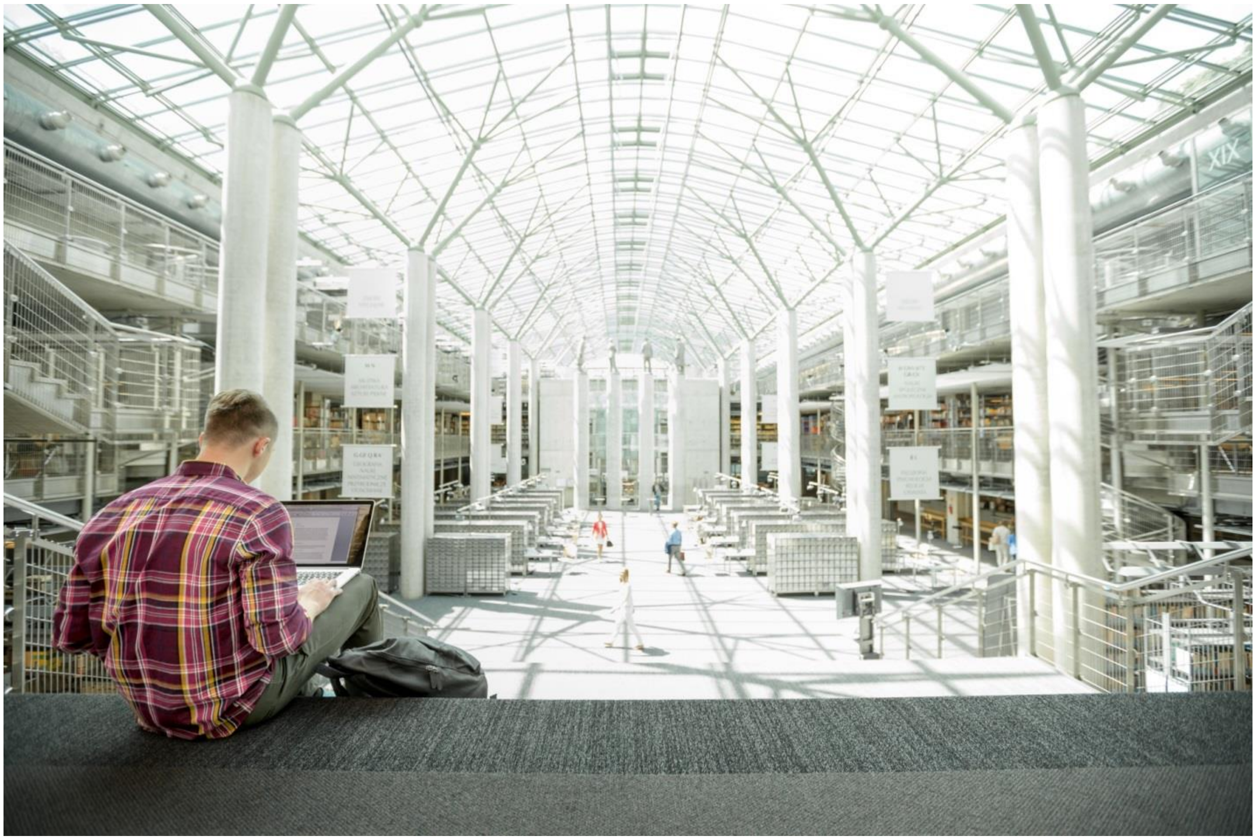

Cisco UCS S3260 M4 Storage Server with Scality RING

Design and Deployment of Scality Object Storage on Cisco UCS S3260 M4 Storage Server

Last Updated: June 20, 2018

CISCO VALIDATED DESIGN

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The Cisco Validated Design (CVD) program consists of systems and solutions designed, tested, and documented to facilitate faster, more reliable, and more predictable customer deployments. For more information, visit:

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Executive Summary

Cisco Validated Designs consist of systems and solutions that are designed, tested, and documented to facilitate and improve customer deployments. These designs incorporate a wide range of technologies and products into a portfolio of solutions that have been developed to address the business needs of our customers.

Traditional storage models are not optimized for the significant growth rates in unstructured data experienced by the majority of organizations today. These organizations require durable, easy to deploy storage that scales in line with business needs. Enterprises need agile, petabyte-scale access platforms that support growth, reduce complexity and offer cloud-like economics when storing and managing data assets. Distributed file and Object storage solutions provide an increasingly viable alternative in managing these challenges, delivering the following benefits:

- Unlimited linear scalability across scale out file system and object workloads via a broad family of application interfaces such as S3, NFS, SMB, etc.
- Predictable, multi-petabyte, geographically distributed deployment of unstructured data.
- High level of data integrity, storage efficiency and flexibility through replication, erasure coding and geo-distribution achieving 14x9s durability and 100% availability.
- Efficient and cost-effective capacity expansion and server replacement for enhanced overall lifecycle management with automatic data rebalancing and self-healing, avoiding fork-lift upgrades.
- Custom creation and search of metadata for objects.

Traditional enterprise storage systems designed to address business-critical requirements in the data center are clearly not suited for unstructured data use cases such as backup and archive, private and hybrid cloud, video and content distribution, media near line archives, medical imaging, public cloud email and public cloud consumer services workloads etc.

Scality RING is a Software-Defined Storage (SDS) solution that turns a pool of x86 Linux based servers into an unbounded scale-out storage system that delivers petabyte-scale, on-premises unified storage. Providing a ubiquitous storage platform with substantially lower TCO than a traditional storage approach and with the unbundling of software and hardware, Scality RING offers cloud-like economics, assurance of data control and the consolidation of legacy and modern applications at scale, enabling organizations to build web-scale storage infrastructures to meet performance and availability requirements with up to 90% reduction in TCO.

The Cisco UCS S3260 Storage Server, originally designed for the data center, together with Scality RING is optimized for object storage solutions, making it an excellent fit for unstructured data workloads such as backup, archive, and cloud data. The Cisco UCS S3260 delivers a complete infrastructure with exceptional scalability for computing and storage resources together with 40 Gigabit Ethernet networking. The Cisco UCS S3260 is the platform of choice for object storage solutions because it provides more than comparable platforms:

- Proven server architecture that allows you to upgrade individual components without the need for migration
- High-bandwidth networking that meets the needs of large-scale object storage solutions like Scality RING Storage
- Unified, embedded management for easy-to-scale infrastructure

Cisco and Scality are collaborating to offer customers a scalable object storage solution for unstructured data that is integrated with Scality RING Storage. With the power of the Cisco UCS management framework, the solution is cost effective to deploy and manage and will enable the next-generation cloud deployments that drive business agility, lower operational costs and avoid vendor lock-in.

Solution Overview

Introduction

Traditional storage systems are limited in their ability to easily and cost-effectively scale to support massive amounts of unstructured data. With about 80 percent of data being unstructured, new approaches using x86 servers are proving to be more cost effective, providing storage that can be expanded as easily as your data grows. Distributed file and object storage is the newest approach for handling massive amounts of data.

Scality is an industry leader in enterprise-class, petabyte-scale storage. Scality introduced a revolutionary software-defined storage platform that could easily manage exponential data growth, ensure high availability, deliver high performance and reduce operational cost. Scality's scale-out storage solution, Scality RING, is based on patented object storage technology and operates seamlessly on commodity server hardware. It delivers outstanding scalability and data persistence, while its end-to-end parallel architecture provides unsurpassed performance. Scality's storage infrastructure integrates seamlessly with applications through standard storage protocols such as S3, NFS, and S3.

Scale-out object storage uses x86 architecture storage-optimized servers to increase performance while reducing costs. The Cisco UCS S3260 Storage Server is well suited for distributed file and object-storage solutions. It provides a platform that is cost effective to deploy and manage using the power of the Cisco Unified Computing System (Cisco UCS) management: capabilities that traditional unmanaged and agent-based management systems cannot offer. You can design Cisco UCS S3260 solutions for a computing-intensive, capacity-intensive, or throughput-intensive workload.

Both solutions together, Scality Object Storage and Cisco UCS S3260 Storage Server, deliver a simple, fast and scalable architecture for enterprise scale-out storage~~.~~

Solution

This Cisco Validated Design is a simple and linearly scalable architecture that provides object storage solution on Scality RING and Cisco UCS S3260 Storage Server. The solution includes the following features:

- Infrastructure for large scale object storage
- Design of a Scality Object Storage solution together with Cisco UCS S3260 Storage Server
- Simplified infrastructure management with Cisco UCS Manager
- Architectural scalability – linear scaling based on network, storage, and compute requirements

Audience

This document describes the architecture, design and deployment procedures of a Scality Object Storage solution using six Cisco UCS S3260 Storage Server with two C3X60 M4 server nodes each as Storage nodes, one Cisco UCS C220 M4S rackserver as Supervisor node, and two Cisco UCS 6332 Fabric Interconnect managed by Cisco UCS Manager. The intended audience for this document includes, but is not limited to, sales engineers, field consultants, professional services, IT managers, partner engineering, and customers who want to deploy Scality object Storage on the Cisco Unified Computing System using Cisco UCS S3260 Storage Servers.

Solution Summary

This CVD describes in detail the process of deploying Scality Object Storage on Cisco UCS S3260 Storage Server.

The configuration uses the following architecture for the deployment:

- 6 x Cisco UCS S3260 Storage Server with 2 x C3X60 M4 server nodes working as Storage nodes and Connectors.
- 1 x Cisco UCS C220 M4S rack server working as Supervisor node
- 2 x Cisco UCS 6332 Fabric Interconnect
- 1 x Cisco UCS Manager
- 2 x Cisco Nexus 9332PQ Switches
- Scality RING 7.4.0.2
- Redhat Enterprise Linux Server 7.4

Technology Overview

Cisco Unified Computing System

The Cisco Unified Computing System is a state-of-the-art data center platform that unites computing, network, storage access, and virtualization into a single cohesive system.

The main components of Cisco Unified Computing System are:

- Computing - The system is based on an entirely new class of computing system that incorporates rack-mount and blade servers based on Intel Xeon Processor E5 and E7. The Cisco UCS servers offer the patented Cisco Extended Memory Technology to support applications with large datasets and allow more virtual machines (VM) per server.

- Network - The system is integrated onto a low-latency, lossless, 40-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 (NFS or iSCSI), Fibre Channel, and Fibre Channel over Ethernet (FCoE). 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.

The Cisco Unified Computing System is designed to deliver:

- A reduced Total Cost of Ownership (TCO) 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.

- Industry standards supported by a partner ecosystem of industry leaders.

Cisco UCS S3260 Storage Server

The Cisco UCS Storage Server (Figure 1) is a modular, high-density, high-availability, dual node rack server well-suited for service providers, enterprises, and industry-specific environments. It addresses the need for dense cost effective storage for the ever-growing data needs. Designed for a new class of cloud-scale applications, it is simple to deploy and excellent for big data applications, software-defined storage environments, and other unstructured data repositories, media streaming, and content distribution.

Figure 1 The Cisco UCS® S3260 Storage Server

Extending the capability of the Cisco UCS C3000 portfolio, the Cisco UCS S3260 helps you achieve the highest levels of data availability. With dual-node capability that is based on the Intel® Xeon® processor E5-2600 v4 series, it features up to 600 TB of local storage in a compact 4-rack-unit (4RU) form factor. All hard-disk drives can be asymmetrically split between the dual-nodes and are individually hot-swappable. The drives can be built-in in an enterprise-class Redundant Array of Independent Disks (RAID) redundancy or be in a pass-through mode.

This high-density rack server comfortably fits in a standard 32-inch depth rack, such as the Cisco® R42610 Rack.

The Cisco UCS S3260 is deployed as a standalone server in both bare-metal or virtualized environments. Its modular architecture reduces total cost of ownership (TCO) by allowing you to upgrade individual components over time and as use cases evolve, without having to replace the entire system.

The Cisco UCS S3260 uses a modular server architecture that, using Cisco's blade technology expertise, allows you to upgrade the computing or network nodes in the system without the need to migrate data migration from one system to another. It delivers:

- Dual server nodes
- Up to 36 computing cores per server node
- Up to 60 drives mixing a large form factor (LFF) with up to 14 solid-state disk (SSD) drives plus 2 SSD SATA boot drives per server node
- Up to 512 GB of memory per server node (1 terabyte [TB] total)
- Support for 12-Gbps serial-attached SCSI (SAS) drives
- A system I/O Controller with Cisco VIC 1300 Series Embedded Chip supporting Dual-port 40Gbps
- High reliability, availability, and serviceability (RAS) features with tool-free server nodes, system I/O controller, easy-to-use latching lid, and hot-swappable and hot-pluggable components

Cisco UCS C220 M4 Rack Server

The Cisco UCS® C220 M4 Rack Server (Figure 2) is the most versatile, general-purpose enterprise infrastructure and application server in the industry. It is a high-density two-socket enterprise-class rack server that delivers industry-leading performance and efficiency for a wide range of enterprise workloads, including virtualization, collaboration, and bare-metal applications. The Cisco UCS C-Series Rack Servers can be deployed as standalone servers or as part of the Cisco Unified Computing System™ (Cisco UCS) to take advantage of Cisco's standards-based unified computing innovations that help reduce customers' total cost of ownership (TCO) and increase their business agility.

Figure 2 Cisco UCS C220 M4 Rack Server

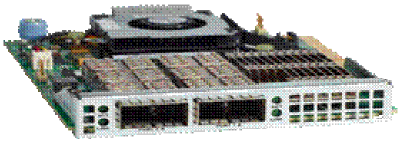
The enterprise-class Cisco UCS C220 M4 rack server extends the capabilities of the Cisco UCS portfolio in a 1RU form factor. It incorporates the Intel® Xeon® processor E5-2600 v4 and v3 product family, next-generation DDR4 memory, and 12-Gbps SAS throughput, delivering significant performance and efficiency gains. The Cisco UCS C220 M4 rack server delivers outstanding levels of expandability and performance in a compact 1RU package:

- Up to 24 DDR4 DIMMs for improved performance and lower power consumption
- Up to 8 Small Form-Factor (SFF) drives or up to 4 Large Form-Factor (LFF) drives
- Support for 12-Gbps SAS Module RAID controller in a dedicated slot, leaving the remaining two PCIe Gen 3.0 slots available for other expansion cards
- A modular LAN-on-motherboard (mLOM) slot that can be used to install a Cisco UCS virtual interface card (VIC) or third-party network interface card (NIC) without consuming a PCIe slot
- Two embedded 1Gigabit Ethernet LAN-on-motherboard (LOM) ports

Cisco UCS Virtual Interface Card 1387

The Cisco UCS Virtual Interface Card (VIC) 1387 (Figure 3) is a Cisco® innovation. It provides a policy-based, stateless, agile server infrastructure for your data center. This dual-port Enhanced Quad Small Form-Factor Pluggable (QSFP) half-height PCI Express (PCIe) modular LAN-on-motherboard (mLOM) adapter is designed exclusively for Cisco UCS C-Series and 3260 Rack Servers. The card supports 40 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE). It incorporates Cisco's next-generation converged network adapter (CNA) technology and offers a comprehensive feature set, providing investment protection for future feature software releases. The card can present more than 256 PCIe standards-compliant interfaces to the host, and these can be dynamically configured as either network interface cards (NICs) or host bus adapters (HBAs). In addition, the VIC supports Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology. This technology extends the Cisco UCS fabric interconnect ports to virtual machines, simplifying server virtualization deployment.

Figure 3 Cisco UCS Virtual Interface Card 1387



The Cisco UCS VIC 1387 provides the following features and benefits:

- Stateless and agile platform: The personality of the card is determined dynamically at boot time using the service profile associated with the server. The number, type (NIC or HBA), identity (MAC address and World Wide Name [WWN]), failover policy, bandwidth, and quality-of-service (QoS) policies of the PCIe interfaces are all determined using the service profile. The capability to define, create, and use interfaces on demand provides a stateless and agile server infrastructure

- Network interface virtualization: Each PCIe interface created on the VIC is associated with an interface on the Cisco UCS fabric interconnect, providing complete network separation for each virtual cable between a PCIe device on the VIC and the interface on the fabric interconnect

Cisco UCS 6300 Series Fabric Interconnect

The Cisco UCS 6300 Series Fabric Interconnects are a core part of Cisco UCS, providing both network connectivity and management capabilities for the system (Figure 4). The Cisco UCS 6300 Series offers line-rate, low-latency, lossless 10 and 40 Gigabit Ethernet, Fibre Channel over Ethernet (FCoE), and Fibre Channel functions.

Figure 4 Cisco UCS 6300 Series Fabric Interconnect

The Cisco UCS 6300 Series provides the management and communication backbone for the Cisco UCS B-Series Blade Servers, 5100 Series Blade Server Chassis, and C-Series Rack Servers managed by Cisco UCS. All servers attached to the fabric interconnects become part of a single, highly available management domain. In addition, by supporting unified fabric, the Cisco UCS 6300 Series provides both LAN and SAN connectivity for all servers within its domain.

From a networking perspective, the Cisco UCS 6300 Series uses a cut-through architecture, supporting deterministic, low-latency, line-rate 10 and 40 Gigabit Ethernet ports, switching capacity of 2.56 terabits per second (Tbps), and 320 Gbps of bandwidth per chassis, independent of packet size and enabled services. The product family supports Cisco® low-latency, lossless 10 and 40 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 the server through the fabric interconnect. Significant TCO savings can be achieved with an FCoE optimized server design in which network interface cards (NICs), host bus adapters (HBAs), cables, and switches can be consolidated.

The Cisco UCS 6332 32-Port Fabric Interconnect is a 1-rack-unit (1RU) Gigabit Ethernet, and FCoE switch offering up to 2.56 Tbps throughput and up to 32 ports. The switch has 32 fixed 40-Gbps Ethernet and FCoE ports.

Both the Cisco UCS 6332UP 32-Port Fabric Interconnect and the Cisco UCS 6332 16-UP 40-Port Fabric Interconnect have ports that can be configured for the breakout feature that supports connectivity between 40 Gigabit Ethernet ports and 10 Gigabit Ethernet ports. This feature provides backward compatibility to existing hardware that supports 10 Gigabit Ethernet. A 40 Gigabit Ethernet port can be used as four 10 Gigabit Ethernet ports. Using a 40 Gigabit Ethernet SFP, these ports on a Cisco UCS 6300 Series Fabric Interconnect can connect to another fabric interconnect that has four 10 Gigabit Ethernet SFPs. The breakout feature can be configured on ports 1 to 12 and ports 15 to 26 on the Cisco UCS 6332UP fabric interconnect. Ports 17 to 34 on the Cisco UCS 6332 16-UP fabric interconnect support the breakout feature.

Cisco Nexus 9332PQ Switch

The Cisco Nexus® 9000 Series Switches include both modular and fixed-port switches that are designed to overcome these challenges with a flexible, agile, low-cost, application-centric infrastructure.

Figure 5 Cisco 9332PQ

The Cisco Nexus 9300 platform consists of fixed-port switches designed for top-of-rack (ToR) and middle-of-row (MoR) deployment in data centers that support enterprise applications, service provider hosting, and cloud computing environments. They are Layer 2 and 3 nonblocking 10 and 40 Gigabit Ethernet switches with up to 2.56 terabits per second (Tbps) of internal bandwidth.

The Cisco Nexus 9332PQ Switch is a 1-rack-unit (1RU) switch that supports 2.56 Tbps of bandwidth and over 720 million packets per second (mpps) across thirty-two 40-Gbps Enhanced QSFP+ ports

All the Cisco Nexus 9300 platform switches use dual- core 2.5-GHz x86 CPUs with 64-GB solid-state disk (SSD) drives and 16 GB of memory for enhanced network performance.

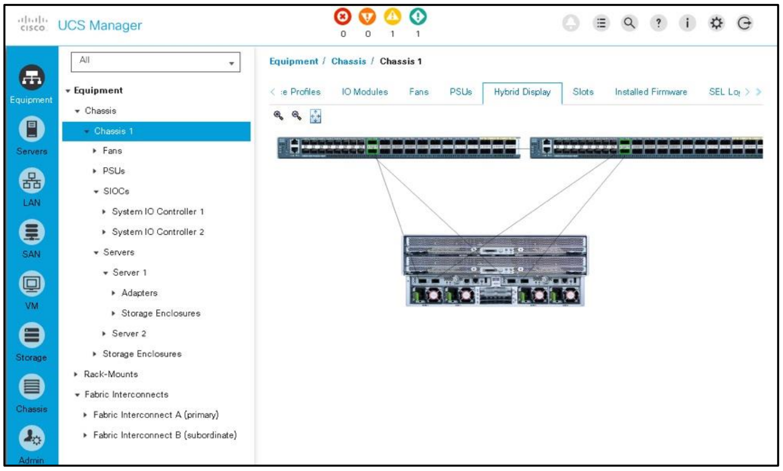
With the Cisco Nexus 9000 Series, organizations can quickly and easily upgrade existing data centers to carry 40 Gigabit Ethernet to the aggregation layer or to the spine (in a leaf-and-spine configuration) through advanced and cost-effective optics that enable the use of existing 10 Gigabit Ethernet fiber (a pair of multimode fiber strands).

Cisco provides two modes of operation for the Cisco Nexus 9000 Series. Organizations can use Cisco® NX-OS Software to deploy the Cisco Nexus 9000 Series in standard Cisco Nexus switch environments. Organizations also can use a hardware infrastructure that is ready to support Cisco Application Centric Infrastructure (Cisco ACI™) to take full advantage of an automated, policy-based, systems management approach.

Cisco UCS Manager

Cisco UCS® Manager provides unified, embedded management of all software and hardware components of the Cisco Unified Computing System™ (Cisco UCS) across multiple chassis, rack servers and thousands of virtual machines. It supports all Cisco UCS product models, including Cisco UCS B-Series Blade Servers, C-Series Rack Servers, and M-Series composable infrastructure and Cisco UCS Mini, as well as the associated storage resources and networks. Cisco UCS Manager is embedded on a pair of Cisco UCS 6300 or 6200 Series Fabric Interconnects using a clustered, active-standby configuration for high availability. The manager participates in server provisioning, device discovery, inventory, configuration, diagnostics, monitoring, fault detection, auditing, and statistics collection.

Figure 6 Cisco UCS Manager



An instance of Cisco UCS Manager with all Cisco UCS components managed by it forms a Cisco UCS domain, which can include up to 160 servers. In addition to provisioning Cisco UCS resources, this infrastructure management software provides a model-based foundation for streamlining the day-to-day processes of updating, monitoring, and managing computing resources, local storage, storage connections, and network connections. By enabling better automation of processes, Cisco UCS Manager allows IT organizations to achieve greater agility and scale in their infrastructure operations while reducing complexity and risk. The manager provides flexible role- and policy-based management using service profiles and templates.

Cisco UCS Manager manages Cisco UCS systems through an intuitive HTML 5 or Java user interface and a command-line interface (CLI). It can register with Cisco UCS Central Software in a multi-domain Cisco UCS environment, enabling centralized management of distributed systems scaling to thousands of servers. UCS Manager can be integrated with Cisco UCS Director to facilitate orchestration and to provide support for converged infrastructure and Infrastructure as a Service (IaaS).

The Cisco UCS XML API provides comprehensive access to all Cisco UCS Manager functions. The API provides Cisco UCS system visibility to higher-level systems management tools from independent software vendors (ISVs) such as VMware, Microsoft, and Splunk as well as tools from BMC, CA, HP, IBM, and others. ISVs and in-house developers can use the XML API to enhance the value of the Cisco UCS platform according to their unique requirements. Cisco UCS PowerTool for Cisco UCS Manager and the Python Software Development Kit (SDK) help automate and manage configurations within Cisco UCS Manager.

Red Hat Enterprise Linux 7.4

Red Hat® Enterprise Linux® is a high-performing operating system that has delivered outstanding value to IT environments for more than a decade. More than 90 percent of Fortune Global 500 companies use Red Hat products and solutions including Red Hat Enterprise Linux. As the world's most trusted IT platform, Red Hat Enterprise Linux has been deployed in mission-critical applications at global stock exchanges, financial institutions, leading telcos, and animation studios. It also powers the websites of some of the most recognizable global retail brands.

Red Hat Enterprise Linux:

- Delivers high performance, reliability, and security
- Is certified by the leading hardware and software vendors
- Scales from workstations, to servers, to mainframes
- Provides a consistent application environment across physical, virtual, and cloud deployments

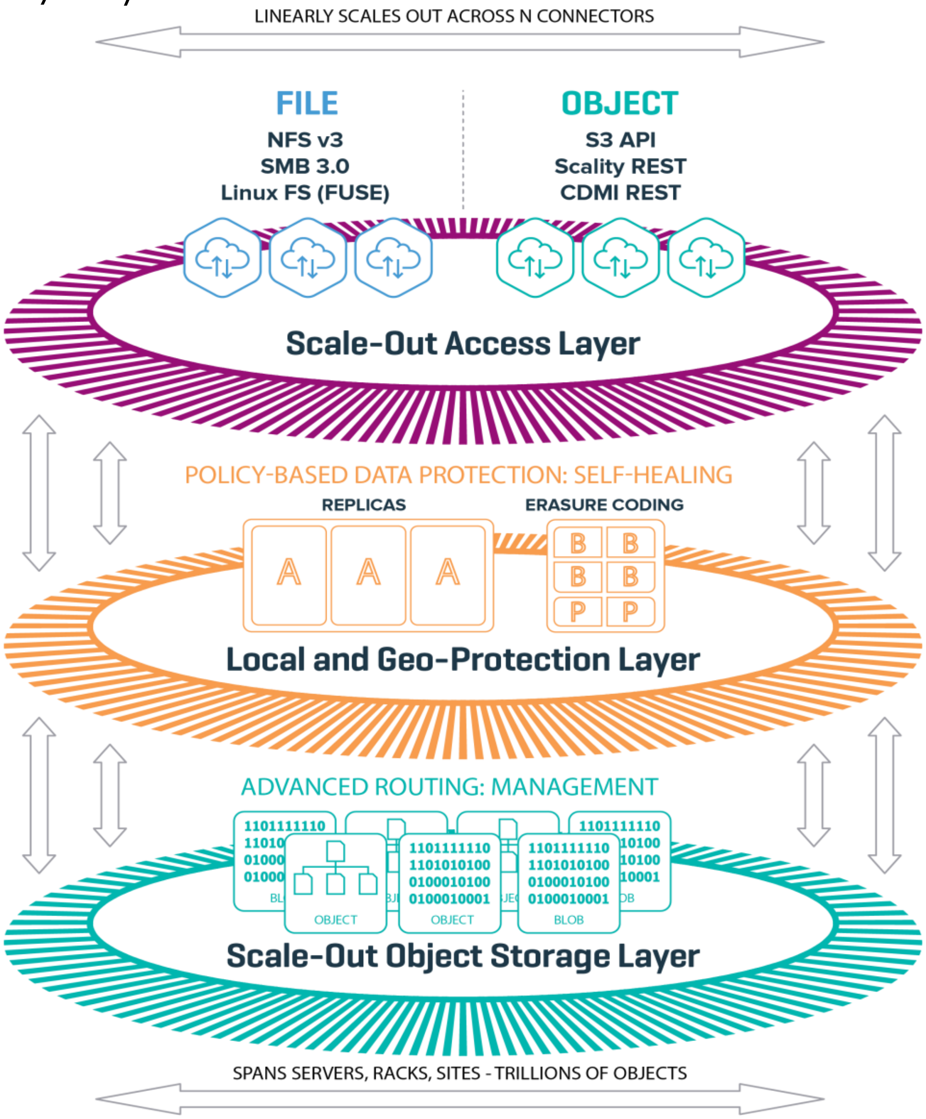
Designed to help organizations make a seamless transition to emerging datacenter models that include virtualization and cloud computing, Red Hat Enterprise Linux includes support for major hardware architectures, hypervisors, and cloud providers, making deployments across physical and different virtual environments predictable and secure. Enhanced tools and new capabilities in this release enable administrators to tailor the application environment to efficiently monitor and manage compute resources and security

Scality RING

The Storage market has shifted dramatically in the last few years from one that is dominated by proprietary storage appliances. Scality RING is designed to support a broad variety of application workloads in a capacity-optimized fashion. The data center has evolved from providing mainly back-office transactional services, to providing a much wider range of applications including cloud computing, content serving, distributed computing and archiving.

Scality RING software is designed as a distributed, 100 percent parallel, scale-out architecture with a set of intelligent services for data access and presentation, data protection and systems management.

Figure 7 Scality RING Architecture


LINEARLY SCALES OUT ACROSS N CONNECTORS
FILE
NFS v3
SMB 3.0
Linux FS (FUSE)
OBJECT
S3 API
Scality REST
CDMI REST
Scale-Out Access Layer
POLICY-BASED DATA PROTECTION: SELF-HEALING
REPLICAS
ERASURE CODING
A
A
A
B
B
B
B
P
P
Local and Geo-Protection Layer
ADVANCED ROUTING: MANAGEMENT
1101111110
1101010100
0100010100
0100010001
OBJECT
OBJECT
BLOB
Scale-Out Object Storage Layer
SPANS SERVERS, RACKS, SITES - TRILLIONS OF OBJECTS

The RING is architected around 3 logical layers:

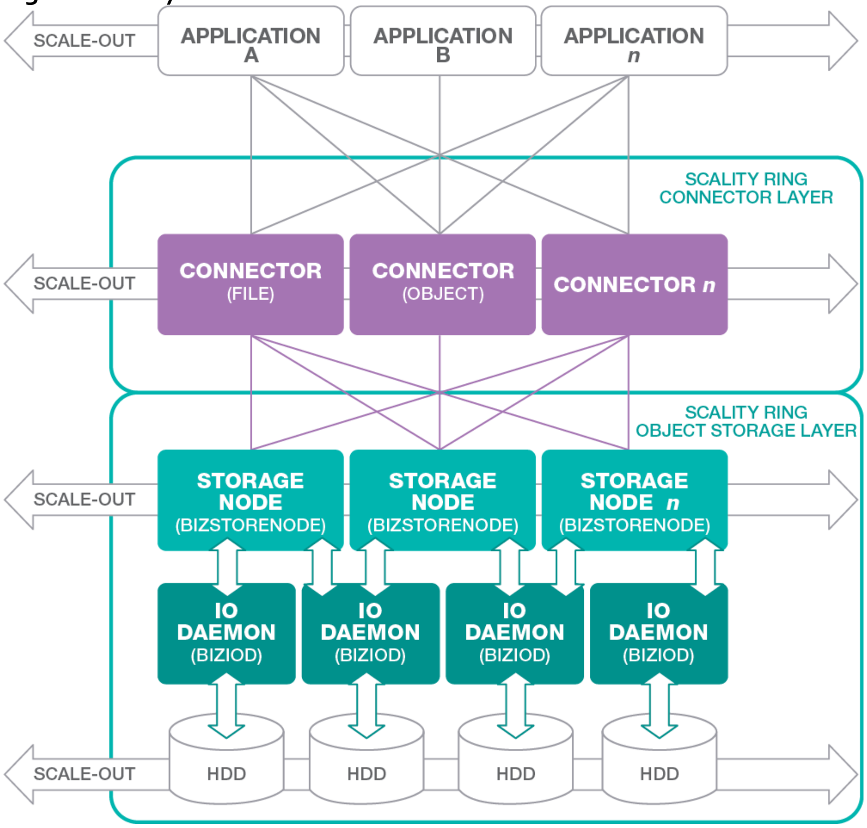
- Scale-out Access Layer
- Local and Geo Protection Layer
- Scale-out Object Storage Layer

At the heart of the storage layer is a distributed object key/value store, based on peer-to-peer routing protocol.

Scale-out Access Layer

The top layer has scalable access services (Connectors) that provide storage protocols for applications.

Figure 8 Scality Scale-out Architecture



RING Connectors

The Connectors provide the top-level access points and protocol services for applications that use the RING for data storage. Applications may make use of multiple connectors in parallel to scale out the number of operations per second, or the aggregate throughput of the RING for high numbers of simultaneous user connections.

The RING Connectors provide a family of application interfaces including object- based Connectors, the S3 connector that is based on AWS S3, and Scality's native REST API, as well as file system Connectors (NFS v3, SMB 3.0, and FUSE) to fit a rich set of applications and a wide variety of data types.

Local and Geo-Protection Layer

This layer of the RING contains a set of data protection mechanisms to ensure data durability and integrity, self-healing processes, and a set of systems management and monitoring services.

Data is persisted to the RING using two different protection schemes: Replication and Erasure Coding. These two models are described in more detail in a section below. All data protection is done extemporaneously and not after the fact. When an application receives acknowledgment that the data has been persisted, it means that it has been persisted already and fully protected.

Scale-Out Object Storage Layer

Storage Nodes and IO Daemons

Storage Nodes are virtual processes (Bizstorenode) that own and store a range of objects associated with its portion of the RING's 'Keyspace'. Each storage server is typically configured with six (6) storage node processes (Bizstorenode), and under these storage nodes are the storage IO daemons (Biziod), which are responsible for persistence of the data on disk, on a standard file system on a local disk. Each Biziod is a low-level process that manages the IO operations to a particular physical disk drive, maintaining the mapping between object ID's and the actual object locations on disk.

Each Biziod stores object payloads and metadata in a set of fixed size container files on each disk, with the storage daemon providing fast access for storage and retrieval operations into the container files. By containerizing objects, the system can still provide high-performance for small files and avoid the pitfalls of inode and management limits. The RING also leverages low-latency flash (SSD) devices for internal metadata for better performance.

The recommended deployment for systems that have both HDD and SSD media on the storage servers is to deploy a data RING on HDD, and the biziod metadata on SSD. Typically, the requirements for metadata are approximately 1% of the storage capacity of the actual data, so the sizing of SSD should follow that percentage for the best effect.

Scality S3 Connector

The Scality S3 Connector provides an advanced, modern S3 compatible application interface to the Scality RING. The AWS S3 service has become the leading cloud storage service and its API has furthermore emerged as the standard RESTful dialect for object storage, just like NFS was for the NAS generation. This is further amplified by the adoption of S3 among leading new and existing ISV's who deliver solutions in areas such as Backup and Archive (more traditional consumers of VTL and file-based storage interfaces), sync-n-share, file gateways and data mover solutions, media managers for video and image data and an increasing list of vertical industry solutions.

Rich AWS and Enterprise Security

Support for the full complement of AWS security services, such as multi- tenant accounts, Identity and Access Management (IAM) for users, groups and roles, AWS-style access keys and secret keys, the latest Signature v4 Authentication mechanism, and data encryption. Also featured is interoperability with such existing enterprise security services as LDAP and Microsoft® Active Directory® servers.

S3 API Compatibility

Notwithstanding rapid AWS advancements, a high-degree of S3 API coverage is assured, including core data APIs for Bucket and Object access and Multi-Part-Upload (MPU) for efficient ingest of large objects.

S3 Connector development is based on Continuous Integration (CI) and agile delivery of features when ready, which allows Scality to introduce new S3 methods shortly after their AWS publication. This functionality is provided by the S3 Server, which is supported by Scality as an open source project on GitHub.

Any-to-Any Scale-Out

Applications can access any Bucket or Object from any connector, thus allowing for parallel and multi-user access to data and scaling to billions of buckets and objects. Performance can be scaled-out simply by adding more connectors.

High-Performance Buckets

Support for low-latency response times and high throughput of reads and writes of Objects in Buckets. Also, performance is optimized for fast Bucket listing operations, including fast partial-path search for selected objects by path prefix.

Geo-Distributed Capabilities

S3 Connector provides integrated geo-replication capabilities for storage across multiple datacenters, supporting Active/Active stretched deployments for site disaster protection with continuous data availability and Site/Bucket level replication.

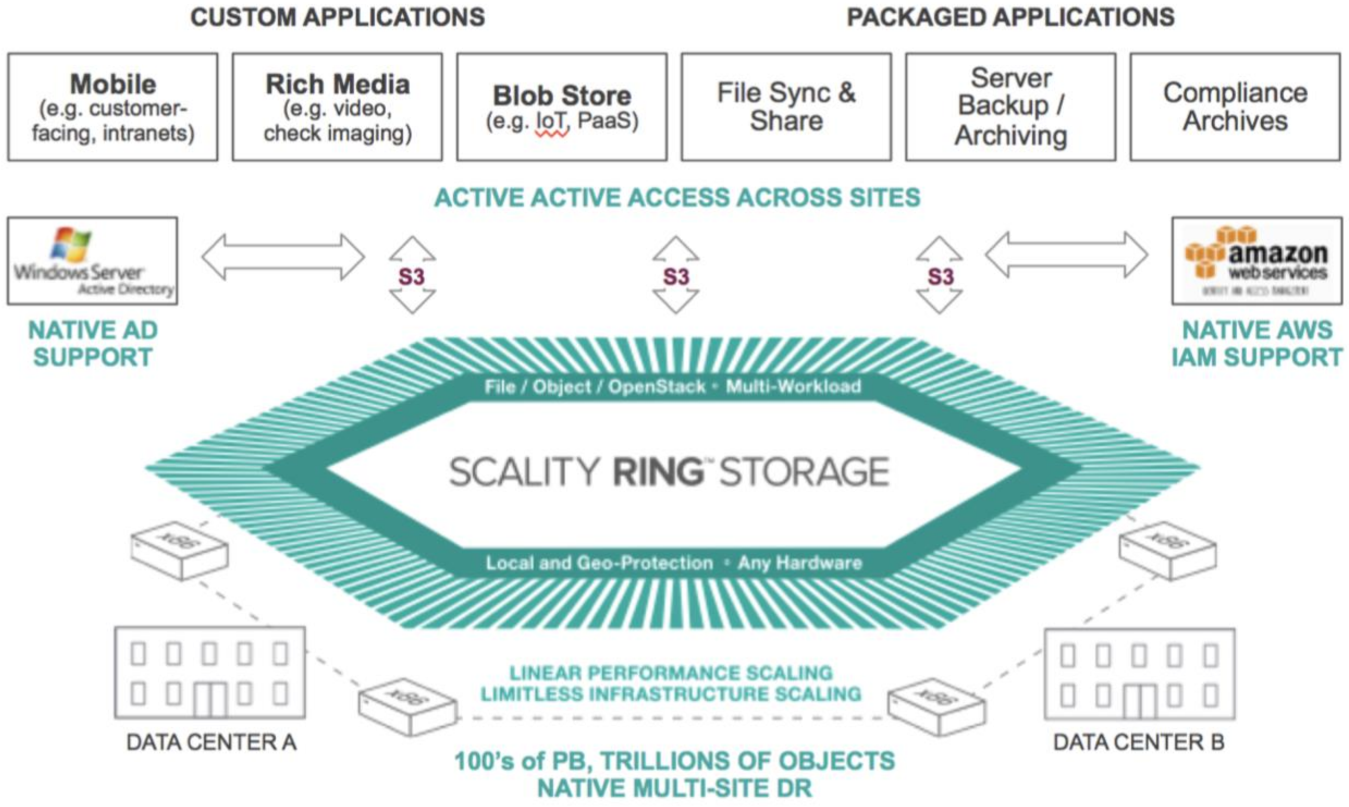
Object Versioning

Scality S3 Connector supports the AWS S3 Bucket Versioning API and follows the functional specifications of the AWS API. Versioning can be enabled and disabled on a per-Bucket basis. By enabling Versioning, the system will retain existing versions of an Object when it is modified. Previous versions of the object are therefore not overwritten but retained in a version history. Object reads will always access the most recent (current) version but can optionally specify a version ID to retrieve a specific older version of the object. This enables data restore capabilities if required in the event of a delete or inadvertent overwrite of the current version.

Ease of Deployment

Delivered as a set of easy-to-deploy Docker containers, installing the S3 Connector is simple, with zero-configuration across the customer's choice of physical, virtual or cloud environments.

Figure 9 Scality S3 Connector


CUSTOM APPLICATIONS
PACKAGED APPLICATIONS
Mobile (e.g. customer-facing, intranets)
Rich Media (e.g. video, check imaging)
Blob Store (e.g. IoT, PaaS)
File Sync & Share
Server Backup / Archiving
Compliance Archives
ACTIVE ACTIVE ACCESS ACROSS SITES
Windows Server Active Directory
NATIVE AD SUPPORT
S3
S3
S3
amazon web services
NATIVE AWS IAM SUPPORT
File / Object / OpenStack • Multi-Workload
SCALITY RING STORAGE
Local and Geo-Protection • Any Hardware
x86
x86
x86
x86
DATA CENTER A
DATA CENTER B
LINEAR PERFORMANCE SCALING
LIMITLESS INFRASTRUCTURE SCALING
100's of PB, TRILLIONS OF OBJECTS
NATIVE MULTI-SITE DR

Scale-Out File System (SOFS)

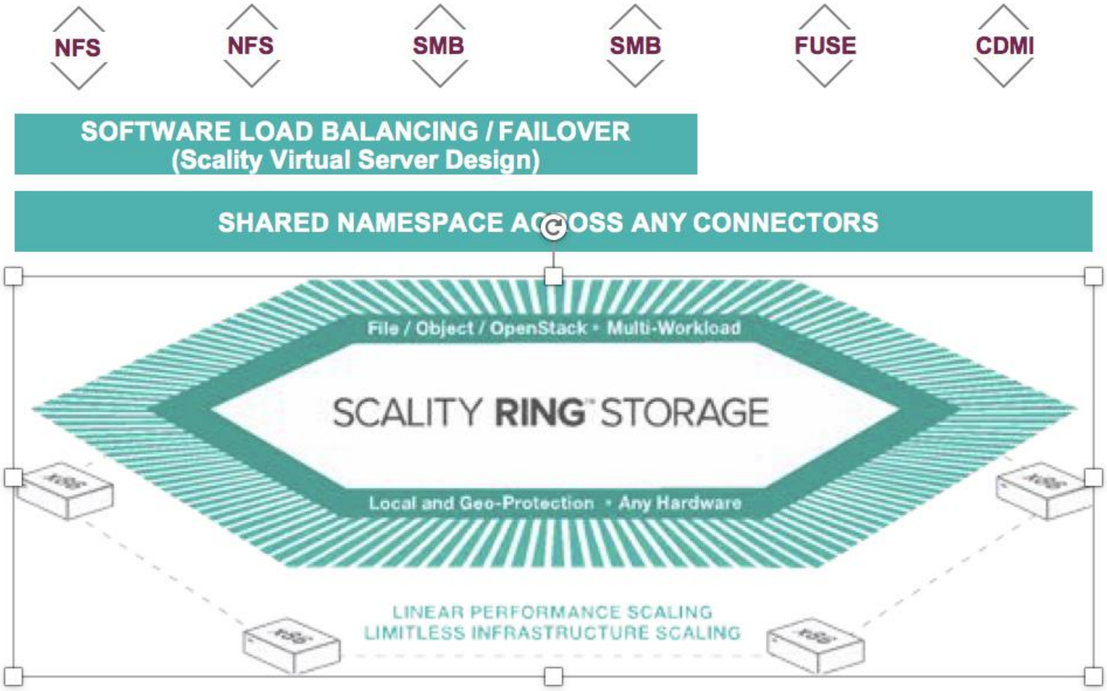
The RING supports native file system access to RING storage through the file Connectors and the integrated Scale-Out File System (SOFS). SOFS is a POSIX based virtual file system that provides file storage services without the need for external file gateways, as is common in other object storage solutions.

RING utilizes an internal distributed database (MESA) on top of the RING's storage services. MESA is a distributed database used to store file system directories and inode structures, providing virtual file system hierarchy, with guaranteed transactional consistency of file system data.

The RING provides the concept of "Volumes", which may be used to easily configure file system services through the Supervisor. The RING can support up to 2^{32} volumes, with support for billions of files per volume.

- Connectors are stateless, can be IP load balanced, and do not lose or corrupt data if they fail
- File system state and INODES are stored in the highly available and durable RING using SSD for performance.

Figure 10 Scality SOFS with Single Namespace and Load Balancing


NFS
NFS
SMB
SMB
FUSE
CDMI
SOFTWARE LOAD BALANCING / FAILOVER
(Scality Virtual Server Design)
SHARED NAMESPACE ACROSS ANY CONNECTORS
File / Object / OpenStack • Multi-Workload
SCALITY RING STORAGE
Local and Geo-Protection • Any Hardware
x86
x86
x86
x86
LINEAR PERFORMANCE SCALING
LIMITLESS INFRASTRUCTURE SCALING

Data Durability and Self-Healing

The RING is designed to expect and manage a wide range of component failures including disks, servers, networks, and even across multiple data centers, while ensuring that data remains durable and available during these conditions. The RING provides data durability through a set of flexible data protection mechanisms optimized for distributed systems, including replication, erasure coding and geo-replication capabilities that allow applications to select the best data protection strategies for their data.

Replication Class of Service

To optimize data durability in a distributed system, the RING employs local replication, or the storage of multiple copies of an object within the RING. The RING will attempt to spread these replicas across multiple storage nodes, and across multiple disk drives, in order to separate them from common failures. While replication is optimal for many use cases where the objects are small, and access performance is critical, it does impose a high storage overhead penalty compared to the original data.

Scality Erasure Coding

Scality's Erasure Coding (EC) provides an alternative data protection mechanism to replication that is optimized for large objects and files. The basic idea with erasure coding is to break an object into multiple chunks (m), and apply a mathematical encoding to produce an additional set of parity chunks (k). The resulting set of chunks, (m+k) are then distributed across the RING nodes, providing the ability to access the original object as long as any subset of m data or parity chunks are available. Stated another way, this provides a way to store an object with protection against k failures, with only k/m overhead in storage space.

Replication and EC may be combined, even on a single connector, by configuring a policy for the connector to store objects below a certain size threshold with replication, and files above with a specific EC schema. This allows the application to simply store objects without worrying about the optimal storage strategy per object, with the system managing that automatically.

Self-Healing

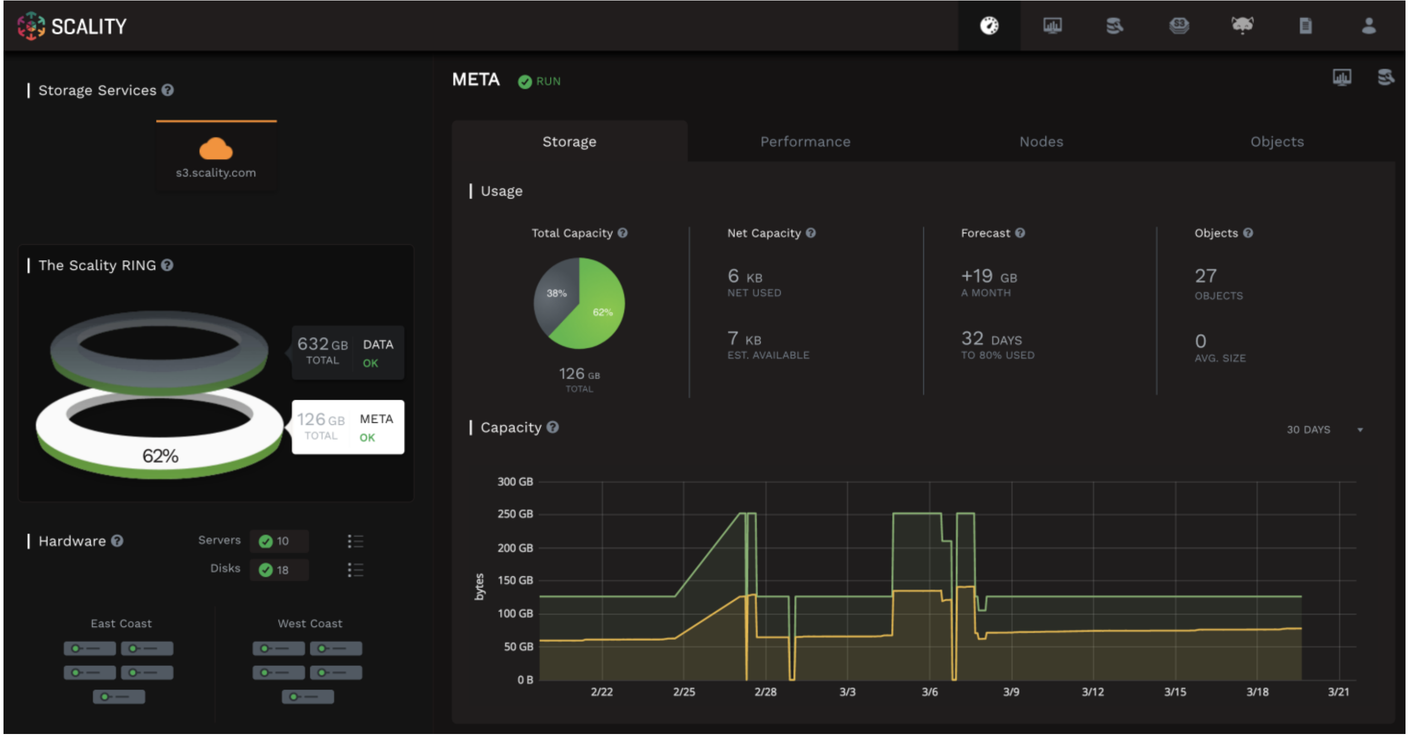
The RING provides self-healing operations to automatically resolve component failures, including the ability to rebuild missing data chunks due to disk drive or server failures, rebalance data when nodes leave and join the RING, and to proxy around component failures. In the event a disk drive or even a full server fails, background rebuild operations are spawned to restore the missing object data from its surviving replicas or EC chunks.

Supervisor Web Management GUI

The Supervisor is the RING's Web based management GUI. It provides visual, point-and-click style monitoring and management of the RING software, as well as the underlying physical platform layer. The Supervisor provides a main Dashboard page that provides graphical RING views, including the Servers, Zones and Storage Nodes comprising the RING, with browsing capabilities to drill down to details of each component, and pages for operations, management and provisioning of RING services. The Supervisor also provides performance statistics, resource consumption and health metrics through a rich set of graphs.

The Supervisor works in conjunction with the Scality management agent (*sagentd*), which is hosted on each Scality managed storage server, or connector server. The *sagentd* daemon provides a single point of communication for the Supervisor with the given host, for purposes of statistics and health metrics collection. This avoids the additional overhead of individual connections from the Supervisor to each Storage Node, and each disk drive daemon running on a specific host.

Figure 11 Supervisor Web GUI



RING 7.4 New Features

For a complete list of new features on RING 7.4 please refer to the Scality documentation located here: http://www.scality.com.

S3 Connector Features

- AWS S3 APIs support

- Vault - AWS Authentication (Signature v4 and v2)
- AWS S3 IAM Support
  - Groups
  - Policies
  - Roles
- Federated Access "Single Sign On" to S3 Connector
- Secure connections over HTTPS/SSL
- Bucket-Level Object Encryption with SafeNet KMS
- S3 Stretched deployments for 2 and 3-sites
- S3 CRR (Cross Regional Replication) for Asynchronous bucket replication
- S3 Bucket Service Utilization API (UTAPI) + Account level Utilization metrics
- IPv6 addresses on external connector interfaces
- Object versioning to track file revisions. The versioning functionality for S3 operations such as PUT, GET and DELETE requests is supported.
- Location Control for compliance and regulatory needs

SOFS Connector Features

- New SOFS Geo Models
  - 2-Site Stretched with Witness
  - 2-Site Asynchronous Replication
- GEOs Fail Back Improvements
- File Versioning and Versioning Policies
- Volume protection
- Access to File namespace thought S3 API
- Enhanced logging (Volume-level space metering and quota)
- Access to File namespace thought S3 API

Management

- Scality HALO Cloud Monitor
- Disk management tools
- New User Interfaces
  - Volume management and monitoring

  - S3 monitoring
- S3 Web browser
- Web S3 utilization per users/buckets
- Scality Cloud Monitor integration with the RING
- White branded Service Provider UI
- Disk management tools

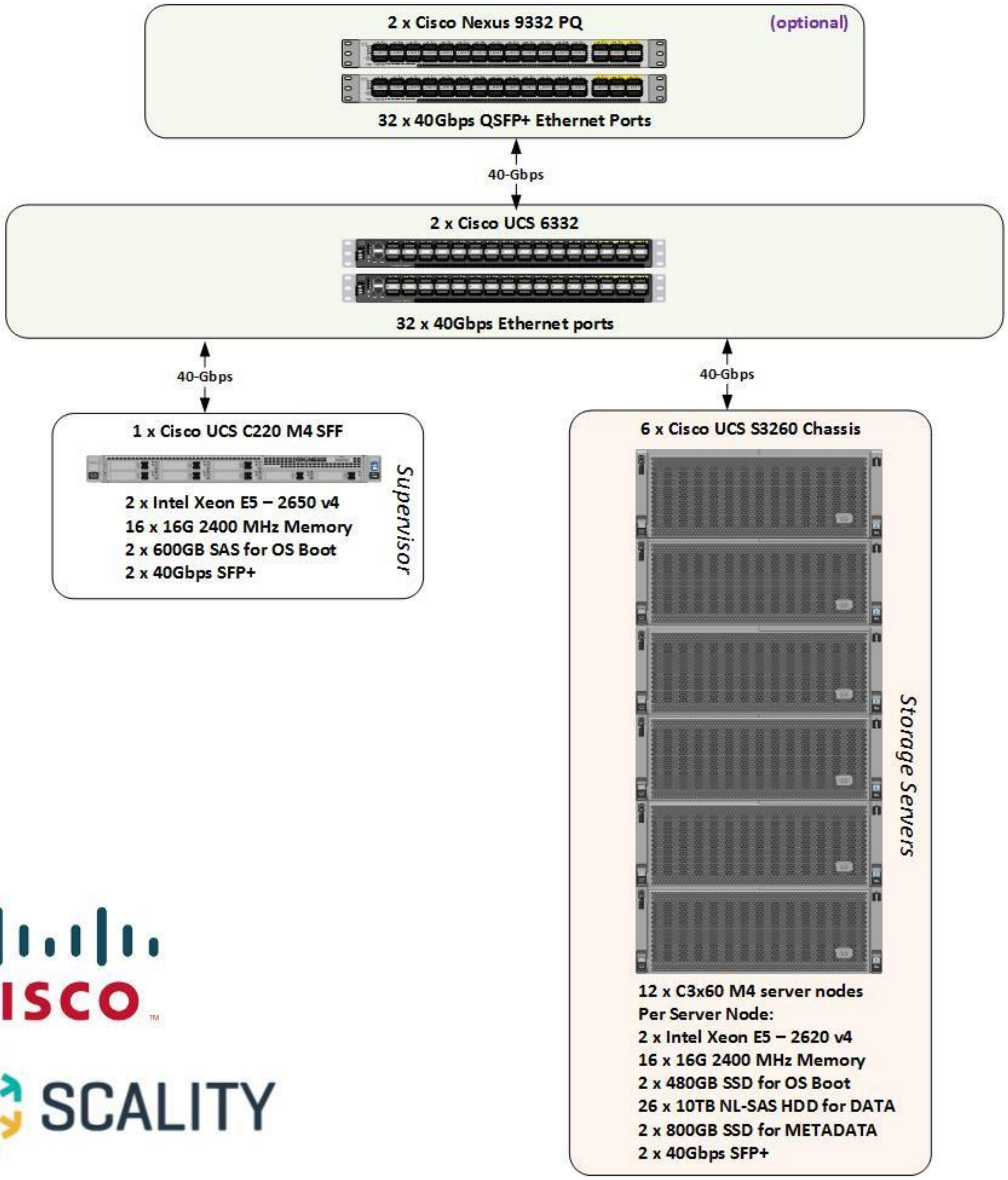
Solution Design

Deployment Architecture

The reference architecture use case provides a comprehensive, end-to-end example of deploying Scality object storage on Cisco UCS S3260.

The first section of this Cisco Validated Design covers setting up the Cisco UCS hardware, the Cisco UCS 6332 Fabric Interconnects (Cisco UCS Manager), Cisco UCS S3260 Storage servers, Cisco UCS C220 M4 rack servers, and the peripherals such as Nexus 9332 switches. The second section explains the step–by-step installation instructions for installing Scality RING. The final section includes the functional and High Availability tests on the test bed, Performance, and the best practices evolved while validating the solution.

Figure 12 Cisco UCS SDS Architecture


2 x Cisco Nexus 9332 PQ
(optional)
32 x 40Gbps QSFP+ Ethernet Ports
40-Gbps
2 x Cisco UCS 6332
32 x 40Gbps Ethernet ports
40-Gbps
40-Gbps
1 x Cisco UCS C220 M4 SFF
2 x Intel Xeon E5 – 2650 v4
16 x 16G 2400 MHz Memory
2 x 600GB SAS for OS Boot
2 x 40Gbps SFP+
Supervisor
6 x Cisco UCS S3260 Chassis
Storage Servers
12 x C3x60 M4 server nodes
Per Server Node:
2 x Intel Xeon E5 – 2620 v4
16 x 16G 2400 MHz Memory
2 x 480GB SSD for OS Boot
26 x 10TB NL-SAS HDD for DATA
2 x 800GB SSD for METADATA
2 x 40Gbps SFP+

Solution Overview

This solution is based on Cisco UCS and Scality Object Storage and is divided into multiple sections and covers three main aspects.

Hardware Requirements

This CVD describes the architecture, design and deployment of a Scality Object Storage solution on six Cisco UCS S3260 Storage Servers, each with two Cisco UCS S3260 M4 nodes configured as storage servers and one Cisco UCS C220 M4S rack server as Supervisor node. The whole solution is connected to the pair of Cisco UCS 6332 Fabric Interconnects and to pair of upstream network switch Cisco Nexus 9332PQ.

The detailed configuration is as follows:

- Two Cisco Nexus 9332PQ Switches
- Two Cisco UCS 6332 Fabric Interconnects
- Six Cisco UCS S3260 Storage Servers with two UCS C3X60 M4 server nodes each
- 1 Cisco UCS C220 M4S Rack Servers

Note: Please contact your Cisco representative for country specific information.

Software Distributions and Versions

The required software distribution versions are listed below in Table 1 .

Table 1 Software Versions

Layer	Component	Version or Release
Storage (Chassis) UCS S3260	Chassis Management Controller	2.0(13f)
	Shared Adapter	4.1(2d)
Compute (Server Nodes) UCS C3X60 M4	BIOS	C3x60M4.3.0.4b
	CIMC Controller	3.0(4a)
Compute (Rack Server) C220 M4S	BIOS	C220M4.3.0.4a
	CIMC Controller	3.0(4a)
Network 6332 Fabric Interconnect	UCS Manager	3.2(3a)
	Kernel	5.0(3)N2(3.23a)
	System	5.0(3)N2(3.23a)
Network Nexus 9332PQ	BIOS	07.59
	NXOS	7.0(3)I5(1)
Software	Red Hat Enterprise	7.4 (x86_64)

Layer	Component	Version or Release
	Linux Server	
	Scality RING	7.4.0.2

Hardware Requirements

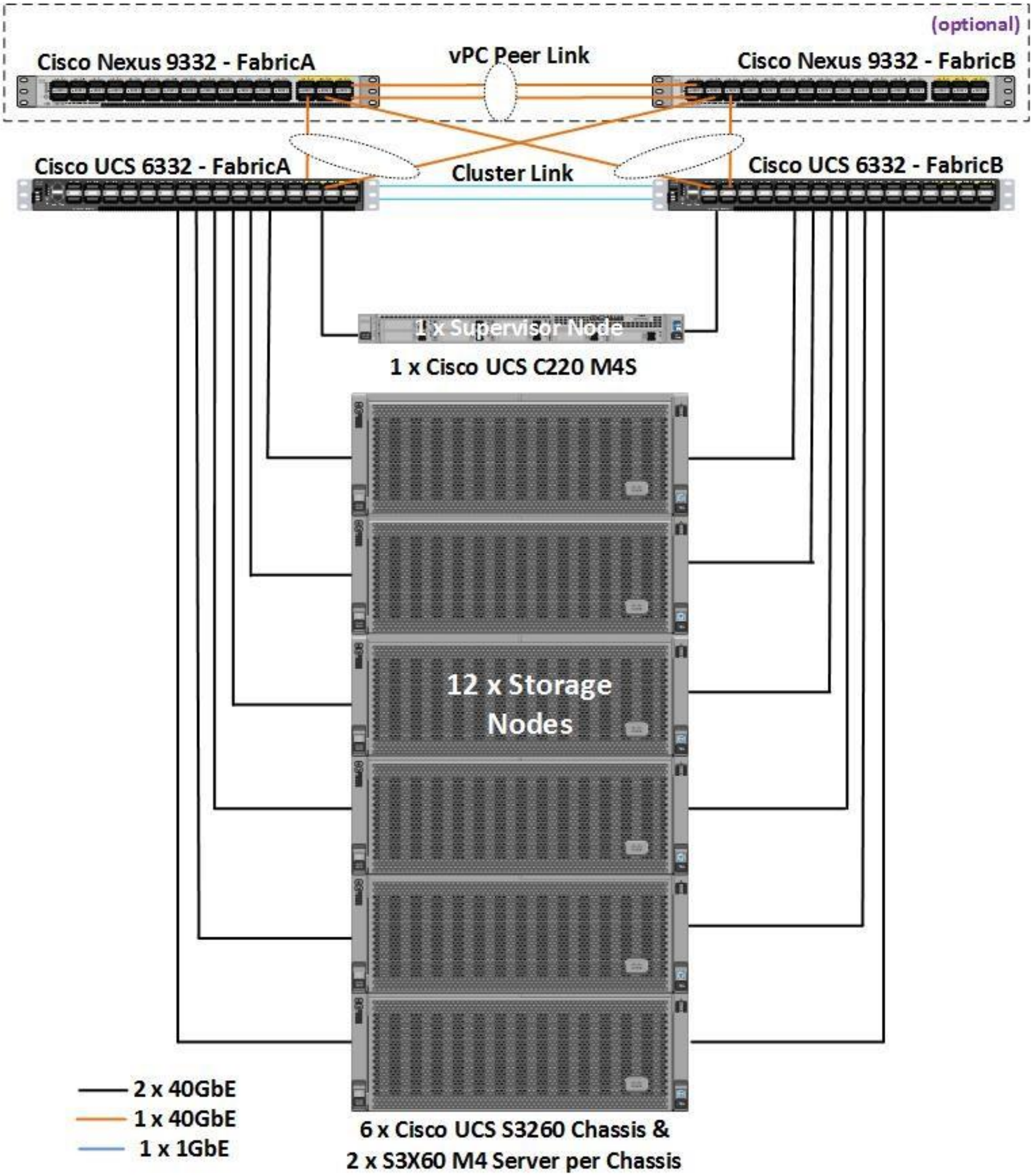
This section contains the hardware components used in the test bed.

Component	Model	Quantity	Comments
Scality Storage node	Cisco UCS S3260 M4 Chassis	6	2 x UCS C3X60 M4 Server Nodes per Chassis (Total = 12nodes) Per Server Node 2 x Intel E5-2650 v4, 128 GB RAM Cisco 12G SAS RAID Controller 2 x 1.6 TB SSD for OS, 26 x 10TB HDDs for Data, 2 x 800G SSD for Metadata Dual-port 40 Gbps VIC
Scality Supervisor Node	Cisco UCS C220M4S Rack server	1	• 2 x Intel E5-2683v4, 128 GB RAM • Cisco 12G SAS RAID Controller • 2 x 600 GB SAS for OS • Dual-port 40 Gbps VIC
UCS Fabric Interconnects	Cisco UCS 6332 Fabric Interconnects	2	
Switches	Cisco Nexus 9332PQ Switches	2	

Physical Topology and Configuration

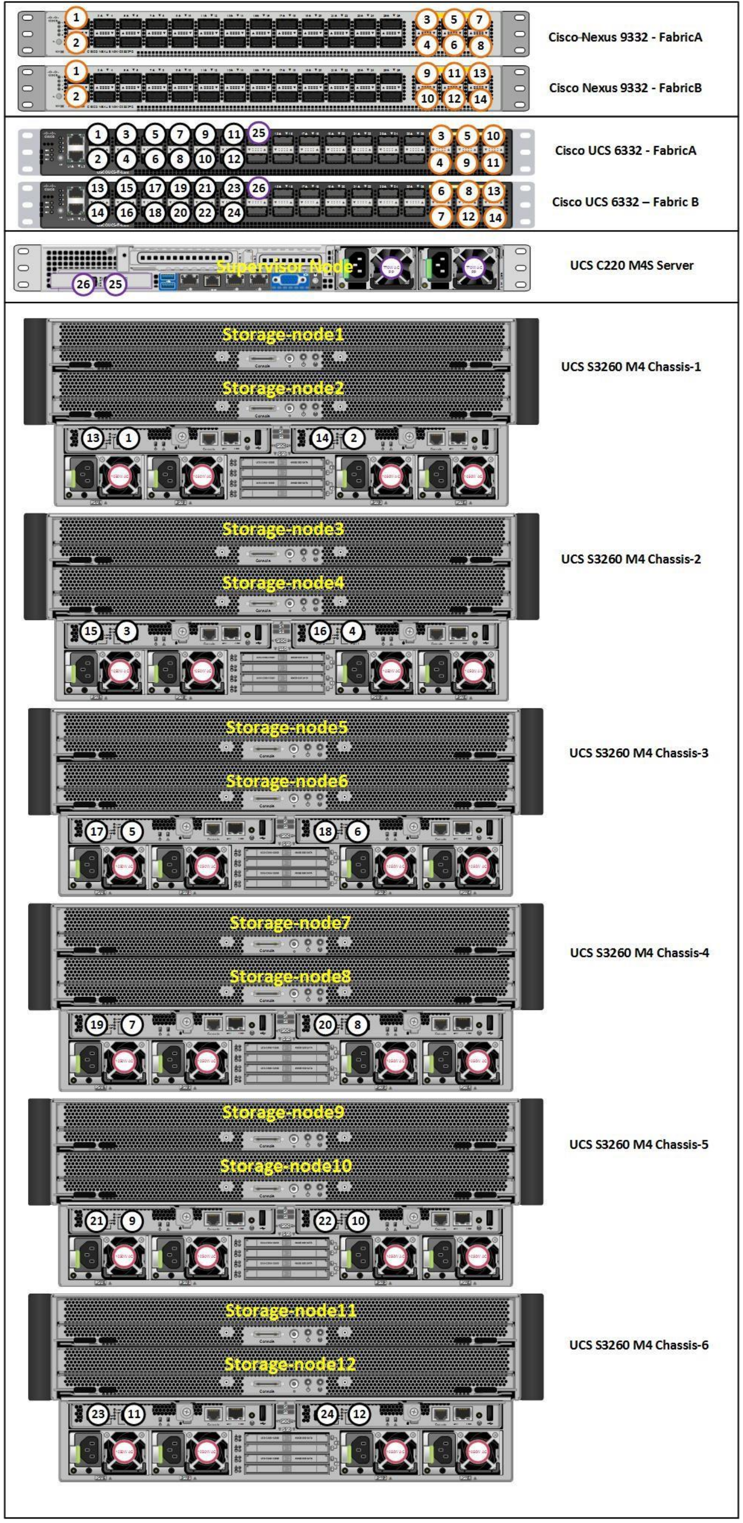
The following sections describe the physical design of the solution and the configuration of each component.

**Figure 13	Physical Topology of the Solution**



The connectivity of the solution is based on 40 Gbit. All components are connected together via 40 QSFP cables. Between both Cisco Nexus 9332PQ switches are 2 x 40 Gbit cabling. Each Cisco UCS 6332 Fabric Interconnect is connected via 2 x 40 Gbit to each Cisco UCS 9332PQ switch, and each Cisco UCS C220 M4S is connected via 1 x 40 Gbit and each Cisco UCS S3260 M4 server is connected with 2 x 40 Gbit cable to each Fabric Interconnect.

Figure 14 Physical Cabling of the Solution



The exact cabling for the Cisco UCS S3260 Storage Server, Cisco UCS C220 M4S, and the Cisco UCS 6332 Fabric Interconnect is illustrated in Table 2 .

Table 2 Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port	Cable
Cisco Nexus 9332 Switch A	Eth1/1	40GbE	Cisco Nexus 9372 Switch B	Eth1/1	QSFP-H40G-CU1M
	Eth1/2	40GbE	Cisco Nexus 9372 Switch B	Eth1/2	QSFP-H40G-CU1M
	Eth1/17	40GbE	Cisco UCS Fabric Interconnect A	Eth1/17	QSFP-H40G-CU1M
	Eth1/18	40GbE	Cisco UCS Fabric Interconnect B	Eth1/17	QSFP-H40G-CU1M
	Eth1/23	40GbE	Top of Rack (Upstream Network)	Any	QSFP+ 4SFP10G
	MGMT0	1GbE	Top of Rack (Management)	Any	1G RJ45
Cisco Nexus 9332 Switch B	Eth1/1	40GbE	Cisco Nexus 9372 Switch B	Eth1/1	QSFP-H40G-CU1M
	Eth1/2	40GbE	Cisco Nexus 9372 Switch B	Eth1/2	QSFP-H40G-CU1M
	Eth1/17	40GbE	Cisco UCS Fabric Interconnect A	Eth1/18	QSFP-H40G-CU1M
	Eth1/18	40GbE	Cisco UCS Fabric Interconnect B	Eth1/18	QSFP-H40G-CU1M
	Eth1/23	40GbE	Top of Rack (Upstream Network)	Any	QSFP+ 4SFP10G
	MGMT0	1GbE	Top of Rack (Management)	Any	1G RJ45
Cisco UCS 6332 Fabric Interconnect A	Eth1/1	40GbE	S3260 Chassis 1 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/2	40GbE	S3260 Chassis 1 - SIOC 2 (left)	port 1	QSFP-H40G-

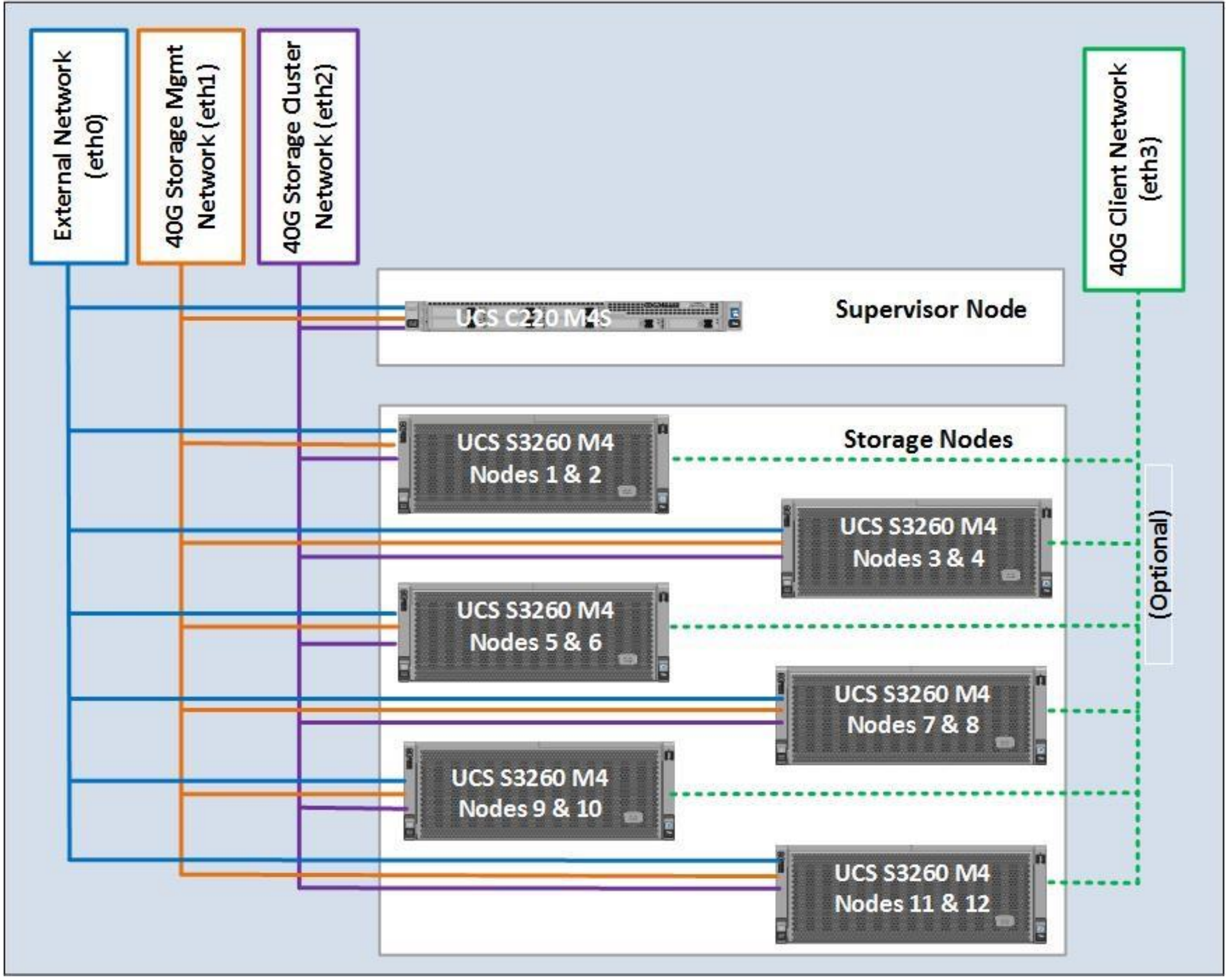
Local Device	Local Port	Connection	Remote Device	Remote Port	Cable
					CU3M
	Eth1/3	40GbE	S3260 Chassis 2 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/4	40GbE	S3260 Chassis 2 - SIOC 2 (left)	port 1	QSFP-H40G-CU3M
	Eth1/5	40GbE	S3260 Chassis 3 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/6	40GbE	S3260 Chassis 3 - SIOC 2 (left)	port 1	QSFP-H40G-CU3M
	Eth1/7	40GbE	S3260 Chassis 4 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/8	40GbE	S3260 Chassis 4 - SIOC 2 (left)	port 1	QSFP-H40G-CU3M
	Eth1/9	40GbE	S3260 Chassis 5 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/10	40GbE	S3260 Chassis 5 - SIOC 2 (left)	port 1	QSFP-H40G-CU3M
	Eth1/11	40GbE	S3260 Chassis 6 - SIOC 1 (right)	port 1	QSFP-H40G-CU3M
	Eth1/12	40GbE	S3260 Chassis 6 - SIOC 2 (left)	port 1	QSFP-H40G-CU3M
	Eth1/17	40GbE	C220 M4S - Server1 - VIC1387	VIC - Port 1	QSFP-H40G-CU1M
	Eth1/27	40GbE	Nexus 9332 A	Eth 1/27	QSFP-H40G-CU1M
	Eth1/28	40GbE	Nexus 9332 A	Eth 1/28	QSFP-H40G-CU1M

Local Device	Local Port	Connection	Remote Device	Remote Port	Cable
	Eth1/29	40GbE	Nexus 9332 A	Eth 1/29	QSFP-H40G-CU1M
	Eth1/30	40GbE	Nexus 9332 B	Eth 1/27	QSFP-H40G-CU1M
	Eth1/31	40GbE	Nexus 9332 B	Eth 1/28	QSFP-H40G-CU1M
	Eth1/32	40GbE	Nexus 9332 B	Eth 1/29	QSFP-H40G-CU1M
	MGMT0	40GbE	Top of Rack (Management)	Any	1G RJ45
	L1	1GbE	UCS 6332 Fabric Interconnect B	L1	1G RJ45
	L2	1GbE	UCS 6332 Fabric Interconnect B	L2	1G RJ45
Cisco UCS 6332 Fabric Interconnect B	Eth1/1	40GbE	S3260 Chassis 1 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M
	Eth1/2	40GbE	S3260 Chassis 1 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/3	40GbE	S3260 Chassis 2 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M
	Eth1/4	40GbE	S3260 Chassis 2 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/5	40GbE	S3260 Chassis 3 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M
	Eth1/6	40GbE	S3260 Chassis 3 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/7	40GbE	S3260 Chassis 4 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M

Local Device	Local Port	Connection	Remote Device	Remote Port	Cable
	Eth1/8	40GbE	S3260 Chassis 4 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/9	40GbE	S3260 Chassis 5 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M
	Eth1/10	40GbE	S3260 Chassis 5 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/11	40GbE	S3260 Chassis 6 - SIOC 1 (right)	port 2	QSFP-H40G-CU3M
	Eth1/12	40GbE	S3260 Chassis 6 - SIOC 2 (left)	port 2	QSFP-H40G-CU3M
	Eth1/13	40GbE	C220 M4S - Server1 - VIC1387	VIC - Port2	QSFP-H40G-CU1M
	Eth1/27	40GbE	Nexus 9332 A	Eth 1/30	QSFP-H40G-CU1M
	Eth1/28	40GbE	Nexus 9332 A	Eth 1/31	QSFP-H40G-CU1M
	Eth1/29	40GbE	Nexus 9332 A	Eth 1/32	QSFP-H40G-CU1M
	Eth1/30	40GbE	Nexus 9332 B	Eth 1/30	QSFP-H40G-CU1M
	Eth1/31	40GbE	Nexus 9332 B	Eth 1/31	QSFP-H40G-CU1M
	Eth1/32	40GbE	Nexus 9332 B	Eth 1/32	QSFP-H40G-CU1M
	MGMT0	40GbE	Top of Rack (Management)	Any	1G RJ45
	L1	1GbE	UCS 6332 Fabric Interconnect A	L1	1G RJ45

Local Device	Local Port	Connection	Remote Device	Remote Port	Cable
	L2	1GbE	UCS 6332 Fabric Interconnect A	L2	1G RJ45

Figure 15 Network Layout of the Solution



Deployment Hardware and Software

Fabric Configuration

This section provides the details to configure a fully redundant, highly available Cisco UCS 6332 fabric configuration:

- Initial setup of the Fabric Interconnect A and B
- Connect to Cisco UCS Manager using virtual IP address of using the web browser
- Launch Cisco UCS Manager
- Enable server and uplink ports
- Start discovery process
- Create pools and policies for service profile template
- Create chassis and storage profiles
- Create Service Profile templates and appropriate Service Profiles
- Associate Service Profiles to servers

Initial Setup of Cisco UCS 6332 Fabric Interconnects

The following section describes the initial setup of the Cisco UCS 6332 Fabric Interconnects A and B.

Configure Fabric Interconnect A

To configure Fabric A, complete the following steps:

1. Connect to the console port on the first Cisco UCS 6332 Fabric Interconnect.
2. At the prompt to enter the configuration method, enter **`console`** to continue.
3. If asked to either perform a new setup or restore from backup, enter **`setup`** to continue.
4. Enter **`y`** to continue to set up a new Fabric Interconnect.
5. Enter **`n`** to enforce strong passwords.
6. Enter the password for the admin user.
7. Enter the same password again to confirm the password for the admin user.
8. When asked if this fabric interconnect is part of a cluster, answer **`y`** to continue.
9. Enter **`A`** for the switch fabric.
10. Enter the cluster name UCS-**`FI-6332`** for the system name.
11. Enter the Mgmto IPv4 address.

12. Enter the Mgmto IPv4 netmask.

13. Enter the IPv4 address of the default gateway.

14. Enter the cluster IPv4 address.

15. To configure DNS, answer **y**.

16. Enter the DNS IPv4 address.

17. Answer **y** to set up the default domain name.

18. Enter the default domain name.

19. Review the settings that were printed to the console, and if they are correct, answer **yes** to save the configuration.

20. Wait for the login prompt to make sure the configuration has been saved.

Example Setup for Fabric Interconnect A

```
                    ---- Basic System Configuration Dialog ----


    This setup utility will guide you through the basic configuration of

    the system. Only minimal configuration including IP connectivity to

    the Fabric interconnect and its clustering mode is performed through these
  steps.


    Type Ctrl-C at any time to abort configuration and reboot system.

    To back track or make modifications to already entered values,

    complete input till end of section and answer no when prompted

    to apply configuration.


    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]: n

    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 (A/B): A
    Enter the system name:  UCS-FI-6332

    Physical Switch Mgmt0 IP address : 192.168.10.101

    Physical Switch Mgmt0 IPv4 netmask : 255.255.255.0

    IPv4 address of the default gateway : 192.168.10.1

    Cluster IPv4 address : 192.168.10.100

    Configure the DNS Server IP address? (yes/no) [n]: no

    Configure the default domain name? (yes/no) [n]: no

    Join centralized management environment (UCS Central)? (yes/no) [n]: no


    Following configurations will be applied:


      Switch Fabric=A

      System Name= UCS-FI-6332

      Enforced Strong Password=no

      Physical Switch Mgmt0 IP Address=192.168.10.101

      Physical Switch Mgmt0 IP Netmask=255.255.255.0

      Default Gateway=192.168.10.1

      Ipv6 value=0


      Cluster Enabled=yes

      Cluster IP Address=192.168.10.100

      NOTE: Cluster IP will be configured only after both Fabric Interconnects are
  initialized.

            UCSM will be functional only after peer FI is configured in clustering
  mode.


    Apply and save the configuration (select 'no' if you want to re-enter)?
  (yes/no): yes

    Applying configuration. Please wait.

   Configuration file - Ok


  Cisco UCS 6300 Series Fabric Interconnect

  UCS-FI-6332-A login:
```

Configure Fabric Interconnect B

To configure Fabric Interconnect B, complete the following steps:

1. Connect to the console port on the second Cisco UCS 6332 Fabric Interconnect.

2. When prompted to enter the configuration method, enter **`console`** to continue.

3. The installer detects the presence of the partner Fabric Interconnect and adds this fabric interconnect to the cluster. Enter **`y`** to continue the installation.

4. Enter the admin password that was configured for the first Fabric Interconnect.

5. Enter the Mgmto IPv4 address.

6. Answer **`yes`** to save the configuration.

7. Wait for the login prompt to confirm that the configuration has been saved.

Example Setup for Fabric Interconnect B

```
                ---- Basic System Configuration Dialog ----


  This setup utility will guide you through the basic configuration of

  the system. Only minimal configuration including IP connectivity to

  the Fabric interconnect and its clustering mode is performed through these
steps.


  Type Ctrl-C at any time to abort configuration and reboot system.

  To back track or make modifications to already entered values,

  complete input till end of section and answer no when prompted

  to apply configuration.


  Enter the configuration method. (console/gui) ? console


  Installer has detected the presence of a peer Fabric interconnect. This Fabric
interconnect will be added to the cluster. Continue (y/n) ? y


  Enter the admin password of the peer Fabric interconnect:

    Connecting to peer Fabric interconnect... done

    Retrieving config from peer Fabric interconnect... done

    Peer Fabric interconnect Mgmt0 IPv4 Address: 192.168.10.101

    Peer Fabric interconnect Mgmt0 IPv4 Netmask: 255.255.255.0
    Cluster IPv4 address          : 192.168.10.100


    Peer FI is IPv4 Cluster enabled. Please Provide Local Fabric Interconnect
Mgmt0 IPv4 Address

  Physical Switch Mgmt0 IP address : 192.168.10.102


  Apply and save the configuration (select 'no' if you want to re-enter)?
(yes/no): yes

  Applying configuration. Please wait.

  Configuration file - Ok


Cisco UCS 6300 Series Fabric Interconnect

UCS-FI-6332-B login:
```

Logging into Cisco UCS Manager

To log into Cisco UCS Manager, complete the following steps:

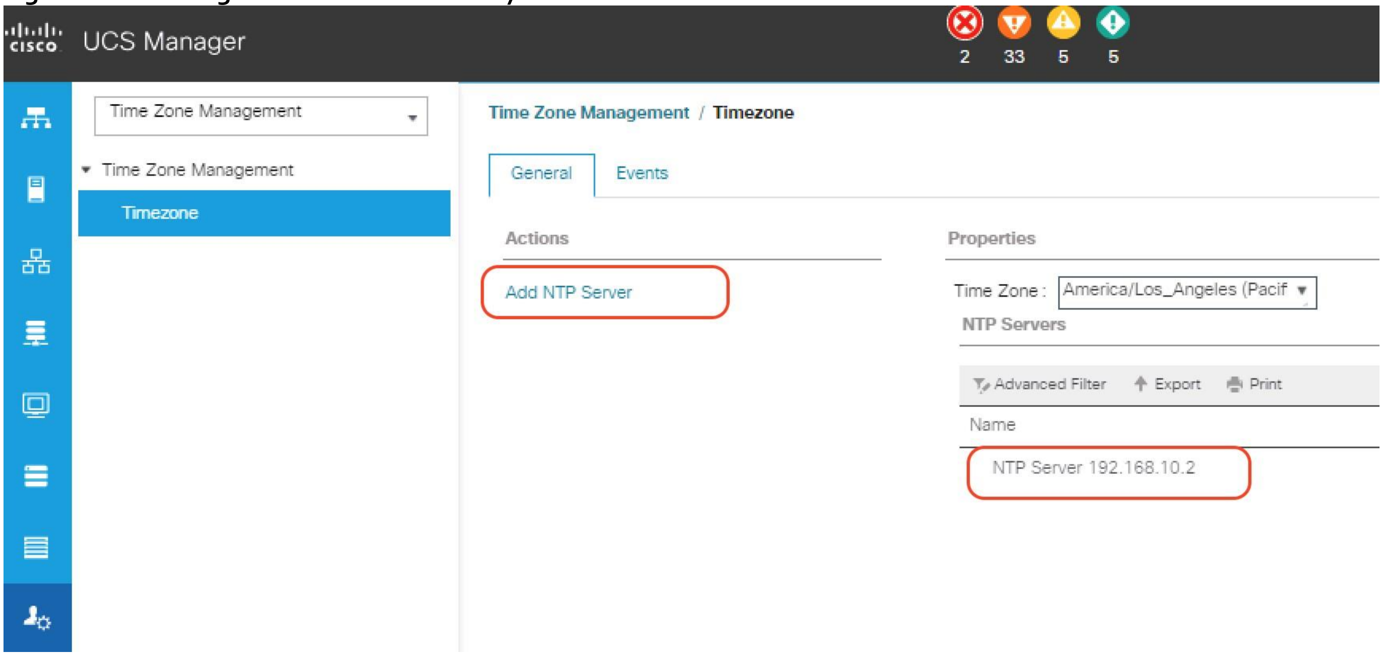
1. Open a Web browser and navigate to the Cisco UCS 6332 Fabric Interconnect cluster address.
2. Click the Launch link to download the Cisco UCS Manager software.
3. If prompted to accept security certificates, accept as necessary.
4. Click Launch UCS Manager HTML.
5. When prompted, enter admin for the username and enter the administrative password.
6. Click Login to log in to the Cisco UCS Manager.

Configure NTP Server

To configure the NTP server for the Cisco UCS environment, complete the following steps:

1. Select Admin tab on the left site.
2. Select Time Zone Management.
3. Select Time Zone.
4. Under Properties select your time zone.
5. Select Add NTP Server.
6. Enter the IP address of the NTP server.
7. Select OK.

Figure 16 Adding a NTP Server - Summary



Time Zone : America/Los_Angeles (Pacif

NTP Servers

NTP Server 192.168.10.2

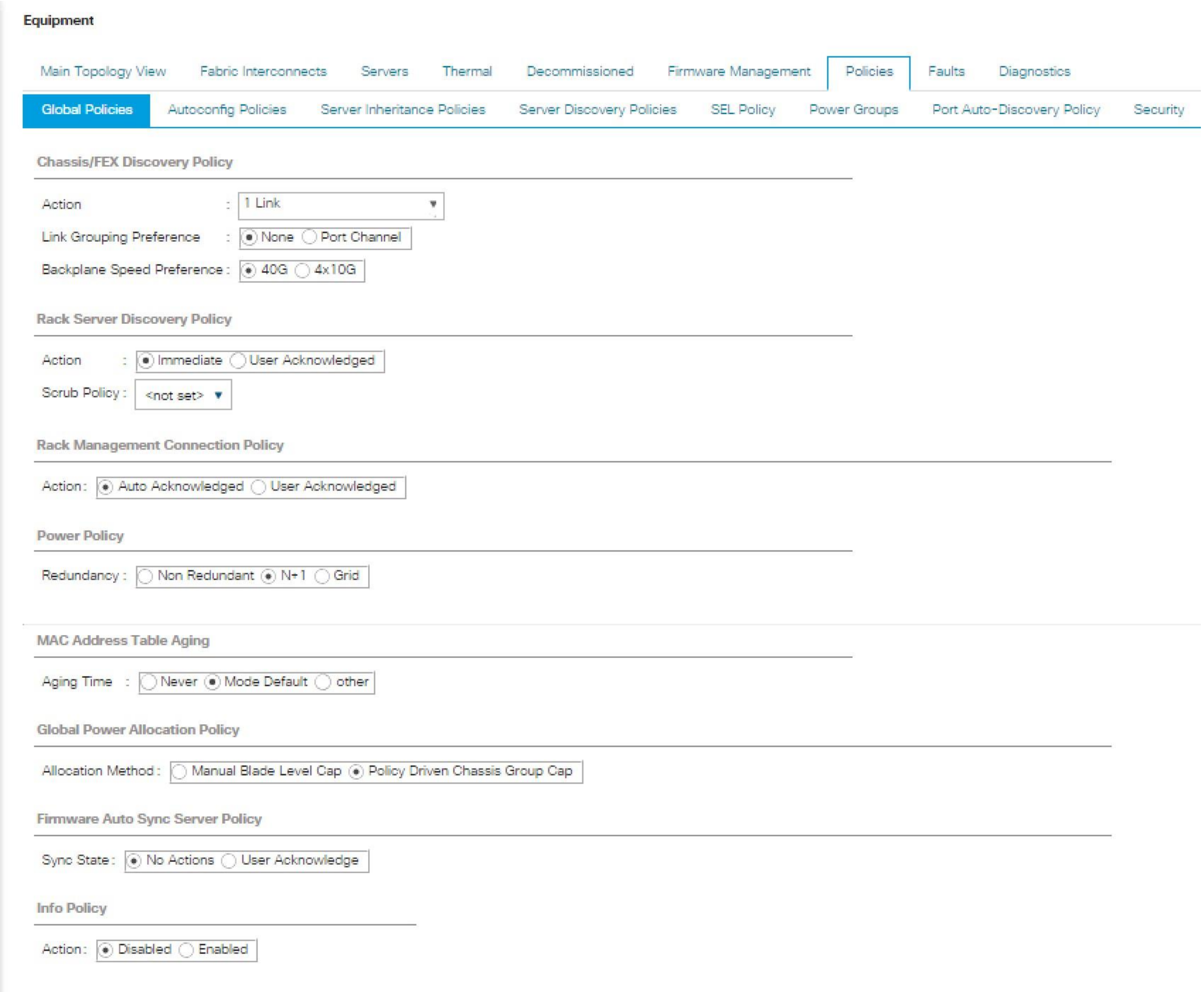
Initial Base Setup of the Environment

Configure Global Policies

To configure the global policies, complete the following steps:

1. Select the `Equipment` tab on the left site of the window.
2. Select `Policies` on the right site.
3. Select Global Policies.
4. Under Chassis/FEX Discovery Policy select `Platform Max` under Action.
5. Select `40G` under Backplane Speed Preference.
6. Under Rack Server Discovery Policy select `Immediate` under Action.
7. Under Rack Management Connection Policy select `Auto Acknowledged` under Action.
8. Under Power Policy select `Redundancy N+1`.
9. Under Global Power Allocation Policy select `Policy Driven`.
10. Select Save Changes.

Figure 17 Configuration of Global Policies



Chassis/FEX Discovery Policy

Action : 1 Link ▾

Link Grouping Preference : ● None ○ Port Channel

Backplane Speed Preference : ● 40G ○ 4x10G

Rack Server Discovery Policy

Action : ● Immediate ○ User Acknowledged

Scrub Policy : <not set> ▾

Rack Management Connection Policy

Action : ● Auto Acknowledged ○ User Acknowledged

Power Policy

Redundancy : ○ Non Redundant ● N+1 ○ Grid

MAC Address Table Aging

Aging Time : ○ Never ● Mode Default ○ other

Global Power Allocation Policy

Allocation Method : ○ Manual Blade Level Cap ● Policy Driven Chassis Group Cap

Firmware Auto Sync Server Policy

Sync State : ● No Actions ○ User Acknowledge

Info Policy

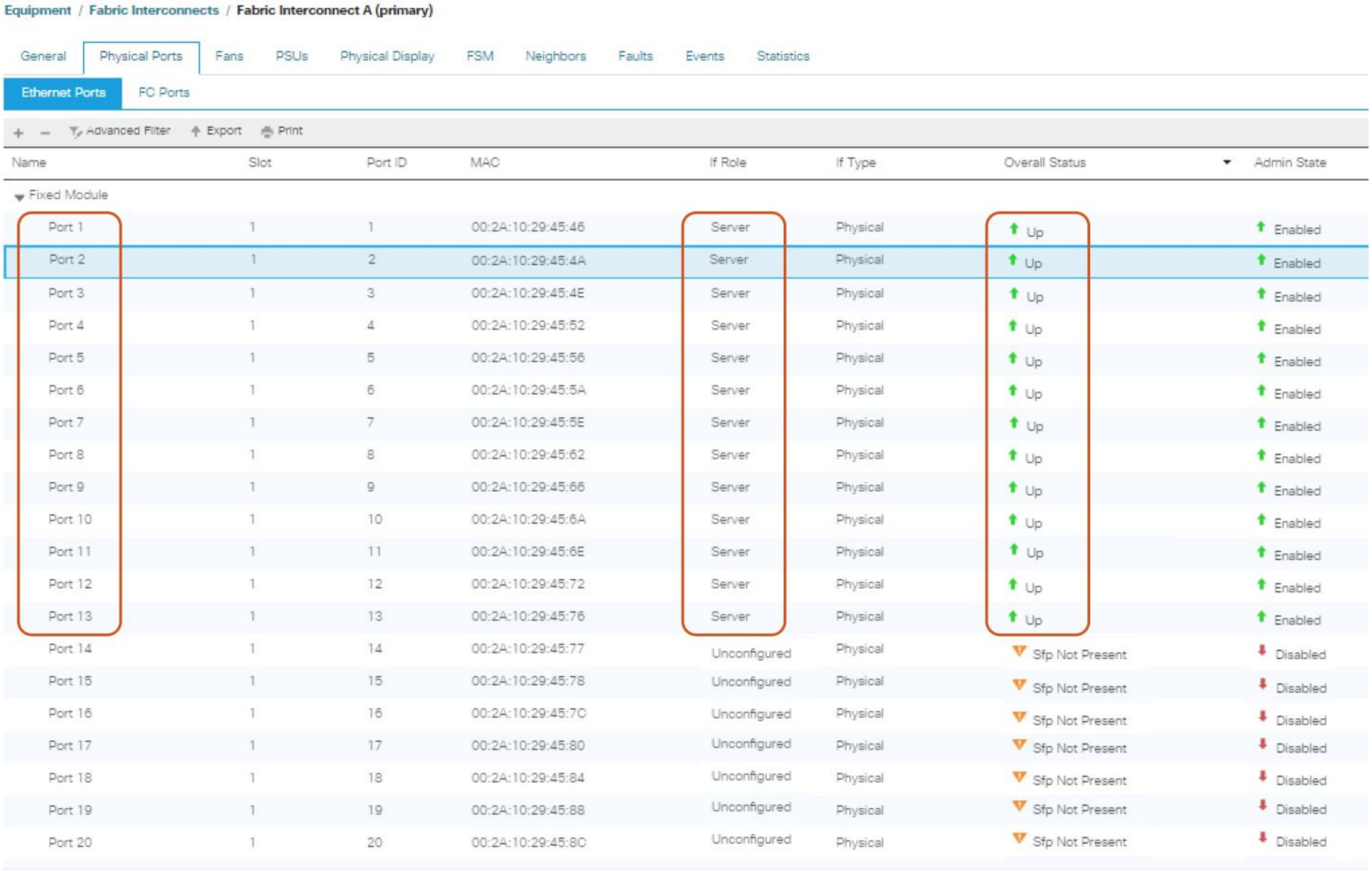
Action : ● Disabled ○ Enabled

Enable Fabric Interconnect A Ports for Server

To enable server ports, complete the following steps:

1. Select the **`Equipment`** tab on the left site.
2. Select Equipment > Fabric Interconnects > Fabric Interconnect A (subordinate) > Fixed Module.
3. Click **`Ethernet Ports`** section.
4. Select Ports 1-12, right-click and then select **`Configure as Server Port`** for S3260 M4 Chassis to discover and click **`Yes`** and then click **`OK`.**
5. Select Port 13 for C220 M4S server, right-click and then select "**`Configure as Server Port`**" for C220 to discover and click **`Yes`** and then click **`OK`**.
6. Repeat these steps for Fabric Interconnect B.

Figure 18 Configuration of Server Ports



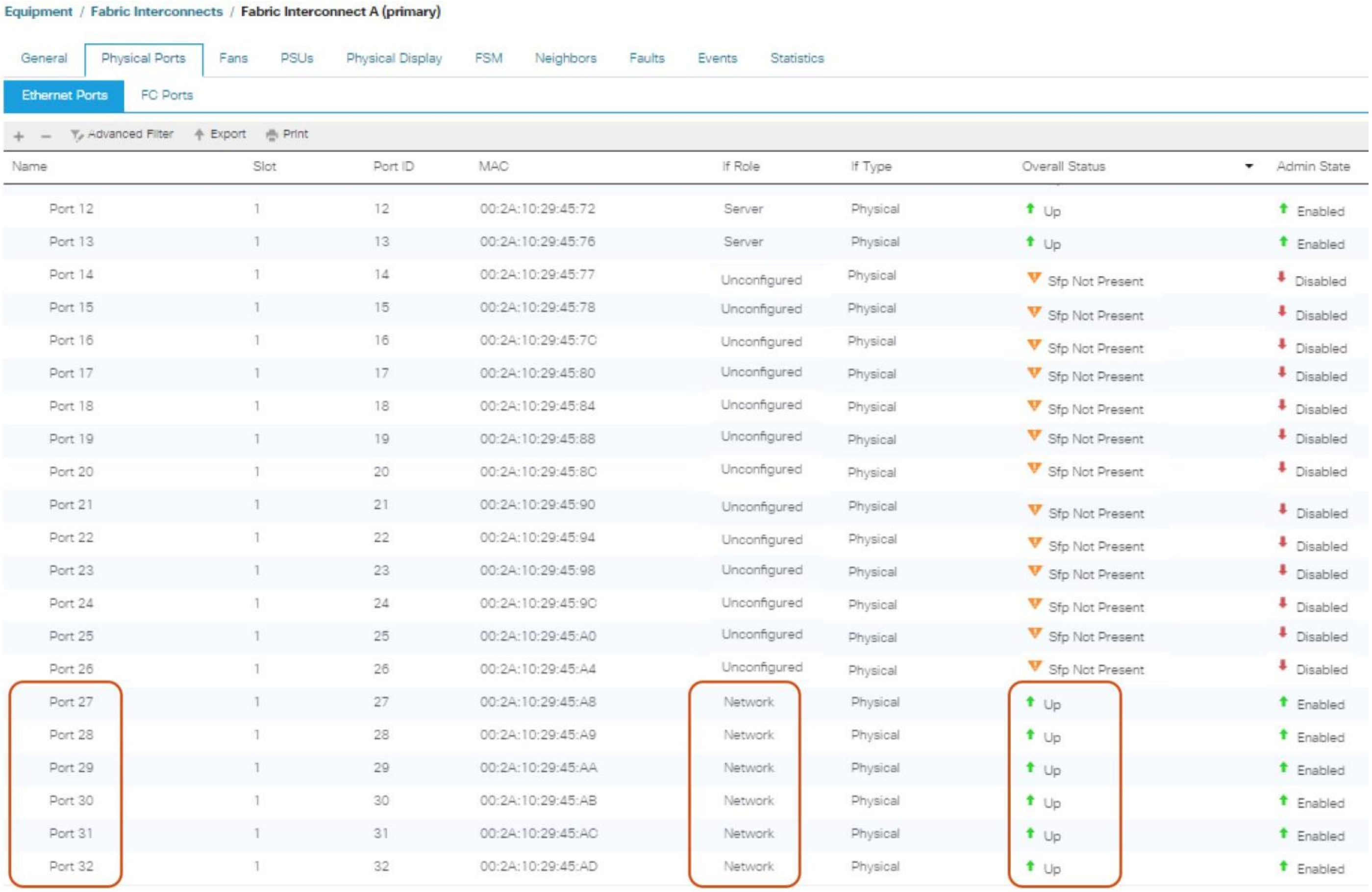
Name	Slot	Port ID	MAC	If Role	If Type	Overall Status	Admin State
Port 1	1	1	00:2A:10:29:45:46	Server	Physical	Up	Enabled
Port 2	1	2	00:2A:10:29:45:4A	Server	Physical	Up	Enabled
Port 3	1	3	00:2A:10:29:45:4E	Server	Physical	Up	Enabled
Port 4	1	4	00:2A:10:29:45:52	Server	Physical	Up	Enabled
Port 5	1	5	00:2A:10:29:45:56	Server	Physical	Up	Enabled
Port 6	1	6	00:2A:10:29:45:5A	Server	Physical	Up	Enabled
Port 7	1	7	00:2A:10:29:45:5E	Server	Physical	Up	Enabled
Port 8	1	8	00:2A:10:29:45:62	Server	Physical	Up	Enabled
Port 9	1	9	00:2A:10:29:45:66	Server	Physical	Up	Enabled
Port 10	1	10	00:2A:10:29:45:6A	Server	Physical	Up	Enabled
Port 11	1	11	00:2A:10:29:45:6E	Server	Physical	Up	Enabled
Port 12	1	12	00:2A:10:29:45:72	Server	Physical	Up	Enabled
Port 13	1	13	00:2A:10:29:45:76	Server	Physical	Up	Enabled
Port 14	1	14	00:2A:10:29:45:77	Unconfigured	Physical	Sfp Not Present	Disabled
Port 15	1	15	00:2A:10:29:45:78	Unconfigured	Physical	Sfp Not Present	Disabled
Port 16	1	16	00:2A:10:29:45:7C	Unconfigured	Physical	Sfp Not Present	Disabled
Port 17	1	17	00:2A:10:29:45:80	Unconfigured	Physical	Sfp Not Present	Disabled
Port 18	1	18	00:2A:10:29:45:84	Unconfigured	Physical	Sfp Not Present	Disabled
Port 19	1	19	00:2A:10:29:45:88	Unconfigured	Physical	Sfp Not Present	Disabled
Port 20	1	20	00:2A:10:29:45:8C	Unconfigured	Physical	Sfp Not Present	Disabled

Enable Fabric Interconnect A Ports for Uplinks

To enable uplink ports, complete the following steps:

1. Select the **`Equipment`** tab on the left site.
2. Select Equipment > Fabric Interconnects > Fabric Interconnect A (subordinate) > Fixed Module.
3. Click **`Ethernet Ports`** section.
4. Select Ports **27-32**, right-click and then select **`Configure as Uplink Port.`**
5. Click **`Yes`** and then **OK.**
6. Repeat the same steps for Fabric Interconnect B.

Figure 19 Configuring of Network Uplink Ports



Name	Slot	Port ID	MAC	If Role	If Type	Overall Status	Admin State
Port 12	1	12	00:2A:10:29:45:72	Server	Physical	⬆ Up	⬆ Enabled
Port 13	1	13	00:2A:10:29:45:76	Server	Physical	⬆ Up	⬆ Enabled
Port 14	1	14	00:2A:10:29:45:77	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 15	1	15	00:2A:10:29:45:78	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 16	1	16	00:2A:10:29:45:7C	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 17	1	17	00:2A:10:29:45:80	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 18	1	18	00:2A:10:29:45:84	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 19	1	19	00:2A:10:29:45:88	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 20	1	20	00:2A:10:29:45:8C	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 21	1	21	00:2A:10:29:45:90	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 22	1	22	00:2A:10:29:45:94	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 23	1	23	00:2A:10:29:45:98	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 24	1	24	00:2A:10:29:45:9C	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 25	1	25	00:2A:10:29:45:A0	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 26	1	26	00:2A:10:29:45:A4	Unconfigured	Physical	▼ Sfp Not Present	⬇ Disabled
Port 27	1	27	00:2A:10:29:45:A8	Network	Physical	⬆ Up	⬆ Enabled
Port 28	1	28	00:2A:10:29:45:A9	Network	Physical	⬆ Up	⬆ Enabled
Port 29	1	29	00:2A:10:29:45:AA	Network	Physical	⬆ Up	⬆ Enabled
Port 30	1	30	00:2A:10:29:45:AB	Network	Physical	⬆ Up	⬆ Enabled
Port 31	1	31	00:2A:10:29:45:AC	Network	Physical	⬆ Up	⬆ Enabled
Port 32	1	32	00:2A:10:29:45:AD	Network	Physical	⬆ Up	⬆ Enabled

Label Servers for Identification

For a better identification, label each server by completing the following steps:

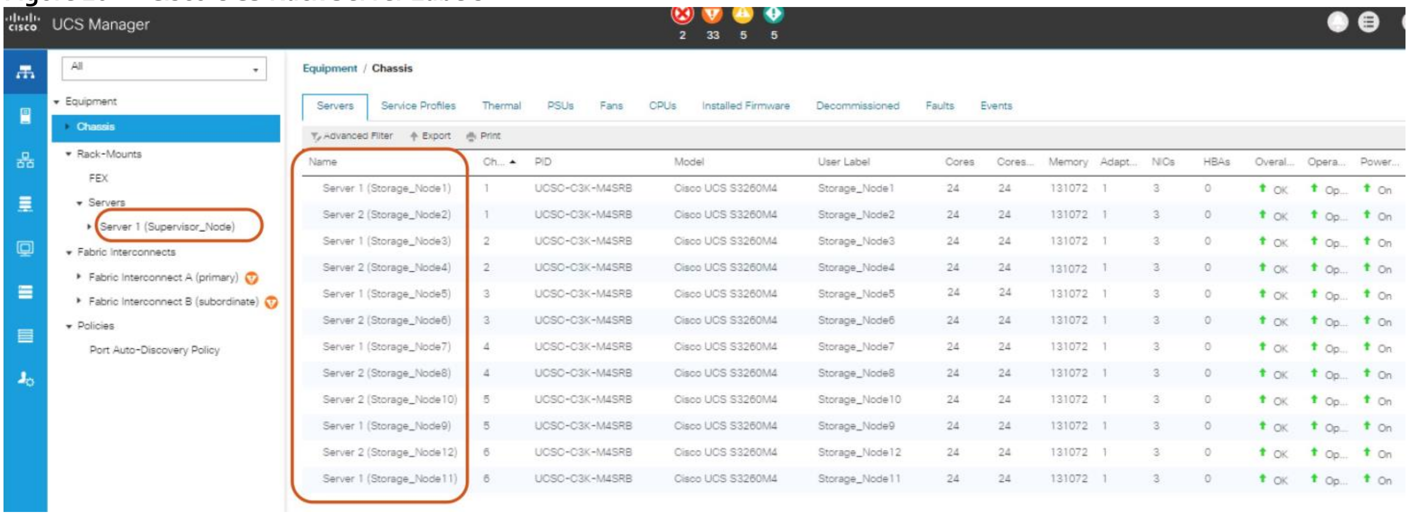
1. Select the **`Equipment`** tab on the left site.
2. Select Chassis > Chassis 1 > Server 1.
3. In the **`Properties`** section on the right go to **`User Label`** and add **`Storage-Node1`** to the field.
4. Repeat the previous steps for **`Server 2`** of **`Chassis 1`** and for all other servers of Chassis 2 – 6 according to Table 2.
5. Go then to **`Servers > Rack-Mounts > Servers >`** and repeat the step for all servers according to **Error! Reference source not found.**

Table 3 Server Label

Server	Name
Chassis 1 / Server 1	Storage-Node1
Chassis 1 / Server 2	Storage-Node2
Chassis 1 / Server 3	Storage-Node3
Chassis 1 / Server 4	Storage-Node4

Server	Name
Chassis 1 / Server 5	Storage-Node5
Chassis 1 / Server 6	Storage-Node6
Chassis 1 / Server 7	Storage-Node7
Chassis 1 / Server 8	Storage-Node8
Chassis 1 / Server 9	Storage-Node9
Chassis 1 / Server 10	Storage-Node10
Chassis 1 / Server 11	Storage-Node11
Chassis 1 / Server 12	Storage-Node12
Rack-Mount / Server 1	Supervisor

Figure 20 Cisco UCS Rack Server Labels



Name	Ch... ▲	PID	Model	User Label	Cores	Cores...	Memory	Adapt...	NICs	HBAs	Overal...	Opera...	Power...
Server 1 (Storage_Node1)	1	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node1	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node2)	1	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node2	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 1 (Storage_Node3)	2	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node3	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node4)	2	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node4	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 1 (Storage_Node5)	3	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node5	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node6)	3	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node6	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 1 (Storage_Node7)	4	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node7	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node8)	4	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node8	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node10)	5	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node10	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 1 (Storage_Node9)	5	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node9	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 2 (Storage_Node12)	6	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node12	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On
Server 1 (Storage_Node11)	6	UCSC-C3K-M4SRB	Cisco UCS S3260M4	Storage_Node11	24	24	131072	1	3	0	↑ OK	↑ Op...	↑ On

Create KVM IP Pool

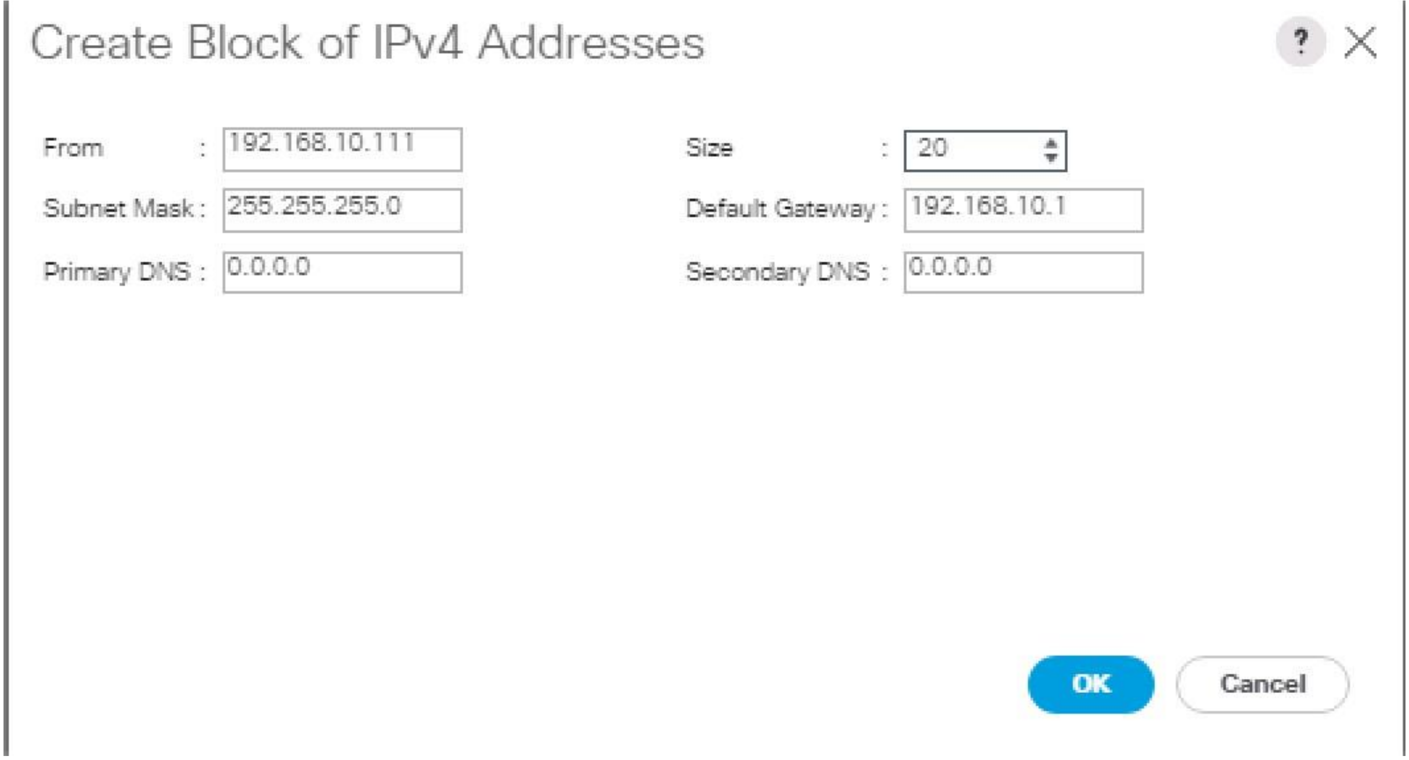
To create a KVM IP Pool, complete the following steps:

1. Select the **`LAN`** tab on the left site.
2. Go to LAN > Pools > root > IP Pools > IP Pool ext-mgmt.
3. Right-click Create Block of IPv4 Addresses.
4. Enter an IP Address in the **`From`** field.
5. Enter **`Size`** 20.
6. Enter your `Subnet Mask`.
7. Fill in your `Default Gateway`.

8. Enter your **`Primary DNS`** and **`Secondary DNS`** if needed.

9. Click `OK`.

Figure 21 Create Block of IPv4 Addresses



Create Block of IPv4 Addresses

From : 192.168.10.111

Size : 20

Subnet Mask : 255.255.255.0

Default Gateway : 192.168.10.1

Primary DNS : 0.0.0.0

Secondary DNS : 0.0.0.0

Create MAC Pool

To create a MAC Pool, complete the following steps:

1. Select the **`LAN`** tab on the left site.

2. Go to LAN > Pools > root > Mac Pools and right-click **Create MAC Pool**.

3. Type in "**Scality-MAC-Pools"** for Name.

4. (Optional) Enter a **`Description`** of the MAC Pool.

5. Set Assignment Order as Sequential.

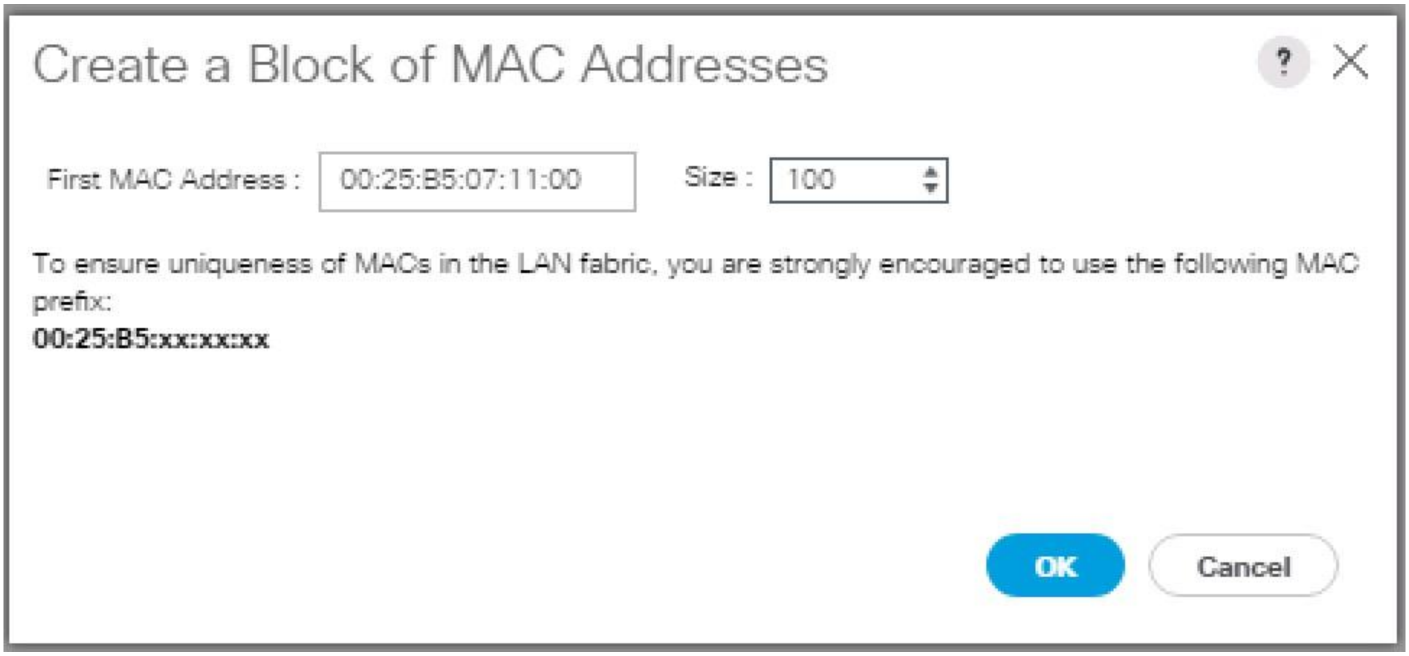
6. Click **`Next`**.

7. Click **`Add`**.

8. Specify a starting MAC address.

9. Specify a size of the MAC address pool, which is sufficient to support the available server resources, for example, 100.

Figure 22 Create a Block of MAC Addresses



Create a Block of MAC Addresses

First MAC Address : 00:25:B5:07:11:00

Size : 100

To ensure uniqueness of MACs in the LAN fabric, you are strongly encouraged to use the following MAC prefix:
00:25:B5:xx:xx:xx

10. Click **OK**.

11. Click **Finish**.

Create UUID Pool

To create a UUID Pool, complete the following steps:

1. Select the **Servers** tab on the left site.

2. Go to Servers > Pools > root > UUID Suffix Pools and right-click **Create UUID Suffix Pool**.

3. Type in "**Scality-UUID-Pools**" for Name.

4. (Optional) Enter a **Description** of the MAC Pool.

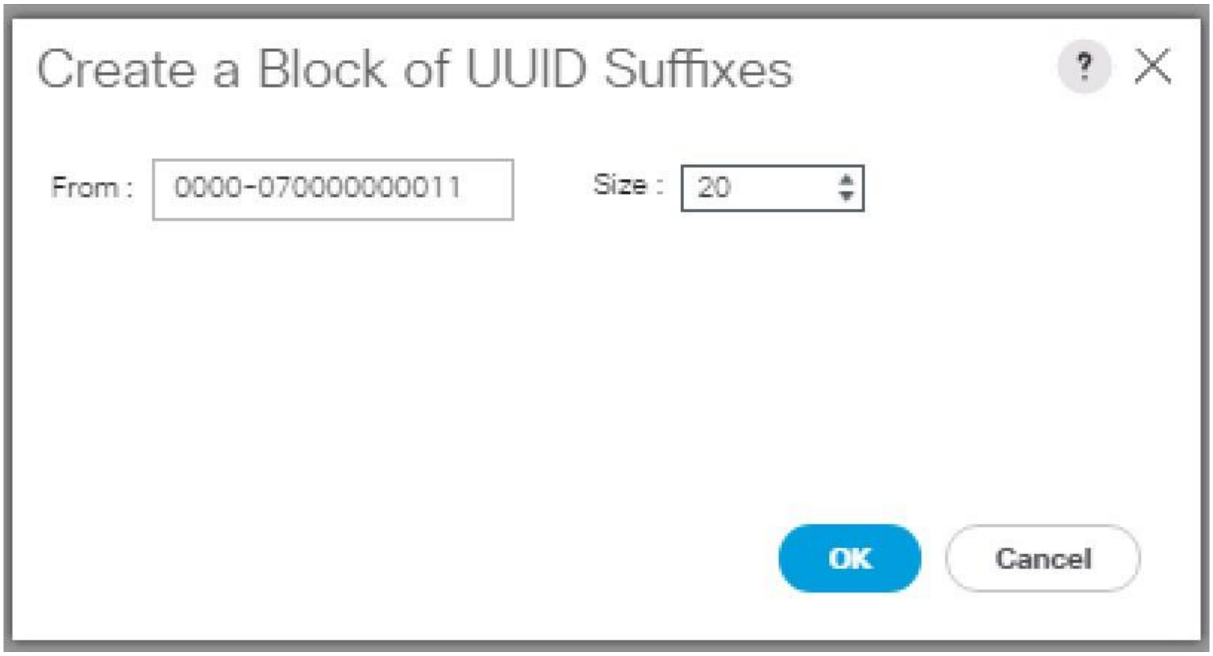
5. Set Assignment Order to **Sequential** and click Next.

6. Click **Add**.

7. Specify a starting UUID Suffix.

8. Specify a size of the UUID suffix pool, which is sufficient to support the available server resources, for example, 25.

Figure 23 Create a Block of UUID Suffixes



Create a Block of UUID Suffixes

From : 0000-070000000011

Size : 20

9. Click **OK**.

10. Click **Finish** and then **OK**.

Create VLANs

As mentioned before it is important to separate the network traffic with VLANs for Storage-Management traffic and Storage-Cluster traffic, External traffic and Client traffic (optional). Table 4 lists the configured VLANs.

Note: Client traffic is optional. We used Client traffic, to validate the functionality of NFS and S3 connectors.

Table 4 VLAN Configurations

VLAN	Name	Function
10	Storage-Management	Storage Management traffic for Supervisor and Storage Nodes
20	Storage-Cluster	Storage Cluster traffic for Supervisor and Storage Nodes
30	Client-Network (optional)	Client traffic for Storage Nodes
79	External-Network	External Public Network for all UCS Servers

To configure VLANs in the Cisco UCS Manager GUI, complete the following steps:

1. Select **LAN** in the left pane in the UCSM GUI.

2. Select LAN > LAN Cloud > VLANs and right-click **Create VLANs**.

3. Enter "**Storage-Mgmt**" for the VLAN Name.

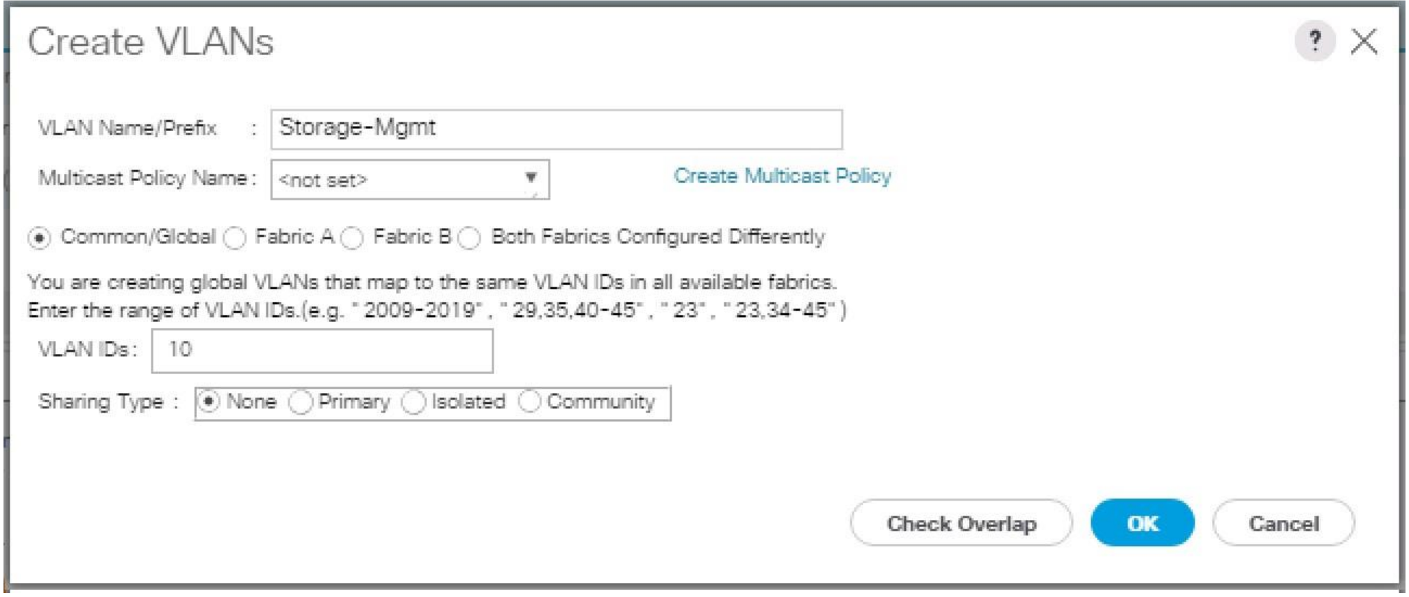
4. Keep Multicast Policy Name as <not set>.

5. Select **Common/Global** for Public.

6. Enter **10** in the **VLAN IDs** field.

7. Click **OK** and then click **Finish**.

Figure 24 Create a VLAN



Create VLANs

VLAN Name/Prefix : Storage-Mgmt

Multicast Policy Name : <not set>

● 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 : 10

Sharing Type : ● None ○ Primary ○ Isolated ○ Community

8. Repeat the steps for rest of the VLANs "**Storage-Cluster**" and "**External-Network.**"

Enable CDP

To enable Network Control Policies, complete the following steps:

1. Select the **LAN** tab in the left pane of the Cisco UCS Manager GUI.

2. Go to LAN > Policies > root > Network Control Policies and right-click Create **Network-Control Policy**.

3. Type in **Enable-CDP** in the **Name** field.

4. (Optional) Enter a description in the **Description** field.

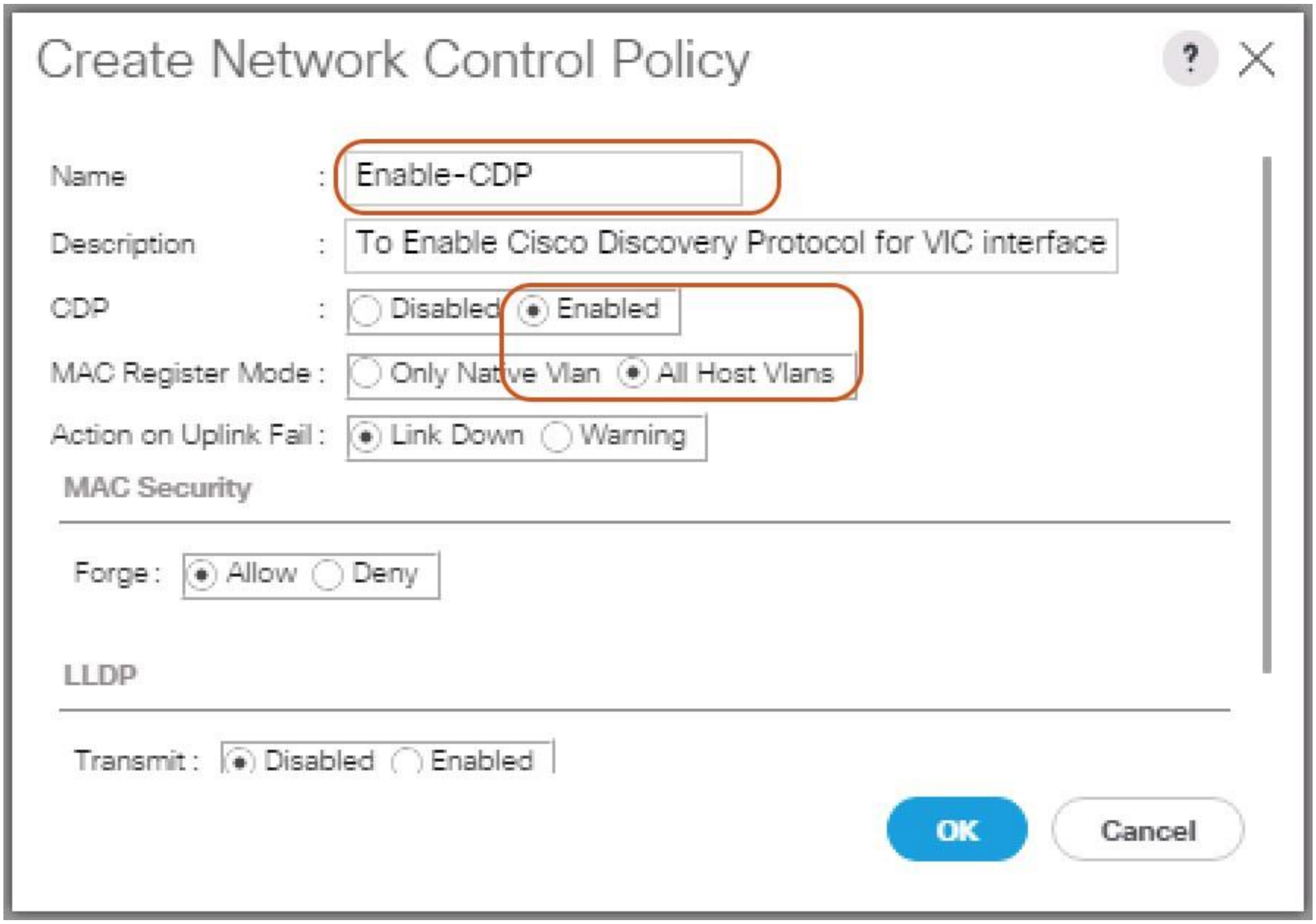
5. Click **Enabled** under **CDP**.

6. Click All Hosts VLANs under MAC Register Mode.

7. Leave everything else untouched and click **OK**.

8. Click **OK**.

Figure 25 Create a Network Control Policy



Create Network Control Policy

Name : Enable-CDP

Description : To Enable Cisco Discovery Protocol for VIC interface

CDP : ○ Disabled ● Enabled

MAC Register Mode : ○ Only Native Vlan ● All Host Vlans

Action on Uplink Fail : ● Link Down ○ Warning

MAC Security

Forge : ● Allow ○ Deny

LLDP

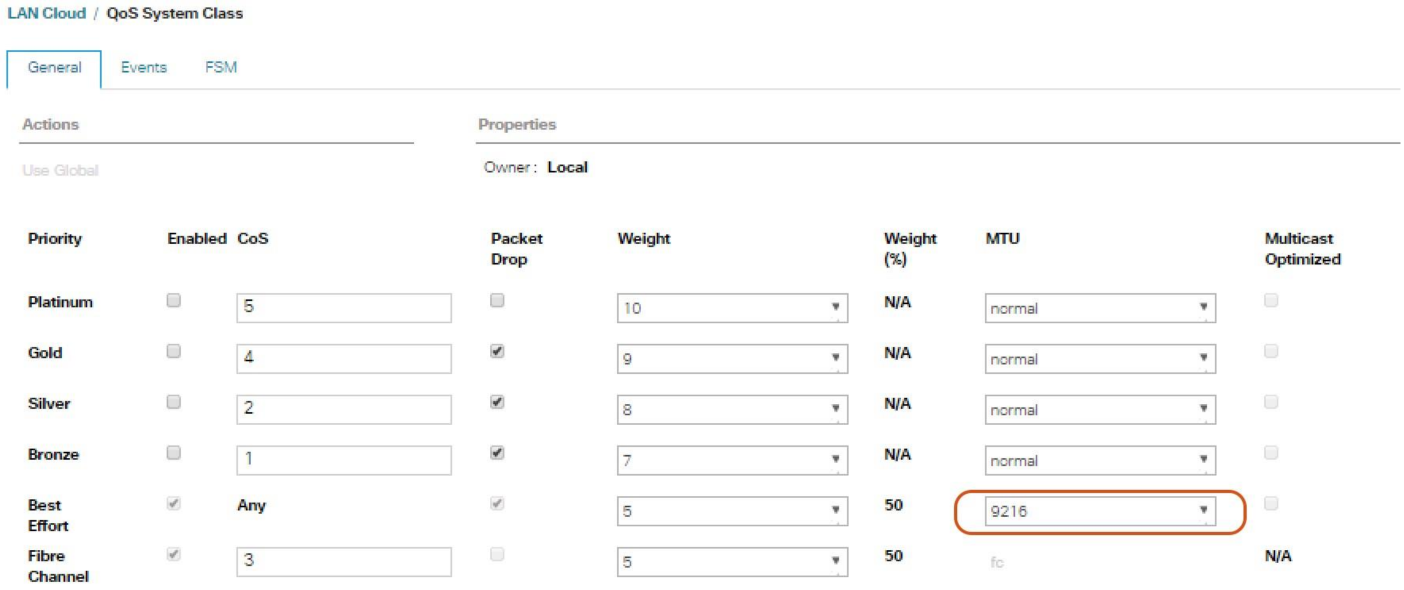
Transmit : ● Disabled ○ Enabled

QoS System Class

To create a Quality of Service System Class, complete the following steps:

1. Select the **LAN** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to LAN > LAN Cloud > QoS System Class.
3. Best Effort MTU as **9216**.
4. Set Fibre Channel Weight to **None**.
5. Click **Save Changes** and then click **OK**.

Figure 26 QoS System Class



LAN Cloud / QoS System Class

Owner : Local

Priority	Enabled	CoS	Packet Drop	Weight	Weight (%)	MTU	Multicast Optimized
Platinum	☐	5	☐	10	N/A	normal	☐
Gold	☐	4	☑	9	N/A	normal	☐
Silver	☐	2	☑	8	N/A	normal	☐
Bronze	☐	1	☑	7	N/A	normal	☐
Best Effort	☑	Any	☑	5	50	9216	☐
Fibre Channel	☑	3	☐	5	50	fc	N/A

vNIC Template Setup

Based on the previous section of creating VLANs, the next step is to create the appropriate vNIC templates. For Scality Storage we need to create four different vNICs, depending on the role of the server. Table 5 provides an overview of the configuration.

Table 5 vNIC Table

vNIC Name	Fabric	Failover	VLAN Name / ID	MTU Size	MAC Pool	Network Control Policy
Storage-Mgmt	A	Yes	Storage-Mgmt **10**	9000	Scality-MAC-Pools	Enable-CDP
Storage-Cluster	B	Yes	Storage-Cluster **20**	9000	Scality-MAC-Pools	Enable-CDP
External-Network	A	Yes	External-Network **79**	1500	Scality-MAC-Pools	Enable-CDP

To create the appropriate vNICs, complete the following steps:

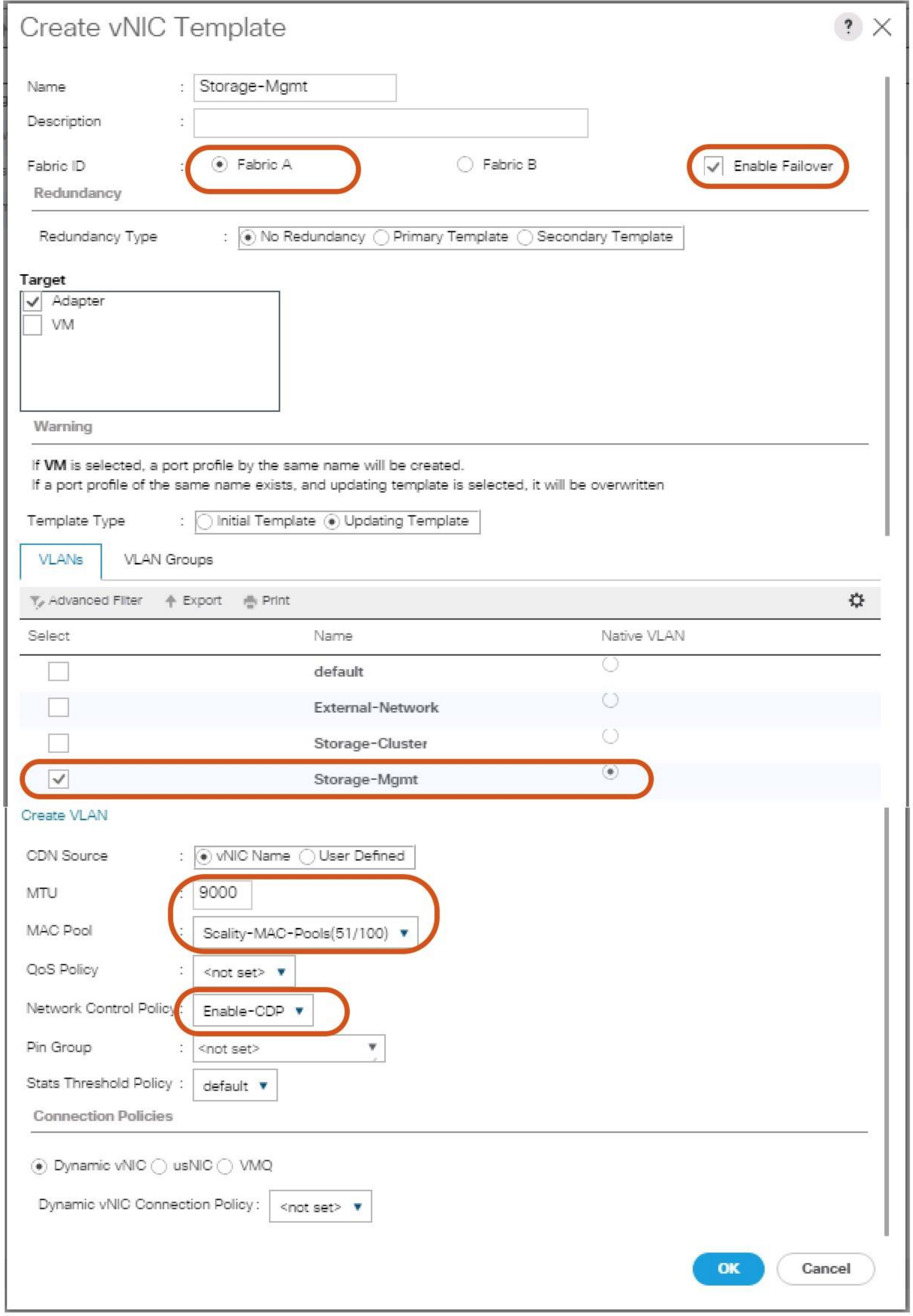
1. Select the **LAN** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to LAN > Policies > root > vNIC Templates and right-click Create **vNIC Template**.
3. Type in **Storage-Mgmt** in the **Name** field.
4. (Optional) Enter a description in the **Description** field.
5. Click Fabric A as Fabric ID and enable failover.
6. Select **default** as **VLANs** and click **Native VLAN**.

7. Select **`Scality-MAC-Pools`** as MAC Pool.

8. Select Enable-CDP as Network Control Policy.

9. Click **OK** and then **OK**.

Figure 27 Setup of vNIC Template for Storage-Mgmt vNIC



Create vNIC Template

Name : Storage-Mgmt

Description :

Fabric ID : ● Fabric A ○ Fabric B ☑ Enable Failover

Redundancy

Redundancy Type : ● No Redundancy ○ Primary Template ○ Secondary Template

Target

☑ Adapter

□ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type : ○ Initial Template ● Updating Template

Select	Name	Native VLAN
□	**default**	○
□	**External-Network**	○
□	**Storage-Cluster**	○
☑	**Storage-Mgmt**	●

CDN Source : ● vNIC Name ○ User Defined

MTU : 9000

MAC Pool : Scality-MAC-Pools(51/100)

QoS Policy : <not set>

Network Control Policy : Enable-CDP

Pin Group : <not set>

Stats Threshold Policy : default

Connection Policies

● Dynamic vNIC ○ usNIC ○ VMQ

Dynamic vNIC Connection Policy : <not set>

10. Repeat these steps for the vNICs "**Storage-Cluster**" and "**External-Network.**" Make sure you select the correct Fabric ID, VLAN and MTU size according to Table 4 .

Ethernet Adapter Policy Setup

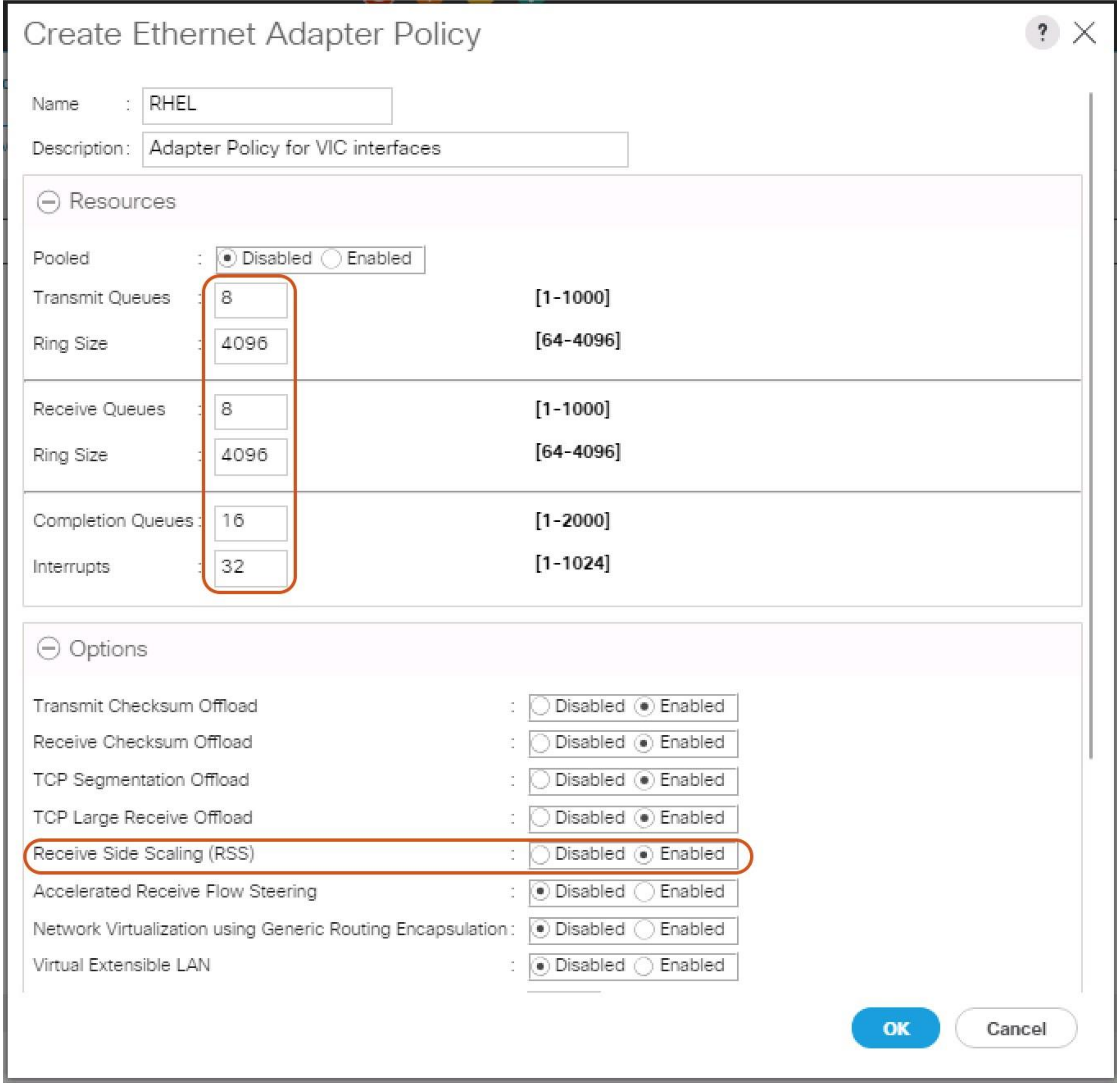
By default, Cisco UCS provides a set of Ethernet adapter policies. These policies include the recommended settings for each supported server operating system. Operating systems are sensitive to the settings in these policies.

Cisco UCS best practice is to enable Jumbo Frames MTU 9000 for any Storage facing Networks (Storage-Mgmt and Storage-Cluster). Enabling jumbo frames on specific interfaces and modifying Tx and Rx values guarantees 39Gb/s bandwidth on the UCS fabric.

To create a specific adapter policy for Red Hat Enterprise Linux, complete the following steps:

1. Select the **Server** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Servers > Policies > root > Adapter Policies and right-click Create Ethernet Adapter Policy.
3. Type in **RHEL** in the **Name** field.
4. (Optional) Enter a description in the **Description** field.
5. Under **Resources** type in the following values:
   a. Transmit Queues: **8**
   b. Ring Size: **4096**
   c. Receive Queues: **8**
   d. Ring Size: **4096**
   e. Completion Queues: **16**
   f. Interrupts: **32**
6. Under Options enable Receive Side Scaling (RSS).
7. Click **OK** and then click **OK** again.

Figure 28 Adapter Policy for RHEL



Create Ethernet Adapter Policy

Name : RHEL

Description : Adapter Policy for VIC interfaces

Resources

Pooled : ● Disabled ○ Enabled

Transmit Queues : 8 [1-1000]

Ring Size : 4096 [64-4096]

Receive Queues : 8 [1-1000]

Ring Size : 4096 [64-4096]

Completion Queues : 16 [1-2000]

Interrupts : 32 [1-1024]

Options

Transmit Checksum Offload : ○ Disabled ● Enabled

Receive Checksum Offload : ○ Disabled ● Enabled

TCP Segmentation Offload : ○ Disabled ● Enabled

TCP Large Receive Offload : ○ Disabled ● Enabled

Receive Side Scaling (RSS) : ○ Disabled ● Enabled

Accelerated Receive Flow Steering : ● Disabled ○ Enabled

Network Virtualization using Generic Routing Encapsulation : ● Disabled ○ Enabled

Virtual Extensible LAN : ● Disabled ○ Enabled

Boot Policy Setup

To create a Boot Policy, complete the following steps:

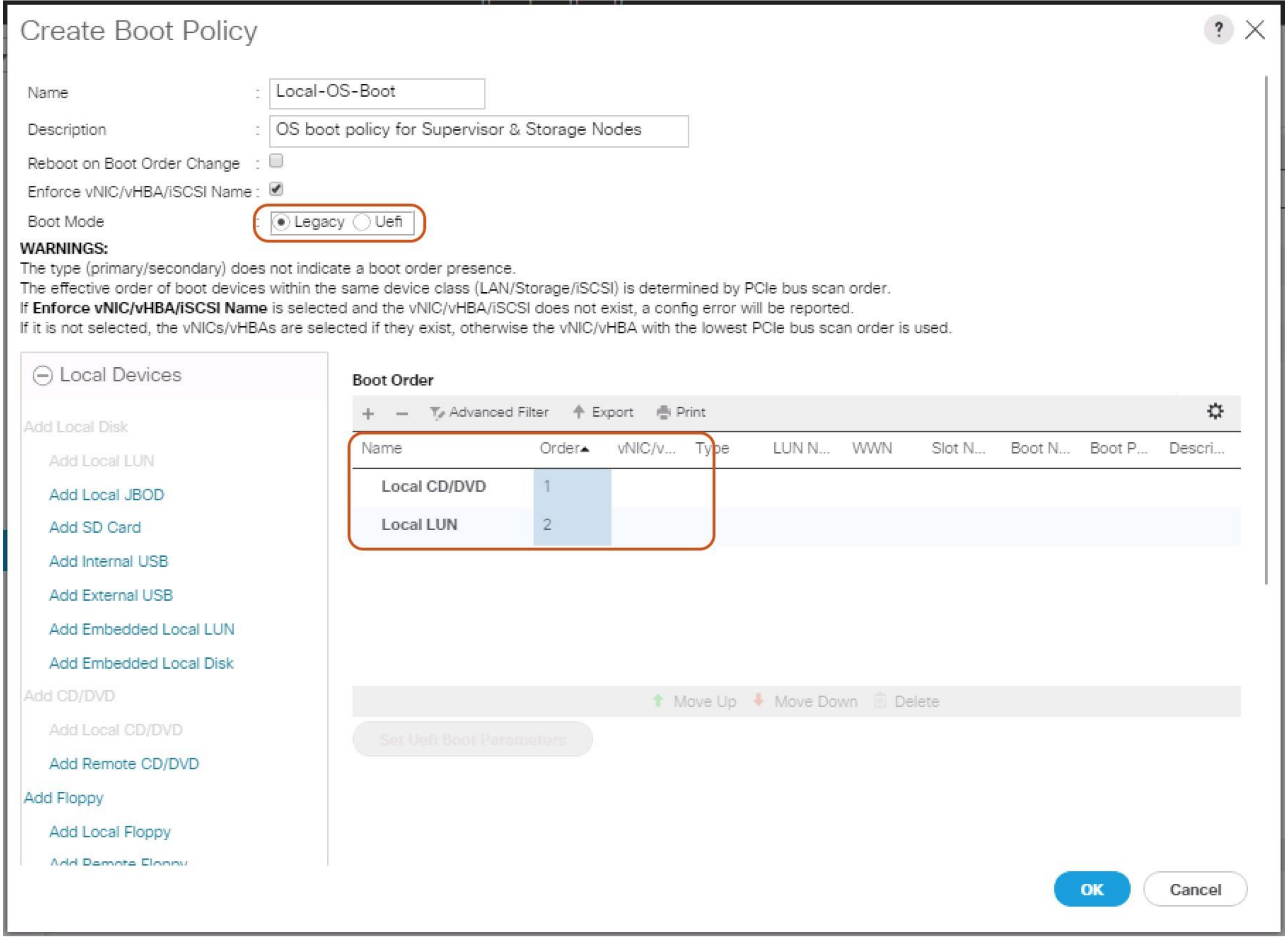
1. Select the **`Servers`** tab in the left pane.

2. Go to Servers > Policies > root > Boot Policies and right-click Create **Boot Policy**.

3. Type in a **`Local-OS-Boot`** in the **`Name`** field.

4. (Optional) Enter a description in the **Description** field.

Figure 29 Create Boot Policy



Create Boot Policy

Name : Local-OS-Boot

Description : OS boot policy for Supervisor & Storage Nodes

Reboot on Boot Order Change : □

Enforce vNIC/vHBA/iSCSI Name : ☑

Boot Mode : ● Legacy ○ Uefi

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Boot Order

Name	Order▲	vNIC/v...	Type	LUN N...	WWN	Slot N...	Boot N...	Boot P...	Descri...
Local CD/DVD	1								
Local LUN	2								

5. Click Local Devices > Add Local CD/DVD and click OK.

6. Click Local Devices > Add Local LUN and Set Type as **"Any"** and click OK.

7. Click **OK**.

Create LAN Connectivity Policy Setup

To create a LAN Connectivity Policy, complete the following steps:

1. Select the **LAN** tab in the left pane.

2. Go to Servers > Policies > root > LAN Connectivity Policies and right-click Create LAN Connectivity Policy for Storage Servers.

3. Type in **Storage-Node** in the **Name** field.

4. (Optional) Enter a description in the **Description** field.

5. Click **Add**.

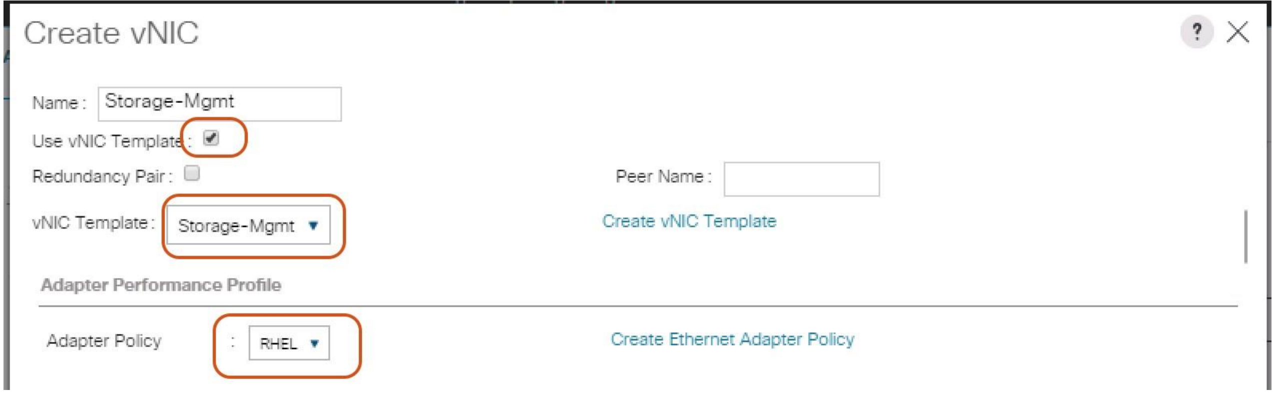
6. Type in **Storage-Mgmt** in the name field.

7. Click "Use vNIC Template."

8. Select vNIC template for "Storage-Mgmt" from drop-down list.

9. If you are using Jumbo Frame MTU 9000, select the default Adapter Policy, previously created as "**RHEL"** from the drop-down list.

Figure 30 LAN Connectivity Policy



Create vNIC

Name : Storage-Mgmt

Use vNIC Template : ☑

Redundancy Pair : □

Peer Name :

vNIC Template : Storage-Mgmt ▾

Adapter Performance Profile

Adapter Policy : RHEL ▾

10. Repeat these steps for the remaining networks "Storage-Cluster" and "External-Network." Make sure you choose Adapter Policy as "RHEL" for VNIC interface "Storage-Cluster."

Create Maintenance Policy Setup

To setup a Maintenance Policy, complete the following steps:

1. Select the `Servers` tab in the left pane.

2. Go to Servers > Policies > root > Maintenance Policies and right-click Create Maintenance Policy.

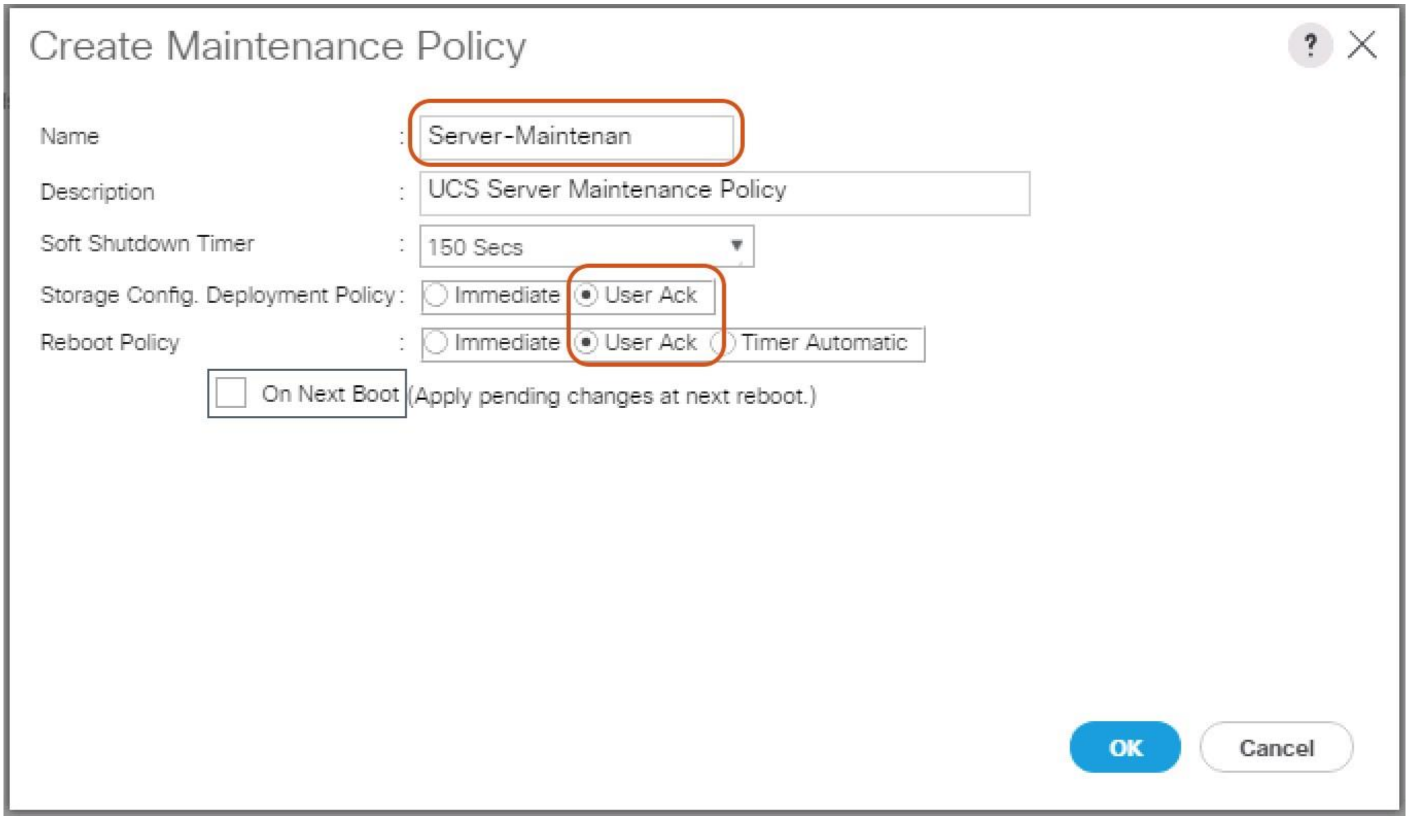
3. Type in a `Server-Maint` in the `Name` field.

4. (Optional) Enter a description in the `Description` field.

5. Click User Ack under Reboot Policy.

6. Click **OK** and then click **OK** again.

7. Create Maintenance Policy



Create Maintenance Policy

Name : Server-Maintenan

Description : UCS Server Maintenance Policy

Soft Shutdown Timer : 150 Secs

Storage Config. Deployment Policy : ○ Immediate ● User Ack

Reboot Policy : ○ Immediate ● User Ack ○ Timer Automatic

□ On Next Boot (Apply pending changes at next reboot.)

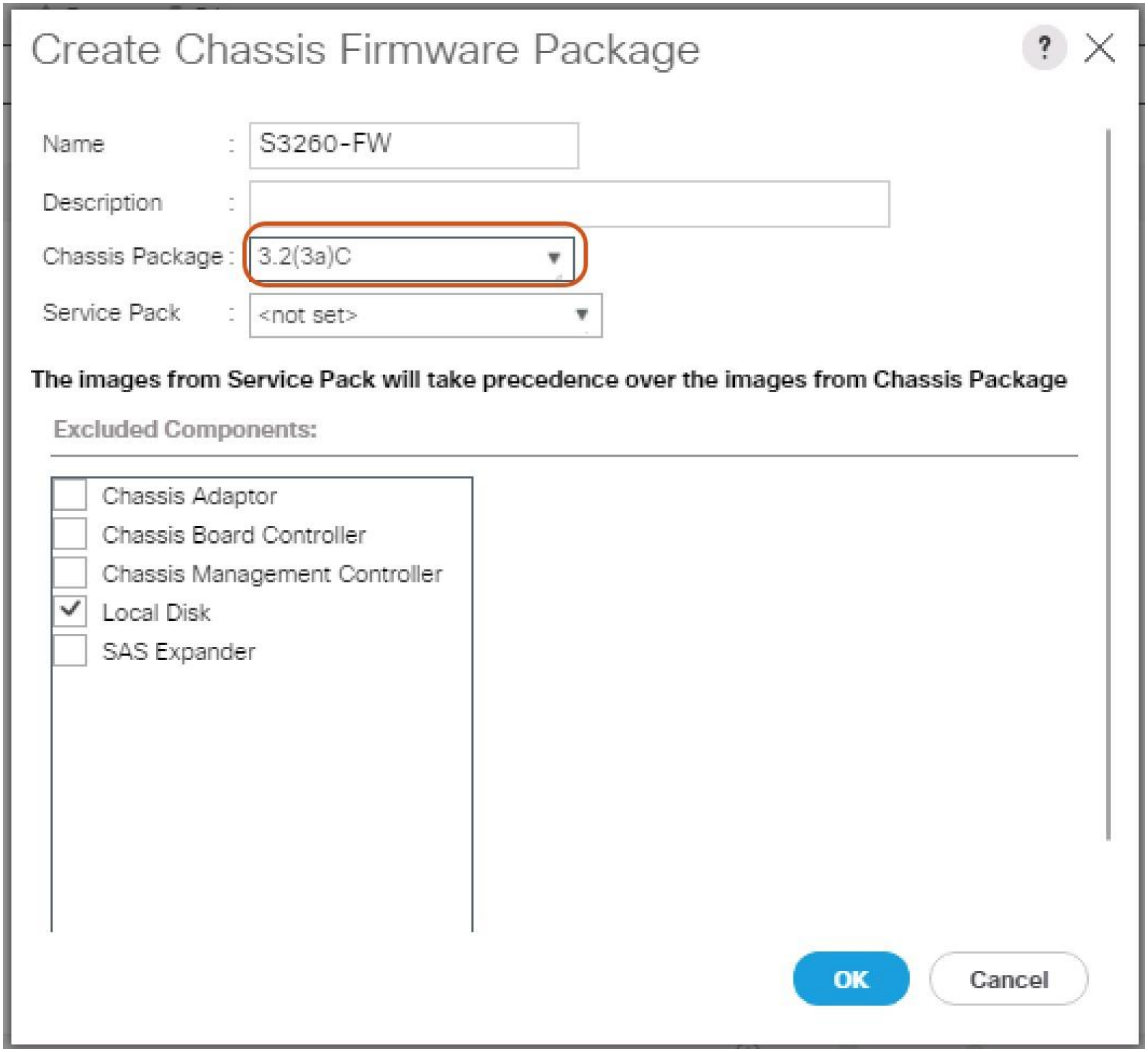
Creating Chassis Profile

The Chassis Profile is required to assign specific disks to a particular server node in a Cisco UCS S3260 Storage Server as well as upgrading to a specific chassis firmware package.

Create Chassis Firmware Package

To create a Chassis Firmware Package, complete the following steps:

1. Select the **`Chassis`** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Chassis > Policies > root > Chassis Firmware Package and right-click Create **Chassis Firmware Package**.
3. Type in **`S3260-FW`** in the `Name` field.
4. (Optional) Enter a description in the **`Description`** field.
5. Select **`3.2.(3a)C`** form the drop-down list of **`Chassis Package`**.
6. Select **`OK`** and then click **`OK`** again.
7. Create Chassis Firmware Package.



Create Chassis Firmware Package

Name : S3260-FW

Description :

Chassis Package : 3.2(3a)C

Service Pack : <not set>

The images from Service Pack will take precedence over the images from Chassis Package

Excluded Components:

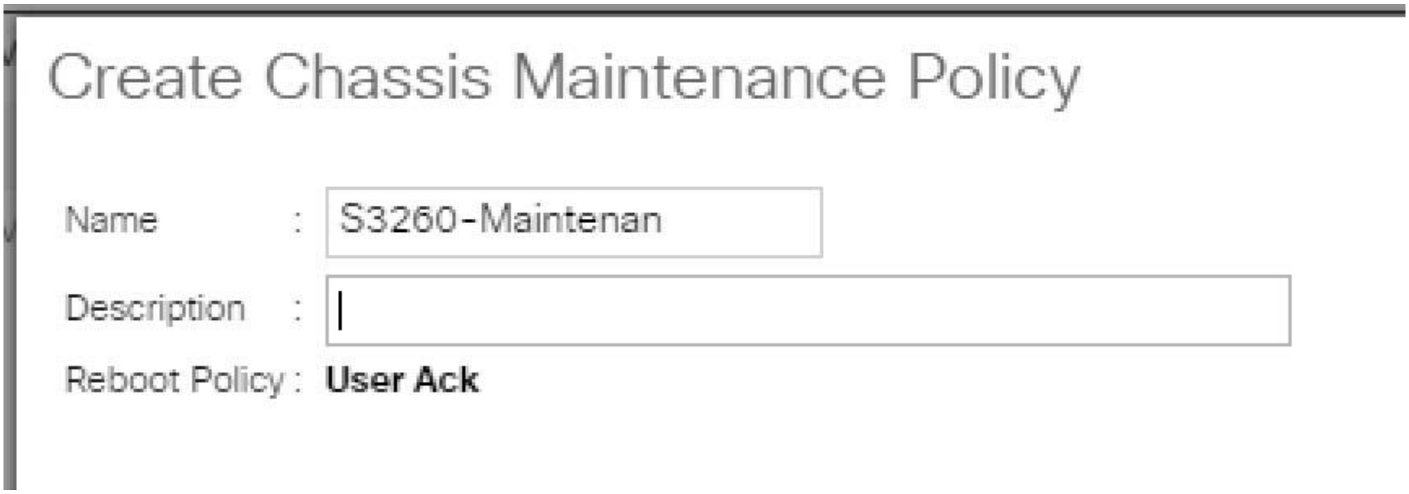
- □ Chassis Adaptor
- □ Chassis Board Controller
- □ Chassis Management Controller
- ☑ Local Disk
- □ SAS Expander

Create Chassis Maintenance Policy

To create a Chassis Maintenance Policy, complete the following steps:

1. Select the **`Chassis`** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Chassis > Policies > root > Chassis Maintenance Policies and right-click Create **Chassis Maintenance Policy**.
3. Type in **`S3260-Main`** in the **`Name`** field.
4. (Optional) Enter a description in the **`Description`** field.
5. Click **`OK`** and then **`OK`**.

6. Create Chassis Maintenance Policy.



Create Chassis Maintenance Policy

Name : S3260-Maintenan

Description :

Reboot Policy : **User Ack**

Create Disk Zoning Policy

To create a Disk Zoning Policy, complete the following steps:

1. Select the **`Chassis`** tab in the left pane of the Cisco UCS Manager GUI.

2. Go to Chassis > Policies > root > Disk Zoning Policies and right-click Create **Disk Zoning Policy**.

3. Type in **`S3260-DiskZoning`** in the `Name` field.

4. (Optional) Enter a description in the **`Description`** field.

5. Create Disk Zoning Policy.

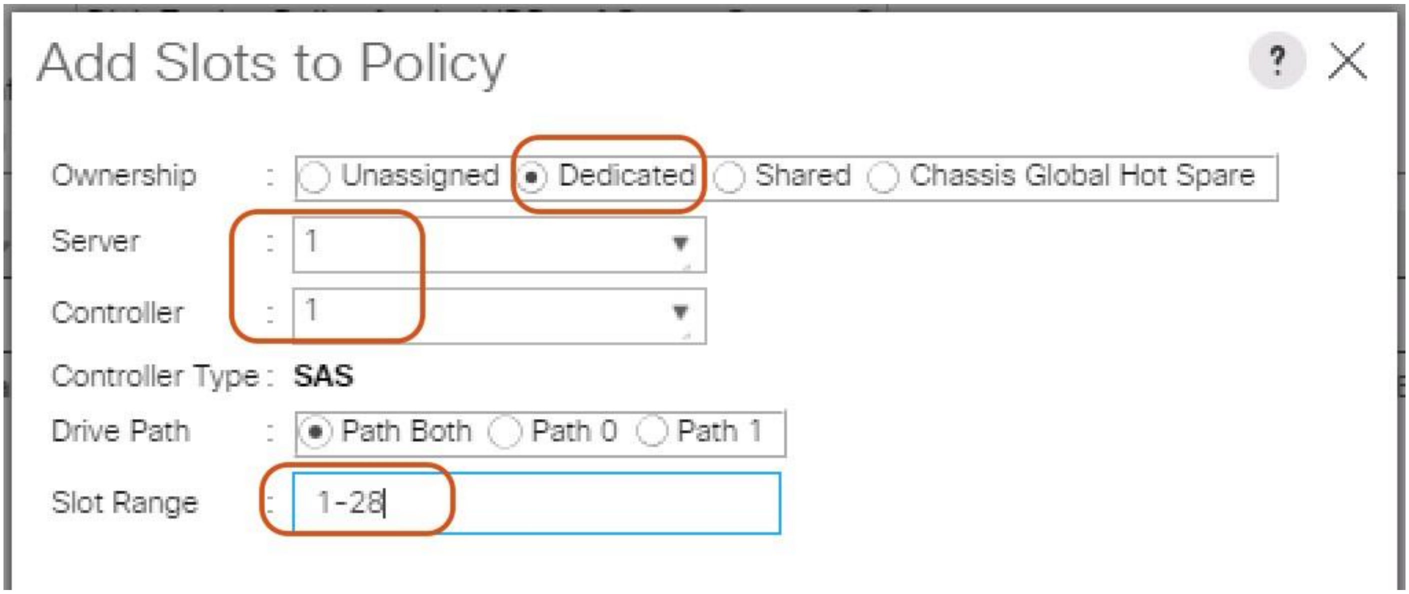
6. Click **`Add`**.

7. Select Dedicated under Ownership.

8. Select **`Server 1`** and Select **`Controller 1`**.

9. Add **`Slot Range 1-28`** for the top node of the Cisco UCS S3260 Storage Server and click **`OK`**.

10. Add Slots to Top Node of Cisco UCS S3260.



Add Slots to Policy

Ownership : ○ Unassigned ● Dedicated ○ Shared ○ Chassis Global Hot Spare

Server : 1

Controller : 1

Controller Type : SAS

Drive Path : ● Path Both ○ Path 0 ○ Path 1

Slot Range : 1-28

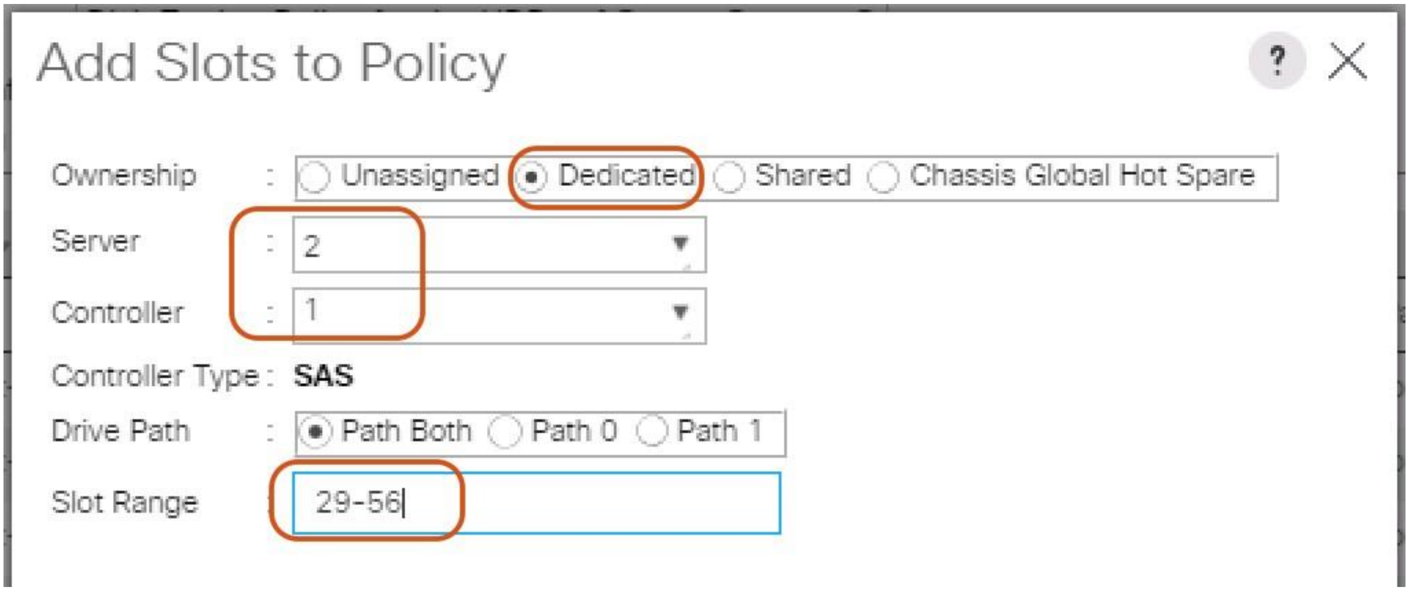
11. Click **Add**.

12. Select Dedicated under Ownership.

13. Select **Server 2** and Select **Controller 1**.

14. Add **Slot Range 29-56** for the bottom node of the Cisco UCS S3260 Storage Server and click OK.

15. Add Slots to Bottom Node of Cisco UCS S3260.



Add Slots to Policy

Ownership : ○ Unassigned ● Dedicated ○ Shared ○ Chassis Global Hot Spare

Server : 2

Controller : 1

Controller Type : SAS

Drive Path : ● Path Both ○ Path 0 ○ Path 1

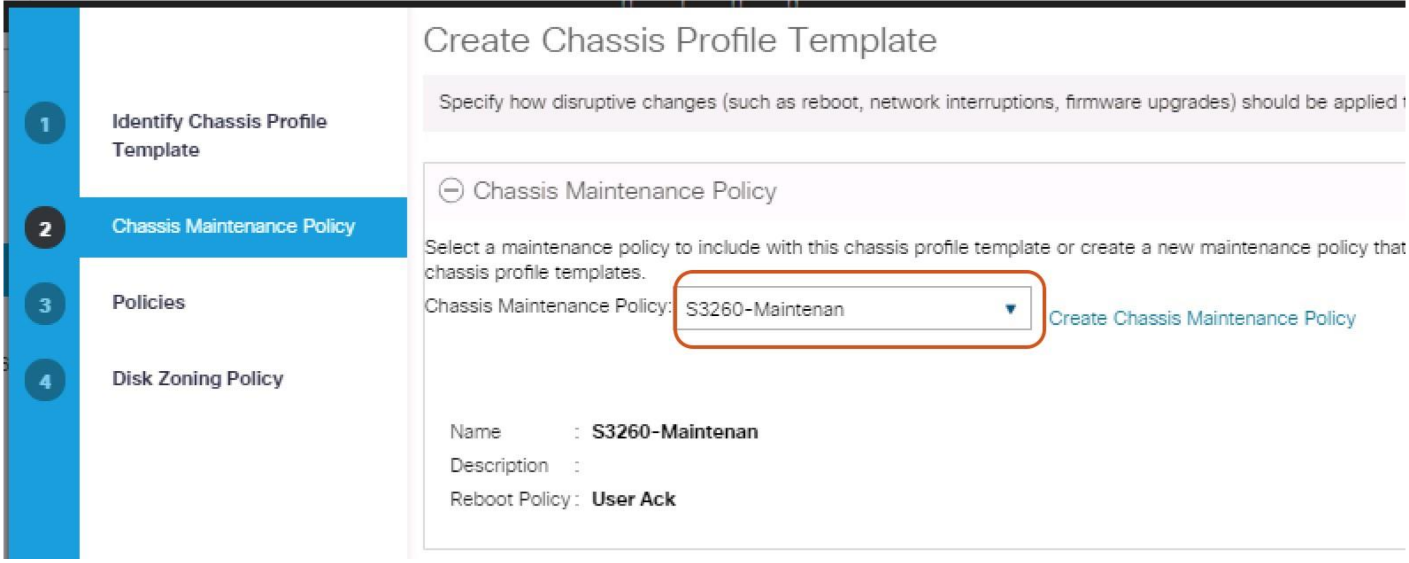
Slot Range : 29-56

Create Chassis Profile Template

To create a Chassis Profile Template, complete the following steps:

1. Select the **`Chassis`** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Chassis > Chassis Profile Templates and right-click Create **Chassis Profile Template**.
3. Type in **S3260-Chassis** in the Name field.
4. Under Type, select **Updating Template**.
5. (Optional) Enter a description in the **`Description`** field.
6. Create Chassis Profile Template
7. Select **`Next`**.
8. Under the radio button **`Chassis Maintenance Policy`**, select your previously created Chassis Maintenance Policy.

Figure 31 Chassis Profile Template – Chassis Maintenance Policy



Create Chassis Profile Template

Specify how disruptive changes (such as reboot, network interruptions, firmware upgrades) should be applied t

⊖ Chassis Maintenance Policy

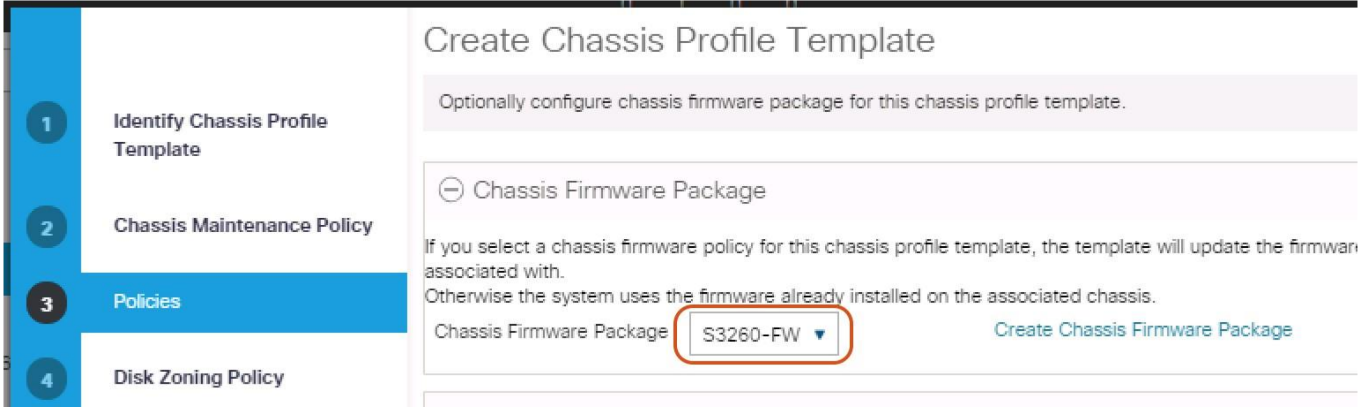
Select a maintenance policy to include with this chassis profile template or create a new maintenance policy that chassis profile templates.

Chassis Maintenance Policy: S3260-Maintenan ▾ Create Chassis Maintenance Policy

Name : **S3260-Maintenan**
Description :
Reboot Policy : **User Ack**

9. Select **`Next`**.
10. Select the + button and select under **`Chassis Firmware Package`** your previously created Chassis Firmware Package Policy.

Figure 32 Chassis Profile Template – Chassis Firmware Package



1 Identify Chassis Profile Template
2 Chassis Maintenance Policy
3 Policies
4 Disk Zoning Policy

Create Chassis Profile Template

Optionally configure chassis firmware package for this chassis profile template.

⊖ Chassis Firmware Package

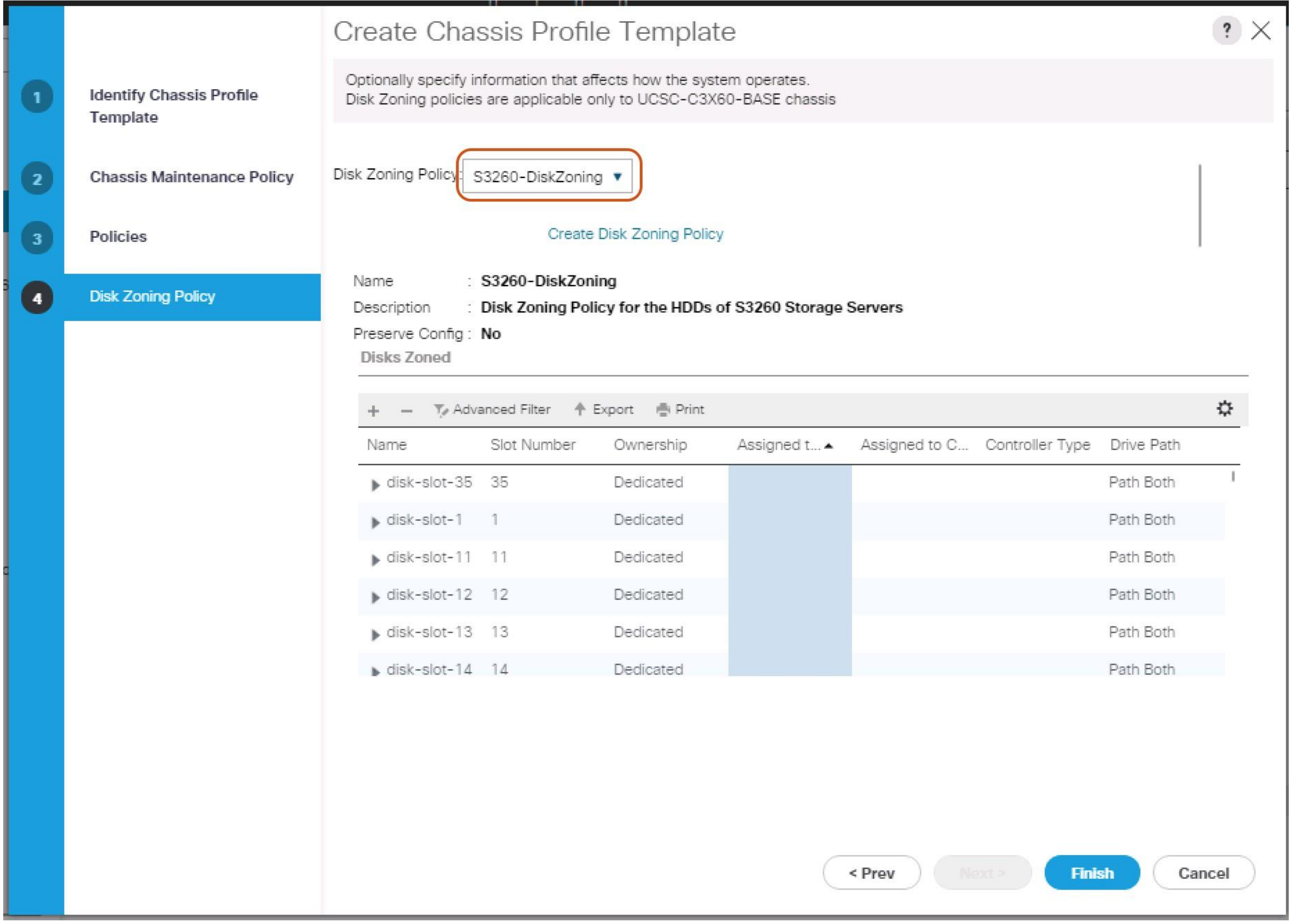
If you select a chassis firmware policy for this chassis profile template, the template will update the firmwar associated with.
Otherwise the system uses the firmware already installed on the associated chassis.

Chassis Firmware Package: S3260-FW ▾

11. Select **Next**.

12. Under **`Disk Zoning Policy`** select your previously created Disk Zoning Policy.

Figure 33 Chassis Profile Template – Disk Zoning Policy



1 Identify Chassis Profile Template
2 Chassis Maintenance Policy
3 Policies
4 Disk Zoning Policy
? ✕

Create Chassis Profile Template

Optionally specify information that affects how the system operates.
Disk Zoning policies are applicable only to UCSC-C3X60-BASE chassis

Disk Zoning Policy: S3260-DiskZoning ▾

Create Disk Zoning Policy

Name : **S3260-DiskZoning**
Description : **Disk Zoning Policy for the HDDs of S3260 Storage Servers**
Preserve Config : **No**

Disks Zoned

+ − Advanced Filter Export Print ⚙

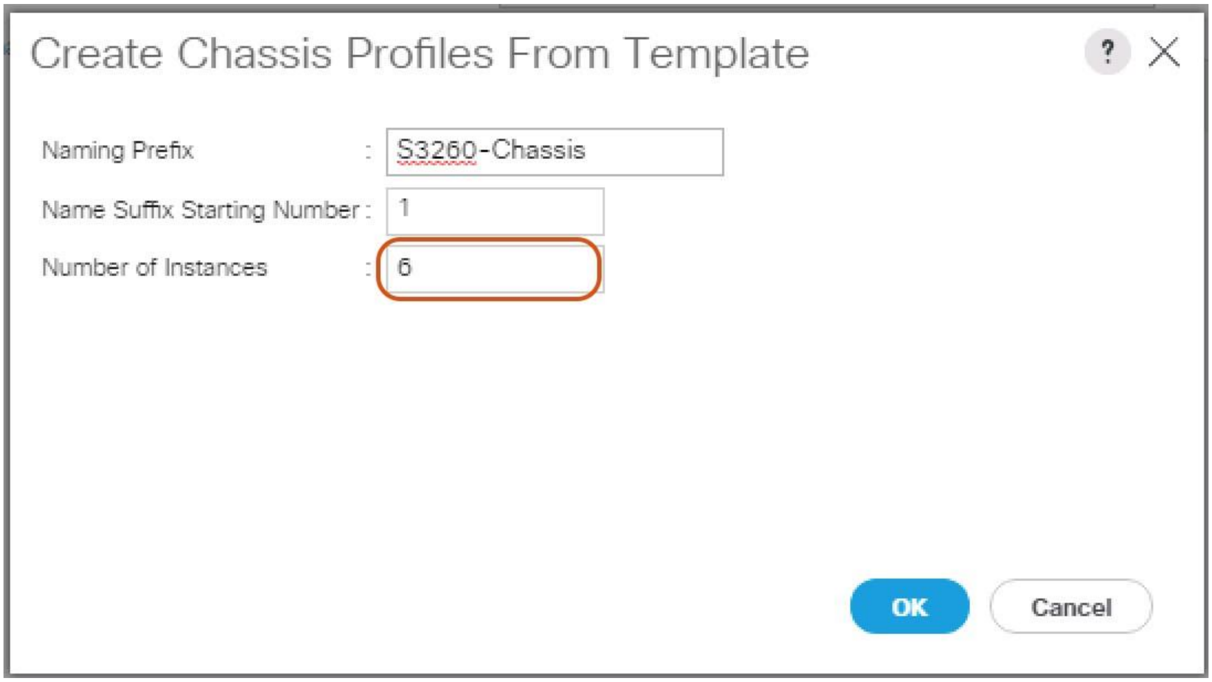
Name	Slot Number	Ownership	Assigned t... ▲	Assigned to C...	Controller Type	Drive Path
▸ disk-slot-35	35	Dedicated				Path Both
▸ disk-slot-1	1	Dedicated				Path Both
▸ disk-slot-11	11	Dedicated				Path Both
▸ disk-slot-12	12	Dedicated				Path Both
▸ disk-slot-13	13	Dedicated				Path Both
▸ disk-slot-14	14	Dedicated				Path Both

13. Click **`Finish`** and then click **`OK`** again.

Create Chassis Profile from Template

To create the Chassis Profiles from the previous created Chassis Profile Template, complete the following steps:

1. Select the **Chassis** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Chassis > Chassis Profile Templates and select "S3260-Chassis" you created previously.
3. Then right click to select "Create Chassis Profiles from Template."
4. Type in **S3260-Chassis** in the **Name** field.
5. Leave the Name Suffix Starting Number untouched.
6. Enter **6** for the **Number of Instances** for all connected Cisco UCS S3260 Storage Server.
7. Click **OK**.



Create Chassis Profiles From Template

Naming Prefix : S3260-Chassis

Name Suffix Starting Number : 1

Number of Instances : 6

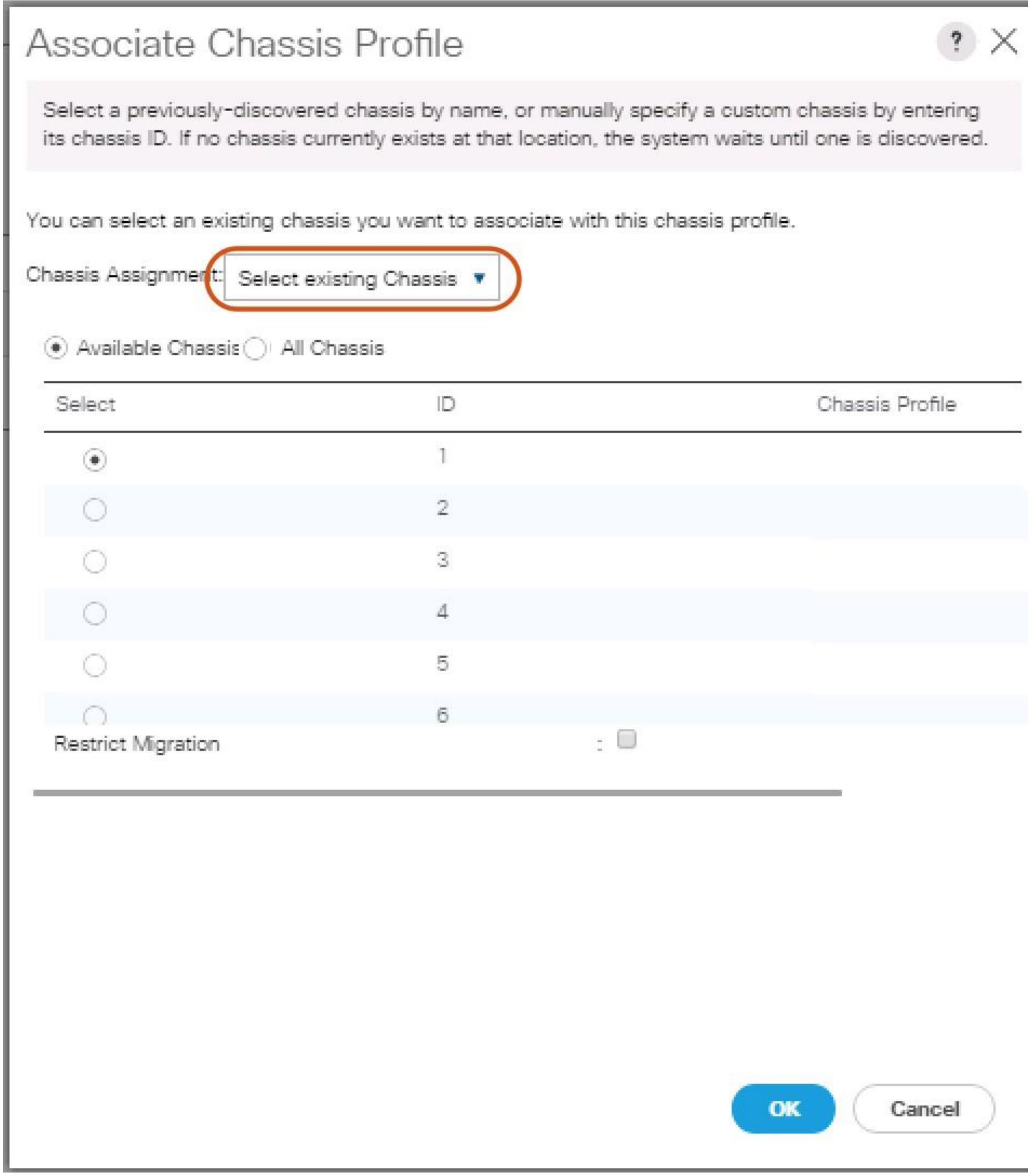
Associate Chassis Profile

To associate all previous created Chassis Profile, complete the following steps:

1. Select the **Chassis** tab in the left pane of the Cisco UCS Manager GUI.
2. Go to Chassis > Chassis Profiles and select "**S3260-Chassis1.**"
3. Right-click Change Chassis Profile Association.
4. Under Chassis Assignment, choose Select existing Chassis from the drop-down list.
5. Under **Available Chassis**, select ID **1**.
6. Click **OK** and then click **OK again**.

7. Repeat the steps for the other four Chassis Profiles by selecting the IDs **2 – 6**.

Figure 34 Associate Chassis Profile



Associate Chassis Profile

Select a previously-discovered chassis by name, or manually specify a custom chassis by entering its chassis ID. If no chassis currently exists at that location, the system waits until one is discovered.

You can select an existing chassis you want to associate with this chassis profile.

Chassis Assignment: Select existing Chassis ▾

● Available Chassis ○ All Chassis

Select	ID	Chassis Profile
●	1	
○	2	
○	3	
○	4	
○	5	
○	6	

Restrict Migration : □

Creating Storage Profiles

Setting Disks for Cisco UCS S3260 M4 Servers and Cisco UCS C220 M4 Rack-Mount Servers to Unconfigured-Good

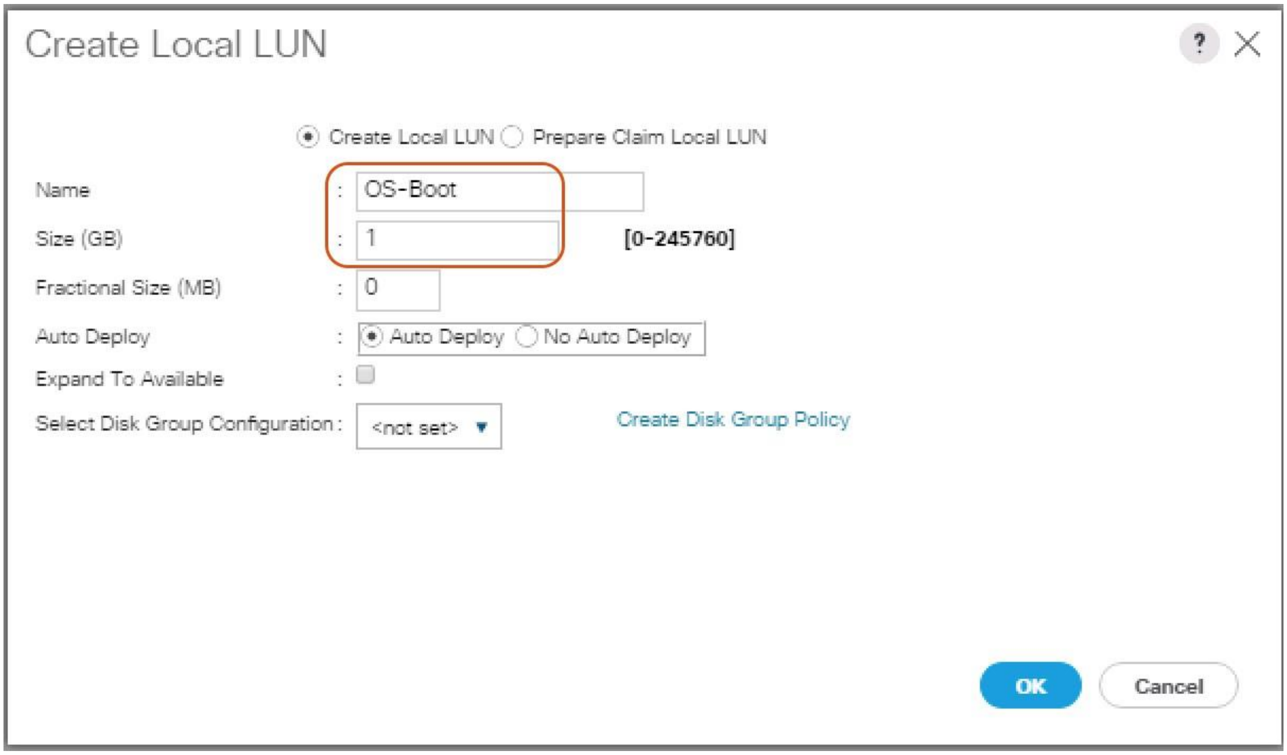
To prepare the OS drives reserved from the Rack-Mount servers for storage profiles, make sure the disks have to be converted from "JBOD" to "Unconfigured-Good". To convert the disks, complete the following steps:

1. Select the **`Equipment`** tab in the left pane of the Cisco UCS Manager GUI.
2. For S3260 M4 servers, Go to Equipment -> Chassis -> Chassis1 -> Servers -> Server1 -> Inventory -> Storage -> Disks
3. Select both disks from slot "201 and 202" and right-click "**`Set JBOD to Unconfigured-Good`**".
4. For C220 M4S servers, Go to Equipment -> Rack-Mounts -> Servers -> Server1 -> Inventory -> Storage -> Disks
5. Select both disks from slot "201 and 202" and right-click "**`Set JBOD to Unconfigured-Good`**".

Create Storage Profiles for Cisco UCS S3260 Storage Server

To create the Storage Profile for the top node of the Cisco UCS S3260 Storage Server, complete the following steps:

1. Select **`Storage`** in the left pane of the Cisco UCS Manager GUI.
2. Go to Storage > Storage Profiles and right-click Create **Storage Profile**.
3. Type in **`S3260-TopNode`** in the **`Name`** field.
4. (Optional) Enter a description in the **`Description`** field.
5. Click **`Add`**.
6. Type in "**`OS-Boot`**" in the **`Name`** field.
7. Configure as follows:
   a. Create Local LUN
   b. Size (GB) = 1
   c. Fractional Size (MB) = 0
   d. Auto Deploy
   e. Select Expand To Available



Create Local LUN

● Create Local LUN ○ Prepare Claim Local LUN

Name : OS-Boot

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : □

Select Disk Group Configuration : <not set>

8. Click "Create Disk Group Policy" to Create RAID1 LUN.

9. Type in **`RAID1-S3260`** in the `Name` field.

10. (Optional) Enter a description in the **`Description`** field.

11. RAID Level = RAID 1 Mirrored.

12. Select Disk Group Configuration (**Manual**).

13. Click **`Add`**.

14. Type in **`201`** for **`Slot Number`**.

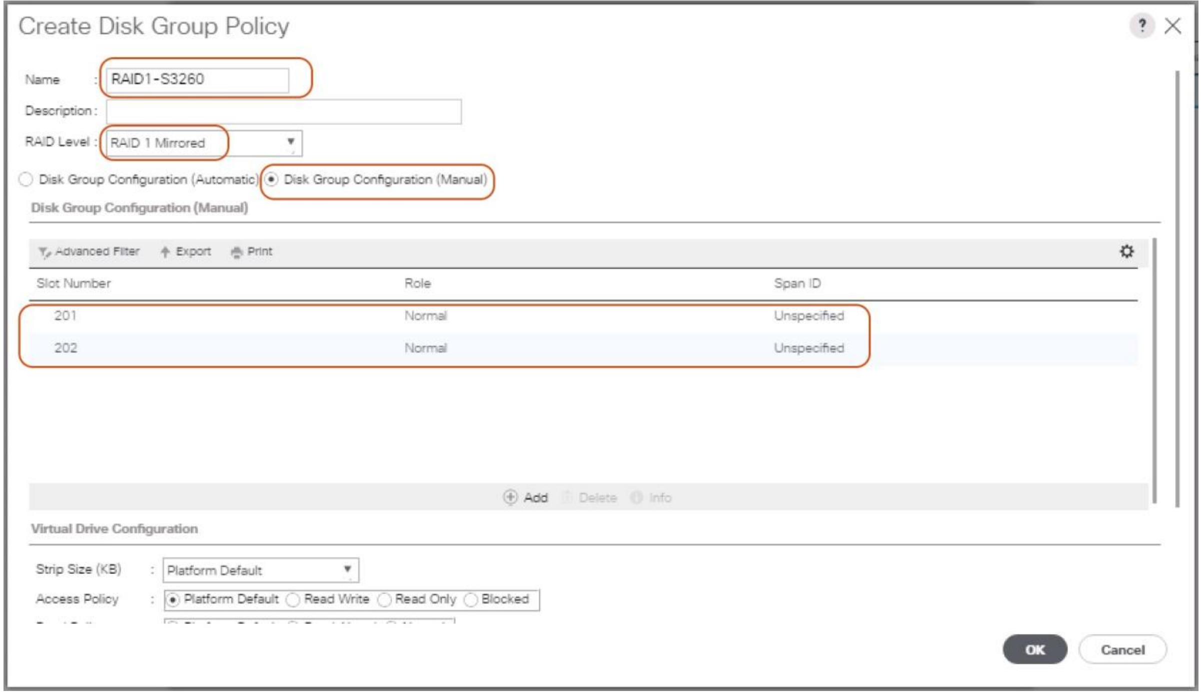
15. Click **`OK`** and then again **`Add`**.

16. Type in **`202`** for **`Slot Number`**.

17. Leave everything else untouched.

18. Click **`OK`** and then **`OK`**.

Figure 35 Create Disk Group Policy



Create Disk Group Policy

Name : RAID1-S3260

Description :

RAID Level : RAID 1 Mirrored

○ Disk Group Configuration (Automatic) ● Disk Group Configuration (Manual)

Disk Group Configuration (Manual)

Slot Number	Role	Span ID
201	Normal	Unspecified
202	Normal	Unspecified

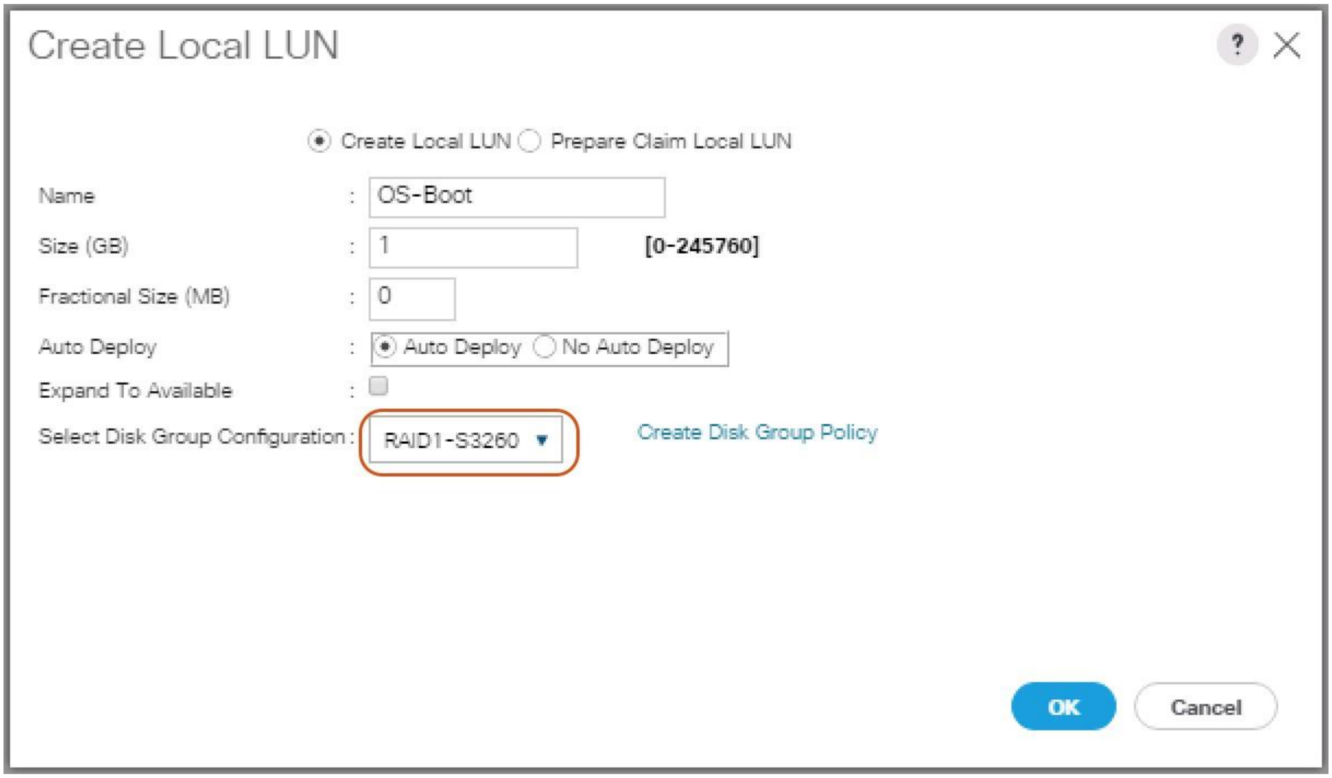
Virtual Drive Configuration

Strip Size (KB) : Platform Default

Access Policy : ● Platform Default ○ Read Write ○ Read Only ○ Blocked

19. Select your previously created Disk Group Policy for the Boot SSDs with the radio button under **`Select Disk Group Configuration`**.

20. Select Disk Group Configuration.



Create Local LUN

● Create Local LUN ○ Prepare Claim Local LUN

Name : OS-Boot

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

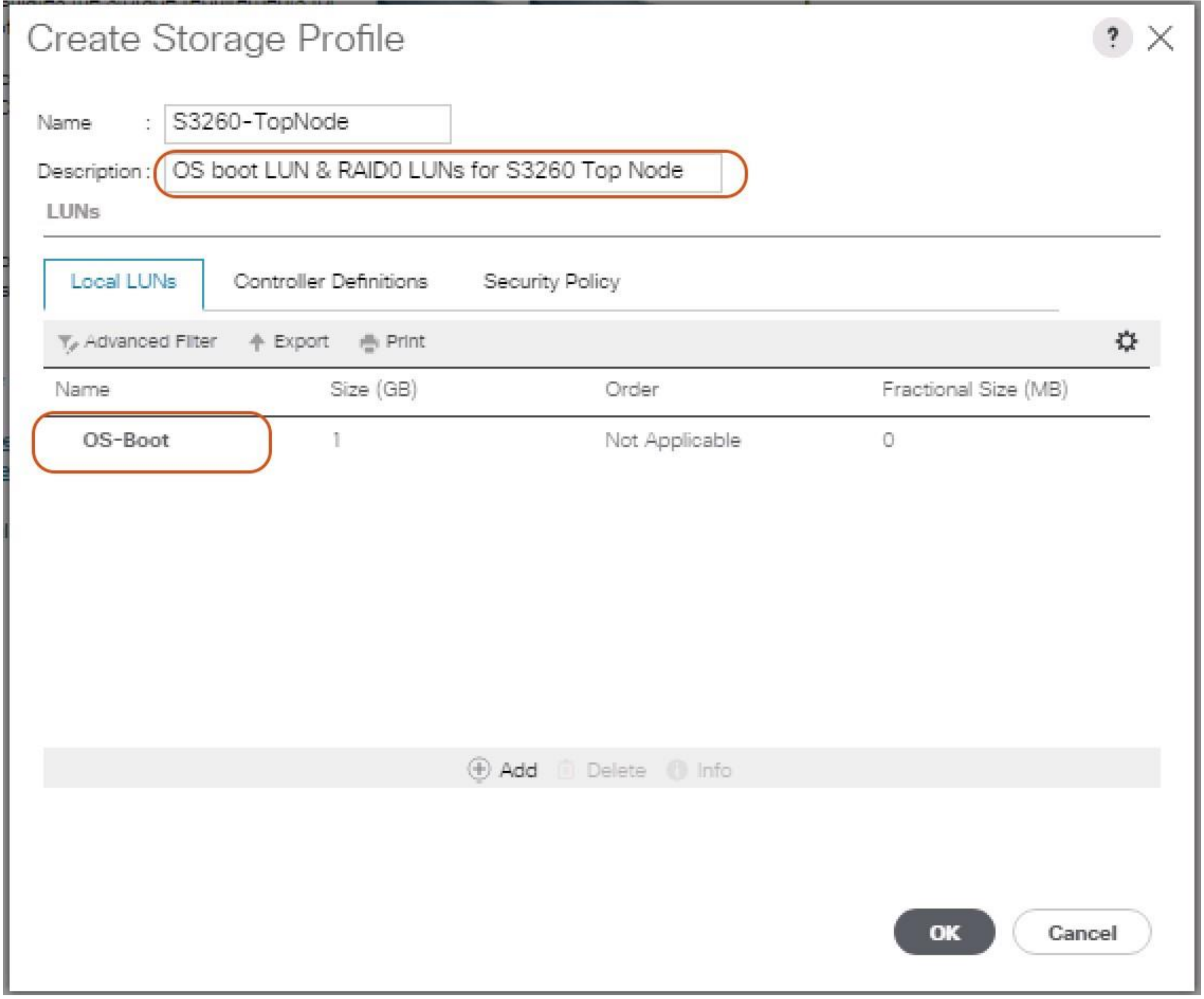
Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : □

Select Disk Group Configuration : RAID1-S3260

21. Click **OK**, click **OK** again, and then click OK.

Figure 36 Storage Profile for the Top Node of Cisco UCS S3260 Storage Server



Create Storage Profile

Name : S3260-TopNode

Description : OS boot LUN & RAID0 LUNs for S3260 Top Node

LUNs

Name	Size (GB)	Order	Fractional Size (MB)
OS-Boot	1	Not Applicable	0

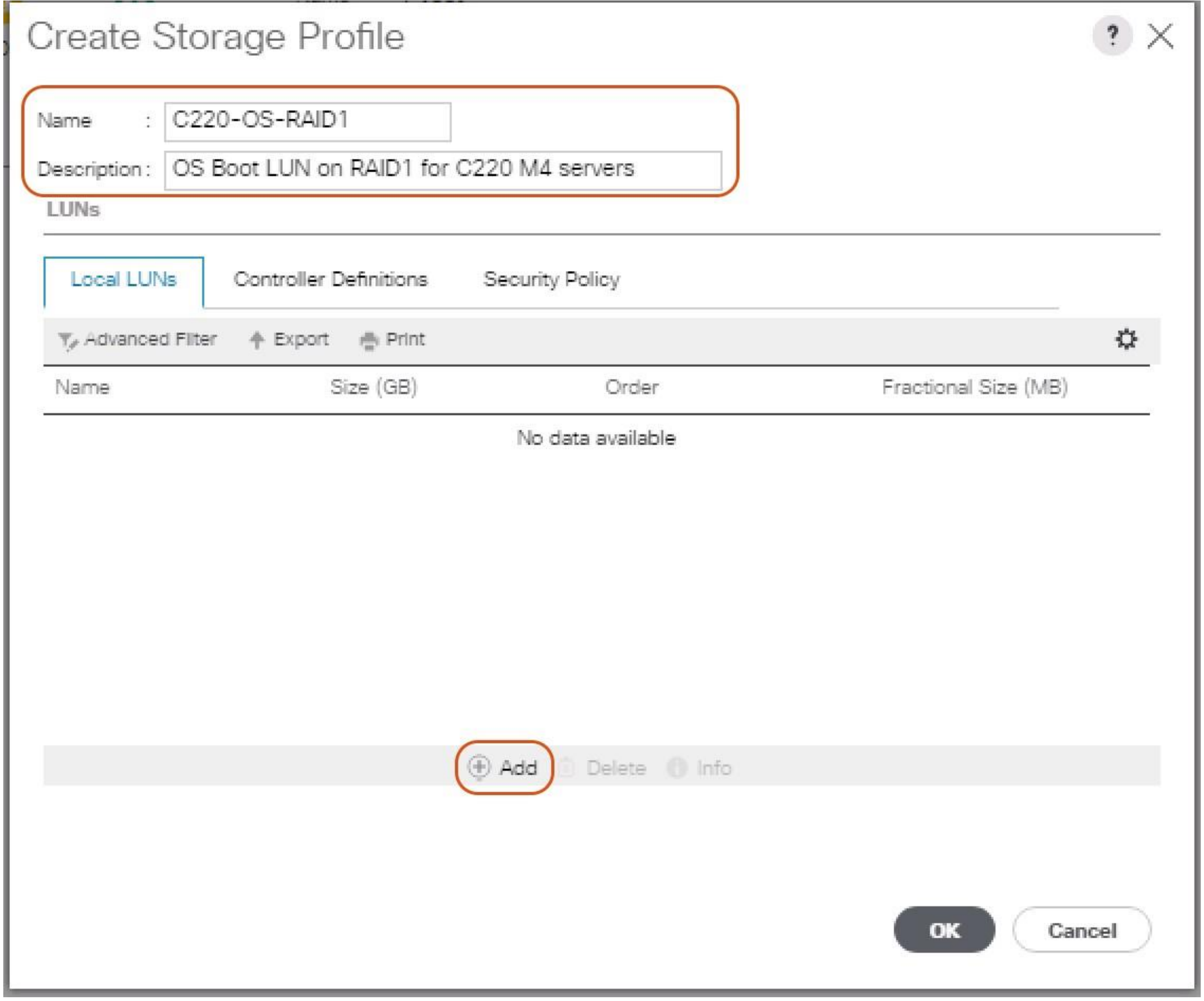
21. Repeat these steps to create the Storage Profile for the bottom Node of the Cisco UCS S3260 Storage Server and name it “S3260-BottomNode.”

Create Storage Profile for Cisco UCS C220 M4S Rack-Mount Servers

To create a Storage Profile for the Cisco UCS C220 M4S, complete the following steps:

1. Select **`Storage`** in the left pane of the UCSM GUI.
2. Go to Storage > Storage Profiles and right-click Create **Storage Profile**.
3. Type in **`C220-OS-RAID1`** in the **`Name`** field.
4. (Optional) Enter a description in the **`Description`** field.
5. Click **`Add`**.

Figure 37 Create Storage Profile for Cisco UCS C220 M4S



Create Storage Profile

Name : C220-OS-RAID1

Description : OS Boot LUN on RAID1 for C220 M4 servers

LUNs

Name	Size (GB)	Order	Fractional Size (MB)
No data available			

22. Type in **`Boot`** in the **`Name`** field.

23. Configure as follows:

    a. Create Local LUN

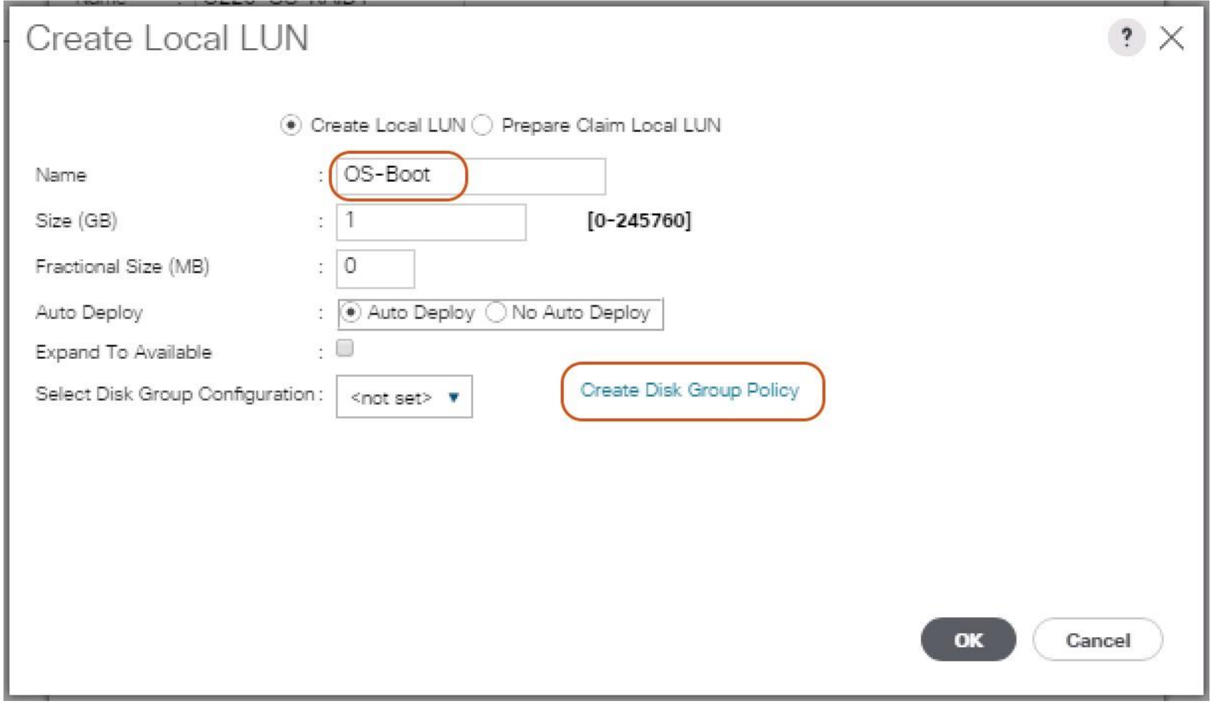
    b. Size (GB) = 1

    c. Fractional Size (MB) = 0

    d. Select Expand To Available

    e. Auto Deploy

Figure 38 Create Local LUN



Create Local LUN

● Create Local LUN ○ Prepare Claim Local LUN

Name : OS-Boot

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : □

Select Disk Group Configuration : <not set>

24. Click Create Disk Group Policy to Create RAID1 LUN.

25. Type in **`RAID1-C220`** in the **`Name`** field.

26. (Optional) Enter a description in the **`Description`** field.

27. RAID Level = RAID 1 Mirrored.

28. Select Disk Group Configuration (**Manual**).

29. Click **`Add`**.

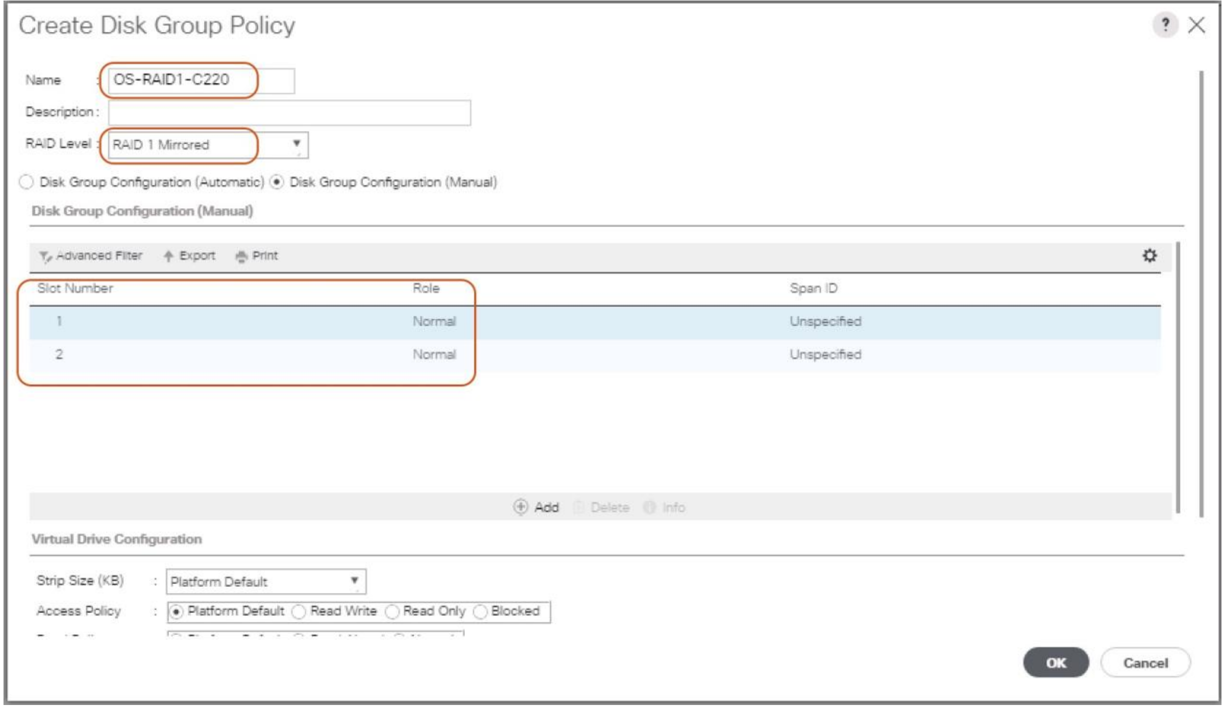
30. Type in **`1`** for **`Slot Number`**.

31. Click **`OK`** and then again **`Add`**.

32. Type in **`2`** for **`Slot Number`**.

33. Leave everything else untouched. Click **`OK`** and then click **`OK`** again.

Figure 39 Create Disk Group Policy for Cisco UCS C220 M4S



Create Disk Group Policy

Name : OS-RAID1-C220

Description :

RAID Level : RAID 1 Mirrored

○ Disk Group Configuration (Automatic) ● Disk Group Configuration (Manual)

Disk Group Configuration (Manual)

Slot Number	Role	Span ID
1	Normal	Unspecified
2	Normal	Unspecified

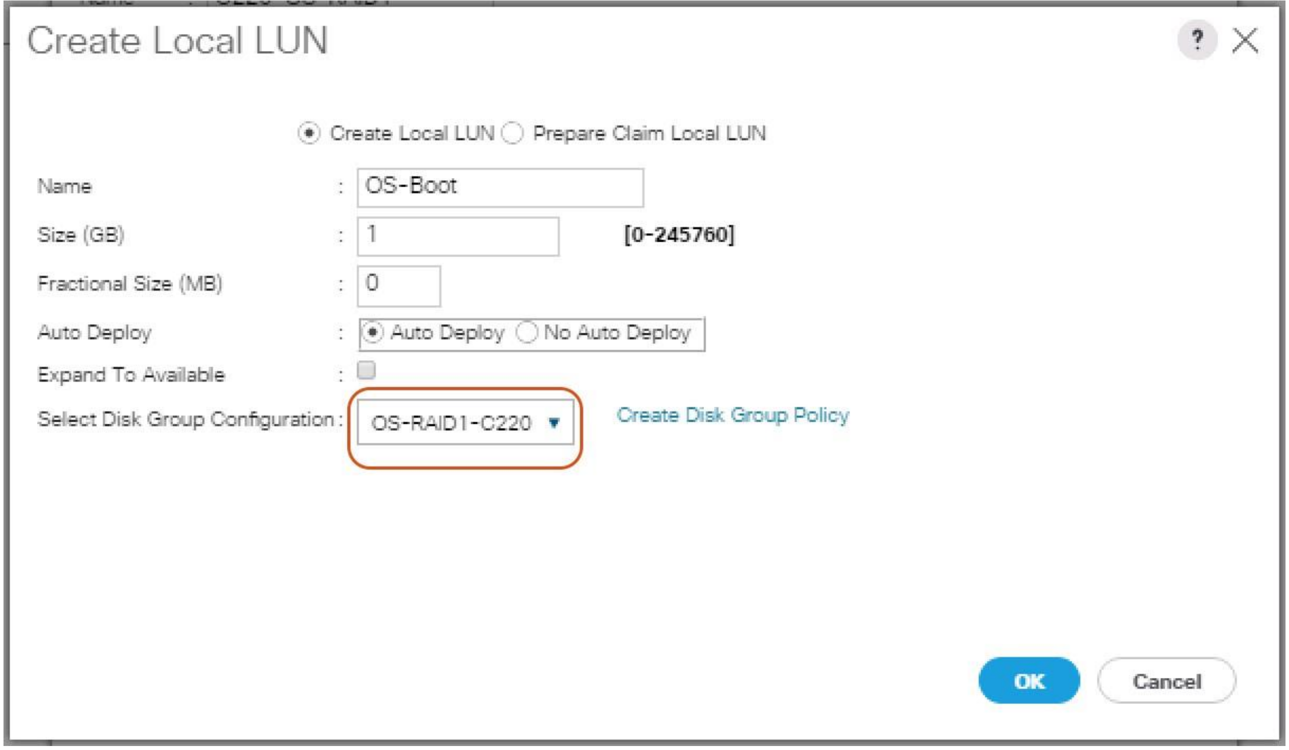
Virtual Drive Configuration

Strip Size (KB) : Platform Default

Access Policy : ● Platform Default ○ Read Write ○ Read Only ○ Blocked

34. Select your previously created Disk Group Policy for the C220 M4S Boot Disks with the radio button under **`Select Disk Group Configuration`**.

Figure 40 Create Disk Group Configuration for Cisco UCS C220 M4S



Create Local LUN

● Create Local LUN ○ Prepare Claim Local LUN

Name : OS-Boot

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : □

Select Disk Group Configuration : OS-RAID1-C220

35. Click **OK** and then **OK** and again click **OK**.

Creating a Service Profile Template for S3260 Storage Server

Create Service Profile Template for Cisco UCS S3260 Storage Server Top and Bottom Node

To create a Service Profile Template, complete the following steps:

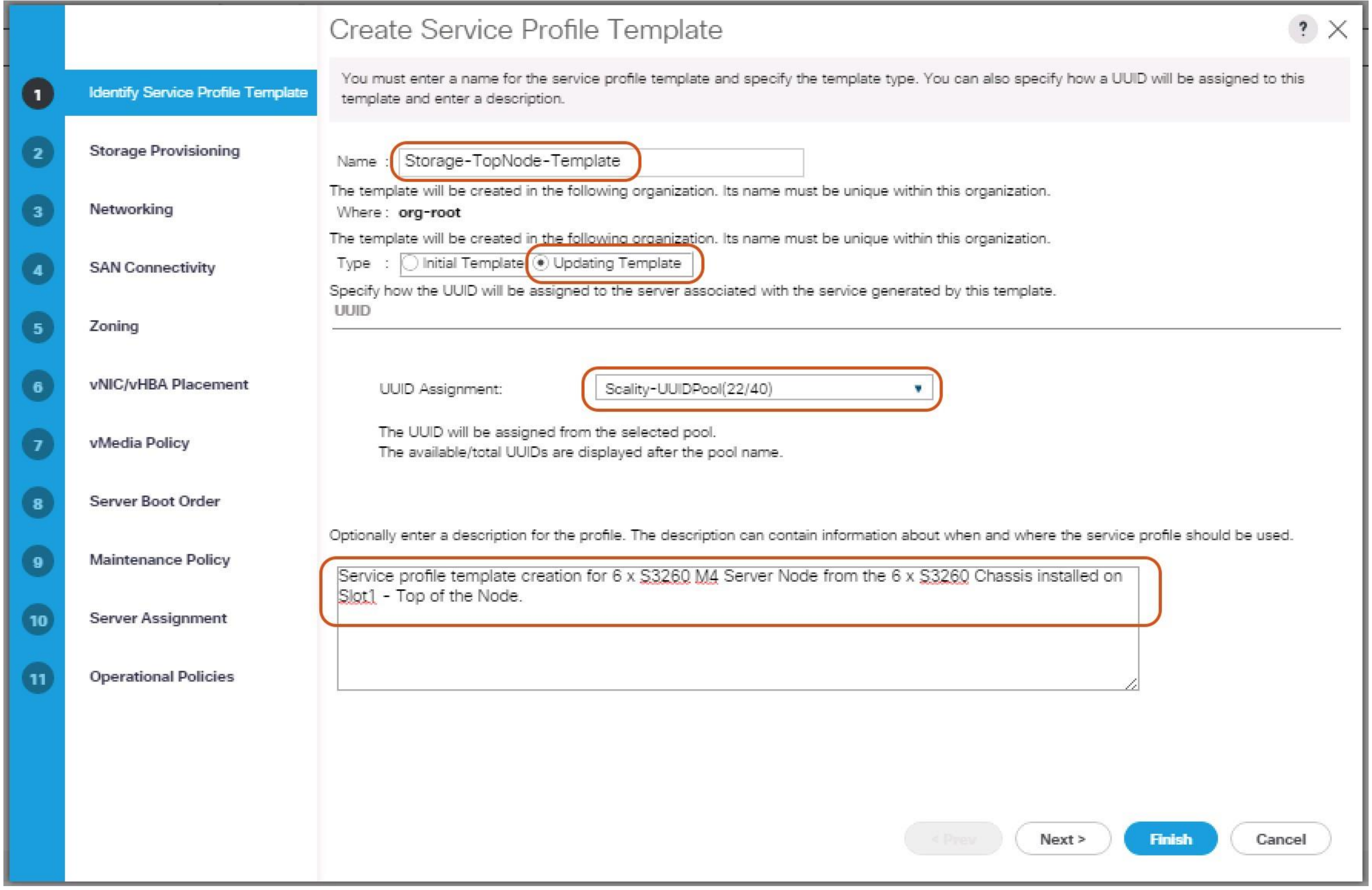
1. Select **`Servers`** in the left pane of the Cisco UCS Manager GUI.
2. Go to Servers > Service Profile Templates > root and right-click Create Service Profile Template.

Identify Service Profile Template

To identify the Service Profile template, complete the following steps:

1. Type in "**Storage-TopNode-Template**" in the Name field.
2. In the **`UUID Assignment`** section, select the UUID Pool you created in the beginning.
3. (Optional) Enter a description in the **`Description`** field.

Figure 41 Identify Service Profile Template



You must enter a name for the service profile template and specify the template type. You can also specify how a UUID will be assigned to this template and enter a description.

Name : Storage-TopNode-Template

The template will be created in the following organization. Its name must be unique within this organization.

Where : **org-root**

The template will be created in the following organization. Its name must be unique within this organization.

Type : ○ Initial Template ● Updating Template

Specify how the UUID will be assigned to the server associated with the service generated by this template.

UUID

UUID Assignment: Scality-UUIDPool(22/40)

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.

Service profile template creation for 6 x S3260 M4 Server Node from the 6 x S3260 Chassis installed on Slot1 - Top of the Node.

4. Click **`Next`**.

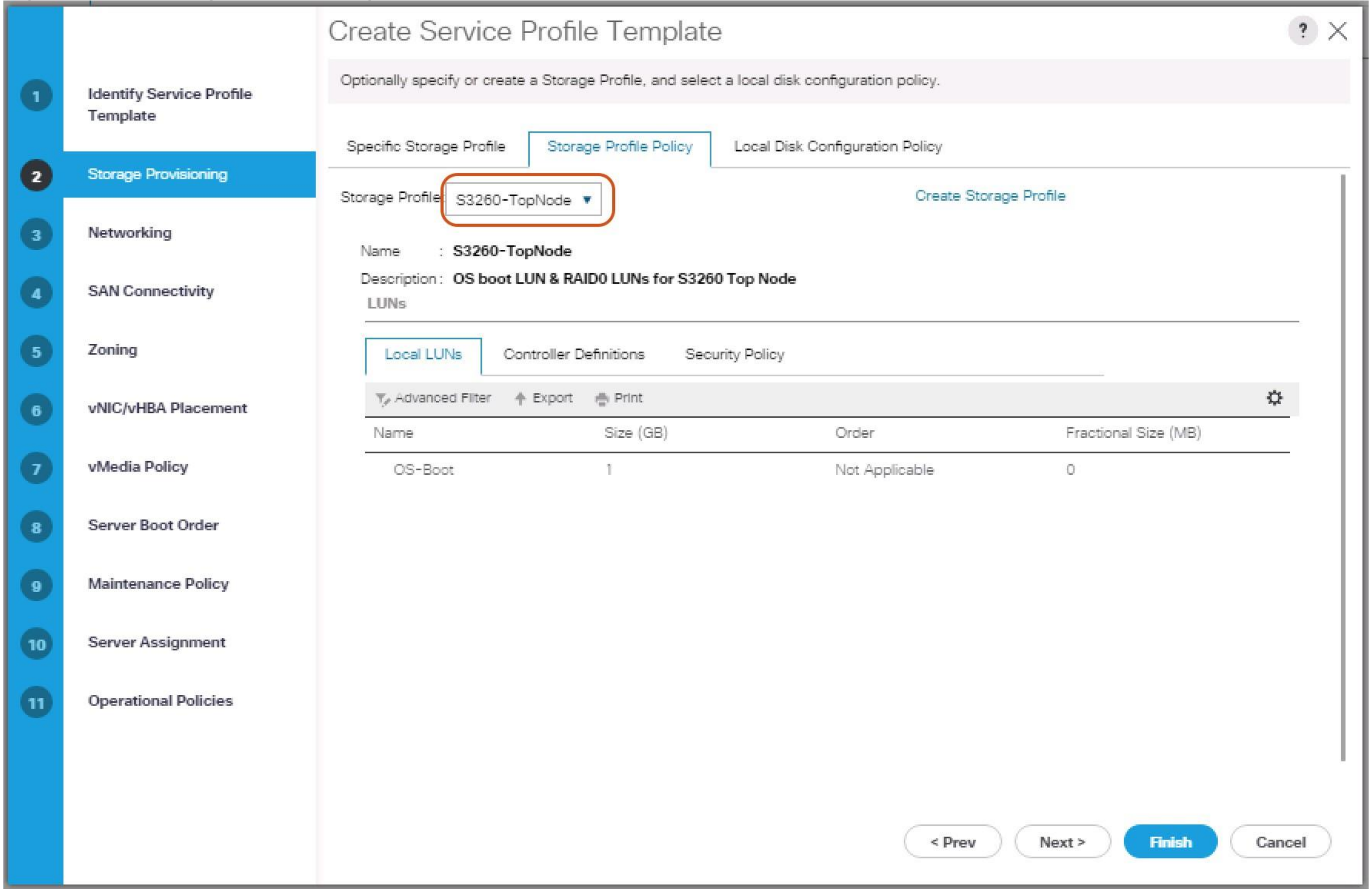
Storage Provisioning

To provision the storage profile, complete the following steps:

1. Go to the **`Storage Profile Policy`** tab and select the Storage Profile **`S3260-TopNode`** for the top node of the Cisco UCS S3260 Storage Server you created before.

2. Click **`Next`**.

Figure 42 Storage Provisioning



Create Service Profile Template

Optionally specify or create a Storage Profile, and select a local disk configuration policy.

Storage Profile: S3260-TopNode

Name : S3260-TopNode

Description : OS boot LUN & RAID0 LUNs for S3260 Top Node

Name	Size (GB)	Order	Fractional Size (MB)
OS-Boot	1	Not Applicable	0

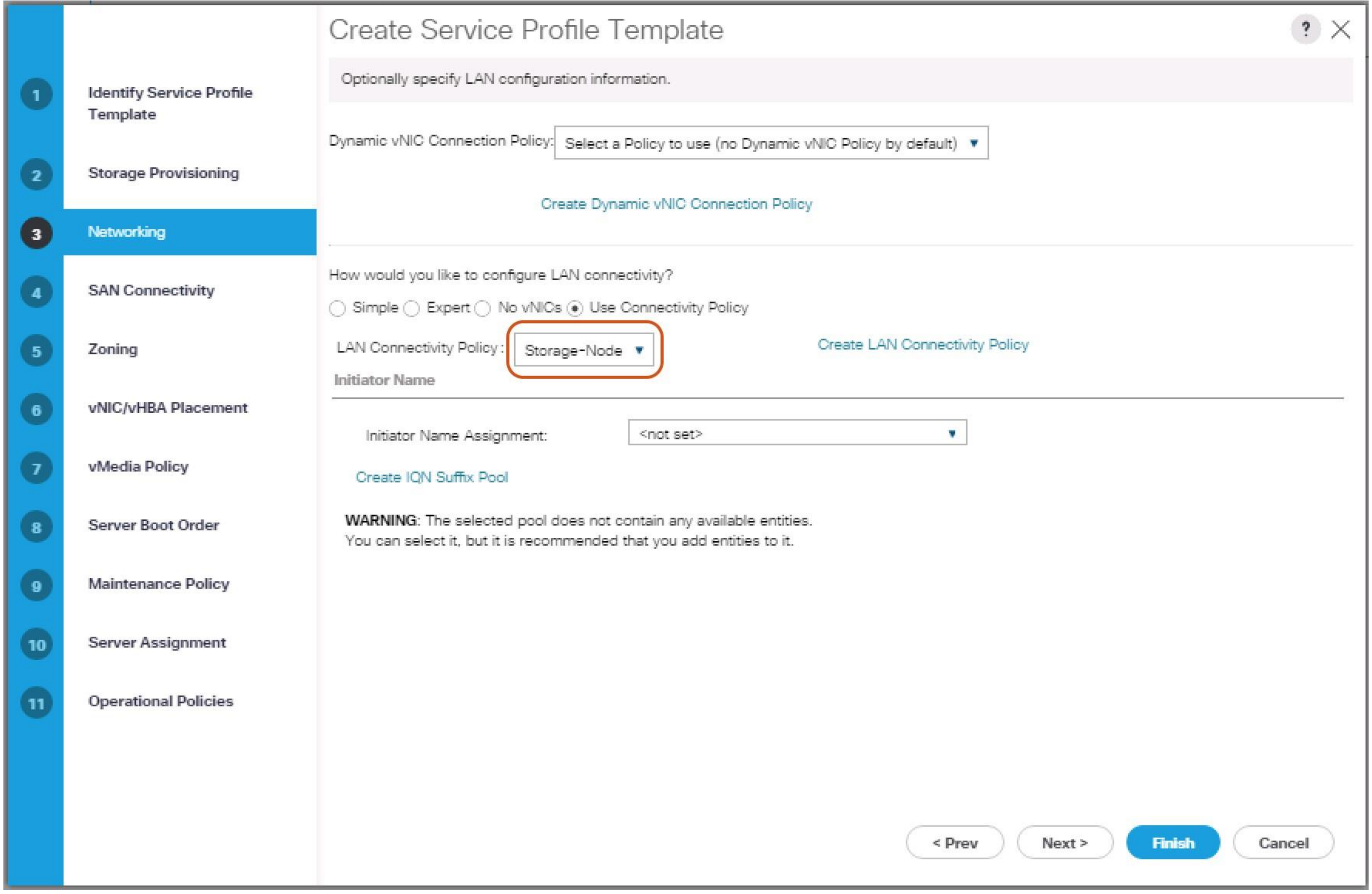
Networking

1. Keep the Dynamic vNIC Connection Policy field at the default.

2. Select LAN connectivity to Use Connectivity Policy created before.

3. From LAN Connectivity drop down list, select "**Storage-Node**" created before and click Next.

Figure 43 Summary Networking



Create Service Profile Template

Optionally specify LAN configuration information.

Dynamic vNIC Connection Policy: Select a Policy to use (no Dynamic vNIC Policy by default)

How would you like to configure LAN connectivity?

○ Simple ○ Expert ○ No vNICs ● Use Connectivity Policy

LAN Connectivity Policy: Storage-Node

Initiator Name

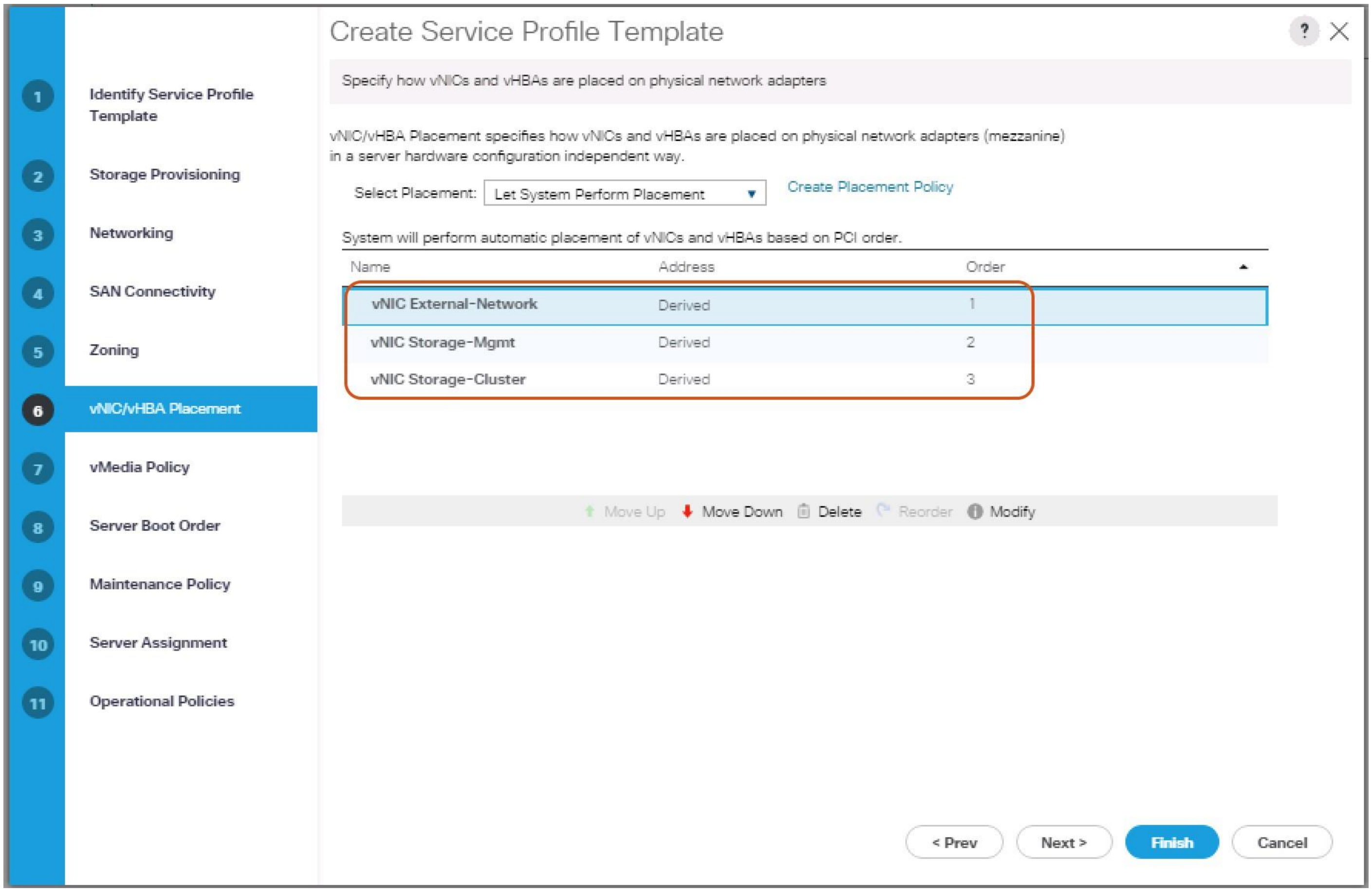
Initiator Name Assignment: <not set>

WARNING: The selected pool does not contain any available entities.
You can select it, but it is recommended that you add entities to it.

3. Click **Next** to continue with SAN Connectivity.
4. Select No vHBA for How would you like to configure SAN Connectivity?
5. Click **Next** to continue with Zoning.
6. Click **Next**.

vNIC/vHBA Placement

1. Select **Let system Perform placement** form the drop-down list.
2. Under PCI order section, Sort all the vNICs.
3. Make sure the vNICs order are listed as External-Network > 1, then followed by Storage-Mgmt > 2 and Storage-Cluster > 3.



Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: Let System Perform Placement

Create Placement Policy

System will perform automatic placement of vNICs and vHBAs based on PCI order.

Name	Address	Order
vNIC External-Network	Derived	1
vNIC Storage-Mgmt	Derived	2
vNIC Storage-Cluster	Derived	3

4. Click **Next** to continue with vMedia Policy.

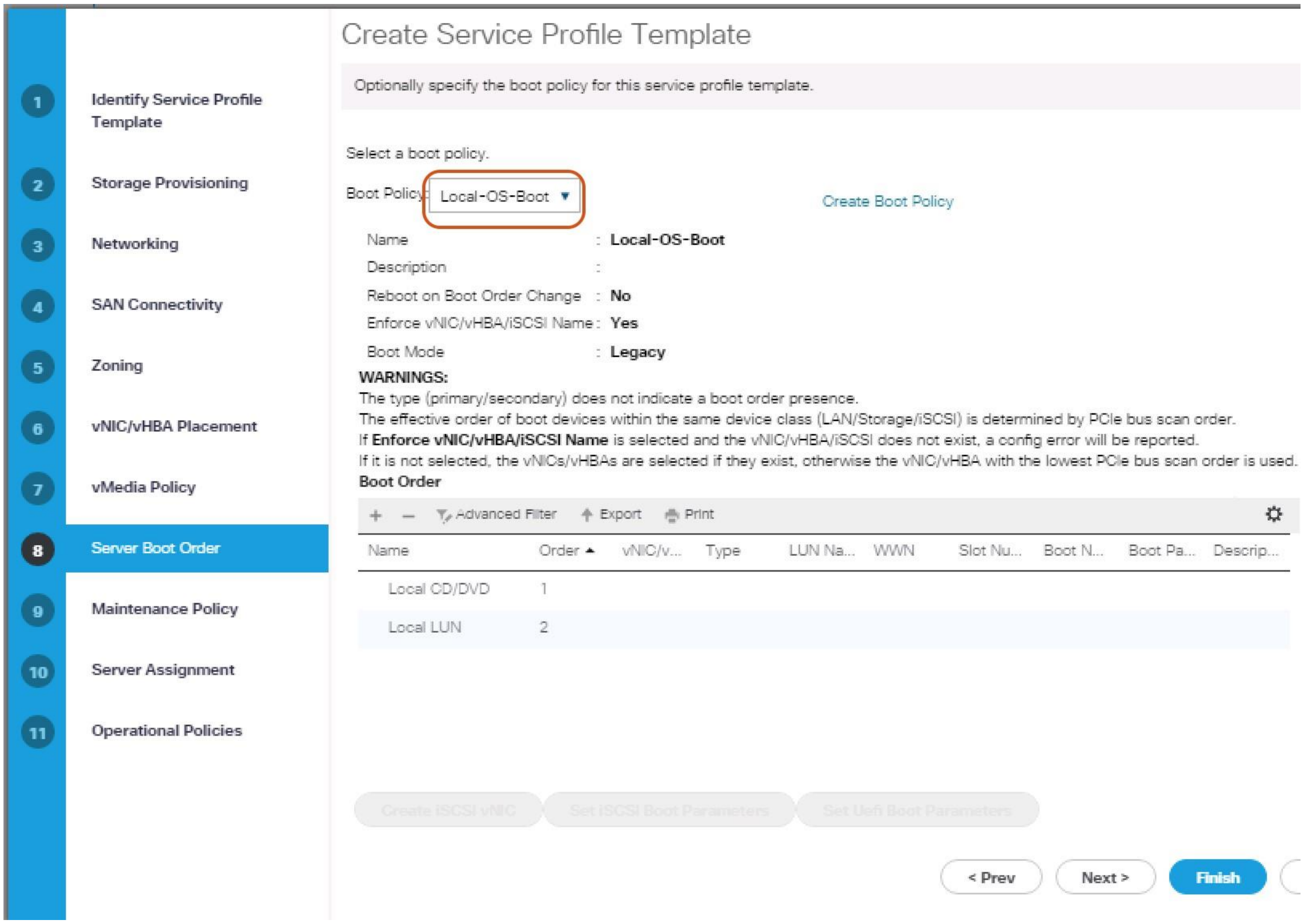
5. Click **Next**.

Server Boot Order

1. Select the Boot Policy “**S3260-Boot**” you created before under Boot Policy.

2. Server Boot Order.

3. Click **Next**.



Create Service Profile Template

Optionally specify the boot policy for this service profile template.

Select a boot policy.

Boot Policy: Local-OS-Boot

Name : **Local-OS-Boot**
Description :
Reboot on Boot Order Change : **No**
Enforce vNIC/vHBA/iSCSI Name : **Yes**
Boot Mode : **Legacy**

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

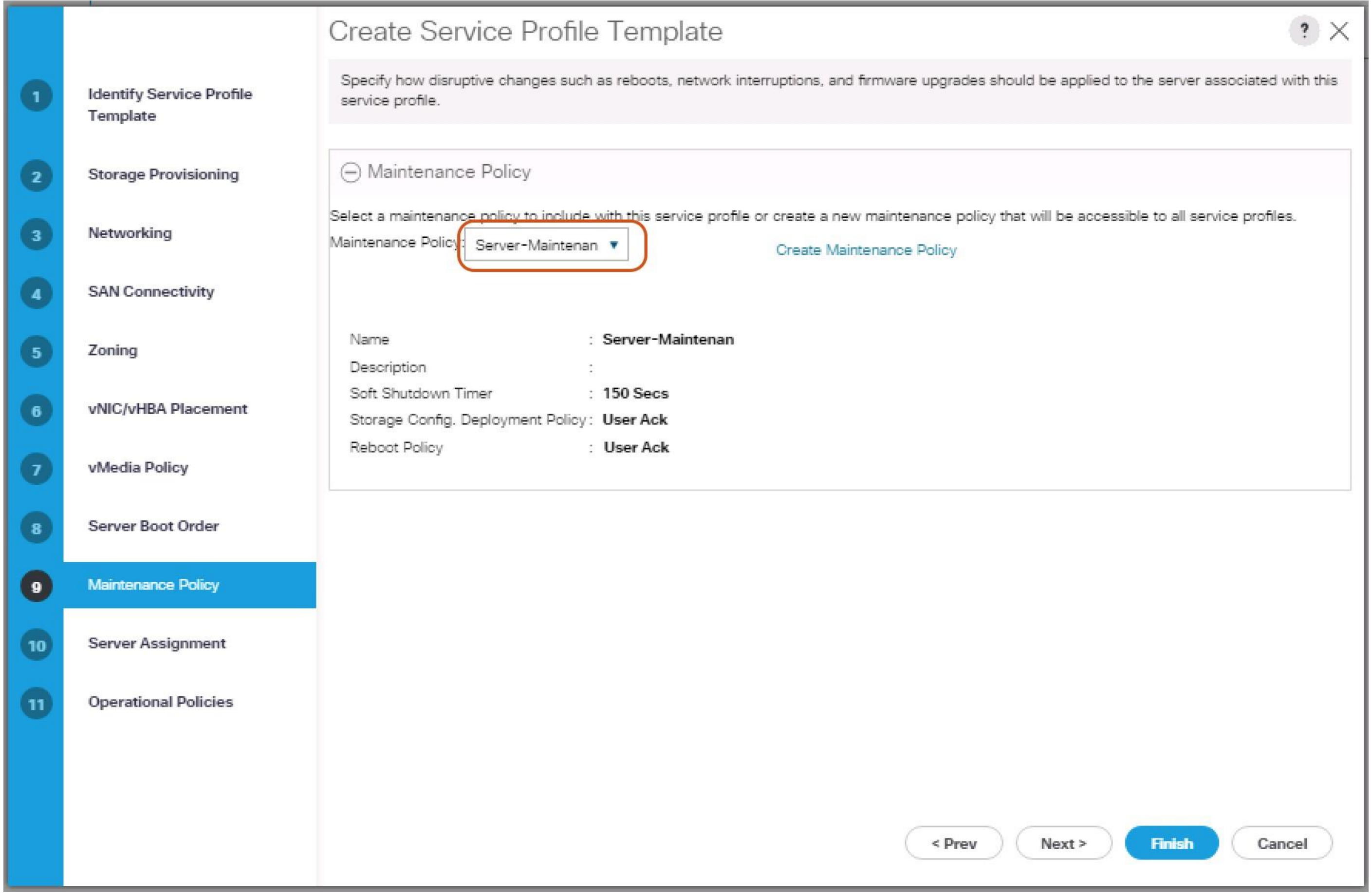
Boot Order

Name	Order ▲	vNIC/v...	Type	LUN Na...	WWN	Slot Nu...	Boot N...	Boot Pa...	Descrip...
Local CD/DVD	1								
Local LUN	2								

Maintenance Policy

1. Select the Maintenance Policy you created before under Maintenance Policy.

Figure 44 Maintenance Policy



Create Service Profile Template

Specify how disruptive changes such as reboots, network interruptions, and firmware upgrades should be applied to the server associated with this service profile.

Maintenance Policy

Select a maintenance policy to include with this service profile or create a new maintenance policy that will be accessible to all service profiles.

Maintenance Policy: Server-Maintenan

Name : Server-Maintenan
Description :
Soft Shutdown Timer : 150 Secs
Storage Config. Deployment Policy : User Ack
Reboot Policy : User Ack

2. Click **Next**.

3. Under Server Assignment, Leave everything else untouched.

4. Click **Next**.

Operational Policies

1. Click **Finish** and then click **OK**.

2. Repeat the steps for the bottom node of the Cisco UCS S3260 Storage Server by naming template as "Storage-BottomNode-Template."

3. During Storage Provisioning tab, choose the Storage Profile for the bottom node "S3260-BottomNode" you created previously.

Create Service Profiles from Template

This section details how to create the appropriate Service Profiles from the previous Service Profile Templates. To create the first profile for the top node of the Cisco UCS S3260 Storage Server, complete the following steps:

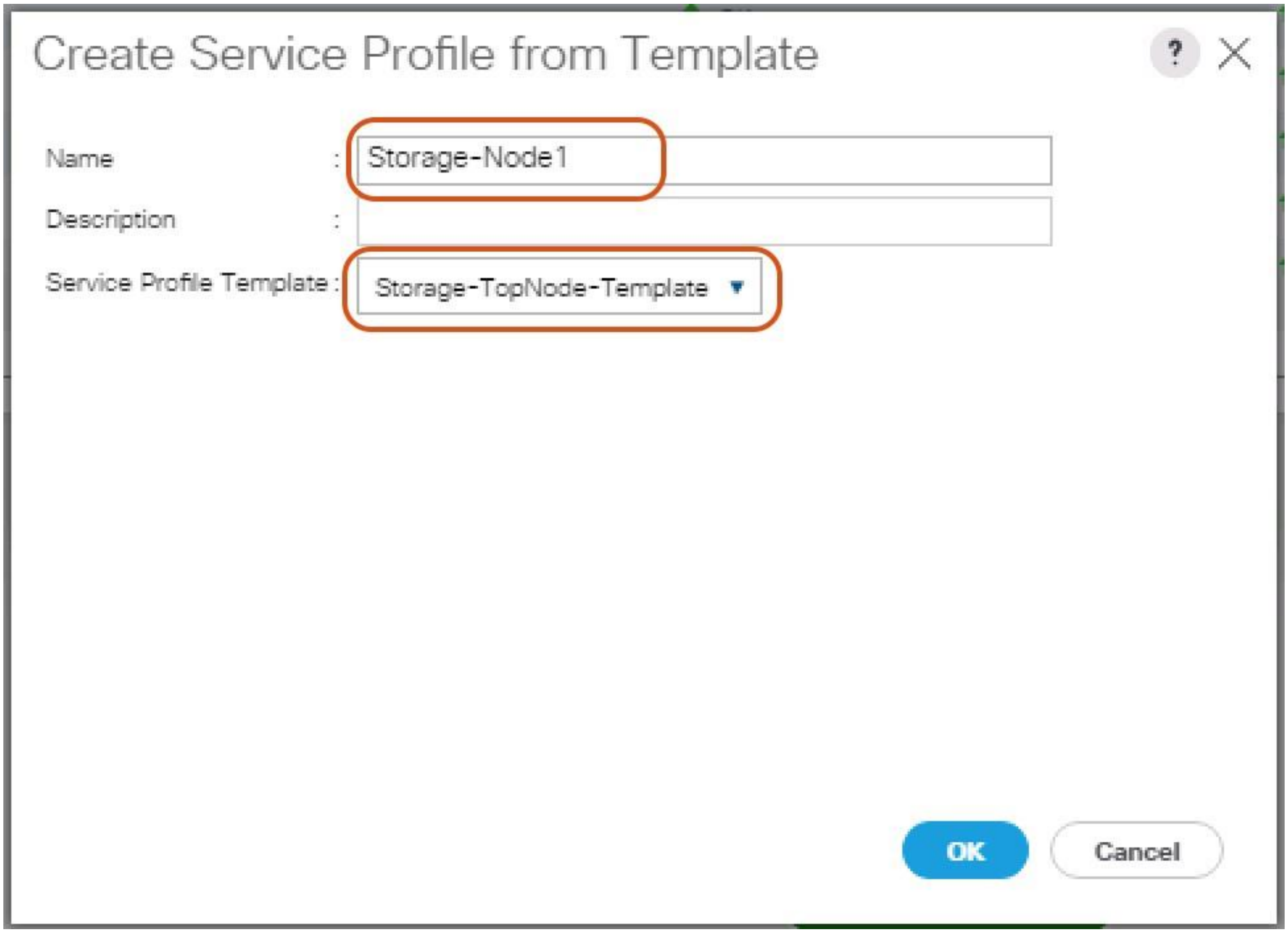
1. Select **Servers** from the left pane of the Cisco UCS Manager GUI.

2. Go to Servers > Service Profiles and right-click Create **Service Profile from Template**.

3. Type in **`Storage-Node1`** in the Name Prefix field.

4. Choose "**`Storage-TopNode-Template`**" as the **`Service Profile Template`** you created before for the top node of the Cisco UCS S3260 Storage Server.

5. Click **OK** and then click **OK** again.



Create Service Profile from Template

Name : Storage-Node1

Description :

Service Profile Template : Storage-TopNode-Template

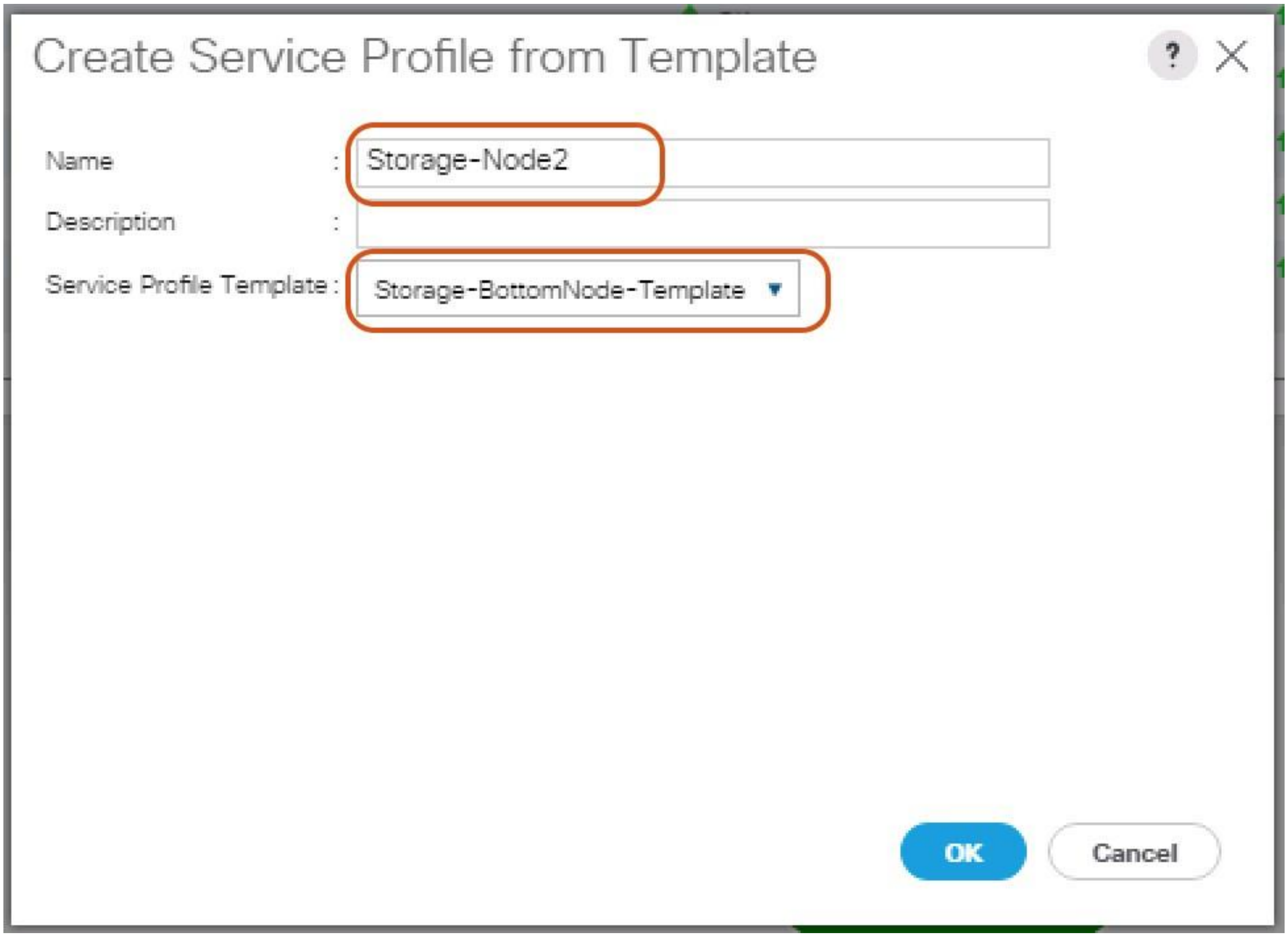
6. Repeat these steps to create Service Profiles for the remaining S3260 M4 server top Nodes from the Template that belongs to top Node "**Storage-TopNode-Template**". Make sure you name it as "Storage-Node3, Storage-Node5, Storage-Node7, Storage-Node9 and Storage-Node11" respectively.

7. For the remaining M4 nodes, again Navigate to Servers > Service Profiles and right-click Create **Service Profile from Template**.

8. Type in **`Storage-Node2`** in the Name Prefix field.

9. Choose "**`Storage-BottomNode-Template`**" as the **`Service Profile Template`** you created before for the top node of the Cisco UCS S3260 Storage Server.

10. Click **OK** and then click **OK** again.



Create Service Profile from Template

Name : Storage-Node2

Description :

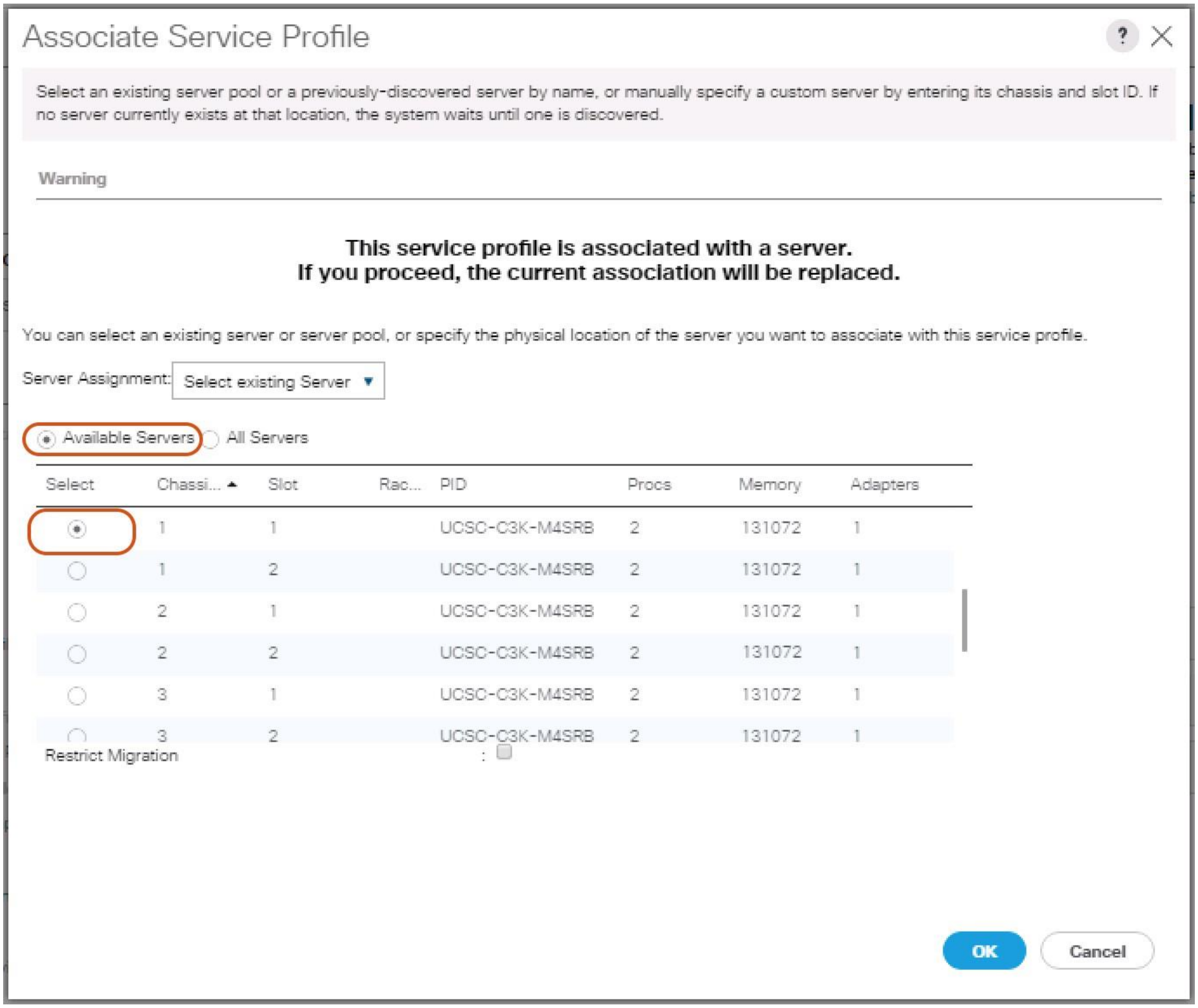
Service Profile Template : Storage-BottomNode-Template

11. Repeat these steps to create Service Profiles for the remaining S3260 M4 server Bottom Nodes from the Template that belongs to bottom Node "**Storage-BottomNode-Template**". Make sure you name it as "Storage-Node4, Storage-Node6, Storage-Node8, Storage-Node10, and Storage-Node12" respectively.

Associating a Service Profile for Cisco UCS S3260 M4 Server

To associate all the "Storage-NodeX" Service Profiles to the Cisco UCS S3260 M4 Storage Servers, complete the following steps:

1. Select **`Servers`** from the left pane of the Cisco UCS Manager GUI.
2. Go to Servers > Service Profiles and right-click "**Storage-Node1**" Service profile created previously.
3. Click "Change Server Profile Association."
4. From the Server Assignment drop-down list choose "Select Existing Server."
5. Click the radio button "Available Servers."
6. From the Chassis and Slot listed, choose Chassis1/Slot1 for Storage-Node1.
7. Click OK.



Associate Service Profile

Select an existing server pool or a previously-discovered server by name, or manually specify a custom server by entering its chassis and slot ID. If no server currently exists at that location, the system waits until one is discovered.

Warning

This service profile is associated with a server.
If you proceed, the current association will be replaced.

You can select an existing server or server pool, or specify the physical location of the server you want to associate with this service profile.

Server Assignment: Select existing Server ▾

● Available Servers ○ All Servers

Select	Chassi... ▲	Slot	Rac...	PID	Procs	Memory	Adapters
●	1	1		UCSC-C3K-M4SRB	2	131072	1
○	1	2		UCSC-C3K-M4SRB	2	131072	1
○	2	1		UCSC-C3K-M4SRB	2	131072	1
○	2	2		UCSC-C3K-M4SRB	2	131072	1
○	3	1		UCSC-C3K-M4SRB	2	131072	1
○	3	2		UCSC-C3K-M4SRB	2	131072	1

Restrict Migration : □

8. Repeat these steps to the Associate Remaining Service profiles "Storage-NodeX" for the Cisco UCS S3260 M4 storage server as shown in the table below.

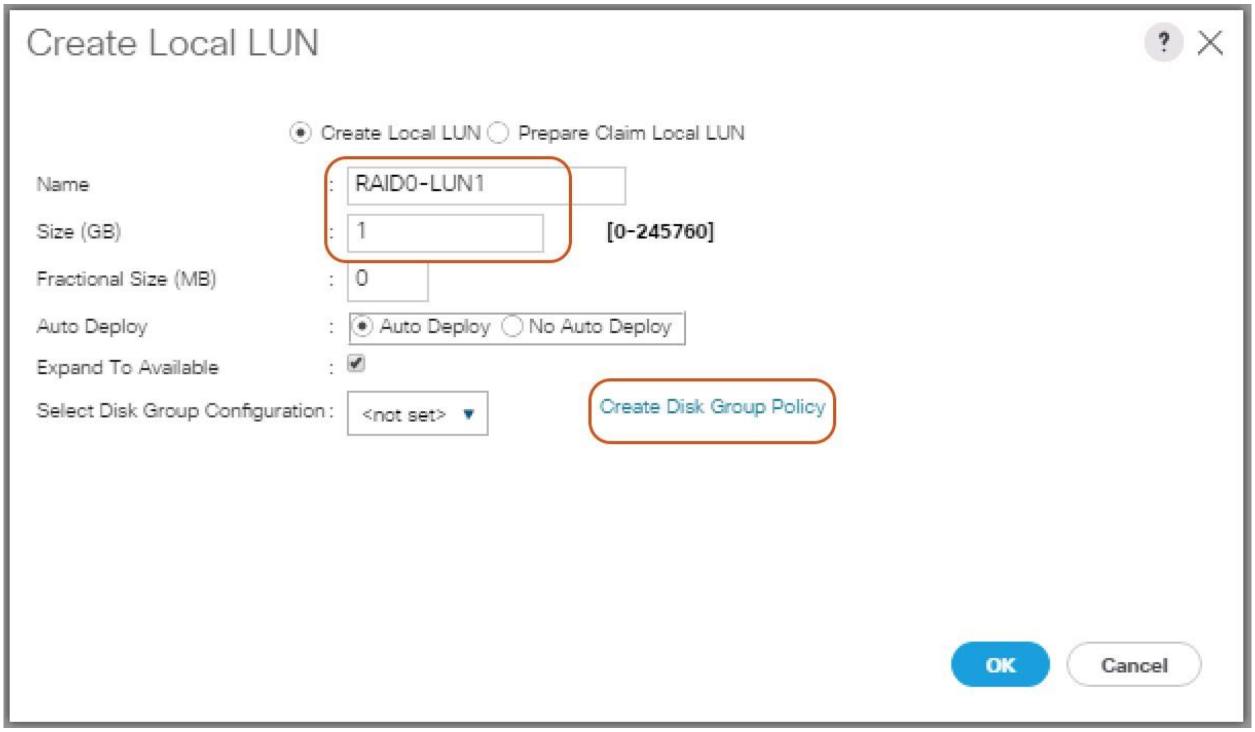
Service Profile Template	Service Profile	S3260 Chassis	Server Slot ID
Storage-TopNode-Template	**Storage-Node1**	**1**	**1**
Storage-BottomNode-Template	**Storage-Node2**	**1**	**2**
Storage-TopNode-Template	**Storage-Node3**	**2**	**1**
Storage-BottomNode-Template	**Storage-Node4**	**2**	**2**
Storage-TopNode-Template	**Storage-Node5**	**3**	**1**

Storage-BottomNode-Template	**Storage-Node6**	3	2
Storage-TopNode-Template	**Storage-Node7**	4	1
Storage-BottomNode-Template	**Storage-Node8**	4	2
Storage-TopNode-Template	**Storage-Node9**	5	1
Storage-BottomNode-Template	**Storage-Node10**	5	2
Storage-TopNode-Template	**Storage-Node11**	6	1
Storage-BottomNode-Template	**Storage-Node12**	6	2

Create Individual RAID0 LUNs for Cisco UCS S3260 Top Loading HDDs

To create individual RAID0 LUNs for the top loading HDDs from Cisco UCS S3260 Storage Server, complete the following steps:

1. Select **Storage** in the left pane of the Cisco UCS Manager GUI.
2. Go to Storage > Storage Profiles -> root and right-click the previously created Storage Profile "**S3260-TopNode"**
3. Select "Create Local LUN" radio button.
4. Type in RAID0-LUN1 in the name field.
5. Size (GB) = **1.**
6. Fractional Size (MB) = 0.
7. Auto Deploy.
8. Select Expand To Available.



● Create Local LUN ○ Prepare Claim Local LUN

Name : RAID0-LUN1

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : ☑

Select Disk Group Configuration : <not set> ▾

9. Click “Create Disk Group Policy” to Create RAID0 LUN.

10. Type in **`RAID0-Disk1`** in the `Name` field.

11. (Optional) Enter a description in the **`Description`** field.

12. RAID Level = RAID 0 Striped.

13. Select Disk Group Configuration (**Manual**).

14. Click **`Add`**.

15. Type in **`1`** for **`Slot Number`**.

16. Click **`OK`**.

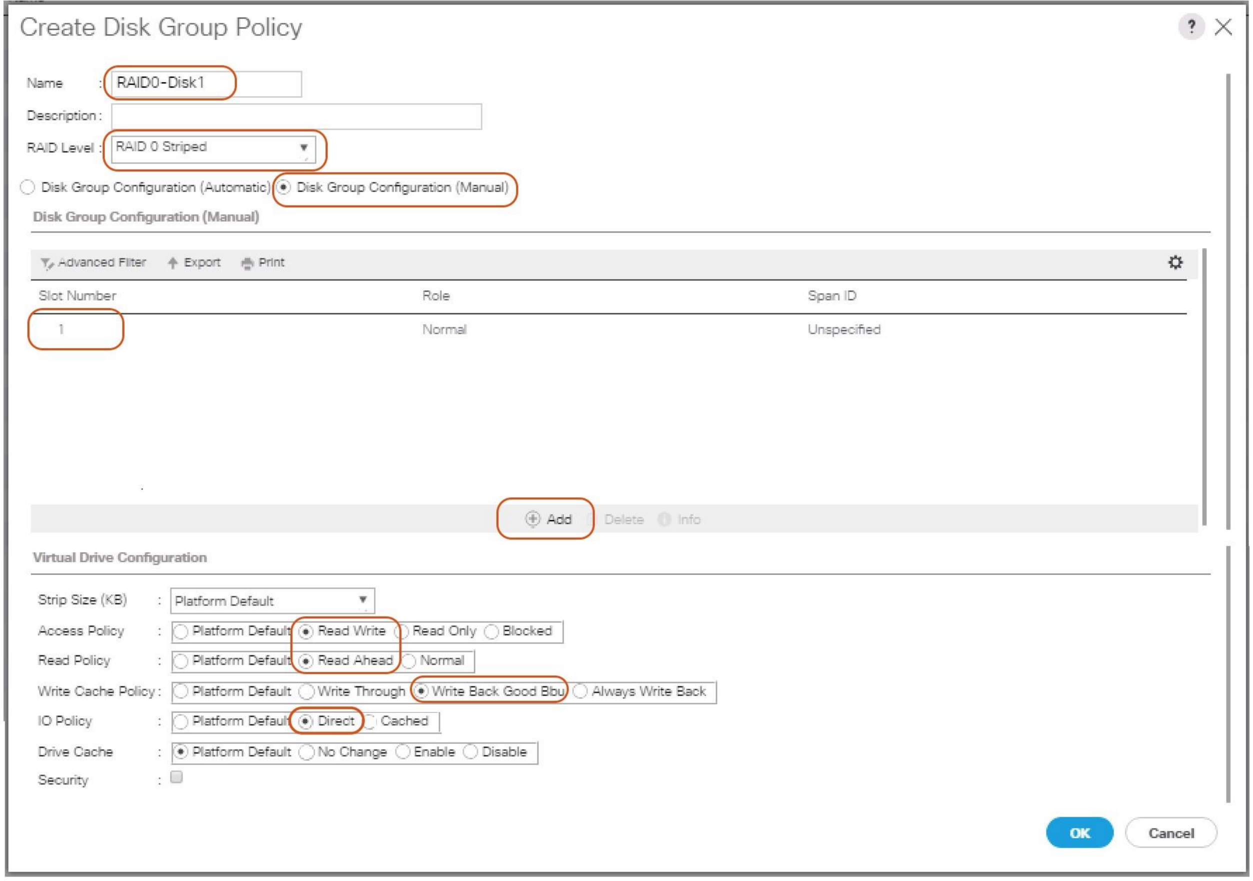
17. Under “Change Virtual Drive Configuration:”

    a. Modify Access Policy as “Read Write” and Read Policy as “Read Ahead”.

    b. Modify Write Cache Policy as “Write Back Good BBU” and IO Policy as “Direct.”

    c. Click **`OK`** and then **`OK`**.

Figure 45 Create Disk Group Policy



Create Disk Group Policy

Name : RAID0-Disk1

Description :

RAID Level : RAID 0 Striped

○ Disk Group Configuration (Automatic) ● Disk Group Configuration (Manual)

Disk Group Configuration (Manual)

Slot Number	Role	Span ID
1	Normal	Unspecified

Virtual Drive Configuration

Strip Size (KB) : Platform Default

Access Policy : ○ Platform Default ● Read Write ○ Read Only ○ Blocked

Read Policy : ○ Platform Default ● Read Ahead ○ Normal

Write Cache Policy : ○ Platform Default ○ Write Through ● Write Back Good Bbu ○ Always Write Back

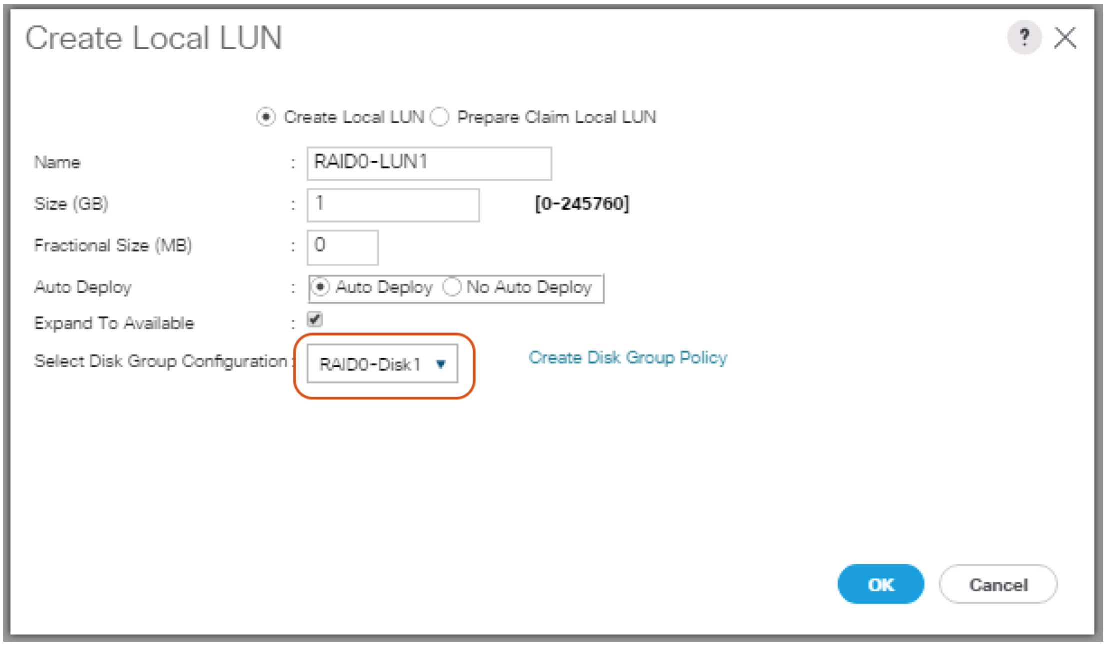
IO Policy : ○ Platform Default ● Direct ○ Cached

Drive Cache : ● Platform Default ○ No Change ○ Enable ○ Disable

Security : □

18. Select your previously created Disk Group Policy for the Boot SSDs with the radio button under **`Select Disk Group Configuration`**.

19. Select Disk Group Configuration.



Create Local LUN

● Create Local LUN ○ Prepare Claim Local LUN

Name : RAID0-LUN1

Size (GB) : 1 [0-245760]

Fractional Size (MB) : 0

Auto Deploy : ● Auto Deploy ○ No Auto Deploy

Expand To Available : ☑

Select Disk Group Configuration : RAID0-Disk1

20. Click **OK** and then **OK** and click OK..

21. Create the RAID0 LUNs for remaining top loading HDDs by following all the steps.

> Note: Make sure to choose "Storage-TopNode" Storage Profile for creating RAID0 LUNs for HDDs installed from Slot 1-26. Then choose "Storage-BottomNode" Storage Profile for creating RAID0 LUNs for HDDs installed from Slot 29-54.

Create Service Profile for Cisco UCS C220 M4S Server for Scality Supervisor Node

To create a Service Profile, complete the following steps:

1. Select **Servers** in the left pane of the Cisco UCS Manager GUI.

2. Go to Servers > Service Profile > root and right-click to choose "Create Service Profile (expert)."

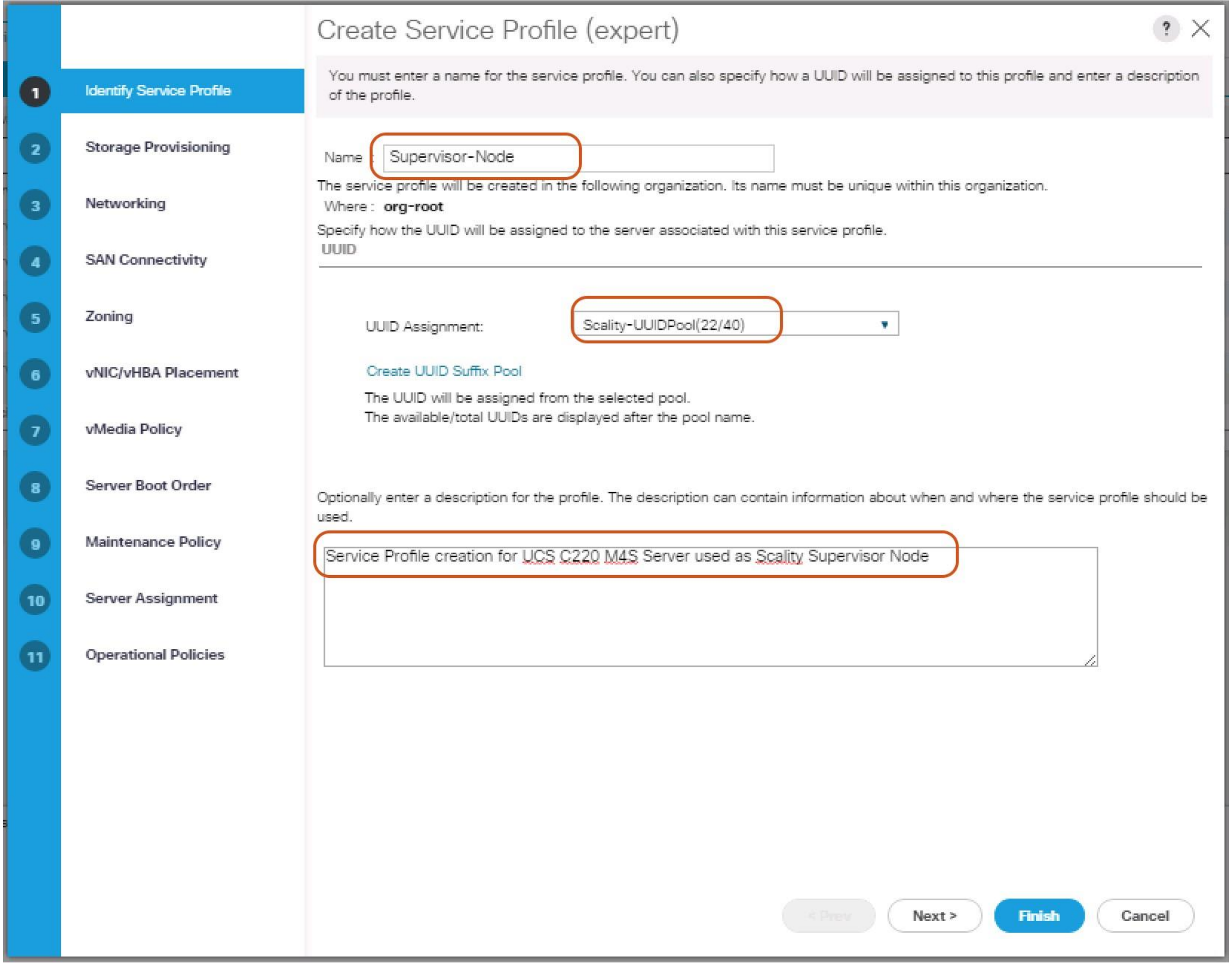
Identify Service Profile

1. Type in **Supervisor-Node** in the Name field.

2. In the **UUID Assignment** section, select the UUID Pool you created in the beginning.

3. (Optional) Enter a description in the **Description** field.

Figure 46 Identify Service Profile



You must enter a name for the service profile. You can also specify how a UUID will be assigned to this profile and enter a description of the profile.

Name : Supervisor-Node

The service profile will be created in the following organization. Its name must be unique within this organization.

Where : **org-root**

Specify how the UUID will be assigned to the server associated with this service profile.

UUID

UUID Assignment: Scality-UUIDPool(22/40)

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.

Service Profile creation for UCS C220 M4S Server used as Scality Supervisor Node

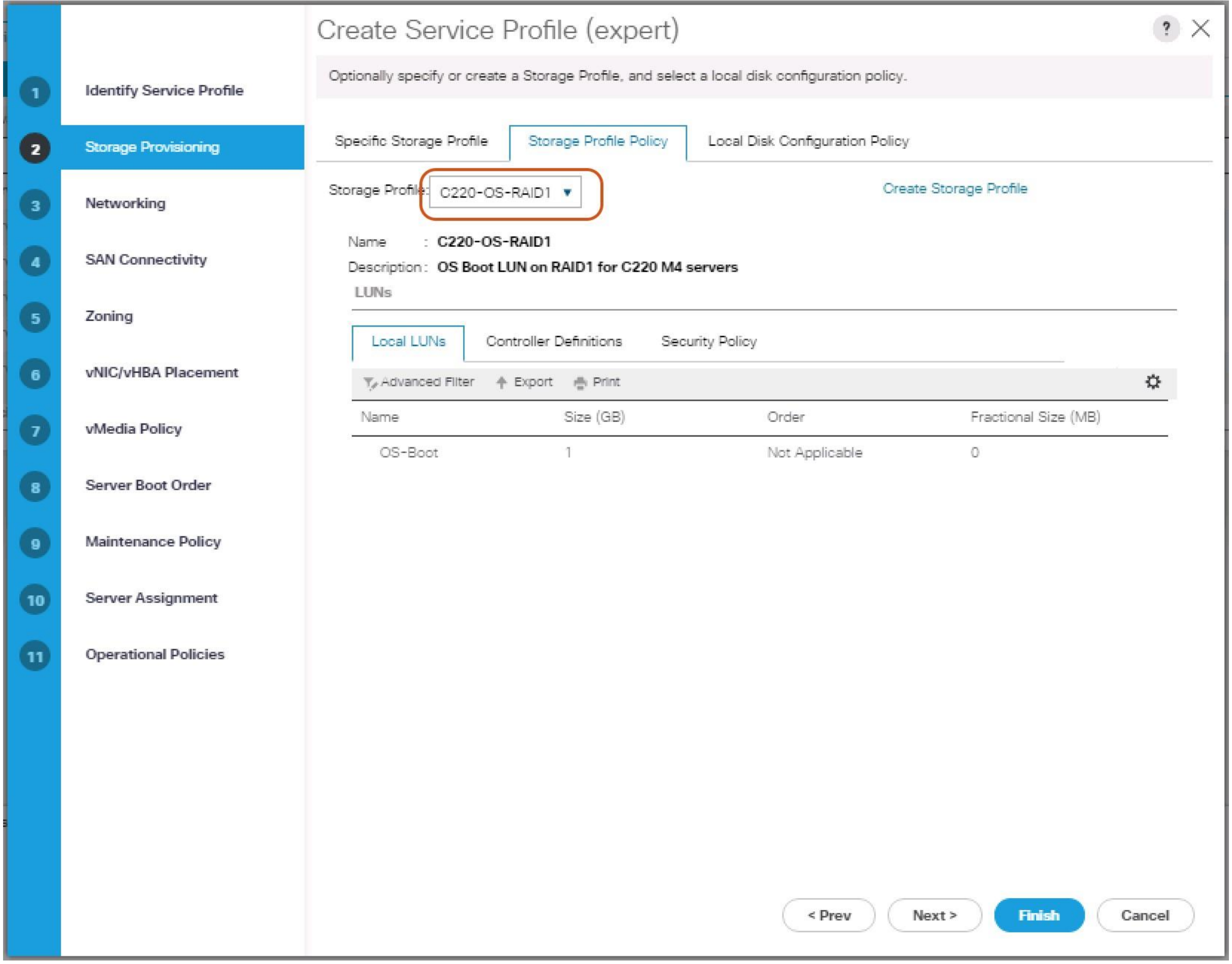
4. Click **`Next`**.

Storage Provisioning

1. Go to the **`Storage Profile Policy`** tab and select the Storage Profile **`S3260-TopNode`** for the top node of the Cisco UCS S3260 Storage Server you created before.

2. Click **`Next`**.

Figure 47 Storage Provisioning



Create Service Profile (expert)

Optionally specify or create a Storage Profile, and select a local disk configuration policy.

Storage Profile: C220-OS-RAID1

Name : C220-OS-RAID1

Description : OS Boot LUN on RAID1 for C220 M4 servers

LUNs

Name	Size (GB)	Order	Fractional Size (MB)
OS-Boot	1	Not Applicable	0

Networking

1. Keep the Dynamic vNIC Connection Policy field at the default.

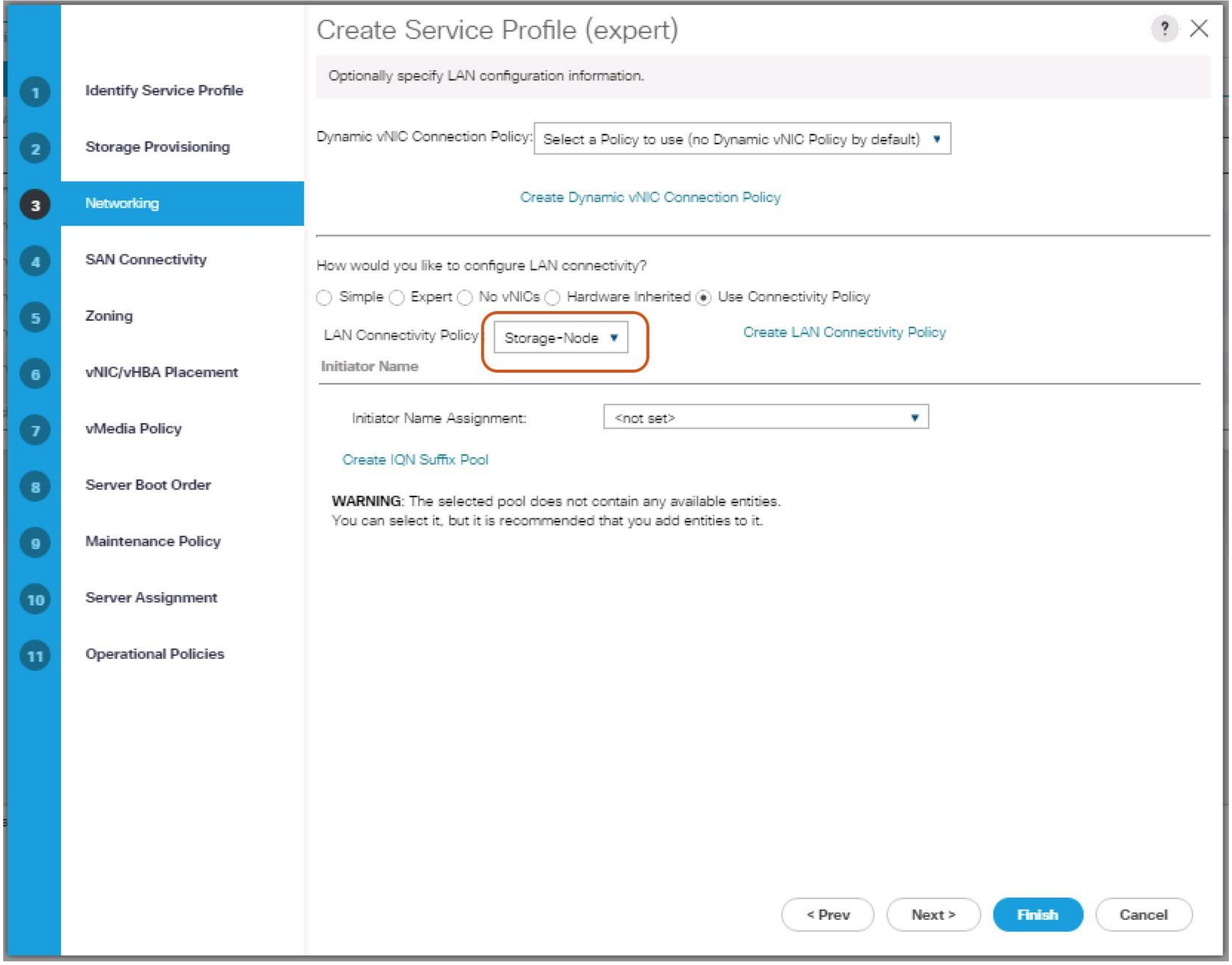
2. Select LAN connectivity to Use Connectivity Policy created previously.

3. From the LAN Connectivity drop-down list, select "**Storage-Node**" previously created.

> Note: Scality Supervisor Node and Storage-Nodes use the same VNIC interfaces.

4. Click Next.

Figure 48 Summary Networking



Create Service Profile (expert)

Optionally specify LAN configuration information.

Dynamic vNIC Connection Policy: Select a Policy to use (no Dynamic vNIC Policy by default)

How would you like to configure LAN connectivity?

○ Simple ○ Expert ○ No vNICs ○ Hardware Inherited ● Use Connectivity Policy

LAN Connectivity Policy: Storage-Node

Initiator Name

Initiator Name Assignment: <not set>

WARNING: The selected pool does not contain any available entities.
You can select it, but it is recommended that you add entities to it.

5. Click **`Next`** to continue with SAN Connectivity.

6. Select No vHBA for How would you like to configure SAN Connectivity?

7. Click **`Next`** to continue with Zoning.

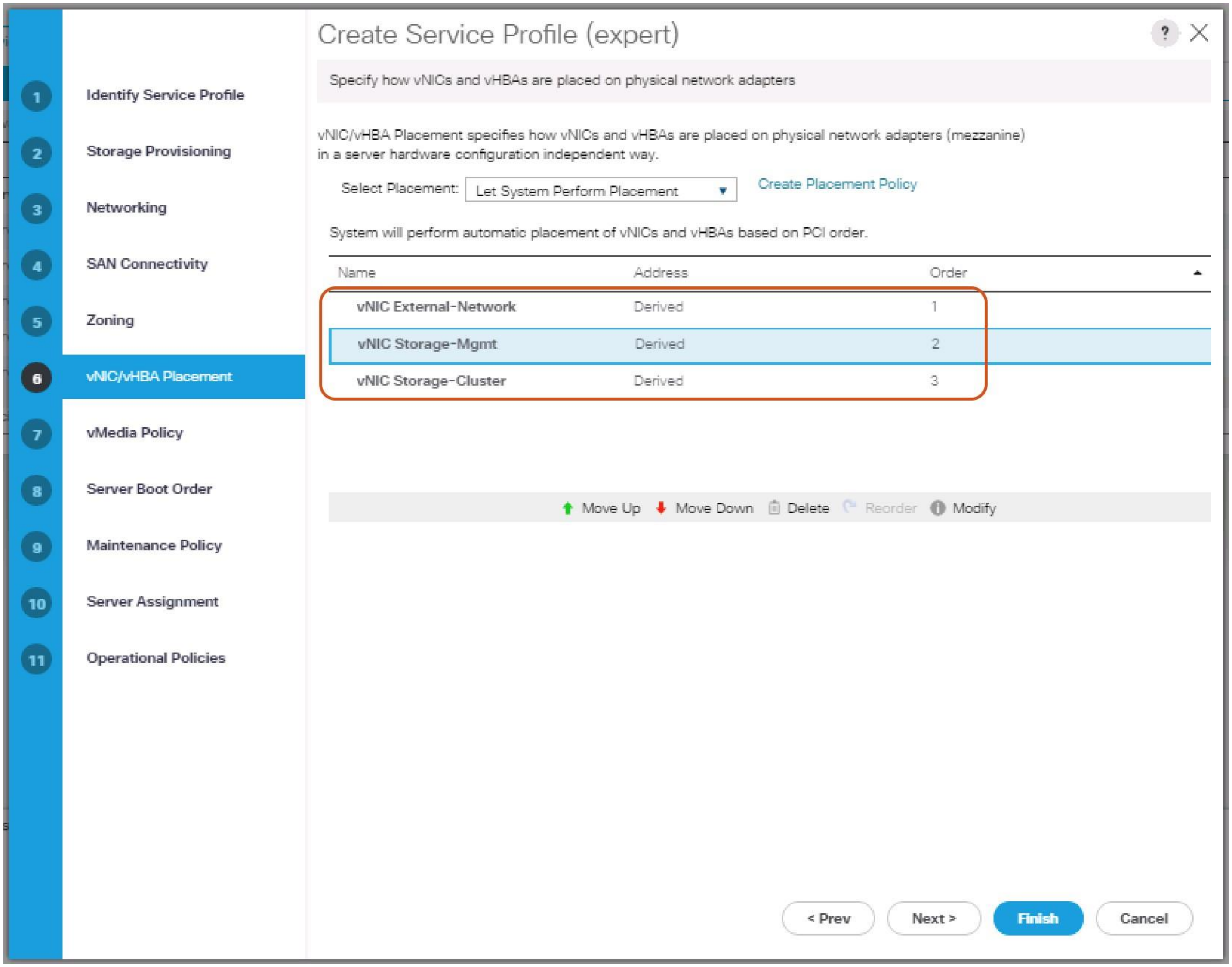
8. Click **`Next`**.

vNIC/vHBA Placement

1. Select **`Let system Perform placement`** form the drop-down list.

2. Under PCI order section, Sort all the vNICs.

3. Make sure the vNICs order listed as External-Network > 1, then followed by Storage-Mgmt > 2 and Storage-Cluster > 3.



Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: Let System Perform Placement

System will perform automatic placement of vNICs and vHBAs based on PCI order.

Name	Address	Order
vNIC External-Network	Derived	1
vNIC Storage-Mgmt	Derived	2
vNIC Storage-Cluster	Derived	3

4. Click **Next** to continue with vMedia Policy.

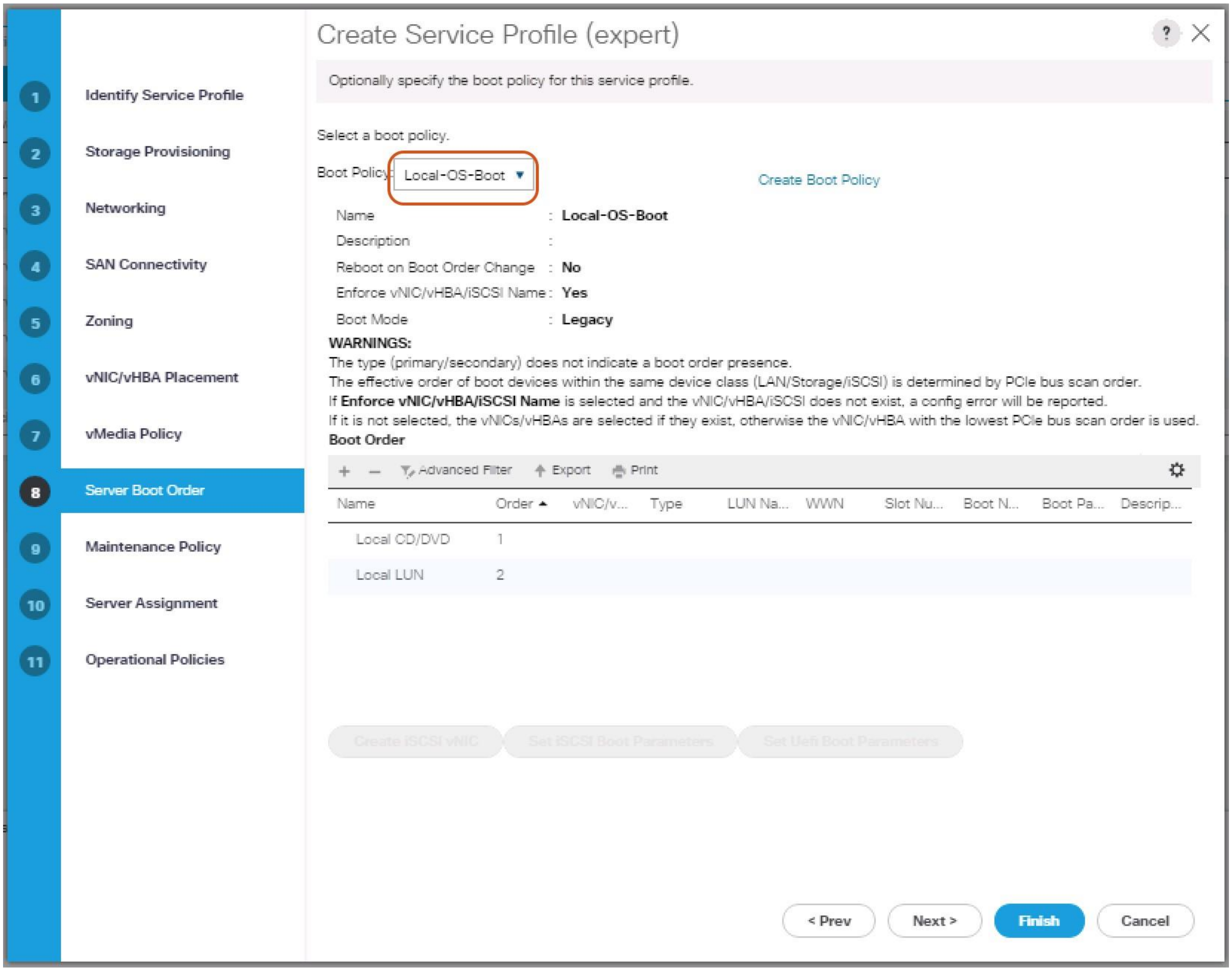
5. Click **Next**.

Server Boot Order

1. Select the Boot Policy “**Local-OS-Boot**” you created before under Boot Policy.

2. Server Boot Order.

3. Click **Next**.



Create Service Profile (expert)

Optionally specify the boot policy for this service profile.

Select a boot policy.

Boot Policy: Local-OS-Boot

Name : **Local-OS-Boot**
Description :
Reboot on Boot Order Change : **No**
Enforce vNIC/vHBA/iSCSI Name : **Yes**
Boot Mode : **Legacy**

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

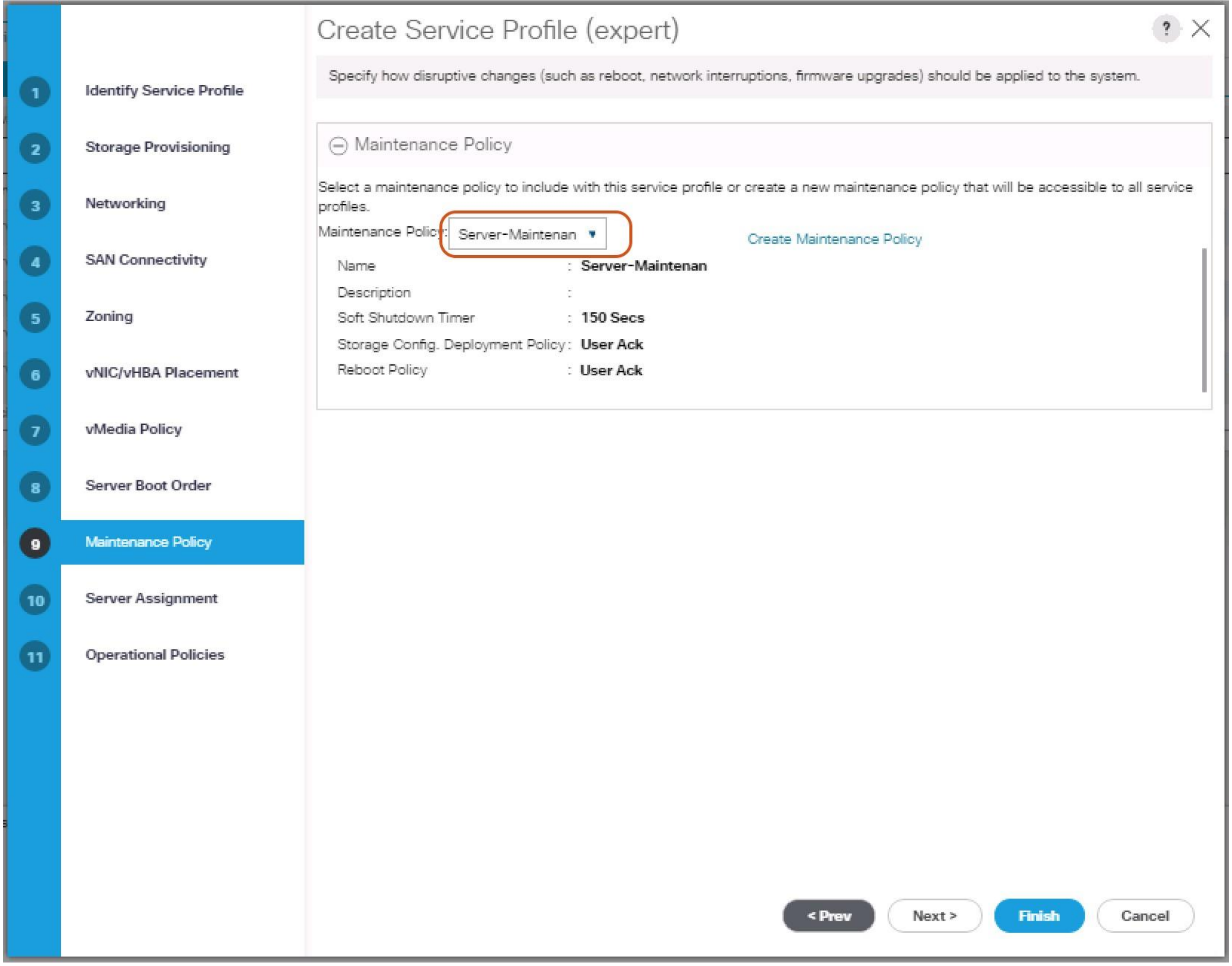
Boot Order

Name	Order ▲	vNIC/v...	Type	LUN Na...	WWN	Slot Nu...	Boot N...	Boot Pa...	Descrip...
Local CD/DVD	1								
Local LUN	2								

Maintenance Policy

1. Select the Maintenance Policy you created before under Maintenance Policy.

Figure 49 Maintenance Policy



Create Service Profile (expert)

Specify how disruptive changes (such as reboot, network interruptions, firmware upgrades) should be applied to the system.

Maintenance Policy

Select a maintenance policy to include with this service profile or create a new maintenance policy that will be accessible to all service profiles.

Maintenance Policy: Server-Maintenan

Name : Server-Maintenan

Description :

Soft Shutdown Timer : 150 Secs

Storage Config. Deployment Policy : User Ack

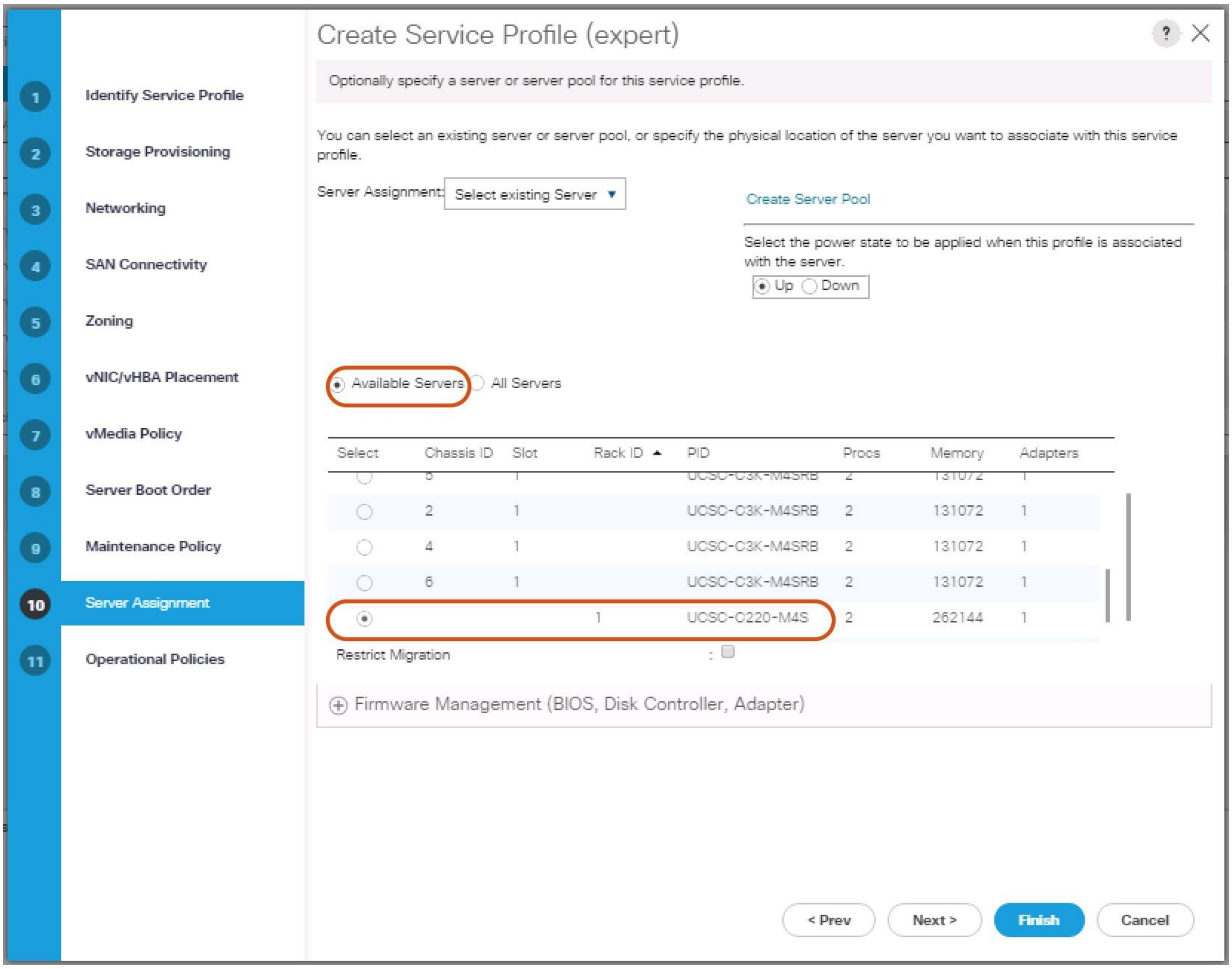
Reboot Policy : User Ack

2. Click **Next**.

3. From the Server Assignment drop-down list, choose “Select existing Server.”

4. Click “Available Servers” radio button.

5. From the Server list, select Rack ID “1” radio button for the C220 M4S Server. This will Associate the service profile.



Create Service Profile (expert)

Optionally specify a server or server pool for this service profile.

You can select an existing server or server pool, or specify the physical location of the server you want to associate with this service profile.

Server Assignment: Select existing Server ▾

Create Server Pool

Select the power state to be applied when this profile is associated with the server.

● Up ○ Down

● Available Servers ○ All Servers

Select	Chassis ID	Slot	Rack ID ▲	PID	Procs	Memory	Adapters
○	5	1		UCSC-C3K-M4SRB	2	131072	1
○	2	1		UCSC-C3K-M4SRB	2	131072	1
○	4	1		UCSC-C3K-M4SRB	2	131072	1
○	6	1		UCSC-C3K-M4SRB	2	131072	1
●			1	UCSC-C220-M4S	2	262144	1

Restrict Migration : □

⊕ Firmware Management (BIOS, Disk Controller, Adapter)

6. Click **Next**.

Operational Policies

1. Click **Finish** and then click **OK**.

2. After Successful creation of "**Supervisor-Node**" Service profile, the Cisco UCS C220 M4S server will start the Service profile association.

Creating Port Channel for Network Uplinks

Create Port Channel for Fabric Interconnect A/B

To create Port Channels to the connected Nexus 9332PQ switches, complete the following steps:

1. Select the **LAN** tab in the left pane of the Cisco UCS Manager GUI.

2. Go to LAN > LAN Cloud > Fabric A > Port Channels and right-click Create Port Channel.

3. Type in **ID 20**.

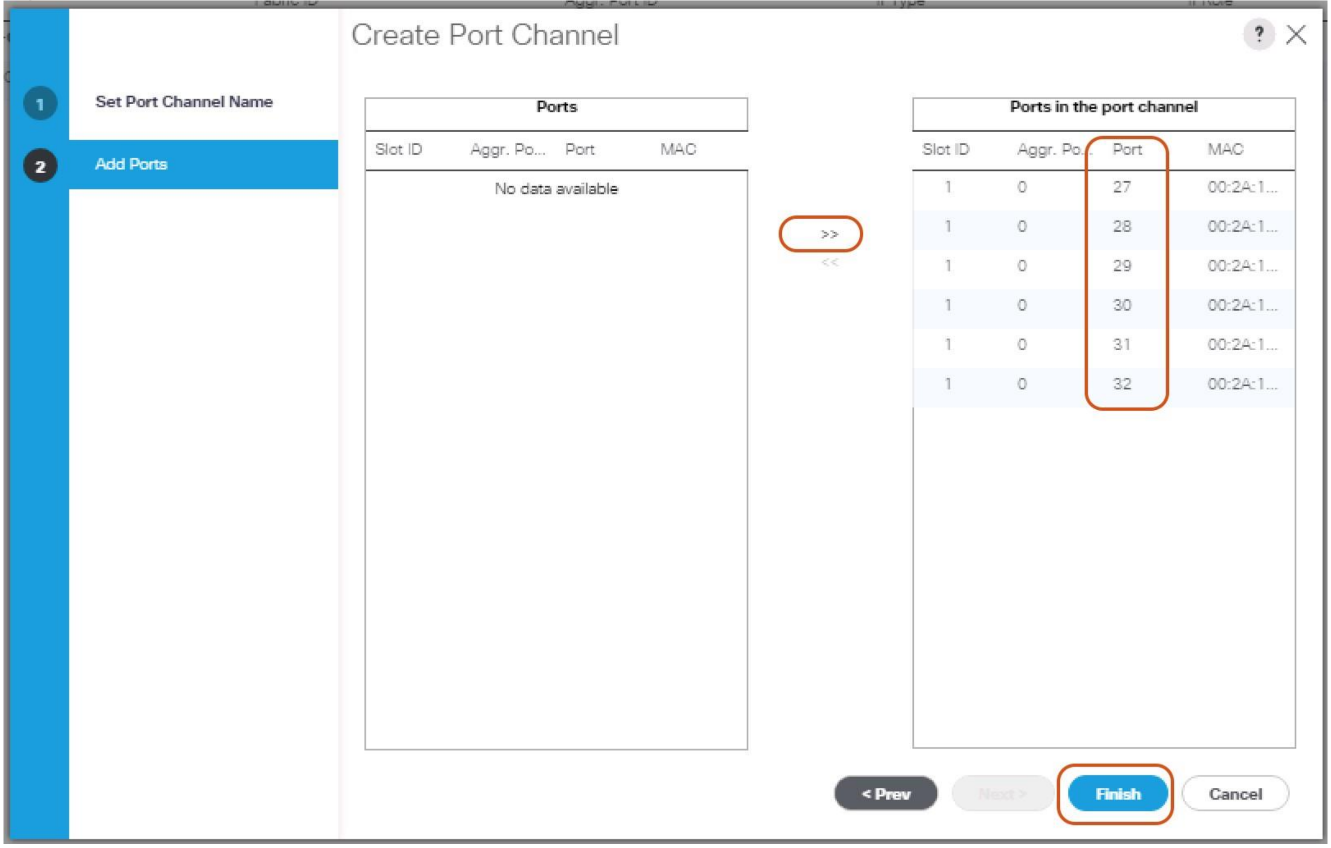
4. Type in **`vPC20`** in the `Name` field.

5. Click Next.

6. Select the available ports on the left **`27-32`** and assign them with >> to **`Ports in the Port Channel`**.

7. The “Add Ports” window will prompt you to confirm the selection, click Yes.

Figure 50 Create Port Channel



Create Port Channel

Ports

Slot ID	Aggr. Po...	Port	MAC
No data available			

Ports in the port channel

Slot ID	Aggr. Po...	Port	MAC
1	0	27	00:2A:1...
1	0	28	00:2A:1...
1	0	29	00:2A:1...
1	0	30	00:2A:1...
1	0	31	00:2A:1...
1	0	32	00:2A:1...

8. Click **`Finish`** and then click **`OK`**.

9. Repeat these same steps for Fabric B under LAN > LAN Cloud > Fabric B > Port Channels and right-click Create Port Channel.

10. Type in **`ID 30`**.

11. Type in **`VPC30`** name in the `Name` field.

12. Click **`Next`**.

13. Select the available ports on the left **`27-32`** and assign them with >> to **`Ports in the Port Channel`**.

14. Click **`Finish`** and then click **`OK`**.

Configuration of Nexus 9332PQ Switch A and B

Both Cisco UCS Fabric Interconnect A and B are connected to two Cisco Nexus 9332PQ switches for connectivity to Upstream Network. The following sections describe the setup of both Cisco Nexus 9332PQ switches.

Initial Setup of Nexus 9332PQ Switch A and B

To configure Switch A, please connect a Console to the Console port of each switch, power on the switch and complete the following steps:

1. Type **`yes`**.
2. Type **`n`**.
3. Type **`n`**.
4. Type **`n`**.
5. Enter the switch name.
6. Type **`y`**.
7. Type your IPv4 management address for Switch A.
8. Type your IPv4 management netmask for Switch A.
9. Type **`y`**.
10. Type your IPv4 management default gateway address for Switch A.
11. Type **`n`**.
12. Type **`n.`**
13. Type **`y`** for ssh service.
14. Press `<Return>` and then `<Return>`.
15. Type **`y`** for ntp server.
16. Type the IPv4 address of the NTP server.
17. Press `<Return>`, then `<Return>` and again `<Return>`.
18. Check the configuration and if correct then press `<Return>` and again `<Return>`.

The complete setup looks like the following:

```
             ---- System Admin Account Setup ----



   Do you want to enforce secure password standard (yes/no) [y]: no
```

```
  Enter the password for "admin":
  Confirm the password for "admin":

         ---- Basic System Configuration Dialog VDC: 1 ----

This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.

Please register Cisco Nexus9000 Family devices promptly with your
supplier. Failure to register may affect response times for initial
service calls. Nexus9000 devices must be registered to receive
entitled support services.

Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes
  Create another login account (yes/no) [n]:
  Configure read-only SNMP community string (yes/no) [n]: no
  Configure read-write SNMP community string (yes/no) [n]: no
  Enter the switch name : N9k-Fab-A
  Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: yes
    Mgmt0 IPv4 address : 192.168.10.103
    Mgmt0 IPv4 netmask : 255.255.255.0
  Configure the default gateway? (yes/no) [y]: yes
    IPv4 address of the default gateway : 192.168.10.1
  Configure advanced IP options? (yes/no) [n]: no
  Enable the telnet service? (yes/no) [n]: no
  Enable the ssh service? (yes/no) [y]: yes
    Type of ssh key you would like to generate (dsa/rsa) [rsa]: rsa
    Number of rsa key bits <1024-2048> [1024]: 1024
  Configure the ntp server? (yes/no) [n]: yes
    NTP server IPv4 address : 192.168.10.2
  Configure default interface layer (L3/L2) [L3]: L2
  Configure default switchport interface state (shut/noshut) [shut]: shut
  Configure CoPP system profile (strict/moderate/lenient/dense) [strict]:
The following configuration will be applied:
  password strength-check
  switchname N9k-Fab-A
vrf context management
ip route 0.0.0.0/0 192.168.10.1
exit
  no feature telnet
  ssh key rsa 1024 force
  feature ssh
  ntp server 192.168.10.2
  no system default switchport
  system default switchport shutdown
  copp profile strict
interface mgmt0
ip address 192.168.10.103 255.255.255.0
no shutdown

Would you like to edit the configuration? (yes/no) [n]: no

Use this configuration and save it? (yes/no) [y]: yes

[########################################] 100%
Copy complete.

User Access Verification
N9k-Fab-A login:
```

Repeat these steps for the Nexus 9332PQ Switch B with the exception of configuring a different IPv4 management address 192.168.10.104 as described in step 7.

Enable Features on Nexus 9332PQ Switch A and B

To enable the features UDLD, VLAN, HSRP, LACP, VPC, and Jumbo Frames, connect to the management interface via ssh on both switches and complete the following steps on both Switch A and B:

Switch A

```
N9k-Fab-A# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-A(config)# feature udld

N9k-Fab-A(config)# feature interface-vlan

N9k-Fab-A(config)# feature hsrp

N9k-Fab-A(config)# feature lacp

N9k-Fab-A(config)# feature vpc

N9k-Fab-A(config)# system jumbomtu 9216

N9k-Fab-A(config)# exit

N9k-Fab-A(config)# copy running-config startup-config
```

Switch B

```
N9k-Fab-B# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-B(config)# feature udld

N9k-Fab-B(config)# feature interface-vlan

N9k-Fab-B(config)# feature hsrp

N9k-Fab-B(config)# feature lacp

N9k-Fab-B(config)# feature vpc

N9k-Fab-B(config)# system jumbomtu 9216

N9k-Fab-B(config)# exit

N9k-Fab-B(config)# copy running-config startup-config
```

Configuring VLANs on Nexus 9332PQ Switch A and B

To configure the same VLANs Storage-Management, Storage-Cluster, Client Network, and External Management as previously configured in the Cisco UCS Manager GUI, complete the following steps on Switch A and Switch B:

Switch A

```
N9k-Fab-A# config terminal

Enter configuration commands, one per line. End with CNTL/Z.
```

```
N9k-Fab-A(config)# vlan 10
N9k-Fab-A(config-vlan)# name Storage-Management
N9k-Fab-A(config-vlan)# no shut
N9k-Fab-A(config-vlan)# exit
N9k-Fab-A(config)# vlan 20
N9k-Fab-A(config-vlan)# name Storage-Cluster
N9k-Fab-A(config-vlan)# no shut
N9k-Fab-A(config-vlan)# exit
N9k-Fab-A(config)# vlan 79
N9k-Fab-A(config-vlan)# name External-Mgmt
N9k-Fab-A(config-vlan)# no shut
N9k-Fab-A(config-vlan)# exit

N9k-Fab-A(config)# interface vlan10
N9k-Fab-A(config-if)# description Storage-Mgmt
N9k-Fab-A(config-if)# no shutdown
N9k-Fab-A(config-if)# no ip redirects
N9k-Fab-A(config-if)# ip address 192.168.10.253/24
N9k-Fab-A(config-if)# no ipv6 redirects
N9k-Fab-A(config-if)# hsrp version 2
N9k-Fab-A(config-if)# hsrp 10
N9k-Fab-A(config-if-hsrp)# preempt
N9k-Fab-A(config-if-hsrp)# priority 10
N9k-Fab-A(config-if-hsrp)# ip 192.168.10.1
N9k-Fab-A(config-if-hsrp)# exit
N9k-Fab-A(config-if)# exit

N9k-Fab-A(config)# interface vlan20
N9k-Fab-A(config-if)# description Storage-Cluster
N9k-Fab-A(config-if)# no shutdown
N9k-Fab-A(config-if)# no ip redirects
N9k-Fab-A(config-if)# ip address 192.168.20.253/24
```

```
N9k-Fab-A(config-if)# no ipv6 redirects
N9k-Fab-A(config-if)# hsrp version 2
N9k-Fab-A(config-if)# hsrp 20
N9k-Fab-A(config-if-hsrp)# preempt
N9k-Fab-A(config-if-hsrp)# priority 10
N9k-Fab-A(config-if-hsrp)# ip 192.168.20.1
N9k-Fab-A(config-if-hsrp)# exit
N9k-Fab-A(config-if)# exit
```

Switch B

```
N9k-Fab-B# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
N9k-Fab-B(config)# vlan 10
N9k-Fab-B(config-vlan)# name Storage-Management
N9k-Fab-B(config-vlan)# no shut
N9k-Fab-B(config-vlan)# exit
N9k-Fab-B(config)# vlan 20
N9k-Fab-B(config-vlan)# name Storage-Cluster
N9k-Fab-B(config-vlan)# no shut
N9k-Fab-B(config-vlan)# exit
N9k-Fab-B(config)# vlan 79
N9k-Fab-B(config-vlan)# name External-Mgmt
N9k-Fab-B(config-vlan)# no shut
N9k-Fab-B(config-vlan)# exit

N9k-Fab-B(config)# interface vlan10
N9k-Fab-B(config-if)# description Storage-Mgmt
N9k-Fab-B(config-if)# no ip redirects
N9k-Fab-B(config-if)# ip address 192.168.10.254/24
N9k-Fab-B(config-if)# no ipv6 redirects
N9k-Fab-B(config-if)# hsrp version 2
N9k-Fab-B(config-if)# hsrp 10
N9k-Fab-B(config-if-hsrp)# preempt
N9k-Fab-B(config-if-hsrp)# priority 5
```

```
N9k-Fab-B(config-if-hsrp)# ip 192.168.10.1
N9k-Fab-B(config-if-hsrp)# exit
N9k-Fab-B(config-if)# exit

N9k-Fab-B(config)# interface vlan20
N9k-Fab-B(config-if)# description Storage-Cluster
N9k-Fab-B(config-if)# no ip redirects
N9k-Fab-B(config-if)# ip address 192.168.20.254/24
N9k-Fab-B(config-if)# no ipv6 redirects
N9k-Fab-B(config-if)# hsrp version 2
N9k-Fab-B(config-if)# hsrp 20
N9k-Fab-B(config-if-hsrp)# preempt
N9k-Fab-B(config-if-hsrp)# priority 5
N9k-Fab-B(config-if-hsrp)# ip 192.168.20.1
N9k-Fab-B(config-if-hsrp)# exit
N9k-Fab-B(config-if)# exit
N9k-Fab-B(config)# copy running-config startup-config
```

Configure vPC and Port Channels on Nexus C9332PQ Switch A and B

To enable vPC and Port Channels on both Switch A and B, complete the following steps:

vPC and Port Channels for Peerlink on Switch A

```
N9k-Fab-B# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
N9k-Fab-A(config)# vpc domain 2
N9k-Fab-A(config-vpc-domain)# peer-keepalive destination 192.168.10.104
Note:
 --------:: Management VRF will be used as the default VRF ::--------
N9k-Fab-A(config-vpc-domain)# peer-gateway
N9k-Fab-A(config-vpc-domain)# exit

N9k-Fab-A(config)# interface port-channel 1
N9k-Fab-A(config-if)# description vPC peerlink for N9k-Fab-A and N9k-Fab-B
N9k-Fab-A(config-if)# switchport
```

```
N9k-Fab-A(config-if)# switchport mode trunk
N9k-Fab-A(config-if)# spanning-tree port type network
N9k-Fab-A(config-if)# speed 40000
N9k-Fab-A(config-if)# vpc peer-link
Please note that spanning tree port type is changed to "network" port type on
vPC peer-link.
This will enable spanning tree Bridge Assurance on vPC peer-link provided the
STP Bridge Assurance
(which is enabled by default) is not disabled.
N9k-Fab-A(config-if)# exit

N9k-Fab-A(config)# interface ethernet 1/1
N9k-Fab-A(config-if)# description connected to peer N9k-Fab-B port 1
N9k-Fab-A(config-if)# switchport
N9k-Fab-A(config-if)# switchport mode trunk
N9k-Fab-A(config-if)# speed 40000
N9k-Fab-A(config-if)# channel-group 1 mode active
N9k-Fab-A(config-if)# exit

N9k-Fab-A(config)# interface ethernet 1/2
N9k-Fab-A(config-if)# description connected to peer N9k-Fab-B port 2
N9k-Fab-A(config-if)# switchport
N9k-Fab-A(config-if)# switchport mode trunk
N9k-Fab-A(config-if)# speed 40000
N9k-Fab-A(config-if)# channel-group 1 mode active
N9k-Fab-A(config-if)# exit
N9k-Fab-A(config)# copy running-config startup-config
```

vPC and Port Channels for Peerlink on Switch B

```
N9k-Fab-B# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
N9k-Fab-B(config)# vpc domain 2
N9k-Fab-B(config-vpc-domain)# peer-keepalive destination 192.168.10.103
```

```
Note:
 --------:: Management VRF will be used as the default VRF ::--------
N9k-Fab-B(config-vpc-domain)# peer-gateway
N9k-Fab-B(config-vpc-domain)# exit


N9k-Fab-B(config)# interface port-channel 1
N9k-Fab-B(config-if)# description vPC peerlink for N9k-Fab-A and N9k-Fab-B
N9k-Fab-B(config-if)# switchport
N9k-Fab-B(config-if)# switchport mode trunk
N9k-Fab-B(config-if)# spanning-tree port type network
N9k-Fab-B(config-if)# speed 40000
N9k-Fab-B(config-if)# vpc peer-link
Please note that spanning tree port type is changed to "network" port type on
vPC peer-link.
This will enable spanning tree Bridge Assurance on vPC peer-link provided the
STP Bridge Assurance
(which is enabled by default) is not disabled.
N9k-Fab-B(config-if)# exit


N9k-Fab-B(config)# interface ethernet 1/1
N9k-Fab-B(config-if)# description connected to peer N9k-Fab-A port 1
N9k-Fab-B(config-if)# switchport
N9k-Fab-B(config-if)# switchport mode trunk
N9k-Fab-B(config-if)# speed 40000
N9k-Fab-B(config-if)# channel-group 1 mode active
N9k-Fab-B(config-if)# exit


N9k-Fab-B(config)# interface ethernet 1/2
N9k-Fab-B(config-if)# description connected to peer N9k-Fab-A port 2
N9k-Fab-B(config-if)# switchport
N9k-Fab-B(config-if)# switchport mode trunk
N9k-Fab-B(config-if)# speed 40000
N9k-Fab-B(config-if)# channel-group 1 mode active
```

```
N9k-Fab-B(config-if)# exit

N9k-Fab-B(config)# copy running-config startup-config
```

vPC and Port Channels for Uplink from UCS Fabric A & B on Nexus Switch A

```
N9k-Fab-B# config terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-A(config)# interface port-channel 10

N9k-Fab-A(config-if)# description vPC for UCS FI-A ports 27 to 29

N9k-Fab-A(config-if)# vpc 10

N9k-Fab-A(config-if)# switchport

N9k-Fab-A(config-if)# switchport mode trunk

N9k-Fab-A(config-if)# switchport trunk allowed vlan 10,20,79

N9k-Fab-A(config-if)# spanning-tree port type edge trunk

Edge port type (portfast) should only be enabled on ports connected to a single

 host. Connecting hubs, concentrators, switches, bridges, etc...  to this

 interface when edge port type (portfast) is enabled, can cause temporary
bridging loops.

 Use with CAUTION

N9k-Fab-A(config-if)# mtu 9216

N9k-Fab-A(config-if)# exit


N9k-Fab-A(config)# interface port-channel 11

N9k-Fab-A(config-if)# description vPC for UCS FI-B ports 27 to 29

N9k-Fab-A(config-if)# vpc 11

N9k-Fab-A(config-if)# switchport

N9k-Fab-A(config-if)# switchport mode trunk

N9k-Fab-A(config-if)# switchport trunk allowed vlan 10,20,79

N9k-Fab-A(config-if)# spanning-tree port type edge trunk

Edge port type (portfast) should only be enabled on ports connected to a single

 host. Connecting hubs, concentrators, switches, bridges, etc...  to this

 interface when edge port type (portfast) is enabled, can cause temporary
bridging loops.

 Use with CAUTION
```

```
N9k-Fab-A(config-if)# mtu 9216

N9k-Fab-A(config-if)# exit


N9k-Fab-A(config)# interface ethernet 1/27-29

N9k-Fab-A(config-if-range)# switchport

N9k-Fab-A(config-if-range)# switchport mode trunk

N9k-Fab-A(config-if-range)# description Uplink from UCS FI-A ports 27 to 29

N9k-Fab-A(config-if-range)# channel-group 10 mode active

N9k-Fab-A(config-if)# exit


N9k-Fab-A(config)# interface ethernet 1/30-32

N9k-Fab-A(config-if-range)# switchport

N9k-Fab-A(config-if-range)# switchport mode trunk

N9k-Fab-A(config-if-range)# description Uplink from UCS FI-B ports 27 to 29

N9k-Fab-A(config-if-range)# channel-group 11 mode active

N9k-Fab-A(config-if)# exit

N9k-Fab-A(config)# copy running-config startup-config
```

vPC and Port Channels for Uplink from Fabric A and B on Nexus Switch B

```
N9k-Fab-B# config terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-B(config)# interface port-channel 10

N9k-Fab-B(config-if)# description vPC for UCS FI-A ports 30 to 32

N9k-Fab-B(config-if)# switchport

N9k-Fab-B(config-if)# switchport mode trunk

N9k-Fab-B(config-if)# switchport trunk allowed vlan 10,20,79

N9k-Fab-B(config-if)# spanning-tree port type edge trunk

Edge port type (portfast) should only be enabled on ports connected to a single

 host. Connecting hubs, concentrators, switches, bridges, etc...  to this

 interface when edge port type (portfast) is enabled, can cause temporary
bridging loops.

 Use with CAUTION

N9k-Fab-B(config-if)# vpc 10
```

```
N9k-Fab-B(config-if)# mtu 9216
N9k-Fab-B(config-if)# exit

N9k-Fab-B(config)# interface port-channel 11
N9k-Fab-B(config-if)# description vPC for UCS FI-B ports 30 to 32
N9k-Fab-B(config-if)# switchport
N9k-Fab-B(config-if)# switchport mode trunk
N9k-Fab-B(config-if)# switchport trunk allowed vlan 10,20,79
N9k-Fab-B(config-if)# spanning-tree port type edge trunk
Edge port type (portfast) should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc...  to this
 interface when edge port type (portfast) is enabled, can cause temporary
bridging loops.
 Use with CAUTION
N9k-Fab-B(config-if)# vpc 11
N9k-Fab-B(config-if)# mtu 9216
N9k-Fab-B(config-if)# exit

N9k-Fab-B(config)# interface ethernet 1/27-29
N9k-Fab-B(config-if-range)# switchport
N9k-Fab-B(config-if-range)# switchport mode trunk
N9k-Fab-B(config-if-range)# description Uplink from UCS FI-A ports 30 to 32
N9k-Fab-B(config-if-range)# channel-group 10 mode active
N9k-Fab-B(config-if)# exit

N9k-Fab-B(config)# interface ethernet 1/30-32
N9k-Fab-B(config-if-range)# switchport
N9k-Fab-B(config-if-range)# switchport mode trunk
N9k-Fab-B(config-if-range)# description Uplink from UCS FI-B ports 30 to 32
N9k-Fab-B(config-if-range)# channel-group 11 mode active
N9k-Fab-B(config-if)# exit
N9k-Fab-B(config)# copy running-config startup-config
```

Verification Check of Nexus C9332PQ Configuration for Switch A and B

Switch A

```
N9k-Fab-B# config terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-A(config)# show vpc brief

Legend:

                (*) - local vPC is down, forwarding via vPC peer-link


vPC domain id                     : 2

Peer status                       : peer adjacency formed ok

vPC keep-alive status             : peer is alive

Configuration consistency status  : success

Per-vlan consistency status       : success

Type-2 consistency status         : success

vPC role                          : secondary

Number of vPCs configured         : 4

Peer Gateway                      : Enabled

Dual-active excluded VLANs        : -

Graceful Consistency Check        : Enabled

Auto-recovery status              : Disabled

Delay-restore status              : Timer is off.(timeout = 30s)

Delay-restore SVI status          : Timer is off.(timeout = 10s)


vPC Peer-link status

---------------------------------------------------------------------

id   Port   Status Active vlans

--   ----   ------ --------------------------------------------------

1    Po1    up     1,10,20,79


vPC status

----------------------------------------------------------------------

id   Port   Status Consistency Reason                     Active vlans
```

```
--   ----   ------ ----------- ------                          ------------

10  Po10  up     success     success                    10,20,79


11  Po11  up     success     success                    10,20,79


N9k-Fab-A(config)#

N9k-Fab-A(config)# show port-channel summary

Flags:  D - Down        P - Up in port-channel (members)

        I - Individual  H - Hot-standby (LACP only)

        s - Suspended   r - Module-removed

        S - Switched    R - Routed

        U - Up (port-channel)

        p - Up in delay-lacp mode (member)

        M - Not in use. Min-links not met

--------------------------------------------------------------------------------

Group Port-       Type     Protocol  Member Ports

      Channel

--------------------------------------------------------------------------------

1      Po1(SU)     Eth      LACP      Eth1/1(P)    Eth1/2(P)

10    Po10(SU)    Eth      LACP       Eth1/27(P)   Eth1/28(P)   Eth1/29(P)

11    Po11(SU)    Eth      LACP       Eth1/30(P)   Eth1/31(P)   Eth1/32(P)

N9k-Fab-A(config)#
```

Switch B

```
N9k-Fab-B# config terminal

Enter configuration commands, one per line. End with CNTL/Z.

N9k-Fab-B(config)# show vpc brief

Legend:

                (*) - local vPC is down, forwarding via vPC peer-link


vPC domain id                     : 2

Peer status                       : peer adjacency formed ok

vPC keep-alive status             : peer is alive

Configuration consistency status  : success
```

```
Per-vlan consistency status       : success
Type-2 consistency status         : success
vPC role                          : primary
Number of vPCs configured         : 4
Peer Gateway                      : Enabled
Dual-active excluded VLANs        : -
Graceful Consistency Check        : Enabled
Auto-recovery status              : Disabled
Delay-restore status              : Timer is off.(timeout = 30s)
Delay-restore SVI status          : Timer is off.(timeout = 10s)

vPC Peer-link status
---------------------------------------------------------------------
id   Port   Status Active vlans
--   ----   ------ -------------------------------------------------
1    Po1    up     1,10,20,79

vPC status
----------------------------------------------------------------------
id   Port   Status Consistency Reason                     Active vlans
--   ----   ------ ----------- ------                     ------------
10  Po10  up     success     success                    10,20,79


11  Po11  up     success     success                    10,20,79

N9k-Fab-B(config)#
N9k-Fab-B(config)# show port-channel summary
Flags:  D - Down        P - Up in port-channel (members)
        I - Individual  H - Hot-standby (LACP only)
        s - Suspended   r - Module-removed
        S - Switched    R - Routed
        U - Up (port-channel)
        p - Up in delay-lacp mode (member)
        M - Not in use. Min-links not met
--------------------------------------------------------------------------------
Group Port-       Type     Protocol  Member Ports
      Channel
--------------------------------------------------------------------------------
1      Po1(SU)     Eth      LACP      Eth1/1(P)    Eth1/2(P)
10    Po10(SU)    Eth       LACP         Eth1/27(P)    Eth1/28(P)    Eth1/29(P)
11    Po11(SU)    Eth       LACP         Eth1/30(P)    Eth1/31(P)    Eth1/32(P)
N9k-Fab-B(config)#
```

The formal setup of the Cisco UCS Manager environment and both Cisco Nexus 9332PQ switches is finished and next is the installation of the Red Hat Enterprise Linux 7.4 Operating System.

Installation of Red Hat Enterprise Linux 7.4 Operating System

This section provides the detailed procedures for installing Red Hat Enterprise Linux 7.4 on Cisco UCS C220 M4S and Cisco UCS S3260 Storage Server. The installation uses the KVM console and virtual Media from Cisco UCS Manager.

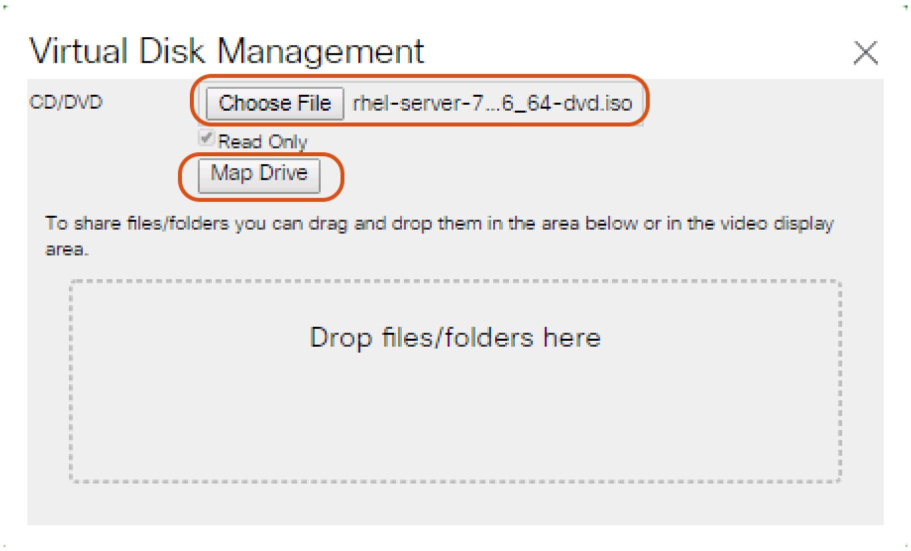
Note: This requires RHEL 7.4 DVD/ISO media for the installation.

Installation of RHEL 7.4 on Cisco UCS C220 M4S and Cisco UCS S3260 M4 Server

To install Red Hat Linux 7.4 operating system on Cisco UCS C220 M4S, complete the following steps:

1. Log in to the Cisco UCS Manager and select the **`Equipment`** tab from the left pane.
2. Go to Equipment > Rack-Mounts > Server > Server 1 (Supervisor) and right-click KVM Console.
3. Launch KVM Console.
4. Click the **`Activate Virtual Devices`** in the Virtual Media tab.
5. In the UCS KVM window, select the Virtual Media tab and then click **`CD/DVD`**.
6. Click Choose File and Browse to the Red Hat Enterprise Linux 7.4 installation ISO image and select then click "**`Map Drive.`**"

Figure 51 Red Hat Enterprise Linux 7.4 ISO image



To share files/folders you can drag and drop them in the area below or in the video display area.

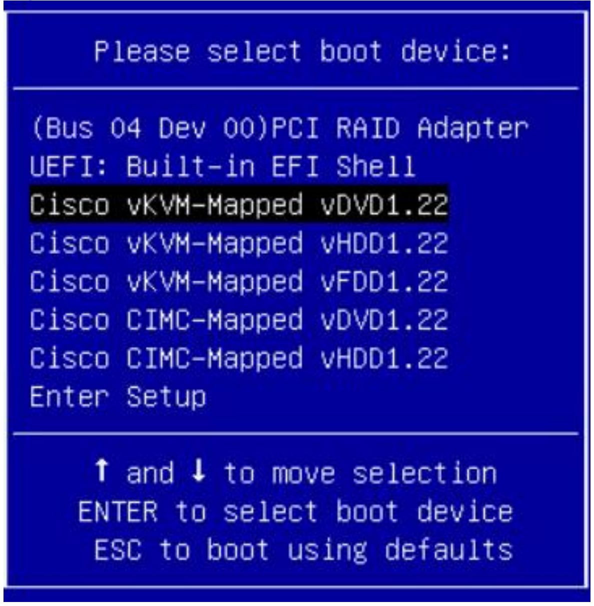
7. In the KVM window, select the **`Macros > Static Macros > Ctrl-Alt-Del`** button in the upper left corner.

8. Click **`OK`** and then click **`OK`** to reboot the system.

9. In the boot screen with the Cisco Logo, press **`F6`** for the boot menu.

10. When the Boot Menu appears, select "**`Cisco vKVM-Mapped vDVD1.22`**"

Figure 52 Boot Menu Selection



```
     Please select boot device:

 (Bus 04 Dev 00)PCI RAID Adapter
 UEFI: Built-in EFI Shell
 Cisco vKVM-Mapped vDVD1.22
 Cisco vKVM-Mapped vHDD1.22
 Cisco vKVM-Mapped vFDD1.22
 Cisco CIMC-Mapped vDVD1.22
 Cisco CIMC-Mapped vHDD1.22
 Enter Setup

     ↑ and ↓ to move selection
   ENTER to select boot device
    ESC to boot using defaults
```

11. When the Red Hat Enterprise Linux 7.4 installer appears, press the Tab button for further configuration options.

12. At the prompt type:

```
inst.ks=ftp://192.168.10.2/Supervisor.cfg net.ifnames=0 biosdevname=0
ip=192.168.10.160::192.168.10.1:255.255.255.0:Supervisor:eth1:none
```

Note: We prepared a Linux Kickstart file with all necessary options for an automatic install. The Kickstart file is located on a server in the same subnet.

Note: The Kickstart file for the Cisco UCS C220 M4S server for Supervisor Node is in Appendix A. This Kickstart file for the Cisco UCS S3260 M4 Server for Storage Noes is in Appendix B.

13. Repeat these steps to install RHEL7.4 on all the UCS S3260 M4 storage servers.

Preparation of all Nodes for Scality RING Installation

Before installing Scality RING, make sure you prepare all nodes with certain configurations.

A summary of the prerequisites for the entire installation with the appropriate changes to the current environment is listed below.

Step 1 - Configuring Network Time Protocol

In our Kickstart installation file, a time server is included. To enable Network Time Protocol on all servers and configure them to use the same source, complete the following steps:

1. Install NTP on all servers:

```
# yum –y install ntp

# for i in {1..12}; do ssh storage-node{i} ‘yum –y install ntp’; done
```

2. Configure /etc/ntp.conf on Supervisor node only with the following contents:

```
# vi /etc/ntp.conf

driftfile /var/lib/ntp/drift

restrict 127.0.0.1

restrict -6 ::1

server 192.168.10.2

fudge 192.168.10.2 stratum 10

includefile /etc/ntp/crypto/pw

keys /etc/ntp/keys
```

3. Start the ntpd daemon on Supervisor Node:

```
# systemctl enable ntpd

# systemctl start ntpd

# systemctl status ntpd
```

4. Copy ntp.conf from Supervisor node to all the Storage nodes:

```
# cd /etc/
# for i in {1..12}; do ssh storage-node{i} ‘scp supervisor:/etc/ntp.conf /etc/’;
done
```

5. Restart the ntpd daemon on all the storage nodes:

```
# for i in {1..12}; do ssh storage-node{i} ‘systemctl enable ntpd; done

# for i in {1..12}; do ssh storage-node{i} ‘systemctl start ntpd; done

# for i in {1..12}; do ssh storage-node{i} ‘systemctl status ntpd; done
```

Scality RING Installation

This sections details how to install Scality RING.

To install Scality RING, complete the following steps:

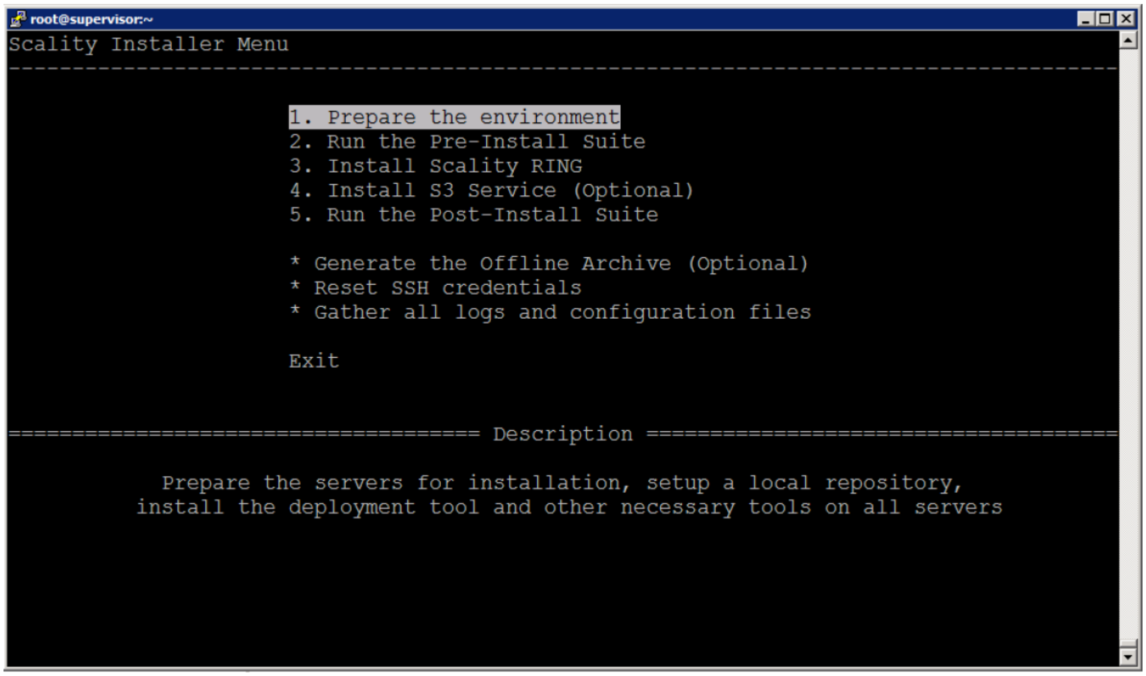
1. Prepare the Environment:

   Download the Scality S3 offline installer from packages.scality.com. For getting access to the above website, please contact your Scality representative. Scality 7.4.0.2 was downloaded for this CVD.

```
[root@supervisor ~]#  sh < scality-ring-run file > --description-
file=CiscoSizing.csv.
```

Note: For details on the sizing file, please contact Scality.

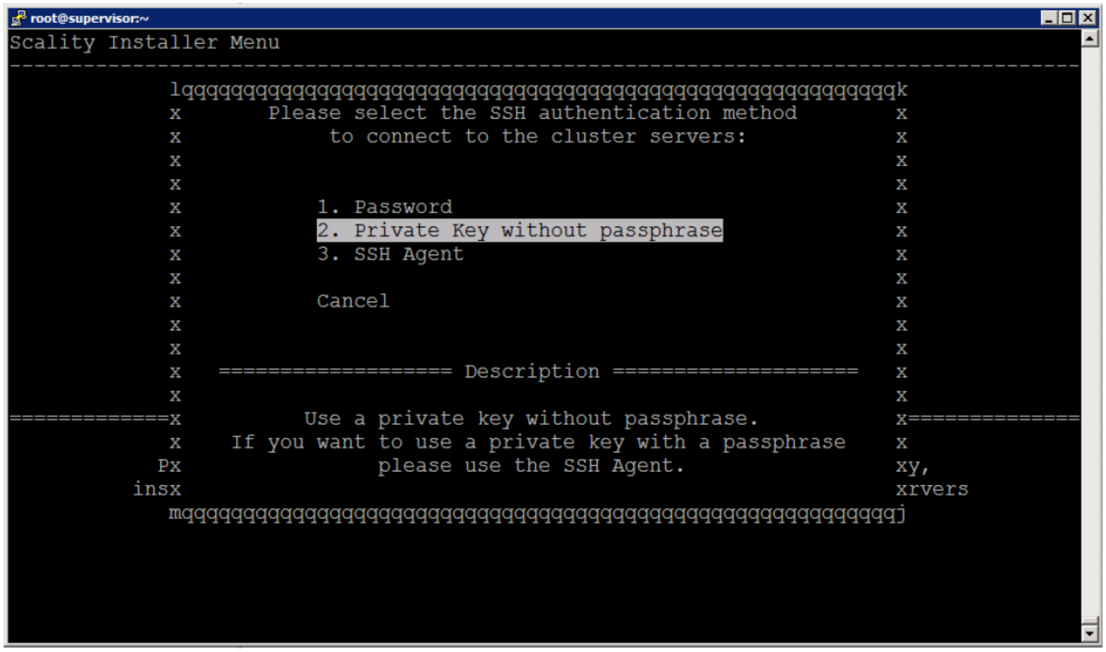
```
Extracting archive content to /srv/scality

Run /srv/scality/bin/launcher --description-file /root/CiscoSizing.csv

From the Scality Installer Menu, select option1, “Prepare the environment”
and press Enter.
```



```
Scality Installer Menu
--------------------------------------------------------------------------------

                    1. Prepare the environment
                    2. Run the Pre-Install Suite
                    3. Install Scality RING
                    4. Install S3 Service (Optional)
                    5. Run the Post-Install Suite

                    * Generate the Offline Archive (Optional)
                    * Reset SSH credentials
                    * Gather all logs and configuration files

                    Exit

===================================== Description =====================================

           Prepare the servers for installation, setup a local repository,
         install the deployment tool and other necessary tools on all servers
```

2. Select the SSH authentication method to connect to the Scality Cluster servers:

   a. Choose Option 2, "Private Key without passphrase" and press Enter.

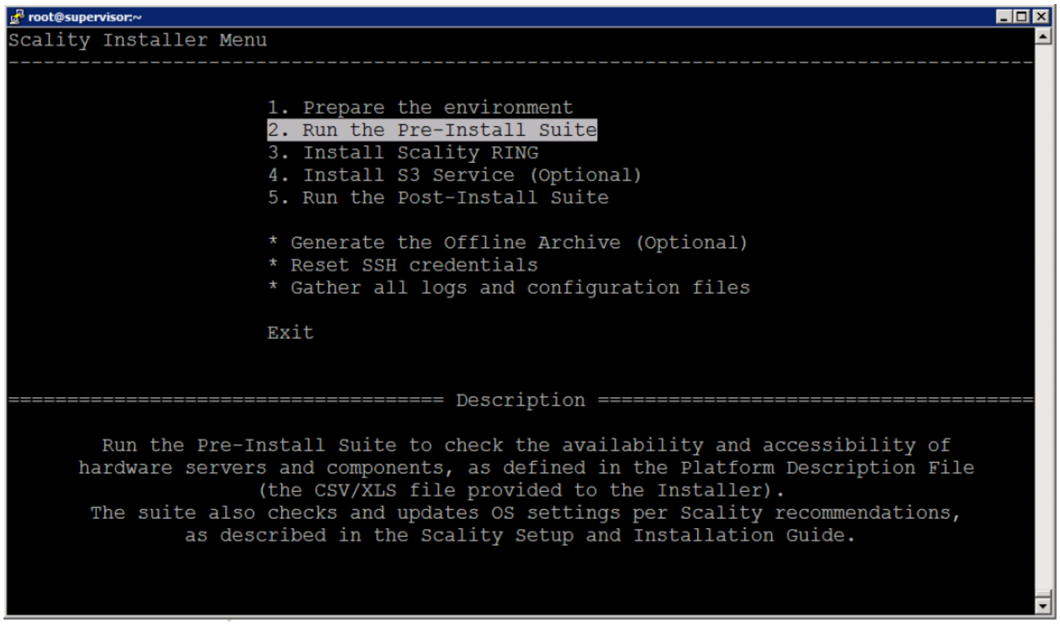


```
Scality Installer Menu
------------------------------------------------------------------------------
            lqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqk
            x       Please select the SSH authentication method        x
            x            to connect to the cluster servers:            x
            x                                                          x
            x                                                          x
            x           1. Password                                    x
            x           2. Private Key without passphrase              x
            x           3. SSH Agent                                   x
            x                                                          x
            x           Cancel                                         x
            x                                                          x
            x                                                          x
            x   =================== Description ====================   x
            x                                                          x
=============x        Use a private key without passphrase.           x==============
            x     If you want to use a private key with a passphrase   x
           Px               please use the SSH Agent.                  xy,
         insx                                                          xrvers
            mqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqqj
```

   b. The next two screens from installer will prompt for password and the SSH key; leave blank and use the default for the "root" password and use the default one for "/root/.ssh/id_rsa" SSH key and press enter.

   c. For admin users, the Scality Supervisor UI requires a password. Choose option1, to "Enter a password". A prompt will appear, enter a password and confirm it.

   d. Run Pre-Install Suite; from the Scality Installer Menu, select option2, "Run the Pre-Install Suite" and press Enter.



```
Scality Installer Menu
------------------------------------------------------------------------------

                     1. Prepare the environment
                     2. Run the Pre-Install Suite
                     3. Install Scality RING
                     4. Install S3 Service (Optional)
                     5. Run the Post-Install Suite

                     * Generate the Offline Archive (Optional)
                     * Reset SSH credentials
                     * Gather all logs and configuration files

                     Exit


==================================== Description ===================================

      Run the Pre-Install Suite to check the availability and accessibility of
    hardware servers and components, as defined in the Platform Description File
                   (the CSV/XLS file provided to the Installer).
     The suite also checks and updates OS settings per Scality recommendations,
             as described in the Scality Setup and Installation Guide.
```

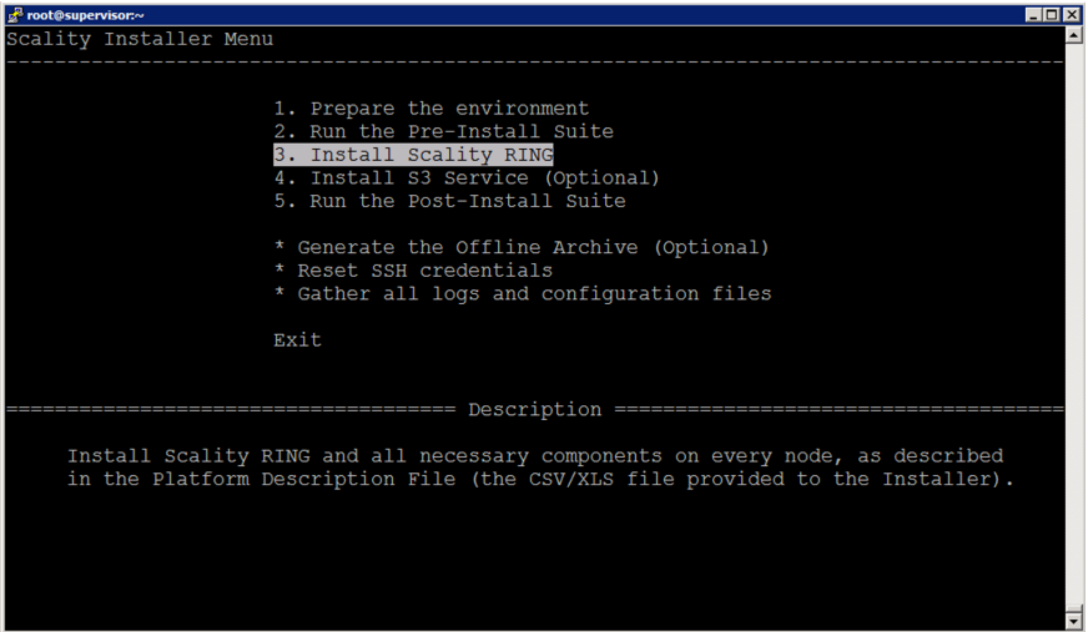
```
Loading the platform description file '/root/CiscoSizing.csv'... OK

Using private key '/root/.ssh/id_rsa'.
```

```
Extracting platform description data... OK

Generating the salt roster file... OK

Preparing and testing SSH connection on every machine... OK

Performing server OS version correspondence check... OK

Generating the pillars for the install... OK

Installing scality-setup-httpd on '192.168.10.150'... OK

Setting up the new repository definitions on every machine... OK

Configuring logging on '192.168.10.150'... OK

Configuring Scality SSH on every machine... OK

Installing sreport on every machine... OK

Installing salt-master on 'supervisor'... OK

Installing salt-minion on every machine... OK

Accepting minion key(s) on the master instance... OK

Syncing configuration on every machine... OK

Installing and configuring scaldisk on every machine... OK

Preparing disks for installation... OK

Restoring repositories on every machine... OK


-- Bootstrap step successful, duration: 0:02:38.990523 --

[2018-06-06 15:29:50-07:00] The bootstrap step finished successfully

Press [Enter] to return to the menu or [Ctrl]+c to exit the installer
```

Note: Critical errors prompted by the pre-install suite, should preferably be addressed before proceeding to the RING Install.

3. Install Scality RING:

   a. From the Scality Installer Menu, select option3, "Install Scality RING" and press Enter.



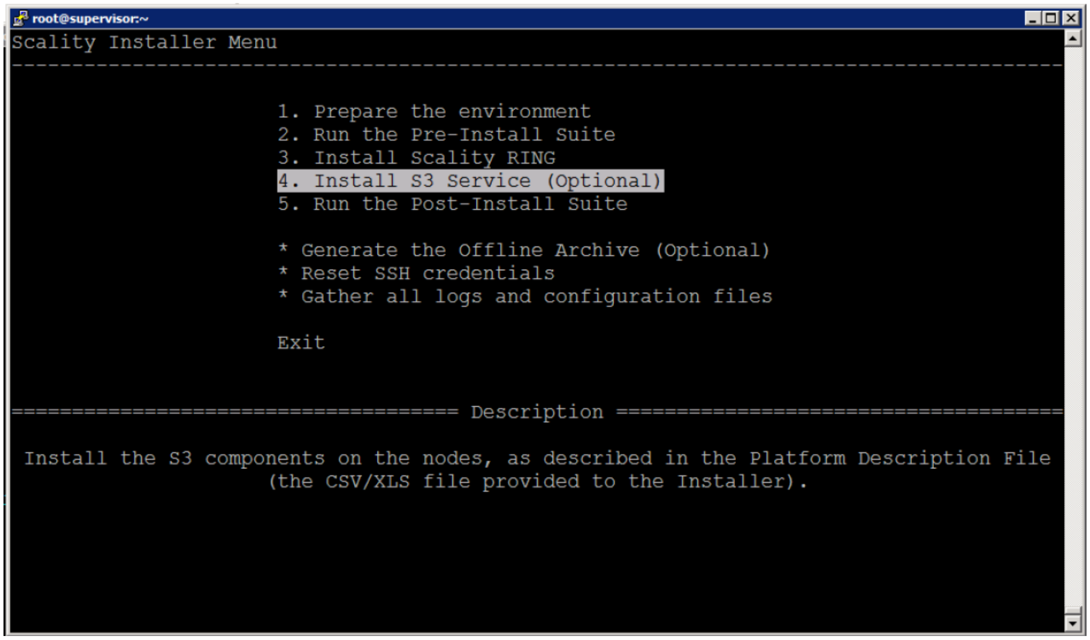
```
Scality Installer Menu
--------------------------------------------------------------------------------

                    1. Prepare the environment
                    2. Run the Pre-Install Suite
                    3. Install Scality RING
                    4. Install S3 Service (Optional)
                    5. Run the Post-Install Suite

                    * Generate the Offline Archive (Optional)
                    * Reset SSH credentials
                    * Gather all logs and configuration files

                    Exit

================================== Description ==================================

     Install Scality RING and all necessary components on every node, as described
     in the Platform Description File (the CSV/XLS file provided to the Installer).
```

```
[2018-06-06 15:43:38,288] INFO     - Launching install, this might take some time

[2018-06-06 15:43:38-07:00] <roles> Clear the cache and sync modules, grains and pillar
... OK

[2018-06-06 15:43:44-07:00] <roles> Ensure grains is deleted everywhere ... OK

[2018-06-06 15:43:47-07:00] <roles> Check storage nodes minions matcher ... OK

[2018-06-06 15:43:47-07:00] <roles> Setup the group for storage nodes ... OK

[2018-06-06 15:43:48-07:00] <roles> Setup supervisor role ... OK

[2018-06-06 15:43:49-07:00] <roles> Setup storage nodes role ... OK

[2018-06-06 15:43:51-07:00] <roles> Setup Elastic Search cluster role ... OK

[2018-06-06 15:43:54-07:00] <roles> Advertise elasticsearch cluster ... OK

[2018-06-06 15:43:56-07:00] <roles> Setup the group for S3 connectors ... OK

[2018-06-06 15:43:57-07:00] <roles> Setup S3 role ... OK

[2018-06-06 15:44:03-07:00] <roles> Setup the group for NFS connectors ... OK

[2018-06-06 15:44:04-07:00] <roles> Setup NFS role ... OK

[2018-06-06 15:44:07-07:00] <setup> Start scality-setup-httpd ... OK

[2018-06-06 15:44:12-07:00] <setup> Install python-scality ... OK

[2018-06-06 15:44:20-07:00] <setup> Install python-scaldisk ... OK

[2018-06-06 15:44:26-07:00] <setup> Install sreport ... OK

[2018-06-06 15:44:34-07:00] <setup> Detect the disks ... OK
```

```
[2018-06-06 15:44:35-07:00] <setup> Publish disks infos ... OK

[2018-06-06 15:44:37-07:00] <sup> Install and configure supervisor ... OK

[2018-06-06 15:46:57-07:00] <sup> Install ringsh ... OK

[2018-06-06 15:47:07-07:00] <rings> Spread rings membership ... OK

[2018-06-06 15:47:10-07:00] <rings> Configure the rings on the supervisor ... OK

[2018-06-06 15:47:47-07:00] <elastic> Install and configure cluster elasticsearch ...
OK

[2018-06-06 15:48:12-07:00] <supapi> Configure the supapi service ... OK

[2018-06-06 15:48:24-07:00] <supapi> Install the cloud monitoring service ... OK

[2018-06-06 15:49:41-07:00] <disks> Partition and format disks ... OK

[2018-06-06 15:59:14-07:00] <disks> Mount all disks ... OK

[2018-06-06 16:50:31-07:00] <nodes> Install and configure storage nodes ... OK

[2018-06-06 16:52:50-07:00] <keyspace> Compute the keyspace ... OK

[2018-06-06 16:53:07-07:00] <keyspace> Spread the keyspace to storage nodes ... OK

[2018-06-06 16:53:12-07:00] <keyspace> Make storage nodes join rings ... OK

[2018-06-06 16:53:22-07:00] <conns> Install NFS connectors ... OK

[2018-06-06 16:54:10-07:00] <conns> Install S3 connectors ... OK

[2018-06-06 16:54:44-07:00] <post> Install external tools ... OK

[2018-06-06 16:54:57-07:00] <exit> Removing the credentials ... OK

[2018-06-06 16:54:59-07:00] <exit> Restoring repositories definitions


Press [Enter] to return to the menu or [Ctrl]+c to exit the installer
```

4. Installing S3 Service Connectors:

   a. From the Scality Installer Menu, select option4, "Install S3 Service(optional)" and press Enter.

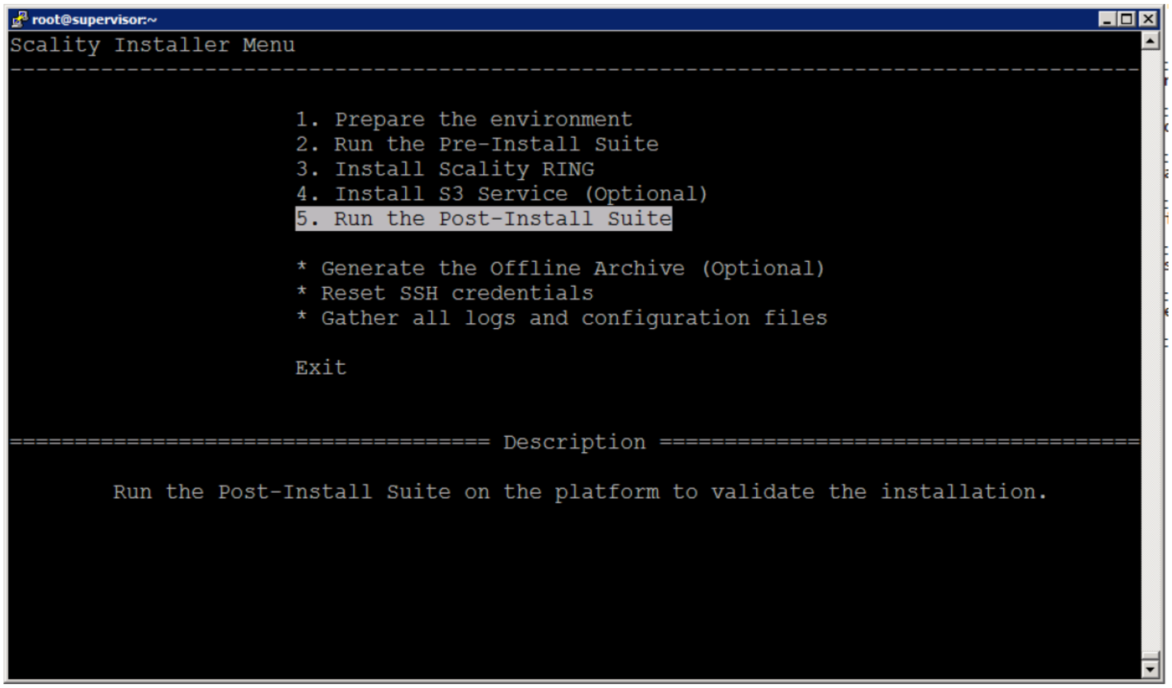


```
Scality Installer Menu
------------------------------------------------------------------------------------------

                      1. Prepare the environment
                      2. Run the Pre-Install Suite
                      3. Install Scality RING
                      4. Install S3 Service (Optional)
                      5. Run the Post-Install Suite

                      * Generate the Offline Archive (Optional)
                      * Reset SSH credentials
                      * Gather all logs and configuration files

                      Exit


===================================== Description =====================================

 Install the S3 components on the nodes, as described in the Platform Description File
                    (the CSV/XLS file provided to the Installer).
```

```
[2018-06-06 17:24:49-07:00] Searching s3 offline archive file ... OK
[2018-06-06 17:24:49-07:00] Extracting s3 offline archive ... OK
s3 installation's detail is found in /srv/scality/s3/s3-offline/federation/ansible.log
[2018-06-06 17:29:51-07:00] Creating s3 playbook from description file ... OK
[2018-06-06 17:29:56-07:00] Generating vault environment configuration ... OK
[2018-06-06 17:30:03-07:00] Running s3 ansible playbook to install the s3 connector ...
OK
[2018-06-06 17:41:08-07:00] Setup identisee credentials ... OK
s3 connector successfully installed
[2018-06-06 17:41:11-07:00] The s3 step finished successfully

Press [Enter] to return to the menu or [Ctrl]+c to exit the installer
```

5. Run the Post-Installer Suite:

   a. From the Scality Installer Menu, select option5, “Run the Post-Installer” and press Enter.



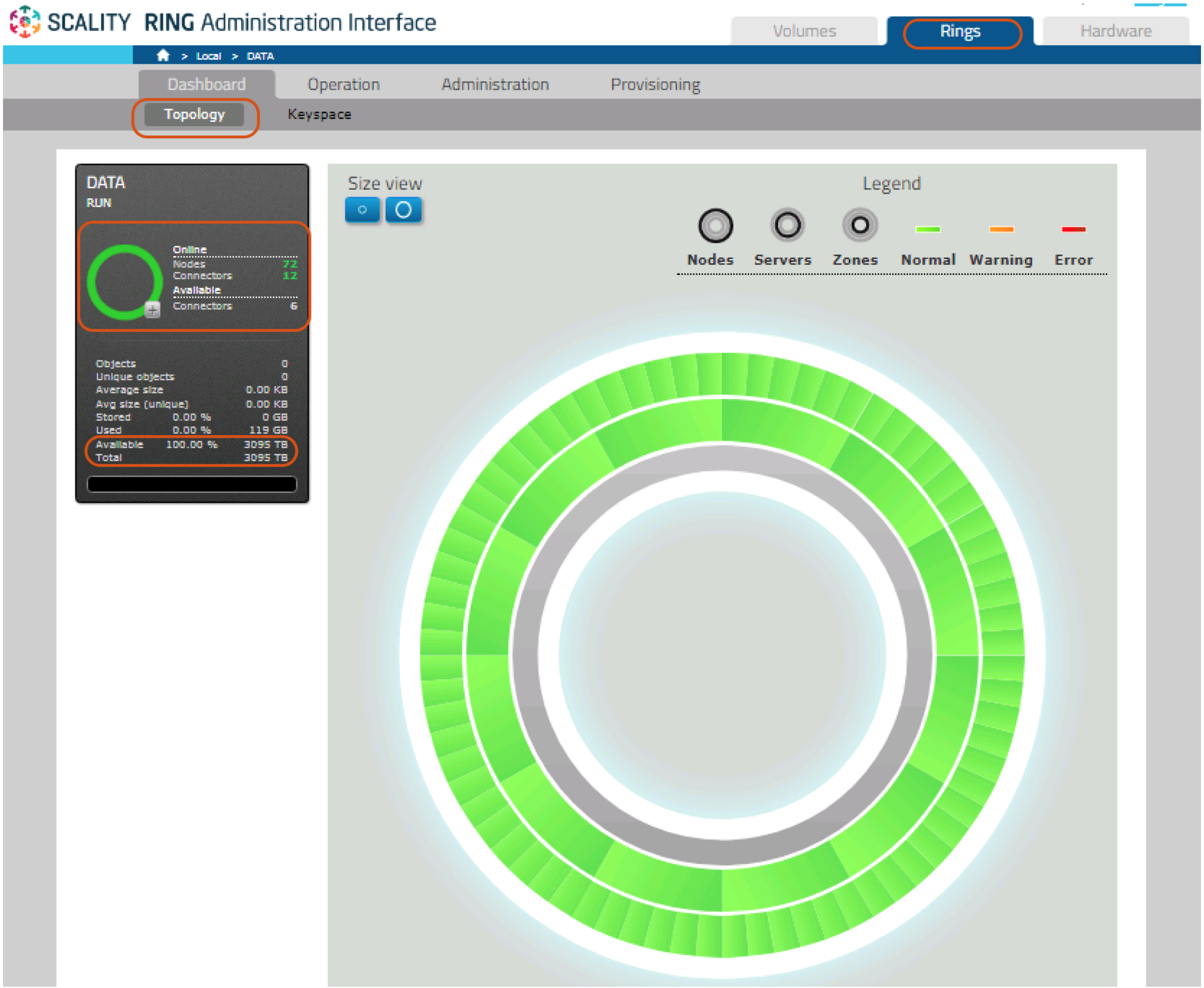
```
root@supervisor:~
Scality Installer Menu
--------------------------------------------------------------------------------

                    1. Prepare the environment
                    2. Run the Pre-Install Suite
                    3. Install Scality RING
                    4. Install S3 Service (Optional)
                    5. Run the Post-Install Suite

                    * Generate the Offline Archive (Optional)
                    * Reset SSH credentials
                    * Gather all logs and configuration files

                    Exit

==================================== Description ====================================

       Run the Post-Install Suite on the platform to validate the installation.
```

```
Script installation detail is found in /var/log/postinstall_launcher.log
[2018-06-07 15:30:49-07:00] Setting up the new repositories definitions on every ma-
chine ... OK
[2018-06-07 15:30:56-07:00] Installing the postinstallchecks ... OK
Running the postinstallchecks
Running script using salt
Starting checks on supervisor,storage-node11,storage-node10,storage-node12,storage-
node9,storage-node8,storage-node5,storage-node4,storage-node7,storage-node6,storage-
node1,storage-node3,storage-node2
Checking if server is handled by salt
Checking missing pillars
Gathering info from servers (salt mine.send) for consistency check later
Running tests
The result is found in: /root/post-install-checks-results.tgz
[2018-06-07 15:36:04-07:00] The postinstall step finished successfully

Press [Enter] to return to the menu or [Ctrl]+c to exit the installer
```

Validate Scality RING and S3 Installation

1. Launch Supervisor UI "http://192.168.10.164/sup/local" and logon as "admin" user.

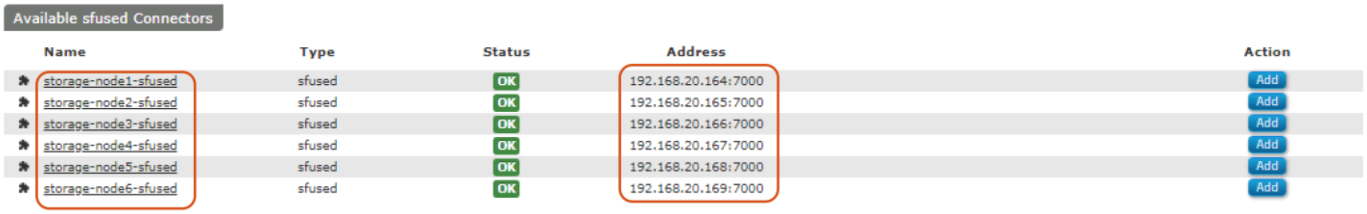
2. From the UI, click Rings > Dashboard > Topology. Make sure the DATA RING and META RING is operational without any errors.



```
DATA
RUN

Online
Nodes                        72
Connectors                   12
Available
Connectors                    6

Objects                        0
Unique objects                 0
Average size             0.00 KB
Avg size (unique)        0.00 KB
Stored       0.00 %         0 GB
Used         0.00 %       119 GB
Available  100.00 %      3095 TB
Total                    3095 TB
```

3. Make sure the NFS connectors are installed on 6 Storage nodes.

4. From the UI, click Rings > Operations > Connectors.


Available sfused Connectors

Name	Type	Status	Address	Action
storage-node1-sfused	sfused	OK	192.168.20.164:7000	Add
storage-node2-sfused	sfused	OK	192.168.20.165:7000	Add
storage-node3-sfused	sfused	OK	192.168.20.166:7000	Add
storage-node4-sfused	sfused	OK	192.168.20.167:7000	Add
storage-node5-sfused	sfused	OK	192.168.20.168:7000	Add
storage-node6-sfused	sfused	OK	192.168.20.169:7000	Add

5. Make sure the S3 Connectors are installed on 5 storage nodes as described in the CiscoSizing.csv file:

```
[root@supervisor ~]# for i in `seq 1 5`; do  ssh storage-node$i "docker ps |grep scali-
ty-frontend-logger" ; done
```

```
e6764842d3ae        scality/s3:7.4.0.2                "/scality-bin/logr..."   12
minutes ago        Up 12 minutes                             scality-frontend-logger

ebec58df2d95        scality/s3:7.4.0.2                "/scality-bin/logr..."   12
minutes ago        Up 12 minutes                             scality-frontend-logger

f0c96d538497        scality/s3:7.4.0.2                "/scality-bin/logr..."   12
minutes ago        Up 12 minutes                          scality-frontend-logger

07ebb086a97f        scality/s3:7.4.0.2                "/scality-bin/logr..."   12
minutes ago        Up 12 minutes                          scality-frontend-logger

3b48b98f71f8        scality/s3:7.4.0.2                "/scality-bin/logr..."   12
minutes ago        Up 12 minutes                        scality-frontend-logger

 [root@supervisor ~]#
```

Note: In this solution, we have performed the performance testing and Failover testing with 12 S3 connectors. In case you need additional S3 connectors, follow the steps below.

Installing 7 Additional S3 Connectors

1. Logon to Supervisor node, then Append the ROLE_S3 to all the storage nodes. Run this command:

   [root@supervisor ~]# salt -G 'roles:ROLE_STORE' grains.append roles ROLE_S3

   ```
   storage-node4:

       The val ROLE_S3 was already in the list roles

   storage-node5:

       The val ROLE_S3 was already in the list roles

   storage-node1:

       The val ROLE_S3 was already in the list roles

   storage-node3:

       The val ROLE_S3 was already in the list roles

   storage-node2:

       The val ROLE_S3 was already in the list roles



   [root@supervisor ~]#
   ```

2. Make a copy of the current env:

   cp -r /srv/scality/s3/s3-offline/federation/env/s3config /srv/scality/s3/s3-offline/federation/env/s3config.org

3. Make the necessary edits to the inventory file to defines the stateless connectors:

4. The following are five S3 connectors configured based on the “CiscoSizing.csv” description file.

```
[root@supervisor]# vi /srv/scality/s3/s3-offline/federation/env/s3config
# Here you can assign IP/hostname to the clusters members
# They should start by md[1-5] or wsb[1-5] and be followed by -clusterX
md1-cluster1 ansible_host=192.168.10.173
md2-cluster1 ansible_host=192.168.10.171
md3-cluster1 ansible_host=192.168.10.174
md4-cluster1 ansible_host=192.168.10.170
md5-cluster1 ansible_host=192.168.10.172

# Here you specify which server will run a S3 connector.
[runners_s3]
# Decoupled deployment
# You can add as many servers as you need
md1-cluster1
md2-cluster1
md3-cluster1
md4-cluster1
md5-cluster1
```

5. Add remaining 7 S3 connectors on the S3config file.

Below is the inventory file after adding 7 more S3 connectors:

```
# Here you can assign IP/hostname to the clusters members
# They should start by md[1-5] or wsb[1-5] and be followed by -clusterX
md1-cluster1 ansible_host=192.168.10.173
md2-cluster1 ansible_host=192.168.10.171
md3-cluster1 ansible_host=192.168.10.174
md4-cluster1 ansible_host=192.168.10.170
md5-cluster1 ansible_host=192.168.10.172
conn1-cluster1 ansible_host=192.168.10.164
```

```
conn2-cluster1 ansible_host=192.168.10.165

conn3-cluster1 ansible_host=192.168.10.166

conn4-cluster1 ansible_host=192.168.10.167

conn5-cluster1 ansible_host=192.168.10.168

conn6-cluster1 ansible_host=192.168.10.169

conn7-cluster1 ansible_host=192.168.10.175


# Here you specify which server will run a S3 connector.

[runners_s3]

# Decoupled deployment

# You can add as many servers as you need

md1-cluster1

md2-cluster1

md3-cluster1

md4-cluster1

md5-cluster1

conn1-cluster1

conn2-cluster1

conn3-cluster1

conn4-cluster1

conn5-cluster1

conn6-cluster1

conn7-cluster1
```

6. Rerun federation to install S3 connectors on remaining Nodes:

```
[root@supervisor]# cd /srv/scality/s3/s3-offline/federation

[root@supervisor federation]# ./ansible-playbook -i env/s3config/inventory run.yml -
l conn*
```

7. To validate additional S3 connectors installed on the Scality RING:

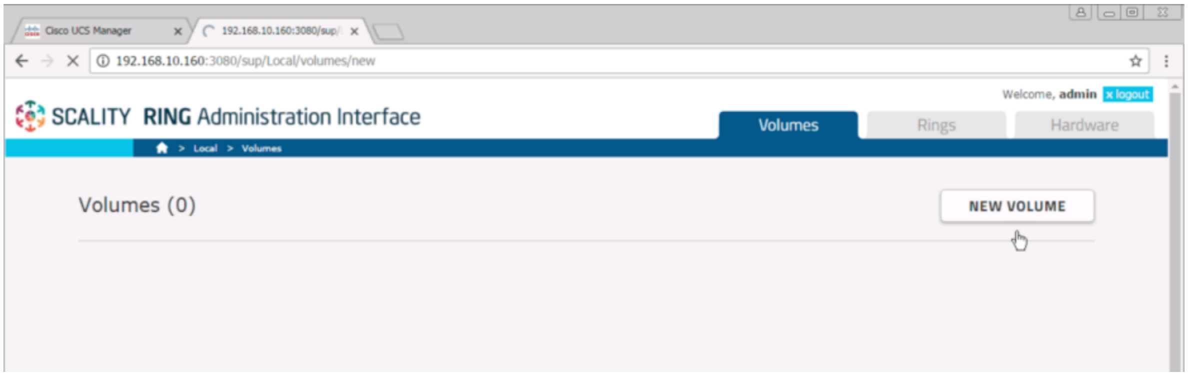
```
[root@supervisor ~]# for i in `seq 1 12`; do  ssh storage-node$i "docker ps |grep
scality-frontend-logger" ; done

fd1b475a8bbd        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

ae4549057f61        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

f3cf7b30f01b        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

0bd56ac633c7        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

398a088a93b8        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

72144c92852a        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

e6764842d3ae        scality/s3:7.4.0.2                "/scality-bin/logr..."   39
minutes ago         Up 39 minutes                            scality-frontend-logger

ebec58df2d95        scality/s3:7.4.0.2                "/scality-bin/logr..."   39
minutes ago         Up 39 minutes                            scality-frontend-logger

f0c96d538497        scality/s3:7.4.0.2                "/scality-bin/logr..."   39
minutes ago         Up 39 minutes                            scality-frontend-logger

07ebb086a97f        scality/s3:7.4.0.2                "/scality-bin/logr..."   39
minutes ago         Up 39 minutes                            scality-frontend-logger

3b48b98f71f8        scality/s3:7.4.0.2                "/scality-bin/logr..."   39
minutes ago         Up 39 minutes                            scality-frontend-logger

1638b53d51e0        scality/s3:7.4.0.2                "/scality-bin/logr..."   14
minutes ago       Up 14 minutes                          scality-frontend-logger

[root@supervisor ~]#
```

Validation

Functional Testing of NFS Connectors

This section details how to create Volumes and configure the NFS exports and perform functional testing of those exports.

1. Click the "Volumes" tab in the supervisor GUI, then click on "NEW VOLUME":



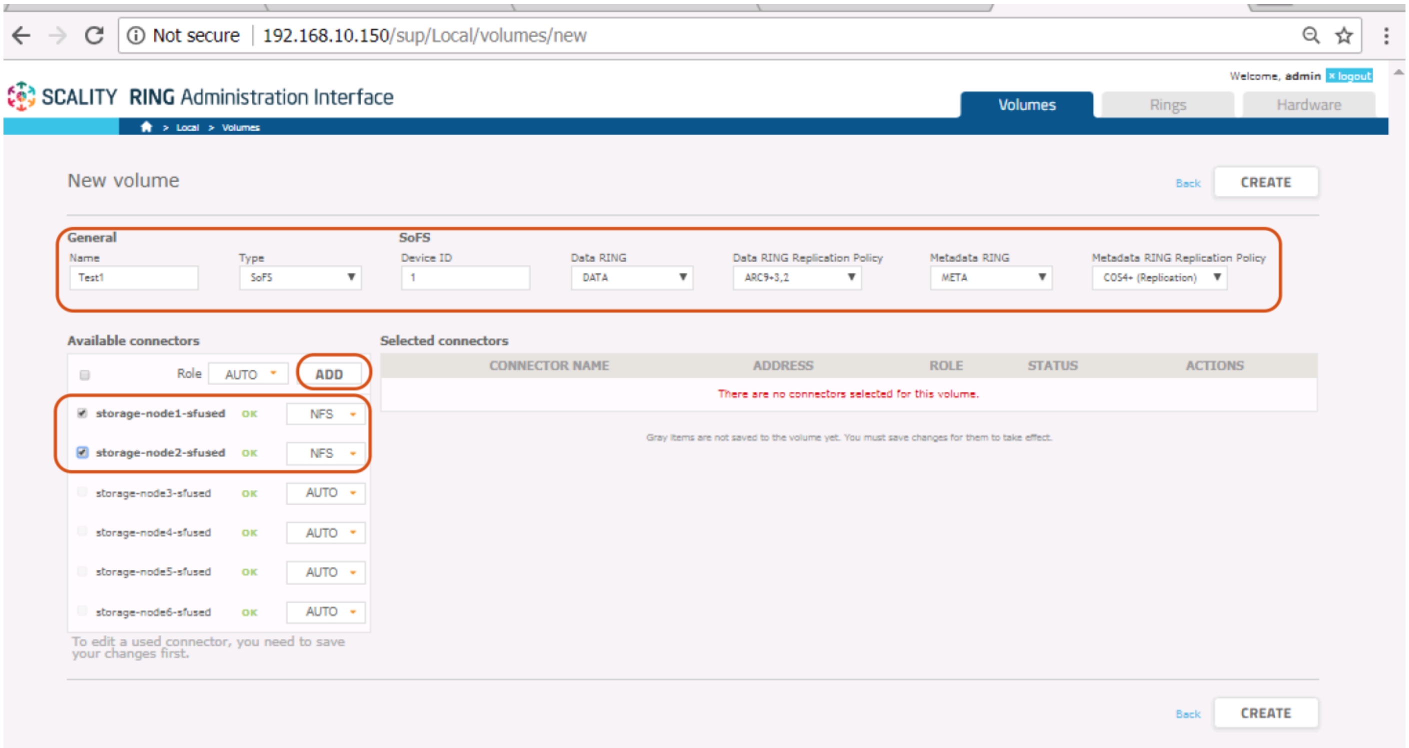
2. Select all available connectors and fill in the appropriate fields:

   Name: Test1
   Type: SoFS
   Device ID: 1
   Data RING: DATA
   Data RING Replication Policy: ARC 9+3
   Metadata RING: META
   Metadata RING Replication Policy: COS 4+ (Replication)

   a. Click Create.

   b. Under Available Connectors select NFS connectors "storage-node1-sfused" and "storage-node2-sfused."

   c. Select Role as "NFS" and click ADD.



Not secure | 192.168.10.150/sup/Local/volumes/new

SCALITY RING Administration Interface

Welcome, admin × logout

Volumes | Rings | Hardware

Local > Volumes

New volume

Back CREATE

General

Name: Test1

Type: SoFS

SoFS

Device ID: 1

Data RING: DATA

Data RING Replication Policy: ARC9+3,2

Metadata RING: META

Metadata RING Replication Policy: COS4+ (Replication)

Available connectors

□	Role: AUTO	ADD
☑ storage-node1-sfused	OK	NFS
☑ storage-node2-sfused	OK	NFS
□ storage-node3-sfused	OK	AUTO
□ storage-node4-sfused	OK	AUTO
□ storage-node5-sfused	OK	AUTO
□ storage-node6-sfused	OK	AUTO

To edit a used connector, you need to save your changes first.

Selected connectors

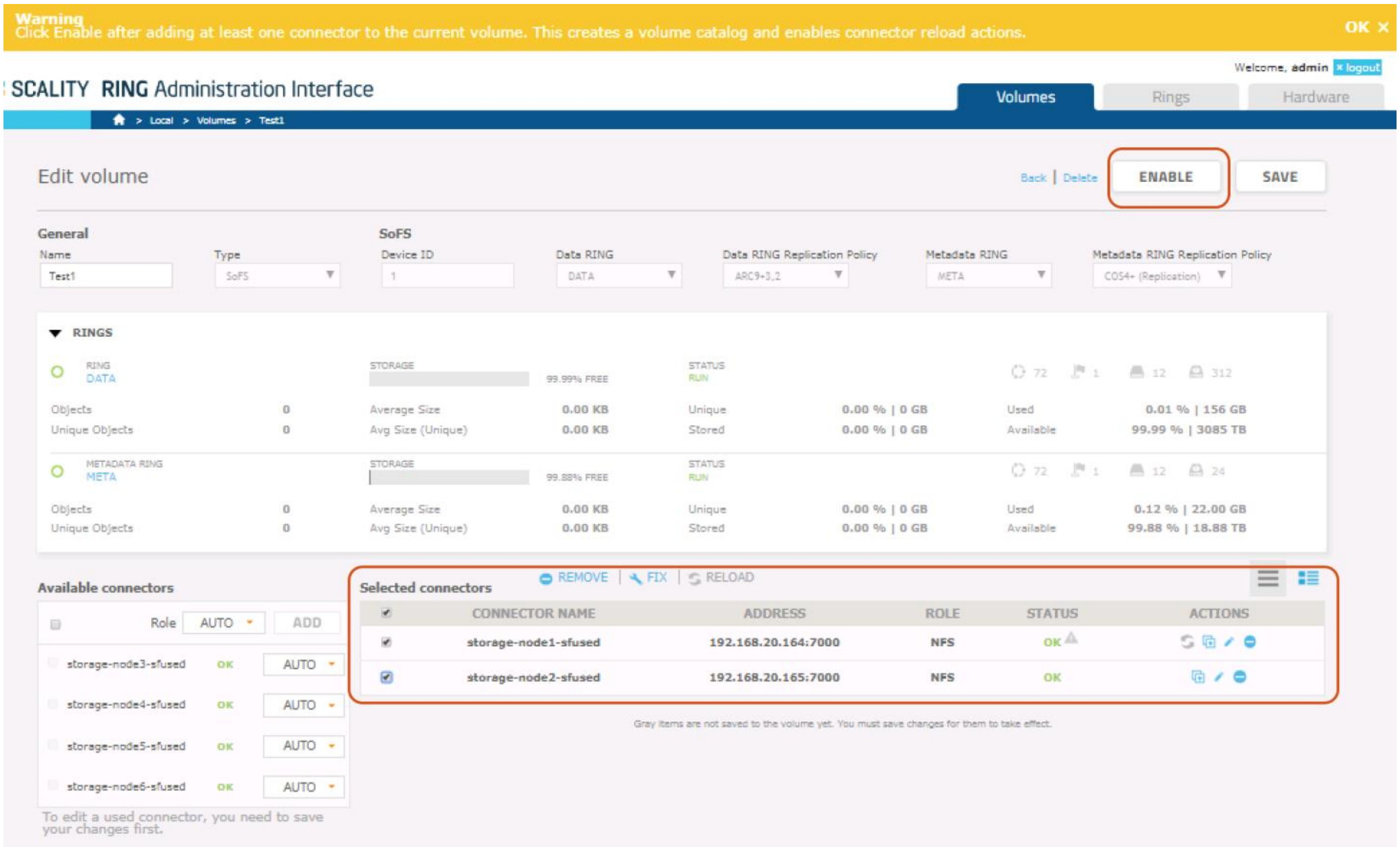
CONNECTOR NAME	ADDRESS	ROLE	STATUS	ACTIONS

There are no connectors selected for this volume.

Gray items are not saved to the volume yet. You must save changes for them to take effect.

Back CREATE

3. Verify that the ROLE of each NFS connector is set to "NFS" and click "Enable."



Warning
Click Enable after adding at least one connector to the current volume. This creates a volume catalog and enables connector reload actions. OK ×

SCALITY RING Administration Interface

Welcome, admin × logout

Volumes | Rings | Hardware

Local > Volumes > Test1

Edit volume

Back | Delete ENABLE SAVE

General

Name: Test1

Type: SoFS

SoFS

Device ID: 1

Data RING: DATA

Data RING Replication Policy: ARC9+3,2

Metadata RING: META

Metadata RING Replication Policy: COS4+ (Replication)

RINGS

RING DATA — STORAGE 99.99% FREE — STATUS RUN — 72 | 1 | 12 | 312

Objects	0	Average Size	0.00 KB	Unique	0.00 % | 0 GB	Used	0.01 % | 156 GB
Unique Objects	0	Avg Size (Unique)	0.00 KB	Stored	0.00 % | 0 GB	Available	99.99 % | 3085 TB

METADATA RING META — STORAGE 99.88% FREE — STATUS RUN — 72 | 1 | 12 | 24

Objects	0	Average Size	0.00 KB	Unique	0.00 % | 0 GB	Used	0.12 % | 22.00 GB
Unique Objects	0	Avg Size (Unique)	0.00 KB	Stored	0.00 % | 0 GB	Available	99.88 % | 18.88 TB

Available connectors

□	Role: AUTO	ADD
□ storage-node3-sfused	OK	AUTO
□ storage-node4-sfused	OK	AUTO
□ storage-node5-sfused	OK	AUTO
□ storage-node6-sfused	OK	AUTO

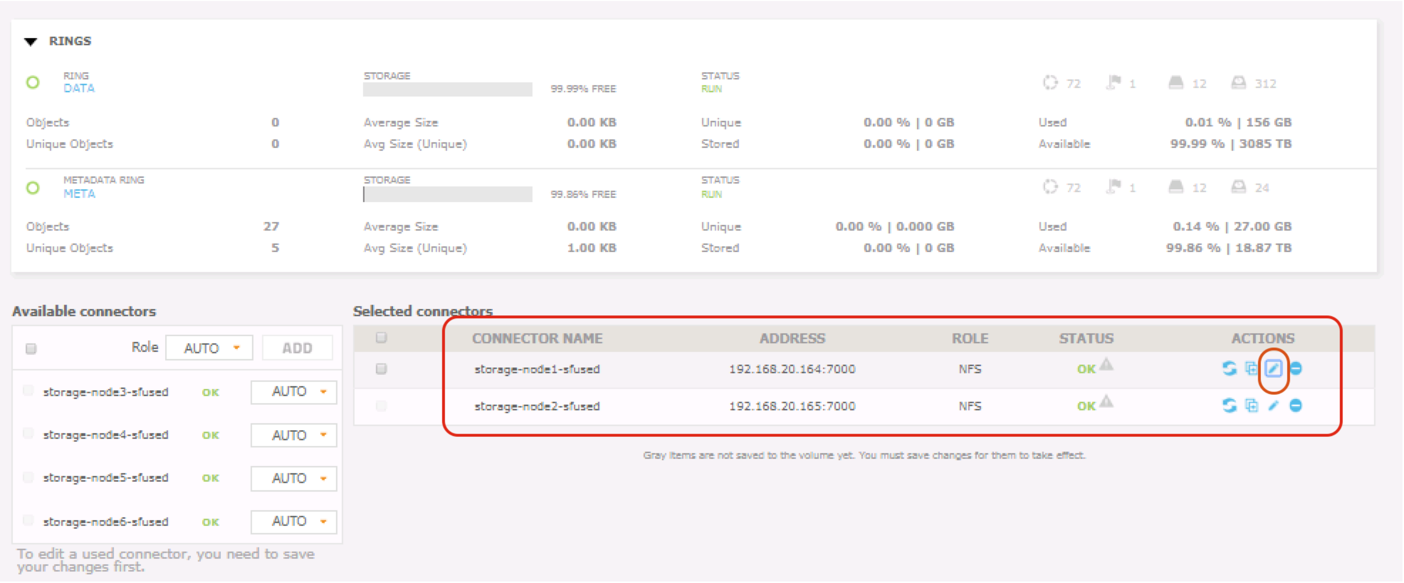
To edit a used connector, you need to save your changes first.

Selected connectors REMOVE | FIX | RELOAD

☑	CONNECTOR NAME	ADDRESS	ROLE	STATUS	ACTIONS
☑	storage-node1-sfused	192.168.20.164:7000	NFS	OK	
☑	storage-node2-sfused	192.168.20.165:7000	NFS	OK	

Gray items are not saved to the volume yet. You must save changes for them to take effect.

4. To create exports, click "Edit NFS" option from ACTIONS as shown below:



▼ RINGS

RING
DATA

STORAGE	99.99% FREE	STATUS RUN		72	1	12	312
Objects	0	Average Size	0.00 KB	Unique	0.00 % | 0 GB	Used	0.01 % | 156 GB
Unique Objects	0	Avg Size (Unique)	0.00 KB	Stored	0.00 % | 0 GB	Available	99.99 % | 3085 TB

METADATA RING
META

STORAGE	99.86% FREE	STATUS RUN		72	1	12	24
Objects	27	Average Size	0.00 KB	Unique	0.00 % | 0.000 GB	Used	0.14 % | 27.00 GB
Unique Objects	5	Avg Size (Unique)	1.00 KB	Stored	0.00 % | 0 GB	Available	99.86 % | 18.87 TB

Available connectors

□	Role	AUTO ▾	ADD
□	storage-node3-sfused	OK	AUTO ▾
□	storage-node4-sfused	OK	AUTO ▾
□	storage-node5-sfused	OK	AUTO ▾
□	storage-node6-sfused	OK	AUTO ▾

To edit a used connector, you need to save your changes first.

Selected connectors

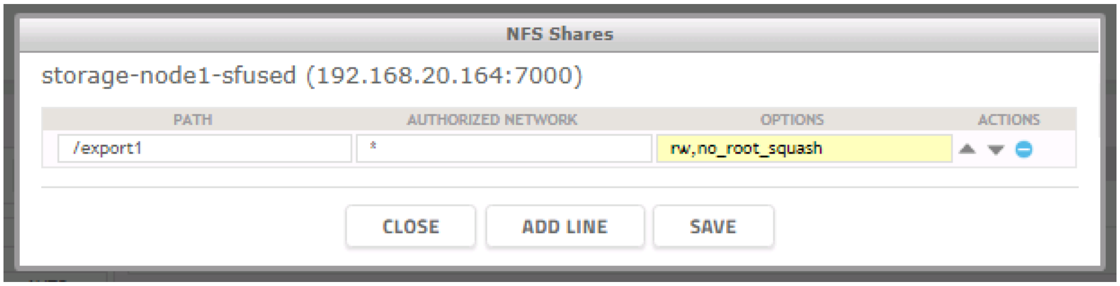
□	CONNECTOR NAME	ADDRESS	ROLE	STATUS	ACTIONS
□	storage-node1-sfused	192.168.20.164:7000	NFS	OK	
□	storage-node2-sfused	192.168.20.165:7000	NFS	OK	

Gray items are not saved to the volume yet. You must save changes for them to take effect.

5. Click the Edit action (identified by the symbol of a pencil) for each connector and fill in the export details.

    a. Provide the path as "export1" and provide RW credentials under options as shown below.

    b. Click Save.



NFS Shares

storage-node1-sfused (192.168.20.164:7000)

PATH	AUTHORIZED NETWORK	OPTIONS	ACTIONS
/export1	*	rw,no_root_squash	

6. Create a NFS export for "storage-node2-sfused" as export2.

7. When the NFS Shares are created, click "SAVE" and then click "Enable."

8. To test NFS functionality, the supervisor server may be utilized as a NFS client, install nfs-utils on the NFS client:

```
#yum -y install nfs-utils
```

9. Mount the export:

```
# cd /mnt; mkdir export1 export2

# mount 192.168.20.164:/export1 /mnt/export1

# mount 192.168.20.165:/export2 /mnt/export2
```

Note: 192.168.20.161 is the data NIC of NFS traffic from Storage-node1. 192.168.20.162 is the data NIC of NFS traffic from Storage-node2.

10. A simple functional test may be performed by copying files to and from the NFS-mounted directories.

Functional Testing of S3 Connectors

This section details how to install and configure s3cmd to perform functional testing of S3 connectors.

To test S3 connectors, the supervisor server may be utilized as a S3 client.

1. Install s3cmd

```
# yum -y install s3cmd
```

2. Before creating bucket, Make sure s3cmd has "no output"

```
# s3cmd ls

(no output)
```

3. Create bucket to upload and download files via s3cmd.

```
# s3cmd mb s3://cvdbucket

Bucket 's3://cvdbucket/' created



# s3cmd ls

2018-05-29 23:33  s3://cvdbucket
```

4. Upload files via s3cmd.

The following example shows how to upload /etc/services, Scality install run file.

```
# s3cmd put FILE /etc/services s3://cvdbucket/services

upload: '/etc/services' -> 's3://cvdbucket/services'  [1 of 1]

 670293 of 670293   100% in    0s     3.69 MB/s  done



# s3cmd put FILE /root/scality-ring-7.4.run s3://cvdbucket/scalityrunfile

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 1
of 21, 15MB] [1 of 1]

 15728640 of 15728640   100% in    0s    46.08 MB/s  done

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 2
of 21, 15MB] [1 of 1]

 15728640 of 15728640   100% in    0s    35.92 MB/s  done

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 3
of 21, 15MB] [1 of 1]
```

```
…

…

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 19 of 21, 15MB] [1 of 1]

 15728640 of 15728640   100% in    0s    51.66 MB/s  done

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 20 of 21, 15MB] [1 of 1]

 15728640 of 15728640   100% in    0s    48.33 MB/s  done

upload: '/root/scality-ring-7.4.run' -> 's3://cvdbucket/scalityrunfile'  [part 21 of 21, 3MB] [1 of 1]

 3181642 of 3181642   100% in    0s    46.82 MB/s  done
```

5. Download files using s3cmd.

   The following example shows how to download the files /etc/services, scality install run file.

```
# s3cmd get s3://cvdbucket/services

download: 's3://cvdbucket/services' -> './services'  [1 of 1]

 670293 of 670293   100% in    0s    14.67 MB/s  done


# s3cmd get s3://cvdbucket/scalityrunfile

download: 's3://cvdbucket/scalityrunfile' -> './scalityrunfile'  [1 of 1]

 317754442 of 317754442   100% in    1s   248.73 MB/s  done


# s3cmd ls s3://cvdbucket

2017-02-10 23:37 317754442   s3://cvdbucket/scalityrunfile

2017-02-10 23:36    670293   s3://cvdbucket/services
```

Note: This makes sure that the functional testing of S3 connectors are using the s3cmd tool.

Performance Testing

Performance evaluation was done on a 12 node cluster. Cosbench was used for load testing the cluster. The tests were conducted on default configurations on Cisco UCS and Scality. The purpose of the tests is to get an idea of the performance of the cluster and should nowhere be considered as benchmark values.

Performance data was collected on 6 chassis 12 node S3260 storage servers with 26 x 10TB HDD disks and 2 x 800 GB SSD's for metadata on each server. A sufficient number of Clients were added to saturate the cluster. Each server had 40 Gb of Network configured for client traffic. Therefore, in a 12 Node configuration, the max capacity is 480 Gb of Client network. Around 10 Clients each with 40GB network capacity were used as clients on the setup. This is useful when your workload is bandwidth intensive, such as block sizes 1MB and more.

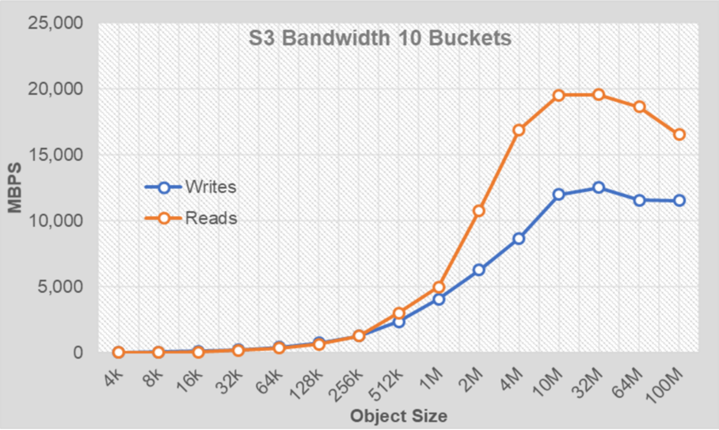
S3 Performance Tests

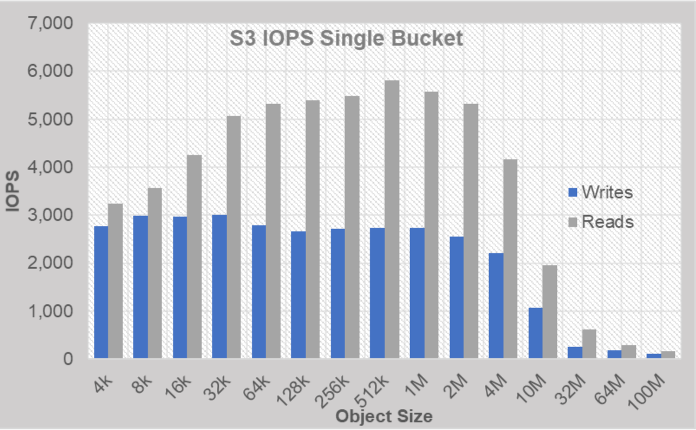
Cosbench was installed on all the 10 client servers worked as driver nodes for generating the workload.

An example of the configuration file is shown below:

```
<storage type="s3" timeout="10000" retry="3"
config="accesskey=65c231b4c6317cd274c7;secretkey=St/9BK1KsLZJTyktOW6Cw9Am2bTcdI3Iioe8QzGt;end
point=http://s3.ciscoscality.com" />



            <workstage name="prepare_1MB" ilosuredelay="60">

                <work type="prepare" workers="100" config="cprefix=bucket-
rf3;containers=r(1,1);oprefix=run2-600-1m_; objects=r(1,102400);sizes=c(1)MB" />

            </workstage>
```

Write and Read tests were done on single bucket and 10 buckets and few of the results captured are listed below.

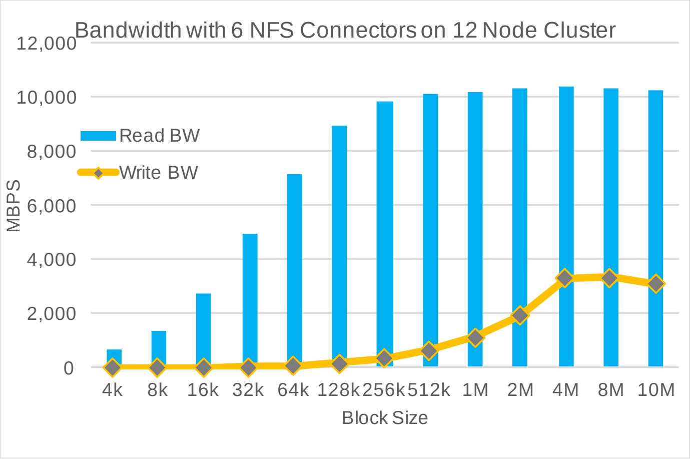


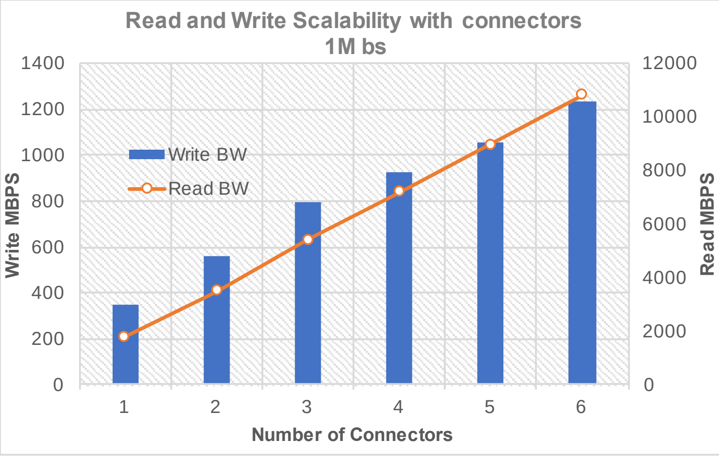


- By using 10 buckets the read bandwidth peaked to almost 19 GB/sec, while writes remained around 12 GB/sec.
- The Write IOPS with single bucket were around 3000 IOPS while read IOPS went up to 6000.
- Multiple buckets increase the write IOPS.
- The peak saturation of bandwidth observed around 10-32 MB object sizes.
- The peak iops were observed around 512k and 1M object sizes.

NFS Performance Tests

One volume was created from each of the 6 connectors and mounted on the clients. Fio tool was used for testing read and writes. The data captured as part of the testing is shown below.





- Around 10,000 MBPS for reads and 3,500 MBPS for writes were observed.
- Tests were performed to access performance by adding the connectors at 1 MB block size. The write and read throughputs increased almost linearly by adding the connectors as shown above.

High Availability Tests

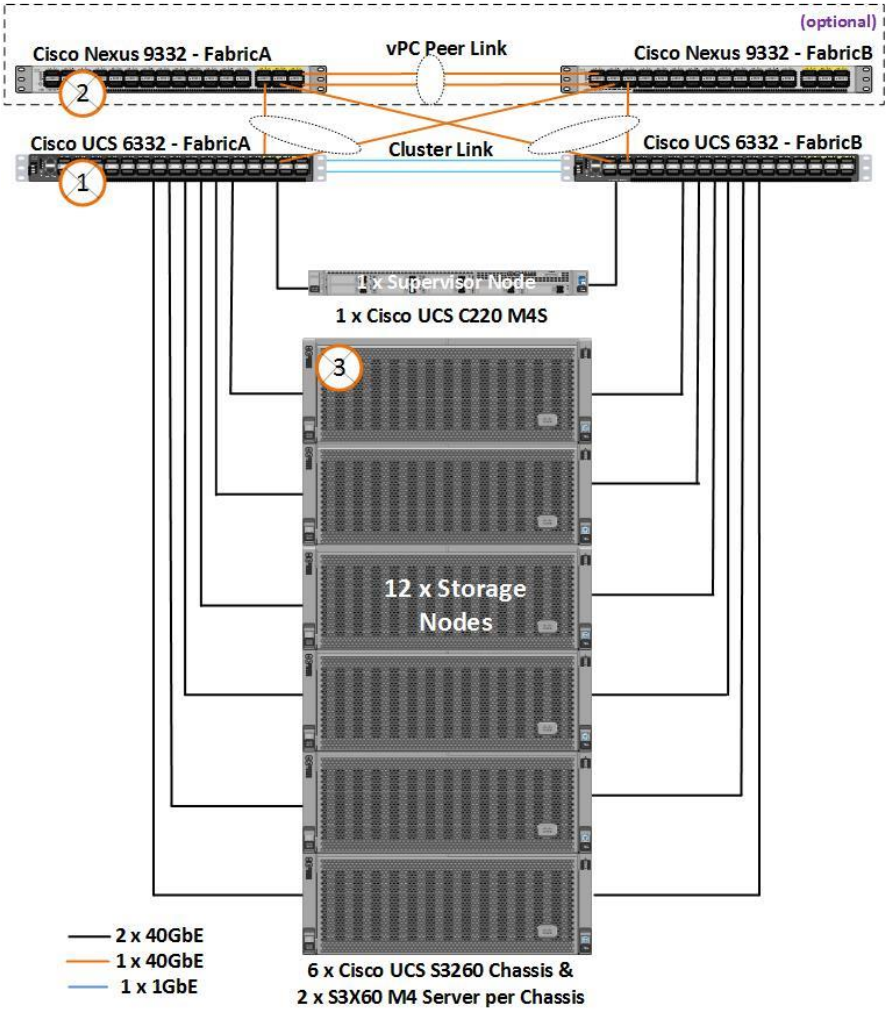
The high availability of this solution was validated by failing out one of the components of the infrastructure.

The purpose of the HA tests is to ensure Business Continuity when the underlying hardware components fail and study the behavior of the system during fault injections. The following points were considered while doing the HA tests.

- The Cluster will have reasonable amount of load when the fault is injected. The outputs like bandwidth and IOPS from the cluster will be gathered before and after the fault injection and after the restoration of the failed components.
- Only one fault is injected at any point of time. No double failures are considered.
- Performance degradation is acceptable but there should not be any business interruption. The underlying infrastructure components should continue to operate with the remaining components.

A few of the HA tests conducted were:

1. Fabric Interconnect Failures
2. Nexus 9000 Failures
3. S3 Connector, NFS Connectors, and Disk Failures



Fabric Interconnect Failures

For checking the business continuity of the system during Fabric Interconnect failures, one of the Fabric interconnects was rebooted after ramping up load through Cosbench. The sequence of events for fault injection and checking the health of the cluster is provided below:

1. Log into one of the Fabric Interconnects.

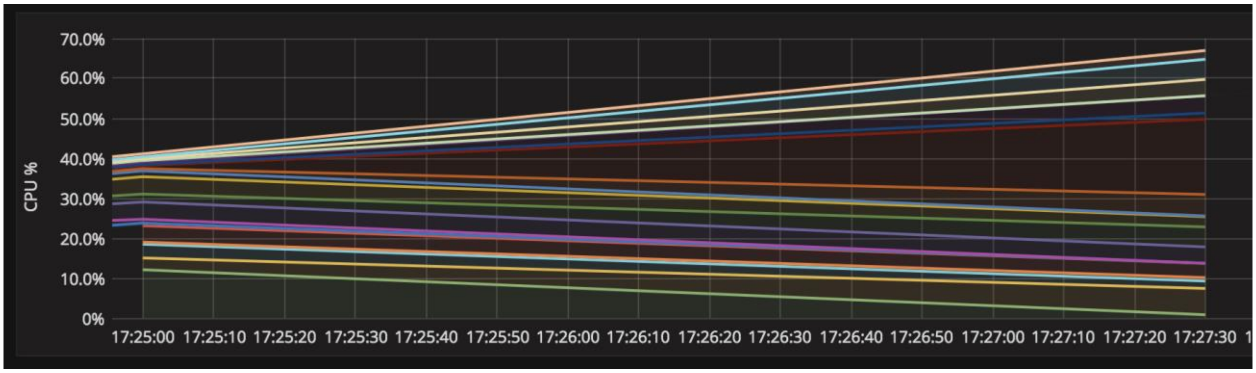
2. Connect Local Management on A

```
scality-pod2-A# connect local-mgmt A

………

scality-pod2-A(local-mgmt)# show cluster extended-state

Cluster Id: 0xba13e47e876d11e7-0x99df002a1029453f

Start time: Sat Nov 11 19:14:33 2017

Last election time: Thu Feb 15 08:51:36 2018
```

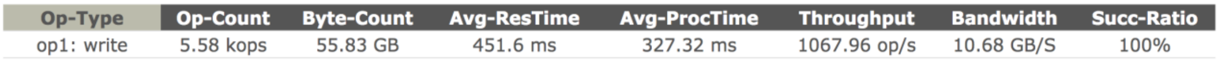
```
A: UP, PRIMARY
B: UP, SUBORDINATE

A: memb state UP, lead state PRIMARY, mgmt services state: UP
B: memb state UP, lead state SUBORDINATE, mgmt services state: UP
   heartbeat state PRIMARY_OK
INTERNAL NETWORK INTERFACES:
eth1, UP
eth2, UP
HA READY
Detailed state of the device selected for HA storage:
Chassis 7, serial: FOX2036G8U6, state: active
Server 2, serial: FCH2033V31P, state: active
Server 4, serial: FCH2034V0UG, state: active

S3 Cosbench test started for 10MB block size and with 480 workers.
```

The following data was gathered after ramping up the load before fault injection.

CPU utilization % before fault injection:

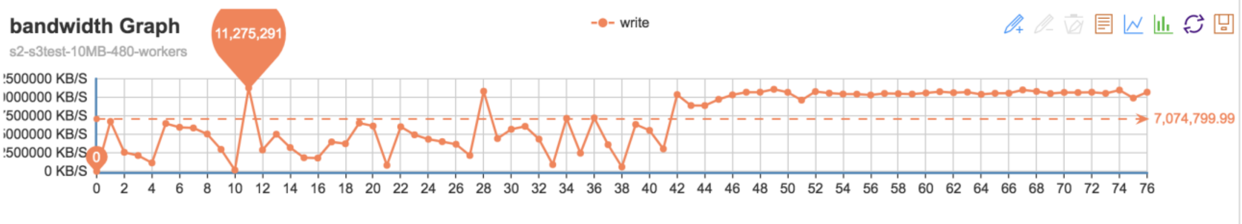


Cosbench graphs:



Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	5.58 kops	55.83 GB	451.6 ms	327.32 ms	1067.96 op/s	10.68 GB/S	100%

Bandwidth around 10.68 GB/s:



The cluster was doing around 10.68 GB/s at 10MB objects size before fault injection.

Inject fault into the system:

Rebooted the fabric

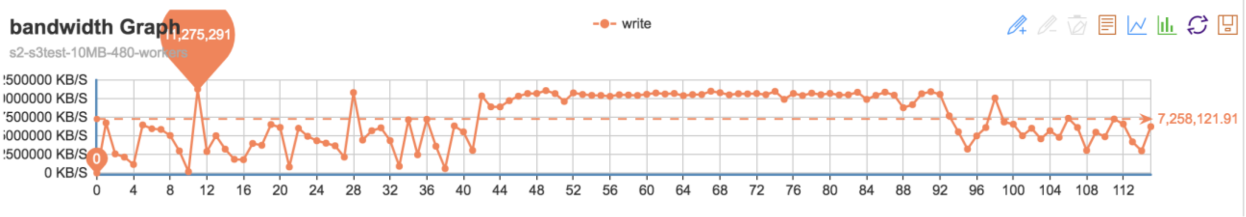
scality-pod2-A(local-mgmt)#

scality-pod2-A(local-mgmt)# reboot

Before rebooting, please take a configuration backup.

Do you still want to reboot? (yes/no):yes

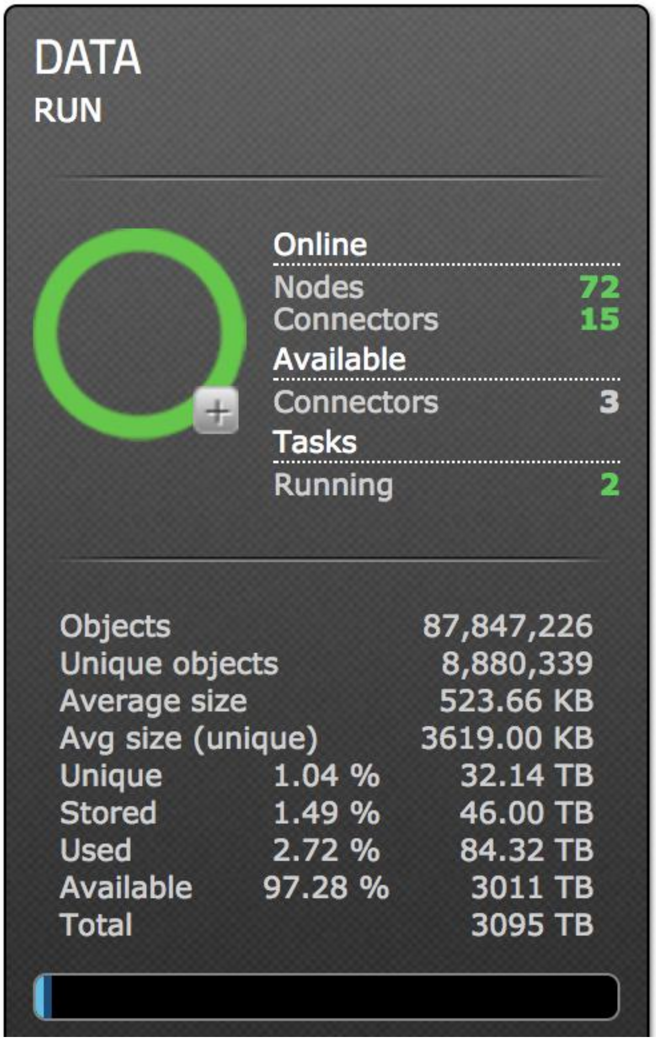
After the FI reboot:



When one of the FI’s is down, cosbench continues to send the requests. However the bandwidth comes down to 7.3 GB/sec from 10.68 GB/sec now.

Ring data dashboard reports cluster as healthy:

The ring dash board does not show any faults because of FI failure.



DATA
RUN

Online		
Nodes		72
Connectors		15
Available		
Connectors		3
Tasks		
Running		2
Objects		87,847,226
Unique objects		8,880,339
Average size		523.66 KB
Avg size (unique)		3619.00 KB
Unique	1.04 %	32.14 TB
Stored	1.49 %	46.00 TB
Used	2.72 %	84.32 TB
Available	97.28 %	3011 TB
Total		3095 TB

```
scality-pod2-B# show cluster extended-state

Cluster Id: 0xba13e47e876d11e7-0x99df002a1029453f

Start time: Tue Jan 23 01:34:43 2018

Last election time: Tue Mar 13 00:27:08 2018


B: UP, PRIMARY

A: DOWN, INAPPLICABLE

B: memb state UP, lead state PRIMARY, mgmt services state: UP

A: memb state DOWN, lead state INAPPLICABLE, mgmt services state: DOWN
```

```
   heartbeat state SECONDARY_FAILED

INTERNAL NETWORK INTERFACES:

eth1, UP

eth2, DOWN

HA NOT READY

Peer Fabric Interconnect is down

Detailed state of the device selected for HA storage:

Chassis 7, serial: FOX2036G8U6, state: active

Server 2, serial: FCH2033V31P, state: active

Server 4, serial: FCH2034V0UG, state: active

HA is not ready but FI’s are up
```

The above output confirms that FI is down now and the cluster is running on single FI in a degraded mode.

```
scality-pod2-B# show cluster extended-state

Cluster Id: 0xba13e47e876d11e7-0x99df002a1029453f


Start time: Tue Jan 23 01:34:43 2018

Last election time: Tue Mar 13 00:32:54 2018

B: UP, PRIMARY

A: UP, SUBORDINATE

B: memb state UP, lead state PRIMARY, mgmt services state: UP

A: memb state UP, lead state SUBORDINATE, mgmt services state: UP

   heartbeat state PRIMARY_OK


INTERNAL NETWORK INTERFACES:

eth1, UP

eth2, UP
```

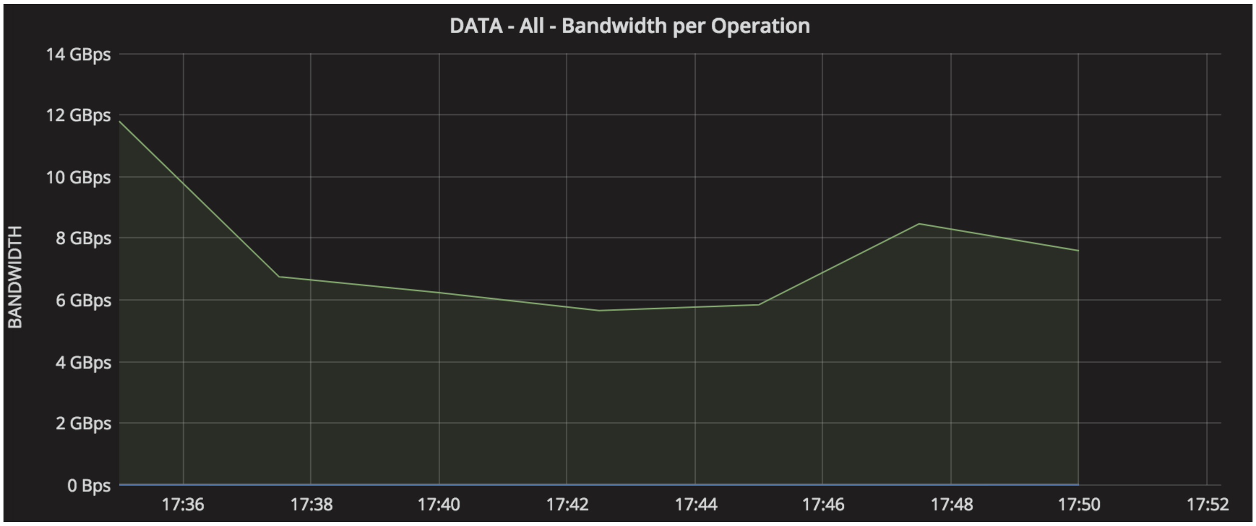
```
HA DOWNGRADED
HA not ready on peer Fabric Interconnect
Detailed state of the device selected for HA storage:
Chassis 7, serial: FOX2036G8U6, state: active
Server 2, serial: FCH2033V31P, state: active
Server 4, serial: FCH2034V0UG, state: active
```

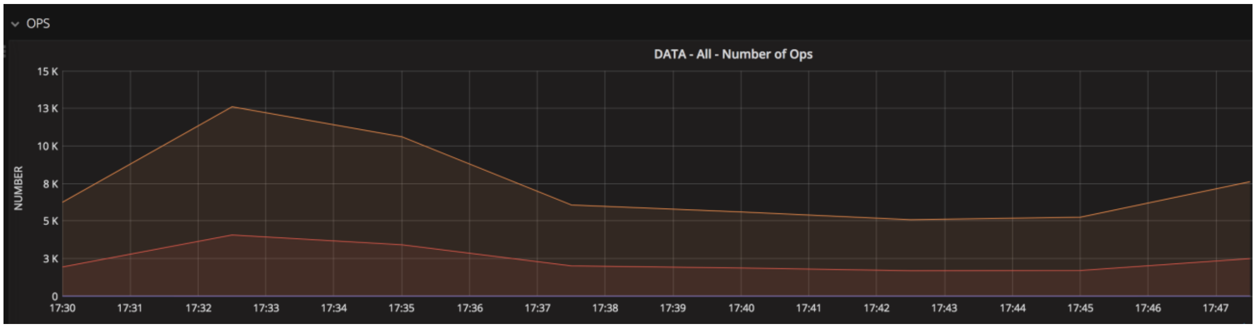
The FI has come up. However it is not fully ready yet.

```
scality-pod2-B# show cluster extended-state
Cluster Id: 0xba13e47e876d11e7-0x99df002a1029453f
Start time: Tue Jan 23 01:34:43 2018
Last election time: Tue Mar 13 00:32:54 2018
B: UP, PRIMARY
A: UP, SUBORDINATE
B: memb state UP, lead state PRIMARY, mgmt services state: UP
A: memb state UP, lead state SUBORDINATE, mgmt services state: UP
   heartbeat state PRIMARY_OK
INTERNAL NETWORK INTERFACES:
eth1, UP
eth2, UP
HA READY
Detailed state of the device selected for HA storage:
Chassis 7, serial: FOX2036G8U6, state: active
Server 2, serial: FCH2033V31P, state: active
Server 4, serial: FCH2034V0UG, state: active
```

At this time, FI joined back and HA is in Ready status.

Bandwidth:





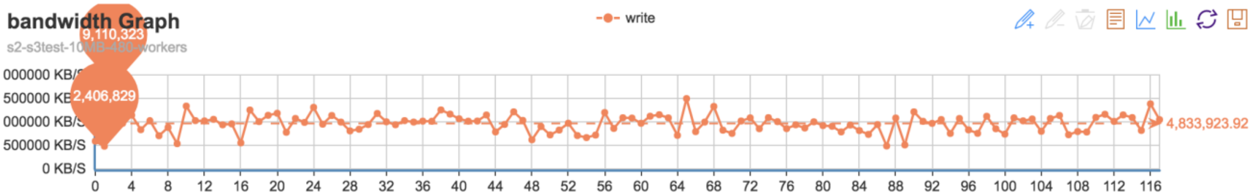
The system recovers after the Fabric joins the cluster and when HA READY. The dip in the graphs show the activity when the FI was rebooted.

Nexus 9000 Switch failures:

Similar to FI failures, one of the upstream Nexus switches was reloaded to make sure that there is business continuity. As both the FI's are connected to either of the switches and with VPC, the requests from the Nexus will still be forwarded to the FI's.

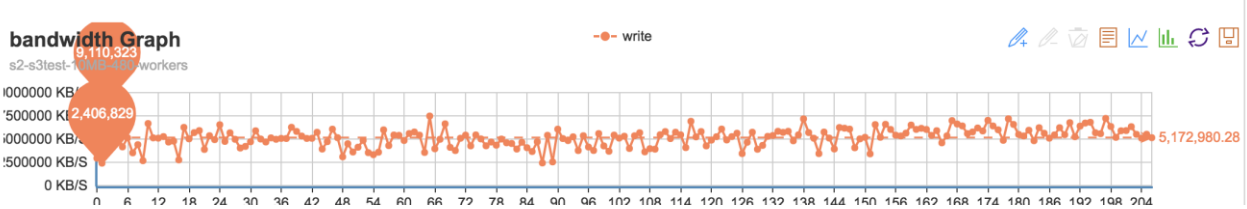
Reloaded the switch to check VPC status and impact on the application.

Similar workload as FI failures above was started on the system:



The N9K switch was reloaded.

```
N9k-Fab-A(config)# show version | grep uptime

Kernel uptime is 163 day(s), 8 hour(s), 18 minute(s), 59 second(s)

N9k-Fab-A(config)#

N9k-Fab-A(config)# reload

This command will reboot the system. (y/n)?  [n] y


N9k-Fab-A# show version | grep uptime

Kernel uptime is 0 day(s), 0 hour(s), 4 minute(s), 33 second(s)
```



System was doing writes of around 5.7 GB/s when the Nexus switch was reloaded.

System continues to operate without any interruption

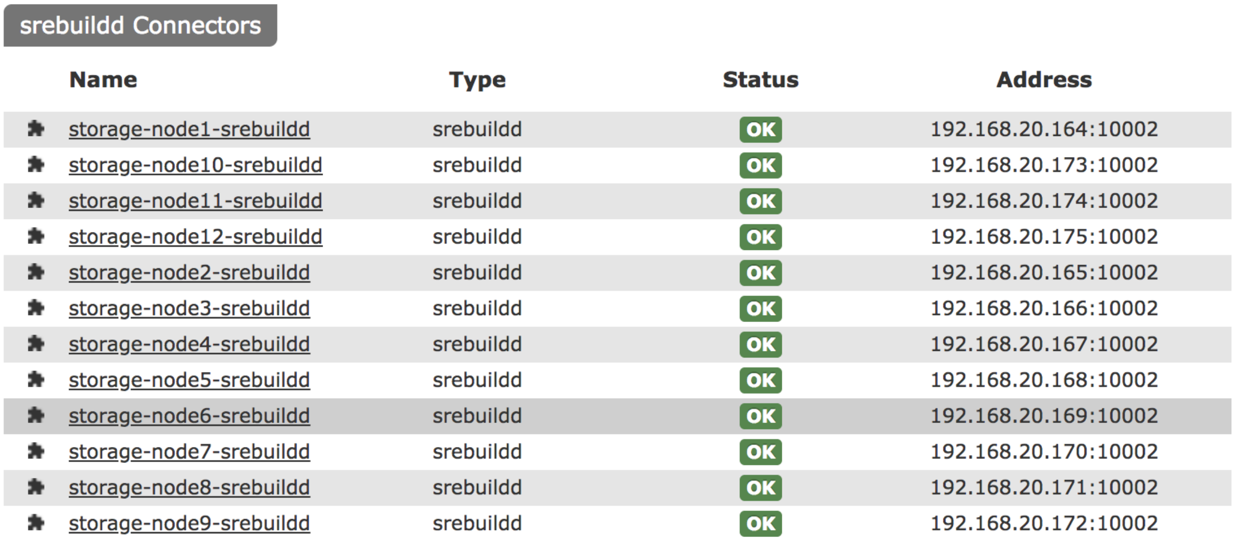
```
N9k-Fab-A# show vpc br

Legend:

                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                     : 201

Peer status                       : peer adjacency formed ok

vPC keep-alive status             : peer is alive

Configuration consistency status  : success

Per-vlan consistency status       : success

Type-2 consistency status         : success

……..

vPC status

----------------------------------------------------------------------
```

```
id    Port    Status Consistency Reason                           Active vlans

--    ----    ------ ----------- ------                           ------------

10    Po10    up     success     success                          10,20,79

11    Po11    up     success     success                          10,20,79
```

S3 Connector Failures

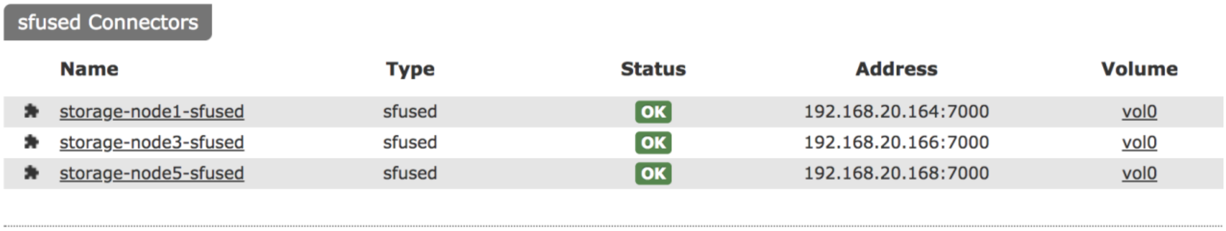
Client load was generated using cosbench and one of the S3 Connectors (which is also the storage node) was shut down from Cisco UCS.

Status of the connectors before fault injection:



srebuildd Connectors

Name	Type	Status	Address
storage-node1-srebuildd	srebuildd	OK	192.168.20.164:10002
storage-node10-srebuildd	srebuildd	OK	192.168.20.173:10002
storage-node11-srebuildd	srebuildd	OK	192.168.20.174:10002
storage-node12-srebuildd	srebuildd	OK	192.168.20.175:10002
storage-node2-srebuildd	srebuildd	OK	192.168.20.165:10002
storage-node3-srebuildd	srebuildd	OK	192.168.20.166:10002
storage-node4-srebuildd	srebuildd	OK	192.168.20.167:10002
storage-node5-srebuildd	srebuildd	OK	192.168.20.168:10002
storage-node6-srebuildd	srebuildd	OK	192.168.20.169:10002
storage-node7-srebuildd	srebuildd	OK	192.168.20.170:10002
storage-node8-srebuildd	srebuildd	OK	192.168.20.171:10002
storage-node9-srebuildd	srebuildd	OK	192.168.20.172:10002

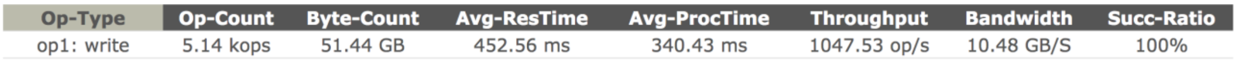


sfused Connectors

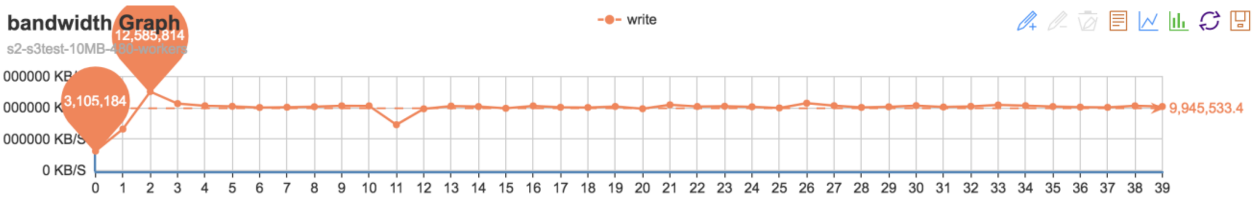
Name	Type	Status	Address	Volume
storage-node1-sfused	sfused	OK	192.168.20.164:7000	vol0
storage-node3-sfused	sfused	OK	192.168.20.166:7000	vol0
storage-node5-sfused	sfused	OK	192.168.20.168:7000	vol0

Run Cosbench to put some load on the system on all connectors, then power off node2 and check the status.

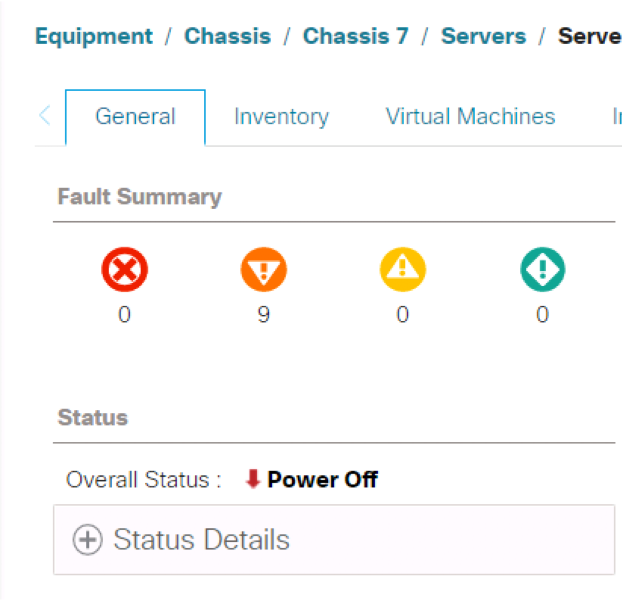
Writes were going around 10 GB/s:



Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	5.14 kops	51.44 GB	452.56 ms	340.43 ms	1047.53 op/s	10.48 GB/S	100%



Fault injected by powering off Node 2:

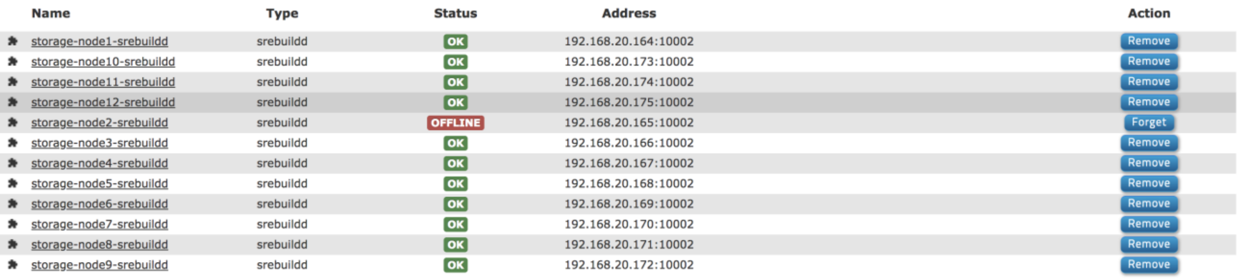


Overall Status : Power Off

One of the Cosbench clients reports an error as shown below:

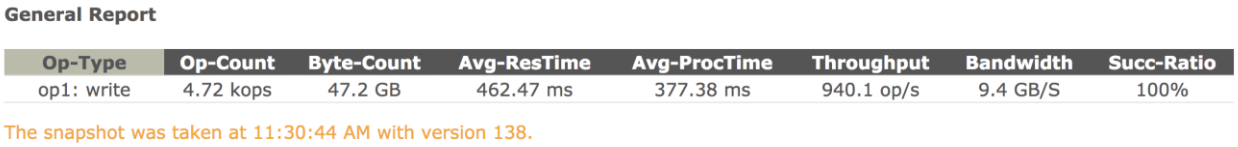
```
2018-03-13 11:25:06,099 [WARN] [S3Storage] - below exception encountered when creat-
ing object myobjects34950 at test10mb4: Failed to reset the request input stream;
If the request involves an input stream, the maximum stream buffer size can be con-
figured via request.getRequestClientOptions().setReadLimit(int)
```

Status as observed from Scality Supervisor console



Name	Type	Status	Address	Action
storage-node1-srebuildd	srebuildd	OK	192.168.20.164:10002	Remove
storage-node10-srebuildd	srebuildd	OK	192.168.20.173:10002	Remove
storage-node11-srebuildd	srebuildd	OK	192.168.20.174:10002	Remove
storage-node12-srebuildd	srebuildd	OK	192.168.20.175:10002	Remove
storage-node2-srebuildd	srebuildd	OFFLINE	192.168.20.165:10002	Forget
storage-node3-srebuildd	srebuildd	OK	192.168.20.166:10002	Remove
storage-node4-srebuildd	srebuildd	OK	192.168.20.167:10002	Remove
storage-node5-srebuildd	srebuildd	OK	192.168.20.168:10002	Remove
storage-node6-srebuildd	srebuildd	OK	192.168.20.169:10002	Remove
storage-node7-srebuildd	srebuildd	OK	192.168.20.170:10002	Remove
storage-node8-srebuildd	srebuildd	OK	192.168.20.171:10002	Remove
storage-node9-srebuildd	srebuildd	OK	192.168.20.172:10002	Remove

The cosbench bandwidth drops to 9.4 GB/s of writes from 10.48 GB/s as below. It should be noted that we brought down 1 of the 12 x S3 connectors/storage nodes here.



General Report

Op-Type	Op-Count	Byte-Count	Avg-ResTime	Avg-ProcTime	Throughput	Bandwidth	Succ-Ratio
op1: write	4.72 kops	47.2 GB	462.47 ms	377.38 ms	940.1 op/s	9.4 GB/S	100%

The snapshot was taken at 11:30:44 AM with version 138.

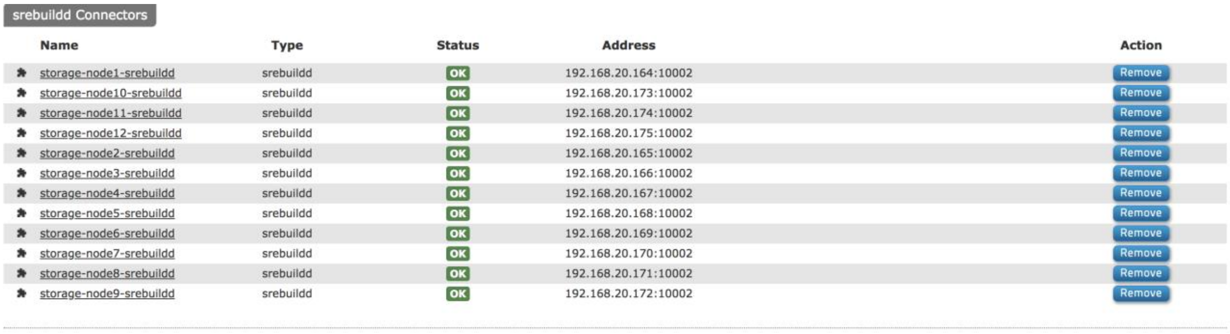
After running for few minutes the server was brought up again.

Server comes up at

[root@storage-node2 ~]# uptime

11:35:26 up 0 min, 1 user, load average: 1.08, 0.26, 0.08

Supervisor shows node the failed node as up now:



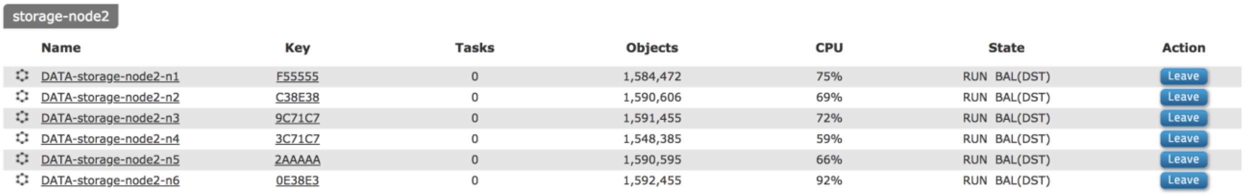
srebuildd Connectors

	Name	Type	Status	Address	Action
★	storage-node1-srebuildd	srebuildd	OK	192.168.20.164:10002	Remove
★	storage-node10-srebuildd	srebuildd	OK	192.168.20.173:10002	Remove
★	storage-node11-srebuildd	srebuildd	OK	192.168.20.174:10002	Remove
★	storage-node12-srebuildd	srebuildd	OK	192.168.20.175:10002	Remove
★	storage-node2-srebuildd	srebuildd	OK	192.168.20.165:10002	Remove
★	storage-node3-srebuildd	srebuildd	OK	192.168.20.166:10002	Remove
★	storage-node4-srebuildd	srebuildd	OK	192.168.20.167:10002	Remove
★	storage-node5-srebuildd	srebuildd	OK	192.168.20.168:10002	Remove
★	storage-node6-srebuildd	srebuildd	OK	192.168.20.169:10002	Remove
★	storage-node7-srebuildd	srebuildd	OK	192.168.20.170:10002	Remove
★	storage-node8-srebuildd	srebuildd	OK	192.168.20.171:10002	Remove
★	storage-node9-srebuildd	srebuildd	OK	192.168.20.172:10002	Remove

The storage-node2 joins the cluster and starts sharing the load.

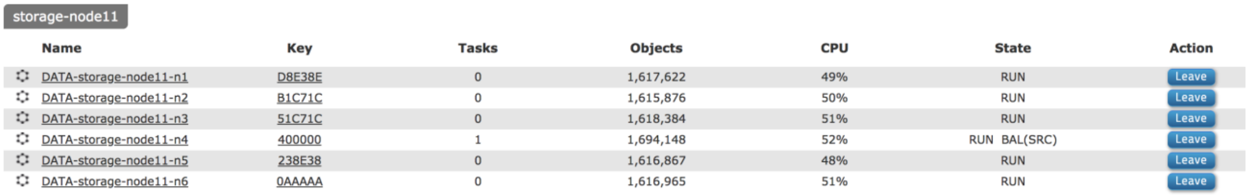
```
[root@supervisor ~]# salt 'stor*' cmd.run "top -b -n3 | head -1"

storage-node12:

    top - 11:42:33 up 4 days, 20:28,  0 users,  load average: 3.02, 4.18, 4.14

storage-node8:

    top - 11:42:33 up 4 days, 20:39,  0 users,  load average: 16.90, 17.75, 17.48

storage-node9:

    top - 11:42:34 up 4 days, 20:31,  0 users,  load average: 8.35, 13.43, 15.49

storage-node10:

    top - 11:42:34 up 4 days, 17:38,  0 users,  load average: 16.78, 16.70, 16.43

storage-node6:

    top - 11:42:34 up 4 days, 20:41,  0 users,  load average: 12.57, 18.44, 18.89

storage-node2:

    top - 11:42:34 up 7 min,  0 users,  load average: 39.43, 37.08, 19.75

storage-node3:
    top - 11:42:34 up 4 days, 20:44,  0 users,  load average: 47.86, 42.08, 40.14
storage-node4:
    top - 11:42:34 up 4 days, 20:44,  0 users,  load average: 25.75, 32.88, 34.42
storage-node1:
    top - 11:42:34 up 4 days, 20:55,  0 users,  load average: 17.78, 18.72, 19.07
storage-node7:
    top - 11:42:34 up 4 days, 20:39,  0 users,  load average: 14.74, 16.42, 16.31
storage-node5:
    top - 11:42:34 up 4 days, 20:41,  0 users,  load average: 14.69, 13.93, 14.41
storage-node11:
    top - 11:42:34 up 4 days, 20:29,  0 users,  load average: 47.80, 42.01, 25.29
```

Balancing Kicks Off on Nodes after storage-node2 joins the cluster:



storage-node2

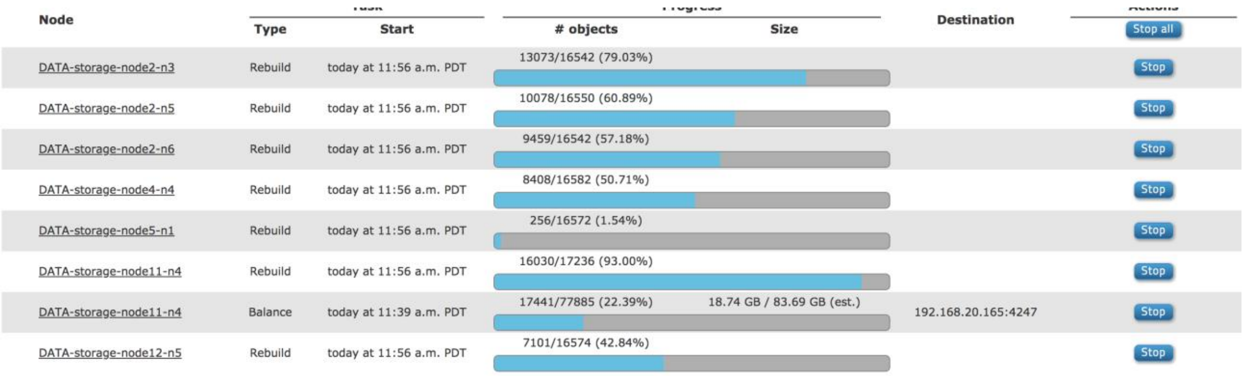
Name	Key	Tasks	Objects	CPU	State	Action
DATA-storage-node2-n1	F55555	0	1,584,472	75%	RUN BAL(DST)	Leave
DATA-storage-node2-n2	C38E38	0	1,590,606	69%	RUN BAL(DST)	Leave
DATA-storage-node2-n3	9C71C7	0	1,591,455	72%	RUN BAL(DST)	Leave
DATA-storage-node2-n4	3C71C7	0	1,548,385	59%	RUN BAL(DST)	Leave
DATA-storage-node2-n5	2AAAAA	0	1,590,595	66%	RUN BAL(DST)	Leave
DATA-storage-node2-n6	0E38E3	0	1,592,455	92%	RUN BAL(DST)	Leave



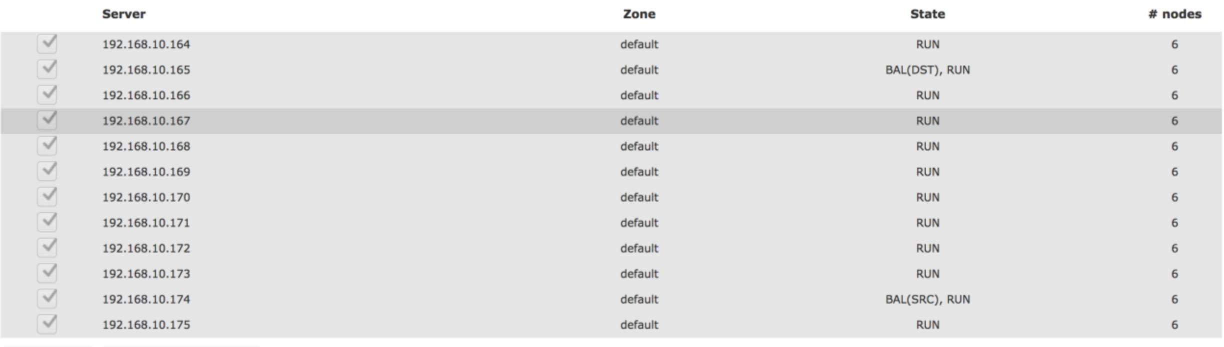
storage-node11

Name	Key	Tasks	Objects	CPU	State	Action
DATA-storage-node11-n1	D8E38E	0	1,617,622	49%	RUN	Leave
DATA-storage-node11-n2	B1C71C	0	1,615,876	50%	RUN	Leave
DATA-storage-node11-n3	51C71C	0	1,618,384	51%	RUN	Leave
DATA-storage-node11-n4	400000	1	1,694,148	52%	RUN BAL(SRC)	Leave
DATA-storage-node11-n5	238E38	0	1,616,867	48%	RUN	Leave
DATA-storage-node11-n6	0AAAAA	0	1,616,965	51%	RUN	Leave

When balancing is on, the following background tasks were observed:

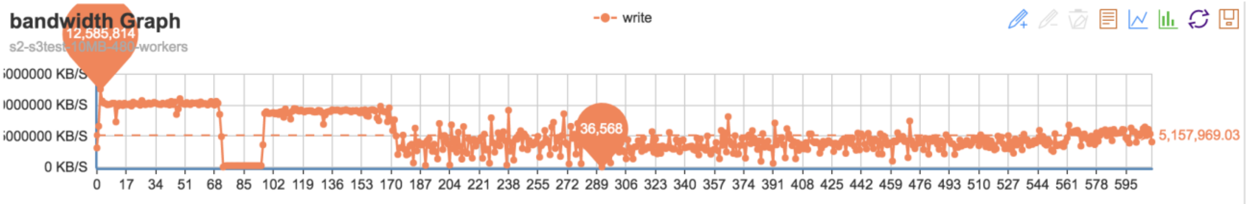


Node	Task		Progress		Destination	Actions
	Type	Start	# objects	Size		Stop all
DATA-storage-node2-n3	Rebuild	today at 11:56 a.m. PDT	13073/16542 (79.03%)			Stop
DATA-storage-node2-n5	Rebuild	today at 11:56 a.m. PDT	10078/16550 (60.89%)			Stop
DATA-storage-node2-n6	Rebuild	today at 11:56 a.m. PDT	9459/16542 (57.18%)			Stop
DATA-storage-node4-n4	Rebuild	today at 11:56 a.m. PDT	8408/16582 (50.71%)			Stop
DATA-storage-node5-n1	Rebuild	today at 11:56 a.m. PDT	256/16572 (1.54%)			Stop
DATA-storage-node11-n4	Rebuild	today at 11:56 a.m. PDT	16030/17236 (93.00%)			Stop
DATA-storage-node11-n4	Balance	today at 11:39 a.m. PDT	17441/77885 (22.39%)	18.74 GB / 83.69 GB (est.)	192.168.20.165:4247	Stop
DATA-storage-node12-n5	Rebuild	today at 11:56 a.m. PDT	7101/16574 (42.84%)			Stop



	Server	Zone	State	# nodes
✓	192.168.10.164	default	RUN	6
✓	192.168.10.165	default	BAL(DST), RUN	6
✓	192.168.10.166	default	RUN	6
✓	192.168.10.167	default	RUN	6
✓	192.168.10.168	default	RUN	6
✓	192.168.10.169	default	RUN	6
✓	192.168.10.170	default	RUN	6
✓	192.168.10.171	default	RUN	6
✓	192.168.10.172	default	RUN	6
✓	192.168.10.173	default	RUN	6
✓	192.168.10.174	default	BAL(SRC), RUN	6
✓	192.168.10.175	default	RUN	6

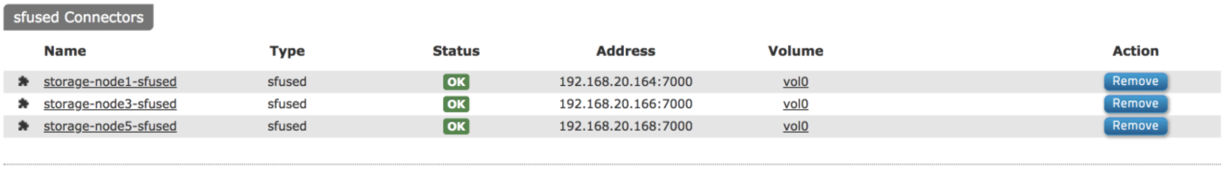
The output drops to 5.5 GB/sec while rebuild is on:



NFS Connector Failures

Similar to S3 connector failures one of the NFS Connectors was powered off while FIO tests were running.

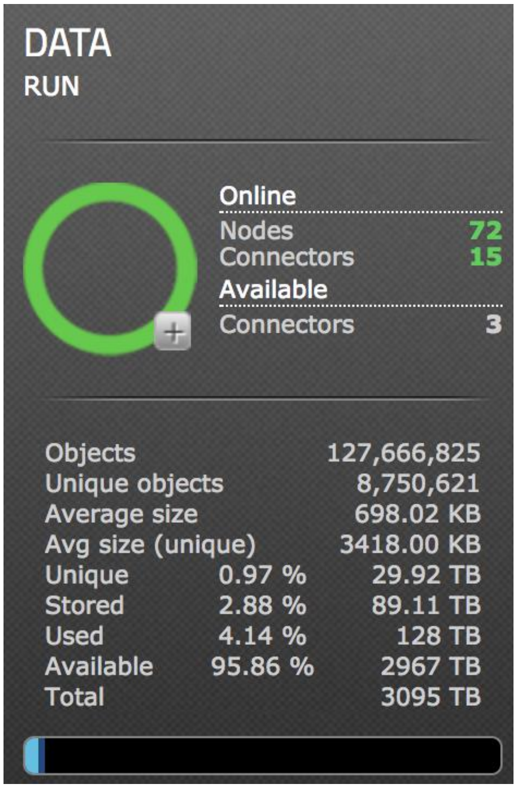
In order to get full high availability for the volumes for Host failures, a minimum of 2 connectors should be attached to each volume as shown below. On the test bed three connectors were chosen for volo. This provides HA to volo on failure of the connectors.



sfused Connectors

Name	Type	Status	Address	Volume	Action
storage-node1-sfused	sfused	OK	192.168.20.164:7000	vol0	Remove
storage-node3-sfused	sfused	OK	192.168.20.166:7000	vol0	Remove
storage-node5-sfused	sfused	OK	192.168.20.168:7000	vol0	Remove

vol0 volume is provided by 3 connectors as shown above. In order to have HA on the NFS connectors, you may have to assign a minimum of 2 connectors to each volume.



DATA

RUN

Online

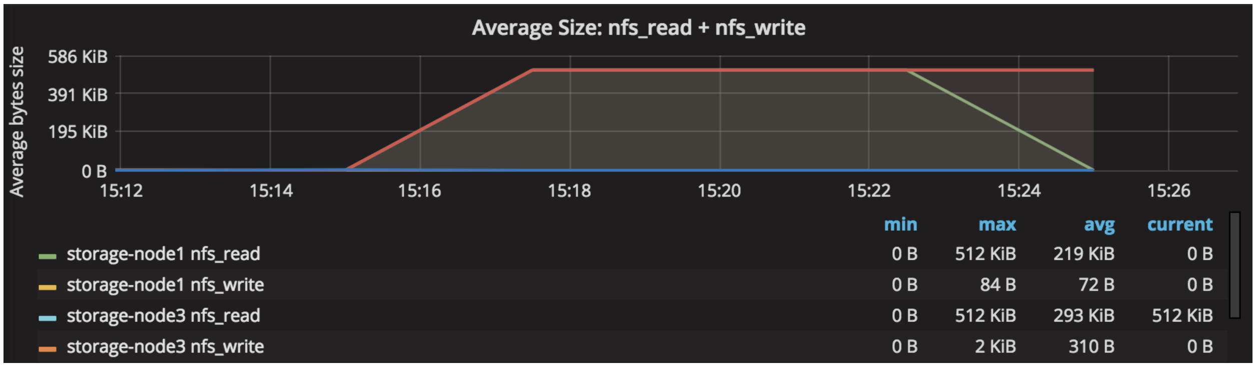
Nodes	72
Connectors	15

Available

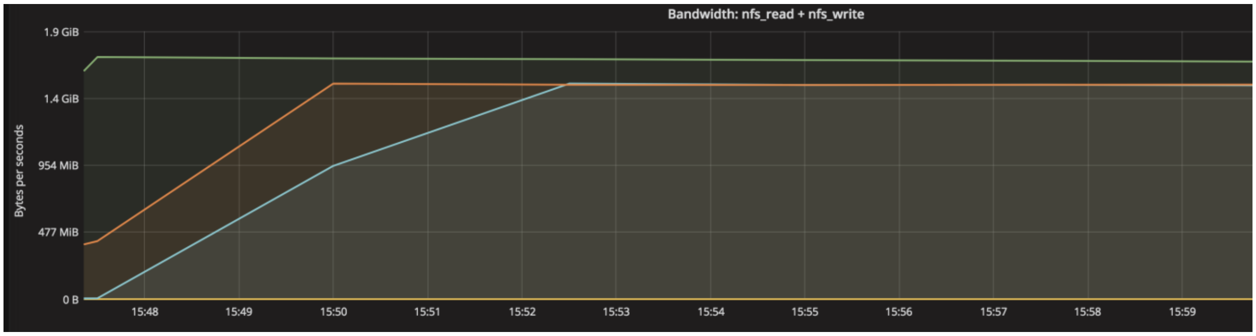
Connectors	3

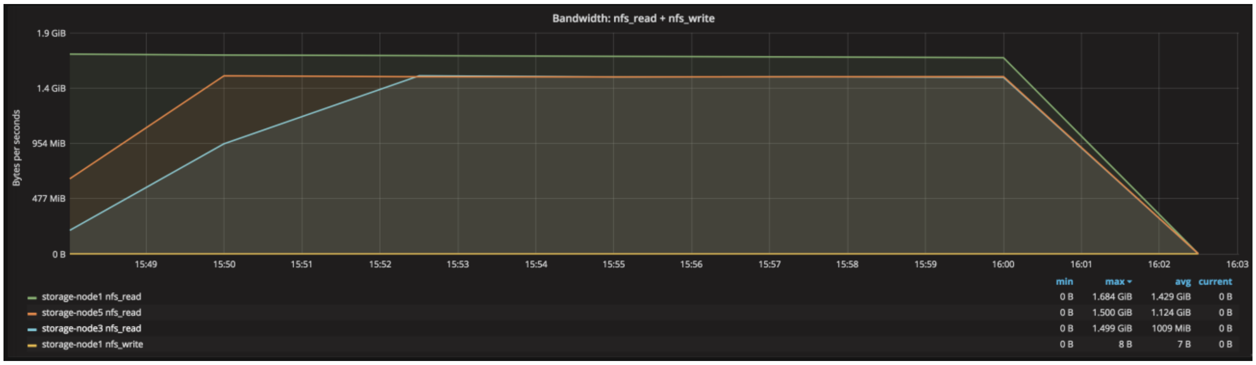
Objects		127,666,825
Unique objects		8,750,621
Average size		698.02 KB
Avg size (unique)		3418.00 KB
Unique	0.97 %	29.92 TB
Stored	2.88 %	89.11 TB
Used	4.14 %	128 TB
Available	95.86 %	2967 TB
Total		3095 TB

FIO tests were run from clients where volo was mounted. The average IO size was 512 for a block size of 1M where fio tests are being run.

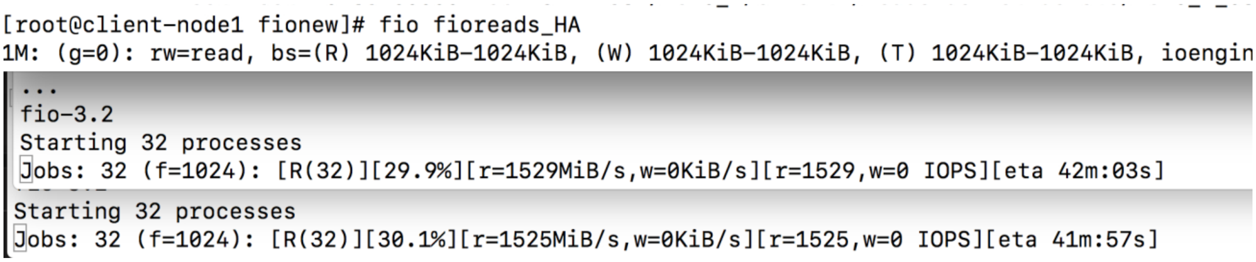


	min	max	avg	current
storage-node1 nfs_read	0 B	512 KiB	219 KiB	0 B
storage-node1 nfs_write	0 B	84 B	72 B	0 B
storage-node3 nfs_read	0 B	512 KiB	293 KiB	512 KiB
storage-node3 nfs_write	0 B	2 KiB	310 B	0 B

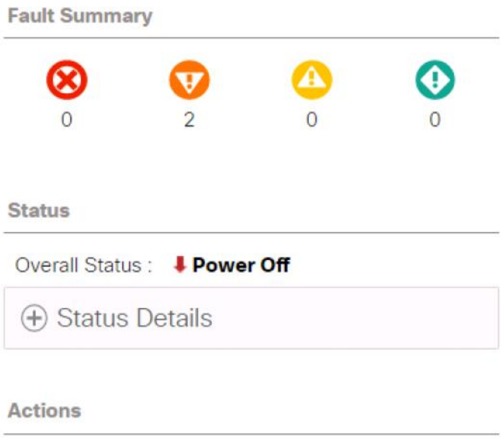




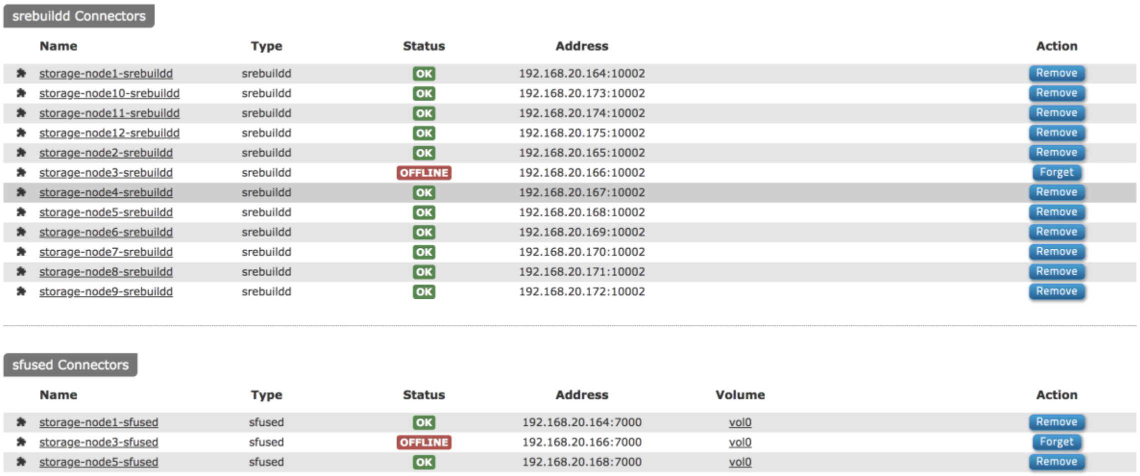
The fault was injected by powering down server 3 from Cisco UCS. The system was doing about 1525 MB/sec at 1M block size before fault was injected.



```
[root@client-node1 fionew]# fio fioreads_HA
1M: (g=0): rw=read, bs=(R) 1024KiB-1024KiB, (W) 1024KiB-1024KiB, (T) 1024KiB-1024KiB, ioengin
...
fio-3.2
Starting 32 processes
Jobs: 32 (f=1024): [R(32)][29.9%][r=1529MiB/s,w=0KiB/s][r=1529,w=0 IOPS][eta 42m:03s]
Starting 32 processes
Jobs: 32 (f=1024): [R(32)][30.1%][r=1525MiB/s,w=0KiB/s][r=1525,w=0 IOPS][eta 41m:57s]
```



One of the connectors goes down, but it continues on other 2 connectors. Supervisor reports as shown below on its user interface.



srebuildd Connectors

Name	Type	Status	Address	Action
storage-node1-srebuildd	srebuildd	OK	192.168.20.164:10002	Remove
storage-node10-srebuildd	srebuildd	OK	192.168.20.173:10002	Remove
storage-node11-srebuildd	srebuildd	OK	192.168.20.174:10002	Remove
storage-node12-srebuildd	srebuildd	OK	192.168.20.175:10002	Remove
storage-node2-srebuildd	srebuildd	OK	192.168.20.165:10002	Remove
storage-node3-srebuildd	srebuildd	OFFLINE	192.168.20.166:10002	Forget
storage-node4-srebuildd	srebuildd	OK	192.168.20.167:10002	Remove
storage-node5-srebuildd	srebuildd	OK	192.168.20.168:10002	Remove
storage-node6-srebuildd	srebuildd	OK	192.168.20.169:10002	Remove
storage-node7-srebuildd	srebuildd	OK	192.168.20.170:10002	Remove
storage-node8-srebuildd	srebuildd	OK	192.168.20.171:10002	Remove
storage-node9-srebuildd	srebuildd	OK	192.168.20.172:10002	Remove

sfused Connectors

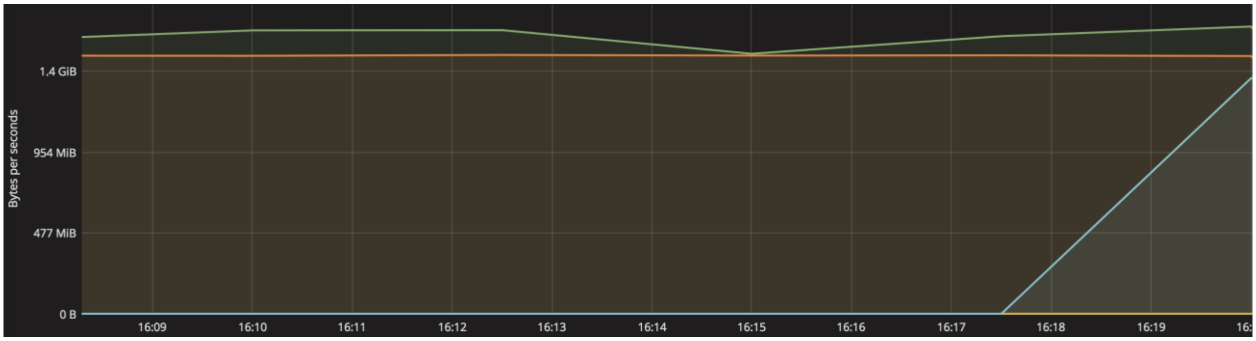
Name	Type	Status	Address	Volume	Action
storage-node1-sfused	sfused	OK	192.168.20.164:7000	vol0	Remove
storage-node3-sfused	sfused	OFFLINE	192.168.20.166:7000	vol0	Forget
storage-node5-sfused	sfused	OK	192.168.20.168:7000	vol0	Remove

Server brought up again.

The node joins the connectors

```
[root@supervisor ~]# salt "storage-node[1,3,5]" cmd.run "dstat -n 2 2"

storage-node5:

     recv  send

       0      0

     61M 1563M

     73M 1557M

storage-node1:

     recv  send

       0      0

     94M 1721M

     84M 1723M

storage-node3:

     recv  send

       0      0

     60M 1550M

     80M 1553M
```

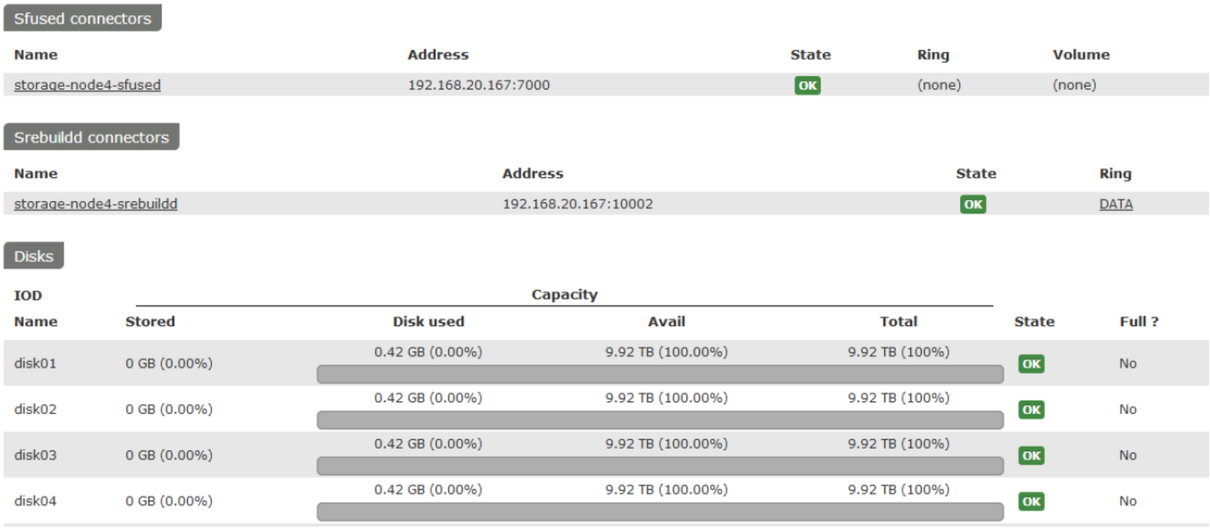
The connector picks up as shown below. The graph depicts that the newly joined node again participates as a connector. It shows how the load ramped up on third connector while the first two were running.



Disk Failure Tests

Disk Failure was simulated to understand the procedure needed from Cisco UCS and the Scality side to replace a failed disk.

The figure below shows the healthy disk on node 4 as reported by Supervisor and Cisco UCS.



Sfused connectors

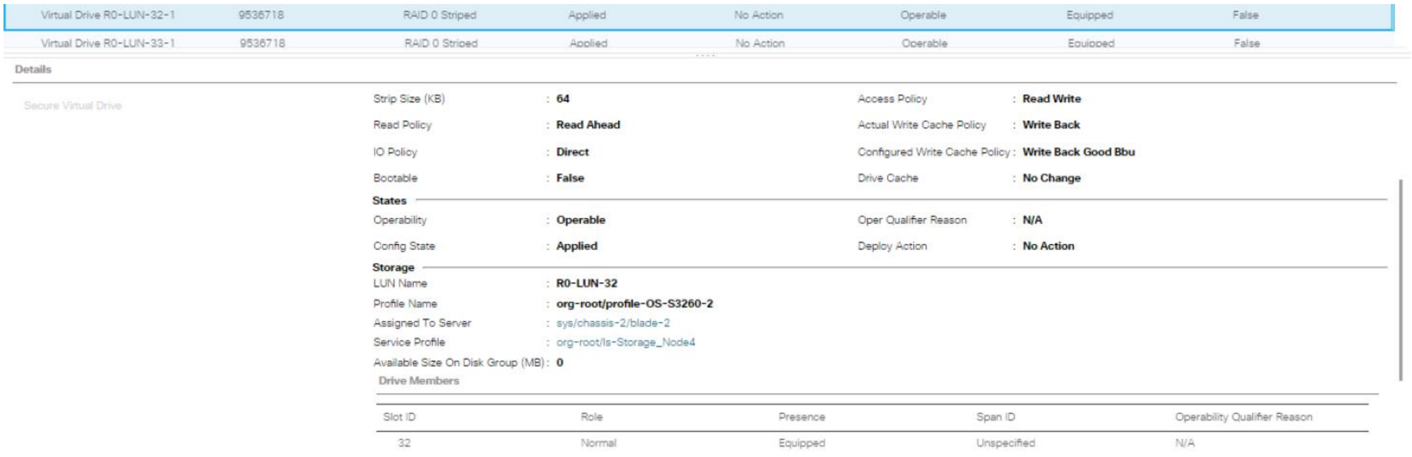
Name	Address	State	Ring	Volume
storage-node4-sfused	192.168.20.167:7000	OK	(none)	(none)

Srebuildd connectors

Name	Address	State	Ring
storage-node4-srebuildd	192.168.20.167:10002	OK	DATA

Disks

IOD		Capacity				
Name	Stored	Disk used	Avail	Total	State	Full ?
disk01	0 GB (0.00%)	0.42 GB (0.00%)	9.92 TB (100.00%)	9.92 TB (100%)	OK	No
disk02	0 GB (0.00%)	0.42 GB (0.00%)	9.92 TB (100.00%)	9.92 TB (100%)	OK	No
disk03	0 GB (0.00%)	0.42 GB (0.00%)	9.92 TB (100.00%)	9.92 TB (100%)	OK	No
disk04	0 GB (0.00%)	0.42 GB (0.00%)	9.92 TB (100.00%)	9.92 TB (100%)	OK	No



Virtual Drive R0-LUN-32-1	9536718	RAID 0 Striped	Applied	No Action	Operable	Equipped	False
Virtual Drive R0-LUN-33-1	9536718	RAID 0 Striped	Applied	No Action	Operable	Equipped	False

Details

Secure Virtual Drive

Strip Size (KB)	: 64	Access Policy	: Read Write
Read Policy	: Read Ahead	Actual Write Cache Policy	: Write Back
IO Policy	: Direct	Configured Write Cache Policy	: Write Back Good Bbu
Bootable	: False	Drive Cache	: No Change

States

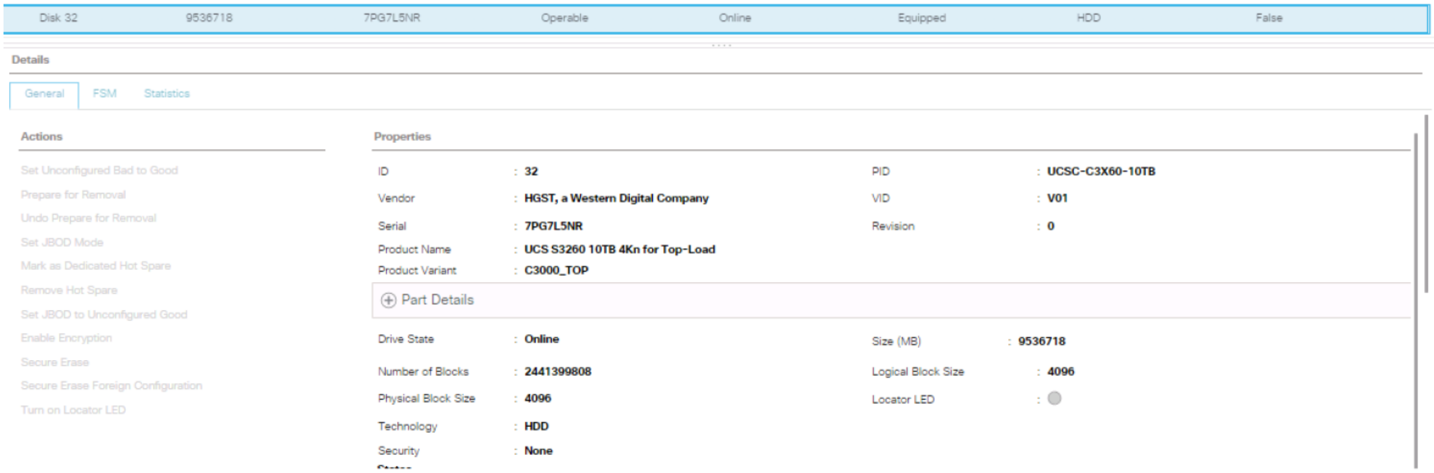
Operability	: Operable	Oper Qualifier Reason	: N/A
Config State	: Applied	Deploy Action	: No Action

Storage

LUN Name : R0-LUN-32
Profile Name : org-root/profile-OS-S3260-2
Assigned To Server : sys/chassis-2/blade-2
Service Profile : org-root/ls-Storage_Node4
Available Size On Disk Group (MB) : 0

Drive Members

Slot ID	Role	Presence	Span ID	Operability Qualifier Reason
32	Normal	Equipped	Unspecified	N/A

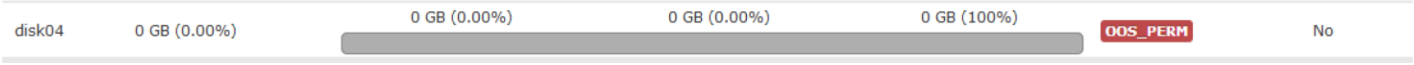


Disk 32	9536718	7PG7L5NR	Operable	Online	Equipped	HDD	False

ID : 32
Vendor : HGST, a Western Digital Company
Serial : 7PG7L5NR
Product Name : UCS S3260 10TB 4Kn for Top-Load
Product Variant : C3000_TOP
PID : UCSC-C3X60-10TB
VID : V01
Revision : 0

Drive State : Online
Number of Blocks : 2441399808
Physical Block Size : 4096
Technology : HDD
Security : None
Size (MB) : 9536718
Logical Block Size : 4096
Locator LED : ○

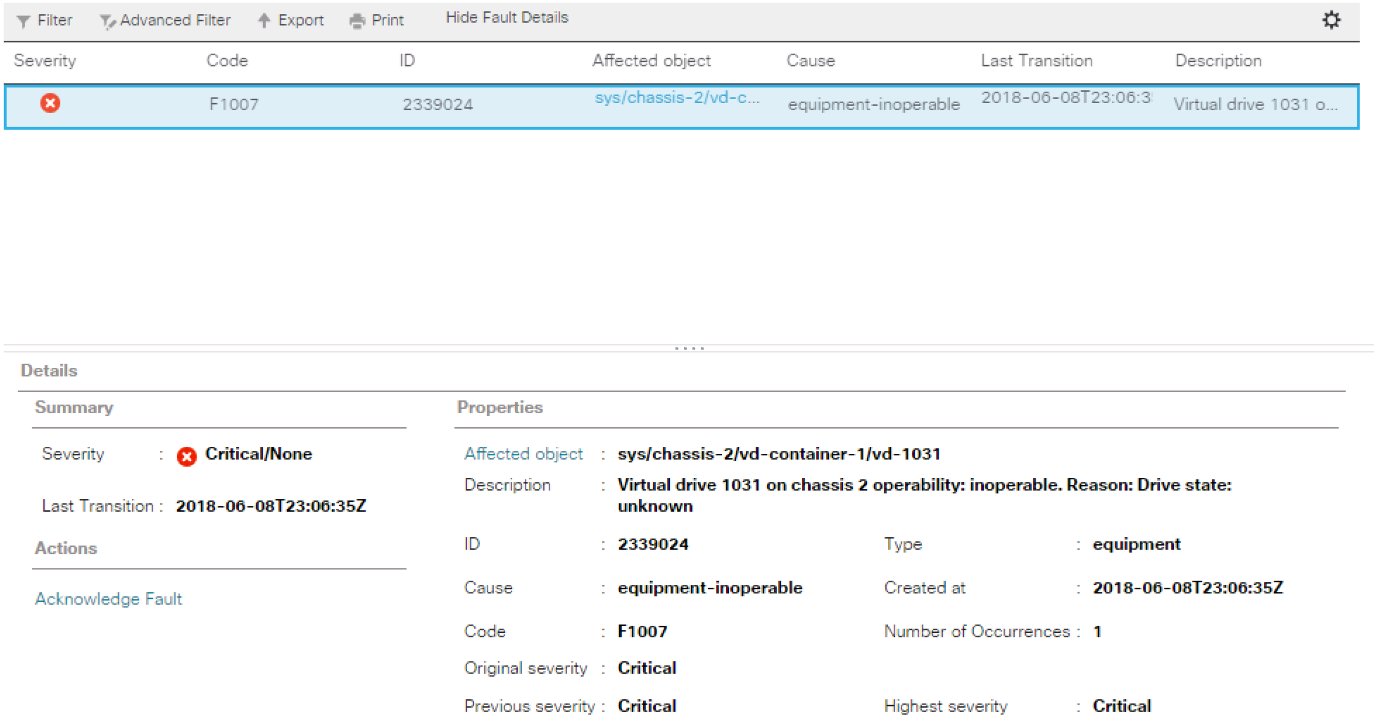
After failing the disk, it displays as a failure in Supervisor.



disk04	0 GB (0.00%)	0 GB (0.00%)	0 GB (0.00%)	0 GB (100%)	OOS_PERM	No

This disk has to be replaced with a new disk.

Re-Acknowledged the server:



Severity	Code	ID	Affected object	Cause	Last Transition	Description
✖	F1007	2339024	sys/chassis-2/vd-c...	equipment-inoperable	2018-06-08T23:06:3	Virtual drive 1031 o...

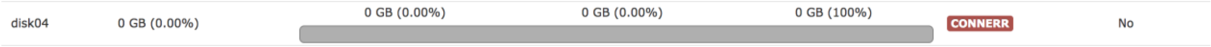
Severity : ✖ Critical/None
Last Transition : 2018-06-08T23:06:35Z

Affected object : sys/chassis-2/vd-container-1/vd-1031
Description : Virtual drive 1031 on chassis 2 operability: inoperable. Reason: Drive state: unknown
ID : 2339024
Type : equipment
Cause : equipment-inoperable
Created at : 2018-06-08T23:06:35Z
Code : F1007
Number of Occurrences : 1
Original severity : Critical
Previous severity : Critical
Highest severity : Critical

The disk was removed and replaced with a new disk.

If this is a used disk, you may clear foreign configuration in Cisco UCS before assigning it as Unconfigured Good.

The disk is replaced now in Cisco UCS, but supervisor still reports as CONNERR as shown below.

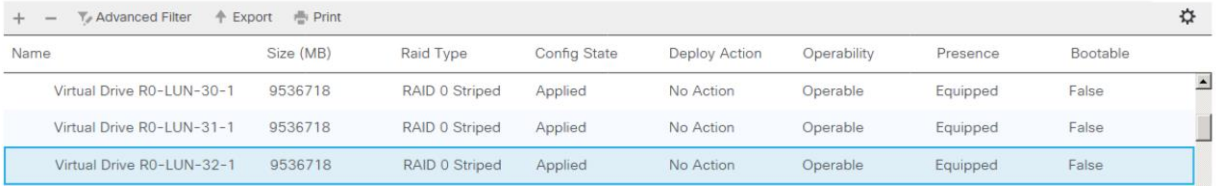


disk04	0 GB (0.00%)	0 GB (0.00%)	0 GB (0.00%)	0 GB (100%)	CONNERR	No

Disk is visible now to the OS, but there is no partition created.

```
[root@storage-node4 ~]# cat /proc/partitions | grep sdg
   8       96 9765599232 sdg
```

Cisco UCS shows that lun32 is a RAID-0 Lun

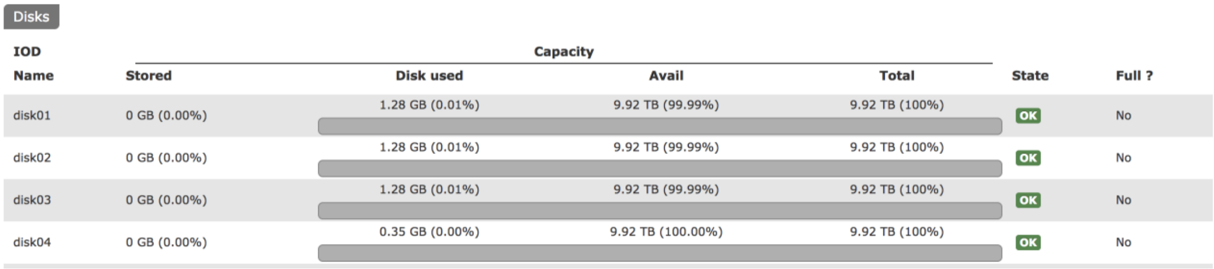


Name	Size (MB)	Raid Type	Config State	Deploy Action	Operability	Presence	Bootable
Virtual Drive R0-LUN-30-1	9536718	RAID 0 Striped	Applied	No Action	Operable	Equipped	False
Virtual Drive R0-LUN-31-1	9536718	RAID 0 Striped	Applied	No Action	Operable	Equipped	False
Virtual Drive R0-LUN-32-1	9536718	RAID 0 Striped	Applied	No Action	Operable	Equipped	False

Run Scalilty’s scaldisk command to make the disk join the cluster.

```
[root@storage-node4 ~]# scaldisk replace -d disk04 -c /dev/sdg

The username has been retrieved in /etc/scality-node-1/userdb/localhost instead
of in /etc/scality-node-1/confdb/r0.0/config.xml
Switch on the LED of the disk: disk04
Disk disk04 with basepath /scality/disk04
disk04 is going to be replaced with /dev/sdg
Please confirm [y/N] y
The username has been retrieved in /etc/scality-node-1/userdb/localhost instead
of in /etc/scality-node-1/confdb/r0.0/config.xml
Starting biziod for disk04
create a new GPT disk label on /dev/sdg (Module function partition.mklabel exe-
cuted)
make a primary partition on /dev/sdg (Module function partition.mkpart executed)
name the partition on /dev/sdg (Module function partition.name executed)
reread the partition table on /dev/sdg before formatting (Command "sleep 3 &&
blockdev --rereadpt /dev/sdg || true" run)
format /dev/sdg1 with an ext4 filesystem (Module function extfs.mkfs executed)
tune the ext4 filesystem on /dev/sdg1 (Module function extfs.tune executed)
leave udev time to update /dev/disk/by-* for /dev/sdg (Command "udevadm settle"
run)
mount /scality/disk04 and persist in fstab (check_cmd determined the state suc-
ceeded)
update systemd auto generated mount unit (Module function ser-
vice.systemctl_reload executed)
mount /scality/disk04 if systemd unmounted it (Command "systemctl start --now
/scality/disk04" run)
clear OOS PERM flag for disk04, ring DATA (OOS PERM flag is cleared for ring DATA
on disk disk04)
/scality/disk04/DATA/0 (Directory /scality/disk04/DATA/0 updated)
ensure biziod for disk04 is running (biziod for disk disk04 is running)
make node DATA-storage-node4-n1 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n1 reloaded keys for ring DATA from disk disk04)
make node DATA-storage-node4-n2 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n2 reloaded keys for ring DATA from disk disk04)
make node DATA-storage-node4-n3 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n3 reloaded keys for ring DATA from disk disk04)
make node DATA-storage-node4-n4 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n4 reloaded keys for ring DATA from disk disk04)
```

```
make node DATA-storage-node4-n5 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n5 reloaded keys for ring DATA from disk disk04)
make node DATA-storage-node4-n6 from ring DATA reload keys on disk04 (Node DATA-
storage-node4-n6 reloaded keys for ring DATA from disk disk04)
Switch off the LED of the disk: disk04
Disk disk04 with basepath /scality/disk04
[root@storage-node4 ~]#

[root@storage-node4 ~]# df -k | grep disk04
/dev/sdg1       9688468648  341400 9688110864   1% /scality/disk04
```



Disks

IOD	Capacity					
Name	Stored	Disk used	Avail	Total	State	Full ?
disk01	0 GB (0.00%)	1.28 GB (0.01%)	9.92 TB (99.99%)	9.92 TB (100%)	OK	No
disk02	0 GB (0.00%)	1.28 GB (0.01%)	9.92 TB (99.99%)	9.92 TB (100%)	OK	No
disk03	0 GB (0.00%)	1.28 GB (0.01%)	9.92 TB (99.99%)	9.92 TB (100%)	OK	No
disk04	0 GB (0.00%)	0.35 GB (0.00%)	9.92 TB (100.00%)	9.92 TB (100%)	OK	No

Note: For more information about scaldisk replace, please refer to the Scality documentation.

Bill of Materials

This section provides the BOM for the entire Scality Storage and Cisco UCS S3260 solution.

Table 6 Bill of Materials for Cisco Nexus 9332PQ

Item Name	Description	Quantity
N9K-C9332PQ	Nexus 9300 Series, 32p 40G QSFP+	2
CON-PSRT-9332PQ	PRTNR SS 8X5XNBD Nexus 9332 ACI Leaf switch with 32p 40G	2
NXOS-703I5.1	Nexus 9500, 9300, 3000 Base NX-OS Software Rel 7.0(3)I5(1)	2
N3K-C3064-ACC-KIT	Nexus 3K/9K Fixed Accessory Kit	2
QSFP-H40G-CU1M	40GBASE-CR4 Passive Copper Cable, 1m	10
NXA-FAN-30CFM-B	Nexus 2K/3K/9K Single Fan, port side intake airflow	8
CAB-C13-CBN	Cabinet Jumper Power Cord, 250 VAC 10A, C14-C13 Connectors	4
N9K-PAC-650W	Nexus 9300 650W AC PS, Port-side Intake	4

Table 7 Bill of Materials for Cisco UCS Fabric Interconnect 6332

Item Name	Description	Quantity
UCS-SP-FI6332-2X	UCS SP Select 6332 FI /No PSU/32 QSFP+	1
UCS-SP-FI6332	(Not sold standalone) UCS 6332 1RU FI/No PSU/32 QSFP+	2
UCS-PSU-6332-AC	UCS 6332 Power Supply/100-240VAC	4
CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 2 Meter Length	4
QSFP-H40G-CU3M	40GBASE-CR4 Passive Copper Cable, 3m	38
QSFP-40G-SR-BD	QSFP40G BiDi Short-reach Transceiver	8
N10-MGT014	UCS Manager v3.1	2
UCS-FAN-6332	UCS 6332 Fan Module	8
UCS-ACC-6332	UCS 6332 Chassis Accessory Kit	2
RACK-UCS2	Cisco R42610 standard rack, w/side panels	1
RP230-32-1P-U-2	Cisco RP230-32-U-2 Single Phase PDU 20x C13, 4x C19	2

Table 8 Bill of Materials for Cisco UCS S3260 Storage Server

Item Name	Description	Quantity

Item Name	Description	Quantity
UCSS-S3260	Cisco UCS S3260 Storage Server Base Chassis	6
UCSC-C3X60-10TB	UCS C3X60 10TB 12Gbps NL-SAS 7200RPM HDD w carrier-Top-load	312
UCS-C3X60-G2SD48	UCSC C3X60 480GB Boot SSD (Gen 2)	24
UCSC-PSU1-1050W	UCS C3X60 1050W Power Supply Unit	24
UCS-C3K-42HD10	UCS C3X60 3 row of 10TB NL-SAS drives (42 Total) 420TB	6
UCS-C3X60-12G280	UCSC C3X60 800GB 12Gbps SSD (Gen 2)	24
UCSC-C3X60-10TB	UCSC C3X60 10TB 4Kn for Top-Load	xx
CAB-C13-CBN	Cabinet Jumper Power Cord, 250 VAC 10A, C14-C13 Connectors	24
UCSC-C3260-SIOC	Cisco UCS C3260 System IO Controller with VIC 1300 incl.	12
UCSC-C3X60-RAIL	UCS C3X60 Rack Rails Kit	6
N20-BBLKD-7MM	UCS 7MM SSD Blank Filler	12
UCSS-S3260-BBEZEL	Cisco UCS S3260 Bezel	6
UCSC-C3K-M4SRB	UCS C3000 M4 Server Node for Intel E5-2600 v4	12
UCS-CPU-E52650E	2.20 GHz E5-2650 v4/105W 12C/05MB Cache/DDR4 2400MHz	24
UCS-MR-1X161RV-A	16GB DDR4-2400-MHz RDIMM/PC4-19200/single rank/x4/1.2v	256
UCS-C3K-M4RAID	Cisco UCS C3000 RAID Controller M4 Server w 4G RAID Cache	12
UCSC-HS-C3X60	Cisco UCS C3X60 Server Node CPU Heatsink	24
RHEL-2S2V-1A	Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 1-Yr Support Requirement	6

Table 9 Bill of Material for Cisco UCS C220 M4S

Item Name	Description	Quantity
UCSC-C220-M4S	UCS C220 M4 SFF w/o CPU, mem, HD, PCIe, PSU, rail kit	1
UCS-CPU-E52683E	2.10 GHz E5-2683 v4/120W 16C/40MB Cache/DDR4 2400MHz	2
UCS-MR-1X161RV-A	16GB DDR4-2400-MHz RDIMM/PC4-19200/single rank/x4/1.2v	8
UCS-HD600G10K12G	600GB 12G SAS 10K RPM SFF HDD	2
UCSC-MLOM-	Cisco VIC 1387 Dual Port 40Gb QSFP CNA MLOM	1

Item Name	Description	Quantity
C40Q-03		
UCSC-RAILB-M4	Ball Bearing Rail Kit for C220 M4 and C240 M4 rack servers	1
UCSC-PSU1-770W	770W AC Hot-Plug Power Supply for 1U C-Series Rack Server	2
CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 2 Meter Length	2
UCS-M4-V4-LBL	Cisco M4 - v4 CPU asset tab ID label (Auto-Expand)	2
N20-BBLKD	UCS 2.5 inch HDD blanking panel	6
UCSC-SCCBL220	Supercap cable 950mm	1
UCSC-MLOM-BLK	MLOM Blanking Panel	1
UCSC-HS-C220M4	Heat sink for UCS C220 M4 rack servers	2
UCSC-MRAID12G	Cisco 12G SAS Modular Raid Controller	1
UCSC-MRAID12G-1GB	Cisco 12Gbps SAS 1GB FBWC Cache module (Raid 0/1/5/6)	1
RHEL-2S2V-1A	Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 1-Yr Support Requirement	1

Appendix

Appendix A – Kickstart File of Supervisor Node for Cisco UCS C220 M4S

Kickstart File for Supervisor Node

```
#version=DEVEL

#from the linux installation menu, hit tab and append this:

#biosdevname=0 net.ifnames=0 ip=eth1:dhcp

#ks=ftp://192.168.10.2/{hostname}.cfg

# System authorization information

auth --enableshadow --passalgo=sha512

# Use CDROM installation media

cdrom

# Use text install

text

# Run the Setup Agent on first boot

firstboot --disable

selinux --disable

firewall --disable

# Keyboard layouts

keyboard --vckeymap=us --xlayouts='us'

# System language

lang en_US.UTF-8

# Network information

network  --bootproto=static --device=eth0 --ip=128.107.79.201 --netmask=255.255.255.0 --onboot=on --gateway=128.107.79.1 --nameserver=171.70.168.183 --ipv6=auto --activate

network  --bootproto=static --device=eth1 --ip=192.168.10.150 --netmask=255.255.255.0 --onboot=on --ipv6=auto --activate

network  --bootproto=static --device=eth2 --ip=192.168.20.150 --netmask=255.255.255.0 --onboot=on --ipv6=auto --activate

network  --hostname=supervisor


# Root password

rootpw --iscrypted $6$yfE2jHtdy.OSmO8g$InneiVXQI9Kc9m4w2cEiS8/og6BKUlu5HSR0eCYgh5dVaeCV54Q6piS7k10lalXignLCBvAZPqmw4dvYgy66V1
```

```
# System services
services --disabled="chronyd"
# System timezone
timezone America/Los_Angeles --isUtc --nontp
# System bootloader configuration
bootloader --append=" crashkernel=auto" --location=mbr --boot-drive=sda
# Partition clearing information
clearpart --drives=sda --all --initlabel
# Disk partitioning information
part /boot --fstype="ext4" --ondisk=sda --size=8192
part swap --fstype="swap" --ondisk=sda --size=32767
part /var --fstype="ext4" --ondisk=sda --grow
part / --fstype="ext4" --ondisk=sda --size=40960

reboot  --eject

%packages
@^minimal
@core
kexec-tools

%end

%addon com_redhat_kdump --enable --reserve-mb='auto'

%end

%anaconda
pwpolicy root --minlen=6 --minquality=50 --notstrict --nochanges --notempty
pwpolicy user --minlen=6 --minquality=50 --notstrict --nochanges --notempty
pwpolicy luks --minlen=6 --minquality=50 --notstrict --nochanges --notempty
%end
```

```
###############
#POST SCRIPT
###############
%post --log=/root/ks-post.log
###############
#GPT Labels for HDDs
###############
for i in a b {d..z} aa ab ac; do parted -s /dev/sd$i mklabel gpt; done;
###############
#Turn off Transparent Hugepages and ensure that hyperthreading
#is turned off.
###############
grubby --update-kernel=ALL --args="transparent_hugepage=never numa=off";
tuned-adm profile latency-performance;
systemctl enable ntpd;
###############
#Preconfigure /etc/hosts
###############
cat >> /etc/hosts <<EOF4
192.168.10.150          supervisor salt
192.168.10.164          storage-node1
192.168.10.165          storage-node2
192.168.10.166          storage-node3
192.168.10.167          storage-node4
192.168.10.168          storage-node5
192.168.10.169          storage-node6
192.168.10.170          storage-node7
192.168.10.171          storage-node8
192.168.10.172          storage-node9
192.168.10.173          storage-node10
192.168.10.174          storage-node11
192.168.10.175          storage-node12
EOF4
```

```
###############
#Setup ssh keys
###############
mkdir /root/.ssh;
cat > /root/.ssh/id_rsa <<EOF5
-----BEGIN RSA PRIVATE KEY-----
MIIEpAIBAAKCAQEAsYGqxWxQdGUsiUzafYLuX6MVD3mjq3r6KaLoQcNSuZ8F3Xfw
7WJWjmhuu/rurLVoA90fjZDQY6aEAdHSH+027mH6hfkMVqyunwQ6u3MtUqqkwRK2
NtEJqJBiHZw9+bmg0fyFYl5wBSWPGIig0kb8m+cBm0uRoE5SFFuAGc7usHkfIFlO
QQd9vz9h6OX8ba3c6yUAZDzWSnt2udyLOTqV4SPpQY4O2NvYgm1VpblHvUvmP7Yu
5yl8hxnoin+RmferTq8WwyZihMV0EyN4q5HfT+gdbSY6xPMM9UHF89+lYNNxdZ4/
VuBcbBskey3UbQ332KqA7wS+Sra2DXmnfysWbwIDAQABAoIBAQCbeRFUXiyR5lP9
5lyw9k9HYRX/OfGLLumSMnJyb1wzzP9cHcPeh/V8QihLadxHVZTHXZRXcHG19pFE
7rx2y7RVU2gUlDCkchd4nEG9EYKvF1u66GLE3I7zH5Nwj/sQkfAKMZ26rTC8sUsG
mBUUWKzE+K7FkIj6ud7WidZHxKH320k1lEcFOsH/nK1BXR29XmQ/O/Kg2hoV/KiM
1Y9CJngpghnybcDzlvpV6LS8bEiRieHJGT5RTyDk+adouSv+f2YtlpvSUIy7NAft
e1feAq3RWT82ZGyKTHWGTFNbfltcUjzPI/dcyS8AurYf+0QjJVAKhAl+yIn7lUrL
V6xKsdYBA0GBANwNb96gJHZUeSoOP/JCnTps+MeOhT1vyrhRRZf1IaFnEmX7hXmE
RKXaQUvGcOSPumZMkKYyqRN22B2PLM7n1DoypKshRmk1eq6tZ/W9gkYfIdno+QAx
AAVfUA8vJm9XLgkCAE402BHvtQ1w63Cfyg0F4V3OAsQv677F6ItROeiBAoGBAM6A
9quEOrPiRDiF25HnXXFUeRUXM4H77QB6WRV3AKggJjVlBXkhNt34g8Jr6/MfW4WO
SebQEwwBYH6NN7IG1Q0PeDRzrcv2voqzM7bV7l1rpc2E2BQhplcSyGr/aA6lWoOA
Ll/HZIdqb6OXXR8ImcPorfxuqUJ8e6SHskG6qAbvAoGAIrw4QXMT7l3NNndDXtFn
EjbrWkzD+XuxCoFA9Aisw1aKz/BRFGptj6SRFA4B+gI6ETXay3FJwRnMaXYVQ5/S
n8pjteOtwqO/dt1GgMLmUn1NkaMavw39C9wMvijaLo8apC9drvjBiqtE8Bc4AvIm
KUjeVzlStHdABkAlQgCTXIECgYEAur6BU4YWmAnsa7kRYRZ7uDsN7Ha4y7mJED+U
RAcD/wZjxzF+C5ZvybgtXyq9i3U2DMcqKaLNNrQgERGf5kyrak4tBDIAXozZ7xAz
mgpIrw7kN8EErt/nTyLbP3eNIIGEoLwgM9lbHeKw5p3BRok+lKi2lmtogX2VSqqo
FyC3RtoCgYADqOJ53sV7NEXfd/NG5D9bzS5yCKW+KNH4fzxAoAYhMBo3nAkgpa/1
rdjPH4f5bAMX6dKZCh5Sy9BFxgqbIotdjVGZBUPK8tboxbcnJ2F3+aLqo2fCfyr+
TfYW1tZ7g7gZJ+To42h4Tv9wj8iWGe+pnR4Moh3WqM1TttuaCJf1nQ==
-----END RSA PRIVATE KEY-----
EOF5
```

```
cat > /root/.ssh/id_rsa.pub <<EOF6

ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCxgarFbFBoZSyJTNp9gu5foxUPeaOrevopovRBw1K5nwXdd/DtYlaOaG67+u6stWgD3R+NkN
BjpoQBodIf6jbuYfqF+QxWrK6fBDq7cy1SqqTBErY20QmokGIdnD35uaCh/IViXnAFJY8YiKDSRvyb5wGbS5GgTlIUW4AZzu6weR8gWU5B
B32/P2Ho5fxtrdzrJQBkPNZKe3a53Is5OpXhI+lBjg7Y29iCbVWluUe9S+Y/ti7nKXyHGfSKf5GZ96tOrxbDJmKExXQTI3irkd9P6B1tJjrE8wz1Q
cXz36Vg03F1nj9W4FxsGyR7LdRtDffYqoDvBL5KtrYNead/KxZv root@storage-node7

EOF6

cat > /root/.ssh/authorized_keys <<EOF7

ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCxgarFbFBoZSyJTNp9gu5foxUPeaOrevopovRBw1K5nwXdd/DtYlaOaG67+u6stWgD3R+NkN
BjpoQBodIf6jbuYfqF+QxWrK6fBDq7cy1SqqTBErY20QmokGIdnD35uaCh/IViXnAFJY8YiKDSRvyb5wGbS5GgTlIUW4AZzu6weR8gWU5B
B32/P2Ho5fxtrdzrJQBkPNZKe3a53Is5OpXhI+lBjg7Y29iCbVWluUe9S+Y/ti7nKXyHGfSKf5GZ96tOrxbDJmKExXQTI3irkd9P6B1tJjrE8wz1Q
cXz36Vg03F1nj9W4FxsGyR7LdRtDffYqoDvBL5KtrYNead/KxZv root@storage-node7

EOF7

chmod 700 /root/.ssh;

chmod 600 /root/.ssh/authorized_keys;

chmod 600 /root/.ssh/id_rsa;

chmod 644 /root/.ssh/id_rsa.pub;

###############

# Remove NetworkManager, a core package which is not needed.

yum -y remove NetworkManager;

%end
```

Appendix B – Kickstart File of Storage Nodes for Cisco UCS S3260 M4 Server

Kickstart File for Storage-node1

```
#version=DEVEL

#from the linux installation menu, hit tab and append this:

#biosdevname=0 net.ifnames=0 ip=eth1:dhcp

#ks=ftp://192.168.10.2/{hostname}.cfg

# System authorization information

auth --enableshadow --passalgo=sha512

# Use CDROM installation media

cdrom

# Use text install

text

# Run the Setup Agent on first boot
```

```
firstboot --disable
selinux --disable
firewall --disable
# Keyboard layouts
keyboard --vckeymap=us --xlayouts='us'
# System language
lang en_US.UTF-8
# Network information
network  --bootproto=static --device=eth0 --ip=128.107.79.205 --netmask=255.255.255.0 --onboot=on --gateway=128.107.79.1 --nameserver=171.70.168.183 --ipv6=auto --activate
network  --bootproto=static --device=eth1 --ip=192.168.10.164 --netmask=255.255.255.0 --onboot=on --ipv6=auto --activate
network  --bootproto=static --device=eth2 --ip=192.168.20.164 --netmask=255.255.255.0 --onboot=on --ipv6=auto --activate
network  --hostname=storage-node1

# Root password
rootpw --iscrypted
$6$yfE2jHtdy.OSmO8g$InneiVXQI9Kc9m4w2cEiS8/og6BKUlu5HSR0eCYgh5dVaeCV54Q6piS7k10lalXignLCBvAZPqmw4dvYgy66V1
# System services
services --disabled="chronyd"
# System timezone
timezone America/Los_Angeles --isUtc --nontp
# System bootloader configuration
bootloader --append=" crashkernel=auto" --location=mbr --boot-drive=sdc
# Partition clearing information
clearpart --drives=sdc --all --initlabel
# Disk partitioning information
part /boot --fstype="ext4" --ondisk=sdc --size=8192
part swap --fstype="swap" --ondisk=sdc --size=32767
part /var --fstype="ext4" --ondisk=sdc --grow
part / --fstype="ext4" --ondisk=sdc --size=40960

reboot  --eject

%packages
```

```
@^minimal
@core
kexec-tools

%end

%addon com_redhat_kdump --enable --reserve-mb='auto'

%end

%anaconda
pwpolicy root --minlen=6 --minquality=50 --notstrict --nochanges --notempty
pwpolicy user --minlen=6 --minquality=50 --notstrict --nochanges --notempty
pwpolicy luks --minlen=6 --minquality=50 --notstrict --nochanges --notempty
%end

###############
#POST SCRIPT
###############
%post --log=/root/ks-post.log
###############
#GPT Labels for HDDs
###############
for i in a b {d..z} aa ab ac; do parted -s /dev/sd$i mklabel gpt; done;
###############
#Turn off Transparent Hugepages and ensure that hyperthreading
#is turned off.
###############
grubby --update-kernel=ALL --args="transparent_hugepage=never numa=off nr_cpus=24";
tuned-adm profile latency-performance;
systemctl enable ntpd;
###############
#Preconfigure /etc/hosts
```

```
###############
cat >> /etc/hosts <<EOF4
192.168.10.150          supervisor salt
192.168.10.164          storage-node1
192.168.10.165          storage-node2
192.168.10.166          storage-node3
192.168.10.167          storage-node4
192.168.10.168          storage-node5
192.168.10.169          storage-node6
192.168.10.170          storage-node7
192.168.10.171          storage-node8
192.168.10.172          storage-node9
192.168.10.173          storage-node10
192.168.10.174          storage-node11
192.168.10.175          storage-node12
EOF4
###############
#Setup ssh keys
###############
mkdir /root/.ssh;
cat > /root/.ssh/id_rsa <<EOF5
-----BEGIN RSA PRIVATE KEY-----
MIIEpAIBAAKCAQEAsYGqxWxQdGUsiUzafYLuX6MVD3mjq3r6KaLoQcNSuZ8F3Xfw
7WJWjmhuu/rurLVoA9ofjZDQY6aEAdHSH+o27mH6hfkMVqyunwQ6u3MtUqqkwRK2
NtEJqJBiHZw9+bmgofyFYl5wBSWPGIigokb8m+cBmouRoE5SFFuAGc7usHkfIFlO
QQd9vz9h6OX8ba3c6yUAZDzWSnt2udyLOTqV4SPpQY4O2NvYgm1VpblHvUvmP7Yu
5yl8hxnoin+RmferTq8WwyZihMVoEyN4q5HfT+gdbSY6xPMM9UHF89+lYNNxdZ4/
VuBcbBskey3UbQ332KqA7wS+Sra2DXmnfysWbwIDAQABAoIBAQCbeRFUXiyR5lP9
5lyw9k9HYRX/OfGLLumSMnJyb1wzzP9cHcPeh/V8QihLadxHVZTHXZRXcHG19pFE
7rx2y7RVU2gUlDCkchd4nEG9EYKvF1u66GLE3I7zH5Nwj/sQkfAKMZ26rTC8sUsG
mBUUWKzE+K7FkIj6ud7WidZHxKH32ok1lEcFOsH/nK1BXR29XmQ/O/Kg2hoV/KiM
1Y9CJngpghnybcDzlvpV6LS8bEiRieHJGT5RTyDk+adouSv+f2YtlpvSUIy7NAft
e1feAq3RWT82ZGyKTHWGTFNbfltcUjzPI/dcyS8AurYf+oQjJVAKhAl+yIn7lUrL
```

```
V6xKsdYBAoGBANwNb96gJHZUeSoOP/JCnTps+MeOhT1vyrhRRZf1IaFnEmX7hXmE
RKXaQUvGcOSPumZMkKYyqRN22B2PLM7n1DoypKshRmk1eq6tZ/W9gkYfIdno+QAx
AAVfUA8vJm9XLgkCAE402BHvtQ1w63CfygoF4V3OAsQv677F6ItROeiBAoGBAM6A
9quEOrPiRDiF25HnXXFUeRUXM4H77QB6WRV3AKggJjVlBXkhNt34g8Jr6/MfW4WO
SebQEwwBYH6NN7IG1QoPeDRzrcv2voqzM7bV7l1rpc2E2BQhplcSyGr/aA6lWoOA
Ll/HZIdqb6OXXR8ImcPorfxuqUJ8e6SHskG6qAbvAoGAIrw4QXMT7l3NNndDXtFn
EjbrWkzD+XuxCoFA9Aisw1aKz/BRFGptj6SRFA4B+gI6ETXay3FJwRnMaXYVQ5/S
n8pjteOtwqO/dt1GgMLmUn1NkaMavw39C9wMvijaLo8apC9drvjBiqtE8Bc4AvIm
KUjeVzlStHdABkAlQgCTXIECgYEAur6BU4YWmAnsa7kRYRZ7uDsN7Ha4y7mJED+U
RAcD/wZjxzF+C5ZvybgtXyq9i3U2DMcqKaLNNrQgERGf5kyrak4tBDIAXozZ7xAz
mgpIrw7kN8EErt/nTyLbP3eNIIGEoLwgM9lbHeKw5p3BRok+lKi2lmtogX2VSqqo
FyC3RtoCgYADqOJ53sV7NEXfd/NG5D9bzS5yCKW+KNH4fzxAoAYhMBo3nAkgpa/1
rdjPH4f5bAMX6dKZCh5Sy9BFxgqbIotdjVGZBUPK8tboxbcnJ2F3+aLqo2fCfyr+
TfYW1tZ7g7gZJ+To42h4Tv9wj8iWGe+pnR4Moh3WqM1TttuaCJf1nQ==
-----END RSA PRIVATE KEY-----
EOF5
cat > /root/.ssh/id_rsa.pub <<EOF6
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCxgarFbFBoZSyJTNp9gu5foxUPeaOrevopovRBw1K5nwXdd/DtYlaOaG67+u6stWgD3R+NkN
BjpoQBodIf6jbuYfqF+QxWrK6fBDq7cy1SqqTBErY20QmokGIdnD35uaCh/IViXnAFJY8YiKDSRvyb5wGbS5GgTlIUW4AZzu6weR8gWU5B
B32/P2Ho5fxtrdzrJQBkPNZKe3a53Is5OpXhI+lBjg7Y29iCbVWluUe9S+Y/ti7nKXyHGfSKf5GZ96tOrxbDJmKExXQTI3irkd9P6B1tJjrE8wz1Q
cXz36Vg03F1nj9W4FxsGyR7LdRtDffYqoDvBL5KtrYNead/KxZv root@storage-node7
EOF6
cat > /root/.ssh/authorized_keys <<EOF7
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCxgarFbFBoZSyJTNp9gu5foxUPeaOrevopovRBw1K5nwXdd/DtYlaOaG67+u6stWgD3R+NkN
BjpoQBodIf6jbuYfqF+QxWrK6fBDq7cy1SqqTBErY20QmokGIdnD35uaCh/IViXnAFJY8YiKDSRvyb5wGbS5GgTlIUW4AZzu6weR8gWU5B
B32/P2Ho5fxtrdzrJQBkPNZKe3a53Is5OpXhI+lBjg7Y29iCbVWluUe9S+Y/ti7nKXyHGfSKf5GZ96tOrxbDJmKExXQTI3irkd9P6B1tJjrE8wz1Q
cXz36Vg03F1nj9W4FxsGyR7LdRtDffYqoDvBL5KtrYNead/KxZv root@storage-node7
EOF7
chmod 700 /root/.ssh;
chmod 600 /root/.ssh/authorized_keys;
chmod 600 /root/.ssh/id_rsa;
chmod 644 /root/.ssh/id_rsa.pub;
###############
# Remove NetworkManger, a core package which is not needed.
yum -y remove NetworkManager;
```

```
%end
```

About the Authors

Vijay Durairaj, Cisco Systems, Inc.

Vijay Durairaj is a Technical Marketing Engineer in Cisco UCS and Data Center Solutions Group. Vijay has over 15 years of experience in IT Infrastructure, Server Virtualization and Cloud Computing. His current role includes building Cloud Computing Solutions, Software defined Storage solutions and Performance benchmarking on Cisco UCS platforms. Vijay also holds Cisco Unified Computing Design Certification.

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William Kettler is a Customer Solution Engineer Partner within Scality's Technical Services group. His current role includes helping customers deploy their petabyte-scale storage solutions, certifying strategic ISVs, and being a technical resource for Scality partners like Cisco.

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