

Introduction to vSphere

Day 1



- Data Center History and Definitions
- The Origin of Data Center Virtualization
- Cloud
- vSphere
- ESXi
- Virtual Machines
- vCenter Server

VCP-Core Certification Alignment

VMware vSphere: Install, Configure, Manage aligns with the VCP-Core certification:

- The VCP-Core exam blueprint served as the basis for the design of this course.
- You should use the VCP-Core exam blueprint as a reference when preparing for the test.
- This course should not be used as the only resource for exam preparation.
- VMware certification details can be found at <http://mylearn.vmware.com/portals/certification/>



Datacenter



What is a Datacenter

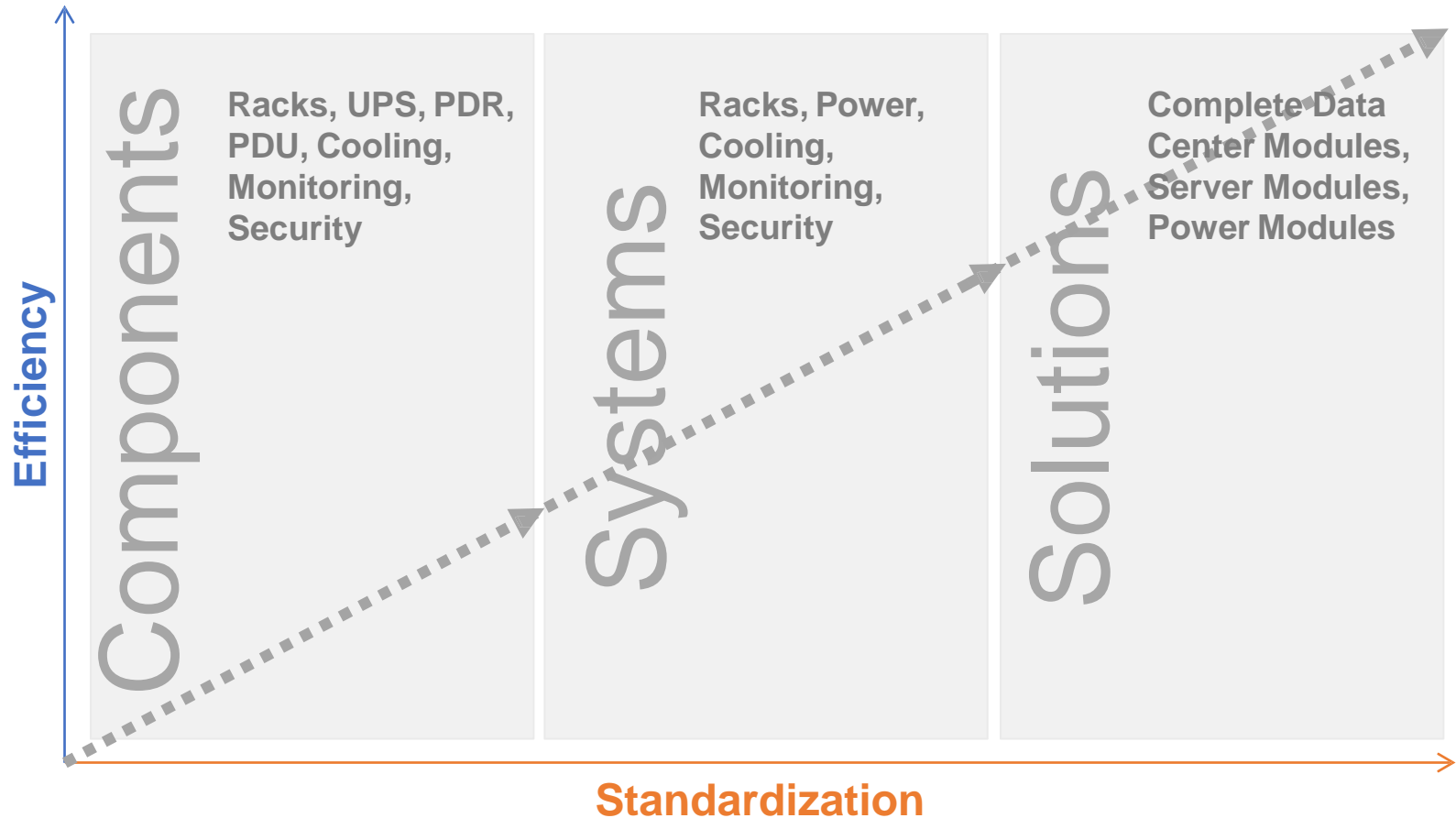
A **data center** (sometimes spelled **datacenter**) is a centralized repository, either physical or virtual, for the storage, management, and dissemination of data and information organized around a particular body of knowledge or pertaining to a particular business.



Data center tiers

Tier Level	Requirements
1	<ul style="list-style-type: none">• Single non-redundant distribution path serving the IT equipment• Non-redundant capacity components• Basic site infrastructure with expected availability of 99.671%
2	<ul style="list-style-type: none">• Meets or exceeds all Tier 1 requirements• Redundant site infrastructure capacity components with expected availability of 99.741%
3	<ul style="list-style-type: none">• Meets or exceeds all Tier 2 requirements• Multiple independent distribution paths serving the IT equipment• All IT equipment must be dual-powered and fully compatible with the topology of a site's architecture• Concurrently maintainable site infrastructure with expected availability of 99.982%
4	<ul style="list-style-type: none">• Meets or exceeds all Tier 3 requirements• All cooling equipment is independently dual-powered, including chillers and heating, ventilating and air-conditioning (HVAC) systems• Fault-tolerant site infrastructure with electrical power storage and distribution facilities with expected availability of 99.995%

- Tier 1 (99.671%) status would allow 1729.224 minutes or 28.817 hours
- Tier 2 (99.741%) status would allow 1361.304 minutes or 22.688 hours
- Tier 3 (99.982%) status would allow 94.608 minutes or 1.5768 hours
- Tier 4 (99.995%) status would allow 26.28 minutes or 0.438 hours



Customer requirement → increase efficiency in design and operation

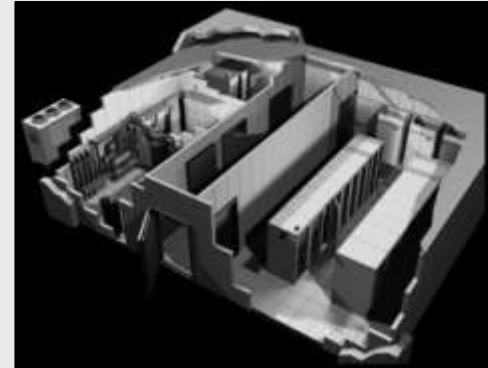
Individual vs. standardized data centers

▪ Individual data centers

- Individual products: CRAC, UPS, ...
- Tailored Data Center planning
- Pay as you grow
- Client-specific solutions

▪ Standardized data centers

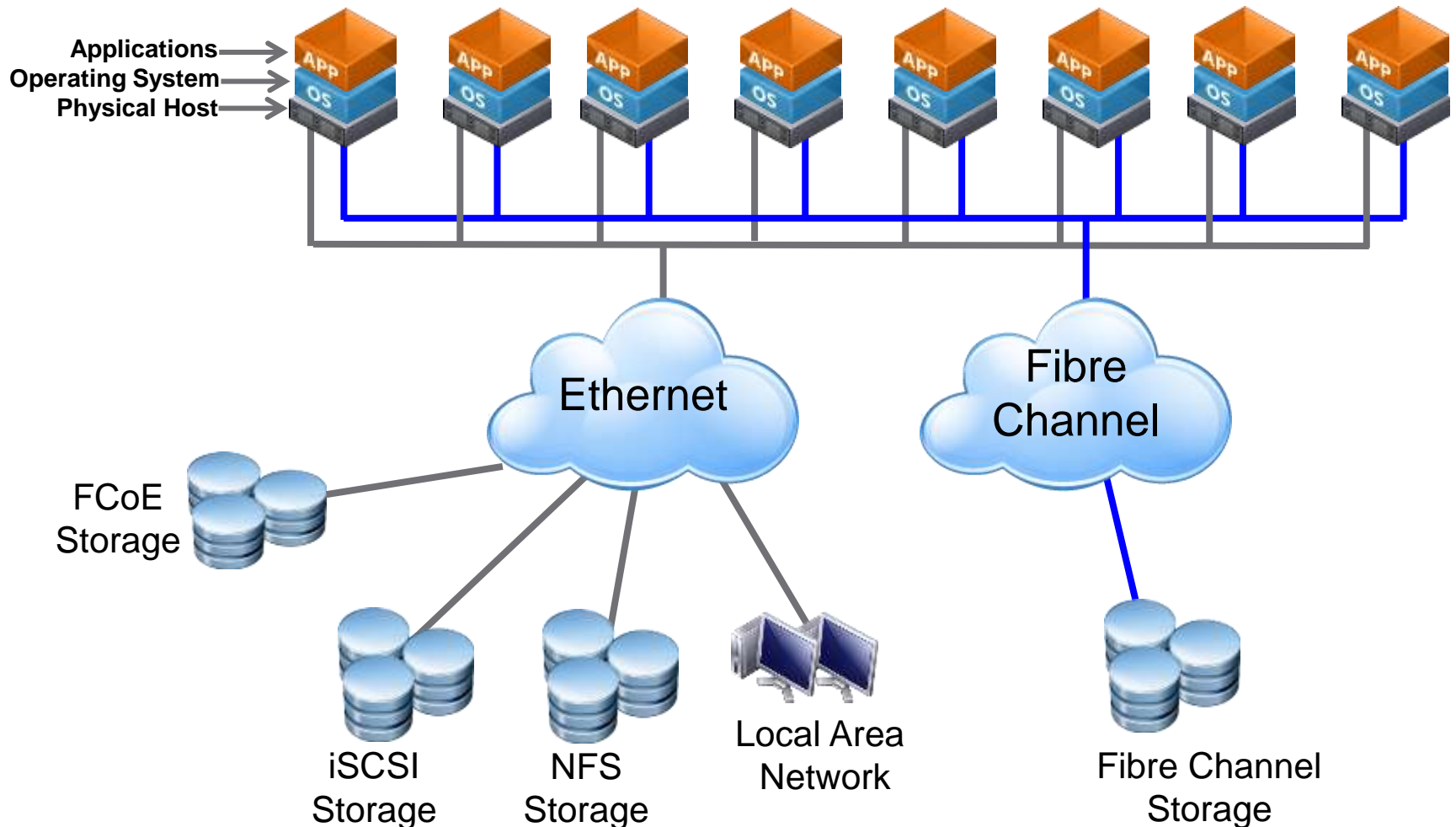
- Pre-defined data center modules
- Standardized Data Center planning
- ROI can be calculated
- Short delivery and launch time



Origin of Data Center Virtualization

Topology of a Physical Data Center

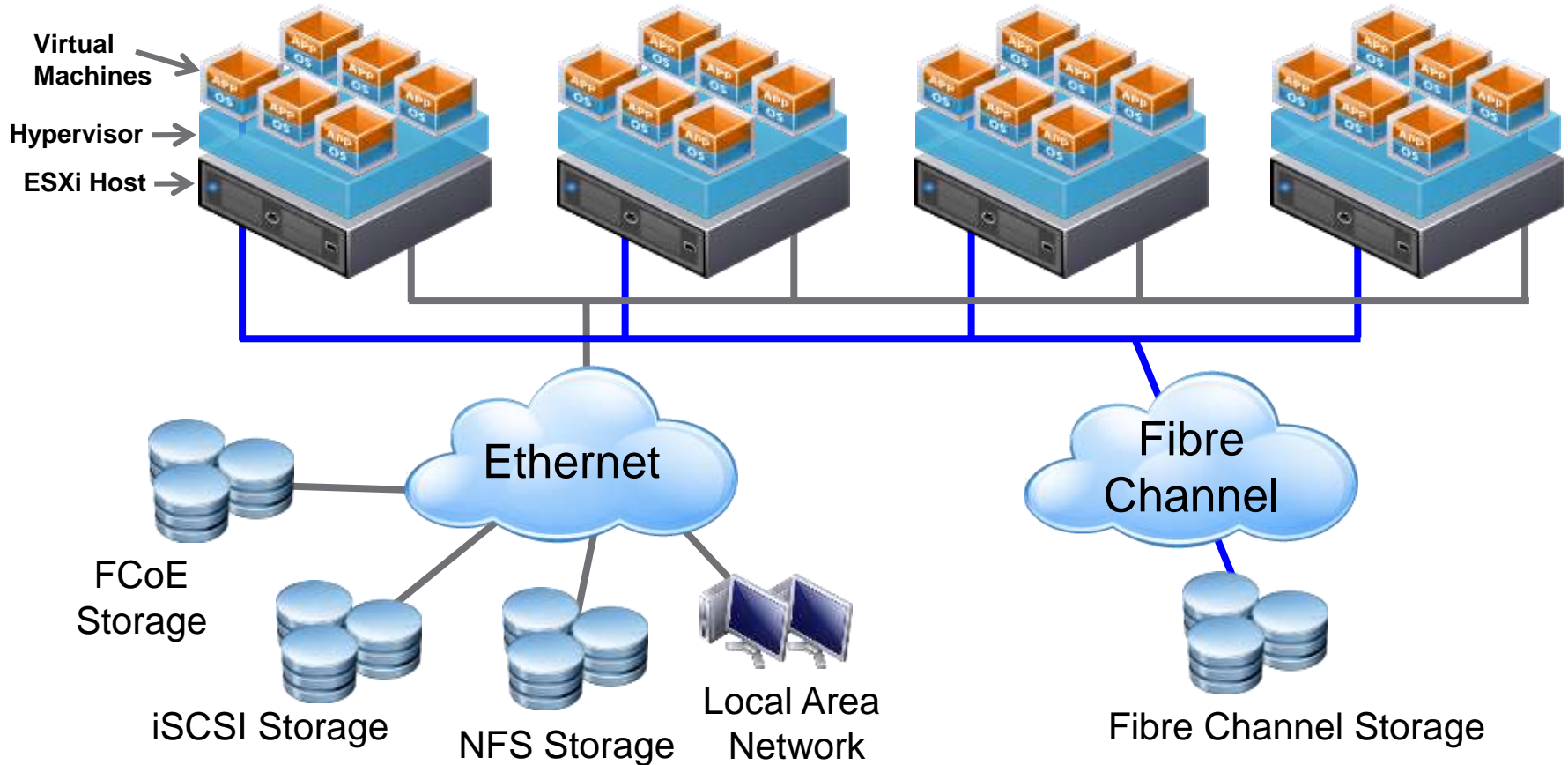
Administering and maintaining a physical data center is time consuming and often inefficient.



Introduction to Virtual Infrastructure

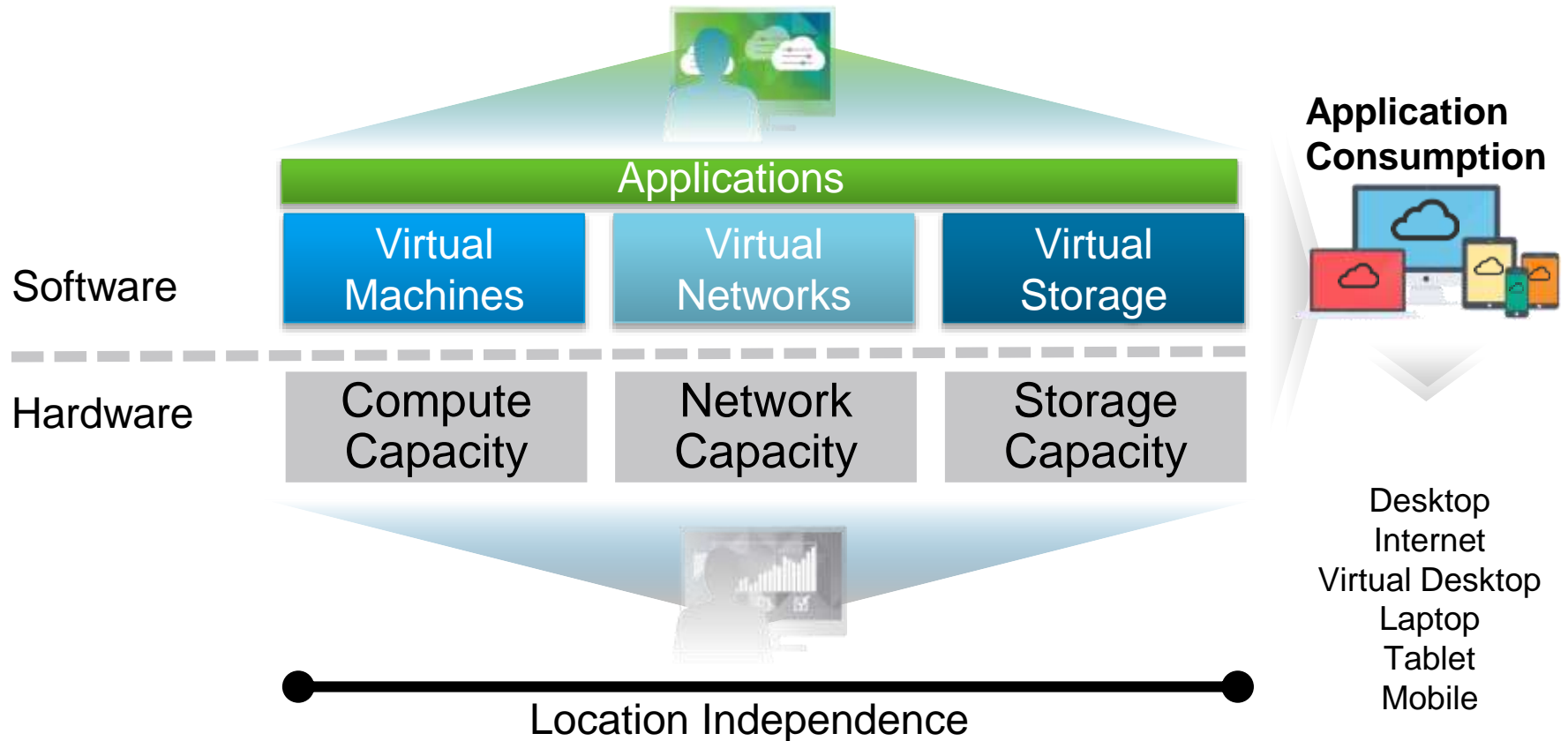
Virtualization consolidates the environment and enables you to run more workloads on a single server.

In a virtualized environment, applications run on virtual machines.



About the Software-Defined Data Center

All major services of the data center can be virtualized.



About Virtual Machines

A virtual machine is a software computer that, like a physical computer, runs an operating system and applications.

Virtual Machine



Virtual Machine Components

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

Physical Machines

Difficult to relocate:

- Moves require downtime.
- Specific to physical hardware.

Difficult to manage:

- Require physical maintenance.
- Hardware failures cause downtime.

Hardware has limitations:

- Hardware changes limit application support.
- One-to-one relationship between application and server.



Virtual Machines

Easy to relocate:

- Encapsulated into files.
- Independent of physical hardware.

Easy to manage:

- Isolated from other virtual machines.
- Insulated from hardware changes.

Provide the ability to support legacy applications.

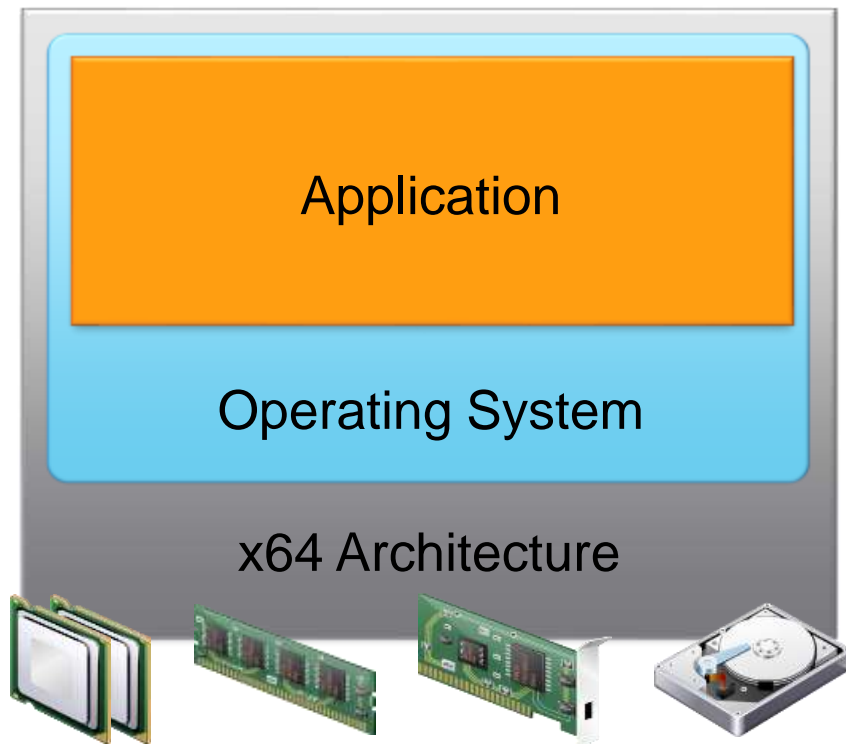
Enable servers to be consolidated.



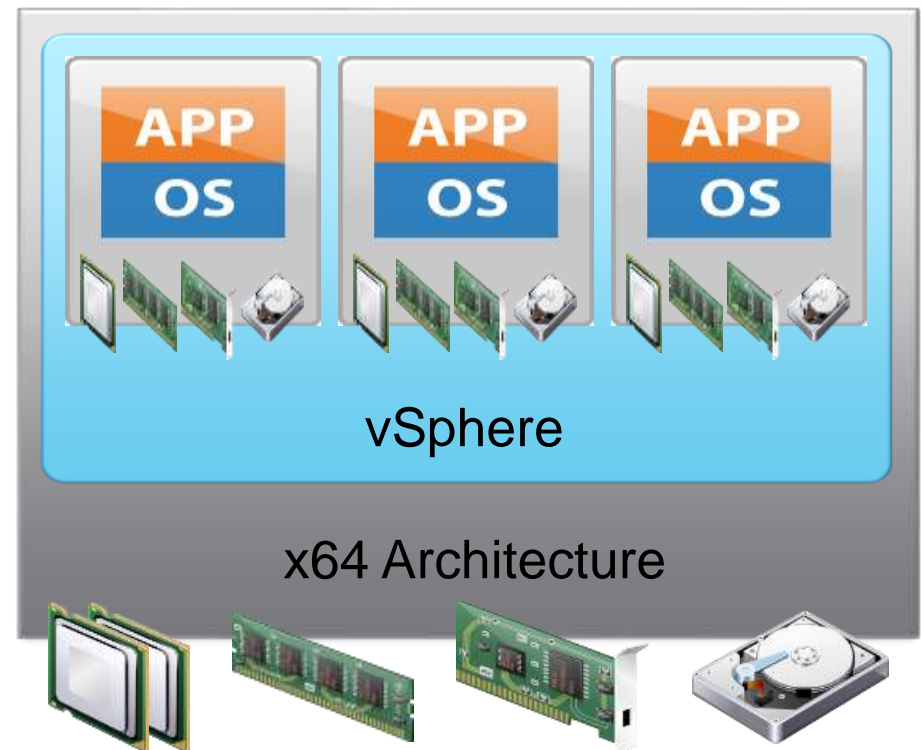
Physical Architecture and Virtual Architecture

Virtualization is a technology that decouples the physical hardware from the operating system and provides solutions to many problems that are faced by IT staff.

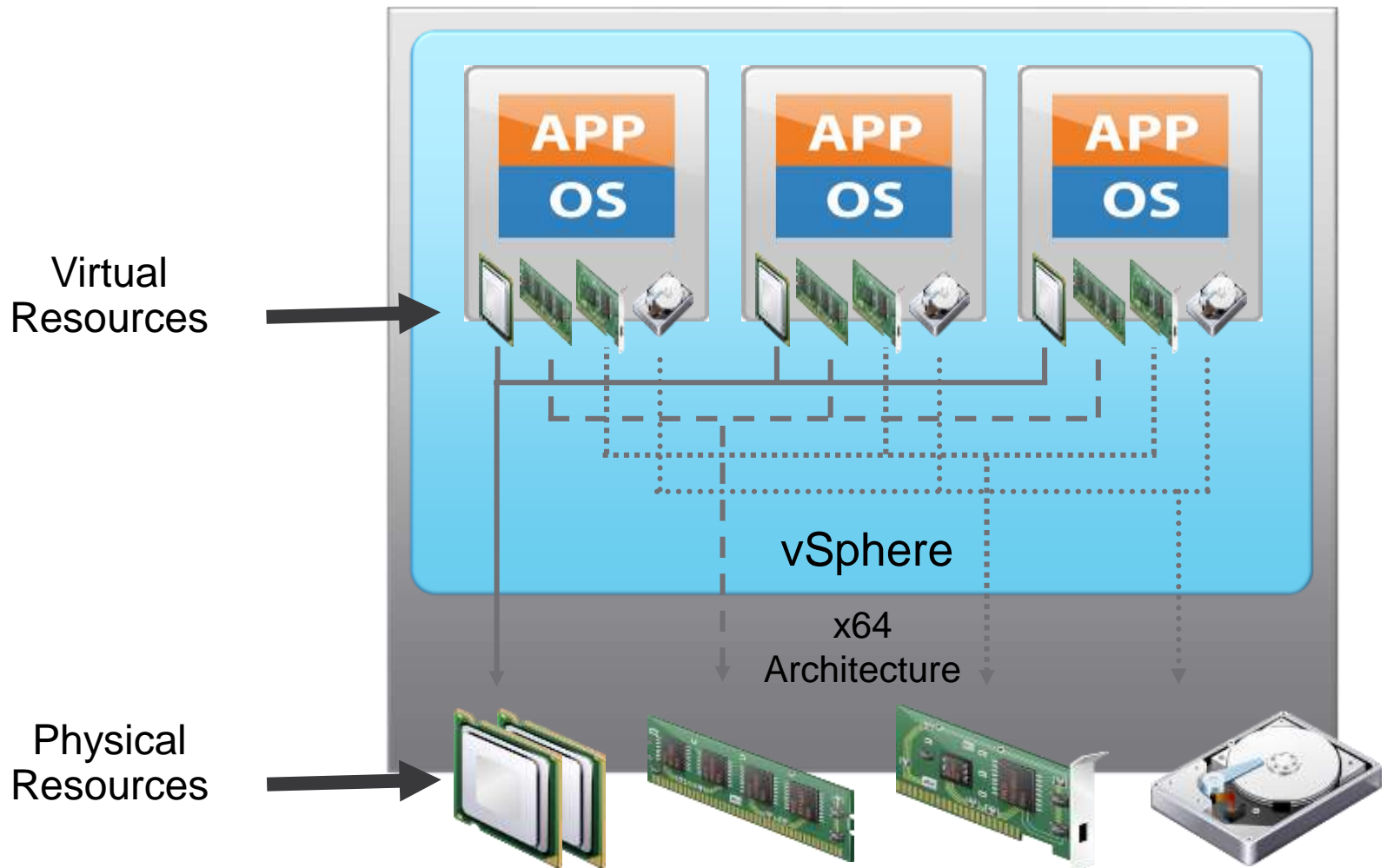
Physical Architecture



Virtual Architecture



Physical Resource Sharing

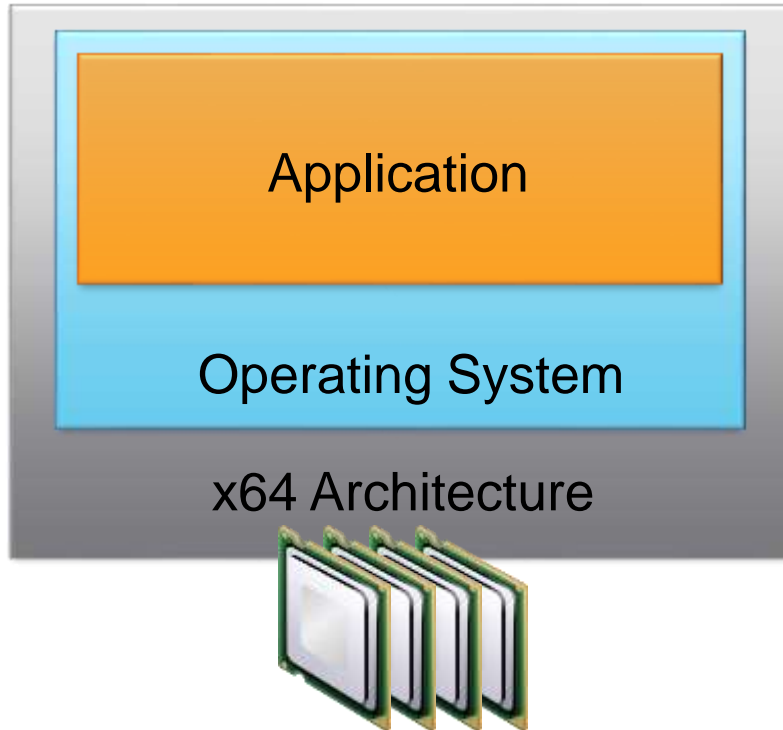


CPU Virtualization

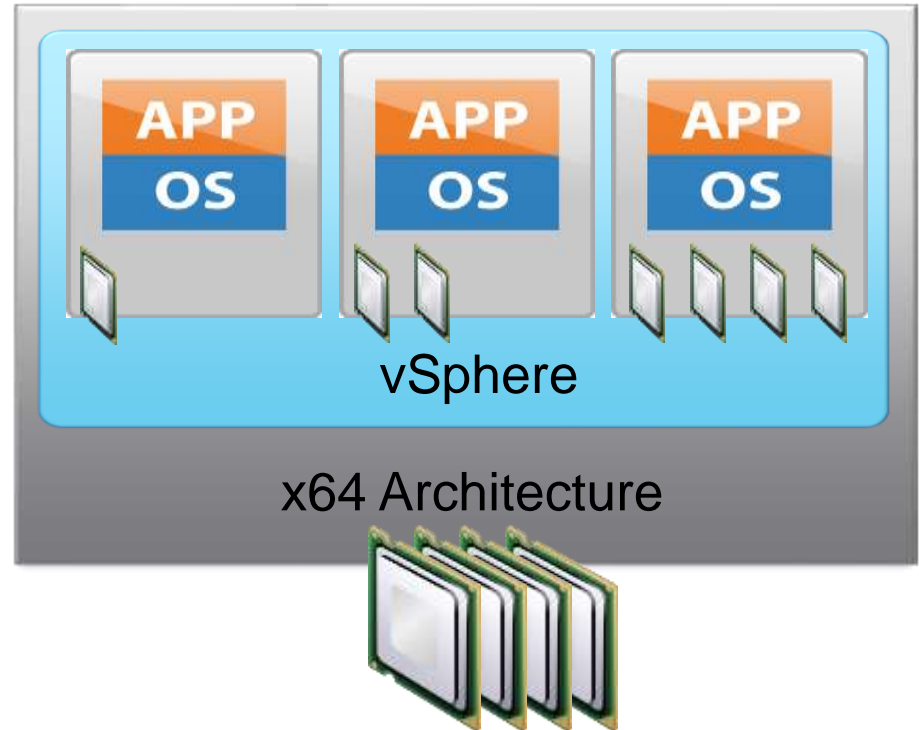
In a physical environment, the operating system assumes the ownership of all the physical CPUs in the system.

