant. The FC-variant of the architecture uses UCS 2.1 with combined B-series and C-series servers with VNX5300 directly attached to UCS fabric interconnect.

The iSCSI-variant of the architecture uses UCS 2.1 and C220 M3 rack mount servers with VNXe storage array directly attached to UCS fabric interconnects. In both variants, the C220 M3 servers are connected with single-wire management feature. VMware vSphere 5.1 is used as server virtualization architecture and iSCSI as the storage access protocol.

Table 1 lists the various hardware and software components which occupies different tiers of the Cisco solution for EMC VSPEX VMware architectures under test:

Vendor	Name	Version	Description
Cisco	UCSM	2.1(1)	Cisco UCS Manager
Cisco	UCS 6248UP FI	5.0(3)N2(2.11)	Cisco UCS Fabric Interconnects
Cisco	UCS 5104 Chassis	N/A	Cisco UCS Blade server chassis (FC-variant)
Cisco	UCS 2208XP FEX	2.1(1)	Cisco UCS Fabric Extenders for Blade Server chassis (FC-variant)
Cisco	UCS B200 M3 servers	2.1(1)	Cisco B200 M3 blade servers (FC-variant)
Cisco	UCS VIC 1240	2.1(1)	Cisco VIC 1240 adapters (FC-variant)
Cisco	UCS 2232PP FEX	5.0(3)N2(2.11)	UCS Fabric Extenders (iSCSI-variant)
Cisco	UCS C220 M3 servers	1.4(6c) or later – CIMC	Cisco C220 M3 rack servers (FC and iSCSI-variant)
Cisco	UCS VIC 1225	C220M3.1.5.1a.0 - BIOS	Cisco UCS VIC adapter (iSCSI-variant)
EMC	EMC VNX5300	05.32.000.5.006	EMC VNX storage array (FC-variant)
EMC	EMC VNXe3300	2.4.0.20932	VNXe storage array (iSCSI-variant)
EMC	EMC Avamar	6.1 SP1	EMC data backup software
EMC	Data Domain OS	5.3	EMC data domain operating system
VMware	ESXi 5.1	5.0 build 799733	VMware Hypervisor
VMware	vCenter Server	5.0 build 455964	VMware management
Microsoft	Microsoft Windows Server 2008 R2	2008 R2 SP1	Operating system to host vCenter server
Microsoft	Microsoft SQL server	2008 R2	Database server SQL R2 Enterprise edition for vCenter

Table 1Hardware and software components of VMware architectures

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Table 2 outlines the Cisco UCS B200 M3 or C200 M3 server configuration for the two variants of VMware architecture. Table 2 shows the configuration on per server basis.

Component	Capacity
Memory (RAM)	64 GB (8X8 MB DIMM)
Processor	2 x Intel® Xenon ® E5-2650 CPUs, 2 GHz, 8 cores, 16 threads
Local storage	Cisco UCS RAID SAS 2008M-8i Mezzanine Card,
	With 2 x 67 GB slots for RAID 1 configuration each

Table 2Server configuration details

Both the architectures assume that there is an existing infrastructure/ management network available in which a virtual machine hosting vCenter server and Windows Active Directory/ DNS server are present.

Required number of C or B series servers and storage array type change depending on number of Virtual Machines. Table 3 highlights the change in the hardware components, as required by different scale points. Typically, 25 reference Virtual Machines are deployed per server.

Table 3Hardware components for different scale

Components	VMware 100 VMs	VMware 125 VMs
Servers	4 x Cisco C220 M3 servers	5 x Cisco B200 M3 servers or C200 M3 servers
Storage	EMC VNXe3300	EMC VNX5300

Figure 8 and Figure 9 show a high level Cisco solution for EMC VSPEX VMware FC variant and iSCSI variant architectures respectively.



Figure 8 Reference Architecture for FC-variant

Figure 9 Reference Arc

Reference Architecture for iSCSI-variant



As it is evident in the above diagrams, following are the high level design points of VMware architecture for SMB market segment:

- We have directly attached storage array to UCS FIs
- iSCSI-variant uses only Ethernet as a network layer 2 media to access storage as well as the TCP/IP network
- Infrastructure network is on a separate 1GE network

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• Network redundancy is built in by providing two switches, two storage controllers and redundant connectivity for data, storage and infrastructure networking.

This design does not dictate or require any specific layout of infrastructure network. The vCenter server, Microsoft AD server and Microsoft SQL server are hosted on infrastructure network. However, design does require accessibility of certain VLANs from the infrastructure network to reach the servers.

ESXi 5.1 is used as hypervisor operating system on each server and is installed on local hard drives. Typical load is 25 virtual machines per server.

Memory Configuration Guidelines

This section provides guidelines for allocating memory to virtual machines. The guidelines outlined here take into account vSphere memory overhead and the virtual machine memory settings.

ESXi/ESXi Memory Management Concepts

vSphere virtualizes guest physical memory by adding an extra level of address translation. Shadow page tables make it possible to provide this additional translation with little or no overhead. Managing memory in the hypervisor enables the following:

- Memory sharing across virtual machines that have similar data (that is, same guest operating systems).
- Memory overcommitment, which means allocating more memory to virtual machines than is physically available on the ESX/ESXi host.
- A memory balloon technique whereby virtual machines that do not need all the memory they were
 allocated give memory to virtual machines that require additional allocated memory.

For more information about vSphere memory management concepts, see the VMware vSphere Resource Management Guide at:

http://www.vmware.com/files/pdf/perf-vsphere-memory_management.pdf

Virtual Machine Memory Concepts

The Figure 10 illustrates the use of memory settings parameters in the virtual machine.

Figure 10

Virtual Machine Memory Settings



The vSphere memory settings for a virtual machine include the following parameters:

- Configured memory—Memory size of virtual machine assigned at creation.
- Touched memory—Memory actually used by the virtual machine. vSphere allocates guest operating system memory on demand.

• Swappable—Virtual machine memory that can be reclaimed by the balloon driver or by vSphere swapping. Ballooning occurs before vSphere swapping. If this memory is in use by the virtual machine (that is, touched and in use), the balloon driver causes the guest operating system to swap. Also, this value is the size of the per-virtual machine swap file that is created on the VMware Virtual Machine File System (VMFS) file system (VSWP file). If the balloon driver is unable to reclaim memory quickly enough, or is disabled or not installed, vSphere forcibly reclaims memory from the virtual machine using the VMkernel swap file.

Allocating Memory to Virtual Machines

The proper sizing of memory for a virtual machine in VSPEX architectures is based on many factors. With the number of application services and use cases available determining a suitable configuration for an environment requires creating a baseline configuration, testing, and making adjustments, as discussed later in this paper. Table 4 outlines the resources used by a single virtual machine:

Characteristics	Value
Virtual Processor (vCPU) per VM	1
RAM per VM	2 GB
Available storage capacity per VM	100 GB
I/O operations per second (IOPS) per VM	25
I/O pattern	Random
I/O read/write ratio	2:1

Table 4 Resources used by a single VM

Following are the descriptions of recommended best practices:

- Account for memory overhead—Virtual machines require memory beyond the amount allocated, and this memory overhead is per-virtual machine. Memory overhead includes space reserved for virtual machine devices, depending on applications and internal data structures. The amount of overhead required depends on the number of vCPUs, configured memory, and whether the guest operating system is 32-bit or 64-bit. As an example, a running virtual machine with one virtual CPU and two gigabytes of memory may consume about 100 megabytes of memory overhead, where a virtual machine with two virtual CPUs and 32 gigabytes of memory may consume approximately 500 megabytes of memory overhead. This memory overhead is in addition to the memory allocated to the virtual machine and must be available on the ESXi host.
- "Right-size" memory allocations—Over-allocating memory to virtual machines can waste memory unnecessarily, but it can also increase the amount of memory overhead required to run the virtual machine, thus reducing the overall memory available for other virtual machines. Fine-tuning the memory for a virtual machine is done easily and quickly by adjusting the virtual machine properties. In most cases, hot-adding of memory is supported and can provide instant access to the additional memory if needed.
- Intelligently overcommit—Memory management features in vSphere allow for overcommitment of physical resources without severely impacting performance. Many workloads can participate in this type of resource sharing while continuing to provide the responsiveness users require of the application. When looking to scale beyond the underlying physical resources, consider the following:

- Establish a baseline before overcommitting—Note the performance characteristics of the application before and after. Some applications are consistent in how they utilize resources and may not perform as expected when vSphere memory management techniques take control. Others, such as Web servers, have periods where resources can be reclaimed and are perfect candidates for higher levels of consolidation.
- Use the default balloon driver settings—The balloon driver is installed as part of the VMware Tools
 suite and is used by ESXi/ESXi if physical memory comes under contention. Performance tests
 show that the balloon driver allows ESXi/ESXi to reclaim memory, if required, with little to no
 impact to performance. Disabling the balloon driver forces ESXi/ESXi to use host-swapping to
 make up for the lack of available physical memory which adversely affects performance.
- Set a memory reservation for virtual machines that require dedicated resources—Virtual machines running Search or SQL services consume more memory resources than other application and Web front-end virtual machines. In these cases, memory reservations can guarantee that those services have the resources they require while still allowing high consolidation of other virtual machines.

Storage Guidelines

The VSPEX architecture for VMware virtual machines for SMB market segment uses FC or iSCSI to access storage arrays. iSCSI is used with smaller scale points with VNXe3300 storage array, while FC is used with VNX5300 storage array. This simplifies the design and implementation for the small to medium level businesses. vSphere provides many features that take advantage of EMC storage technologies such as auto discovery of storage resources and ESXi hosts in vCenter and VNX/VNXe respectively. Features such as VMware vMotion, VMware HA, and VMware Distributed Resource Scheduler (DRS) use these storage technologies to provide high availability, resource balancing, and uninterrupted workload migration.

Storage Protocol Capabilities

VMware vSphere provides vSphere and storage administrators with the flexibility to use the storage protocol that meets the requirements of the business. This can be a single protocol datacenter wide, such as iSCSI, or multiple protocols for tiered scenarios such as using Fibre Channel for high-throughput storage pools and NFS for high-capacity storage pools. As mentioned before, this architecture uses iSCSI as storage access protocol.

For more information, see the VMware whitepaper on Comparison of Storage Protocol Performance in VMware vSphere 5 at:

http://www.vmware.com/files/pdf/perf_vsphere_storage_protocols.pdf

Storage Best Practices

Following are the descriptions of vSphere storage best practices:

- Host multi-pathing—Having a redundant set of paths to the storage area network is critical to protecting the availability of your environment. This redundancy is in the form of dual adapters connected to separate fabric switches.
- Partition alignment—Partition misalignment can lead to severe performance degradation due to I/O operations having to cross track boundaries. Partition alignment is important both at the VMFS level as well as within the guest operating system. Use the vSphere Client when creating VMFS datastores to be sure they are created aligned. When formatting volumes within the guest, Windows 2008 aligns NTFS partitions on a 1024KB offset by default.

- Use shared storage—In a vSphere environment, many of the features that provide the flexibility in
 management and operational agility come from the use of shared storage. Features such as VMware
 HA, DRS, and vMotion take advantage of the ability to migrate workloads from one host to another
 host while reducing or eliminating the downtime required to do so.
- Calculate your total virtual machine size requirements—Each virtual machine requires more space than that used by its virtual disks. Consider a virtual machine with a 20GB OS virtual disk and 16GB of memory allocated. This virtual machine will require 20GB for the virtual disk, 16GB for the virtual machine swap file (size of allocated memory), and 100MB for log files (total virtual disk size + configured memory + 100MB) or 36.1GB total.
- Understand I/O Requirements—Under-provisioned storage can significantly slow responsiveness and performance for applications. In a multitier application, you can expect each tier of application to have different I/O requirements. As a general recommendation, pay close attention to the amount of virtual machine disk files hosted on a single VMFS volume. Over-subscription of the I/O resources can go unnoticed at first and slowly begin to degrade performance if not monitored proactively.

Virtual Networking

This architecture demonstrates use and benefits of Adapter-FEX technology using Cisco UCS VIC adapter. Each B200 M3 blade server and C220 M3 rack server has one physical adapter with two 10 GE links going to fabric A and fabric B for high availability. In FC-variant, Cisco UCS VIC 1225 or 1240 presents four virtual Network Interface Cards (vNICs) to the hypervisor, two vNICs per fabric path. In iSCSI-variant, the Cisco UCS VIC 1225 adapter presents six virtual Network Interface Cards (vNICs) to the hypervisor, three vNICs per fabric path. The MAC addresses to these vNICs are assigned using MAC address pool defined on the UCSM. These vNICs are used in active-active configuration for load-balancing and high-availability. Following are vSphere networking best practices implemented in this architecture:

- Separate virtual machine and infrastructure traffic—Keep virtual machine and VMkernel or service console traffic separate. This is achieved by having three vSwitches per hypervisor:
 - vSwitch (default)—Used for management and vMotion traffic
 - iSCSI-vSwitch (default)—Used for iSCSI storage traffic (iSCSI-variant only)
 - vSwitch1—Used for Virtual Machine data traffic
- Use NIC Teaming—Use two physical NICs per vSwitch, and if possible, uplink the physical NICs to separate physical switches. This is achieved by using two vNICs per vSwitch, each going to different fabric interconnects. Teaming provides redundancy against NIC failure, switch (FI or FEX) failures, and in case of UCS, upstream switch failure (due to "End Host Mode" architecture).
- Enable PortFast on ESX/ESXi host uplinks—Failover events can cause spanning tree protocol recalculations that can set switch ports into a forwarding or blocked state to prevent a network loop. This process can cause temporary network disconnects. Cisco UCS Fabric Extenders are not really separate switches they are line cards to the Cisco UCS Fabric Interconnect, and the Cisco UCS Fabric Interconnects run in end-host-mode and avoid running Spanning Tree Protocol. Given this, there is no need to enable port-fast on the ESXi host uplinks. However, it is recommended that you enable portfast on the infrastructure switch that connects to the UCS Fabric Interconnect uplinks for faster convergence of STP in the events of FI reboots or FI uplink flaps.
- Jumbo MTU for vMotion and Storage traffic—This best practice is implemented in the architecture by configuring jumbo MTU end-to-end.

VSPEX VMware Storage Virtualization

Storage Layout

The architecture diagram in this section shows the physical disk layout. Disk provisioning on the VNXe series is simplified through the use of wizards, so that administrators do not choose which disks belong to a given storage pool. The wizard may choose any available disk of the proper type, regardless of where the disk physically resides in the array.

Figure 11 illustrates storage architecture for 125 virtual machines on VNX5300 for FC-variant of architecture:



Figure 11 EMC VNX5300 Storage Architecture for 125 VMs

Figure 12 illustrates storage architecture for 100 virtual machines on VNXe3300 for iSCSI-variant of architecture:



Figure 12 EMC VNX3300 Storage Architecture for 100 VMs

Table 5 provides the size of the datastores for both the architectures laid out Figure 11 and Figure 12:

Table 5 datastores for 100 and 125 VMs

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Parameters	100 Virtual Machines	125 Virtual Machines
Disk capacity and types	600 GB SAS	600 and 300 GB SAS
Number of disks	77	60 (600 GB)
RAID type	6+1 RAID 5 groups	4+1 RAID 5 groups
Number of pools	11	15

For all the architectures, EMC recommends one hot spare disk allocated for each 30 disks of a given type.

The VNX/VNXe family is designed for "five 9s" availability by using redundant components throughout the array. All of the array components are capable of continued operation in case of hardware failure. The RAID disk configuration on the array provides protection against data loss due to individual disk failures, and the available hot spare drives can be dynamically allocated to replace a failing disk.

Storage Virtualization

VMFS is a cluster file system that provides storage virtualization optimized for virtual machines. Each virtual machine is encapsulated in a small set of files and VMFS is the default storage system for these files on physical SCSI disks and partitions.

It is preferable to deploy virtual machine files on shared storage to take advantage of VMware VMotion, VMware High AvailabilityTM (HA), and VMware Distributed Resource SchedulerTM (DRS). This is considered a best practice for mission-critical deployments, which are often installed on third-party, shared storage management solutions.

Service Profile Design

This architecture implements following design steps to truly achieve stateless computing on the servers:

- Service profiles are derived from service profile template for consistency.
- The ESXi host uses following identities in this architecture:
 - Host UUID
 - Mac Addresses: one per each vNIC on the server
 - One WWNN and two WWPN (FC-variant)
 - Two iSCSI initiator IP addresses, one for each fabric (iSCSI-variant)
 - Two iSCSI IQN name identifiers (iSCSI-variant)

All of these identifiers are defined in their respective identifier pools and the pool names are referred in the service profile template.

- Local disks are not used for booting. Boot policy in service profile template suggests host to boot from the storage devices using iSCSI or FC protocol.
- Server pool is defined with automatic qualification policy and criteria. Rack servers are automatically put in the pool as and when they are fully discovered by UCSM. This eliminates the need to manually assign servers to server pool.
- Service profile template is associated to the server pool. This eliminates the need to individually associating service profiles to physical servers.

Given this design and capabilities of UCS and UCSM, a new server can be procured within minutes if the scale needs to be increased or if a server needs to be replaced by different hardware. In case, if a rack server has physical fault (faulty memory, or PSU or fan, for example), using following steps, a new server can be procured within minutes:

- Put the faulty server in maintenance mode using vCenter. This would move VMs running on fault server to other healthy servers on the cluster.
- Disassociate the service profile from the fault server and physically remove the server for replacement of fault hardware (or to completely remove the faulty server).
- Physically install the new server and connect it to the Fabric Extenders. Let the new server be discovered by UCSM.
- Associate the service profile to the newly deployed rack server. This would boot the same ESXi server image from the storage array as the faulty server was running.
- The new server would assume the role of the old server with all the identifiers intact. You can now end the maintenance mode of the ESXi server in vCenter.

Thus, the architecture achieves the true statelessness of the computing in the data-center. If there are enough identifiers in all the id-pools, and if more servers are attached to UCS system in future, more service profiles can be derived from the service profile template and the private cloud infrastructure can be easily expanded. We would demonstrate that blade and rack servers can be added in the same server pool.

Network High Availability Design – FC-variant

Following figure demonstrates logical layout of the FC-variant of architecture. Following are the key aspects of this solution:

- Mix of Cisco UCS B200 M3 and C220 M3 servers are used, managed by Cisco UCS Manager (UCSM).
- Fabric A and Fabric B are used with host based FC multi-pathing for high availability
- EMC VNX5300 storage array is directly attached to Cisco UCS Fabric Interconnects
- Two 10GE links between FI and FEX provides enough bandwidth oversubscription for the SMB segment private cloud. The oversubscription can be reduced by adding more 10GE links between FI and FEX if needed by the VMs running on the ESXi hosts.
- Two vSwitches are used per host, as discussed in the Virtual Networking design section.

Storage is made highly available by deploying following practices:

- EMC VNX storage arrays provide two Storage Processors (SPs): SP-A and SP-B
- Cisco UCS Fabric Interconnects A and B are connected to SP-A and SP-B respectively.
- Port-channels or port-aggregation is not implemented or required in this architecture.
- Storage Processors are always in the active/active mode; if the target cannot be reached on SAN-A, server can access the LUNs through SAN-B and storage-processor inter-link.
- On hosts, boot order lists vHBA on both fabrics for high-availability.



Figure 13 Logical Layout of the FC-variant Architecture

Network High Availability Design - iSCSI-variant

Figure 14 demonstrates logical layout of the iSCSI-variant architecture. Following are the key aspects of this solution:

- Cisco UCS C220 M3 servers are used, managed by Cisco UCS Manager (UCSM).
- Fabric A and Fabric B are used with host based iSCSI multi-pathing for high availability
- EMC VNXe storage array is directly attached to Cisco UCS Fabric Interconnects
- Two 10GE links between FI and FEX provides enough bandwidth oversubscription for the SMB segment private cloud. The oversubscription can be reduced by adding more 10GE links between FI and FEX if needed by the VMs running on the ESXi hosts.
- Three vSwitches are used per host, as discussed in the Virtual Networking design section.

Storage is made highly available by deploying following practices:

- VNXe storage arrays provide two Storage Processors (SPs):
 - SP-A
 - SP-B

- Both the Cisco UCS Fabric Interconnects (A and B) are connected to both Storage Processors, however, a given FI connects to the same port on each SP. FI-A connects to "eth10" port of SP-A and SP-B, while FI-B connects to "eth11" port of SP-A and SP-B.
- Port-channels or port-aggregation is not implemented or required in this architecture.
- iSCSI is implemented on different VLANs and subnets on fabric A and fabric B, as per the best practice guidelines.
- Storage Processors are always in the active/stand-by mode; the links are up on both SPs, but packets are accepted only on one of the two SPs.
- Datastore in Storage Array is accessible through only one iSCSI server, but the iSCSI server can listen on two IP addresses, one on each fabric.
- On hosts, boot order lists iSCSI initiator on both fabrics for high-availability.



Figure 14 Logical Layout of the iSCSI-variant Architecture

MTU Setting

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Jumbo MTU (size 9000) is used for following two types of traffic in this architecture:

- iSCSI Storage access
- vMotion traffic

Both of these traffic types are "bulk transfer" traffic, and larger MTU significantly improves the performance. Jumbo MTU must be configured end-to-end to ensure that IP packets are not fragmented by intermediate network nodes. Following is the checklist of end-points where jumbo MTU needs to be configured:

- Ethernet ports on VNXe Storage Processors
- Appliance ports on FIs (through QoS policies)
- vNICS in service profiles
- System QoS classes
- vSwitches on the ESXi hosts
- VM-Kernel ports used for vMotion and storage access on the ESXi hosts

In addition to these end-points, infrastructure networks that connect FI-A and FI-B also need to support jumbo-MTU for vMotion traffic. iSCSI traffic is completely self-contained on the UCS fabrics.

The next section provides information on sizing guidelines of the Cisco solution for EMC VSPEC VMware architectures outlined here.

Sizing Guideline

In any discussion about virtual infrastructures, it is important to first define a reference workload. Not all servers perform the same tasks, and it is impractical to build a reference that takes into account every possible combination of workload characteristics.

Defining the Reference Workload

To simplify the discussion, we have defined a representative customer reference workload. By comparing your actual customer usage to this reference workload, you can extrapolate which reference architecture to choose.

For the VSPEX solutions, the reference workload was defined as a single virtual machine. This virtual machine has the following characteristics:

Characteristics	Value
VM operating system	Microsoft Windows Server 2008 R2
Virtual processor (vCPU) per VM	1
RAM per VM	2 GB
Available storage capacity per VM	100 GB
I/O operations per second (IOPS) per VM	25
I/O pattern	Random
I/O read/write ratio	2:1

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This specification for a virtual machine is not intended to represent any specific application. Rather, it represents a single common point of reference to measure other virtual machines.

Applying the Reference Workload

When considering an existing server that will move into a virtual infrastructure, you have the opportunity to gain efficiency by right-sizing the virtual hardware resources assigned to that system.

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The reference architectures create a pool of resources sufficient to host a target number of reference virtual machines as described above. It is entirely possible that customer virtual machines may not exactly match the specifications above. In that case, you can say that a single specific customer virtual machine is the equivalent of some number of reference virtual machines, and assume that number of virtual machines have been used in the pool. You can continue to provision virtual machines from the pool of resources until it is exhausted. Consider these examples:

Example 1 Custom Built Application

A small custom-built application server needs to move into this virtual infrastructure. The physical hardware supporting the application is not being fully utilized at present. A careful analysis of the existing application reveals that the application can use one processor, and needs 3 GB of memory to run normally. The IO workload ranges between 4 IOPS at idle time to 15 IOPS when busy. The entire application is only using about 30 GB on local hard drive storage.

Based on these numbers, the following resources are needed from the resource pool:

- CPU resources for one VM
- Memory resources for two VMs
- Storage capacity for one VM
- IOPS for one VM

In this example, a single virtual machine uses the resources of two of the reference VMs. If the original pool had the capability to provide 100 VMs worth of resources, the new capability is 98 VMs.

Example 2 Point of Sale System

The database server for a customer's point-of-sale system needs to move into this virtual infrastructure. It is currently running on a physical system with four CPUs and 16 GB of memory. It uses 200 GB storage and generates 200 IOPS during an average busy cycle.

The following are the requirements to virtualize this application:

- CPUs of four reference VMs
- Memory of eight reference VMs
- Storage of two reference VMs
- IOPS of eight reference VMs

In this case the one virtual machine uses the resources of eight reference virtual machines. If this was implemented on a resource pool for 100 virtual machines, there would be 92 virtual machines of capability remaining in the pool.

Example 3 Web Server

The customer's web server needs to move into this virtual infrastructure. It is currently running on a physical system with two CPUs and 8GB of memory. It uses 25 GB of storage and generates 50 IOPS during an average busy cycle.

The following are the requirements to virtualize this application:

- CPUs of two reference VMs
- Memory of four reference VMs
- Storage of one reference VMs
- IOPS of two reference VMs

In this case the virtual machine would use the resources of four reference virtual machines. If this was implemented on a resource pool for 100 virtual machines, there would be 96 virtual machines of capability remaining in the pool.

Example 4 Decision Support Database

The database server for a customer's decision support system needs to move into this virtual infrastructure. It is currently running on a physical system with ten CPUs and 48 GB of memory. It uses 5 TB of storage and generates 700 IOPS during an average busy cycle.

The following are the requirements to virtualize this application:

- CPUs of ten reference VMs
- Memory of twenty-four reference VMs
- Storage of fifty-two reference VMs
- IOPS of twenty-eight reference VMs

In this case the one virtual machine uses the resources of fifty-two reference virtual machines. If this was implemented on a resource pool for 100 virtual machines, there would be 48 virtual machines of capability remaining in the pool.

Summary of Example

The four examples presented illustrate the flexibility of the resource pool model. In all four cases the workloads simply reduce the number of available resources in the pool. If all four examples were implemented on the same virtual infrastructure, with an initial capacity of 100 virtual machines they can all be implemented, leaving the capacity of thirty four reference virtual machines in the resource pool.

In more advanced cases, there may be tradeoffs between memory and I/O or other relationships where increasing the amount of one resource decreases the need for another. In these cases, the interactions between resource allocations become highly complex, and are outside the scope of this document. However, once the change in resource balance has been examined, and the new level of requirements is known; these virtual machines can be added to the infrastructure using the method described in the examples.

The next section provides step by step procedure for deploying the Cisco solution for EMC VSPEX VMware architectures.

VSPEX Configuration Guidelines

The configuration for Cisco solution for EMC VSPEX VMware architectures is divided in to following steps:

- 1. Pre-deployment tasks
- 2. Connect network cables
- 3. Prepare and configure storage array for resource pools and iSCSI servers (iSCSI-variant only)

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- 4. Prepare UCS FIs and configure UCSM
- 5. Configure datastores for ESXi images
- 6. Install ESXi servers and vCenter infrastructure
- 7. Install and configure vCenter server
- 8. Configure storage for VM datastores, install and instantiate VMs through vCenter

9. Test the installation

Next pages go into details of each section mentioned above.

Pre-deployment tasks

Pre-deployment tasks include procedures that do not directly relate to environment installation and configuration, but whose results will be needed at the time of installation. Examples of pre-deployment tasks are collection of hostnames, IP addresses, VLAN IDs, license keys, installation media, and so on. These tasks should be performed before the customer visit to decrease the time required onsite.

