

# VMware vSphere Install, Configure, Manage | Lab Guide

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# VMware vSphere Install, Configure, Manage | Lab Guide

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## Importance of Virtualization:

- **Efficiency:**
  - Maximizes hardware usage.
  - Reduces the need for multiple physical machines.
- **Cost Savings:**
  - Reduces power consumption.
  - Lowers cooling and hardware costs.
- **Flexibility:**
  - Enables rapid VM deployment.
  - Supports scaling and migration.
- **Business Continuity:**
  - Simplifies backup processes.
  - Bolsters disaster recovery.
  - Ensures high availability.
- **Isolation:**
  - Provides distinct environments for applications.
  - Enhances both security and performance.

## VMware vSphere Introduction:

- **vSphere:** VMware's leading virtualization platform.
  - **ESXi Hypervisor:** Bare-metal hypervisor for creating VMs.
  - **vCenter Server:** Centralized management for ESXi hosts. Features include:
    - Centralized control and automation of resources.
    - Simplified deployment and management of virtual environments.
  - **vSAN:** Software-defined storage for hyper-converged infrastructure.
    - **Performance:** Flash-optimized storage.
    - **Resilient:** Fault-tolerant and offers data protection.
    - **Scalable:** Effortlessly add capacity as needs grow.
  - **Cloud Integration:** Seamless connection to public cloud platforms.
    - **Hybrid Deployment:** Combine on-premises and cloud resources.
    - **Scale on Demand:** Extend infrastructure to the cloud when needed.
    - **Disaster Recovery:** Backup and restore with cloud solutions.

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## ESXi Installation and Configuration:

ESXi is the bare-metal hypervisor from VMware that provides the foundation for running virtual machines on a physical server. In this section, we will cover the basic steps for installing and configuring ESXi.

### 1. Check hardware compatibility:

- Before installing ESXi, you need to ensure that the hardware is compatible. You can check the hardware compatibility by visiting the [VMware Compatibility Guide - System Search](#).

### 2. Download ESXi ISO image and burn to CD/DVD or USB drive:

- Once you have downloaded the ESXi ISO image, you can burn it to a CD/DVD or USB drive using a tool like Rufus or the built-in Windows USB/DVD Download Tool.

### 3. Boot the server from the CD/DVD or USB drive:

- Insert the CD/DVD or USB drive into the server and boot from it. The ESXi installer will start.

### 4. Install ESXi:

- Follow the on-screen instructions to install ESXi. You will need to select the disk on which to install ESXi and provide basic networking information like IP address, subnet mask, default gateway, and DNS server.

### 5. Configure ESXi:

- After installing ESXi, you can configure it by logging in to the vSphere Web Client or vSphere Client. You can configure settings like hostname, network configuration, time zone, and NTP server.

### 6. Create a virtual machine:

- Once ESXi is installed and configured, you can create virtual machines using the vSphere Web Client or vSphere Client. You will need to provide settings like virtual machine name, guest operating system, number of CPUs, amount of RAM, and storage.

### 7. Power on and access the virtual machine:

- After creating the virtual machine, you can power it on and access it using a remote desktop or a console connection. You can also install an operating system and other software on the virtual machine.

**Note:** All instructions are explained in detail below with screenshots to guide you through each step of the process.

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## DNS Configuration for all ESXi Hosts and vCenter Servers

Configuring Domain Name System (DNS) for all ESXi hosts and vCenter Servers is important as it allows these hosts to communicate with other hosts and services on the network using domain names instead of IP addresses.

### Forward Lookup Zone Configuration

#### 1. Add A (Address) Records:

- Open your DNS manager.
- Navigate to the forward lookup zone for abdelwahed.me.
- Add the following A records for each ESXi host, vCenter server:

Hostname	IP Address
ESXI01	200.200.200.201
ESXI02	200.200.200.202
vCenter01	200.200.200.111
DC	200.200.200.200

### Reverse Lookup Zone Configuration

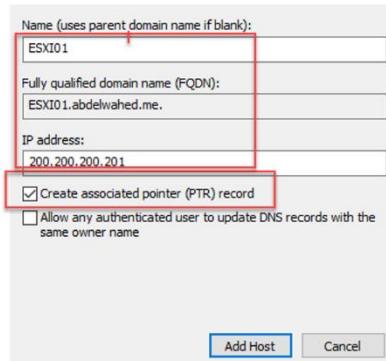
#### 1. Add Reverse Lookup Zone:

- Open your DNS manager.
- Create a new reverse lookup zone for the network 200.200.200.x.

#### 2. Add PTR (Pointer) Records:

- Within the reverse lookup zone, add the following PTR records:

IP Address	Hostname
200.200.200.201	ESXI01.abdelwahed.me
200.200.200.202	ESXI02.abdelwahed.me
200.200.200.111	vCenter01.abdelwahed.me
200.200.200.200	dc.abdelwahed.me

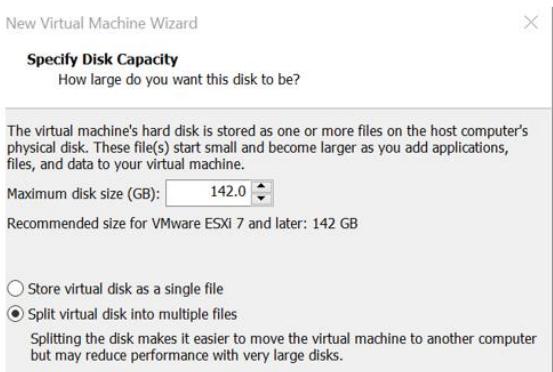
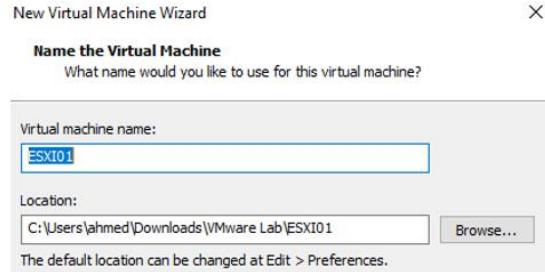
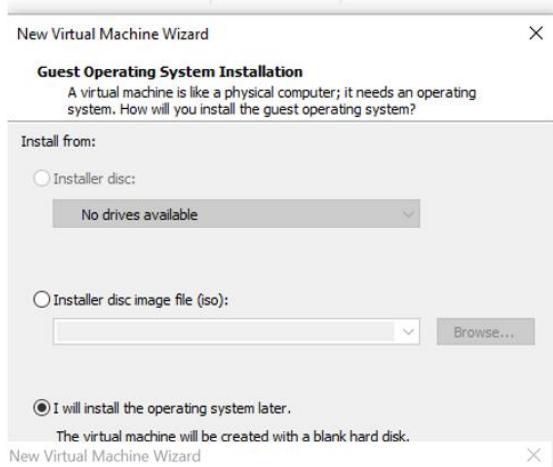


The screenshot shows the VMware DNS Manager window. On the left, the tree view shows 'DNS' expanded, with 'DC' selected. Under 'DC', there are 'Forward Lookup Zones' (containing '\_msdcs.abdelwahed.me' and 'abdelwahed.me') and 'Reverse Lookup Zones' (containing '200.200.200.in-addr.arpa'). On the right, a table lists PTR records:

Name	Type	Data	Timestamp
(same as parent folder)	Start of Authority (SOA)	[12], dc.abdelwahed.me, ...	static
(same as parent folder)	Name Server (NS)	dc.abdelwahed.me.	static
200.200.200.1	Pointer (PTR)	ESXI01.abdelwahed.me.	static
200.200.200.111	Pointer (PTR)	vCenter01.abdelwahed.me.	static
200.200.200.2	Pointer (PTR)	ESXI02.abdelwahed.me.	static
200.200.200.200	Pointer (PTR)	DC.abdelwahed.me.	5/27/2021
200.200.200.222	Pointer (PTR)	vCenter.abdelwahed.me.	static

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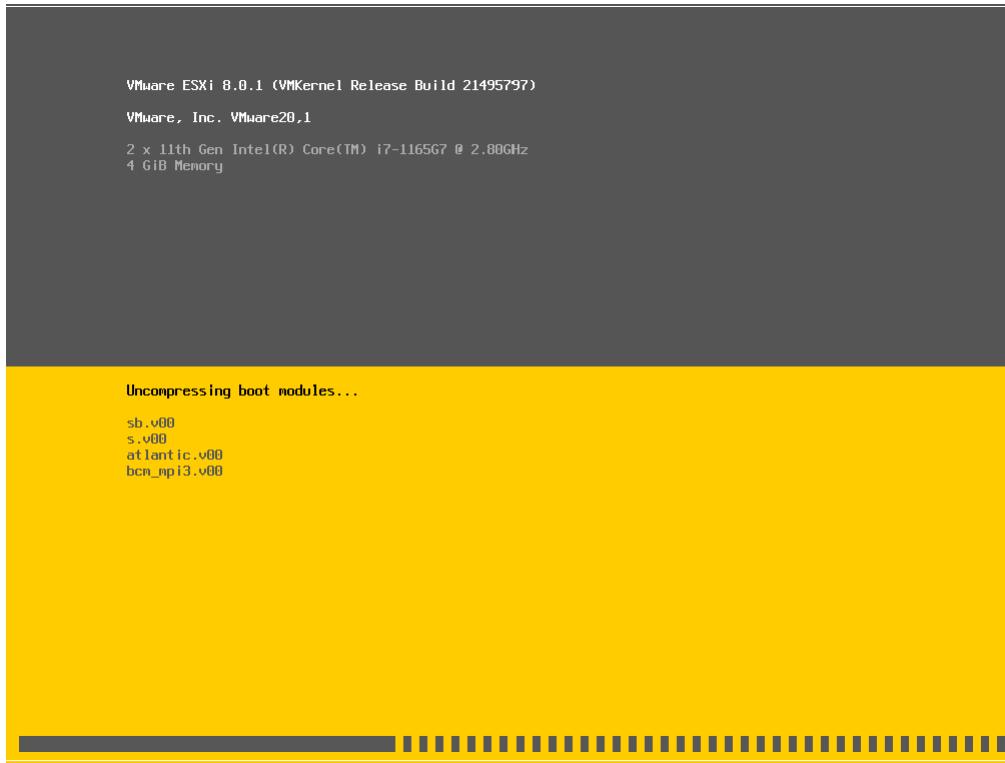
## Basic Configuration for a Virtual Machine to Host ESXi Server inside VMware Workstation



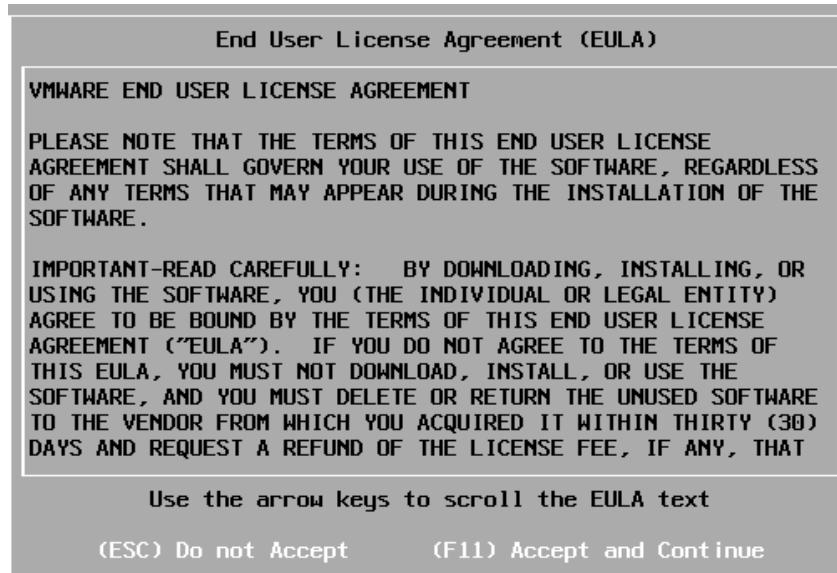
Device	Summary
Memory	7.9 GB
Processors	2
New CD/DVD (IDE)	Using file C:\Users\ahmed\Downloads\VMware Lab\ESXi01\ISO\VMware ESXi 7.0.0 build-14200000.iso
Network Adapter	Host-only
USB Controller	Present
Display	Auto detect

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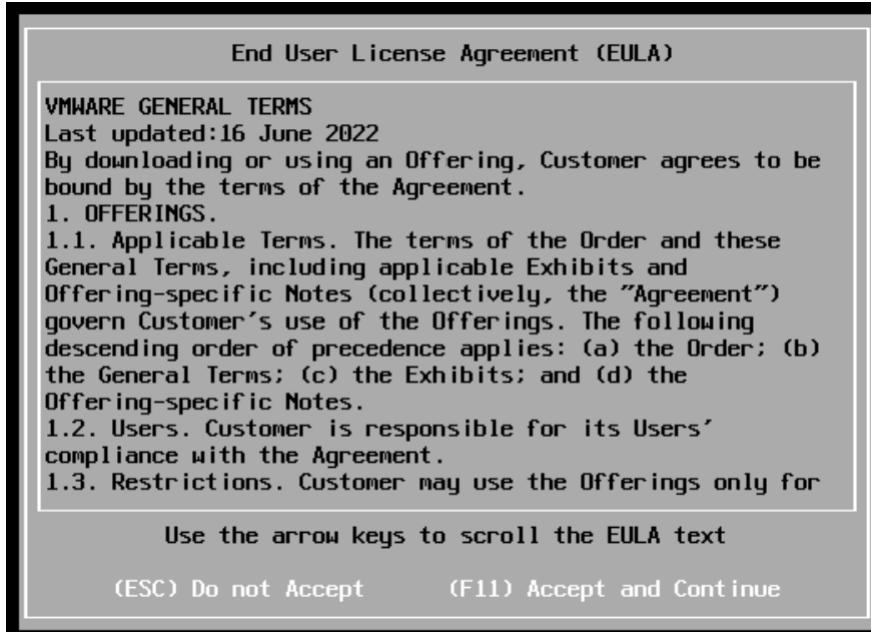
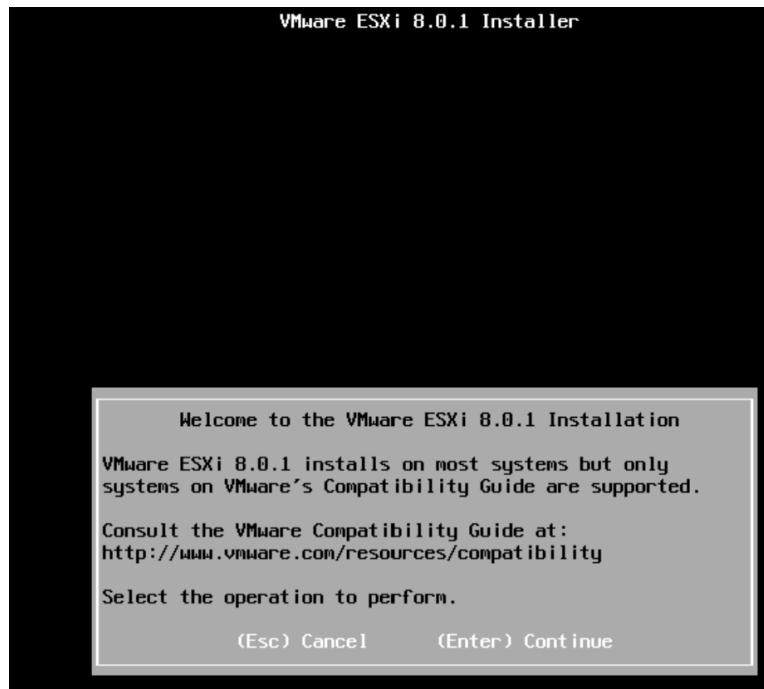


Press F11 to agree to the license.



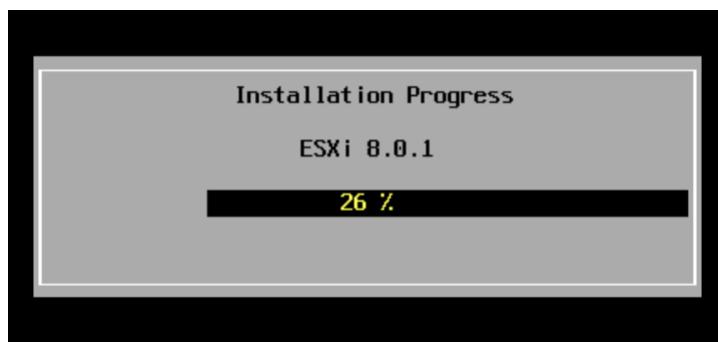
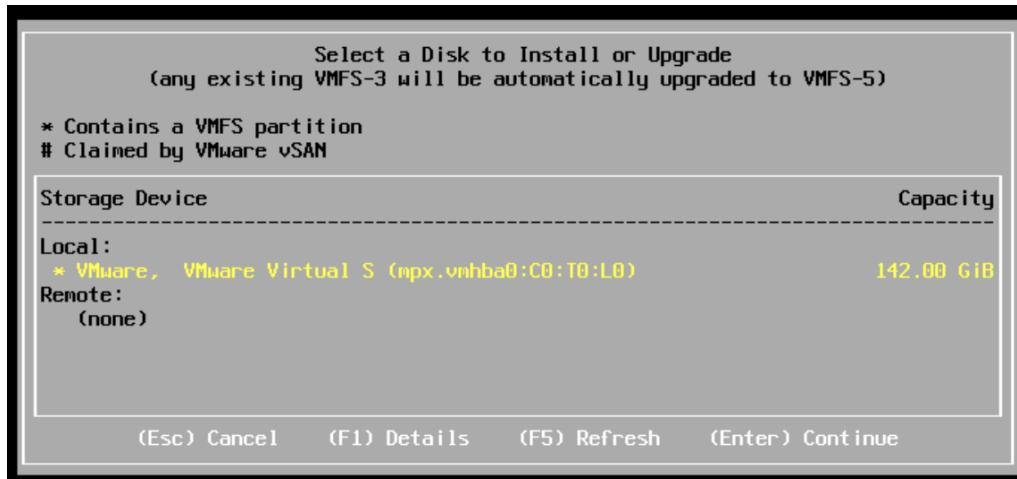
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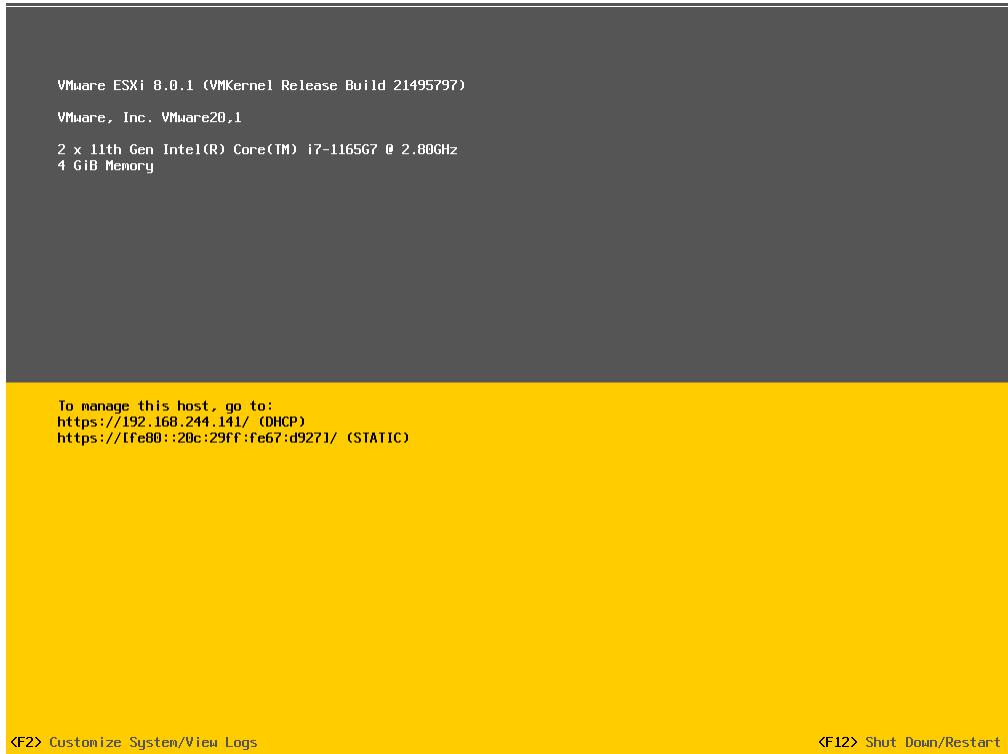
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Press F2 to sign in as the root user.

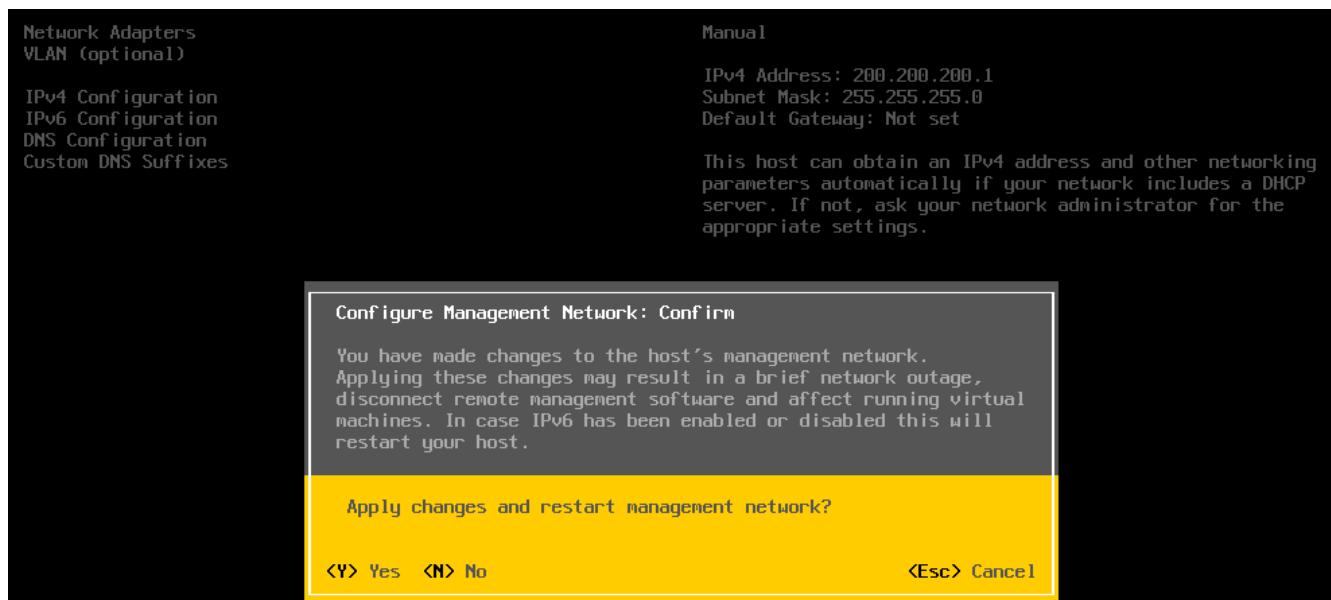
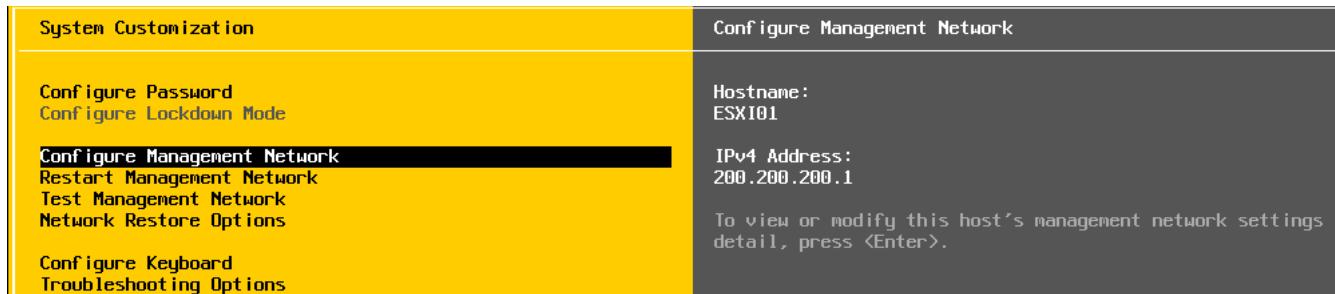
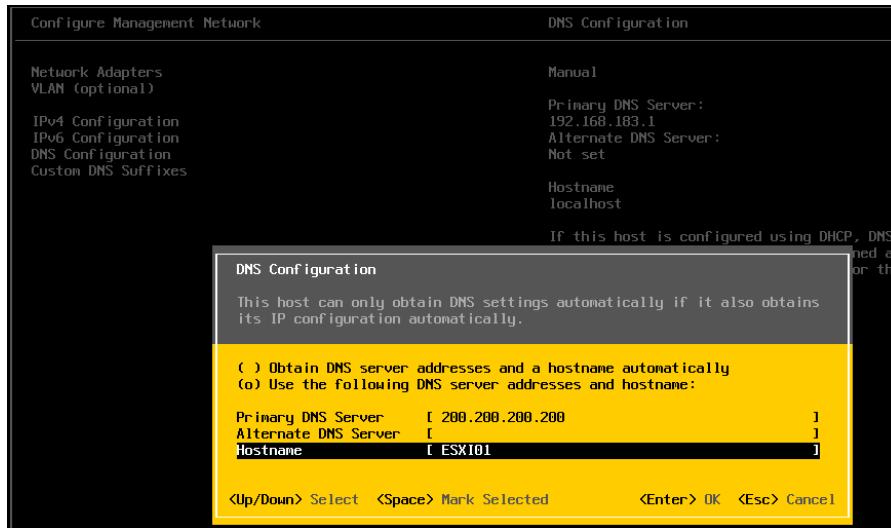


Set up the hostname and network configurations.

You can now set up the hostname and network to enable remote management of the server via http.

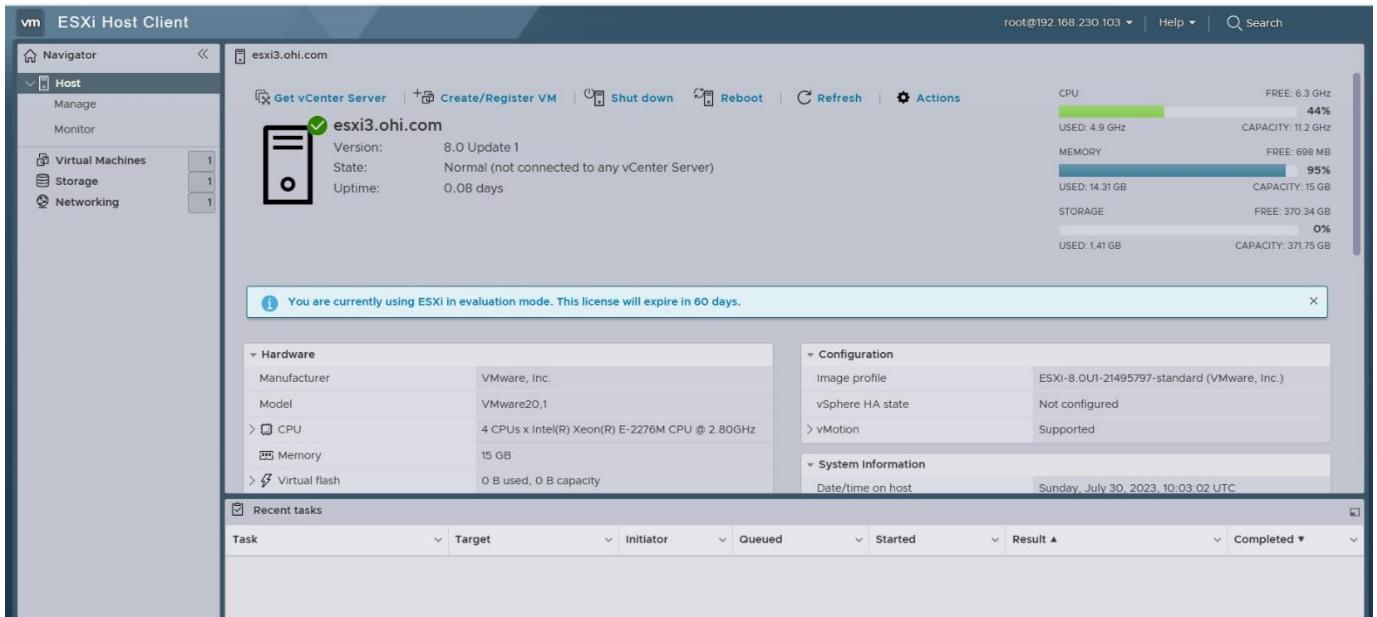
System Customization	Configure Management Network
<p>Configure Password Configure Lockdown Mode</p> <p><b>Configure Management Network</b></p> <p>Restart Management Network Test Management Network Network Restore Options</p> <p>Configure Keyboard Troubleshooting Options</p> <p>View System Logs</p> <p>View Support Information</p> <p>Reset System Configuration</p>	<p>Hostname: ESXI01</p> <p>IPv4 Address: 200.200.200.1</p> <p>IPv6 Addresses: fe80::20c:29ff:fe9c:857a/64</p> <p>To view or modify this host's management network settings in detail, press &lt;Enter&gt;.</p>

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Now, all ESXi servers are manageable directly through a web browser.



**Repeat these steps for every ESXi server you intend to set up.**

## vCenter

vCenter is a management software platform for VMware vSphere, a virtualization platform used by many organizations to host and manage virtual machines. vCenter allows administrators to manage multiple ESXi hosts and their virtual machines from a single centralized location, providing a more streamlined and efficient way to manage a virtual infrastructure. Here are some of the key features and benefits of vCenter:

### 1. Centralized Management:

- With vCenter, administrators can manage multiple ESXi hosts and their virtual machines from a single, unified console.
- This provides a more streamlined and efficient way to manage virtual infrastructure, as well as more control over the virtual environment.

### 2. High Availability:

- vCenter supports high availability features, such as vCenter High Availability (vCHA), that ensure that vCenter remains available in the event of hardware or software failures.

### 3. Automation:

- vCenter includes automation features, such as vSphere Auto Deploy and vSphere PowerCLI, that allow administrators to automate tasks and workflows in the virtual environment, reducing the workload and potential for human error.

### 4. Security:

- vCenter includes security features, such as vCenter Single Sign-On (SSO), that help ensure that the virtual environment is secure and protected from unauthorized access.

### 5. Performance Monitoring:

- vCenter includes performance monitoring features, such as vSphere Distributed Resource Scheduler (DRS) and vSphere High Availability (HA), that help administrators optimize the performance and availability of the virtual environment.

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## Deploy vCenter

Install vCenter by mounting the VCA ISO onto a Domain Controller or any virtual machine that is part of the abdelwahed.me domain. Begin the installation process with ESXI1 designated as the host for deploying vCenter.

This PC > DVD Drive (D:) VMware VCSA > vcsa-ui-installer > win32 >			
Name	Date modified	Type	Size
<b>Files Currently on the Disc (20)</b>			
locales	4/21/2021 12:54 A...	File folder	
resources	4/21/2021 12:54 A...	File folder	
swiftshader	4/21/2021 12:54 A...	File folder	
chrome_100_percent.pak	12/29/2020 2:12 PM	PAK File	177 KB
chrome_200_percent.pak	12/29/2020 2:12 PM	PAK File	314 KB
d3dcompiler_47.dll	12/29/2020 2:12 PM	Application extens...	3,628 KB
ffmpeg.dll	12/29/2020 2:12 PM	Application extens...	2,565 KB
icudtl.dat	12/29/2020 2:12 PM	DAT File	10,272 KB
installer	12/29/2020 2:12 PM	Application	104,283 KB
libFGL.dll	12/29/2020 2:12 PM	Application extens...	366 KB

vCenter Server 8.0 Installer interface, which provides four main options:

### 1. Install:

- Install a new vCenter Server.

### 2. Upgrade:

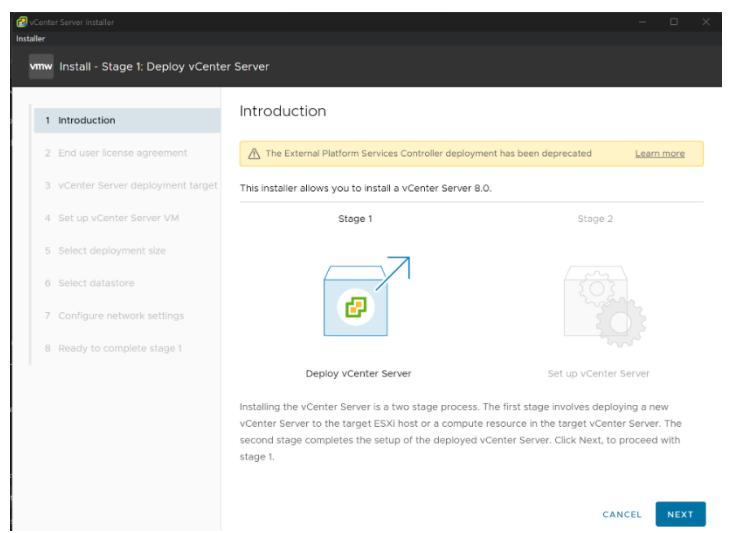
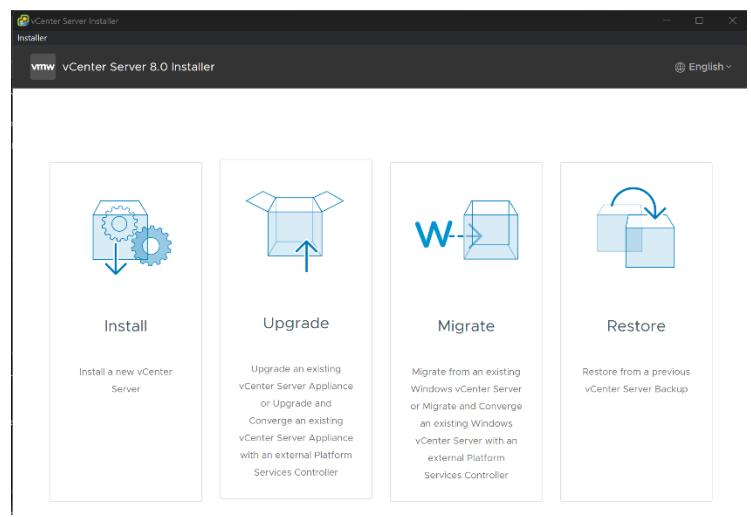
- Upgrade an existing vCenter Server Appliance or upgrade and converge an existing vCenter Server Appliance with an external Platform Services Controller.

### 3. Migrate:

- Migrate from an existing Windows vCenter Server or migrate and converge an existing Windows vCenter Server with an external Platform Services Controller.

### 4. Restore:

- Restore from a previous vCenter Server Backup.



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The screenshot shows the 'vCenter Server Installer' window with the title 'vmw Install - Stage 1: Deploy vCenter Server'. The left sidebar lists steps 1 through 8. Step 2, 'End user license agreement', is selected. The main panel displays the 'VMWARE END USER LICENSE AGREEMENT' text, which states: 'PLEASE NOTE THAT THE TERMS OF THIS END USER LICENSE AGREEMENT SHALL GOVERN YOUR USE OF THE SOFTWARE, REGARDLESS OF ANY TERMS THAT MAY APPEAR DURING THE INSTALLATION OF THE SOFTWARE.' It also includes sections for 'IMPORTANT-READ CAREFULLY:' and 'EVALUATION LICENSE'. A checkbox labeled 'I accept the terms of the license agreement.' is checked. At the bottom right are buttons for 'Activate W...', 'CANCEL', 'BACK', 'NEXT', and 'Finish settings & next'.

The screenshot shows the 'vCenter Server deployment target' configuration screen. The left sidebar shows step 3, 'vCenter Server deployment target', is selected. The main panel shows fields for 'ESXi host or vCenter Server name' (set to 'esxi01.abdelwahed.me'), 'HTTPS port' (set to '443'), 'User name' (set to 'root'), and 'Password' (set to '\*\*\*\*\*'). At the bottom right are buttons for 'Activate W...', 'CANCEL', 'BACK', 'NEXT', and 'Finish settings & next'.

The screenshot shows a 'Certificate Warning' dialog box overlaid on the 'vCenter Server deployment target' screen. The dialog title is 'vCenter Server deployment target'. It contains text about untrusted SSL certificates and provides the SHA1 thumbprint: '55:A3:28:EB:5F:0C:CF:3A:D8:DC:6F:50:0E:B6:9A:4B:C4:2C:ED:EF'. It asks the user to click 'Yes' to accept the certificate. At the bottom are 'NO' and 'YES' buttons.

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The screenshots illustrate the VMware vCenter Server Installer interface during the deployment process:

**Step 1: Set up vCenter Server VM**

VM name: Abdelwahed vCenter  
Set root password:  Confirm root password:

**Step 5: Select deployment size**

Deployment size: Tiny  
Storage size: Default

Deployment Size	vCPUs	Memory (GB)	Storage (GB)	Hosts (up to)	VMs (up to)
Tiny	2	12	463	10	100
Small	4	19	528	100	1000
Medium	8	28	748	400	4000

**Step 6: Select datastore**

Select the storage location for this vCenter Server

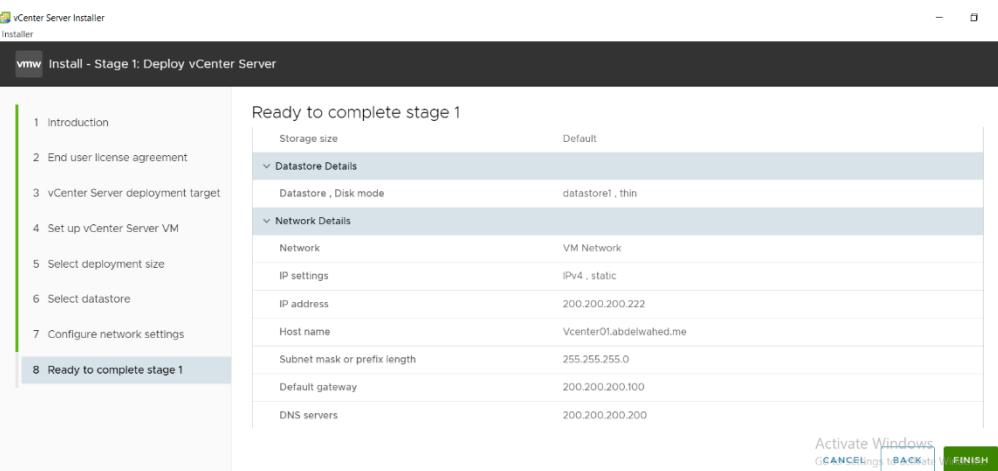
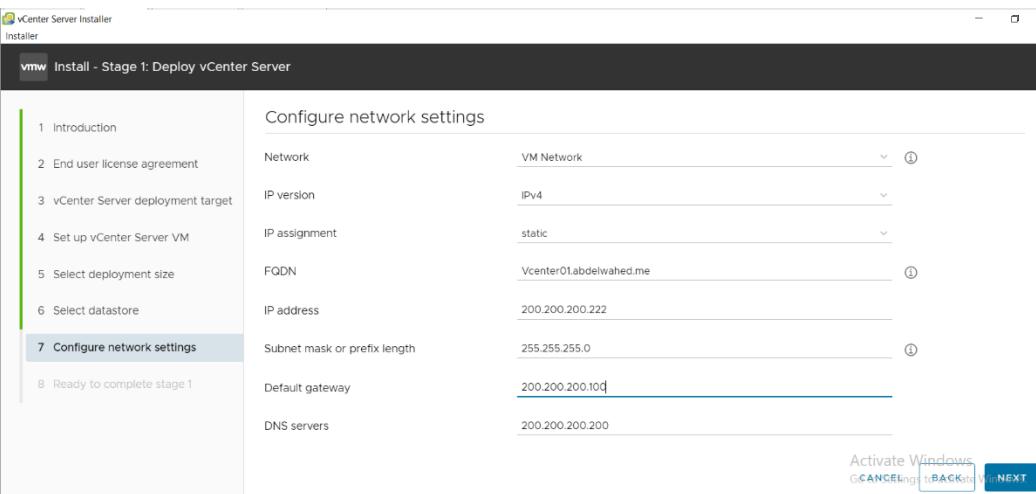
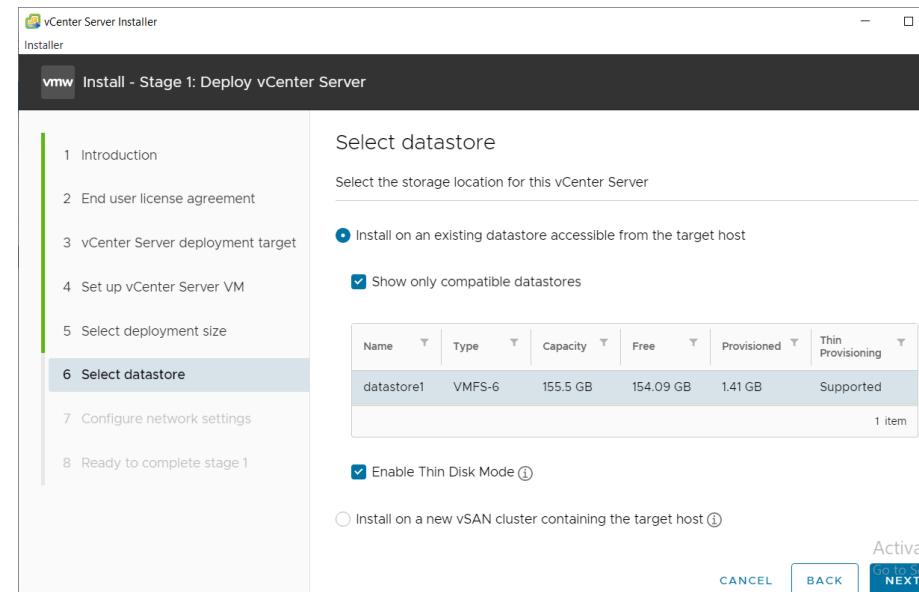
Install on an existing datastore accessible from the target host  
 Show only compatible datastores

Name	Type	Capacity	Free	Provisioned	Thin Provisioning
datastore1	VMFS-6	13.75 GB	12.34 GB	1.41 GB	Supported

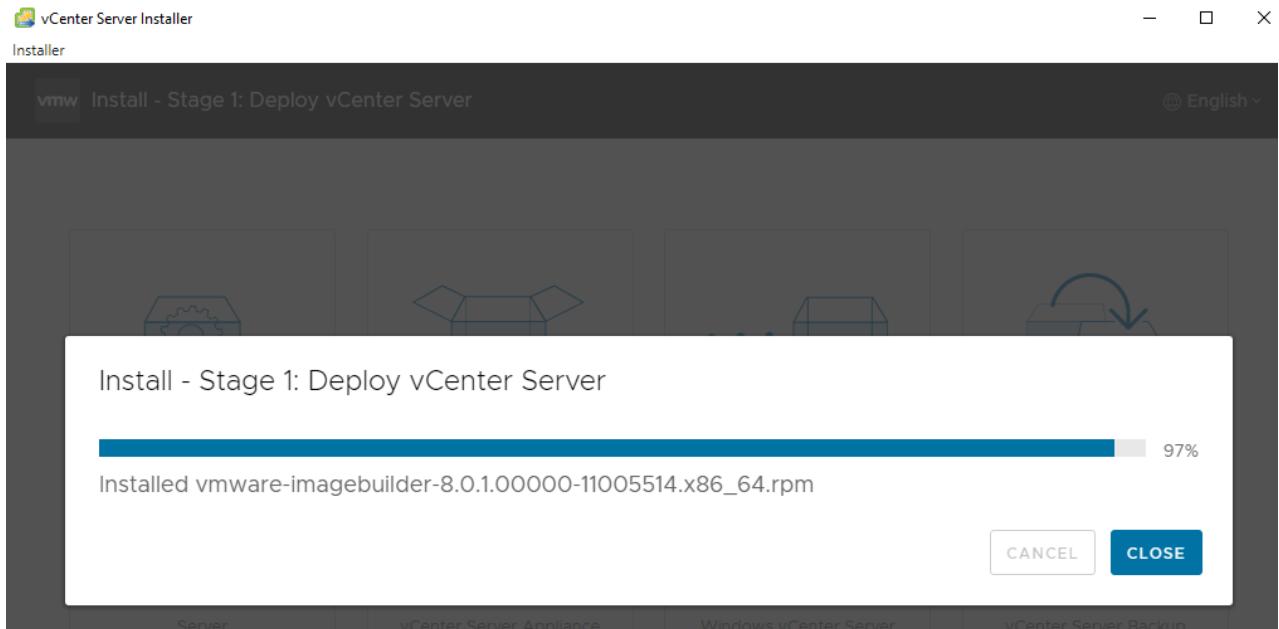
Enable Thin Disk Mode (1)

Install on a new vSAN cluster containing the target host (1)

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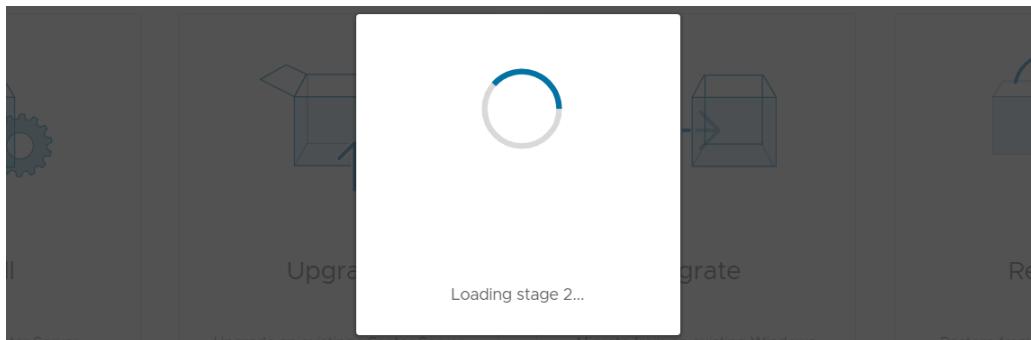
## Install - Stage 1: Deploy vCenter Server

⌚ You have successfully deployed the vCenter Server.

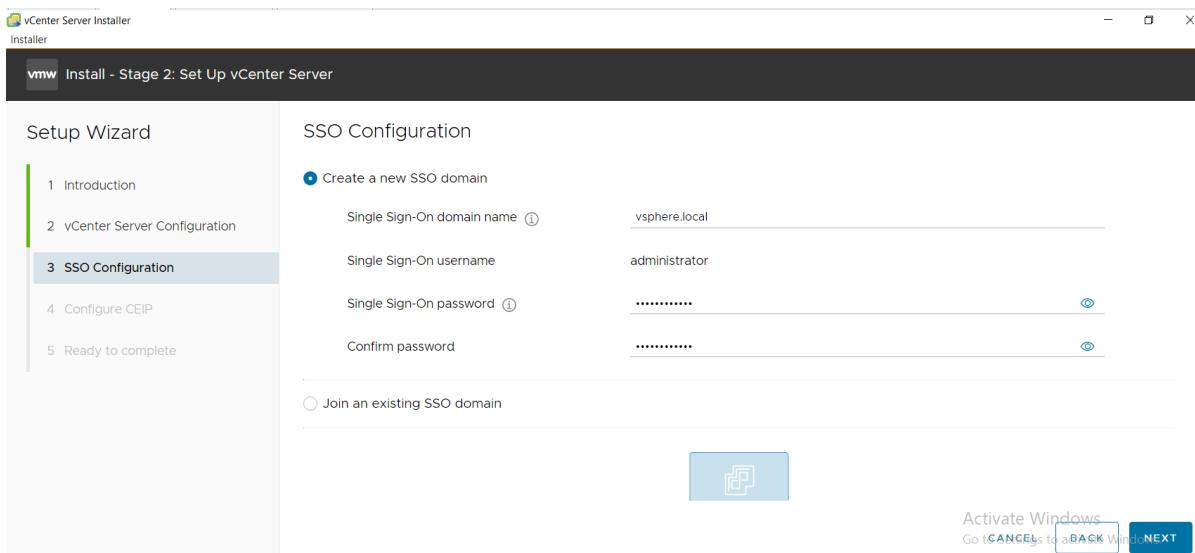
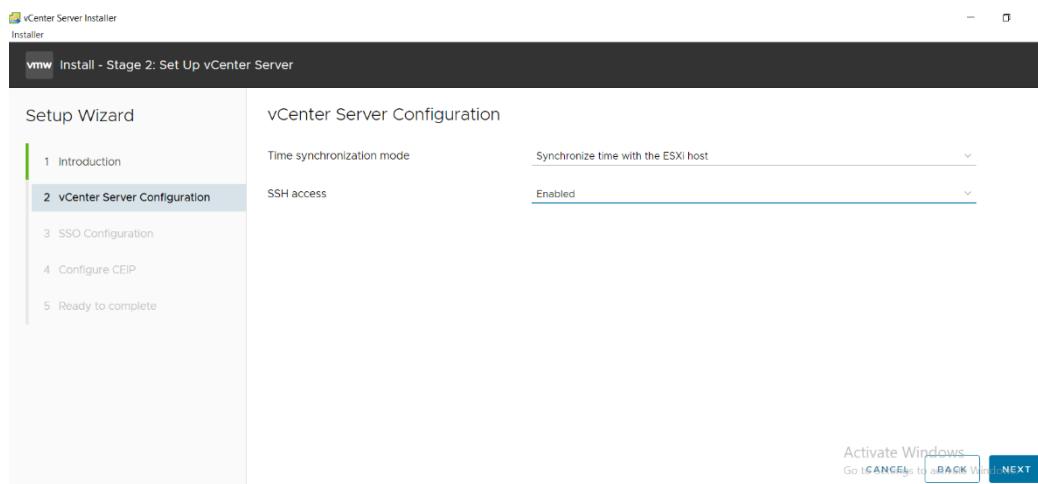
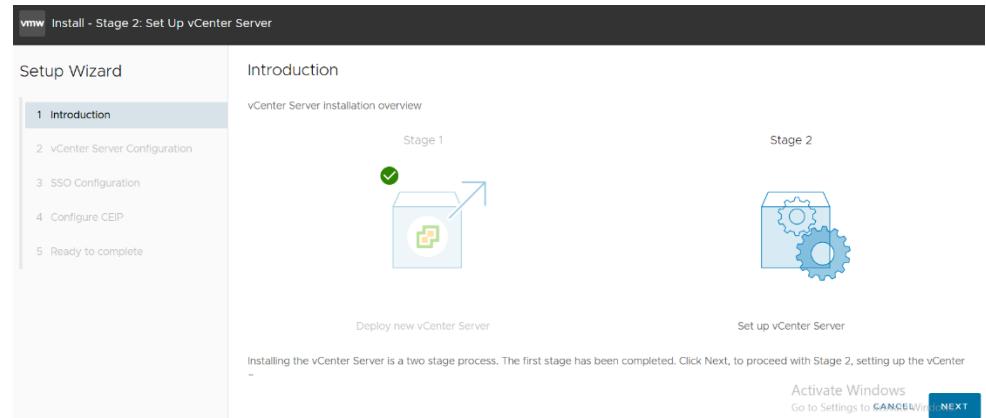
To proceed with stage 2 of the deployment process, vCenter Server setup, click Continue.

If you exit, you can continue with the vCenter Server setup at any time by logging in to the vCenter Server Management Interface <https://200.200.200.222:5480/>

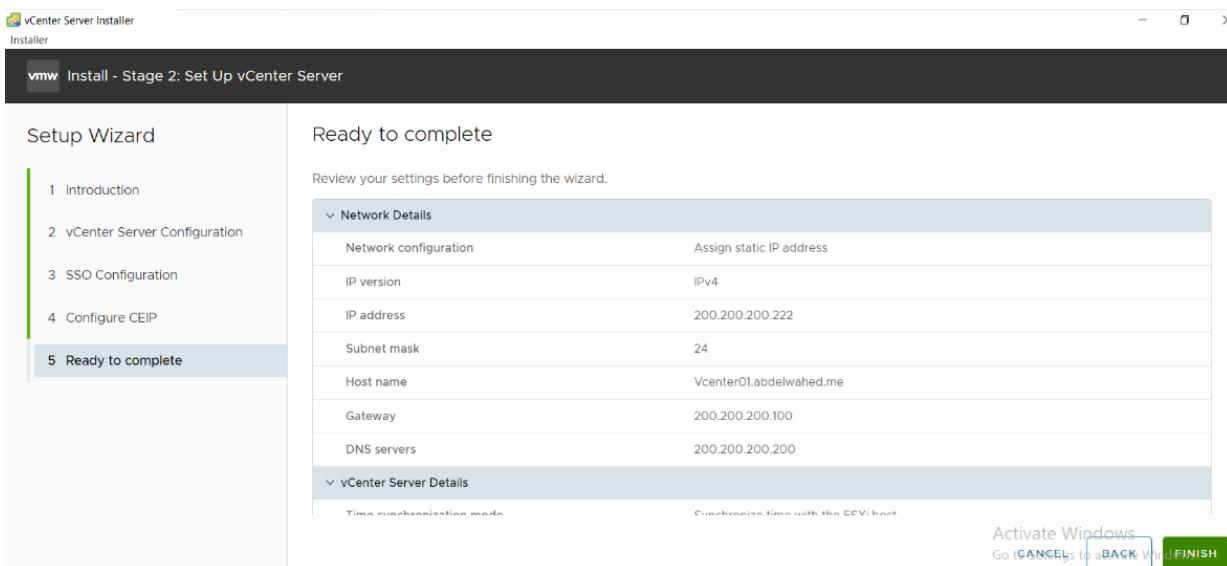
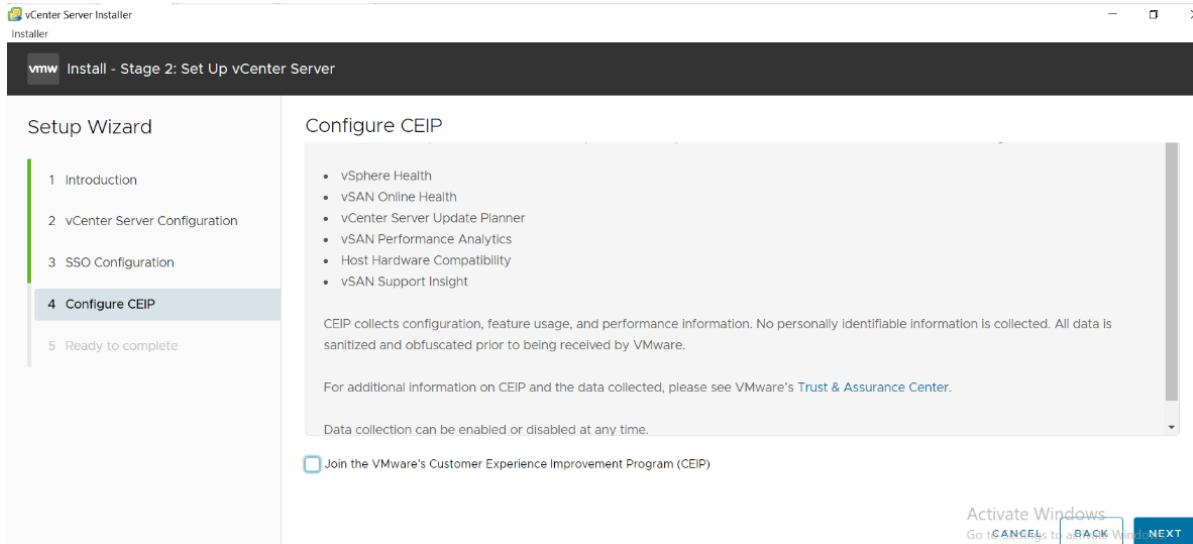
[CANCEL](#) [CLOSE](#) [CONTINUE](#)



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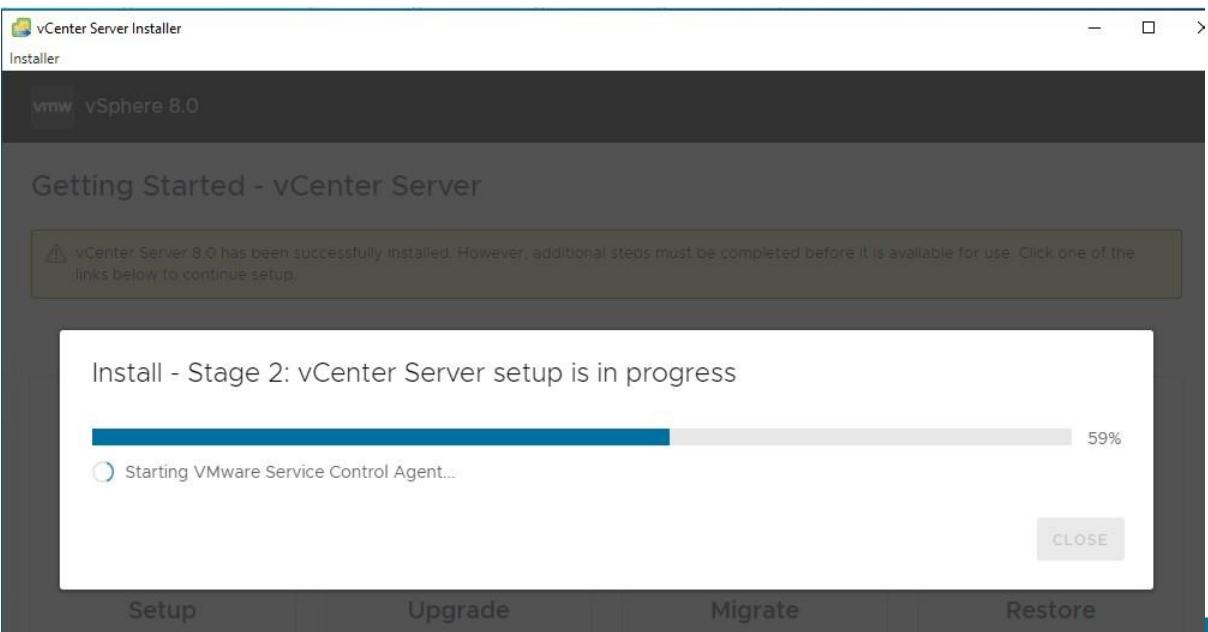


## Warning

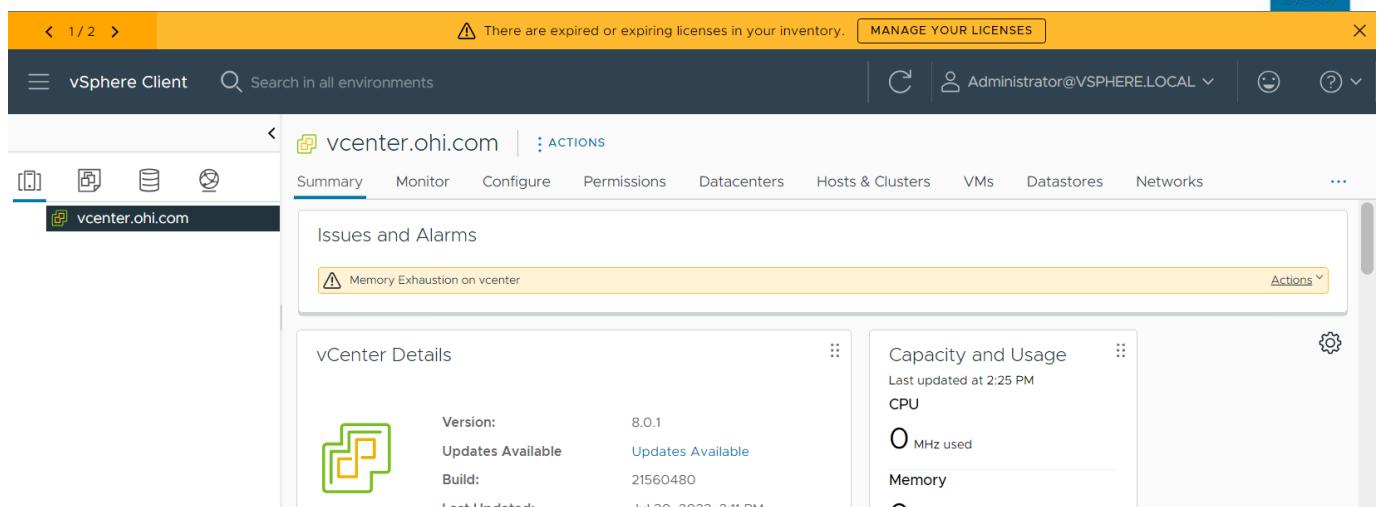
**⚠️** You will not be able to pause or stop the install from completing once its started. Click OK to continue, or Cancel to stop the install.

