SANJEEV AGRAWAL GLOBAL EDUCATIONAL UNIVERSITY, BHOPAL

SCHOOL OF COMPUTER APPLICATION

Lab File

PRINCIPLES OF VIRTUALIZATION

(CA21B302)

BACHELOR OF COMPUTER APPLICATION
(CLOUD COMPUTING)
Academic Year 2023-24

Submitted By:

Aditya Nair

Enrollment No:

22BCA3CCM10005

Submitted To: Mr. Prashant Kumar

Asst. Professor,

SSOCA

Content

Experiment No. 1

Title: Install and configure VMware ESXi Server 6.0, a type-I hypervisor on a host machine to deploy a virtual machine. 1. Launch DCUI Console. 2. Configure Management Network 3. Set IPV4 & DNS Configuration. 4. Restart.

Steps of VMware ESXi Server 7.0 installation and configuration:

Minimum hardware requirements for ESXi are:

CPU: A two-core x86_64 CPU on the computer where the ESXi host will run. Intel VT-x or AMD-v (RVI) features must be enabled in UEFI/BIOS.

RAM: 4 GB of RAM to run ESXi and at least 8 GB of RAM to run VMs on an ESXi host. The more memory your computer/server running ESXi has, the more VMs you can run.

Storage: At least 8 GB of disk space is required to install and boot ESXi 7.0. ESXi can be installed on a separate HDD or SSD, RAID, and even a USB flash drive or SD card. Be aware that when you install ESXi on a USB flash drive or SD card, there is no persistent */scratch* partition to store logs. It is recommended that you provide 32 GB or more on a boot device for ESXi. A boot device must not be shared between multiple ESXi hosts. Opt for SCSI (SAS) disks for VM storage.

Network: At least one Gigabit Ethernet network controller. The network adapter must be compatible with ESXi 7.0. Install multiple network adapters on your ESXi server to use NIC Teaming (link aggregation), configure separate This is especially important for using VMware clustering features. It is recommended that you use static IP configuration for vSphere components such as ESXi hosts, vCenter servers, and so on.

Step 1. DVD disc or USB flash drive and boot from this prepared medium to run the ESXi 7 installer on your server.

Step 2. Welcome to the VMware ESXi 7.0.0 Installation. Read the welcome message and hit Enter to continue.

Step 3. End User License Agreement (EULA). Read the EULA and press Enter to accept and continue.

Step 4. Setup-vSphere-7_starting-ESXi-installation

Step 5. Select a Disk to Install or Upgrade. In this example we have one disk to install ESXi 7.0. Later you can attach more disks, initialize them and use as datastores to store VM files. Select a storage device and hit Enter.

Step 6. Please select a keyboard layout. US Default is used in our case. We recommend that you use the same option.

Step 7. VMware-vSphere-installation-and-setup-begins-from-ESXi-installation

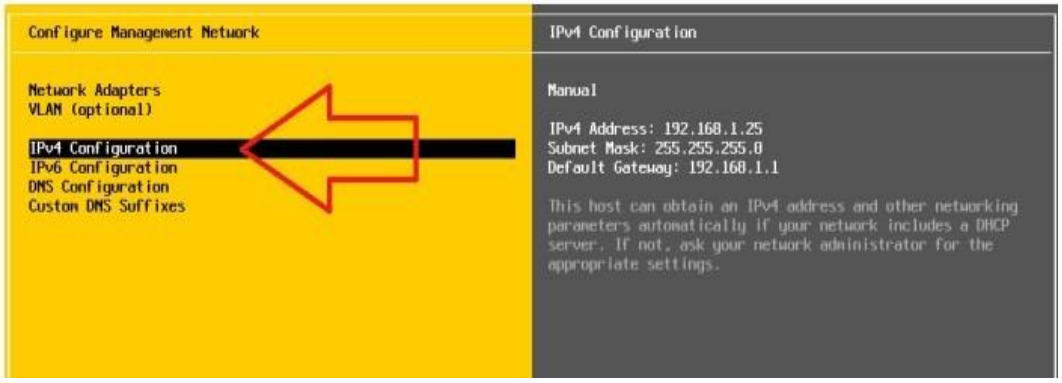
Step 8. Enter a root password. A password must meet the complexity requirements.

Step 9. Confirm Install. Press F11 to start the installation process of ESXi 7.0 on your server.

Step 10. Entering-the-root-password-for-ESXi-and-installation-confirmation

Step 11. Wait until the installation process finishes. Installation Complete. When you see this screen, it means that ESXi 7.0 has been installed successfully. Remove the installation medium and press Enter to reboot the machine.

Step 12. The ESXi server can be configured using function keys F2.



Step 13. 192.168.1.25 – IP address given to manage the ESXi server

Step 14. <F2> Customize System/ View logs

Step 15. <F12> Shutdown /Restart

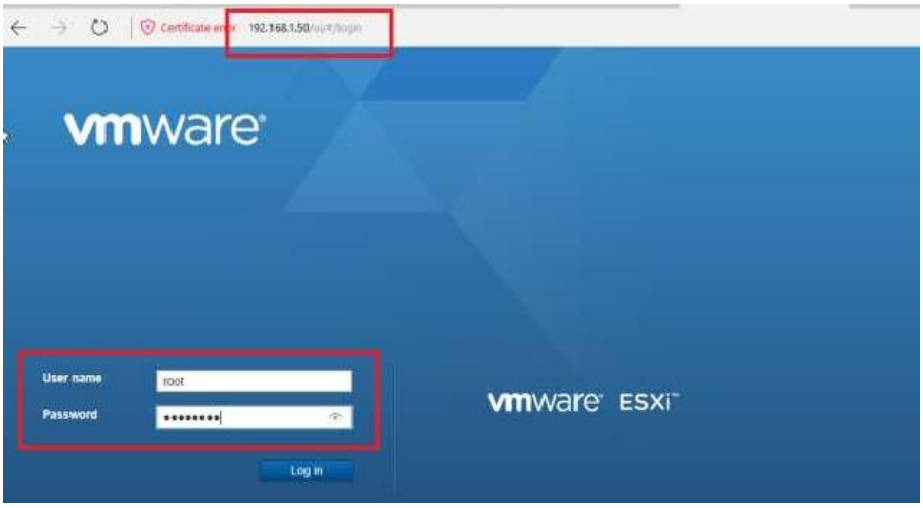
Conclusion:

Experiment No. 2

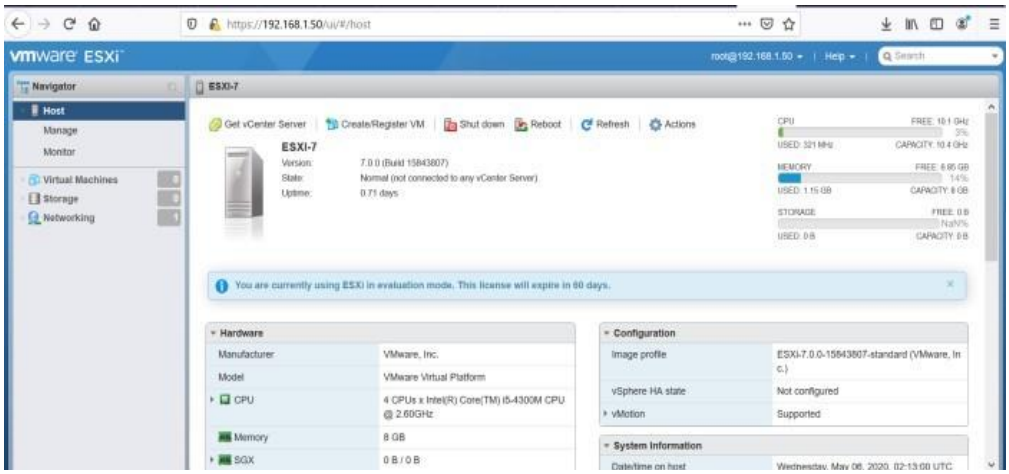
Title: Installation and deployment of VMware vSphere Client in a Physical Machine. Connect ESXi Host with all required configurations. – Use ESXi 7.X version for this Lab.

Access of ESXi using VMware vSphere Client:

Step 1. Open Web browser and write IP address 192.168.1.50 to access ESXi server.



Step 2. Enter Username as root and password.


https://192.168.1.50/ui/#/host
vmware ESXi
root@192.168.1.50
Help
Search
Navigator
Host
Manage
Monitor
Virtual Machines
Storage
Networking
ESXI-7
Get vCenter Server
Create/Register VM
Shut down
Reboot
Refresh
Actions
ESXI-7
Version: 7.0.0 (Build 15843807)
State: Normal (not connected to any vCenter Server)
Uptime: 0.71 days
CPU
FREE: 10.1 GHz
3%
USED: 321 MHz
CAPACITY: 10.4 GHz
MEMORY
FREE: 6.85 GB
14%
USED: 1.15 GB
CAPACITY: 8 GB
STORAGE
FREE: 0 B
NaN%
USED: 0 B
CAPACITY: 0 B
You are currently using ESXi in evaluation mode. This license will expire in 60 days.
Hardware
Manufacturer
VMware, Inc.
Model
VMware Virtual Platform
CPU
4 CPUs x Intel(R) Core(TM) i5-4300M CPU @ 2.60GHz
Memory
8 GB
SGX
0 B / 0 B
Configuration
Image profile
ESXi-7.0.0-15843807-standard (VMware, Inc.)
vSphere HA state
Not configured
vMotion
Supported
System Information
Date/time on host
Wednesday, May 06, 2020, 02:13:00 UTC

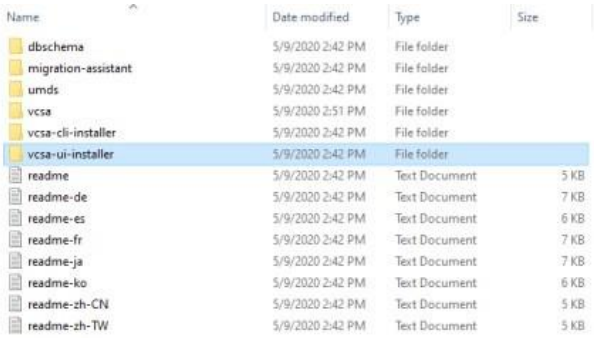
Conclusion:

Experiment No. 3

Title: Installation and deployment of VMware vCenter in a virtual machine that runs on an ESXi host-Mount VMware vCenter 6.0 on Windows Server operating system 2012, 64 bits along with the necessary drivers. a. Configure the settings (RAM-8GB, Processor-2) b. Mount iso image of vCenter on CD/DVD drive c. Select Embedded deployment d. Create New vCenter Single-Sign-On domain e. Allow Common ports, Platform service controller ports & vCenter Server ports. f. Launch vSphere Web Client.