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

Physical Architecture



Virtual Architecture

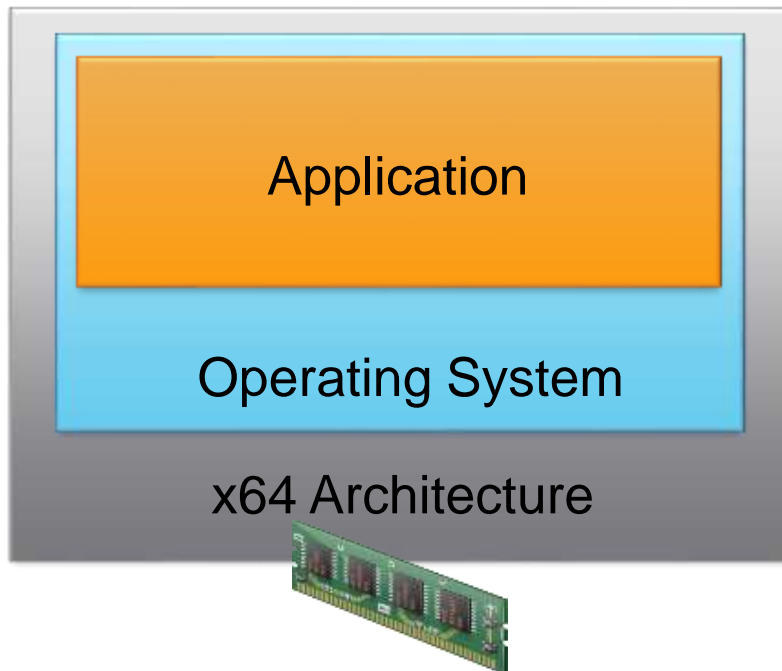


Physical and Virtualized Host Memory Usage

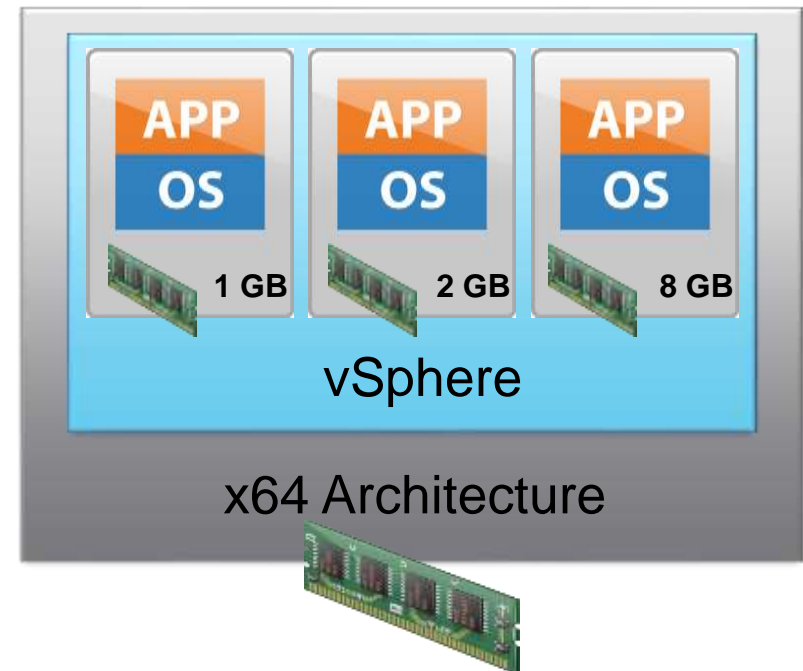
In a physical environment, the operating system assumes the ownership of all physical memory in the system.

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

Physical Architecture



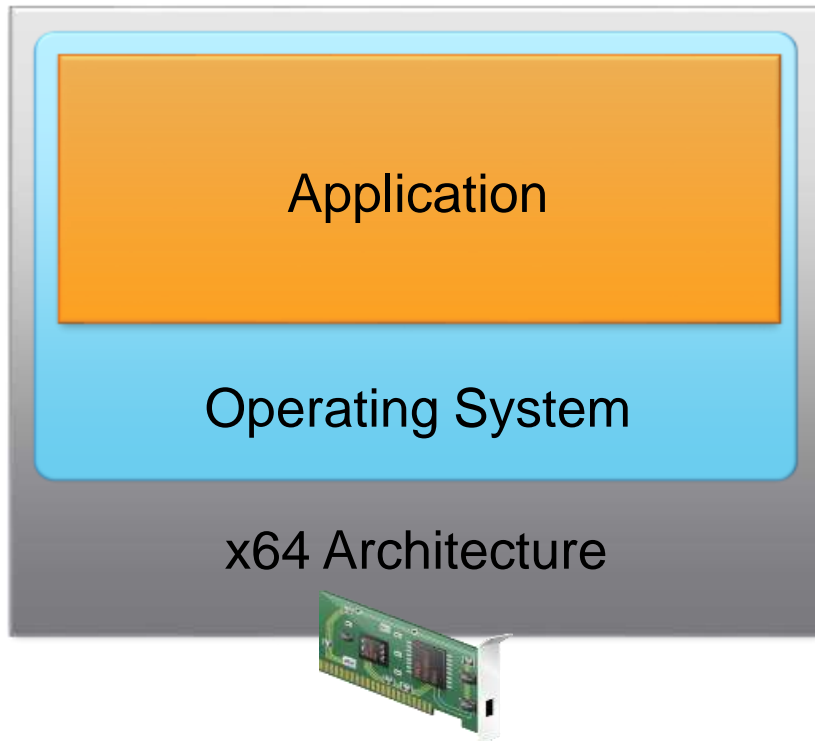
Virtual Architecture



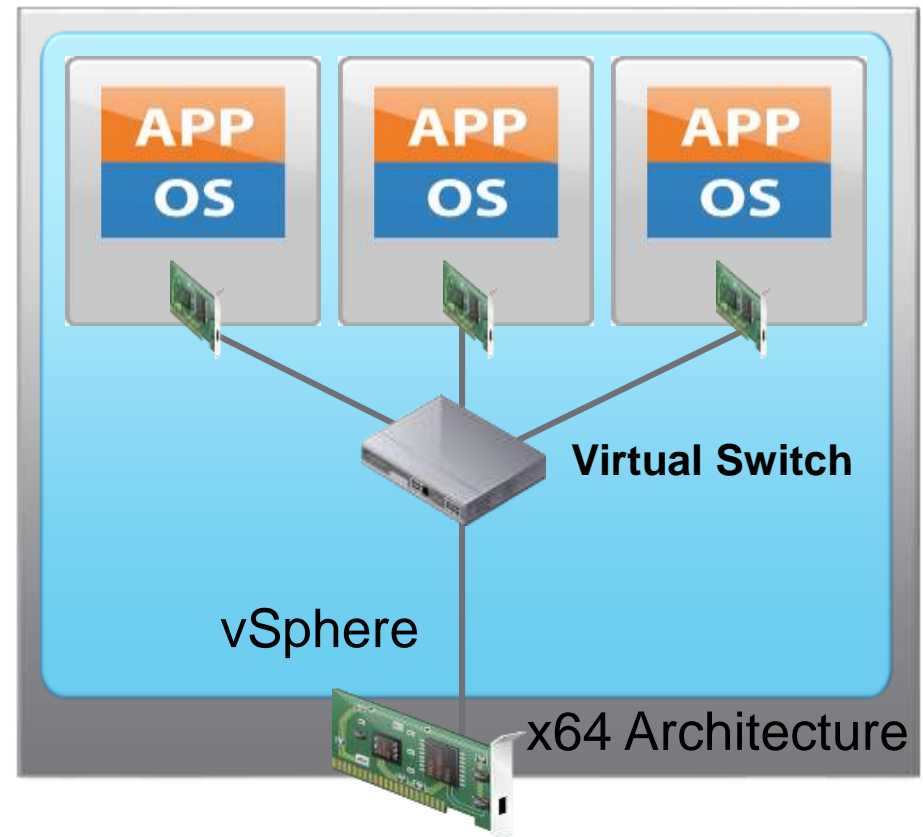
Physical and Virtual Networking

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

Physical Architecture



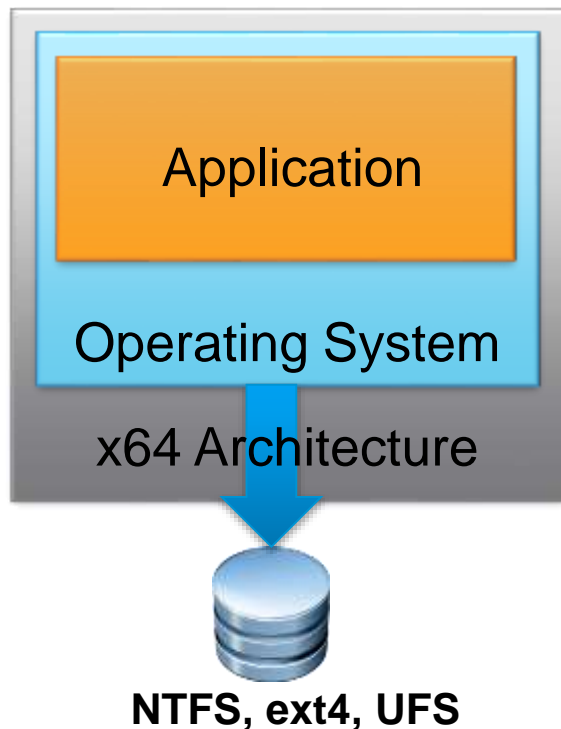
Virtual Architecture



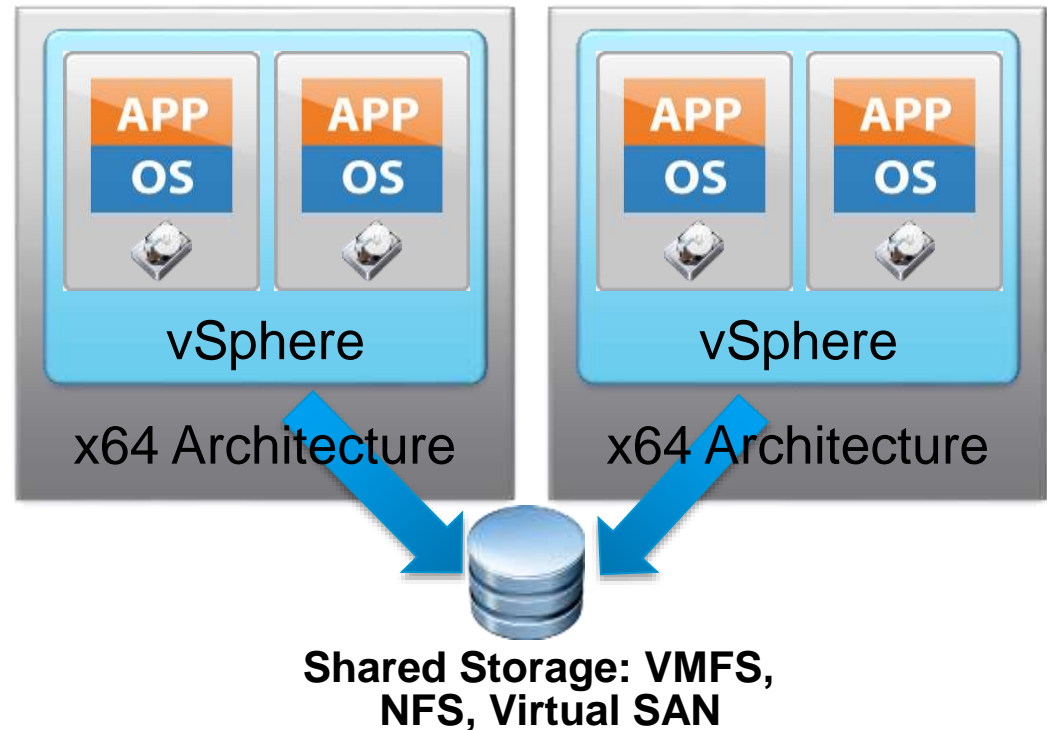
Physical File Systems and VMFS

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

Physical Architecture



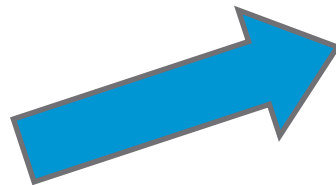
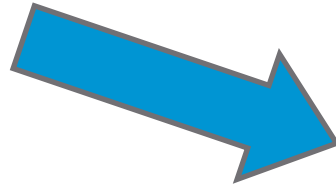
Virtual Architecture



Encapsulation



Virtual machine files are stored in directories on a VMFS or NFS datastore.



Datastore: VMFS or NFS

A **hypervisor** or virtual machine monitor (VMM) is a piece of computer software, firmware or hardware that creates and runs virtual machines.

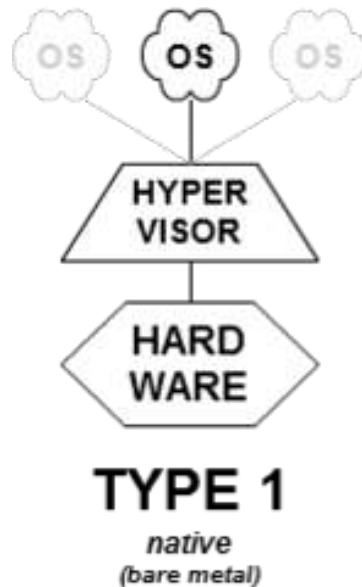
A computer on which a hypervisor runs one or more virtual machines is called a **host machine**, and each virtual machine is called a **guest machine**.

The hypervisor presents the guest operating systems with a virtual operating platform and manages the execution of the guest operating systems. Multiple instances of a variety of operating systems may share the virtualized hardware resources: for example, Linux, Windows, and OS X instances can all run on a single physical x86 machine.

Type I

These hypervisors run directly on the host's hardware to control the hardware and to manage guest operating systems. For this reason, they are sometimes called bare metal hypervisors.

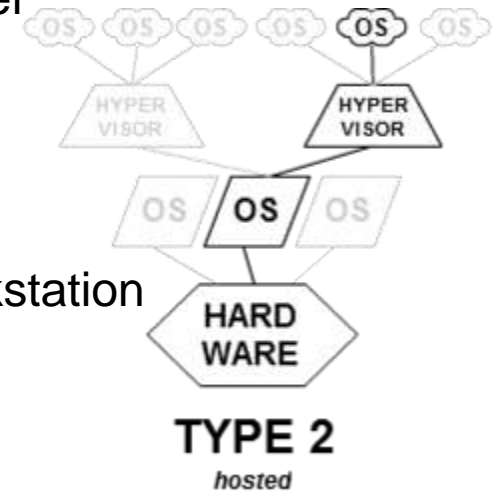
Vmware ESXi
Microsoft Hyper-V
Citrix XenServer
Oracle VM Server



Type II

These hypervisors run on a conventional operating system just as other computer programs do. A guest operating system runs as a process on the host. Type-2 hypervisors abstract guest operating systems from the host operating system.

VMware Player
VirtualBox
KVM
QEMU
VMware Workstation



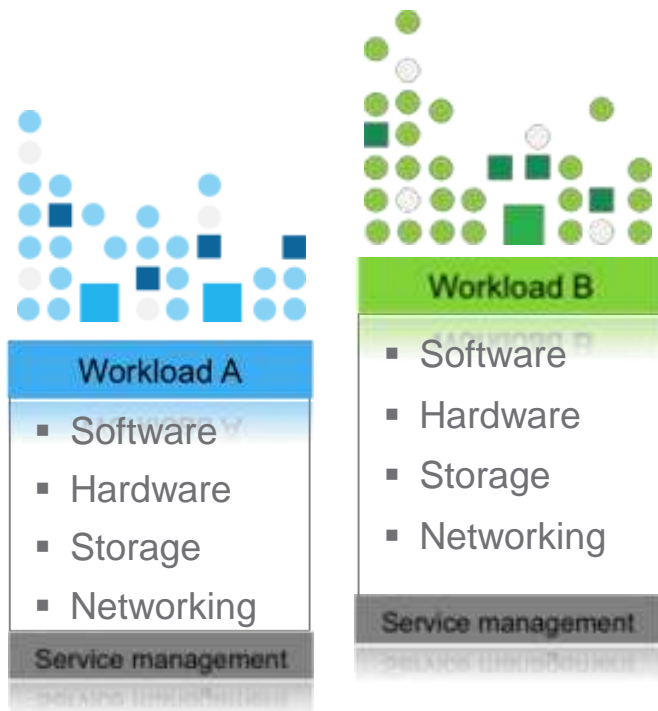
Cloud Computing

What is Cloud Computing


Cloud computing is a type of Internet-based **computing** that provides shared **computer** processing resources and data to computers and other devices on demand.

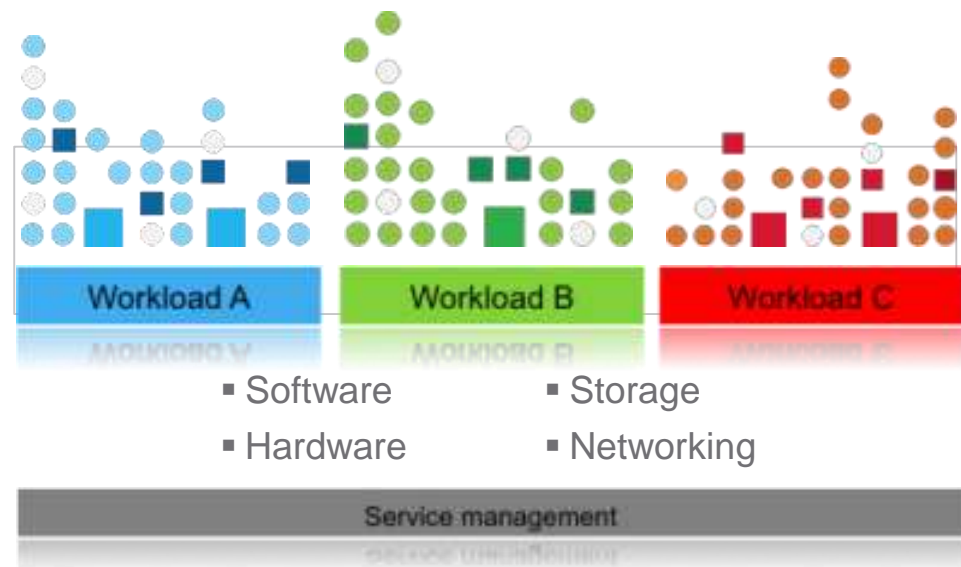


Without cloud computing



With cloud computing

- 
- Virtualized resources
 - Automated service management
 - Standardized services
 - Location independent
 - Rapid scalability
 - Self-service



Cloud computing helps overcome IT challenges

Cloud helps address the challenges using **virtualization**, **standardization**, and **automation**.

Virtualized

Doing more with
less

Higher utilization

Economy-of-scale benefits

Lower capital expense

Lower operating expense

Standardized

Providing higher
quality services

Easier access

Flexible pricing

Reuse and sharing

Easier integration

Automated

Achieving
breakthrough
agility and
reducing risk

Faster cycle times

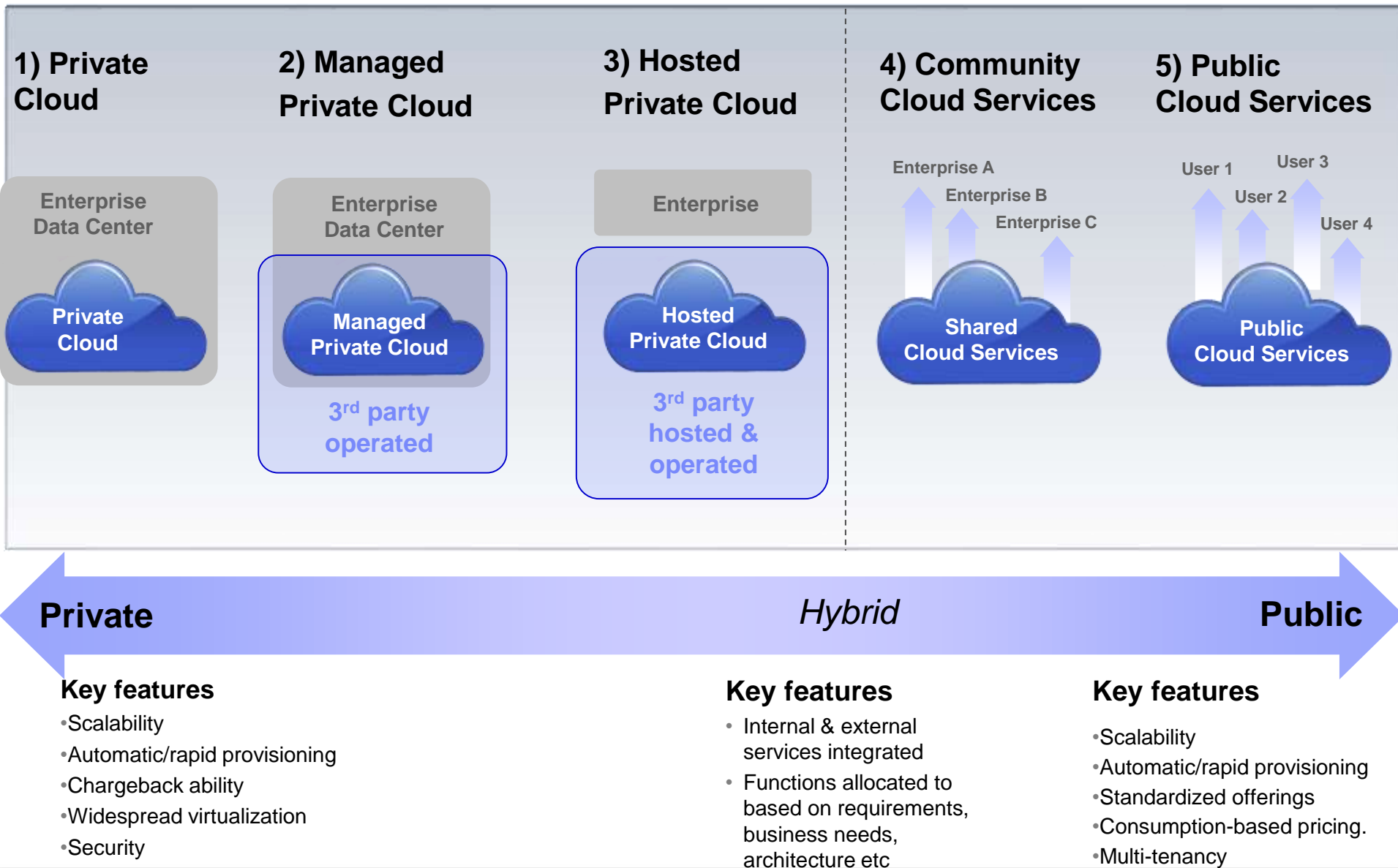
Lower support costs

Improved compliance

Optimized security

Better user experience

There is a spectrum of deployment options for cloud computing



Cloud delivery models

Customers are choosing a variety of cloud models to meet their unique needs..



Private Cloud

On or off premises cloud infrastructure operated solely for an organization and managed by the organization or a third party



Hybrid Cloud

Traditional IT and clouds (public and private) that remain separate but are bound together by technology that enables data and application portability



Public Cloud

Available to the general public or a large industry group and owned by an organization selling cloud services



Traditional IT

Appliances, pre-integrated systems and standard hardware, software, and networking

Cloud Service Models



Traditional On-Premises

Infrastructure as a Service

Platform as a Service

Software as a Service

Applications

Applications

Applications

Applications

Data

Data

Data

Data

Runtime

Runtime

Runtime

Runtime

Middleware

Middleware

Middleware

Middleware

O/S

O/S

O/S

O/S

Virtualization

Virtualization

Virtualization

Virtualization

Servers

Servers

Servers

Servers

Storage

Storage

Storage

Storage

Networking

Networking

Networking

Networking

Customization; higher costs; slower time to value

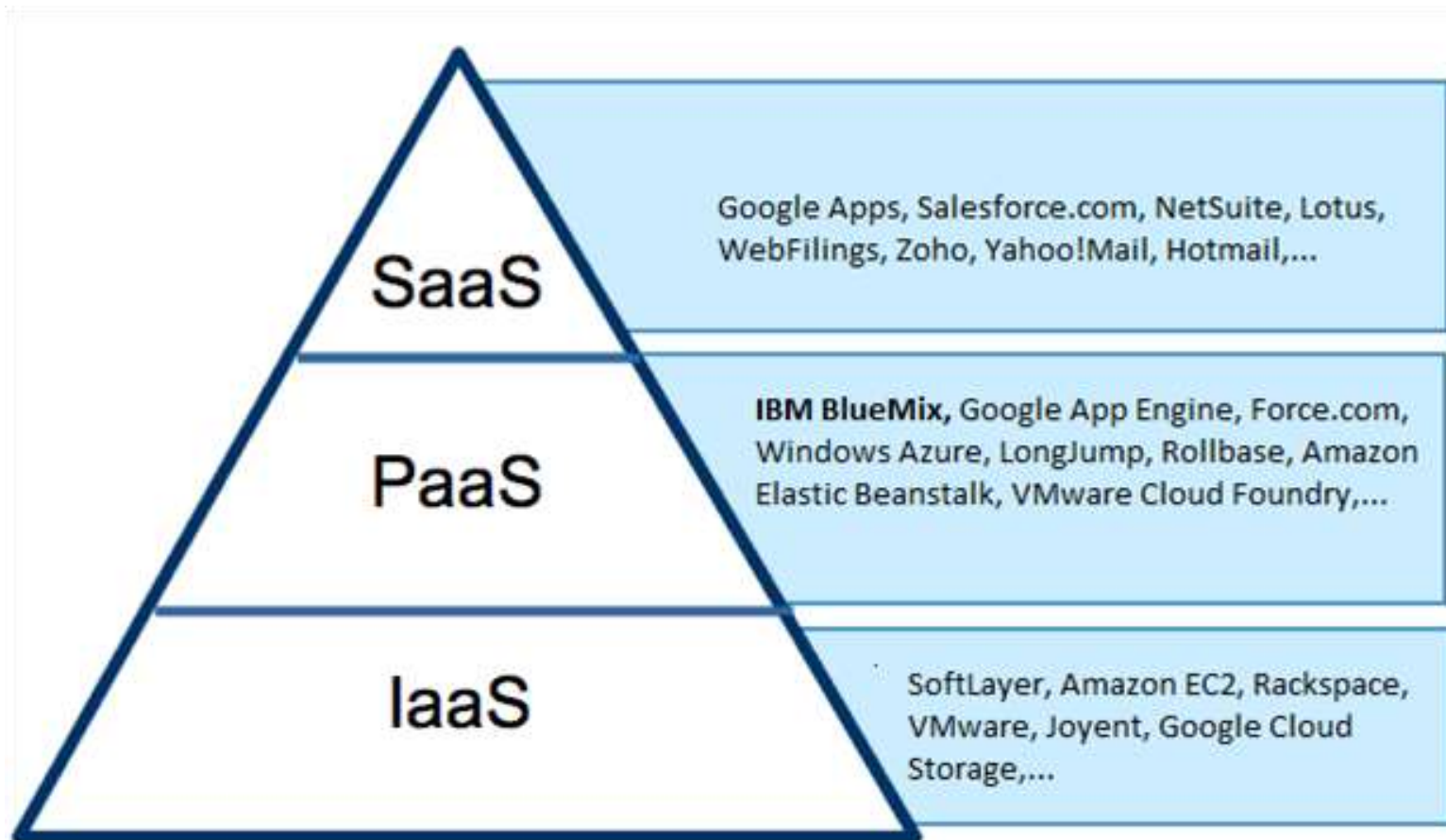
Standardization; lower costs; faster time to value

Client Manages

Vendor Manages

Cloud service models (1 of 2)

The following diagram shows the cloud service models.



