

vCenter Server

Lesson 1: vCenter Server Architecture

Learner Objectives

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

- Describe the vCenter Server architecture
- Discuss the vCenter Server deployment models
- Identify the vCenter Server services, components, and modules
- Explain Platform Services Controller
- Discuss the REST-based API
- Describe vCenter Server High Availability

Overview of vCenter Server Appliance (1)

vCenter Server Appliance is a preconfigured Linux-based virtual machine that is optimized for running vCenter Server and the associated services.

vCenter Server Appliance reduces the deployment time of vCenter Server and the associated services, and provides a low-cost alternative to the Windows-based vCenter Server installation.

The vCenter Server Appliance package contains the following software:

- VMware Photon™ OS 1.0
- The Platform Services Controller group of infrastructure services
- The vCenter Server group of services
- PostgreSQL

Overview of vCenter Server Appliance (2)

vCenter Server Appliance uses the embedded PostgreSQL database, which can scale up to 2,000 hosts and 35,000 registered virtual machines or 25,000 powered-on virtual machines.

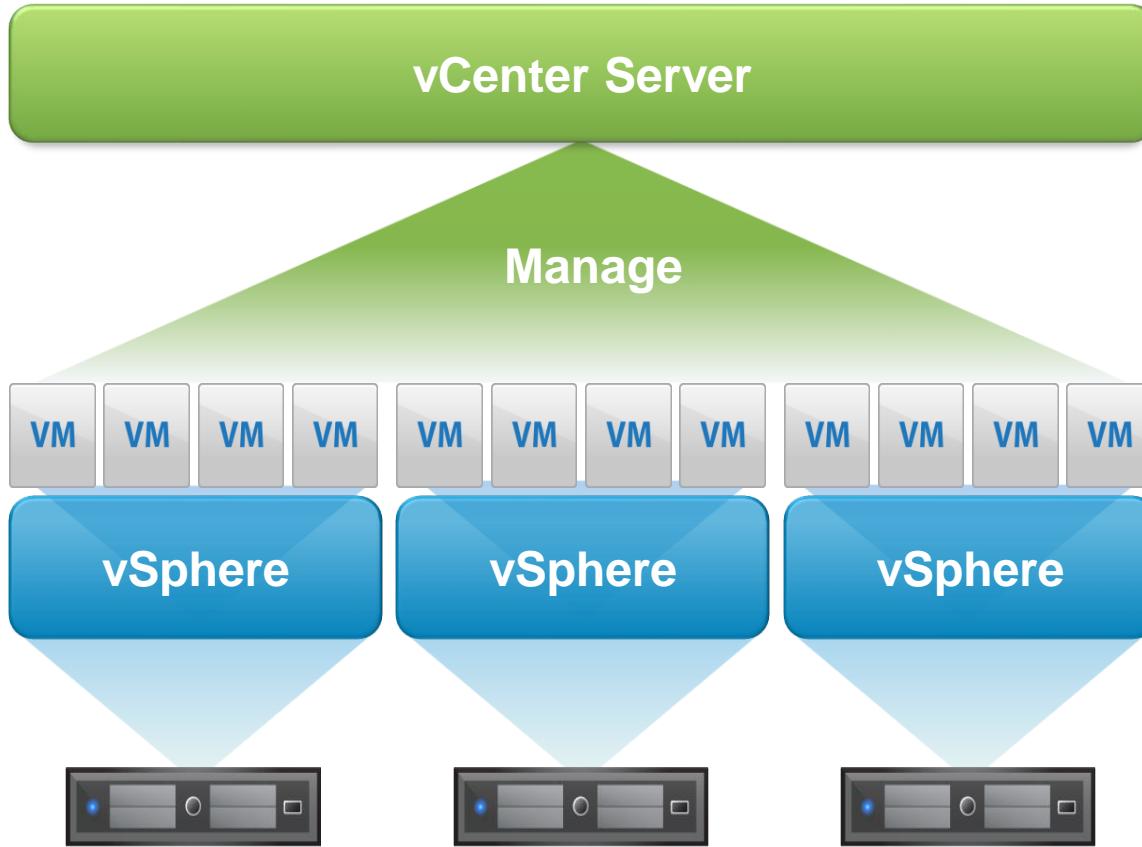
During deployment, you can choose the vCenter Server Appliance size for your vSphere environment and the storage size for your database requirements.

Starting with vSphere 6.5, the vCenter Server services in vCenter Server Appliance include:

- vSphere Update Manager extension
- vCenter Server Appliance support for high availability
- vCenter Server Appliance and Platform Services Controller support for file-based backup and restore

About the vCenter Server Management Platform

vCenter Server is an application 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 Services

The vCenter Server group of services contains the following functions:

- vCenter Server
- PostgreSQL
- vSphere Web Client (server)
- vSphere Auto Deploy
- vSphere ESXi Dump Collector
- vSphere Syslog Collector
- vSphere Update Manager

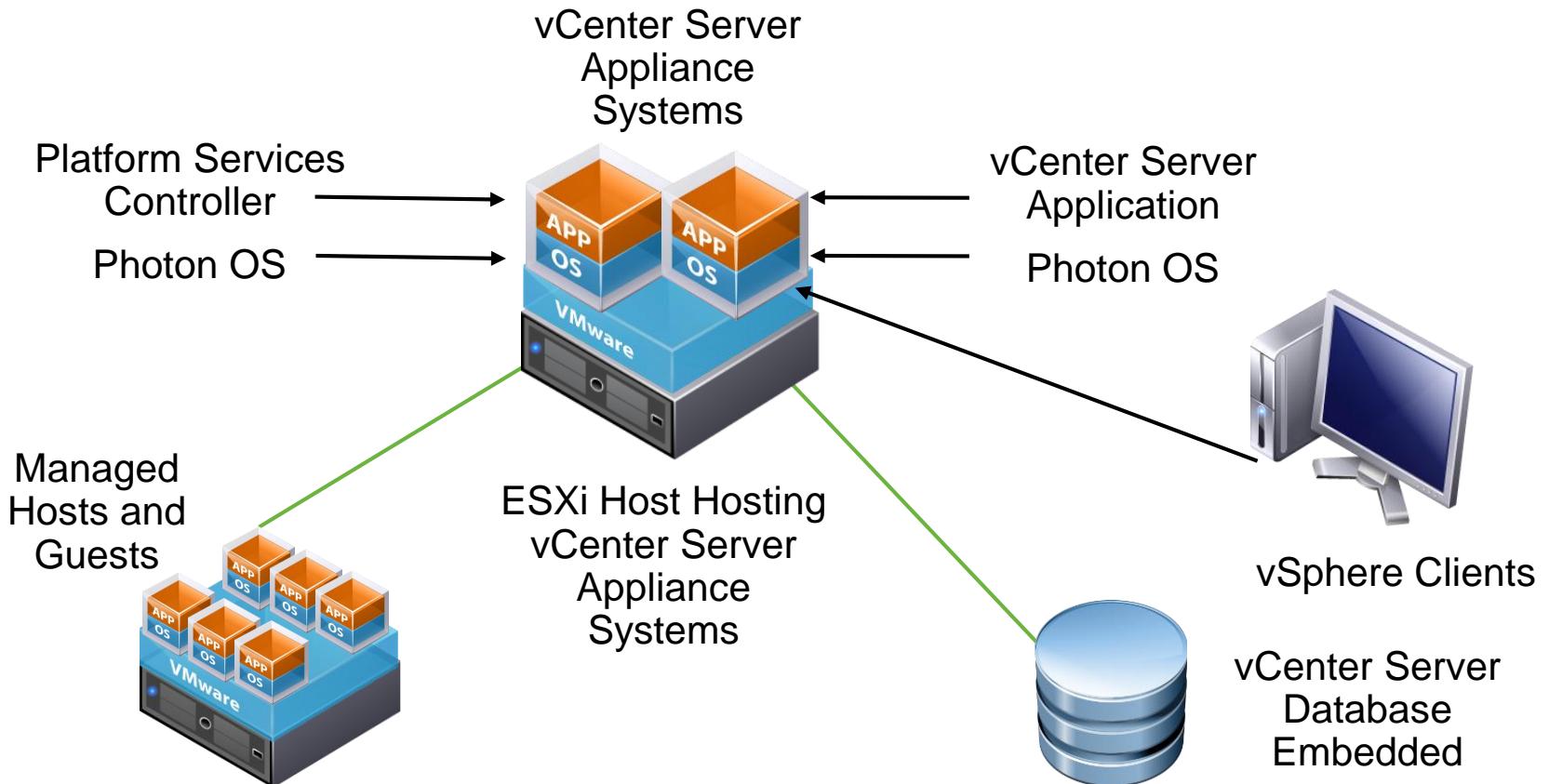
Platform Services
Controller

vCenter Server

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

vCenter Server Appliance Architecture

The diagram shows the supporting components for vCenter Server Appliance.



vCenter Server Appliance

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

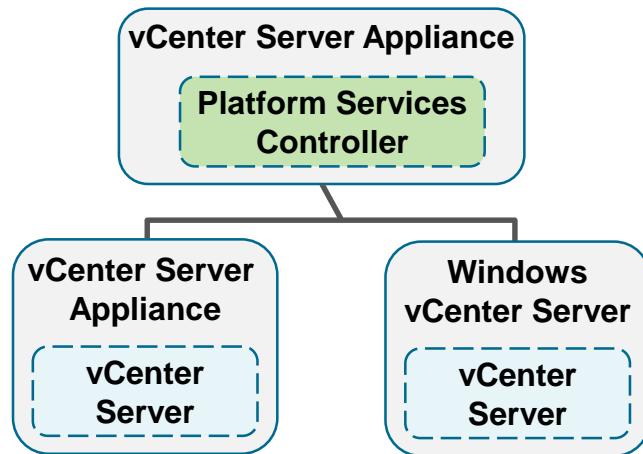
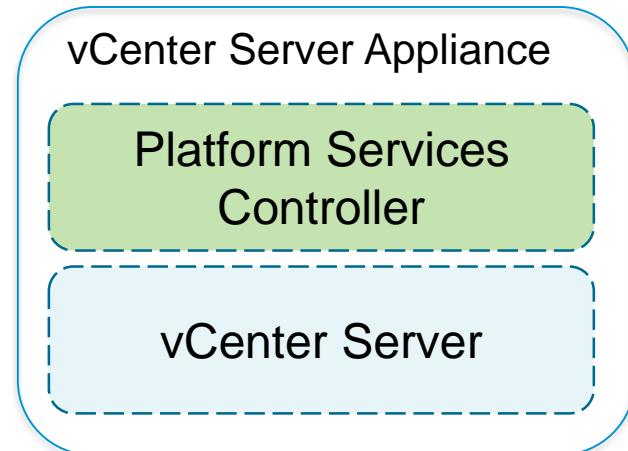
Metric	Windows 6.5	vCenter Server Appliance 6.5
Hosts per vCenter Server system	2,000	2,000
Powered-on virtual machines per vCenter Server System	25,000	25,000
Hosts per cluster	64	64
Virtual machines per cluster	8,000	8,000
Database	Must be Oracle or SQL for full scalability	Embedded vPostgres
Enhanced Linked Mode	Yes	Yes

vCenter Server Deployment Options

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

- vCenter Server Appliance can be configured in the following ways:
 - As an embedded system with an internal Platform Services Controller instance
 - As a distributed system with an external Platform Services Controller instance

