

Practical 1

Installation of VMware Esxi, Citrix Xen, Microsoft Hyper-V

Aim: 1(A) Installation of VMware Esxi.

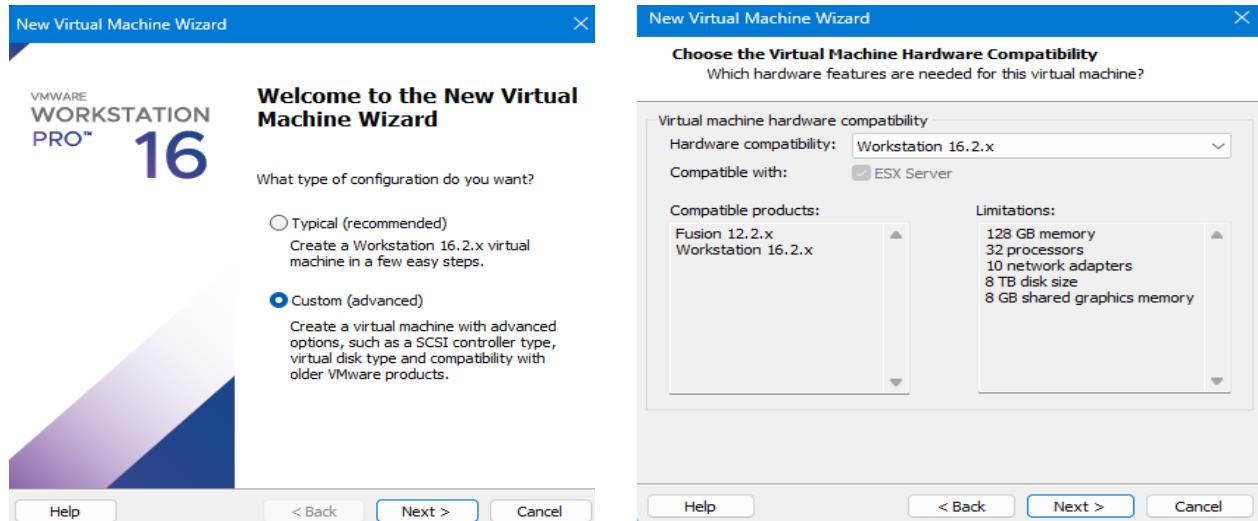
Software used: VMware Workstation Pro, VMware Esxi

Theory:

VMware ESXi is a powerful enterprise-level type-1 hypervisor that permits several virtual machines to run directly on physical hardware without a traditional OS. It is a lightweight, secure, and efficient platform that is commonly used in data centers for server consolidation and simplified IT management. ESXi boasts supporting features like vMotion, high availability, and distributed resource scheduling, thus forming the two pillars of the VMware virtualization ecosystem. Small footprint and high performance make it suitable for today's virtual infrastructures.

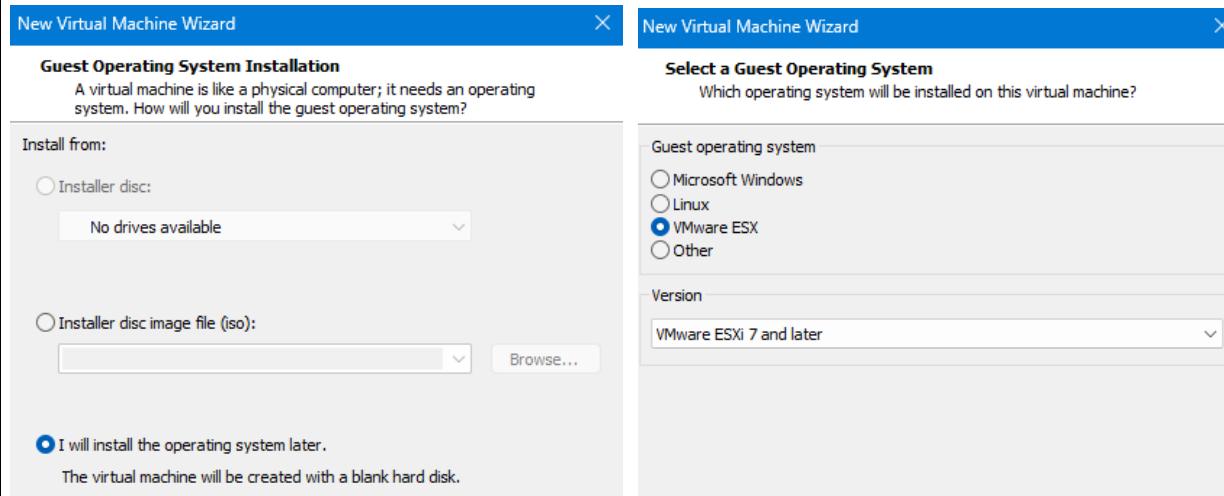
Implementation:

STEP 1: Open the VMware Workstation Pro 16. Go to the File menu. Click on New Virtual Machine option.



STEP 2: Select the option button “I will install the operating system later” & click on Next.

Then select the Guest operating system as VMware ESXi & confirm the version should be VMware ESXi 7.



STEP 3: Give the Virtual machine name as VMware ESXi 7 & click on Next. The number of core processors is 1, make it number of core processors as 2.

Name the Virtual Machine
What name would you like to use for this virtual machine?

Virtual machine name: practical one

Location: C:\Desktop

The default location can be changed at Edit > Preferences.

STEP 4: The virtual machine settings will display, by default, memory 8GB to 16gb. Click On Next.

Processor Configuration
Specify the number of processors for this virtual machine.

Processors
Number of processors: 2
Number of cores per processor: 2
Total processor cores: 4

Memory for the Virtual Machine
How much memory would you like to use for this virtual machine?

Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.

128 GB
64 GB
32 GB
16 GB
8 GB
4 GB
2 GB
1 GB
512 MB
256 MB
128 MB
64 MB
32 MB
16 MB
8 MB
4 MB

Memory for this virtual machine: 16384 MB

Maximum recommended memory: 6.2 GB
Recommended memory: 4 GB
Guest OS recommended minimum: 4 GB

Network Type
What type of network do you want to add?

Network connection

Use bridged networking
Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network.

Use network address translation (NAT)
Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.

Use host-only networking
Connect the guest operating system to a private virtual network on the host computer.

Do not use a network connection

Select I/O Controller Types
Which SCSI controller type would you like to use for SCSI virtual disks?

I/O controller types

SCSI Controller:
 BusLogic (Not available for 64-bit guests)
 LSI Logic
 LSI Logic SAS
 Paravirtualized SCSI (Recommended)

Select I/O Controller Types
Which SCSI controller type would you like to use for SCSI virtual disks?

I/O controller types

SCSI Controller:
 BusLogic (Not available for 64-bit guests)
 LSI Logic
 LSI Logic SAS
 Paravirtualized SCSI (Recommended)

Select a Disk Type
What kind of disk do you want to create?

Virtual disk type

IDE
 SCSI (Recommended)
 SATA
 NVMe

Select a Disk
Which disk do you want to use?

Disk

Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.

Use an existing virtual disk
Choose this option to reuse a previously configured disk.

Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk. Requires administrator privileges.

Specify Disk Capacity
How large do you want this disk to be?

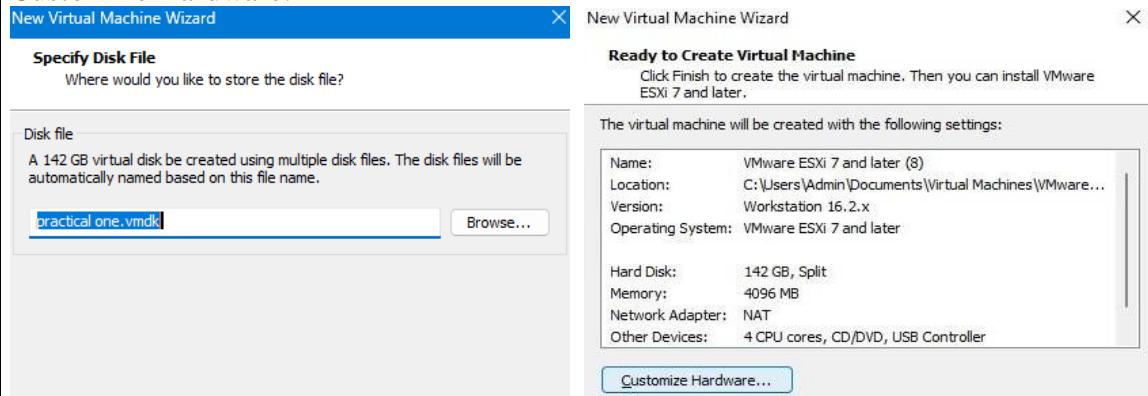
Maximum disk size (GB): 142.0

Recommended size for VMware ESXi 7 and later: 142 GB

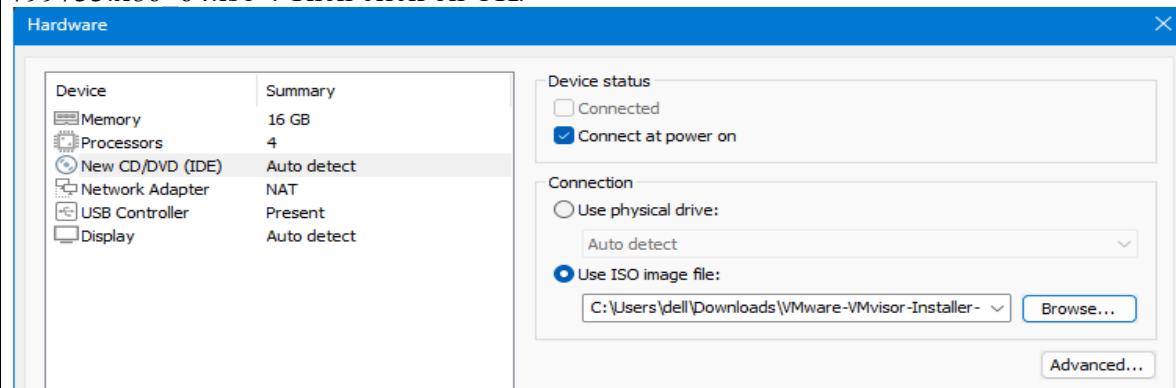
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.

Store virtual disk as a single file
 Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.

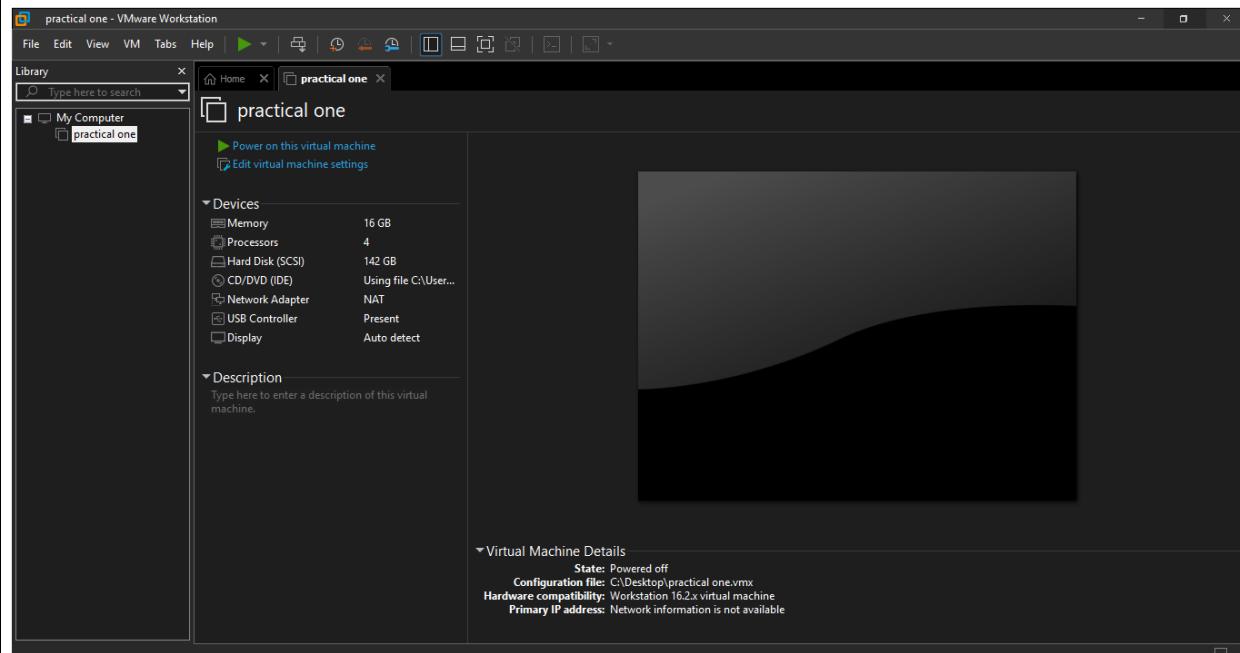
STEP 5: Then it will display the whole hardware information for VMware ESXi 5. Just click on Customize Hardware.



STEP 6: Click on CD/DVD SATA option & click on the option button “Use ISO image file” & then click on browse button & just select the ISO image of ESXi server “VMware-VMvisor-Installer-5.1.0-799733.x86_64.iso”. Then click on OK.



STEP 7: Click On Close, Click Finish and click Power on Virtual Machine



STEP 8: After loading this, it will display the Welcome screen for ESXi installation. Press (Enter) to continue.

Welcome to the VMware ESXi 6.5.0 Installation

VMware ESXi 6.5.0 installs on most systems but only systems on VMware's Compatibility Guide are supported.

Consult the VMware Compatibility Guide at:
<http://www.vmware.com/resources/compatibility>

Select the operation to perform.

(Esc) Cancel (Enter) Continue

STEP 11: It will display End User License Agreement screen. Press(F11) key to accept the license & continue.

End User License Agreement (EULA)

VMWARE END USER LICENSE AGREEMENT

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.

IMPORTANT-READ CAREFULLY: BY DOWNLOADING, INSTALLING, OR USING THE SOFTWARE, YOU (THE INDIVIDUAL OR LEGAL ENTITY) AGREE TO BE BOUND BY THE TERMS OF THIS END USER LICENSE AGREEMENT ("EULA"). IF YOU DO NOT AGREE TO THE TERMS OF THIS EULA, YOU MUST NOT DOWNLOAD, INSTALL, OR USE THE SOFTWARE, AND YOU MUST DELETE OR RETURN THE UNUSED SOFTWARE TO THE VENDOR FROM WHICH YOU ACQUIRED IT WITHIN THIRTY (30) DAYS AND REQUEST A REFUND OF THE LICENSE FEE, IF ANY, THAT

Use the arrow keys to scroll the EULA text

(ESC) Do not Accept (F11) Accept and Continue

STEP 12: It will display the screen for selecting the disk to install. Press (Enter) to continue.

Select a Disk to Install or Upgrade

* Contains a VMFS partition
 # Claimed by VMware Virtual SAN (VSAN)

Storage Device	Capacity
Local:	
VMware, VMware Virtual S (mpx.vnhba0:C0:T0:L0)	142.00 GiB
Remote:	
(none)	

(Esc) Cancel (F1) Details (F5) Refresh (Enter) Continue

Please select a keyboard layout

Swiss French
 Swiss German
 Turkish
US Default
 US Dvorak
 Ukrainian
 United Kingdom

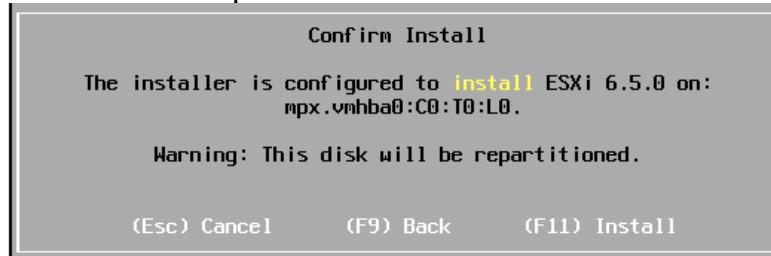
Use the arrow keys to scroll.

(Esc) Cancel (F9) Back (Enter) Continue

STEP 13: It will display the screen for entering the password for root user. Just enter the password & remember the password for future use.



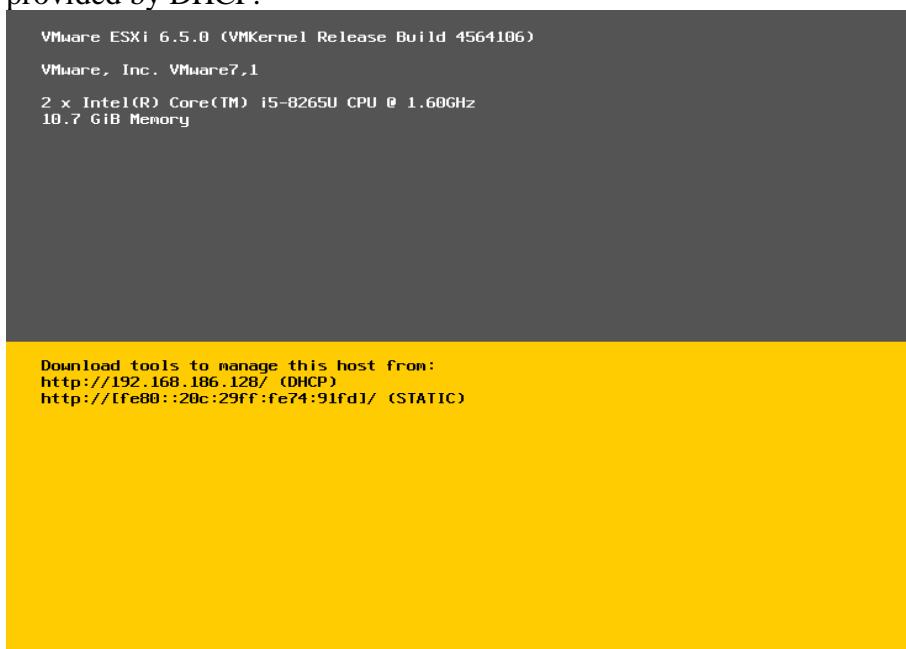
STEP 14: It will provide the window for Confirm install. Press (F11) to install. It will install the ESXi server.



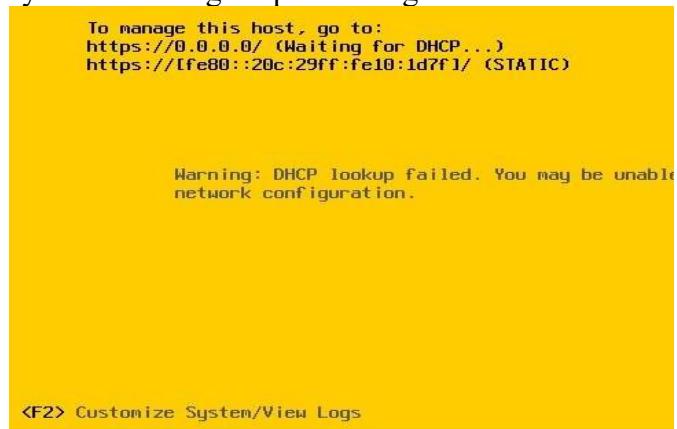
STEP 15: Then it will ask for rebooting.



STEP 16: After rebooting the server, it will provide an ip-address through DHCP. Note down IP Address provided by DHCP.



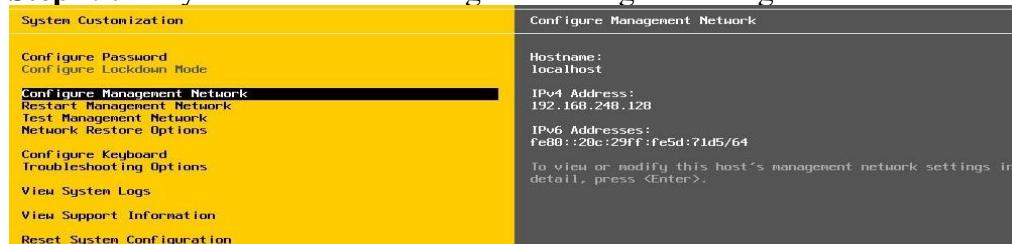
Step 17: After Rebooting we have to assign a static ip address to the ESXi, for that goto “customize system/view logs” option using F2.



Step 18: Provide login name and password for Authentication



Step 19: In System Customization goto “Configure Management Network” option.



Step 20: In that goto IPv4 Configuration option to change IP address



Step 21: Now here first Select ‘Set static IPv4 address’ option and set any IPv4 address with its associated subnet mask and Default gateway and press Enter.



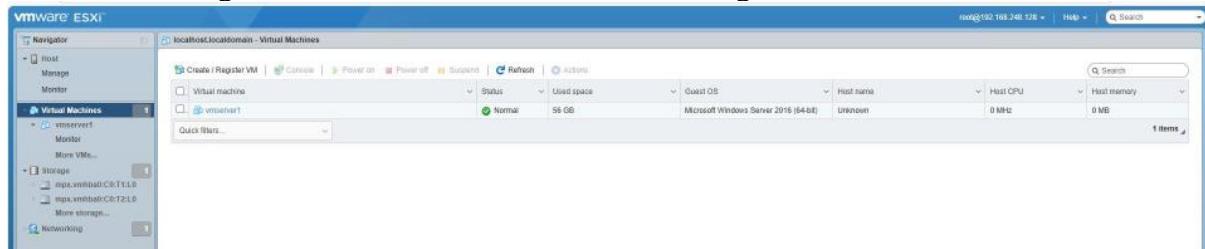
Step 22: We can see that the url to manage the ESXi host is changed with the static IP address we assigned.

To manage this host, go to:
[https://192.168.248.128/ \(STATIC\)](https://192.168.248.128/)
[https://\[fe80::20c:29ff:fe5d:71d5\]/ \(STATIC\)](https://[fe80::20c:29ff:fe5d:71d5]/)

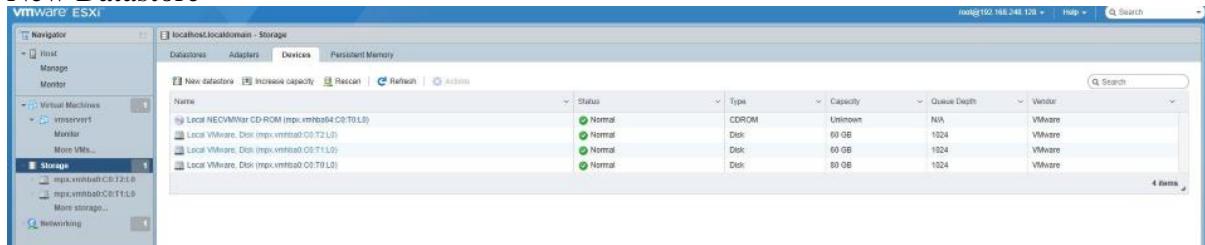
Step 23: Use the url with static IP address to open the login page of VMware ESXi using any Browser. Enter your username and password to log in.



Step 24: After logging in we can see the VMware ESXi DCUI (Direct Console User Interface) where we can create and manage virtual machines, Virtual Networking tools and datastore.



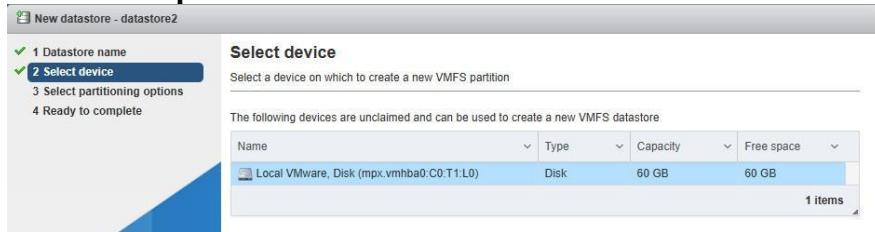
Step 25: VMware ESXi does not store VM files directly on raw disks or partitions; it uses datastores as an abstraction layer. In VMware ESXi, a datastore is a logical container used to store files required for virtual machines (VMs) including VM disk files, VM configuration files, ISO images, Snapshots and logs. So creating a datastore is essential because it's the storage foundation for running VMs on ESXi. Without it, you'd have nowhere to place the virtual disks or VM configs. For creating datastore simply goto 'storage' and click on New Datastore



Step 26: Here provide the name of the new datastore you are creating.



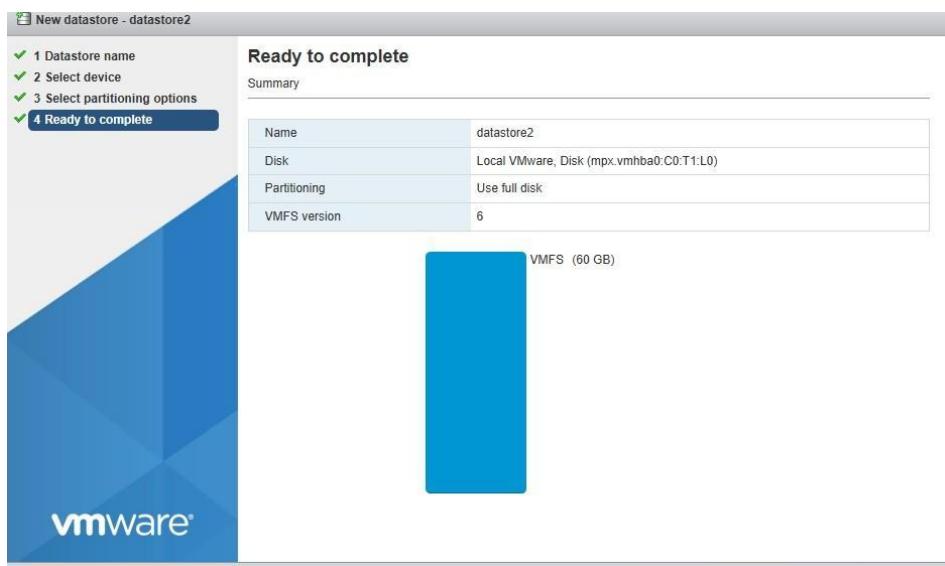
Step 27: Now after naming the datastore, select the device shown which is the second hardisk we created earlier at **Step 7**.

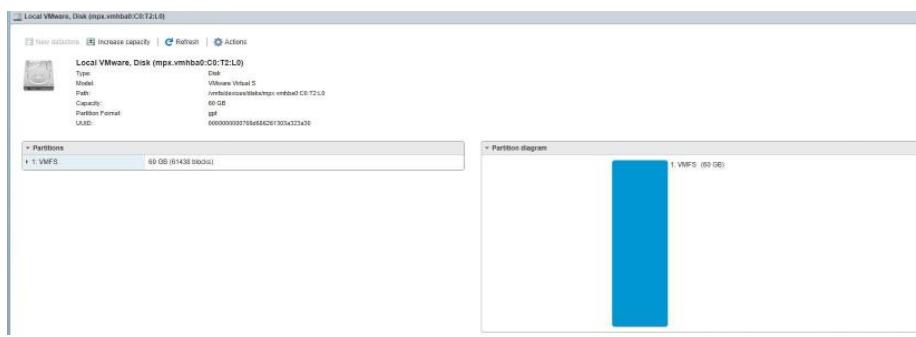


Step 28: Select either you want to use the full disk or partition with your custom settings. Select the latest VMF version and Click on Next.

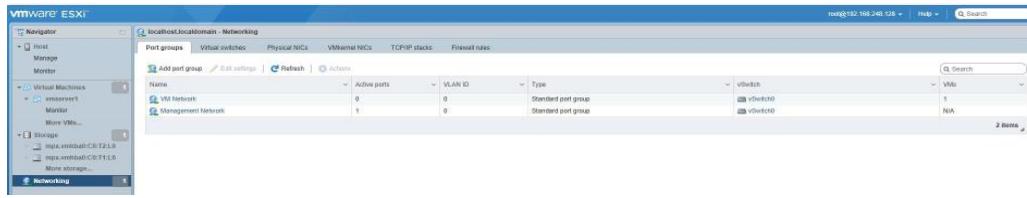


Step 29: Check the Summary to verify required options have been applied and Click on Finish to complete the Creation of datastore after which we can see a new datastore can be seen on the interface.

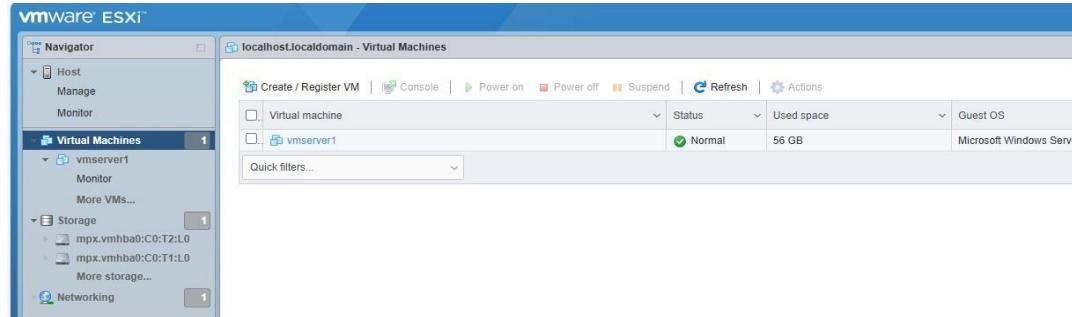




When you first install or boot up VMware ESXi, you see the DCUI (Direct Console User Interface) screen, which shows networking as “1”. That “1” under networking typically means ESXi has detected 1 physical network interface card (NIC) on your server. In other words, it’s telling you there is one active physical network adapter available to handle management traffic, VM traffic, etc.



