

# VMware vSphere 4.1 Ultimate Bootcamp

## **Course Introduction**

5m

Course Introduction

## **Chapter 01 - Course Introduction and Methodology**

5m

### **Learn IT! Do IT! Know IT!**

Certified Virtualization Expert (CVE) Certification

VMTraining's Physical Setup

VMTraining's Setup Student to Datacenter

VMTraining's Network IP Setup

Chapter 01 Review

## **Chapter 02 - Virtualization Overview**

47m

### **Why Virtualize?**

Why Virtualize? - Cost Savings

VMware ROI TCO Calculator v2.0

Why Virtualize? - Simplified Management!

What is Virtual Infrastructure?

What is a Virtual Machine (VM)?

Type 1 and Type 2 Hypervisors

Cloud Computing

VMware vCloud

VMware Virtualization Products

VMware Go

VMware Server 2.0

VMware Infrastructure 3 (VI3)

vSphere 4

vSphere 4.1 - New Features

vSphere 4.1 Update 1 (2011/02/10) - New Features

VMware vCenter Server

VMware vCenter Orchestrator

VMware View 4.5 (Virtual Desktop Infrastructure)

VMware Workstation 7.1.2

VMware ACE 2.7

VMware Fusion 3.1.1

VMware Player 3.1.2

Windows/Microsoft Virtual PC 2007

Microsoft Virtual Server 2005 R2 SP1

Windows Server Virtualization Hyper-V R2 (Windows Server 2008 R2)

Hyper-V Screenshot

System Center Virtual Machine Manager 2008 R2

SCVMM 2008 R2

XenServer Enterprise v5.6

XenDesktop & Essentials for XenServer

Virtualization Platforms

Chapter 02 Review

## **Chapter 03 - Planning and Installing ESX/ESXi**

1hr 11m

### **Topic 1: Planning the ESX/ESXi Deployment**

Physical Hardware Requirements

Linux, Windows & ESX/ESXi

VMware ESX/ESXi 4.1 Update 1  
ESX Service Console (SC or COS)  
Service Console Resources  
Default and Suggested Partition Scheme ESX 4.1  
vSphere Hypervisor 4.1 Update 1 (VMware ESXi)  
Booting ESX/ESXi from a SAN LUN (Fibre Channel or iSCSI)  
Booting ESX/ESXi from a SAN LUN

### **Topic 2: vSphere 4.1 Deployment Guidelines**

Overview of Deployment Planning  
ESX/ESXi Compatibility Guides  
Determining ESX/ESXi Physical Host Size  
VMware Capacity Planner  
Guided Consolidation  
Storage: Capacity and Performance  
Memory Overcommitment

### **Topic 3: vSphere Hypervisor (ESXi) Installation**

vSphere Hypervisor 4.1 Update 1 Installable  
Demo: Installation of ESXi 4.1 U1  
Local Configuration of ESXi 4.1 Using DCUI

### **Topic 4: ESX Installation**

ESX Installation  
ESX 4.1 Installation  
UDA 2.0 Script ESX/ESXi Installation  
Demo - ESXi Host Install

### **Topic 5: Configuring Hostname Resolution and NTP**

Hostname Resolution in ESX/ESXi  
Configuring DNS Settings  
Time Synchronization  
Troubleshooting NTP  
Demo - ESXi NTP Information

### **Topic 6: Troubleshooting ESX/ESXi**

esx.conf Settings  
ESX/ESXi Server Health Check  
ESXi Host Boot Process  
ESX Host Boot Process  
ESX Host Hardware Changes Cause Reboot  
ESX Boot Procedure - GRUB Boot Menu Choices  
Troubleshooting ESX Boot Process  
Resetting root Password ESX  
Resetting root Password ESXi 4.1  
Troubleshooting: vmware-hostd  
Troubleshooting ESXi CIM Management Agents  
Purple Screen of Death (PSOD)  
Chapter 03 Review

## **Chapter 04 - Using Tools to Administer a VMware**

42m

### **Topic 1: Overview of 3rd Party Tools**

Veeam (veeam.com)  
Veeam nworks 5.5  
Veeam - FastSCP 3.0.3  
WinSCP  
Datastore Browser  
ISO Programs  
Novell - PlateSpin Migrate  
Novell - PlateSpin Orchestrate  
Vizioncore Tools (Quest Software)

PowerGUI (Quest)

PHD Virtual (phdvirtual.com)

VKERNEL (vkernel.com)

## **Topic 2: ESX/ESXi Management**

ESX/ESXi Host Management Overview

Physical Server Console

Managing ESX/ESXi with the vSphere Client (VIC)

Demo - vSphere Client

The Management User Interface (MUI) (ESX/ESXi/vCenter)

Managing VMs with the Web Client

PowerCLI 4.1

SSH Access: PuTTY, SecureCRT, FastSCP, etc.