- Gather documents—Gather the related documents listed in the Preface. These are used throughout the text of this document to provide detail on setup procedures and deployment best practices for the various components of the solution.
- Gather tools—Gather the required and optional tools for the deployment. Use following table to confirm that all equipment, software, and appropriate licenses are available before the deployment process.
- Gather data—Collect the customer-specific configuration data for networking, naming, and required accounts. Enter this information into the Customer Configuration Data worksheet for reference during the deployment process.

Requirement	Description	Reference
Hardware	Cisco UCS Fabric Interconnects, Fabric Extenders and UCS chassis for network and compute infrastructure	See the corresponding product documentation
	Cisco UCS B200 M3 and/or C220 M3 servers to host virtual machines	
	VMware vSphere TM 5.1 server to host virtual infrastructure servers	
	Note This requirement may be covered in the existing infrastructure	
	EMC VNX/VNXe storage—Multiprotocol storage array with the required disk layout as per architecture requirements	

Table 7 Deployment prerequisites

Requirement	Description	Reference
Software	VMware ESXi [™] 5.1 installation media	See the corresponding product documentation
	VMware vCenter Server 5.1 installation media	
	EMC VSI for VMware vSphere: Unified Storage Management – Product Guide	
	EMC VSI for VMware vSphere: Storage Viewer—Product Guide	
	Microsoft Windows Server 2008 R2 SP1 installation media (suggested OS for VMware vCenter)	
	Microsoft SQL Server 2008 R2 SP1	
	Note This requirement may be covered in the existing infrastructure	
Licenses	VMware vCenter 5.1 license key	Consult your corresponding vendor to obtain license keys
	VMware ESXi 5.1 license key	
	Microsoft SQL Server license key	
	Note This requirement may be covered in the existing infrastructure	
	Microsoft Windows Server 2008 R2 SP1 license key	

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Table 7 Deployment prerequisites

Customer Configuration Data

To reduce the onsite time, information such as IP addresses and hostnames should be assembled as part of the planning process.

Customer Configuration Data Sheet, page 192 provides a set of tables to maintain a record of relevant information. This form can be expanded or contracted as required, and information may be added, modified, and recorded as deployment progresses.

Additionally, complete the *VNX/VNXe Series Configuration Worksheet*, available on the EMC online support website, to provide the most comprehensive array-specific information.

Connect Network Cables

See the Cisco UCS FI, FEX, Blade servers chassis, B-series and C-series server and EMC VNXe storage array configuration guide for detailed information about how to mount the hardware on the rack. Following diagrams show connectivity details for the VSPEX VMware architecture covered in this document.

Connectivity for FC-variant:

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As shown in the following figure, there are four major cabling sections in this architecture:

- Cisco UCS Fabric Interconnects to EMX storage array Fibre Channel links (shown in yellow)
- Cisco Fabric Interconnects to Cisco UCS Fabric Extenders links (shown in blue)
- Cisco UCS Fabric Extenders to Cisco UCS C220 M3 Server links (shown in green)
- Infrastructure connectivity (not shown)

Figure 15

Detailed Connectivity Diagram of the FC-variant Architecture



Figure 16 elaborates the detailed cable connectivity for the architecture.

Cable					
ID	Peer 1	Peer 2	VLAN	Mode	Description
А	FI-A, FC	SP-A,	Storage		
	2/9		VSAN	Appliance	Directly attached storage on FI
В	FI-A, FC	SP-B,	Storage		
	2/10		VSAN	Appliance	Directly attached storage on FI
С	FI-B, FC	SP-B,	Storage		
	2/9	6 D . A	VSAN	Appliance	Directly attached storage on FI
D	FI-B, FC	SP-A,	Storage		
	2/10		VSAN	Appliance	Directly attached storage on Fl
E,F	FI-A, Eth	FEX-A			FI/FEX 20GE port-channel
	1/1, 1/2	uplinks	N/A	Server	connectivity
G,H	HI-A, Eth	FEX-B	NI/A	C	FI/FEX 20GE port-channel
1	1/1,1/2	Uplinks	N/A	Server	connectivity
1					
	FEX-A,	nort 1	NI/A	(internal)	allowed on per vNIC basis
1	porti	C220-	IN/A	(internal)	
	FFX-B	M3 VIC		VNTag	Server to fabric B. VI ANs are
	port 1	port 2	N/A	(internal)	allowed on per vNIC basis
K.L	port	5108	,	(
		Chassis,			
		FEX			
	FI-A, Eth	2208			FI/FEX 20GE port-channel
	1/3, 1/4	Left	N/A	Server	connectivity
M,N		5108			
		Chassis,			
		FEX			
	FI-B, Eth	2208			FI/FEX 20GE port-channel
	1/3, 1/4	Right	N/A	Server	connectivity
(not	Eth 2/1,	Uplink			
shown)	2/2 on	switch			
	FI-A and				Uplink to Infrastructure
	FI-B		All	Uplink	network

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6 Connectivity Details of FC-variant Architecture

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Connectivity for iSCSI-variant:

As shown in the following figure, there are four major cabling sections in this architecture:

- Cisco UCS Fabric Interconnects to EMC storage array 10G Ethernet links (shown in yellow)
- Cisco UCS Fabric Interconnects to Cisco UCS Fabric Extenders links (shown in blue)
- Cisco UCS Fabric Extenders to Cisco UCS C220 M3 Server links (shown in green)
- Infrastructure connectivity (not shown)


Figure 17 Detailed Connectivity Diagram of the Architecture

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Figure 18 elaborates the detailed cable connectivity for the architecture.

Cable ID	Peer 1	Peer 2	VLAN	Mode	Description
А	FI-A, Eth	SP-A,	Storage		Directly attached storage on
	1/5	eth10	(A)	Appliance	FI
В	FI-A, Eth	SP-B,	Storage		Directly attached storage on
	1/6	eth10	(A)	Appliance	FI
С	FI-B, Eth	SP-B,	Storage		Directly attached storage on
	1/5	eth11	(B)	Appliance	FI
D	FI-B, Eth	SP-A,	Storage		Directly attached storage on
	1/6	eth11	(B)	Appliance	FI
E,F	FI-A, Eth	FEX-A			FI/FEX 20GE port-channel
	1/1, 1/2	uplinks	N/A	Server	connectivity
G,H	FI-A, Eth	FEX-B			FI/FEX 20GE port-channel
	1/1, 1/2	uplinks	N/A	Server	connectivity
1		C220-			
	FEX-A,	M3 VIC		VNTag	Server to fabric A. VLANs are
	port 1	port 1	N/A	(internal)	allowed on per vNIC basis
J		C220-			
	FEX-B,	M3 VIC		VNTag	Server to fabric B. VLANs are
	port 1	port 2	N/A	(internal)	allowed on per vNIC basis
	Eth 2/1,				
(not	2/2 on FI-	Uplink			Uplink to Infrastructure
shown)	A and FI-B	switch	All	Uplink	network

Figure 18	Connectivit	v Details of iSCSI-variant Archite	cture
liguic io	Connectivit		ciui c

An important difference to recognize between FC and iSCSI variants are transport used to connect storage array with UCS FIs. In case of FC-variant, 8G Fibre Channel cables are connected from SP-A to FI-A and SP-B to FI-B. This is required to maintain "SAN-A/SAN-B separation". In case of iSCSI-variant, 10G Ethernet cables are crisscrossed between SP-A/SP-B and FI-A/FI-B. This design maintains high-availability in iSCSI-variant.

By connecting all the cables as outlined above, and you would be ready to configure the storage array and UCSM.

Prepare and Configure Storage Array for Resource Pools and iSCSI Servers (iSCSI-variant only)

This subsection for EMC VNXe3300 storage array is for iSCSI-variant of the architecture only. Please refer to the Configuration Guide of your respective storage array on how to perform initial configuration of storage array.

At a high level to configure storage array for this solution, you need to complete these steps:

- 1. Create storage resource pools for ESXi boot images, VM images and VM datastores.
- 2. Configure iSCSI servers.
- 3. Configure ESXi hosts that can access various datastores.
- 4. Configure VMware datastores using the resource pools created in step 1 on the iSCSI servers created on step 2.

Note that steps 1 and 2 can be completed without configuring UCS Manager. Configuration made in step 2 is used to configure boot policy for service profiles in UCS Manager. The iSCSI initiator IP address and IQN names given in the UCS Manager service profile are used to configure step 3, which is a pre-requisite for step 4. In this section, we would configure steps A and B.

Configure Resource Pools

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Follow these steps to configure storage resource pools:

- **1.** Using your browser, navigate to the management IP address of the storage array. Provide username and password.
- 2. Choose Systems > Storage Pools.
- 3. Click Configure Disks as shown in the image below.

Figure 19 Configuring Storage pools

EMC Unisphere		Q 3.
Dashboard System Storage Settings Hosts Support		
VNXe3300 > System > Storage Pools		
Storage Pools		2
Storage Pools:		
Hot Spare Pool Unconfigured Di		
Selected: 1		Items: 2
Configure Disks Details Recycle Disks Refresh		
Name: VNXe3100 Alerts: 20	User: admin	System Time: 15:22

4. Click **Manually create a new pool** and choose Pool created for VMware Storage – General Purpose from drop-down menu.

🧥 Sele	ct Configura	tion Mode	
Step 1	of 7		< 📀
elect the disk config	uration mode:		
Automatically	configure pools		
Configure disks	into the system's pools	and hot spares	
Manually creat Create a new p	e a new pool	specific application	
* Pool crea	ted for VMware Stora	ge - General Purpose.	
Manually add of Add unconfigure	lisks to an existing po		
Select po	ol		

Selecting the Configuration Mode for Pool Creation

1

- 5. Enter pool name and (optional) description., click Next.
- 6. Select disk type for balanced performance storage profile as shown in Fig.

Disk Configuration Wizard	
Specify Pool Name Step 2 of 6	>>
Specify a name and optional description.	
Name: * SystemBoot	
Description: Pool for ESXi system boot images.	
< Back Next > Finish Cance	Help

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Figure 21 Specifying the Pool Name

7. Choose 5 disks for the ESXi boot images (minimum disks required) for the number of storage disks required.

	Figure 22	Selecting	the Disk Type					
Disk Configuration Wizard								
Select Storage Type Step 3 of 6								
Please select the type of disks you want to use for this new pool. The disks and their storage types have been rated according to their suitability to the selected application / usage.								
Rating	Disk Type	Max Capacity	Storage Profile					
मे मे मे	SAS	16.775 TB	Balanced Perf/Capaci					
प्रे प्रे	SAS	18.872 TB	Balanced Perf/Capaci					
\$	NL SAS	0 GB (None Available	High Capacity					
	SAS	11.008 TB	High Performance					
	EFD	0 GB (None Available	Best Performance					
Uses SAS disks to provide a balanced level of storage performance and capacity. This pool type does not offer performance as high as High Performance pools, but it can be adequate for databases with low-to-average performance requirements. VMware SAS storage pool using RAID 5(4+1).								
	< Back	Next > Finis	h Cancel Help					

8. Click Next to verify configuration and click **Finish** to deploy the disk storage. Repeat these steps for three more datastores; one for VM operating system storage, and two for the VM data storage. Refer to storage architecture for the number of disks used for each type of datastores.

Configure iSCSI Servers

Next step is to create iSCSI servers on the storage array. You can configure multiple IP addresses for a given iSCSI server, one is accessible from each of the Cisco Fabric Interconnect. iSCSI server is configured on a given Storage Processor, and would automatically failover to the other Storage Processor if the primary SP fails or the link on which it is deployed goes down.

Following these steps to configure iSCSI servers on the storage array:

1. Choose Settings > iSCSI Server Settings.

	Figure 23	Crea	ting iSCSI Se	rver		
EMC Unisphere						
Dashboard	System	Storage	Settings	Hosts	👩 Suppor	t
VNXe3300 > Setting						
Set con	anagement Settin up and configure network amunication settings for yo	gs and our storage system.		ę	Ser Diag syste	vice System nose, troubleshoot, and repair your storage m. Requires the Service password.
Mai opc	CSI Server Setting nage storage settings for i rations.	gs SCSI storage			Sha Mana acce share	red Folder Server Settings ige settings for Shared Folder storage ss: Windows shares (CIFS) and Linux/UNIX is (NFS).
Pr Cha set	eferences inge user preferences, inc tings and your account pas	luding language sword.		Ś	View stora mana	re configuration additional configuration options for your ge system such as updating your software, ging users, licenses and alerts.

2. Click Add iSCSI Server.



Dashboard	System 🗊 S	torage 🍏 Settings	Hosts 📀 Support		
VNXe3300 > Settings iSCSI Server Settings Q iSCSI Servers —	: > iSCSI Server Settings				
Name	IP Address	Target	Storage Processor	Ethernet Port	Status
Add iSCSI Server	Details Remove				
iSNS Configurati	ion	CHAP Security CHAP Security Require CHAP Secret Use Mutual CHAP Sec Mutual CHAP secret:	ret		

EMC Unisphere

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3. Enter server name, IP address and subnet mask. Make sure that the IP address is given from the subnet corresponding to the fabric-A storage VLAN subnet. See the Customer Configuration Data Sheet, page 192 for details. Click **Show advanced**, and choose SP A for Storage processor, eth10 interface for Ethernet Port to deploy the iSCSI server as shown in Figure 25.

1

iSCSI Server		
iscsi	Server	
		>>
Step 1 of 3		V
Specify the Network Inte	rface for the new iSCSI Server:	
Server	Name: * BootServer	
IP Ad	ddress: * 192.168.100.101	
Subnet Mask/Prefix L	ength: * 255.255.255.0	
Ga	teway:	
Hide advanced		
Storage Processor:	SP A V	
Ethernet Port:	eth10 (Link Up)	
VLAN ID:	0 <click edit="" to=""></click>	
	< Back Next > Finish Can	cel Help

Figure 25 Specifying the Network Interface

4. Click Next to verify the configuration and click Finish. Once the control goes back to the "iSCSI Server Settings" page, select the iSCSI server just created, and click **Details** to add one more IP address on the other fabric.

E	MC Unisphere									
	Dashboard	System	Storage	Settings	Hosts	📀 Support				
vi	VXe3300 > Settings	> iSCSI Server Settin	gs							
	iSCSI Server Settings									
	— 😪 iSCSI Servers —									
	Name		IP Address		Targ	et		Storage Processor	Ethernet Port	Statu
	BootServer		192.168.100.101		iqn.1	992-05.com.emc:ckm0012	212004850000-9-vnx	SP A	eth10	Ok
	Add iSCSI Server	Details Remove								

Figure 26 Adding iSCSI Server on Fabric B

5. Click Add Network Interface.

Figure 2	27
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Adding Network Interface in EMC Unisphere

EMC Unisphere				
Dashboard System	Storage	Settings	Hosts	📀 s
VNXe3300 > Settings > iSCSI Server Settings	> iSCSI Serve	r Details		
iSCSI Server Details				
Summary				
Server Name: BootServer Storage Processor: SP A IQN: iqn.1992-05.com.emc:ckm00121 General Server Name: BootServer	.2004850000-9-vnx	ie		
Network Interfaces	Cubest Mask /	Deefer Length	Cata	
192.168.100.101	255,255,255.0	Prenx Length	Gate	way
Add Network Interface Modify Remove				

6. Specify the IP address and subnet mask corresponding to the storage VLAN subnet on fabric B. Click **Show advanced**.

Add network interface		
IP Address: *	192.168.200.101	
Subnet Mask/Prefix Length: 🖇	255.255.255.0	
Gateway:		
Show advanced		
	Add	ancel

Figure 28

Specifying IP Address and Subnet Mask

7. Since SP-A was already selected for the Storage Processor, this time only the Ethernet port option is shown. Choose eth11 as the Ethernet interface to deploy the newly configured IP address from the Ethernet Port drop-down list. Click Add.

1

	Figure 29	Selecting the Ethernet Port
--	-----------	-----------------------------

Add network interface	
IP Address: * 192.168.200.101 Subnet Mask/Prefix Length: * 255.255.255.0 Gateway:	
Hide advanced Ethernet Port eth11 (Link Up) v VLAN ID: 0 < click to edit>	
	Add Cancel

8. Once both the IP addresses are configured, IQN name and boot target IP addresses are available as shown in Figure 30. This information is used to configure iSCSI boot target in the UCS Manager service profile configuration.

Figure 30

IQN Name and IP Address Shown After the iSCSI Server Configuration

MC Unisphe	re						
평 Dash	board System	Storage	Settings	Hosts	Support	:	
NXe3300 >	Settings > iSCSI Server Sett	ings					
iSCSI Server Sett	ings						
- 😣 iscsi se	ervers						
Name	IP Address	Target			Storage Processor	Ethernet Port	Status
BootServer	192.168.100.101, 192.168.200.1	.01 iqn.1992-05.com	.emc:ckm001212004850	0000-9-vnxe	SP A	eth10, eth11	Ok

9. To increase MTU size of the iSCSI server NICs, choose **Settings** > **More configuration** > **Advanced Configuration**, and select eth10, and set MTU size to 9000 and save the configuration.

Figure 31 Setting Jumbo Frame for eth10 Interface

EMC Unisphere			
Dashboard System Store	ige 💡	🍏 Se	ings Hosts 📀 Support
/NXe3300 > Settings > More configuration > Advance	ed Confi	guration	
Advanced Configuration			
IO Modules			Ethernet Port
V IO Module 0	SP A	SP B	Port Name: eth10
	0	0	Maximum Transmission Unit (MTU) Size: 9000
eth12	G	0	🛕 To avoid disrupting I/O, changing MTU Size requires matching changes be made in all network components including switcher
eth13	0	•	More information
V Base Ports	SP A		Port Speed: 1 Gbps
eth2	•	•	Link State: SP A (Link Up), SP B (Link Up)
eth3	0	0	Network Addresses: 192.168.100.101

10. Repeat step 9 for eth11 interface.

ſ

EMC Unisphere		
Dashboard System	🗊 Storage 🐝 Setting	gs 📳 Hosts 📀 Support
VNXe3300 > Settings > More configuration.	> Advanced Configuration	
Advanced Configuration		
IO Modules		Ethernet Port
▼ 10 Module 0 	SPA SPB 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Port Name: eth11 Aggregation: Aggregate with eth10 Maximum Transmission Unit (MTU) Size: 9000
♥ Base Ports eth2 eth3	SPA SPB	To avoid disrupting I/O, changing MTU Size requires matching changes be mar <u>More information</u> Port Speed: 1 Gbps Link State: SP A (Link Up), SP B (Link Up) Network Addresses: 192.168.200.101

Figure 32 Setting Jumbo Frame for eth11 Interface

Prepare Cisco UCS Fls and Configure Cisco UCS Manager

At a high level to configure Cisco UCS Fabric Interconnects and Cisco UCS Manager, you need to complete these steps:

- 1. Initial configuration of Cisco UCS Fabric Interconnects
- 2. Configuration for server discovery
- 3. Upstream/global network configuration
- 4. Configure identifier pools
- 5. Configure server pool and qualifying policy
- 6. Configure service profile template
- 7. Instantiate service profiles from the service profile template

The following sections provide a step-by-step procedure on configuring Cisco UCS Manager.

Initial Configuration of Cisco UCS Fabric Interconnects

At this point of time, the UCS FI, Blade servers chassis, FEX and C-series server must be mounted on the rack and appropriate cables must be connected as suggested in Architectural Overview, page 16. Two 100 Mbps Ethernet cables must be connected between two FIs for management pairing. Two redundant power supplies are provided per FI, it is highly recommended that both are plugged in, ideally drawing power from two different power strips. Connect mgmt0 interfaces of each FI to the infrastructure network, and put the switch port connected to FI in access mode with access VLAN as management VLAN. Now follow these steps to perform initial configuration of FIs:

 Attach RJ-45 serial console cable to the first FI, and connect the other end to the serial port of laptop. Configure password for the "admin" account, fabric ID "A", UCS system name, management IP address, subnet mask and default gateway and cluster IP address (or UCS Manager Virtual IP address), as the initial configuration script walks you through the configuration as shown in the below image. Save the configuration, which would eventually lead to UCS Manager CLI login prompt.

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🖞 10.65.121.10 - PuTTY
Enter the configuration method. (console/gui) ? console
Enter the setup mode; setup newly or restore from backup. (setup/restore) ? setup
You have chosen to setup a new Fabric interconnect. Continue? (y/n) : y
Enforce strong password? (y/n) [y]:
Enter the password for "admin": Confirm the password for "admin":
Is this Fabric interconnect part of a cluster(select 'no' for standalone)? (yes/no) [n]: yes
Enter the switch fabric (λ /B) []: λ
Enter the system name: VSPEX-FI
Physical Switch Mgmt0 IPv4 address : 10.65.121.226
Physical Switch Mgmt0 IPv4 netmask : 255.255.255.0
IPv4 address of the default gateway : 10.65.121.1
Cluster IPv4 address : 10.65.121.228
Configure the DNS Server IPv4 address? (yes/no) [n]:
Configure the default domain name? (yes/no) [n]:
Following configurations will be applied:
Switch Fabric=A System Name=VSPEX-FI Enforced Strong Password=yes
Physical Switch Mgmt0 IP Address=10.65.121.226 Physical Switch Mgmt0 IP Netwask=255.255.0
Default Gateway=10.65.121.1
Cluster Enabled=yes
Cluster IP Address=10.65.121.228 NOTE: Cluster IP will be configured only after both Fabric Interconnects are initialized
Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no):

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Figure 33 Configuring Primary Cisco UCS Fabric Interconnect

2. Now disconnect the RJ-45 serial console from the FI that you just configured and attach it to the other FI. The other FI would detect that its peer has been configured, and would prompt you to just join the cluster. The only information you need to provide is the FI specific management IP address, subnet mask and default gateway, as shown in the image below. Save the configuration.



3. Once initial configurations on both FIs are completed, you can disconnect the serial console cable. Now, UCS Manager would be accessible through web interface (https://<ucsm-virtual-ip>/) or SSH. Connect to UCS Manager using SSH, and see HA status. As there is no common device connected between two FIs (a rack server or blade server chassis), the status would say "HA NOT READY", but you must see both FI A and FI B in "Up" state as shown in Figure 35.



VSPEX-FI-A# show cluster state Cluster Id: 0xec91409a491011e2-0xb7a4547feeaa1564	
A: UP, FRIMARY B: UP, SUBORDINATE	
HA NOT READY No device connected to this Fabric Interconnect VSPEX-FI-A#	

Configuration for Server Discovery

All FI Ethernet ports are Unconfigured and shut down by default. You need to classify ports as server facing ports, directly attached storage array facing ports and uplink ports. Next steps show how to configure ports for the proper server auto-discovery:

 Firstly, we need to configure chassis discovery policy that specifies server side connectivity. Using a web browser, access the Cisco UCS Manager using the management virtual IP address and download the Java applet to launch UCS Manager GUI. In the home page, click Equipment tab on the left pane and then Policies tab on the right pane. In the Chassis Discovery Policy area, select 2 Link for Action field, as two 10 GE links are connected between Cisco UCS FI and FEX per fabric. Also, click the Port Channel radio button for Link Grouping Preference, for better utilization of bandwidth and link level high-availability as shown in Figure 36. Click Save changes.

🛕 Cisco Unified Computing System Manager - VSPE	EX-FI	A DE MORE	
Fault Summary	Ġ 🏐 🗳 New 📲 🏹 Options 🛛 😢 🚯 📥 Pe	nding Activities 🛛 🚺 Exit	
	>> 🛱 Equipment		Equipment
Equipment Servers LAN SAN VM Admin	Main Topology View	Fabric Interconnects	Servers
Filter: All	Global Policies Autoconfig Policies Server Inherita	nce Policies Blade Server Discovery Poli	cies SEL Policy Power Groups
Chassis Rack-Mounts FEX Servers Fabric Interconnects	Chassis Discovery Policy Action: 2 Link Link Grouping Preference: None Port Cl Rack Server Discovery Policy Action: Immediate User Acknowled Scrub Policy: <not set=""> Power Policy Redundancy: Non Redundant • n+1 MAC Address Table Aging Aging Time: Never • Mode Default • of Global Power Allocation Policy</not>	aannel dged Grid	E Save Changer
			Sare changes

Figure 36 **Configuring Chassis Discovery Policy**

2. Next, we need to identify ports connected to the Chassis or FEX per FI basis. Click Equipment tab, expand Cisco UCS Fabric Interconnects, choose a particular FI, for example, Fabric Interconnect A,

choose Unconfigured Ethernet Ports. A list of unconfigured Ethernet ports appears in the right pane of the window. Select the two ports connected to FEX-A, right-click on each of them and click Configure as Server Port as shown in Fig. Click Yes on the confirmation message window.

Figure 37 **Configuring Ethernet Ports as Server Ports**

A Cisco Unified Computing System Manager - VS	SPEX-F	FI							x
Fault Summary	G) 💿 🗉 New	- Options 🤅	🧿 🕕 🛆 Pend	ling Activities 🛛 🚺	D Exit			altalta cisco
0 0 0 0	>	> 🛱 Equipment	t 🕨 💷 Fabric Inter	rconnects 🕨 🎫 F	abric Interconnec	t A (primary) 🕨 🎫	Fixed Module 🕨		
Equipment Forward LAN SAN VM Admin		Unconfigured E	thernet Ports						
Equipment Bervers LAW SAW WM Aumin	6	🔍 Filter 📥 Exp	ort 📚 Print						
Filter: All		Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative	
± =		1 .	1	54:7F:EE:AA:1	Unconfigured	Physical	🐥 Admin Down	🕂 Disabled 🔺	
- E Fabric Interconnects	•	1	2	54:7F:EE:AA:1	Unconfigured		🖶 Admin Down	🕹 Disabled 📄	
Fabric Interconnect A (primary)	į	1	Enable			Physical	👃 Admin Down	🖡 Disabled	
Fixed Module	. 1	1	Disable			Physical	👃 Admin Down	Jisabled	
-I Appliance Ports	j	1	C	Dent		Physical	💎 Sfp Not Pre	🖡 Disabled	
Monitoring Ethernet Ports	1	1 L	Configure as serv	/er Port		Physical	💎 Sfp Not Pre	📕 Disabled 🔤	
Monitoring Echoritor	1	1	Configure as Upli	ink Port		Physical	💎 Sfp Not Pre	👃 Disabled 🦷	
- Server Ports	- 1	1	Configure as FCo	E Storage Port		Physical	💎 Sfp Not Pre	Disabled	
Storage EC Ports	1	1	Configure as Apr	oliance Port		Physical	💎 Sfp Not Pre	🖡 Disabled	
Unconfigured Ethernet Ports	1	1	lla sa finana	maneer one		Physical	💎 Sfp Not Pre	Disabled	
Port 1	1	1	Unconfigure			Physical	💎 Sfp Not Pre	🖡 Disabled 🔝	
Port 2	1	1	Сору		Ctrl+C	Physical	💎 Sfp Not Pre	Disabled	
Port 3	1	1	Copy XML		Ctrl+L	Physical	💎 Sfp Not Pre	🖡 Disabled	
Port 5	1	1	Delate		Ctrl D	Physical	V Sfp Not Pre	Disabled	
Port 6	1	1	Delete		Ctri+D	Physical	👃 Admin Down	👃 Disabled	
Port 7	1	1	16	54:7F:EE:AA:1	Unconfigured	Physical	👃 Admin Down	Disabled	

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- **3.** Repeat step 2 for the other FI.
- **4.** Once server ports are configured on both FIs, the Chassis or FEX auto-discovery will start. In case of FEX, after the deep discovery of FEX is complete, you will be able to see two Fabric Extenders in the Equipment tab with overall status shown as Operable.