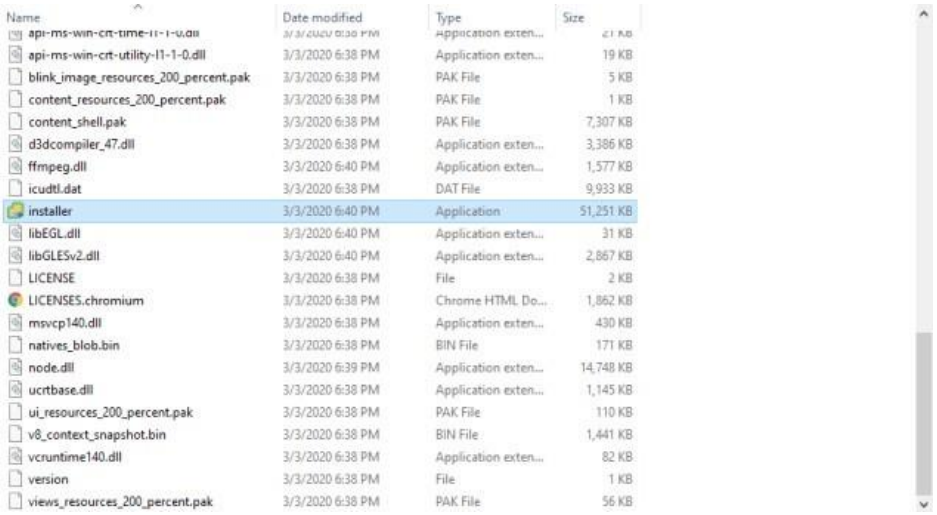
vCenter installation and configuration steps:

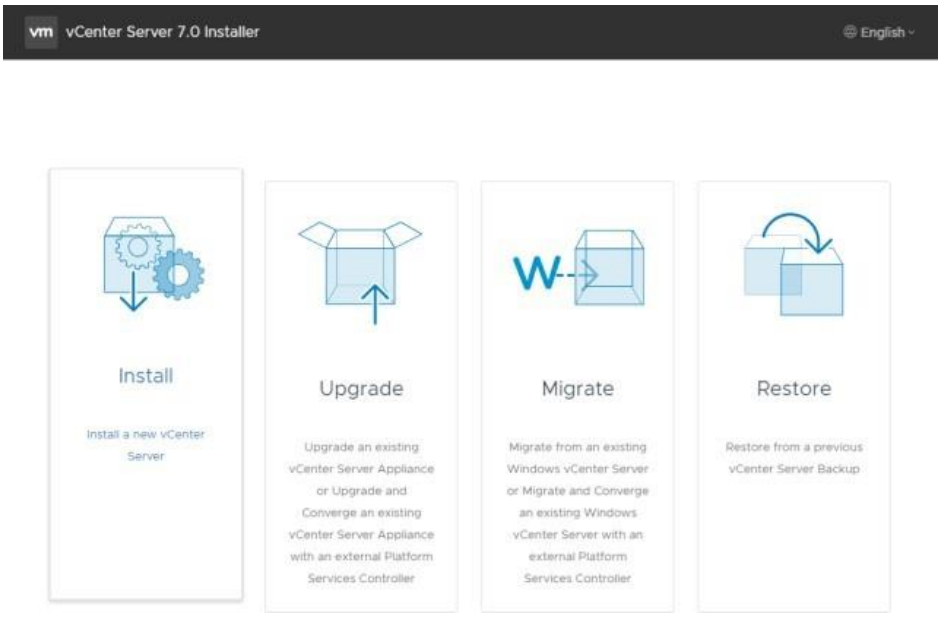
Step1: Mount the vCenter ISO file



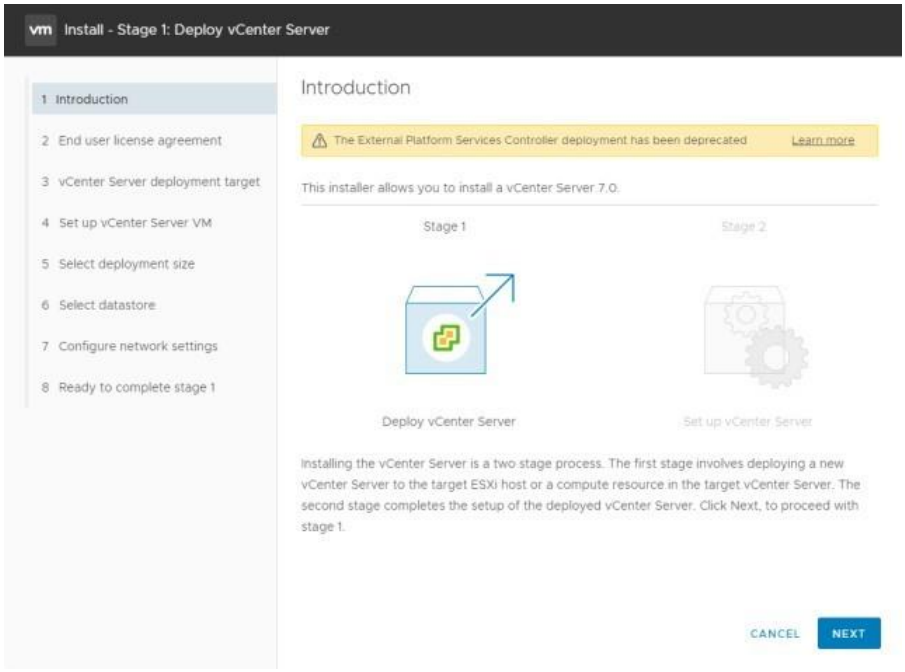
Step 2: Go to **vcsa-ui-installer** folder