Demo - PuTTY Session

Troubleshooting Options: ESXi 4.1

Configuration of TSM in ESXi 4.1

vSphere Hypervisor (ESXi) Only Features

Sample ESX/ESXi Commands

vSphere Command Line Interface (vCLI)

vCLI Commands

Managing ESX/ESXi with the vSphere CLI (vCLI)

vCLI Command Syntax

vSphere SDK for Perl

vSphere Management Assistant (vMA 4.1)

## **Topic 3: Linux Command Review**

Windows Commands vs. Linux Commands

Service Console Linux Commands

Common Command Line Interface (CLI) Options

Demo - VI Editor

Text Editors

VMkernel System Information Viewing

## **Topic 4: Troubleshooting the vSphere Client (VIC)**

vSphere Client Logs

Cannot Login Using vSphere Client

Multiple vSphere Client Error

Chapter 04 Review

## **Chapter 05 - Configuring Networking**

59m

### **Topic 1: Creating & Modifying Virtual Networks**

Networking Terms

vSphere 4.x Virtual Switch Types

Network Connections

Add Network Wizard

Virtual Switches

Virtual Switch and Connection Type Identification

VMware Assigned MAC Addresses

Virtual Switch Physical NIC Configurations

Ports Used by VMkernel

NIC Teaming

Cisco Discovery Protocol

Modifying vSwitch Properties (Ports Tab)

Modifying vSwitch Properties (Network Adapters Tab)

VLAN Overview

Standard vSwitch VLAN Configuration

VLAN Planning

Standard vSwitch Protection and VLANs

Standard vSwitch and Port Group Policy Exceptions: Security

Standard vSwitch and Port Group Policy Exceptions: Traffic Shaping  
Standard vSwitch and Port Group Policy Exceptions: NIC Teaming  
Network Failure and NIC Teaming Options  
Load Balancing Method: Route Based on the Originating Virtual Port ID (Default)  
Load Balancing Method: Route Based on IP Hash (Source + Destination)  
Load Balancing Method: Route Based on Source MAC Hash  
Port Group: Override vSwitch Failover Order  
Multiple Policies Applied to a Single Team  
Physical Switch Configuration  
Networking Review

## **Topic 2: Creating & Modifying Virtual Networks Using CLI**

Physical NIC Commands  
Configure Physical NICs  
Virtual Switch Commands  
Configure Virtual Switches  
VMkernel Port Commands  
Configure the VMkernel Port  
Service Console (vswif) Commands  
Additional Service Console (vswif) Commands  
Adding a Second Service Console  
Demo - Network Configuration  
Chapter 05 Review

## **Chapter 06 - Configuring Storage**

2h

### **Topic 1: Storage Concepts**

Storage Terms  
SAN vs NAS in vSphere  
Path and Device Naming  
Multipathing  
Pluggable Storage Architecture (PSA)  
Path Selection Considerations  
Viewing Multipathing  
Storage I/O Control (SIOC)  
vSphere API for Array Integration (VAAI)  
Multipathing Commands  
PSA Commands  
Multipathing Command Examples

### **Topic 2: iSCSI Storage (GUI & Command Line)**

Internet Small Computers Systems Interface (iSCSI) Overview  
iSCSI Terms for ESX/ESXi  
ESX/ESXi and iSCSI SAN Environment and Addressing  
Hardware vs Software Initiators  
Multipathing with iSCSI  
iSCSI Software Initiator Networking  
Configuring iSCSI  
Configure Software Initiator  
Bind VMkernel Ports to Storage Adapter  
Discovering iSCSI Targets  
Jumbo Frames  
Configure Software Initiator: CHAP Authentication  
iSCSI Firewall Access - ESX 3.5  
iSCSI Firewall Settings (CLI) ESX 3.5  
Software iSCSI Configuration Options (CLI)  
Software iSCSI Adapter Enable/Disable/Scan  
iSCSI Configuration Options (CLI)  
View and Configure iSCSI Adapter (CLI)

iSCSI Software Initiator Troubleshooting

iSCSI Vendors and Products

Demo - Storage Setup

### **Topic 3: Fibre Channel Storage**

What is Fibre Channel?

