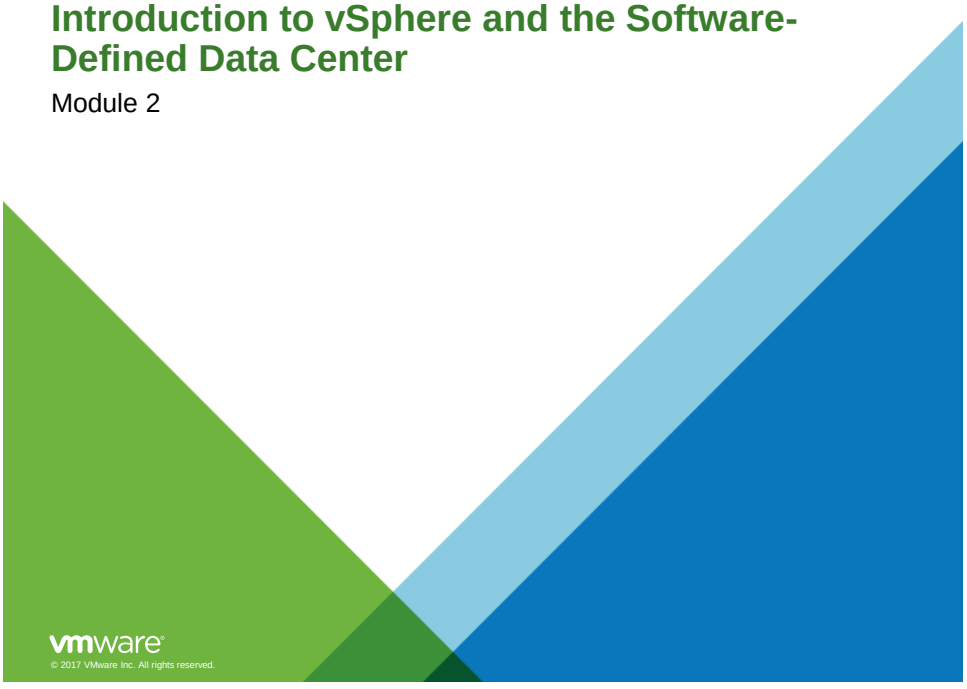
Introduction to vSphere and the Software-Defined Data Center

Module 2



You Are Here

1. Course Introduction
2. **Introduction to vSphere and the Software-Defined Data Center**
3. Creating Virtual Machines
4. vCenter Server
5. Configuring and Managing Virtual Networks
6. Configuring and Managing Virtual Storage
7. Virtual Machine Management
8. Resource Management and Monitoring
9. vSphere HA, vSphere Fault Tolerance, and Protecting Data
10. vSphere DRS
11. vSphere Update Manager

Importance

A vSphere administrator should be familiar with the many components on which vSphere is based. You should also understand the following concepts and best practices:

- Virtualization, ESXi, and the virtual machine
- Fundamental vSphere components and use of vSphere in the software-defined data center
- Use of vSphere clients to administer and manage vSphere environments

Module Lessons

Lesson 1:	Overview of vSphere and the Software-Defined Data Center
Lesson 2:	Abstraction: Overview of a Virtual Machine
Lesson 3:	Shared Resources: Overview of ESXi
Lesson 4:	Centralized Management: Overview of vCenter Server

Lesson 1: Overview of vSphere and the Software-Defined Data Center

Learner Objectives

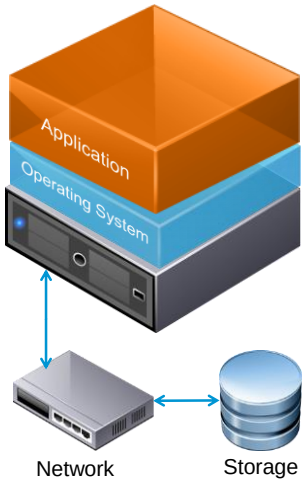
By the end of this lesson, you should be able to meet the following objectives:

- Understand similarities and differences between physical and virtual machines
- Describe benefits of using virtual machines
- Identify virtual machine files and file extensions
- Describe how a virtual machine is a guest and consumer of host resources
- Explain how vSphere interacts with CPUs, memory, networks, and storage
- Use vSphere clients
- Describe how vSphere fits into the software-defined data center and the cloud infrastructure

Traditional Architecture

Traditional architecture has inherent challenges:

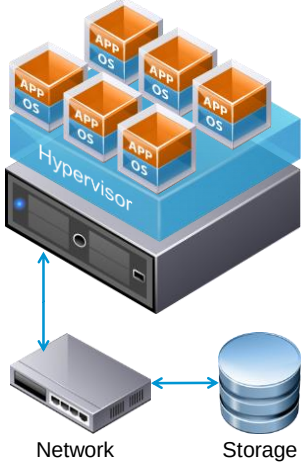
- Poor use of physical resources
- High management and maintenance costs
- High physical infrastructure costs
- Provisioning challenges
- Insufficient failover and poor disaster protection



Virtual Architecture

Virtual architecture has inherent benefits:

- Expanded use of physical resources
- Reduced management and maintenance costs
- Improved desktop manageability and security
- Increased availability of applications
- Increased operational flexibility

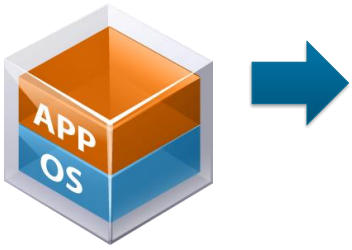


About Virtual Machines

A virtual machine is a software representation of a physical computer and its components.

The virtualization software converts the physical machine and its components into files.