Similarly, if server ports are connected to chassis, you would see the chassis fully discovered, with all its IOMs, fans, power supplies and so on.



Status Details of Discovered Cisco UCS Blade Chassis

Figure 39

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5. After the Chassis and FEX auto-discovery, the Blade Server and Rack Server auto-discovery will also start respectively. As and when the servers are discovered, you will be able to see them in the Equipment tab with over-all status shown as Unassociated and availability state shown as Available, and discovery state shown as Complete.



Figure 40 Status Details of Discovered Cisco UCS Rack Mount Server

Similarly, a Blade Server's status can be observed as Figure 41:

Figure 41 Status Details of Discovered Cisco UCS Blade Server



6. Once all the servers are discovered, to see summary of all the servers, choose Equipment tab > Rack-Mounts > Servers.

🛕 Cisco Unified Computing System Manager - VSP	EX-FI														
Fault Summary Image: Constraint of the second	S S New	▼ Qptions Q t > Rack-Mounts >	 Pendin Servers 	g Activities 🛛 🚺 Exit											4
Equipment Servers LAN SAN VM Admin	Servers	and little prices													
Filter: Al	Name	Overall Status	PID	Model	User Label	Cores	Memory	Adapters	NICs	HBAs	Operability	Power State	Assoc State	Pr	Fault Sup
± =	Server 1	Unassociated	UCSC-C220	Cisco UCS C220 M3		16	262144	1	0	lo	1 Operable	I Off	I None	1	N/A
Equipment	Server 2	Unassociated	UCSC-C220	Cisco UCS C220 M3		16	262144	1	0	0	1 Operable	I Off	None		N/A
- Hill Chassis	Server 3	Unassociated	UCSC-C220	Cisco UCS C220 M3		16	262144	1	0	0	1 Operable	4 Off	None		N/A
Rack-Mounts Rex PEX Porture Portu	Server 4	Unassociated	UCSC-C220	Gisco UCS C220 M3		16	262144	1	0	0	1 Operable	♣ Off	None		N/A

Figure 42 Summary of the Discovered Rack Mount Servers

Or, in case of Blade Servers, from the **Equipment** tab, under **Equipment > Chassis > Chassis < id>** > Servers.

Figure 43 Summary of the Discovered Blade Servers



Upstream / global Network Configuration

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This section provides a few upstream/global network configuration steps:

- 1. Move to FC switching mode (FC-variant only)
- **2**. Uplink VLAN configuration
- 3. Appliance VLAN configuration (iSCSI-variant only)
- 4. Appliance VSAN configuration (FC-variant only)
- 5. Configure uplink ports
- 6. Configure FC appliance ports (FC-variant only)
- 7. Configure FC Zoning policies (FC-variant only)
- 8. Configure Ethernet appliance ports (iSCSI-variant only)
- 9. Configure QoS classes and QoS policy for jumbo MTU

To configure these upstream/global network, follow these steps:

1. (FC-variant only) From the Equipment tab, select and right-click on Fabric Interconnect A, and select Set FC Switching Mode.

Cisco Unified Computing System Man	ager - VSPEX-FI			-
ult Summary		Ġ 🔵 🖬 New - 📘	Options	00
V V 🛆		>> 88 Equipment > 1	Eabric Inte	erconnecto k
0 0 0	_			
uipment Servers LAN SAN VM Adm	in	General Physical Por	is Fans PS	US Physical L
Filter: All		Fault Summary		
		🛛 🗸	΄ 🛆	
🛱 Equipment		0 0	0	0
🗄 🥡 Chassis		Status		
E- E Fabric Interconnects		Overall Status:	1 Operable	
🕞 📲 Fabric Interconnect A (pringer	ANUInlinks	_, . Managar	· -·	
Hapric Interconnect B (sub	Chan Oplinks	iviariager		-
	Show Naviga	itor		
	Activate Firm	nware		
	Internal Fabr	ic Manager		
	Enable All Po	rts		
	Disable All P	orts		
	Enable All Se	rver Ports		
	Disable All Se	erver Ports		
	Enable All Up	link Ethernet Ports		
	Disable All U	plink Ethernet Ports		
	Enable All Up	link FCoE Ports		
	Disable All U	plink FCoE Ports		
	Enable All Up	link FC Ports		
	Disable All U	plink FC Ports		ode
	Set Ethernet I	End-Host Mode		ode
	Set Ethernet	Switching Mode		
	Turn on Loca	ator LED		
	Configure Ur	nified Ports		
	Set FC End-H	lost Mode		
	Set FC Switch	ning Mode		
	Сору		Ctrl+C	
	Copy XML		Ctrl+L	
	Delete		Ctrl+D	

2. (FC-variant only) A message window appears with a warning that the Fabric Interconnects will be restarted as a result of this action. Click **Yes** for both the FIs to reboot (first the secondary FI and then the primary FI). This action is traffic disruptive, so make sure that you perform this operation in maintenance window, if you are working on a production environment.

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3. From the LAN tab, expand LAN > LAN Cloud, and right-click on VLANs, and select Create VLANs.

Fault Summary		New - 🕞 🕞 (Options 🕜 👩	Pending A	ctivities 🛛 👩	Exit
🛛 V 🛆 🔺		···· 💌 ·				
0 0 0	>> 🗏 LAN	 C LAN C 	oud 🕨 📃 VLAN	s		
Fourinment Servers LAN SAN VM Admin	VLANs					
Equipmente Der verte and prive verte Hammit	🔍 Filter 🛋	Export 😸	Print			
Filter: All	Name	ID	Туре	Transport	Native	VLAN Sha
± =	= VLAN de	1	Lan	Ether	Yes	None
Fabric A Fabric B						
Pabric A Pabric B Pabric B QoS System Class LAN Pin Groups S Threshold Policies M AN Groups VIANS	Details	Ora Permissir	ons MI AN Group	Membershin, Ea	III	

Creating VLANs

Figure 45

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4. Enter the VLAN name in the Name field. Keep the radio button Common/Global selected. And Assign ID in the VLAN IDs field.

Cisco Virtualization Solution for EMC VSPEX with VMware vSphere 5.1 for 100-125 Virtual Machines

Figure 46

Create VLANs	×
Create VLANs	0
VLAN Name/Prefix: vSphereMgmt	
Multicast Policy Name: Knot set > Create Multicast Policy	
Common/Global Fabric A Fabric B Both Fabrics Configured Differently	
You are creating global VLANs that map to the same VLAN IDs in all available fabrics.	
Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")	
VLAN IDs: 1	
Sharing Type: None Primary Isolated 	
Check Over	lap OK Cancel

Creating VLAN for Management

5. Click **OK** to deploy the VLAN. Repeat these steps for vSphereMgmt, VM-Data and vMotion VLANs. See Customer Configuration Data Sheet, page 192 for the VLAN values.

1

6. (iSCSI-variant only) Storage VLAN is deployed differently, it has different VLAN IDs on each fabric to meet the iSCSI storage access best practices. Click the radio button **Both Fabrics Configured Differently**, and assign VLAN ID for each fabric.

IEGLE TLAIS	
reate VLANs	6
VLAN Name/Prefix: Storage	
ulticast Policy Name: <not set=""> 🔹 🗄 Create f</not>	Multicast Policy
C Common/Global C Fabric A C Fa	bric B 💽 Both Fabrics Configured Differently
Fabric A VLAN IDs: 40	Fabric B VLAN IDs 41
Sharing Type: 💽 None 🔿 Primary 🔿 Isolated	Sharing Type: 📀 None 🔿 Primary 🔿 Isolated
	U

Creating VLAN for Storage

Figure 47

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 (iSCSI-variant only) After configuring uplink or global VLANs, next step is to create Appliance VLANs. From the LAN tab, expand LAN > Appliances, right-click on VLANs and select Create VLANs.


8. (iSCSI-variant only) Enter Storage for VLAN Name field and click **Both Fabrics Configured Differently** radio button, and provide the VLAN IDs for each fabric. Click **OK** to deploy the configuration.

🚔 Create VLANs		۲ ۲
Create VLANs		0
VLAN Name/Prefix: Storage C Common/Globa You are creating VLANs that m	I C Fabric A C Fabric E Both Fat	brics Configured Differently
Fabric A VLAN IDs: 40	Fabric B	
		ck Overlap OK Cancel

Figure 49 Creating Storage VLAN for Appliances

9. (FC-variant only) Click the **SAN** tab. Expand Storage Cloud and right-click on VSANs. Select Create Storage VSAN.



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Figure 50 Creating Storage VSAN

10. Enter the VSAN name in the Name field. Click the radio button **Enable** for FC Zoning and assign VSAN ID and its corresponding FCoE VLAN ID. FCoE VLAN ID should not have conflict with any of the VLANs configured before.

	Figure 51	Create Storage VSA	N	
Create Storage VSAN	and a	-	-	X
Create Storag	e VSAN			0
Name: Storage				
FC Zoning Settings FC Zoning: Disable Do NOT enable zoning upstream switch that h	d Enabled For this VSAN if the fabri as zoning enabled on the	ic interconnect is connected to an e same VSAN.		
 Common/Global F You are creating a globa the same VSAN ID in all 	abric A	Both Fabrics Configured Different A VLAN can be used mapped to this VSAN	y to carry FCoE traffic and	d can be
Enter the VSAN ID that I	maps to this VSAN.	Enter the VLAN ID th	hat maps to this VSAN.	
			ОК	Cancel

11. To configure Uplink ports connected to the infrastructure network, click **Equipment** tab. Expand Fabric Interconnects, choose a particular FI, expand Expansion Module 2 (this may vary depending on which port you have chosen as uplink port), right-click on the Ethernet port, and select Configure as Uplink Port. Repeat this step for all the uplink ports on each FI.

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Figure 52 Configuring Ethernet Ports as Uplink Ports

12. (FC-variant only) Cisco UCS 6248UP Fabric Interconnects have Universal Ports. The physical ports are 10G Ethernet ports by default, but can be converted in to Fibre Channel ports. For the FC-variant of the architecture, we need FC connectivity to the EMC VNX storage array. For that, some of the ports need to be converted into FC ports. We will convert ports from expansion module into FC ports. For that, click the Equipment tab. Expand Fabric Interconnects and select Fabric Interconnect A. In the right pane of the window, in the Actions area click Configure Unified Ports. Click Yes in the warning message window.



Figure 53 Configuring Unified Ports

13. (FC-variant only) In the Configure Unified Ports window, click **Configure Expansion Module Ports.**

	,	igure 54	Configuring Expansion	on Module Ports	
🛕 Configure	Unified Ports				×
U	nified (Comput	ting System	Manager	
Configu	ure Fixed Mo	odule Ports			0
Instruction	The position of the si All the ports to the le By default, Ethernet	lider determines the type of the slider are Ether ports are Unconfigured a	of the ports. net ports (Blue), while the ports Right click	right are Fibre Channel ports (Purple). K on a port to change its type (Server, Uplink, Appliance	e, etc.)
Port	Transport	If Role or Port Ch	annel Membership	Desired If Role	
Port Port 1	Transport ether	If Role or Port Ch Server Port Channel	annel Membership Member	Desired If Role	
Port 1 Port 2	Transport ether ether	If Role or Port Ch Server Port Channel Server Port Channel	annel Membership Member Member	Desired If Role	A
Port 1 Port 2 Port 3	Transport ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel	annel Membership Member Member Member	Desired If Role	^
Port 1 Port 2 Port 3 Port 4	Transport ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel	Annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5	Transport ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage	annel Membership Member Member Member Member	Desired If Role	^ ^
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6	Transport ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7	Transport ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8	Transport ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Appliance Storage Appliance Storage Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9	Transport ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10	Transport ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 7 Port 8 Port 9 Port 10 Port 11	Transport ether ether ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 12	Transport ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 12 Port 13	Transport ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Appliance Storage Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 12 Port 13 Port 14	Transport ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member Member	Desired If Role	
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 11 Port 12 Port 13 Port 14 Port 15	Transport ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured	annel Membership Member Member Member	Desired If Role	
Port Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8 Port 9 Port 10 Port 11 Port 12 Port 13 Port 15	Transport ether ether	If Role or Port Ch Server Port Channel Server Port Channel Server Port Channel Appliance Storage Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured Unconfigured	Annel Membership Member Member Member	Desired If Role	

14. (FC-variant only) Select the slider bar and slide it to the middle of the slider bar. Make sure that ports 2/9 to 2/15 are showing as FC Uplink. Click **Finish**. A warning message window appears to warn on rebooting the FI. Click **OK** to reboot the FI.

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	Figure 55	Window Showing FC Uplink Ports	
A Configure Unified Port		Pres + 0 ()	×
Unifie	d Compu	ting System Manager	
Configure Exp	ansion Module P	Ports	0
Instructions The positio All the port By default,	n of the slider determines the typ s to the left of the slider are Ethe Ethernet ports are Unconfigured	Pe of the ports. ernet ports (Blue), while the ports to the right are Fibre Channel ports (Purple). d and FC ports are Uplink ports. Right click on a port to change its type (Server, Uplink, App	bliance, etc.)
Port Trans	sport If Role or Port C	Channel Membership Desired If Role	
Port 7 ether	Unconfigured		
Port 8 other	Unconfigured		
Port 9 ether	Unconfigured	FC Uplink	
Port 10 ether	Unconfigured	FC Uplink	
Port 11 ether	Unconfigured	FC Uplink	
Port 12 ether	Unconfigured	FC Uplink	E
Port 13 ether	Unconfigured	FC Uplink	
Port 14 ether	Unconfigured	FC Uplink	
Port 15 ether	Unconfigured	FC Uplink	•
		📕 Up 📕 Admin Down 📕 Fail 🔜 Link Down	
		Configure Fixed Module Ports Configure Expansion Module Ports	Finish Cancel

- 15. (FC-variant only) Once the FI is up after reboot, repeat steps 12, 13 and 14 for FI-B.
- 16. (FC-variant only) Physical FC ports further need to be classified as FC storage ports for directly attached storage array. Click the Equipment tab. Expand Fabric Interconnect > Fabric Interconnect A > Expansion Module 2 > FC Ports. Select each FC ports and in Actions area click Configure as FC Storage port in the right pane of the window.

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Figure 56

Configuring Storage Ports as FC Storage Ports

17. (FC-variant only) Make sure that the over all status of the is shown Up. In the Properties area for the VSAN field, select the Storage VSAN configured in steps 9 and 10 from the drop-down list. Click Save Changes.

Cisco Unified Computing System Manager - VSP	x-fi
Cisco Unified Computing System Manager - VSP Fault Summary 0 9 0 7 Equipment Servers LAN SAN VM Admin Filter: All Equipment Chassis Rack-Mounts Fabric Interconnect A (primary) Fixed Module Fixed Module 2 Fixed Module 2 Fixed Module 2 Fixed Fixed Module 2 Fixed Fixed F	C-Fi Contended of the second degree of the seco
	Configure as Uplink Port Configure as PC Storage Port Show Interface
	Save Changes F

18. (FC-variant only) At this point of time, the EMC VNX storage array will do Fibre Channel flogi into the FIs. Using the WWPN of the VNX storage array, we can carve out the zoning policy on the FI. Use SSH connection to the UCS Manager Virtual IP address, and type connect nxos a command. In the read-only NXOS shell, type show flogi database command and note down the WWPN of the storage array.

Figure 57 Selecting the Configured Storage VSAN for the FC Port

🚰 10.65.121.228 - PuTTY 📃 📃 💌 🌄							
VSPEX-FI-A# connect nxos a							
Cisco Nexus Operating System (NX-OS) Software							
TAC support: htt	TAC support: http://www.cisco.com/tac						
Copyright (c) 20	002-201	2, Cisco Sy	ystems, Inc. All rights n	reserved.			
The copyrights t	to cert	ain works (contained in this softwar	re are			
owned by other t	third p	arties and	used and distributed und	ler			
license. Certain	n compo	nents of th	his software are licensed	1 under			
the GNU General	Public	License ((GPL) version 2.0 or the (GNU			
Lesser General I	Public	License (L(GPL) Version 2.1. A copy	of each			
such license is	avalla	ple at					
http://www.opens	source.	org/license	es/gp1-2.0.pnp and				
WSPFY_FT_0(nyos)	f show	flogi det	abase				
	, , , , , , , , , , , , , , , , , , , ,						
INTERFACE	VSAN	FCID	PORT NAME	NODE NAME			
fc2/9	10	0x2003ef	50:06:01:64:3e:a0:65:0a	50:06:01:60:be:a0:65:0a			
fc2/10	10	0x2002ef	50:06:01:65:3e:a0:65:0a	50:06:01:60:be:a0:65:0a			
Total number of	flogi	= 2.					
VSPEX-FI-1(nxos)	#						
VSPEX-FI-A(nxos)	#						
VSPEX-FI-A(nxos)) #			-			
-				, i			

Running flogi in Read-only NXOS Shell

Figure 58

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19. (FC-variant only) On UCS Manager GUI, click the **SAN** tab. Expand **SAN** > **Policies** > **root**, right-click on Storage connection policies, and choose Create Storage Connection Policy.



20. (FC-variant only) Enter Fabric-A in the Name field and (optional) description. Click the **Single Initiator Multiple Targets** radio button as the Zoning Type. Click **II** to add a new FC Target Endpoint.

	Figure 60	Adding FC Target Endpoint	
🛕 Create Storage Conne	ction Policy		×
Create Storag	e Connecti	on Policy	0
Name: Fabri Description: zone Zoning Type: N	c-A s for fabric A one Osingle Initiat	tor Single Target Single Initiator Multiple Targets 	
FC Target Endpo	oints		
WWPN	Path	VSAN E	
		OK	Cancel

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21. (FC-variant only) Copy the WWPN from the "show flogi database" output from step 18 and paste it in the WWPN field. Provide description (optional), click the **A** radio button for Path and choose Storage VSAN from VSAN drop-down list.

Fig	gure 61	Creating FC Target End	point
A Create FC Target Endpoin	t		×
Create FC Targe	et Endpoir	nt	Ø
WWPN: 50:06:01:64:36 Description: FI-A, port 2/9 Path: • A • B Select VSAN: VSAN Storage	connected to SP	≻-A eate VSAN	
			OK Cancel

22. (FC-variant only) Similarly, add the second FC target end-point for fabric A and click **OK**.

1
Name: Fabric-A				
Description: zones for fabric	A			
Zoning Type: O None O Sing	le Initiator S	Single Target 💿 Single Inil	tiator Multiple T	argets
FC Target Endpoints				
🔍 Filter 🖨 Export 🗞 Print				
WWDN	Path	VSAN	Ē	
50:06:01:65:3E:A0:65:0A	A	Storage		
50:06:01:64:3E:A0:65:0A	A	Storage		
				ER .
				-
			•	

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23. (FC-variant only) Repeat steps 18 to 22 for Fabric B. The end result will look similar to Figure 62.

		U			U		
🚖 Cisco Unif	ied Computin	g Sys <mark>tem</mark> Manag	ger - VSPE	X-FI			
Fault Summ	ary V	Δ	A	6	🗈 New 🔪 🏹 Options 🛛 😗 🚺	Pending Activities 0 Exit	
0	O	0	0	>> =	SAN 🛌 🚿 Policies 🕨 🎄 root 🕨 💃	Storage Connection Policies	
Equipment S	ervers LAN	SAN VM Admin]	Stora	ge Connection Policies		
Equipment -				. 🛨 🖯	🗉 🔍 Filter 👄 Export 😸 Print		
Filte	er: All		'	Name		Description	WWPN
• •					Fabric-B	zoning for fabric B	
🖃 🚍 SAN							50:06:01:6D:3E:A0:65:0A
🕀 💭 SAI	N Cloud			L.			50:06:01:6C:3E:A0:65:0A
🕀 🏉 Sto	orage Cloud			ė-g	SFabric-A	zones for fabric A	
POI	ICIES I SAN Cloud						50:06:01:65:3E:A0:65:0A
	- 🖾 Threshold	Policies		L.			50:06:01:64:3E:A0:65:0A
<u> </u>	root						
	- 写 Default vi	IBA Behavior					
±	- <u> F</u> ibre Cha	nnel Adapter Polici	ies				
	SAN Conn	ectivity Policies					
	-) Storage C	onnection Policies					
1	<u>)</u> inreshold	Policies					

Figure 63 Storage Connection Policies for Fabric A and Fabric B

24. (iSCSI-variant only) To mark ports connected to directly attached storage arrays, from the Equipment tab, expand Equipment > Fabric Interconnects, select a particular FI. Choose the port under Fixed Module, right-click, and choose Configure as Appliance Port.

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Figure 64 Configuring Ethernet Port as Appliance Port

25. (iSCSI-variant only) In the Configure as Appliance Port window, choose Platinum for Priority from the drop-down list (for jumbo MTU configuration of storage access). Click the Access radio button for port-mode in the VLANs area and choose Storage from the drop-down list for Select VLAN field. Click **OK** to deploy the configuration.

-		
Pr	ority: Platinum 🔻	
Pin (roup: <not set=""></not>	
twork Control I	tolicy: default 🔹 👻	
Flow Control I	Volicy: default 🔹 📑 Create Flow Control Policy	
Admin Speed(ibps): 🔘 1 Gbps 🕥 10 Gbps 🔘 20 Gbps 🔘 40 Gbps	
ANS Port Mode: 0 elect VLAN: 5 Create VLA	Trunk Trunk Access	
Ethernet Ta	get Endpoint	

Figure 65Specifying Details in the Configure as Appliance Port Window

1

- 26. (iSCSI-variant only) Repeat these steps for the remaining 3 appliance ports.
- 27. For QoS configuration, click the LAN tab, expand LAN > LAN Cloud, and choose QoS System Class. Set the priority as Platinum, and select MTU as 9216 from the drop-down list. Keep other configuration as default and save the configuration.

Cisco Unified Computing System Manager - VSPEX-FI	and the state of t	No. of Concession, Name		1000 P	Contract of the	1000	828 ····	
Fault Summary	G) □ New -	Options	; 🕜 🌘	Pending Act	ivities 🛛 💽 Exit			ť
0 8 0 4	>> 🗏 LAN + 🙆 L	AN Cloud >	👬 QoS S	System Class				🙀 QoS System Cl
Equipment Servers LAN SAN VM Admin	General Events F	FSM						
Filter: All	Priority	Enabled	CoS	Packet Drop	Weight	₩eight (%)	MTU	Multicast Optimized
• =	Platinum	V	5		10	5 0	9216	• 🔲
E-= LAN	Gold		4	V	9	▼ N/A	normal	
E-C LAN Cloud	Silver		2	V	8	▼ N/A	normal	•
⊕ esa Fabric B	Bronze		1	V	7	▼ N/A	normal	• 🔳
Appliances	Best Effort		Any		5	- 25	normal	• 🔳
Internal LAN	Fibre Channel		3		5	- 25	fc	N/A
Policies								
LAN Cloud								
S Default vNIC Behavior								

Figure 66 Configuring QoS System Class

From the LAN tab, expand LAN > Policies > root. Right-click on QoS Policies and choose Create QoS Policy.



29. Enter the name of the policy as jumboMTU and choose Priority as Platinum from the drop-down list in the Egress area. Click **OK** to save the configuration.

Figure 68 Specifying Details for Creating QoS Policy

A Create QoS Policy	×
Create QoS Policy	0
Name: jumboMTU Egress Priority: Platinum Burst(Bytes): 10240 Rate(Kbps): line-rate Host Control: None Full	
	OK Cancel

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Configure Identifier Pools

In this section, we would configure following identifier pools used by service profile:

- **1**. Server UUID pool
- 2. MAC address pool
- 3. WWN pool (FC-variant only)
- 4. IQN pool (iSCSI-variant only)
- 5. iSCSI initiator IP address pool (iSCSI-variant only)
- 6. Management IP address pool

To configure these pools, follow these steps:

 From the Servers tab, expand Servers > Pools > root. Right-click on UUID Suffix pools and choose Create UUID Suffix Pool.



Figure 69 Creating UUID Suffix Pool

2. Enter the name of the UUID Suffix Pool and (optional) description. Keep other configurations at default.

	Figure 70 S	Specifying Details for Creating UUID Suffix Poo
A Create UUID Suffix Pool		
Unified	Comput	ing System Manageı
Create UUID Suffix Pool	Define Nar	ne and Description 🤫
2. Add UUID Blocks	Name:	VSPEX-UUIDs
	Description:	UUID Pool for VSPEX project
	Prefix:	Derived other
	Assignment Order:	Default Sequential
		< Prev Next > Finish Cancel

3. Click **Add** to add UUID block.

Adding UUID Block

Figure 71

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Create UUID Suffix Pool	ompu	ting Syst	em Mar	nagei
Create UUID Suffix Pool 1. VDefine Name and	Add UUI	D Blocks		0
2. √ <u>Add UUID Blocks</u>	Name	From	To	P
		< Prev	Next > Finish	Cancel

4. Specify the beginning of the UUIDs, and make sure to have a large block of UUID to accommodate future expansion.

Figure 72	Size of the UUID Suffix Block
A Create a Block of UUID Suffixes	X
Create a Block of UUID	Suffixes 🥹
From: 600D-0000000001 Size-	20
	OK Cancel

- 5. Click **OK** and then click **Finish** to deploy UUID pool.
- 6. From the LAN tab, expand LAN > Pools > root. Right-click on MAC Pools and choose Create MAC Pool.



Figure 73 Creating MAC Pool

7. Enter the MAC Pool name in the Name field and (optional) description. Click Next.

1	-igure 74	Specifying Details for Creating MAC P	00
A Create MAC Pool			
Unified (Computi	ing System Manage	-
Create MAC Pool 1. √Define Name and	Define Nam	ne and Description 🧉	
2. Add MAC Addresses	Name: Description:	VSPEX-MACs DMAC address pool for VSPEX	
	Assignment Order:	🛈 Default 🔿 Sequential	
		< Prev Next > Finish Cancel	

..

8. Click **H** Add to add MAC pool block.

Figure 75

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Create MAC Pool	ompu	ting Syst	tem Man	agei
Create MAC Pool 1. √ <u>Set MAC Pool Name</u> 2. √ <u>Add MAC Addresses</u>	Add MAC	C Addresses		8
	Name	From	To Delete	- -
		< Prev	Next > Finish	Cancel

9. Provide the initial MAC address and size of the block. Make sure you provide a large block of MAC addresses to accommodate future expansion. Make sure that you have 6 MAC addresses per server.