Step 3: Go to **win32** folder

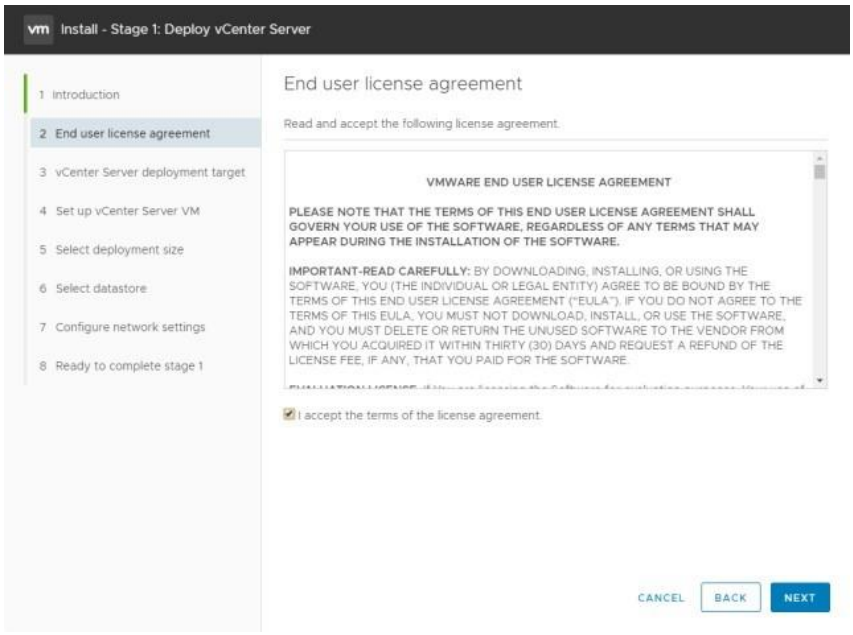




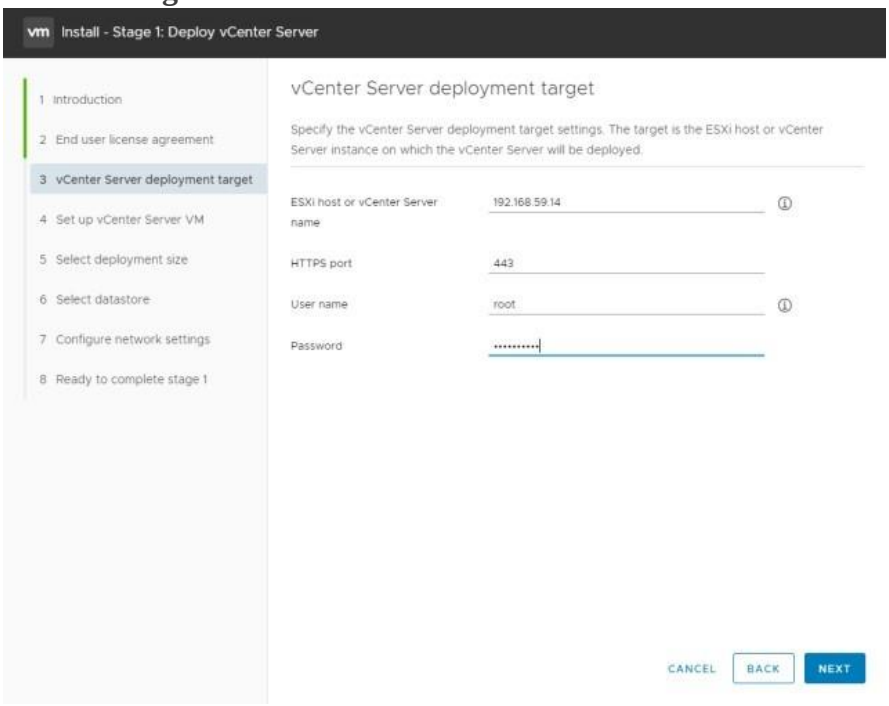
Step 4: Click on **Install**



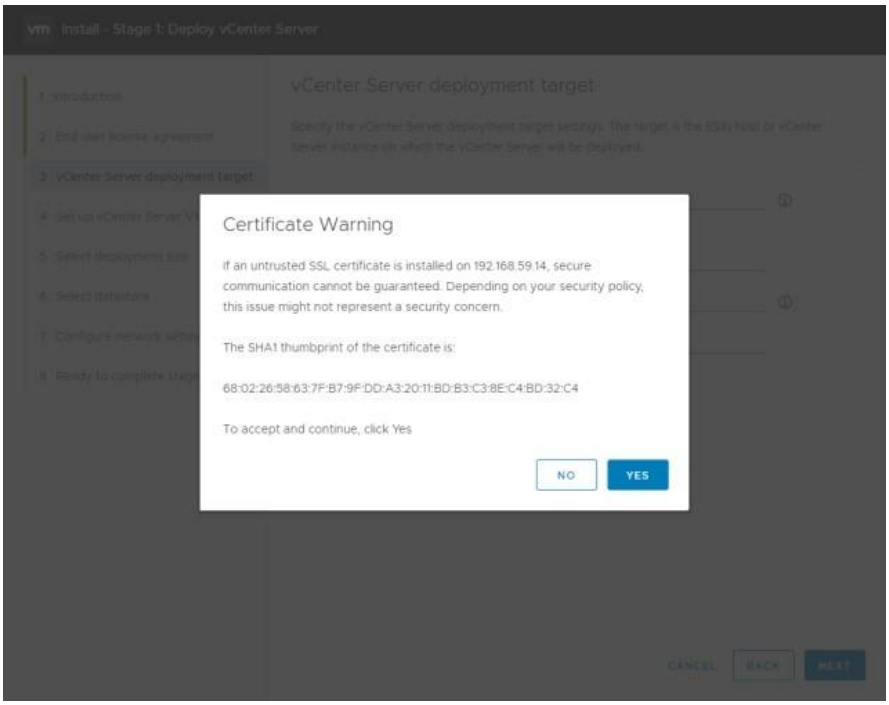
Step 5: Click on **Next**



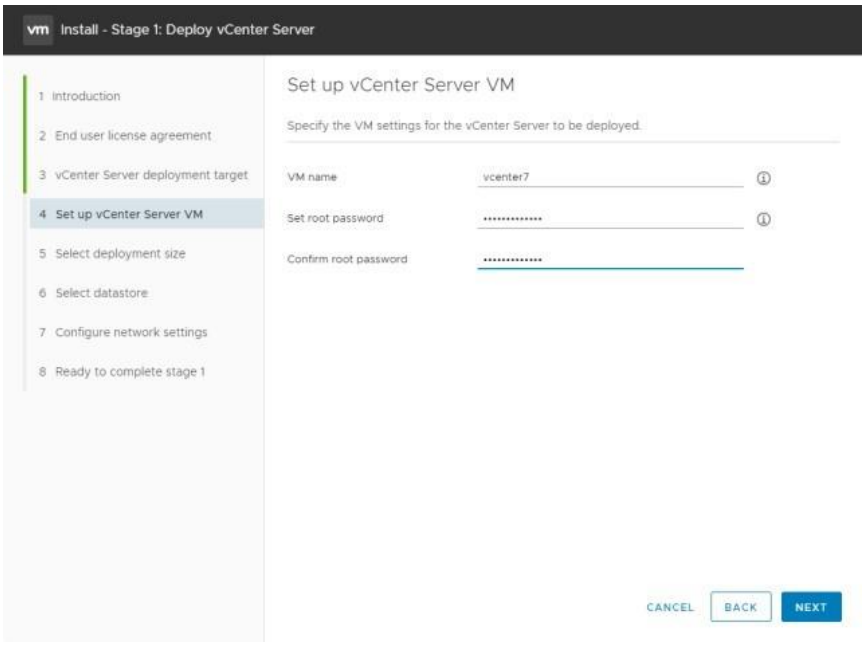
Step 6: Accept the **User Agreement** and click on **Next**



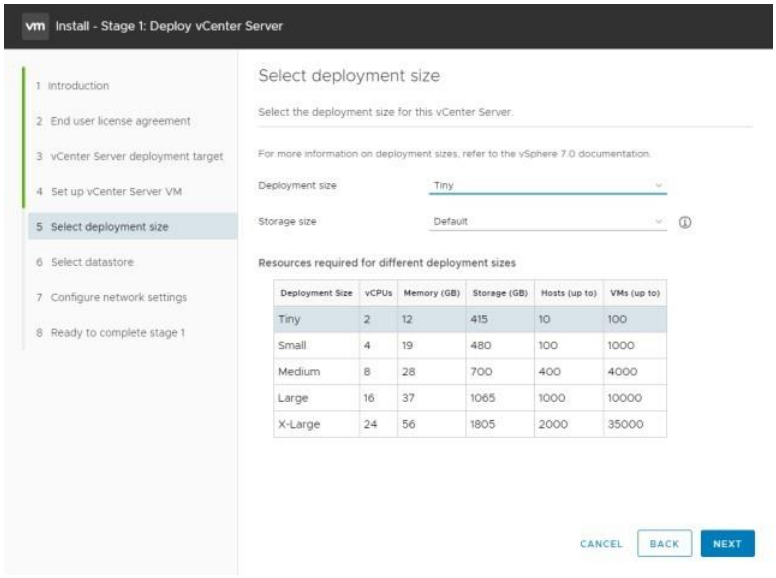
Step 7: Provide IP of the host where you want to install vCenter Applicance, the root password and click on **Next**



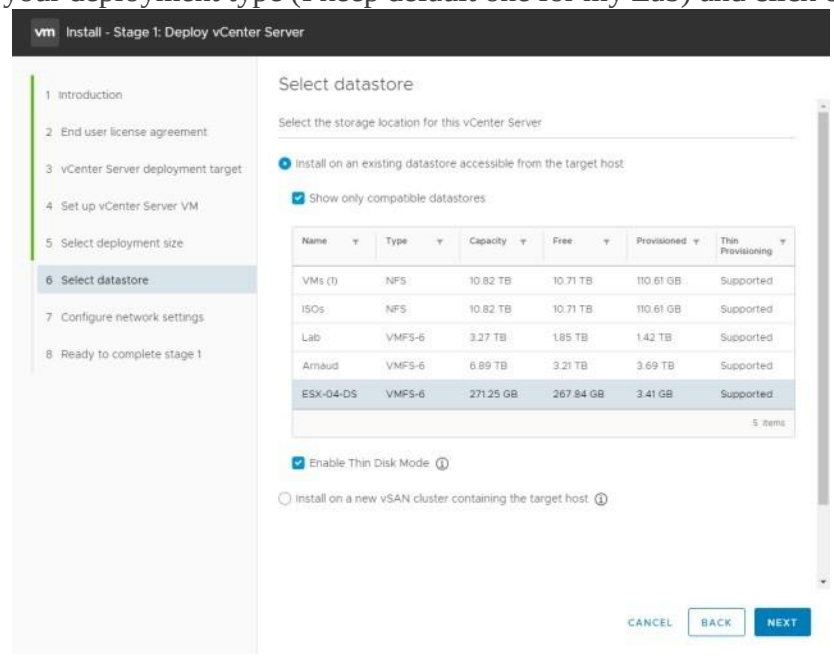
Step 8: Click on Yes



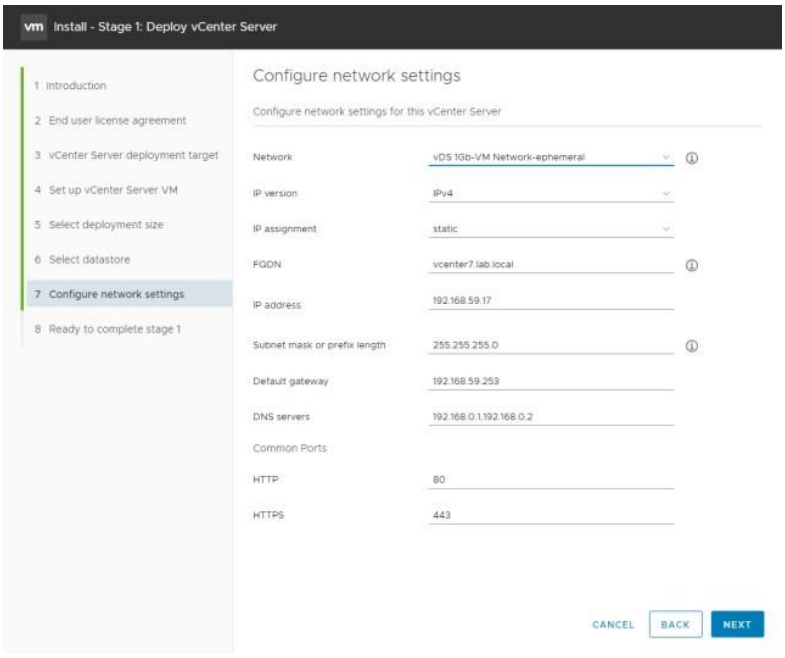
Step 9: Provide a name for the VM, set the root password and click on **Next**