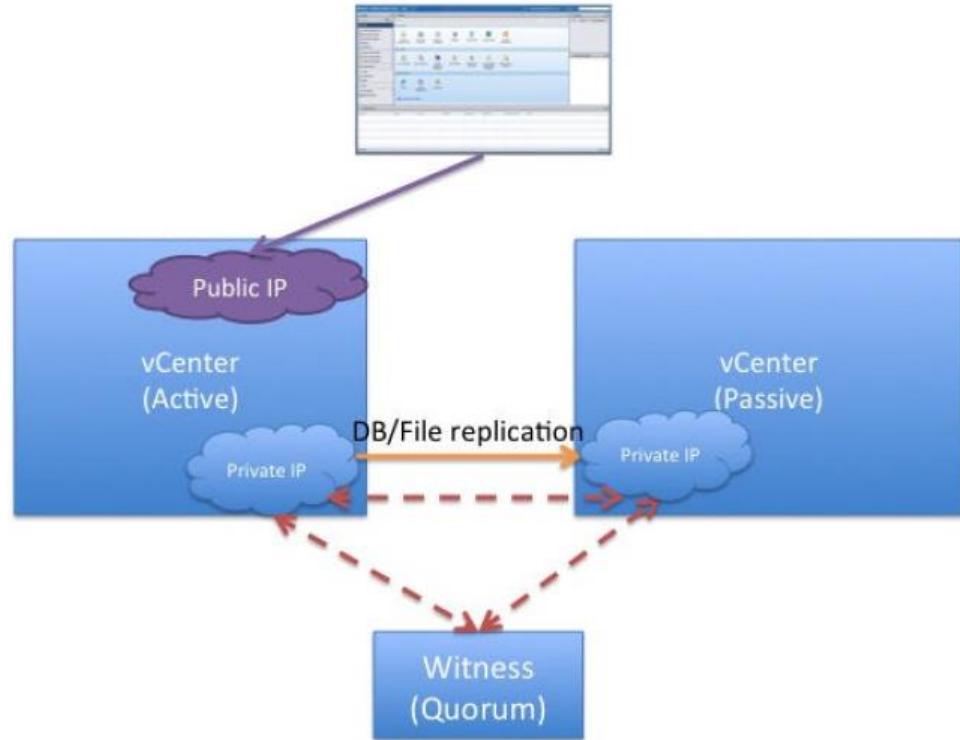
vCenter Server Appliance supports Enhanced Linked Mode.



High Availability for vCenter Server Appliance

High availability for vCenter Server Appliance protects against both hardware and software failures and ensures that your implementation can recover quickly.

- The protected node is called the active node.
- Two other appliance nodes are created: a passive node and a witness node.
- If the active node fails, the passive node takes over the role of the active node.
- The state of the active node is replicated to the passive node and captured in a PostgreSQL database and in the configuration files.



Review of Learner Objectives

You should be able to meet the following objectives:

- Describe the vCenter Server architecture
- Discuss the vCenter Server deployment models
- Identify the vCenter Server services, components, and modules
- Explain Platform Services Controller
- Discuss the REST-based API
- Describe vCenter Server High Availability

Lesson 2: Deploying, Backing Up, and Restoring vCenter Server Appliance

Learner Objectives

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

- Deploy vCenter Server Appliance into an infrastructure
- Add license keys to vCenter Server
- Configure vCenter Server settings
- Create a vCenter Server backup
- Restore vCenter Server Appliance from a backup

Preparing for vCenter Server Appliance Deployment (1)

Before deploying vCenter Server Appliance, you must complete several tasks:

- Verify that all vCenter Server Appliance system requirements are met.
- For the first installation of vCenter Server Appliance, Platform Services Controller must be deployed before vCenter Server:
 - If you deploy vCenter Server Appliance with an embedded Platform Services Controller, this operation occurs automatically.
 - If you install vCenter Server Appliance with an external Platform Services Controller instance, you must first install Platform Services Controller and then install vCenter Server.

Preparing for vCenter Server Appliance Deployment (2)

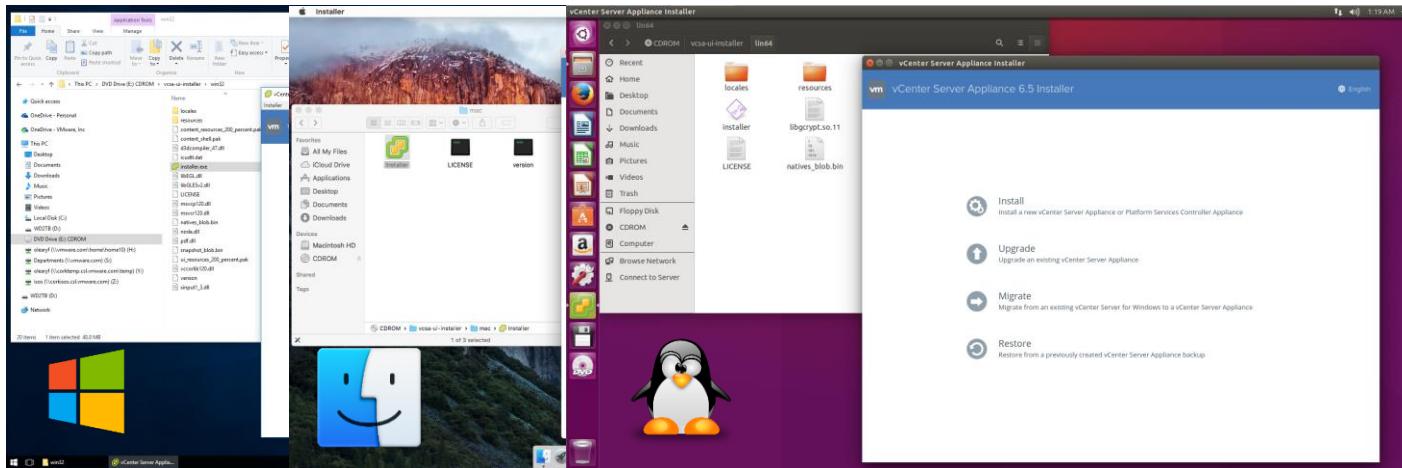
Before deploying vCenter Server Appliance, you must complete several tasks:

- You must provide the fully qualified domain name (FQDN) or the static IP of the host machine on which you are performing the install or upgrade. VMware recommends using the FQDN.
- You must verify that clocks on all machines on the vSphere network are synchronized.

vCenter Server Appliance Native UI Installer

With vSphere 6.5, a native application has been developed to facilitate the deployment of vCenter Server Appliance 6.5:

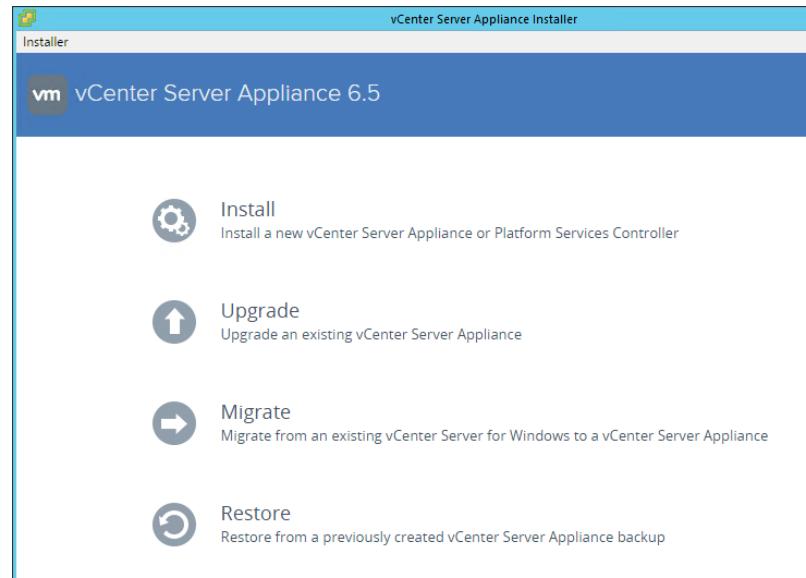
- A native application has been written for Windows, Linux, and Mac OS X and has no dependency on browsers or a plug-in.
- This GUI application performs validations and prechecks during the deployment to ensure that no mistakes are made and that a compatible environment is created.



vCenter Server Install, Upgrade, Migrate, and Restore

The new UI deployment tool has the following featured options:

- **Install:** Installs a new vCenter Server Appliance or Platform Services Controller
- **Upgrade:** Upgrades an existing vCenter Appliance
- **Migrate:** Migrates an existing vCenter Server for Windows to a vCenter Server Appliance
- **Restore:** Restores from a previously created vCenter Server Appliance backup



vCenter Server Appliance Deployment

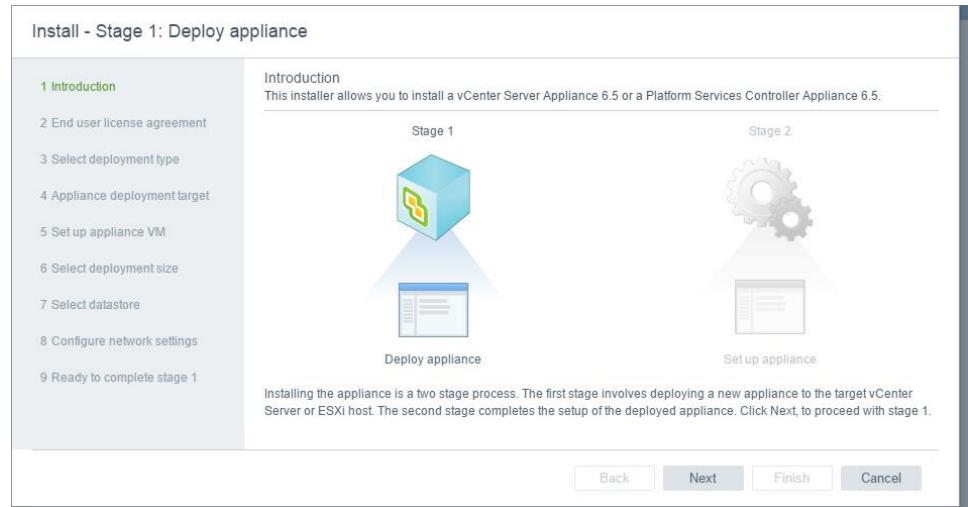
Installer support for Windows, Mac, and Linux

vSphere Update Manager is included

vCenter Server Appliance and Platform Services Controller install is a two-stage process:

- Stage 1: Deploy OVF
- Stage 2: Configuration

Fully automatable by using JSON templates, with Windows, Linux, and Mac support



vCenter Server Appliance Two-Stage Deployment

Stage 1: UI

- Accept the EULA.
- Select the deployment type.
- Connect to the target ESXi host or vCenter Server system to deploy vCenter Server Appliance.
- Define vCenter Server Appliance name and root password.
- Select deployment size (Mem/CPU) and storage size.
- Select datastore location (thin disk).
- Configure networking.