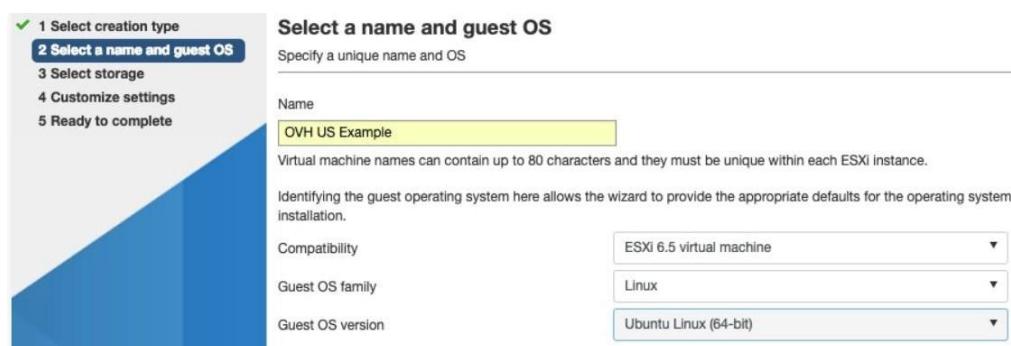
Step 30: After creating Datastore we can create and run a Virtual Machine for which goto Virtual Machine option and Click of create VM.



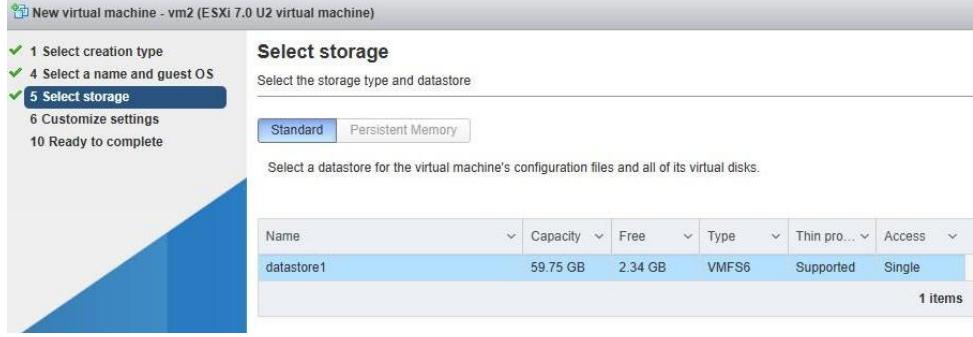
Step 31: Select the creation type of Virtual machine as shown.



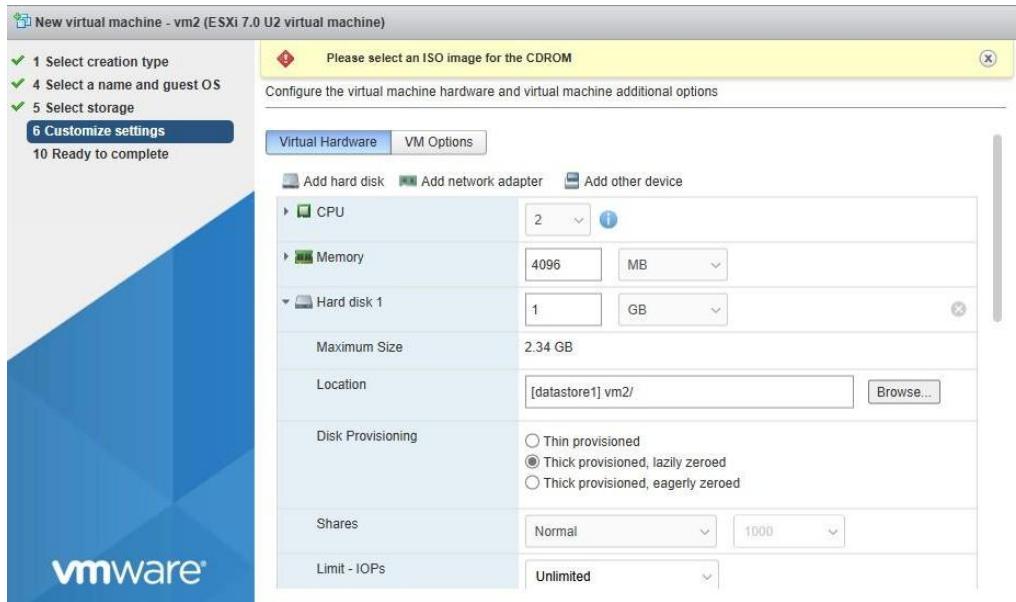
Step 32: Select the name and guest OS for the new virtual machine, here we are Installing Windows Server 2016 and click on Next.



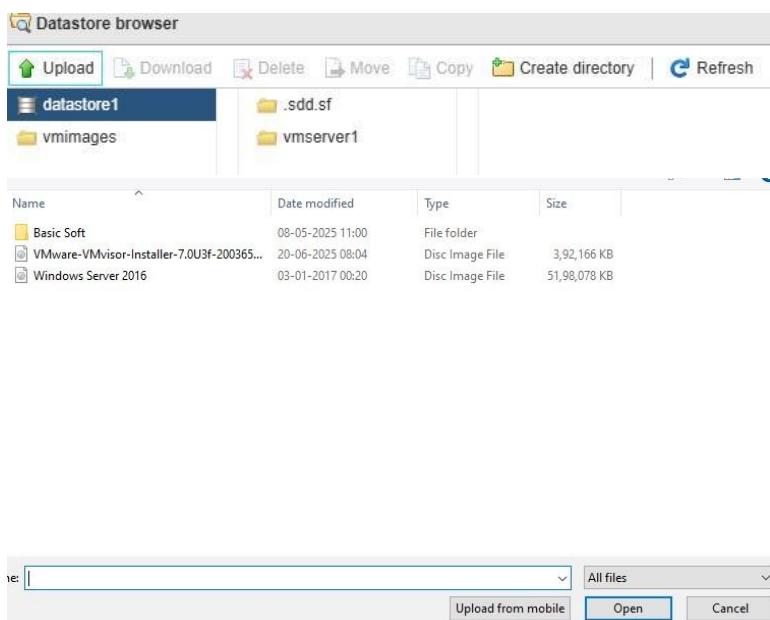
Step 33: For Storage in New VM select the new datastore created earlier and click on Next.

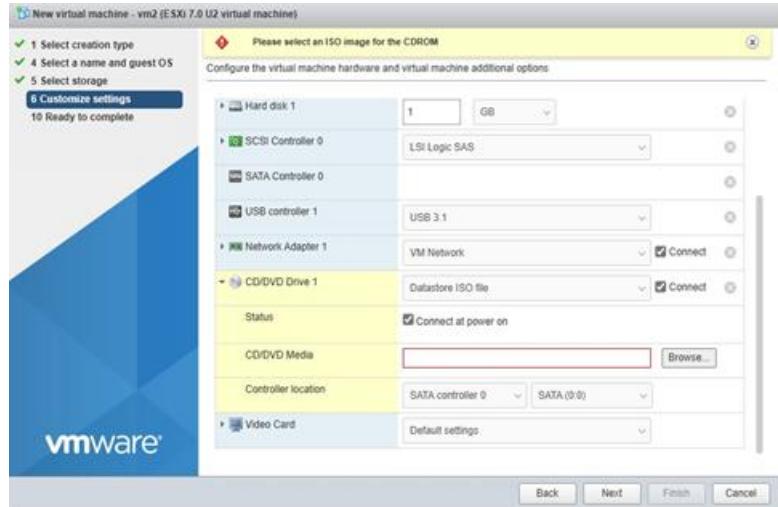


Step 34: Customize the Setting of the new VM like allocating CPU, memory, hard disk Space. Provide the Location and Disk Provisioning type.

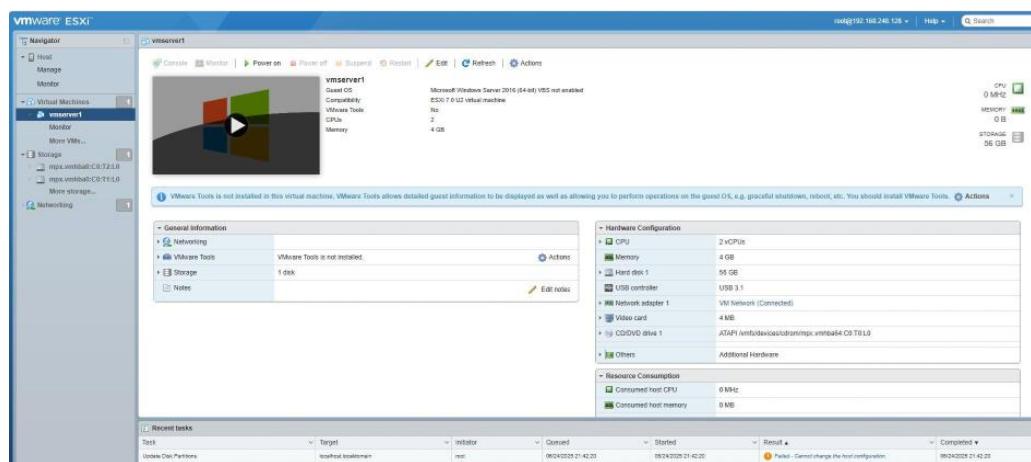


Step 35: In CD/DVD Drive 1 select the Datastore ISO file, click on connect and then provide the location of the ISO file in CD/DVD media as shown below.

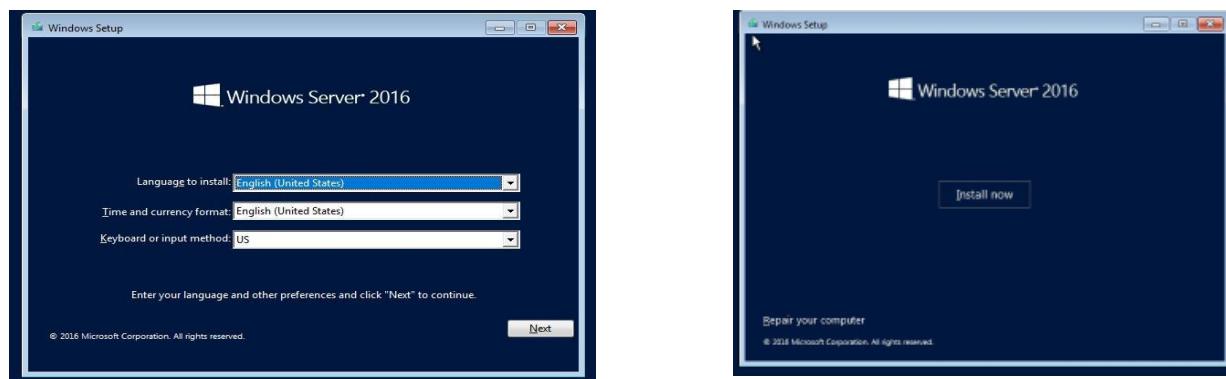




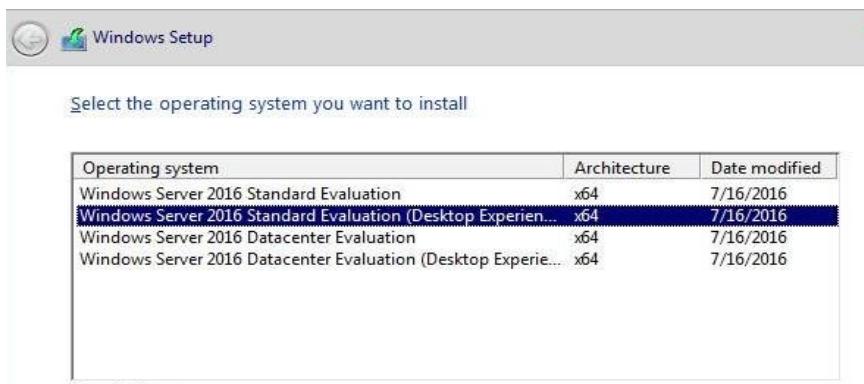
Step 36: Here we can see a new virtual machine is created, click on power on to start the Virtual Machine.



Step 37: In the setup select the language to install, Time and Currency format and input format, after that click on Next and click on Install button to start the Installation.



Step 38: Select the Operating system as per your preference and click on Next.

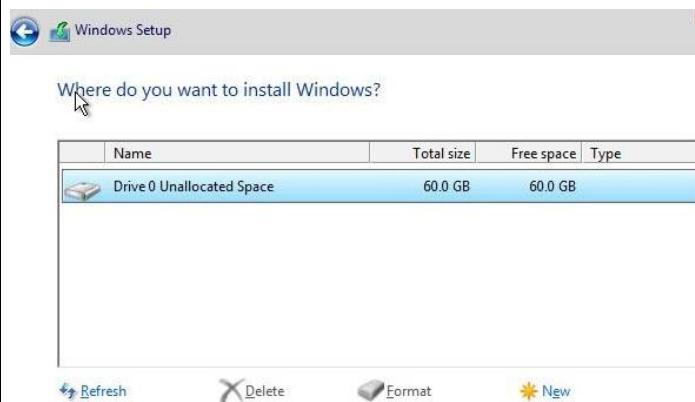
**Description:**

This option is useful when a GUI is required—for example, to provide backward compatibility for an application that cannot be run on a Server Core installation. All server roles and features are supported. For more details see "Windows Server Installation Options."

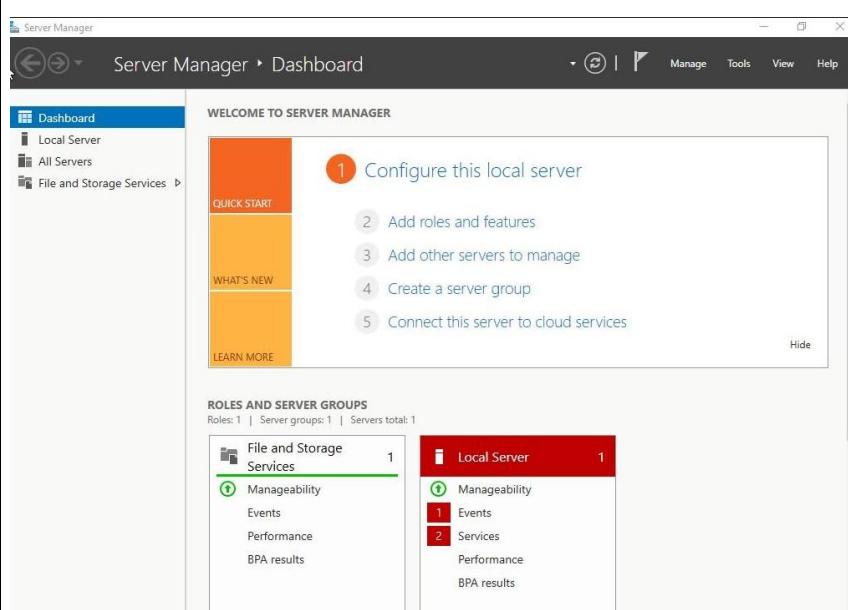
Step 39: Accept the License term and select which installation type you want and click Next.



Step 40: Select the drive shown where we will be installing windows and click on Next. The installation of Windows begin.



After logging in, we can see a new VM of Windows Server 2016 has been installed over VMware ESXi.



Conclusion:

The installation of VMware ESXi provides a robust, reliable, and efficient virtualization platform for managing and running multiple virtual machines on a single physical server. Through this practical, we learned how to install ESXi on supported hardware, configure basic network and storage settings, and prepare the host for managing virtual infrastructure. This forms the foundation for further tasks such as deploying virtual machines, configuring datastores, and implementing advanced features like vMotion and High Availability in a virtualized environment. Overall, ESXi installation is a critical step toward building a scalable and flexible virtualization solution.

Aim: 1(B) Installation of Citrix Xen

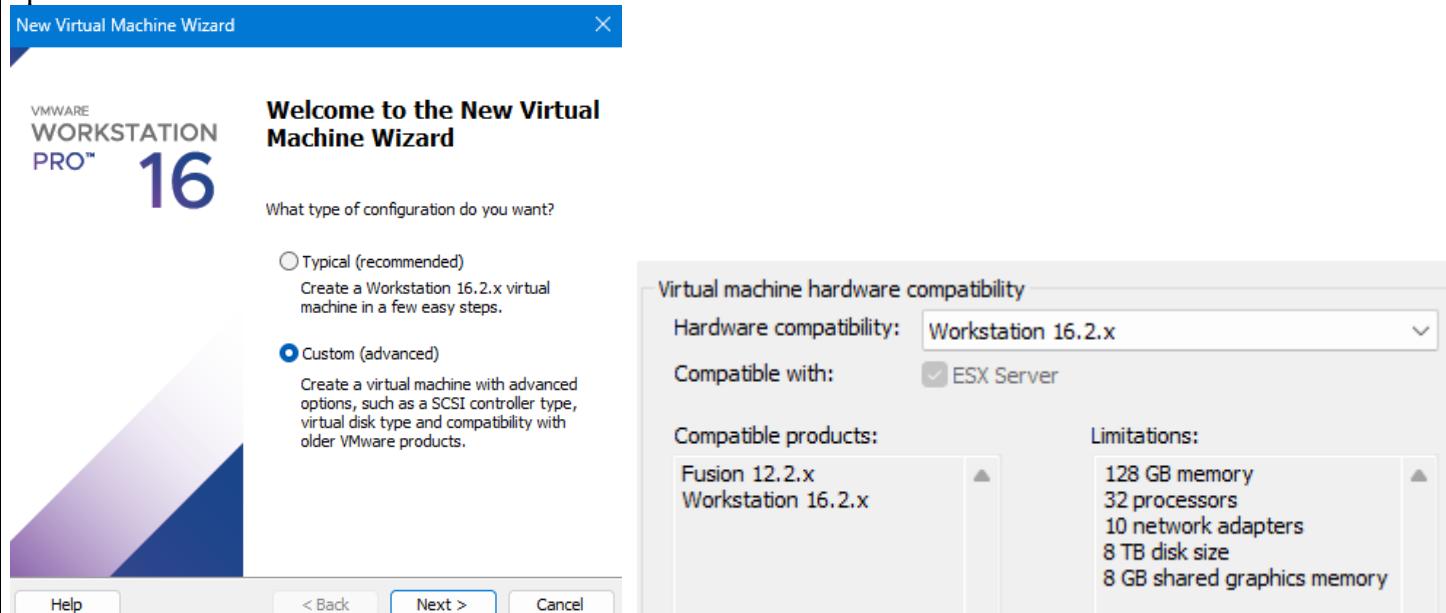
Software used: VMware Workstation Pro, Citrix Xen

Theory:

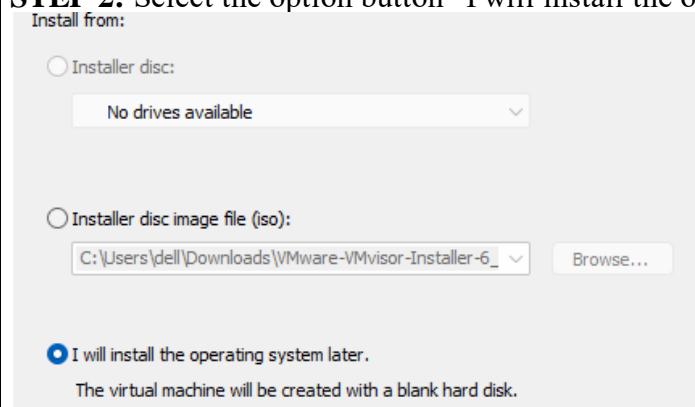
Citrix XenServer is a powerful, open-source virtualization platform designed for managing and running multiple virtual machines (VMs) on a single physical server. Built on the Xen Project hypervisor, it supports Windows and Linux VMs and is widely used in enterprise environments for server consolidation, desktop virtualization, and application testing. XenServer offers features like live VM migration, high availability, and centralized management through Citrix Hypervisor tools, making it suitable for scalable and cost-effective IT infrastructure deployment.

Implementation :

STEP 1: Open the VMware Workstation Pro 16. Go to the File menu. Click on the New Virtual Machine option.

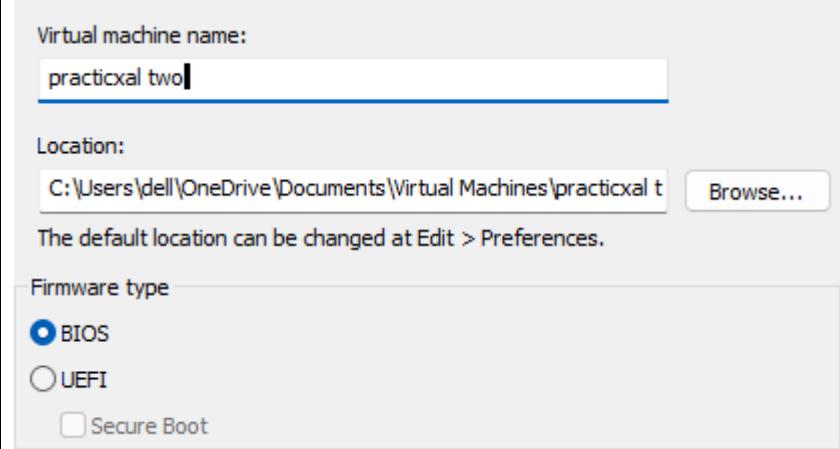


STEP 2: Select the option button “I will install the operating system later” & click on Next.



STEP 3: Select the Guest operating system as VMware ESXi & confirm the version should be VMware ESXi 7. Click on Next



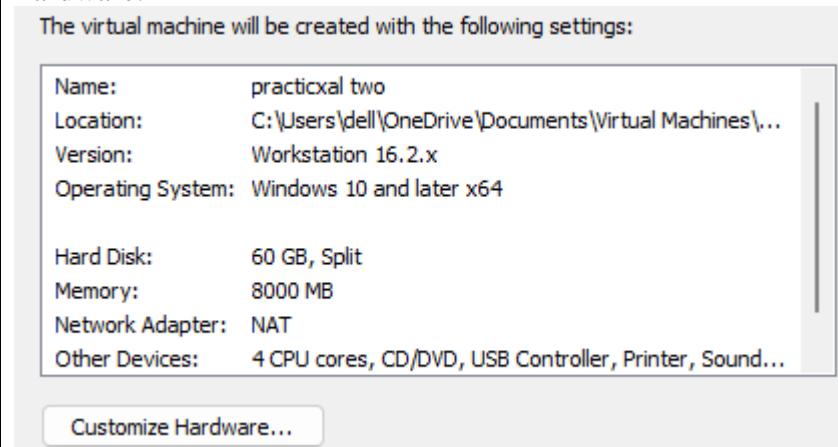
STEP 4: Give the Virtual machine name as Windows 10 and later x64 & click on Next.**STEP 5:** The number of core processors is 1, make it number of core processors as 2. Click on Next

Processors	
Number of processors:	<input type="text" value="2"/>
Number of cores per processor:	<input type="text" value="2"/>
Total processor cores:	4

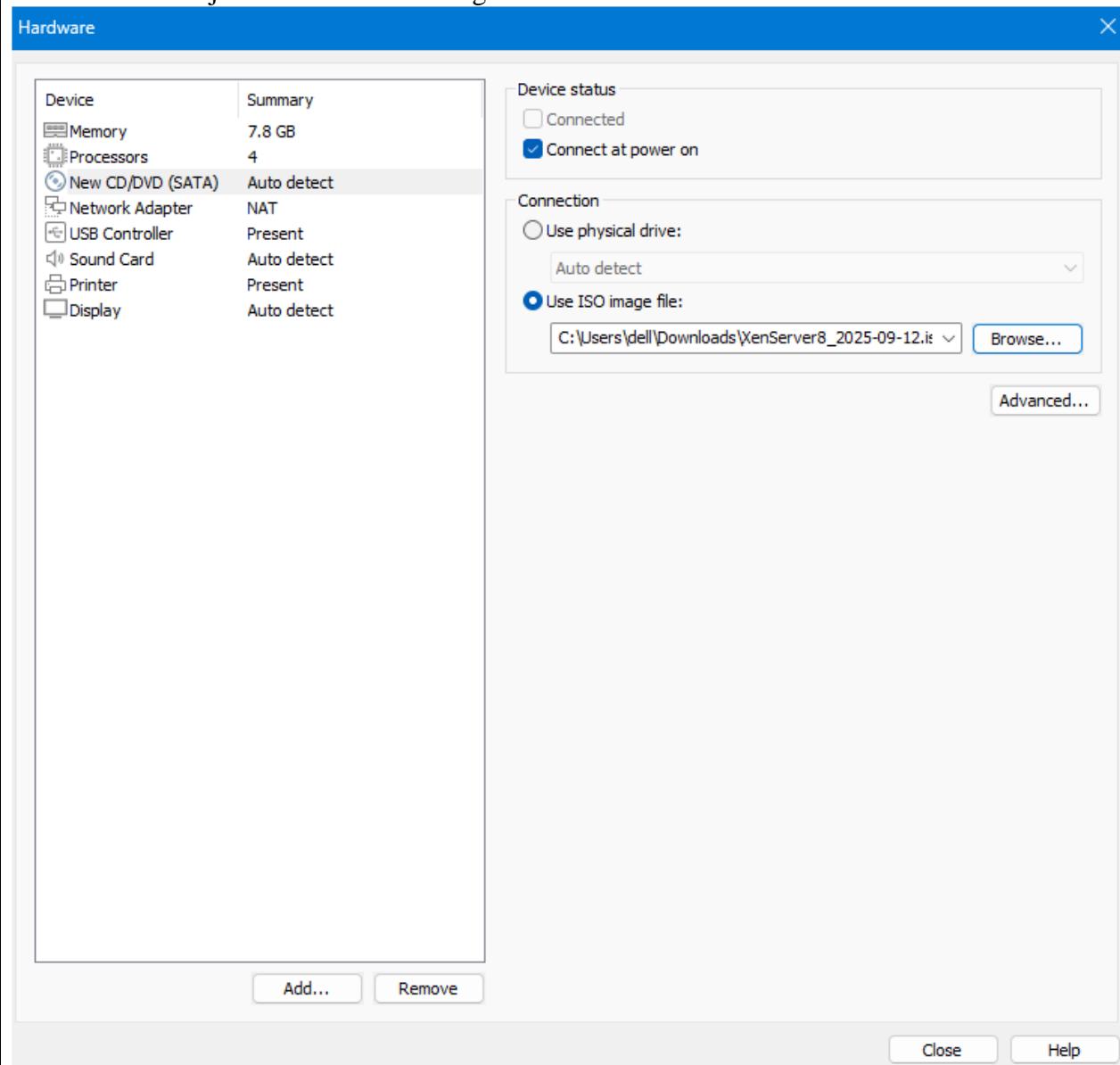
STEP 6: The virtual machine settings will display, by default, memory 4 GB. Click On Next.

<p>Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.</p> <p>Memory for this virtual machine: <input type="text" value="8000"/> MB</p> <p>128 GB 64 GB 32 GB 16 GB 8 GB 4 GB 2 GB 1 GB 512 MB 256 MB 128 MB 64 MB 32 MB 16 MB 8 MB 4 MB</p> <p>Maximum recommended memory: 6.2 GB Recommended memory: 2 GB Guest OS recommended minimum: 1 GB</p>	<p>Network connection</p> <p><input checked="" type="radio"/> Use bridged networking Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network.</p> <p><input checked="" type="radio"/> Use network address translation (NAT) Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.</p> <p><input type="radio"/> Use host-only networking Connect the guest operating system to a private virtual network on the host computer.</p> <p><input type="radio"/> Do not use a network connection</p>
<p>I/O controller types</p> <p>SCSI Controller:</p> <ul style="list-style-type: none"> <input type="radio"/> BusLogic (Not available for 64-bit guests) <input type="radio"/> LSI Logic (Not supported by Windows 10 and later x64) <input checked="" type="radio"/> LSI Logic SAS (Recommended) <input type="radio"/> Paravirtualized SCSI 	<p>Virtual disk type</p> <p><input checked="" type="radio"/> IDE <input type="radio"/> SCSI <input type="radio"/> SATA <input type="radio"/> NVMe (Recommended)</p>
<p>Disk</p> <p><input checked="" type="radio"/> Create a new virtual disk A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.</p> <p><input type="radio"/> Use an existing virtual disk Choose this option to reuse a previously configured disk.</p> <p><input type="radio"/> Use a physical disk (for advanced users) Choose this option to give the virtual machine direct access to a local hard disk. Requires administrator privileges.</p> <p>Disk file A 60 GB virtual disk be created using multiple disk files. The disk files will be automatically named based on this file name.</p> <p><input type="text" value="practicxal two.vmdk"/> <input type="button" value="Browse..."/></p>	<p>Maximum disk size (GB): <input type="text" value="50.0"/> Recommended size for Windows 10 and later x64: 60 GB</p> <p><input type="checkbox"/> Allocate all disk space now. Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.</p> <p><input type="radio"/> Store virtual disk as a single file <input checked="" type="radio"/> Split virtual disk into multiple files Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.</p>

STEP 7: Then it will display the whole hardware information for VMware ESXi 5. Just click on Customize Hardware.