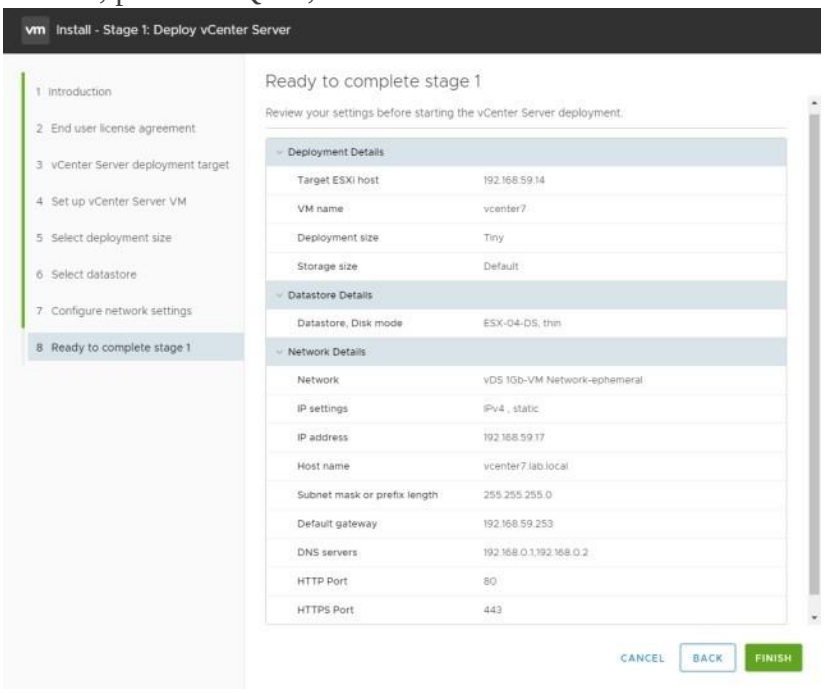
Step 10: Select your deployment type (I keep default one for my Lab) and click on **Next**



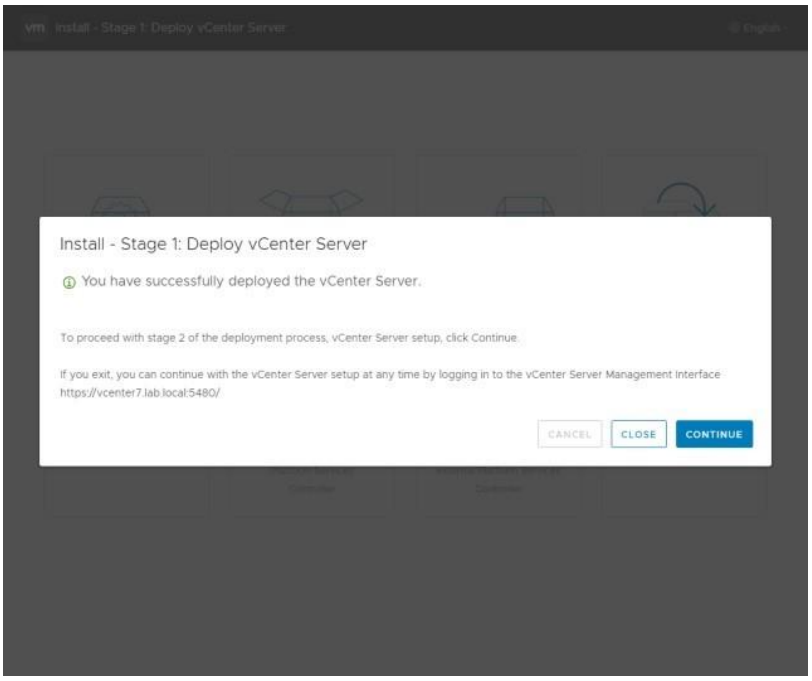
Step 11: Select the Datastore and click on **Next**



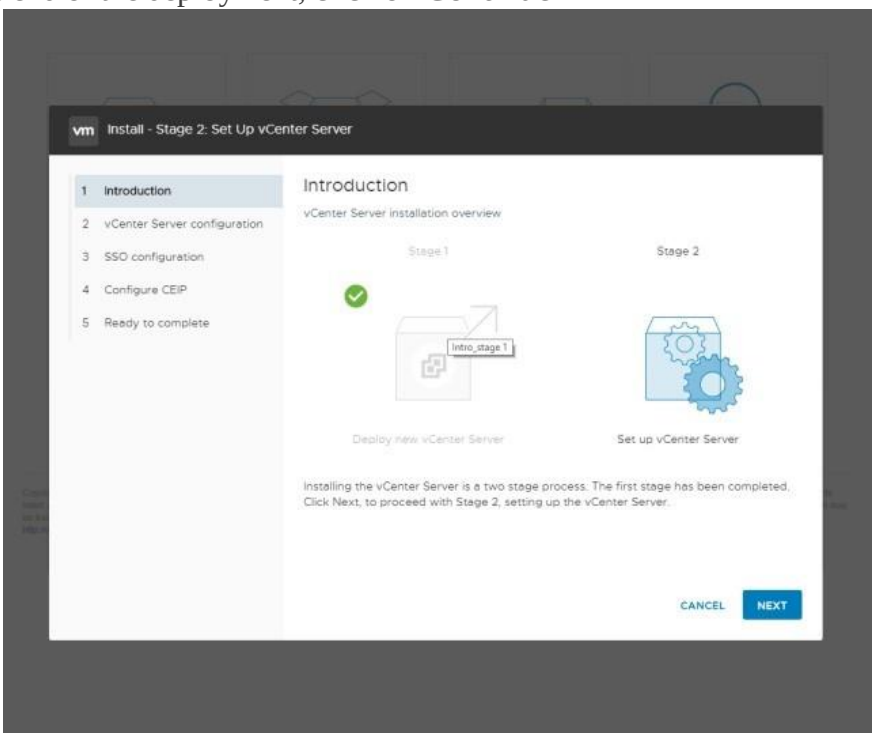
Step 12: Select Network, provide FQDN, network information and click on **Next**



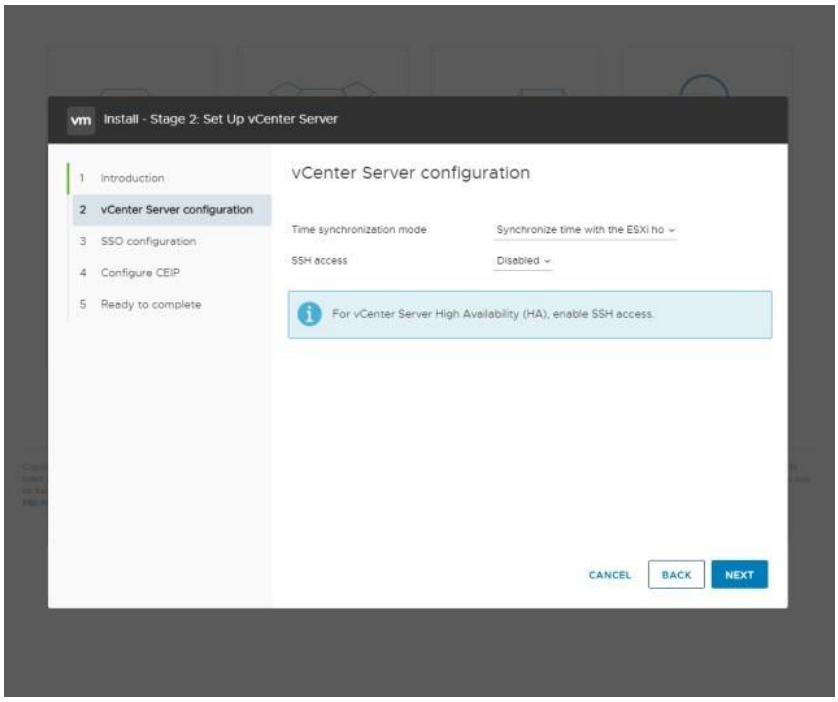
Step 13: Review information and click on **Finish**



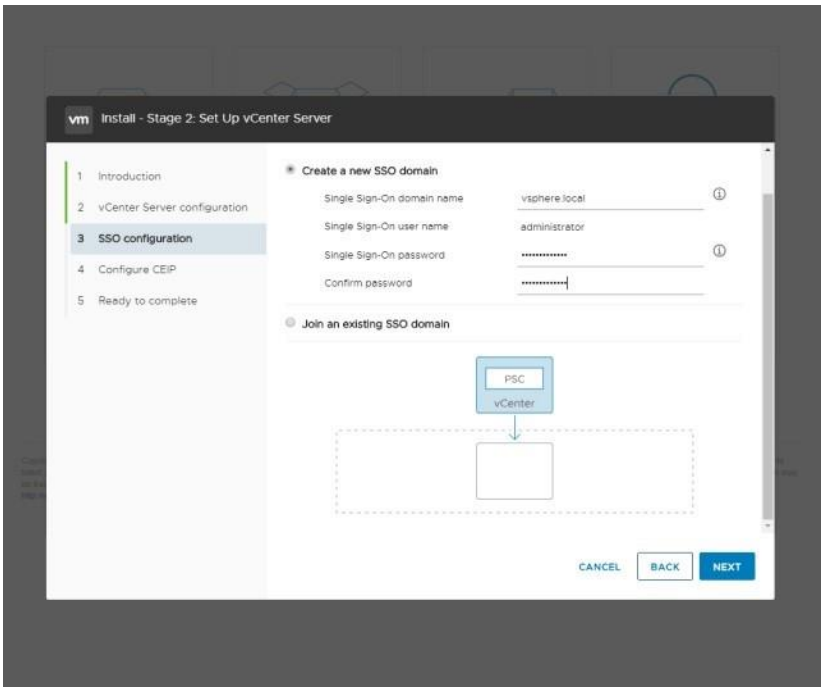
Step 14: At the end of the deployment, click on **Continue**