**CANCEL** **OK**

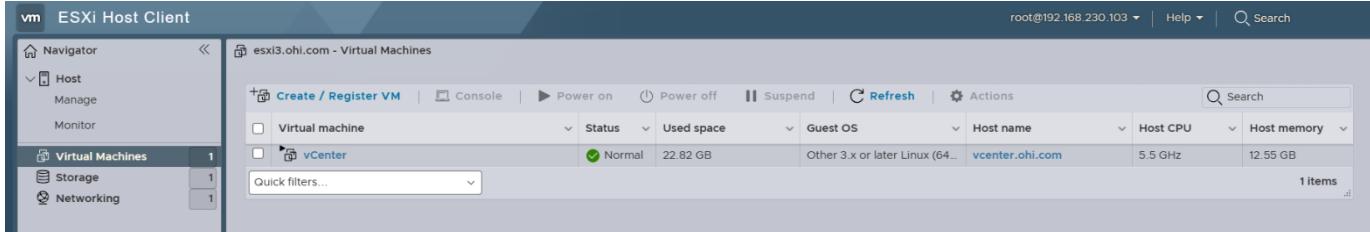
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The screenshot shows the vCenter Server Installer interface. A central modal window displays "Install - Stage 2: vCenter Server setup is in progress" with a progress bar at 59%. Below it, a sub-task "Starting VMware Service Control Agent..." is shown. At the bottom of the modal, there is a "CLOSE" button. The background shows tabs for "Setup", "Upgrade", "Migrate", and "Restore".



The screenshot shows the vSphere Client interface. The top navigation bar includes tabs for "Setup", "Upgrade", "Migrate", and "Restore". A banner at the top right indicates "There are expired or expiring licenses in your inventory." with a "MANAGE YOUR LICENSES" button. The main content area shows "vcenter.ohi.com" under the "vcenter.ohi.com" section. It displays "Issues and Alarms" with a warning about "Memory Exhaustion on vcenter". Below that is the "vCenter Details" section, which lists the version as 8.0.1, updates available, build number 21560480, and last updated on Jul 30, 2023, 2:11 PM. To the right is the "Capacity and Usage" section, which shows 0 MHz used for CPU and 0 for Memory.



The screenshot shows the ESXi Host Client interface. The left sidebar has sections for "Host", "Virtual Machines", "Storage", and "Networking". The main pane shows "esxi3.ohi.com - Virtual Machines" with a table. The table has columns for "Type", "Status", "Used space", "Guest OS", "Host name", "Host CPU", and "Host memory". It lists one item: "Virtual machine" (Status: Normal, Used space: 22.82 GB, Guest OS: Other 3.x or later Linux (64-bit), Host name: vcenter.ohi.com, Host CPU: 5.5 GHz, Host memory: 12.55 GB). There is also a "Quick filters..." dropdown.

Prior to installing vCenter, it's crucial to create DNS A and PTR records for the server to ensure that other systems can identify the vCenter's hostname and IP, which is essential for seamless interaction within the vSphere infrastructure.

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Configuring and managing using ESXi host.

Add a welcome message and assign license

The screenshot shows the 'Manage' interface for the ESXi host. In the 'System' tab, under 'Advanced settings', the 'Annotations.WelcomeMessage' key is being edited. The new value is set to 'Welcome to Ahmed Lab'. A red box highlights the 'Edit option' button and the 'Annotations.WelcomeMessage' row in the table.

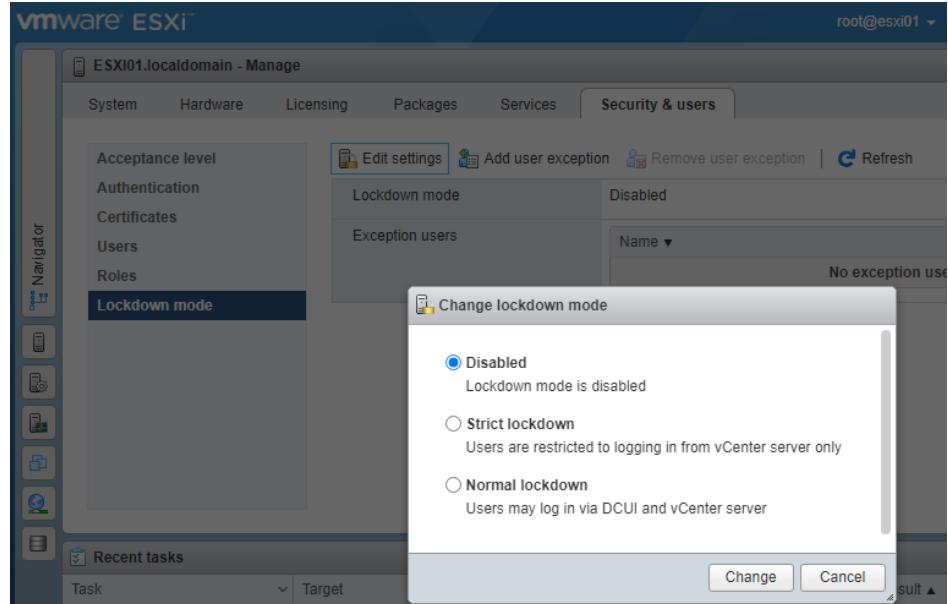
- Based on the license you assign, additional features will be added.
- A trial license is available and works for 60 days, during the trial period, all features are fully functional.

The screenshot shows the 'Licensing' tab in the 'Manage' interface. The 'Assign license' button is highlighted with a red box. To its right, a large red box highlights the list of features available in Evaluation Mode, including vSphere API, Content Library, Storage APIs, vSphere vMotion, X-Switch vMotion, vSphere HA, vSphere Data Protection, vShield Endpoint, vSphere Replication, vShield Zones, and Hot-Pluggable virtual HW.

# VMware vSphere Install, Configure, Manage | Lab Guide

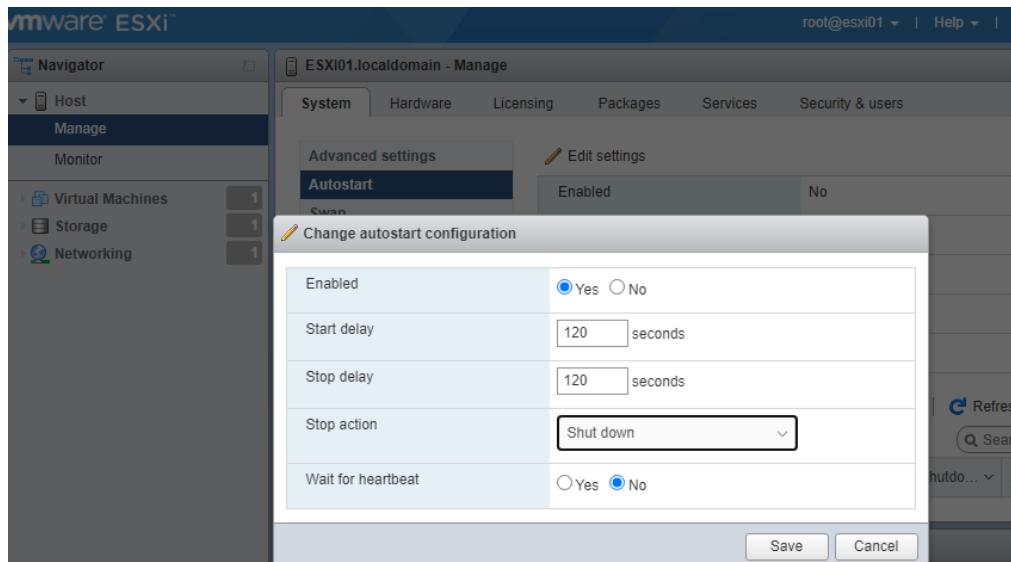
## Lockdown Mode and Auto Restart Option

- **Purpose:** Lockdown mode is a security feature in ESXi that restricts access to the host to prevent unauthorized changes to its configuration.
- **Functionality:**
  - When Lockdown mode is enabled, only the vCenter Server system and the local DCUI (Direct Console User Interface) can perform operations on the host.
  - All other access to the host, including SSH, console, and vSphere Web Client, is blocked.



## Auto Restart Option:

- The Auto Restart option allows virtual machines (VMs) to automatically restart if the ESXi host they are running on is restarted or fails. This ensures that critical VMs are brought back online without manual intervention, enhancing the availability and resilience of the virtual environment.



# VMware vSphere Install, Configure, Manage | Lab Guide

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## Adding Local Users to ESXi Host

ESXi hosts have the ability to create and manage local user accounts. Local user accounts can be used to allow users to log in to the ESXi host using the vSphere Web Client, vSphere Client, or SSH. Once you have added local user accounts to the ESXi host, users can log in to the host using their username and password. Local user accounts have a limited set of privileges, which can be modified using the vSphere Web Client or vSphere Client.

### Steps to Add Local Users to ESXi Host

The screenshot shows the vSphere Web Client interface for managing a host named 'ESXi01.localdomain'. The 'Security & users' tab is selected. On the left, a sidebar titled 'Navigator' lists 'Acceptance level', 'Authentication', 'Certificates', 'Users' (which is selected), 'Roles', and 'Lockdown mode'. In the main content area, there are buttons for 'Add user', 'Edit user', 'Remove user', and 'Refresh'. A table displays a single user entry: 'User Name' is 'root' and 'Description' is 'Administrator'.

The screenshot shows the vSphere Web Client interface for managing a host named 'ESXi01.localdomain'. The 'Security & users' tab is selected. On the left, a sidebar titled 'Navigator' lists 'Acceptance level', 'Authentication', 'Certificates', 'Users', 'Roles' (which is selected), and 'Lockdown mode'. In the main content area, there are buttons for 'Add role', 'Edit role', 'Remove role', and 'Refresh'. A table lists several roles with their descriptions: 'Administrator' (Full access rights), 'Anonymous' (Not logged-in user (cannot be granted)), 'No access' (Used for restricting granted access), 'No cryptography administrator' (Full access without Cryptographic operations privileges), 'Read-only' (See details of objects, but not make changes), and 'View' (Visibility access (cannot be granted)).

# VMware vSphere Install, Configure, Manage | Lab Guide

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## Add and Manage Datastore

A datastore is a storage location in vSphere where you can store virtual machine files, ISO images, templates, and other files. Adding and managing datastores in vSphere is an important part of managing your virtual infrastructure.

### Steps to Add and Manage a Datastore in vSphere

#### 1. Add a Datastore:

- To add a datastore, go to the host or cluster that you want to add the datastore to in the vSphere Web Client or vSphere Client, and click the Storage tab.
- Click the "Add Datastore" button and select the type of datastore that you want to add, such as NFS, iSCSI, or VMFS.
- Follow the prompts to configure the settings for the datastore, such as the datastore name, capacity, and storage location.

#### 2. Manage a Datastore:

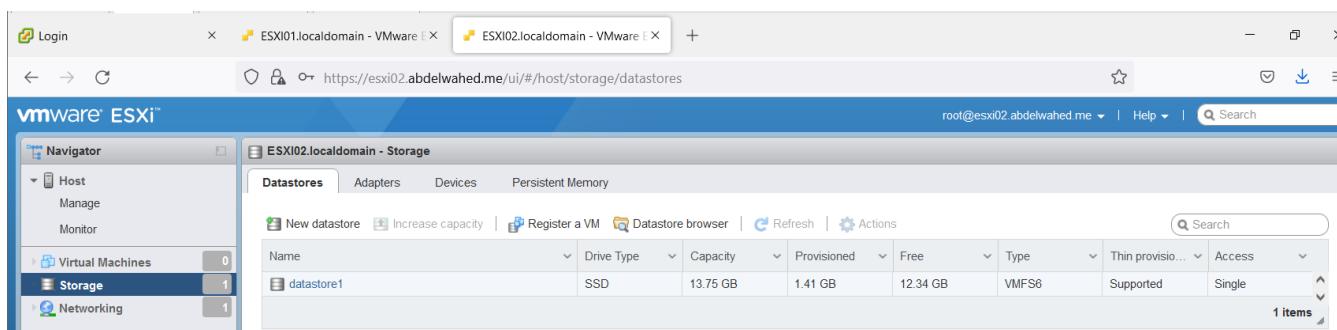
- After adding a datastore, you can manage it by performing various tasks, such as formatting, extending, and deleting the datastore.
  - **Format a Datastore:** Go to the host or cluster that the datastore is attached to, select the datastore in the Storage tab, and click the "Format Datastore" button.
  - **Extend a Datastore:** Select the datastore and click the "Extend Datastore" button, and follow the prompts to add more storage capacity.
  - **Delete a Datastore:** Select the datastore and click the "Delete Datastore" button, and follow the prompts to confirm the deletion.

#### 3. Monitor a Datastore:

- You can also monitor the performance and usage of a datastore in vSphere.
- To do this, go to the host or cluster that the datastore is attached to, select the datastore in the Storage tab, and click the "Monitor" tab.
- Here, you can view charts and statistics for the datastore, such as the amount of free space, the number of virtual machines using the datastore, and the amount of read and write activity.

## Storage Allocation for ESXi Hosts

Both servers book around 8GB for the OS, and the rest of the hard disk space is allocated for datastores to save any kind of data, including VM data and OS ISO files.



# VMware vSphere Install, Configure, Manage | Lab Guide

## Create new local datastore (VMFS) using ESXi

To establish a new local datastore (VMFS) using ESXi, first, you need to install a new hard drive on the server. Afterward, either reboot the ESXi server or perform a storage rescan without restarting by utilizing vCenter. Simply right-click on the ESXi server, select 'storage', and choose 'rescan'. Then proceed as follows:

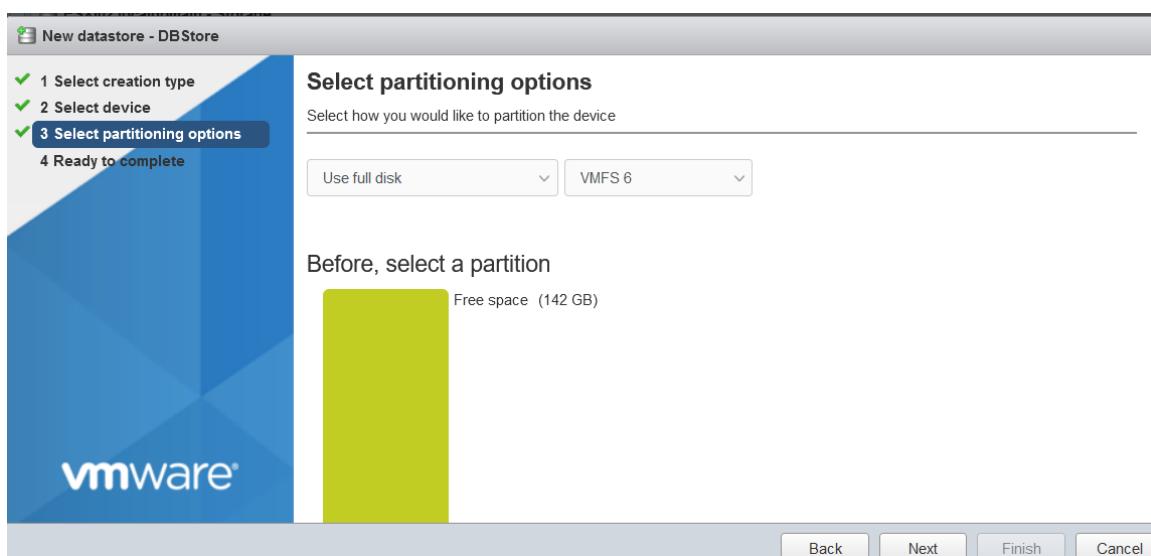
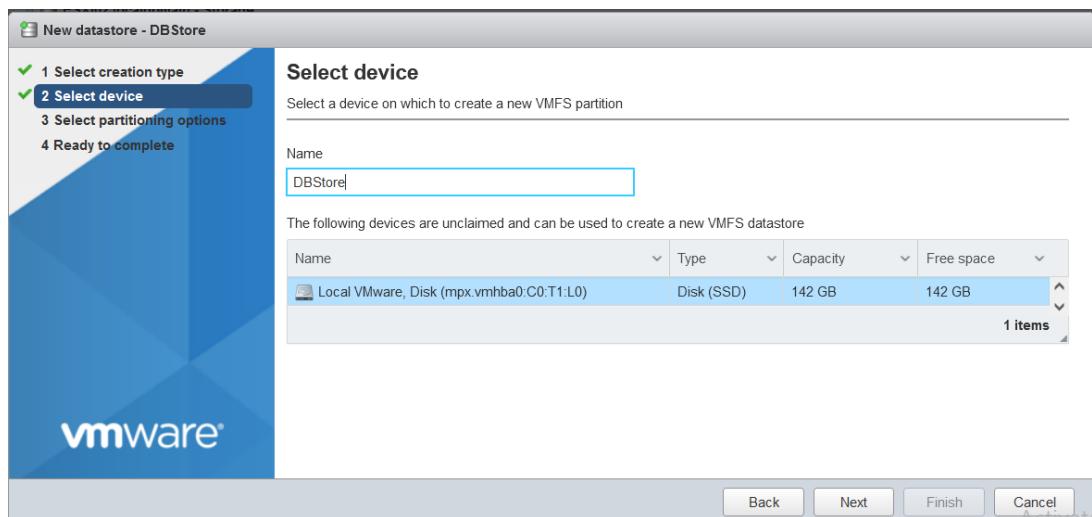
Virtual Machine Settings

Hardware Options

Device	Summary
Memory	7.9 GB
Processors	2
Hard Disk (SCSI)	142 GB
New Hard Disk (SCSI)	142 GB
CD/DVD (IDE)	Using file D:\vmware\VMware ...
Network Adapter	Host-only
USB Controller	Present
Display	Auto detect

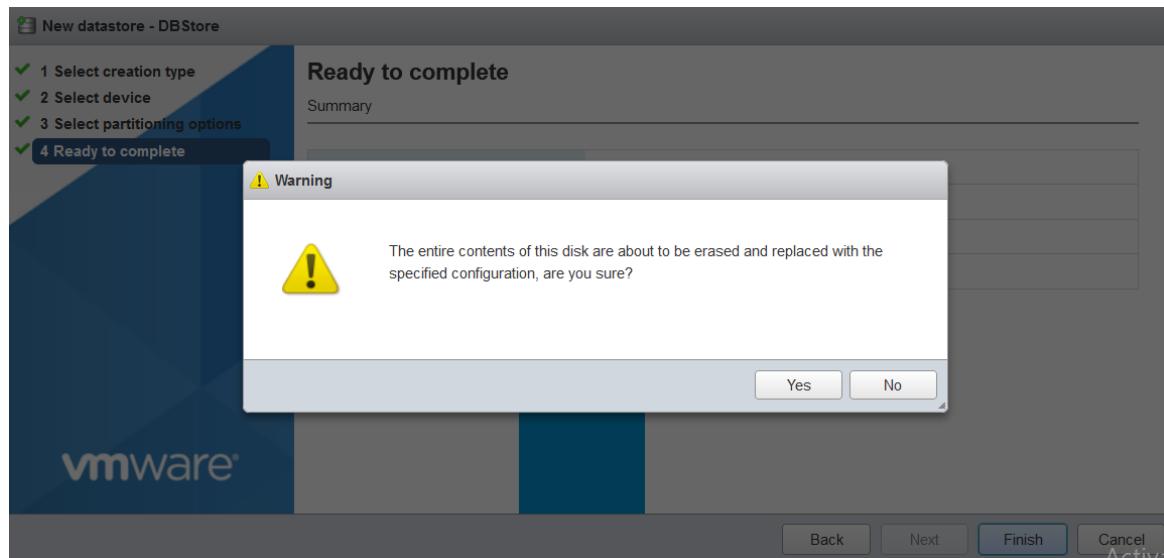
Disk file  
ESXI02-0.vmdk

Capacity  
Current size: 17.8 MB  
System free: 200.5 GB  
Maximum size: 142 GB



# VMware vSphere Install, Configure, Manage | Lab Guide

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The screenshot shows the 'Datastores' section of the VMware ESXi host interface. The left sidebar shows 'Host', 'Manage', and 'Monitor' sections, with 'Storage' currently selected. The main pane displays a table of datastores:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin provis...	Access
datastore1	SSD	13.75 GB	1.41 GB	12.34 GB	VMFS6	Supported	Single
DBStore	SSD	141.75 GB	1.41 GB	140.34 GB	VMFS6	Supported	Single

A message at the top left indicates: 'VMFS datastore DBStore successfully created.' The URL in the browser bar is <https://esxi02.abdelwahed.me/ui/#/host/storage/datastores>.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Extend Existing Datastore

To extend an existing datastore, follow these steps. In this example, we will add a 200GB hard disk to extend datastore1. Note that you may need to restart the server for the new hard disk to be recognized, or you can rescan the storage without restarting.

The screenshot shows the VMware vSphere Web Client interface. The left sidebar has 'Host' selected under 'Storage'. The main pane shows 'ESXi02.localdomain - Storage' with 'Datastores' selected. It lists 'datastore1' (SSD, 13.75 GB) and 'DBStore'. A context menu is open over 'datastore1', with 'Increase capacity' highlighted. Below the table, a summary shows 'STORAGE: 12.34 GB', 'FREE: 1.41 GB', and 'CAPACITY: 13.75 GB'.

**Increase datastore capacity - datastore1 - datastore1**

**Select device**  
Select a device on which to create a new VMFS partition

The following devices are unclaimed and can be used to create a new VMFS datastore

Name	Type	Capacity	Free space
Local VMware, Disk (mpx.vmhba0:C0:T2:L0)	Disk (SSD)	200 GB	200 GB

**Increase datastore capacity - datastore1**

**Select creation type**  
How would you like to create a datastore?

Add an extent to existing VMFS datastore  
Expand an existing VMFS datastore extent

**Increase datastore capacity - datastore1 - datastore1**

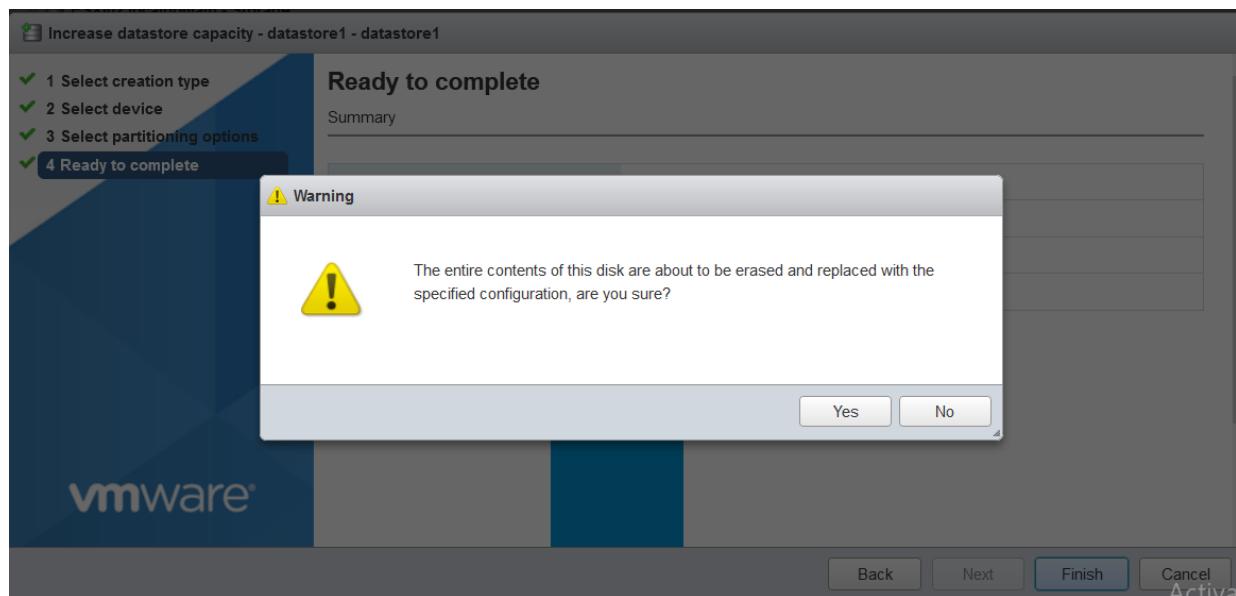
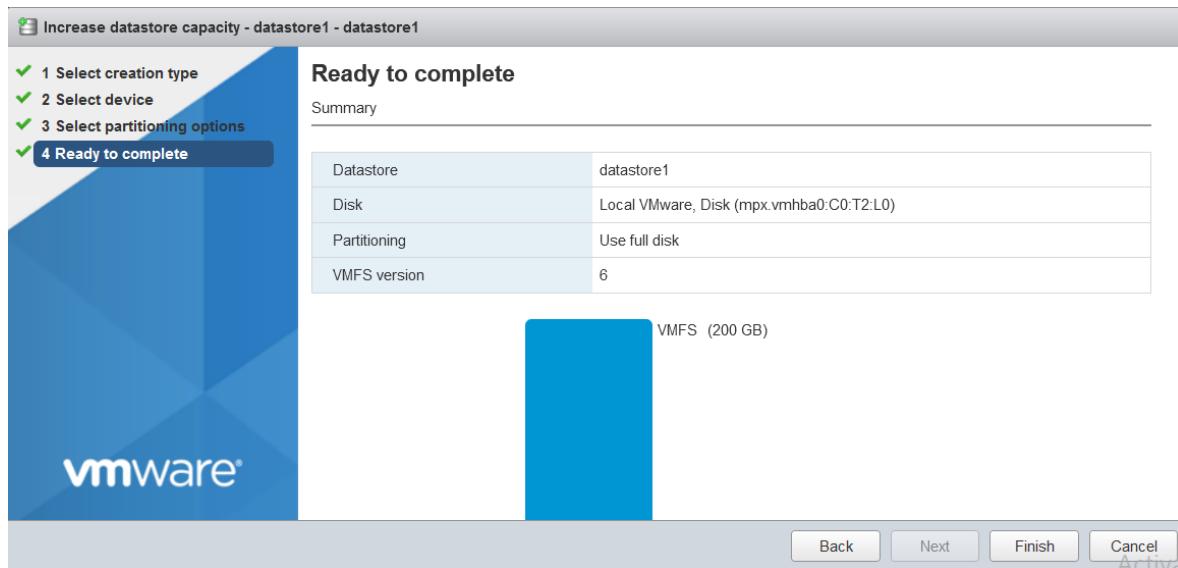
**Select partitioning options**  
Select how you would like to partition the device

Use full disk VMFS 6

Before, select a partition  
Free space (200 GB)

A vertical sidebar on the left lists the steps: 1 Select creation type, 2 Select device, 3 Select partitioning options, 4 Ready to complete. Step 2 is highlighted.

# VMware vSphere Install, Configure, Manage | Lab Guide



The screenshot shows the 'Storage' section of the ESXi Host Client. The left sidebar shows 'Host', 'Virtual Machines', 'Storage' (selected), and 'Networking'. The main pane displays the 'Datastores' table:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin provis...	Access
datastore1	SSD	213.5 GB	1.41 GB	212.09 GB	VMFS6	Supported	Single
DBStore	SSD	141.75 GB	1.41 GB	140.34 GB	VMFS6	Supported	Single

Below the table, there is a detailed view of 'datastore1' showing its type (VMFS6), location (/vmfs/volumes/628fc607-87673bcd-070b-000c2959ba95), UUID (628fc607-87673bcd-070b-000c2959ba95), hosts (1), and virtual machines (0). A storage summary at the bottom right shows: STORAGE 213.5 GB, FREE: 212.09 GB, USED: 1.41 GB, CAPACITY: 213.5 GB, and 1% usage.

# VMware vSphere Install, Configure, Manage | Lab Guide

Upload the ISO file to the datastore.

Begin by navigating to that store.

The screenshot shows the VMware ESXi Host Client interface. In the top left, the Navigator pane is open, showing sections for Host, Virtual Machines, Storage, Networking, and more. Under Storage, 'DBStore' is selected. The main content area displays details for 'DBStore', including its type (VMFS6), location (/vmfs/volumes/6293bd29-ec31a501-0984-000c2959ba95), UUID (6293bd29-ec31a501-0984-000c2959ba95), hosts (1), and virtual machines (0). Below this, a 'VMFS details' table provides information about the VMFS version (6.82), local status (Yes), block size (1 MB), and extent details (mpx.vmhba0:C0:T1:L0, partition 1). In the bottom half of the screen, the 'Datastore browser' window is open. It shows a tree view of datastores: 'datastore1' and 'DBStore'. Under 'DBStore', there is a folder named '.sdd.sf'. A modal dialog box titled 'New directory' is displayed, prompting for a 'Directory name' which is 'OS Source'. Below the dialog, a note says 'This directory will be created in [DBStore]/'. At the bottom of the dialog are 'Create directory' and 'Cancel' buttons.

Next, transfer the ISO file to the **OS Source** directory.

The screenshot shows the VMware ESXi Host Client interface. The 'Datastore browser' window is open, showing the same directory structure as the previous screenshot. The 'OS Source' directory under 'DBStore' is now selected. The status bar at the bottom right indicates '1 file(s)' and '100%'. In the bottom half of the screen, another 'Datastore browser' window is shown, identical to the one above it, with the 'OS Source' directory selected and the status bar indicating '1 file(s)' and '100%'.

# VMware vSphere Install, Configure, Manage | Lab Guide

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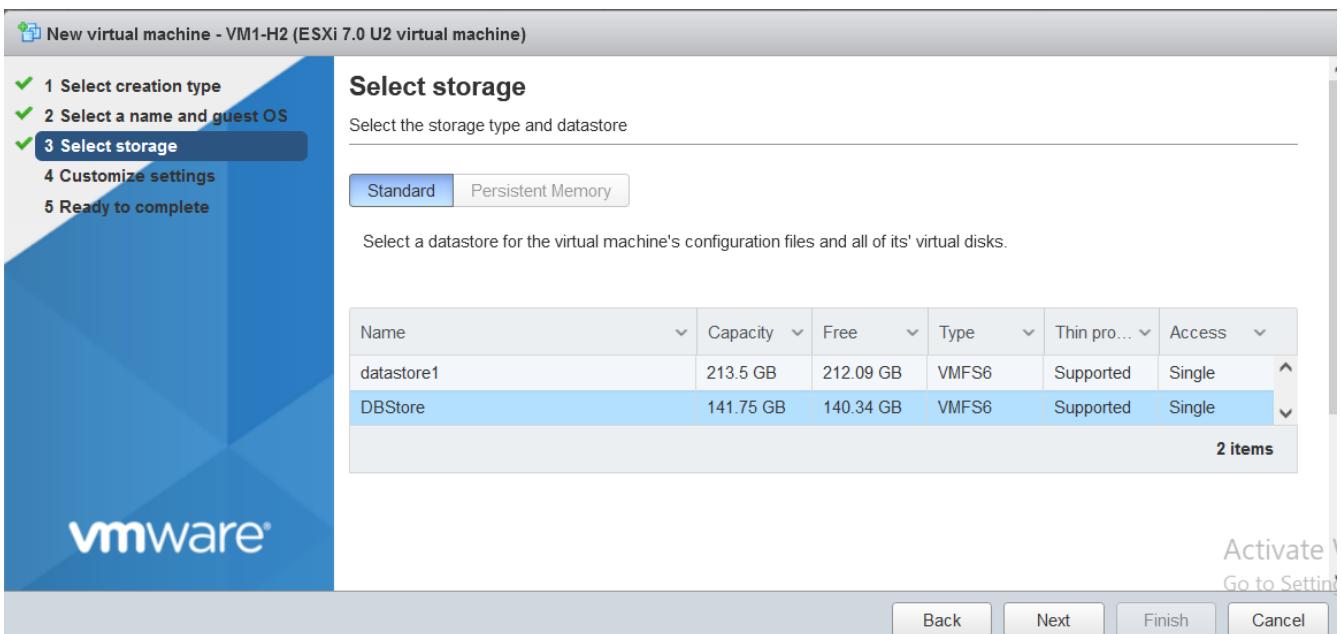
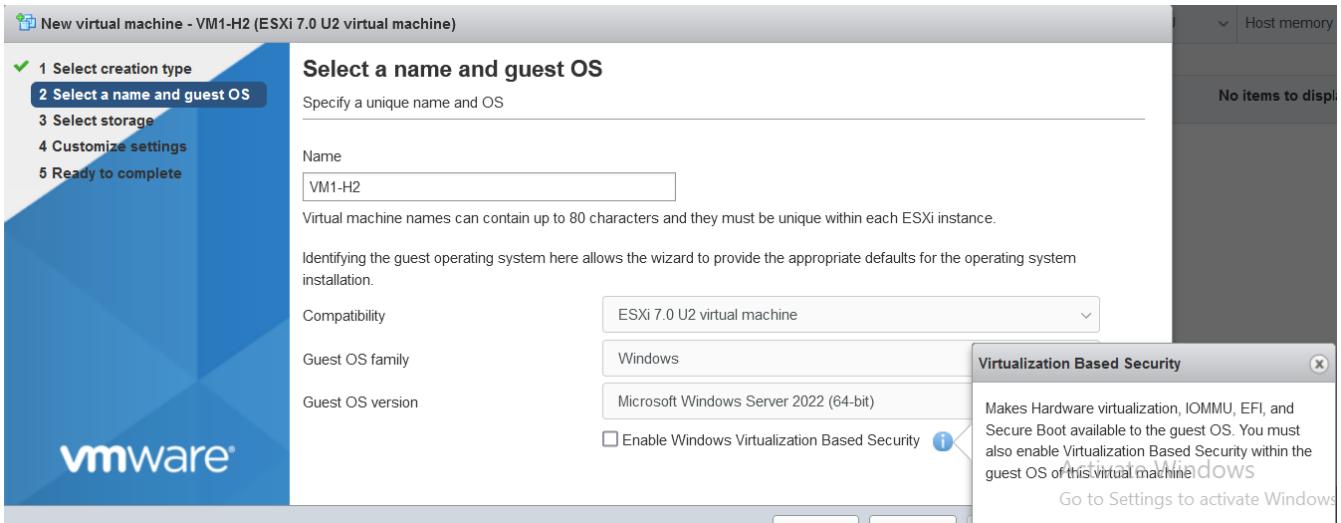
## Create and configure VM through ESXi02 host

To create and configure a virtual machine (VM) through ESXi02 host, follow these steps:

1. Log in to the vSphere Web Client or vSphere Client using the credentials for the ESXi02 host.
2. Select the ESXi02 host from the inventory and go to the Virtual Machines tab.
3. Click the Create/Register VM button to create a new virtual machine.
4. In the New Virtual Machine wizard, select the type of VM that you want to create, such as a typical VM or a custom VM.
5. Follow the prompts to configure the settings for the VM, such as the VM name, guest operating system, virtual hardware, and storage.
6. After the VM is created, select it in the inventory and go to the Configure tab to configure additional settings.
7. Configure the VM settings as appropriate for your environment, such as the network adapter, storage adapter, CPU and memory allocation, and advanced settings.
8. Power on the VM to begin using it.
9. To access the console of the VM, select the VM in the inventory and go to the Console tab.
10. Use the console to install the guest operating system, install applications, and configure the VM as needed.

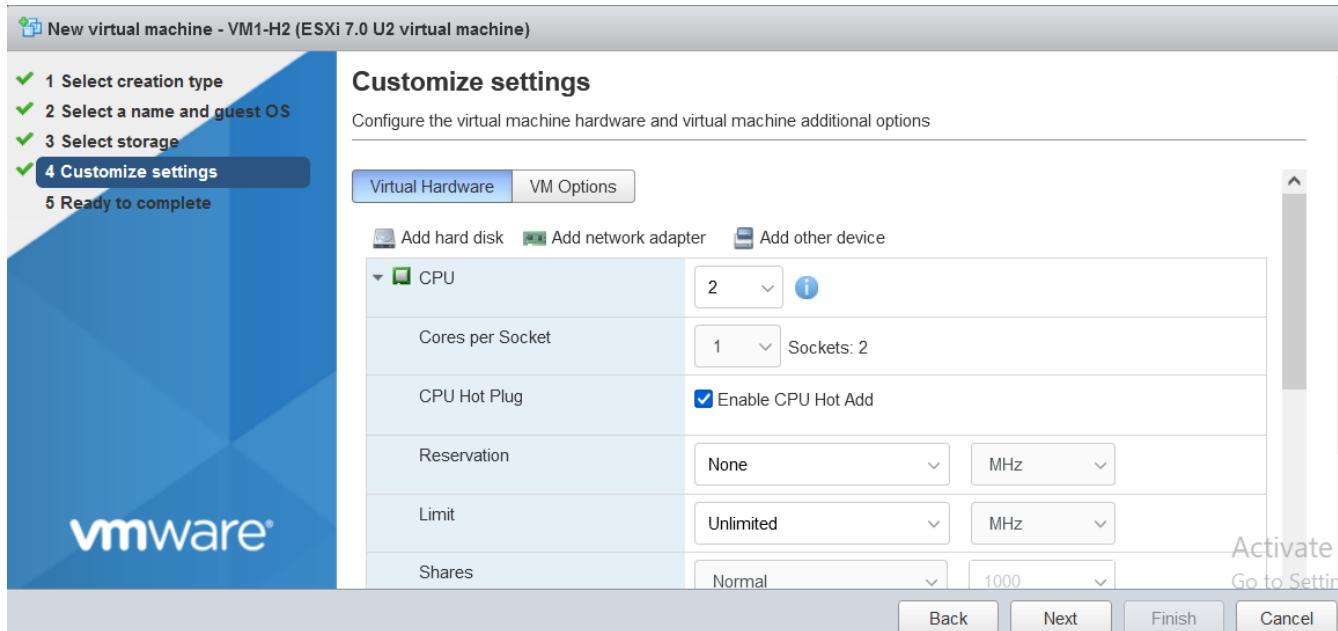
# VMware vSphere Install, Configure, Manage | Lab Guide

## Creating a Virtual Machine in ESXi

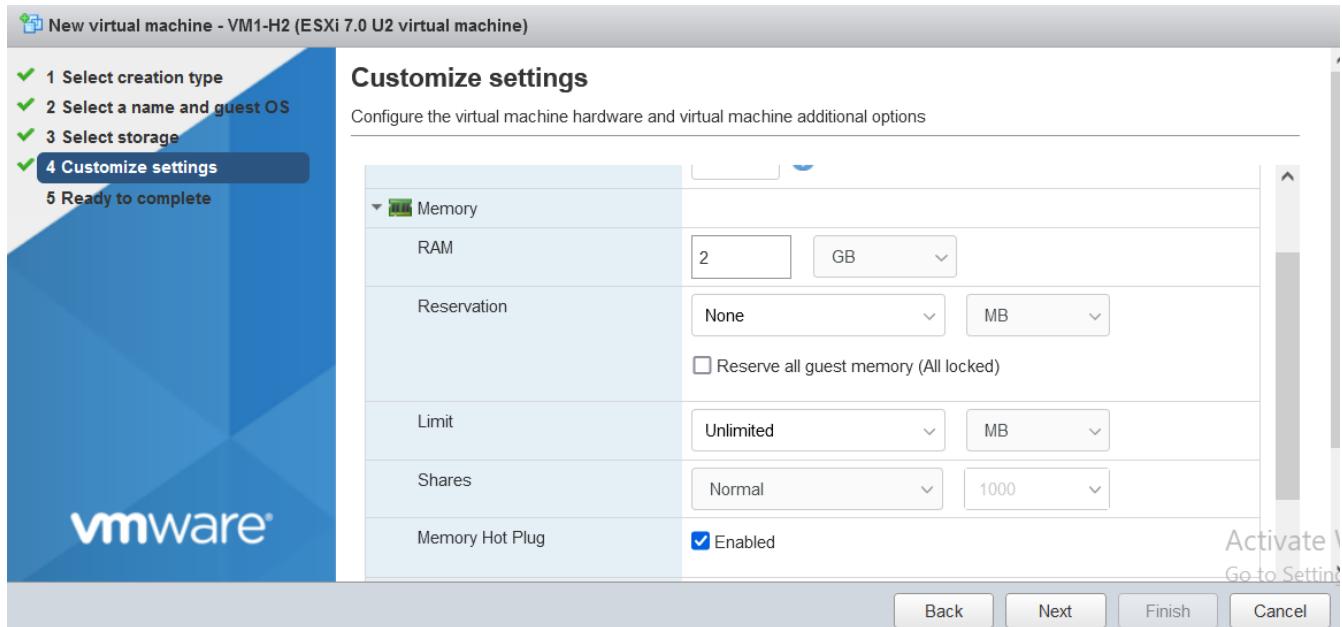


# VMware vSphere Install, Configure, Manage | Lab Guide

## Choose CPU Settings



## Choose memory configurations.

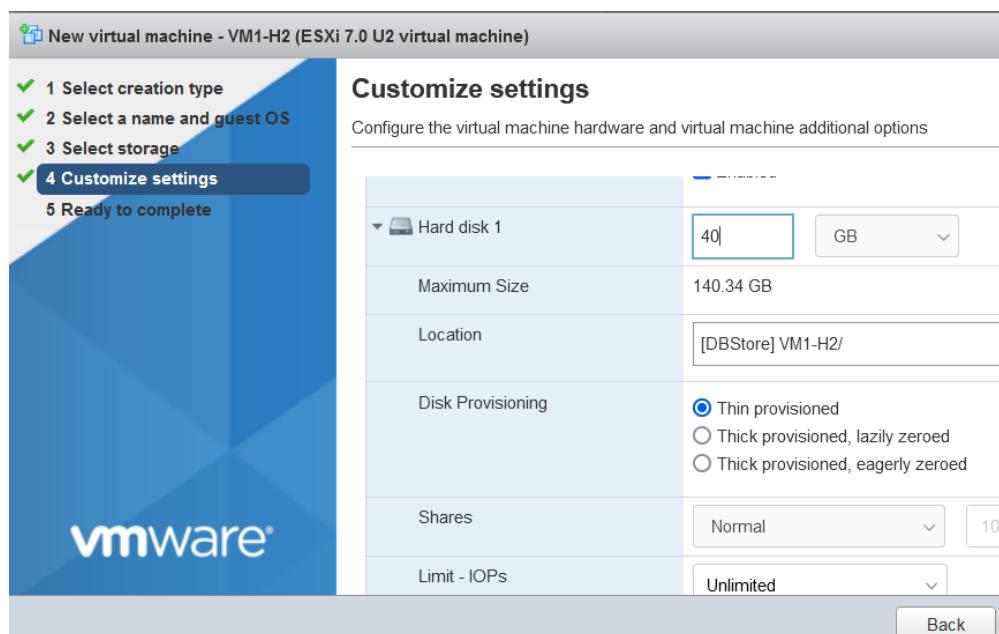


# VMware vSphere Install, Configure, Manage | Lab Guide

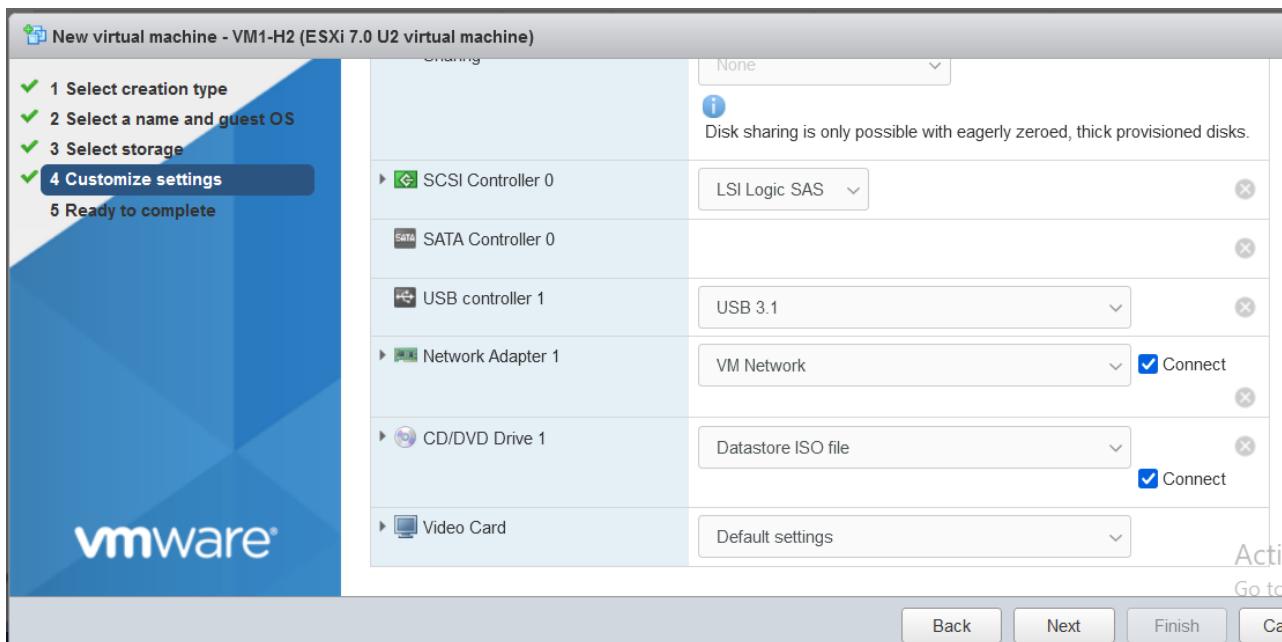
## Options for Hard Disk Storage

**Disk Provisioning:** Options include:

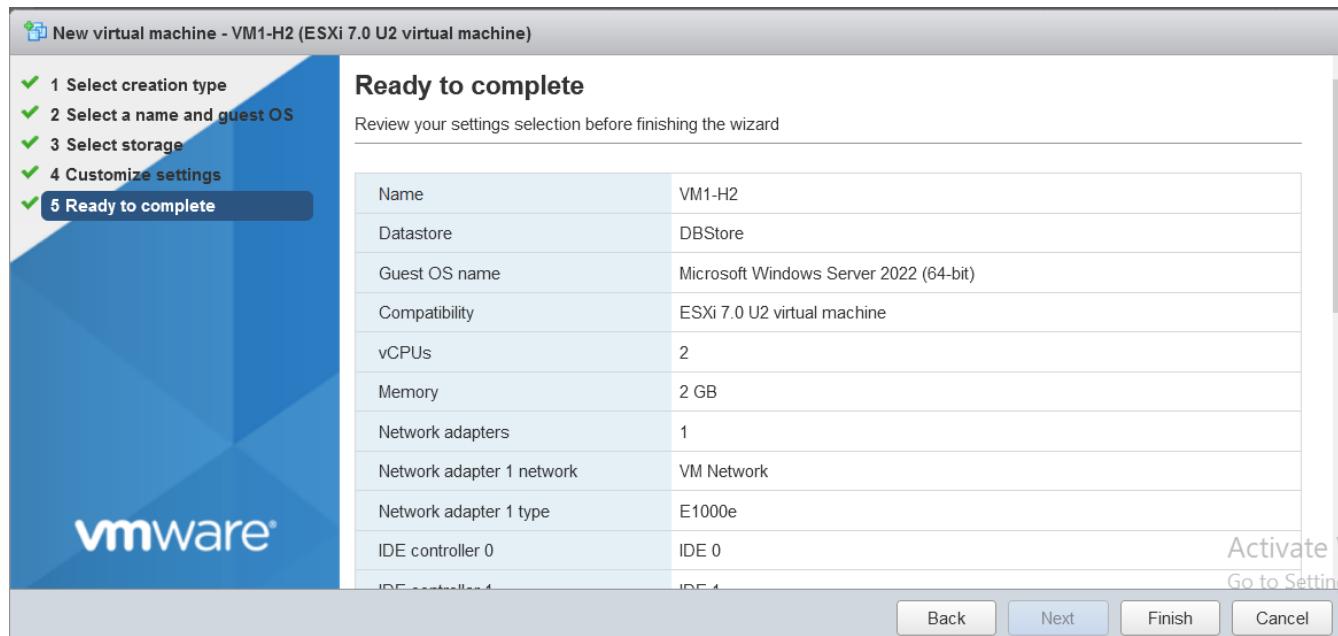
- **Thin Provisioned:** Selected option, which allocates storage space as needed.
- **Thick Provisioned, Lazily Zeroed:** Allocates storage space immediately but zeros out blocks as they are written.
- **Thick Provisioned, Eagerly Zeroed:** Allocates and zeroes out storage space immediately.



## Options for NIC and DVD (choose an ISO file from the datastore)



# VMware vSphere Install, Configure, Manage | Lab Guide

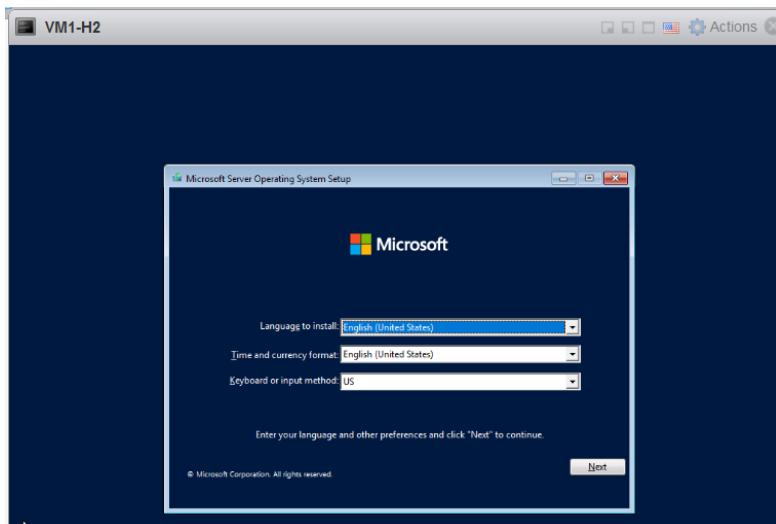


The screenshot shows the VMware ESXi host interface. The left sidebar has sections for Host, Storage, Networking, and Virtual Machines. Under Virtual Machines, 'Virtual Machines' is selected, showing a list of VMs including 'VM1-H2'. The main pane displays details for 'VM1-H2':

Guest OS	Microsoft Windows Server 2022 (64-bit) VBS ...
Compatibility	No
CPUs	2
Memory	2 GB

Resource usage metrics are shown on the right: CPU 0 MHz, MEMORY 0 B, and STORAGE 0 B. A thumbnail image of the Windows logo is also present.

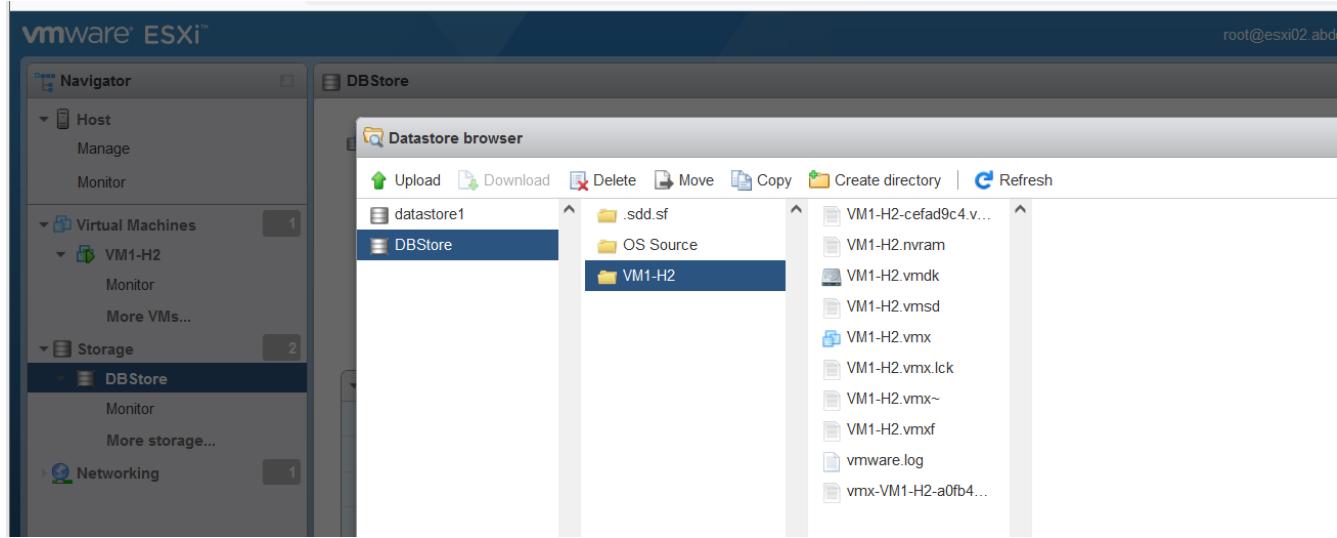
beginning installation



# VMware vSphere Install, Configure, Manage | Lab Guide

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VM files saved inside selected datastore.



# VMware vSphere Install, Configure, Manage | Lab Guide

## Download and Install VMRC

VMRC (VMware Remote Console) is a standalone application that allows you to connect to virtual machines on an ESXi host or vCenter Server using a remote console. Here are the steps to download and install VMRC:

### Go to the VMware VMRC Download Page:

Visit the following URL: [VMware VMRC Download Page](#).

### Download VMRC Installer:

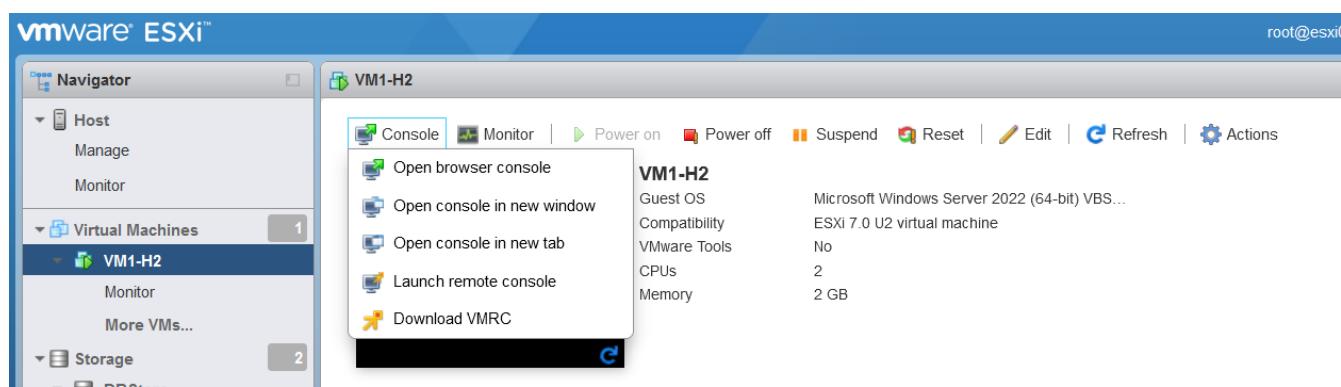
Click the "Download" button to download the VMRC installer for your operating system.

You will need to log in with your VMware account or create a new one if you don't have one already.