Cloud service models (2 of 2)



Infrastructure as a Service (IaaS)

In IaaS, you outsource the hardware. In such cases, it is not just the computing power that you rent; it also includes power, cooling, networking, and cloud storage. When you choose to run your applications at this cloud service level, you are responsible for everything on the stack that is required to operate above it.



Platform as a Service (PaaS)

In the middle, we have Platform as a Service, or PaaS. At this service level, the vendor takes care of the underlying infrastructure for you, giving you only a platform with which to build and host your application(s).



Software as a Service (SaaS)

Software applications that are available only over the internet, fall into the Software as a Service category, or SaaS. The simplest example to understand is email.

What are the drivers for Cloud?

Accelerate new business solutions
to improve time to value

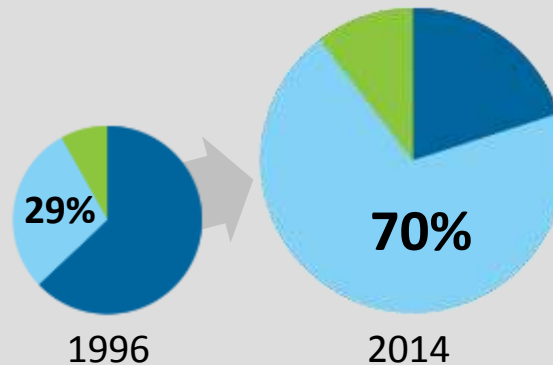


34% of new IT Projects

deploy late

Improve IT efficiency
to lower costs

- New server spending
- Power & cooling costs
- Server mgmt & admin costs



70% of IT

operating costs in 2014 will be for
management and administration

Simplify cloud transformations
for agility and cost effectiveness



90% plan to implement cloud

by 2017

Clouds Six potentially “game-changing” business enablers

Business Scalability

- Rapidly scale up/down in response to events
- Scale on-prem resources for efficiency

Social Media

Hyper-connectivity

Business Agility

- Speed to market
- Quickly adapt to business changes

Ease of consumption

- Self service
- Lower the barrier to consumption

Big Data

Differentiation & Specialisation

- Context-driven Variability
- User-defined experiences
- Increases relevance

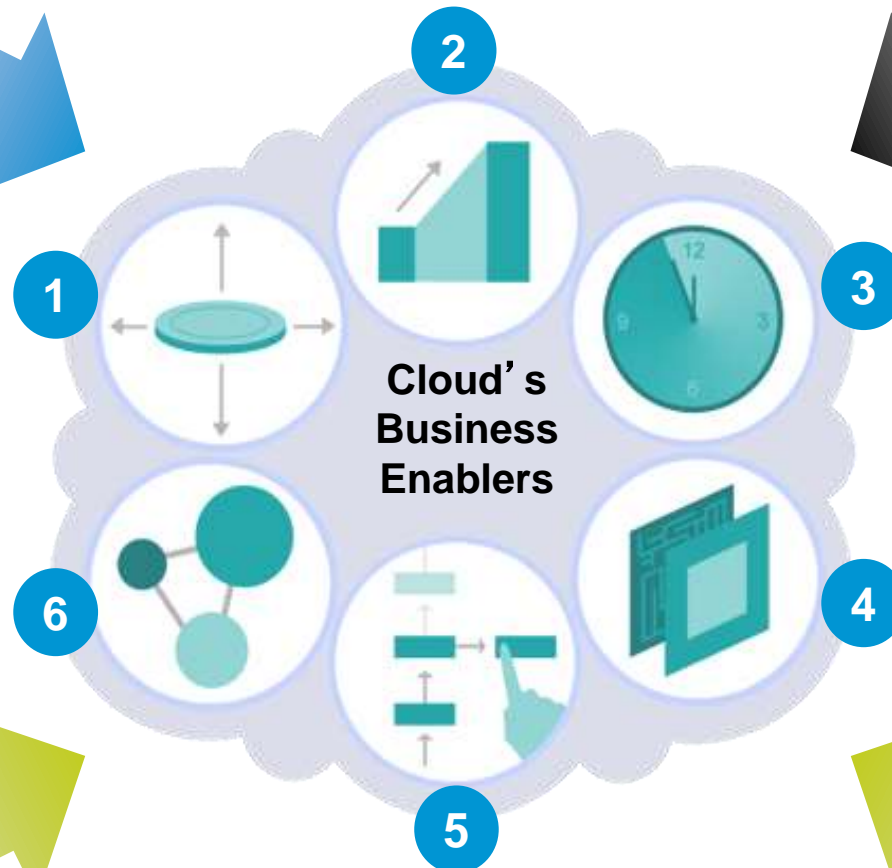
Mobility

Cost Flexibility

- Shift CAPEX to OPEX
- Scale costs to volumes
- PAYG options

Eco-system Connectivity

- Strategically reinvent customer relationships
- Access new services that improve business processes



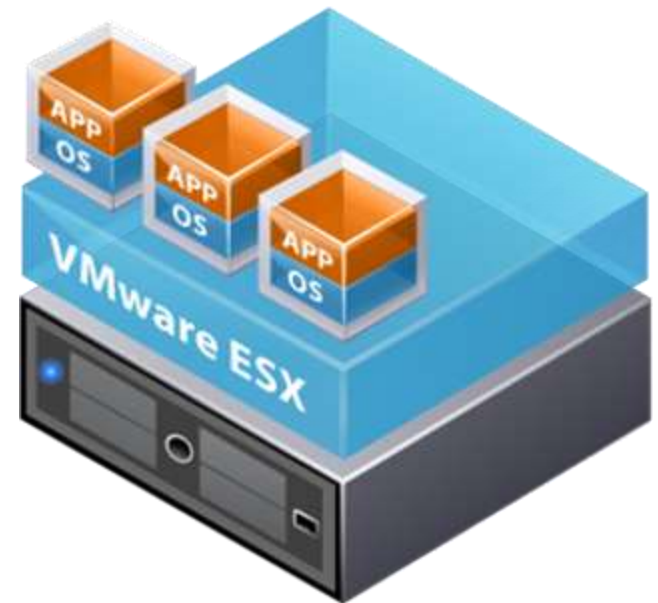
ESXi



VMware **ESXi** (formerly ESX) is an enterprise-class, type-1 hypervisor developed by VMware for deploying and serving virtual computers. As a type-1 hypervisor, ESXi is not a software application that one installs in an operating system (OS); instead, it includes and integrates vital OS components, such as a kernel.

After version 4.1 (released in 2010), VMware renamed ESX to ESXi. ESXi replaces Service Console (a rudimentary operating system) with a more closely integrated OS. ESX/ESXi is the primary component in the VMware Infrastructure software suite.

<https://www.vmware.com/support/pubs/vsphere-esxi-vcenter-server-6-pubs.html>



Versions

2002 – Vmware

2002 – Vmware ESX Server 1.5

2004 – Vmware ESX Server 2.0

2005 – Vmware ESX Server 2.5

2006 – Vmware Infrastructure 3.0

2008 – Vmware ESXi 3.5

2009 – Vmware ESXi 4.0

2011 – Vmware ESXi 4.1

2012 – Vmware ESXi 5.0

2014 – Vmware ESXi 5.1

2014 – Vmware ESXi 5.5

2015 – Vmware ESXi 6.0

2016 – Vmware ESXi 6.5

Processor: 64-bit x86 CPU:

- Requires at least two cores.
- ESXi supports a broad range of x64 multicore processors.
- Requires NX/XD bit to be enabled for the CPU in the BIOS.

Memory: 4 GB RAM minimum

One or more Ethernet controllers:

- Gigabit, 10 Gigabit, and 40 Gigabit Ethernet controllers are supported.

Disk storage:

- A SCSI adapter, Fibre Channel adapter, converged network adapter, iSCSI adapter, or internal RAID controller
- A SCSI disk, Fibre Channel logical unit number (LUN), iSCSI disk, or RAID LUN with unpartitioned space: SATA, SCSI, or Serial Attached SCSI

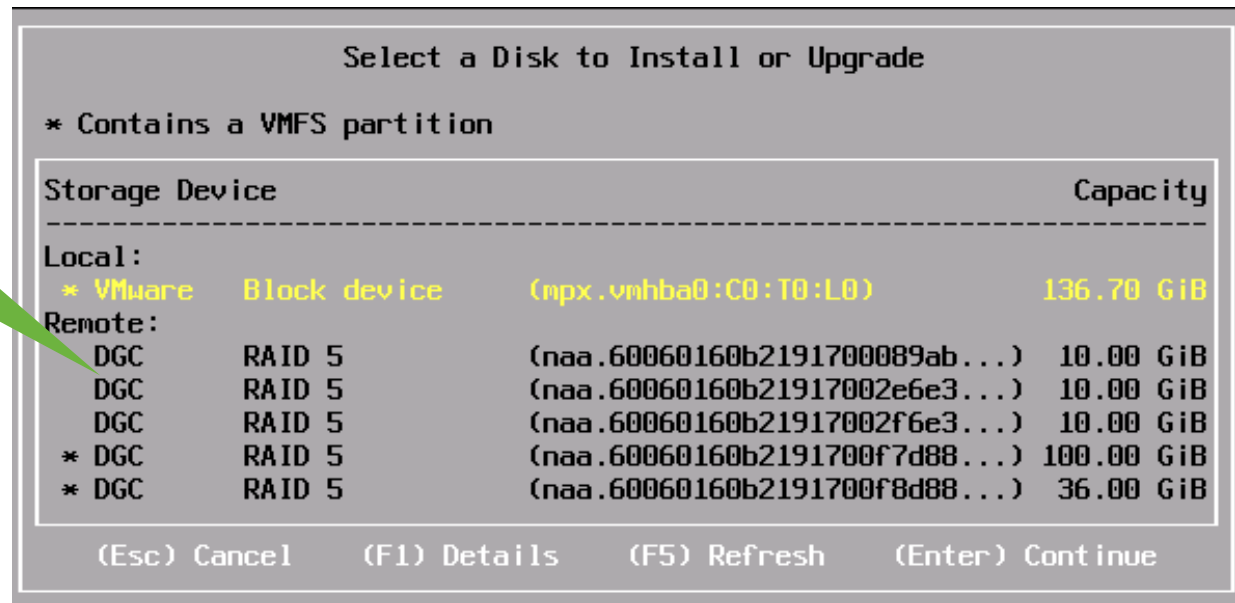
Installing ESXi

You must have the ESXi ISO file on CD, DVD, or USB flash drive media.

Boot from the media to start the ESXi installer.

Select a volume that is not formatted with VMware vSphere® VMFS.

Select a volume that
is not formatted with
VMFS.



In addition to using an interactive installation procedure to install ESXi, the following options are available:

- Scripted ESXi installation:
 - The script contains the host configuration settings.
 - The script must be stored in an accessible location such as HTTP, HTTPS, FTP, NFS, CD, or USB.
 - A PXE boot installation is possible.
- Automatic ESXi installation with VMware vSphere® Auto Deploy™:
 - The ESXi host loads the image directly into the host memory.
 - The ESXi installation can be either stateful or stateless.
 - PXE boot is used to contact an autodeploy server.
 - vSphere Auto Deploy uses host profiles.
- Remote management applications:
 - Install ESXi on hosts in remote locations with third-party management applications.

Booting from SAN

You can configure the boot device for an ESXi host.

An ESXi host can be booted from SAN:

- Supported for Fibre Channel SAN
- Supported for iSCSI and FCoE for qualified storage adapters

The host boots from the LUNs rather than from its local disk.

The ESXi host must have exclusive access to its boot LUN, where the boot image is stored.

SAN connections must be made through a switched topology unless the array is certified for direct-connect.

Use different LUNs for VMFS datastores and boot partitions.

Configure a diagnostic partition to store host fault information.

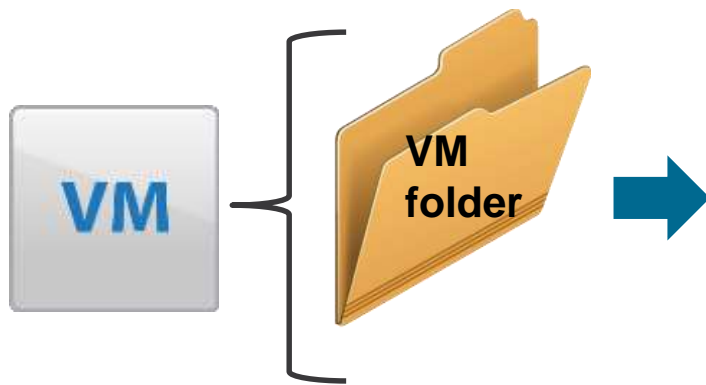


Virtual Machine



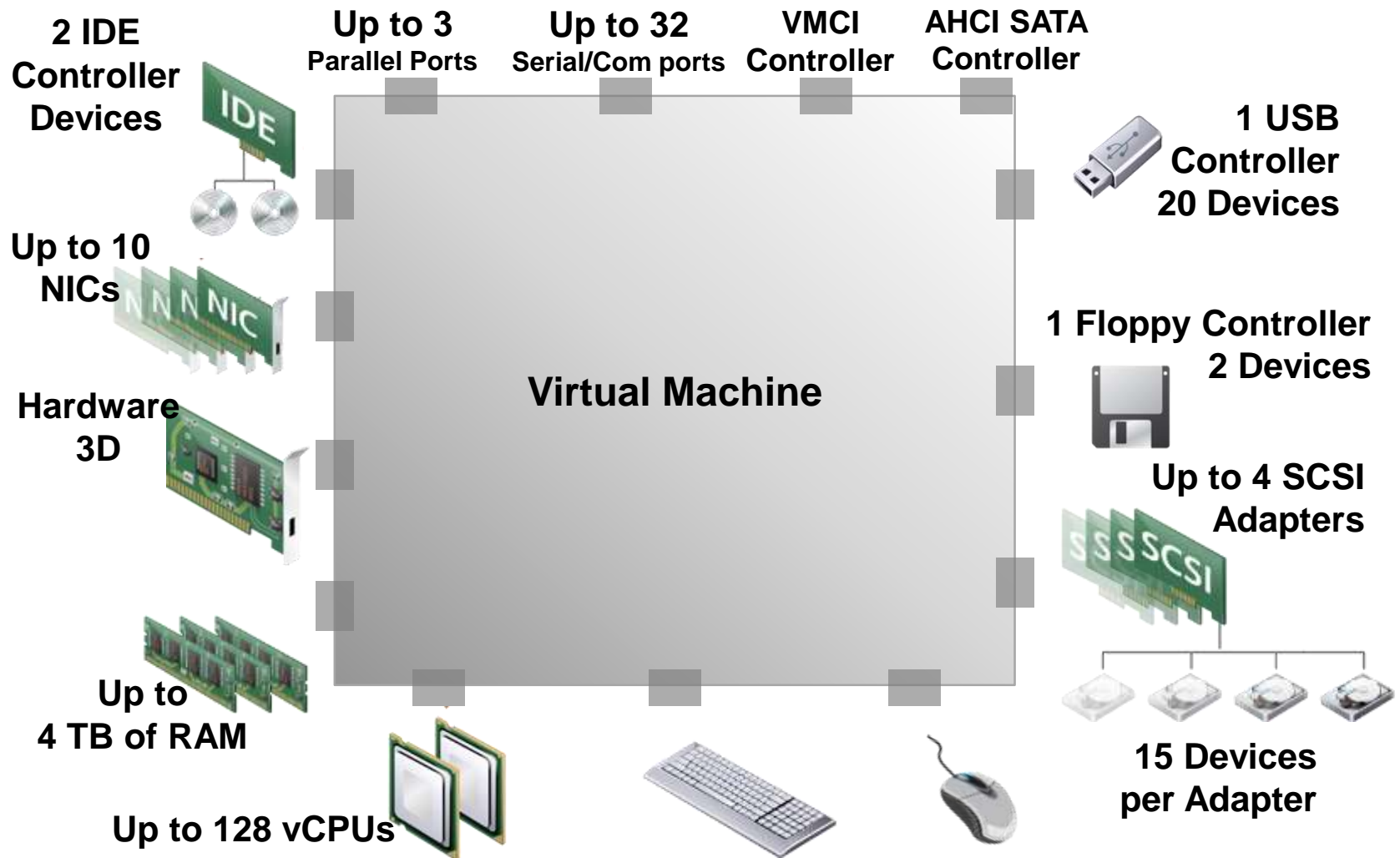
About Virtual Machine Files

A virtual machine consists of a set of related files.



Configuration file	<code>VM_name.vmx</code>
Swap files	<code>VM_name.vswp</code> <code>vmx-VM_name.vswp</code>
BIOS file	<code>VM_name.nvram</code>
Log files	<code>vmware.log</code>
Template file	<code>VM_name.vmtx</code>
Raw device map file	<code>VM_name-rdm.vmdk</code>
Disk descriptor file	<code>VM_name.vmdk</code>
Disk data file	<code>VM_name-flat.vmdk</code>
Suspend state file	<code>VM_name.vmss</code>
Snapshot data file	<code>VM_name.vmsd</code>
Snapshot state file	<code>VM_name.vmsn</code>
Snapshot disk file	<code>VM_name-delta.vmdk</code>

About Virtual Machine Virtual Hardware



Virtual Hardware Versions

The virtual hardware version determines the operating system functions that a virtual machine supports. Do not use a version that is higher than supported by the VMware product.

Compatibility	Hardware Version
VMware ESXi™ 6 and later	11
ESXi 5.5 and later	10
ESXi 5.1 and later	9
ESXi 5.0 and later	8
ESXi/ESX 4.0 and later	7

Hardware Version Comparison



Features	VMware vSphere 5.0	VMware vSphere 5.1	VMware vSphere 5.5	VMware vSphere 6.0
VM HW Version	Virtual Hardware 8	Virtual Hardware 9	Virtual Hardware 10	Virtual Hardware 11
vCPU	32 vCPUs	64 vCPUS	64 vCPUS	128 vCPUS
VM Memory	1 TB	1 TB	1 TB	4 TB
Graphics Support	Software based 3D graphics	Hardware based 3D graphics	Improved 3D graphics Support	WDDM 1.1 GDI graphics acceleration
Cluster Nodes	32 Nodes	32 Nodes	32 Nodes	64 Nodes
VM's Per Cluster	3,000	4,000	4,000	8,000
Max CPU per Host	160	160	320	480
Max Mem per Host	2 TB	2 TB	4 TB	12 TB
Max vCPU per FT VM	1 vCPU	1 vCPU	1 vCPU	4 vCPU
vCSA with Embedded Database	5 hosts and 50 VM's	5 hosts and 50 VM's	300 Hosts and 1,000 VM's	1000 Hosts and 10,000 VM's
Content Libraray	NA	NA	NA	Content Library Introduced with vSphere 6.0
VSAN	NA	NA	VSAN 5.5	VSAN 6.0
vMotion Enhancements	vMotion Supported	vMotion without Shared Storage	vMotion without Shared Storage Long Distance vMotion(10 ms RTTs)	vMotion across vCenters vMotion across Virtual Switches Long Distance vMotion (100+ ms RTTs)
Virtual Volumes (Vvols)	NA	NA	NA	Available with vSphere 6.0
NFS Support	NFS v3	NFS v3	NFS v3	NFS 4.1 Support Multipathing and Kerberos Authentication
vCenter Single Sign-on	NA	Introduced with 5.1	SSO with Improved Architecture	SSO included as part of Platform Services Controller

About Virtual Hardware Version 11



Virtual hardware version 11 provides several features and benefits.

Features	Benefits
xHCI controller updated to version 1.0	USB 3 support for Mac OS X 10.8, Windows Server 2012, and Windows 8 operating systems.
Windows VMXNET3 driver support	Supports large receive offload, resulting in reduced associated CPU costs by reducing network packet processing.
Enhanced NUMA feature	Hot-add local memory is distributed across all NUMA nodes.
Guest authentication	Support for Windows 2000 and later, Linux kernels 2.4 and later, and Solaris operating systems.
Host Guest File System (HGFS) shared folder driver	Allows sharing of a folder between the virtual machine and the host system. Use this driver if you plan to use the virtual machine with VMware WorkStation™, VMware Player™, or VMware Fusion®.
Increased vCPU capacity	Hardware version 11 virtual machines can support up to 128 virtual CPUs.
Increased RAM capacity	Hardware version 11 virtual machines support up to 4 TB of RAM.
Increased serial port configuration	Hardware version 11 virtual machines can be configured with up to 32 serial ports.

About CPU and Memory

You can add, change, or configure CPU and memory resources to improve virtual machine performance.

The maximum number of vCPUs that you can assign to a virtual machine depends on:

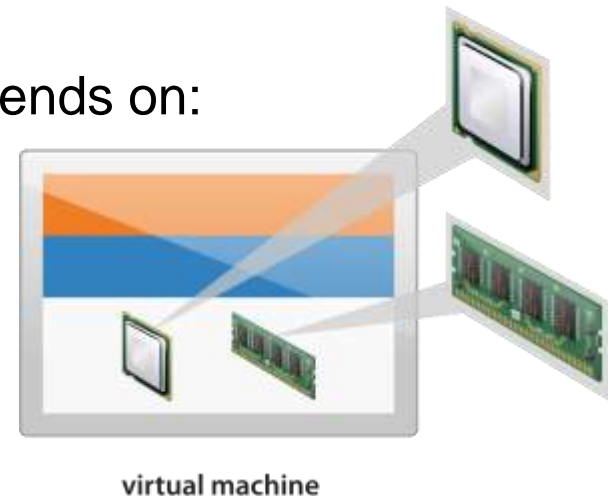
- The number of logical CPUs on the host
- The host license
- The type of installed guest operating system

A virtual machine running on an ESXi 6 host can have up to 128 vCPUs.

Maximum memory size for a virtual machine depends on:

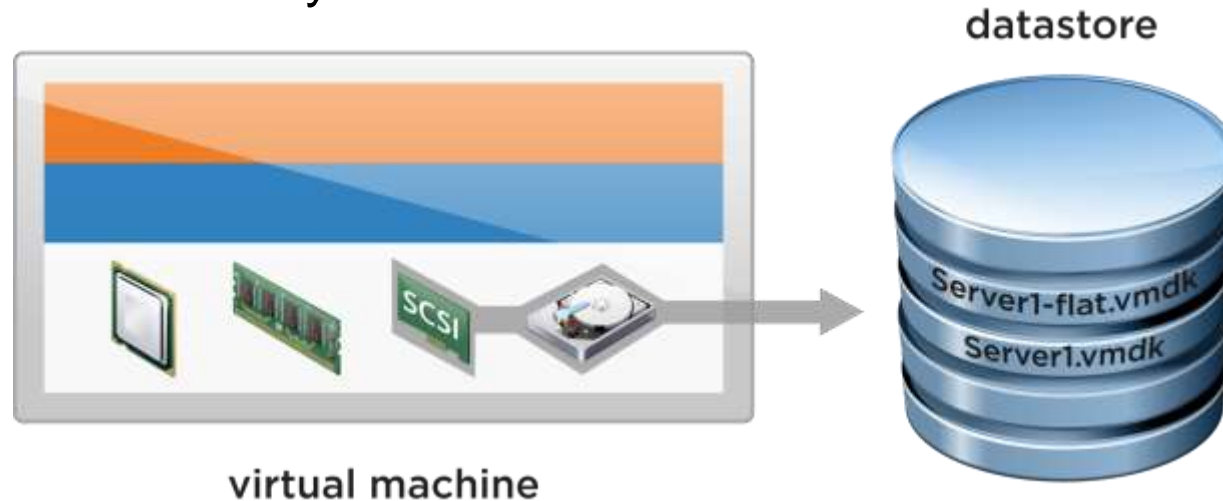
- The host's physical memory
- The virtual machine's compatibility setting

The maximum memory size of a virtual machine with ESXi 6 compatibility running on ESXi 6 is 4,080 GB.



About Virtual Disks

A virtual machine usually has a least one virtual disk.



Sample virtual disk definition:

Virtual disk size:	8 GB
Datastore:	MyVMFS
Virtual disk node:	0:0
Virtual storage adapter:	LSI Logic SAS
Virtual disk files:	<code>Server1.vmdk</code> and <code>Server1-flat.vmdk</code>
Default disk mode:	Snapshots allowed
Optional disk mode:	Independent: Persistent or Nonpersistent
Disk provisioning policy:	Thick Provision Lazy Zeroed, Thick Provision Eager Zeroed, or Thin Provision

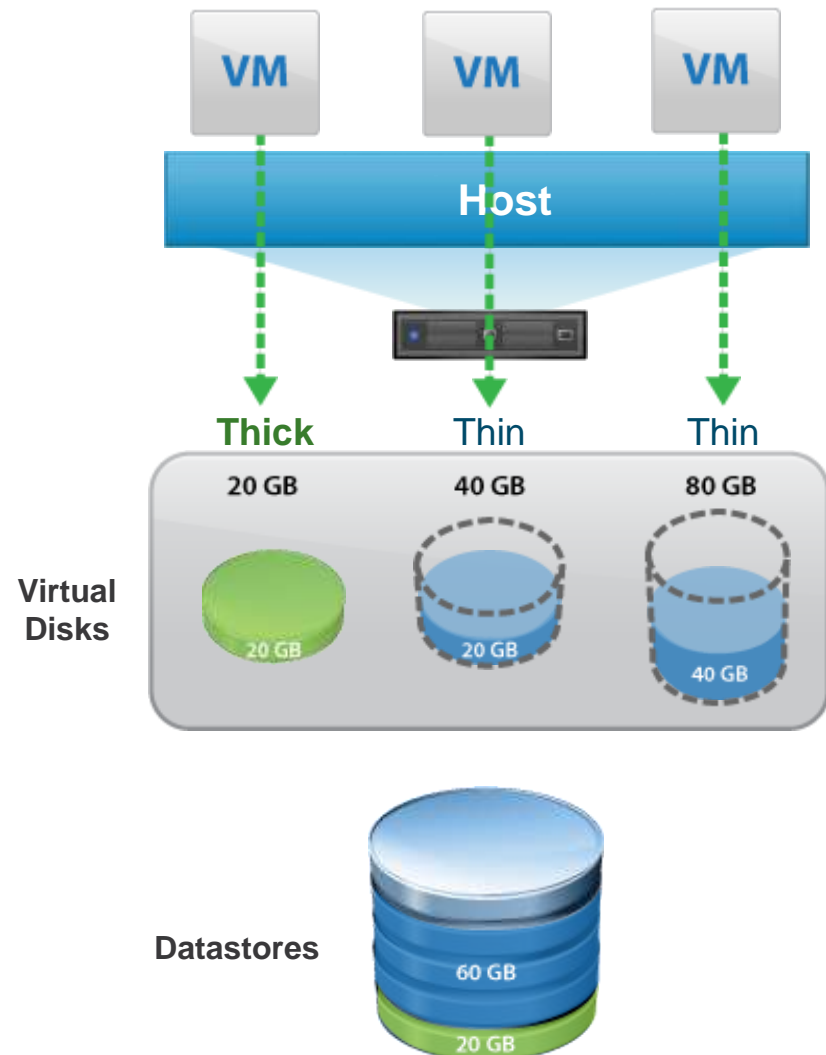
About Thick-Provisioned Virtual Disks

Thick provisioning uses all the defined disk space at the creation of the virtual disk:

- Virtual machine disks consume all the capacity, as defined at creation, regardless of the amount of data in the guest operating system file system.

Eager zeroed or lazy zeroed:

- Every block in an eager zeroed thick-provisioned disk is prefilled with a zero.
- Every block in a lazy zeroed thick-provisioned disk is filled with a zero when data is written to the block.



About Thin-Provisioned Virtual Disks

Thin provisioning enables virtual machines to use storage space as needed:

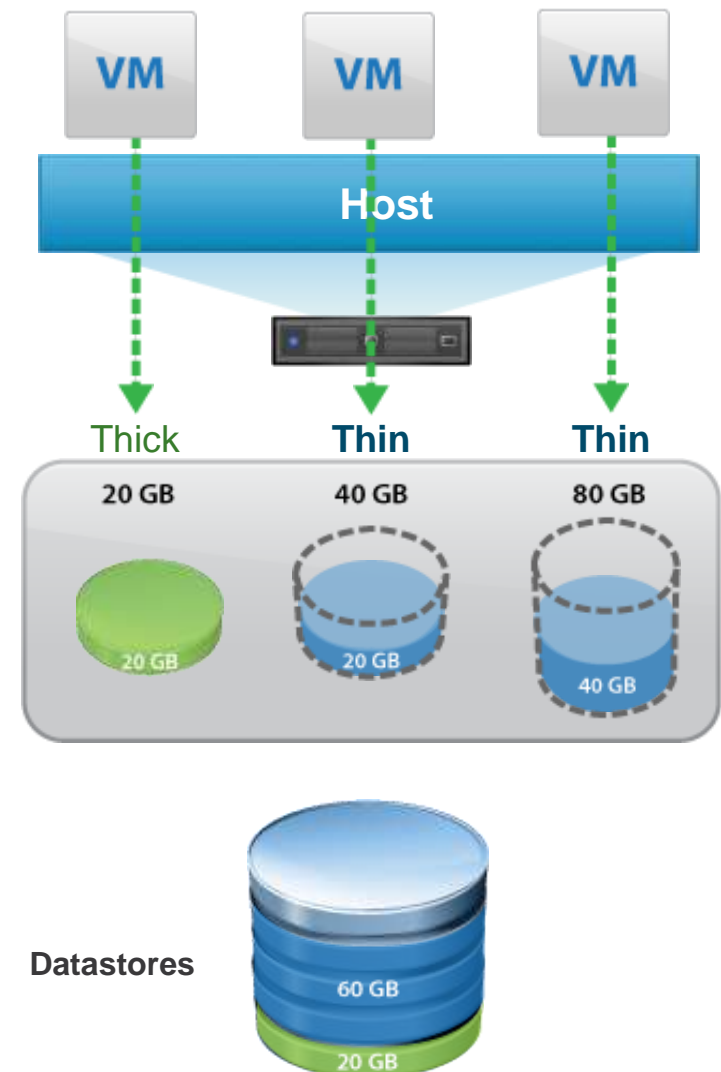
- Thin-provisioned virtual machine disks consume only the capacity needed to hold the current files.
- A virtual machine sees the full allocated disk size at all times.