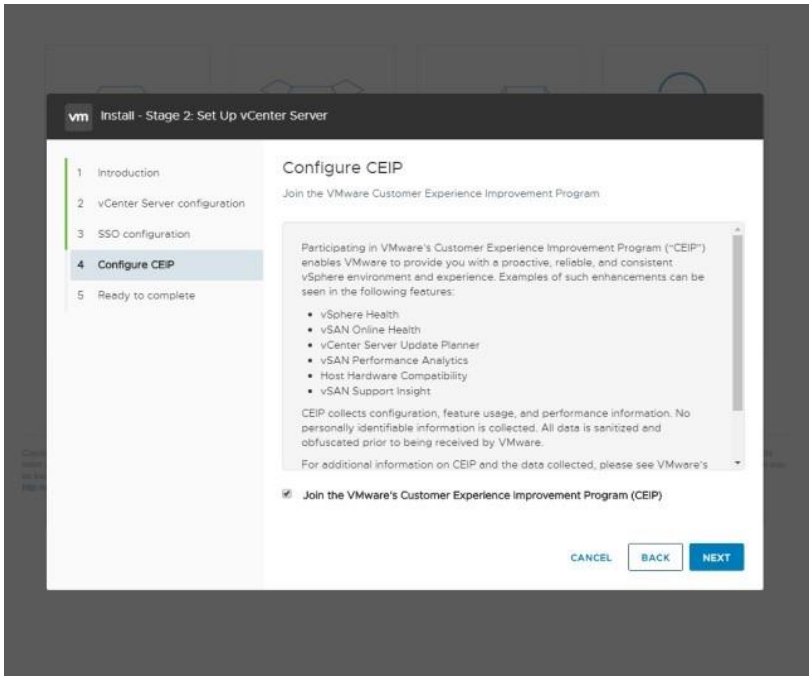
Step 15: Click on **Next**



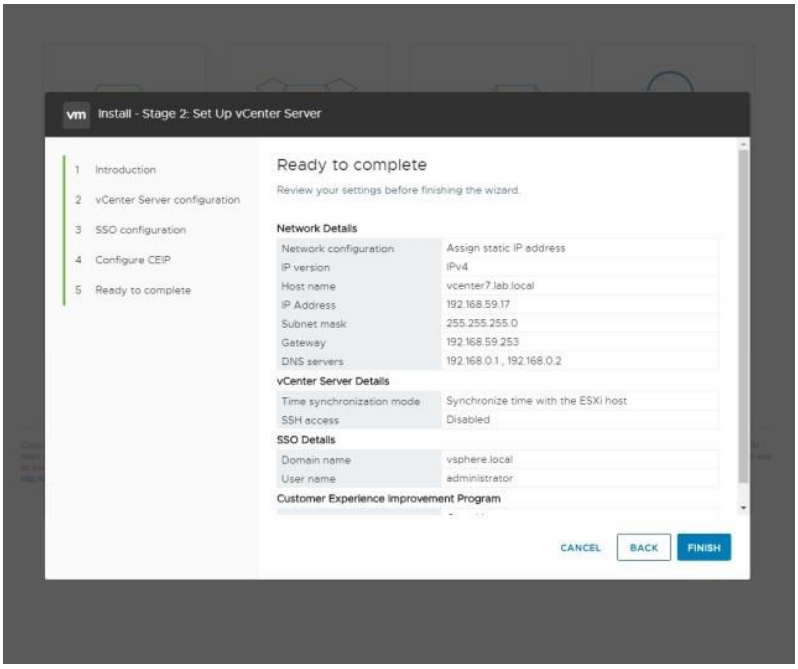
Step 16: Click on **Next**



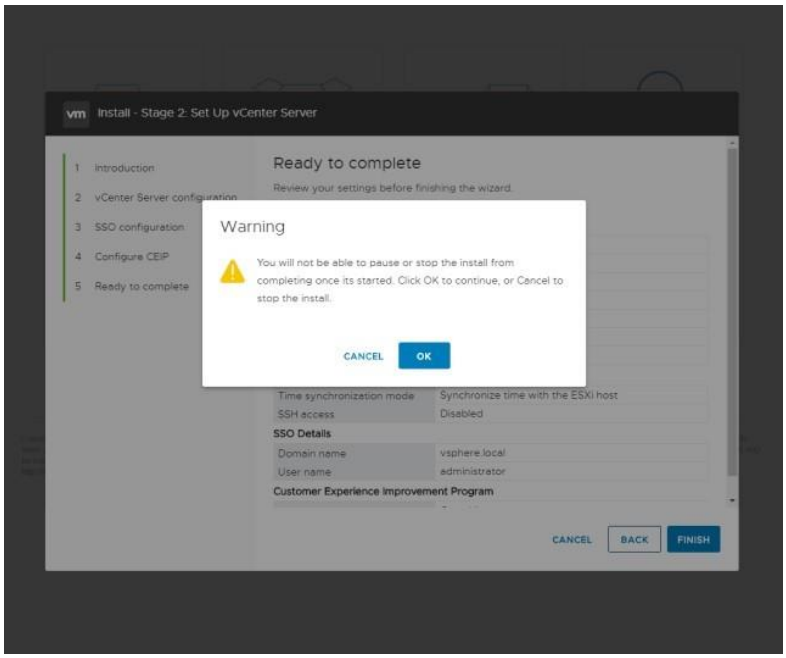
Step 17: Provide SSO Domain, Password and click on **Next**



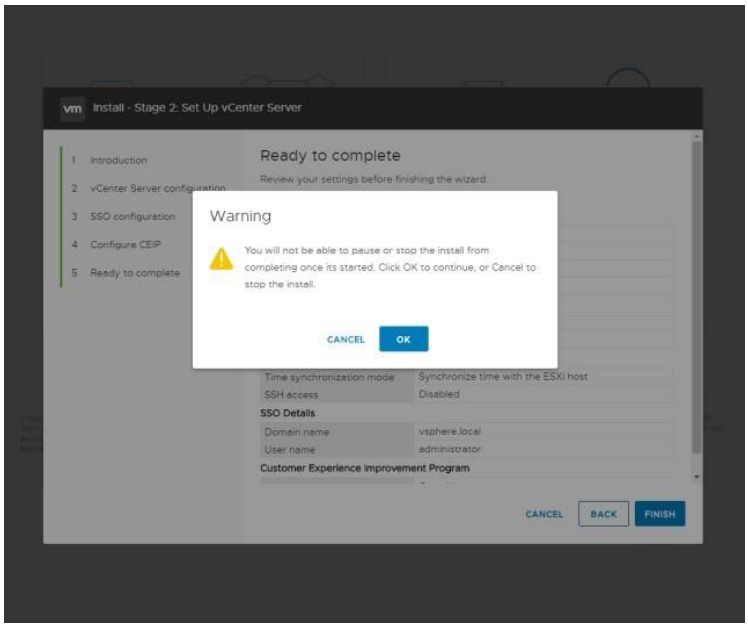
Step 18: If you want to join CEP click on **Next** (otherwise uncheck the box)



Step 19: Review details and click on **Finish**



Step 20: Click on **OK** to start the install



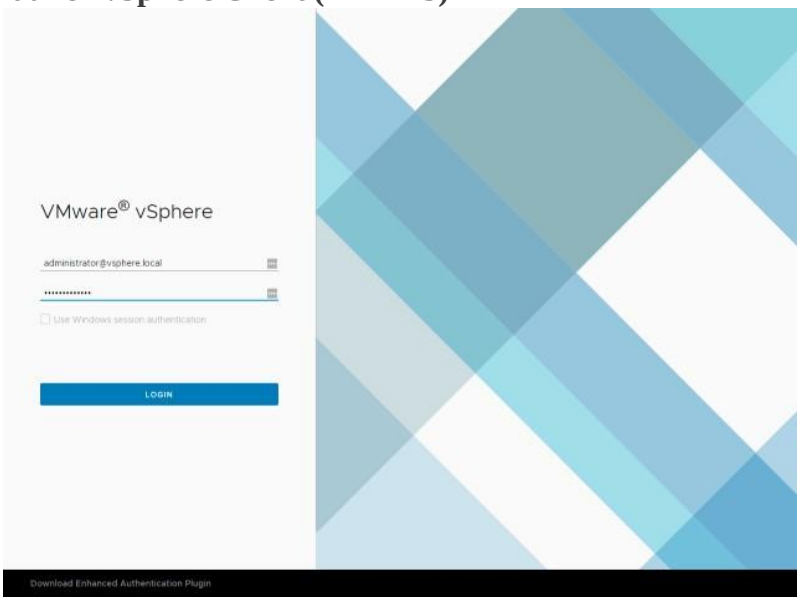
Step 21: Click on **Close**

Conclusion:

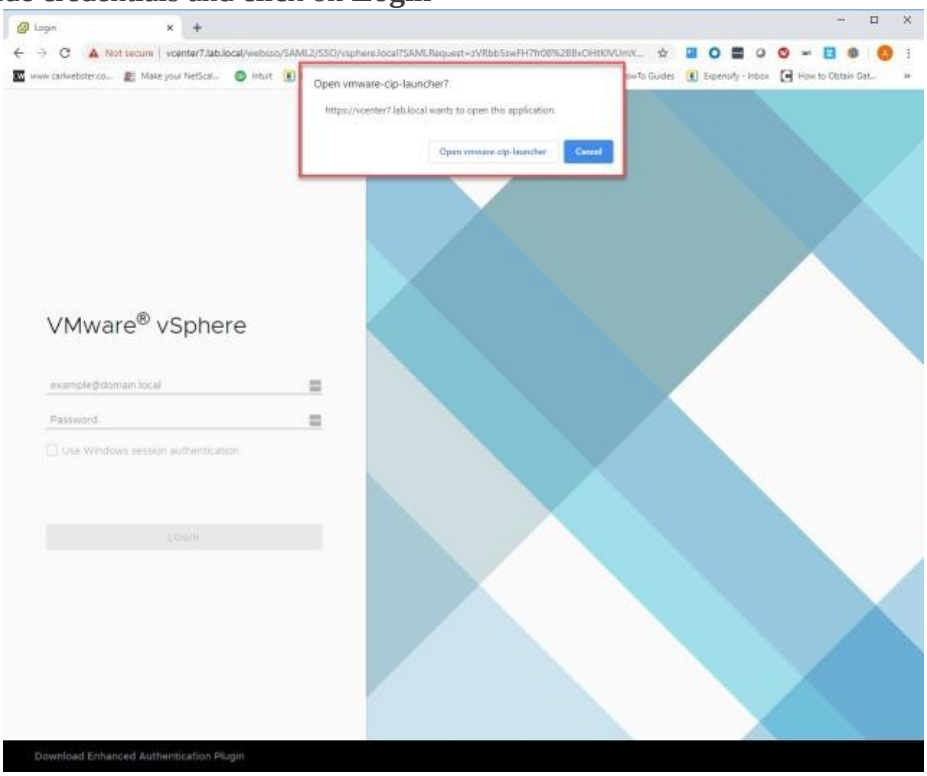
Experiment No. 4

Title: Creation of virtual machine using vCenter Server on a machine that has access to ESXi host by installing vSphere client - Launch vSphere client and communicate with the ESXi host by performing the following operations. a. Create a virtual machine b. Configure and run the machine c. Select Guest OS Ubuntu d. Select a location & datacentre e. Create a Cluster & Add a host

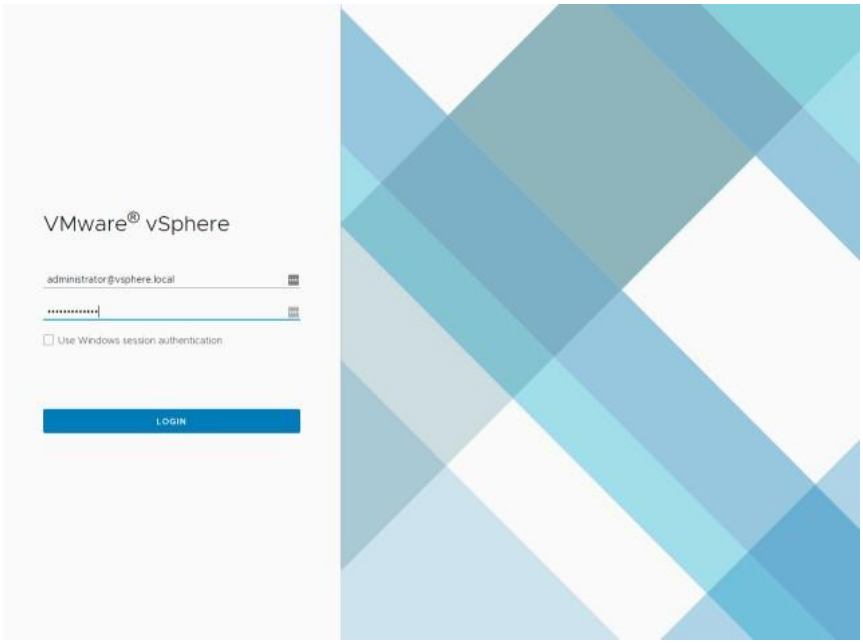
Step 1: Click on **Launch vSphere Client (HTML5)**



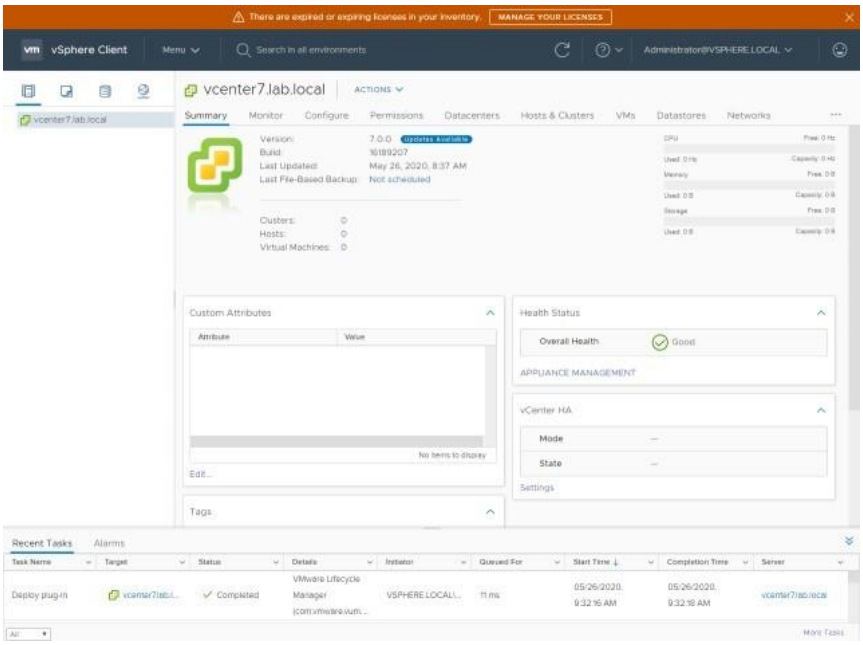
Step 2: Provide credentials and click on **Login**



Step 3: When plugin is installed, on first connection you have the above pop-up, click on **Open vmware-cip-launcher**



Step 4: Provide credentials and click on **Login**



Step 5: Next steps will be to add host, manage license, etc.

Conclusion:

Experiment No. 5

Title: Modify virtual machine settings by adjusting configuration like hardware, adding new virtual hard disk, number of virtual processor and memory settings.

Theory:

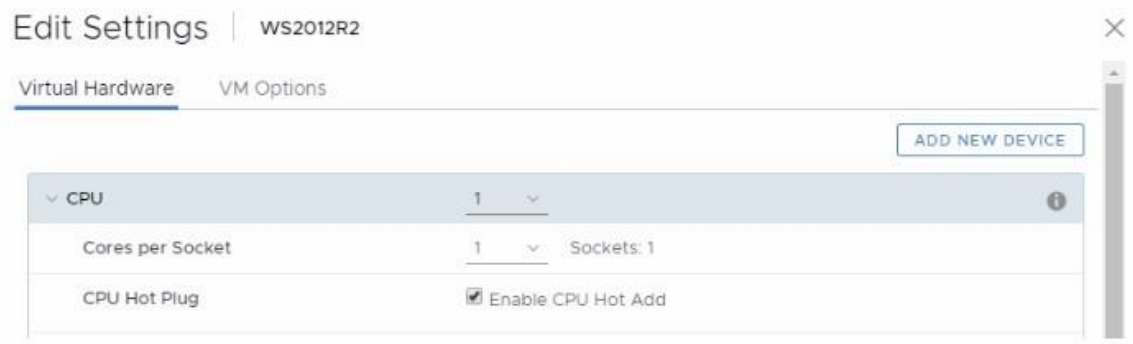
Each Virtual Machine is a collection of resources provided by the infrastructure layer, usually organized in a pool of resources and assigned dynamically (or in some case statically) to each VM. Each VM "see" a subset of the physical resources in a form of virtual hardware components defined usually by the following minimum elements:

- Hardware platform type (x86 for 32 bit VM or x64 for 64 bit VM)
- Virtual Hardware type (depending by the virtualization layer)
- Virtual CPU (and maybe virtual sockets and virtual cores)
- Virtual RAM (and maybe also a Persistent RAM)
- Virtual disk connected to a virtual controller
- Virtual NIC

Then there can be also additional hardware components that maybe are not mandatory, but maybe are useful on specific use cases. Or are needed for some basic operations, like, for example, installing the guest OS where a video driver, a keyboard and a mouse device are needed to use the remote console.

To enable the CPU hot add option:

1. Right-click a virtual machine in the inventory and select Edit Settings.
2. On the Virtual Hardware tab, expand CPU, and select Enable CPU Hot Add.
3. Click OK.



Conclusion:

Experiment No. 6

Title: Clone a virtual machine including all its settings.

Theory:

The cloning process in VMware is a process in which you create an exact copy of your original virtual machine (VM). A VMware clone has the same hardware, software, and other configurations as the original VM. Cloning is useful when deploying several virtual machines with the same resource allocation and configurations. The cloning process saves you a lot of time in situations that require new, similar machines fast.

Benefits of Cloning a Virtual Machine

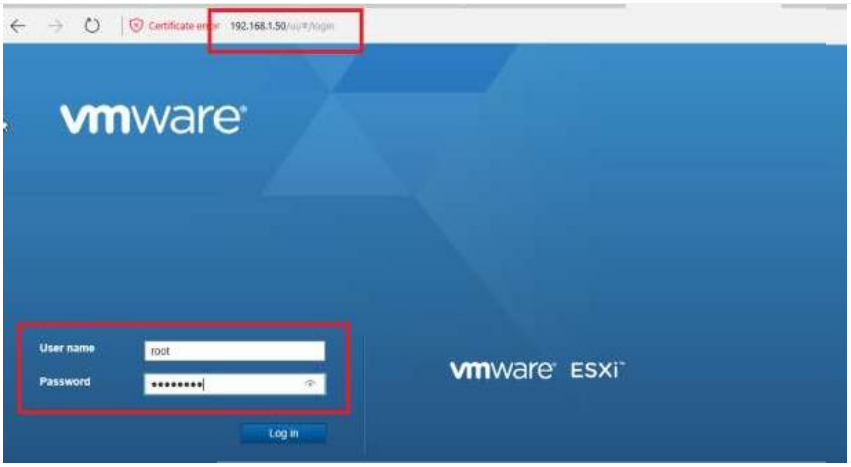
The speed and simplicity of the VMware cloning VM process are its biggest advantage. The process of new VM creation can be quite long sometimes because of the OS installation. With cloning, you can quickly deploy multiple virtual machines with the same setup. Cloning is handy when you've just started a new quality assurance (QA) team, and they all need to run tests in the same environment. They can all get their environment in just a few clicks.