Stage 2: Deployment

- OVF is deployed to the ESXi host.
- Disks are configured.
- RPMs are installed (depending on Embedded, Platform Service Controller, vCenter Server deployment choice).
- Networking is configured.

vCenter Server Deployment Wizard

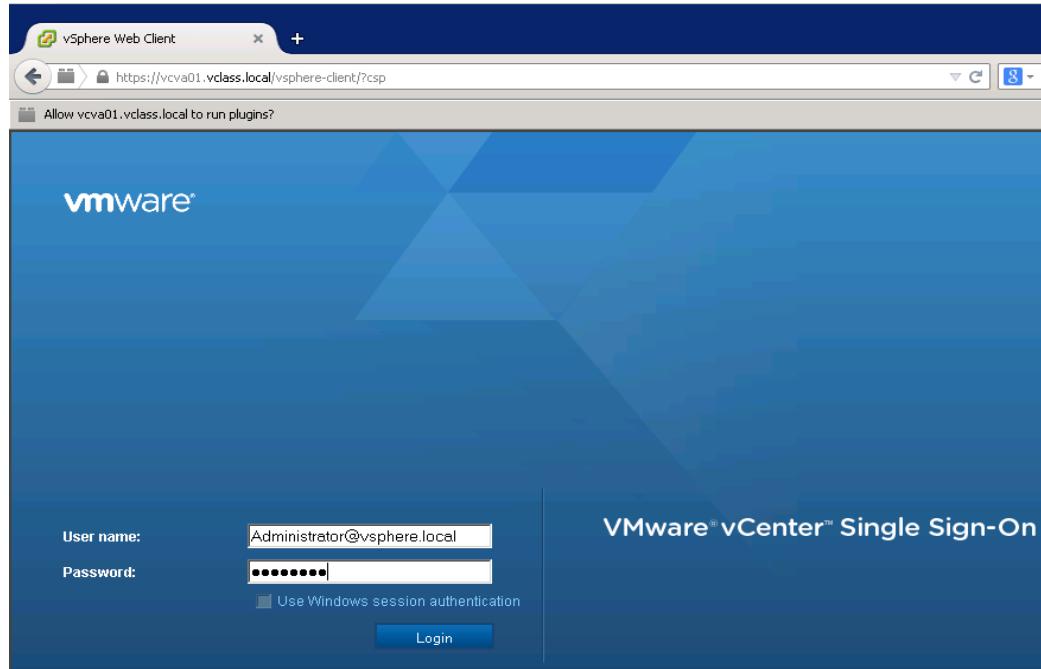
The vCenter Server Deployment wizard prompts for information depending on your choice of deployment methods.

	Embedded	PSC	vCenter Server
Stage 1			
Deployment target	✓	✓	✓
Deployment type	✓	✓	✓
Deployment size	✓	✗	✓
Define VM name	✓	✓	✓
Define root password	✓	✓	✓
Define datastore location	✓	✓	✓
Define networking	✓	✓	✓
Stage 2			
Create SSO domain	✓	✓	✗
Join SSO domain	✗	✓	✓
Configure CEIP	✓	✓	✓

Getting Started with vCenter Server

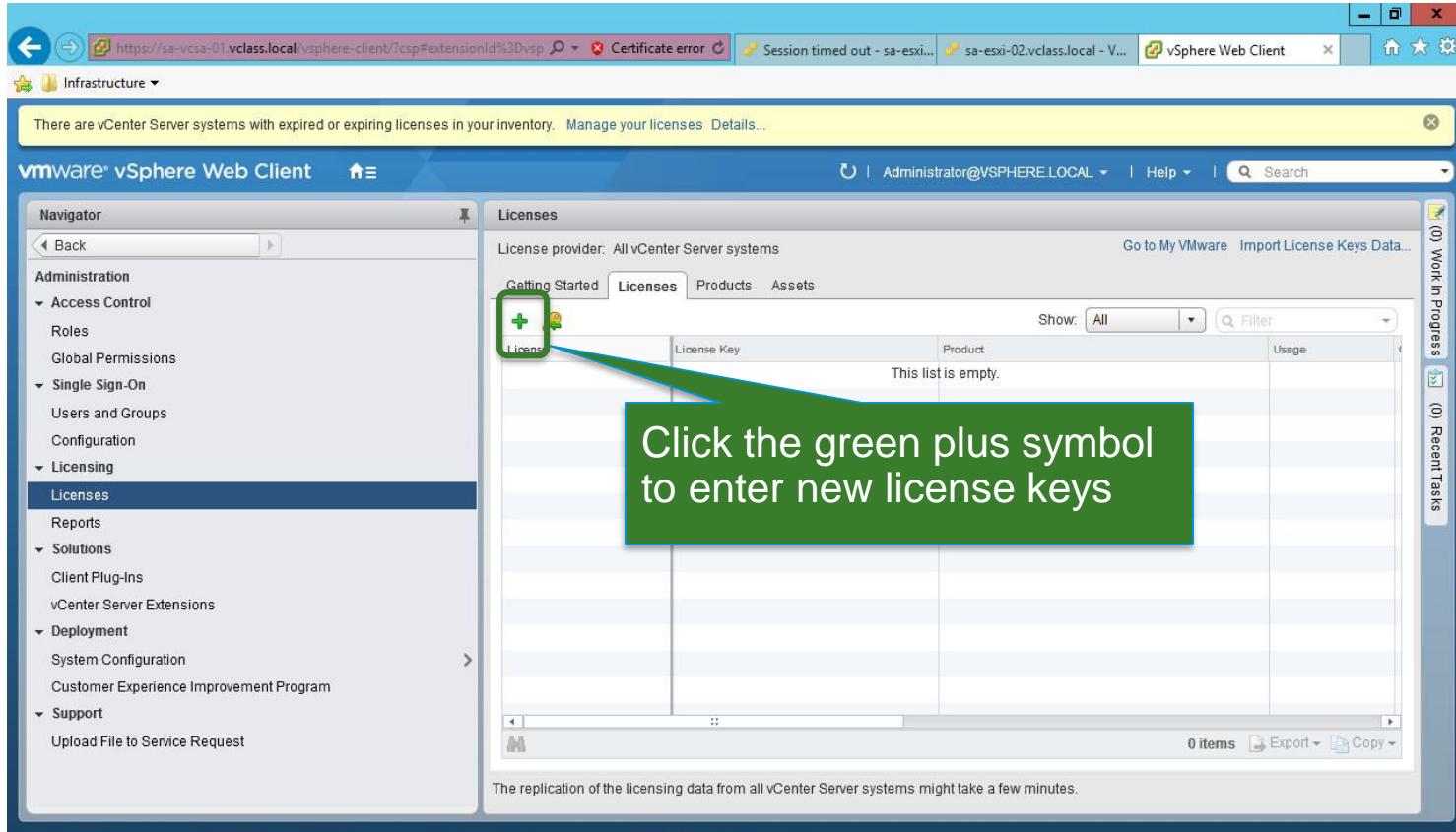
After you deploy vCenter Server Appliance, log in to it by using one of the vSphere clients to manage your vSphere inventory:

- vSphere Web Client: https://FQDN_for_vCenter_Server/vsphere-client
- vSphere Client: https://FQDN_for_vCenter_Server/ui



Adding License Keys to vCenter Server

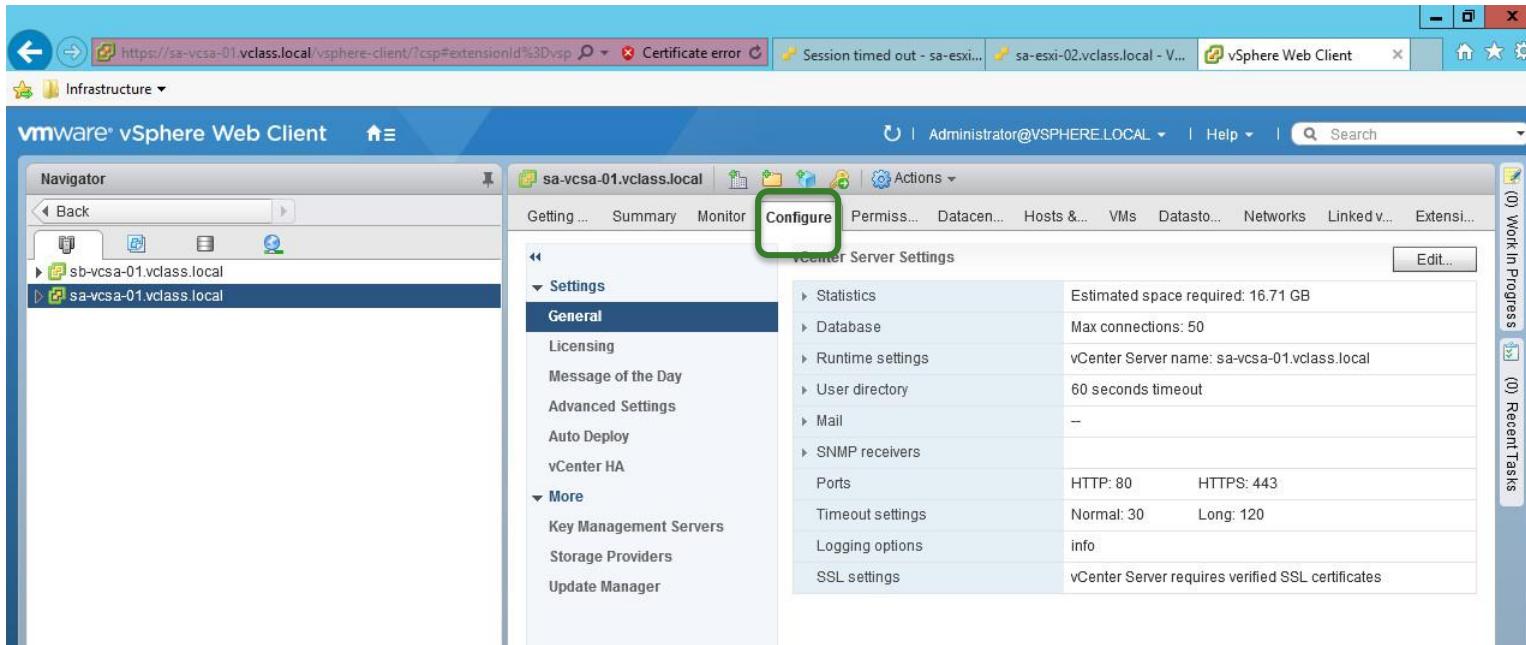
Assign a license to vCenter Server before its 60-day evaluation period expires.



