

Length: 5 Days

## Format: Lecture/Lab

Course Version: 5.0

## Product Version: 2.1

**Exam:** 642-999



www.fireflycom.net sales@fireflycom.net

> A T L A N T A LONDON SINGAPORE



## Why Firefly

From expert-led classrooms to virtual experiences and state-of-the art remote labs, we are passionate about the service we deliver. Firefly's heritage in education and data center technologies ensures a consistently high level of customer satisfaction. Our instructors are industry practitioners and leverage this experience to blend formal education with hands-on training and customized labs to deliver a highly interactive and immersive course.

This course includes coverage of UCS Manager version 2.1 and UCS Central 1.0 featuring additional content on networking design and operations that customers need to successfully integrate UCS into their environments not in the standard version of the course. All UCS generation 1-3 components and features are covered.

## **Course Description**

This Firefly offering covers all topics in the Cisco DCUCI v5 course, along with unique content on new UCS hardware and software.

UCS-IP is a five-day, hands-on course designed for system engineers, data-center administrators, technicians and architects implementing Cisco Unified Computing System B- and C-Series servers.

The course teaches how to deploy, configure, and manage UCS servers with consolidated I/O networking for LAN and SAN connectivity including multi-hop FCoE. It teaches how to virtualize server properties to enable simple and rapid mobility of service profiles between physical servers. In the lab you will configure mobile service profiles, upgrade firmware, configure a multi-tenant management model, enable high availability and fault tolerance, and perform back-ups and restore system configurations.

Students will learn to use the built-in monitoring and troubleshooting tools. They will also install and configure VMware VM-FEX and VM-FEX Universal Pass-Through Mode with the Cisco Virtual Interface Card on the Cisco UCS infrastructure.

## Who Should Attend

This course prepares students for exam 642-999, Implementing Cisco Data Center Unified Computing. Upon passing this exam, the student will be a certified Cisco Data Center Unified Computing Support Specialist and be able to configure, implement, and manage live UCS environments.

#### Prerequisites

- Understanding of Server System design and architecture
- Familiarity with Ethernet and TCP/IP Networking
- Familiarity with LAN/SAN Technology
- Familiarity with Fibre Channel Protocol
- Understanding of Cisco Enterprise Data Center Architecture
- Familiarity with server virtualization technologies (VMware vSphere, Microsoft Hyper-V, Red Hat KVM, Citrix Xen)

## **Learning Objectives**

- Install Cisco R-Series rack enclosures
- Describe Cisco UCS C-Series System Architecture and Hardware components in UCS Manager 2.1
- Describe the Cisco UCS B-Series Management and System Architecture in UCS Manager 2.1
- Implement system management, maintenance, and high-availability services for Cisco UCS B- and C-Series servers
- Configure Cisco UCS Stateless Computing using resource pools, templates, and policies with Cisco Unified Fabric
- Manage firmware upgrades
- Troubleshoot errors and faults using the built-in logging systems
- Monitor performance statistics using the built-in tools
- Provision the Cisco UCS Compute Resources
- Explain and configure Cisco UCS VM-FEX Technology in UCS Manager 2.1 in a VMware Environment



## Module 1: Implement Cisco UCS C-Series Rack Server

#### Lesson 1: Implementing Cisco R-Series Rack Enclosures

Unpack the Cisco R42610 rack enclosure Remove the Cisco R-Series rack from the pallet Secure the Cisco R-Series rack to the floor Join Cisco R42610 racks into a suite Install a Cisco RP208-30-U-1 PDU Remove and install side panels Remove and install Cisco R-Series rack doors Use cabling portholes

#### Lesson 2: Installing Cisco UCS C-Series Servers

Review ESD precautions Review how to open Cisco UCS C-Series cases Compare PCle riser cards across Cisco UCS C-Series models Describe CPU population rules for dual- and quad-socket servers

Describe the importance of color coding internal Cisco UCS C-Series components Describe DRAM installation and population rules Describe fan replacement

Describe power supply replacement

#### Lesson 3: Installing Cisco UCS C-Series Servers in a Cisco R-Series Rack Enclosures

Install the slide-rail assembly into the Cisco R42610 rack enclosure

Attach the mounting brackets to the server Insert the server into the slide rail Attach the cable management arm Connect the Cisco UCS C-Series server to the PDU Connect management and data cables

#### Lesson 4: Updating Cisco UCS C-Series Firmware with the Host Upgrade Utility

Download the Cisco UCS Host Upgrade Utility from Cisco.com Enable KVM and virtual media in Cisco Integrated Management Controller Describe the session options that are available in the KVM Launch virtual media and map the Cisco UCS Host Upgrade Utility ISO image \*New—Server Configuration Utility Perform an upgrade of all components

