



# VMware vSphere 7.0 with ESXi and vCenter

Course VM-7

5 Days

Instructor-led, Hands-on

## Course Description

This powerful 5-day, instructor-led course is an intensive introduction to VMware vSphere™ including VMware ESXi™ 7 and vCenter™ 7. This course has been completely updated to reflect the most recent changes introduced in vSphere 7.

Assuming no prior virtualization experience, this class starts with the basics and rapidly progresses to advanced topics. With 45+% of class time is devoted to labs, students learn the skills they need to become effective vSphere administrators.

Students use dedicated labs that 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 management, high availability, replication, performance, 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 learned the skills, and best practices of virtualization. Attendees will be able to design, implement, deploy, configure, monitor, manage and troubleshoot vSphere 7.

## Who Should Attend

This class is suitable for anyone who want 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.

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## Course Objectives

At the end of the course, attendees will be able to:

- Explain the many significant benefits of virtualization
- Install ESXi Server according to best practices
- Use Host Client to manage standalone ESXi hosts
- 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 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 to upgrade VM hardware with zero downtime
- Configure, manage, monitor and secure users and groups
- Work with roles and permissions to implement access controls to vCenter
- 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
- Add and grow VM 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 hot Storage VMotion migrations
- 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 unplanned VM down time caused by ESXi host failures, storage network failures or SAN volume failures
- Patch and update ESXi servers using vCenter Lifecycle Manager
- Monitor and tune both ESXi and virtual machine performance
- Understand how VMware and third party products, including operating systems, are impacted by virtualization
- Troubleshoot common problems

## Prerequisites

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.

## Hands On Labs

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

- Install of ESXi 7 and perform post-install configurations
- Create, update Network Standard vSwitches. Use NIC Teams for performance and redundancy
- 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 (Optional)
- 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
- 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 partition with no downtime
- Configure and test hotplug memory
- Hotplug a new virtual CPU package into a running VM
- Work with vCenter permissions. Use and customize Roles
- iSCSI, Fibre Storage Area Networks. Scanning for and connecting to SAN shared storage
- VMware VMFS 6 – 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 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
- Set up VMware Lifecycle 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 update the ESXi host
- Performance analysis and bench marking storage and networking

Every attendee gets the use of a dedicated lab environment for their exclusive use during the class. Student labs are available 24hrs/day for review, practice, etc.

## **Course Outline**

Every attendee perform one or more Hands on Lab exercises at the end of the module

### **Module 1: Virtualization Infrastructure Overview**

- Virtualization explained
- How VMware virtualization compares to traditional PC deployments
- Common pain points in PC Server management
- How virtualization effectively addresses common IT issues
- VMware vSphere software products
- Hyperconverged Storage with VMware vSAN
- Hyperconverged Networking with VMware NSX
- What's New in vSphere 7

### **Module 2: How to Install, Configure ESXi 7**

- Understanding ESXi
- Selecting, validating and preparing your server
- Storage controllers, disks and partitions
- Software installation and best practices
- Join ESXi to a Domain
- Local User Management and Policies
- First look at VMware Host Client

### **Module 3: Virtual and Physical Networking**

- vNetwork standard virtual Switches
- Virtual Switches, Ports and Port Groups
- Creating VMkernel NICs
- Creating, sizing, and customizing Virtual Switches

### **Module 4: Connecting to and Using NAS Shared Storage**

- Benefits Shared Storage offer to Virtual Infrastructure

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- NFS Overview
- Configuring ESX to use NFS Shares
- Configuring NFS for performance and redundancy
- NFS Use Cases
- Troubleshooting NFS connections

## **Module 5: Virtual Hardware and Virtual Machines**

- VM virtual hardware, options and limits
- Sizing and creating a new VM
- Assigning, modifying and removing Virtual Hardware
- Working with a VM's BIOS
- VMware remote console applications
- Installing an OS into a VM
- Driver installation and customization

## **Module 6: vCenter Server Appliance and HTML 5 Client**

- The need for Identity Source management
- Installing and configuring vCenter Server Appliance with an embedded Platform Service Controller
- Connecting Single Sign On (SSO) to Active Directory and other identity sources
- vCenter feature overview and components
- Organizing vCenter's inventory views
- Importing ESX hosts into vCenter management
- Administering vCenter Server with vSphere Client

## **Module 7: VM Rapid Deployment using Templates, Clones**

- Templates – Virtual Machine Golden Master images
- Creating, modifying, updating and working with Templates
- Patching, and refreshing Templates
- Cloning, one time copies of VMs
- Best practices for cloning and templating
- Adding and resizing virtual disks
- Hotplug VM virtual CPUs and Memory

## **Module 8: Configuring and Using VM Hotplug Hardware**

- Upgrade VM vHardware with no downtime with hotplug virtual hardware
- Preparing to hotplug vCPUs and vRAM into a running VM
- Hotplugging vNICs and vDisks into a running VM
- Hotplug Hardware and Guest OS support

## **Module 9: ESXi and vCenter Permission Model**

- VMware Security model



- Configuring local users and groups
- Managing local permissions
- vCenter security model
- Local, Domain and Active Directory users and groups
- How permissions are applied

## **Module 10: Using Fibre and iSCSI Shared Storage**

- Fibre SAN overview
- Identifying and using Fibre Host Bus Adapters
- Scanning and Rescanning Fibre SANs
- iSCSI overview
- Virtual and physical iSCSI adapters
- Connecting to iSCSI storage
- Scanning and rescanning iSCSI SANS
- Performance and redundancy considerations and best practices
- Understanding the benefits of VMware VAAI compliant storage

## **Module 11: VMware File System (VMFS)**

- Unique file system properties of VMFS 6
- Managing shared Volumes
- Creating new VMFS partitions
- Explanation of VMFS 6 features and capabilities
- Managing VMFS capacity with LUN spanning and LUN expansion
- Native and 3rd party Multipathing with Fibre and iSCSI SANs
- VMFS performance considerations
- VMFS scalability and reliability

## **Module 12: Infrastructure Monitoring with vCenter Alarms**

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

## **Module 13: Resource Management and Resource Pools**

- Delegate resources in bulk using Resource Pools
- How ESX delivers resources to VMs
- Shares, Reservations and Limits
- CPU resource scheduling
- Memory resource scheduling
- Resource Pools

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## **Module 14: VMotion Migration, Cold Migration, Storage VMotion**

- Cold VM migrations to new ESX hosts, datastores
- Hot Migrations with VMotion
- VMotion requirements and dependencies
- How VMotion works – detailed explanation
- Troubleshooting VMotion
- How to test hosts for VMotion compatibility
- Storage VMotion for hot VM disk migrations

## **Module 15: Distributed Resource Scheduling Clusters**

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

## **Module 16: Failure Recovery with High Availability Clusters**

- High Availability options to minimize unplanned down time
- How VMware HA protects against ESXi host, storage network and SAN volume failures
- Understand and review HA's many policies
- Introduction to continuous VM availability using VMware Fault Tolerance

## **Module 17: Patch Management with VMware Lifecycle Manager**

- Configure and enable VMware Lifecycle Manager
- Establishing a patch baseline
- Verifying compliance and patching ESXi hosts

## **Module 18: Managing Scalability and Performance**

- VMkernel CPU and memory resource management mechanisms
- Tuning VM storage I/O performance
- Identifying and resolving resource contention
- Monitoring VM and ESX host performance
- Performance and capacity planning strategies

## **Module 19: Final Thoughts**

- Consolidation guidelines for VMs and Storage
- Determining which workloads to consolidate
- Useful books, white papers and online resources