Configuring vCenter Server Settings

You can configure your vCenter Server system from 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 vSphere Web Client and click the **Configure > Settings** tabs.



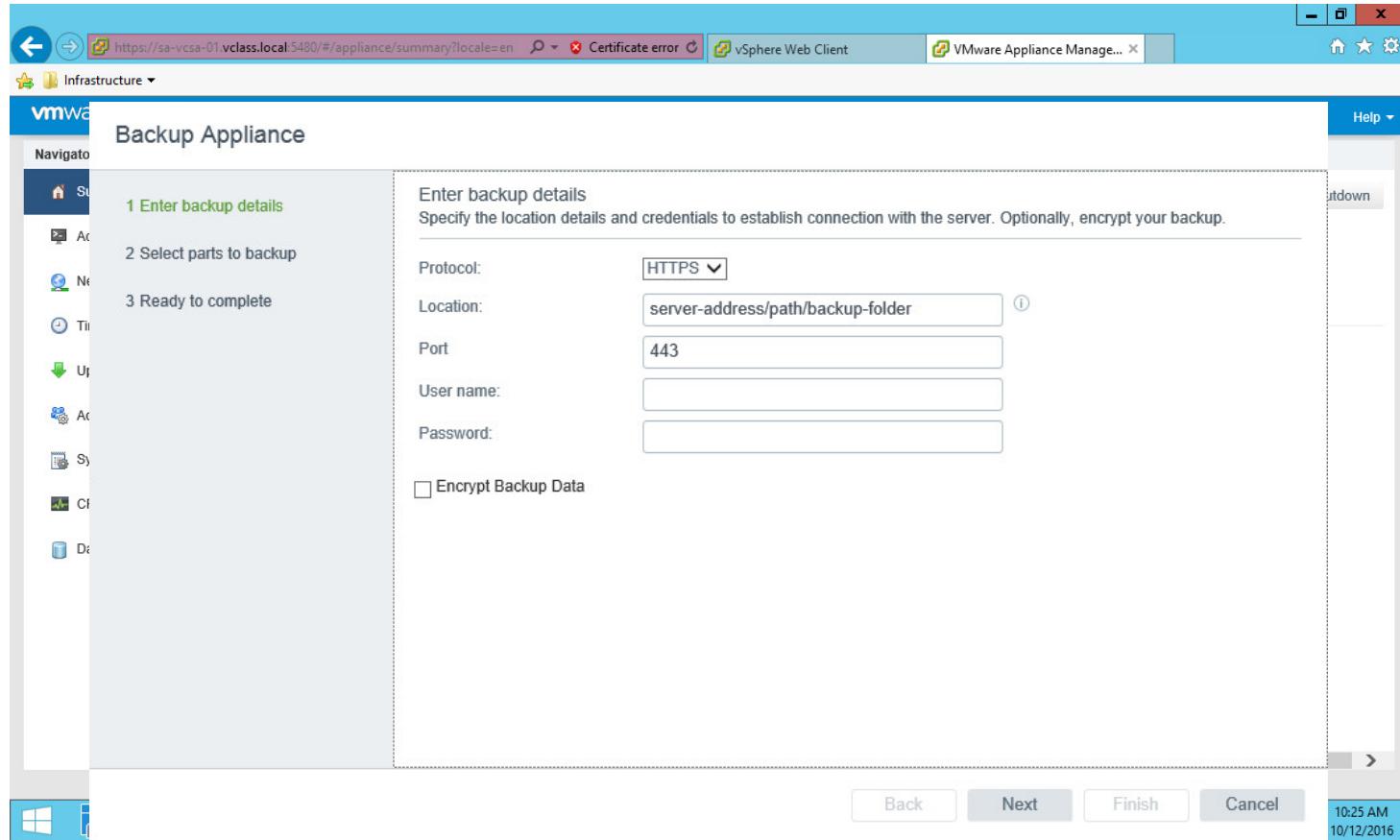
Logging In to the vCenter Server Appliance Management UI

To back up or restore vCenter Server Appliance, you must connect to the Appliance Management interface at https://FQDN_or_IP_address:5480.



vCenter Server Appliance Management Home

After logging in to the vCenter Server Appliance Management UI, you see the functions that you can perform. To back up the appliance, click the **Backup** tab.



Native vCenter Server Backup and Restore

Removes dependency on third-party backup solutions

Restores a vCenter Server instance to a brand new appliance

Supports backup or restore of vCenter Server Appliance and Platform Services Controller

Includes embedded and external deployments

Supports protocols, including:

- HTTP/S
- SCP
- FTP/S

Includes option for encryption

Restores directly from the vCenter Server Appliance ISO

vCenter Server Appliance 6.5 Restore - Stage 1: Deploy OVF

✓ 1 Introduction
✓ 2 End user license agreement
3 Enter backup details
4 Review backup information
5 Appliance deployment target
6 Set up target appliance VM
7 Select deployment size
8 Select datastore
9 Configure network settings
10 Ready to start

Enter backup details
Enter the backup location type, location, and credentials.

Backup location type: **HTTPS**
Backup location: <server address>//<path>/<backup-folder>
Port: 443
User name:
Password:
Encryption password: Provide this field if the backup is encrypted optional

Install
Install a new vCenter Server Appliance or Platform Services Controller Appliance

Upgrade
Upgrade an existing vCenter Server Appliance

Migrate
Migrate from an existing vCenter Server for Windows to a vCenter Server Appliance

Restore
Restore from a previously created vCenter Server Appliance backup

Lab 4: Working with vCenter Server

Install and use vCenter Server Appliance

1. Deploy vCenter Server Appliance
2. Access and Configure vCenter Server Appliance
3. Add Your ESXi Hosts to the vCenter Server Inventory
4. Configure the ESXi Hosts as NTP Clients
5. Back Up vCenter Server Appliance
6. Complete the vCenter Server Appliance Deployment

Review of Learner Objectives

You should be able to meet the following objectives:

- Deploy vCenter Server Appliance into an infrastructure
- Add license keys to vCenter Server
- Configure vCenter Server settings
- Create a vCenter Server backup
- Restore vCenter Server Appliance from a backup

Lesson 3: vSphere Clients

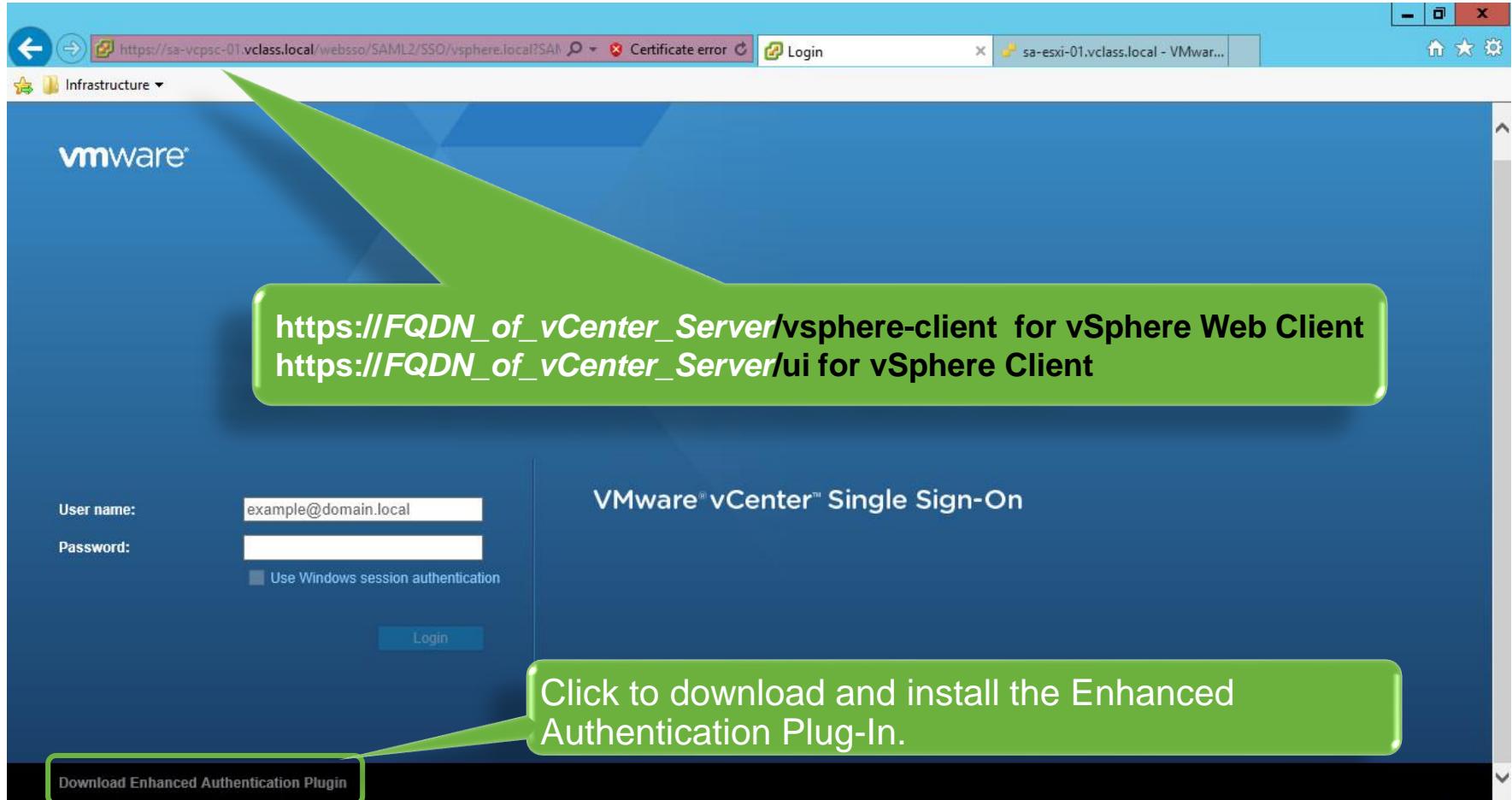
Learner Objectives

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

- Access the vSphere clients
- Install the Enhanced Authentication Plug-In for Windows
- Navigate the vSphere clients

Accessing vSphere Clients

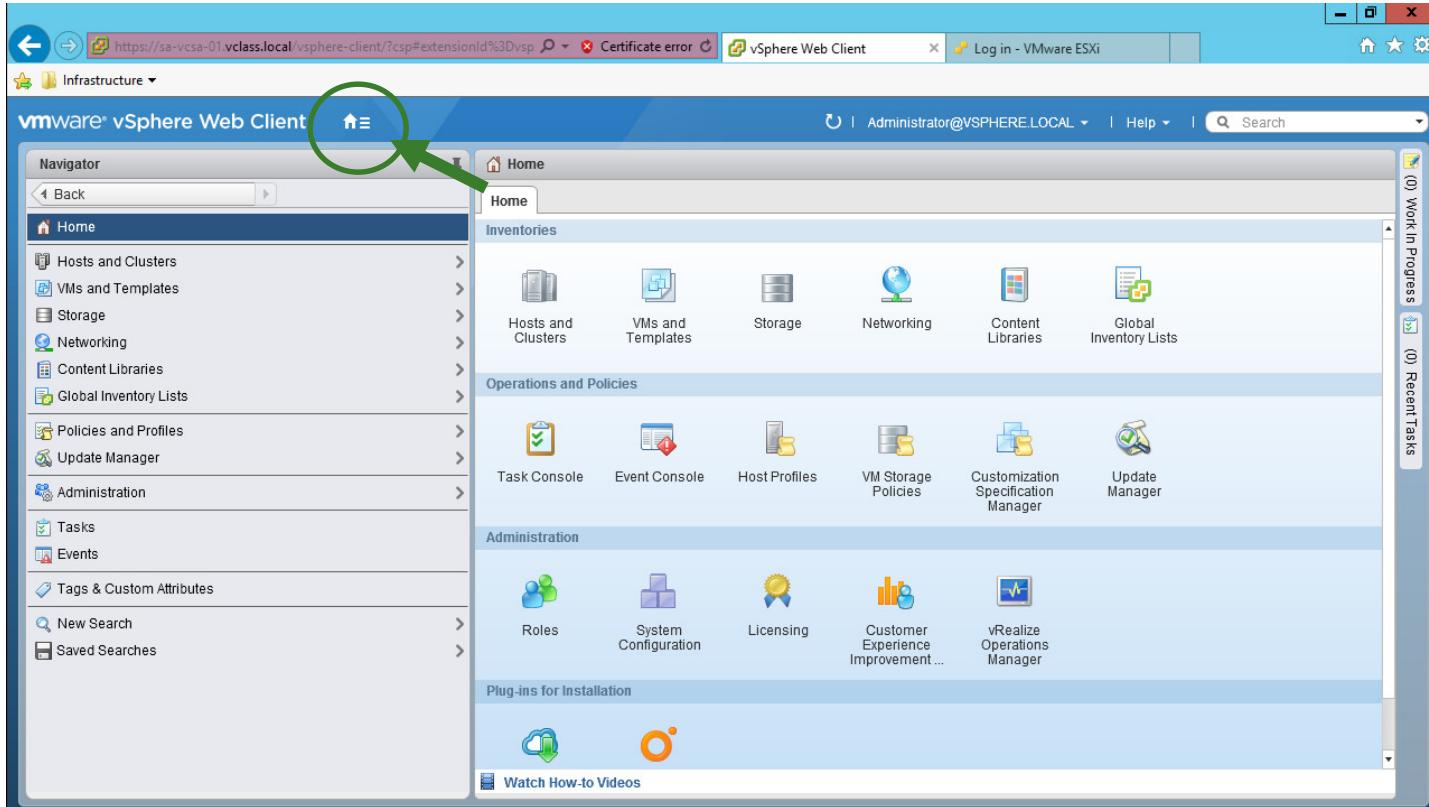
To access a vSphere client, you open a Web browser and enter the URL for the desired vSphere client.



vSphere Web Client Home Page

Click the **Home** icon to reach the vCenter Server Home page.

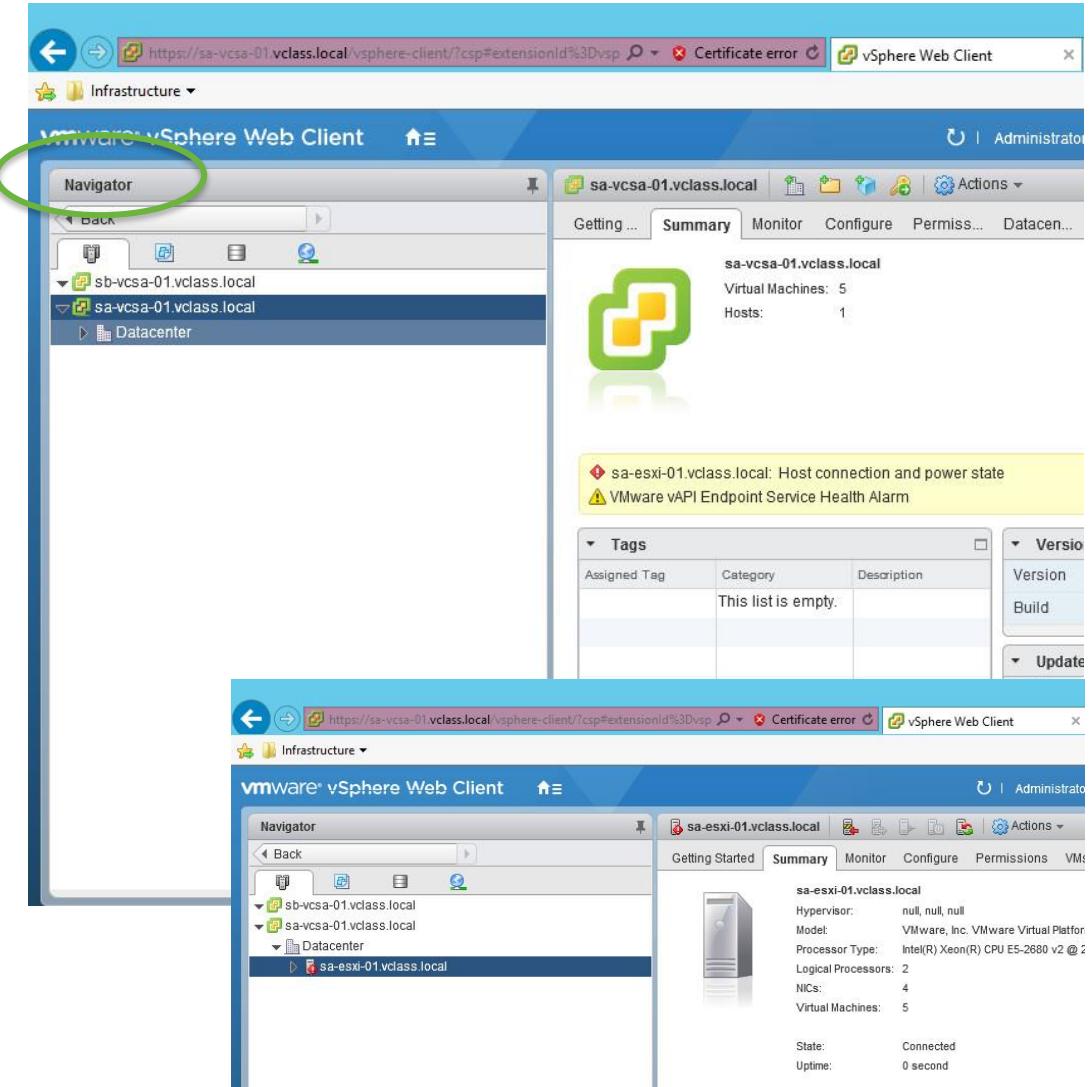
The Home page has a Navigator pane on the left and Inventories, Monitoring, and Administration panes on the right.



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 list-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

vmware vSphere Web Client

Administrator@VSPHERE.LOCAL | Help | Search

Navigator

Getting Started Summary Monitor Configure Permissions VMs Resource Pools Datastores Networks Update Manager

sa-esxi-01.vclass.local

Hypervisor: VMware ESXi, 6.5.0, 4564106
Model: VMware, Inc. VMware Virtual Platform
Processor Type: Intel(R) Xeon(R) CPU E5-2680 v2 @ 2.80GHz
Logical Processors: 2
NICs: 4
Virtual Machines: 1

CPU USED: 46.00 MHz FREE: 5.55 GHz CAPACITY: 5.60 GHz
MEMORY USED: 1.44 GB FREE: 6.56 GB CAPACITY: 8.00 GB
STORAGE USED: 17.17 GB FREE: 42.33 GB CAPACITY: 59.50 GB

State: Connected Uptime: 15 days

Hardware Configuration

VMs and Templates Inventory View

vmware vSphere Web Client Updated at 10:27 AM Administrator@VSPHERE.LOCAL | Help | Search

Navigator

Getting Started Summary Monitor Configure Permissions Snapshots Datastores Networks Update Manager

VM1-1

Guest OS: Microsoft Windows 7 (64-bit)
Compatibility: ESXi 6.5 and later (VM version 13)
VMware Tools: Running, version:10272 (Current)
More info...
DNS Name: VM1-1
IP Addresses: 172.20.10.200
View all 2 IP addresses
Host: sa-esxi-01.vclass.local

CPU USAGE 756.00 MHz
MEMORY USAGE 573.00 MB
STORAGE USAGE 13.11 GB

Powered On

VM Hardware Advanced Configuration

vCenter Server Views: Storage and Networks

Storage Inventory View

Updated at 10:27 AM | Administrator@VSPHERE.LOCAL | Help | Search

Navigator

Back | Datacenter | datastore 1 | Actions

Getting Started | **Summary** | Monitor | Configure | Permissions | Files | Hosts | VMs

datastore 1

Type: VMFS 5

URL: ds://vmfs/volumes/58237eef-2a385635-0e73-005056013df7/

STORAGE USED: 14.05 GB FREE: 15.70 GB CAPACITY: 29.75 GB

Refresh

Details | Related Objects

Networks Inventory View

Updated at 10:27 AM | Administrator@VSPHERE.LOCAL | Help | Search

Navigator

Back | Datacenter | VM Network | Actions

Getting Started | **Summary** | Monitor | Configure | Permissions | Hosts | VMs

VM Network

Accessible: Yes

Virtual machines: 2

Hosts: 2

Network Details | Tags

Viewing Object Information

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

The screenshot shows the vSphere Client interface with the URL <https://sa-vcsa-01.vclass.local/ui/#?extensionId=vsphere.core.host.summary> in the address bar. A 'Certificate error' message is displayed. The title bar says 'vSphere Client'. The navigation bar includes 'Infrastructure' (selected), 'vSphere Client', 'Menu', 'Search', 'Administrator@VSPHERE.LOCAL', 'Help', and a smiley face icon.