#### Lesson 5: Provisioning monitoring and logging on the Cisco UCS C-Series Server Provision SNMP

Provision syslog destinations for server logging data Access data from the system event log Export technical support information

# Lesson 6: Provisioning LAN and SAN connectivity in the CIMC

Provision the Cisco UCS P81E VIC to allow FCoE Provision a locally administered MAC address for the A- and B-side 10 Gigabit Ethernet interfaces Enable RSS on Ethernet adapters Provision locally administered addresses for the Fibre Channel interface WWPN and WWNN Provision the Fibre Channel boot target for the A- and B-side Fibre Channel interfaces \*New—C-Series Single Wire Data and Management

# Lesson 7: Provisioning Raid on the C-Series Server

Describe the characteristics of RAID levels 0, 1, 5, 6, and 10 Boot the server in the KVM and access the LSI

MegaRAID web user interface Add all local hard drives to a RAID 5 array and save the configuration

# **Lesson 8:** Installing VMware ESXi on the C-Series server local RAID array

Open a KVM session to the Cisco UCS C-Series server Map virtual media to the ESXi installer ISO image Install ESXi on the local RAID array Boot ESXi from the local RAID array Configure a management IP address for the ESXi server

Connect to the ESXi server with the VMware vSphere Client utility and connect to the VMware File System shared storage LUN on the Fibre Channel storage system



# Module 2: Manage the Cisco UCS B-Series

#### Lesson 1: Implementing Role Based Access Control

Describe the overall framework of RBAC in the Cisco UCS B-Series

Implement local users, roles, and privileges Implement organizations and locales Describe the effective rights of a user as an

intersection of roles and locales mapped to a user

Implement LDAP providers and provider groups Implement LDAP (Microsoft Active Directory) as an external authentication and authorization service

Implement Cisco UCS roles mapping to LDAP (Active Directory) attributes with LDAP provider maps

# Lesson 2: Managing and Upgrading UCS B-Series Firmware

Describe where to find Cisco UCS firmware packages on Cisco.com

Update Cisco UCS firmware

Direct upgrade of mezzanine adapter, Cisco Integrated Management Controller, and IOM firmware

Describe software updates on the fabric interconnect

Describe the requirement for firmware updates via host firmware packages in the service profile Describe the differences between the firmware processes of Cisco UCS fabric interconnect and IOM, Cisco Integrated Management Controller, and adapter

\*New—Firmware Auto Install

\*New—Enhancements to Firmware Maintenance and policies

Describe how to update and activate the hardware capability catalog

Lesson 3: \*New—Support for UCS Central 1.0

#### Lesson 4: Implementing Backup, Import and Restore of the Cisco UCS Manager Database

Differentiate between the supported backup types and the database objects to which they map in the Cisco UCS Manager database

Differentiate between an import operation and a disaster recovery restore operation

Implement a backup job

Implement backup jobs to preserve abstracted identities

Verify that the backup is created and executed Implement an import job to restore the AAA user database

Verify that the AAA user database is restored Configure the Cisco UCS 6100/6200 Series Fabric Interconnect for disaster recovery restore

## Lesson 5: Implementing Logging and Monitoring

and Monitoring Describe Cisco UCS Manager management interfaces Describe the fault management system and evaluate fault severity levels

Use the audit log to track administrative changes to the Cisco UCS Manager database Describe Cisco UCS Manager operations subject to FSM validation and how to interpret FSM output Implement logging options including local buffer, console, and external syslog servers

Use system event log and system event log policies Implement the Smart Call Home feature Validate the Smart Call Home feature Configure settings for logs, events, and faults Configure SPAN to allow protocol analysis

#### Lesson 6: Implementing High Availability

Describe high-availability cluster connection requirements for Cisco UCS B-Series Describe intercluster communications and Cisco UCS Manager database synchronization Differentiate between cluster partition-in-time and partition-in-space split-brain conditions Describe how the Cisco UCS 5108 Blade Server Chassis SEEPROM resolves a split-brain issue in the high-availability cluster Modify cluster IP addressing from the Cisco UCS Manager GUI and CLI



## Module 3: Implement Cisco UCS B-Series Connectivity

#### Lesson 1: Implementing Cisco UCS B-Series Physical Connectivity

Describe the relationship between I/O uplinks and bandwidth oversubscription with generation 2 hardware