Virtual Machine



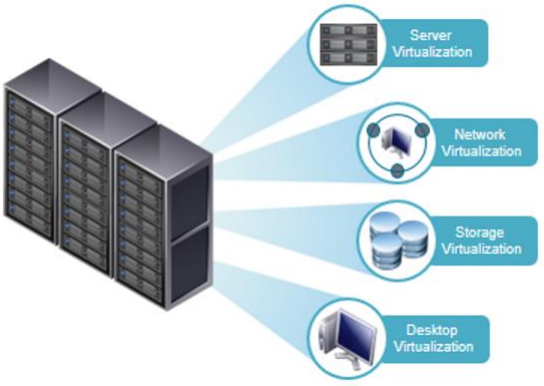
Virtual Machine Components

- Operating system
- VMware Tools™
- Virtual resources, such as:
  - CPU and memory
  - Network adapters
  - Disks and controllers
  - Parallel and serial ports

Benefits of Using Virtual Machines

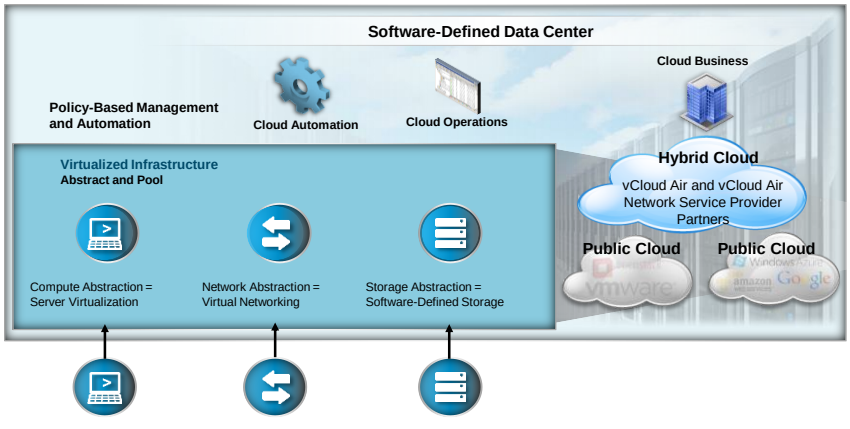
Physical machines	Virtual machines
Difficult to move or copy	Easy to move or copy
Bound to a specific set of hardware components	• Encapsulated into files • Independent of physical hardware
Often has a short lifecycle	Easy to manage
Requires personal contact to upgrade hardware	• Isolated from other virtual machines running on same physical hardware • Insulated from physical hardware changes
	

Types of Virtualization



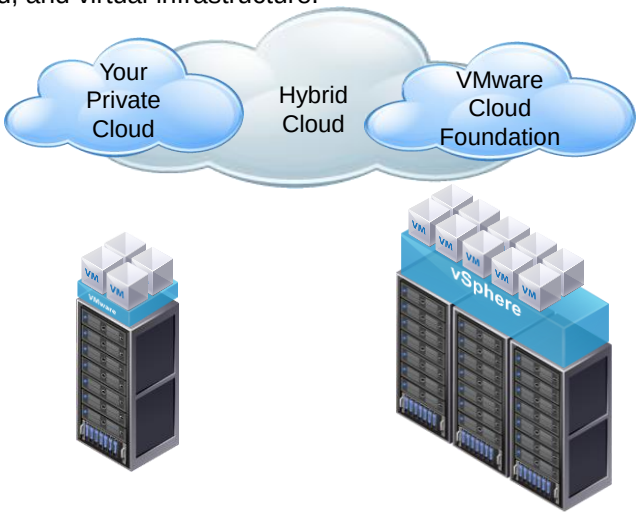
About the Software-Defined Data Center

In a software-defined data center, all infrastructure is virtualized and the control of the data center is entirely automated by software. vSphere is the foundation of the software-defined data center.



vSphere and Cloud Computing

Cloud computing leverages the efficient pooling of an on-demand, self-managed, and virtual infrastructure.



Review of Learner Objectives

You should be able to meet the following objectives:

- Understand similarities and differences between physical and virtual machines
- Describe benefits of using virtual machines
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- Describe how a virtual machine is a guest and consumer of host resources
- Explain how vSphere interacts with CPUs, memory, networks, and storage
- Use vSphere clients
- Describe how vSphere fits into the software-defined data center and the cloud infrastructure

Lesson 2: Abstraction: Overview of a Virtual Machine

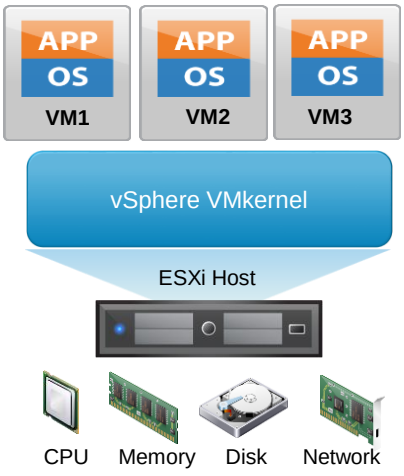
Learner Objectives

By the end of this lesson, you should be able to meet the following objectives:

- Describe similarities and differences between a physical machine and a virtual machine
- Identify benefits of using virtual machines
- Highlight that a virtual machine is a set of specification and configuration files
- Recognize that a virtual machine is a guest and consumer of a host and its resources
- Explain how vSphere interacts with CPUs, memory, networks, and storage
- Navigate vSphere clients and examine VM settings
- Use vSphere Web Client to access and manage your vCenter Server system and ESXi host

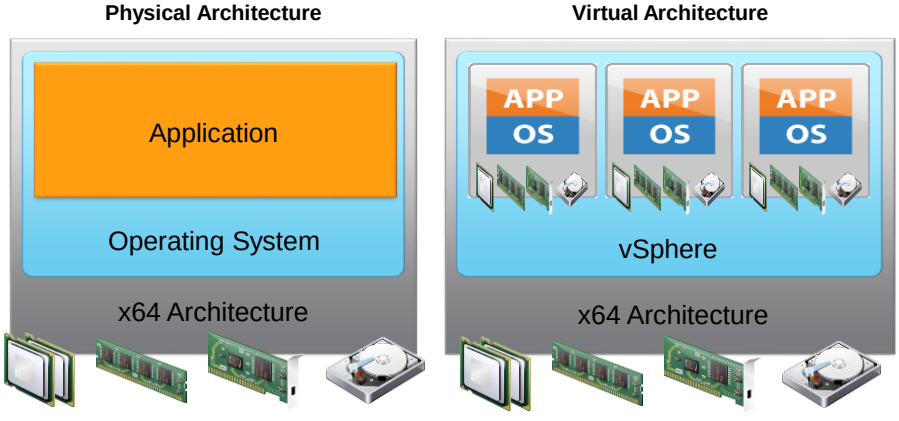
Virtual Machine: Guest and Consumer of ESXi Host

Any application in any OS can run in a virtual machine (guest) and consume CPU, memory, disk, and network from host-based resources.

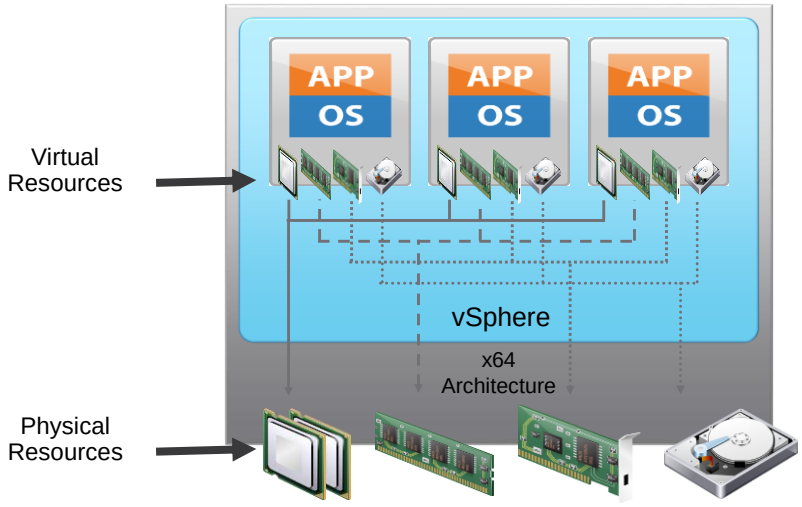


Physical and Virtual Architecture

Virtualization is a technology that abstracts physical components into software components and provides solutions to many problems that are faced by IT staff.



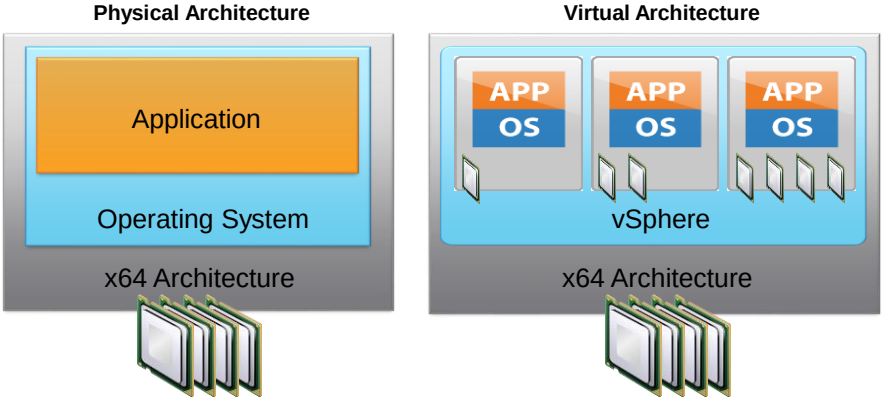
Physical Resource Sharing



CPU Virtualization

In a physical environment, the operating system assumes the ownership of all the physical CPUs in the system.

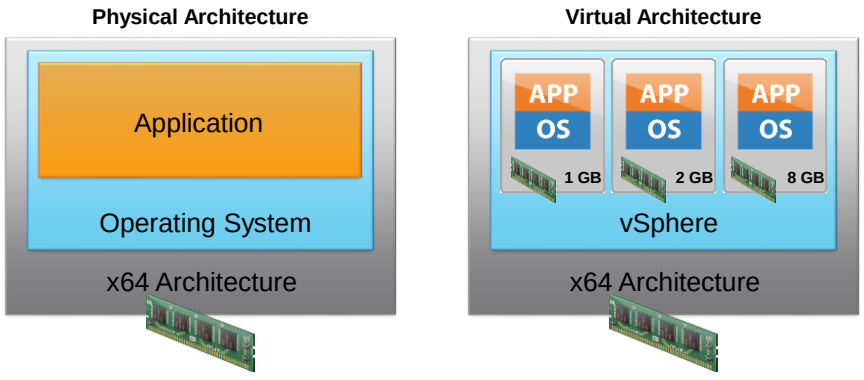
CPU virtualization emphasizes performance and runs directly on the available CPUs.



Physical and Virtualized Host Memory Usage

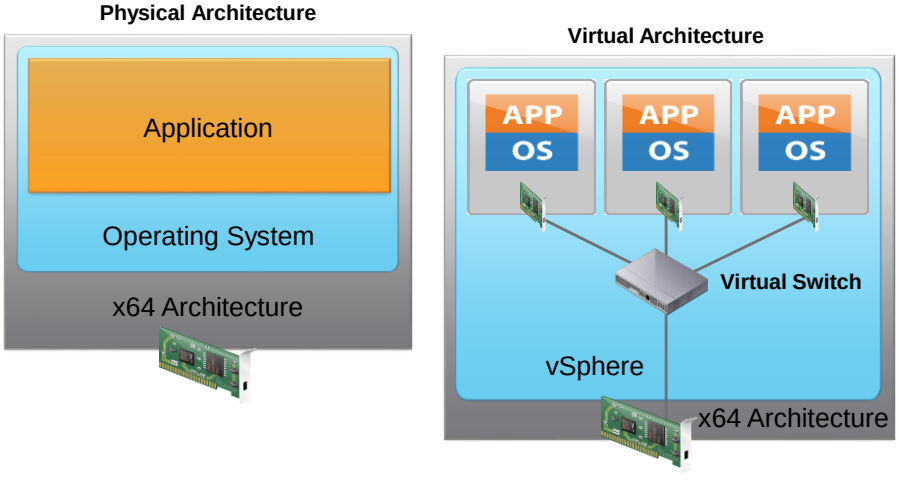
In a physical environment, the operating system assumes the ownership of all physical memory in the system.

Memory virtualization emphasizes performance and runs directly on the available RAM.



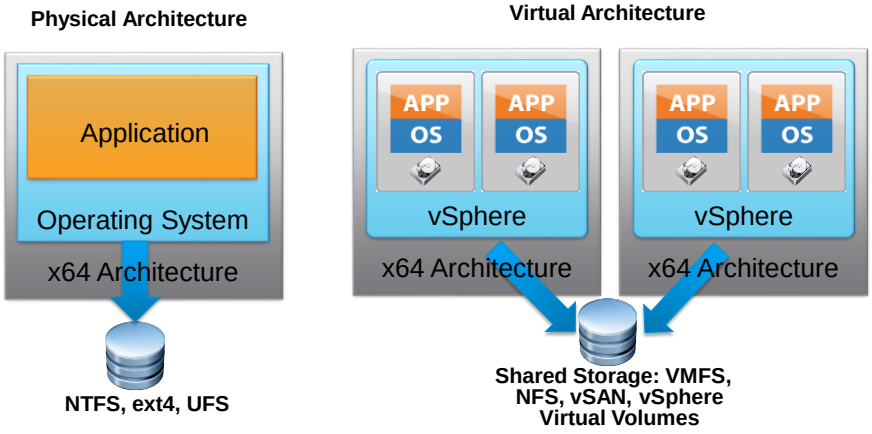
Physical and Virtual Networking

Virtual Ethernet adapters and virtual switches are key virtual networking components.



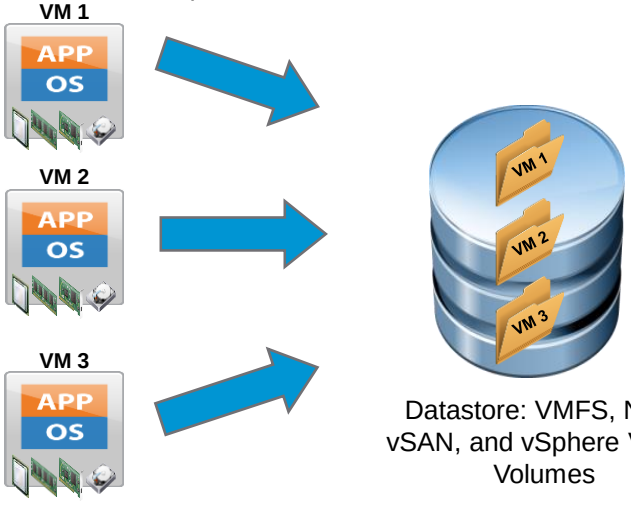
Physical File Systems and VMFS

VMware vSphere® VMFS enables a distributed storage architecture, allowing multiple ESXi hosts to read or write to the shared storage concurrently.



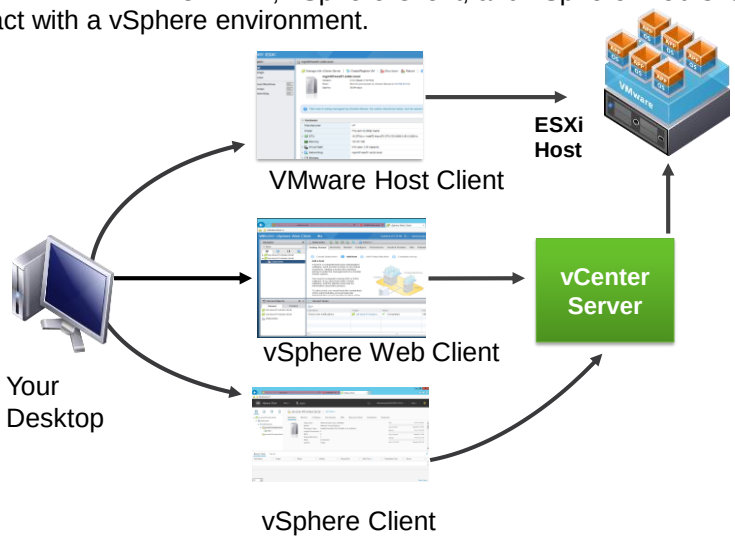
Encapsulation

Virtual machine files are stored in directories on a VMFS, NFS, VMware vSAN™ and VMware vSphere® Virtual Volumes™ datastore.



vSphere Clients

You use VMware Host Client™, vSphere Client, and vSphere Web Client to interact with a vSphere environment.



vSphere Web Client

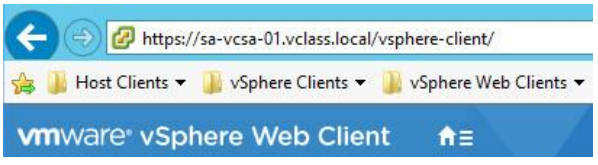
vSphere Web Client has the following components:

- Adobe Flex client application running in a browser
- Java server embedded in vCenter Server Appliance 6.5

No dedicated installation-time configuration is needed.

You access vSphere Web Client from vCenter Server Appliance at https://*your_vCenter_Server_Appliance*/vsphere-client.

Client Integration Plug-in is not required.



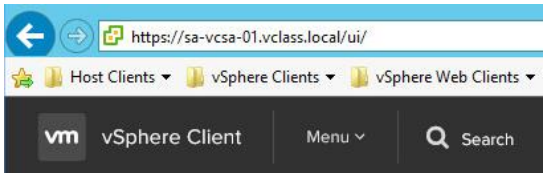
vSphere Client

HTML-based vSphere Client has no dependence on installing Adobe Flex.

vSphere Client uses the same Java server as vSphere Web Client.

No dedicated installation-time configuration is needed.

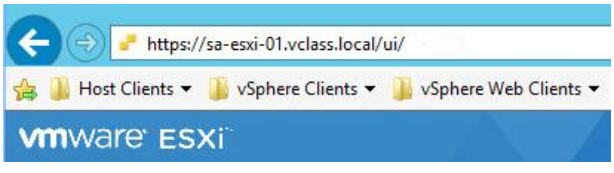
You access vSphere Client from vCenter Server Appliance at https://*your_vCenter_Server_Appliance*/ui.



VMware Host Client

With VMware Host Client, no dedicated installation-time configuration is needed.

VMware Host Client is served from ESXi 6.5: https://*your_ESXi_host*/ui.



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- Use vSphere Web Client to access and manage your vCenter Server system and ESXi host

Lesson 3: Shared Resources: Overview of ESXi

Learner Objectives

By the end of this lesson, you should be able to meet the following objectives:

- Describe the ESXi host architecture
- Navigate the Direct Console User Interface (DCUI) to configure an ESXi host
- Use the new VMware Host Client to administer an ESXi host
- Configure ESXi host settings
- Discuss user account best practices

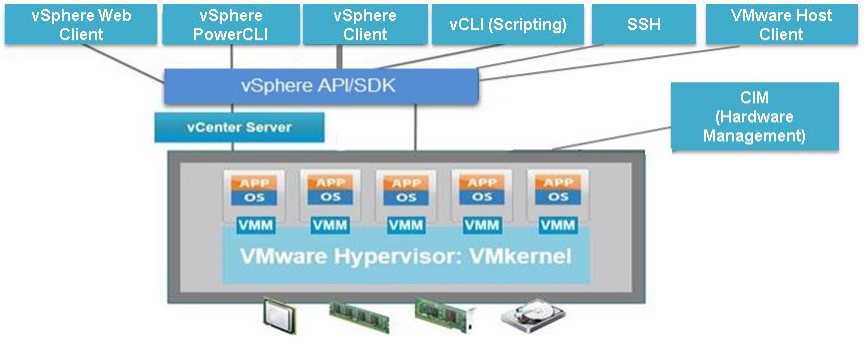
About ESXi Hosts

An ESXi host has the following availability and features:

- Available for purchase with vSphere or as a free, downloadable version
- High security:
  - Host-based firewall
  - Memory hardening
  - Kernel module integrity
  - Trusted Platform Module
  - UEFI secure boot
  - Lockdown modes
- Small disk footprint
- Installable on hard disks, SAN LUNs, USB devices, SD cards, and diskless hosts

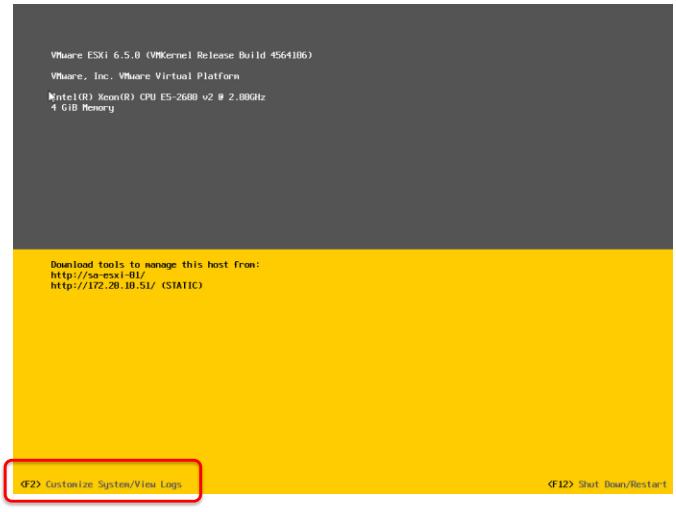
Physical and Virtual Architecture

The ESXi hypervisor provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host and allocates them to multiple virtual machines.



Configuring an ESXi Host

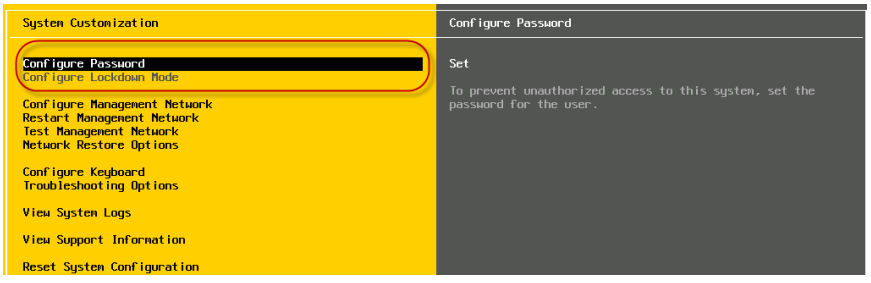
The DCUI is a text-based user interface with keyboard-only interaction.



Configuring an ESXi Host: Root Access

DCUI enables an administrator to configure root access settings:

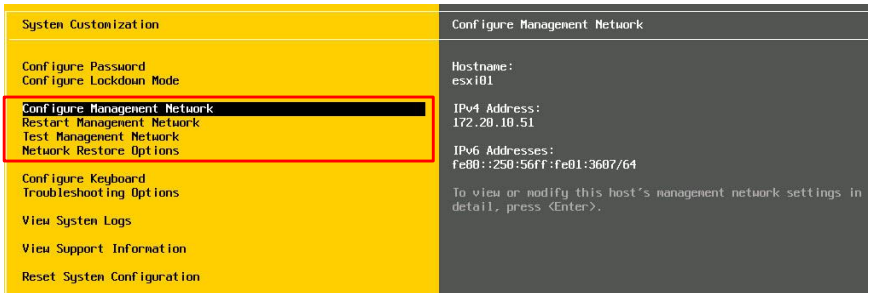
- Set a root password (complex passwords only).
- Enable or disable lockdown mode:
  - Limits management of the host to vCenter Server.
  - Enabled only for hosts managed by vCenter Server.



Configuring an ESXi Host: Management Network

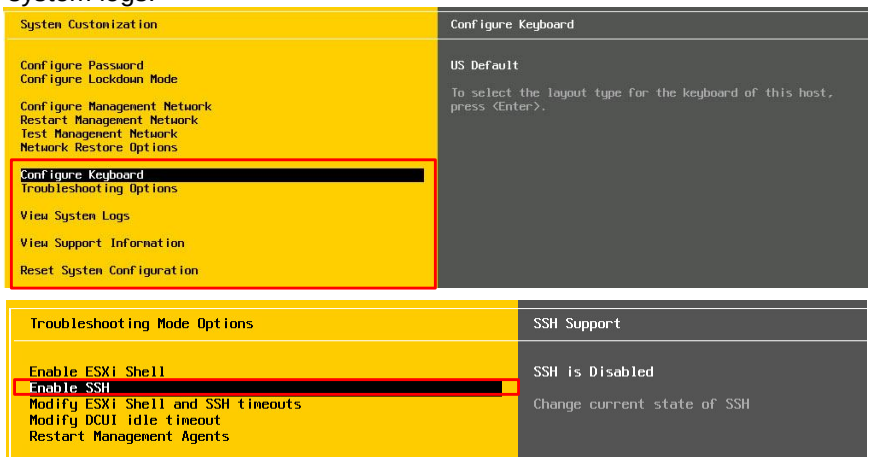
The DCUI enables you to modify network settings:

- Host name
- IP configuration (IP address, subnet mask, default gateway)
- DNS servers



Configuring an ESXi Host: Other Settings

The DCUI enables an administrator to configure the keyboard layout, enable troubleshooting services, view support information, and view system logs.



Remote Access Settings: Security Profile

The security profile controls remote access to an ESXi host:

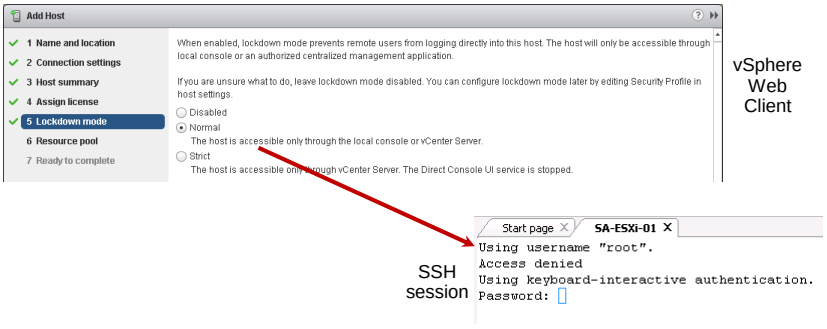
- ESXi includes a firewall that is enabled by default.
- The ESXi firewall blocks incoming and outgoing traffic, except for the traffic that is enabled in the host's security profile.
- You can customize many essential security settings for an ESXi host through the Security Profile panel in vSphere Web Client.
- Some services can be managed by the administrator. Some daemons, such as the DCUI and NTP client processes, can start and stop automatically with the ESXi host.

Configuring Lockdown Mode

To increase the security of your ESXi hosts, you can put your hosts in lockdown mode:

- Two lockdown modes are available: Normal and strict.

When you enable normal lockdown mode, no users but vpxuser have authentication permissions. Also, users cannot perform operations against the host directly.

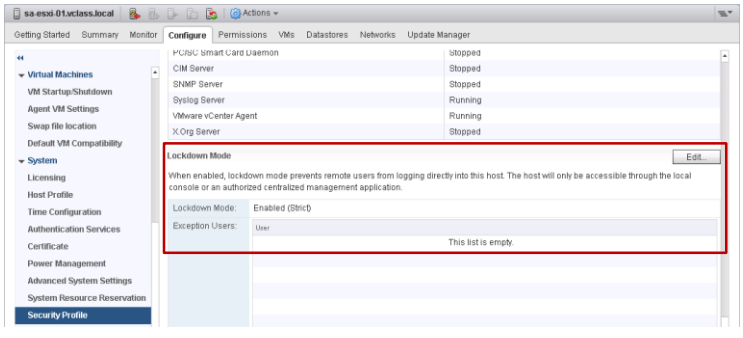


Strict Lockdown Mode

In strict lockdown mode, the DCUI service is also stopped.

If the connection to the vCenter Server system is lost and vSphere Web Client is no longer available, the ESXi host becomes unavailable.

The host can be accessed in this situation only if the VMware vSphere® ESXi™ Shell and SSH services are enabled and authorized users are added to the Exception Users list.



Managing User Accounts: Best Practices

Exercise care when assigning user accounts to access ESXi hosts or vCenter Server systems:

- Strictly control root privileges to ESXi hosts.
- Create strong root account passwords that have at least eight characters. Use special characters, case changes, and numbers. Change passwords periodically.
- Manage ESXi hosts centrally through the vCenter Server system by using the appropriate vSphere client.

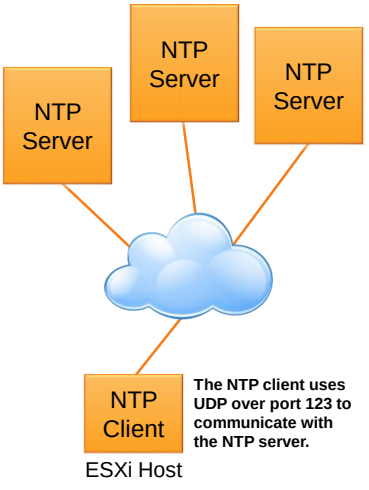
ESXi Host as an NTP Client

Network Time Protocol (NTP) is a client-server protocol used to synchronize a computer's clock to a time reference.

NTP is important:

- For accurate performance graphs
- For accurate time stamps in log messages
- So that virtual machines have a source to synchronize with

An ESXi host can be configured as an NTP client. It can synchronize time with an NTP server on the Internet or your corporate NTP server.



Labs

Lab 1: Installing ESXi

Lab 2: Configuring ESXi Hosts

Lab 1: Installing ESXi

Install ESXi on a VM using your student desktop

1. Access Your Student Desktop
2. Install ESXi

Lab 2: Configuring ESXi Hosts

Configure an ESXi host

1. Examine the Options in the DCUI
2. Configure the Management Network
3. Enable SSH
4. View System Logs
5. Clean Up for the Next Lab

Review of Learner Objectives

You should be able to meet the following objectives:

- Describe the ESXi host architecture
- Navigate the DCUI to configure an ESXi host
- Use the new VMware Host Client to administer an ESXi host
- Configure ESXi host settings
- Discuss user account best practices

Lesson 4: Centralized Management: Overview of vCenter Server

Learner Objectives

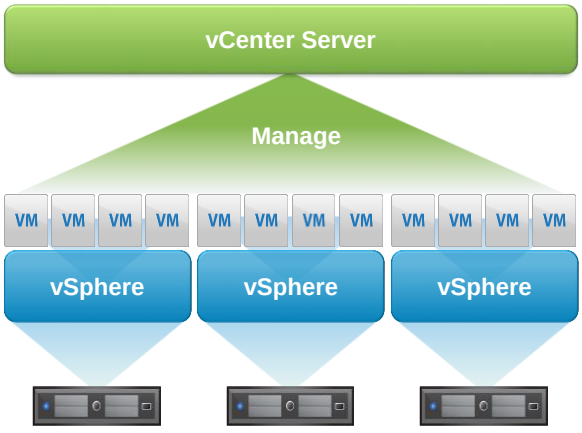
By the end of this lesson, you should be able to meet the following objectives:

- Describe the vCenter Server architecture
- Discuss how ESXi hosts communicate with vCenter Server
- Identify the vCenter Server services, components, and modules
- Explain VMware Platform Services Controller™
- Describe the vCenter Server security

About the vCenter Server Management Platform

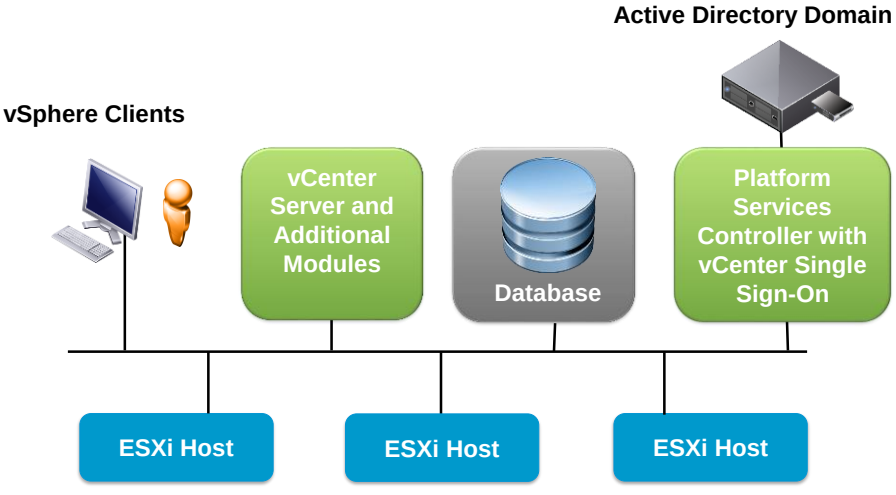
vCenter Server is a service that acts as a central administration point for ESXi hosts and their virtual machines connected on a network:

- Runs on Windows or on a Linux-based appliance
- Directs the actions of virtual machines and hosts



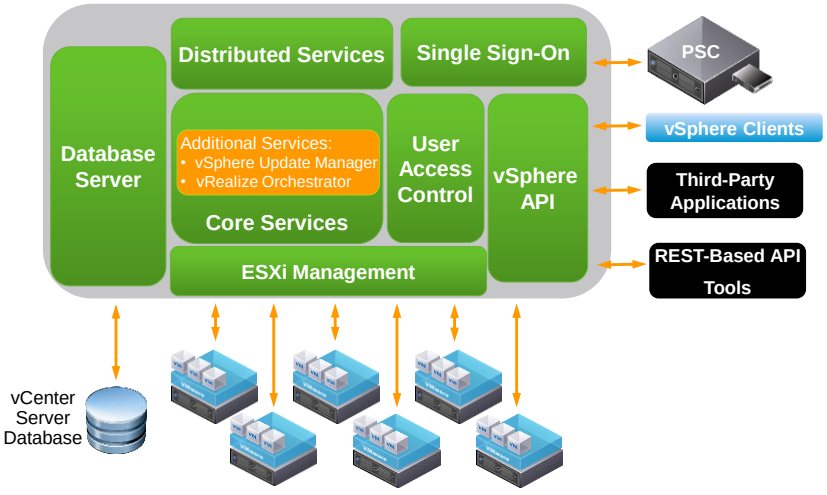
vCenter Server Architecture

The diagram shows the supporting components for vCenter Server.



Additional vCenter Server Services and Interfaces

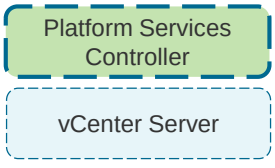
vCenter Server has additional services and interfaces that provide important functions.



Platform Services Controller

vCenter Server includes Platform Services Controller:

- Platform Services Controller includes a set of common infrastructure services:
  - VMware vCenter® Single Sign-On
  - VMware License Server
  - Lookup Service
  - VMware Certificate Authority
  - Certificate Store
  - VMware Directory Services

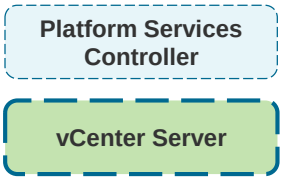


- Other features are installed under the vCenter Server component.
- You can install vCenter Server and Platform Services Controller on the same or different machines.

vCenter Server Services

The vCenter Server group of services contains:

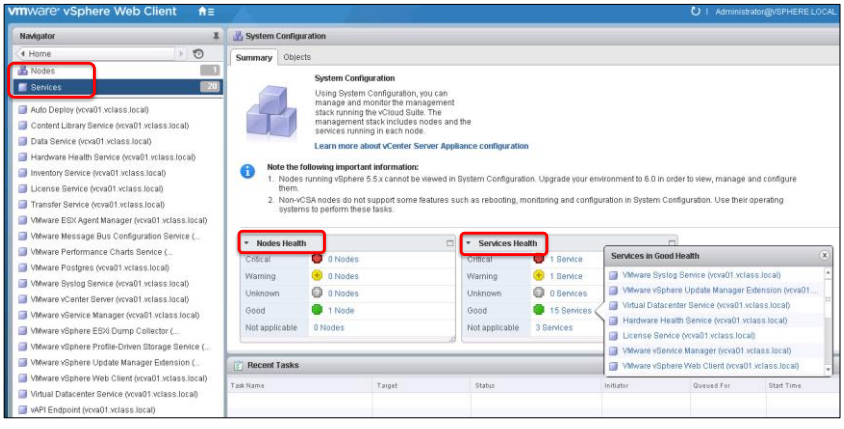
- vCenter Server
- vSphere Web Client (server)
- VMware Inventory Service
- vSphere Update Manager
- VMware vSphere® Auto Deploy™
- VMware vSphere® ESXi™ Dump Collector
- VMware vSphere® Syslog Collector



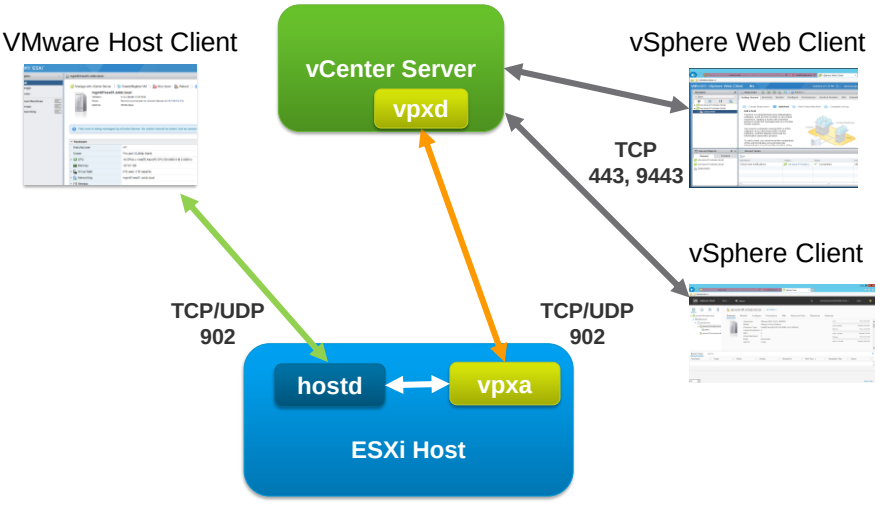
You cannot distribute these vCenter Server functions across multiple servers. When you deploy vCenter Server Appliance, all of these features are included.

Monitoring the Health and Status of Services and Nodes Across vCenter Server Systems

vSphere Web Client enables you to monitor the status of all manageable services and nodes across vCenter Server systems. A list of default services is available in each vCenter Server instance.



ESXi and vCenter Server Communication



Review of Learner Objectives

You should be able to meet the following objectives:

- Describe the vCenter Server architecture
- Discuss how ESXi hosts communicate with vCenter Server
- Identify the vCenter Server services, components, and modules
- Explain Platform Services Controller
- Describe the vCenter Server security

Key Points

- Using virtual machines solves many data center problems.
- Virtual machines are hardware independent.
- Virtual machines share the physical resources of the ESXi host on which they reside.
- A virtual machine is a set of files that is easy to transfer and back up.
- Virtual machine files are encapsulated into a folder and placed on a datastore.
- The ESXi hypervisor runs directly on the host.
- vSphere abstracts CPU, memory, storage, and networking for virtual machine use.

Questions?