Adding MAC Address Block

Figure 76 Size of th	ne MAC Address Block
A Create a Block of MAC Addresses	
Create a Block of MAC Addresses	0
First MAC Address: 00:25:85:60:0D:00 To ensure uniqueness of MACs in the LAN fabric, you are strongly encouraged to use the following MAC prefix: 00:25:85:xx:xx:xx	Size: 30 🜩
	OK Cancel

- 10. Click **OK** and then click **Finish** to complete the configuration.
- **11.** (FC-variant only) Click the **SAN** tab, expand **SAN** > **Pools** > **root**, right-click WWxN Pools, and choose Create WWxN Pool.

1



12. (FC-variant only) Enter the name of the WWxN pool in the Name field, (optional) description and select 3 Ports per Node from the drop-down for Max Ports per Node.

Unified C	Computi	ng System Manager	
eate WWxN Pool 1. √Define Name and	Define Nam	e and Description	0
2. Add www Blocks	Name: Description:	YSPEX-WWNs D Combined WWNN and WWPN pool for YSPEX project	
	Max Ports per Node: Assignment Order:	O Ports Per Node O Sequential	

Figure 79

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Figure 78 Specifying Details for Creating WWxN Pool

13. (FC-variant only) Click **H** Add to add a block of WWxN IDs.

Create WWxN Pool Unified C	comput	ing System	n Manage	• r
Create WWxN Pool 1. √Define Name and	Add WWN Blocks			
<u>Description</u> 2. ✓ <u>Add wwn Blocks</u>	Name	From	To	
		<pre></pre>	v Next > Finis	h Cancel

Adding WWxN Block

- 14. (FC-variant only) Provide beginning of the WWN IDs and make sure to have a larger block size. Click OK and then click Finish.

Figure 80 Size of the WWxN	l Block
Create WWN Block	×
Create WWN Block	0
From: 20:00:00:25:B5:60:0D:00 To ensure uniqueness of WWNs in the SAN fabric, you are strongly encouraged to use the following WWN prefix: 20:00:00:25:b5:xx:xx:xx	Size: 100 🜩
	OK Cancel

15. (iSCSI-variant only) From the **SAN** tab, expand **SAN** > **Pools** > **root**, right-click on IQN Pools, and choose Create IQN Suffix Pool.



16. (iSCSI-variant only) Enter the IQN Pool name in the Name field, (optional) description and Enter the Prefix for the IQN pool. We have chosen vspex for prefix in this example.

	Figure 82 S	pecitying Details for Creating IQN Suffix Poo
🛕 Create IQN Suffix Pool		
Unified	Comput	ing System Manageı
Create IQN Suffix Pool 1. √Define Name and	Define Nar	ne and Description 🤫
Description 2. Add ION Blocks	Name: Description: Prefix:	VSPEX-IQNs IQN pool for VSPEX vspex
	Assignment Order:	Oefault Sequential <pre></pre>

17. (iSCSI-variant only) Click **Next** and click **T** Add to add an IQN identifier block.

Create IQN Suffix Pool	Comput	ting Syst	tem Mar	nagei
Create IQN Suffix Pool	Add IQN	Add IQN Blocks		
<u>Description</u> 2. √ <u>Add IQN Blocks</u>	Name	From	To	•
		< Prev	Next > Finish	Cancel

Adding IQN Block

Figure 83

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18. (iSCSI-variant only) Enter the IQN name in the Suffix field, enter a value in the From field and specify the size of the block in the Size field. The IQN identifiers are created in the following format "<prefix>:<suffix>:<from>", "<prefix>:<suffix>:<from+1>", "<prefix>:<suffix>:<from+size-1>".

	Figure 84	Size of the IQN B	lock
🛕 Create a Block of I	QN Suffixes		×
Create a Blo	ock of IQN S	uffixes	0
			-
Suffix: iqn 0 From: 0			
Size: 60			
		ОК	ancel

- Provide initial IP address, size of the pool, default gateway and subnet mask as shown below. Click OK to deploy the configuration. IP addresses are assigned to various rack server CIMC management access from this block.
- 20. Next, you need to create management IP address block for KVM access of the servers. The default pool for server CIMC management IP addresses are created with the name "ext-mgmt". From the LAN tab, expand LAN > Pools > root > IP Pools > IP Pool ext-mgmt. Click Create Block of IP addresses in the Actions area on the right pane of the window.



Figure 85 Creating IP Address Block for CIMC Management

21. Specify the initial IP address in the From field, size of the pool in the Size field, Default Gateway value and Subnet Mask in the respective fields. Click **OK** to deploy the configuration. IP addresses are assigned to various rack server CIMC management access from this block.

🛕 Create Bloc	k of IP Addresses	Response to the	a latest man-	×
Create a Block of IP Addresses				0
From:	10.65.121.231 D	Size:	0	8
Subnet Mask:	255.255.255.0	Default Gateway:	10.65.121.1	
Primary DNS:	0.0.0.0	Secondary DNS:	0.0.0.0	_
			0	K Cancel

Figure 86 Specifying Details for Creating IP Address Block for CIMC Management

22. (iSCSI-variant only) To create iSCSI initiator IP address pool, from LAN tab, expand LAN > Pools > root. Right-click on IP Pools and choose Create IP Pool.

Cisco Unified Computing System Manager - VSPEX-FI	
Cisco Unified Computing System Manager - VSPEX-FL Fault Summary 0 0 0 0 0 Equipment Servers LAN SAN VM Admin Filter: All LAN LAN Cloud Appliances LAN Case Delicies Pools Pools Pool MAC Pc Create IP Pool MAC Pc Traffic Monitoring Sessions	 New Options New Options Pools IP Pools Filter Export Print IP Pool ext-mgmt IP Pool iscsi-initiator-pool

ſ

Figure 87 Creating IP Address Pool for iSCSI Initiator Pool

23. (iSCSI-variant only) Enter the IP pool name in the Name field and (optional) description for the IP pool, click **Next**. Pool name signifies that the pool is created for fabric A.

ΓI,	yure oo	Specifying Details for Cr	eating if Address For
🛕 Create IP Pool			×
Unified C	omput	ing System	Managei
Create IP Pool 1. √ <u>Define Name and</u> <u>Description</u> 2. <u>Add IP Blocks</u>	Define Na	me and Description	0
	Name	VSPEX-ISCSI-IPs-A	
	Description	IP address pool for iSCSI initiator	's on fabric A
	Assignment Order:	 Default Sequential Sequential	
		< Prev Next >	Finish Cancel

Figure 88 Specifying Details for Creating IP Address Pool for iSCSI Initiator Pool

1

24. (iSCSI-variant only) Click \blacksquare Add to add iSCSI initiator IP address block.

Fig	gure 89	Adding IP	Address Blo	ck for iSC	SI Initiator I	Pool
🛕 Create IP Pool						x]
Unified (Compi	uting	Syste	m M	anag	eı
Create IP Pool 1. √ <u>Define Name and</u> <u>Description</u> 2. √ <u>Add IP Blocks</u>	Add IP	Blocks	😸 Print Default Gateway	Primary DN5	Secondary DNS	
			Add Dele	te		
		(< Prev Ne:	xt > F	inish Cance	e

25. (iSCSI-variant only) Provide initial IP address of the block, size of the block, subnet mask and default gateway as shown below.

🛕 Create Bloc	k of IP Addresses			×	J
Create a	Ø				
From:	192.168.100.50	Size:	0	30 🐳	Í
Subnet Mask:	255.255.255.0	Default Gateway:	192.168.100.1		
Primary DNS:	0.0.0.0	Secondary DNS:	0.0.0.0		
				OK Cancel	

Figure 90 Specifying Details for Creating IP Address Block for iSCSI Initiator Pool

- 26. (iSCSI-variant only) Click OK and Finish.
- **27.** (iSCSI-variant only) iSCSI storage access best practices suggests different VLANs and subnets on two fabrics. Given that, you need to create one more iSCSI initiator IP address pool for fabric B on a different subnet. Repeat steps 18 to 22 to create VSPEX-iSCSI-IPs-B pool.

With this all the identifier pools and block configurations are completed.

Configure Server Pool and Qualifying Policy

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Creation and policy based auto-population of server pools can be broadly divided in to following 3 tasks:

- 1. Creation of server pool
- 2. Creation of server pool policy qualification
- 3. Creation of server pool policy

To complete these tasks, follow these steps:

 From the Servers tab, expand Servers > Pools > root, right-click on Server Pools and choose Create Server Pool.

Fig	jure 91	Creating Server Po
A Cisco Unified Computing S	System Mana	ager - VSPEX-FI
Fault Summary	A 0 N VM Admi ates Server Po Create Ser	A 4 in Server Pools • • • • • • • • • • • • • • • • • • •

2. Enter the name of the server pool in the Name field, and click Next.

Figure 92 Specifying Details for Creating Server Pool

Unified	Computing System Manager	
eate Server Pool	Set Name and Description	
2. Add Servers	Name: USPEX-Servers	
	Description:	

3. Click **Finish** to create the empty server pool. Compute resources need to be added to this pool dynamically, based on policy.

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Unified C	omputing System Man	age	r
Create Server Pool 1. $\sqrt{\text{Set Name and Description}}$ 2. $\sqrt{add Servers}$	Add Servers		0
nuu serrers	Servers		Pooled Servers
	Ch Sło Ra Us PID Ad Ad Serial Cor R 1 UCS UCS FCH		C Sl R Us PID Ad Ad Se Co 🛱
	Details for rack-unit-1	>>	Details
	Model: UCSC-C220-M35	<<	Model:
	Serial Number: FCH1641V0KU		Serial Number:
	Vendor: Cisco Systems Inc		Vendor:
	Vendor: Cisco Systems Inc		Vendor: Vendor: Vendor: Vendor:

4. From the **Servers** tab, expand **Servers** > **Policies** > **root**, right-click on Server Pool Policy Qualifications and choose Create Server Pool Policy Qualification.

Figure 93 Adding Servers to the Server Pool

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	Figure 94		Creating Server Pool Policy Qualification
	🛕 Cisco Unified Computing System Manager - VSP	EX-	FI
	Fault Summary		
	0 8 1 4		>> 🥪 Servers + 🚿 Policies + 👬 root + 🖉
		11	Server Pool Policy Qualifications
	Equipment Servers AN SAN VM Admin	Л	🛨 🖃 🛷 Filter 🚓 Export 🖉 Print
	Filter: All	Ш	
		ш	Name
l		Ш	
l	E- Servers		
l	🕀 🍜 Service Profiles		
ı	🕀 🄟 Service Profile Templates		
1	E S Policies		
	e i i i i i i i i i i i i i i i i i i i		
	Mapter Policies		
	BIOS Defaults		
	Boot Policies		
	B. S Host Firmware Parkages		
	S IPMI Access Profiles		
	🕀 🗑 Local Disk Config Policies		
	🗄 🗐 🖉 Maintenance Policies		
	🗐 Management Firmware Packages		
	Power Control Policies		
	🕀 🖉 Scrub Policies		
	🔊 Serial over LAN Policies		
	Server Pool Policies	Ш	
	C Threshold Delicity	C	nue De al Delieu Quelificatione
	iscsI Authentication Profiles	Sél	iver Pool Policy Qualifications
		Cr	eate Server Pool Policy Qualification
	Sub-Organizations		
	🕀 🎯 Pools		
	🛨 🗃 Schedules		

5. Enter the name of the server policy qualification criterion in the name field. We have chosen minimum memory qualification criterion in this example.

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Figure 95 Creating Memory Qualifications

A Create Server Pool Policy Qualification 0 Create Server Pool Policy Qualification Naming Name: Min-Memory Description: Minimum memory criteria to add servers to VSPEX pool This server pool policy qualification will apply to new or re-discovered servers. Existing servers are not qualified until they are re-discovered Qualifications Create Adapter Qualifications 🔹 😑 💐 Filter 👄 Export 🗞 Print Create Chassis/Server Oualifications ₽ Name Max Model From То Architecture Speed Stepping Power Group Create Memory Qualifications ato CDU/Coros Qualificatio Create Storage Qualifications + Create Server PID Qualifications 1 Create Power Group Qualifications 暍 Create Rack Qualifications OK Cancel

6. Set minimum 64 GB RAM as the pool qualification criterion. Click **OK** twice to create the qualification.

Figure 96 Specifying Minimum Memory Capacity

Create Memory Qualifications	×
Create Memory Qualifications	0
Clock (MHz): Unspecified select Latency (ns): Unspecified select Min Cap (MB): Unspecified select G5536	
Width: Ourspecified select Units: Unspecified select	
	OK Cancel

Note

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This is an example criterion, you need to choose a criterion that suites your requirement.

7. From the Servers tab, expand Servers > Policies > root, right-click on Server Pool Policies and choose Create Server Pool Policy.



8. Enter the name of the server pool policy in the name field and (optional) description. Choose the recently created Target Pool and Qualification from the respective drop-down lists. Click **OK** to deploy the configuration.

Create Sen	ver Pool Policy	×
Create	Server Pool Policy	0
Name:	VSPEX-Servers	
Description:	Policy for VSPEX server pool classification	
Target Pool:	Server Pool VSPEX-Ser	
Qualification:	Min-Memory -	
	0	

Figure 98

9. After creating the qualification criterion, in the **Servers** tab under Server Pools, select the created Target Pool. In the right pane of the window, you will see that all the compute resources that meet the qualification criteria are dynamically added to the server pool. Figure 99 is from the FC-variant of the architecture, where combination of UCS B200 M3 blade servers and C220 M3 rack servers are used to share the work load. This architecture showcases the form-factor independent architecture with managed servers using UCS Manager.



Figure 99 Server Pool Showing Added Cisco UCS Blade and Rack-Mount Server

Specifying Details for Creating Server Pool Policy

Configure Service Profile Template

Service profile template needs to be created from which we can instantiate individual service profiles. Follow these steps to create the service profile template:

1. Click the **Servers** tab, under Servers, select and right-click on Service Profile Templates. Choose Create Service Profile Template.





2. Enter the service profile template name in the Name field, let the Type be **Initial Template**, and choose UUID pool for UUID Assignment field from the drop-down list. Click **Next**.

Figure 101 Specifying Details for Creating a Service profile Template

📥 Create Service Profile Template

Unified Computing System Manager Identify Service Profile Template 0 Create Service Profile Template You must enter a name for the service profile template and specify the template type. You can also specify how a 1. √<u>Identify Service</u> UUID will be assigned to this template and enter a description. Profile Template 2. 🗋 Networking Name: VSPEX-Service-Profile 3. 🗋 <u>Storage</u> 4. Dzoniną The template will be created in the following organization. Its name must be unique within this organization. 5. CVNIC/VHBA Placement Where: org-root 6. Distance Server Boot Order The template will be created in the following organization. Its name must be unique within this organization. 7. Maintenance Policy 8. Server Assignment Type: 💽 Initial Template 🔿 Updating Template 9. Deperational Policies Specify how the UUID will be assigned to the server associated with the service generated by this template. UUID UUID Assignment: VSPEX-UUIDs(20/20) The UUID will be assigned from the selected pool. The available/total UUIDs are displayed after the pool name. Optionally enter a description for the profile. The description can contain information about when and where the service profile should be used Next > Finish Cancel

3. Click the **Expert** radio button for LAN connectivity. Click **H** Add to create a vNIC.

Figure	102	I AN Configuratio	n Details
riyure	102	LAN CONIGUIANC	ni Detans

A Create Service Profile Template **Unified Computing System Manager** Networking Create Service Profile Template Optionally specify LAN configuration information. 1. √Identify Service Profile Template 2. Vetworking 3. Storage Dynamic vNIC Connection Policy: Select a Policy to use (no Dynamic vNIC Policy by defa... 💌 🗄 Create Dynamic vNIC Connection Policy 4. Zoning 5. DVNIC/VHBA Placement 6. Server Boot Order 7. Maintenance Policy How would you like to configure LAN connectivity? Simple Expert No vNICs O Use Connectivity Policy 8. Server Assignment Click Add to specify one or more vNICs that the server should use to connect to the LAN. 9. Operational Policies Name MAC Address Fabric ID Native VLAN 🕂 Add 100 Click Add to specify one or more iSCSI vNICs that the server should use. Name Overlay vNIC Name **iSCSI** Adapter Policy MAC Address

4. Create a system vNIC for fabric A. Enter the vNIC name as System A in the Name field, choose the MAC pool created from the MAC Assignment drop-down list. Click the Fabric A radio button for fabric ID. Check the check boxes vMotion and vSphereMgmt VLANs. Click the vSphereMgmt radio button to set it as the native VLAN. Enter 9000 in the MTU field, choose VMware as the adapter policy and jumboMTU as the QoS policy.

🗄 Add 👚 Delete 📓 Modify

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Next >

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< Prev

: system-A	MAC	Address
	MAC	Address Assignment: VSPEX-MACs(30/30)
visic femplate:		
	.	Create MAC Pool
	The	MAC address will be automatically assigned from the selected pool
Ireate vNIC Template	me	nac audioss will be automatically assigned from the selected pool.
c ID: 💽 Fabric A 🔿 Fabric B 🗍	Enable Failover	r
LANS		
Select Name		Native VLAN
Storage		<u> </u>
VM-Data		0
VMotion		
vMotion vSphereMgmt		• •
vMotion vSphereMgmt Create VLAN		•
vMotion vSphereMgmt Create VLAN		•
VMotion VSphereMgmt Create VLAN		•
V Motion V SphereMgmt Create VLAN MTU: 9000 Varning		
	e value in the QC	S System Class
VMotion VSphereMgmt Create VLAN MTU: 9000 Varning ake sure that the MTU has the same rresponding to the Egress priority of	e value in the Q_{0}	S System Class oS Policy.
VMotion VSphereMgmt Create VLAN MTU: 9000 Varning ake sure that the MTU has the same vresponding to the Egress priority of Group: <not set=""></not>	e value in the Qo If the selected Qo Create LAN Pi	S System Class p5 Policy. in Group
	e value in the Qo f the selected Q Create LAN Pi	S System Class oS Policy. in Group
VMotion VSphereMgmt Create VLAN MTU: 9000 Warning lake sure that the MTU has the same orresponding to the Egress priority o Group: <not set=""> perational Parameters</not>	e value in the Qo if the selected Q Create LAN Pi	S System Class oS Policy. in Group
	e value in the Qo f the selected Qo Create LAN Pi	S System Class oS Policy. in Group
	e value in the Qo f the selected Q Create LAN Pi	S System Class oS Policy. in Group
	e value in the Qo f the selected Q Create LAN Pi	S System Class oS Policy. in Group
	e value in the Qo f the selected Q Create LAN Pi are set>	S System Class oS Policy. in Group Create Ethernet Adapter Policy
	e value in the Qo f the selected Q Create LAN Pi are set> oMTU	S System Class oS Policy. in Group Create Ethernet Adapter Policy Create Dynamic vNIC Connection Policy Create QoS Policy

Figure 103 Specifying vNIC Details

5. Similarly, create one more vNIC with the same properties on fabric B.

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6. (iSCSI-variant only) Add one more vNIC for iSCSI storage access. Enter the name as "iSCSI-Overlay-A" in the name field. Choose created MAC address pool from MAC Address Assignment drop-down list, click the Fabric A radio button for Fabric ID. Check the check box Storage for VLAN and click the radio button to set this as the native VLAN. Enter 9000 in the MTU field, choose VMware from the Adapter Policy drop-down list and jumboMTU from QoS Policy drop-down list.

7. Similarly, create vNICs for fabric B. Table 8 summarizes all the vNICs created on the service profile.

1

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vNIC Name	MAC Address Assignment	VLANS	Native VLANS	Fabric	MTU	Adapter Policy	QoS Policy
System-A	MAC Pool	vSphereMgnt, vMotion	vSphereMgnt	А	9000	VMware	jumboMTU
System-B	MAC Pool	vSphereMgnt, vMotion	vSphereMgnt	В	9000	VMware	jumboMTU
iSCSI-	MAC Pool	Storage	Storage	А	9000	VMware	jumboMTU
Overlay-A							
iSCSI-	MAC Pool	Storage	Storage	В	9000	VMware	jumboMTU
Overlay-B							
Data-A	MAC Pool	VM-Data	VM-Data	А	9000	VMware	-
Data-B	MAC Pool	VM-Data	VM-Data	В	9000	VMware	-

 Table 8
 vNICs Created on the Service profile



The iSCSI Overlay vNICs are created only for iSCSI variant of the solution.

8. For iSCSI variant of the solution, click **Add** to add iSCSI vNIC.





9. (iSCSI-variant only) Enter iSCSI-A in the Name field, choose iSCSI-Overlay-A from the Overlay vNIC drop-down list, choose Storage as the native VLAN from the VLAN drop-down list, and keep the default option that is, None used by default for the MAC Address Assignment field (MAC address would be taken from the overlay vNIC).

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	Figure 105	Creating iSCSI vNI	с
📥 Create iSCSI vNIC			×
Create iSCSI	vNIC		0
Name: i Overlay vNIC: i iSCSI Adapter Policy: VLAN: iSCSI MAC Address MAC Address Assignm	SCSI-A 5CSI-Overlay-A cnot set> itorage (native) nt: Select(None used b	Create iSCSI Adapter Policy	
			OK Cancel

10. Similarly, create another iSCSI vNIC for fabric B. Click Next to configure Storage. (iSCSI-variant only)

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11. For FC-variant of the solution, click the Expert radio button for SAN connectivity and choose VSPEX-WWNs from WWNN pool drop-down list. Click \blacksquare Add to add vHBA.

Figure 106

SAN Configuration Details for FC-variant of the Solution

Create Service Profile Template

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Unified C	omputing System Manager
Create Service Profile Template	Storage Optionally specify disk policies and SAN configuration information.
Template 2. √ <u>Networking</u> 3. X <u>Storage</u> 4. 2 _{20ning} 5. √ _{NIC/VHBA Placement 6. Server Boot Order 7. Maintenance Policy 8. Server Assignment}	Select a local disk configuration policy. Local Storage: Select Local Storage Policy to use If nothing is selected, the default Local Storage configuration policy will be assigned to this service profile. Treate Local Disk Configuration Policy
9. Deprational Policies	How would you like to configure SAN connectivity? Simple Expert No vHBAs Use Connectivity Policy A server is identified on a SAN by its World Wide Node Name (WWNN). Specify how the system should assign a WWNN to the server associated with this profile. World Wide Node Name WWNN Assignment: VSPEX-WWNs(100/100)
	The WWNIN will be assigned from the selected pool. The vHBAs's WWPN will also be derived from this pool as long as you select derived for their address. The available/total WWNNs are displayed after the pool name.
	Name WWPN
	Tele 💽 Add 🕒 Modify

 (FC-variant) To create a vHBA, enter vHBA-A in the Name field, choose WWPN Assignment as Derived from the drop-down list. Click the A radio button for Fabric ID, choose Storage from the Select VSAN drop-down list, and choose VMware from the Adapter Policy drop-down list. Click OK to deploy the vHBA.

Figure 107 Create vHBA	Specifying vHBA Details	×
Create vHBA		C
Name: vHBA-A	World Wide Port Name	
Use vHBA Template:	WWPN Assignment: Derived	
Create vHBA Template	Create WWPN Pool If you select a WWXN Pool for the World Wide Node Name, the WWPN will be derived from that pool. If you did not select a WWXN Pool for the World Wide Node Name, the WWPN assigned by the manufacturer will be used. Note: When a manifacturer assigned WWPN is used, the WWPN will not be migrated if the service profile is moved to a new server.	
Fabric ID: A B		
Select VSAN: Storage	Create VSAN	
Pin Group: 	Create SAN Pin Group	
Persistent Binding:		
Max Data Field Size: 2048		
Operational Parameters	8	
Adapter Performance Profile		
Adapter Policy: VMWare	Fibre Channel Adapter Policy	
Qos Policy: <not set=""> Create</not>	a Cop Holich	
	ОК	Cancel

13. (FC-variant only) Repeat step 14 for vHBA-B on fabric B, with the rest of the configuration being same.

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14. For iSCSI-variant of the solution, in the Storage configuration window, click the **No VHBAs** radio button for SAN connectivity and click **Next**.

Figure 108 SAN Configuration Details for iSCSI-variant of the Solution

A Create Service Profile Template

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Unified Computing System Manager Storage Create Service Profile Template Optionally specify disk policies and SAN configuration information. 1. √Identify Service Profile Template Select a local disk configuration policy. 2. VNetworking 3. √<u>Storage</u> 4. Zoning Local Storage: Select Local Storage Policy to use If nothing is selected, the default Local Storage configuration 5. VNIC/VHBA Placement policy will be assigned to this service profile. 6. Server Boot Order 🚹 Create Local Disk Configuration Policy 7. Amintenance Policy 8. Server Assignment 9. Deprational Policies How would you like to configure SAN connectivity? No vHBAs Use Connectivity Policy Simple Exper This server associated with this service profile will not be connected to a storage area network. < Prev Next > Finish

15. For FC-variant of the solution, in the Zoning window of the wizard, click **H** Add.

	Figure 109	Creating Init	iator Group			
Create Service Profile Templa	ite	Constanting State	- A			<u> </u>
Unified	Comp	uting Sys	stem Mar	nager		
Create Service Profile Template 1. √ Identify Service Profile Template 2. √ Networking 3. √ Storage 4. √ Zoning 5. □ vNIC/vHBA Placement 6. □ Server Boot Order 7. □ Maintenance Policy 8. □ Server Assignment 9. □ Operational Policies	Zoning Specify z Zoning configurat 1. Select vHB 3. Add select Select vHBA Name vHBA-A vHBA-B	oning information ion involves the following ste A Initiator(s) (vHBAs are created A Initiator Group(s) ad Initiator(s) to selected Initiation Initiators >> Add	ated on storage page) ator Group(s) Select vHBA I Name	nitiator Groups Storage Conn	ection Policy Name	
	•					
				< Pr	ev Next >	Finish Cancel

16. (FC-variant only) Enter the name of the VNBA as SAN-A in the Name field in the vHBA initiator group area, and choose previously configured Fabric-A from the Storage Connection Policy (zoning policy) drop-down list and click **OK**.

1

Name: SAN-A				
ription:				
rage Connection Policy: Fa	bric-A	T 🛨 🖸	reate Storage Connection Poli	cy
lobal Storage Connectio	n Policy			
label staves connection of	line defined und	an and is assigned to this UURA		
sional scorage connection po	ally defined unde	TE HELLIS ASSILLELLITTUS VODA	IDIFIEDON ANOLID	
Desparties			initiator group.	
Properties			iniciacor group.	
Properties Storage Connection Policy	: Fabric-A		initiator group.	
Properties Storage Connection Policy Description	: Fabric-A : zones for fabri	ic A	nitiator group.	
Properties Storage Connection Policy Description Zoning Type	: Fabric-A : zones for fabri : Single Initiato	ic A r Multiple Targets	niciacor group.	
Properties Storage Connection Policy Description Zoning Type FC Target Endpoints	: Fabric-A : zones for fabri : Single Initiato	ic A r Multiple Targets	nitiator group.	
Properties Storage Connection Policy Description Zoning Type FC Target Endpoints Filter Store Export	: Fabric-A : zones for fabri : Single Initiator rint	ic A r Multiple Targets	nitiator group.	
Properties Storage Connection Policy Description Zoning Type FE Target Endpoints Filter Properties Filter Properties Properties	: Fabric-A : zones for fabri : Single Initiato rint	ic A r Multiple Targets	Initiator group.	
Properties Storage Connection Policy Description Zoning Type FC Target Endpoints ≪ Filter ⇔ Export ⊗ P WWPN FD06-01-64-25-00-65-00	: Fabric-A : zones for fabri : Single Initiato rint Path	ic A r Multiple Targets VSAN	Initiator group.	
Properties Storage Connection Policy Description Zoning Type FE Target Endpoints ≪ Filter ➡ Export P WWPN 50:06:01:64:3E:A0:65:0A	r: Fabric-A e: zones for fabri e: Single Initiato rint Path A	ic A r Multiple Targets VSAN Storage	Initiator group.	
Properties Storage Connection Policy Description Zoning Type FE Target Endpoints ≪ Filter ⇒ Export ⊗ P WWPN 50:06:01:64:3E:A0:65:0A 50:06:01:65:3E:A0:65:0A	r: Fabric-A e: zones for fabri e: Single Initiato rint Path A A	ic A r Multiple Targets VSAN Storage Storage	Initiator group.	
Properties Storage Connection Policy Description Zoning Type FE Target Endpoints ≪ Filter ⇔ Export ⊗ P WWPN 50:06:01:64:3E:A0:65:0A 50:06:01:65:3E:A0:65:0A	r: Fabric-A n: zones for fabri n: Single Initiato rint Path A A	ic A r Multiple Targets VSAN Storage Storage	Iniciacor group.	

