

NetApp Verified Architecture

FlexPod Select for High-Performance Oracle RAC NVA Deployment

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1 Solution Overview

This NVA validates that the NetApp® FlexPod® Select solution can run Oracle databases in a highly resilient architecture while remaining competitive in both price and performance. This document addresses the scenarios that customers experience in their production Oracle databases.

The solution outlined in this NVA deployment guide was architected to deliver over 2 million input/output operations per second (IOPS) at microsecond-level average latency with a workload that is 100% random reads using an 8K request size. Additionally, NetApp validated that this solution delivers consistent performance using a variety of other mixed online transaction processing (OLTP) type workloads, such as:

- 90% reads, 10% writes, 100% random I/O using an 8K request size
- 80% reads, 20% writes, 100% random I/O using an 8K request size

1.1 Solution Technology

FlexPod Select uses technologies from Cisco and NetApp that are configured according to the companies' best practices. This section discusses the products and technologies leveraged in the solution.

NetApp EF560 Flash Array

The NetApp EF560 flash array is designed for performance-driven applications with microsecond-level latency requirements.

This solution uses the NetApp EF560 flash array as the underlying storage technology, which is built on storage architecture with more than 20 years of storage development experience and more than 750,000 systems in the field. Each EF560 flash array can deliver extreme consistent performance with microsecond-level response times, enabling business-critical applications to deliver faster results and improving the end-user experience. This combination of high IOPS and ultralow latency makes the EF560 flash array an ideal choice for database-driven applications that require extreme performance.

The EF560 flash array runs on the enterprise-proven NetApp SANtricity[®] platform, which is optimized for flash solutions and allows storage administrators to achieve maximum performance and capacity utilization. The extensive configuration flexibility, custom performance tuning, and complete control over data placement make it an ideal choice for mission-critical applications. Its GUI-based performance tools provide key information about storage input/output (I/O) from multiple viewpoints, allowing administrators to make informed decisions about configuration adjustments to further refine performance.

The NetApp EF560 flash array delivers extreme performance, reliability, and availability to drive greater speed and responsiveness from the applications controlling your key business operations.

The NetApp EF560 flash array can:

- Increase the speed of business with microsecond-level response times.
- Eliminate overprovisioning and improve IT efficiency.
- Achieve the transactional performance of 2,000 15K RPM drives in a two–rack unit (2RU) enclosure that requires just 5% of the available rack space, power, and cooling as compared to storage systems that run on spinning disks.
- Detect and resolve issues quickly with advanced monitoring and proactive repair.
- Protect against data loss and downtime with NetApp point-in-time images, remote replication, and other advanced data protection.
- Create copies of the database by using the NetApp Snapshot[®] volume feature.
- Replicate data to either an EF560 flash array or an E-Series system.

• Leverage the enterprise-proven SANtricity software platform.

By combining extreme IOPS, microsecond-level response times, scale-up capacity, and enterprisegrade reliability, the NetApp EF560 flash array helps you to increase productivity and achieve faster business results.

Cisco Unified Computing System

The Cisco Unified Computing System (Cisco UCS) is a next-generation solution for blade and rack server computing. The system integrates a low-latency, lossless 10 Gigabit Ethernet (10GbE) unified network fabric with enterprise-class, x86 architecture servers. The system is an integrated, scalable, multichassis platform in which all resources participate in a unified management domain. Cisco UCS accelerates the delivery of new services simply, reliably, and securely through end-to-end provisioning and migration support for both virtualized and nonvirtualized systems.

Cisco Nexus 5000

Cisco Nexus 5000 series switches are designed to deliver high-density, top-of-rack layer 2 and layer 3 10GbE with unified ports in compact 1RU and 2RU form factors. The Cisco Nexus 5000 series includes Cisco Nexus 5500 and 5600 platforms as part of the Cisco Unified Fabric portfolio.

The Cisco Nexus 5500 switches simplify convergence through broad connectivity support. This makes them ideal top-of-rack access switches for traditional and converged deployments. The Cisco 5500 switches are designed to meet the scalability demands of today's data centers. Key Cisco Nexus 5500 series features include:

- Up to 1,152 ports in a single management domain that uses Cisco Fabric Extender (FEX) architecture
- Up to 96 unified ports

Oracle Database

The Oracle Database 12c Enterprise Edition provides industry-leading performance, scalability, security, and reliability on clustered or single servers with a wide range of options to meet the business needs of critical enterprise applications. Oracle Real Application Cluster (RAC) brings an innovative approach to the challenges of rapidly increasing amounts of data and demand for high performance. Oracle RAC uses a scale-out model in which active-active clusters utilize multiple servers to deliver high performance, scalability, and availability.

Oracle Automatic Storage Management (Oracle ASM) provides an integrated cluster file system and volume-management features that remove the need for third-party volume management tools and reduce the complexity of the overall architecture.

Some of the key Oracle ASM features include:

- Automatic file and volume management
- Database file system with performance of raw I/O
- Automatic distribution and striping of data
- A choice of external (array-based) data protection, two-way, and three-way mirror protection
- Control over which copy of mirrored data should be used preferentially

With these capabilities, Oracle ASM provides an alternative to the third-party file system and volumemanagement solutions for database storage management tasks, such as creating or laying out databases and managing the use of disk space. Oracle ASM provides load balancing of I/O across all LUNs or files in an Oracle ASM disk group by distributing the contents of each data file evenly across the entire pool of storage in the disk group. The NetApp SANtricity plug-in for Oracle Enterprise Manager (Oracle EM) provides Oracle database administrators (DBAs) with powerful capabilities designed to increase their productivity and simplify their jobs. The plug-in is designed to access E-Series and EF-Series storage arrays used in conjunction with Oracle EM database software. This allows Oracle DBAs to monitor and report on the storage subsystems, with the ultimate goal of confirming the performance and availability of the infrastructure they use. Performance views that come with the plug-in help DBAs easily identify bottlenecks in the system. The plug-in also gives a view of the end-to-end database mapping to the storage and allows DBAs to create a database-to-storage topology report without accessing the storage layers underneath. The plug-in is free and does not require a license.

Key features of the Oracle EM plug-in include:

- Integration with Oracle Enterprise Manager 12c
- Support for NetApp E-Series and EF-Series storage arrays
- End-to-end storage volume-to-database mapping
- Integrated business intelligence publisher reports
- Automatic metrics collection on key storage array components
- Integrated database performance homepage

Oracle Linux

Oracle Linux brings the latest Linux innovations to market, delivering extreme performance, advanced scalability, and reliability for enterprise applications and systems along with worldwide, enterprise-class, low-cost support. It is free to download and distribute, including patches and updates. It is certified for compliance with the Linux Standard Base (LSB) standard. Oracle Linux is completely free to download, deploy, and distribute. Oracle Linux Support delivers enterprise-class support for Linux with Ksplice zero-downtime updates, premier backports, comprehensive management, and indemnification at significantly lower cost. Only Oracle delivers the industry's most complete integrated apps-to-disk Linux solutions.

1.2 Use-Case Summary

The NetApp FlexPod Select for Oracle solution, which can run high-performance Oracle databases in a highly resilient architecture, is competitive in terms of both price and performance. As part of this solution, the following use cases were validated:

- Deliver an architecture and a prescriptive reference deployment that provides a high level of resiliency against component failure.
- Deliver over two million random read IOPS with microsecond-level latency using an 8K request size.
- Demonstrate consistent performance and response time utilizing a workload that consists of 90% random reads and 10% random writes using an 8K block size.
- Demonstrate consistent performance and response time utilizing a workload that consists of 80% random reads and 20% random writes using an 8K block size.

The FlexPod Select for Oracle high-performance solution provides extreme reliability when deploying tier 1 enterprise applications. This document describes deployment procedures for the FlexPod Select for Oracle high-performance solution. In the architecture described in the document, an Oracle RAC setup is used along with Cisco and NetApp components to demonstrate the performance and scalability of the solution. Section 2, "Solution Validation," shows the performance characteristics of the solution in terms of IOPS and latency.

2 Solution Validation

2.1 Performance Testing Results

For all tests, NetApp used the Silly Little Oracle Benchmark (SLOB2) workload generator to simulate the I/O patterns that are likely to be encountered in actual Oracle production environments. SLOB2 drives different levels of simulated users, each generating the specific I/O patterns described previously in the use case section. After each test, NetApp recorded the physical database reads and average latency from the Oracle automatic workload repository reported by the Oracle database.

Figure 1 shows the IOPS and average latency observed by the database during testing with 100% random 8K reads. The load on the database was increased incrementally until the IOPS exceeded two million while simultaneously observing microsecond-level application latencies. The storage arrays are capable of delivering higher levels of IOPS provided the users have a tolerance for higher latency.



Figure 1) FlexPod Select for Oracle with eight RAC nodes showing 100% 8K random reads.

The results of the mixed workload use cases are shown in Table 1, which shows performance of the solution for all the use cases. Like 100% read workloads, we followed the same approach in running the workload to generate the IOPS with minimal latency.

Table 1) Solution validation results for all use cases.

Use Case	Max IOPS	Average Latency (µs)
100% random reads	2,076,637	700
90% random reads and 10% updates	1,400,395	600
80% random reads and 20% updates	1,300,909	1,040

3 Technology Requirements

This document is intended to provide an example of an environment that can be deployed using the best practices guidance for the FlexPod Select architecture. Additional resources can be added per the recommendations in the design guide for this solution (and companion to this document), <u>NVA-0012-DESIGN: FlexPod Select for High-Performance Oracle RAC</u>, and can be configured as necessary using the guidance in this document. Different models within the product families described as follows are acceptable as long as the models meet the physical cabling requirements specified in the design guide. Performance expectations for this environment are subject to change depending on the products used.

3.1 Hardware Requirements

Figure 2 shows the hardware components associated with this solution.



Figure 2) FlexPod Select for high-performance Oracle RAC solution architecture.

Table 2 lists the hardware components required to implement the solution and to achieve the previously defined performance objectives. The hardware components used in any particular implementation of this solution might vary based on customer requirements.

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Hardware	Quantity
Storage	·
NetApp EF560 dual-controller array	4
NetApp 16Gb Fibre Channel host interface card	8
NetApp 400GB SSD	96
Compute	
Cisco UCS fabric interconnect 6248	2
Cisco UCS 5108 chassis	2
Cisco B200M3 compute blade with 2 Intel Xeon E5- 2620 v2 processors and 64GB RAM	4
Cisco B200M3 compute blade with 2 Intel Xeon E5- 2650 v2 processors and 128GB RAM	4
Cisco UCS 1240 virtual interface card (VIC)	8
Cisco UCS 2208 FEX	4
Network	-
Cisco Nexus 5548UP switch	2
Cisco 8Gb Fibre Channel SFP (DS-SFP-FC8G-SW)	32

3.2 Software Requirements

Table 3 lists the software components required to implement the solution. The software components used in any particular implementation of the solution may vary based on customer requirements.

Table 37 Sollware requirements.

Software	Version		
Storage	Storage		
NetApp EF560 firmware version	8.20.08.00		
NetApp SANtricity Storage Manager	11.20.0G00.0006		
Compute			
Cisco UCS Manager	2.2(5b)		
Cisco UCS firmware bundle	2.2(5b)		
Cisco UCS 1240 VIC fnic driver	1.6.0.18		
Cisco UCS 1240 VIC enic driver	2.1.1.67		

Software	Version	
Network		
Cisco Nexus NX-OS	6.0(2)N1(2a)	
Operating System		
Oracle Enterprise Linux (OEL)	6.6	
Application Software		
Oracle Real Application Clusters (RAC) 12.1.0.2.0		
SLOB tool	2.3	

3.3 Configuration Guidelines

This document describes the configuration of a fully redundant, highly available FlexPod unit with NetApp E-Series storage. We've clearly identified which component is being configured in each step or procedure, for example, Cisco Nexus 5548UP switch A and Cisco Nexus 5548UP switch B. The Cisco UCS fabric interconnects are similarly identified.

Additionally, this document provides steps for provisioning multiple Cisco UCS hosts.

This document is intended to enable you to fully configure the customer environment. In this process, various steps require you to insert customer-specific naming conventions, IP addresses, and VLAN schemes, as well as to record appropriate MAC addresses. Table 4 describes the VLANs necessary for deployment as outlined in this guide. Table 5 lists the hosts necessary for deployment as outlined in this guide.

VLAN Name	VLAN Purpose	Value Used in Validating This Document	Customer Value
Management	VLAN for management interfaces	3160	
Native	VLAN to which untagged frames are assigned	2	
RAC Cluster VLAN for Oracle RAC intercluster node communication		3161	
FCoE-VLAN-A	VLAN for FCoE traffic for fabric A	101	
FCoE-VLAN-B	VLAN for FCoE traffic for fabric B	102	

Table 4) Necessary VLANs.

Table 5) Host machines created.

Machine Description	Host Name
Qty 8 Oracle RAC servers	
SANtricity management system	

Table 6 lists the configuration variables that are used throughout this document. This table can be completed based on the specific site variables and used in implementing the document configuration steps.

Table 6) Configuration variables.

Description	Customer Value
EF560 controller 01a host name	

Description	Customer Value
EF560 controller 01a management IP address	
EF560 controller 01a channel 1 WWPN	
EF560 controller 01a channel 2 WWPN	
EF560 controller 01a channel 3 WWPN	
EF560 controller 01a channel 4 WWPN	
EF560 controller 01b host name	
EF560 controller 01b management IP address	
EF560 controller 01b channel 1 WWPN	
EF560 controller 01b channel 2 WWPN	
EF560 controller 01b channel 3 WWPN	
EF560 controller 01b channel 4 WWPN	
EF560 controller 02a host name	
EF560 controller 02a management IP address	
EF560 controller 02a channel 1 WWPN	
EF560 controller 02a channel 2 WWPN	
EF560 controller 02a channel 3 WWPN	
EF560 controller 02a channel 4 WWPN	
EF560 controller 02b host name	
EF560 controller 02b management IP address	
EF560 controller 02b channel 1 WWPN	
EF560 controller 02b channel 2 WWPN	
EF560 controller 02b channel 3 WWPN	
EF560 controller 02b channel 4 WWPN	
EF560 controller 03a host name	
EF560 controller 03a management IP address	
EF560 controller 03a channel 1 WWPN	
EF560 controller 03a channel 2 WWPN	
EF560 controller 03a channel 3 WWPN	
EF560 controller 03a channel 4 WWPN	
EF560 controller 03b host name	
EF560 controller 03b management IP address	
EF560 controller 03b channel 1 WWPN	
EF560 controller 03b channel 2 WWPN	
EF560 controller 03b channel 3 WWPN	

Description	Customer Value
EF560 controller 03b channel 4 WWPN	
EF560 controller 04a host name	
EF560 controller 04a management IP address	
EF560 controller 04a channel 1 WWPN	
EF560 controller 04a channel 2 WWPN	
EF560 controller 04a channel 3 WWPN	
EF560 controller 04a channel 4 WWPN	
EF560 controller 04b host name	
EF560 controller 04b management IP address	
EF560 controller 04b channel 1 WWPN	
EF560 controller 04b channel 2 WWPN	
EF560 controller 04b channel 3 WWPN	
EF560 controller 04b channel 4 WWPN	
Cisco Nexus A host name	
Cisco Nexus B host name	
Cisco Nexus VPC domain ID	
Global NTP server IP address	
Global DNS server IP address	
Cisco UCS manager cluster system name	
Cisco UCS manager password	
Cisco UCS fabric interconnect (FI) A management IP address	
Management network netmask	
Management network default gateway	
Cisco UCS manager cluster IP address	
Cisco UCS FI B management IP address	
RAC SCAN IP addresses 1	
RAC SCAN IP addresses 2	
RAC SCAN IP addresses 3	
RAC cluster subnet mask	
RAC private interconnect subnet mask	
Public virtual IP (VIP) subnet mask	
Management IP address of RAC-SERVER-01	
RAC cluster IP address of RAC-SERVER-01	

Description	Customer Value
RAC private interconnect address of RAC- SERVER-01	
Public virtual IP (VIP) addresses of RAC- SERVER-01	
WWPN of RAC-SERVER-01 A Port 1	
WWPN of RAC-SERVER-01 A Port 2	
WWPN of RAC-SERVER-01 B Port 1	
WWPN of RAC-SERVER-01 B Port 2	
Management IP address of RAC-SERVER-02	
RAC cluster IP address of RAC-SERVER-02	
RAC private interconnect address of RAC- SERVER-02	
Public VIP addresses of RAC-SERVER-02	
WWPN of RAC-SERVER-02 A Port 1	
WWPN of RAC-SERVER-02 A Port 2	
WWPN of RAC-SERVER-02 B Port 1	
WWPN of RAC-SERVER-02 B Port 2	
Management IP address of RAC-SERVER-03	
RAC cluster IP address of RAC-SERVER-03	
RAC private interconnect address of RAC- SERVER-03	
Public VIP addresses of RAC-SERVER-03	
WWPN of RAC-SERVER-03 A Port 1	
WWPN of RAC-SERVER-03 A Port 2	
WWPN of RAC-SERVER-03 B Port 1	
WWPN of RAC-SERVER-03 B Port 2	
Management IP address of RAC-SERVER-04	
RAC cluster IP address of RAC-SERVER-04	
RAC private interconnect address of RAC- SERVER-04	
Public VIP addresses of RAC-SERVER-04	
WWPN of RAC-SERVER-04 A Port 1	
WWPN of RAC-SERVER-04 A Port 2	
WWPN of RAC-SERVER-04 B Port 1	
WWPN of RAC-SERVER-04 B Port 2	
Management IP address of RAC-SERVER-05	
RAC cluster IP address of RAC-SERVER-05	

Description	Customer Value
RAC private interconnect address of RAC- SERVER-05	
Public VIP addresses of RAC-SERVER-05	
WWPN of RAC-SERVER-05 A Port 1	
WWPN of RAC-SERVER-05 A Port 2	
WWPN of RAC-SERVER-05 B Port 1	
WWPN of RAC-SERVER-05 B Port 2	
Management IP address of RAC-SERVER-06	
RAC cluster IP address of RAC-SERVER-06	
RAC private interconnect address of RAC- SERVER-06	
Public VIP addresses of RAC-SERVER-06	
WWPN of RAC-SERVER-06 A Port 1	
WWPN of RAC-SERVER-06 A Port 2	
WWPN of RAC-SERVER-06 B Port 1	
WWPN of RAC-SERVER-06 B Port 2	
Management IP address of RAC-SERVER-07	
RAC cluster IP address of RAC-SERVER-07	
RAC private interconnect address of RAC- SERVER-07	
Public VIP addresses of RAC-SERVER-07	
WWPN of RAC-SERVER-07 A Port 1	
WWPN of RAC-SERVER-07 A Port 2	
WWPN of RAC-SERVER-07 B Port 1	
WWPN of RAC-SERVER-07 B Port 2	
Management IP address of RAC-SERVER-08	
RAC cluster IP address of RAC-SERVER-08	
RAC private interconnect address of RAC- SERVER-08	
Public VIP addresses of RAC-SERVER-08	
WWPN of RAC-SERVER-08 A Port 1	
WWPN of RAC-SERVER-08 A Port 2	
WWPN of RAC-SERVER-08 B Port 1	
WWPN of RAC-SERVER-08 B Port 2	

4 Deployment Procedures

The following subsections describe the deployment of the overall solution and include specific steps to install and configure the technology components described in section 3, "Technology Requirements," into a consumable solution.

Note: Note that some of the specific names used in these sections, for example, group names or file names, are examples and might not be the same for all environments.

4.1 Physical Infrastructure Layout

The physical layout of the integrated reference architecture is explained in this section. Included are graphical layouts, which provide helpful cabling diagrams for all equipment in the design. Correct cabling is instrumental in achieving correct and efficient operation of the infrastructure, both in the initial deployment and in the ongoing lifecycle.

NetApp EF-Series Storage Controllers

Follow the guidelines in Table 7 when unpacking and racking all of the storage controllers for this solution. Proper adherence to these guidelines is essential for the equipment to operate properly.

Requirement	Reference	Comments
Physical site where storage system will be installed must be ready	NetApp EF560 Flash Array Site Preparation Guide	Refer to the section "Specifications of the EF560 Flash Array" of the NetApp EF560 Flash Array Site Preparation Guide.
Storage system connectivity requirements for out-of-band management	NetApp EF560 Flash Array Hardware Cabling Guide	Refer to the section "Cabling for Out-of-Band Management" of the NetApp EF560 Flash Array Hardware Cabling Guide.
Storage system power, cooling, air flow, temperature, and humidity requirements	NetApp EF560 Flash Array Site Preparation Guide	Refer to the section "Specifications of the EF560 Flash Array" of the NetApp EF560 Flash Array Site Preparation Guide.

Table 7) Requirements for unpacking and racking of all storage controllers in solution.

Cisco Unified Computing System Fabric Interconnect and Chassis

Follow the guidelines in Table 8 when installing the Cisco UCS FI6248 fabric interconnects and the Cisco UCS 5108 chassis in the data center. Proper adherence to these guidelines is essential in order for the equipment to operate as expected.

Table 8) Requirements for installing Cisco UCS FI6248 fabric interconnects and Cisco UCS 5108 chassis in data center.

Requirement	Reference	Comments
Physical site where compute system will be installed must be ready	Cisco UCS Site Preparation Guide	
Compute system power, cooling, air flow, temperature, and humidity requirements	Cisco UCS Site Preparation Guide	

Cisco Nexus 5548UP Switches

Follow the guidelines in Table 9 when installing the Cisco Nexus 5548UP switches in the data center. Proper adherence to these guidelines is essential in order for the equipment to operate as expected.

Requirement	Reference	Comments
Physical site where switches need to be installed must be ready	Cisco Nexus 5000 Series Hardware Installation Guide	
Switch power, cooling, air flow, temperature, and humidity requirements	Cisco Nexus 5000 Series Hardware Installation Guide	Refer to section "Technical Specifications" in the Cisco Nexus 5000 Series Hardware Installation Guide.

Table 9) Requirements for installing Cisco Nexus 5548UP switches in data center.

Physical Cabling

Figure 3 and Figure 4 show the hardware components of the solution. Use them as a guide to visualize the physical connectivity between the solution components.

Note: Because of the size of the physical cabling diagram, the detail of the information contained within it, and the limitations of the PDF format for enlarging it, it has been broken up into two parts.

The prescribed connectivity was tested during the verification of this solution and provided the observed performance results. Following the diagram is a series of tables that correspond to each component of the solution.



Figure 3) Physical cabling diagram for Cisco UCS and Cisco Nexus switches.

	NetApp EF560
= used 10Gb FCoE Port = used 8Gb FC port = used 10Gb Ethernet Port	Device 1 Device 2

Figure 4) Physical cabling diagram for NetApp EF560 arrays.

Table 10) Cisco UCS B-Series 5801 Chassis 1 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
Cisco UCS 5108 Chassis 1	FEX2208 A Port 1	10GbE	Cisco UCS FI6248 1	1/1	1
	FEX2208 A Port 2	10GbE	Cisco UCS FI6248 1	1/2	2
	FEX2208 A Port 3	10GbE	Cisco UCS FI6248 1	1/3	3
	FEX2208 A Port 4	10GbE	Cisco UCS FI6248 1	1/4	4
	FEX2208 A Port 5	10GbE	Cisco UCS FI6248 1	1/5	5
	FEX2208 A Port 6	10GbE	Cisco UCS FI6248 1	1/6	6
	FEX2208	10GbE	Cisco UCS FI6248 1	1/7	7

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	A Port 7				
	FEX2208 A Port 8	10GbE	Cisco UCS FI6248 1	1/8	8
	FEX2208 B Port 1	10GbE	Cisco UCS FI6248 2	1/1	71
	FEX2208 B Port 2	10GbE	Cisco UCS FI6248 2	1/2	72
	FEX2208 B Port 3	10GbE	Cisco UCS FI6248 2	1/3	73
	FEX2208 B Port 4	10GbE	Cisco UCS FI6248 2	1/4	74
	FEX2208 B Port 5	10GbE	Cisco UCS FI6248 2	1/5	75
	FEX2208 B Port 6	10GbE	Cisco UCS FI6248 2	1/6	76
	FEX2208 B Port 7	10GbE	Cisco UCS FI6248 2	1/7	77
	FEX2208 B Port 8	10GbE	Cisco UCS FI6248 2	1/8	78

Table 11) Cisco UCS B-Series 5108 Chassis 2 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
Cisco UCS 5108 Chassis 2	FEX2208 A Port 1	10GbE	Cisco UCS FI6248 1	1/9	9
	FEX2208 A Port 2	10GbE	Cisco UCS FI6248 1	1/10	10
	FEX2208 A Port 3	10GbE	Cisco UCS FI6248 1	1/11	11
	FEX2208 A Port 4	10GbE	Cisco UCS FI6248 1	1/12	12
	FEX2208 A Port 5	10GbE	Cisco UCS FI6248 2	1/13	13
	FEX2208 A Port 6	10GbE	Cisco UCS FI6248 2	1/14	14
	FEX2208 A Port 7	10GbE	Cisco UCS FI6248 2	1/15	15
	FEX2208 A Port 8	10GbE	Cisco UCS FI6248 2	1/16	16
	FEX2208	10GbE	Cisco UCS FI6248 1	1/9	79

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	B Port 1				
	FEX2208 B Port 2	10GbE	Cisco UCS FI6248 1	1/10	80
	FEX2208 B Port 3	10GbE	Cisco UCS FI6248 1	1/11	81
	FEX2208 B Port 4	10GbE	Cisco UCS FI6248 1	1/12	82
	FEX2208 B Port 5	10GbE	Cisco UCS FI6248 2	1/13	83
	FEX2208 B Port 6	10GbE	Cisco UCS FI6248 2	1/14	84
	FEX2208 B Port 7	10GbE	Cisco UCS FI6248 2	1/15	85
	FEX2208 B Port 8	10GbE	Cisco UCS FI6248 2	1/16	86

Table 12) Cisco UCS Fabric Interconnect 6248UP A cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cablin g Code
Cisco UCS Fabric Interconnect 6248UP A	1/1	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 1	1
	1/2	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 2	2
	1/3	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 3	3
	1/4	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 4	4
	1/5	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 5	5
	1/6	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 6	6
	1/7	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 7	7
	1/8	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 A Port 8	8
	1/9	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 1	9
	1/10	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 2	10
	1/11	10GbE	Cisco UCS 5108 Chassis 2	FEX2208	11

Local Device	Local Port	Connection	Remote Device	Remote Port	Cablin g Code
				A Port 3	
	1/12	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 4	12
	1/13	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 5	13
	1/14	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 6	14
	1/15	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 7	15
	1/16	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 A Port 8	16
	1/17	10GbE	Cisco Nexus 5548UP 1	Eth1/1	17
	1/18	10GbE	Cisco Nexus 5548UP 1	Eth1/2	18
	1/19	10GbE	Cisco Nexus 5548UP 1	Eth1/3	19
	1/20	10GbE	Cisco Nexus 5548UP 1	Eth1/4	20
	1/21	10GbE	Cisco Nexus 5548UP 1	Eth1/5	21
	1/22	10GbE	Cisco Nexus 5548UP 1	Eth1/6	22
	1/23	10GbE	Cisco Nexus 5548UP 1	Eth1/7	23
	1/24	10GbE	Cisco Nexus 5548UP 1	Eth1/8	24
	1/25	10GbE	Cisco Nexus 5548UP 1	Eth1/9	87
	1/26	10GbE	Cisco Nexus 5548UP 1	Eth1/10	88
	1/27	10GbE	Cisco Nexus 5548UP 1	Eth1/11	89
	1/28	10GbE	Cisco Nexus 5548UP 1	Eth1/12	90
	1/29	10GbE	Cisco Nexus 5548UP 1	Eth1/13	91
	1/30	10GbE	Cisco Nexus 5548UP 1	Eth1/14	92
	1/31	10GbE	Cisco Nexus 5548UP 1	Eth2/1	25
	1/32	10GbE	Cisco Nexus 5548UP 2	Eth2/1	26
	MGMT0	GbE	GbE management switch (not shown)	Any	Not shown
	L1	GbE	Cisco UCS FI6248 2	L1	Not shown
	L2	GbE	Cisco UCS FI6248 2	L2	Not shown

Table 13) Cisco UCS Fabric Interconnect 6248UP B cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cablin g Code
Cisco UCS Fabric Interconnect 6248UP B	1/1	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 1	71
	1/2	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 2	72
	1/3	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 3	73
	1/4	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 4	74
	1/5	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 5	75
	1/6	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 6	76
	1/7	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 7	77
	1/8	10GbE	Cisco UCS 5108 Chassis 1	FEX2208 B Port 8	78
	1/9	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 1	79
	1/10	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 2	80
	1/11	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 3	81
	1/12	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 4	82
	1/13	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 5	83
	1/14	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 6	84
	1/15	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 7	85
	1/16	10GbE	Cisco UCS 5108 Chassis 2	FEX2208 B Port 8	86
	1/17	10GbE	Cisco Nexus 5548UP 2	Eth1/1	27
	1/18	10GbE	Cisco Nexus 5548UP 2	Eth1/2	28
	1/19	10GbE	Cisco Nexus 5548UP 2	Eth1/3	29
	1/20	10GbE	Cisco Nexus 5548UP 2	Eth1/4	30
	1/21	10GbE	Cisco Nexus 5548UP 2	Eth1/5	31

Local Device	Local Port	Connection	Remote Device	Remote Port	Cablin g Code
	1/22	10GbE	Cisco Nexus 5548UP 2	Eth1/6	32
	1/23	10GbE	Cisco Nexus 5548UP 2	Eth1/7	33
	1/24	10GbE	Cisco Nexus 5548UP 2	Eth1/8	34
	1/25	10GbE	Cisco Nexus 5548UP 2	Eth1/9	93
	1/26	10GbE	Cisco Nexus 5548UP 2	Eth1/10	94
	1/27	10GbE	Cisco Nexus 5548UP 2	Eth1/11	95
	1/28	10GbE	Cisco Nexus 5548UP 2	Eth1/12	96
	1/29	10GbE	Cisco Nexus 5548UP 2	Eth1/13	97
	1/30	10GbE	Cisco Nexus 5548UP 2	Eth1/14	98
	31	10GbE	Cisco Nexus 5548UP 1	Eth2/2	35
	32	10GbE	Cisco Nexus 5548UP 2	Eth2/2	36
	MGMT0	GbE	GbE management switch (not shown)	Any	Not shown
	L1	GbE	Cisco UCS FI6248 1	L1	Not shown
	L2	GbE	Cisco UCS FI6248 2	L2	Not shown

Table 14) Cisco Nexus 5548UP Switch A cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
Cisco Nexus 5548UP	Eth1/1	10GbE	Cisco UCS FI6248 1	1/17	17
Switch A	Eth 1/2	10GbE	Cisco UCS FI6248 1	1/18	18
	Eth 1/3	10GbE	Cisco UCS FI6248 1	1/19	19
	Eth 1/4	10GbE	Cisco UCS FI6248 1	1/20	20
	Eth 1/5	10GbE	Cisco UCS FI6248 1	1/21	21
	Eth 1/6	10GbE	Cisco UCS FI6248 1	1/22	22
	Eth 1/7	10GbE	Cisco UCS FI6248 1	1/23	23
	Eth 1/8	10GbE	Cisco UCS FI6248 1	1/24	24
	Eth 1/9	10GbE	Cisco UCS FI6248 1	1/25	87
	Eth 1/10	10GbE	Cisco UCS FI6248 1	1/26	88
	Eth 1/11	10GbE	Cisco UCS FI6248 1	1/27	89
	Eth 1/12	10GbE	Cisco UCS FI6248 1	1/28	90

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	Eth 1/13	10GbE	Cisco UCS FI6248 1	1/29	91
	Eth 1/14	10GbE	Cisco UCS FI6248 1	1/30	92
	FC 1/17	8Gb FC	EF560 Array 1	HIC 1 Port 1	37
	FC 1/18	8Gb FC	EF560 Array 1	HIC 1 Port 2	38
	FC 1/19	8Gb FC	EF560 Array 1	HIC 2 Port 1	41
	FC 1/20	8Gb FC	EF560 Array 1	HIC 2 Port 2	42
	FC 1/21	8Gb FC	EF560 Array 2	HIC 1 Port 1	45
	FC 1/22	8Gb FC	EF560 Array 2	HIC 1 Port 2	46
	FC 1/23	8Gb FC	EF560 Array 2	HIC 2 Port 1	49
	FC 1/24	8Gb FC	EF560 Array 2	HIC 2 Port 2	50
	FC 1/25	8Gb FC	EF560 Array 3	HIC 1 Port 1	53
	FC 1/26	8Gb FC	EF560 Array 3	HIC 1 Port 2	54
	FC 1/27	8Gb FC	EF560 Array 3	HIC 2 Port 1	57
	FC 1/28	8Gb FC	EF560 Array 3	HIC 2 Port 2	58
	FC 1/29	8Gb FC	EF560 Array 4	HIC 1 Port 1	61
	FC 1/30	8Gb FC	EF560 Array 4	HIC 1 Port 2	62
	FC 1/31	8Gb FC	EF560 Array 4	HIC 2 Port 1	65
	FC 1/32	8Gb FC	EF560 Array 4	HIC 2 Port 2	66
	Eth 2/1	10GbE	Cisco UCS FI6248 1	1/31	25
	Eth 2/2	10GbE	Cisco UCS FI6248 2	1/31	35
	Eth 2/3	10GbE	Cisco Nexus 5548UP 2	Eth 2/3	69
	Eth 2/4	10GbE	Cisco Nexus 5548UP 2	Eth 2/4	70

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	Mgmt0	1GbE	GbE management switch (not shown)	Any	Not shown

Table 15) Cisco Nexus 5548UP Switch B cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
Cisco Nexus 5548UP	Eth1/1	10GbE	Cisco UCS FI6248 2	1/17	27
Switch B	Eth 1/2	10GbE	Cisco UCS FI6248 2	1/18	28
	Eth 1/3	10GbE	Cisco UCS FI6248 2	1/19	29
	Eth 1/4	10GbE	Cisco UCS FI6248 2	1/20	30
	Eth 1/5	10GbE	Cisco UCS FI6248 2	1/21	31
	Eth 1/6	10GbE	Cisco UCS FI6248 2	1/22	32
	Eth 1/7	10GbE	Cisco UCS FI6248 2	1/23	33
	Eth 1/8	10GbE	Cisco UCS FI6248 2	1/24	34
	Eth 1/9	10GbE	Cisco UCS FI6248 2	1/25	93
	Eth 1/10	10GbE	Cisco UCS FI6248 2	1/26	94
	Eth 1/11	10GbE	Cisco UCS FI6248 2	1/27	95
	Eth 1/12	10GbE	Cisco UCS FI6248 2	1/28	96
	Eth 1/13	10GbE	Cisco UCS FI6248 2	1/29	97
	Eth 1/14	10GbE	Cisco UCS FI6248 2	1/30	98
	FC 1/17	8Gb FC	EF560 Array 1	HIC 1 Port 3	39
	FC 1/18	8Gb FC	EF560 Array 1	HIC 1 Port 4	40
	FC 1/19	8Gb FC	EF560 Array 1	HIC 2 Port 3	43
	FC 1/20	8Gb FC	EF560 Array 1	HIC 2 Port 4	44
	FC 1/21	8Gb FC	EF560 Array 2	HIC 1 Port 3	47
	FC 1/22	8Gb FC	EF560 Array 2	HIC 1 Port 4	48
	FC 1/23	8Gb FC	EF560 Array 2	HIC 2 Port 3	51
	FC 1/24	8Gb FC	EF560 Array 2	HIC 2 Port 4	52

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	FC 1/25	8Gb FC	EF560 Array 3	HIC 1 Port 3	55
	FC 1/26	8Gb FC	EF560 Array 3	HIC 1 Port 4	56
	FC 1/27	8Gb FC	EF560 Array 3	HIC 2 Port 3	59
	FC 1/28	8Gb FC	EF560 Array 3	HIC 2 Port 4	60
	FC 1/29	8Gb FC	EF560 Array 4	HIC 1 Port 3	63
	FC 1/30	8Gb FC	EF560 Array 4	HIC 1 Port 4	64
	FC 1/31	8Gb FC	EF560 Array 4	HIC 2 Port 3	67
	FC 1/32	8Gb FC	EF560 Array 4	HIC 2 Port 4	68
	Eth 2/1	10GbE	Cisco UCS FI6248 1	1/32	26
	Eth 2/2	10GbE	Cisco UCS FI6248 2	1/32	36
	Eth 2/3	10GbE	Cisco Nexus 5548UP 1	Eth 2/3	69
	Eth 2/4	10GbE	Cisco Nexus 5548UP 1	Eth 2/4	70
	Mgmt0	1GbE	GbE management switch (not shown)	Any	Not shown

Table 16) NetApp EF560 1 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
NetApp EF560 1	HIC 1 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/17	37
	HIC 1 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/18	38
	HIC 1 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/17	39
	HIC 1 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/18	40
	HIC 2 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/19	41
	HIC 2 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/20	42
	HIC 2 Port	8Gb FC	Cisco Nexus 5548UP 2	FC 1/19	43

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	3				
	HIC 2 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/20	44
	Controller 1 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown
	Controller 2 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown

Table 17) NetApp EF560 2 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
NetApp EF560 2	HIC 1 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/21	37
	HIC 1 Port 2	8Gb FC	Gb FC Cisco Nexus 5548UP 1		38
	HIC 1 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/21	39
	HIC 1 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/22	40
	HIC 2 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/23	41
	HIC 2 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/24	42
	HIC 2 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/23	43
	HIC 2 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/24	44
	Controller 1 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown
	Controller 2 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown

Table 18) NetApp EF560 3 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
NetApp EF560 3	HIC 1 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/25	53
	HIC 1 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/26	54
	HIC 1 Port	8Gb FC	Cisco Nexus 5548UP 2	FC 1/25	55

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
	3				
	HIC 1 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/26	56
	HIC 2 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/27	57
	HIC 2 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/28	58
	HIC 2 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/27	59
	HIC 2 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/28	60
	Controller 1 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown
	Controller 2 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown

Table 19) NetApp EF560 4 cabling.

