



**RAMNIRANJAN JHUNJHUNWALA COLLEGE
GHATKOPAR (W), MUMBAI - 400 086**

**DEPARTMENT OF INFORMATION TECHNOLOGY
2020 - 2021**

M.Sc.(I.T.) SEM II

Virtualization

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Roll No. : 11**



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CERTIFICATE

This is to certify that Miss. **Sneha Ramchandra Pawar** with Roll No. **11** has successfully completed the necessary course of experiments in the subject of **Virtualization** during the academic year **2020 – 2021** complying with the requirements of **RAMNIRANJAN JHUNJHUNWALA COLLEGE OF ARTS, SCIENCE AND COMMERCE**, for the course of **M.Sc.(IT)** semester -II.

Internal Examiner

External Examiner

Head of Department

College Seal

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Practical No: 01

AIM: Implement VMwareESXi for server virtualization.

- A. Install VMwareESXi server and vSphere client.
- B. Add ESXi host to vCenter Server

- A. Install VMwareESXi server and vSphere client.

What is VMWare ESXi :

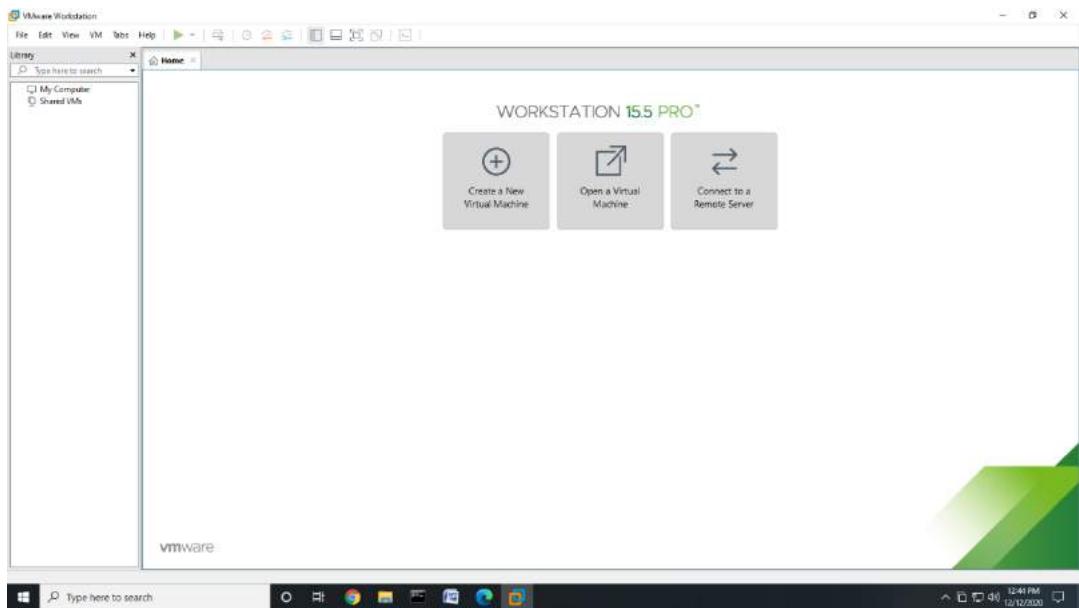
VMWare ESXi is just an OS that sits on your hardware and give you the power to virtualize your hardware resources eg, CPU, RAM etc.

What is VMWare vSphere Client :

The VMWare vSphere Client is a web based application that connects to the vCenter Server so IT administrators can manage installations and handle inventory objects in a vSphere deployment.

Step: Install ESXi server

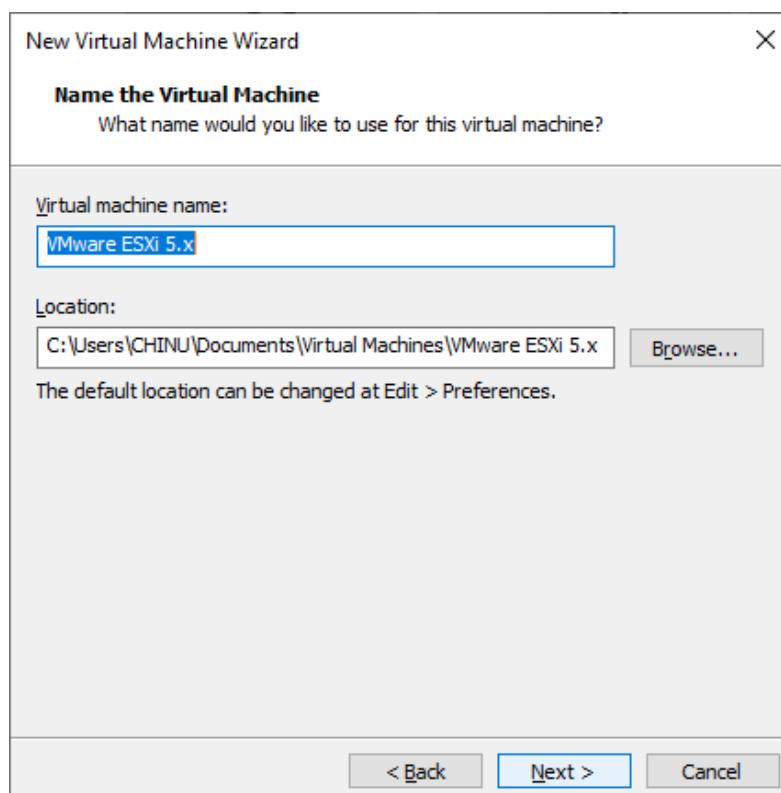
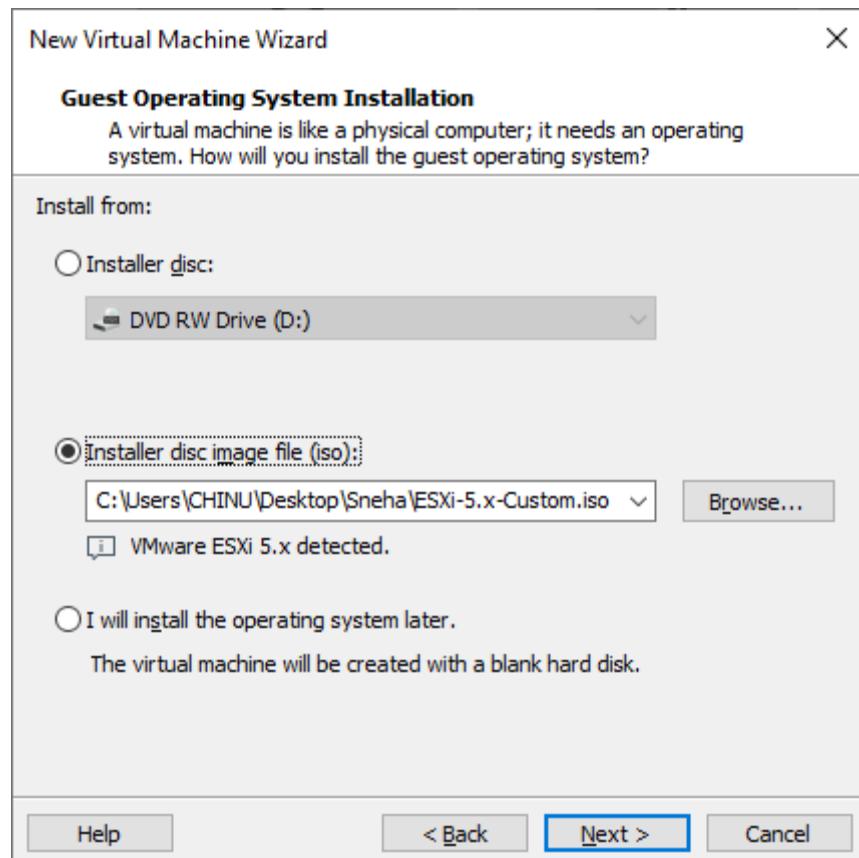
>> Open VMware Workstation and select Create a New Virtual Machine.



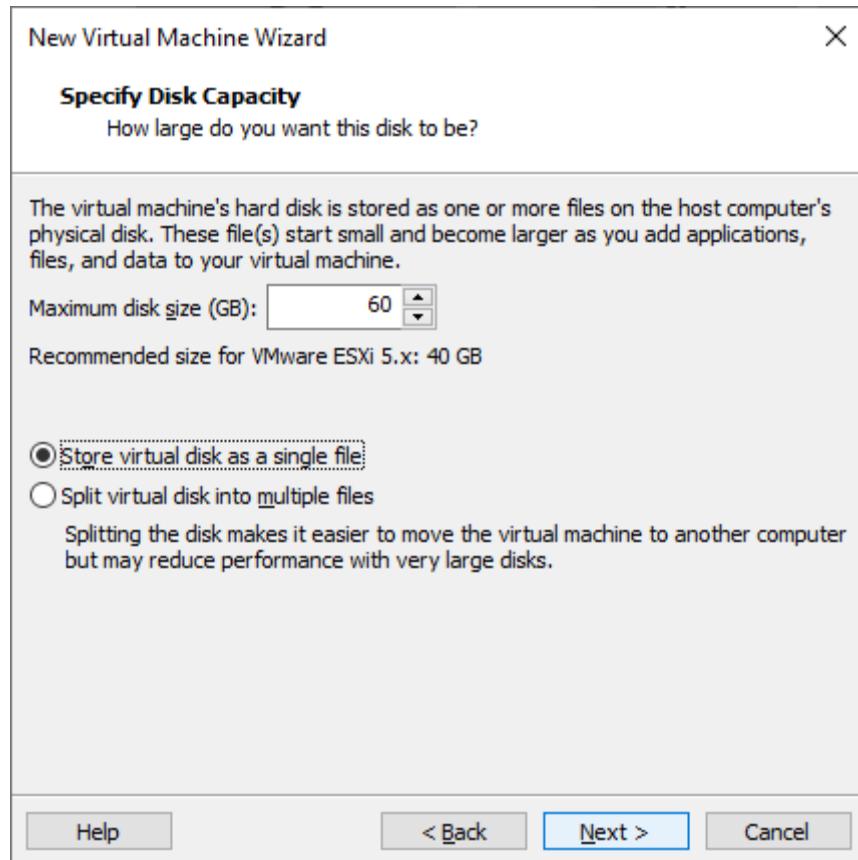
>> Select Typical and click “Next”.



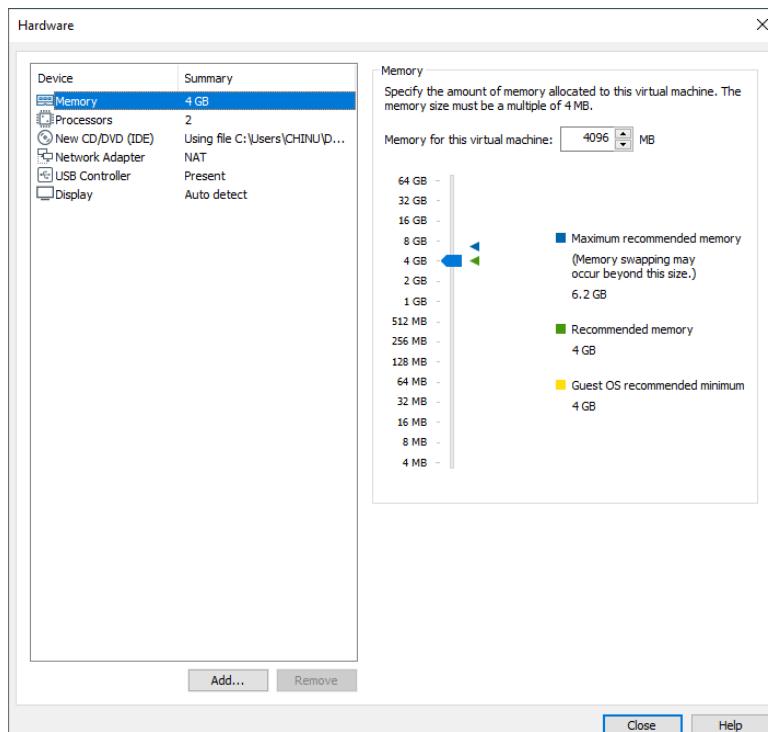
>> Select Installer disc_image file(ISO). Click Browse>>ESXi 5.xCustom.iso (Iso File)



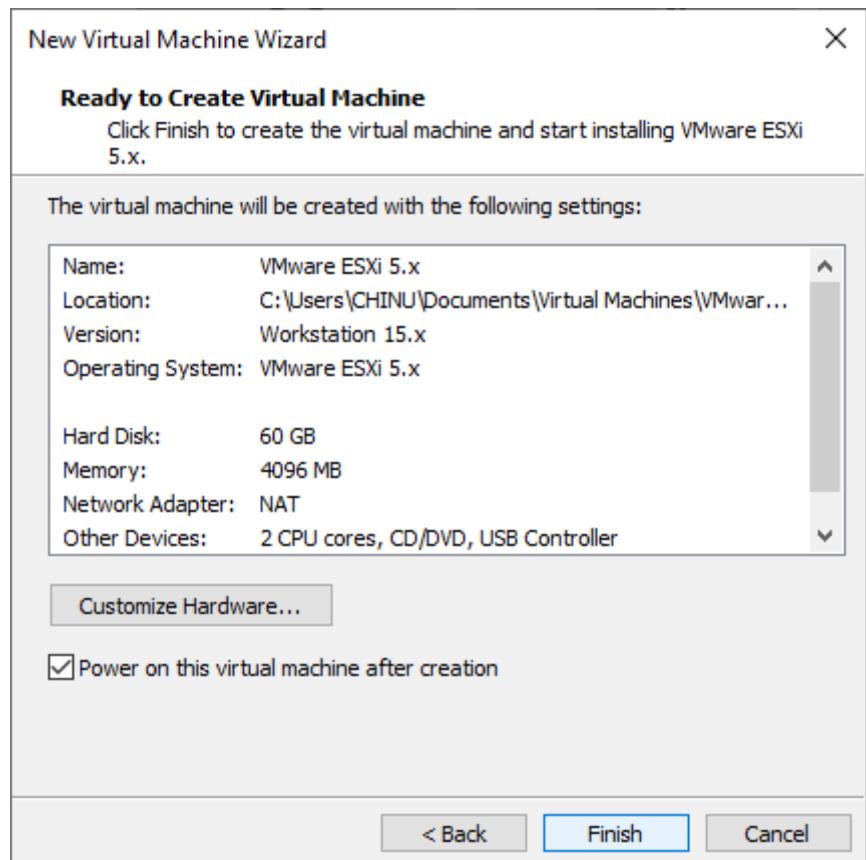
>> Choose “Store virtual disk as a single file” and Keep the memory size as 60GB. Click “NEXT”.



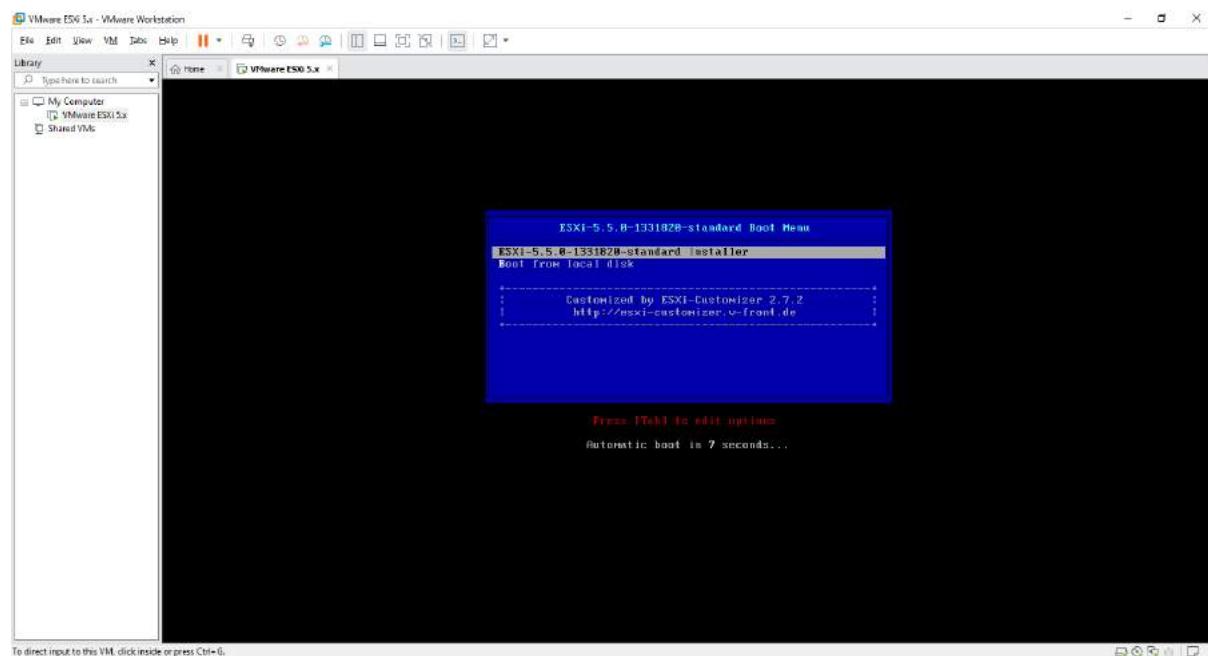
>> Click on Memory under Devices on the right side and make it to 4GB. Power on the virtual machine by clicking check box “Power on this virtual machine”. Click on Processor and select Virtualize Intel VT-x.

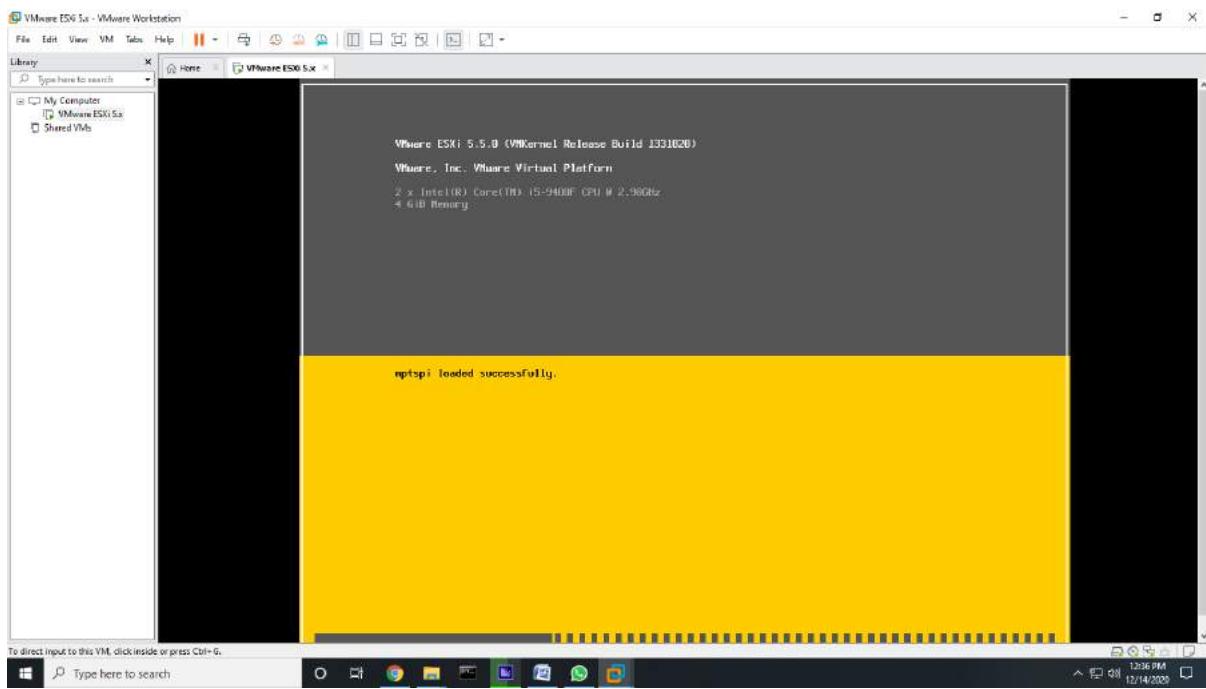
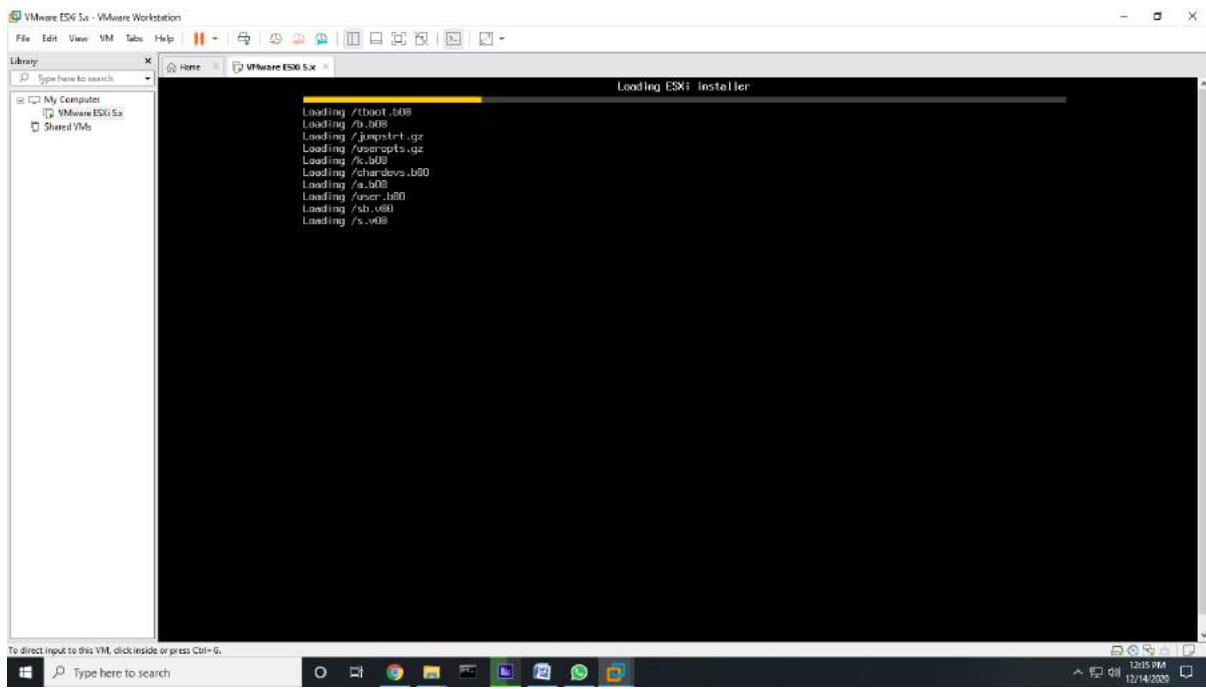


>> Click on “Finish” button.

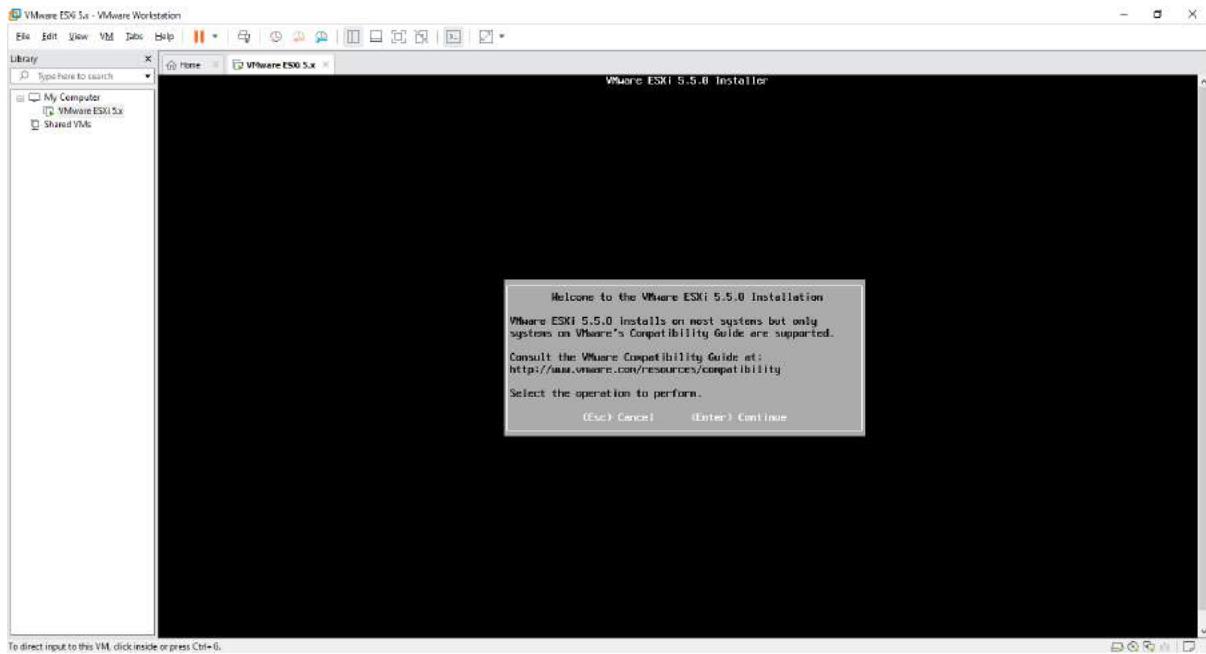


>> Wait until it boots automatically.

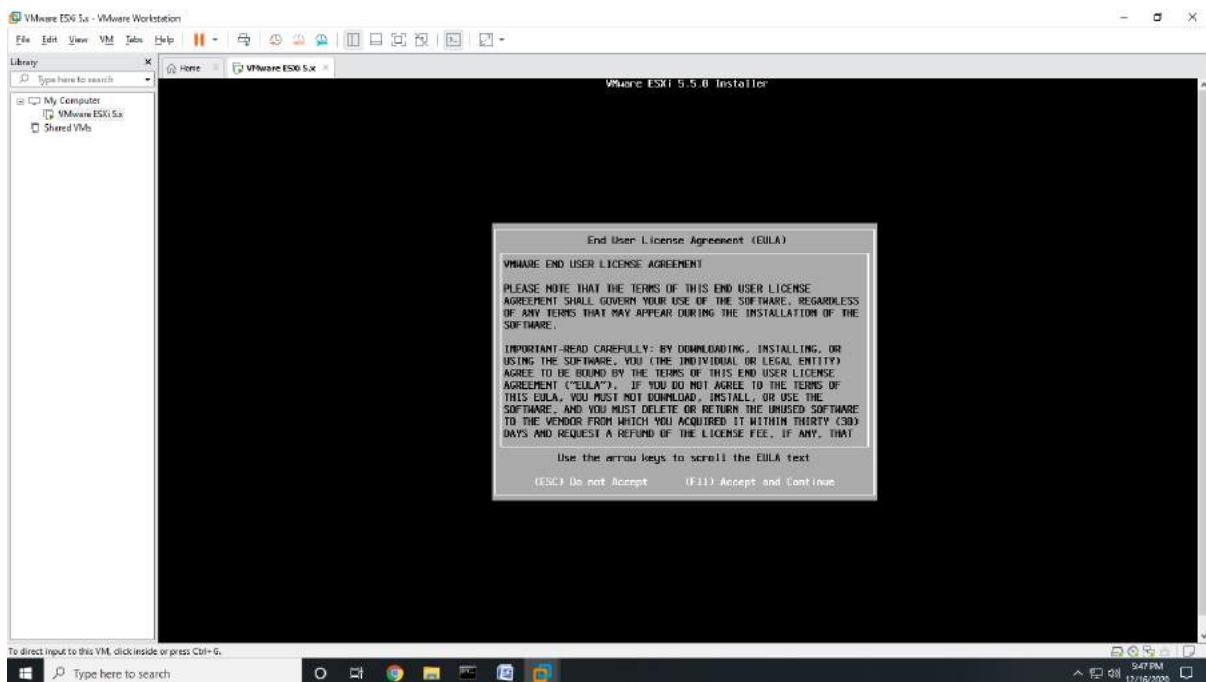




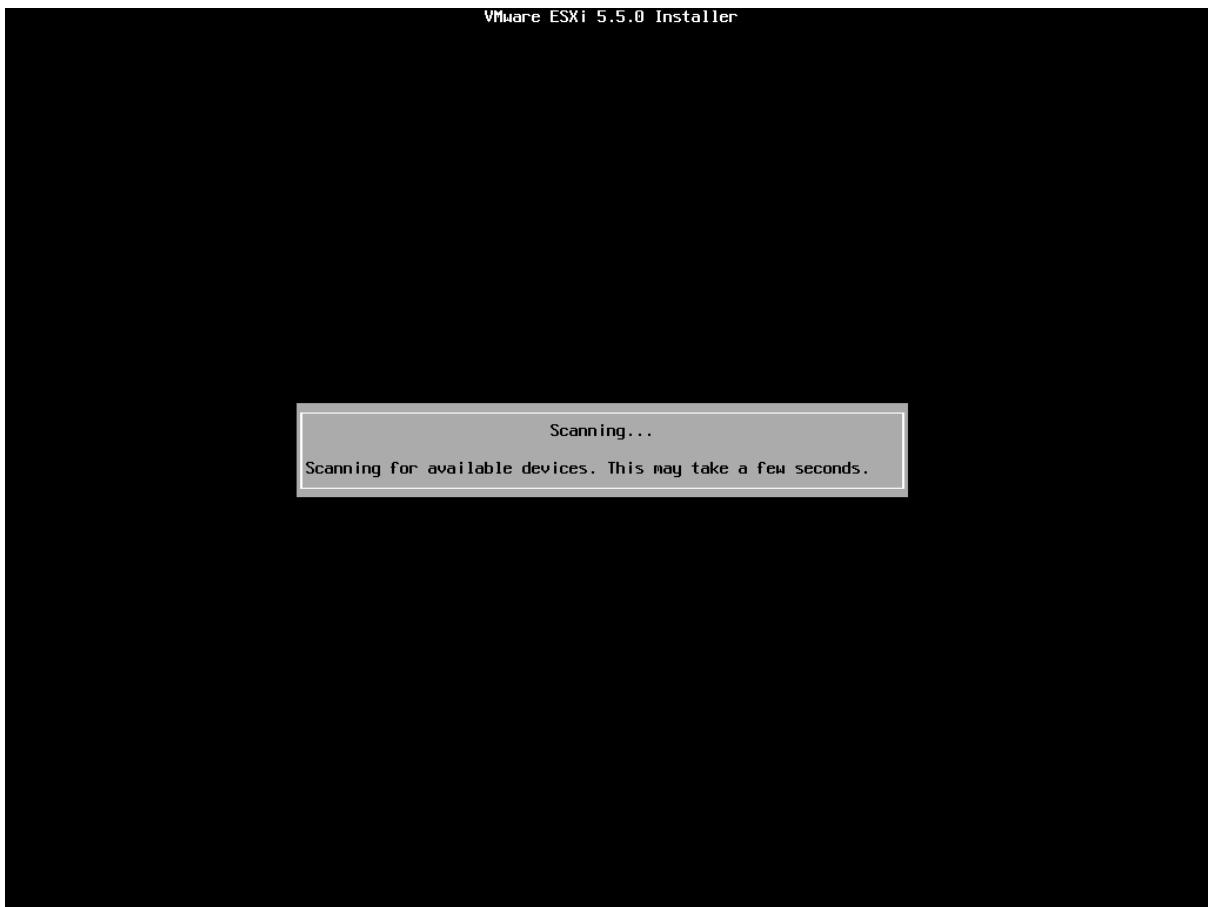
>> Press Enter to Continue.



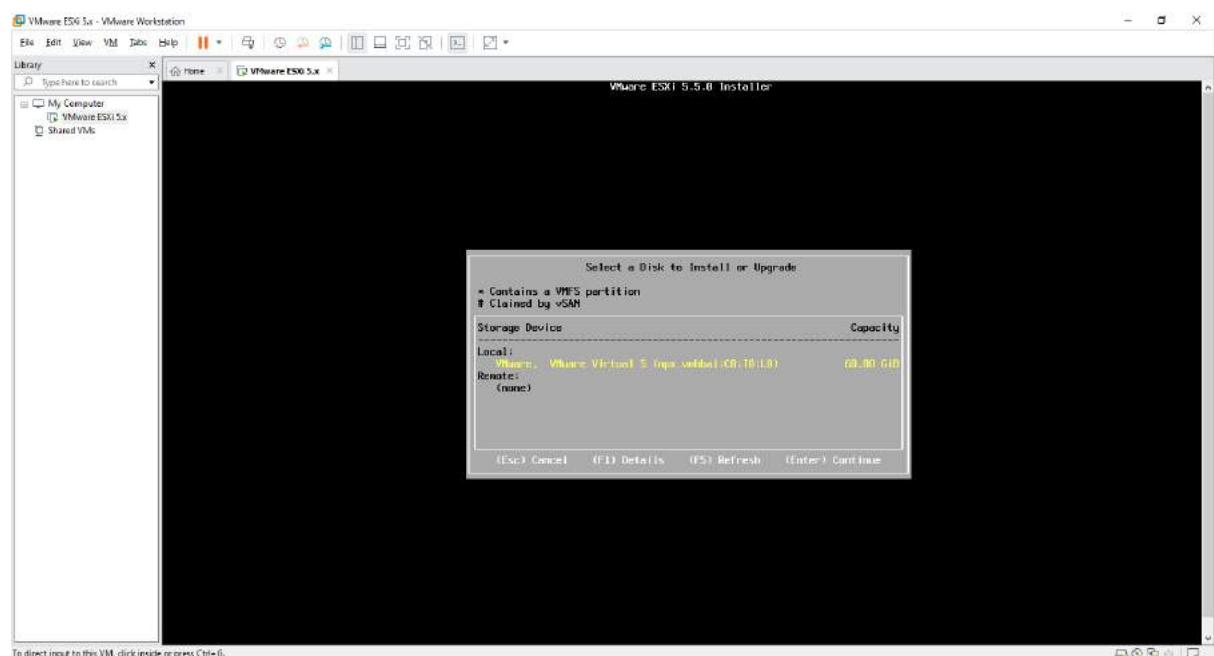
>> Press Function key 11 (F11) to Accept and Continue.



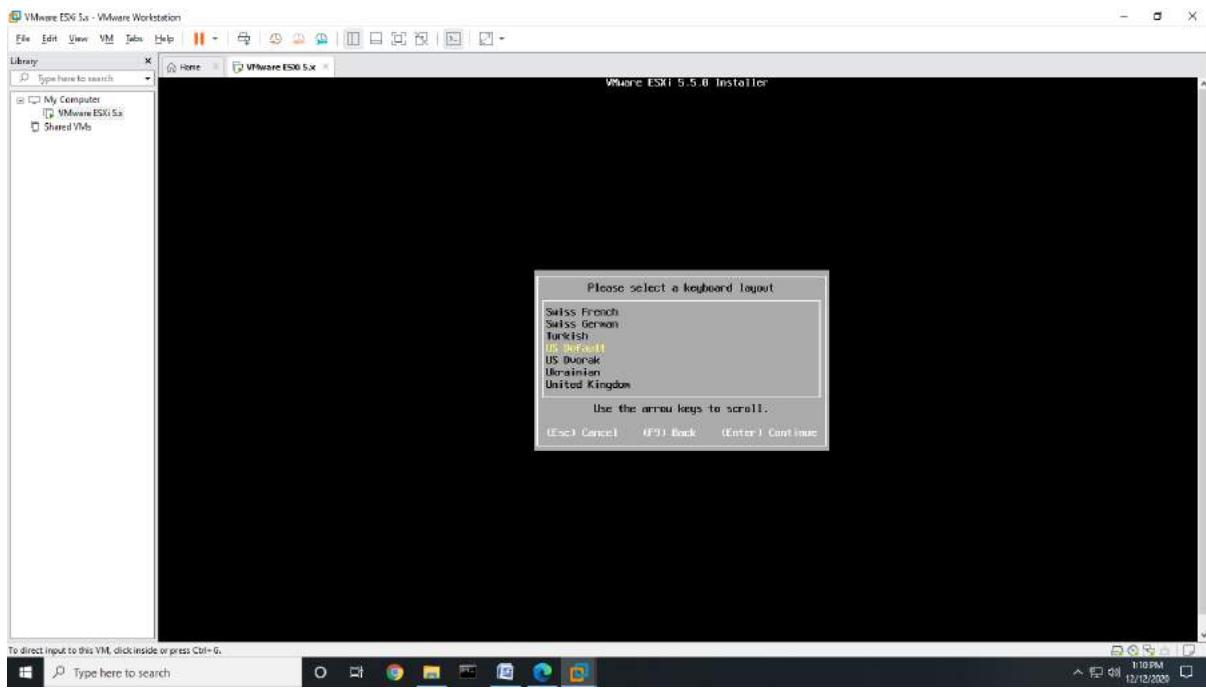
>> Wait until finish scanning.



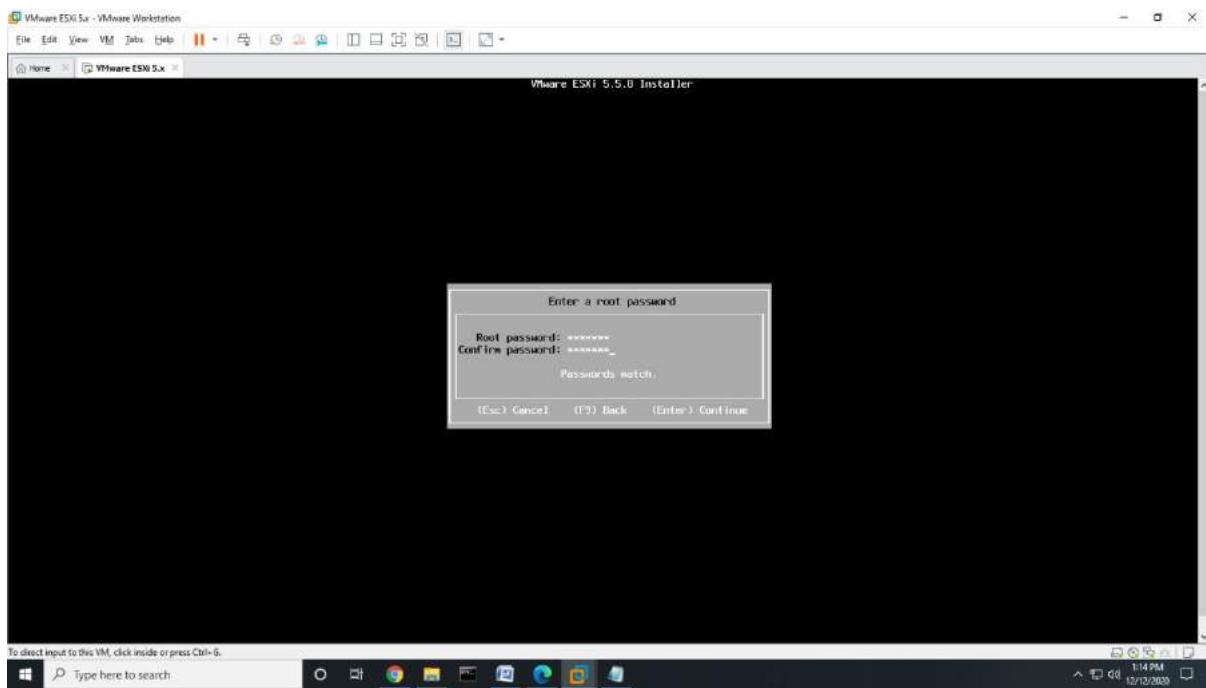
>> Press Enter to Continue.

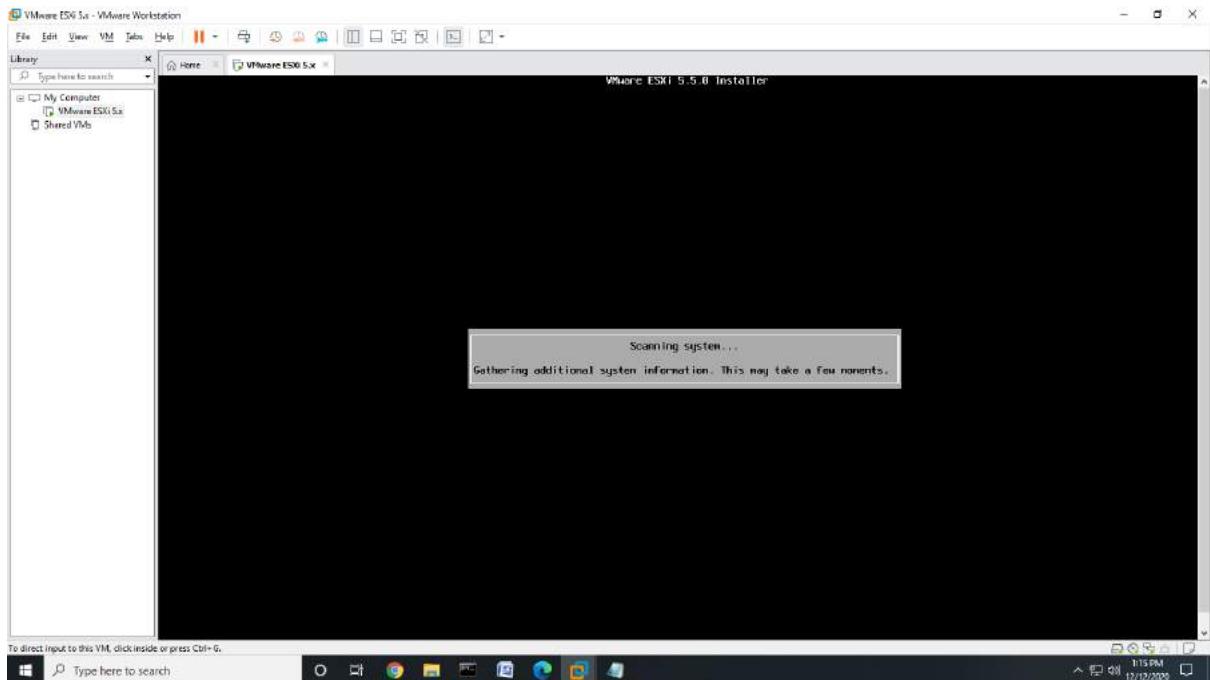


>> Select "US Default" and press "Enter".

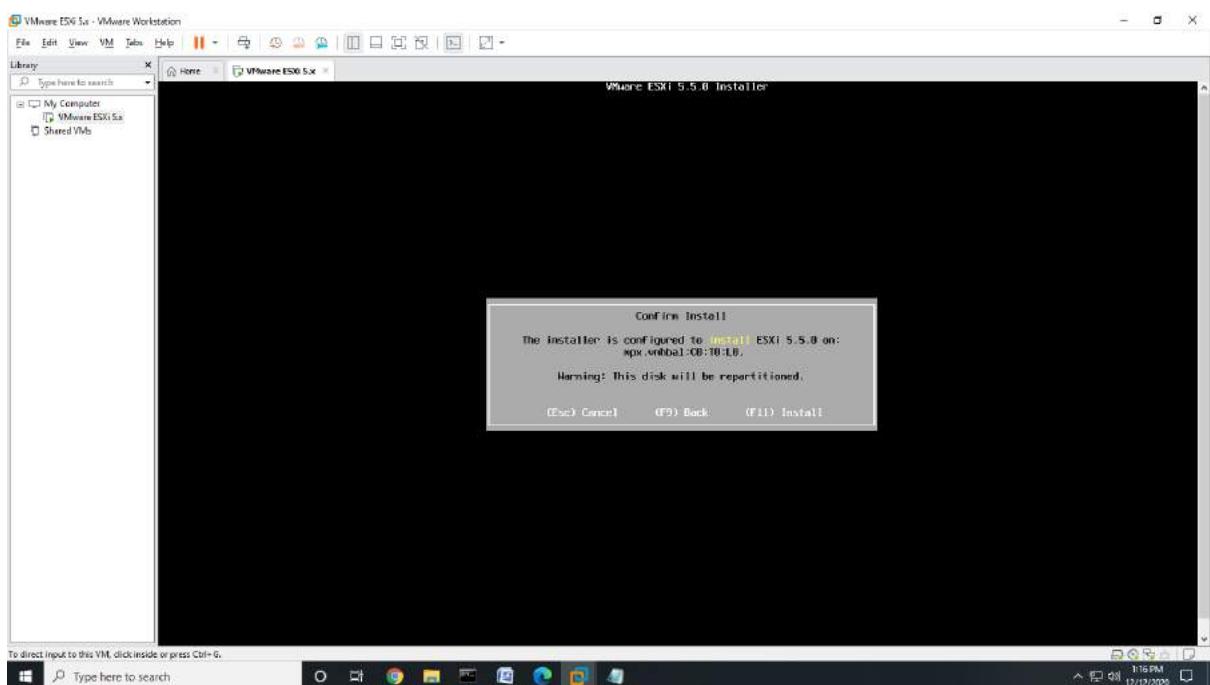


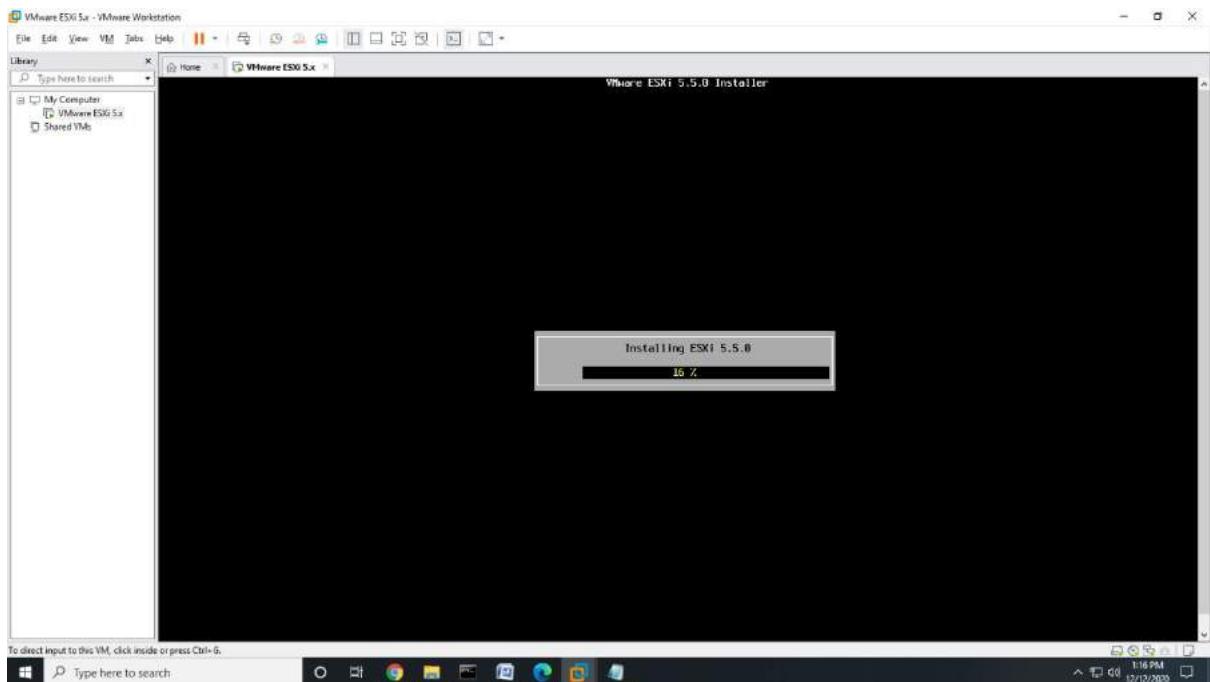
>> Enter the Password “rjit123” and press “Enter”.



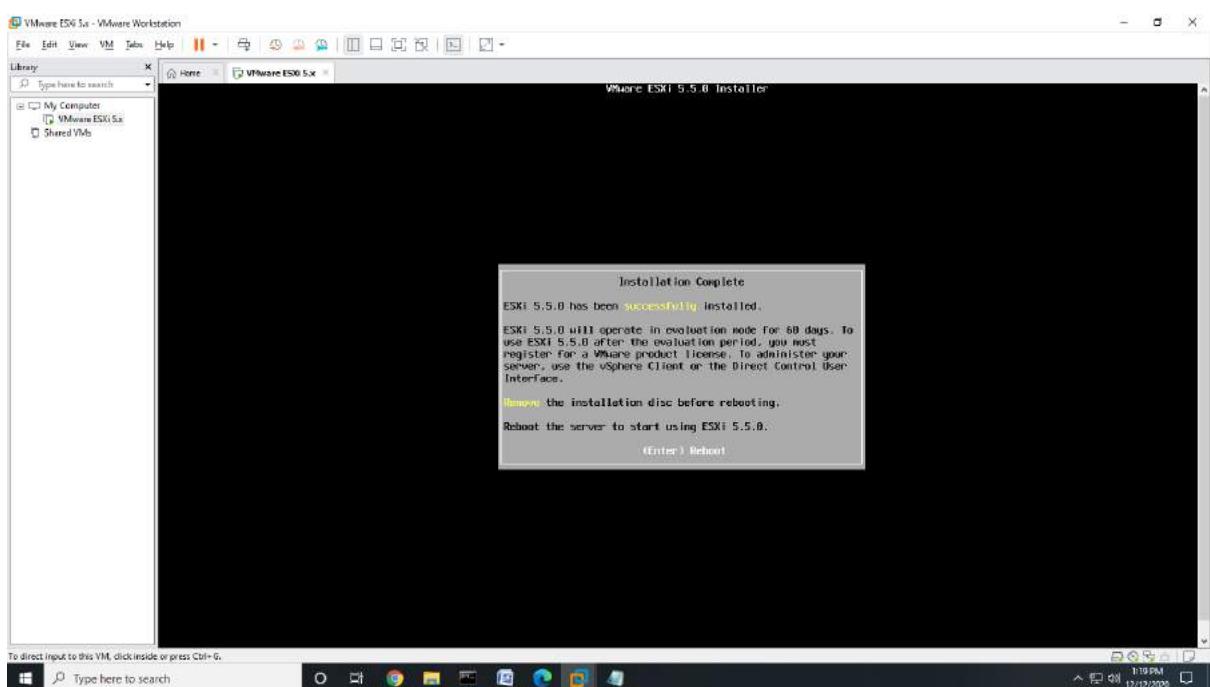


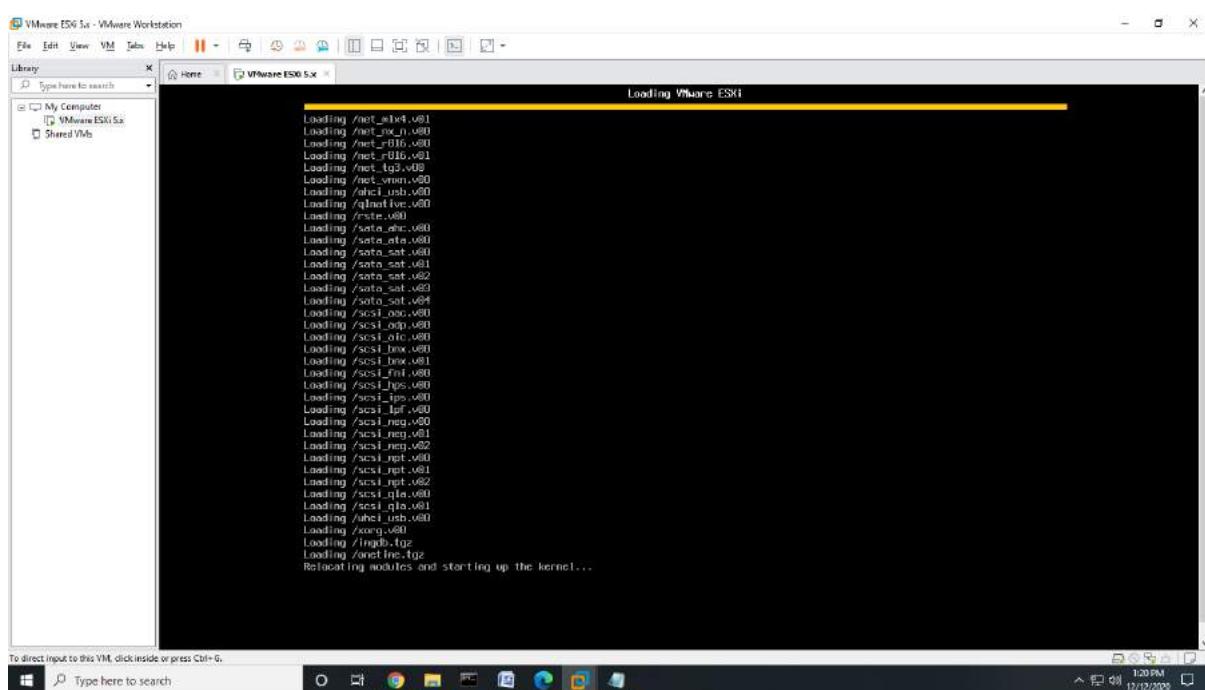
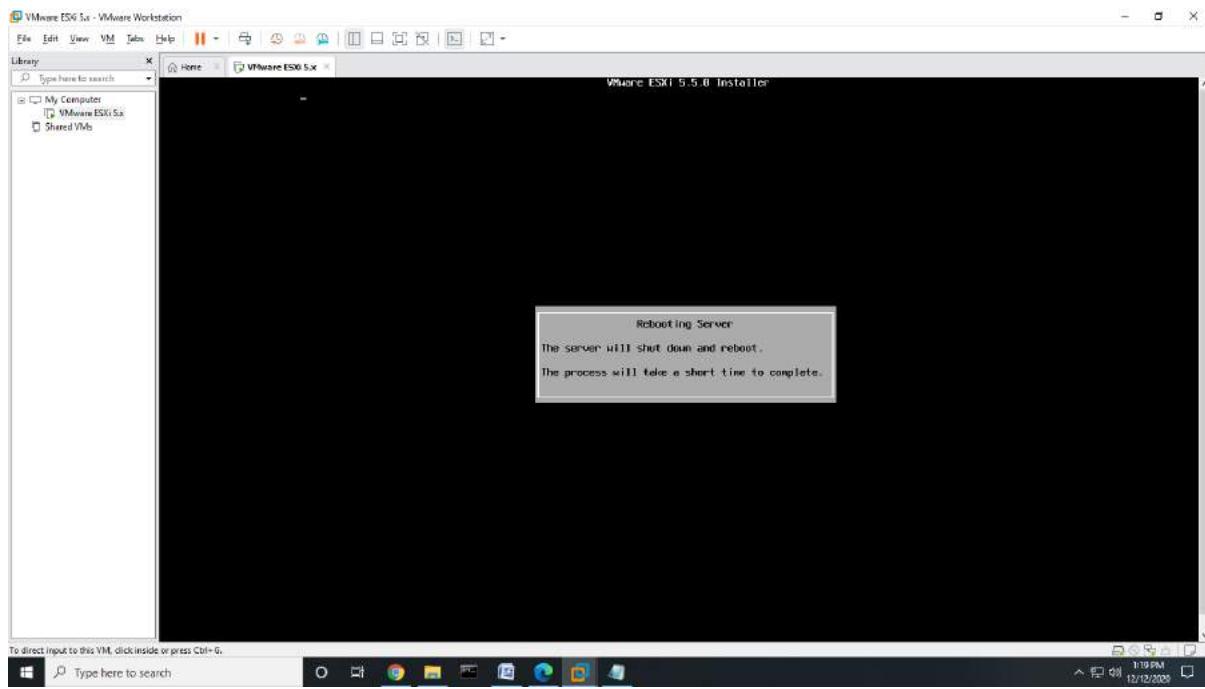
>> Press Function Key 11 “F11” to install EX-Si 5.5.8.

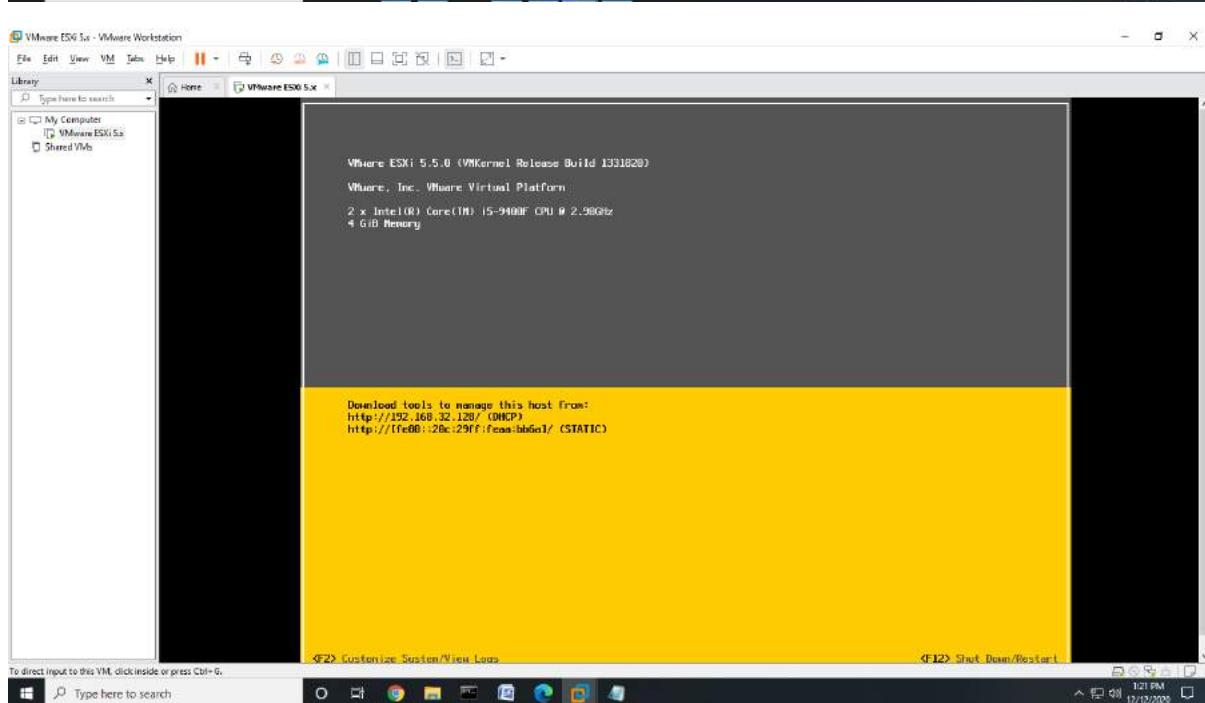
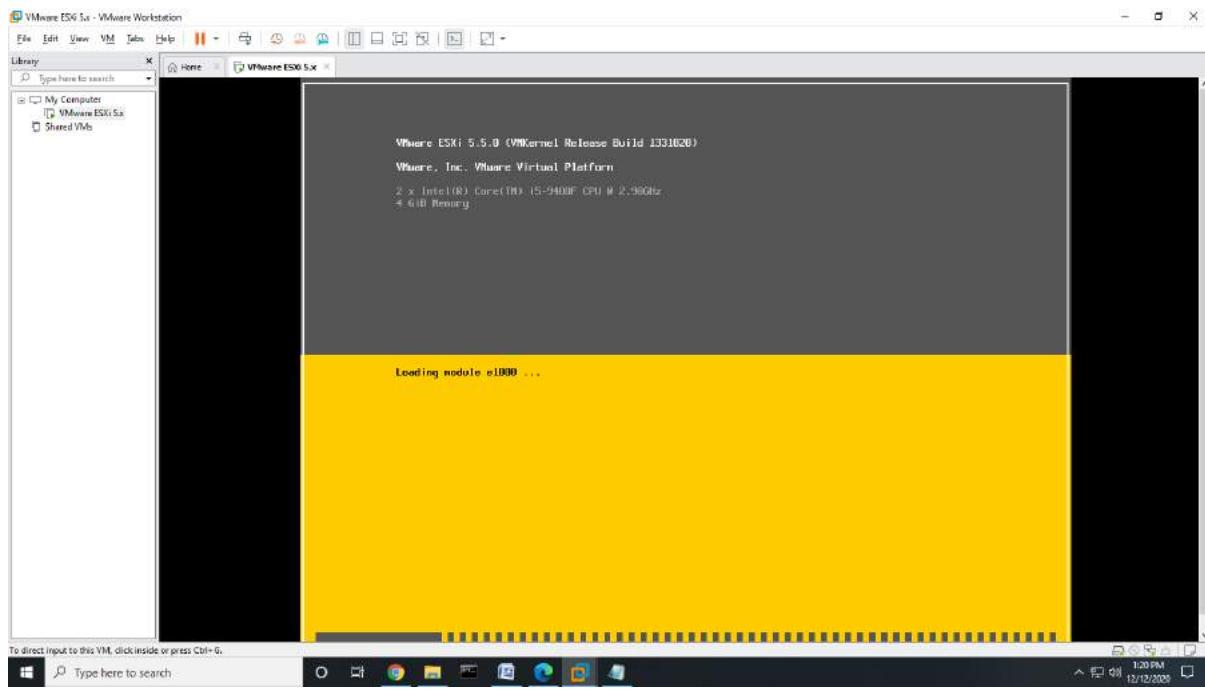




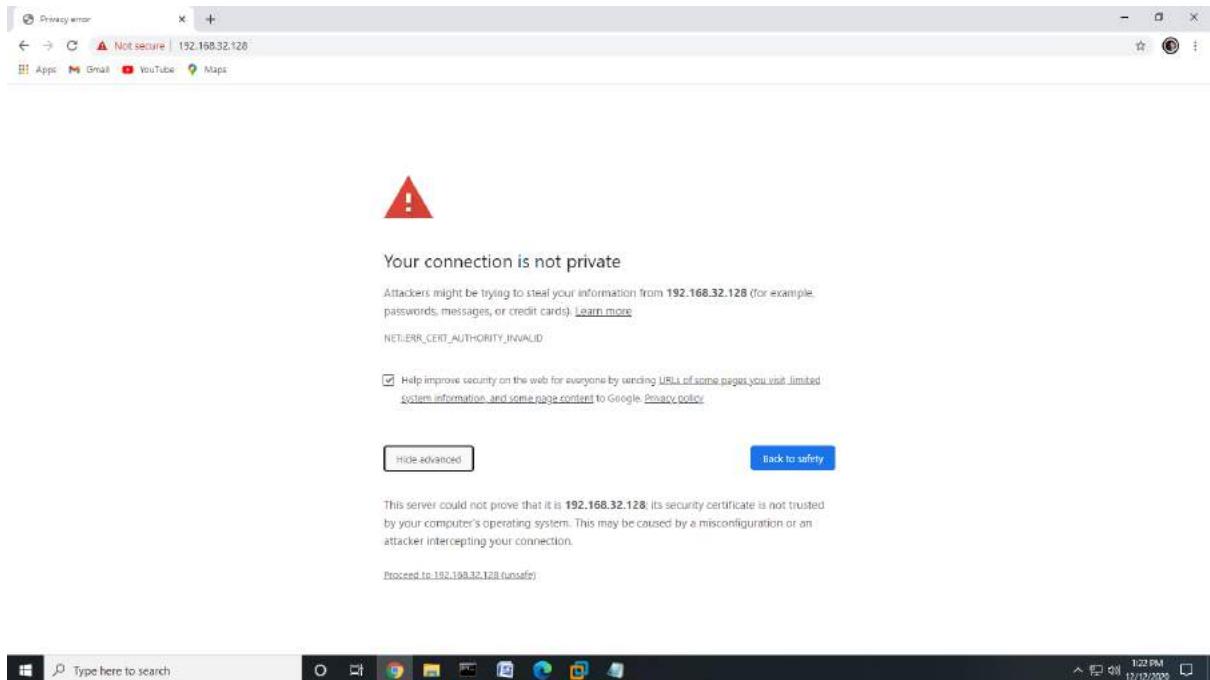
>> Press "Enter" to reboot.







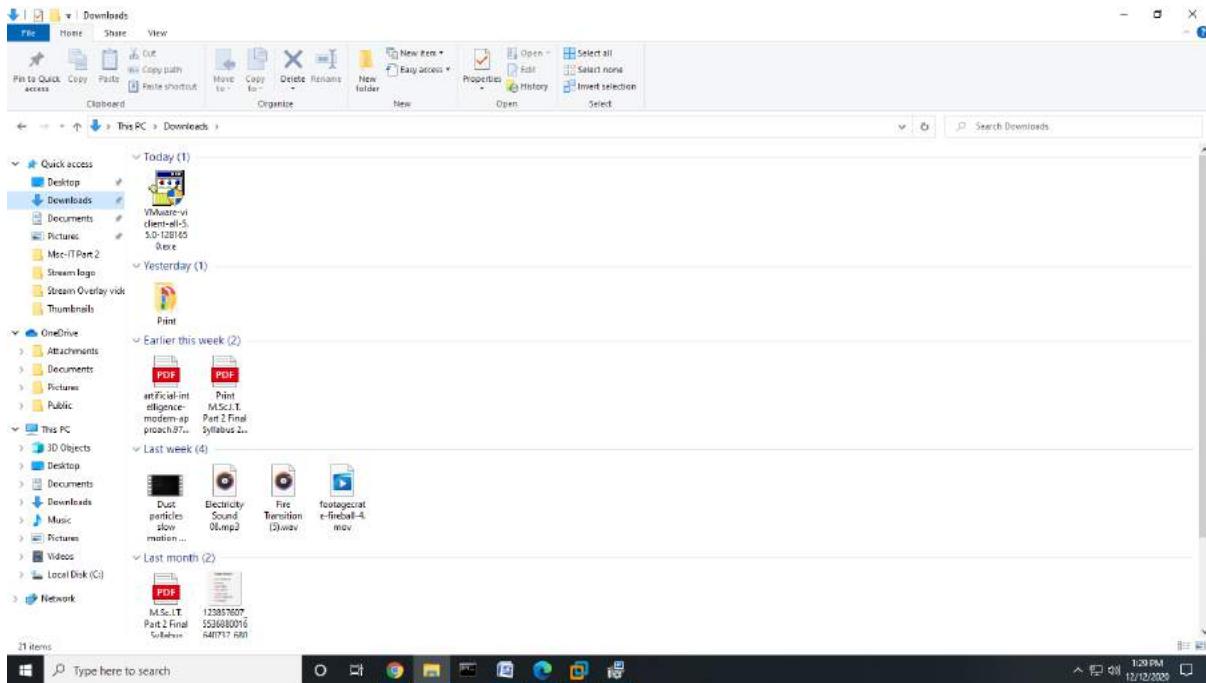
>> Open Browser & type respective IP Address “192.168.32.128”. Click on Advance and Click Proceed to 192.168.32.128.



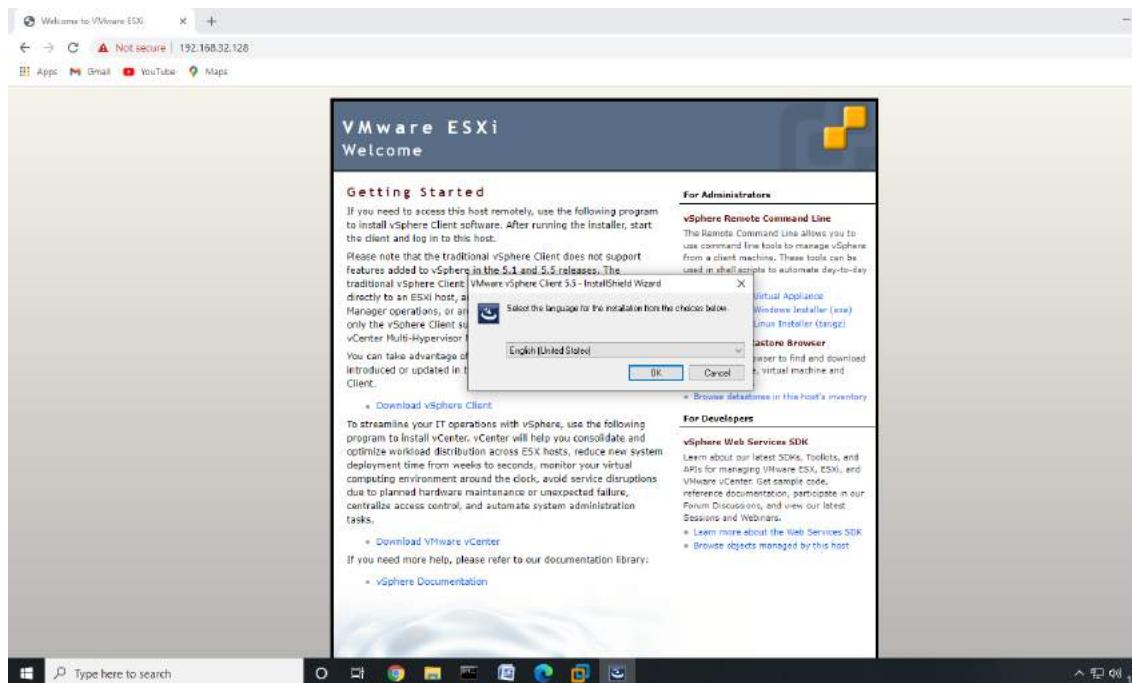
>> Right Click on “Download vsphere Client” and select Open in new tab. This will download the file instantly.

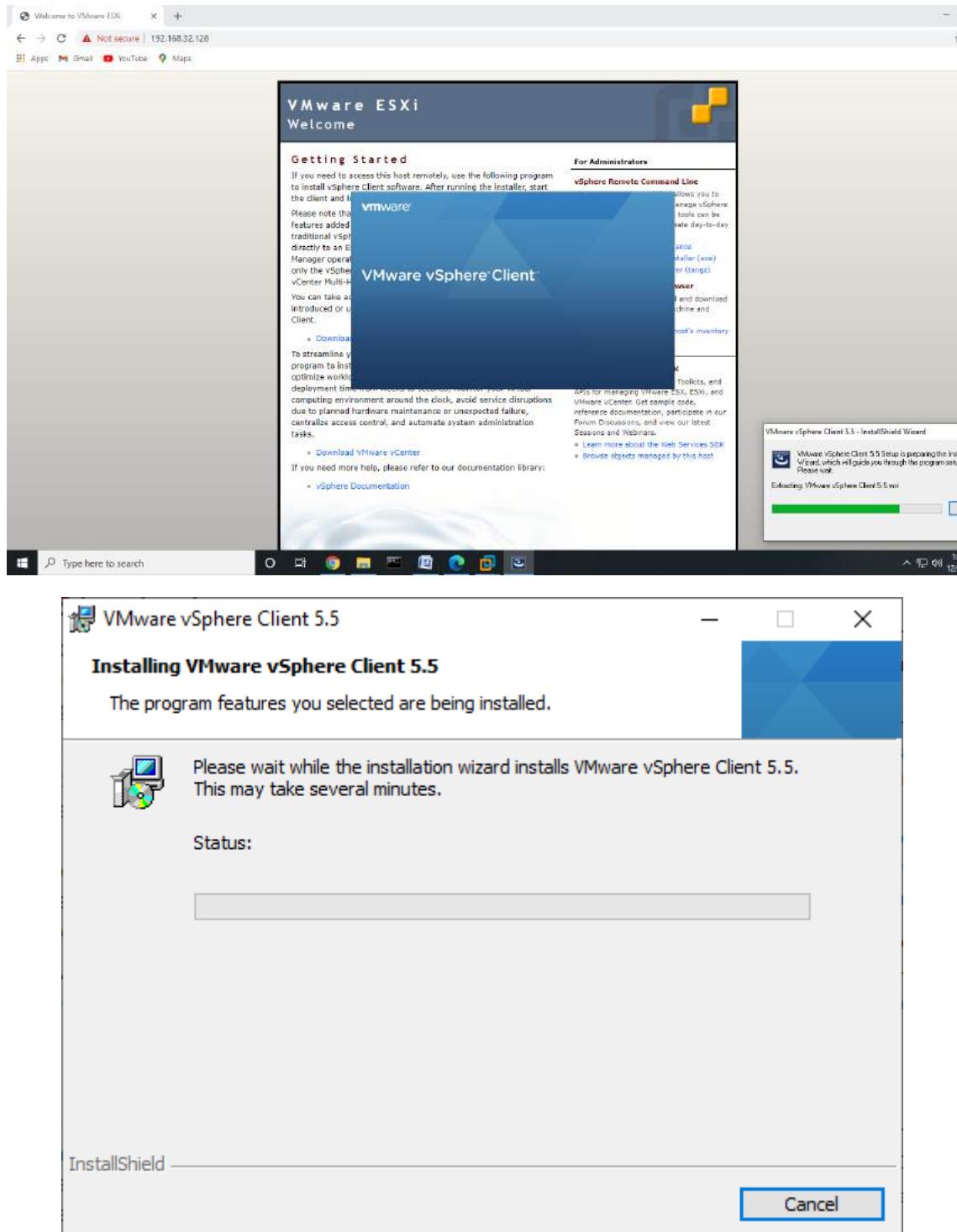


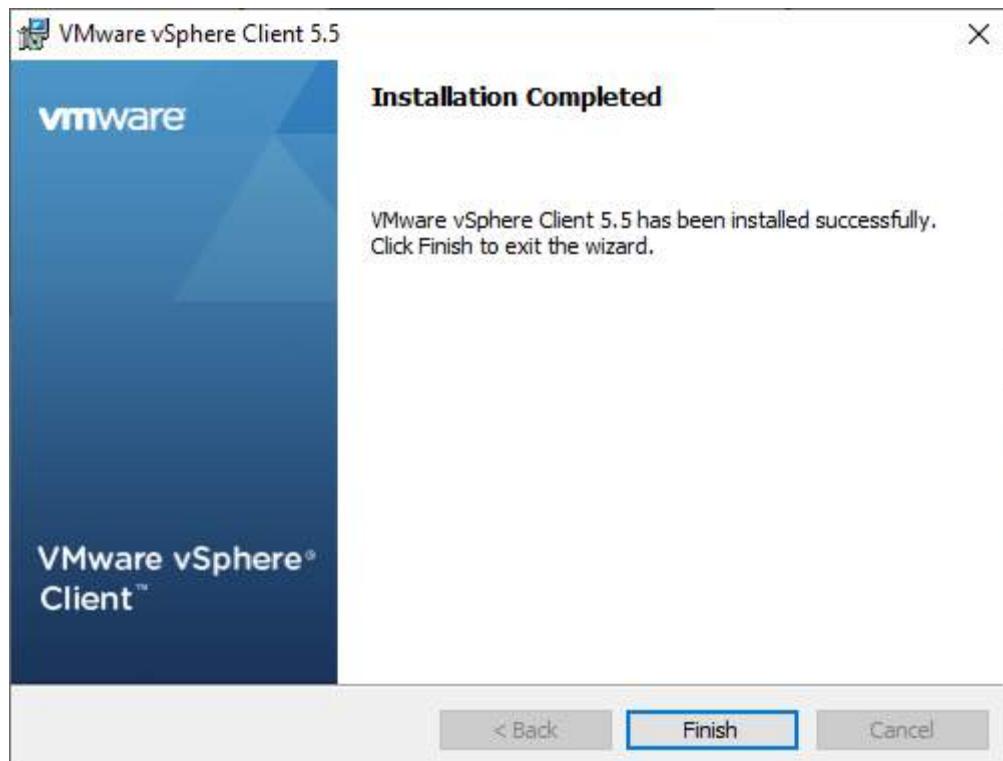
>> Go to downloads Folder and install by selecting run as administrator.



>> Select Language “English United States”. Click OK.

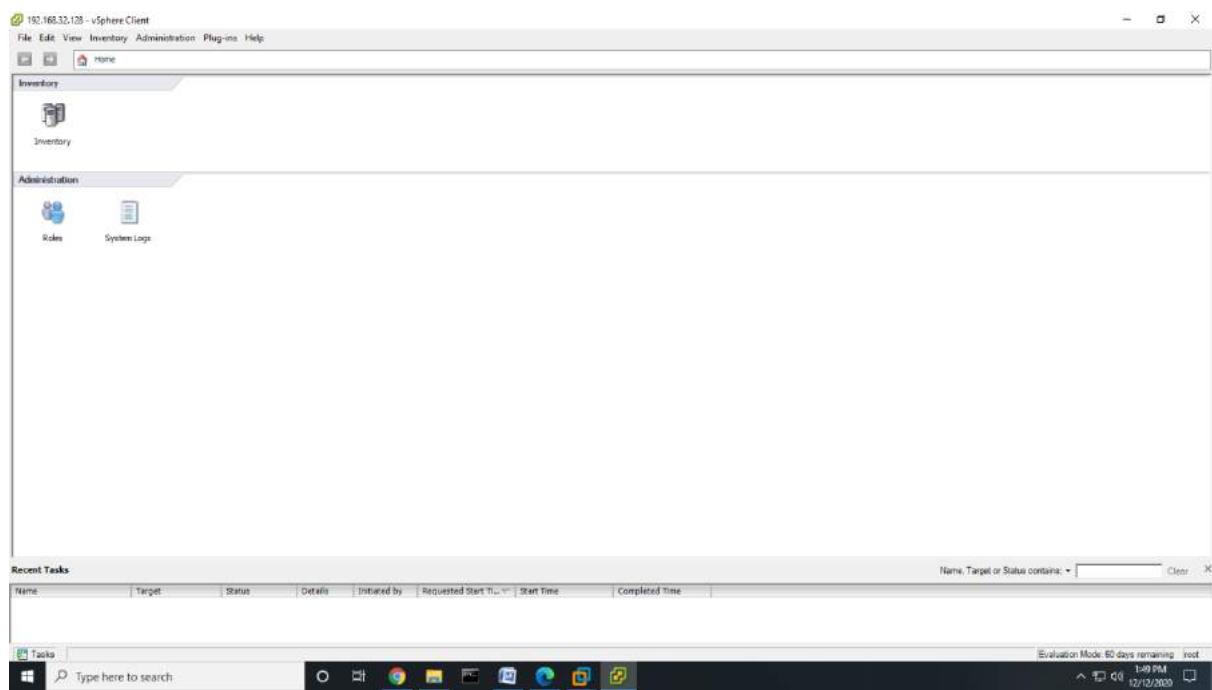
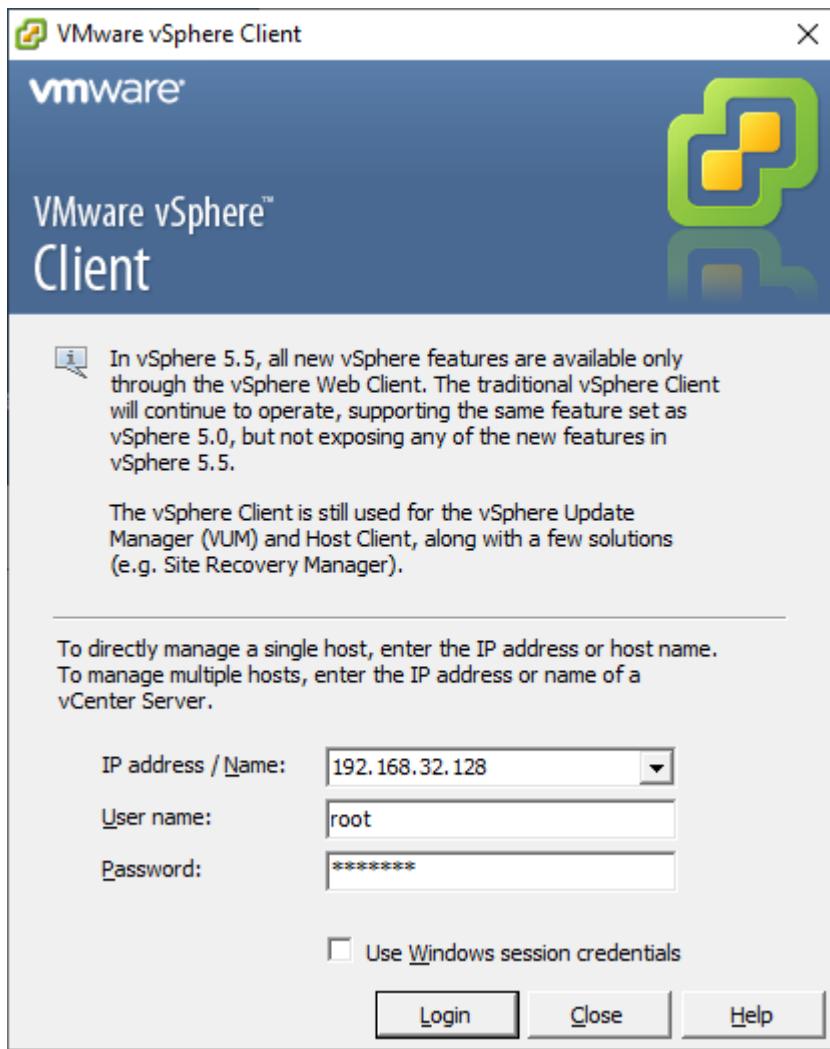






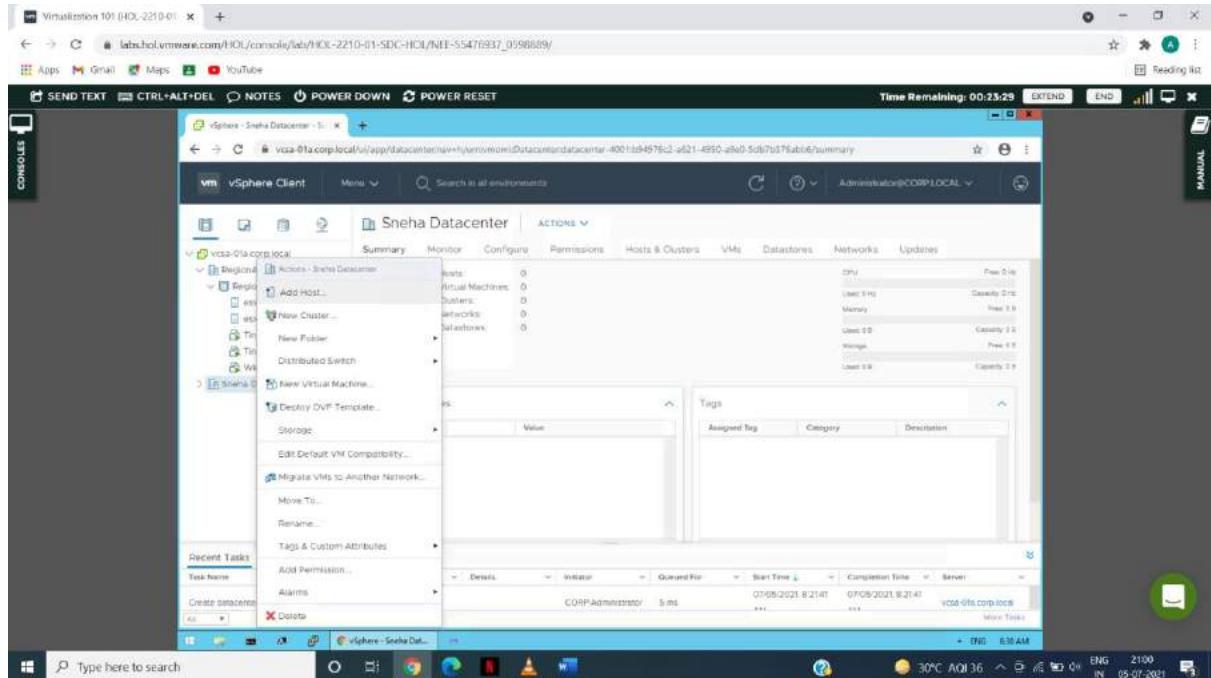
>> Open VMware vSphere Client

- Enter IP address (Which was assigned dynamically) (root)
- Enter Username and Password. (rjit123)

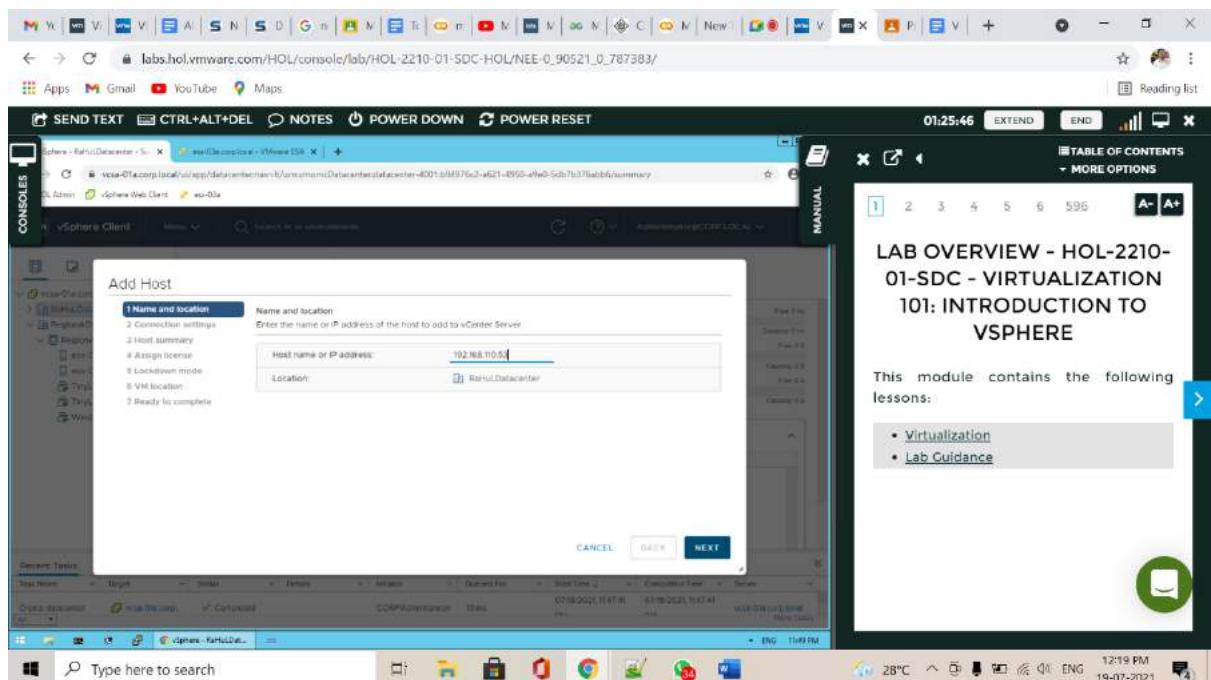


B. Add ESXi host to vCenter Server

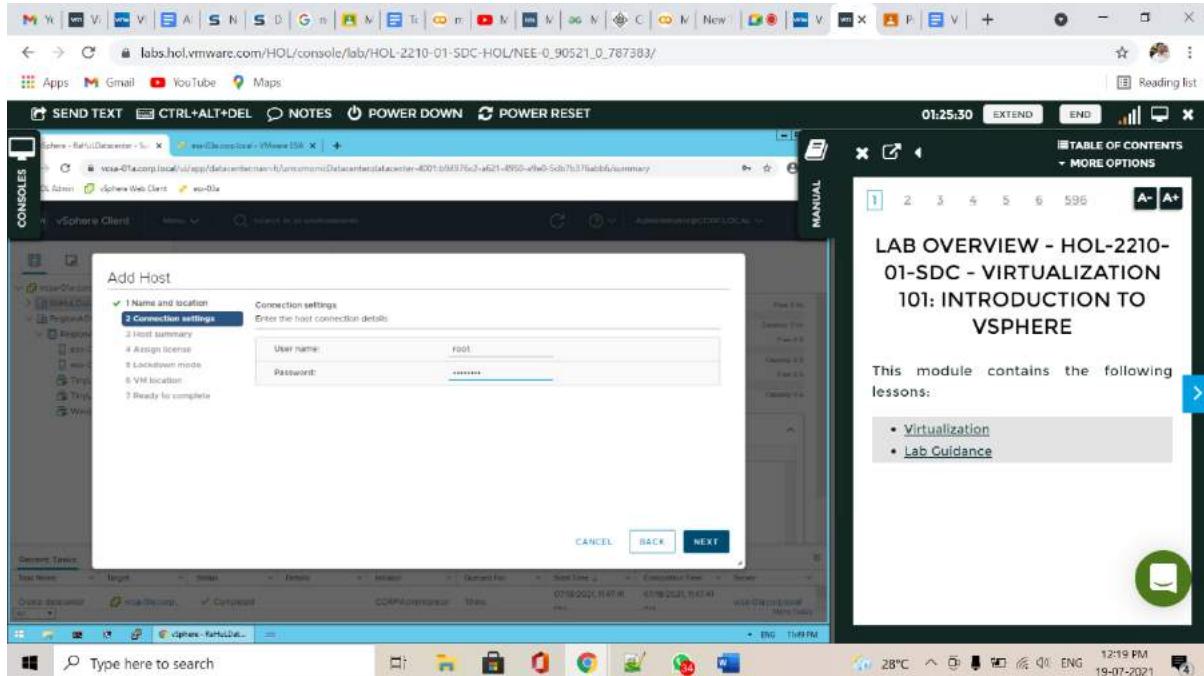
>>Open your VMware vSphere Web Client, right-click your Datacenter , then select Add Host.