17. (FC-variant) Repeat steps 15 and 16 for zoning on fabric B.

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18. Choose vHBA-A from the list of vHBA initiators and choose SAN-A from the vHBA Initiator Groups in the right pane of the window, and click >> Add To >> in the mid pane to add the initiator to the initiator group.







19. Repeat step 20 for fabric B. The end result looks as show in Figure 112. Click Next.
Figure 112 SAN Zoning Details

Create Service Profile Template

I

Unified Computing System Manager Zoning Create Service Profile Template Specify zoning information 1. √Identify Service Profile Template 2. VNetworking Zoning configuration involves the following **steps**: 1. **Select** vHBA Initiator(s) (vHBAs are created on storage page) 3. √<u>Storage</u> 4. √<u>Zoninq</u> Select vHBA Initator Group(s) 3. Add selected Initiator(s) to selected Initiator Group(s) 5. NIC/VHBA Placement 6. Server Boot Order Select vHBA Initiators Select vHBA Initiator Groups 7. A Maintenance Policy Name ₽ 8. Server Assignment 9. Operational Policies vHBA-A Name Storage Connection Policy Name vHBA-B 🗉 💕 SAN-B Fabric-B Storage Initiator vHBA-B 😑 🙀 SAN-A Fabric-A >> Add To >> 🐰 Storage Initiator vHBA-A 音 Delete 🚹 Add 📗 Modify 4 < Prev Next > Finish

- 20. For the iSCSI-variant of the solution, select default configuration on Zoning. Click Next.
- For FC-variant of the solution, choose Create a Specific Boot Policy from the Boot policy drop-down list. Choose Add CD-ROM in the Local Devices area as the first boot order choice. Click vHBA-A as the next choice in the vHBAs area, and name it as vHBA-A, keep the Type as Primary.



22. (FC-variant only) Similarly, select vHBA-B as the next (secondary) choice to boot from SAN. Once both vHBAs are added, make sure that Reboot on Boot Order Change and Enforce vNIC/vHBA/iSCSI name check boxes are checked. Click Add SAN Boot Target in the vHBAs area, and choose Add San Boot Target to SAN primary.

Figure 114 Secondary SAN Boot Target



23. (FC-variant only) Enter the target WWPN of the VNX storage device (which can be obtained using "show flogi database" NXOS CLI command executed under connect nxos {alb} shell). Keep the Target as Primary.

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		Figure 115	Specifying Boot Target WWPN
	Add SAN Boot Ta	rget	
1	Add SAN B	oot Target	0
C	Boot Target LUN: Boot Target WWPN: Type:	0 50:06:01:64:3E:A0:65: Primary Seconda	OA Bry
			OK Cancel

- 24. (FC-variant only) Repeat step 23 for the fabric B.
- **25.** For the iSCSI-variant of the solution, choose Create a specific Boot Policy from the Boot Policy drop-down list. Check the check box Reboot on Boot Order Change. Click **Add CD-ROM** as the first boot choice. After that, iSCSI vNICs on fabric A and B as the next boot choices. Click **Set Boot Parameters** under the iSCSI vNICs area.

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26. (iSCSI-variant only) For iSCSI vNIC on fabric A, choose the IQN pool name from Initiator Name Assignment drop-down list, choose iSCSI initiator IP Address Policy from the drop-down list. Click the **iSCSI Static Target Interface** radio button and click **+** to add the iSCSI target.

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	Figure	117 S	Setting iSCSI Boo	t Parameters for is	SCSI-A
Set iSCSI Boot Par	rameters				
Set iSCSI Bo	oot Parame	eters			(
Name: iSCSI-A					
Authentication Pro	file: <pot set=""></pot>	- 🖪 ca	eate ISCSI Authentication P	ofile	
- Initiator Name -			de best handhaddinni	-	
Initiator Name As:	signment: VSPEX-IQ	Ns(60/60) -			
		_			
Initiator Name:	Suffix Pool				
The IQN will be a	assigned from the sel	ected pool.			
The available/tot	tal IQNs are displaye	d after the pool r	name.		
Initiator Addres	5				
Initiator IP Addr	ess Policy: VSPEX-iS	CSI-IPs-A(30/30			
Thus Adda					
Subnet Ma	ss: 0.0.0.0 sk: 255.255.255.0				
Default Gatewa	ay: 0.0.0. 0				
Primary DN	15: 0.0.0.0				
Create IP F	Pool				
The IP address	will be automatically	assigned from th	ne selected pool.		
Minimum one in	stance of iSCSI St	atic Target Iol	terface and maximum t	Target Interface	
Name	Priority	Port	Authentication Profile	iSCSI IPV4 Address	LUN Id 🛱
					1
					_
1					
					OK Cancel

27. (iSCSI-variant only) In the Create iSCSI Static Target window, enter the iSCSI target name. Provide the target IPv4 address on the same subnet as initiator IP address and click **OK**. Let the LUN ID be 0 for now, we need to update the LUN ID for different datastores later per Service Profile basis.

1

1

Create iSCSI Static	Target	×
reate iSCSI	Static Target	0
iSCSI Target Name:	ckm001212004850000-9-vnxe	
Priority:	1	
Port:	3260	
Authentication Profile:	<not set=""></not>	
IPv4 Address:	192.168.100.101	
LUN ID:	0	
	ОК	Cancel

Figure 118

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28. (iSCSI-variant only) Click OK and in the Server Boot Order window, click Set Boot Order Parameter again for the iSCSI vNIC on fabric B. IQN name for fabric B is taken from the same IQN pool, but the IPv4 initiator address comes from fabric B specific iSCSI initiator IP address pool. Click 📑 to statically add the iSCSI target.

Specifying iSCSI Static Target for iSCSI-A

	Figure	e 119	Setting iSCSI Bo	ot Parameters fo	or iSCSI-l	В
et iSCSI Boot Par	ameters					
et iSCSI Bo	oot Param	eters				C
lame: iSCSI-B						
Authentication Prol	file: <not set=""></not>	💌 🛨 Cre	ate iSCSI Authentication P	rofile		
Initiator Name						
Initiator Name As:	signment: VSPEX-IG	QNs(60/60) 🔻				
Initiator Name:						
🛨 Create IQN	Suffix Pool					
The IQN will be a The available/tot	assigned from the se al IQNs are displaye	ected pool. ed after the pool n	ame.			
Initiator Addres	is					
Initiator IP Addr	ess Policy: VSPEX-i	5C5I-IPs-B(30/30)	-			
IPv4 Addre: Subnet Ma:	ss: 0.0.0.0 sk: 255.255.255.0	1				
Default Gatewa	ay: 0.0.0.					
Primary DN	15: 0.0.0.0					
Secondary DN	15: 0.0.0.0					
🛨 Create IP F	Pool					
The IP address	will be automatically	y assigned from the	e selected pool.			
	۰	iSCSI Static Targe	t Interface 🔘 iSCSI Auto	Target Interface		
Minimum one in	stance of iSCSI S	tatic Target Int	erface and maximum t	wo are allowed.		
Name	Priority	Port	Authentication Profile	iSCSI IPV4 Address	LUN Id	E.
						4
						OK Cancel

29. (iSCSI-variant only) Specify target IQN name and target IPv4 address. Make sure that the target IP address is from the same subnet as the initiator IP address, that is, pool's subnet.

1

Create iSCSI Static Target iSCSI Target Name:emc:ckm001212004850000-9-vnxe Priority: 1 Port: 3260 Authentication Profile: <not set=""></not>	
iSCSI Target Name:emc:ckm001212004850000-9-vnxe Priority: 1 Port: 3260 Authentication Profile: <not set=""> ▼ IPv4 Address: 192.168.200.101 LUN ID: 0</not>	Ø

- **30.** Click **OK** and then click **Next** to go to the Maintenance Policy window. Keep everything at default and click **Next** to go to the Server Assignment window.
- 31. Choose the previously created server pool from the Pool Assignment drop-down list. Click Next.

Figure 121 Assigning a Server Pool

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Create Service Profile Template	Computing System Manager
Create Service Profile Template	Server Assignment Optionally specify a server pool for this service profile template.
Template 2. √Networking 3. √Storage 4. √Zoning 5. √VNIC/VHBA Placement 6. √Server Boot Order 7. √Maintenance Policy 8. √Server Assignment 9. □Operational Policies	You can select a server pool you want to associate with this service profile template. Pool Assignment: VSPEX-Servers Create Server Pool Select the power state to be applied when this profile is associated with the server. Up Down
	The service profile template will be associated with one of the servers in the selected pool. If desired, you can specify an additional server pool policy qualification that the selected server must meet. To do so, select the qualification from the list. Server Pool Qualification: <not set="">Restrict Migration:</not>

Figure 120 Specifying iSCSI Static Target for iSCSI-B

32. In the Operation Policies window, keep everything at default, and click **Finish** to deploy the Service Profile Template.

1

	Figure 122	Operational Policies Window			
Create Service Profile Templ	ate	per t a di		U	x
Unified	Comp	uting System Manage	r		
Create Service Profile Template	Operatio	Dnal Policies Ily specify information that affects how the system operates.			0
2. V <u>Networking</u>	BIOS Config	uration		8	
3. √ <u>Storage</u> 4. √Zoning	External IPM	MI Management Configuration		۲	
5. √ <u>vNIC/vHBA Placement</u> 6. √Server Boot Order	Managemer	nt IP Address		8	
7. √ <u>Maintenance Policy</u>	Monitoring	Configuration (Thresholds)		8	
 v Server Assignment v Operational Policies 	Power Contr	rol Policy Configuration		8	
	Scrub Policy	/		8	
		< Prev	Next >	Finish Car	ncel

Instantiate Service Profiles from the Service Profile Template

This section details on instantiating service profiles from the service profile template created in the previous section. Follow these steps to instantiate service profiles:

 From the Servers tab, expand Servers > Service profiles > root, and click Create Service Profile from Template on right pane os the window.

🛕 Cisco Unified Computing System Manager - VSPEX-FI	
Fault Summary Image: Servers Image: Service Profile Image: Service Profile <	 New Control of the second se

Figure 123 Creating Service Profiles from Template

2. Enter the naming prefix, number of service profiles to be instantiated and choose the created service profile template from the drop-down list.



A Create Service Profiles From Template	
Create Service Profiles From	Template 🛛
Naming Prefix: VSPEX-Server-	
Number: 4	
Service Profile Template: Service Template VSPEX-Service	ce-Profile
U	
	OK Cancel

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3. Four service profiles are created in this example.



Figure 125 Service Profiles Instantiated from a Service profile Template

4. As the service profile template is assigned to a server pool, the service profiles instantiated from the template will be assigned to the individual server resource from the server pool as long as they are available. You can select the service profile and see its association state, and the associated server details.





 Eventually, all four servers will get associated. See the summary by clicking on Servers under the Equipment tab.

Summary	Δ		G 🔘 🖬 New	 Options 	😧 🛈 🛆 P	ending Activities	<u>E</u> xit								
0 0	0	0	>> 📑 Equipme	nt 🔹 🗇 Rack-M	ounts 🔹 🐲 Serve	rs									
ment Services LAN EAL			Servers												
Servers CHAT SH		_	🛋 Filter 👄 Ex	port 😸 Print										\frown	
Filter: Al	•		Name	Overall Status	PID	Model	User Label	Co	Memory	Adapters	NICs	Operability	Power St	Assoc State	Profile
3			Server 1	1 Ok	UC5C-C220-M35	Cisco UCS C220 M3		16	262144	1	4	1 Operable	1 On	1 Associated	org-root/ls-VSPEX-Server-4
Equipment			Server 2	1 Ok	UC5C+C220-M35	Cisco UCS C220 M3		16	262144	1	4	1 Operable	1 On	1 Associated	org-root/ls-VSPEX-Server-3
- BI Chassis			Server 3	1 Ok	UC5C-C220-M35	Cisco UCS C220 M3		16	262144	1	4	1 Operable	1 On	1 Associated	org-root/ls-VSPEX-Server-2
Rack-Mounts			Server 4	1 Ok	UC5C-C220-M35	Cisco UCS C220 M3		16	262144	1	4	1 Operable	1 On	1 Associated	org-root/ls-VSPEX-Server-1
Server 2 Server 3 Server 4 Server 4															
- N	lote N s	Note tl torago	hat we ha e array. W we neede	ve not y Ve need d to cor	et carved specific	l out speci IQN and ne service	ific da iSCSI profil	tast ini e b	ore t tiato efore	o inst or IP a e we c	tall addi can	ESXi h ress to a carve o	ypervi allow a ut the	sor OS	image on the o the datastor or each ESXi

Figure 127 Summary of the Associated Servers

Configure Datastores for ESXi images – FC-variant

This section details on creating FC accessible datastores for the ESXi boot image per server basis. This includes three steps:

- 1. Configure Storage Pool
- 2. Register hosts

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on the storage pool.

3. Configure Storage Groups

A: Configure Storage Pool

Follow these steps to create storage pool and carve boot LUNs per server basis.

1. Login to the EMC VNX5300 Unisphere GUI, click Storage tab. Choose Storage Configuration > Storage Pools. Click the RAID Groups tab and click Create to create RAID groups.

Figure 128

EMC Unisphere - Mozilla Firefox	Trans.					
https://10.65.121.24/start.html					1 3 3 B	
EMC Unisphere				P	ool LUN 🗸	Search
< > 1 UNX5300-VSPEX	💌 🔠 Dashboard	System	Storage	Hosts 🧃	Jata Protection	🗳 Setti
VNX5300-VSPEX > Storage > S	torage Configuration > Sto	orage Pools				
Pools RAID Groups						
RAID Groups					2 5	7 🔩 🔥 🤉
T Filter for	AID Type All					
ID 🔺 Drive Type	RAID Type	User Capacity (GB)	Free Capacity (C	iB) % Full	Largest	Contiguous
0 Selected Create Delete	Properties Defragme	ent		Last	Refreshed: 2013-03	0 item: -26 12:40:20
Details	Usage ALL User LUNs	V			27	7 🔩 🖻 🤉
Name 🔺 ID	State	User Cap	acity (GB) Cu	rrent Owner	Host Informa	tion

Creating RAID Groups

2. By default, for RAID5 RAID Group, the system would select five SAS disks. Click the **Manual** radio button, and click **Select** to manually select/deselect disks.

1

	Storage Pool	-	100		
General Advanced					
Storage Pool Paran	neters				
Storage Pool Type:	🔘 <u>P</u> ool 💽 <u>R</u> AID Group				
Storage Pool ID:	1				~
Storage Pool Name:	RAID Group 1				
RAID Configuration	RAID5				~
Number of Disks:	5 (Recommended)				~
Disks					
🔘 Automatic 📃 Use P	ower Saving Eligible Disks				
<u> </u>	<u>S</u> elect		Total Raw	Capacity: 3	2684.0
Disk	Capacity Drive Type	Model	State Po	wer Saving	Eligible
Bus 1 Enclosure 2	D 536.808 SAS	STE600	Unb No		
Bus 1 Enclosure 2	D 536.808 SAS	STE600	Unb No		
Bus 1 Enclosure 2	D 536.808 SAS	STE600	Unb No		
Bus 1 Enclosure 2	D 536.808 SAS	STE600	Unb No		

Figure 129 Specifying RAID Group Details

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3. Deselect last two disks by clicking on from the five disks. Click **OK** twice.

Select From: All Cabinets Select Disk Available Disks Disk Capacity Drive Mode Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Bus 1 Enclosure 2 D 536.80 SAS STE6000 Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Bus 1 Enclosure 3 D 1834.	Figure 130 Remov	ving the Disks from t	the Selected Disks List		×
Disk Capacity Drive Mode Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 0 Enclosure 0 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 2 D 536.80 SAS STE6000 Ø Bus 1 Enclosure 2 D 536.80 SAS STE6000 Ø Bus 1 Enclosure 2 D 536.80 SAS STE6000 Ø Bus 1 Enclosure 2 D 536.80 SAS STE6000 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20 Ø Bus 1 Enclosure 3 D 1834.3 NL SAS ST20	Select From: All Cabinets		Selected Disks		
	Disk Capacity Drive Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 0 Enclosure 0 D 1834.3 NL SAS Image: Bus 1 Enclosure 3 D 1834.3 NL SAS Image: Bus 1 Enclosure 3 D 1834.3 NL SAS Image: Bus 1 Enclosure 3 D 1834.3 NL SAS Image: Bus 1 Enclosure 3 D 1834.3 NL SAS Image: Bus 1 Enclosure 3 D 1834.3 NL SAS	Mode ST20 * ST20 :: ST20 ST20 ST20 ST20 ST20 ST20 ST20 ST20 ST20 ST20 ST20	Disk Disk	Capacity Drive 536.80 SAS 536.80 SAS 536.80 SAS 536.80 SAS 536.80 SAS	Model STE6000 STE6000 STE6000 STE6000

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Figure 131	Creating LUN for the Created RAID Group	

4. Select the newly created RAID group, right-click and choose Create LUN.

EMC Unisphere				Pool LUN	Search
< > 🍙 🗊 VNX5300-VSPEX 💌	🔠 Dashboard	System	Storage 🛛 🐌 Hos	ts 🛛 🗊 Data Pro	tection 🛛 拳 Settir
<u>VNX5300-VSPEX</u> > <u>Storage</u> > <u>Storag</u>	e Configuration > Store	age Pools			
Pools RAID Groups					
RAID Groups					🏾 💈 🍸 🔧 🍺 🤉
Filter for RAID	Fype All 🔽				
ID 🔺 Drive Type	RAID Type	User Capacity (GB)	Free Capacity (GB)	% Full	Largest Contiguous
RAID Group 0 Create LUN	RAID5	1070.635	1070.635		1070.635
Delete					
Power Savings					
Properties					
1 Selected Create Delete Pr	operties Defragmen	t			1 items

5. Choose the value 5 from Number of LUNs to create drop-down list for create 5 LUNs for five ESXi hosts, with 50 GB capacity each.

VNX5300-VSPEX - Create LUN					
General Advanced					
Storage Pool Properties —					
Storage Pool Type:	Pool <u>R</u> AID Group				
RAID Type: R	AID5: Distributed Parity (High Throughput) 💽				
Storage Pool for new LUN: 0	<u>N</u> ew				
Capacity Available Capacity: 1070-635-GB Consumed Capacity: 0.000-GB					
Avanable Capacity: 1070.035 GB Consumed Capacity: 0.000 GB					
Largest Contiguous Free Space	e: 1070.655 GB				
LUN Properties					
User Capacity: 50	✓ GB				
LUN ID: 0	Number of LUNs to create: 5				
Name					
Starting ID					
Automatically assign LUN IDs as LUN Names					
	Apply Cancel Help				

Figure 132 Specifying Details for Creating LUN

Register Hosts

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As soon as the service profiles are associated in UCS Manager, the vHBAs will do flogi in the network and the SAN initiators will be identified by the VNX storage array. Follow these steps to register the hosts identified by the WWPN of the server.

1. In the Unisphere GUI, click the **Hosts** tab, and choose Initiators. Select the first unregistered initiator and click **Register**.

VNX5300-VSPEX Initiators Y Filter for Status Initiators Status S0 So S0 So S0 So S0 So S0 So S0 So S0	VNX5300-VSPEX V X > <u>Hosts</u> > Initiators	🔠 Dashboard	System		Storage		Hosts	Da	ta Prote	ection	🎎 Se	ettings	👩 Su
VNX5300-VSPEX Initiators T Filter for Status Ini So So So So So So So So So So So So	X > <u>Hosts</u> > Initiators)			- (,					
Initiators Filter for Status Init Status 50 Status	r Connecti												
Filter for Status Ini So 50	r Connecti										4	74.	٥
Status Ini ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50 ✓ 50		ion Status All	[~									
✓ 50 ✓ 50 ✓ 50 ✓ 50	nitiator Name		v	SP Port	Host N	Host I	Storag	Regist	Logge	Failov	Туре	Protocol	Attrib
✓ 50 ✓ 50 ✓ 50	D:06:01:60:C7:20:35:8C:	50:06:01:69:47:20:3	5:8C	B-2	Celer	10.65	~filest	Yes	Yes	4	Host	Fibre	
✓ 50 ✓ <u>50</u>	0:06:01:60:C7:20:35:8C:	50:06:01:68:47:20:3	5:8C	A-2	Celer	10.65	~filest	Yes	Yes	4	Host	Fibre	
<u>≁50</u> 20	D:06:01:60:C7:20:35:8C:	50:06:01:61:47:20:3	5:8C	B-3	Celer	10.65	~filest	Yes	Yes	4	Host	Fibre	
<u>A</u> 20	1:06:01:60:C7:20:35:8C:	50:06:01:60:47:20:35	5:8C	A-3	Celer	10.65	~filest	Yes	Yes	4	Host	Fibre	
	0:00:00:25:B5:60:0D:5C:	20:00:00:25:B5:60:0	D:5E	A-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:5C:	20:00:00:25:B5:60:0	D:5D	B-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:4C:	20:00:00:25:B5:60:0	D:4E	A-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:4C:	20:00:00:25:B5:60:0	D:4D	B-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:3C:	20:00:00:25:B5:60:0	D:3E	A-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u> </u>	0:00:00:25:B5:60:0D:3C:	20:00:00:25:B5:60:0	D:3D	B-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:2C:	20:00:00:25:B5:60:0	D:2E	A-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:2C:	20:00:00:25:B5:60:0	D:2D	B-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u>4</u> 20	0:00:00:25:B5:60:0D:0C:	20:00:00:25:B5:60:0	D:0E	A-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
<u> </u>	0:00:00:25:B5:60:0D:0C:	20:00:00:25:B5:60:0	D:0D	B-4	UNKN	UNKN	~man	No	Yes	4	Host	Fibre	
1 Selected Cre													

Figure 133 Registering Initiators in EMC Unisphere

From the Cisco UCS Manager GUI, click the Servers tab, expand Servers > Service Profiles > root, select a specific service profile, and choose vHBAs. WWPN identities are listed. Using this IDs, you can associate WWPN to the server.

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Figure 134 Associating WWPN to the Server

3. In the Register Initiator Record wizard, choose the Initiator Type as CLARiiON/VNX from the drop-down list and choose Failover Mode as failover mode 1 from the drop-down list. Click the **New Host** radio button, enter the hostname and (future) management IP address of the host. Click **OK**.

Figure 135

Initiator Information WWN/IQN: 20:00:00:25:85:60:0D:4C:20:00:00:25:8	5:60:0D:4E
SP - port: A-4 (Fibre)	
Initiator Type: CLARiiON/VNX	ilover Mode: ve/Passive mode(PNR)-failovermode 1 💌
• New Host	Existing Host Selected Host
Host Name: VSPEX-Server-1 IP Address: 10.65.121.239	Browse Host
Advanced Options	
	<u>O</u> K <u>C</u> ancel <u>H</u> elp

Registering Initiator Record for New Host

4. Select the second vHBA's WWPN from the same server, click **Register.** Click the **Existing Host** radio button in the Host Agent Information area. Click **Browse Host** to select the host.

1

Figure 136 Registering Initiator Record for the Second vHBA's WWPN

Register Initiator Recor	d	141 4644. 1		×
WWN/IQN: 20:00:00:25	n 5:85:60:0D:4C:20:00:00:	25:85:60:0D:4D		
SP - port: B-4 (Fibre)	<			
Initiator Type: CLARi	ion/vnx 🔽	Failover Mode:	/e/Passive mode(PNR)-failovermode 1 💌
Host Agent Informa <u>New Host</u> Host Name: IP Address:	tion) <u>E</u> xisting Host Browse Host	Selected Host
Advanced Options				
			<u>0</u> K	<u>C</u> ancel <u>H</u> elp

5. Select the previously registered host, and click **OK**.

🕑 VNX5300-	VSPEX - Con	nectivity Status			×
Filter for:					
Host Nan	ne	IP Address	OS Name		
20:00:00 Celerra	:25:B5:6	UNKNOWN 10.65.121.23	Unknown VNX Op		
VSPEX-S	erver-1	10.65.121.239	Unknown		
			<u>о</u> к	Cancel	<u>H</u> elp

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Figure 137 Connectivity Status of the Registered Host

6. Repeat these steps for all the servers in the group. The final page is shown in the Figure 138.

Figure 138

Initiators Window Showing the Connection Status of All the Registered Servers

EMC Un	isphere					Poo	I LUN		❤ Se	earch	Search 🖉 🍹 🕄 -
< >	↑ 🗊 VNX5300-VSPEX 🗹 🔠 Dashboard 📲	System	🗊 Storage 🚦	Hosts	1	Data Pi	rotectio	in 1	🖇 Set	tings 🛛 🔞) Support
<u>VNX530</u>	<u>D-VSPEX</u> > <u>Hosts</u> > Initiators										
Initiators	1								3	74.0	Vizards ^
Ϋ.	Filter for Connection Status All	*									Storage Assignment Wizard for Block
Status	Initiator Name	SP Port	Host Name	- Host	Stora	Regi	Logg	Failo	Туре	Proto Att	tri Hypervisor Information Configuration Failover Wizard
×	50:06:01:60:C7:20:35:8C:50:06:01:69:47:20:35:8C	B-2	Celerra_VNX5300	10.6	~file	Yes	Yes	4	Host	Fibre	
4	50:06:01:60:C7:20:35:8C:50:06:01:60:47:20:35:8C	A-3	Celerra_VNX5300	10.6	~file	Yes	Yes	4	Host	Fibre	Host Management A
×	50:06:01:60:C7:20:35:8C:50:06:01:68:47:20:35:8C	A-2	Celerra_VNX5300	10.6	~file	Yes	Yes	4	Host	Fibre	Allocate LUNs for File Storage
1	50:06:01:60:C7:20:35:8C:50:06:01:61:47:20:35:8C	B-3	Celerra VNX5300	10.6	~file	Yes	Yes	4	Host	Fibre	Connect Host
<u> </u>	20:00:00:25:B5:60:0D:4C:20:00:00:25:B5:60:0D:4E	A-4	VSPEX-Server-1	10.6	~ma	Yes	Yes	1	Host	Fibre	Update All Hosts
4	20:00:00:25:B5:60:0D:4C:20:00:00:25:B5:60:0D:4D	B-4	VSPEX-Server-1	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:5C:20:00:00:25:B5:60:0D:5D	B-4	VSPEX-Server-2	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:5C:20:00:00:25:B5:60:0D:5E	A-4	VSPEX-Server-2	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:2C:20:00:00:25:B5:60:0D:2E	A-4	VSPEX-Server-3	10.6	~ma	Yes	Yes	1	Host	Fibre	•
4	20:00:00:25:B5:60:0D:2C:20:00:00:25:B5:60:0D:2D	B-4	VSPEX-Server-3	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:3C:20:00:00:25:B5:60:0D:3E	A-4	VSPEX-Server-4	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:3C:20:00:00:25:B5:60:0D:3D	B-4	VSPEX-Server-4	10.6	~ma	Yes	Yes	1	Host	Fibre	
4	20:00:00:25:B5:60:0D:0C:20:00:00:25:B5:60:0D:0E	A-4	VSPEX-Server-5	10.6	~ma	Yes	Yes	1	Host	Fibre	
Δ	20:00:00:25:B5:60:0D:0C:20:00:00:25:B5:60:0D:0D	B-4	VSPEX-Server-5	10.6	~ma	Yes	Yes	1	Host	Fibre	

Configure Storage Groups

Now that hosts as well as LUNs are created on the VNX storage array, we need to create storage groups to assign access to LUNs for various hosts. Boot LUN will be dedicated to a specific server. Follow these steps to configure storage groups:

1. Click the **Hosts** tab in the EMC VNX Unisphere GUI, choose Storage Groups. Click **Create** to create a new storage group.