The main pane displays the 'Summary' tab for the host 'sa-esxi-01.vclass.local'. On the left, a tree view shows the hierarchy: Datacenter > Lab Servers > sa-esxi-01.vclass.local > VM1-1. The host summary table includes the following details:

Category	Value	Resource Type	Capacity
Hypervisor	VMware ESXi, 6.5.0, 4513128	CPU	Free: 5.54 GHz
Model	VMware Virtual Platform	Used: 83 MHz	Capacity: 5.8 GHz
Processor Type	Intel(R) Xeon(R) CPU E5-2680 v2 @ 2.80GHz	Memory	Free: 13.42 GB
Logical Processors	2	Used: 2.58 GB	Capacity: 16 GB
NICs	4	Storage	Free: 81.31 GB
Virtual Machines	1	Used: 18.19 GB	Capacity: 90.5 GB
State	Connected		
Uptime	1 days		

Below the summary table, there is a 'Recent Tasks' section and a 'Alarms' section. At the bottom, there is a dropdown menu for 'All' tasks and a link to 'More Tasks'.

Using Quick Filters in vSphere Web Client

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

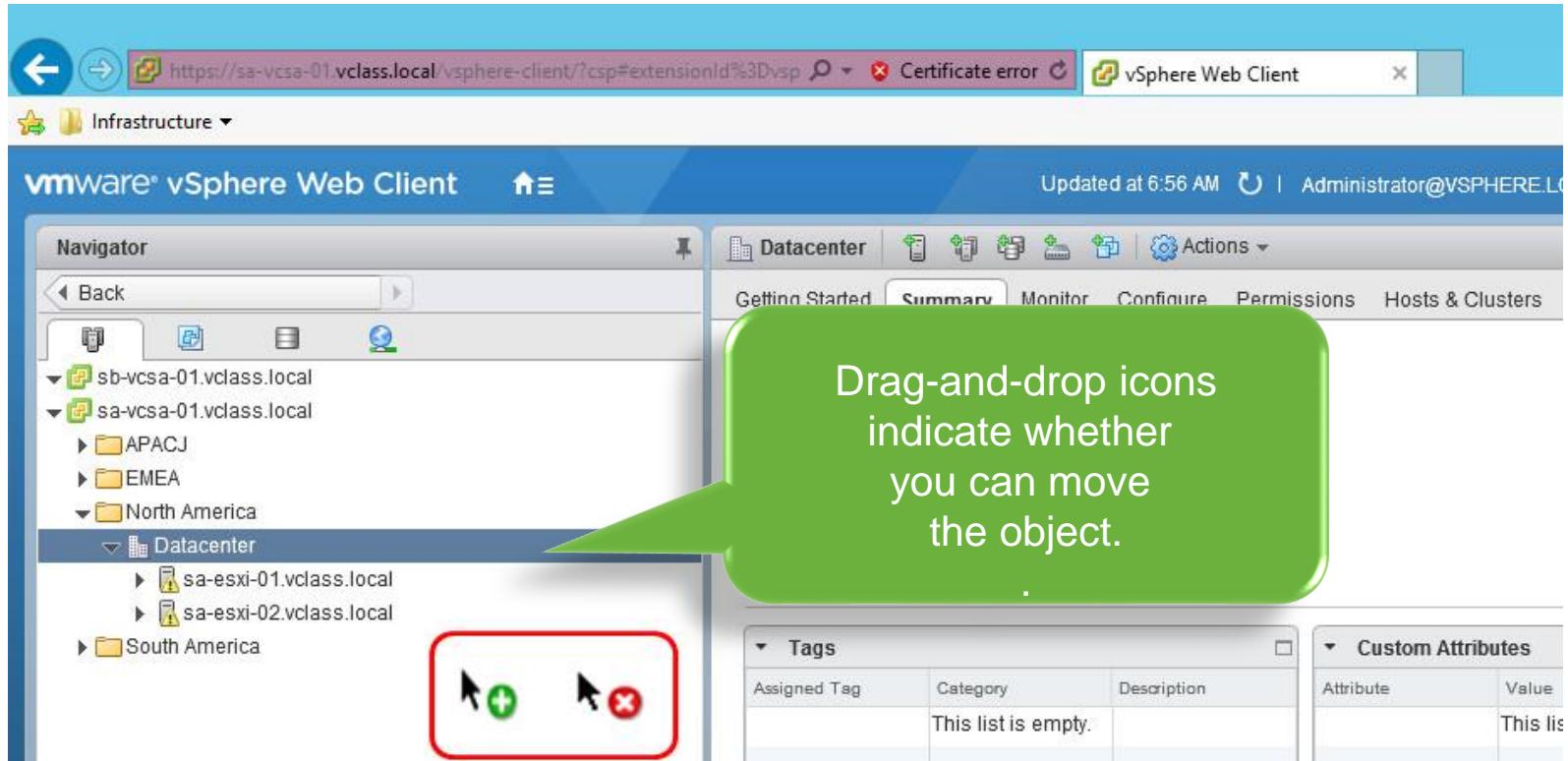
The screenshot shows the vSphere Web Client interface. The left sidebar displays a tree view of the inventory, including a Datacenter node with two hosts: sa-esxi-01.vclass.local and sa-esxi-02.vclass.local, each containing one VM (VM1-1 and VM2-1 respectively). The main content area is titled 'Datastores' and lists two datastores: Local01-2 and Local02-2. A green callout bubble points to a 'local' quick filter icon in the top right corner of the table header. The table has columns for Name, Status, Type, Datastore Cluster, Capacity, and Free space. Both datastores are listed under the 'Normal' status and 'VMFS 5' type. The 'Capacity' column shows 37.75 GB for Local01-2 and 29.75 GB for Local02-2, while the 'Free' column shows 25.52 GB and 25.84 GB respectively.

Name	Status	Type	Datastore Cluster	Capacity	Free
Local01-2	Normal	VMFS 5		37.75 GB	25.52 GB
Local02-2	Normal	VMFS 5		29.75 GB	25.84 GB

Show or hide the quick filters options.

Using Drag-and-Drop Functionality in vSphere Web Client

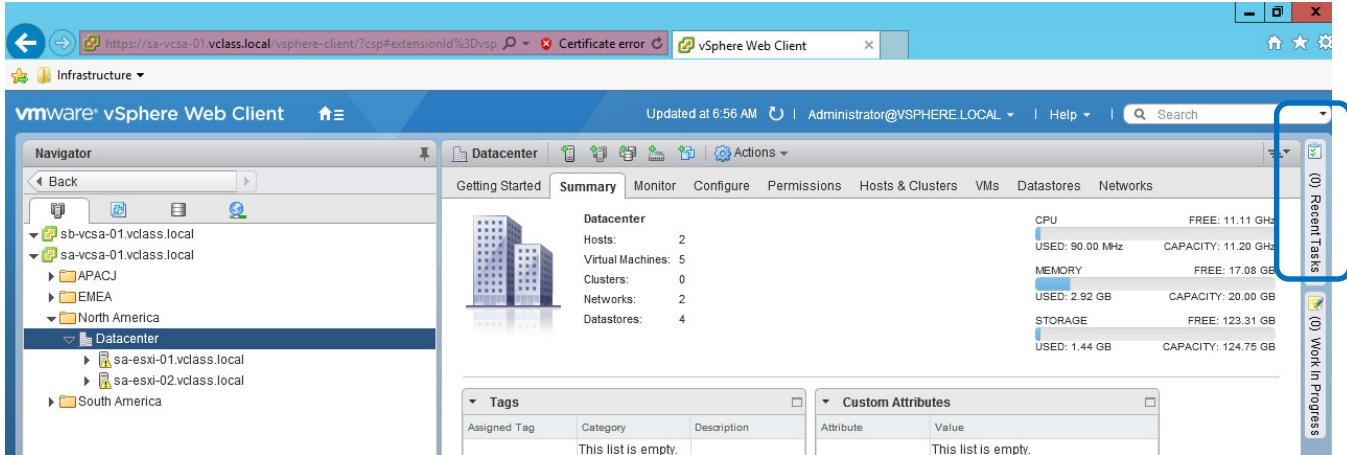
You can drag an inventory object to another location.



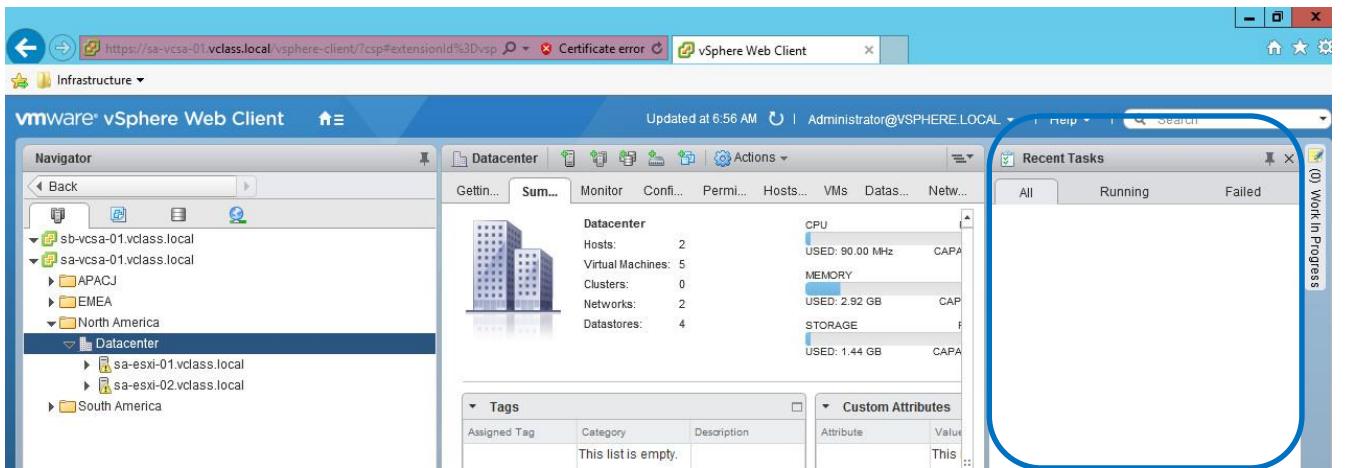
Using Pin and Unpin Functionality

You can pin and unpin display panes within the user interface.

Unpinned
Recent Tasks



Pinned Recent
Tasks



Lab 5: Navigating the vSphere Clients

Become familiar with vSphere Client and vSphere Web Client

1. Navigate vSphere Client
2. Navigate vSphere Web Client

Review of Learner Objectives

You should be able to meet the following objectives:

- Access the vSphere clients
- Install the Enhanced Authentication Plug-In for Windows
- Navigate the vSphere clients

Lesson 4: Managing the vCenter Server Inventory

Learner Objectives

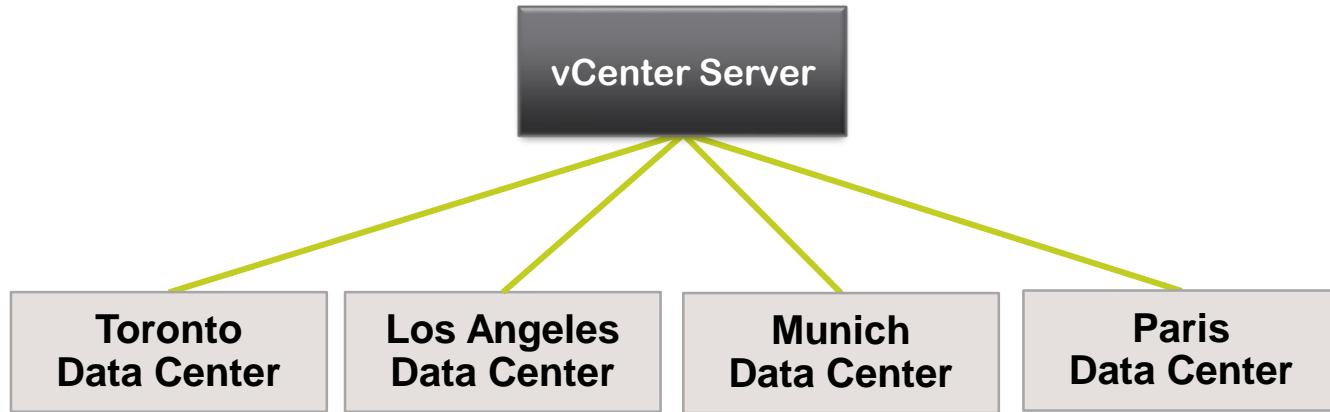
By the end of this lesson, you should be able to meet the following objectives:

- Create and organize vCenter Server inventory objects
- Add data center and organizational objects to vCenter Server
- Add hosts to vCenter Server
- Discuss how to create custom inventory tags for inventory objects
- Recognize how to view vCenter Server logs and events
- Manage the vCenter Server services
- Monitor vCenter Server Appliance

About Data Center Objects

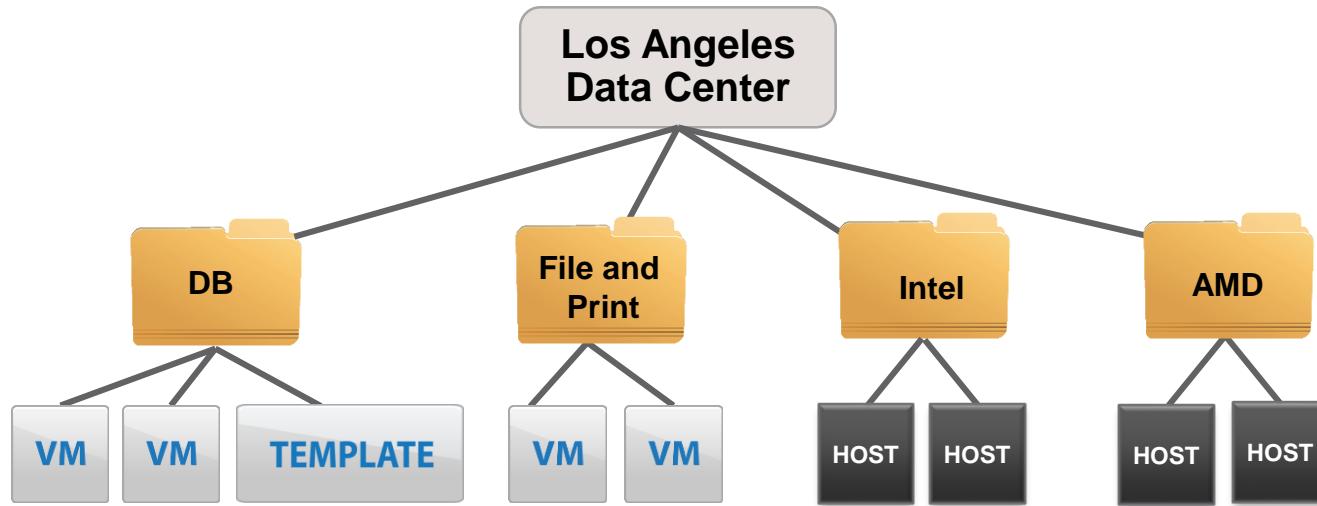
A virtual data center is a container for all the inventory objects required to complete a fully functional environment for operating virtual machines:

- 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

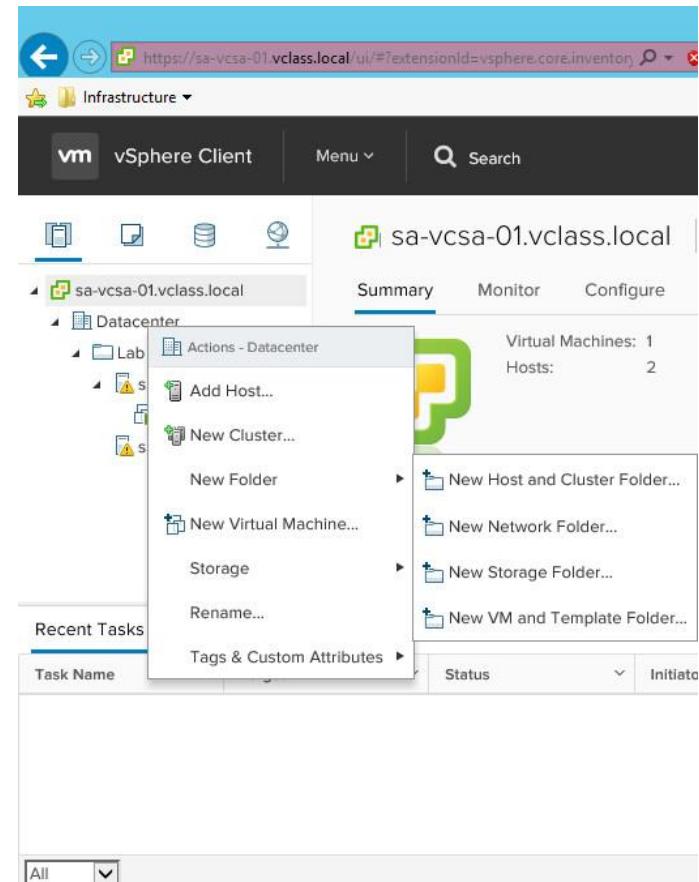
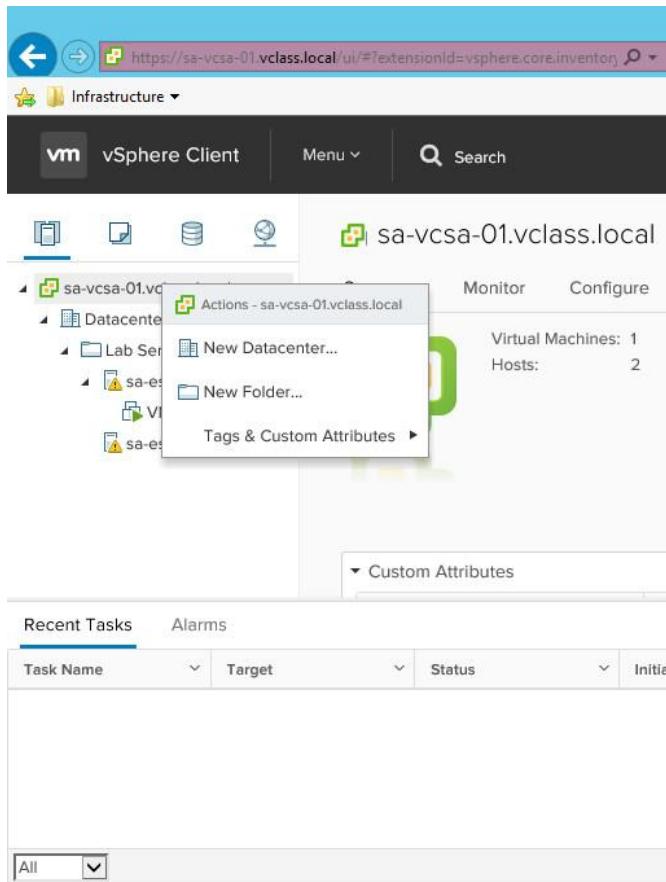
Items in the data center can be placed into folders. Folders and subfolders can be created to better organize systems.



Adding a Data Center and Organizational Objects to vCenter Server

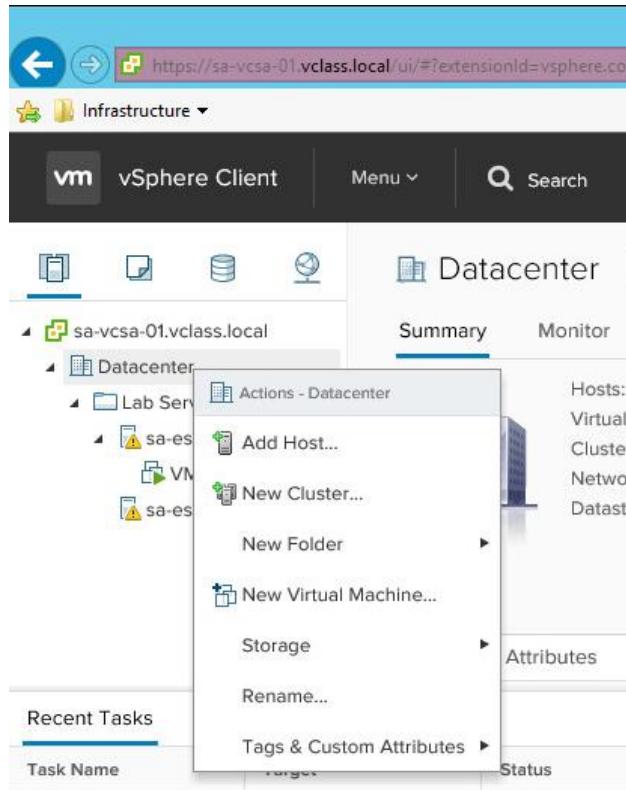
You can add a data center and host and cluster folders:

- You can use folders to group objects of the same type for easier management.



Adding ESXi Hosts to vCenter Server

You can add an ESXi host.



Add Host

1 Name and location

Name and location
Enter the name or IP address of the host to add to vCenter Server.

Host name or IP address:

Location: Datacenter

2 Connection settings

3 Host summary

4 Assign license

5 Lockdown mode

6 VM location

7 Ready to complete

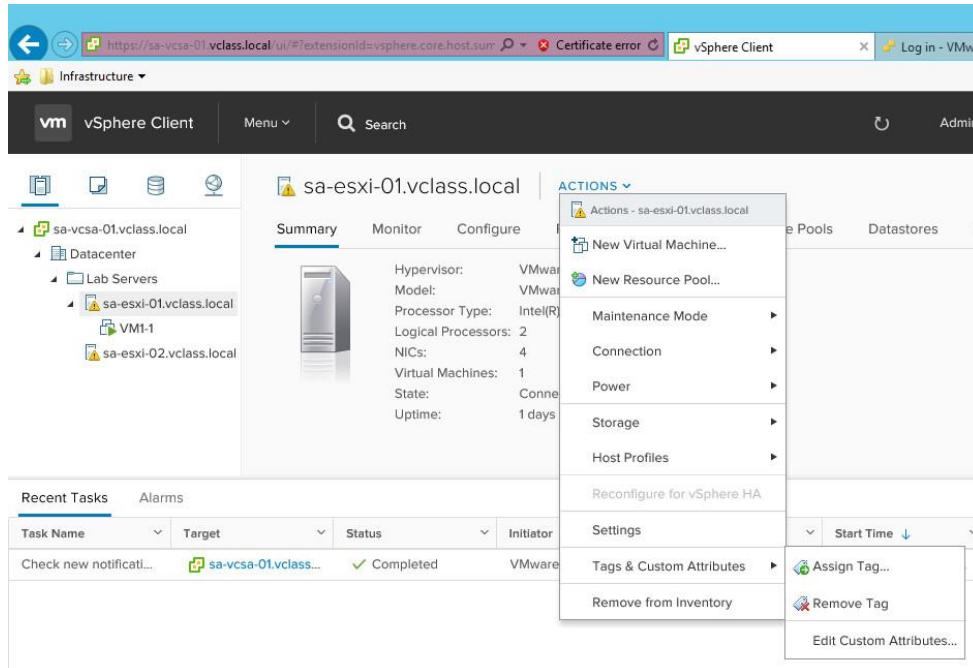
CANCEL BACK

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.



vCenter Server Events

The vCenter Server events and audit trail allows selectable retention periods in increments of 30 days:

- User-action information includes the user's account and specific event details.
- All actions are reported, including file ID, file path, source of operation, operation name, and date and time of operation.

The screenshot shows the vSphere Client interface for the host sa-esxi-01.vclass.local. The left sidebar shows the navigation tree with the 'Events' option selected under 'Tasks and Events'. The main pane displays the 'Event Type' and 'Event Details' sections. The 'Event Type' section is highlighted with a green box and shows a table of events with columns for Description, Type, Date Time..., Task, Target, User, and Event Type... (with 100 items). The 'Event Details' section is also highlighted with a green box and shows a detailed description of a recent event: 'User root@172.20.10.80 logged out (login time: Fri Oct 28 13:05:08 UTC 2016, number of API invocations: 0, user agent: Mozilla/5.0 (Windows NT 6.3; WOW64; Trident/7.0; rv:11.0) like Gecko)'.

Description	Type	Date Time...	Task	Target	User	Event Type...
Message...	Information	10/28/2016 6...		VM1-1	User	vim.event.Vm...
User root...	Information	10/28/2016 6...		sa-esxi-0...	root	vim.event.Us...
VM1-1 is...	Information	10/28/2016 6...		VM1-1	VSPHERE.LOC...	vim.event.Vm...
Message...	Information	10/28/2016 6...		VM1-1	vxpuser	vim.event.Vm...
VM1-1 is...	Information	10/28/2016 6...		VM1-1	VSPHERE.LOC...	vim.event.Vm...
Task: Po...	Information	10/28/2016 6...	Power On vir...	VM1-1	VSPHERE.LOC...	vim.event.Ta...
Power On...	Information	10/28/2016 6...		VM1-1	VSPHERE.LOC...	vim.event.Ta...

vCenter Server System Logs

vSphere records events in the vCenter Server database:

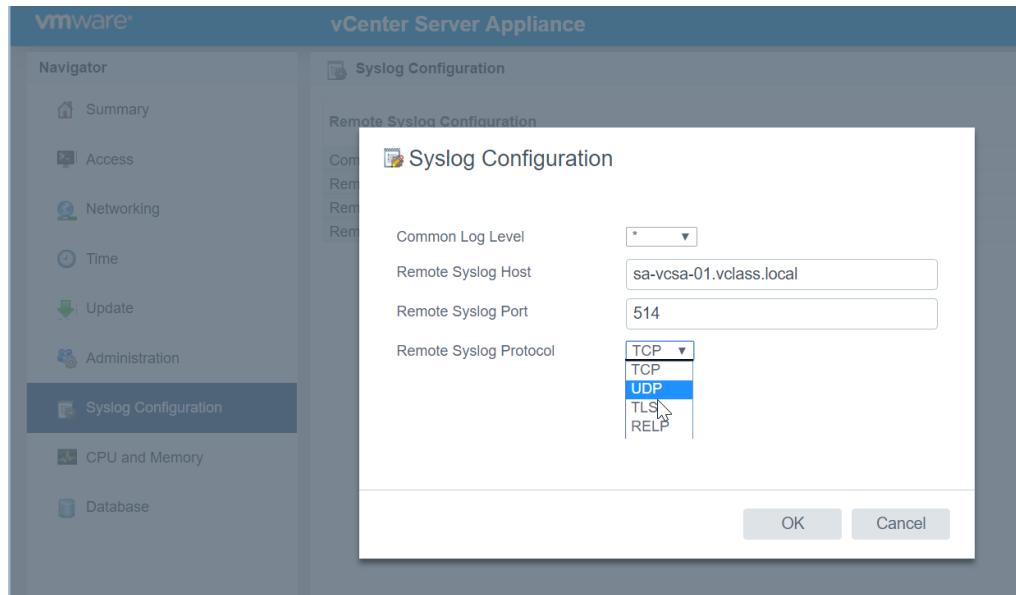
- System log entries include information, such as who generated the event, when the event was created, and the type of event.

The screenshot shows the vSphere Web Client interface. In the top navigation bar, the URL is https://sa-vcsa-01.vclass.local/vsphere-client/?csp#extensionId%3Dvsp and there is a 'Certificate error' warning. The title bar says 'vSphere Web Client'. The top menu includes 'Administrator@VSPHERE.LOCAL', 'Help', and a search bar. The left sidebar has a 'Navigator' section with 'Back', 'Infrastructure' (selected), and a tree view showing 'sb-vcsa-01.vclass.local' and 'sa-vcsa-01.vclass.local' (selected). The main content area has tabs for 'Issues', 'Tasks & Events', 'System Logs' (selected), and 'Sessions'. Below the tabs, a dropdown shows 'vCenter Server log [vpxd-15.log]'. A button labeled 'Export System Logs' is highlighted with a callout box containing the text: 'You can export system logs for troubleshooting system problems.' The log viewer displays several lines of system log output, starting with '2016-10-11T17:41:47.632Z Section for VMware VirtualCenter, pid=4023, version=6.5.0, build=2016-10-11T17:41:47.632Z verbose vpxd[7F29D7D02800] [Originator@6876 sub=Default] D'. The log continues with various system initialization messages and signal handlers. At the bottom, it says 'Showing 2000 of 50850 lines' and has buttons for 'Show line numbers', 'Show Next 2000 Lines', and 'Show All Lines'.

Outputting vCenter Server Logs to Syslog Collector

vCenter Server is capable of streaming its log information to a remote Syslog server:

- You can enable this feature in the vCenter Server Appliance Management Interface at https://FQDN_of_vCenter_Server_Appliance:5480.
- This feature can help prevent the file system of vCenter Server Appliance from filling up with log files. It also enables further analysis of the vCenter Server Appliance log files with log analysis products, such as VMware vRealize® Log Insight™.



vCenter Server Database Health

vCenter Server checks the status of the database every 15 minutes:

- Database health warnings trigger an alarm when the volume (by default) reaches 80 percent.
- The alarm changes from warning to error when the free space reaches 95 percent and vCenter Server services shut down to allow the user to configure more disk space or remove unwanted content.

These features are available for the following databases:

- PostgreSQL and MSSQL
- Not available for Oracle

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. On the left, the Navigator pane is open with the following navigation path: Administration > System Configuration > Services. The 'System Configuration' and 'Services' items are highlighted with red boxes. The main content area is titled 'System Configuration' and contains the following information:

- System Configuration**: A brief description stating: "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."
- 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**: A table showing the status of nodes across five categories: Critical (0 Nodes), Warning (0 Nodes), Unknown (0 Nodes), Good (1 Node), and Not applicable (0 Nodes).
- Services Health**: A table showing the status of services across five categories: Critical (0 Services), Warning (0 Services), Unknown (1 Service), Good (17 Services), and Not applicable (3 Services).

Lab 6: Creating Folders in vCenter Server Appliance

Create folders in vCenter Server Appliance

1. Create a Host and Cluster Folder
2. Create Virtual Machine and Template Folders

Review of Learner Objectives

You should be able to meet the following objectives:

- Create and organize vCenter Server inventory objects
- Add data center and organizational objects to vCenter Server
- Add hosts to vCenter Server
- Discuss how to create custom inventory tags for inventory objects
- Recognize how to view vCenter Server logs and events
- Manage the vCenter Server services
- Monitor vCenter Server Appliance