Local Device	Local Port	Connection	Remote Device	Remote Port	Cabling Code
NetApp EF560 4	HIC 1 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/29	61
	HIC 1 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/30	62
	HIC 1 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/29	63
	HIC 1 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/30	64
	HIC 2 Port 1	8Gb FC	Cisco Nexus 5548UP 1	FC 1/31	65
	HIC 2 Port 2	8Gb FC	Cisco Nexus 5548UP 1	FC 1/32	66
	HIC 2 Port 3	8Gb FC	Cisco Nexus 5548UP 2	FC 1/31	67
	HIC 2 Port 4	8Gb FC	Cisco Nexus 5548UP 2	FC 1/32	68
	Controller 1 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown
	Controller 2 Port 1	1 GbE	GbE management switch (not shown)	Any	Not shown

4.2 Cisco UCS Configuration

This section provides detailed procedures for configuring the Cisco Unified Computing System (Cisco UCS) for use in a FlexPod environment. The steps are required in order to provision the Cisco UCS B-Series servers and must be followed precisely to avoid improper configuration.

This deployment guide assumes that the Cisco UCS environment has the correct code version for the Cisco UCS management interface and that the correct firmware for the solution has been installed.

This section does not require the completion of any other sections of this document, but it does require that the equipment has been racked and cabled as per section 4.1, "Physical Infrastructure Layout."

Perform Initial Setup of Cisco UCS 6248 Fabric Interconnect for FlexPod Environments

Cisco UCS Fabric Interconnect 6248 1

To configure the Cisco UCS environment for use in a FlexPod environment, complete the following steps:

1. Connect to the console port on the first Cisco UCS 6248 Fabric Interconnect.



2. Wait for the login prompt to verify that the configuration has been saved.

Cisco UCS Fabric Interconnect 6248 2

To configure the Cisco UCS environment for use in a FlexPod environment, complete the following steps:

1. Connect to the console port on the second Cisco UCS 6248 Fabric Interconnect.

```
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:
Peer Fabric interconnect Mgmt0 IPv4 Netmask:
Cluster IPv4 address :
Peer FI is IPv4 Cluster enabled. Please Provide Local Fabric Interconnect Mgmt0 IPv4 Address
Physical Switch Mgmt0 IP address :
Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes
Applying configuration. Please wait.
Configuration file - 0k
```

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

Log in to Cisco UCS Manager

To log in to the Cisco UCS environment, complete the following steps:

- 1. Open a web browser and navigate to the Cisco UCS 6248 Fabric Interconnect cluster address.
- 2. Click the Launch UCS Manager link to download the Cisco UCS Manager software.
- 3. If prompted to accept security certificates, accept as necessary.
- 4. When prompted, enter admin as the user name and enter the Cisco UCS administrator password.
- 5. To log in to Cisco UCS Manager, click Login. Upon successful login, the following screen should be displayed:

🔺 Cisco Unified Computing System Manager - icefs	1-ucs1	- • •
Fault Summary	💿 💿 🖪 New 👻 🔀 Options 🥝 🕕 Pending Activities 🔟 Exit	cisco
	>> 🛱 Equipment	Equipment
Equipment Servers LAN SAN VM Admin	🔋 🛱 Main Topology View 📧 Fabric Interconnects 🧠 Servers 🧹 Thermal 🕸 Decommissioned 📥 Firmware Management 💆 Policies 👗	Faults
Filter: All	ି କ୍ କ୍ କ୍	
• •	ahah	
⊡-∰ Equipment	cisco	
⇒i Chassis ⊟-≪ Rack-Mounts		
FEX Servers		
Fabric Interconnects		
	Fabric Interconnect A (primary) Fabric Interconnect B (subordinate)	
	All Links Up Some Links Down All Links Down	
	Save Changes	Reset Values
Logged in as admin@172.20.160.20	System Time: 2014-0	D7-10T12:36

Upgrade Cisco UCS Manager to UCSM Release 2.2(5b)

- 1. In Cisco UCS Manager, in the navigation pane, click the Equipment tab.
- 2. In the list on the left, select Equipment.
- 3. On the right, select the Firmware Management tab and then the Installed Firmware tab.
- 4. If the Cisco UCS Manager Running Version in the center pane is not 2.2(5b), refer to <u>http://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-manager/products-installation-guides-list.html</u> and select the appropriate Upgrade Guide to upgrade the Cisco UCS system to Release 2.2(5b). Install the version 2.2(5b) Infrastructure, B-Series, and C-Series software bundles.

Add Block of IP Addresses for Out-of-Band KVM Access

To create a block of IP addresses for server keyboard, video, mouse (KVM) access in the Cisco UCS environment, complete the following steps:

- **Note:** This block of IP addresses should be in the same subnet as the management IP addresses for the Cisco UCS Manager.
- 1. In Cisco UCS Manager, in the navigation pane, click the LAN tab.
- 2. Select Pools > Root > IP Pools > IP Pool Ext-Mgmt.

🛕 Cisco Unified Computing System Manager - ic	efs1-ucs1	- • •
Fault Summary	🕻 🕒 🎒 🖪 New - 🕞 Options 🛛 🕜 🕕 Pending Activities 🛛 🚺 Exit	alada
	>> = LAN > Pools > IP Pools > IP Pools > IP Pool ext-mgmt	IP Pool ext-mgmt
Continuent Commune 10NI Cont Una Admin	General IP Addresses IP Blocks Faults Events	
Equipment Servers Centre SAN VIVI Admin	Actions	
Filter: All	Actions Properties Select Name: ext-mgmt Create Block of IPv4 Addresses GUD: 0000000-0000-0000-0000000000 Ster: 0 Assigned: 0 Assigned: 0 Assigned: 0 Assigned: 0 Assigned: 0 Show Pool Usage Sequential	ve Changes Reset Values
Logged in as admin@172.20.160.20	System	Time: 2014-07-10T12:38

- 3. In the Actions pane, select Create Block of IP Addresses.
- 4. Enter the starting IP address of the block, the number of IP addresses required, and the subnet and gateway information.

📥 Create Bloc	k of IPv4 Addresses			—		
Create a Block of IPv4 Addresses						
From:	0.0.0.0	Size:		1 📩		
Subnet Mask:	255.255.255.0	Default Gateway:	0.0.0.0			
Primary DNS:	0.0.0.0	Secondary DNS:	0.0.0.0			
				OK Cancel		

- 5. Click OK to create the IP block.
- 6. Click OK in the confirmation message.

Synchronize Cisco UCS to NTP

To synchronize the Cisco UCS environment to the NTP server, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Admin tab.
- 2. Select All > Timezone Management.
- 3. In the Properties pane, select the appropriate time zone in the Timezone menu.
- 4. Click Save Changes and then click OK.
- 5. Click Add NTP Server.
- 6. Enter the IP address of the global NTP server and click OK.
- 7. Click OK.

Edit Chassis Discovery Policy

Setting the discovery policy simplifies the addition of Cisco UCS B-series chassis and C-series servers. To modify the chassis discovery policy, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Equipment tab and select Equipment in the list on the left.
- 2. In the right pane, click the Policies tab.
- 3. Under Global Policies, set the Chassis/FEX Discovery Policy to 8-link or set it to match the number of uplink ports that are cabled between the chassis and the fabric interconnects.
- 4. Set the Link Grouping Preference to Port Channel.

🔺 Cisco Unified Computing System Manager - ic	efs1-uc1	
Fault Summary	🕻 😋 🌑 🗳 New 🚽 🔁 Options 🛛 🕐 🕕 🗛 Pending Activities 🛛 🚺 Exit	alialia
		Equipment
0 1 4 2	See Equipment	Servers
LAN SAN VM Admin Storage Equipment Servers	Version of the second s	Taults
Filter: All	Global Policies Autoconfig Policies Server Inheritance Policies Blade Server Discovery Policies SEL Policy Power Groups	
	Chassis/FEX Discovery Policy	
	Action: 8 Link	
Chassis Rack-Mounts	Link Grouping Preference: O None O Port Channel	
Servers	Rack Server Discovery Policy	
Fabric Interconnects Fabric Interconnect A (subordinate)	Action: Immediate User Acknowledged	
Ethernet Ports	Scrub Policy: <not set=""></not>	
FC Ports	Rack Management Connection Policy	
	Action: O Auto Acknowledged User Acknowledged	
	Power Policy	
	Redundancy: ONN Redundant ON+1 OGrid	
	MAE Address Table Aging	
	Aging Time: Never Mode Default other	
	Global Power Allocation Policy	
	Allocation Method: O Manual Blade Level Cap O Policy Driven Chassis Group Cap	
	Firmware Auto Sync Server Policy	
	Sync State: O Auto Acknowledge O User Acknowledge No Actions	
	Info Policy	
	Action: Disabled Enabled	
	Save Channes	Reset Values
A Logged in as admin@172.20.160.20	System Time: 201	15-10-21T11:10

- 5. Click Save Changes.
- 6. Click OK.

Enable Server and Uplink Ports

To enable server and uplink ports, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Equipment tab.
- 2. Select Equipment > Fabric Interconnects > Fabric Interconnect A (primary) > Fixed Module.
- 3. Expand Ethernet Ports.
- 4. Select ports 1 through 16 that are connected to the chassis, right-click them, and select Configure as Server Port.
- 5. Click Yes to confirm server ports and click OK.
- 6. Select ports 31 and 32 that are connected to the Cisco Nexus 5548 switches, right-click them, and select Configure as Uplink Ports. These ports carry non-SAN Ethernet traffic between the switches and the fabric interconnect ports.
- 7. Click Yes to confirm uplink ports and click OK.
- 8. Select ports 17 through 30, which serve as FCoE uplinks to the Cisco Nexus 5548 switch 1. Rightclick them and select Configure as FCoE Uplink Port.
- 9. Click Yes to confirm FCoE uplink ports and click OK.
- 10. In the left pane, navigate to Fabric Interconnect A. In the right pane, navigate to the Physical Ports tab > Ethernet Ports tab. Confirm that the ports in the If Role column have been configured correctly.

Cisco Unified Computing System Manager - ice	fs1-uc1						
ault Summary	10	Jew 🚽 🕞 Ontions	🔗 🚯 🗛 Pending Activities 🛛 🔞	Fxit			al
🔕 🔻 🛆 🔺				_XIC			c
0 1 4 2	>> 📑 Equip	oment 🕨 🎫 Fabric In	terconnects 🕨 🎫 Fabric Interconnect A	(subordinate) 🕨 🧱	🖩 Fixed Module 🕨 🕂 🚺 E	thernet Ports	
	Ethernet P	orts					
Equipment Servers	🔍 Filter 👄	Export 🈹 Print If I	Role: 🔨 🟹 All 🛛 Unconfigured 📝 Na	stwork 🔽 Server	🔽 FCoE Uplink 🔽 Un	ified Uplink 🔽 Appliance	Sto ⊧
Equipment Servers	Slot	Dort ID	MAC If Dolo	If Turne	Quoral Status	A desinistrativo Stato	F
Filter: All	5100	Port ID		Intype	Overall Status		
	1	1	54:7F:EE:90:ED:00 perver	Physical	T Up	T Enabled	-11
Equipment	1	3	54:7F:EE:90:EB:00 Server	Physical	t Up	Enabled	-
Chassis	1	4	54:7E:EE:90:EB:08 Server	Physical	t Up		-
Rack-Mounts	1	5	54:71:122:50:20:00 Delver	Physical	t Up	Enabled	-
	1	6	54:7F:EE:90:EB:0D Server	Physical	t Up	Enabled	-
Servers	1	7	54:7F:FE:90:FB:0F Server	Physical	t Up	 Enabled 	-
Fabric Interconnects	1	8	54:7E:EE:90:EB:0E Server	Physical	t Un	 Enabled 	-
Fabric Interconnect A (suboruinate)	1	9	54:7E:EE:90:EB:10 Server	Physical	t Un	 Enabled 	-
	1	10	54-7E-EE-90-EB-11 Server	Physical	t Un	Enabled	-
FC Ports	1	11	54:7E:EE:90:EB:12 Server	Physical	t Un	Enabled	-
🗄 🔛 Fans	1	12	54-7E-EE-90:EB-13 Server	Physical	t Un	Enabled	-
🕀 🙀 PSUs	1	13	54:7E:EE:90:EB:14 Server	Physical	t Un	Enabled	-
Fabric Interconnect B (primary)	1	14	54:7E:EE:90:EB:15 Server	Physical	t Up	Enabled	-
	1	15	54:7E:EE:90:EB:16 Server	Physical	t Up	Enabled	-
	1	16	54-7E:EE:90:EB:17 Server	Physical	t Un	Enabled	-
	1	17	54:7E:EE:90:EB:18 Ecce Liplink	Physical	* Up	Enabled	-
	1	18	54:7E:EE:90:EB:19 Ecce Uplink	Physical	t Un	Enabled	-
	1	19	54:7E:EE:90:EB:14 Ecce Uplink	Physical	t Un	Enabled	-
	1	20	54:7E:EE:90:EB:1B Ecce Unlink	Physical	t Un	Enabled	-
	1	20	54:7E:EE:90:EB:1C Ecce Uplink	Physical	t Un	Enabled	-
	1	22	54:7E:EE:90:EB:1D Ecoe Uplink	Physical	t Un	Enabled	
	1	23	54:7E:EE:90:EB:1E Ecoe Uplink	Physical	t Up	Enabled	-1
	1	24	54:7E:EE:90:EB:1E Ecoe Uplink	Physical	t Up	Enabled	
	1	25	54:7E:EE:90:EB:20 Ecce Unlink	Physical	1 Up	Enabled	-
	1	26	54:7E:EE:90:EB:21 Ecce Unlink	Physical	1 Up	Enabled	
	1	27	54:7E:EE:90:EB:22 Ecoe Unlink	Physical	1 Un	Enabled	
	1	28	54:7E:EE:90:EB:23 Ecce Unlink	Physical	1 Un	Enabled	
	1	29	54:7E:EE:90:EB:24 Ecce Unlink	Physical	1 Up	Enabled	-
	1	30	54:7E:EE:90:EB:25 Ecce Uplink	Physical	1 Up	Enabled	-
	1	31	54:7E:EE:90:EB:26 Network	Physical	1 Un	Enabled	-
	1	32	54:7E:EE:90:EB:27 Network	Physical	1 Un	Enabled	
		32	54:/f:EE:9U:EB:2/ Network	Physical	T Up	Changer Peret Val	195
							10.3
gged in as admin@172.20.160.20					System	1 Time: 2015-10-21T11:11	

Note: You might have to scroll to the top of the main pane to see the Physical Ports tab.

- 11. Repeat the preceding steps for Fabric Interconnect B (subordinate).
- 12. In the left pane, navigate to Fabric Interconnect B (subordinate). In the right pane, navigate to the Physical Ports tab > Ethernet Ports tab. Confirm that the ports in the If Role column have been configured correctly.

📤 Cisco Unified Computing System Manager - icef	s1-uc1							
Fault Summary	🛛 🕥 🖬 N	ew 🚽 🍃 Options	🕜 🔒 🔺 Pending	Activities 🛛 👩	Exit			սիսիս
🛛 🔍 🗸 🖉		1 22 -2			-			cisco
0 1 4 2	>> 👸 Equip	ment 🕨 🚥 Fabric Ir	nterconnects 🕨 🔤 Fabri	c Interconnect I	B (primary) 🕨 🎫 Fix	ed Module 🕨 🕂 🚺 Etherr	net Ports –I	et Ports
LAN SAN VM Admin Storage	Ethernet Po	orts						
Equipment Servers	🔍 Filter 👄	Export 📚 Print If	Role: 🔨 📝 All 👿 Unc	onfigured 🔽 N	Vetwork 🔽 Server	🔽 FCoE Uplink 🔍 Uni	fied Uplink 📝 Appliance S	ito 🕨
Filter: 📶 🔽	Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative State	
• -	1	1	00:2A:6A:B3:10	Server	Physical	1 Up	Enabled	_^
	1	2	00:2A:6A:B3:10	Server	Physical	T Up	T Enabled	
	1	3	00:2A:6A:B3:10	Server	Physical	T Up	T Enabled	_
Rack-Mounts	1	4	00:2A:6A:B3:10	Server	Physical	T Up	T Enabled	
- Min FEX	1	5	UU:2A:6A:B3:1U	Server	Physical	T Up	T Enabled	_
Servers	1	6	UU:2A:6A:B3:1U	Server	Physical	T Up	T Enabled	_
E E Fabric Interconnects	1	7	00:2A:6A:B3:10	Server	Physical	1 Up	Enabled	_
Fabric Interconnect A (subordinate)	1	8	00:2A:6A:B3:10	Server	Physical	1 Up	Enabled	
E Fabric Interconnect B (primary)	1	9	00:2A:6A:B3:10	Server	Physical	1 Up	1 Enabled	_
E Fixed Module	1	10	00:2A:6A:B3:10	Server	Physical	1 Up	1 Enabled	
	1	11	00:2A:6A:B3:10	Server	Physical	1 Up	1 Enabled	
FL Ports	1	12	00:2A:6A:B3:10	Server	Physical	1 Up	1 Enabled	
	1	13	00:2A:6A:B3:10	Server	Physical	🏦 Up	1 Enabled	
1905	1	14	00:2A:6A:B3:10	Server	Physical	🕇 Up	1 Enabled	
	1	15	00:2A:6A:B3:10	Server	Physical	🕇 Up	1 Enabled	
	1	16	00:2A:6A:B3:10	Server	Physical	1 Up	1 Enabled	
	1	17	00:2A:6A:B3:10	Fcoe Uplink	Physical	🕇 Up	1 Enabled	
	1	18	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	
	1	19	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	
	1	20	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	
	1	21	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	-
	1	22	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	
	1	23	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	- 11
	1	24	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	
	1	25	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	- 11
	1	26	00:2A:6A:B3:10	Fcoe Uplink	Physical	1 Up	1 Enabled	- 11
	1	27	00:2A:6A:B3:10	Ecoe Uplink	Physical	t Un	Enabled	- 11
	1	28	00:2A:6A:B3:10	Ecoe Uplink	Physical	1 Un	Enabled	- 11
	1	29	00:2A:6A:B3:10	Ecoe Uplink	Physical	* Un	Enabled	- 11
	1	30	00:24:64:B3:10	Ecoe Uplink	Physical	t Un	Enabled	- 11
	-	31	00:24:64:83:10	Network	Physical	t Up	Enabled	- 11
	1	32	00:24:64:B3:10	Network	Physical	1 Up	Enabled	- 11
	-	02	DOIZHIOHIDOITOIII	NOCHOIN	ritysical	• •	- Endblod	
								-
						Save	Changes Reset Valu	Jes
A Logged in as admin@172.20.160.20						System	Time: 2015-10-21T11:13	

Note: You might have to scroll to the top of the main pane to see the Physical Ports tab.

Acknowledge Cisco UCS Chassis

To acknowledge all Cisco UCS chassis, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Equipment tab.
- 2. Expand Chassis and select each chassis that is listed.
- 3. Right-click each chassis and select Acknowledge Chassis.
| 📥 Cisco Unified Computing System Manager - ice | fs1-ucs1 | 3 |
|---|--|-----|
| Fault Summary | 🕞 🌑 🗳 New - 🔽 Options 🕜 🕕 🗛 Pending Activities 🔽 📴 Exit | alu |
| | S Registrant & S Charles & State 1 | Ĩ |
| | Test-Jud Examples CELLage Dever Cashed Mander Cashed Mander Cashed Hader Example Example CEM Statistics Temperatures Dever | |
| Equipment Servers LAN SAN VM Admin | General Servers Service Profiles IO Modules Fans PSUs Hybrid Display Slots | |
| Filter: All | Fault Summary Physical Display | |
| | | |
| E-gg Equipment
E-sg Chassis | | |
| Chassis 1 | | |
| | Overall Status: Overall Status: Overa | |
| IO Module 1
 | Status Details 🛞 | |
| B PSUs | | |
| ⊕-sp bervers ⊕-sp Chassis 2 | Configuration State: Ok | |
| Rack-Mounts | Operability: Operable Prover: | |
| Servers | Thermal: † Ok | |
| Fabric Interconnects Fabric Interconnect A (primary) | | |
| ⊕ 🔤 Fabric Interconnect B (subordinate) | Actions Properties | |
| | ID: 1 Acknowledge Chassis Product Name: Cisco UCS 5108 | |
| | PLC Decommission Chassis Vendor: Cisco Systems Inc PID: N20-C6508 | |
| | Revision: 0 Serial: F0X1438GN15 | |
| | Turn on Locator LED User Label: | |
| | View POST Results Part Details | |
| | Start Fault Suppression Power State Details | |
| | Stop Fault Suppression | |
| | Suppression Task Properties Power Control Details | |
| | | |
| | | |
| | | |
| | | |
| | Save Changes Reset Values | |
| A Logged in as admin@172.20.160.20 | System Time: 2014-07-10T09:14 | - |

4. Click Yes and then click OK to complete acknowledging the chassis.

Create Uplink Port Channels to Cisco Nexus 5548UP Switches

To configure the necessary port channels in the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
 - **Note:** In this procedure, two port channels are created: one from Fabric A to both Cisco Nexus 5548UP switches and one from Fabric B to both Cisco Nexus 5548UP switches.
- 2. Under LAN > LAN Cloud, expand the Fabric A node.

Cisco Unified Computing System Manager - ice	fs1-ucs1					- • •
	🤇 🔘 🛄 Net	v 👻 🛃 Options 🛛 🕜 🌒	Pending Activities	it		dialo cisco
0 0 1 3	>> ELAN +	◯ LAN Cloud ト 📧 Fabric A	→ Port Channels			↔ Port Channels
Equipment Servers LAN SAN VM Admin		s Filter 🖙 Export 🔂 Print				
Filter: All	Name	Fabric ID	If Type	If Role	Transport	
						<u> </u>
AN CLAN Cloud CLAN Cloud Fabric A Uplink the Interfaces VLAN Optimization Sets VLAN Optimization Sets VLAN Groups VLAN For Groups VLANS VLANS VLANS Policies Policies Policies Netflow Monitoring Sessions Netflow Monitoring					Save Chan	Pes Reset Values
A Logged in as admin@172.20.160.20					System Time: 20	014-07-10T09:15

- 3. Right-click Port Channels.
- 4. Select Create Port Channel.
- 5. Enter 15 as the unique ID of the port channel.
- 6. Enter vPC-15 as the name for the port channel.

🔺 Create Port Channel		
Unified C	Computing System Manager	
Create Port Channel	Set Port Channel Name 0	
1. √ <u>Set Port Channel Name</u> 2. □ <u>Add Ports</u>		
	ID: 0 0	
	Name: UPC-15	
	<pre></pre>)

- 7. Click Next.
- 8. Select the following ports to be added to the port channel:
 - Slot ID 1 and port 31
 - Slot ID 1 and port 32
- 9. Click the double right-arrow button (>>) to add the ports to the port channel.

🔺 Create Port Channel									×
Unified C	comp	uting	Syst	em	Mar	nager	-		
Create Port Channel 1. √ <u>Set Port Channel Name</u>	Add Port	ts							0
2. √ <u>Add Ports</u>	Ports					Ports in the po	ort channel		
	Slot ID	Port	MAC	Ę		Slot ID	Port	MAC	Ę
				^		1	31	54:7F:EE:90:EB:26	
				_		1	32	54:7F:EE:90:EB:27	- 1
				- 11					
				- 11					
				- 11	>>				
				- 11	<<				
				- 11					
				- 11					
				- 11					
				- 11					
				- 11					
				T					~
							- Prov	Next > Finich	ancel
							< Prev		ancei

- 10. Click Finish to create the port channel.
- 11. Click OK.
- 12. In the navigation pane, under LAN > LAN Cloud, expand the Fabric B node.
- 13. Right-click Port Channels.
- 14. Select Create Port Channel.
- 15. Enter 16 as the unique ID of the port channel.
- 16. Enter vPC-16 as the name for the port channel.

🔺 Create Port Channel	
Unified C	Computing System Manager
Create Port Channel	Set Port Channel Name @
1. ✓ <u>Set Port Channel Name</u> 2. □ odd Ports	
<u>Add Ports</u>	
	ID: 16
	Name: (VFC-10)
	< Prev Next > Finish Cancel

- 17. Click Next.
- 18. Select the following ports to be added to the port channel:
 - Slot ID 1 and port 31
 - Slot ID 1 and port 32
- 19. Click the double left-arrow button (>>) to add the ports to the port channel.

📥 Create Port Channel									×
Unified C	omp	uting	Syst	em	Mar	nager			
Create Port Channel 1. √Set Port Channel Name	Add Port	ts							0
2. √ <u>Add Ports</u>	Ports					Ports in the po	vt channel		
	Slot ID	Port	MAC	Ę		Slot ID	Port	MAC	Ę
				^		1	31	00:2A:6A:B3:10:86	-
						1	32	00:2A:6A:B3:10:87	
					~~~				
					<<				
				-					-
							< Prev	Next > Finish C	ancel

- 20. Click Finish to create the port channel.
- 21. Click OK.

### **Create an Organization**

Organizations are used to organize resources and restrict access to various groups within the IT organization, thereby enabling multi-tenancy of the compute resources.

**Note:** Although this document does not assume the use of organizations, this procedure provides instructions for creating one.

To configure an organization in the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, from the New menu in the toolbar at the top of the window, select Create Organization.
- 2. Enter a name for the organization.
- 3. Optional: Enter a description for the organization.
- 4. Click OK.
- 5. Click OK in the confirmation message.

#### **Create MAC Address Pools**

To configure the necessary MAC address pools for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
- 2. Select Pools > Root.

**Note:** In this procedure, two MAC address pools are created: one for each switching fabric.

3. Right-click MAC Pools under the root organization.

- 4. Select Create MAC Pool to create the MAC address pool.
- 5. Enter MAC-POOL-A as the name for the MAC pool.
- 6. Optional: Enter a description for the MAC pool.

Note: Keep the Assignment Order value as Default.

📥 Create MAC Pool	
Unified Co	omputing System Manager
Create MAC Pool	Define Name and Description 🥹
<ol> <li>√Define Name and Description</li> <li>2. ^{Add MAC Addresses} </li> </ol>	Name: MAC-POOL-A Description: Assignment Order: O Default O Sequential
	< Prev Next > Finish Cancel

🛕 Create MAC Pool				×
Unified Co	omputi	ing Syster	n Manag	jer
Create MAC Pool	Add MAC A	ddresses		0
<u>Description</u> 2. √ <u>Add MAC Addresses</u>	Name	From	То	<b>P</b>
		🛨 Add 👕 De	lete	
		< Prev	Next > Finish	Cancel

- 8. Click Add.
- 9. Specify a starting MAC address.
  - **Note:** For the FlexPod solution, the NetApp recommendation is to place 0A in the next-to-last octet of the starting MAC address to identify all of the MAC addresses as Fabric A addresses.
- 10. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources.



- 11. Click OK.
- 12. Click Finish.
- 13. In the confirmation message, click OK.
- 14. Right-click MAC Pools under the root organization.
- 15. Select Create MAC Pool to create the MAC address pool.
- 16. Enter MAC-POOL-B as the name for the MAC pool.
- 17. Optional: Enter a description for the MAC pool.

Note: Select Default for the Assignment Order.

🛆 Create MAC Pool	
Unified Co	omputing System Manager
Create MAC Pool	Define Name and Description 🤨
1. ✓ <u>Define Name and</u>	
2. ✓ <u>Add MAC Addresses</u>	Name: MAC-POOL-B
	Assignment Order: <ul> <li>Default</li> <li>Sequential</li> </ul>
	< Prev Next > Finish Cancel

Create MAC Pool	omputi	ng Syste	m Manag	ger
Create MAC Pool 1. √ <u>Define Name and</u>	Add MAC A	ddresses		Ø
2. √ <u>Add MAC Addresses</u>	Name	From	То	- -
		🖪 Add 👕	Delete	
		< Prev	Next > Finish	Cancel

- 19. Click Add.
- 20. Specify a starting MAC address.
  - **Note:** For the FlexPod solution, the recommendation is to place **OB** in the next-to-last octet of the starting MAC address to identify all the MAC addresses in this pool as Fabric B addresses.
- 21. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources.

📥 Create a Block of MAC Addresses	<b>—</b>
Create a Block of MAC Addresses	0
First MAC Address: 00:25:85:00:0B:00	Size: 32
	OK Cancel

🛕 Create MAC Pool				23	
Unified Computing System Manager					
Create MAC Pool 1. √ <u>Define Name and</u>	Add MAC Addresses			0	
2. √ <u>Add MAC Addresses</u>	Name	From	То	<b>₽</b>	
	[00:25:85:00:08:00 - 00:25:85:00:08:1F]	00:25:85:00:08:00	00:25:85:00:08:1F	*	
	+ Add	Delete		-	
		< Prev Next >	Finish Car	icel	

23. Click Finish.

24. In the confirmation message, click OK.

### **Create WWNN Pools**

To configure the necessary worldwide node name (WWNN) pools for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the SAN node in the navigation pane.
- 2. Select Pools > Root.

🛕 Cisco Unified Computing System Manager - ic	efs1-ucs1		
Fault Summary	🕻 🤤 💷 New - 🏹 Options 🔞 🕕	Pending Activities	alialia cisco
	>> 🚍 SAN + 🛞 Pools + 🙏 root		🙏 root
Equipment Servers LAN SAN VM Admin	General Sub-Organizations Pools Policies	Faults Events	
Filter: All	Fault Summary	Properties	
• •	🛛 🔍 🖉 🛆 🛆	Name: root	
SAN		Description:	
B-O Storage Cloud	Actions	Level: ROOC	
Policies     Policies     Policies	Create Organization     Delete		
ie-ion root ie-ima IQN Pools			
WWxN Pools			
			Save Changes Reset Values
Logged in as admin@172.20.160.20			System Time: 2014-07-10T09:34

- 3. Right-click WWNN Pools.
- 4. Select Create WWNN Pool.
- 5. Enter WWNN-POOL as the name for WWNN pool.
- 6. Optional: Add a description for the WWNN pool.
- 7. Select Default for the Assignment Order.

📥 Create WWNN Pool		
Unified C	Computing System Manager	
Create WWNN Pool	Define Name and Description	0
<ol> <li>Y Define Name and Description</li> <li>2. □ Add wwwn Blocks</li> </ol>	Name: WWNN-POOL Description: Assignment Order: O Default O Sequential	
	<pre></pre>	Cancel

📥 Create WWNN Pool				<b>—</b>
Unified C	omput	ing System	Manage	er
Create WWNN Pool	Add WWN	Blocks		0
1. V Define Name and				
2. ✓ <u>Add WWN Blocks</u>	Name	From	То	R.
				^
	L	<b>1</b>	lata.	-
		Add De	ieue	
		< Prev	/ Next > Fin	ish Cancel

- 9. Click Add to add a block of WWNNs.
- 10. Either retain the default block of WWNNs or specify a base WWNN.
- 11. Specify a size for the WWNN block that is sufficient to support the available blade or server resources.



📥 Create WWNN Pool		
Unified C	omputing System Manager	
Create WWNN Pool	Add WWN Blocks	
1. √ <u>Define Name and</u> <u>Description</u>		1
<ol> <li>✓ <u>Add WWN Blocks</u></li> </ol>	Name From To E	
	🗄 Add 👕 Delete	
	<pre></pre>	]

- 13. Click Finish.
- 14. Click OK.

## **Create WWPN Pools**

To configure the necessary worldwide port name (WWPN) pools for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the SAN tab in the navigation pane.
- 2. Select Pools > Root.

**Note:** In this procedure, two WWPN pools are created: one for Fabric A and one for Fabric B.

- 3. Right-click WWPN Pools.
- 4. Select Create WWPN Pool.
- 5. Enter WWPN-POOL-A as the name for WWPN pool for Fabric A.
- 6. Optional: Enter a description for this WWPN pool.

7. Select Default for Assignment Order.

📥 Create WWPN Pool		×
Unified C	Computing System Manager	
Create WWPN Pool	Define Name and Description	0
<ol> <li><u>√ Define Name and Description</u></li> <li>2. <u>Add www Blocks</u></li> </ol>	Name: WWPN-POOL-A Description: Assignment Order: Official Sequential	
	<pre>Prev Next &gt; Finish</pre>	Cancel

📥 Create WWPN Pool				×
Unified C	omput	ting System	n Manage	er
Create WWPN Pool	Add WWN	l Blocks		0
<ol> <li>✓<u>Define Name and</u> Description</li> </ol>				
2. Add WWN Blocks	Name	From	То	<b>₽</b>
		🛨 Add 💼 D	elete	<b>T</b>
		< Pre	W Next > Fini	sh Cancel

- 9. Click Add to add a block of WWPNs.
- 10. Specify the starting WWPN in the block for Fabric A.
  - **Note:** For the FlexPod solution, the recommendation is to place OA in the next-to-last octet of the starting WWPN to identify all the WWPNs in this pool as Fabric A addresses.
- 11. Specify a size for the WWPN block that is sufficient to support the available blade or server resources.



📥 Create WWPN Pool	
Unified	Computing System Manager
Create WWPN Pool	Add WWN Blocks
1. √ <u>Define Name and</u>	
2. √ <u>Add WWN Blocks</u>	Name From To 🖽
	[20:00:00:25:85:00:0A:00 - 20:00:00:25:85:00: 20:00:00:25:85:00: *
	🛨 Add 💼 Delete
	<pre></pre>

- 13. Click Finish to create the WWPN pool.
- 14. Click OK.
- 15. Right-click WWPN Pools.
- 16. Select Create WWPN Pool.
- 17. Enter WWPN-POOL-B as the name for the WWPN pool for Fabric B.
- 18. Optional: Enter a description for this WWPN pool.
- 19. Select Default for the Assignment Order.