Figure 139 Creating a Storage Group

EMC Unisphere			Pool LUN	Search
A NX5300-VSPEX Dashboard System	🗊 Storage	Hosts	🐻 Data Protection	🆇 Settings
VNX5300-VSPEX > Hosts > Storage Groups				
Storage Groups				272.
Filter for				
Storage Group Name	WWN			
😰 ~filestorage	60:06:01:60:	00:00:00:00:00:00:0	00:00:00:00:00:00:04	
0 Selected Create Delete Properties Connect LUNs Connect H	losts			

2. Enter the storage group name in the Storage Group Name field. Click OK.

torage System:	VNX5300-VSPEX
Storage Group Name:	VSPEX-Server-1

Figure 140

- A confirmation message window pops up. The system prompts you to create LUNs and connect
- Figure 141 Confirmation on Adding LUNs or Connecting Hosts

Specifying Storage Group Details

Cor	nfirm: VNX5300-VSPEX - Create Storage Group
?	Results from call to create storage group:Success
	Do you wish to add LUNs or connect hosts?
	Do you wish to continue?
	Yes No

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hosts. Click Yes.

4. From the LUNs tab of the wizard, select a single LUN and click Add.

Name 🛆 T- 🗐 Metal	LINS	ID		Capaci	ty	Drive T	уре
I I - M SP A I - M SP B							
	V 0	0		50.000	GB	SAS	
-53-00	ит	1		50.000	GB	SAS	
│││□□□□	12	2		50.000	GB	SAS	_
⊨‱ LUI	13	3		50.000	GB	SAS	
Selected L Name	ID		Capacity		Drive Type	Ho	st LUN ID
							<u>R</u> emove

Figure 142 Adding LUN to the Storage Group

5. Click the **Hosts** tab in the wizard, and select a single server and click is to add to the storage group. Click **OK** to deploy the storage group.

General LUNs Hos	ts	age Group Proper	ties		
Show Hosts: Not co	nnected 🔽				
Available Hosts			Hosts to be Connec	ted	
Name	IP Address OS	Туре	Name	IP Address OS T	уре
VSPEX-Server-5 VSPEX-Server-3 VSPEX-Server-4 VSPEX-Server-4	10.65.12 10.65.12 10.65.12	Fibre Fibre Fibre)		
< :	1	>	<	:	>
<u>R</u> efresh					
		Г		Casad	de la

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Figure 143 Selecting Hosts to be Connected

6. Repeat these steps for all the five servers. After adding all the servers to the storage group, you can see all the servers listed in the storage group as shown in Figure 144.

Figure 144 Storage Group Window Showing All the Added Servers

EMC Unisphere	Pool LUN	Search	Advanced 👰 🍹
I NNX5300-VSPEX Dashboard System	🛐 Storage 📲 Hosts 😱 Data Protection 🧳	🖇 Settings 🛛 👩 Support	
<u>VNX5300-VSPEX</u> > <u>Hosts</u> > Storage Groups			
Storage Groups	1005		Vizards Storage Assignment Wizard for Block
VSPEX-Server-1	6C:AD:F3:D6:F0:96:E2:11:88:F7:00:60:16:52:A0:88	Ē	ailover Wizard
VSPEX-Server-2 VSPEX-Server-3	8A:5B:4A:59:F1:96:E2:11:88:F7:00:60:16:52:A0:88 1E:B5:BE:97:F1:96:E2:11:88:F7:00:60:16:52:A0:88	н	lost Management
USPEX-Server-4	A8:85:C9:C3:F1:96:E2:11:88:F7:00:60:16:52:A0:88	A	Mocate LUNs for File Storage Connect Host Indate All Hosts
VSPEX-Server-S VSPEX-Server-S VSPEX-Server-S	44//FB1FEFF196/2211/88/F/00/60/16/52/A0/88 60:06:01:60:00:00:00:00:00:00:00:00:00:00:00:00		
1 Selected Create Delete Properties Connect LUNs Connect H	sts	6 items	

Configure Datastores for ESXi images – iSCSI-variant

This section details on creating iSCSI accessible datastore for the ESXi boot image per server basis. This includes two steps:

- 1. Add ESXi host information on storage
- 2. Create boot LUNs (datastores) for each server

Add ESXi Host Information on Storage

Follow these steps to add ESXi host information on the VNXe storage array. As the ESXi boot image is not yet installed and storage array and hypervisors are not integrated with vCenter, the ESXi host information needs to be added statically, instead of dynamically discovering the hosts through vCenter.

1. From the VNXe Unisphere web interface, click the Hosts tab and then choose Hosts.

Figure 145 Selecting Hosts to Add ESXi Host Information on VNXe Storage Array



2. Click Create Host in the Hosts wizard.

I

EMC Unisphere	Q
Dashboard System Storage Storage Dashboard Description Support	
VNXe3300 > Hosts > Hosts	
Hosts	?
Hosts:	
Selected: 0	Items: 0
Create Host Create Subnet Create Netoroup Details Refresh Delete	
Create Host Create Subnet Create Netgroup Details Refresh Delete	

Figure 146 Creating Host in EMC Unisphere

3. Enter the name of the host in the Name field and (optional) description. Click Next.

Figure 147 Specifying Details for Creating Host

Host Wizard		
Spe Step 2	ecify Name 📀 >>	
Enter a name and	optional description for the host configuration:	
Name: *	ESX-Host1	
Description:	ESXi host 1	
	< Back Next > Finish Cancel Help	

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4. Choose the host operating system as VMware ESX from the drop-down list. This will generate an alert, which you can ignore. Click **Next**.

Figure 148	Specifying Operating System for Creating Host
Host Wizard	
Operating Syste Step 2 of 6	em 📀 >>
Specify the host operating system.	
While this information is not required, providi troubleshooting instructions. Operating System: VMware ESX It is better to discover VMware ESX h	ing this information will allow for more specific setup and total setup a
you create a VMware ESX nost here, y	you will not have the benefit of the VMware host integration.
	< Back Next > Finish Cancel Help

5. Provide iSCSI initiator IP address of the host's iSCSI vNIC. Click Next.

1

Host Wizard		
Step 3 of 6	dress	?>>
Specify the host network address.		
You can specify the network address	of the host as either a r	network name or IP Address.
Network Address:	Network Name:	
	• IP Address:	192.168.100.69
Advanced Storage Access (ASA):	Allow Access	
	System-wide This setting is a per-host ba <u>More informat</u>	e ASA: Disabled s only effective if ASA is set to "Enable access on asis". <u>ion</u>
	< Ba	ck Next > Finish Cancel Help

Figure 149 Specifying iSCSI Initiator IP Address

<u>Note</u>

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The iSCSI initiator IP address of each servers created on the UCS Manager can be easily obtained from the following page: From the LAN tab, expand LAN > Pools > root > IP Pools, and select the iSCSI IP pool on fabric A. Click the IP addresses tab on right pane of the window, and sort by Assigned To column. You can see the IP addresses configured per server basis in Figure 150.

Cisco Unified Computing System Manager - V	/SPEX-FI	Contraction of the local division of the	and the second second	-	
Fault Summary	> = LAN + @	▼ Options 00 (Pools > ▲ root > ■	 Pending Activities IP Pools > III IP Pool V 	Exit	IP Pool VSPEX-IS
Equipment Server LAN SAN VM Admin Filter: All	General IP Add & Filter ⇔ Exp	resses IP Blocks Even	nts		
e el	ID Addross	Subnot	Dofault Catoway	Assigned	Assigned To T
LAN LAN LAN LAN Cloud Appliances Filternal LAN Policies Policies Policie Policie	192.168.100 192.168.100 192.168.100 192.168.100 192.168.100 192.168.100	78 255.255.255.0 59 255.255.255.0 69 255.255.255.0 79 255.255.255.0 77 255.255.255.0 76 255.255.255.0 76 255.255.255.0	192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1	Yes Yes Yes Yes No No	org-root/ls-VSPEX-Server-4/iscsi-iSCSI-A/vlan/ipv//ipv4-po org-root/ls-VSPEX-Server-3/iscsi-iSCSI-A/vlan/ipv//ipv4-po org-root/ls-VSPEX-Server-2/iscsi-iSCSI-A/vlan/ipv//ipv4-po org-root/ls-VSPEX-Server-1/iscsi-iSCSI-A/vlan/ipv//ipv4-po
IP Pool IP Pool IP Pool VSPEX-SCS1-IPS-A IP Pool VSPEX-SCS1-IPS-B IP IP	192.168.100. 192.168.100. 192.168.100. 192.168.100. 192.168.100. 192.168.100. 192.168.100.	75 255.255.255.0 74 255.255.255.0 73 255.255.255.0 72 255.255.255.0 70 255.255.255.0 70 255.255.255.0 68 255.255.255.0 72 255.255.255.0	192.186.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1 192.168.100.1	No No No No No No	

Figure 150 IP Addresses Window Showing iSCSI Initiator IP Addresses of All the Servers

1

6. In the next step, enter the IQN name of the iSCSI vNIC of the service profile. Click Next.

Host Wizard			
iSCSI Acces Step 4 of 6	s		<u>@</u> >>
If this host is connected to iSCSI sto IQN: vspex:iqn:49 CHAP Secret: Confirm CHAP Secret:	rage, you must specify a valic	t iSCSI address (IQN).	
	<u>Add Another ION</u>		
	< Back	Next > Finish	Cancel Help

Figure 151 Specifying iSCSI Address



To find the IQN name assigned to various iSCSI vNICs, From the **SAN** tab in UCS Manager, expand **SAN** > **Pools** > **root** > **IQN Pools** and select the IQN pool created in previous section. Click the **IQN Suffixes** tab in the right pane of the window and sort the rows by clicking on Assigned To column title. This provides IQN name suffixes per vNIC basis as shown in Figure 152.

Figure 152 IQN Suffixes Window Showing IQN Name Assigned to iSCSI vNICs

A Cisco Unified Computing System Manager - VSPEX-F	H X Q X X / =				
Fault Summary					
0 0 0 0	>> 🚍 SAN + 🚱 Pools + 🛕 root + 🎆 IQI	N Pools > M Pool VSPEX-IQNs		Real VSPEX-IC	
Equipment Servers LAIT SAN VM Admin	Genera IQN Suffixes QN Blocks Faults	Events			
Filter: All	🕰 Filter 👄 Export 🈸 Print			-	
+ - I	IQN Suffix	Assigned	Assigned To	∇ Prev Assign	
R. I SAN	iqn:48	Yes	org-root/is-VSPEX-Server-4/iscsi-iSC51-B	org-root/ls-\	
B SAN Cloud	ign:38	Yes	org-root/ls-VSPEX-Server-4/iscsi-iSCSI-A	org-root/ls-\	
E Storage Cloud	ign:19	Yes	org-root/ls-VSPEX-Server-3/iscsi-iSCSI-B	org-root/ls-\	
Delicies	iqn:58	Yes	org-root/ls-VSPEX-Server-3/iscsi-iSCSI-A	org-root/ls-\	
🗇 💮 Pools	ign:39	Yes	org-root/ls-VSPEX-Server-2/iscsi-iSCSI-B	org-root/ls-\	
- A root	iqn:29	Yes	orn-root/is-VSPEX-Server-2/iscsi-iSCSI-A	org-root/ls-\	
IQN Pools	iqn:59	Yes	org-root/ls-VSPEX-Server-1/iscsi-iSCSI-B	org-root/ls-v	
Pool VSPEX-IQNs	iqn:49	Yes	org-root/ls-VSPEX-Server-1/iscsi-iSCSI-A	org-root/ls-v	
A WAWNIN Rook	iqn:9	NU			
WWWW POOIS	iqn:8	No			
WWxN Pools	iqn:7	No			

7. Click Next in the Host Wizard in the EMC Unisphere GUI, verify the configuration and deploy the configuration. This wizard allows us to add iSCSI initiator on one fabric only. To add the iSCSI initiator information on fabric B, select the ESX-Host1 in Hosts window, and click **Details**.

Figure 153 Adding iSCSI Initiator on Fabric B

EMC Unisphere

I

Dashboard System	Storage	Settings	Hosts	📀 Support
/NXe3300 > Hosts > Hosts				
Hosts				
Hosts: ESX-Host1				
Selected: 1				
Create Host Create Subnet Create Nets	proup Details	Refresh Delete		

8. In the Details window, click Add to add IP address on fabric B.

Fig	gure 154	Adding Data	Storage Addre	ess in the Hos	t Details Windo	W
EMC Unisphere						
Dashboard	System	Storage	Settings	Hosts	👩 Support	
VNXe3300 > Hosts > Host	:s > Host Detai	ls				
Host Details						
_ Summary						
Name: ESX-	Host1					
Description: ESXi	host 1					
Operating System:						
Data Storage Address: 192.1	168.100.69					
Data IQNs: vspe	x:iqn:49					
General						
Name	e: ESX-Host1					
Description	n: ESXi host 1					
Operating System	VMware ESX		•			_
Data Storage Address	5: 192.168.100.6	9			Add a Net selected I	work Name / IP Address for the

9. Similarly, in the details window click **Add** to add the IQN of iSCSI vNIC on fabric B. Click **Apply Changes** after the second IQN is added.

Figure 155 Adding IQN in the Host Details Window

*General		
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	
Data IQNs:	vspex:iqn:49	Add
		Delete
		Edit CHAP Secret
Apply Changes Cancel Change	5	

10. Repeat steps 1 to 9 for all the four ESXi hosts service profiles created in UCS Manager.

Create Boot LUNs (Datastores) for Each Server

All the ESXi hosts access information is configured on VNXe, we can now carve our boot LUNs for each server using appropriate access privileges. Follow these steps to carve out boot LUNs for each server:

1. Click the Storage tab and click VMware to create datastore.



Selecting VMware for Carving Out Boot LUNs for Each Server

- 2. In the VM ware Storage window, click Create.

Figure 157	Creating VMware Datastores
------------	----------------------------

Figure 156

EMC Unisphere	
Dashboard System Storage Storage Dashboard Dashboard Support	
VNXe3300 > Storage > VMware	
VMware Storage	?
Allocated VMware Datastores:	
Selected: 0	Items: 0
Create a Replication Destination Details Refresh Delete	

3. Enter the name of the datastore in the Name field and (optional) description. Click Next.

FMC Unisphere

I

	Figure 158	Specifying Datastore Name	
VMware Storage V	Wizard		
Spectrum Spectrum Step :	ecify Name		?>
Enter a name for t	he VMware datastore.		
Name: 🗴	ESX-Server01]	
Description:	Datastore for system image	e of ESXi server 1	
		< Back Next > Finish C	Cancel Help

4. Click the Virtual Disk (VMFS) radio button in the VMware Storage wizard. Click Next.

1

Figure 159 Selecting Datastore Type

VMware Storage Wizard	
Specify File System Type Step 2 of 8	>>
Configure the type of datastore to create: Datastore Type: O Network File System (NFS) There is no Shared Folder Server configured with NFS support enabled. You can enable NFS support fr	rom
 Wirtual Disk (VMFS) VMware/VMFS Datastore that is accessed through iSCSI. 	
< Back Next > Finish Cancel	Help

5. Choose 50 GB datastore from the Size drop-down list and select Systematic resource pool. Click Next.

VMware St	orage Wizard				
vm	Configure Step 3 of 8	Storage			>>
Configure th	ne storage pool and siz	e for this datastore:			
Туре	Pool	Server	Available	Percent Used	Subscription
vm	SystemBoot	BootServer	2.029 TB	0%	0%
			Percent Used:	Percent Available	: Alert Threshold:
Si	ze: * 50	GB ▼			
			< 1	Back Next >	Finish Cancel Help

ſ

Figure 160 Specifying the Size of the Datastore

6. Only allow ESX-Host1 to access this datastore by selecting Datastore and snapshot for access permission from the drop-down list.

Step 6 of 8				(
ure which hosts will a	ccess this storage:	IÓN	Access	
ESX-Host1	2 (2)	/ (2)	Datastore and Snapshot	•
ESX-Host2	/ (2)	2 (2)	No Access	•
ESX-Host3	/ (2)	2 (2)	No Access	-
► ESX-Host4	2 (2)	2 (2)	No Access	•
Create New Host	Add ESX Host Refresh			

7. Verify the information and deploy the configuration. When success notification is received, click **Close** to create the datastore.

1
	Figure 162	Verifying the Datastore Creation	
VMware St	orage Wizard		
	Results		
	Step 8 of 8	0	>>
VMware dat	astore successfully created.		
🥹 Creati	ing VMware datastore		
Configuratio	n completed successfully.		
Options	I		
Choose an a	action to follow this wizard:		
•	None		
×	You may initiate replication	n from the storage element's detail page at a later time.	
00	Replicate locally		
(1)	Local replication will retain	a full copy of the storage resource on the local system.	
	Replicate to a remote sy	vstem	
	Remote replication will ret network.	ain a full copy of the storage resource on another system by transferring the data over th	ne
		< Back Next > Finish Close	Help

Γ

8. Repeat steps 1 to 7 for all the four ESXi hosts in the architecture. Next, select a specific ESXi host, and click **Details**.

1	Figure 163 Cre	eating VMware Da	tastores for All the	e Hosts	
EMC Unisphere					
Dashboard	System	Storage	Settings	Hosts	📀 Support
VNXe3300 > Storage	> VMware				
VMware Storage					
Allocated VMware Datas	tores: ESX-Server04 ESX-S	Server03 ESX-Set	ver01		
Selected: 1	6				
Create Create a Re	eplication Destination	Details Refresh	Delete		

9. Note down the LUN ID of the given server.

Figure 164 VMware Storage Details Window Showing Summary of the Selected Server

EMC Unisphere

Dashboard System	Storage 🐝 Setti	ngs 📳 Hosts 📀	Support						
/NXe3300 > Storage > VMware > VMw	are Details								
VMware Storage Details									
Summary									
Status: Ok Storage Server: BootServer (192.168.100.101) Name: ESX-Server02 Storage Pool: SystemBoot Description: iSCSI Target: iqn.1992-05.com.emc:ckm001212004850000-9-vn Datastore Type: VMFS Datastore LUN: 1									
General Datastore Capacity Protection Siz	e Host Access Virtual Machines	Snapshots Replication							
Name: ESX-Server02									
Description:									
Thin: Disabled	View Access Details								

1

10. We need to update the iSCSI target LUN ID in the service profile boot policy. Only one of the four servers (typically the first datastore created) will have the LUN ID as 0. For all the other servers, the LUN ID needs to be updated. Click the Servers tab of UCS Manager, choose specific service profile, click the Boot Order tab in the right pane of the window and click Set Boot Parameters in the iSCSI vNICs area.

🚔 Cisco Unified Computing System Manager - VSPEX-FI		
Fault Summary	😧 🎯 🗳 New ~ 🔀 Options 🛛 🚱 🔹 Pending Activities 🛛 🔯 Exit	
0 0 0 0	>> 🥪 Service Profiles + 🙏 root + 😇 Service Profile VSPEX-Server-2 👘 Service Profile VSPEX-Server-2	ofile VSPEX-
Equipment Servers LAN SAN VM Admin	General Storage Network SCSI vNICE Boot Order Virtual Machines FC Zones Policies Server Details FSM VIF Paths Faults Events	
Filter: All	Actions	
•	Modify Boot Policy	
E Servers	Specific Boot Policy	
Service Profiles	Book Order	
	Local Devices	
WSPEX-Server-2	Reboot on Boot Order Change:	
	Enforce vNIC/vHBA/ISCSI Name: 🔽	
SPEX-Server-4	WARNINGS:	
Sub-Organizations	The type (primary)secondary) does not indicate a book order presence. The effective order of boot devices within the same device dask (LAN)storage/ISCSI) is deter	ermined by
• S Policies	IF Enforce vNIC/vHBA/iSCSI Name is selected and the vNIC/vHBA/iSCSI does not exist, If it is not selected, the vNICs/vHBAs/iSCSI are selected if they exist, otherwise the vNICs/vHBAs/iSCSI are selected if they exist.	a config er
⊕- ⊕ Pools		
	Filter ⇒ Export i Print	
	Name Order VNIC/vHBA/iSCSI vNIC	Туре
	CD-ROM 1	
	ISCSI ISCSI-A Primary	,
	SCS1 SCS1 Second	ary

Figure 165 Setting Boot Parameters for the Second Server

11. Select the iSCSI Static Target Interface, and click in the right pane of the window.

I

t iSCSI Boot Parameters me: iSCSI-A wutertication Profile: <pre>crost set> </pre> <pre>Crosts ISCSI Authentication Profile Initiator Name Initiator Name: </pre> VSPEX-IQNS(52(60) Initiator Name: VSPEX-IQNS(52(60) Initiator Address Initiator IP Address Policy: VSPEX-IGS(51-IPS-4(26/30)) Initiator IP Address: <pre>192.168.100.19 VSPEX-IGS(51) Initiator IP Address: <pre>192.168.100.1 Primary DNS: <pre>0.0.00 Secondary DNS: <pre>0.0.00 Condent Policy Initiator Secondary DNS: <pre>0.0.00 Condent Policy Initiator IP Address Will be automatically assigned from the selected pool. </pre></pre></pre></pre></pre>	t ISCSI Boot Parameters me: ISCSI A Authentication Profile: India set> I Create ISCSI Authentication Profile Initiator Name Initiator Name Assignment: VSPEX-IQNE(52/60) I Initiator Name Assignment: VSPEX-IQNE(52/60) I Initiator Name: Vspecial IQN Sife Pool Initiator Name: Vspecial IQN Sife Pool Initiator IP Address Policy: VSPEX-ISCSI-IPF-A(26/30) I Initiator IP Address Policy: VSPEX-ISCSI-IPF-A(26/30) I Initiator IP Address: 192.168.100.69 Submet Mask: 255.255.255.255.255.255.255.255.255.255		
me: iSCSI-A utherbication Profile: <pre>cnot set> </pre> Initiator Name nitiator Name Assignment: VSPEX-IQNs(52/60) Initiator Name Assignment: VSPEX-IQNs(52/60) Initiator Name Assignment: VSPEX-IQNs(52/60) Initiator Name Assignment: VSPEX-IQNs(52/60) Initiator Name: vspecingn:29 Create IQN Suffix Pool The IQN will be assigned from the selected pool. The valiable/total IQNs are displayed after the pool name. national VSPEX-ISCSI-IPS-A(26/30) Initiator IP Address Policy: VSPEX-ISCSI-IPS-A(26/30) Initiator IP Address: 192.168.100.69 Subnet Mask: 255.25.25.25.00 Default Gateway: 192.168.100.10 Primary DNS: 0.0.00 Center IP Pool The IP address will be automatically assigned from the selected pool. In IP address will be automatically assigned from the selected pool. C: ISCSI Static Target Interface ISCSI Auto Target Interface Image Priority Port Authentication Profile ISCSI IPV4 Address LUN Id Image Image Priority Port Authentication Profile ISCSI IPV4 Address LUN Id Image Image Priority Port Authentication Profile ISCSI IPV4 Address LUN Id Image Imag	me: iSCSI-A utherbication Profile: <not set=""></not>	iSCSI Boot Parameters	
uthentication Profile: <pre><mail:> </mail:></pre> <pre>create ISCSI Authentication Profile </pre> <pre>nitiator Name Assignment: <pre>VSPEX-IQNs(52/60) • </pre> <pre> Futitor Name Assignment: <pre>VSPEX-IQNs(52/60) • </pre> Exclusion Name Assignment: <pre>VSPEX-IQNs(52/60) • </pre> Exclusion Name Assignment: <pre>VSPEX-IQNs(52/60) • </pre> Exclusion Name Assignment: <pre>VSPEX-IGNs(1)</pre> Intiator Address Intiator IP Address Policy: </pre> VSPEX-ISCSI-IPS-A(26/30) • Intiator IP Address Policy: VSPEX-ISCSI Policy: Intiator IP Address Policy: VSPEX-ISCSI Policy: Intiator IP Address will be automatically assigned from the selected pool. Intiator IP Address will be automatically assigned from the selected pool. Intiator IP Address Interface: Intiator ISCSI Static Target Interface: Interface Interface: Interface Interface: Interface:</pre>	uthentication Profile: <code>cnot set></code> Create SCSI Authentication Profile Initiator Name Initiator Name Assignment: <code>VSPEX-IQNS(52/60) • • • • • • • • • • • • • • • • • • •</code>	ne: iSCSI-A	
utherbitation Profile: end set>	utherbitation Profile: <pre><pre><pre><pre><pre>chilitator Name</pre> <pre>initiator Name Assignment: </pre> <pre>VSPEX-IQNs(52/60) •</pre> </pre> Initiator Name Assignment: </pre> <pre>VSPEX-IQNs(52/60) •</pre> Initiator Name: </pre> <pre>vspexiqn:29 </pre> Create IQN Suffix Pool The available/total IQNs are displayed after the pool name. Initiator Address Initiator Address Initiator IP Address: 192.168.100.69 Submet Mask: 255.255.255.0 Default Gateway: 192.168.100.1 Primary DNS: 0.0.00 Scondary DNS: 0.0.00 Scondary DNS: 0.0.00 Inceste IP Pool The IP address will be automatically assigned from the selected pool. Name Priority Port Authentication Profile ISCSI IPV4 Address LUN Id @</pre>		
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		n.1992-05.co 1 3260 192.168.100.101 U	
			-
			-1

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12. Update the LUN ID to match the LUN ID shown in step 9, and click **OK**.

Figure 167 Updating the LUN ID	
🖨 Modify iSCSI Static Target	×
Modify iSCSI Static Target	0
iSCSI Target Name: i.emc:ckm001212004850000-9-vnxe Priority: 1 Port: 3260 Authentication Profile: <not set=""> ▼</not>	
OK	Cancel

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13. Click OK in the Boot Order window. A warning message window appears. Click Yes to continue.

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	Figure	9 108	warning wessage	on Updating the	LONID			
The available	total IONs are displaye	d after the nool	name					
	Set iSCSI Boot Para	meters				×		
Initiator Add	Your chang Modify: lur Property:	jes: n (<i>org-root/ls-V5</i> : i d	PEX-Server-2/iscsi-boot-par	ams/boot-vnic-iSCSI-A/	1/lun)			
IPv4 Ad Subnet	Will cause t Service P	he Immediate R rofile VSPEX-S	eboot of: erver-2 (<i>org-root/ls-VSPE</i>)	(-Server-2)[Server: sy :	s/rack-unit-3]			
Derault Gati Primary Secondary Create The IP addr	Are you su Press Yes i or Cancel	re you want to a to disregard the to make changes	pply the changes? warning and submit change s to the current configuratio	s, No to quit the wizard n. Cancel				
Minimum one	ा instance of iSCSI S	iSCSI Static Targ t atic Target Ir	et Interface C iSCSI Auto) Target Interface				
Name	Priority	Port	Authentication Profile	iSCSI IPV4 Address	LUN Id	1		
ign.1992-05.co	1	3260		192.168.100.101	1	-		
						H	1	
						1		
						Ę	6	
						-		
						_	_	
						ОК		Cancel

- 14. Repeat steps 10 to 13 for the iSCSI vNIC on fabric B using the same service profile.
- 15. Repeat steps 1 to 14 for all the service profiles in UCS Manager.

At this point, we have end-to-end iSCSI storage access from servers in Cisco UCS to the specific boot LUN on the EMC VNXe storage devices. We are ready to install ESXi images on the server.

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Install ESXi Servers and vCenter Infrastructure

Follow these steps to install ESXi image on Cisco UCS servers:

1. From UCS Manager GUI, click the **Servers** tab, expand **Servers** > **Service Profiles** > **root**, and select a particular service profile. Click KVM Console in the right pane of the window.



2. Once the Java pallet of KVM is launched, click the Virtual Media tab and click Add Image. A window appears to select an ISO image. Browse through the local directory structure and select ISO image of the ESXi 5.1 hypervisor installer media.

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VSPEX-Server-1	1 (Rack -4)) - KVM Console				
Help						
loot Server 🛛 🔩 🤮	Shutdown Se	erver 🧕 Reset				
Console Properti	ies					
Virtual Media						
lient View						
Mapped I	Read Only	Drive				Exit
		🚽 A: - Floppy				Create Image
	\checkmark	🙆 D: - CD/DVD				
						Add Image
						Remove Image
						Details 🔹
etails						
arget Drive	Mapped	То	Read Bytes	Write Bytes	Duration	
irtual CD/DVD	Not map	ped				USB Reset
emovable Disk	Not map	ped				

Figure 170 Adding an ISO Image of the ESXi 5.0 Hypervisor Installer Media

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3. When the ISO image shows up in the list, check the Mapped check box and click **Reset** to reset the server.

Â	/ VSPEX-Server-1	(Rack -4) - K¥M Console					_ 🗆 ×
File	e Help Boot Server 🔩 Sh	nutdown Server 🧕 Reset					
K٧	M Console Propertie	s					
K٧	M Virtual Media						
	Client View						
	Mapped R	ead Only Drive					Exit
		🗆 🚽 A: - Floppy					Create Image
1		D: - CD/DVD					Additioner
		🔽 🏩 Y:\ISO\VMware	ESXI5.1\RTM79	9733\VMware-VM	Avisor-Installer-5.1.0	-799733.x86_64.iso	Add Image
5							Remove Image
							Details ±
	4						
	Details	-	,	-			
-	Target Drive	Mapped To	Read Bytes	Write Bytes	Duration		
L	Virtual CD/DVD	Y:\ISO\VMware\ESXi5.1	. 0	0	00:00:14		USB Reset
	Removable Disk	Not mapped					
	Floppy	Not mapped					

Figure 171 Mapping the ISO Image and Resetting the Server

4. Click **OK** in the Reset Server warning message window.



Reset S	erver X
	You have selected the Reset action for one or more servers. If you are trying to boot a server from a power-down state, you should not use this method. If you continue the power-up with this process, the desired power state of the servers will become out of sync with the actual power state and the servers may unexpectedly shut down at a later time. To safely reboot the selected servers from a power-down state, click Cancel then select the Boot Server action. If you are certain that you want to continue with the Reset operation, click OK . OK Cancel

5. Click the **Power Cycle** radio button and click **OK**.

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Reset Server Service Profile VSPEX-Server-1 Image: A server Profile VSPEX-Server-1 </th <th></th> <th>Figure 173</th> <th>Selecting Resetting Option</th>		Figure 173	Selecting Resetting Option
 You are attempting to reset a server. The server can be reset by gracefully restarting the OS or via a brute force nower cycle. How would you like to reset? Power Cycle Gracefully restart OS If Graceful OS Restart is not supported by the OS or it does not happen within a reasonable amount of time, the system will perform a power cycle. The UCS system might be in the process of performing some tasks on this server. Would you like this operation to wait until the completion of outstanding activities? Wait for completion of outstanding UCS tasks on this server. 	Reset Se	erver Service Profile ¥SPEX-	Server-1 🛛 🗙
OK Cancel		You are attempting to reset a reset by gracefully restarting nower cycle. How would you Power Cycle Gracefully restart OS If Graceful OS Restart is not does not happen within a rea the system will perform a pow The UCS system might be in t on this server. Would you like the completion of outstanding Wait for completion of o	a server. The server can be the OS or via a brute force like to reset? supported by the OS or it usonable amount of time, wer cycle. the process of performing some tasks a this operation to wait until g activities? butstanding UCS tasks on this server. Cancel

6. Click the **KVM** tab, and for iSCSI-variant, make sure iSCSI Option ROM installs successfully on both the fabrics. (For FC-variant, you will see similar Option ROM installation through vHBAs).





At this point of time, ESXi installation media would boot from the virtual disk mounted on the KVM. Follow the steps to install ESXi 5.1 hypervisor on the boot LUN. Make sure that you select the boot LUN and not the local disk. You can select all the default parameters or parameters settings as per your requirements.

Once the ESXi is installed, login to the system by pressing F2 on the KVM window. You need to configure basic management network for the ESXi host. Make sure that you select two system vNICs.

Figure 175 Selecting Adapters for Default Management Network Connection



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Note

Easiest way to figure out which vmnic adapter should be used for the vSphere management purpose, you can identify the vmnic by MAC address. The MAC addresses of the vNICs (vmnic's) are summarized in UCS Manager GUI as show in Figure 176. Click the **Servers** tab, expand **Servers** > **Service Profiles** > **root**, and select a particular service profile and click **VNICs**. The vNIC names and MAC addresses are listed in the right pane of the window.

📥 Cisco Unifi	ed Computing Syst	em Manager	- VSPEX-FI										_ 🗆
-Fault Summ	iary V	Δ	Δ	😋 🔘 🗳 New 🗸	Options 🕜	0	Pending A	tivities	0 <u>E</u> xit				्ता दा
0	0	0	0	>> 🥪 Servers 🕴 😎	Service Profiles • 🙏	root	Service Pro	file VSPEX-S	ierver-3 •	-I vNICs			-I vNI
Equipmer: S	ervers AN SAN	M Admin		Network FSM									
	Filter: All	-		Actions			Dynamic	vNIC Con	nection P	olicy			
± =				😌 Change Dyna	amic vNIC Connection F	Policy	Nothing	Selected					
E Server	s) Modify vNIC/	VHBA Placement		VNIC/VH	BA Placem	ent Polic	v			
⊡-≣ Se	rvice Profiles						Nothing	Selected		•			
l i	SPEX-Server-1								a Itau				
. E	VSPEX-Server-2						LAN LON	nectivity P	olicy				
	VSPEX-Server-3							LAN Connec	ctivity Polic	y: <not set=""></not>	-		
	- VHRAC						LAN Conr	nectivity Poli	icy Instanc	e:			
							🛨 Crea	te LAN Conr	nectivity P	olicy			
	- B - B - MIC-dah	a-A											
	VNIC dat	a-B		VNICE									
	VNIC ISC	SI-Overlay-A SI-Overlay-B		A Shulet Furth	The Dates								
		tem-A		export	G PTIL	_				,		,	
		tem-B		Name	MAC Address		Desired Order	Actual	Order	Fabric ID	Desired Placement	Actual Placemer	nt 🛱
	- 🔩 VSPEX-Server-4			-II vNIC data-A	00:25:85:60:0D:06	5		5		A	Any	1	-
	🕂 Sub-Organization	IS		-II vNIC data-B	00:25:85:60:0D:16	6		6		В	Any	1	
E Se	rvice Profile Templates			-I vNIC iSCSI-Ov	00:25:85:60:0D:08	3		3		A	Any	1	
	icies			-I WIC ISCSI-OV	00-25-85-60-00-18	4		4		В	Any	1	
	us bedulec			-II vNIC system-A	00:25:85:60:0D:07	1		1		A	Any	1	
	ieddies			-II vNIC system-B	00:25:85:60:0D:17	2		2		В	Any	1	
						-							

Figure 176 vNIC Names and Their MAC Addresses are Shown in the vNICs Area

7. Repeat the ESXi installation steps for all the four servers.

VMware vCenter Server Deployment

This section describes the installation of VMware vCenter for VMware environment and to complete the following configuration:

- A running VMware vCenter virtual machine
- A running VMware update manager virtual machine
- VMware DRS and HA functionality enabled.

For more information on installing a vCenter Server, see the link:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId =2032885

The following steps provide high level configuration procedure to configure vCenter server:

1. Create the vCenter host VM

If the VMware vCenter Server is to be deployed as a virtual machine on an ESXi server installed as part of this solution, then we need to directly connect to an Infrastructure ESXi server using the vSphere Client. Create a virtual machine on the ESXi server with the customer's guest OS configuration, using the Infrastructure server datastore presented from the storage array. The memory and processor requirements for the vCenter Server are dependent on the number of ESXi hosts and virtual machines being managed. The requirements are outlined in the vSphere Installation and Setup Guide.

2. Install vCenter guest OS

Install the guest OS on the vCenter host virtual machine. VMware recommends using Windows Server 2008 R2 SP1. To ensure that adequate space is available on the vCenter and vSphere, Update Manager installation drive, see *vSphere Installation and Setup Guide*.

3. Install vCenter server

Install vCenter by using the VMware VIMSetup installation media. Easiest method is to install vCenter single sign on, vCenter inventory service and vCenter server using Simple Install. Use the customer-provided username, organization, and vCenter license key when installing vCenter.

4. Apply vSphere license keys

To perform license maintenance, log into the vCenter Server and select the Administration -Licensing menu from the vSphere client. Use the vCenter License console to enter the license keys for the ESXi hosts. After this, they can be applied to the ESXi hosts as they are imported into vCenter.

Configuring Cluster, HA and DRS on VMware vCenter

Follow these steps to configure cluster, HA, and DRS on vCenter:

- 1. Log into VMware ESXi Host using VMware vSphere Client.
- 2. Create a vCenter Datacenter.
- 3. Create a new management cluster with DRS and HA enabled.
 - a. Right-click on the cluster and, in the corresponding context menu, click Edit Settings.
 - **b.** Check the check boxes Turn On vShpere HA and Turn On vSphere DRS, as shown in Figure 177.
 - c. Click OK, to save changes.

Now Cluster Wizzrd	
Cluster Features What features do you want t	to enable for this cluster?
Cluster Features vSphere DRS Power Management vSphere HA Virtual Machine Options VM Monitoring VMware EVC VM Swapfile Location Ready to Complete	Name VSPEX-Cluster Cluster Features Select the features you would like to use with this cluster. ✓ Turn On vSphere HA vSphere HA detects failures and provides rapid recovery for the virtual machines running within a cluster. Core functionality includes host and virtual machine monitoring to minimize downtime when heartbeats cannot be detected. vSphere HA must be turned on to use Fault Tolerance. ✓ Turn On vSphere DRS vSphere DRS enables vCenter Server to manage hosts as an aggregate pool of resources. Cluster resources can be divided into smaller resource pools for users, groups, and virtual machines. vSphere DRS also enables vCenter Server to manage the assignment of virtual machines to hosts automatically, suggesting placement when virtual machines are powered on, and migrating running virtual machines to balance load and enforce resource allocation policies. vSphere DRS and VMware EVC should be enabled in the cluster in order to permit placing and migrating VMs with Fault Tolerance turned on, during load balancing.
Help	Back Next ≥ Cancel

Figure 177 Configuring HA and DRS on Cluster

4. Add all the ESXi hosts to the cluster by providing servers' management IP addresses and login credentials one by one.

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🚱 VSPEX - vSphere Client							_ O ×
File Edit View Inventory Administration	ation Plug-ins Help						
🖸 💽 🏡 Home 🕨 🛃 Inve	ventory 🕨 🗊 Hosts and	Clusters				Search Invento	ry 🔍
II	4						
	VSPEX-Cluster						
□ B VSPEX-DC	Getting Started Sumn	nary Virtual Machir	es Hosts DRS	Resource Allocation	Performance Task	s & Events Alarms Perr	nissions Maps F 🛛 Þ
10.65.121.231		`		\\	Name	or State contains: -	Clear
10.65.121.233	Name	State	Status	% CPU	% Memory	Memory Size	CPU Count M
10.65.121.234	10.65.121.233	Connected	🔔 Warning	0	1	262084.60 MB	2
	10.65.121.234	Connected	🔔 Warning	0	1	262084.60 MB	2
	10.65.121.232	Connected	🔔 Warning	0	1	262084.40 MB	2
	10.65.121.231	Connected	<u> (</u> Warning	0		262084.50 MB	2
	4						Þ
🚰 Tasks 🞯 Alarms	<u> </u>				E	valuation Mode: 45 days rema	ining Administrator

Figure 178 Adding ESXi Hosts to the Cluster

Virtual Networking Configuration

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In UCS Manager service profile, we created six vNICs per server for iSCSI-variant and four vNICs per server for FC-variant. This shows up as six or four network adapters or vmnics in ESXi server. You can see these adapters in the vCenter by choosing **Home > Inventory > Hosts and Clusters**, select a particular server, click the **Configuration** tab in the right pane of the window, and click **Network Adapters**.

ile Edit View Inventory Administration Plug-ins Help	and Clusters						
🖸 🖸 🚺 Home 🕨 👸 Inventory 🕨 👘 Hosts	and Clusters						
다 역 않 중 101 🔅							
VSPEX 10.65.121.234 VM	ware ESXi, 5.1.0, 799733 Eva Summary Virtual Machines R	aluation (60 days remaining)	ration Tasks & Ever	nts Alarms F	Permissions Maps	Storage Views Hardware Stat	us Vodate Mana
- U 05-EA-Closter 10.65.121.231 Hardware	Netw	ork Adapters		· · · ·	, , ,		
10.65.121.233 10.65.121.233 10.65.121.234 Processors Memory Storage Networking Storage Network Adapt Advanced Sett Power Manage Software Licensed Feature	ers between the second	te Speed Systems Inc Cisco VIC Ethernet NIC vmnic5 vmnic5 10000 F vmnic3 10000 F vmnic2 10000 F vmnic1 10000 F vmnic0 10000 F	Configured 10000 Full 10000 Full 10000 Full 10000 Full 10000 Full 10000 Full	Switch None None IScsiBootvSw vSwitch0 vSwitch0	MAC Address 00:25:b5:60:0d:13 00:25:b5:60:0d:03 00:25:b5:60:0d:03 00:25:b5:60:0d:05 00:25:b5:60:0d:04 00:25:b5:60:0d:04	Observed IP ranges None None None 10.65.121.1-10.65.121.127 10.65.121.1-10.65.121.127	Wake on LAN Sur No No No No No

Figure 179 Network Adapter Showing vmnics in ESXi Server

Table 9 shows UCS Manager service profile and vSphere vmnic per ESXi host basis:

UCS Manager vNIC Names	vSphere VM NIC Names	MAC Address
System-A	vmnic0	
System-B	vmnic1	
*iSCSI-Overlay-VNIC-A	vmnic2	
*iSCSI-Overlay-VNIC-B	vmnic3	
Data-A	vmnic4	
Data-B	vmnic5	

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Table 9 Service profile VIVIC and VSphere Vmnic relat

*iSCSI Overlay vNICs are applicable for iSCSI-variant of the solution only.

We need to create three native vSwitches for virtual network configuration as follows:

- 1. vSwitch0—Standard, default vSwitch for management and vMotion traffic.
- 2. iScsiBootvSwitch—Default iSCSI boot vSwitch (iSCSI-variant only).
- **3.** vSwitch1—For VM data traffic.

Each vSwitch listed will have two vmnics, one on each fabric for load balancing and high-availability. Also, for vMotion and iSCSI storage traffic, jumbo MTU needs to be configured in virtual network.

Follow these steps to configure the three vSwitches:

 (iSCSI-variant only) In the vSphere client, choose Home > Inventory > Hosts and Clusters. In the Hosts and Clusters window, click the Configuration tab on the right pane of the window. Click Networking in the Hardware area. Click Properties to see the details of iScsiBootvSwitch.



Figure 180 Viewing Details of iScsiBootvSwitch

2. (iSCSI-variant only) Click the Network Adapters tab in the iScsiBootvSwitch Properties window, and click Add.

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letwork Adapter	Speed	Observed IP ranges		Adapter Details Cisco Systems Inc Cisco VIC B	Ethernet NIC
	1000011	None		Name: Location:	vmnic2 PCI 08:00.0
				Driver:	enic
				Status Link Status: Configured Speed, Duplex:	Connected 10000 Mb, Full Duplex
				Actual Speed, Duplex: iSCSI Port Binding:	10000 Mb, Full Duplex Disabled
				Networks:	None
Add		Edit	Remove		

Figure 181 Adding vmnics to the iScsiBootStwitch

3. (iSCSI-variant only) Select the second vmnic to the iScsiBootvSwitch, use Table 9 to choose the correct vmnic. Click **Close**.

1

Figure 182 Selecting the Appropriate vmnic

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Add Adapter Wiz Adapter Selection New adapters vSphere stand	ard on may be taken from a ard switch.	pool of ur	nused ones, or tr	ansferred from a	n existing
Adapter NIC Order Summary	Select one or m attached to and standard switch	ore adapt other vSph n and adde	ers from the follo ere standard sw ed to this one.	wing list. If you s itch, it will be rem	elect an adapter that is oved from that vSphere
	Name		Speed	Network	
	Unclaimed A <u>Cisco Syste</u>	dapters ms Inc C	isco VIC Etherr	net NIC	_
		mnic3	10000 Full	None	
		mnic4	10000 Full	None	
		mnic5	10000 Full	None	
	VSwitchU Ad	apters ma Inc Ci	icco VIC Ethor		
		mpic1	10000 Full	10.65.12	1 1-10 65 121 127
		mnic0	10000 Full	10.65.12	1.1-10.65.121.127
Help				< Back	Next > Cancel

4. Now, click **Properties** to see the details of vSwitch0.



Figure 183 Viewing Details of vSwitch0

5. Select the vSwitch in the vSwitch0 Properties window and click Edit.

Copfiguration Summary VSwitch 120 Ports Management Net Virtual Machine Management Net vMotion and IP Advanced Properties MTU: Default Policies Security Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Average Bandwidth: Peak Bandwidth:	•
Windetwork Virtual Machine Management Net vMotion and IP Advanced Properties MTU: Default Policies Security Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Average Bandwidth: Peak Bandwidth:	
MTU: 1500 Default Policies Security Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Average Bandwidth: Peak Bandwidth:	
Default Policies Security Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Peak Bandwidth:	
Security Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Peak Bandwidth:	
Promiscuous Mode: Reject MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Average Bandwidth:	
MAC Address Changes: Accept Forged Transmits: Accept Traffic Shaping Average Bandwidth: Peak Bandwidth:	
Forged Transmits: Accept Traffic Shaping Average Bandwidth: Peak Bandwidth:	
Traffic Shaping Average Bandwidth: Peak Bandwidth:	
Average Bandwidth: Peak Bandwidth:	
Peak Bandwidth:	
Burst Size:	
Failover and Load Balancing	
Load Balancing: Port ID	
Network Failure Detection: Link status only	
Notify Switches: Yes	-
Failback: Yes	
Add Edit Remove Active Adapters: vmnic0	

Figure 184 Editing vSwitch0 Properties

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6. Click the **General** tab of the vSwitch0 Properties window, change the MTU in the Advanced Properties area to 9000.

Figure 185

	n Properties		
Number of Ports:	120	-	
Changes will not tak	e effect until the syst	em is restarted.	
MTU:	9000	E	
	, .		

Setting Jumbo MTU

7. Click the NIC Teaming tab in the vSwitch0 Properties window. Select the adapter under Standby Adapters and click Move up to get it under Active Adapters, and click OK.

1

oad Balancing:	:	Route based on the ori	stanting statutes and TD				
Internet Caller		Indice based on the on	Route based on the originating virtual port ID				
etwork Fallove	er Detection:	Link status only					
lotify Switches	:	Yes	•				
ailback:		Yes	Yes				
ailover Order:							
elect active an adapters activa	nd standby adapt te in the order s	ters for this port group. In a failover specified below.	r situation, standby				
Name	Speed	Networks	Move Up				
Active Adapt Monico Standby Ada	iers 10000 Full	10.65.121.1-10.65.121.127	Move Down				
wmnic1 Unuseu Auap	10000 Full	10.65.121.1-10.65.121.127					
wmnic1 Unuseu Adap Adapter Deta Cisco Systems	10000 Full ICERS ils ; Inc Cisco VIC Et	10.65.121.1-10.65.121.127					
Adapter Deta Cisco Systems Name:	10000 Full ICERS ils ; Inc Cisco VIC Et	10.65.121.1-10.65.121.127 thernet NIC vmnic1					
Adapter Deta Cisco Systems Name: Location:	10000 Full ICERS ils	10.65.121.1-10.65.121.127 thernet NIC vmnic1 PCI 07:00.0					

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Figure 186 Moving Standby Adapter to Active Adapter

8. In the vSwitch0 configuration window, click the **Ports** tab, and click **Add**.

ts Network Adapters				
Configuration	Summary	vSphere Standard Switch Propertie	s	
T vSwitch	120 Ports	Number of Ports:	120	
VM Network Image: Management Net	Virtual Machine vMotion and IP	Advanced Properties	9000	
		Default Policies		
		Security		
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
		Forged Transmits:	Accept	
		Traffic Shaping		
		Average Bandwidth:		
		Peak Bandwidth:	-	
		Burst Size:		
		Failover and Load Balancing		
		Load Balancing:	Port ID	
		Network Failure Detection:	Link status only	
		Notify Switches:	Yes	
		Failback:	Yes	
Add	Edit Remove	Active Adapters:	vmnic0, vmnic1	

Figure 187 Adding Ports to vSwitch0

9. Click the **VMKernel** radio button in the Connection Types area and click **Next** in the Add Network Wizard window.

1

Add Network Wizard	
Connection Type Networking hardware	can be partitioned to accommodate each service that requires connectivity.
Connection Type Connection Settings Summary	Connection Types • Virtual Machine Add a labeled network to handle virtual machine network traffic. • VMkernel The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.
Help	< Back. Next > Cancel

Figure 188 Specifying Connection Type

10. Enter vMotion in the Network Label field. Choose the VLAN ID from the drop-down list. The standard vSwitch0 carries both management and vMotion VLANs. Management traffic leaves vSwitch0 untagged using the native VLAN of the vNIC. The vMotion traffic must be tagged with the appropriate VLAN ID. Check the Use this port group for vMotion check box.

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Figure 189 Specifying Port Group Properties for Setting VMkernel Connection

11. Configure IP address and subnet mask for the vmkernel interface. Click **Next** and deploy the vmkernel.

🛃 Add Network Wizard	
VMkernel - IP Connectio Specify VMkernel IP set	n Settings tings
Connection Type Connection Settings IP Settings Summary	Obtain IP settings automatically IV Use the following IP settings: IP Address: Subnet Mask: VMkernel Default Gateway: IO 65 VMkernel Port VMkernel Port VMotion IO.42.42.104 VLAN ID: 42 VMkernel Port VMkort VMker
Help	<pre></pre>

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Figure 190 Specifying IP Address and Subnet Mask for Setting VMkernel Connection

12. In the vSwitch0 properties window, select the newly created vMotion port group and click Edit.

rts Network Adapters		Deat Descention		
Configuration	Summary	Port Properties		
🗊 vSwitch	120 Ports	Network Label:	vMotion	
VM Network	Virtual Machine	VLAN ID:	42	
vMotion	vMotion and IP	vMotion:	Enabled	
👱 Management Net	vinition and in	Fault Tolerance Logging:	Disabled	
		Management Traffic:	Disabled	
		iSCSI Port Binding:	Disabled	
		-NIC Settings		
		MAC Address:	00:50:56:60:58:c1	
		MTU:	1500	
		IP Settings		
		IP Address:	10.42.42.104	
		Subnet Mask:	255.255.255.0	
				View Routing Table
		Effective Policies		
		Security		
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
Add	Edit Remove	Forged Transmits:	Accept	

Figure 191 Editing vMotion vSwitch0 to Set Jumbo MTU

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- **13**. Set the MTU to 9000 and click **OK**. Click **Close**.
- 14. Repeat steps 1 to 13 for all the ESXi hosts in the cluster. Once all the ESXi hosts are configured, you must be able to ping from one host to another on the vMotion vmkernel port with jumbo MTU. Validate this by issuing ping with IP's don't fragment.



Figure 192 Pinging the VMKernel Port with Jumbo MTU

15. In the vCenter GUI, choose Home > Inventory > Hosts and Clusters. In the Hosts and Clusters window, click the Configuration tab on the right pane of the window. Click Networking in the Hardware area. Click Add Networking.



Figure 193 Add Networking in VMware vSphere Client

16. Click the Virtual Machine radio button in the Add Networking Wizard, click Next.

1

dd Network Wizard	
Connection Type Networking hardware ca	n be partitioned to accommodate each service that requires connectivity.
Connection Type Network Access Connection Settings Summary	Connection Types Virtual Machine Add a labeled network to handle virtual machine network traffic. VMkernel The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.
Help	< Back Next > Cancel

17. Select the two vmnics corresponding to the VM-Data vNICs by checking the check boxes and click Next.

	Figure 195 Selecting the	vSphere Standard S	Switch for Handling Network Tra	ffic
Add Network Wizard				
Virtual Machines - Virtual machines	Network Access reach networks through uplink adapters attacl	hed to vSphere standard swi	tches.	
Connection Type Network Access	Select which vSphere standard swit vSphere standard switch using the	ch will handle the network tra unclaimed network adapters	affic for this connection. You may also create a listed below.	a new
Connection Settings Summary	Create a vSphere standar Cisco Systems Inc Cisco	dswitch Speed V.C Ethernet NIC	Networks	_
	Vmnic4	10000 Full 10000 Full	None None	
	O Use vSwitch0 Cisco Systems Inc Cisco	Speed VIC Ethernet NIC	Networks	
	mic1	10000 Full 10000 Full	10.65.121.1-10.65.121.127 10.65.121.1-10.65.121.127	
	Preview:	Sneed	Networks	•
	Virtual Machine Port Group VM Network 2	Physical Adapters • 😨 vmnic4 • 😨 vmnic5		
Help			< Back Next >	Cancel

18. Enter VM-Data in the Network Label field, and keep VLAN ID as None (0) to signify absence of VLAN tag. Click **Next**.