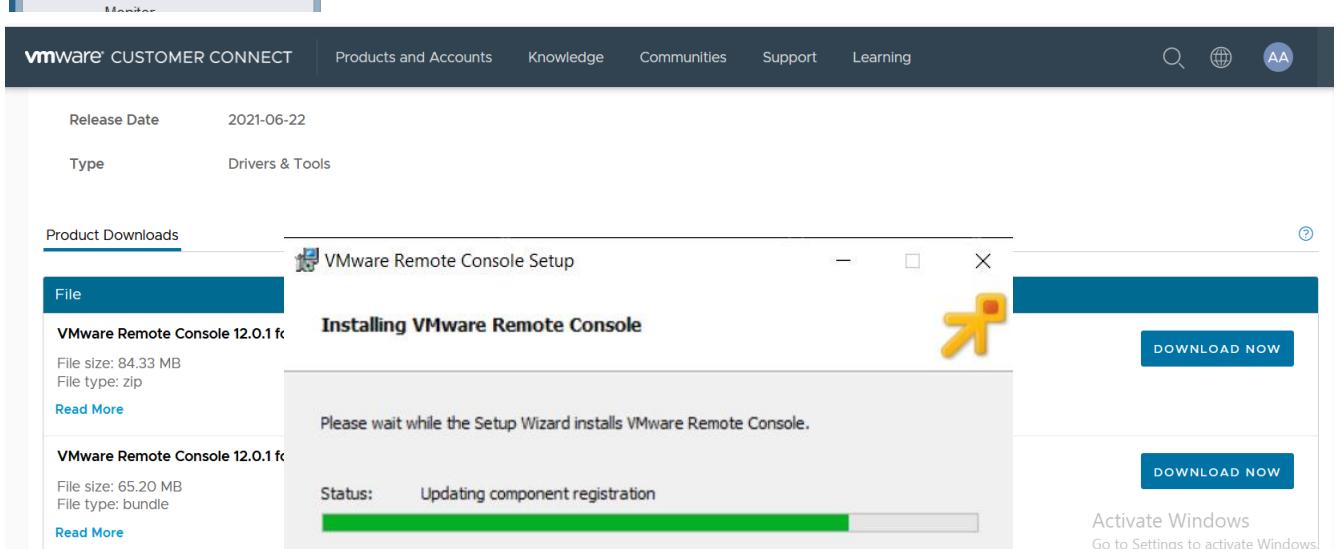
### Install VMRC:

Once the download is complete, run the installer.

Follow the installation wizard to install VMRC on your system.



The screenshot shows the VMware ESXi interface. On the left, the Navigator pane is open, showing categories like Host, Virtual Machines, Storage, and DBStore. Under Virtual Machines, 'VM1-H2' is selected, indicated by a red box labeled '1'. In the center, the details for 'VM1-H2' are displayed, including Guest OS (Microsoft Windows Server 2022), Compatibility (ESXi 7.0 U2), VMware Tools (No), CPUs (2), and Memory (2 GB). At the bottom of the central pane, there is a context menu with several options: Open browser console, Open console in new window, Open console in new tab, Launch remote console, and Download VMRC. The 'Download VMRC' option is highlighted with a red box labeled '2'. The top right corner shows the session information 'root@esxi0'.

The screenshot shows the VMware Customer Connect website. At the top, there are navigation links for Products and Accounts, Knowledge, Communities, Support, and Learning. Below this, it shows the Release Date (2021-06-22) and Type (Drivers & Tools). The main content area is titled 'Product Downloads' and shows a list of files under the 'File' category. The first item listed is 'VMware Remote Console 12.0.1 fc', which has a file size of 84.33 MB and a file type of zip. There is a 'Read More' link next to it. To the right, there is a download progress bar for the 'VMware Remote Console Setup' file, which is currently at 100% completion. A yellow progress bar indicates the status 'Updating component registration'. There are two 'DOWNLOAD NOW' buttons, one for the setup file and one for the full version. At the bottom right, there is a message about activating Windows: 'Activate Windows Go to Settings to activate Windows.'

# VMware vSphere Install, Configure, Manage | Lab Guide



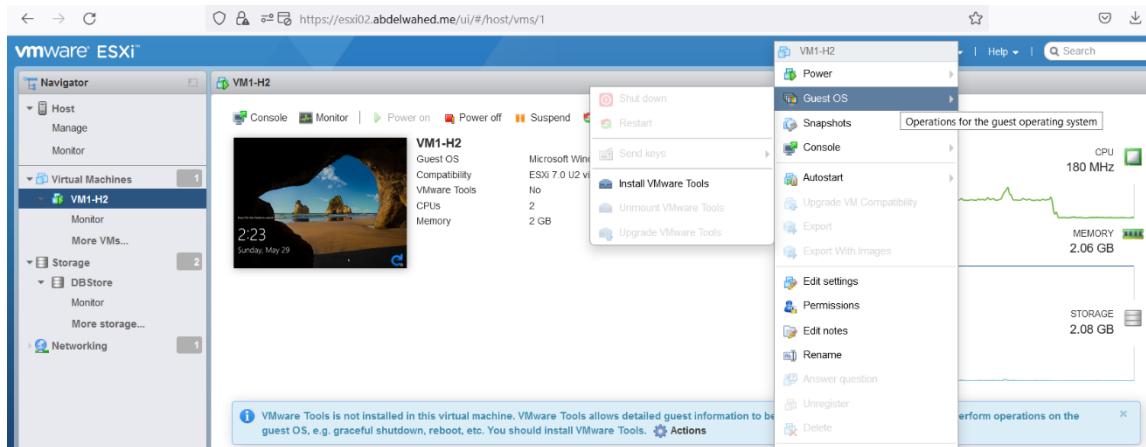
You can add that VM to the [abdelwahed.me](#) domain.

A screenshot of the Windows Server Manager interface. The left sidebar shows "Local Server". The main pane shows "System Properties" with "Computer Name/Domain Changes" settings. It shows the computer name is "VM1-H2" and it is a member of the "abdelwahed.me" domain. A modal dialog box is open, saying "Welcome to the abdelwahed.me domain." with "OK" and "Cancel" buttons. On the right, there are system details like processor, memory, and disk space. At the bottom, it says "Administrator: C:\Windows\system32\cmd.exe".

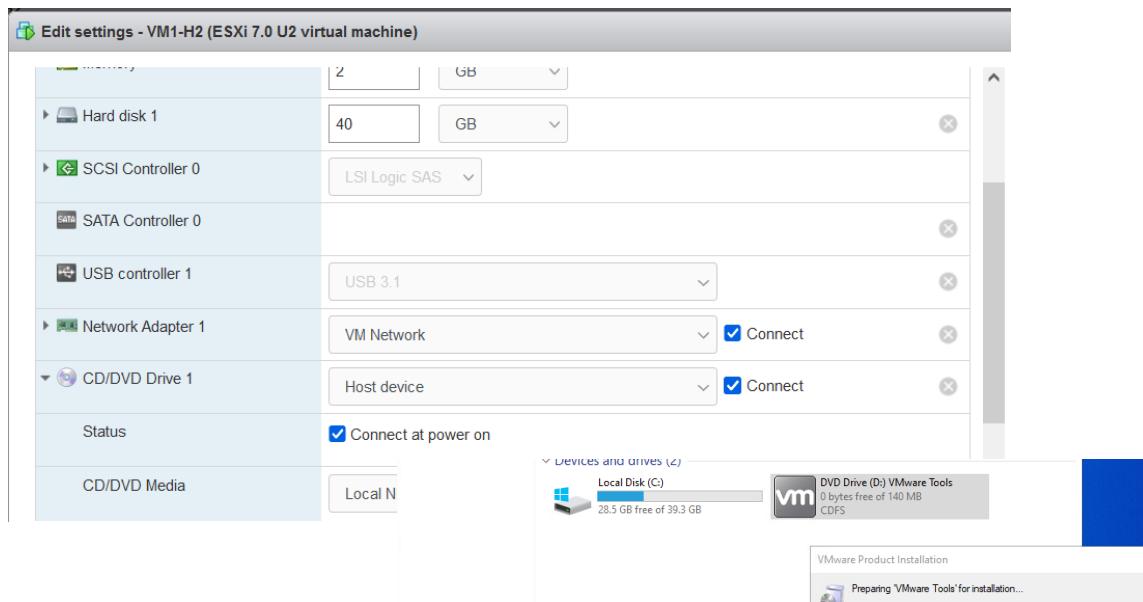
# VMware vSphere Install, Configure, Manage | Lab Guide

## Set up VMware Tools.

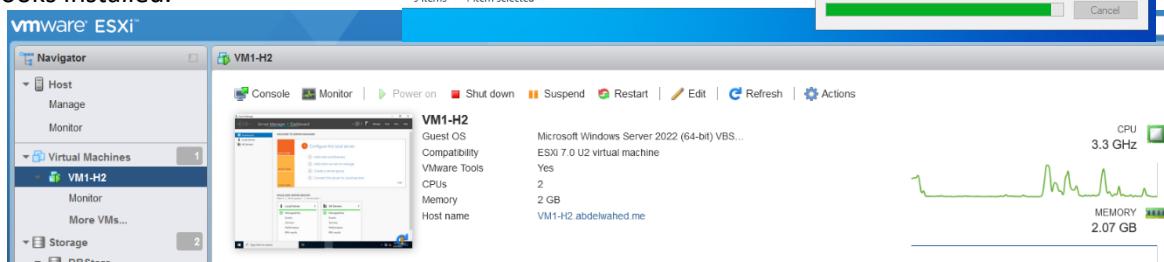
VMware Tools comprises various utilities and drivers that improve the performance and capabilities of virtual machines within vSphere.



If VMware Tools do not appear in this VM area, edit the CD/DVD VM settings (connect at power) as shown below.



Now VM tools looks installed.



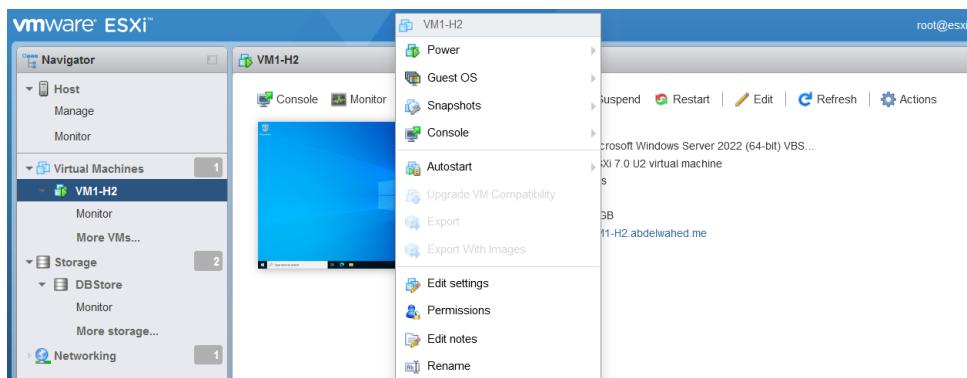
# VMware vSphere Install, Configure, Manage | Lab Guide

## Edit VM settings.

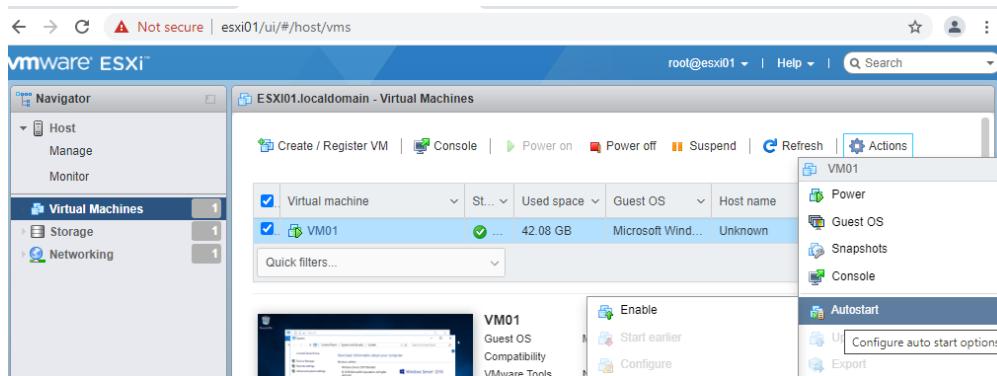
By editing the settings of a VM using ESXi, you can modify its configuration to meet the needs of your environment.

### Key Configuration Changes

1. **Adjust CPU and Memory Allocation:**
  - o **CPU Allocation:** Modify the number of virtual CPUs assigned to the VM.
  - o **Memory Allocation:** Adjust the amount of memory allocated to the VM.
2. **Add or Remove Virtual Disks:**
  - o **Add Disks:** Increase storage capacity by adding new virtual disks.
  - o **Remove Disks:** Free up resources by removing unnecessary virtual disks.
3. **Configure Network Adapters:**
  - o **Add Adapters:** Connect the VM to different networks or increase bandwidth.
  - o **Remove Adapters:** Simplify network configuration by removing unused adapters.



With the ESXI01 server, you are able to adjust few settings such as AutoStart directly.



**As indicated, the management of VMs via ESXi comes with a set of limited features; therefore, we transition to using Vcenter which offers an expanded suite of management tools including migration, cloning, and high availability options.**

## Configuring and Managing ESXi Servers Using vCenter

vCenter Server: \*\*vCenter01\*\*

```
|  
|-- **Datacenters**  
| |  
| | |-- **Datacenter1**  
| | |  
| | | |-- **Clusters**  
| | | |  
| | | | |-- **ClusterA**  
| | | | |  
| | | | | |-- **Hosts (ESXi Servers)**  
| | | | | |  
| | | | | | |-- **ESXi1.ohi.com**  
| | | | | | |  
| | | | | | | |-- **VM01**  
| | | | | | |  
| | | | | | | |-- **VM02**  
| | | | | | |  
| | | | | | | |-- **ESXi02.ohi.com**  
| | | | | | |  
| | | | | | | |-- **VM03**  
| | | | | | |  
| | | | | | | |-- **Resource Pools**  
| | | | | | | |  
| | | | | | | | |-- **HighPriorityPool**  
| | | | | | | |  
| | | | | | | | |-- **LowPriorityPool**  
| | | | | | |  
| | | | | | | |-- **Folders**  
| | | | | | |  
| | | | | | | |-- **ProdVMs**  
| | | | | | | |  
| | | | | | | | |-- **VM04**  
| | | | | | | |  
| | | | | | | | |-- **TestVMs**  
| | | | | | | |  
| | | | | | | | |-- **VM05**
```

# VMware vSphere Install, Configure, Manage | Lab Guide

By adding **ESXi** servers to **vCenter**, you can centralize the management of your virtual environment and perform tasks such as creating virtual machines, configuring storage and networking, and monitoring performance. It's important to follow best practices for managing ESXi servers, such as keeping them up-to-date with the latest patches and updates, monitoring their performance and usage, and securing them with appropriate permissions and firewall rules.

The screenshot shows the vSphere Client interface. The top navigation bar includes 'vSphere Client', 'Menu', a search bar, and user information 'Administrator@VSPHERE.LOCAL'. Below the navigation is a toolbar with icons for Home, Hosts & Clusters, VMs, Datastores, and Networks. The main content area shows a summary for 'vcenter01.abdelwahed.me' with details like version 7.0.2, build 17920168, and last backup scheduled. A context menu is open over this host, with 'Actions - vcenter01.abdelwahed.me' selected. A modal dialog titled 'New Datacenter' is displayed, prompting for a name ('vDatacenter') and location ('vcenter01.abdelwahed.me'). At the bottom right of the dialog are 'CANCEL' and 'OK' buttons.

The screenshot shows the vSphere Client interface after the datacenter was created. The top navigation bar and toolbar are visible. The main content area shows the 'vDatacenter' entry under 'vcenter01.abdelwahed.me'. The 'Summary' tab is selected, displaying statistics: Hosts: 0, Virtual Machines: 0, Clusters: 0, Networks: 0, and Datastores: 0. The 'Actions' dropdown menu is also visible.

Adding ESXi hosts is now possible.

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the VMware vSphere Client interface. In the top right corner, there is a context menu with the following items:

- Actions - vDatacenter
- Add Host...
- New Cluster...
- New Folder
- Distributed Switch
- New Virtual Machine...
- Deploy OVF Template...
- Storage
- Edit Default VM Compatibility...
- Migrate VMs to Another Network...

Remember to review the new folder option.

## Add Host

### 1 Name and location

- 2 Connection settings
- 3 Host summary
- 4 Assign license
- 5 Lockdown mode
- 6 VM location
- 7 Ready to complete

### Name and location

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

Host name or IP address:

Location:

## Add Host

### 1 Name and location

### 2 Connection settings

- 3 Host summary
- 4 Assign license
- 5 Lockdown mode
- 6 VM location
- 7 Ready to complete

### Connection settings

Enter the host connection details

User name:

Password:

# VMware vSphere Install, Configure, Manage | Lab Guide

## Add Host

- ✓ 1 Name and location
- ✓ 2 Connection settings

### Host summary

Review the summary for the host

Name	esxi01.abdelwahed.me
Vendor	VMware, Inc.
Model	VMware7.1
Version	VMware ESXi 7.0.2 build-17867351
Virtual Machines	vCenter Server

## Add Host

- ✓ 1 Name and location
- ✓ 2 Connection settings
- ✓ 3 Host summary

### Assign license

Assign an existing or a new license to this host

License	License Key	Product	Usage	Ca
<input checked="" type="radio"/> Evaluation License	--	--	--	--

## Add Host

- ✓ 1 Name and location
- ✓ 2 Connection settings
- ✓ 3 Host summary
- ✓ 4 Assign license
- ✓ 5 Lockdown mode

Specify whether to enable lockdown mode on the host

When enabled, lockdown mode prevents remote users from logging directly into this host. The host will only be accessible through local console or an authorized centralized management application.

If you are unsure what to do, leave lockdown mode disabled. You can configure lockdown mode later by editing Security Profile in host settings.

Disabled

Normal

The host is accessible only through the local console or vCenter Server.

Strict

The host is accessible only through vCenter Server. The Direct Console UI service is stopped.

## Add Host

- ✓ 1 Name and location
- ✓ 2 Connection settings
- ✓ 3 Host summary
- ✓ 4 Assign license
- ✓ 5 Lockdown mode
- ✓ 6 VM location

### VM location

vDatacenter

7 Ready to complete

# VMware vSphere Install, Configure, Manage | Lab Guide

## Add Host

- ✓ 1 Name and location
- ✓ 2 Connection settings
- ✓ 3 Host summary
- ✓ 4 Assign license
- ✓ 5 Lockdown mode
- ✓ 6 VM location
- 7 Ready to complete**

**Ready to complete**  
Click Finish to add the host

Name	esxi01.abdelwahed.me
Location	vDatacenter
Version	VMware ESXi 7.0.2 build-17867351
License	Evaluation License
Networks	VM Network
Datastores	datastore1
Lockdown mode	Disabled
VM location	vDatacenter

**CANCEL** **BACK** **FINISH**

The screenshot shows the vSphere Client interface. On the left, the navigation tree shows 'vcenter01.abdelwahed.me' expanded, with 'vDatacenter' and 'esxi01.abdelwahed.me' selected. The main pane displays the summary for 'esxi01.abdelwahed.me'. The host has a status of 'Connected' and an uptime of '0 second'. Resource usage is shown in a bar chart: CPU (Free: 5.62 GHz, Used: 0 Hz), Memory (Free: 16 GB, Used: 0 B), and Storage (Free: 118.23 GB, Used: 37.27 GB). The host is running VMware ESXi 7.0.2, build 17867351, with an Intel(R) Xeon(R) E-2276M CPU @ 2.80GHz.

Apply the same process to ESXi02 for integration into our data center.

The screenshot shows the vSphere Client interface. On the left, the navigation tree shows 'vcenter01.abdelwahed.me' expanded, with 'vDatacenter' and 'esxi02.abdelwahed.me' selected. The main pane displays the summary for 'esxi02.abdelwahed.me'. The host has a status of 'Connected' and an uptime of '7 hours'. Resource usage is shown in a bar chart: CPU (Free: 1.79 GHz, Used: 3.83 GHz), Memory (Free: 4.39 GB, Used: 3.5 GB), and Storage (Free: 334.48 GB, Used: 20.77 GB). The host is running VMware ESXi 7.0.2, build 17867351, with an Intel(R) Xeon(R) E-2276M CPU @ 2.80GHz.

Both hosts have now been added.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Integrate vSphere with Active Directory

Integrating vSphere with Active Directory (AD) allows you to use AD user accounts and groups to authenticate and authorize access to vSphere resources. This simplifies user management, improves security, and provides a centralized view of user permissions across the organization. Here are the steps to integrate vSphere with AD:

The image consists of three vertically stacked screenshots of the vSphere Client interface, each showing a different step in the process of integrating with Active Directory.

- Screenshot 1: Administration Panel**  
The left sidebar shows the "Administration" section with several sub-options. The "Single Sign On" option under "Certificates" is highlighted with a red box.
- Screenshot 2: Roles Management**  
The left sidebar shows the "Roles" section. Under "Single Sign On", the "Users and Groups" and "Configuration" options are highlighted with red boxes. The main pane displays a list of roles with their descriptions and privileges. One role, "Administrator", is selected, showing "Full access rights".
- Screenshot 3: Identity Source Configuration**  
The left sidebar shows the "Configuration" section. The "Identity Sour..." tab is selected and highlighted with a red box. A button labeled "ADD IDENTITY SOURCE" is also highlighted with a red box. The main pane shows a table of existing identity sources, including "vsphere.local" and "VCENTER01".

# VMware vSphere Install, Configure, Manage | Lab Guide

## Add Identity Source

Identity Source Type

Active Directory (Windows Integrated AI)

Active Directory (Windows Integrated Authentication)

Active Directory over LDAP

Open LDAP

Use machine account

Use Service Principal Name (SPN)

## Add Identity Source

Identity Source Type

Active Directory (Windows Integrated AI)

Domain name

Use machine account

Use Service Principal Name (SPN)

Administration		Policies	Identity Sources	Active Directory Domains	Login Messages	Smart Card Authentication
Roles						
Global Permissions						
▼ Licensing						
Licenses						
▼ Solutions						
Client Plug-Ins						
▼ Deployment						
Customer Experience ...						
▼ Certificates						
Certificate Management...						

ADD IDENTITY SOURCE    EDIT    SET AS DEFAULT    REMOVE

Name	Server URL	Type	Domain	Alias
vsphere.local	--	--	System Domain	--
VCENTER01	--	--	Local OS (Default)	--
abdelwahed.me	--	Active Directory (Windows Integrated Authentication)	External Domain	--

sign in using domain accounts and privileges



You are now able to log in, however, you lack the necessary permissions to access vCenter resources.

(!) Unable to login because you do not have permission on any vCenter Server systems connected to this client. [Back to login screen](#)

# VMware vSphere Install, Configure, Manage | Lab Guide

Now grant [it01@abdelwahed.me](mailto:it01@abdelwahed.me) permissions using Role-Based Access Control (RBAC).

The screenshot shows the vSphere Client interface under the 'Administration' section, specifically the 'Access Control' tab. The 'Global Permissions' option is highlighted with a red box. On the right, the 'PASSWORD POLICY' tab is selected, showing a description of password rules. Below it, the 'Password Policy' section includes a 'Description' field and a checkbox for 'Propagate to children'. A modal window titled 'Add Permission' is open, showing the 'User' dropdown set to 'abdelwahed.me', the search bar containing 'IT01', the 'Role' dropdown set to 'Administrator', and the 'Propagate to children' checkbox checked. The 'Global Permissions' table lists several entries, with the row for 'ABDELWAHED.ME\IT01' highlighted with a red box.

User/Group	Role	Defined In
ABDELWAHED.ME\IT01	Administrator	Global Permission
VSPHERE.LOCAL\Administrator	Administrator	Global Permission
VSPHERE.LOCAL\Administrators	Administrator	Global Permission
VSPHERE.LOCAL\AutoUpdate	AutoUpdateUser	Global Permission
VSPHERE.LOCAL\vpxd-2baf9d20-bf6a-11eb-...	Administrator	Global Permission

IT01 now has a full access.

The screenshot shows the vSphere Client interface for the vCenter01 host. The navigation tree on the left highlights the 'vCenter01.abdelwahed.me' node. The main pane displays the 'Summary' tab for the host, showing 1 virtual machine and 2 hosts. Resource usage metrics for CPU, Memory, and Storage are listed. The top navigation bar shows the user 'IT01@abdelwahed.me' is currently selected.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Create VM using vCenter

The screenshot shows the vSphere Client interface. On the left, the navigation tree displays a hierarchy: vcenter01.abdelwahed.me > vDatacenter > esxi01.abdelwahed.me > VM1-H2. A context menu is open over VM1-H2, with 'New Virtual Machine...' highlighted. The main pane shows details for a selected host: Hypervisor: VMware ESXi, 7.0.2, 17867351, Model: VMware7,1, Processor Type: Intel(R) Xeon(R) E-2276M CPU @ 2.80GHz, Logical Processors: 2, L1C: 1, Virtual Machines: 1, State: Connected, Uptime: 30 minutes. A banner at the top right indicates 'There are expired or expiring licenses in your inventory.' with a 'MANAGE YOUR LICENSES' button.

## New Virtual Machine

The screenshot shows the 'Select a creation type' step of the New Virtual Machine wizard. The steps are numbered 1 through 8. Step 1 is highlighted with a green checkmark. The 'Create a new virtual machine' option is selected. A tooltip explains: '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.' Other options listed are Deploy from template, Clone an existing virtual machine, Clone virtual machine to template, Clone template to template, and Convert template to virtual machine.

## New Virtual Machine

The screenshot shows the 'Select a name and folder' step of the New Virtual Machine wizard. Step 2 is highlighted with a green checkmark. The 'Virtual machine name:' field contains 'VM2-H2'. Below it, a section for 'Select a location for the virtual machine.' shows the navigation tree: vcenter01.abdelwahed.me > vDatacenter.

# VMware vSphere Install, Configure, Manage | Lab Guide

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- 3 Select a compute resource**
- 4 Select storage
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select a compute resource  
Select the destination compute resource for this operation

vDatacenter

- > esxi01.abdelwahed.me
- > esxi02.abdelwahed.me**

Compatibility

✓ Compatibility checks succeeded.

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- 4 Select storage**
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select storage  
Select the storage for the configuration and disk files

Encrypt this virtual machine (Requires Key Management Server)

VM Storage Policy Datastore Default

Disable Storage DRS for this virtual machine

	Name	Storage Con	Capacity	Provisione	Free	Type
<input type="radio"/>	datastore1 ...	--	213.5 GB	1.41 GB	212.09 GB	VMFS
<input checked="" type="radio"/>	DBStore	--	141.75 GB	48.85 GB	124.47 GB	VMFS
2 items						

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- 5 Select compatibility**
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select compatibility  
Select compatibility for this virtual machine depending on the hosts in your environment

The host or cluster supports more than one VMware virtual machine version. Select a compatibility for the virtual machine.

Compatible with: ESXi 7.0 U2 and later (i)

This virtual machine uses hardware version 19, which provides the best performance and latest features available in ESXi 7.0 U2.

# VMware vSphere Install, Configure, Manage | Lab Guide

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- ✓ 5 Select compatibility

### 6 Select a guest OS

7 Customize hardware

8 Ready to complete

#### Select a guest OS

Choose the guest OS that will be installed on the virtual machine

Identifying the guest operating system here allows the wizard to provide the appropriate defaults for the operating system installation.

Guest OS Family: Windows

Guest OS Version: Microsoft Windows Server 2022 (64-bit)

Enable Windows Virtualization Based Security [\(i\)](#)

Compatibility: ESXi 7.0 U2 and later (VM version 19)

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- ✓ 5 Select compatibility
- ✓ 6 Select a guest OS

### 7 Customize hardware

8 Ready to complete

> New Hard disk *	20	GB	▼
> New SCSI controller *	LSI Logic SAS		
> New Network *	VM Network	▼	<input checked="" type="checkbox"/> Connect...
> New CD/DVD Drive *	Client Device	▼	<input type="checkbox"/> Connect...
> New USB Controller	Client Device		
> Video card *	Host Device		
> Security Devices	Datastore ISO File		
	Content Library ISO File		
	Not Configured		

## New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- ✓ 5 Select compatibility
- ✓ 6 Select a guest OS

### 7 Customize hardware

8 Ready to complete

> New Hard disk *	20	GB	▼
> New SCSI controller *	LSI Logic SAS		
> New Network *	VM Network	▼	<input checked="" type="checkbox"/> Connect...
> New CD/DVD Drive *	Datastore ISO File	▼	<input type="checkbox"/> Connect...
> New USB Controller	USB 3.1	▼	
> Video card *	Specify custom settings	▼	
> Security Devices	Not Configured		

# VMware vSphere Install, Configure, Manage | Lab Guide

## New Virtual Machine

✓ 1 Select a creation type

✓ 2 Select a name and folder

✓ 3 Select a compute resource

✓ 4 Select storage

✓ 5 Select compatibility

✓ 6 Select a guest OS

✓ 7 Customize hardware

**8 Ready to complete**

**Ready to complete**

Click Finish to start creation.

Virtual machine name	VM2-H2
Folder	vDatacenter
Host	esxi02.abdelwahed.me
Datastore	DBStore
Guest OS name	Microsoft Windows Server 2022 (64-bit)
Virtualization Based Security	Disabled

Server Core 2022 is now installed.

The screenshot shows the vSphere Client interface. On the left, the inventory tree shows vcenter01.abdelwahed.me, vDatacenter, esxi01.abdelwahed.me (with vCenter Server), and esxi02.abdelwahed.me (with VM1-H2 and VM2-H2). The main pane displays VM2-H2, which is powered on. It shows the following details:

- Guest OS: Microsoft Windows Server 2022 (64-bit)
- Compatibility: ESXi 7.0 U2 and later (VM version 19)
- VMware Tools: Not running, not installed
- DNS Name: esxi02.abdelwahed.me
- IP Addresses: esxi02.abdelwahed.me
- Host: esxi02.abdelwahed.me

On the right, resource usage is shown:

- CPU USAGE: 84 MHz
- MEMORY USAGE: 1,013 MB
- STORAGE USAGE: 21.08 GB

The screenshot shows the vSphere Client interface with the same inventory and summary view for VM2-H2. A modal dialog box titled "Launch Console" is open in the foreground, asking the user to select a console type:

- Web Console
- VMware Remote Console (VMRC) [INSTALL VMRC](#)

At the bottom of the dialog, there is a "Remember my choice" checkbox, a "CANCEL" button, and an "OK" button. A note at the bottom of the main screen states: "VMware Tools is not installed on this virtual machine."

# VMware vSphere Install, Configure, Manage | Lab Guide

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## Edit VM Settings from vCenter.

With VM configurations, you are able to modify various virtual machine settings. In this instance, we will be demonstrating how to increase the size of the hard drive (note that some settings may necessitate turning the power off).

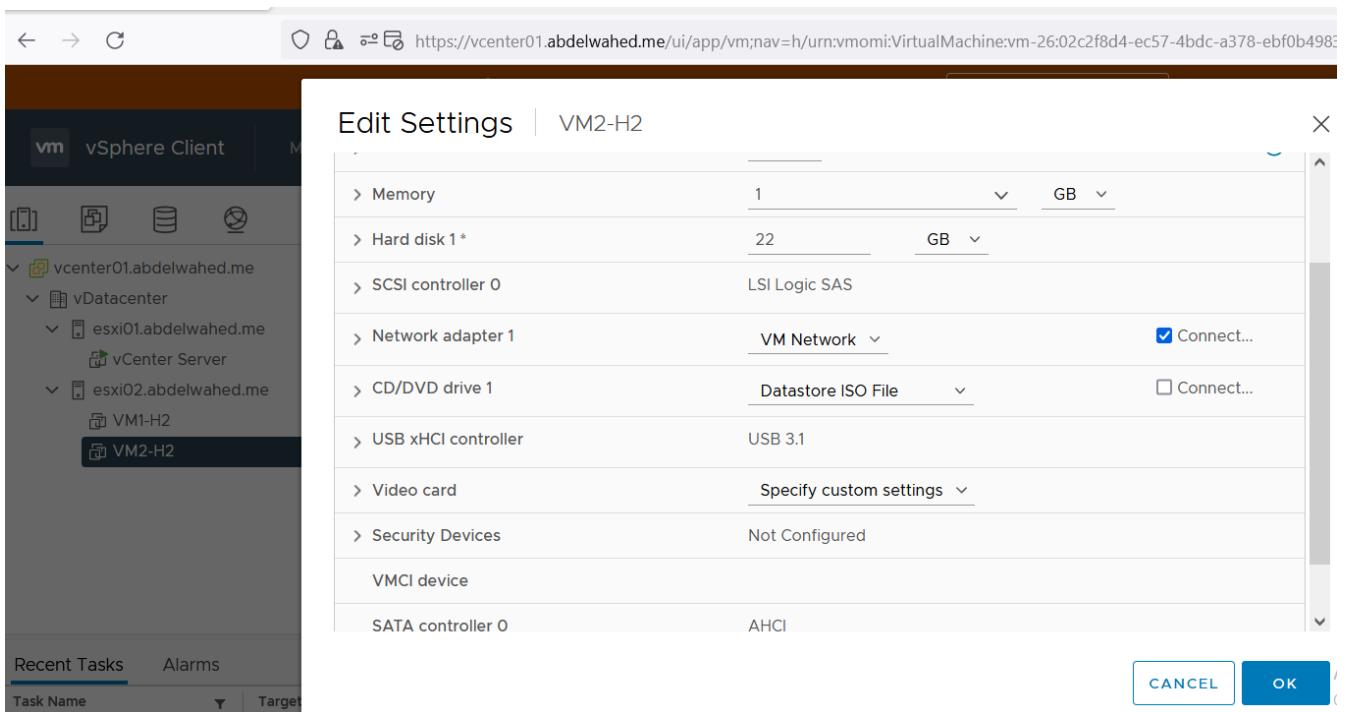
The screenshot shows the VMware vSphere Web Client interface. The left sidebar has a 'Virtual Machines' section with two items: 'VM1-H2' and 'VM2-H2'. The 'VM2-H2' item is selected and highlighted with a blue border. The main pane displays a table of virtual machines with columns for Name, Status, Used space, Guest OS, and Host name. 'VM1-H2' has 10.7 GB used space and 'VM2-H2' has 20 GB used space.

Virtual machine	Status	Used space	Guest OS	Host name
VM1-H2	Normal	10.7 GB	Microsoft Windows Serve...	Unknown
VM2-H2	Normal	20 GB	Microsoft Windows Serve...	Unknown

Using vCenter, we will increase the VM's hard drive size from 20 GB to 22 GB.

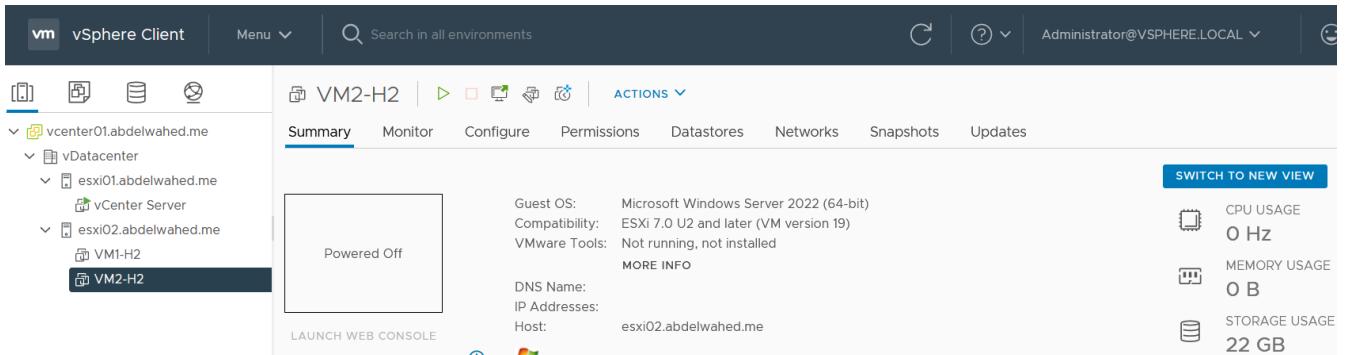
The screenshot shows the 'Edit settings' dialog for 'VM2-H2'. The 'Virtual Hardware' tab is selected. A warning message box is displayed, stating: 'As this host's resources are being managed by vCenter Server, some configuration options are disabled. If you wish to change this VM's resource settings, please do so from vCenter Server.' The dialog lists various hardware components: CPU (1), Memory, Hard disk 1, SCSI Controller 0, SATA Controller 0, USB controller 1, and Network Adapter 1. The 'Network Adapter 1' settings show 'VM Network' selected with a checked checkbox.

# VMware vSphere Install, Configure, Manage | Lab Guide



The screenshot shows the VMware vSphere Client interface. On the left, the navigation tree shows the vCenter server and its hosts: esxi01 and esxi02. The selected host is esxi02, and the selected VM is VM2-H2. The main window displays the 'Edit Settings' dialog for VM2-H2. The configuration tabs include Memory (1 GB), Hard disk 1 (22 GB), SCSI controller 0 (LSI Logic SAS), Network adapter 1 (VM Network, checked), CD/DVD drive 1 (Datastore ISO File, unchecked), USB xHCI controller (USB 3.1), Video card (Specify custom settings), Security Devices (Not Configured), VMCI device, and SATA controller 0 (AHCI). At the bottom right of the dialog are 'CANCEL' and 'OK' buttons, with 'OK' being highlighted.

Hard drive now expanded to 22GB

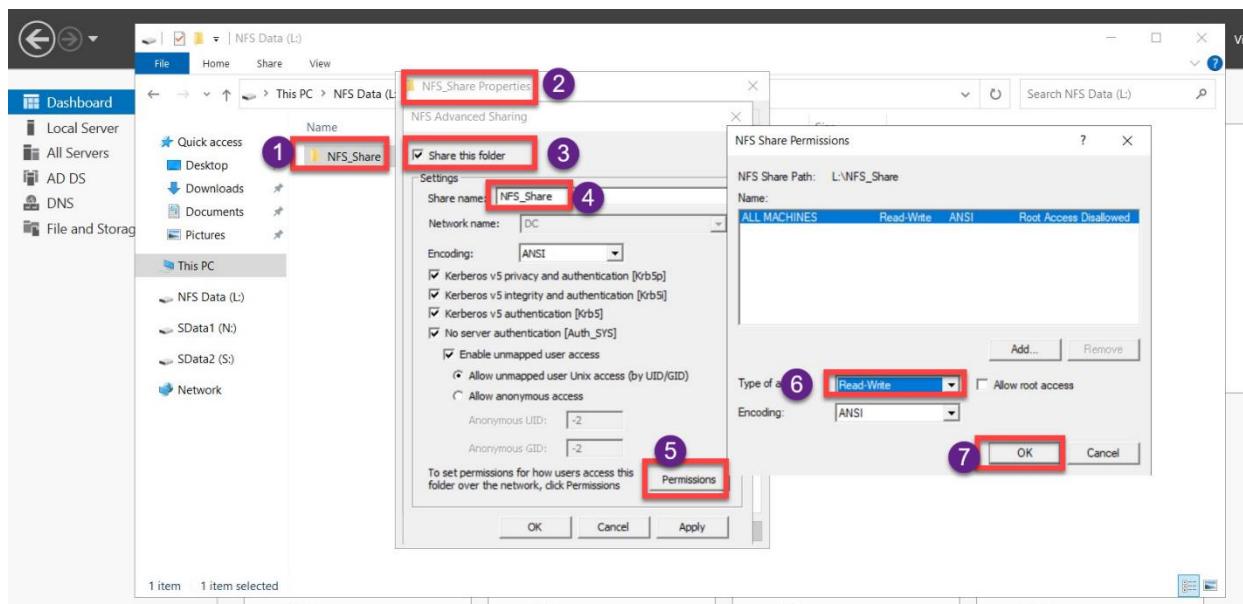
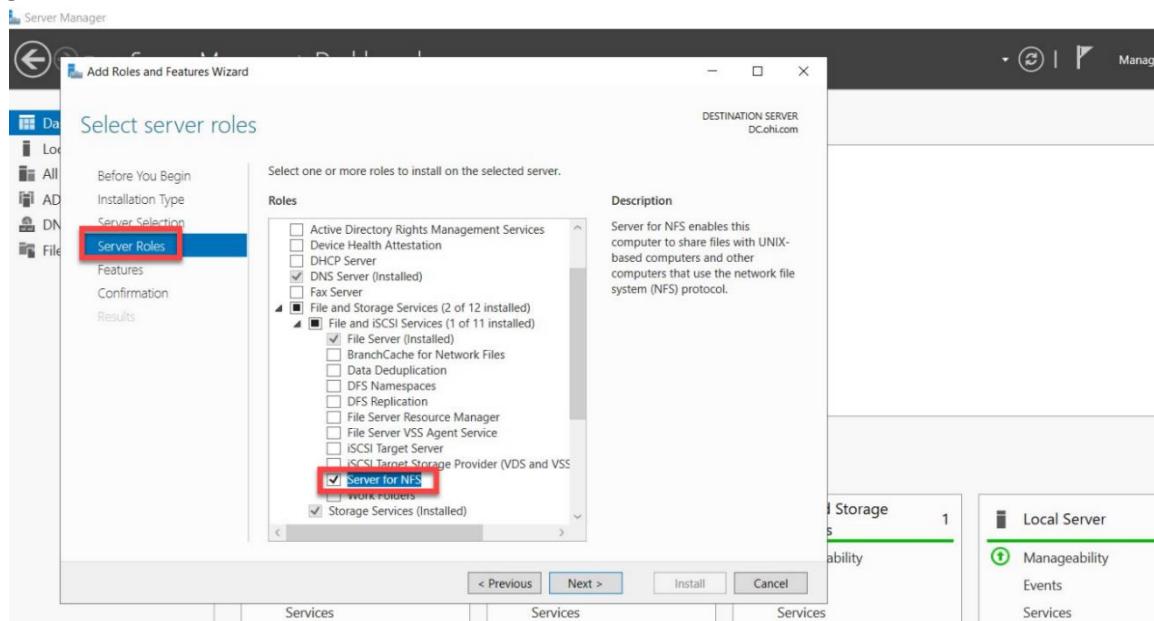


The screenshot shows the VMware vSphere Client interface. The navigation tree on the left shows the vCenter server and its hosts: esxi01 and esxi02. The selected host is esxi02, and the selected VM is VM2-H2. The main window displays the 'Summary' tab for VM2-H2. The summary details include: Guest OS: Microsoft Windows Server 2022 (64-bit); Compatibility: ESXi 7.0 U2 and later (VM version 19); VMware Tools: Not running, not installed; MORE INFO; DNS Name:; IP Addresses:; Host: esxi02.abdelwahed.me. On the right side, there are resource usage metrics: CPU USAGE 0 Hz, MEMORY USAGE 0 B, and STORAGE USAGE 22 GB. At the bottom left, there is a 'LAUNCH WEB CONSOLE' button.

# VMware vSphere Install, Configure, Manage | Lab Guide

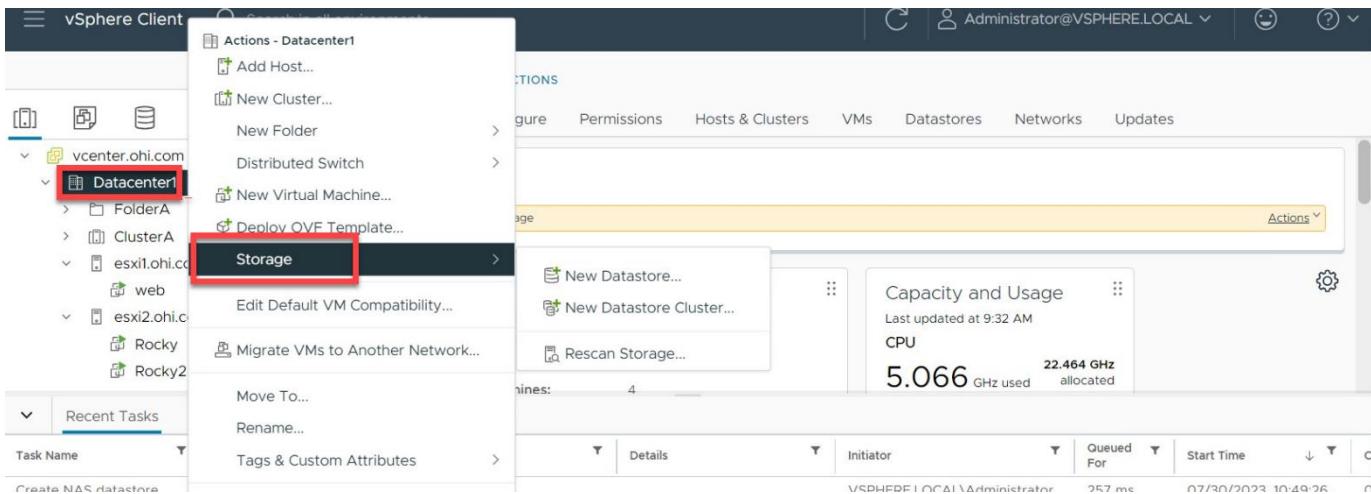
## Configuring NFS Server on Windows Server - NFS Datastore

Creating an NFS datastore in vSphere using a Windows Server involves setting up the NFS Server role on the Windows machine and then configuring vSphere to mount the NFS share as a datastore. Here's a step-by-step guide on how to achieve this:

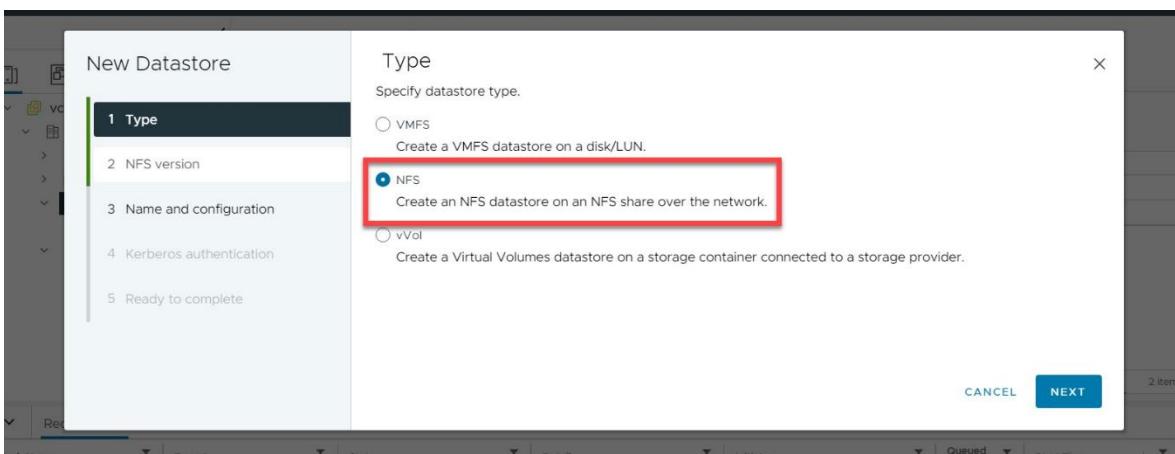


# VMware vSphere Install, Configure, Manage | Lab Guide

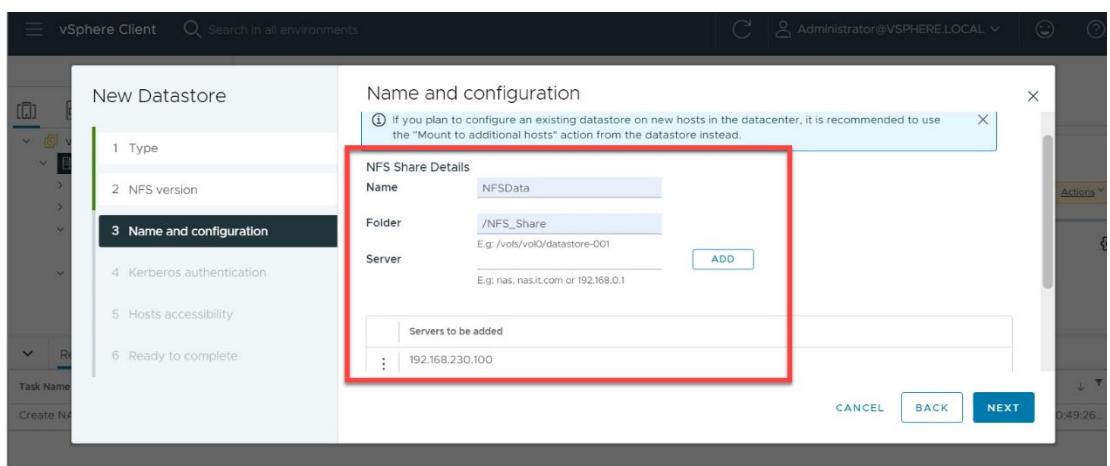
The upcoming configuration will enable NFS on all ESXi servers in the datacenter, and these steps can be replicated at the ESXi level.



The screenshot shows the vSphere Client interface. In the left sidebar, under the 'Datacenter' section, the 'Storage' option is highlighted with a red box. The main pane displays storage-related metrics and actions.

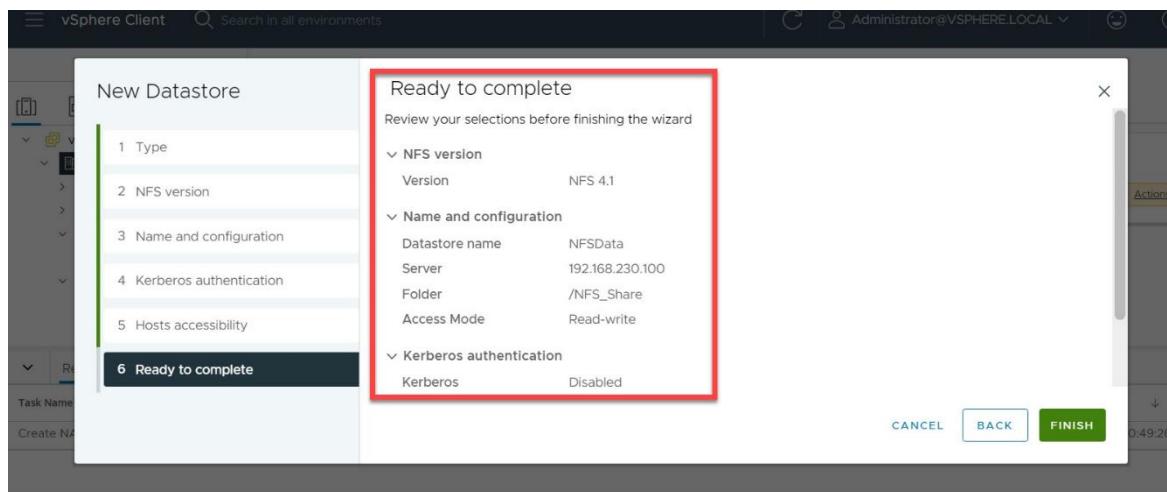
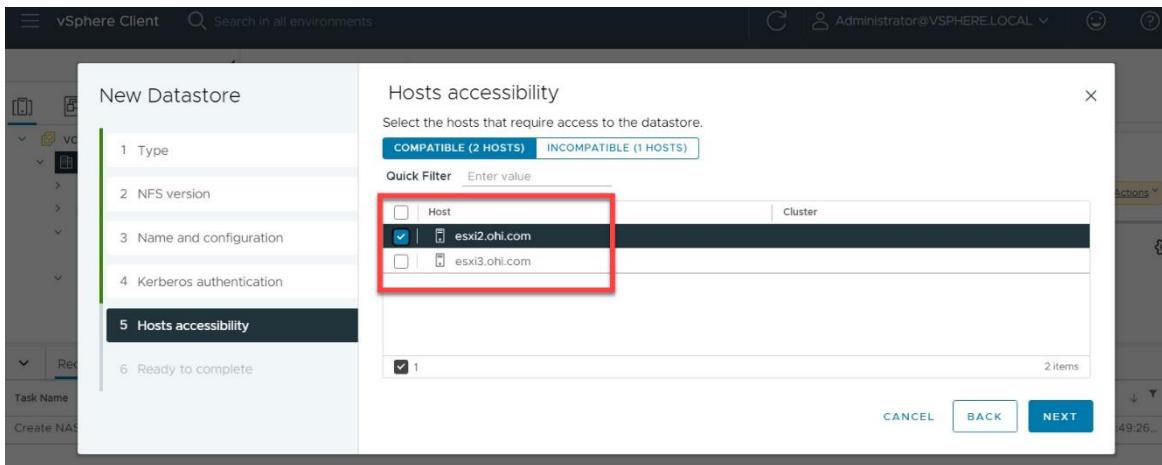


The 'New Datastore' wizard is open, showing the 'Type' selection step. The 'NFS' option is selected and highlighted with a red box. The other options are VMFS, vVol, and vDisk.



The 'Name and configuration' step is shown. The 'NFS Share Details' section is highlighted with a red box. It includes fields for 'Name' (NFSData), 'Folder' (/NFS\_Share), and 'Server' (192.168.230.100). An 'ADD' button is visible next to the server field.

# VMware vSphere Install, Configure, Manage | Lab Guide



# VMware vSphere Install, Configure, Manage | Lab Guide

## Add iSCSI disk to both ESXi servers using vCenter.

Initially, I set up dc.abdelwahed.me for iSCSI storage and permitted the two ESXi servers access to this storage via the network. In this setup, I utilized two iSCSI disks, with capacities of 800 GB and 700 GB respectively. At this point, the iSCSI software (iSCSI initiator) is used..

The screenshot shows the vSphere Client interface. On the left, the navigation tree is expanded to show 'vcenter01.abdelwahed.me' and its sub-tree, including 'esxi01.abdelwahed.me'. The 'Configure' tab is selected. Under 'Storage', the 'Storage Adapters' tab is selected. A red box highlights the 'Add Software Adapter' button. The main pane displays a table of existing storage adapters:

Adapter	Type	Status	Identifier
vmhba1	Block SC...	Unknown	0
vmhba64	Block SC...	Unknown	1

- NVMe over RDMA Adapter:** Enable this option if using NVMe storage devices that are shared over an RDMA network for high performance.
- Software FCoE Adapter:** Discover and use software Fibre Channel over Ethernet (FCoE) adapters.

The dialog box is titled 'Add Software Adapter' and shows the host 'esxi01.abdelwahed.me'. It has three radio button options:

- Add software iSCSI adapter
- Add software NVMe over RDMA adapter
- Add Software FCoE Adapter

Below the first option, a note states: 'A new software iSCSI adapter will be added to the list. After it has been added, select the adapter and use the Adapter Details section to complete the configuration.'

The 'Physical Network Adapter:' dropdown is set to 'vmnic0'. The 'VLAN ID:' input field is '0' with a range of '0 - 4094'. The 'Priority Class:' input field is '3' with a range of '0 - 7'. The 'Controller MAC Address:' input field is '00:0c:29:9c:85:7a'.

At the bottom right are 'CANCEL' and 'OK' buttons, with 'OK' being highlighted by a red box.

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the vSphere Client interface for host esxi01.abdelwahed.me. The left sidebar shows the vCenter Server and vDatacenter structure. The main pane is titled 'Storage Adapters' under the 'Configure' tab. It lists two adapters: 'vmhba65' (ISCSI Software Adapter) and 'vmhba1' (PIIX4 for 430TX/440BX/MX IDE Controller). The 'vmhba65' row is highlighted with a red box.

The screenshot shows the same vSphere Client interface for host esxi01.abdelwahed.me. The 'Network Port Binding' tab is selected in the 'Properties' section. A red box highlights the 'vmhba65' adapter entry. Another red box highlights the 'Network Port Binding' tab itself.

Link the ISCSI software you installed to the network adapter.

The screenshot shows the vSphere Client interface for host esxi01.abdelwahed.me. The 'Network Port Binding' tab is selected. A red box highlights the 'vmhba65' adapter entry. Another red box highlights the 'Network ...' button in the toolbar at the bottom of the list.

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esxi01.abdelwahed.me | ACTIONS ▾

Summary Monitor Configure Permissions VMs Resource Pools Datastores Networks Updates

Storage ▾ Storage Adapters

Properties Devices Paths Dynamic Discovery Static Discovery Network Port Binding Advanced Options

+ Add... X Remove ⓘ View Details

Port Group	VMkernel Adapter	Port Group Policy	Path Status
Management Netw...	vmk0	Compliant	Not used

esxi01.abdelwahed.me | ACTIONS ▾

Summary Monitor Configure Permissions VMs Resource Pools Datastores Networks Updates

Storage ▾ Storage Adapters

Properties Devices Paths Dynamic Discovery Static Discovery Network Port Bind

+ Add... X Remove Authentication... Advanced...

ISCSI server  
dc.abdelwahed.me:3260

Storage Devices Host Cache Configuration Protocol Endpoints I/O Filters Networking Virtual switches

esxi01.abdelwahed.me | ACTIONS ▾

Summary Monitor Configure Permissions VMs Resource Pools Datastores Networks Updates

Storage ▾ Storage Adapters

Properties Devices Paths Dynamic Discovery Static Discovery Network Port Binding Advanced Options

+ Add Software Adapter Refresh Rescan Storage... Rescan Adapter X Remove

Adapter	Type	Status	Identifier	Targ...
vmhba1	Block SC...	Unknown	-	0
vmhba64	Block SC...	Unknown	-	1

esxi01.abdelwahed.me | ACTIONS ▾

Summary Monitor Configure Permissions VMs Resource Pools Datastores Networks Updates

Storage ▾ Storage Adapters

Properties Devices Paths Dynamic Discovery Static Discovery Network Port Binding Advanced Options

Refresh Attach Detach Rename

Name	L...	Type	Capacity	Datastor...	Operational S...	Hardwa...
MSFT ISCSI Disk (naa.60003ff44dc75adc94fdc...)	0	disk	499.82 GB	Not Cons...	Attached	Not sup...

# VMware vSphere Install, Configure, Manage | Lab Guide

The iSCSI Disk becomes visible and is available for addition as a datastore.

The screenshot shows the VMware vSphere Client interface. On the left, the navigation pane lists hosts (vcenter01.abdelwahed.me), datacenters (vDatacenter), and hosts (esxi01.abdelwahed.me, esxi02.abdelwahed.me). The host esxi01.abdelwahed.me is selected and highlighted with a red box. In the center, under the 'Storage' section of the configuration tab, there is a table showing existing datastores. One datastore, 'MSFT iSCSI Disk (naa.60003ff44dc75adc94fdc...)', is listed with details: Name, LUN, Type (disk), Capacity (499.82 GB), Datastore (Not Consistent), and Operational State (Attached). A red box highlights the 'New Datastore...' button in the 'Storage' menu.