📥 Create WWPN Pool		<b>X</b>
Unified C	omputing System Manager	
Create WWPN Pool	Define Name and Description	0
<ol> <li>Y <u>Define Name and</u> <u>Description</u></li> <li>Add <u>WWN Blocks</u></li> </ol>	Name: WWPN-POOL-8 Description: Assignment Order: O Default Sequential	
	<pre>Prev Next &gt; Finish (</pre>	Cancel

📥 Create WWPN Pool				<b>×</b>
Unified C	omput	ing System	n Manage	r
Create WWPN Pool	Add WWN	Blocks		0
1. √ <u>Define Name and</u>				
2. ✓ <u>Add WWN Blocks</u>	Name	From	То	<b>₽</b>
				~
		🛨 Add 👕 De	elete	<b>•</b>
		<pre></pre>	v Next > Finis	h Cancel

- 21. Click Add to add a block of WWPNs.
- 22. Enter the starting WWPN address in the block for Fabric B.
  - **Note:** For the FlexPod solution, the recommendation is to place OB in the next-to-last octet of the starting WWPN to identify all the WWPNs in this pool as Fabric B addresses.
- 23. Specify a size for the WWPN block that is sufficient to support the available blade or server resources.



📥 Create WWPN Pool		<b>—</b>
Unified C	omputing System Man	ager
Create WWPN Pool	Add WWN Blocks	0
1. √ <u>Define Name and</u>		
2. ✓ <u>Add WWN Blocks</u>	Name From	То
	[20:00:00:25:85:00:08:00 - 20:00:00:25:8520:00:00:25:85:00:	20:00:00:25:B5:00: *
	Hadd 👕 Delete	
	<pre>Prev Next &gt;</pre>	Finish Cancel

- 25. Click Finish.
- 26. Click OK.

## **Create UUID Suffix Pool**

To configure the necessary universally unique identifier (UUID) suffix pool for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
- 2. Select Pools > Root.
- 3. Right-click UUID Suffix Pools.
- 4. Select Create UUID Suffix Pool.
- 5. Enter UUID-POOL as the name for the UUID suffix pool.
- 6. Optional: Enter a description for the UUID suffix pool.
- 7. Select the Derived option for Prefix.

8. Select Default for the Assignment Order.

📥 Create UUID Suffix Pool	
Unified Co	omputing System Manager
Create UUID Suffix Pool	Define Name and Description 🤫
<ol> <li>✓ <u>Define Name and</u></li> </ol>	
2 Description	Name: UUTD-ROOL
	Description:
	Prefix: O Derived O other
	Assignment Order: <ul> <li>Default</li> <li>Sequential</li> </ul>
	< Prev Next > Finish Cancel

📥 Create UUID Suffix Pool				×
Unified Co	omputing	<mark>y</mark> System	Manag	jei
Create UUID Suffix Pool 1. √Define Name and	Add UUID Bloc	ks		0
2. √ <u>Add UUID Blocks</u>	Name	From	То	₽
		🛨 Add 👕 Delete		•
		<pre>Prev Next &gt;</pre>	Finish Can	cel

- 10. Click Add to add a block of UUIDs.
- 11. Select the From option as the default setting.
- 12. Specify a size for the UUID block that is sufficient to support the available blade or server resources.

A Create a Block of UUID Suffixes	<b>x</b>							
Create a Block of UUID Suffixes								
From: 0000-00000000001 Size: 32 🚔								
0								
OK	Cancel							

Create UUID Suffix Pool	omputing Sy	stem	Mana	<mark>.∞</mark> agei
Create UUID Suffix Pool 1. √ <u>Define Name and</u> <u>Description</u> 2. √ <u>Add UUID Blocks</u>	Add UUID Blocks	From -00:0000-00000	To 100 0000-0000	() () () () () () () () () () () () () (
	< Prev	Next >	Finish	Cancel

- 14. Click Finish.
- 15. Click OK.

#### **Create Server Pool**

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

- **Note:** Consider creating unique server pools to achieve the granularity that is required in your environment.
- 1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
- 2. Select Pools > Root.
- 3. Right-click Server Pools.
- 4. Select Create Server Pool.
- 5. Enter ORACLE-POOL as the name for server pool.
- 6. Optional: Enter a description for the server pool.

🛕 Create Server Pool	
Unified C	Computing System Manager
Create Server Pool	Set Name and Description 0
1. √ <u>Set Name and</u> Description 2. □ _{Add Servers}	
	Name: ORACLE-POOL
	Description:
	< Prev Next > Finish Cancel

- 7. Click Next.
- 8. Select eight servers to be used for the Oracle RAC cluster and click the double right-arrow button (>>) to add them to the ORACLE-POOL server pool.

🛆 Create Server Pool		x
Unified C	Computing System Manager	
Create Server Pool	Add Servers	Ø
<ol> <li>√<u>Set Name and Description</u></li> <li>✓<u>Add Servers</u></li> </ol>		
	Servers         Pooled Servers           C Sl R U PID         A Ad Ad S Co II	Ð
	▲ 1 1 UC FC 16	•
	1         12         UC         FC         16           1         3         UC         FC         16	
	1 4 UC FC 16	
	2 1 UC FC 12	
	2 3 UC FC 12	
	2 4 UC FC 12	
	· · ·	-
	Details	
	Model:	
	Serial Number:	=
	Vendor:	
	Vendor:	
	<pre></pre>	el

- 9. Click Finish.
- 10. Click OK.

### **Create VLANs**

To configure the necessary virtual local area networks (VLANs) for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.

Note: In this procedure, five VLANs are created.

- 2. Select LAN > LAN Cloud.
- 3. Right-click VLANs.
- 4. Select Create VLANs.
- 5. Enter MGMT-VLAN as the name for the VLAN to be used for management traffic.
- 6. Retain the Common/Global option selected for the scope of the VLAN.
- 7. Enter the ID of the management VLAN.
- 8. Retain the Sharing Type as None.

📥 Create VLANs	x
Create VLANs	0
VLAN Name/Prefix: MGMT-VLAN	
Multicast Policy Name: Croate Multicast Policy	
Common/Global  Fabric A  Fabric B  Fabric B  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: 3160	
Sharing Type: O None O Primary O Isolated O Community	
Check Overlap OK Canc	el

- 9. Click OK and then click OK again.
- 10. Right-click VLANs.
- 11. Select Create VLANs.
- 12. Enter RAC-VIP-VLAN as the name for the VLAN to be used for RAC intercluster traffic.
- 13. Retain the Common/Global option selected for the scope of the VLAN.
- 14. Enter the ID for the VLAN.
- 15. Retain the Sharing Type as None.



16. Click OK and then click OK again.

# **Create VSANs and FCoE Port Channels**

To configure the necessary virtual storage area networks (VSANs) and FCoE uplink port channels for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the SAN tab in the navigation pane.
- 2. Expand the SAN > SAN Cloud tree.
- 3. Right-click VSANs.
- 4. Select Create VSAN.
- 5. Enter VSAN-A as the name for the VSAN for Fabric A.
- 6. Keep the Disabled option selected for FC Zoning.
- 7. Select Fabric A.
- 8. Enter the VSAN ID for Fabric A.
- 9. Enter the FCoE VLAN ID for Fabric A.

**Note:** For the FlexPod solution, it is recommended to use the same ID for the VSAN and the FCoE VLAN required for Fabric A.

📥 Create VSAN	<b>X</b>
Create VSAN	0
Name: VSAN-A	
FC Zoning Settings	
FC Zoning: O Disabled O Enabled	
Do NOT enable local zoning if fabric interconnect is conne	cted to an upstream FC/FCoE switch.
Common/Global  Fabric A Fabric B  Both Fabric A	rrics Configured Differently
You are creating a local VSAN in fabric A that maps to a VSAN ID that exists only in fabric A.	A VLAN can be used to carry FCoE traffic and can be mapped to this VSAN.
Enter the VSAN ID that maps to this VSAN.	Enter the VLAN ID that maps to this VSAN.
VSAN ID: 101	FCoE VLAN: 101
U	0
	OK

- 10. Click OK and then click OK again to create the VSAN.
- 11. Right-click VSANs.
- 12. Select Create VSAN.
- 13. Enter VSAN-B as the name for the VSAN for Fabric B.
- 14. Retain the Disabled option selected for FC Zoning.
- 15. Select Fabric B.
- 16. Enter the VSAN ID for Fabric B.
- 17. Enter the FCoE VLAN ID for Fabric B.
  - **Note:** NetApp recommends using the same ID for the VSAN and the FCoE VLAN required for Fabric B.

📥 Create VSAN	
Create VSAN	0
Name: VSAN-B	
FC Zoning Settings FC Zoning:   Disabled  Enabled	
Do NOT enable local zoning if fabric interconnect is connect     O Common/Global	ed to an upstream FC/FCoE switch.
You are creating a local VSAN in fabric B that maps to a VSAN ID that exists only in fabric B.	A VLAN can be used to carry FCoE traffic and can be mapped to this VSAN.
Enter the VSAN ID that maps to this VSAN.	Enter the VLAN ID that maps to this VSAN.
VSAN ID: 102	FCoE VLAN: 102
	OK Cancel

- 18. Click OK and then click OK again to create the VSAN.
- 19. In the navigation pane, under SAN > SAN Cloud, expand the Fabric A tree.
- 20. Right-click FCoE Port Channels.
- 21. Select Create FCoE Port Channel.
- 22. Enter 101 for the port channel ID and Po101 for the port channel name.

📥 Create FCoE Port Channel	
Unified C	Computing System Manager
Create FCoE Port Channel	Set Port Channel Name 0
<ol> <li>√<u>Set Port Channel Name</u></li> <li>2. <u>Add Ports</u></li> </ol>	
	ID: 101
	U
	n Pototi
	<pre></pre>

- 23. Click Next.
- 24. Select ports 17 through 30 and click the double right-arrow button (>>) to add the ports to the port channel.

🛕 Create FCoE Port Channel								×
Unified C	Comp	uting	Syst	em N	lanagei	r		
Create FCoE Port Channel 1. √ <u>Set Port Channel Name</u> 2. √ <b>Add Ports</b>	Add Por	ts						0
	Ports		_		Ports in the p	ort channel		
	Slot ID	Port	MAC	R	Slot ID	Port	MAC	Ę
					1	17	54:7F:EE:90:EB:18	
					1	18	54:7F:EE:90:EB:19	
					1	19	54:7F:EE:90:EB:1A	
					1	20	54:7F:EE:90:EB:1B	
					1	21	54:7F:EE:90:EB:1C	
					1	22	54:7F:EE:90:EB:1D	
					1	23	54:7F:EE:90:EB:1E	
					1	24	54:7F:EE:90:EB:1F	
					1	25	54:7F:EE:90:EB:20	
					>> 1	26	54:7F:EE:90:EB:21	
					1	27	54:7F:EE:90:EB:22	
					<< 1	28	54:7F:EE:90:EB:23	
					1	29	54:7F:EE:90:EB:24	
					1	30	54:7F:EE:90:EB:25	
				v				Ŧ
						< Prev	Next > Finish C	ancel

- 25. Click Finish.
- 26. Select the checkbox for Show Navigator for FCoE Port-Channel 101 (Fabric A).
- 27. Click OK to create the port channel.
- 28. Click OK to close the navigator.
- 29. In the navigation pane, under SAN > SAN Cloud, expand the Fabric B tree.
- 30. Right-click FCoE Port Channels.
- 31. Select Create FCoE Port Channel.
- 32. Enter 102 for the port channel ID and Po102 for the port channel name.

📥 Create FCoE Port Channel		3
Unified C	Computing System Manager	
Create FCoE Port Channel	Set Port Channel Name	
<ol> <li>√<u>Set Port Channel Name</u></li> <li><u>Add Ports</u></li> </ol>		
	Name: P0102	
	< Prev Next > Finish Cancel	

- 33. Click Next.
- 34. Select ports 17 through 30 and click the double right-arrow button (>>) to add the ports to the port channel.

🛕 Create FCoE Port Channel								×
Unified C	omp	uting	Syst	em N	lanagei	٢		
Create FCoE Port Channel 1. √ <u>Set Port Channel Name</u> 2. √ <u>Add Ports</u>	Add Por	ts						Ø
	Ports				Ports in the p	ort channel		
	Slot ID	Port	MAC	Ę	Slot ID	Port	MAC	E.
					1	17	00:2A:6A:B3:10:78	-
					1	18	00:2A:6A:B3:10:79	
					1	19	00:2A:6A:B3:10:7A	
					1	20	00:2A:6A:B3:10:7B	
					1	21	00:2A:6A:B3:10:7C	
					1	22	00:2A:6A:B3:10:7D	
					1	23	00:2A:6A:B3:10:7E	
					1	24	00:2A:6A:B3:10:7F	
					1	25	00:2A:6A:B3:10:80	
					>> 1	26	00:2A:6A:B3:10:81	
					1	27	00:2A:6A:B3:10:82	
					<< 1	28	00:2A:6A:B3:10:83	
					1	29	00:2A:6A:B3:10:84	
					1	30	00:2A:6A:B3:10:85	
				Ŧ				·
						< Prev	Next > Finish C	ancel

- 35. Click Finish.
- 36. Select the checkbox for Show Navigator for FCoE Port-Channel 102 (Fabric B).
- 37. Click OK to create the port channel.
- 38. Click OK to close the navigator.

## **Create Host Firmware Package**

Firmware management policies allow the administrator to select the corresponding packages for a given server configuration. These policies often include packages for adapters, BIOS, board controller, FC adapters, host bus adapter (HBA) option ROM, and storage controller properties.

To create a firmware management policy for a given server configuration in the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
- 2. Select Policies > Root.
- 3. Right-click Host Firmware Packages.
- 4. Select Create Host Firmware Package.
- 5. Enter RAC-HOST as the name for the host firmware package.
- 6. Leave Simple selected.
- 7. Select the version 2.2(5b) for both the Blade and Rack packages.

📥 Create Host Firmware Package		<b>×</b>
Create Host Firmware Pac	kage	0
Name: RAC-Host		
Description:		
	How would you like to configure the Host Firmware Package? <ul> <li>Simple</li> <li>Advanced</li> </ul>	
Blade Package: 2.2(5b)B		
Rack Package: 2.2(5b)C		
	ОК	Cancel

- 8. Click OK to create the host firmware package.
- 9. Click OK.

## Set Jumbo Frames in Cisco UCS Fabric

To configure jumbo frames and enable quality of service (QoS) in the Cisco UCS fabric, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the LAN tab.
- 2. Select LAN > LAN Cloud > QoS System Class.
- 3. In the right pane, click the General tab.
- 4. In the Best Effort row, enter 9216 in the box under the MTU column.

📥 Cisco Unified Computing System Manager - icefs1-ucs1									
Fault Summary	🕒 🏐 🖪 New -	Option	s 🕜 🕕	A Pending Ac	tivities 🛛 🔟 Ex	it			alialia cisco
	>> = LAN > OL	AN Cloud >	😽 OoS Syst	em Class					😽 Oo5 System Class
Equipment Servers LAN SAN VM Admin	General Events F	General Events FSM							
Equipment Servers and SAN Vin Aumin									
	Priority	Enabled	5	Packet Drop	Weight	•	Weight (%)	MIU pormal	Multicast Uptimized
	Gold		4		9		N/A	normal T	
LAN Cloud	Silver		2		8	-	N/A	normal 🔻	
Fabric A     Fabric B	Bronze		1	<b>V</b>	7	•	N/A	normal 🔻	
QoS System Class	Best Effort		Any		5	•	50	9216	
Threshold Policies	Fibre Channel		3		5	•	50	fc 🗸	N/A
VLAN Groups									
Appliances									
B → S Policies									
⊡-@ Pools									
P Pools									
IP Pool exchiging									
MAC Pools									
MAC Pool MAC-POOL-B									
Sub-Organizations									
Traffic Monitoring Sessions									
									Save Changes Reset Values
Logged in as admin@172.20.160.20									System Time: 2014-07-10T10:05

- 5. Click Save Changes.
- 6. Click OK.

# **Create Network Control Policy for Cisco Discovery Protocol**

To create a network control policy that enables Cisco Discovery Protocol (CDP) on virtual network ports, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the LAN tab.
- 2. Select Policies > Root.
- 3. Right-click Network Control Policies.
- 4. Select Create Network Control Policy.
- 5. Enter ENABLE-CDP as the policy name.
- 6. For CDP, select the Enabled option.

📥 Create Network Control Policy	<b>—</b>
Create Network Control Policy	0
Name: ENABLE-CDP	
Description:	
CDP: Oisabled O Enabled	
MAC Register Mode: Only Native Vlan 🔿 All Host Vlans	
Action on Uplink Fail: 💿 Link Down 🕥 Warning	
MAC Security	
Forge: O Allow O Deny	
	OK Cancel

- 7. Click OK to create the network control policy.
- 8. Click OK.

# **Create Power Control Policy**

To create a power control policy for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Select Policies > Root.
- 3. Right-click Power Control Policies.
- 4. Select Create Power Control Policy.
- 5. Enter NO-POWER-CAP as the power control policy name.
- 6. Change the power capping setting to No Cap.

📥 Create Power Control Policy	×
Create Power Control Policy	0
Name: NO-POWER-CAP	
Description:	
Power Capping	
If you choose <b>cap</b> , the server is allocated a certain amount of power based on its priority with its power group. Priority values range from 1 to 10, with 1 being the highest priority. If you	in
choose <b>no-cap</b> , the server is exempt from all power capping.	
● <u>No Capi</u> ○ cap	
Cisco UCS Manager only enforces power capping when the servers in a power group require more	, ,
power than is currently available. With sufficient power, all servers run at full capacity regardless their priority.	of
OK	Cancel

- 7. Click OK to create the power control policy.
- 8. Click OK.

## **Create Server BIOS Policy**

To create a server BIOS policy for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Select Policies > Root.
- 3. Right-click BIOS Policies.
- 4. Select Create BIOS Policy.
- 5. Enter RAC-HOST as the BIOS policy name.
- 6. Change the Quiet Boot setting to Disabled.

A Create BIOS Policy			×
Unified C	omputing S	System Manager	
Create BIOS Policy	Main		0
<ol> <li>✓ Main</li> <li>Processor</li> <li>Intel Directed IO</li> <li>RAS Memory</li> <li>Serial Port</li> <li>USB</li> <li>PCI</li> <li>QPI</li> <li>LOM and PCIe Slots</li> <li>Boot Options</li> <li>Server Management</li> </ol>	Name: Description: Reboot on BIOS Settings Change: Quiet Boot: Post Error Pause: Resume Ac On Power Loss: Front Panel Lockout:	RAC-HOST	
		< Prev Next > Finish	Cancel

- 7. Click Finish to create the BIOS policy.
- 8. Click OK.

# **Create vNIC/vHBA Placement Policy for Virtual Machine Infrastructure Hosts**

To create a vNIC/vHBA placement policy for the infrastructure hosts, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Select Policies > Root.
- 3. Right-click vNIC/vHBA Placement Policies.
- 4. Select Create Placement Policy.
- 5. Enter RAC-HOST as the name for the placement policy.
- 6. Click 1 and, under the Selection Preference, select Assigned Only.

📥 Create Placement Policy	×	]		
Create Placement Policy				
_		ľ		
Name: RAC	I-HOST			
Virtual Slot Mapping Scheme: 💿	Round Robin 🕜 Linear Ordered			
🔍 Filter 🖨 Export 😸 Print				
Virtual Slot	Selection Preference			
1	Assigned Only			
2	All			
3	All			
4	All			
	OK Cancel			

7. Click OK and then click OK again.

# **Update Default Maintenance Policy**

To update the default maintenance policy, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Choose Policies > Root.
- 3. Choose Maintenance Policies > Default.
- 4. Change the Reboot Policy to User Ack.

🛕 Cisco Unified Computing System Manager - icef:	1-uc1			- • •
Fault Summary	Ġ 🏐 🖬 New 🔹 🛃 Options 🛛 😯 🚯	A Pending Activities		alialia cisco
	>>	Maintenance Policies • S default		🚿 default
Terievent Servers Late Cate Unit Advis	Main Events	2		2
Equipment Servers LAN SAN VM Admin	Actions	Droperties		
Filter: All		Name: default		
	C Show Policy License	Description:		
Servers     Service Profiles	A use clobal	Owner: Local		
Service Profile Templates	- 056 3003i	Reboot Policy: O Immediate O User Ack O Timer Automati	ic	
Policies		Ū.		
Adapter Policies				
🖶 🗐 BIOS Defaults				
Boot Policies				
Host Firmware Packages				
IPMI Access Profiles				
Maintenance Policies				
default				
Management Pirniware Packages     Memory Policy				
Power Control Policies				
Scrub Policies     Serial over LAN Policies				
Server Pool Policies				
Server Pool Policy Qualifications     The sheld Policies				
Inreshold Policies     Inreshold Policies     Inreshold Policies				
🕀 🏯 Sub-Organizations				
Generations     Generations				
_				
			Save Changes	Reset Values
A Logged in as admin@192.168.171.44			System Time: 2014-03	-04T09:10

- 5. Click Save Changes.
- 6. Click OK to acknowledge the change.

# **Create vNIC Templates**

To create multiple virtual network interface card (vNIC) templates for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the LAN tab.
- 2. Select Policies > Root.
- 3. Right-click vNIC Templates.
- 4. Select Create vNIC Template.
- 5. Enter MGMT as the vNIC template name.
- 6. For Fabric ID, select Fabric A.
- 7. Select the Enable Failover checkbox.

**Note:** Under Target, do not select the VM checkbox.

- 8. Select Updating Template as the Template Type.
- 9. Under VLANs, select the checkboxes for MGMT-VLAN.
- 10. Set MGMT-VLAN as the native VLAN.
- 11. For MTU, enter 1500.
- 12. In the MAC Pool list, select MAC-POOL-A.
- 13. In the Network Control Policy list, select ENABLE-CDP.
| 🛕 Create vNIC Templa           | te                         |                                                     | ×      |
|--------------------------------|----------------------------|-----------------------------------------------------|--------|
| Create vNIC                    | Template                   |                                                     | 0      |
|                                | iompiaco                   |                                                     |        |
|                                |                            |                                                     | *      |
| Name:                          | MGMT<br>D                  |                                                     |        |
| Description:                   |                            |                                                     |        |
| Fabric ID:                     | 💿 Fabric A 🕤 Fabric B      | 3 🔽 Enable Failover                                 |        |
|                                | Target                     |                                                     |        |
|                                | Adapter                    |                                                     |        |
|                                | MV VM                      |                                                     |        |
|                                |                            |                                                     |        |
| Warning                        |                            |                                                     |        |
| If <b>VM</b> is selected, a po | rt profile by the same nam | e will be created.                                  |        |
| If a port profile of the       | same name exists, and up   | dating template is selected, it will be overwritten |        |
| Template Type:                 | 🕥 Initial Template 🛛 💿     | Updating Template                                   |        |
| VIANS                          | 0                          |                                                     | E      |
| Eilter Export                  | Seriet                     |                                                     |        |
|                                |                            |                                                     |        |
| Select                         | Name                       | Native VLAN                                         |        |
|                                | MGMT-VLAN                  |                                                     |        |
|                                | RAC-VIP-VLAN               | 0                                                   |        |
|                                |                            |                                                     |        |
|                                |                            | -                                                   |        |
|                                |                            |                                                     |        |
|                                | 4500                       |                                                     |        |
| MIU:                           | 1500                       |                                                     |        |
| MAC Pool:                      | MAC-POOL-A(14/ 🔻           |                                                     |        |
| QoS Policy:                    | <not set=""></not>         |                                                     |        |
| Network Control Policy:        | ENABLE-CDP                 |                                                     |        |
| Pin Group:                     | <pre>not set&gt;</pre>     |                                                     |        |
| Stats Threshold Policy:        | default 🔹                  |                                                     |        |
|                                |                            |                                                     |        |
|                                |                            |                                                     |        |
|                                |                            | OK                                                  | Cancel |

- 14. Click OK to create the vNIC template.
- 15. Click OK.
- 16. In the navigation pane, select the LAN tab.
- 17. Select Policies > Root.
- 18. Right-click vNIC Templates.
- 19. Select Create vNIC Template.
- **20.** Enter RAC-CLUSTER as the vNIC template name.
- 21. Select Fabric B.

22. Select the Enable Failover checkbox.

Note: Under Target, do not select the VM checkbox.

- 23. Select Updating Template as the template type.
- 24. Under VLANs, select the checkboxes for RAC-VIP-VLAN.
- 25. Set RAC-VIP-VLAN as the native VLAN.
- **26.** For MTU, enter 9000.
- 27. In the MAC Pool list, select MAC Pool B.
- 28. In the Network Control Policy list, select Enable_CDP.

Name: Description:	Template			0
Name: Description:				
Description:	RAL-LLUSTER			-
Fabric ID:	💿 Fabric A 💿 Fabric B 📝 Ena	ble Failover		
(	Target			
	Adapter			
	M M			
	(			
Warning If VM is selected, a po	rt profile by the same name will be (	reated.		
If a port profile of the	same name exists, and updating ter	mplate is selected, it will be overwr	itten	
Template Type:	<ul> <li>Initial Template</li> <li>Updating</li> </ul>	Template		
VLANs				
🔍 Filter 🖨 Export 🖡	😸 Print			
Select	Name	Native VLAN	<b>F</b>	
	default	0	<b>^</b>	
	MGMT-VLAN	0		
<b></b>	RAC-VIP-VLAN	۲		
			+	
+ Create VLAN				
MTU:	9000			
Mag Paul				
	MAC-POOL-B(14/ ▼ D			
QoS Policy:	<not set=""></not>			
Jetwork Control Policy:	D			
Pin Group:	<not set=""></not>			
Stats Threshold Policy:	default			
	III			P.

- 29. Click OK to create the vNIC template.
- 30. Click OK.

### **Create vHBA Templates for Fabric A and Fabric B**

To create multiple virtual host bus adapter (vHBA) templates for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the SAN tab.
- 2. Select Policies > Root.
- 3. Right-click vHBA Templates.
- 4. Select Create vHBA Template.
- 5. Enter VSAN_A as the vHBA template name.
- 6. Select A for Fabric ID.
- 7. In the Select VSAN list, select VSAN-A.
- 8. In the WWPN Pool list, select WWPN-POOL-A.

📥 Create vHBA Templat	te	×
Create vHBA	Template	0
		_
Name:	VSAN-A	
Description:		
Fabric ID:	• A • B	
Select VSAN:	VSAN-A 🗾 🔽 Create VSAN	
Template Type:	<ul> <li>Initial Template </li> <li>Updating Template</li> </ul>	
Max Data Field Size:	2048	
WWPN Pool:	WWPN-POOL-A(32/32)	
QoS Policy:	<not set=""></not>	
Pin Group:	<not set=""></not>	
Stats Threshold Policy:	default 🔹	
	ОК Са	ancel

- 9. Click OK to create the vHBA template.
- 10. Click OK.
- 11. In the navigation pane, click the SAN tab.
- 12. Select Policies > Root.
- 13. Right-click vHBA Templates.
- 14. Select Create vHBA Template.
- 15. Enter  $\texttt{VSAN}_\texttt{B}$  as the vHBA template name.

- 16. Select B for Fabric ID.
- 17. In the Select VSAN list, select VSAN-B.

18. In the WWPN Pool, select WWPN-POOL-B.

🛕 Create vHBA Templat	e e	×
Create vHBA	Template	Ø
_		
Name:	VSAN-B	
Description:		
Fabric ID:	○ A ● B	
Select VSAN:	VSAN-B	
Template Type:	<ul> <li>Initial Template</li> <li>Updating Template</li> </ul>	
Max Data Field Size:	2048	
WWPN Pool:	WWPN-POOL-B(32/32)	
QoS Policy:	<not set=""></not>	
Pin Group:	<not set=""></not>	
Stats Threshold Policy:	default	
		incel

19. Click OK to create the vHBA template.

20. Click OK.

## **Create Boot Policies**

This solution provides SAN boot volumes from an EF560 storage array using the two Fibre Channel host interface cards (HICs). Each HIC has four ports: two ports connected to each of the two Cisco Nexus 5548UP switches in the solution. Each Cisco Nexus switch corresponds to a unique SAN fabric. The boot policy uses one port per HIC per fabric (four ports total) to provide access to storage during boot operations.

For detailed port connectivity, see the Physical Cabling section of this document.

Two boot policies are configured in this procedure. The first policy configures fabric A as the primary path, and the second boot policy configures fabric B as the primary path.

To create boot policies for the Cisco UCS environment, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Select Policies > Root.
- 3. Right-click Boot Policies.
- 4. Select Create Boot Policy.
- 5. Enter BOOT-FABRIC-A as the name for the boot policy.
- 6. Optional: Enter a description for the boot policy.

Note: Do not select the Reboot on Boot Order Change checkbox.

7. Expand the Local Devices drop-down menu and select Add Remote CD/DVD.

🛕 Create Boot Policy							×
Create Boot Policy							0
Name: BOOT-F	ABRIC-A						
Description:							
Reboot on Boot Order Change: 📃							
Enforce vNIC/vHBA/iSCSI Name: 🔽							
Boot Mode: 💿 Lega	acy 🚫 Uefi						
WARNINGS:							
The type (primary/secondary) does not inc The effective order of boot devices within	dicate a boot order presence. the same device class (LAN/Storage/	iSCSI) is determin	ed by PCIe bus scan order.				
If Enforce vNIC/vHBA/iSCSI Name is a If it is not selected, the vNICs/vHBAs/iSCS	selected and the vNIC/vHBA/iSCSI do I are selected if they exist, otherwise	es not exist, a co the vNIC/vHBA/	nfig error will be reported. ISCSI with the lowest PCIe bus scan (	order is used.			
	Reak Ouder						_
Local Devices 🛛 😵	💼 🖃 🧖 Filter 🖨 Export 🕅	> Print		_			
CIMC Mounted vMedia 🛛 🛞	Name	Order	VNTC/VHBA/ISCST VNTC	Type	Lun ID	WWN	æ
	@ Remote CD/DVD	1		1700	E GITTE		
vNICs 📎							
vHBAs 🛞							
Add SAN Boot							
Add SAN Boot Target							
iSCSI vNICs 🛛 🖇							
	L		A Move Lip. 🗢 Move Down	Delete			*
			A Hove op . A Hove Down	Delete			
						ОК	Cancel

- 8. Expand the vHBAs drop-down menu and select Add SAN Boot.
- 9. In the Add SAN Boot dialog box, enter  ${\tt VSAN-A}$  in the vHBA field.
- 10. Select Primary, or confirm that it is selected, for the Type option.

📥 Add SAN Boot	<b>—</b>
Add SAN Boot	0
VHBA: VSAN-A	
Type: O Primary O Secondary	

- 11. Click OK to add the SAN boot initiator.
- 12. From the vHBA drop-down menu, select Add SAN Boot Target.
- 13. Keep 0 as the value for Boot Target LUN.
- 14. Enter the WWPN for channel 1 of the first EF560 controller.Note: To obtain this information, see the Appendix of this document.
- 15. Select Primary for the SAN boot target type.

📥 Add SAN Boot Ta	📥 Add SAN Boot Target			
Add SAN B	0			
Boot Target LUN:	0			
Boot Target WWPN:	20:12:00:80:E5:29:67:8C			
Type:	<ul> <li>Primary O Secondary</li> </ul>			
		OK Cancel		

- 16. Click OK to add the SAN boot target.
- 17. From the vHBA drop-down menu, select Add SAN Boot Target.
- 18. Enter 0 as the value for Boot Target LUN.
- 19. Enter the WWPN for channel 1 of the second EF560 controller.

📥 Add SAN Boot Target 🧮 🔁				
Add SAN Boot Target	0			
Boot Target LUN: 0				
Boot Target WWPN: 20:13:00:80:E5:29:67:8C				
Type: 🔍 Primary 💿 Secondary				
	OK Cancel			

- 20. Click OK to add the SAN boot target.
- 21. From the vHBA drop-down menu, select Add SAN Boot.
- 22. In the Add SAN Boot dialog box, enter VSAN-B in the vHBA box.
- 23. The SAN boot type should automatically be set to Secondary, and the Type option should be unavailable.

📥 Add SAN Boot	<b>—</b>
Add SAN Boot	Ø
VHBA: VSAN-B	
Type: O Primary O Secondary	
	OK Cancel

- 24. Click OK to add the SAN boot initiator.
- 25. From the vHBA drop-down menu, select Add SAN Boot Target.
- 26. Keep 0 as the value for Boot Target LUN.
- 27. Enter the WWPN for channel 3 of the first EF560 controller.

28. Select Primary for the SAN boot target type.

📥 Add SAN Boot Target 📃 🔀				
Add SAN B	Ø			
Boot Target LUN:	0			
Boot Target WWPN:	20:32:00:80:E5:29:67:8C			
Туре:	Primary O Secondary			
		OK Cancel		

- 29. Click OK to add the SAN boot target.
- 30. From the vHBA drop-down menu, select Add SAN Boot Target.
- 31. Keep 0 as the value for Boot Target LUN.
- 32. Enter the WWPN for channel 3 of the second EF560 controller.

📥 Add SAN Boot Target				
Add SAN B	Ø			
_				
Boot Target LUN:	0			
Boot Target WWPN:	20:33:00:80:E5:29:67:8C			
Туре:	💿 Primary 💿 Secondary			
		OK Cancel		

33. Click OK to add the SAN boot target.

📥 Create Boot Policy								×
Create Boot Policy	y							0
	-							
Nama	DOOT FA							
Name:	DUUI-FA	DKIL-A						
Description:								
Reboot on Boot Order Change:								
Enforce vNIC/vHBA/iSCSI Name:	<b>V</b>							
Boot Mode:	<ul> <li>Legac</li> </ul>	y 🔵 Uefi						
WARNINGS: The type (primary/secondary) do The effective order of boot devic If Enforce vNIC/vHBA/iSCSI N If it is not selected, the vNICs/vH Local Devices	es not indic es within th lame is sel BAs/ISCSI (	ate a boot order presence. le same device class (LAN/S) lected and the vNIC/vHBA/I are selected if they exist, ot Boot Order	torage/ISCSI) is determined i SCSI does not exist, a config herwise the vNIC/vHBA/ISC	by PCIe bus scan order. gerror will be reported. 51 with the lowest PCIe bus scar	n order is used.	_		
		🛨 🖃 🕰 Filter 🖨 Ex	port 📚 Print					
CIMC Mounted vMedia	8	Name	Order	VNIC/VHBA/ISCSI VNIC	Туре	Lun ID	WWN	E.
UNIC-		🖂 💮 Remote CD/DVD	) 1					*
ANICS	~	🖻 🛒 San	2					
VHBAS		SAN primary	ot primary	VSAN-A	Primary	0	20.12.00.00.00.00.00.00.00.000	- 11
		SAN Targ	et secondary		Secondary	0	20:12:00:80:E5:29:67:80	
Add SAN Boot		🖻 🛒 SAN seconda	ry	¥SAN-B	Secondary	-		
Aug Shir boot rarget		📑 SAN Targ	et primary		Primary	0	20:32:00:80:E5:29:67:8C	
		🔤 🛒 SAN Targ	et secondary		Secondary	0	20:33:00:80:E5:29:67:8C	
ISCST VNICS	8							
								-
				🔺 Move Up 🔍 Move Down	👚 Delete			
							ОК Са	ncel

- 34. Click OK, then click OK again to create the boot policy.
- 35. Right-click Boot Policies.
- 36. Select Create Boot Policy.
- **37.** Enter BOOT-FABRIC-B as the name for the boot policy.
- 38. Optional: Enter a description of the boot policy.