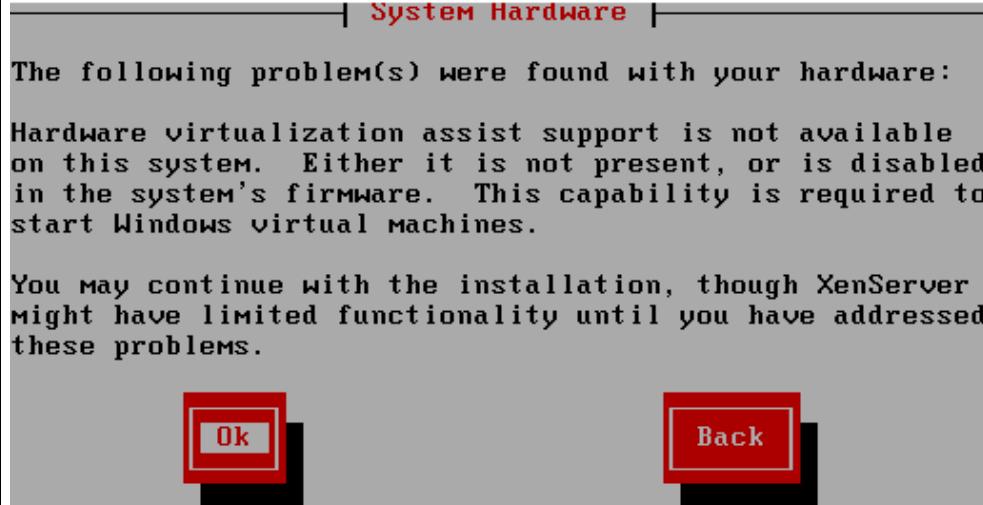
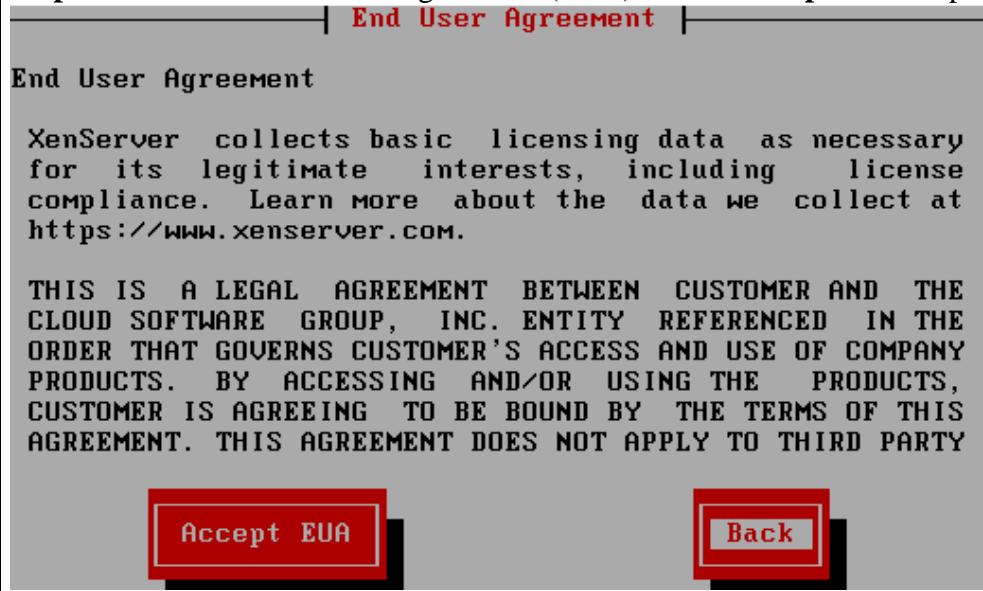
STEP 8: Click on CD/DVD SATA option & click on the option button “Use ISO image file” & then click on browse button & just select the ISO image of Citrix Xen server . Then click on OK.



STEP 9: Start the installation by selecting boot from such drive.

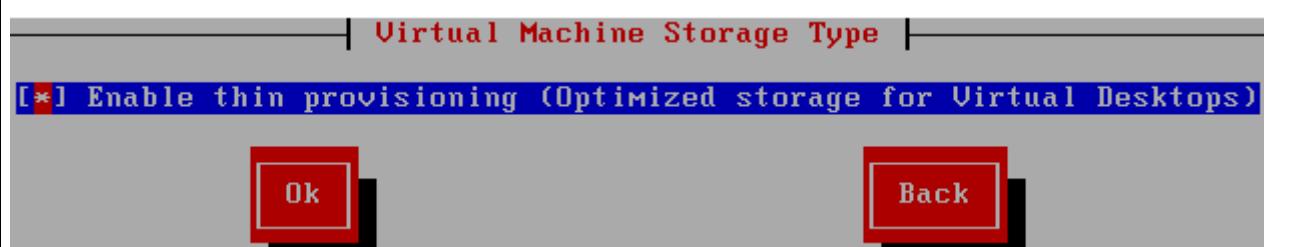


Step10: XenServer End User Agreement (EUA). Select **Accept EUA** to proceed.

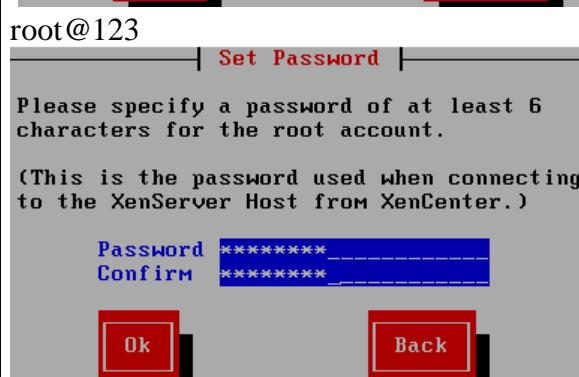
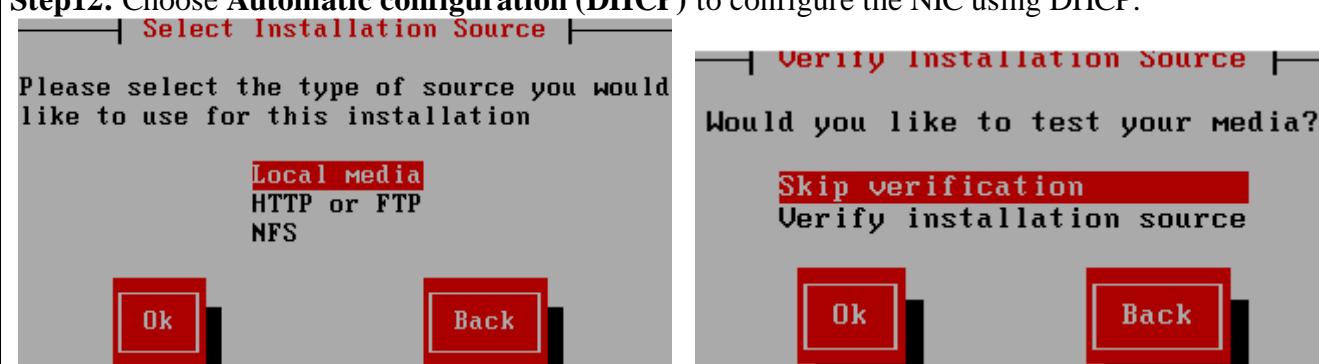


Step11: Select your installation media source.





Step12: Choose Automatic configuration (DHCP) to configure the NIC using DHCP.



Networking

Please specify how networking should be configured for the management interface on this host.

(*) Automatic configuration (DHCP)

() Static configuration:

IP Address: _____
Subnet Mask: _____
Gateway: _____

[] Use VLAN:

VLAN (1-4094): _____

Ok

Back

Hostname and DNS Configuration**Hostname Configuration**

(*) Automatically set via DHCP

() Manually specify:

xenserver-uxMfypcx_____

DNS Configuration

(*) Automatically set via DHCP

() Manually specify:

DNS Server 1: _____

DNS Server 2: _____

DNS Server 3: _____

Ok

Back

Select Time Zone

Please select the geographical area that your XenServer Host is in:

Africa
America
Antarctica
Arctic
Asia
Atlantic
Australia
Etc



Ok

Back

Select Time Zone

Please select the city or area that the managed host is in (press a letter to jump to that place in the list):

Khandyga
Kolkata
Krasnoyarsk
Kuala Lumpur
Kuching
Kuwait
Macau
Magadan

↑
↓

Ok **Back**

System Time

How should the local time be determined?

Use DHCP NTP servers
Use default NTP servers
Provide NTP servers manually
No NTP (not recommended)

Ok **Back**

Step 13: Confirm installation

Confirm Installation

We have collected all the information required to install XenServer.

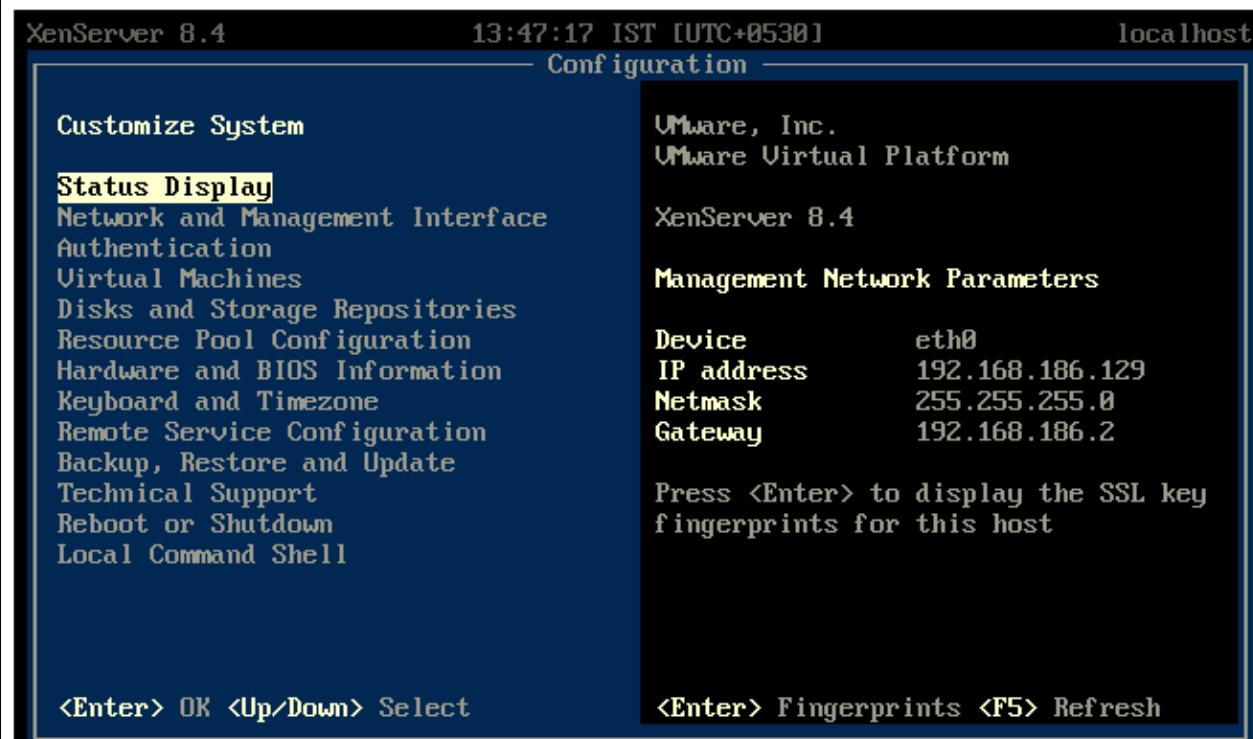
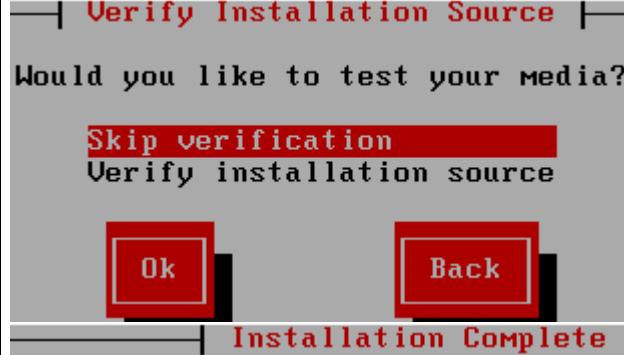
Please confirm you wish to proceed: all data on disk sda will be destroyed!

Install XenServer **Back**

Supplemental Packs

Would you like to install any Supplemental Packs?

Yes **No**



Step 14: Install Xencenter

XenCenter 2025.3.0

Aug 11, 2025

XenCenter is the graphical Windows-based user interface for XenServer. This page contains information about the XenServer 8 release.

XenCenter is the graphical Windows-based user interface for XenServer. For information about the XenServer 8 release, see the XenServer 8 Release Notes. For information about getting started with XenCenter and its features, see XenServer Product Documentation. To access XenCenter documentation, see XenServer Documentation.

XenCenter

XenCenter is the graphical Windows-based user interface for XenServer. To download and install XenCenter, see the XenCenter Downloads page. To access XenCenter documentation, see XenCenter Product Documentation.

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XenCenter™ is the UI that enables the management of your XenServer environment. Use this version to install and manage XenServer 8.4 hosts. Once installed on a Windows system, use it to deploy, manage, and monitor your virtual machines.

XenCenter will now prompt you to update the UI when a newer version becomes available.

DOWNLOAD XENCENTER

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Downloads

XenServer 8 - Installation ISO

December 10, 2024

Download the latest XenServer 8 installation ISO. This includes all updates in the Normal channel to December 9, 2024.

DOWNLOAD XENSERVER 8 .ISO

Checksum
SHA-256: 8364422457efef9a792a77dfde17b29d00e347a745a28cefef6106c1c6e67e0ac8

Open File - Security Warning

Do you want to open this file?

Name: C:\Users\dell\Downloads\XenServer8_2025-09-12.iso
 Publisher: Unknown Publisher
 Type: Disc Image File
 From: C:\Users\dell\Downloads\XenServer8_2025-09-12.iso

Always ask before opening this file

XenCenter 2025.3.0 Setup

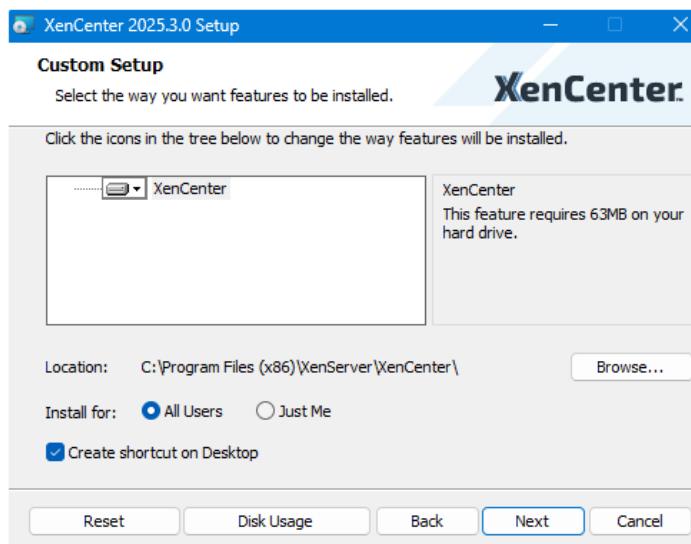
Welcome to the XenCenter 2025.3.0 Setup Wizard

The Setup Wizard will install XenCenter 2025.3.0 on your computer. The installation will remove all previous versions of the application from your computer. This includes Citrix XenCenter 8.2.7 and earlier.

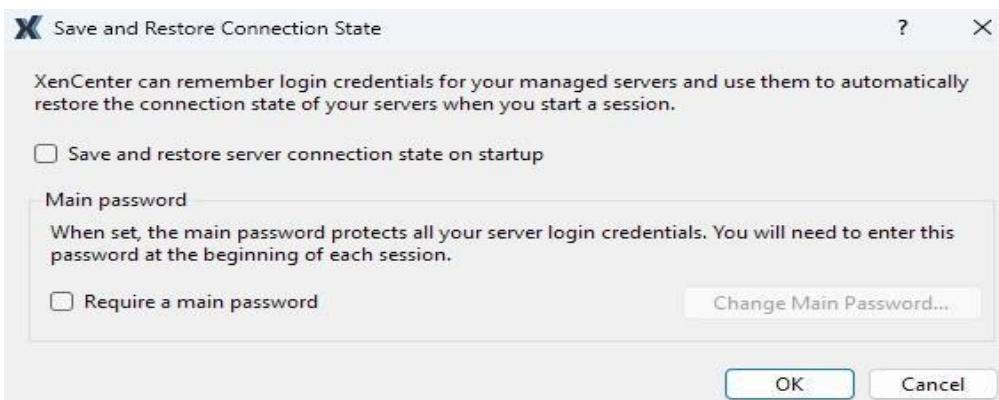
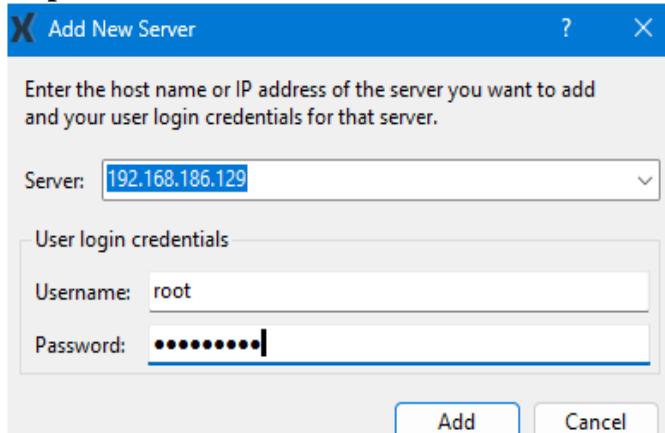
Click Next to continue or Cancel to exit the Setup Wizard.

XenCenter

Back **Next** **Cancel**



Step 15: Add New Server.



Conclusion:

This practical successfully demonstrated the installation of the Citrix Xen hypervisor within a VMware Workstation environment. We learned how to create a new virtual machine and configure it with the necessary hardware, such as processors, memory, and disk space, to meet XenServer's requirements. This installation is the foundational step required to begin deploying and managing virtual machines on the Citrix virtualization platform.

Practical 2

Aim: Configuring ESXi Hosts

Practical Description:

- Examine the options in DCUI
- Configure the Management Network
- Enable SSH

Software used: VMware Workstation Pro, VMware Esxi

Theory:

Post-installation, an ESXi host requires essential configuration to integrate it into a network and make it remotely manageable. This initial setup is performed using the DCUI (Direct Console User Interface), the yellow-and-gray console accessed directly from the host's monitor and keyboard. The DCUI provides a low-level interface for critical tasks, most importantly the configuration of the Management Network.

Implementation:

- Examine the options in DCUI

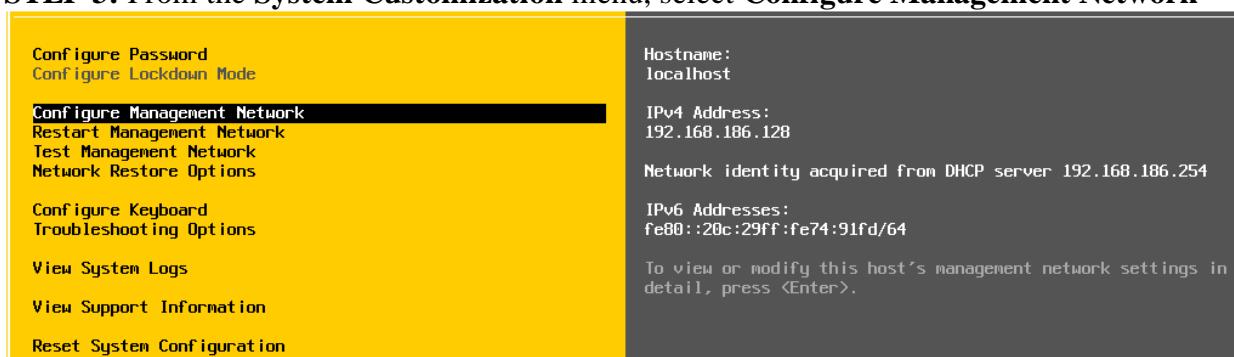
STEP 1: Press F2 to log in to the Direct Console User Interface.

STEP 2: Enter the credentials that you created during the ESXi setup, and then press Enter.



b. Configure the Management Network

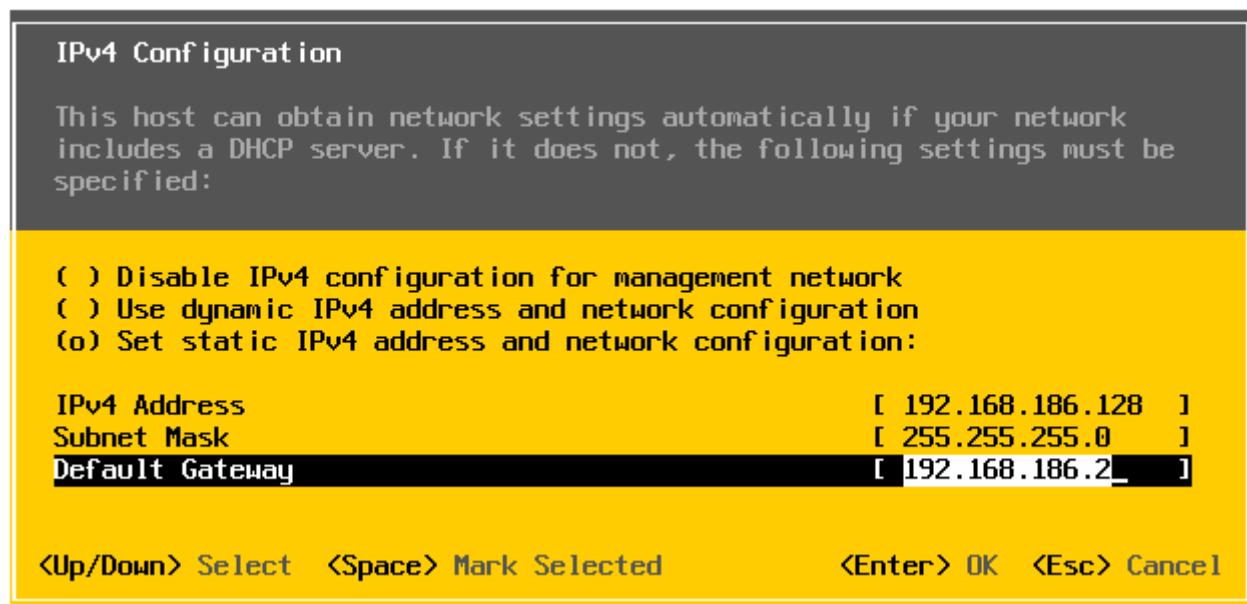
STEP 3: From the System Customization menu, select **Configure Management Network**



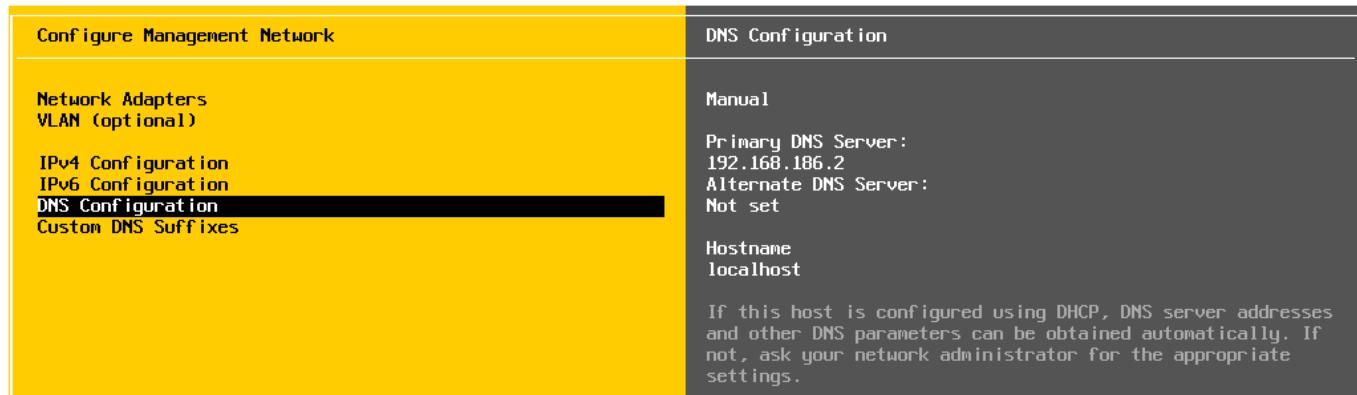
STEP 4: Select **IPv4 Configuration** and press Enter.



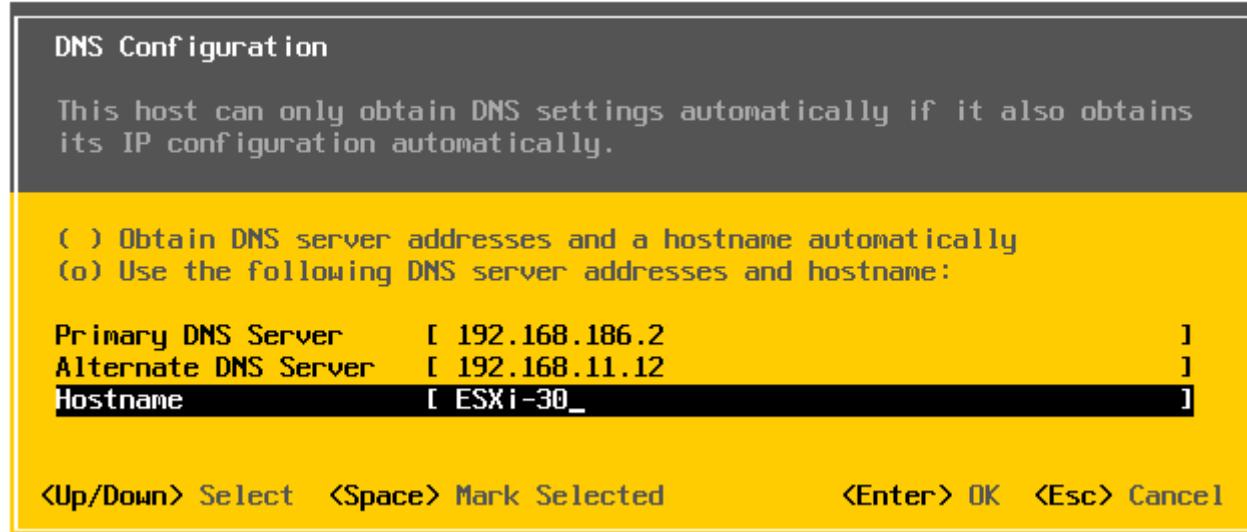
STEP 5: Using the cursor keys, select **Set static IPv4 address**, and then press the space bar. On the **IPv4 Configuration** page, enter the IPv4 address, subnet mask, and default gateway for the management host.



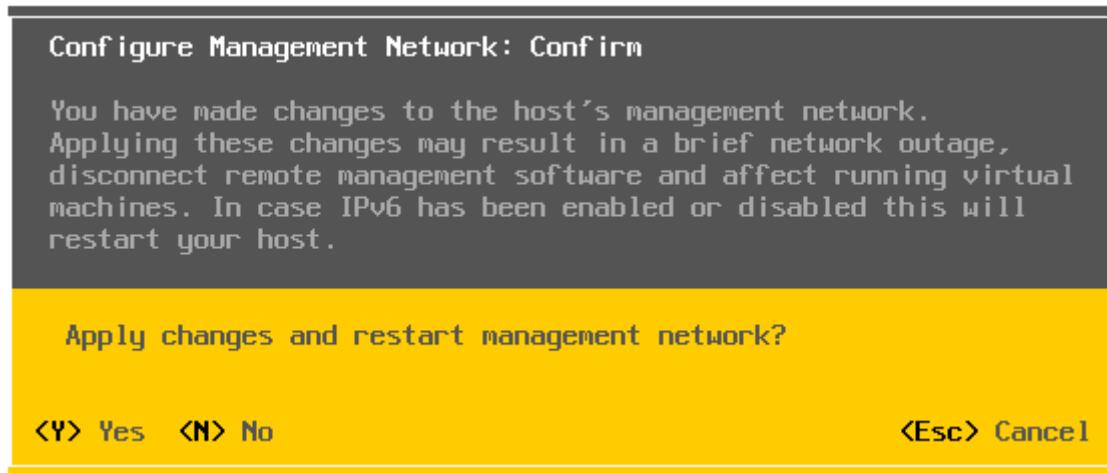
STEP 6: Select **DNS Configuration** and press Enter



STEP 7: Type the IP address of the DNS servers and the FQDN of the host.