Fibre Channel Terms for ESX/ESXi

ESX/ESXi and Fibre Channel SAN Environment and Addressing

Scanning Fibre Channel LUNs

Multipathing with Fibre Channel

Fibre Channel Vendors and Products

Network/Storage Architecture Review

### **Topic 4: VMFS Datastores (GUI & Command Line)**

Virtual Machine File System (VMFS-3)

Viewing and Creating a VMFS Datastore

Expanding Your VMFS Datastore Using Extents

Add an Extent to Existing VMFS

Expand an ESX/ESXi 4.1 VMFS Volume

Demo - Creating a VMFS Datastore

LUN Identification Using esxcfg-scsidevs

Partition Alignment Using fdisk

Disk Defragmentation

VMFS Operations - vmkfstools

Displaying Disk Usage Detail (ESX vdf -h ESXi df -h)

### **Topic 5: NAS Storage and NFS Datastores (GUI & Command Line)**

Network Attached Storage (NAS) and ESX/ESXi

NFS Components, Addressing and Access Control with NFS on Linux

NFS Target on Windows 2003 R2

Mount an NFS Datastore to Host

NFS Configuration Options (CLI)

NFS Configuration Options (CLI) Examples

Demo - NFS Creating

### **Topic 6: Raw Device Mapping (RDM)**

Raw Device Mapping (RDM)

Raw Device Mapping Benefits

RDM Compatibility Modes

RDM CLI Commands

## **Chapter 07 - vCenter Server 4.1 and Licensing**

**1hr 34m**

### **Topic 1: Licensing**

vCenter Server and ESX/ESXi Host Licensing Model

Manage vSphere Licenses

VI3 License Types and Pricing (per 2 Sockets)

vSphere Essentials 4.1 for Small Business

vSphere 4.1 License Types and Pricing (per 1 Socket)

Windows Licensing Calculator 1

Windows Licensing Calculator 2

Microsoft Server Virtualization Validation Program

Novell SUSE Linux Enterprise Server 11 SP1 - Free

### **Topic 2: vCenter Server Installation**

vCenter Server 4.1 Summary

Managing Multiple Enterprise Locations

vCenter Server 4.1 Specifications

vCenter Server Architecture

ESX/ESXi Host and vCenter Server 4.1 Functionality

Order of vCenter Installation

vCenter Server Database Overview

### **Topic 3: vCenter Server Inventory**

vCenter Server Home Page  
Hosts and Clusters: Datacenters  
Hosts and Clusters: Folders and Clusters  
VMs and Templates: Subfolders  
vCenter Inventory: VMs Tab  
Datastores: Folders and Datastores  
Networks: Portgroups & Distributed Switches (vDS)  
Demo - vCenter Install

### **Topic 4: Managing vCenter Server**

Scheduled Tasks  
Events  
Sessions  
System Logs  
Guided Consolidation  
Client Settings

### **Topic 5: Planning vCenter Server Deployment**

vCenter Database Sizing VC 2.5 & 4.x  
vCenter Server 4.x Database Sizing  
Backup Strategy for vCenter Server  
vCenter Server Heartbeat 6.3

### **Topic 6: Troubleshooting vCenter Server and Database**

Refreshing vCenter Server  
ESX Host Agent Hangs  
vCenter Server Installation Logs  
vCenter Server Log Files  
SQL Recovery Models  
vCenter Server Service (vpxd) Errors  
vCenter Server Standalone Mode  
Reinitializing the vCenter Server Database  
vSphere Client Session Errors  
Chapter 07 Review

## **Chapter 08 - VM Creation, Configuration, and Snapshots**

2hr 27m

### **Topic 1: Create a VM**

VM Virtual Hardware  
Types of Virtual NICs (vNIC)  
Virtual Machine Files  
Virtual Disk  
Virtual SCSI Controller Type  
VMDirectPath  
Virtual Machine Access to Storage  
Install Guest OS into VM  
VM Console & Menus  
VMware Tools  
VMware Tools Configurable Features  
Demo - Creating a VM

### **Topic 2: Create Multiple VMs, Templates, & Clones**

Clones & Templates  
Deploy VM from Template  
Customizing the OS in a Virtual Machine  
Customization Specification Manager  
Deploying Across Datacenters

### **Topic 3: Virtual Appliances**

Virtual Appliances  
Import Virtual Appliances

Export VM to OVF Format

Demo - Template Provisioning

#### **Topic 4: VMware Converter (P2V - V2V)**

VMware Converter 4.3

VMware Converter Sources - Standalone and Integrated

VMware vCenter Converter 4.3 Versions Comparison

Pre Conversion Tasks

Hot/Cold Cloning - 4 Step Process

Post Conversion Steps

VMware vCenter Converter 4.3 Standalone

Enterprise Converter 4.2 Usage

Troubleshooting VMware Converter

#### **Topic 5: Manage VMs**

Hot and Cold VM Migrations

Hot Add Memory and CPUs

VM Properties - Hardware Tab

VM Properties - Options Tab

Resize a Virtual Disk

Extend VMDK

Extend Partitions Using gparted

Renaming a Virtual Machine

vmware-cmd

#### **Topic 6: Virtual Machine Startup/Shutdown**

Startup/Shutdown of VMs

Enabling VM Startup/Shutdown

VM Startup/Shutdown Override

Demo - VM Startup/Shutdown

#### **Topic 7: Virtual Machine Snapshots**

Virtual Machine Snapshots

Files Used by Snapshots

Taking Snapshots

Snapshot Manager

Reverting to a Snapshot

Deleting Snapshots

Demo - Snapshots

#### **Topic 8: Web Access**

Web Access Management

Enable Web Access in ESX 4.x

Log in to Web Access

Web Access Tasks

Generate Virtual Machine Shortcut

Demo - Web Access

#### **Topic 9: Virtual Machine Troubleshooting & Best Practices**

Troubleshooting VM Problems

Differences Between VMs and Physical Servers (Best Practices)

Chapter 08 Review

### **Chapter 09 - Security and Permissions**

1hr 26m

#### **Topic 1: Controlling User Access and Passwords**

Types of Users

vCenter/ESX/ESXi Host Security Model

Permissions

Roles

Privileges Explained

ESX/ESXi Host Permissions

vCenter Permissions

Multiple Group Permissions: No Conflicts - Groups Only  
Multiple Group Permissions: No Conflicts - Users and Groups  
Multiple Group Permissions: Conflicting Permissions  
Multiple Group Permissions: User Overrides and Unions  
Multiple User Permissions: Explicit vs. Inherited  
Multiple User Permissions: Explicit vs. Inherited #2  
ESX/Linux User and Group Management Tools  
ESX/ESXi/Linux User Authentication  
Configuring ESX Authentication  
ESX Authentication Settings  
Reusing Passwords in ESX  
Configuring Password Complexity in ESX  
Demo - vSphere Client Access

## **Topic 2: ESX/ESXi Active Directory (AD) Integration**

UNIX Authentication Model  
UNIX Authentication Flow  
AD-ESX/ESXi 4.0 Authentication Integration  
AD-ESX/ESXi 4.1 Authentication Services  
Assign ESX/ESXi 4.1 Permissions Directly to AD Users  
Demo - Active Directory Integration

## **Topic 3: Managing Firewalls**

TCP & UDP Ports  
Certificates and Data Encryption  
Default Security - ESX Service Console  
ESX Service Console Firewall Configuration via vSphere Client  
ESX Service Console Firewall Commands  
ESX Service Console Security Levels  
ESX Service Console Firewall

## **Topic 4: SSH Access**

Secure Shell (SSH)  
Controlling SSH Access  
SSH/Console Banner Message  
Monitoring Service Console Access  
last Command  
fuser Command

## **Topic 5: Running Elevated Commands (su, sudo, setuid/setgid)**

root Logon  
Restricting substitute user (su)  
Configure the Wheel Group (ESX Only)  
sudo  
sudo Usage  
For More Security Information

## **Topic 6: VMsafe and vShield Zones**

VMsafe Overview  
Current VMsafe Partners  
vShield Zones Overview  
vShield VM Wall Features  
vShield VM Flow Features  
Chapter 09 Review

## **Chapter 10 - Server and VM Monitoring**

1hr 23m

### **Topic 1: Optimizing Resources**

Transparent Memory Page Sharing  
Balloon-Driver: vmmemctl  
VMkernel Swap - Defined  
VMkernel Swap vm-name.vswp

Memory Compression  
Virtual CPUs (vCPUs)  
VMkernel CPU Load Balancing  
VMs' CPU & Memory Resource Setting Terms  
CPU Resource Settings  
Memory Resource Settings  
Memory Overhead  
ESX/ESXi 4 Resource Allocation per VM  
Resource Shares  
Monitoring - Hardware Status  
Demo - Hardware Status

### **Topic 2: Performance Monitoring**

Performance Monitoring - Overview  
Customize Performance Chart  
Troubleshooting Performance  
Problem: High CPU Utilization  
Problem: High Memory Utilization  
Problem: High Disk Utilization  
Problem: High Network Utilization  
Veeam Monitor  
Veeam Monitor Demo  
Vizioncore vFoglight  
VKERNEL CapacityVIEW  
Demo - vMotion

### **Topic 3: Configuring Alarms**

vCenter Alarms  
Alarm Settings  
Default Alarms in vCenter  
Configure vCenter Notifications

### **Topic 4: ESXi/ESX and vCenter Logs**

Using esxtop  
Performance Snapshots from CLI  
ESX Log File Locations  
ESX/ESXi Log Files  
ESX/ESXi Log Rotation & vCenter Log Files  
Collecting vCenter Log Files  
Collecting Diagnostics Data  
Configuring Syslog on ESXi  
Sending Logs to a Syslog Server  
ESXi Log File Locations  
Chapter 10 Review

## **Chapter 11 - Advanced ESX/ESXi and vCenter Management**

2hr 14m

### **Topic 1: Storage Views & Topology Maps**

vCenter Storage Views  
Storage Views - Reports  
Storage Views - Maps  
vCenter Topology Maps  
Cluster Map View

### **Topic 2: Storage vMotion**

Storage vMotion Migration  
Requirements for Storage vMotion  
Storage vMotion in vSphere 4  
Storage vMotion - Command-Line Interface  
(vCLI/RCLI) Non-interactive Mode: SvMotion Examples  
Demo - Storage vMotion

### **Topic 3: Configuring vMotion**

vMotion Migration

How vMotion Works

vMotion: ESX/ESXi Host Requirements

Identifying CPU Characteristics

Enable or Disable Nx/xD

vMotion Errors and Warnings

VM Map View

Advanced vMotion Errors

Demo - vMotion

### **Topic 4: Distributed Resource Scheduler (DRS) Cluster**

Distributed Resource Scheduler (DRS) Overview

DRS Cluster in the vCenter Inventory

vCenter Cluster

Configure Automation Level

Initial Placement

Dynamic Balancing/History

Virtual Machine Rules

Virtual Machine to Host Rules

Virtual Machine Options

Distributed Power Management (DPM)

Enhanced vMotion Compatibility (EVC)

VM Swapfile Location

Demo - Creating a Cluster

### **Topic 5: Resource Pools and Monitoring**

Resource Pools

Expandable Reservations

Resource Pool Example Summary

Resource Pool Example: CPU Limits

Troubleshooting Memory Resources

Retaining Host Resource Pools

Best Practices for VM Resources

Monitoring the DRS Cluster - Resource Allocation

Monitoring the DRS Cluster - DRS Resource Distribution Graph

Monitor Cluster Usage

Demo - DRS Usage

### **Topic 6: vNetwork Distributed Virtual Switches**

vNetwork Distributed vSwitch (vDS) Overview

Creating a Distributed Virtual Switch

Edit dvSwitch Settings

Edit dvSwitch Uplink Policy Settings

Edit dvSwitch Port Group Settings

Port Binding Methods

Private VLANs

Private VLAN (PVLAN) Tagging

Migrating Service Console Port or VMkernel Port to vDS

Network I/O Control (NIOC)

Network I/O Control (NIOC) Best Practices

Cisco Nexus 1000v Virtual Switch

Nexus 1000v Architecture

### **Topic 7: Host Profiles**

Host Profiles Overview

Create Host Profile

Edit Host Profile

Attach Host Profile

Check Compliance with Host Profile

Apply Host Profile

Export a Host Profile

Demo - Host Profiles

### **Topic 8: Linked Mode Group of vCenter Servers**

Linked vCenter Servers Overview

Linked Mode Group Prerequisites

Create a Linked Mode Group

Manage Multiple vCenters

Chapter 11 Review

## **Chapter 12 - Patching and Upgrading ESX**

51m

### **Topic 1: Patching ESX/ESXi Standalone Hosts**

Planned Downtime: Maintenance Mode

Patch Installation: esxupdate

Patch Installation: vihostupdate

vSphere Host Update Utility: ESXi Patching

### **Topic 2: Patching with Update Manager**

Update Manager Overview

Update Manager Terms

Update Manager vSphere Client Plugin

Update Manager Baselines

Update Manager Tab

Update Manager Remediation Defaults and Configuration Options

Update Manager Downloads

Update Manager Download Service

Remediation

Update Manager Events

Update Manager Notifications

### **Topic 3: Upgrades and Migrations**

Upgrade Methodology

Upgrade VirtualCenter/vCenter to a New Version

ESX/ESXi Migration to New Hardware 3.x to Any Version

ESX/ESXi 4.x Migration to New Hardware - ESX/ESXi Enterprise Plus

ESX/ESXi Upgrade Using Update Manager

vSphere Host Update Utility: ESX/ESXi Upgrade

Overview of Scripted Upgrade

ESX Post Upgrade Considerations

Upgrade the Virtual Machines

Use the vSphere Client to Upgrade the VMware Tools

Use vSphere Client to Upgrade Virtual Machine Hardware

Use Update Manager to Upgrade Virtual Machines

Chapter 12 Review

## **Chapter 13 - Disaster Recovery and Backup**

1h 20m

### **Topic 1: Site Recovery Manager (SRM)**

VMware Site Recovery Manager (SRM) V4.1

SRM Architecture Overview

SRM - Site Recovery Infrastructure

SRM - Create Recovery Plans

SRM - Test Recovery Plans

SRM - Automate Failover

SRM Summary

### **Topic 2: High Availability (HA)**

VMware High Availability

VMware HA in Action

Configure HA Cluster

VMware HA: Virtual Machine Options  
Host Isolation  
Guidelines for Isolation Response Setting  
HA VM Monitoring  
Viewing your HA Cluster  
Troubleshooting VMware HA  
Demo - High Availability  
**Topic 3: VM Fault Tolerance**  
Fault Tolerance Overview  
Fault Tolerance Requirements  
Configure VMkernel NIC  
Turn on Host Certificate Checking  
Turn on Fault Tolerance  
**Topic 4: Microsoft Clustering**  
Virtualizing Microsoft Clusters  
Microsoft Cluster Services  
Microsoft Cluster Services Requirements  
**Topic 5: Backup Strategies**  
Backup Strategies for VMs  
**Topic 6: Using VCB Command Line Utilities**  
VMware Consolidated Backup (VCB) Features  
VCB Components  
Using VCB Command-Line Utilities  
Files that Make Up a Full VM Backup  
Back Up and Restore Individual Virtual Disks from Service Console  
**Topic 7: VMware Data Recovery**  
Data Recovery 1.2 Overview  
Demo - Data Recovery Setup  
Data Recovery Installation & Features  
Configure Network Settings  
Configure VMs to Backup  
Configure Data Recovery Appliance and Setup Backup Job  
Demo - Data Recovery  
**Topic 8: Third Party Backups**  
PHD Virtual Backup for VMware 5.1  
PHD Virtual Backup v5.1 - vCenter Plugin  
Quest vRanger 5 (formerly Vizioncore)  
vRanger Pro - Screenshots  
Veeam Backup & Replication v5 with vPower  
Veeam Backup - Screenshot  
Chapter 13 Review  
Course Closure

**Total Duration: 17hrs 4m**