This screenshot shows the 'New Datastore' wizard, step 1: Type. The steps are numbered 1 through 4. Step 1, 'Type', is active and highlighted with a red box. It asks to specify the datastore type. Three options are shown: 'VMFS' (selected and highlighted with a red box), 'NFS', and 'vVol'. Below each option is a brief description of what it creates.

This screenshot shows the 'New Datastore' wizard, step 2: Name and device selection. The steps are numbered 1 through 5. Step 2 is active and highlighted with a red box. It asks to specify the datastore name and the disk/LUN for provisioning. The 'Name:' field contains 'Datastore'. Below it is a table showing available storage devices. One device, 'MSFT iSCSI Disk (naa.60003ff44dc75adc94fdc...)', is selected and highlighted with a red box. The table columns include Name, LUN, Capacity, Hardware, Drive Type, Sector Size, and Clusters.

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the VMware vSphere Datastore Wizard interface across three pages:

- New Datastore** (Step 3: VMFS version):
  - Specify the VMFS version for the datastore.
  - VMFS 6**: VMFS 6 enables advanced format (512e) and automatic space reclamation support.
  - VMFS 5**: VMFS 5 enables 2+TB LUN support.
- New Datastore** (Step 4: Partition configuration):
  - Review the disk layout and specify partition configuration details.
  - Partition Configuration**: Use all available partitions
  - Datastore Size**: 499.1 GB
  - Block size**: 1 MB
  - Space Reclamation Granularity**: 1 MB
  - Space Reclamation Priority**: Low
- New Datastore** (Step 5: Ready to complete):
  - Review your settings selections before finishing the wizard.
  - General**:
    - Name: Datastore
    - Type: VMFS
    - Datastore size: 499.82 GB
  - Device and Formatting**:
    - Disk/LUN: MSFT iSCSI Disk (naa.60003ff44dc75adc94fdc2b8b8c3c3e6)
    - Partition Format: GPT
    - VMFS Version: VMFS 6
  - Buttons**: CANCEL, BACK, FINISH

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the vSphere Client interface for host `esxi01.abdelwahed.me`. The left sidebar shows the vCenter Server and the hosts `esxi01` and `esxi02`. The main pane is titled `esxi01.abdelwahed.me` and displays the `Datastores` tab. A red box highlights the first entry in the list, which is `Datastore`, showing a capacity of 499.75 GB.

Now, do the same for ESXi02. We won't add a new datastore; we just want to connect it.

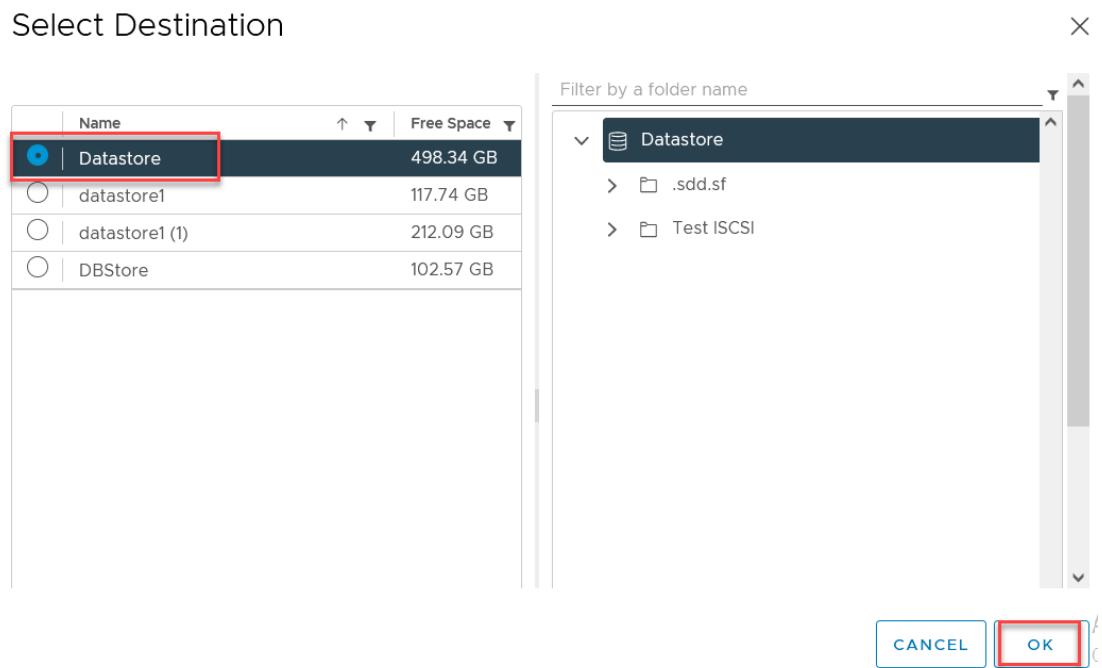
The screenshot shows the vSphere Client interface for host `esxi02.abdelwahed.me`. The left sidebar shows the vCenter Server and the hosts `esxi01` and `esxi02`. The main pane is titled `esxi02.abdelwahed.me` and displays the `Datastores` tab. A red box highlights the first entry in the list, which is `Datastore`, showing a capacity of 499.75 GB.

Please proceed to upload files to the iSCSI storage.

The screenshot shows the vSphere Client interface for the `DBStore` datastore. The left sidebar shows the vCenter Server and the hosts `esxi01` and `esxi02`. The main pane is titled `DBStore` and displays the `Files` tab. A red box highlights the `COPY TO` button in the toolbar. In the file list, a file named `vmware-vsphere-install-configure-manage-v70.p...` is selected, indicated by a red box.

# VMware vSphere Install, Configure, Manage | Lab Guide

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## Migrate VM to Another iSCSI Datastore

### Cold Migration (Without vMotion)

Without vMotion enabled, it is not possible to move a virtual machine (VM) during its powered-on state. The only way to move a VM in this state is through a process called "cold migration," which involves powering off the VM, moving its files to another location, and then powering it back on.

### Hot Migration (With vMotion)

On the other hand, with vSphere vMotion, it is possible to move a VM while it is in a powered-on state, without any disruption to its services. This type of migration is often referred to as "hot migration" or "live migration," and it is a key feature of vSphere that allows for more flexibility and agility in managing virtual environments.

### Key Points About vSphere vMotion

- **Live Migration:** vSphere vMotion enables the live migration of a running virtual machine from one host to another with zero downtime.
- **Use Cases:** You can move virtual machines between hosts for load balancing, maintenance, or other reasons, without any disruption to their services.
- **Requirements:**
  - **Shared Storage:** vMotion relies on shared storage accessible by both the source and target hosts.
  - **High-Speed Network Connection:** A high-speed network connection between the hosts is essential.
  - **License:** vSphere Enterprise Plus license is required to use vMotion.

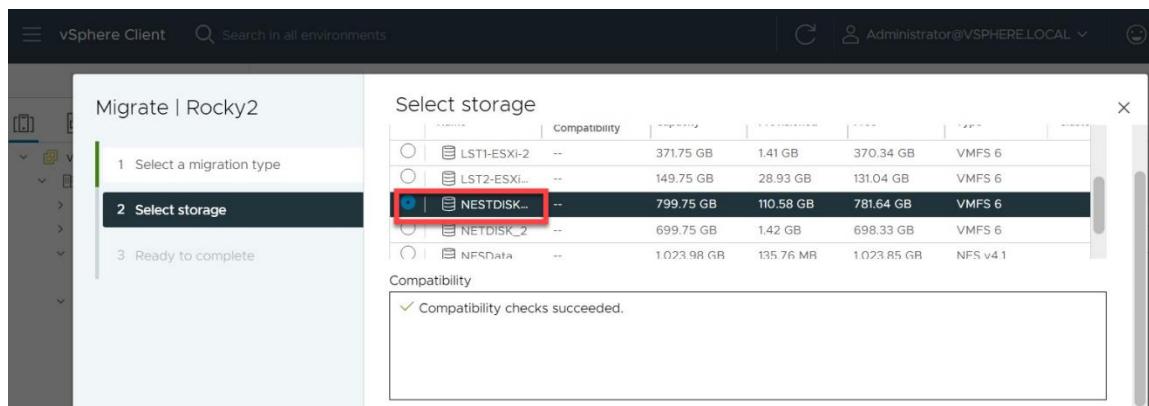
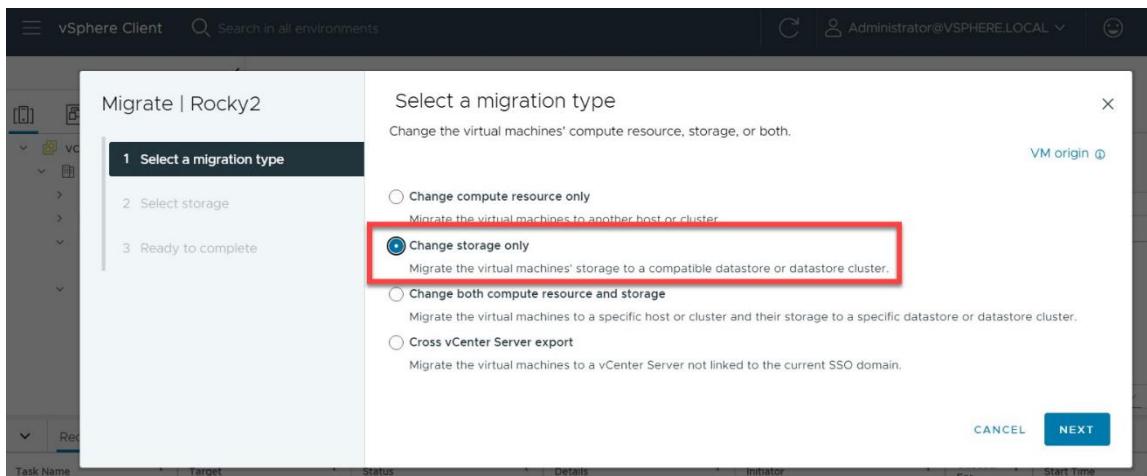
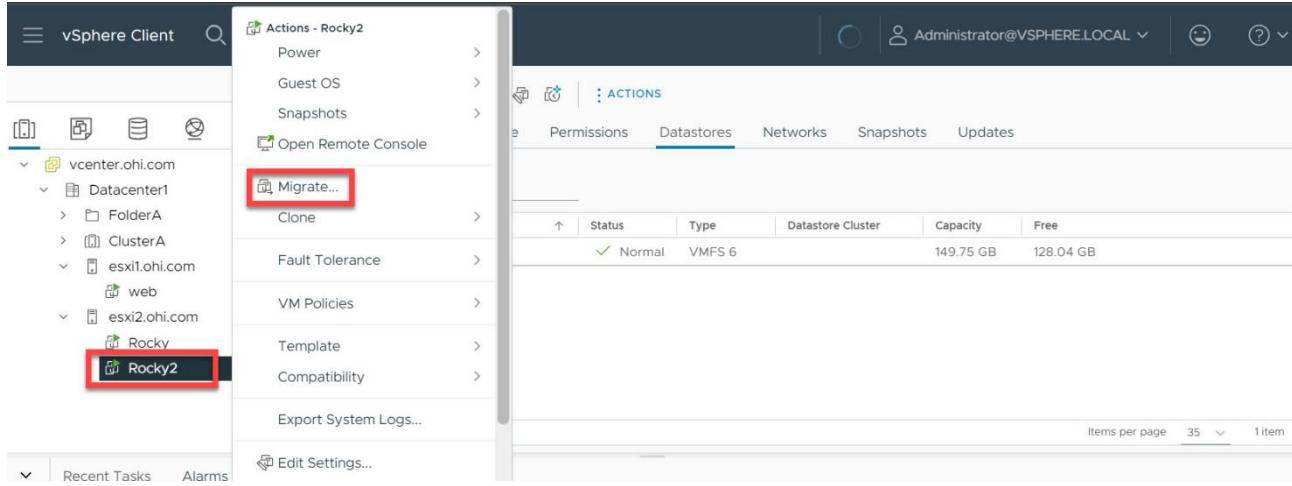
### Best Practices for Using vMotion

- **Monitor Network and Storage Performance:** Ensure that network and storage resources are sufficient to handle the migration process.
- **Check VM Compatibility:** Verify that the virtual machines are compatible with the target hosts.
- **Secure vMotion:** Implement appropriate permissions and firewall rules to secure the vMotion process.

# VMware vSphere Install, Configure, Manage | Lab Guide

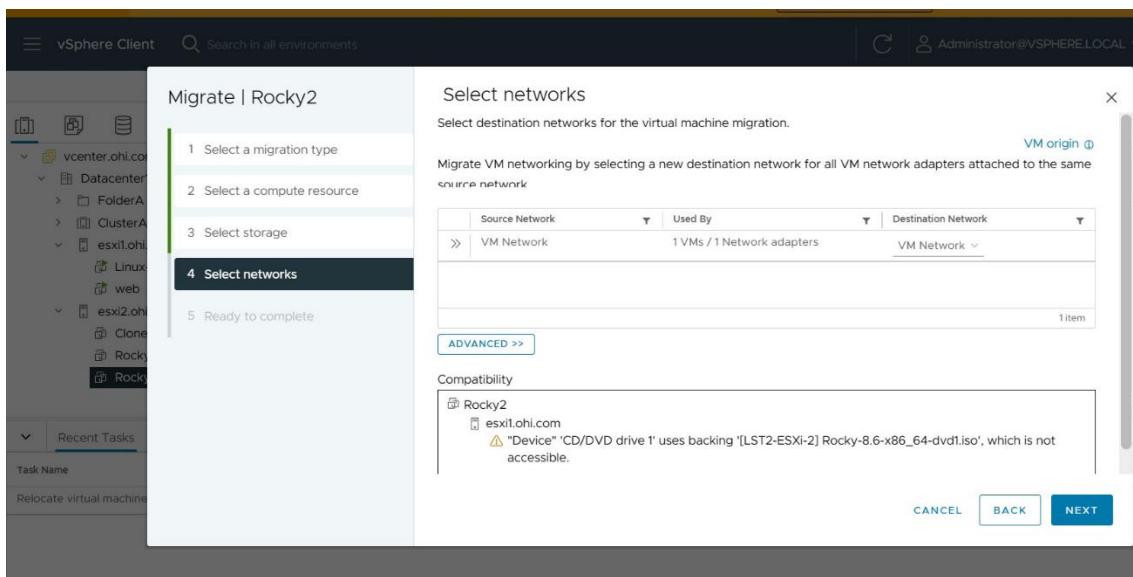
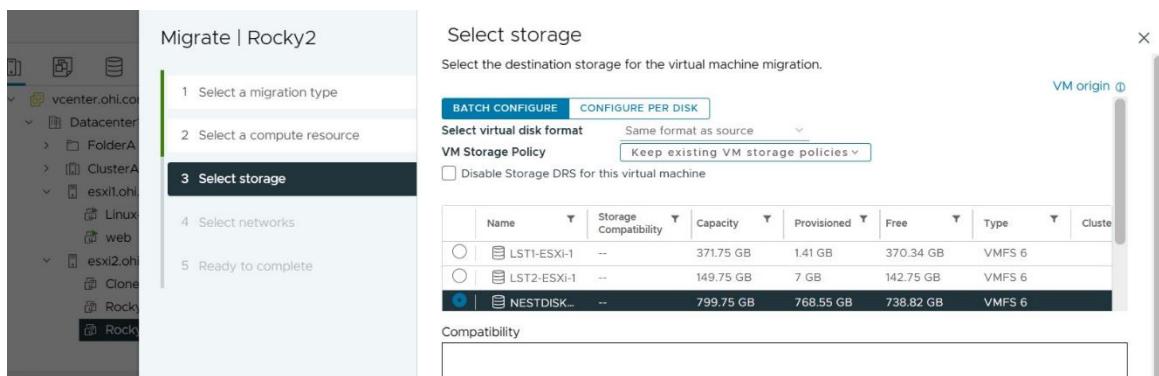
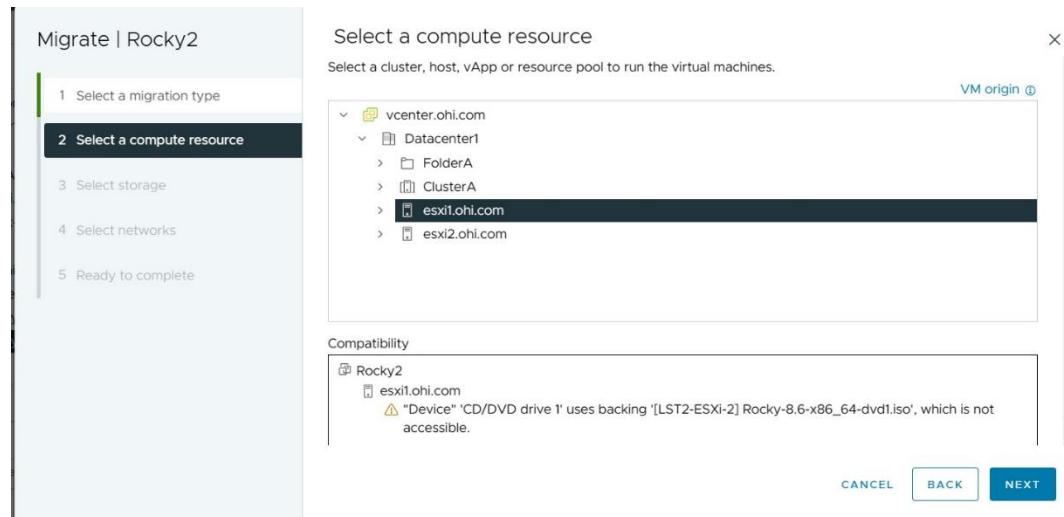
## Cold Migration Without the Need for vMotion

### Disk Migration



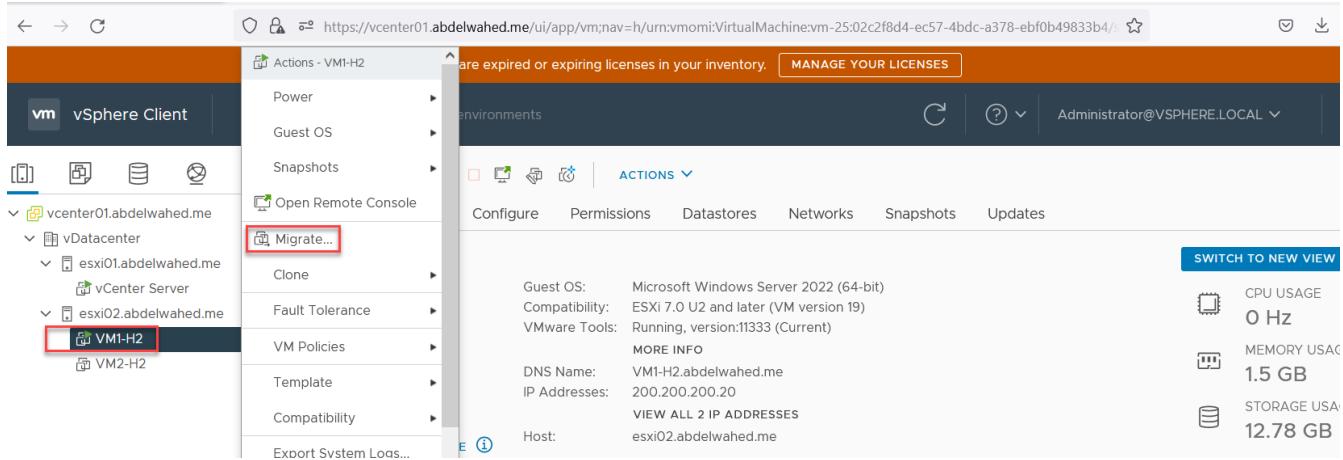
# VMware vSphere Install, Configure, Manage | Lab Guide

## VM Migration (Power off required)



# VMware vSphere Install, Configure, Manage | Lab Guide

## Live Migrate (vMotion needed)



The screenshot shows the VMware vSphere Client interface. On the left, the navigation tree shows a hierarchy: vcenter01.abdelwahed.me > vDatacenter > esxi01.abdelwahed.me > VM1-H2. A red box highlights the 'Migrate...' button in the Actions dropdown menu for VM1-H2. The main pane displays details for VM1-H2, including its Guest OS (Microsoft Windows Server 2022), Compatibility (ESXi 7.0 U2 and later (VM version 19)), and Host (esxi02.abdelwahed.me). On the right, resource usage metrics are shown: CPU USAGE 0 Hz, MEMORY USAGE 1.5 GB, and STORAGE USAGE 12.78 GB.

### Migrate | VM1-H2

1 Select a migration type

2 Select a compute resource

3 Select storage

4 Select networks

5 Select vMotion priority

6 Ready to complete

Select a migration type  
Change the virtual machines' compute resource, storage, or both.

Change compute resource only  
Migrate the virtual machines to another host or cluster.

Change storage only  
Migrate the virtual machines' storage to a compatible datastore or datastore cluster.

Change both compute resource and storage  
Migrate the virtual machines to a specific host or cluster and their storage to a specific datastore or datastore cluster.

Cross vCenter Server export  
Migrate the virtual machines to a vCenter Server not linked to the current SSO domain.

VM origin ⓘ

CANCEL BACK NEXT

### Migrate | VM1-H2

✓ 1 Select a migration type

2 Select a compute resource

3 Select storage

4 Select networks

5 Select vMotion priority

6 Ready to complete

Select a compute resource  
Select a cluster, host, vApp or resource pool to run the virtual machines.

vcenter01.abdelwahed.me  
vDatacenter  
esxi01.abdelwahed.me  
esxi02.abdelwahed.me

VM origin ⓘ

CANCEL BACK NEXT

# VMware vSphere Install, Configure, Manage | Lab Guide

## Migrate | VM1-H2

- ✓ 1 Select a migration type
- ✓ 2 Select a compute resource
- 3 Select storage**
- 4 Select networks
- 5 Select vMotion priority
- 6 Ready to complete

Select storage  
Select the destination storage for the virtual machine migration.

VM origin ⓘ

**BATCH CONFIGURE** **CONFIGURE PER DISK**

Select virtual disk format Same format as source

VM Storage Policy Keep existing VM storage policies

Name	Storage Cor.	Capacity	Provisions	Free	Type	Cluster
Datastore	--	499.75 GB	1.45 GB	498.3 GB	VMFS 6	
datastore1 ...	--	213.5 GB	1.41 GB	212.09 GB	VMFS 6	
DBStore	--	141.75 GB	71.96 GB	102.57 GB	VMFS 6	

**CANCEL** **BACK** **NEXT**

## Migrate | VM1-H2

- ✓ 1 Select a migration type
- ✓ 2 Select a compute resource
- ✓ 3 Select storage
- 4 Select networks**
- 5 Select vMotion priority
- 6 Ready to complete

Select networks  
Select destination networks for the virtual machine migration.

VM origin ⓘ

Migrate VM networking by selecting a new destination network for all VM network adapters attached to the same source network.

Source Network	Used By	Destination Network
VM Network	1 VMs / 1 Network adapters	VM Network

VM Network is in use at:

VM	Network Adapter	Network
VM1-H2	Network adapter 1	VM Network

**CANCEL** **BACK** **NEXT**

## Migrate | VM1-H2

- ✓ 1 Select a migration type
- ✓ 2 Select a compute resource
- ✓ 3 Select storage
- ✓ 4 Select networks
- 5 Select vMotion priority**
- 6 Ready to complete

Select vMotion priority  
Protect the performance of your running virtual machines by prioritizing the allocation of CPU resources.

Schedule vMotion with high priority (recommended)

vMotion receives higher CPU scheduling preference relative to normal priority migrations. vMotion might complete more quickly.

Schedule normal vMotion

vMotion receives lower CPU scheduling preference relative to high priority migrations. You can extend vMotion duration.

**CANCEL** **BACK** **NEXT**

# VMware vSphere Install, Configure, Manage | Lab Guide

## Migrate | VM1-H2

The screenshot shows the VMware vSphere Client migration wizard. On the left, a sidebar lists steps 1 through 5 with checkmarks, followed by "6 Ready to complete". The main pane is titled "Ready to complete" with the sub-instruction "Verify that the information is correct and click Finish to start the migration." A "VM origin" link is in the top right. Below is a table with the following data:

Migration Type	Change compute resource and storage
Virtual Machine	VM1-H2
Host	esxi02.abdelwahed.me
vMotion Priority	High
Storage	Datastore

Buttons at the bottom include "CANCEL", "BACK", and a large blue "FINISH" button.

The screenshot shows the VMware vSphere Client interface. The navigation bar indicates "https://vcenter01.abdelwahed.me/ui/app/vm;nav=h;urn:vmomi:VirtualMachine:vm-25:02c2f8d4-ec57-4bdc-a378-ebf0b49833b4/". The main pane displays "VM1-H2" details, including guest OS as Microsoft Windows Server 2022 (64-bit) and compatibility as ESXi 7.0 U2 and later (VM version 19). The "Recent Tasks" section shows a task titled "Relocate virtual machine" for target "VM1-H2" with a progress bar at 35%, which is highlighted with a red box.

The screenshot shows the VMware vSphere Client interface after the migration. The "Recent Tasks" section now shows the same task as "Completed" with a green checkmark, also highlighted with a red box. The CPU usage is listed as 168 MHz.

# VMware vSphere Install, Configure, Manage | Lab Guide

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## VM Cloning, Templating, and Snapshot in vSphere

### VM Cloning

Cloning involves making an exact copy of a VM. Key points about cloning:

#### 1. Exact Copy:

- A cloned VM is an exact replica of the original VM, including virtual hardware, configuration settings, and data.

#### 2. Use Cases:

- Useful for testing, backup, or disaster recovery.

#### 3. Any Power State:

- Cloning can be done at any time, regardless of the VM's power state.

#### 4. MAC Address:

- Option to keep the same MAC address or generate a new one.

#### 5. Source VM:

- The source VM remains unchanged and functional after cloning.

### VM Templating

Templating involves creating a new VM based on a master template. Key points about templating:

#### 1. Master Copy:

- A template is a master copy of a VM used to create new VMs with the same configuration and software settings.

#### 2. Use Cases:

- Useful for creating multiple identical VMs for specific purposes, like web server farms or development environments.

#### 3. Create Template:

- First, create a VM with desired settings, then convert it to a template.

#### 4. Customization:

- When creating a new VM from a template, customize settings and assign a unique name and MAC address.

#### 5. Source VM:

- The source VM is converted into a template and becomes unavailable as a regular VM.

### VM Snapshots

Snapshots capture the state of a VM at a specific point in time. Key points about snapshots:

#### 1. State Capture:

- A snapshot captures the state, configuration, and data of a VM at a particular moment.

#### 2. Revert Changes:

- Useful for reverting the VM to a previous state in case of errors or issues during updates or changes.

#### 3. Multiple Snapshots:

- Multiple snapshots can be taken, but it's best to manage and limit the number to avoid performance issues.

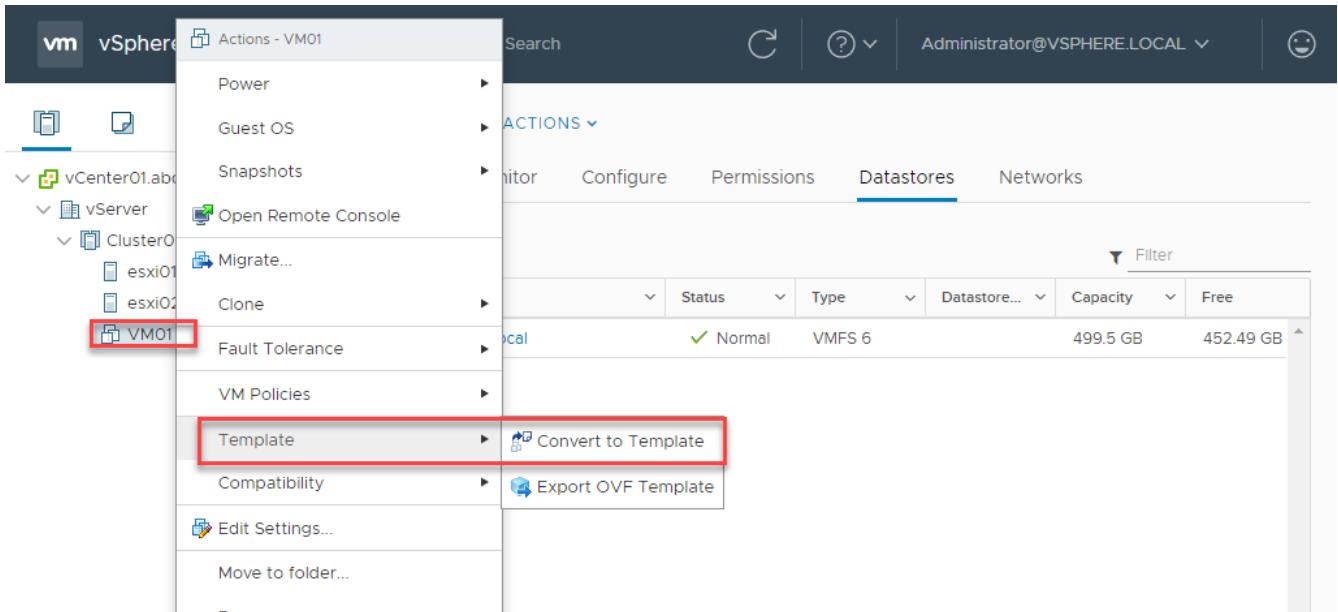
#### 4. Source VM:

- The source VM continues to operate normally after taking a snapshot.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Steps to Create a Template:

It is essential to turn off the virtual machine (VM) before converting it into a template to secure a consistent and stable condition.



## Confirm Convert | VM01



Convert the virtual machine "VM01" to a template?

NO

YES

Recent Tasks		Alarms						
Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Ti...	Server	
Mark virtual machine as template	VM01	Completed	VSPHERE.LOCA...	undefined	05/29/2021, 9:47:47 PM	05/29/2021, 9:47:48 PM	vCenter01.abdel...	

# VMware vSphere Install, Configure, Manage | Lab Guide

Create a virtual machine using a template.

## Deploy From Template

**1 Select a creation type**

2 Select a template

3 Select a name and folder

4 Select a compute resource

5 Review details

6 Select storage

7 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 the process of creating a virtual machine from a template. A template is a golden image of a virtual machine that lets you easily create ready-for-use virtual machines. You must have a template to proceed with this option.

## Deploy From Template

**✓ 1 Select a creation type**

**2 Select a template**

3 Select a name and folder

4 Select a compute resource

5 Select storage

6 Select clone options

7 Ready to complete

Select a template

Content Library      Data Center

vCenter01.abdelwahed.me

vServer

Discovered virtual machine

VM01

## VM01 - Deploy From Template

**✓ 1 Select a creation type**

**✓ 2 Select a template**

**3 Select a name and folder**

4 Select a compute resource

5 Select storage

6 Select clone options

7 Ready to complete

Select a name and folder  
Specify a unique name and target location

Virtual machine name: Server01

Select a location for the virtual machine.

vCenter01.abdelwahed.me

vServer

Discovered virtual machine

## VM01 - Deploy From Template

**✓ 1 Select a creation type**

**✓ 2 Select a template**

**✓ 3 Select a name and folder**

**4 Select a compute resource**

5 Select storage

6 Select clone options

7 Ready to complete

Select a compute resource  
Select the destination compute resource for this operation

vServer

Cluster01

esxi01.abdelwahed.me

esxi02.abdelwahed.me

# VMware vSphere Install, Configure, Manage | Lab Guide

## VM01 - Deploy From Template

- ✓ 1 Select a creation type
- ✓ 2 Select a template
- ✓ 3 Select a name and folder
- ✓ 4 Select a compute resource
- 5 Select storage**

6 Select clone options

7 Ready to complete

### Select storage

Select the datastore in which to store the configuration and disk files

Configure per disk

Select virtual disk format:

Same format as source

VM Storage Policy:

Keep existing VM storage policies

Name	Capacity	Provisioned	Free
▲ Storage Compatibility: Compatible			
DataStore03_local	149.5 GB	7 GB	142.5 GB
Datastore04_local	499.5 GB	49.22 GB	452.49 GB
datastore1_local	192.5 GB	1.41 GB	191.09 GB

## VM01 - Deploy From Template

- ✓ 1 Select a creation type
- ✓ 2 Select a template
- ✓ 3 Select a name and folder
- ✓ 4 Select a compute resource
- ✓ 5 Select storage
- 6 Select clone options**

7 Ready to complete

### Select clone options

Select further clone options

Customize the operating system

Customize this virtual machine's hardware (Experimental)

Power on virtual machine after creation

I set up four servers with two VMs on each host.

Recent Tasks	Alarms	▼					
Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Ti...	Server
Clone virtual machine	VM01	41% <input checked="" type="button"/>	VSPHERE.LOCA...	undefined	05/29/2021, 9:56:08 PM		vCenter01.abdel...
Clone virtual machine	VM01	44% <input checked="" type="button"/>	VSPHERE.LOCA...	undefined	05/29/2021, 9:55:35 PM		vCenter01.abdel...
Clone virtual	VM01	52% <input checked="" type="button"/>	VSPHERE.LOCA...	undefined	05/29/2021, 9:55:35 PM	Activate Windows Go to Settings to activate Windows	vCenter01.abdel...

# VMware vSphere Install, Configure, Manage | Lab Guide

## Steps to Clone a VM:

Cloning a running VM will create a new VM that is an exact copy of the source VM, while converting a VM to a template will convert the source VM into a template and make it unavailable as a regular VM. Both cloning and creating a template will generate a new UUID for the new VM or template. You can check the VM's UUID by running the following command on the guest operating system: `wmic path win32_computersystemproduct get uuid`

## Clone Existing Virtual Machine

The screenshot shows the 'Clone Existing Virtual Machine' wizard. On the left, a vertical navigation bar lists steps 1 through 7. Step 1, 'Select a creation type', is highlighted with a dark background. The main panel title is 'Select a creation type' with the subtitle 'How would you like to create a virtual machine?'. A list of options includes 'Create a new virtual machine', 'Deploy from template', 'Clone an existing virtual machine' (which is highlighted with a red box), 'Clone virtual machine to template', 'Clone template to template', and 'Convert template to virtual machine'. To the right, a descriptive text box states: 'This option guides you through creating a copy of an existing virtual machine.' At the bottom are 'CANCEL', 'BACK', and 'NEXT' buttons.

## Clone Existing Virtual Machine

The screenshot shows the 'Select a virtual machine' step of the wizard. The vertical navigation bar on the left has step 2, 'Select a virtual machine', highlighted. The main panel title is 'Select a virtual machine' with the subtitle 'Select a virtual machine to clone'. A tree view shows 'vcenter01.abdelwahed.me' expanded, revealing 'vDatacenter' which further expands to 'vCenter Server' and finally 'VM1-H2' (which is highlighted with a red box). At the bottom are 'CANCEL', 'BACK', and 'NEXT' buttons.

# VMware vSphere Install, Configure, Manage | Lab Guide

## VM1-H2 - Clone Existing Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a virtual machine
- 3 Select a name and folder**
- 4 Select a compute resource
- 5 Select storage
- 6 Select clone options
- 7 Ready to complete

Select a name and folder  
Specify a unique name and target location

Virtual machine name: **VM1-H2-Clone**

Select a location for the virtual machine.

vcenter01.abdelwahed.me  
**vDatacenter**

CANCEL

BACK

NEXT

I will be transferring to a different ESXI host.

## VM1-H2 - Clone Existing Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a virtual machine
- ✓ 3 Select a name and folder
- 4 Select a compute resource**
- 5 Select storage
- 6 Select clone options
- 7 Ready to complete

Select a compute resource  
Select the destination compute resource for this operation

vDatacenter  
**esxi01.abdelwahed.me**  
esxi02.abdelwahed.me

## VM1-H2 - Clone Existing Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a virtual machine
- ✓ 3 Select a name and folder
- ✓ 4 Select a compute resource
- 5 Select storage**
- 6 Select clone options
- 7 Ready to complete

Select storage  
Select the storage for the configuration and disk files

BATCH CONFIGURE CONFIGURE PER DISK

Select virtual disk format Same format as source

VM Storage Policy Keep existing VM storage policies

Disable Storage DRS for this virtual machine

Name	Storage Con	Capacity	Provisione	Free	Type
<input checked="" type="radio"/> Datastore	--	499.75 GB	43.57 GB	485.45 GB	VMFS 6
<input type="radio"/> datastor...	--	155.5 GB	448.03 GB	117.64 GB	VMFS 6

CANCEL

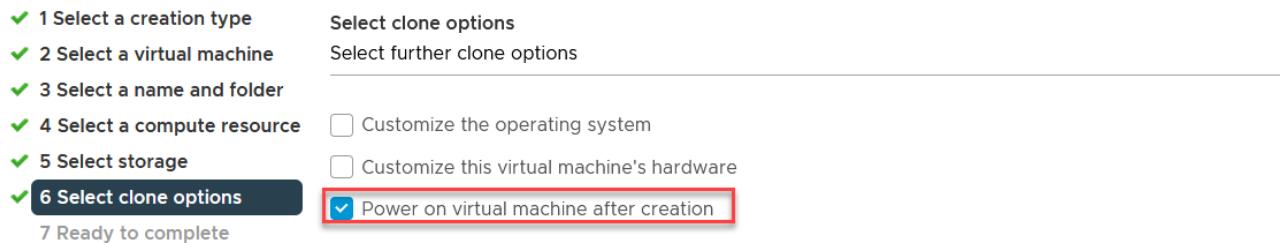
BACK

NEXT

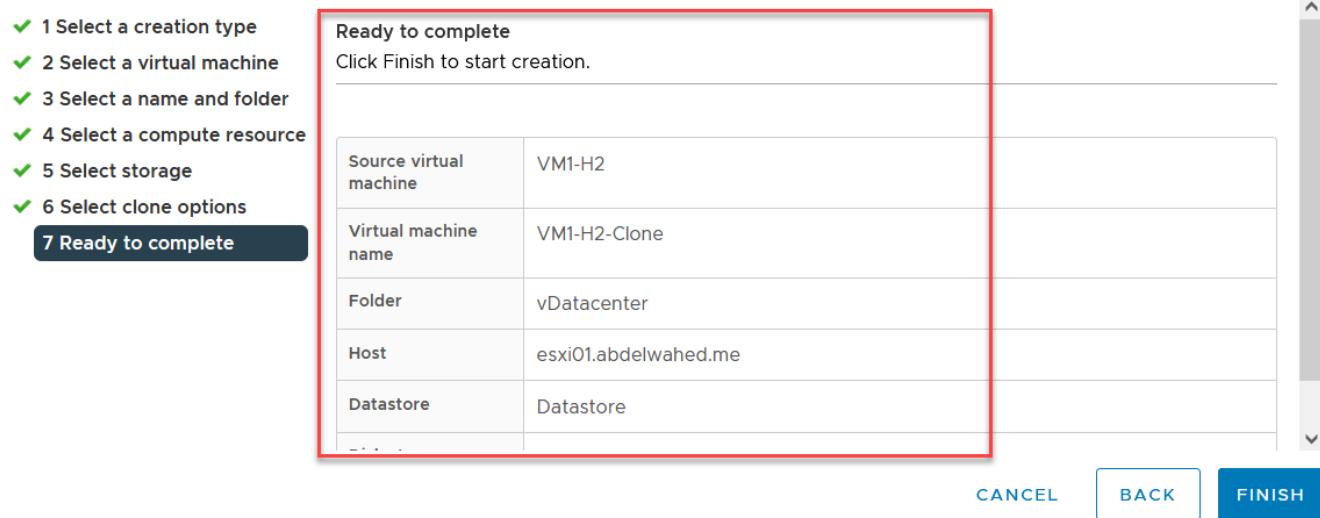
# VMware vSphere Install, Configure, Manage | Lab Guide

To adjust the hardware settings of a virtual machine, opt for the second choice.

## VM1-H2 - Clone Existing Virtual Machine

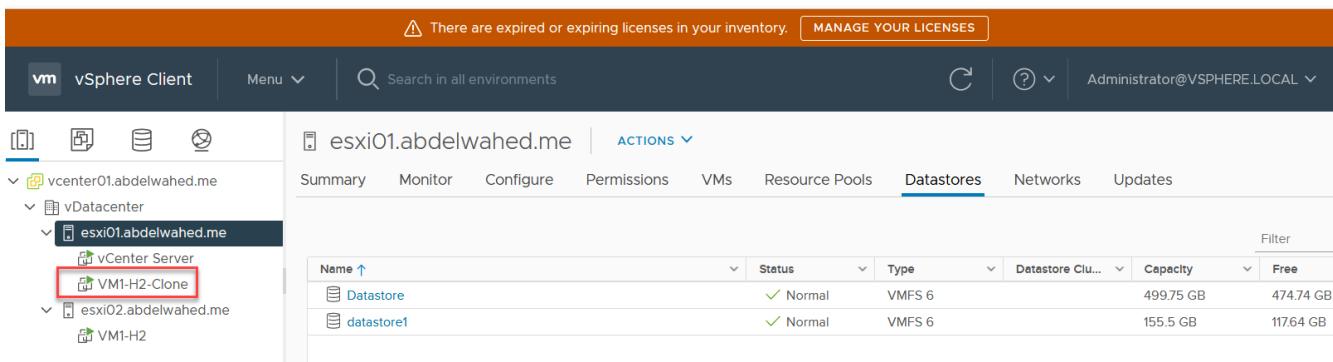


## VM1-H2 - Clone Existing Virtual Machine



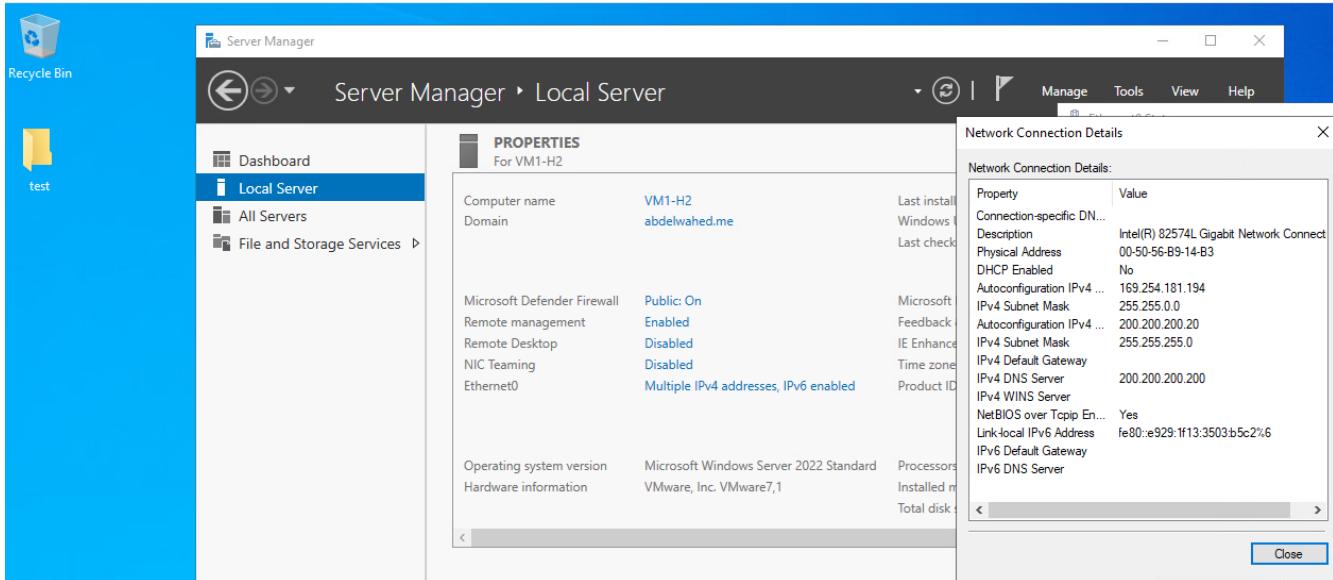
The screenshot shows the vSphere Client interface. The left sidebar shows the vCenter hierarchy: vcenter01.abdelwahed.me > vDatacenter > esxi01.abdelwahed.me > VM1-H2-Clone. The main pane displays the 'Datastores' tab for the host esxi01.abdelwahed.me, listing the Datastore. At the bottom, the 'Recent Tasks' section shows a task for 'Clone virtual machine' with progress at 9%.

# VMware vSphere Install, Configure, Manage | Lab Guide



Name	Status	Type	Datastore Clu...	Capacity	Free
Datastore	Normal	VMFS 6		499.75 GB	474.74 GB
datastore1	Normal	VMFS 6		155.5 GB	117.64 GB

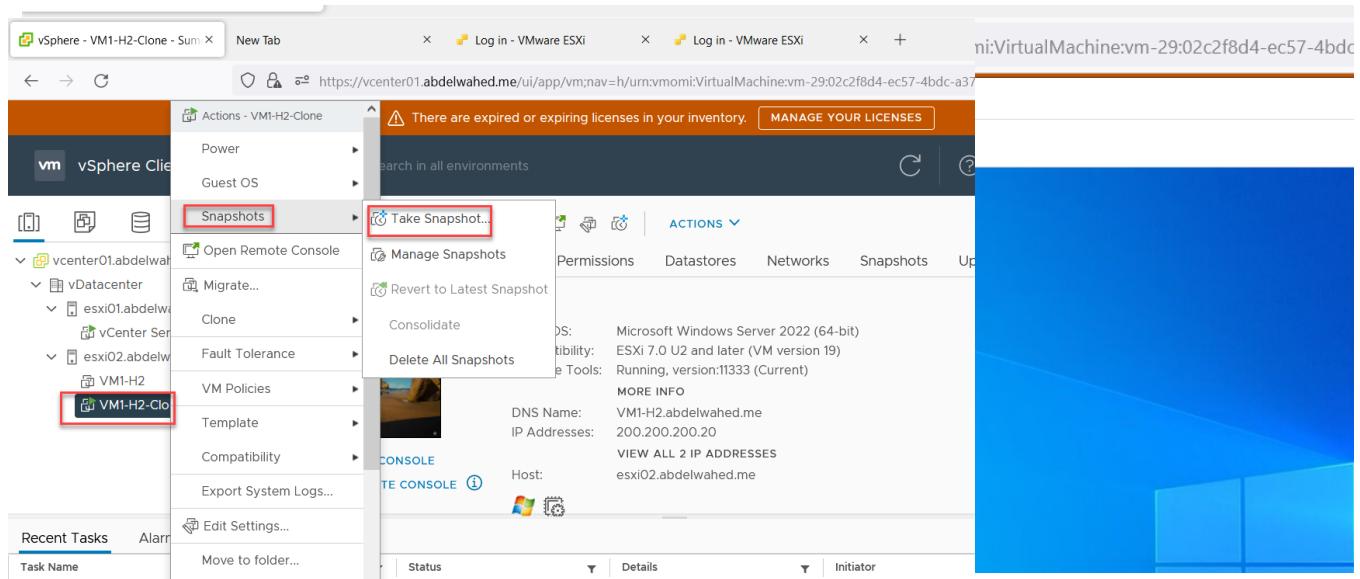
Post-cloning, all attributes remain unchanged except for the IP address and UUID.



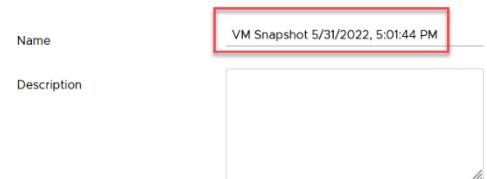
Property	Value
Connection-specific DN...	Intel(R) 82574L Gigabit Network Connect
Description	00-50-56-B9-14-B3
Physical Address	No
DHCP Enabled	Autoconfiguration IPv4 ...
Autoconfiguration IPv4 ...	169.254.181.194
IPv4 Subnet Mask	255.255.0.0
Autoconfiguration IPv4 ...	200.200.200.20
IPv4 Subnet Mask	255.255.255.0
IPv4 Default Gateway	IPv4 DNS Server
IPv4 DNS Server	200.200.200.200
IPv4 WINS Server	IPv4 WINS Server
NetBIOS over Tcpip En...	NetBIOS over Tcpip En...
Link-local IPv6 Address	Yes
IPv6 Default Gateway	fe80::e929:1f13:3503:b5c2%6
IPv6 DNS Server	

# VMware vSphere Install, Configure, Manage | Lab Guide

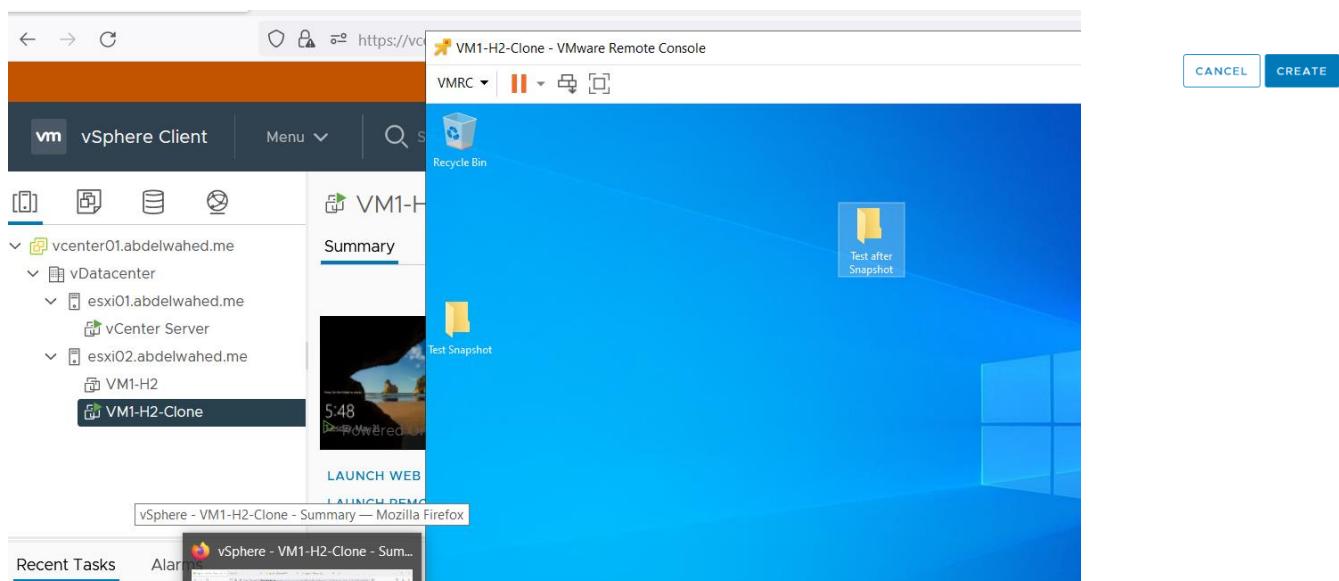
## Steps to take a Snapshot



Take snapshot

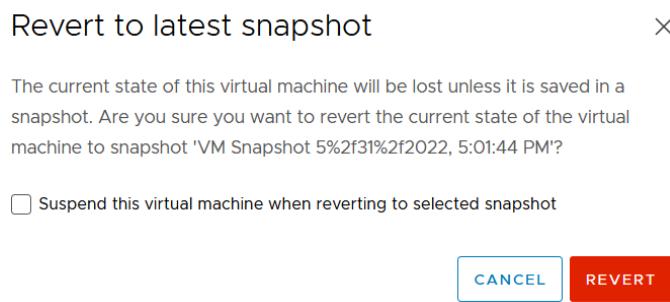
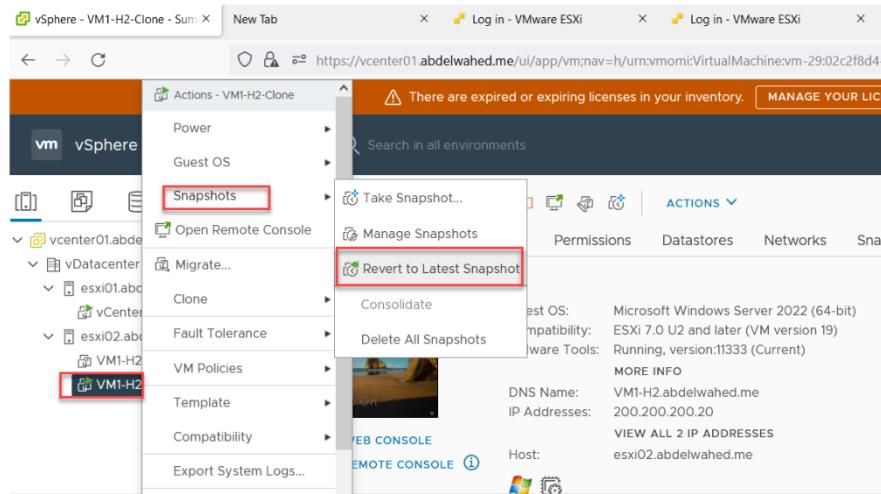


Once I captured a snapshot, I included an additional folder as demonstrated below.

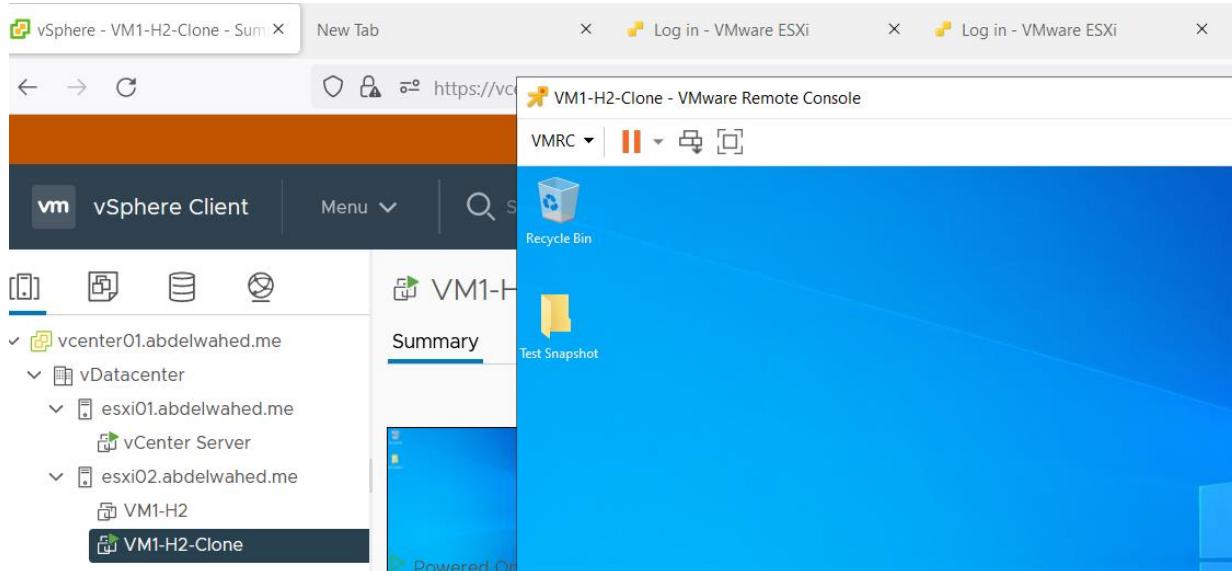


# VMware vSphere Install, Configure, Manage | Lab Guide

Now I'm going to restore the virtual machine to its previous state to observe the modifications.



The recently added folder has been removed.

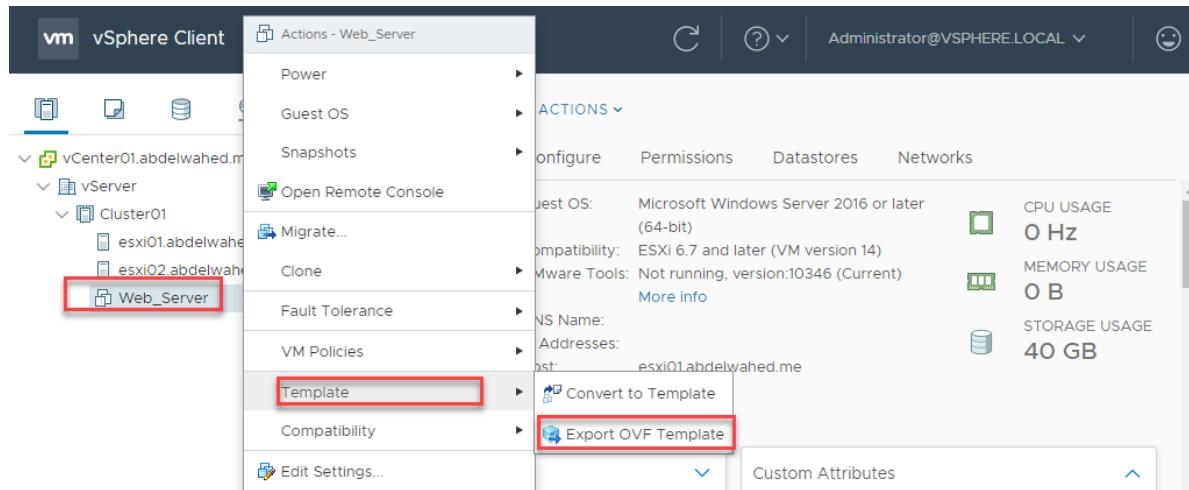


# VMware vSphere Install, Configure, Manage | Lab Guide

## OVF and OVA Template (Open Visualization Format and Appliance)

Using OVF (Open Virtualization Format) or OVA (Open Virtualization Appliance) templates, users can create preconfigured VMs that can be easily deployed in different virtualization environments. These templates include all necessary configuration settings, such as the number of virtual CPUs, the amount of memory, and the disk configuration, making it easy to import and deploy the VM without having to manually configure these settings.

Before exporting the VM, ensure it is powered off.