STEP 8: Press Esc to exit Configure Management Network menu. Reboot is required, press Y to reboot ESXi host



c. Enabling SSH.

STEP 9: From the Direct User Interface, press F2 to access the System Customization menu.

STEP 10: Select Troubleshooting Options and press Enter.

System Customization		Troubleshooting Options
Configure Password Configure Lockdown Mode Configure Management Network Restart Management Network Test Management Network Network Restore Options Configure Keyboard Troubleshooting Options View System Logs View Support Information Reset System Configuration	To view various troubleshooting mode options like Enable ESXi Shell, Enable SSH and Restart Agents.	

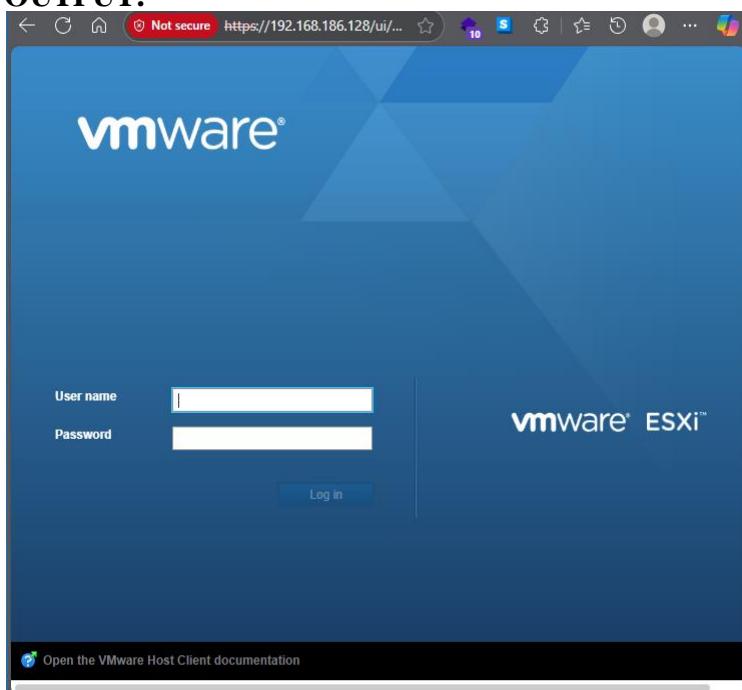
STEP 11: From the Troubleshooting Mode Options menu, select a service to enable.

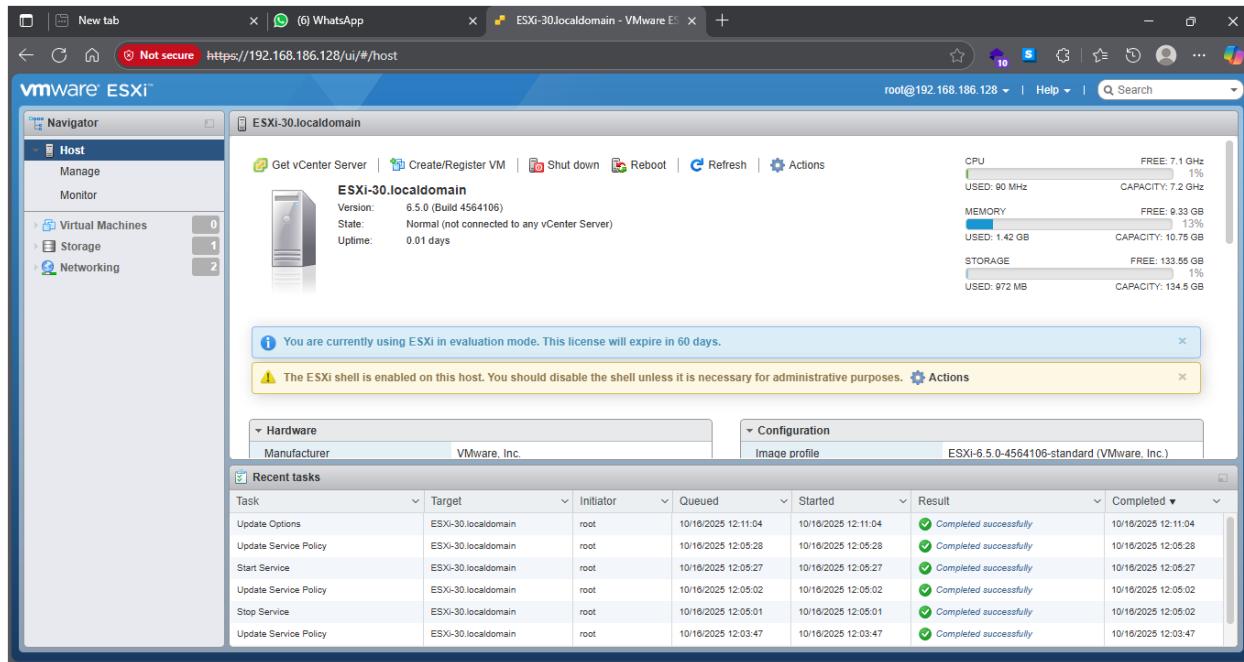
Enable ESXi Shell

Enable SSH

Troubleshooting Mode Options	ESXi Shell
Disable ESXi Shell Enable SSH Modify ESXi Shell and SSH timeouts Modify DCUI idle timeout Restart Management Agents	ESXi Shell ESXi Shell is Enabled Change current state of the ESXi Shell

OUTPUT:





Conclusion:

This practical successfully demonstrated the fundamental post-installation configuration of a VMware ESXi host. We learned how to navigate the DCUI to examine system settings and perform critical setup tasks. By configuring the Management Network with a static IP address, we established a stable and reliable connection point for remote management via the ESXi Host Client. Furthermore, we enabled the SSH service, a critical step for allowing advanced, command-line troubleshooting. As a result of these configurations, the ESXi host is no longer in a default state; it is now properly identified on the network, remotely accessible, and ready for the next stages of virtual infrastructure management, such as deploying virtual machines and configuring storage.

Practical 3

Aim: Deploying and Configuring A Virtual Machine.

Practical Description:

- a. Create a Virtual Machine
- b. Install A Guest Operating System and Disable Windows Updates.
- c. Install VMware Tools/Install Files.

Software used: VMware Workstation Pro, VMware ESXi 7, Ubuntu

Theory:

A virtual machine (VM) is a software-based emulation of a physical computer, running on a hypervisor like ESXi. It abstracts the host's physical hardware (CPU, Memory, Disk, Network) into a self-contained virtual environment. Each VM consists of key files, primarily the .vmx (configuration file) and the .vmdk (virtual disk file), which are stored on a datastore.

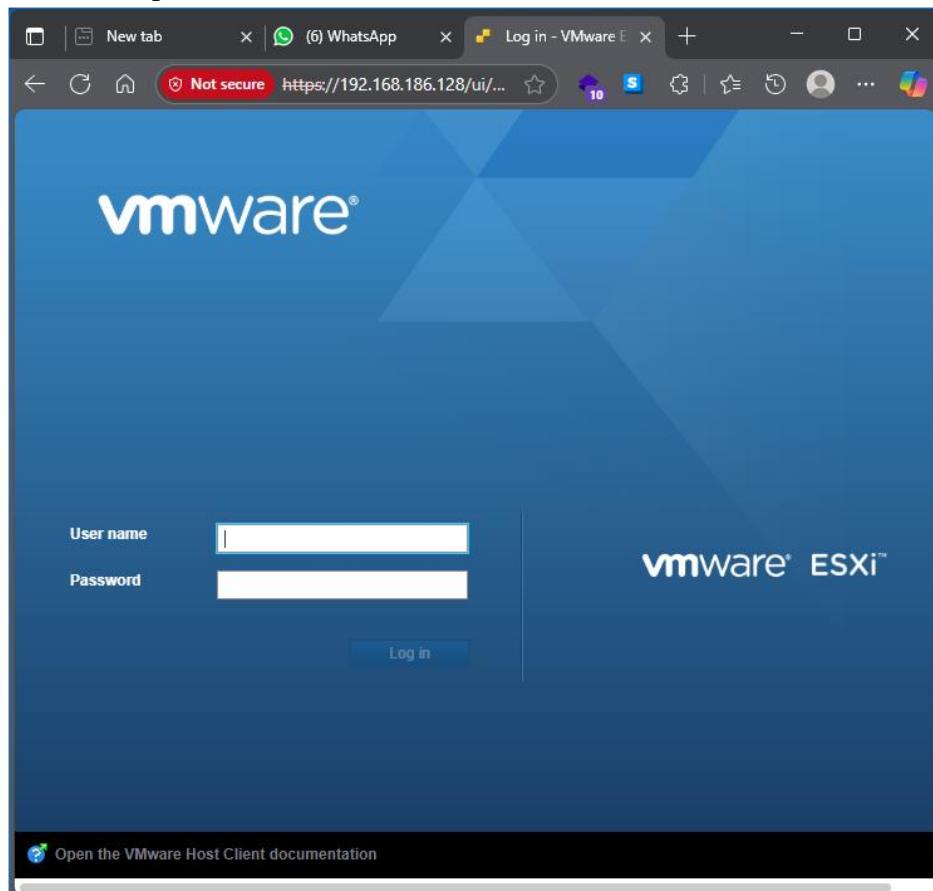
A Guest Operating System (like Windows or Linux) is installed inside the VM to run applications. A crucial component of this setup is VMware Tools, a suite of drivers and utilities installed within the Guest OS.

VMware Tools is essential for enhancing performance, improving graphics, enabling mouse synchronization, and allowing graceful shutdown commands from the hypervisor.

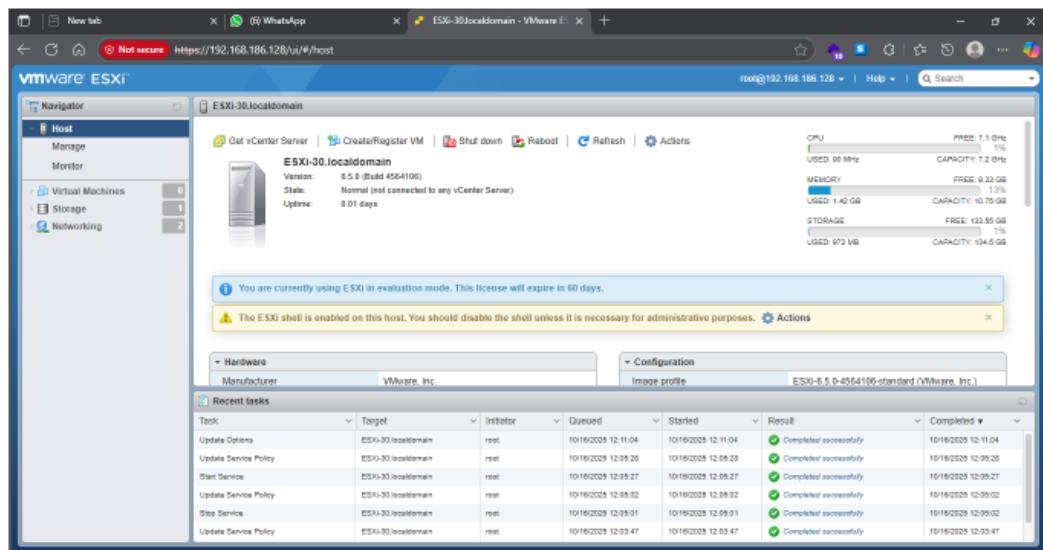
Implementation:

a. Create a Virtual Machine.

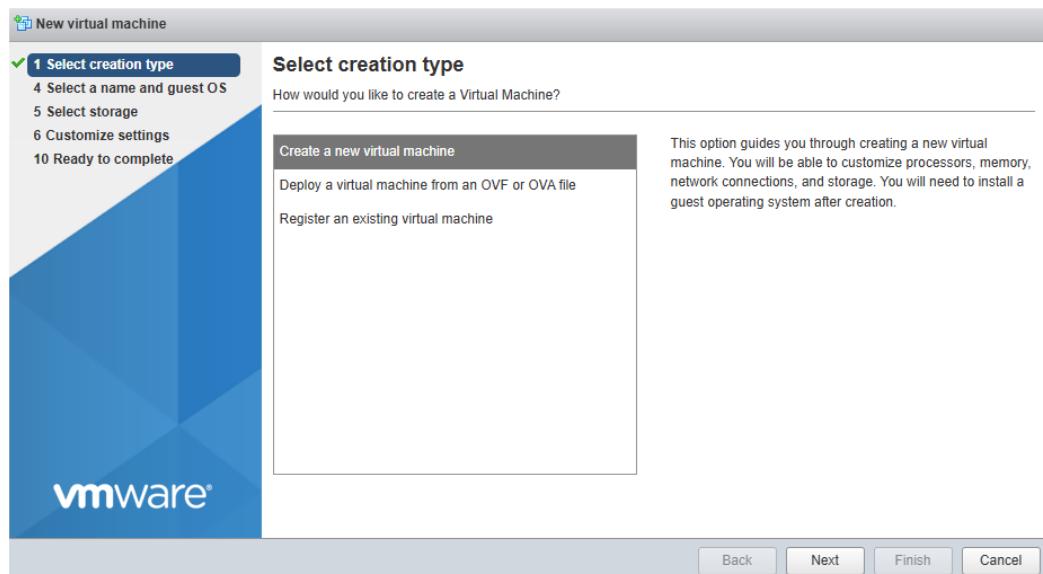
STEP 1: Open Browser and enter the first IP address from the DCUI console & login with the credentials



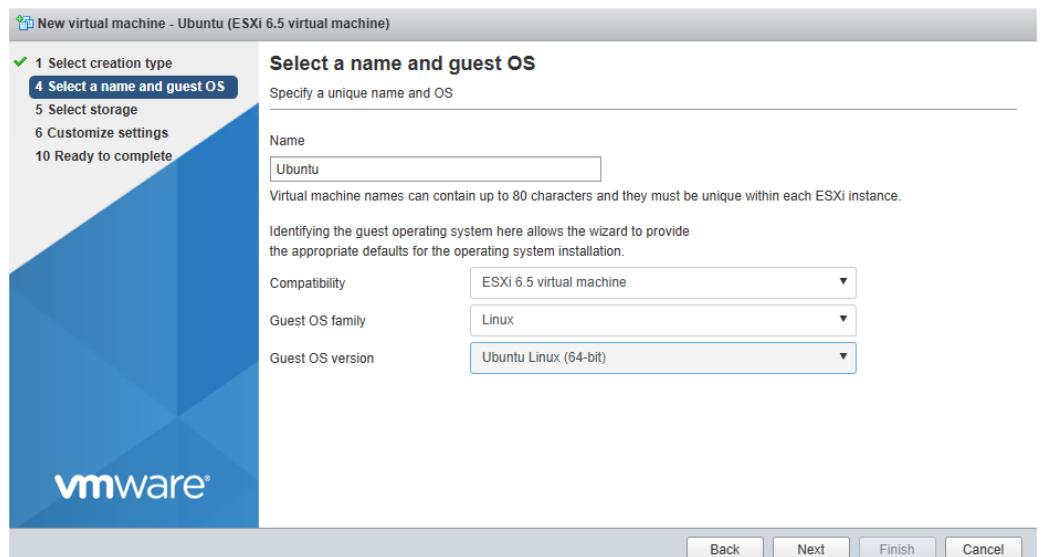
STEP 2: After Login, Click on Create/Register VM



STEP 3: Select Create a New Virtual Machine, click next



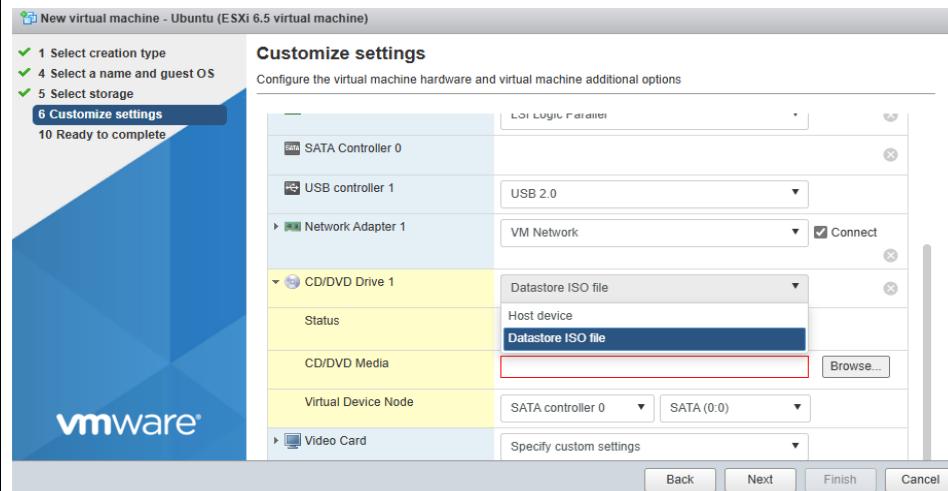
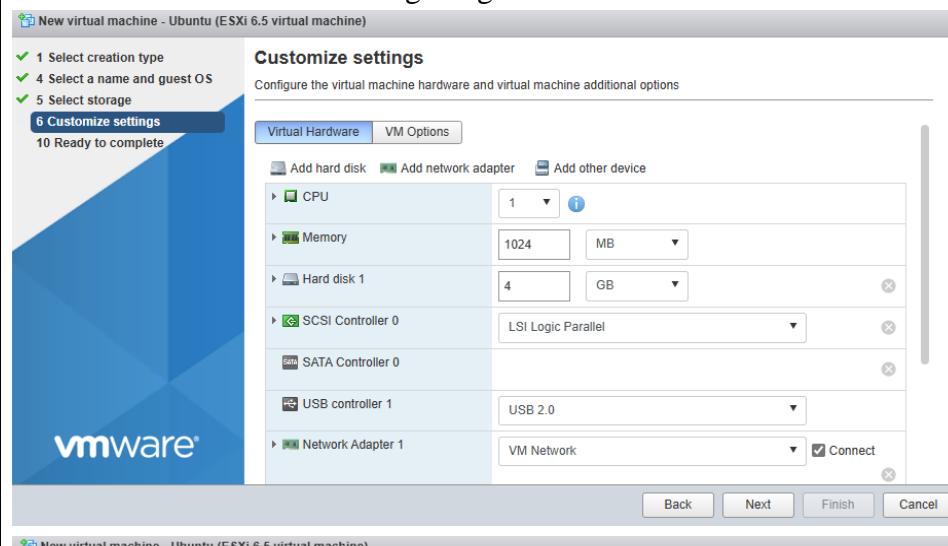
STEP 4: Give a name to the Virtual Machine & Click Next



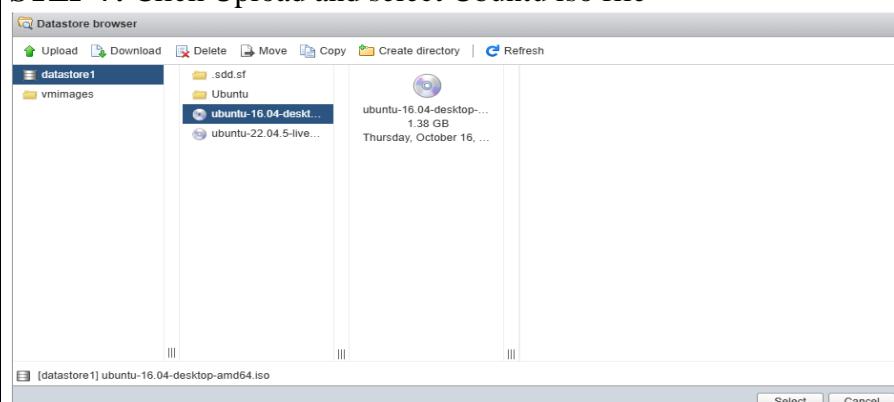
STEP 5: Select a storage for the VM.



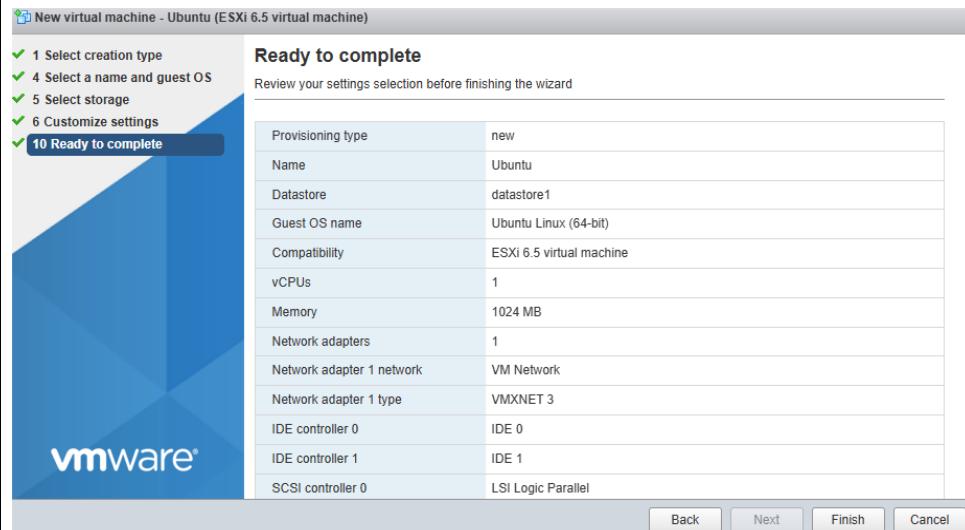
STEP 6: Customize the Settings as given below



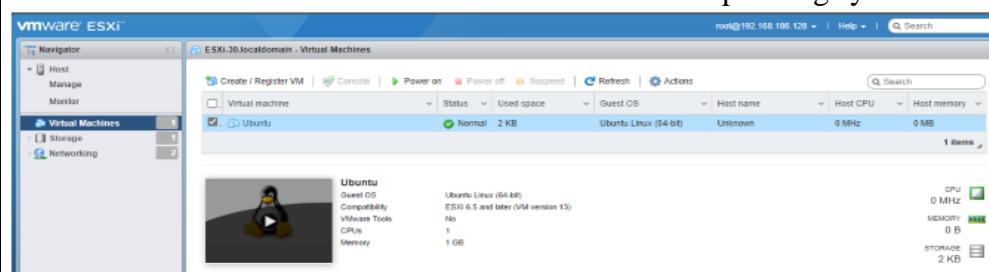
STEP 7: Click Upload and select Ubuntu iso file



STEP 8: Click Finish



STEP 9: The Virtual Machine with UBUNTU Guest Operating system is created. Click to power on it.



Conclusion:

This practical successfully demonstrated the fundamental process of provisioning a new virtual machine on an ESXi host. We learned how to define the virtual hardware (CPU, memory, disk), select the appropriate datastore, and mount an ISO image to install a Guest Operating System. The installation of VMware Tools was also covered, which is a critical step for ensuring proper driver support, performance, and manageability of the VM. This entire procedure is the core foundation of server virtualization, as it provides the basic compute instances required for running all applications and services within a virtual infrastructure.

Practical No: 04

Working with vCenter Server

Objective: Install and use vCenter Server Appliance

- Deploy vCenter Server Appliance
- Access and Configure vCenter Server Appliance
- Add Your ESXi Hosts to the vCenter Server Inventory
- Configure the ESXi Hosts as NTP Clients
- Back Up vCenter Server Appliance
- Complete the vCenter Server Appliance Deployment

IMPLEMENTATION:

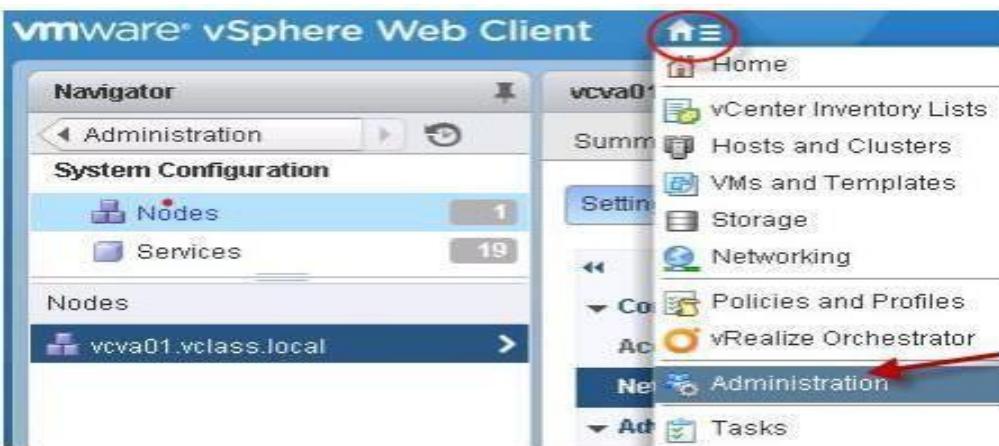
Deploy a VMware vCenter® Server Appliance™ on a your first ESXi host:

1. On your student desktop, navigate to the Class Materials and Licenses folder and double-click to open it.
2. Double-click the Class Files subfolder.
3. Double-click the VMware-VCSA-all-6.5.0.iso file.
4. Double-click the vcsa-ui-installer folder.
5. Double-click the win32 folder.
6. Locate and double-click the installer.exe application.
7. On the vCenter Server Appliance 6.5 Installer page, click Install
8. On the Install-Stage 1: Deploy appliance page, select the I accept the terms of the license agreement check box and click Next.
9. On the Select deployment type page, ensure that vCenter Server with an Embedded Platform Services Controller is selected and click Next.
10. On the Appliance deployment target page, enter your first ESXi host name sa-esxi01.vclass.local in the ESXi host or vCenter Server name text box.
11. In the HTTPS port text box, enter 443.
12. In the User name text box, enter root.
13. In the Password text box, enter the standard lab password and click Next.
14. On the Certificate Warning page, click Yes.
15. On the Set up appliance VM page, enter 172.20.10.194 in the VM name text box.
16. Enter the standard lab password in the Root password and Confirm root password text boxes and click Next.
17. On the Select deployment size page, accept the default Tiny and click Next.
18. On the Select datastore page, select Local01-2 as the deployment datastore.
19. Select the Enable Thin Disk Mode check box and click Next.
20. On the Configure network settings page, select VM Network from the Network drop-down menu.
21. From the IP version drop-down menu, select IPv4.
22. From the IP assignment drop-down menu, select static.
23. In the System name text box, enter 172.20.10.194.
24. In the IP address text box, enter 172.20.10.194.
25. In the Subnet mask or prefix length text box, enter 255.255.255.0.
26. In the Default gateway text box, enter 172.20.10.10.
27. In the DNS servers text box, enter 172.20.10.10 and click Next.
28. Click Finish.

Task 2: Access and Configure vCenter Server Appliance

You license both vCenter Server and ESXi hosts, edit the SSO configuration, create a data center object, and add your ESXi hosts to the inventory.

1. In your Internet Explorer Web browser, click vSphere Web Client on the favorite bar and select vSphere Web Client - sa-vcsa-01.vclass.local.
2. When the Website Security page opens, click Continue to this website (not recommended).
3. Log in to vCenter Server using administrator@vsphere.local as the user name and the standard lab password.
4. In vSphere Web Client, click the Home icon and select Administration.



5. In the Navigator pane, select Licenses.
6. In the Content pane, click the Licenses tab.
7. Click the Create New Licenses icon (the green plus sign).
8. On the Enter license keys page, in the License keys text box, enter the vCenter Server and vSphere Enterprise Plus license keys (on separate lines) provided by your instructor.
9. Verify that both licenses are listed correctly in the text box and click Next.
10. On the Edit license names page, enter VMware vCenter Server and VMware ESXi in the appropriate License name fields.
11. Click Next.
12. On the Ready to complete page, click Finish.
13. In the content pane, click the Assets tab
14. Right-click sa-vcsa-01.vclass.local and select Assign License.
15. At the bottom of the Assign License screen, you will see a message stating Some features will become unavailable.
16. Select the vCenter Server license and click OK.
17. Point to Home and select Administration > Single Sign-On > Configuration.
18. On the Policies tab, ensure that Password Policy is selected and click Edit.
19. In the Maximum lifetime text box, enter 0 for password never expires.
20. Click OK to save
21. Point to Home and select Home



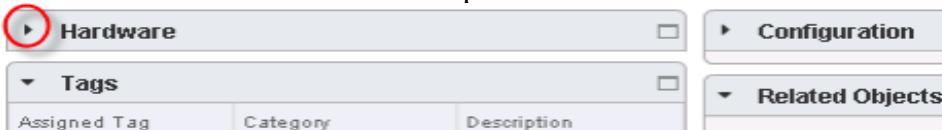
22. In the center pane, click Hosts and Clusters.
 23. In the Navigator pane, right-click sa-vcsa-01.vclass.local and select New Datacenter.
 24. In the Datacenter name text box, accept the default name Datacenter and click OK.
- In the Navigator pane, you should see that the new data center object is listed under vCenter Server Appliance.