Describe the Cisco UCS 2204/2208XP IOM architecture including CMC, I/O MUX, and chassis management switch

Describe the relationship between I/O uplinks and bandwidth oversubscription with generation 1 hardware

Describe the Cisco UCS 2104XP IO module architecture including CMC, I/O MUX, and chassis management switch

Describe the features of the Cisco UCS VIC 1280 and VIC 1240

Compare the number of virtual interfaces available on the Cisco UCS M81KR VIC and the VIC 1280 Describe new mezzanine cards including M51, M61, and M72

Describe the Cisco Integrated Management Controller management component of the B-Series blades

Describe the creation of port channels from the Cisco UCS 6200 Series Fabric Interconnect to the 2204/2208XP IOM

Describe the difference between server and uplink port personalities in the fabric interconnect Describe the chassis discovery process and monitor using the FSM

Configure the chassis discovery policy

#### **Lesson 2:** Installing Cisco UCS B-Series Hardware

Describe the ESD precautions that are necessary when installing Cisco UCS B-Series components List the steps for opening the case of half- and full-slot blade servers

List the steps for physical installation of rackmount slides in the enclosure and on the Cisco UCS 5108 chassis

List the steps for installation and removal of CPU, RAM, and mezzanine cards in Cisco UCS B-Series blade servers

List the steps for physical installation and removal of local hard drives

List the steps for physical installation of half- and full-slot blade servers

List the steps for physical installation of IOMs and power supplies in the Cisco UCS 5108 chassis List the steps for physical installation and removal of fan units

List the steps for physical installation and removal of SFP+ copper twinax and optical modules

#### Lesson 3: Implementing Cisco UCS B-Series LAN Connectivity

Differentiate between uplink, server, appliance, FCoE storage, and monitoring Ethernet port personalities of 10 Gigabit Ethernet interfaces on the Cisco UCS fabric interconnect

Describe the requirements and configuration of port channels from the Cisco UCS fabric interconnect to a northbound switch

Describe end-host mode and its importance in forwarding over multiple Layer 2 links and maintaining a loop-free topology

Differentiate end-host mode with switched mode Describe the requirements to configure VLANs in Cisco UCS Manager

Describe the role of vNICs to abstract MAC addresses into a service profile

Describe the automatic pinning process and recovery from failure

Describe the configuration of manual pinning and recovery from failure

Describe the configuration of disjoint Layer 2 domains \*New—VLAN Groups

\*New—PV Count Optimization

\*New—Multicast Policy with IGMP Snooping and Querier



#### Lesson 4: Implementing Cisco UCS **B-Series SAN Connectivity**

Describe Fibre Channel switching Describe NPV

Differentiate between Fibre Channel uplink, Fibre Channel storage, and Fibre Channel monitoring port personalities of 10 Gigabit Ethernet interfaces on the Cisco UCS fabric interconnect Differentiate between benefits and drawbacks of Fibre Channel switching and NPV Describe how NPIV allows a single N Port to be

associated with multiple FCIDs Describe the requirements and configuration of

VSANs in Cisco UCS Manager

Describe the role of the vHBA to abstract WWNNs and WWPNs into a service profile

Describe the automatic pinning process and recovery from failure

Describe the configuration of manual pinning and recovery from failure

Differentiate Ethernet failover from Fibre Channel multipath I/O recovery

\*New—Multi-Hop FCoE \*New—Unified Appliance Port

\*New—UCSM based FC Zoning - Direct Connect Topologies

\*New—Inventory and Discovery Support for Fusion-IO and LSI PCIe Mezzanine Flash Storage (for UCS M3 blades)

#### Module 4: Provision Cisco UCS **Compute Resources**

#### Lesson 1: Provisioning the Cisco UCS Cluster

Configure the primary cluster peer from the fabric interconnect console

Configure the secondary cluster peer from the fabric interconnect console and join to the cluster Log into the Cisco UCS Manager GUI and assign a pool of management IP addresses for server management

#### Lesson 2: Provisioning LAN Networking

Provision VLANs for single fabric, both fabrics, and both fabrics configured differently Provision VLAN ranges Provision private VLANs Provision Ethernet uplinks Provision Ethernet uplink port channels Provision fabric port channels from the Cisco UCS Fabric Interconnect to a Cisco 2204/2208 IOM Provision FCoE storage ports Provision appliance ports and prune VLANs

#### Lesson 3: Provisioning SAN Networking

Provision VSANs for single fabric, both fabrics, and both fabrics configured differently Provision Fibre Channel uplinks and VSAN trunking Provision Fibre Channel port channels Provision direct-attach Fibre Channel storage ports and default zoning

#### Lesson 4: Provisioning Resource Pools in **Cisco UCS Manager**

Provision server pools Provision server pool autoplacement Provision UUID pools Provision MAC pools Provision WWNN pools Provision WWPN pools Provision iSCSI initiator pools

#### Lesson 5: Provisioning Server Policies in **Cisco UCS Manager**

Provision a service profile using the expert service profile wizard

Implement pools and policies in the service profile Associate a service profile to a server

Describe the Cisco UCS Utility Operating System Observe the association process using the FSM

#### Lesson 6: Provisioning Service Profiles from Templates in Cisco UCS Manager

Provision a service profile using the expert service profile wizard

Implement pools and policies in the service profile Associate a service profile to a server

Describe the Cisco UCS Utility Operating System Observe the association process using the FSM



#### Lesson 7: Provisioning Cisco UCS C-Series Server Integration in Cisco UCS Manager

Describe the benefits of C-Series integration Describe the physical connectivity requirements for C-Series integration

Install version 1.2 C-Series server firmware to allow integration with Cisco UCS prior to version 2.0(2xx)

Describe the C-Series discovery process

## Module 5: Implement Cisco UCS Server Virtualization Features

#### Lesson 1: Provisioning Cisco VM-FEX and Cisco VM-FEX Universal Pass-Through Mode

Describe VMware vSwitch and vDS Describe Cisco Nexus 1000V switching Describe Cisco VM-FEX Describe Cisco VM-FEX universal pass-through

#### Lesson 2: Provisioning Cisco VM-FEX

Provision VMware ESXi servers with a Cisco VEM Provision the secure connection from Cisco UCS Manager to VMware vCenter Server Provision port profiles and push to vCenter as port groups Provision a dynamic vNIC connection policy and BIOS policy for Cisco VM-FEX Join ESXi hosts to the DVS Provision VMs to consume port groups on the DVS

#### Lesson 3: Provisioning Cisco VM-FEX Universal Pass-Through Mode

Describe VMware requirements for universal pass-through mode Provision a dynamic vNIC connection policy for Cisco VM-FEX universal pass-through Provision a BIOS policy for Cisco VM-FEX universal pass-through Associate universal pass-through policies to a service profile Provision a port profile for universal pass-through mode Provision VMs to connect to DirectPath I/O interfaces Verify universal pass-through mode \*New—VM FEX for KVM SRIOV \*New—VM FEX for Hyper-V SRIOV **Demonstration 1:** Provision Initial B-Series Configuration

Lab 1: Firmware Upgrades

Lab 2: Creating the Simple Service Profile

Lab 3: Configuring Identity Resource Pools

Lab 4: Configure the Mobile Service Profile

Lab 5: Configuring and Testing High Availability

Lab 6: Back up and Restore the UCS Configuration

Lab 7: Configuring Role Based Access Control

Lab 8: Provisioning M81KR Cisco VM-FEX



## What's New in This Version?

#### New hardware:

6248 and 6296 Fabric Interconnects 2204 and 2208 IO Modules 1225, 1240 and 1280 VIC B-Series Servers B22 M3, B200 M3, B230 M2, B420 M3, B440 M2 C-Series Servers C22 M3, C24 M3, C220 M3, C240 M3, C260 M2, C420 M3, C460 M2 Support for 16GB DIMMs

#### Key new software features:

UČS Central C-Series Single Wire Management Boot from iSCSI Multi-Hop FCoE Direct-connect storage UCSM Upgrade Validation Utility

#### And many other new features:

UCSM based FC Zoning - Direct Connect Topologies Unified Appliance Port Inventory and Discovery Support for Fusion-IO and LSI PCIe Mezzanine Flash Storage (for UCS M3 blades) Sequential Pool ID Assignment **PV** Count Optimization **VLAN** Group Multicast Policy with IGMP Snooping and Querier **Org-Aware VLAN** LAN/SAN Connectivity Policies for Service Service Profile renaming **Profile Configuration** VCON Enhancement Cisco CNA NIC Multi-receiving Queue Support VM FEX for KVM SRIOV VM FEX for Hyper-V SRIOV Firmware Auto Install Mixed version support for Infrastructure and Server bundles Fault Suppression FSM Tab Enhancement Lower Power Cap Minimum for B Series **RBAC Enhancements** Independent server and FI firmware upgrades CIMC Firmware update enhancements. Implicit upgrade compatibility check **PVLAN** support SPAN support Discrete and Port Channel modes for FEX connectivity