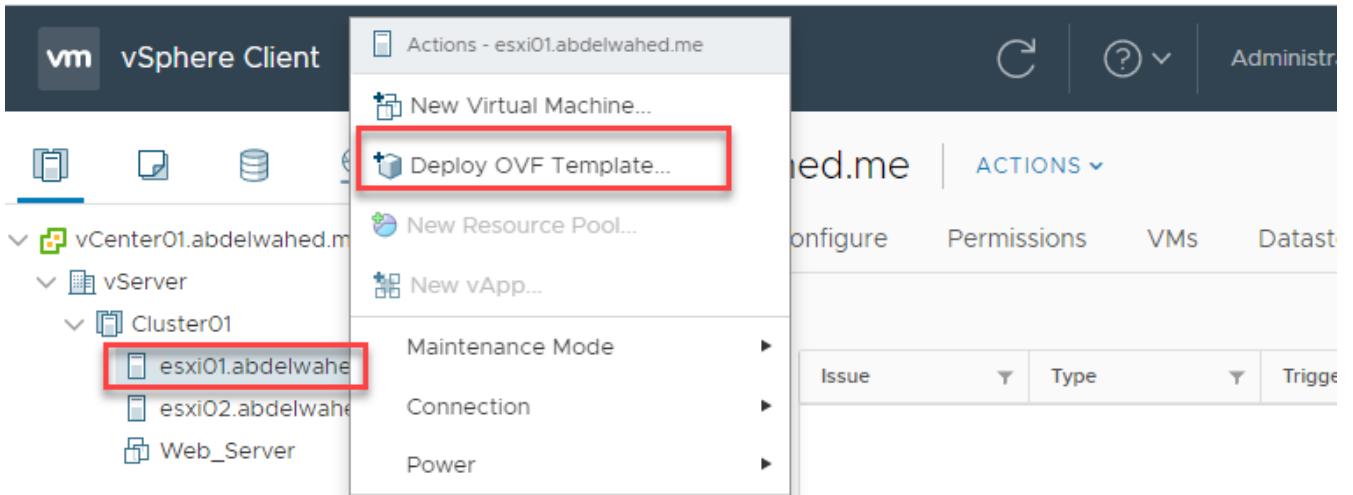
### Export OVF Template

Name	Server_OVF
Format	Folder of files (OVF)
Annotation	
Advanced	
<input checked="" type="checkbox"/> Enable advanced options	
<input type="checkbox"/> Include BIOS UUID	
<input type="checkbox"/> Include MAC addresses	
<input type="checkbox"/> Include extra configuration	

Recent Tasks	Alarms						
Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Ti...	Server
Export OVF template	Web_Server	0%	VSPHERE.LOCAL...	8 ms	06/02/2021, 4:48:43 AM		vCenter01.abdel...
Export OVF package	Web_Server	0%	vsphere.local\A...	176 ms	06/02/2021, 4:48:43 AM	Activate Windows	vCenter01.abdel...

# VMware vSphere Install, Configure, Manage | Lab Guide

You can now import the OVF into either the same environment or a different one by following these steps:



## Deploy OVF Template

### 1 Select an OVF template

2 Select a name and folder

3 Select a compute resource

4 Review details

5 Select storage

6 Ready to complete

### Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

URL

Local file

No file chosen

# VMware vSphere Install, Configure, Manage | Lab Guide

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## VM Files

Virtual machines (VMs) in VMware vSphere are encapsulated by a set of files stored on a VMFS (Virtual Machine File System) datastore. These files collectively define the VM's behavior, configuration, and content.

### Overview of VM Files

File	Description	Example	VM State Where File Appears
.vmx	Main configuration file for the VM.	Stores settings like the VM's CPU and memory configuration.	Always Present
.vmdk	Represents the VM's hard drive.	The VM's 80GB hard drive data is stored here.	Always Present
.nvram	Contains the VM's BIOS or EFI configuration.	Changes to the boot order in the VM's BIOS are saved here.	Always Present
.log	Log files for operational activities of the VM.	Provides logging while the VM is managed by vSphere.	Always Present
.vswp	vSwap file used for virtual memory.	If a VM with 8GB RAM and 2GB reservation uses its physical RAM, ESXi might swap memory pages to this file.	Powered On
.vmsd	Maintains snapshot metadata.	Stores snapshot information.	When VM has Snapshots
.vmsn	Represents the state of a snapshot. One for each snapshot	Captures the running state of a VM at the time a snapshot was taken.	When VM has Snapshots
.vmss	Suspended state file.	Captures the exact running state of a VM at the time of suspension.	Suspended

# VMware vSphere Install, Configure, Manage | Lab Guide

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## Content Library in VMware vSphere

A Content Library is a centralized repository for storing and managing virtual machine templates, ISO images, scripts, and other files that can be used to create and deploy virtual machines in a VMware vSphere environment. This feature allows users to create, share, and manage a library of virtual machine content across multiple vCenter Server instances.

### Key Features and Benefits

#### 1. Centralized Storage:

- The Content Library is stored on a datastore, which can be shared across multiple hosts and vCenter Server instances. This centralization makes it easier to manage and distribute content across the entire virtual infrastructure.

#### 2. Organization:

- Content can be organized into folders and subfolders, making it easy to manage and find specific items. It also supports versioning to keep track of changes and updates.

#### 3. Variety of Content Types:

- Virtual Machine Templates:** Preconfigured VMs used as starting points for creating new VMs.
- ISO Images:** Bootable images for installing operating systems or applications on VMs.
- Scripts:** Scripts or configuration files for automating VM configurations.
- Other Files:** Documentation, images, and multimedia files.

#### 4. Consistency and Efficiency:

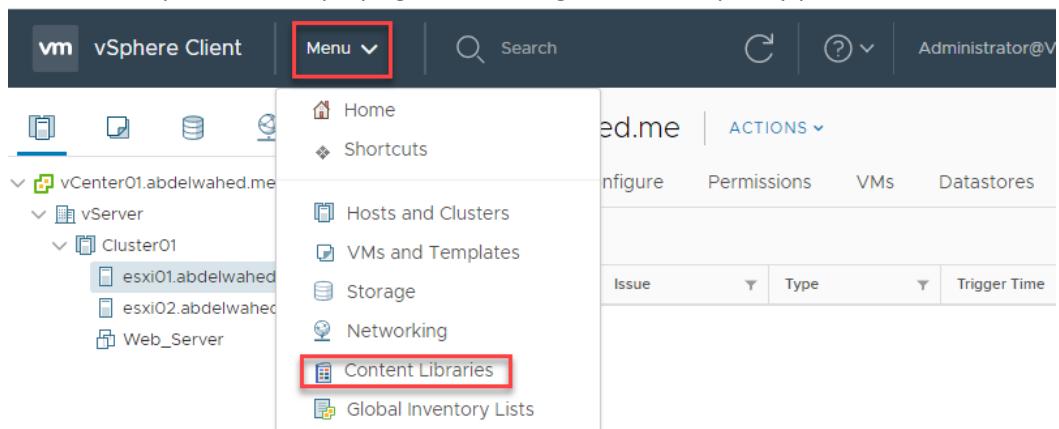
- Eliminates the need to duplicate content across multiple hosts and vCenter Server instances, saving time and storage space while ensuring consistency across the virtual infrastructure.

#### 5. Automation:

- Facilitates the automated deployment of VMs, allowing for quick provisioning of new resources as needed.

### Benefits of Using a Content Library

- Centralized Management:** Simplifies the management of VM templates, ISO images, and other resources.
- Resource Sharing:** Enables sharing of content across multiple vCenter Server instances and hosts.
- Consistency:** Ensures consistent deployment and configuration of VMs across the environment.
- Storage Efficiency:** Reduces the need for duplicate copies of templates and other content, saving storage space.
- Automation:** Streamlines the process of deploying VMs, making it easier to quickly provision new resources.



# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the VMware vSphere Client interface for managing content libraries. At the top, there's a navigation bar with back, forward, and search icons, followed by the URL <https://vcenter01.abdelwahed.me/ui/app/content-libraries>. Below the URL is a header with the 'vSphere Client' logo, a 'Menu' dropdown, and a search bar. The main area is titled 'Content Libraries' and shows a table of existing libraries. A red box highlights the '+ Create' button in the top right corner of the table header. The table has columns for Name, Type, Publishing..., Password..., Automation..., vCenter Server, and Templates. Below the table, a section titled 'New Content Library' is displayed. It includes a step-by-step wizard: '1 Name and location' (which is completed), '2 Configure content library' (which is selected), '3 Add storage', and '4 Ready to complete'. The 'Name and location' step shows a text input field where 'Abdelwahed\_local\_Lib' is typed. The 'Notes' field is empty. Under 'vCenter Server', the dropdown shows 'vCenter01.abdelwahed.me'. The entire screenshot is framed by a red border.

This library can be made public, allowing another vCenter to link to it and utilize its resources.

## New Content Library

The screenshot shows the 'Configure content library' step of the 'New Content Library' wizard. It has a green checkmark next to '1 Name and location' and a blue bolded '2 Configure content library' indicating the current step. The steps are: '3 Add storage' and '4 Ready to complete'. To the right, there's a description: 'Local libraries can be published externally and optimized for syncing over HTTP. Subscribed libraries originate from other published libraries.' Below this, there are two radio button options: 'Local content library' (selected) and 'Subscribed content library'. Under 'Local content library', there are three checkboxes: 'Publish externally', 'Optimize for syncing over HTTP' (disabled), and 'Enable authentication' (disabled). A note below says: 'Once published, it cannot be reverted back to a local library and cannot be used to deploy virtual machines.' At the bottom, there's a 'Subscription URL:' field with the placeholder 'Example: https://server/path/lib.json'.

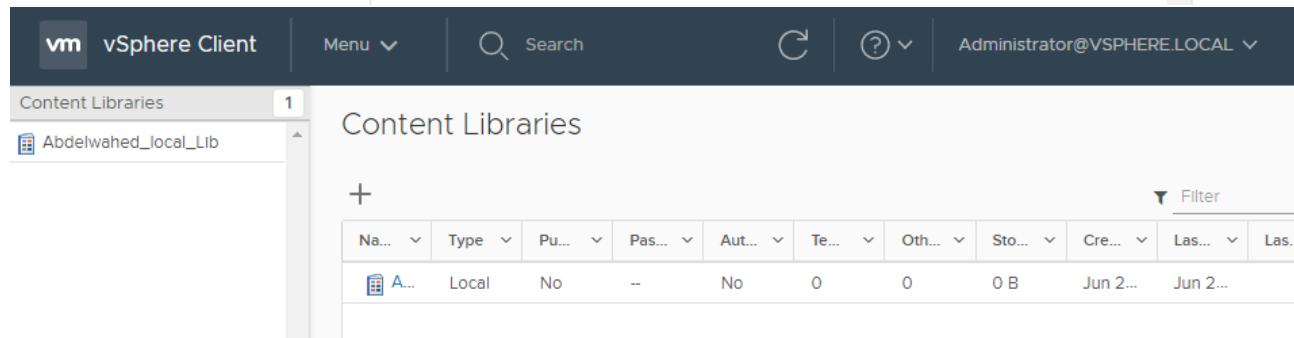
# VMware vSphere Install, Configure, Manage | Lab Guide

## New Content Library

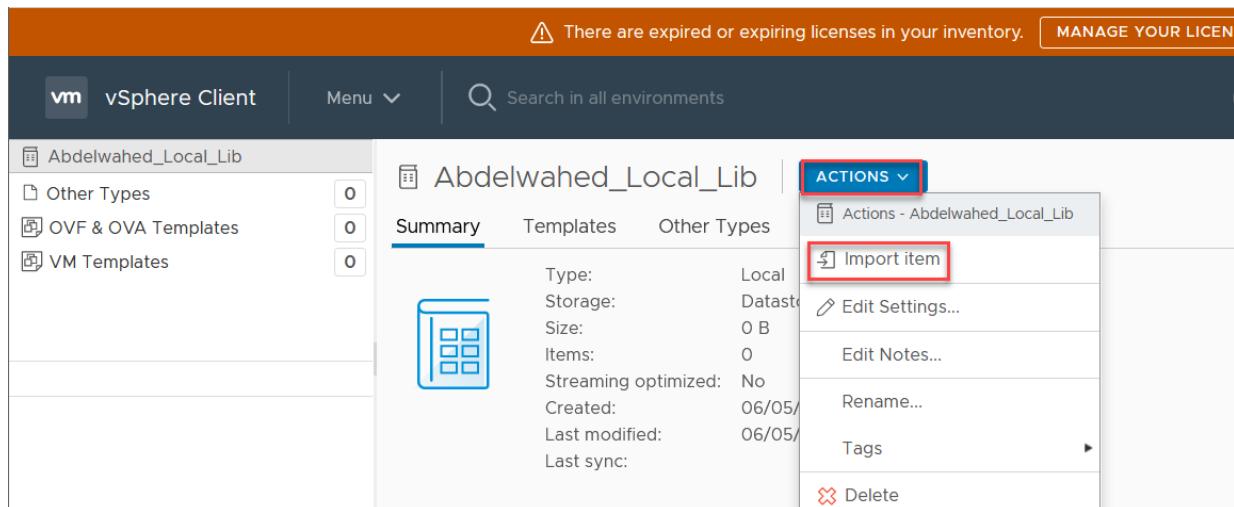
✓ 1 Name and location  
✓ 2 Configure content library  
**3 Add storage**  
4 Ready to complete

Add storage  
Select a storage location for the library contents. Use a file system backing for published content libraries to store the uploaded OVF packages. Use a datastore backing for local and subscribed content libraries to store content optimized for cloning.

Name ↑	Status	Type	Datastore...
DataStore03_local	✓ Normal	VMFS 6	
Datastore04_ISCSI	✓ Normal	VMFS 6	
datastore1_local	✓ Normal	VMFS 6	
datastore2_local	✓ Normal	VMFS 6	
Datastore5-ISCSI	✓ Normal	VMFS 6	



You now have the ability to upload various kinds of data to it.



⚠ There are expired or expiring licenses in your inventory. [MANAGE YOUR LICENSES](#)

vm vSphere Client | Menu | Search in all environments

Content Libraries 1

Abdelwahed\_local\_Lib

Content Libraries

+ Filter

Name	Type	Published	Passphrase	Autocreate	Template	Other	Storage	Created	Last Sync	Last Modified
A... Local No -- No 0 0 0 B Jun 2... Jun 2...										

Abdelwahed\_Local\_Lib

Summary Templates Other Types

Type: Local  
Storage: Datastore  
Size: 0 B  
Items: 0  
Streaming optimized: No  
Created: 06/05/2024  
Last modified: 06/05/2024  
Last sync:

ACTIONS ▾

- Actions - Abdelwahed\_Local\_Lib
- Import item**
- Edit Settings...
- Edit Notes...
- Rename...
- Tags
- Delete

# VMware vSphere Install, Configure, Manage | Lab Guide

## Abdelwahed\_local\_Lib | Import Library Item

### Source

Source file

URL

Enter URL.

Local file

**UPLOAD FILE**

### Recent Tasks

### Alarms

Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Ti...	Server
Upload Files to a Library Item	en_windows_s...	<div style="width: 20%;">20%</div>	VSPHERE.LOCA...	undefined	06/02/2021, 5:28:56 AM		vCenter01.abdel...
Create Library Item	Abdelwahed_lo...	<span style="color: green;">✓</span> Completed	vsphere.local\A...	undefined	06/02/2021, 5:28:56 AM	06/02/2021, 5:28:56 AM	vCenter01.abdel...

You have the option to change this local library into a subscription-based web library.

The screenshot shows the vSphere Client interface. On the left, there's a sidebar with categories like 'Abdelwahed\_Local\_Lib', 'Other Types', 'OVF & OVA Templates', and 'VM Templates'. The main panel displays the 'Abdelwahed\_Local\_Lib' library details. A context menu is open over the library, with the 'Edit Settings...' option highlighted by a red box. Other options in the menu include 'Import item', 'Edit Notes...', 'Rename...', 'Tags', and 'Delete'.

You can also utilize this link as a local library for another vCenter.

Edit Settings | Abdelwahed\_local\_Lib



Publishing option

Publish this content library externally

Subscription URL

<https://vCenter01.abdelwahed.me:443/cis/vcsp/lib/a241bb75-bb88-4cd1-83c7-8c0677259803/lib.json>

**COPY LINK**

Authentication

Enable user authentication for access to this content library

Password

\*\*\*\*\*

Confirm Password

\*\*\*\*\*

# VMware vSphere Install, Configure, Manage | Lab Guide

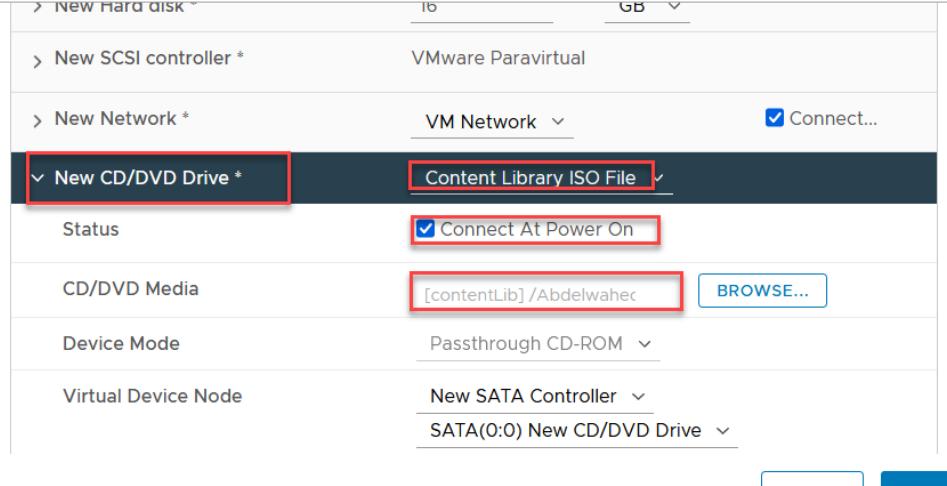
You can now use the ISO that's been uploaded to the library to set up a new virtual machine.

## New Virtual Machine

✓ 1 Select a creation type  
✓ 2 Select a name and folder  
✓ 3 Select a compute resource  
✓ 4 Select storage  
✓ 5 Select compatibility  
✓ 6 Select a guest OS  
**7 Customize hardware**  
8 Ready to complete

NEW Hard disk	16	GB
New SCSI controller *	VMware Paravirtual	
New Network *	VM Network	<input checked="" type="checkbox"/> Connect...
<b>New CD/DVD Drive *</b>	<b>Content Library ISO File</b>	
Status	<input checked="" type="checkbox"/> Connect At Power On	
CD/DVD Media	[contentLib] /Abdelwahed	BROWSE...
Device Mode	Passthrough CD-ROM	
Virtual Device Node	New SATA Controller	
	SATA(0:0) New CD/DVD Drive	

**CANCEL** **BACK** **NEXT**



# VMware vSphere Install, Configure, Manage | Lab Guide

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# VMware vSphere Install, Configure, Manage | Lab Guide

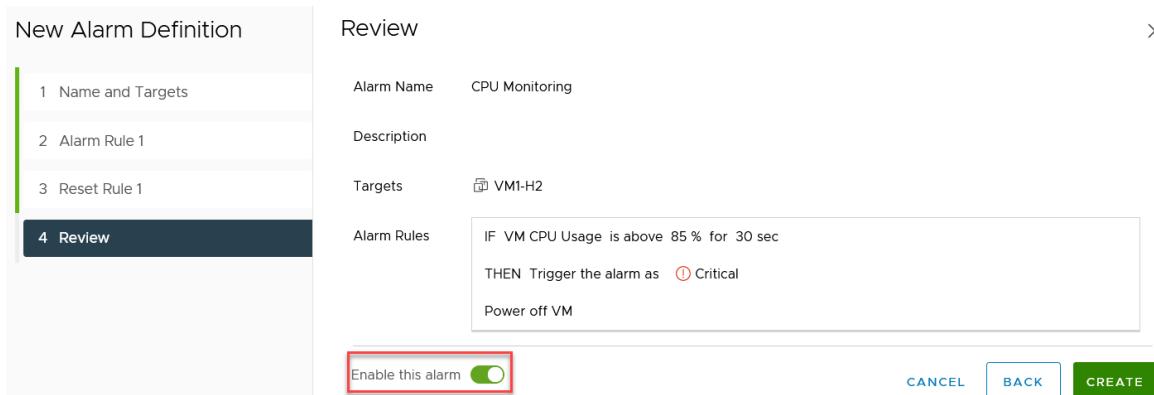
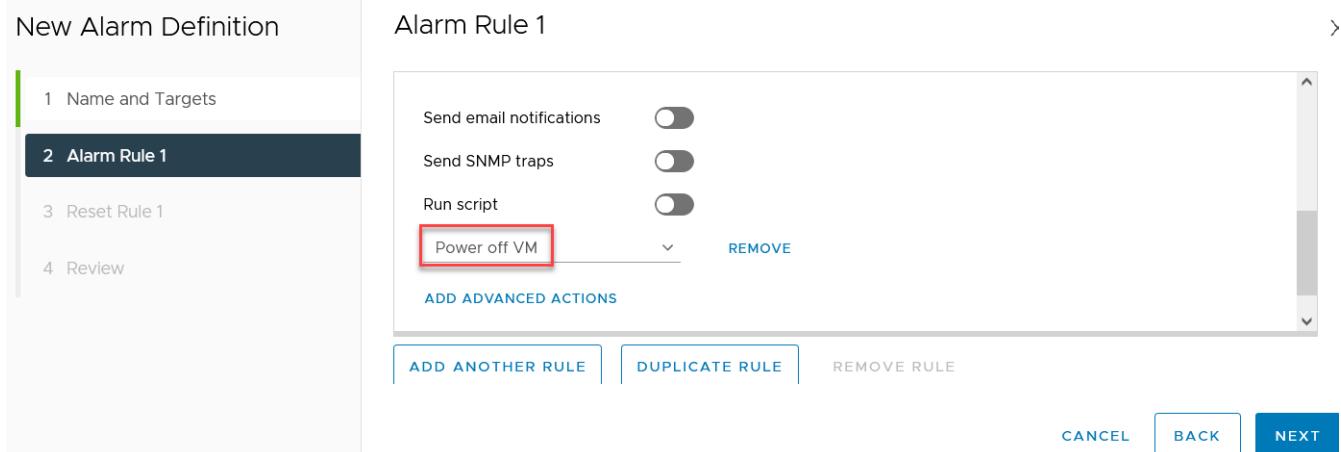
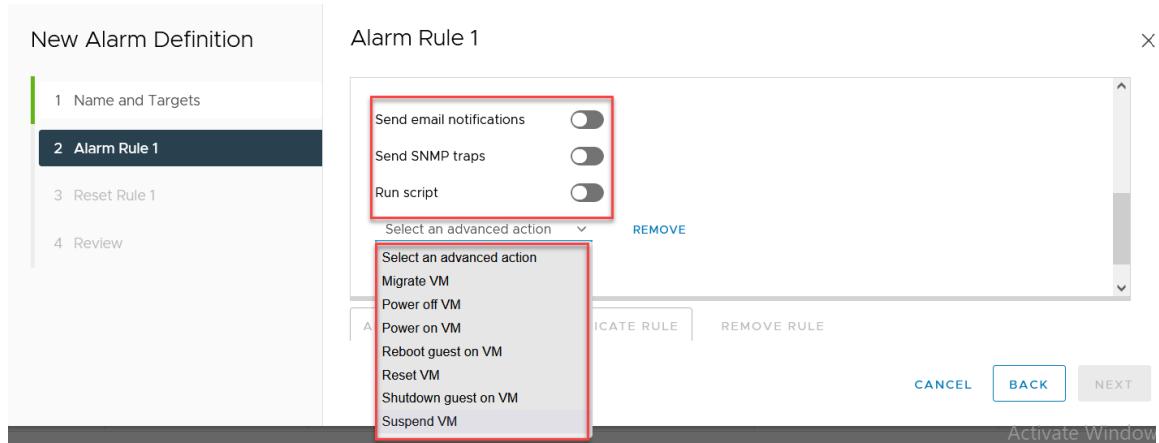
## Using Alarms

In a VMware vSphere environment, alarms can be created to monitor events and conditions related to virtual machines (VMs). Alarms can be configured to alert administrators when specific events or conditions occur, allowing them to quickly take action to resolve issues and maintain the health of the virtual infrastructure.

The screenshot shows the VMware vSphere Client interface. In the left sidebar, under 'vCenter01.abdelwahed.me / Cluster01', a virtual machine named 'VM1-H2' is selected and highlighted with a red box. In the center pane, under 'VM1-H2 - Triggered', there is a 'Triggered Alarms' section. A sub-menu is open for 'Alarms', with 'New Alarm Definition...' highlighted and also enclosed in a red box. Below this, the 'Name and Targets' step of the 'New Alarm Definition' wizard is visible. It shows an 'Alarm Name' field containing 'CPU Monitoring' and a 'Target type' dropdown set to 'Virtual Machine'. The 'IF' condition for the rule is 'VM CPU Usage is above 85 % for 30 sec', and the 'THEN' action is 'Show as Critical'. The 'NEXT' button is visible at the bottom right of the wizard steps.

# VMware vSphere Install, Configure, Manage | Lab Guide

You can initiate actions once your criteria are fulfilled.



## Host Profile in VMware vSphere

Host Profile is a feature in vSphere that allows you to create a template for configuring and managing ESXi hosts in your environment. With Host Profile, you can define a standard set of configuration settings, policies, and security settings, and apply them to one or more hosts at once. This ensures consistency and compliance across your host infrastructure and simplifies host management.

### Steps to Create and Apply a Host Profile in vSphere

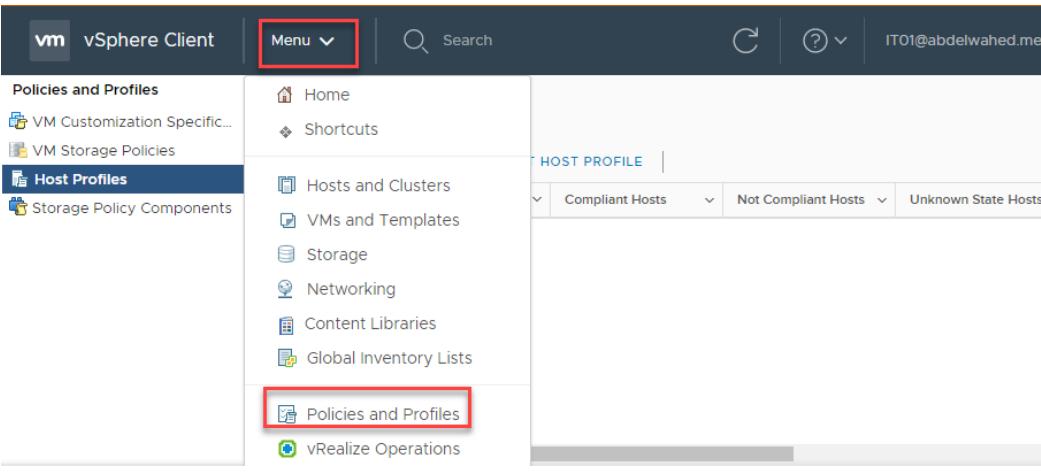
1. **Create a Host Profile:**
  - **Access Host Profiles:** Go to the Host Profiles section in the vSphere Web Client or vSphere Client.
  - **Create Profile:** Click Create Profile, provide a name and description for the profile, and select the host to use as the reference.
  - **Configure Settings:** Define the settings for the profile, including networking, storage, security, and advanced settings. You can also add custom scripts and commands.
2. **Edit the Host Profile:**
  - **Access Host Profiles:** Go to the Host Profiles section and select the profile to edit.
  - **Edit Profile:** Click Edit Profile and make the necessary changes to the settings.
3. **Attach the Host Profile:**
  - **Select Hosts:** Go to the Hosts and Clusters view and select the hosts to apply the profile to.
  - **Attach Profile:** Click the Attach/Detach Host Profile button, select the Host Profile to apply, and click Attach.
4. **Remediate the Host Profile:**
  - **Select Host Profile:** Go to the Host Profiles section and select the Host Profile to remediate.
  - **Remediate Hosts:** Click Remediate, select the hosts to remediate, and the vSphere system will check the host's current settings against the profile settings and apply the changes if necessary.

### Benefits of Using Host Profiles

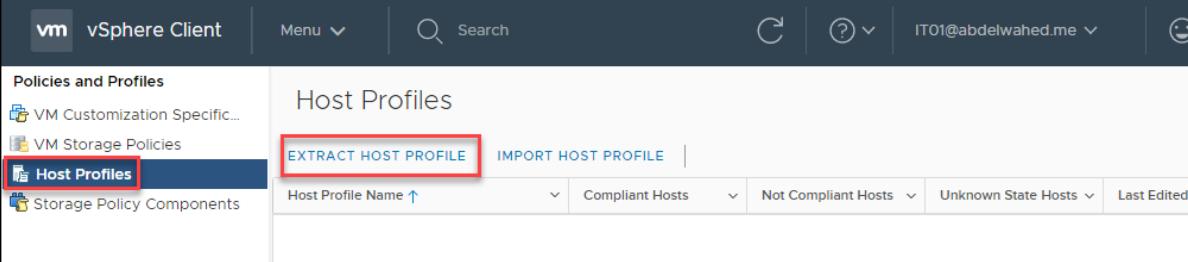
- **Consistency:** Ensures that all ESXi hosts adhere to a standardized configuration, reducing configuration drift.
- **Compliance:** Helps maintain compliance with internal and external policies by enforcing consistent settings across hosts.
- **Simplified Management:** Streamlines the management of multiple hosts by allowing administrators to apply configuration changes to all hosts from a central location.
- **Automated Remediation:** Automatically identifies and corrects configuration deviations from the defined Host Profile.

# VMware vSphere Install, Configure, Manage | Lab Guide

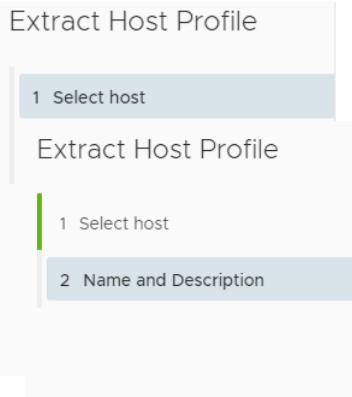
## Resetting the Password for ESXi Root Accounts



The screenshot shows the VMware vSphere Client interface. The left sidebar has a red box around the "Menu" dropdown. Under "Policies and Profiles", "Host Profiles" is selected and highlighted with a red box. Below it, "Policies and Profiles" is also highlighted with a red box.

The screenshot shows the "Host Profiles" page. The "Host Profiles" section in the sidebar is highlighted with a red box. The main area shows a table with columns: "Host Profile Name" (sorted by name), "Compliant Hosts", "Not Compliant Hosts", "Unknown State Hosts", and "Last Edited". A red box highlights the "EXTRACT HOST PROFILE" button.

The screenshot shows the first step of the "Extract Host Profile" wizard, titled "1 Select host". It displays a list of hosts: "esxi-01", "esxi-02", and "esxi-03".

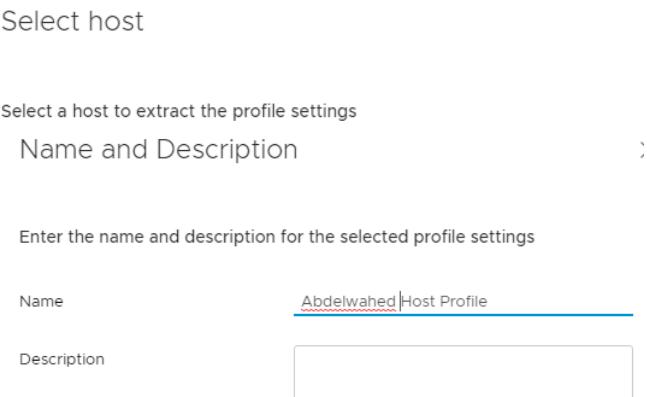
**Select host**

1 Select host

Extract Host Profile

1 Select host

2 Name and Description

The screenshot shows the second step of the "Extract Host Profile" wizard, titled "2 Name and Description". It asks for a "Name and Description". The "Name" field contains "Abdelwahed Host Profile".

**Select host**

Select a host to extract the profile settings

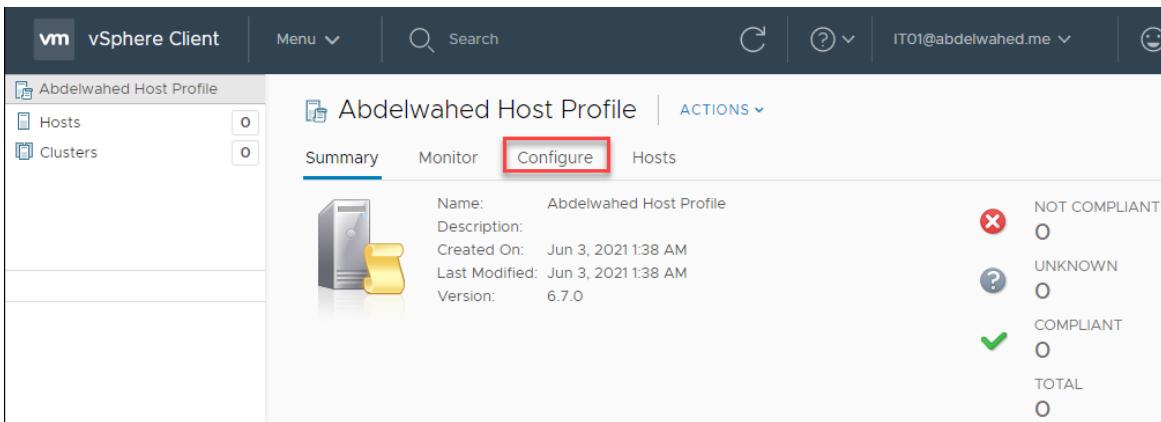
Name and Description

Enter the name and description for the selected profile settings

Name: Abdelwahed Host Profile

Description:

# VMware vSphere Install, Configure, Manage | Lab Guide



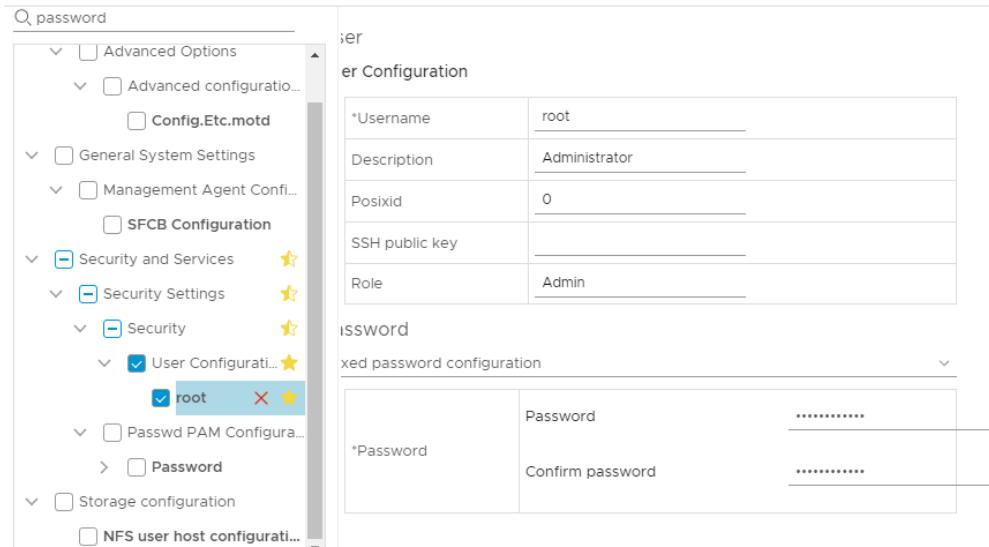
To set this profile as default, clear all current configurations to prevent conflicts before adding your custom settings.

The screenshot shows the "Edit Host Profile" screen for the "Abdelwahed Host Profile". The "Configure" tab is selected. A red box highlights the "EDIT HOST PROFILE..." button. Below it, a list of configuration categories is shown:

- > Advanced Configuration ...
- > General System Settings
- > Networking configuration
- > Other
- > Security and Services
- > Storage configuration

A red box highlights the "Advanced Configuration ..." category and its sub-options.

# VMware vSphere Install, Configure, Manage | Lab Guide



No host is linked to the profile yet.

The screenshot illustrates the process of attaching a host profile. On the left, the vSphere Client navigation pane shows a host named 'esxi02.abdelwahed.me' highlighted with a red box. In the center, the host's context menu is open, with the 'Host Profiles' option highlighted with a red box. On the right, the 'Host Profiles' tab of the host details page is selected, showing the 'Attach Host Profile...' option highlighted with a red box.

# VMware vSphere Install, Configure, Manage | Lab Guide

## esxi02.abdelwahed.me - Attach Host Profile

Profile	Description
Abdelwahed Host Profile	

A host is now connected to that profile, and you can also link it to a cluster.

vSphere Client

New Virtual Machine... Deploy OVF Template... New Resource Pool... New vApp... Maintenance Mode Connection Power Certificates Storage Add Networking... Host Profiles Reconfigure for vSphere HA Assign License... Settings Move To... Tags & Custom Attributes

esxi02.abdelwahed.me | ACTIONS ▾

Configure Permissions VMs Datastores Networks

VMware ESXi, 6.7.0, 14320388

CPU	Free: 5.5 GHz
Used: 115 MHz	Capacity: 5.62 GHz

VMware Virtual Platform

Memory	Free: 6.53 GB
Used: 1.36 GB	Capacity: 7.9 GB

Intel(R) Xeon(R) E-2276M CPU @ 2.80GHz

Processors: 2 Cores: 4 Threads: 0

Add Networking... Extract Host Profile... Attach Host Profile... Change Host Profile... Remediate... Detach Host Profile Check Host Profile Compliance

Completion Time Server

2021, 06/03/2021, 1:56:45 AM vCenter01.abdelwahed.me

2021, 06/03/2021, vCenter01.abdelwahed.me

Recent Tasks Alarms

Task Name Target

Attach host profile esxi02.abdelwahed.me

Update host

Abdelwahed Host Profile | ACTIONS ▾

Hosts Clusters 1 0

Hosts

Name	State	Status	Cluster
esxi02.abdelwahed.me	Connected	Normal	Cluster01

## vCenter password reset

### Password reset for vCenter root

1. Restart the vCenter server.
2. During the boot process, access the GRUB menu by pressing "e."
3. Edit the selected entry and append "**rw init=/bin/bash**" to the end of the line starting with "**linux /\$photon**"
4. Boot into single-user mode with a root shell prompt.
5. Remount the root filesystem in read-write mode: **mount -o remount,rw /**
6. Reset the root password: **passwd root**
7. Reboot the server: **reboot -f**
8. After the server restarts, log in to vCenter using the new root password.

The screenshot shows two terminal sessions. The top session is the GRUB menu with a red box highlighting the line "linux /\$photon". The bottom session is a root shell with several commands entered:

```
GNU GRUB version 2.03

setparams 'Photon'

linux /$photon
linux root=$rootpartition $photon_cmdline $systemd_cm\
dline rw init=/bin/bash_
    if [ -f /$photon_initrd ]; then
        initrd /$photon_initrd
    fi

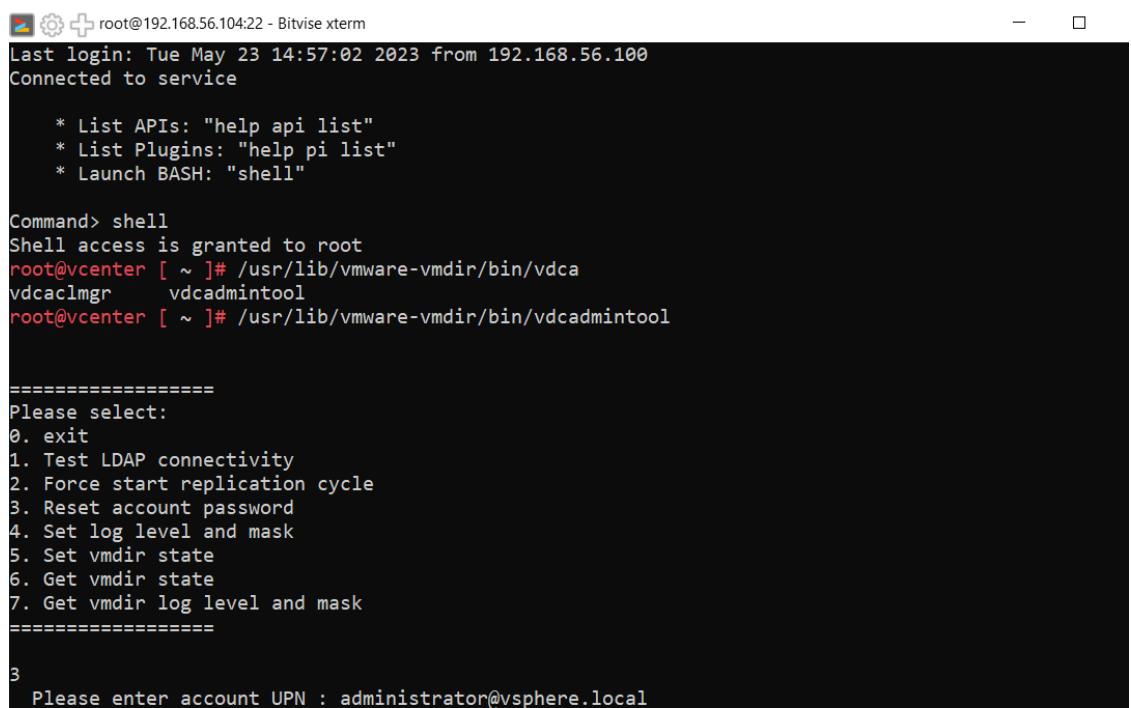
[ 3.342022] sd 2:0:13:0: [sdm] Assuming drive cache: write through
[ 3.343234] sd 2:0:14:0: [sdn] Assuming drive cache: write through
[ 3.345228] sd 2:0:15:0: [sdo] Assuming drive cache: write through
[ 3.815471] sd 3:0:0:0: [spd] Assuming drive cache: write through
root [ / ]# mount -o remount,rw /
root [ / ]# passwd
New password:
Retype new password:
passwd: password updated successfully
root [ / ]# umount /
root [ / ]# reboot -f
```

# VMware vSphere Install, Configure, Manage | Lab Guide

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Reinitialize the vCenter administrator credentials.

1. Log in to the VCSA management portal using root credentials through port 5480
2. Navigate to the "Administration" section.
3. Look for the "Access" tab or similar option that provides SSH and Bash access settings. Enable SSH and Bash access if they are not already enabled.
4. Open an SSH client (such as PuTTY) and connect to the vCenter server using the SSH protocol on port 22. Use the IP address or hostname of the vCenter server. using root user.



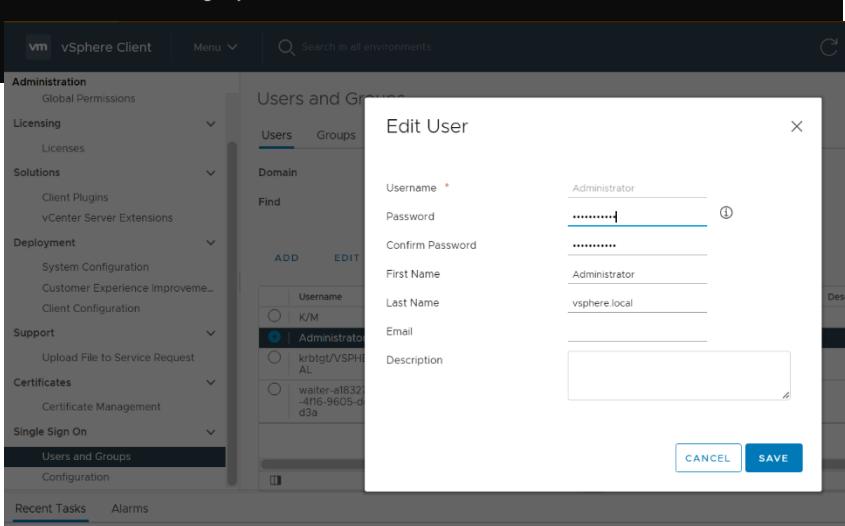
```
root@192.168.56.104:22 - Bitvise xterm
Last login: Tue May 23 14:57:02 2023 from 192.168.56.100
Connected to service

* List APIs: "help api list"
* List Plugins: "help pi list"
* Launch BASH: "shell"

Command> shell
Shell access is granted to root
root@vcenter [ ~ ]# /usr/lib/vmware-vmdir/bin/vdca
vdcaclmgr      vdcaadmintool
root@vcenter [ ~ ]# /usr/lib/vmware-vmdir/bin/vdcaadmintool

=====
Please select:
0. exit
1. Test LDAP connectivity
2. Force start replication cycle
3. Reset account password
4. Set log level and mask
5. Set vmdir state
6. Get vmdir state
7. Get vmdir log level and mask
=====

3
Please enter account UPN : administrator@vsphere.local
New password is -
DZ";=+7fw@nIYs8M9q M
```



## VMware vSphere Network

### Use Two Networks

It's advised to have two distinct network types in a VMware vSphere environment:

1. **ESXi Management Network:**
  - o Specifically for managing ESXi hosts.
2. **VM Network:**
  - o Exclusively for virtual machine (VM) traffic.

### Benefits

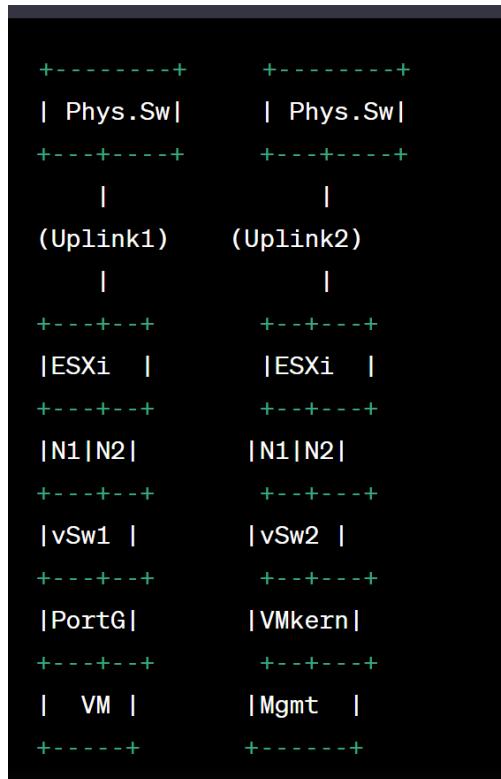
1. **Improved Security:**
  - o By segregating traffic, potential security vulnerabilities are minimized.
2. **Enhanced Performance:**
  - o Isolates VM traffic from ESXi management traffic, ensuring smooth operations.

### Network Configuration

1. **Two Virtual Switches:**
  - o Create two standard virtual switches in vSphere.
2. **Connectivity with Failover and Load Balancing:**
  - o **Two Uplinks per Virtual Switch:**
    - Each virtual switch should be linked to two uplinks (NICs) connected to two physical switches.
  - o **Failover:**
    - Configuring failover ensures that if one NIC fails, the other can take over, ensuring continuous connectivity.
  - o **Load Balancing:**
    - Distributing the network traffic across both NICs optimizes bandwidth utilization and potentially increases throughput.
3. **Port Group on vSwitch1:**
  - o Used for VM connections.
4. **VMkernel Port on vSwitch2:**
  - o Used for ESXi management connections.
5. **IP Assignments:**
  - o VMkernel port gets its IP from the uplink (NIC), while the VM gets its IP from the port group.

### Default Configuration

1. **vSwitch0:**
  - o Post ESXi installation, a standard virtual switch named vSwitch0 is created.
2. **Port Groups:**
  - o Includes a port group named VM Network.
3. **VMkernel Port:**
  - o Named Management Network for ESXi management.



## Explanation:

- **Phys.Sw:** Physical Switch
- **Uplink1/Uplink2:** Uplinks connecting ESXi hosts to physical switches.
- **ESXi:** ESXi hosts
- **N1 | N2:** Network interfaces (NICs) on the ESXi hosts.
- **vSw1:** Virtual Switch 1 for VM connections.
- **vSw2:** Virtual Switch 2 for ESXi management connections.
- **PortG:** Port Group on Virtual Switch 1 for VMs.
- **VMKern:** VMkernel Port on Virtual Switch 2 for ESXi management.
- **VM:** Virtual Machine network traffic.
- **Mgmt:** Management network traffic.

# VMware vSphere Install, Configure, Manage | Lab Guide

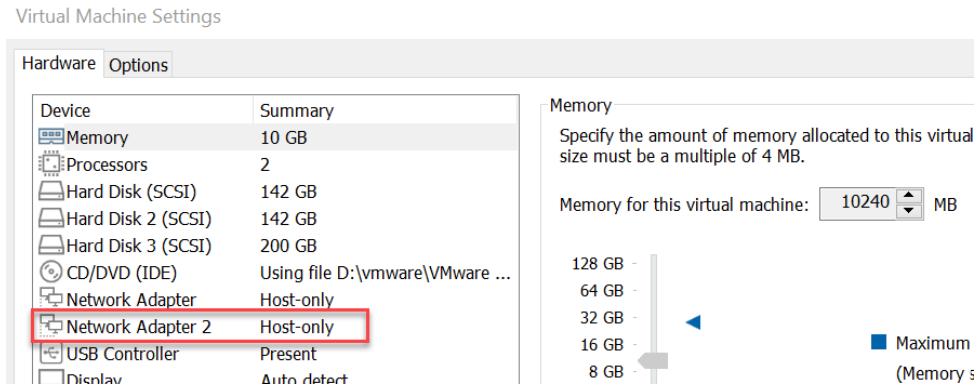
The screenshot shows the vSphere Client interface for managing a VMware host named `esxi01.abdelwahed.me`. The host is part of a cluster named `Cluster01`. The left sidebar lists various host components under `vServer`, including `esxi01.abdelwahed.me` and `esxi02.abdelwahed.me`. The main pane is titled "Virtual switches" and displays the configuration for the standard switch `vSwitch0`. Under "Port Groups", two port groups are listed: `Management Network` and `VM Network`. Both port groups have one active port each, connected to the `vmnic0` adapter. A red box highlights the `vSwitch0` entry in the list.

This screenshot shows the vSphere Client interface for a vCenter Server named `vcenter01.abdelwahed.me`. The left sidebar shows the `vDatacenter` structure, including clusters `Cluster01` and `Cluster02`, and resource pools like `Resource Pool_01`. The main pane displays the "Virtual switches" configuration for the standard switch `vSwitch0`. It shows the `Management Network` and `VM Network` port groups, along with the physical adapter `vmnic0` which is 10GbE Full. A red box highlights the `vSwitch0` entry in the list.

# VMware vSphere Install, Configure, Manage | Lab Guide

Install an additional NIC on ESXi02 for load balancing through vCenter.

Insert an additional network interface card via the ESXi VM settings and reboot the server.



Below are two methods to add a network adapter: directly using 'Add Networking' or via the settings menu.

The screenshot shows the vSphere Client interface. The left sidebar lists hosts: 'vcenter01.abdelwahed' (selected), 'vDatacenter', 'esxi01.abdelwahed', 'vCenter Server', 'VM1-H2-Clone', and 'esxi02.abdelwahed' (highlighted with a red box). The main pane shows the 'Configure' tab for host 'esxi02.abdelwahed'. A red box highlights the 'Add Networking...' option under the 'Host Profiles' section. Another red box highlights the 'Settings' option in the bottom navigation bar. To the right, the 'Physical adapters' section displays one adapter: 'vmnic0' with an 'Actual Speed' of '10 Gb'.

## esxi02.abdelwahed.me - Add Networking

### 1 Select connection type

### 2 Select target device

### 3 Add physical network ad...

### 4 Ready to complete

#### Select connection type

Select a connection type to create.

##### VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN and host management.

##### Virtual Machine Port Group for a Standard Switch

A port group handles the virtual machine traffic on standard switch.

##### Physical Network Adapter

A physical network adapter handles the network traffic to other hosts on the network.

## esxi02.abdelwahed.me - Add Networking

### ✓ 1 Select connection type

#### Add physical network adapter

### ✓ 2 Select target device

Assign physical network adapters to the switch.

### 3 Add physical network ad...

### 4 Ready to complete

#### Assigned adapters

	+	X	↑	↓
Active adapters				
 vmnic0				
Standby adapters				
Unused adapters				

# VMware vSphere Install, Configure, Manage | Lab Guide

Add Physical Adapters to the Switch

Network Adapters

All		Properties	CDP	LLDP
Adapter	vmnic1	VMware Inc. vmxnet3 Virtual Ethernet Controller		
Name	vmnic1			
Location	PCI 0000:13:00.0			
Driver	nvmxnet3			
Status				
Status	Connected			
Actual speed, Duplex	10 Gbit/s, Full Duplex			
Configured speed, Duplex	10 Gbit/s, Full Duplex			
Networks	No networks			
Network I/O Control				
Status	Allowed			
SR-IOV				
Status	Not supported			
Cisco Discovery Protocol				
Cisco Discovery Protocol is not available on this physical network adapter				
Link Layer Discovery Protocol				
Link Layer Discovery Protocol is not available on this physical network adapter				

CANCEL OK

## esxi02.abdelwahed.me - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- 3 Add physical network ad...**
- 4 Ready to complete

Add physical network adapter

Assign physical network adapters to the switch.

Assigned adapters

All		Properties	CDP	LLDP
Adapter	vmnic0	VMware Inc. vmxne Controller		
Name	vmnic1			
Location	PCI 0000:13:00.0			
Driver	nvmxnet3			
Status				
Status	Connected			
Actual speed, Duplex	10 Gbit/s, Full Duplex			
Configured speed, Duplex	10 Gbit/s, Full Duplex			
Networks	No networks			
Network I/O Control				
Status	Allowed			
SR-IOV				
Status	Not supported			
Cisco Discovery Protocol				

(New) vmnic1

CANCEL BACK NEXT

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the vSphere Client interface for managing a physical adapter. The left sidebar shows the navigation tree with 'vcenter01.abdelwahed.me' and 'esxi02.abdelwahed.me' selected. The main pane is titled 'Configure' for 'esxi02.abdelwahed.me'. Under the 'Networking' section, the 'Physical adapters' tab is selected, displaying a table of physical adapters. Two entries are visible: 'vmnic0' and 'vmnic1'. Both entries are highlighted with red boxes. The table columns include Device, Actual Speed, Configured Speed, Switch, and MAC Address.

Device	Actual Speed	Configured Speed	Switch	MAC Address
vmnic0	10 Gbit/s	10 Gbit/s	vSwitch0	00:0c:29:59:ba:95
vmnic1	10 Gbit/s	10 Gbit/s	vSwitch0	00:0c:29:59:ba:9f

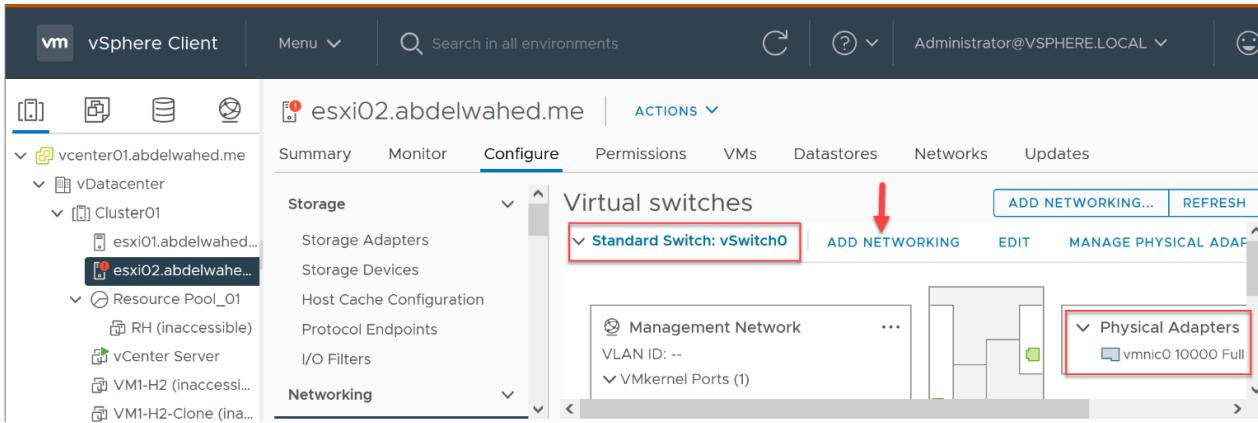
- Setting both NICs to "Active" on a vSphere vSwitch activates load balancing, which distributes network traffic between the NICs for better bandwidth utilization and improved network efficiency.

The screenshot shows the vSphere Client interface for managing a virtual switch. The left sidebar shows the navigation tree with 'vcenter01.abdelwahed...' and 'esxi02.abdelwahed...' selected. The main pane is titled 'Configure' for 'esxi02.abdelwahed...'. Under the 'Networking' section, the 'Virtual switches' tab is selected, showing 'Standard Switch: vSwitch0'. Below it, there is a 'Management Network' entry with a 'Physical Adapters' section. This section lists 'vmnic0 10000 Full' and 'vmnic1 10000 Full', both of which are highlighted with red boxes.

# VMware vSphere Install, Configure, Manage | Lab Guide

Attach a backup physical adapter to vSwitch0 (standard switch).

Begin by installing a new NIC adapter to the virtual machine and then proceed with the subsequent steps.



## 1 Select connection type

## 2 Select target device

## 3 Add physical network ad...

## 4 Ready to complete

### Select connection type

Select a connection type to create.

#### VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN and host management.

#### Virtual Machine Port Group for a Standard Switch

A port group handles the virtual machine traffic on standard switch.

#### Physical Network Adapter

A physical network adapter handles the network traffic to other hosts on the network.

# VMware vSphere Install, Configure, Manage | Lab Guide

✓ 1 Select connection type  
2 Select target device  
3 Add physical network ad...  
4 Ready to complete

Select target device  
Select a target device for the new connection.

Select an existing switch  
 New standard switch

vSwitch0 [BROWSE ...](#)

MTU (Bytes) 1500

## esxi02.abdelwahed.me - Add Networking

✓ 1 Select connection type  
✓ 2 Select target device  
✓ 3 Add physical network ad...  
4 Ready to complete

Ready to complete  
Review your settings selections before finishing the wizard.

Standard switch vSwitch0  
Assigned adapters vmnic1

✓ 1 Select connection type  
✓ 2 Select target device  
3 Add physical network ad...  
4 Ready to complete

Add physical network adapter  
Assign physical network adapters to the switch.

Assigned adapters

Adapter	Name	Location	Driver
vmnic0	vmnic1	PCI 0000:13:00.0	nvtxnet3
(New) vmnic1			

# VMware vSphere Install, Configure, Manage | Lab Guide

Upon disconnection of the primary network interface card, ESXi02 maintains continuous operation due to the failover capabilities in place on the secondary NIC. This guarantees consistent performance and provides network redundancy.

The screenshot shows the VMware vSphere Client interface. In the terminal window on the left, a ping command is being run from a Windows host to the IP address 100.200.200.2. The output shows that the packets are being sent via both the vmnic0 and vmnic1 interfaces, demonstrating failover. The right side of the screen shows the configuration of a standard switch named 'vSwitch0' with two physical adapters assigned: 'vmnic0' and 'vmnic1 10000 Full'. Both adapters are listed under the 'Physical Adapters' section, which is highlighted with a red box.

```
C:\Windows\system32\cmd.exe - ping esxi02 -t
200.200.200.2: bytes=32 time=16ms TTL=64
200.200.200.2: bytes=32 time=1ms TTL=64
200.200.200.2: bytes=32 time=1ms TTL=64
200.200.200.2: bytes=32 time=1ms TTL=64
200.200.200.2: bytes=32 time<1ms TTL=64
200.200.200.2: bytes=32 time=8ms TTL=64
200.200.200.2: bytes=32 time<1ms TTL=64
```

# VMware vSphere Install, Configure, Manage | Lab Guide

## Load Balancing and Standby NIC Features in vSphere 8

The screenshot shows the vSphere Client interface for the host `esxi1.ohi.com`. In the left sidebar, under the `Networking` section, the `Physical adapters` option is selected. A red box highlights the `ADD NETWORKING...` button. Below it, four physical network adapters (vmnic0, vmnic1, vmnic2, vmnic3) are listed in a table.

Device	Actual Speed	Configured Speed	Switch	MAC Address	DPU Backed	Observed IP Ranges	Wake on LAN Supported
vmnic0	10 Gbit/s	10 Gbit/s	vSwitch0	00:0c:29:53:1b:29	--	No networks	No
vmnic1	10 Gbit/s	10 Gbit/s	--	00:0c:29:53:1b:33	--	No networks	No
vmnic2	10 Gbit/s	10 Gbit/s	--	00:0c:29:53:1b:3d	--	No networks	No
vmnic3	10 Gbit/s	10 Gbit/s	--	00:0c:29:53:1b:47	--	No networks	No

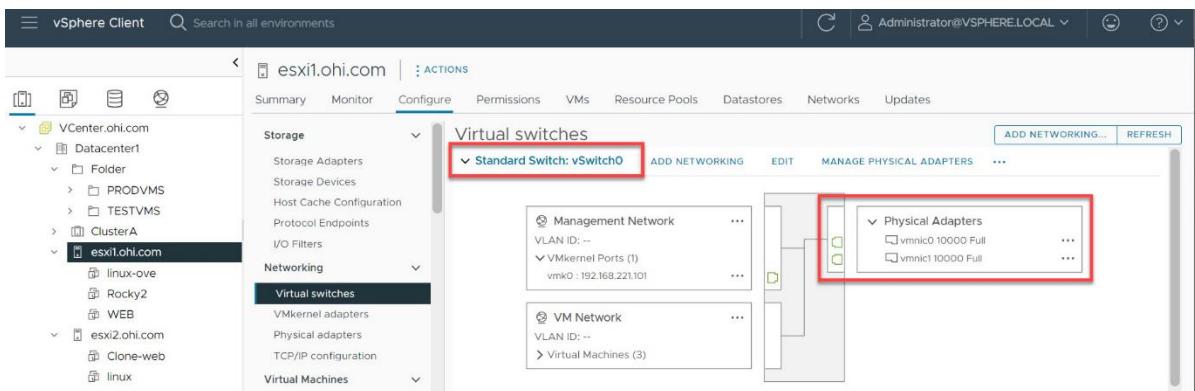
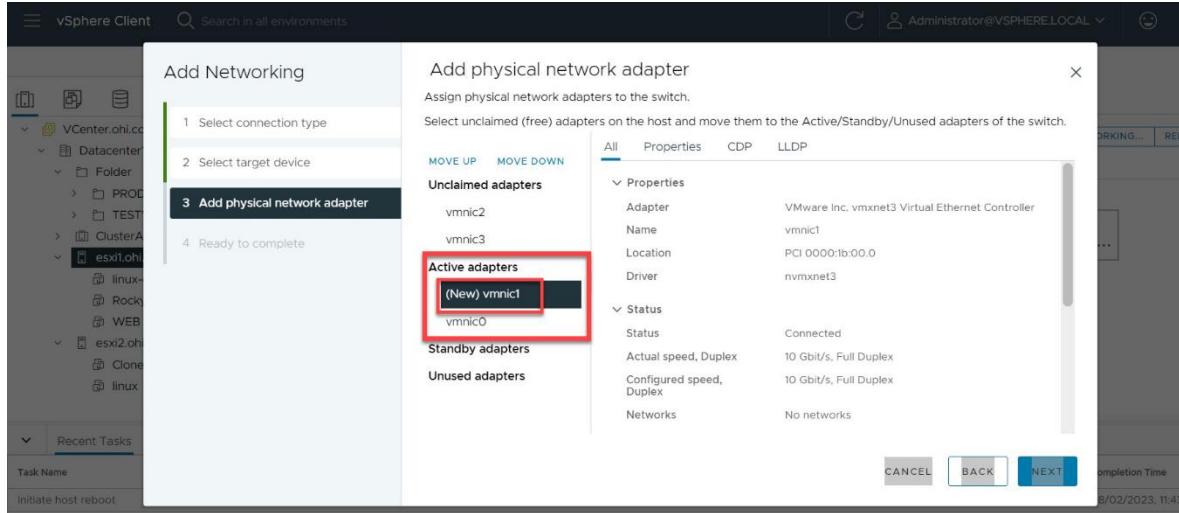
  

The screenshot shows the `Add Networking` wizard. Step 1: `Select connection type` is active. It lists three options: `VMkernel Network Adapter`, `Virtual Machine Port Group for a Standard Switch`, and `Physical Network Adapter`. The `Physical Network Adapter` option is selected and highlighted with a red box.

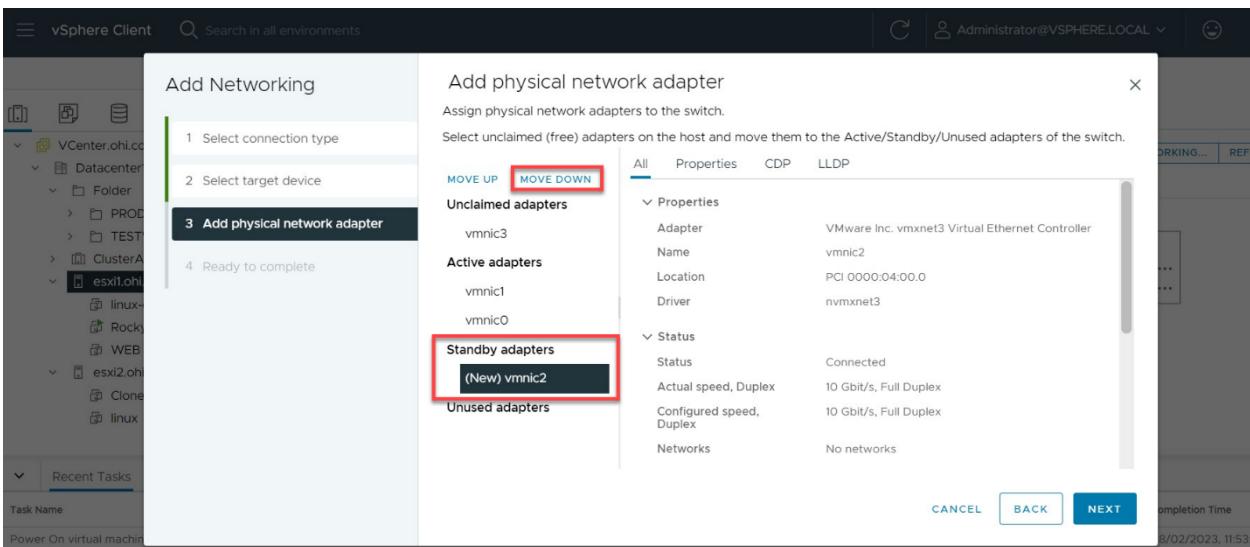
  

The screenshot shows the `Add Networking` wizard. Step 2: `Select target device` is active. It shows a list of target devices: `Select an existing switch` (selected) and `New standard switch`. Below the list is a `Quick Filter` input field containing the value `vSwitch0`, which is also highlighted with a red box.

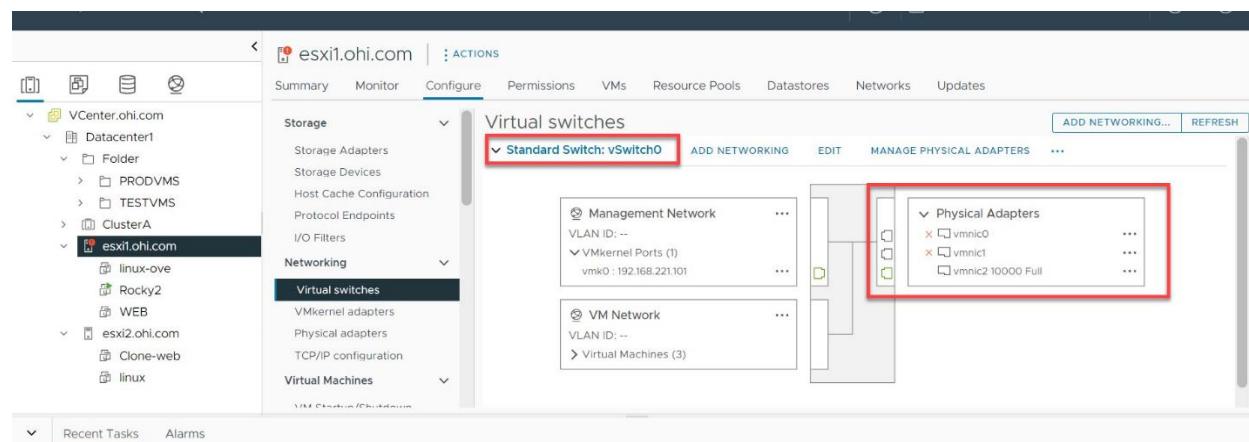
# VMware vSphere Install, Configure, Manage | Lab Guide



Up next on standby.



# VMware vSphere Install, Configure, Manage | Lab Guide



# VMware vSphere Install, Configure, Manage | Lab Guide

## Adding VMkernel Port for Management in vSphere

- 1- For both ESXi servers, install a new NIC with a Host-only profile (restart the network management for the NIC to show up) and do not assign an IP address.
- 2- Add a new switch to both ESXi servers for VMKernel port assignment.

Please be aware that it's advisable for each VMkernel to serve a single purpose, possess a distinct IP address, and be set up on a separate VLAN.

The screenshot shows the vSphere Client interface for the host `esxi01.abdelwahed.me`. The left sidebar shows the vCenter connection structure, including `vCenter01.abdelwahed.me`, `vServer`, `Cluster01`, and `VM01`. The main pane is titled `esxi01.abdelwahed.me` and has tabs for `Summary`, `Monitor`, `Configure`, `Permissions`, `VMs`, `Datastores`, and `Networks`. The `Configure` tab is selected. In the `Virtual switches` section, there is a table with one row for `vSwitch0`. A red box highlights the `Add Networking...` button in the toolbar above the table.

## esxi01.abdelwahed.me - Add Networking

### 1 Select connection type

2 Select target device

3 Port properties

4 IPv4 settings

5 Ready to complete

### Select connection type

Select a connection type to create.

#### VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN and host management.

#### Virtual Machine Port Group for a Standard Switch

A port group handles the virtual machine traffic on standard switch.

#### Physical Network Adapter

A physical network adapter handles the network traffic to other hosts on the network.

# VMware vSphere Install, Configure, Manage | Lab Guide

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type  
2 **Select target device**  
3 Create a Standard Switch  
4 Port properties  
5 IPv4 settings  
6 Ready to complete

Select target device  
Select a target device for the new connection.

Select an existing network  
 Select an existing standard switch  
 New standard switch

vSwitch0 [BROWSE ...](#)

New standard switch

MTU (Bytes) 1500

- **MTU (Maximum Transmission Unit)** represents the largest packet or frame size, specified in bytes, that can be sent over a network interface without fragmentation.
- **Ethernet Default:** For Ethernet, the default MTU size is typically **1500 bytes**.
- **Jumbo Frames:** In modern Ethernet networks, especially in data centers and for specific use-cases, the MTU can be increased to up to **9000 bytes**. This is often referred to as using "jumbo frames".
- **Example:** Jumbo frames might be used within a storage area network (SAN) because larger frames can improve efficiency by reducing the overhead of the header information for each packet.

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type  
✓ 2 Select target device  
3 **Create a Standard Switch**  
4 Port properties  
5 IPv4 settings  
6 Ready to complete

Create a Standard Switch  
Assign free physical network adapters to the new switch.

**Assigned adapters**

All	Properties	CDP	LLDP
Adapter Name Location Driver	vmnic1 PCI 0000:13:00.0 nvmxnet3		
Status Status Actual speed, Duplex Configured speed, Duplex Networks	Connected 10000 Mb, Full Duplex 10000 Mb, Full Duplex No networks		

# VMware vSphere Install, Configure, Manage | Lab Guide

## esxi01.abdelwahed.me - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- ✓ 3 Create a Standard Switch
- ✓ 4 Port properties
- ✓ 5 IPv4 settings

Ready to complete

Review your settings selections before finishing the wizard.

**6 Ready to complete**

New standard switch	vSwitch1
Assigned adapters	vmnic1
Switch MTU	1500
New port group	VMkernel
VLAN ID	None (0)
vMotion	Disabled
Provisioning	Disabled
Fault Tolerance logging	Disabled
Management	Enabled
vSphere Replication	Disabled
vSphere Replication NFC	Disabled
vSAN	Disabled

### NIC settings

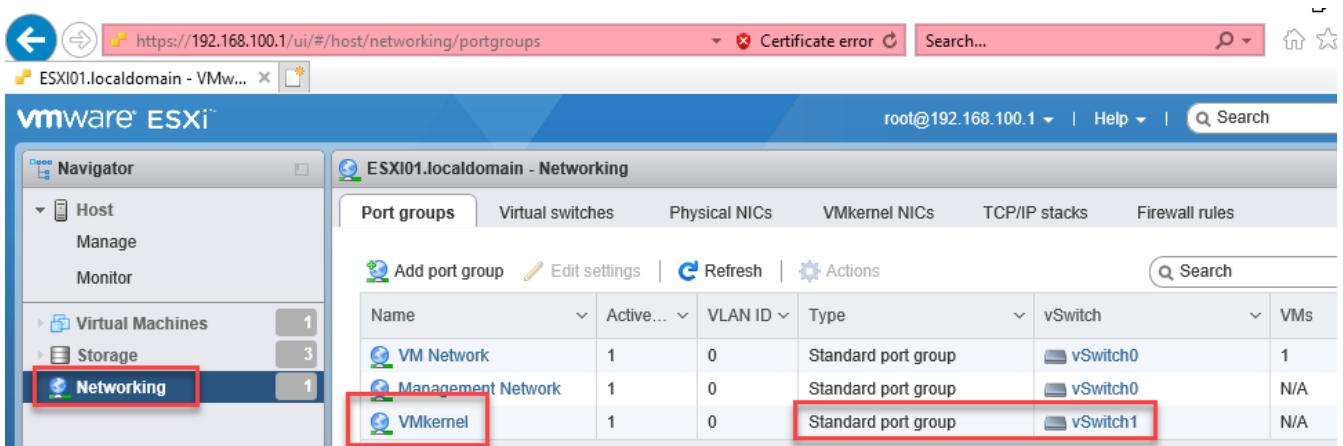
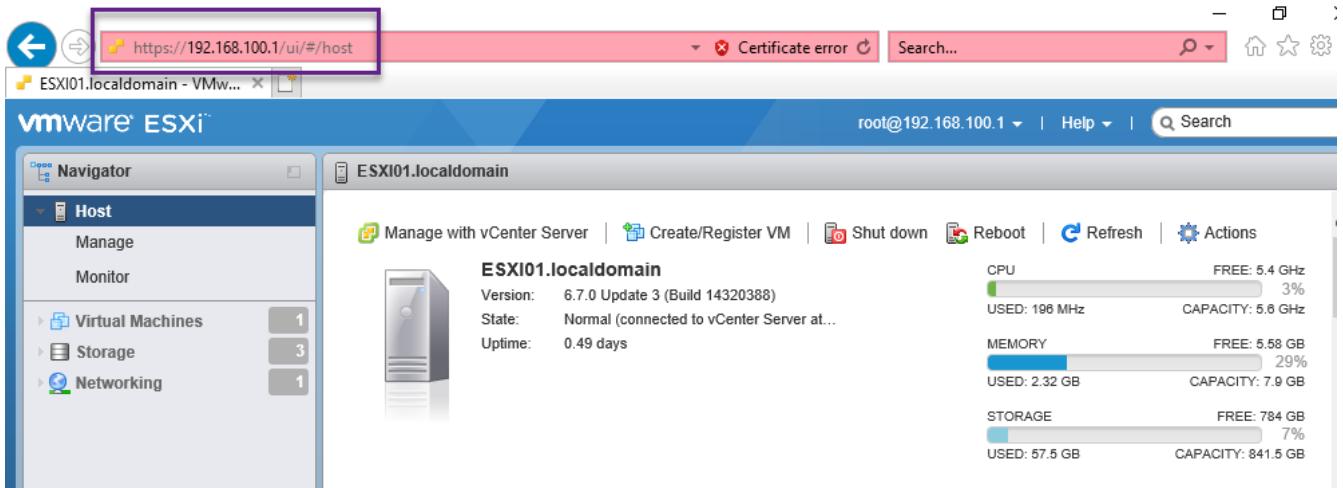
MTU	1500
TCP/IP stack	Default

### IPv4 settings

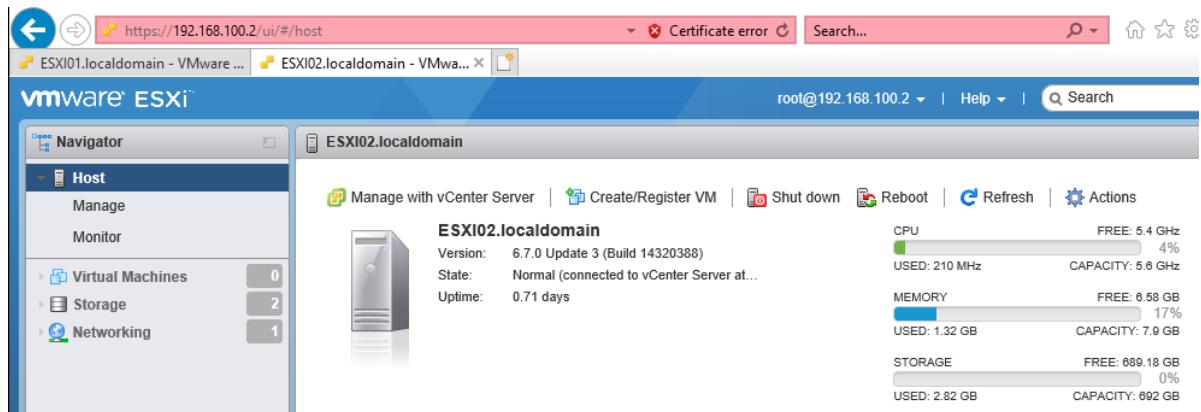
IPv4 address	192.168.100.1 (static)
Subnet mask	255.255.255.0

The screenshot shows the vSphere Client interface for the host esxi01.abdelwahed.me. The left sidebar shows the vCenter01 cluster with two hosts: esxi01 and esxi02, and one VM named VM01. The main pane is on the 'Configure' tab under 'Networks'. In the 'Virtual switches' section, vSwitch0 and vSwitch1 are listed. vSwitch1 is selected, and its details are shown in the right panel. It is a standard switch with one port group named VMkernel, which is connected to the vmnic1 adapter. There are also tabs for 'Port Groups', 'Properties', and 'Policies'.

# VMware vSphere Install, Configure, Manage | Lab Guide



On a different computer, assign an additional IP address to the Network Interface Card and attempt to connect to the VMKernel port of ESXi01, then apply the same configuration to ESXi02.



# VMware vSphere Install, Configure, Manage | Lab Guide

Modify VMkernel port settings to enable vMotion capability (for storage and VM migration).

The screenshot shows the vSphere Client interface with the title bar "vSphere Client" and the URL "esxi01.abdelwahed.me". The navigation pane on the left shows the hierarchy: vCenter01.abdelwahed.me > vServer > Cluster01 > esxi01.abdelwahed.me. The "Configure" tab is selected. In the center, under "Networking", the "VMkernel adapters" section is highlighted with a red box. A table lists two entries: vmk0 (Management Network, vSwitch0, 200.200.1.1) and vmk1 (VMkernel, vSwitch1, 192.168.1.1). An "Edit..." button is also highlighted with a red box.

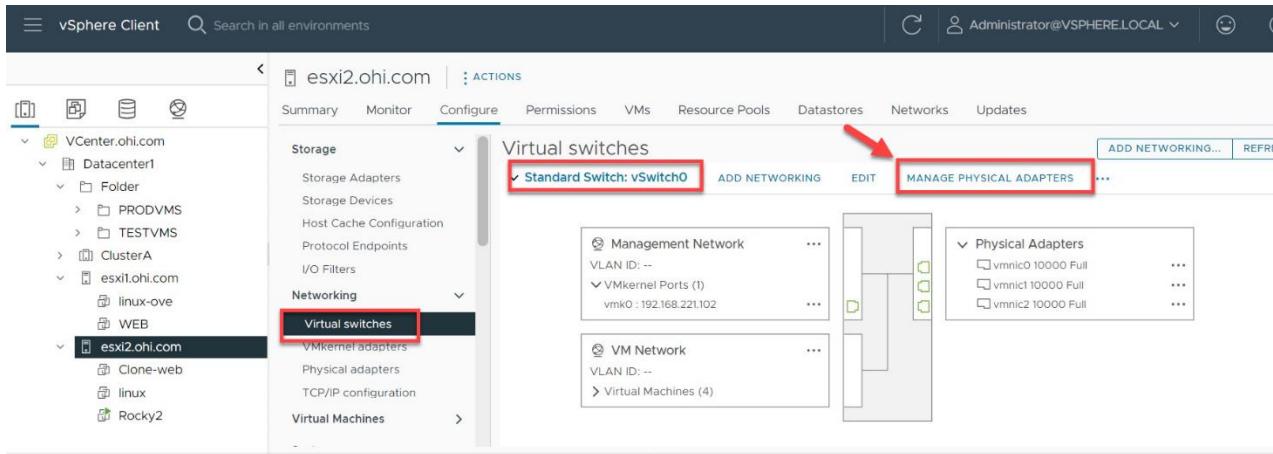
## vmk1 - Edit Settings

The dialog box shows the "Port properties" tab selected. Under "IPv4 settings", "TCP/IP stack" is set to "Default" and "MTU" is set to 1500. Under "VMkernel port settings", "Enabled services" include vMotion (checked), Management (checked), and Provisioning (unchecked). Other options like Fault Tolerance logging, vSphere Replication, vSphere Replication NFC, and vSAN are also listed but unchecked.

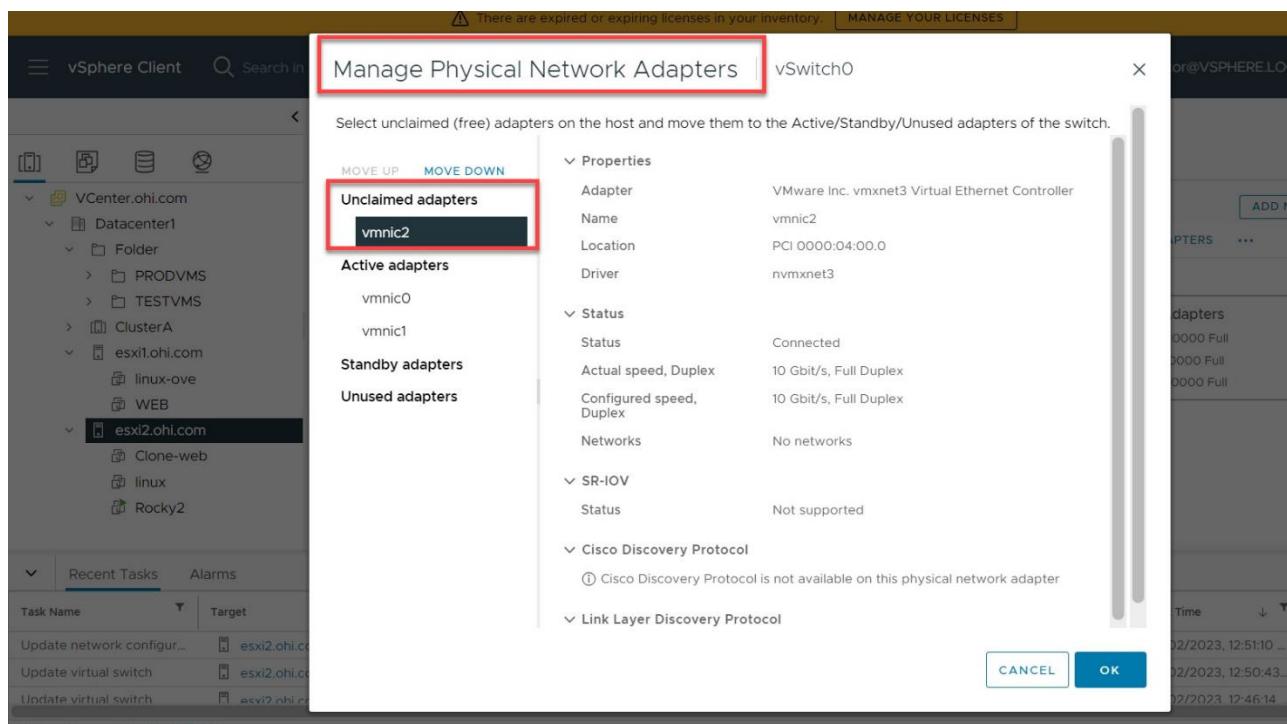
Please be aware that for executing storage or VM migration across ESXi hosts, it's crucial to set up a dedicated VMKernel adapter to handle vMotion traffic. This task can be accomplished by creating a new adapter or enabling the vMotion capability on an existing one, allowing the live relocation of virtual machines between hosts seamlessly and without any interruptions.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Remove Physical NIC from vSwitch



Transfer that network interface card to the unassigned adapter.

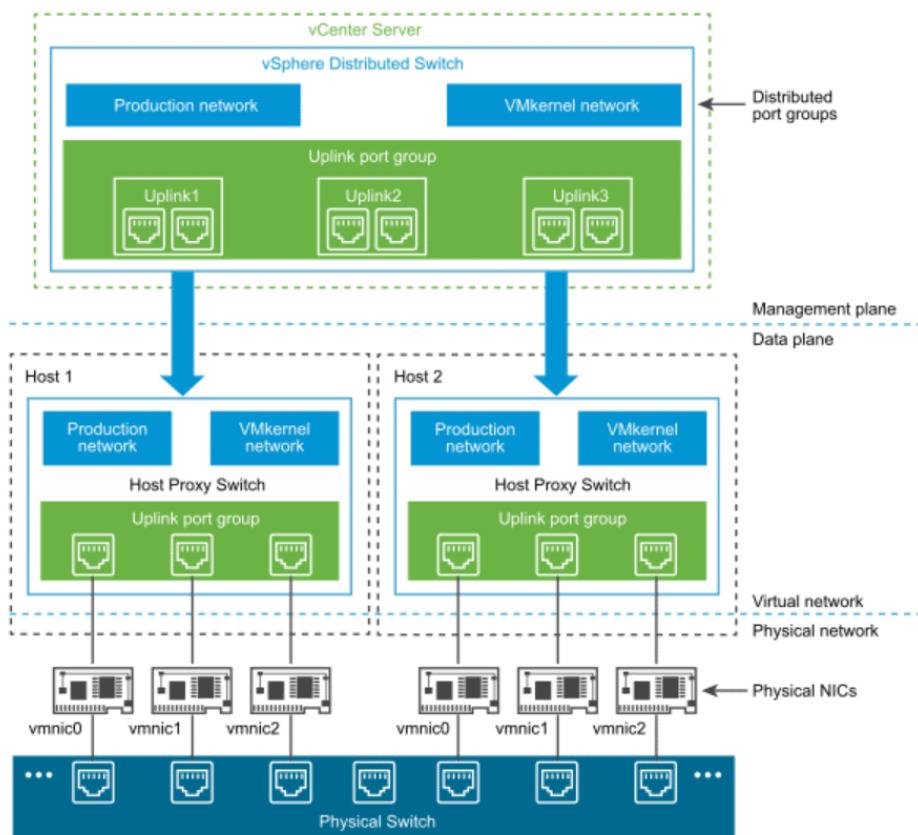


## VMware vSphere Distributed Virtual Switch (VDS)

A VMware Virtual Distributed Switch (VDS) allows you to manage network switches centrally at the data center level, which can help to simplify management and improve efficiency. Instead of creating separate switches for each ESXi server, you can create a single VDS that spans multiple hosts within a data center.

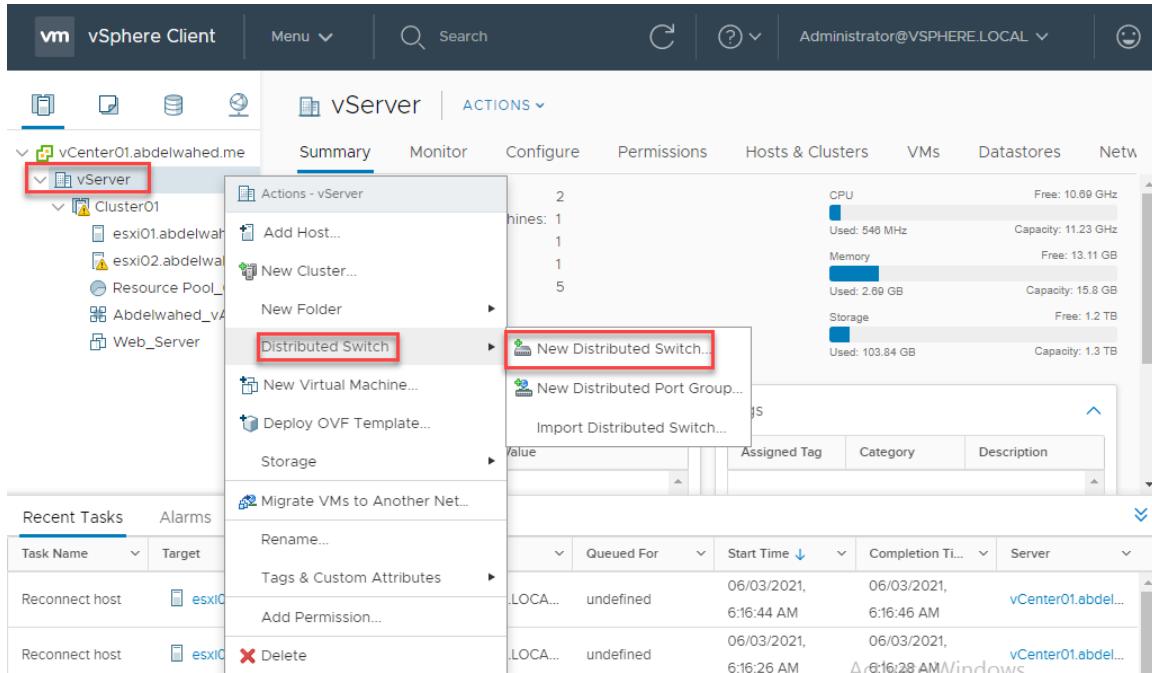
### Key Benefits of VDS

1. **Centralized Management:**
  - Configure network settings such as VLANs, port groups, and traffic shaping from a central location.
  - Apply settings to all hosts that are part of the VDS to ensure consistency and avoid errors.
2. **Consistency:**
  - Ensures that network configurations are consistent across all ESXi hosts in the data center.
  - Reduces the risk of misconfiguration by managing switches at the individual host level.
3. **Policy Application:**
  - Apply policies and settings across multiple hosts to meet security and compliance requirements consistently.
  - Monitor network traffic and performance from a central location and optimize as needed.



# VMware vSphere Install, Configure, Manage | Lab Guide

Initially, install NICs on the ESXi servers.



## New Distributed Switch

### 1 Name and location

2 Select version

3 Configure settings

4 Ready to complete

### Name and location

Specify distributed switch name and location.

Name

DSwitch

Location

vServer

Choose the earliest version of ESXi available if you're working with various versions, and remember that this choice cannot be downgraded later.

## New Distributed Switch

✓ 1 Name and location

### 2 Select version

3 Configure settings

4 Ready to complete

### Select version

Specify a distributed switch version.

6.6.0 - ESXi 6.6 and later

6.5.0 - ESXi 6.5 and later

6.0.0 - ESXi 6.0 and later

# VMware vSphere Install, Configure, Manage | Lab Guide

## New Distributed Switch

✓ 1 Name and location  
✓ 2 Select version  
**3 Configure settings**  
4 Ready to complete

**Configure settings**  
Specify number of uplink ports, resource allocation and default port group.

Number of uplinks: 1

Network I/O Control: Enabled

Default port group:  Create a default port group

Port group name: DProduction

## New Distributed Switch

✓ 1 Name and location  
✓ 2 Select version  
✓ 3 Configure settings  
**4 Ready to complete**

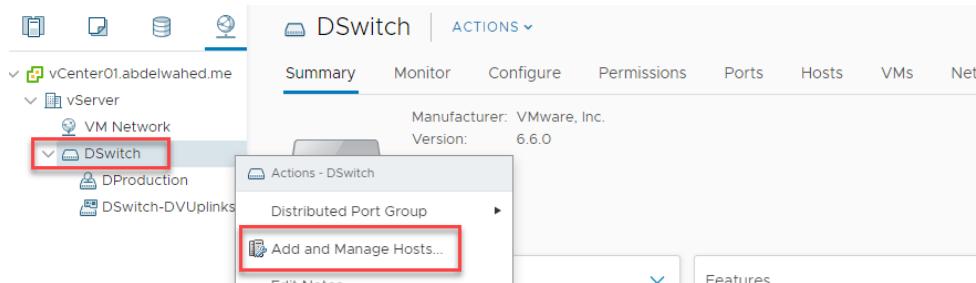
**Ready to complete**  
Review your settings selections before finishing the wizard.

Name	DSwitch
Version	6.6.0
Number of uplinks	1
Network I/O Control	Enabled
Default port group	DProduction

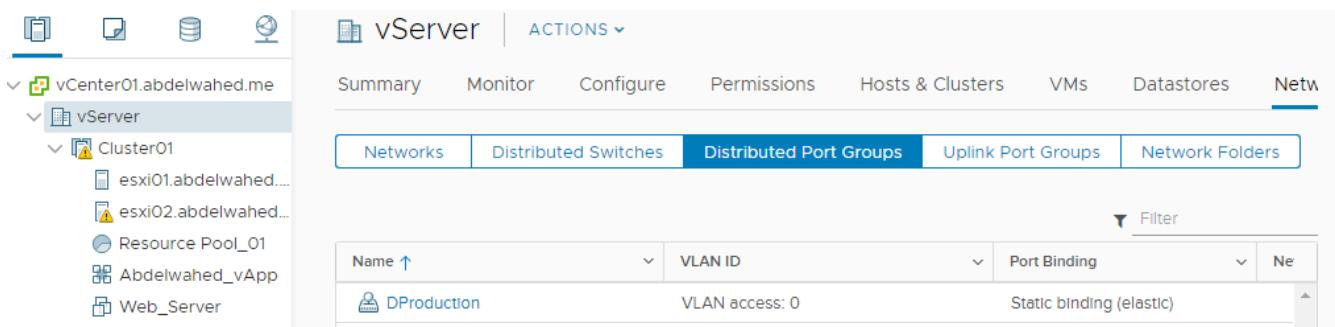
**Suggested next actions**

- New Distributed Port Group
- Add and Manage Hosts

These actions will be available in the Actions menu of the new distributed switch.



The screenshot shows the vSphere Web Client interface. On the left, the navigation tree shows 'vCenter01.abdelwahed.me' and 'vServer'. Under 'vServer', 'VM Network' is expanded, and 'DSwitch' is selected. A context menu is open over 'DSwitch', with 'Actions - DSwitch' at the top, followed by 'Distributed Port Group' and 'Add and Manage Hosts...'. The 'Add and Manage Hosts...' option is highlighted with a red box.



The screenshot shows the 'vServer' configuration page. The navigation tree on the left shows 'vCenter01.abdelwahed.me' and 'vServer'. Under 'vServer', 'Cluster01' is expanded, showing 'esxi01.abdelwahed...', 'esxi02.abdelwahed...', 'Resource Pool\_01', 'Abdelwahed\_vApp', and 'Web\_Server'. The 'Distributed Port Groups' tab is selected in the top navigation bar. A table below lists port groups: 'Name' (DProduction), 'VLAN ID' (VLAN access: 0), 'Port Binding' (Static binding (elastic)), and 'Net' (highlighted with a red box).

# VMware vSphere Install, Configure, Manage | Lab Guide

## DSwitch - Add and Manage Hosts

1 Select task      Select task  
2 Select hosts      Select a task to perform on this distributed switch.  
3 Manage physical adapters       Add hosts  
4 Manage VMkernel adapt...      Add new hosts to this distributed switch.  
5 Migrate VM networking       Manage host networking  
6 Ready to complete      Manage networking of hosts attached to this distributed switch.  
 Remove hosts      Remove hosts from this distributed switch.

## DSwitch - Add and Manage Hosts

✓ 1 Select task      Manage physical adapters  
✓ 2 Select hosts      Add or remove physical network adapters to this distributed switch.  
3 Manage physical adapt...        
4 Manage VMkernel adap...  
5 Migrate VM networking  
6 Ready to complete

Assign uplink    Reset changes    View settings

Host/Physical Network Adapters	In Use by Switch	Uplink	Uplink Port Group
vmnic2	vSwitch2	--	--
vmnic3	vSwitch2	--	--
vmnic4	--	--	--
esxi02.abdelwahed.me			
On this switch			
On other switches/unclaimed			
vmnic0	vSwitch0	--	--
vmnic1	vSwitch1	--	--
vmnic2	vSwitch2	--	--
vmnic3	vSwitch2	--	--
vmnic4	--	--	--

Uplinks correspond to the count of Network Interface Cards (NICs), which you can later adjust by adding or reducing the number. For instance, if there are initially 2 uplinks per server, you can increase the total to 4.

Select an Uplink | vmnic4 X

Uplink	Assigned Adapter
Uplink 1	-- (Auto-assign)

# VMware vSphere Install, Configure, Manage | Lab Guide

NIC now connected to DSwitch.

## DSwitch - Add and Manage Hosts

✓ 1 Select task  
✓ 2 Select hosts  
**3 Manage physical adapters**  
4 Manage VMkernel adapt...  
5 Migrate VM networking  
6 Ready to complete

Manage physical adapters  
Add or remove physical network adapters to this distributed switch.

Assign uplink   

Host/Physical Network Adapters	In Use by Switch	Uplink	Uplink Port Group
esxi01.abdelwahed.me			
On this switch			
vmnic4 (Assigned)	--	Uplink 1	DSwitch-DVUplin...
On other switches/unclaimed			
vmnic0	vSwitch0	--	--
vmnic1	vSwitch1	--	--
vmnic2	vSwitch2	--	--
vmnic3	vSwitch2	--	--
esxi02.abdelwahed.me			
On this switch			
vmnic4 (Assigned)	--	Uplink 1	DSwitch-DVUplin...
On other switches/unclaimed			

## DSwitch - Add and Manage Hosts

✓ 1 Select task  
✓ 2 Select hosts  
✓ 3 Manage physical adapters  
**4 Manage VMkernel adapters**  
5 Migrate VM networking  
6 Ready to complete

Manage VMkernel adapters  
Manage and assign VMkernel network adapters to the distributed switch.

Assign port group   

Host/VMkernel Network Adapters	In Use by Switch	Source Port Group	Destination Port Gr...
esxi01.abdelwahed.me			
On this switch			
On other switches/unclaimed			
vmk0	vSwitch0	Management Net...	Do not migrate
vmk1	vSwitch1	VMkernel	Do not migrate
vmk2	vSwitch2	FT_Network	Do not migrate
esxi02.abdelwahed.me			
On this switch			
On other switches/unclaimed			
vmk0	vSwitch0	Management Net...	Do not migrate
vmk1	vSwitch1	VMkernel	Do not migrate
vmk2	vSwitch2	FT_Network	Do not migrate

Now transfer the VM network to the new production DSwitch (currently, we have only the Web-Server on ESXi01).

# VMware vSphere Install, Configure, Manage | Lab Guide

## DSwitch - Add and Manage Hosts

✓ 1 Select task      Migrate VM networking  
✓ 2 Select hosts      Select virtual machines or network adapters to migrate to the distributed switch.  
✓ 3 Manage physical adapters  
✓ 4 Manage VMkernel adapt...  
**5 Migrate VM networking**  
6 Ready to complete

**Assign port group**   

Host/Virtual Machine/Network Adapter	NIC Count	Source Port Group	Destination Port Group
esxi01.abdelwahed.me			
Web_Server	1		
Network adapter 1		VM Network	Do not migrate

## DSwitch - Add and Manage Hosts

✓ 1 Select task  
✓ 2 Select hosts  
✓ 3 Manage physical adapters  
✓ 4 Manage VMkernel adapters  
**5 Migrate VM networking**  
6 Ready to complete

### Select Network

Name	Distributed Switch
DProduction	DSwitch

## DSwitch - Add and Manage Hosts

✓ 1 Select task      Migrate VM networking  
✓ 2 Select hosts      Select virtual machines or network adapters to migrate to the distributed switch.  
✓ 3 Manage physical adapters  
✓ 4 Manage VMkernel adapters  
**5 Migrate VM networking**  
6 Ready to complete

**Assign port group**   

Host/Virtual Machine/Network Adapter	NIC Count	Source Port Group	Destination Port Group
esxi01.abdelwahed.me			
Web_Server	1	Reassigned	
Network adapter 1		VM Network	DProduction

## DSwitch - Add and Manage Hosts

✓ 1 Select task  
✓ 2 Select hosts  
✓ 3 Manage physical adapters  
✓ 4 Manage VMkernel adapters  
✓ 5 Migrate VM networking  
**6 Ready to complete**

Ready to complete  
Review your settings selections before finishing the wizard.

Number of managed hosts  
Hosts to add 2

Number of network adapters for update  
Physical adapters 2  
Virtual machine 1  
adapters

**DSwitch**    **ACTIONS**

Name	State	Status	Cluster
esxi01.abdelwahed.me	Connected	Normal	Cluster01
esxi02.abdelwahed.me	Connected	Normal	Cluster01

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Be aware of the changes to NIC assignments in vSphere 8.

DSwitch0 - Add and Manage Hosts

Manage physical adapters

Add or remove physical network adapters to this distributed switch.

Adapters on all hosts  Adapters per host

Select an individual host to assign or unassign physical network adapter.

Host	Assigned adapters
ESXi1.OHI.COM	2
ESXi2.OHI.COM	2

CANCEL BACK NEXT

DSwitch0 - Add and Manage Hosts

Manage physical adapters

Add or remove physical network adapters to this distributed switch.

GO BACK TO HOSTS |ESXi1.OHI.COM| 1

Physical network adapters	In use by switch	Assign uplink
vmnic0	vSwitch0	None
vmnic1	vSwitch0	None
vmnic2	vSwitch0	None
vmnic3	vSwitch0	None
vmnic4	This switch	(Auto-assign)
vmnic5	This switch	(Auto-assign)

CANCEL BACK NEXT

Allocate virtual machines to the newly created distributed switch.

DSwitch0 - Add and Manage Hosts

Migrate VM networking

Select virtual machines or network adapters to migrate to the distributed switch.

Migrate virtual machine networking

Configure per network adapter  Configure per virtual machine

Select an individual virtual machine to migrate its network to different source network

Virtual machine
WEB
linux-ove
Clone-web
Rocky2
linux

Select network

Name	NSX port group ID	Distributed switch	Actions
DPortGroup	--	DSwitch0	UNASSIGN

CANCEL BACK NEXT

## VMware Cluster and Distributed Resource Scheduler (DRS)

### Adding VMware Cluster

For the following labs, you must add a VMware cluster using vCenter and move the ESXi servers to it.

### VMware vSphere Distributed Resource Scheduler (DRS) – Power of Cluster

#### Overview

VMware DRS (Distributed Resource Scheduler) is a feature available with a vCenter cluster. Once DRS is enabled, it monitors CPU and memory utilization on each ESXi host in the cluster and will automatically migrate included virtual machines to another ESXi host if the utilization of a particular host exceeds a certain threshold.

- **Workload Balancing:** Ensures that each host is used efficiently and that VMs have access to the resources they need.
- **Improves Performance:** Reduces the risk of downtime or other issues.

#### DRS Automation Levels

##### 1. Manual:

- DRS makes recommendations for VM placement, requiring manual approval for migrations.

##### 2. Partially Automated:

- DRS automatically migrates VMs in response to resource imbalances but prompts for approval if disruptions may occur.

##### 3. Fully Automated:

- DRS automatically migrates VMs without requiring manual approval.

#### Choosing the Appropriate Automation Level

- **Fully Automated Mode:** Effective at balancing workloads but may cause frequent migrations that could impact performance.
- **Manual Mode:** Provides more control but requires more intervention.

#### DRS Rules

Even if DRS is set to fully automated mode, you can still add DRS rules to guide its behavior:

##### 1. Separating Critical VMs:

- Ensure that critical VMs, such as domain controllers and Active Directory servers, are always separated across different ESXi hosts in case of hardware failure.

## 2. Keeping Application Servers Together:

- Ensure that application servers and database servers are always kept together on the same ESXi host to reduce latency and improve performance.

## 3. Preventing Power Disconnects:

- Prevent VMs from being migrated to ESXi hosts in different compute racks in case of power disconnects to ensure high availability.

## 4. Predictive DRS:

- Use historical performance data to predict and initiate VM migrations before resource utilization reaches critical levels.

## Additional Options in DRS

### 1. Automation Level:

- Determines how much automation DRS uses to manage resource allocation and workload placement (Manual, Partially Automated, Fully Automated).

### 2. Migration Threshold:

- Determines the threshold at which DRS will initiate a migration of VMs to balance resource utilization (Conservative, Moderate, Aggressive).

### 3. Power Management:

- Allows you to enable or disable vSphere Distributed Power Management (DPM) to dynamically power on and power off hosts to balance resource utilization and save energy.

### 4. CPU Overcommitment:

- Allows you to enable or disable CPU overcommitment, allowing multiple VMs to share a physical CPU core.

### 5. Memory Overcommitment:

- Allows you to enable or disable memory overcommitment, allowing VMs to share memory resources.

### 6. CPU Affinity Rules:

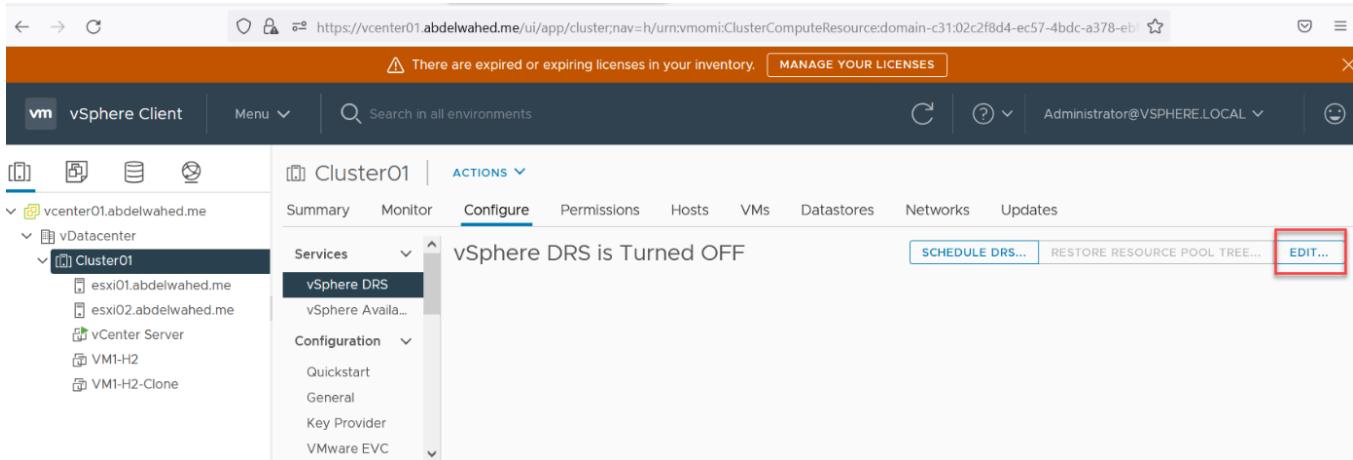
- Allows you to configure CPU affinity rules to control the placement of VMs on physical hosts.

### 7. VM Distribution:

- Allows you to configure how DRS distributes VMs across physical hosts (Spread, Pack, Evenly Balanced).

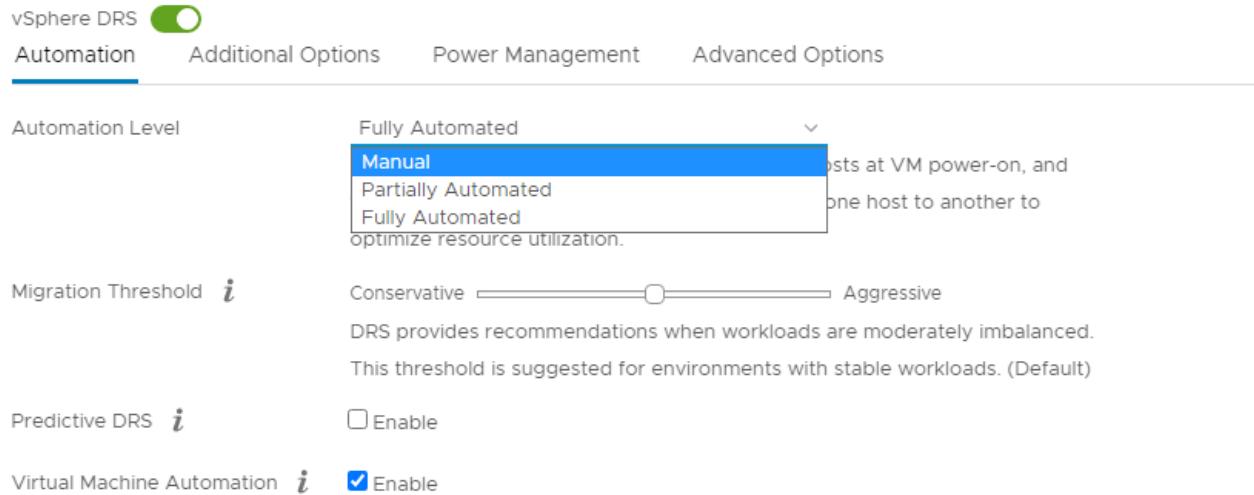
# VMware vSphere Install, Configure, Manage | Lab Guide

## Steps to create DRS



The screenshot shows the vSphere Client interface for managing a cluster named 'Cluster01'. In the 'Configure' tab, under the 'Services' section, 'vSphere DRS' is listed. A message states 'vSphere DRS is Turned OFF'. Below this, there are buttons for 'SCHEDULE DRS...' and 'EDIT...'. The 'EDIT...' button is highlighted with a red box.

## Edit Cluster Settings | Cluster01



The screenshot shows the 'Edit Cluster Settings' dialog for 'Cluster01'. The 'Automation' tab is selected. Under 'Automation Level', a dropdown menu is open, showing 'Manual' selected (highlighted with a blue box) and other options: 'Fully Automated', 'Partially Automated', and 'Fully Automated' (with a note about optimizing resource utilization). The 'Additional Options' tab is also visible.

**Automation Level:** Fully Automated  
Manual  
Partially Automated  
Fully Automated (Optimize resource utilization)

**Migration Threshold:** i Conservative ————— Aggressive  
DRS provides recommendations when workloads are moderately imbalanced.  
This threshold is suggested for environments with stable workloads. (Default)

**Predictive DRS:** i  Enable

**Virtual Machine Automation:** i  Enable

# VMware vSphere Install, Configure, Manage | Lab Guide

## Edit Cluster Settings | Cluster01 X

vSphere DRS (On)

Automation

Additional Options

Power Management

Advanced Options

VM Distribution  For availability, distribute a more even number of virtual machines across hosts.

Memory Metric for Load Balancing  Load balance based on consumed memory of virtual machines rather than active memory.

This setting is only recommended for clusters where host memory is not over-committed.

CPU Over-Commitment (i)  Enable

Over-commitment ratio: 0 :1 (vCPU:pCPU)

## Edit Cluster Settings | Cluster01

vSphere DRS (On)

Automation

Additional Options

Power Management

Advanced Options

DPM (i)

Enable

Automation Level

Manual ▼

DPM Threshold

Conservative Aggressive  
vCenter Server will apply power-on recommendations produced to meet vSphere HA requirements or user-specified capacity requirements. Power-on recommendations will also be applied if host resource utilization becomes higher than the target utilization range. Power-off recommendations will be applied if host resource utilization becomes very low in comparison to the target utilization range.

## Edit Cluster Settings | Cluster01

vSphere DRS (On)

Automation

Additional Options

Power Management

Advanced Options

Configuration Parameters

+ Add X Delete

Option	Value

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the vSphere Client interface. The left sidebar lists the vCenter server (vCenter01.abdelwahed.me) and its clusters (Cluster01, esxi01.abdelwahed..., esxi02.abdelwahed..., VM01). The main pane is titled "Cluster01" and shows the "Configure" tab selected. Under "Services", "vSphere DRS" is highlighted. A message box states "vSphere DRS is Turned ON". Below it, configuration options include "DRS Automation" (Manual), "Additional Options" (Expand for policies), "Power Management" (Off), and "Advanced Options" (None). Action buttons "RESTORE RESOURCE POOL TREE..." and "EDIT.." are available.

Any suggestions provided here can be considered and implemented as needed.

The screenshot shows the vSphere Client interface. The left sidebar lists the vCenter server (vCenter01.abdelwahed.me) and its clusters (Cluster01, esxi01.abdelwahed..., esxi02.abdelwahed..., VM01). The main pane is titled "Cluster01" and shows the "Monitor" tab selected. Under "vSphere DRS", "Recommendations" is highlighted. A section titled "DRS Recommendations" includes a "RUN DRS NOW" button and a table with columns "Apply", "Priority", "Recommendation", and "Reason".

## Creating VM and Host Groups in VMware vSphere

In a VMware vSphere environment, creating VM and host groups helps organize and manage virtual machines and ESXi hosts based on specific criteria. These groups can simplify management tasks, improve performance and availability, and ensure optimal resource utilization.

### Uses of VM and Host Groups

#### 1. Resource Allocation:

- **Purpose:** Ensure that VMs are distributed across ESXi hosts to maximize resource utilization.
- **Example:** Group VMs based on CPU or memory requirements and distribute them across capable ESXi hosts.

#### 2. High Availability:

- **Purpose:** Ensure that VMs are distributed to maximize high availability.
- **Example:** Group critical VMs and ensure they are distributed across ESXi hosts in different compute racks or datacenters to ensure high availability in case of hardware failure.

#### 3. Simplified Management:

- **Purpose:** Simplify management tasks such as patching, updates, or migration.
- **Example:** Group VMs based on their application and ensure they are patched and updated together to minimize disruptions.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Steps to Create VM and Host Groups

The screenshot shows the vSphere Client interface. In the left navigation pane, under 'vCenter01.abdelwahed.me' and 'vServer', 'Cluster01' is selected. In the main content area, the 'Configure' tab is selected, and the 'VM/Host Groups' section is highlighted. A red box highlights the 'Cluster01' entry in the navigation tree, the 'Configure' tab, and the 'VM/Host Groups' section.

### Create VM/Host Group | Cluster01

Name: R1  
Type: VM Group  
Members:  
Server01  
Server02

### Create VM/Host Group | Cluster01 >

Name: R2  
Type: VM Group  
Members:  
Server03  
Server04

# VMware vSphere Install, Configure, Manage | Lab Guide

## Set Up VM/Host Rules

To manage DRS actions.

The screenshot shows the vSphere Client interface. On the left, the navigation tree shows 'vCenter01.labdelwahed.me' and its sub-tree including 'vServer' and 'Cluster01'. 'Cluster01' is selected and highlighted with a red box. On the right, the main pane shows 'Cluster01' with tabs: Summary, Monitor, Configure (which is selected and highlighted with a red box), Permissions, Hosts, VMs, Datastores, and Network. Under the 'Configure' tab, there's a section for 'VM/Host Rules' with a table header: Name, Type, Enabled, Conflicts, and Defined By. Below the table is a '+ Add...' button, which is also highlighted with a red box.

### Create VM/Host Rule | Cluster01 X

Name	DC-ADC Rule	<input checked="" type="checkbox"/> Enable rule.
Type	Separate Virtual Machines	

Description:

The listed Virtual Machines must be run on separate hosts.

+ Add...    - Remove

Members
ADC
DC

### Create VM/Host Rule | Cluster01 X

Name	App-AppDB Rule	<input checked="" type="checkbox"/> Enable rule.
Type	Keep Virtual Machines Together	▼

Description:

The listed Virtual Machines must be run on the same host.

+ Add... X Remove

Members
<span style="color: blue;">▶</span> App
<span style="color: blue;">▶</span> AppDB

### Create VM/Host Rule | Cluster01 X

Name	R1 VMs Rule	<input checked="" type="checkbox"/> Enable rule.
Type	Virtual Machines to Hosts	▼

Description:

Select cluster host group

VM Group:

R1

Must run on hosts in group	▼
Must run on hosts in group	
Should run on hosts in group	
Must Not run on hosts in group	
Should Not run on hosts in group	

Create VM/Host Rule | Cluster01 X

Name	R1-R2 Rule	<input checked="" type="checkbox"/> Enable rule.
Type	Virtual Machines to Virtual Machines <span style="float: right;">▼</span>	

Description:

Virtual machines in the Cluster VM Group R1 must have the dependency restart condition met before vSphere HA proceeds with restarting the VMs in group R2.

The VM dependency restart condition must be met before continuing to:

R1 ▼

On restart for VM group:

R2 ▼

## Virtual Machine Overrides

Enable this option during DRS setup to customize settings and other details for a particular VM.

### Edit Cluster Settings | cluster01

vSphere DRS ON

Automation Additional Options Power Management Advanced Options

Automation Level ▼  
Manual  
DRS generates both power-on placement recommendations, and migration recommendations for virtual machines. Recommendations need to be manually applied or ignored.

Migration Threshold i Conservative ————— Aggressive  
DRS provides recommendations when workloads are moderately imbalanced.  
This threshold is suggested for environments with stable workloads. (Default)

Predictive DRS i

Virtual Machine Automation i **Help** ×  
Override for individual virtual machines can be set from the VM Overrides page.

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After activating, you can set up configurations from

The screenshot shows the vSphere Web Client interface. On the left, the navigation tree is expanded to show 'vCenter01.abdelwahed.me' and its sub-tree, including 'vServer' and 'Cluster01'. Under 'Cluster01', several hosts are listed: 'esxi01.abdelwahed...', 'esxi02.abdelwahed...', 'ADC', 'App', 'AppDB', and 'DC'. The 'Configure' tab is selected. In the main pane, the 'VM Overrides' section is active. It contains a table with two rows: 'vSphere DRS Automation' and 'vSphere HA Restart Policy'. There are buttons for 'Add ...', 'Edit ...', and 'Delete'.

Begin by choosing the virtual machine (VM) on which to apply various DRS settings.

## Add VM Override Cluster01

This screenshot shows the 'Select a VM' step of the 'Add VM Override' wizard. It displays a table of VMs with columns for Name, State, Status, Provisioned Space, and a selection checkbox. The 'DC' VM is selected. The table has a header row and four data rows.

Name	State	Status	Provisioned Space
ADC	Powered On	Normal	42.08 GB
App	Powered On	Normal	42.08 GB
AppDB	Powered On	Normal	42.08 GB
DC	Powered On	Normal	42.08 GB

## Add VM Override Cluster01

This screenshot shows the 'Add VM Override' step of the wizard, specifically the 'vSphere DRS' configuration section. The 'Override' checkbox is checked, and a dropdown menu is open, showing options: 'Disabled', 'Manual' (which is selected), 'Partially Automated', and 'Fully Automated'. Other sections visible include 'vSphere HA' and 'VM Restart Priority'.

## VMware High Availability (HA)

VMware HA (High Availability) is designed to reduce downtime by automatically restarting virtual machines on another ESXi host in the event of a host failure. Here are the key points and features of VMware HA:

### Key Points of VMware HA

1. **Network Storage Requirement:**
  - VMware HA requires network storage (such as iSCSI or NFS) to store the virtual machine data, allowing multiple ESXi hosts to access it.
2. **Downtime and Fault Tolerance:**
  - While HA reduces downtime by restarting VMs on another host, there may still be some downtime during the reboot process.
  - For true zero-downtime operation, use VMware Fault Tolerance (FT), which creates a real-time duplicate of a VM on a secondary host.
3. **Heartbeat Monitoring:**
  - VMware HA uses heartbeat monitoring to detect host failures. Heartbeat traffic is sent over multiple channels (network, storage, and management interfaces) to ensure robustness.
4. **vCenter Server Independence:**
  - If the vCenter Server goes down, VMware HA will continue to operate because the master host in the cluster manages the HA configuration. If the master host fails, another host is elected to take its place.
5. **Admission Control:**
  - Ensures sufficient resources are available in the cluster to accommodate VM failover. This can involve reserving a percentage of resources on each host or an entire host as a standby.
  - Admission control can also trigger VM resource reduction to ensure a VM can be restarted on a different host even with limited resources.
6. **Shared Datastores and Network Settings:**
  - VMware HA requires at least two shared datastores and properly configured network settings (including a default gateway) to ensure proper operation and fault detection.

## vSphere Cluster Services (vCLS)

vCLS ensures essential vSphere cluster services (like DRS) operate even if vCenter Server is unavailable.

### Key Points of vCLS

1. **vCLS VMs:**
  - Lightweight VMs, typically three per cluster, identifiable with the "vCLS" prefix.
2. **Functionality:**
  - Allows DRS to function without vCenter.
  - Monitors ESXi host health.
3. **Operational Notes:**
  - Do not manually power off or delete vCLS VMs. If deleted, they are automatically recreated.
  - vCLS VMs dynamically adjust resources as per cluster needs.

### Best Practices for vCLS

- **Monitor Rather Than Modify:** It's optimal to monitor vCLS VMs rather than modify them manually.
- **Understanding vCLS Role:** Understanding their role can lead to better cluster management decisions. For instance, if vCLS VMs are deleted, vCenter will redeploy them to ensure uninterrupted DRS functionality.

### Example

- **DRS Functionality Without vCenter:**
  - DRS can rebalance VM workloads across hosts in a cluster even if vCenter Server is down, ensuring continuous operation and resource optimization.

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## Set up High Availability

Attach two iSCSI disks to each server and then create a new datastore.

The screenshot shows the vSphere Web Client interface for the host 'esxi01.abdelwahed.me'. The 'Configure' tab is active. In the 'Storage' section, the 'Storage Adapters' table lists one adapter: 'vmhba65' (Model: iSCSI Software Adapter). Below this, the 'Datastores' table lists two MSFT iSCSI Disks: 'MSFT iSCSI Disk (naa.60003ff44dc75adca3d1...)' and 'MSFT iSCSI Disk (naa.60003ff44dc75adc89d0...)'. Both the adapter and the disks are highlighted with red boxes.

The screenshot shows the vSphere Web Client interface for the host 'esxi02.abdelwahed.me'. The 'Configure' tab is active. In the 'Storage' section, the 'Storage Adapters' table lists one adapter: 'vmhba65' (Model: iSCSI Software Adapter). Below this, the 'Datastores' table lists two MSFT iSCSI Disks: 'MSFT iSCSI Disk (naa.60003ff44dc75adca3d1...)' and 'MSFT iSCSI Disk (naa.60003ff44dc75adc89d0...)'. Both the adapter and the disks are highlighted with red boxes.

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We have previously configured an iSCSI datastore of 500GB size; now we are proceeding to add an additional iSCSI datastore with a capacity of 300GB.

The screenshot shows the VMware vSphere Client interface. On the left, the navigation tree shows a cluster named 'Cluster01' containing two hosts: 'esxi01.abdelwahed.me' and 'esxi02.abdelwahed.me'. The host 'esxi01.abdelwahed' is selected. In the main pane, the 'Datastores' tab is selected. A red box highlights the 'Storage' section under the 'esxi01.abdelwahed' host, and another red box highlights the 'New Datastore...' button. Below this, a modal window titled 'Type' is open, showing the steps for creating a datastore:

Step	Description
1 Type	Type Specify datastore type. <input checked="" type="radio"/> VMFS <input type="radio"/> NFS <input type="radio"/> VVol
2 Name and device selection	Select a name and a disk/LUN for provisioning the datastore. Datastore name: Datastore5-iSCSI
3 VMFS version	
4 Partition configuration	
5 Ready to complete	

The 'Name and device selection' step is currently active, showing a table with one entry:

Name	LUN	Capacity	Hardware...	Drive T...	S
MSFT iSCSI Disk (naa.60...)	1	299.71 GB	Not support...	HDD	E

# VMware vSphere Install, Configure, Manage | Lab Guide

✓ 1 Type  
✓ 2 Name and device selection  
**3 VMFS version**  
4 Partition configuration  
5 Ready to complete

VMFS version  
Specify the VMFS version for the datastore.

VMFS 6  
VMFS 6 enables advanced format (512e) and automatic space reclamation support.

VMFS 5  
VMFS 5 enables 2+TB LUN support.

## New Datastore

✓ 1 Type  
✓ 2 Name and device selection  
✓ 3 VMFS version  
**4 Partition configuration**  
5 Ready to complete

Partition configuration  
Review the disk layout and specify partition configuration details.

Partition Configuration: Use all available partitions

Datastore Size: 299.71 GB

Block size: 1 MB

Space Reclamation Granularity: 1 MB

Space Reclamation Priority: Low: Deleted or unmapped blocks are reclaimed on the LUN at Low priority

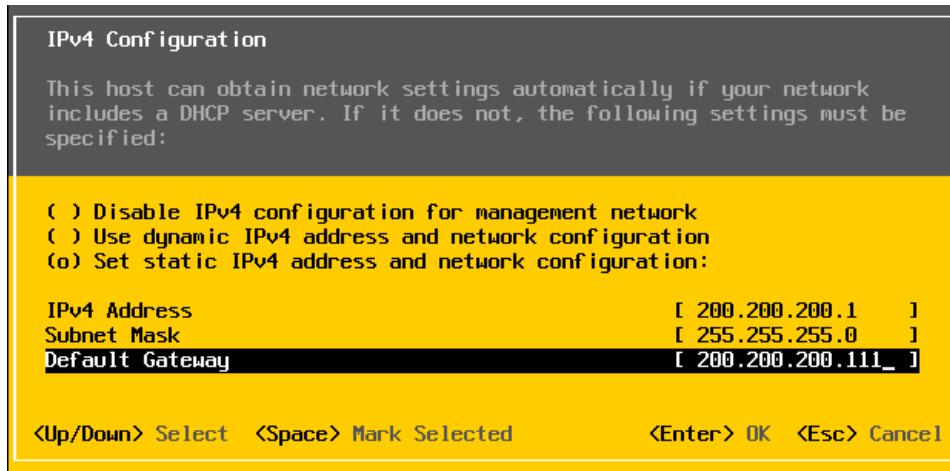
Name	Status	Type	Capacity	Free
DataStore03_local	Normal	VMFS 6	149.5 GB	142.5 GB
Datastore04_ISCSI	Normal	VMFS 6	499.5 GB	284.17 GB
datastore1_local	Normal	VMFS 6	192.5 GB	191.09 GB
Datastore5-ISCSI	Normal	VMFS 6	299.5 GB	298.09 GB
Datastore04_ISCSI	Normal	VMFS 6	499.5 GB	284.17 GB

Currently, both hosts are connected to two iSCSI datastores.

Name	Status	Type	Capacity	Free
Datastore04_ISCSI	Normal	VMFS 6	499.5 GB	284.17 GB
datastore2_local	Normal	VMFS 6	192.5 GB	191.09 GB
Datastore5-ISCSI	Normal	VMFS 6	299.5 GB	298.09 GB

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Set a pingable default gateway for both hosts (using the vCenter IP as an example).



Now you can enable HA

The screenshot shows the vSphere Client interface. The left sidebar shows the navigation tree with 'vCenter01.abdelwahed.me' and 'vServer'. 'Cluster01' is selected and highlighted with a red box. The main pane shows the 'Cluster01' configuration page with the 'Configure' tab selected. Under the 'Services' section, 'vSphere Availability' is selected and highlighted with a red box. A callout box with a red border contains the text: 'vSphere HA is Turned OFF' and 'Proactive HA is Turned OFF'. At the bottom, there is a section titled 'Failure conditions and responses'.

# VMware vSphere Install, Configure, Manage | Lab Guide

vSphere HA

Failures and responses      Admission Control      Heartbeat Datastores      Advanced Options

---

You can configure how vSphere HA responds to the failure conditions on this cluster. The following failure conditions are supported: host, host isolation, VM component protection (datastore with PDL and APD), VM and application.

Enable Host Monitoring  i

> Host Failure Response	<input type="button" value="Restart VMs"/>
> Response for Host Isolation	<input type="button" value="Disabled"/>
> Datastore with PDL	<input type="button" value="Disabled"/>
> Datastore with APD	<input type="button" value="Disabled"/>
> VM Monitoring	<input type="button" value="Disabled"/>

## Summary of HA Response Options in VMware vSphere

### Response for Host Isolation

- **Disabled:** No action taken when a host is isolated.
- **Power off and restart VMs:** VMs on the isolated host are powered off and restarted on another host.
- **Shut down and restart VMs:** VMs on the isolated host are gracefully shut down and then restarted on another host.

### Datastore with PDL (Permanent Device Loss) Failure Response

- **Disabled:** No action taken on the affected VMs.
- **Issue events:** No action taken on the affected VMs, but events are generated.
- **Power off and restart VMs:** All affected VMs are terminated, and vSphere HA attempts to restart them on hosts with datastore connectivity.

### Datastore with APD (All Paths Down) Failure Response

- **Disabled:** No action taken on the affected VMs.
- **Issue events:** No action taken on the affected VMs, but events are generated.
- **Power off and restart VMs - Conservative restart policy:** A VM is powered off if HA determines it can be restarted on a different host.
- **Power off and restart VMs - Aggressive restart policy:** A VM is powered off if HA determines it can be restarted on a different host or if it cannot detect resources on other hosts due to network partition.

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the VMware vSphere configuration interface with the following sections:

- Datastore with PDL Failure Response:** A dropdown menu shows "Shut down and restart VMs" selected. Below it, the "Datastore with PDL" section is expanded, showing the "Datastore with PDL Failure Response" setting. It allows selecting from "Disabled", "Issue events", "Power off and restart VMs", or "Shut down and restart VMs". The "Disabled" option is selected.
- All Paths Down (APD) Failure Response:** A dropdown menu shows "Shut down and restart VMs" selected. Below it, the "All Paths Down (APD) Failure Response" section is expanded, showing the "All Paths Down (APD) Failure Response" setting. It allows selecting from "Disabled", "Issue events", "Power off and restart VMs - Conservative restart policy", or "Power off and restart VMs - Aggressive restart policy". The "Disabled" option is selected.
- VM Monitoring:** A dropdown menu shows "Disabled" selected. Below it, the "VM Monitoring" section is expanded, showing the "Enable heartbeat monitoring" setting. It allows selecting from "Disabled", "VM Monitoring Only", or "VM and Application Monitoring". The "Disabled" option is selected.

# VMware vSphere Install, Configure, Manage | Lab Guide

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## Summary of VMware HA Settings

### Host Failure Response

- **Disabled:** Host Monitoring is turned off. vCenter will not respond to host failures.
- **Restart VMs:** When a host failure is detected, VMs are restarted in the order determined by their restart priority.

### Default VM Restart Priority

- Options to set the default restart priority for VMs (e.g., Medium).

### VM Dependency Restart Condition

- **Resources Allocated:** vSphere HA proceeds with the next VM restart priority after the condition is met.
- **Additional Delay:** Specify a delay before restarting VMs.
- **VM Dependency Restart Condition Timeout:** Set a timeout period for VM dependency restart conditions (e.g., 600 seconds).

### Datastore Usage for Heartbeat

- **Use Datastores Only from the Specified List:** Restrict to specified datastores.
- **Use Datastores from the Specified List and Complement Automatically if Needed:** Allows automatic selection of additional datastores if necessary.

### Available Heartbeat Datastores

- List of datastores selected for heartbeat:
  - **Datastore5-ISCSI**
  - **Datastore04-ISCSI**
  - Hosts mounting each datastore (e.g., 2 hosts).

### Performance Degradation VMs Tolerate

- **Percentage (%):** Indicates the percentage of performance degradation the VMs in the cluster are allowed to tolerate during a failure (e.g., 100%).
  - 0% raises a warning if there is insufficient failover capacity to guarantee the same performance after VMs restart.
  - 100% disables the warning.

# VMware vSphere Install, Configure, Manage | Lab Guide

vSphere HA

Failures and responses

Admission Control

Heartbeat Datastores

Advanced Options

Admission control is a policy used by vSphere HA to ensure failover capacity within a cluster. Raising the number of potential host failures will increase the availability constraints and capacity reserved.

Host failures cluster tolerates

1

Maximum is one less than number of hosts in cluster.

Define host failover capacity by

Cluster resource Percentage ▾

Override calculated failover capacity.

Reserved failover CPU capacity: 20 % CPU

Reserved failover Memory capacity: 30 % Memory

Performance degradation VMs tolerate

100 %

Percentage of performance degradation the VMs in the cluster are allowed to tolerate during a failure. 0% - Raises a warning if there is insufficient failover capacity to guarantee the same performance after VMs restart. 100% - Warning is disabled.

vSphere HA

Failures and responses

Admission Control

Heartbeat Datastores

Advanced Options

Maximum is one less than number of hosts in cluster.

Define host failover capacity by

Slot Policy (powered-on VMs) ▾

Define slot policy

Cover all powered-on virtual machines

Calculate slot size based on the maximum CPU/Memory reservation and overhead of all powered-on virtual machines.

Fixed slot size

Specify the slot size explicitly.

CPU slot size: 32 MHz

Memory slot size: 100 MB

VMs requiring multiple slots:

[VIEW](#)

[CALCULATE](#)

Performance degradation VMs tolerate

100 %

Percentage of performance degradation the VMs in the cluster are allowed to tolerate during a failure. 0% - Raises a warning if there is insufficient failover capacity to guarantee the same performance after VMs restart. 100% - Warning is disabled.

Activate Windows  
Go to Settings to activate

# VMware vSphere Install, Configure, Manage | Lab Guide

vSphere HA

Failures and responses      Admission Control **Admission Control**      Heartbeat Datastores      Advanced Options

Admission control is a policy used by vSphere HA to ensure failover capacity within a cluster. Raising the number of potential host failures will increase the availability constraints and capacity reserved.

Host failures cluster tolerates  Maximum is one less than number of hosts in cluster.

Define host failover capacity by

**Add** **Remove**

Failover Hosts
----------------

vSphere HA

Failures and responses      Admission Control      **Heartbeat Datastores**      Advanced Options

vSphere HA uses datastores to monitor hosts and virtual machines when the HA network has failed. vCenter Server selects 2 datastores for each host using the policy and datastore preferences specified below.

Heartbeat datastore selection policy:

Automatically select datastores accessible from the hosts

Use datastores only from the specified list

Use datastores from the specified list and complement automatically if needed

Available heartbeat datastores

Name	Datastore Cluster	Hosts Mounting Datastore ↓
<input type="checkbox"/> Datastore5-ISCSI	N/A	2
<input type="checkbox"/> Datastore04_ISCSI	N/A	2

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the 'vSphere HA' configuration page. At the top, there is a toggle switch labeled 'vSphere HA' which is turned on (green). Below the switch are four tabs: 'Failures and responses' (selected), 'Admission Control', 'Heartbeat Datastores', and 'Advanced Options'. Under the 'Failures and responses' tab, there is a section titled 'Host Failure Response'. It contains two options: 'Disabled' (radio button) and 'Restart VMs' (radio button, selected). A note states: 'Allows you to configure host monitoring and failover on this cluster.' Below this, there is a 'Default VM restart Priority' dropdown set to 'Medium'. Under 'VM dependency restart condition', it says 'After the condition has been met, vSphere HA will proceed with the next VM restart priority.' A dropdown menu is open, showing 'Resources allocated' as the current selection. Below the dropdown, there are fields for 'Additional delay:' (0 seconds) and 'VM dependency restart condition timeout:' (600 seconds).

The screenshot shows the vSphere Web Client interface. On the left, the navigation tree is expanded to show 'vCenter01.abdelwahed.me', 'vServer', and 'Cluster01'. 'Cluster01' is selected. The main pane title is 'Cluster01 | ACTIONS ▾'. Below the title, there are tabs: 'Summary', 'Monitor', 'Configure' (selected), 'Permissions', 'Hosts', 'VMs', 'Datastores', and 'Networks'. In the 'Configure' tab, there are sections for 'Services' (with 'vSphere DRS' and 'vSphere Availability' listed) and 'Configuration' (with 'General'). To the right of these sections, there are three status messages: 'vSphere HA is Turned ON' (with an 'EDIT...' button), 'Proactive HA is Turned OFF' (with an 'EDIT...' button), and 'Failure conditions and responses'.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Testing VMware HA Failover

### Scenario: Testing Failover by Disconnecting ESXi02

**Objective:** Verify that VMware HA properly triggers a failover event when ESXi02 is disconnected from the network, and the AppDB virtual machine is restarted on ESXi01.

### Steps and Expected Outcomes

1. **Network Disconnection:**
  - **Action:** Disconnect ESXi02 from the network.
  - **Expected Outcome:** VMware HA detects the loss of network connection to ESXi02.
2. **Failover Event:**
  - **Response:** If configured correctly, VMware HA will initiate the process to restart the virtual machines from ESXi02 on another host in the cluster, such as ESXi01.
3. **Resource Allocation:**
  - **Assumption:** ESXi01 has sufficient resources to accommodate the virtual machines from ESXi02.
  - **Outcome:** The AppDB virtual machine should be automatically restarted on ESXi01.
4. **Time to Completion:**
  - **Consideration:** The time required to restart the virtual machine depends on its size and complexity.
  - **Expected Outcome:** The virtual machine is restarted and operational on ESXi01.
5. **Post-Failover Connectivity:**
  - **Verification:** Connect to the AppDB virtual machine on ESXi01.
  - **Expected Outcome:** You should be able to connect and use the virtual machine as usual.

### Important Considerations

- **Potential Downtime:** VMware HA aims to minimize downtime but does not guarantee zero downtime. There may be a delay during the failover process.
- **Application Configuration:** Some applications may require additional configuration to operate correctly after a failover.
- **Testing in Controlled Environment:** Always test failover scenarios in a controlled environment to ensure that your HA configuration functions as expected.

The image consists of two vertically stacked screenshots of the vSphere Client interface. Both screenshots show the 'AppDB' virtual machine details in the 'vSphere Client' window. The top screenshot shows the 'Host' field as 'esxi02.abdelwahed.me'. The bottom screenshot shows the 'Host' field as 'esxi01.abdelwahed.me', indicating a successful failover. The 'vSphere Client' interface includes a navigation tree on the left, a toolbar at the top, and tabs for Summary, Monitor, Configure, Permissions, Datastores, and Networks on the right. The 'Summary' tab is selected in both cases.

# VMware vSphere Install, Configure, Manage | Lab Guide

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## VMware vCenter Proactive HA

VMware vCenter Server can utilize Proactive HA to monitor the health of physical server hardware components and proactively migrate virtual machines to healthy hosts before a hardware failure occurs. This feature requires specific hardware monitoring plugins such as Dell OpenManage or HP Insight Manager installed on the ESXi hosts.

### Key Features of Proactive HA

1. **Health Monitoring:**
  - Monitors hardware components like CPUs, memory, and storage for potential failures or performance degradation.
2. **Proactive Migration:**
  - Uses vCenter and Distributed Resource Scheduler (DRS) to migrate VMs to healthy hosts if an issue is detected before it leads to hardware failure.
3. **Minimize Downtime:**
  - Helps to minimize downtime and prevent data loss by taking preventive measures.

### Requirements

- **Hardware Monitoring Plugins:** Plugins provided by hardware vendors (e.g., Dell OpenManage, HP Insight Manager) need to be installed on ESXi hosts.
- **Appropriate Hardware Sensors:** Ensure the hardware supports the necessary sensors for health monitoring.
- **Configuration:** Additional configuration beyond basic vCenter HA.

### Configuration and Testing

1. **Install Plugins:**
  - Install the necessary hardware monitoring plugins on the ESXi hosts.
2. **Enable Proactive HA:**
  - In vCenter, navigate to the cluster settings and enable Proactive HA.
  - Configure the hardware health monitoring settings and thresholds.
3. **Define Remediation Policies:**
  - Set policies for how VMs should be migrated in case of hardware degradation.
  - Determine whether remediation should be automatic or manual.
4. **Test Configuration:**
  - Carefully test and validate the Proactive HA configuration to ensure it works properly.
  - Simulate hardware failures or degradations to verify that VMs are migrated as expected.

### Remediation Actions

- **Proactive HA Remediation:**
  - Migrates VMs to healthy hosts before hardware failure occurs based on detected issues.
- **vSphere DRS:**
  - Balances resource utilization across hosts, automatically migrating VMs as needed to ensure optimal resource allocation and minimize downtime.

### Policies and Planning

1. **Define Policies:**
  - Set policies for migration to standby hosts or hosts with specific performance characteristics.
  - Decide on automatic vs. manual remediation based on the severity of issues and impact on VM operations.
2. **Regular Testing:**
  - Regularly test remediation policies to ensure timely and efficient VM migration.
  - Ensure minimal disruption to critical workloads and avoid unnecessary risk.

# VMware vSphere Install, Configure, Manage | Lab Guide

vSphere Client | Cluster01 | ACTIONS ▾

Summary Monitor Configure Permissions Hosts VMs Datastores Networks

Services vsphere DRS vsphere Availability Configuration General Licensing

vSphere HA is Turned ON  
Runtime information for vSphere HA is reported under vSphere HA Monitoring

Proactive HA is Turned OFF

Failure conditions and responses

## Edit Proactive HA | Cluster01

Status

Failures & Responses Providers

Enable providers and select rows to view/edit the failure conditions supported by the provider.

<input type="checkbox"/>	Proactive HA provider	Status	Failure conditions blocked
<input type="checkbox"/>			

## Edit Proactive HA | cluster01

Status

Failures & Responses Providers

You can configure how Proactive HA responds when a provider has notified its health degradation to vCenter, indicating a partial failure of that host. In the event of a partial failure, vCenter Server can proactively migrate the host's running VMs to a healthier host.

Automation Level Manual

DRS will suggest recommendations for VMs and Hosts.

Remediation *i* Quarantine mode

Balances performance and availability, by avoiding the usage of partially degraded hosts as long as VM performance is unaffected.

# VMware vSphere Install, Configure, Manage | Lab Guide

Remediation dictates the response (for HA) when a server is flagged for hardware degradation.

Edit Proactive HA | Cluster01 ×

Status (ON)

[Failures & Responses](#) [Providers](#)

You can configure how Proactive HA responds when a provider has notified its health degradation to vCenter, indicating a partial failure of that host. In the event of a partial failure, vCenter Server can proactively migrate the host's running VMs to a healthier host.

**Automation Level** Automated ▼

Virtual machines will be migrated to healthy hosts and degraded hosts will be entered into quarantine or maintenance mode depending on the configured Proactive HA automation level.

**Remediation** i Quarantine mode ▼

Balances performance and availability, by avoiding the usage of partially degraded hosts as long as VM performance is unaffected.

- When a server is in **quarantine mode**, it's excluded from high-availability tasks such as being selected for server transfers or chosen as the master.

Edit Proactive HA | Cluster01 ×

Status (ON)

[Failures & Responses](#) [Providers](#)

You can configure how Proactive HA responds when a provider has notified its health degradation to vCenter, indicating a partial failure of that host. In the event of a partial failure, vCenter Server can proactively migrate the host's running VMs to a healthier host.

**Automation Level** Automated ▼

Virtual machines will be migrated to healthy hosts and degraded hosts will be entered into quarantine or maintenance mode depending on the configured Proactive HA automation level.

**Remediation** i Quarantine mode ▼

Balances performance and availability, by avoiding the usage of partially degraded hosts as long as VM performance is unaffected.

# VMware vSphere Install, Configure, Manage | Lab Guide

- Maintenance mode, move all included VMs to another host.



- Mixed mode, move VMs to another host and mark as quarantine



## HA Summary and Heartbeat

voted master server

**Top Screenshot: vSphere HA Summary**

Hosts	Master	esxi01.abdelwahed.me
Hosts connected to master	1	
Hosts not connected to master	0	
vSphere HA agent not reachable	0	
vSphere HA agent configuration error	0	
Hosts failed	0	
Network isolated	0	
Network partitioned	0	

**Bottom Screenshot: Heartbeat Details**

Name	Datastore Cluster	Hosts Mounting Datastore...
Datastore04_ISCSI	N/A	2
Datastore5-ISCSI	N/A	2

## VMware Fault Tolerance (FT) for Zero Downtime

VMware Fault Tolerance (FT) provides a way to achieve zero downtime by duplicating a virtual machine (VM) on another host in the cluster and maintaining real-time synchronization of storage and memory between the primary and secondary VMs. If the primary VM fails or becomes unavailable, the secondary VM takes over seamlessly without any interruption.

### Requirements and Considerations

1. **Network Interface Cards (NICs):**
  - o Each host in the cluster must have at least two dedicated NICs with 1 Gbps speed or higher.
2. **Storage:**
  - o The VM must be running on a datastore hosted on SSD storage to ensure optimal performance.
3. **Licensing:**
  - o A valid VMware Fault Tolerance license must be available for each host in the cluster.
4. **VMware High Availability (HA):**
  - o VMware HA must be enabled on the cluster.

### Configuration Steps

1. **Add and Configure NICs:**
  - o Add the additional NICs to each ESXi host.
  - o Ensure that the network settings are properly configured.
2. **Enable Fault Tolerance:**
  - o Use the vSphere Client or vSphere Web Client to enable Fault Tolerance for the VM.
  - o This process creates a duplicate VM on another host in the cluster and synchronizes the storage and memory between the primary and secondary VMs.

### Important Notes

- **Not a Replacement for Backups:**
  - o Fault Tolerance helps maintain zero downtime but does not protect against data loss or other types of disruptions.
  - o Maintain a comprehensive disaster recovery plan, including regular backups, replication, and other measures to ensure data availability and integrity.

# VMware vSphere Install, Configure, Manage | Lab Guide

esxi01.abdelwahed.me - Add Networking

## 1 Select connection type

2 Select target device

3 Port properties

4 IPv4 settings

5 Ready to complete

### Select connection type

Select a connection type to create.

#### VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN and host management.

## esxi01.abdelwahed.me - Add Networking

### ✓ 1 Select connection type

### 2 Select target device

3 Create a Standard Switch

4 Port properties

5 IPv4 settings

6 Ready to complete

### Select target device

Select a target device for the new connection.

#### Select an existing network

BROWSE ...

#### Select an existing standard switch

BROWSE ...

#### New standard switch

MTU (Bytes)

1500

Include both adapters that were attached to the ESXi in the virtual switch.

# VMware vSphere Install, Configure, Manage | Lab Guide

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type

✓ 2 Select target device

### 3 Create a Standard Switch

4 Port properties

5 IPv4 settings

6 Ready to complete

Create a Standard Switch

Assign free physical network adapters to the new switch.

### Assigned adapters

	Active adapters
	(New) vmnic2
	(New) vmnic3

All

Properties

CDP

LLDP

#### Adapter

Name vmnic3  
Location PCI 0000:1b:00.0  
Driver nvmxnet3

#### Status

Status Connected  
Actual speed, Duplex 10000 Mb, Full Duplex  
Configured speed, Duplex 10000 Mb, Full Duplex  
Networks No networks

#### Network I/O Control

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type

✓ 2 Select target device

✓ 3 Create a Standard Switch

### 4 Port properties

5 IPv4 settings

6 Ready to complete

#### Port properties

Specify VMkernel port settings.

#### VMkernel port settings

Network label	FT_Network
VLAN ID	<input type="button" value="None (0)"/>
MTU	Get MTU from switch 1500
TCP/IP stack	Default
Available services	<input type="checkbox"/> vMotion <input type="checkbox"/> Provisioning <input checked="" type="checkbox"/> Fault Tolerance logging <input type="checkbox"/> Management <input type="checkbox"/> vSphere Replication <input type="checkbox"/> vSphere Replication NFC <input type="checkbox"/> vSAN

Set up a distinct IP addressing scheme.

# VMware vSphere Install, Configure, Manage | Lab Guide

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type      **IPv4 settings**  
✓ 2 Select target device      Specify VMkernel IPv4 settings.  
✓ 3 Create a Standard Switch  
✓ 4 Port properties  
**5 IPv4 settings**  
6 Ready to complete

Obtain IPv4 settings automatically  
 Use static IPv4 settings

IPv4 address	172.16.0.100
Subnet mask	255.255.255.0
Default gateway	<input type="checkbox"/> Override default gateway for this adapter 200.200.200.111
DNS server addresses	200.200.200.200

## esxi01.abdelwahed.me - Add Networking

✓ 1 Select connection type      **Ready to complete**  
✓ 2 Select target device      Review your settings selections before finishing the wizard.  
✓ 3 Create a Standard Switch  
✓ 4 Port properties  
✓ 5 IPv4 settings  
**6 Ready to complete**

New standard switch	vSwitch2
Assigned adapters	vmnic2, vmnic3
Switch MTU	1500
New port group	FT_Network
VLAN ID	None (0)
vMotion	Disabled
Provisioning	Disabled
Fault Tolerance logging	Enabled
Management	Disabled
vSphere Replication	Disabled
vSphere Replication NFC	Disabled
vSAN	Disabled

**NIC settings**

MTU	1500
TCP/IP stack	Default

**IPv4 settings**

IPv4 address	172.16.0.100 (static)
Subnet mask	255.255.255.0

Activate Windows  
CANCEL to go BACK to act FINISH in do

Do the same for EXSi02, which has the IP address 172.16.0.101.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Enabling Fault Tolerance (FT) for App Server

To enable FT for the Web\_Server VM hosted on ESXi01 and ensure the secondary VM is stored in a different iSCSI datastore

The screenshot shows the vSphere Web Client interface. On the left, the navigation tree is expanded to show 'vCenter01.abdelwahed.me' and its 'vServer' and 'Cluster01' sub-nodes. Under 'Cluster01', 'Web\_Server' is selected. The main pane displays the 'Web\_Server' VM details. The 'Summary' tab is active, showing the following information:

Setting	Value
Guest OS	Microsoft Windows Server 2016 or later (64-bit)
Compatibility	ESXi 6.7 and later (VM version 14)
VMware Tools	Running, version:10346 (Current)
DNS Name	VM01.abdelwahed.me
IP Addresses	200.200.200.20
Host	esxi02.abdelwahed.me

On the right, resource usage metrics are displayed:

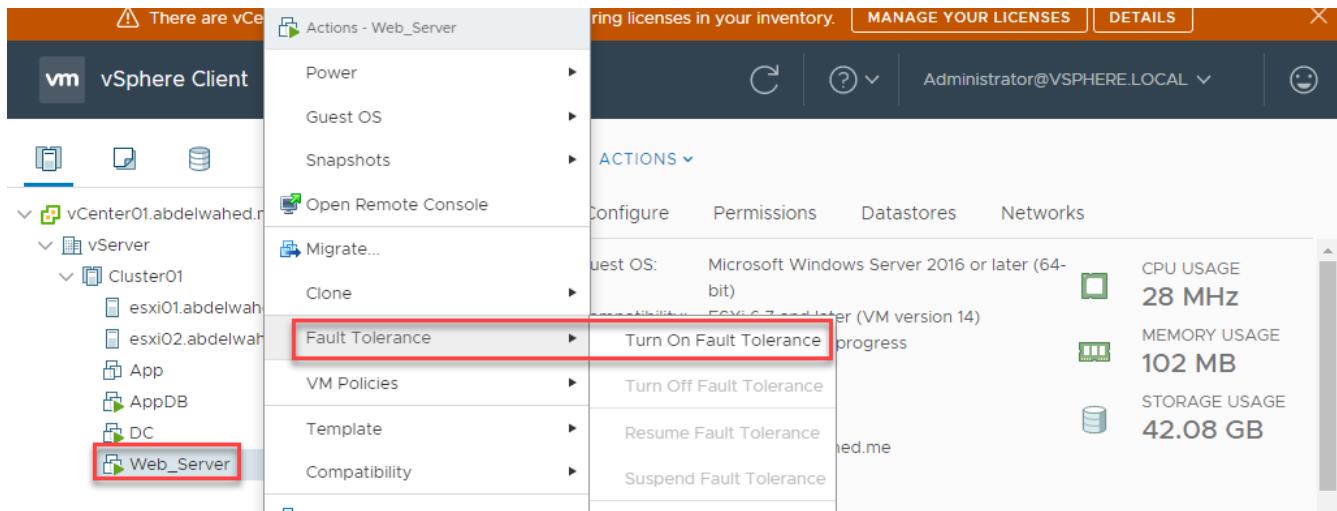
- CPU USAGE: 28 MHz
- MEMORY USAGE: 225 MB
- STORAGE USAGE: 42.08 GB

Buttons at the bottom include 'Launch Web Console' and 'Launch Remote Console'.

The screenshot shows the vSphere Web Client interface. The navigation tree is identical to the previous screenshot. The main pane now displays the 'Datastores' tab for the 'Web\_Server' VM. The table shows one datastore entry:

Name	Status	Type	Datastore	Capacity	Free
Datastore04_ISCSI	Normal	VMFS 6		499.5 GB	286.23 GB

# VMware vSphere Install, Configure, Manage | Lab Guide



## Web\_Server - Turn On Fault Tolerance

**1 Select datastores**

2 Select host

3 Ready to complete

Select datastores  
Select datastores to place the secondary VM disks and configuration files.

Configure per disk

Name	Capacity	Provisioned	Free
Datastore5-ISCSI	299.5 GB	1.41 GB	298.09 GB
Datastore04_ISCSI	499.5 GB	217.68 GB	286.23 GB

## Web\_Server - Turn On Fault Tolerance

**✓ 1 Select datastores**

**2 Select host**

3 Ready to complete

Select host  
Select host for the secondary VM.

Show all hosts

Name	State	Status
esxi01.abdelwahed.me	Connected	Normal

## Web\_Server - Turn On Fault Tolerance

**✓ 1 Select datastores**

**✓ 2 Select host**

**3 Ready to complete**

Ready to complete  
Review your selections and click Finish to turn on fault tolerance on this virtual machine.

Placement details for the Secondary VM

Host:	esxi01.abdelwahed.me
Configuration File Location:	Datastore5-ISCSI
Tie Breaker File Location:	Datastore5-ISCSI
Hard disk 1 Location:	Datastore5-ISCSI

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the vSphere Web Client interface. On the left, the navigation tree shows the vCenter01 host and its clusters. In the center, the 'Web\_Server' VM is selected. The 'Summary' tab is active, displaying the guest OS as Microsoft Windows Server 2016 or later (64-bit), compatibility with ESXi 6.7 and later (VM version 14), and VMware Tools status. Resource usage metrics like CPU, memory, and storage are shown on the right. A yellow banner at the bottom indicates a 'Virtual machine Fault Tolerance state changed'. Below the summary, the 'Recent Tasks' table lists several recent operations, including a fault tolerance task for the Web\_Server VM.

The screenshot shows the vSphere Web Client interface for the esxi01 host. The navigation tree shows the host and its clusters. The 'VMs' tab is selected in the top navigation bar. The 'Virtual Machines' tab is active, showing a list of VMs. The 'Web\_Server' VM is listed as 'Powered On' with a status of 'Normal' and 40.24 GB of provisioned space. A red box highlights the 'VMs' tab and the 'Web\_Server' VM entry.

## Testing Fault Tolerance (FT) by Disconnect ESXi02 (Primary Host)

**Objective:** Verify that VMware Fault Tolerance (FT) functions correctly when the primary host (ESXi02) is disconnected from the network, ensuring zero downtime for the Web\_Server VM.

The screenshot shows the vSphere Web Client interface for the esxi01 host. The navigation tree shows the host and its clusters. The 'VMs' tab is selected in the top navigation bar. The 'Virtual Machines' tab is active, showing the 'Web\_Server' VM as 'Powered On' with a status of 'Alert' and 40.08 GB of provisioned space. A red box highlights the 'VMs' tab and the 'Web\_Server' VM entry.

## Migrating a Virtual Machine Without Failure in VMware

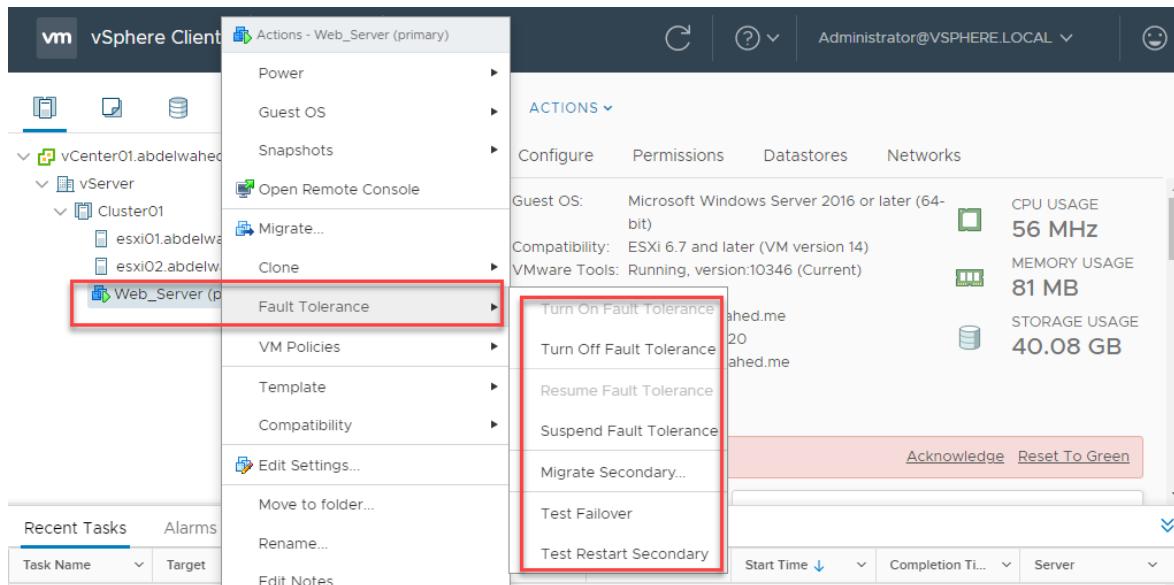
Migrating a virtual machine (VM) in VMware can be accomplished with minimal downtime and disruption by following best practices and ensuring proper planning. Here are the steps and considerations for a successful VM migration using vSphere vMotion, Storage vMotion, or Cross-Host vMotion.

### Types of VM Migration

1. **vSphere vMotion:** Migrates a running VM from one physical host to another without downtime.
2. **Storage vMotion:** Migrates a VM's disk files from one datastore to another without downtime.
3. **Cross-Host vMotion:** Migrates VMs across different vCenter Server instances.

### Best Practices for Migration

1. **Compatibility Check:**
  - Ensure that the source and destination hosts are compatible, including CPU, memory, and storage requirements.
  - Verify that both hosts are running compatible versions of ESXi.
2. **Resource Allocation:**
  - Check that the VM has the necessary resources allocated (CPU, memory, and storage).
  - Ensure that there is sufficient capacity on the destination host to accommodate the VM.
3. **Network Configuration:**
  - Verify that the network settings are properly configured on both the source and destination hosts.
  - Ensure that the VM can communicate with other network resources post-migration.
4. **Software and Applications:**
  - Ensure that any software or applications running on the VM are properly configured and will function correctly after migration.
  - Test applications in a similar environment before performing the actual migration.
5. **Backup:**
  - Take a snapshot or backup of the VM before initiating the migration process to ensure data safety.



## Creating and Managing Resource Pools in VMware vSphere

Resource pools in VMware vSphere allow you to manage the allocation of resources (CPU and memory) for groups of virtual machines (VMs) within a cluster. They help in ensuring that resources are distributed based on priority, workload, and other factors. To create and manage resource pools, you need to enable the Distributed Resource Scheduler (DRS) on your cluster.

### Prerequisites

#### 1. Enable DRS:

- DRS must be enabled on the cluster to allow for automatic balancing of resource utilization across hosts.
- Log in to vSphere Client, navigate to the cluster, and enable DRS under the "Configure" tab.

### Steps to Create a Resource Pool

#### 1. Log in to vSphere Client:

- Open vSphere Client or vSphere Web Client and log in with appropriate credentials.

#### 2. Select the Cluster or Host:

- Navigate to the cluster or host where you want to create the resource pool.

#### 3. Navigate to Resource Pools:

- Go to the "Configure" tab.
- Under "Resource Management," select "Resource Pools."

#### 4. Create a New Resource Pool:

- Click "Add" to create a new resource pool.
- Provide a name and description for the resource pool.

#### 5. Configure Resource Pool Settings:

- **CPU Settings:**
  - **Reservation:** The guaranteed CPU resources for the resource pool.
  - **Limit:** The maximum CPU resources that the resource pool can use.
  - **Shares:** The relative priority of the resource pool in terms of CPU resources.
- **Memory Settings:**
  - **Reservation:** The guaranteed memory resources for the resource pool.
  - **Limit:** The maximum memory resources that the resource pool can use.
  - **Shares:** The relative priority of the resource pool in terms of memory resources.

#### 6. Set Priorities:

- Assign high priority to critical workloads and low priority to less important workloads to ensure appropriate resource allocation.

#### 7. Create the Resource Pool:

- Review the settings and click "OK" to create the resource pool.

### Managing Resource Pools

#### 1. Monitoring:

- Regularly monitor resource utilization to ensure that VMs are receiving appropriate resources.
- Use performance charts and alerts to track resource usage and identify potential issues.

#### 2. Adjusting Settings:

- Adjust resource pool settings as needed to avoid resource contention and maintain optimal performance.
- Modify reservations, limits, and shares based on current workload requirements.

#### 3. Allocating VMs to Resource Pools:

- Move VMs into the resource pool by dragging and dropping them into the desired pool.
- Ensure that VMs are grouped appropriately based on their resource needs and priority.

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The screenshot shows the VMware vSphere Web Client interface. In the left navigation pane, under 'vCenter01.abdelwahed.me' and 'vServer', 'Cluster01' is selected and highlighted with a red box. A context menu is open over 'Cluster01', with the 'New Resource Pool...' option highlighted with a red box. The main content area displays the configuration for a new Resource Pool named 'Resource Pool\_01'. The configuration includes:

Name	Value
Scale Descendant's Shares	<input checked="" type="checkbox"/> Yes, make them scalable
<b>CPU</b>	
Shares	Normal 4000
Reservation	1000 MHz
Reservation Type	<input checked="" type="checkbox"/> Expandable
Limit	Unlimited MHz
<b>Memory</b>	
Shares	Normal 163840
Reservation	6 GB
Reservation Type	<input checked="" type="checkbox"/> Expandable
Limit	Unlimited MB

A tooltip for the 'Scale Descendant's Shares' checkbox is displayed, stating: "If this option is selected, the shares allocated to each descendant resource pool shall be adjusted to ensure that the relative shares allocated to the VMs are maintained".

# VMware vSphere Install, Configure, Manage | Lab Guide

The image contains two screenshots of the vSphere Client interface, both titled "Cluster01".

**Screenshot 1: CPU Reservation Details**

- The left sidebar shows the navigation tree: "vcenter01.abdelwahed.me" > "vDatacenter" > "Cluster01".
- The "Monitor" tab is selected.
- The "Resource Allocat..." dropdown is open, and the "CPU" option is selected.
- The "CPU Reservation Details" panel displays the following data:
  - Cluster Total Capacity: 11.23 GHz
  - Total Reservation Capacity: 5.35 GHz
  - Used Reservation: 1 GHz (highlighted with a red box)
  - Available Reservation: 4.35 GHz

**Screenshot 2: Memory Reservation Details**

- The left sidebar shows the navigation tree: "vcenter01.abdelwahed.me" > "vDatacenter" > "Cluster01".
- The "Monitor" tab is selected.
- The "Resource Allocat..." dropdown is open, and the "Memory" option is selected.
- The "Memory Reservation Details" panel displays the following data:
  - Cluster Total Capacity: 25.99 GB
  - Total Reservation Capacity: 17.55 GB
  - Used Reservation: 6.11 GB (highlighted with a red box)
  - Available Reservation: 11.44 GB

For testing purposes, I am utilizing a RedHat VM that operates at 1GHZ CPU speed.

The screenshot shows the vSphere Client interface with the navigation tree: "vcenter01.abdelwahed.me" > "vDatacenter" > "Cluster01".

The "Monitor" tab is selected, and the "Utilization" section is active.

The "Performance" dropdown is open, and the "Utilization" option is selected.

The "Virtual Machine CPU" chart shows the following data:

- Consumed: 168 MHz
- Active: 168 MHz
- Reservation: 0 Hz

The "Virtual Machine Memory" chart shows the following data:

- VM Consumed: 2.05 GB
- VM Overhead Consumed: 56 MB
- Reservation: 0 B

# VMware vSphere Install, Configure, Manage | Lab Guide

This screenshot shows the vSphere Client interface. The left sidebar navigation tree is expanded to show the hierarchy: vcenter01.abdelwahed.me > vDatacenter > Cluster01 > Resource Pool\_01. The 'Monitor' tab is selected in the top navigation bar. In the main content area, the 'CPU' tab is selected under 'Resource Alloc...' in the left sidebar. The right panel displays 'CPU Reservation Details' with the following data:

	Value
Resource Pool Total Capacity	5.35 GHz
Configured Reservation	1 GHz
Used Reservation	0 Hz
Available Reservation	5.35 GHz
Reservation Type	Expandable

This screenshot shows the vSphere Client interface, similar to the previous one but with the 'Memory' tab selected in the left sidebar under 'Resource Alloc...'. The right panel displays 'Memory Reservation Details' with the following data:

	Value
Resource Pool Total Capacity	17.44 GB
Configured Reservation	6 GB
Used Reservation	59 MB
Available Reservation	17.39 GB
Reservation Type	Expandable

I plan to escalate CPU utilization by running the command dd if=/dev/zero of=/dev/null and will observe the changes in CPU performance.

This screenshot shows the vSphere Client interface with the 'Utilization' tab selected in the left sidebar under 'Performance'. The right panel displays 'Virtual Machine CPU' utilization details:

CPU Metric	Value
Consumed	982 MHz
Active	982 MHz
Reservation	0 Hz

Below this, it shows 'Virtual Machine Memory' utilization details:

Memory Metric	Value
VM Consumed	2.05 GB
VM Overhead Consumed	56 MB
Reservation	0 B

On the far right, there is a note: "Now, move".

# VMware vSphere Install, Configure, Manage | Lab Guide

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the RH VM into the new resource pool. Additionally, we can make a sub-pool, and deleting a resource pool won't affect the included VMs; it will just sever their connection to that pool.

The screenshot shows the VMware vSphere Client interface. The URL in the address bar is <https://vcenter01.abdelwahed.me/ui/app/resourcepool;nav=h/urn:vmomi:ResourcePool:resgroup-1011:02c2f8d4-ec57->. A banner at the top right says "There are expired or expiring licenses in your inventory." with a "MANAGE YOUR LICENSES" button. The left sidebar shows a hierarchy: vcenter01.abdelwahed.me > vDatacenter > Cluster01 > esxi01.abdelwahed.me > esxi02.abdelwahed.me > Resource Pool\_01 > RH. The main pane is titled "Resource Pool\_01" and shows the "Summary" tab. It displays statistics: This pool / Total VMs and Templates: 1 / 1, Powered on VMs: 1 / 1, Child Resource Pools: 0 / 0, and Child vApps: 0 / 0. The "Actions" menu is visible at the top right of the main pane.

## vApp in VMware vSphere

A vApp in VMware is a container that allows you to group multiple virtual machines (VMs) together and manage them as a single entity. It extends the functionality of resource pools by providing additional management features and a higher level of abstraction.

### Key Features of vApp

1. **Resource Allocation:**
  - Like resource pools, vApps allow you to allocate resources (CPU and memory) to a group of VMs based on their priority and workload.
2. **Start Order:**
  - You can define the start order for VMs within the vApp, ensuring that dependent applications or services are started in the correct sequence.
3. **Power State Control:**
  - You can control the power state of all VMs within the vApp simultaneously. This is useful for managing maintenance windows or other operational tasks.
4. **Simplified Management:**
  - Instead of managing individual VMs, you can manage the vApp as a single entity, simplifying management and improving efficiency.

### Use Cases for vApp

- **Multi-Tiered Applications:**
  - Group related VMs that form a multi-tiered application (e.g., web server, application server, database server) and manage them together.
- **Development Environments:**
  - Create development or test environments with multiple VMs and manage them as a single unit.
- **Maintenance:**
  - Power on or off all VMs in the vApp at the same time for maintenance purposes.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Creating and Managing a vApp

The screenshot shows the VMware vSphere Client interface with the following details:

- Top Bar:** Shows "vSphere Client" and "Administrator@".
- Left Navigation:** Shows "vCenter01.abdelwahed.me" and "vServer". Under "vServer", there is a "Cluster01" folder containing "esxi01.abdelwahed.me", "esxi02.abdelwahed.me", "Resource Pool", and "Web\_Server".
- Actions Panel:** Shows "Cluster01" and "Configure" selected. A tooltip indicates "vSphere HA is Turned OFF" and "Proactive HA is Turned OFF".
- Central Area:** A context menu is open over "Cluster01" with the "New vApp..." option highlighted.
- New vApp Wizard:** The first step "Select creation type" is active. It offers two options:
  - Create a new vApp: "This option guides you through creating a new vApp. You will be able to customize CPU and memory resources."
  - Clone an existing vApp
- Select a name and location:** The "vApp name:" field contains "Abdelwahed\_vApp". The "Select a folder or datacenter" dropdown shows "vServer" and "Discovered virtual machine".
- Resource allocation:** Shows CPU settings:
  - Shares: High (8000)
  - Reservation: 300 MHz
  - Reservation Type: Expandable
  - Limit: Unlimited (5,728 MHz)

# VMware vSphere Install, Configure, Manage | Lab Guide

The screenshot shows the 'New vApp' wizard in progress, specifically the 'Review and finish' step. The summary table includes:

Name	Abdelwahed_vApp
Location	vServer
Resource	Cluster01
CPU allocation	300 - Unlimited MHz
Memory allocation	2048 - Unlimited MB

Below the wizard, the 'Abdelwahed\_vApp' details page is shown. The 'Actions' menu for the vApp is open, with the 'Power' option highlighted. A sub-menu shows 'Power On' (highlighted), 'Power Off', 'Suspend', and 'Shut Down'. The vApp tree on the left shows 'vCenter01.abdelwahed.me' and its children.

## Edit vApp | Abdelwahed\_vApp

The 'Edit vApp' interface is displayed for 'Abdelwahed\_vApp'. The 'Start Order' tab is selected. The table lists resources with their current status as 'Normal' and no VMs assigned:

Name	Order	Startup action	Startup delay (s)	VM tools	Shutdown action	Shutdown delay (s)

Below the table, there are sections for 'Order' and 'Group' settings, and 'Startup' and 'Shutdown' configurations with dropdown menus for 'Action' and 'Delay (s)'.

## VMware vSphere Lifecycle Manager

VMware vSphere Lifecycle Manager is a feature integrated into vCenter Server, providing centralized management for the lifecycle of ESXi hosts. It simplifies updating, patching, and configuring hardware and software components, ensuring compliance and optimal performance.

### Key Features

1. **Centralized Management:**
  - Provides a single interface for managing the entire lifecycle of ESXi hosts.
  - Included with vCenter Server, no additional installation required.
2. **Lifecycle Stages:**
  - **Deployment:** Deploy new ESXi hosts.
  - **Maintenance:** Apply updates and patches.
  - **Retirement:** Decommission and retire hosts.
3. **Baselines and Compliance:**
  - Create and apply baselines for host configuration and software updates.
  - Ensure hosts meet compliance standards for security and regulations.
4. **Hardware and Software Management:**
  - Visibility into firmware, driver versions, and other hardware components.
  - Update and manage hardware and software components as needed.
5. **HTML5-Based Interface:**
  - Accessible through the vSphere Client, providing a modern, intuitive interface for managing host lifecycles.

### Steps to Use vSphere Lifecycle Manager

1. **Access vSphere Lifecycle Manager:**
  - Open the vSphere Client and navigate to the Lifecycle Manager interface.
2. **Create Baselines:**
  - Define baselines for host configurations and software updates.
  - Baselines can include patches, updates, and configurations needed for compliance.
3. **Attach Baselines to Hosts:**
  - Select individual hosts or groups of hosts to apply baselines.
  - Ensure that hosts are evaluated against the baselines to identify non-compliance.
4. **Update and Patch Hosts:**
  - Use the Lifecycle Manager to apply updates and patches to ESXi hosts.
  - Schedule updates to minimize disruption to operations.
5. **Monitor Compliance:**
  - Regularly check host compliance with defined baselines.
  - Address any compliance issues by applying necessary updates and configurations.
6. **Manage Hardware Components:**
  - View detailed information on host hardware components.
  - Update firmware and drivers to maintain compatibility and performance.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Benefits

- **Improved Efficiency:** Streamlines the process of managing ESXi host lifecycles from a central location.
- **Enhanced Compliance:** Helps ensure hosts meet security and regulatory standards.
- **Better Visibility:** Provides detailed insights into hardware and software components, aiding in proactive management.

## Best Practices

- **Regular Updates:** Frequently update baselines and apply patches to keep hosts secure and up-to-date.
- **Compliance Monitoring:** Continuously monitor host compliance to avoid potential security and regulatory issues.
- **Proactive Management:** Use the hardware and software management features to proactively address potential issues before they impact operations.

The screenshot shows the VMware vSphere Client interface. The left sidebar has a red box around the 'Lifecycle Manager' item. The main area is titled 'Lifecycle Manager' with tabs for 'Image Depot' and 'Updates'. A dropdown menu labeled 'ACTIONS' is open, with a red box highlighting the 'Import Updates' option. The URL in the browser bar is https://vcenter01.abdelwahed.me/ui/app/plugin/com.vmware.vum.client/com.vmware.vum.domainView.