Task 3: Add Your ESXi Hosts to the vCenter Server Inventory

You add ESXi hosts to the vCenter Server inventory.

1. In the Navigator pane, right-click Datacenter and select Add Host. The Add Host wizard appears.
2. On the Name and location page, enter sa-esxi-01.vclass.local and click Next. When repeating the task for your second host, enter sa-esxi-02.vclass.local.
3. On the Connection settings page, enter root as the user name and the standard lab password and click Next.
4. If you see a security alert stating that the certificate store of vCenter Server cannot verify the certificate, click Yes to proceed.
5. On the Host summary page, review the information and click Next.
6. On the Assign license page, click the VMware ESXi license key and click Next.
7. On the Lockdown mode page, accept the default Disabled and click Next.

8. On the VM location page, leave the default and click Next.
9. On the Ready to complete page, review the information and click Finish.
10. In the Recent Tasks pane, monitor the progress of the task.
11. Repeat steps 1 through 10 to add sa-esxi-02.vclass.local to the inventory.
12. In the Navigator pane, select your first ESXi host and click the Summary tab. This tab displays information for the ESXi host, such as CPU, memory, storage, NICs, and virtual machines.
13. Click the arrow next to the Hardware pane to view the hardware details of the ESXi host.



Task 4: Configure the ESXi Hosts as NTP Clients

You configure the ESXi hosts to use Network Time Protocol (NTP) to maintain accurate time and date.

1. Select sa-esxi-01.vclass.local in the inventory and click the Configure tab. When repeating steps for your second host, select sa-esxi-02.vclass.local.
2. Under System in the middle pane, select Time Configuration and view the current settings.
3. Click Edit.
4. Click Use Network Time Protocol (Enable NTP client).
5. From the NTP Service Startup Policy drop-down menu, select Start and stop with host.
6. In the NTP Servers text box, ensure that 172.20.10.10 is entered.
7. Under NTP Service Status, click Start.
8. Click OK.
9. In the Time Configuration pane, verify that the NTP client appears as Enabled and that the NTP service status appears as Running.
10. Repeat steps 1 through 9 to configure your second ESXi host.
11. Task 5: Back Up vCenter Server Appliance
12. You back up your vCenter Server appliance by connecting to the vCenter Server Appliance with a Web browser using Management port 5480.
13. Open a new Internet Explorer tab and enter <https://sa-vcsa-01.vclass.local:5480> in the address bar to access your vCenter Server Management port.
14. When the Security Warning appears, click Continue to this website (not recommended).
15. Log in with root as the user name and the standard lab password and click Login.
16. On the Summary page, click Backup on the upper-right corner of the screen.
17. On the Enter backup details page, select FTP from the Protocol drop-down menu.
18. In the Location text box, enter 172.20.10.10/VC-Backup.
19. In the User name text box, enter ftp-admin
20. In the Password text box, enter the standard lab password and click Next.
21. On the Select parts to backup page, click Next.
22. On the Ready to complete page, click Finish.
23. When the vCenter Server backup progress bar appears, close the vCenter Server Appliance Management UI browser tab.

Task 6: Complete the vCenter Server Appliance Deployment

You return to the vCenter Server Appliance deployment to complete the final steps and clean up for the next lab.

1. Return to the vCenter Server Appliance deployment screen and click Continue.
2. On the Introduction page of stage 2, click Next.
3. On the Appliance configuration page, enter 172.20.10.10 in the NTP servers text box and click Next.
4. On the SSO configuration page, enter vsphere.local in the SSO domain name text box.
5. In the SSO password and Confirm password text boxes, enter the standard lab password.
6. In the Site name text box, enter site-a and click Next.
7. On the Configure CEIP page, deselect the Join the VMware Customer Experience Improvement Program check box and click Next.
8. On the Ready to complete page, click Finish.
9. When you are prompted with the warning message You will not be able to pause or stop the install from completing once it's started. Click OK to continue or Cancel to stop, click OK. The installation might take about 20 minutes to complete.
10. When the progress bar shows that the installation is complete, click Close. If your browser is open, it will

automatically open a new browser tab.

11. When a certificate warning appears, click Continue to this website (Not recommended).
12. Close the Getting Started tab.
13. Log in to sa-esxi-01.vclass.local with root as user name and the standard lab password.
14. In the navigator pane, select Virtual Machines.
15. In the right pane, right-click your newly deployed vCenter Server Appliance and select Power > Power off.
16. When prompted with the warning messaging about powering off the virtual machine, click Yes to continue.
17. When vCenter Server Appliance is powered off, right-click it in the Navigator pane and select Delete.
18. When prompted with the Are you sure message, click Delete.

Practical No: 04

B. Navigating the vSphere Clients

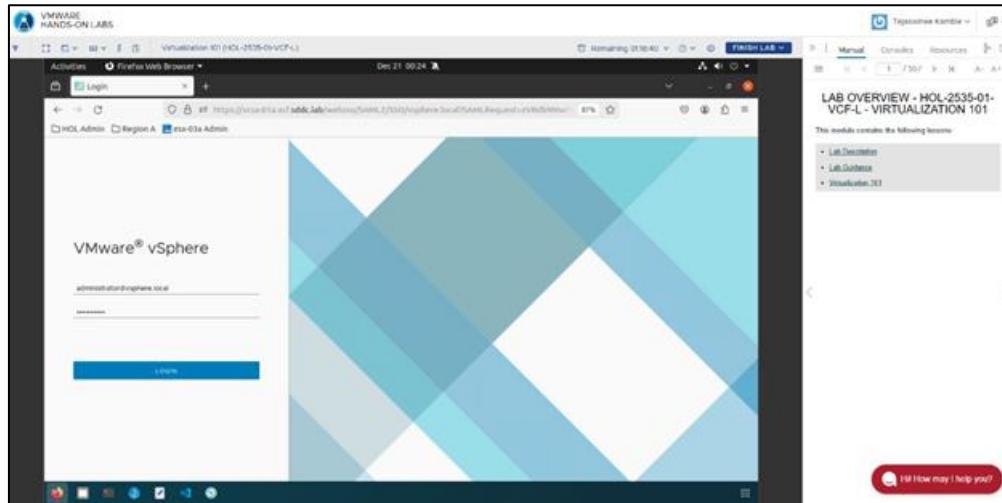
Objective: Become familiar with vSphere Client and vSphere Web Client

1. Navigate vSphere Client
2. Navigate vSphere Web Client

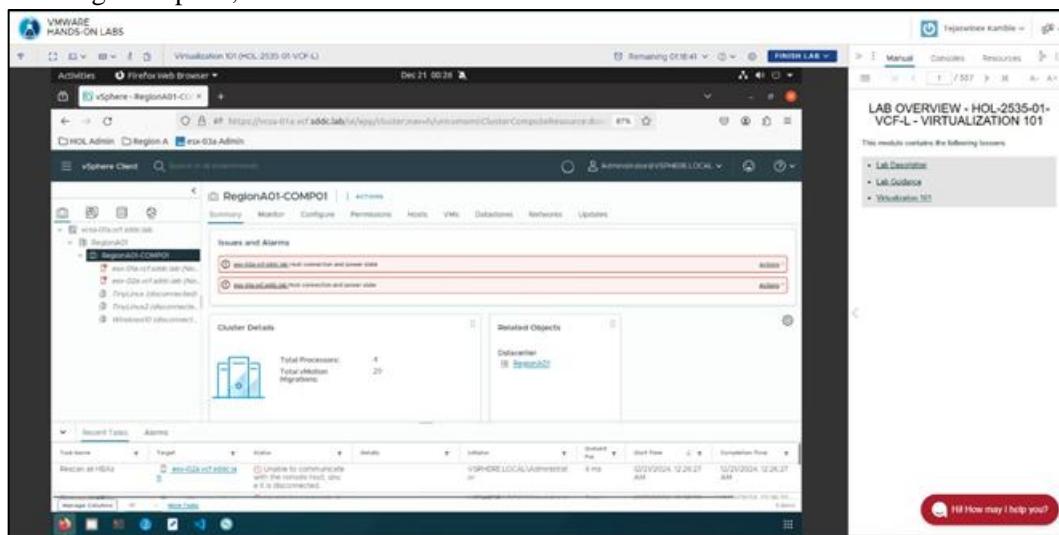
1: Navigate vSphere Client

In VMware vSphere® Client™, you navigate through the objects in the navigation tree and view the configuration settings to become familiar with the UI layout.

1. In your Internet Explorer Web browser, click vSphere Client on the favorite bar and select vSphere Client - sa-vcsa-01.vclass.local.
2. When the Security Warning appears, click Continue to this website (not recommended).
3. On the VMware vCenter Single Sign-on page, enter administrator@vsphere.local as the user name and the standard lab password and click Login.



4. In the navigation pane on the left, click the Hosts and Clusters icon.
5. In the navigation pane, click the arrow next to each object to expand the view completely.
6. In the navigation pane, select sa-esxi-01.vclass.local



7. In the right pane, click the Summary tab and record the information.

- Hypervisor
- Logical Processors
- NICs

Host Details

- Hypervisor: VMware ESXi 8.0.3, 2402291
- Model: VMware7!
- Processor Type: Intel(R) Xeon(R) Gold 6448FY
- Logical Processors: 2
- NICs: 4
- Virtual Machines: 2
- Status: Connected
- Uptime: 2 minutes

Capacity and Usage

Resource	Used	Total Capacity
CPU	0.22 GHz used	4.2 GHz capacity
Memory	3.95 GB used	8.0 GB capacity
Storage	25.01 GB used	90.52 GB capacity

Recent Tasks

Task Name	Target	Status	Details	Initiator	Elapsed	Start Time	Completion Time
Power On Virtual Machine	Windows10	Completed		VSPHERE LOCAL\Administrat...	4 ms	12/21/2024, 12:27:15 AM	12/21/2024, 12:27:15 AM
Power On Virtual Machine	TinyLinux	Completed		VSPHERE LOCAL\Administrat...	4 ms	12/21/2024, 12:27:04 AM	12/21/2024, 12:27:05 AM

8. In the right pane, expand the Hardware and Configuration panes to review the information.

vCenter Details

- Version: 8.0.3
- Build: 2402160
- Last Updated: Jul 24, 2024, 8:47 PM
- Backup: Not scheduled
- Clusters: 1
- Hosts: 2,593
- Virtual Machines: 5,376

Capacity and Usage

Resource	Used	Total Capacity
CPU	0.57 GHz used	7.01 GHz capacity
Memory	1.61 GB used	8.0 GB capacity
Storage	29.34 GB used	90.52 GB capacity

Recent Tasks

Task Name	Target	Status	Details	Initiator	Elapsed	Start Time	Completion Time
Power On Virtual Machine	Windows10	Completed		VSPHERE LOCAL\Administrat...	4 ms	12/21/2024, 12:27:15 AM	12/21/2024, 12:27:15 AM
Power On Virtual Machine	TinyLinux	Completed		VSPHERE LOCAL\Administrat...	4 ms	12/21/2024, 12:27:04 AM	12/21/2024, 12:27:05 AM

9. In the navigation pane, select the vCenter Server Appliance name to return to the top of the navigation tree.

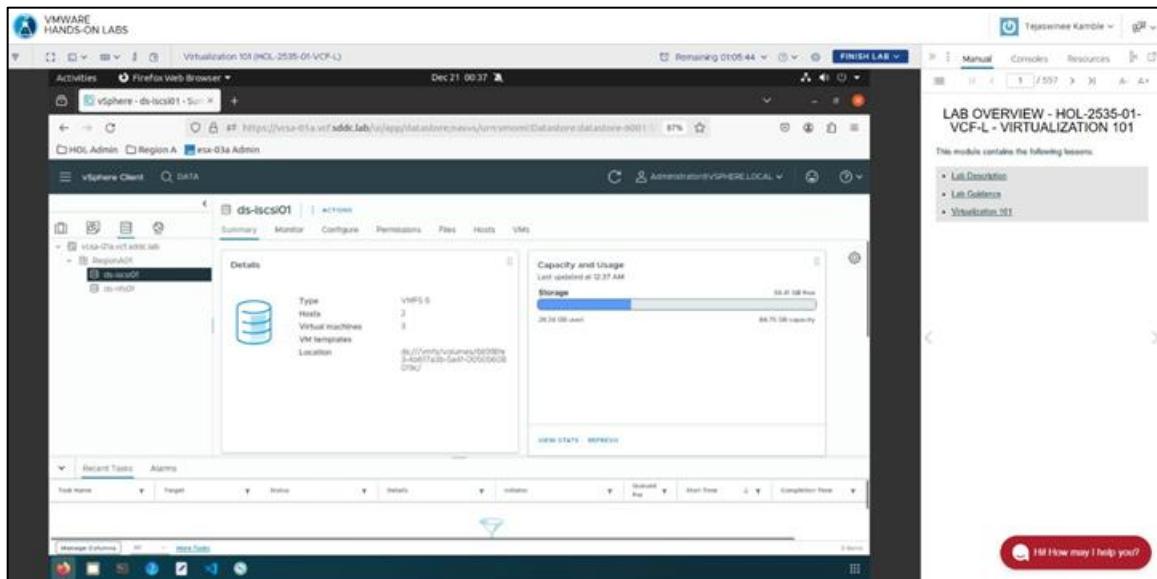
Task Name	Target	Status	Details
Power On virtual machine	Windows01	Completed	VSPHERE LOCAL\Administrat... 12/29/2024, 12:27:15 AM
Power On virtual machine	TinyLinux	Completed	VSPHERE LOCAL\Administrat... 12/29/2024, 12:27:04 AM

10. In the Search text box on the top, enter datastore.

11. When the datastores appear under the search box, click datastore 1.

Name	Status	Type	Datastore Cluster	Capacity	Free
ds-nfs01	Normal	NFS 3		84.75 GB	56.41 GB
ds-iscsi0	Normal	MPFS 3		5.77 GB	5.77 GB

12. In the Summary tab, review the datastore details in the Details pane.

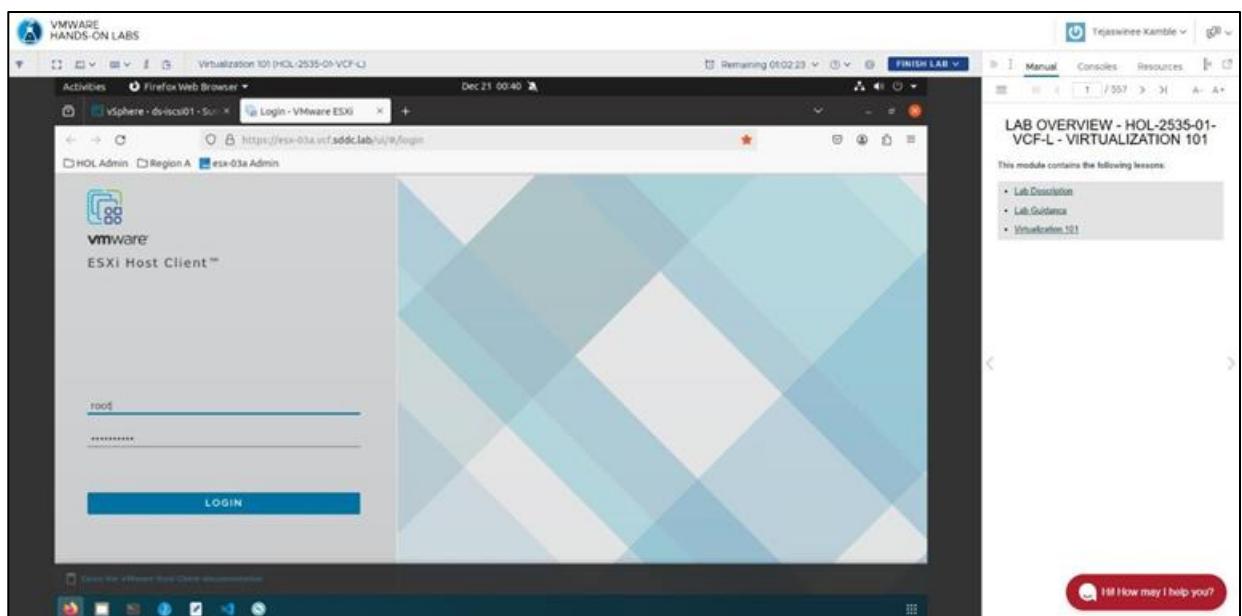


13. Close the vSphere Client tab.

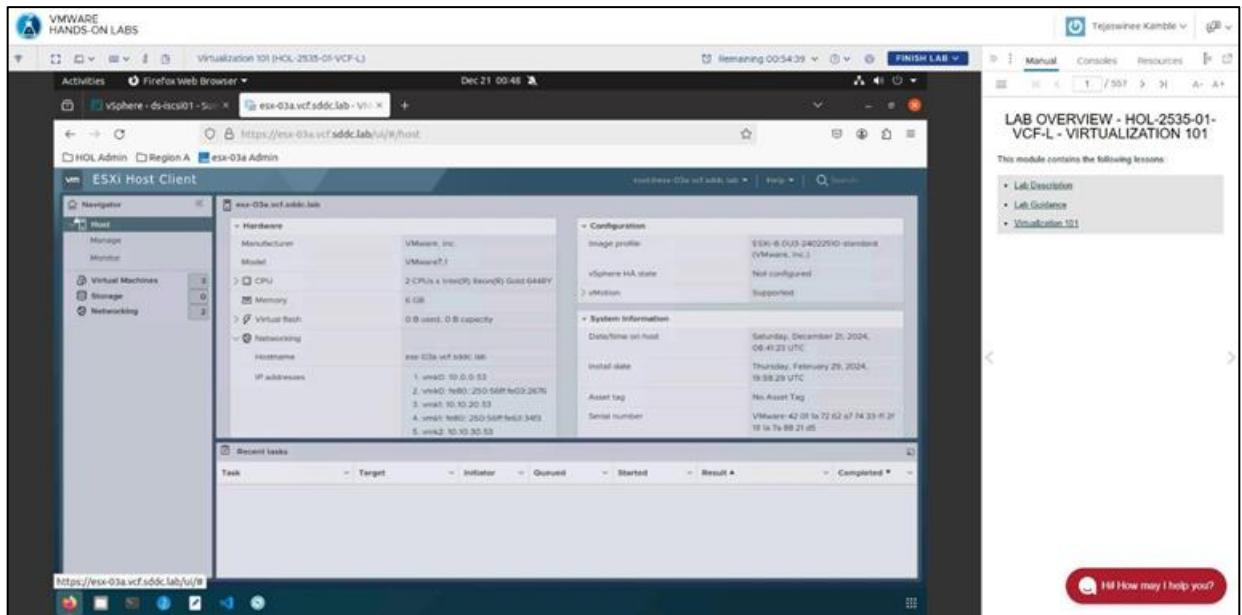
2: Navigate vSphere Web Client

You navigate through vSphere Web Client to become familiar with the UI layout.

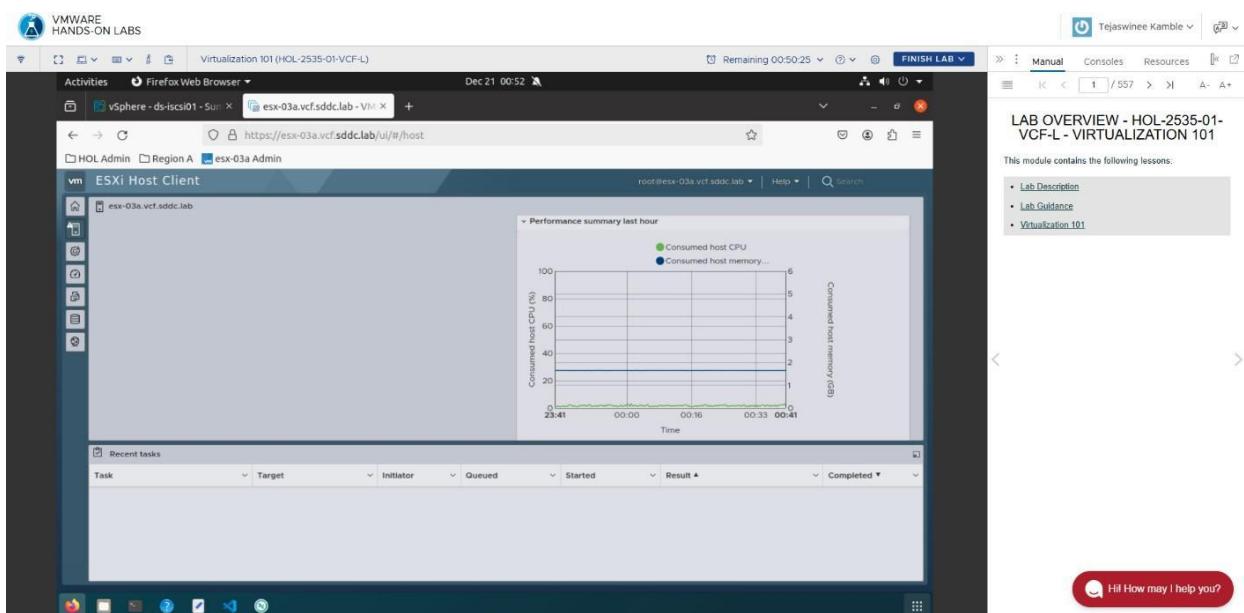
1. In the favorites menu of your Internet Explorer Web browser, select vSphere Web Client > vSphere Web Client - sa-vcsa-01.vclass.local.
2. When the There is a problem with this website's security certificate warning message appears, click Continue to this website (not recommended).
3. On the VMware vCenter Single Sign-on page, enter administrator@vsphere.local as the user name and the standard lab password and click Login.



- On the vSphere Web Client Home page, click Hosts and Clusters.



- Click sa-esxi-01.vclass.local in the navigation pane.
- In the center pane, under the Summary tab, expand the Hardware and Configuration panes to review the information.
- In the navigation pane, select sa-vcsa-01.vclass.local to return to the top of the navigation tree.
- In the Search text box, enter datastore.
- When the datastores appear under the search box, select datastore 1.
- In the Summary tab, review the datastore details in the Details pane.



- Click the vSphere Web Client Home icon and select Home. The vSphere Web Client displays two panes to the right of the window: Work In Progress and Alarms. You can adjust these panes to provide more space for the content area.
- In the Alarms pane, click the pin icon. The Alarms pane shrinks to a side tab to the right.

13. In the Work In Progress pane, click the pin icon to shrink it to a side tab.
14. To restore the default layout of the user interface, click your logged in user name and select Layout Settings.
15. In the Layout Settings window and click Reset to default layout.
16. On the vSphere Web Client Home page, click Hosts and Clusters and select sa-vcsa01.vclass.local in the navigation pane.
17. In the content pane, review the information shown under the Getting Started tab, which provides general information about the object that you selected in the navigation pane.
18. If you are familiar with vCenter Server fundamentals and know how to navigate among the objects, click Help above the content pane and select Hide All Getting Started Pages. The Getting Started tab no longer appears.
19. In vSphere Web Client, click the Home icon and select Home from the drop-down menu.
20. Leave vSphere Web Client open for the next lab.

Practical 5

Using Standard Switches

Aim: To configure a vSphere Standard Switch (vSwitch) and port group.

Practical Description:

- View the Standard Switch Configuration
- Create a Standard Switch with a Virtual Machine Port Group
- Attach a Virtual Machine to the New Port Group

Software used: VMware Workstation Pro, VMware ESXi 7

Theory:

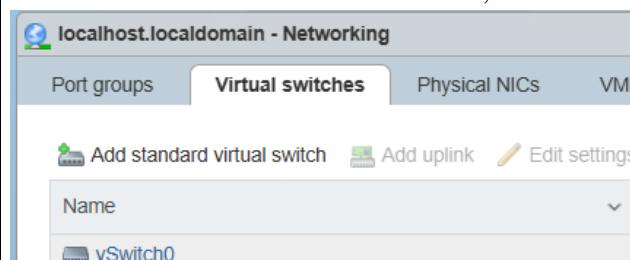
A vSphere Standard Switch (vSwitch) is a software-based switch that functions like a physical Ethernet switch. It connects virtual machines to each other and to the physical network (uplinks). A Port Group is a configuration template that defines policies for the ports on a vSwitch, such as VLAN tagging or security. Virtual machines connect to port groups, not directly to the vSwitch.

Implementation:

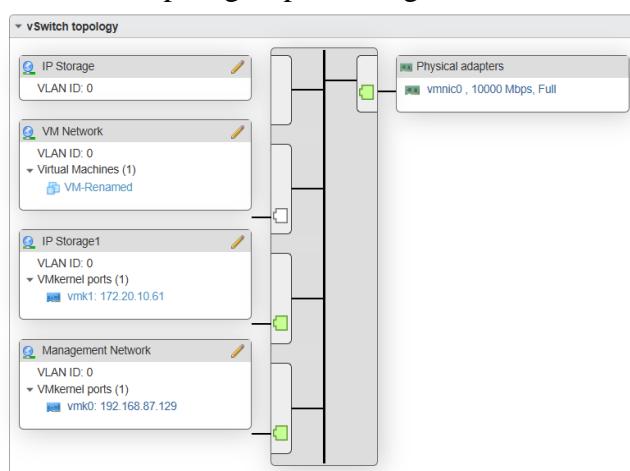
a. View the Standard Switch Configuration

STEP 1: Log in to the ESXi host and navigate to the Networking section in the left navigator.

STEP 2: On the Virtual switches tab, select the default switch, vSwitch0.

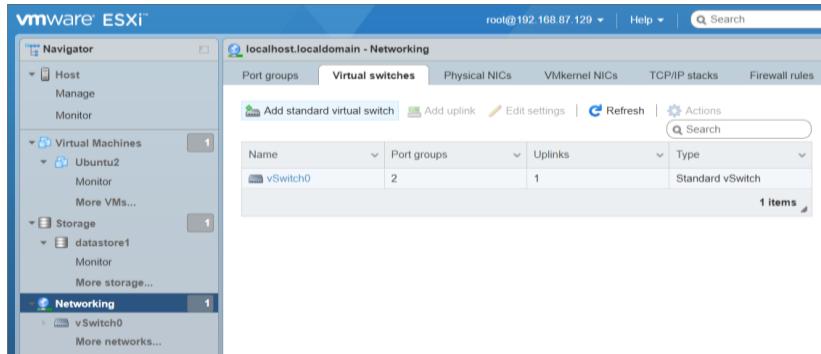


STEP 3: Observe the topology diagram. Note that vSwitch0 is connected to the physical NIC vmnic0 and contains two port groups: Management Network and VM Network.



b. Create a Standard Switch with a Virtual Machine Port Group

STEP 4: On the Networking > Virtual switches tab, click the Add standard virtual switch button.

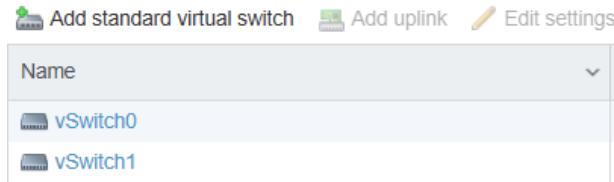


STEP 5: A new window will open.

- **vSwitch Name:** Enter vSwitch1.

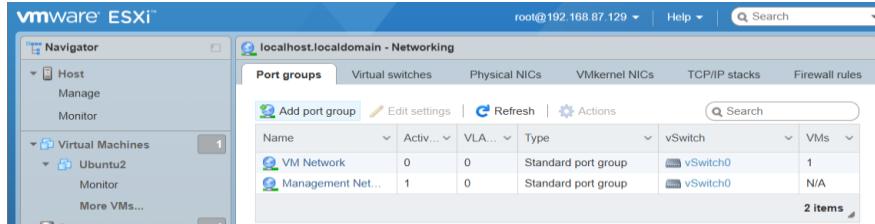
vSwitch Name	vSwitch1
MTU	1500
Link discovery	
Security	

STEP 6: Click the Add button. The new vSwitch1 will appear in the list.



STEP 7: At the top of the "Networking" page, click the Port groups tab.

STEP 8: Click the Add port group button.



STEP 9: In the "Add port group" window, configure the settings:

- **Name:** Production
- **VLAN ID:** 0
- **Virtual switch:** Select the new vSwitch1 from the drop-down menu.