You can mix thick and thin formats.

Full reporting and alerts help manage allocations and capacity.

More efficient use of storage:

- Virtual disk allocation: 140 GB
- Available datastore capacity: 100 GB
- Used storage capacity: 80 GB



A virtual network is a network of virtual machines running on a physical machine. The virtual machines are logically connected so that they can send and receive data with each other.

When you configure networking for a virtual machine, you select or change:

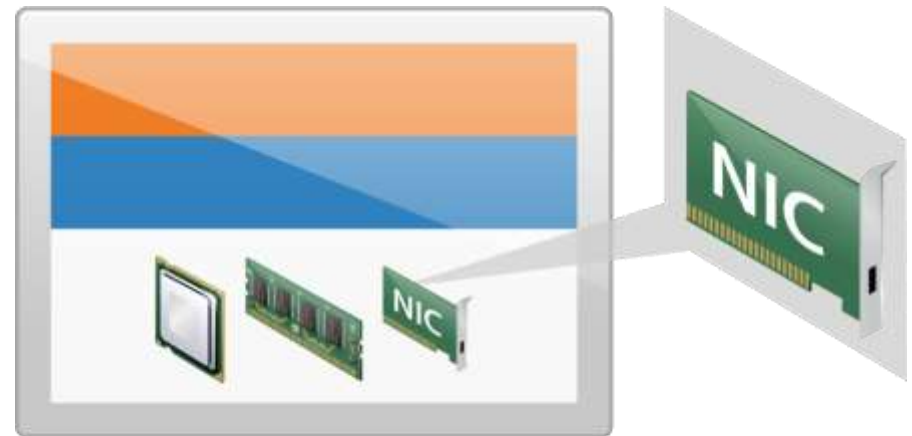
- The network adapter type
- The network connection
- Whether to connect to the network when the virtual machine powers on

About Network Adapters

When you configure a virtual machine, you can add network adapters (NICs) and specify the adapter type. Whenever possible, select VMXNET3.

Supported network adapter types:

- Flexible: Can function as either a Vlan or VMXNET adapter.
- E1000-E1000E: High-performance adapter available for only some guest operating systems.
- VMXNET, VMXNET2, and VMXNET3 are VMware drivers that are available only with VMware Tools.
- SR-IOV passthrough: The virtual machine and the physical adapter exchange data without using the VMkernel as an intermediary.
 - Limited guest operating system support



virtual machine

About Miscellaneous Devices

A virtual machine must have a vCPU and virtual memory. The addition of other virtual devices makes the virtual machine more useful.

CD/DVD drive:

- Connect to CD, DVD, or ISO image.

USB 3.0:

- Smart-card readers

Floppy drive:

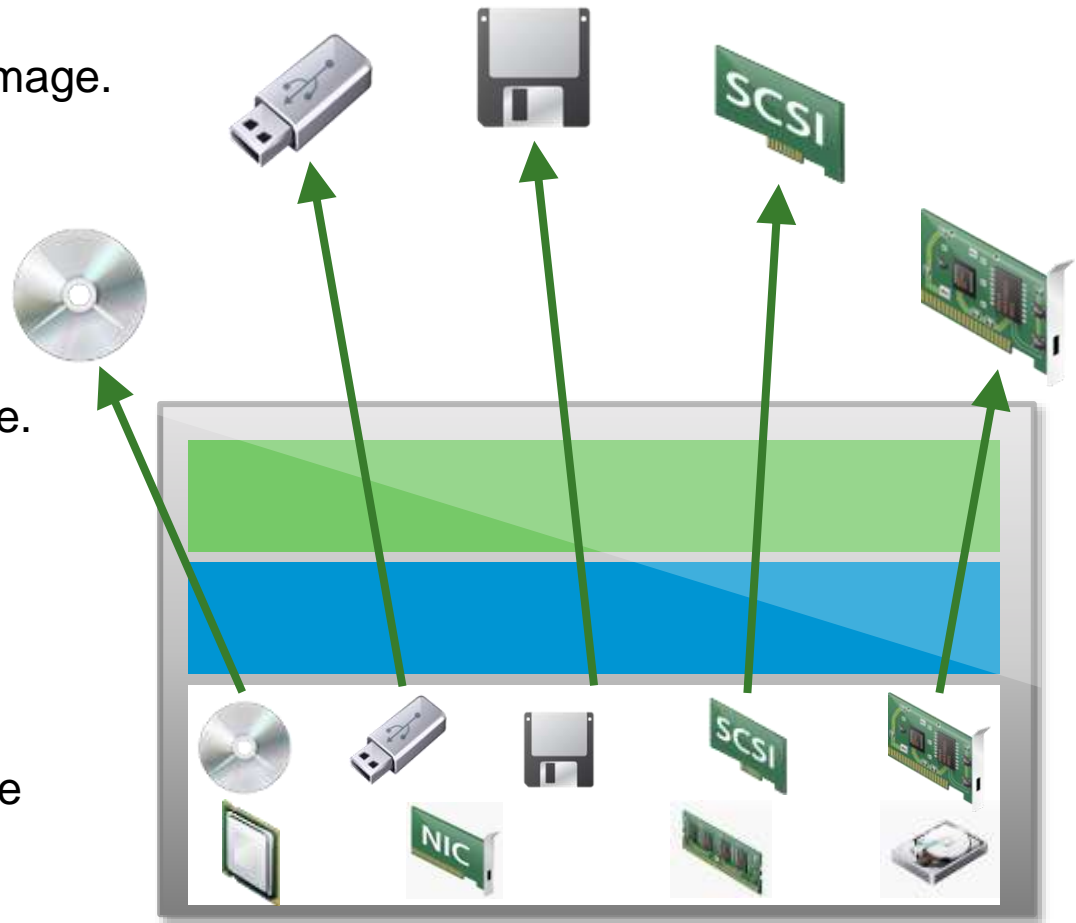
- Connect a virtual machine to a floppy drive or a floppy image.

Generic SCSI devices:

- A virtual machine can be connected to additional SCSI adapters.

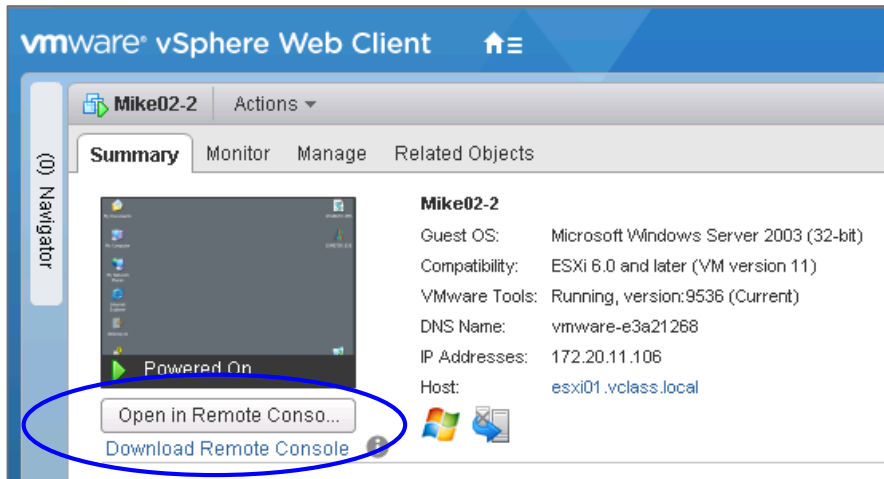
vGPUs:

- Enable a virtual machine to use GPUs on the physical host for high-computation activities.

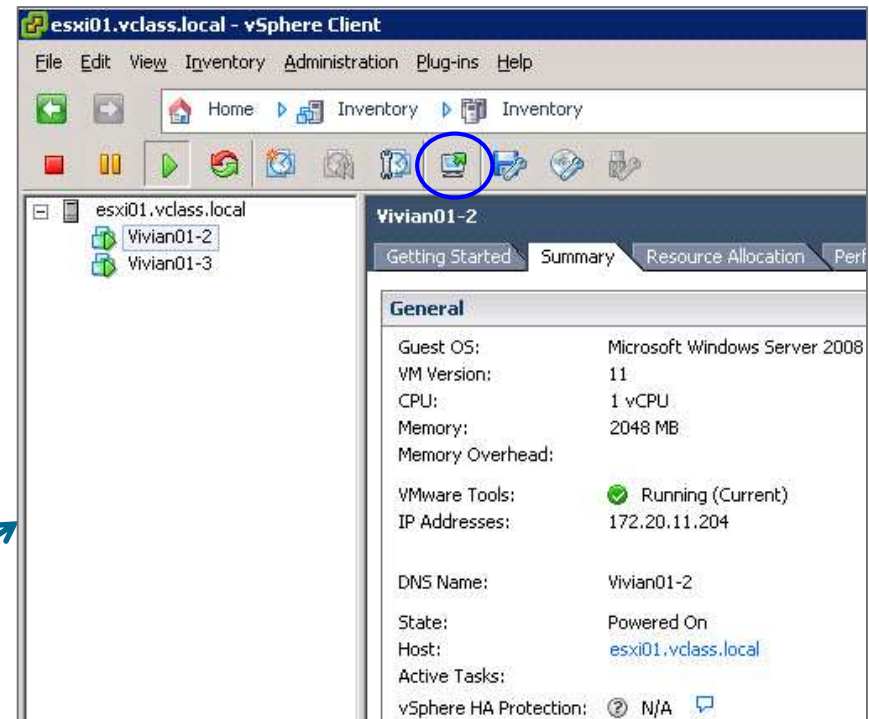


About the Virtual Machine Console

The virtual machine console provides the mouse, keyboard, and screen features to control the virtual machine.



vSphere Web Client



vSphere Client

Creating a Virtual Machine

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

- Create, provision, and remove a virtual machine
- Explain the importance of VMware Tools
- Describe how to import a virtual appliance OVF template
- Discuss how to use VMware vCloud® Air™ to create a virtual machine from a template

About Provisioning Virtual Machines

You can create virtual machines in several ways:

- Use the New Virtual Machine wizard to create virtual machines.
- Deploy virtual machines, virtual appliances, and vApps stored in Open Virtual Machine Format (OVF).
- Use a CentOS, Linux, or Windows template in a vCloud Air catalog to create virtual machines.

Creating Virtual Machines with the New Virtual Machine Wizard

You can use the New Virtual Machine wizard in the vSphere Web Client to create a virtual machine.

New Virtual Machine

1 Select creation type

✓ **1 a Select a creation type**

2 Edit settings

2a Select a name and folder

2b Select a compute resource

2c Select storage

2d Select compatibility

2e Select a guest OS

2f Customize hardware

3 Ready to complete

Select a creation type

How would you like to create a virtual machine?

Create a new virtual machine

Deploy from template

Clone an existing virtual machine

Clone virtual machine to template

Clone template to template

Convert template to virtual machine

This option guides you through creating a new virtual machine. You will be able to customize processors, memory, network connections, and storage. You will need to install a guest operating system after creation.

Back Next Finish Cancel

New Virtual Machine Wizard

New Virtual Machine

1 Select creation type

2 Edit settings

3 Ready to complete

1 a Select a creation type

2 a Select a name and folder

2 b Select a compute resource

2 c Select storage

2 d Select compatibility

2 e Select a guest OS

2 f Customize hardware

Customize hardware

Configure the virtual machine hardware

Virtual Hardware

VM Options

SDRS Rules

CPU

1

1

GB

*Memory

10

GB

*New Hard disk

New SCSI controller

LSI Logic SAS

New Network

Production

Connect...

*New CD/DVD Drive

Datastore ISO File

Connect...

New Floppy drive

Client Device

Connect...

Video card

Specify custom settings

VMCI device

New SATA Controller

Other Devices

New device:

----- Select -----

Add

Back

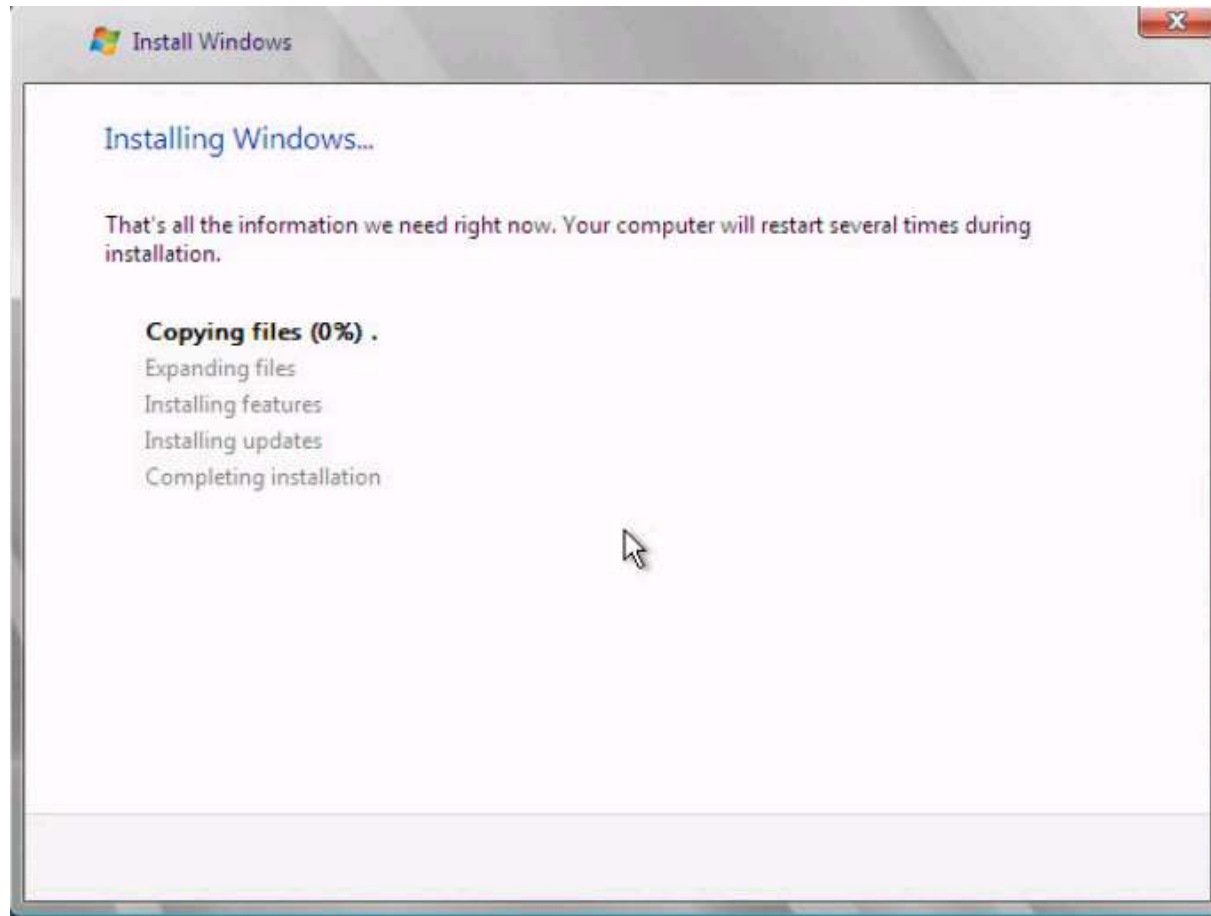
Next

Finish

Cancel

Installing the Guest Operating System

Installing a guest operating system in your virtual machine is like installing it on a physical computer.



Deploying OVF Templates

You can deploy any virtual machine or a virtual appliance stored in OVF.

Virtual appliances are:

- Preconfigured virtual machines
- Usually designed for a single purpose, for example, a safe browser or firewall
- Available from the VMware Solution Exchange

**vSphere Web
Client**

The screenshot shows the 'Deploy OVF Template' wizard in the vSphere Web Client. The left sidebar contains a tree view with the following items: '1 Source', '1a Select source' (highlighted), '1b Review details', '2 Destination', '2a Select name and folder', '2b Select storage', and '3 Ready to complete'. The main panel is titled 'Select source' and 'Select the source location'. It contains a text box for entering a URL, a 'Browse...' button, and radio buttons for 'URL' (selected) and 'Local file'. At the bottom, there are 'Back', 'Next', 'Finish', and 'Cancel' buttons.

Deploying a Virtual Machine in vCloud Air

vCloud Air is a secure, hybrid cloud service built on the vSphere foundation:

- vCloud Air is available in the following infrastructure-as-a-service subscription service types:
 - Dedicated Cloud
 - Virtual Private Cloud and Virtual Private Cloud OnDemand
 - Disaster Recovery
- vCloud Air includes a catalog that is populated with CentOS, Linux, and Windows templates that you can use to create virtual machines.
- Your organization also has its own catalog, My Catalog, which can contain your customized templates.
- In vCloud Air, end users select from catalogs to add virtual machines.
- You can use virtual machines as desktop or workstation environments, as testing environments, or to consolidate server machines to supply what the end user sees as My Catalog.
- Go to <http://vcloud.vmware.com> for more information.

About VMware Tools

VMware Tools is a suite of utilities that enhance the performance of the virtual machine's guest operating system.

VMware Tools benefits:

- Device drivers:
 - SVGA display
 - VMXNET/VMXNET3
 - Balloon driver for memory management
 - Sync driver for quiescing I/O
- Increased graphics performance
- Improved mouse performance

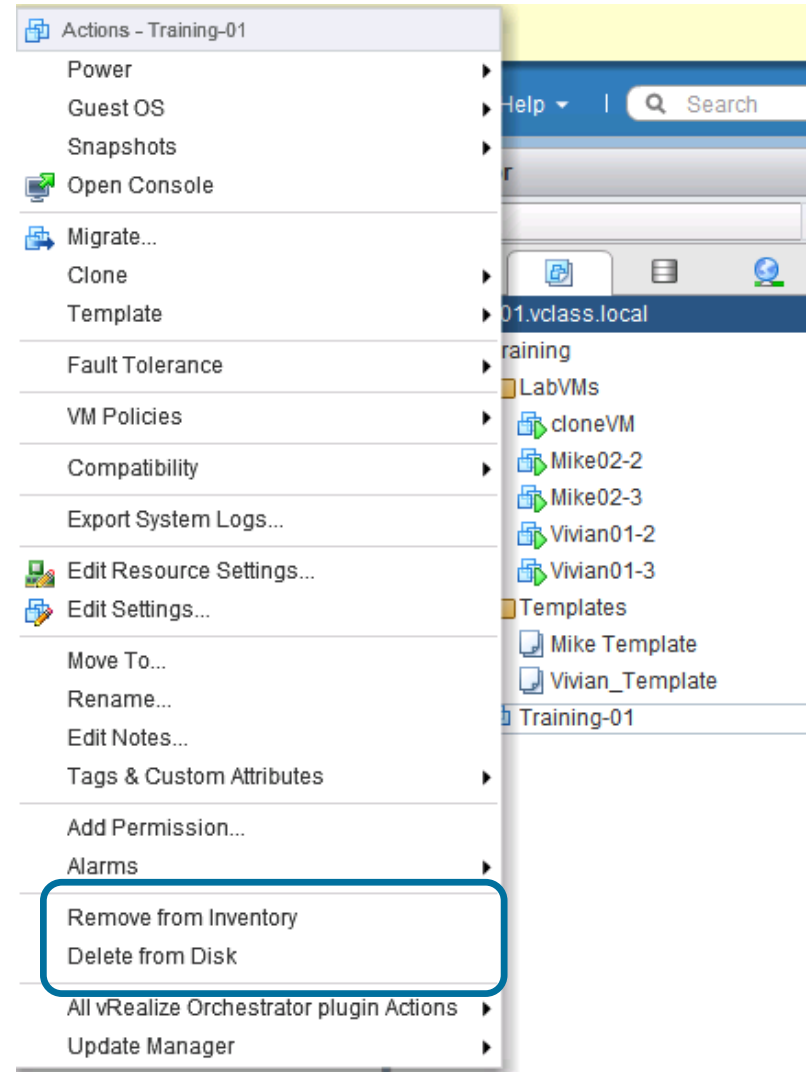
VMware Tools features:

- Shared folders between host and guest file systems
- Copying and pasting text, graphics, and files between the virtual machine and the host or client desktop
- Time synchronization
- Ability to shut down the virtual machine

Removing a Virtual Machine

You can remove a virtual machine in two ways:

- Remove from the inventory:
 - This type of removal unregisters the virtual machine.
 - The virtual machine's files remain on the disk.
 - The virtual machine can later be registered (added) to the inventory.
- Delete from disk:
 - All virtual machine files are permanently deleted from the virtual machine datastore.



Key Points

- Virtual machines can be provisioned using various methods:
 - You can use the New Virtual Machine wizard in the vSphere Client or the vSphere Web Client to create virtual machines.
 - You can create a virtual machine by deploying an OVF template.
 - You can use vCloud Air to create a virtual machine from a template.
- VMware Tools increases the performance of the virtual machine's guest operating system.

Questions?

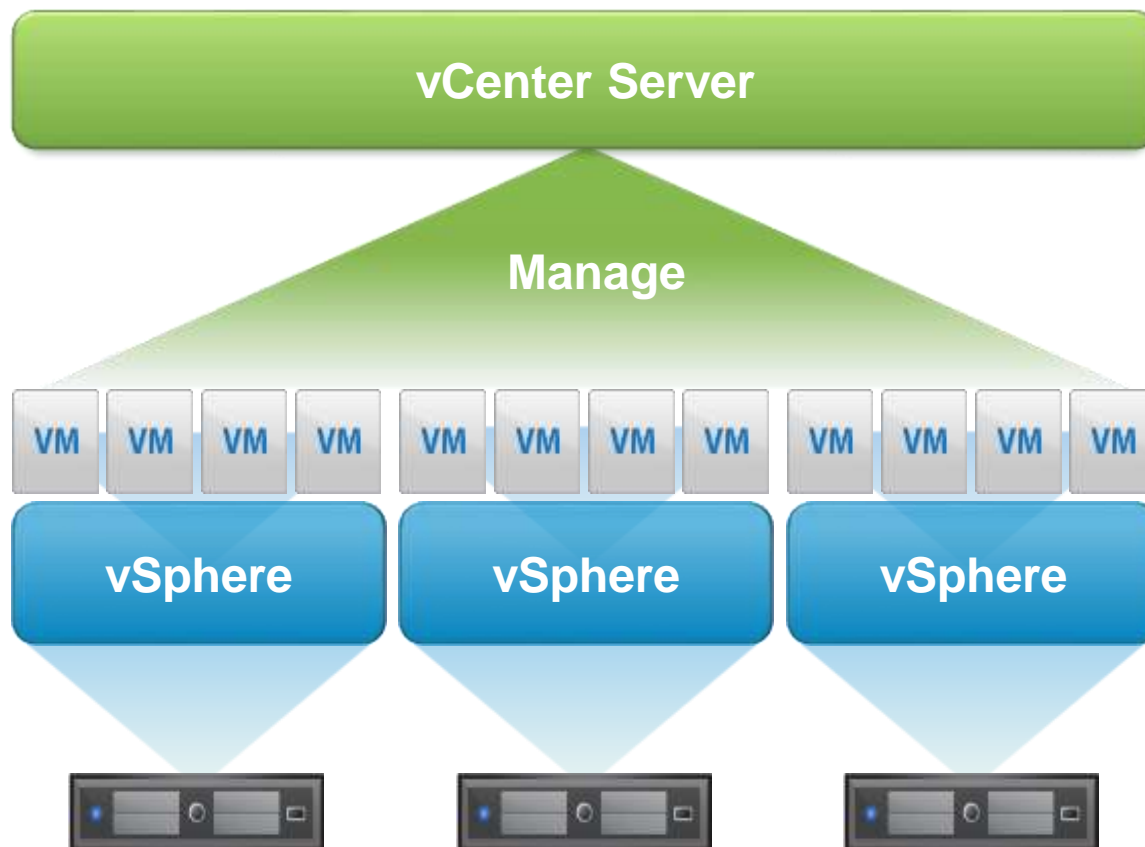
vCenter Server



About the vCenter Server Management Platform

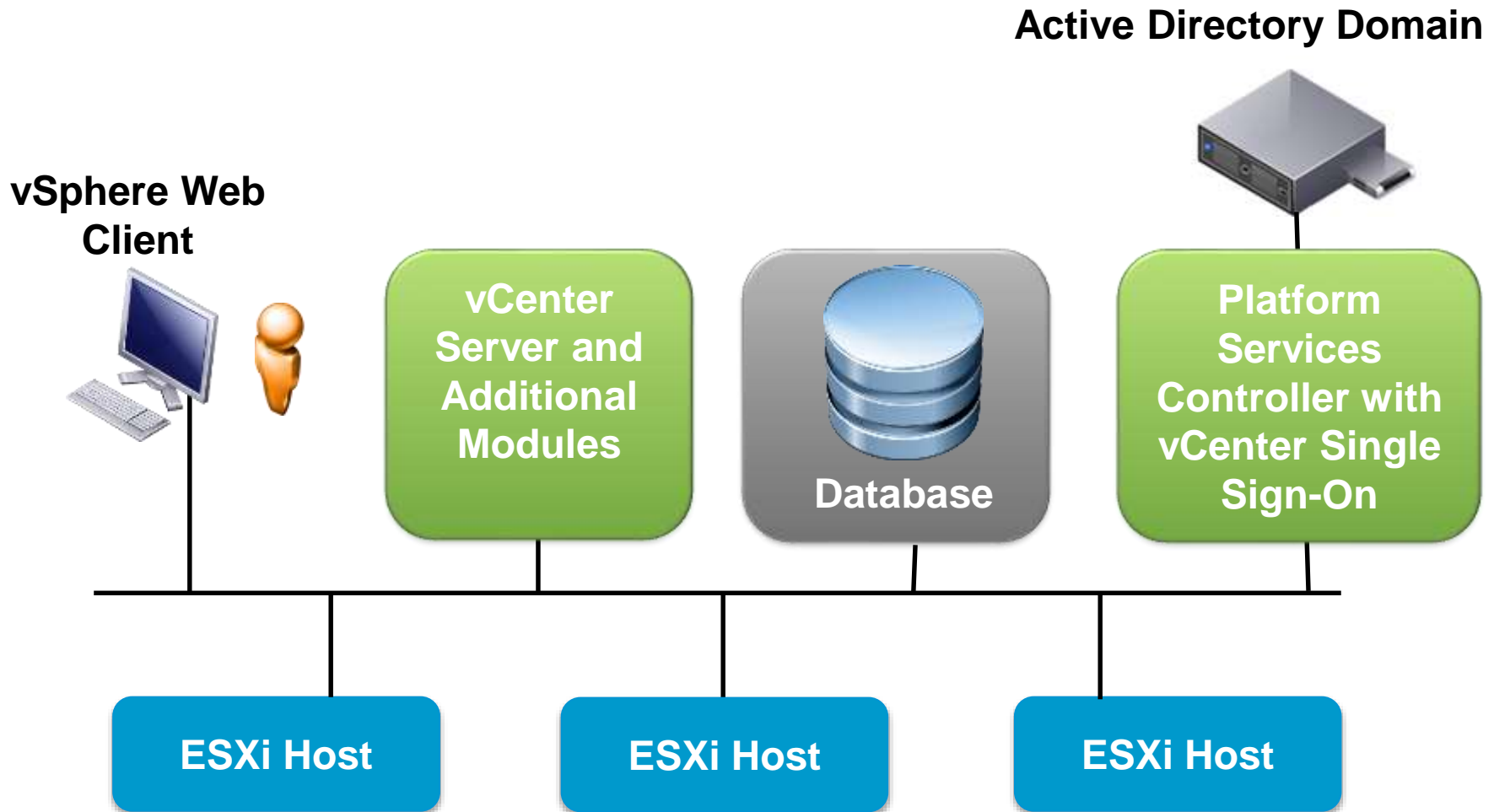
vCenter Server is a service that acts as a central administration point for ESXi hosts and their virtual machines connected on a network.

This service directs the actions of virtual machines and hosts.



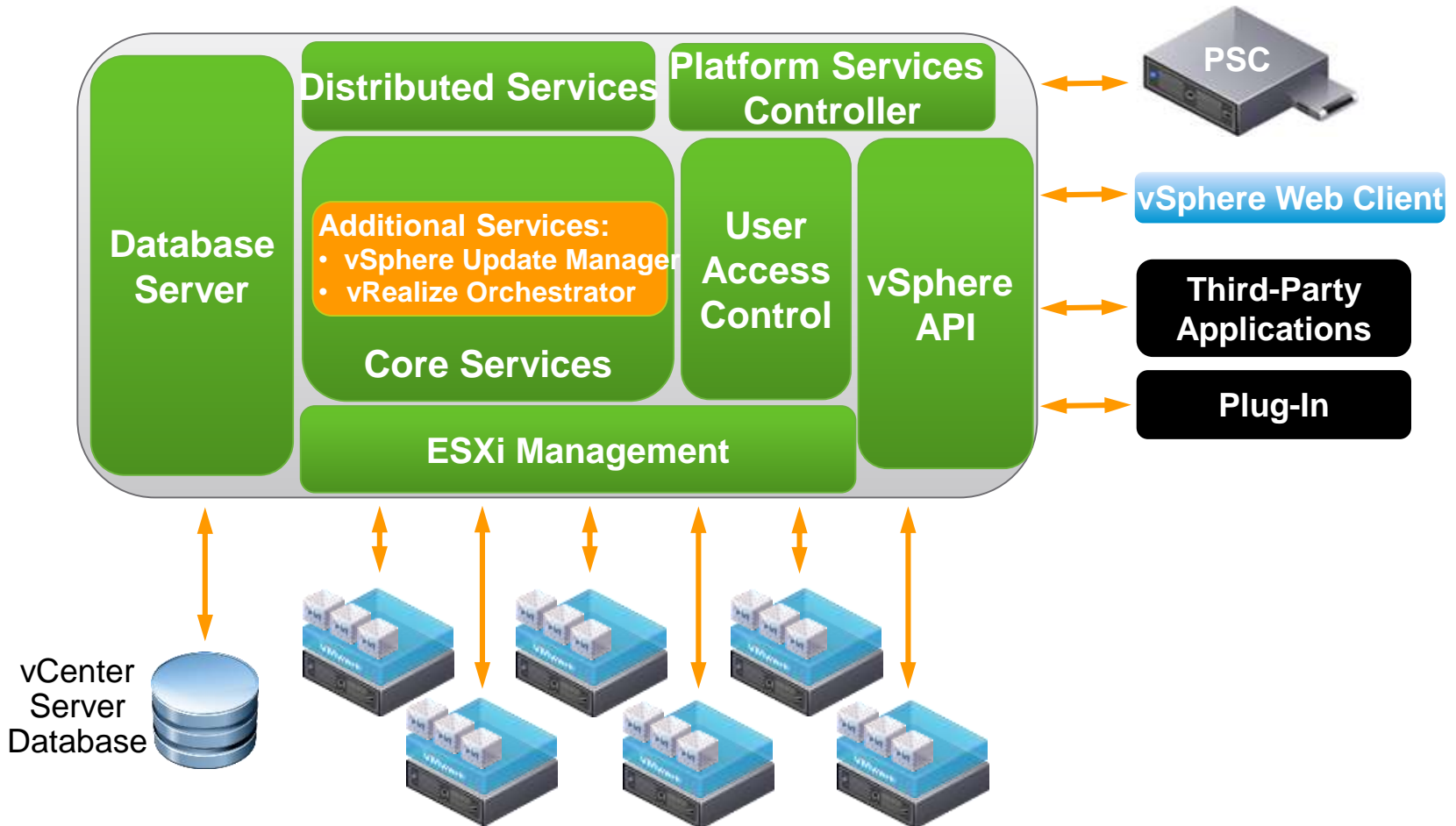
vCenter Server Architecture

The diagram shows the supporting components for vCenter Server.



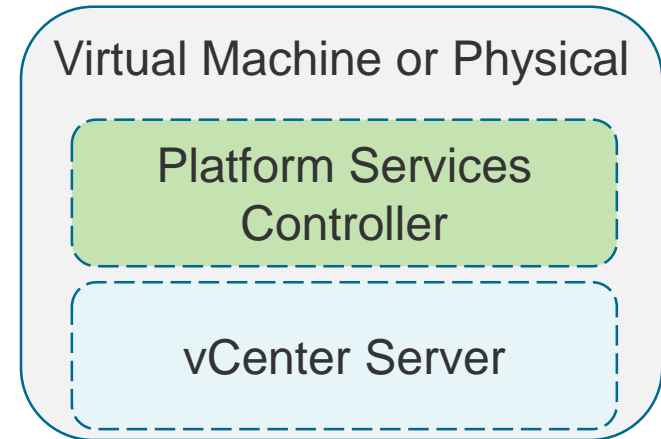
Additional vCenter Server Services and Interfaces

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



vCenter Server includes the Platform Services Controller:

- The Platform Services Controller includes a set of common infrastructure services:
 - VMware vCenter™ Single Sign-On™
 - VMware License Server
 - Lookup Service
 - Certificate Authority
 - Certificate Store
 - VMware Directory Services
- Other features are installed under the vCenter Server component.
- You can install vCenter Server and the Platform Services Controller on the same or different machines.

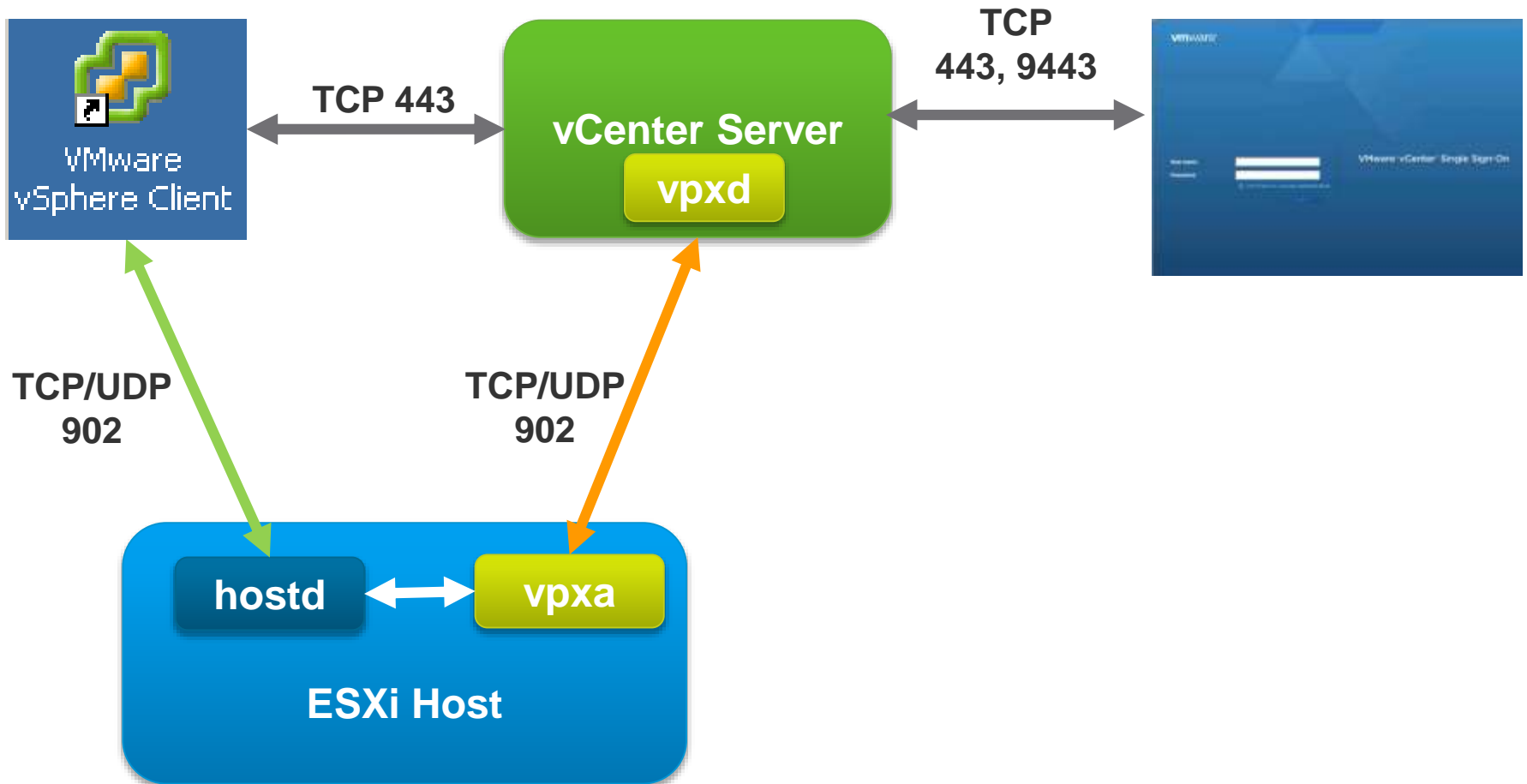


The vCenter Server group of services contains:

- vCenter Server
- VMware vSphere® Web Client (server)
- VMware Inventory Service
- 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 install the vCenter Server component, all of these features are included.

ESXi and vCenter Server Communication



vCenter Appliance



vCenter Server Appliance Features

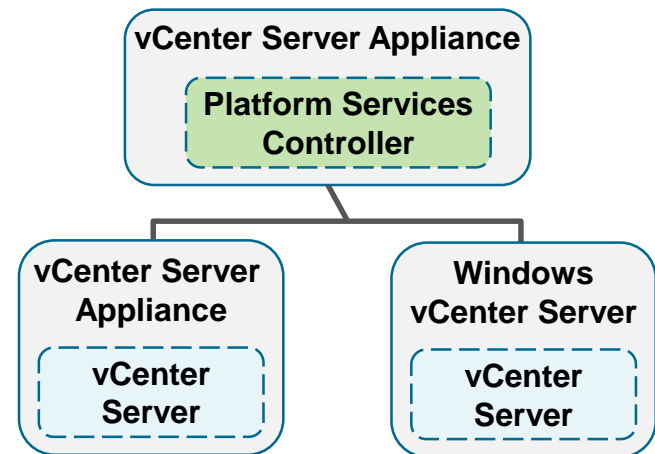
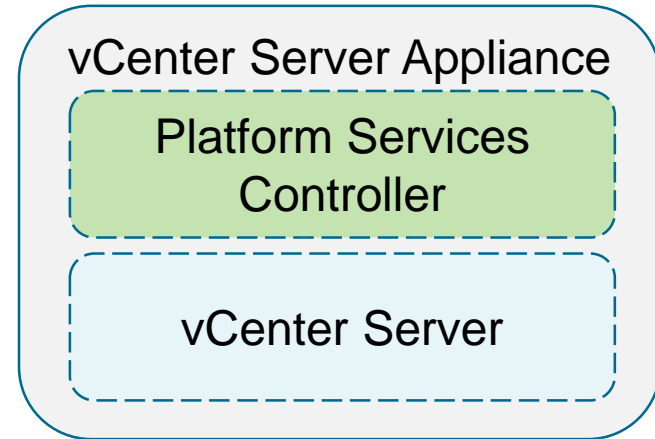
vCenter Server Appliance is a preconfigured, Linux-based virtual machine:

- Runs on SUSE Linux Enterprise Server 11, Update 3
- Can be used with ESXi 5.5 and later ESXi versions
- Is prepackaged with a PostgreSQL embedded database:
 - Suitable for environments with up to 1,000 hosts and 10,000 virtual machines
- Supports an external Oracle database when running in an enterprise
- Is equipped with the vCenter Server Appliance console, used for troubleshooting and configuration
- Supports centralized authentication

vCenter Server Appliance Basics

vCenter Server Appliance is functionally equivalent to vCenter Server installed on a Windows server:

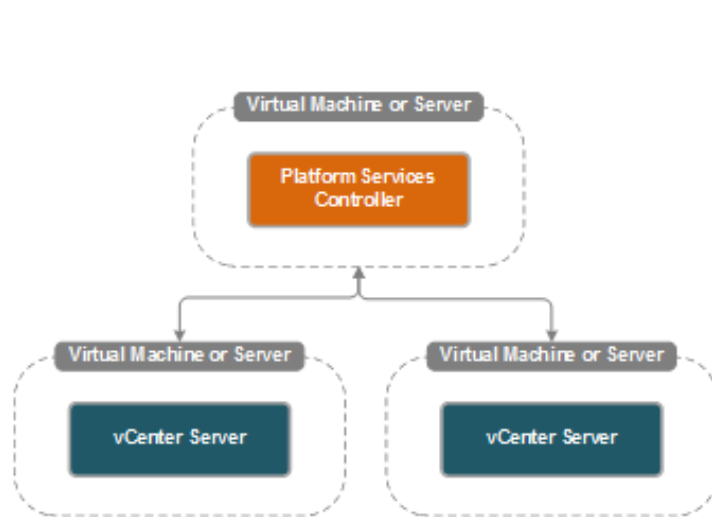
- vCenter Server Appliance can be configured with an embedded Platform Services Controller.
- vCenter Server Appliance can be configured as a distributed vCenter Server instance with an external Platform Services Controller.
- You can combine vCenter Server Appliance instances and vCenter Server systems installed on Windows servers in the same architecture.
- vCenter Server Appliance supports Linked Mode.



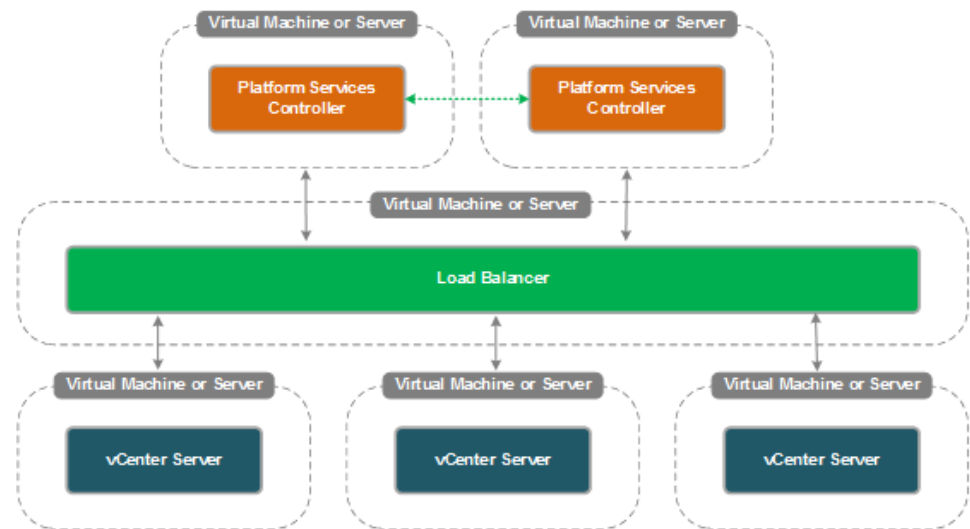
Platform Services Controller Deployment Recommendations (1)

Deployment Models Recommended for the Platform Services Controller in Enhanced Linked Mode

Enhanced Linked Mode with an External Platform Services Controller Without vSphere HA



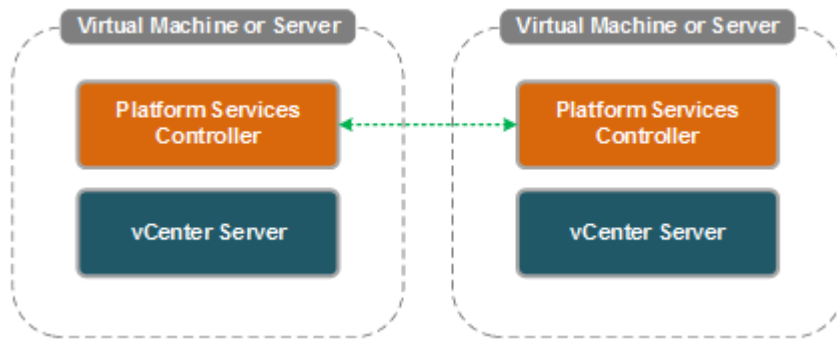
Enhanced Linked Mode with an External Platform Services Controller with vSphere HA



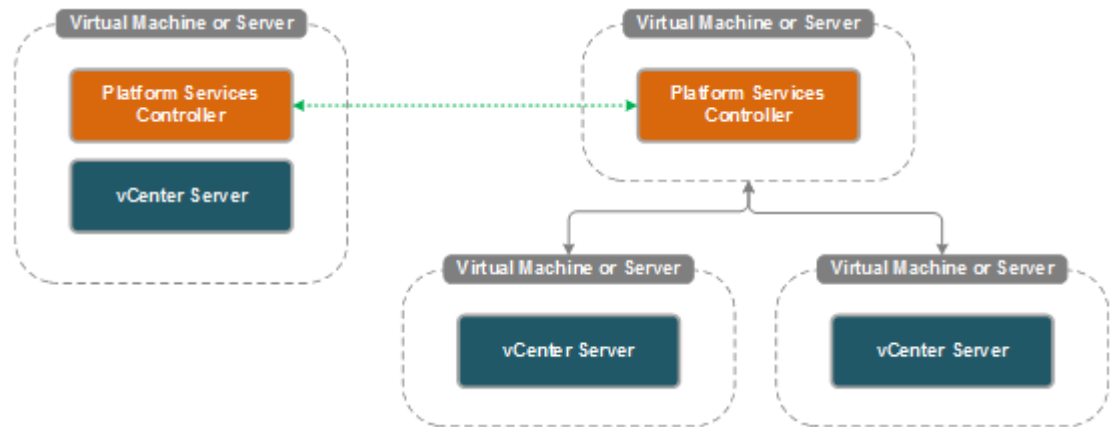
Platform Services Controller Deployment Recommendations (2)

Deployment Models Not Recommended for the Platform Services Controller in Enhanced Linked Mode

Enhanced Linked Mode with Embedded Platform Services Controllers



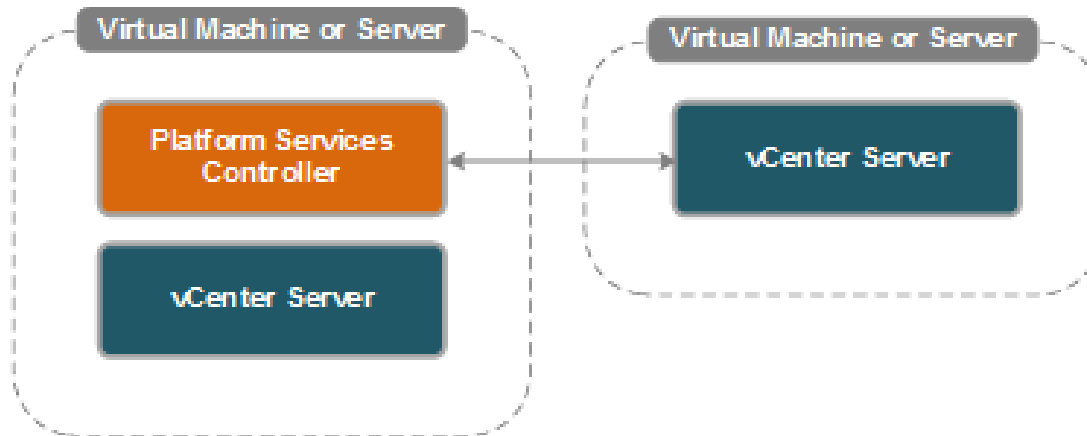
Combination Deployments of Both Embedded and external Platform Services Controllers



Platform Services Controller Deployment Recommendations (3)

Deployment Model Not Recommended for the Platform Services Controller in Enhanced Linked Mode

External vCenter Server System Linked to an Embedded Platform Services Controller



vCenter Server Appliance Scalability

vCenter Server Appliance scales to the same capacity as vCenter Server installed on a Windows machine.

Metric	Windows	Appliance
Hosts per vCenter Server System	1,000	1,000
Powered-on virtual machines per vCenter Server System	10,000	10,000
Hosts per cluster	64	64
Virtual machines per cluster	8,000	8,000
Database	Must be Oracle or SQL for full scalability	Can be either Oracle or embedded PostgreSQL
Linked Mode	Yes	Yes

In vSphere 6, the License Service is part of the Platform Services Controller.

It delivers centralized license management and reporting functionality to vSphere and to products integrated with vSphere.

It provides an inventory for licenses in the vSphere environment and manages the license assignments for ESXi hosts, vCenter Server systems, and clusters with VMware Virtual SAN™ enabled .

It manages the license assignments for products that integrate with vSphere.

vCenter Installation



When to Use a Windows Server or a Virtual Appliance

Should you use a Windows server or a virtual appliance?

Virtual appliance advantages:

- A virtual appliance is much easier to install and configure.
- No operating system license is required.
- All configuration is done through a GUI.
- vCenter Server running on a virtual appliance can scale to the same loads as a vCenter Server installed on a Windows server

vCenter Server system running on a Windows server advantages:

- Better for administrators who are more comfortable with Windows.
- More options for external database support.
- Configuration is done through a GUI, but individual components appear as Windows services.

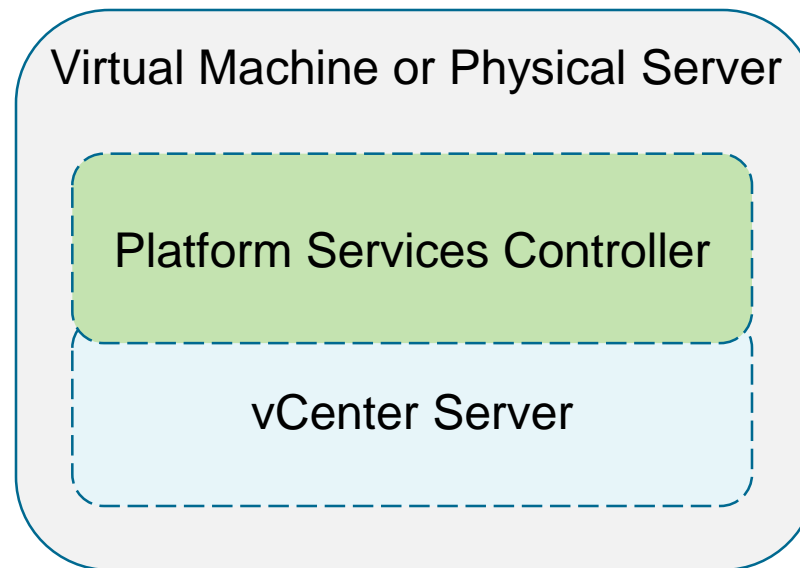
Both the Windows and the virtual appliance types of installation appear the same and operate the same in the vSphere Web Client, with identical functionality.

Consider the following options when you install a single (embedded) system or a distributed system:

- In a single system all components are installed on one server:
 - Much simpler to install.
 - Much simpler to manage.
 - The user interface calls a single system deployment an embedded deployment.
- In a distributed system you have multiple servers:
 - You can have different components on different servers.
 - A distributed system can handle higher loads and provide more fault tolerance if it is configured correctly.
 - The user interface calls a distributed deployment an external install.

vCenter Server in an Embedded Install

All services bundled with the Platform Services Controller are deployed on the same host as vCenter Server.

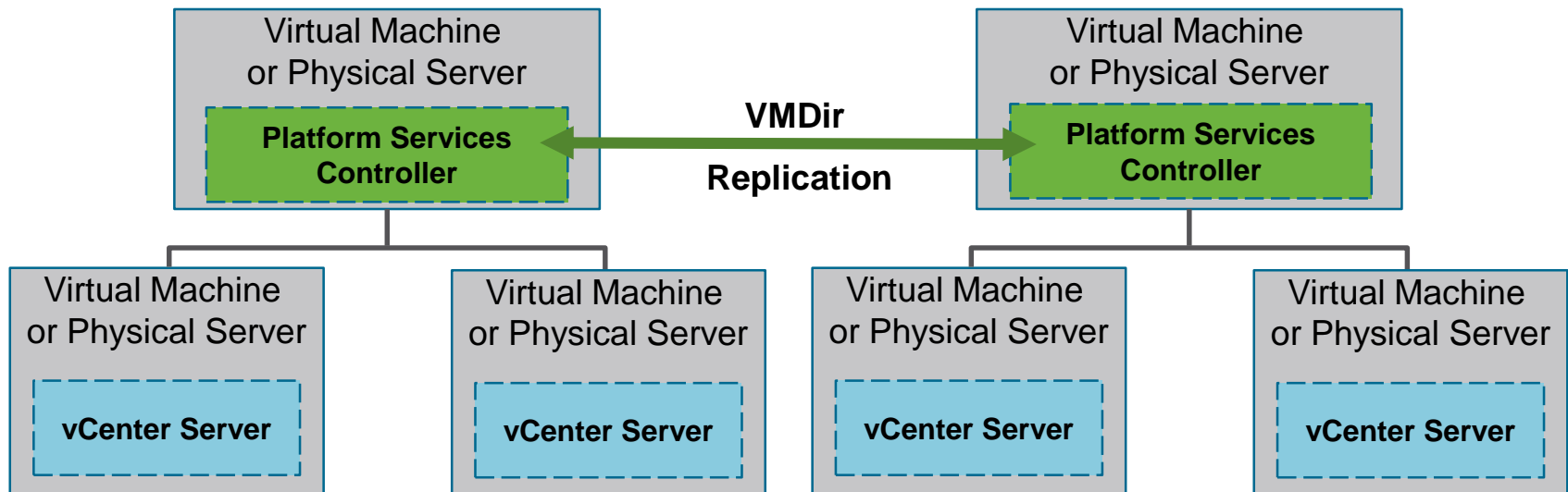


After a deployment method is selected, it cannot be undone.

Distributed vCenter Server System Configuration

The services included with Platform Services Controller and vCenter Server are deployed on different physical servers or virtual appliances.

You must first deploy Platform Services Controller on one machine and then deploy vCenter Server on another machine.



A single Platform Services Controller is suitable for deployments with eight or fewer vCenter Server instances.

Choosing an Installation Method

You must determine which vCenter Server installation method meets the needs of your organization:

- A virtual appliance is much easier to install and configure:
 - No operating system license is required.
 - All configuration is done through a GUI.
 - vCenter Server Appliance must be installed on an ESXi host.
- vCenter Server Appliance and Windows-based vCenter Server have the same functionality. Both can be used to manage large environments.

vCenter Server Appliance Benefits



VMware vCenter Server™ Appliance™ has many benefits:

- Simplified installation and setup.
- Contains all of the necessary services, such as vCenter Single Sign-On and the License Service, which can be shared between multiple vCenter Server instances.
- The VMware vFabric® Postgres embedded database supports larger environments than databases embedded in previous vCenter Server Appliance versions.
- Support for both IPv4 and IPv6 connectivity (no mixed mode deployments).

vCenter Server Appliance is a preconfigured Linux-based virtual machine, which is optimized for running vCenter Server.

- vCenter Server Appliance runs on SUSE Linux Enterprise Server 11, Update 3.
- vCenter Server Appliance can reside on a host running ESXi 5.5 or ESXi 6.
- Prepackaged with an embedded VMware vFabric® Postgres database :
 - Suitable for environments with up to 1,000 hosts and 10,000 virtual machines.
 - Also supports Oracle 11g R2 11.2.0.4 and Oracle 12c as external databases.
- Equipped with the vCenter Server Appliance console for troubleshooting and configuration.
- Supports vSphere Web Client.
- Supports connections by either IPv4 or IPv6 addresses.

Instead of using a virtual appliance, you can install vCenter Server on Microsoft Windows Server 2008 SP2 or later:

- Validate vCenter Server hardware and software requirements.
- Choose a vCenter Server database.
 - Embedded vFabric Postgres database
 - External database
- Install vCenter Server and the infrastructure services.
 - Embedded Platform Services
 - External Platform Services Controller

User Account for Running vCenter Server

You can use the Microsoft Windows built-in system account or a user account to run vCenter Server:

- User (administrator) account:
 - With this account, you can enable Windows authentication for SQL Server.
 - This account provides more security.
- Microsoft Windows built-in system account:
 - This account has more permissions and rights on the server than the vCenter Server system needs.
 - This account can contribute to security problems.
- The virtual appliance has a built-in administrator account (root).

vCenter Server Windows Host Requirements

At installation, when you select the deployment model, the preinstallation checker determines whether the Windows server on which you install vCenter Server meets the minimum hardware requirements.

vCenter Server with an Embedded Platform Services Controller		vCenter Server with an External Platform Services Controller	
Property		vCenter Server	Platform Services Controller
Memory	8 GB	8 GB	2 GB
Disk Space	17 GB	17 GB	4 GB
Number of CPUs	2	2	2

Supported Operating Systems for vCenter Server 6



Windows operating systems supported by vCenter Server 6:

- Microsoft Windows Server 2008 SP2 64-bit
- Microsoft Windows Server 2008 R2 64-bit
- Microsoft Windows Server 2008 R2 SP1 64-bit
- Microsoft Windows Server 2012 64-bit
- Microsoft Windows Server 2012 R2 64-bit

Before Installing vCenter Server

Before beginning the vCenter Server installation, ensure that the following prerequisites are met:

- Ensure that vCenter Server hardware and software requirements are met.
- Ensure that the vCenter Server system belongs to a Microsoft Windows domain rather than a workgroup.
- Create a vCenter Server database, unless you plan on using the embedded vFabric Postgres database:
 - If you create a database, you must also create a 64-bit data source name.
- Obtain and assign a static IP address and a host name to the vCenter Server system:
 - The name should be resolvable by DNS.
 - If you plan to use IPv6, the name should be resolvable in IPv6 by DNS.
- Create any administrator accounts that are needed.

Installing vCenter Server and Its Components

You use the VMware vCenter Installer to install vCenter Server.

Embedded
Deployment

Distributed
Deployment

Select deployment type

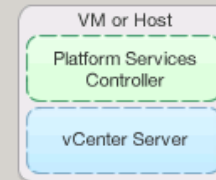
Select the component to deploy.

vCenter Server 6.0.0 requires a Platform Services Controller, which contains shared services such as vCenter Single Sign-On, Licensing, and Certificate Management. An embedded Platform Services Controller is deployed on the same Windows Host as vCenter Server. An external Platform Services Controller is deployed in a separate Windows Host. For smaller installations, consider vCenter Server with an embedded Platform Services Controller. For larger installations with multiple vCenter Servers, consider one or more Platform Services Controllers. Refer to product documentation for more information.

Note: Once you deploy vCenter Server, you can only change from an embedded to an external Platform Services Controller with a fresh install.

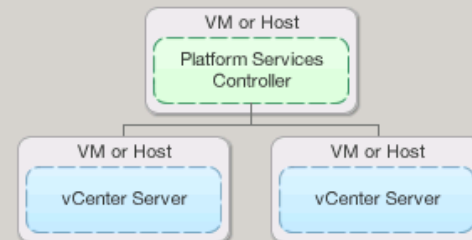
Embedded Deployment

- ☒ vCenter Server and Embedded Platform Services Controller



External Deployment

- ☐ Platform Services Controller
- ☐ vCenter Server
- A previously installed Platform Services Controller is required



< Back

Next >

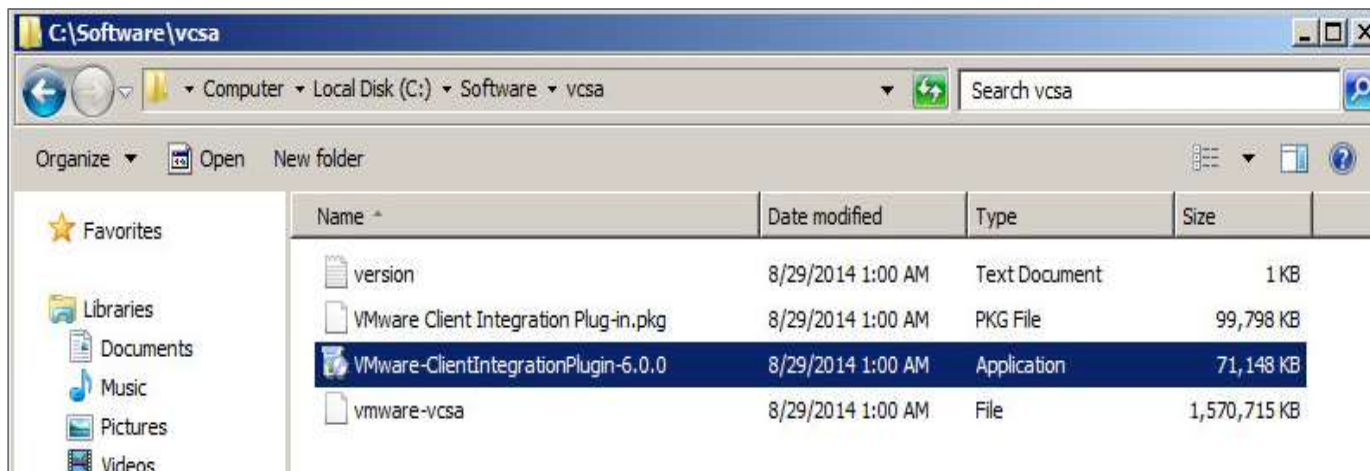
Cancel

Deploying vCenter Server Appliance

You can configure vCenter Server Appliance by using the vSphere Web Client, the appliance shell, or the Direct Console User Interface.

You must download and install the vCenter Server Appliance installer and the VMware Client Integration Plug-In.

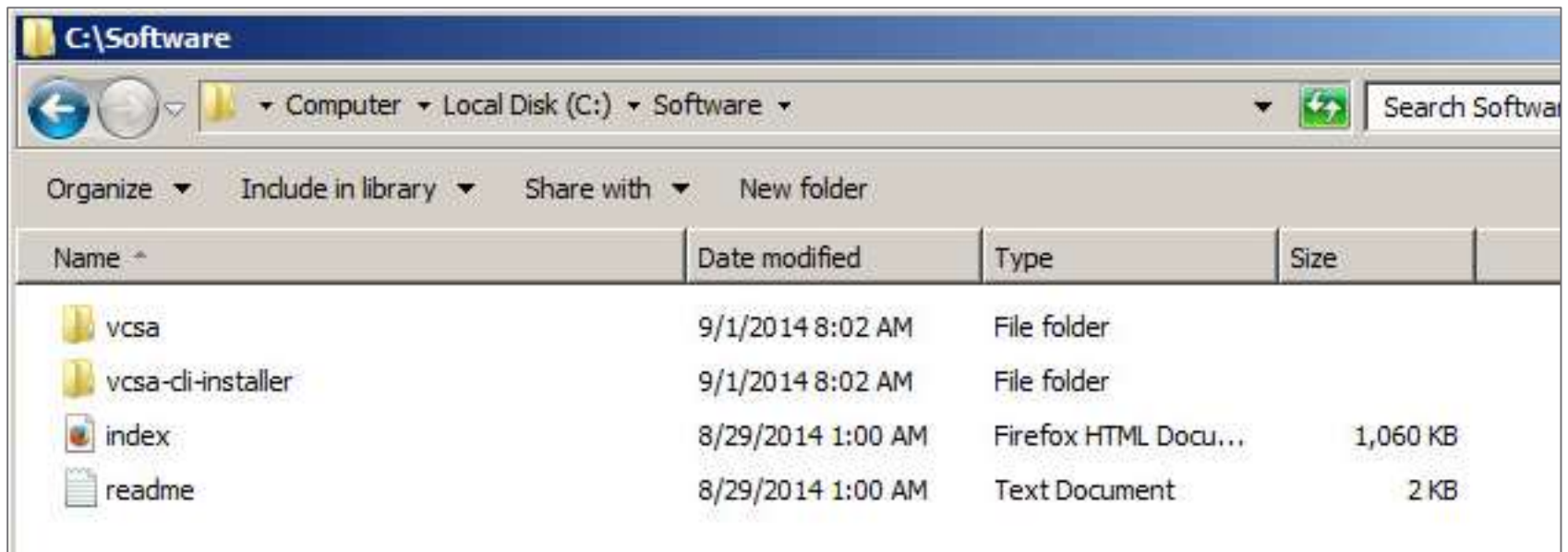
The Client Integration Plug-In provides access to a virtual machine's console in the vSphere Web Client as well as access to other vSphere infrastructure tasks.



vCenter Server Appliance Installation Media

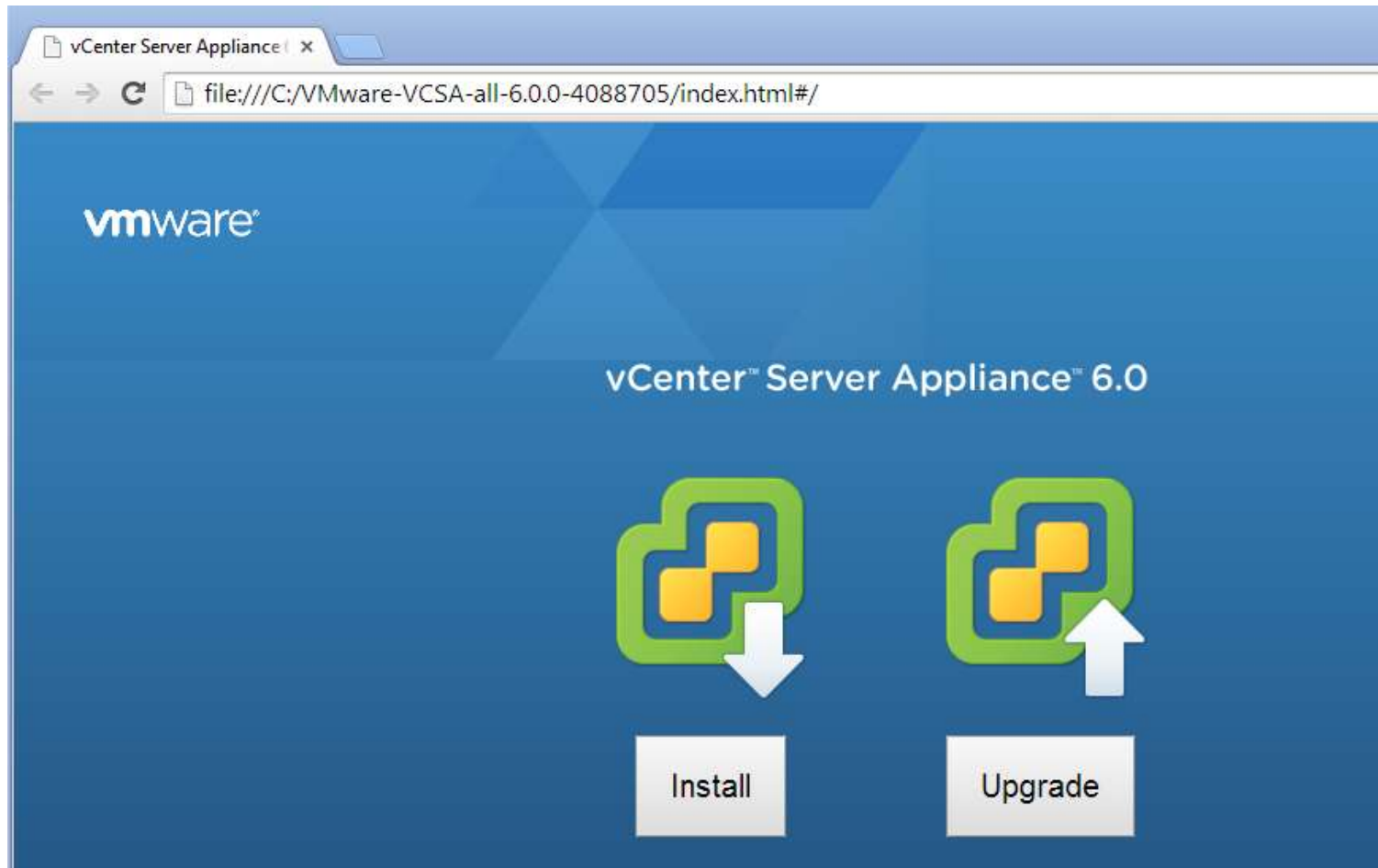
vCenter Server Appliance is distributed as an ISO image, which contains the following components:

- vCenter Server Appliance 6 data file (`vcsa` folder)
- Client Integration Plug-In 6 for Windows, Mac, and Linux
- vCenter Server Appliance command-line installer
- vCenter Server Appliance UI deployment Web page (`index.html`)



vCenter Server Appliance Installer

The vCenter Server Appliance ISO image contains a UI deployment Web page (`index.html`). Open this file to begin the installation.



Connecting to the ESXi Host on Which to Deploy vCenter Server Appliance

In the vCenter Server Appliance Deployment wizard, you connect to the target ESXi host where you deploy vCenter Server Appliance.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard. The left sidebar lists the steps: 1 End User License Agreement (checked), 2 Connect to target server (highlighted), 3 Set up virtual machine, 4 Select deployment type, 5 Set up Single Sign-on, 6 Select appliance size, 7 Select datastore, 8 Configure database, 9 Network Settings, and 10 Ready to complete. The main area is titled 'Connect to target server' with the instruction 'Specify the ESX host on which to deploy the vCenter Server Appliance.' Below this, there are three input fields: 'FQDN or IP Address:' with the value 'esxi60-a.srt.local', 'User name:' with the value 'root', and 'Password:' with a masked password '.....'. At the bottom right, there are four buttons: 'Back', 'Next' (highlighted with a green border), 'Finish', and 'Cancel'.

VMware vCenter Server Appliance Deployment

1 End User License Agreement
2 Connect to target server
3 Set up virtual machine
4 Select deployment type
5 Set up Single Sign-on
6 Select appliance size
7 Select datastore
8 Configure database
9 Network Settings
10 Ready to complete

Connect to target server
Specify the ESX host on which to deploy the vCenter Server Appliance.

FQDN or IP Address: esxi60-a.srt.local

User name: root

Password:

Back Next Finish Cancel

Specifying the Virtual Machine Name and Password for Root User

Enter the vCenter Server Appliance name and set the password for the root user.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard. The left sidebar contains a list of steps: 1 End User License Agreement, 2 Connect to target server, 3 Set up virtual machine (highlighted), 4 Select deployment type, 5 Set up Single Sign-on, 6 Select appliance size, 7 Select datastore, 8 Configure database, 9 Network Settings, and 10 Ready to complete. The main area is titled 'Set up virtual machine' with the instruction 'Specify virtual machine settings for the vCenter Server Appliance to be deployed.' Below this, there are four input fields: 'Appliance name:' with the value 'VCSA60-A.srt.local', 'OS user name:' with the value 'root', 'OS password:' with masked characters and an information icon, and 'Confirm OS password:' with masked characters. At the bottom right, there are four buttons: 'Back', 'Next' (highlighted with a red border), 'Finish', and 'Cancel'.


VMware vCenter Server Appliance Deployment

1 End User License Agreement
2 Connect to target server
3 Set up virtual machine
4 Select deployment type
5 Set up Single Sign-on
6 Select appliance size
7 Select datastore
8 Configure database
9 Network Settings
10 Ready to complete

Set up virtual machine
Specify virtual machine settings for the vCenter Server Appliance to be deployed.

Appliance name: VCSA60-A.srt.local

OS user name: root

OS password: 

Confirm OS password:

Back Next Finish Cancel

Selecting the Deployment Type

Select a deployment type based on your organization's needs.

VMware vCenter Server Appliance Deployment

✓ 1 End User License Agreement
✓ 2 Connect to target server
✓ 3 Set up virtual machine
4 Select deployment type
5 Set up Single Sign-on
6 Single Sign-on Site
7 Select appliance size
8 Select datastore
9 Configure database
10 Network Settings
11 Ready to complete

Select deployment type
Select the services to deploy onto this appliance.

vCenter Server 6.0 requires a Platform Services Controller, which contains shared services such as Single Sign-On, Licensing, and Certificate Management. An embedded Platform Services Controller is deployed on the same Appliance VM as vCenter Server. An external Platform Services Controller is deployed in a separate Appliance VM. For smaller installations, consider vCenter Server with an embedded Platform Services Controller. For larger installations with multiple vCenter Servers, consider one or more external Platform Services Controllers. Refer to the vCenter Server documentation for more information.

Note: Once you install vCenter Server, you can only change from an embedded to an external Platform Services Controller with a fresh install.

Embedded Platform Services Controller

☒ Install vCenter Server with an Embedded Platform Services Controller

External Platform Services Controller

☐ Install Platform Services Controller
☐ Install vCenter Server (Requires External Platform Services Controller)

Diagram:

- Embedded:** A single box labeled "VM or Host" containing a green dashed box "Platform Services Controller" and a blue dashed box "vCenter Server".
- External:** A green dashed box "Platform Services Controller" (labeled "VM or Host") connected to two separate blue dashed boxes "vCenter Server" (each labeled "VM or Host").

Back Next Finish Cancel

Configuring vCenter Single Sign-On

Configure vCenter Single Sign-On by specifying a password, a domain name, and a site name.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard. The left sidebar lists steps 1 through 10, with step 5 'Set up Single Sign-on' highlighted. The main area is titled 'Set up Single Sign-on' with the instruction 'Create or join a Single Sign-On domain.' Below this, there are two radio button options: 'Configure Single Sign-On' (selected) and 'Join a Single Sign-On domain in an existing platform services controller'. The 'Configure Single Sign-On' section contains five input fields: 'User name' (pre-filled with 'administrator'), 'Password' (masked with dots), 'Confirm password' (masked with dots), 'Domain name' (pre-filled with 'vsphere.local'), and 'Site name' (pre-filled with 'Kenmare'). Each of the last three fields has an information icon (i) to its right. At the bottom right, there are four buttons: 'Back', 'Next', 'Finish', and 'Cancel'.

VMware vCenter Server Appliance Deployment

- ✓ 1 End User License Agreement
- ✓ 2 Connect to target server
- ✓ 3 Set up virtual machine
- ✓ 4 Select deployment type
- 5 Set up Single Sign-on**
- 6 Select appliance size
- 7 Select datastore
- 8 Configure database
- 9 Network Settings
- 10 Ready to complete

Set up Single Sign-on
Create or join a Single Sign-On domain.

☒ Configure Single Sign-On
☐ Join a Single Sign-On domain in an existing platform services controller

User name: administrator

Password: [masked] ⓘ

Confirm password: [masked]

Domain name: vsphere.local ⓘ

Site name: Kenmare ⓘ

Back Next Finish Cancel

Selecting a vCenter Server Appliance Size

Select the vCenter Server Appliance size based on the size of your vSphere inventory.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard. On the left, a list of steps is shown: 1 End User License Agreement, 2 Connect to target server, 3 Set up virtual machine, 4 Select deployment type, 5 Set up Single Sign-on, 6 Select appliance size (highlighted), 7 Select datastore, 8 Configure database, 9 Network Settings, and 10 Ready to complete. The main area is titled 'Select appliance size' with the instruction 'Specify a deployment size for the new appliance'. Below this, there is a label 'Select Appliance size:' followed by a dropdown menu showing 'Embedded-Tiny (up to 20 hosts, 4)'. A 'Description' section below the dropdown states: 'This will deploy a Tiny VM configured with 2 vCPUs and 8 GB of memory. Please note this option contains vCenter Server with an embedded infrastructure controller.' At the bottom right, there are four buttons: 'Back', 'Next' (highlighted with a red border), 'Finish', and 'Cancel'.

VMware vCenter Server Appliance Deployment

1 End User License Agreement
2 Connect to target server
3 Set up virtual machine
4 Select deployment type
5 Set up Single Sign-on
6 Select appliance size
7 Select datastore
8 Configure database
9 Network Settings
10 Ready to complete

Select appliance size
Specify a deployment size for the new appliance

Select Appliance size: Embedded-Tiny (up to 20 hosts, 4)

Description
This will deploy a Tiny VM configured with 2 vCPUs and 8 GB of memory. Please note this option contains vCenter Server with an embedded infrastructure controller.

Back Next Finish Cancel

Selecting a Datastore

From the list of available datastores, select the location where all the virtual machine configuration files and virtual disks will be stored and, optionally, enable thin provisioning.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard at step 7, 'Select datastore'. The left sidebar lists steps 1 through 10, with step 7 highlighted. The main area is titled 'Select datastore' and 'Select the storage location for this deployment'. It contains a table of accessible datastores and a checkbox for 'Enable Thin Disk Mode'.

1 End User License Agreement
2 Connect to target server
3 Set up virtual machine
4 Select deployment type
5 Set up Single Sign-on
6 Select appliance size
7 Select datastore
8 Configure database
9 Network Settings
10 Ready to complete

Select datastore
Select the storage location for this deployment

The following datastores are accessible. Select the destination datastore for the virtual machine configuration files and all of the virtual disks.

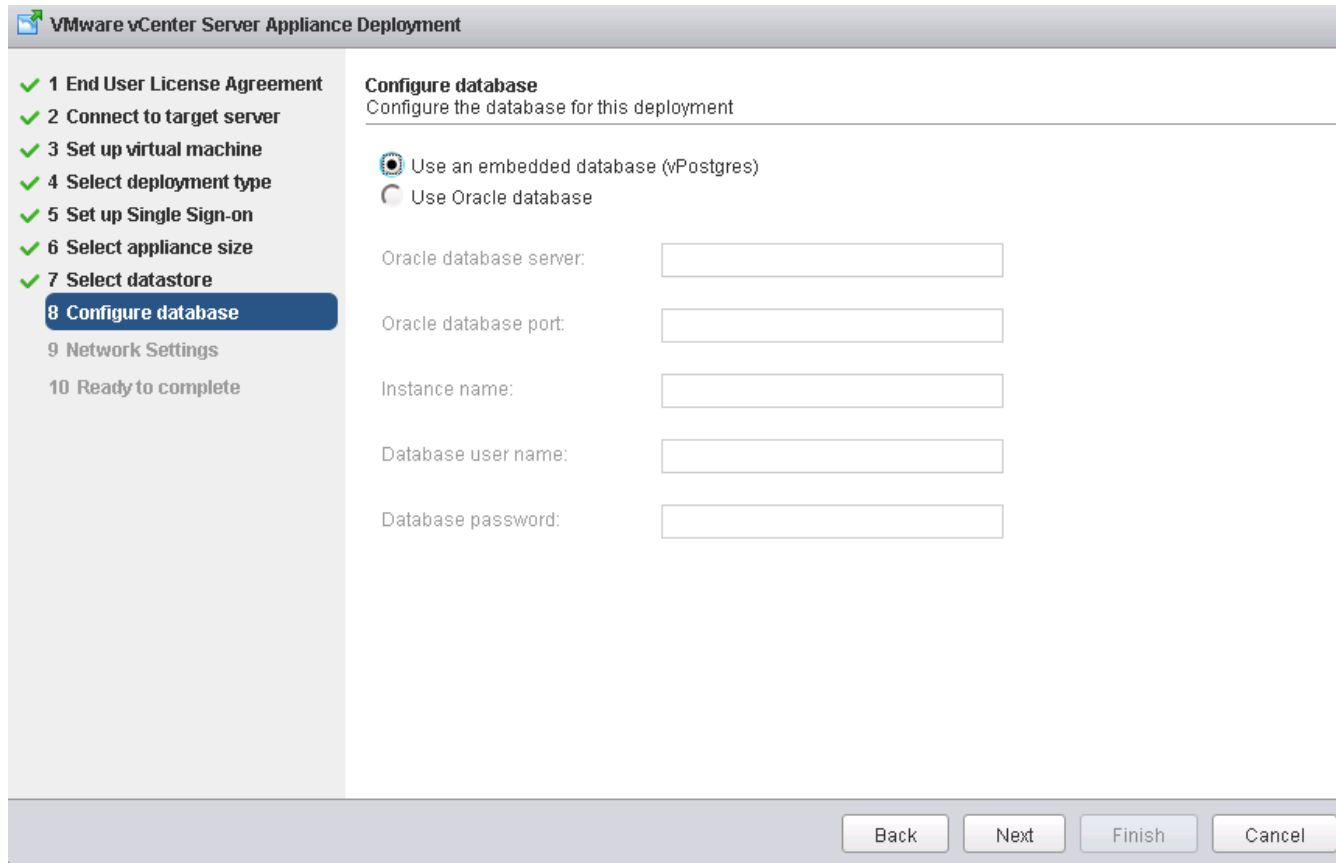
name	Type	Capacity	Free	Provisioned	Thin Provisioning
datastore1	VMFS	0.5 GB	0.48 GB	0.02 GB	true
NFS-A	NFS	28.94 GB	28.94 GB	0 GB	true

☒ Enable Thin Disk Mode

Back Next Finish Cancel

Configuring a Database

You can configure vCenter Server Appliance to either use an existing Oracle database or use the embedded PostgreSQL database that is suitable for small-scale deployments.



The screenshot shows the 'Configure database' step of the VMware vCenter Server Appliance Deployment wizard. The left sidebar lists the steps, with '8 Configure database' highlighted. The main area contains two radio buttons: 'Use an embedded database (vPostgres)' (selected) and 'Use Oracle database'. Below these are five text input fields for Oracle database configuration: 'Oracle database server:', 'Oracle database port:', 'Instance name:', 'Database user name:', and 'Database password:'. At the bottom right are four buttons: 'Back', 'Next', 'Finish', and 'Cancel'.

VMware vCenter Server Appliance Deployment

- ✓ 1 End User License Agreement
- ✓ 2 Connect to target server
- ✓ 3 Set up virtual machine
- ✓ 4 Select deployment type
- ✓ 5 Set up Single Sign-on
- ✓ 6 Select appliance size
- ✓ 7 Select datastore
- 8 Configure database**
- 9 Network Settings
- 10 Ready to complete

Configure database
Configure the database for this deployment

☒ Use an embedded database (vPostgres)
☐ Use Oracle database

Oracle database server:

Oracle database port:

Instance name:

Database user name:

Database password:

Back Next Finish Cancel

Configuring Network Settings

You must configure network settings, specify if you want to enable SSH, and select a time sync option.

The screenshot shows the 'VMware vCenter Server Appliance Deployment' wizard. On the left, a list of steps is shown with green checkmarks for steps 1 through 8, and step 9 'Network Settings' is highlighted in blue. Step 10 'Ready to complete' is listed below. The main area is titled 'Network Settings' with the instruction 'Configure network settings for this deployment.' Below this, several configuration fields are present: 'Choose a network:' with a dropdown menu showing 'VM Network'; 'IP address family:' with a dropdown menu showing 'ipv4'; 'Network type:' with a dropdown menu showing 'static'; 'Network address:' with a text box containing '172.20.10.91'; 'System name [FQDN or IP address]:' with a text box containing 'vcva01.vclass.local' and an information icon; 'Subnet mask:' with a text box containing '255.255.255.0'; 'Network gateway:' with a text box containing '172.20.10.1'; 'Network DNS Servers separated by commas' with a text box containing '172.20.10.10'; and 'Configure time sync:' with two radio button options: 'Synchronize appliance time with host' (which is selected) and 'Use NTP servers (Separated by commas)'. At the bottom right, there are four buttons: 'Back', 'Next', 'Finish', and 'Cancel'.

VMware vCenter Server Appliance Deployment

✓ 1 End User License Agreement
✓ 2 Connect to target server
✓ 3 Set up virtual machine
✓ 4 Select deployment type
✓ 5 Set up Single Sign-on
✓ 6 Select appliance size
✓ 7 Select datastore
✓ 8 Configure database
9 Network Settings
10 Ready to complete

Network Settings
Configure network settings for this deployment.

Choose a network: VM Network

IP address family: ipv4

Network type: static

Network address: 172.20.10.91

System name [FQDN or IP address]: vcva01.vclass.local

Subnet mask: 255.255.255.0

Network gateway: 172.20.10.1

Network DNS Servers separated by commas: 172.20.10.10

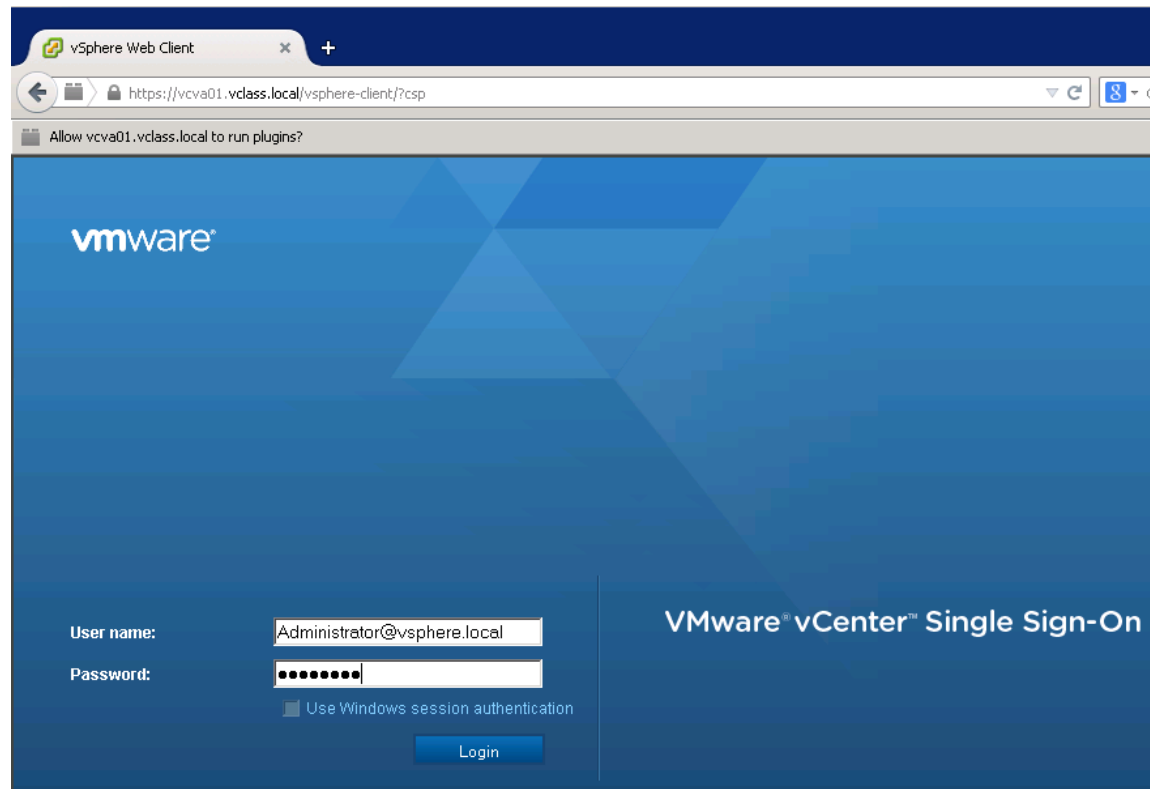
Configure time sync:
☒ Synchronize appliance time with host
☐ Use NTP servers (Separated by commas)

Back Next Finish Cancel

Using the vSphere Web Client to Log In to vCenter Server

After you deploy vCenter Server Appliance, log in to it by using the vSphere Web Client to manage your vSphere inventory.

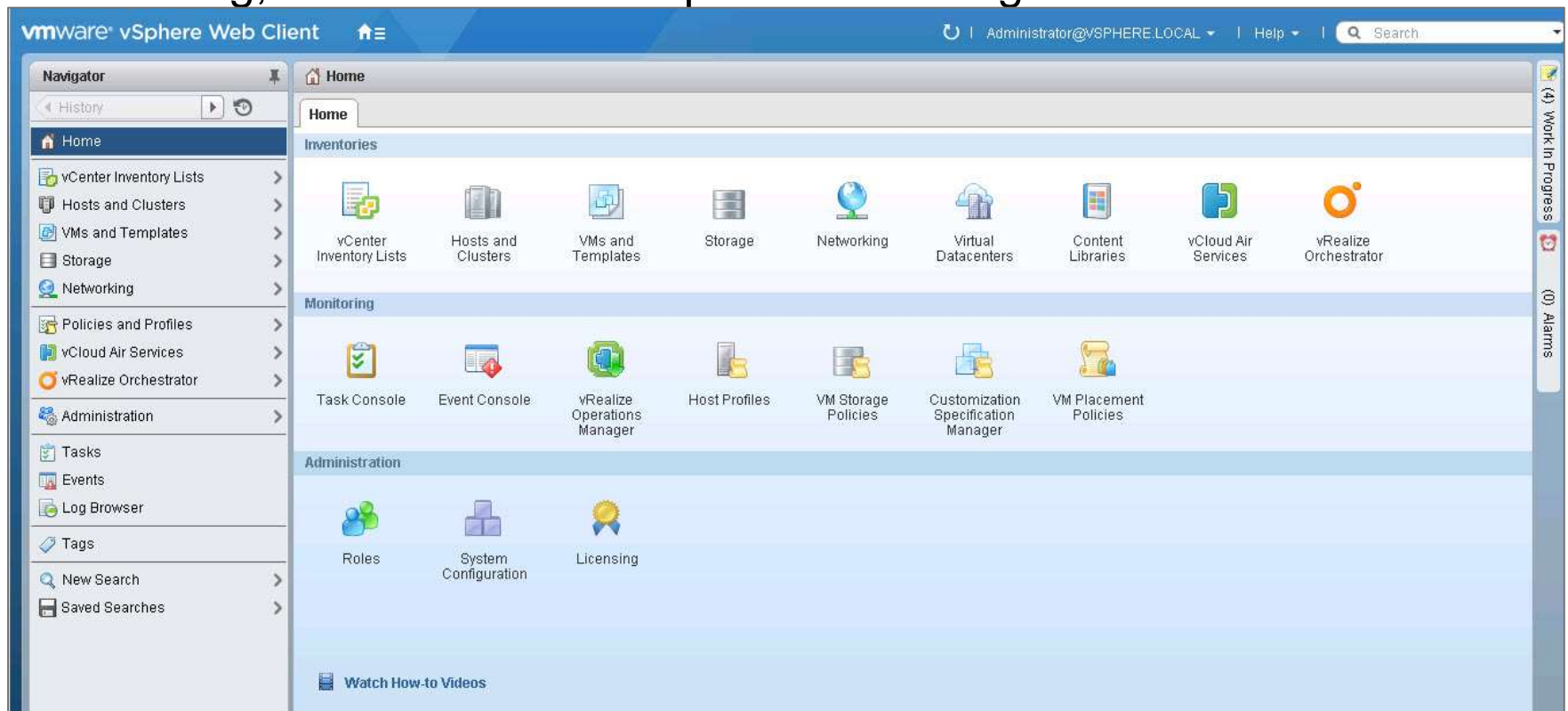
- Open a Web browser and enter the URL for the vSphere Web Client:
`https://appliance_IP_address_or_FQDN/vsphere-client`.



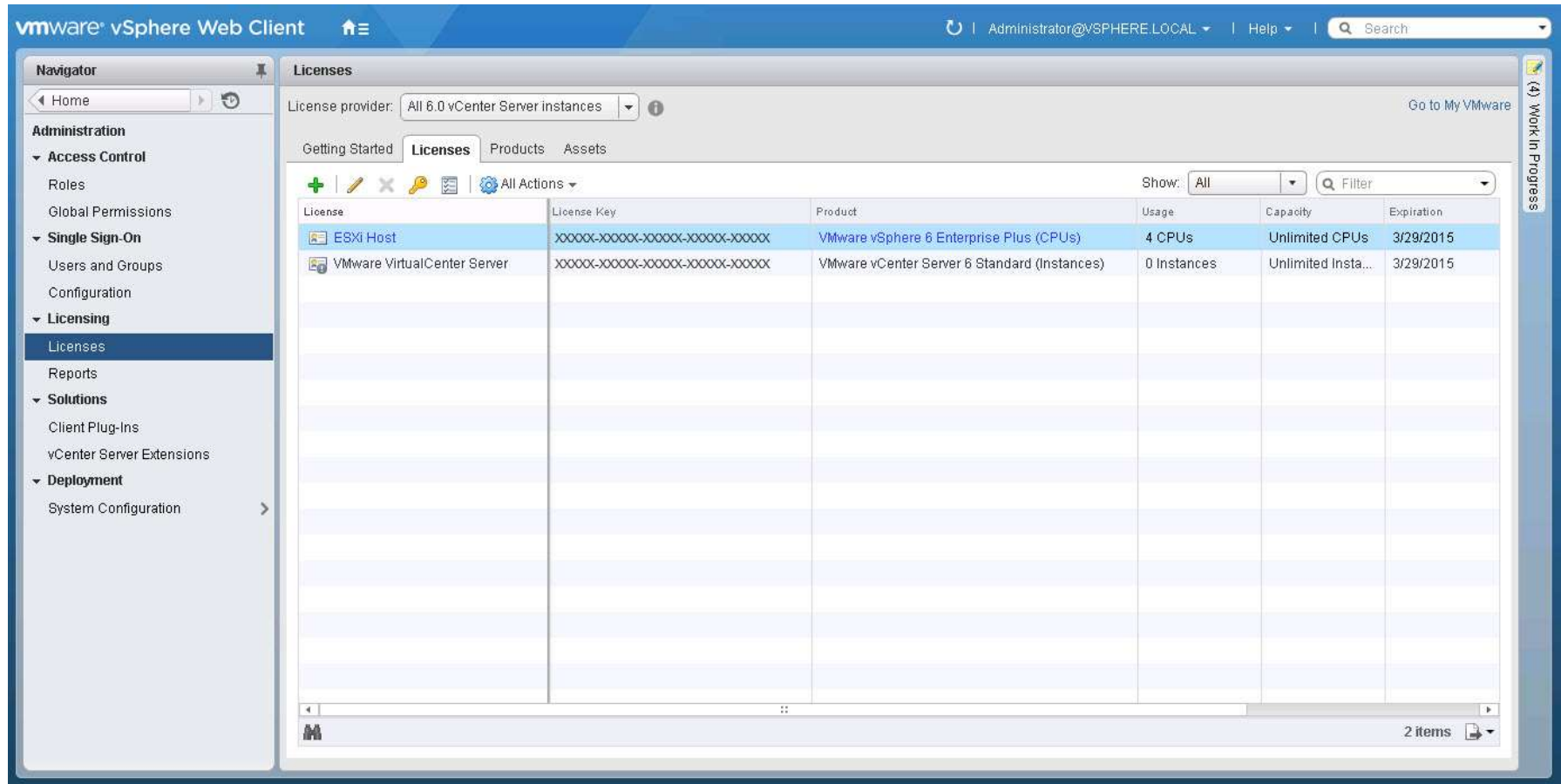
vSphere Web Client Home Page

The vSphere Web Client Home page appears the first time that you use the vSphere Web Client to log in to your vCenter Server system.

The Home page has a Navigator pane on the left and Inventories, Monitoring, and Administration panes on the right.



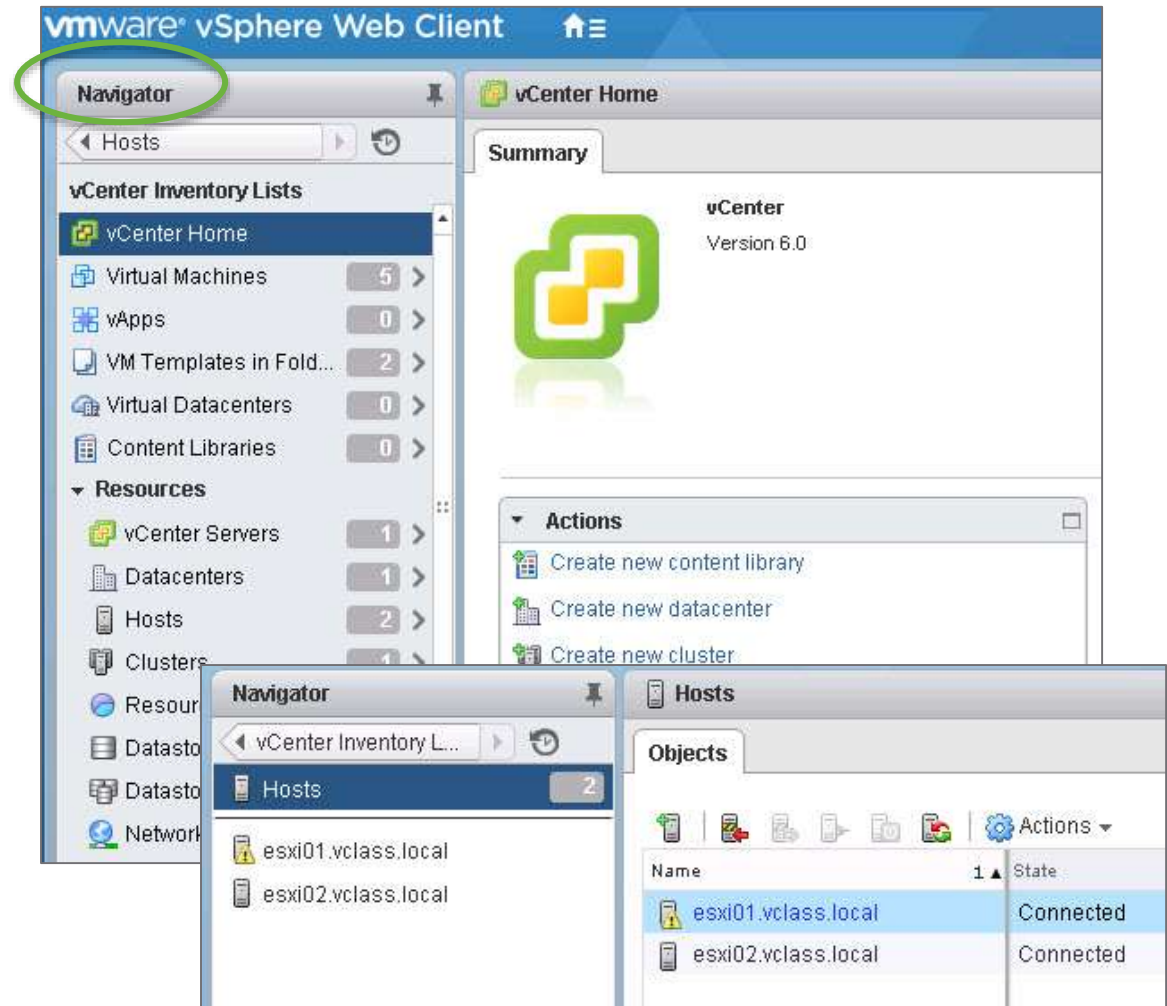
Assign a license to vCenter Server before its 60-day evaluation period expires.



Using the vSphere Web Client Navigator

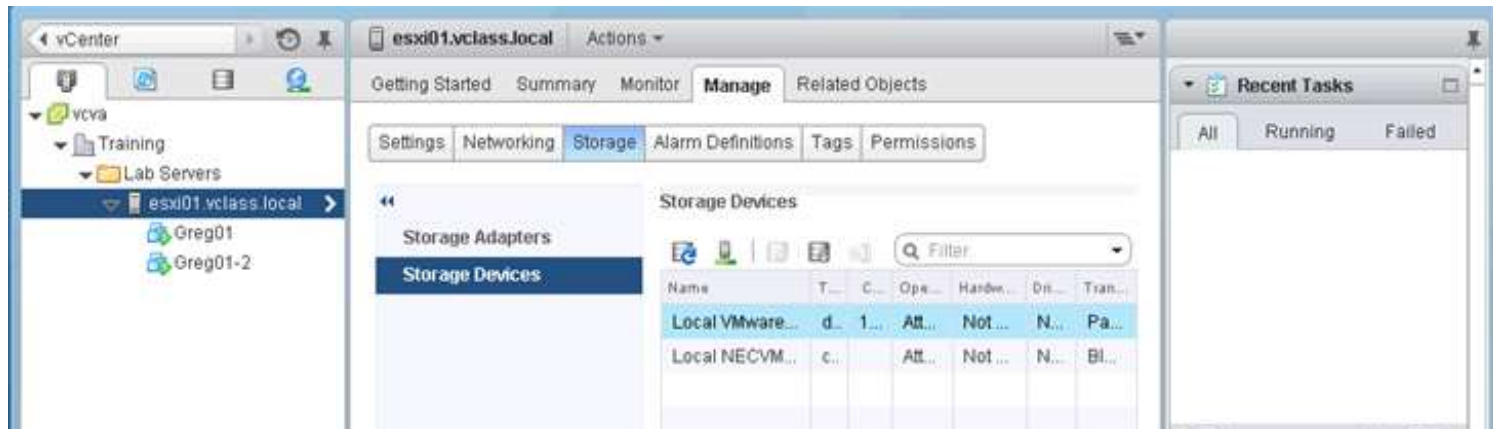
You can use the Navigator pane to browse and select objects in the vSphere Web Client inventory.

The navigator presents a graph-based view of the inventory, which enables you to navigate inventory objects.

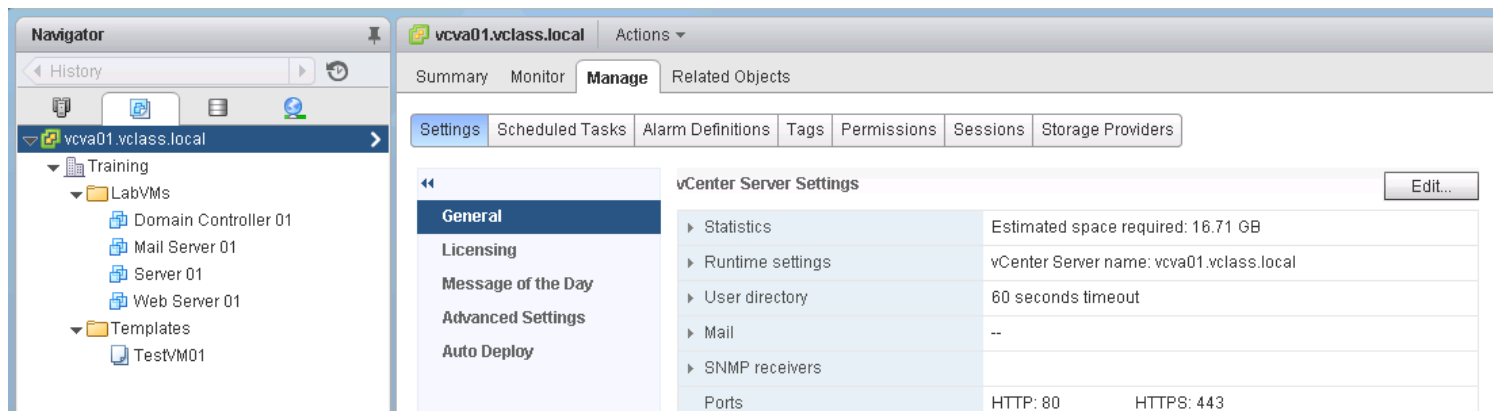


vCenter Server Views: Hosts and Clusters, VMs and Templates

Hosts and Clusters Inventory View

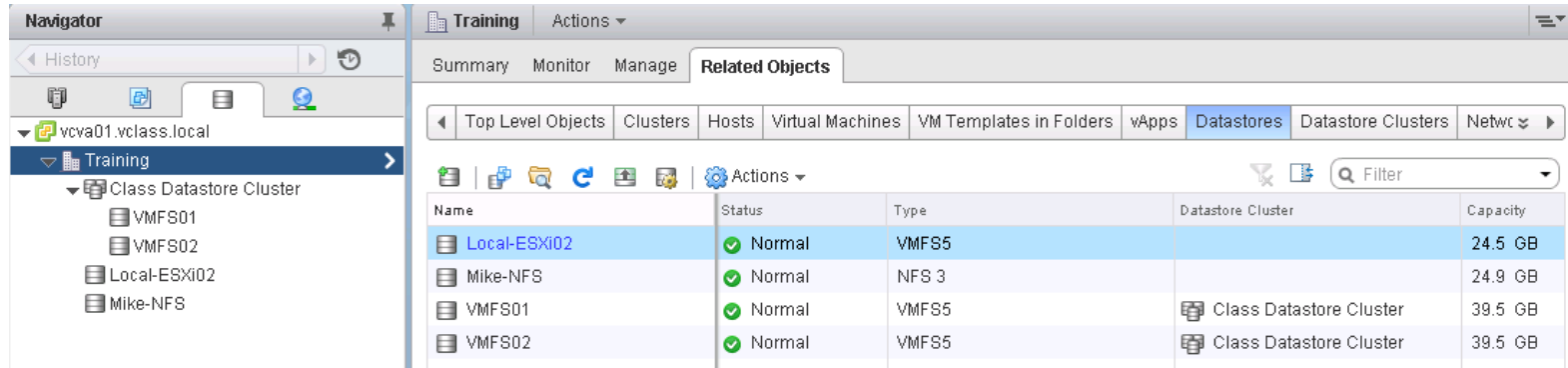


VMs and Templates Inventory View



vCenter Server Views: Storage and Networks

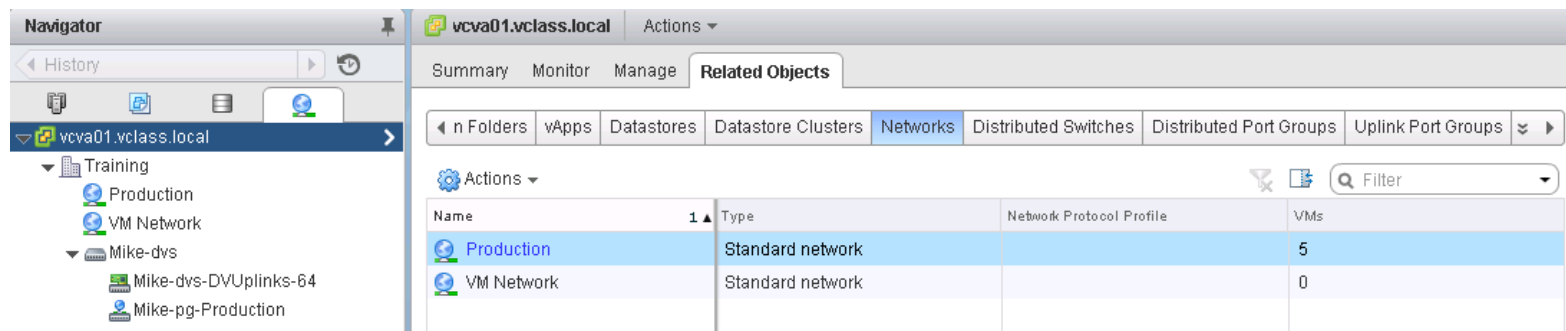
Storage Inventory View



The screenshot shows the vCenter Storage Inventory View. The left pane (Navigator) displays the hierarchy: vcva01.vclass.local > Training > Class Datastore Cluster. The right pane shows the 'Related Objects' tab with the 'Datastores' filter selected. A table lists the following datastores:

Name	Status	Type	Datastore Cluster	Capacity
Local-ESXi02	Normal	VMFS5		24.5 GB
Mike-NFS	Normal	NFS 3		24.9 GB
VMFS01	Normal	VMFS5	Class Datastore Cluster	39.5 GB
VMFS02	Normal	VMFS5	Class Datastore Cluster	39.5 GB

Networks Inventory View



The screenshot shows the vCenter Networks Inventory View. The left pane (Navigator) displays the hierarchy: vcva01.vclass.local > Training > VM Network > Mike-dvs. The right pane shows the 'Related Objects' tab with the 'Networks' filter selected. A table lists the following networks:

Name	Type	Network Protocol Profile	VMs
Production	Standard network		5
VM Network	Standard network		0

Viewing Object Information

Because you can navigate to view object information and access related objects, monitoring and managing object properties is easy.

The screenshot displays the VMware vSphere Web Client interface for an ESXi host named 'esxi01.vclass.local'. The 'Summary' tab is active, showing various host details and resource usage.

Host Details:

- Type: ESXi
- Model: VMware, Inc. VMware Virtual Platform
- Processor Type: Intel(R) Xeon(R) CPU X5650 @ 2.67GHz
- Logical Processors: 2
- NICs: 4
- Virtual Machines: 2
- State: Connected
- Uptime: 34 days

Resource Usage:

- USED: 120.00 MHz, CAPACITY: 5.33 GHz
- MEMORY: USED: 1.69 GB, FREE: 2.31 GB, CAPACITY: 4.00 GB
- STORAGE: USED: 14.77 GB, FREE: 39.66 GB, CAPACITY: 54.43 GB

SSH for the host has been enabled (Warning message)

Hardware Section:

- Tags:** This list is empty.
- Update Manager Compliance:** Status: --

Configuration Section:

- ESX/ESXi Version: VMware ESXi, 6.0.0, 2283102
- Image Profile: (Updated) ESXi-6.0.0-2283102-standard
- vSphere HA State: Running (Master)
- Fault Tolerance (Legacy): Unsupported
- Fault Tolerance: Supported
- EVC Mode: Disabled

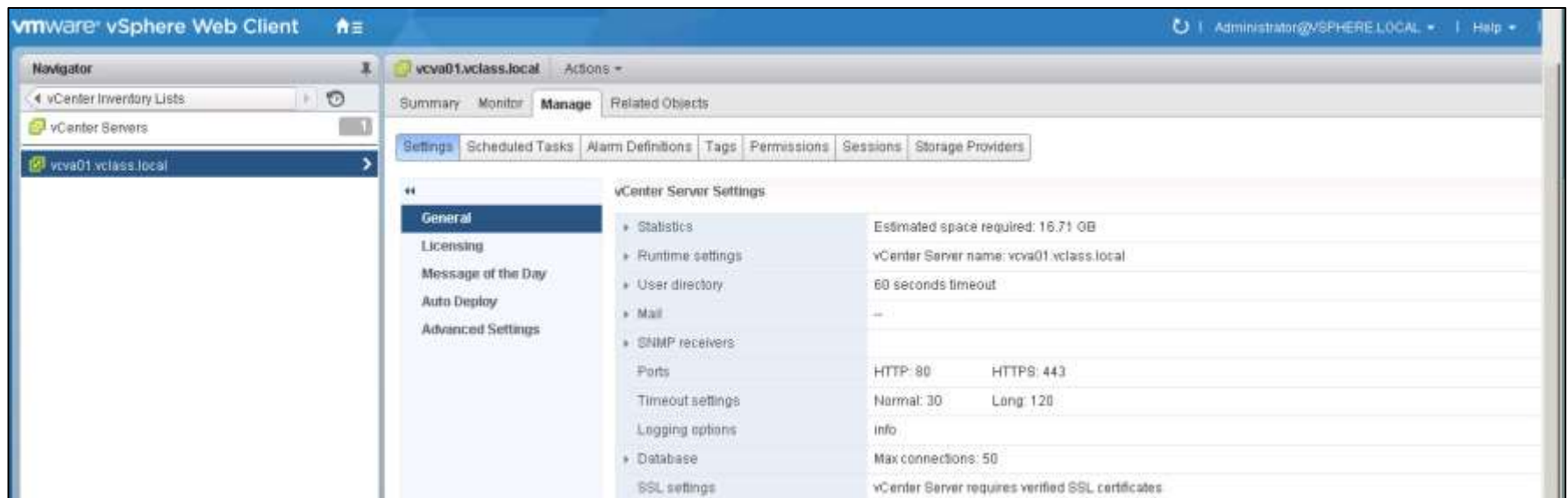
Related Objects Section:

- Cluster: Lab Cluster
- More Related Objects

Configuring vCenter Server Settings

You can configure your vCenter Server system from the vSphere Web Client, including settings such as licensing, statistics collection, logging, and other settings.

- To access the vCenter Server system settings, navigate to the vCenter Server system in the vSphere Web Client and click the **Manage** > **Settings** tabs.



Managing the vCenter Server Services

You can manage vCenter Server services by selecting **Administration** > **System Configuration** from the Home page and selecting **Services**.

The screenshot shows the VMware vSphere Web Client interface. In the left-hand 'Navigator' pane, the 'Administration' tree is expanded, and 'System Configuration' is selected. Under 'System Configuration', the 'Services' sub-item is highlighted. The main content area displays the 'System Configuration' page with the 'Summary' tab active. It includes a description of the system configuration and a list of services. Below the description, there is a note about important information regarding node and service health. At the bottom, two health status tables are provided: 'Nodes Health' and 'Services Health'.

System Configuration

Using System Configuration, you can manage and monitor the management stack running the vCloud Suite. The management stack includes nodes and the services running in each node.

[Learn more about vCenter Server Appliance configuration](#)

Note the following important information:

- Nodes running vSphere 5.5.x cannot be viewed in System Configuration. Upgrade your environment.
- Non-vCSA nodes do not support some features such as rebooting, monitoring and configuration systems to perform these tasks.

Nodes Health	
Critical	0 Nodes
Warning	0 Nodes
Unknown	0 Nodes
Good	1 Node
Not applicable	0 Nodes

Services Health	
Critical	0 Services
Warning	0 Services
Unknown	1 Service
Good	17 Services
Not applicable	3 Services

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

The 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.

The screenshot displays the VMware vSphere Web Client interface, specifically the System Configuration page. The left sidebar shows the Navigator with 'Services' selected, listing 20 services. The main content area shows the 'System Configuration' summary, including a note about important information and two health status panels.

System Configuration Summary:

- Nodes Health:**
 - Critical: 0 Nodes
 - Warning: 0 Nodes
 - Unknown: 0 Nodes
 - Good: 1 Node
 - Not applicable: 0 Nodes
- Services Health:**
 - Critical: 1 Service
 - Warning: 1 Service
 - Unknown: 0 Services
 - Good: 15 Services
 - Not applicable: 3 Services

A 'Services in Good Health' pop-up window lists the following services:

- VMware Syslog Service (vcva01.vclass.local)
- VMware vSphere Update Manager Extension (vcva01....)
- Virtual Datacenter Service (vcva01.vclass.local)
- Hardware Health Service (vcva01.vclass.local)
- License Service (vcva01.vclass.local)
- VMware vService Manager (vcva01.vclass.local)
- VMware vSphere Web Client (vcva01.vclass.local)

The bottom section shows the 'Recent Tasks' table with columns: Task Name, Target, Status, Initiator, Queued For, and Start Time.