Drawbacks of Cloning a Virtual Machine

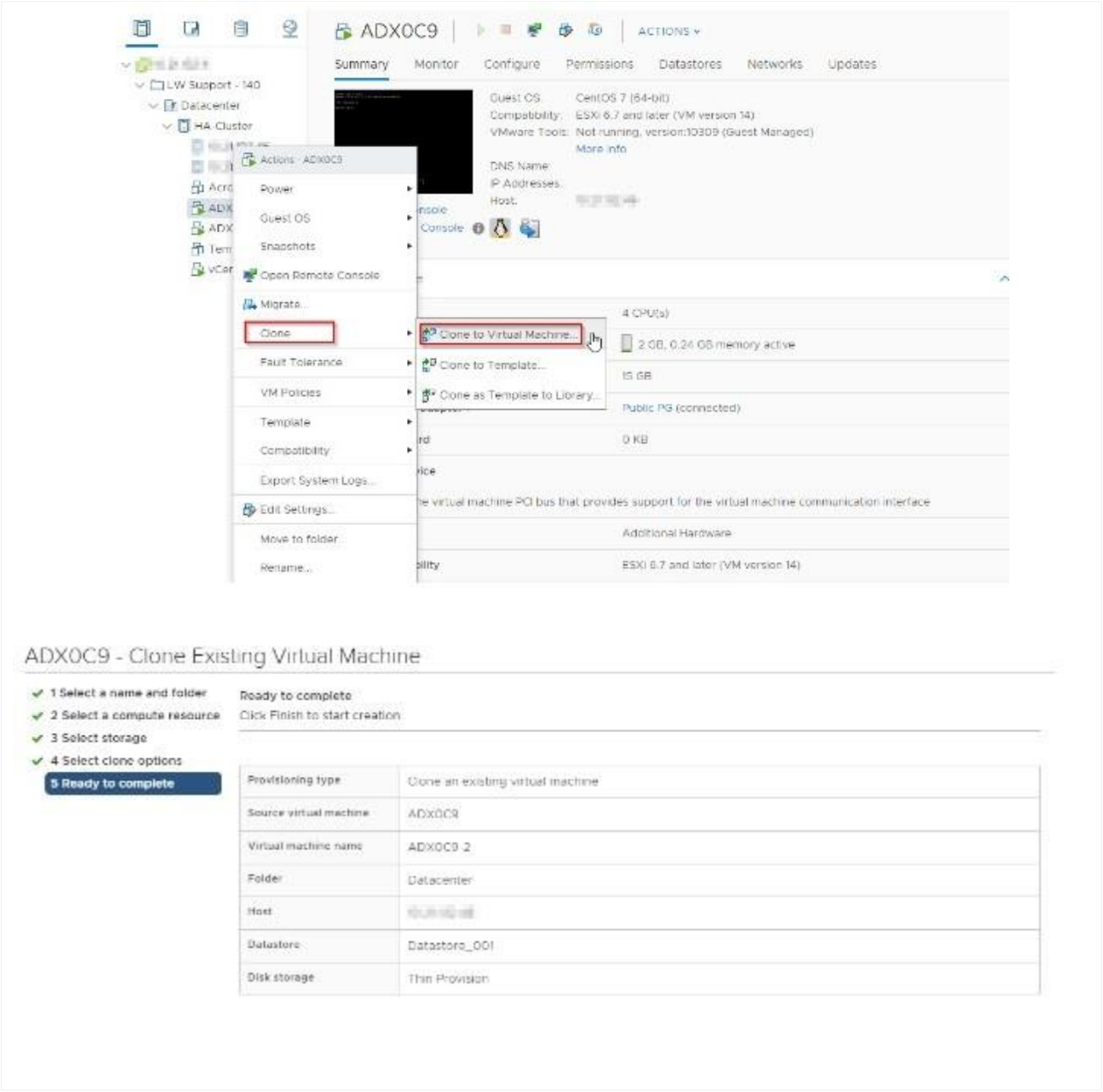
The only real drawback is that eventually, you may run out of resources. It is easy to create new clones, and you may run out of resources faster than you realize. When creating many VM clones, you will overload your RAM and CPU at some point. It happens because you will have many virtual CPUs and virtual memory allocated to your virtual machines, not to mention storage space. So just keep in mind how many resources you have at your disposal when you are cloning virtual machines.

Clone a Virtual Machine:

Step 1: Log in to your vSphere client. Each managed VMware cloud hosting here at Liquid Web comes with vSphere. Enter the IP address of the host on which has your vSphere installation. The login page will load. Enter your credentials and click **login**.



Step 2: Once logged in, navigate to your virtual machines. Choose a VM you wish to clone and right-click on it with your mouse. A menu will appear, and you can hover your mouse pointer over the Clone option. Finally, click on **Clone to Virtual Machine**.



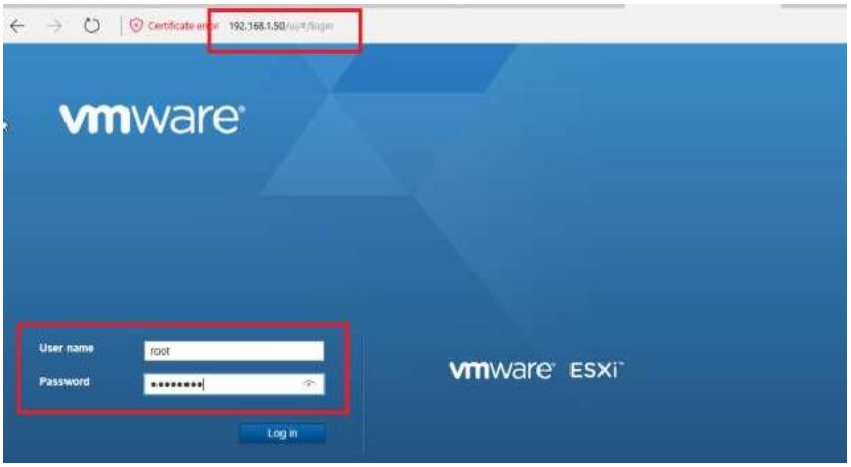
Conclusion:

Experiment No. 7

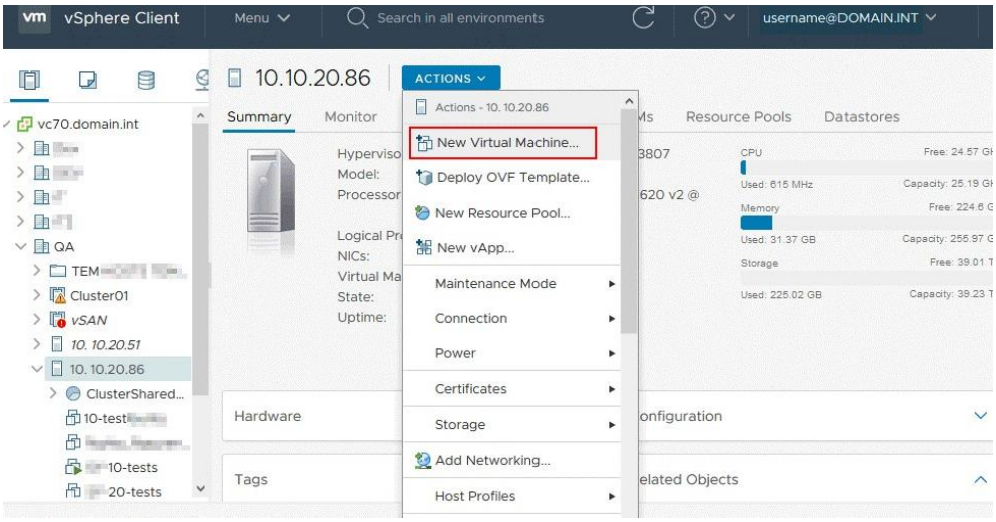
Title: Installing Windows Virtual PC on various platforms (32-bit, 64-bit).

Steps of installation of Windows Virtual PC:

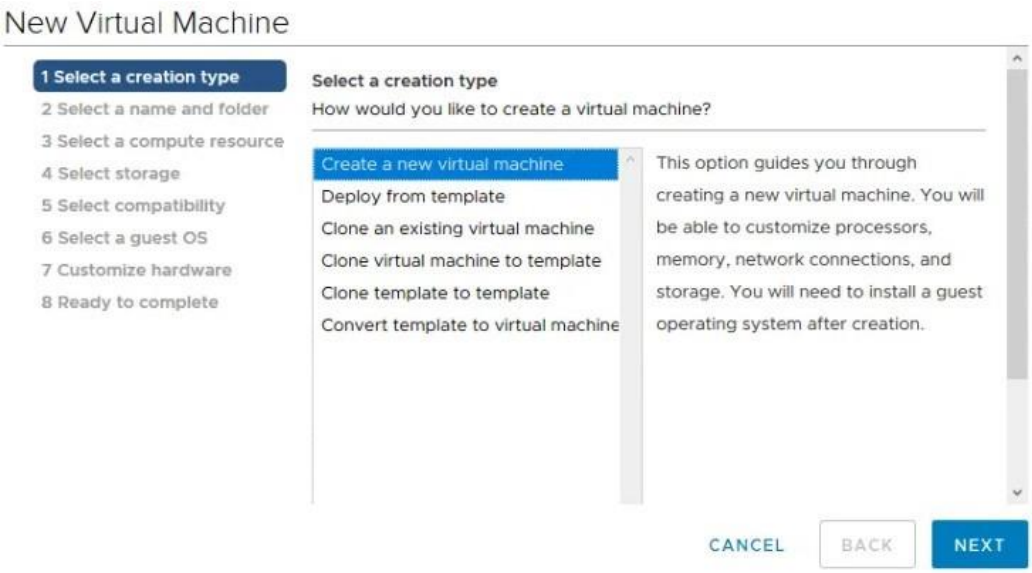
Step 1: Open VMware vSphere client using web browser.