**Note:** Do not select the Reboot on Boot Order Change option.

39. From the Local Devices drop-down menu, select Add Remote CD/DVD.

📥 Create Boot Policy								×
Create Boot Policy	У							0
Name:	BOOT-FA	BRIC-B						
Description:	0							
Reboot on Boot Order Change:								
Enforce vNIC/vHBA/iSCSI Name:	✓							
Boot Mode:	<ul> <li>Legac</li> </ul>	:y 🔿 Uefi						
WARNINGS:								
The type (primary/secondary) do The effective order of boot device	es not indic es within th	cate a boot order presence. ne same device class (LAN/St	orage/iSCSI) is determine	d by PCIe bus scan order.				
If Enforce vNIC/vHBA/iSCSI N If it is not selected, the vNICs/vH	<b>lame</b> is se IBAs/iSCSI -	elected and the vNIC/vHBA/is are selected if they exist, ot	5CSI does not exist, a con herwise the vNIC/vHBA/i9	fig error will be reported. iCSI with the lowest PCIe bus scan	order is used.			
		Boot Order						-
Local Devices	*	+ - A Filter ⇒ Ex	port 🔂 Print					
CIMC Mounted vMedia	8	Name	Order	VNIC/VHBA/ISCSI VNIC	Туре	Lun ID	WWN	Ę
VNICs	8		1					*
vHBAs	8							
Add SAN Boot								
Add SAN Boot Target								
	8							
								-
				🔺 Move Up 🔝 Move Down 👔	Delete			
		<u> </u>						
							OK	Cancel

- 40. From the vHBA drop-down menu, select Add SAN Boot.
- 41. In the Add SAN Boot dialog box, enter VSAN-B in the vHBA box.
- 42. Confirm that Primary option is selected for the SAN boot type.

📥 Add SAN Boot	×
Add SAN Boot	0
VHBA: VSAN-B	
Type: O Primary O Secondary	-
	OK Cancel

- 43. Click OK to add the SAN boot initiator.
- 44. From the vHBA drop-down menu, select Add SAN Boot Target.
- 45. Enter 0 as the value for Boot Target LUN.
- 46. Enter the WWPN for channel 3 of the first EF560 controller.
  - Note: To obtain this information, see the Appendix of this document.
- 47. Select Primary option for the SAN boot target type.

📥 Add SAN Boot Target	×			
Add SAN Boot Target				
Boot Target LUN: 0				
Boot Target WWPN: 20:32:00:80:E5:29:67:8C				
Type: O Primary 🔿 Secondary				
ОК	Cancel			

- 48. Click OK to add the SAN boot target.
- 49. From the  ${\tt vHBA}$  drop-down menu, select Add SAN Boot Target.
- 50. Enter 0 as the value for Boot Target LUN.
- 51. Enter the WWPN for channel 3 of the second EF560 controller.

📥 Add SAN Boot Target 🗧				
Add SAN Boot Target				
<u> </u>				
Boot Target LUN: 0				
Boot Target WWPN: 20:33:00:80:E5:29:67:8C				
Type: O Primary O Secondary				
OK Cancel				

- 52. Click OK to add the SAN boot target.
- 53. From the vHBA menu, select Add SAN Boot.
- 54. In the Add SAN Boot dialog box, enter  $\ensuremath{\texttt{VSAN-A}}$  in the vHBA box.
- 55. The SAN boot type should automatically be set to Secondary, and the Type option should be unavailable.

📥 Add SAN Boot	×
Add SAN Boot	0
VHBA: VSAN-A	
Type: 🔵 Primary 🍥 Secondary	

- 56. Click OK to add the SAN boot initiator.
- 57. From the vHBA menu, select Add SAN Boot Target.
- 58. Enter 0 as the value for Boot Target LUN.
- 59. Enter the WWPN for channel 1 of the first EF560 controller.

60. Select the Primary option for the SAN boot target type.

📥 Add SAN Boot Target	×
Add SAN Boot Target	0
Boot Target LUN: 0	
Boot Target WWPN: 20:12:00:80:E5:29:67:8C	
Type: 💿 Primary 💿 Secondary	
	OK Cancel

- 61. Click OK to add the SAN boot target.
- 62. From the vHBA drop-down menu, select Add SAN Boot Target.
- 63. Enter 0 as the value for Boot Target LUN.
- 64. Enter the WWPN for channel 1 of the second EF560 controller.

📥 Add SAN Boot Target	×		
Add SAN Boot Target			
Boot Target LUN: 0			
Boot Target WWPN: 20:13:00:80:E5:29:67:8C			
Type: 💿 Primary 💿 Secondary			
ОК	Cancel		

65. Click OK to add the SAN boot target.

📥 Create Boot Policy									×
Create Boot Policy	,								0
-									
Manag	DOOT FA								
	DUUI-FA	DKIL-D							
Description:									
Reboot on Boot Order Change:									
Enforce vNIC/vHBA/iSCSI Name:	<b>V</b>								
Boot Mode:	<ul> <li>Legac</li> </ul>	y 🔘 Uefi							
WARNINGS: The type (primary/secondary) doe The effective order of boot device If Enforce vNIC/vHBA/iSC5I Na If it is not selected, the vNICs/vHB	s not indic s within th <b>ame</b> is se 3As/iSCSI -	ate a boot order presence. e same device class (LAN/St lected and the vNIC/vHBA/i3 are selected if they exist, ot Boot Order	orage/iSCSI) is determi iSCSI does not exist, a c herwise the vNIC/vHBA	ned by PCI onfig error /iSCSI with	e bus scan order. will be reported. the lowest PCIe bus scan	order is used.			
Local Devices	8		port 🔊 Print	_		_	_		
CTMC Mounted uMedia			porc & Fine						
CIME Mounted Amedia		Name	0	rder	VNIC/VHBA/ISCSI VNIC	Туре	Lun ID	WWN	
vNICs	8	Remote CD/DVD	1						^
		SAN primary	2	v	SAN-B	Primary			
vHBAs	8	🛒 SAN Targe	et primary			Primary	0	20:32:00:80:E5:29:67:8C	
Add CAM Past		🛒 SAN Targe	et secondary			Secondary	0	20:33:00:80:E5:29:67:8C	
Add SAN Boot Target		😑 🛒 SAN seconda	ry	۷	SAN-A	Secondary			
		🛒 SAN Targe	et primary			Primary	0	20:12:00:80:E5:29:67:8C	
	_	SAN Targe	et secondary			Secondary	0	20:13:00:80:E5:29:67:8C	
ISLSI VNILS	×								I
				A M	ave Lla 🗢 Maye Down	🚔 Delete			
							_		
								ОКСа	ncel

66. Click OK and then click OK again to create the boot policy.

## **Create Service Profile Templates**

In this procedure, two service profile templates are created: one that boots primarily from fabric A and another that boots primarily from fabric B.

To create service profile templates, complete the following steps:

- 1. In Cisco UCS Manager, in the navigation pane, click the Servers tab.
- 2. Select Service Profile Templates > Root.
- 3. Right-click Root.
- 4. Select Create Service Profile Template to open the Create Service Profile Template wizard.
- 5. Identify the Service Profile Template:
  - a. Enter RAC-SERVER-BOOT-FABRIC-A as the name for the service profile template. This service profile template is configured to boot from Node 1 on Fabric A.
  - b. Select the Updating Template option.
  - c. Under UUID, select UUID-POOL as the UUID pool.

🛕 Create Service Profile Template	
Unified C	Computing System Manager
Unified ( Create Service Profile Template 1. √Identify Service Profile Template 2. Networking 3. Storage 4. Zoning 5. vMIC/vHBA Placement 6. vMedia Policy 7. Server Boot Order 8. Maintenance Policy 9. Server Assignment 10. Operational Policies	Computing System Manager         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:       RAC-SERVER-BOOT-FABRIC-A         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         UDD       updating Template         UUID Assignment:       UUID-POOL(32/32)
	The UUID will be assigned from the selected pool. The available/total UUIDs are displayed after the pool name.
	< Prev Next > Finish Cancel

- d. Click Next.
- 6. Configure the following Networking options:
  - a. Retain the default setting for Dynamic vNIC Connection Policy.
  - b. Select the Expert option to configure the LAN connectivity.

🛕 Create Service Profile Template 🛛					×
Unified C	Computii	n <mark>g Syste</mark> m	Manager		_
Create Service Profile Template 1. √ <u>Identify Service Profile</u> Template	Networking Optionally specify	y LAN configuration informatic	n.		Ø
2. √ <u>Networking</u> 3. □ <u>Storage</u> 4. □ <u>Zoning</u> 5. □ <u>vNIC/vHBA Placement</u>	Dynamic vNIC Connectio	on Policy: Select a Policy to use (no	Dynamic vNIC Policy by defa 💌	Create Dynamic vNIC Connection Policy	
6. □ <u>vMedia Policy</u> 7. □ <u>Server Boot Order</u> 8. □ <u>Maintenance Policy</u> 9. □ <u>Server Assignment</u>	How wo Click Add to specify one a	uld you like to configure LAN c	onnectivity? O Simple © Expert	No vNICs Use Connectivity Policy	
10. Doperational Policies	Name	MAC Address	Fabric ID	Native VLAN	E
					~
			👕 Delete 📑 Add 📑 Modify		
	iSCSI vNICs	_			8
				< Prev Next > Finish	Cancel

- c. Click the upper Add button to add a vNIC to the template.
- d. In the Create vNIC dialog box, enter VNIC-MGMT as the name for vNIC.
- e. Select the Use vNIC Template checkbox.
- f. In the vNIC Template list, select  ${\tt MGMT}.$
- g. In the Adapter Policy list, select Linux.

A Create vNIC	×
Create vNIC	0
News UNIC MEMT	
Use vNIC Template:	
E Create vNIC Template	
VNIC Template: MGMT	
Adapter Performance Profile	
Adapter Policy: Linux 🔹 🛨 Create Ethernet Adapter Policy	
U	
OK C	ancel

- h. Click OK to add this vNIC to the template.
- i. On the Networking page of the wizard, click the Add button to add another vNIC to the template.
- j. In the Create vNIC box, enter VNIC-RAC-CLUSTER as the name for vNIC.
- k. Select the Use vNIC Template checkbox.
- I. In the vNIC Template list, select RAC-CLUSTER.
- m. In the Adapter Policy list, select Linux.

📥 Create vNIC	×
Create vNIC	0
Create VNIC Template	
VNIC Template: RAC-CLUSTER	
Adapter Performance Profile	
Adapter Policy: Linux Teate Ethernet Adapter Policy	
OK Cance	

- n. Click OK to add the vNIC to the template.
- o. Review the table in the Networking page to confirm that both vNICs were created.

🛕 Create Service Profile Template					×
	1				
Create Service Profile Template	Networking				0
1. √ <u>Identify Service Profile</u>	Optionally specify LAN configurati	on information.			
2. Vetworking					
3. I <u>Storage</u> 4. Zoning	Dynamic vNIC Connection Policy: Select a P	olicy to use (no Dynamic vNI)	C Policy by defa 💌 🚹 Cre	ate Dynamic vNIC Connection Policy	
5. VIC/VHBA Placement					
7. Server Boot Order	How would you like to co	nfigure LAN connectivity?	? 🔿 Simple 💿 Expert 🔿 No vNI	Cs 📀 Use Connectivity Policy	
8. D	Click <b>Add</b> to specify one or more vNICs that t	he server should use to conn	ect to the LAN.		
10. Operational Policies	Name	MAC Address	Eshvis ID	Native VI AN	Ē
		Derived	derived	INduve VLAN	<b>↓</b>
	VNIC VNIC-RAC-CLUSTER	Derived	derived		
					-
		👕 Delete	🛨 Add 🏢 Modify		
	ISCSI VNICs				8
			<	Prev Next > Finish	Cancel

- p. Click Next.
- 7. Configure the Storage options:
  - a. Do not alter the Local Storage option.
  - b. Select the Expert option to configure the SAN connectivity.
  - c. In the WWNN Assignment list, select WWNN-POOL.

📥 Create Service Profile Template		×
Unified Computing System Manager		
ennied eeniputing eystern manager		
Create Service Profile Template Storage		Ø
1. √ <u>Identify Service Profile</u> Optionally specify disk policies and SAN configuration information.		
2. √ <u>Networking</u> Select a local disk configuration policy.		Â
3. X <u>Storage</u>		
Cocal Storage: Select Cocal Storage Policy to use     If nothing is selected, the default Local Storage configuration     policy will be assigned to this service profile.		
6. DvMedia Policy    Create Local Disk Configuration Policy		
7. Userver Boot Order		
9. Diserver Assignment		
10. Doperational Policies How would you like to configure SAN connectivity? Simple Expert No vHBAs Use Connectivity Policy		
A server is identified on a SAN by its World Wide Node Name (WWNN). Specify how the system should assign a WWNN to the server associated with profile	this	
World Wide Node Name		
WWNN Assignment: WWNN-POOL(32/32)		Ξ
The WWMN will be acciment from the celested pool		
The available/total WWWNs are displayed after the pool name.		
Name WWPN	R	
	<u> </u>	
	- 11	
	- 11	
	-	
💼 Delete 🚹 Add 🌆 Modify		
		т F
<prev next=""> Finish</prev>	Cano	e

- d. Click the Add button to add a vHBA to the template.
- e. In the Create vHBA dialog box, enter  ${\tt VSAN-A}\,$  as the name for vHBA.
- f. Select the Use vHBA Template checkbox.
- g. In the vHBA Template list, select  ${\tt VSAN_A}.$
- h. In the Adapter Policy list, select Linux.

📥 Create vHBA	<b>—</b> ×
Create vHBA	0
Name: VSAN-A	
Use vHBA Template:	
Create vHBA Template	
VHBA Template: VSAN-A	
Adapter Performance Profile	
Adapter Policy: Linux Terrate Fibre Channel Adapter Policy	
OK	Cancel

- i. Click OK to add this vHBA to the template.
- j. On the Storage page of the wizard, click Add to add another vHBA to the template.
- k. In the Create vHBA dialog box, enter  ${\tt VSAN-B}$  as the name for vHBA.
- I. Select the checkbox for Use HBA Template.
- m. In the vHBA Template list, select VSAN-B.
- n. In the Adapter Policy list, select Linux.

📥 Create vHBA	<b>×</b>
Create vHBA	0
Name: VSAN-B	
Use vHBA Template: V	
Create vHBA Template	
vHBA Template: VSAN-B	
Adapter Performance Profile	
Adapter Policy: Linux Teate Fibre Channel Adapter Policy	

- o. Click OK to add the vHBA to the template.
- p. Review the table on the Storage page to verify that both vHBAs were created.

📥 Create Service Profile Template		×
Unified (	Computing System Manager	
Onnica c		
Create Service Profile Template	Storage	•
1. √ <u>Identify Service Profile</u>	Uptionally specify disk policies and SAN configuration information.	_
2. VNetworking	Select a local disk configuration policy.	ĥ
3. ✓ <u>Storage</u> 4. □ _{Zoping}	Local Storage: Select Local Storage Policy to use	
5. D <u>vNIC/vHBA Placement</u>	If nothing is selected, the default Local Storage configuration policy will be assigned to this service profile.	
6. U <u>vMedia Policy</u> 7. D Server Beat Order	🛨 Create Local Disk Configuration Policy	
8. Maintenance Policy		
9. Server Assignment	How would you like to configure SAN connectivity? Simple Connect No VHBAS Use Connectivity Policy	
10. Operational Policies		
	A server is identified on a SAM by its world wide node name (wiwnin). Specify now the system should assign a wiwnin to the server associated with this profile.	
	World Wide Node Name	1_
	WWNN Assignment: WWNN-POOL(32/32)	=
	The WWNN will be assigned from the selected pool. The available/total WWNNs are displayed after the pool name.	
	Name WWPN C	
	L-4 vHBA If	
	Contraction of the second seco	
	*	
	💼 Delete 📑 Add 🔚 Modify	
	· · · · · · · · · · · · · · · · · · ·	۰ ۲
	< Prev Next > Finish Can	cel

q. Click Next.

🛕 Create Service Profile Template 🛛				×
Unified (	Computing Sys	tem Mana	aer	
onnica c	bomputing 0ys		901	
Create Service Profile Template	Zoning			0
<ol> <li>✓<u>Identify Service Profile</u> Template</li> </ol>	Specify zoning information			
2. VNetworking	WARNING: Switch in end-host mode. In e	nd-host mode, zoning configur	ation will NOT be applied.	
4. Vzoning	Zaping configuration involves the following stops	_,		
5. D <u>vNIC/vHBA Placement</u> 6. Server Boot Order	2. Select vHBA Initiator(s) (vHBAs are create     2. Select vHBA Initiator(s)	s: ed on storage page)		
7. Maintenance Policy	3. Add selected Initiator(s) to selected Initiat	or Group(s)		
<ol> <li>Server Assignment</li> <li>Operational Policies</li> </ol>	Select vHBA Initiators	Select vHBA Initiato	or Groups	
	Name		· · ·	
	Fabric-A A Fabric-B	Name	Storage Connection Policy Name	₽ 
	>> Add T	0 >>		
	-		🚔 Delete 💻 Add 💷 Modify	-
	•	III		
			< Prev Next > Fir	ish Cancel

- 8. Set no Zoning options and click Next.
- 9. Set the following vNIC/vHBA placement options:
  - a. In the Select Placement list, select the RAC-HOST placement policy.
  - b. Select vCon1 and assign the vHBAs/vNICs to the virtual network interfaces policy in the following order:
  - VHBA VSAN-A
  - VHBA VSAN-B
  - VNIC-MGMT
  - VNIC-RAC-CLUSTER
  - c. Review the table to verify that all of the vNICs and vHBAs were assigned to the policy in the appropriate order.

🛕 Create Service Profile Template					<b>×</b>
Unified (	Computing Syst	em Manager			
Onnieu e	bompating eyet	ionn managor			
Create Service Profile Template	vNIC/vHBA Placement				Ø
1. √ <u>Identify Service Profile</u>	Specify how vNICs and vHBAs are pla	ced on physical network adapters			
2. Vetworking	in a server hardware configuration independent way.	s are placed on physical network adapters (mezzan	ine)		
3. √ <u>Storage</u> 4. √Zenina					
5. √ <u>vNIC/vHBA Placement</u>	Select Placement: RAC-HOST	Create Placement Policy			
6. U <u>vMedia Policy</u>					
8. Maintenance Policy	Virtual Network Interface connection provides a	mechanism of placing vNICs and vHBAs on physical	network adapters.		
9. Server Assignment	vNICs and vHBAs are assigned to one of Virtual f performed explicitly by selecting which Virtual Ne	Network Interface connection specified below. This twork Interface connection is used by vNIC or vHB4	assignment can be A or it can be done		
10. U Operational Policies	automatically by selecting "any". vNIC/vHBA placement on physical network interf	ace is controlled by placement preferences.			
	Please select one Virtual Network Interface and o	one or more vNICs or vHBAs			
		Virtual Network Interfaces Policy (read only)			
	VNICs VHBAs	Name	Order	Selection Preference	
	Name 🛤			Assigned Only	
		WHBA VSAN-B	2		
			3		
		vCon 2	4	All	
		vCon 3		All	
		······ )=) VCon 4	lo 🚍 Maya Dawo	АШ	_
	-	Move u	y wove bown		

d. Click Next.

10. Set the Server Boot Order:

- a. In the Boot Policy list, select BOOT-FABRIC-A.
- b. Review the table to verify that all of the boot devices were created and identified. Verify that the boot devices are in the correct boot sequence.

🔺 Create Service Profile Template 🚽								<b>—</b>
Unified (	Computing S	vete	m Mana	dor				
Unineu C	somputing 5	ysie		yei				
Create Service Profile Template	Server Boot Order							0
1. √Identify Service Profile	Optionally specify the boot pol	icy for this	service profile template.					
Template	Select a boot policy.							<u>^</u>
2. V <u>Networking</u> 3. √Storage								
4. √Zoning	Boot Policy: BOOT-FABRIC-A	👻 🖪 e	reate Boot Policy					
5. VVNIC/VHBA Placement								
6. √ <u>vMedia Policy</u>								
7. ✓ <u>Server Boot Order</u>	Name: BOOT-	FABRIC-A						
8. Maintenance Policy	Description:							
9. Server Assignment	Reboot on Boot Order Change: No							
10. Derational Policies	Enforce vNIC/vHBA/iSCSI Name: Yes							
	Boot Mode: Legac	У						
	WARNINGS:							
	The type (primary/secondary) does not i	ndicate a bo	ot order presence.	ent) is determined	d hu note hu			
	If Enforce vNIC/vHBA/iSCSI Name i	in the same i s selected ar	id the vNIC/vHBA/iSCSI does	not exist, a con	a by PCIe bu ifiq error will	is scan order. be reported.		
	If it is not selected, the vNICs/vHBAs/iS	ISI are selec	ted if they exist, otherwise th	ne vNIC/vHBA/is	SCSI with the	lowest PCIe bus scan order is	used.	
	Root Order						_	Ξ
	🕂 🖃 🎑 Filter 🖨 Export 🔂 Prin	t		_	_			
	Name	Order	VNIC/VHBA/ISCSI VNIC	Туре	Lun ID	WWN	Ę	
		1						
	San	2						
	🖨 🚍 SAN primary		VSAN-A	Primary				
	SAN Target primary			Primary	0	20:12:00:80:E5:29:67:8C		
	SAN Target secondary			Secondary	0	20:13:00:80:E5:29:67:8C		
	🖻 🚍 SAN secondary		VSAN-B	Secondary				
	SAN Target primary			Primary	0	20:32:00:80:E5:29:67:8C		
	SAN Target secondary			Secondary	0	20:33:00:80:E5:29:67:8C		
							<b>T</b>	
	Create iSCSI vNIC Set iSCSI	Boot Parame	ters					
								-
					<	Prev Next > Fi	nish	Cancel

- c. Click Next.
- 11. Add a Maintenance Policy:
  - a. Confirm that maintenance policy is set to default.

🛕 Create Service Profile Template		
Unified C	Computing System Manager	
Unified C Create Service Profile Template 1.	Computing System Manager 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 profile. Maintenance Policy: default Description: Reboot Policy: User Ack	
	<prev next=""> Finish Cancel</prev>	

b. Click Next.

12. Specify the Server Assignment:

- a. In the Pool Assignment list, select ORACLE-POOL.
- b. Optional: Select a Server Pool Qualification policy.
- c. Select Down as the power state to be applied when the profile is associated with the server.
- d. Expand Firmware Management and select RAC-HOST from the Host Firmware list.

🛕 Create Service Profile Template		×
Unified (	Computing System Manager	
Create Service Profile Template	Server Assignment Optionally specify a server pool for this service profile template.	0
Template       2.     ✓ Networking       3.     ✓ Storace       4.     ✓ Zoning       5.     ✓ whtch/what Placement       6.     ✓ whedia Policy       7.     ✓ Server Boot Order       8.     ✓ Maintenance Policy       9.     ✓ Server Assignment       10.     □ Operational Policies	Pool Assignment:       ORACLE-POOL       Image: Create Server Pool         Select the power state to be applied when this profile is associated with the server.       Image: Ima	E
	Firmware Management (BIOS, Disk Controller, Adapter)                   If you select a host firmware policy for this service profile, the profile will update the firmware on the server that it is associated with.                 Otherwise the system uses the firmware already installed on the associated server.                Host Firmware:             RAC-HOST               If create Host Firmware Package	•

- e. Click Next.
- 13. Add Operational Policies:
  - a. In the BIOS Policy list, select RAC-HOST.
  - b. Expand Power Control Policy Configuration and select NO-POWER-CAP in the Power Control Policy list.

🛕 Create Service Profile Template				<b>×</b>
Unified C	Computing System Manager			_
Create Service Profile Template 1. √ <u>Identify Service Profile</u>	Operational Policies Optionally specify information that affects how the system operates.			0
Iemplate           2.         ✓ Networking           3.         ✓ Storage           4.         ✓ Zoning           5.         ✓ <u>vMIC/vHBA Placement</u> 6.         ✓ <u>vME/vHBA Placement</u> 7.         ✓ Server Bock Order	BIOS Configuration         If you want to override the default BIOS settings, select a BIOS policy that will be associated with this service profile         BIOS Policy:       RAC-HOST         O       Create BIOS Policy	۲		
<ol> <li>✓<u>Maintenance Policy</u></li> <li>✓<u>Server Assignment</u></li> </ol>	External IPMI Management Configuration	۲		
10. √ <u>Operational Policies</u>	Management IP Address	۲		
	Monitoring Configuration (Thresholds)	۲		
	Power Control Policy Configuration	۲		
	Power control policy determines power allocation for a server in a given power group. Power Control Policy: O C			
	Scrub Policy	۲		
	KVM Management Policy	۲		
	< Prev	Next >	Finish	Cancel

- 14. Click Finish to create the service profile template.
- 15. Click OK in the confirmation message.
- 16. Click the Servers tab in the navigation pane.
- 17. Select Service Profile Templates > Root.

🛕 Cisco Unified Computing System Manager - ice	fs1-ucs1
Fault Summary	🕞 🍏 🖬 New - 🕞 Options 🛛 🕢 Pending Activities 🛛 👩 Exit
0 26 3	Service Prome Templaces / M. root / Dervice Templace RAC-SE VER-BOOT-PABRIC-A Dervice Templace RAC-SE
Equipment Servers LAN SAN VM Admin	General Scorage Network ISCSI VINICS VMedia Policy Boot Order Policies Events PSM
Equipment       Delvers       LAN       SAN       VM       Admin         Filter:       All       Image: Administration of the service Profiles       Image: Administration of the service Profile Templates         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service Template PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service Template PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service Template PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service Profile Template PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image: Service Profile Template PAC-SERVER-BOO       Image: Administration of the service PAC-SERVER-BOO         Image:	Actions   Create a Clone   Disassociate Template   Sociate a Change   Disassociate Template   Sociate With Server Pool   Change Maintenance Policy   Change Maintenance Policy   Change Management IP Address   Deleter Information Configuration   Sociated Server Usage
	Save Changes Reset Values
A Logged in as admin@172.20.160.20	System Time: 2014-07-11T08:37

- 18. Right-click the previously created RAC-SERVER-BOOT-FABRIC-A template.
- 19. Select Create a Clone.
- 20. In the dialog box, enter RAC-SERVER-BOOT-FABRIC-B as the name for clone, select the Root Org, and click OK.



- 21. Click OK.
- 22. Select the newly cloned service profile template and click the Boot Order tab.



- 23. Click Modify Boot Policy.
- 24. In the Boot Policy list, select BOOT-FABRIC-B.

mouny boot roney						
Iodify Boot Policy						
Boot Policy: BOOT-FABRIC-B	- Creat	e Boot Policy				
		,				
Name: BOO1	F-FABRIC-B					
Description:						
Enforce VNIC/VHB0/ISCSI Name: Xec						
Boot Mode: Lega	ary.					
boot hodor Eega	7					
WARNINGS:						
The type (primary/secondary) does not The offective order of best devices with	t indicate a boo thin the correct	ot order presence. Jouise class (LAN/Storage/SCC	'ST) is dotorsing		is scop order	
If Enforce vNIC/vHBA/iSCSI Name	nin the same o is selected an	d the vNIC/vHBA/iSCSI does	.51) is determine .not exist, a con	a by PCIe bu fia error will	is scan order. be reported.	
If it is not selected, the vNICs/vHBAs/if	SCSI are select	ed if they exist, otherwise th	ne vNIC/vHBA/is	5CSI with the	lowest PCIe bus scan order is u	ised.
Boot Order						
🕕 🖃 🛃 Filter 🖨 Export 😹 Pr	int					
Name	Order	VNIC/VHBA/iSCSI VNIC	Туре	Lun ID	WWN	Ę
Remote CD/DVD	1					
	2					
SAN primary	-	VSAN-B	Primary			
SAN Target primary						
			Primary	0	20:32:00:80:E5:29:67:8C	
SAN Target secondary			Primary Secondary	0 0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary	0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary Primary	0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary Primary Secondary	0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary Primary Secondary	0 0 0 0 0 0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary Primary Secondary	0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C	
SAN Target secondary		VSAN-A	Primary Secondary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	-
SAN Target secondary SAN Secondary SAN Target primary SAN Target primary SAN Target secondary Create ISCSI vNIC Set ISCS	I Boot Paramet	VSAN-A	Primary Secondary Secondary Primary Secondary	0	20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	-
SAN Target secondary  SAN Target secondary  SAN Target primary  SAN Target secondary  Create iSCSI vNIC Set iSCS	I Boot Paramet	VSAN-A	Primary Secondary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	•
SAN Target secondary  SAN Target primary  SAN Target primary  SAN Target secondary  Create iSCSI vNIC Set iSCS	I Boot Paramet	VSAN-A	Primary Secondary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	•
SAN Target secondary	I Boot Paramet	VSAN-A	Primary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	•
SAN Target secondary	I Boot Paramel	VSAN-A	Primary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	•
SAN Target secondary	I Boot Paramet	VSAN-A ters	Primary Secondary Primary Secondary		20:32:00:80:E5:29:67:8C 20:33:00:80:E5:29:67:8C 20:12:00:80:E5:29:67:8C 20:13:00:80:E5:29:67:8C	-

- 25. Click OK and then click OK again to close the confirmation window.
- 26. In the right pane, click the Network tab and then click Modify vNIC/HBA Placement.
- 27. Expand vCon 1 and move vHBA VSAN-B ahead of vHBA VSAN-A in the placement order.
- 28. Click OK and then click OK again.

## **Create Service Profiles**

To create service profiles from the service profile template, complete the following steps:

- 1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
- 2. Select Service Profile Templates > Root > Service Template RAC-SERVER-BOOT-FABRIC-A.

🔺 Cisco Unified Computing System Manager - icefs1-uce	1							
Fault Summary	🖌 🕒 💼 🗉 New 🚽 🕞 Ontions 🛛 🖉 🕕 A Pending Activities 🛛 🔞 Exit	սիսին						
🛛 🔇 💙 🛆 🔺		CISCO						
1 15 3 1	>> 🥪 Servers 🕨 🔟 Service Profile Templates 🕨 📩 root 🕨 🔟 Service Template RAC-SERVER-BOOT-Fr	>> 🥪 Servers > 🔟 Service Profile Templates > 🎪 root > 🔟 Service Template RAC-SERVER-BOOT-FABRIC-A						
Equipment Servers LAN SAN VM Admin	General Storage Network ISCSI vNICs vMedia Policy Boot Order Policies Events FSM							
Filter: All	Actions Properties							
• -	Create Service Profiles From Template Name: RAC-SERVER-BOOT-FABRIC-A							
Servers	Description:							
Service Profiles	UUID: Derived from pool (UUID-POOL)							
E- Stest1	Type: Updating Template							
⊕	Associate with Server Pool Associated Server Pool	8						
E-A root	Change Maintenance Policy Maintenance Policy	8						
Service Template RAC-SERVER-BOOT-FABR	Change UUID							
	Change Management IP Address							
	UN Delete Inband Configuration							
e v root	Show Policy Usage							
Gerver Pools      Gerver Pools      Gerver Pools								
		Save Changes Reset Values						
· · · · · · · · · · · · · · · · · · ·								
Logged in as admin@172.20.160.20		System Time: 2014-10-24T12:46						

- 3. Right-click RAC-SERVER-BOOT-FABRIC-A and select Create Service Profiles from Template.
- 4. Enter RAC-SERVER-BOOT-FABRIC-A-0 as the Naming Prefix.
- 5. Enter 1 as the Suffix Starting Number.
- 6. Enter 4 as the Number of Instances to create.

🛕 Create Service Profiles Fror	n Template	×
Create Service F	Profiles From Template	0
Naming Prefix:	RAC-SERVER-BOOT-FABRIC-A-0	
Number of Instances:	4	
Service Profile Template:	Service Template RAC-SERVER-BOOT-FABRIC-A D	•
		ncel

- 7. Click OK to create the service profile.
- 8. Click OK in the confirmation message.
- 9. Select Service Profile Templates > Root > Service Template RAC-SERVER-BOOT-FABRIC-B.

A Cisco Unified Computing System M	lanager - icefs1-ucs								
Fault Summary	anager reerva aes				de de la				
	Δ Δ	🖌 🤤 💷 New 🌱 🎽 Options 🛛 🚱 🚺 🖉 Pendi	ng Activities 🛛 🚺 Exit		cisco				
1 15 3	3 1	>> 🥪 Servers + 🛐 Service Profile Templates + 🎎	>> 🥪 Service > 🔟 Service Profile Templates > 🙏 root > 🔟 Service Template RAC-SERVER-BOOT-FABRIC-B 👘 Service Template RAC-SERVER-BOO						
Equipment Servers LAN SAN VM A	dmin	General Storage Network iSCSI vNICs vMedia Po	licy Boot Order Policies Events FSM						
Filter: All	-	Actions Pr	operties Name: RAC-SERVER-BOOT-FABRIC-						
		Create Service Profiles From Template	Description:						
Service Profiles     Service Profiles     Service Profiles     Service Profile Templates     Service Template RAC-     Service Template RAC-	SERVER-BOOT-FABR	Create a Clone         Image: Disassociate Template         Image: Disassociate with Server Pool         Image: Change Maintenance Policy         Image: Change UUID         Image: Change Management IP Address         Image: Delete Inband Configuration         Image: Show Policy Usage	Jescription: UUID: Derived from pool (UUID-PC wer State:	ial)					
				Save Changes	Reset Values				
•	•								
A Logged in as admin@172.20.160.20				System Time: 2014-10-	24T12:49				

- 10. Right-click RAC-SERVER-BOOT-FABRIC-B and select Create Service Profiles from Template.
- **11.** Enter RAC-SERVER-BOOT-FABRIC-B-0 as the Naming Prefix.
- 12. Enter 1 for Name Suffix Starting Number.
- 13. Enter 4 for Number of Instances.

🔺 Create Service Profiles From Template	×
Create Service Profiles From Template	0
Naming Prefix: RAC-SERVER-BOOT-FABRIC-B-0 Name Suffix Starting Number: 1 Number of Instances: 4 Service Profile Template: Service Template RAC-SERVER-BOOT-FABRIC-B	Ŧ
OK C	Cancel

- 14. Click OK to create the service profile.
- 15. In the confirmation message, click OK.
- 16. Verify that all eight service profiles have been created. The service profiles are automatically associated with the servers from the servers assigned to the ORACLE-POOL server pool.

# 4.3 NetApp EF-Series Array Configuration

Table 20 provides requirements for configuring the NetApp EF-Series array, along with references and comments related to the configuration.

Requirement	Reference	Comments
Storage system management software installation	NetApp E-Series Storage Systems Initial Configuration Guide and Software Installation for SANtricity Storage Manager 11.10	Refer to step 2 of the section "Installing the SANtricity Storage Manager Software" in the referenced document.
Storage system out-of-band management configuration	NetApp E-Series Storage Systems Initial Configuration Guide and Software Installation for SANtricity Storage Manager 11.10	Refer to step 6, option 2 of the referenced document.

Table 20) Requirements, references, and comments for configuring NetApp EF-Series array.

## Configure NetApp EF-Series Array

This section demonstrates using SANtricity with the EF560 to create the storage for the Oracle RAC database and map each of the RAC database nodes to the EF560 storage controllers. This requires the following procedures, which are described in detail in the following subsections:

- Create host groups in which to manage the Oracle RAC database servers.
- Create volume groups used to manage the EF560 storage provisioned for the Oracle RAC database nodes to use.
- Create the storage volumes used to boot the Oracle RAC database servers.
- Create the storage volumes used to house the Oracle RAC database.
- Provide access to the storage volumes from the Oracle RAC database nodes.

Table 21 shows the names and sizes of the volume groups, volumes, and host groups that were created on one of the four EF560 all-flash arrays. Comparable configurations were provisioned on the remaining three EF560 all-flash arrays to enable the Oracle RAC database to be provisioned evenly across all of the storage arrays.

**Note:** Refer to Table 24 in the appendix for the specific names that were used in this configuration. Table 21 is a sample from Table 24 to illustrate how each EF560 should be configured.

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/LUN Name	Allocated Capacity in GB	Total Capacity	Spare Disks	Mapped Host Group Name	
EF560-1	Data	A1VG1	10	DATALUN1	450	3.6TB	2	RAC	
		A2VG2			DATALUN2	450			
				DATALUN3	450				
				DATALUN4	450				
			A2VG2 10	DATALUN5	450				
				DATALUN6	450				
				DATALUN7	450				

Table 21) Storage layout for one EF560 all-flash array.

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/LUN Name	Allocated Capacity in GB	Total Capacity	Spare Disks	Mapped Host Group Name
				DATALUN8	450			
Redo logs and	Redo	do A1LOGVG	A1LOGVG 2	RAC1BOOT	78	256GB		
			RAC2BOOT	78				
	LUNs			LOG1	50			
				LOG2	50			

### **Create Host and Host Group**

In order to map the storage devices to an Oracle RAC database node, the first step is to create a host group that includes the associated FC HBA WWPNs for all of the Oracle RAC database server nodes. For this solution we created a single host group called "RAC" and included a total of eight hosts (one for each of the RAC nodes). All the storage devices are mapped to the RAC host group so that all the RAC nodes have access to those devices.

Follow these steps to create the host group and the hosts:

1. Launch the E-Series SANtricity management interface for one of the four EF560 storage arrays and select the Host Mappings tab.

SANtricity®					NetApp [.]			
Storage Array Storage Copy Services Host Mappings Hardware Monitor Upgrade Help								
icefs1-e550-1 Optimal								
Summary Performance Storage	& Copy Services 📑 Host M	appings 🧮 Hardware 📝	Setup					
Find object in tree	Defined Mappings				_			
🖃 - 🧱 Storage Array icefs 1-e550-1	Volume Name	Accessible By	LUN	Volume Capacity	Туре			
Undefined Mappings	Access	Derault Group	1		Access			
Default Group								
Unassociated Host Port Identifiers								
Premium Features: 📉 🚇								

2. On the left navigation bar, right-click the Storage array.

- 3. Select Define.
- 4. Select Host Group.
- 5. In the menu to enter the host group name, give the host group name as RAC.

SANtricity	Ø					NetApp [.]			
Storage Array Stor	torage Array Storage Copy Services Host Mappings Hardware Monitor Upgrade Help								
🛛 🖉 🖉	<u>Va</u>								
icefs1-e550	icefs1-e550-1 📓 Optimal								
Summa	ry 🔀 Performance 🔐 Storage 8	& Copy Services 💾 Host I	lappings 🛗 Hardware [	Setup					
Find object in tree	B	Defined Mappings	· · · · ·						
	av leafe 1 a ESO 1	Volume Name	Accessible By	LUN	Volume Capacity	Туре			
LP ^R U	Define	<ul> <li>Host Group</li> </ul>	Default Group	/		Access			
	Manage Host Port Identifiers View Unassociated Host Port Identifier	rs Host Storage Partition							
	Locate	•							
	Premium Features Mirroring Manage Copies	•							
	Security	•				_			
	Change Tray	Þ.							
	Configuration	•							
	Monitor Upgrade	Þ							
	Rename								
	Preferences								
	Exit								

6. Click OK to complete the host group creation.

### **Create Volume Group**

Now that you have created the host groups and added the hosts associated with the Oracle RAC nodes, the next step is to provision the storage on the EF560 for use by the Oracle RAC database. Complete the following steps to create the volume groups and associated LUNs used to provide storage for the Oracle RAC database.

To create a volume group from unconfigured capacity in the storage system using SANtricity, complete the following steps:

- 1. In the SANtricity Array Management window (AMW), click the Hardware tab and verify that the required number of hot spare drives have been allocated. For this setup, each EF560 system was provisioned with two hot spares.
  - **Note:** For more information about configuring hot spare drives, refer to the section "Using Hot Spare Drives" in the SANtricity online help.
- 2. In the AMW, select the Storage and Copy Services tab, right-click Total Unconfigured Capacity, and select Create Volume Group.
| SANtricity [®]         |                       |                                                                                                                                                                                                                                                                                                                                                                               |                                    | NetApp [.] |
|---------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------|
| Storage Array Storage Copy Serv | ices Host Mappings Ha | rdware Monitor                                                                                                                                                                                                                                                                                                                                                                | Upgrade Help                       |                     |
| 🖉 🗉 🖉 🌭 🌲 🖤                     |                       |                                                                                                                                                                                                                                                                                                                                                                               |                                    |                     |
| icefs1-e550-1 🛗 Optimal         |                       |                                                                                                                                                                                                                                                                                                                                                                               |                                    |                     |
| Summary Perfor                  | mance 🔐 Storage &     | Copy Services                                                                                                                                                                                                                                                                                                                                                                 | 💾 Host Mappings 🕅 Hardware 📝 Setup |                     |
| Find object in tree             | B                     | Total                                                                                                                                                                                                                                                                                                                                                                         | Unconfigured Capacity              | Â                   |
| All Logical Objects             |                       | View Associated Pl                                                                                                                                                                                                                                                                                                                                                            | vsical Components                  |                     |
|                                 | View Associated Physi | cal Components                                                                                                                                                                                                                                                                                                                                                                | 17.454 TB                          |                     |
| Asynchronous Mirri              | Create Volume Group.  |                                                                                                                                                                                                                                                                                                                                                                               | 386 Serial Attached SCSI (SAS)     |                     |
|                                 | Create Disk Pool      |                                                                                                                                                                                                                                                                                                                                                                               | : 512 bytes                        |                     |
|                                 |                       | Unassigned           Tray         Slot           99         1           99         2           99         3           99         4           99         5           99         6           99         7           99         8           99         9           99         10           99         12           99         13           99         14           99         15 | rives:                             | E                   |
|                                 |                       | 99 16<br>99 17<br>99 18                                                                                                                                                                                                                                                                                                                                                       |                                    |                     |

3. Click Next to proceed to the next screen.

This wizard will help you quickly create a volume group. A volume group is a set of drives that you logically group together to provide capacity and a RAID level for one or more volumes. You will be given the option to create volumes when you finish creating the volume group. Choonfigured capacity selected: 17.454 TB (SAS) Tos and examples on allocating capacity Selected to the selected to t
Next > Cancel Help

- 4. Provide a name for the new volume group. In this configuration, the volume group name is A1VG1.
  - **Note:** Volume group names must not exceed 30 characters and must not contain spaces. The name string can contain letters, numbers, underscores (_), dashes (-), and pound signs (#).
- 5. To create a volume group automatically, select Automatic (Recommended) and click Next.

	L NetA
olume group name (30 characters maximum):	
41VG1	
$\overline{Z}$ Fifter drive selection to show Data Assurance(DA) capable drives only. To create DA capable volumes in this volume	group, all drive in the volume group must be DA capable
Note: Enabling Data Assurance for a volume is done when it is being created.	
rive selection choices:	
Automatic (Recommended): Choose from a list of automatically generated drive and capacity options.	
) Manual (Advanced): Choose specific drives to obtain capacity for the new volume group.	
	<back next=""> Cancel He</back>

- 6. Select RAID level from the drop down. In this case we are selecting RAID10.
- 7. Select the number of drives. We are selecting 10 drives in this case.
- 8. Click finish to create the RAID group.
- 9. Repeat step 2 through step 8 to create all the required volume groups defined in Table 24. For this solution, a total of two volume groups were created with the RAID type as RAID 10, and one volume group was created with the RAID type as RAID 1, on each of the four EF560 systems:
  - Two volume groups were created with 10 drives for the Oracle data files.
  - One volume group was created with 2 drives for the redo logs and RAC-node boot LUNs.

NetApp

Specify the redundancy protection (RAID level) and its overall capacity (number of drives) for the new volume group.

What RAID level is best for my application?

What is tray loss protection?

#### Select RAID level:

RAID 1 V disk mirroring" offers high performance and the best data availability. Select four or more drives to achieve mirroring and striping (RAID 1 V 10 or RAID 1+0). Usable capacity is half of the drives in the volume group.

Note: If you do not see a drive candidate consisting of a drive count or capability you expected, use the manual method from the previous screen.

#### Select capacity:

Capacity	Drives	Speed (rpm)	Logical Sector Size	Drive Sector Format	Media	Interface	DA Capable
744.712 GB	2	NA	512 bytes	Native	SSD	SAS	Yes
1,489.425 GB	4	NA	512 bytes	Native	SSD	SAS	Yes
2,234.138 GB	6	NA	512 bytes	Native	SSD	SAS	Yes
2,978.850 GB	8	NA	512 bytes	Native	SSD	SAS	Yes
3,723.563 GB	10	NA	512 bytes	Native	SSD	SAS	Yes
4,468.276 GB	12	NA	512 bytes	Native	SSD	SAS	Yes
5,212.989 GB	14	NA	512 bytes	Native	SSD	SAS	Yes
5,957.701 GB	16	NA	512 bytes	Native	SSD	SAS	Yes
6,702.414 GB	18	NA	512 bytes	Native	SSD	SAS	Yes
7,447.127 GB	20	NA	512 bytes	Native	SSD	SAS	Yes
8,191.840 GB	22	NA	512 bytes	Native	SSD	SAS	Yes
8,936.552 GB	24	NA	512 bytes	Native	SSD	SAS	Yes

NetApp[.]

Specify the redundancy protection (RAID level) and its overall capacity (number of drives) for the new volume group.

What RAID level is best for my application?

What is tray loss protection?

canacity:		The volume	group was success	fully created.		ious sereen.	
Capacity	Drives	You must cr the new vol	eate at least one vo ume group.	olume before you	can use the capacity of	Interface	DA Capable
744.712 GB	2	Learn abou	it volumes and volu	me groups		SAS	Yes
1,489.425 GB	4	Would you I	ike to create a volu	me using the new	volume group now?	SAS	Yes
2,234.138 GB	6			-		SAS	Yes
2,978.850 GB	8					SAS	Yes
3,723.563 GB	10		Yes	No		SAS	Yes
4,468.276 GB	12					SAS	Yes
5,212.989 GB	14	NA	512 bytes	Native	SSD	SAS	Yes
5,957.701 GB	16	NA	512 bytes	Native	SSD	SAS	Yes
6,702.414 GB	18	NA	512 bytes	Native	SSD	SAS	Yes
7,447.127 GB	20	NA	512 bytes	Native	SSD	SAS	Yes
8,191.840 GB	22	NA	512 bytes	Native	SSD	SAS	Yes
8,936.552 GB	24	NA	512 bytes	Native	SSD	SAS	Yes

#### **Create Volume for Boot LUN**

This section describes using the A1LOGVG volume group to provision storage for the Oracle Linux boot LUNs used by the Oracle RAC nodes. This process creates a series of volumes (LUNs) and associates them with a specific volume group to facilitate manageability.

**Note:** Before the Oracle provisioning, NetApp recommends that you create the boot LUNs for the RAC database nodes.

To create a volume, complete the following steps:

- 1. Select the volume group that was created for the redo logs and boot LUNs. In this example, the A1LOGVG volume group was used to create the boot LUNs for two RAC nodes.
- 2. Right-click Free Capacity and select Create Volume.



- 3. Enter the new volume capacity from the available capacity in volume group A1LOGVG. For this setup, we used 100GB for each boot LUN for the RAC nodes.
- 4. Enter a new volume name, in this case RAC1BOOT.
- 5. From the Map to Host drop-down list, select the host name.
- 6. Disable data assurance.
- 7. Select File System for the Volume I/O characteristics type.
- 8. Disable dynamic cache read prefetch.
- 9. Click Finish to create the new volume.

- 10. Repeat step 1 through step 9 for each RAC node listed in step 5 earlier so that each RAC node has a configured boot LUN. After the boot LUN creation, the setup used for this solution has entries as provided in Table 22.
  - **Note:** Although it is not a requirement, NetApp recommends that you install the Oracle Linux operating system on all the RAC nodes immediately after creating the boot LUNs. This makes it easier to identify the correct LUNs on the EF560 that is provisioned for the process. If you would like to install the Oracle Linux OS now, perform the procedures in the section "Oracle Linux Installation on RAC Nodes."

	NetApp [.]
Tips on storage provisioning         Volume Parameters         Volume group name:       A1LOGVG         Volume group RAID level:       1         Free capacity:       544.710 GB         New volume capacity:       Units:	
78.000 ⊕ GB ▼ Volume name: 2 RAC1BOOT Map to host: 2	
Map Later   Host RAC-A01 (Linux (DM-MP))  Host RAC-A03 (Linux (DM-MP))  Host RAC-A03 (Linux (DM-MP))  Host RAC-B01 (Linux (DM-MP))  Host RAC-B02 (Linux (DM-MP))  Host RAC-B03 (Linux (DM-MP))  Host RAC-B04 (Linux (DM-MP))  Enable dynamic cache read prefetch 2	2 005
Segment size: 128 KB  v Finish Cancel	Help

#### Table 22) Storage layout for boot LUNs for RAC nodes.

Storage Array	Туре	Volume Group RAID 1	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Mapped Host Name	Total Allocated Capacity	Spare Disks
EF560-1	Boot	A1LOGVG	2	RAC1BOOT	78	RAC-A01	624GB	2
	for the			RAC2BOOT	78	RAC-A02		
EF560-2	nodes	A2LOGVG		RAC3BOOT	78	RAC-A03		
				RAC4BOOT	78	RAC-A04		
EF560-3		A3LOGVG		RAC5BOOT	78	RAC-B01		
				RAC6BOOT	78	RAC-B02		

Storage Array	Туре	Volume Group RAID 1	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Mapped Host Name	Total Allocated Capacity	Spare Disks
EF560-4		A4LOGVG		RAC7BOOT	78	RAC-B03		
				RAC8BOOT	78	RAC-B04		

## **Volume Creation for Oracle RAC Grid**

This section explains how to create the disks for the grid cluster. A total of three disks are created for the grid infrastructure. For this setup, the second EF560 array out of the four is used to house the disks for the grid. Follow the steps to create the disks for grid infrastructure.

- 1. Launch the SANtricity GUI for the second storage array EF560-2.
- 2. Select one of the volume groups you created for the Oracle installation. This is A2VG1 in this example.
- 3. Select free capacity, right-click, and select Create Volume.
- 4. Enter the new volume capacity from the available capacity in the volume group A2VG1. For this setup we used 5GB for each Oracle Cluster Ready Services (CRS) disk.
- 5. Enter a new volume name, in this case CRS1.
- 6. From the Map to host drop-down list, select Host Group RAC.
- 7. Disable Data Assurance.
- 8. Select File System in the Volume I/O characteristics type.
- 9. Disable dynamic cache read prefetch.
- 10. Click Finish to create the new volume.
- 11. You are prompted to create another volume within the same volume group.
- 12. Click Yes.
- Repeat step 4 through step 10 to create a total of three 5GB CRS LUNs (CRS1 through CRS3) for the volume group A2VG1. Table 23 shows the results of the CRS disk setup after all three disks are created.

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Mapped Host Group Name	Total Allocated Capacity	Spare Disks
EF560-2	CRS	A2LOGVG	2	GRID1	5	RAC	5GB	2
	aisk			GRID2	5			
				GRID3	5			

 Table 23) Storage layout for CRS disks for RAC cluster.

NetApp [.]
Tips on storage provisioning
Volume Parameters
Volume group name: A2VG1 Volume group RAID level: 10 Free capacity: 1,723.554 GB
New volume capacity: Units:
5.000 🐳 GB 👻
Volume name: 😰
CRS1
Map to host: 2
Map Later
Map Later
Host Group RAC
- Host RAC-A01 (Linux (DM-MP))
- Host RAC-A02 (Linux (DM-MP)) = tion on the new volume 🛙 😡
- Host RAC-A03 (Linux (DM-MP))
- Host RAC-A04 (Linux (DM-MP))
- Host RAC-B01 (Linux (DM-MP))
- Host RAC-B02 (Linux (DM-MP)) *
Enable dynamic cache read prefetch 2
Segment size:
128 KB 👻
Finish Cancel Help

## **Volume Creation for Oracle RAC Database**

This section describes using the A1VG1 volume group to provision storage for the Oracle RAC database accessed by the Oracle RAC nodes. This process creates a series of volumes (LUNs) and associates them with a specific volume group to facilitate manageability. To create a volume, complete the following steps:

- 1. Select one of the volume groups you created for the Oracle installation. This volume group in this example is A1VG1.
- 2. Select Free Capacity, right-click, and select Create Volume.

SANtricity [®]			NetApp [.]
Storage Array Storage Copy Services Host Mappings Ha	rdware Monitor Upgrad	le Help	
icefs1-e550-1 🔛 Optimal			
Summary Performance Storage 8	Copy Services 💾 H	ost Mappings 🕅 Hardware 📝 Setup	
Find object in tree	Free Capac	ity	
	View Associated Physica	I Components	
Uolume Groups	Free Capacity:	3,723.563 GB	
📄 🗣 🧇 A 1LOGVG (RAID 1) (744.712 GB)	Associated volume	group: A1VG1	
Free Capacity (744.712 GB)	RAID level:	1	
Create Volume Create Volume Pree Capacity (3,723.563 GB) Create Volume Pree Capacity (3,723.563 GB) Consistency Groups Consistency Groups Asynchronous Mirror Groups			

- 3. Enter the new volume capacity from the available capacity in the volume group A1VG1. For this setup, we used 450GB for each volume.
- 4. Enter a new volume name, in this case DATALUN1.

NetApp [.]
Tips on storage provisioning
Volume Parameters Volume group name: A1VG1 Volume group RAID level: 10 Free capacity: 3,723,554 GB
New volume capacity: Units:
0.000 🖶 GB 💌
DATALUN1
Map to host: 😰
Map Later
Host Group RAC         - Host RAC-A01 (Linux (DM-MP))         Host RAC-A02 (Linux (DM-MP))         Host RAC-A03 (Linux (DM-MP))         Host RAC-A04 (Linux (DM-MP))         Host RAC-B01 (Linux (DM-MP))         Host RAC-B01 (Linux (DM-MP))         Host RAC-B02 (Linux (DM-MP))         Host RAC-B02 (Linux (DM-MP))         Host RAC-B02 (Linux (DM-MP))         Host RAC-B02 (Linux (DM-MP))         Host RAC-B03 (Linux (DM-MP))         Host RAC-B
Finish Cancel Help

- 5. From the Map to Host drop-down list, select Host Group RAC.
- 6. Disable Data Assurance.
- 7. Select Database in the Volume I/O characteristics type.
- 8. Disable dynamic cache read prefetch.
- 9. Click Finish to create the new volume.
- 10. You are prompted to create another volume within the same volume group.
- 11. Click Yes.
- 12. Repeat step 3 through step 9 to create a total of four 450GB data LUNs (DATALUN1 through DATALUN4) for the volume group A1VG1.
- 13. Repeat step 1 and select second volume group A1VG2 to create the rest of the data LUNs.
- 14. Repeat step 3 through step 9 to create a total of four 450GB data LUNs (DATALUN5 through DATALUN8) for the volume group A1VG2.
- 15. Repeat this process to provision the rest of the EF560 storage arrays as part of the solution.
- **Note:** For this setup, each data volume group was created with four 450GB LUNs, which makes eight LUNs per EF560 system. A total of 32 LUNs were created for all four EF560 systems together. See Table 24 in the appendix for details.

_	NetApp [.]
	Tips on storage provisioning         Volume Parameters         Volume group name:       A1VG1         Volume group RAID level:       10         Free capacity:       3,723.554 GB         New volume capacity:       Units:         450.000       GB         Volume name:       Image: Comparison of the second secon
	Host Group RAC         Quality of Service (QoS) Attributes         Enable data assurance (DA) protection on the new volume ?         Volume I/O characteristics type:         Database         Imable dynamic cache read prefetch ?         Segment size:         128 KB         Finish       Cancel

## 4.4 Cisco Nexus 5548UP Network Configuration

This section describes the installation and configuration of the Cisco Nexus 5548UP switches used in this solution. Section 4.2, "Cisco UCS Configuration," must be completed before the procedure in this section can be performed.

## **FlexPod Cisco Nexus Base**

The following procedures describe how to configure the Cisco Nexus switches for use in a base FlexPod environment with Cisco Nexus NX-OS 7.0(0)N1(1) or later.

### Initial Cisco Nexus 5548UP Switch A Configuration

To set up the initial configuration for the Cisco Nexus switch A, complete the following steps:

- 1. Configure the switch.
  - **Note:** On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter power-on autoprovisioning.
  - **Note:** Review the configuration summary before enabling the configuration.

Abort Power on Auto Provisioning and continue with normal setup? (yes/no) [n]: yes

```
Do you want to enforce secure password standard (yes/no): yes
Enter the password for "admin":
Confirm the password for "admin":
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name:
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address:
Mgmt0 IPv4 netmask:
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway:
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa): rsa
Number of rsa key bits <1024-2048> : 1024
Configure the ntp server? (yes/no) [n]: y
NTP server IPv4 address:
Enter basic FC configurations (yes/no) [n]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

#### 2. Review the configuration summary before enabling the configuration.

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

## Initial Cisco Nexus 5548UP Switch B Configuration

To set up the initial configuration for the Cisco Nexus switch B, complete the following steps:

- 1. Configure the switch.
  - **Note:** On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter power-on autoprovisioning.
  - Note: Review the configuration summary before enabling the configuration.

```
Abort Power on Auto Provisioning and continue with normal setup? (yes/no) [n]: yes
Do you want to enforce secure password standard (yes/no): yes
Enter the password for "admin":
Confirm the password for "admin":
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name:
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address:
Mgmt0 IPv4 netmask:
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway:
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa): rsa
Number of rsa key bits <1024-2048> : 1024
Configure the ntp server? (yes/no) [n]: y
NTP server IPv4 address:
Enter basic FC configurations (yes/no) [n]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

#### 2. Review the configuration summary before enabling the configuration.

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

# FlexPod Cisco Nexus Fibre Channel (FC) Storage

This section describes the steps required to configure the FCoE and FC capabilities required for the Cisco Nexus 5548UP switches.

### **Enable Licenses**

To license the Cisco Nexus switches, complete the following steps:

- 1. For the Cisco Nexus 5548UP switch A and Cisco Nexus 5548UP switch B, log in as admin.
- 2. Run the following commands:

```
config t
feature fcoe
feature npiv
feature lacp
feature vpc
feature lldp
```

## **Configure FC Ports**

To configure the FC ports on the Cisco Nexus switches, complete the following step:

1. On the Cisco Nexus 5548UP switch A and Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands:

```
slot 1
port 17-32 type fc
exit
copy run start
reload
```

## **Set Global Configurations**

To enable global configurations on the Cisco Nexus switches, complete the following step:

1. On the Cisco Nexus 5548UP switch A and Cisco Nexus 5548UP switch B, run the following commands to set global configurations and jumbo frames in QoS:

```
spanning-tree port type network default
spanning-tree port type edge bpduguard default
port-channel load-balance ethernet source-dest-port
policy-map type network-qos jumbo
class type network-gos class-default
mtu 9216
exit
class type network-gos class-fcoe
pause no-drop
mtu 2158
exit
exit
system dos
service-policy type network-qos jumbo
exit
copy run start
```

## **Create VLANs**

To create the necessary virtual local area networks (VLANs), complete the following steps on both the switches:

1. On the Cisco Nexus 5548UP switch A, from the global configuration mode, run the following commands. VLAN IDs for the Native-VLAN, the Fabric A FCoE VLAN, the in-band management VLAN, and the RAC interconnect VLAN are entered:

vlan _

 On Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands. VLAN IDs for the Native-VLAN, the Fabric B FCoE VLAN, the in-band management VLAN, and the RAC interconnect VLAN are entered:

```
vlan

name Native-VLAN

exit

vlan

name FCOE_Fabric_B

exit

vlan

name IB-MGMT

exit

vlan

name RAC-Interconnnect-1 VLAN

exit
```

#### Add Individual Port Descriptions for Troubleshooting Switch A and Switch B

To add individual port descriptions for troubleshooting activity and verification for Cisco Nexus 5548UP switch A, complete the following step:

1. From the global configuration mode, run the following commands (which include example component names):

```
interface fc1/17
switchport description EF560 controller 01a-1
exit
interface fc1/18
switchport description EF560 controller 01a-2
exit
interface fc1/19
switchport description EF560 controller 01b-1
exit
interface fc1/20
switchport description EF560 controller 01b-2
exit
interface fc1/21
switchport description EF560 controller 02a-1
exit
interface fc1/22
switchport description EF560 controller 02a-2
exit
interface fc1/23
switchport description EF560 controller 02b-1
exit
interface fc1/24
switchport description EF560 controller 02b-2
exit
interface fc1/25
switchport description EF560 controller 03a-1
exit
interface fc1/26
switchport description EF560 controller 03a-2
exit
interface fc1/27
switchport description EF560 controller 03b-1
```

exit interface fc1/28 switchport description EF560 controller 03b-2 exit interface fc1/29 switchport description EF560 controller 04a-1 exit interface fc1/30 switchport description EF560 controller 04a-2 exit interface fc1/31 switchport description EF560 controller 04b-1 exit interface fc1/32 switchport description EF560 controller 04b-2 exit interface Eth1/1 description UCS FlexPod-A:1/17 exit interface Eth1/2 description UCS FlexPod-A:1/18 exit interface Eth1/3 description UCS FlexPod-A:1/19 exit interface Eth1/4 description UCS FlexPod-A:1/20 exit interface Eth1/5 description UCS FlexPod-A:1/21 exit interface Eth1/6 description UCS FlexPod-A:1/22 exit interface Eth1/7 description UCS FlexPod-A:1/23 exit interface Eth1/8 description UCS_FlexPod-A:1/24 exit interface Eth1/9 description UCS FlexPod-A:1/25 exit interface Eth1/10 description UCS_FlexPod-A:1/26 exit interface Eth1/11 description UCS_FlexPod-A:1/27 exit interface Eth1/12 description UCS FlexPod-A:1/28 exit interface Eth1/13 description UCS_FlexPod-A:1/29 exit interface Eth1/14 description UCS_FlexPod-A:1/30 exit interface Eth2/3 description nexus B:2/3 exit interface Eth2/4 description nexus B:2/4 exit interface eth2/1 description UCS FlexPod-A:1/31 exit interface eth2/2 description UCS FlexPod-B:1/31 exit

To add individual port descriptions for troubleshooting activity and verification for Cisco Nexus 5548UP switch B, complete the following step:

1. From the global configuration mode, run the following commands (which include example component names):

interface fc1/17 switchport description EF560 controller 01a-3 exit interface fc1/18 switchport description EF560 controller 01a-4 exit interface fc1/19 switchport description EF560 controller 01b-3 exit interface fc1/20 switchport description EF560 controller 01b-4 exit. interface fc1/21 switchport description EF560 controller 02a-3 exit. interface fc1/22 switchport description EF560 controller 02a-4 exit interface fc1/23 switchport description EF560 controller 02b-3 exit interface fc1/24 switchport description EF560 controller 02b-4 exit. interface fc1/25 switchport description EF560 controller 03a-3 exit interface fc1/26 switchport description EF560 controller 03a-4 exit interface fc1/27 switchport description EF560 controller 03b-3 exit interface fc1/28 switchport description EF560 controller 03b-4 exit interface fc1/29 switchport description EF560 controller 04a-3 exit interface fc1/30 switchport description EF560 controller 04a-4 exit interface fc1/31 switchport description EF560 controller 04b-3 exit interface fc1/32 switchport description EF560 controller 04b-4 exit interface Eth1/1 description UCS FlexPod-B:1/17 exit interface Eth1/2 description UCS FlexPod-B:1/18 exit interface Eth1/3 description UCS FlexPod-B:1/19 exit interface Eth1/4 description UCS FlexPod-B:1/20 exit interface Eth1/5 description UCS FlexPod-B:1/21 exit. interface Eth1/6

description UCS FlexPod-B:1/22 exit interface Eth1/7 description UCS FlexPod-B:1/23 exit interface Eth1/8 description UCS FlexPod-B:1/24 exit. interface Eth1/9 description UCS FlexPod-B:1/25 exit interface Eth1/10 description UCS FlexPod-B:1/26 exit interface Eth1/11 description UCS FlexPod-B:1/27 exit interface Eth1/12 description UCS FlexPod-B:1/28 exit interface Eth1/13 description UCS FlexPod-B:1/29 exit interface Eth1/14 description UCS FlexPod-B:1/30 exit interface Eth2/3 description nexus A:2/3 exit interface Eth2/4 description nexus A:2/4 exit interface eth2/1 description UCS FlexPod-A:1/32 exit. interface eth2/2 description UCS FlexPod-B:1/32 exit

### **Create Port Profiles for Switch A and Switch B**

Port profiles are used to simplify ongoing network administration and configuration. Ports with similar configurations can be grouped within port profiles. Configuration changes can then be made to the port profile and are applied to all members of the port profile. FlexPod recommends port profiles for the following port types:

- Cisco UCS Ethernet ports
- Cisco UCS FCoE ports
- Cisco Nexus VPC ports

To create the Ethernet traffic port profiles, complete the following step on both the switches:

1. On Cisco Nexus 5548UP switch A, from the global configuration mode, run the following commands. Text is entered instead of the actual VLAN IDs in the following example:

```
port-profile default max-ports 512
port-profile type port-channel UCS-Ethernet
switchport mode trunk
switchport trunk native vlan 2
switchport trunk allowed vlan in band management vlan id, RAC interconnect 1 vlan id
spanning-tree port type edge trunk
state enabled
port-profile type port-channel vPC-Peer-Link
switchport mode trunk
switchport trunk native vlan 2
switchport trunk native vlan 2
switchport trunk allowed vlan in band management vlan id, RAC interconnect 1 vlan id
spanning-tree port type network
```

```
state enabled
port-profile type port-channel UCS-FCOE-FABRIC-A
switchport mode trunk
switchport trunk native vlan 2
switchport trunk allowed vlan FCoE fabric a vlan id
spanning-tree port type edge trunk
state enabled
exit
```

2. On the Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands:

```
port-profile default max-ports 512
port-profile type port-channel UCS-Ethernet
switchport mode trunk
switchport trunk native vlan 2
switchport trunk allowed vlan in band management vlan id, RAC interconnect 1 vlan id
spanning-tree port type edge trunk
state enabled
port-profile type port-channel vPC-Peer-Link
switchport mode trunk
switchport trunk native vlan 2
switchport trunk allowed vlan in band management vlan id, RAC interconnect 1 vlan id
spanning-tree port type network
state enabled
port-profile type port-channel UCS-FCOE-FABRIC-B
switchport mode trunk
switchport trunk native vlan 2
switchport trunk allowed vlan FCoE fabric b vlan id
spanning-tree port type edge trunk
state enabled
exit
```

#### Create Port Channels for Switch A and Switch B

To create the necessary port channels between devices, complete the following step on both the switches:

1. On the Cisco Nexus 5548UP switch A, from the global configuration mode, run the following commands:

```
interface Pol0
description vPC peer-link
exit
interface Eth2/3-4
channel-group 10 mode active
no shutdown
exit
interface Pol3
description UCS FlexPod-A
exit
interface Eth2/1
channel-group 13 mode active
no shutdown
exit
interface Pol4
description UCS FlexPod-B
exit
interface Eth2/2
channel-group 14 mode active
no shutdown
exit
interface Po15
description UCS FlexPod-fabric-A-FCOE
exit
interface Eth1/1-14
channel-group 15 mode active
exit
copy run start
```

2. On the Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands:

```
interface Pol0
description vPC peer-link
exit.
interface Eth2/3-4
channel-group 10 mode active
no shutdown
exit
interface Pol3
description UCS FlexPod-A
exit
interface Eth2/1
channel-group 13 mode active
no shutdown
exit
interface Pol4
description UCS FlexPod-B
exit
interface Eth2/2
channel-group 14 mode active
no shutdown
exit
interface Po15
description UCS FlexPod-fabric-B-FCOE
exit
interface Eth1/1-14
channel-group 15 mode active
exit.
copy run start
```

### Add Port Profiles to Port Channels for Switch A and Switch B

Port channels and their member ports inherit their configuration from the previously configured port profiles.

To assign port profiles to the appropriate port channels, complete the following step on both the switches:

1. On the Cisco Nexus 5548UP switch A, from the global configuration mode, run the following commands:

```
interface Po10
inherit port-profile vPC-Peer-Link
exit
interface Po13
inherit port-profile UCS-Ethernet
exit
interface Po14
inherit port-profile UCS-Ethernet
exit
interface Po15
inherit port-profile UCS-FCOE-FABRIC-A
exit
copy run start
```

2. On the Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands:

```
interface Po10
inherit port-profile vPC-Peer-Link
exit
interface Po13
inherit port-profile UCS-Ethernet
exit
interface Po14
inherit port-profile UCS-Ethernet
exit
```

```
interface Pol5
inherit port-profile UCS-FCOE-FABRIC-B
exit
copy run start
```

## Configure Virtual Port Channels for Switch A and Switch B

To configure virtual port channels (vPCs), complete the following step on both switches:

 On the Cisco Nexus 5548UP switch A, from the global configuration mode, run the following commands. Text is entered instead of the actual VPC domain ID and source and destination IP addresses of the Cisco Nexus switches in the following example:

```
vpc domain Nexus VPC Domain ID
role priority 10
peer-keepalive destination nexus B mgmt0 ip source nexus A mgmt0 ip
auto-recovery
exit
interface Po10
vpc peer-link
exit
interface Po13
vpc 13
exit
interface Po14
vpc 14
exit
copy run start
```

2. On the Cisco Nexus 5548UP switch B, from the global configuration mode, run the following commands. Text is entered instead of the actual VPC domain ID and source and destination IP addresses of the Cisco Nexus switches in the following example:

```
vpc domain Nexus VPC Domain ID
role priority 20
peer-keepalive destination nexus A mgmt0 ip source nexus B mgmt0 ip
auto-recovery
exit
interface Po10
vpc peer-link
exit
interface Po13
vpc 13
exit
interface Po14
vpc 14
exit
copy run start
```

### **Uplink into Existing Network Infrastructure**

Depending on the available network infrastructure, several methods and features can be used to uplink the FlexPod environment. If an existing Cisco Nexus environment is present, NetApp recommends using vPCs to uplink the Cisco Nexus 5548UP switches included in the FlexPod environment into the infrastructure. The procedures described in section "FlexPod Cisco Nexus Base" can be used to create an uplink vPC to the existing environment. Make sure to run copy run start to save the configuration on each switch after the configuration is complete.

#### Create VSANs, Assign and Enable Virtual Fibre Channel Ports

This procedure configures the Fibre Channel over Ethernet (FCoE) connections between the Cisco Nexus 5548UP switches, the Cisco UCS Fabric Interconnects, and the NetApp storage systems.

#### **Cisco Nexus 5548UP Switch A**

To configure virtual storage area networks (VSANs), create and update relevant port profiles, assign virtual Fibre Channel (vFC) ports, and enable vFC ports on switch A, complete the following step. You create a VLAN for FCoE traffic and a corresponding VSAN for fabric A:

1. From the global configuration mode, run the following commands:

```
vlan
name FCoE Fabric A
fcoe vsan
exit
interface vfc15
switchport description UCS FlexPod-A:FCoE
bind interface po15
switchport trunk allowed vsan 101
no shutdown
vsan database
vsan 101name Fabric A
vsan 101 interface vfc15
vsan 101 interface fc1/17
vsan 101 interface fc1/18
vsan 101 interface fc1/19
vsan 101 interface fc1/20
vsan 101 interface fc1/21
vsan 101 interface fc1/22
vsan 101 interface fc1/23
vsan 101 interface fc1/24
vsan 101 interface fc1/25
vsan 101 interface fc1/26
vsan 101 interface fc1/27
vsan 101 interface fc1/28
vsan 101 interface fc1/29
vsan 101 interface fc1/30
vsan 101 interface fc1/31
vsan 101 interface fc1/32
exit
copy run start
```

#### Cisco Nexus 5548UP B

To configure VSANs, create and update relevant port profiles, assign vFC ports, and enable vFC ports on switch B, complete the following step. You create a VLAN for FCoE traffic and a corresponding VSAN for fabric A. Examples are written below:

1. From the global configuration mode, run the following commands:

```
vlan
name FCoE Fabric B
fcoe vsan 102
exit
interface vfc15
switchport description UCS FlexPod-B:FCoE
bind interface po15
switchport trunk allowed vsan 102
no shutdown
vsan database
vsan 102 name Fabric B
vsan 102 interface vfc15
vsan 102 interface fc1/17
vsan 102 interface fc1/18
vsan 102 interface fc1/19
vsan 102 interface fc1/20
vsan 102 interface fc1/21
vsan 102 interface fc1/22
vsan 102 interface fc1/23
vsan 102 interface fc1/24
vsan 102 interface fc1/25
vsan 102 interface fc1/26
vsan 102 interface fc1/27
vsan 102 interface fc1/28
vsan 102 interface fc1/29
```

```
vsan 102 interface fc1/30
vsan 102 interface fc1/31
vsan 102 interface fc1/32
exit
copy run start
```

## **Create Device Aliases**

To configure device aliases on both switches, complete the following steps.

#### Cisco Nexus 5548UP Switch A

1. From the global configuration mode, run the following commands. Enter the WWPN for the preceding device in each line of command. Examples are written below:

device-alias d	database
device-alias r	name RAC-SERVER-01-A pwwn
device-alias r	name RAC-SERVER-01-A-2 pwwn
device-alias r	name RAC-SERVER-02-A pwwn
device-alias r	name RAC-SERVER-02-A-2 pwwn
device-alias r	name RAC-SERVER-03-A pwwn
device-alias r	name RAC-SERVER-03-A-2 pwwn
device-alias r	name RAC-SERVER-04-A pwwn
device-alias r	name RAC-SERVER-04-A-2 pwwn
device-alias r	name RAC-SERVER-05-A pwwn
device-alias r	name RAC-SERVER-05-A-2 pwwn
device-alias r	name RAC-SERVER-06-A pwwn
device-alias r	name RAC-SERVER-06-A-2 pwwn
device-alias r	name RAC-SERVER-07-A pwwn
device-alias r	name RAC-SERVER-07-A-2 pwwn
device-alias r	name RAC-SERVER-08-A pwwn
device-alias r	name RAC-SERVER-08-A-2 pwwn
device-alias r	name EF560 controller 01a-1 pwwn
device-alias r	name EF560 controller 01a-2 pwwn
device-alias r	name EF560 controller 01b-1 pwwn
device-alias r	name EF560 controller 01b-2 pwwn
device-alias r	name EF560 controller 02a-1 pwwn
device-alias r	name EF560 controller 02a-2 pwwn
device-alias r	name EF560 controller 02b-1 pwwn
device-alias r	name EF560 controller 02b-2 pwwn
device-alias r	name EF560 controller 03a-1 pwwn
device-alias r	name EF560 controller 03a-2 pwwn
device-alias r	name EF560 controller 03b-1 pwwn
device-alias r	name EF560 controller 03b-2 pwwn
device-alias r	name EF560 controller 04a-1 pwwn
device-alias r	name EF560 controller 04a-2 pwwn
device-alias r	name EF560 controller 04b-1 pwwn
device-alias r	name EF560 controller 04b-2 pwwn
exit	
device-alias c	commit

#### Cisco Nexus 5548UP Switch B

1. From the global configuration mode, run the following commands. Enter the WWPN for the preceding device in each line of command. Examples are written:

```
      device-alias
      database

      device-alias
      name
      RAC-SERVER-01-B pwwn

      device-alias
      name
      RAC-SERVER-02-B pwwn

      device-alias
      name
      RAC-SERVER-02-B pwwn

      device-alias
      name
      RAC-SERVER-02-B-2 pwwn

      device-alias
      name
      RAC-SERVER-03-B pwwn

      device-alias
      name
      RAC-SERVER-03-B pwwn

      device-alias
      name
      RAC-SERVER-03-B-2 pwwn

      device-alias
      name
      RAC-SERVER-04-B pwwn

      device-alias
      name
      RAC-SERVER-04-B pwwn

      device-alias
      name
      RAC-SERVER-05-B pwwn

      device-alias
      name
      RAC-SERVER-05-B pwwn

      device-alias
      name
      RAC-SERVER-05-B-2 pwwn

      device-alias
      name
      RAC-SERVER-06-B pwwn

      device-alias
      name
      RAC-SERVER-06-B pwwn

      device-alias
      name
      RAC-SERVER-06-B pwwn

      device-alias
      name
      RAC-SERVER-06-B pwwn

      device-alias
      name
      RAC-SERVER-06-B-2 pwwn
```

device-alias name RAC-SERVER-07-B pwwn
device-alias name RAC-SERVER-07-B-2 pwwn
device-alias name RAC-SERVER-08-B pwwn
device-alias name RAC-SERVER-08-B-2 pwwn
device-alias name EF560 controller 01a-3 pwwn
device-alias name EF560 controller 01a-4 pwwn
device-alias name EF560 controller 01b-3 pwwn
device-alias name EF560 controller 01b-4 pwwn
device-alias name EF560 controller 02a-3 pwwn
device-alias name EF560 controller 02a-4 pwwn
device-alias name EF560 controller 02b-3 pwwn
device-alias name EF560 controller 02b-4 pwwn
device-alias name EF560 controller 03a-3 pwwn
device-alias name EF560 controller 03a-4 pwwn
device-alias name EF560 controller 03b-3 pwwn
device-alias name EF560 controller 03b-4 pwwn
device-alias name EF560 controller 04a-3 pwwn
device-alias name EF560 controller 04a-4 pwwn
device-alias name EF560 controller 04b-3 pwwn
device-alias name EF560 controller 04b-4 pwwn
exit
device-alias commit

### **Create Zones**

#### **Cisco Nexus 5548UP Switch A**

To create zones for the service profiles on switch A, complete the following steps:

1. Create a zone for each service profile.

**Note:** A single host is demonstrated in the following example. Perform this procedure for all Oracle RAC hosts. Each host HBA WWPN is zoned with all EF560 targets on the fabric.

```
zone name RAC-SERVER-01-A vsan 101
member device-alias RAC-SERVER-01-A
member device-alias RAC-SERVER-01-A-2
member device-alias EF560-1a-1
member device-alias EF560-1a-2
member device-alias EF560-1b-1
member device-alias EF560-1b-2
member device-alias EF560-2a-1
member device-alias EF560-2a-2
member device-alias EF560-2b-1
member device-alias EF560-2b-2
member device-alias EF560-3a-1
member device-alias EF560-3a-2
member device-alias EF560-3b-1
member device-alias EF560-3b-2
member device-alias EF560-4a-1
member device-alias EF560-4a-2
member device-alias EF560-4b-1
member device-alias EF560-4b-2
exit
```

2. After the zones for the Cisco UCS service profiles have been created, create the zone set and add the necessary members.

zoneset name FlexPod vsan 101 member RAC-SERVER-01-A member RAC-SERVER-02-A member RAC-SERVER-03-A member RAC-SERVER-04-A member RAC-SERVER-05-A member RAC-SERVER-06-A member RAC-SERVER-07-A member RAC-SERVER-08-A exit 3. Activate the zone set.

```
zoneset activate name FlexPod vsan 101
exit
copy run start
```

#### **Cisco Nexus 5548UP Switch B**

To create zones for the service profiles on switch B, complete the following steps:

- 1. Create a zone for each service profile.
  - **Note:** A single host is demonstrated in the following example. Replicate this procedure for all Oracle RAC hosts. Each host HBA WWPN is zoned with all EF560 targets on the fabric.

```
zone name RAC-SERVER-01-B vsan 102
member device-alias RAC-SERVER-01-B
member device-alias RAC-SERVER-01-B-2
member device-alias EF560-1a-3
member device-alias EF560-1a-4
member device-alias EF560-1b-3
member device-alias EF560-1b-4
member device-alias EF560-2a-3
member device-alias EF560-2a-4
member device-alias EF560-2b-3
member device-alias EF560-2b-4
member device-alias EF560-3a-3
member device-alias EF560-3a-4
member device-alias EF560-3b-3
member device-alias EF560-3b-4
member device-alias EF560-4a-3
member device-alias EF560-4a-4
member device-alias EF560-4b-3
member device-alias EF560-4b-4
exit
```

After the zones for the Cisco UCS service profiles have been created, create the zone set and add the necessary members.

```
zoneset name FlexPod vsan 102
member RAC-SERVER-01-B
member RAC-SERVER-02-B
member RAC-SERVER-03-B
member RAC-SERVER-04-B
member RAC-SERVER-05-B
member RAC-SERVER-05-B
member RAC-SERVER-07-B
member RAC-SERVER-07-B
member RAC-SERVER-08-B
exit
```

#### 3. Activate the zone set.

```
zoneset activate name FlexPod vsan 102
exit
copy run start
```

## 4.5 Oracle Real Application Cluster Configuration

The following section describes the installation and configuration of Oracle RAC nodes into an eightnode cluster.

**Note:** The storage configuration of the boot LUNs must be complete before you start the Oracle Linux installation on the Oracle RAC nodes.

## **Oracle Linux Installation on RAC Nodes**

This section provides details around how to install and configure Oracle Linux 6.6 for use in this solution. From the Cisco UCS director, launch the KVM console for the first RAC node.

<ol> <li>After the console is up and running, activate the virtual device to map the vir</li> </ol>	/irtual CD-ROM.
-----------------------------------------------------------------------------------------------------	-----------------

icefs1-uc1 / RAC-SERVER-BOOT-FABRIC-B-01 (Chat	ssis - 1 Server - 4) - KVM Console(	(Launched By: admin)
File View Macros Tools Virtual Media Help		
📣 Boot Server 🔩 Shutdown Server 🧕 Reset		
KVM Console Properties		
		1
📥 Virtual Media - Map CD/DVD	<b>——</b>	
Uri		
Kei		×86_64
Drive/Image File: V41362-01.iso	<ul> <li>Browse</li> </ul>	
rai		
Read Only		
	Map Device Cancel	

2. Map the virtual CD-ROM on the KVM console to pick the Oracle Linux Server 6.6 installation media. The install media should be attached to the Cisco UCS system manager.

Reboot the RAC node through the KVM console so that the installation media is recognized.



3. On the first splash screen, select Skip.

To begin testing the media before
installation press OK.
Choose Skip to skip the media test and start the installation.
OK Skip

4. Click Next.

ORACLE		
Oracle Linux 6		
Copyright © 2014, Oracle and/or its affiliates. All rights reserved.		
	Back	Next

## 5. Click Next to select English as the language.

What language would you like to use during the installation process?	
Arabic (العربية)	<u>^</u>
Assamese (অসমীয়া)	
Bengali (বাংলা)	
engali(India) (বাংলা ( ভারত))	
Bulgarian (Български)	
Catalan (Català)	≡.
Chinese(Simplified) (中文(简体))	
Chinese(Traditional) (中文(正體))	
Croatian (Hrvatski)	
Czech (Čeština)	
Danish (Dansk)	
Dutch (Nederlands)	
English (English)	
Estonian (eesti keel)	
Finnish (suomi)	
French (Français)	
German (Deutsch)	
Greek (Ελληνικά)	
Gujarati (ગુજરાતી)	
Hebrew (עברית)	
Hindi (हिन्दी)	
Hungarian (Magyar)	
Icelandic (Icelandic)	
lloko (lloko)	
Indonesian (Indonesia)	
	Back Next

# 6. Click Next to use U.S. English for the keyboard layout.

Select the appropriate keyboard for the system.	
Italian	
Italian (IBM)	
Italian (it2)	
Japanese	
Korean	
Latin American	
Macedonian	
Norwegian	
Polish	
Portuguese	
Romanian	
Russian	
Serbian	
Serbian (latin)	
Slovak (qwerty)	
Slovenian	
Spanish	
Swedish	
Swiss French	
Swiss French (latin1)	=
Swiss German	
Swiss German (latin1)	
Turkish	
U.S. English	
U.S. International	
Ukrainian	
United Kingdom	
	Back Next

- 7. Select Specialized Storage Devices so that the boot from the NetApp storage can be initialized.
- 8. Click Next.

What type of devices will your installation involve?		
Basic Storage Devices Installs or upgrades to typical types of storage devices. If you're not sure which option is right for you, this is probably it.		
Specialized Storage Devices Installs or upgrades to enterprise devices such as Storage Area Networks (SANs). This option will allow you to add FCoE / ISCSI / zFCP disks and to filter out devices the installer should ignore.		
	<b>B</b> ack	▶ <u>N</u> ext

- 9. Select the listed NetApp disk. This example assumes that only the storage associated with the RAC node boot process has been provisioned at this time. As a result, there are no other NetApp storage devices available.
- 10. Click Next.

Pleas you'd	Please select the drives you'd like to install the operating system on, as well as any drives you'd like to automatically mount to your system, below:														
Bas	ic Devices	Firmware	e RAID	lultipath I	Devices	Other !	SAN Devices	Search							
<ul> <li>Model Capacity (MB)</li> </ul>				(MB)	Intercon	nnect Serial Number			Identifier	Identifier					
•	✓ NETAPP INF-01-00 102400			SCSI		360080e500	029739800	D011ab543512€	of 3:60:08:	0e:50:00:2	9:73:98:	00:00:11:8	ab:54:35:	12:6	
	k														
<								111							>
									[	<u>D</u> evice	e Options	-	Add Adv	anced Tar	get
1 de	vice(s) (1	02400 M	B) selec	ted out o	of 1 devic	e(s) (10	02400 MB) to	tal.							
ि <mark>च</mark> ir se	ip: Selection stallation pelect here b	ng a drive process. A py modifyi	on this so Also, note ing your /	that post etc/fstab	s not nec -installat file.	essarily tion you	y mean it wil I may mount	be wiped b drives you d	y the lid not						
													<u>B</u> ack	<u>▶</u> <u>N</u>	ext

## 11. In the splash window select Yes, Discard Any Data.

## 12. Click Next.

Please select the drives you'd like to install the operating system on, as well as any drives you'd like to automatically mount to your system, below:

Basic	Devices	Firmware	RAID Mult	tipath Devices	Other SAN Devices	Search				
0	Model		Capacity (M	MB) Intercon	nnect Serial Numb	ber	Identifier			
~	NETAPP	INF-01-00	102400	SCSI	360080e500	0297398000011ab543512	6f 3:60:08:0e:50:00:29:7	/3:98:00:00:11:a	ab:54:35:12:6	
					Storage	Device Warning				
				The storag	e device below	may contain data.				
				<b>NETAPP</b> 102400.0	<b>INF-01-00</b> MB pci-0000:0	c:00.0-fc-0x20140080e529	7398-lun-0			
	We could not detect partitions or filesystems on this device.									
	This could be because the device is <b>blank</b> , <b>unpartitioned</b> , or <b>virtual</b> . If not, there may be data on the device that can not be recovered if you use it in this installation. We can remove the device from this installation to protect the data.									
				Are you sure th	is device does not co	ontain valuable data?				
	Apply my choice to all devices with undetected partitions or filesystems									
Yes, discard ark data No, keep any data										
<									>	
							<u>D</u> evice Options		anced Target	
1 dev	vice(s) (1	02400 M	B) selected	d out of 1 devic	e(s) (102400 MB) tot	tal.				
ins sel	p: Selectir tallation p lect here b	ng a drive process. A py modifyi	on this scree lso, note the ng your /etc	en does not nec at post-installat c/fstab file.	essarily mean it will tion you may mount	be wiped by the drives you did not				
								<b>B</b> ack	▶ <u>N</u> ext	

13. Enter the public host name; in this case, we used rac-server-01.

## 14. Click Next.

Please name this computer. The hostname identifies the computer on a network.		
Hostname: rac-server-01	)	
Configure Network		
		⊕ Back     Next

15. Select the time zone and click Next.



16. Because this is a completely new installation, select Use All Space to wipe out all the data.17. Click Next.

KVM Console	Properties							
Which type	e of installation would you like?							
•	Use All Space Removes all partitions on the selected device(s). This includes partitions created by other operating systems.							
	Tip: This option will remove data from the selected device(s). Make sure you have backups.							
0	Replace Existing Linux System(s) Removes only Linux partitions (created from a previous Linux installation). This does not remove other partitions you may have on your storage device(s) (such as VFAT or FAT32).							
	Tip: This option will remove data from the selected device(s). Make sure you have backups.							
0 [05]	Shrink Current System Shrinks existing partitions to create free space for the default layout.							
0	Use Free Space Retains your current data and partitions and uses only the unpartitioned space on the selected device (s), assuming you have enough free space available.							
° ?	Create Custom Layout Manually create your own custom layout on the selected device(s) using our partitioning tool.							
	▶							
Encrypt system								
Review	v and modify partitioning layout							
		<b>—</b> <u>B</u> ack	▶ <u>N</u> ext					

18. Select the physical volume and click Create.

			Please	Sele	ct A Device				
Device	Size (MB)	Mount Point/ RAID/Volume	Туре	Format					
➡ Hard Drives									
sdd (/dev/sdd)									
Free	500								
sdd2	101899		physical volume (LVM)	$\checkmark$					
						<u>C</u> reate	Edit	Delete	Reset
								<b>B</b> ack	▶ <u>N</u> ext

. |

19. In the popup window, below Create Partition, select Standard Partition.

#### 20. Click Create.

rioperaes									
Please Select A Device									
Device	Size (MB)	Mount Point/ RAID/Volume	Туре	Format					
♥ Hard Drives ♥ sdd (/dev/sdd) sdd1	102399		Create Partition Standard Part General purpo Create Software RAID Partitio Create a RAID RAID Device Requires at let Create LVM LVM Volume Requires at let Create a logical Create a logical	Create Storage rtition is partition creation e RAID on formated partition ast 2 free RAID form Sofoup ast 1 free LVM form Volume al volume on selected I volume formated partition	Information information Information ted partition d volume group				
						<u>C</u> reate	Edit	Delete	Reset
								Back	▶ <u>N</u> ext

- 21. For the mount point, select /boot.
- 22. For File System Type, select ext4.
- 23. For the validation of this solution, we used a 5000MB size. This value can be a lower number depending on the user requirement.
- 24. From the additional options, select Fixed Size.
- 25. Click OK.

Please Select A Device	
Device Size Mount Point/ (MB) RAID/Volume Type Format	
✓ Hard Drives ✓ sdd (/dev/sdd) Add Partition	
sdd1 102399 Mount Point: //boot 🗸	
File System Type:	
Allowable Drives: Model	
<u>S</u> ize (MB): 5000	
Additional Size Options	
○ Fill all space <u>up</u> to (MB):	
○ Fill to maximum <u>a</u> llowable size	
Force to be a primary partition     Encrypt	
Create Edit Delete Re	set
Back •	Next

- 26. Select the physical volume again.
- 27. Click Create.
- 28. In the popup window, select Logical Volume Group.
- 29. Click Add on the Logical Volume Group.
- 30. In the new window, select File System Type as Swap.
- 31. Either use the default name for the logical volume or give the appropriate name for the swap logical volume.
- 32. Enter the volume size. This verified architecture used a size of 36GB.
- 33. Click OK.

KVM Console Properties			Please	Select A Device
			Flease	
Device	Size (MB)	Mount Point/ RAID/Volume	Туре	Format
✓ Hard Drives ✓ sdd (/dev/sdd)			Make	LVM Volume Group
sdd1	5000	^{/boo} <u>V</u> olume Group	Name:	vg_racserver01
saaz	97399	<u>P</u> hysical Exter	nt:	4 MB   \$
				✓ sdd2 97396.00 MB
		Physical Volur	Mak	e Logical Volume
			Mount Point:	
		Used Space: Reserved Space	Elle System Type:	swap 🗢
		Free Space: Total Space:	Size (MB)	
		Logical Vol	u Encrypt	(Max size is 97396 MB)
		Logical Vol	u	<u>C</u> ancel <u>OK</u> <u>Add</u>
				Edit
				Delete
				<u>Cancel</u> <u>QK</u>
				<u>C</u> reate <u>Edit</u> <u>Delete</u> <u>Reset</u>
				A Back Next
				172.20.160.41 admin 6.0 fm 5.038 / 8/6

- 34. Click Add in the Logical Volume Group pane.
- 35. For Mount Point, select /.
- 36. For File System Type, select ext4.
- 37. Either use a default logical volume name or provide an appropriate name.
- 38. Use the rest of the space from the physical volume. This can be changed depending on specific user requirements.
- 39. Click OK.
| KVM Consol | e Properties                            |               |               |                                                                                                                                                                       |                                                                                            |                                      |                                                                                                                                                                            |
|------------|-----------------------------------------|---------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                         |               |               |                                                                                                                                                                       | Please                                                                                     | Se                                   | lect A Device                                                                                                                                                              |
|            | Device                                  | Size<br>(MB)  | Mour<br>RAID/ | it Point/<br>/Volume                                                                                                                                                  | Туре                                                                                       | Form                                 | at                                                                                                                                                                         |
| ▼ Hard     | Drives<br>Id (/dev/sdd)<br>sdd1<br>sdd2 | 5000<br>97399 | /boo          | Volume Group<br>Physical Exter<br>Physical Volur<br>Used Space:<br>Reserved Spar<br>Free Space:<br>Total Space:<br><b>Logical Vol</b><br>Logical Volu<br>Logical Volu | Make<br>Name:<br>nt:<br>Mount Point:<br>Eile System Type<br>Logical Volume N<br>Size (MB): | e LVM<br>Vg_r<br>4 M<br>V :<br>ke Lc | Volume Group<br>acserver01<br>3<br>3<br>dd2 97396.00 MB<br>gical Volume<br>//<br>ext4<br>LogVol01<br>61396<br>(Max size is 61396 MB)<br>Cancel QK<br>Add<br>Edit<br>Delete |
|            |                                         |               |               |                                                                                                                                                                       |                                                                                            |                                      | <u>C</u> reate <u>E</u> dit <u>Delete</u> <u>Reset</u><br>↓ <u>Back</u> ↓ <u>Next</u>                                                                                      |

40. Click OK to create the volume group and the logical volumes.

KVM Console Properties				
		Please	e Select A Device	
Device	Size (MB)	Mount Point/ Type RAID/Volume	Format	
➡ Hard Drives				
Sdd (/dev/sdd)	EOOO	Mak	ce LVM Volume Group	
sdd2	97399	^{/DOO} <u>V</u> olume Group Name:	vg_racserver01	
5002	57555	<u>P</u> hysical Extent:	4 MB 🗘	
			✓ sdd2 97396.00 MB	
		Physical Volumes to <u>U</u> se:		
		Used Space: Reserved Space: Free Space: Total Space: <b>Logical Volumes</b>	97396.00 MB (100.0 %) 0.00 MB (0.0 %) 97396.00 MB	
		Logical Volume Name Mount	t Point Size (MB)	
		LogVol01 /	61396 <u>A</u> dd	
		LogVol00 N/A	36000 Edit Delete	
			<u>C</u> ancel <u>O</u> K	
			<u>C</u> reate <u>Edit</u> <u>Delete</u>	Re <u>s</u> et
			-Back	<u>N</u> ext

			Please Sele	ct A Dev	lice
Device	Size (MB)	Mount Point/ RAID/Volume	Туре	Format	
ZVM Volume Groups					
vg_racserver01	97396				
LogVol01	61396	/	ext4	$\checkmark$	
LogVol00	36000		swap	$\checkmark$	
Z Hard Drives					
sdd (/dev/sdd)					
sddl	5000	/boot	ext4	$\checkmark$	
sdd2	97399	vg_racserver01	physical volume (LVM)	$\checkmark$	
					<u>C</u> reate <u>E</u> dit <u>D</u> elete <u>Res</u> et

43. Select Write Changes to Disk in the message window.

e View Macros Tools Virtual Media Help				
KWM Console Properties				
Please Select A Device				
Device       Size (MB)       Mount Point/ RAID/Volume       Type       Format         Writing storage configuration to disk         Image: Size in the second state of				
<u>C</u> reate <u>E</u> dit <u>D</u> elete <b>Res</b>	et			
<b>▲</b> Back <b>→</b>	<u>N</u> ext			

🗹 Install	boot loader on /dev/s	da. Change device	
🗌 Use a	boot loader password	Change password	
Boot loa	der operating syste	em list	
Default	Label	Device	Add
۲	Oracle Linux Server 6	/dev/mapper/vg_racserver01-lv_root	Edit
			Delete
		de Back	Next

- 46. Select Database Server.
- 47. Click Next.

The default installation of Oracle Linux Server is a basic server install. You can optionally select a different set of software now.	
O Basic Server	
O Database Server	
O Web Server	
<ul> <li>Identity Management Server</li> </ul>	
<ul> <li>Virtualization Host</li> </ul>	
O Desktop	
<ul> <li>Software Development Workstation</li> </ul>	
O Minimal	
lease select any additional repetitories that you want to use for software installation	
	10
High Availability	
Load Balancer	-
Add additional software repositories	
fou can further customize the software selection now, or after install via the software management application.	
Customize later O Customize now	
	🔶 Back 📄 Nex

The installation of Oracle Linux starts.



- 48. Click Reboot to reboot the server.
- 49. When the node starts to reboot, change the boot order from CD-ROM (the default) to HDD, which is the newly installed Oracle Linux image.
- 50. Using the KVM console, log in as a root user and set the network for public IP and the RAC interconnect. For this setup, eth0 was used as a public network, and eth1 was used as private network. For this setup, the following commands were used to set up the Ethernet interfaces:

```
rac-server-01]# cd /etc/sysconfig/network-scripts
rac-server-01]# vi ifcfg-eth0
DEVICE=eth0
HWADDR=00:25:B5:00:0A:1F
TYPE=Ethernet
ONBOOT=yes
NM CONTROLLED=no
BOOTPROTO=no
IPADDR=172.20.160.50
NETMASK=255.255.255.0
GATEWAY=172.20.160.1
DNS1=10.61.186.19
Save the file to commit the changes
rac-server-01]# vi ifcfg-eth1
DEVICE=eth2
HWADDR=00:25:B5:00:0A:0F
TYPE=Ethernet
UUID=61a99cae-8cba-49bb-b528-58eb249ca10f
ONBOOT=yes
NM CONTROLLED=no
```

```
BOOTPROTO=no
IPADDR=172.20.161.111
NETMASK=255.255.255.0
MTU=9000
```

#### 51. Repeat the same for all the other RAC nodes.



Congratulations, your Oracle Linux Server installation is complete.

Please reboot to use the installed system. Note that updates may be available to ensure the proper functioning of your system and installation of these updates is recommended after the reboot.

Assuming you have performed the steps to install Oracle Linux before provisioning the Oracle RAC database storage, refer back to sections "Volume Creation for Oracle RAC Grid" and "Volume Creation for Oracle RAC Database" to create the storage for the database. If you have already done this, proceed to section "Installing Cisco UCS Drivers on RAC Nodes."

# Installing Cisco UCS Drivers on RAC Nodes

Cisco UCS Virtual Interface Card (VIC) drivers facilitate communication between the Oracle Linux operating system running on the RAC nodes and the Cisco UCS VICs on the Cisco UCS blades or the RAC nodes itself. The Cisco UCS VIC driver ISO bundle includes an eNIC driver and an fNIC driver. The eNIC is the driver for the Cisco UCS VIC Ethernet NIC. The fNIC is the driver for the Cisco UCS VIC Fibre Channel over Ethernet HBA (FCoE). The drivers can be downloaded and installed from the Downloading Cisco UCS VIC Drivers page of the Cisco website. Driver version are specified in section 3.2, "Software Requirements."

After the drivers are installed for all the RAC nodes, reboot all the RAC nodes before the Oracle RAC Node preparation.

Back

Reboot

### **Oracle RAC Node Preparation**

Before you start the Oracle software installation, complete the following tasks to make the servers (RAC nodes) ready.

#### **Setting Up User Accounts**

Oracle recommends that you use different user accounts for the installation of the grid infrastructure (GI) and the Oracle RDBMS home. The GI is installed in a separate Oracle base, owned by user grid. After the grid install is done, the GI home ownership is changed to root so that it is inaccessible to unauthorized users.

1. Create the operating system group oinstall by running the following command as a root user:

**Note:** For the verification of this solution, we created only one group. In a real production environment you have to add other groups to conform to security requirements.

groupadd -g 501 oinstall

2. Create the operating system users oracle and grid by running the following command as a root user:

**Note:** For the verification of this solution, we created only these two users. This might vary in a production environment.

```
useradd -u 501 -c "Grid User" -g oinstall
useradd -u 502 -c "Oracle User" -g oinstall
```

3. Set the password for the preceding two users.

#### Setting Secure Shell (SSH) Passwordless Logins

In order to perform the Oracle installation, SSH passwordless login for the grid, oracle, and root users must be enabled. As part of this setup, all the RAC nodes were set up to enable the passwordless login for these three users: grid, oracle, and root. To setup passwordless login for Oracle installation, complete the following steps:

- **Note:** The following example shows how to set up passwordless login for one user and two RAC nodes.
- 1. Log in to the first RAC node 1 (for example, rac-server-01) as a root user.
- 2. Generate a public/private key pair.

```
ssh-keygen
```

**Note:** When you run the ssh-keygen command, you are prompted to answer several questions. Just press Enter each time until you are returned to a prompt. For example:

```
[root@rac-server-01 ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id rsa.
Your public key has been saved in /root/.ssh/id rsa.pub.
The key fingerprint is:
51:cc:1f:e2:b6:a5:44:f8:6f:da:3c:32:4f:5d:1d:19 root@stlrx600s6-5
The key's randomart image is:
+--[ RSA 2048]----+
         +. E |
..= . 0|
         .+ 0 . 0 |
.= 0 0|
So =
                 οI
```

I	00
1	=
1	+.+
1	+
+	+

- 3. Copy the public key from the file id_rsa.pub, which is located in the .ssh directory of the home directory of the user, and paste it to a file called authorized_keys under the .ssh directory. Make sure that the text is all on one line.
- 4. Log in to first RAC node 2 (for example, rac-server-02) as a root user.
- 5. Generate a public/private key pair by typing this command:

#### ssh-keygen

- 6. When you run this command, you are prompted to answer several questions. Press Enter each time until you are returned to a prompt, just as you did for rac-server-01.
- 7. Copy the public key from the file id_rsa.pub, which is located in the .ssh directory of the home directory of the user, and paste it to a file called authorized_keys in the .ssh directory. Make sure the text is all on one line.
- 8. Copy the content of authorized keys from rac-server-01 to the same file in rac-server-02.
- 9. Copy the content of authorized keys from rac-server-02 to the same file in rac-server-01.
- 10. After you are done with the preceding two steps, the authorized_keys file has two lines, one from each server, and the file is identical on both servers (rac-server-01 and rac-server-02).
- 11. Test to make sure the secure shell communication is working without having to enter passwords by doing an SSH between two servers.
- 12. Follow the same steps for all the RAC nodes for the root, grid, oracle users. After you are done, the authorized_keys file for each user on each RAC node has eight entries. This enables passwordless logins between RAC nodes for all three users.

#### Networking

In order to set up RAC clustering, you need to set up the following names:

- A unique cluster name.
- Public host names for each of the RAC nodes.
- Public virtual host names for each of the RAC nodes. The virtual host is used to reroute client
  requests sent to the node if the node is down. Oracle recommends that the host name be in this
  format: public hostname-vip. Also, the virtual host name must be in the same subnet as your public
  IP address, must be registered with your DNS for each node, and must be capable of performing a
  reverse DNS lookup. The following command output shows how the reverse lookup has been set
  for one of the RAC nodes as an example:

```
[root@rac-server-01 oracle]# nslookup rac-server-vip-01
Server: 10.61.186.19
Address: 10.61.186.19#53
Name: rac-server-vip-01.ice.rtp.netapp.com
Address: 172.20.160.60
[root@rac-server-01 oracle]# nslookup 172.20.160.60
Server: 10.61.186.19
Address: 10.61.186.19#53
```

60.160.20.172.in-addr.arpa name = rac-server-vip-01.ice.rtp.netapp.com.

• A private host name for each node in the cluster. The private network should be on a dedicated switch or on a separate VLAN and preferably on a 10GbE network.

• All the public, virtual, and private IPs should be added to the /etc/hosts file on each of the RAC nodes. In order to avoid any confusion, all the RAC nodes were copied with the same /etc/hosts file for this setup, as shown in the following:

```
#--public
172.20.160.50 rac-server-01
172.20.160.51 rac-server-02
172.20.160.52 rac-server-03
172.20.160.53 rac-server-04
172.20.160.54 rac-server-05
172.20.160.55 rac-server-06
172.20.160.56 rac-server-07
172.20.160.57 rac-server-08
# Public Virtual IP (VIP) addresses
172.20.160.60 rac-server-vip-01
172.20.160.61 rac-server-vip-02
172.20.160.62 rac-server-vip-03
172.20.160.63 rac-server-vip-04
172.20.160.64 rac-server-vip-05
172.20.160.65 rac-server-vip-06
172.20.160.66 rac-server-vip-07
172.20.160.67 rac-server-vip-08
# RAC Interconnect - eth2
172.20.161.111 rac-server-01-priv
172.20.161.112 rac-server-02-priv
172.20.161.113
172.20.161.114
                   rac-server-03-priv
rac-server-04-priv
                       rac-server-05-priv
172.20.161.115
172.20.161.116
                      rac-server-06-priv
172.20.161.117 rac-server-07-priv
172.20.161.118 rac-server-08-priv
```

 Add a single client access name (SCAN) for the cluster that resolves to three IP addresses on the DNS server. SCAN is an Oracle RAC feature that provides a single name for clients to access Oracle databases running in a cluster. The SCAN IPs must not be added to the /etc/hosts file on the RAC nodes and must be resolved by DNS. The reverse lookup should also be enabled for the SCAN, the output of which is shown in the following example.

```
nslookup rac
               10.61.186.19
Server:
Address:
               10.61.186.19#53
Name: rac.ice.rtp.netapp.com
Address: 172.20.160.101
Name: rac.ice.rtp.netapp.com
Address: 172.20.160.102
Name: rac.ice.rtp.netapp.com
Address: 172.20.160.100
[root@rac-server-01 oracle]# nslookup 172.20.160.101
         10.61.186.19
Server:
Address:
              10.61.186.19#53
101.160.20.172.in-addr.arpa
                             name = rac.ice.rtp.netapp.com.
[root@rac-server-01 oracle]# nslookup 172.20.160.102
Server:
         10.61.186.19
Address:
              10.61.186.19#53
102.160.20.172.in-addr.arpa
                              name = rac.ice.rtp.netapp.com.
[root@rac-server-01 oracle]# nslookup 172.20.160.100
         10.61.186.19
Server.
Address:
              10.61.186.19#53
100.160.20.172.in-addr.arpa
                             name = rac.ice.rtp.netapp.com.
```

1. Edit the /etc/nsswitch.conf file on each of the RAC nodes to change the search order of the name resolution for the hosts.

hosts: dns files nis service nscd restart

## **RAC Node Time Synchronization**

For this solution, the Network Time Protocol (NTP) server was disabled, and Oracle Clusterware Cluster Time Synchronization Service (CTSS) was used instead. To disable the NTP server, complete the following commands on all participating RAC nodes. If the requirement is to synchronize with an external time source, you must use NTPD, which makes CTSSD run in observer mode.

[ OK ]

```
[root@rac-server-01 service ntpd stop
Shutting down ntpd:
[root@rac-server-01 mv /etc/ntp.conf /etc/ntp.conf.bkp
chkconfig ntpd off
```

### **Recommended Kernel Parameters**

The following kernel parameters were used as part of this setup. All of the RAC nodes are required to be updated with the following settings. These parameters are modified by editing the file /etc/sysctl.conf. Customers implementing the Oracle RAC solution are advised to check the Oracle documentation for any updates on these kernel settings.

```
kernel.msgmnb = 65536
kernel.msgmax = 65536
kernel.shmmax = 68719476736
kernel.shmall = 4294967296
kernel.shmmni = 4096
kernel.sem = 8192 48000 8192 8192
fs.file-max = 6815744
net.ipv4.ip local port range = 9000 65500
net.core.rmem default = 4194304
net.core.rmem max = 16777216
net.core.wmem default = 262144
net.core.wmem max = 16777216
net.ipv4.ipfrag_high_thresh = 524288
net.ipv4.ipfrag low thresh = 393216
net.ipv4.tcp_rmem = 4096 524288 16777216
net.ipv4.tcp wmem = 4096 524288 16777216
net.ipv4.tcp timestamps = 0
net.ipv4.tcp_sack = 0
net.ipv4.tcp window scaling = 1
net.core.optmem max = 524287
net.core.netdev max backlog = 2500
net.ipv4.tcp mem = 16384 16384 16384
fs.aio-max-nr = 1048576
net.ipv4.tcp no metrics save = 1
net.ipv4.tcp_moderate_rcvbuf = 0
vm.min free kbytes=262144
vm.swappiness=100
```

1. To make the changes permanent, run the following command on all of the RAC nodes:

```
[root@rac-server-01 /sbin/sysctl -p
```

### **User Limits (ulimit)**

Oracle recommends setting the user limits to an optimal number; the affects application performance. For this solution, the following user limits were applied for both the grid and oracle users. The settings were applied on all RAC nodes. Refer to the Oracle documentation for any updates to these settings.

grid soft nproc 2047 grid hard nproc 16384

```
grid soft nofile 1024
grid hard nofile 65536
oracle soft nproc 2047
oracle hard nproc 16384
oracle soft nofile 1024
oracle hard nofile 65536
```

# **Home Directory Path**

Before starting the Oracle installation, home directories must be created so that the installer GUI can be updated with the appropriate directory paths. For this installation, we used the following path names and the associated commands on all RAC nodes to set up the directory paths.

```
For the Oracle Grid
mkdir -p /u01/11.2.0/grid
chown -R grid:oinstall /u01/11.2.0/grid
chmod -R 775 /u01/11.2.0/grid
mkdir -p /u01/app/oraInventory
chown -R grid:oinstall /u01/app/oraInventory
chmod -R 775 /u01/app/oraInventory
For the Oracle Base
mkdir -p /u01/app/oracle
chown -R oracle:oinstall /u01/app/oracle
chmod -R 775 /u01/app/oracle
```

### **Installing Requisite Packages**

NetApp recommends running the runcluvfy.sh script, which is part of the Oracle installation package. The script verifies that all the required packages exist for each RAC node. The script can be run from the first RAC node and validates all the other nodes that are part of the cluster. The script can be executed as follows and is available in the installer directory of the grid install software:

```
./runcluvfy.sh stage -pre crsinst -n rac-server-01,rac-server-02,rac-server-03,rac-server-
04,rac-server-05,rac-server-06,rac-server-07,rac-server-08 -fixup -verbose -asm -asmdev
dev/mapper/crs1,/dev/mapper/crs2,/dev/mapper/crs3
```

# **Oracle Software Installation**

This section provides the details around installing the Oracle 12c RAC environment used in this solution.

Before you start the grid infrastructure installation, you must finish the section "Volume Creation for Oracle RAC Grid" so that all the CRS disks are available before the grid installation.

### **Oracle Grid Infrastructure Installation**

To install the Oracle grid infrastructure, complete the following steps:

- 1. Run the installation application as a grid user.
- 2. Select Install and Configure Grid Infrastructure for a Cluster and click Next.

🔏 Oracle Gr	id Infrastructure 12c Release 1 Installer - Step 1 of 16 $_$ $_$ $\times$
Select Installation Option	GRID INFRASTRUCTURE 12 ^C
Installation Option	<ul> <li>Install and Configure Oracle Grid Infrastructure for a <u>C</u>luster</li> </ul>
Cluster Type         Installation Type         Cluster Configuration         Cluster Configuration         Cluster Configuration         Cluster Configuration         OCR Storage         Voting Disk Storage         Management Options         Operating System Groups         Installation Location         Root script execution         Prerequisite Checks	<ul> <li>Install and Configure Oracle Grid Infrastructure for a Standalone Server</li> <li>Upgrade Oracle Grid Infrastructure or Oracle Automatic Storage Management</li> <li>Install Oracle Grid Infrastructure Software Only</li> </ul>
Summary Install Product Finish	< Back Next > Install Cancel

3. Select Configure a Standard cluster and click Next.

\$	Oracle O	Grid Infrastructure 12c Release 1 Installer - Step 2 of 16 $_$ $_$ $\propto$
Se	lect Cluster Type	
凈	Installation Option	Choose the type of cluster required.
	Cluster Type	Onfigure a Standard cluster
	Installation Type	Choose this option to configure a group of servers into a single cluster.
	Cluster Configuration	○ Configure a <u>F</u> lex cluster
0	Network Interface Usage	Flex clusters are highly scalable clusters in which servers can be assigned specific roles to satisfy
卜卜	Storage Option	database or application functions.
0	OCR Storage	
0	Voting Disk Storage	
0	Management Options	
0	Operating System Groups	
0	Installation Location	
4	Root script execution	
0	Prerequisite Checks	
0	Summary	
0	Install Product	
9	Finish	
	Help	< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel

4. Select Advanced Installation and click Next.

🛃 Oracle	Grid Infrastructure 12c Release 1 Installer - Step 3 of 16 _ 🛛 🚬 🗆 🗙
Select Installation Type	GRID INFRASTRUCTURE 12 ^C
Installation Option Cluster Type Installation Type	<ul> <li><u>Typical Installation</u></li> <li>Perform a full grid infrastructure installation with basic configuration.</li> <li><u>Advanced Installation</u></li> </ul>
<ul> <li>Cluster Configuration</li> <li>Network Interface Usage</li> <li>Storage Option</li> <li>OCR Storage</li> <li>Voting Disk Storage</li> <li>Management Options</li> <li>Operating System Groups</li> <li>Installation Location</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Install Product</li> <li>Finish</li> </ul>	Allows advanced configuration options such as alternative storage choices, additional networking flexibility, integration with IPMI.
Help	< <u>Back</u> Next > Install Cancel

5. Select the preferred Product Language and click Next.

🛃 Oracle Gr	id Infrastructure 12c Rel	lease 1 Installer	- Step 4 of 11	_ = ×
Select Product Languages				
Installation Option Cluster Type Installation Type Product Languages Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish	Select the languages in which you Available languages: Arabic Bengali Brazilian Portuguese Bulgarian Canadian French Catalan Croatian Czech Danish Dutch Egyptian English (United Kingdom) Estonian Finnish French Cerman Creek Hebrew Hungarian Icelandic Indonesian	ur product will run.	Selected languages: English	
Help			< <u>B</u> ack <u>N</u> ext >	Install Cancel

- 6. Provide the cluster name, SCAN name, and SCAN port name. GNS was disabled in this example.
- 7. Click Next.

Srid Plug and Play Inform	ation
Installation Option     Cluster Type     Installation Type     Product Languages     Crid Plug and Play	Single Client Access Name (SCAN) allows clients to use one name in connection strings to connect to the cluster as a whole. Client connect requests to the SCAN name can be handled by any cluster node. <u>C</u> luster Name:       rac <u>SCAN Name:</u> rac.ice.rtp.netapp.com
Cluster Node Information Network Interface Usage Storage Option OCR Storage Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish	Configure CNS Configure CNS Configure nodes Virtual IPs as assigned by the Dynamic Networks Create a new GNS GNS ½IP Address: GNS Sub Domain: rac-ser. Use Shared GNS GNS Client Data: Browse
Help	<u>Back</u> <u>Next &gt; Install</u> Cancel

- 8. Provide the public and virtual host name for all the RAC nodes.
- 9. Click Add to add all the RAC nodes.
- 10. Click Next.

🛃 Oracle G	rid Infrastructure 12c Release 1 Instal	ler - Step 6 of 18 🛛 🗛 🗆 🗙
Cluster Node Information		
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option OCR Storage Voting Disk Storage Management Options Operating System Groups Installation Location Root script execution Prerequisite Checks Summary Install Product Finish	Provide the list of nodes to be managed by Oracle O         Virtual Hostname.         Public Hostname         rac-server-01         rac-server-02         rac-server-03         rac-server-04         rac-server-05         rac-server-06         rac-server-08         SSH connectivity         User clust         QS Username:         grid         User home is shared by the selected nodes         Reuse private and public keys existing in the use	Trid Infrastructure with their Public Hostname and     Virtual Hostname   rac-server-vip-01   rac-server-vip-02   rac-server-vip-03   rac-server-vip-04   rac-server-vip-06   rac-server-vip-07   rac-server-vip-08     ster Configuration File   Add   Edit   Remove     Ser home     Test     Setup
Help		< <u>Back</u> <u>N</u> ext > <u>Install</u> Cancel

- 11. Make sure the network interfaces are displayed as required. Any anomaly is likely due to incorrect entries in the /etc/hosts file on the RAC nodes. The /etc/hosts file must be the same on all the RAC nodes.
- 12. Click Next.

4	📓 Oracle Grid Infrastructure 12c Release 1 Installer - Step 7 of 18 _ 🗆 🗙			
Sp	ecify Network Interface	Usage		GRID INFRASTRUCTURE
Ť	Installation Option	Private interfaces are used by	Oracle Grid Infrastructure for inte	rnode traffic.
	<u>Installation Type</u> Product Languages	eth0 eth1	172.20.160.0 1.1.1.0	Public  Private
<b>Ý</b>	<u>Grid Plug and Play</u> <u>Cluster Node Information</u>			
	Network Interface Usage	Note: If you intend to store O Automatic Storage Manageme	racle Cluster Registry (OCR) and vo ent (Oracle Flex ASM), then you mu	oting disk files using Oracle Flex st designate at least one of the private
	OCR Storage Voting Disk Storage	Internace submets either as A	SM OF as ASM & Private.	
	Management Options Operating System Groups			
ļ	Installation Location			
Ť	Prerequisite Checks			
Ŷ	Summary Install Product			
6	Finish			
	<u>H</u> elp		< <u>B</u> ack	< <u>N</u> ext > Install Cancel

13. Select Use Standard ASM for storage and click Next.

📓 Oracle Grid Infrastructure 12c Release 1 Installer - Step 8 of 18 _ 🗆 🗙		
Storage Option Informatio		
↑ Installation Option ↑ Cluster Type	You can place Oracle Cluster Registry (OCR) files and voting disk files on Oracle ASM storage, or on a file system. Oracle ASM can be configured on this cluster or can be an existing ASM on a storage server cluster.	
Installation Type     Product Languages     Grid Plug and Play	<ul> <li>Use <u>Standard ASM for storage</u> Choose this option to configure Local Oracle ASM in this cluster and store OCR and voting disk files on it. ASM instance will be configured on all nodes of the cluster.</li> </ul>	
<u>Cluster Node Information</u> <u>Network Interface Usage</u> Storage Option	Use Oracle Flex <u>A</u> SM for storage Choose this option to configure OCR and voting disks on ASM storage. ASM instance will be configured on reduced number of cluster nodes.	
OCR Storage     Voting Disk Storage	<ul> <li>Configure as ASM <u>Client Cluster</u></li> <li>Choose this option to store OCR and Voting disk files on Oracle ASM Storage configured on a storage server cluster.</li> </ul>	
Management Options     Operating System Groups     Installation Location	ASM Client Data: Browse          Use Shared File System         Choose this option to configure OCR and voting disk files on an existing shared file system.	
Root script execution Prerequisite Checks Summary		
Finish		
Help	< <u>Back</u> <u>Next</u> Install Cancel	

- 14. Configure the ASM disk group for the CRS disk. For this setup, external redundancy was selected for the Oracle ASM diskgroup CRS, and three disks were used.
- 15. Click Next.

🔬 Oracle G	rid Infrastructure 12c Release 1 Installer - Step 9 of 1	18 <u> </u>
Create ASM Disk Group	GRID	
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group	Select Disk Group characteristics and select disks          Disk group name       GRID         Redundancy       High       Normal       External         Allocation Unit Size       64       MB         Add Disks       All Disks       Orandidate Disks         Disk Path       Disk Path	Size (i 🔺 Status
ASM Password     Management Options     Operating System Groups     Installation Location     Root script execution     Prerequisite Checks     Summary     Install Product     Finish	<pre>✓ /dev/mapper/360080e500029c5b00000b6225602a165 ✓ /dev/mapper/360080e500029e18c0000b785602b003 ✓ /dev/mapper/360080e500029843400009504373a33c /dev/mapper/360080e5000298528000090455ad7466 /dev/mapper/360080e500029c5b00000029055ac9568 /dev/mapper/360080e500029c6e400000e8955ffc049 </pre>	5120 Candidate       5120 Candidate       5120 Candidate       51200 Candidate       Change Discovery Path
Help	< <u>B</u> ack Ne	xt > Install Cancel

- 16. The same Oracle ASM passwords were used for all the accounts. In a production scenario, the passwords can be different.
- 17. Click Next.

📓 🛛 Oracle Gi	id Infrastructure 12c Release 1 Installer - Step 10 of 18 🛛 🗛 🗆 🛪
Specify ASM Password	
Installation Option     Cluster Type     Installation Type	The new Oracle Automatic Storage Management (Oracle ASM) instance requires its own SYS user with SYSASM privileges for administration. Oracle recommends that you create a less privileged ASMSNMP user with SYSDBA privileges to monitor the ASM instance.
Product Languages     Grid Plug and Play	Specify the password for these user accounts.
Cluster Node Information     Network Interface Usage     Storage Option     Create ASM Dick Crown	Password         Confirm Password           SYS
ASM Pass word      Management Options	Our of the end of
Operating System Groups	Specify <u>P</u> assword: ••••••••
Prerequisite Checks Summary	
Finish	
Help	< <u>Back</u> <u>Mext</u> > <u>Install</u> Cancel

18. For this setup, the Intelligent Platform Management Interface (IPMI) option was disabled.

Failure Isolation Support       CRACLE 12C         Installation Option       Cluster Type         Installation Type       Choose one of the following Failure Isolation Support options.         Cluster Type       Choose one of the following Failure Isolation Support options.         Cluster Type       Choose one of the following Failure Isolation Support options.         Cluster Node Information       Use Intelligent Platform Management Interface (IPMI)         Network Interface Usage       Uger Name :         Storage Option       Create ASM Disk Group         ASM Password       Do not use Intelligent Platform Management Interface (IPMI)         Operating System Croups       Installation Location         Root script execution       Prerequisite Checks	📓 🛛 Oracle Grid Infrastructure 12c Release 1 Installer - Step 11 of 19 🛛 💷 🗙		
Installation Option   Cluster Type   Installation Type   Product Languages   Crid Plug and Play   Cluster Node Information   Network Interface Usage   Storage Option   Create ASM Disk Group   ASM Password   Failure Isolation   Management Options   Operating System Groups   Installation Location   Root script execution   Prequisite Checks	Failure Isolation Support	GRID INFRASTRUCTURE 12 ^C	
ASM Password      Asm Password      Failure Isolation      Management Options      Operating System Groups      Installation Location      Root script execution      Prerequisite Checks	Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group	Choose one of the following Failure Isolation Support options.	
Ý Prerequisite Checks	Failure Isolation     Management Options     Operating System Groups     Installation Location     Root script execution		
Summary Install Product Finish	Prerequisite Checks     Summary     Install Product     Finish		

20. Make sure that Register with EM Cloud Control is unchecked and click Next.

📓 Oracle Gi	rid Infrastructure 12c Releas	e 1 Installer - Step 1	L2 of 19	_ 🗆 ×
Specify Management Optic	ons			<b>12</b> °
Installation Option	You can configure to have this instan Management to be managed by Enter Control configuration to perform the	ce of Oracle Grid Infrastructo prise Manager Cloud Control registration.	ure and Oracle Automatic St I. Specify the details of the C	orage loud
	☐ Register with Enterprise Manager ( OMS host: OM <u>S</u> port: EM A <u>d</u> min User Name: EM Admin Pass <u>w</u> ord:	EM) Cloud Con <u>t</u> rol		
Root script execution Prerequisite Checks Summary Install Product Finish				
Help		< <u>B</u> ack	<u>N</u> ext > <u>I</u> nstall	Cancel

📓 Oracle Grid Infrastructure 12c Release 1 Installer - Step 13 of 19 _ 🗆 🗙		
Privileged Operating Syste	m Groups	
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options	Select the name of the operating system group, that you w to Oracle Automatic Storage Management. Oracle <u>A</u> SM Administrator (OSASM) Group Oracle ASM <u>D</u> BA (OSDBA for ASM) Group Oracle ASM <u>O</u> perator (OSOPER for ASM) Group (Optional)	ant to use for operating system authentication asmadmin asmdba asmoper
Operating System Groups		
Prerequisite Checks Summary Install Product Finish		
Help		< <u>Back Next &gt; Install</u> Cancel

- 21. Provide the grid base software location directories. For this installation, we used /oracle/base for the grid base and /oracle/app/product/12c/grid for the grid software location.
- 22. Click Next.

🛃 🛛 🛛 Oracle Gri	id Infrastructure 12c Release 1 Installer - Step 14 of 19 $_$ $_$ $\propto$
Specify Installation Locatio	
Installation Option       Cluster Type       Installation Type	Specify the Oracle Grid Infrastructure for a Cluster Oracle base. By default, Oracle Grid Infrastructure is installed in a path indicating the Oracle Grid Infrastructure release and grid infrastructure software owner. <a href="https://oracle/base">Oracle base</a>
	Specify a location for storing Oracle software files separate from configuration files in the Oracle base directory. This software directory is the Oracle Grid Infrastructure home directory.
Storage Option Create ASM Disk Group ASM Password	Software location: /oracle/app/product/12c/grid
Failure Isolation     Management Options     Operating System Groups	
Installation Location     Root script execution     Prerequisite Checks	
Y Summary Y Install Product O Finish	
<u>H</u> elp	< <u>Back</u> <u>Next</u> > <u>Install</u> Cancel

- 23. Provide the Inventory Directory.
- 24. Click Next.

🛃 Oracle (	Grid Infrastructure 12c Release 1 Installer - Step 15 of 20 $_$ $_$ $\checkmark$ $\times$
Create Inventory	GRID INFRASTRUCTURE 12 ^C
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group	<ul> <li>You are starting your first installation on this host. Specify a directory for installation metadata files (for example, install log files). This directory is called the "inventory directory". The installer automatically sets up subdirectories for each product to contain inventory data. The subdirectory for each product typically requires 150 kilobytes of disk space.</li> <li>Inventory <u>Directory</u>: /oracle/oralnventory</li> <li><u>Browse</u></li> <li>Members of the following operating system group (the primary group) will have write permission to the inventory directory (oralnventory).</li> <li>oralnventory Group Name: oinstall</li> </ul>
ASM Password Failure Isolation Management Options Operating System Groups Installation Location Create Inventory Root script execution Prerequisite Checks	•
Summary Install Product	✓ ✓ ✓ Øack Next > Install Cancel

📓 Oracle Grid Infrastructure 12c Release 1 Installer - Step 16 of 20 _ 🗆 🗙		
Root script execution confi	iguration ORACLE GRID INFRASTRUCTURE 12 ^C	
Installation Option     Cluster Type	While configuring the software, certain operations have to be performed as "root" user. You can choose to have the Installer perform these operations automatically by specifying inputs for one of the options below.	
Installation Type	Automatically run configuration scripts	
Product Languages	● Use "root" user <u>c</u> redential	
Grid Plug and Play	Password :	
Cluster Node Information		
<u>Network Interface Usage</u>	Program nath : //use//asel//bis/sude	
Storage Option		
<u>Create ASM Disk Group</u>	User name : grid	
<u>ASM Password</u>	Password :	
<u>Failure Isolation</u>		
Management Options		
Operating System Groups		
Installation Location		
Create Inventory		
Root script execution		
Install Product		
- Finish		
Help	< <u>Back</u> _install Cancel	

- 26. The next page performs the prerequisite verification. If the runcluvfy.sh script was run successfully in the section "Installing Requisite Packages," the prerequisite verification should not generate any errors.
- 27. Click Next.



28. The installation prompts you to run the following two scripts as a root user. Run the scripts on all of the RAC nodes, one at a time. Make sure the script is successful on all of the nodes.

/u01/app/oraInventory/orainstRoot.sh /u01/app/11.2.0/grid/root.sh.

29. Click Install.

🛃 Oracle	Grio	d Infrastructure 12c Release 1 Installer - Step 18 of 20 $_$ $\square$ $\times$
Summary		GRID INFRASTRUCTURE 12 ^C
Installation Option         Cluster Type         Installation Type         Product Languages         Grid Plug and Play         Cluster Node Information         Network Interface Usage         Storage Option         Create ASM Disk Group         ASM Password         Failure Isolation         Management Options         Operating System Groups         Installation Location         Create Inventory         Root script execution         Prerequisite Checks         Summary		GRID INFRASTRUCTURE
Install Product	•	Save Response File

Install Product		<u></u>
Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play	Progress     7%     Extracting files to '/oracle/app/product/12c/grid'.     Ctatus	
Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options	Install Grid Infrastructure for a Cluster Install Grid Infrastructure for a Cluster Prepare Copy files Link binaries Setup Perform remote operations Setup Oracle Base Update Inventory Execute Root Scripts Configure Oracle Grid Infrastructure for a Cluster	In Progress Succeeded In Progress Pending Pending Pending Pending Pending Pending Pending
Create Inventory     Create Inventory     Root script execution     Prerequisite Checks     Summary	Details ORACLE 120 Quality of Service	<u>R</u> etry <u>S</u> kip

🚳 🛛 Oracle Grid Infrastructure 12c Release 1 Installer - Step 20 of 20 🛛 💷 🛪				
Finish				
Finish Installation Option Cluster Type Installation Type Product Languages Grid Plug and Play Cluster Node Information Network Interface Usage Storage Option Create ASM Disk Group ASM Password Failure Isolation Management Options Operating System Groups Installation Location Create Inventory Root script execution Prerequisite Checks Summary	The installation of Oracle Grid Infrastructure for a Cluster was successful			
Install Product     Finish				
пер	< <u>Back</u> <u>Next</u> > [Nstall] <u>Close</u>			

# **Oracle Database Software Installation**

Launch the installer GUI to install the database software.

- 1. On the Configure Security Updates page, click Next.
- 2. On the next page, check the option to get the latest updates from Oracle, or skip the software updates, which is what was chosen for this installation.
- 3. Click Next.

🛃 Or	acle Database 12c Relea	se 1 Installer - Step 1 of 9	_ O X
Configure Security Update	25		
Configure Security Updates	Provide your email address to b and initiate configuration manage	e informed of security issues, install the p ger. <u>View details</u> .	product
Installation Option     Grid Installation Options     Install Type	E <u>m</u> ail:	Easier for you if you use your My Oracl address/username.	] e Support email
<ul> <li>Typical Installation</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Install Product</li> <li>Finish</li> </ul>	Ny Oracle Su <u>p</u> port Password	Jates via My Oracle Support.	
Help		< <u>B</u> ack	lext > Install Cancel

- 4. Select Install Database Software only.
- 5. Click Next.

<u>\$</u>	Ora	acle Database 12c Release 1 Installer - Step 2 of 9		_ 🗆 ×
Select Installat	tion Option		ORACLE DATABASE	<b>12</b> ^{<i>c</i>}
<u>Configure Sect</u>	urity Updates	Select any of the following install options.		
linstallation O	ption	○ <u>C</u> reate and configure a database		
🔶 Grid Installatio	n Options			
Install Type				
U Typical Installa	ation	Upgrade an existing database		
Prerequisite Cl	hecks			
o Summary				
install Product				
Ô Finish				
<u>H</u> elp		< <u>B</u> ack	<u>N</u> ext > <u>I</u> nstall	Cancel

- 6. Select Oracle Real Application Clusters Database Installation.
- 7. Click Next.

🤹 OI	racle Database 12c Release 1 Installer - Step 3 of 9		_ 0 ×
Grid Installation Options		ORACLE DATABASE	<b>12</b> ^c
Configure Security Updates     Installation Option     Grid Installation Options	Select the type of database installation you want to perform. Single instance database installation Oracle Real Application Clusters database installation		
Install Type         Typical Installation         Prerequisite Checks         Summary         Install Product         Finish	Oracle RAC Ong Node database installation		
Help	< <u>B</u> ack	lext >	Cancel

- 8. Select all of the RAC nodes.
- 9. Click SSH Connectivity.
| 🛓 Ora                                                 | cle Database 12c Release 1 Installer - Step 4 of 10 _ 🗆 🗆                                                                      | ×  |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----|
| Select List of Nodes                                  | DATABASE 12                                                                                                                    | С  |
| <u>Configure Security Updates</u> Installation Option | Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC o<br>Oracle RAC One. | r  |
|                                                       | Node name                                                                                                                      |    |
| A Grid Installation Options                           | ✓ 1 rac-server-01                                                                                                              | -  |
| Nodes Selection                                       | ✓ 2 rac-server-07                                                                                                              | -  |
| install Type                                          | V 5 rac-server-02                                                                                                              | -  |
|                                                       | V 4 Tac-server-06                                                                                                              | -  |
| 🍦 Typical Installation                                | ✓ 6 rac-server-05                                                                                                              | -  |
| Prerequisite Checks                                   | ▼ 7 rac-server-04                                                                                                              | -  |
|                                                       | 8 rac-server-03                                                                                                                | -  |
| O Summary                                             |                                                                                                                                |    |
| 🔆 Install Product                                     |                                                                                                                                |    |
| O Finish                                              |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       | SEL connectivity                                                                                                               |    |
|                                                       |                                                                                                                                | J  |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                |    |
|                                                       |                                                                                                                                | _  |
| Help                                                  | < <u>B</u> ack <u>N</u> ext > <u>I</u> nstall Cance                                                                            | el |

- 10. Enter the OS password.
- 11. Click Next.

🧉 Orac	le Database 12c Release 1 Installer - Step 4 of 10 ×
Select List of Nodes	
<u>Configure Security Updates</u> Installation Option	Select nodes (in addition to the local node) in the cluster where the installer should install Oracle RAC or Oracle RAC One.
T	Node name
The crid installation Options	I rac-server-UI
Nodes Selection	✓ 2 rac-server-07
🚊 Install Type	✓ 4 rac-server-08
	▼ 5 rac-server-06
O Typical Installation	✓ 6 rac-server-05
<ul> <li>Prerequisite Checks</li> </ul>	▼ 7 rac-server-04
O Summary	✓ 8 rac-server-03
I	
O Install Product	
o Finish	SSH <u>c</u> onnectivity <u>S</u> elect all <u>D</u> eselect all
	OS Username: oracle OS Pass <u>w</u> ord: ••••••••
	Ilser home is shared by the selected nodes
	Reuse private and public keys existing in the user home
	<u>T</u> est Setu <u>p</u>
Help	< <u>Back</u> <u>N</u> ext > <u>Install</u> Cancel

12. Select the preferred language.Click Next.

🔮 Orac	le Database 12c Release 1	Installer - Step 5 of 12	_ = ×
Select Product Languages			
Configure Security Updates Installation Option Crid Installation Options Nodes Selection Product Languages Database Edition Unstallation Location Operating System Groups Prerequisite Checks Summary Install Product Finish	Select the languages in which your p Available languages: Arabic Bengali Brazilian Portuguese Bulgarian Canadian French Catalan Croatian Czech Danish Dutch Egyptian English (United Kingdom) Estonian Finnish French Cerman Greek Hebrew Hungarian Icelandic	product will run.  Selected languag English  S  S  S  S  S  S  S  S  S  S  S  S  S	Jes:
Help		< <u>B</u> ack <u>N</u>	ext > Install Cancel

- 13. Select Enterprise Edition.
- 14. Click Next.

🕌 Ora	cle Database 12c Release 1 Installer - Step 6 of 12 _ 🗆 🗙
Select Database Edition	
Configure Security Updates Installation Option Crid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product Finish	Which database edition do you want to install? <ul> <li>Enterprise Edition (6.4CB)</li> <li>Oracle Database 12c Enterprise Edition is a self-managing database that has the scalability, performance, high availability, and security features required to run the most demanding, mission-critical applications.</li> <li>Standard Edition (6.1CB)</li> <li>Oracle Database 12c Standard Edition is a full-featured data management solution ideally suited to the needs of medium-sized businesses. It includes Oracle Real Application Clusters for enterprise-class availability and comes complete with its own Oracle Clusterware and storage management capabilities.</li> </ul>
Help	< <u>Back</u> <u>N</u> ext > <u>Install</u> Cancel

- 15. Provide the Oracle base and Oracle database software installation directory locations. For this installation, we used /oracle/app for Oracle base and /oracle/app/product/12c/db as the Oracle database software installation directory.
- 16. Click Next.

🔮 Ora	cle Database 12c Release 1 Installer - Step 7 of 12 _ $_$ $\square$ $ imes$
Specify Installation Locatio	
Configure Security Updates Installation Option Crid Installation Options Nodes Selection Product Languages Database Edition Operating System Groups Prerequisite Checks Summary Install Product Finish	Specify a path to place all Oracle software and configuration-related files installed by this installation owner.         Oracle base:       /oracle/app         Image: Oracle/app       Image: Im
Help	< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel

- 17. Provide the OSDBA and OSOPER group name in the next screen. For this setup, the oinstall group was selected.
- 18. Click Next.

📓 Oracle Database 12c Release 1 Installer - Step 8 of 12 _ 🗆 🗙					
Privileged Operating Syste	m groups ORACLE 12 ^c				
<ul> <li>Configure Security Updates</li> <li>Installation Option</li> <li>Grid Installation Options</li> <li>Nodes Selection</li> <li>Product Languages</li> <li>Database Edition</li> <li>Installation Location</li> <li>Operating System Groups</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Install Product</li> <li>Finish</li> </ul>	SYS privileges are required to create a database using operating system (OS) authentication. Membership in OS Groups grants the corresponding SYS privilege, eg. membership in OSDBA grants the SYSDBA privilege. Database Administrator (OSDBA) group: Database Operator (OSOPER) group (Optional): Database Backup and Recovery (OSBACKUPDBA) group: Data Guard administrative (OSDGDBA) group: Encryption Key Management administrative (OSKMDBA) group: dba				
Help	< <u>Back</u> Next > Install Cancel				

- 19. On the Perform Prerequisite Checks page, make sure the installer doesn't give any errors. If errors are detected, resolve them before continuing.
- 20. Click Next.

🛓 Ora	cle Database 12c Release 1 Installer - Step 9 of 12 _ 🗆 🗙
Perform Prerequisite Check	
<ul> <li>Configure Security Updates</li> <li>Installation Option</li> <li>Grid Installation Options</li> <li>Nodes Selection</li> <li>Product Languages</li> <li>Database Edition</li> <li>Installation Location</li> <li>Operating System Groups</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Install Product</li> <li>Finish</li> </ul>	Verifying that the target environment meets minimum installation and configuration requirements for products you have selected. This can take time. Please wait.           53%           Checking OS Kernel Parameter: wmem_default
<u>H</u> elp	< <u>B</u> ack <u>N</u> ext > <u>I</u> nstall <b>Cancel</b>

21. Click Finish on the summary page to finish the installation.

🕌 Orac	le Database 12c Release 1 Installer - Step 12 of 12	_ = ×
Finish		
Configure Security Updates Installation Option Grid Installation Options Nodes Selection Product Languages Database Edition Installation Location Operating System Groups Prerequisite Checks Summary Install Product Simmary	The installation of Oracle Database was successful.	
Help	< <u>B</u> ack []	Next > Install Close

### **Oracle ASM Configuration**

After provisioning the storage and successfully installing the Oracle RAC environment, create and configure the ASM disks on the RAC nodes. Launch the ASM GUI from any node as a grid user by running the command <code>amsca</code>, which opens the GUI.