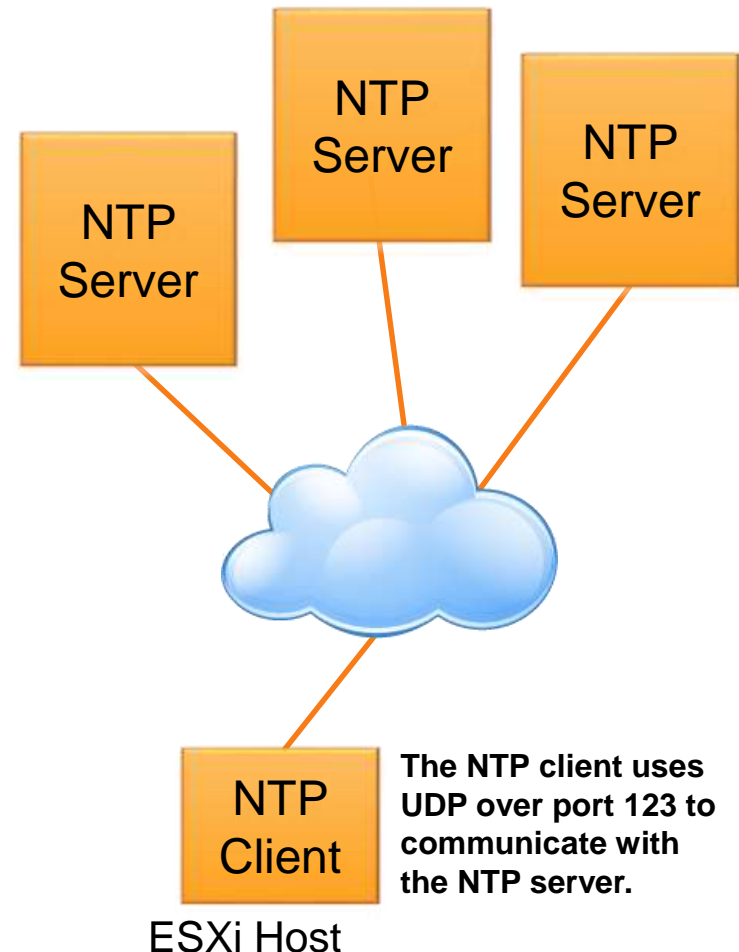
ESXi Host as an NTP Client

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

NTP is important:

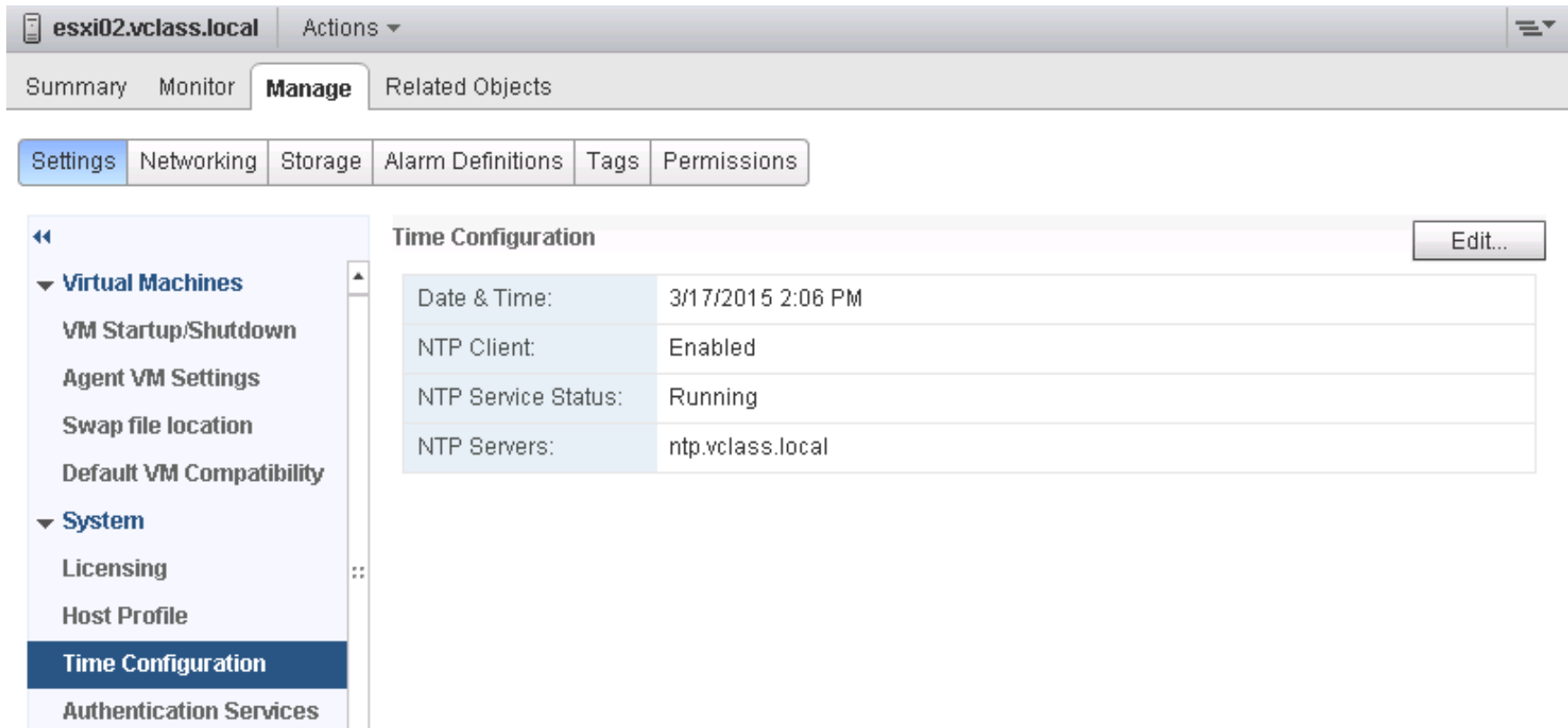
- For accurate performance graphs
- For accurate time stamps in log messages
- So that virtual machines have a source to synchronize with

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.



Configuring ESXi Host Time Synchronization

Configure Network Time Protocol (NTP) settings for each host:



The screenshot displays the vSphere Client interface for host **esxi02.vclass.local**. The **Manage** tab is selected, and the **Settings** sub-tab is active. In the left-hand navigation pane, the **System** category is expanded, and **Time Configuration** is selected. The main content area shows the **Time Configuration** settings, which include a table of current values and an **Edit...** button.

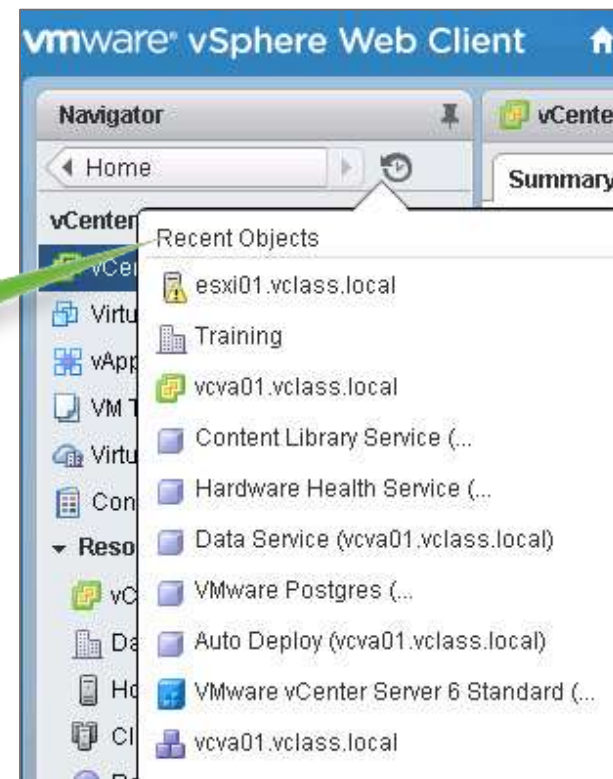
Time Configuration	
Date & Time:	3/17/2015 2:06 PM
NTP Client:	Enabled
NTP Service Status:	Running
NTP Servers:	ntp.vclass.local

Viewing Recent Objects

You can quickly navigate to the objects that you visited during your vSphere Web Client session.

You can revisit objects without having to search in the inventory tree.

You use the **Recent Objects** icon to view objects that you visited or created in your environment.



Using Quick Filters

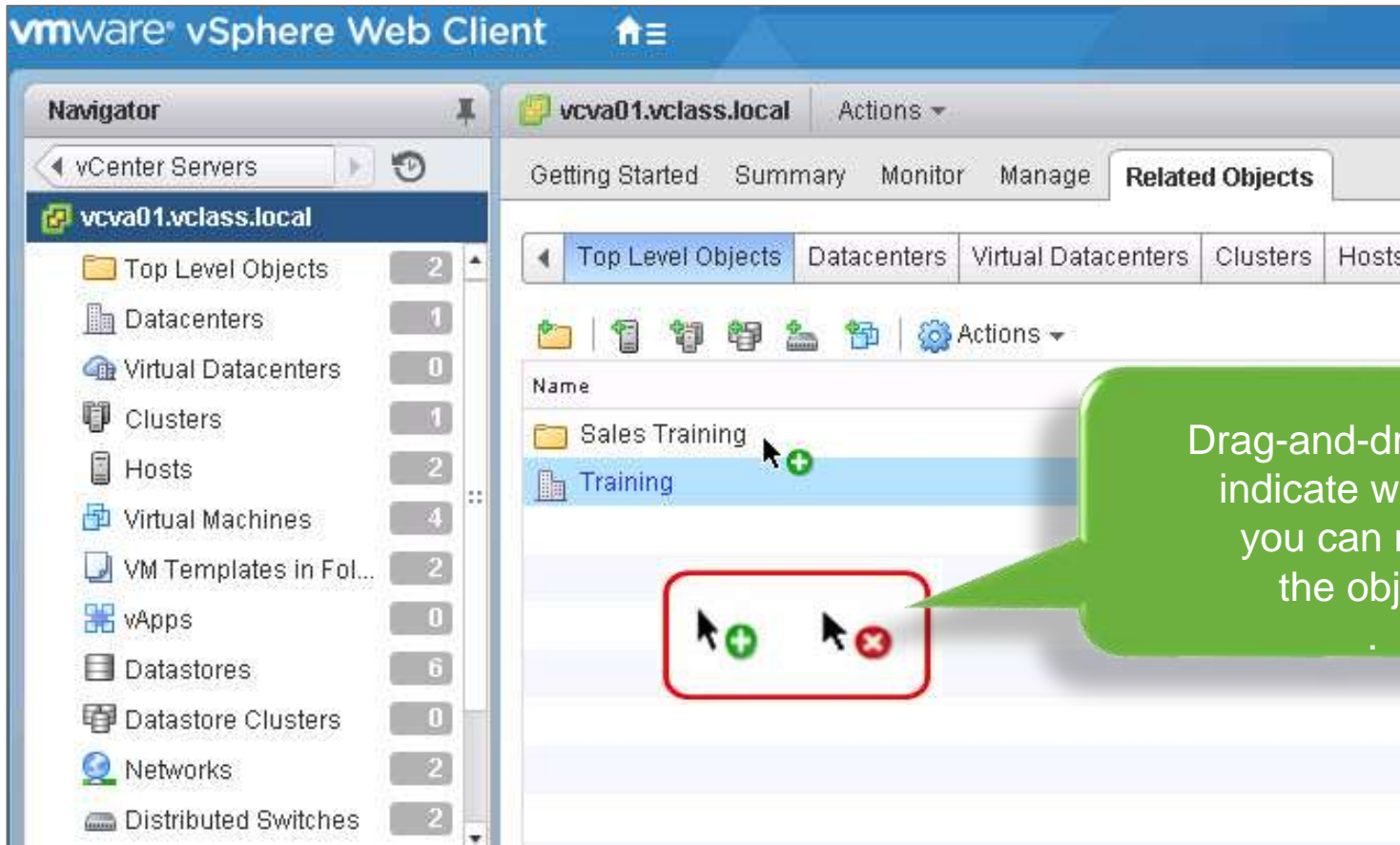
You can use quick filters to find an object or a set of objects in the vSphere inventory by using certain display criteria.

The screenshot shows the VMware vSphere Web Client interface. The left sidebar displays the 'Navigator' pane with 'vCenter Inventory L...' and 'vcva01.vclass.local'. The main pane shows the 'Related Objects' tab for 'vcva01.vclass.local', with the 'Virtual Machines' sub-tab selected. A table lists four virtual machines: Mike02-2, Mike02-3, Vivian01-2, and Vivian01-3. The table columns include Name, State, Status, Provisioned Space, Used Space, Host CPU, and Host Memory. A green callout box with the text 'Show or hide the quick filters options.' points to the 'Filter' button in the top right corner of the VM list. The right sidebar shows the 'Overall Compliance' section with checkboxes for Noncompliant, Unknown, Compliant, and Updating. Below this are sections for 'Tags', 'State' (with 'Powered On' checked), 'Needs Consolidation' (with 'Yes' and 'No' options), 'Blocked by Question', 'vSphere FT Role', 'VMware Tools Version Status', and 'VMware Tools Running Status'. The bottom right corner of the interface indicates '4 of 4 Objects'.

Name	State	Status	Provisioned Space	Used Space	Host CPU	Host Memory
Mike02-2	Powered On	Alert	11.17 GB	7.18 GB	2,666 MHz	1,039 MB
Mike02-3	Powered On	Normal	11.17 GB	7.26 GB	79 MHz	1,039 MB
Vivian01-2	Powered On	Normal	11.17 GB	7.07 GB	106 MHz	1,036 MB
Vivian01-3	Powered On	Normal	11.17 GB	11.17 GB	106 MHz	1,031 MB

Using Drag-and-Drop Functionality

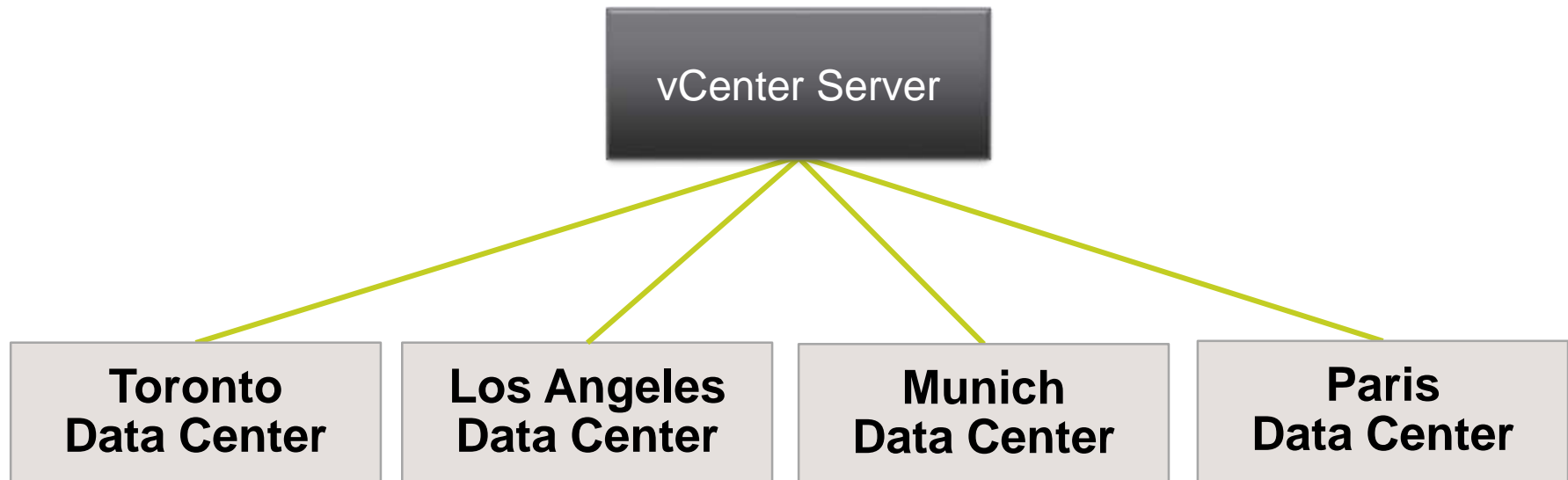
You can drag an inventory object to another location. This action is an alternative way to perform tasks that are available in the context menu.



About Data Center Objects

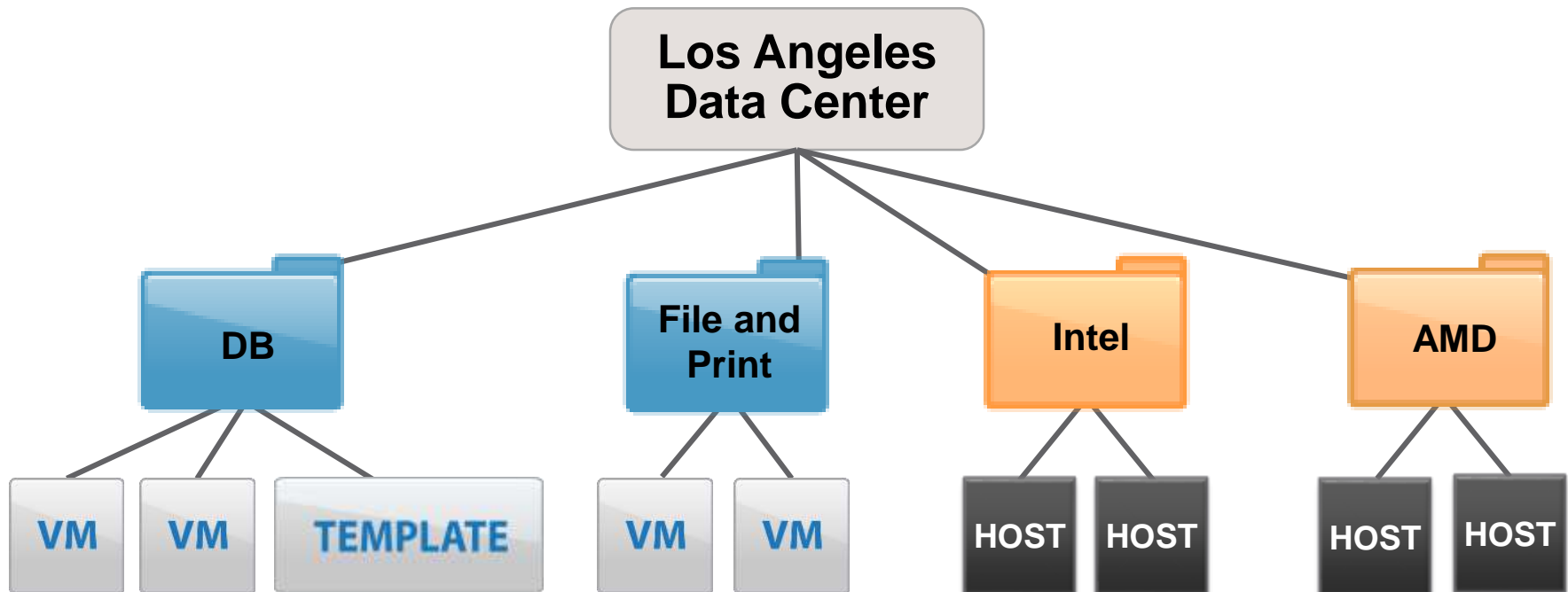
A virtual data center is a container for all the inventory objects required to complete a fully functional environment for operating virtual machines:

- You can create multiple data centers to organize sets of environments.
- Each data center has its own hosts, virtual machines, templates, datastores, and networks.



Organizing Inventory Objects into Folders

Items in the data center can be placed into folders. Folders and subfolders can be created to better organize systems.



Using Folders

You can use folders to group objects of the same type for easier management. For example, permissions can be applied to folders, enabling you to use folders to group objects that should have a common set of permissions.

The screenshot displays the vCenter Server interface. On the left, the **Navigator** pane shows a tree view of vCenter Servers. Under **vcva01.vclass.local**, there are folders for **APACJ**, **EMEA**, **North America**, **Training**, and **South America**. The **Training** folder contains **Lab Servers** and **Lab Cluster test**. The main pane shows the **Summary** tab for **vcva01.vclass.local**. It includes a green VMware logo, a summary of Virtual Machines (4) and Hosts (1), and resource usage bars for CPU, MEMORY, and STORAGE. Below these are two expandable panels: **Tags** (empty) and **Version Information** (showing Version 6.0.0 and Build 2444733).

CPU	
USED: 92.00 MHz	FREE: 5.24 GHz
CAPACITY: 5.33 GHz	

MEMORY	
USED: 1.41 GB	FREE: 4.59 GB
CAPACITY: 6.00 GB	

STORAGE	
USED: 54.53 GB	FREE: 73.87 GB
CAPACITY: 128.40 GB	

Tags		
Assigned Tag	Category	Description
This list is empty.		

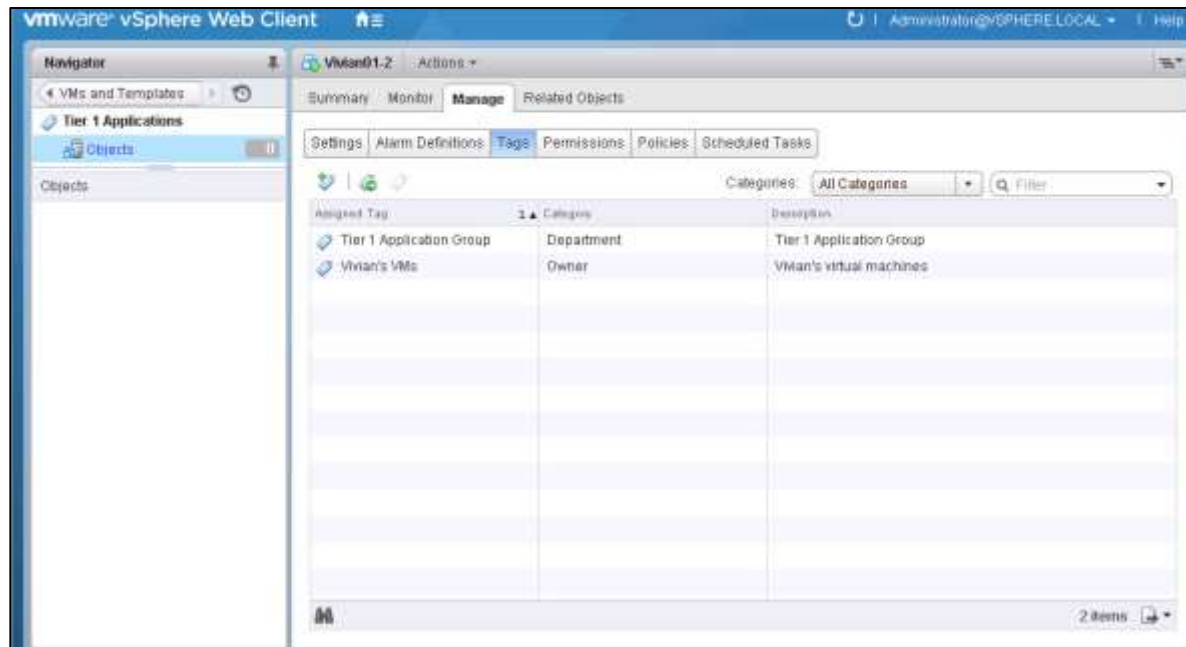
Version Information	
Version	6.0.0
Build	2444733

Creating Custom Tags for Inventory Objects

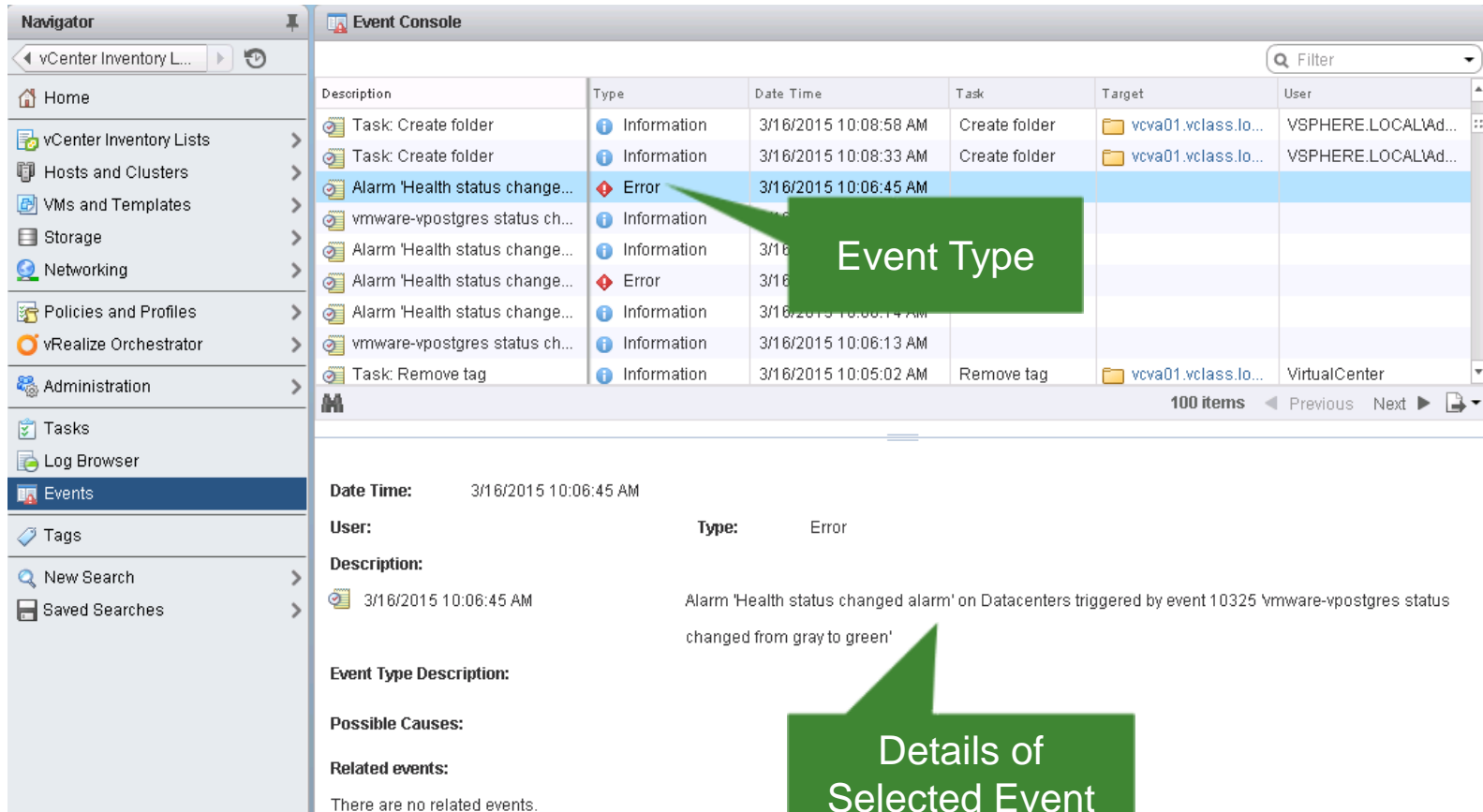
Tags enable you to attach metadata to objects in the vSphere inventory to make these objects more sortable.

You can associate a set of objects of the same type:

- Search for objects by that tag.
- Enable a business case where customers want to create groups of virtual machines, clusters, and datastores for ease of management.



Events are records of user actions or system actions that occur on objects in vCenter Server or on a host.



The screenshot displays the vCenter Event Console interface. On the left is the Navigator pane with a tree view containing categories like Home, vCenter Inventory Lists, Hosts and Clusters, VMs and Templates, Storage, Networking, Policies and Profiles, vRealize Orchestrator, Administration, Tasks, Log Browser, Events (selected), Tags, New Search, and Saved Searches. The main Event Console pane shows a table of events with columns: Description, Type, Date Time, Task, Target, and User. A green callout box labeled "Event Type" points to the "Error" type of the selected event. Below the table, the details for the selected event are shown, including Date Time, User, Type, Description, Event Type Description, Possible Causes, and Related events. A green callout box labeled "Details of Selected Event" points to this details section.

Description	Type	Date Time	Task	Target	User
Task: Create folder	Information	3/16/2015 10:08:58 AM	Create folder	vcva01.vclass.io...	VSPHERE.LOCALAd...
Task: Create folder	Information	3/16/2015 10:08:33 AM	Create folder	vcva01.vclass.io...	VSPHERE.LOCALAd...
Alarm 'Health status change...	Error	3/16/2015 10:06:45 AM			
vmware-vpostgres status ch...	Information				
Alarm 'Health status change...	Information	3/16/2015 10:06:14 AM			
Alarm 'Health status change...	Error	3/16/2015 10:06:14 AM			
Alarm 'Health status change...	Information	3/16/2015 10:06:14 AM			
vmware-vpostgres status ch...	Information	3/16/2015 10:06:13 AM			
Task: Remove tag	Information	3/16/2015 10:05:02 AM	Remove tag	vcva01.vclass.io...	VirtualCenter

Date Time: 3/16/2015 10:06:45 AM

User: VSPHERE.LOCALAdministrator

Type: Error

Description: Alarm 'Health status changed alarm' on Datacenters triggered by event 10325 'vmware-vpostgres status changed from gray to green'

Event Type Description:

Possible Causes:

Related events: There are no related events.

vCenter Server System Logs

vSphere records events in the vCenter Server database. System log entries include information such as who generated the event, when the event was created, and the type of event.

vmware vSphere Web Client

Administrator@VSPHERE.LOCAL

Navigator

vCenter Inventory L

vCenter Servers

vcsa01.vclass.local

Getting Started Summary Monitor Manage Related Objects

Issues Service Health Tasks Events System Logs Log Browser

vCenter Server log [vpxd-13.log]

Export System Logs

You can export system logs for troubleshooting system problems.

2015-01-12T19:22:52.301Z Section for VMware VirtualCenter, pid=8235, version=6.0.0, build=2295569, option=Re
2015-01-12T19:22:52.301Z verbose vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Dumping early logs:

----- Early init logs start -----

2015-01-12T19:22:49.411Z verbose-[7FDB31D4D7A0] [Originator@6876 sub=vpxdvpdSignal] Signal handler for signal 1 is installed
2015-01-12T19:22:49.411Z verbose-[7FDB31D4D7A0] [Originator@6876 sub=vpxdvpdSignal] Signal handler for signal 2 is installed
2015-01-12T19:22:49.411Z verbose-[7FDB31D4D7A0] [Originator@6876 sub=vpxdvpdSignal] Signal handler for signal 15 is installed
2015-01-12T19:22:49.411Z verbose-[7FDB31D4D7A0] [Originator@6876 sub=vpxdvpdSignal] Signal handler for signal 10 is installed

----- Early init logs end -----

2015-01-12T19:22:52.322Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Logging uses fast path: true
2015-01-12T19:22:52.322Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] The boratlib logs WALL be handled by VmaCore
2015-01-12T19:22:52.322Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Initialized channel manager
2015-01-12T19:22:52.329Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Current working directory: /storage/logs/vmware/vpxd
2015-01-12T19:22:52.330Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=ThreadPool] Thread pool on asio: Min Io, Max Io, Min Task, Max Task, Max Concurrency: 2, 200, 2, 90, 2147483647
2015-01-12T19:22:52.340Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=ThreadPool] Thread enlisted
2015-01-12T19:22:52.340Z info vpxd[7FDB216AC700] [Originator@6876 sub=ThreadPool] Thread enlisted
2015-01-12T19:22:52.340Z info vpxd[7FDB217AE700] [Originator@6876 sub=ThreadPool] Thread enlisted
2015-01-12T19:22:52.341Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Syscommand enabled: true
2015-01-12T19:22:52.341Z info vpxd[7FDB2162B700] [Originator@6876 sub=ThreadPool] Thread enlisted
2015-01-12T19:22:52.341Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] ReaperManager Initialized
2015-01-12T19:22:52.341Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Log path: /storage/logs/vmware/vpxd
2015-01-12T19:22:52.341Z info vpxd[7FDB3172D700] [Originator@6876 sub=ThreadPool] Thread enlisted
2015-01-12T19:22:52.349Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] Initializing SSL
2015-01-12T19:22:52.353Z info vpxd[7FDB31D4D7A0] [Originator@6876 sub=Default] VmaCore: InitSSL: handshakeTimeoutUs = 120000000

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