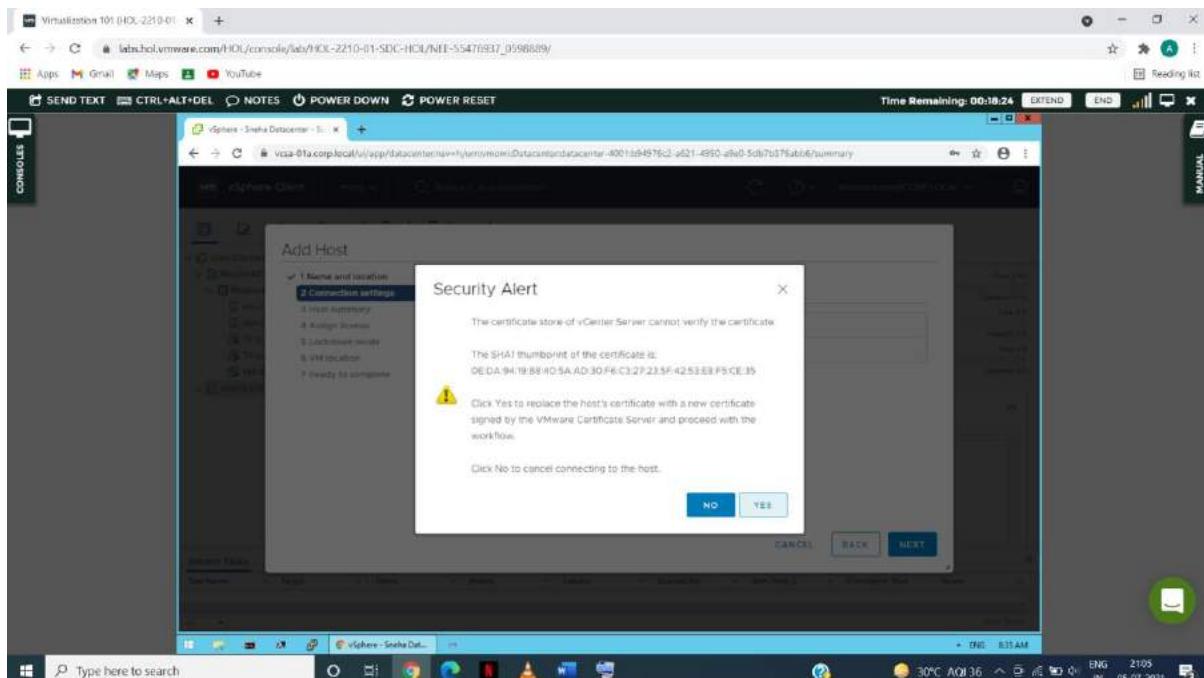
>>Type the hostname or IP address of your ESXi 7 Host and then click Next



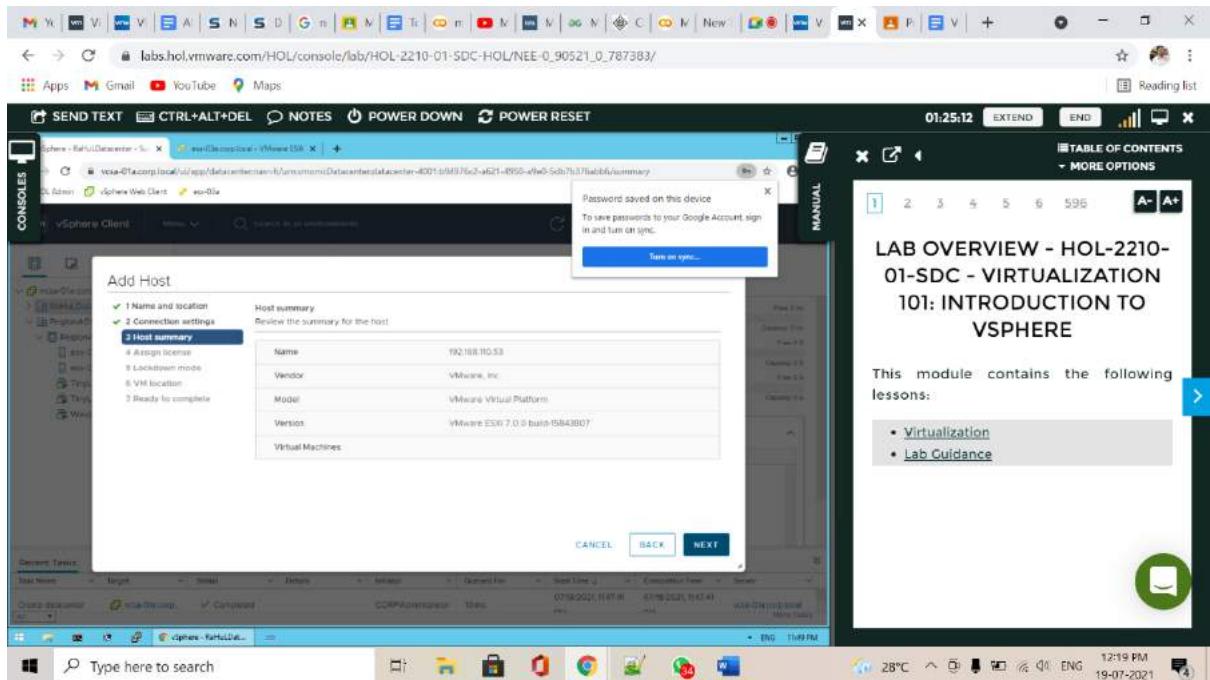
>>Type your ESXi 7 host user name (root) and password (Vmware1!) then click next .



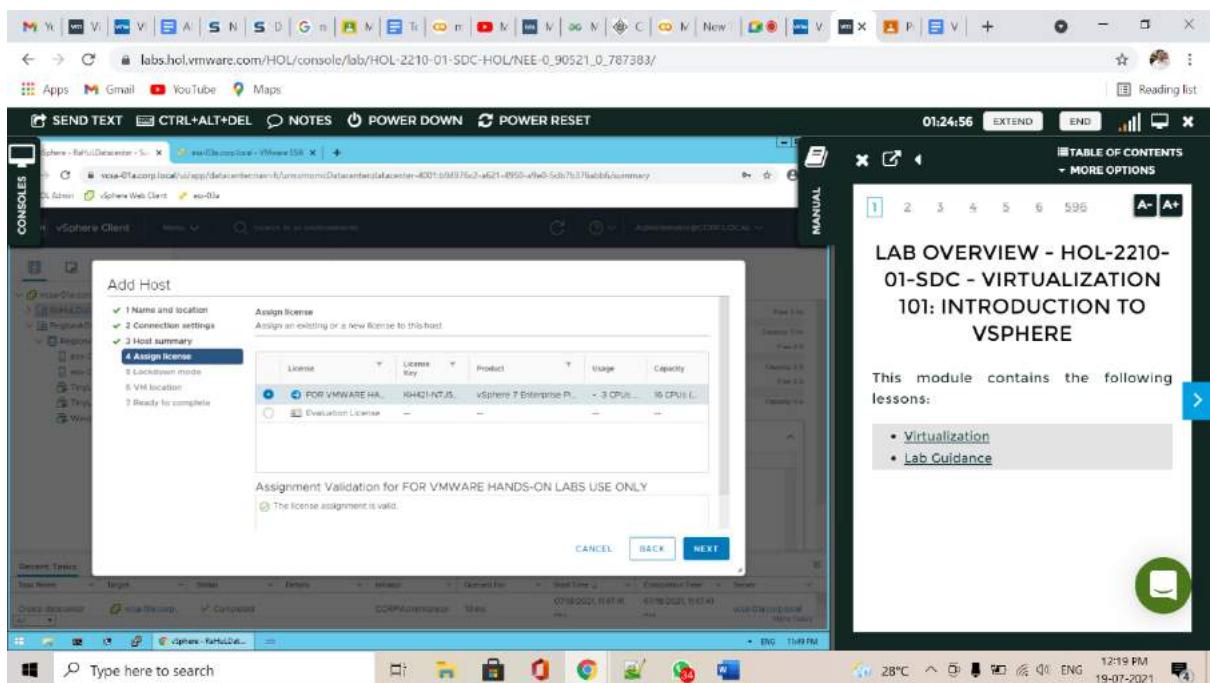
>>Click Yes to accept the default security certificate.



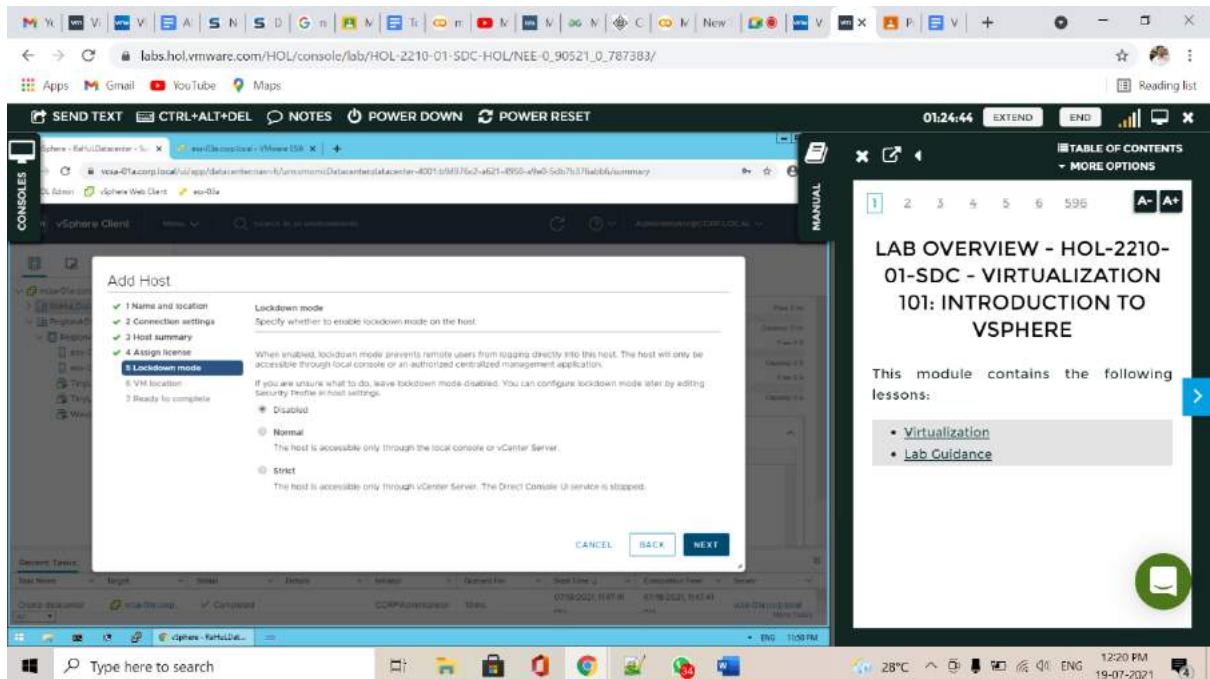
>>Review the Host Summary and click next.



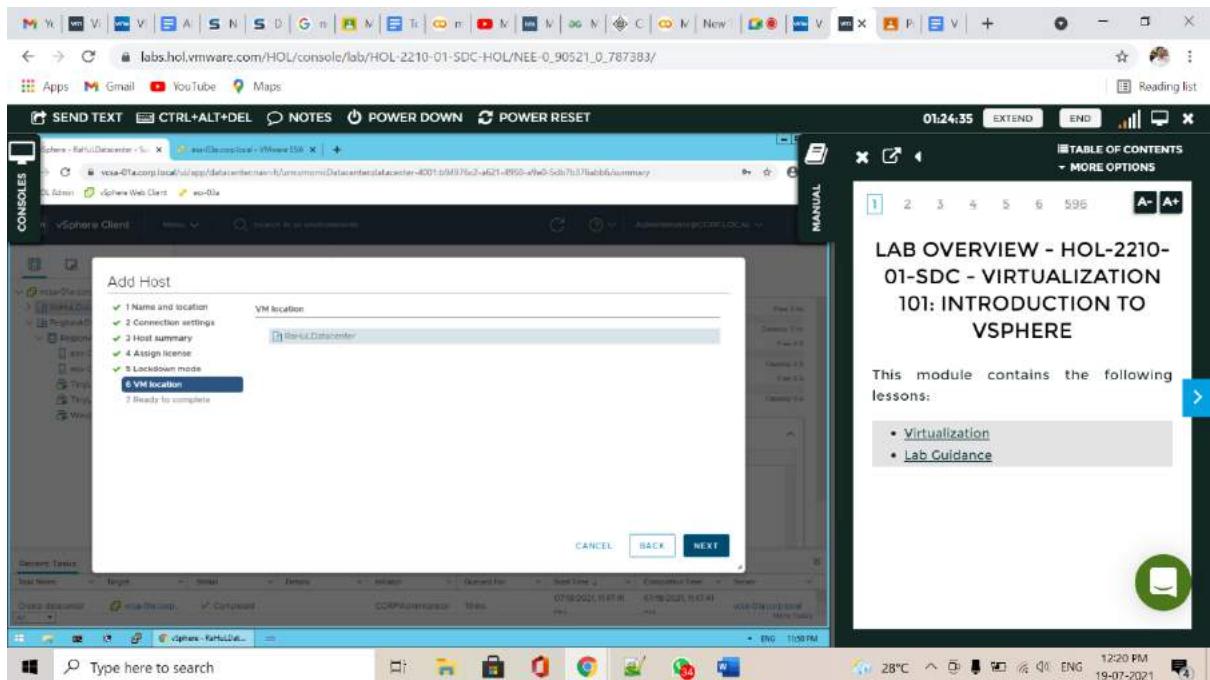
>>The default license option, click next



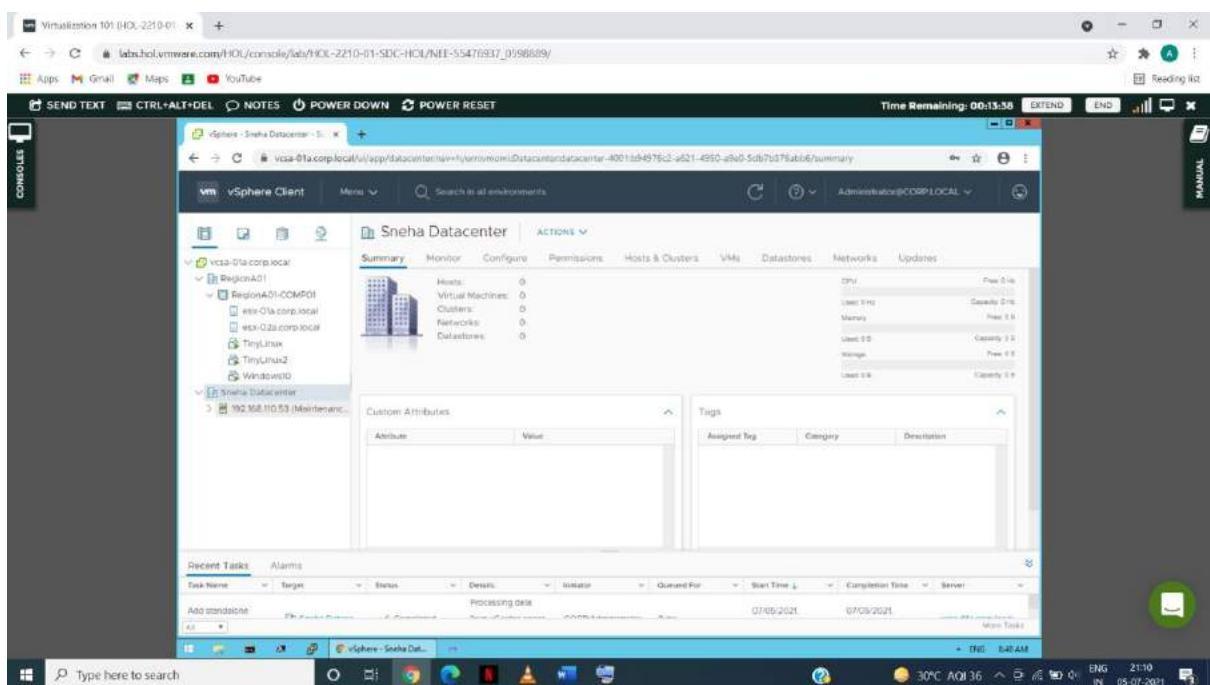
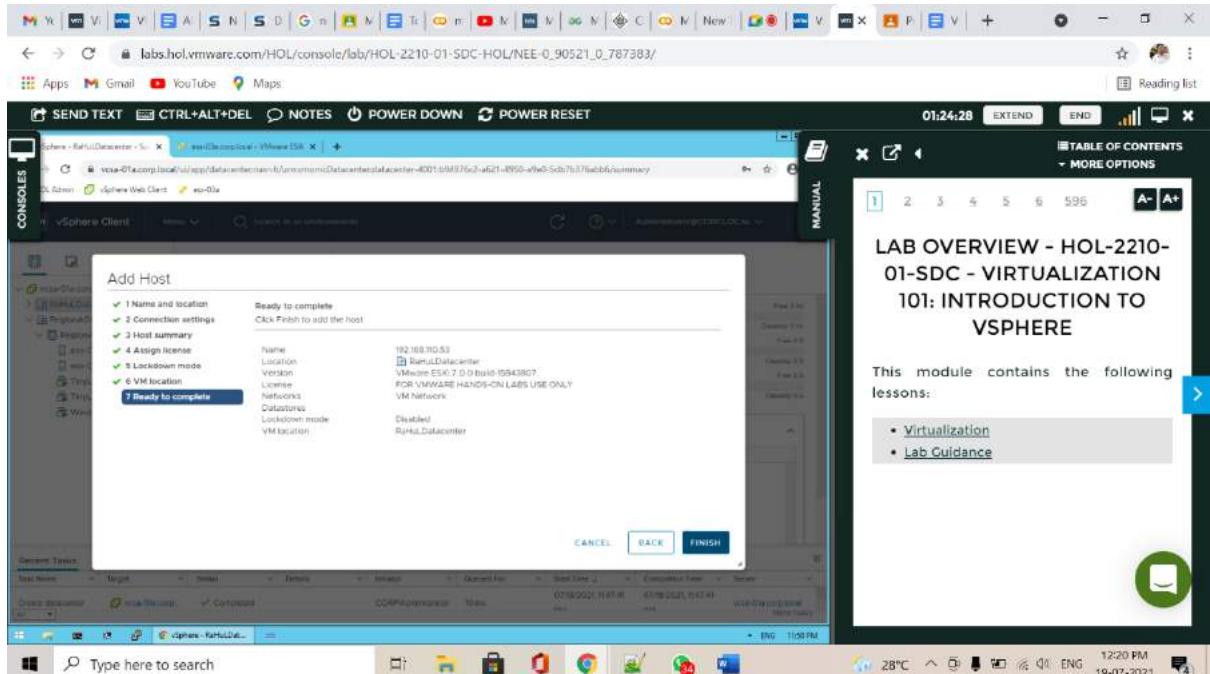
>>Select Lockdown mode Disabled and then click next

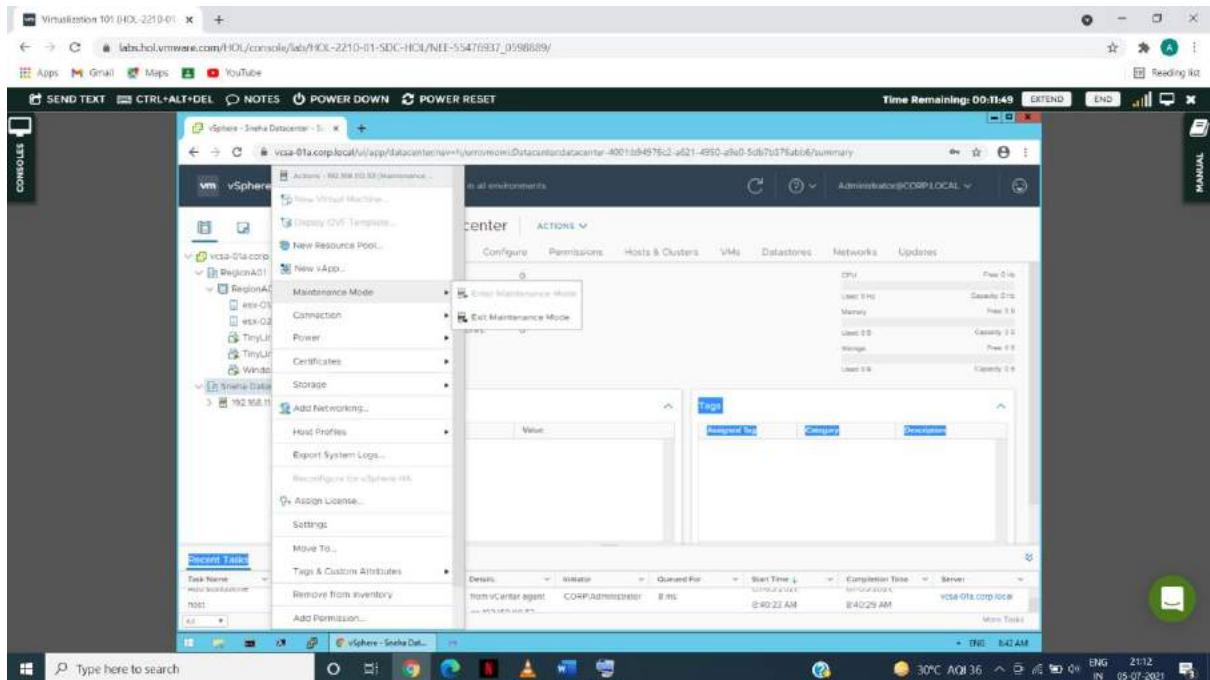


>>Select VM location, so click next



>>Review the details and then click the finish button to complete the process.





PRACTICAL 2

Manage VMwareESXi server with vCentre server.

- Create a virtual machine in vmwareESXi Server.
- Migrate the virtual machine from one ESXi server to another ESXi server with and without vMotion.

What is VMware ESXi?

- VMware ESXi (formerly ESX) is an enterprise type -1 hypervisor developed by VMware for deploying and serving virtual computers.
- ESXi provides a virtualization layer that abstracts the CPU, storage, memory and networking resources of the physical host into multiple virtual machines

What is Virtual Machine ?

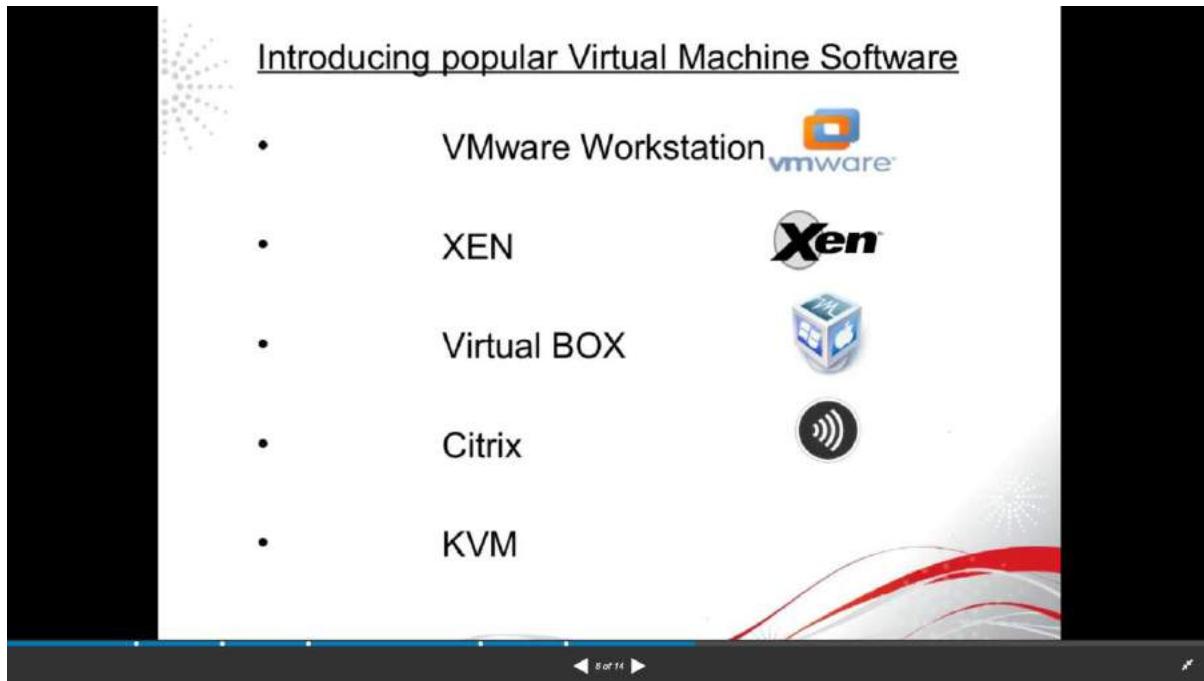
- Virtual machine (VM): A software implementation of a machine (computer) that executes programs like a physical machine. A virtual machine provides an interface identical to the underlying bare hardware
- The operating system creates the illusion of multiple processes, each executing on its own processor with its own (virtual) memory

Types of virtual machine

System virtual machines

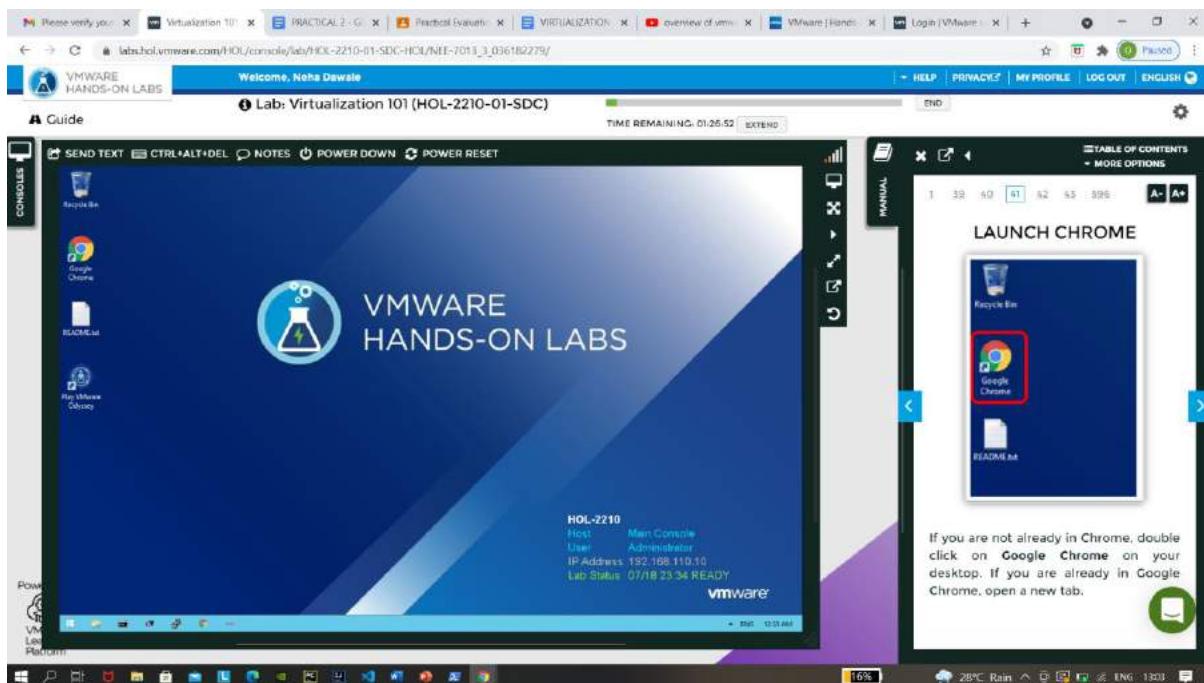
Process virtual machine

Introducing popular Virtual Machine Software

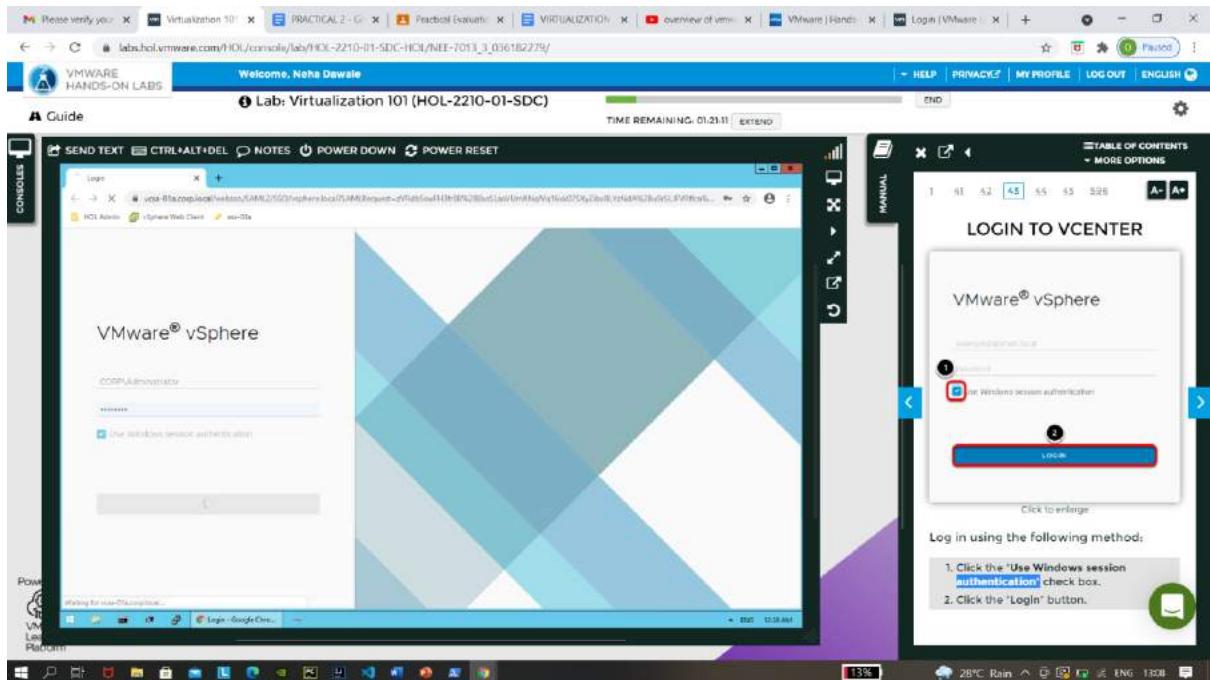


Aim: A. Create a virtual machine in vmwareESXi Server.

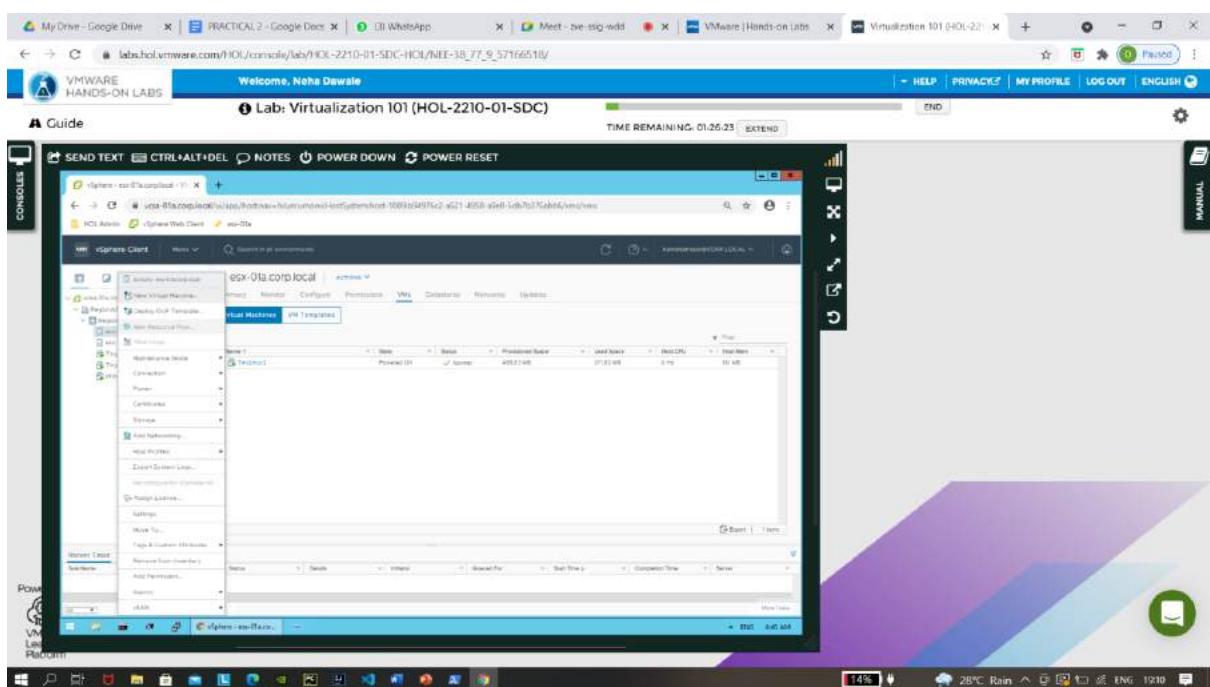
Step 1: Open VMware hand-on lab - And open the google chrome



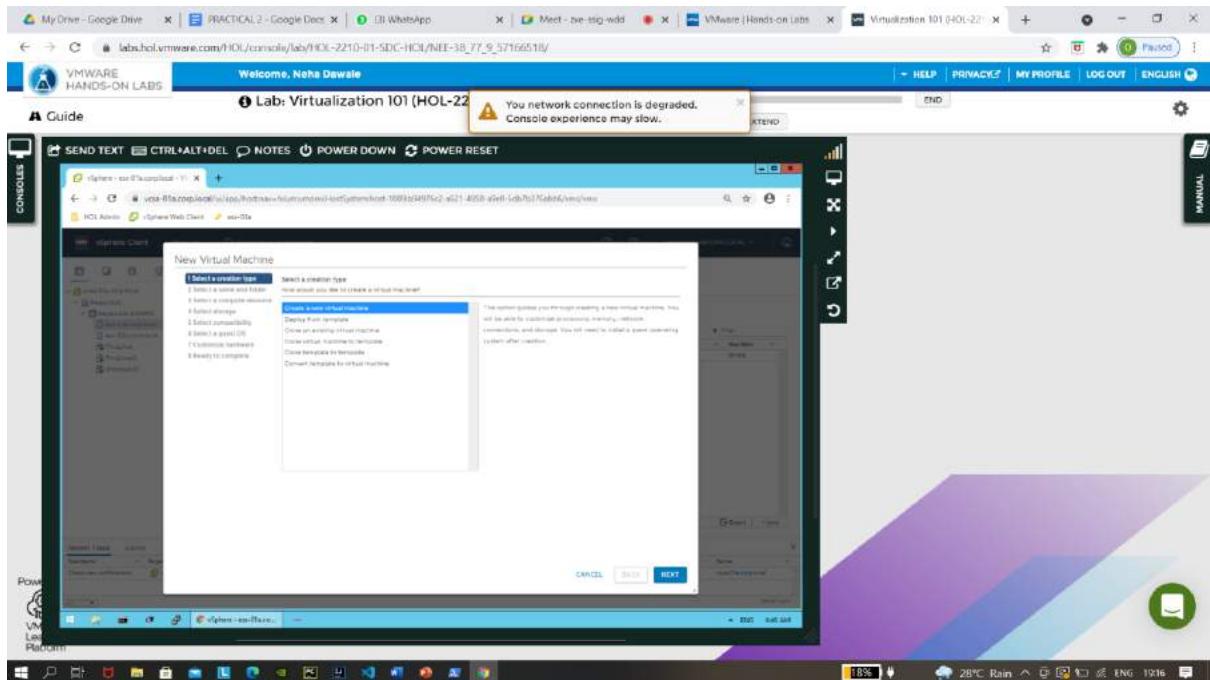
Step 2: Click the vSphereclient & and click the use windows session authentication box check box and click the login button.



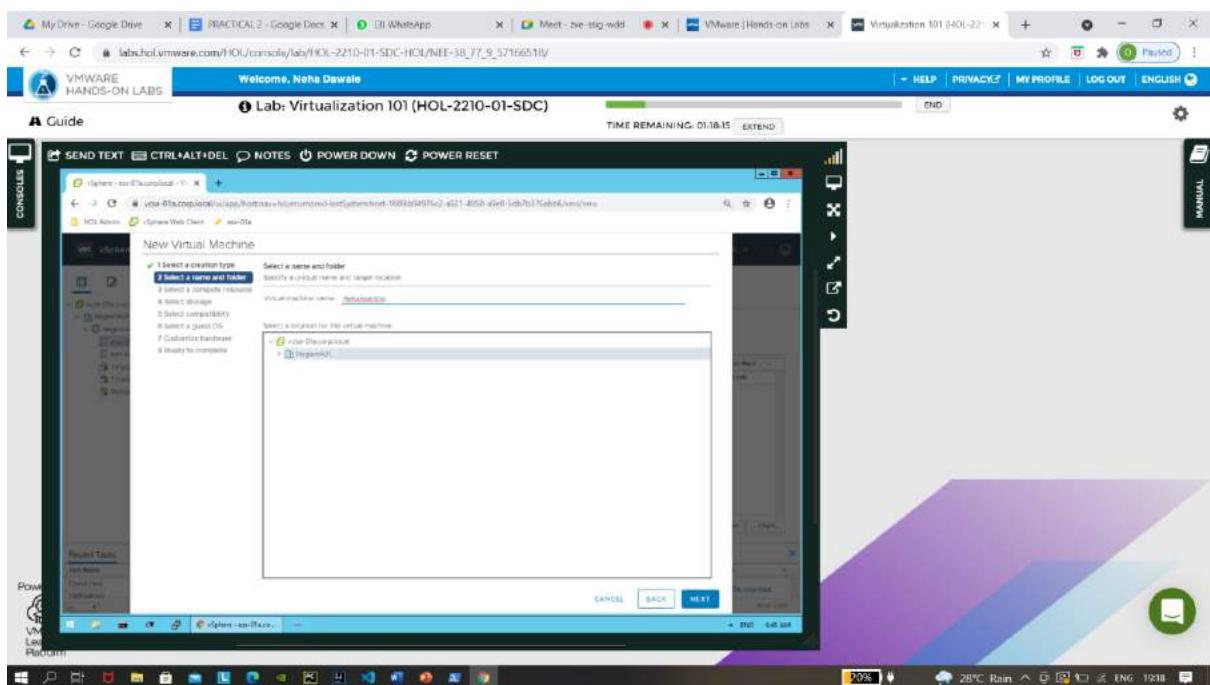
Step 3: Expand the RegionA01 Datacenter and right click esx-01a, then click on New virtual machine



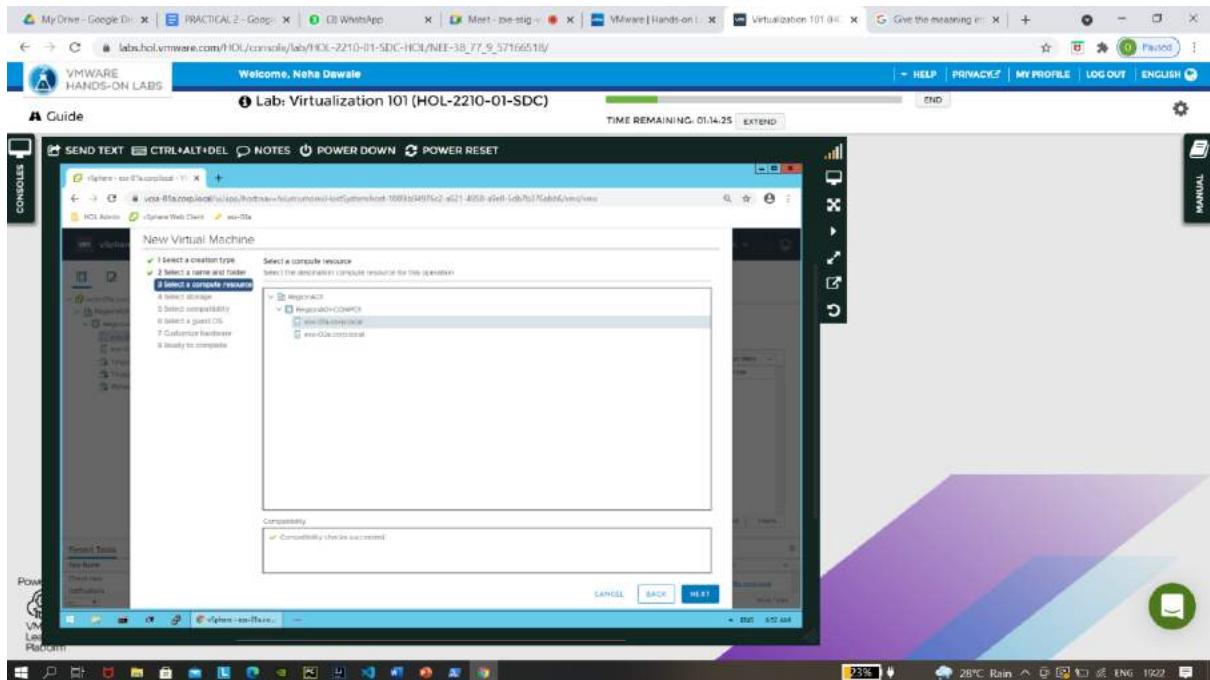
Step 4: Select New virtual machine and click on Next.



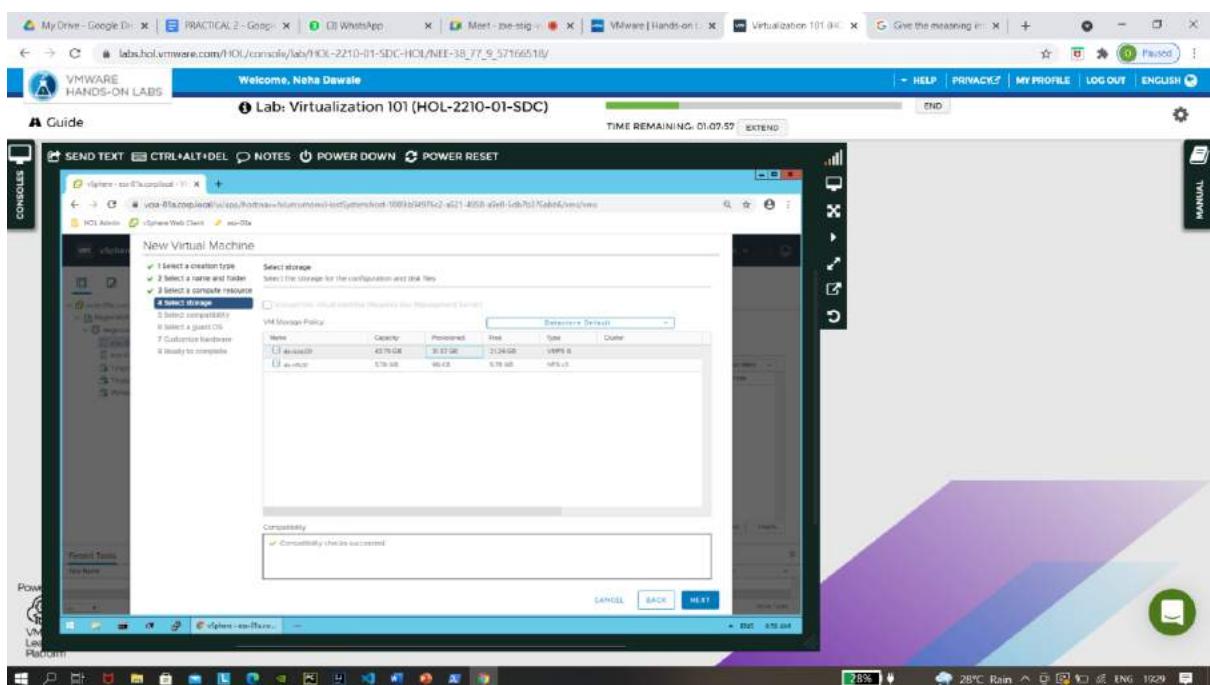
Step 5: Give the Virtual machine name for eg.(NehaAkansha) and click on Next



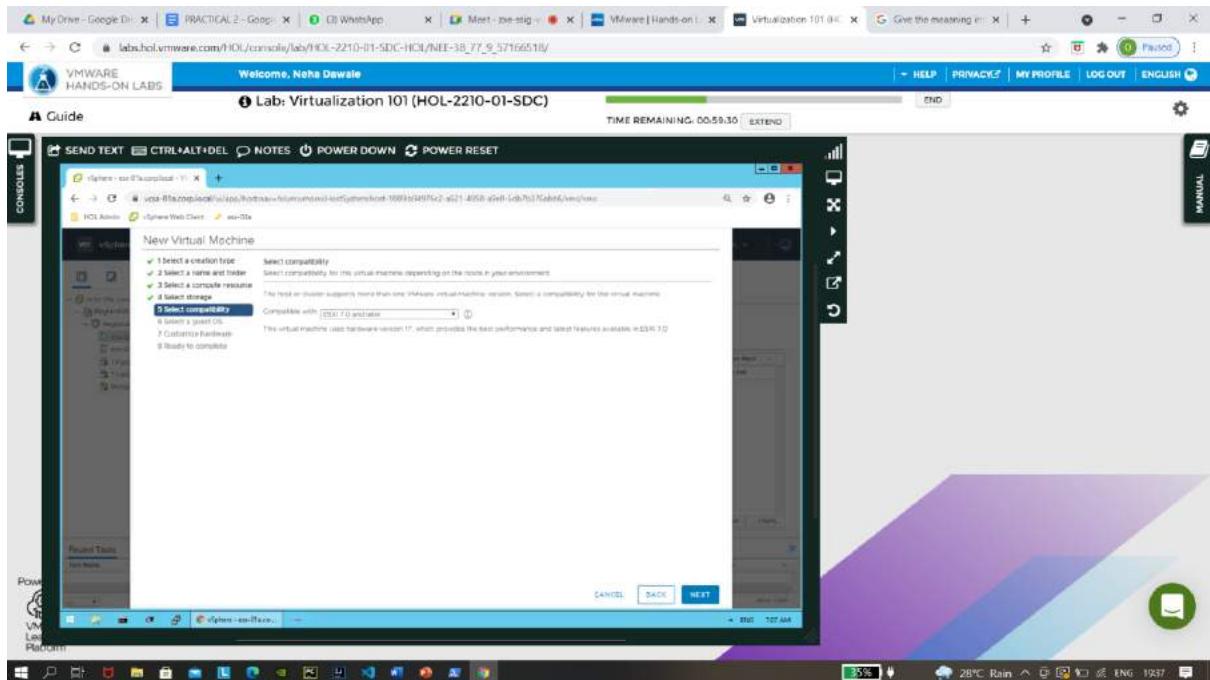
Step 6:
Select a compute resource and click on next



Step 7: Select the storage and click on Next.



Step:8 Select Compatibility (EXSI 7.0 later) and click on Next.

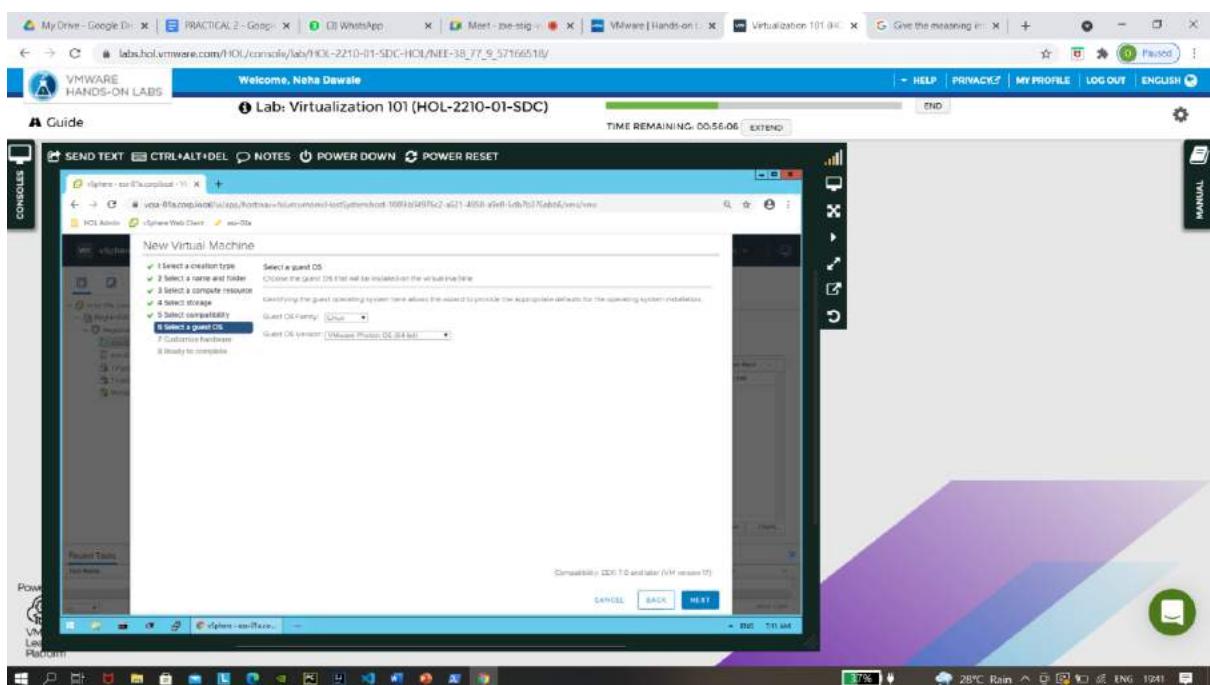


Step:9: Select a guest os

Guest Os family:Linux

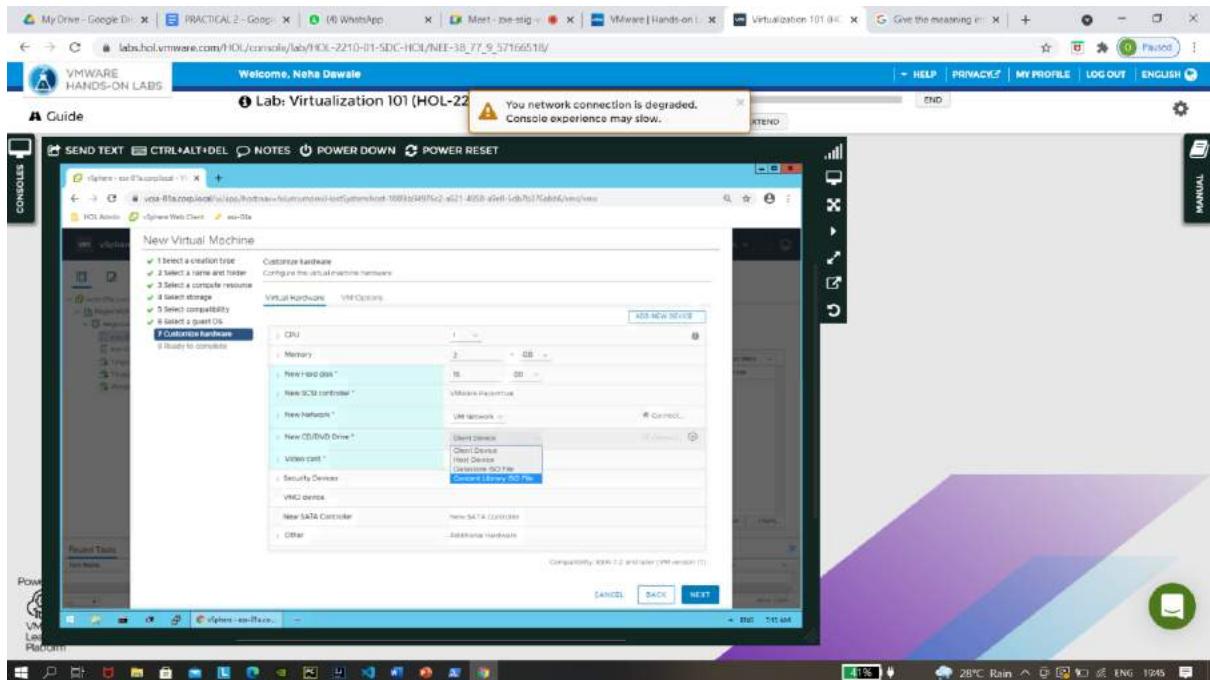
Guest Os version: Vmware Photon OS(64-bit)

And click on next.

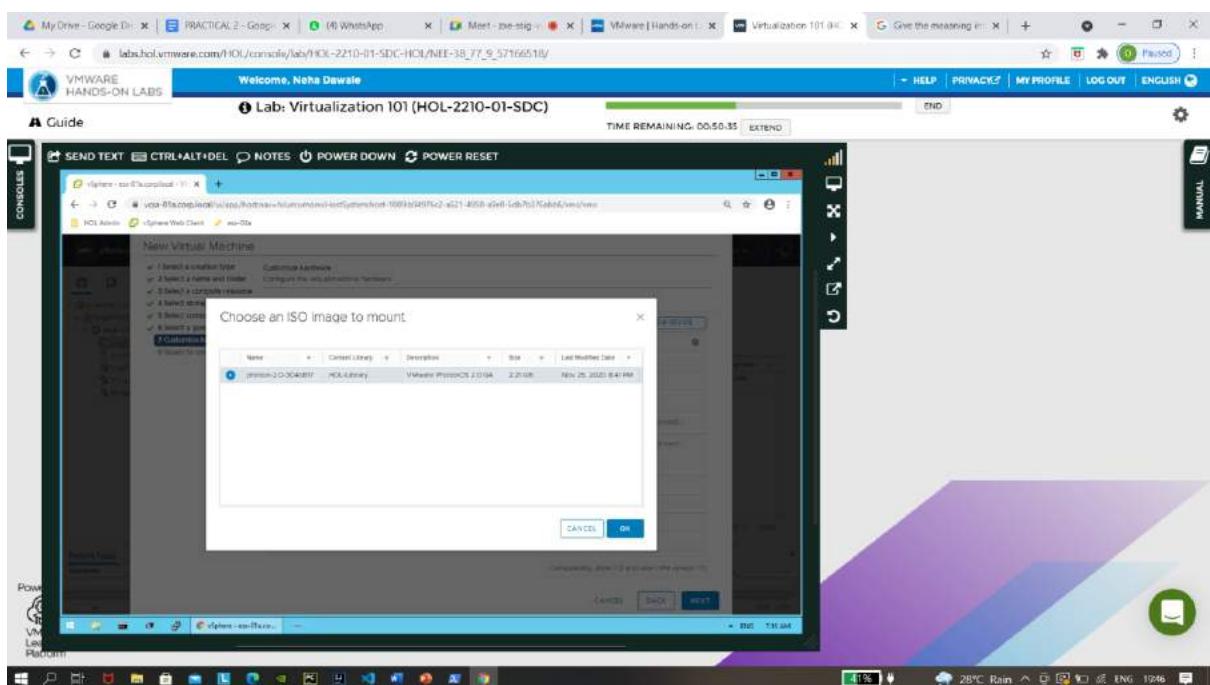


Step 10:

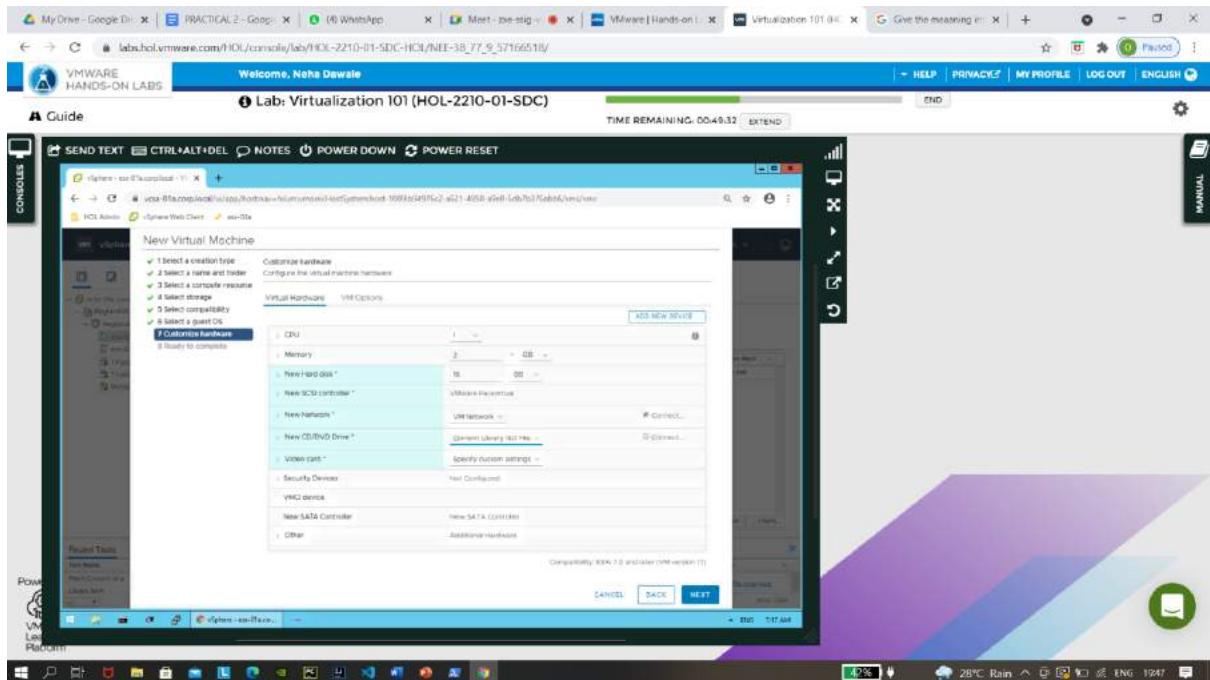
Click the New CD/ DVD drive and choose the (content Library Iso File)



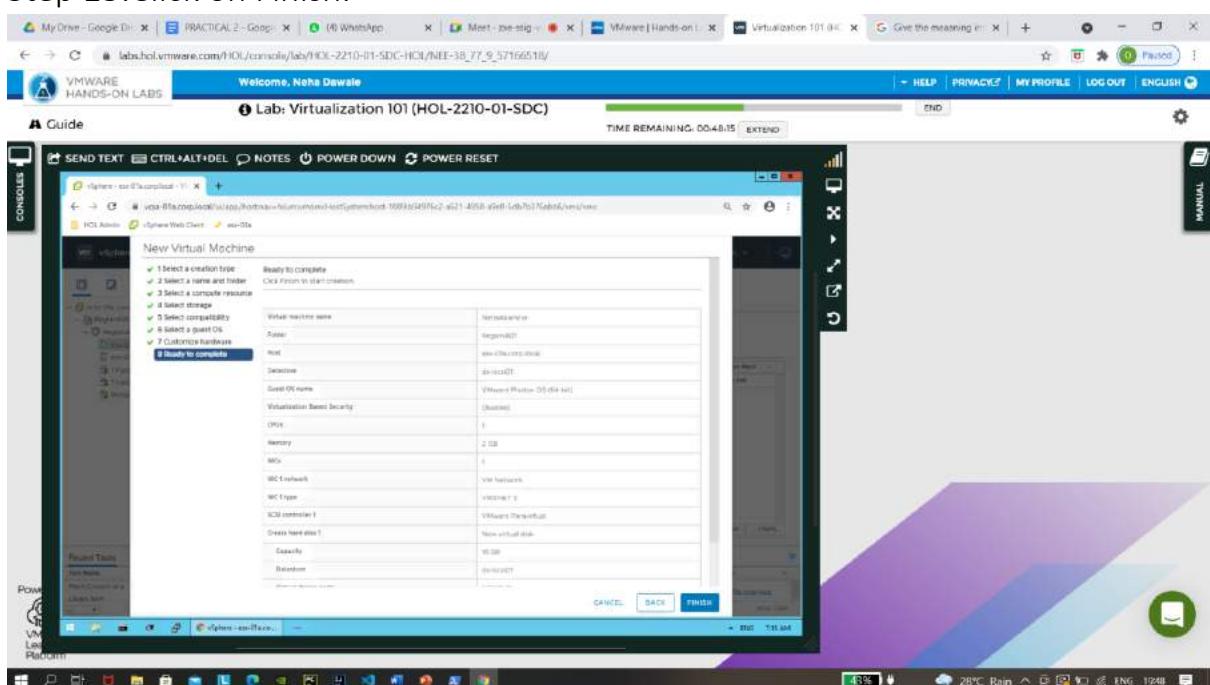
Step 11: choose an iso image to mount and click on ok.



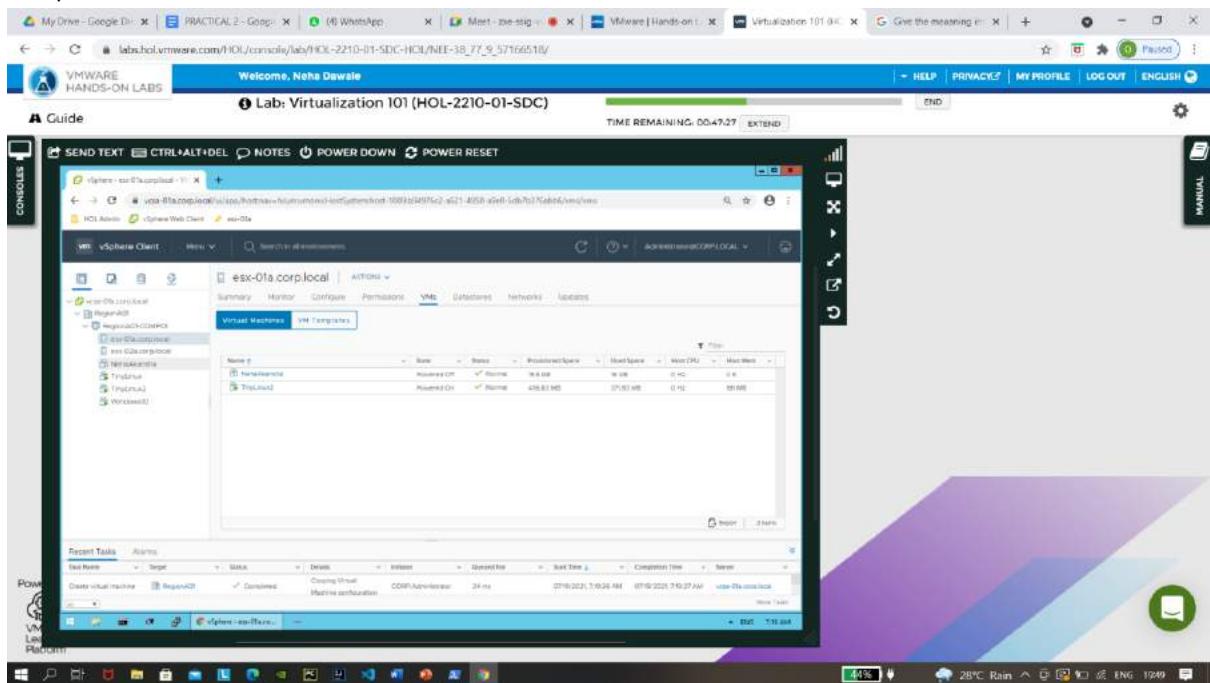
Step 12: Click on next



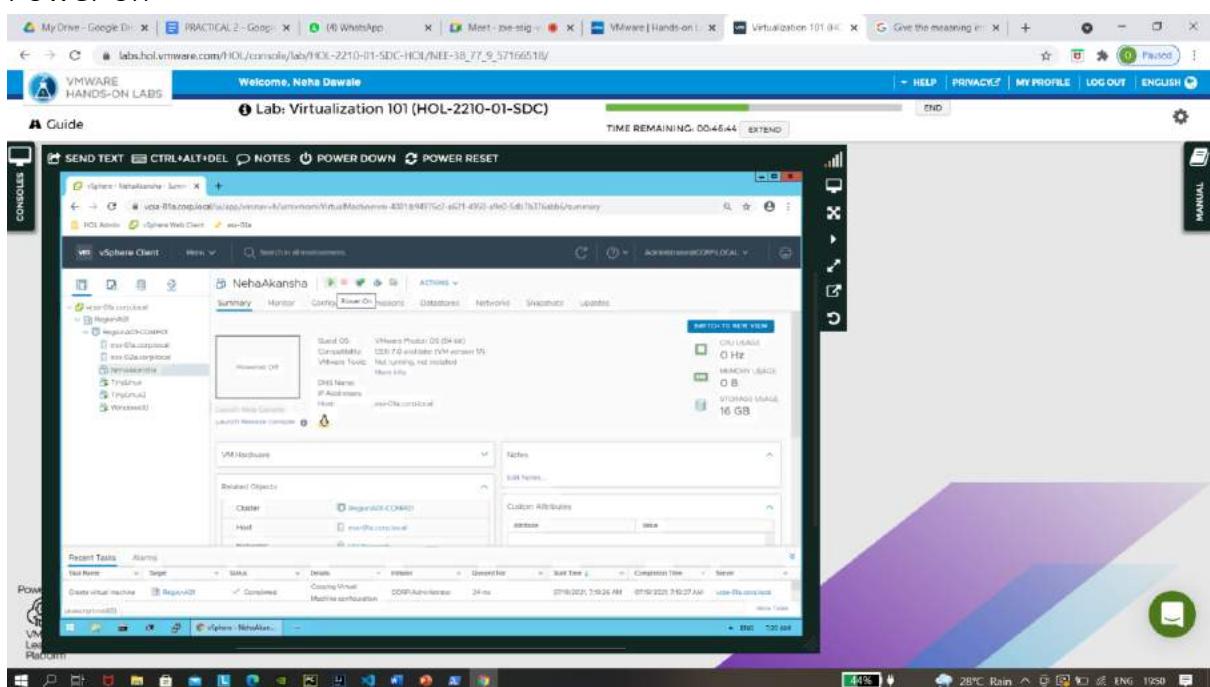
Step 13: Click on Finish.



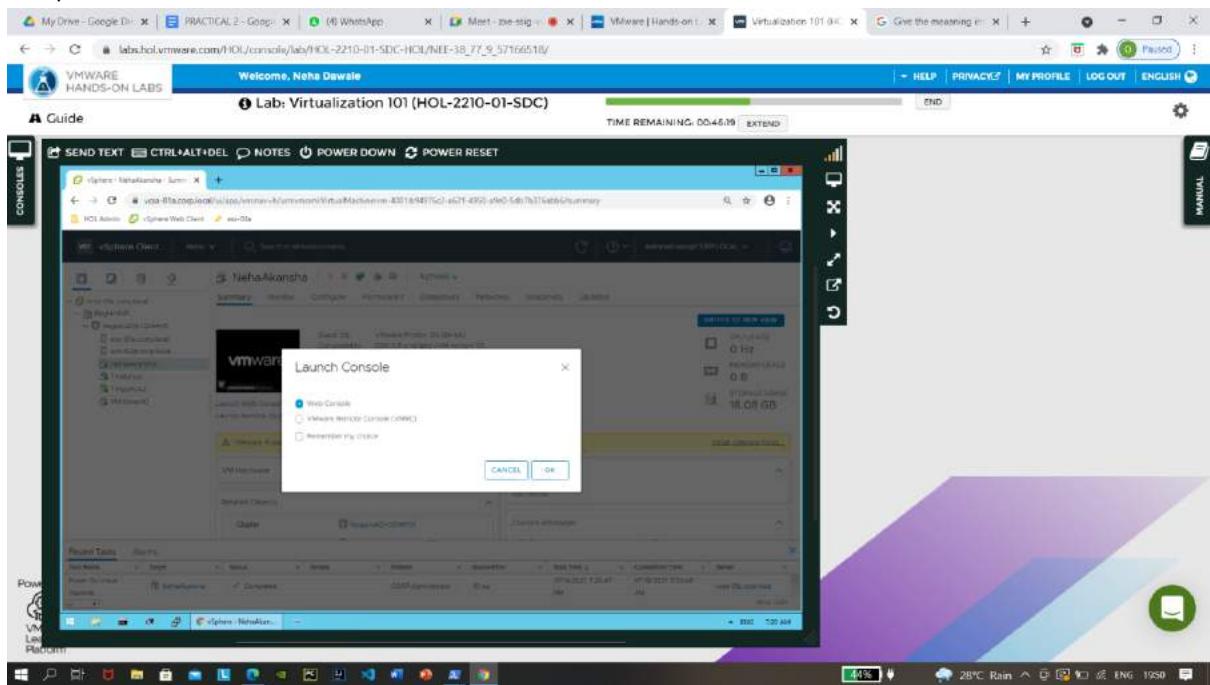
Step 14: Click on Your virtual machine.



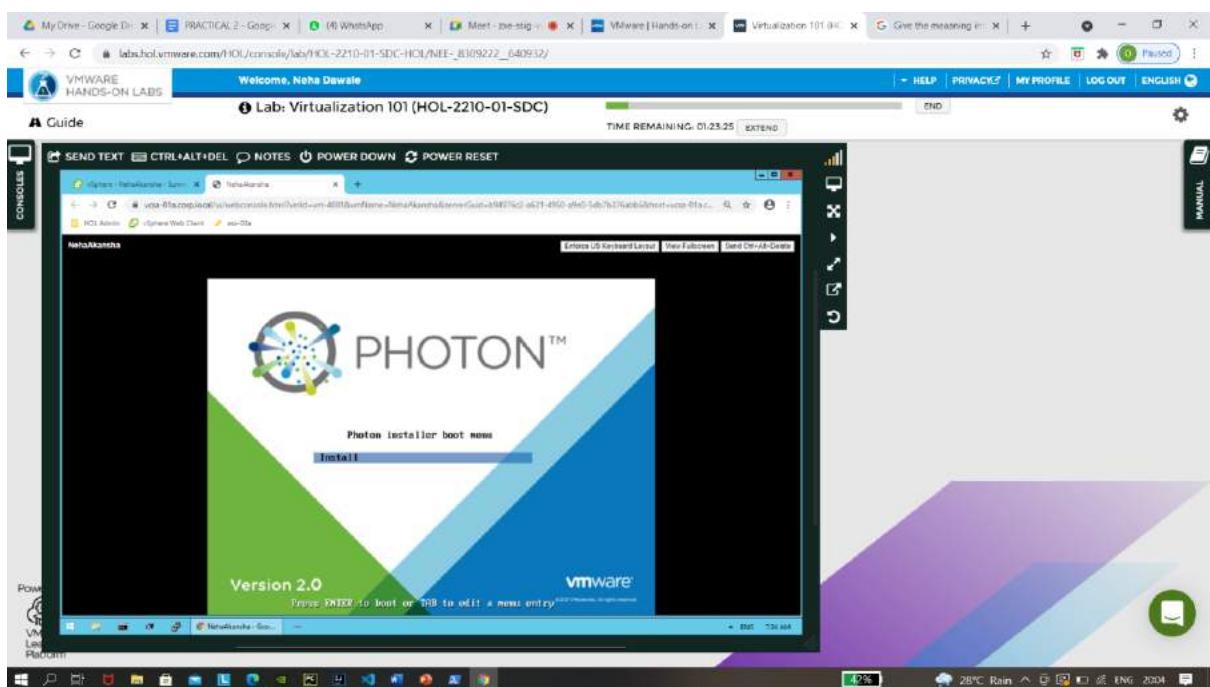
Step 15: Power on



Step 16: Launch the console and select the web console then click on ok.



Step 17: New your virtual machine ready to install



Aim (B) : Migrate the virtual machine from one ESXi server to another ESXi server with vMotion.

What is vSphere vMotion :

vSphere vMotion enables zero-downtime, live migration of workloads from one server to

another so your users can continue to access the systems they need to stay productive.

VMware vSphere live migration allows you to move an entire running virtual machine

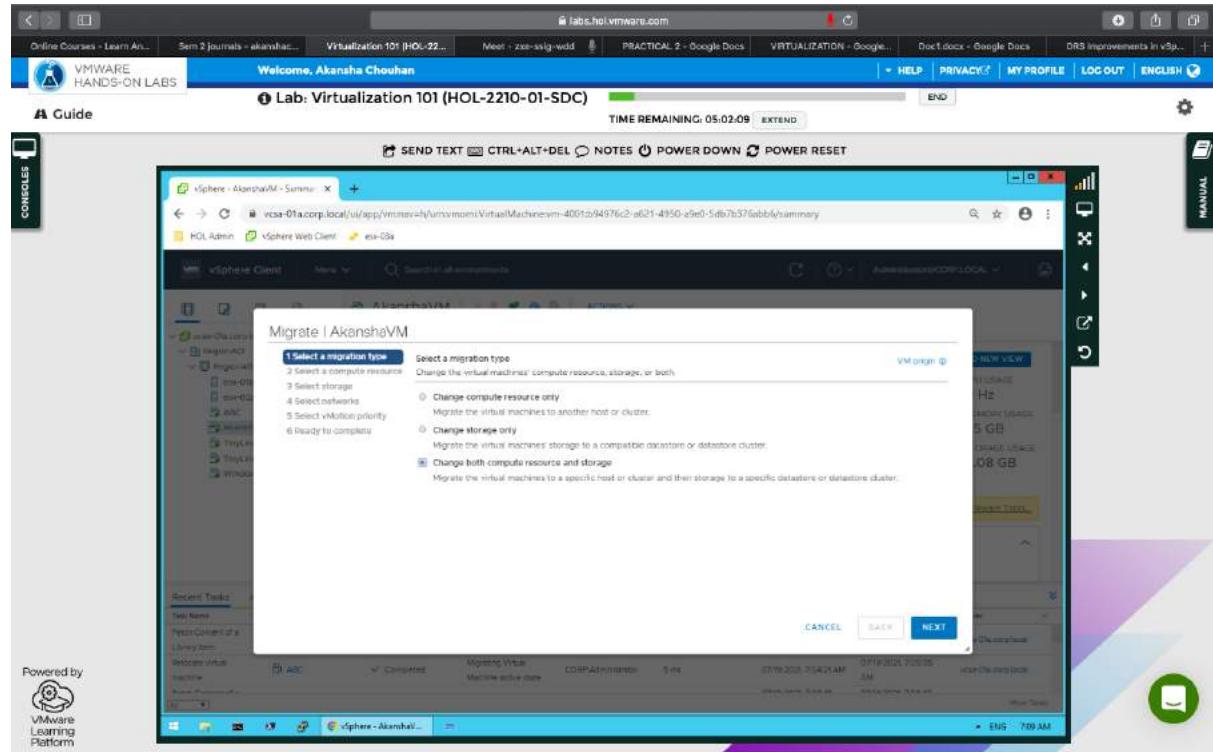
from one physical server to another, with no downtime. This entire process takes less

than two seconds

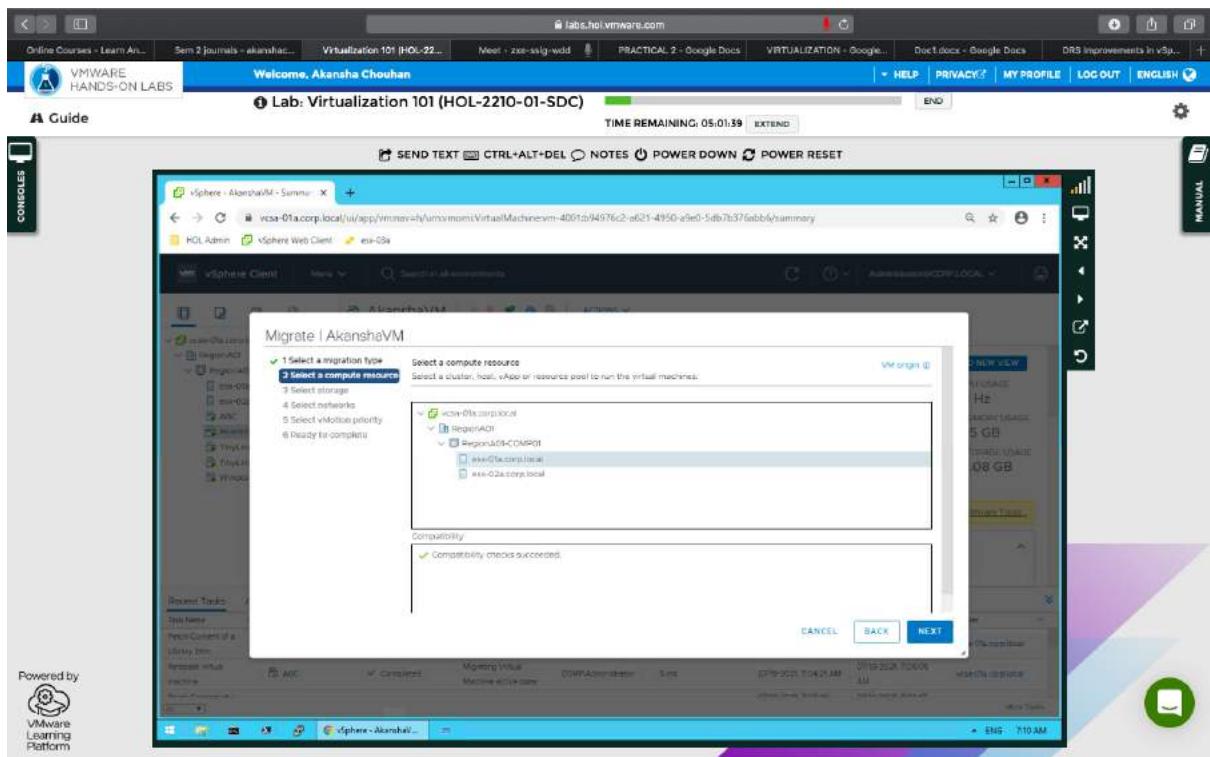
Step 1 : Create a Virtual Machine, following steps of part (A)

Step 2 : Right click on the Virtual Machine and Click on Migrate.

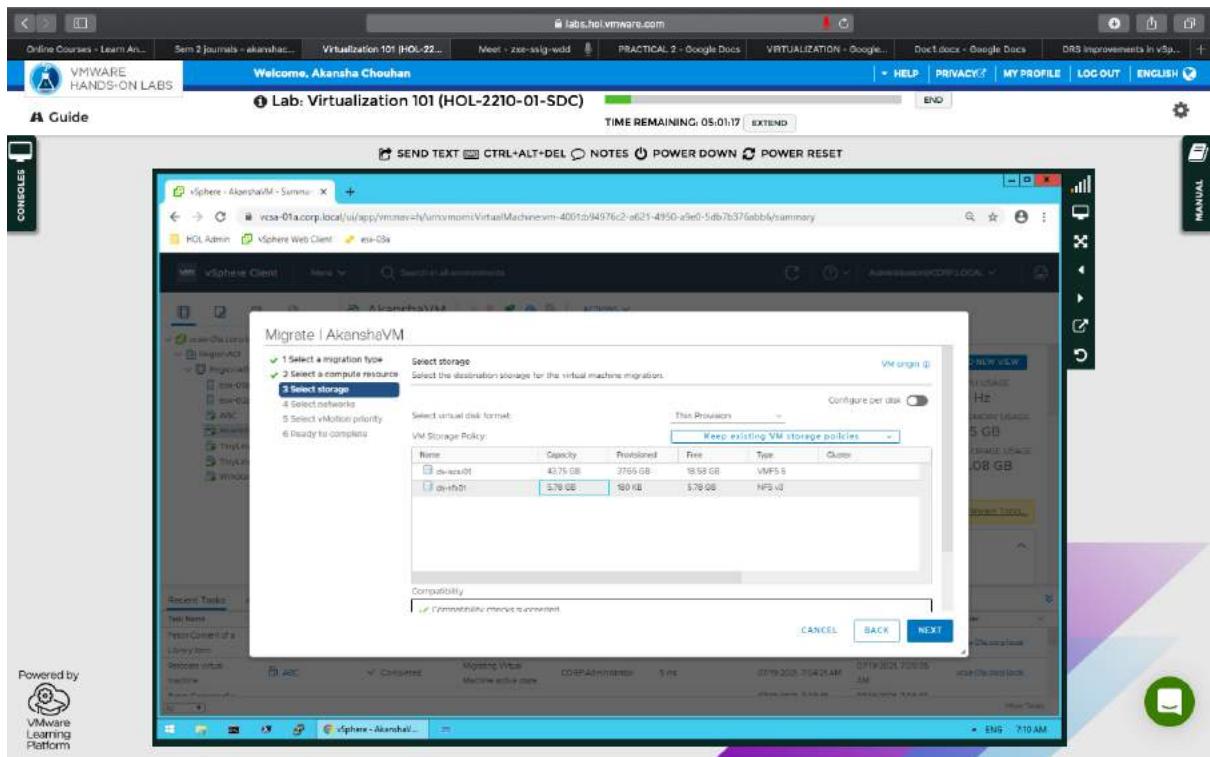
Step 3 : In Select a Migration type, Click Change both compute resource and storage.



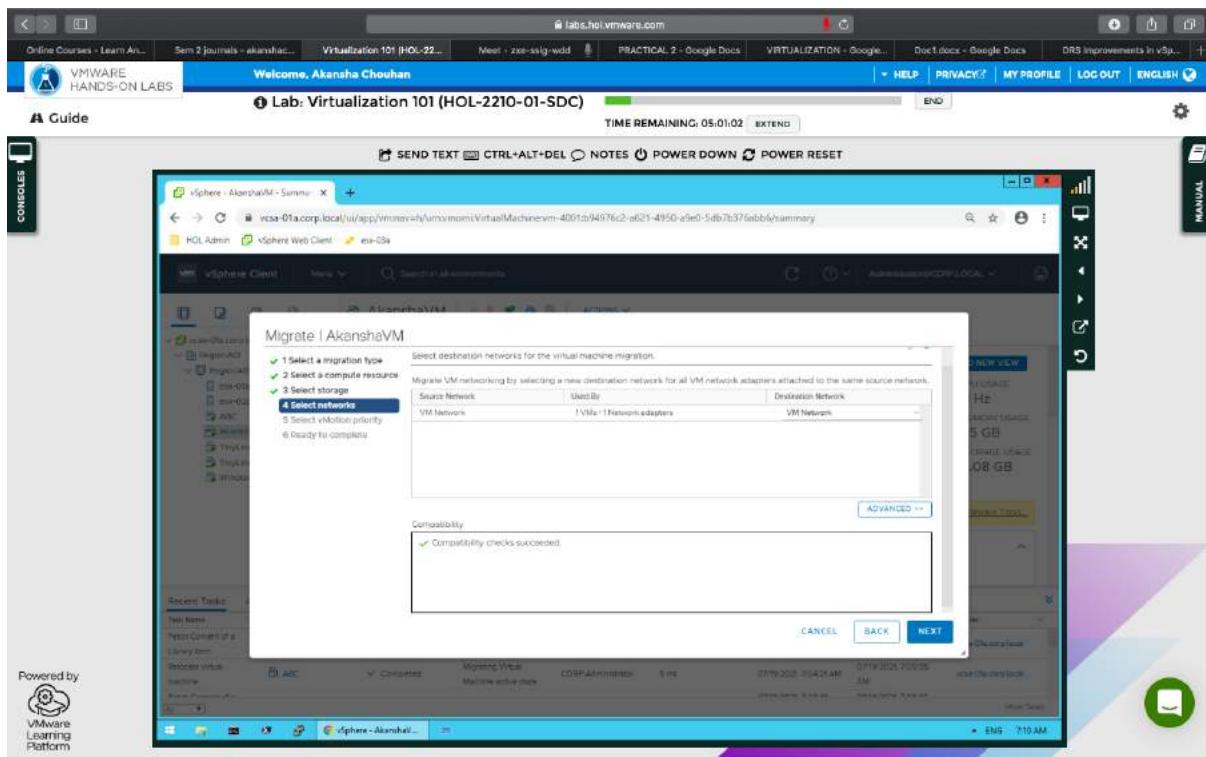
Step 4 : In Select a Compute Resource, Click the option where you want to migrate the Virtual Machine.



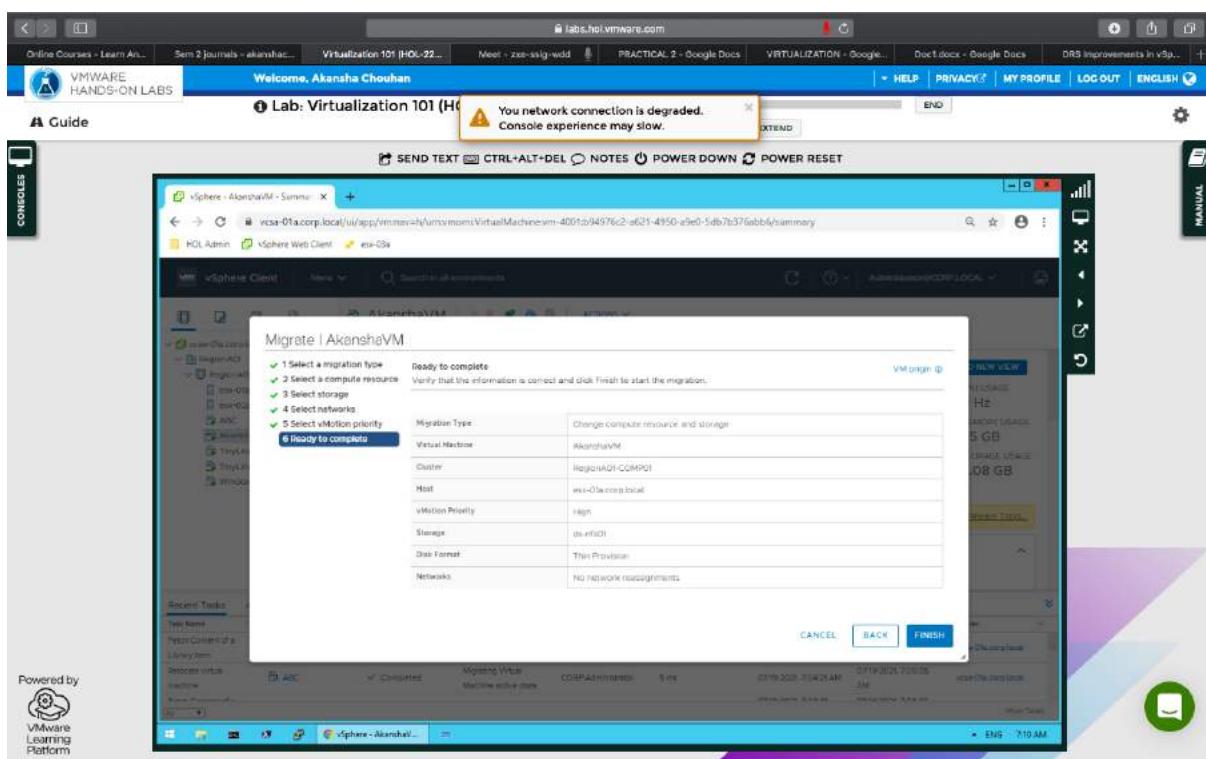
Step 5 : In Select Storage , click on the Data Storage options : ds-nfs01

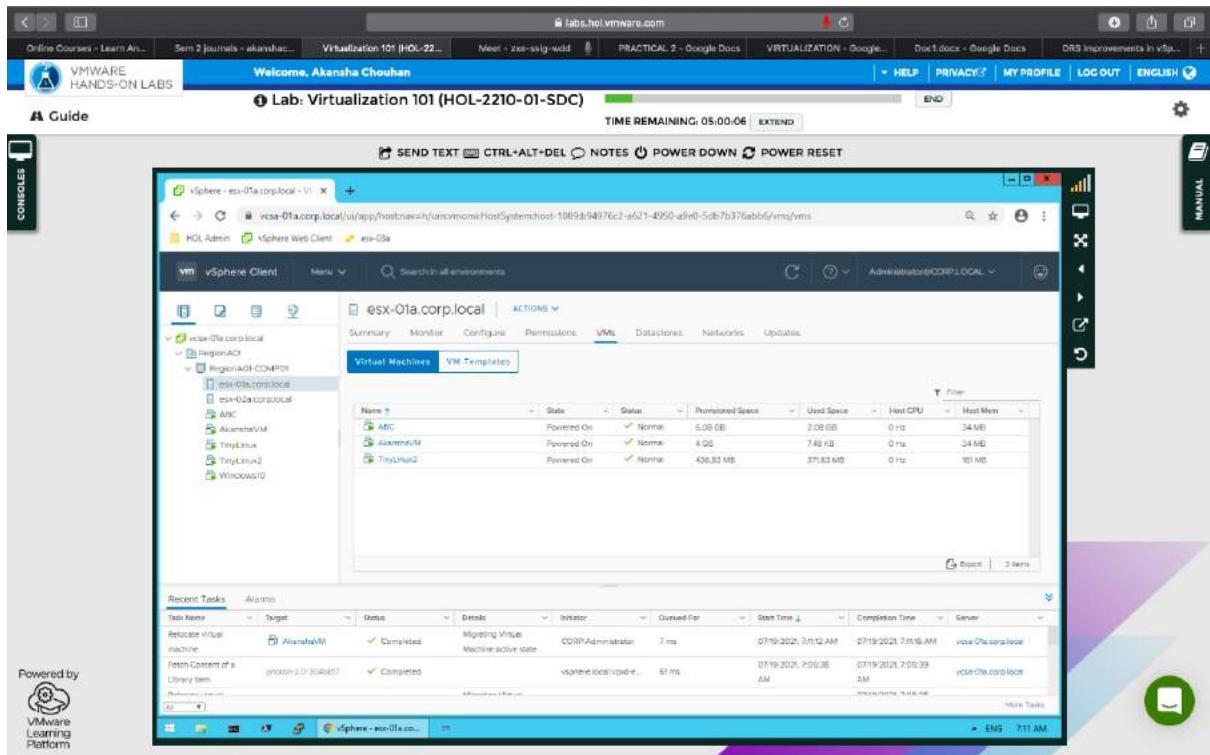


Step 6 : In Select the Network, Click Next.



Step 7 : Ready to Complete and Click on Finish.





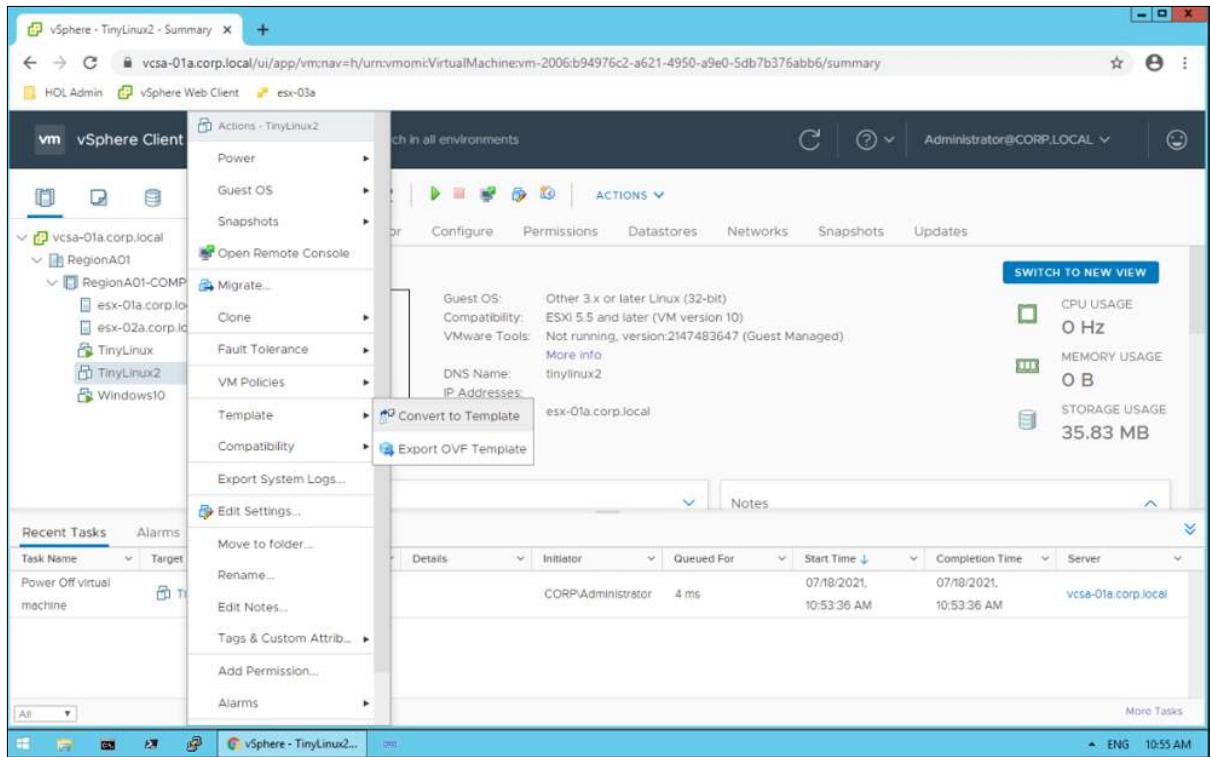
Practical 3

Topic: Create A Template In The vSphere Client

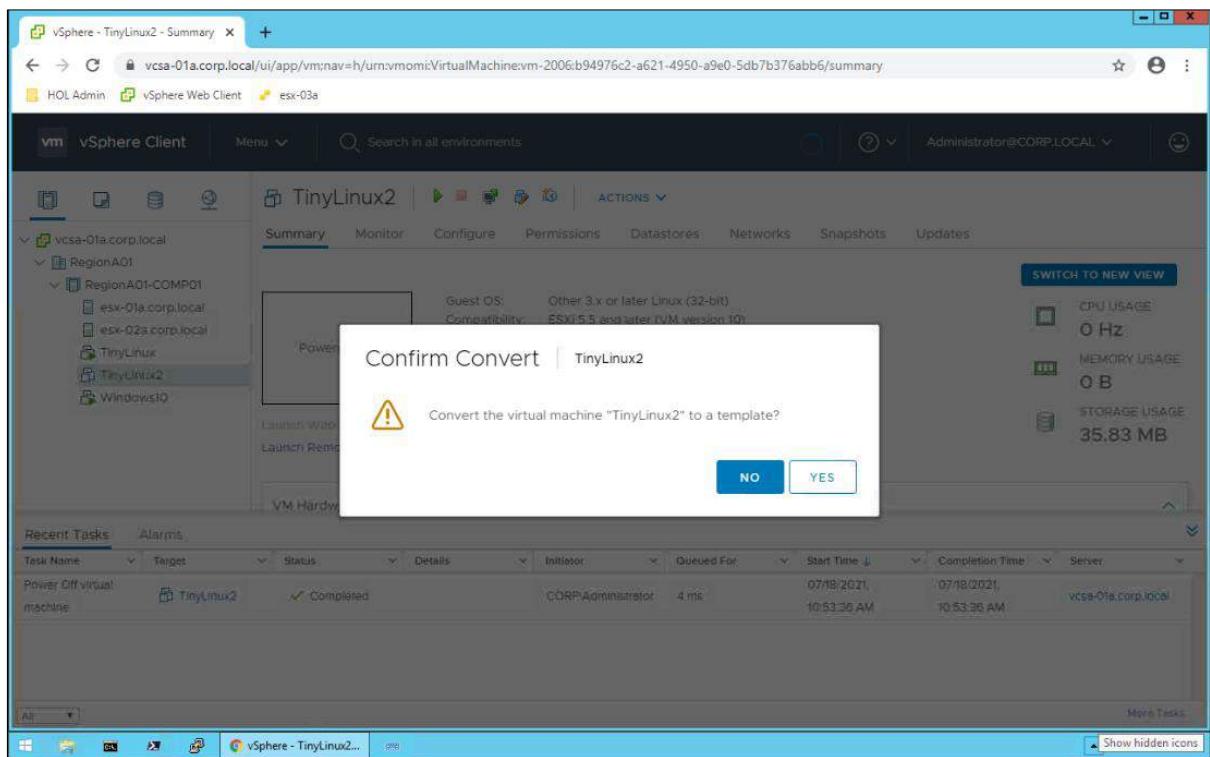
Steps:

A) Convert a Virtual Machine to a Template in the vSphere Client

- 1) Right click on virtual machine then go to **Template** option and choose **Convert to template**. Power off the virtual machine before converting to template.



2) Popup screen for confirmation would appear. Click on Yes



3) Now here we could see, virtual machine is now converted to template file

vSphere - TinyLinux2 - Summary

vcsa-01a.corp.local/ui/app/vm:nav=h:urn:vmomi:VirtualMachine:vm-2006:b94976c2-a621-4950-a9e0-5db7b376abb6/summary

HOL Admin vSphere Web Client esx-03a

vm vSphere Client Menu Search in all environments

TinyLinux2 ACTIONS

Summary Monitor Configure Permissions Datastores Versioning Updates

Powered Off

Guest OS: Other 3.x or later Linux (32-bit)
Compatibility: ESXi 5.5 and later (VM version 10)
VMware Tools: Not running, version:2147483647 (Guest Managed)
More info
DNS Name: tinylinux2
IP Addresses:
Host: esx-01a.corp.local

SWITCH TO NEW VIEW

STORAGE USAGE
35.83 MB

VM Hardware Notes

Recent Tasks Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time	Server
Mark virtual machine as template	TinyLinux2	Completed		CORP\Administrator	7 ms	07/18/2021, 10:56:57 AM	07/18/2021, 10:56:58 AM	vcsa-01a.corp.local
Power Off virtual machine	TinyLinux2	Completed		CORP\Administrator	4 ms	07/18/2021, 10:53:36 AM	07/18/2021, 10:53:36 AM	vcsa-01a.corp.local

All More Tasks

ENG 10:57 AM

This screenshot shows the vSphere Client interface for the VM 'TinyLinux2'. The left sidebar shows the vSphere Client navigation tree with 'vcsa-01a.corp.local' selected. The main pane displays the 'Summary' tab for 'TinyLinux2', which is currently 'Powered Off'. Key details shown include the guest OS as 'Other 3.x or later Linux (32-bit)', compatibility with 'ESXi 5.5 and later (VM version 10)', and VMware Tools status. A storage usage of '35.83 MB' is also displayed. Below the summary, a table lists recent tasks, including marking the VM as a template and performing a power-off operation. The bottom status bar shows the date and time as 'Sunday, July 18, 2021' and 'ENG 10:57 AM'.

vSphere - esx-01a.corp.local - VM

vcsa-01a.corp.local/ui/app/hostnav=h:urn:vmomi:HostSystem:host-1009:b94976c2-a621-4950-a9e0-5db7b376abb6/vms/vm-templates

HOL Admin vSphere Web Client esx-03a

vm vSphere Client Menu Search in all environments

esx-01a.corp.local ACTIONS

Summary Monitor Configure Permissions VMs Datastores Networks Updates

Virtual Machines VM Templates

Name	Provisioned Space	Guest OS	Compatibility	Memory Size
TinyLinux2	735.07 MB	Other 3.x or later Linux (32-bit)	ESXi 5.5 and later (VM versio...	256 MB

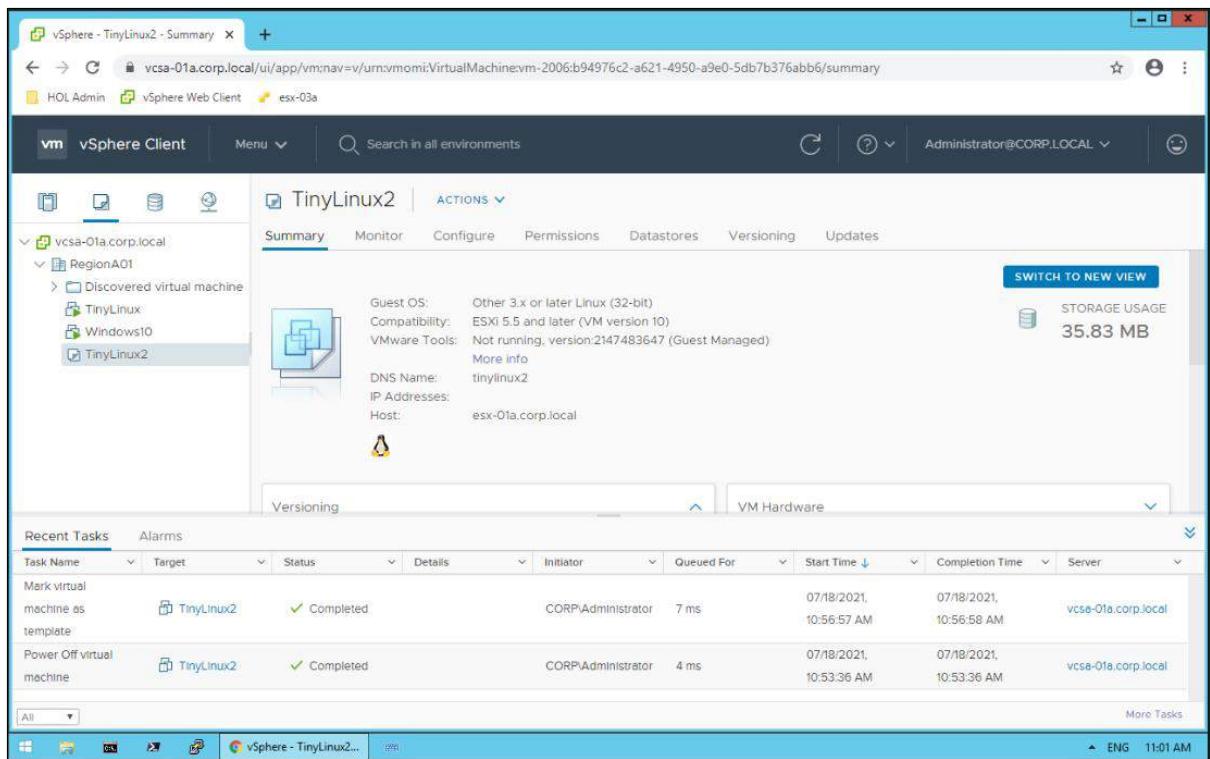
Recent Tasks Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time	Server
Mark virtual machine as template	TinyLinux2	Completed		CORP\Administrator	7 ms	07/18/2021, 10:56:57 AM	07/18/2021, 10:56:58 AM	vcsa-01a.corp.local
Power Off virtual machine	TinyLinux2	Completed		CORP\Administrator	4 ms	07/18/2021, 10:53:36 AM	07/18/2021, 10:53:36 AM	vcsa-01a.corp.local

Sunday, July 18, 2021

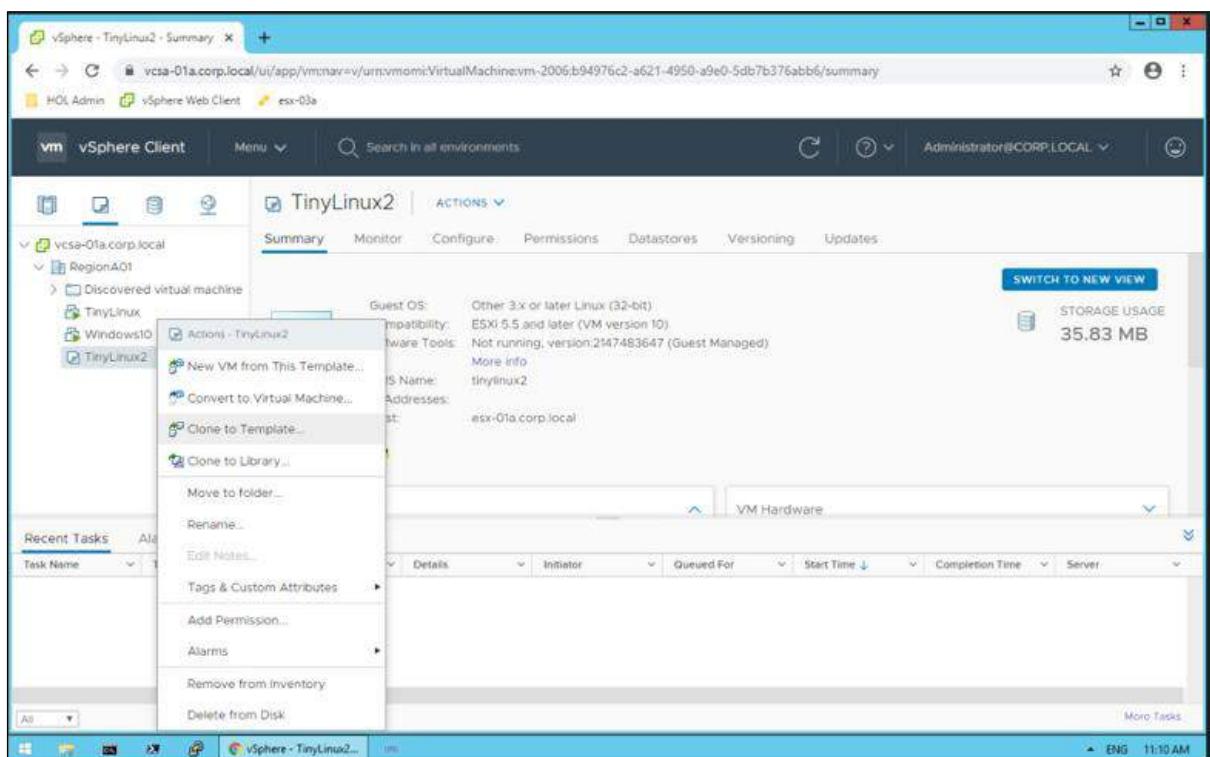
ENG 10:57 AM

This screenshot shows the vSphere Client interface for the host 'esx-01a.corp.local'. The left sidebar shows the vSphere Client navigation tree with 'esx-01a.corp.local' selected. The main pane displays the 'VMs' tab for the host, showing the 'Virtual Machines' and 'VM Templates' sections. The table under 'VM Templates' lists the VM 'TinyLinux2' with its configuration details. Below the table, a table lists recent tasks, including marking the VM as a template and performing a power-off operation. The bottom status bar shows the date and time as 'Sunday, July 18, 2021' and 'ENG 10:57 AM'.

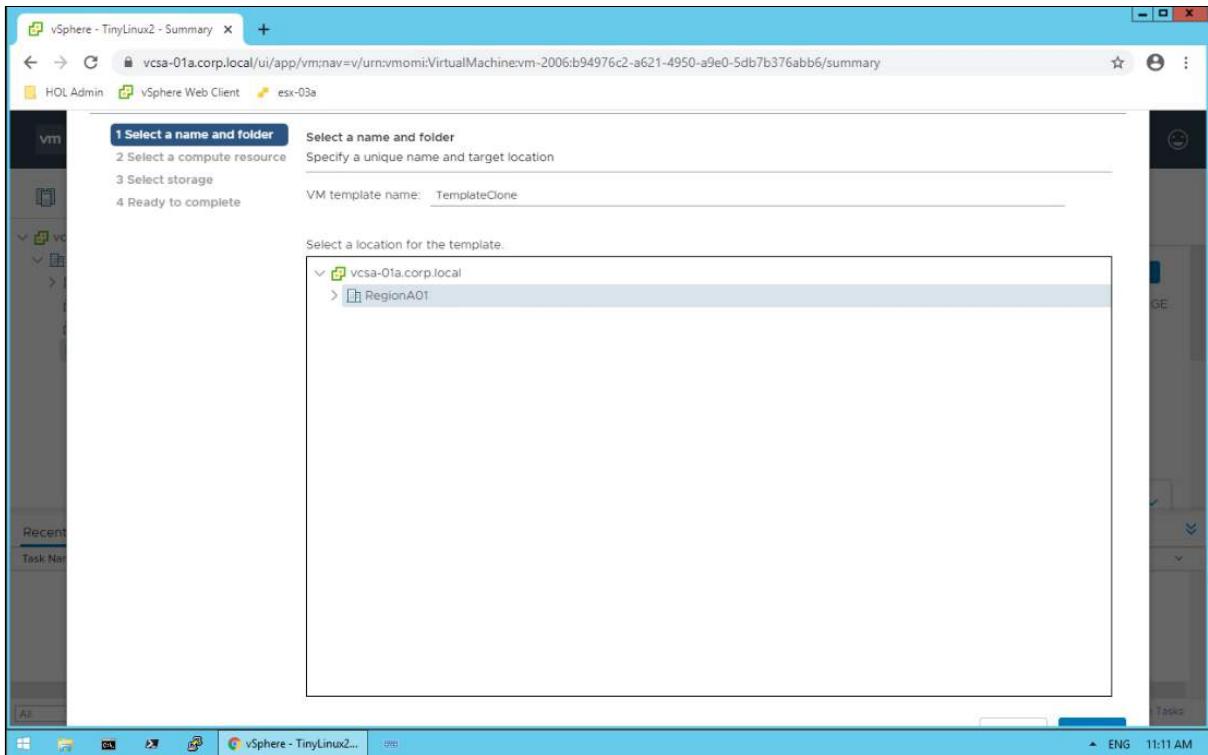


B) Clone a Template in the vSphere Client

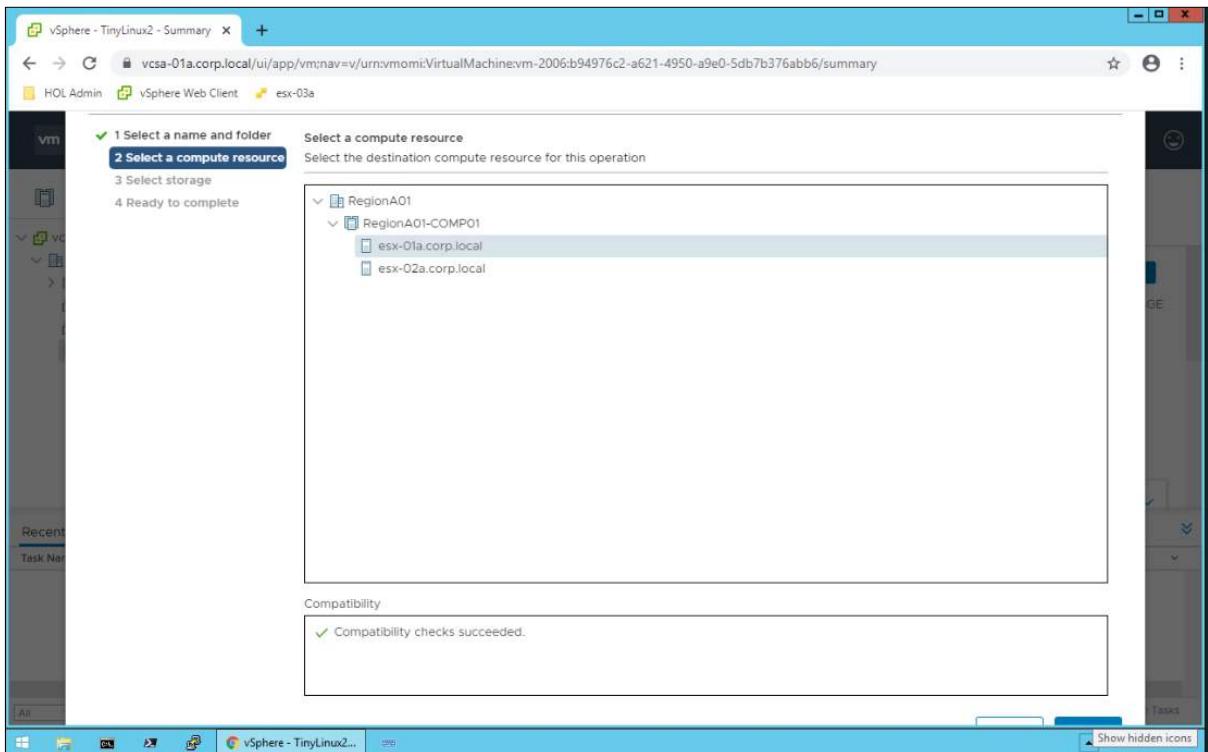
- 1) Right-click the template and select **Clone to Template**



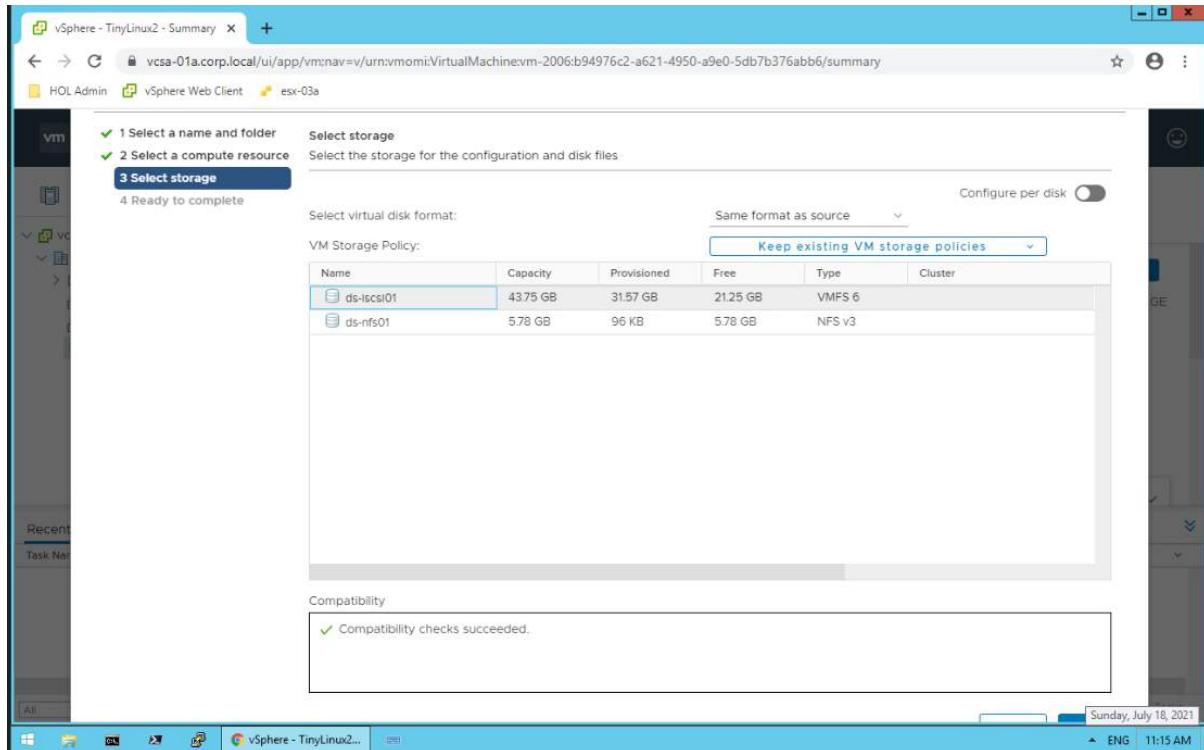
2) Give the new template a unique name and click **Next**.



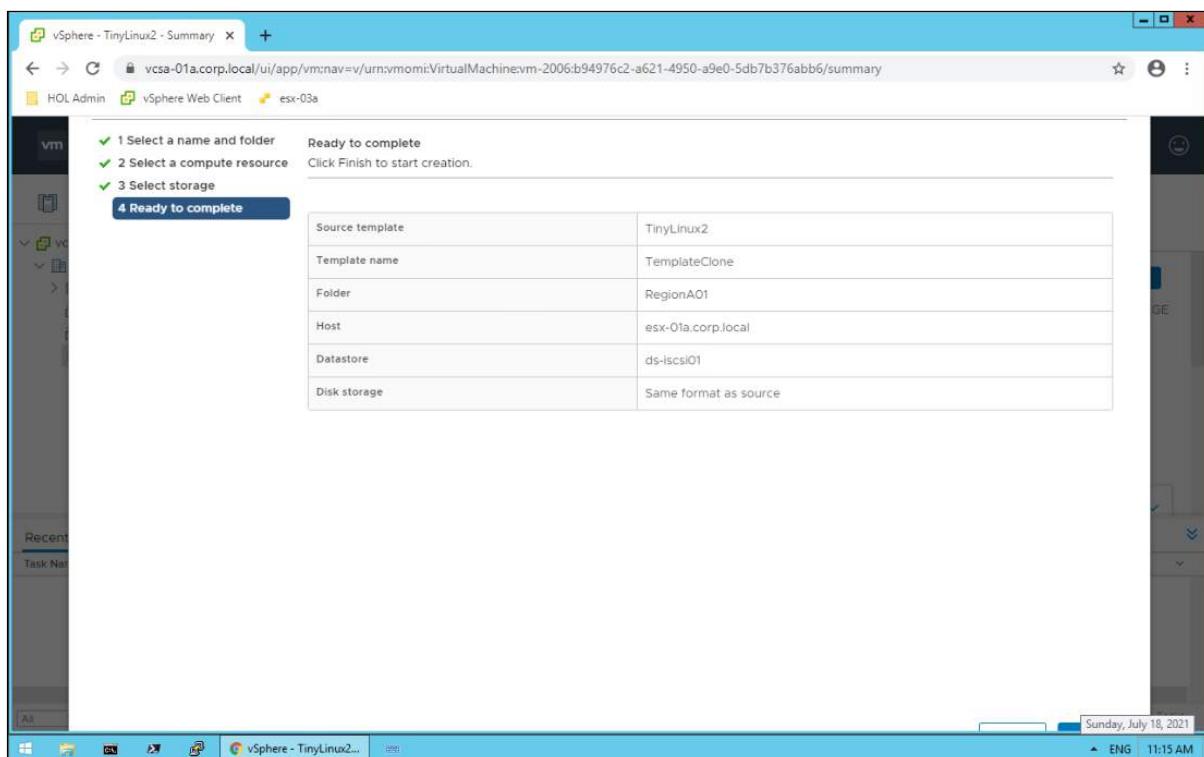
3) Select the host or cluster where you want to clone the template and click **Next**.



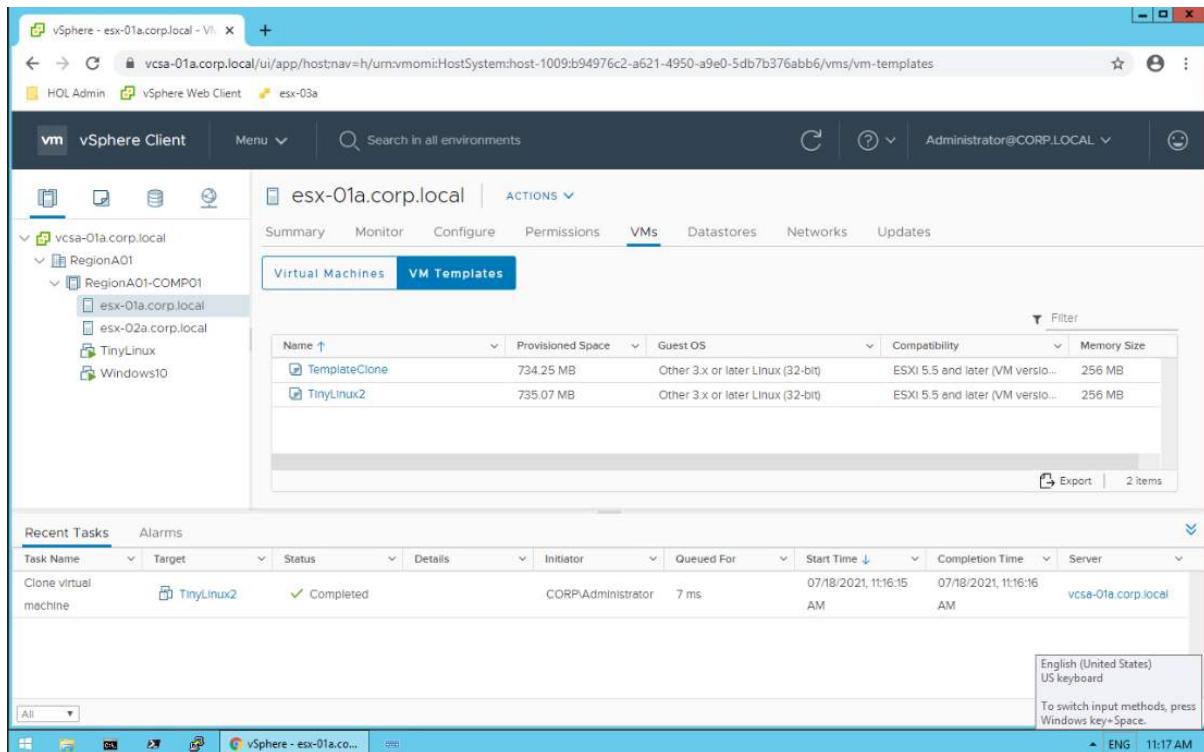
4) Choose a Data-store for the Template and the click on “Next”. Specify in which format to store the template’s virtual disks.



5) Review the information for the template and click **Finish**.



6) Here, we could see the cloned template is added to the list in the **Virtual Machines** tab.



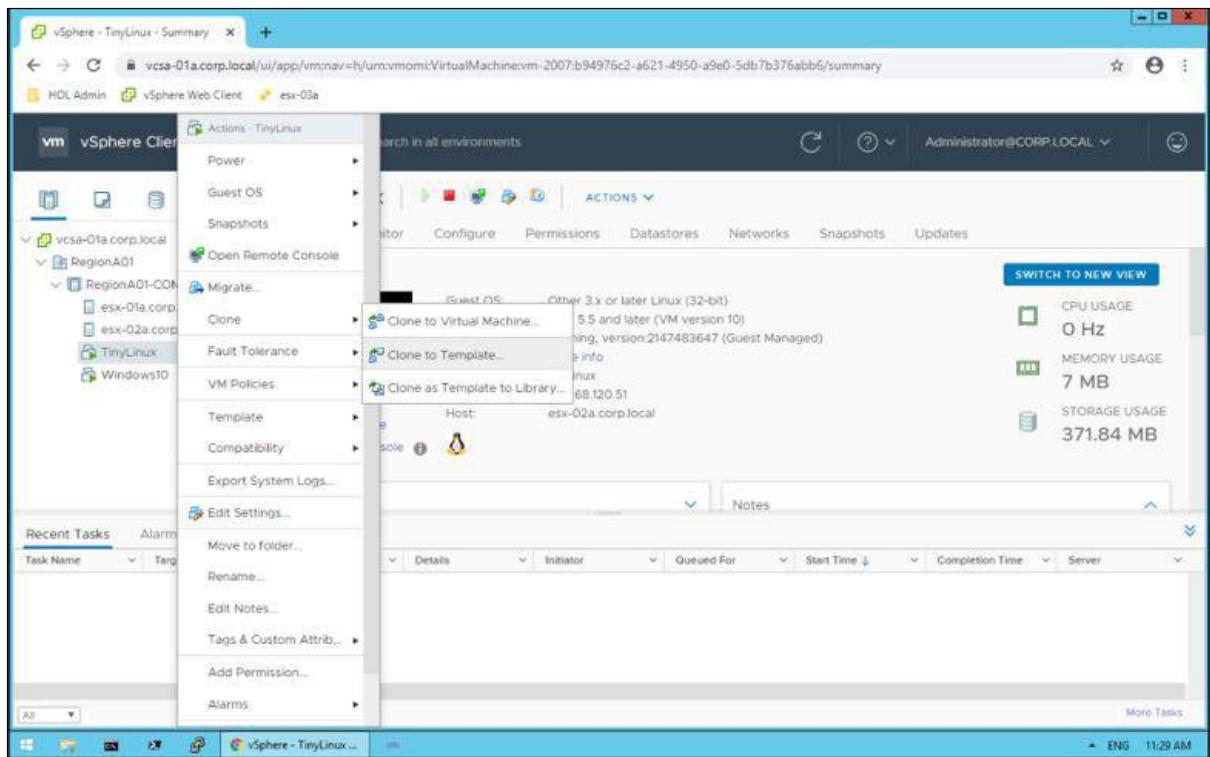
The screenshot shows the vSphere Client interface for the host esx-01a.corp.local. The left sidebar shows the navigation tree with nodes like vcsa-01a.corp.local, RegionA01, and RegionA01-COMP01. The main content area is titled 'esx-01a.corp.local' and has tabs for Summary, Monitor, Configure, Permissions, VMs (which is selected), Datastores, Networks, and Updates. Under the VMs tab, there is a sub-tab for 'VM Templates'. A table lists two templates:

Name	Provisioned Space	Guest OS	Compatibility	Memory Size
TemplateClone	734.25 MB	Other 3x or later Linux (32-bit)	ESXi 5.5 and later (VM versio...)	256 MB
TinyLinux2	735.07 MB	Other 3x or later Linux (32-bit)	ESXi 5.5 and later (VM versio...)	256 MB

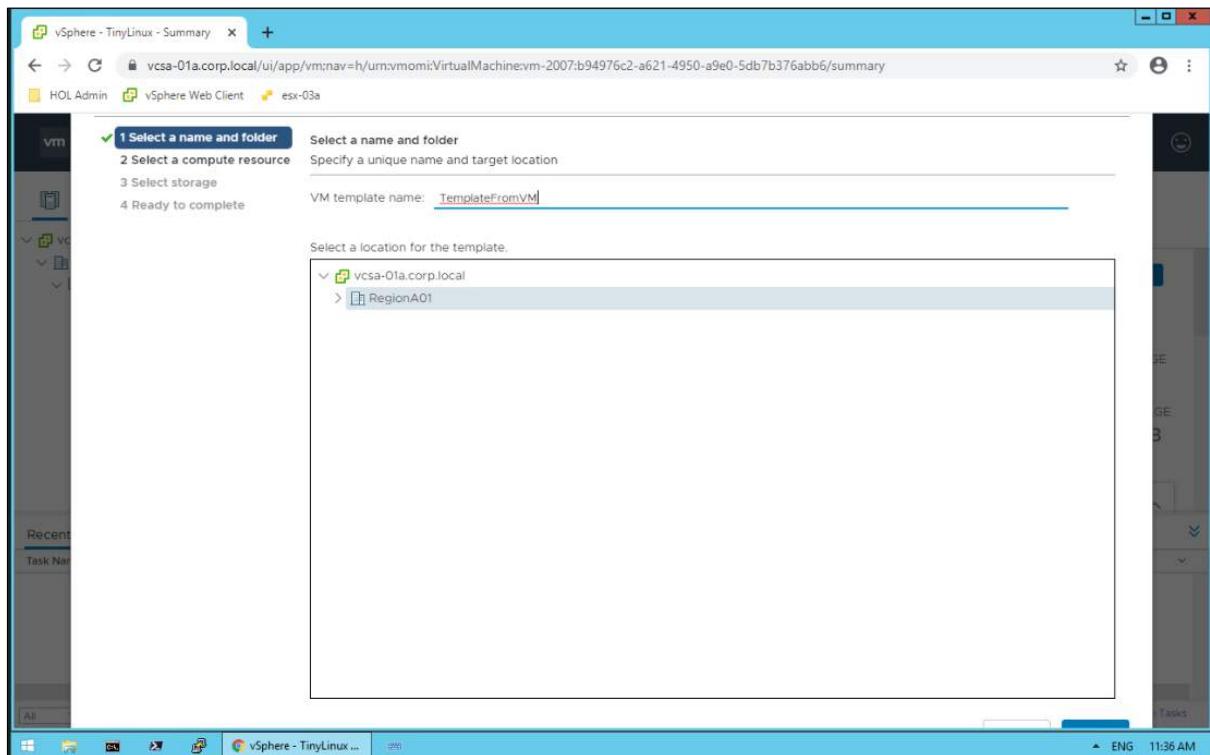
Below the table, a 'Recent Tasks' section shows a completed task: 'Clone virtual machine' for 'TinyLinux2' by 'CORP\Administrator' at 07/18/2021, 11:16:15 AM. The status is 'Completed'. The bottom right corner shows the system tray with language settings (English (United States) US keyboard) and a timestamp (ENG | 11:17 AM).

C) Clone Virtual Machine to Template in the vSphere Client

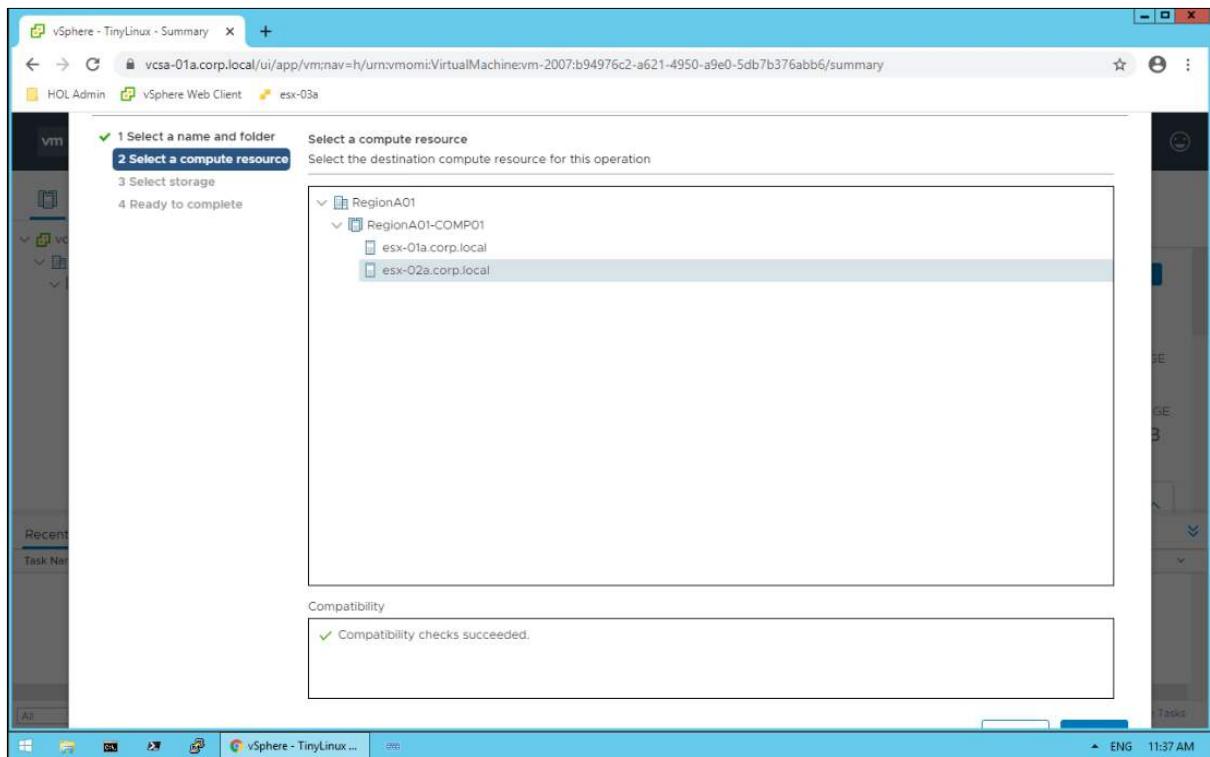
- 1) Right-click the virtual machine and select **Clone > Clone to Template**.



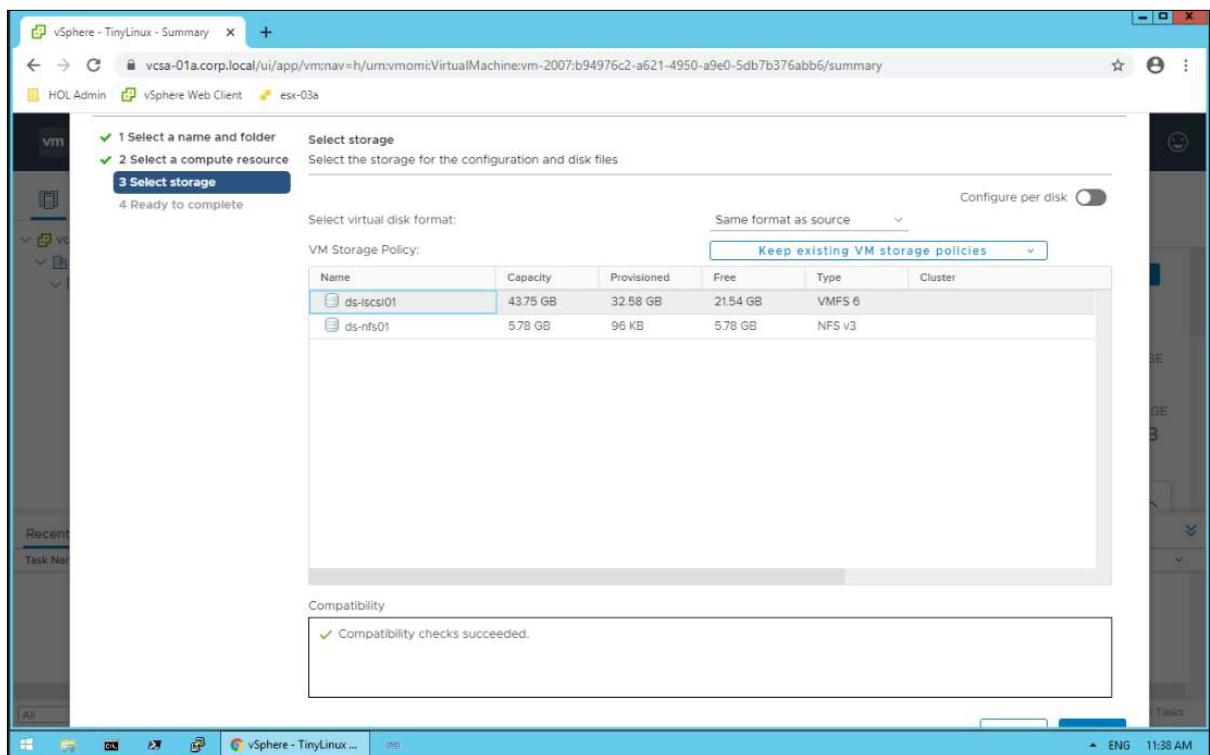
2) Give the new template a name, select its inventory location, and click **Next**.



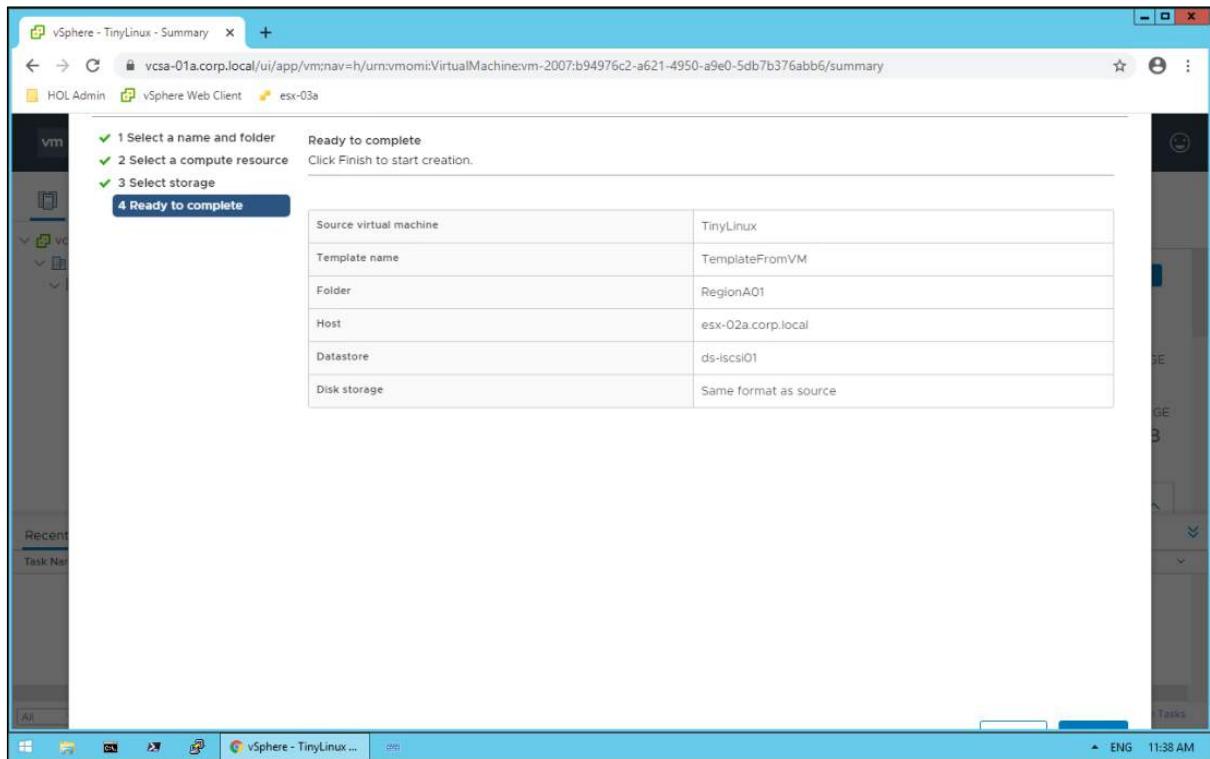
3) Pass through the target location page i.e. select host and click **Next**.



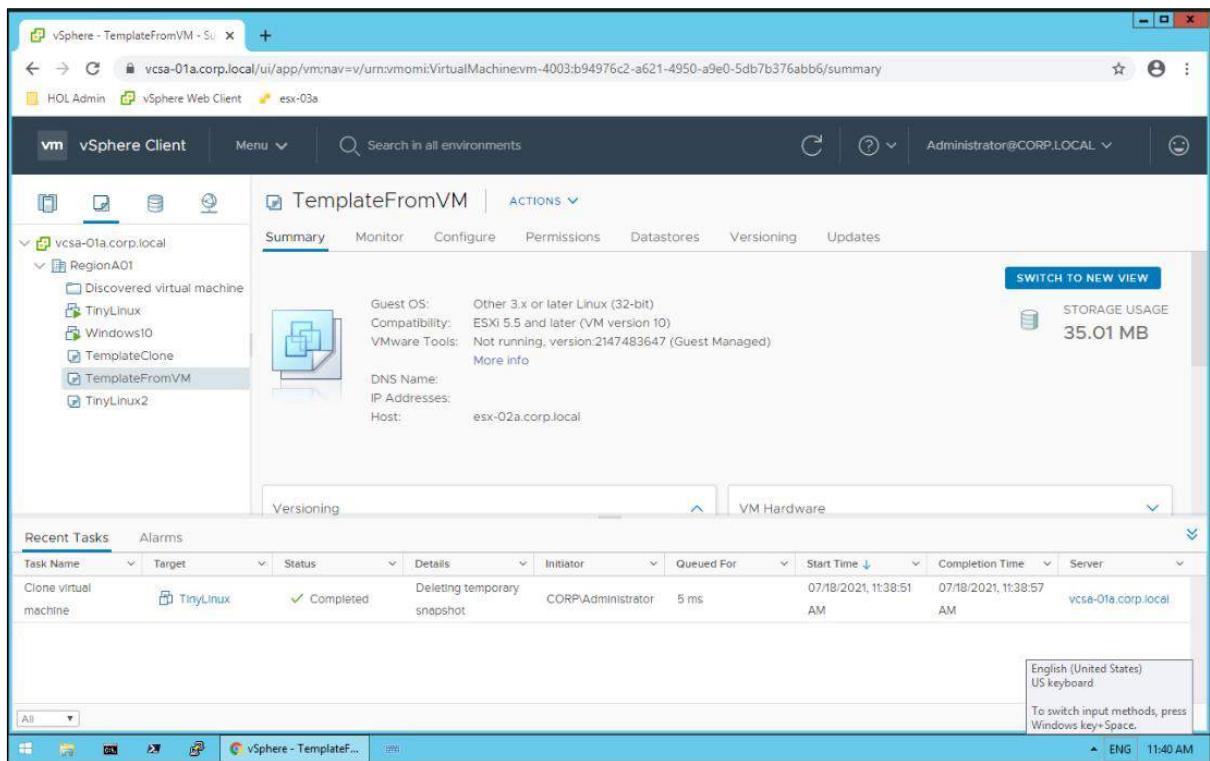
4) Specify in which format to store the template's virtual disks and Select the datastore location where you want to store the virtual machine files and click Next.

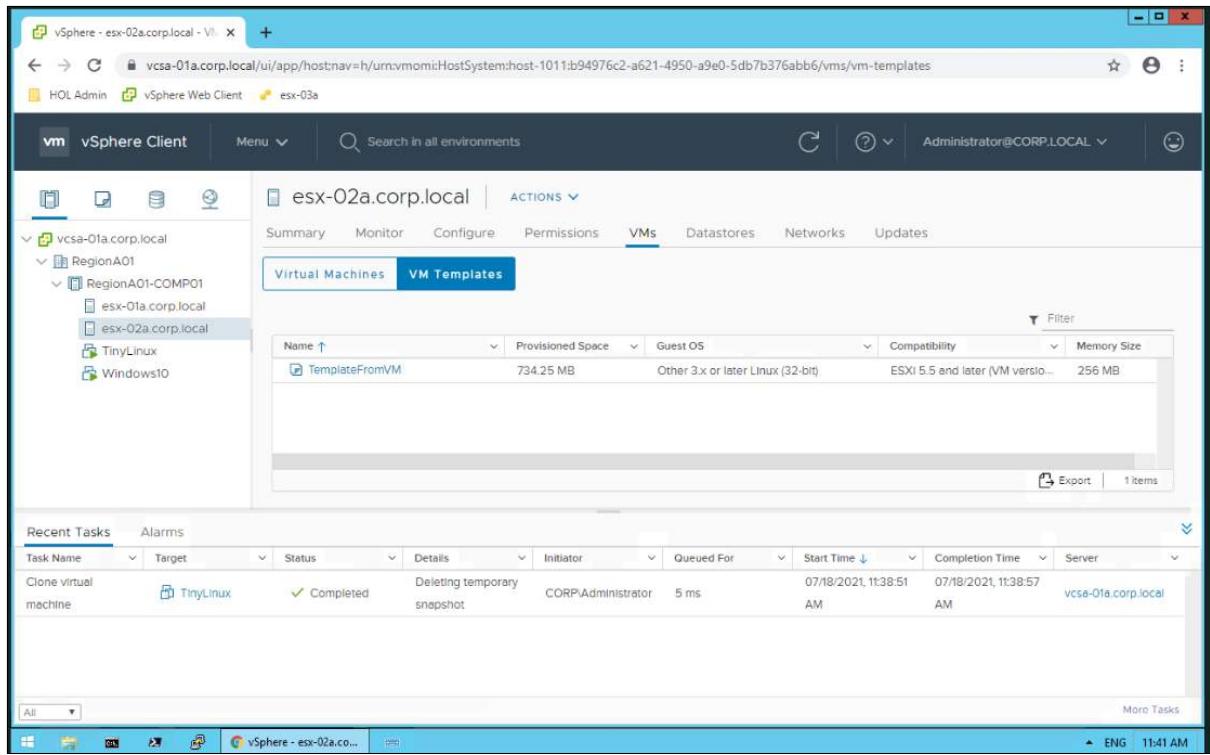


5) Review the information for the template and click **Finish**.



6) You could see the template created.





Practical 4

Aim : Implement and manage the network of VMware ESXi servers.

Two Types of Virtual Switches

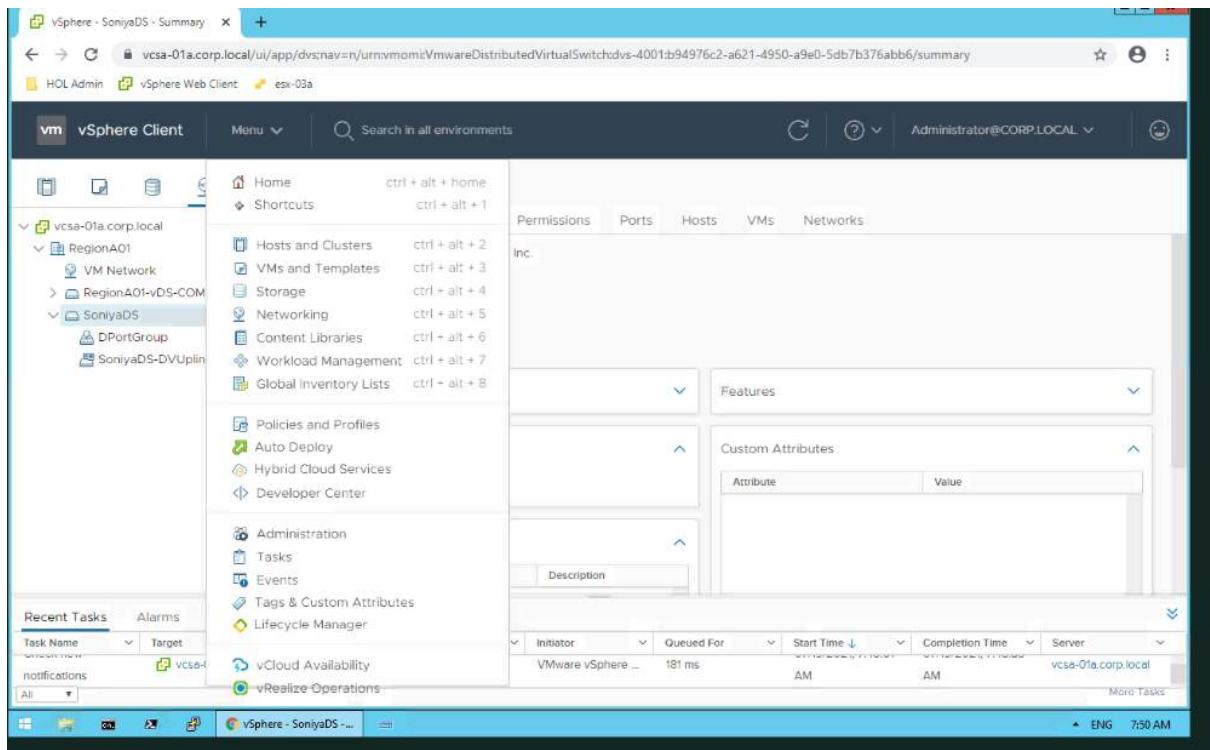
- Standard Switch
- Distributed Switch

Standard Switch

Adding and configuring a Standard Switch.

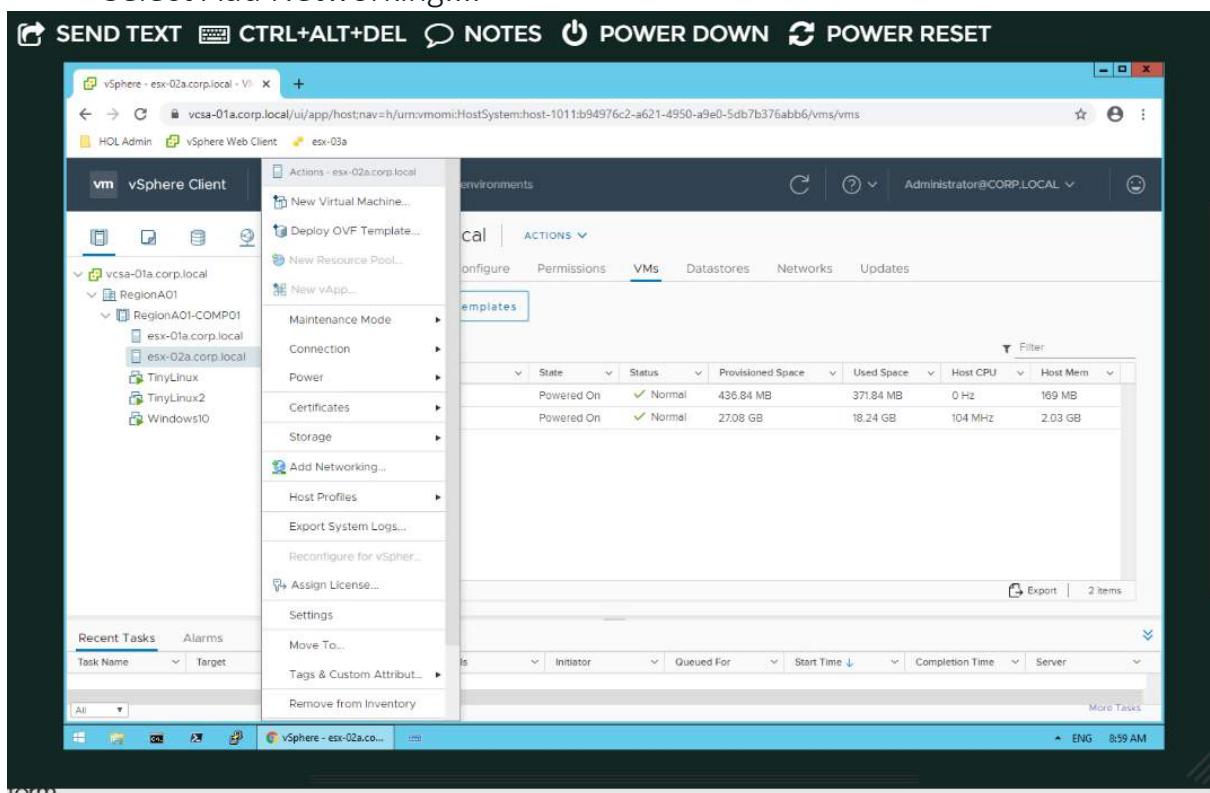
Step 1 : SELECT HOST AND CLUSTERS

- Click Menu
- Click Host and Clusters



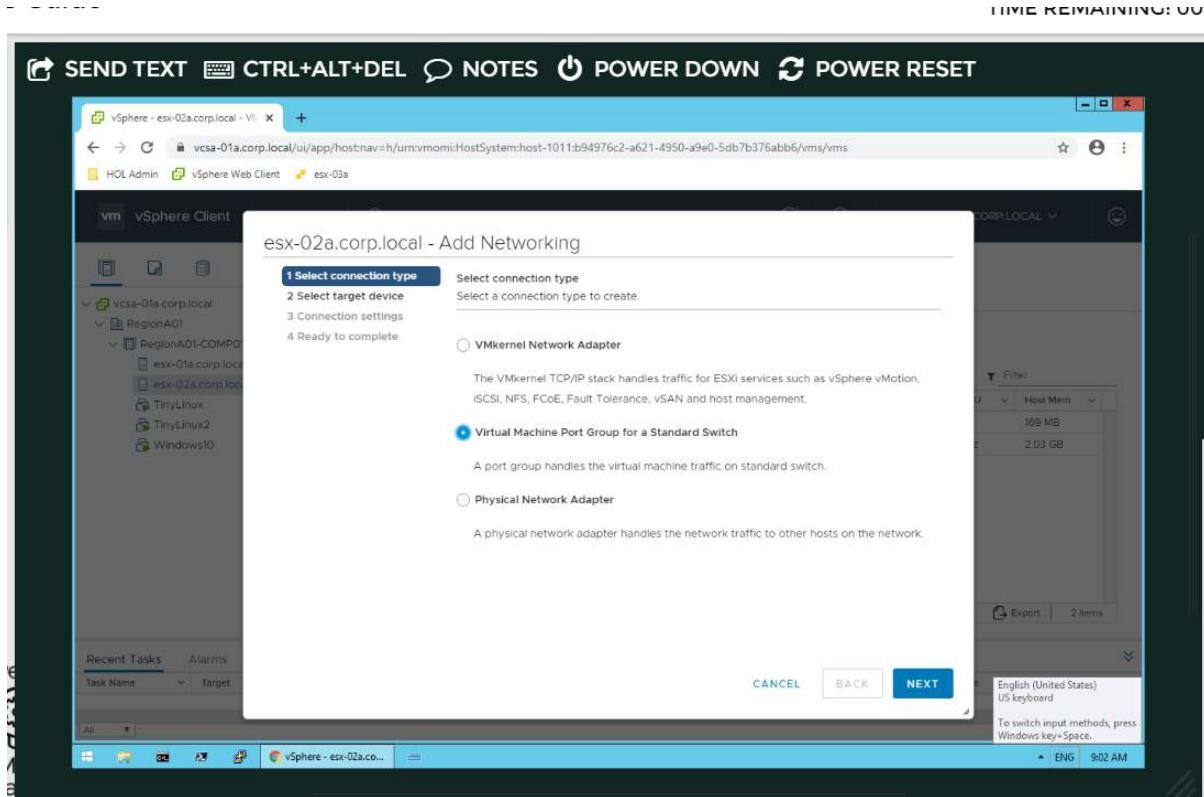
Step 2 : ADD NETWORKING

- Under vcsa-01a.corp.local, expand RegionA01 and then RegionA01-COMP01.
- Next, right-click on esx-02a.corp.local in the Navigator.
- Select Add Networking....



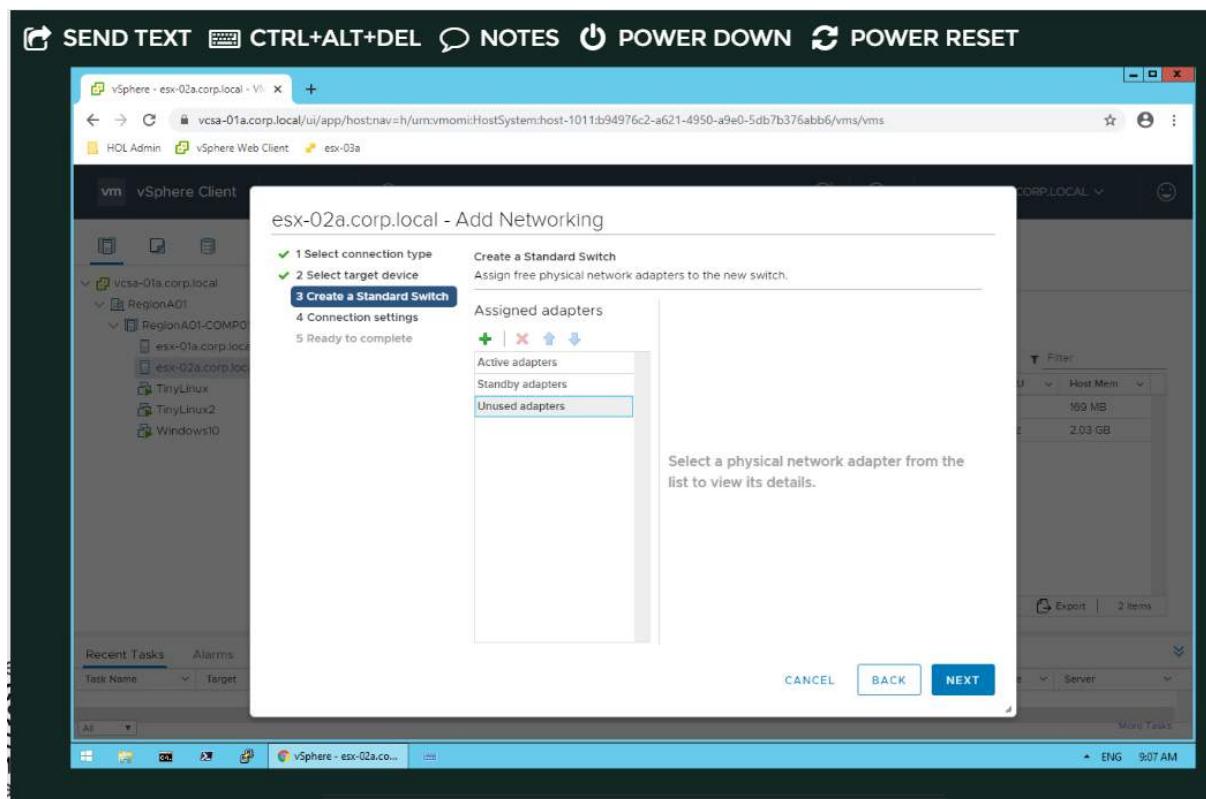
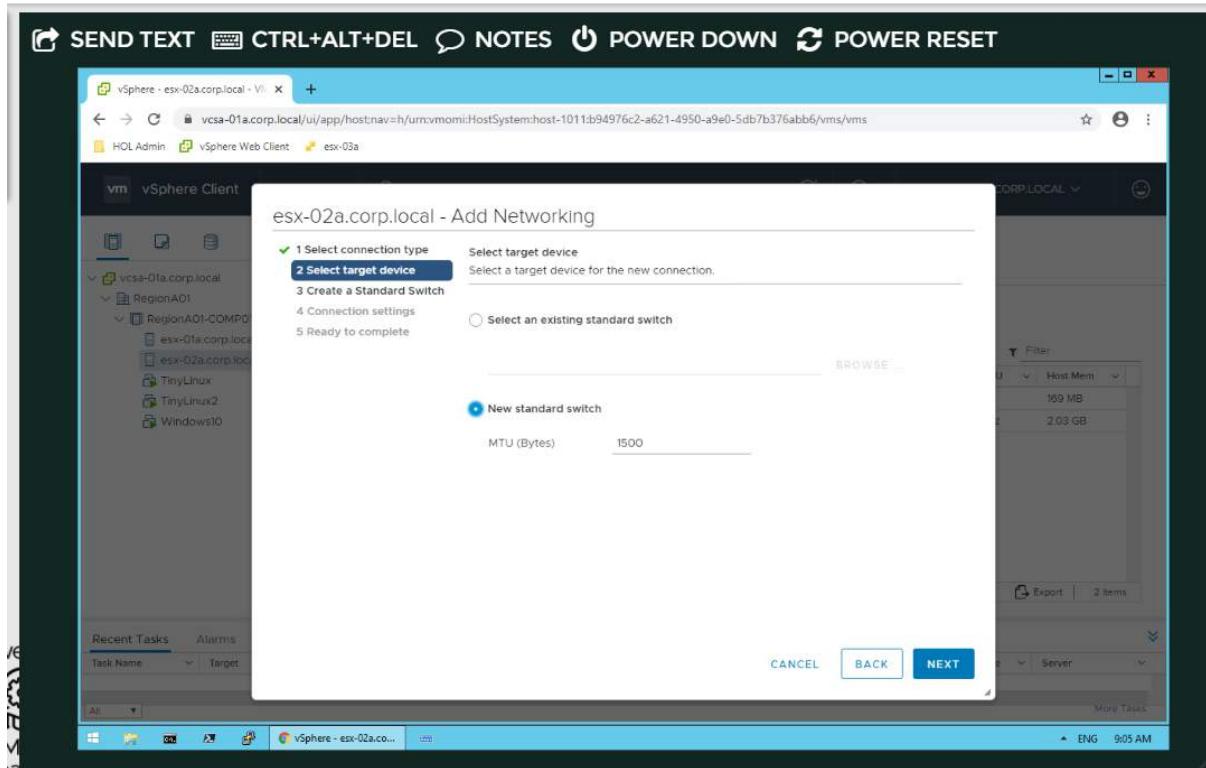
Step 3 : CONNECTION TYPE

- When asked to select connection type, choose Virtual Machine Port Group for a Standard Switch.
- Click Next.



Step 4 : TARGET DEVICE

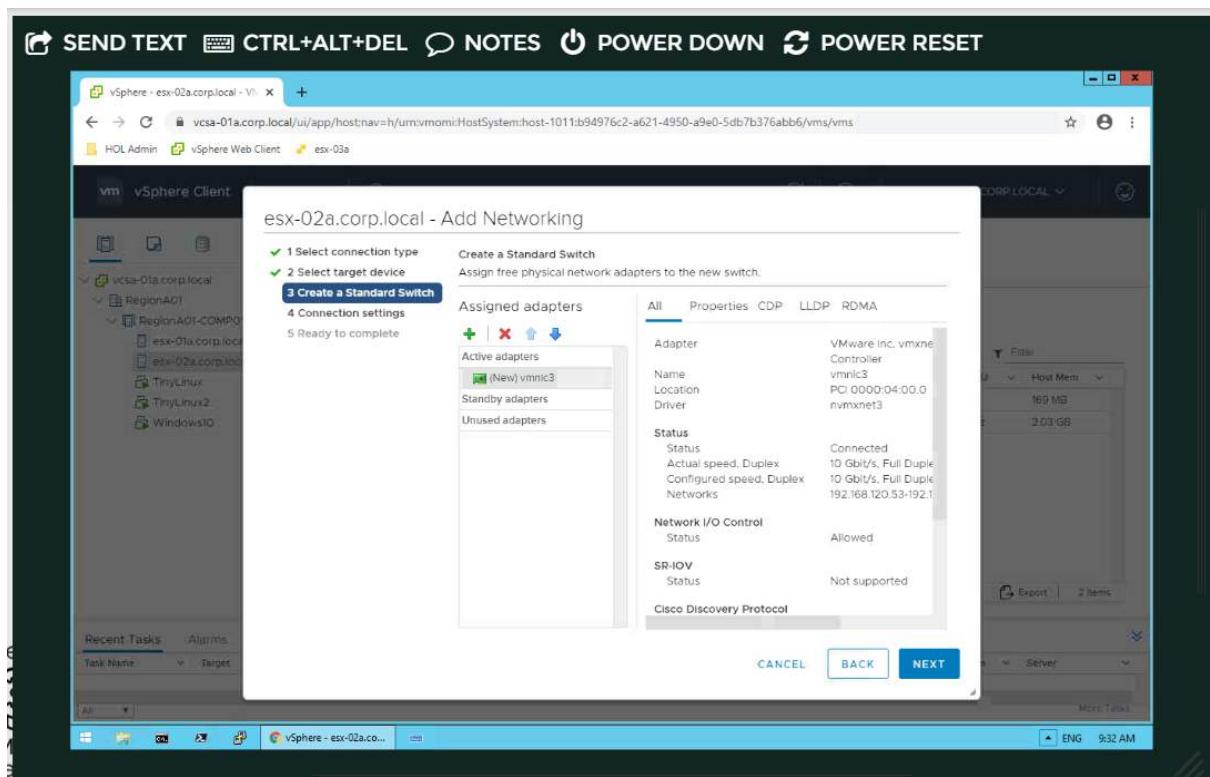
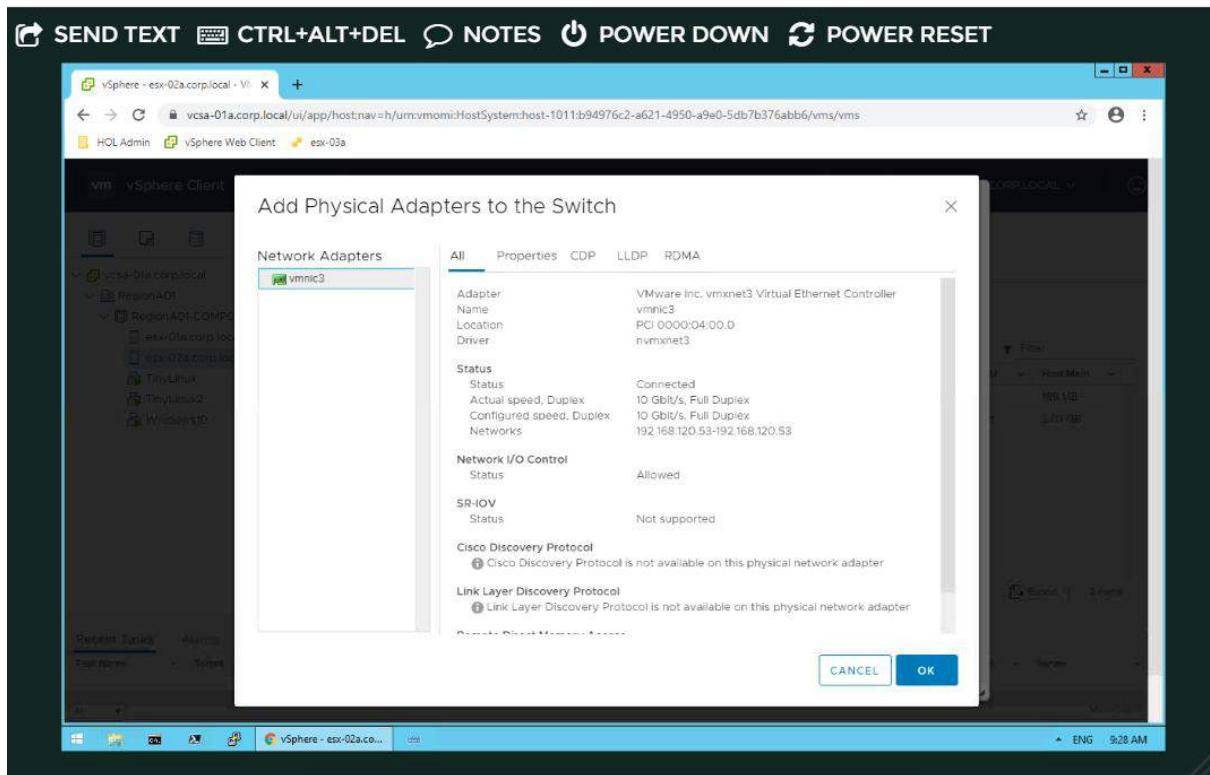
- When asked to select a target device, choose New Standard Switch. Note that a larger MTU size can be specified if needed.
- Click Next.



Step 6 : ADD PHYSICAL ADAPTER

- Select vmnic3 under Network Adapters

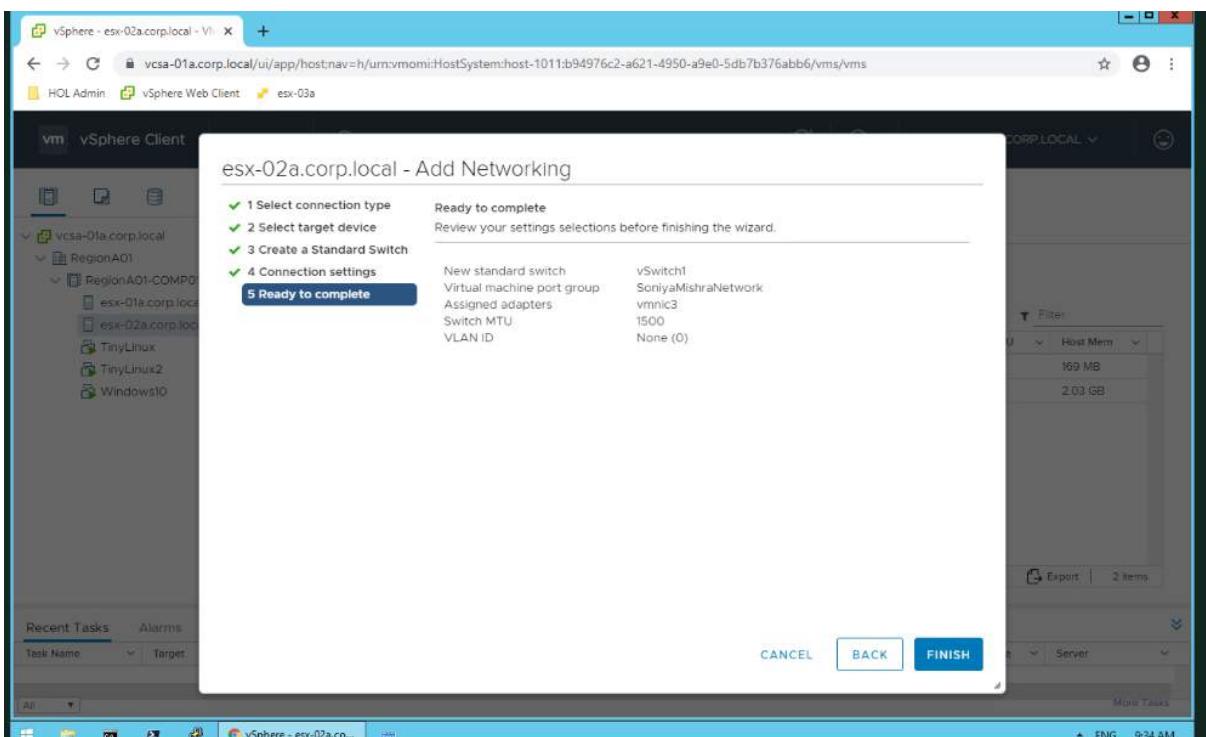
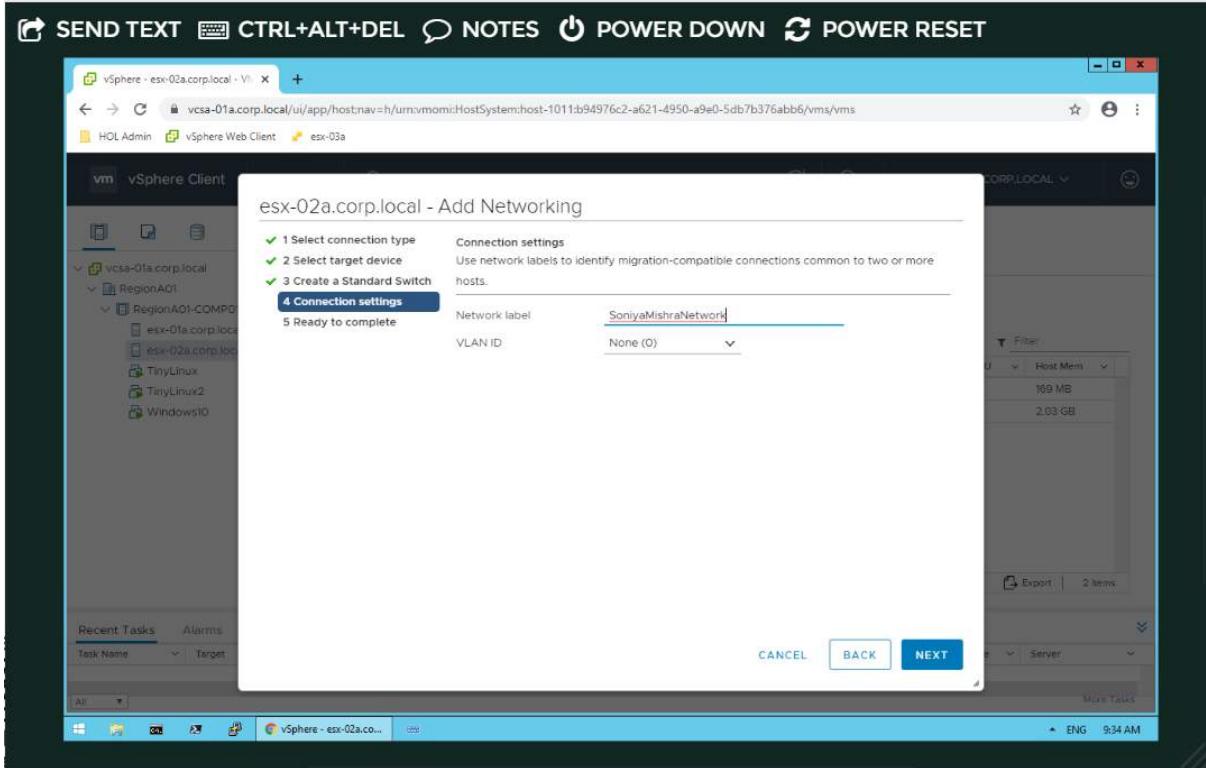
- Click OK.



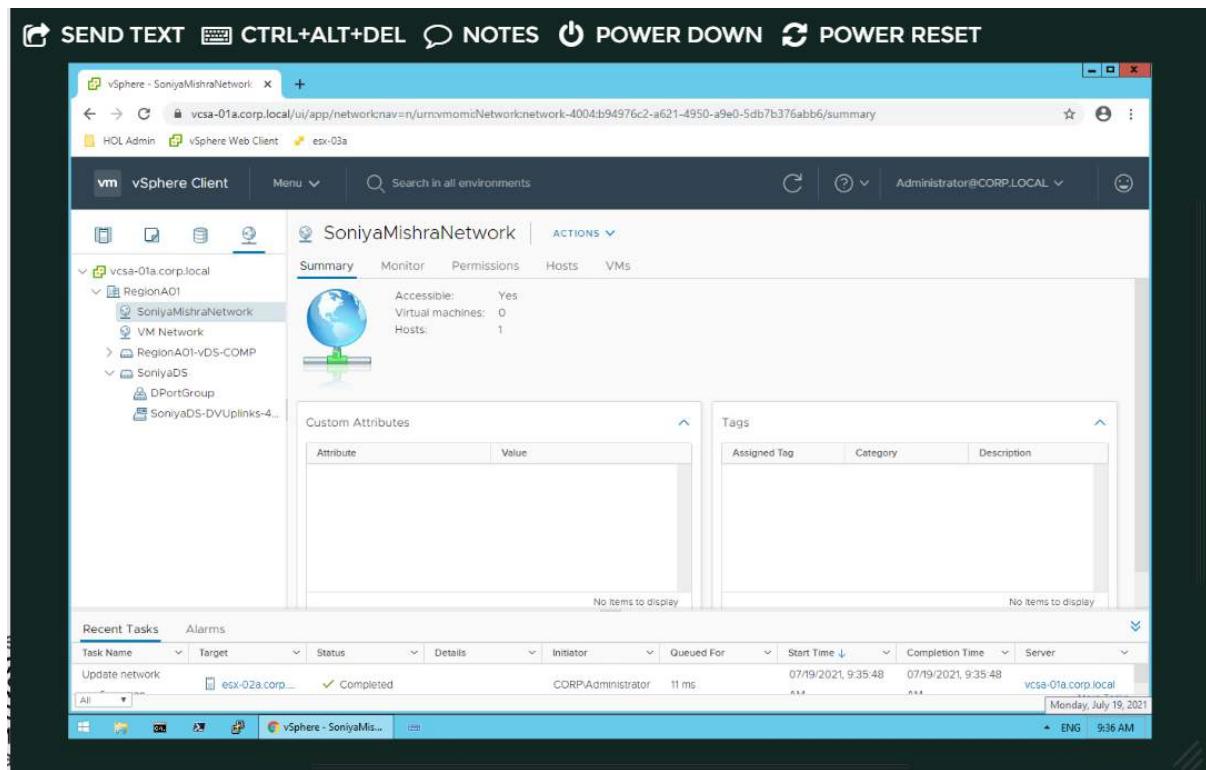
Click Next

Step 7 : CONNECTION SETTINGS

- At the Connection settings step of the wizard, for Network label, give the network name
- Do not change the VLAN ID; leave this set to **None (0)**.



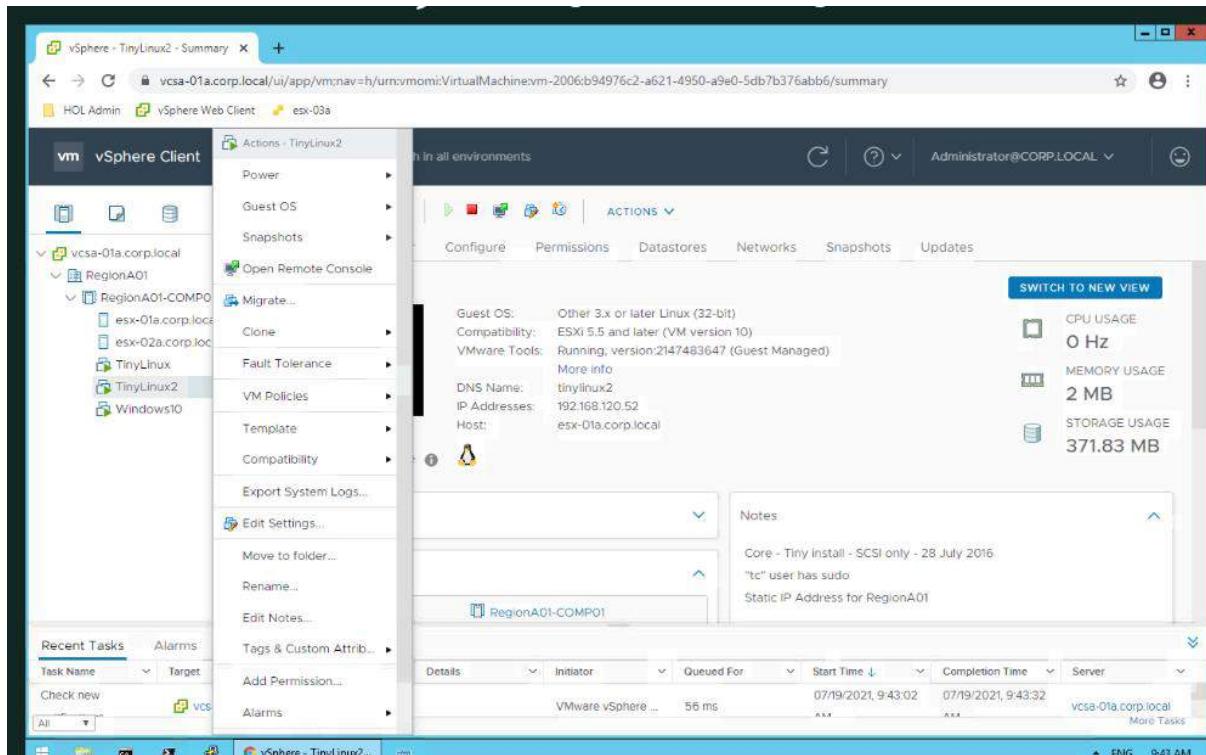
Click Finish.



Standard Switch has been created.

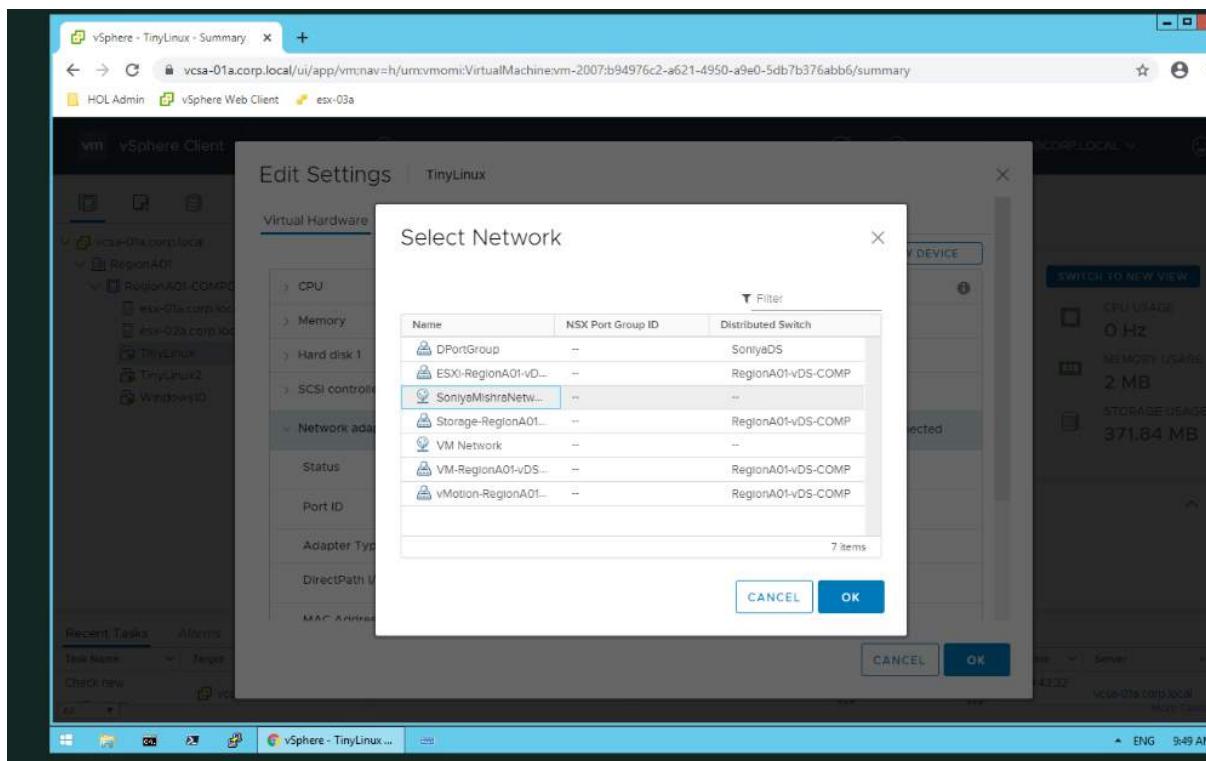
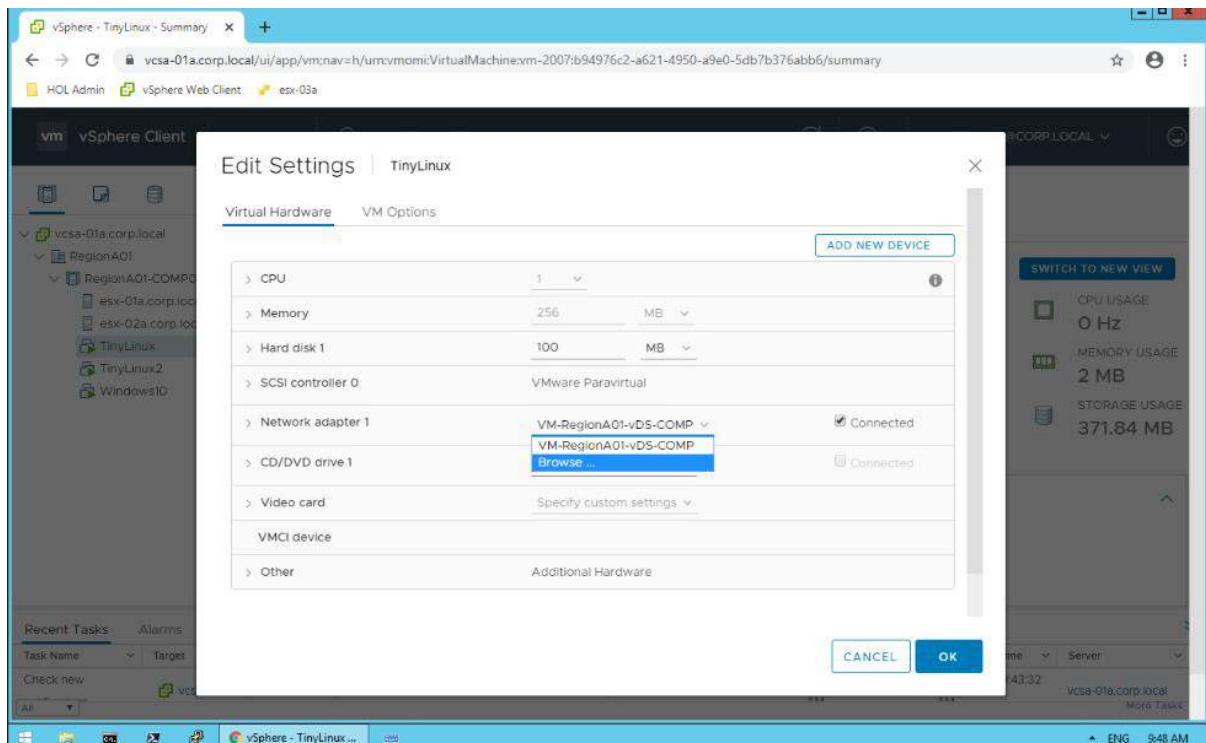
Step 8 : Assigning a new created standard switch to a VM

- Right Click on TinyLinux2 and Select Edit Settings

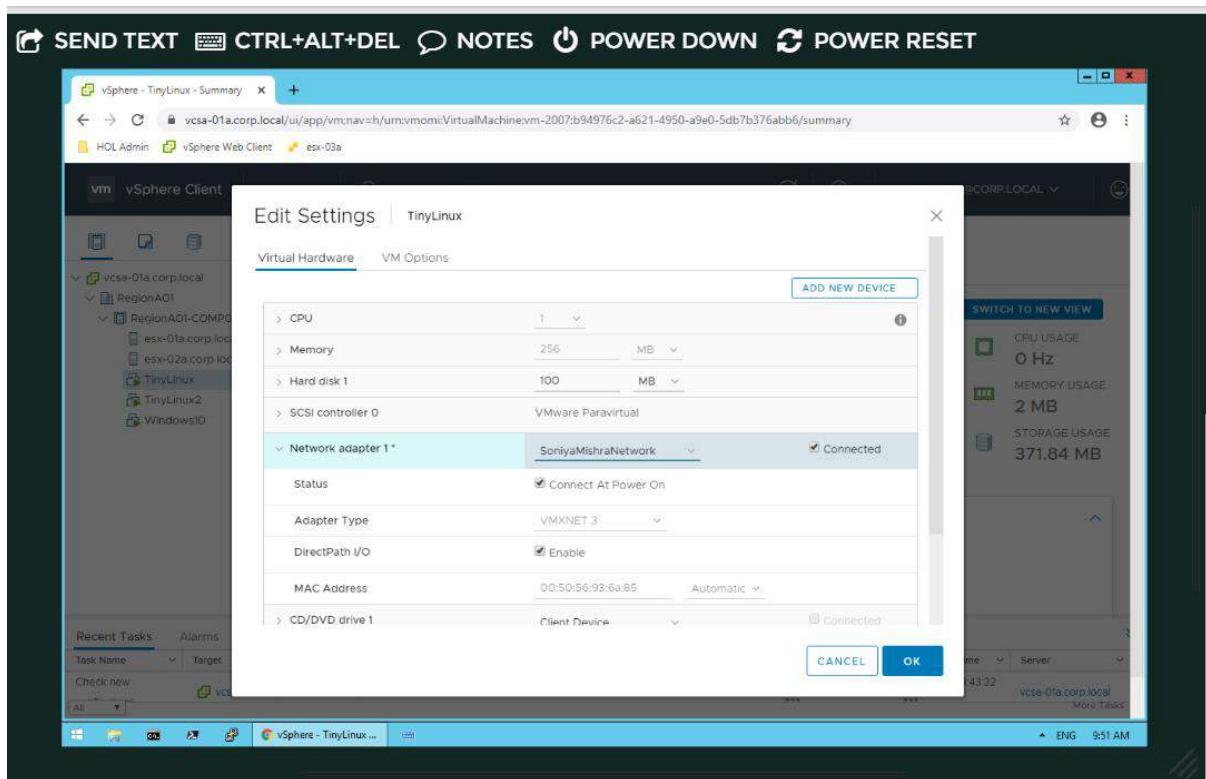


Step 9 : Edit Setting

- Under Network Adapter 1, click on browse



Select the standard switch newly created and click OK.



Click Ok

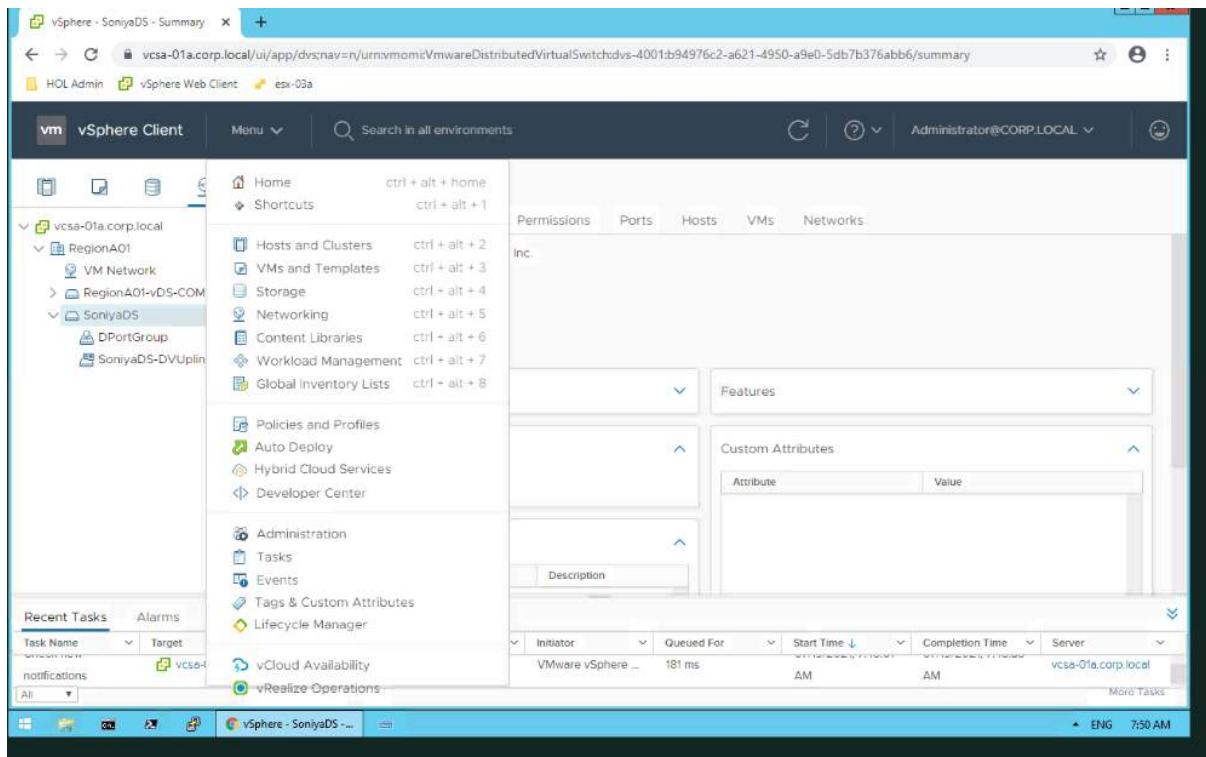
Now the TinyLinux have the standard switch.

Distributed Switch

Adding and configuring a Distributed Switch.

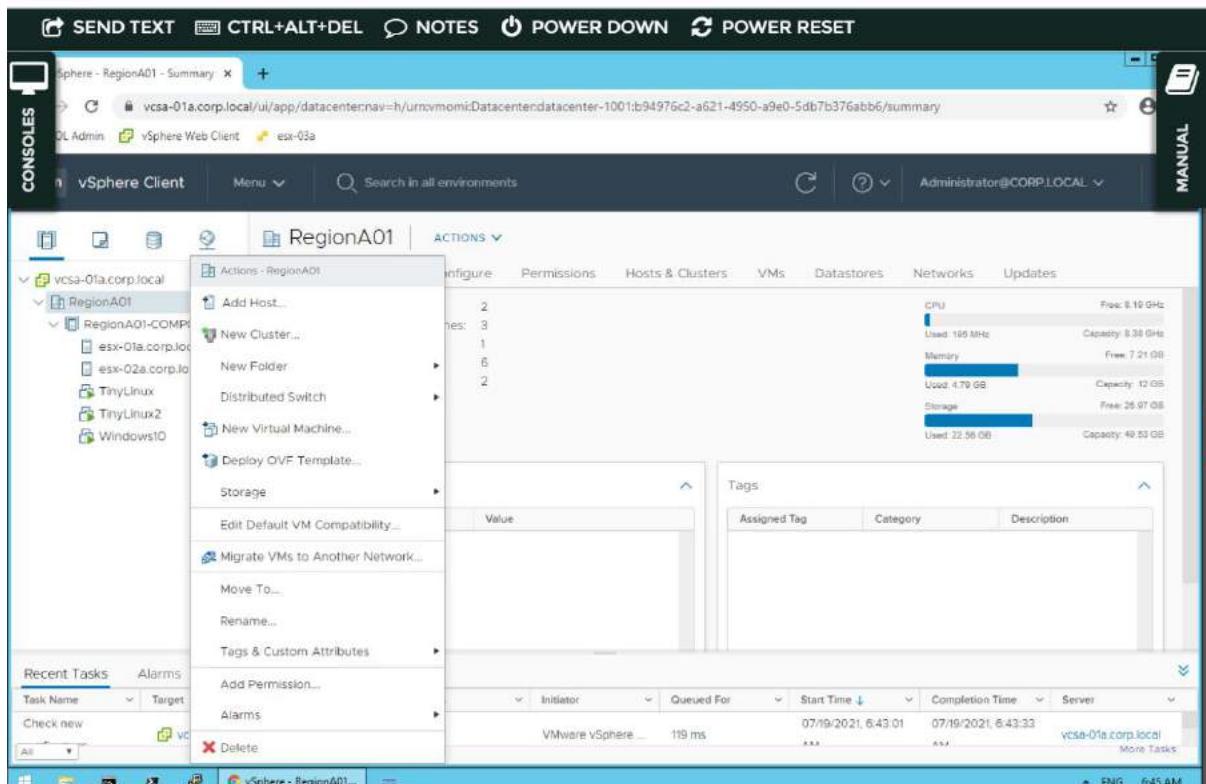
Step 1 : SELECT HOST AND CLUSTERS

- Click Menu
- Click Host and Clusters



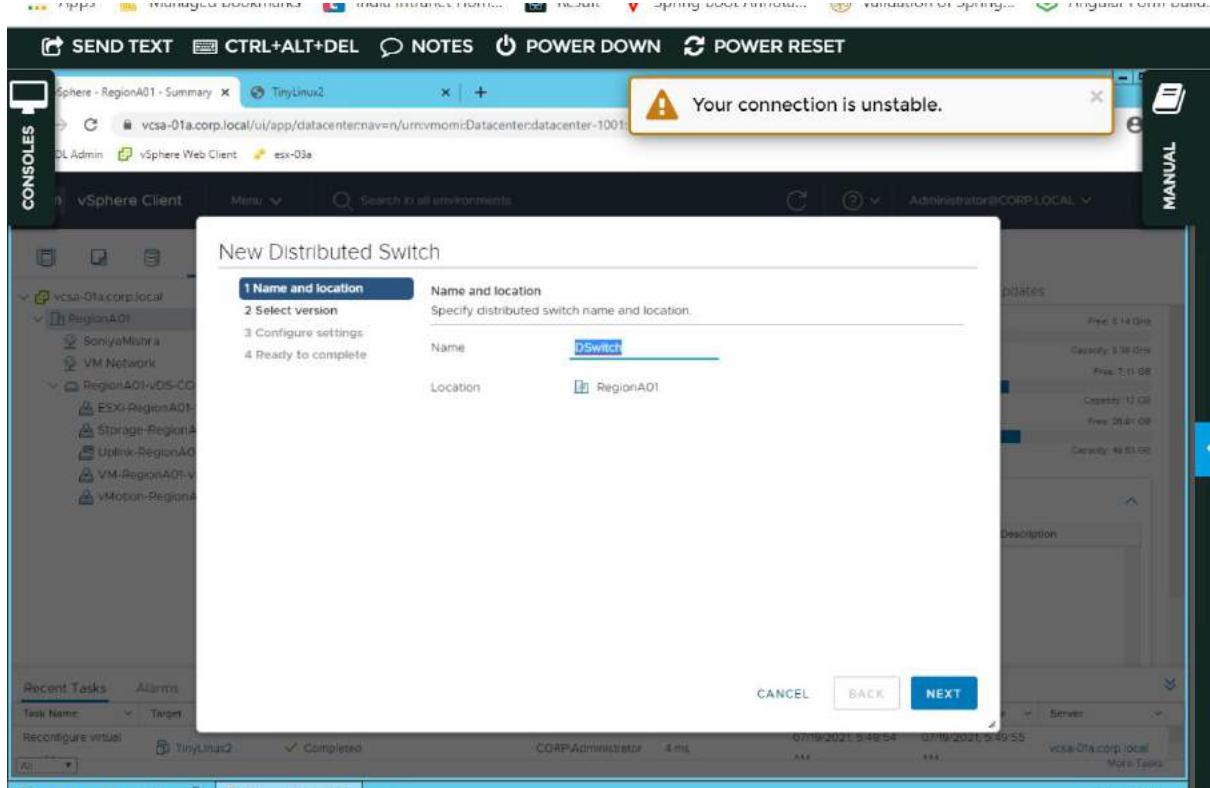
Step 2 : ADD A VSphere DISTRIBUTED SWITCH USING THE VSphere WEB CLIENT

- Under vcsa-01a.corp.local, right-click RegionA01
- Select Distributed Switch and then click New Distributed Switch



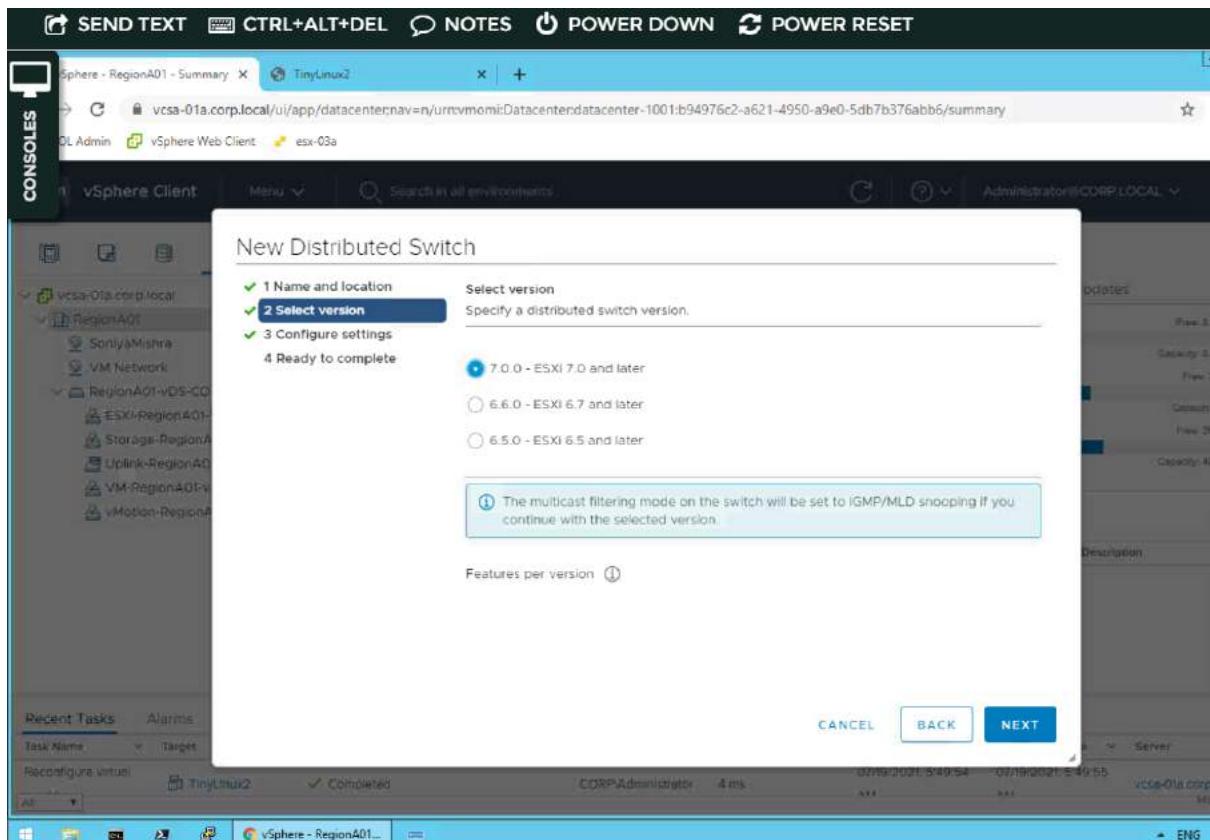
Step 3: NAME AND LOCATION

- Give name for the new distributed switch.
- Click Next



Step 4 : SELECT VERSION

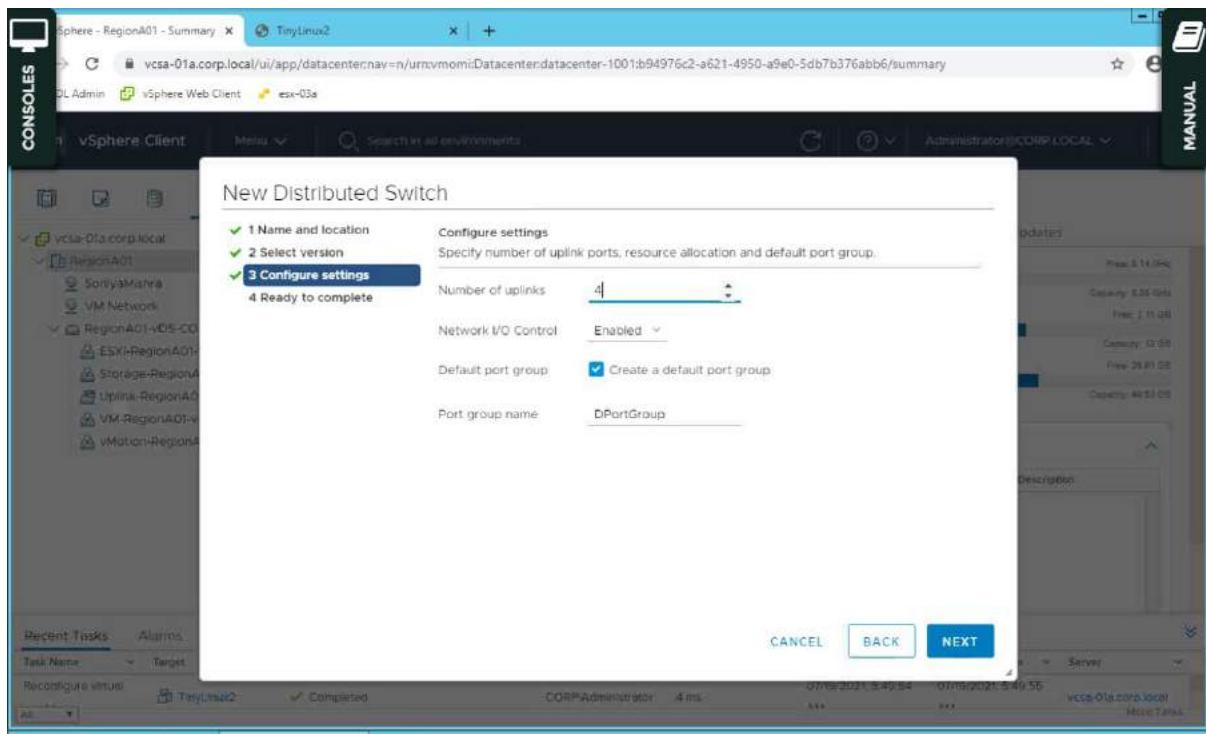
- Leave the default setting of 7.0.0 - ESXi 7.0 and later
- Click Next



Step 5 : CONFIGURE SETTINGS

The configure settings screen allows configuring the number of uplinks to the vDS, Network I/O Control (enabled by default), and allows creating the first distributed port group and name.

- Leave the default options and click Next



Step 6: READY TO COMPLETE

- Click finish

New Distributed Switch

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

Name	SonyiADS
Version	7.0.0
Number of uplinks	4
Network I/O Control	Enabled
Default port group	DPortGroup

Suggested next actions

- New Distributed Port Group
- Add and Manage Hosts

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

SONYA - RegionA01 - Summary

SonyiADS

Manufacturer: VMware, Inc.
Version: 7.0.0

Switch Details

Features

Notes

Tags

Step 7 : ADD HOSTS TO A VSphere DISTRIBUTED SWITCH IN THE VSphere WEB CLIENT

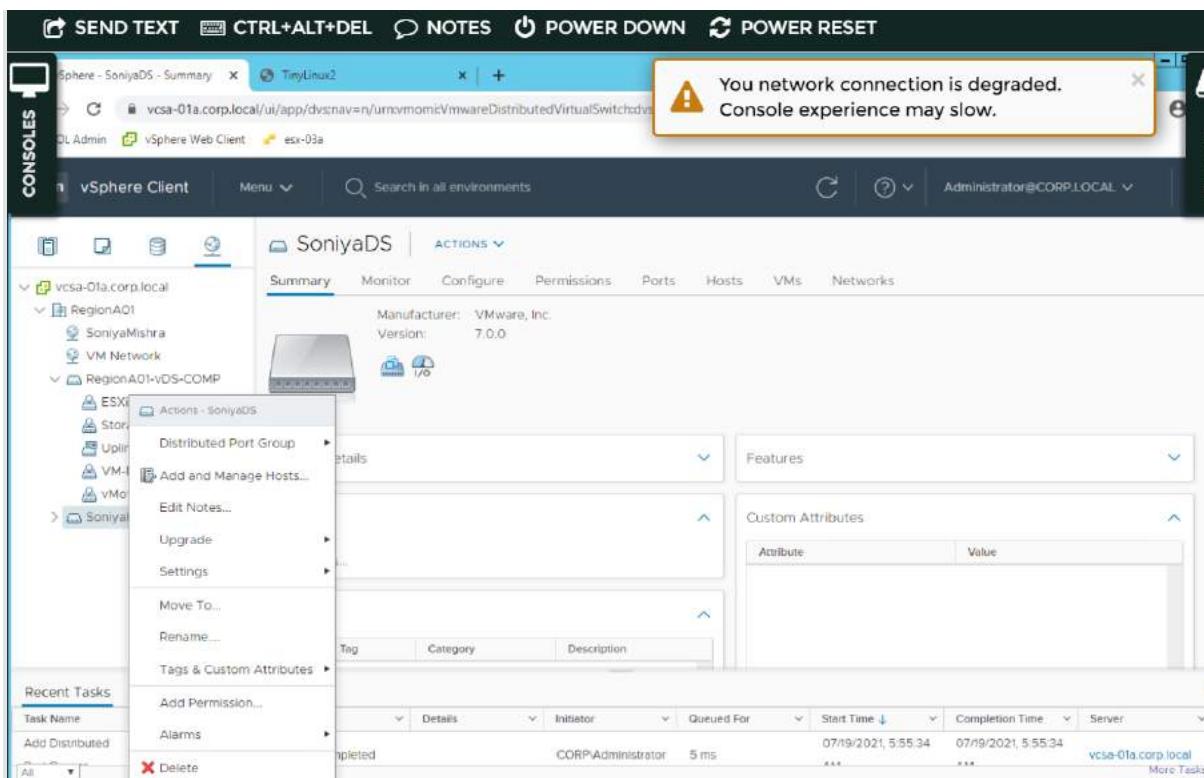
Adding ESXi hosts to the Distributed Port Group

One of the fundamental differences in the vSphere Distributed Switch vs. the vSphere Standard Switch is where the management plane resides. Keep in

mind, merely creating a vSphere Distributed Switch does not automatically add them to your ESXi hosts. Add the ESXi hosts to the new vSphere Distributed Switch to add the data plane to the ESXi host. Now that we have created a new vSphere Distributed Switch, we can add it to the ESXi hosts.

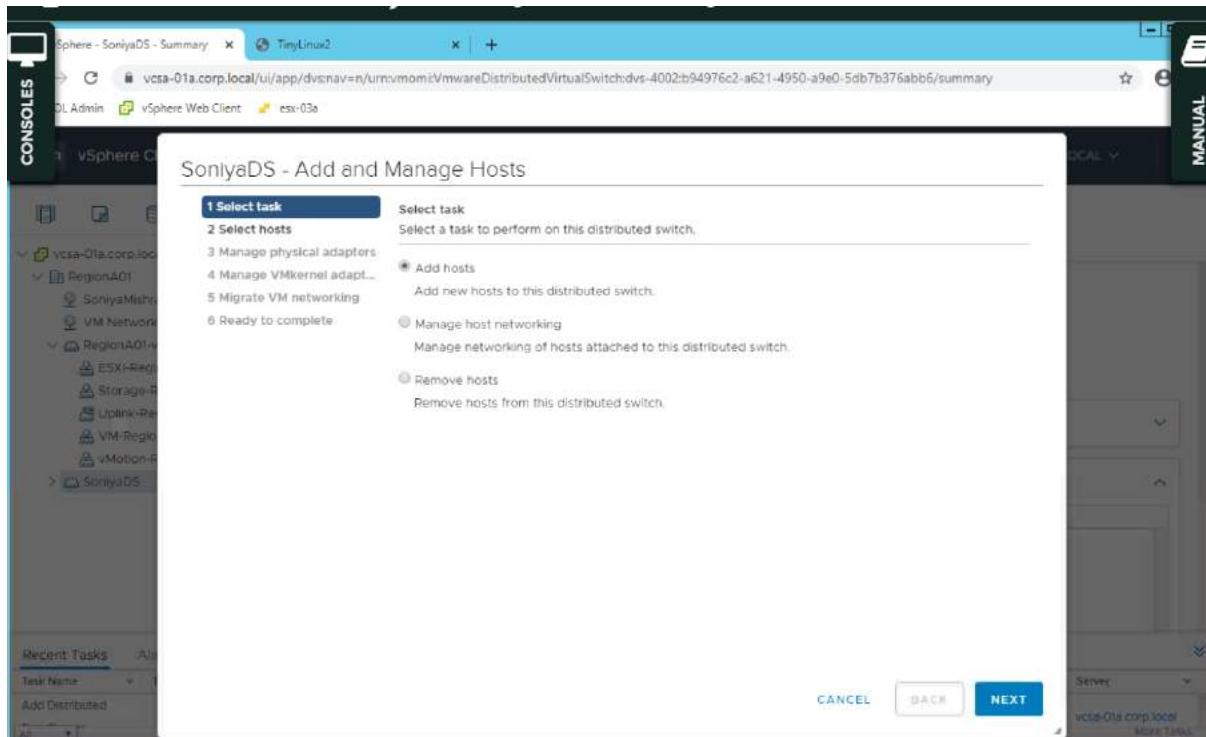
To add the vDS to your ESXi hosts, visit the networking tab, right-click your vDS that you want to add to your ESXi host, and select Add and Manage Hosts.

- Right-click on DSwitch
- Select Add and Manage Hosts



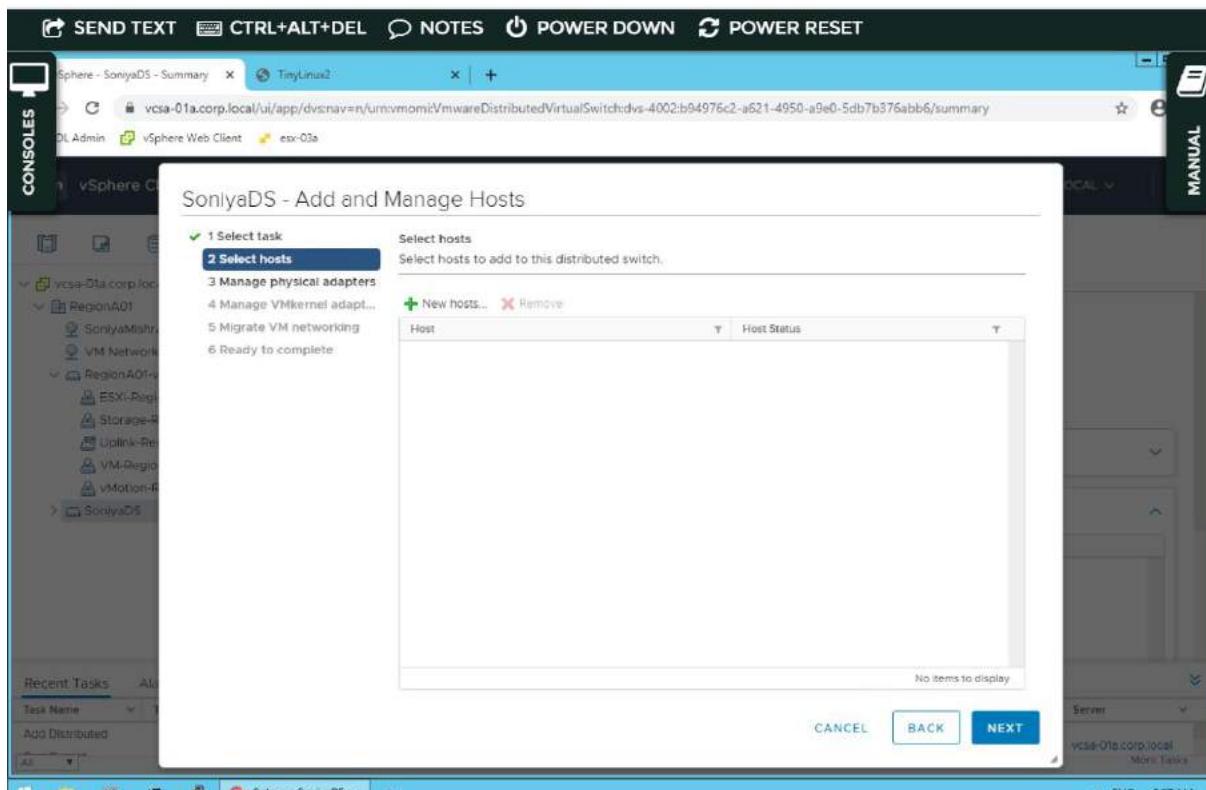
Step 8 : SELECT TASK

- Select Add hosts
- Click Next



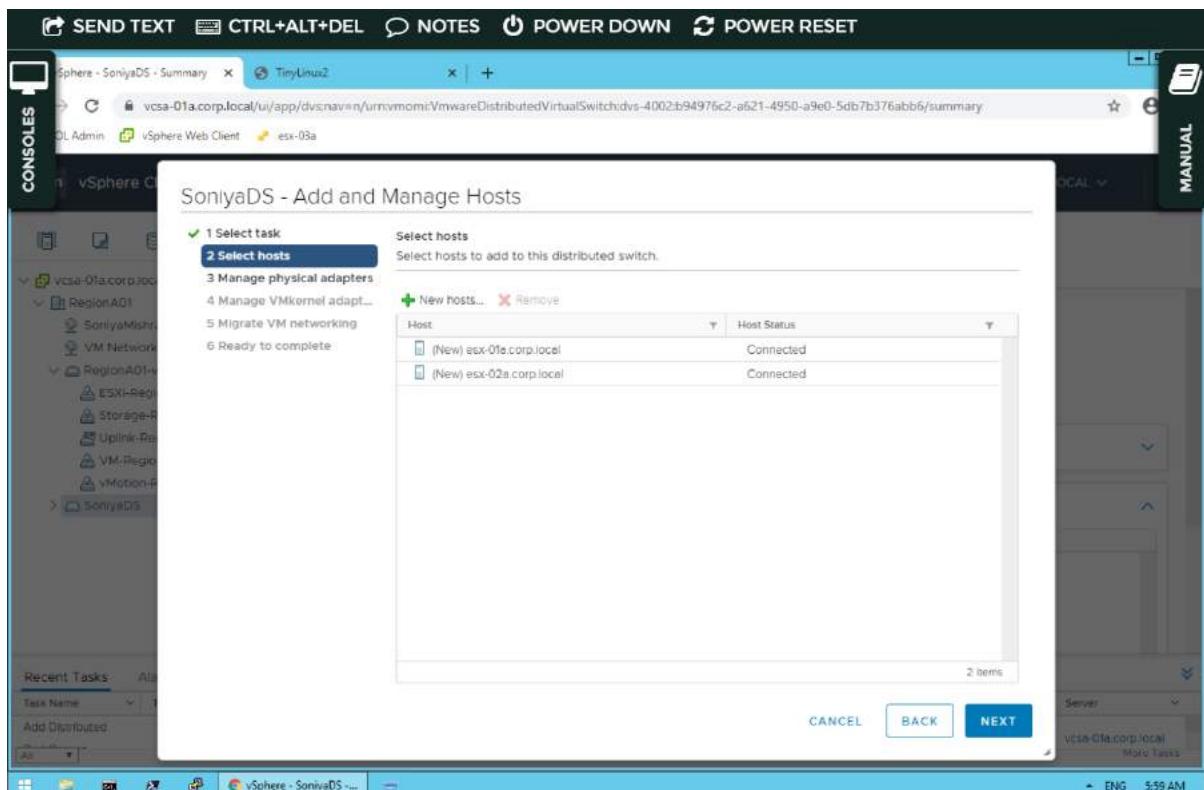
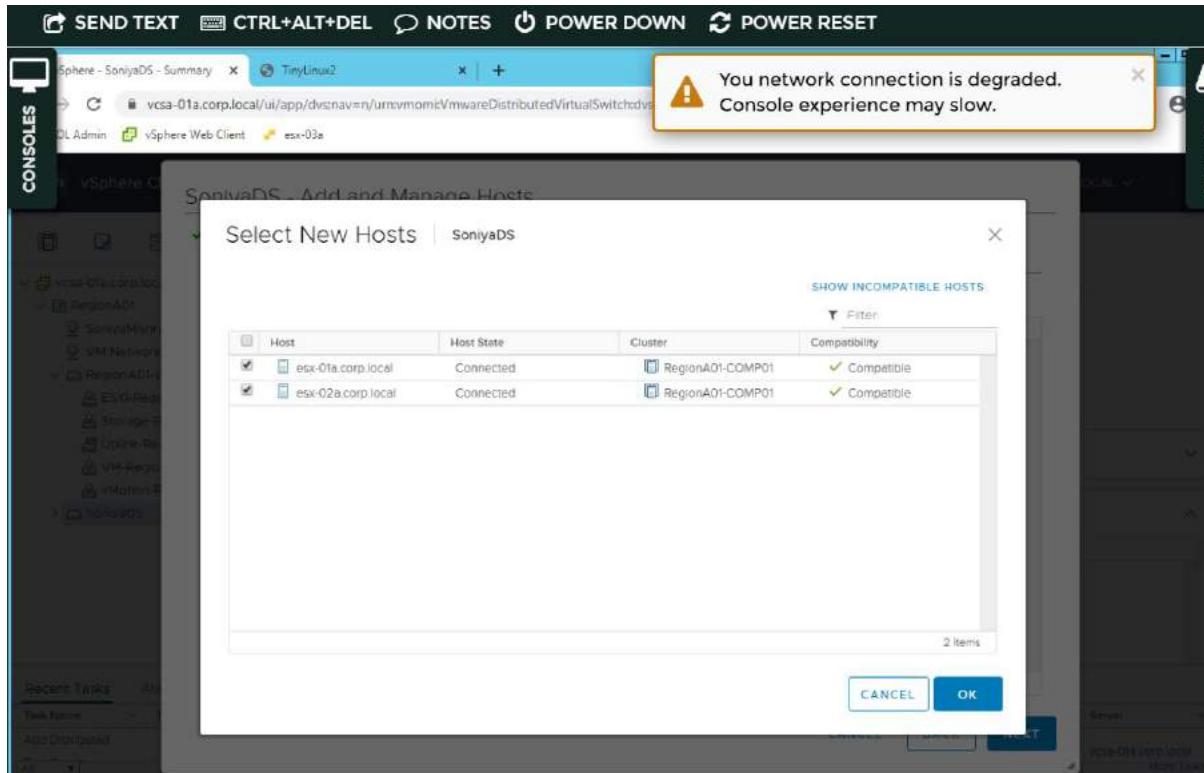
Step 9 : SELECT HOSTS

- Click New hosts



Step 10 : SELECT YOUR HOSTS

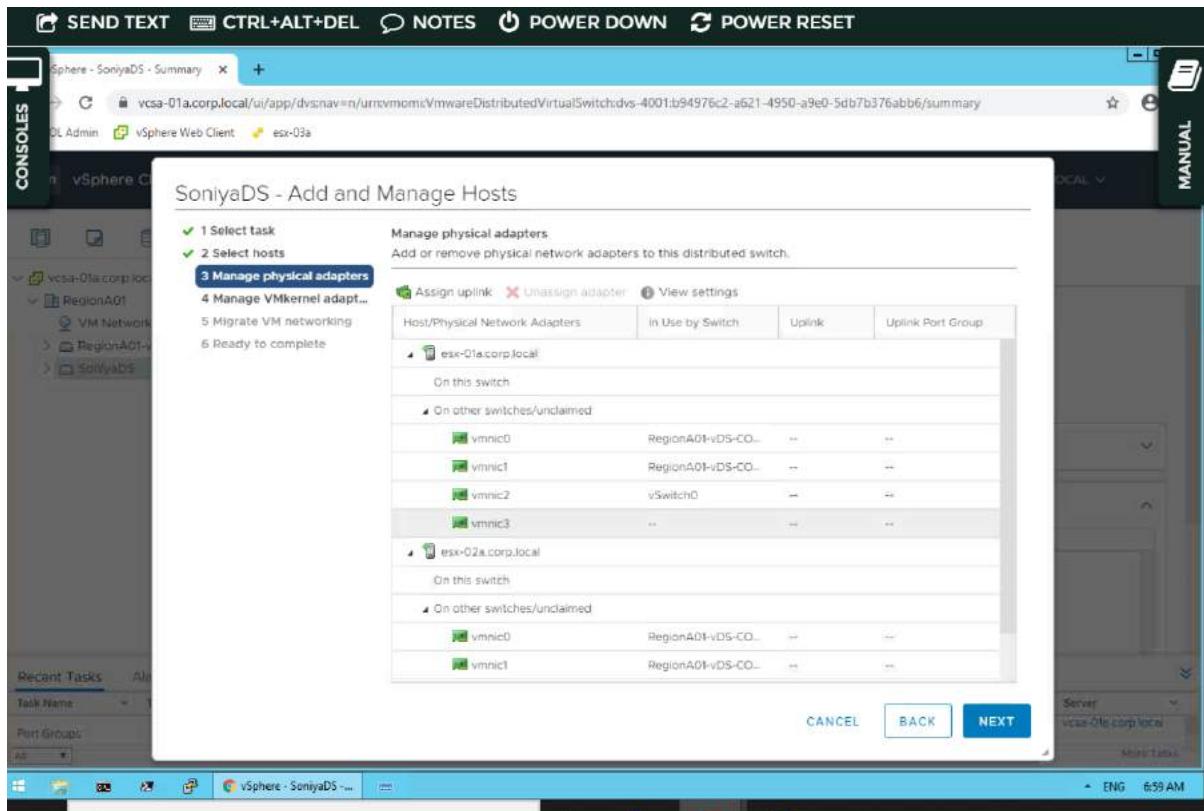
- Select all ESXi hosts shown (esx-01a.corp.local and esx-02a.corp.local)
- Click OK



Click Next.

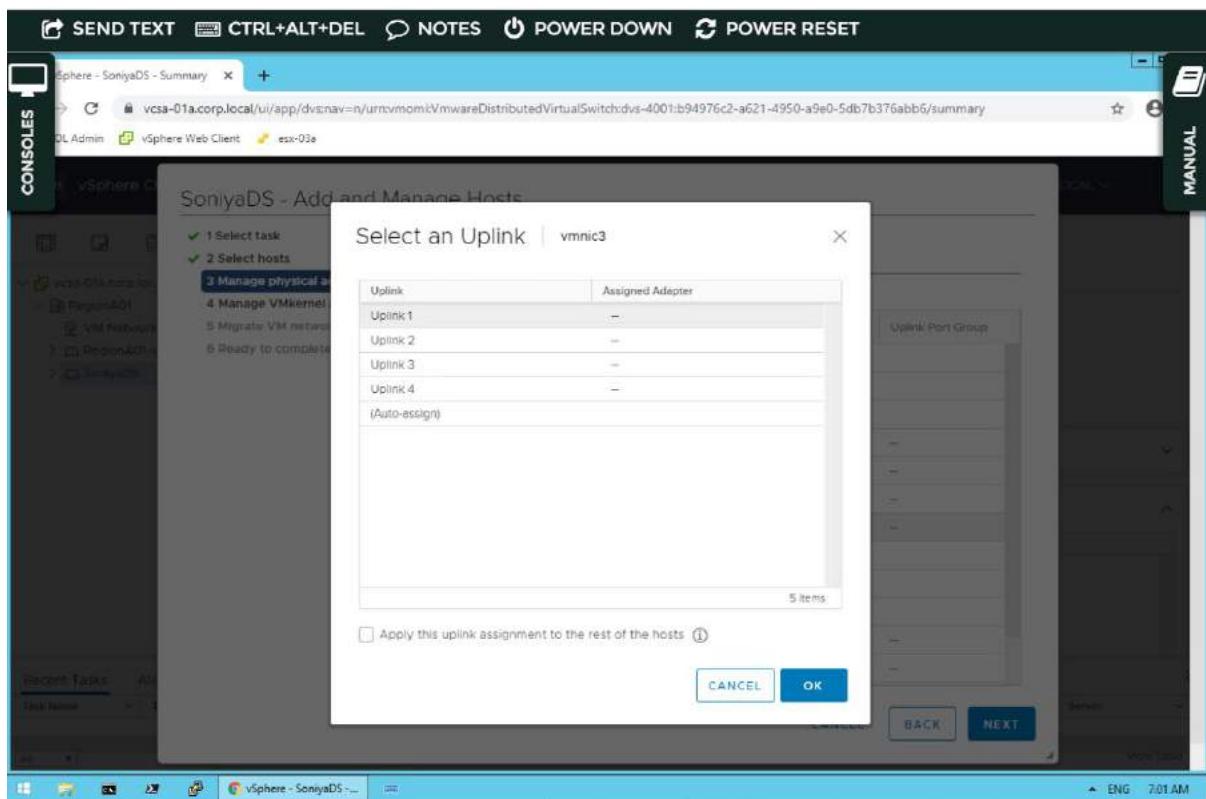
Step 11 : MANAGE PHYSICAL NETWORK ADAPTERS

- Select vmnic3
- Click Assign uplink



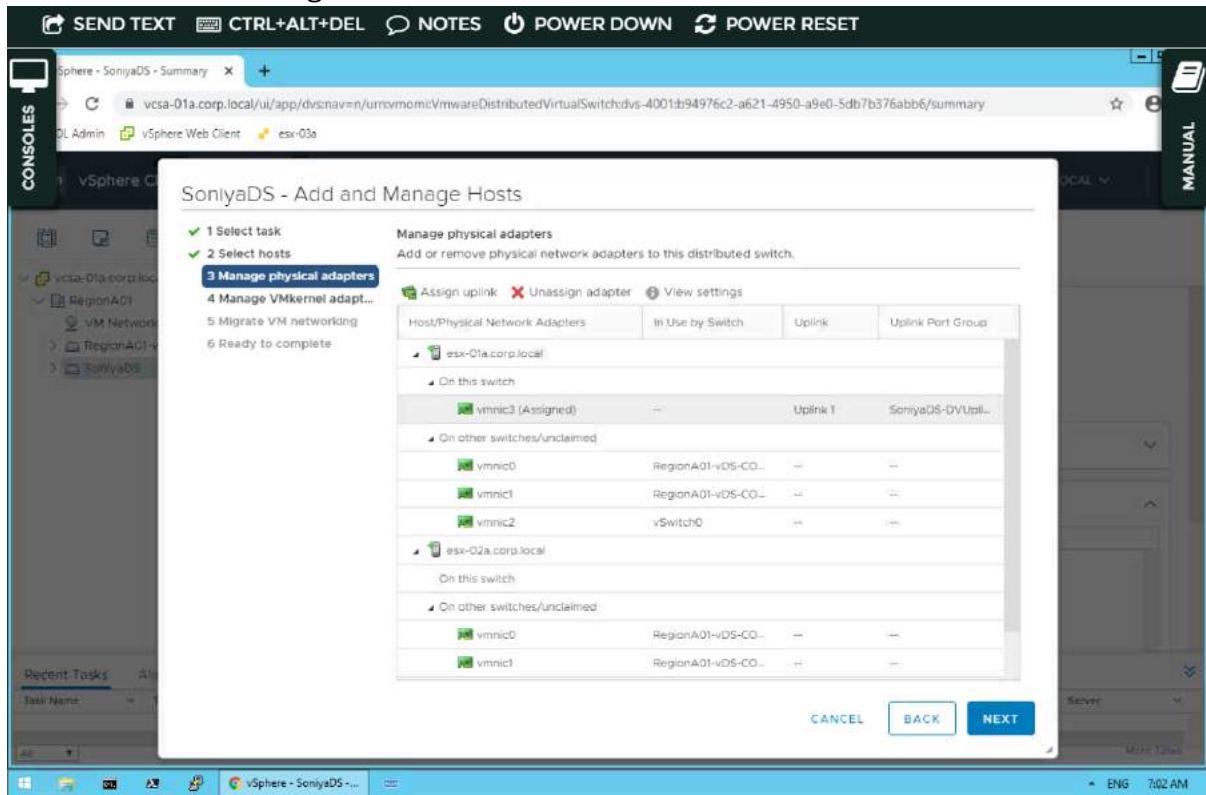
Step 12 : SELECT AN UPLINK FOR VMNIC3

- Select Uplink 1
- Click OK



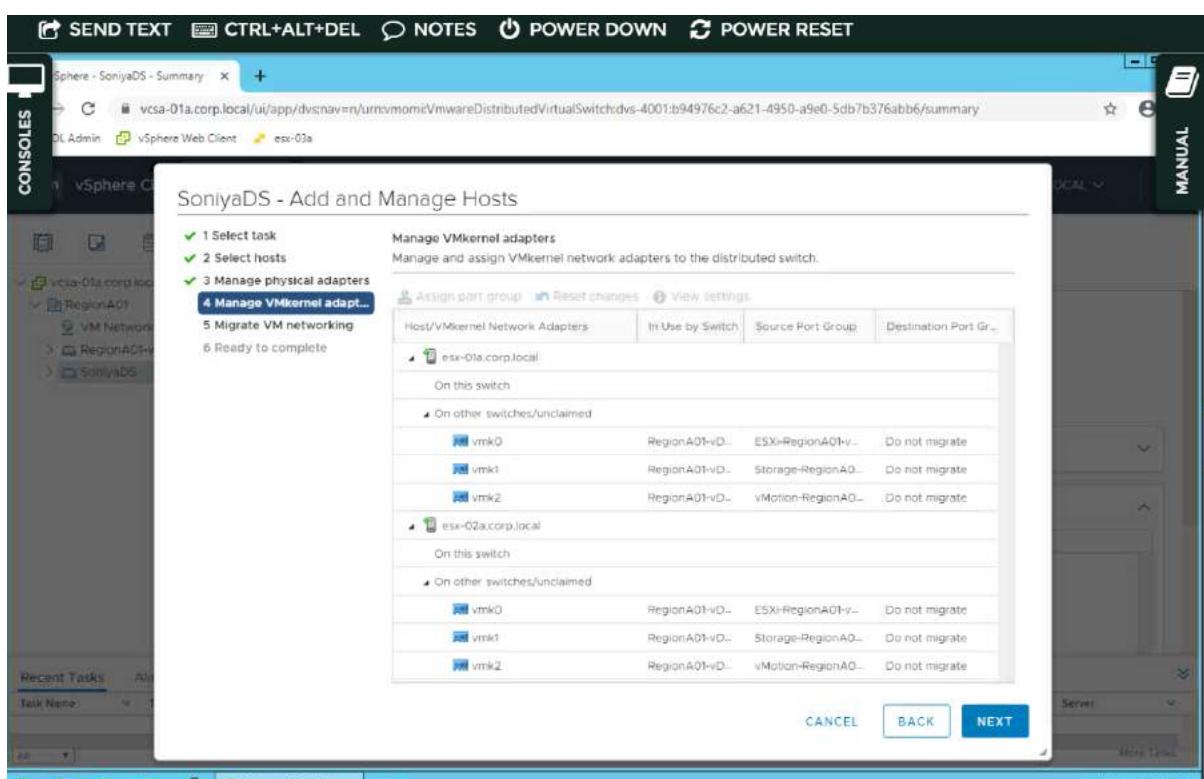
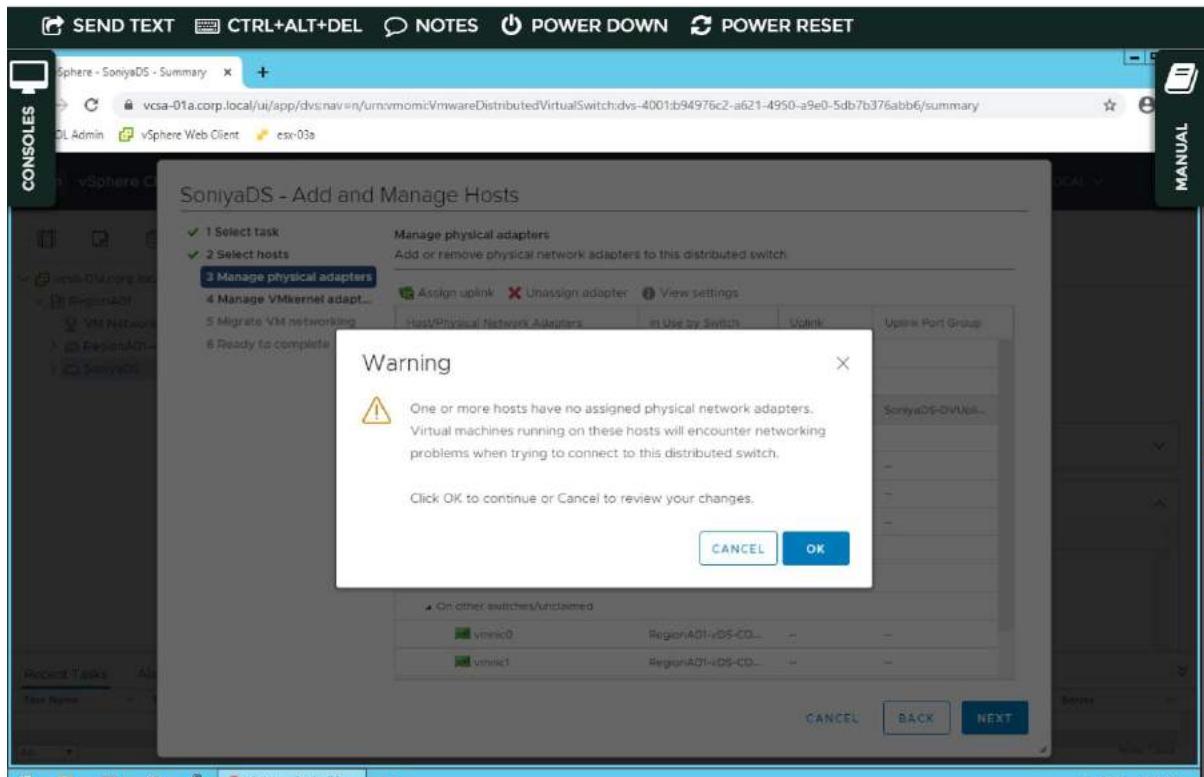
Step 13 : CONFIRM ADDITION

- vmnic3 is assigned and click Next to continue



Step 14 : Warning Message

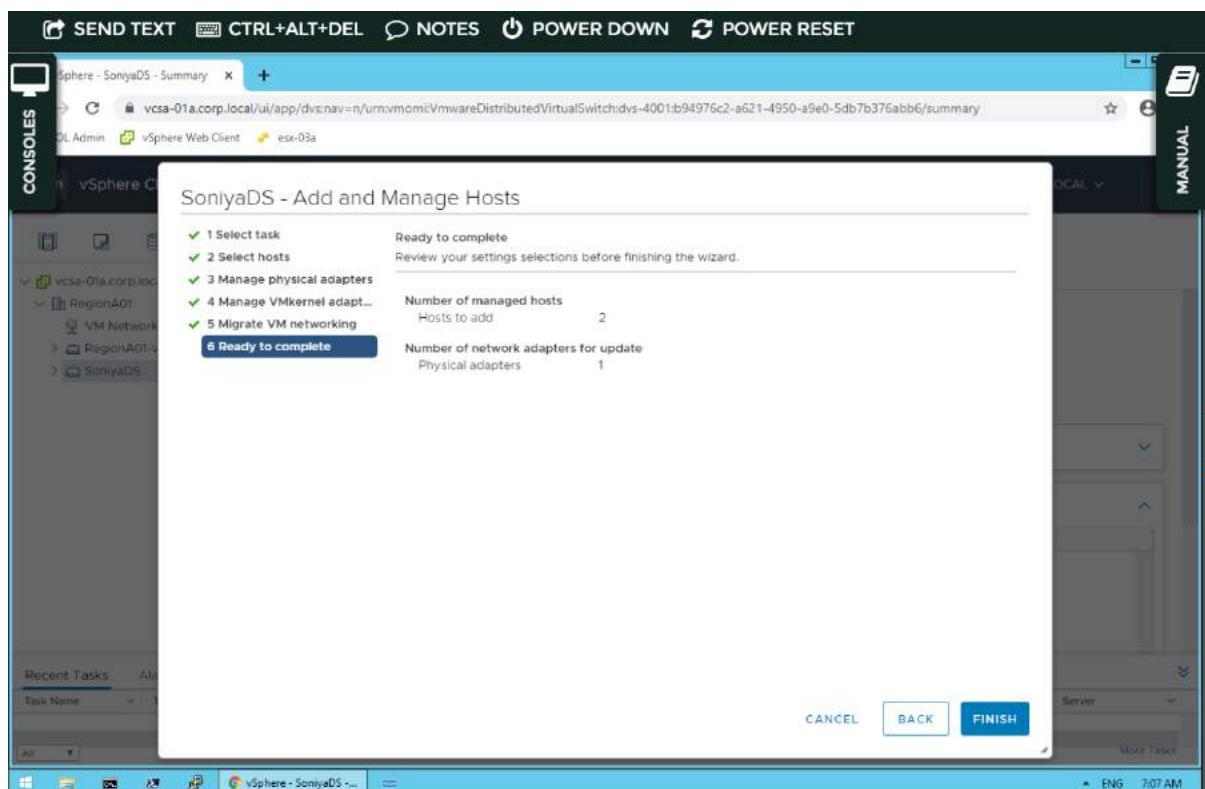
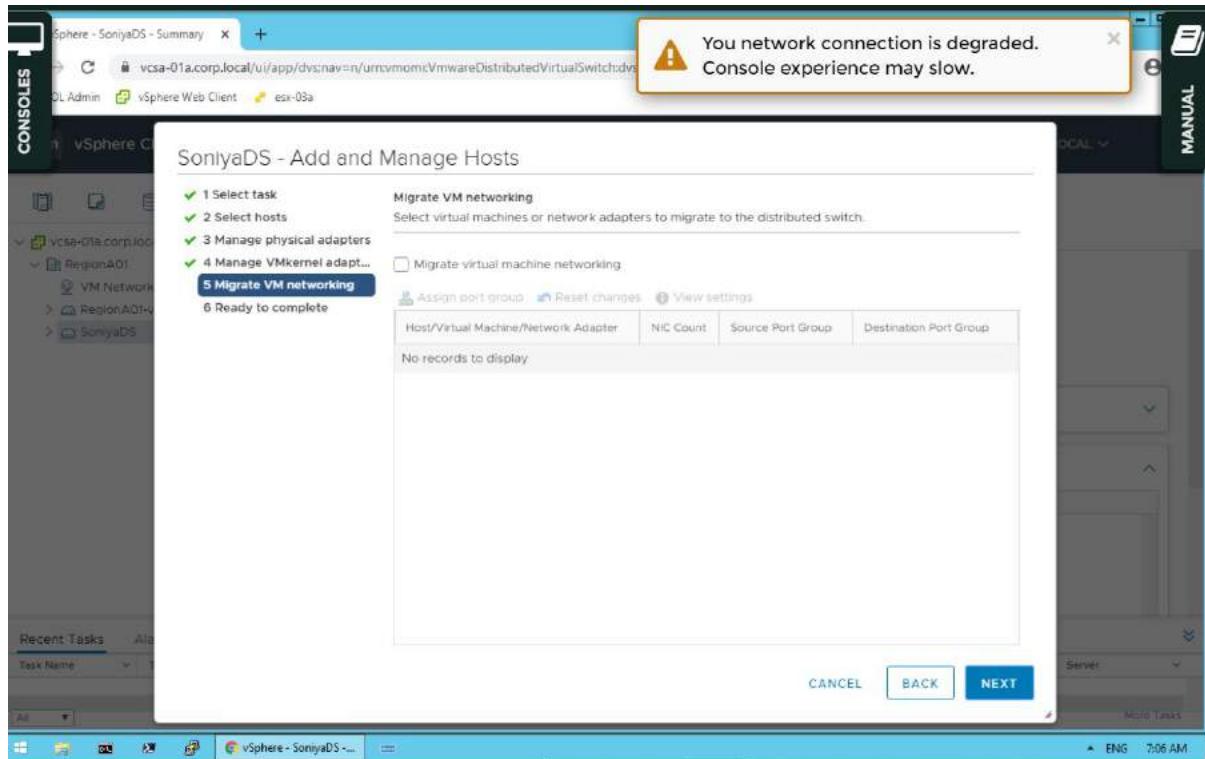
- Click OK to continue



Click Next
Click next

Step 15: MIGRATE VM NETWORKING

- Click Next to Continue



Click Finish

Practical 5

Aim: Implement the NFS with the vCenter Server.

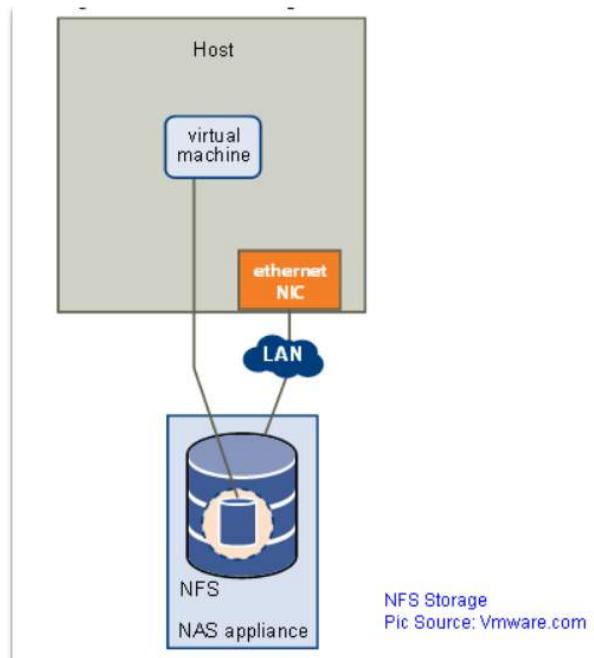
Security-Add new role and add permission.

A . Implement the NFS with the vCenter Server.

NFS (Network File System) overview :

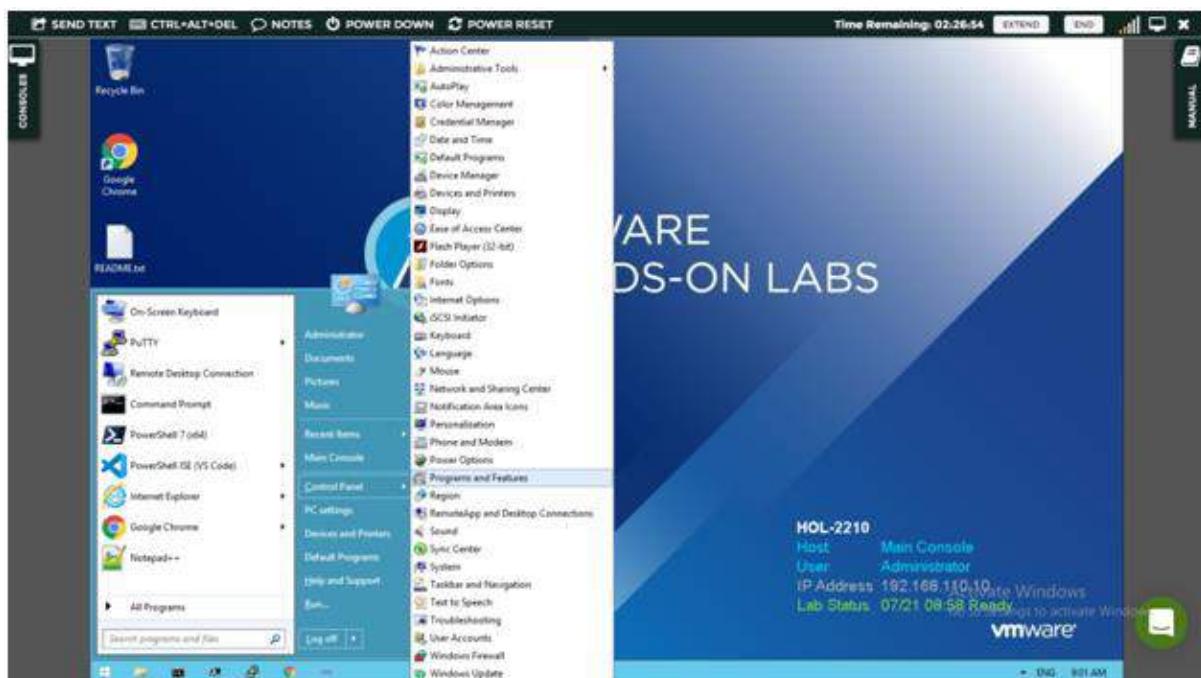
- NFS (Network File System) is a file-sharing protocol used by ESXi hosts to communicate with a NAS (Network Attached Storage) device over a standard TCP/IP network.
- A NAS device is a specialized storage device connected to a network, providing data access services to ESXi hosts through protocols such as NFS.
- NFS can hold virtual machine files, templates, ISO images, and other data.
- An NFS volume supports advanced vSphere features such as vMotion, DRS, and HA.
- ESXi includes a built-in NFS client that uses NFS v3 to communicate with the NFS server.
- NFS Volumes are created at storage end then you have to add it on ESXi as datastore.

NFS Storage Design

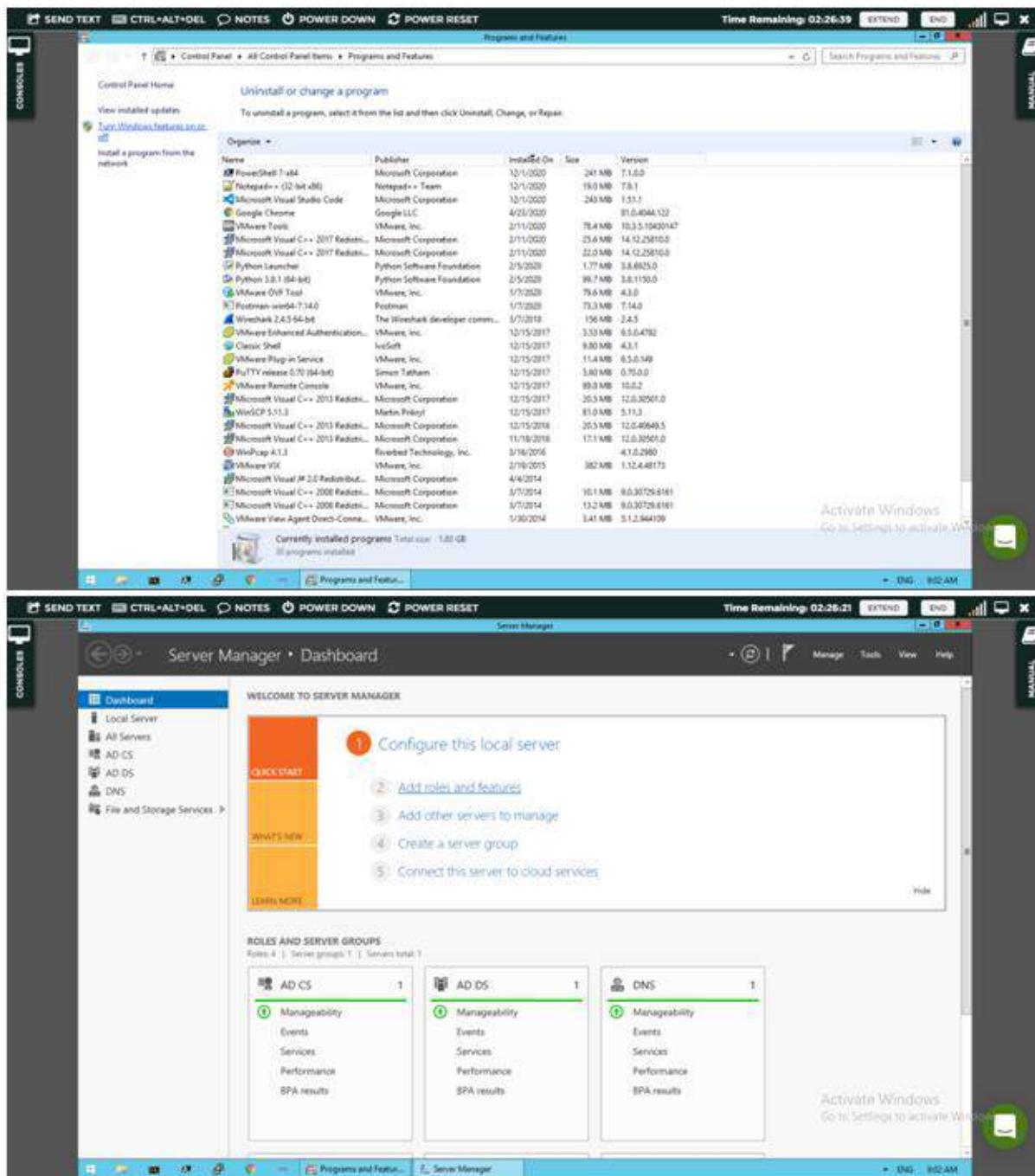


Steps for implementing NFS with VCentre server.

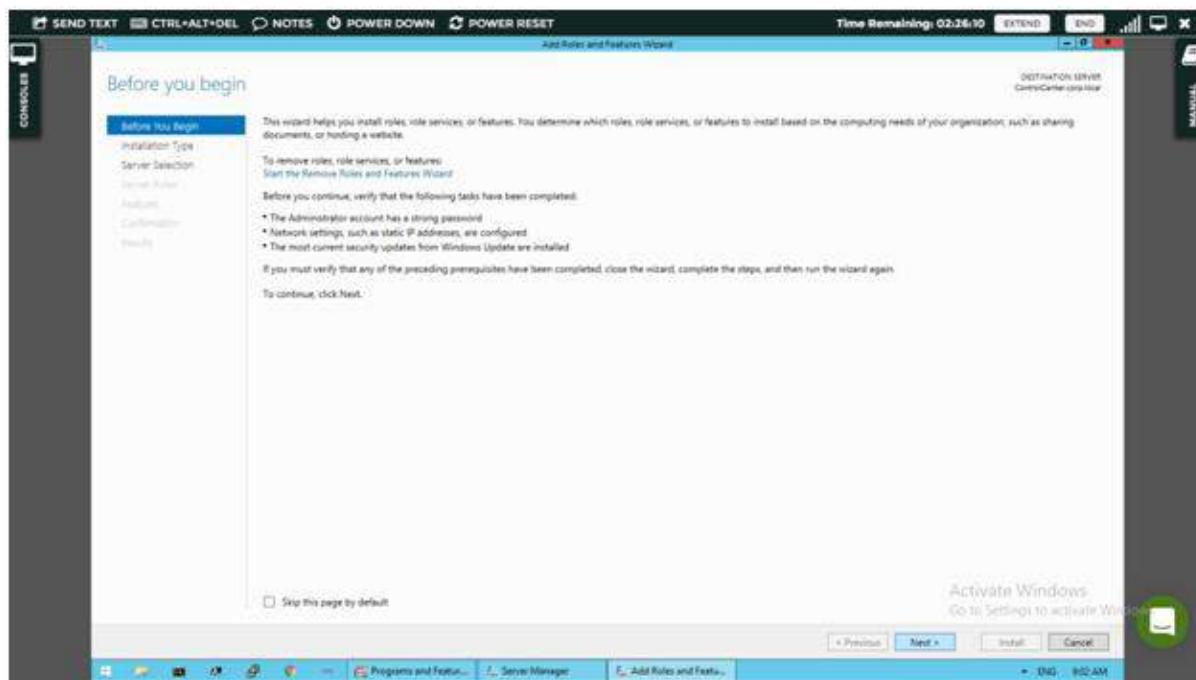
Step 1: Click on Start, Go to Control Panel and Select Programs & features.



Step 2: Click on Windows features turn On and Off >> Add roles and features.



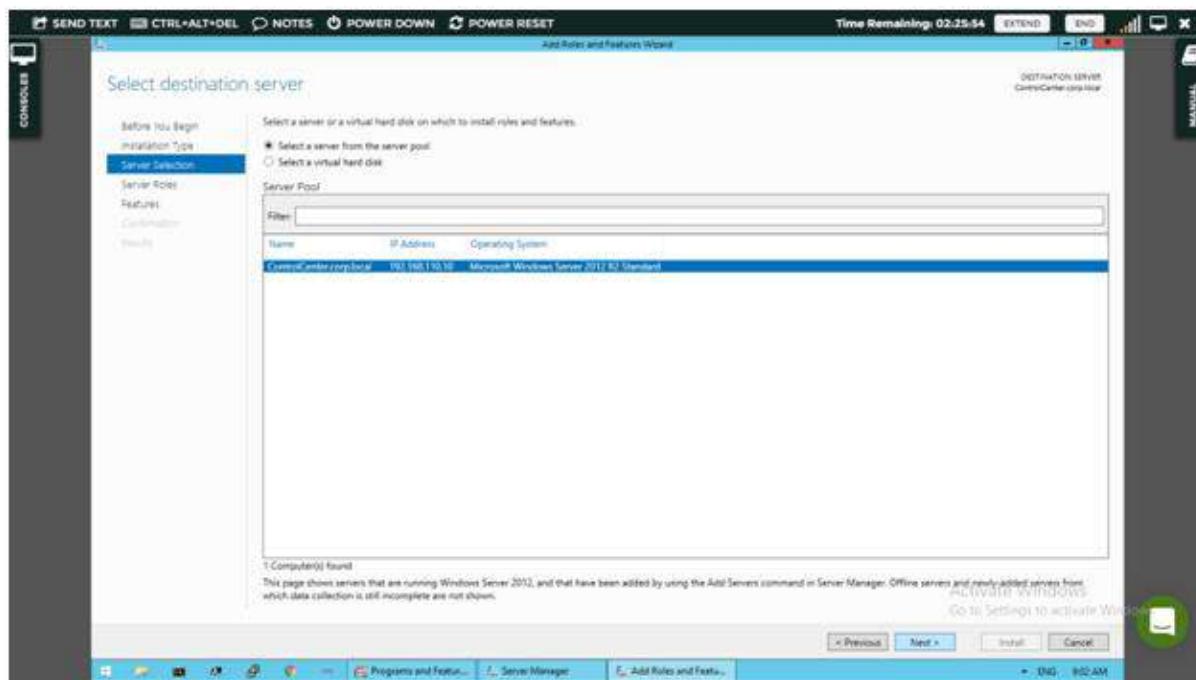
Step 3: Click on Next.



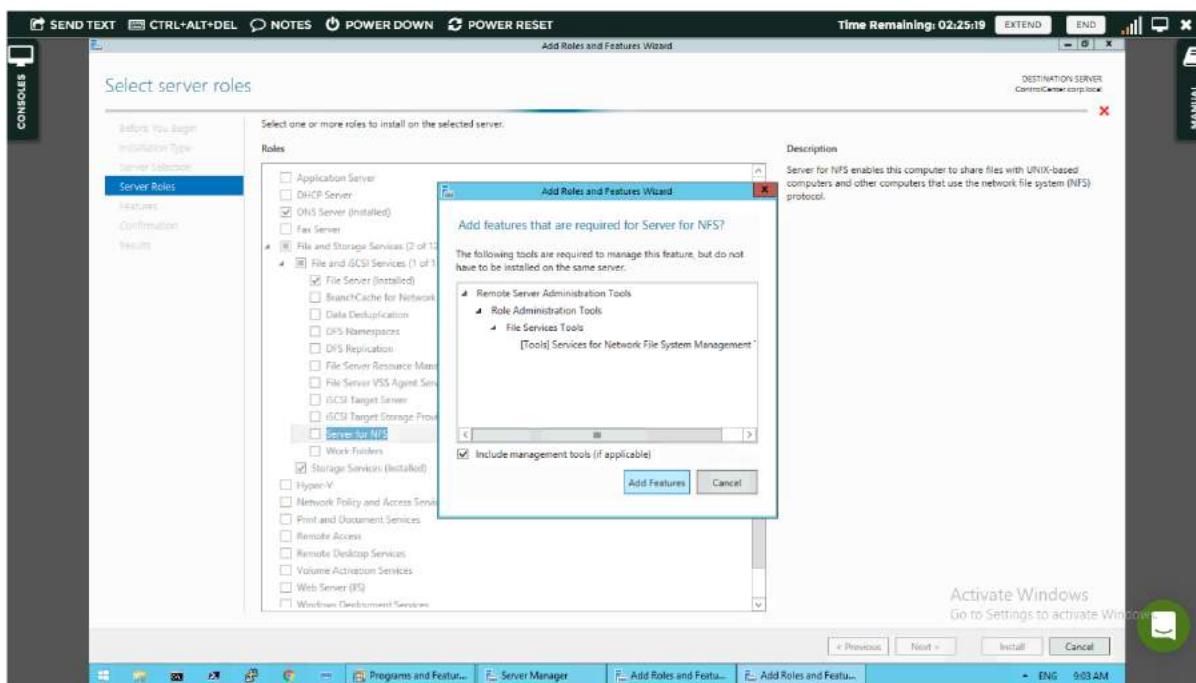
Step 4: Click on Next.

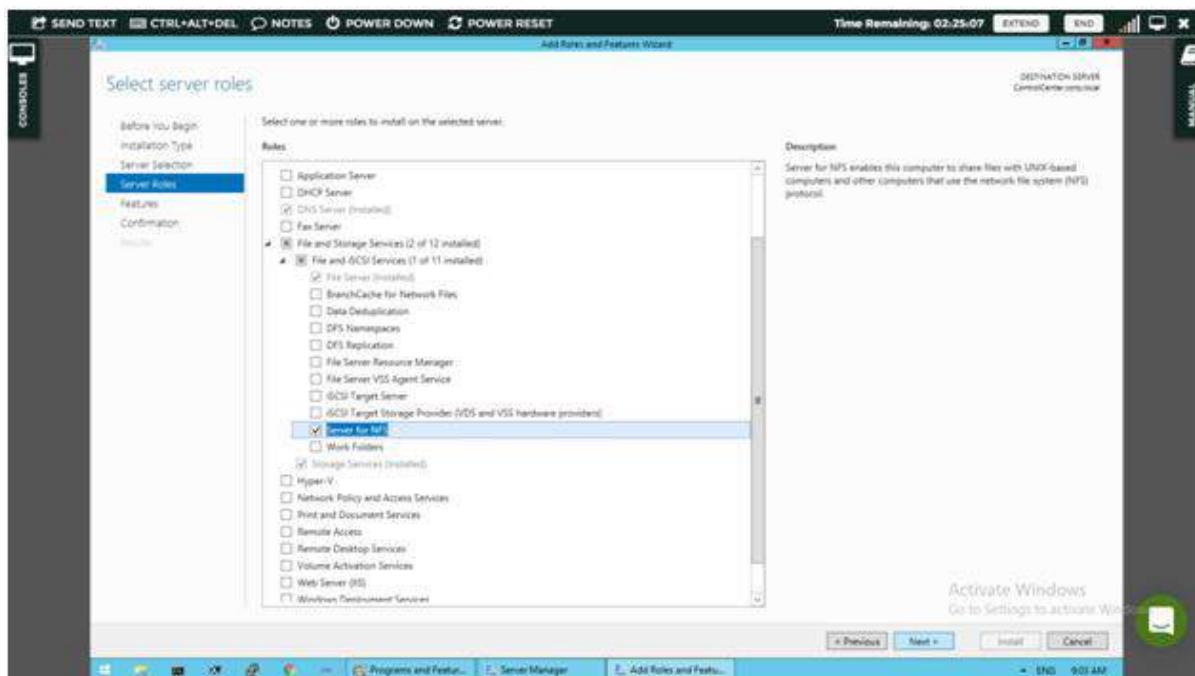


Step 5: Click on Next.

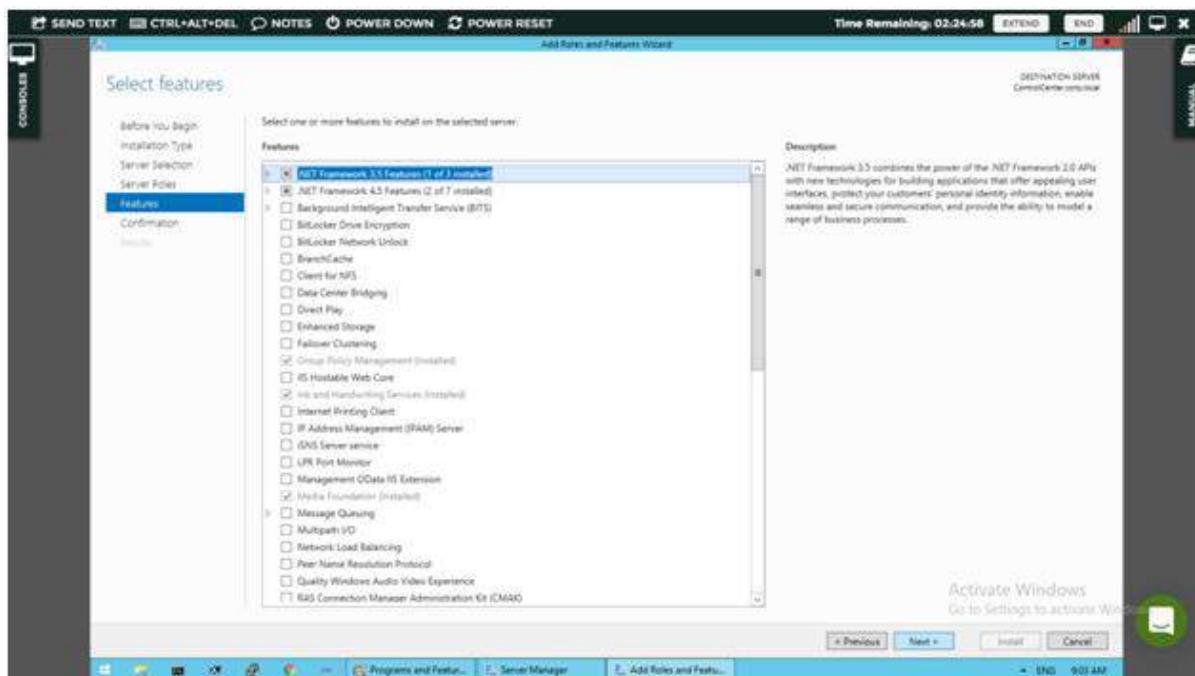


Step 6: Select Server for NFS & Add features.

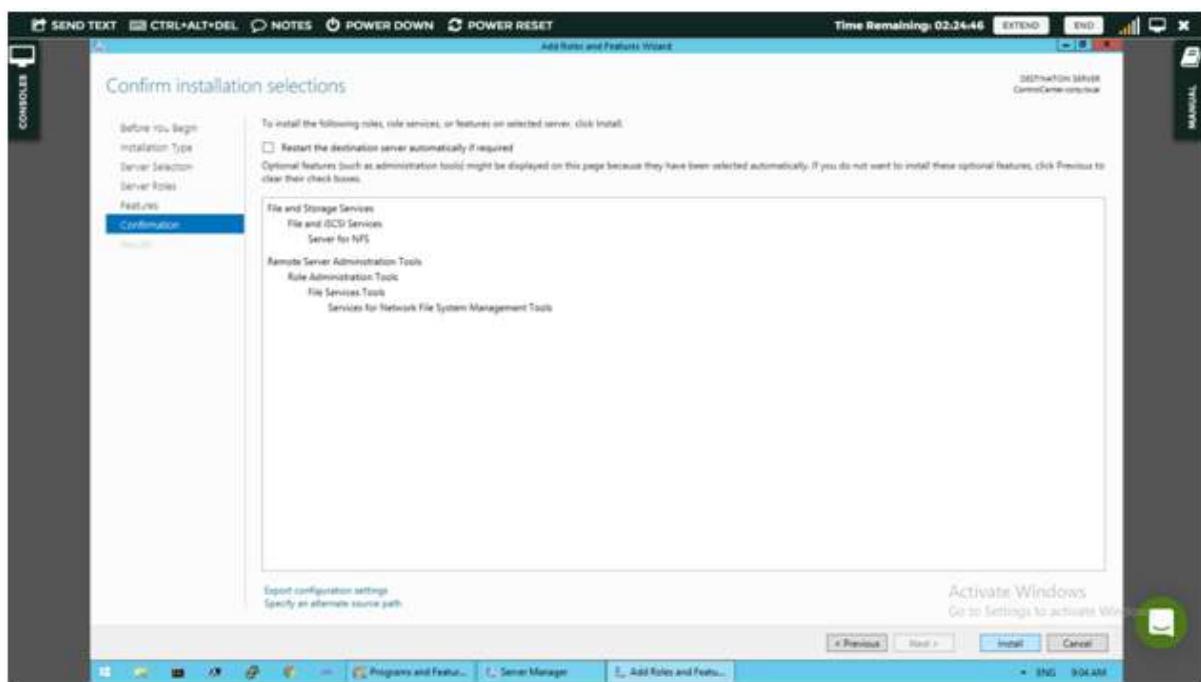




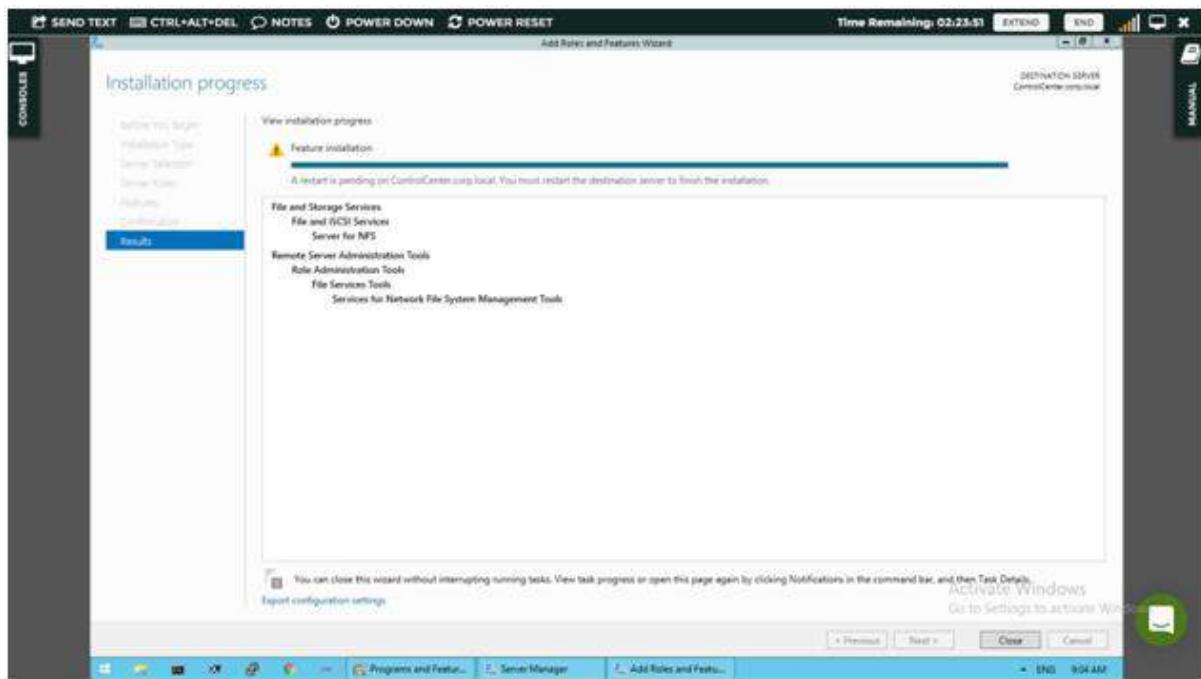
Step 7: Click on Next.

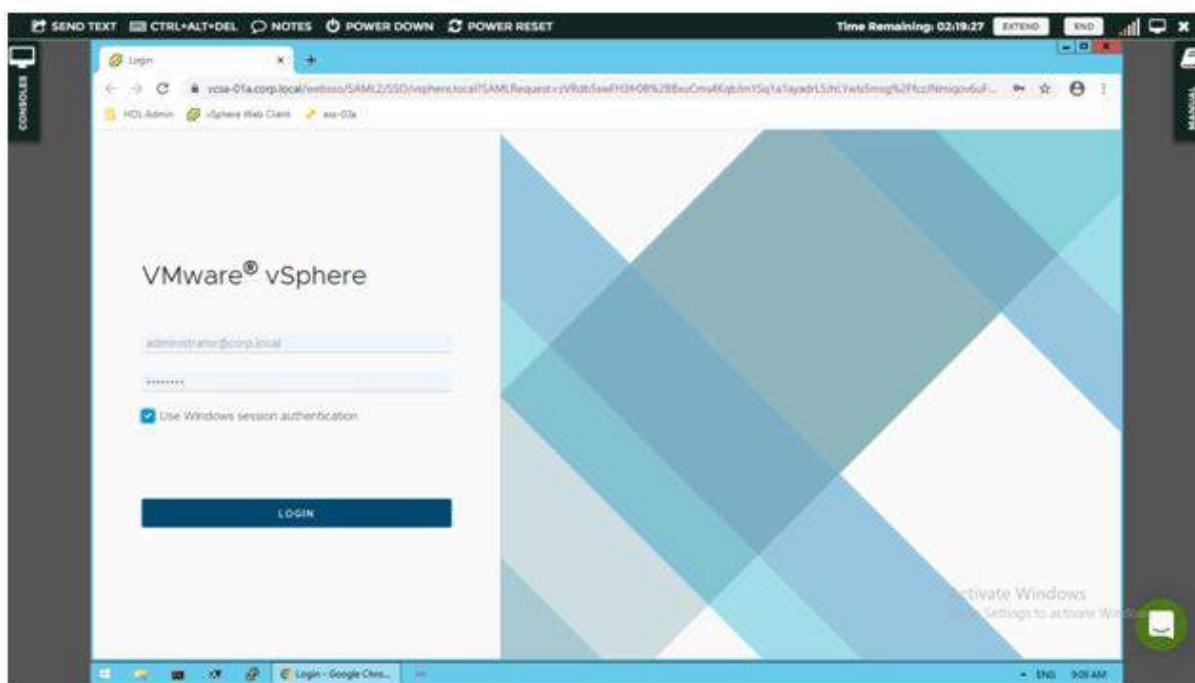
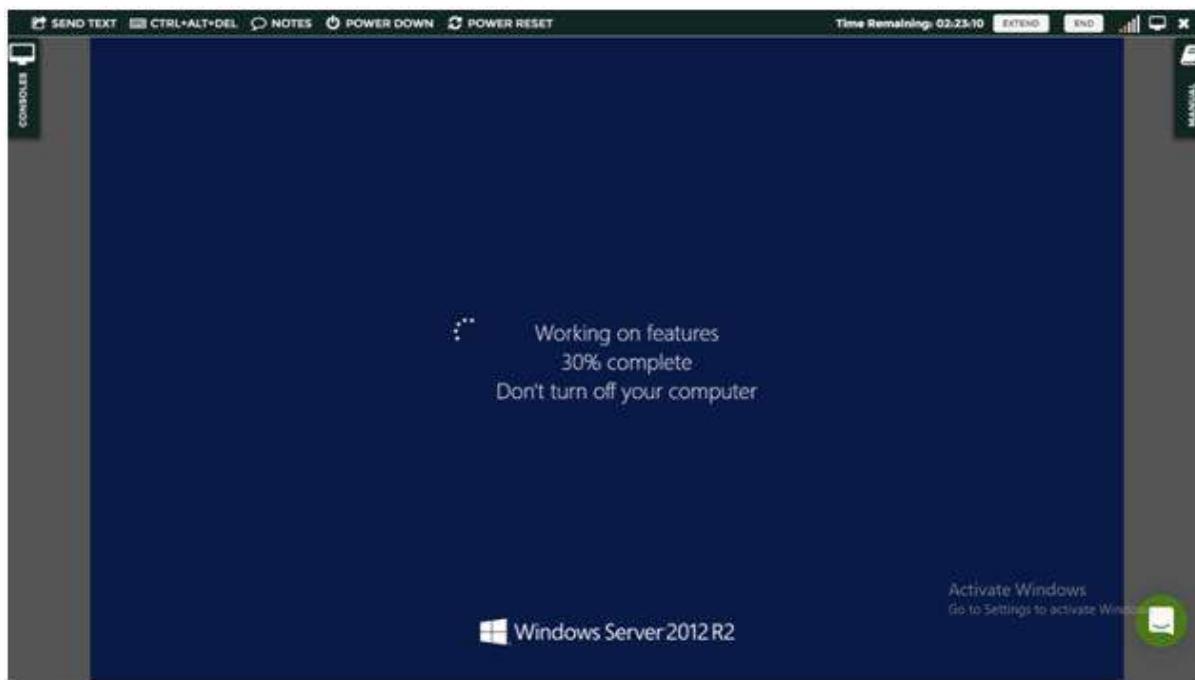


Step 8: Click on Install.

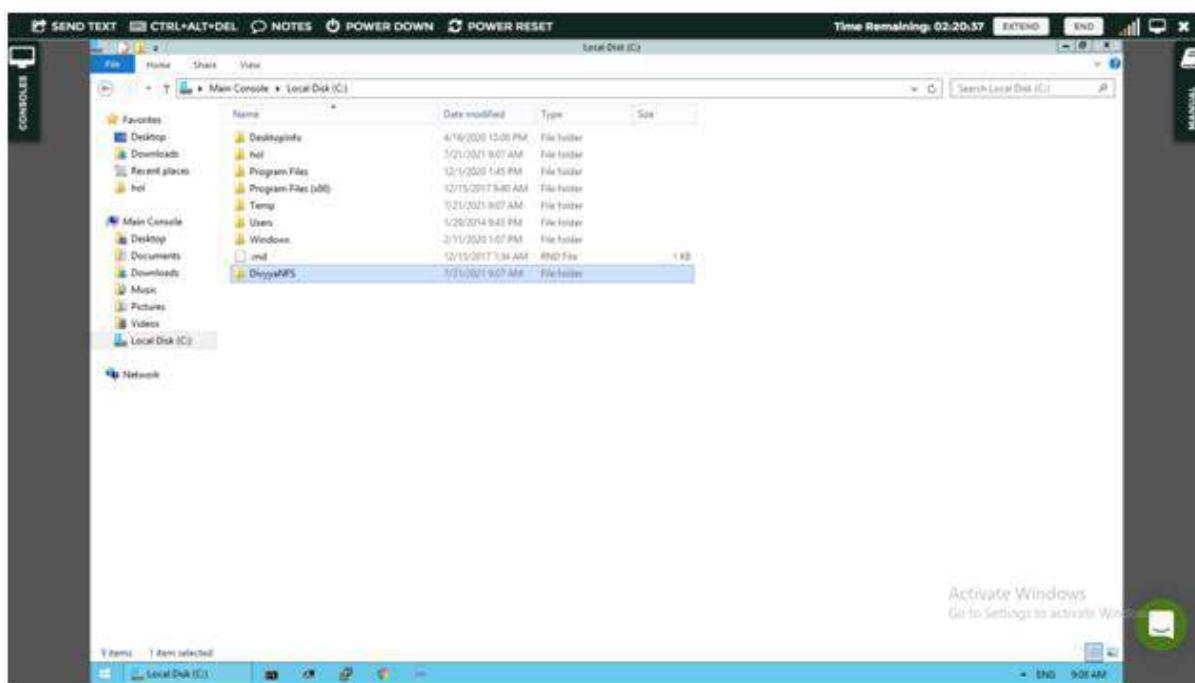
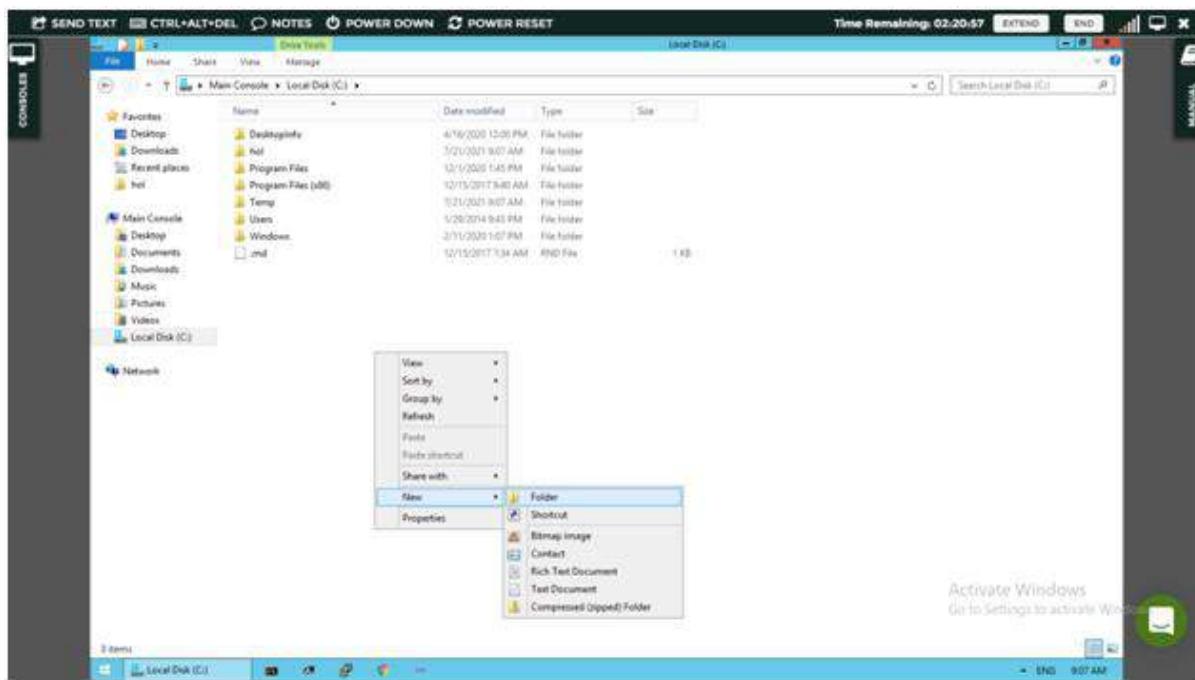


Step 9: After the installation is completed, Restart the PC >> Login to VSphere.

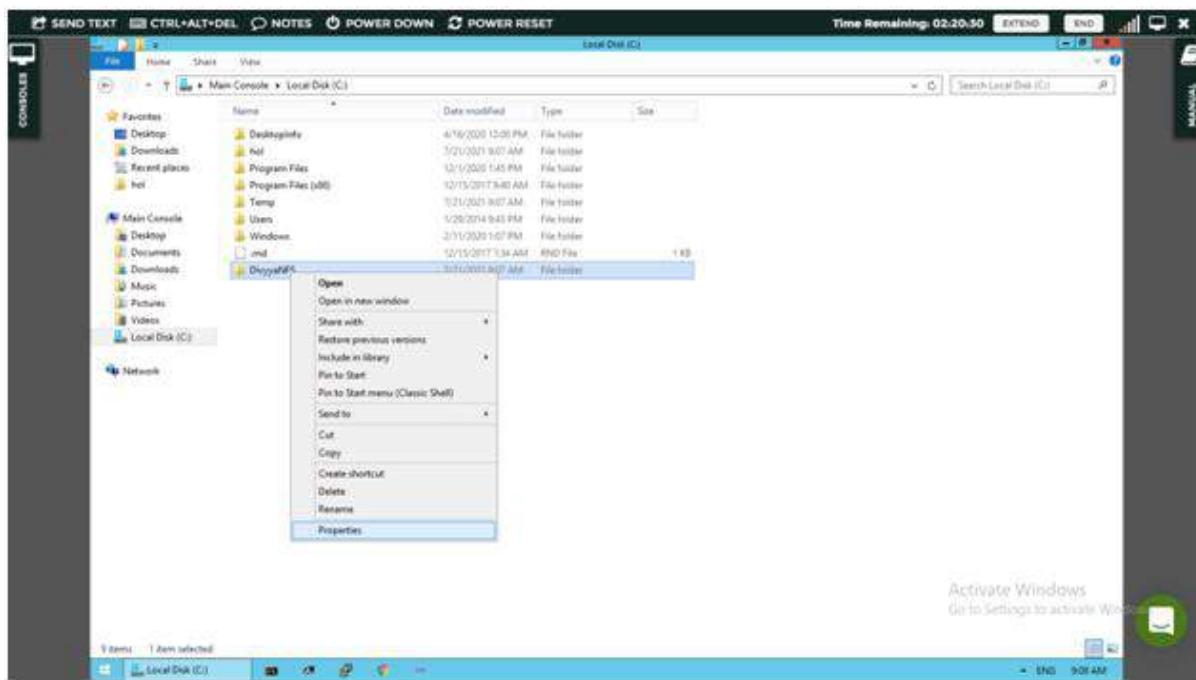




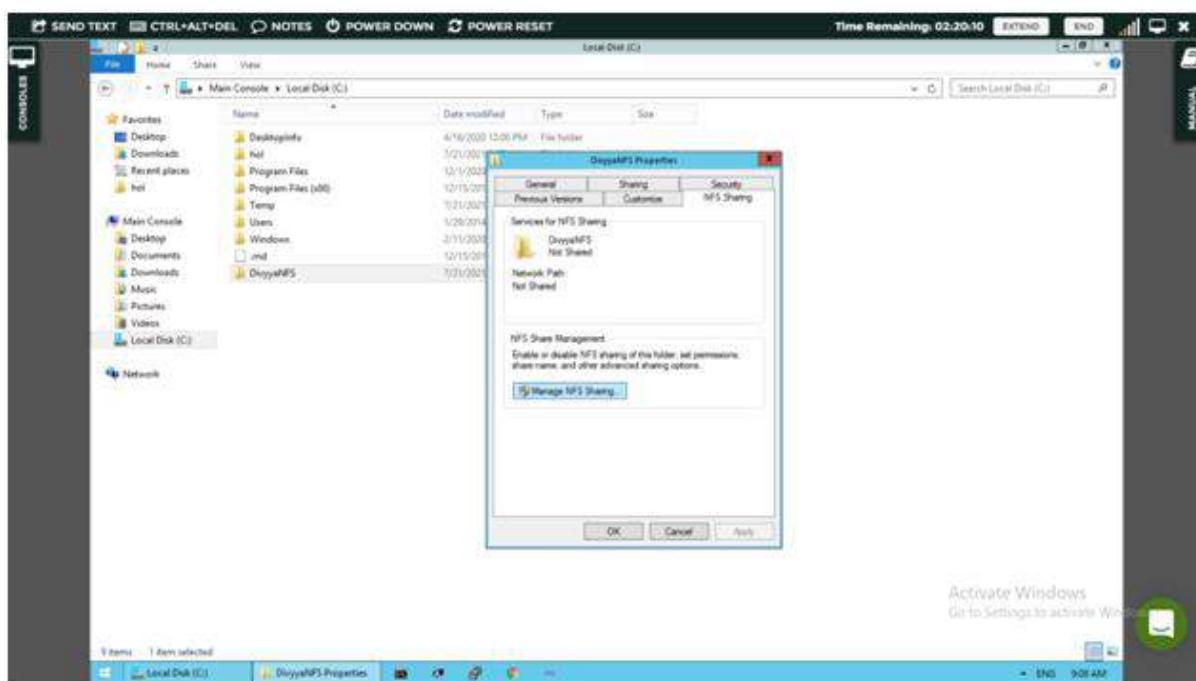
Step 10: Go to File Explorer >> C:/
Make new folder with any name, For example: DivyyaNFS



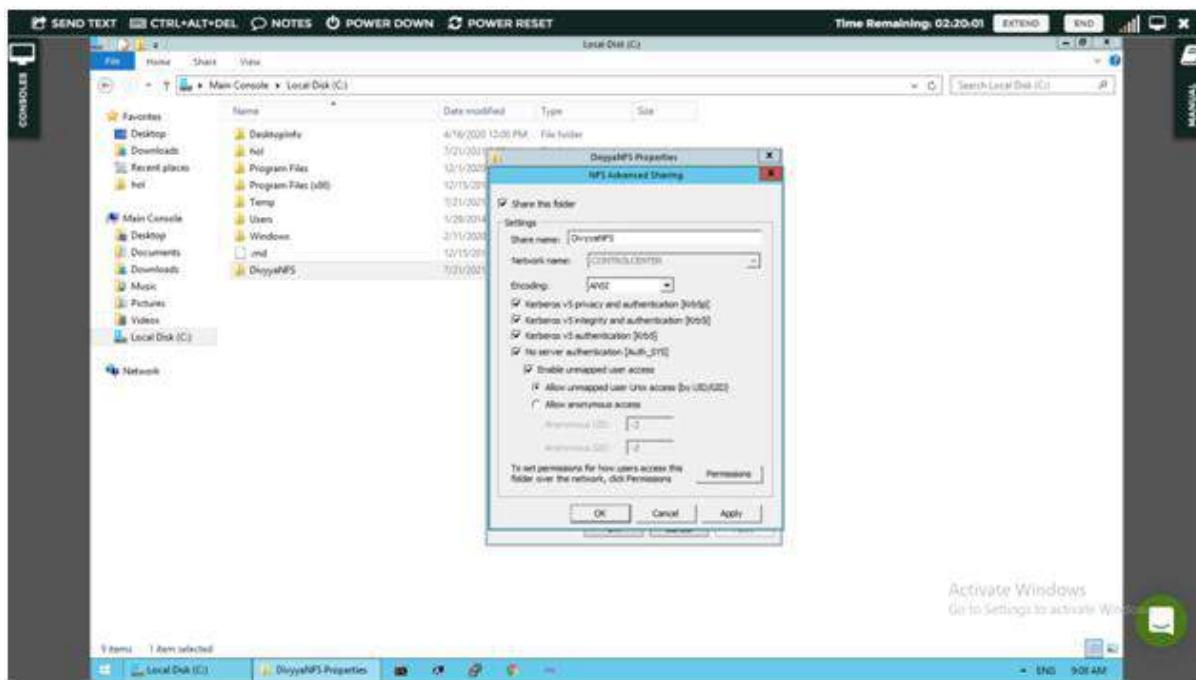
Step 11: Right Click on the folder DivyyaNFS and select properties.



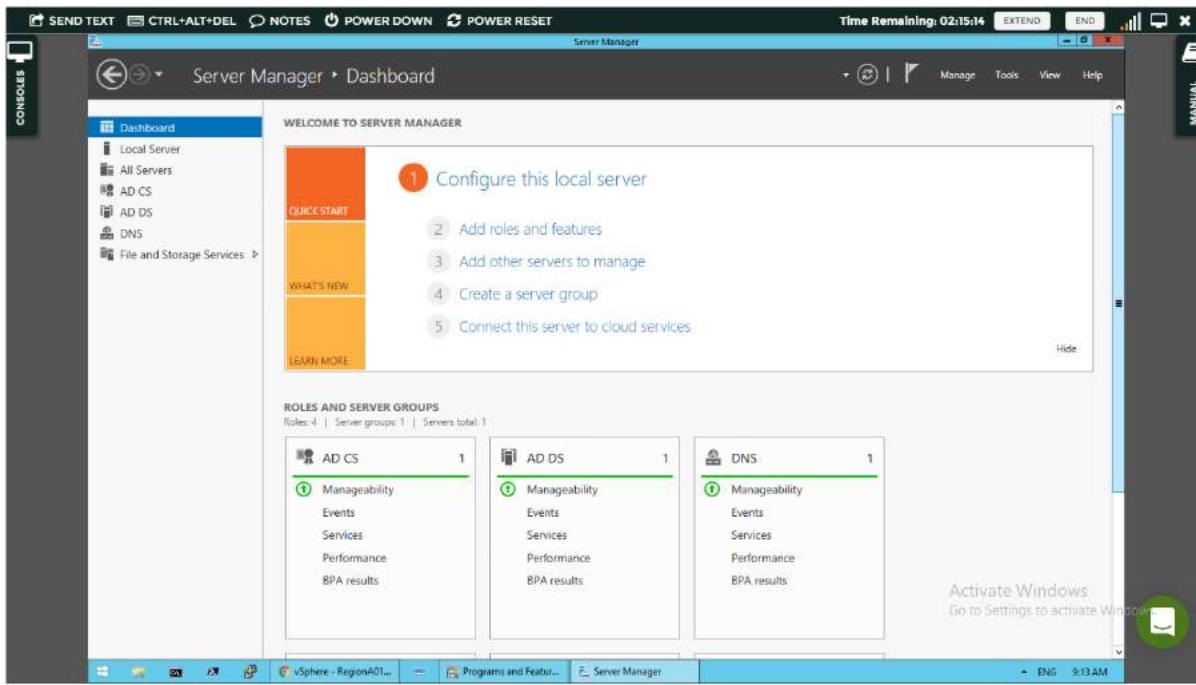
Step 12: Select NFS Sharing and click Manage NFS Sharing.



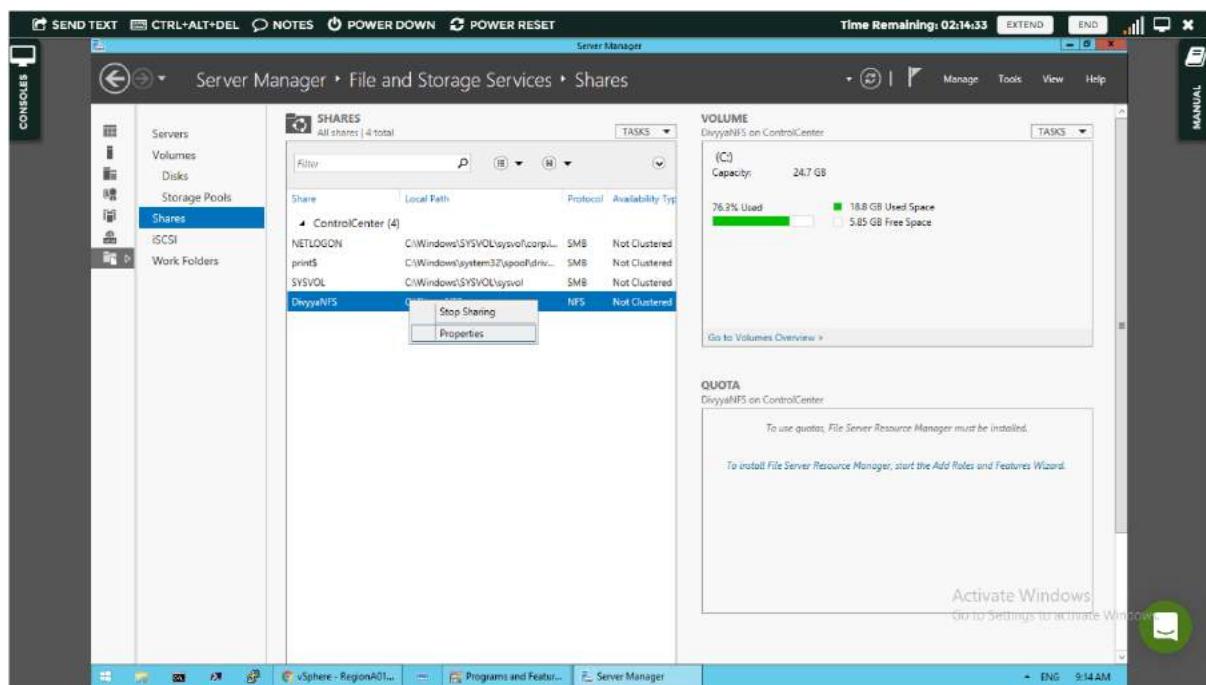
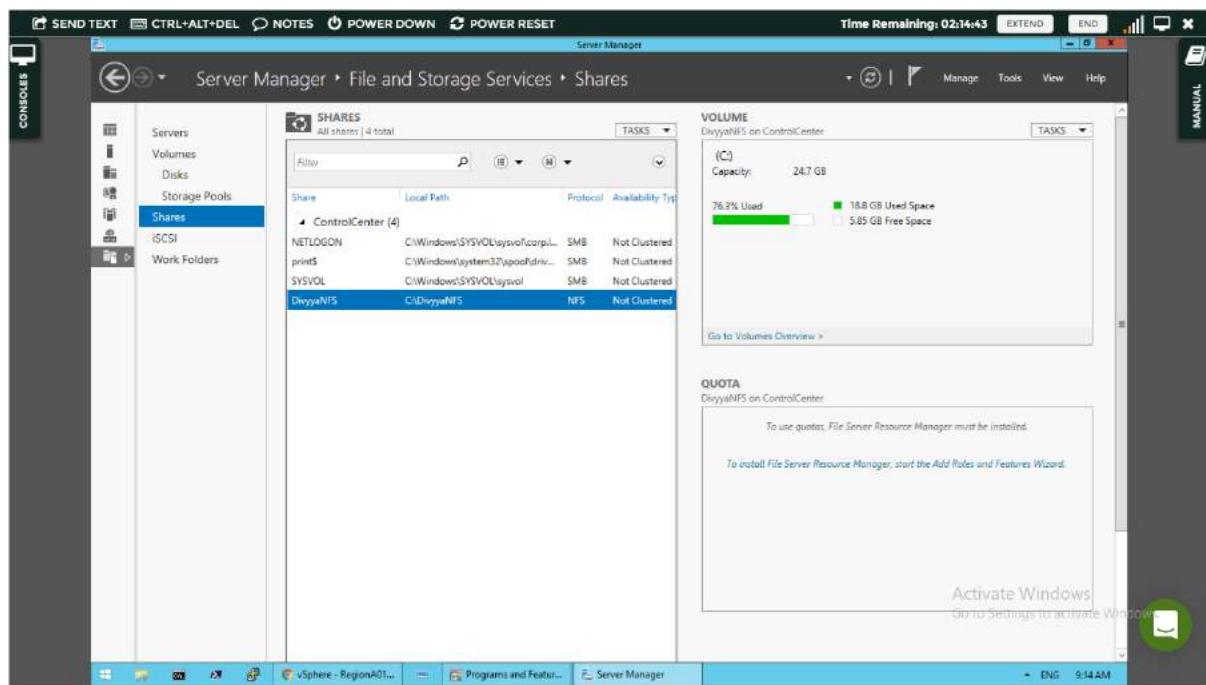
Step 13: Select share this folder and Apply.

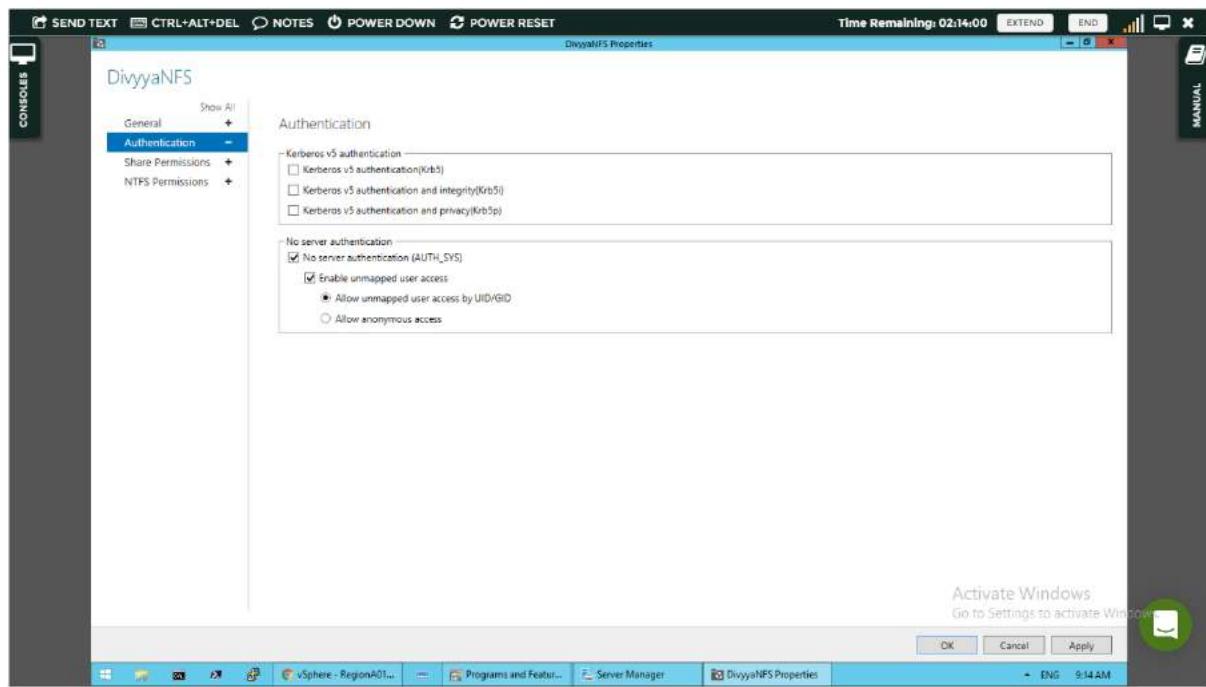
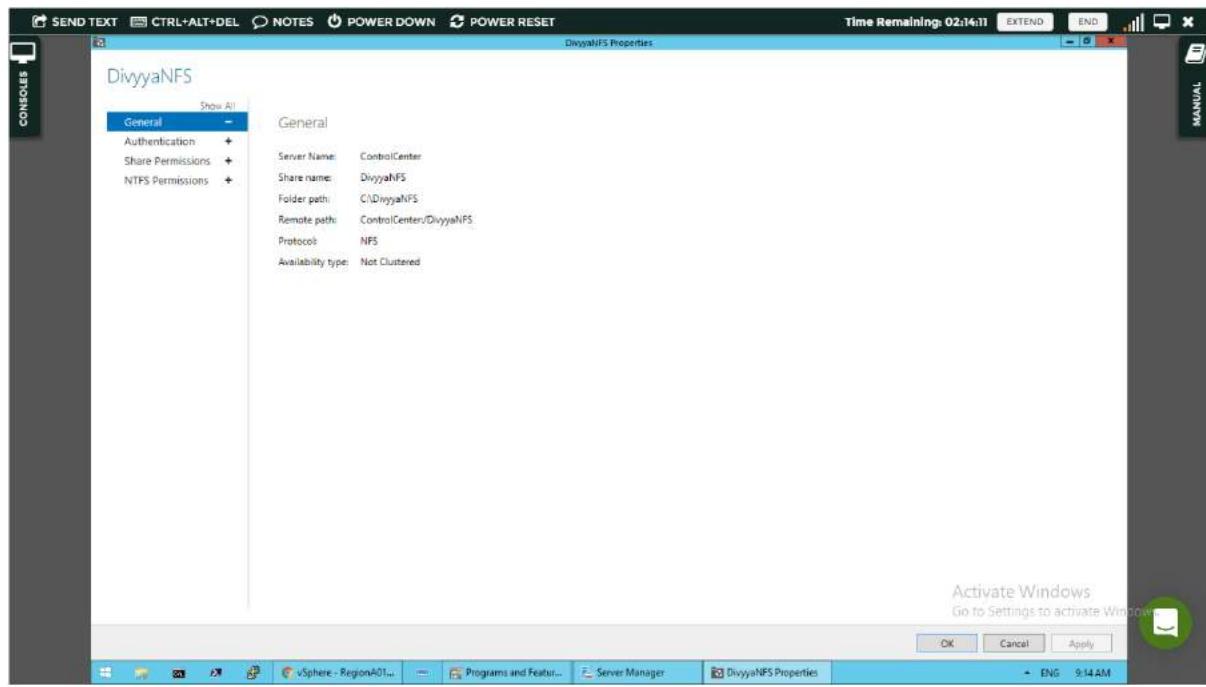


Step 14: Go to Control Panel >> Select programs & features >> Click on Files and Storage Services.

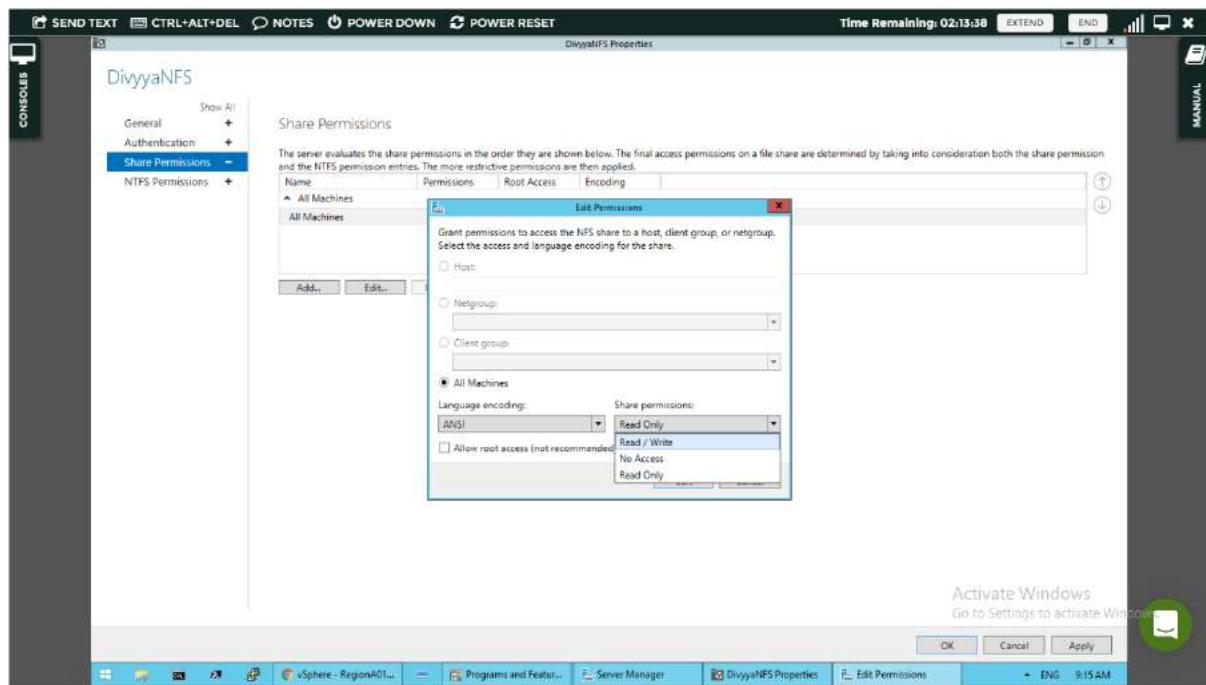
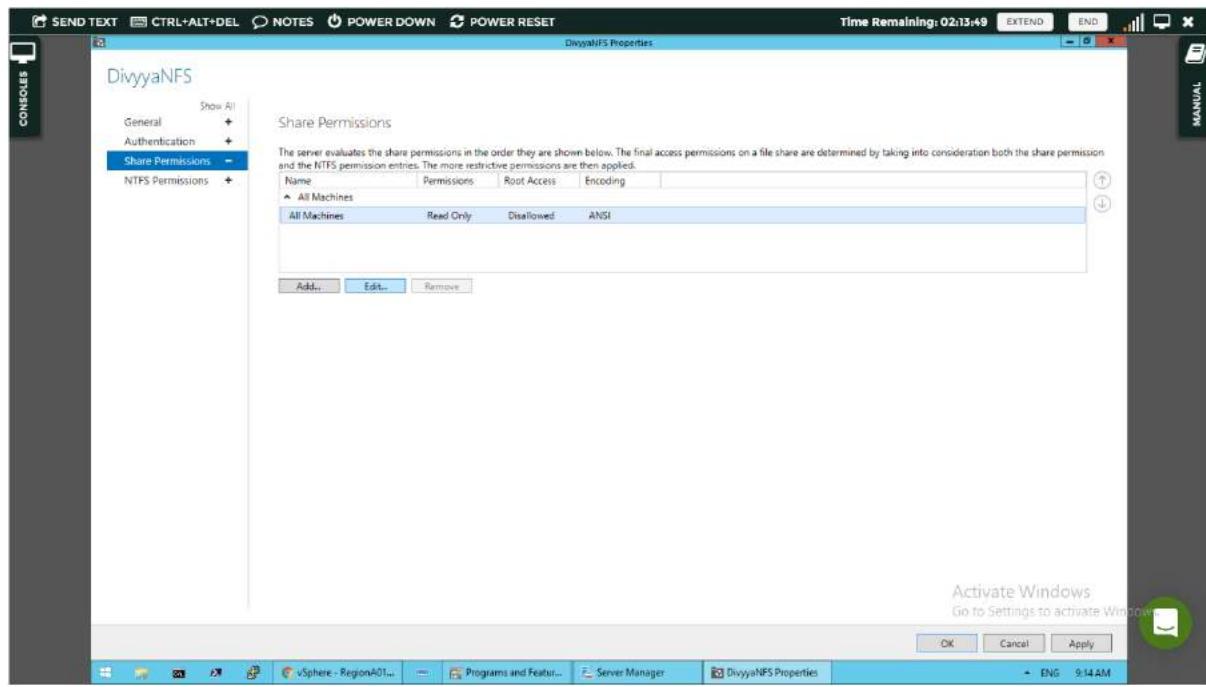


Step 15: Go to Shares and Right click on the folder you have created and Select Properties
Untick the following.

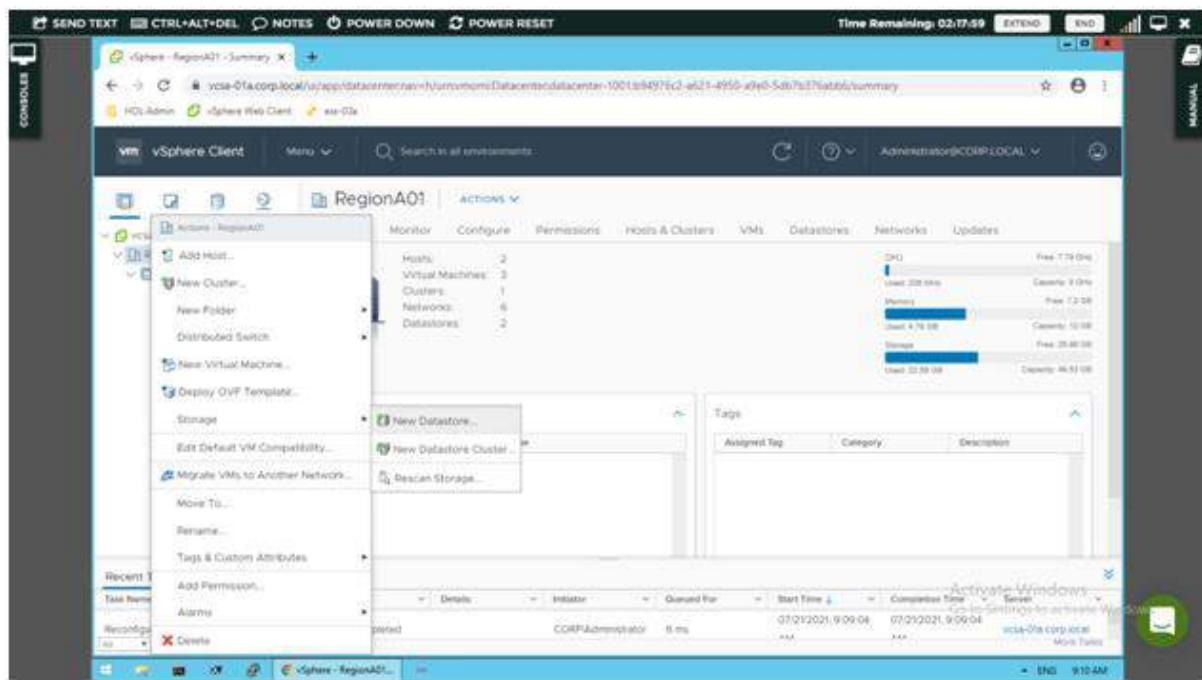




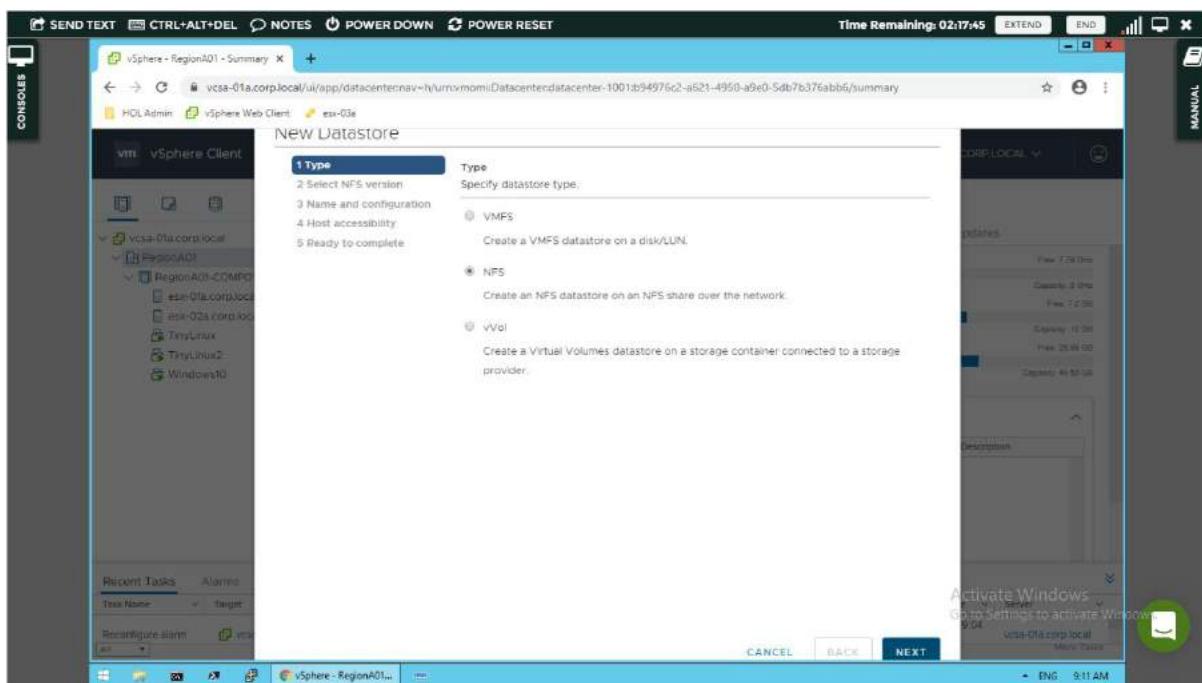
Step 16: Go to Share Permissions and Click on Edit >> Make Share Permissions Read/Write >> Click On Apply.

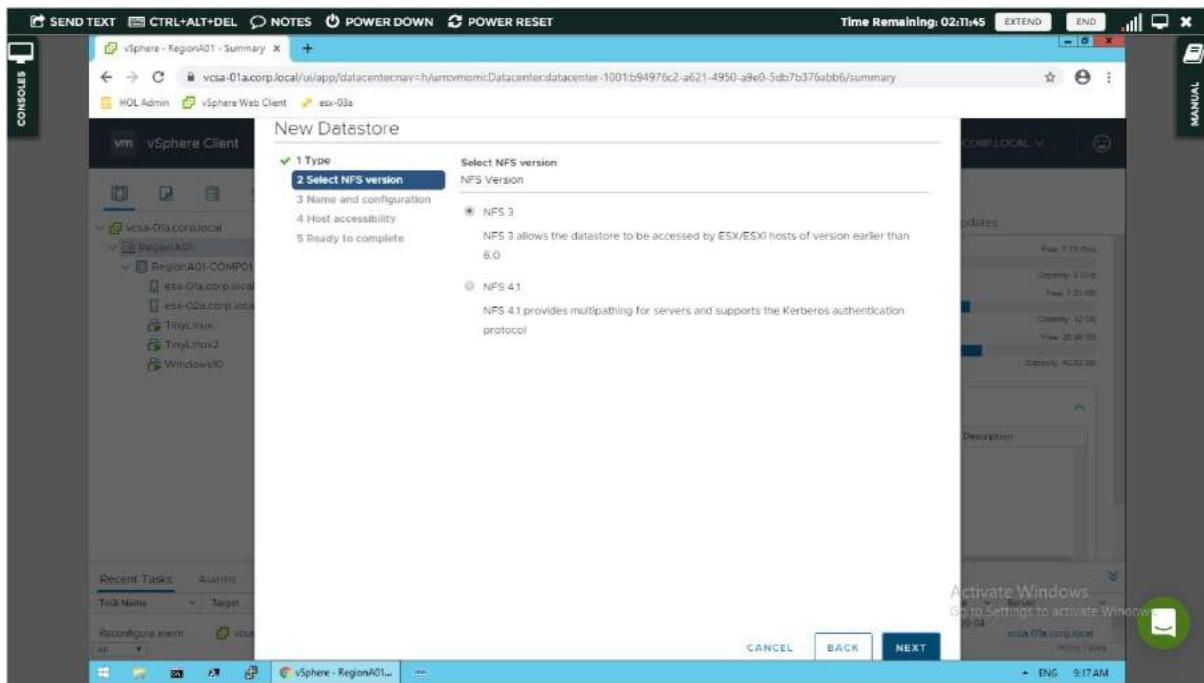


Step 17: Create New DataStore.

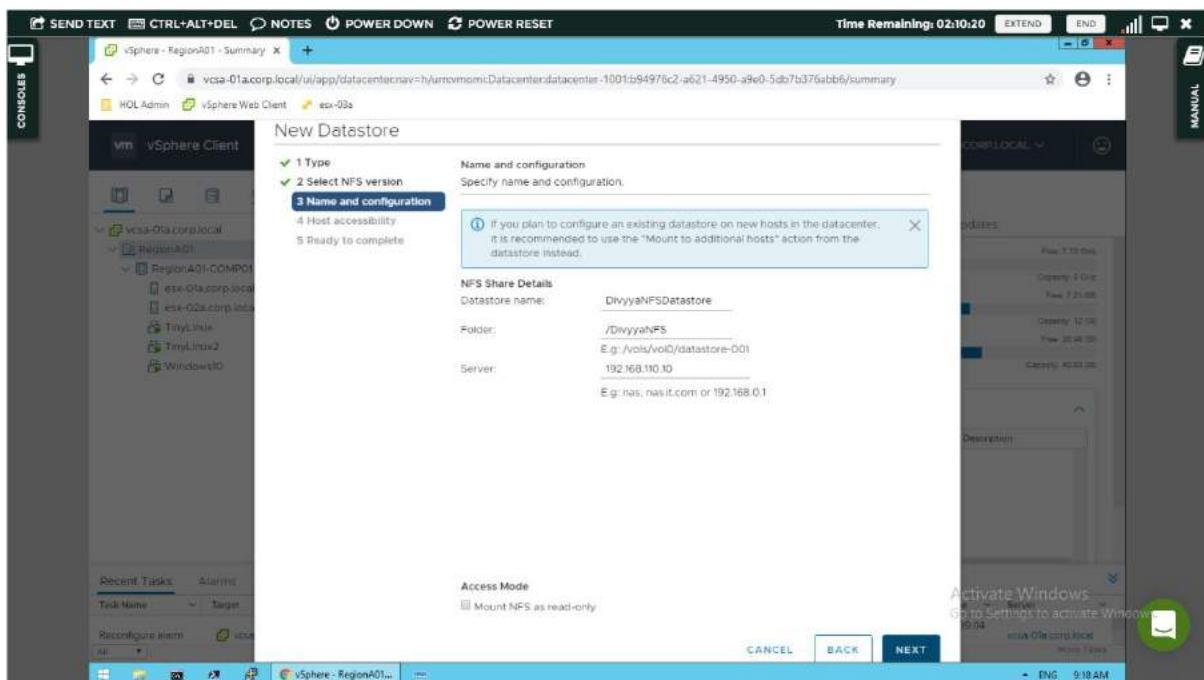


Step 18: Select NFS and Click on Next >> Click on Next.

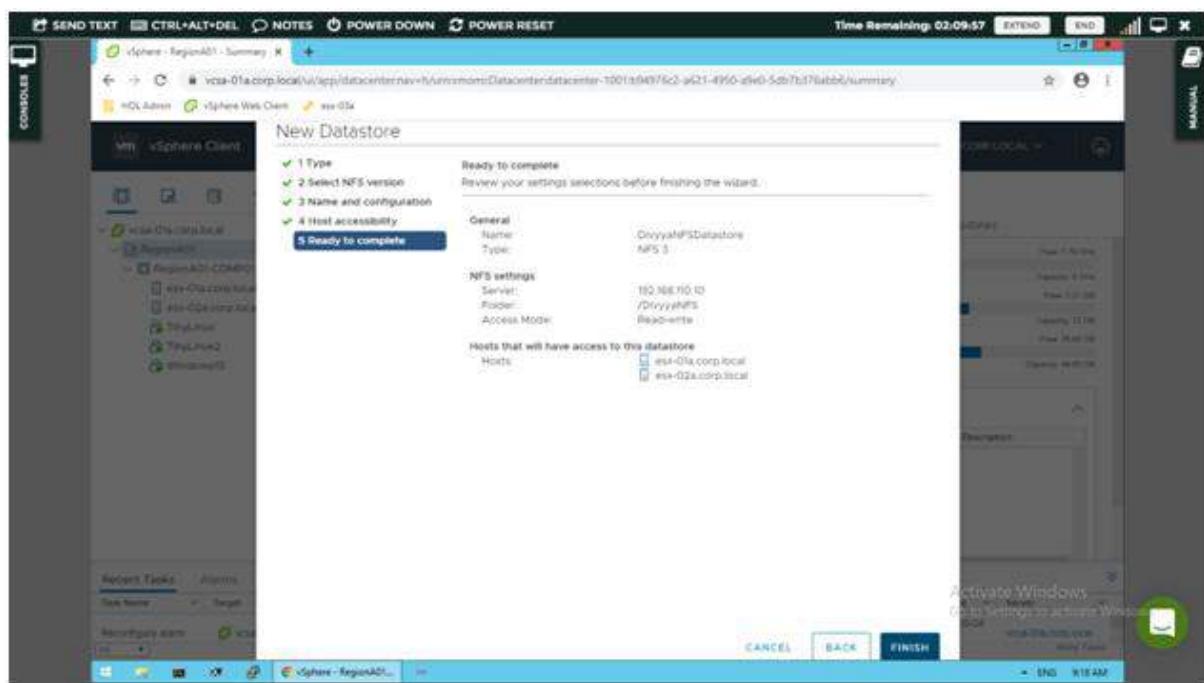
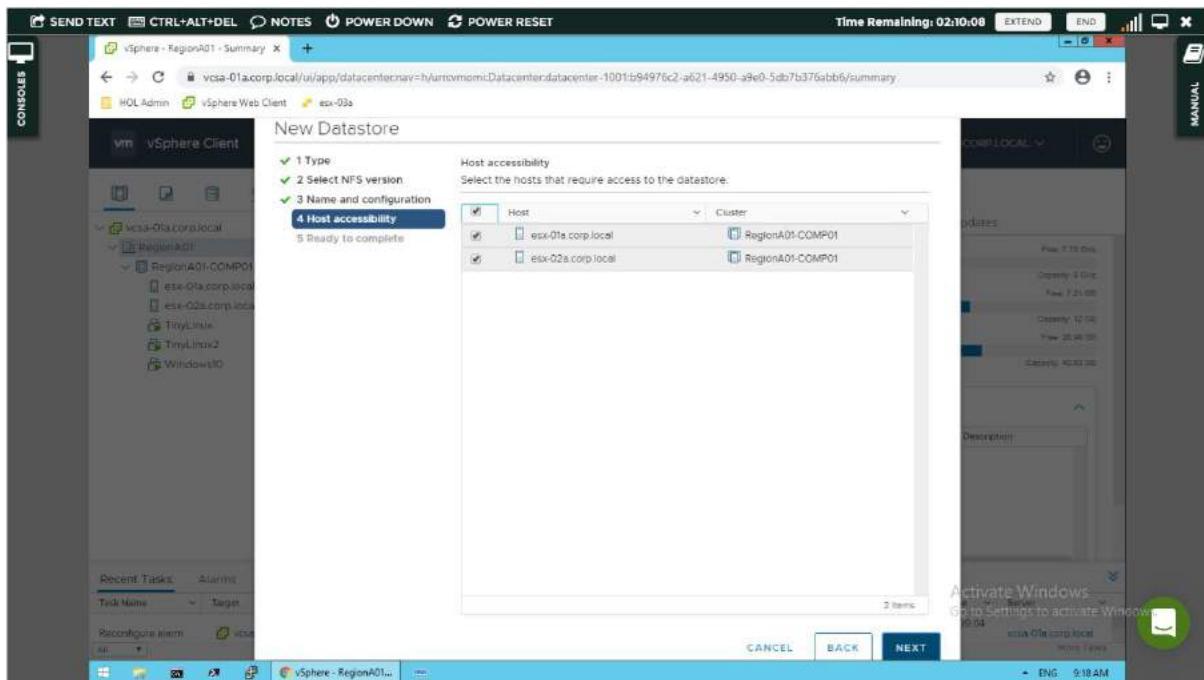




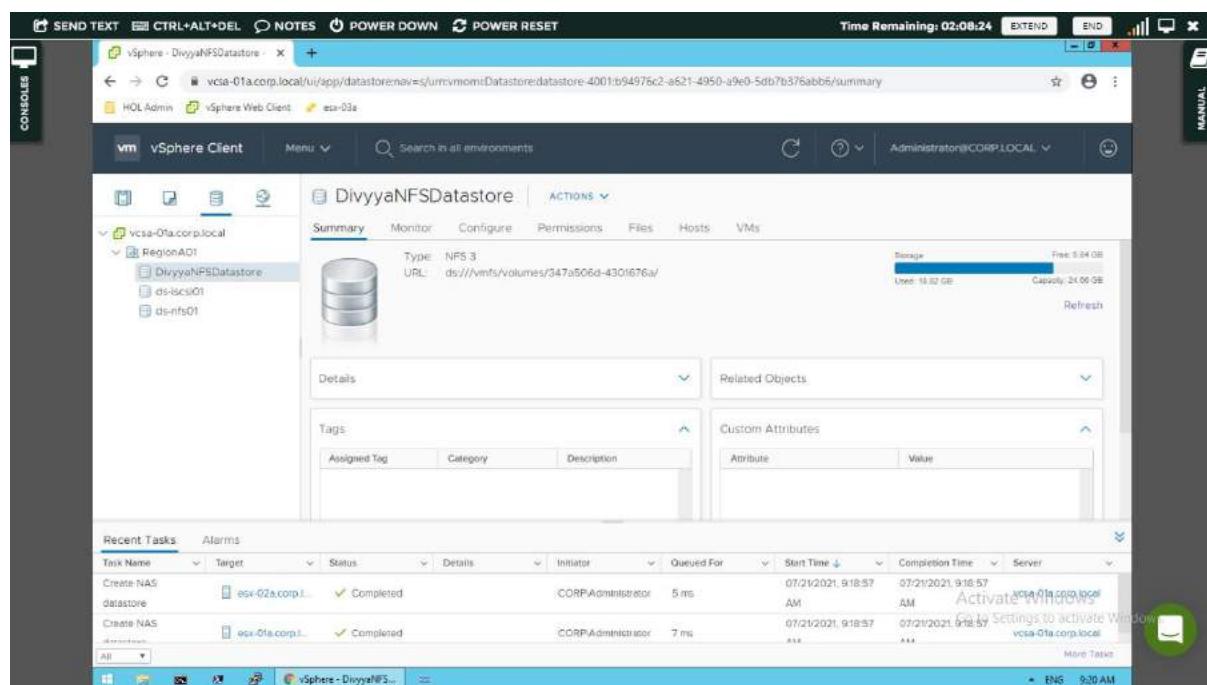
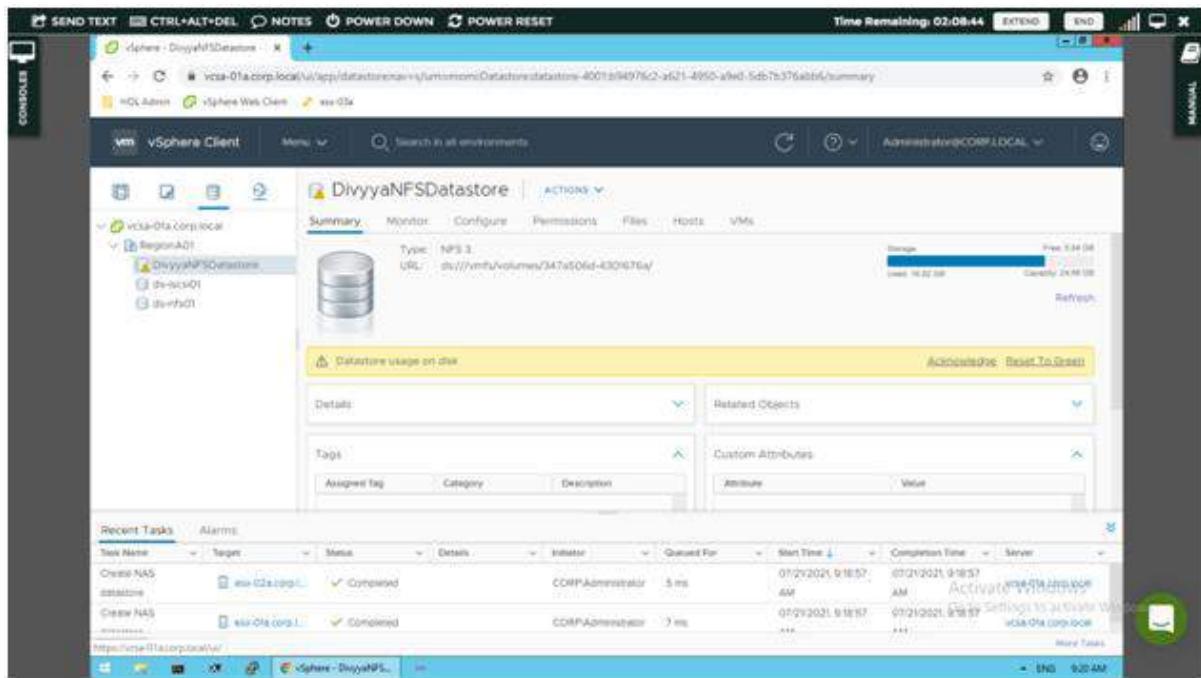
Step 19: Name the datastore the folder name and the IP address of the Server.



Step 20: Select all ESXi hosts >> Click on Finish.

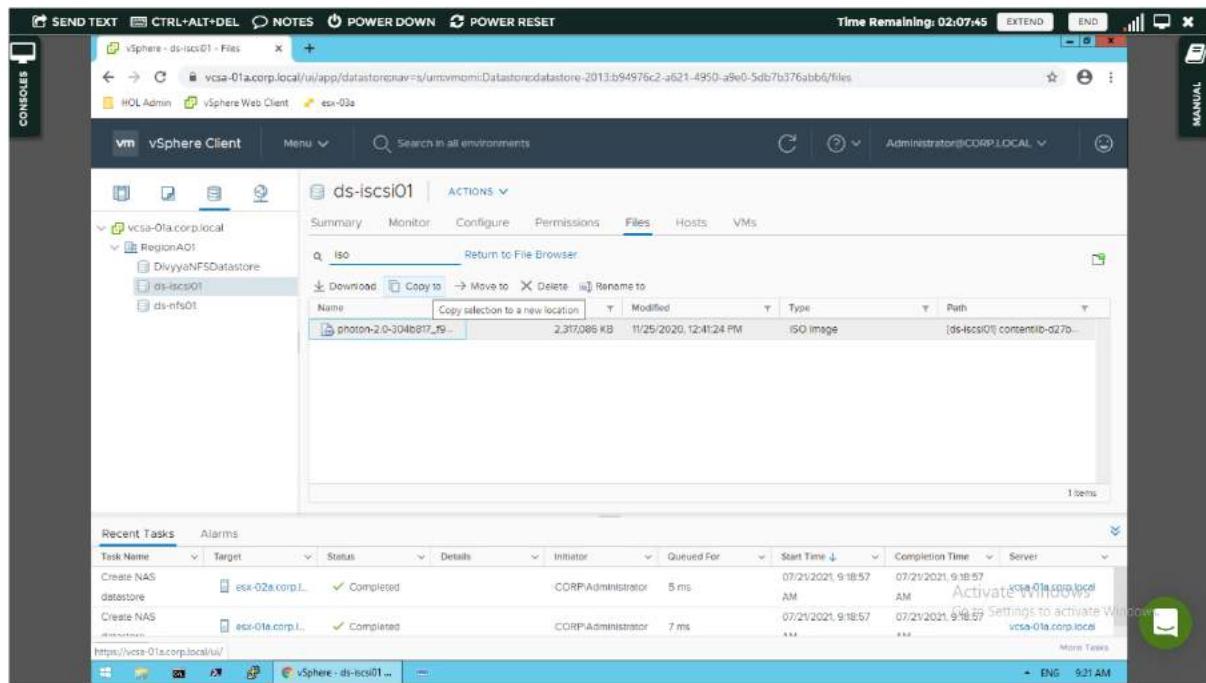


Step 21: To remove Warning alert go to “Monitor” tab then in right click on “Status” and select **Reset to Green** >> So the NFS Datastore is ready.

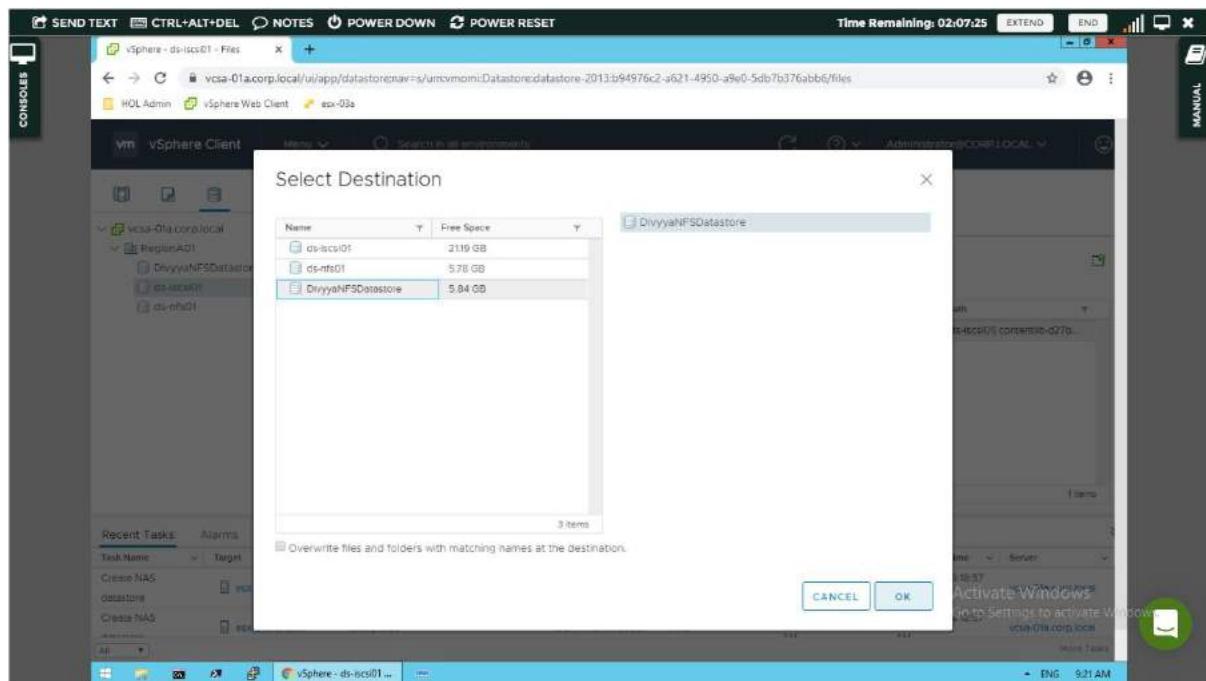


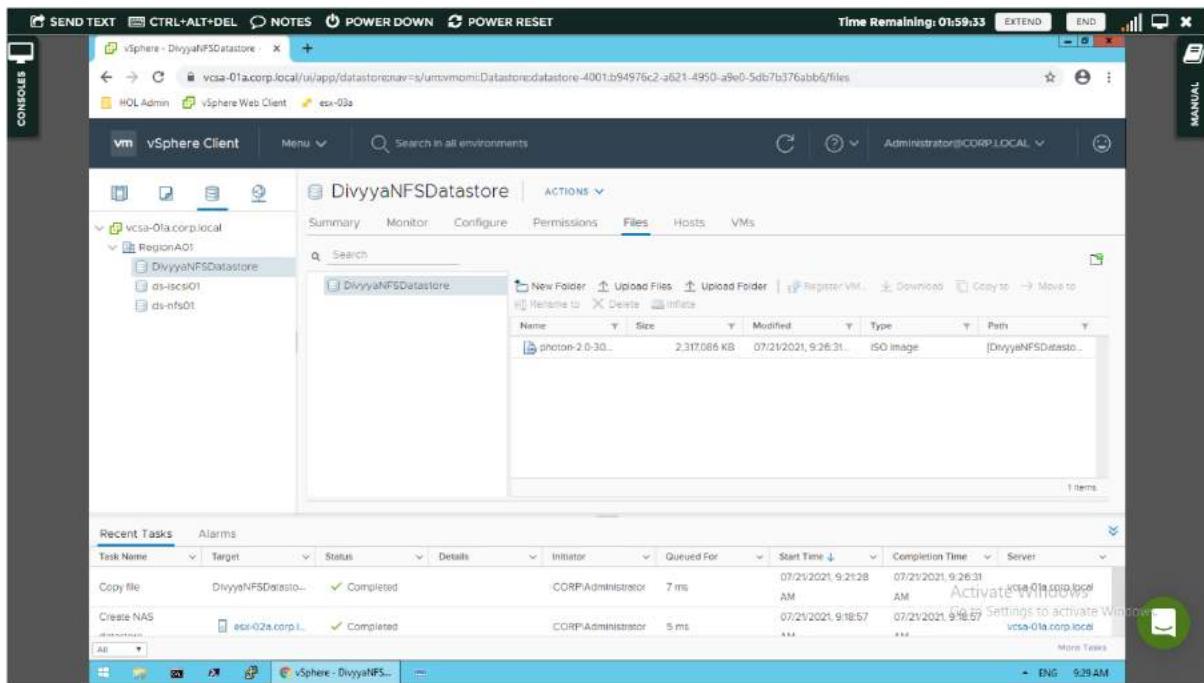
Step 21: Copy the Photon iso to our database:

To copy Go to existing Datastore ds-iscsi01 then files >> Search for iso file and click copy.



Step 22: Select the datastore you have created >> NFS Datastore is ready.





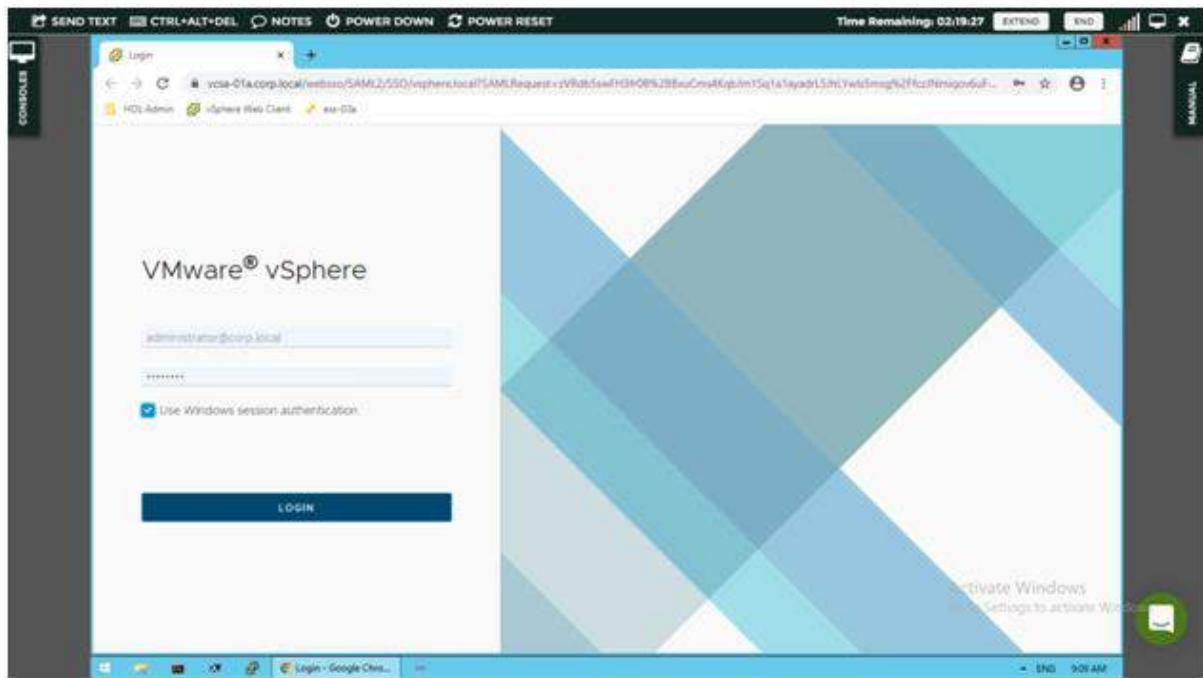
B. Security-Add new role and add permission

- The privileges and Roles allow the administrator of a VMware virtual environment to configure a granular security policy defining individual user rights.
- For a VMware system administrator it's good practice to define the user access rights from the vCenter servers.
- We are going to see how to assign a customized role to an individual user.

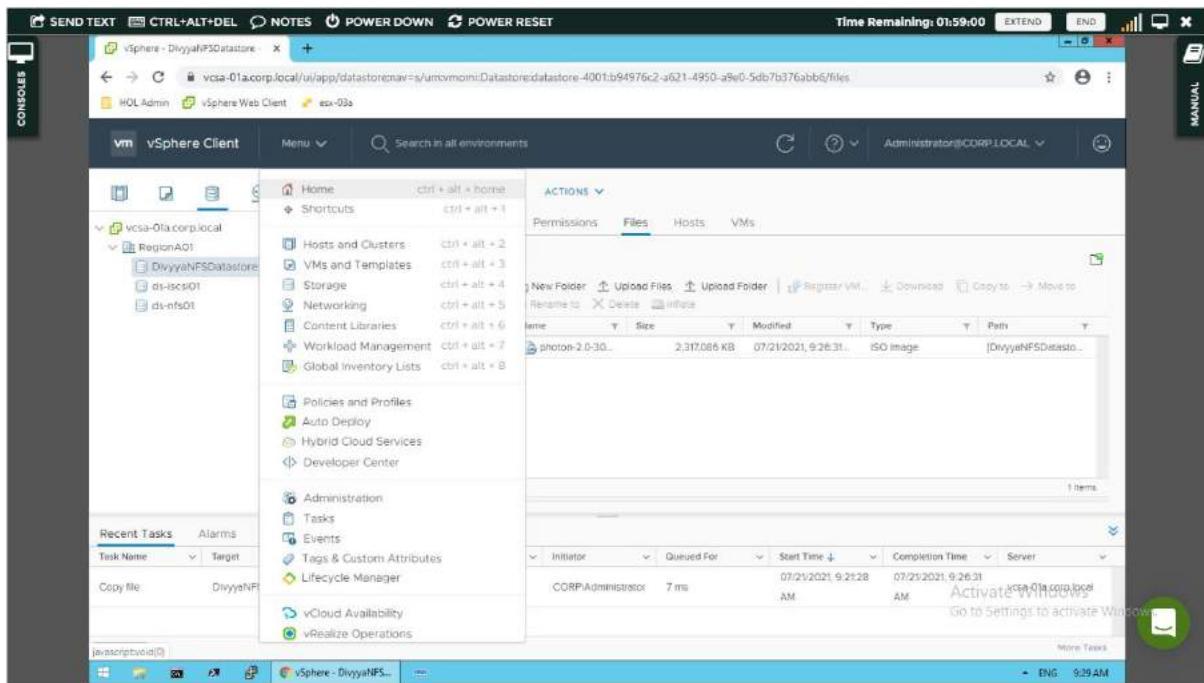
A. To Create Role

Steps to create and assign a role with privileges to create and manage virtual machines to a Local User/Group.

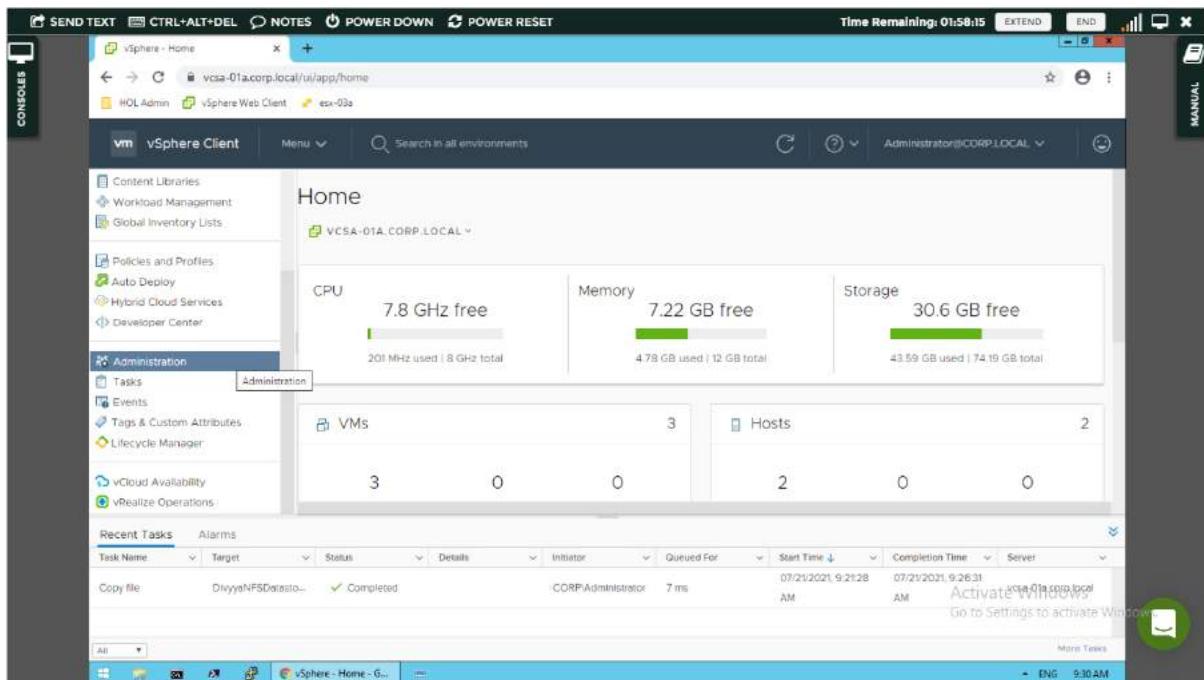
Step 1: Login To VSphere Client.



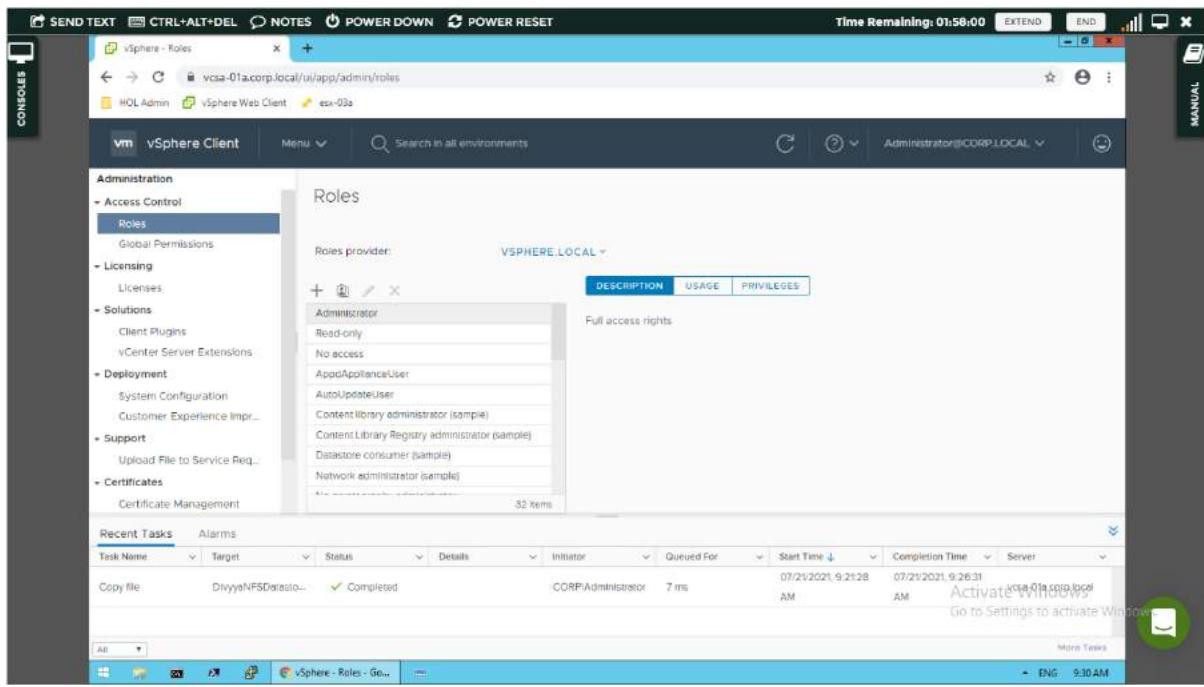
Step 2: Go to Home Section From Dropdown Menu.



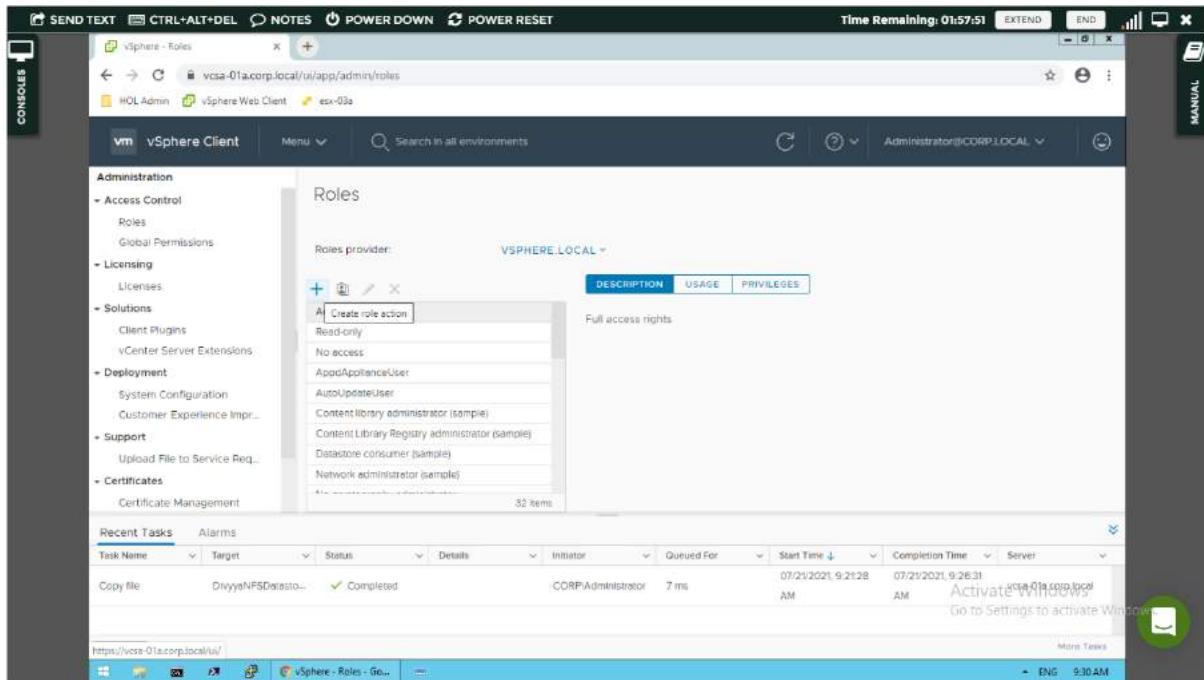
Step 3: Click “Administration” in the Home Section.



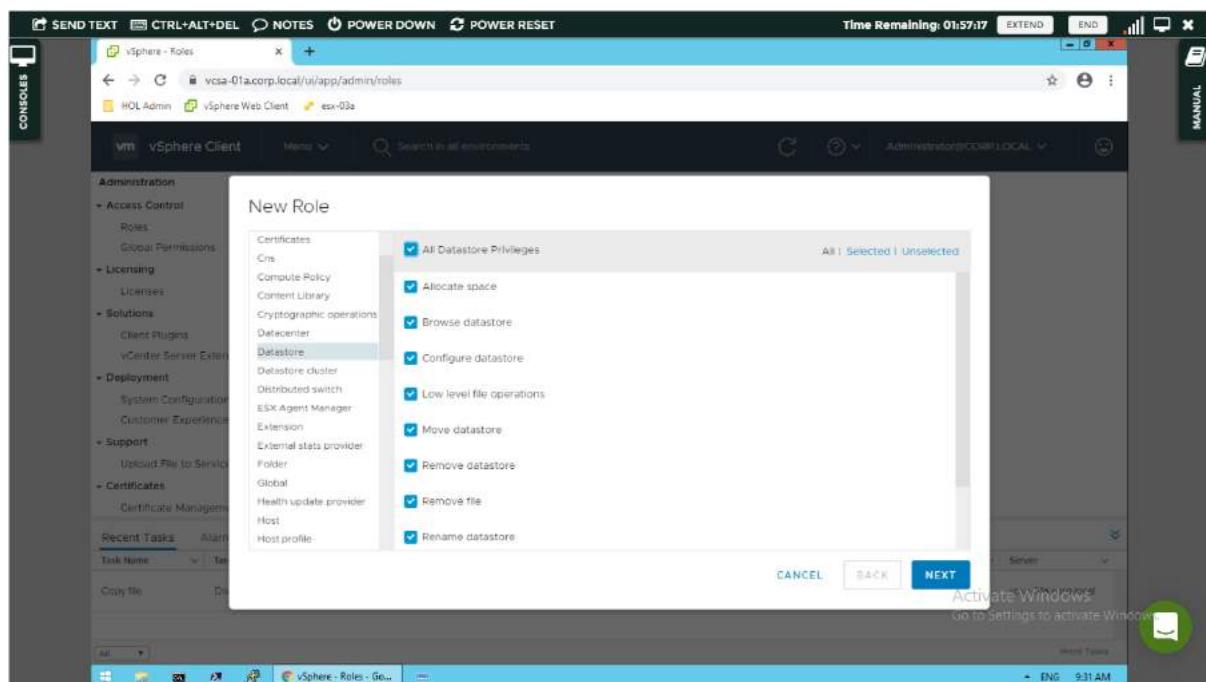
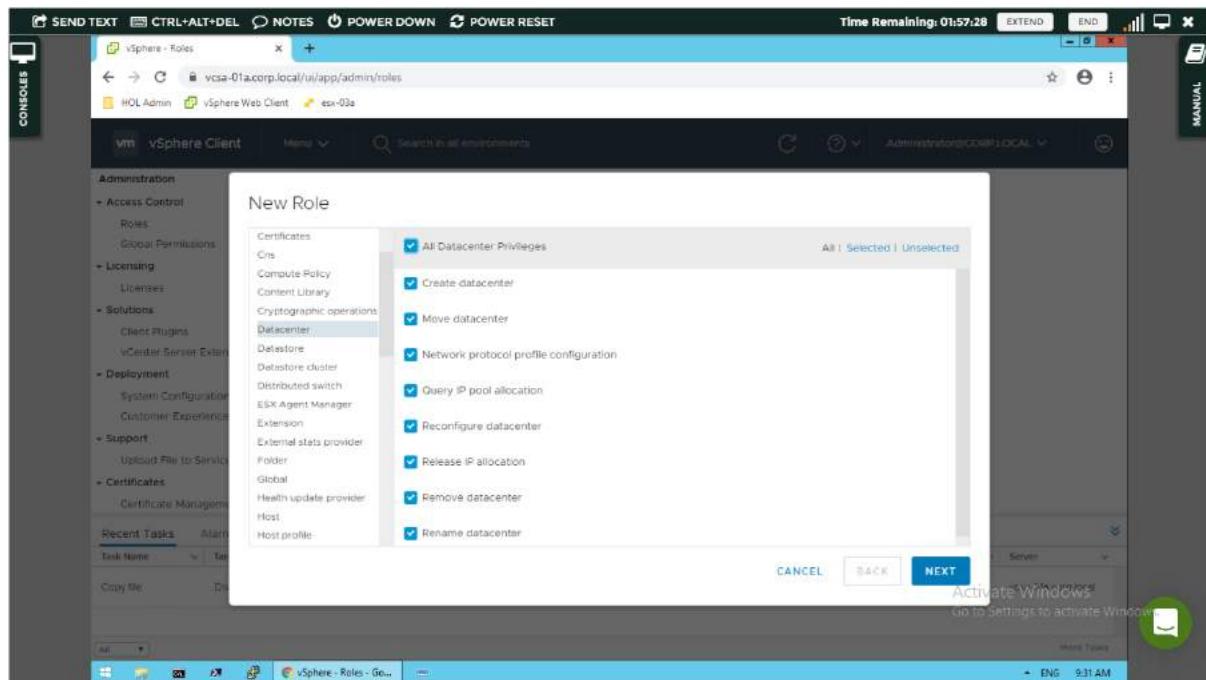
Step 4: Select “Roles” from Access Control List.

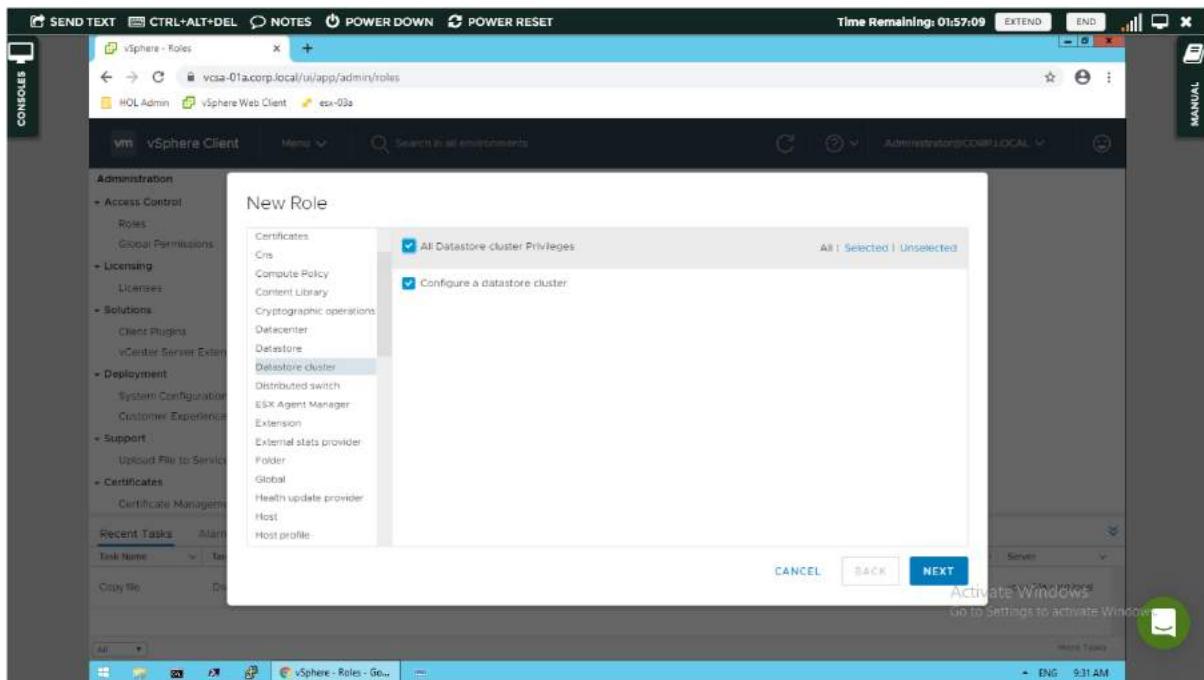


Step 5: Then Click to “Add Role”.

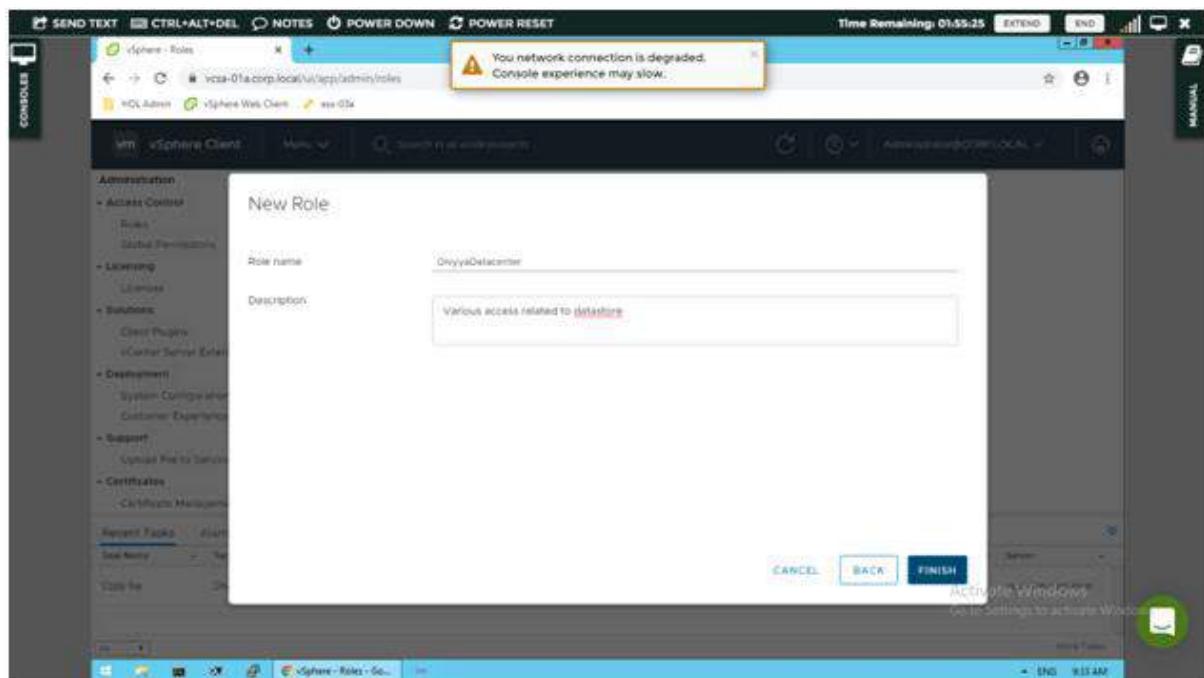


Step 6: Here We select all data centre's operations privileges to assigned roles
=> After Selecting All Role Click “Next”.

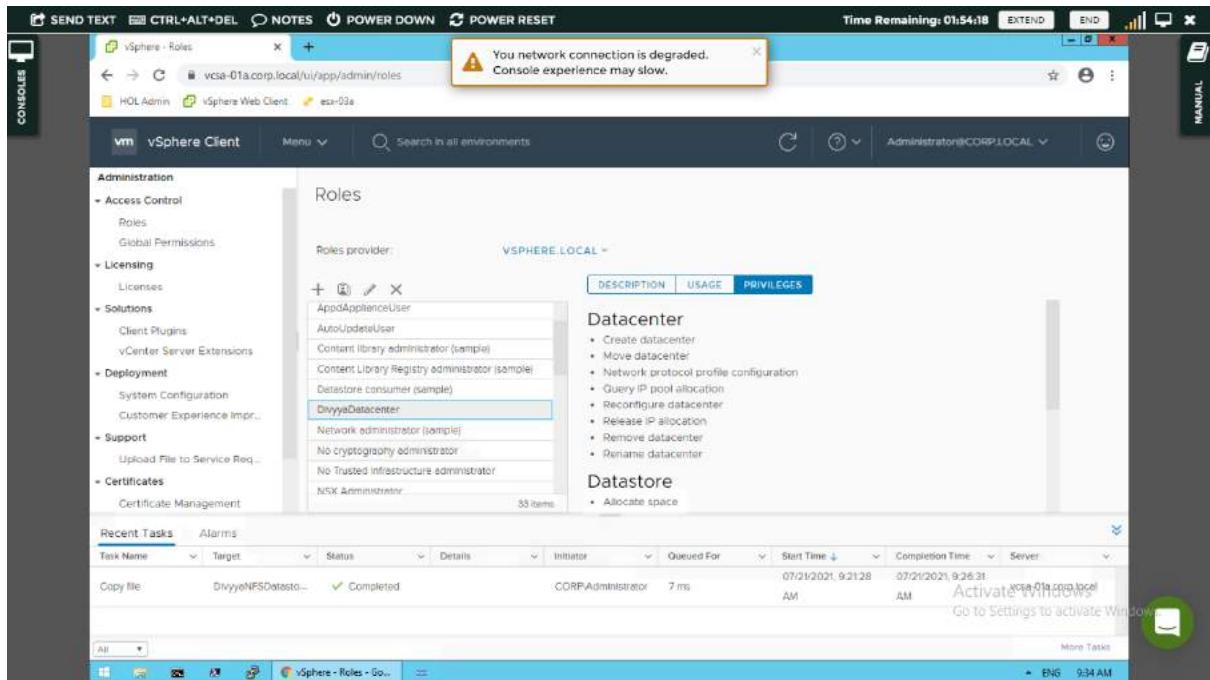




Step 7: Type a unique name and description for New Role and click finish.



Step 8: Here we can see Data Center and Datastore administration" Role in List of Roles which we have created.

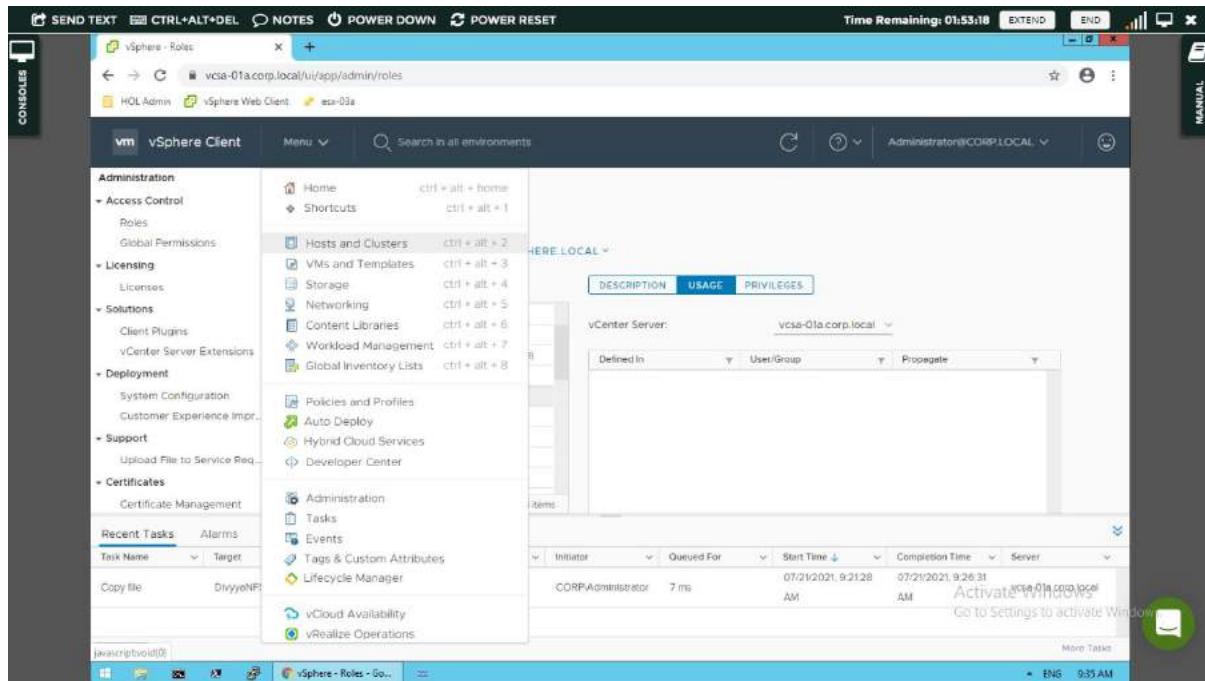


B. Assigning Permissions to User and Groups:

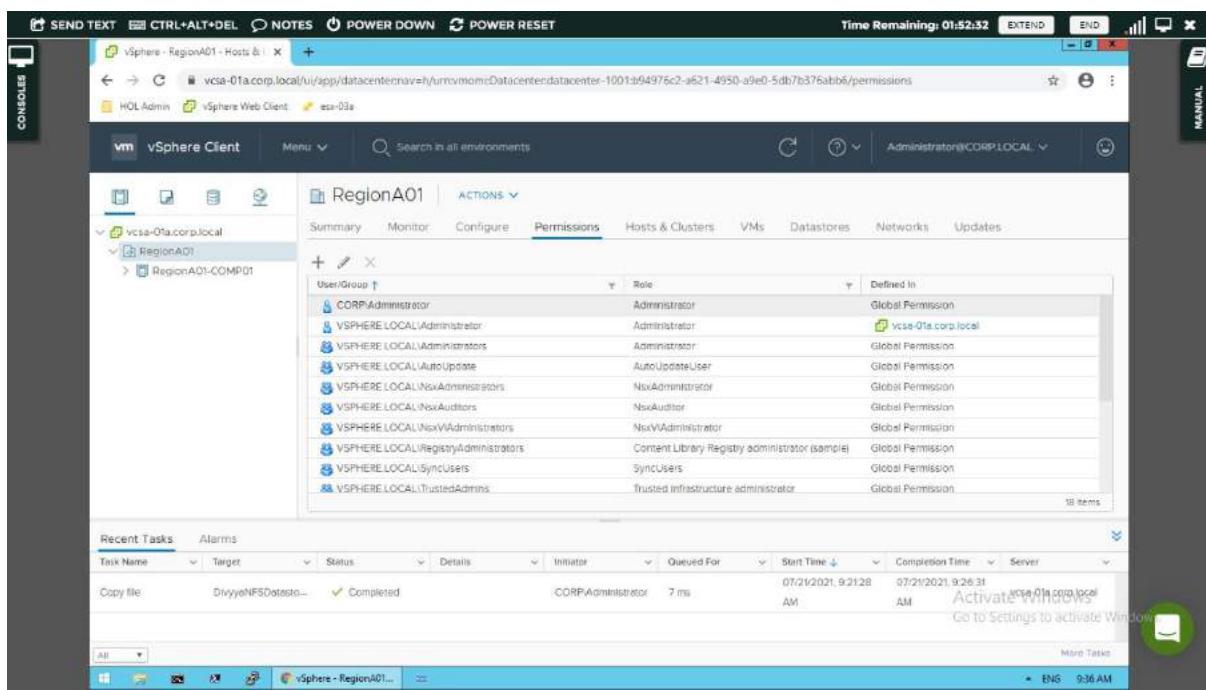
- Steps to assign a role with privileges to create and manage virtual machines to a Domain or Local User/Group.

- Now we can assign permissions by selecting an object in our vsphere inventory and assign this role to user or group for that object.

Step1: Go to inventory >> Go to users and groups. i.e:Host and Clusters.

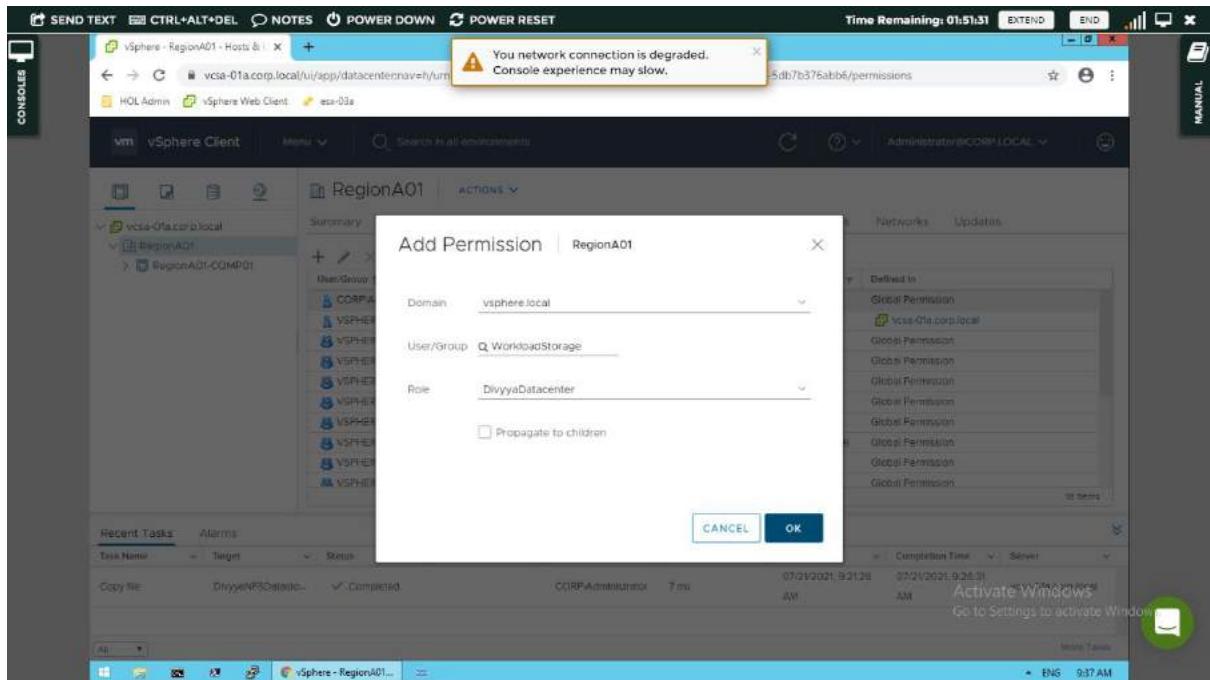


Step 2: Select an object in vsphere client then permission tab.

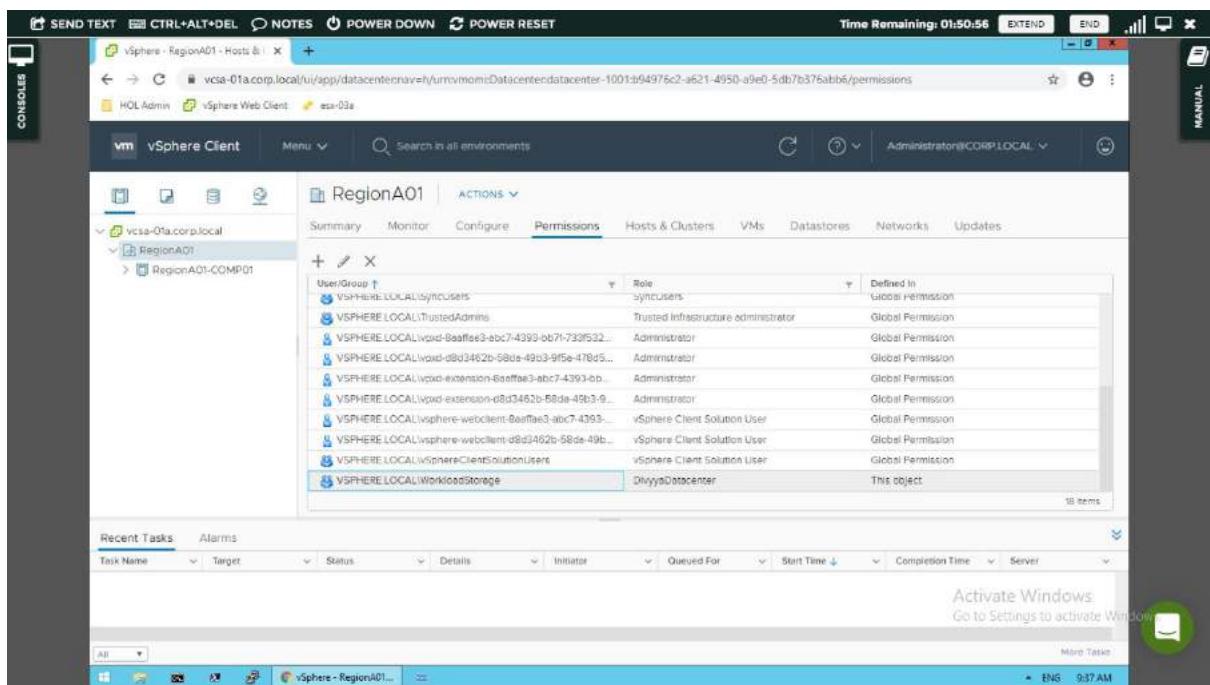


Step 3: Click add permissions >> From user dropdown select the domain for user or group then add a user or add new Unique user name and then select the role which has been created earlier, then Click “OK”.

Note: Here we are Using “VMware HOL” so we are Selecting “Existing User” as we can not create new user.



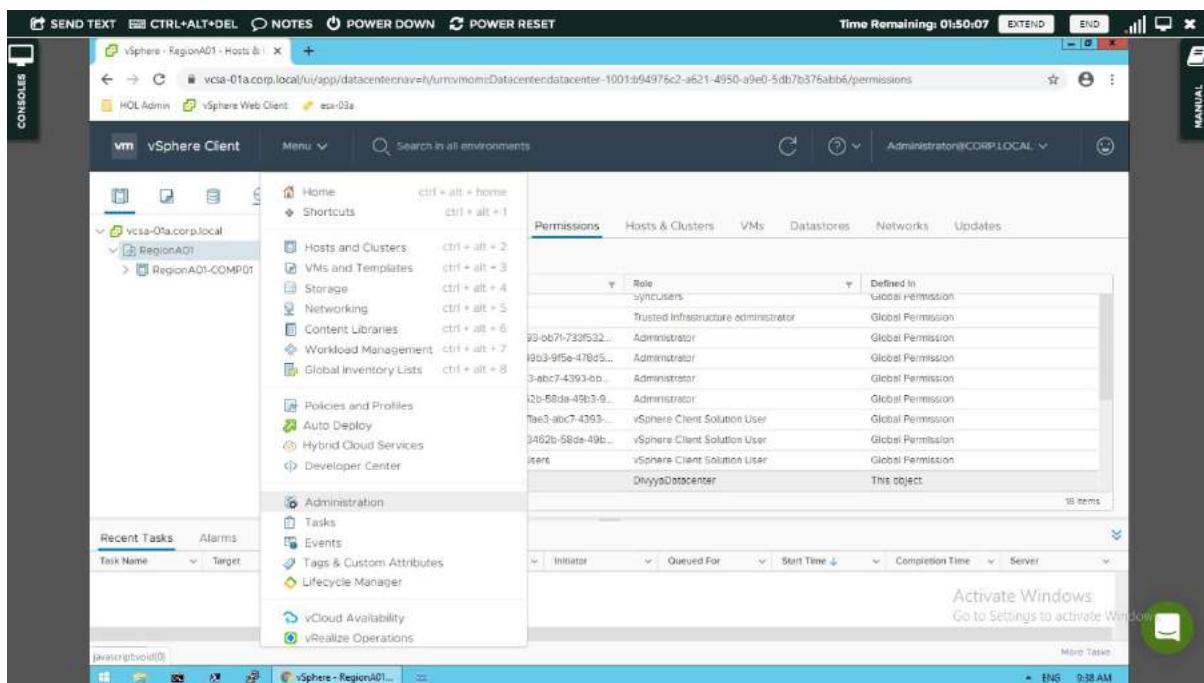
Step 4: Hence we can see Role has been assigned to an existing user workloadStorage.

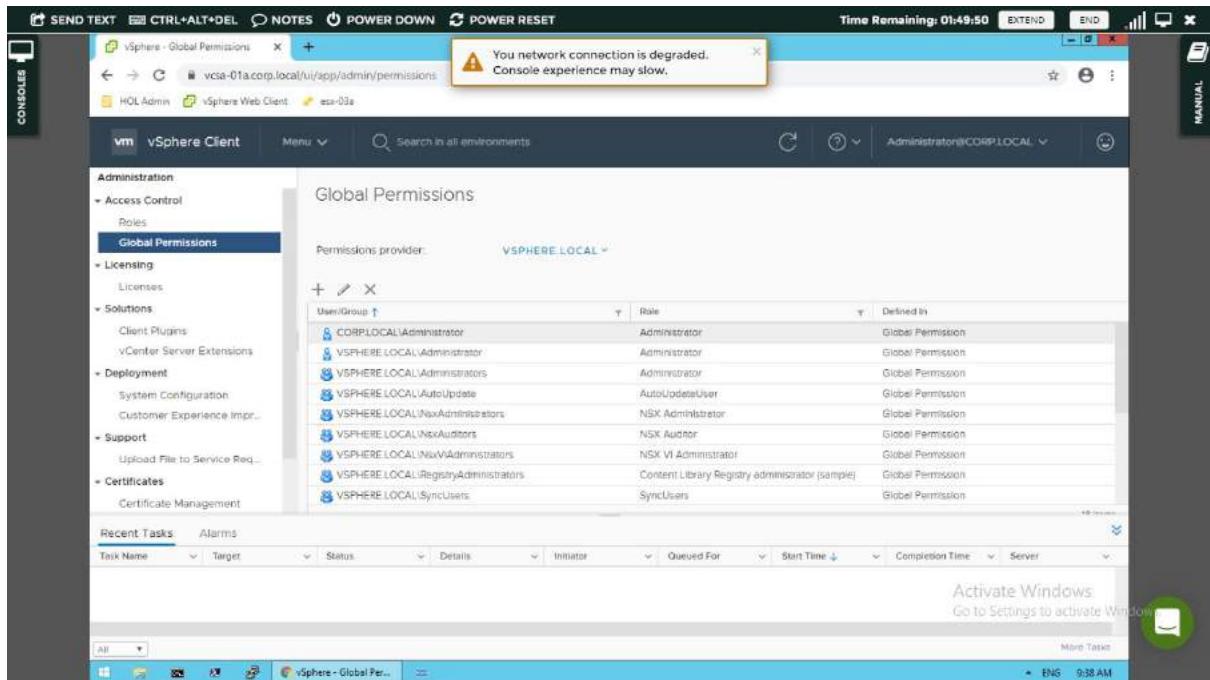


C. Assign Global Permission:

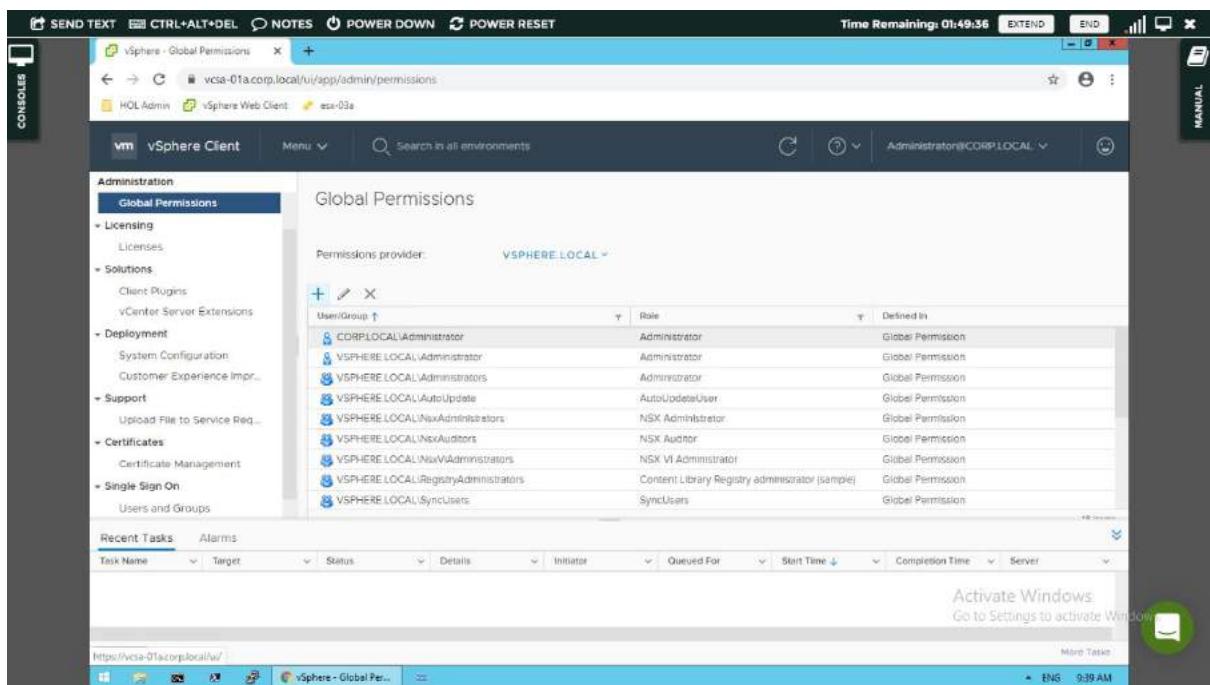
- In addition to assigning roles and permission to an object we can also assign global permissions.
- Global permissions can be assigned to users or groups.
- It gives privileges to all objects and all hierarchies of the vsphere environment.

Step1: To assign a global permissions Go to inventory and Click Administrations.

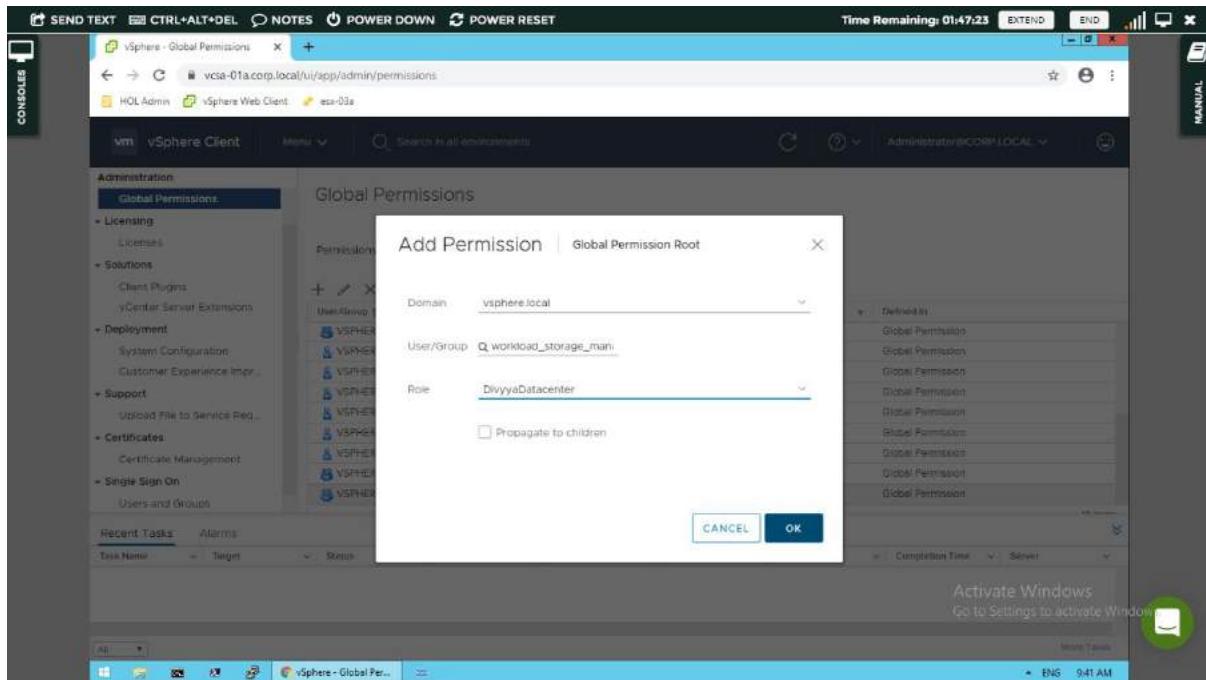




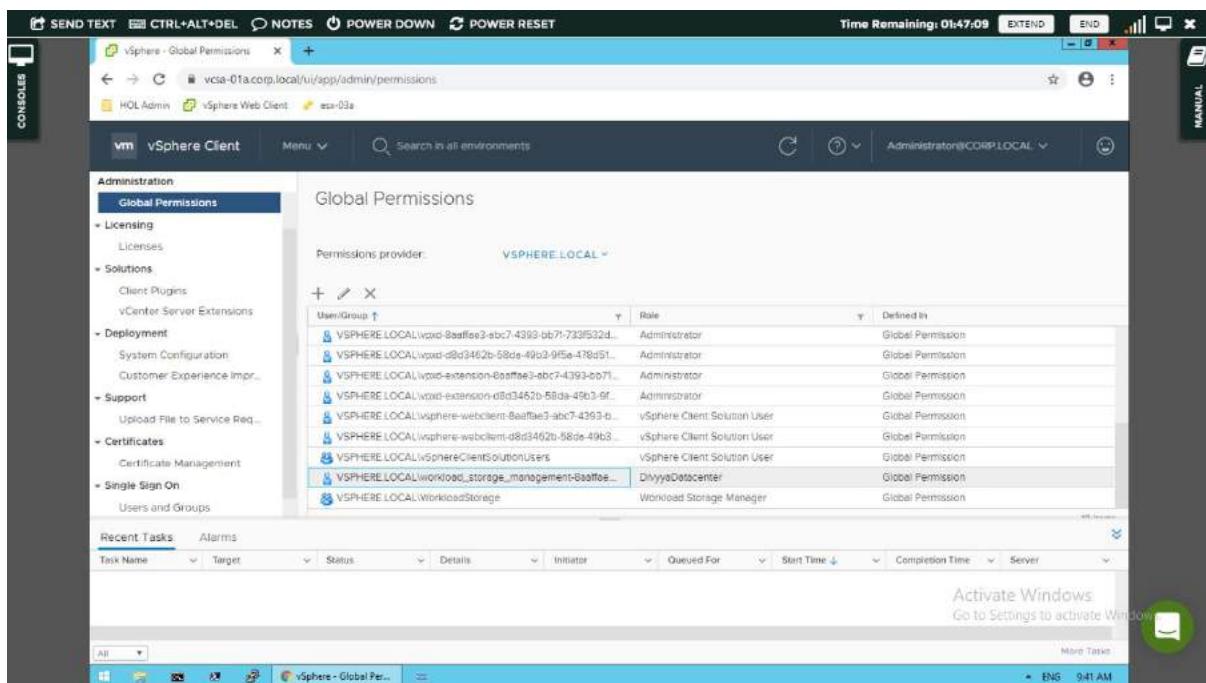
Step 2: Click “Global Permissions” in the Access Control list >> Click Add Permissions.



Step 3: Select Domain, User, Role as above then “OK”.



Step 4: Now this Role has been Assigned globally.



Practical 6

Importance of Storage Design

- Storage design has always been important, but it becomes more so when vSphere is used for larger workloads, for mission-critical applications, for larger clusters, and for offerings based on Infrastructure as a Service (IaaS) in a nearly 100-percent virtualized datacenter.
- **Advanced Capabilities:** Many of vSphere's advanced features depend on shared storage; vSphere High Availability (HA), vSphere Distributed Resource Scheduler (DRS), vSphere Fault Tolerance (FT), and some parts of VMware vCenter Site Recovery Manager all have critical dependencies on shared storage.
- **Performance:** Virtualization brings—consolidation, higher utilization, more flexibility, and higher efficiency. But often, people have initial questions about how vSphere can deliver performance for individual applications when it is inherently consolidated and oversubscribed. Likewise, the overall performance of the VMs and the entire vSphere cluster both depend on shared storage, which can also be highly consolidated and oversubscribed.
- **Availability:** The overall availability of your virtualized infrastructure—and by extension, the VMs running on that infrastructure—depend on the shared storage infrastructure. Designing high availability into this infrastructure element is paramount. If the storage is not available, vSphere HA will not be able to recover and the aggregate community of VMs can be affected.

What is iSCSI?

SCSI (Internet Small Computer System Interface) encapsulates SCSI control and data in TCP/IP packets, allowing access to storage devices over the existing network infrastructure. An iSCSI SAN usually consists of the following components: iSCSI storage system – a physical storage system on the network.

How does it work?

iSCSI is a transport layer protocol that works on top of the Transport Control Protocol (TCP). It enables block-level SCSI data transport between

the iSCSI initiator and the storage target over TCP/IP networks. ... The protocol uses initiators to send SCSI commands to storage device targets on remote servers.

What is iscsi used for?

iSCSI is used to **facilitate data transfers over intranets and to manage storage over long distances**. It can be used to transmit data over local area networks (LANs), wide area networks (WANs), or the Internet and can enable location-independent data storage and retrieval

Is iscsi a NAS?

iSCSI is a transport layer protocol that describes how Small Computer System Interface (SCSI) packets are transferred over a network. The difference between iSCSI and NAS is that iSCSI is a **data transport protocol** where NAS is a common way of connecting storage into a shared user network

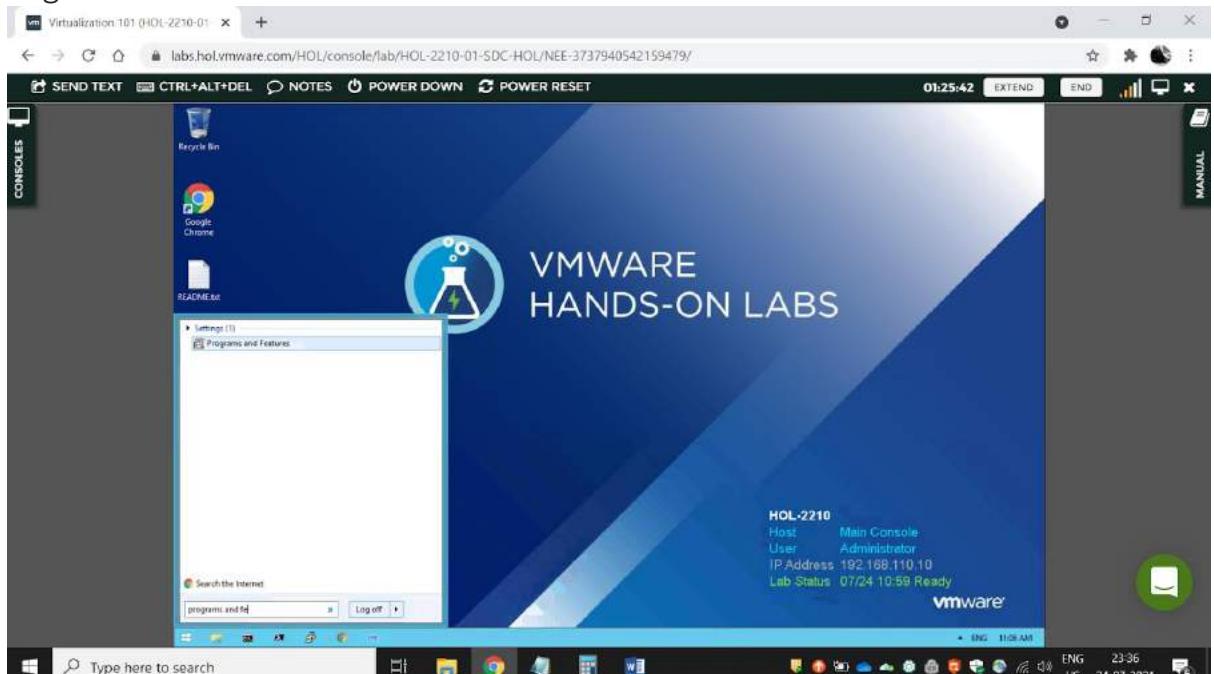
What is iscsi LUN?

An **iSCSI LUN** is a logical unit of storage. In SoftNAS Cloud®, the basic storage **LUN** is a volume that is accessed as a block device. ... The target serves up the **LUNs**, which are collections of disk blocks accessed via the **iSCSI** protocol over the network.

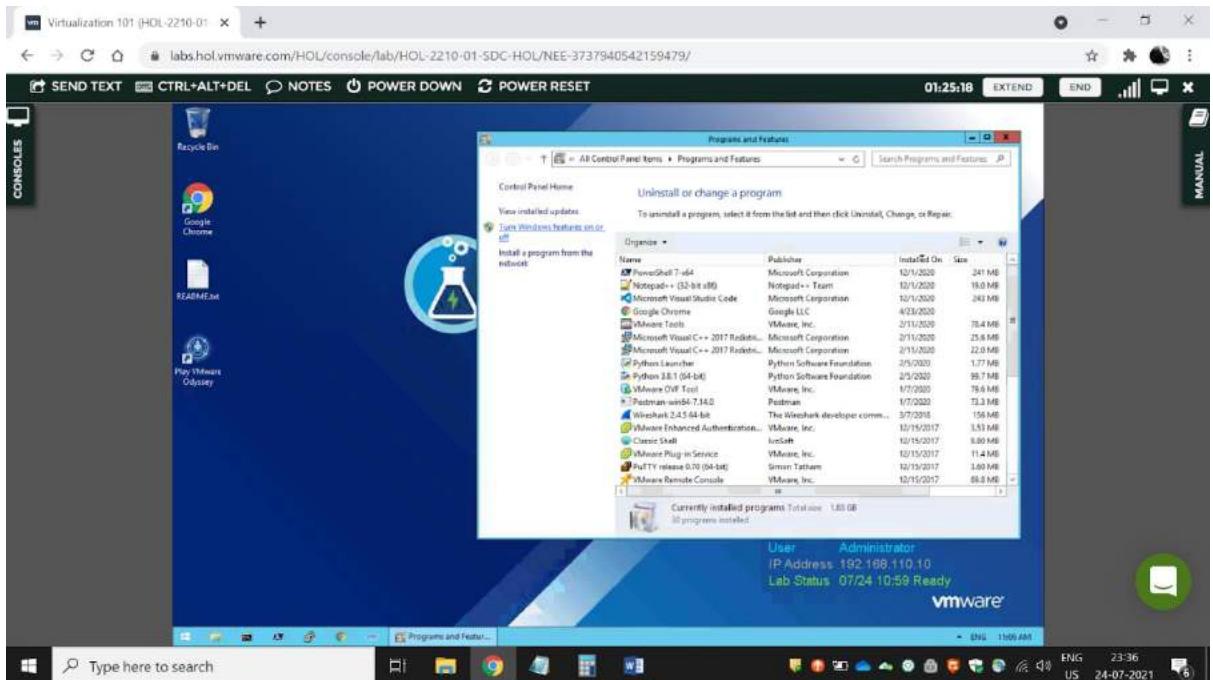
4a-Add virtual Storage in VMware ESXi Server with vSphere client using iSCSI



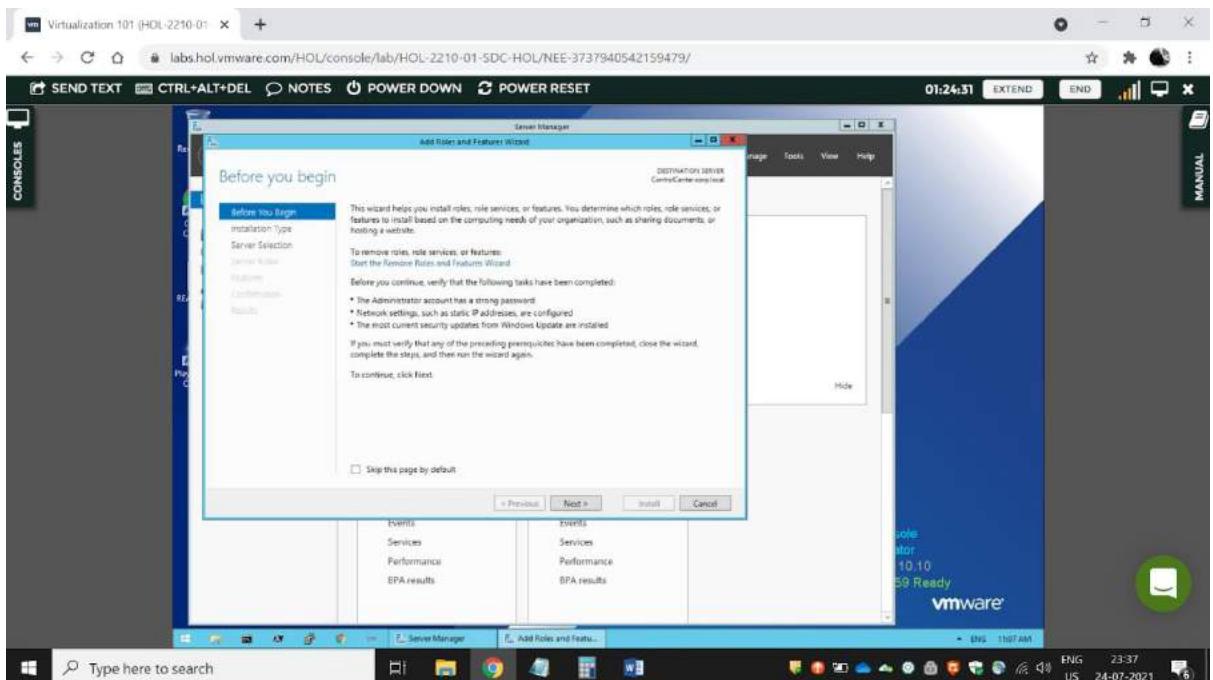
Login into vmware hands on lab -> Virtualization 101 lab



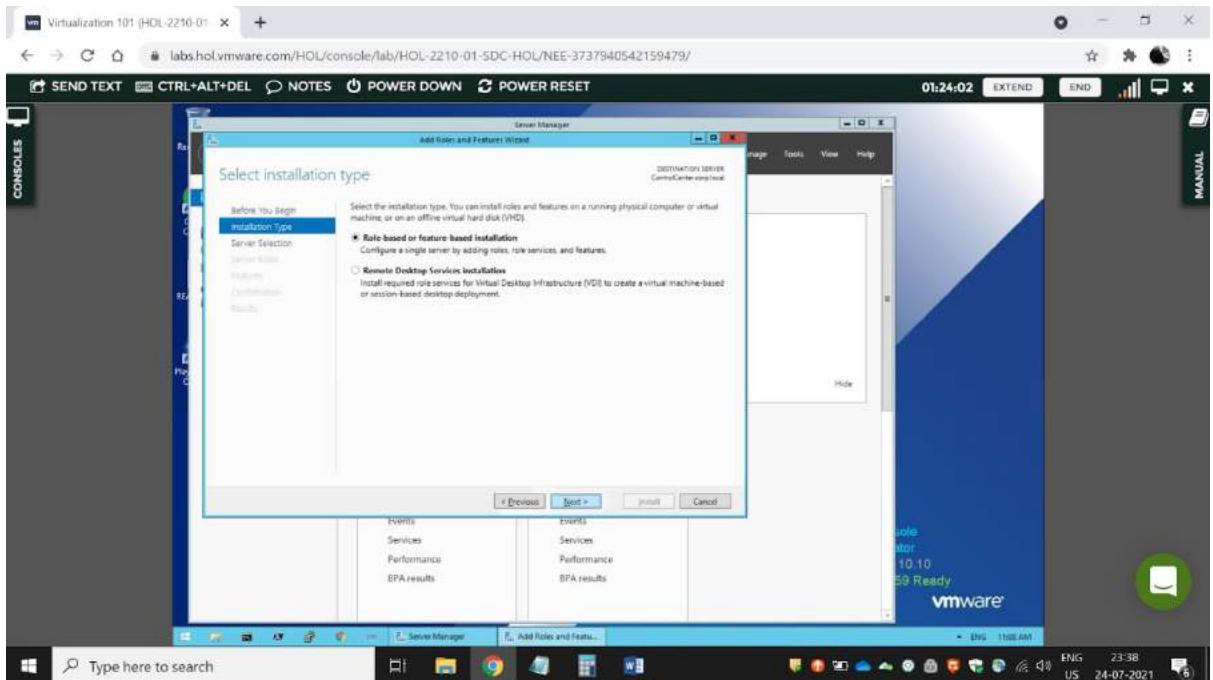
Go to programs and features



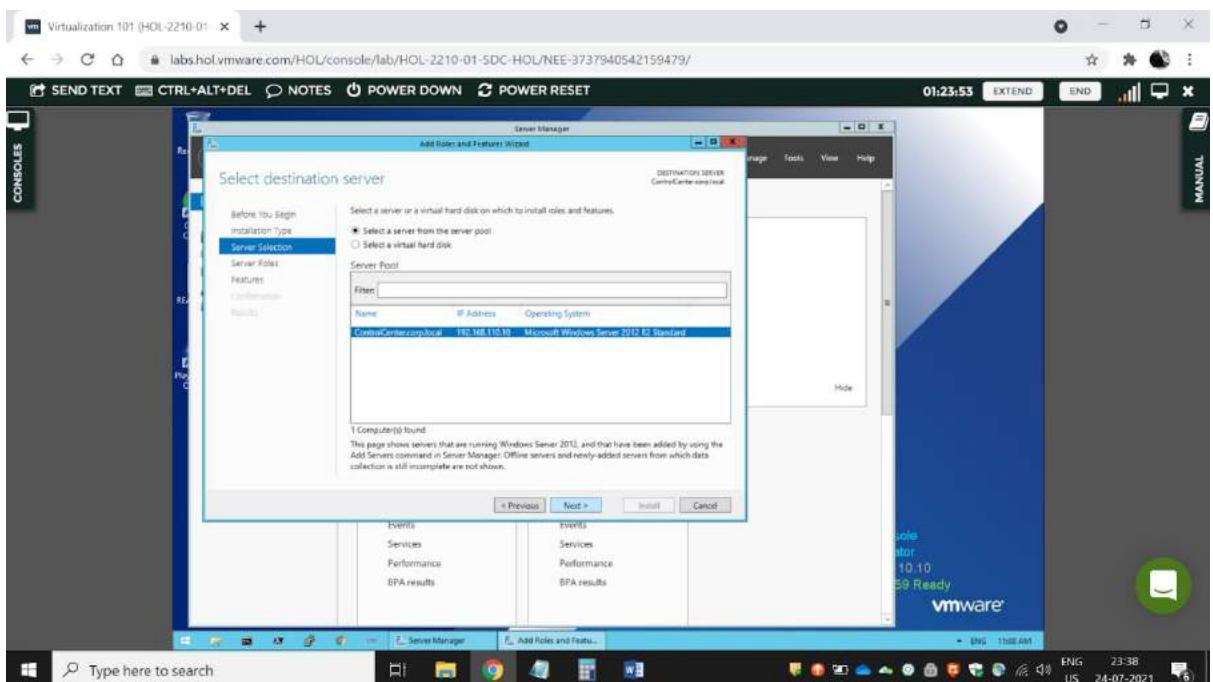
Click on Turn window features on or off



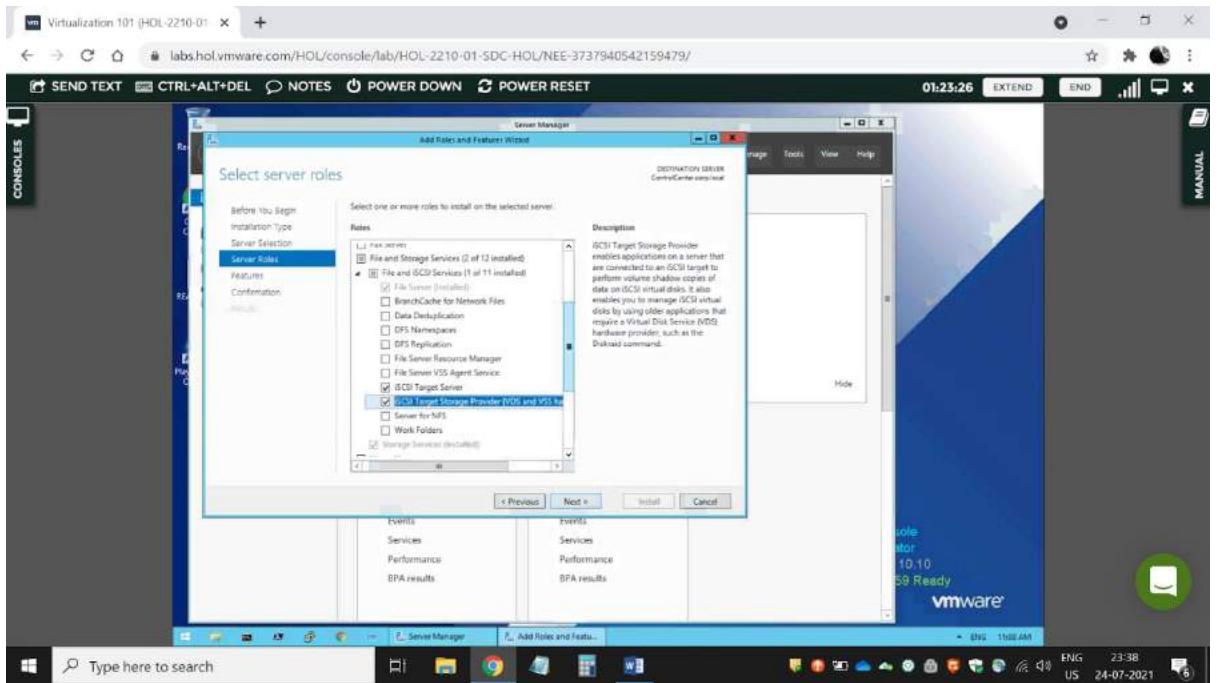
Click on Add roles and features option and next



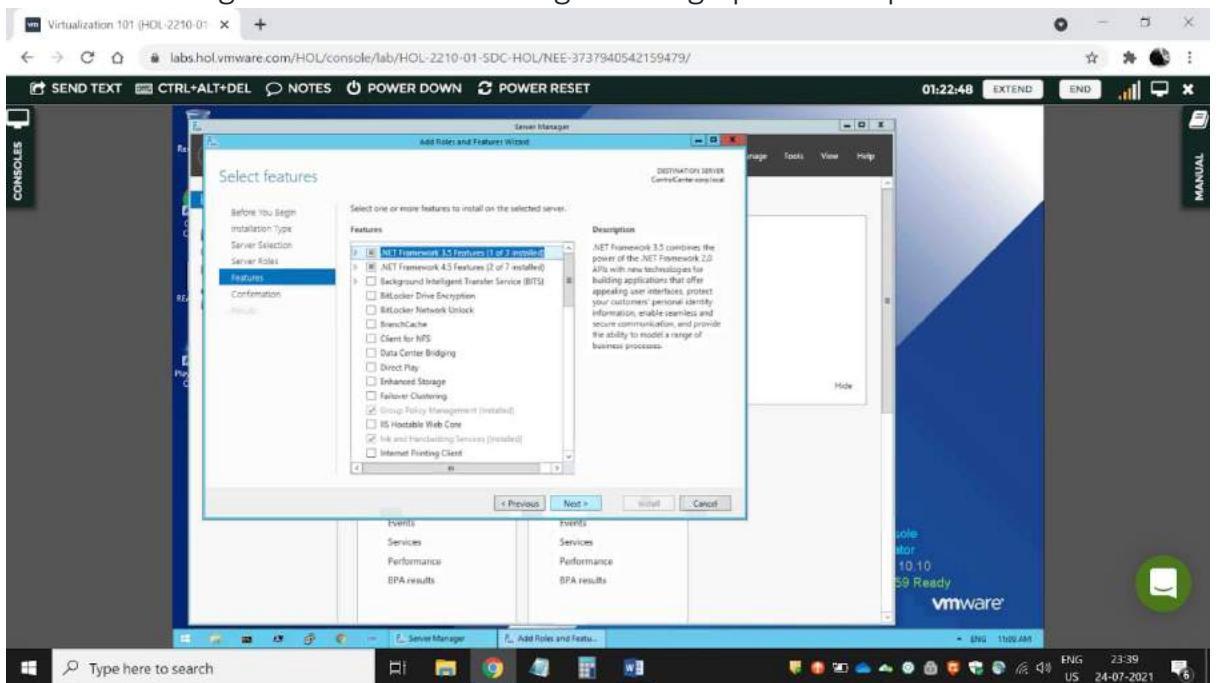
Next



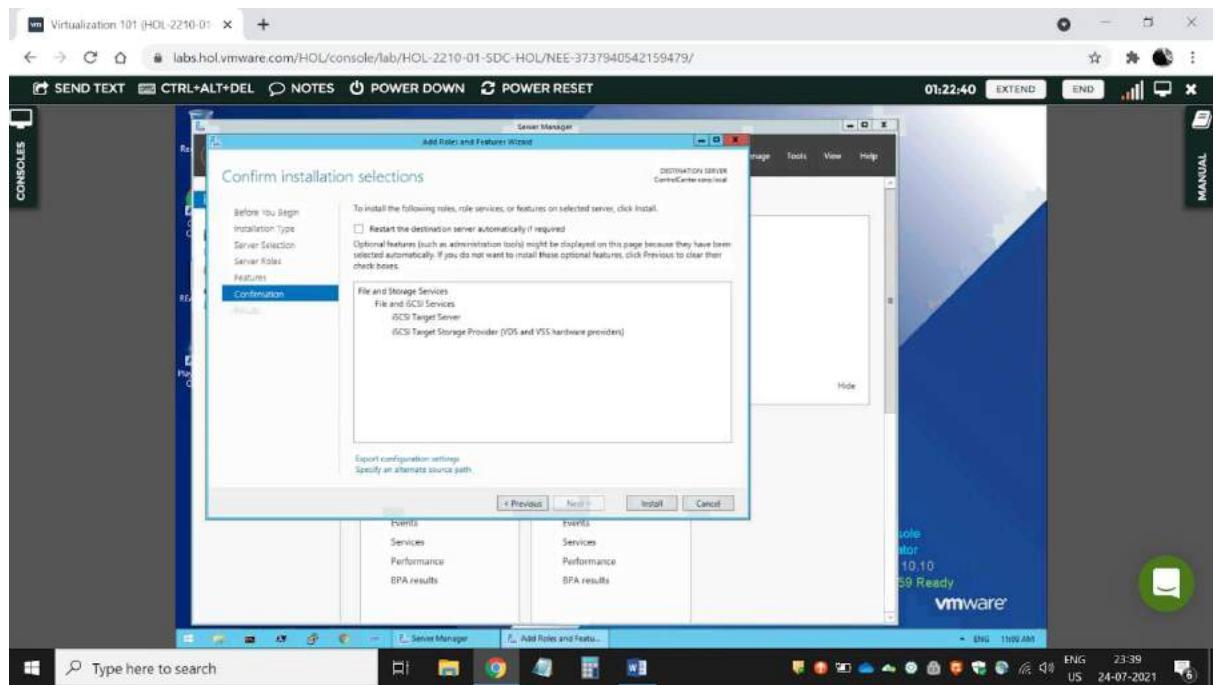
Next



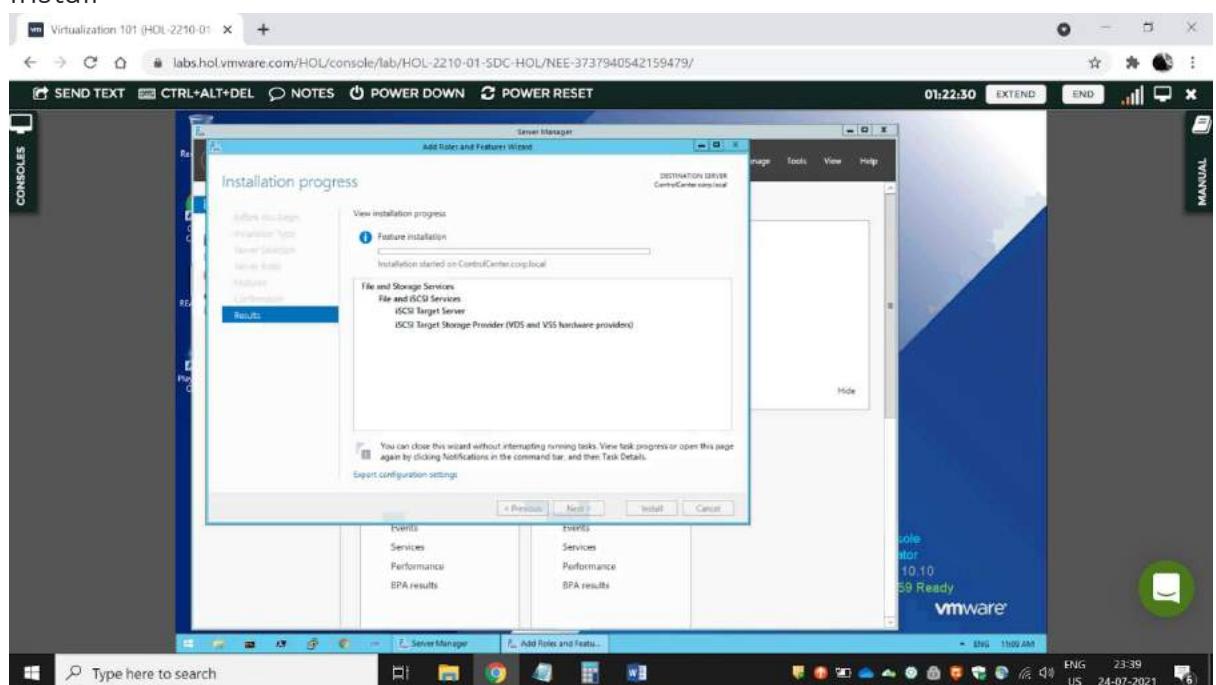
Select iSCSI target server and iSCSI target storage provider option and Next



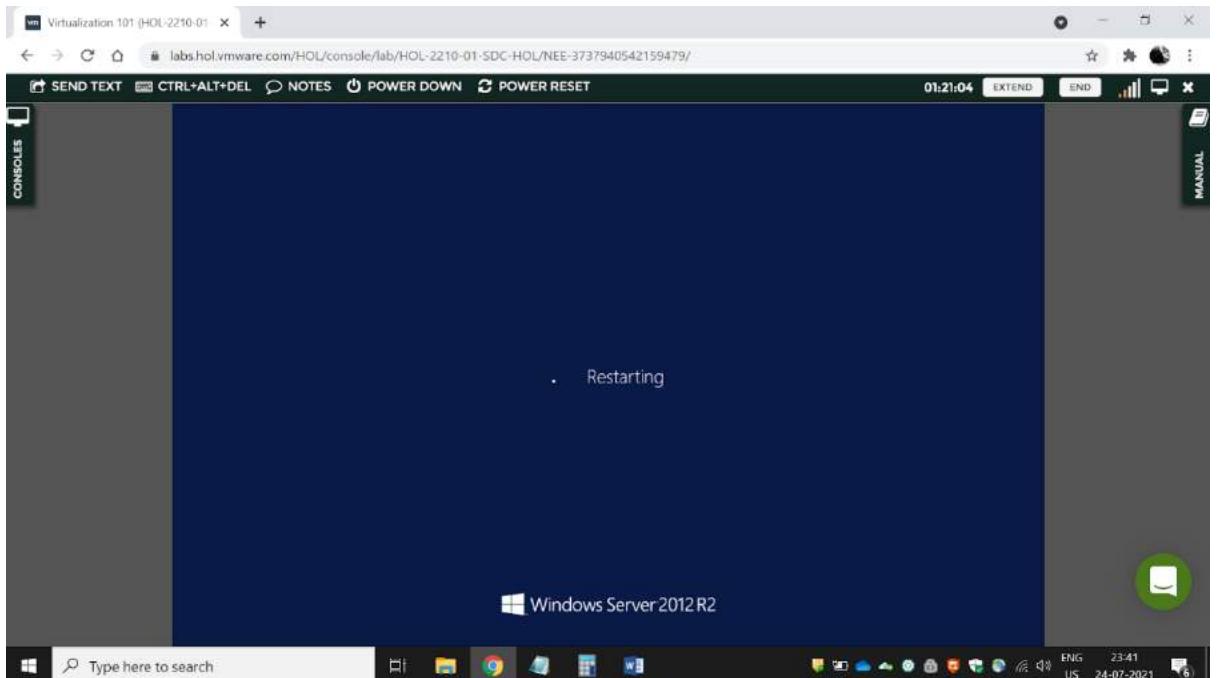
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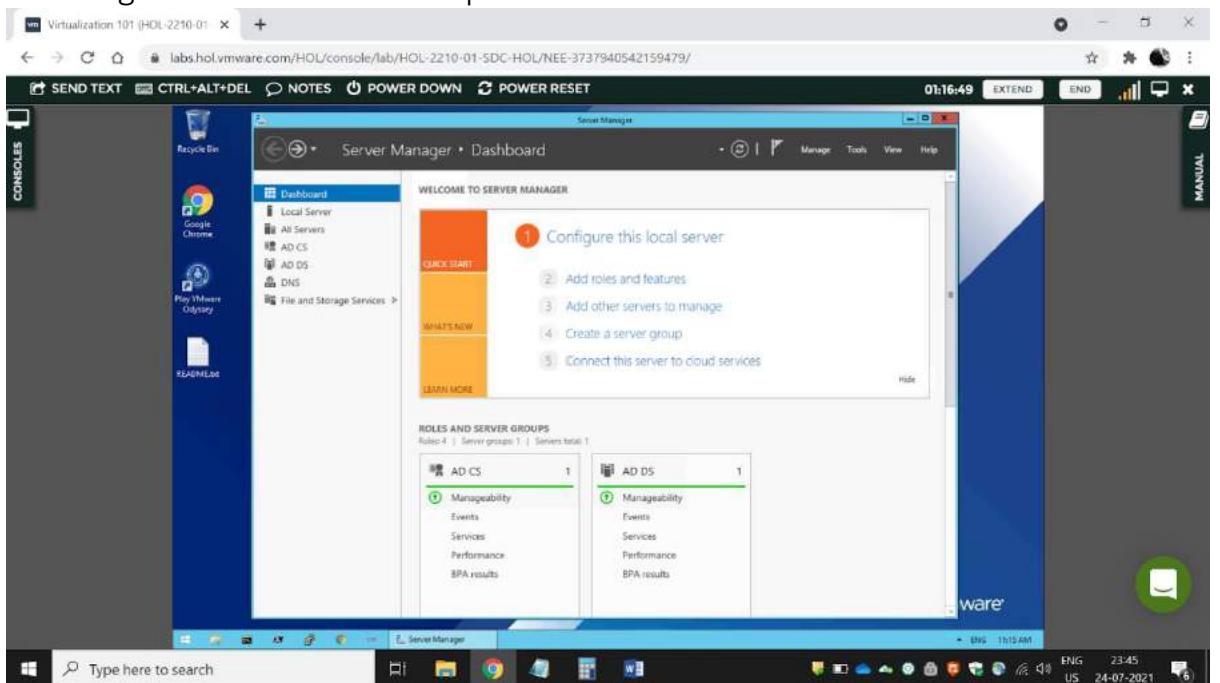
Install



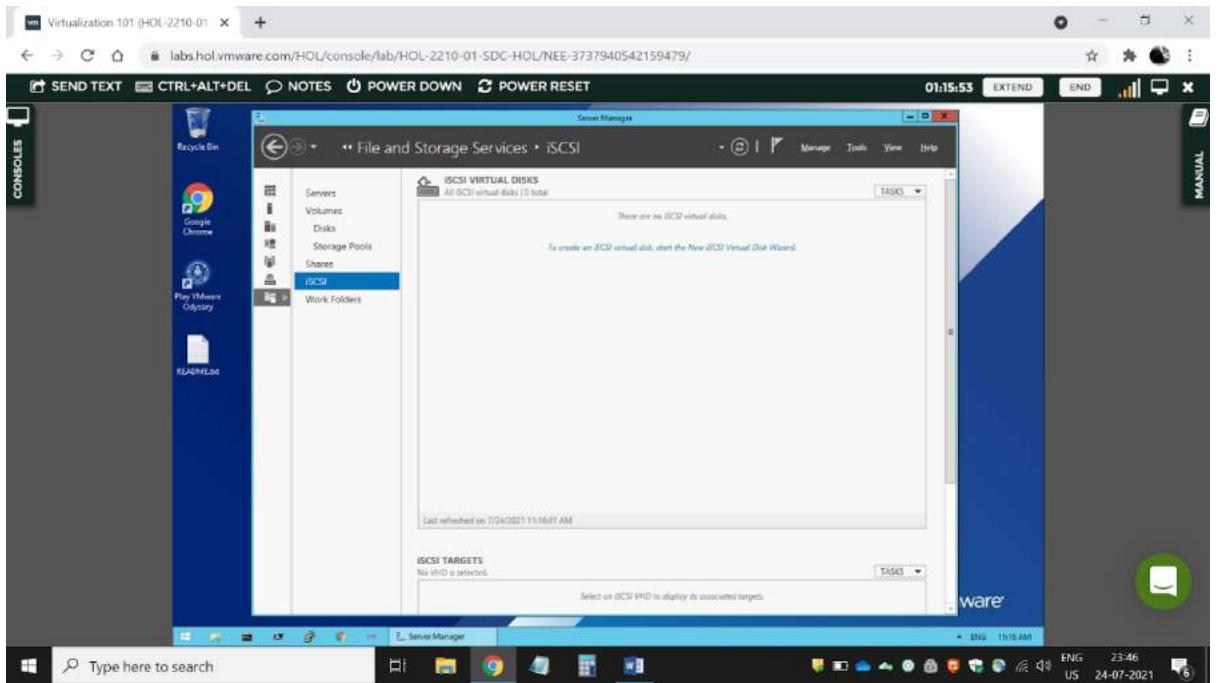
Will take sometime to install



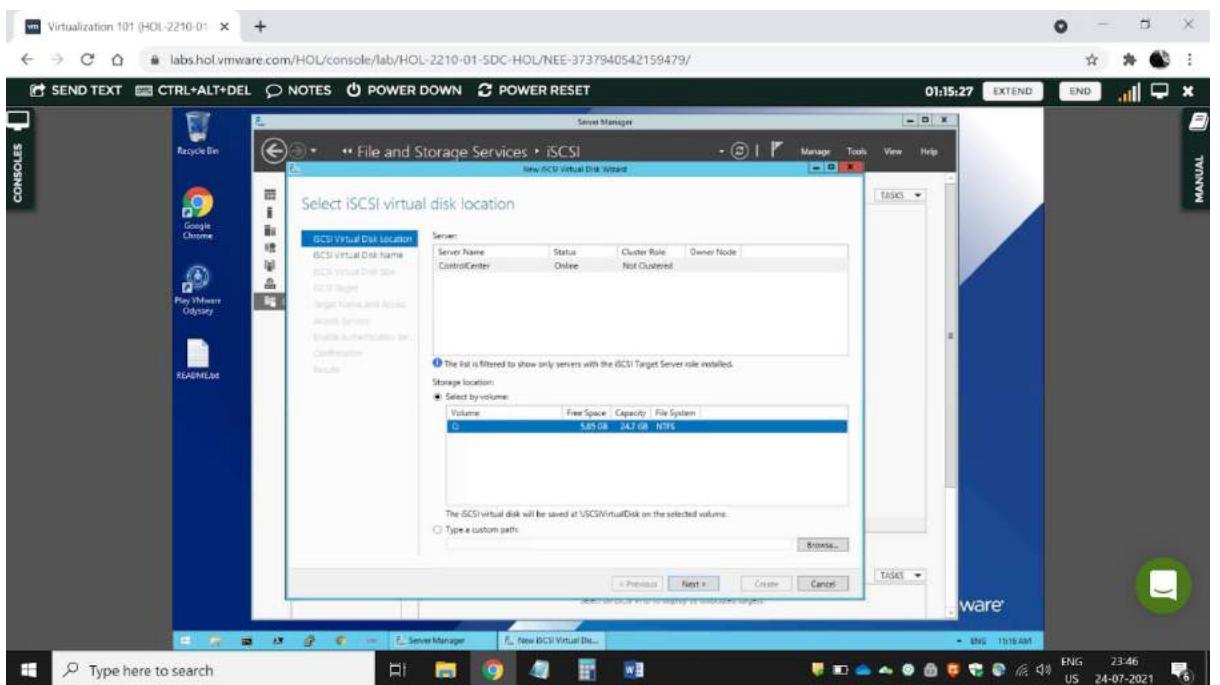
Once installation is done Restart your device to access those changes.
Then login from administrator password is VMware1!



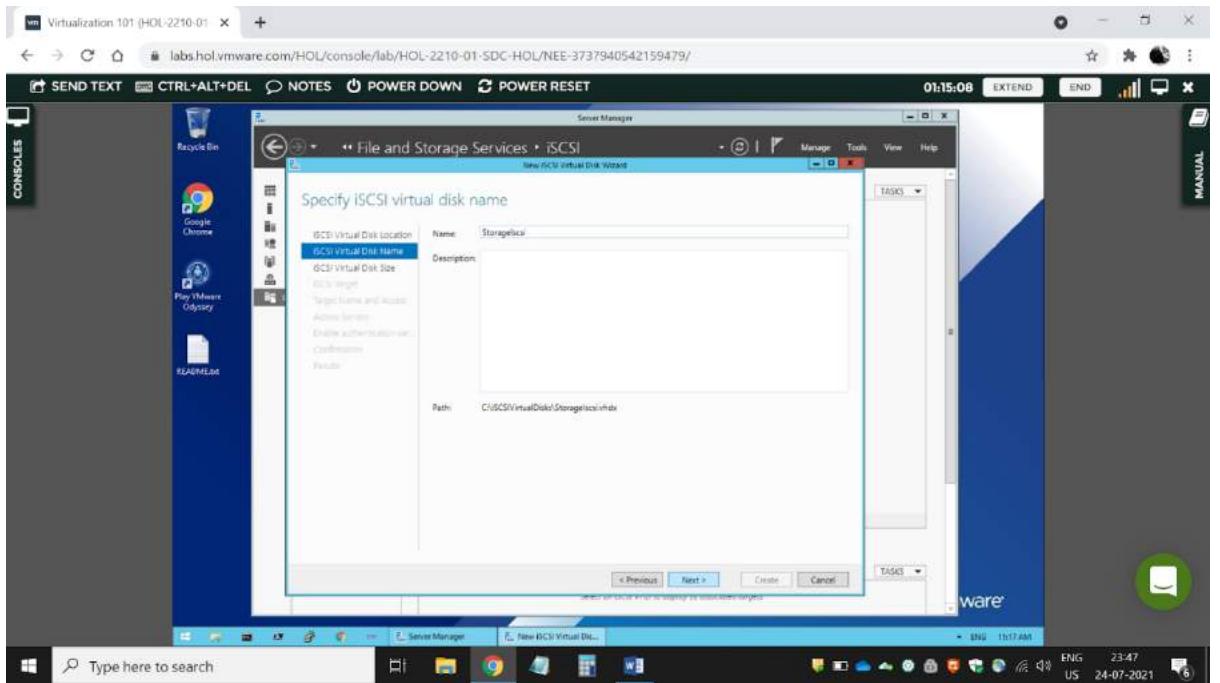
Go in programs and features again and go to File and Storage Services
then go to ISCSI part



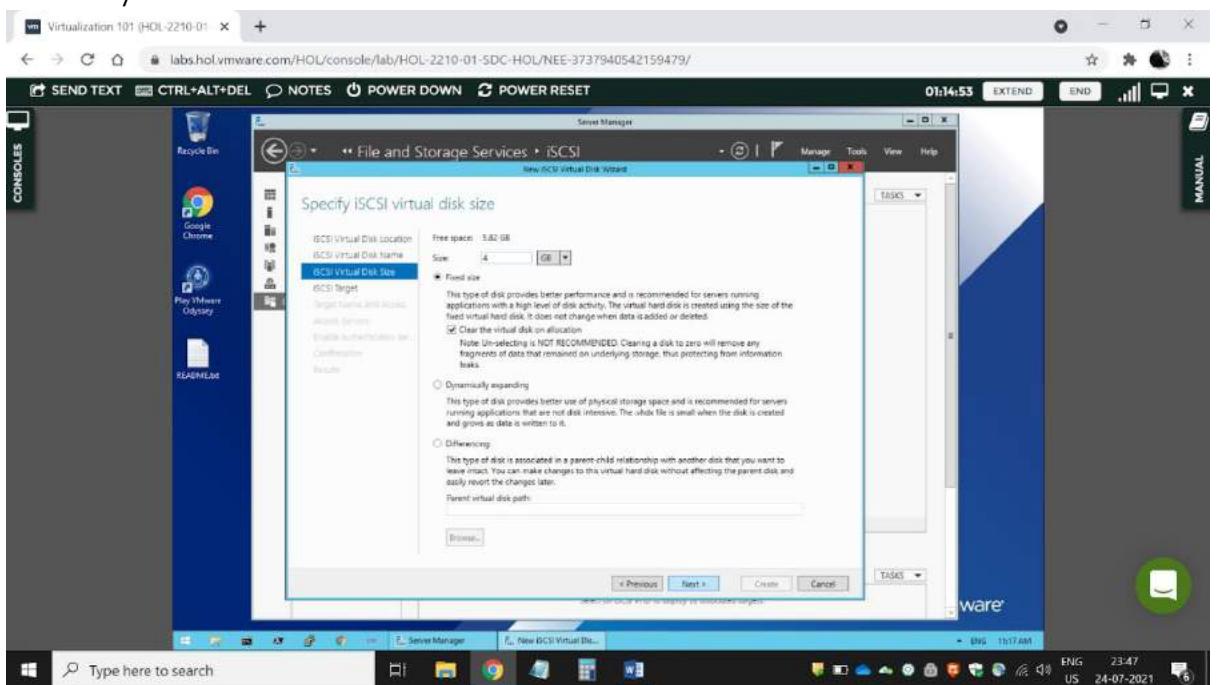
Create an iSCSI disk



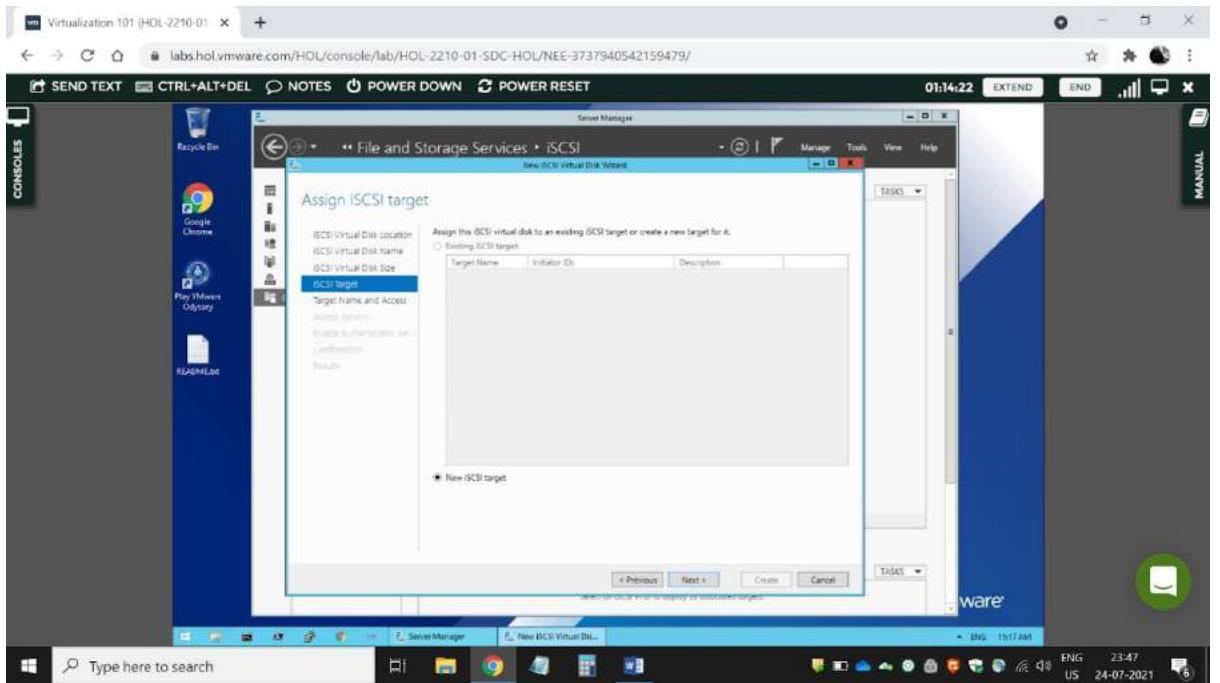
Next



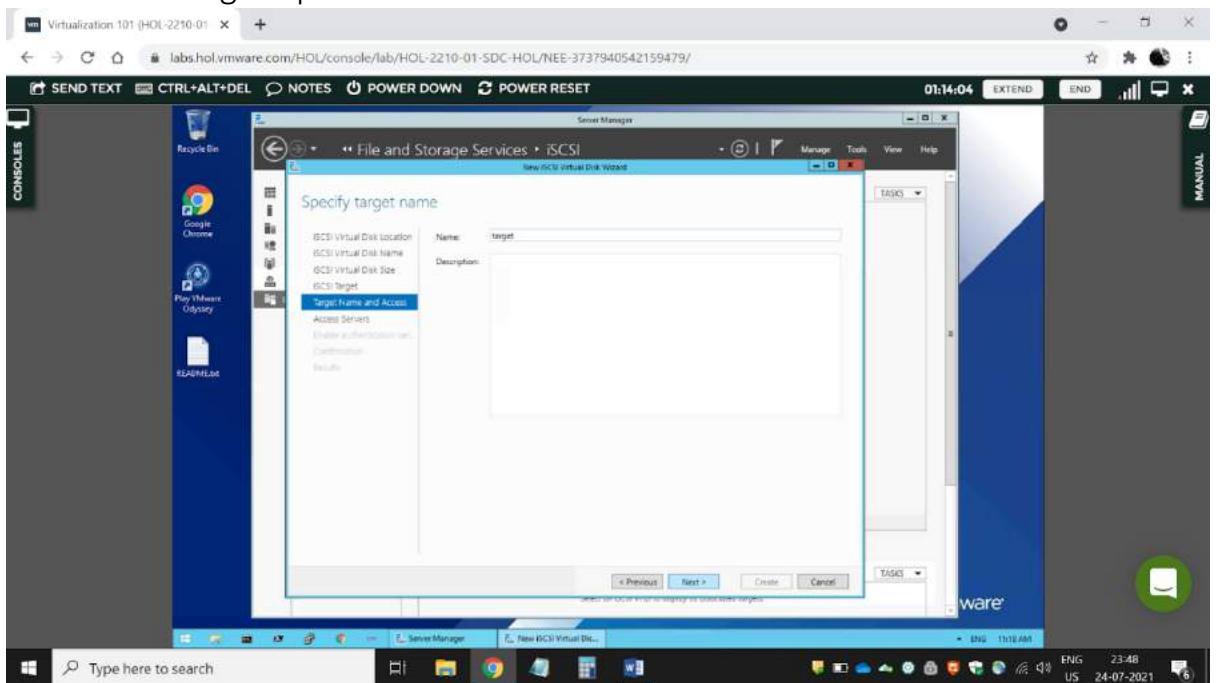
Give any name and next



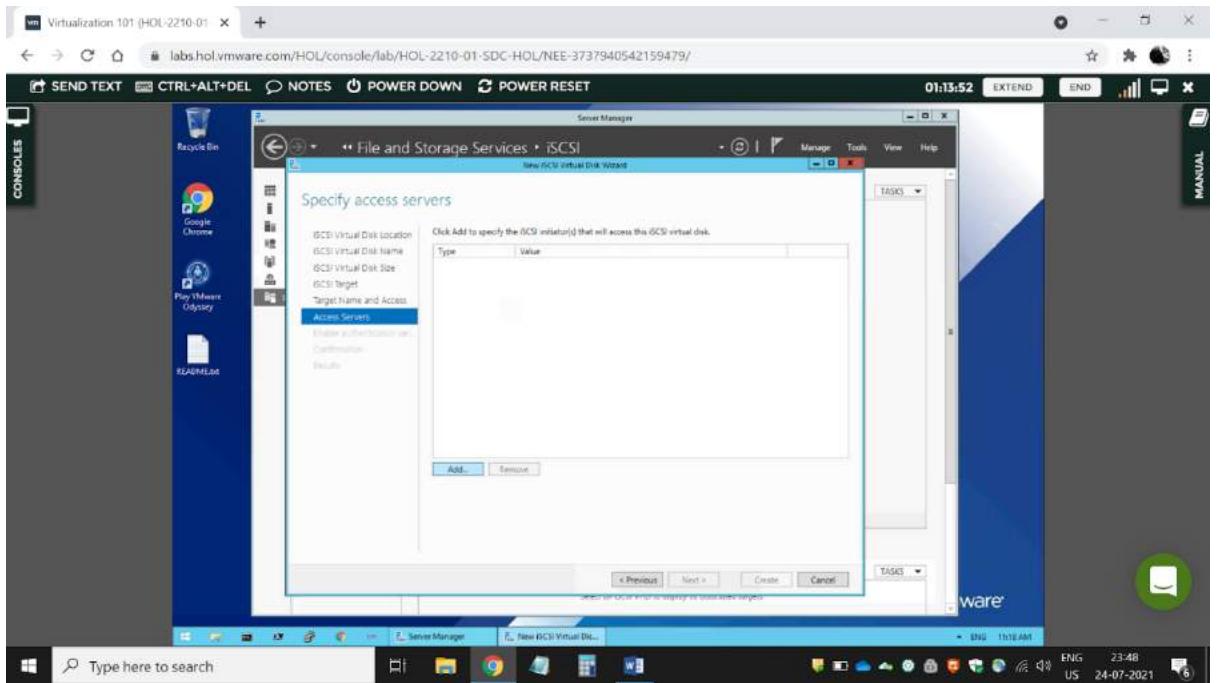
Give storage size as per the available device



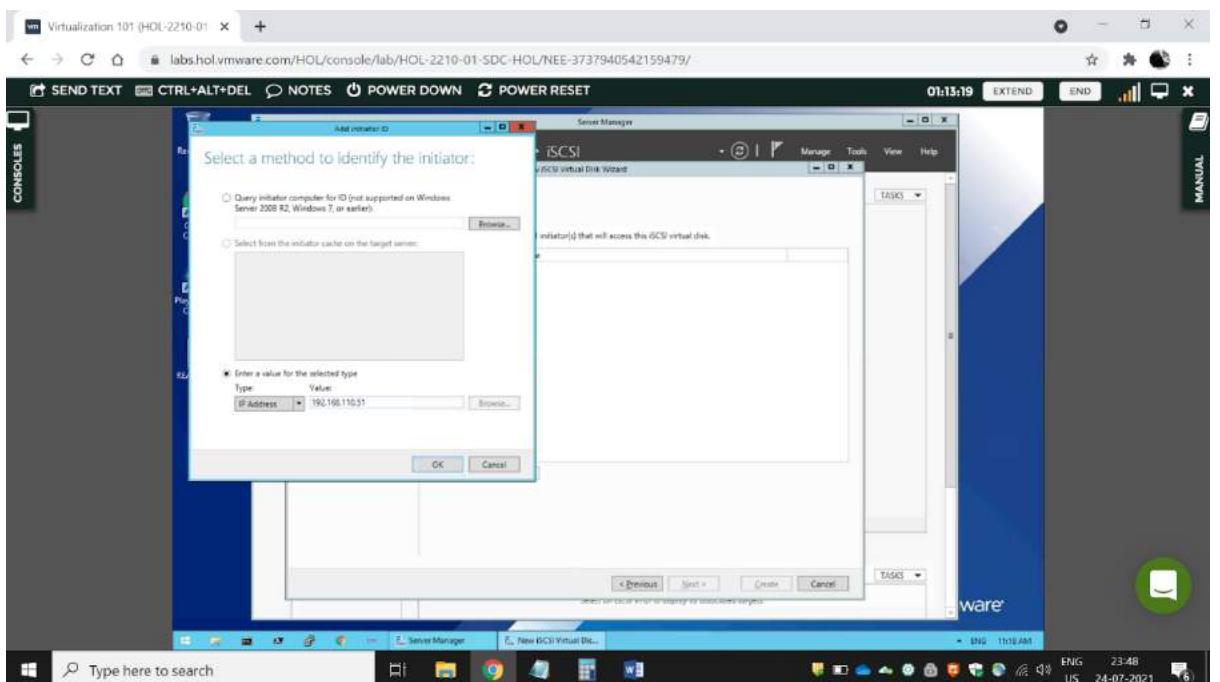
Select new target option



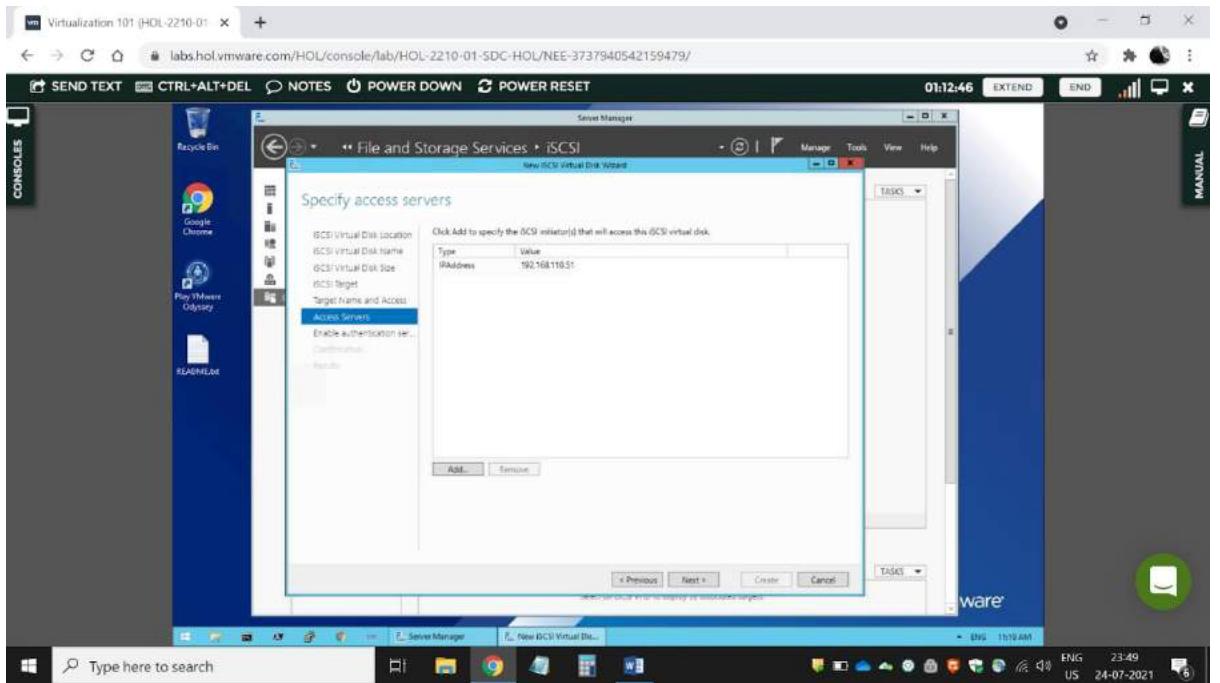
Give name and next



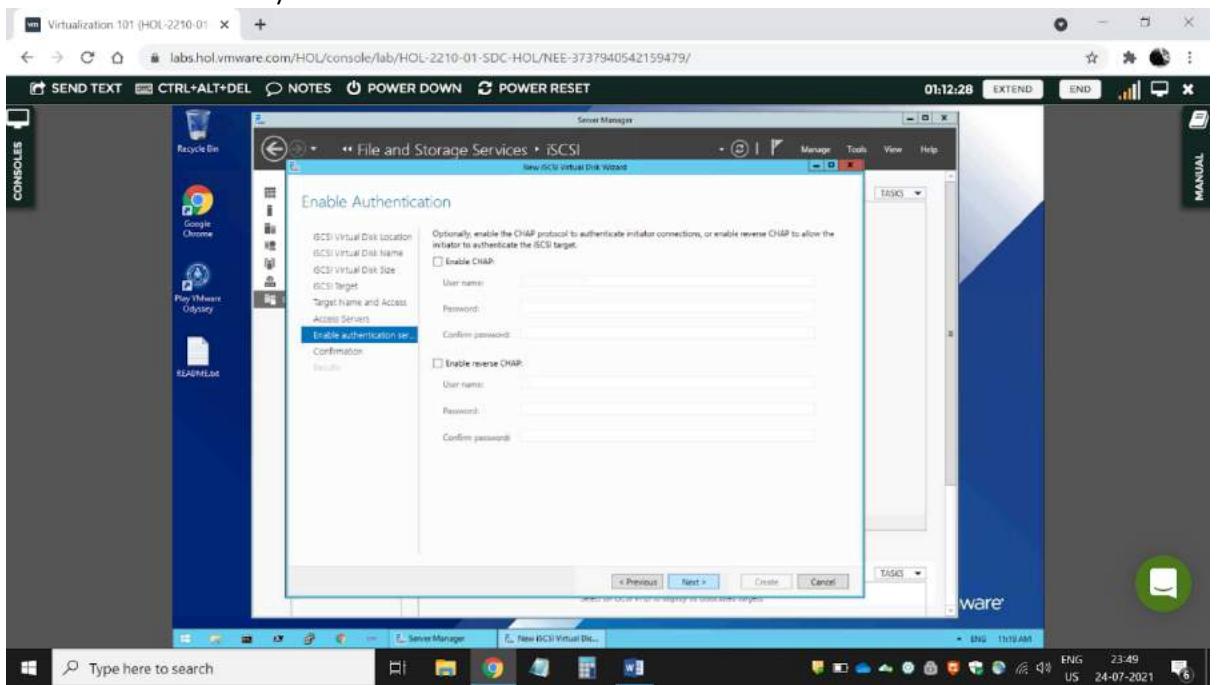
Click on add



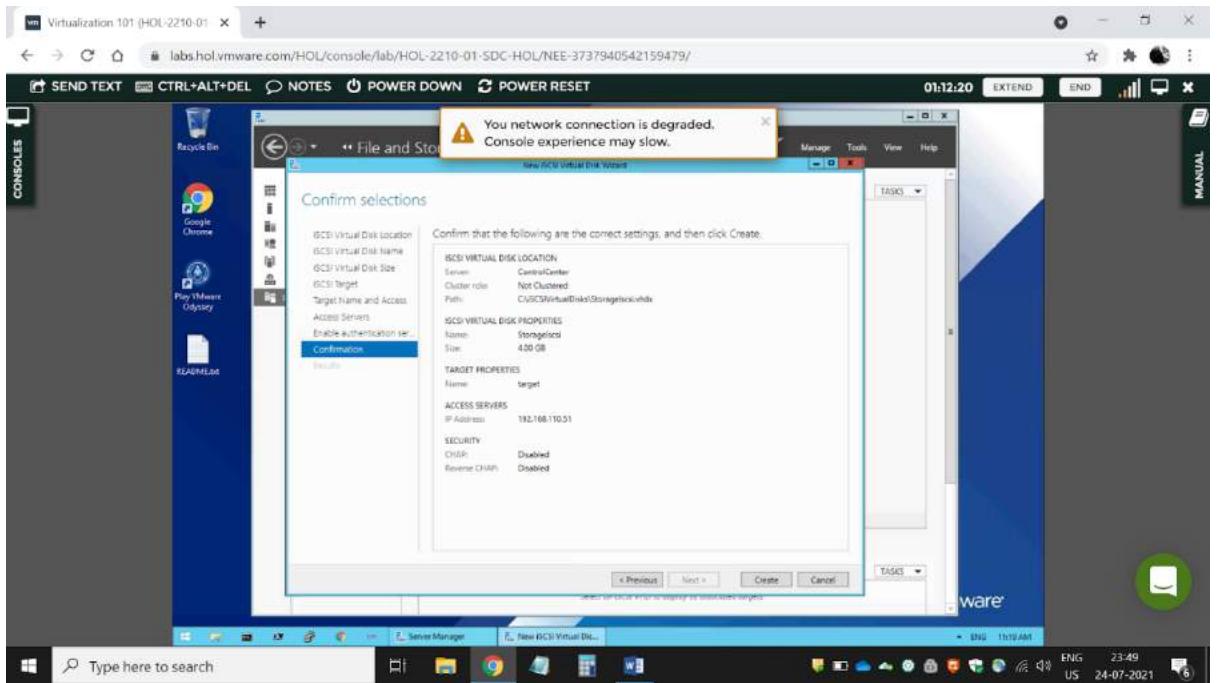
Select 2nd option and type select IP address and give mentioned IP



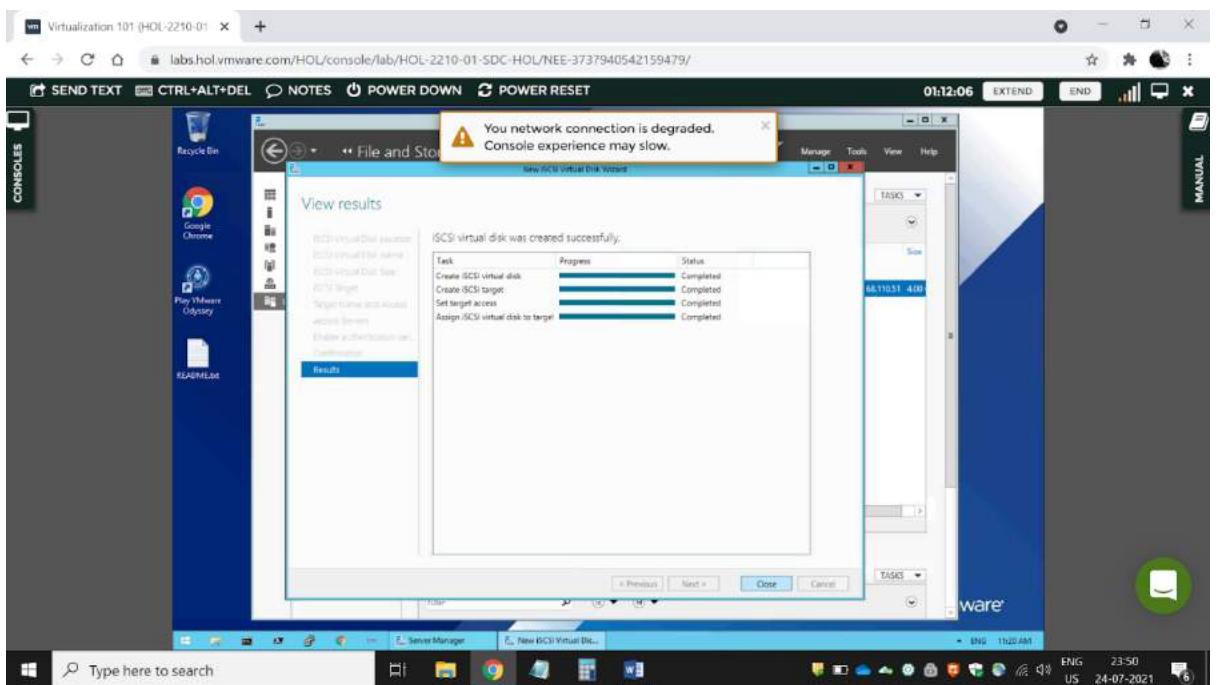
Added successfully and Next



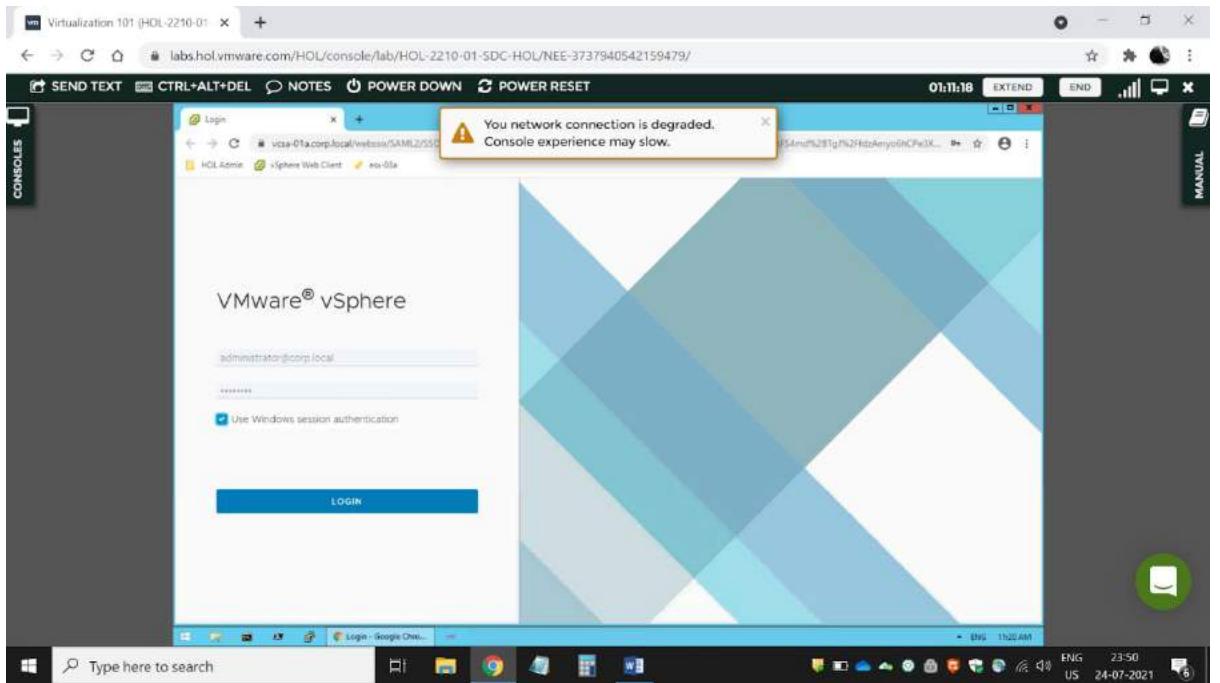
Next



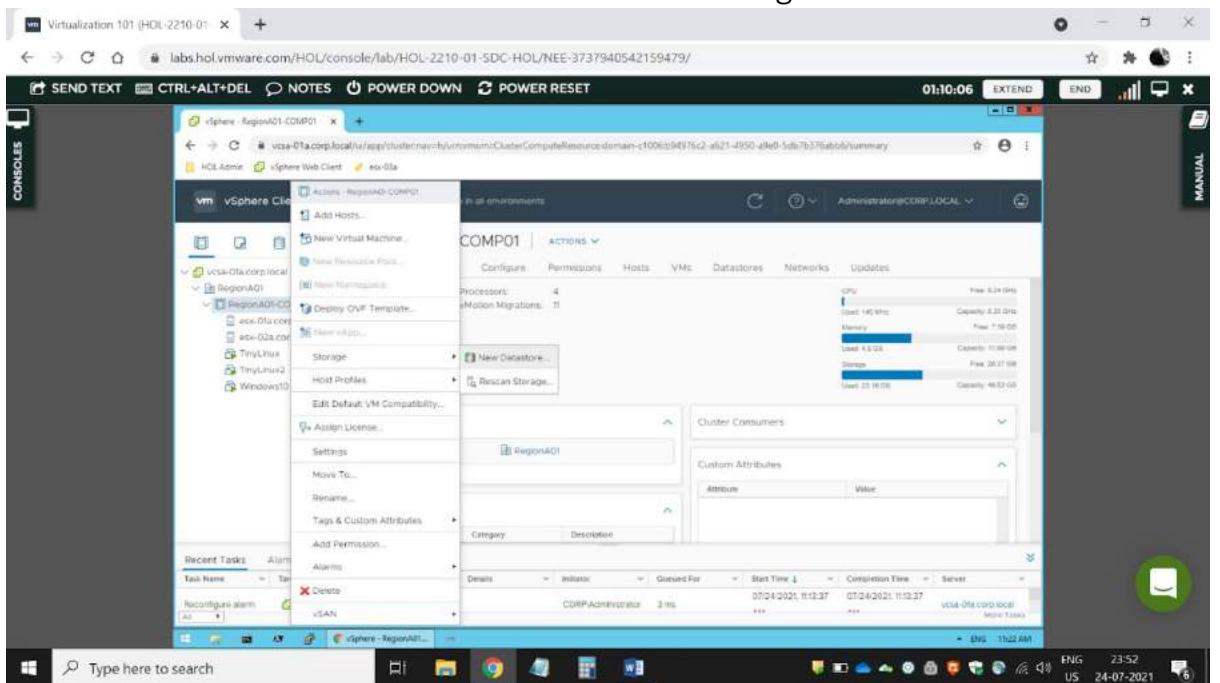
Click on create



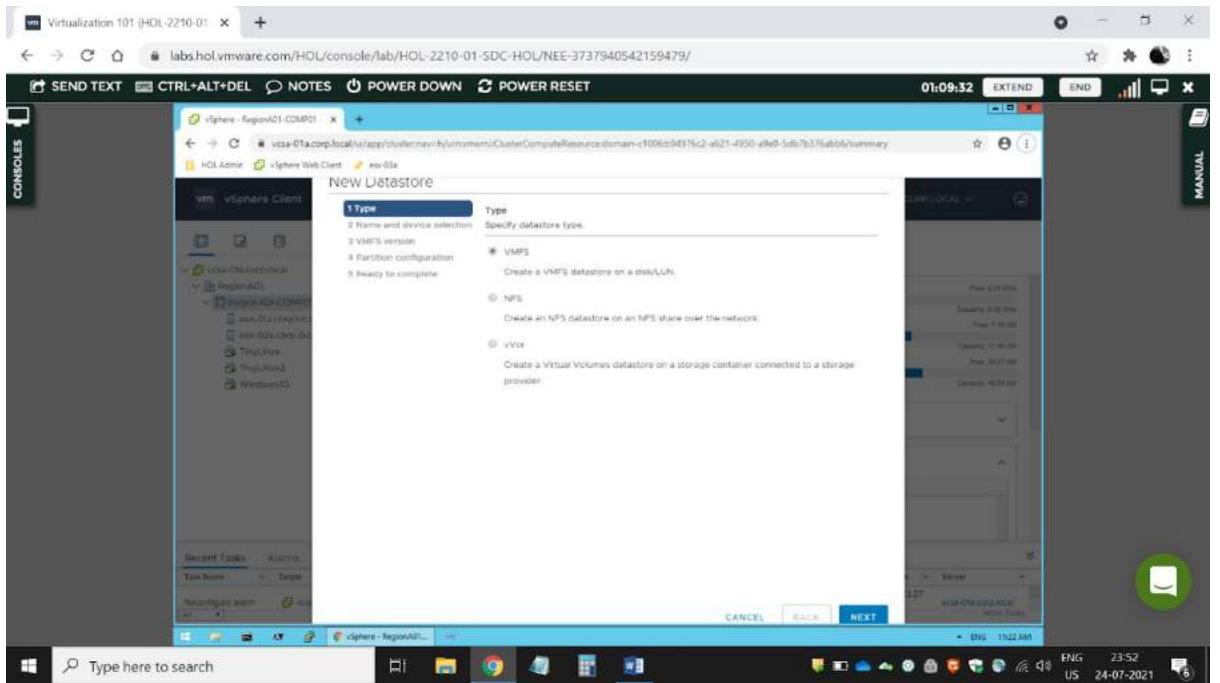
Done. Close and open chrome



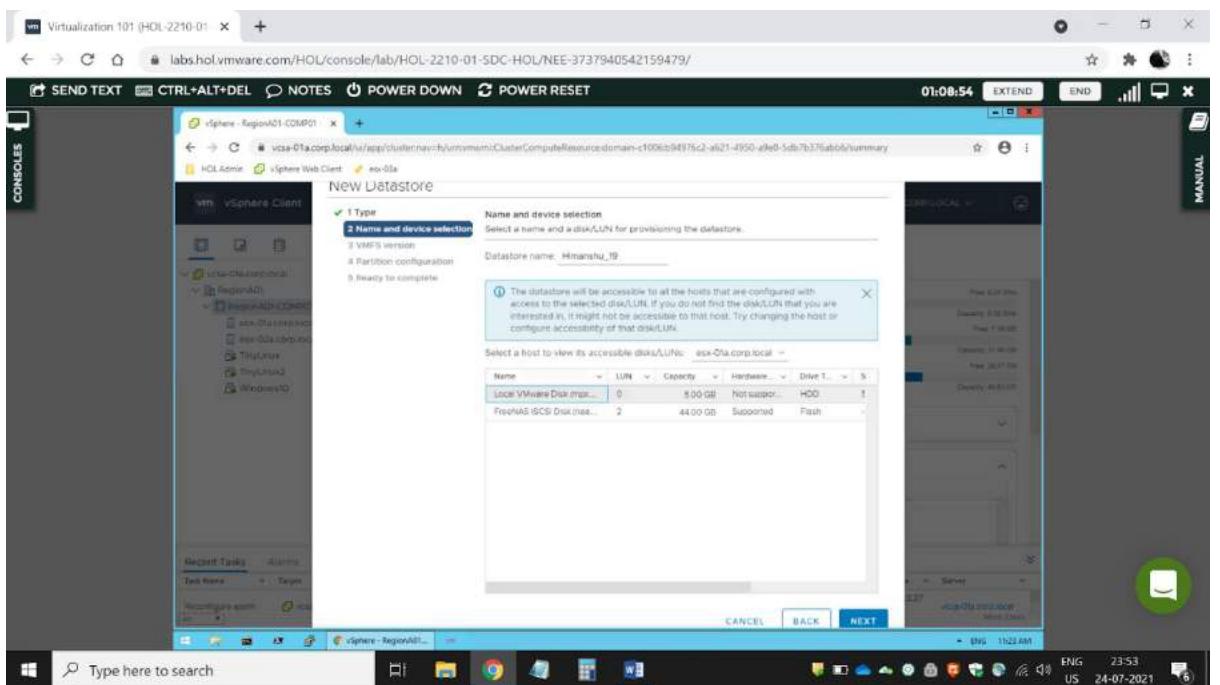
Click on Use Window session authentication and Login



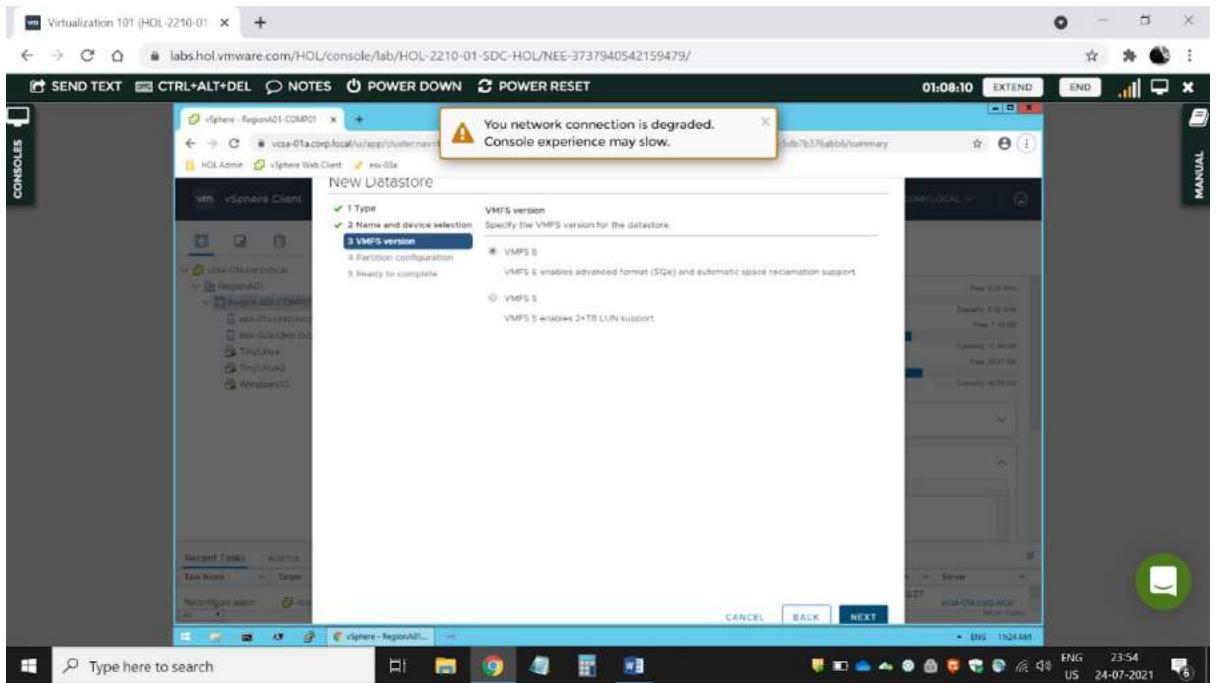
Click on cluster and create new Datastore



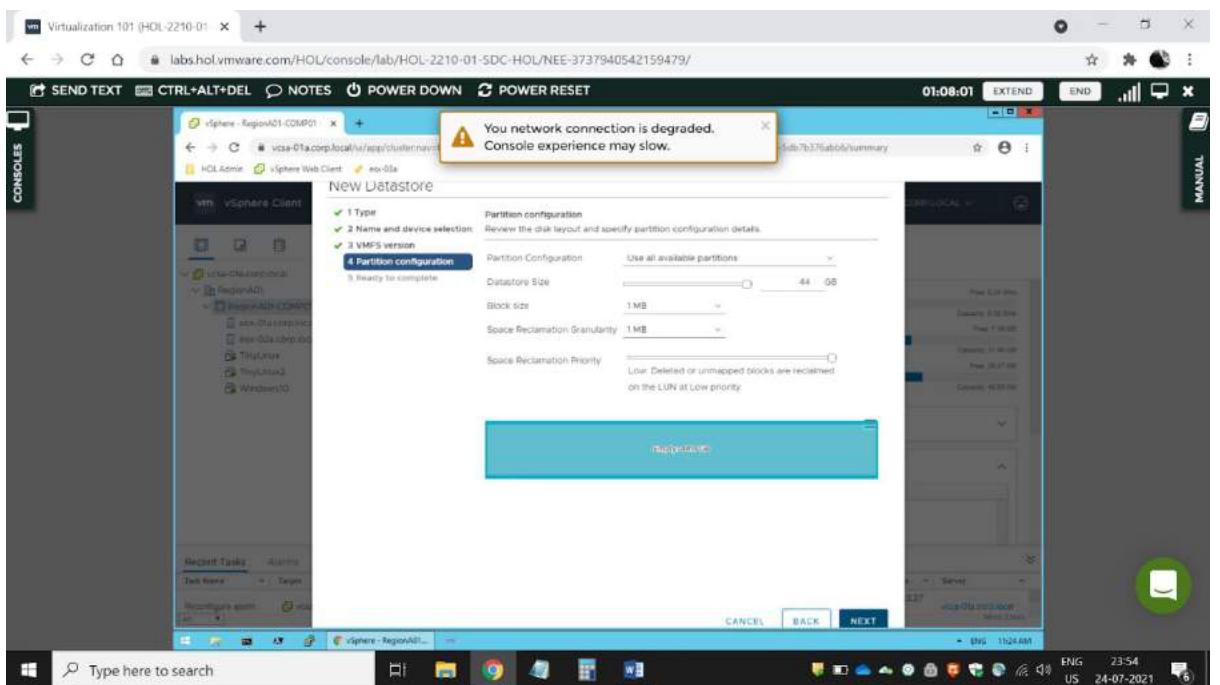
Next



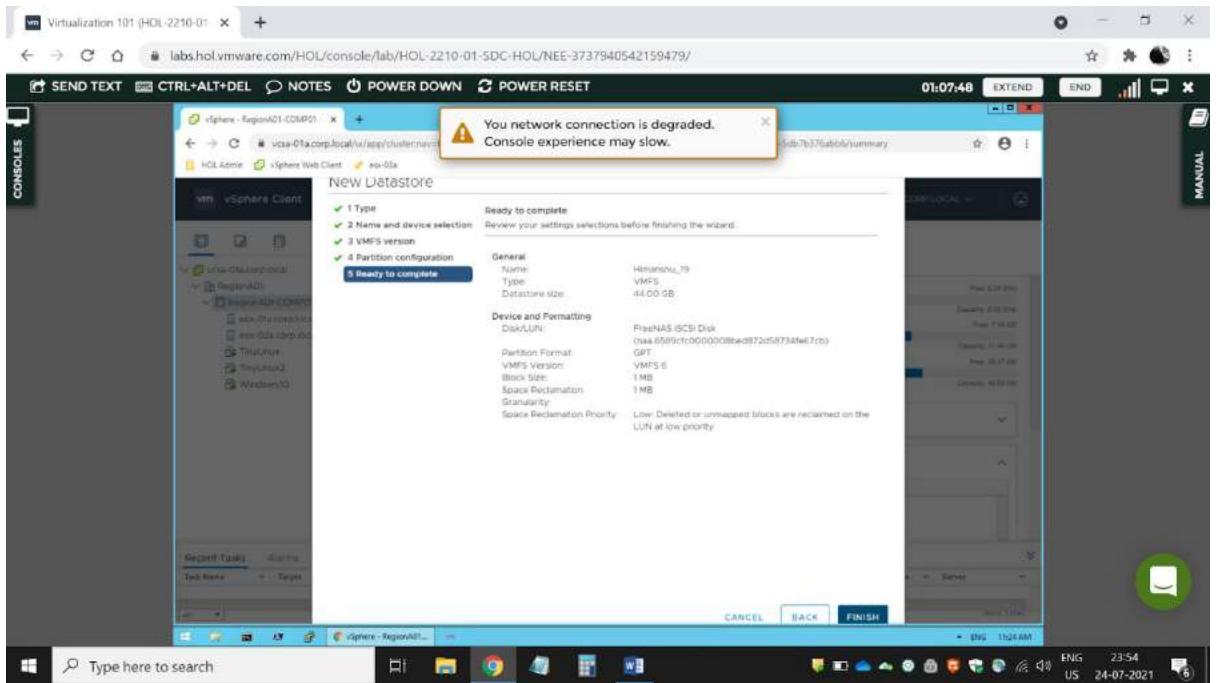
Give name to datastore and select a host and select FreeNAS iSCSI Disk



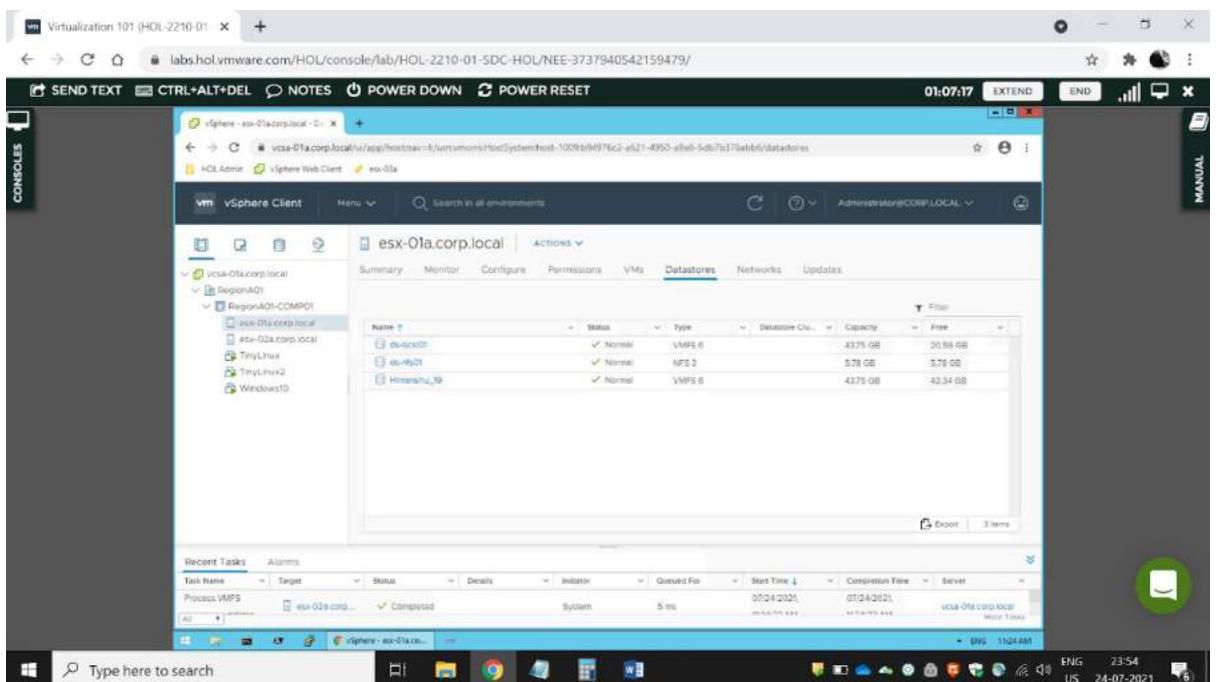
Next



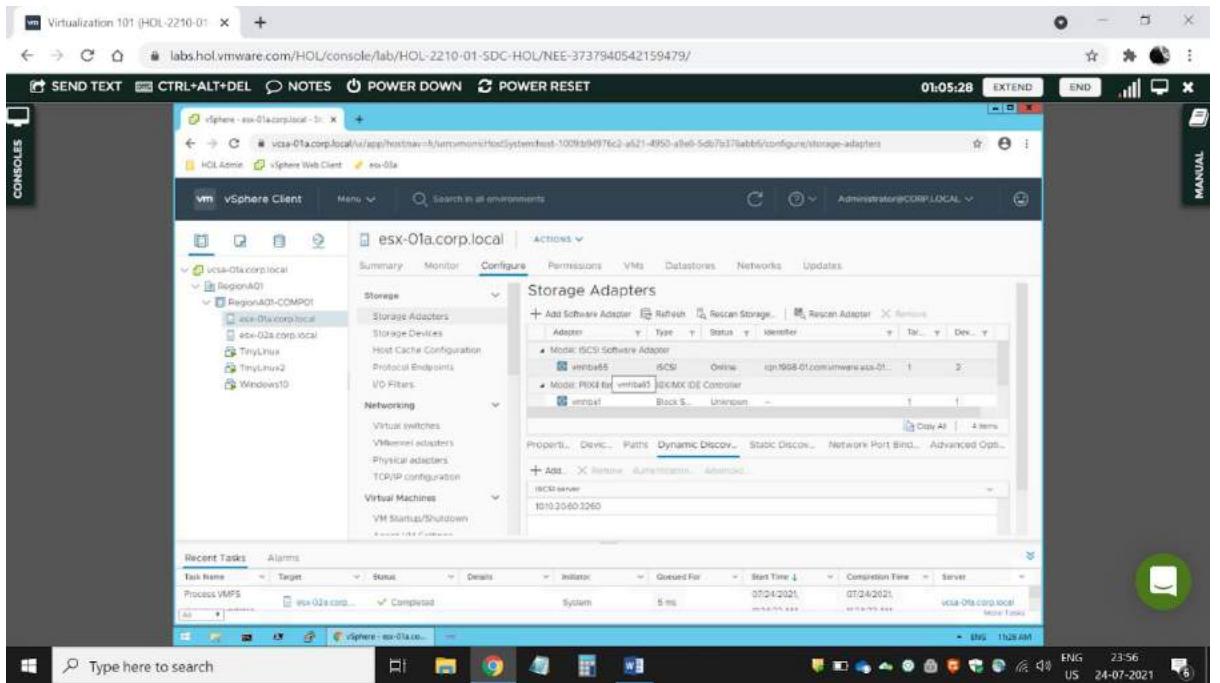
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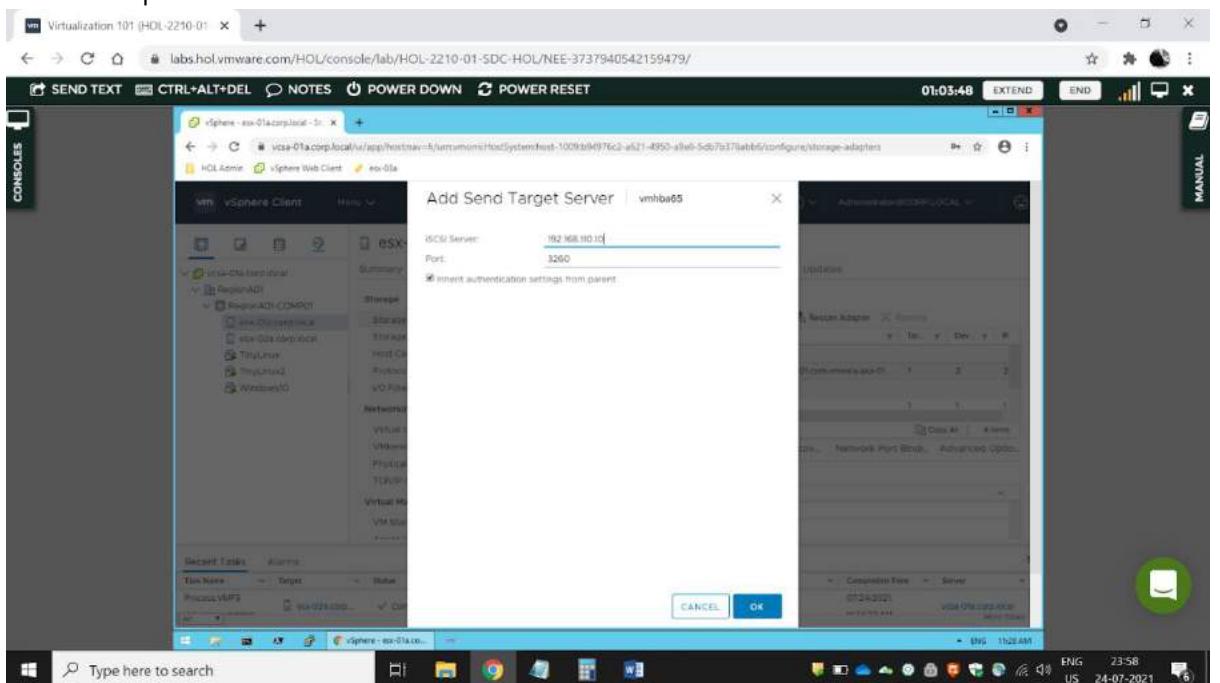
Finish



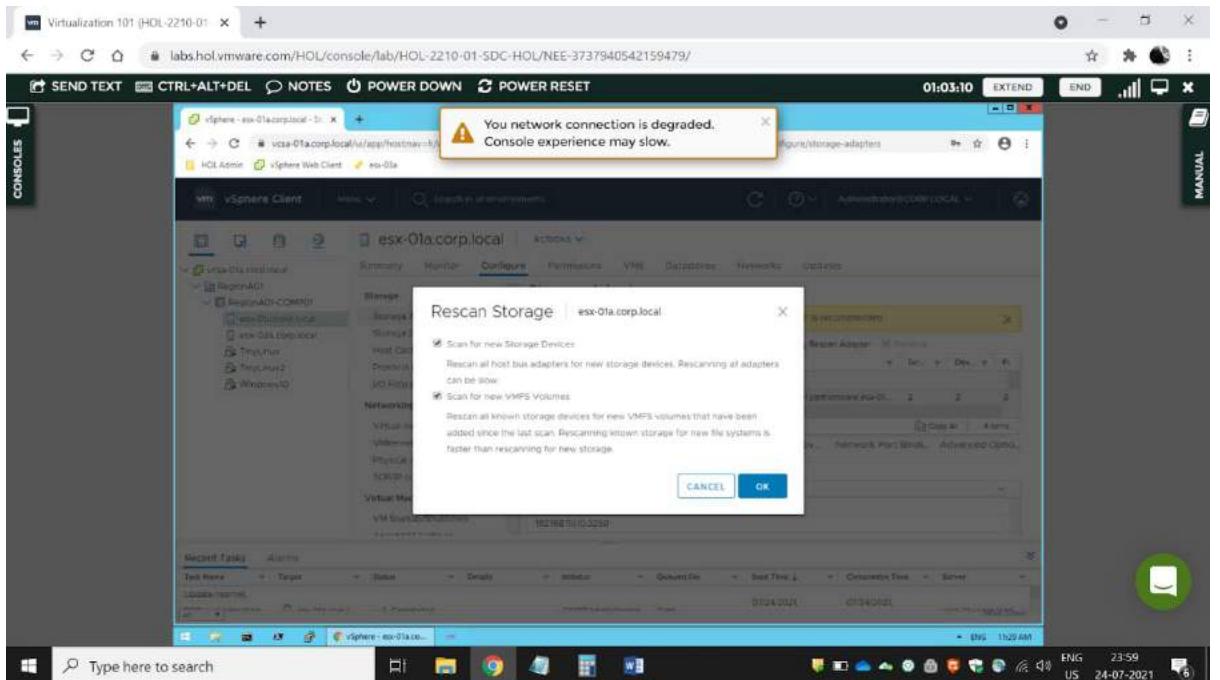
Here datastore added successfully



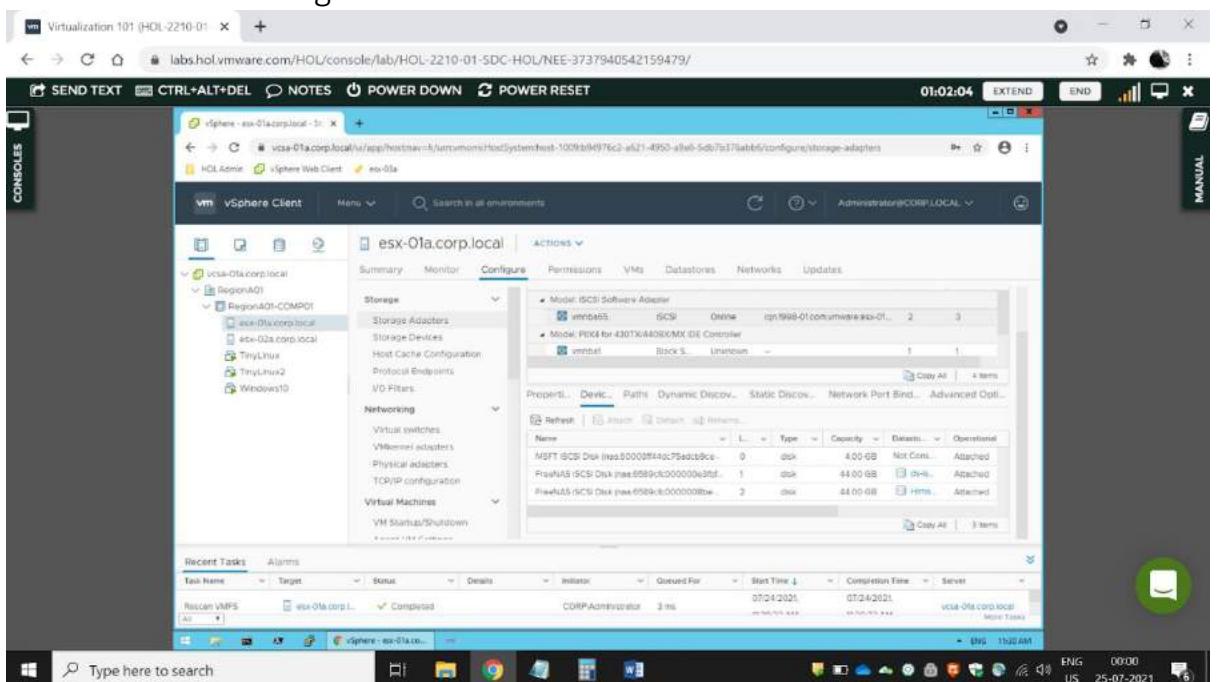
Now click on host 1 configure. Double click on iSCSI software adapter.
Below we can see a page will open click on Dynamic Discovery and click on Add option



Enter the required port ip and Done.



Click on rescan storage



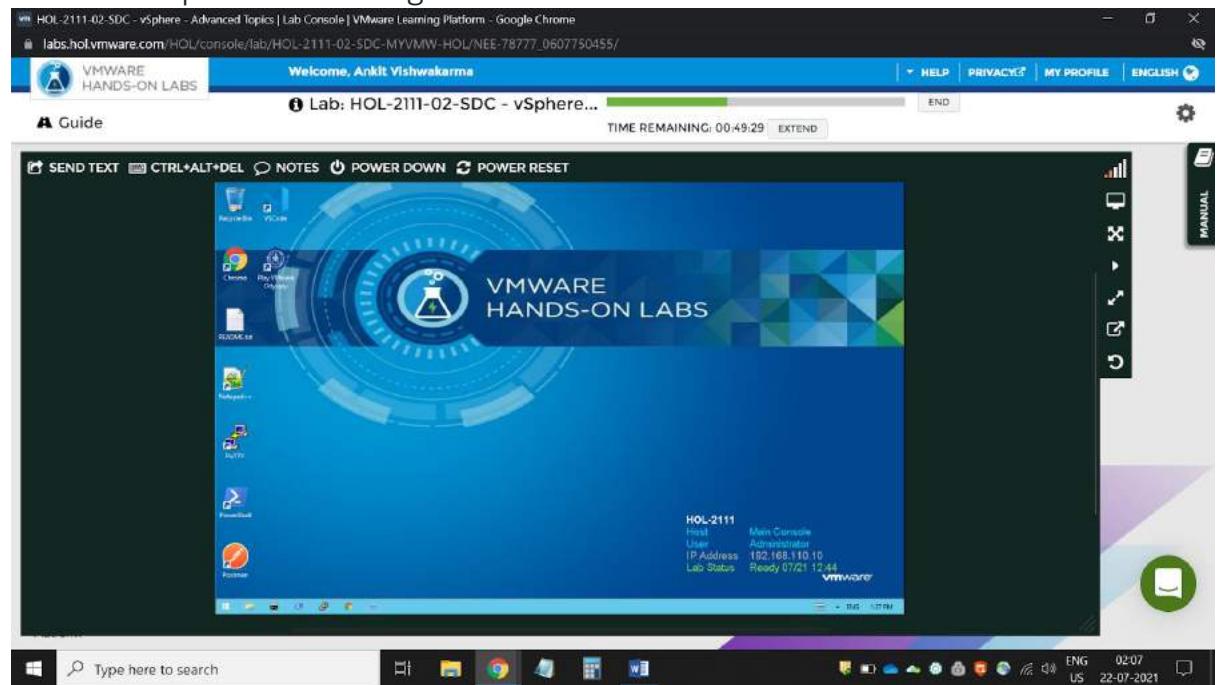
Here we can see our created iscsi disk is added.

4b-Migrating Virtual Machine from vCenter to vCenter

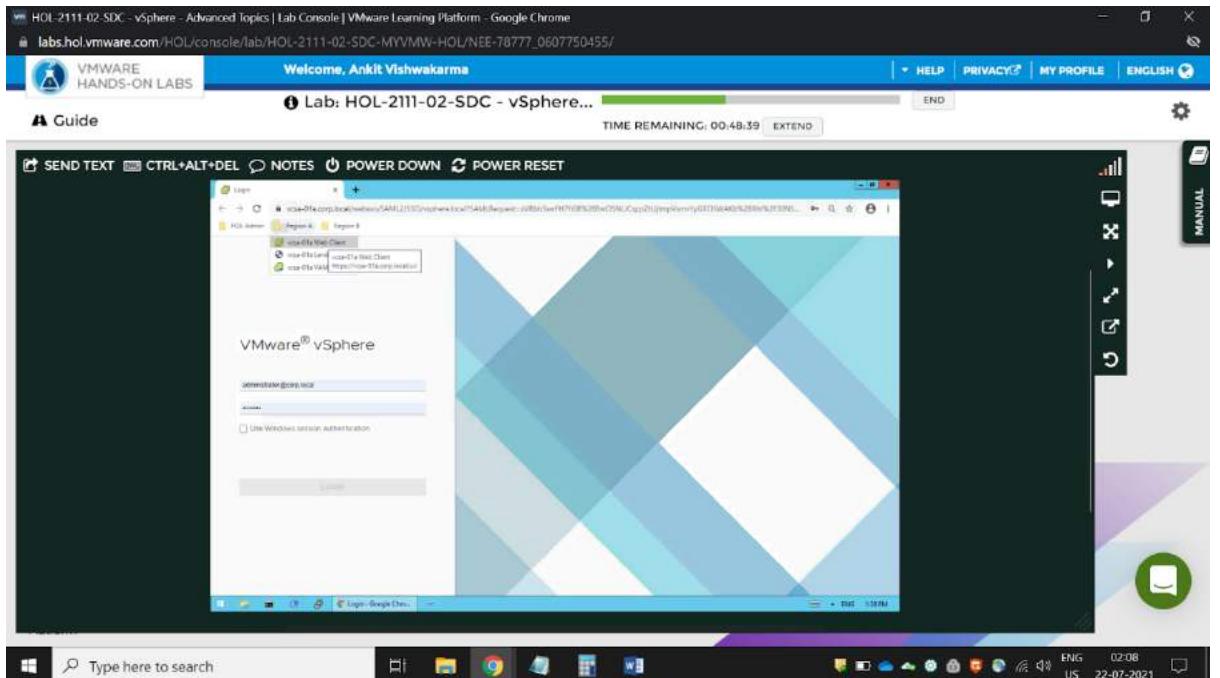
Login to

<https://my.vmware.com/en/web/vmware/evalcenter?p=vsphere-hol-adv-20>

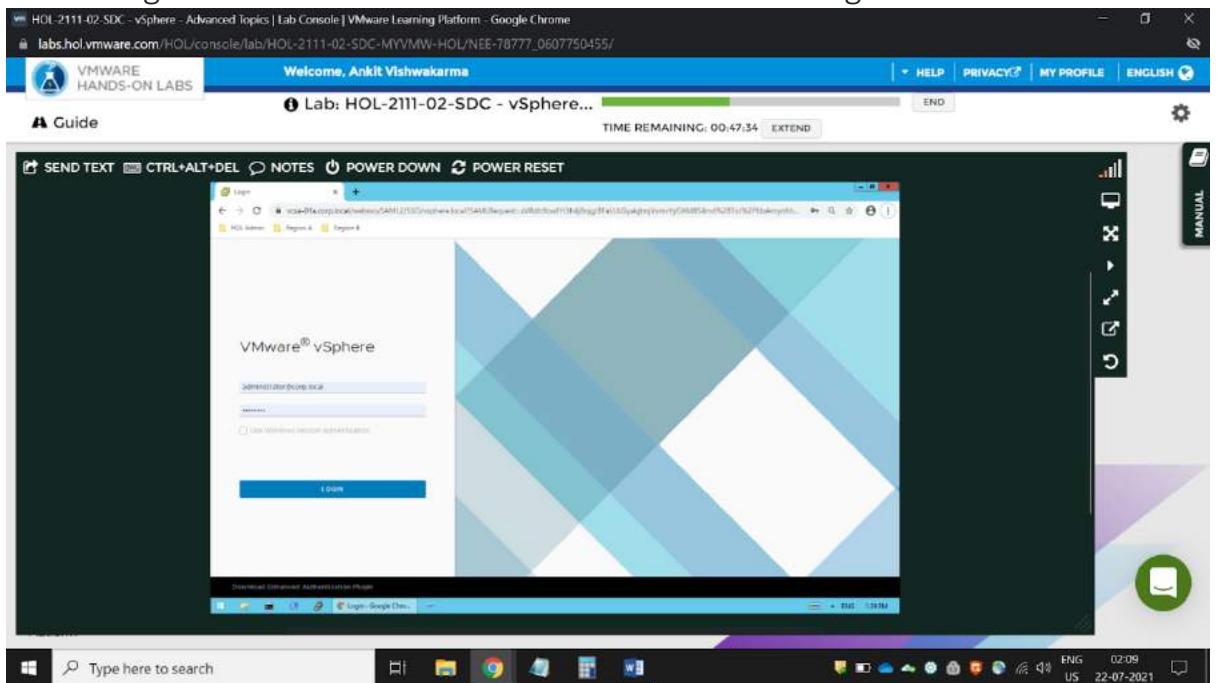
Enter credential if facing issue try to clear cache and restart your device after that open link in incognito tab.



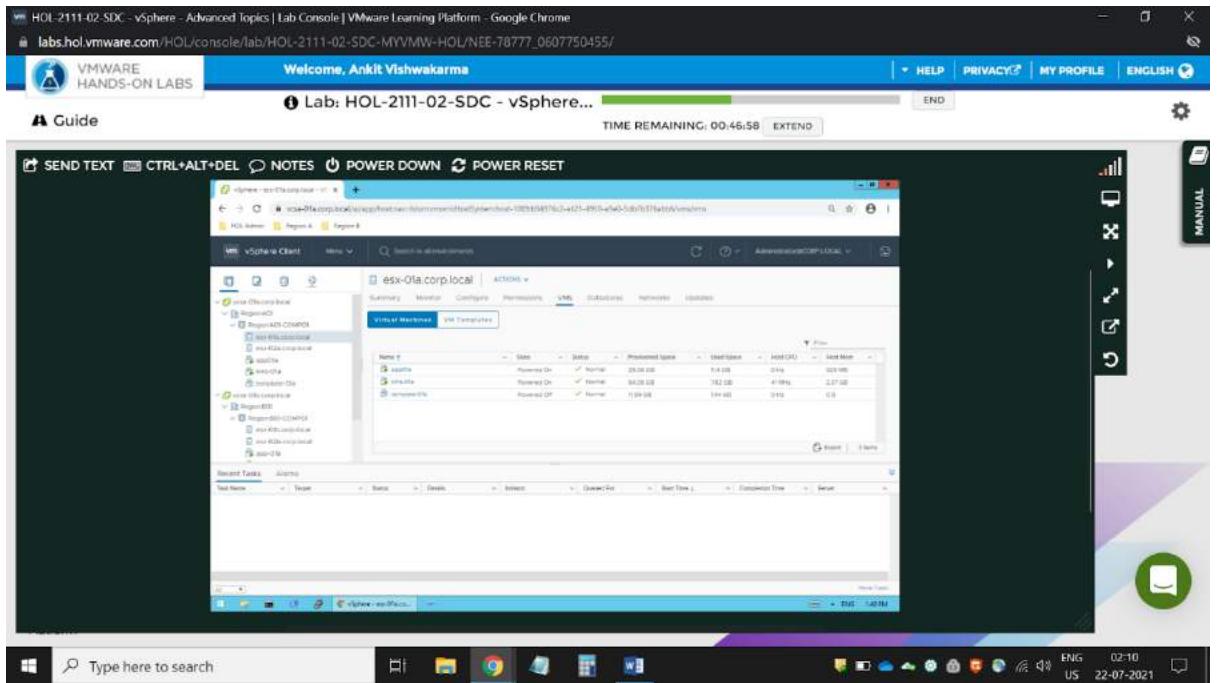
After logging in successfully. Open Chrome browser.



Select Region A folder select 1st vCenter then click on Login.

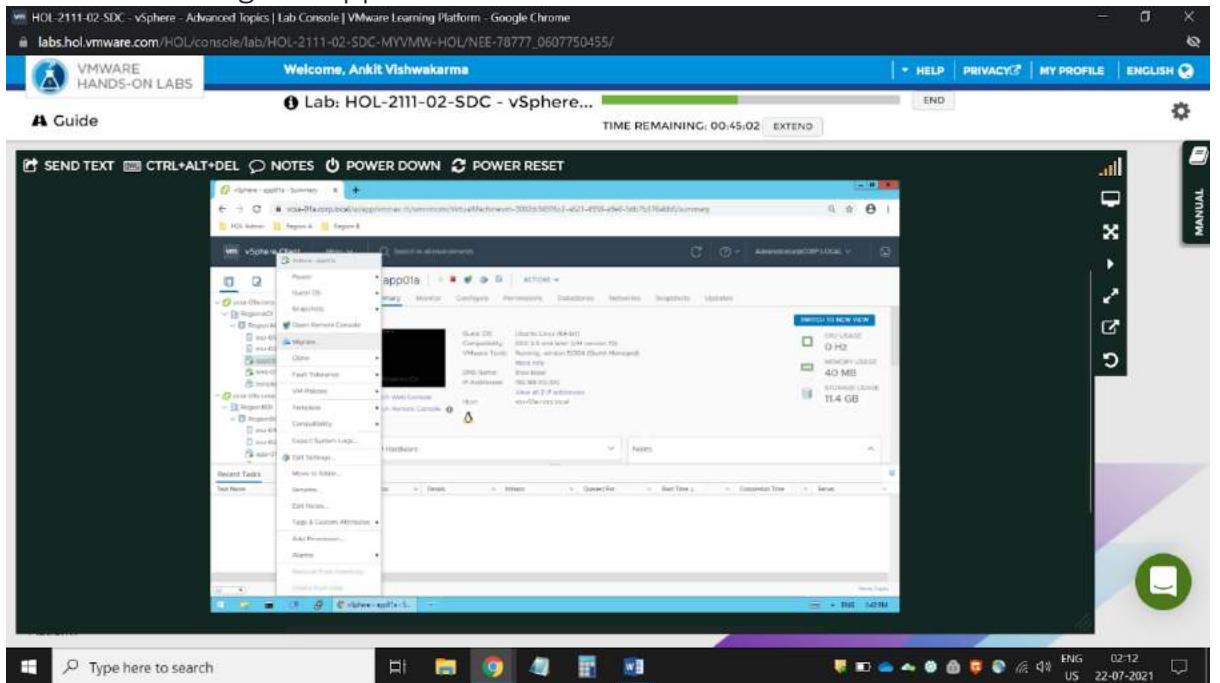


Click on Login.

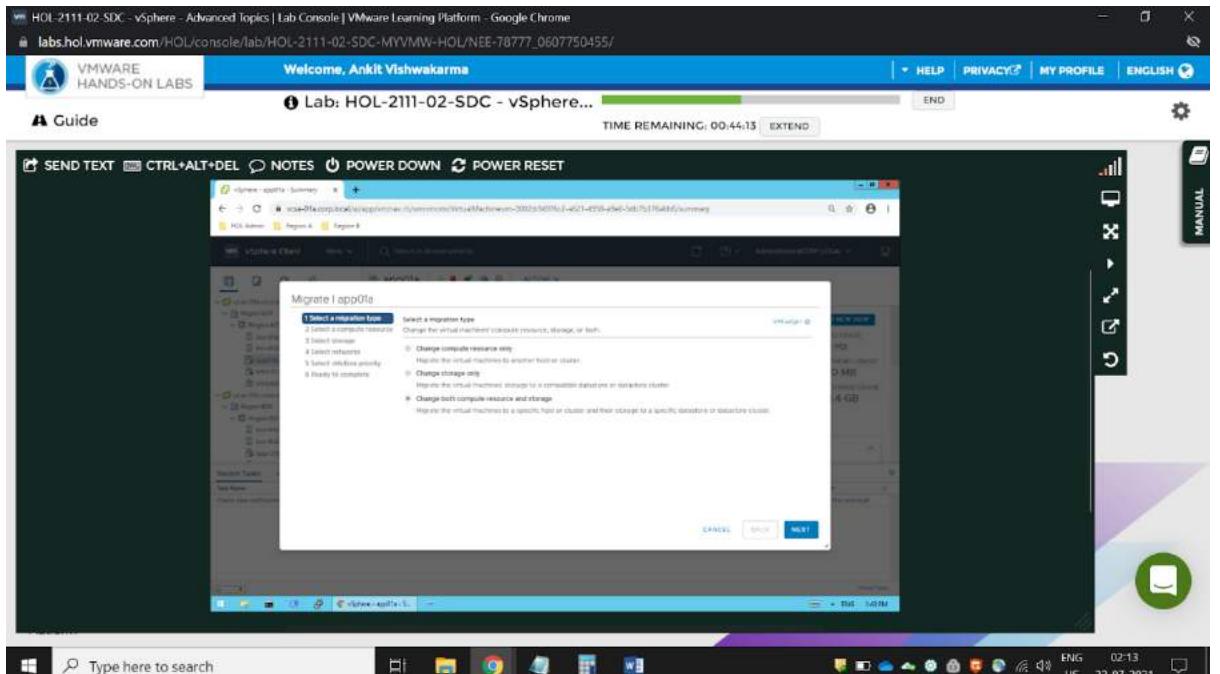


Here we can see Esxi host esx-01a.corp.local have 3 VMs running on it.

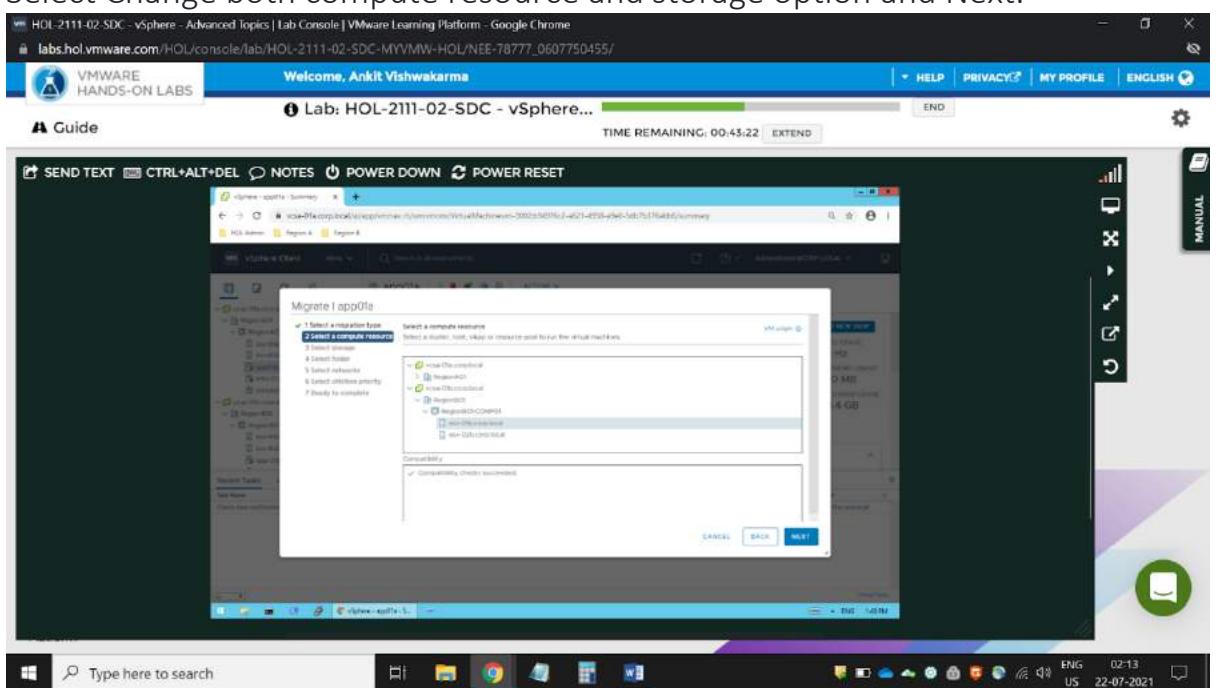
Here we will migrate app01a VM to another vCenter.



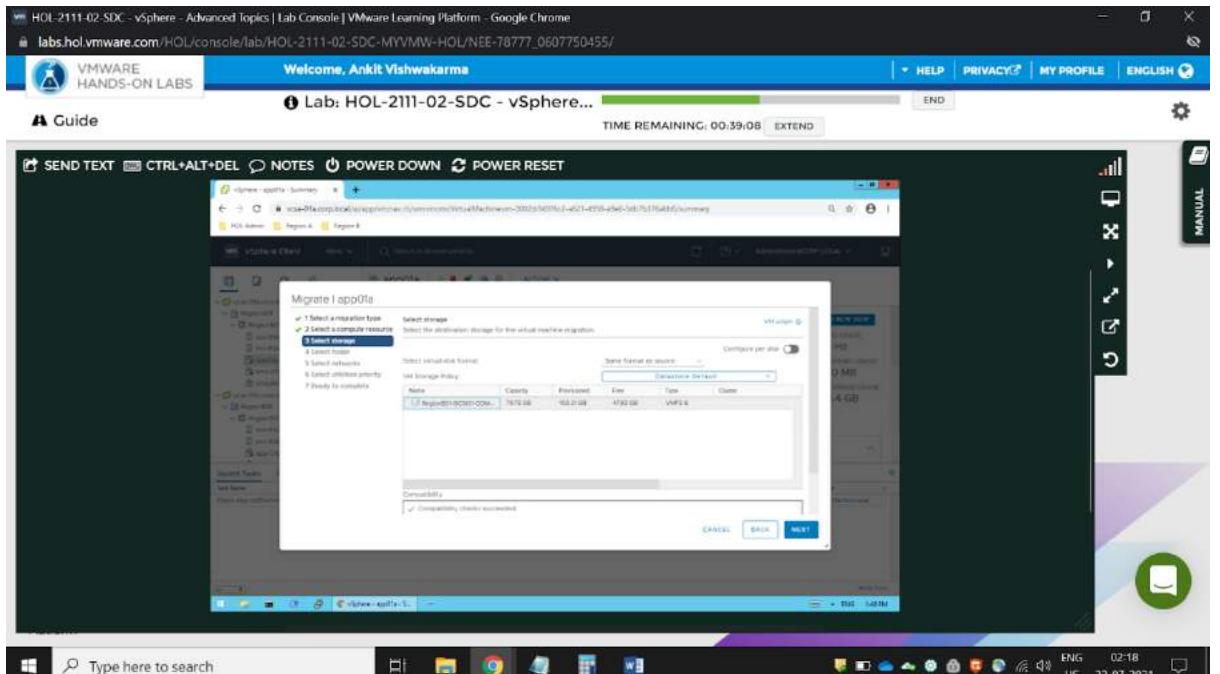
Right click on app01a and select Migrate.



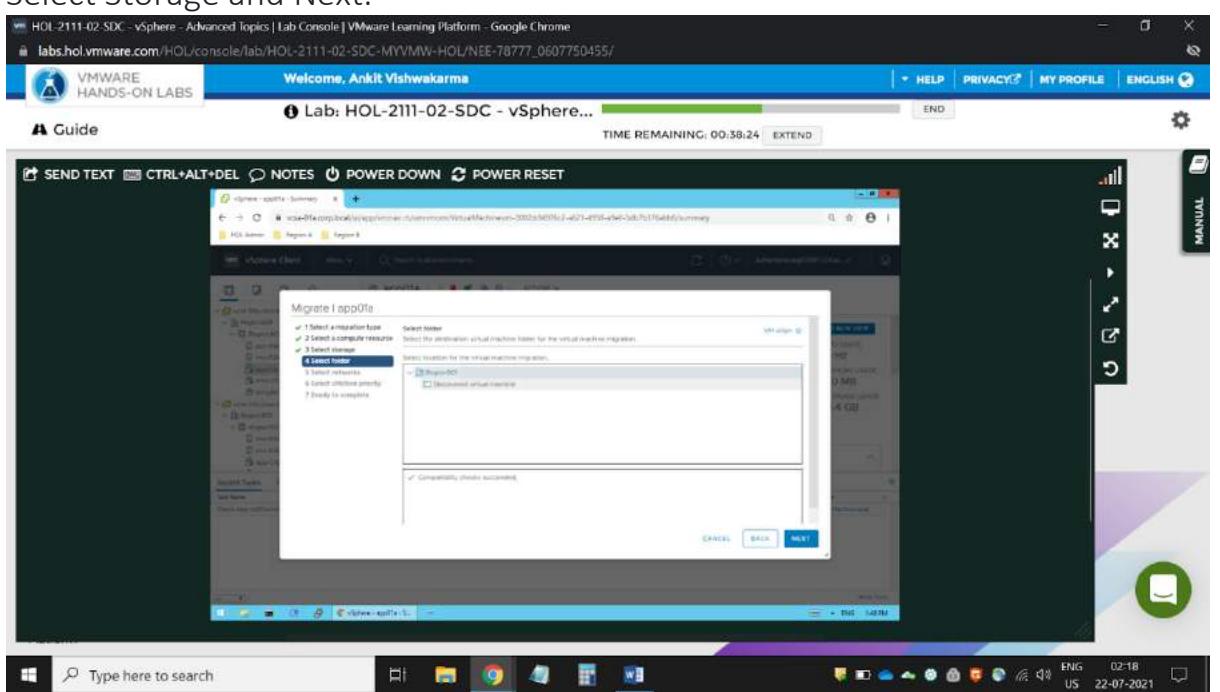
Select Change both compute resource and storage option and Next.



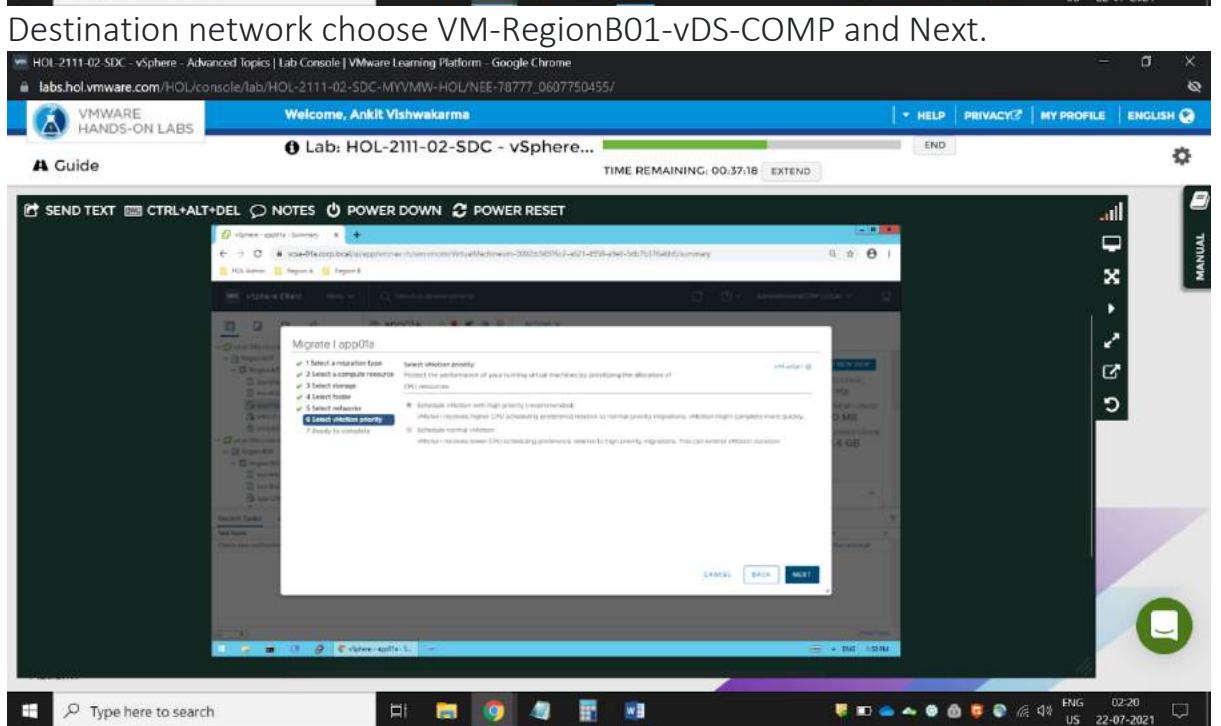
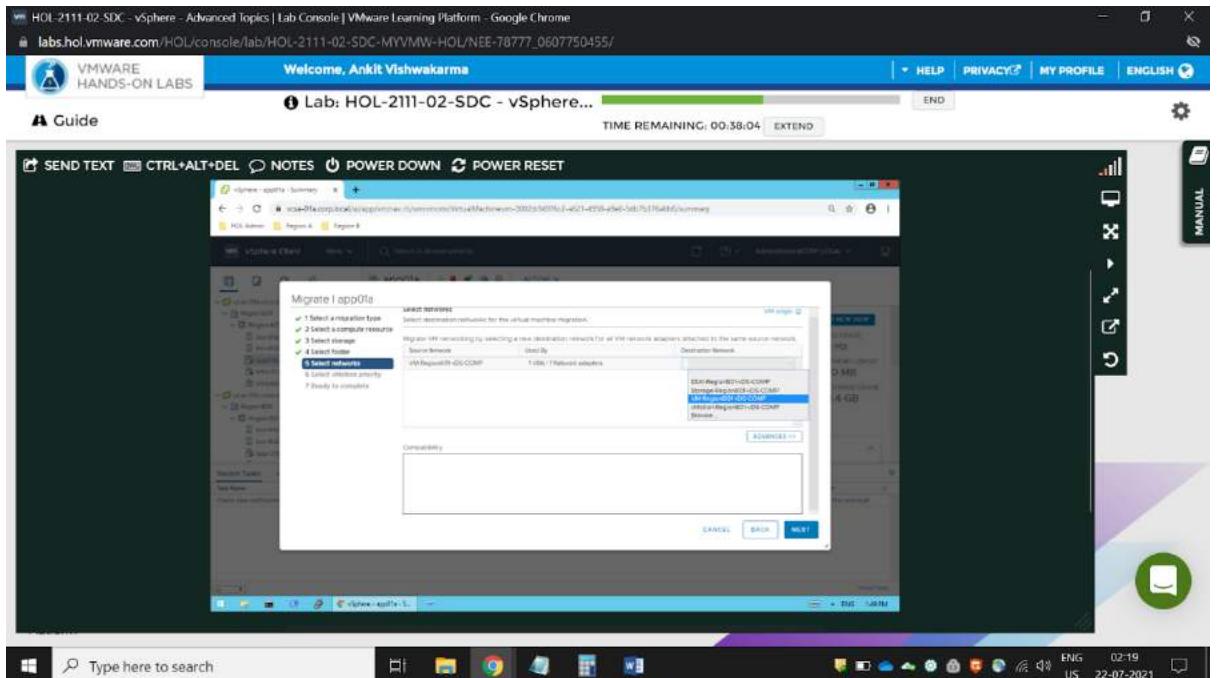
Here expand 2nd vCenter to select migrate location for app01a VM. In that choose any of the Esxi host. I have selected 1st one.



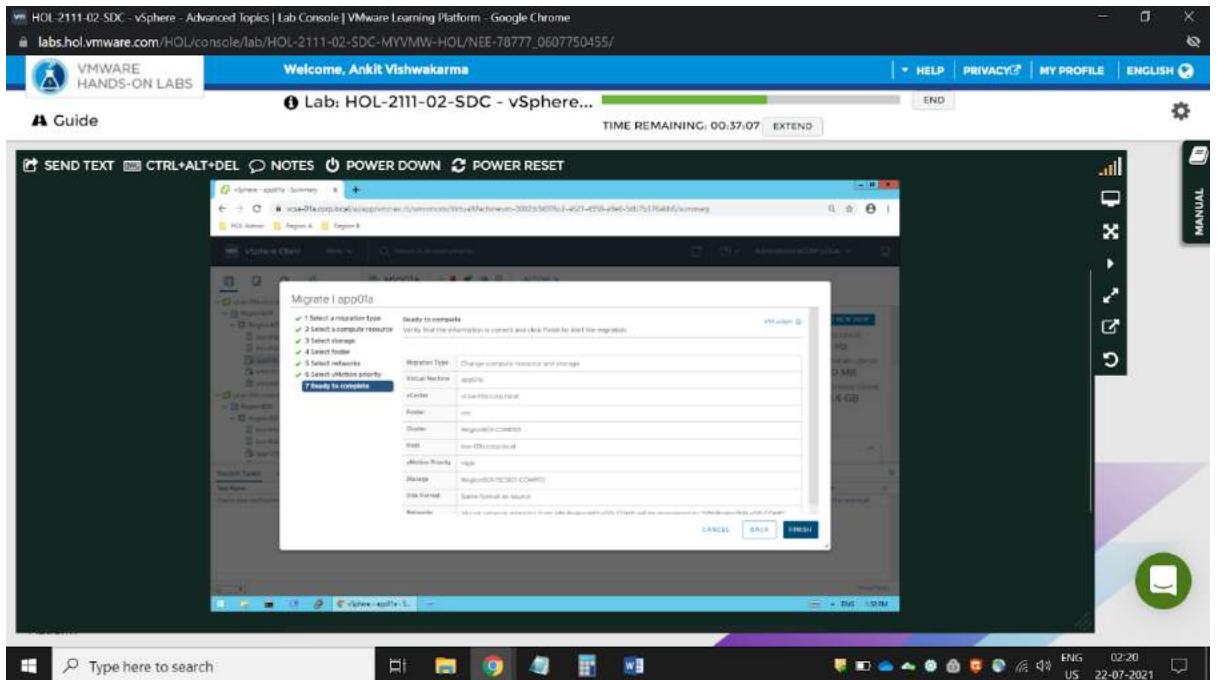
Select Storage and Next.



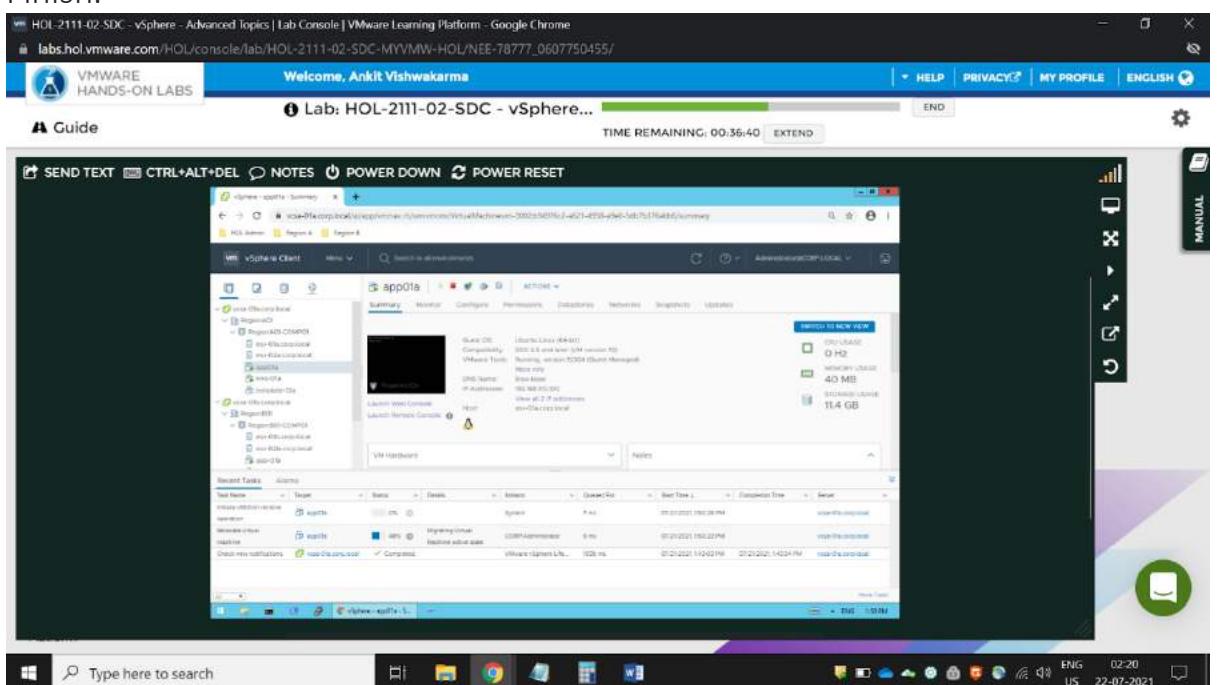
Next.



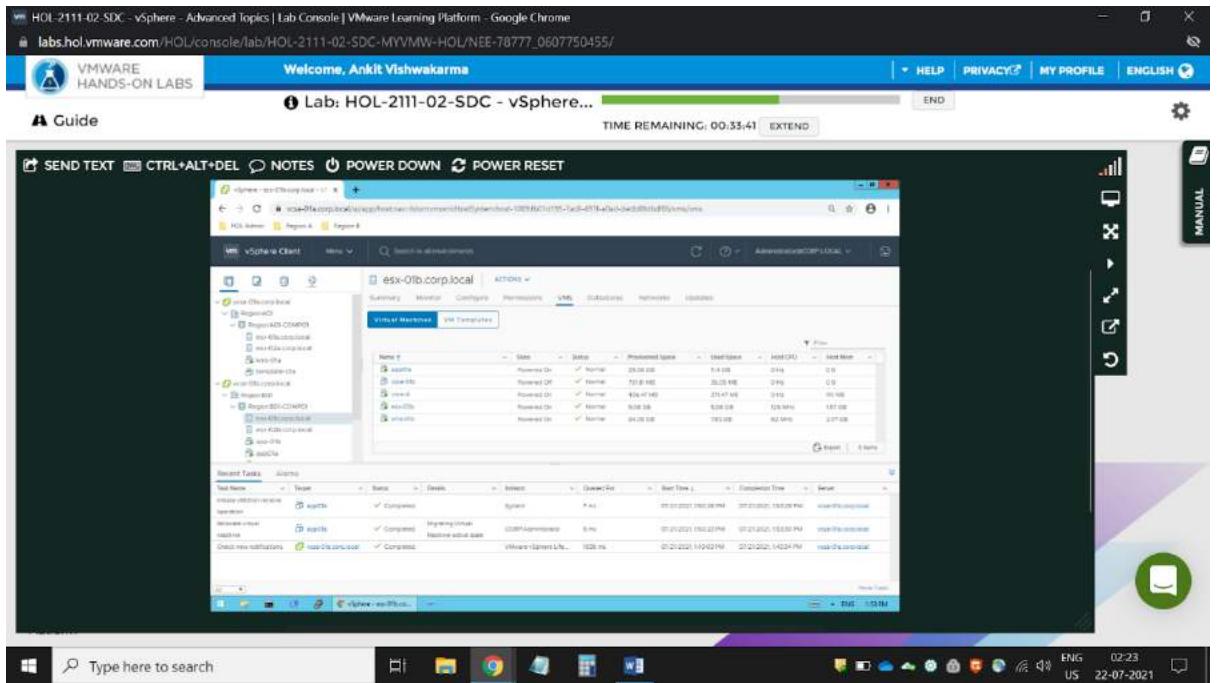
Next.



Finish.



Here in recent tasks we can see it is migrating from 1st vCenter to another vCenter.

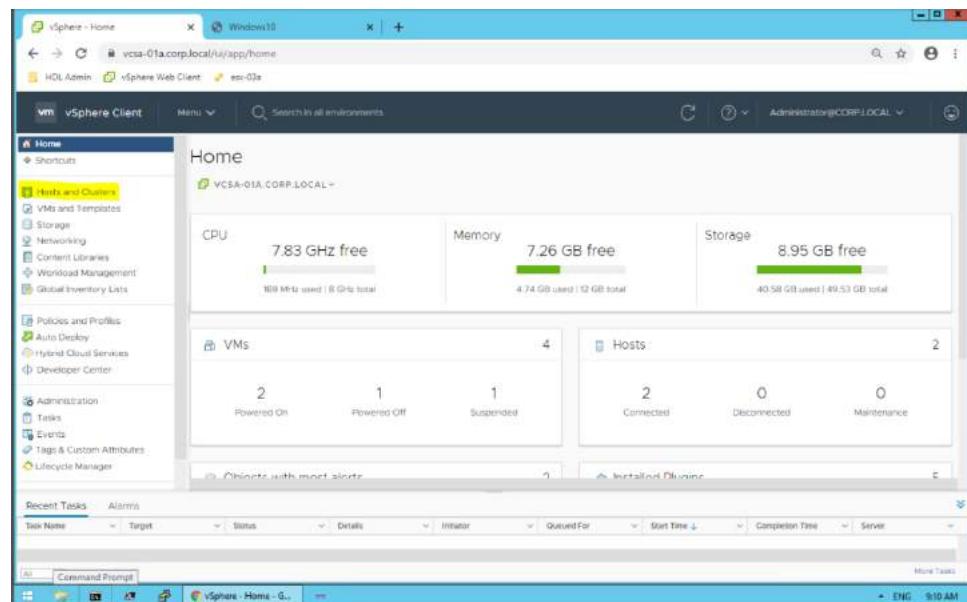


Here we can see app01a migrated to 2nd vCenter successfully in its 1st Esxi host.

Practical 7

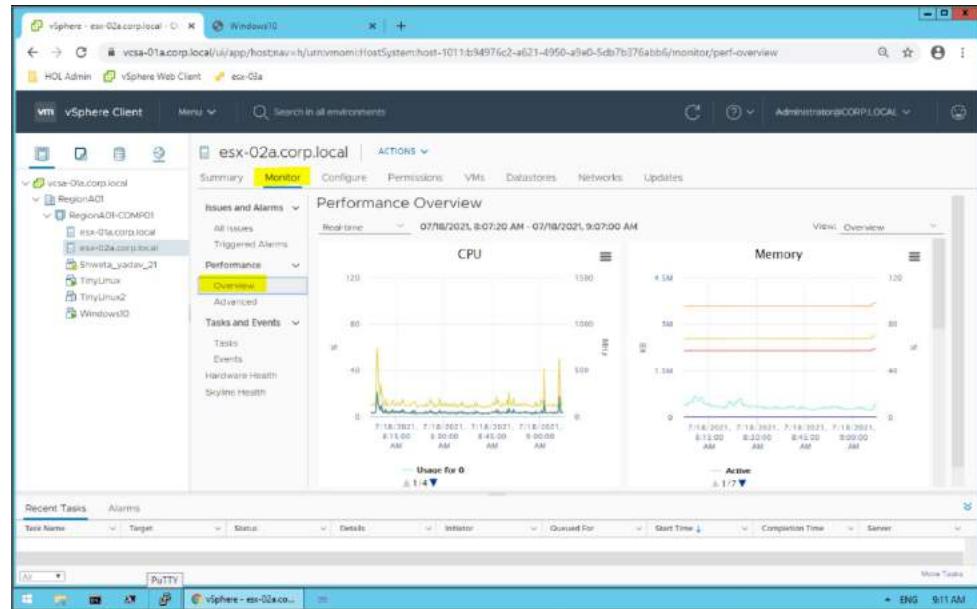
A. Monitoring Inventory Objects with different Performance Charts.

Step 1:- Go to Host and Cluster Tab for Monitoring the performance of them.



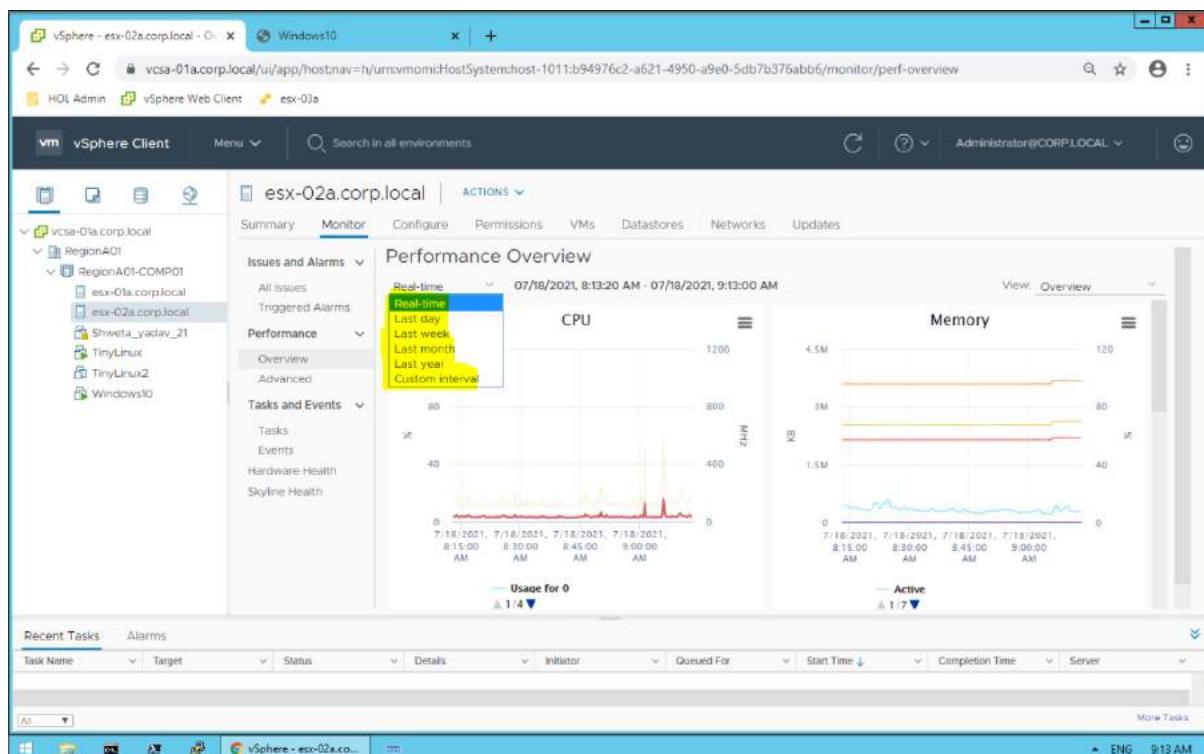
Step 2:-

Select the host for which you have to monitor and go to “Monitor” tab and click on “overview” under “Performance” section.



Step 3:-

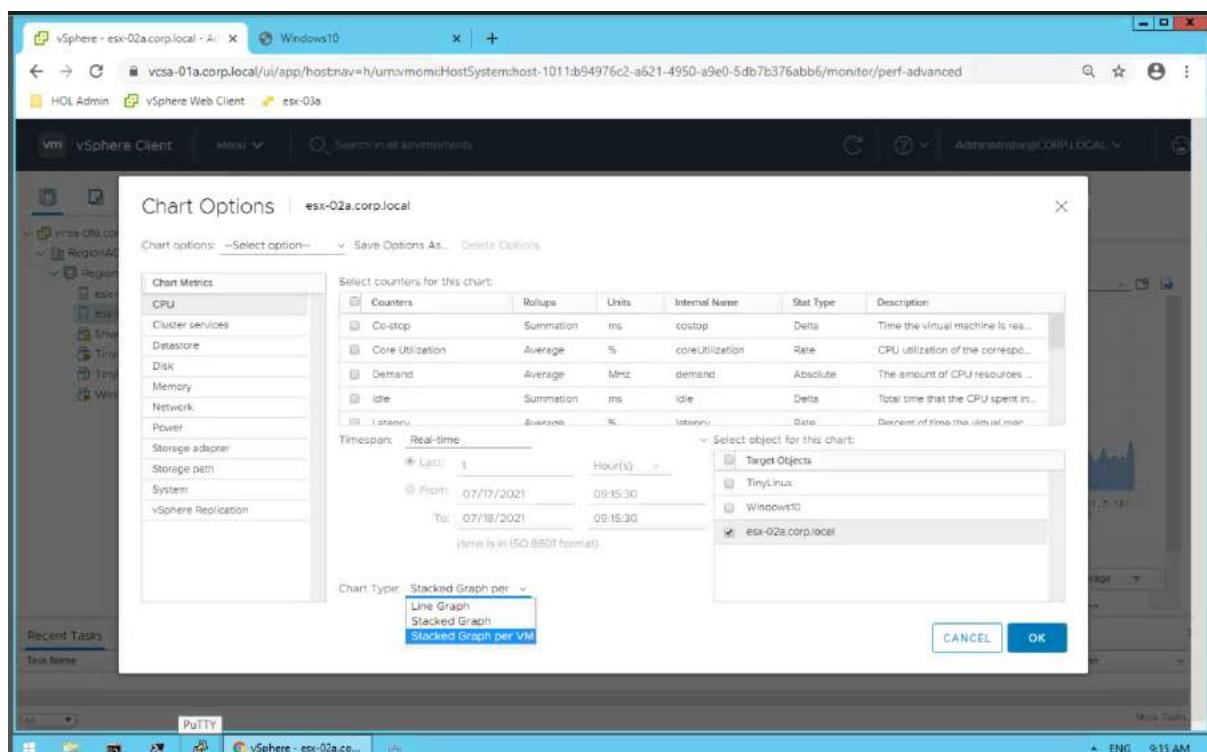
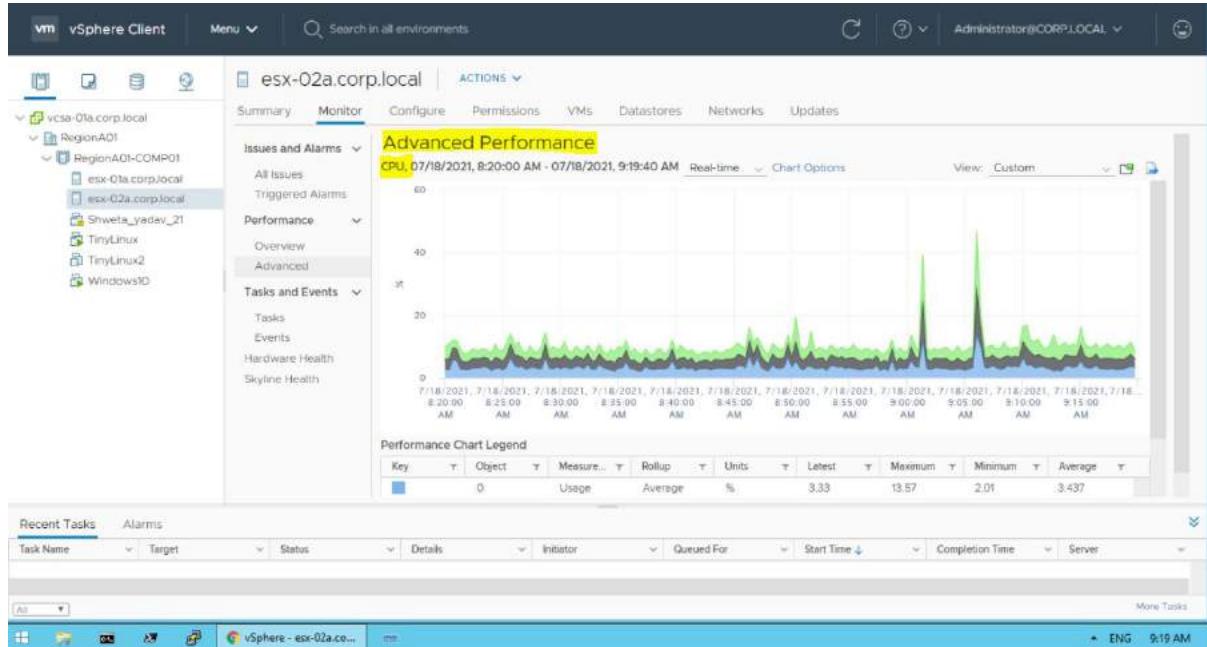
Here we can find the Overview of the performance of various features like CPU, Memory, Virtual Machine Operation, etc. based of the interval we select in the dropdown option as shown in below screenshot.



Step 4:-

Further we can see the Advanced Detailed Performance of the ESXi hosts by selecting the “Advanced” tab under Performance section.

This tab provides the detailed view of the ESXi host performance based on Single Features that we select in the Chart Option as seen in below two screenshots.



B. Enable the HA feature of ESXi cluster and explain its various functions

Step 1:-

To Enable the high Availability feature of ESXI Cluster follow below path..
Go to Host & Cluster Tab and select the cluster

vSphere Client | RegionA01-COMP01 | ACTIONS ▾

Summary Monitor Configure Permissions Hosts VMs Datastores Networks Updates

Services vSphere DRS vSphere Availability Configuration

vSphere HA is Turned OFF
Runtime information for vSphere HA is reported under vSphere HA Monitoring.

Proactive HA is Turned OFF

Failure conditions and responses

Failure	Response	Details
Host failure	Disabled	vSphere HA disabled. VMs are not restarted in the event of a host failure.
Proactive HA	Disabled	Proactive HA is not enabled.
Host Isolation	Disabled	vSphere HA disabled. VMs are not restarted in the event of a host isolation.

Admission Control Expand for details

Datastore for Heartbeating Expand for details

Advanced Options None

Recent Tasks Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time	Server
Unconfiguring vSphere HA	esx-01a.corp.local	Completed	Disabling vSphere HA on host	System	5 ms	07/21/2021, 1:49:50 PM	07/21/2021, 1:49:53 PM	vcsa-01a.corp.local

vSphere - RegionA01... 1:50 PM

Step 2:-

Click on Edit option and click “ON” the High Availability for the vSphere and maintain the necessary configuration as shown in below screenshots.

Edit Cluster Settings | RegionA01-COMP01

vSphere HA

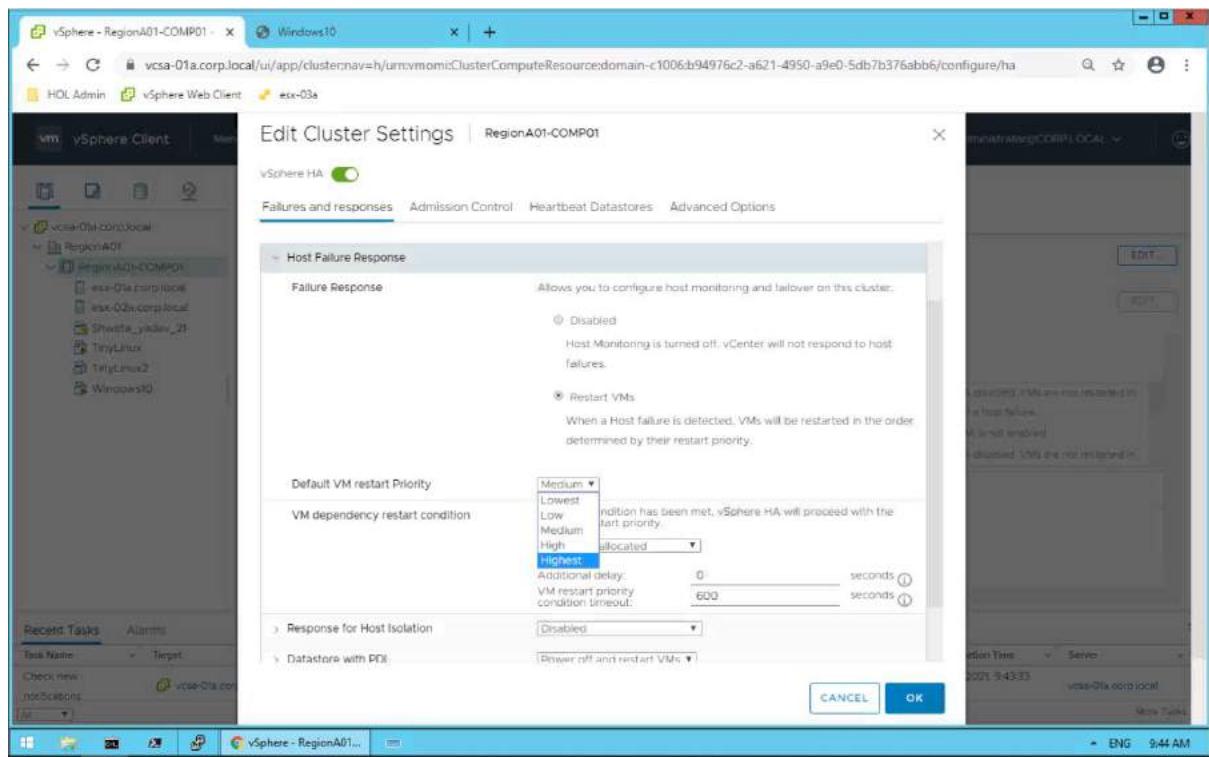
Failures and responses Admission Control Heartbeat Datastores Advanced Options

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

Enable Host Monitoring

Host Failure Response	Restart VMs
Response for Host Isolation	Disabled
Datastore with PDL	Power off and restart VMs
Datastore with APD	Power off and restart VMs - Conservative restart policy
VM Monitoring	Disabled

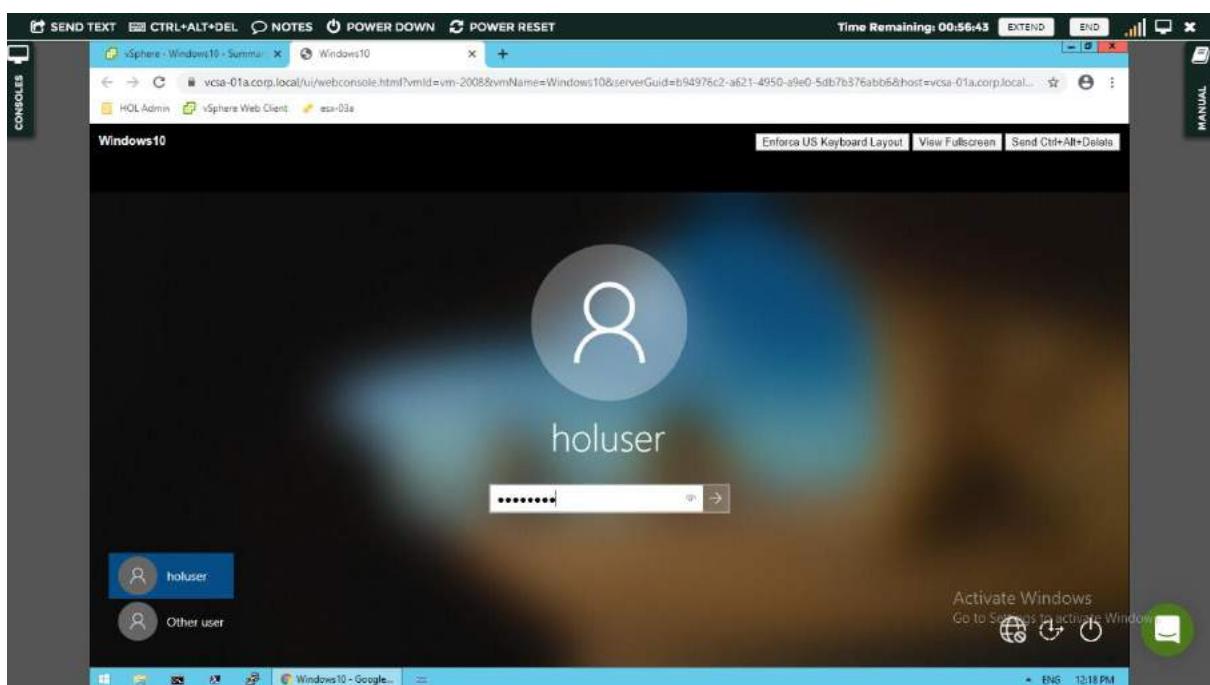
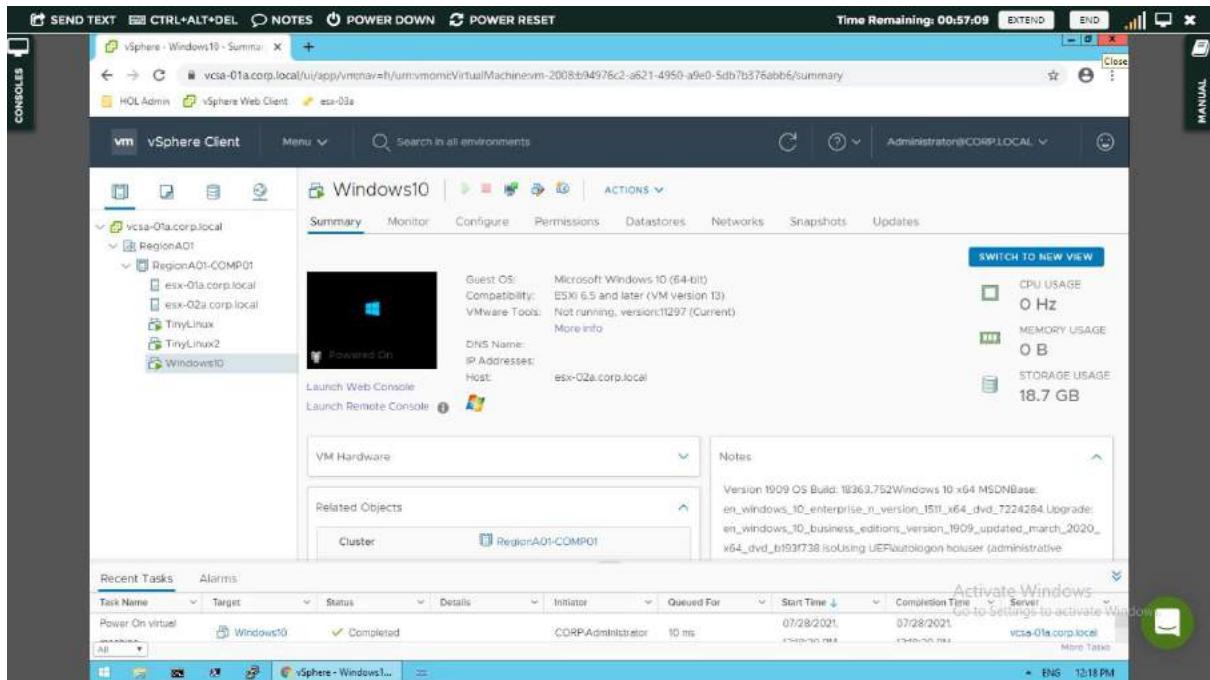
CANCEL OK



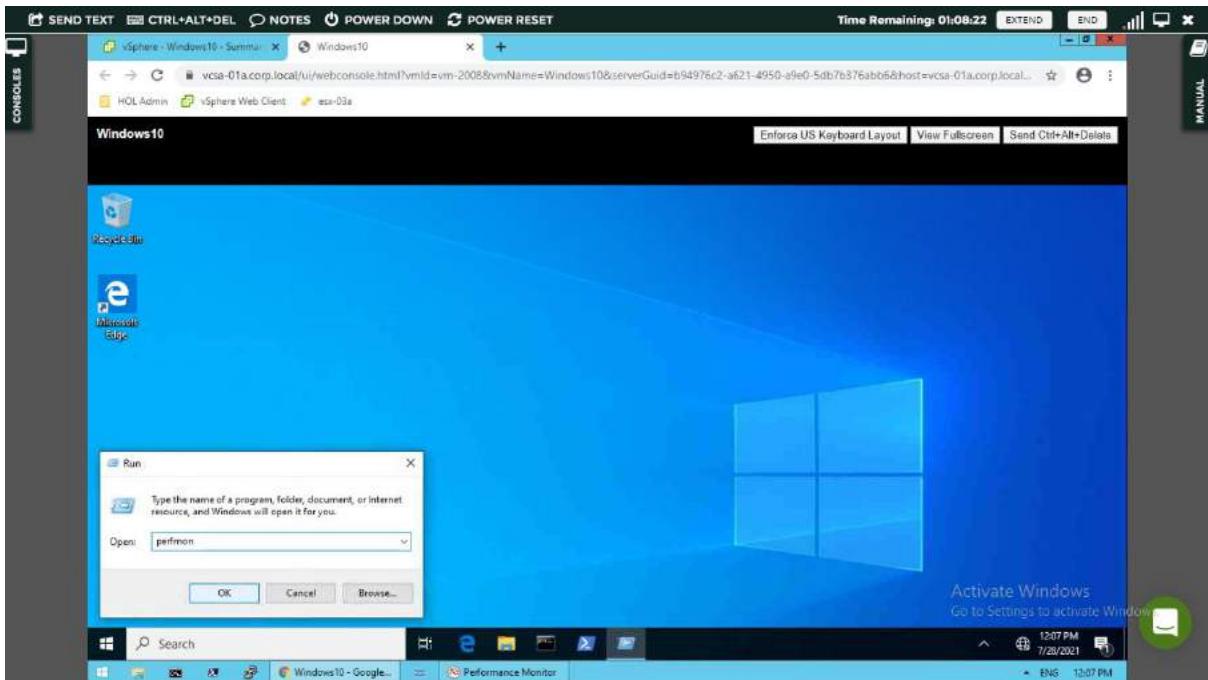
Monitoring guest operating system performance.

View performance statistics for windows guest operating systems.

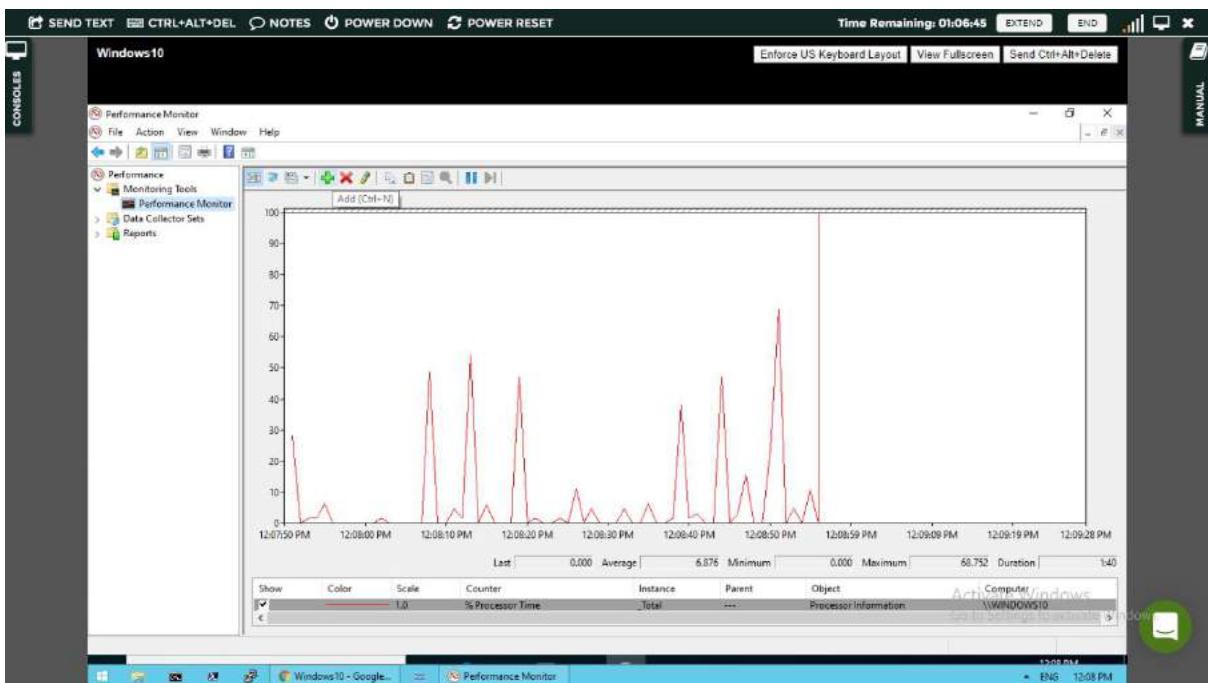
Open a console to the virtual machine and log in.



Select Start > Run. Enter Perfmon and press Enter.



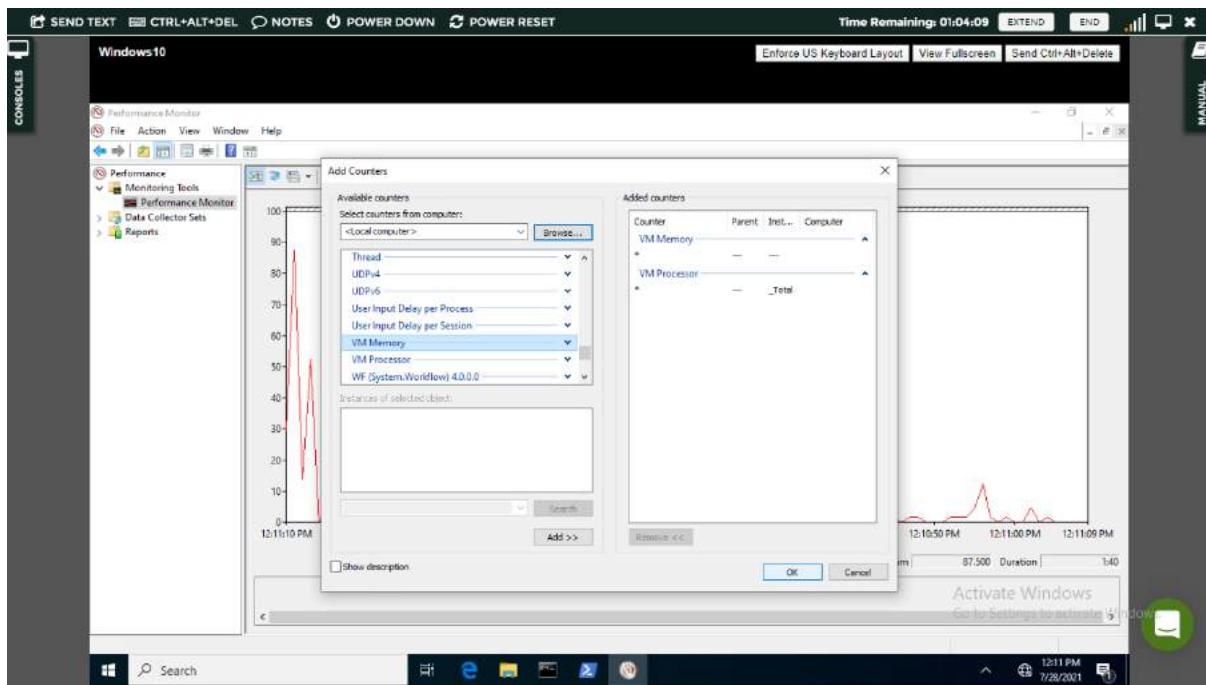
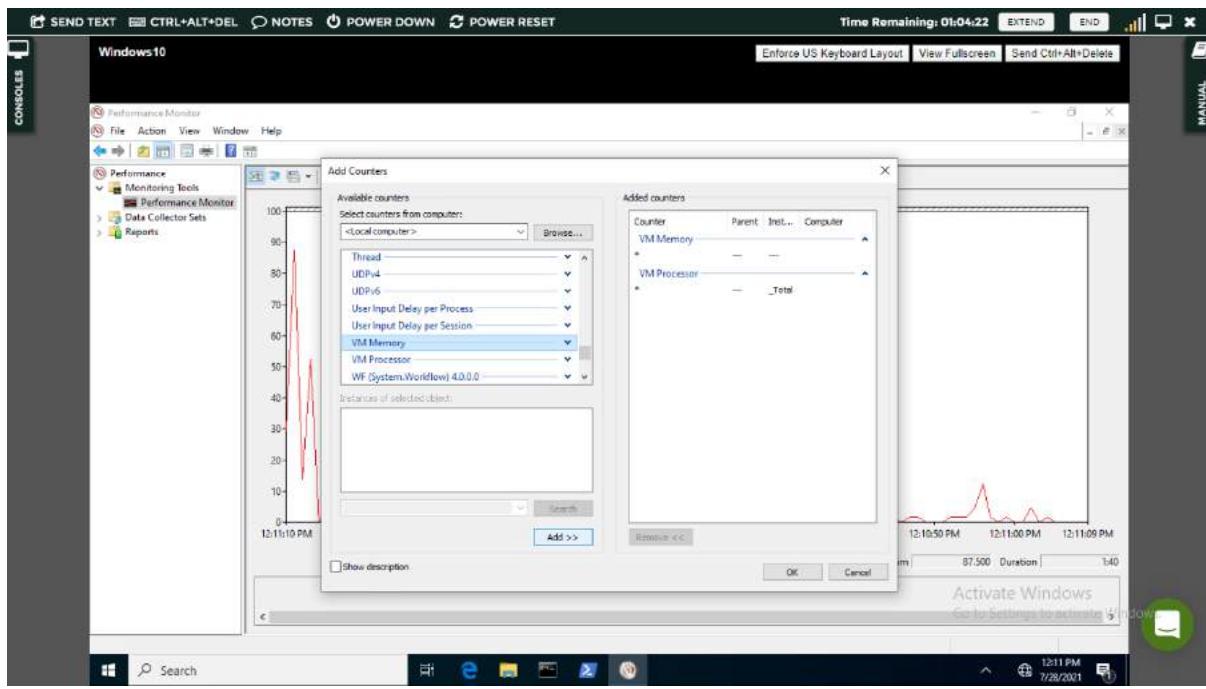
In the Performance dialog box, click **Add**.



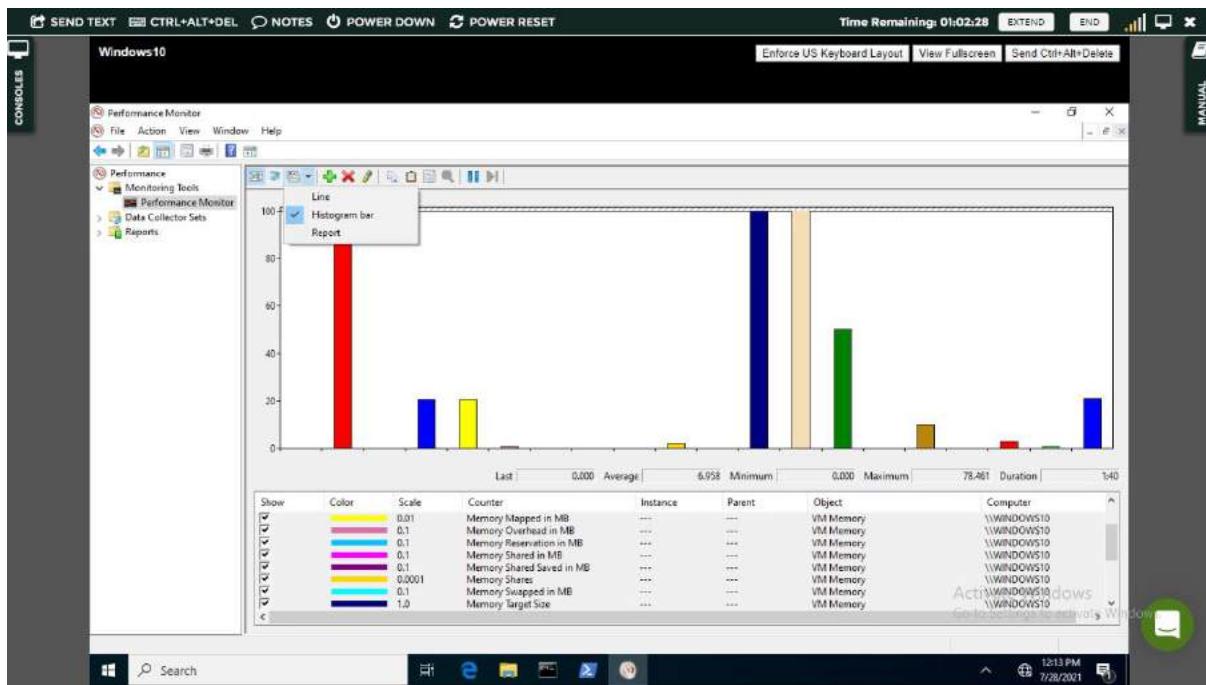
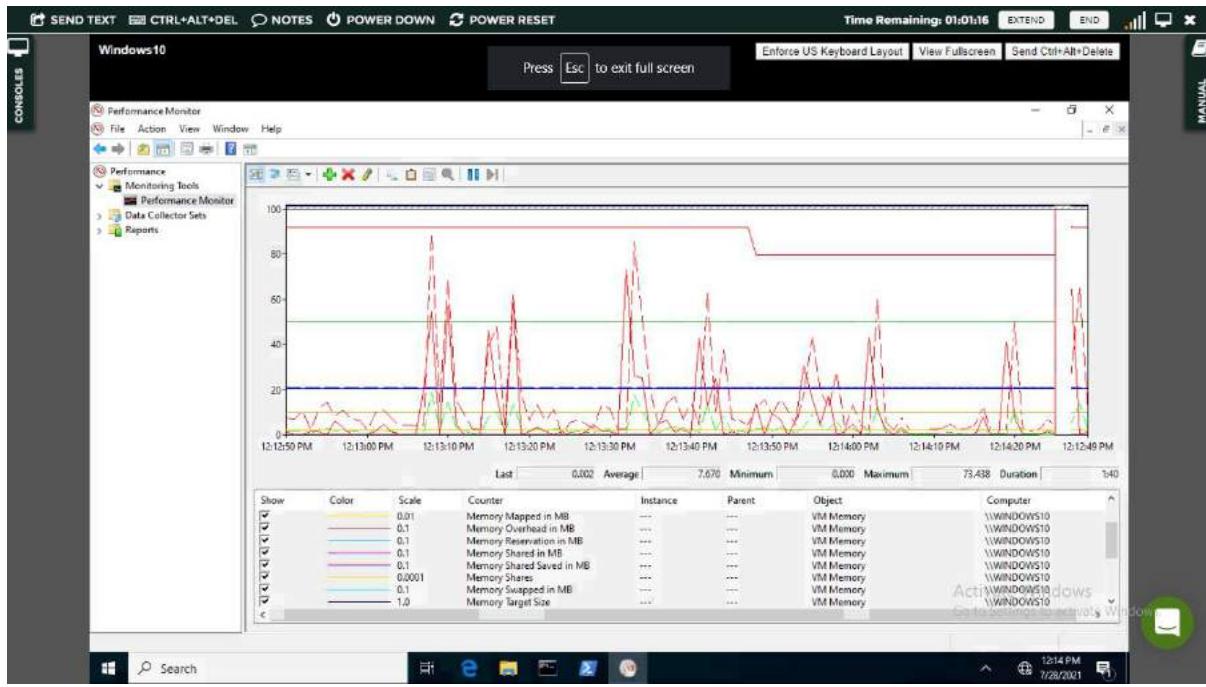
In the Add Counters dialog box, select **Use local computer counters**.

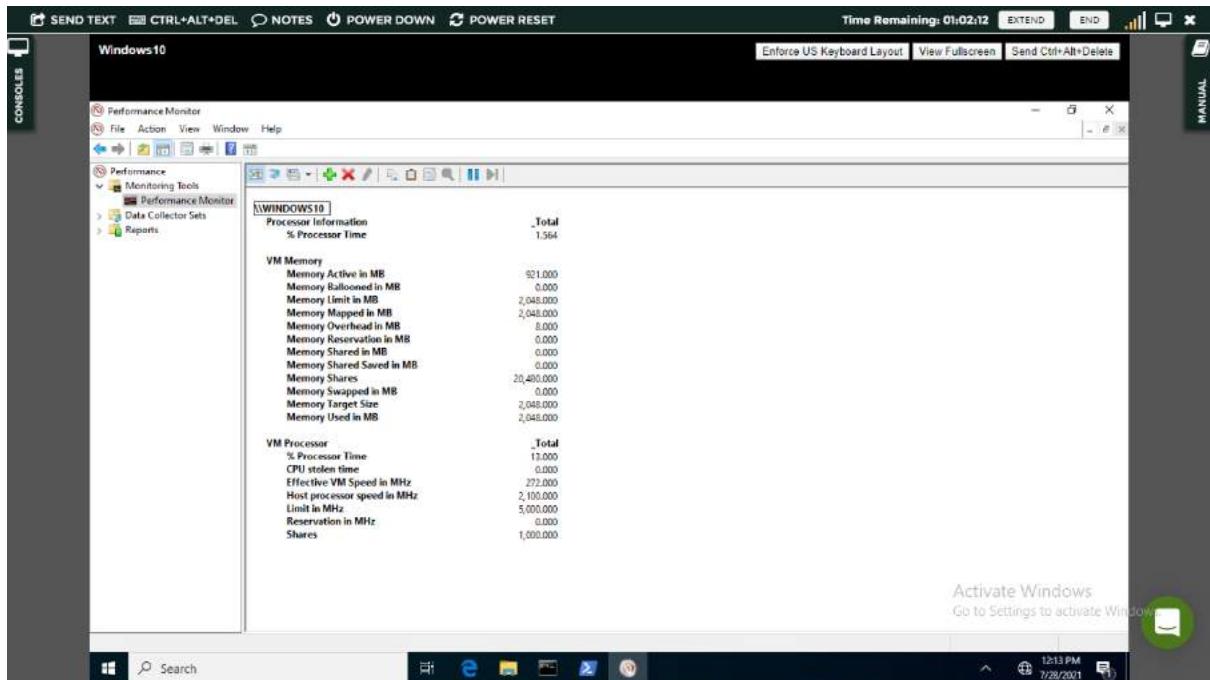
Select a virtual machine performance object.

Virtual machine performance object names begin with **VM**. Select the counters that you want to display for that object. If the performance object has multiple instances, select the instances you want to display. Click **Add**.



The Performance dialog box displays data for the selected performance object. Click **Close** to close the Add Counter dialog box and return to the Performance dialog box.

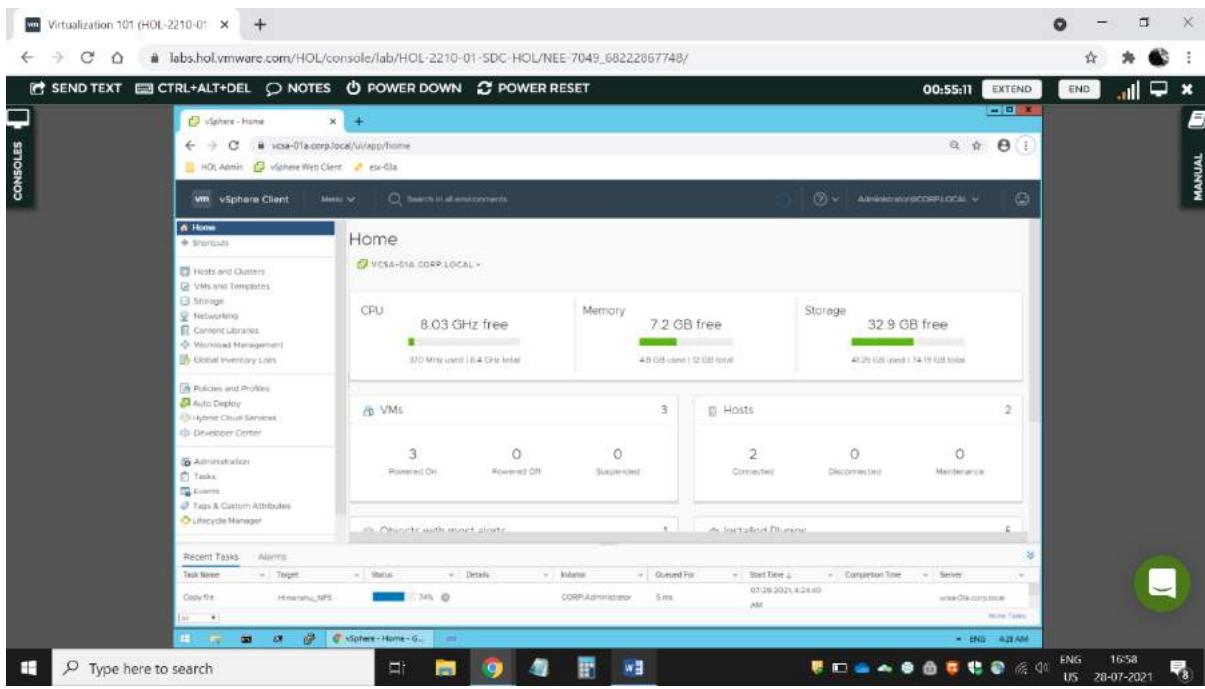




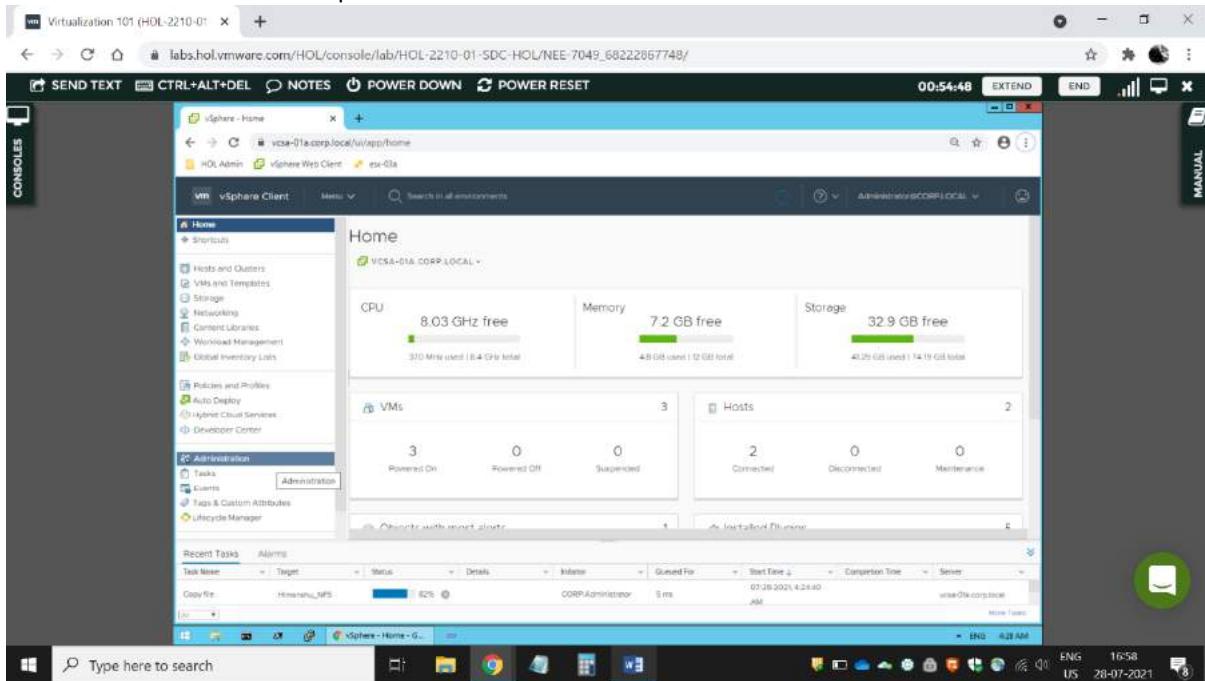
Practical 8

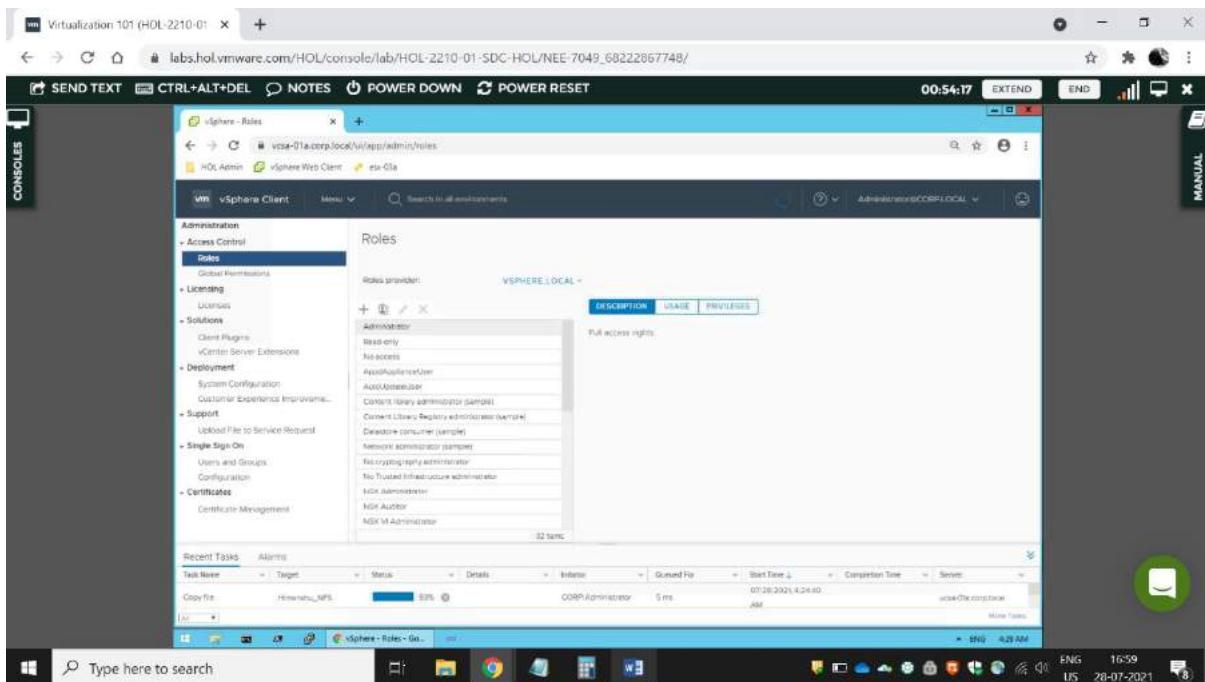
A. Add New Role and Add Permission

Click on vSphere Client option on menu bar

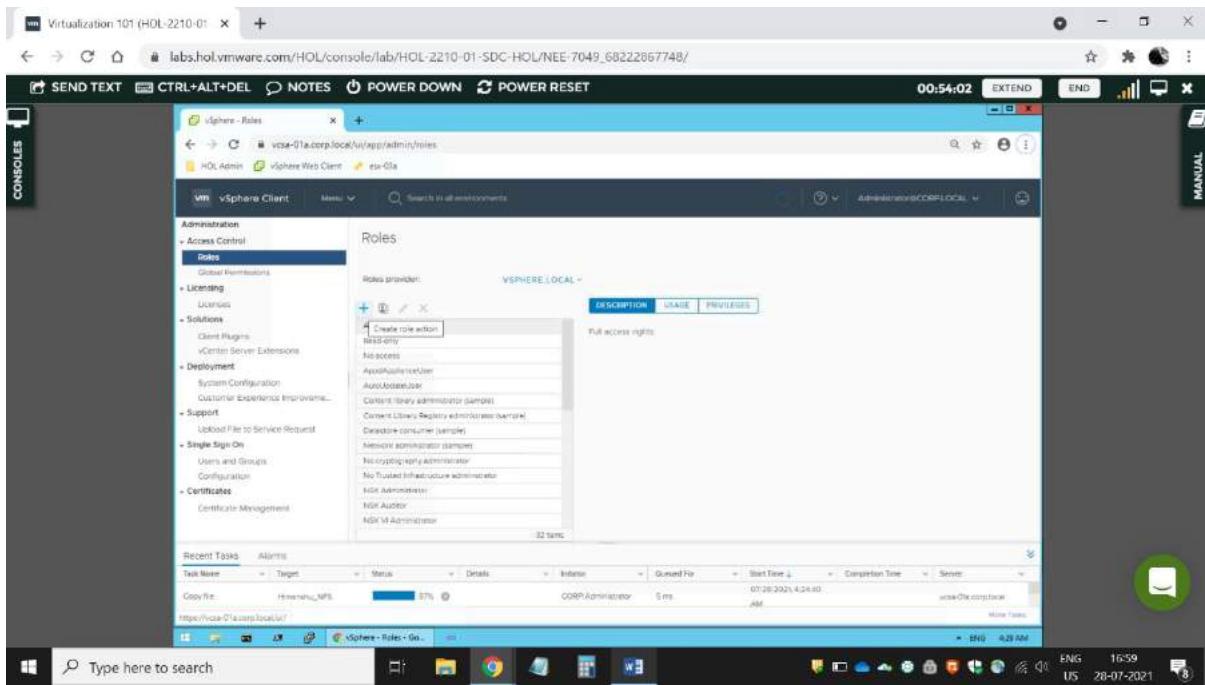


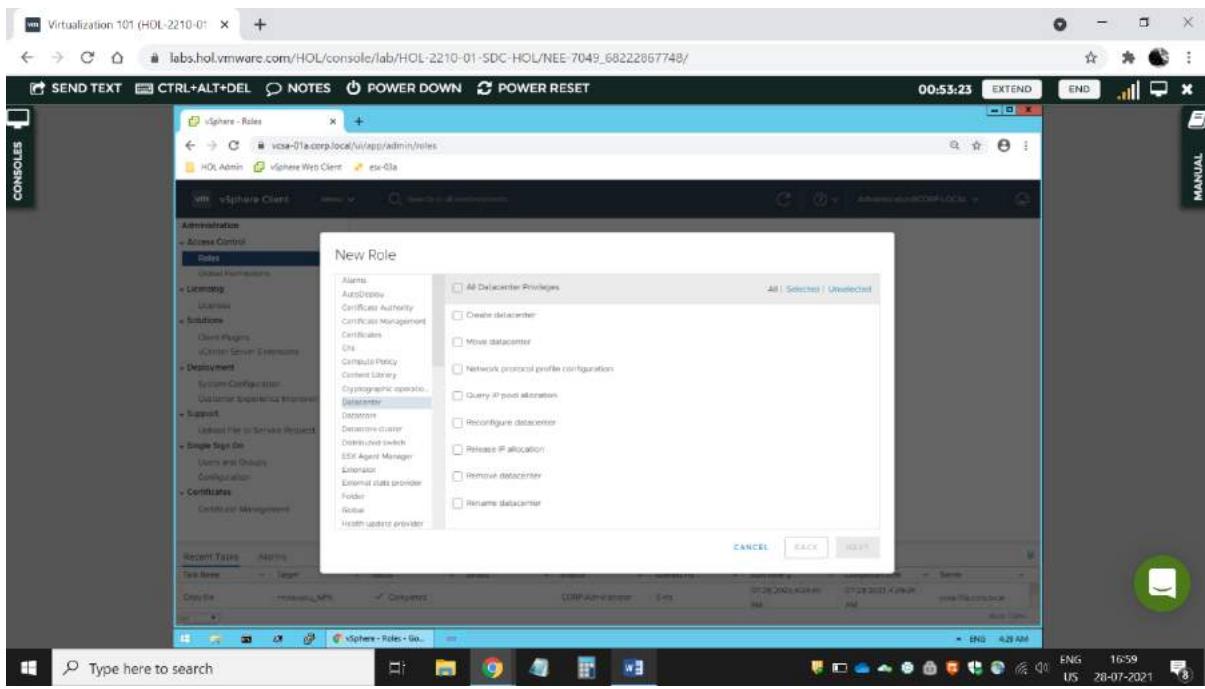
Select administrator option



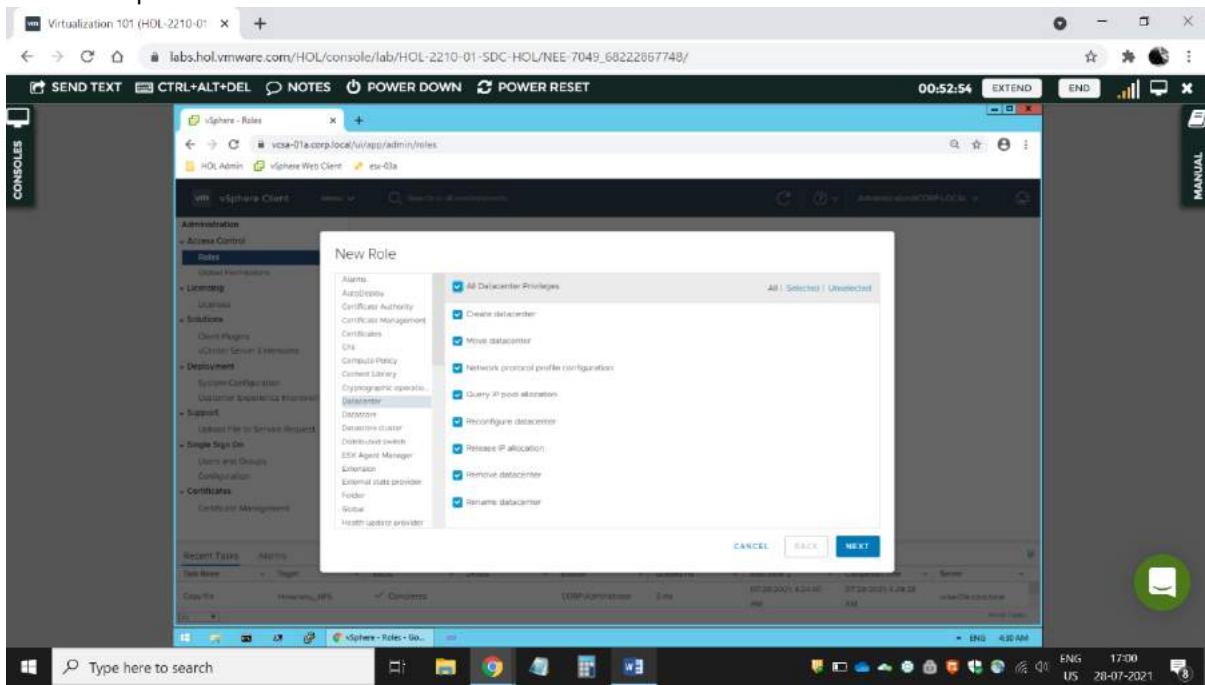


Click on create role action

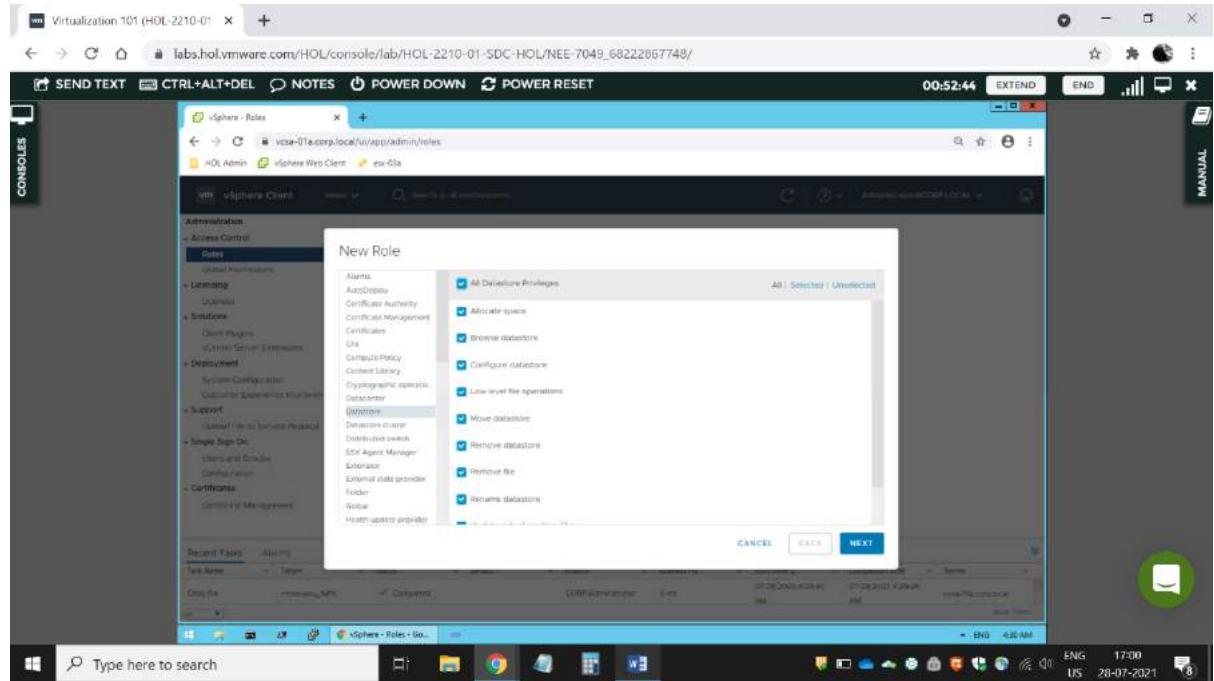




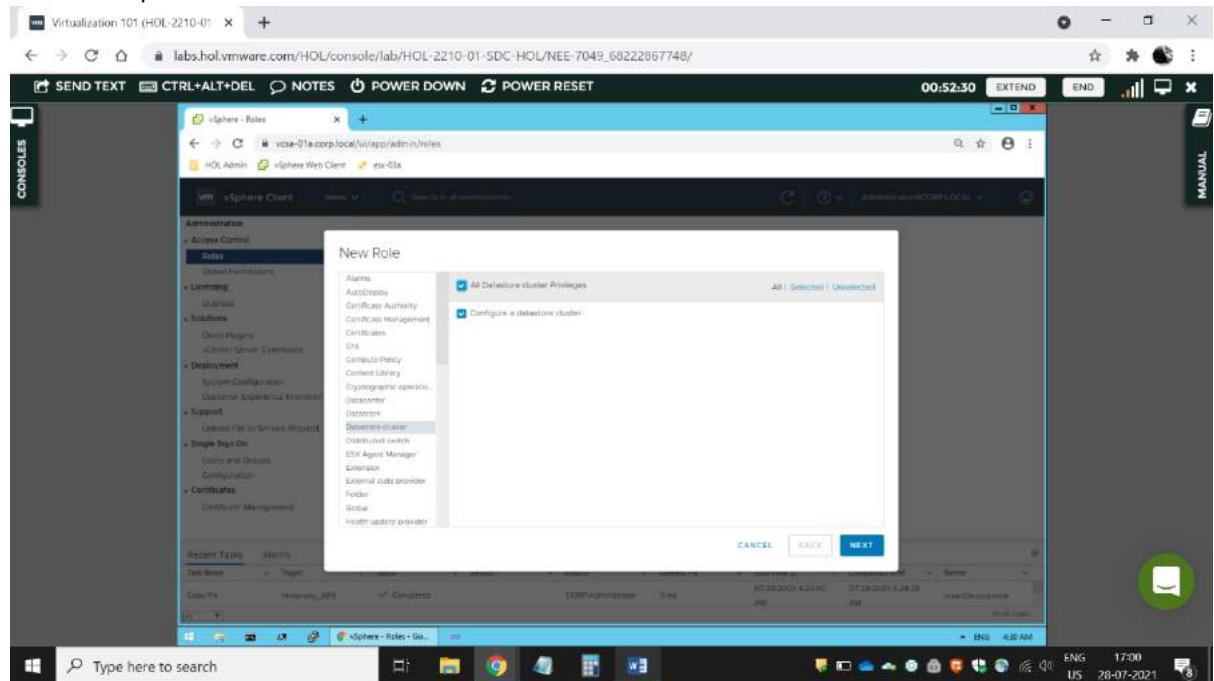
Tick all option in Datacenter



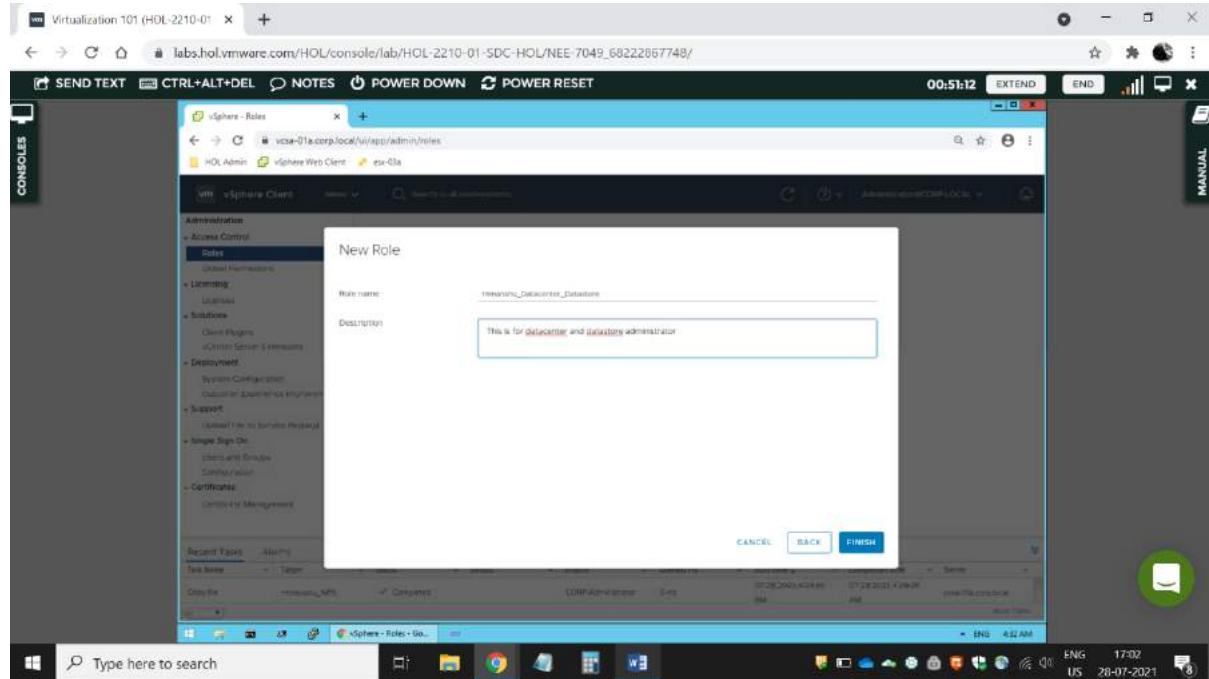
Tick all option in Datastore



Tick all option in Datastore cluster and next



Give unique name and description and finish



Here we can see all settings are installed

Click on Host and Cluster

In cluster in permissions

Click on add permissions option

In user/group select WordLoadStorage option and select Role you have created and click on the tick and Ok

Here you can see it added successfully

Again go to administrator option

Select global permissions option

Click on add permissions

Again choose default option like previous

Added successfully

B.Upgrade ESXi 6.5 to 6.7 Using vSphere Lifecycle Manager

Step 1:-

We begin by uploading the VMware vSphere Hypervisor (ESXi) 6.7 installation ISO file to the VUM server so we can create and attach a baseline. From the top menu, click on Update Manager.

- The Home screen for vSphere Update Manager is displayed.
- Click on ESXi images, and then Import

- Browse to find the VMware vSphere Hypervisor (ESXi) 6.7 installation ISO. Once selected, the upload process starts on its own.
 - When complete, click Import to complete the action and save the ESXi Image to VUM.
 - From the Update Manager ESXi Images screen, we can see the image is loaded into Update Manager for use with a Baseline
- **Create an Update Manager Baseline**
- Click on Baselines to begin. From this screen click on NEW, then New Baseline
- Fill out the name & description for the baseline, click the radio button for “Upgrade” as the content type for the baseline, and click Next.
- Select the ESXi 7 Image to use with this baseline, click Next to continue.
- Review all setting selections and then click Finish
- A new baseline is available now to attach to ESXi hosts. Next we can begin to remediate our vSphere Hosts by leveraging this upgrade baseline.
- **Upgrading vSphere Hosts**
- Now that our vSphere ESXi image has been uploaded to VUM and an upgrade baseline has been created, we move forward to upgrade our vSphere 6.0 hosts to vSphere 6.7.
 - Begin by moving to the Hosts and Clusters view.

- Next, click on the Datacenter object (#1) then click on Updates (#2) and last click on Attach (#3)
- In the pop up window, select “attach baseline or baseline group” so that we can attach it to our vSphere 7 hosts. Click OK to continue.
- Once selected, the new upgrade baseline shows as ‘attached’ to the hosts within the cluster
- Click Check Compliance to begin the process of Update Manager validating that the hosts to be remediated are indeed eligible. Note that you may need to manually refresh to see current results.
- Once the Compliance Checks are completed, we can quickly see that our vSphere hosts need attention. This is a good and expected result. What this means is that the vSphere 6.7 code is not running on these vSphere hosts
- Click Pre-Check Remediation to validate that the hosts & cluster are in compliance. This pre-check will report any issues with the vSphere cluster. If issues are found they are reported along with helpful notes on the actions that must be taken before a vSphere host is remediated

- An option to Open Pre-Check Documentation is available if the machine you are working from is connected to the internet. Once all edits, changes, and reviews have been completed, click Done.
- Click on Remediate to begin upgrading vSphere hosts.
- Review and Accept the End User License Agreement (EULA), then click OK to continue
- Select the hosts that you would like to Remediate with the vSphere 6.7 Upgrade baseline. You can choose to do all hosts within a cluster or a select few. Click OK to continue.
- Below we can see our vSphere host going into Maintenance Mode and preparing to Upgrade. Once this host is done and back online after its reboot, Update Manager will move to the next ready host in the cluster to update in the same manner.
- Success! All 4 vSphere hosts are running vSphere 6.7 software. vSphere versions can be validated by viewing Update Manager via the Updates tab. We can see “All Hosts Compliant” as well as below in the Attached Baselines section compliance shows Compliant.