Step 2: Click on Virtual machine



Step 3: Click on Create a new virtual machine



Step 4: select ESXi version, Guest Operating system family, ESXi compatibility.
Step 5: insert windows ISO image select appropriate version of windows (32/64 bits)
Step 6: click on install
Step 7: enter administrator password and continue
Step 8: wait for windows installation completion.

Experiment No. 8

Title: Creating and managing virtual hard disks.

Steps to manage Virtual disks:

Step 1.Select **Window** > **Virtual Machine Library**.

Step 2.Select a virtual machine in the **Virtual Machine Library** window and click **Settings**.

Step 3.Click **Add Device**.

Step 4.Click **New Hard Disk**.

Step 5.Click **Add**.

A new hard disk appears. The new hard disk is selected and a default filename appears in the **File name** pop-up menu.

Step 6.**(Optional)** Change the filename for the new virtual hard disk.

a. Select the filename in the pop-up menu and select **Save As**.
b. Type the filename for the hard disk in the **Save as** field and click **Save**.
Fusion creates the virtual disk file with this name and stores it in the App bundle directory.

Step 7.Use the **Disk size** slider to set the maximum size for the hard disk.

The maximum size for any hard disk is 8 TB.

Step 8.**(Optional)** Under Advanced options, set the **Bus type** for the hard disk to **IDE**, **SCSI**, **SATA**, or **NVMe**.

Step 9.Set your disk space configuration, depending on the constraints of the file system.

Step 10. Click Apply. The hard disk is created. View the new hard disk in Settings > Removable Devices of the virtual machine.

Conclusion:

Experiment No. 9

Title: Create a Snapshot & then create a virtual machine using that snapshot.

To take a snapshot in the vSphere Web Client:

Step 1.Right-click the virtual machine in the inventory and click **Take Snapshot.**

1. Select a datacenter, folder, cluster, resource pool, host, or vApp.
2. Click the **Related Objects** tab and click **Virtual Machines**.

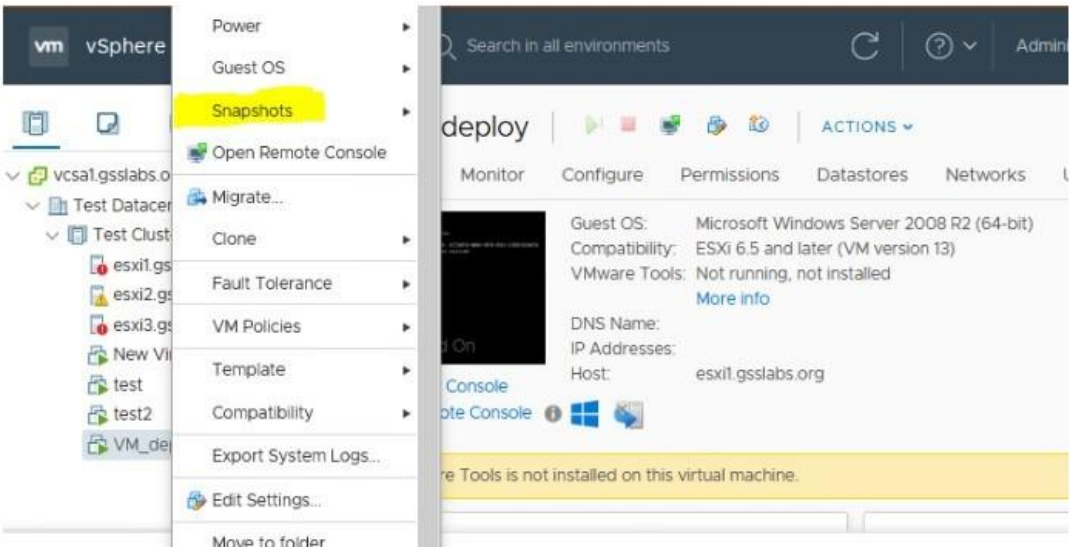
Step 2.Enter a name for the snapshot.

Step 3.Enter a description for the snapshot. This step is optional.

Step 4.Select the **Snapshot the virtual machine's memory** option to capture the memory of the virtual machine. This step is optional.

Step 5.Select **guest file system (Needs VMware Tools installed)** option to pause running processes on the guest operating system, so that file system contents are in a known consistent state when you take the snapshot. This step is optional.

Step 6.Click **OK**.



Conclusion:

Experiment No. 10

Title: Create a Template & then create a virtual machine from Template.

Theory: A VM template is a master copy image of a virtual machine that includes VM disks, virtual devices, and settings. A VM template can be used many times over for the purposes of VM cloning. You cannot power on and edit the template once it has been created. This is by design, so that nobody can accidentally edit the virtual machine that is used as a template. This approach provides greater security (and a more "foolproof" method) for VM cloning. After cloning the VM from a template, VM clones are not linked to a VM template and are independent. If you want to edit a template, you should convert a template to a VM, edit the VM, and then convert the edited VM to a new template.

Difference between a VM Clone and a VM Template:
A regular VM clone is an exact copy of the source VM at the appropriate point of time. If you were to periodically clone a VM that is in a running state, the resulting clones would differ from one another. It is preferable to clone a powered-off VM, although standard cloning still doesn't offer all the benefits of a template.

When a VM is cloned, all settings such as static IP network, computer name, and identifiers are left identical for each VM clone. As a result, network conflicts can occur. A VM template helps you prevent these issues, because a VM template cannot be edited, nor can it ever be in a running state. VMware provides tools that simplify guest OS customization for VM clones.

OVA and OVF templates are used for distributing pre-configured software as virtual appliances. OVA and OVF are compressed file formats. They can contain multiple VMs, which is useful for cases where software consists of multiple components that must be deployed on different machines.

OVF and OVA Files:
OVF is an open standard which contains multiple files as a package. For example, .ovf, .vmdk, .nvram, and so on. OVF supports exchange of virtual appliances across products and platforms. OVA is a single file distribution of the OVF file package. When you export a virtual machine as an OVF file, you create a directory that contains an OVF file and the virtual disk files.

The OVF and OVA formats offer the following advantages:

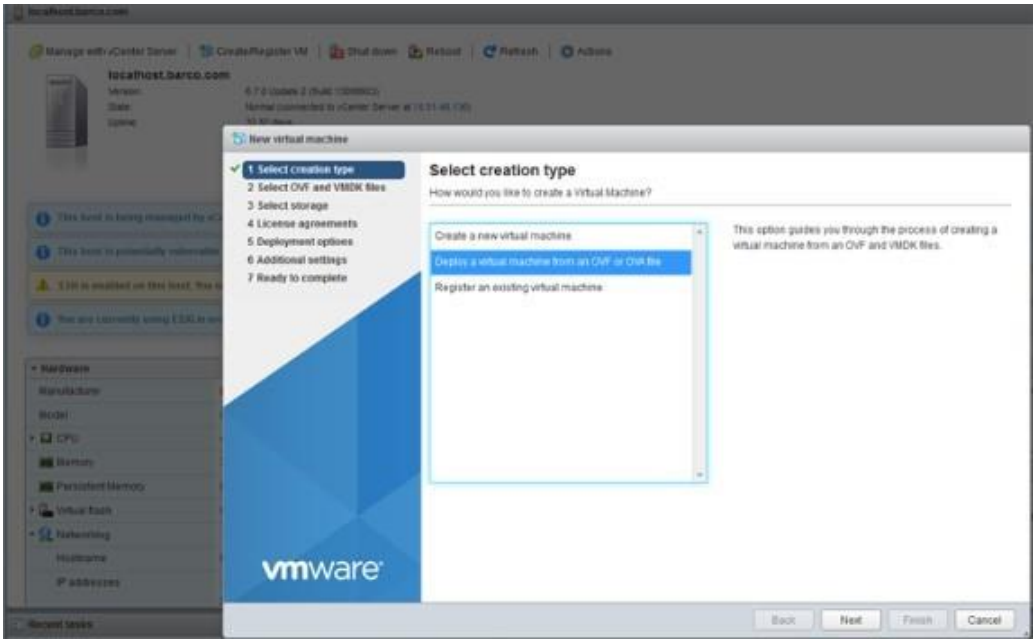
- OVF and OVA files are compressed, allowing for faster downloads.
- The vSphere Web Client validates an OVF or OVA file before importing it, and ensures that it is compatible with the intended destination server. If the appliance is incompatible with the selected host, it cannot be imported and an error message appears.
- OVF and OVA can encapsulate multi-tiered applications and more than one virtual machine.

Create VM using OVA and OVF template:

1. Right-click Host in the VMware Host Client inventory and select Create/Register VM.

The New Virtual Machine wizard opens.

2. On the Select creation type page, select Deploy a virtual machine from an OVF or OVA file and click Next.
3. On the Select OVF and VMDK files page, provide a unique name for the virtual machine.
4. To select an OVF and VMDK, or an OVA file to deploy, click the blue pane.
   Your local system storage opens.
5. Select the file that you want to deploy your virtual machine from and click Open.
   The file you selected appears in the blue pane.
6. Click Next.
7. On the Select storage page, select the storage type for the virtual machine.
   a. To save all the virtual machine disks and configuration files on a standard datastore, click the Standard button.
   b. To save the virtual machine hard disks on the host-local PMem datastore, click the Persistent Memory button.
   c. Select a datastore from the list and click Next.
8. On the Deployment options page, select the network mappings, disk provisioning, and whether you want the virtual machine to power on after deployment.
9. Click Next.
10. On the Ready to complete page, review the details and click Finish.



Conclusion: