Course Outline

VMware vSphere 6.7 Boot Camp

Course Summary

Description

This class is an intensive introduction to VMware vSphere including VMware ESXi 6.7 and vCenter 6.7. This course has been completely rewritten to reflect the most recent changes introduced in vSphere 6.7. Our courseware and labs have been fully updated and now use Host Client and Web Client rather than legacy vSphere Client for both presentation material and lab procedures.

Assuming no prior virtualization experience, this class starts with the basics and rapidly progresses to advanced topics. With 40+% of class time is devoted to labs, students learn the skills they need to become effective vSphere administrators.

Labs start with installation and configuration of stand-alone ESXi servers and progress to shared storage, networking and centralized management. The class continues to advanced topics including resource balancing, high availability, power management, back up and recovery, performance, vCenter redundancy, VM redundancy. Disaster preparedness, rapid deployment and VM cold, hot and storage migration.

This class is unique in its approach; which is to identify and eliminate common IT pain points using vSphere. Students learn how to deliver business value; not just the technical or mechanical aspects of the software.

By the end of the class, attendees will have the knowledge, skills, and best practices to design, implement, deploy, configure, monitor, manage and troubleshoot vSphere 6.7 installations.

Objectives

By the end of this course, students will be able to:

- Explain the many significant benefits of virtualization
- Install ESXi Server according to best practices
- Upgrade and use Host Client to manage stand alone ESXi hosts
- Use vSwitch policies to improve network security
- Explain and select the optimal pNIC teaming strategy for network availability and performance
- Implement Jumbo Frames to improve network throughput and reduce protocol overhead
- Configure and manage local storage resources
- Create virtual and virtual to physical network configurations
- Define and use file share (NAS / NFS) datastores Create virtual machines, install operating systems and applications
- Install, configure and upgrade VMware Tools
- Install, configure and update the Platform Service Controller and vCenter Server Appliance
- Rapidly deployment of VMs using golden-master templates
- Create clones – one-time copies of virtual machine
- Use Guest OS customization to rapidly configure new VMs according to requirements
- Configure and use hotplug hardware including hot-add vCPUs and Memory
- Configure, manage, monitor and secure users and groups

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- Understand the benefits and trade offs of network attached storage and Fibre, iSCSI SANs
- Configure and use shared SAN storage including Fibre SAN, iSCSI SAN
- Use Raw Device Maps to give VMs direct connectivity to SAN volumes
- Add and grow virtual disks including system disks and secondary volumes
- Use vCenter alarms to monitor ESXi, VM, storage and network health, performance, state
- Use Resource Pools to bulk delegate resource to meet Service Level Agreements
- Perform VM cold migrations, hot VMotion migrations and Storage VMotion
- Configure and manage server CPU and Memory capacity and maintain VM responsiveness with Distributed Resource Schedule load balanced clusters
- Deliver high VM service availability using VMware High Availability clusters
- Use HA to successfully minimize VM down time caused by ESXi host failures, storage network failures or SAN volume failures
- Use VMware Fault Tolerance to eliminate VM down time due to host, network or storage failures
- Patch and update ESXi servers using vCenter Update Manager
- Monitor and tune both ESXi and virtual machine performance
- Understand how VMware and third party products, including operating systems, are impacted by virtualization
- Build, configure, and use distributed virtual switches. Migrate hosts and networking to dvSwitches
- Troubleshoot common problems

Topics

- Virtualization Infrastructure Overview
- How to Install, Configure ESXi 6.7
- Advanced Networking
- Virtual and Physical Networking
- Connecting to and Using NAS Shared Storage
- Virtual Hardware and Virtual Machines
- vCenter Server Appliance and Web Client
- VM Rapid Deployment using Templates, Clones
- ESXi and vCenter Permission Model
- Using Fibre and iSCSI Shared Storage
- Direct VM to SAN Access with Raw Device Maps
- VMware File System (VMFS)
- Infrastructure Monitoring with vCenter Alarms
- Resource Management and Resource Pools
- VMotion Migration, Cold Migration, Storage VMotion
- Distributed Resource Scheduling Load Balanced Clusters
- Continuous VM Availability with Fault Tolerance
- Failure Recovery with High Availability Clusters
- Patch Management with VMware Update Manager
- Distributed Virtual Switches
- Managing Scalability and Performance
- Final Thoughts

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Audience

This class is suitable for anyone who wants to learn how to extract the maximum benefit from their investment in Virtual Infrastructure, including:

- System architects or others who need to design virtual infrastructure
- Security specialists responsible for administering, managing, securing Virtual Infrastructure
- Operators responsible for day-to-day operation of Virtual Infrastructure
- Performance analysts who need to understand, provision, monitor Virtual Infrastructure
- Business Continuity specialists responsible for disaster recovery and high availability
- Storage administrators who work with Fibre / iSCSI SAN volumes and NAS datastores
- Managers who need an unbiased understanding of virtualization before committing their organization to a virtual infrastructure deployment.