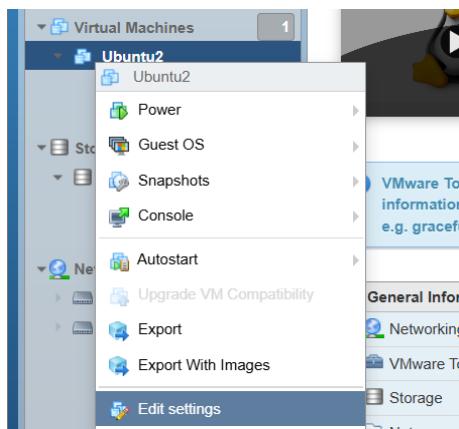
Name	Production
VLAN ID	0
Virtual switch	vSwitch1
Security	

STEP 10: Click the Add button.

c. Attach Your Virtual Machine to the New Port Group

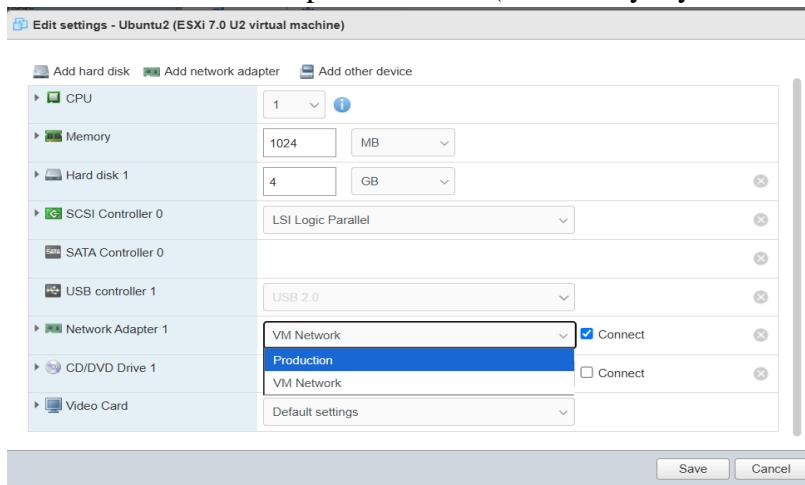
STEP 11: In the navigator, click Virtual Machines.

STEP 12: Right-click the "Ubuntu" VM and select Edit settings.



STEP 13: In the settings window, find the Network adapter 1 device.

STEP 14: Click the drop-down menu (it currently says VM Network) and select the new Production port group.



STEP 15: Click Save.

d. Verify the Connection

STEP 16: Power on the "Ubuntu" VM and open its Console.

STEP 17: Log in and open a Terminal.

STEP 18: Test the new network connection by pinging an external site:

ping -c 4 google.com

```
ankit@ankit-VMware-Virtual-Platform:~$ ping -c 4 google.com
PING google.com (142.250.70.78) 56(84) bytes of data.
64 bytes from pbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=1 ttl=128 time=3.28 ms
64 bytes from pbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=2 ttl=128 time=6.61 ms
64 bytes from pbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=3 ttl=128 time=3.59 ms
64 bytes from pbomb-ab-in-f14.1e100.net (142.250.70.78): icmp_seq=4 ttl=128 time=8.38 ms
...
... google.com ping statistics ...
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 3.278/5.463/8.377/2.127 ms
ankit@ankit-VMware-Virtual-Platform:~$
```

Conclusion:

This practical demonstrated the creation of a new vSphere Standard Switch (vSwitch1) and a new port group (Production). A virtual machine was successfully migrated from the default VM Network to the new Production network, validating the new network path. This process is fundamental for network segmentation and managing VM traffic in an ESXi environment.

Practical 6

Accessing iSCSI Storage

a. Managing VMFS Datastores b. Accessing NFS Storage

Aim: To configure and access iSCSI storage on a standalone ESXi host.

Practical Description:

- Create a VMkernel Port Group for iSCSI
- Configure a virtual machine to act as an iSCSI Target (storage server)
- Configure the iSCSI Software Adapter and connect it to the storage
- Rescan for and verify the new storage device

Software used: VMware Workstation Pro, VMware ESXi 7, Ubuntu Desktop

Theory:

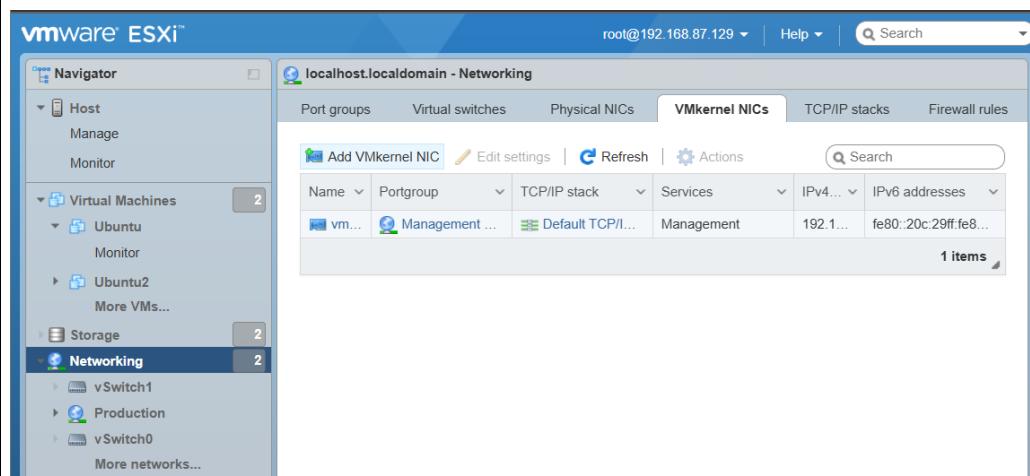
iSCSI (Internet Small Computer System Interface) is a storage networking standard that allows block-level storage data to be transported over standard IP networks. In ESXi, this requires a VMkernel port configured for iSCSI traffic and a software iSCSI adapter to connect to a storage server (known as an iSCSI Target). This practical will simulate an iSCSI target using a nested Ubuntu VM, allowing the ESXi host to discover and use iSCSI LUNs (Logical Unit Numbers) as storage.

Implementation:

a. Create a VMkernel Port Group for iSCSI (on ESXi Host)

STEP 1: In the ESXi Host Client, navigate to the Networking section.

STEP 2: Select the VMkernel NICs tab and click Add VMkernel NIC.



STEP 3: In the "Add VMkernel NIC" window, fill in the following details:

- **New port group:** IP Storage
- **Virtual switch:** vSwitch0
- Expand **IPv4 settings** and select **Static**.
- **Address:** 172.20.10.61
- Subnet mask: 255.255.255.0

Add VMkernel NIC

Port group	New port group
New port group	IP Storage1
Virtual switch	vSwitch0
VLAN ID	0
MTU	1500
IP version	IPv4 only
IPv4 settings	
Configuration	<input type="radio"/> DHCP <input checked="" type="radio"/> Static
Address	172.20.10.61
Subnet mask	255.255.255.0
TCP/IP stack	Default TCP/IP stack
Services	<input type="checkbox"/> vMotion <input type="checkbox"/> Provisioning <input type="checkbox"/> Fault tolerance logging

Create Cancel

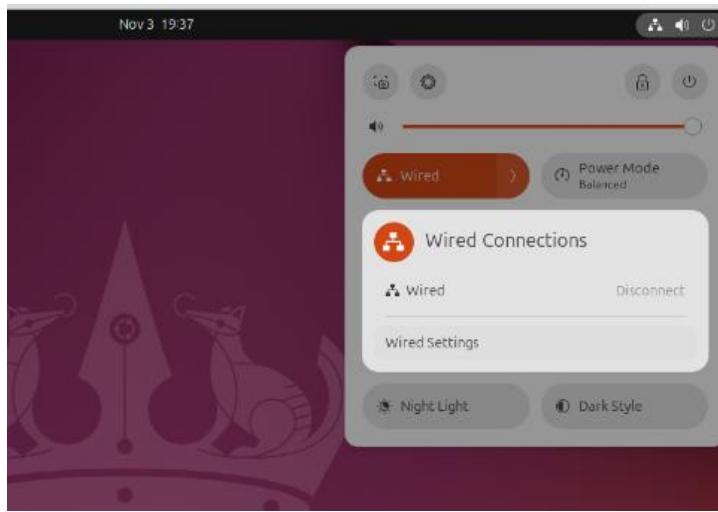
STEP 4: Click Create. The new vmk1 (IP Storage) port will appear in the list.

b. Configure the Ubuntu VM as an iSCSI Target

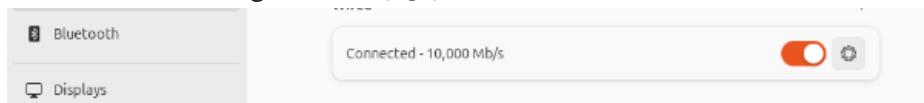
STEP 5: In the ESXi client, move the "Ubuntu" VM to the VM Network port group (on vSwitch0) to ensure it can communicate with the vmk1 port.

STEP 6: Power on the "Ubuntu" VM and open its Console.

STEP 7: Log in and set a static IP. Click the network icon > Wired Connected > Wired Settings.

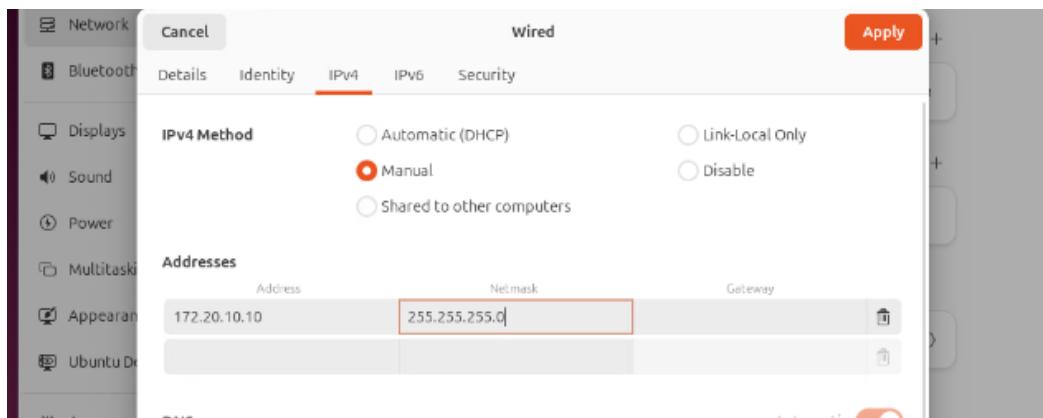


STEP 8: Click the gear icon (⚙️), select the IPv4 tab, and choose Manual.



STEP 9: Enter the following settings and click Apply. Then, toggle the network off and on.

- **Address:** 172.20.10.10
- **Netmask:** 255.255.255.0
- **Gateway:** (Leave blank)



STEP 10: Open a Terminal and install the iSCSI target software:

```
sudo apt update
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt update
[sudo] password for ankit:
[et:1 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
[et:2 http://in.archive.ubuntu.com/ubuntu noble InRelease
[et:2 http://in.archive.ubuntu.com/ubuntu noble-security InRelease [126 kB]
sudo apt install tgt
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt install tgt
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

STEP 11: Create a backing file to act as the 10 GB LUN:

```
sudo mkdir /storage
```

```
sudo dd if=/dev/zero of=/storage/lun1.img bs=1G count=10
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo mkdir /storage
ankit@ankit-VMware-Virtual-Platform:~$ sudo dd if=/dev/zero of=/storage/lun1.img
bs=1G count=10
```

STEP 12: Configure the iSCSI target. Open the configuration file:

```
sudo nano /etc/tgt/targets.conf
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo nano /etc/tgt/targets.conf
```

STEP 13: Add the following lines to the end of the file to define the target and share the LUN:

```
<target iqn.2025-11.lab.target>
    backing-store /storage/lun1.img
    portal 172.20.10.10
    write-cache off
</target>
```

```
GNU nano 7.2          /etc/tgt/targets.conf
# Empty targets configuration file -- please see the package
# documentation directory for an example.
#
# You can drop individual config snippets into /etc/tgt/conf.d
include /etc/tgt/conf.d/*.conf
<target iqn.2025-11.lab.target>
    backing-store /storage/lun1.img
    portal 172.20.10.10
    write-cache off
</target>

[Wrote 10 lines]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute  ^C Location
^X Exit      ^R Read File   ^V Replace   ^U Paste     ^J Justify  ^/ Go To Line
```

STEP 14: Press Ctrl+O (Save) and Ctrl+X (Exit).

STEP 15: Restart the iSCSI target service to apply the changes:

```
sudo systemctl restart tgt
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo systemctl restart tgt
ankit@ankit-VMware-Virtual-Platform:~$
```

c. Configure the iSCSI Software Adapter (on ESXi Host)

STEP 16: In the ESXi client, navigate to the Storage section.

STEP 17: Click the Adapters tab, then click Software iSCSI.

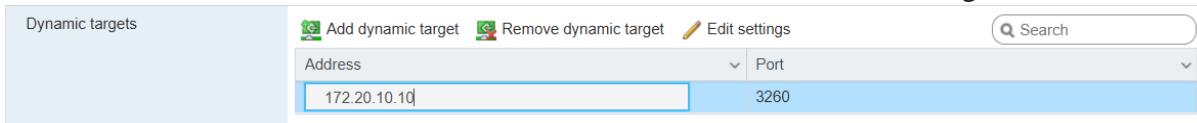
STEP 18: In the "Software iSCSI" window, click the toggle to Enabled.

STEP 19: Scroll down to "Network port bindings" and click Add port binding.

STEP 20: Select the vmk1 (IP Storage) interface and click Select.

STEP 21: Scroll down to "Dynamic targets" and click Add dynamic target.

STEP 22: Enter the iSCSI server's IP address: 172.20.10.10. Click Add target.

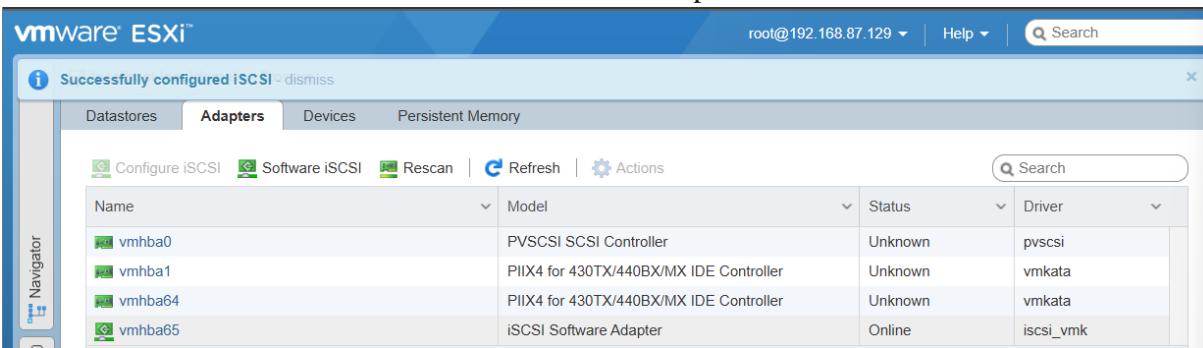


STEP 23: Scroll to the top and click Save configuration.

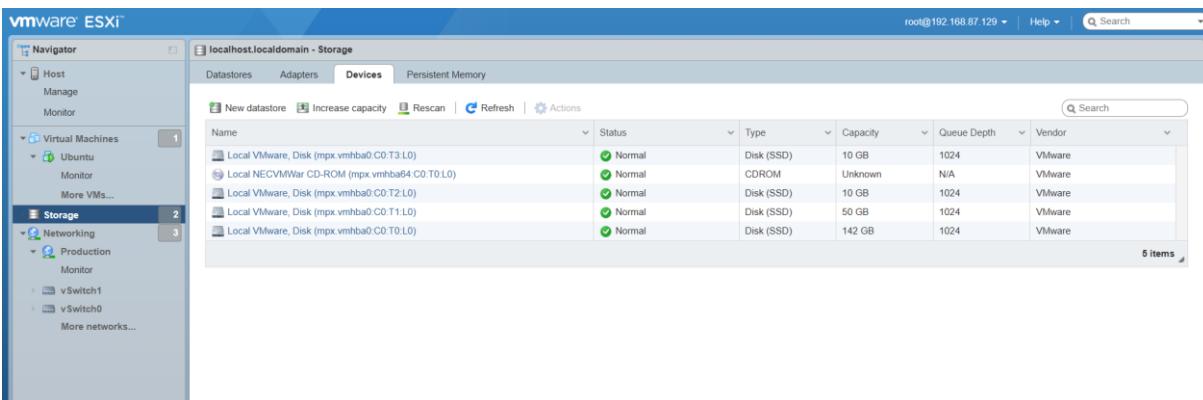
d. Rescan for and Verify the New Storage

STEP 24: After the configuration is saved, click the Rescan button.

STEP 25: Wait for the "Rescan all HBA" task to complete.



STEP 26: Click the Devices tab. A new 10 GB disk (the iSCSI LUN from the Ubuntu VM) will now be visible in the list.



Conclusion:

This practical demonstrated the end-to-end process of configuring iSCSI storage. A VMkernel port for storage was created on the ESXi host. A nested Ubuntu VM was configured as an iSCSI target to serve a 10 GB LUN. Finally, the ESXi host's software iSCSI adapter was enabled and bound to the VMkernel port, successfully discovering the iSCSI LUN, which is now available to the host for datastore creation.

Aim:6(A) To manage VMFS datastores by creating, expanding, deleting, and extending them across multiple LUNs.

Practical Description:

- Add a new virtual disk to the ESXi host.
- Create datastores with partial and full disk allocation.
- Expand a VMFS datastore to consume unused space on its LUN.
- Remove a VMFS datastore.
- Extend a VMFS datastore by adding a second LUN (extent).
- Create a new datastore on a separate large disk.

Software used: VMware Workstation Pro, VMware ESXi 7, Ubuntu Desktop

Theory:

VMFS (Virtual Machine File System) is a high-performance clustered file system from VMware that allows multiple ESXi hosts to read and write to the same shared storage. Managing VMFS datastores involves more than just creation; it includes expanding a datastore's capacity by either growing its partition on the same LUN or by adding new LUNs to it as "extents," effectively spanning the datastore across multiple disks.

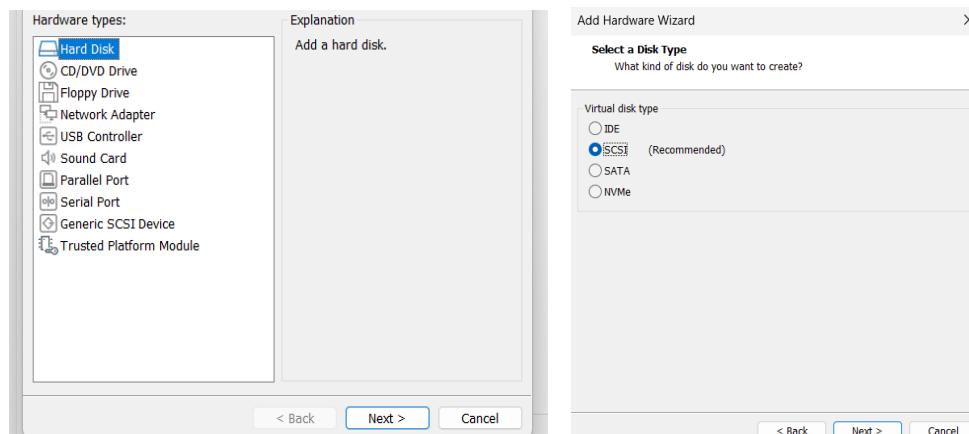
Implementation:

a. Preparation Task B: Add 63 GB Disk (in Workstation)

STEP 1: In the ESXi client, shut down your ESXi host (Host > Power > Shut down).

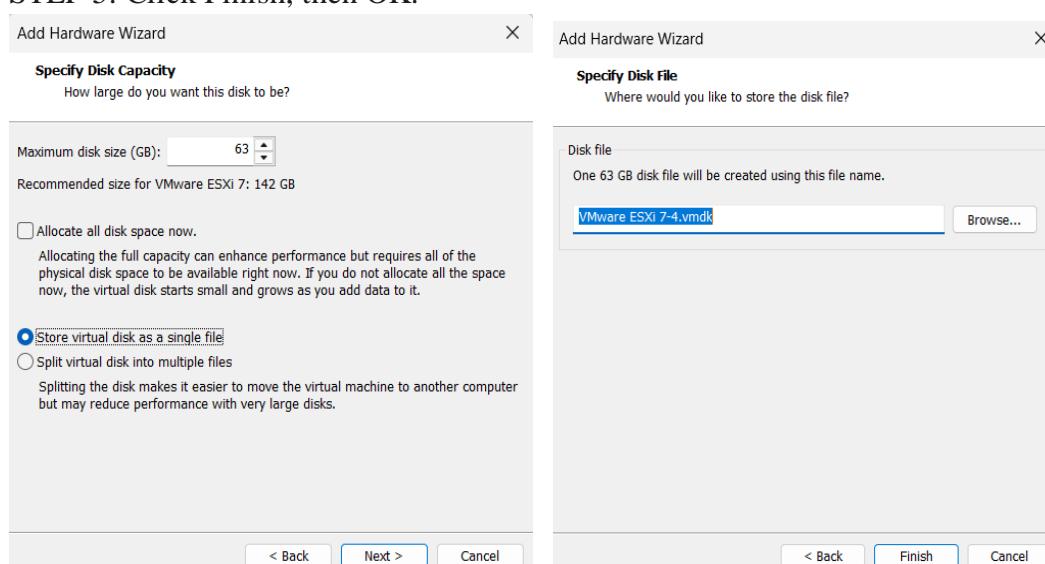
STEP 2: In VMware Workstation, open the Settings for your ESXi VM.

STEP 3: Click Add... > Hard Disk > SCSI > Create a new virtual disk.



STEP 4: Set the "Maximum disk size" to 63 GB and select "Store virtual disk as a single file."

STEP 5: Click Finish, then OK.



STEP 6: Power on your ESXi VM in Workstation and log in to the web client.

c. Task 2: Create VMFS Datastores (LUN 2 & LUN 3)

STEP 7: In the ESXi client, navigate to Storage.

STEP 8: Go to the Adapters tab and click Rescan to discover both 10 GB LUNs and the new 63 GB disk.

Name	Status	Type	Capacity	Queue Depth	Vendor
Local VMware, Disk (mpx.vmhba0:C0:T4:L0)	Normal	Disk (SSD)	1 GB	1024	VMware
Local VMware, Disk (mpx.vmhba0:C0:T3:L0)	Normal	Disk (SSD)	10 GB	1024	VMware
Local NECVMWar CD-ROM (mpx.vmhba64:C0:T0:L0)	Normal	CDROM	Unknown	N/A	VMware
Local VMware, Disk (mpx.vmhba0:C0:T2:L0)	Normal	Disk (SSD)	10 GB	1024	VMware
Local VMware, Disk (mpx.vmhba0:C0:T1:L0)	Normal	Disk (SSD)	50 GB	1024	VMware
Local VMware, Disk (mpx.vmhba0:C0:T0:L0)	Normal	Disk (SSD)	142 GB	1024	VMware
Local VMware, Disk (mpx.vmhba0:C0:T5:L0)	Normal	Disk (SSD)	63 GB	1024	VMware

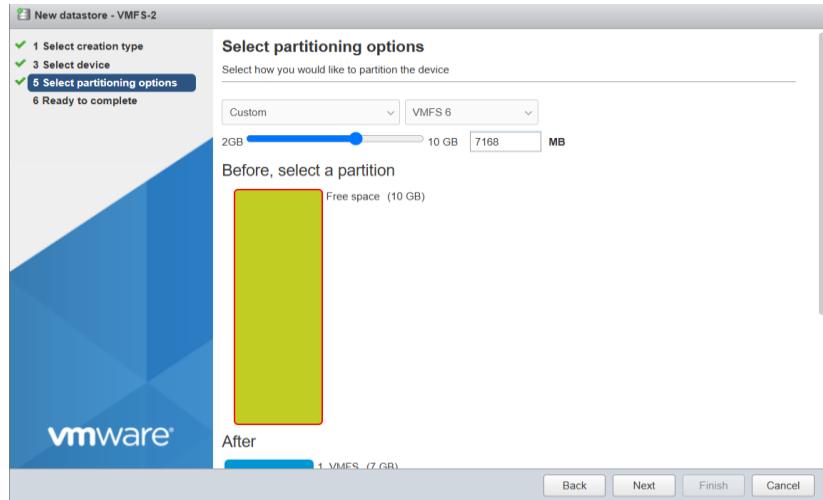
STEP 9: Go to the Datastores tab and click New datastore.

STEP 10: Select Create new VMFS datastore and click Next.

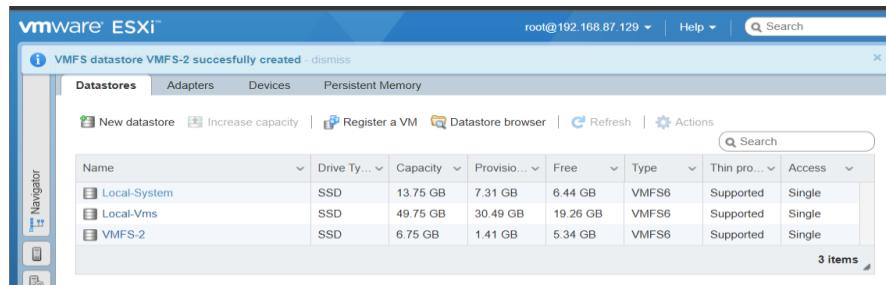
STEP 11: Create VMFS-2 (Partial):

- **Name:** VMFS-2
- **Select device:** Click the *first* 10 GB iSCSI LUN.

- Click Next.
- Select partitioning options: Select Custom.
- VMFS size: Set the value to 7 GB.



- Click Next, then Finish, and Yes to confirm.

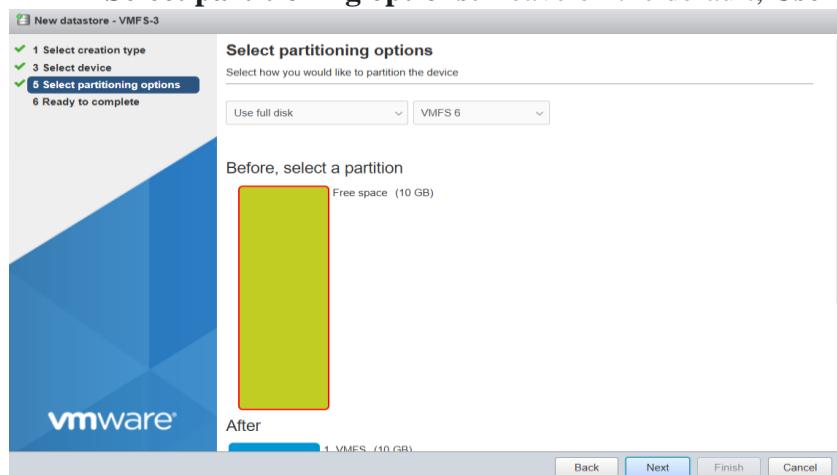


STEP 12: Create VMFS-3 (Full):

- Click New datastore again.
- Choose Create new VMFS datastore and click Next.
- Name: VMFS-3
- Select device: Click the second 10 GB iSCSI LUN.
- Click Next.



- Select partitioning options: Leave on the default, Use full disk.



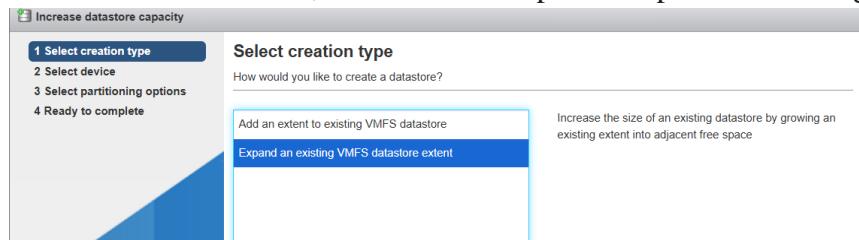
- Click Next, then Finish, and Yes to confirm.

d. Task 3: Expand a VMFS Datastore (Using Free Space)

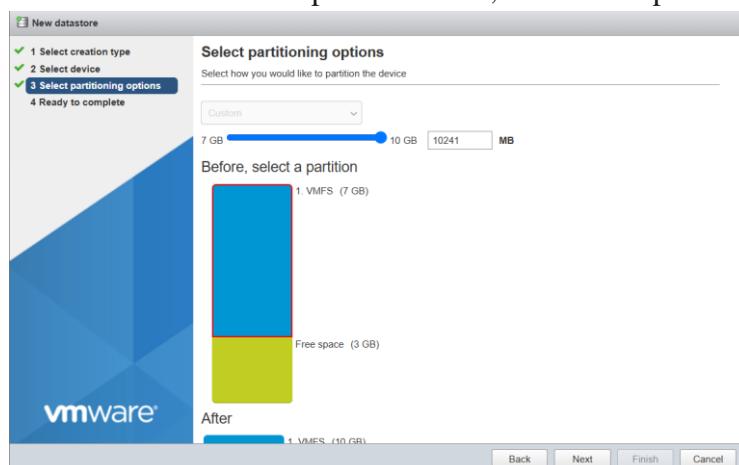
STEP 13: On the Datastores tab, right-click VMFS-2 and select Increase capacity.



STEP 14: In the wizard, select the first option: Expand an existing VMFS datastore extent. Click Next.



STEP 15: From the drop-down menu, select the option to use the remaining 3 GB of free space. Click Next.

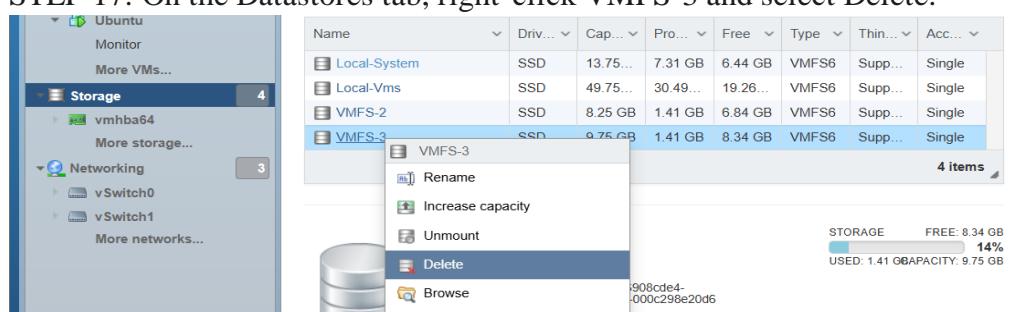


STEP 16: Click Finish. The capacity of VMFS-2 will grow to 10 GB.

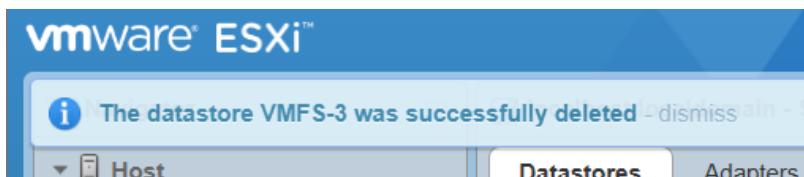


e. Task 4: Remove a VMFS Datastore

STEP 17: On the Datastores tab, right-click VMFS-3 and select Delete.

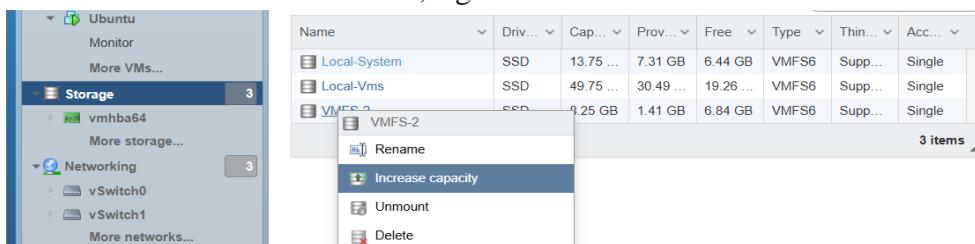


STEP 18: Click Delete to confirm. This frees up the second 10 GB LUN.

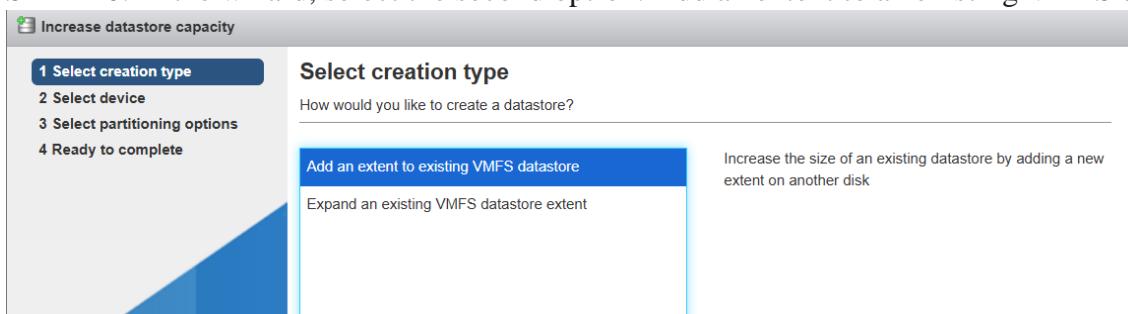


f. Task 5: Extend a VMFS Datastore (Across Disks)

STEP 19: On the Datastores tab, right-click VMFS-2 and select Increase capacity.

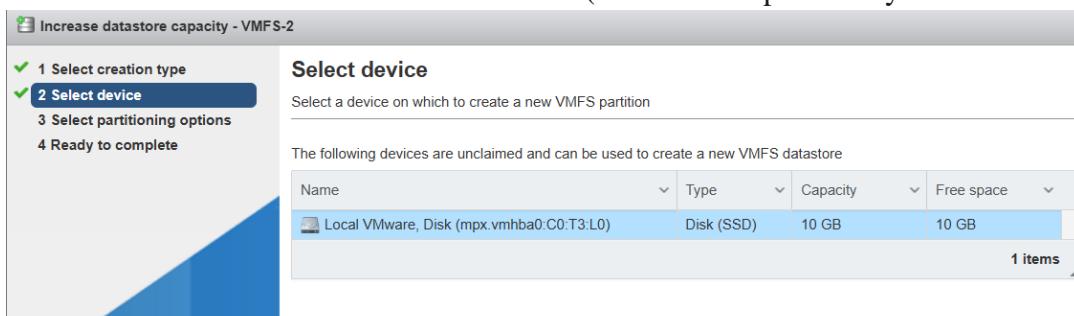


STEP 20: In the wizard, select the second option: Add an extent to an existing VMFS datastore. Click Next.

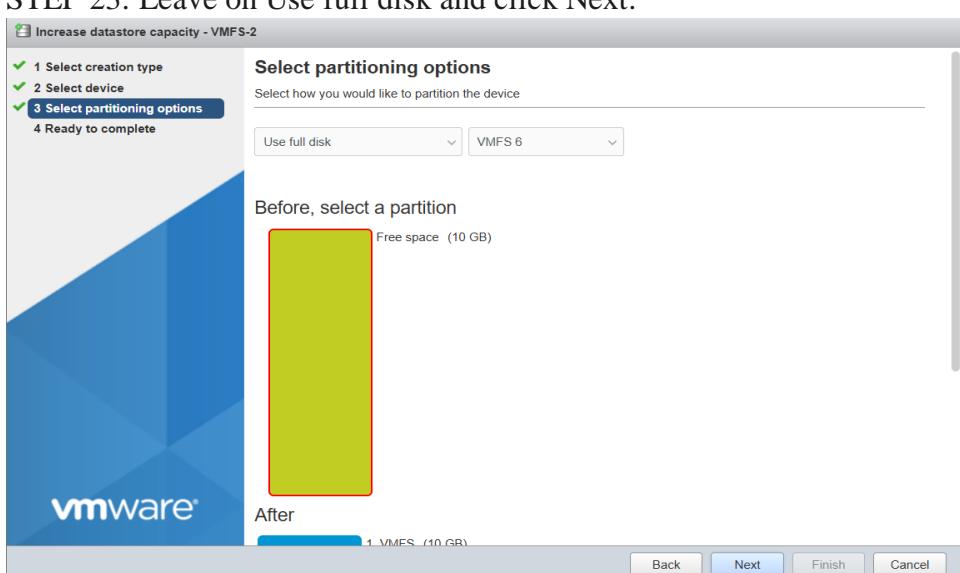


STEP 21: Select VMFS-2 and click Next.

STEP 22: Select the now-blank 10 GB LUN (the disk that previously held VMFS-3). Click Next.



STEP 23: Leave on Use full disk and click Next.

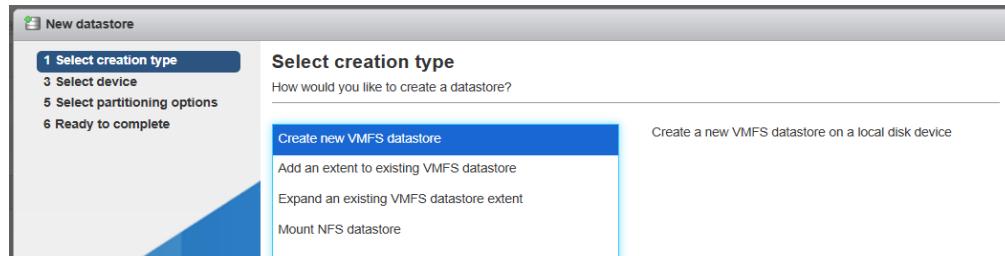


STEP 24: Click Finish. The capacity of VMFS-2 will now be expanded.

VMFS-2	SSD	18 GB	1.41 GB	16.59 GB
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g. Task 6: Create a second Shared VMFS Datastore

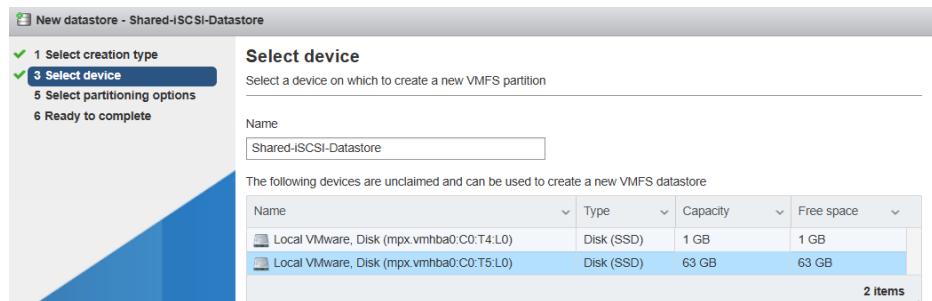
STEP 26: On the Datastores tab, click New datastore.



STEP 27: Select Create new VMFS datastore and click Next.

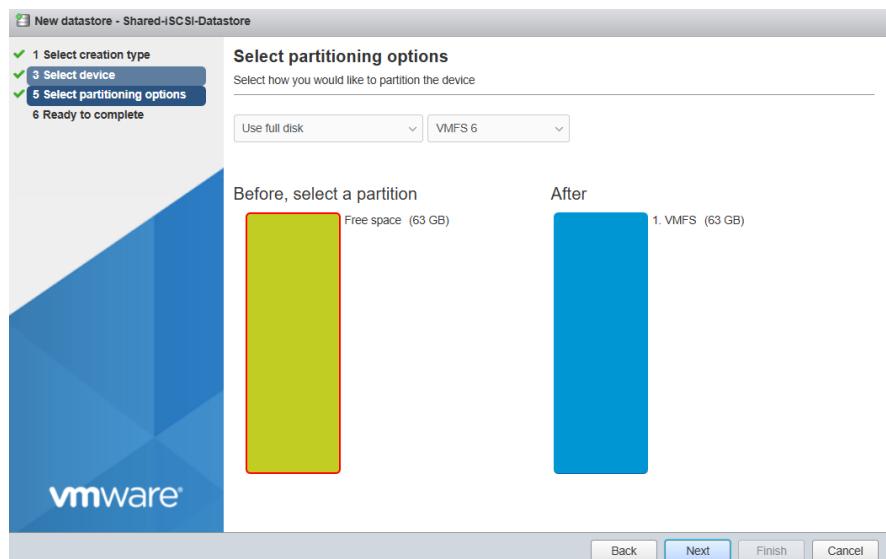
STEP 28: On the "Select device" page:

- **Name:** Shared-iSCSI-Datastore
- Select device: Click on the 63 GB disk.

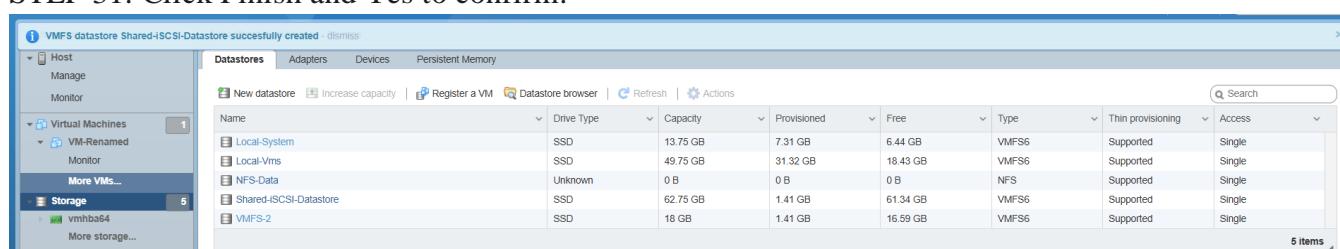


STEP 29: Click Next.

STEP 30: Select Use full disk and click Next.



STEP 31: Click Finish and Yes to confirm.



Conclusion:

This practical demonstrated the full lifecycle of VMFS datastore management. We successfully created datastores from simulated iSCSI LUNs, expanded a datastore's capacity on its existing LUN, removed a datastore, and extended a datastore across a second LUN (creating an extent). Finally, a new, separate datastore was created on a larger disk, completing all required storage configurations.

Aim:6(B) To configure and access NFS (Network File System) storage on a standalone ESXi host.

Practical Description:

- Configure a virtual machine to act as an NFS Server.
- Configure the ESXi host to mount the NFS datastore.
- View the new NFS datastore information.

Software used: VMware ESXi 7, Ubuntu Desktop

Theory:

NFS (Network File System) is a storage protocol that allows an ESXi host to access a shared folder over a standard IP network and treat it as a datastore. Unlike iSCSI (which is block-level), NFS is file-level storage. This practical will simulate an NFS server using the Ubuntu VM, which will "export" (share) a folder that the ESXi host will then "mount" and use.

Implementation:

a. Preparation: Verify Network Configuration

STEP 1: In the ESXi client, verify that the vmk1 (IP Storage) port (at 172.20.10.61) and the VM Network (where the Ubuntu VM is) are both on vSwitch0.

STEP 2: In the Ubuntu VM console, verify its static IP is set to 172.20.10.10. This confirms the host and server can communicate on the storage network.

b. Configure the Ubuntu VM as an NFS Server

STEP 3: Power on the "Ubuntu" VM and open its Console.

STEP 4: Log in and open a Terminal.

STEP 5: Install the NFS server software:

```
sudo apt update
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt update
[sudo] password for ankit:
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt install nfs-kernel-server
Reading package lists... Done
```

STEP 6: Create the folder that will be shared as the datastore:

```
sudo mkdir /NFS-Data
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo mkdir /NFS-Data
```

STEP 7: Set the correct permissions to allow ESXi to read and write to the folder:

```
sudo chown nobody:nogroup /NFS-Data
```

```
sudo chmod 777 /NFS-Data
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo chown nobody:nogroup /NFS-Data
ankit@ankit-VMware-Virtual-Platform:~$ sudo chmod 777 /NFS-Data
```

STEP 8: Open the exports configuration file to define the share:

```
sudo nano /etc/exports
```

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo nano /etc/exports
```

STEP 9: Add the following line to the end of the file. This grants your ESXi host (172.20.10.61) full access to the folder:

```
/NFS-Data 172.20.10.61(rw,sync,no_subtree_check,no_root_squash)
```

```
GNU nano 7.2                               /etc/exports *
# /etc/exports: the access control list for filesystems which may be exported
#           to NFS clients. See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes      hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_subtree_check)
#
# Example for NFSv4:
# /srv/nfs4        gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes  gss/krb5i(rw,sync,no_subtree_check)
#
Data 172.20.10.61(rw.sync,no_subtree_check,no_root_squash)

^G Help      ^O Write Out ^W Where Is   ^K Cut       ^T Execute    ^C Location
^X Exit      ^R Read File ^Y Replace   ^U Paste     ^J Justify    ^/ Go To Line
```

STEP 10: Press Ctrl+O (Save) and Ctrl+X (Exit).

STEP 11: Apply the new export rule and restart the NFS server:

`sudo exportfs -a`

`ankit@ankit-VMware-Virtual-Platform:~$ sudo exportfs -a`

`sudo systemctl restart nfs-kernel-server`

c. Task 1: Configure Access to NFS Datastore (on ESXi Host)

STEP 12: In the ESXi web client, navigate to the Storage section.

STEP 13: Select the Datastores tab and click New datastore.

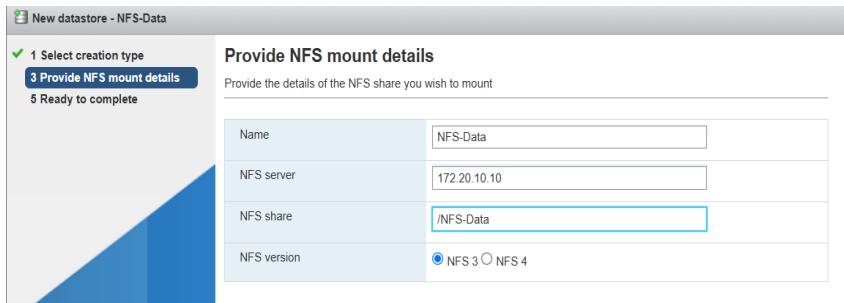
Name	Driv...	Cap...	Prov...	Free...	Type	Thin...	Acc...
Local-System	SSD	13.75 ...	7.31 GB	6.44 GB	VMFS6	Supp...	Single
Local-Vms	SSD	49.75 ...	30.49 ...	19.26 ...	VMFS6	Supp...	Single
VMFS-2	SSD	18 GB	1.41 GB	16.59 ...	VMFS6	Supp...	Single

STEP 14: The "New datastore" wizard will open. Select Mount NFS datastore and click Next.

STEP 15: On the "Provide NFS mount details" page, fill in the following:

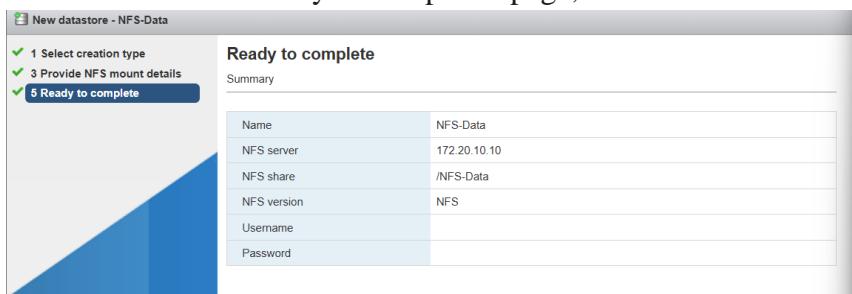
- **Name:** NFS-Data
- **NFS server:** 172.20.10.10 (The IP of your Ubuntu VM)

- **NFS share:** /NFS-Data (The folder you created)
- **NFS version:** Select NFS 3



STEP 16: Click Next.

STEP 17: On the "Ready to complete" page, review the information and click Finish.



d. Task 2: View NFS Storage Information

STEP 18: The task will complete successfully, and the new NFS-Data datastore will appear in the list.

Name	Drv...	Cap...	Prov...	Free	Type	Thin...	Acc...
Local-System	SSD	13.75 ...	7.31 GB	6.44 GB	VMFS6	Supp...	Single
Local-Vms	SSD	49.75 ...	30.49 ...	19.26 ...	VMFS6	Supp...	Single
NFS-Data	Unkn...	24.44 ...	20.07 ...	4.37 GB	NFS	Supp...	Single
VMFS-2	SSD	18 GB	1.41 GB	16.59 ...	VMFS6	Supp...	Single

Conclusion:

This practical demonstrated the configuration of NFS storage. An Ubuntu VM was successfully configured to act as an NFS server, exporting a directory. The ESXi host was then configured to mount this NFS share, which now appears as a usable datastore for virtual machines.

Practical 7

Using Templates and Clones

Aim: To manually clone a virtual machine and create a "template" on a standalone ESXi host.

Practical Description:

- Manually clone a VM using the datastore browser (simulating Task 7).
- Prepare a "golden image" VM to act as a template (simulating Task 1).
- Deploy a new VM from the "template" (simulating Task 3).

Software used: VMware ESXi 7

Theory:

Cloning and templating are essential for rapid VM deployment. A clone is an exact copy of a VM. A template is a master copy of a VM, typically generalized and kept powered off, used to create new VMs. On a standalone ESXi host, these operations are performed manually by copying the VM's files in the datastore and registering the copy as a new VM.

Implementation:

a. Part 1: Clone and Template a VM (Export/Import Method)

a. Task 1: Prepare the "Golden Image" (Template)

STEP 1: Power on your "Ubuntu" VM and log in.

STEP 2: Open a Terminal. Install all system updates and any common software needed for the template.

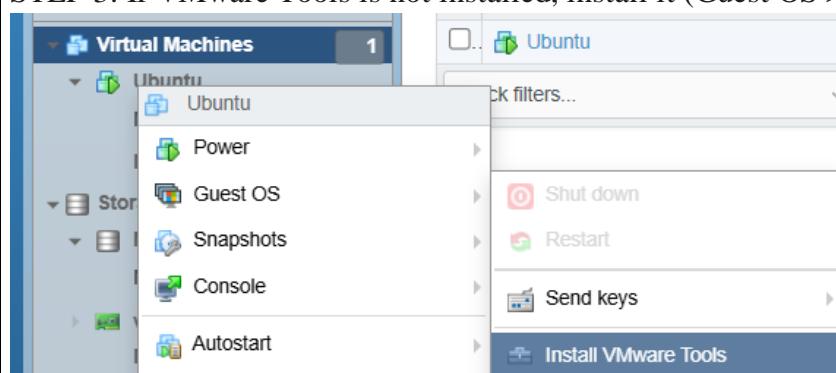
sudo apt update

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt update
[sudo] password for ankit:
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
```

sudo apt upgrade

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo apt upgrade
[sudo] password for ankit:
Reading package lists... Done
```

STEP 3: If VMware Tools is not installed, install it (Guest OS > Install VMware Tools).



STEP 4: Once the VM is fully prepared, shut it down from the Terminal:

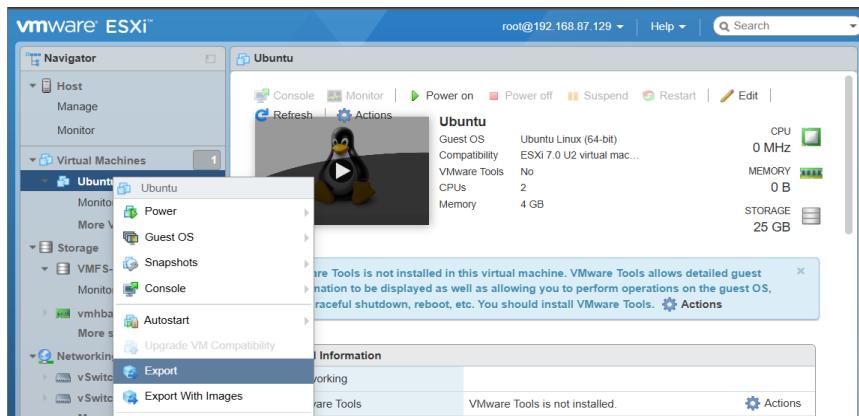
sudo shutdown now

```
ankit@ankit-VMware-Virtual-Platform:~$ sudo shutdown now
```

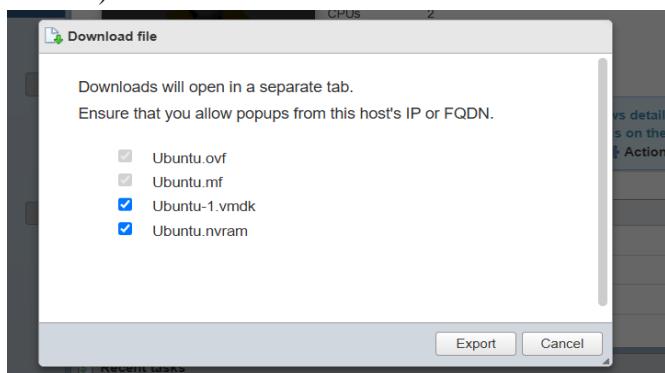
STEP 5: In the ESXi Virtual Machines list, the "Ubuntu" VM is now your "golden image" template.

b. Task 2: Deploy a VM from the Template (Cloning)

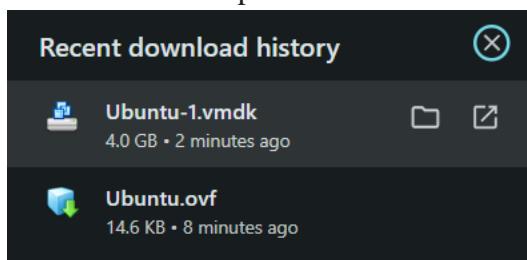
STEP 6: Right-click the powered-off Ubuntu VM and select Export.



STEP 7: A "Download file" pop-up will appear. Check the boxes for all the files listed (.ovf, .mf, .vmdk, .nvram).

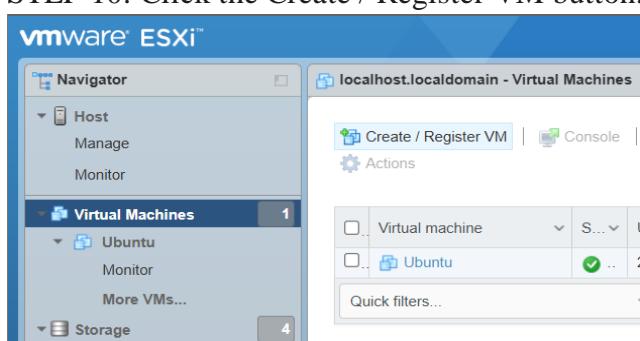


STEP 8: Click Export. Save all the files together in a new folder on your computer.

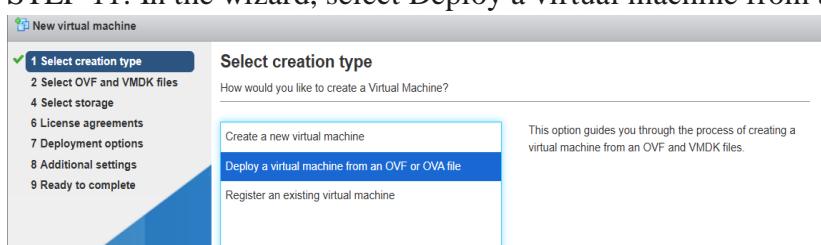


STEP 9: After the download is complete, navigate back to the Virtual Machines view.

STEP 10: Click the Create / Register VM button.

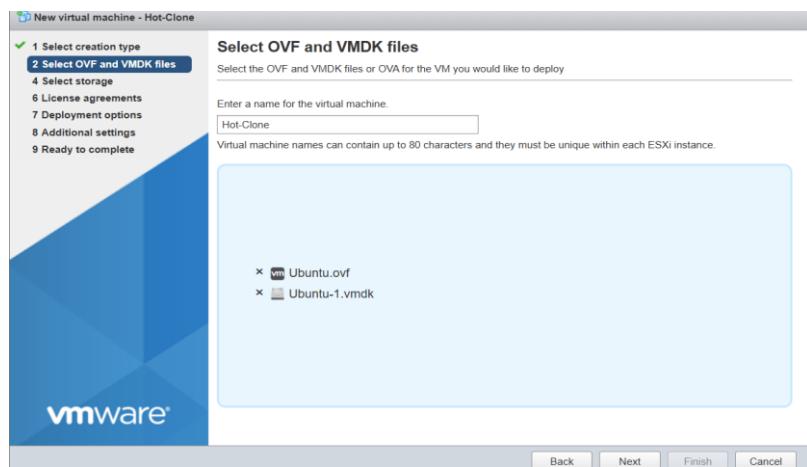


STEP 11: In the wizard, select Deploy a virtual machine from an OVF or OVA file. Click Next.



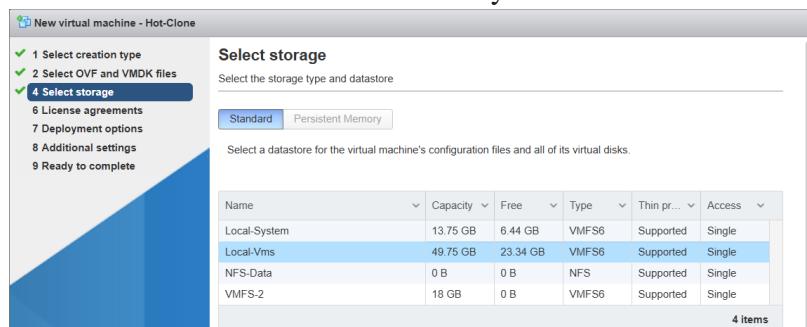
STEP 12: Enter a name for the new (cloned) VM, for example: Hot-Clone.

STEP 13: Click inside the blue box. Navigate to the folder where you saved the exported files and select all.



STEP 14: Click Next.

STEP 15: Select the datastore where you want to store this new VM (e.g., Local-VMs). Click Next.



STEP 16: On the "Deployment options" page, leave all settings as default. Click Next.

STEP 17: Click Finish. ESXi will upload the files and create the new Hot-Clone.

The screenshot shows the 'Ready to complete' summary and the 'Virtual Machines' list in the VMware Host Client. The summary table includes:

Product	Ubuntu
VM Name	Hot-Clone
Files	Ubuntu-1.vmdk
Datastore	Local-Vms
Provisioning type	Thin
Network mappings	VM Network: VM Network
Guest OS Name	Unknown

A warning message at the bottom says: 'Do not refresh your browser while this VM is being deployed.' The 'Actions' bar has buttons for Create/Register VM, Console, Power on, Power off, Suspend, Refresh, and Actions. The 'Virtual Machines' list shows 'Ubuntu' and 'Hot-Clone'.

Conclusion:

This practical demonstrated the manual workaround for templating and cloning on a standalone ESXi host. A "golden image" VM was prepared to act as a template. This template was then "cloned" by exporting its files and re-importing them as a new, independent virtual machine. This method is a reliable way to deploy new VMs from a master image without vCenter Server.