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	rigure 196 Spechyllig Fort Group Properties
Add Network Wizard	
Virtual Machines - Conne Use network labels to id	ection Settings dentify migration compatible connections common to two or more hosts.
Connection Type Network Access Connection Settings Summary	Port Group Properties Network Label: VLAN ID (Optional): None (0)
	Preview: Virtual Machine Port Group VM-Data VM-Data Vmnic5
Help	<pre></pre>

400 •

This concludes the Virtual Networking configuration on vCenter. Repeat steps 15 to 18 for all the ESXi hosts in the cluster.

Configure Storage for VM datastores, Install and Instantiate VMs from vCenter

This section details the VM datastore creation for the FC-variant of the solution. Refer to Figure 8 for Storage Architecture for 125 VMs on VNX5300 to have a high-level overview of storage architecture. Follow these steps to implement the same:

1. Login to EMC VNX Unisphere, and click the Storage tab. Choose Storage Configuration > Storage Pools and click the RAID Groups tab. Click Create.

EMC U	Inisphere						Pool LUN	Search
< >		300-VSPEX 💌	🔠 Dashboard	System	Stor	rage 👔 Hosts	🐻 Data Protection	n 🛛 🌼 Settings
<u>VNX53</u>	00-VSPEX > <u>St</u>	torage > <u>Storag</u> e	<u>Configuration</u> > Sto	rage Pools				
Pools	RAID Groups							
RAID	Groups							💈 🍸 🔧 🔥 🧿
Y	 Filter for 	RAID T	ype All 🔽					
ID	*	Drive Type	RAID Type	User Capac	city (GB)	Free Capacity (GB)	% Full	argest Contiguous
🚰 R.	AID Group 0	SAS	RAID5		1070.635	820.635	5	820.635
0 Sele	ecter Create	Delete Pro	operties Defragme	ent				1 items

Figure 197 Creating Storage Pool

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2. In the create Storage Pool wizard, click the **RAID Group** radio button for Storage Pool Type in the Storage Pool Parameters area. Keep the radio button **Automatic** selected in the Disks area.

	Figure	198	Spec	ifying St	orage	Pool Parameters
VNX5300-VSPEX - Create	Storage P	ool				
General Advanced						
Storage Pool Paran Storage Pool Type: Storage Pool ID: Storage Pool Name: RAID Configuration	Poo Poo RAID Group RAID5	<u>R</u> AID G	roup			v
Number of Disks:	5 (Recon	nmended)			*
• Automatic Use P	ower Savi	ing Eligibl	le Disks Select		Total I	Raw Capacity: 2684.0
Disk	Capa	city Dri	vе Туре	Model	State	Power Saving Eligible
Bus 1 Enclosure 2 Bus 1 Enclosure 2	D 536.8 D 536.8 D 536.8 D 536.8 D 536.8	08 SA 08 SA 08 SA 08 SA		STE600 STE600 STE600 STE600	Unb Unb Unb Unb	No No No No
				<u>о</u> к	Apply	<u>Cancel</u> <u>H</u> elp

3. Repeat this step for 13 more times to create total 14 RAID5 groups for VM data storage.

1

EMC Unisphere					Pool LUN	Search
< > 🏦 🗊 v	NX5300-VSPEX 💌	Dashboard	System 🛐 St	torage 🔡 Hosts	🛛 👔 Data Protec	tion 🛛 🏶 Settings
VNX5300-VSPEX >	<u>Storage</u> > <u>Stora</u>	ge Configuration > S	torage Pools			
Pools RAID Groups]					
RAID Groups						2 🖓 🔧 🖻 🤉
🝸 🗸 Filter for	RAID	Type All 💌		_		
Ю	Drive Type	RAID Type	User Capacity (GB)	Free Capacity (GB)	% Full	Largest Contiguous
	0.10					
RAID Group 4	SAS	RAIDS	2141.336	2141.336		2141.336
RAID Group 5	SAS	RAID5	2141.336	2141.336		2141.336
RAID Group 6	SAS	RAID5	2141.336	2141.336		2141.336
🛱 RAID Group 7	SAS	RAID5	2141.336	2141.336		2141.336
🛱 RAID Group 8	SAS	RAID5	2141.336	2141.336		2141.336
🛱 RAID Group 9	SAS	RAID5	2141.336	2141.336		2141.336
🛱 RAID Group 10	0 SAS	RAIDS	2141.336	2141.336		2141.336 #
F RAID Group 1	1 SAS	RAID5	2141.336	2141.336		2141.336
🛱 RAID Group 13	2 SAS	RAIDS	2141.336	2141.336		2141.336
F RAID Group 13	3 SAS	RAIDS	2141.336	2141.336		2141.336
🛱 RAID Group 14	4 SAS	RAIDS	2141.336	2141.336		2141.336 🗸
0 Selected Crea	te Delete P	Properties Defrage	ment			15 item:

Figure 199 Summary of the Configured RAID Groups

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4. Choose Storage > LUNs. You will see five boot LUNs created for five hosts. Click Create to create the LUN for VM datastore.

MC Unisphere					Pool LUN	Search
< > 🏦 🔝 VNX5300-VSPEX 💌	🚟 Dashboard	System	Stora	age 👔 Hosts	🐻 Data Protection	🐝 Settings
<u>VNX5300-VSPEX</u> > <u>Storage</u> > LUNs						
LUNS Folders						
LUNs					1	ટે 🍸 🔧 📑 📀
T Filter for Usage A	ALL User LUNs 🛛 🔽	Folder All 🔽 S	Status All	~		
Name	ID	L	Jser Capa	Host Information		
🛱 LUN O		0	50.000	VSPEX-Server-1		
E LUN 1		1	50.000	VSPEX-Server-3		
E LUN 2		2	50.000	VSPEX-Server-2		
LUN 3		3	50.000	VSPEX-Server-4		
🗮 LUN 4		4	50.000	VSPEX-Server-5		
		"				Elbanada E - 6 E
u Selected Créate Delete Pro	perties Add to St	orage Group				rittered: 5 of 5

Figure 200 Creating LUNs for VM Datastore

Click the RAID Group radio button for Storage Pool Type. For Storage Pool for new LUN choose 1 (VM data RAID group ID) from the drop-down list. Choose the User Capacity as MAX from the drop-down list to create one LUN per RAID group, and click Apply.

1

1
VNX5300-VSPEX - Crea	te LUN			
General Advanced	erties —			
Storage Pool Type:	O Pool O RAID Group			
RAID Type:	RAID5: Distributed Parity (High Throug	hput) 🔽		
Storage Pool for new	LUN: 1	<u>N</u> ew		
Capacity Available Capacity: 2141.336 GB Consumed Capacity: 0.000 GB Largest Contiguous Free Space: 2141.336 GB LUN Properties				
User Capacity: MAX	⟨ SB	~		
LUN ID: 5	Number of LUNs to create: 1			
Automatically assign LUN IDs as LUN Names				
	<u>A</u> pply <u>C</u> ancel	<u>H</u> elp		

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Figure 201 Specifying Details for Creating LUN

6. Repeat step 5 for all 14 RAID groups in the system. After completing this, the end result is as shown in Figure 202.

Figure 202	EMC Unisphere Showing Created LUNs

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EMC Unisphere

< > 1 UNX5300-VSPEX V	🔠 Dashboard	System	Storage	🔡 Hosts	🐻 Data P	rotection	斄 Settings	👩 Support
<u>VNX5300-VSPEX</u> > <u>Storage</u> > LUNs								
LUNs Folders								
1 I INs								
Eilter for		California allando	A					
Usage A	LL User LUNS			· · · · · · · · · · · · · · · · · · ·				
Name	▲ ID	State	User	Capacity (GB)		Host Informa	ition	
E LUN 0		0 Ready			50.000	VSPEX-Serve	er-1	
LUN 1		1 Ready			50.000	VSPEX-Serve	er-3	
ELUN 2		2 Ready			50.000	VSPEX-Serve	er-2	
EUN 3		3 Ready			50.000	VSPEX-Serve	er-4	
EUN 4		4 Ready			50.000	VSPEX-Serve	er-5	
🗒 LUN 5		5 Ready			2141.336			
EUN 6		6 Ready			2141.336			
EUN 7		7 Ready			2141.336			
ELUN 8		8 Ready			2141.336			
E LUN 9		9 Ready			2141.336			
E LUN 10		10 Ready			2141.336			
LUN 11		11 Ready			2141.336			
LUN 12		12 Ready			2141.336			
😂 LUN 13		13 Ready			2141.336			
🚝 LUN 14		14 Ready			2141.336			
🚝 LUN 15		15 Ready			2141.336			
E LUN 16		16 Ready			2141.336			
🚝 LUN 17		17 Ready			2141.336			
LUN 18		18 Ready			2141.336			

7. Select all the newly created LUNs, and click Add to Storage Group.

EMC Unisphere			Pool LL	JN 💽	Search
< > 1 VNX5300-VSPE	xv	<< d 📗 Syste	m Storage	🐌 Hosts	🐞 Data Protection
<u>VNX5300-VSPEX</u> > <u>Storage</u> >	LUNs				
LUNs Folders					
LUNs					💈 🍸 🔧 💿 🧿
Y , Filter for	Usage ALL	User LUNs 💽 F	older All 💌 Status All		~
Name	State	User Capacity (GB)	Host Information		
🛗 LUN 7	7 Ready	2141.336			
EUN 8	8 Ready	2141.336			
🖺 LUN 9	9 Ready	2141.336			
🖺 LUN 10	Ready	2141.336			
🖺 LUN 11	Ready	2141.336			
🖺 LUN 12	Ready	2141.336			
🗮 LUN 13	Ready	2141.336			
🗮 LUN 14	Ready	2141.336			
🖺 LUN 15	Ready	2141.336			
🛱 LUN 16	Ready	2141.336			
🛱 LUN 17	Ready	2141.336			
🖺 LUN 18	Ready	2141.336			~
<					>
14 Selected Create Dele	te Prop	erties Add to Sto	arage Group		Filtered: 19 of 19

Figure 203 Adding LUNs to Storage Group

8. Select all the five servers under Available Servers, and move them under Selected Storage Groups by clicking on ______. This would allow all ESXi hosts to see the datastore, which is essential for the vMotion of VMs across the cluster.

ſ

Figure 204

Select Storage Groups Available Storage Groups Name VSPEX-Server-1 VSPEX-Server-2 VSPEX-Server-4	Add to selected Storage Groups	
Select Storage Groups Available Storage Groups Name VSPEX-Server-1 VSPEX-Server-2 VSPEX-Server-3 VSPEX-Server-4 Available Storage	VNX5300-VSPEX	•
Available Storage Groups Selected Storage Groups Name VSPEX-Server-1 VSPEX-Server-2 VSPEX-Server-3 VSPEX-Server-4 Automatic and a second secon	Select Storage Groups	
Name VSPEX-Server-1 VSPEX-Server-2 VSPEX-Server-3 VSPEX-Server-4 VSPEX-Server-4 VSPEX-Server-4 VSPEX-Server-4	Available Storage Groups	Selected Storage Groups
VSPEX-Server-5 VSPEX-Server-2 VSPEX-Server-3 VSPEX-Server-4 VSPEX-Server-4	Name	Name
VSPEX-Server-1 VSPEX-Server-2 VSPEX-Server-4 VSPEX-Server-4	VSPEX-Server-5	
VSPEX-Server-2 VSPEX-Server-3 VSPEX-Server-4	VSPEX-Server-1	
VSPEX-Server-3	VSPEX-Server-2	
VSPEX-Server-4	VSPEX-Server-3	
P ~hilestorage	VSPEX-Server-4	
	😅 ~filestorage	

Selecting the Storage Groups

9. In the **LUNs** tab, you will see the storage group (and hence host) access for LUNs and their State showing Ready.

1

EMC Unispher	e				Pool LU	Search	
< >	VNX5300-VSPEX 💌	🔠 Dashboard	System	Storage	🐌 Hosts	📷 Data Protection	鋒 Settings
VNX5300-VSPEX	> <u>Storage</u> > LUNs						
LUNs Folders							nenenenenenenenenenenenen
LUNS							
Y Filter fo	r Usage	ALL User LUNs 💽 F	older All 💌	Status All	~		
Name	🔺 ID State	User Capacity	(GB) Host In	formation			
E LUN 0	0 Ready	50	.000 VSPEX-	Server-1			
E LUN 1	1 Ready	50	.000 VSPEX-	Server-3			
E LUN 2	2 Ready	50	.000 VSPEX-	Server-2			
🗑 LUN 3	3 Ready	50	.000 VSPEX-	Server-4			
EUN 4	4 Ready	50	.000 VSPEX-	Server-5			
EUN 5	5 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
EUN 6	6 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
😂 LUN 7	7 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
E LUN 8	8 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
E LUN 9	9 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
🕮 LUN 10	10 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
🗐 LUN 11	11 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	-Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
🗐 LUN 12	12 Ready	2141	.336 VSPEX-	Server-4; VSPEX-S	erver-3; VSPEX	Server-2; VSPEX-Serve	r-1; VSPEX-Server-5
1 Selected Cri	eate Delete Pr	operties Add to Stor	age Group				

Figure 205 Summary of the Configured LUNs

10. Login to vCenter GUI, select a host from the Hosts and Clusters window, click **Configuration** and then **Storage**. Click **Add Storage**.

🛃 VSPEX - vSphere Client					
File Edit View Inventory Administration Plug-ins Help					
🖸 🔝 🔥 Home 🕨 👸 Inventory 🕨 🛐 Hosts and Clusters	tory 🕨 🛐 Hosts and Clusters Search Inventory 🦉				
a e e e e e e e e e e e e e e e e e e e					
Image: System of the syste	Performance Configuration Tasks & Events Alarms Permissions View: Datastores Datastores Identification Status Device Drive Type datastore1 (5) Normal DGC Fibre Channel Non-SSD	Maps Storage Views Hardware Status Update Mar (Refresh Delete Add Storage Rescan All Capacky Free Type Last Upt 45.00 GB 44.05 GB VMF55 4/1/201			

Figure 206 Adding Storage in VMware vSphere Client

11. In the Storage Type area, click the Disk/LUN radio button in the Add Storage wizard. Click Next.



Figure 207 Selecting a Storage Type

12. Select the first DGC Fibre Channel Disk (..) from the list and click Next.

Figure 208

JN elect Disk/LUN	Name, Identifier, Path ID, LUN, Capacit	y, Expandable or VMFS	i Label c		(
e System Version	Name	Path ID	LUN /	Drive Type	Capa
irrent Disk Layout operties	Local LSI Disk (naa.64403a70b495e	vmhba0:C2:T0:L0	0	Non-SSD	184.40
rmatting	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L3	3	Non-SSD	2.0
to Complete	DGC Fibro Channel Disk (naa. 60060	vmhba1+C0+T1+L1	1	Non SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L5	5	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L6	6	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L7	7	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L8	8	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L9	9	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L10	10	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L11	11	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L12	12	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L13	13	Non-SSD	2.0
	DGC Fibre Channel Disk (naa.60060	vmhba1:C0:T1:L14	14	Non-SSD	2.09

Selecting the First DCG Fibre Channel Disk

13. Enter VM-DS1 in the datastore name field as the first datastore and click Next and then Finish.

1

🛃 Add Storage				
Properties Specify the properties for t	he datatore			
Disk/LUN Select Disk/LUN File System Version Current Disk Lavout Properties Formatting Ready to Complete	Enter a datastore name			
Help		≤Back	Next ≥	Cancel

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Figure 209 Specifying Datastore Name for Current Disk Layout

14. Repeat steps 10 to 13 for all the 14 datastores. Once datastores are added to one host, it would automatically show up for the other hosts too. The end result is as shown in Figure 210 on each host.

🛃 VSPEX - vSphere Client							
File Edit View Inventory Administr	ation Plug-ins Help						
🖸 🔯 🏠 Home 🕨 🛃 Inv	ventory 🕨 🎁 Hosts and Clusters				🛃 🗸 Search I	nventory	Q
5 c :: 8 0 4							
	10.65.121.209 VMware ESXI, 5.1.0, 79 Getting Started Summary Virtual Ma	9733 chines Performance Confi	guration fasks &	Events Alarms Permissions	laps Storage Views	Hardware Status	Update Mar 🜗
10.65.121.205	Hardware	View: Datastores De	vices				
10.65.121.207	Processors	Datastores			Refresh Delete	Add Storage	Rescan All
10.65.121.208	Memory	Identification	Status	Device Drive Type	Capacity	Free Type	Last Up
10.65.121.209	▶ Storage	datastore1 (1)	Normal	DGC Fibre Channel Non-SSD	45.00 GB	44.05 GB VMF55	5 4/1/201
	Networking	WM-DS1	Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Storage Adapters	WM-DS10	🤣 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Network Adapters	VM-DS11	🤣 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Advanced Settings	VM-D512	🤣 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Power Management	WM-DS2	🥏 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
		WM-DS3	Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Software	WM-DS4	Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Licensed Features	I VM-DS5	Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	Time Configuration	WM-D56	Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF55	5 4/1/201
	DNS and Routing	VM-D57	🦁 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF58	5 4/1/201
	Authentication Services	I VM-DS8	🥏 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF5	5 4/1/201
	Power Management	🗑 VM-D59	🥏 Normal	DGC Fibre Channel Non-SSD	2.09 TB	2.09 TB VMF5	5 4/1/201
	Virtual Machine Startun/Shutdown		,				
	Virtual Machine Scarcop/Structown						
	Security Profile	4					•
	Heat Casha Configuration	Datastore Details					Properties
	Host Cache Configuration						Propercies
	System Resource Allocation						

iSCSI-variant

In section "Prepare and configure storage array for resource pools and iSCSI servers", we demonstrated how to create resource pool and iSCSI servers on VNXe storage array. Later in the "Configure datastores for ESXi images" section, we demonstrated how to create datastore. You need to deploy 10 additional datastores with 6+1 RAID5 pools for Virtual Machines using the same steps. Please refer to the storage architecture section for the size of the datastore. Following table summarizes the relationship between resource pool, iSCSI servers and datastores:

Table 10 Relationship between resource pool, iSCSI servers and datastores

Data-Resource-pool	iSCSI Servers	IP1: eth10	Data-Store-1
1	Data-A: Active on SP-A	IP2: eth11	Data-Store-2
			Data-Store-3
			Data-Store-4
			Data-Store-5
	iSCSI Server	IP3: eth10	Data-Store-6
	Data-B: Active on SP-B	IP4: eth11	Data-Store-7
			Data-Store-8
			Data-Store-9
			Data-Store-10

Figure 210 DataStores Added to a Host

Make sure that Data-Store-1 and Data-Store-2 are available from all the ESXi hosts. Discover the newly created datastores from the vCenter 5.1 server by rescanning the iSCSI datastores from all the hosts in the cluster.

Next subsection explains how to deploy virtual machines using vCenter GUI.

Template-Based Deployments for Rapid Provisioning



In an environment with established procedures, deploying new application servers can be streamlined, but can still take many hours or days to complete. Not only must you complete an OS installation, but downloading and installing service packs and security updates can add a significant amount of time. Many applications require features that are not installed with Windows by default and must be installed prior to installing the applications. Inevitably, those features require more security updates and patches. By the time all deployment aspects are considered, more time is spent waiting for downloads and installs than is spent configuring the application.

Virtual machine templates can help speed up this process by eliminating most of these monotonous tasks. By completing the core installation requirements, typically to the point where the application is ready to be installed, you can create a golden image which can be sealed and used as a template for all of your virtual machines. Depending on how granular you want to make a specific template, the time to deployment can be as little as the time it takes to install, configure, and validate the application. You can use PowerShell tools and VMware vSphere Power CLI to bring the time and manual effort down dramatically.

Make sure to spread VMs across different VM datastores to properly load-balance the storage usage. The final snap-shot of VMs in a cluster would look similar to the following figure:



Figure 212 Summary of the Cluster in VMware vSphere Client

Validating Cisco Solution for EMC VSPEX VMware Architectures

This section provides a list of items that should be reviewed once the solution has been configured. The goal of this section is to verify the configuration and functionality of specific aspects of the solution, and ensure that the configuration supports core availability requirements.

Post Install Checklist

The following configuration items are critical to functionality of the solution, and should be verified prior to deployment into production.

- Create a test virtual machine that accesses the datastore and is able to do read/write operations. Perform the virtual machine migration (vMotion) to a different host on the cluster.
- Perform storage vMotion from one datastore to another datastore and ensure correctness of data.
- During the vMotion of the virtual machine, have a continuous ping to default gateway and make sure that network connectivity is maintained during and after the migration.

Verify the Redundancy of the Solution Components

Following redundancy checks were performed at the Cisco lab to verify solution robustness. A continuous ping from VM to VM, and vCenter to ESXi hosts should not show significant failures (one or two ping drops might be observed at times, such as FI reboot). Also, all the datastores must be visible and accessible from all the hosts at all the time.

- 1. Administratively shutdown one of the two server ports connected to the Fabric Extender A. Make sure that connectivity is not affected. Upon administratively enabling the shutdown port, the traffic should be rebalanced. This can be validated by clearing interface counters and showing the counters after forwarding some data from virtual machines on the Nexus switches.
- **2.** Administratively shutdown both server ports connected to Fabric Extender A. ESXi hosts should be able to use fabric B in this case.
- **3.** Administratively shutdown one of the two data links connected to the storage array from FI. Make sure that storage is still available from all the ESXi hosts. Upon administratively enabling the shutdown port, the traffic should be rebalanced. Repeat this step for each link connected to the Storage Processors one after another.
- 4. Reboot one of the two Fabric Interconnects while storage and network access from the servers are going on. The switch reboot should not affect the operations of storage and network access from the VMs. Upon rebooting the FI, the network access load should be rebalanced across the two fabrics.
- **5.** Reboot the active storage processor of the VNXe storage array and make sure that all the iSCSI shares are still accessible during and after the reboot of the storage processor.
- **6.** Fully load all the virtual machines of the solution. Put one of the ESXi host in maintenance mode. All the VMs running on that host should be migrated to other active hosts. No VM should lose any network or storage accessibility during or after the migration. This test assumes that enough RAM is available on active ESXi hosts to accommodate VMs from the host put in maintenance mode.
- 7. Reboot the host in maintenance mode, and put it out of the maintenance mode. This should rebalance the VM distribution across the cluster.

Cisco Validation Test Profile

vdbench testing tool was used with Windows 2008 R2 SP1 server to test scaling of the solution in Cisco labs. Table 11 details on the test profile used.

Profile characteristic	Value
Number of virtual machines	100 or 125 depending on the architecture
Virtual machine OS	Windows Server 2008 R2 SP1
Processors per virtual machine	1
Number of virtual processors per physical CPU core	4

Table 11 Test profile details

Profile characteristic	Value
RAM per virtual machine	2 GB
Average storage available for each virtual machine	100 GB
Average IOPS per virtual machine	25 IOPS
Number of datastores to store virtual machine disks	2
Disk and RAID type for datastores	RAID 5, 600 GB, 15k wpm, 3.5 inch SAS disks

Table 11 Test profile details

Bill of Material

Table 12 gives the list of the components used in the CVD for 250 virtual machines configuration.

 Table 12
 List of hardware components used in the CVD

Description	Part #
4 x UCS C220 M3 rack servers	UCSC-C220-M3S
CPU for C220 M3 rack servers (2 per server)	UCS-CPU-E5-2650
Memory for C220 M3 rack servers (4 per server)	UCS-MR-1X162RY-A
Cisco UCS 1225 VIC adapter (1 per server)	UCSC-PCIE-CSC-02
UCS 6248UP Fabric Interconnects (2)	UCS-FI-6248UP
UCS 2232PP Fabric Extenders (2)	N2K-C2232PP-10GE
10 Gbps SFP+ multifiber mode	SFP-10G-SR

For more information on part numbers and options available for customization, see Cisco C220 M3 server specsheet at:

http://www.cisco.com/en/US/prod/collateral/ps10265/ps10493/C220M3_SFF_SpecSheet.pdf

Customer Configuration Data Sheet

Before you start the configuration, gather the customer-specific network and host configuration information. Table 13, Table 14, Table 15, Table 16, Table 17, Table 18, Table 19 provide information on assembling the required network, host address, numbering, and naming information. This worksheet can also be used as a "leave behind" document for future reference.

Server Name	Purpose	Primary IP
	Domain Controller	
	DNS Primary	
	DNS Secondary	

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 Table 13
 Common Server Information

Server Name	Purpose	Primary IP	
	DHCP		
	NTP		
	SMTP		
	SNMP		
	vCenter Console		
	SQL Server		

Table 13Common Server Information

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Table 14ESXi Server Information

Server Name	Purpose	Primary IP	Private Net (storage) addresses	VMkernel IP	vMotion IP
	ESXi Host1				

Table 15 Array Information

Array name	
Admin account	
Management IP	
Storage pool name	
Datastore name	
NFS Server IP	

Table 16 Network Infrastructure Information

Description	IP	Subnet Mask	Default Gateway
Cisco UCSM Virtual IP address			
Cisco UCS Fabric Interconnect A			
Cisco UCS Fabric Interconnect B			

Name	Network Purpose	VLAN ID	Allowed Subnets
vSphereMgmt	Virtual Machine Networking ESXi Management		
Storage (A)	iSCSI VLAN on fabric A (iSCSI-variant only)		
Storage (B)	iSCSI VLAN on fabric B (iSCSI-variant only)		
vMotion	vMotion traffic network		
vlan-data (multiple)	Data VLAN of customer VMs as needed		

Table 17 VLAN Information

Table 18 VSAN Information

Name	Network Purpose	VSAN ID	FCoE VLAN ID
Storage	storage access		

Table 19Service Accounts

Account	Purpose	Password (optional, secure appropriately)
	Windows Server administrator	
root	ESXi root	
	Array administrator	
	vCenter administrator	
	SQL Server administrator	

References

Cisco UCS:

http://www.cisco.com/en/US/solutions/ns340/ns517/ns224/ns944/unified_computing.html

Cisco UCSM 2.1 configuration guides:

CLI:

http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/cli/config/guide/2.1/b_UCSM_CLI_Configuration_Guide_2_1.html

GUI:

http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/gui/config/guide/2.1/b_UCSM_GUI_Configuration_Guide_2_1.html

VMware vSphere:

http://www.vmware.com/products/vsphere/overview.html

VMware vSphere 5.1 Documentation:

http://pubs.vmware.com/vsphere-51/index.jsp EMC VNX5xxx series resources: http://www.emc.com/storage/vnx/vnx-series.htm#!resources EMC VNXe3xxx series resources: http://www.emc.com/storage/vnx/vnxe-series.htm#!resources Microsoft SQL Server installation guide:

http://msdn.microsoft.com/en-us/library/ms143219.aspx

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