# VMware vSphere Install, Configure, Manage | Lab Guide

## Upgrading ESXi Hosts Using VMware vSphere Lifecycle Manager

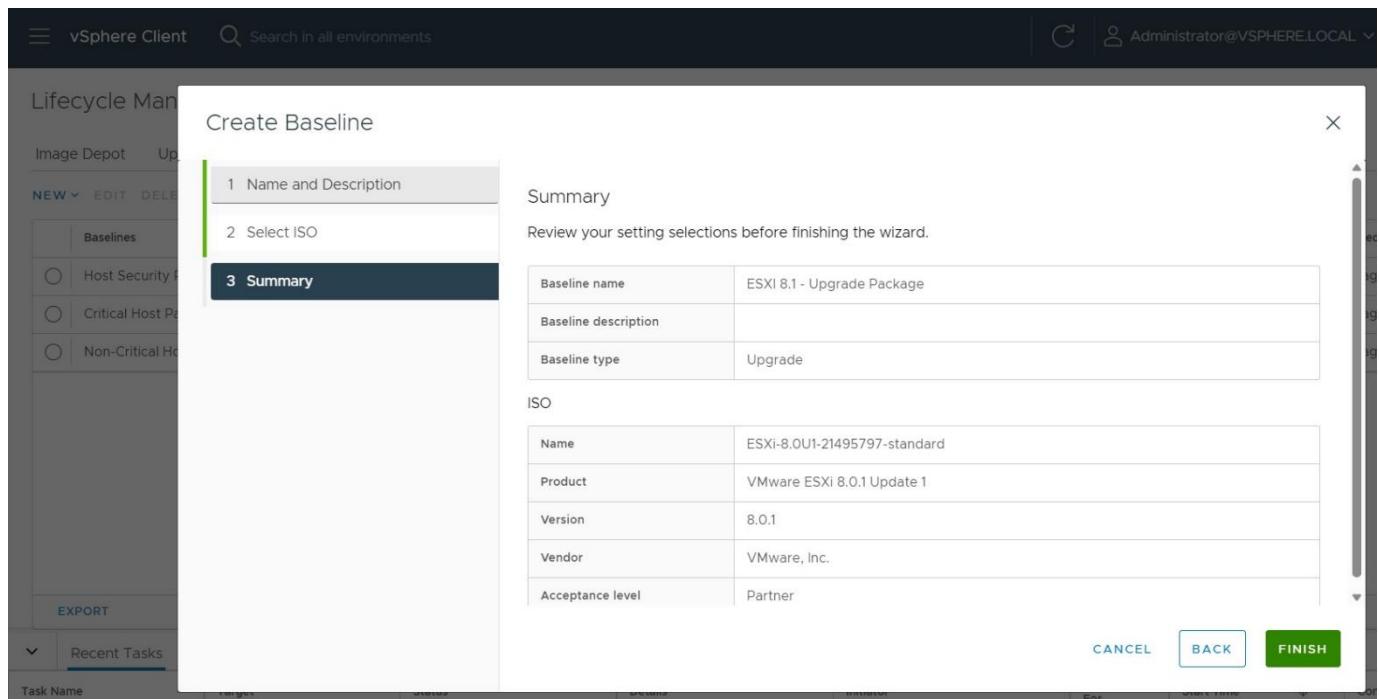
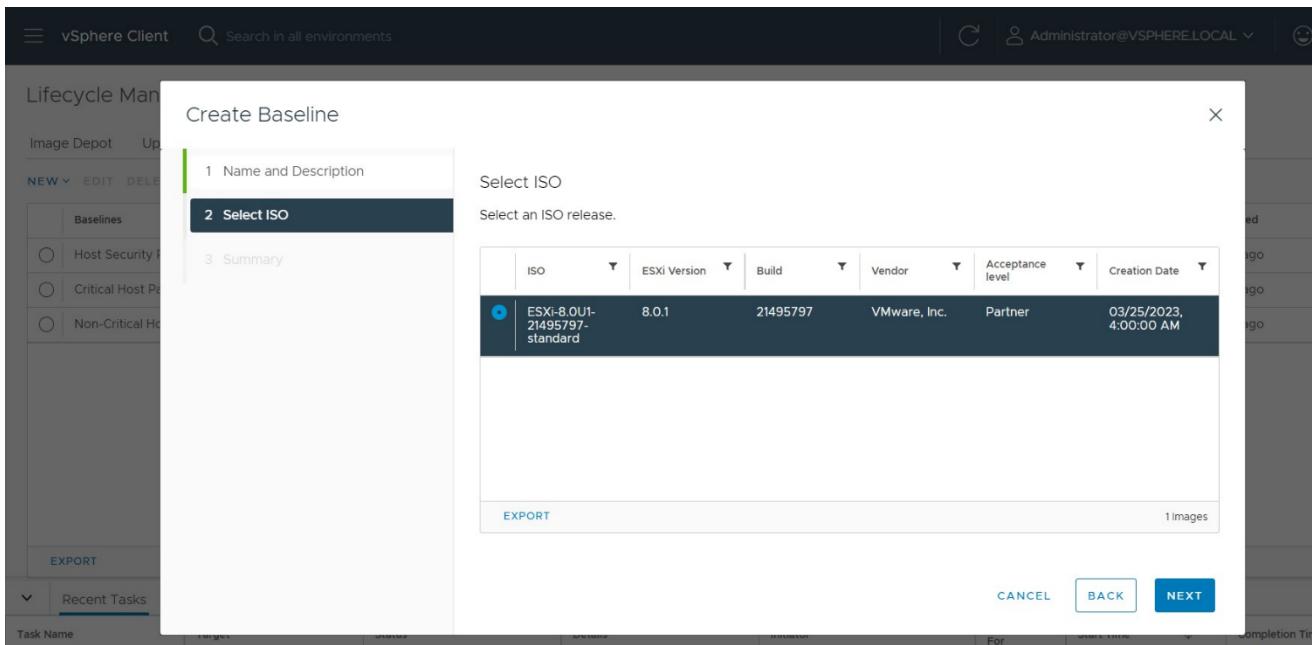
### Steps to Upgrade ESXi Hosts

The screenshot shows the vSphere Client interface with the Lifecycle Manager module selected. The 'Imported ISOs' tab is active, indicated by a red box. A single row in the table is highlighted with a red box, representing an imported ISO named 'ESXi-8.0U1-21495797-standard'. The table includes columns for Name, Product, Version, Build, Vendor, Acceptance Level, and Creation Date.

The screenshot shows the vSphere Client interface with the Lifecycle Manager module selected. The 'Baselines' tab is active, indicated by a red box. A table lists several baselines, with the first item, 'Baseline', highlighted with a red box. The table includes columns for Content, Type, ESXi version, and Last Modified.

The screenshot shows the vSphere Client interface with the Lifecycle Manager module selected. A modal dialog titled 'Create Baseline' is open, with the '1 Name and Description' step highlighted by a red box. In this step, the user is prompted to enter a name and select the baseline type. The 'Name' field contains 'ESXi 8.1 - Upgrade Package'. The 'Content' section shows three options: 'Upgrade' (selected), 'Patch', and 'Extension', with 'Upgrade' highlighted with a red box. The 'NEXT' button is visible at the bottom right of the dialog.

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## From the ESXi Perspective

The screenshots illustrate the steps to attach a baseline to an ESXi host:

- Screenshot 1:** The left sidebar shows the navigation tree. A red box highlights the selected host, **esxi1.ohi.com**. A purple circle labeled **1** is placed on the host icon.
- Screenshot 2:** The main pane shows the **Baselines** tab selected. A red box highlights the **Updates** tab at the top right. A purple circle labeled **2** is placed on the **Updates** tab.
- Screenshot 3:** The **Baselines** tab is selected. A red box highlights the **Attached Baselines** section. A purple circle labeled **3** is placed on the **Baselines** tab.
- Screenshot 4:** A dropdown menu is open under the **ATTACH** button. A red box highlights the **ATTACH** button. A purple circle labeled **4** is placed on the **ATTACH** button.
- Screenshot 5:** The dropdown menu shows two options: **Create and Attach Baseline** and **Create and Attach Baseline Group**. A red box highlights the **Attach Baseline or Baseline Group** button. A purple circle labeled **5** is placed on the **Attach Baseline or Baseline Group** button.
- Screenshot 6:** The **Attached Baselines** table shows a single entry: **ESXi 8.1 - Upgrade Package**. A red box highlights this entry. A purple circle labeled **1** is placed on the entry.
- Screenshot 7:** The **PRE-CHECK REMEDIATION** section is highlighted with a red box. A purple circle labeled **2** is placed on the **PRE-CHECK REMEDIATION** section.
- Screenshot 8:** A modal window titled **Remediation Pre-check | esxi1.ohi.com** is displayed. It contains the message: **No cluster has any issue that may prevent completion of remediation**. A red box highlights this message. A purple circle labeled **3** is placed on the message.
- Screenshot 9:** The **RE-RUN PRE-CHECK** and **DONE** buttons are visible at the bottom of the modal. A red box highlights the **DONE** button. A purple circle labeled **4** is placed on the **DONE** button.

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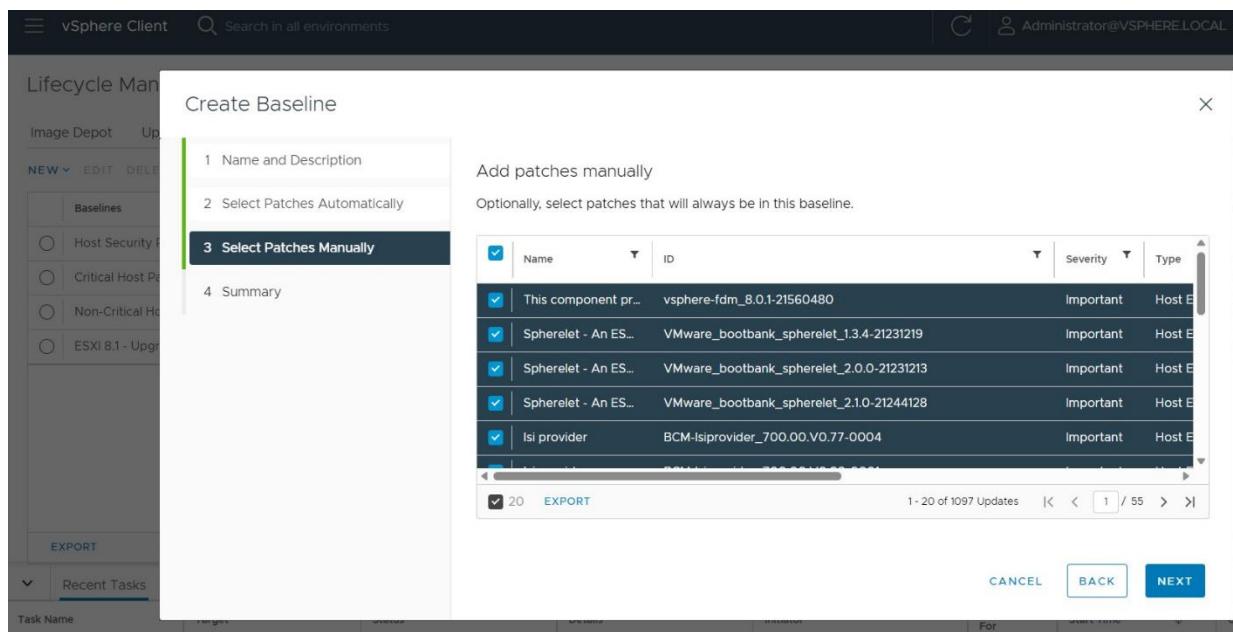
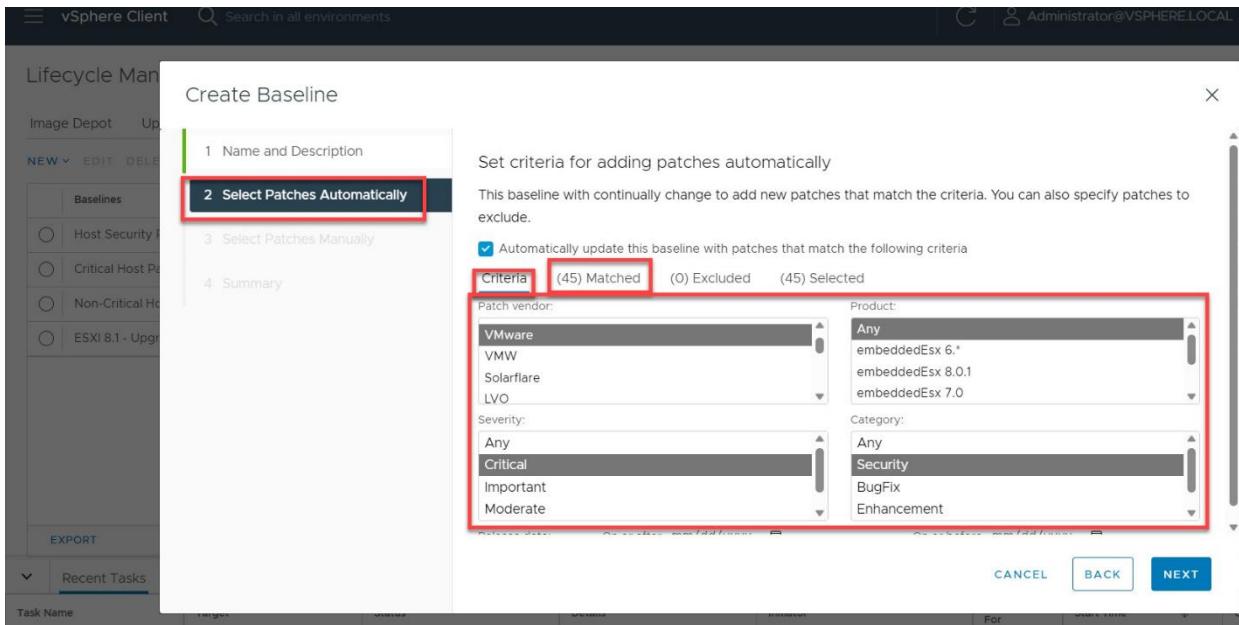
The screenshot shows the vSphere Client interface. On the left, the navigation tree highlights the host `esxi1.ohi.com`. A context menu is open over this host, with the 'Maintenance Mode' option selected and highlighted by a red box. Under 'Maintenance Mode', the 'Enter Maintenance Mode' option is also highlighted with a red box.

This screenshot shows the 'Updates' tab for the host `esxi1.ohi.com`. The 'Attached Baselines' section indicates that the host is 'Ready to remediate', which is highlighted with a red box. At the bottom of the 'Attached Baselines' table, there is a 'REMEDIEATE' button, also highlighted with a red box.

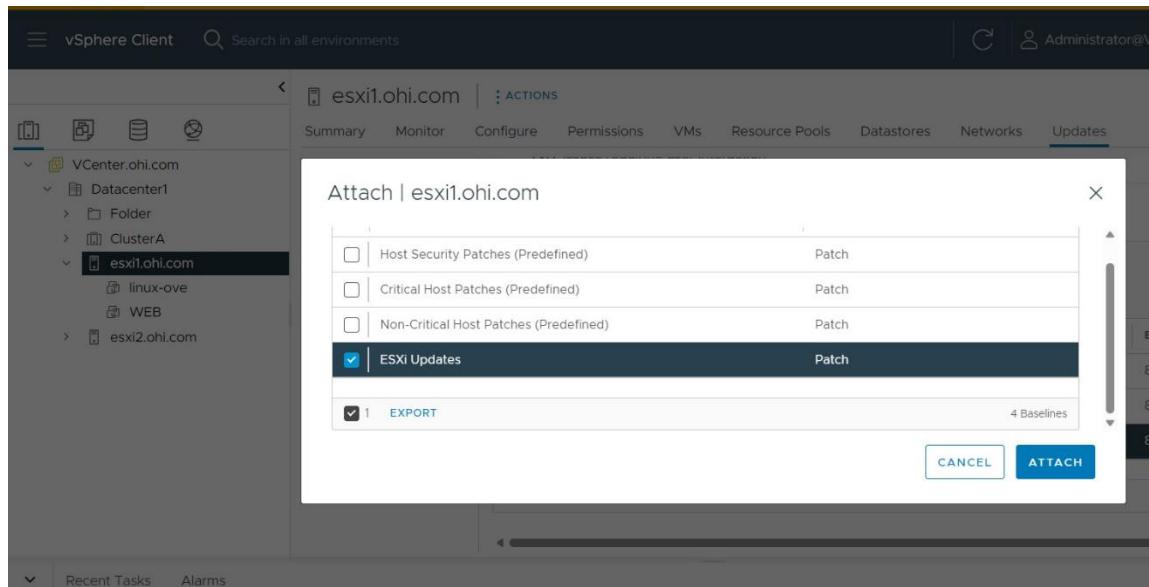
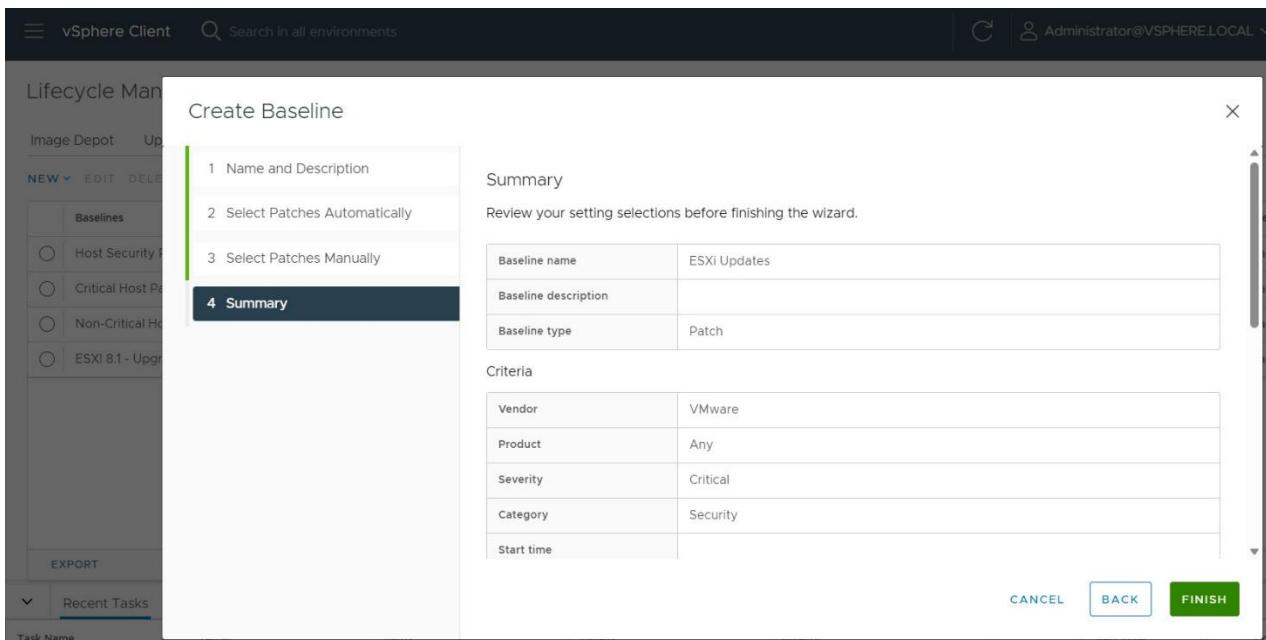
This screenshot shows a modal dialog titled 'VMware General Terms'. It displays the terms of service and a checkbox for accepting them. The 'Accept' button at the bottom right is highlighted with a red box.

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## Establish and attach a new baseline for updates.



# VMware vSphere Install, Configure, Manage | Lab Guide



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The screenshot shows the vSphere Client interface for managing an ESXi host. The left sidebar lists vCenter servers, Datacenters, Clusters, and hosts. The main pane is for the host 'esxi1.ohi.com'. The 'Updates' tab is selected, showing a summary of issues requiring user interaction and a list of attached baselines.

**Attached Baselines:**

Attached Baseline	Status	Type	ESXi version	Last Modified
Host Security Patches (Predefined)	Unknown	Patch	8.0, 7.0, 6.7.0	19 hours ago
Critical Host Patches (Predefined)	Unknown	Patch	8.0, 7.0, 6.7.0	19 hours ago
ESXi 8.1 - Upgrade Package	Unknown	Upgrade	8.0.1	18 hours ago
<b>ESXi Updates</b>	Unknown	Patch	7.0, 7.0.0, 8.0, ...	17 hours ago

A red box highlights the 'PRE-CHECK REMEDIATION' link and the 'ESXi Updates' baseline in the list.

**Remediate | esxi1.ohi.com with ESXi Updates**

This dialog box shows the host ready for remediation. It lists one host ('esxi1.ohi.com') with its details: Host Name (esxi1.ohi.com), Version (8.0.1), Patches (65 (0 Staged)), Extensions (0 (0 Staged)), and Remediation Status (Ready). A red box highlights the host entry in the table.

**Buttons:** CANCEL, REMEDIATE

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## Backup and Restore vCenter Server

Not secure | https://vcenter.ohi.com:5480/#/ui/backup

vCenter Server Management | Wed 08-02-2023 12:18 PM UTC | English | Help | Actions | root

Summary | Monitor | Access | Networking | Firewall | Time | Services | Update | Administration | Syslog | **Backup**

Backup Schedule | Status: Not configured | CONFIGURE

Activity | BACKUP NOW | No items to display

vCenter Server Management | Wed 08-02-2023 12:25 PM UTC | English | Help | Actions

Summary | Monitor | Access | Networking | Firewall | Time | Services | Update | Administration | Syslog | **Backup**

Create Backup Schedule

Backup location: nfs://192.168.221.100/vbk

User name: administrator@ohi.com

Password:

Schedule: Daily at 11 : 59 P.M. Etc/UTC

Encrypt backup:  Encryption Password  
 Confirm Password

Number of backups to retain: Retain last 30 backups

Data:

- Stats, Events, and Tasks (42 MB)
- Inventory and configuration (84 MB)

Total size (compressed): 126 MB

CANCEL | CREATE

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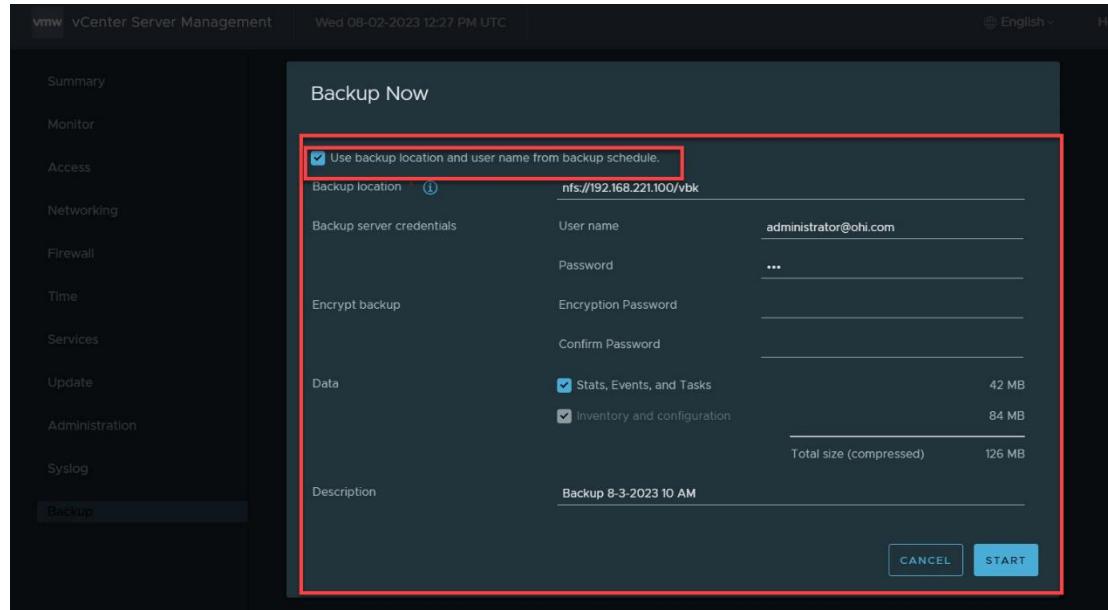
This screenshot shows the vCenter Server Management interface. The left sidebar includes options like Summary, Monitor, Access, Networking, Firewall, Time, Services, Update, Administration, Syslog, and Backup. The Backup section is currently selected. The main content area displays a 'Backup Schedule' table with the following data:

Backup Schedule	
Status	Activated
Schedule	Daily , 11:59 P.M. Etc/UTC
Backup Location	nfs://192.168.221.100/vbk
Backup data	<ul style="list-style-type: none"><li>• Stats, Events, and Tasks</li><li>• Inventory and configuration</li></ul>
Number of backups to retain	30

Below the schedule, there's an 'Activity' section with a 'BACKUP NOW' button.

This screenshot is identical to the one above, but the 'Backup Schedule' table is highlighted with a red box. Additionally, the 'BACKUP NOW' button in the 'Activity' section is also highlighted with a red box.

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Before taking a backup, a backup server must be set up and configured such that the vCenter server has access to it. The protocols supported for backup are FTPS, HTTPS, SFTP, FTP, NFS, SMB and HTTP.

Backup Location	Type	Status	Data Transferred	Duration	End Time
nfs://192.168.221.100/vbk/v...	Manual	95%	171.27MB	00:00:15	00:00:15

EDIT DEACTIVATE DELETE

BACKUP NOW

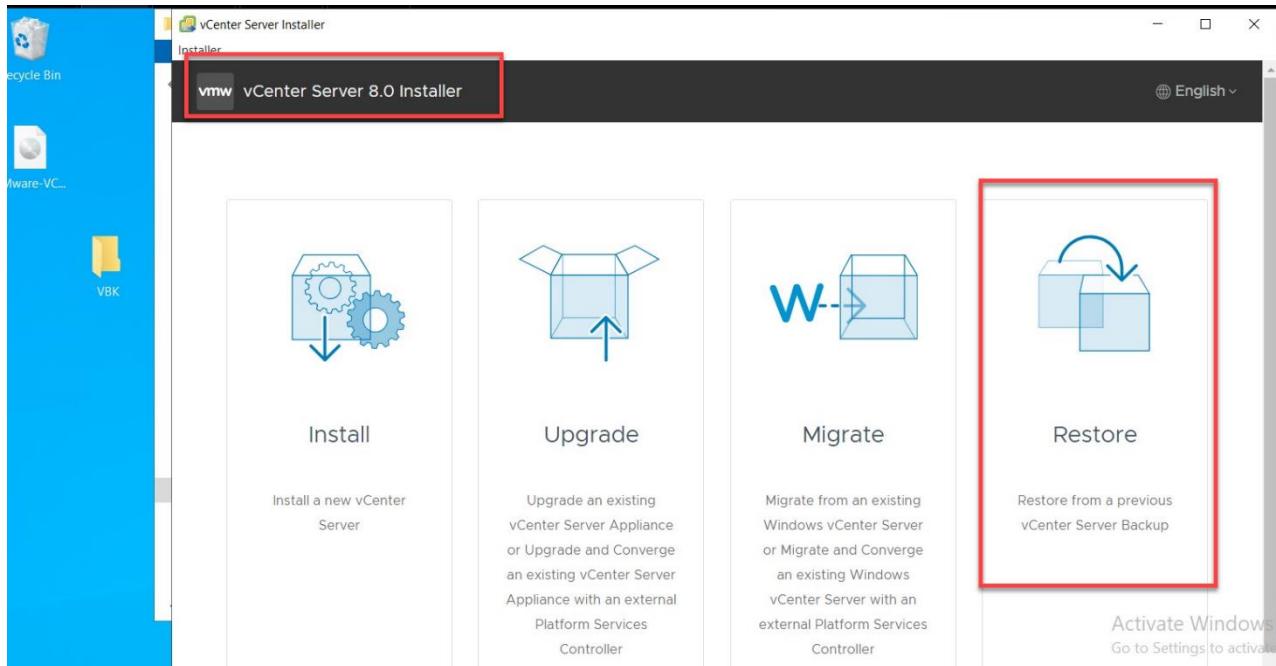
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The screenshot shows the vCenter Server Management interface. On the left, there's a sidebar with various tabs: Summary, Monitor, Access, Networking, Firewall, Time, Services, Update, Administration, Syslog, and Backup. The Backup tab is selected. In the main area, there's a message about backup requirements. Below it, the 'Backup Schedule' section shows a single entry with status 'Activated'. A red box highlights the 'Activity' section, which displays a table of backup details:

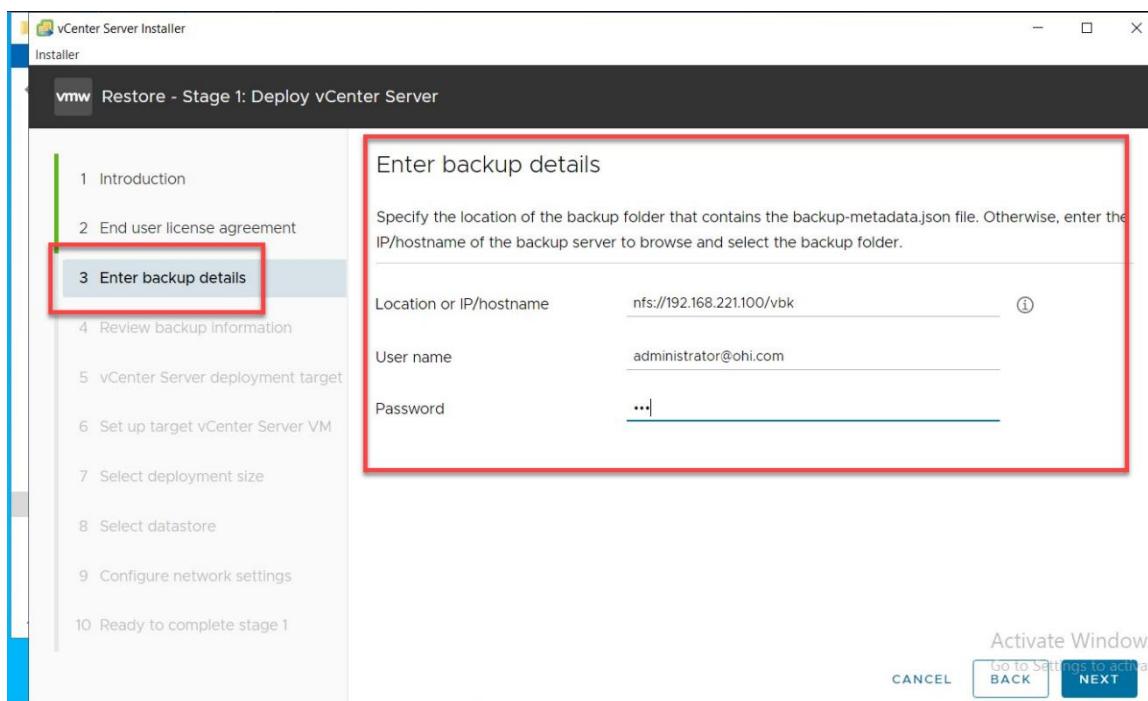
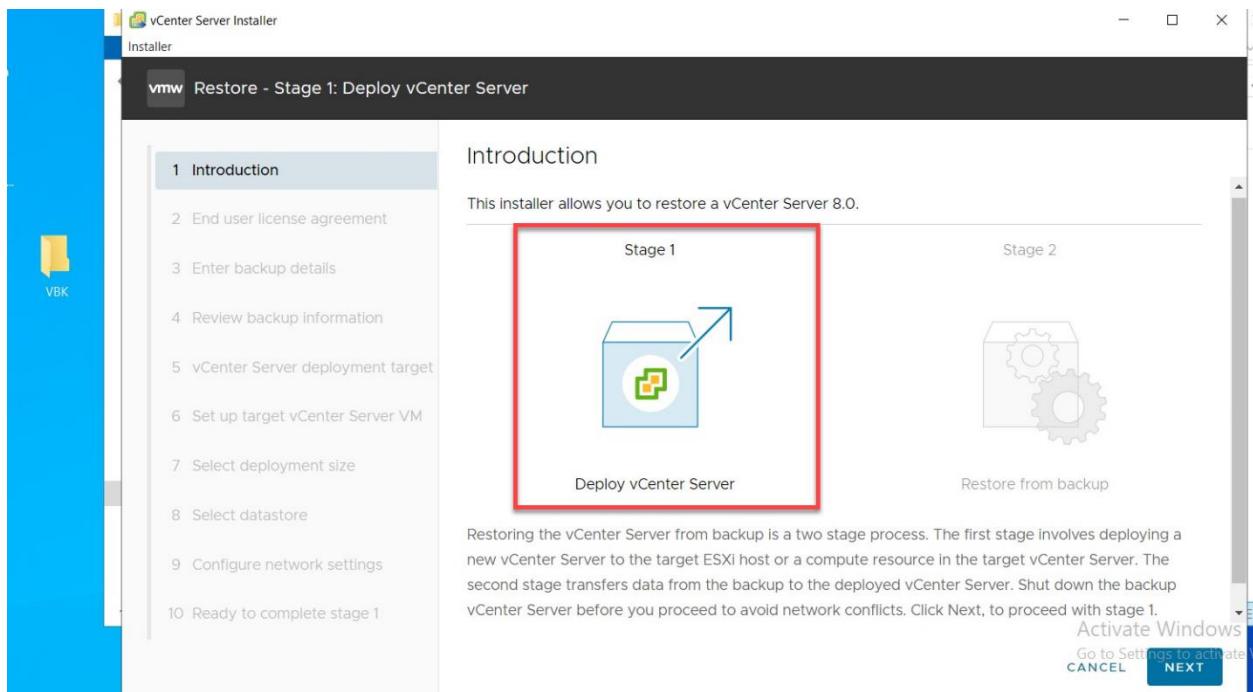
Backup Location	Type	Status	Data Transferred	Duration	End Time
nfs://192.168.221.100/vbk/v...	Manual	Complete	883.38MB	00:00:49	Aug 2, 2023, 04:28:15 PM

Below the table, there are additional details: Backup Location (nfs://192.168.221.100/vbk/vCenter/sn\_VCenter.ohi.com/M\_8.0.1.00000\_20230802-122726\_JQWG23VOAQDQLJTFUZDAMRTEAYTAICBJU=====), Version (VC-8.0.1), Backup server user name (administrator@ohi.com), and Start Time (Aug 2, 2023, 04:27:26 PM). A 'BACKUP NOW' button is visible at the top right of the activity table.

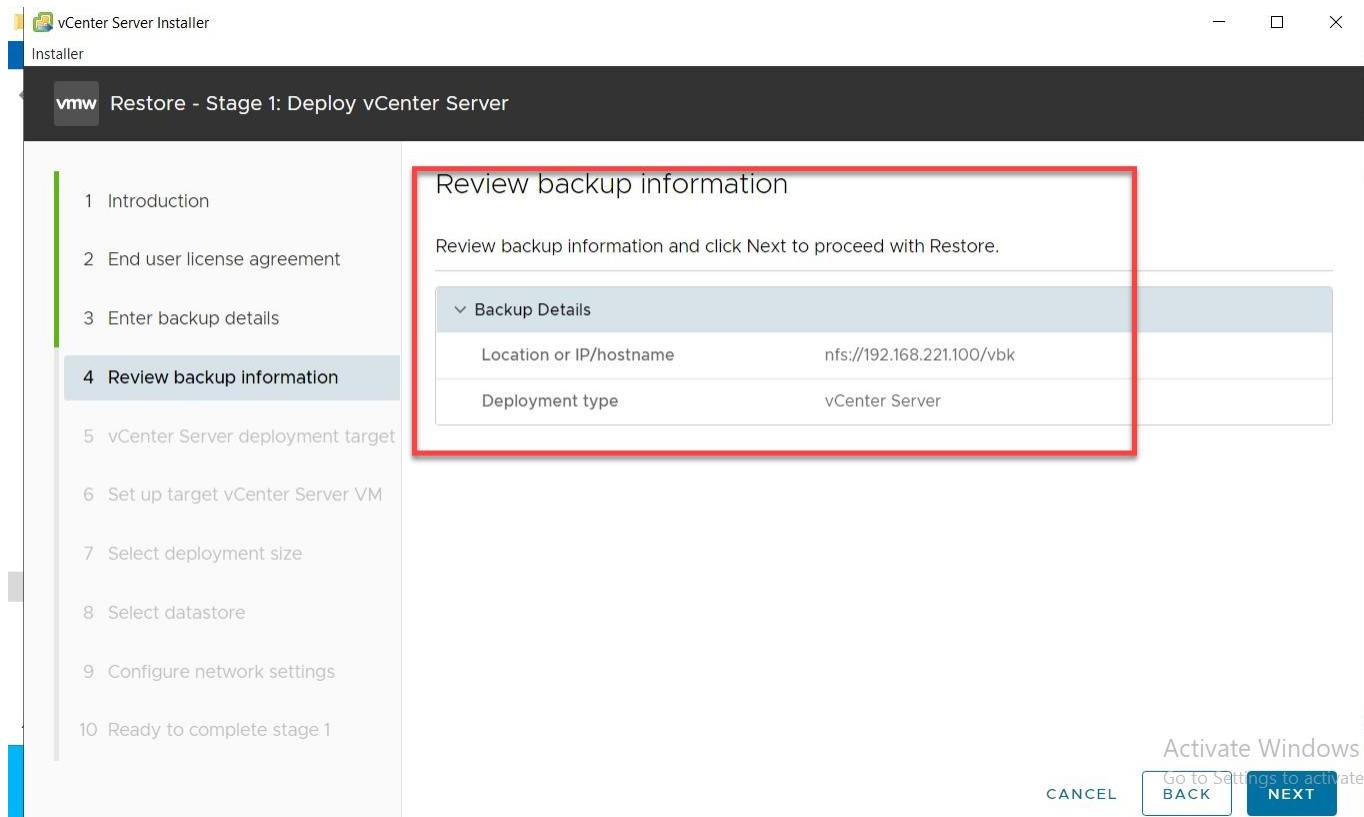
Restore using vCenter setup media.



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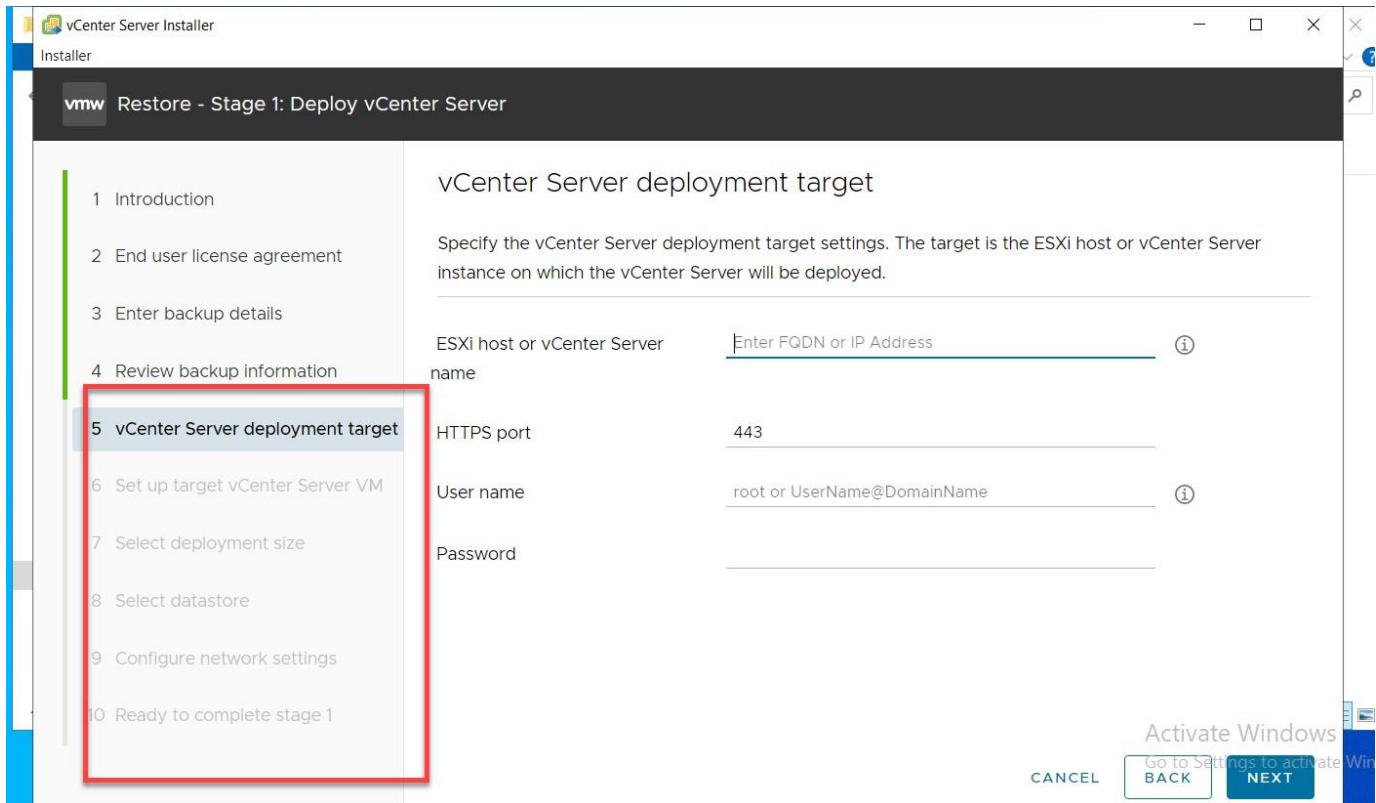


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and complete the normal installation process.



## Performance Monitoring

The screenshot shows the 'vSphere Client' interface. The left sidebar shows a hierarchy with 'VCenter.ohi.com' expanded, showing 'Datacenter1', 'ClusterA', 'esxi1.ohi.com' (with sub-folders 'linux-ove' and 'WEB'), and 'esxi2.ohi.com'. The main content area is titled 'Datacenter1' and has tabs for 'Summary', 'Monitor', 'Configure', 'Permissions', 'Hosts & Clusters' (which is selected and highlighted with a red box), 'VMs', 'Datastores', 'Networks', and 'Updates'. Below these tabs is a table showing host performance metrics:

Name	State	Status	Cluster	Consumed CPU %	Consumed Memory %	HA State
esxi1.ohi.com	Connected	Normal		0%	34%	N/A
esxi2.ohi.com	Connected	Normal		0%	34%	N/A
esxi3.ohi.com	Connected	Alert		6%	95%	N/A

# VMware vSphere Install, Configure, Manage | Lab Guide

This screenshot shows the vSphere Client interface for Datacenter1. The left sidebar lists various hosts and clusters under VCenter.ohi.com. The main pane displays a table of virtual machines (VMs) with columns for Name, State, Status, Provisioned Space, Used Space, Host CPU, and Host Mem. A red box highlights the VM table.

Name	State	Status	Provisioned Space	Used Space	Host CPU	Host Mem
Clone-web	Powered on	Normal	102.34 GB	10.89 GB	0 Hz	0 B
linux	Powered on	Normal	26.33 GB	1.9 GB	0 Hz	0 B
linux-ove	Powered on	Normal	488.93 MB	64.1 MB	0 Hz	0 B
Rocky2	Powered on	Normal	17.26 GB	7.25 GB	0 Hz	0 B
VCenter	Powered on	Normal	600.55 GB	52.12 GB	1.21 GHz	12.48 GB
WEB	Powered on	Normal	213.82 GB	12.15 GB	0 Hz	0 B

This screenshot shows the vSphere Client interface for esxi3.ohi.com. The left sidebar shows a folder structure under VCenter.ohi.com. The main pane displays the Performance Overview for CPU and Memory usage. A red box highlights the Performance Overview section.

**Performance Overview**  
Period: Real-time (08/02/2023, 3:45:20 PM - 08/02/2023, 4:44:40 PM)  
View: Overview

**CPU**  
Usage for 2 (green line), Usage for esxi3.ohi.com (blue line), Active (green bar), Swap (purple bar)

**Memory**  
KB (Y-axis), Usage for 2 (green line), Usage for esxi3.ohi.com (blue line), Active (green bar), Swap (purple bar)

This screenshot shows the vSphere Client interface for esxi3.ohi.com, similar to the previous one but with a different view. The left sidebar shows a folder structure under VCenter.ohi.com. The main pane displays the Performance Overview for CPU and Memory usage. A red box highlights the Performance Overview section.

**Performance Overview**  
Period: Real-time (08/02/2023, 3:45:20 PM - 08/02/2023, 4:44:40 PM)  
View: Overview

**CPU**  
Usage for 2 (green line), Usage for esxi3.ohi.com (blue line), Active (green bar), Swap (purple bar)

**Memory**  
KB (Y-axis), Usage for 2 (green line), Usage for esxi3.ohi.com (blue line), Active (green bar), Swap (purple bar)

# VMware vSphere Install, Configure, Manage | Lab Guide

vSphere Client Search in all environments Administrator@VSphere.LOCAL

esxi3.ohi.com ACTIONS

Summary Monitor Configuration Permissions VMs Resource Pools Datastores Networks Updates

Issues and Alarms ▾ Period: Last day 08/01/2023, 4:50:00 PM - 08/02/2023, 4:45:00 PM View: Overview

**Performance Overview**

CPU Memory

Legend: Usage for esxi3.ohi.com, Usage in MHz, Balloon, Usage for esxi3.ohi.com, Consumed

Recent Tasks Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time
-----------	--------	--------	---------	-----------	------------	------------	-----------------

vSphere Client Search in all environments Administrator@VSphere.LOCAL

esxi3.ohi.com ACTIONS

Summary Monitor Configuration Permissions VMs Resource Pools Datastores Networks Updates

Issues and Alarms ▾ All Issues Triggered Alarms Performance Overview Advanced Tasks and Events ▾ Tasks Events Resource Allocation ▾ CPU Memory

**Advanced Performance** CPU, 08/02/2023, 3:48:20 PM - 08/02/2023, 4:47:40 PM Period: Real-time Chart Options View: CPU usage in %

08/02/2023, 4:01:00 PM CPU usage as a percentage during the interval: 25.81

Recent Tasks Alarms

vSphere Client Search in all environments Administrator@VSphere.LOCAL

esxi3.ohi.com ACTIONS

Summary Monitor Configuration Permissions VMs Resource Pools Datastores Networks Updates

Issues and Alarms ▾ All Issues Triggered Alarms Performance Overview Advanced Tasks and Events ▾ Tasks Events Resource Allocation ▾ CPU Memory

**Advanced Performance** Memory, 08/02/2023, 3:51:00 PM - 08/02/2023, 4:50:20 PM Period: Real-time Chart Options View: Memory

**Performance Chart Legend**

Key	Object	Measurement	Rollup	Units	Latest	Maximum	Minimum	Average
[Red Box]	esxi3.ohi.com	Active	Average	KB	2,594,188	4,360,144	2,590,252	3,381,047.5
[Red Box]	esxi3.ohi.com	Balloon memory	Average	KB	0	710,328	0	309,737.06
[Red Box]	esxi3.ohi.com	Consumed	Average	KB	15,013,816	15,100,744	14,893,372	14,999,083
[Red Box]	esxi3.ohi.com	Granted	Average	KB	15,134,572	15,219,296	14,509,060	14,846,204
[Red Box]	esxi3.ohi.com	Shared common	Average	KB	391,296	402,348	320,060	370,907.44
[Red Box]	esxi3.ohi.com	Swap consumed	Average	KB	2,448	2,464	2,448	2,454,324

Recent Tasks Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time
-----------	--------	--------	---------	-----------	------------	------------	-----------------

## Troubleshooting

Troubleshooting VMware vCenter can encompass a broad range of issues, as vCenter is a complex product with various components and dependencies. Here's a structured approach to troubleshooting vCenter:

### 1. Identify the Problem:

- **Symptoms:** Understand the specific issues being faced. Are there errors in the vCenter UI? Is vCenter unresponsive? Are there issues with specific functionalities like vMotion or provisioning VMs?

### 2. Check vCenter Server Status:

- **Services:** Ensure all necessary VMware services are running.
  - For Windows-based vCenter, check using the Services console.
  - For vCenter Server Appliance (VCSA), check using the VAMI interface or **service-control** command.
- **Logs:** Examine the vCenter logs for any errors or warnings. The logs can be found at:
  - Windows: **C:\ProgramData\VMware\vCenterServer\logs**
  - VCSA: **/var/log/vmware**

### 3. Database Issues:

- Check the health of the database. Ensure there's enough space and that the database service is running.
- Look for database connection errors in the logs.

### 4. Networking:

- **Connectivity:** Test the network connectivity to the vCenter server using tools like **ping** and **traceroute**.
- **Firewall:** Ensure required ports for vCenter are open and not blocked by a firewall.
- **DNS:** Confirm that DNS resolution is working for the vCenter server and ESXi hosts.

### 5. Authentication:

- **SSO (Single Sign-On):** If there are authentication issues, check the status of the SSO service.
- **AD/LDAP:** If vCenter is integrated with Active Directory or another LDAP service, ensure it can connect and authenticate users.

### 6. Performance:

- If vCenter is slow or unresponsive, check CPU, memory, and disk utilization.
- Monitor database performance, especially if the database is external.

### 7. Licensing:

- Confirm that licenses haven't expired.
- Ensure there are no errors related to licensing in the logs.

### 8. Integration with Other Components:

- If you're using solutions integrated with vCenter (like NSX, vSAN, etc.), check their status and logs.

### 9. Backup and Recovery:

- If there's a critical failure, consider restoring from a backup.
- Always make backups before making significant changes or upgrades.

### 10. Reach Out to VMware Support:

- If you can't identify the issue, consider creating a support bundle and contacting VMware support. The support bundle contains logs and configurations that can help VMware support diagnose the issue.

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## Services

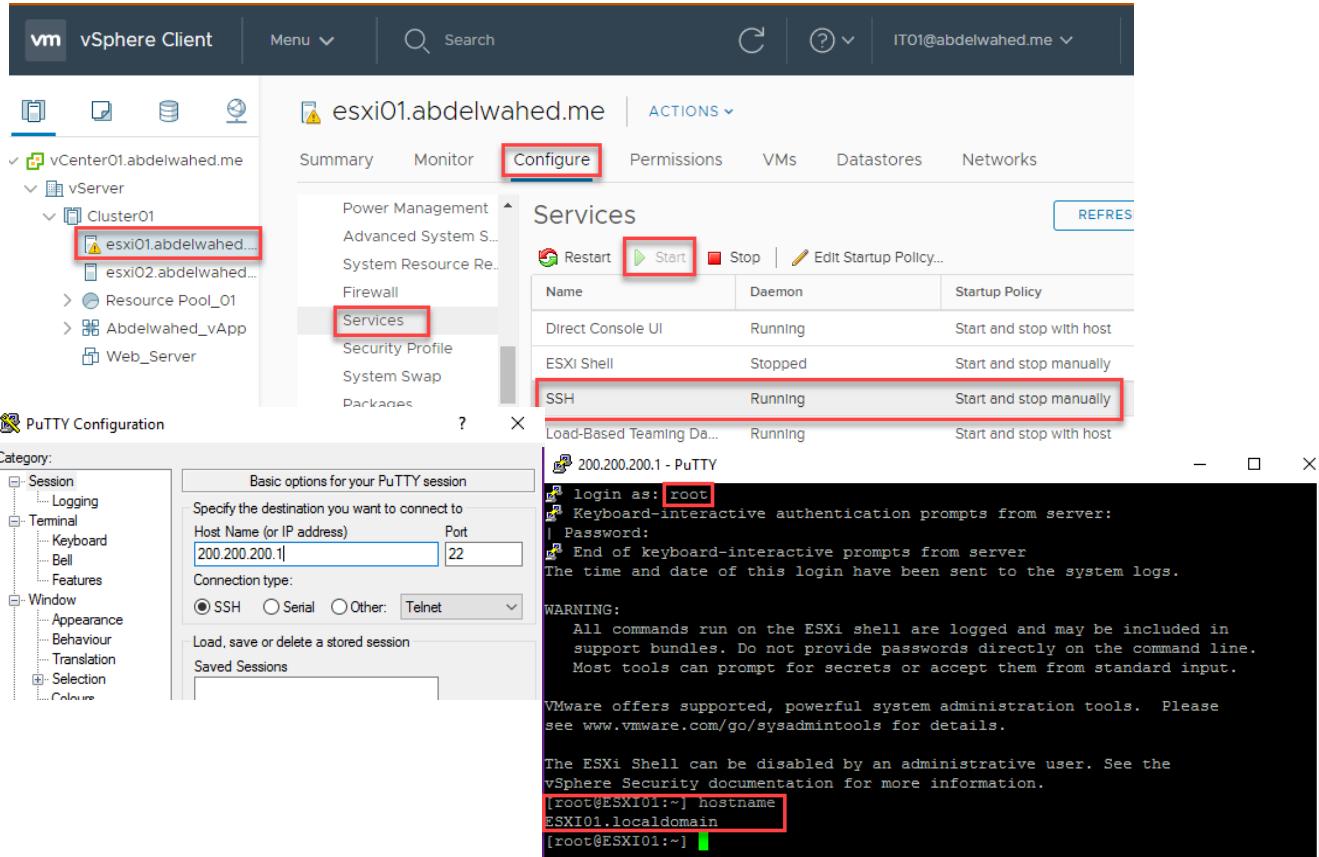
Component	Service Name	Alias	Description	Default State
vCenter	vCenter Server	vpxd	Core service of vCenter, enabling VM provisioning, vMotion, DRS, etc.	Running
	VMware Directory Service	vmdir	Manages Single Sign-On (SSO) capabilities and security tokens.	Running
	VMware Content Library	content-library	Manages content libraries: containers for VM templates, vApp templates, etc.	Running
	vCenter Profile-Driven Storage Service	vpxd-profile	Manages VM storage profiles and associated policies (SPBM).	Running
	VMware vCenter Identity Services	vmware-stsd	Supports authentication services for VMware components.	Running
	VMware vSphere Update Manager	vmware-updatemgr	Automates tracking, patching, and updating VMs, appliances, and ESXi hosts.	Running
	VMware Certificate Authority	vmcad	Manages certificates for vCenter services ensuring secure communication.	Running
	vSphere Lifecycle Manager (v7 and later)	vLCM	Streamlines ESXi host lifecycle management.	Running
ESXi	Hostd	hostd	Manages most operations on the ESXi host, including HA.	Running
	Vpxa	vpxa	Acts as a communication bridge between the ESXi host and vCenter, assisting in DRS operations.	Running
	Fdm	fdm	VMware High Availability (HA) service. Manages VM restarts on other hosts in case of host failure.	Running (if HA is enabled)
	vLockstep	vLockstep	Part of VMware Fault Tolerance. Provides lockstep replication of VMs for zero downtime and data loss protection.	Running (if FT is enabled)
	ESXi Shell Service	esx.shell	Provides shell access to administer ESXi hosts.	Stopped (can be enabled)
	VMware vSAN service	vsanvpd (vSAN VASA Provider)	Offers VASA provider services for vSAN.	Running (if vSAN is enabled)
	NTP Daemon	ntpd	Maintains time synchronization on ESXi hosts.	Stopped (can be enabled)

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## Establish SSH connection to ESXi host and vCenter.

To use SSH for connecting to an ESXi host, first activate SSH on the host, then employ an SSH client for the connection. Follow these instructions to establish an SSH connection with an ESXi host:



After establishing an SSH connection to an ESXi host, you have the ability to deploy numerous commands for host management and observation. Below is a list of typical SSH commands that can aid in the administration of ESXi:

ESXi Command	Description	Example
<b>esxcli system version get</b>	This command allows you to see the version and build number of your ESXi host.	<b>Example:</b> You run the command and get output similar to "VMware ESXi 6.7.0 build-8169922".
<b>esxcli network ip interface list</b>	This command displays all network interfaces on your ESXi host, along with their respective IP addresses.	<b>Example:</b> Running this command shows an output including interfaces like "vmk0", "vmk1", with their associated IP addresses.

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<b>esxcli network ip dns server list</b>	With this command, you can see the DNS servers that your ESXi host is configured to use.	<b>Example:</b> The command output shows "DNS servers: 192.0.2.53, 203.0.113.53", indicating these are the configured DNS servers.
<b>esxcli storage core device list</b>	This command reveals the storage devices that your ESXi host can access.	<b>Example:</b> Running this command might display devices like "naa.6006016045502500a7e03a8b8b7ed411" with additional information about the device.
<b>esxcli storage vmfs extent list</b>	Use this command to see the VMFS volumes and their extents on your ESXi host.	<b>Example:</b> The output might include volumes like "datastore1", along with the extent information.
<b>esxcli hardware cpu list</b>	This command provides detailed information about the CPUs on your ESXi host.	<b>Example:</b> You might see output like "CPU0, core 0, HT 0, Socket 0" which gives detailed info about each CPU.
<b>esxcli hardware memory get</b>	You can use this command to get the memory information from your ESXi host.	<b>Example:</b> The command might output something like "Physical Memory: 32 GB", showing the total physical memory.
<b>esxcli software vib list</b>	This command will show you the installed VIBs (vSphere Installation Bundles) on your ESXi host.	<b>Example:</b> Output may include VIBs like "esx-base", "vsan", each with version and installation dates.
<b>esxcli vm process list</b>	This command provides a list of the running virtual machines on your ESXi host.	<b>Example:</b> You might see an output including VM names like "vm1, vm2", with additional information such as World ID, UUID, and display name.

Keep in mind that the examples provided are for illustration purposes only and the real results will vary based on your ESXi host's particular setup and condition.

## vCenter Server Appliance (VCSA):

Action	Command
List all services	<code>service-control --list</code>
Start a service	<code>service-control --start [servicename]</code>
Stop a service	<code>service-control --stop [servicename]</code>
Restart a service	<code>service-control --restart [servicename]</code>
List service dependencies	<code>service-control --list-dependencies [servicename]</code>
List required services	<code>service-control --required-by [servicename]</code>

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