Practical 8

Aim: Modifying Virtual Machines.

Practical Description:

- Increase the size of a VMDK file.
- Adjust memory allocation on a virtual machine.
- Rename a virtual machine in the ESXi inventory.

Software used: VMware Workstation Pro, VMware ESXi 7, Ubuntu Desktop

Theory:

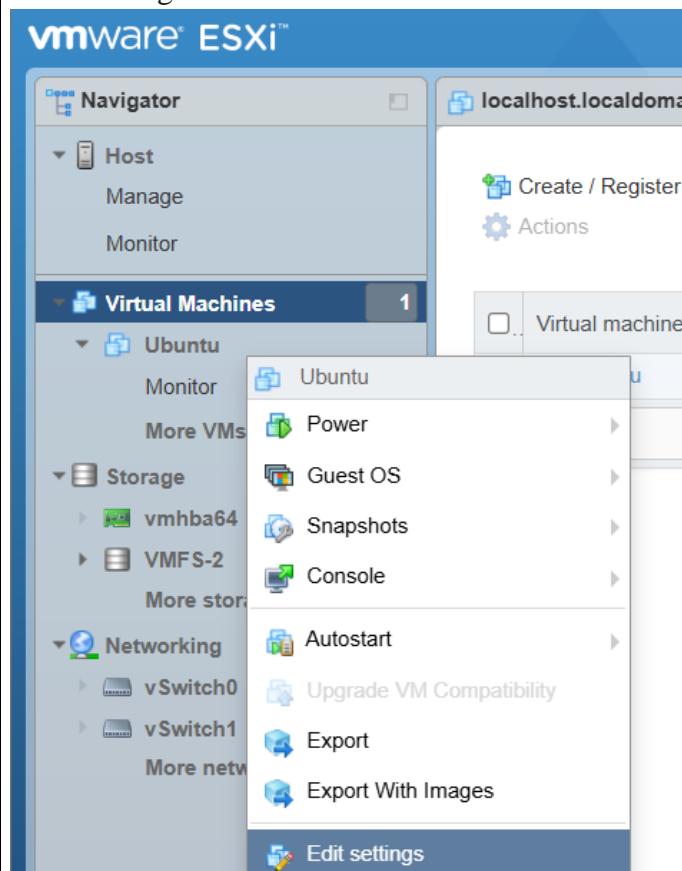
Virtual machine hardware is not fixed. The ESXi hypervisor allows for modifying virtual hardware components such as CPU, memory, and disk size. This flexibility is a key advantage of virtualization. This practical also explores Raw Device Mapping (RDM), a method that allows a VM to directly access a storage LUN, bypassing the VMFS file system.

Implementation:

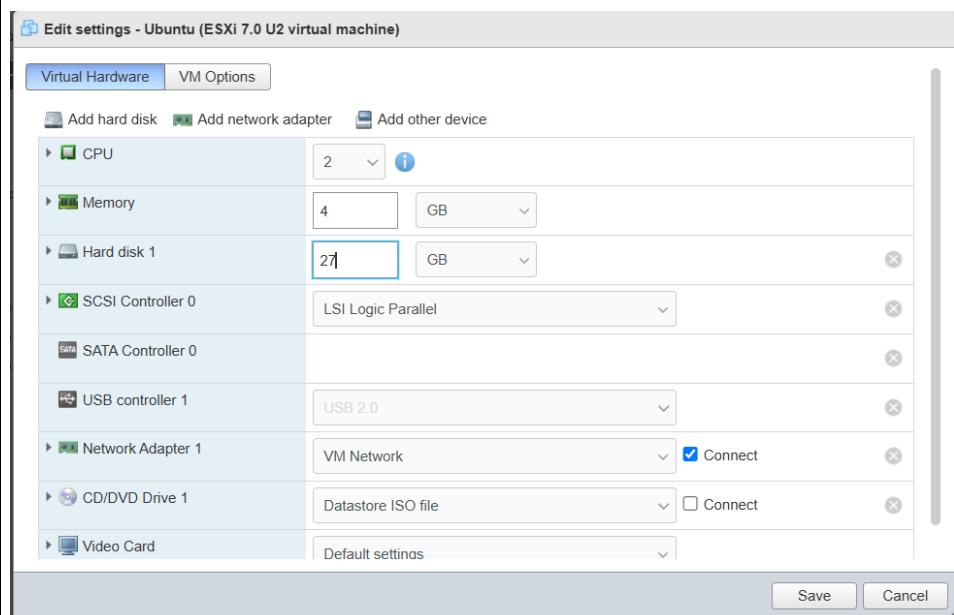
a. Task 1: Increase the Size of a VMDK File

STEP 1: In the ESXi client, navigate to Virtual Machines.

STEP 2: Right-click the Ubuntu VM and select Edit settings.



STEP 3: Find Hard disk 1. In the size box, change the value from its current size to a larger one (e.g., from 25 GB to 27 GB).



STEP 4: Click Save.



STEP 5: Power on the Ubuntu VM and log in.

STEP 6: Open a Terminal and install the gparted partition tool:

`sudo apt update`

`sudo apt install gparted`

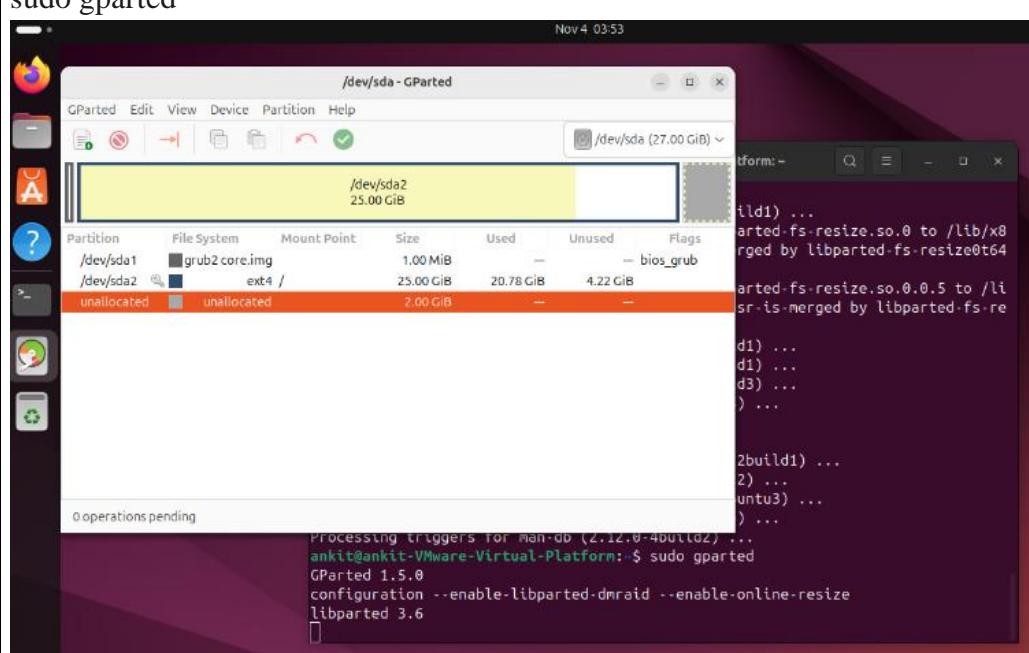
`202 packages can be upgraded. Run 'apt list --upgradable' to see them.`

`ankit@ankit-VMware-Virtual-Platform:~$ sudo apt install gparted`

`Reading package lists... Done`

STEP 7: Launch the tool:

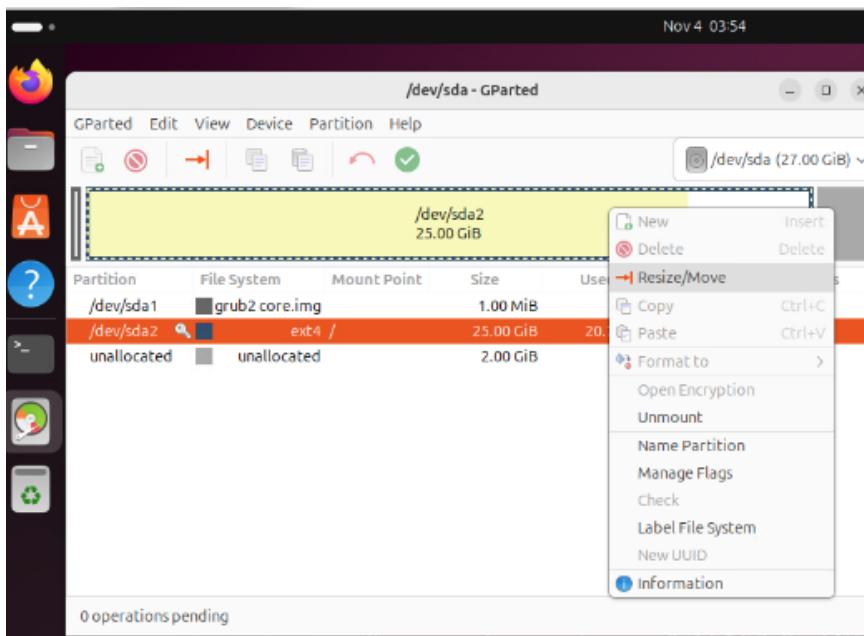
`sudo gparted`



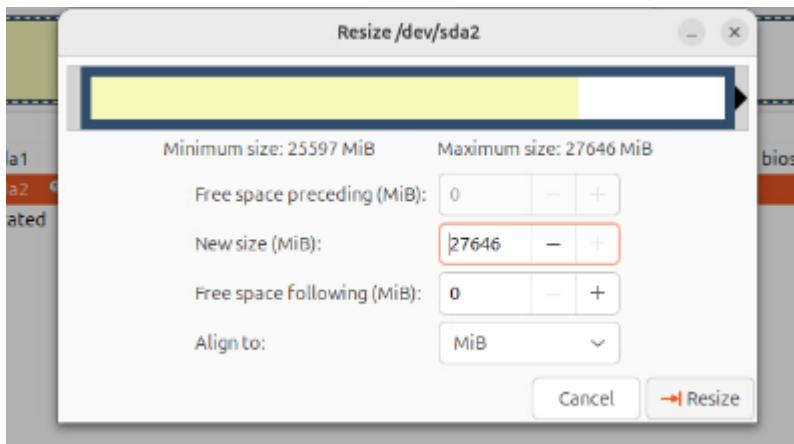
STEP 8: In the GParted window, a 2 GB "unallocated" space will be visible.

STEP 9: Right-click the main Ubuntu partition (e.g., /dev/sda3) and select Resize/Move.

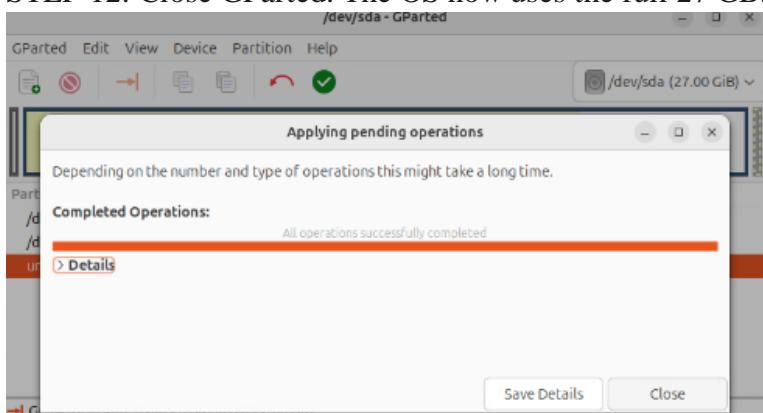
STEP 10: Drag the right-side arrow of the partition to fill the 2 GB of unallocated space.



STEP 11: Click the Resize/Move button, then click the green checkmark ("Apply All Operations") on the toolbar.



STEP 12: Close GParted. The OS now uses the full 27 GB.



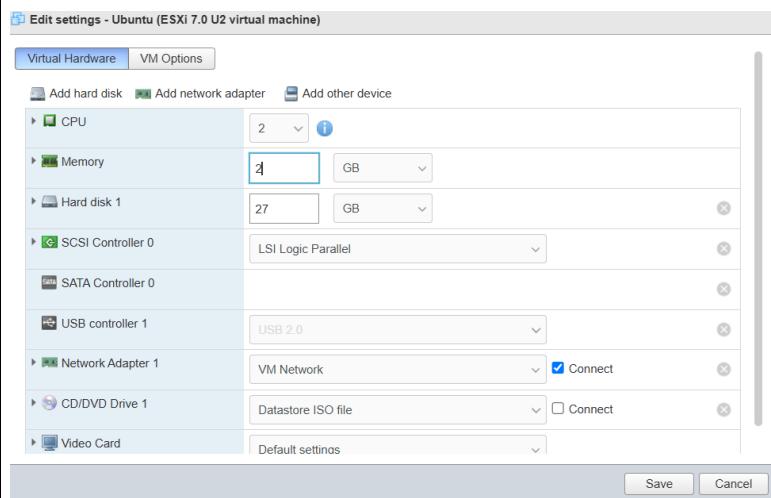
b. Task 2: Adjust Memory Allocation

STEP 13: In the Ubuntu Terminal, type sudo shutdown now to power off the VM.

STEP 14: In the ESXi client, right-click the Ubuntu VM and select Edit settings.

STEP 15: Find the Memory setting.

STEP 16: Change the value from its current amount 4GB to 2 GB .



STEP 17: Click Save.

STEP 18: Power on the VM, open the console, and log in.

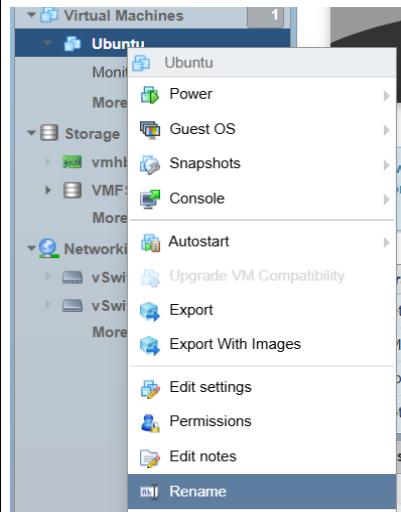
STEP 19: Open a Terminal and type free -h. The "Total" memory will now be approximately 2 GB.

```
ankit@ankit-VMware-Virtual-Platform:~$ free -h
      total        used        free      shared  buff/cache   available
Mem:    1.9Gi     1.0Gi     280Mi      11Mi     804Mi     923Mi
```

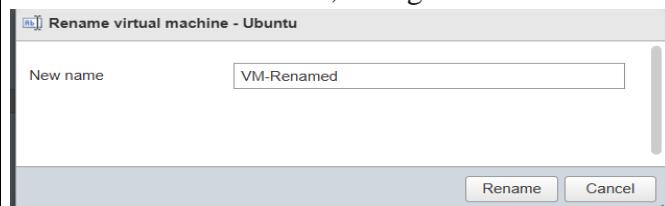
c. Task 3: Rename a Virtual Machine

STEP 20: In the ESXi client, right-click the Ubuntu VM in the inventory list.

STEP 21: Select Rename.



STEP 22: In the text box, change the name to VM-Renamed.



STEP 23: Click Save.



Conclusion:

This practical demonstrated how to modify a virtual machine's hardware. We successfully increased a VM's disk size and expanded the partition within the guest OS. We also adjusted the VM's memory allocation and renamed it.

Practical 9

Migrating Virtual Machines

Aim: To manually migrate a Virtual Machine from one standalone ESXi host.

Practical Description:

- Manually download all VM files (.vmx, .vmdk, -flat.vmdk) from the source host.
- Upload the VM files to the destination host's datastore.
- Use vmkfstools to convert the disk from thick to thin provisioning.
- Register the new VM

Software used: VMware ESXi, an SSH Client (like PuTTY or Windows Terminal), an SCP Client (like WinSCP).

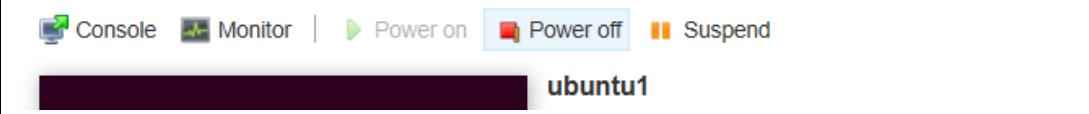
Theory:

A virtual machine is a collection of files, primarily a .vmx (configuration) file and one or more .vmdk (virtual disk) files. While vCenter Server automates the migration of VMs (vMotion), a manual migration is possible on standalone hosts. This process involves powering down the VM, copying its files from the source datastore to a local machine, and then uploading them to a datastore on the destination host. The final step is to "register" the .vmx file, which adds the VM to the new host's inventory.

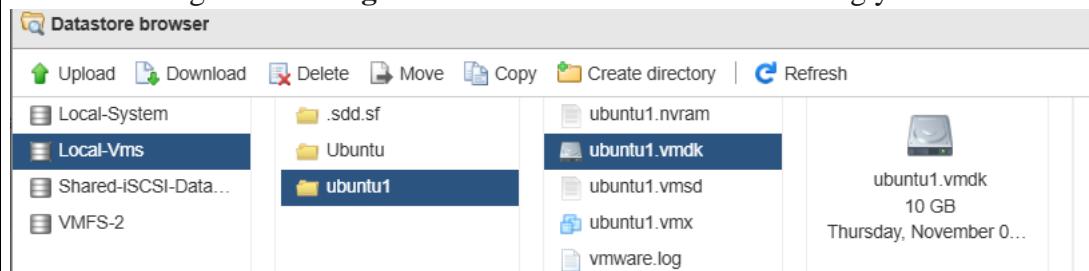
Implementation:

a. Download VM Files from Source Host

STEP 1: Log in to your source ESXi host and power off the virtual machine (e.g., ubuntu1).



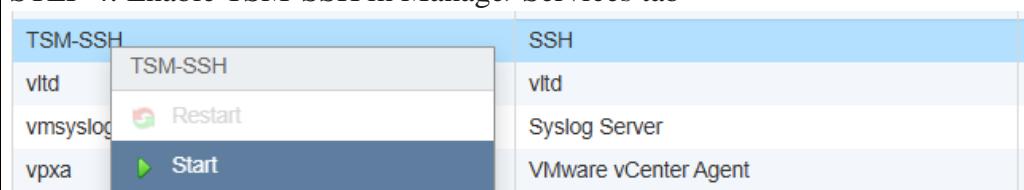
STEP 2: Navigate to **Storage** and browse the datastore containing your VM.



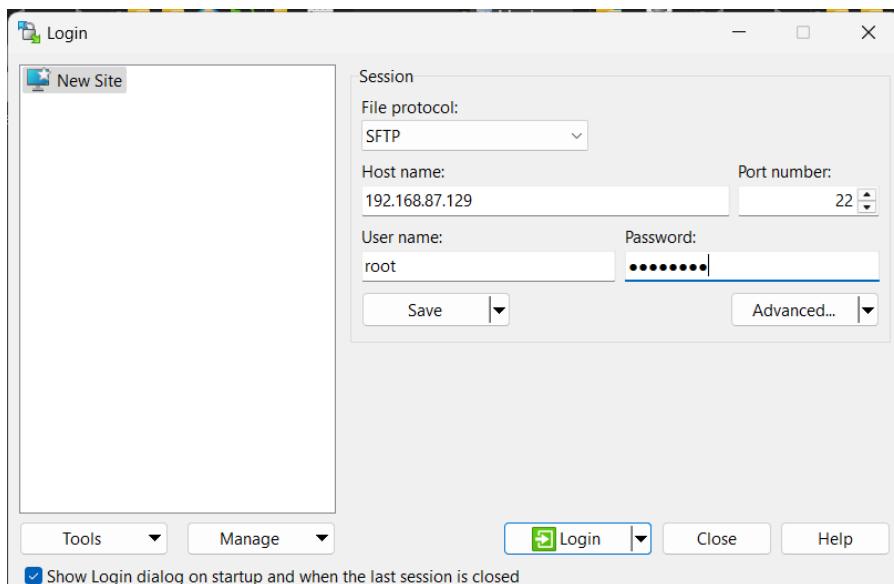
STEP 3: Locate the VM's folder (e.g., ubuntu1). You will see the ubuntu1.vmx, ubuntu1.vmdk, and ubuntu1-flat.vmdk files.

- Note: The *ubuntu1-flat.vmdk* file contains the actual data and is hidden in the web interface, but it is the largest file.

STEP 4: Enable TSM-SSH in Manage>Services tab



STEP 5: Use an SCP client (like WinSCP) to connect to the source host.



STEP 6: Navigate to the VM's folder (e.g., /vmfs/volumes/690ccde1.../ubuntu2/) and Download all three files (ubuntu1.vmx, ubuntu1.vmdk, ubuntu1-flat.vmdk) to a folder on your local computer.

/vmfs/volumes/690788e3-c882c348-cd64-000c298e20d6/ubuntu1/

The screenshot shows a file listing of VM files in a terminal window. The files listed are: .nvram, ubuntu1.vmdk, ubuntu1.vmsd, ubuntu1.vmx, ubuntu1-flat.vmdk, and vmware.log. A separate window shows the download progress for 'ubuntu1-flat.vmdk' to 'C:\MSC ITSEM 3\dct\Migration\'. The download is at 1% completion, with a speed of 46.5 MB/s.

b. Upload and Register VM on Destination Host

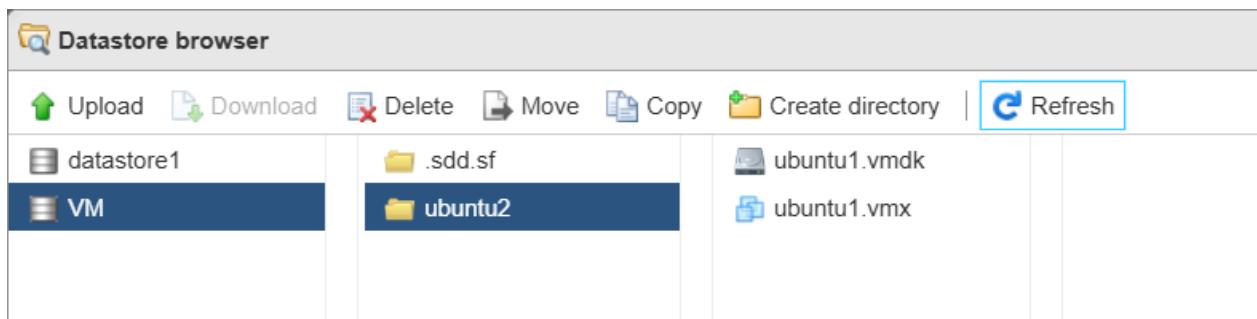
STEP 7: Log in to your destination ESXi host.

STEP 8: Using the datastore browser, create a new folder for your VM (e.g., ubuntu2).

The screenshot shows the Datastore browser interface. A 'New directory' dialog box is open, prompting for a directory name, with 'ubuntu2' entered. The message below says 'This directory will be created in [VM]/'. There are 'Create directory' and 'Cancel' buttons.

STEP 9: Upload the three files from your local computer into this new folder.

The screenshot shows the Datastore browser interface. The 'VM' folder is selected. A 'New folder' dialog box is open, showing a list of files: ubuntu1, ubuntu1, and ubuntu1-flat. These files are listed under the 'ubuntu2' folder in the datastore browser.



c. Convert Disk to Thin Provisioning

STEP 10: Log in to the destination ESXi host using an SSH client (like Command Prompt).

```
C:\Users\ankit>ssh root@192.168.87.133
(rroot@192.168.87.133) Password:
The time and date of this login have been sent to the system logs.
```

STEP 11: Navigate to your new VM folder:

```
cd /vmfs/volumes/VM/ubuntu2/
```

```
[root@localhost:/vmfs/volumes/690ccde1-08bdeab1-c71d-000c290f664c] cd /vmfs/volumes/VM/ubuntu2
```

STEP 12: Convert the thick-provisioned disk to thin:

```
vmkfstools -i ubuntu1.vmdk -d thin ubuntu1-thin.vmdk
```

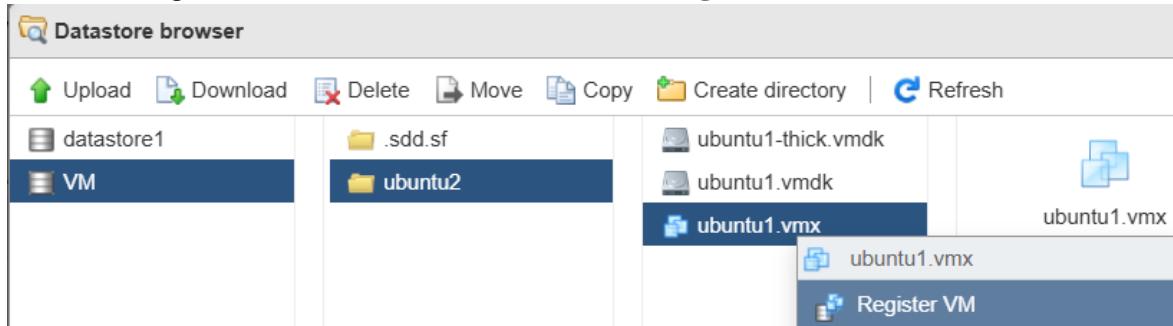
```
[root@localhost:/vmfs/volumes/690ccde1-08bdeab1-c71d-000c290f664c/ubuntu2] vmkfstools -i ubuntu1.vmdk -d thin ubuntu1-thin.vmdk
Destination disk format: VMFS thin-provisioned
Cloning disk 'ubuntu1.vmdk'...
Clone: 100% done.
```

d. Register and Troubleshoot the VM

STEP 13: In the ESXi web client, go to **Storage>Datastore Browser**.

STEP 14: Browse to the directory where the VM is copied and stored.

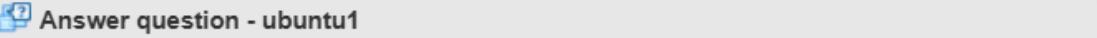
STEP 15: Right click on **ubuntu1.vmx** and select **Register VM**.



STEP 16: The new VM will appear in your inventory. Select it and click **Power on**.

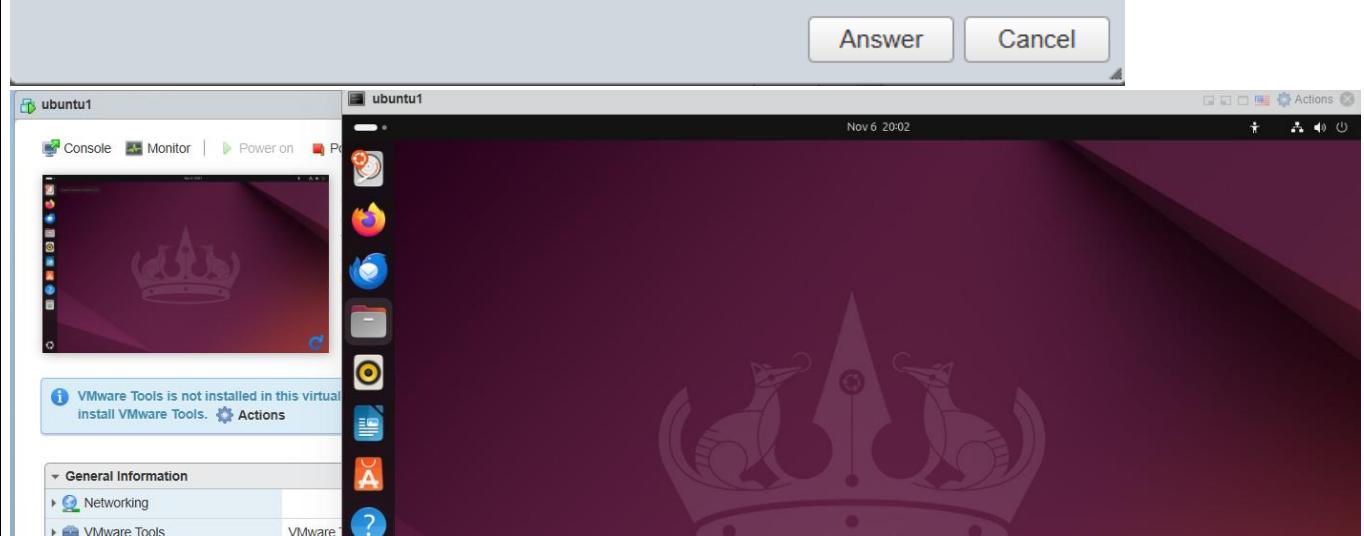


STEP 17: Power the VM on again. When prompted, select "**I copied it**".

 Answer question - ubuntu1

This virtual machine might have been moved or copied. In order to configure certain management and networking features, VMware ESX needs to know if this virtual machine was moved or copied. If you don't know, answer "I Copied It".

I Moved It
 I Copied It



Conclusion:

This practical successfully demonstrated the manual migration of a virtual machine between standalone ESXi hosts. We learned that a VM consists of portable files that can be moved using standard file transfer tools. We also learned how to register a VM from its configuration file. This process is critical for managing standalone hosts without vCenter.