Prerequisite

Attendees should have user, operator or administrator experience on common operating systems such as Microsoft Windows®, Linux, UNIX, etc. Experience installing, configuring and managing operating systems, storage systems and or networks is useful but not required. We assume that all attendees have a basic familiarity with PC server hardware, disk partitioning, IP addressing, O/S installation, networking, etc.

Duration

Five Days

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I. Virtualization Infrastructure Overview

A. Virtualization explained
B. How VMware virtualization compares to traditional PC deployments
C. Common pain points in PC Server management
D. How virtualization effectively addresses common IT issues
E. VMware vSphere software products
F. What's New and Improved in vSphere 6.7

II. How to Install, Configure ESXi 6.7

A. Understanding ESXi
B. Selecting, validating and preparing your server
C. Storage controllers, disks and partitions
D. Software installation and best practices
E. Joining ESXi to a Domain
F. Local User Management and Policies
G. First look at the VMware vSphere Host Client

III. Advanced Networking

A. Use vSwitch Security policies to defend against malicious VM network activity
B. Explain and implement all five physical NIC team policies
C. Improve network health and fault detection by using Beaconing
D. How to enable and test Jumbo Frames

IV. Virtual and Physical Networking

A. vNetwork standard and distributed virtual Switches
B. Virtual Switches, Ports and Port Groups
C. Creating VMkernel ports
D. Creating, sizing and customizing Virtual Switches

V. Connecting to and Using NAS Shared Storage

A. Benefits Shared Storage offer to Virtual Infrastructure
B. Shared Storage options
C. NFS Overview
D. Configuring ESX to use NFS Shares
E. Configuring NFS for performance and redundancy
F. NFS Use Cases
G. Troubleshooting NFS connections

VI. Virtual Hardware and Virtual Machines

A. VM virtual hardware, options and limits
B. Sizing and creating a new VM
C. Assigning, modifying and removing Virtual Hardware
D. Working with a VM's BIOS
E. VMware remote console applications
F. Installing an OS into a VM
G. Driver installation and customization
H. Use and update VMware Host Client

VII. vCenter Server Appliance and Web Client

A. The need for Identity Source management
B. Installing and configuring vCenter Server Appliance with embedded Platform Service Controller
C. Connecting Single Sign On (SSO) to Active Directory and other identity sources
D. vCenter feature overview and components
E. Organizing vCenter's inventory views
F. Importing ESXi hosts into vCenter management
G. Installing and Using the vSphere Next Generation Web Client

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VIII. VM Rapid Deployment using Templates, Clones

A. Templates - Virtual Machine Golden Master images
B. Creating, modifying, updating and working with Templates
C. Patching, and refreshing Templates
D. Cloning, one time copies of VMs
E. Best practices for cloning and templating
F. Adding and resizing virtual disks
G. Hotplug VM virtual CPUs and Memory
H. Hotplug VM virtual CPUs and Memory

IX. ESXi and vCenter Permission Model

A. VMware Security model
B. Configuring local users
C. Managing local permissions
D. vCenter security model
E. Local, Domain and Active Directory users and groups
F. How permissions are applied

X. Using Fibre and iSCSI Shared Storage

A. Fibre SAN overview
B. Identifying and using Fibre Host Bus Adapters
C. Scanning and Rescanning Fibre SANs
D. iSCSI overview
E. Virtual and physical iSCSI adapters
F. Connecting to iSCSI storage
G. Scanning and rescanning iSCSI SANS
H. Performance and redundancy considerations and best practices
I. Understanding the benefits of VMware VAAI compliant storage

XI. Direct VM to SAN Access with Raw Device Maps

A. Explain Physical and Virtual Raw Device Maps (RDMs)
B. Use cases for Raw Device Maps
C. How Raw Device Maps work with VM cold, VMotion and Storage VMotion migrations
D. Using RDMs to implement Virtual and Virtual/Physical Microsoft Fail Over Clusters

XII. VMware File System (VMFS)

A. Unique file system properties of VMFS
B. Managing shared Volumes
C. Creating new VMFS partitions
D. Introduction to VMFS 6 features and capabilities
E. Managing VMFS capacity with LUN spanning and LUN expansion
F. Native and 3rd party Multipathing with Fibre and iSCSI SANs
G. VMFS performance considerations
H. VMFS scalability and reliability

XIII. Infrastructure Monitoring with vCenter Alarms

A. Alarm categories and definitions
B. Creating custom alarms and actions
C. Reviewing alarms and acknowledging them
D. Configure vCenter so it can send E-mail and SNMP alerts
E. Work with alarm conditions, triggers and actions
F. Identify most useful alarms to review and enable

XIV. Resource Management and Resource Pools

A. Delegate resources in bulk using Resource Pools
B. How ESX delivers resources to VMs
C. Shares, Reservations and Limits
D. CPU resource scheduling
E. Memory resource scheduling
F. Resource Pools

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XV. VMotion Migration, Cold Migration, Storage VMotion

A. Cold Migrations to new ESX hosts, datastores
B. Hot Migrations with VMotion
C. VMotion requirements and dependencies
D. How VMotion works – detailed explanation
E. How to test ESXi hosts and VMs for VMotion compatibility
F. Troubleshooting VMotion
G. Storage VMotion for hot VM disk migrations

XVI. Distributed Resource Scheduling Load Balanced Clusters

A. CPU and Memory resource balanced clusters with VMware Distributed Resource Scheduler
B. Resource balanced clusters with VMware Distributed Resource Scheduler
C. DRS Cluster configuration and tuning
D. Per-VM cluster policy overrides
E. Learn the features and benefits of DRS Power Management

XVII. Continuous VM Availability with Fault Tolerance

A. High Availability options to minimize unplanned down time
B. VMware High Availability clusters
C. How VMware HA protects against ESXi host, storage network and SAN volume failures
D. Introduction to VMware Fault Tolerance

XVIII. Failure Recovery with High Availability Clusters

A. How Fault Tolerance provides continuous VM availability during ESXi host, storage network and SAN storage failures
B. How to configure ESXi hosts and networks to enable Fault Tolerance
C. How to configure, enable and monitor Fault Tolerance on VMs
D. Managing Fault Tolerance protected VMs
E. Fault Tolerance scalability, performance and limitations

XIX. Patch Management with VMware Update Manager

A. Configure and enable VMware Update Manager
B. Establishing a patch baseline
C. Verifying compliance and patching ESXi hosts

XX. Distributed Virtual Switches

A. Features and benefits of dvSwitches vs. Standard vSwitches
B. How to create a new dvSwitches
C. Role of dvUplink ports and dvSwitch Port Groups
D. Migrating physical NICs to dvSwitches
E. Migrating VMs and VMkernel ports to dvSwitches

XXI. Managing Scalability and Performance

A. VMkernel CPU and memory resource management mechanisms
B. Tuning VM storage I/O performance
C. Identifying and resolving resource contention
D. Monitoring VM and ESX host performance
E. Performance and capacity planning strategies

XXII. Final Thoughts

A. Consolidation guidelines for VMs and Storage
B. Determining which workloads to consolidate
C. Other considerations

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Attendees will complete the following hands on labs during the class:

- Install of ESXi 6.7 and perform post-install configurations
- Update ESXi 6.7 Host Client to improve stability and add features
- Create, update Network Standard vSwitches. Use NIC Teams for performance and redundancy
- Enable vSwitch Security policies. Upgrade a pNIC team for reliability
- Enable Jumbo Frames on pNICs and VMkernel ports for improved network throughput
- Define, connect to and browse NFS file shares
- Create a Virtual Machine and install a guest OS into the VM. Install VMware Tools into the VM. Add 3rd party tools and utilities to the VM
- Export a VM in Open Virtual Machine Format (OVF) and then re-import it
- Install and configure the vCenter Server Appliance (vCSA)
- Configure Single Sign On (SSO) identity sources including Active Directory
- Configure vCenter's inventory views to organize inventory objects
- Getting started with VMware Next Generation Web Client
- Work with Clones and Templates. Convert a VM into a template. Rapidly deploy new VMs from template. Copy VMs using cloning.
- Use guest OS customization to easily change the identity of a VM. Create, update and deploy VMs using Guest OS Customization Specifications
- Work with virtual disks
  Hot add a secondary virtual disk
  Grow a non-system volume
  Grow a Windows system disk and increase it's partitions without the need for 3rd party tools
- Configure and test hotplug memory. Create multi-core vCPUs
- Work with vCenter permissions. Use and customize Roles
- iSCSI, Fibre Storage Area Networks. Scanning for and connecting to SAN shared storage
- Create and use Raw Device Maps to give VMs direct SAN volume access
- VMware VMFS – VMware's cluster file system. How to create, tune and grow VMFS volumes
- vCenter alarms for monitoring key infrastructure objects. Send SNMP traps to a trap receiver on high VM resource consumption
- Create and resource tune Resource Pools. Test resource resource delegations
- Cold Migration VMs from one ESXi host and storage volume to another
- Hot VMotion the live running state of a VM from one ESXi host to another
- Hot Storage Migrate the live disk state of a running VM from one datastore to another
- Build and test an automated CPU and Memory resource load balancing DRS clusters
- Create and test an HA cluster. Watch the cluster place and restart VMs during a server failures
- Configure and enable Fault Tolerance protected VMs to implement zero unplanned VM downtime
- Prepare for an IT failure with vSphere Replication. Hot replicate and then restore a running VM
- Set up VMware Update Manager to patch/update ESXi hosts. Perform an ESXi host Patch Scan, review host non-compliance with attached patch baselines and then apply patches to bring the host up to date
- Create, configure and use distributed Virtual Switches. Migrate standard network to dvSwitches
- Performance analysis and bench marking storage and networking