- 1. Provide the ASM disk group name for DATA; in this case, it is ORADATA.
- Select the appropriate drives. For this solution, 32 drives were selected from the list as per Table 24.
- 3. For Redundancy, select External.
- 4. Click Show Advanced Options.
- 5. Under Disk Group Attributes, set Allocation Unit (AU) Size to 64MB and click OK.
- 6. Click OK on the confirmation message.

sk Group N Redundanc wo differer High ( Select Mem Show Eli Show Eli Uorum fai f 11.2 or h V /dev /dev /dev /dev /dev /dev /dev /dev	ame ORADATA cy y is achieved by storing mult nt failure groups, and high re Normal  External (None) Ther Disks gible Show All lure groups are used to storn igher. Fath //mapper/360080e50002 //mapper/3600800002 //mapper/360080080002 //mapper/3	e voting files in exter Header Status CANDIDATE CANDIDATE CANDIDATE	ta on different f ast three differe nded clusters ar Disk Name	ailure groups. Int failure grou nd do not cont Size (MB) 460800 460800	. Normal redu ups. tain any user Quorum	undancy need	ds disks from at l equire ASM comp	east patibility
Redundance wo differer High () Select Mem Select Mem Show Eli Quorum fai of 11.2 or h V /dev V /dev	cy y is achieved by storing mult nt failure groups, and high re Normal  External (None) ther Disks gible Show All lure groups are used to stor- higher. Path //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	iple copies of the dat dundancy from at le e voting files in exter Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE	ta on different f ast three differe nded clusters ar Disk Name	ailure groups. Int failure grou nd do not cont Size (MB) 460800 460800	. Normal redu ups. tain any user Quorum	r data. They r	ds disks from at l equire ASM comp	Jeast Datibility
Redundanc         wo differer         High         Select Mem         Show Eli         Quorum fai         f11.2 or h         V         /dev         v         v         dv         v         v         v         v         v	y is achieved by storing mult tt failure groups, and high re Normal  External (None) ther Disks gible Show All lure groups are used to stor- higher. Path //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	e voting files in exter Header Status CANDIDATE CANDIDATE CANDIDATE	ta on different f ast three differe nded clusters ar Disk Name	ailure groups. Int failure grou do not cont Size (MB) 460800 460800	. Normal redu ups. tain any user Quorum	r data. They r	ds disks from at l equire ASM comp	patibility
Woo differer         High         Select Mem         Show Eli         Uorum fai         f11.2 or h         V         /dev	y is achieved by Storing mark the failure groups, and high re Normal  External (None) ther Disks gible Show All lure groups are used to stor- higher. Path //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	e voting files in exter Header Status CANDIDATE CANDIDATE CANDIDATE	nded clusters ar	nt failure groups. Size (MB) 460800 460800 460800	tain any user	r data. They r	equire ASM comp	patibility
High ( Select Mem Show Eli Quorum fai of 11.2 or h Disk V /dev V /dev	Normal  External (None)  ber Disks gible Show All  lure groups are used to storn  igher.  Path //mapper/360080e50002 //mapper/360080e5002 //mapper/360080e5002 //mapper/360080e5002 //mapper/360080e50002 //mapper/360080e5002 //mapper/360080e5002 //mapper/360080e5002 //mapper/360080e5002 //mapper/360080e50080 //mapper/360080080 //mapper/36008080 //mapper/360080 //mapper/8608	e voting files in exter Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	Quorum	r data. They r	equire ASM comp	Datibility
Select Mem Select Mem Show Eli (uorum fai of 11.2 or h Disk V /dev V /dev	) Normal (None) iber Disks gible Show All lure groups are used to storn igher. Path //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	d do not cont Size (MB) 460800 460800 460800	Quorum	r data. They r	equire ASM comp	oatibility
Select Mem Show Eli Uuorum fai If 11.2 or h V Disk V /dev V /dev	nber Disks gible Show All ilure groups are used to storn igher. : Path :/mapper/360080e50002 :/mapper/360080e50002 :/mapper/360080e50002 :/mapper/360080e50002 :/mapper/360080e50002	Header Status Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	d do not cont Size (MB) 460800 460800	tain any user Quorum	r data. They n	equire ASM comp	oatibility
Show Eli Cuorum fai f 11.2 or h  f Disk /dev /dev /dev /dev /dev /dev /dev /dev	gible Show All ilure groups are used to storn igher. Fath //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	tain any user Quorum	r data. They r	equire ASM comp	oatibility
Quorum fai of 11.2 or h v Disk v /dev v /dev	llure groups are used to storn nigher. //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	tain any user Quorum	r data. They n	equire ASM comp	oatibility
Quorum fai f 11.2 or h Disk /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev /dev	lure groups are used to stor higher. //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status  CANDIDATE  CANDIDATE  CANDIDATE  CANDIDATE  CANDIDATE  CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	Quorum	r data. They r	equire ASM comp	oatibility
Image: Construction of the second	rigner. Fath //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status ANDIDATE ANDIDATE ANDIDATE ANDIDATE CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	Quorum			•
Disk     /dev	: Path //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	Header Status CANDIDATE CANDIDATE CANDIDATE CANDIDATE CANDIDATE	Disk Name	Size (MB) 460800 460800 460800	Quorum	_		•
V     /dev       Image: state	<pre>//mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002</pre>	CANDIDATE           CANDIDATE           CANDIDATE           CANDIDATE           CANDIDATE           CANDIDATE           CANDIDATE           CANDIDATE		460800 460800 460800				<b>^</b>
Image: Weight of the second	<pre>//mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002</pre>	CANDIDATE		460800 460800				
✓ /dev	//mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	CANDIDATE		460800				
<ul> <li>✓ /dev</li> <li>✓ /dev</li> <li>✓ /dev</li> <li>✓ /dev</li> <li>✓ /dev</li> <li>Iote: If you</li> <li>he Disk Disk</li> </ul>	//mapper/360080e50002 //mapper/360080e50002 //mapper/360080e50002	CANDIDATE		10000				333
✓ /dev ✓ /dev ✓ /dev Iote: If you he Disk Disk	//mapper/360080e50002 //mapper/360080e50002	CANDIDATE		460800				
✓ /dev ✓ /dev Iote: If you he Disk Disk	//mapper/360080e50002			460800				
Iote: If you he Disk Di	, , , , , , , , , , , , , , , , , , ,	CANDIDATE		460800				
lote: lf you 'he Disk Di:	/mapper/360080e50002	CANDIDATE		460800	Γ	-		-
risk Discov Disk Group In allocatic IUs. The Al	scovery Path limits set of disl rery Path: /dev/mapper/* p Attributes on unit (AU) is the fundament U size cannot be modified lat Unit Size (MB) 64 🗸	ks considered for dis al unit in which cont er.	scovery. iguous disk spa	ce is allocated	d to ASM files	Chan 5. ASM file ext	nge Disk Discover tent size is a mult	y Path
pecify min	imum software versions for A	ASM, Database and A	SM volumes tha	t this disk gro	oup need to b	oe compatible	e with.	
SM Compa	atibility 12.1.0.0	).0						
atabase C	ompatibility							
DVM Com	patibility							
efer Oracl	e Automatic Storage Manage	ment Administrator':	s Guide for mor	e details on th	ne Compatibil	lity matrix.		
		Hide Advanced	Options OK	Cancel	Help			

<b>\$</b>	ASM Config	uration Assista	nt: Configur	e ASM: Disk	Groups	×
	ASM Instances You can choose to groups with 11.2 A Tip: To perform op Disk Groups	Disk Groups Volum create a new disk grou SM compatibility or hig erations on a disk grou	ASM Cluste up or add disks to gher. up, right mouse cl	r File Systems an existing disk g lick on the row.	roup. To create dynam	ic volumes, you need disk
	Disk Group Nan	ne Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
	ORADATA	14400.00	14393.06	14393.06	EXTERN	MOUNTED(8 of 8)
	GRID	15.00	7.94	7.94	EXTERN	MOUNTED(8 of 8)
	Create Mour	t All) Dismount All				
Help						Exit

7. Repeat step 1 through step 6 for the ORALOG disk group. For the ORALOG disk group, eight ASM disks were used. The ASM AU size was set at 64M for ORALOG as well.

<u>ی</u>	ASM Config	juration Assista	ant: Configur	e ASM: Disk (	Groups	_ 0 ×
10100101010101010101010	ASM Instances	Disk Groups Volui	nes ASM Cluste	r File Systems		
	You can choose to groups with 11.2 A Tip: To perform op Disk Groups	create a new disk gro SM compatibility or h erations on a disk gro	up or add disks to igher. oup, right mouse cl	an existing disk gr lick on the row.	oup. To create dynam	ic volumes, you need disk
	Disk Group Nan	ne Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
	ORALOG	400.00	397.56	397.56	EXTERN	MOUNTED(8 of 8)
	ORADATA	14400.00	14393.06	14393.06	EXTERN	MOUNTED(8 of 8)
	GRID	15.00	7.94	7.94	EXTERN	MOUNTED(8 of 8)
	Create Moun	t All Dismount All	)			
Help						Exit

### **Oracle Database Creation**

After the ASM disk groups are available, the Oracle RAC database can be created using them. In order to create the Oracle RAC database, run the Database Configuration Assistant (DBCA) utility as an Oracle user, which launches the DBCA GUI. After the DBCA GUI is successfully launched, complete the following steps to create the Oracle RAC database:

- 1. Select Oracle Real Application Clusters (RAC) Database as the database type and click Next.
- 2. Select Create Database.
- 3. Select Next.

🛃 Dat	abase Configuration Assistant - Welcome - Step 1 of 6		_ 0 ×
Database Operation		ORACLE DATABASE	<b>12</b> ^c
Database Operation     Creation Mode     Prerequisite Checks     Summary     Progress Page     Finish	Select the operation that you want to perform.            • <u>Create Database</u> • Configure Database Options         • <u>Delete Database</u> • <u>Manage Templates</u> • <u>Manage Pluggable Databases</u> • <u>Instance Management</u> • [Instance Management]         • [I		
Help	< <u>B</u> ack	ext > Einish	Cancel

4. Select Advanced Mode and click Next.

4	Database	Configuration Assistant - C	reate Database - Step 2 of 14	⊧ _ □ ×
Cre	eation Mode			
φ	Database Operation	Create a database with default co	nfiguration	
0	Creation Mode	<u>G</u> lobal Database Name:		
-	Database Template	<u>S</u> torage Type:	Automatic Storage Management (ASM)	-
¢	Database Identification	Database Files Location:	+ORADATA	Browse
Ý	Management Options	F <u>a</u> st Recovery Area:	+ORALOG	Browse
	Database Credentials Storage Locations	Da <u>t</u> abase Character Set:	WE8MSWIN1252 - MS Windows Code Pag	ge 1252 8-bit Wes ▼
Ý	Database Options	Administrative Password :		
Ĩ	Initialization Parameters	Confirm <u>P</u> assword:		
Ĭ	Creation Options	✓ Create As Container Databa	ise	
Ţ	Summary	P <u>l</u> uggable Database Name:		
	Progress Page	Advanced Mode		
6	Finish			
	Help		< <u>B</u> ack <u>N</u> ext >	Einish Cancel

- 5. Select General Purpose or Transaction Processing
- 6. Select Admin Managed as the configuration type and click Next.

2	🚳 🛛 🗛 Database Configuration Assistant - Create Database - Step 3 of 14 🛛 💷 🗆					
Da	tabase Template					
Ŷ	Database Operation <u>Creation Mode</u>	Select the type of dat <u>D</u> atabase Type:	abase you want to configure. Oracle Real Application Clusters (RAC) database			
	Database Template	Configuration Type:	Admin Managad			
	Database Identification	<u></u>	Admin-Manageo			
	Management Options					
	Database Credentials	Templates that includ	de datafiles contain pre-created databases. They all	owyou to create a new database		
	Storage Locations	in minutes, as oppos as when you need to	ed to an hour or more. Use templates without datafi change attributes like block size, which cannot be a	iles only when necessary, such Itered after database creation.		
	Database Options					
IJ	Initialization Parameters	Select a template for	your database.			
Ĭ	Grandian Ondiana	Select Temp	late ral Purpose or Transaction Processing	Includes Datafiles		
Ϋ́	Creation Options	Custo	om Database	No		
Ŷ	Prerequisite Checks	O Data V	Narehouse	Yes		
Ý	Summary					
¢	Progress Page					
6	Finish					
				Snow Details		
	Help		< <u>B</u> ack <u>N</u>	ext > Einish Cancel		

- 7. Provide a Global Database Name; in this case, LWNDB was used.
- 8. Click Next.

4	Database	Configuration Assistant - Create Database - Step 4 of 15 $_$ $_$ $\square$ $\times$
Da	tabase Identification	
0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-	Database Operation Creation Mode <u>Database Template</u>	Provide the identifier information required to access the database uniquely. An Oracle database is uniquely identified by a Global Database Name, typically of the form "name.domain". A database is referenced by an Oracle instance on each cluster database node. Specify a prefix to be used to name the cluster database instances.
	Database Identification	<u>C</u> lobal Database Name: LWNDB
· · · · · · · · · · · · · · · · · · ·	Database Placement Management Options Database Credentials Storage Locations Database Options Initialization Parameters Creation Options Prerequisite Checks Summary Progress Page Finish	SID Prefix:       Image: Single database         Create As Container Database         Creates a database container for consolidating multiple databases into a single database and enables database virtualization. A container database (CDB) can have zero or more pluggable databases (PDB).         ○ Create an Empty Container Database         ● Create a Container Database with one or more PDBs         Number of PDBs:       1         Image: PDB Name:
	Help	< <u>B</u> ack <u>N</u> ext > <u>F</u> inish Cancel

9. Click the ">>" button to add all eight RAC nodes and click Next.

📓 🛛 🗛 Database Configuration Assistant - Create Database - Step 5 of 15 🛛 💷 🛛 🗙					
Database Placement					
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Identification</li> <li>Database Credentials</li> <li>Storage Locations</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Select Nodes         Select the nodes on which you want to create the cluster database. The local node "rac-server-01" should always be selected.         Available:       Selected:         rac-server-01       rac-server-02         rac-server-03       rac-server-03         rac-server-04       rac-server-06         rac-server-07       rac-server-07         rac-server-08       Image: Comparison of the server of the serve				
Help	< <u>Back</u> <u>N</u> ext > Einish Cancel				

10. Unselect Configure Enterprise Manager. Although this was not selected for this configuration, this could change depending upon the user need.

📓 🛛 Database	e Configuration Assistant - Create Database - Step 6 of 15	_ 0 ×
Management Options		<b>12</b> ^c
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li><u>Database Placement</u></li> <li>Management Options</li> <li><u>Database Credentials</u></li> <li>Storage Locations</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Specify the management options for the database.         Run Cluster Verification Utility (CVU) Checks Periodically         Configure Enterprise Manager (EM) Database Express         EM Database Express Port:         S500         Register with Enterprise Manager (EM) Cloud Control         QMS Host:         OMS_Port:         EM Admin Username:         EM Agmin Password:	
Help	< <u>Back</u> <u>Next</u> <u>Finish</u>	Cancel

11. Enter and confirm the administrative passwords. Although the same password was used for all accounts for this configuration, this could be different depending on the customer requirement.

🔬 Database	Configuration Assistant - Create Database - Step 7 of 15 $_$ $_$ $\square$ $\times$
Database Credentials	
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> <li>Management Options</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	For security reasons, you must specify passwords for the following user accounts in the new database.         Use Different Administrative Passwords         User Name       Password         SYS         SYSTEM
Help	                                                                                                                                                                                                                                                                                                                                                     

- 12. Select Use Common Location for All Database Files.
- 13. Use +ORADATA ASM disk group for the database files location.
- 14. Click Next.

🔮 🛛 🕹 Database	<b>Configuration Assistant</b>	- Create Database - Step 8 of	15 _ 🗆 ×
Storage Locations			
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> </ul>	Database files Storage Type: O Use Database File Locations O U <u>s</u> e Common Location for A F <u>i</u> le Location:	Automatic Storage Management (ASM) 🔻 from Template All Database Files +ORADATA	B <u>r</u> owse
Management Options     Database Credentials	Us <u>e</u> Oracle-Managed Fil	Multiplex Redo Logs and Cont	rol Files
Storage Locations     Database Options	Re <u>c</u> overy files Storage Type:	Automatic Storage Management (ASM) 🔻	)
Creation Options	Specify Fast Recovery Area Fast Recovery Area:	+ORADATA	Br <u>o</u> wse
<ul> <li>Prerequisite Checks</li> <li>Summary</li> </ul>	Fas <u>t</u> Recovery Area Size:		7035 🔶 MB 💌
Progress Page Finish	Enable Archiving Edit Ar	rchive Mode Parameters	File Loc <u>a</u> tion Variables
Help		< <u>B</u> ack Ne	ext > Einish Cancel

Specify Fast Recovery Area was not selected for this configuration.

- **Note:** Flash recovery area (FRA) is a centralized storage area that is used to keep the entirety of the database backup and recovery files. The flash recovery area is managed by Oracle Managed Files (OMF).
- 15. Click Next.

📓 🛛 🕹 🖉	Configuration Assistant - Create Database - Step 9 of 15 $_$ $_$ $\square$ $\times$
Database Options	
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> <li>Management Options</li> <li>Database Credentials</li> <li>Storage Locations</li> <li>Oatabase Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Sample Schemas       Database Vault & Label Security         Sample Schemas       Illustrate the use of a layered approach to complexity, and are used by some demonstration programs. Installing this will give you the following schemas in your database: Human Resources, Order Entry, Online Catalog, Product Media, Information Exchange, Sales History. It will also create a tablespace called EXAMPLE. The tablespace will be about 150 MB.         Specify whether or not to add the Sample Schemas to your database.
Help	< <u>Back</u> <u>Next</u> <u>Einish</u> Cancel

16. For Initialization Parameters, keep the default and click Next. The sample init.ora file used in this solution is provided in Figure 5 in the appendix.

📓 🛛 🕹 Database O	Configuration Assistant - Cr	eate Databas	e - Step 10 of 15	_ = ×
Initialization Parameters				
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> <li>Management Options</li> <li>Database Credentials</li> <li>Storage Locations</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Memory Sizing Character Memory Size (SCA and PGA): Percentage: 32 9 Use Automatic Memory Mana Custom Settings Memory Management SGA Size: PGA Size: Total Memory for Oracle:	Sets Connection 20480 MB 6 Igement Automatic Sha 25720 MB	1 Mode 250 MB Show Memory D red Memory Management 19,290   M Bytes ▼ 6,430   M Bytes ▼	64360 MB
Help	<u>A</u> ll Initialization Parameters		< Back Next >	Finish Cancel
Help	All Initialization Parameters		< <u>B</u> ack Next >	<u>Finish</u> Cancel

17. Select Create Database and click Next.

📓 🛛 🔤 Database 🤅	Configuration Assistant - Create Database - Step 11 of 15	- o x
Creation Options	ORACLE DATABASE	<b>2</b> ^c
🌱 Database Operation	Select the database creation options.	
Creation Mode	✓ Create Database	
Database Template		
Database Identification	<u>G</u> enerate Database Creation Scripts	
<ul> <li>Database Placement</li> </ul>	Destination Directory: /oracle/app/admin/LWNDB/scripts Br	owse
o Management Options	Customize Storage Loca	tions
<ul> <li>Database Credentials</li> </ul>		
Storage Locations		
<ul> <li>Database Options</li> </ul>		
Initialization Parameters		
Creation Options		
Prerequisite Checks		
ý Summary		
Progress Page		
o Finish		
Help	< <u>B</u> ack <u>N</u> ext > <u>F</u> inish	Cancel

- 18. In the navigation pane, expand Redo Log Groups.
- 19. Change the file directory for each Redo Log Group (1–16) to the +ORALOG ASM disk group and click OK.

<u>\$</u>	Customize Storage >>
□	Edit Redo Log Group - 1 Group #: Elie Size: Comparis Comparison
<u>A</u> dd <u>R</u> emove	<u>O</u> K <u>C</u> lose

20. After the database is created, the Configuration Assistant performs prerequisite checks.

📓 🛛 Database	Configuration Assistant - Create Database - Step 12 of 15	_ 0 ×
Prerequisite Checks		<b>12</b> ^c
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> <li>Management Options</li> <li>Database Credentials</li> <li>Storage Locations</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Prerequisite Checks	
Help	< <u>B</u> ack Next > Einish	Cancel

21. Resolve any issues that are found and click Next.

🛓 🛛 🕹 🖉	Configuration Assistant - Create Database - Step 12 of 15	×
Prerequisite Checks		<b>12</b> ^c
<ul> <li>Database Operation</li> <li>Creation Mode</li> <li>Database Template</li> <li>Database Identification</li> <li>Database Placement</li> <li>Management Options</li> <li>Database Credentials</li> <li>Storage Locations</li> <li>Database Options</li> <li>Initialization Parameters</li> <li>Creation Options</li> <li>Prerequisite Checks</li> <li>Summary</li> <li>Progress Page</li> <li>Finish</li> </ul>	Validation Results         Ignore All         Yalidation         Otabase Validation Checks         Cluster Validation Checks         Physical Memory         Available Physical Memory         Swap Size         Free Space: rac-server-05:/tmp         Free Space: rac-server-05:/tmp         Free Space: rac-server-05:/tmp         Free Space: rac-server-03:/tmp         Free Space: rac-server-02:/tmp         Free Space: rac-server-03:/tmp         Free Space: rac-server-03:/tmp         Free Space: rac-server-06:/tmp         Free Space: rac-server-06:/tmp         User Existence: oracle         Run Level         Hard Limit: maximum open file descriptors         Soft Limit: maximum open file descriptors	Check Again
	Cluster Verification Check "Swap Size" failed on node "rac-server-05", expected value	:: 16GB (1.6777 🖵
Hain		ich Cancel
Пеір	< <u>B</u> ack <u>N</u> ext > <u>F</u> in	Ish Cancel

22. Click Finish to complete.

📓 🛛 🕹 Database 🤇	Configuration Assistant - Create Database - Step 13 of 15 $_$ $_$ $\square$ $\times$
Summary	
Database Operation	Database Configuration Assistant: Summary
<ul> <li><u>Creation Mode</u></li> <li><u>Database Template</u></li> </ul>	Create Database – Summary
Database Identification	Database Configuration Summary
Management Options	Global Database LWNDB
<ul> <li><u>Database Credentials</u></li> <li><u>Storage Locations</u></li> </ul>	Database Configuration Admin-Managed Cluster Database
Database Options     Initialization Parameters	Type: Node List: rac-server-01,rac-server-02,rac-server-03,rac-server-04,rac-server-05,rac-server-06,rac-s SID List: UWNDR1 UWNDR2 UWNDR6 UWNDR7 UWNDR3 UWNDR5 UWNDR4 UWNDR8
Creation Options	Create As Container No
Summary	Storage Type:
Progress Page Finish	Memory Configuration Automatic Shared Memory Management Type:
	Template General Purpose or Transaction Processing Name:
	Database Configuration Details
Help	< <u>B</u> ack <u>N</u> ext > <u>Finish</u> Cancel

🧕 🛛 Database (	Configuration Assistant - Create Database - Step 14 o	of 15 _ □ ×
Progress Page		
Database Operation     Creation Mode     Database Template     Database Identification	Progress Clone database "LWNDB" creation in progress 32%	
Unitabase Placement	Steps	Status
Management Options	Copying database files	Finished
🇘 Database Credentials	S Creating and starting Oracle instance	In Progress
Storage Locations	Creating cluster database views	
Database Options		
Initialization Parameters		
Creation Options		
Prerequisite Checks		
y Summary		
Progress Page		
5 Finish	Activity Log	
Help	<u>Back</u>	ext > <u>F</u> inish <b>Cancel</b>

23. Close the database configuration assistant.

<u></u>	Database	Configuration Assistant - Create Database - Step 15 of 15 $_$ $_$ $\square$ $\times$
Fin	ish	
>->->->->->->->->->->->->->->->->->->->-	Database Operation Creation Mode Database Template Database Identification Database Placement Management Options Database Credentials Storage Locations Database Options Initialization Parameters Creation Options Prerequisite Checks Summary Progress Page	Database creation complete. For details check the logfiles at: /oracle/app/cfgtoollogs/dbca/LWNDB. Database Information: Global Database Name: LWNDB System Identifier(SID) Prefix: LWNDB Server Parameter File name: +ORADATA/LWNDB/spfileLWNDB.ora Note: All database accounts except SYS and SYSTEM are locked. Select the Password Management button to view a complete list of locked accounts or to manage the database accounts. From the Password Management window, unlock only the accounts you will use. Oracle strongly recommends changing the default passwords immediately after unlocking the account. <u>Password Management</u>
	Finish Help	<u>Sack</u> <u>Next</u> > <u>Einish</u> <u>Close</u>

# **5** Conclusion

The FlexPod Select for High-Performance Oracle RAC solution is designed for applications that are looking for extreme performance and reliability. The architecture is also highly scalable, which allows the customer to select the number of Cisco UCS server blades and EF-Series storage units required for the workload. The NetApp EF560 all-flash storage array is a true enterprise-class storage array designed for applications that expect high IOPS with microsecond-level latencies. The fully redundant enterprise-class high-availability feature on the storage controllers provides maximum availability and delivers the required performance for mission-critical applications for which superior performance and low latency are imperative.

## **Appendix**

## Identifying Fibre Channel over Ethernet (FCoE) WWPNs in Cisco UCS

Use the following steps to identify the WWPNs for each server in the Cisco UCS environment.

- 1. In Cisco UCS Manager, click the Server tab in the navigation pane.
- 2. Select Service Profiles > root > Sub-organizations > [organization-name].
- 3. For each server, select the server name.



4. In the management pane, select the Storage tab. Expand the WWPN column until the full WWPN is visible. Each server has one WWPN for each fabric. The fabric to which a WWPN corresponds can be identified by the Fabric ID column.

S       Image: Service Profiles       Image: Se	ervice Profil
3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     3     1     1     3     1     3     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1 <th>Events</th>	Events
Equipment       Servers       LAN       SAN       VM       Admin         Filter:       All       Image: Servers       Network       ISCS1 vNICs       VMedia Policy         Image: Servers	
Filter: All     VHBA     VHBA </th <th></th>	
Competition Policy     Works VHBA Indexor Groups	
Actions     World Wide Node Name       Sub-Organizations     Change World Wide Iods (Jame       Actions     Change Local Dist: Configuration Policy       Modify vittC(/rBA Placement     WWNN Pool Instance: org-root/wwn-pool-WWNN-POOL	
Service Profiles   Change World Wide Rode (Tame  World Wide Rode Name: 20:00:00:25:85:00:00:0F  WWNN Pool: WWNN-POOL  WWNN Pool: Service org-root/wwn-pool-WWNN-POOL	
A root     A root	
A Sub-Organizations	
D T T T T T T T T T T T T T T T T T T T	
RACSERVER-02-BOOT-FARILCA     Local Disk Configuration Policy	
B T RAC-SERVER-03-BOOT-FABRIC-A Local Disk Policy: default	
🕀 🍜 RAC-SERVER-04-BOOT-FABRIC-A Local Disk Policy Instance: org-root/local-disk-config-default	
B C RAC-SERVER-05-BOOT-FABRIC-B	
B AR-SERVER-00-BOUT-RARIL-5 SAN Connectivity Policy	
RAC-SERVER-08-BOOT-FABRIC-B SAN Connectivity Policy: <not set=""></not>	
A Sub-Organizations SAN Connectivity Policy Instance:	E
Greate SAU Connectivity Policy	
B S Adapter Policies	
B StoS Defaults	
B Soot Policies Name WWPN Desired Order Actual Order Fabric ID Desired Placement Actual Placement	₽.
G TDM roac Purifier 20:00:00:25:85:00:0A:0F 1 5 A 1 1	
B         SKVM Massement Policies         Image: WHA VSAN-B         20:00:00:25:85:00:08:0F         2         6         B         1         1	
🖶 🖉 Local Disk Config Policies	
🕀 🗊 Maintenance Policies	
— 💹 Management Firmware Packages	
Bernory Policy     Generated Policy	
G carbon being	
	-
B Server Pool Policy Qualifications	
Save Changes Rese	Values

### Identifying Fibre Channel WWPNs in SANtricity 11.10

The information gathered using the procedure to identify FC WWPNs is useful during the configuration of zoning within the Cisco Nexus switches and during configuration of the SAN boot path during Cisco UCS service profile configuration.

Use the following steps to identify the WWPN of each port on an EF560 array using SANtricity 11.10:

1. In the SANtricity Enterprise Management Console, right-click the name of the array and select Manage Storage Array.

SANtricity® (Enterprise Management)					
SANtricity®					NetApp [.]
Edit View Tools Help					
<ul> <li>ice-jump</li> <li>ice-jump</li> <li>Storage Array icefs1-ef560-1</li> <li>Storage Array icefs1-ef560-2</li> <li>Storage Array icefs1-ef560-3</li> <li>Storage Array icefs1-ef560-4</li> </ul>	Name icefs1-ef560-1 icefs1-ef560-2 icefs1-ef560-3 icefs1-ef560-4	Type	Status Optimal Optimal Optimal	Management Connections Out-of-Band( <u>details</u> ) Out-of-Band( <u>details</u> ) Out-of-Band( <u>details</u> ) Out-of-Band( <u>details</u> )	Comment

Note: This opens a new Array Management window.

2. From the Array Management window menu bar, select Monitor > Reports > Storage Array Profile.

ANtricity®					Net/
e Array Storage Copy Services Host Mappings Har	dware Monitor Upgrade Help				
efs1-ef560-1 📓 Optimal					
👥 Summary 🔀 Performance 📷 Storage &	Copy Services Host Mappings Hardwar	re 🚰 Setup			
Monitor	Storage & Copy Services	Host Mappings		Hardware	
Storage Array status is optimal	Disk Pools / Volumes on Disk Pools: 0 / 0	) Storage Partitions (Used/Allowed)	: 3/512	Controllers:	2
📌 No Operations in Progress	Volume Groups: 3	B Host Groups:	1	Trays:	1
	RAID 1/10 Volume Groups: 3 Volumes: 12	Configured Hosts:	8		
Management Software Version: 11.20.0000.0006	Standard Volumes (Used/Allowed) 12 / 2,048	Host-to-Volume Mannings:	14	Assigned	24
Controller Firmware version: 08.20.08.00	Base: 12	Manned Volumes:	13	Unassigned:	22
View Firmware Inventory	Repository: 0	Total Mannable Volumes:	13	Media Type:	, in the second se
View Storage Array Prome	Thin Volumes (Used/Allowed): 0 / 2,048			SSD:	24
Cellect Support Date Manually	Volume Copies: 0	-		Interface Type:	
Collect Support Data Manually	Snapshot Elements			SAS SAS	24
	Snapshot Groups: 0			Hot Spare Drives:	2
Capacity	Snapshot Images: 0	Premium Features		In-use:	0
Total Capacity: 4.038.225 GB	Snapshot Volumes: 0	Trials Available	0	Standby:	2
	Consistency Groups: 0	Trials Active	0	L	
Unconfigured:	Member Volumes: 0	Enabled 🛛	0	Information Center	
Free'	Carteria State Asynchronous Mirroring	Disabled 2	2	Online Help	
182.225 GB	Mirror Groups: 0	Manage Premium Features		Storage Concepts Tutori	al
Create Volume	Mirrored Pairs: 0			Planning Your Configura	
Configured:				Configuring Your Storage	e Array
3,030.000 GB				Essential Terms to Know	<u>N</u>
				L	

Note: This opens a new Storage Array Profile window.

3. From the Storage Array Profile window, select the Hardware tab.

		NetApp
🖹 Storage Array 🟭 Storage 🔩 Co	opy Services 👔 Host Mappings 🔤 Hardware 🔛 All	
Controllers 🔋 Drives 🔁 Drive Ch	annels 👫 Trays	
PROFILE FOR STORAGE ARRAY: icefsl-es	560-3 (Mon Dec 15 14:09:17 EST 2014)	*
CONTROLLERS		
Number of controllers: 2		
Controller in Tray 99, Slot A		
Status:	Online	
Current configuration		
Firmware version:	08.10.11.00	
Appware version:	08.10.11.00	
Bootware version:	08.10.11.00	
NVSRAM Version: Dending configuration	N5501-810834-DB3	
Firmware version:	None	
Appware version:	None	-
ind: 🗾 🖌 🗐		
Results:	Save As Close	Help

4. In the Find text box at the bottom left side of the window, enter world-wide port. The interface finds 8 results.

	NetApp [.]
🖹 Storage Array 🟭 Storage 🥰 Copy Services 🕅 Host Mappings 🖬 Hardware 📷 All	
🚾 Controllers 📋 Drives 🔁 Drive Channels 👫 Trays	
Port: 1 Part type: LSISAS2308 revision 223,037,696 Status: Up Maximum data rate: 6 Gbps Current data rate: 6 Gbps	•
Host interface:       Fibre         Host Interface Card(HIC):       Not Available         Channel:       1         Port:       1         Current ID:       Not applicable/0xFFFFFFF         Preferred ID:       0/0xEF         NL-Port ID:       0x920020         Maximum data rate:       16 Gbps         Current data rate:       8 Gbps	
Data rate control:       Auto         Link status:       Up         Topology:       Fabric Attach         World-wide port       identifier:         20:12:00:80:e5:29:6e:dc	-
Find: world-wide port -	
Result:1 of 8 instances found <u>Close</u>	<u>H</u> elp

- 5. Note the port number and the worldwide port identifier for each port. Click the Next button (binoculars icon) to navigate to the next port. The first set of ports corresponds to controller 1, and the second set of ports corresponds to controller 2.
- 6. Repeat step 1 to step 5 for each array in the environment.

### Storage Layout for Eight-Node RAC

Table 24 describes the consolidated storage layout for an eight-node Oracle RAC environment.

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Total Capacity	Spare Disks	Mapped Host Group Name/Host Name
EF560-1	Redo logs	A1LOGVG	2	RAC1BOOT	78	256GB	2	RAC-A01
	LUNs	L		RAC2BOOT	78	-		RAC-A02
				LOG1	50			RAC
				LOG2	50			
	Data	A1VG1	10	DATALUN1	450	3.6TB		
				DATALUN2	450			
				DATALUN3	450			
				DATALUN4	450			

Table 24) Storage layout for eight-node RAC.

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Total Capacity	Spare Disks	Mapped Host Group Name/Host Name
		A1VG2	10	DATALUN5	450			
				DATALUN6	450		-	
				DATALUN7	450		-	
				DATALUN8	450			
EF560-2	Redo logs and boot LUNs	A2LOGVG	2	LOG3	50	271GB	2	RAC
				LOG4	50			
				RAC3BOOT	78			RAC-A03
				RAC4BOOT	78			RAC-A04
				GRID1	5			RAC
				GRID2	5			
				GRID3	5			
	Data	A2VG1	10	DATALUN9	450	3.6TB		RAC
				DATALUN10	450			
				DATALUN11	450			
				DATALUN12	450			
		A2VG2	10	DATALUN13	450			
				DATALUN14	450			
				DATALUN15	450			
				DATALUN16	450			
EF560-3	Redo logs and boot LUNs	A3LOGVG	2	LOG5	50	256GB	2	RAC
				LOG6	50			
				RAC5BOOT	78			RAC-B01
				RAC6BOOT	78			RAC-B02
	Data	A3VG1	10	DATALUN17	450	3.6TB		RAC
				DATALUN18	450			
	]			DATALUN19	450			
				DATALUN20	450			
		A3VG2	10	DATALUN21	450			
				DATALUN22	450			

Storage Array	Туре	Volume Group RAID 10	Number of Physical Disks	Volume/ LUN Name	Allocated Capacity in GB	Total Capacity	Spare Disks	Mapped Host Group Name/Host Name
				DATALUN23	450			
				DATALUN24	450			
EF560-4	Redo logs and boot LUNs	A4LOGVG	2	LOG7	50	256G	2	RAC
				LOG8	50			
				RAC7BOOT	78			RAC-B03
				RAC8BOOT	78			RAC-B04
	Data	A4VG1	10	DATALUN25	450	3.6TB		RAC
				DATALUN26	450			
				DATALUN27	450			
				DATALUN28	450			
		A4VG2	10	DATALUN29	450			
				DATALUN30	450			
				DATALUN31	450			
				DATALUN32	450			

### Sample init.ora File

The sample init.ora file in Figure 5 was used for this solution.

**Note**: The SGA size in this setup was kept to the lowest in order to get the maximum hits on the storage arrays. For a real production environment, the databases must be provided with appropriate SGA.

Figure 5) Sample init.ora file for this solution.

```
cat init.ora
*.audit file_dest='/oracle/app/admin/LWNDB/adump'
*.audit_trail='db'
*.cluster database=true
*.compatible='12.1.0.2.0'
*.control files='+ORADATA/LWNDB/control01.ctl','+ORADATA/LWNDB/control02.ctl'
*.db_block_size=8192
*.db create file dest='+ORADATA'
*.db_create_online_log_dest_1='+ORALOG'
*.db domain=''
*.db_name='LWNDB'
*.diagnostic_dest='/oracle/app'
*.dispatchers='(PROTOCOL=TCP) (SERVICE=LWNDBXDB)'
LWNDB3.instance_number=3
LWNDB6.instance number=6
LWNDB7.instance number=7
LWNDB5.instance number=5
LWNDB1.instance_number=1
LWNDB4.instance number=4
LWNDB2.instance number=2
LWNDB8.instance number=8
LWNDB2.thread=2
LWNDB6.thread=6
LWNDB8.thread=8
```

LWNDB7.thread=7
LWNDB3.thread=3
LWNDB4.thread=4
LWNDB5.thread=5
LWNDB1.thread=1
LWNDB8.undo tablespace='UNDOTBS8'
LWNDB5.undo tablespace='UNDOTBS6'
LWNDB1.undo tablespace='UNDOTBS1'
LWNDB2.undo tablespace='UNDOTBS2'
LWNDB6.undo tablespace='UNDOTBS3'
LWNDB7.undo tablespace='UNDOTBS4'
LWNDB3.undo tablespace='UNDOTBS5'
LWNDB4.undo_tablespace='UNDOTBS7'
*.db_writer_processes=20
*.filesystemio_options='setall'
*.db_files=2000
*.open_cursors=300
<pre>*.pga_aggregate_target=2G</pre>
*.processes=3000
*.remote_login_passwordfile='exclusive'
*.shared_pool_size=4G
*.db_cache_size=3G
*.log_buffer=134217728
*.pga_aggregate_target=1G

## References

This report references the following documents and resources:

- <u>Cisco UCS Virtual Interface Card Drivers for Linux Installation Guide</u>
- <u>Cisco UCS 2.2(5) Hardware and Software Interoperability Matrix</u>
- <u>Cisco UCS fnic Tunables</u>
- Oracle Database Quick Installation Guide 12c Release 1 (12.1) for Linux x86
- NetApp EF560 Flash Array Installation Guide
- TR-4305: NetApp Extreme Performance Solution for Oracle Database

## **Version History**

Version	Date	Document Version History
Version 1.0	January 2015	Engineering content creation
Version 2.0	December 2015	Updated test configuration data

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