SIES COLLEGE OF ARTS, SCIENCE & COMMERCE (EMPOWERED AUTONOMOUS), SION(W), MUMBAI-22

DEPARTMENT OF INFORMATION TECHNOLOGY

MSc (IT), SEMESTER I

Practical Journal

for the Subject

Cloud Computing

Submitted by

Yogesh Chatrooram Sahu

FMIT2526179

For the Academic Year

2025-2026

College of Arts, Science & Commerce (Empowered Autonomous)

SIES

RISE WITH EDUCATION

NAAC REACCREDITED "A" GRADE

SIES College of Arts, Science and Commerce (Empowered Autonomous),

Sion (W), Mumbai – 400 022.

Department of Information Technology

CERTIFICATE

This is to certify that Mr. **Yogesh Chatrooram Sahu**, of MSc [Information Technology] Semester - I, Seat No. **FMIT2526179** has successfully completed the practicals for the subject of **Cloud Computing** as a partial fulfilment of the degree **M.Sc. (I.T**.) during the academic year 2025-2026.

Faculty-in-Charge

Iqra Shaikh

Examiner

Course Co-Ordinator

Sudha Bhagavatheeswaran

College Seal

Date:

INDEX

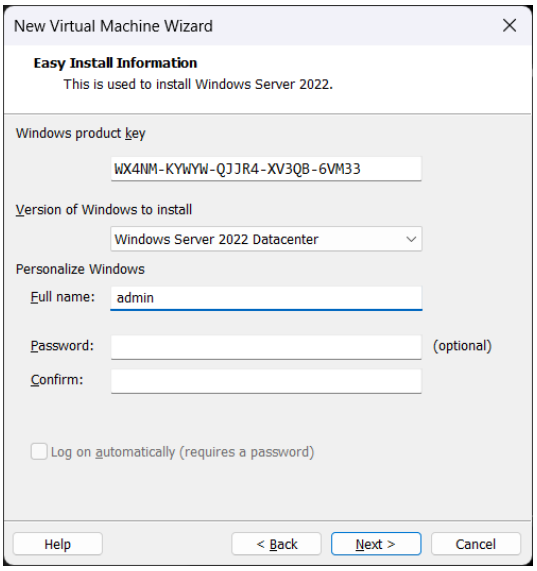
PRACTICAL 1

Aim: - Implementing Failover Cluster on Windows

File used: - Windows Server 2022.iso file

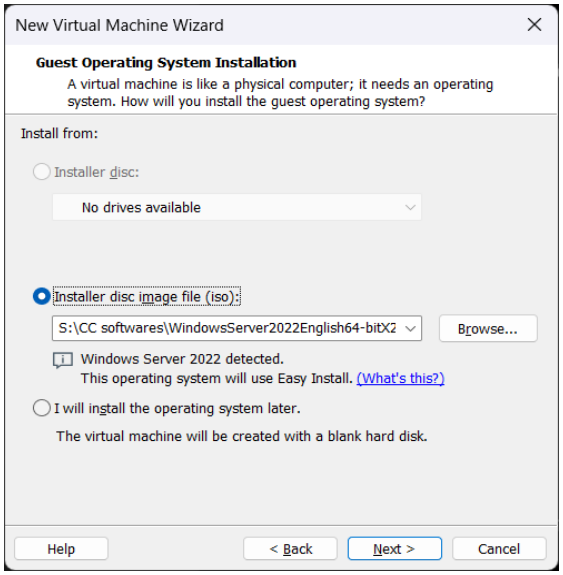
Steps: -

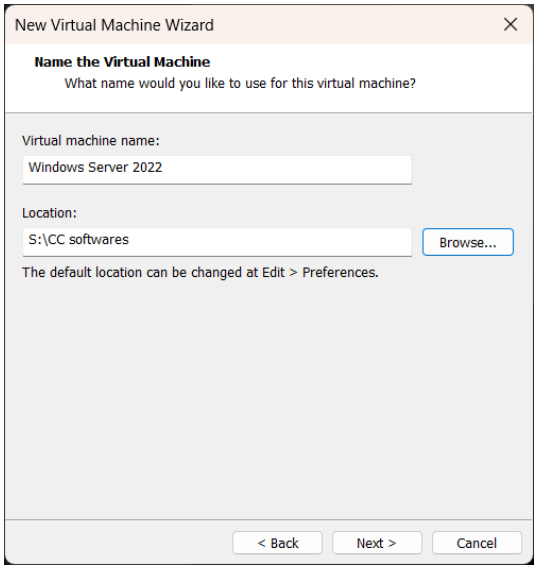
Step1: - Create a new VM



"windowserver2022…."

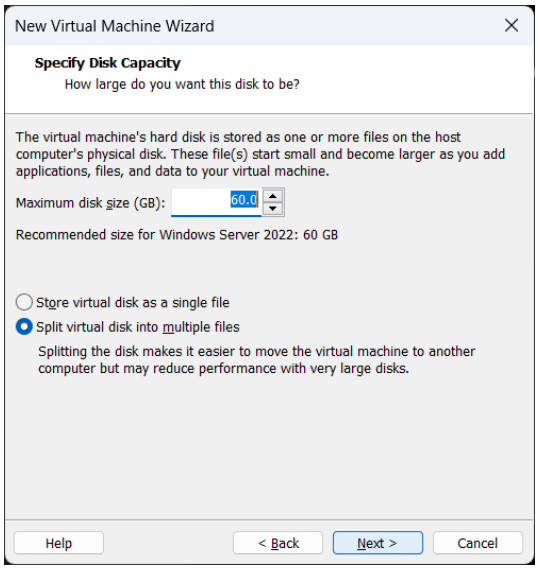
Step2: - Browse the iso file-



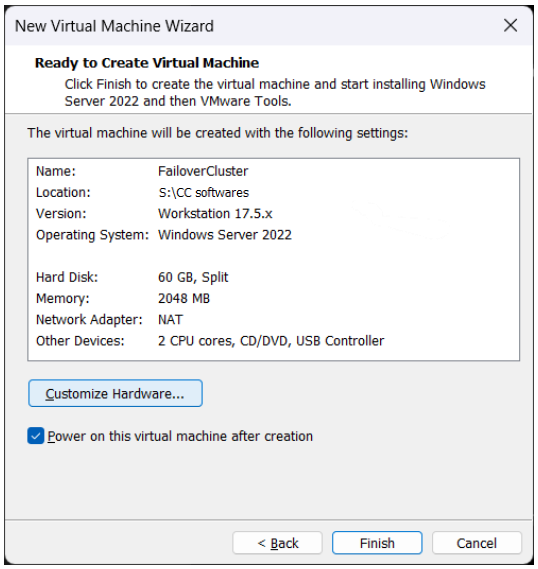


Step3: - Give a Name → Next.

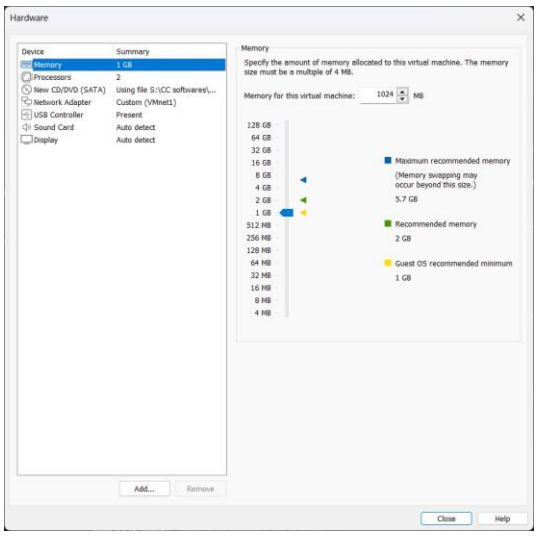
Step4: - Keep default storage capacity → split virtual disk into multiple files.

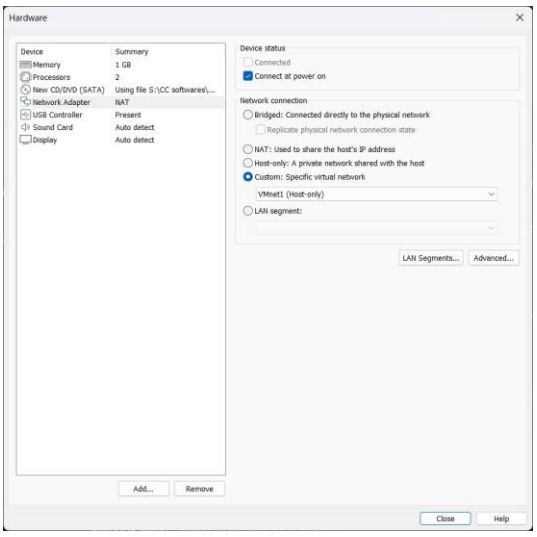


Step5: - Click on Customize Hardware

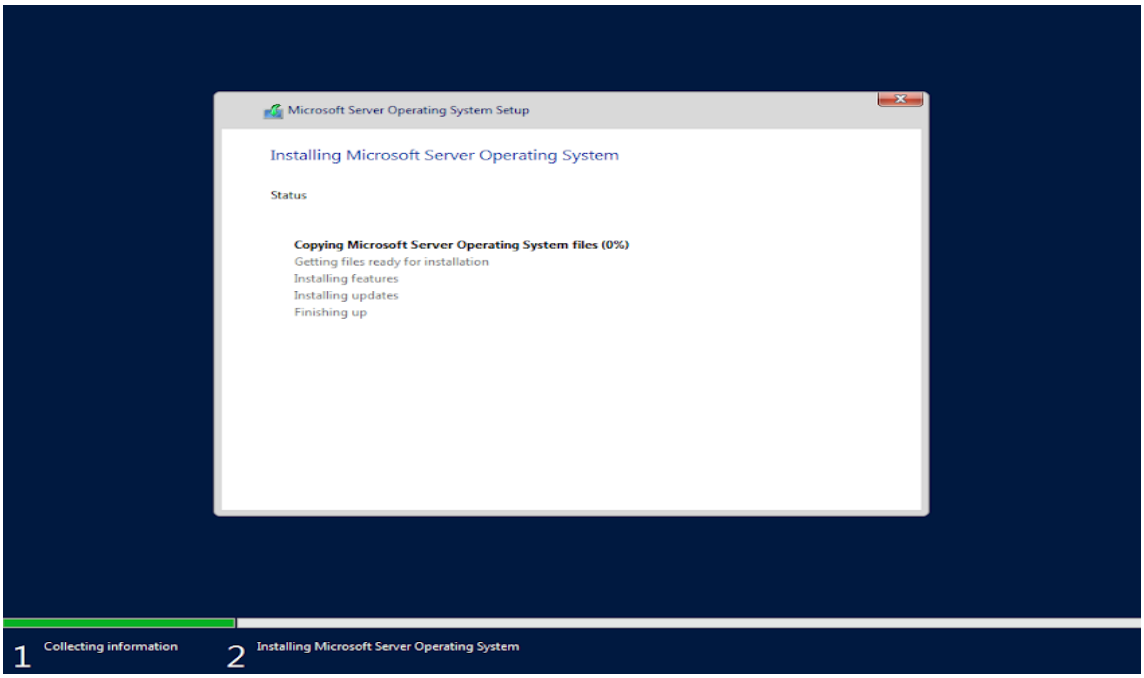


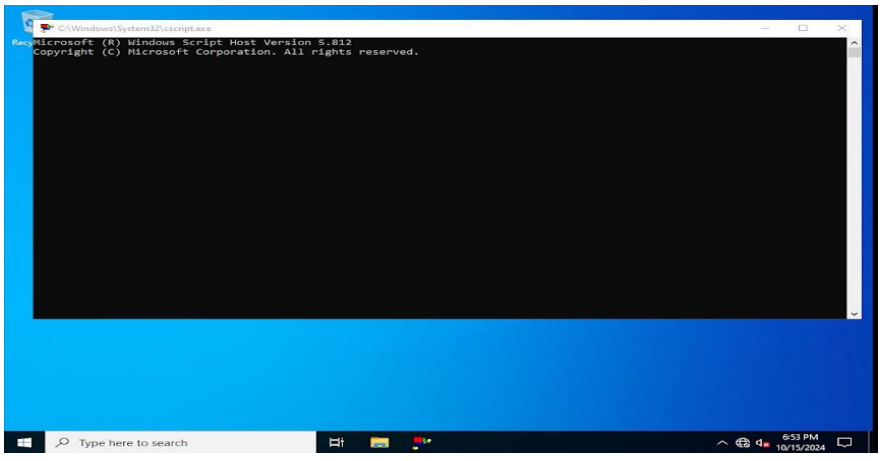
Step6: - Set Memory to 1GB →Network Adapter→ Custom specific Virtual network.



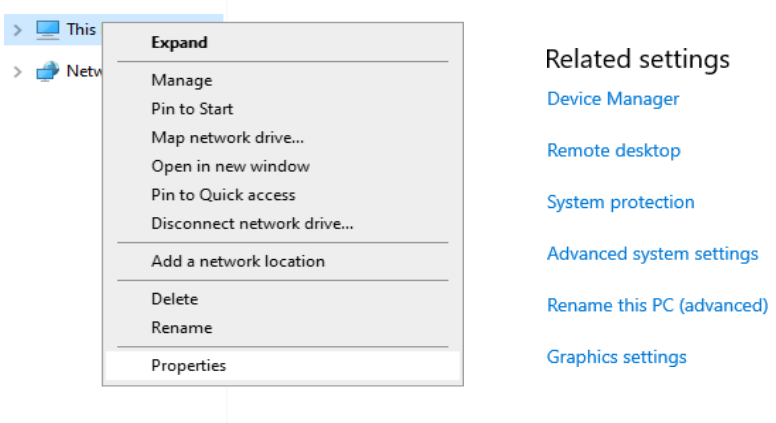


Step7: - Now Power on the virtual machine

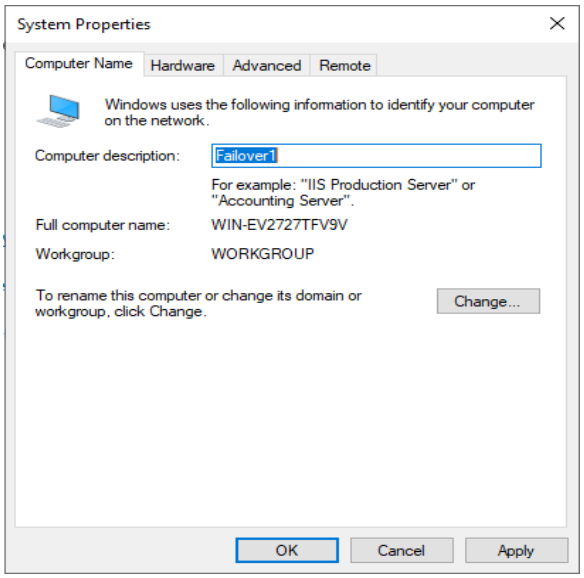


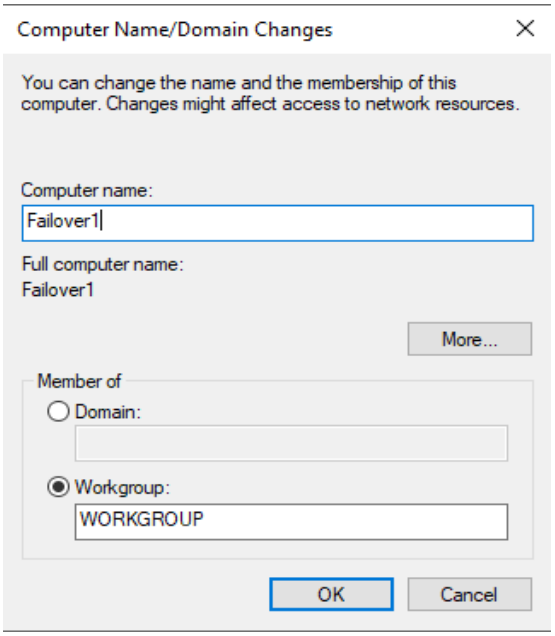


Step8: - Ctrl + E → This Pc → Right Click → Properties.

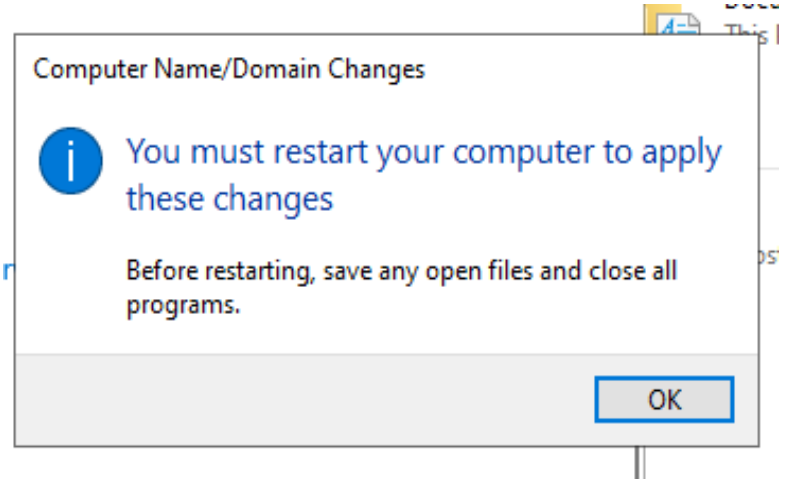


Step9: - Click on Rename this Pc (advanced) → give a name →Click on change → Ok.

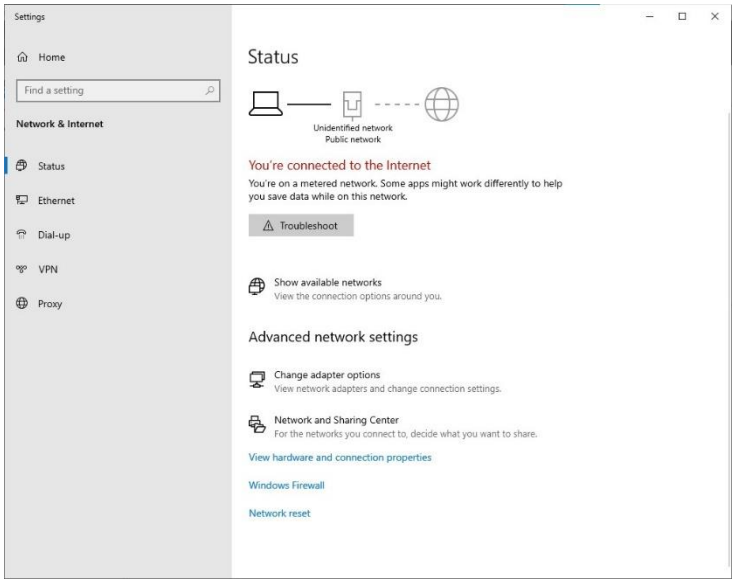


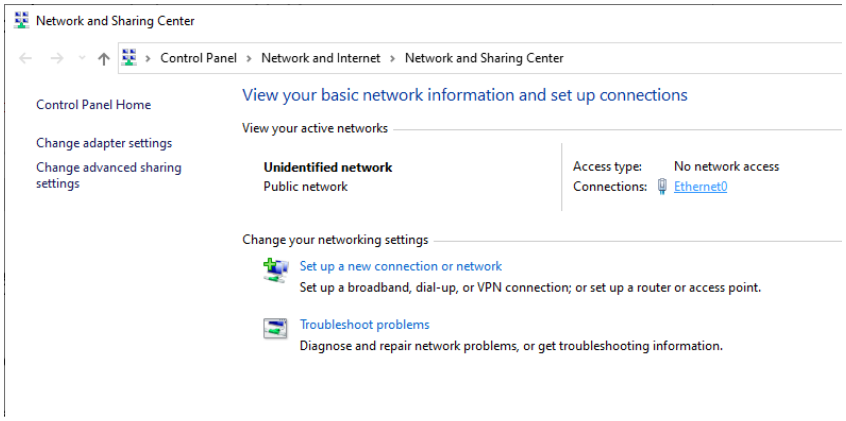


Step10: - After restart

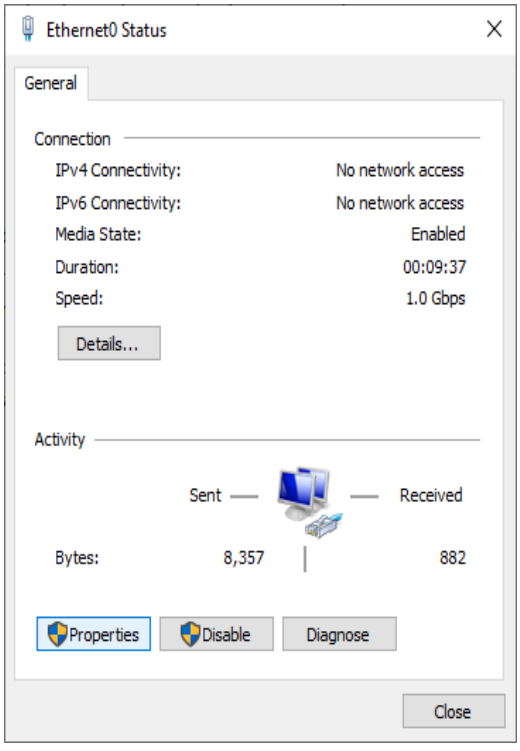


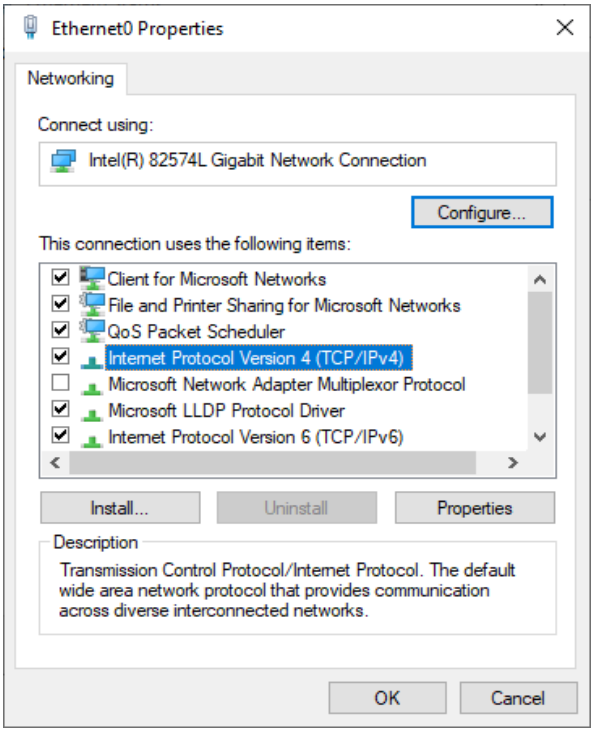
Step12: - Go to setting → network and sharing center → Click on Ethernet ()



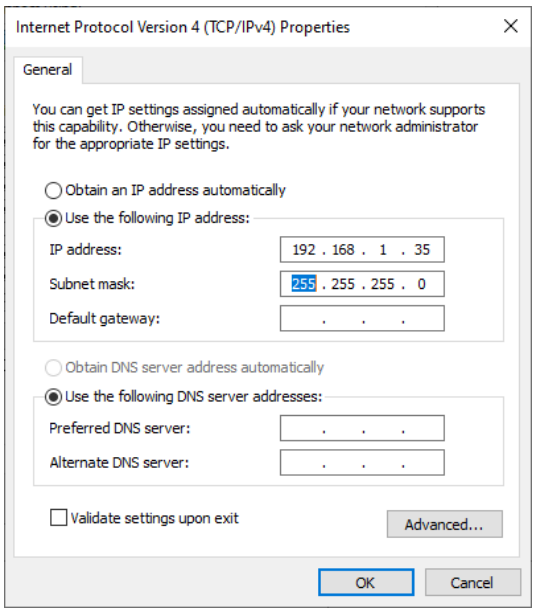


Step13: - Click on properties → Click internet protocol version 4(TCP/IPv4)

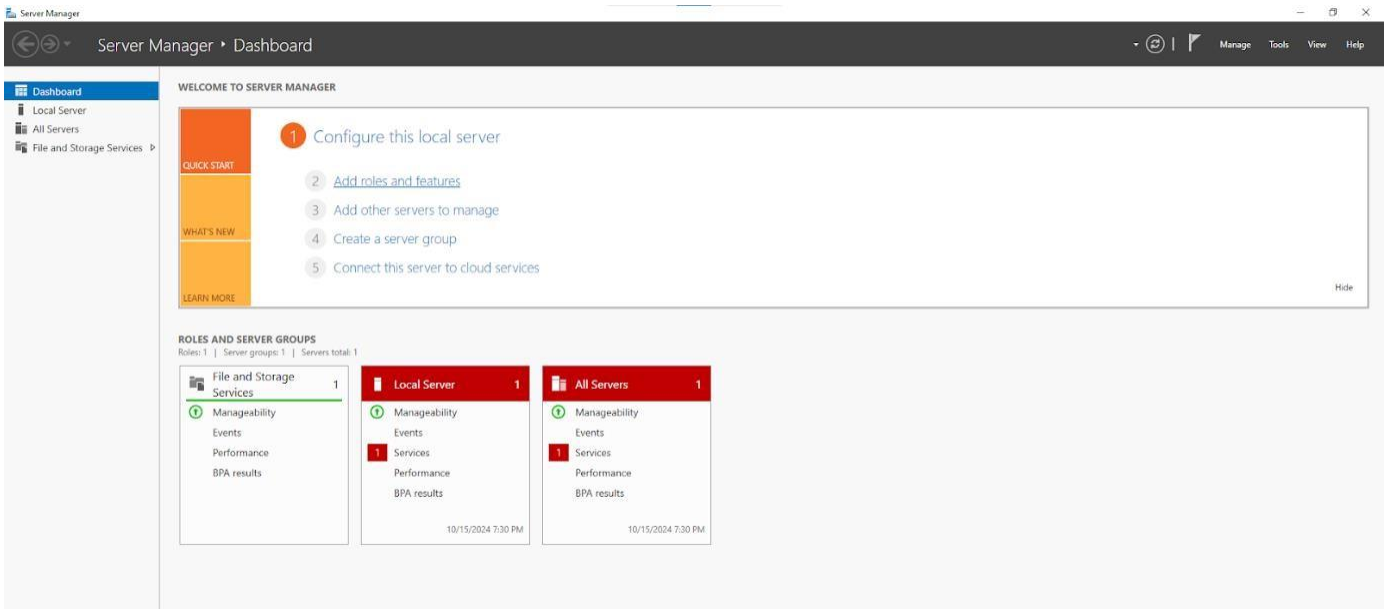


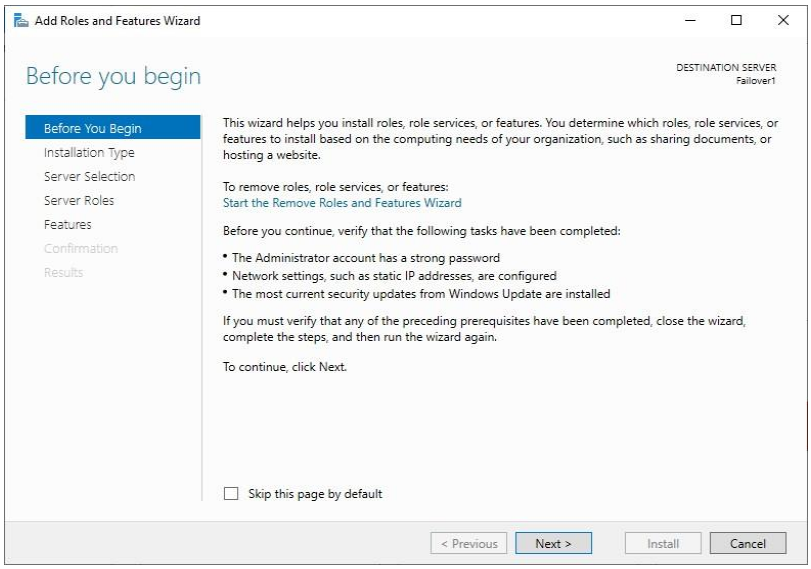


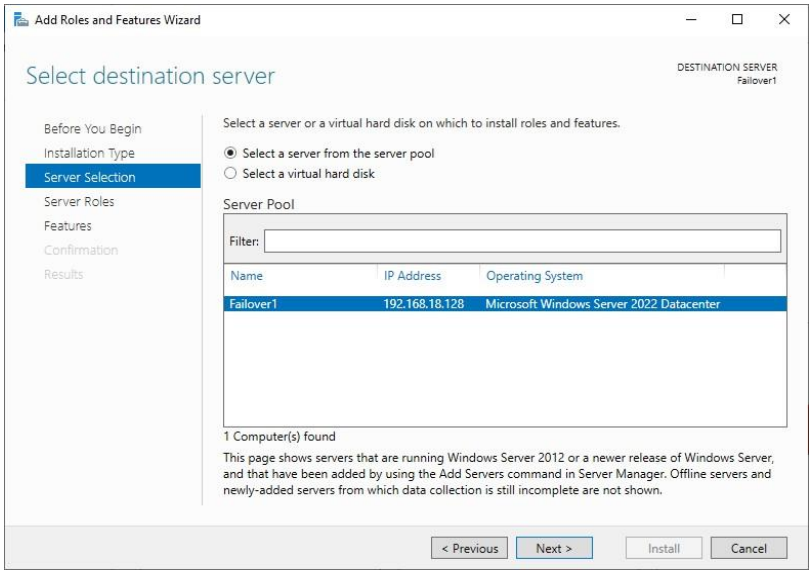
Step14: - Now add Ip address 192.168.1.35, subnet mask.



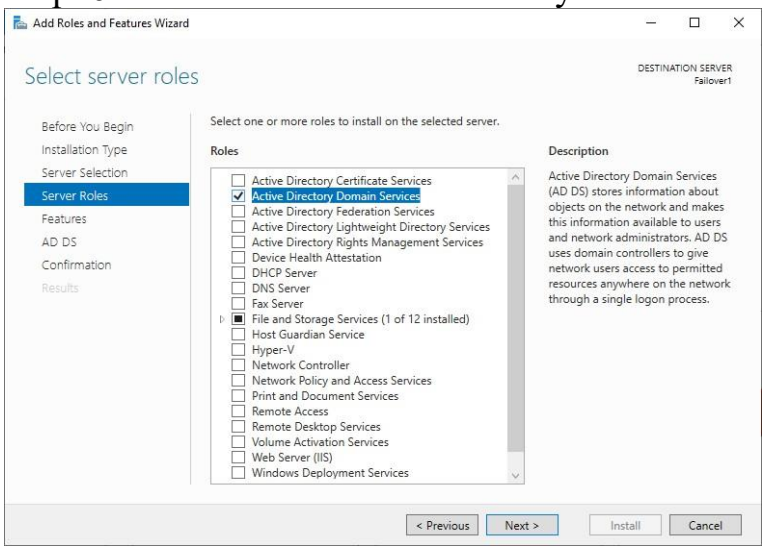
Step15: - Now click on server manager → Add roles and features.



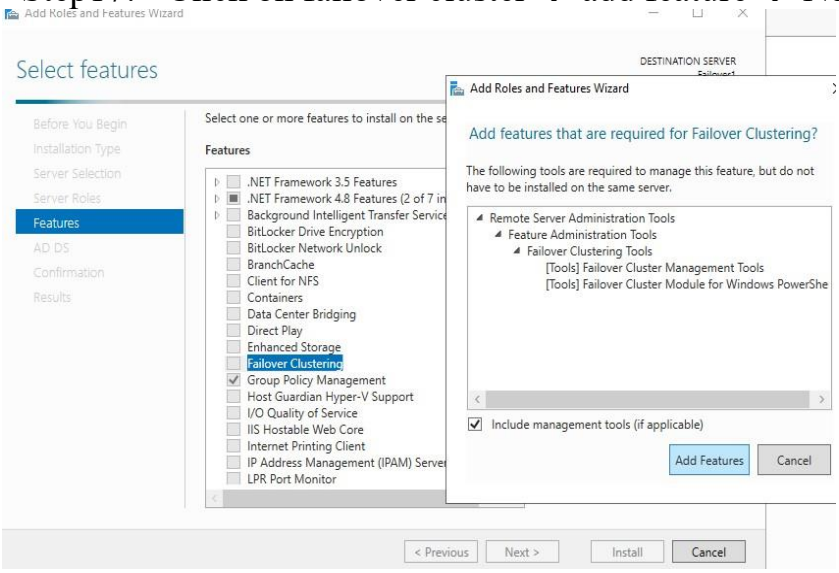




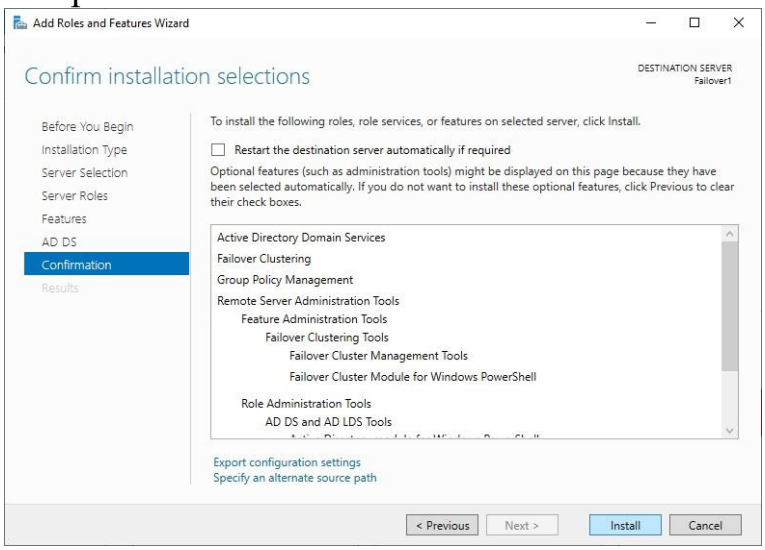
Step16: - Check the “Active Directory Domain Services” → Add feature → next.



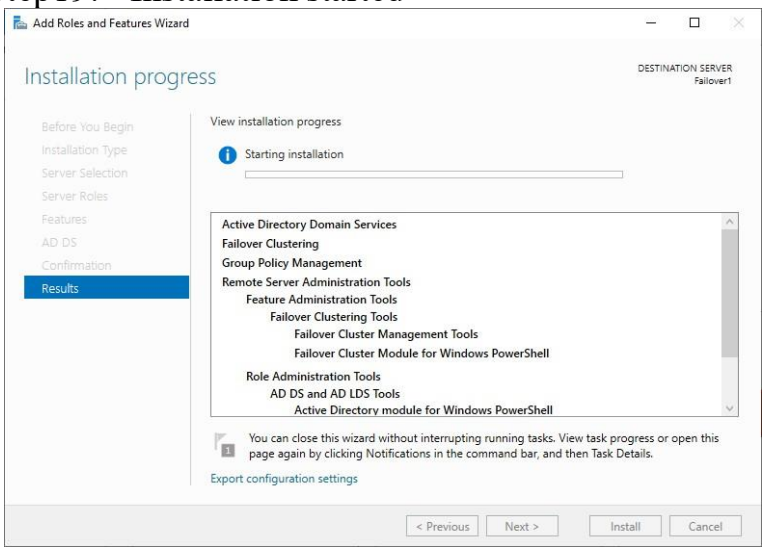
Step17: - Click on failover cluster → add feature → Next.



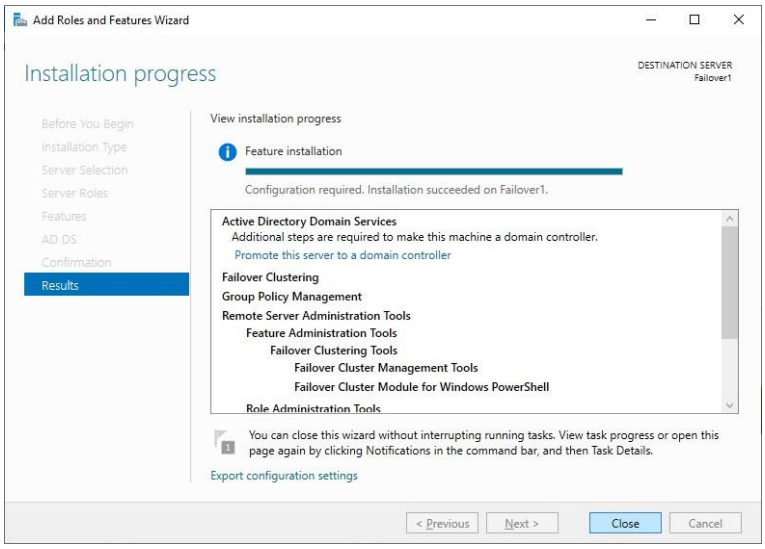
Step18: - Click on installation.



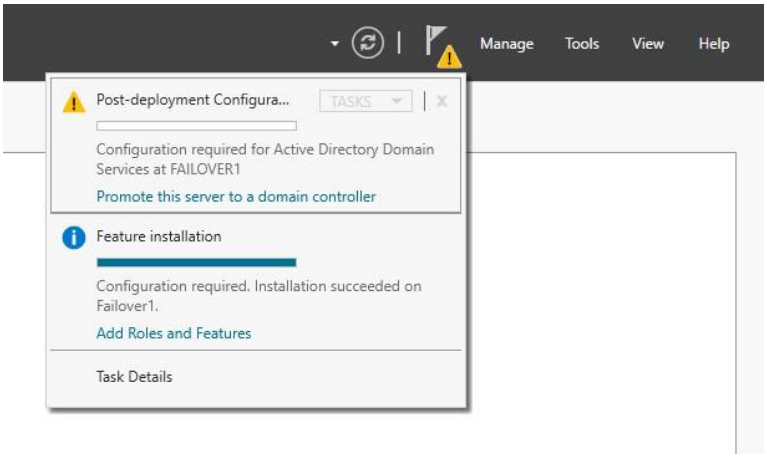
Step19: - Installation started



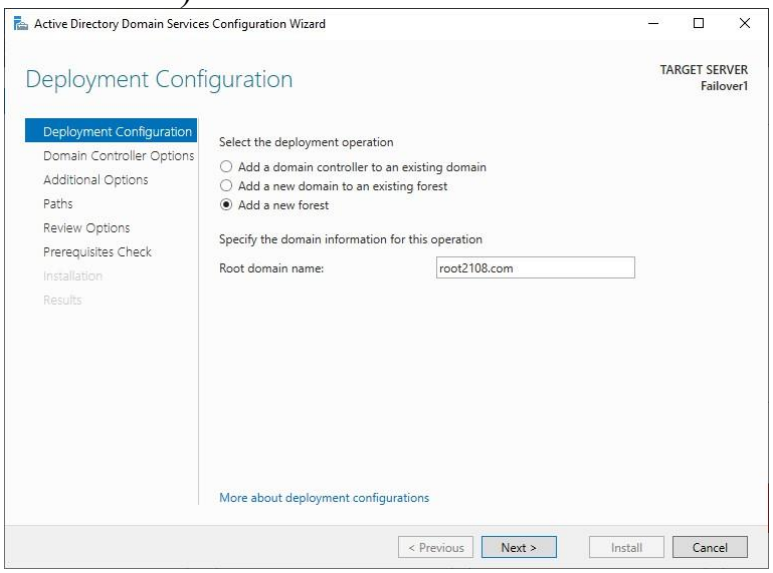
Step20: - After installation click on close.



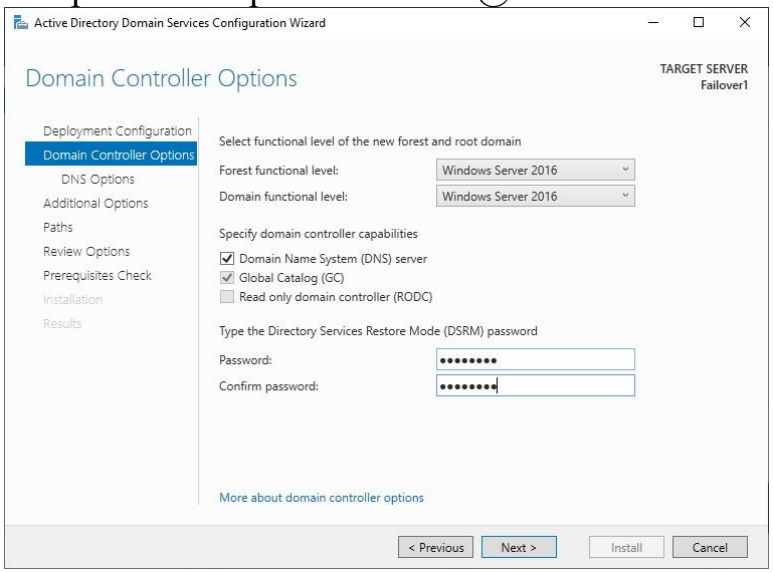
Step21: - Now click on flag (notification) icon → promote this to server to a domain controller.



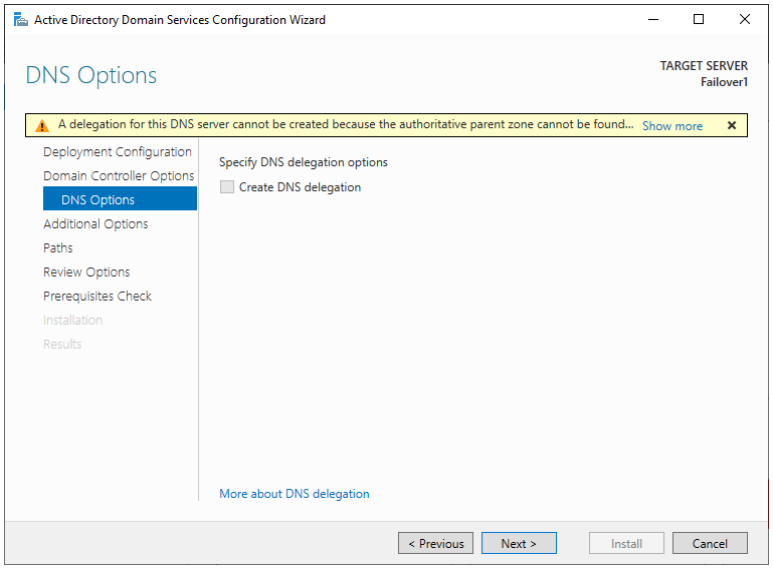
Step22: - Click on Add a new forest → give root domain name (.com is necessary at the end of the name)



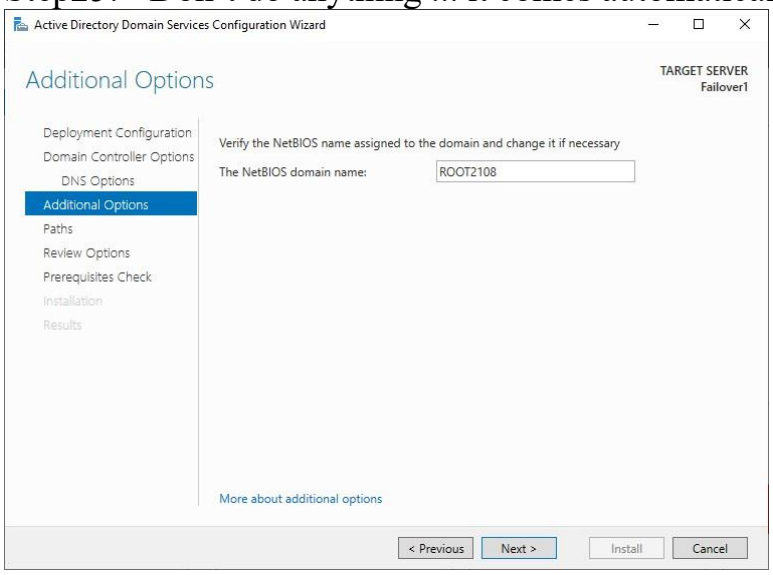
Step23: - Give password: **root@2108** → next.



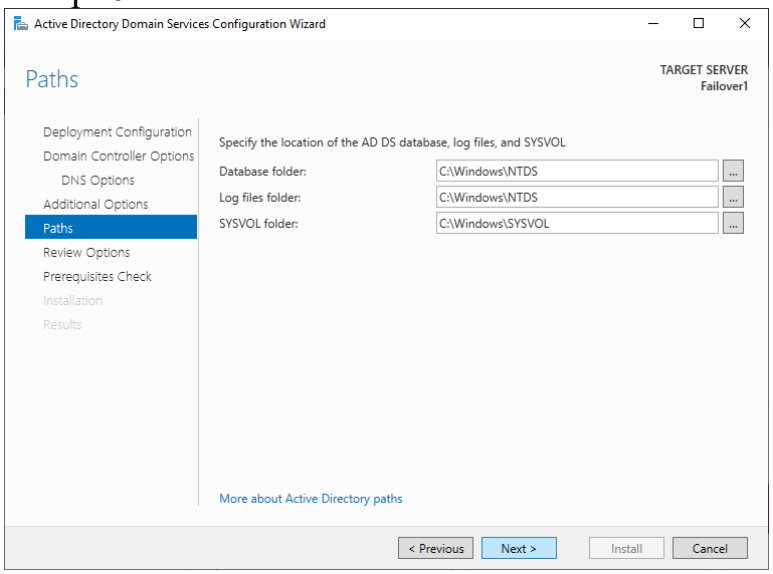
Step24: - Click on next.



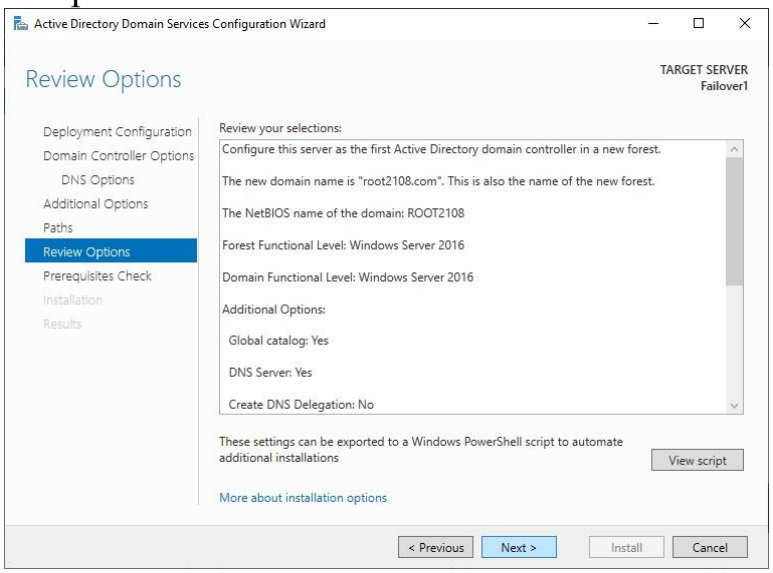
Step25: - Don’t do anything ... it comes automatically → next.



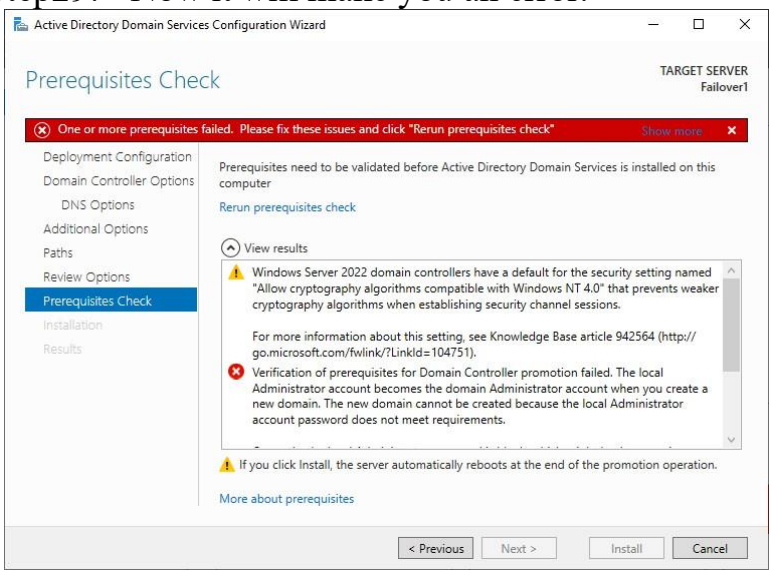
Step26: - Click Next



Step27: - Click on next.



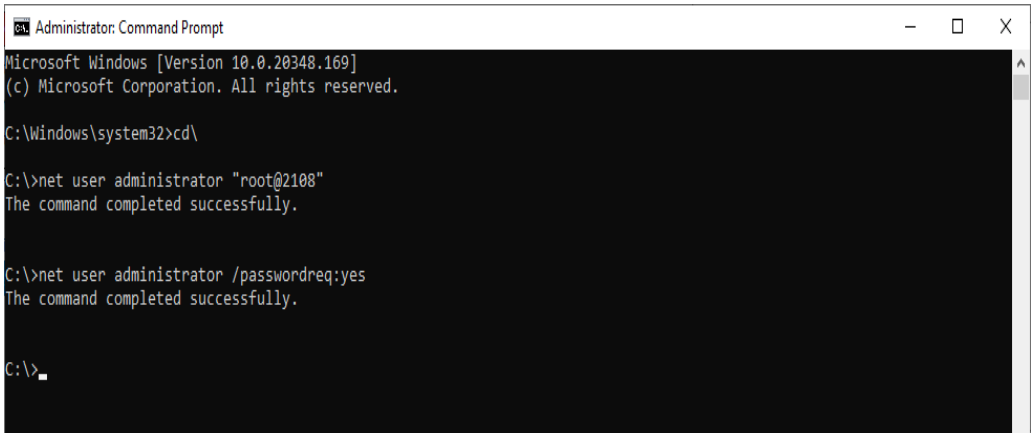
Step29: - Now it will make you an error.



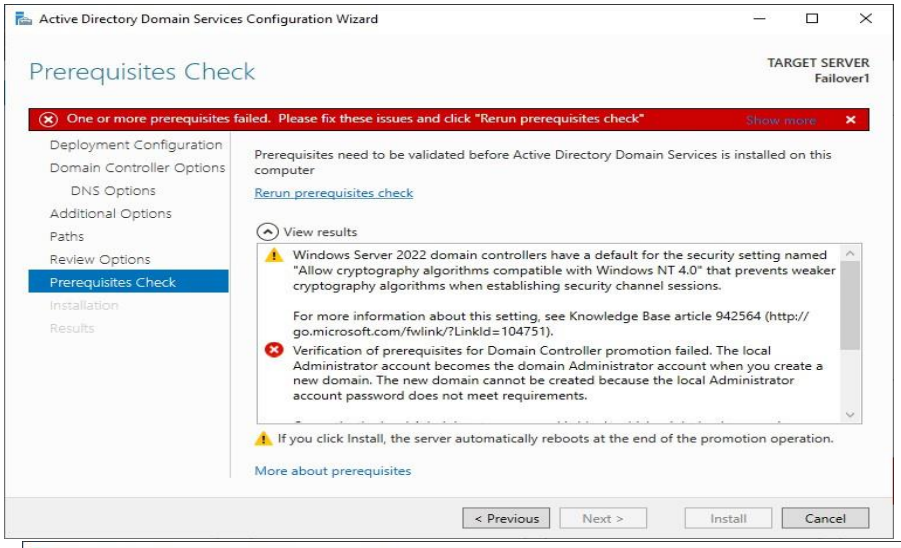
Step30: - Open cmd → run as administrator → Now type the following commands: -

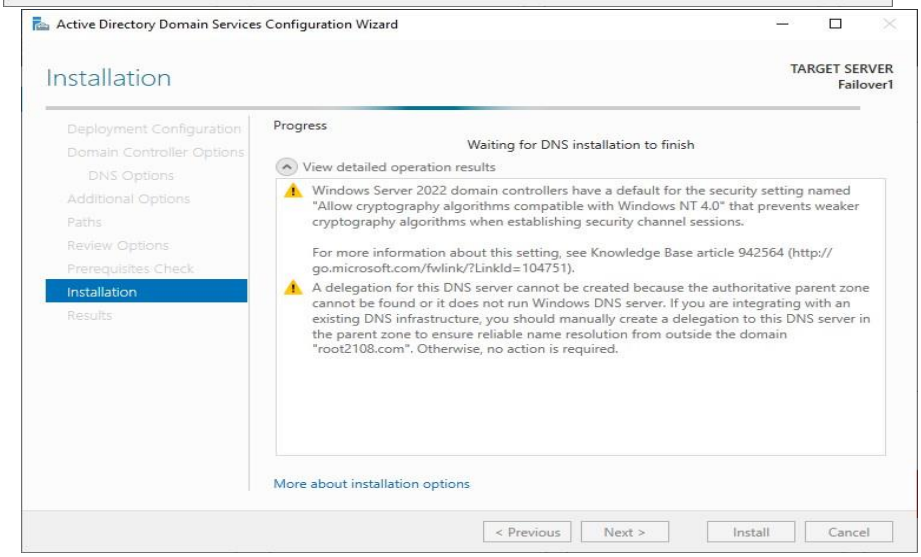
- cd\
- net user administrator "root@2108"
- net user administrator /passwordreq:yes

root@2108 – this is the password u set before

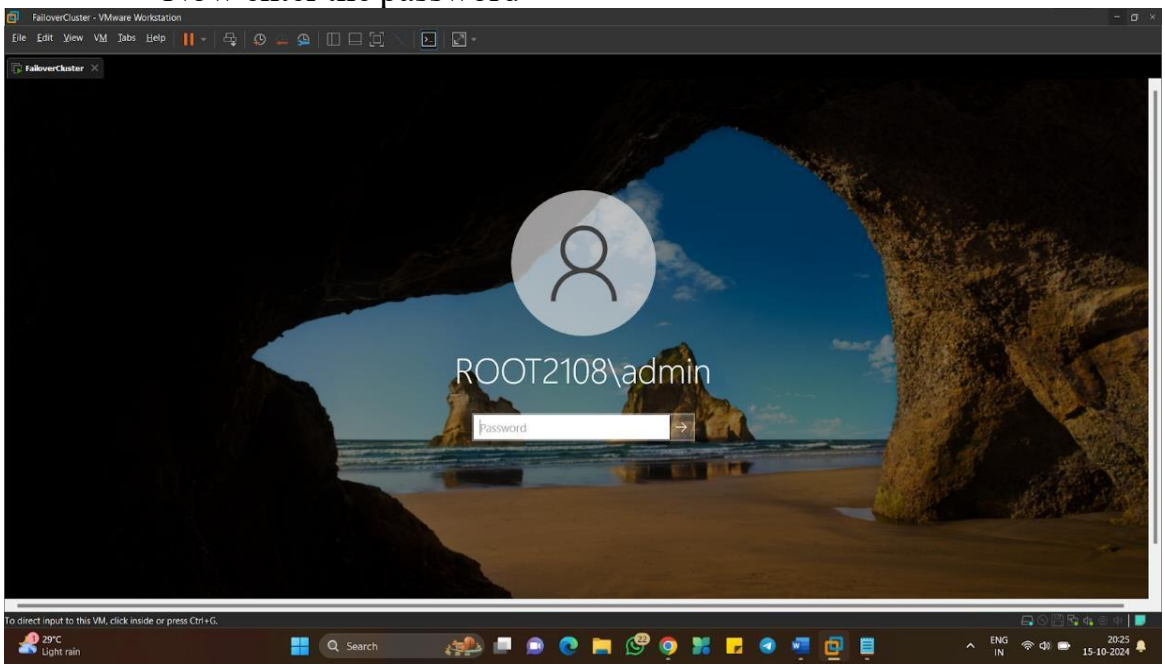


Step31: - Now click on rerun prerequisites check → install.

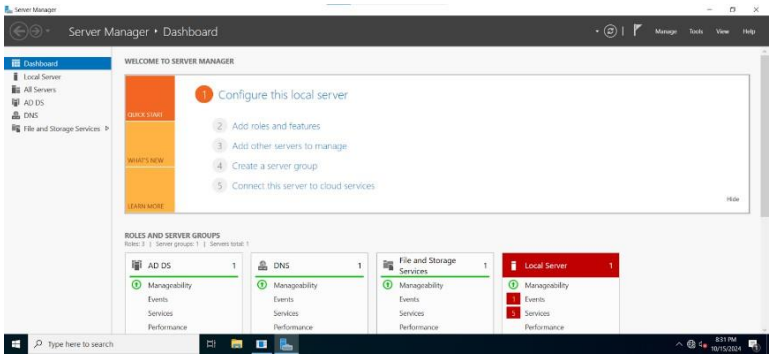




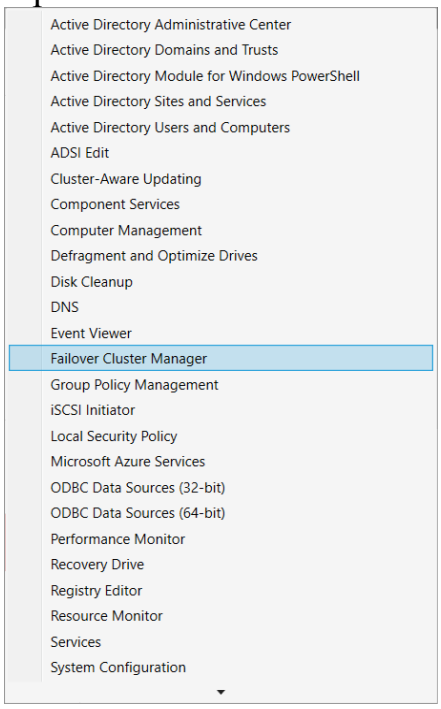
Step32: - After this the PC will restart.
Now enter the password



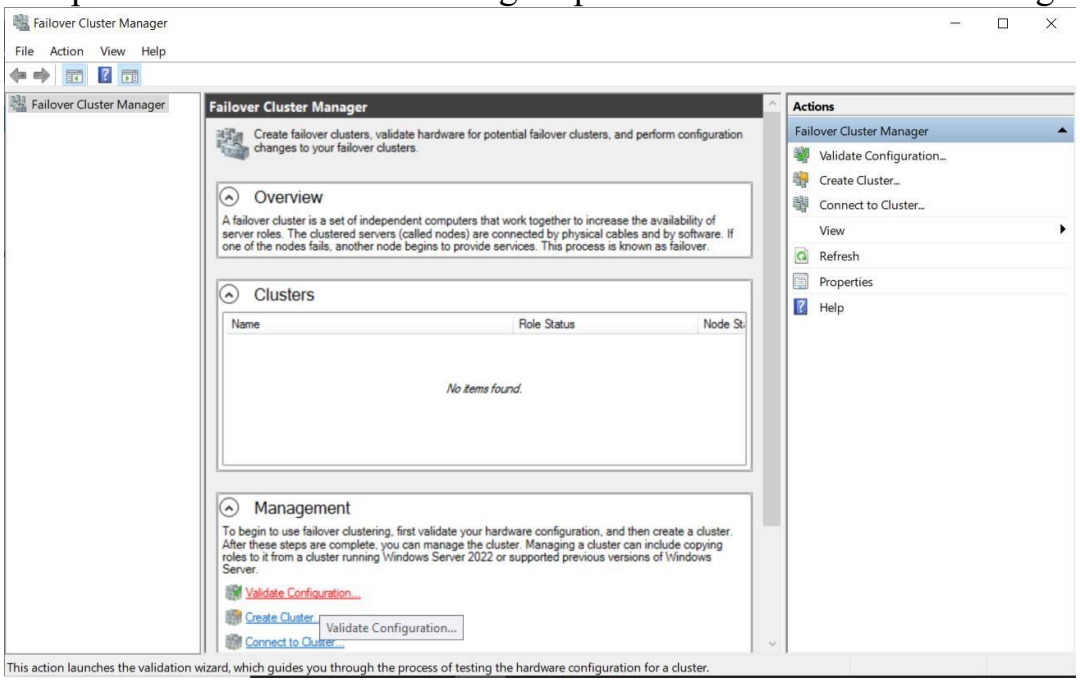
Step33: - Click on tools.



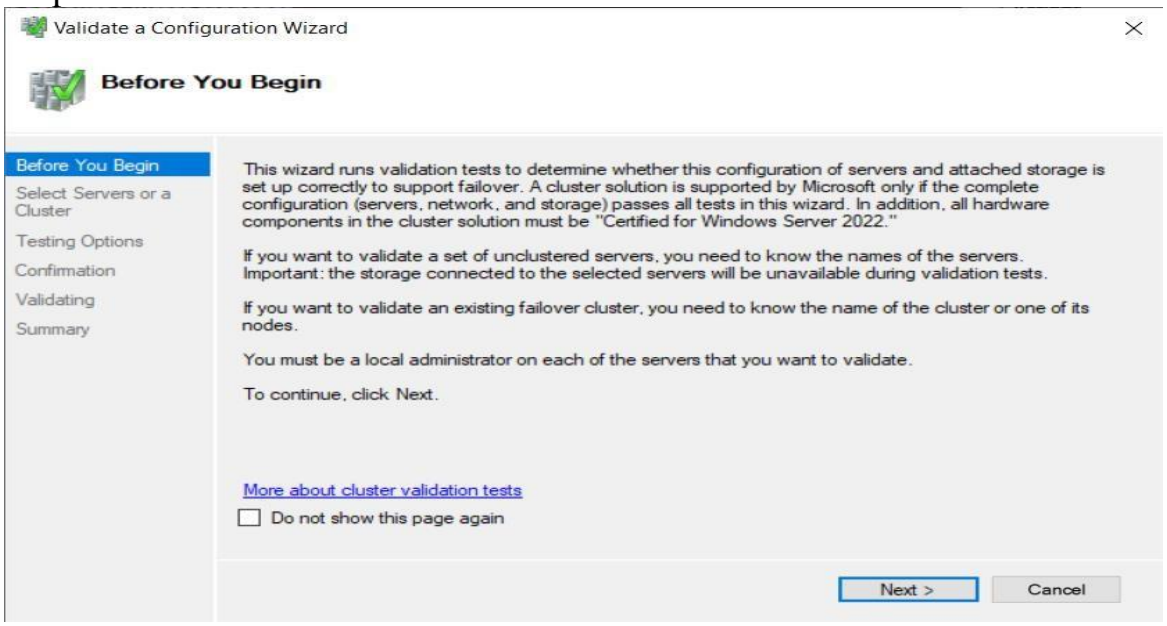
Step34: - Now click on tools → failover cluster manager.



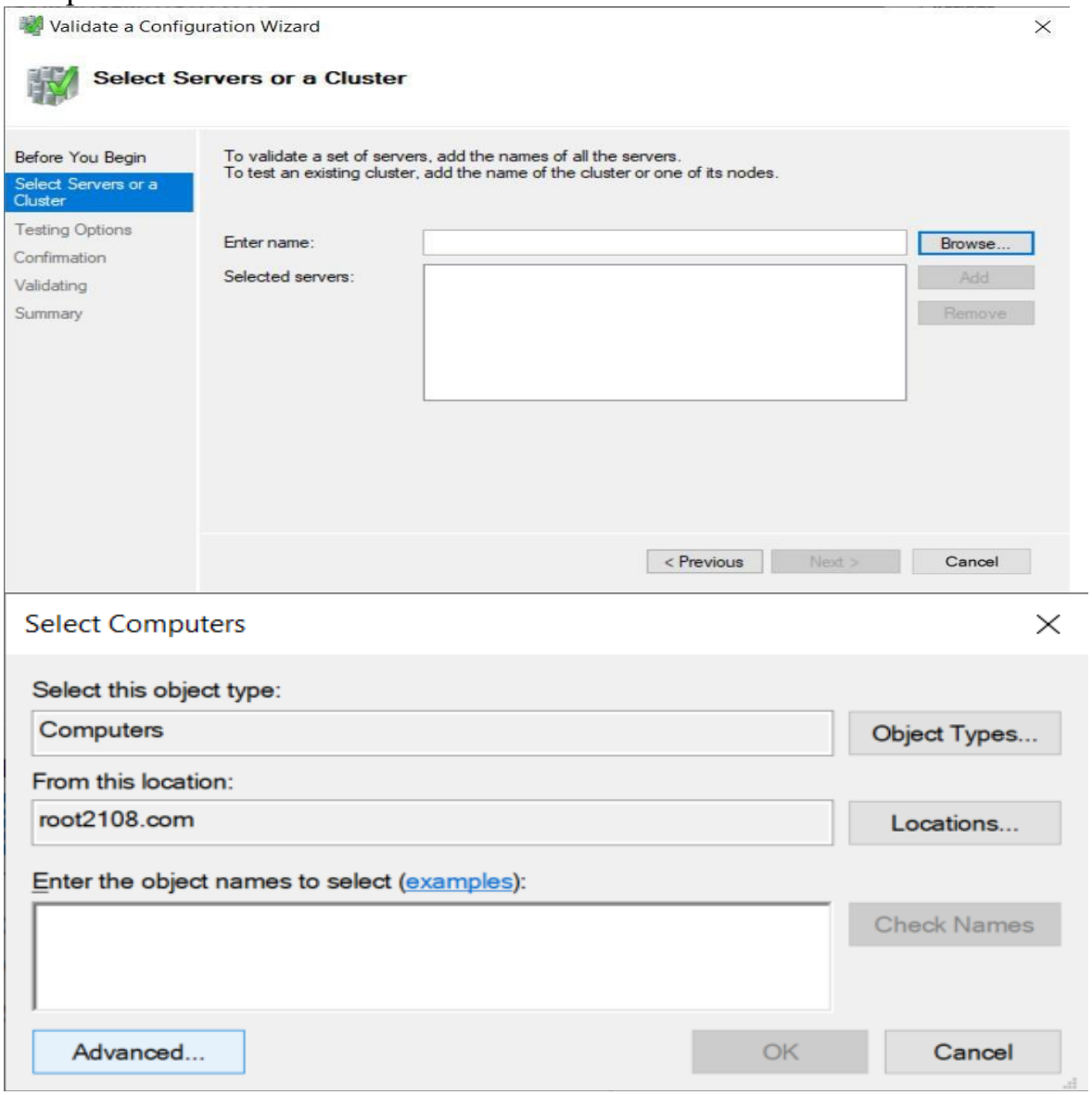
Step35: - Failover Cluster manager opens → Click on validate configuration.

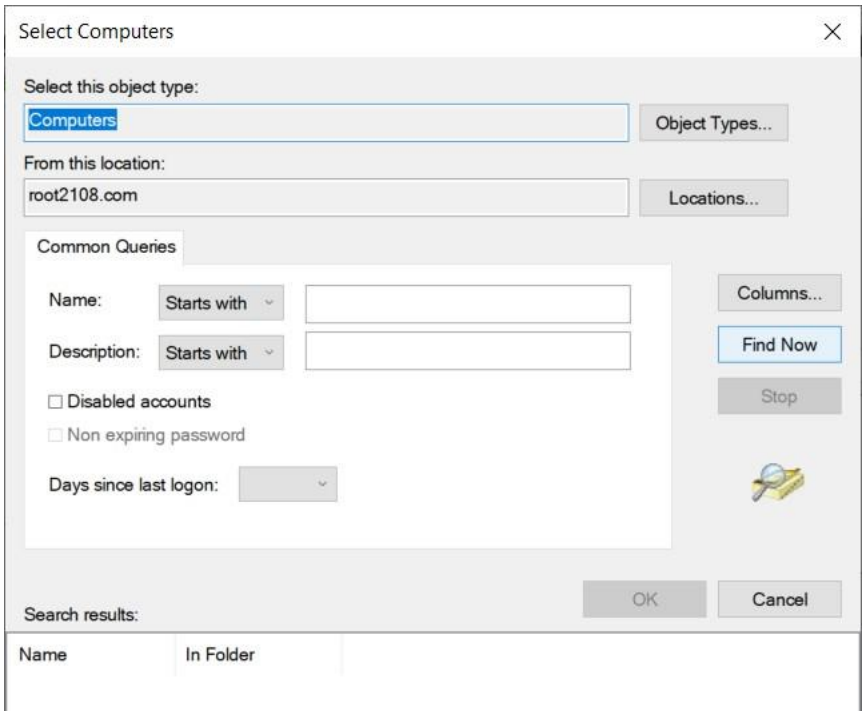


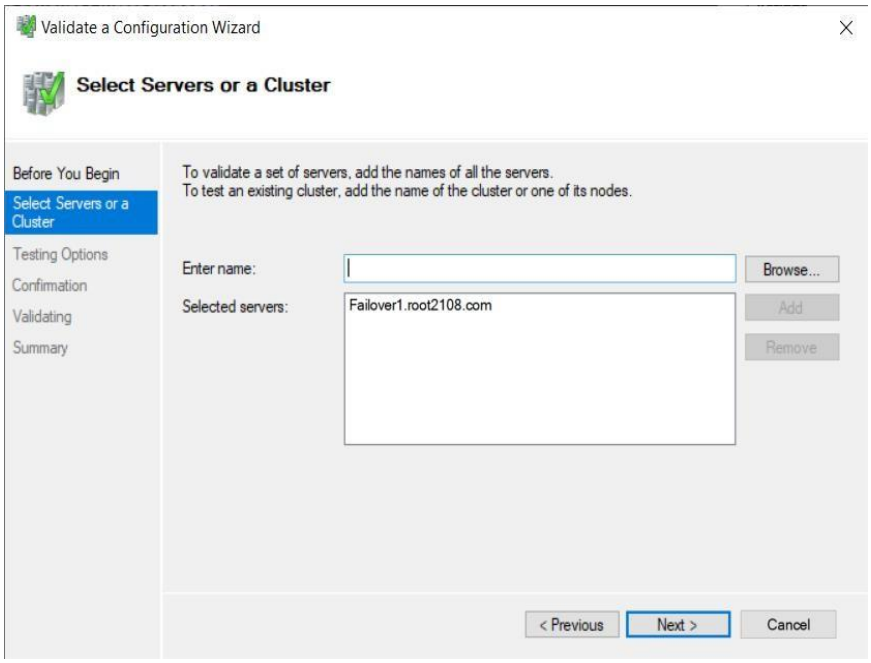
Step36: - Now click on next.



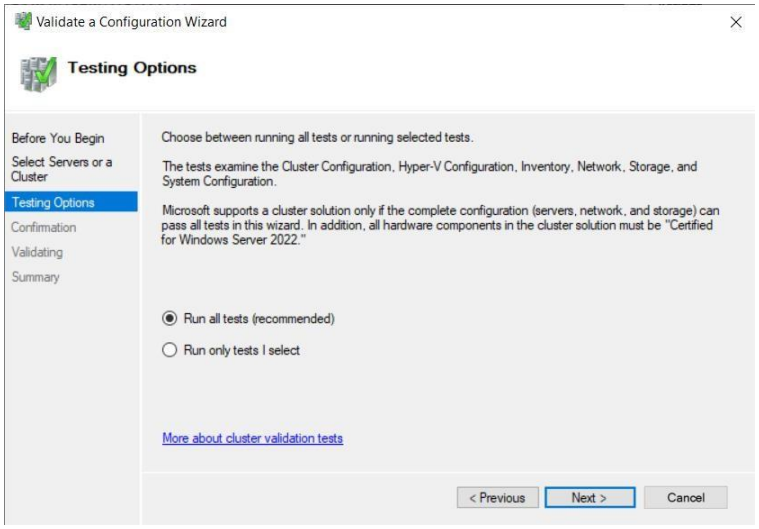
Step37: - Click on browse →Advanced →Find now →Next.



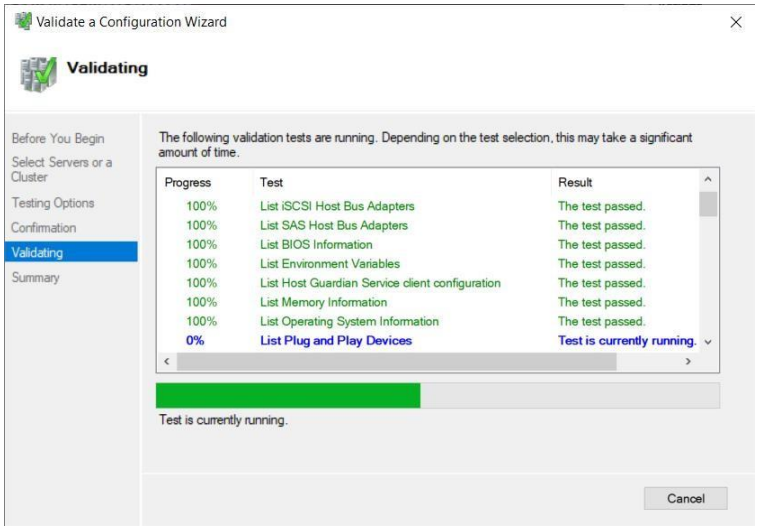

Select Computers
Select this object type:
Computers
Object Types...
From this location:
root2108.com
Locations...
Common Queries
Name:
Starts with
Description:
Starts with
Disabled accounts
Non expiring password
Days since last logon:
Columns...
Find Now
Stop
OK
Cancel
Search results:
Name
In Folder


Validate a Configuration Wizard
Select Servers or a Cluster
Before You Begin
Select Servers or a Cluster
Testing Options
Confirmation
Validating
Summary
To validate a set of servers, add the names of all the servers.
To test an existing cluster, add the name of the cluster or one of its nodes.
Enter name:
Browse...
Selected servers:
Failover1.root2108.com
Add
Remove
< Previous
Next >
Cancel

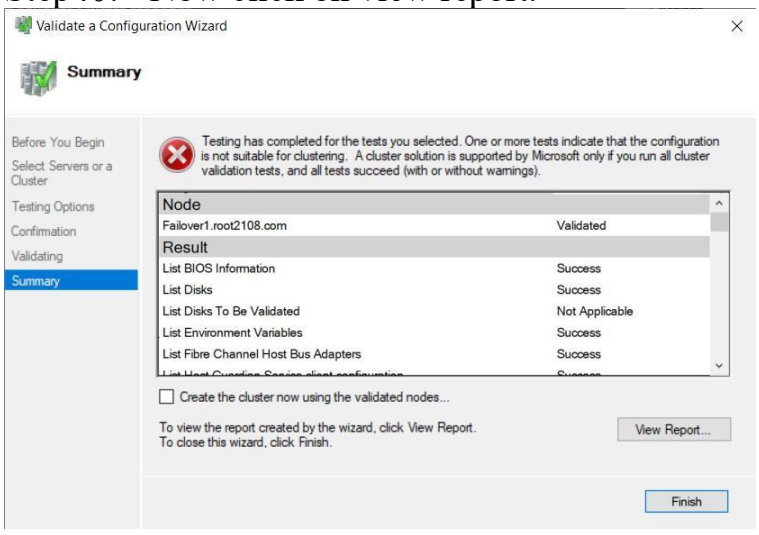
Step38: - Now run all tests.



Step39: - Now click on next.

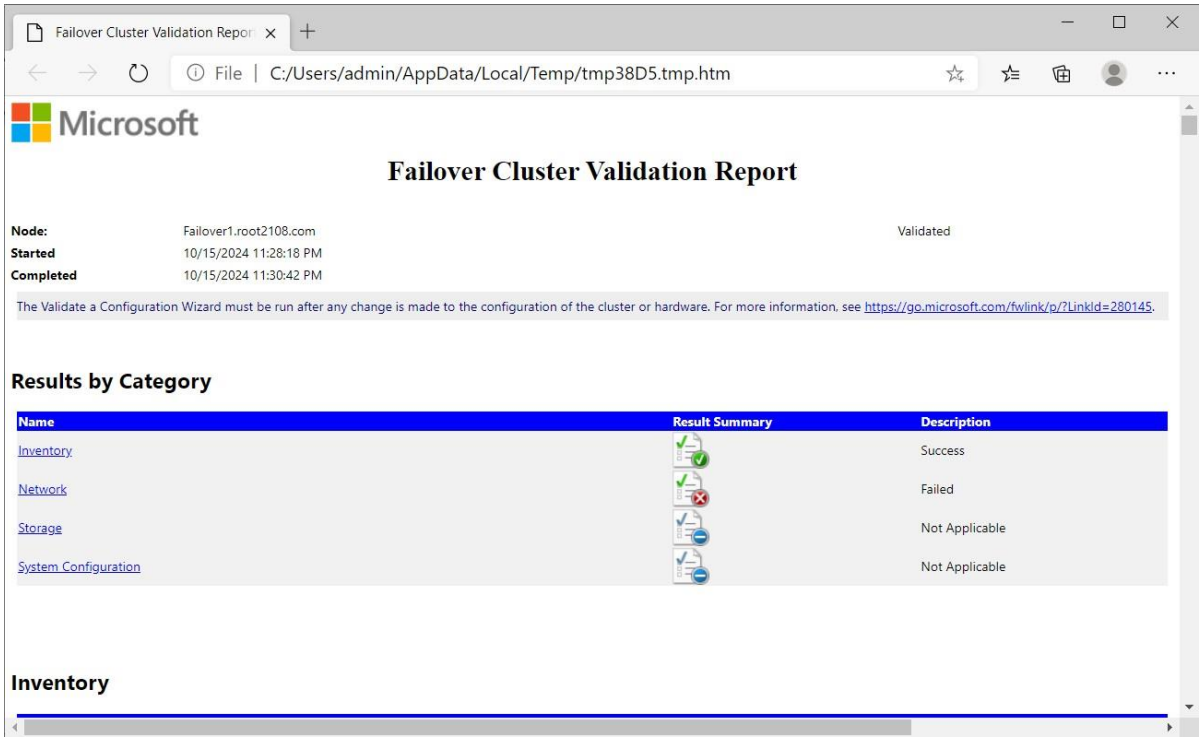


Step40: - Now click on view report.



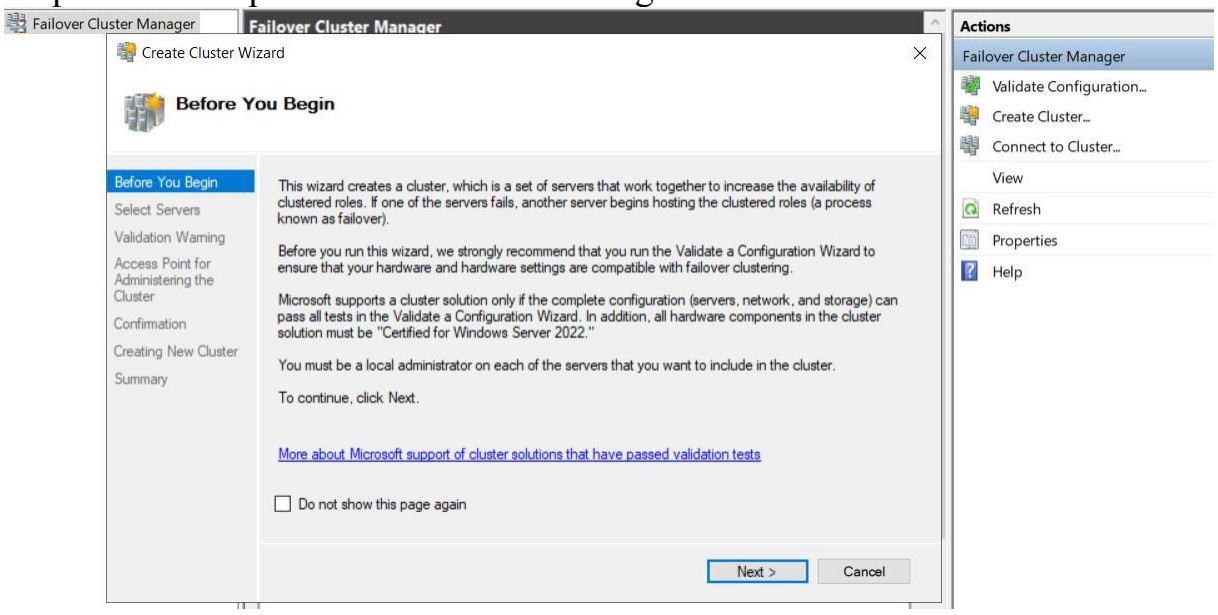
Then it will display the following page

Step41: - After viewing the report click on finish.

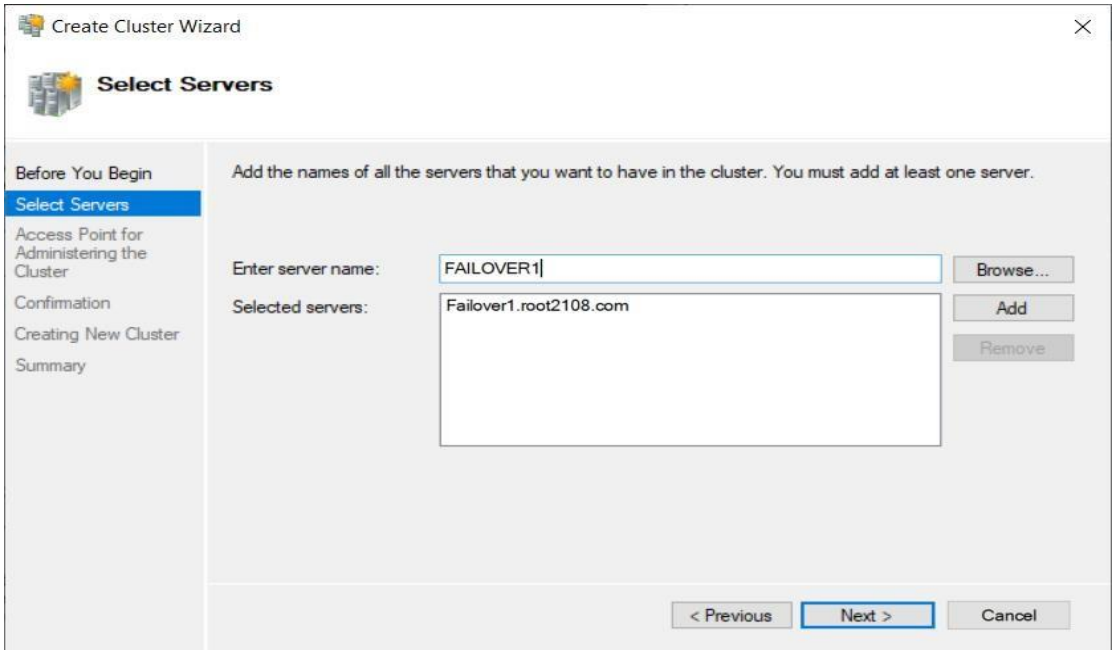


Creating Cluster

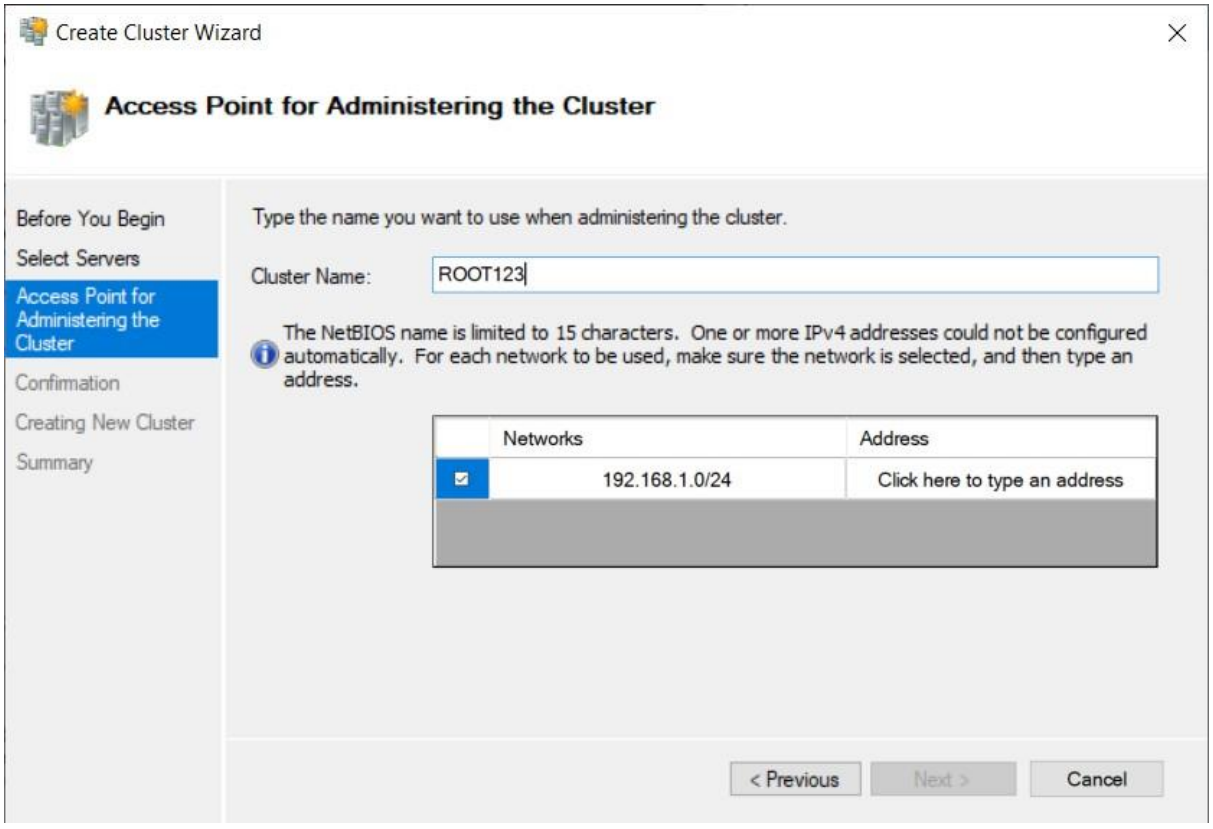
Step42: - Now open failover cluster manager → Create Cluster → next.



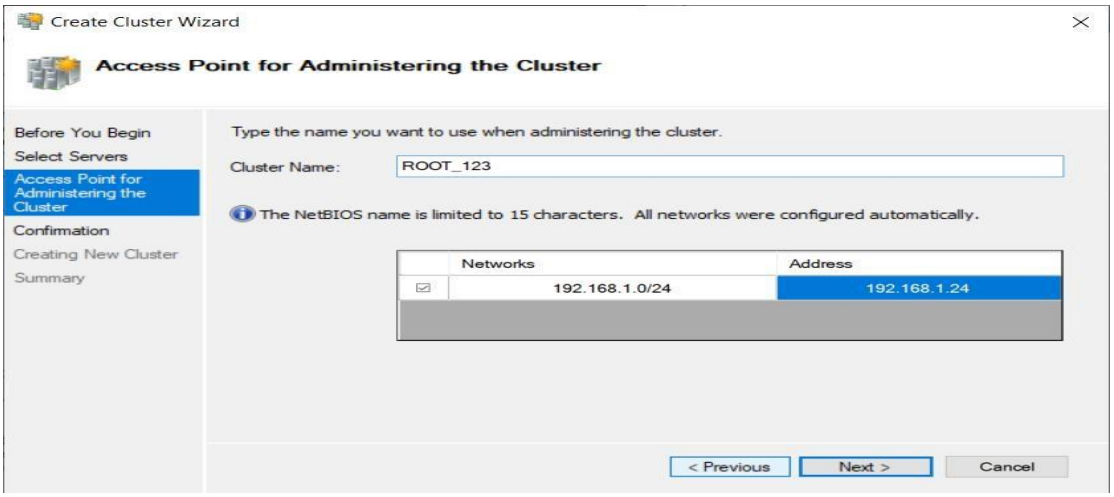
Step43: - Click on browse →Advanced →Find now →Next.



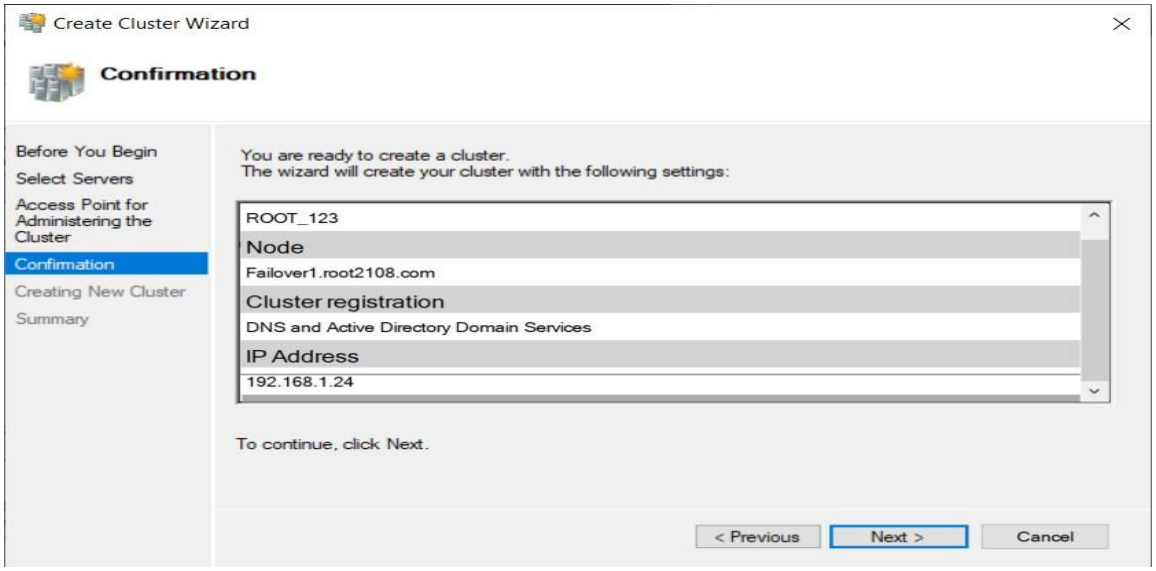
Step44: - Name the Cluster As "ROOT_123"



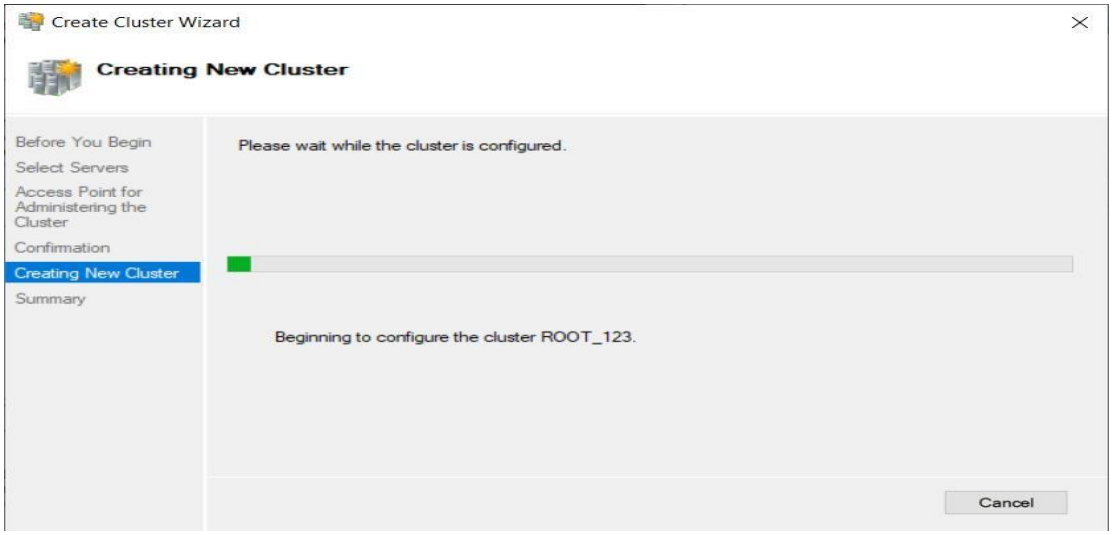
Step45: - Click on NEXT



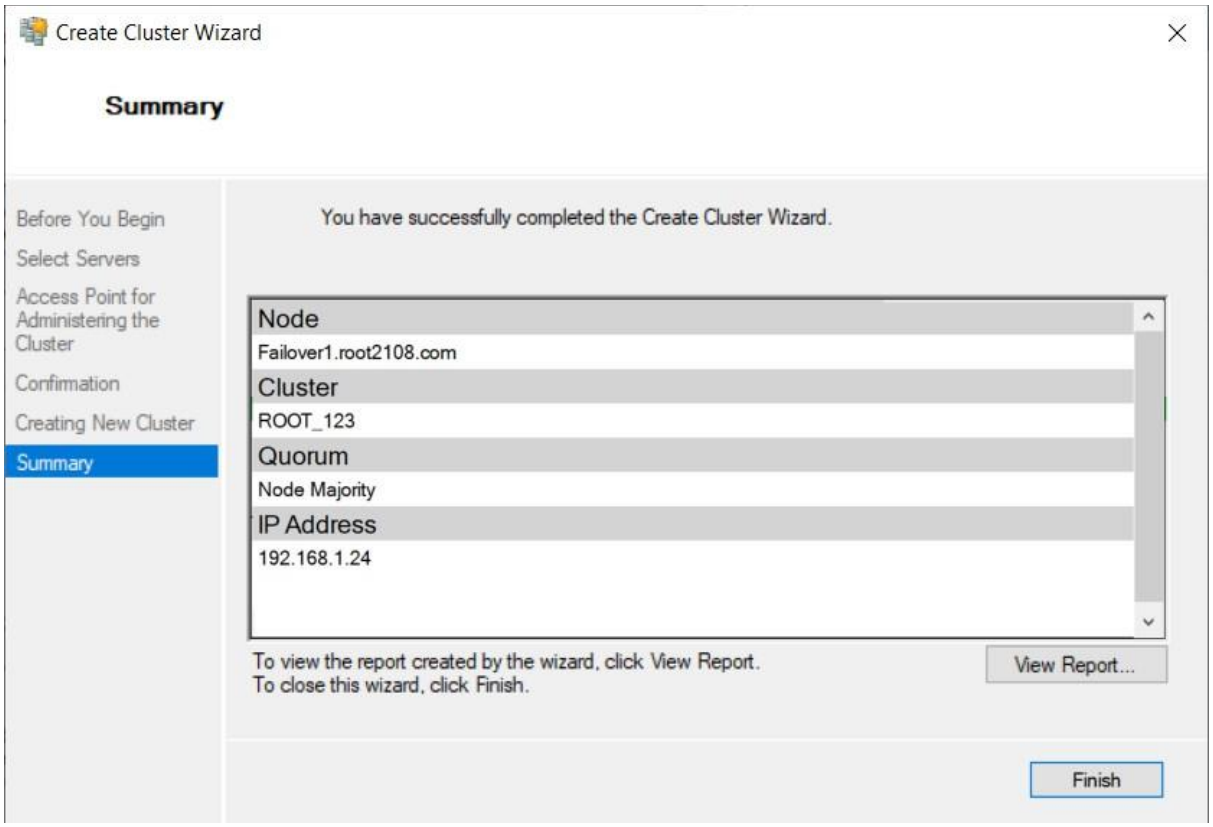
Step46: - Click on NEXT



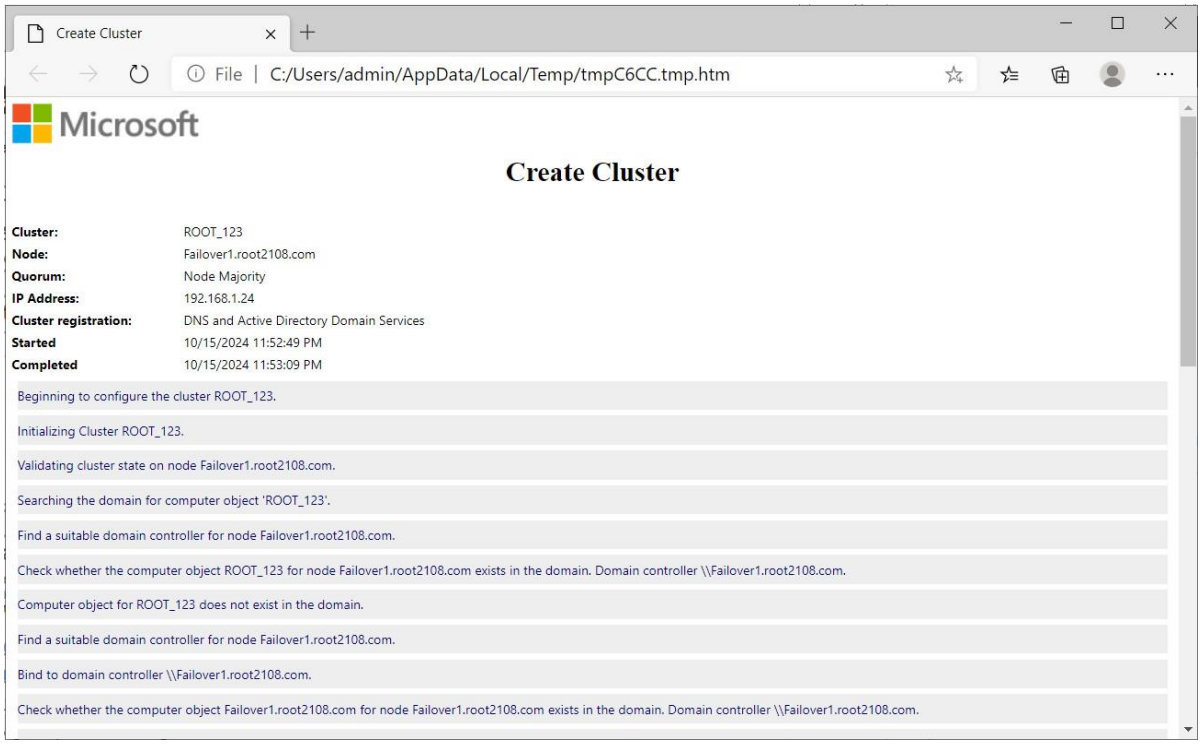
Step47: -Click on NEXT



Step48: -Click on VIEW REORT…→ Click on FINISH



Created Cluster Report View



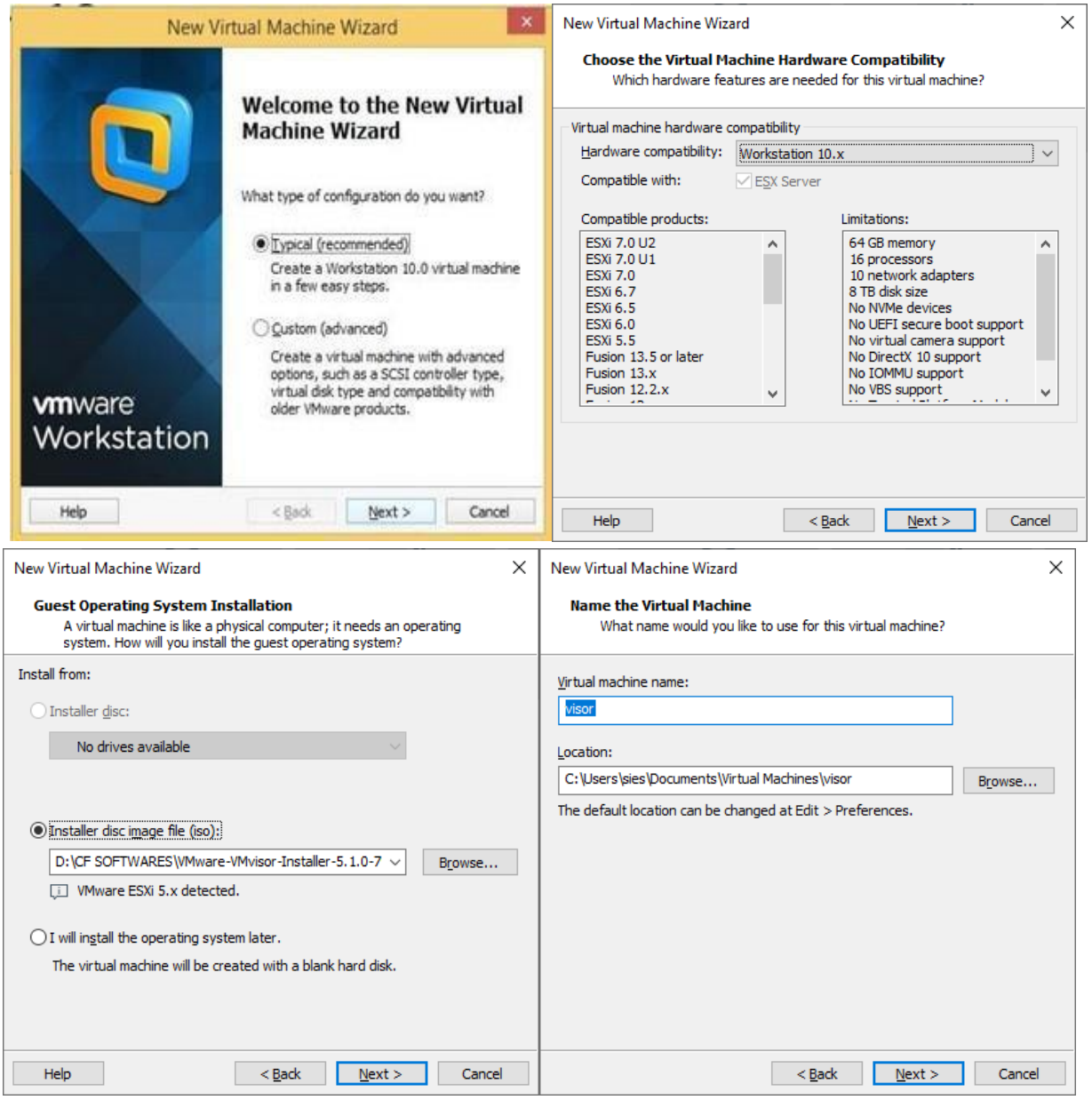
PRACTICAL 2

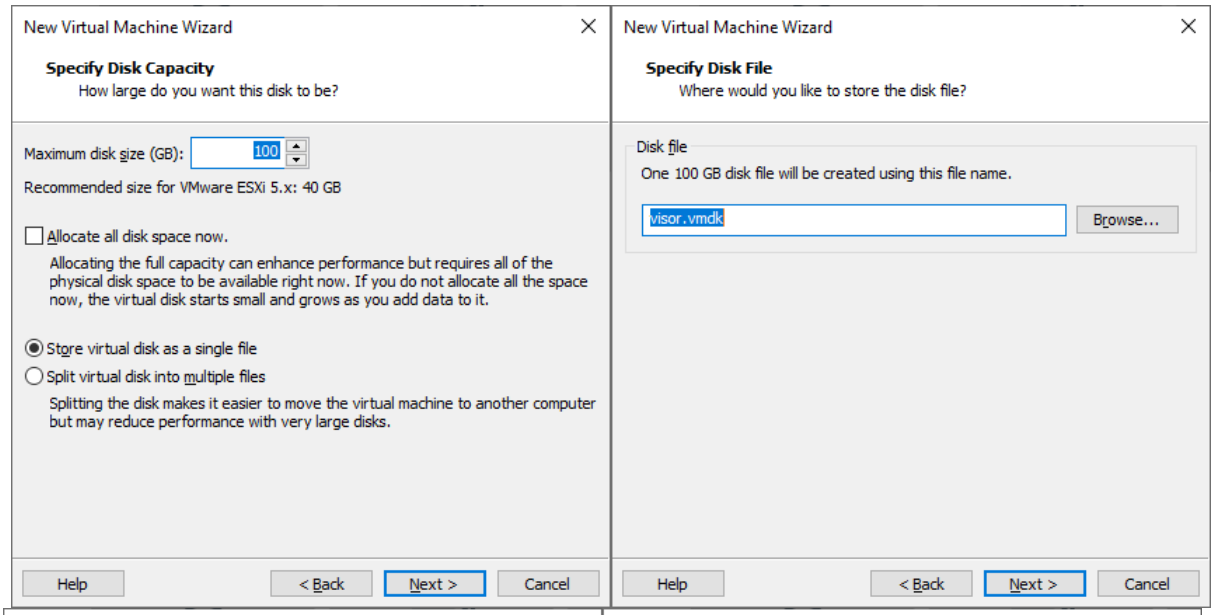
Aim: - Implement VMware ESXi Server with VSphere Client

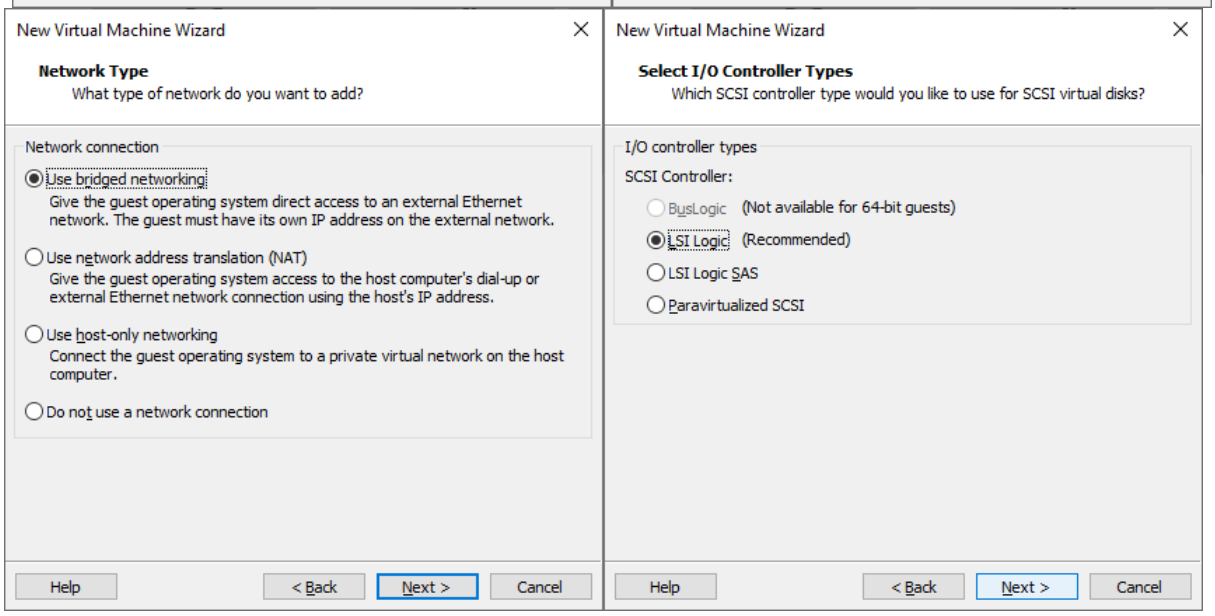
File: - VMware-VMvisor-installer-5.1.0..... iso

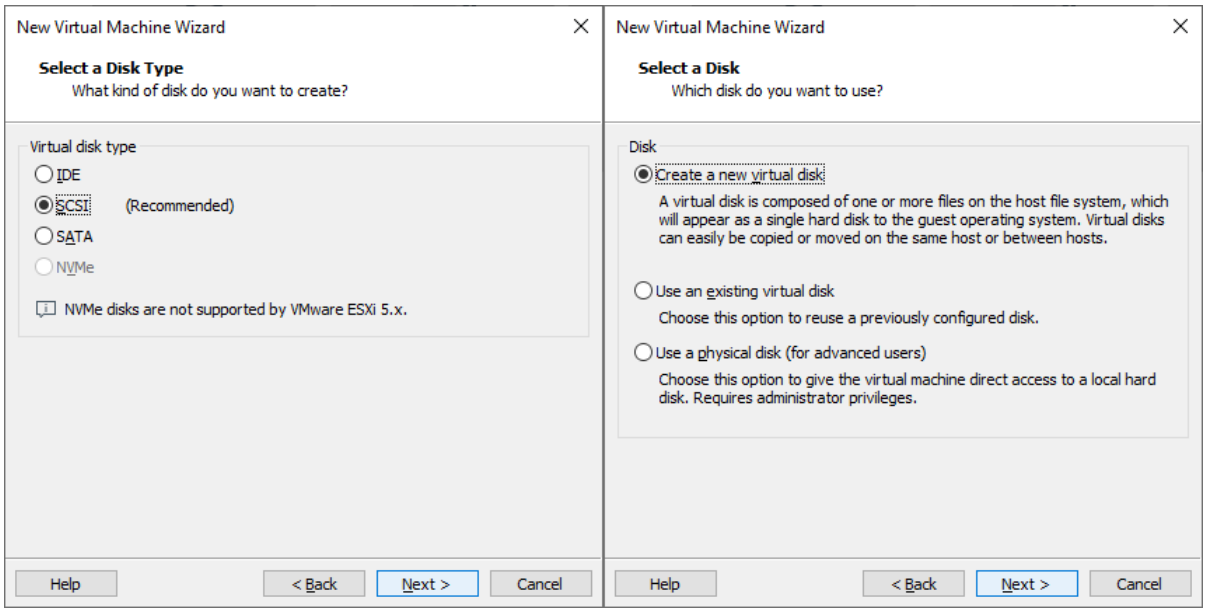
Step: -

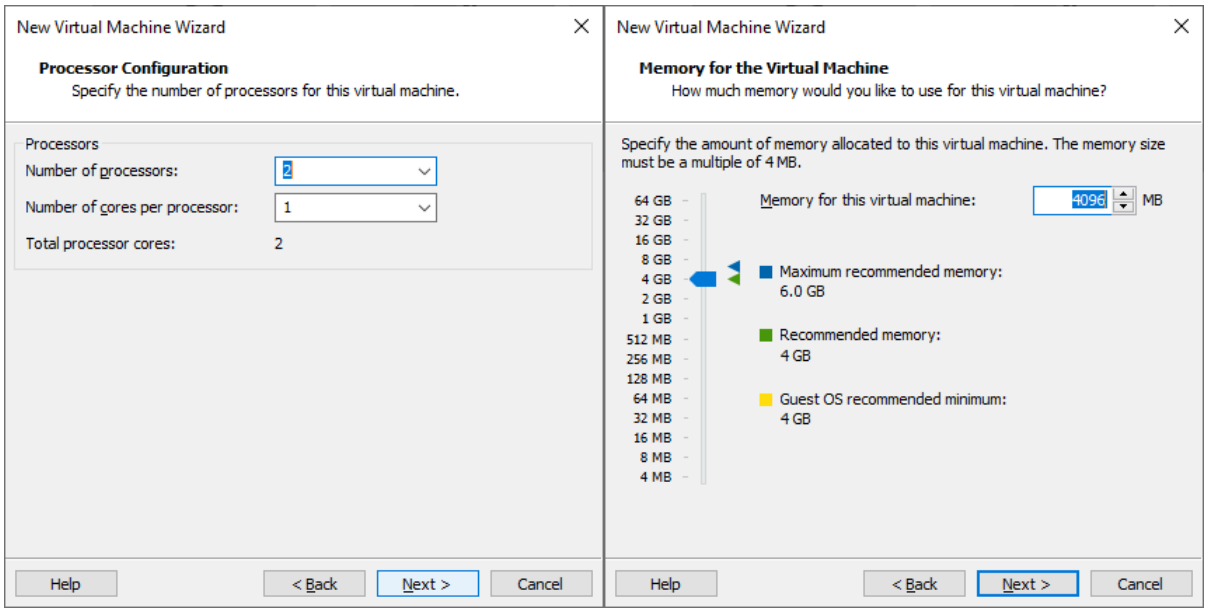
Step1: - Create a new VM.



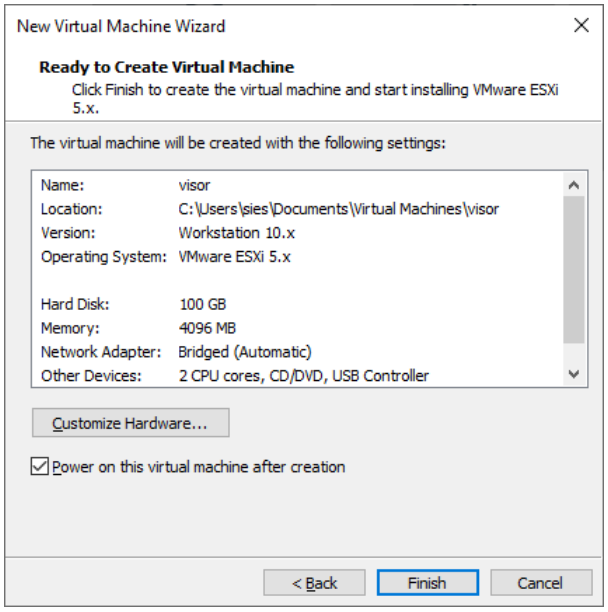

New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
Maximum disk size (GB): 100
Recommended size for VMware ESXi 5.x: 40 GB
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
< Back
Next >
Cancel
New Virtual Machine Wizard
Specify Disk File
Where would you like to store the disk file?
Disk file
One 100 GB disk file will be created using this file name.
visor.vmdk
Browse...
Help
< Back
Next >
Cancel


New Virtual Machine Wizard
Network Type
What type of network do you want to add?
Network connection
Use bridged networking
Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network.
Use network address translation (NAT)
Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.
Use host-only networking
Connect the guest operating system to a private virtual network on the host computer.
Do not use a network connection
Help
< Back
Next >
Cancel
New Virtual Machine Wizard
Select I/O Controller Types
Which SCSI controller type would you like to use for SCSI virtual disks?
I/O controller types
SCSI Controller:
BusLogic (Not available for 64-bit guests)
LSI Logic (Recommended)
LSI Logic SAS
Paravirtualized SCSI
Help
< Back
Next >
Cancel

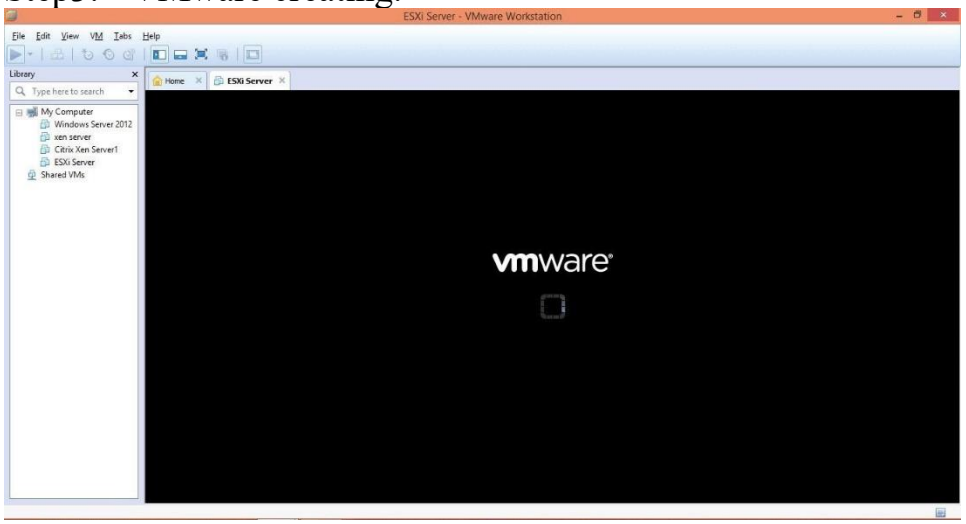

New Virtual Machine Wizard
Select a Disk Type
What kind of disk do you want to create?
Virtual disk type
IDE
SCSI (Recommended)
SATA
NVMe
NVMe disks are not supported by VMware ESXi 5.x.
Help
< Back
Next >
Cancel
New Virtual Machine Wizard
Select a Disk
Which disk do you want to use?
Disk
Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.
Use an existing virtual disk
Choose this option to reuse a previously configured disk.
Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk. Requires administrator privileges.
Help
< Back
Next >
Cancel



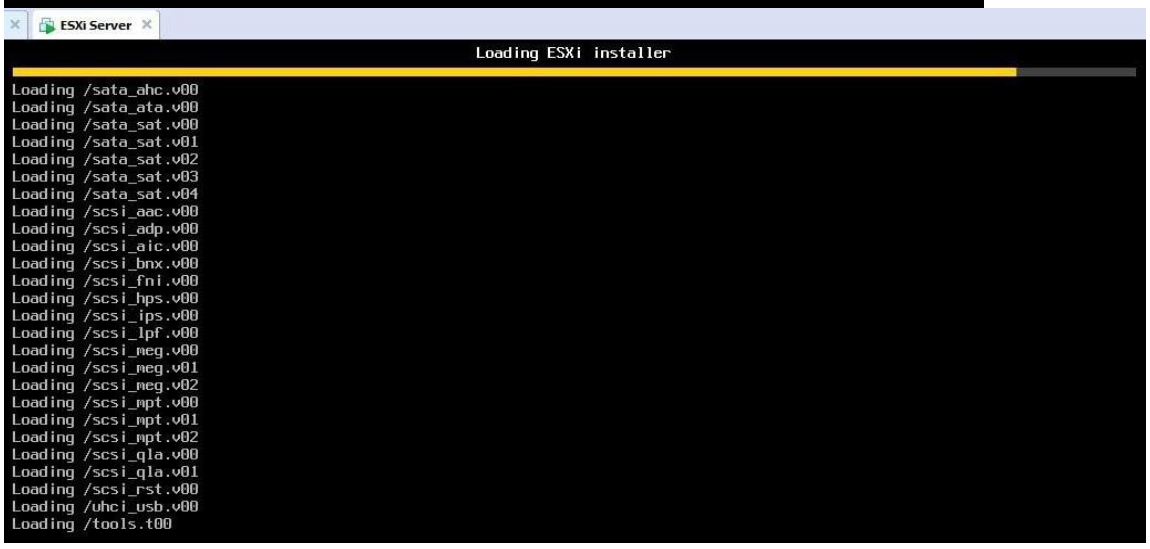
Step2: - At the final window click on “Finish” button.



Step3: - VMware creating.

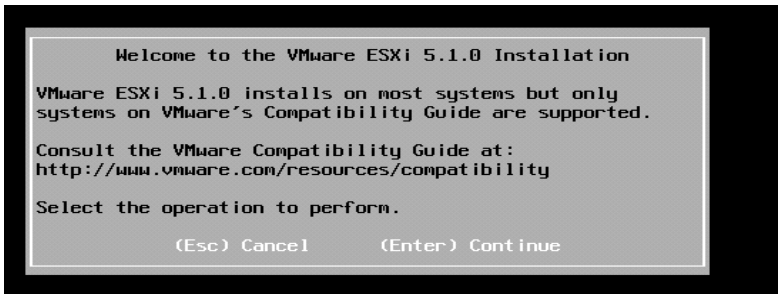


Step4: - Creation of Virtual Machine is in progress…

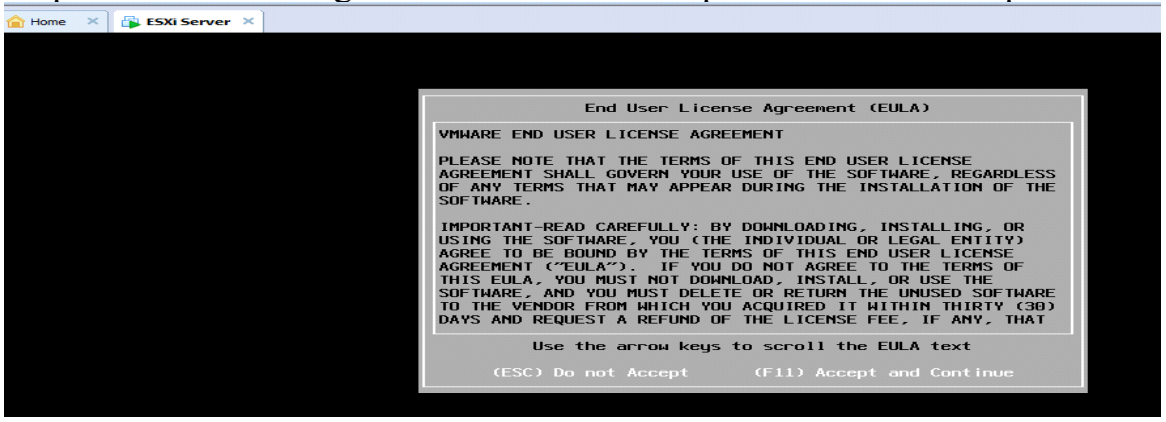


Step5: - In the following screen click on Continue or press Enter key.

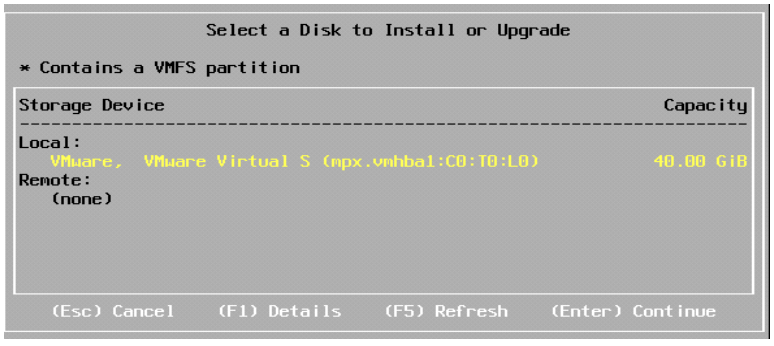
Step6: - For Installation press Enter key.



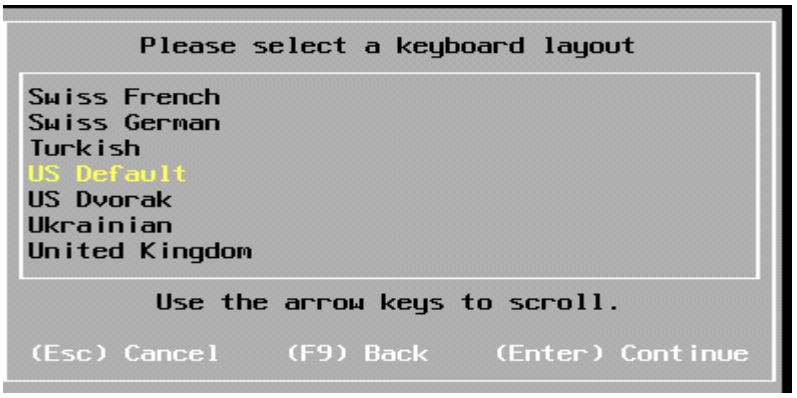
Step7: -For License Agreement click on "Accept and Continue" or press F11 key.



Step8: -press Enter key to Continue.

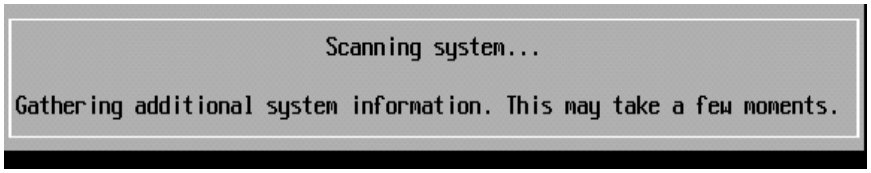


Step9: -Keep the default settings for keyboard settings and press Enter key.

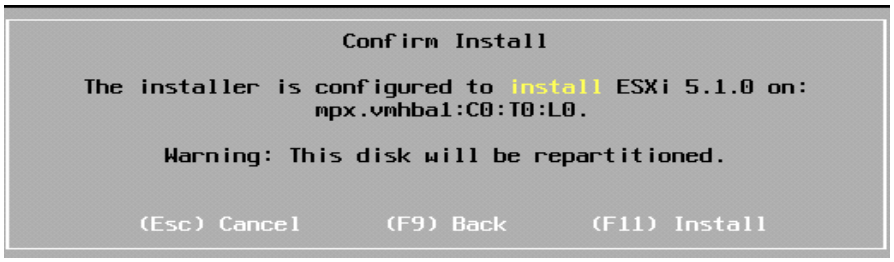


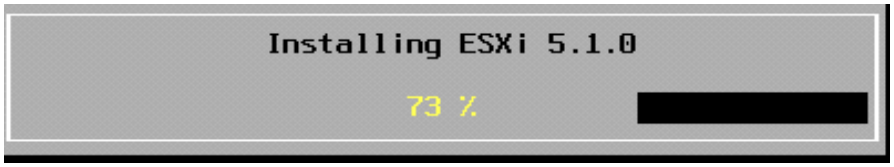
Step10: -Enter the root and confirmation password (1234567) and click on Continue or press Enter key.

Step11: -The Installation is in progress…



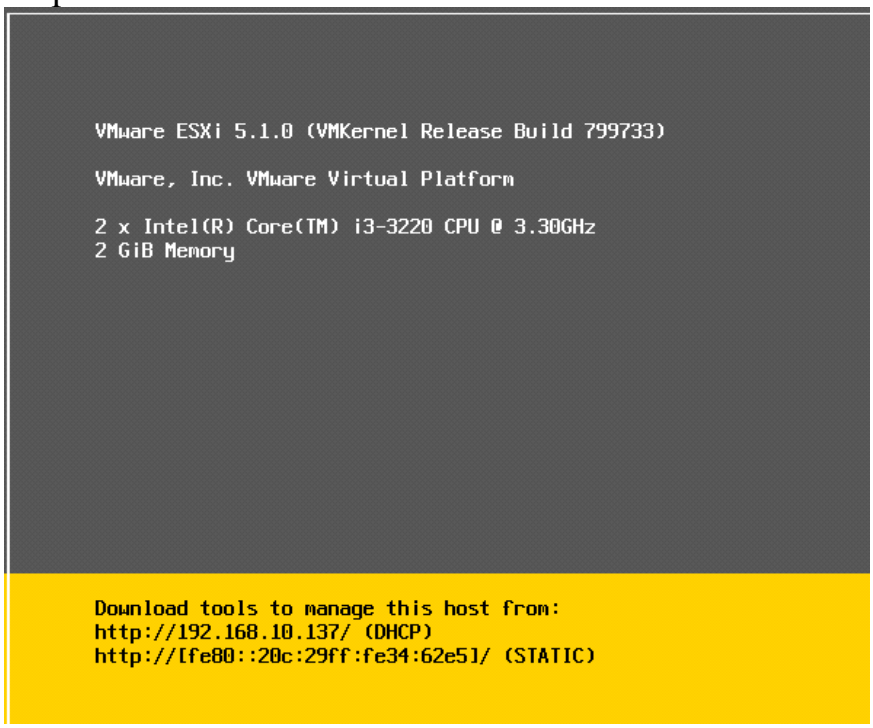
Step12: -Press F11 key to Install. Installing ESXi 5.1.0…



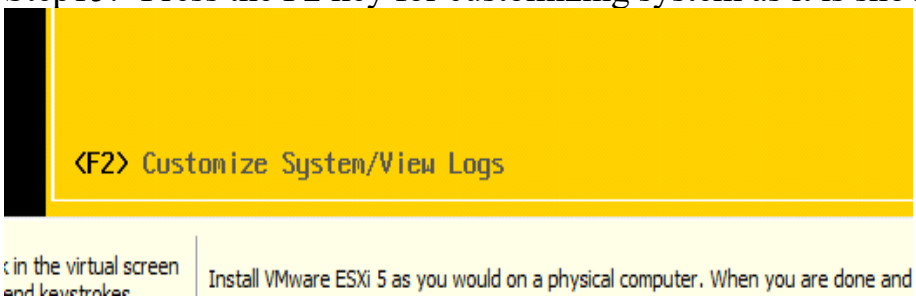


Step13: -Press Enter key to Reboot.

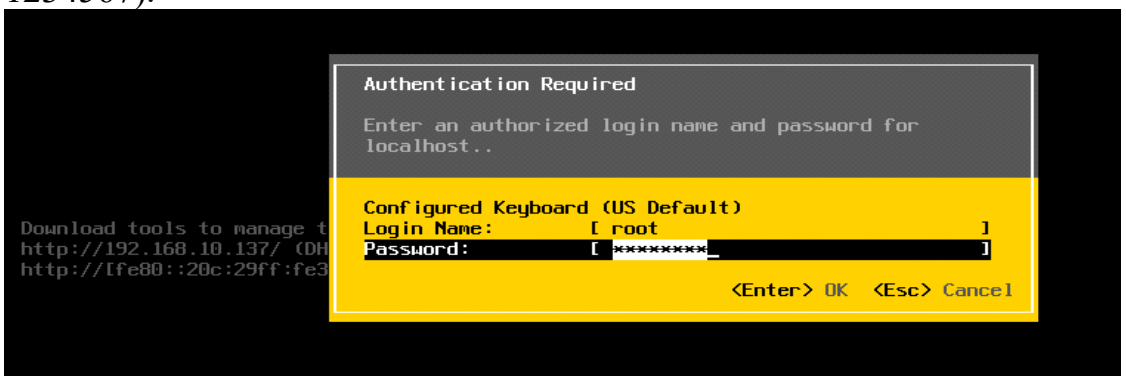
Step14: -Note the DHCP IP Address. Here it is-192.168.10.137



Step15: -Press the F2 key for customizing system as it is shown at the bottom of the VM.

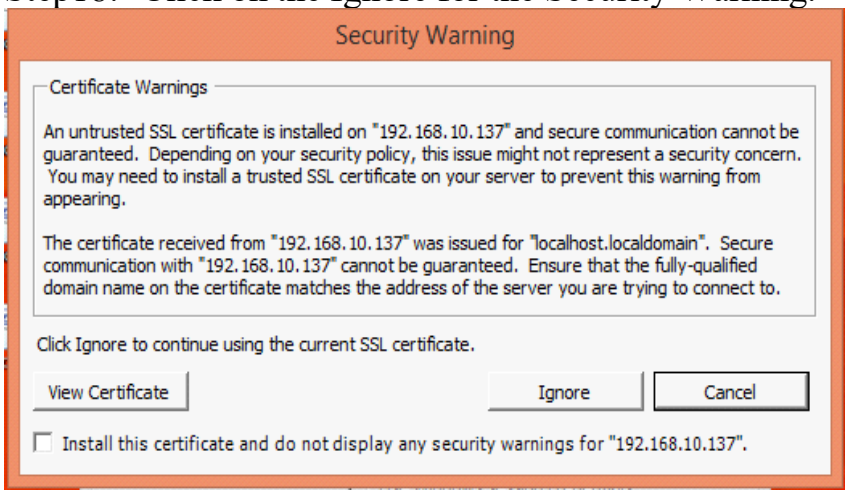


Step16: -Enter the username as root and the root password (which was used earlier-1234567).

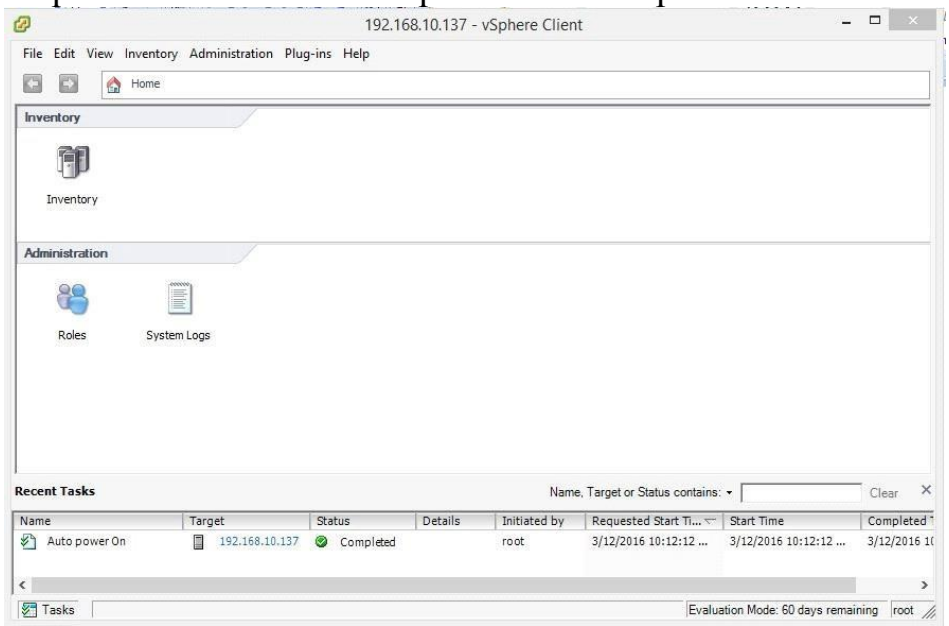


Step17: -Now start the VMware vSphere Client. Enter the IP address (*DHCP IP address of ESXi Server*), username as root and the same password as the ESXi System. Click on "Login" button.

Step18: -Click on the Ignore for the Security Warning.

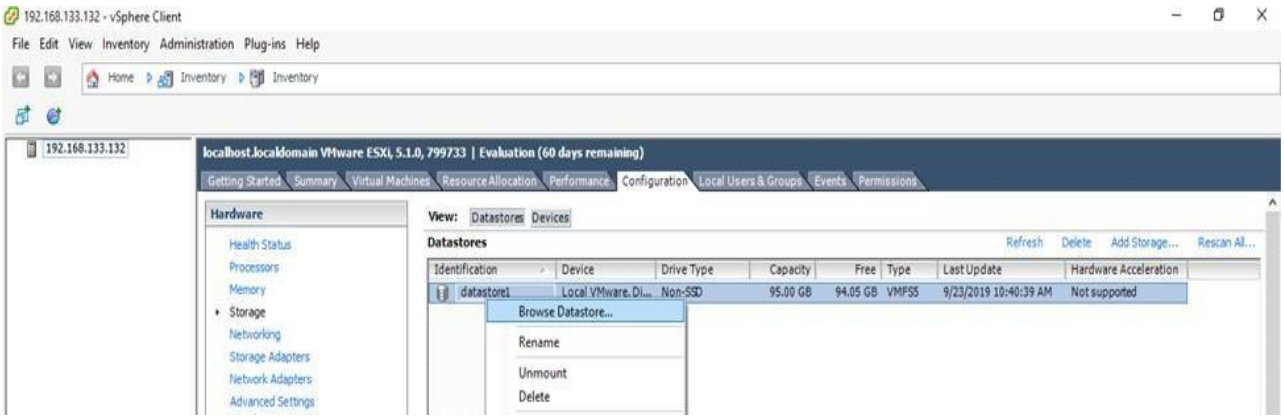


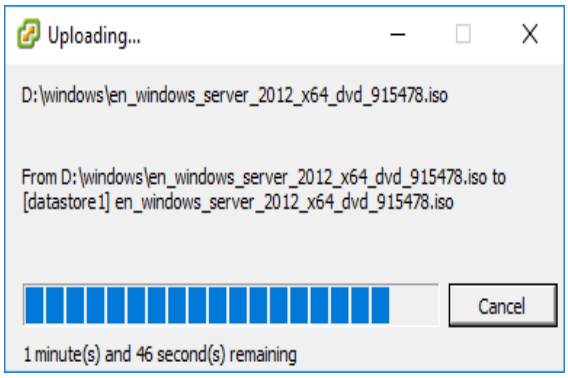
Step19: user interface of vSphere client is open.

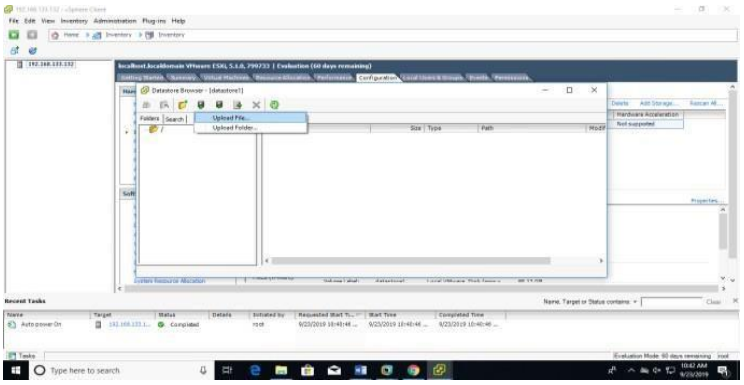


Step20: After login, the VMware vSphere Client looks like the following image. At the bottom of this screen the connectivity of VMware vSphere Client where the target IP address is the ESXi Server's DHCP IP address. Click on the Inventory.

In Configuration tab click on Hardware Storage. Right click on "datastore1" and select "Browse Datastore…".

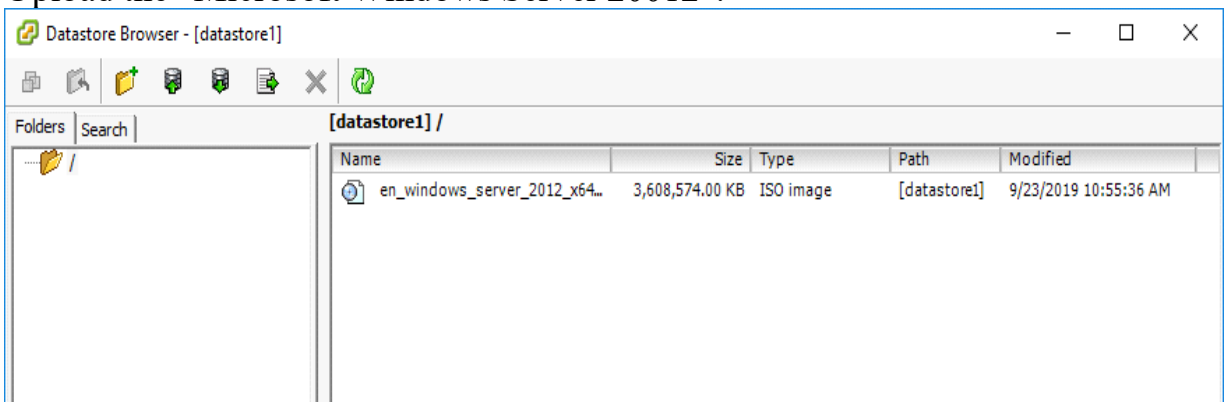




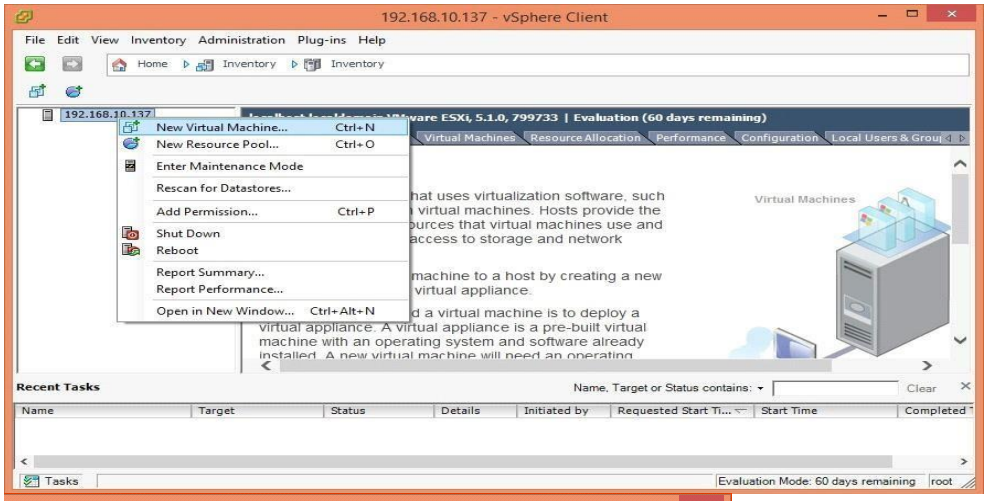


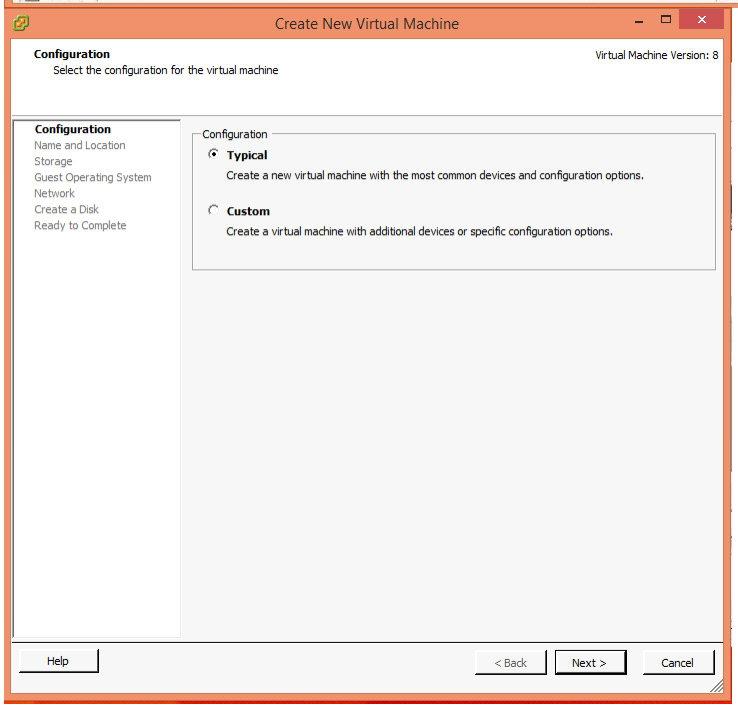
Step21: In the Datastore Browser – [datastore1] window click on Upload files to this datastore tool and select "Upload File…" option.

Upload the "Microsoft Windows Server 20012".



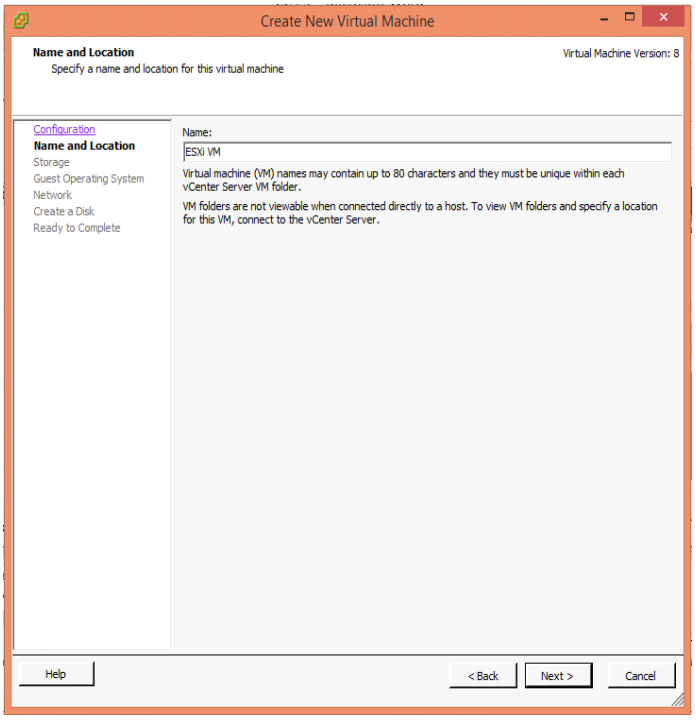
Step22: It shows the IP Address (192.168.10.137) listed on the left page. Right click on the IP address and select the option “New Virtual Machine….”

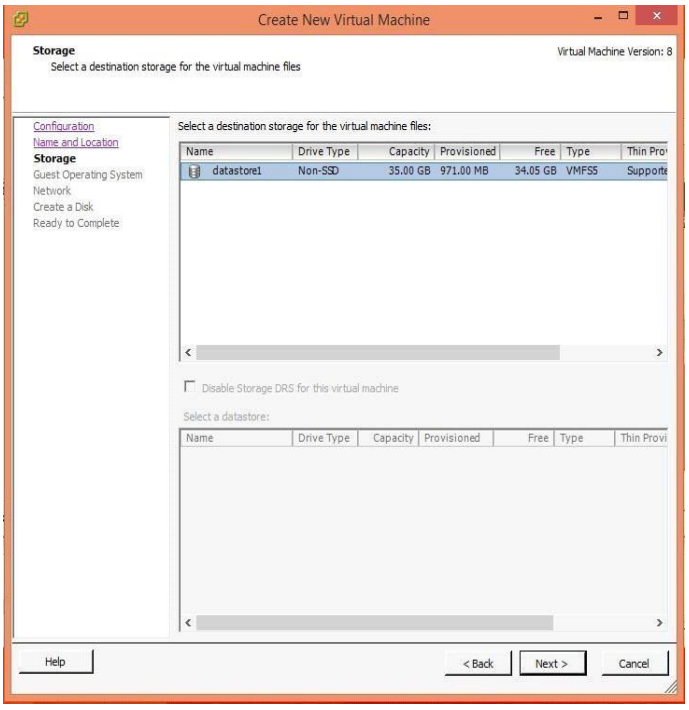




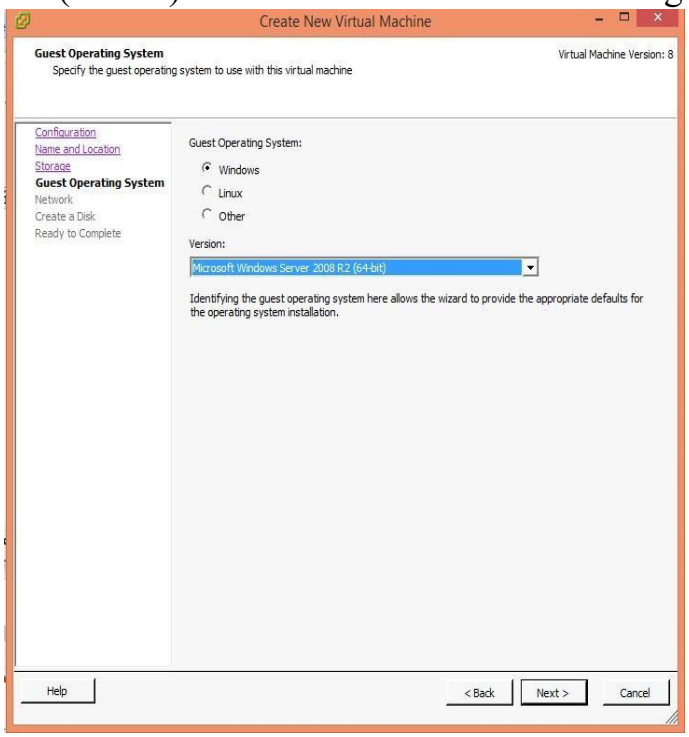
Step23: In the Create New Virtual Machine window select the Typical option and click on "Next." Give a name to the Virtual Machine. Here it is given as ESXi VM. Click on the "Next button.

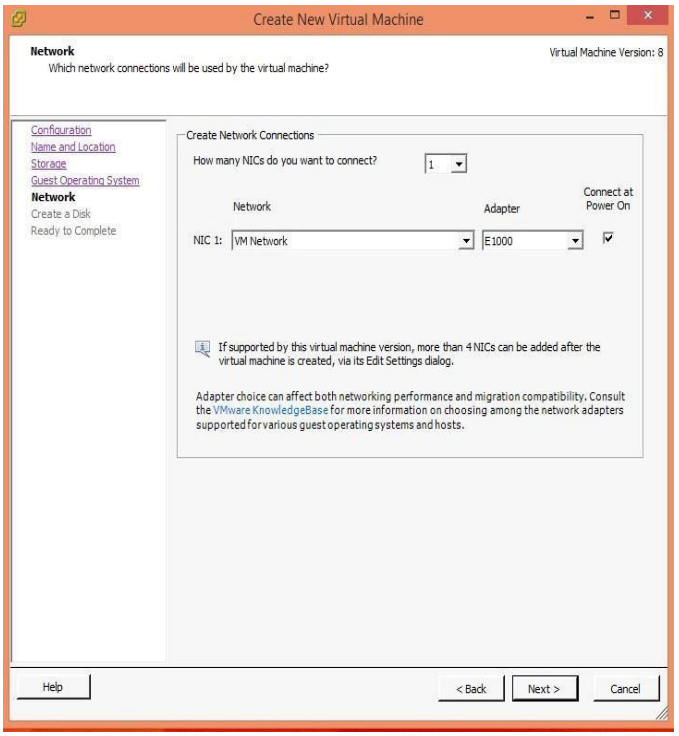
In the next screen keep the settings default for Storage and click on "Next."



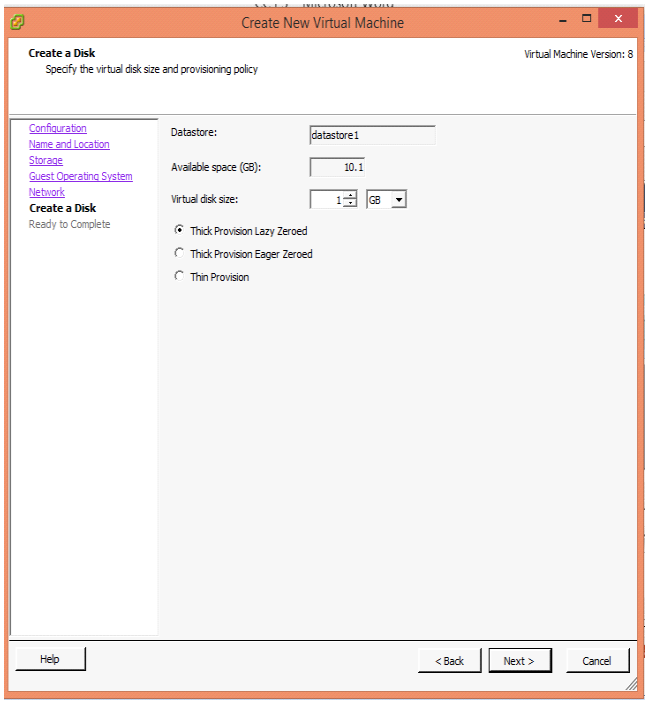


Step24: Select the Guest OS as Windows and Version as "Microsoft Windows Server 2008 R2 (32- bit)". And Leave the Network settings default and click on "Next."

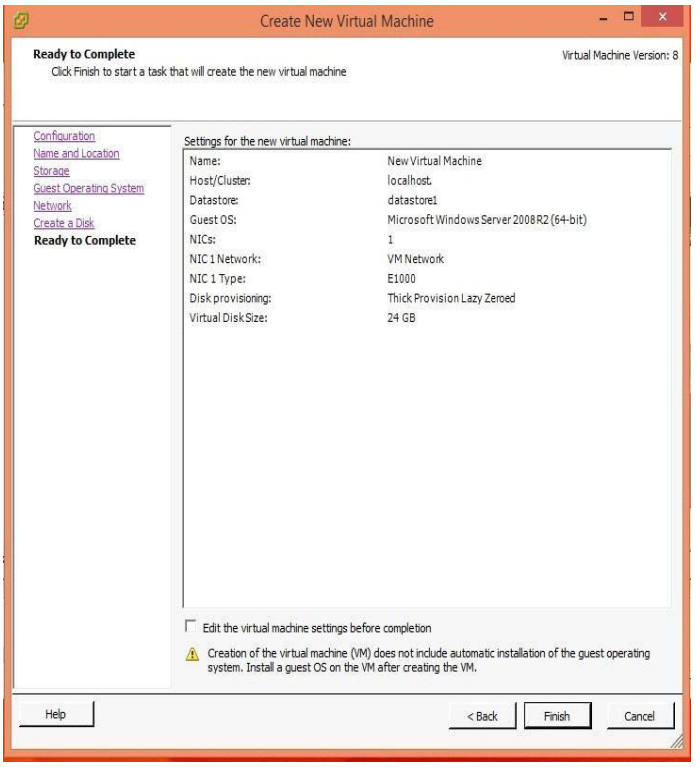




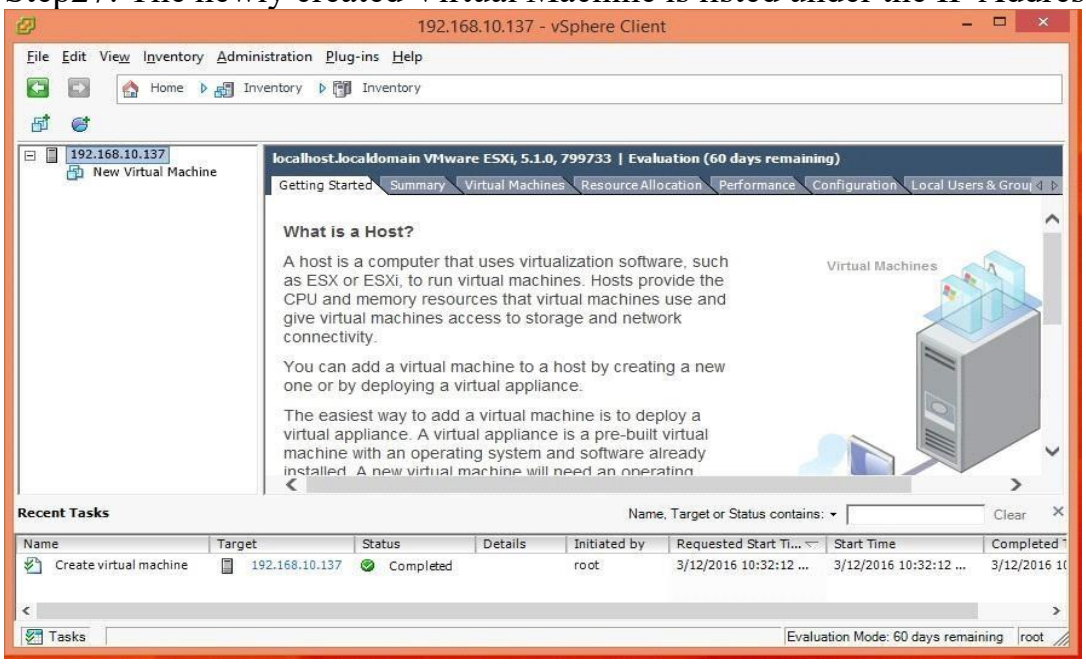
Step25: Choose the Disk space (depending on the available space of user's system. Here it is 1GB) of the VM in GB. Click on the "Next" button.



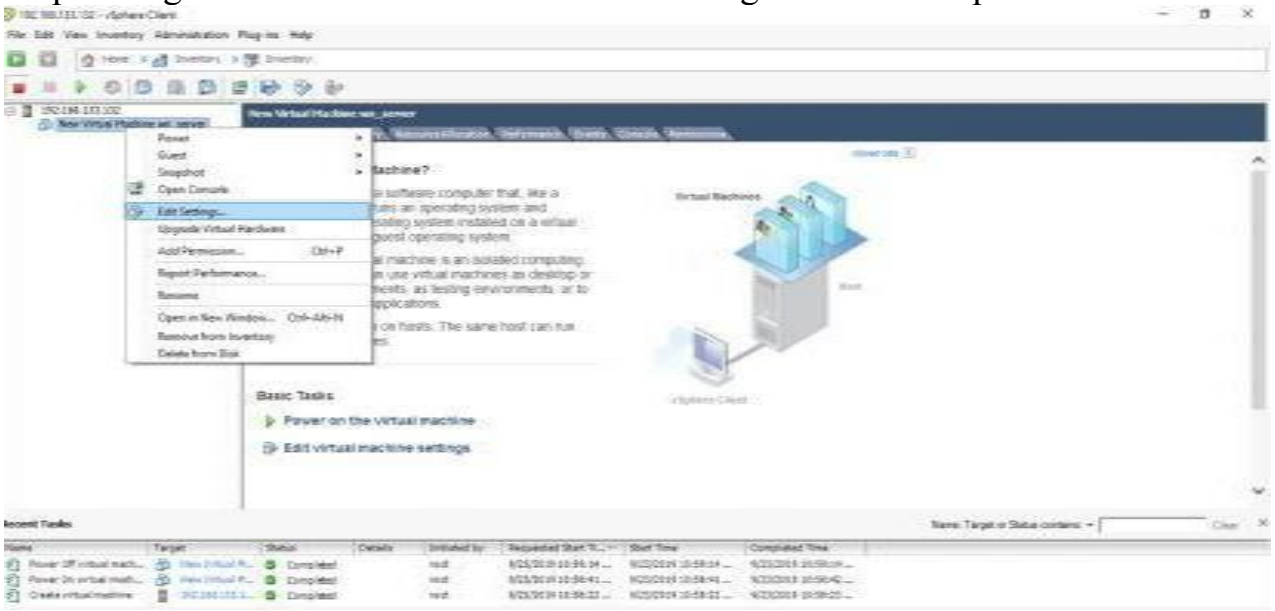
Step26: At the final screen click on "Finish" button.



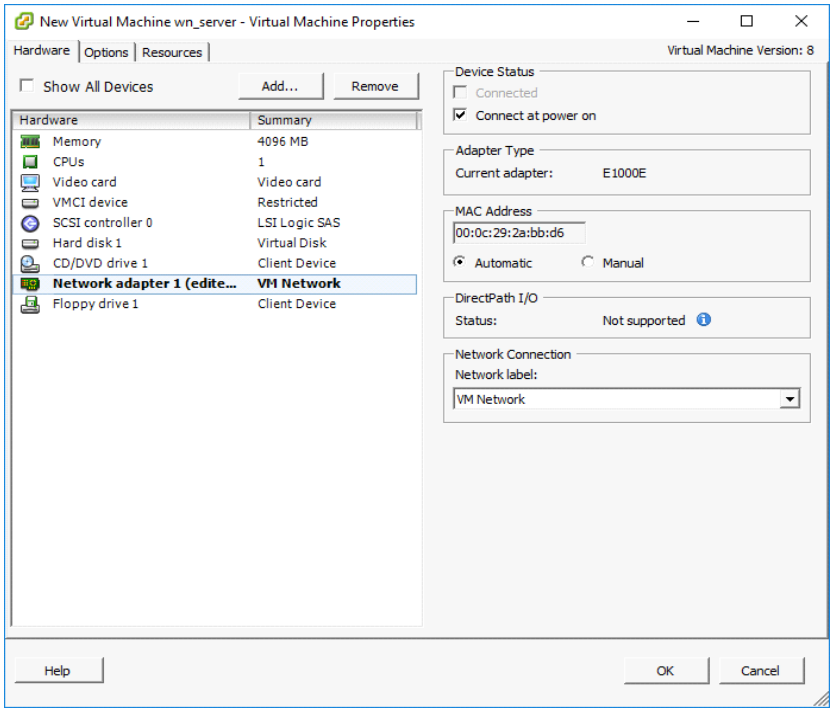
Step27: The newly created Virtual Machine is listed under the IP Address.



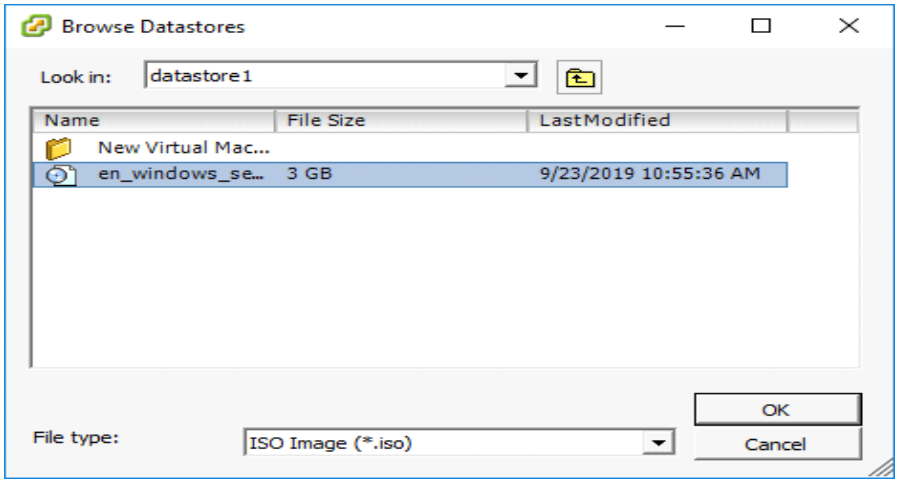
Step28: Right click on virtual machine Edit settings Network adapter.

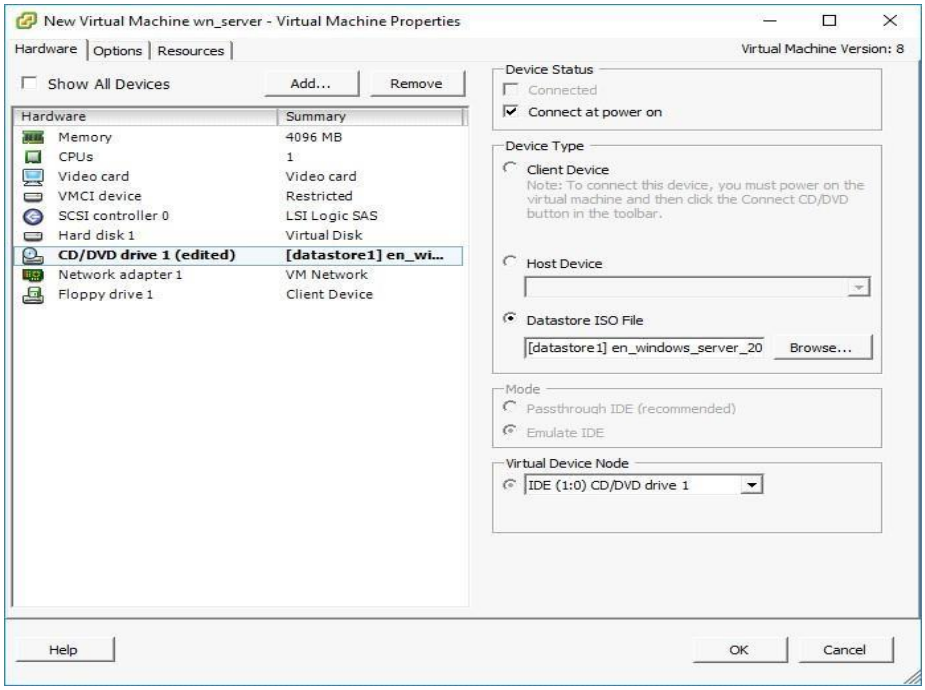


Step29: Right click on virtual machine Edit settings Network adapter" Check on Connect at power on."



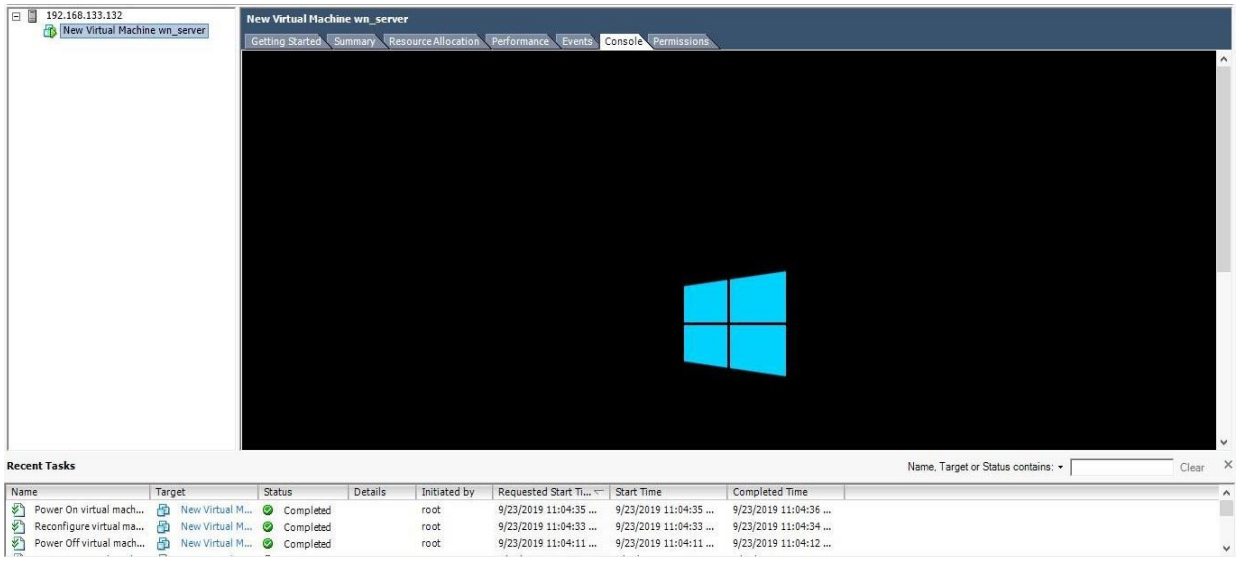
Step30: Right click on virtual machine Edit settings CD/DVD Drive Check on Datastore ISO file and browse the iso.

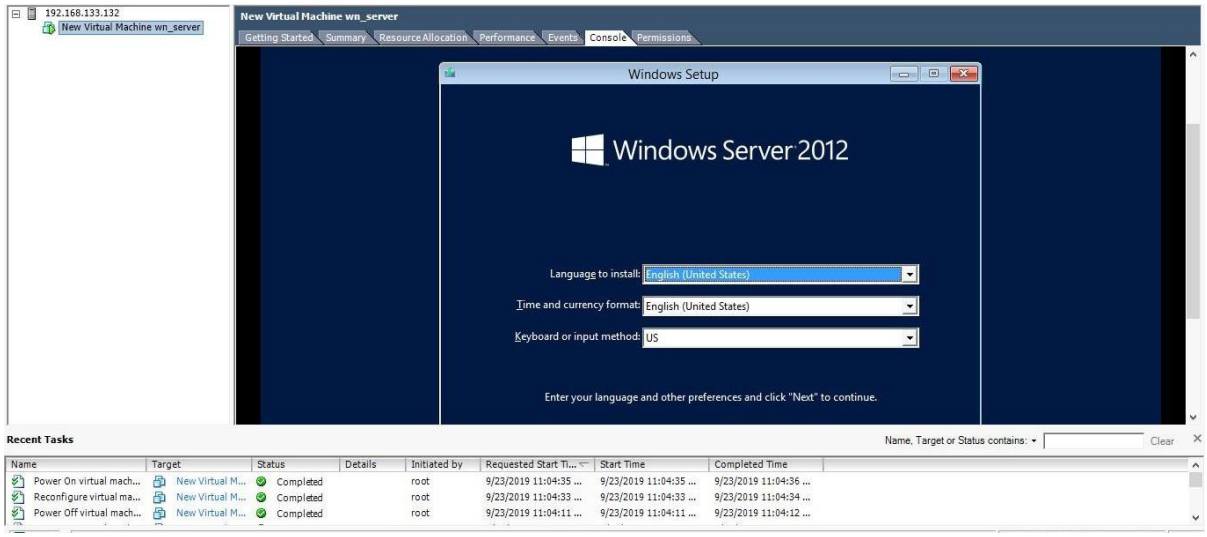




Step31: “Check on Connect at power on.”

Power on VM





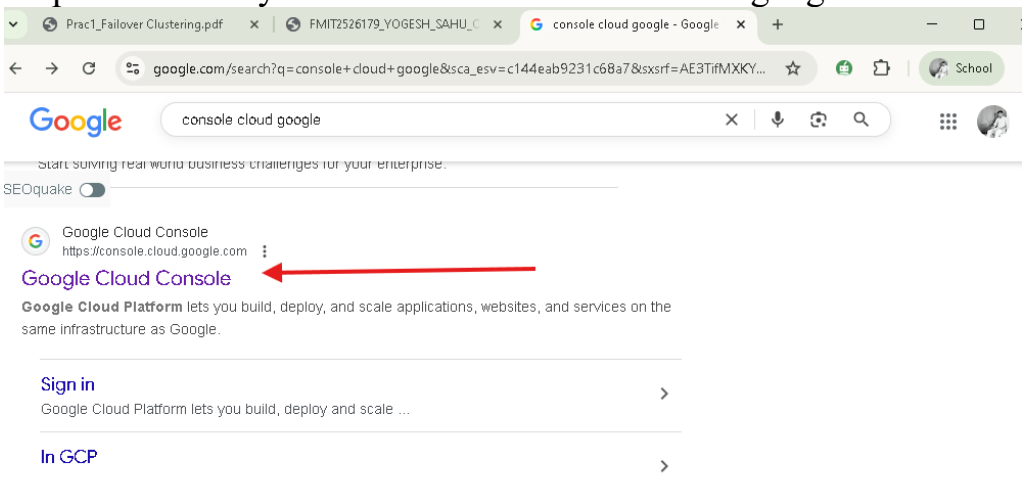
PRACTICAL 3

Aim: - Implementing Google App

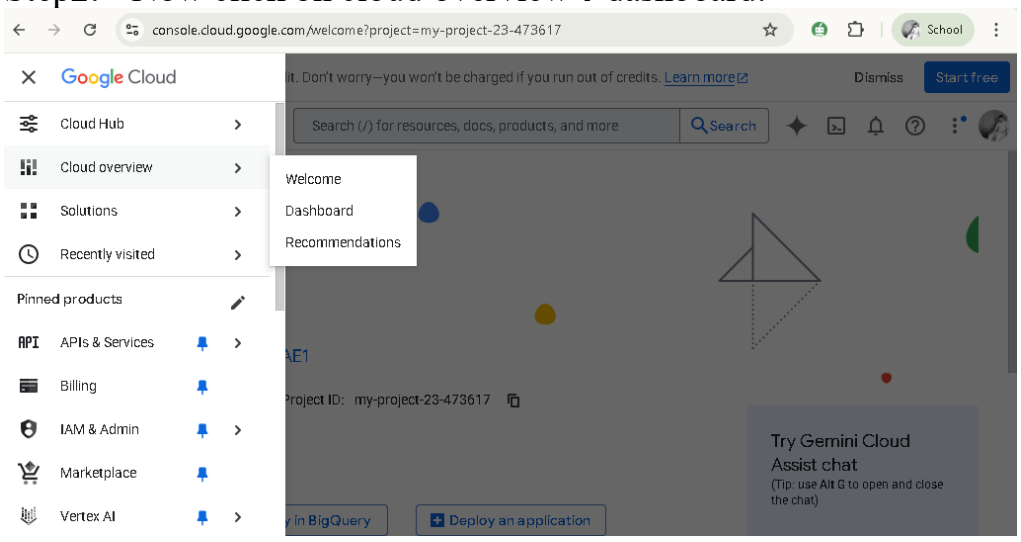
Engine Software: - Google cloud console

Steps: -

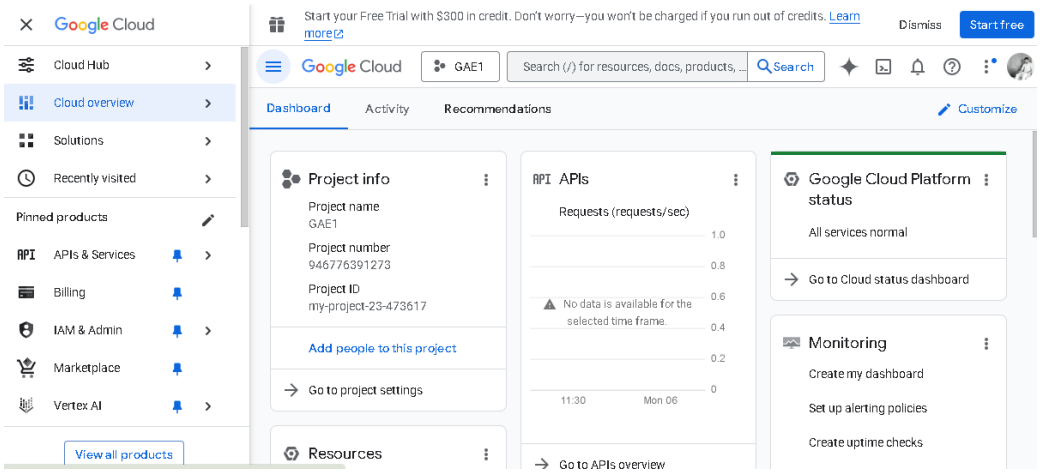
Step1: - Go to any browser search “console cloud googles”



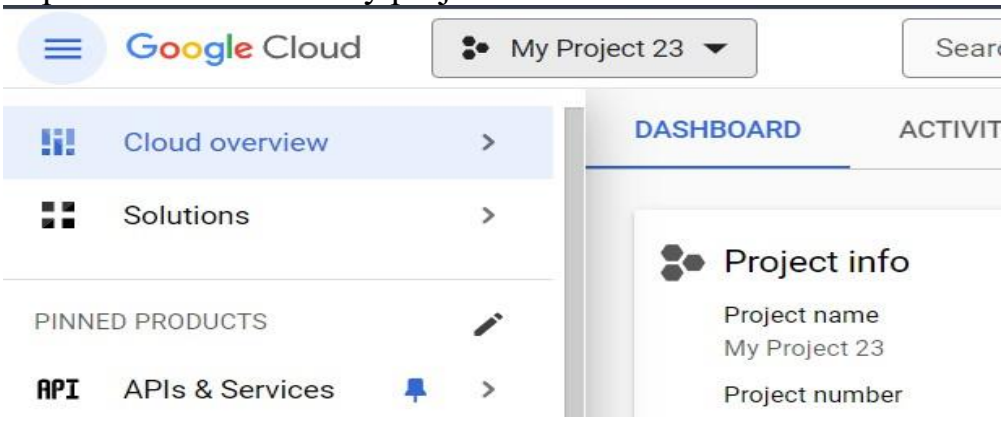
Step2: - Now click on cloud overview→dashboard.



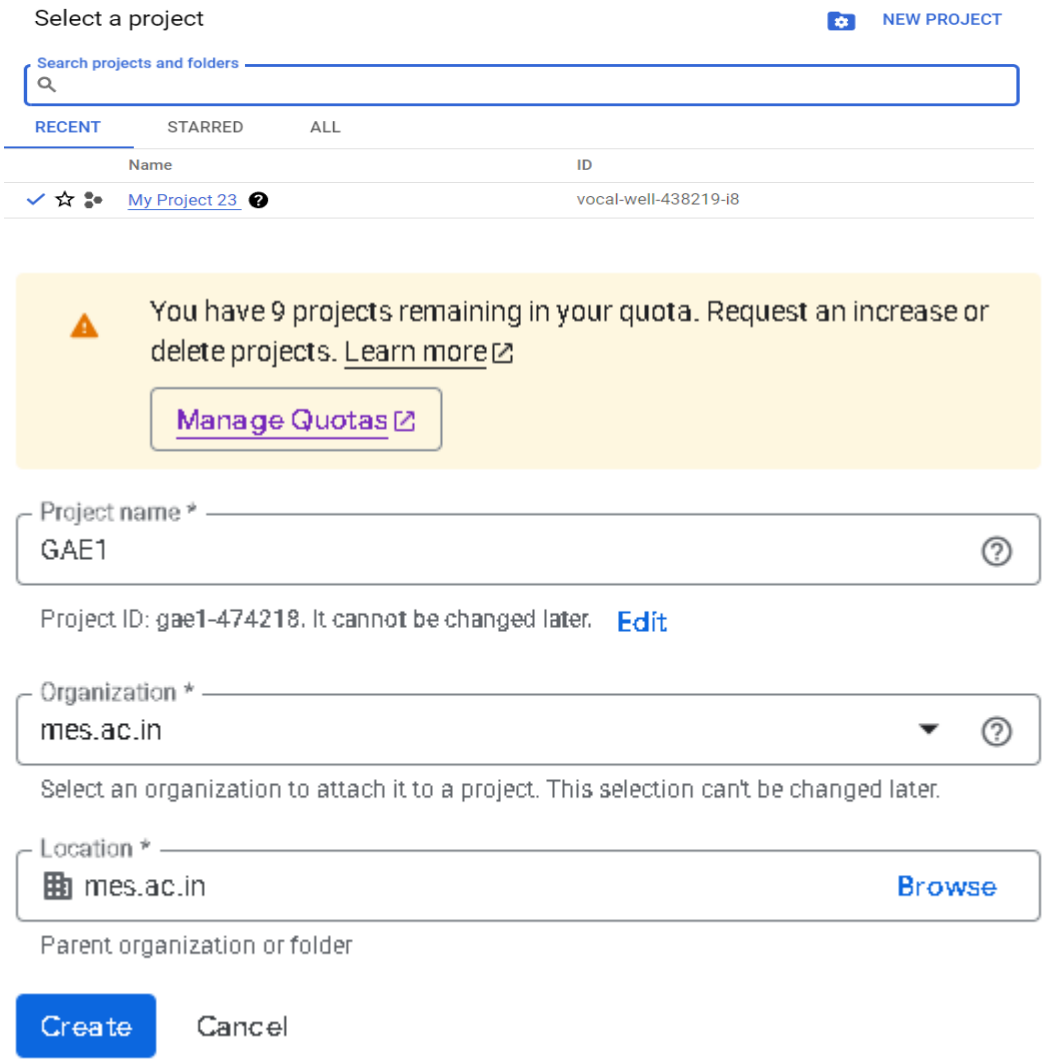
Step3: - Now u can see this interface.



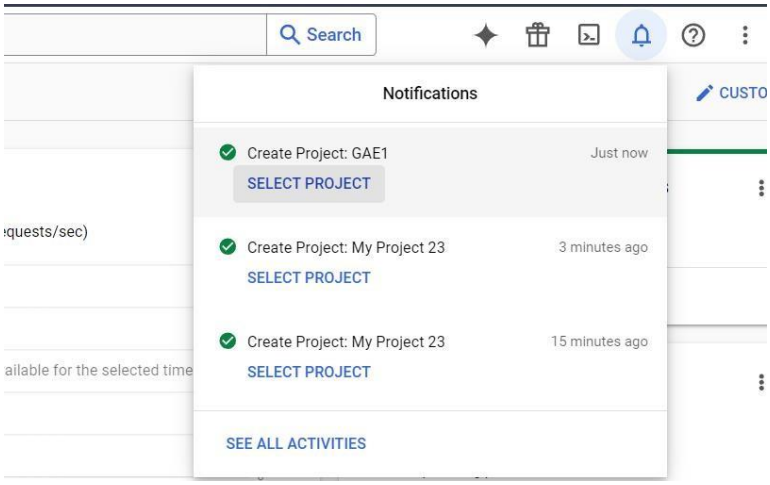
Step4: - Now click on My project 23.



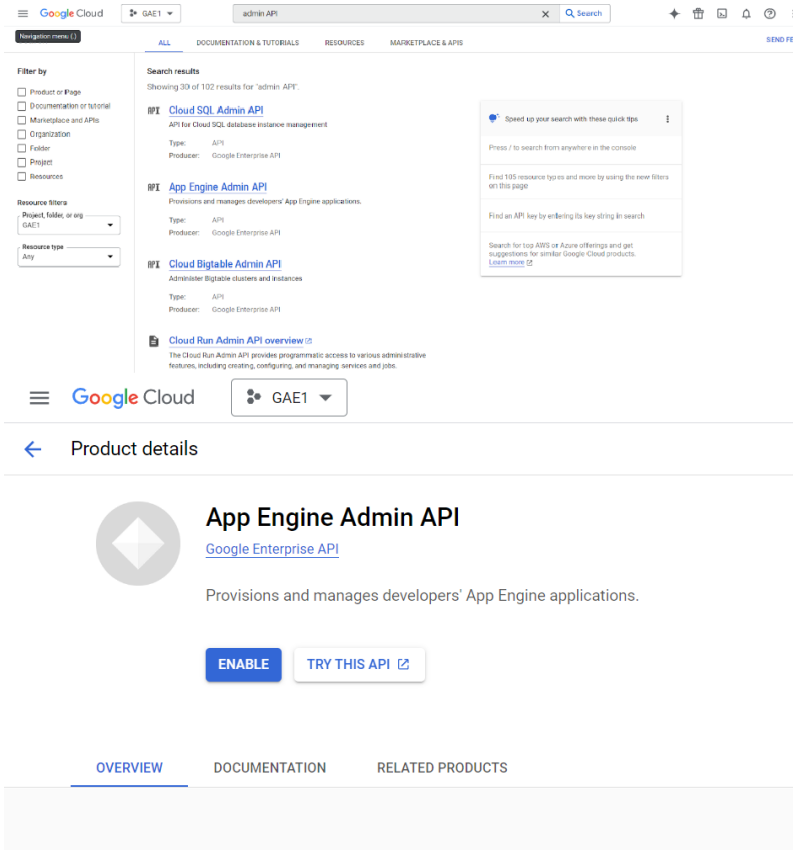
Step5: - Now create a project by clicking on new project.



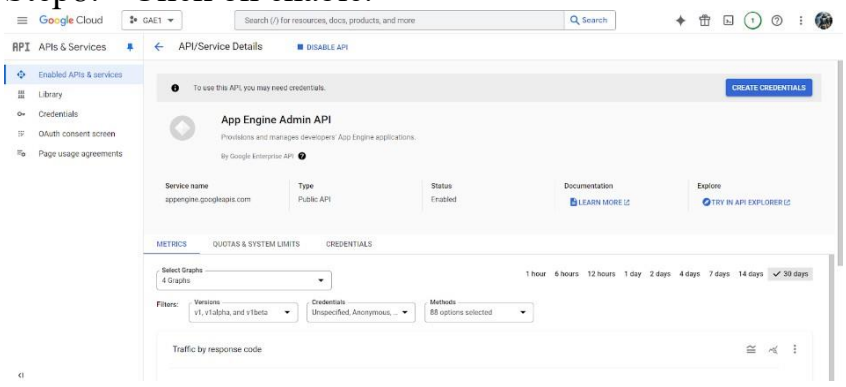
Step6: - Now click on project that you created.



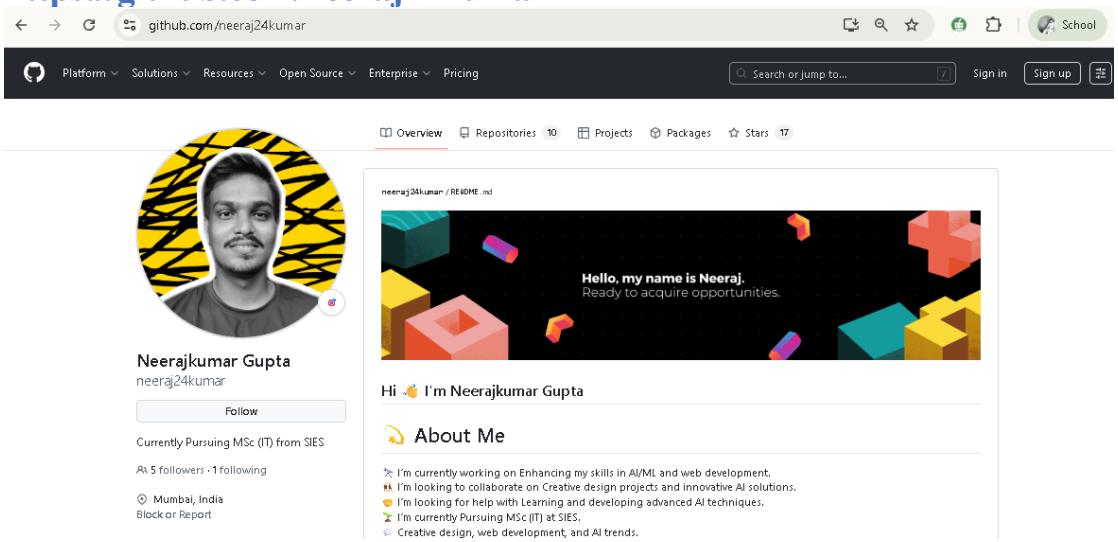
Step7: - Now search “Admin API”



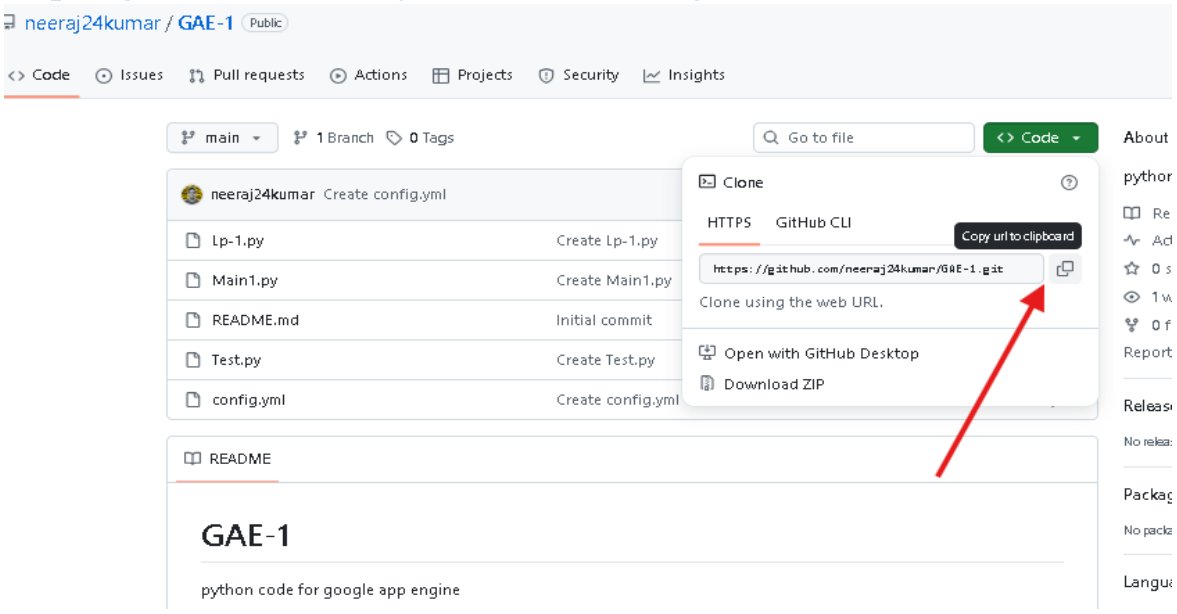
Step8: - Click on enable.



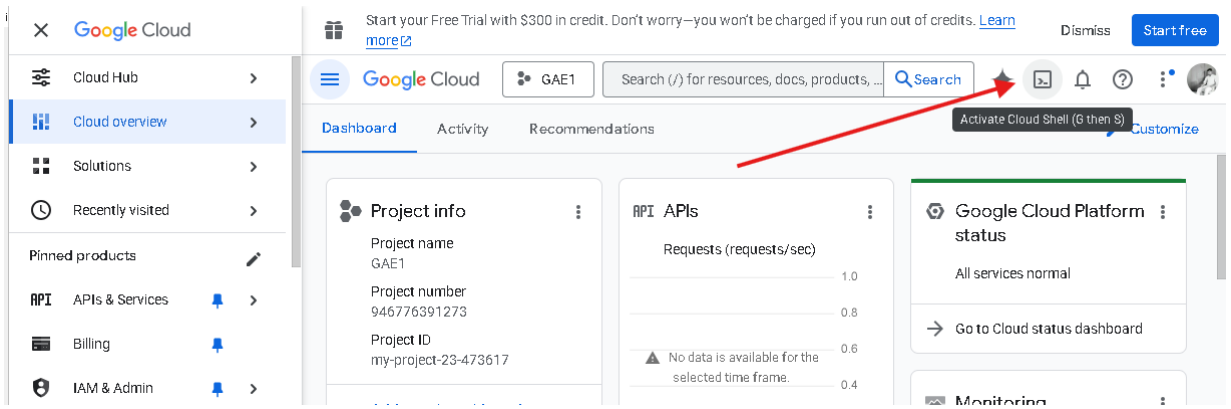
Step9: - Now open chrome and type neeraj24kumar in GitHub
https://github.com/neeraj24kumar



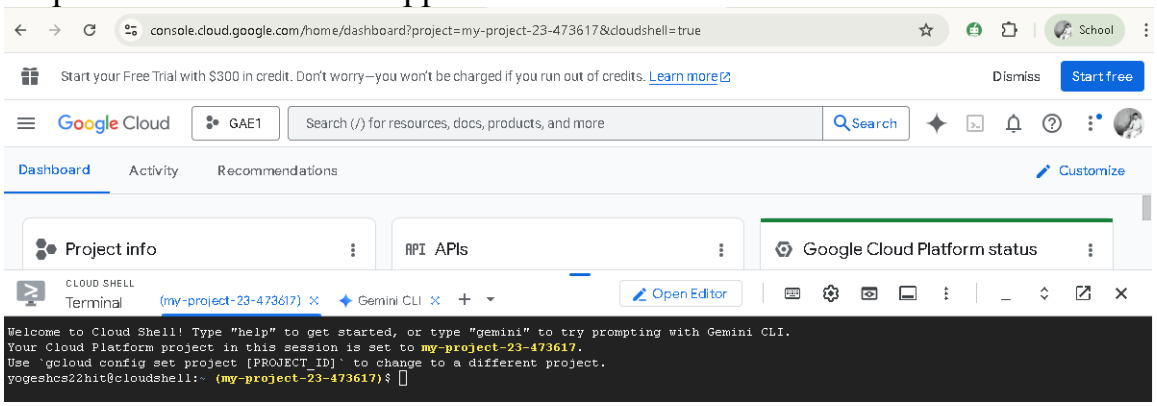
Step10: - GO to **Repositories** → Now click on GAE-1 and then copy the link→
https://github.com/neeraj24kumar/GAE-1.git



Step11: - Now go back to google console and open "Activate Cloud Shell"



Step12: - A terminal will appear from bottom.



Step13: - Now type the following cmd.

- **git clone https://github.com/neeraj24kumar/GAE-1.git**

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to gae1-438219.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
knighttech2804@cloudshell:~ (gae1-438219)$ git clone https://github.com/neeraj24kumar/GAE-1.git
Cloning into 'GAE-1'...
remote: Enumerating objects: 19, done.
remote: Counting objects: 100% (19/19), done.
remote: Compressing objects: 100% (15/15), done.
remote: Total 19 (delta 2), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (19/19), 5.46 KiB | 1.37 MiB/s, done.
Resolving deltas: 100% (2/2), done.
knighttech2804@cloudshell:~ (gae1-438219)$
```

- **ls** (To view all the list of folders in the repository)
- **cd GAE-1** (to change the directory in order to access the GAE-1 folder files)
- **ls**

```
knighttech2804@cloudshell:~ (gae1-438219)$ ls
GAE-1  README-cloudshell.txt
knighttech2804@cloudshell:~ (gae1-438219)$ cd GAE-1
knighttech2804@cloudshell:~/GAE-1 (gae1-438219)$ ls
config.yml  Lp-1.py  Main1.py  README.md  Test.py
knighttech2804@cloudshell:~/GAE-1 (gae1-438219)$
```

You will see the "Lp-1.py" file that we need to execute.

- **python Lp-1.py**
-

```
knighttech2804@cloudshell:~/GAE-1 (gae1-438219)$ python Lp-1.py
hello
```

"hello" is seen which means the print statement inside code has been executed successfully.

Step14: - **Now to remove all the above read folders and files, do the following steps: -**

- **cd ...**
- **rm -rf GAE-1** (Remove the folder)
- **ls**

Step15: - Now you will not see any files in it.

```
knighttech2804@cloudshell:~/GAE-1 (gae1-438219)$ cd ..
knighttech2804@cloudshell:~ (gae1-438219)$ rm -rf GAE-1
knighttech2804@cloudshell:~ (gae1-438219)$ ls
README-cloudshell.txt
```

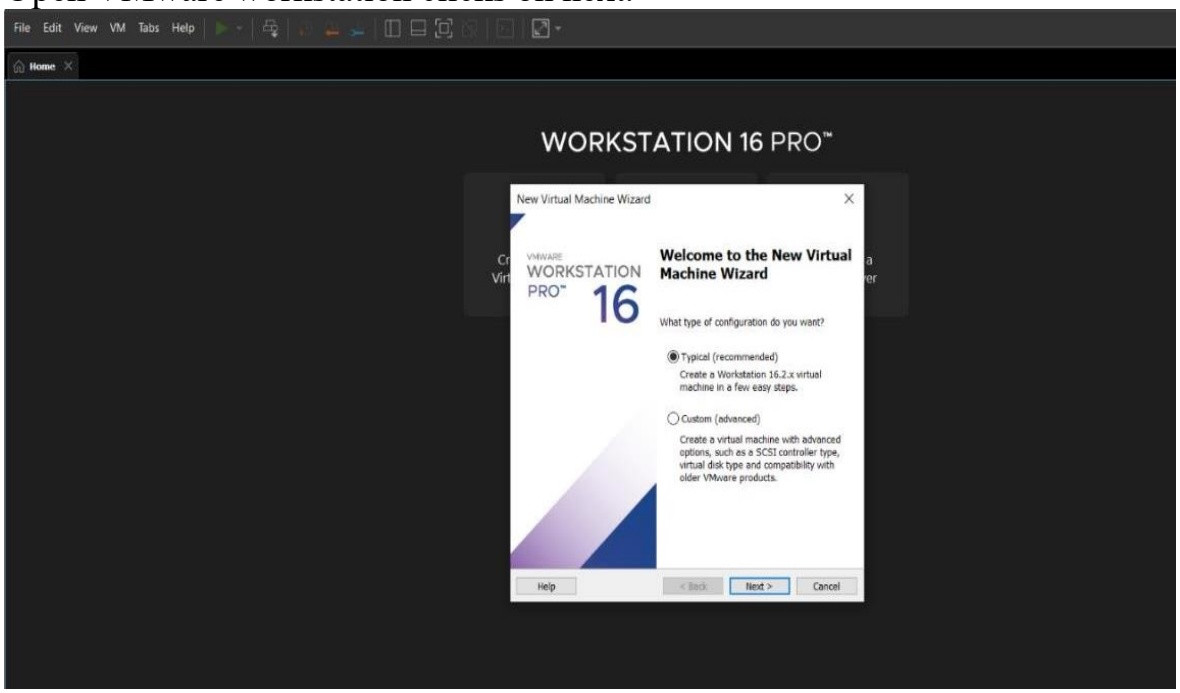
PRACTICAL 4

Aim: -Implementing IaaS using Eucalyptus

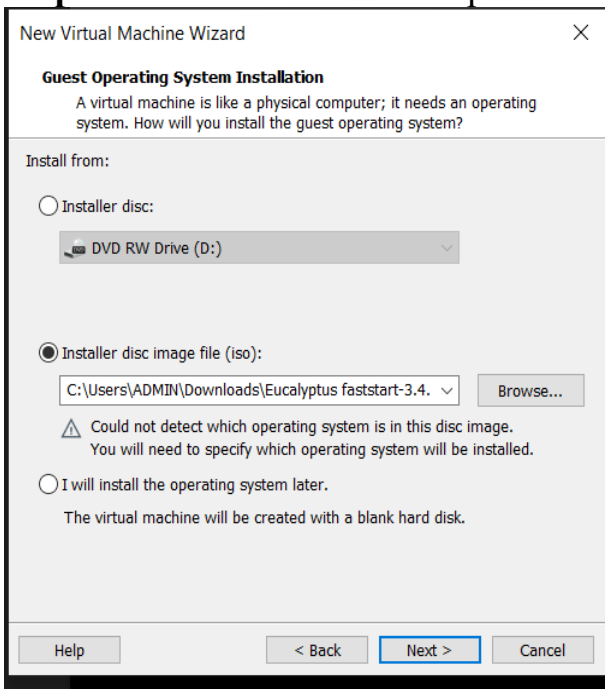
Requirements: - VMware Workstation 17x, Eucalyptus faststart 3.4.1.iso file

Steps: -

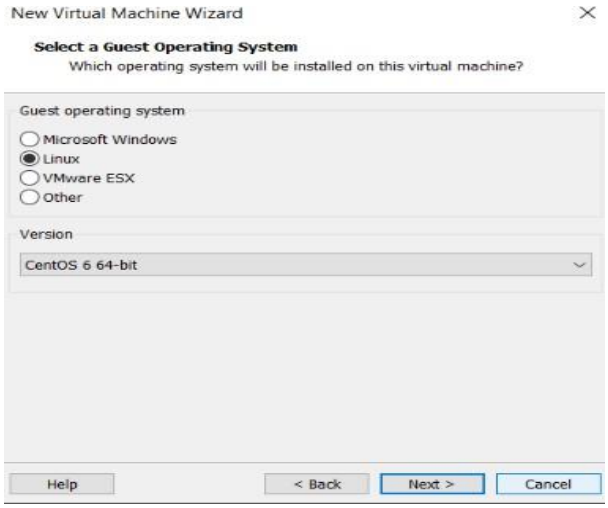
Open VMware workstation clicks on next.



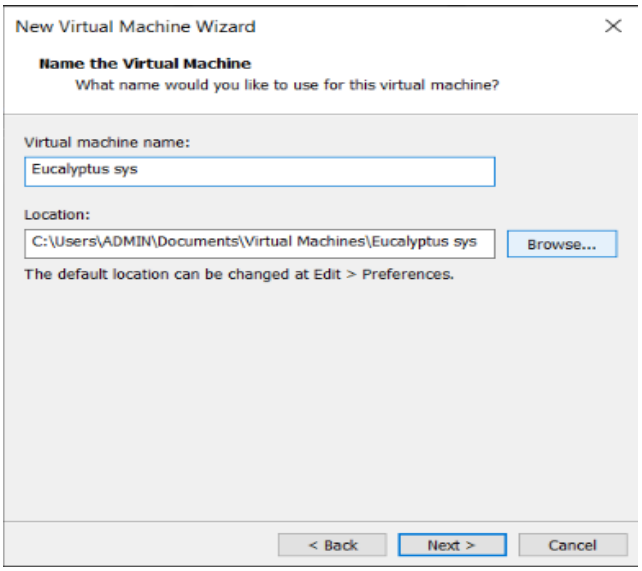
Step1: -Click on Browse and upload the Eucalyptusfaststsrt-3.4.1



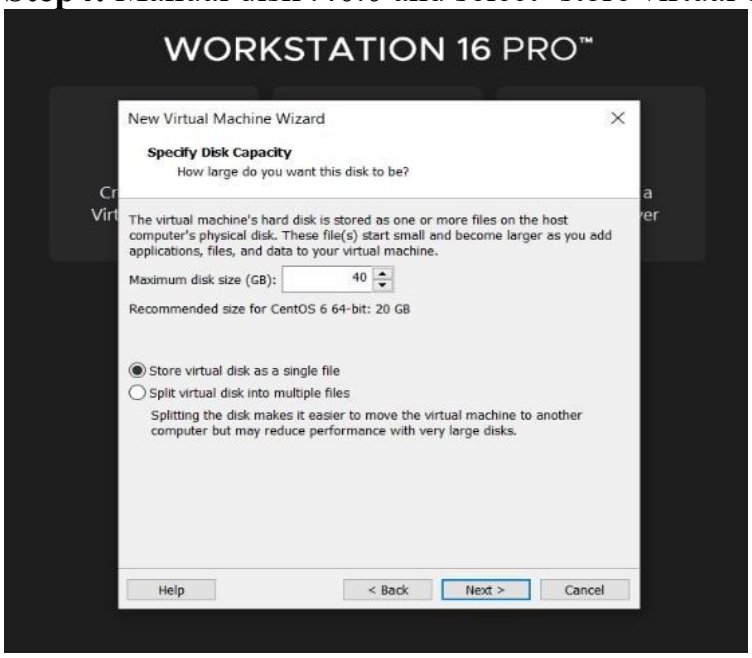
Step2: Click on Linux and version is CentOS 6 64-bit.



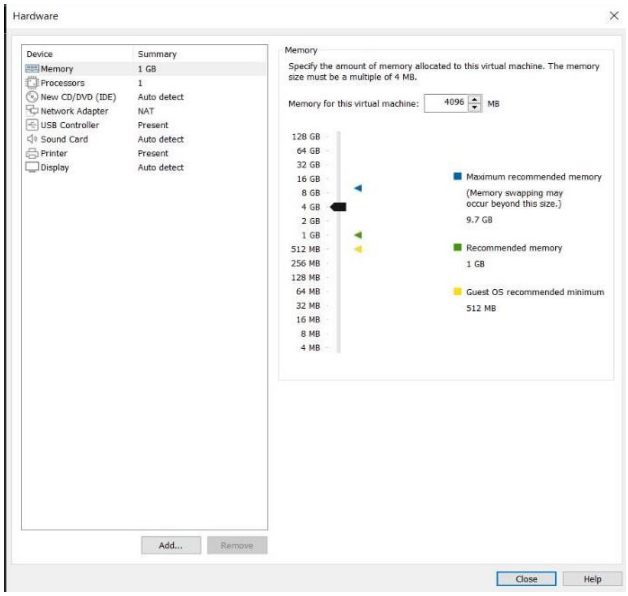
Step3: Name for virtual machine as **"Eucalyptus"**



Step4: Manual disk :40.0 and select -store virtual disk as single file.



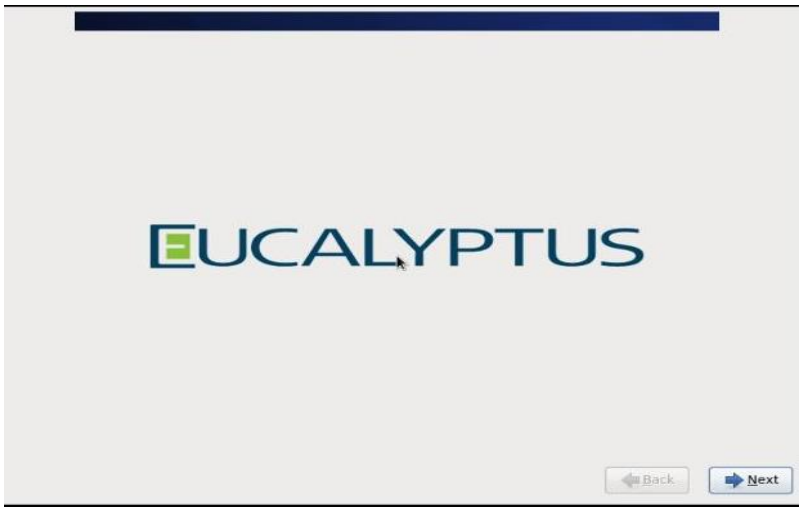
Step5: Click on Custom Hardware & Give **the memory storage as 4GB** and then click on next & also Change **the number of cores per processor as 2 and select virtualize intel VT-x/EPT** and then in Network Adapters **select bridge network connection** and close and **start the vm.**



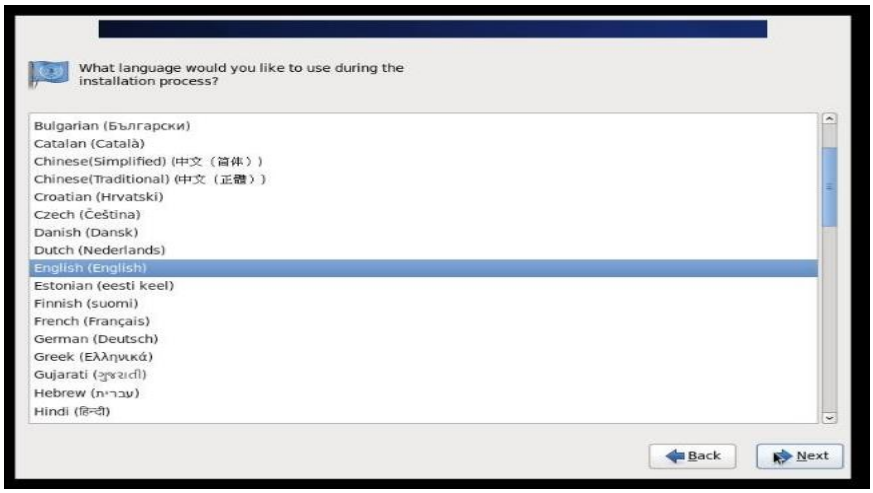
Step6: Select Install CentOS 6 with Eucalyptus Cloud-in-a-box and press enter.

Step7: Skip and then OK

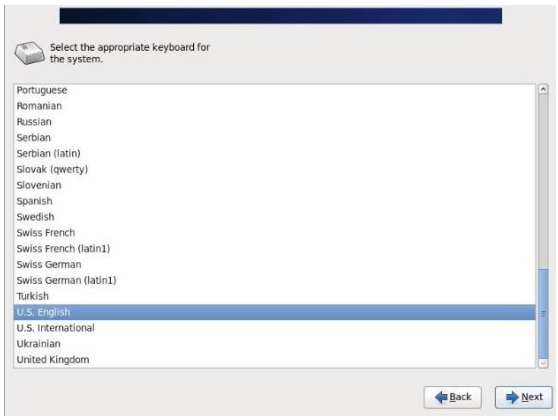
Step8: When the installation screen pops up **Click on Next**



Step9: Select **English** Press Enter



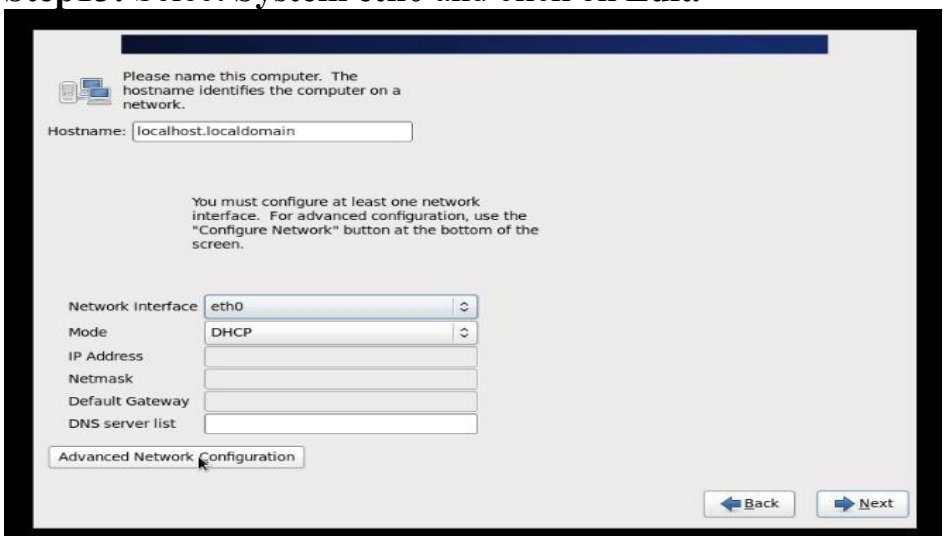
step10: Select **U.S English** & Press Enter



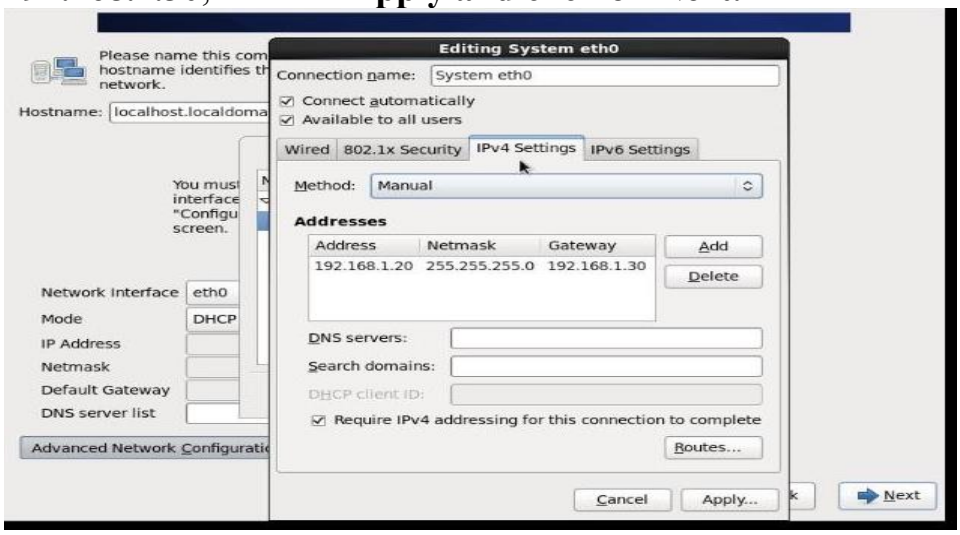
Step11: Click on **Yes, Discard any Data.**

Step12: Click on **Advance Network Configuration**

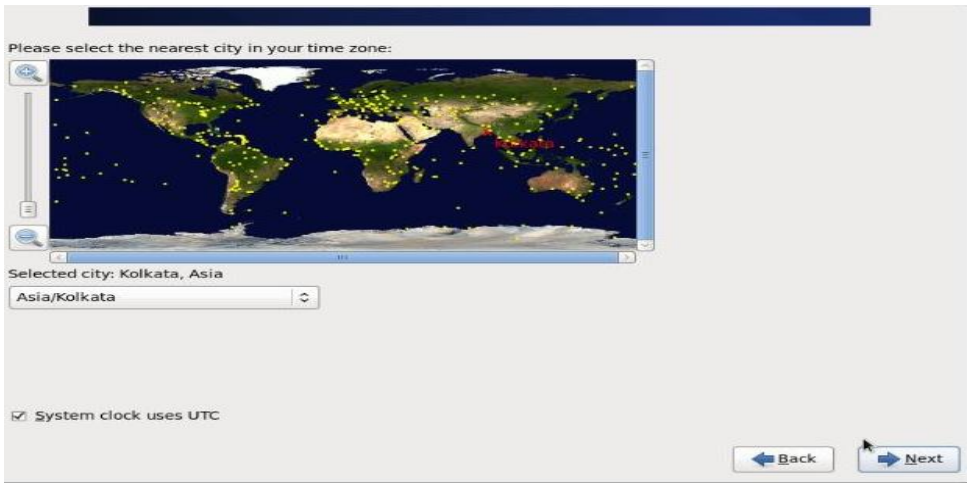
Step13: Select **System eth0** and click on **Edit.**



Step14: Click on Add **Address as 192.168.1.20**, **Netmasks 255.255.255.0, Gateway as 192.168.1.30**, click on **Apply and click on Next.**

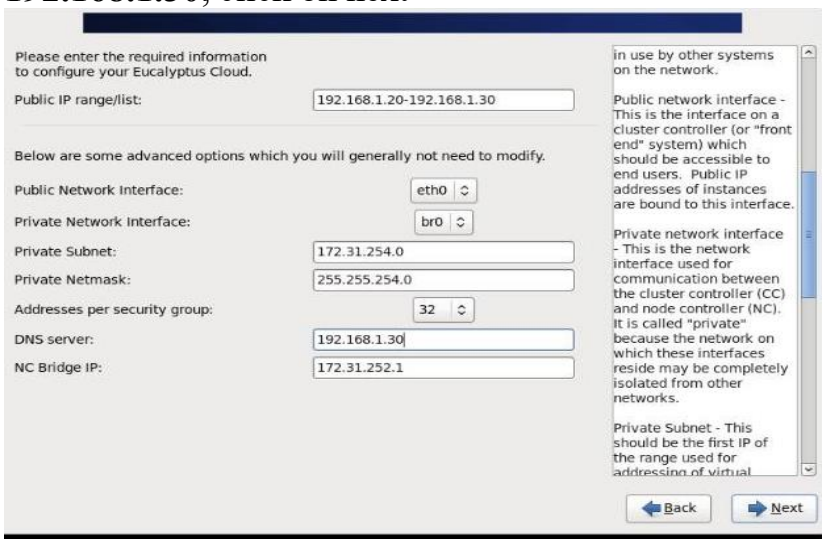


Step15: Select **Asia, Kolkata** and then next.

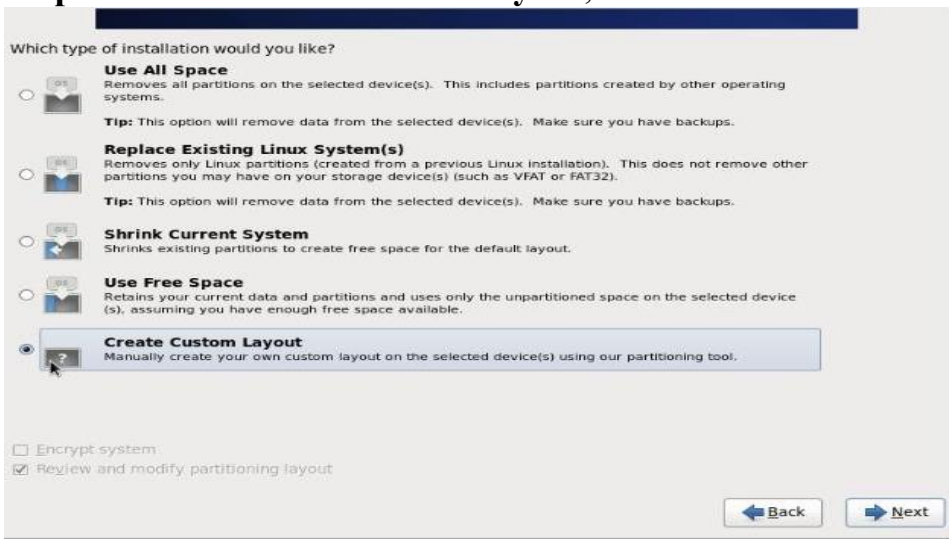


Step16: Create password and next.

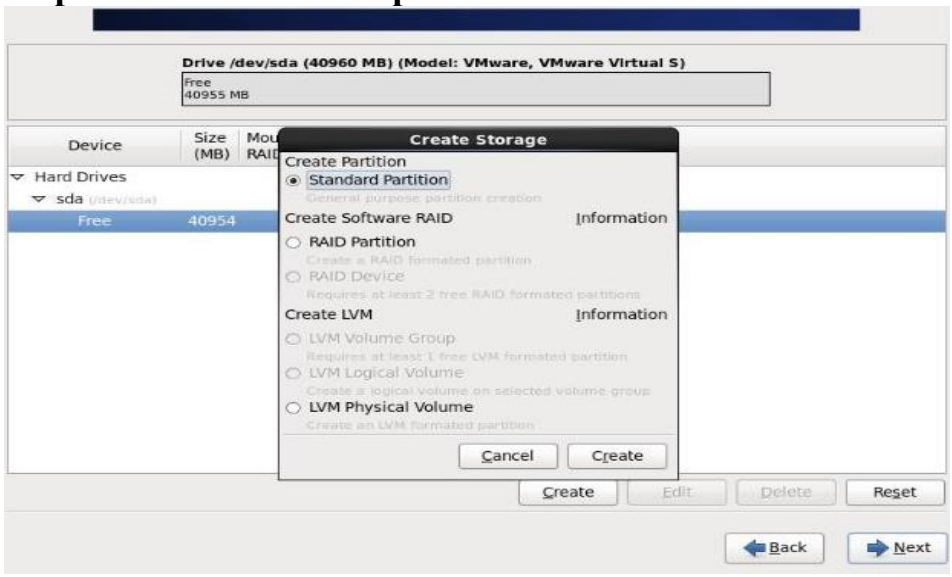
Step17: Place *public IP range* **192.168.1.20-192.168.1.30** and *DNS server* as **192.168.1.30**, click on next



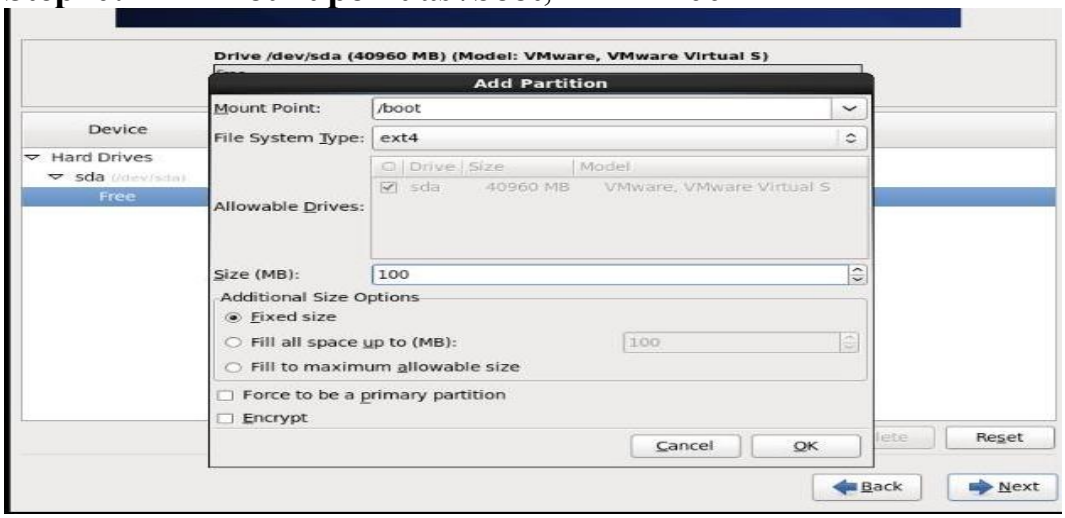
Step18: Select **Create Custom layout**, click on Next.



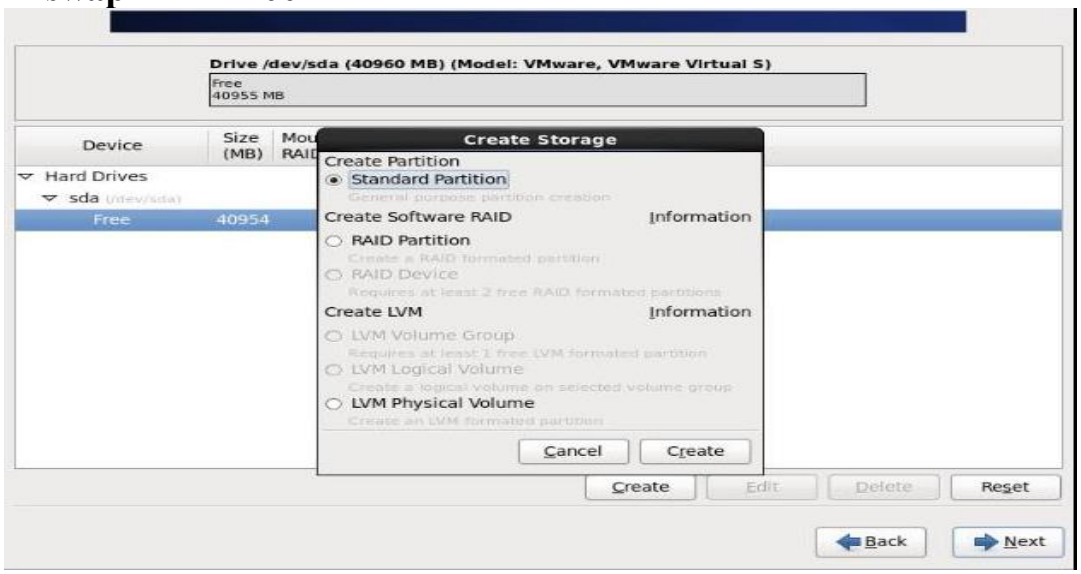
Step19: Select **Standard partition** and click on Create.

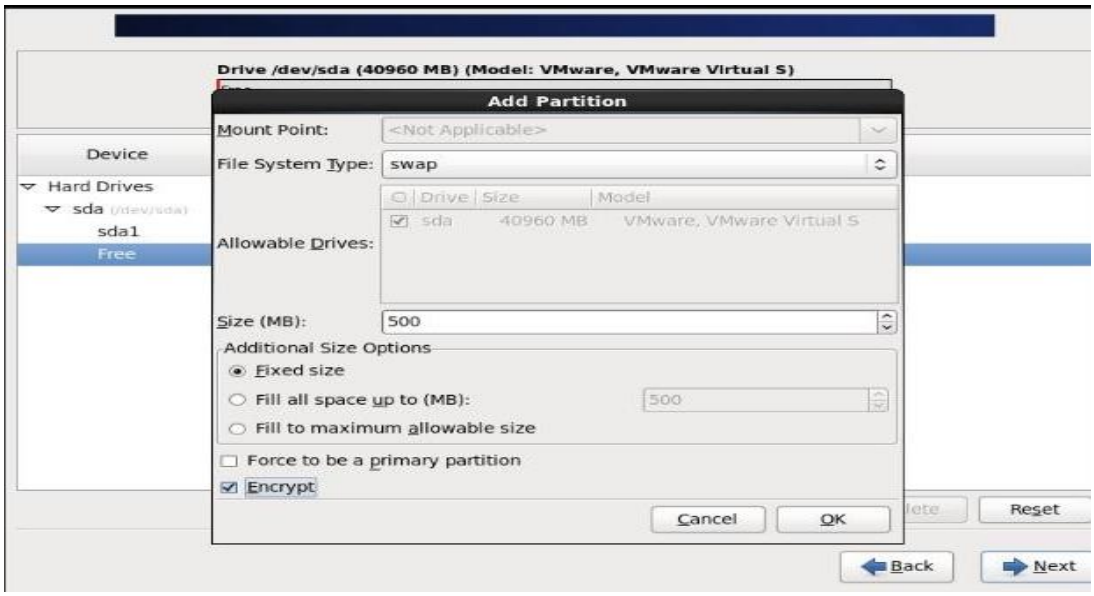


Step20: Give **mount point as /boot**, size as **100MB** and click on OK.

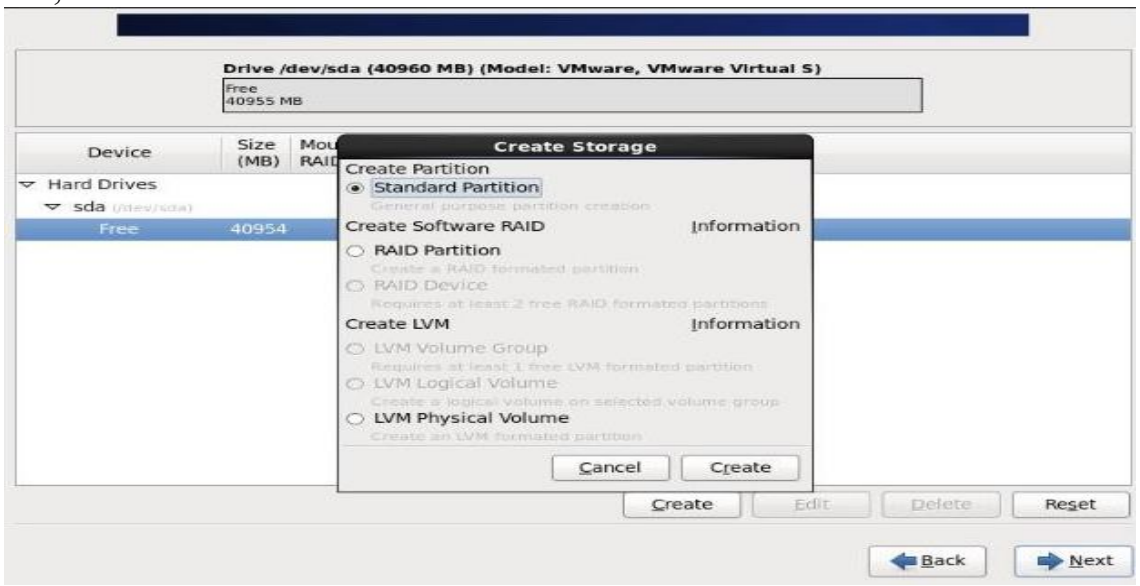


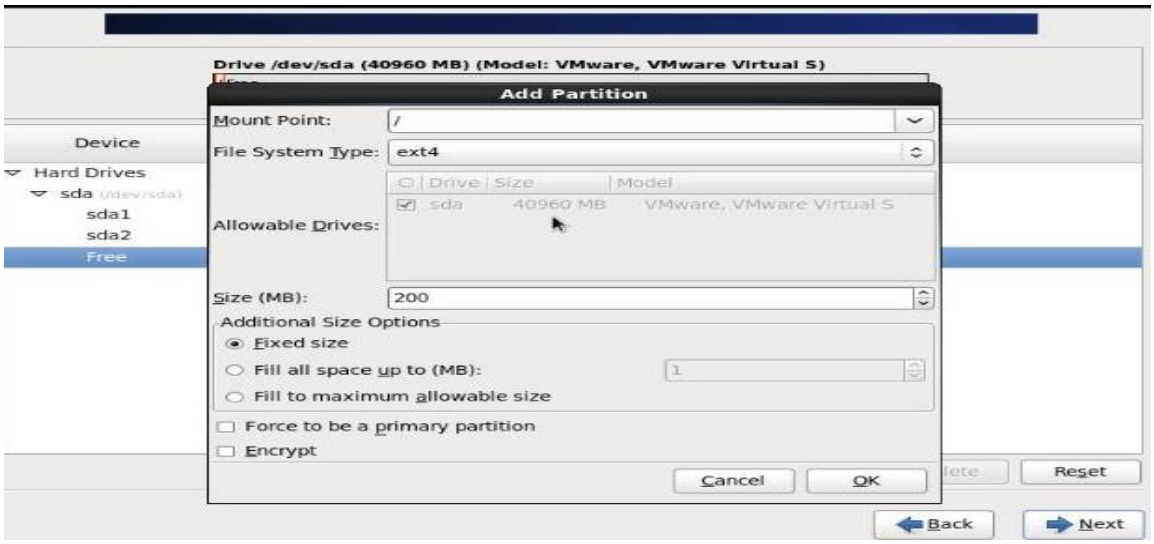
Step21: Again, Select **Standard partition** and click on Create & Select File System Type as **swap** size as 2**00MB** and click on OK.





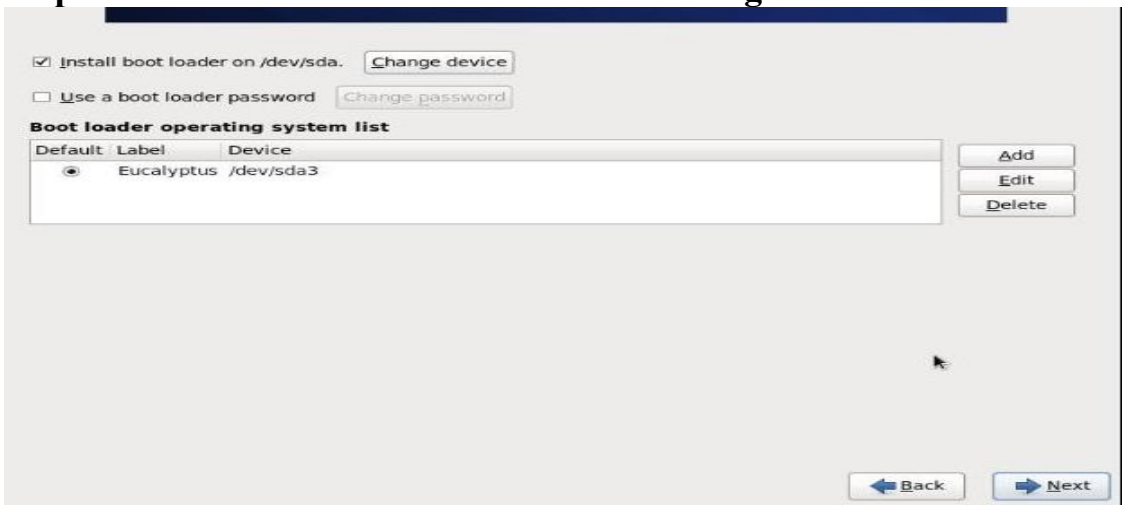
Step22: Again, Select **Standard partition** and click on Create & Give **mount point as "/"**, size as **200MB** and Select **Fill to maximum allowable size** click on OK.



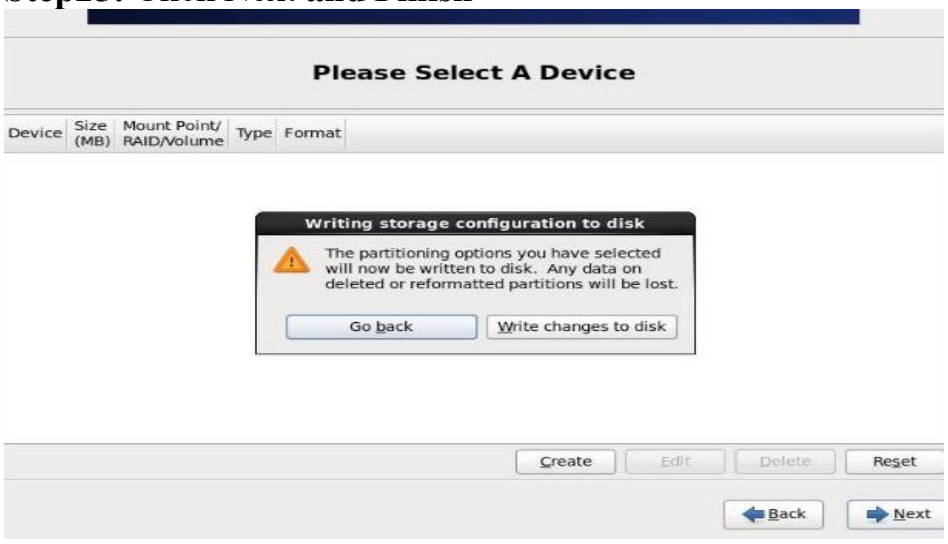


Step23: Click on Next

Step24: Click on **Format** & click on **Write changes to disk.**

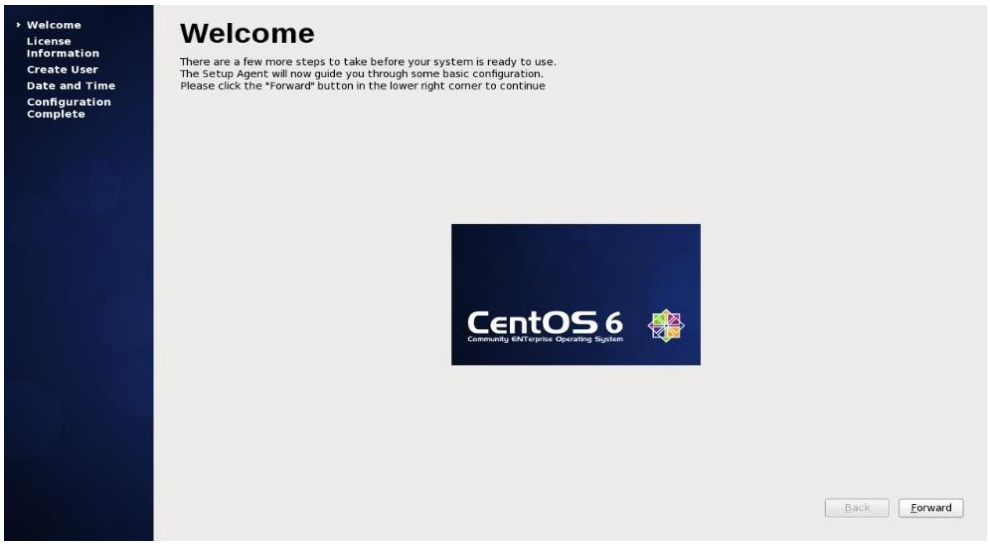


Step25: Click Next **and Finish**

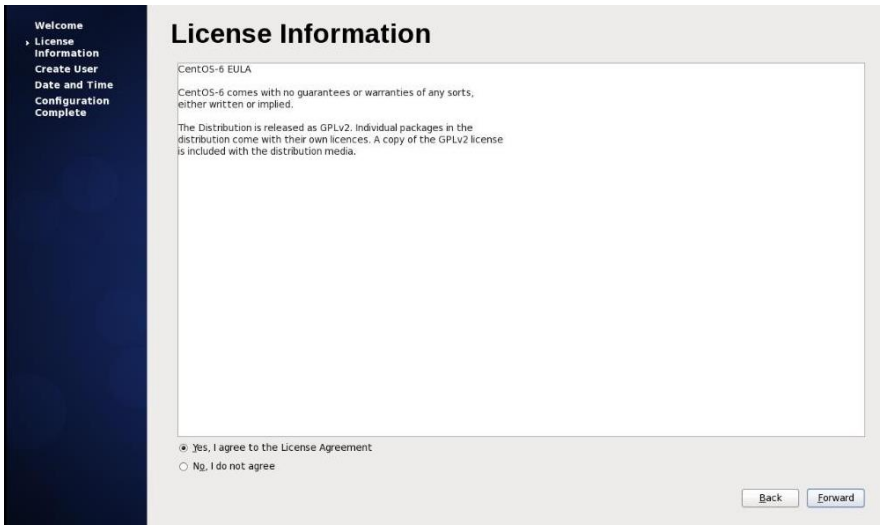


Step26: Click on **Reboot**

Step27: Click on **Forward**

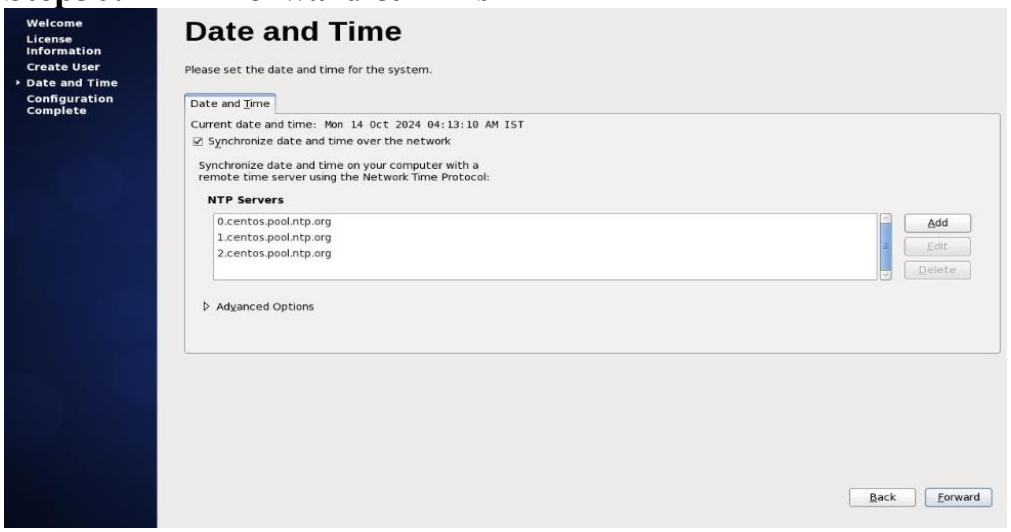


Step28: Click on **"Yes, I agree the license Agreement"** and **Forward**

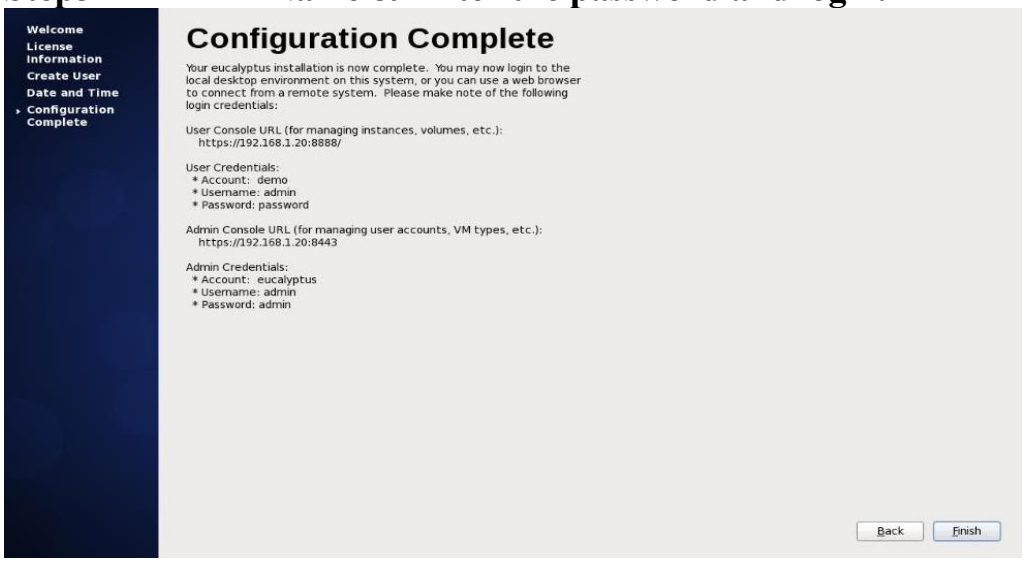


Step29: Fill up **username, Full name, password & confirm Password of your choice.**

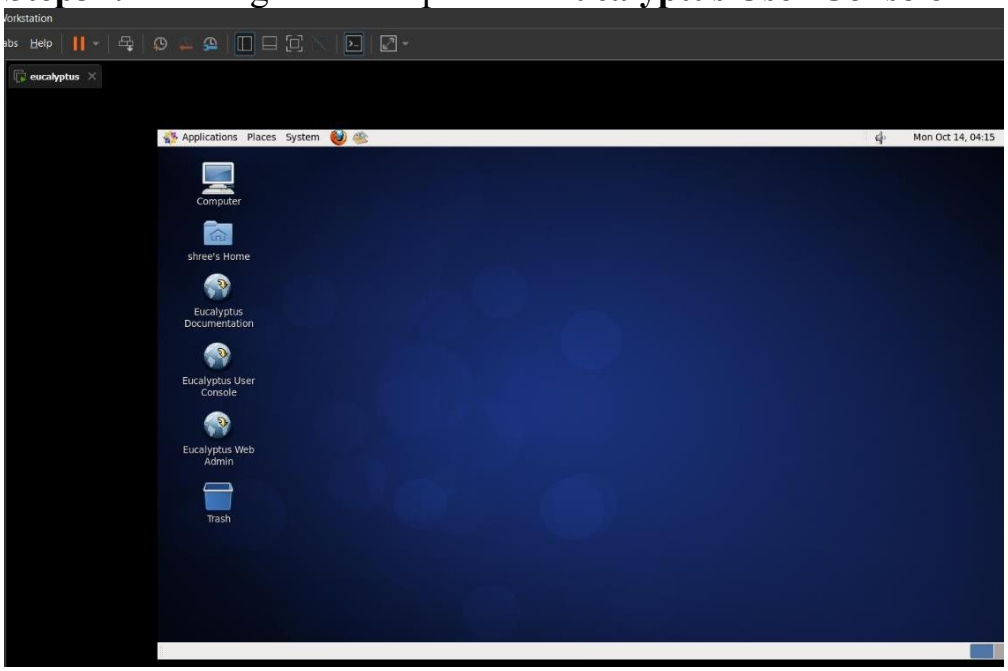
Step30: Click **Forward & Finish**



Step31: Click on **Name & Enter the password and login.**

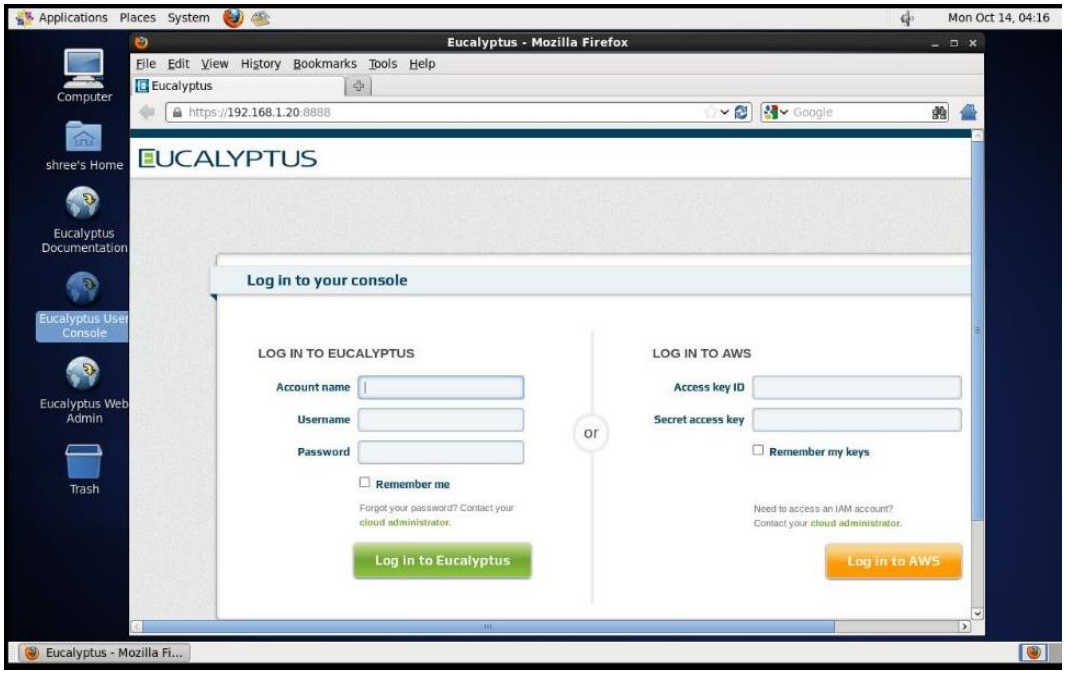


Step32: After login it will open this **Eucalyptus User Console**

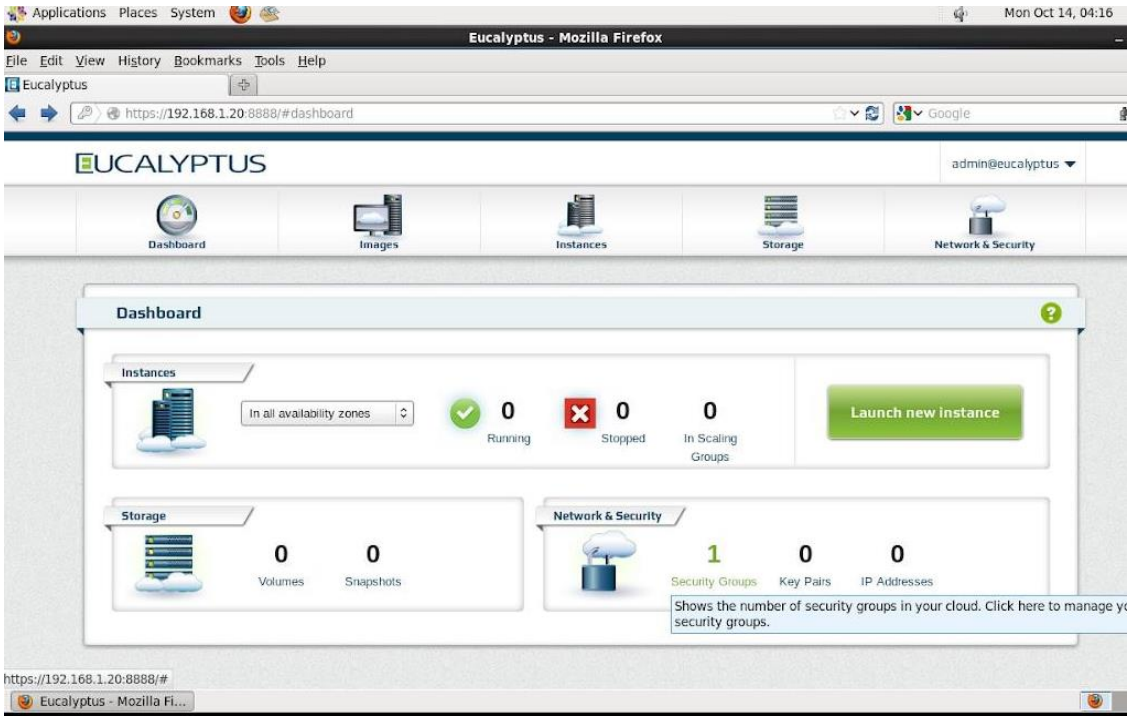


Step33: Now First Click on **Understand the risk and then add exception**

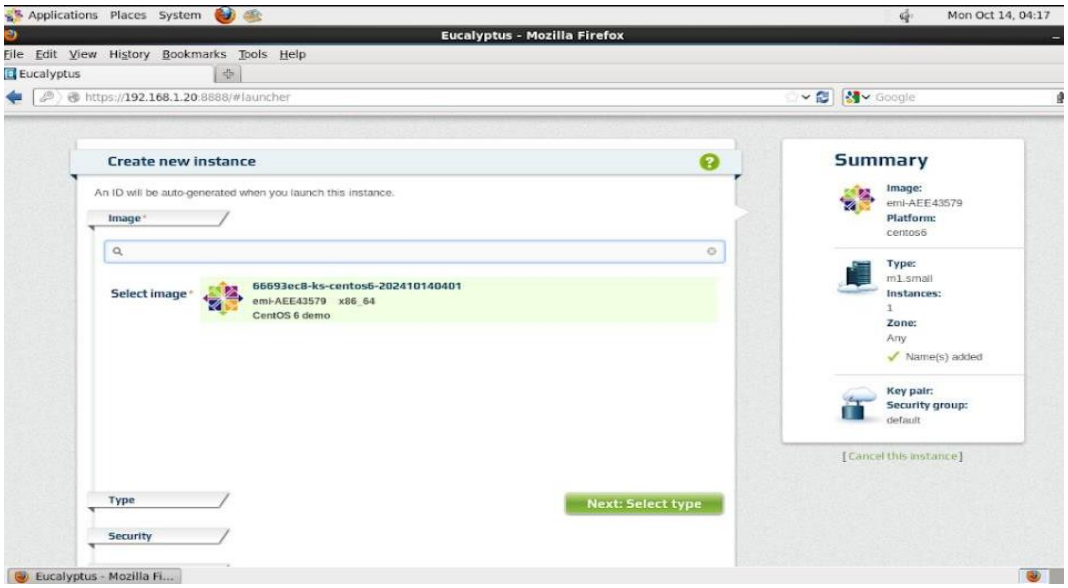
Step34: Login to Eucalyptus



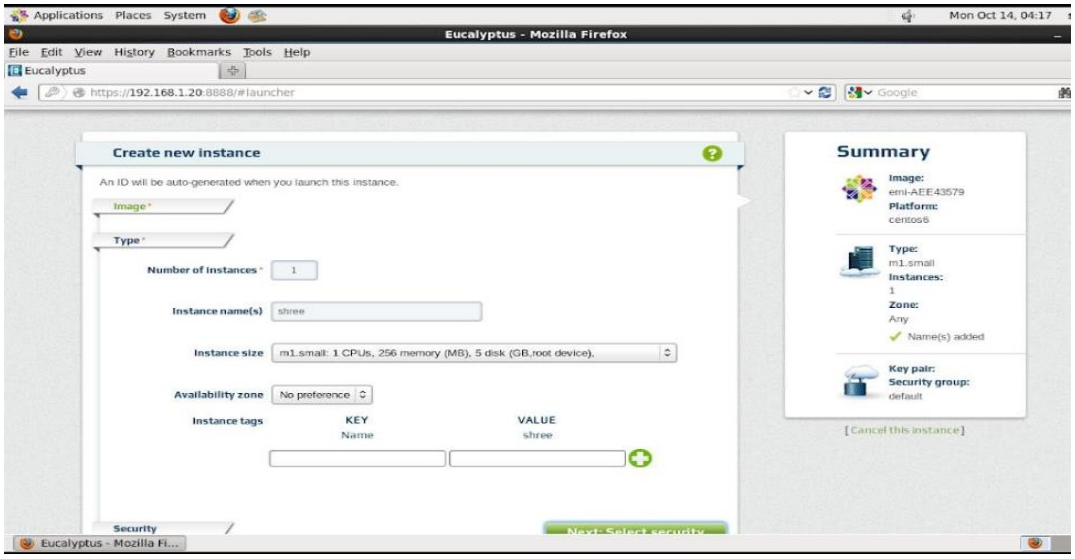
Step35: Create instance by Clicking on **"Launch new Instance"**



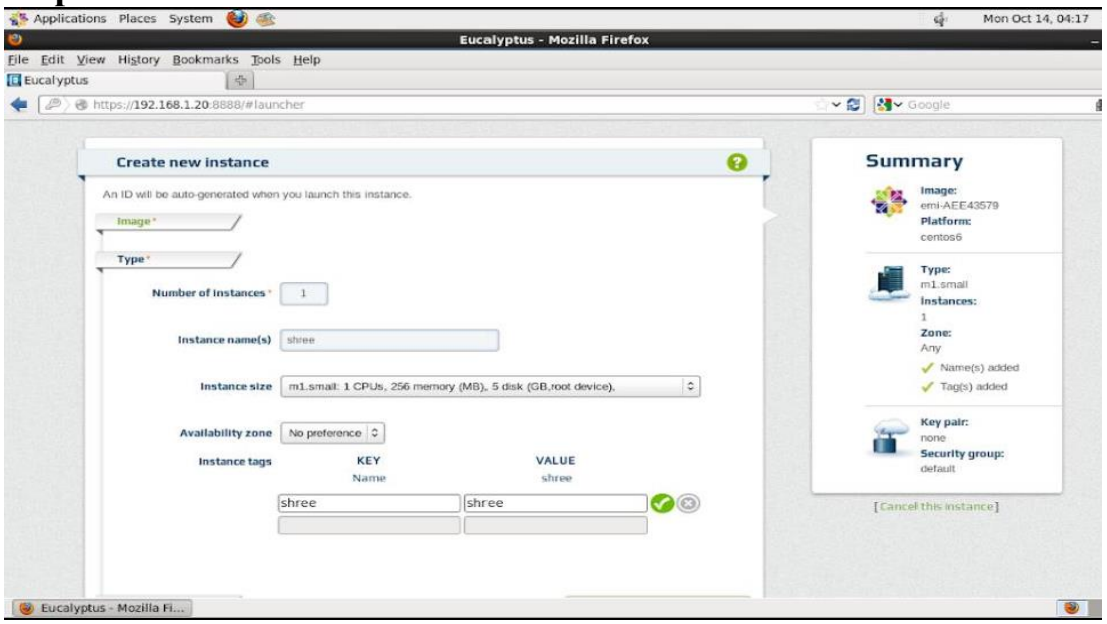
Step36: Click on **Next: Select Type** and give the **instance name** as **Eucalyptus** and **key name is yogesh.**



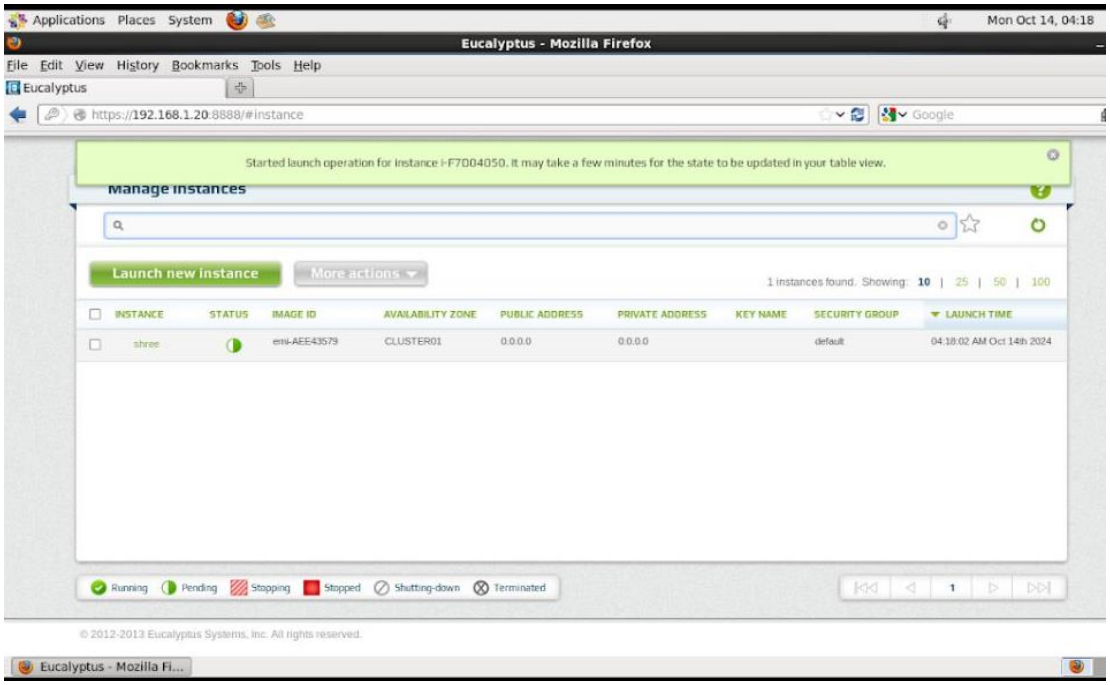
Step37: In security, **Select key name: none** and leave others by default.



Step38: Click on Launch Instance



Step39: After clicking on launch instance, it will display this window.



PRACTICAL 5

Aim: Manage XenServer with XenCenter

Requirements: - 1.VM Ware

2. Xen Center

3.Xen Server 8

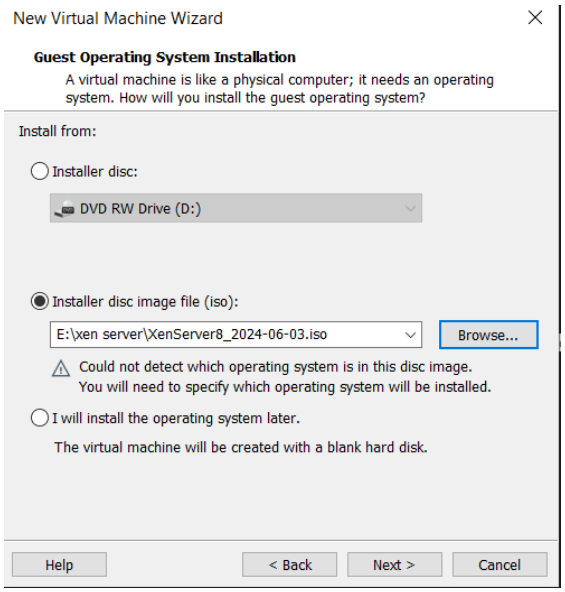
Steps:

Step1: - Create a new Virtual Machine in VMware Workstation

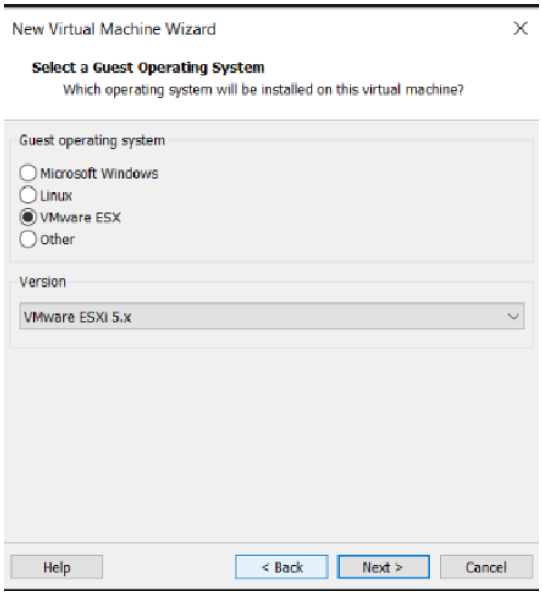
File → New Virtual Machine

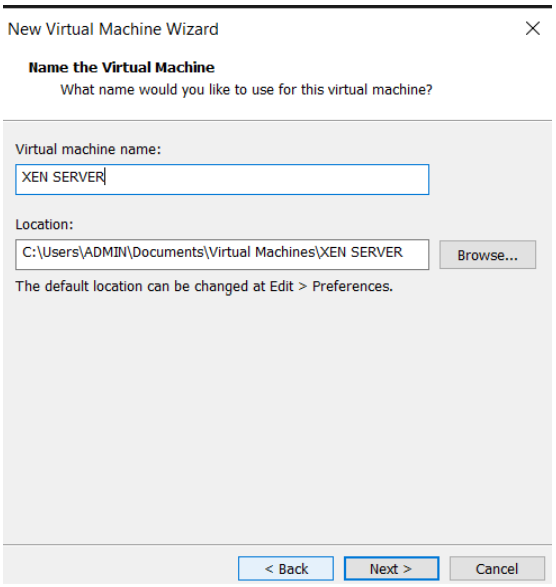
Step2: Select Typical (recommended) and click on “Next” button.

Step3: Select the iso file click on the Browse & select “XenServer-8.2.0- install-cd” file. Then click on the “Next” button.

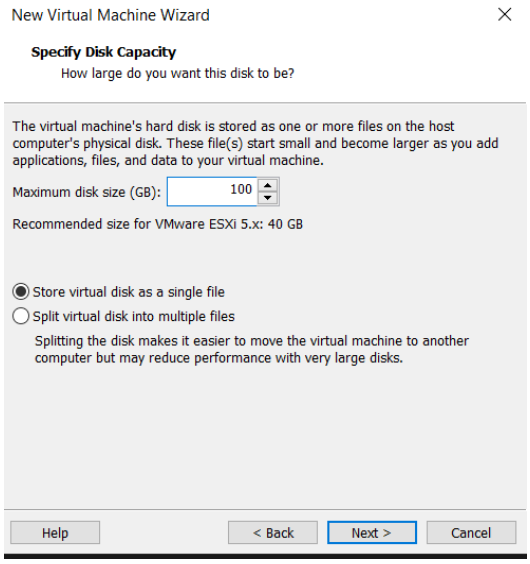


Step4: Select Guest OS as “VMware ESXi” and Version as “VMware ESXi 5”. Give a name to the Virtual Machine as “Xen Server”.

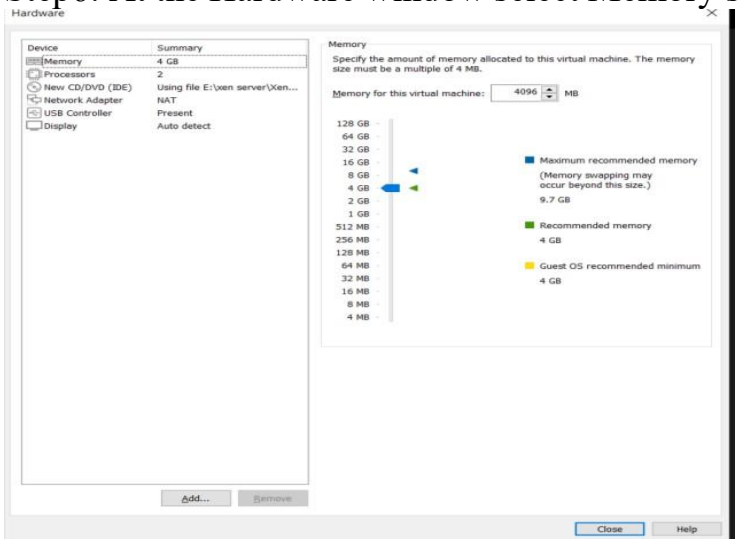




Step5: Select Maximum disk size 100 GB. Store virtual disk as a single file” and click on “Next.” Click on “Customize Hardware”

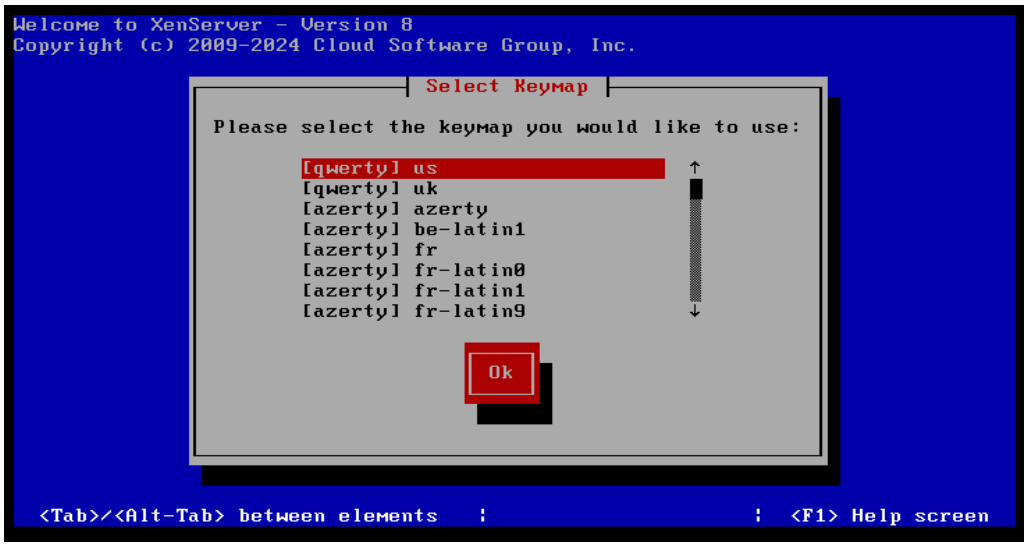


Step6: At the Hardware window select Memory size as 2GB, Close and Click on “Finish”

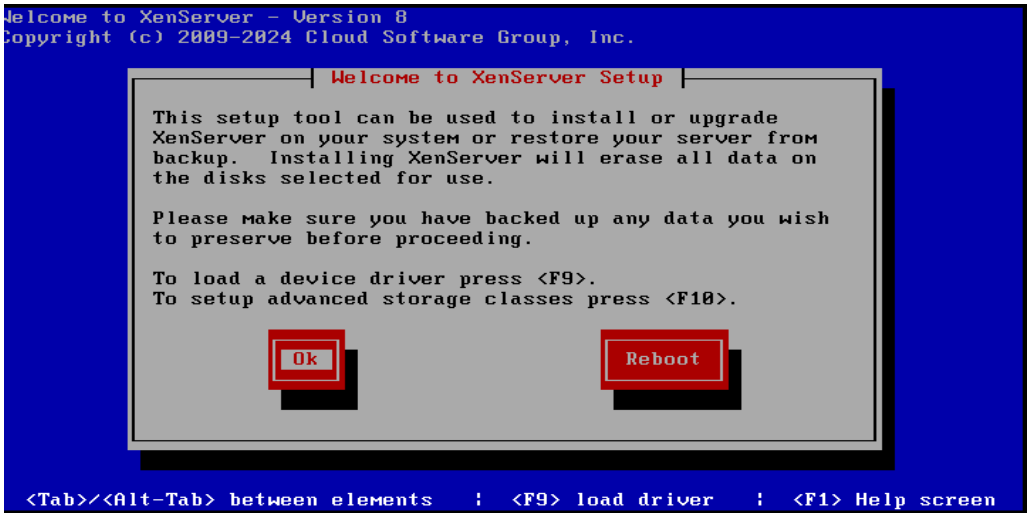


Step7: Power ON the Xen Server

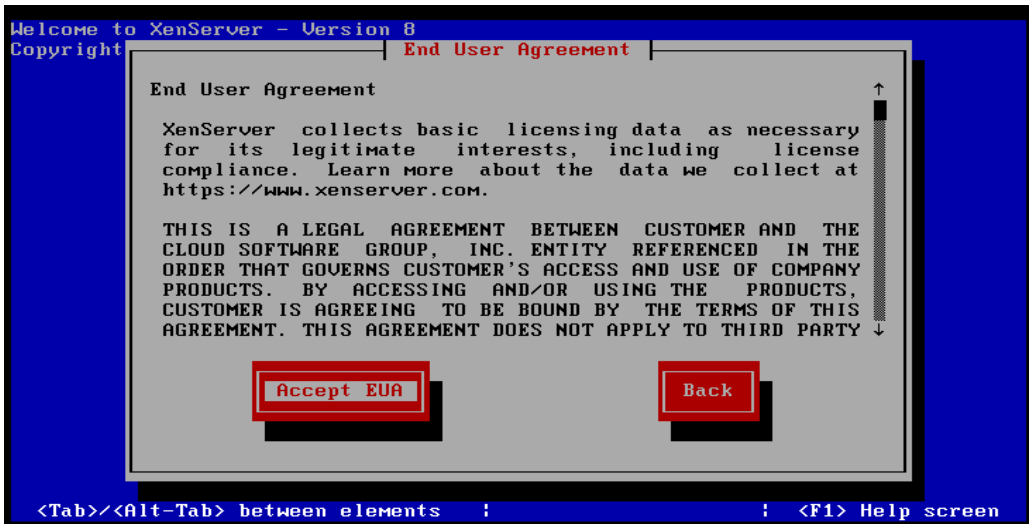
Step8: Select Keymap as [qwerty] us and press Enter.



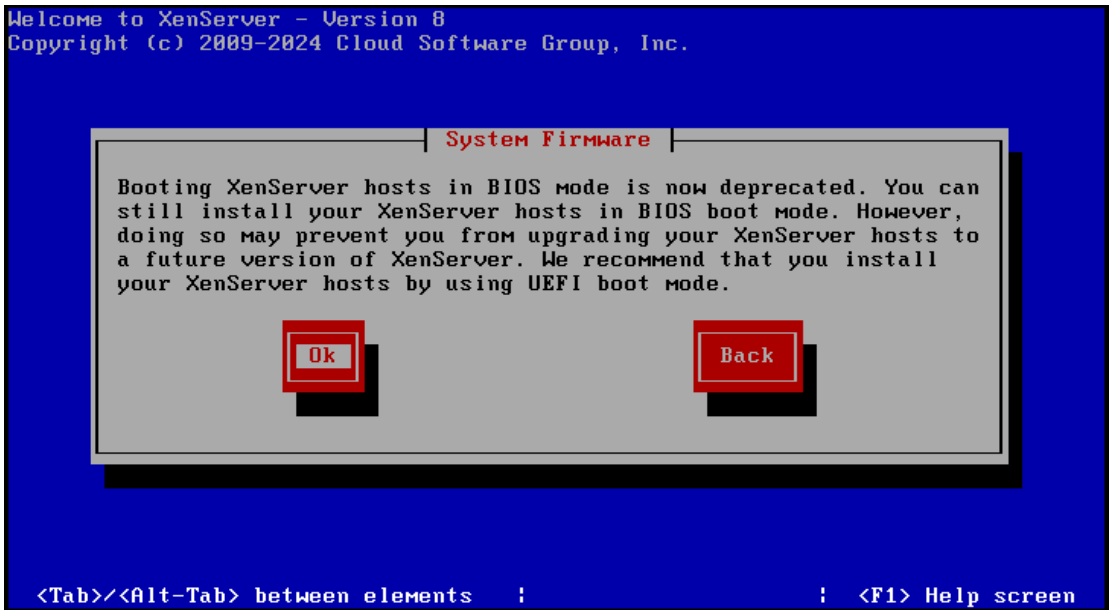
Step9: In the Welcome to XenServer Setup screen press Enter to choose Ok.



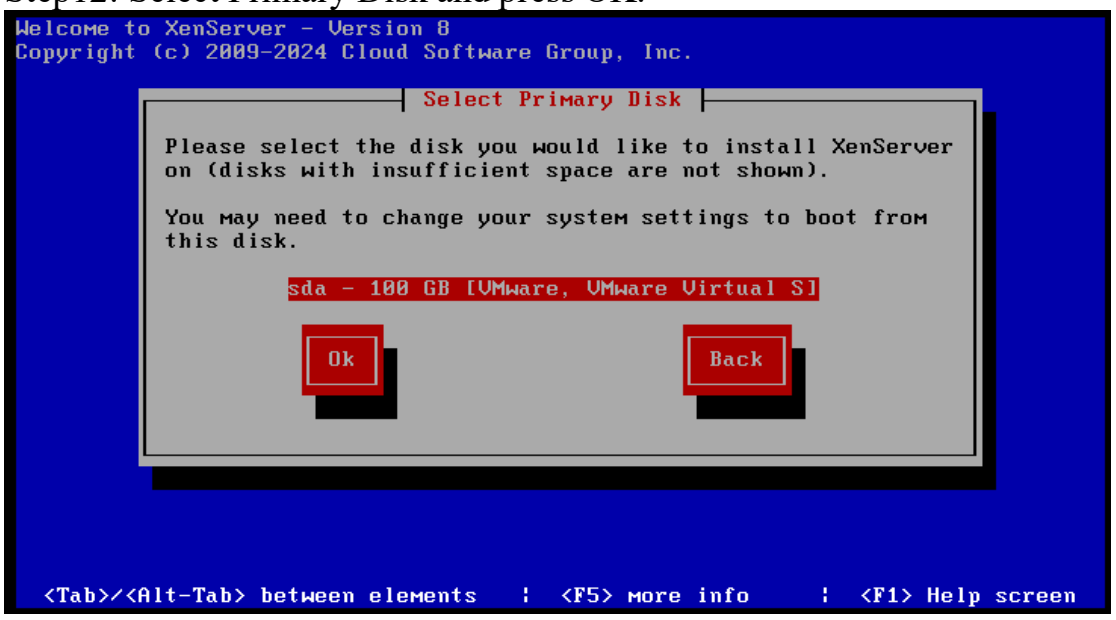
Step10: In End User Agreement Select Accept EUA



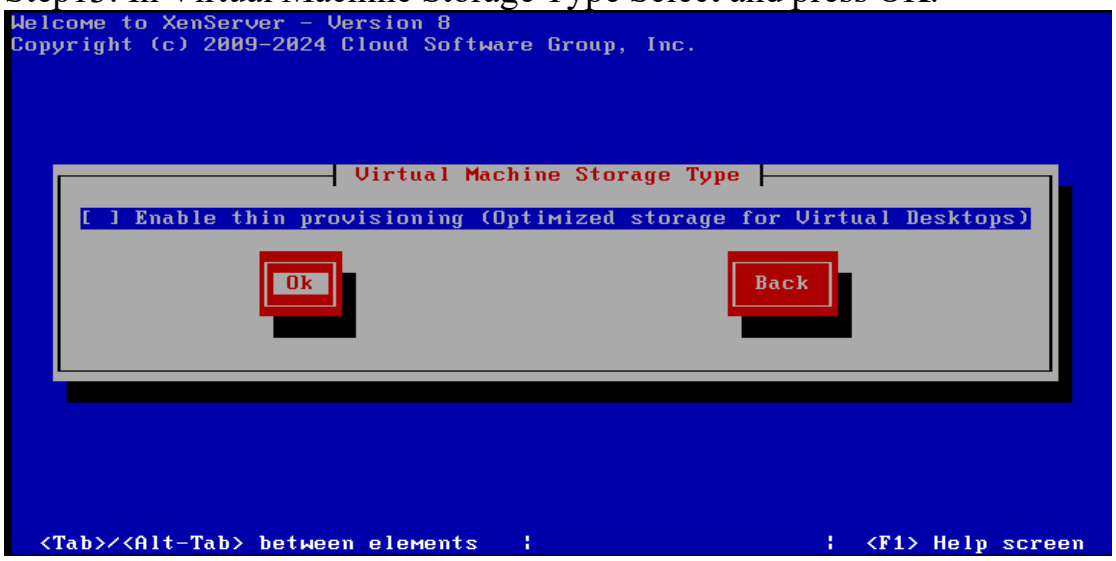
Step11: In system Firmware Select OK



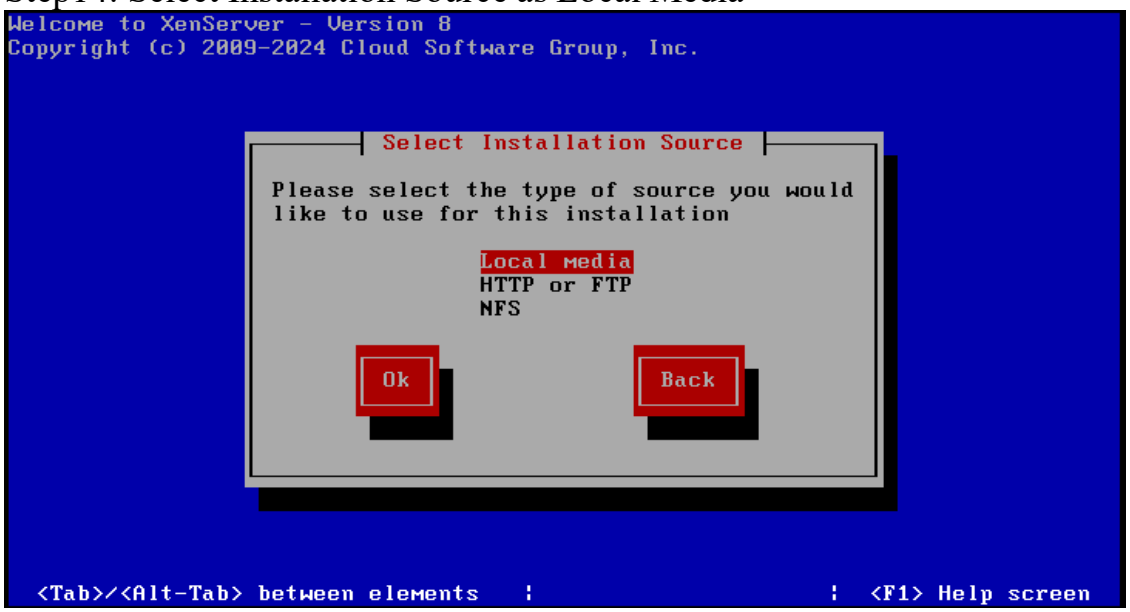
Step12: Select Primary Disk and press OK.



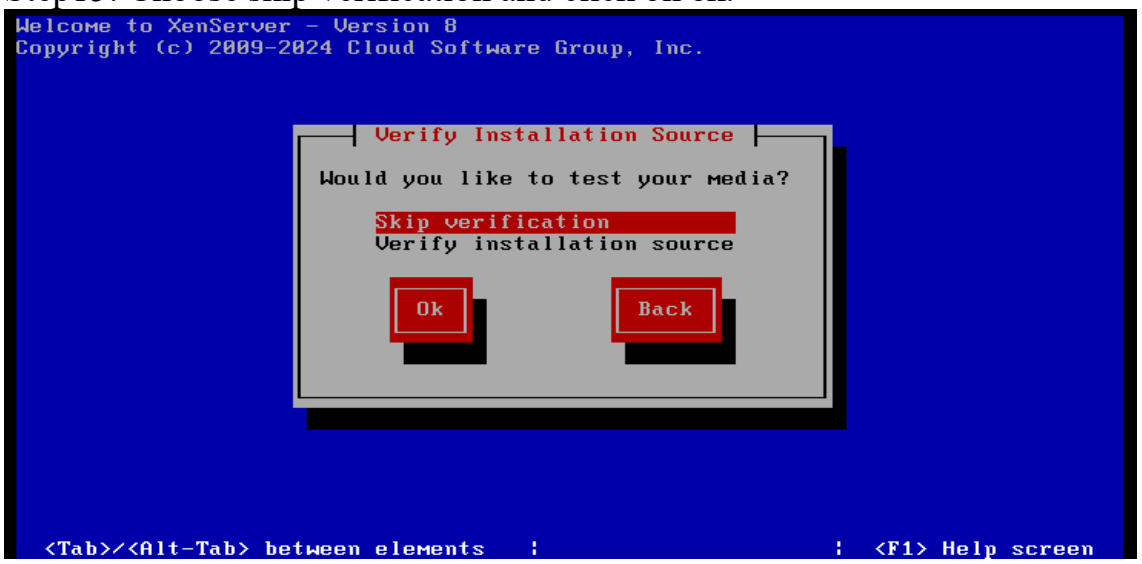
Step13: In Virtual Machine Storage Type Select and press OK.



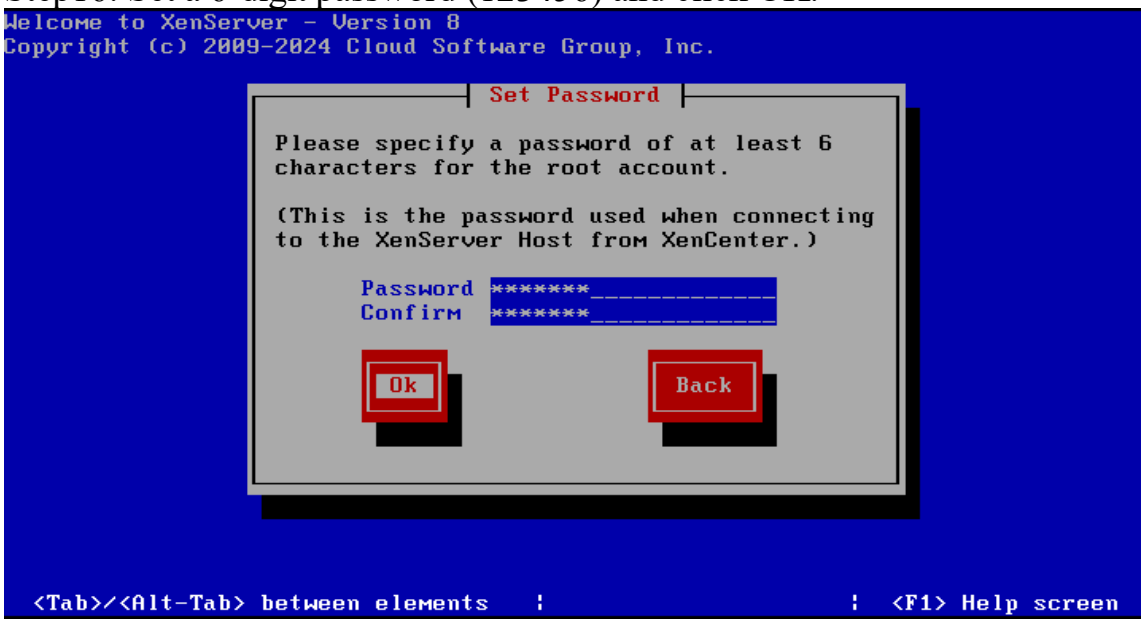
Step14: Select Installation Source as Local Media



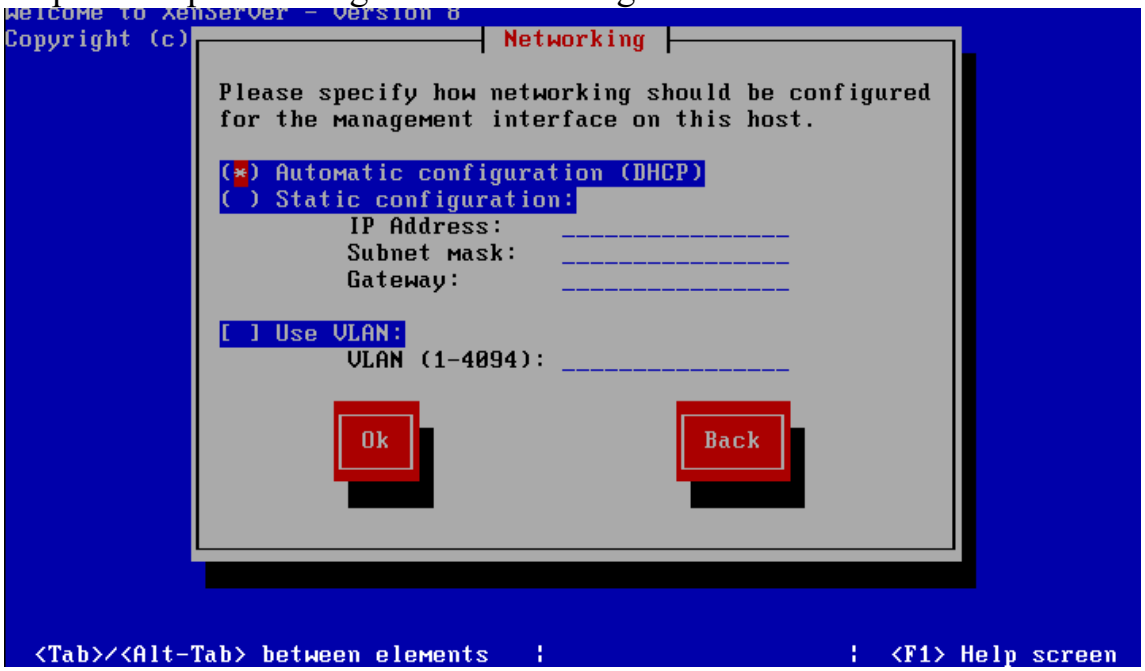
Step15: Choose skip verification and click on ok.



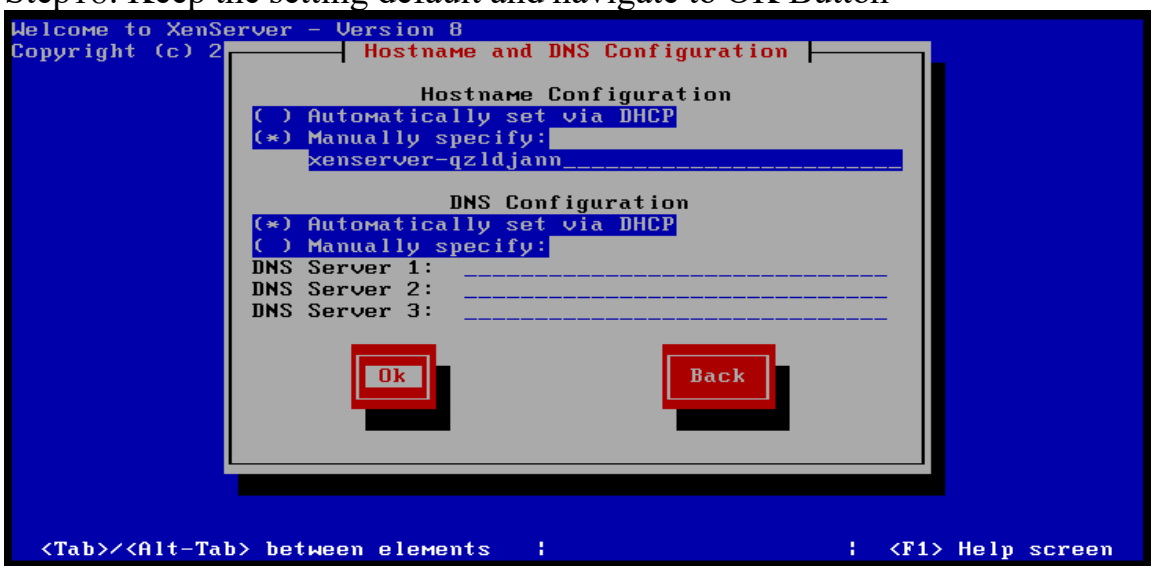
Step16: Set a 6-digit password (123456) and click OK.



Step17: Keep the setting default and navigate to OK Button

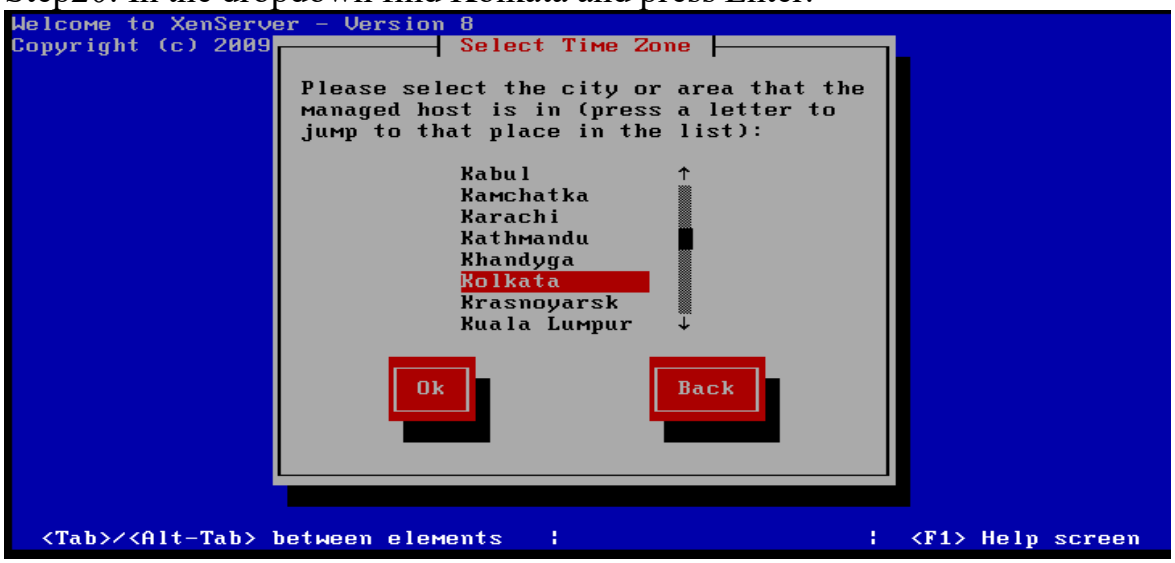


Step18: Keep the setting default and navigate to OK Button

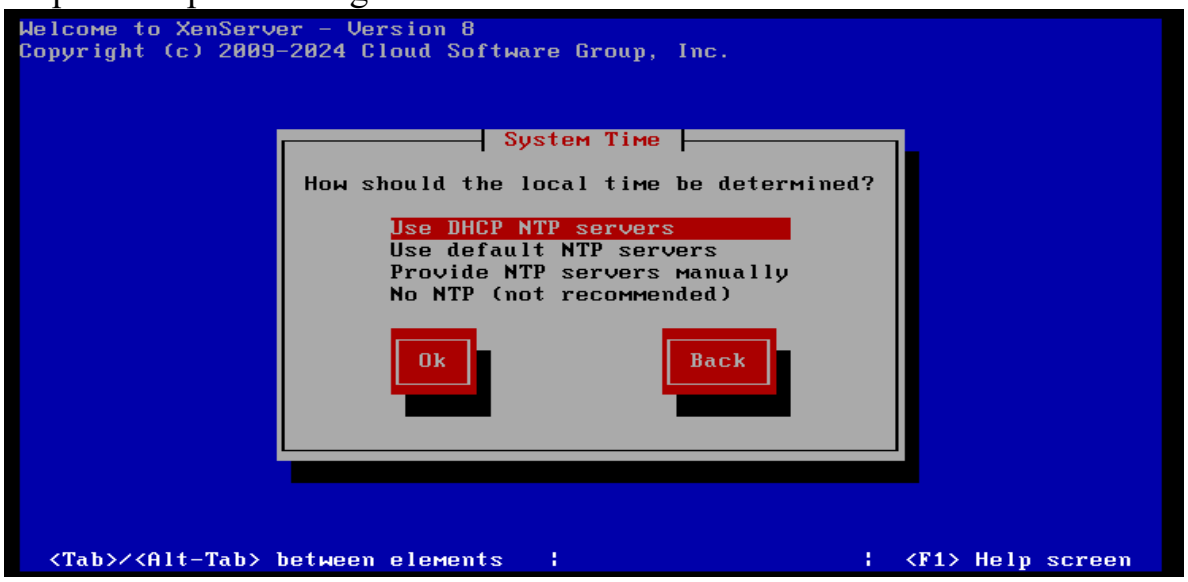


Step19: In the dropdown find Asia and press Enter.

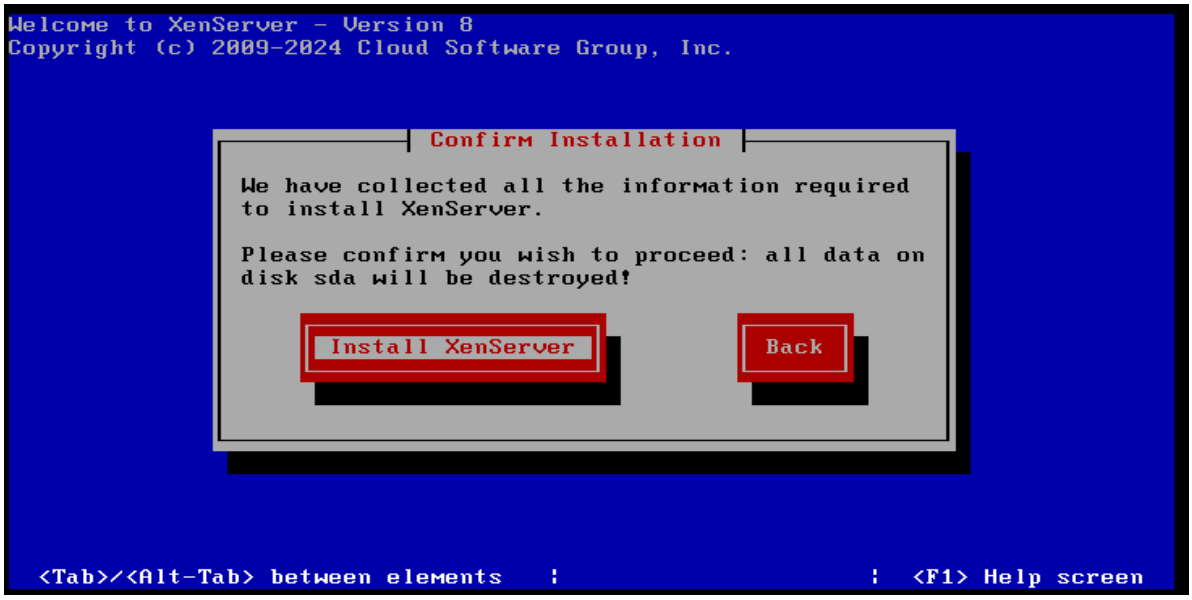
Step20: In the dropdown find Kolkata and press Enter.



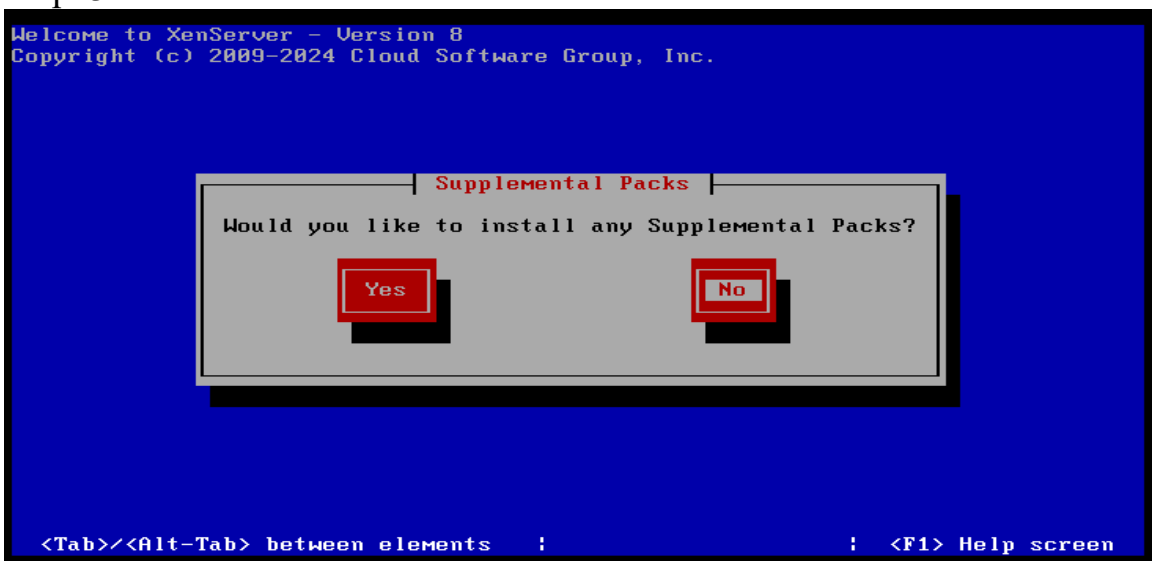
Step21: Keep the setting default & click on OK.



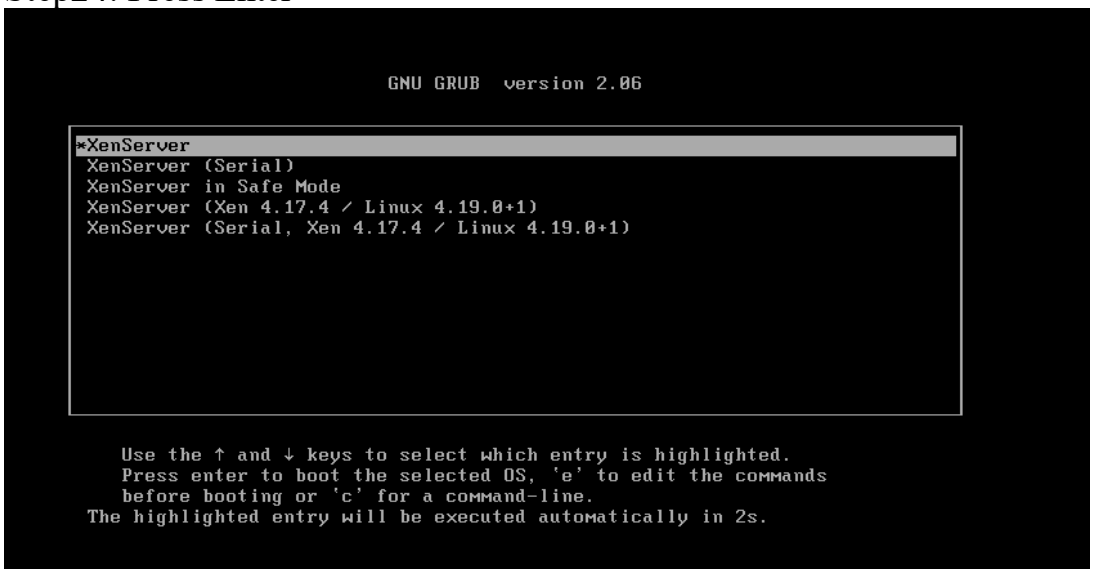
Step22: Click on Install XenServer.



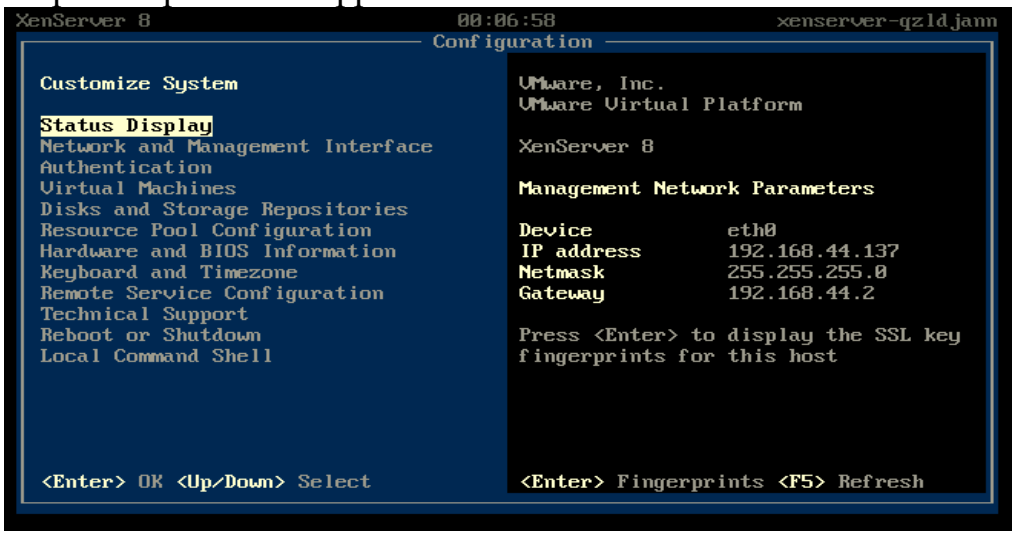
Step23: Select No and the vm will reboot.



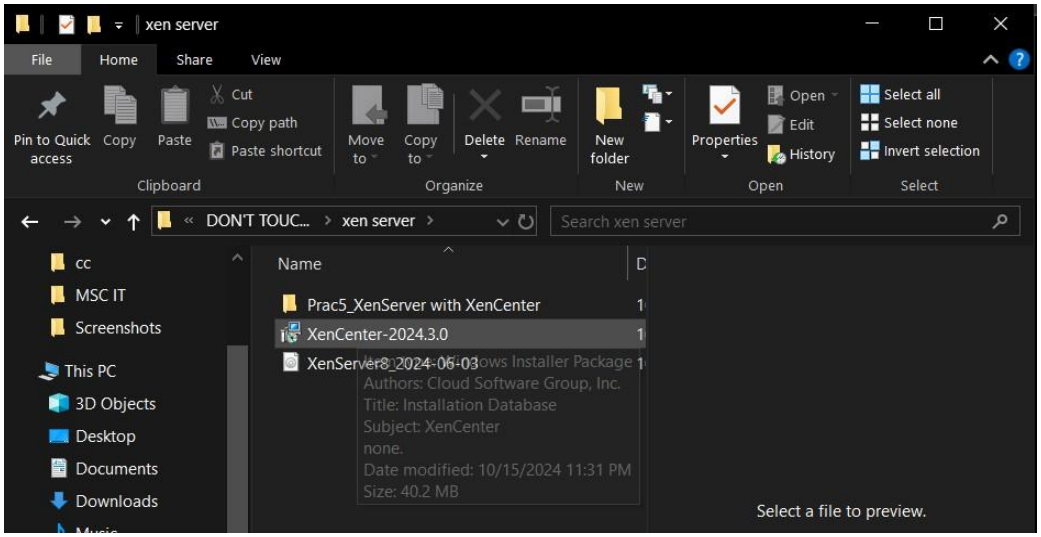
Step24: Press Enter



Step25: A panel will appear with wealth of information.

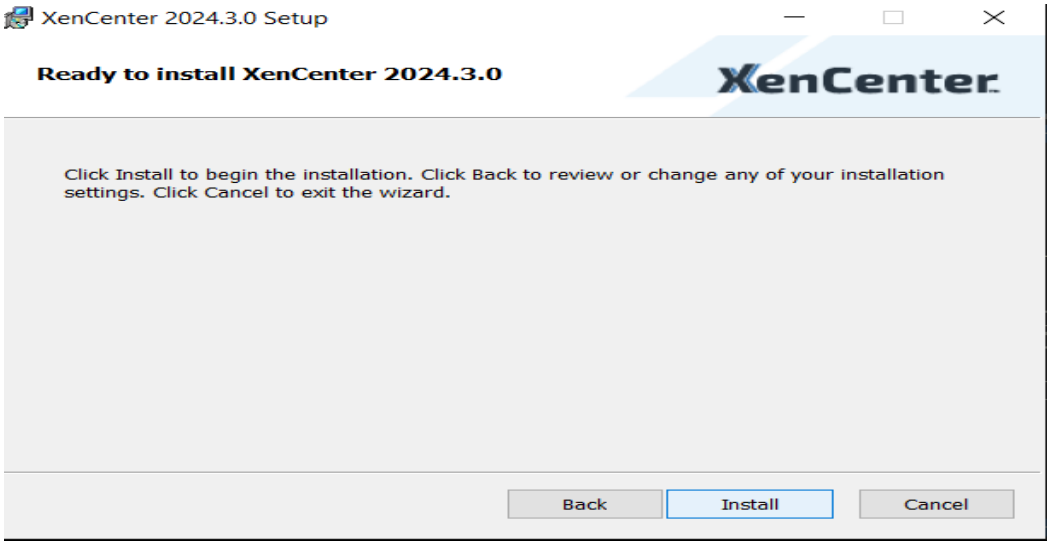


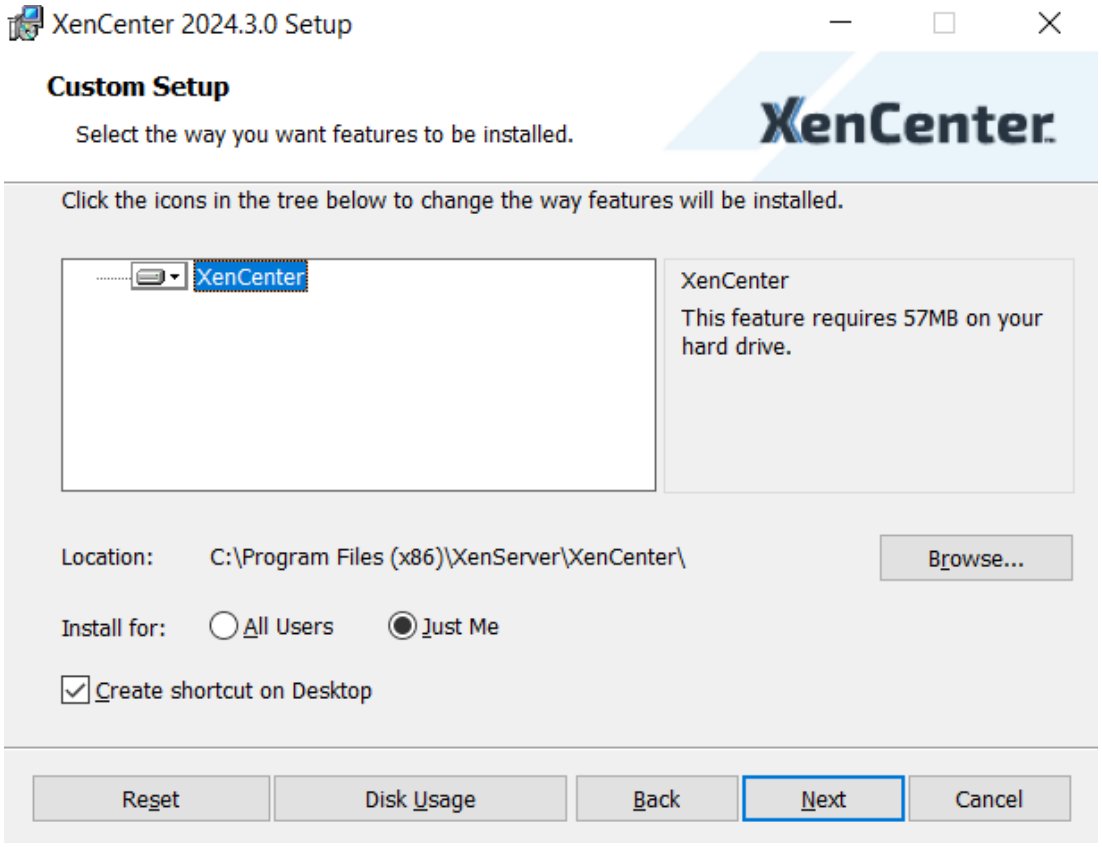
Step26: Now Install the Xen center application.



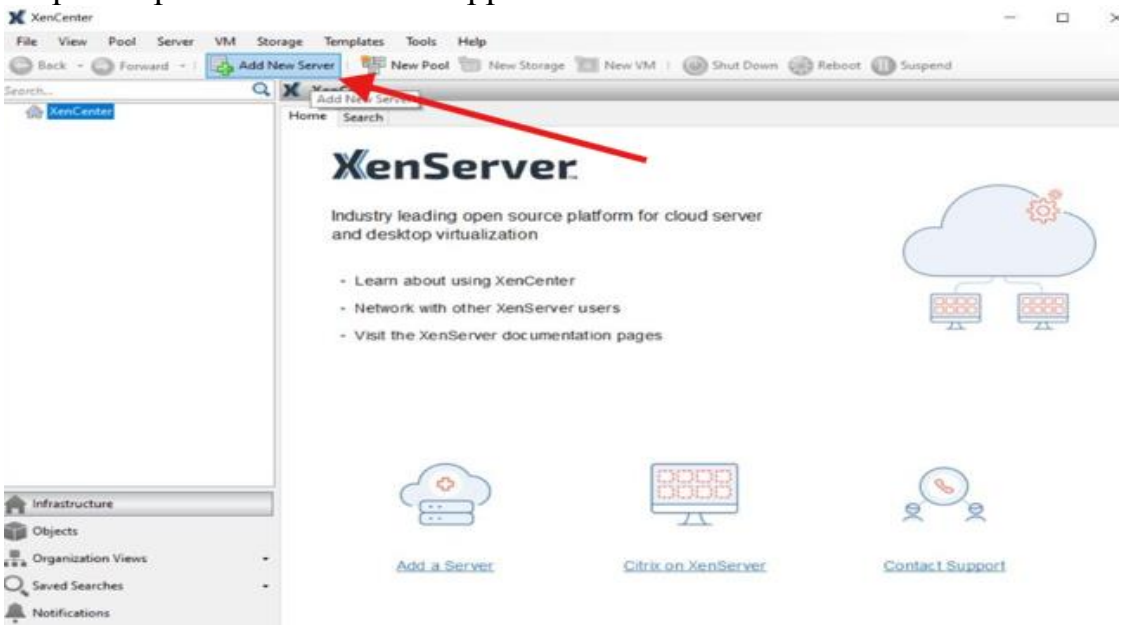
Step27: Click on Next

Step28: Click on Install & then Next.

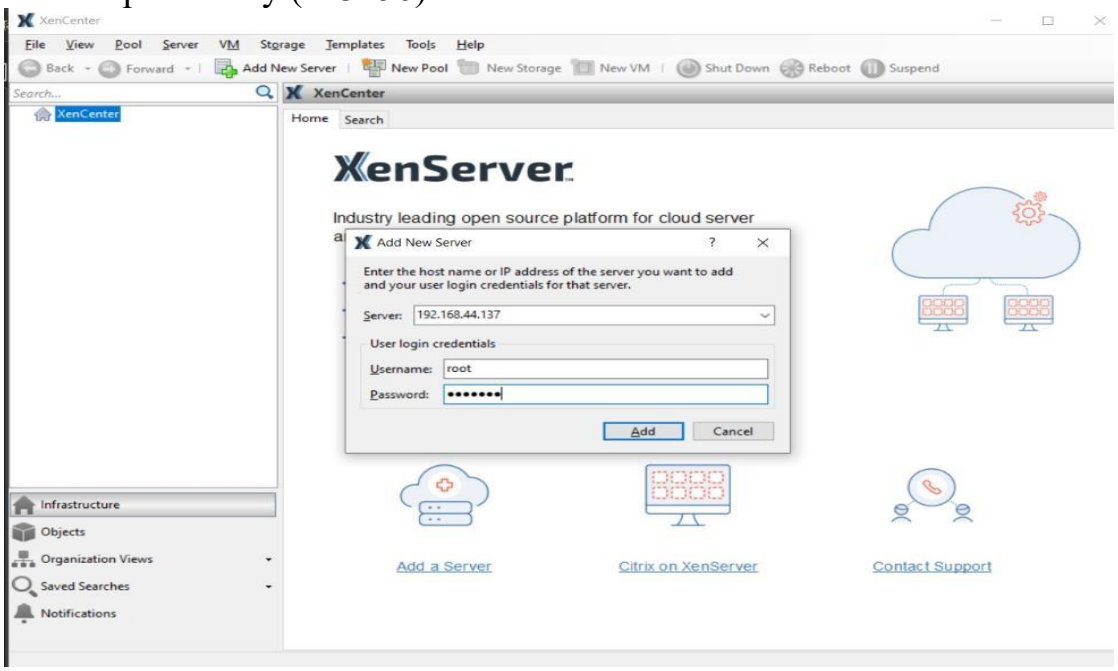




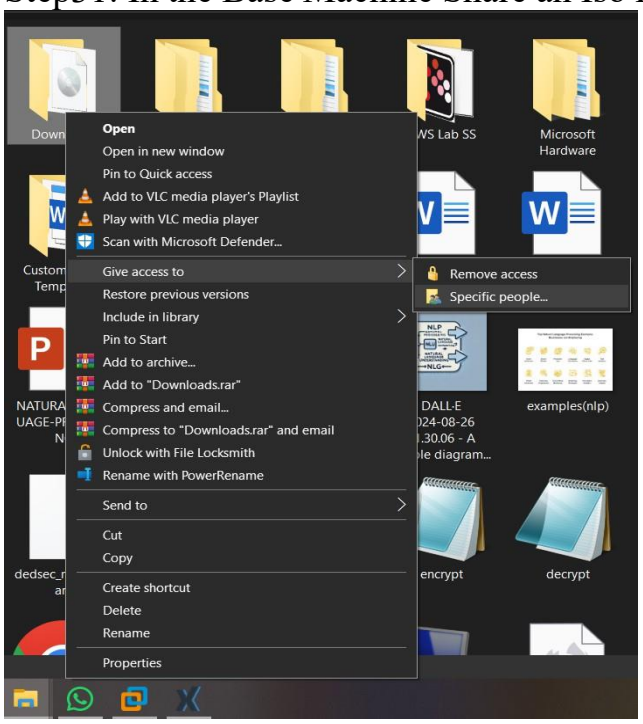
Step29: Open the Xen Center app and Click on Add New Server



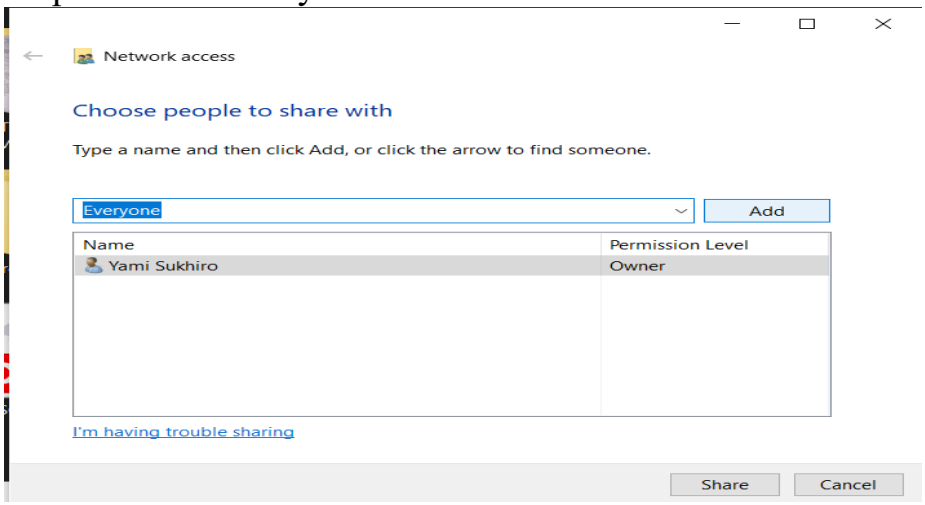
Step30: Copy the Ip Address from the VMWare panel and put in 6-digit password which was set previously (123456).



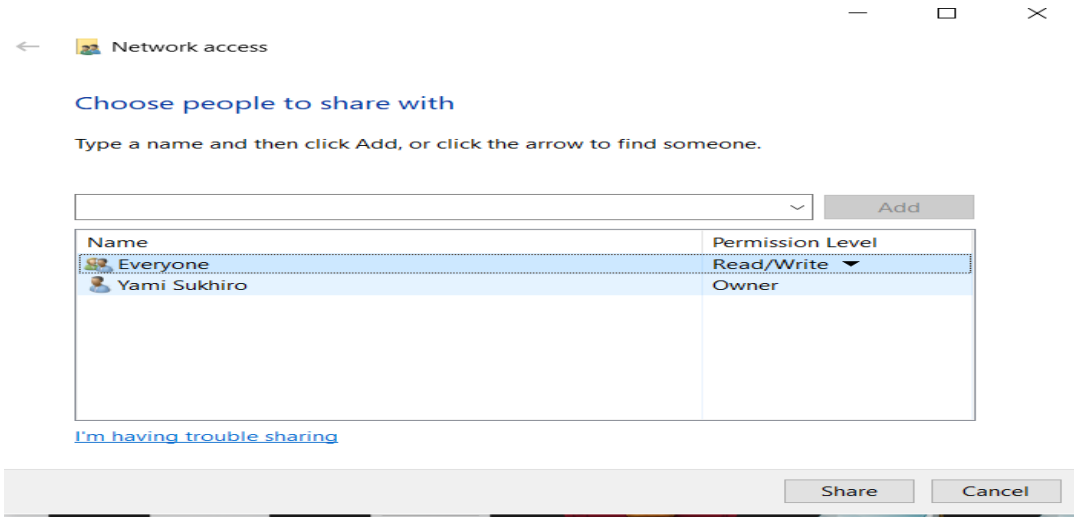
Step31: In the Base Machine Share an Iso file of Windows server 2022 over network.



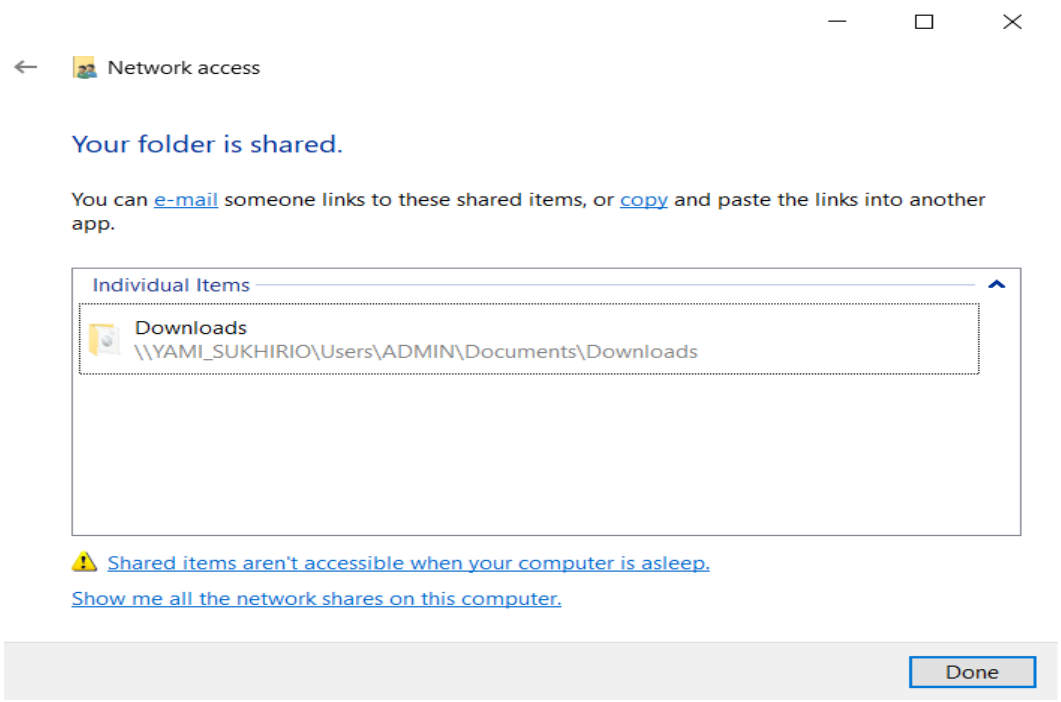
Step32: Select Everyone and Click on add.



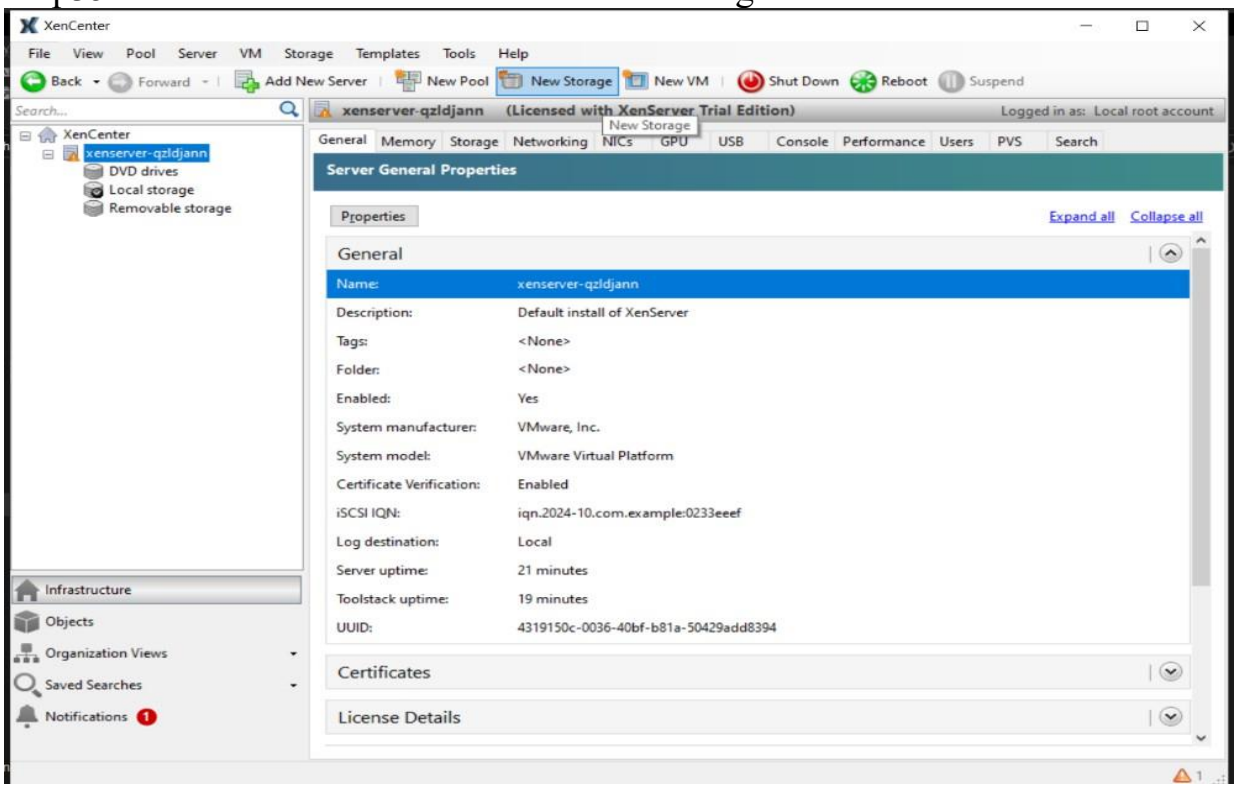
Step33: Change the permission level to Read/Write and click on Share.



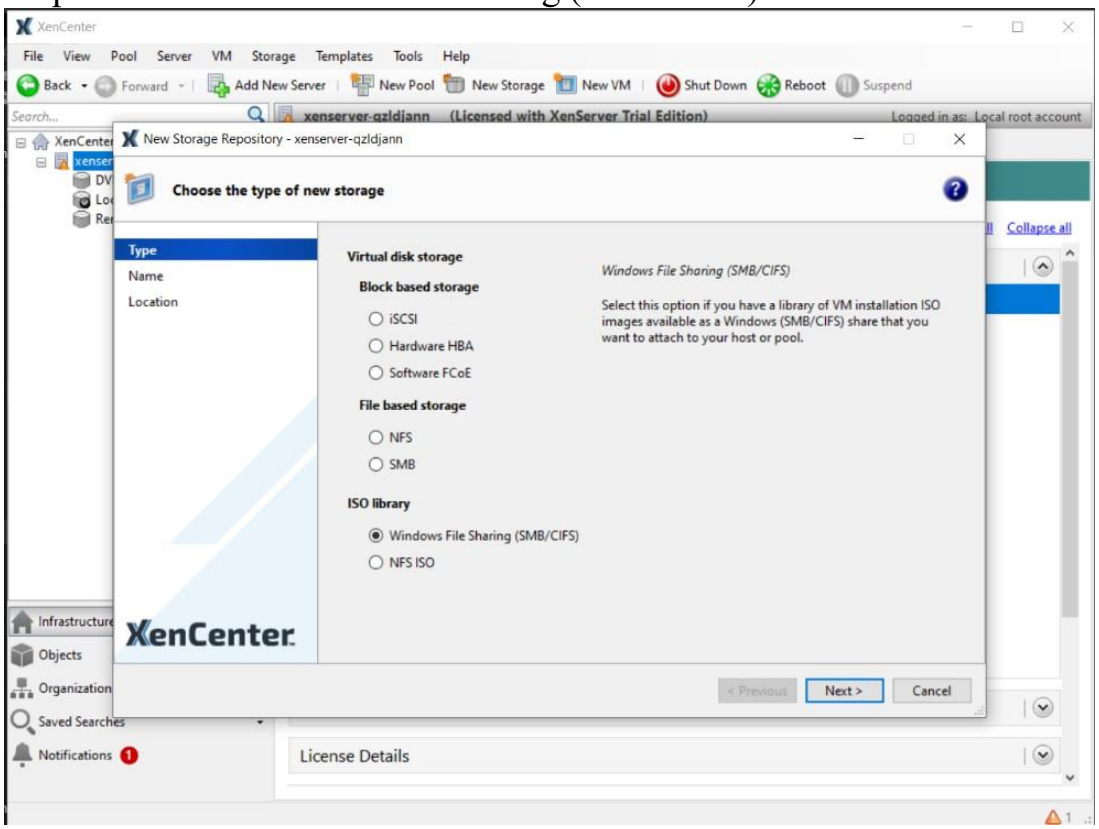
Step34: Copy the path.



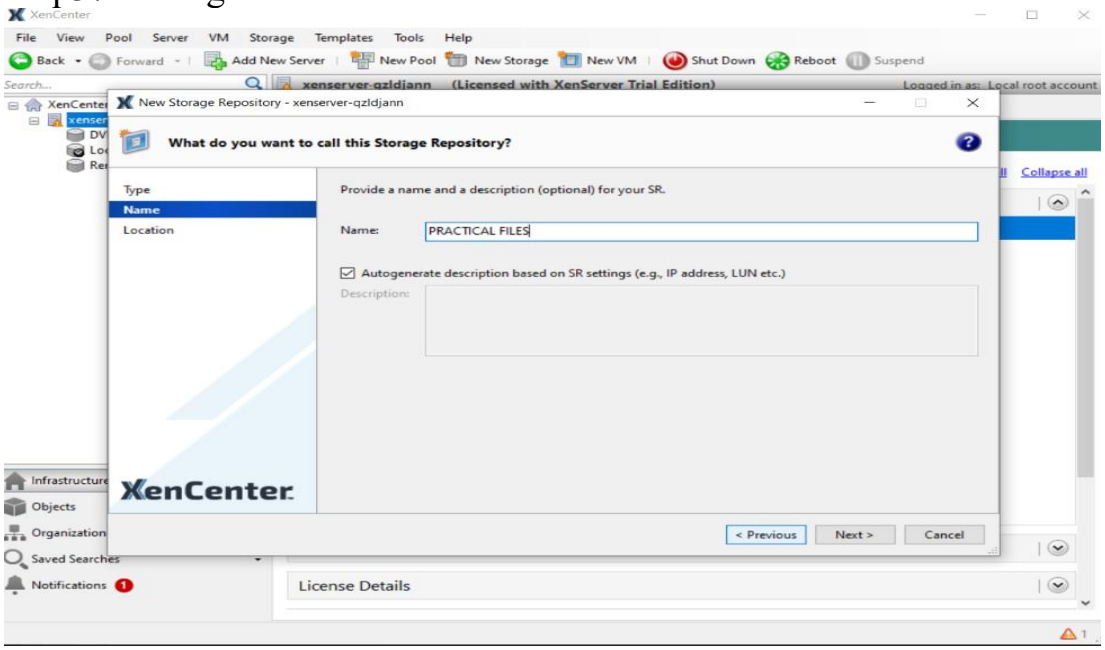
Step35: After Add the server Click on New Storage



Step36: Select Windows File Sharing (SMB/CIFS) and NEXT



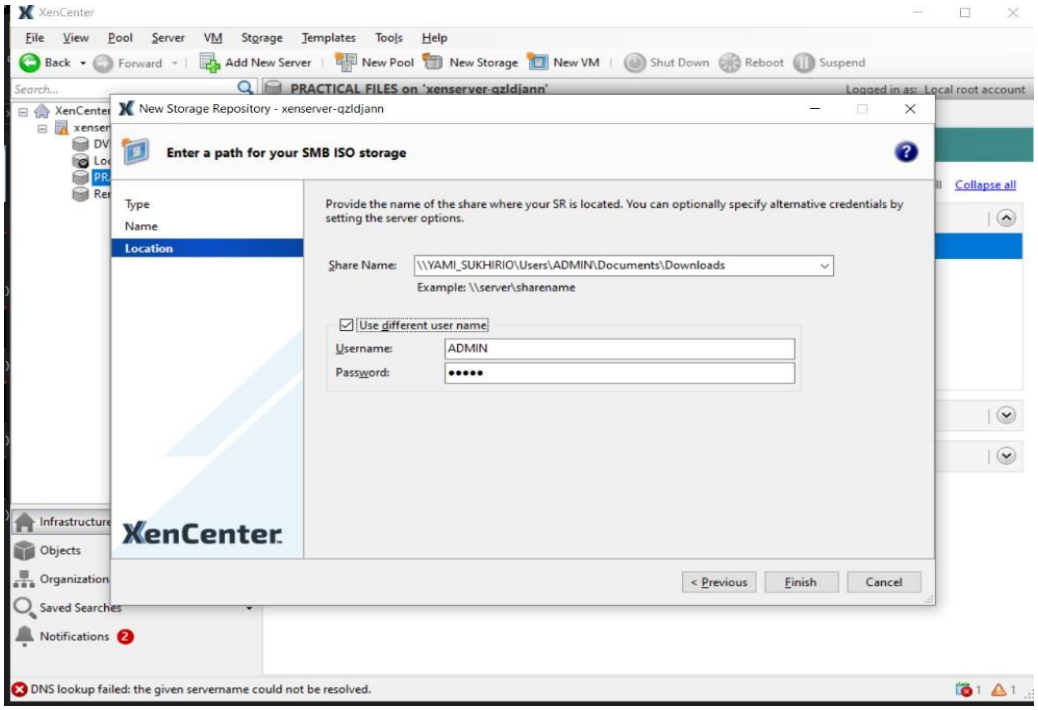
Step37: Change name to “PRACTICAL FILES” and NEXT



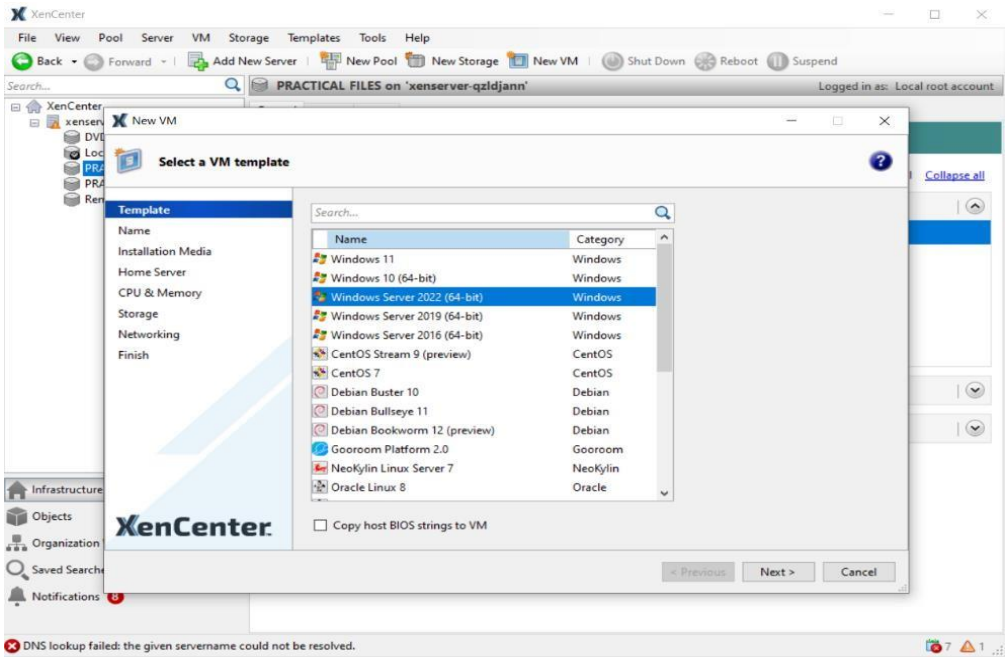
Step38: Paste the path of the file shared over the network.

(Remember file name should be written by \\Username\foldername\...)

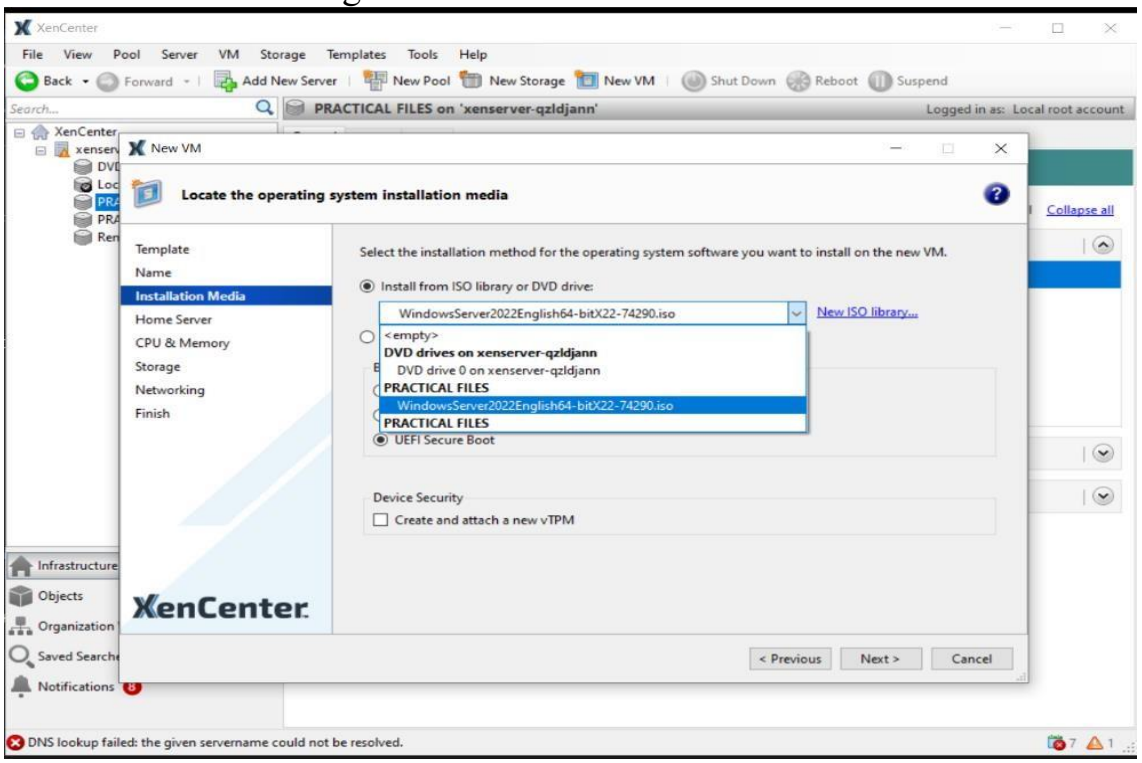
eg: "\\Downloads\Windows_server2022"



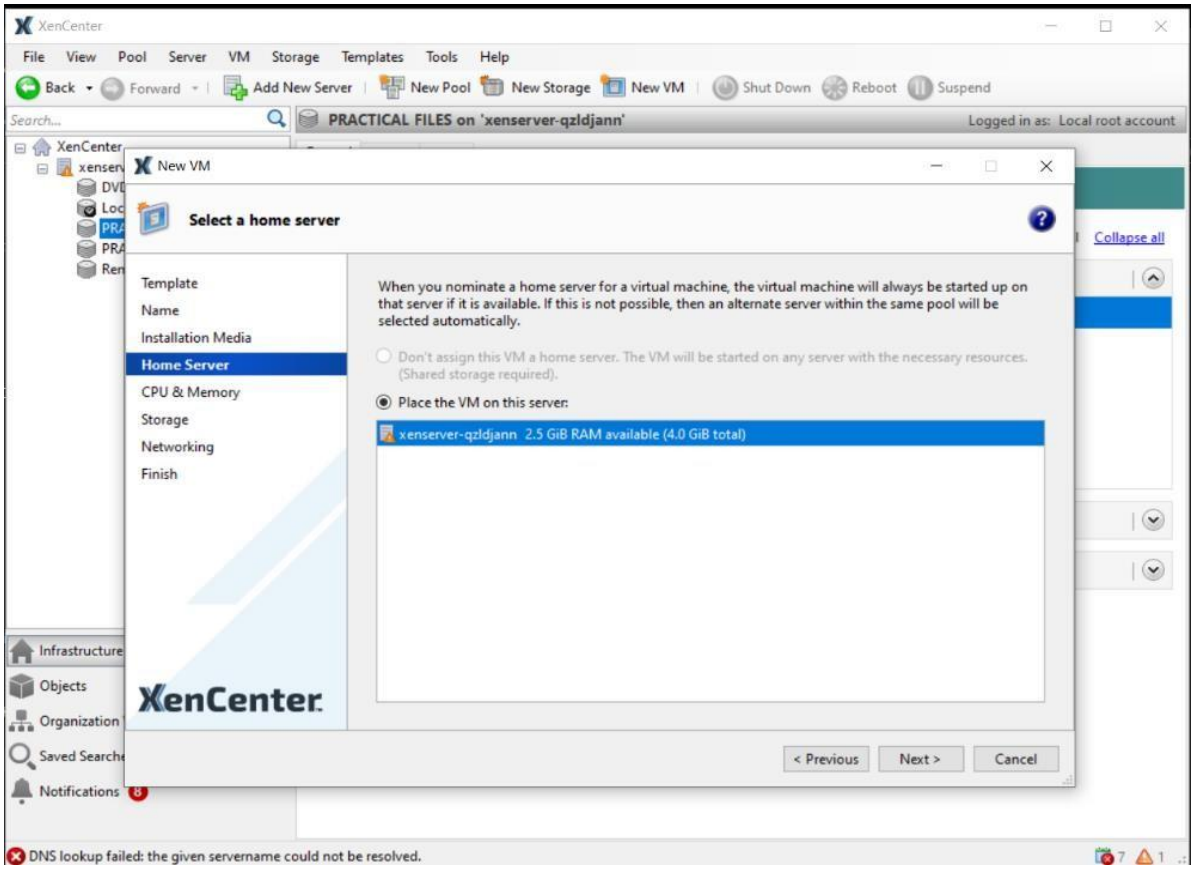
Step39: After adding a New Storage Click on New VM And Select Windows Server 2022(64-bit)



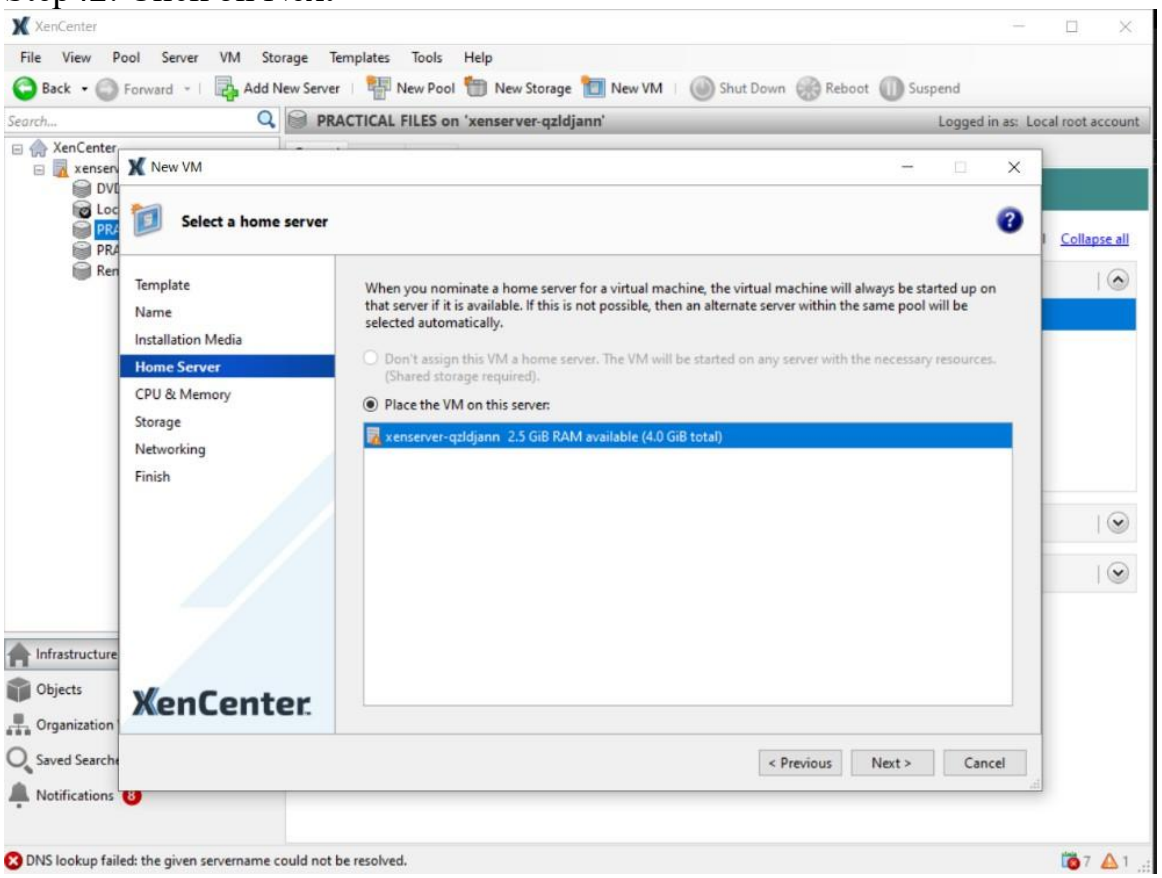
Step40: Select the ISO image which was shared over the network. - WindowServer2022English64-bitX22-74290.ios



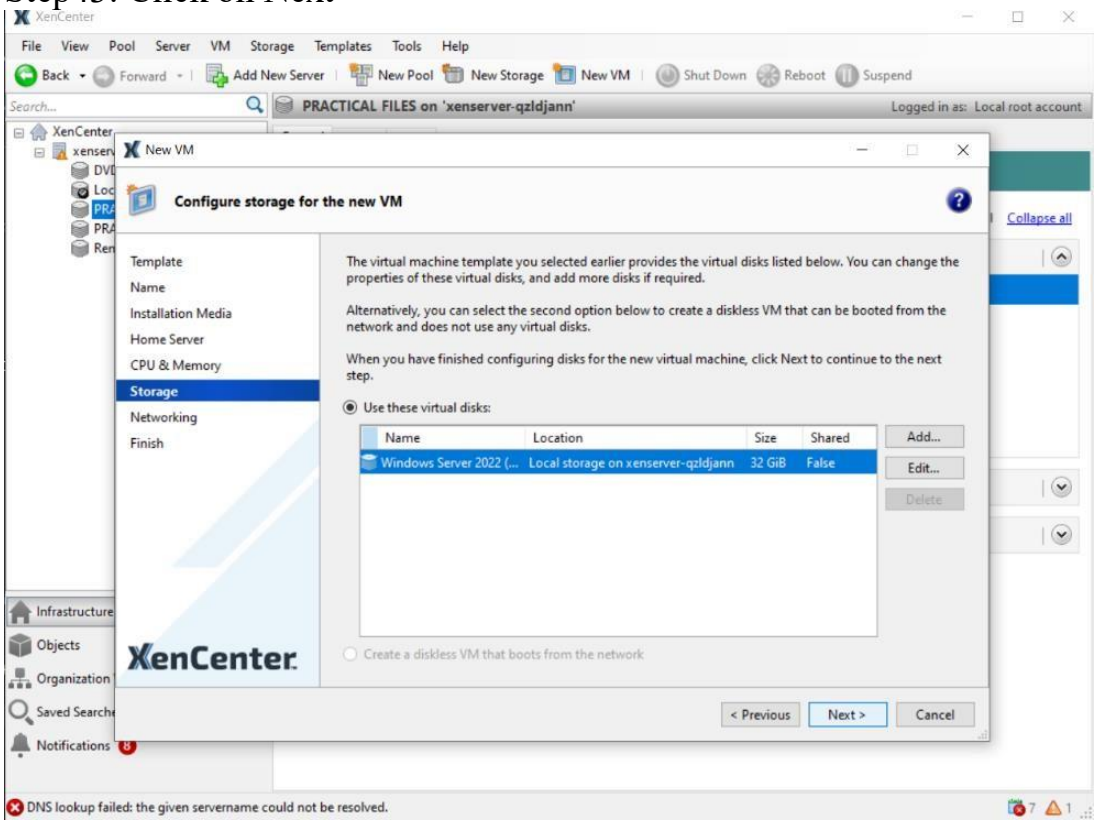
Step41: Click on Next



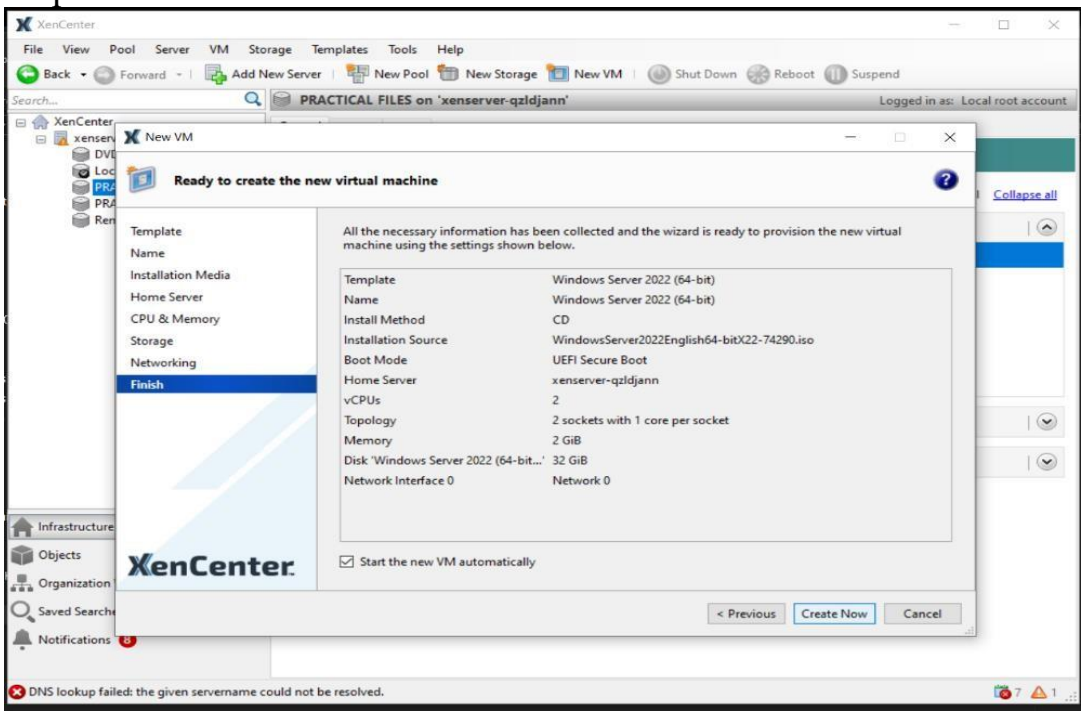
Step42: Click on Next



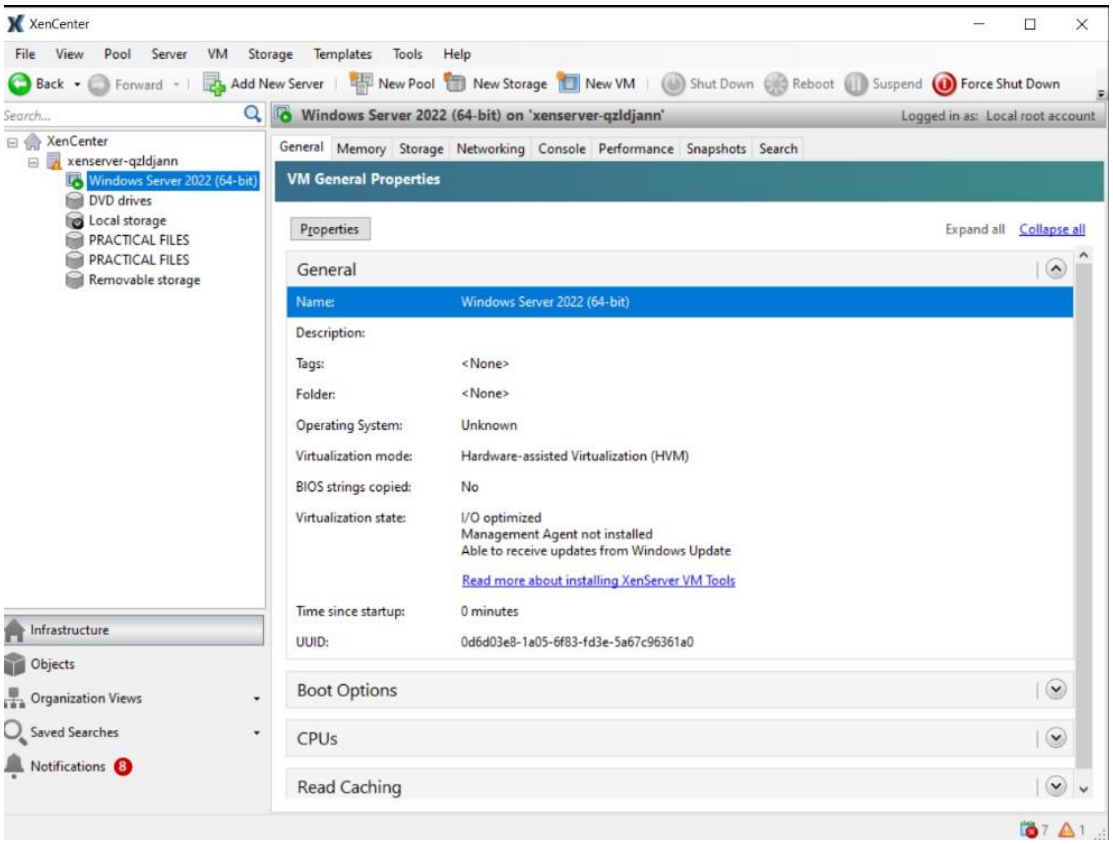
Step43: Click on Next



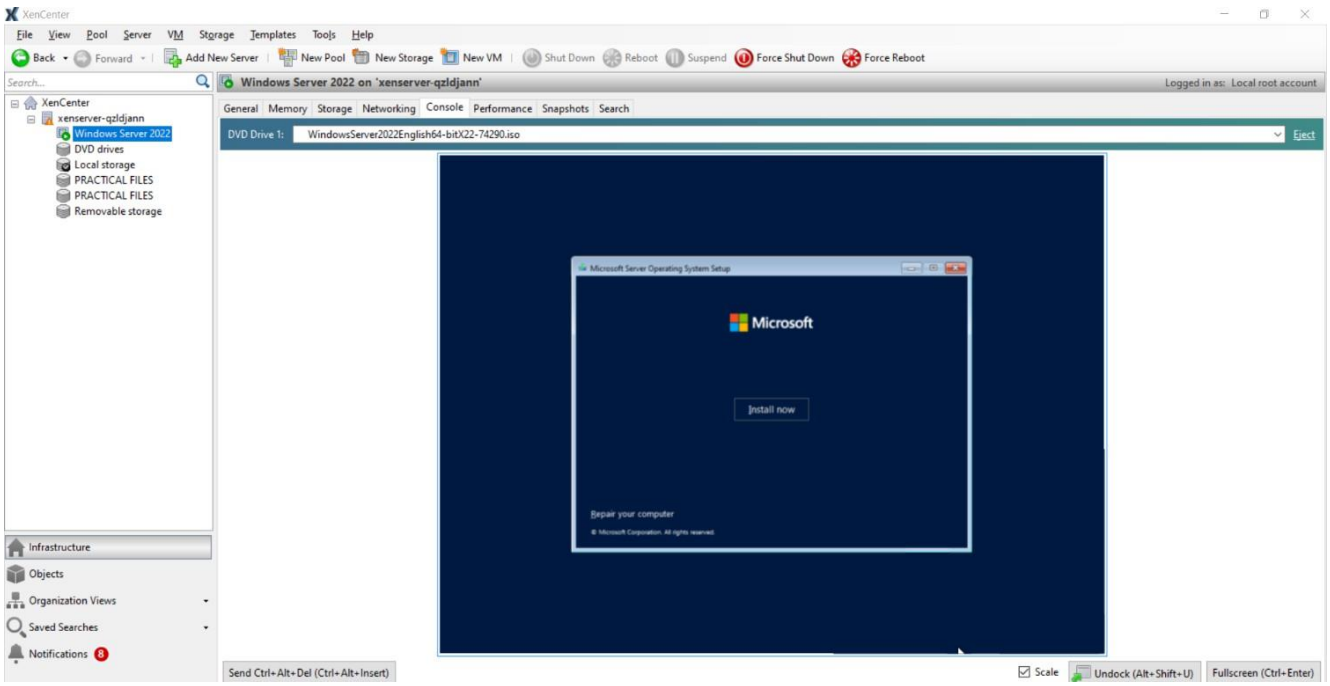
Step44: Click on Create Now



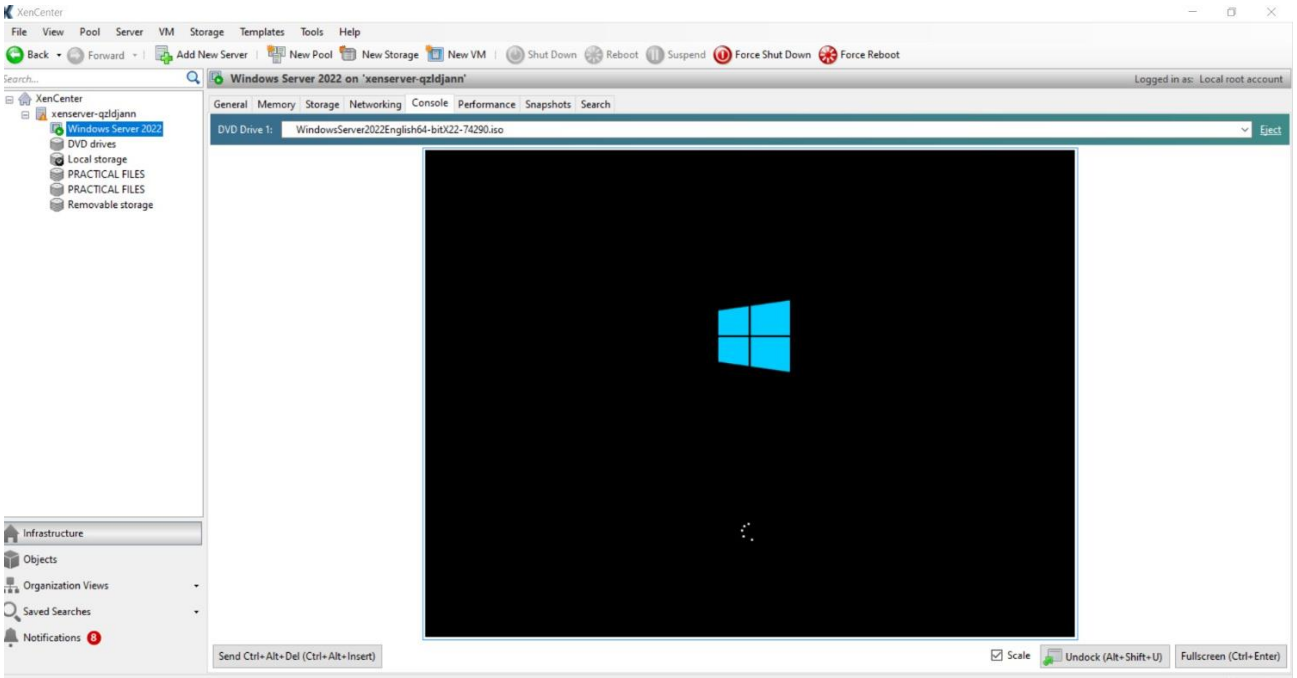
Step46: Click on Windows Server 2022(64-bit) & Navigate to Console tab.



Step47: Click on Install



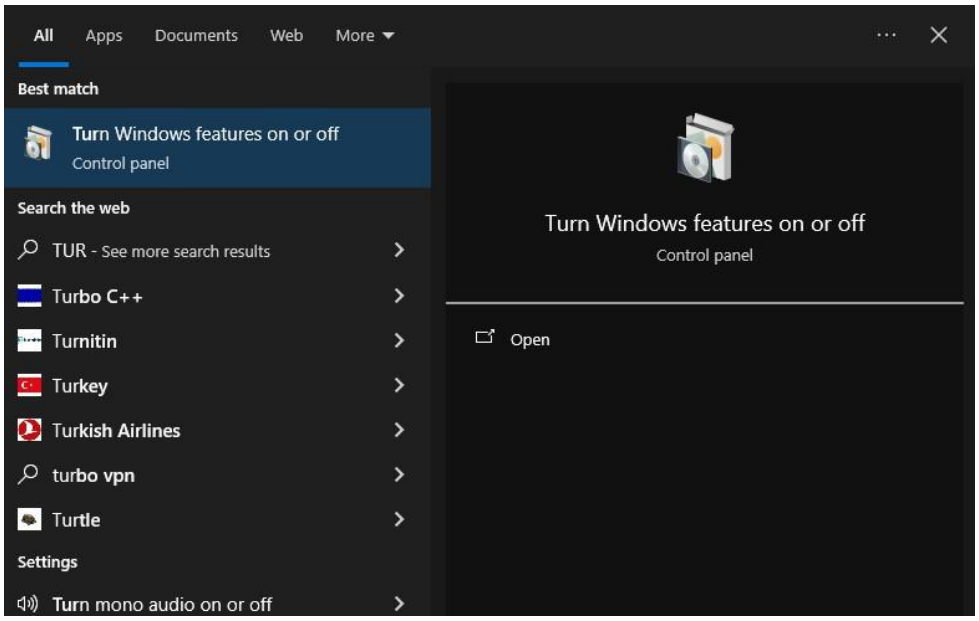
Step48: And Install Windows Server in Xen-Server



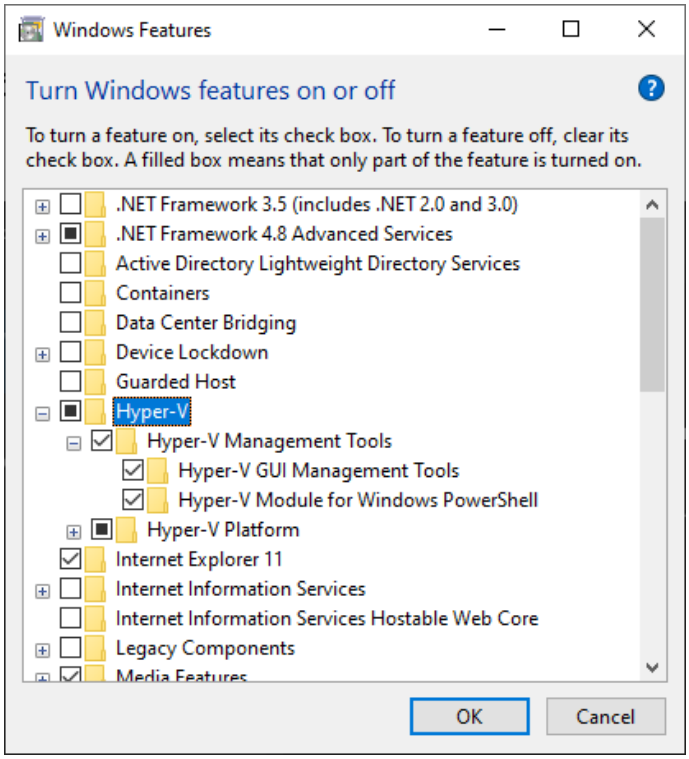
PRACTICAL 6

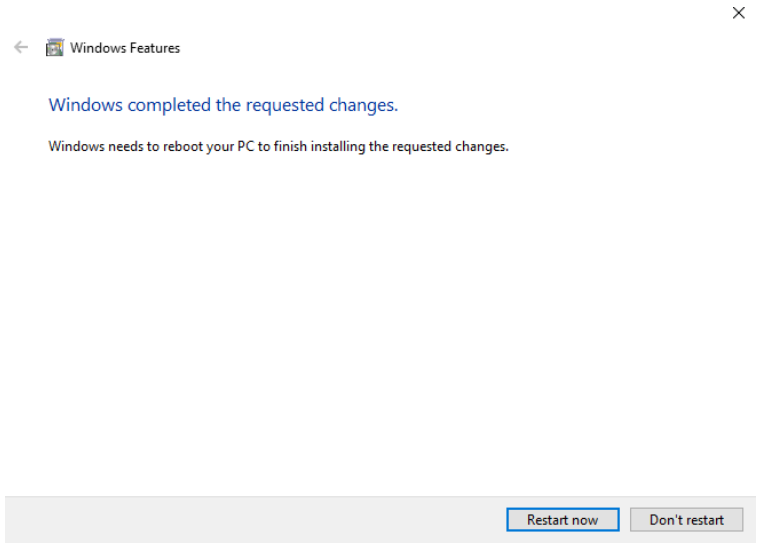
Aim: - Implementing Hypervisor
Requirements: - Hyper V manager
Steps: -

Step1: - Search for Turn Windows feature on or off.

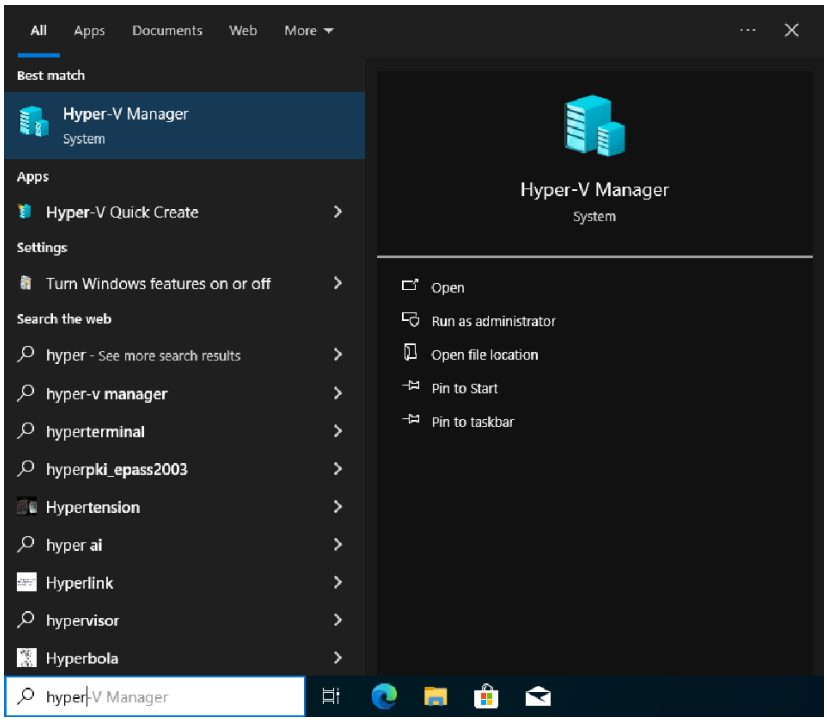


Step2: - Now check the Hyper V option → Ok.
Then device will restart or reboot

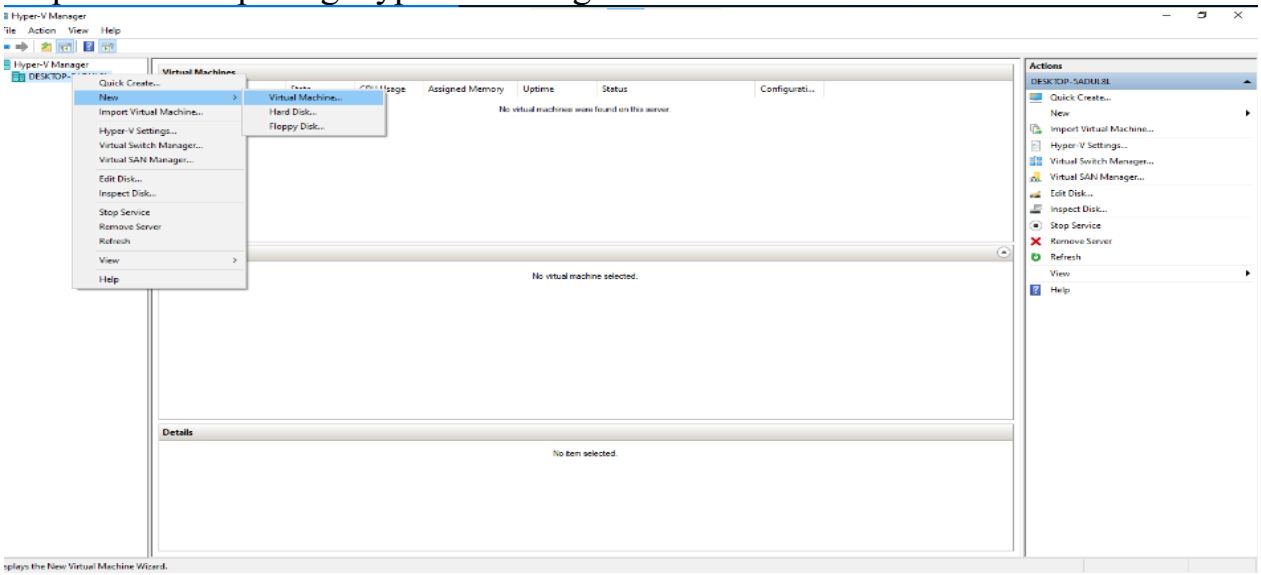




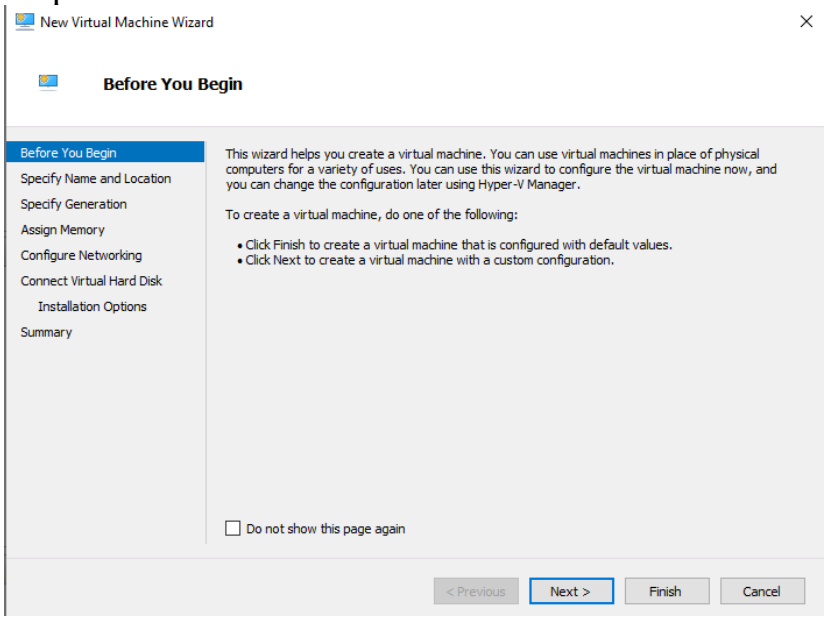
Step3: - Now Open Hyper v manager



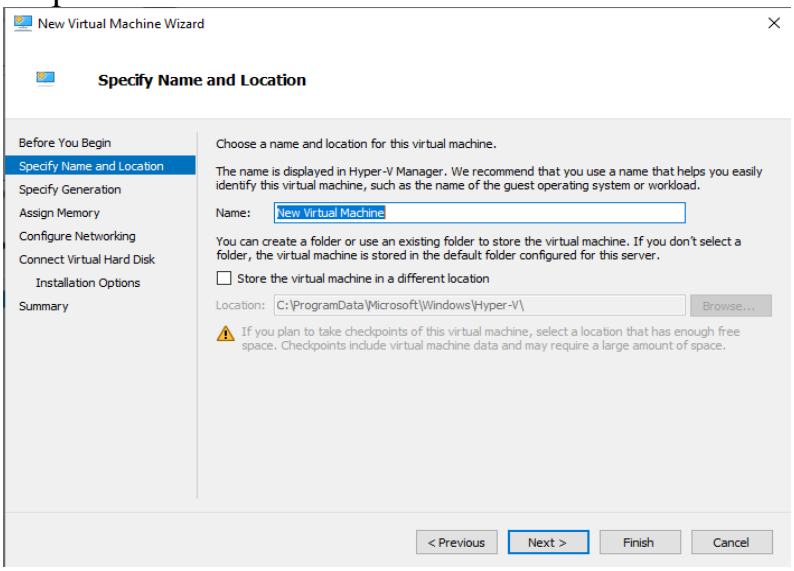
Step4: - After opening Hyper V Manager create new virtual machine.



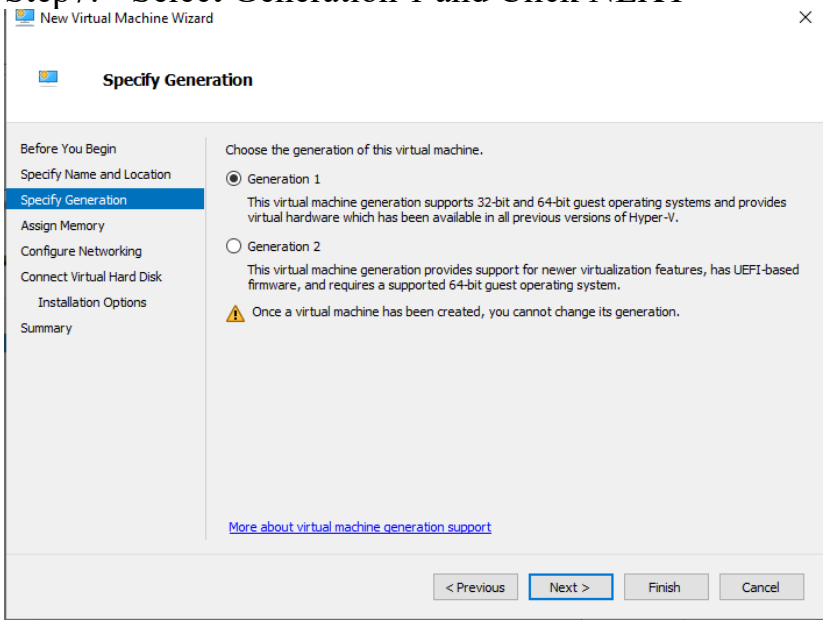
Step5: - Click NEXT



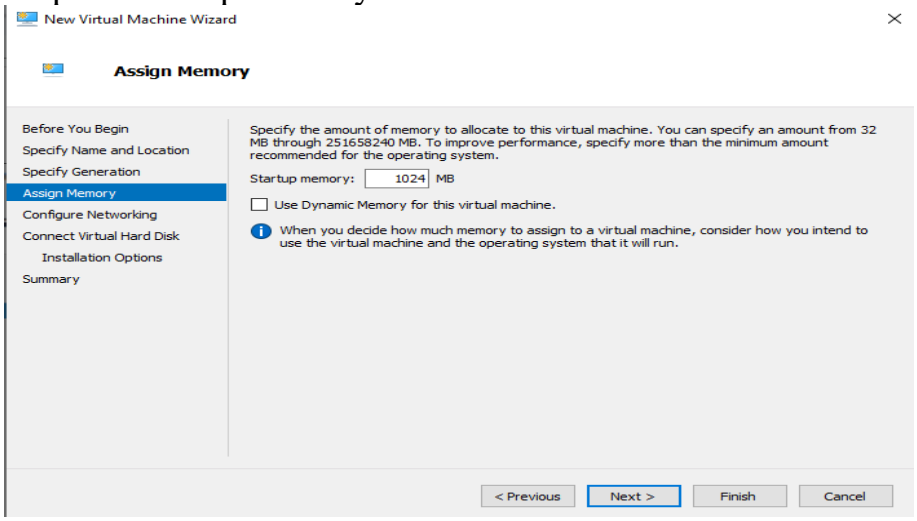
Step6: - Name the machine as “NEW VIRTUAL MACHINE”



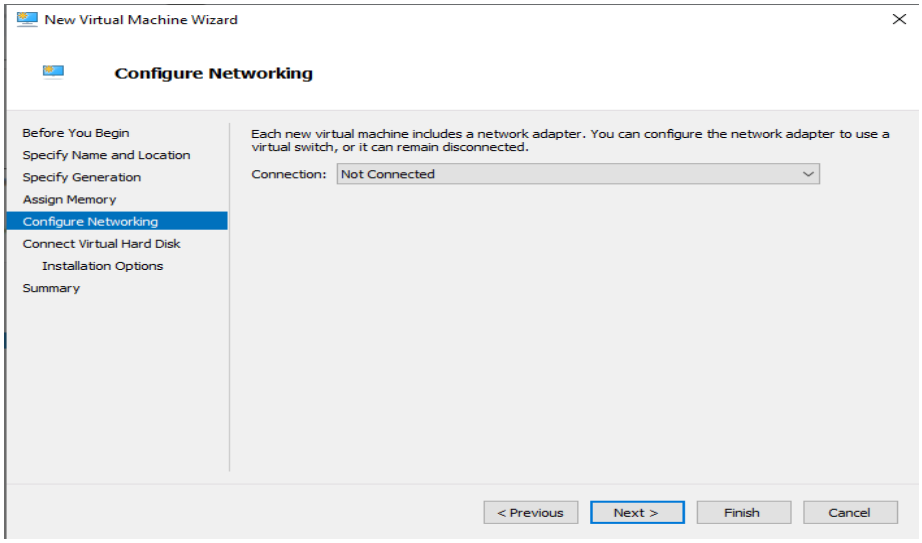
Step7: - Select Generation 1 and Click NEXT



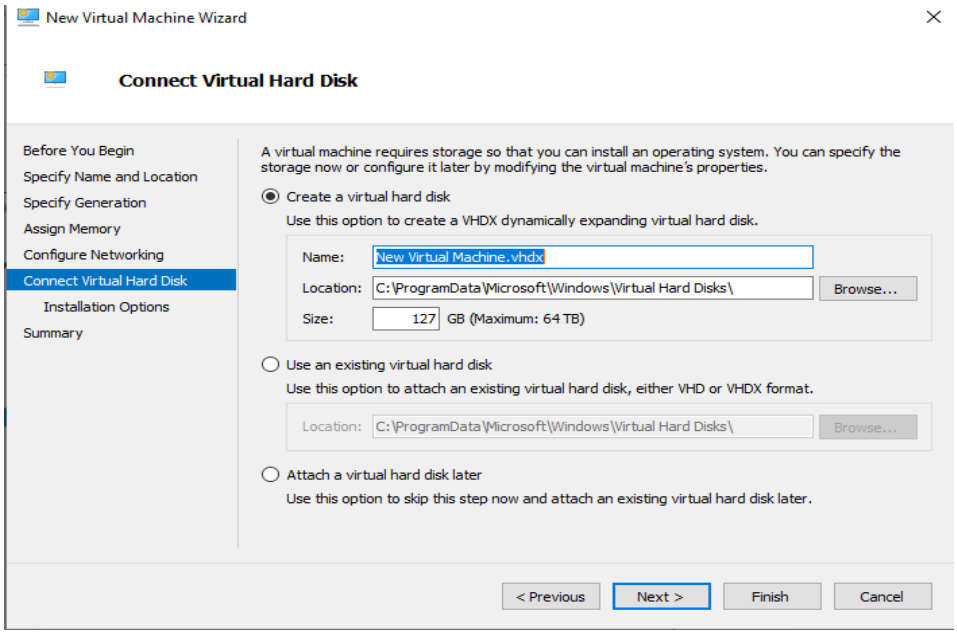
Step8: - Startup memory: 1024 MB and Click NEXT



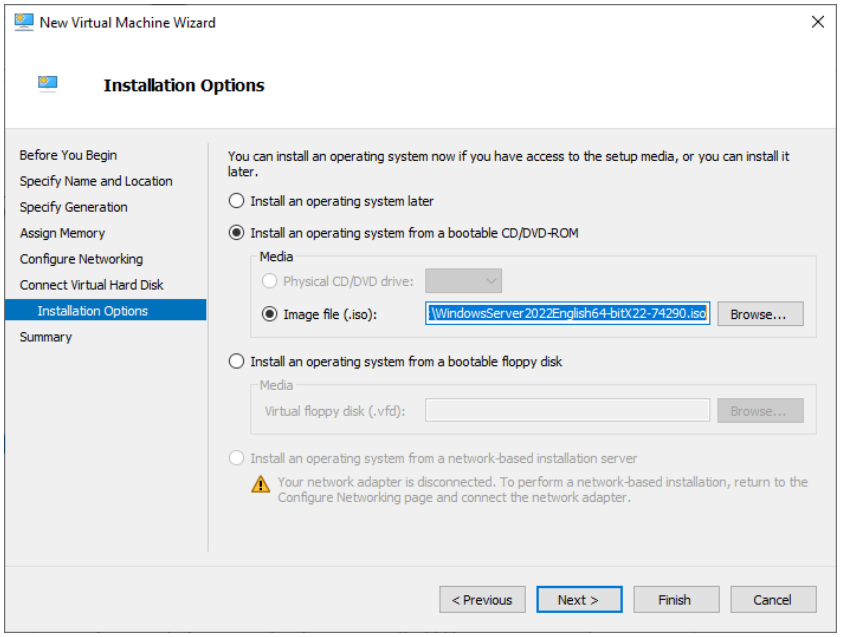
Step9: - Keep the Default Setting of Configuration Networking.



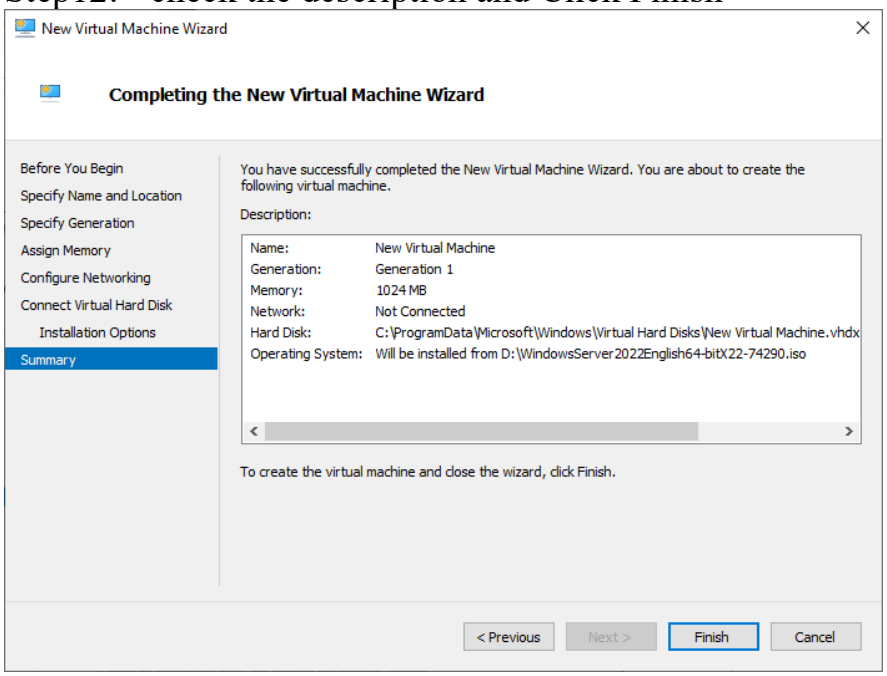
Step10: - Select the “Create a virtual hard disk” and give it a name, location and set the size to 127GB then Click NEXT



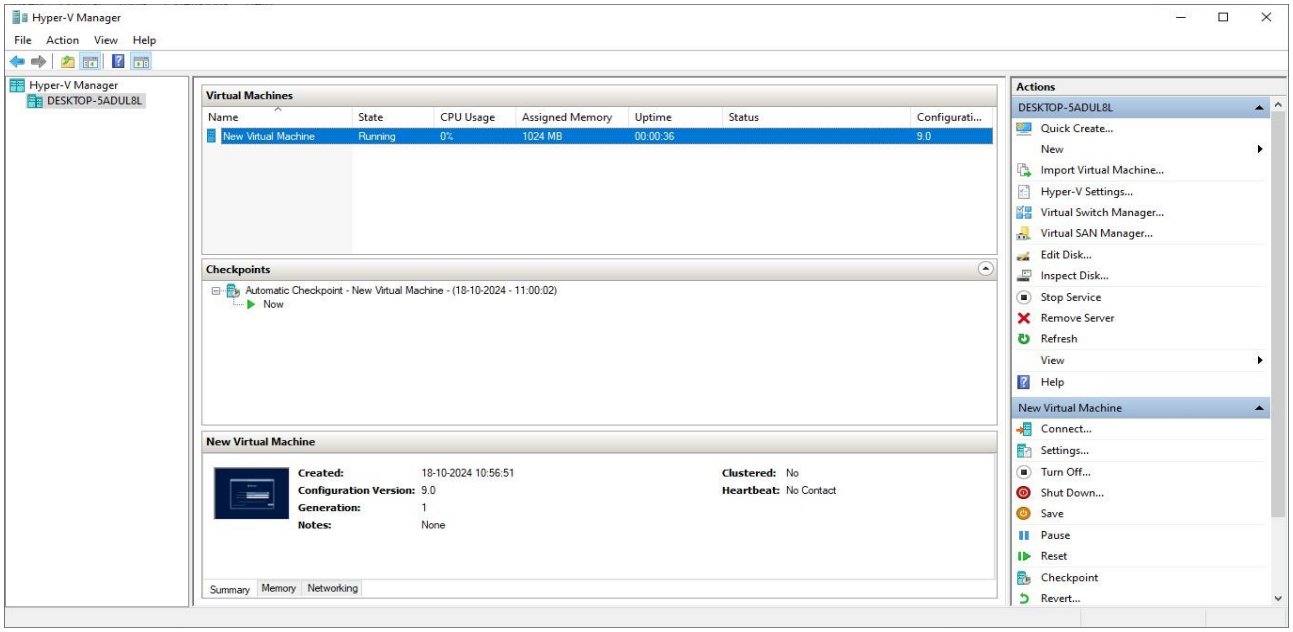
Step11: - Now select the **Install an operating system from a bootable CD/DVD-ROM** option, in this select **Image file(.iOS)** and browse the **windowserver2022.ios file** then **Click NEXT**



Step12: - check the description and Click Finish



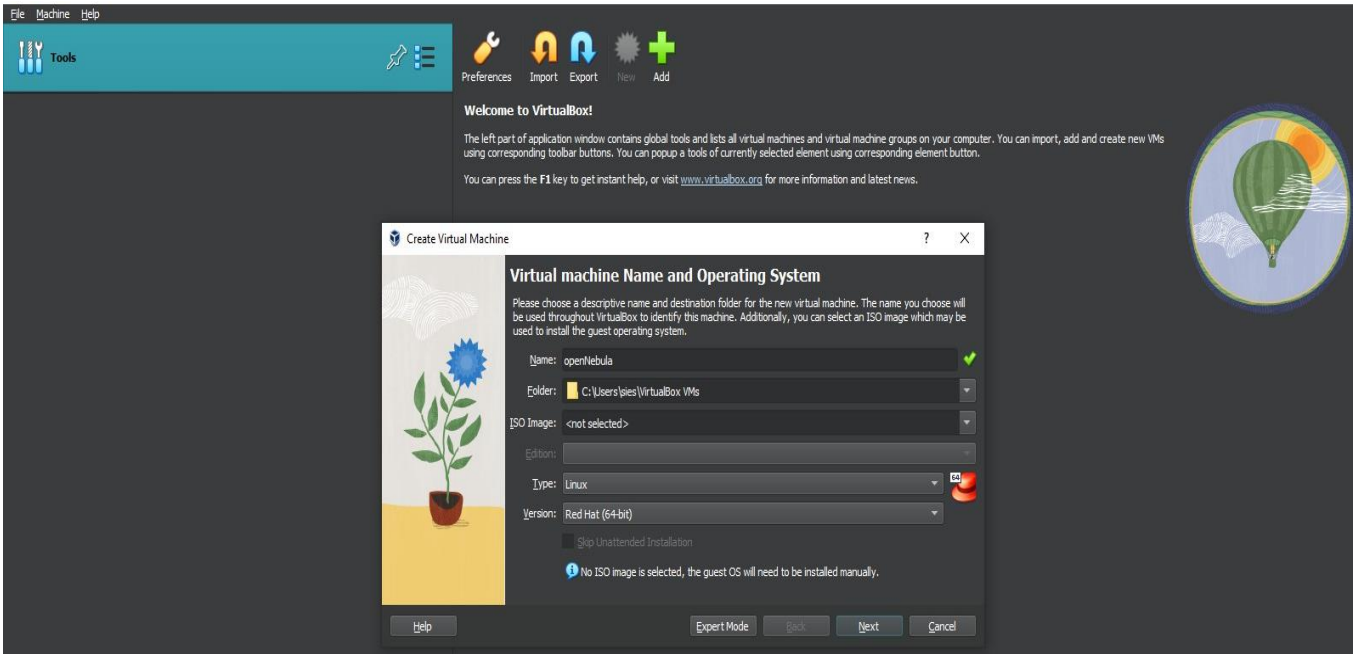
Step13: - power on the virtual machine



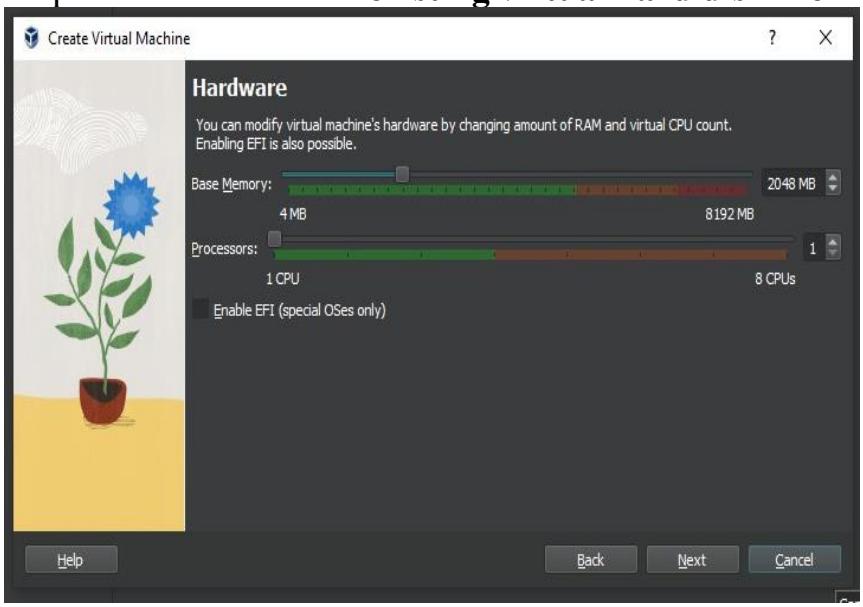
PRACTICAL 7

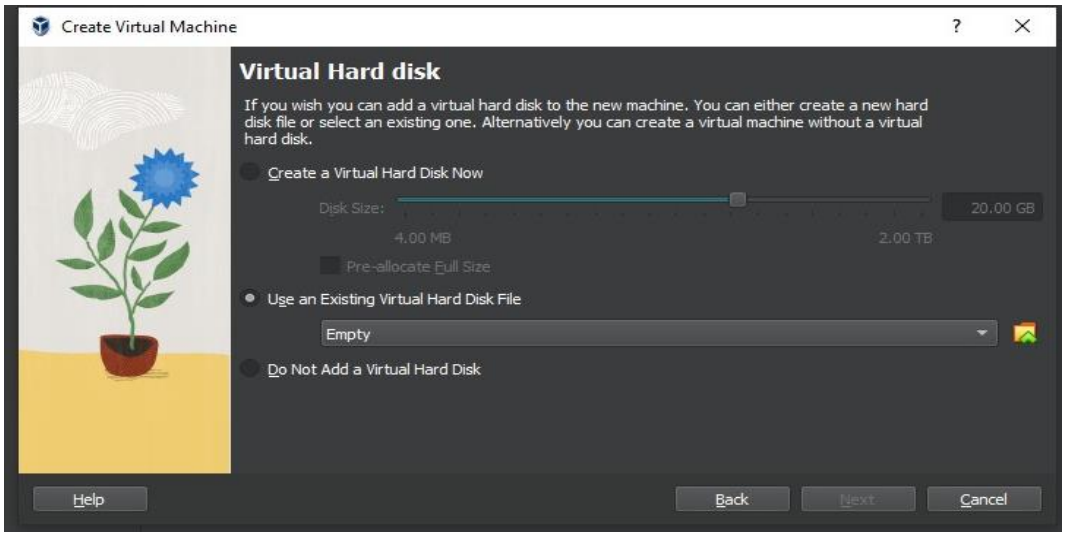
Aim - Implementing open Nebula.
Requirements: - oracle vm virtual box, open nebula sandbox
Steps: -

Step1: - Open oracle Vm VirtualBox → Click on New → Give name, Type - Linux, Version - Red Hat(64-bit) → Next.

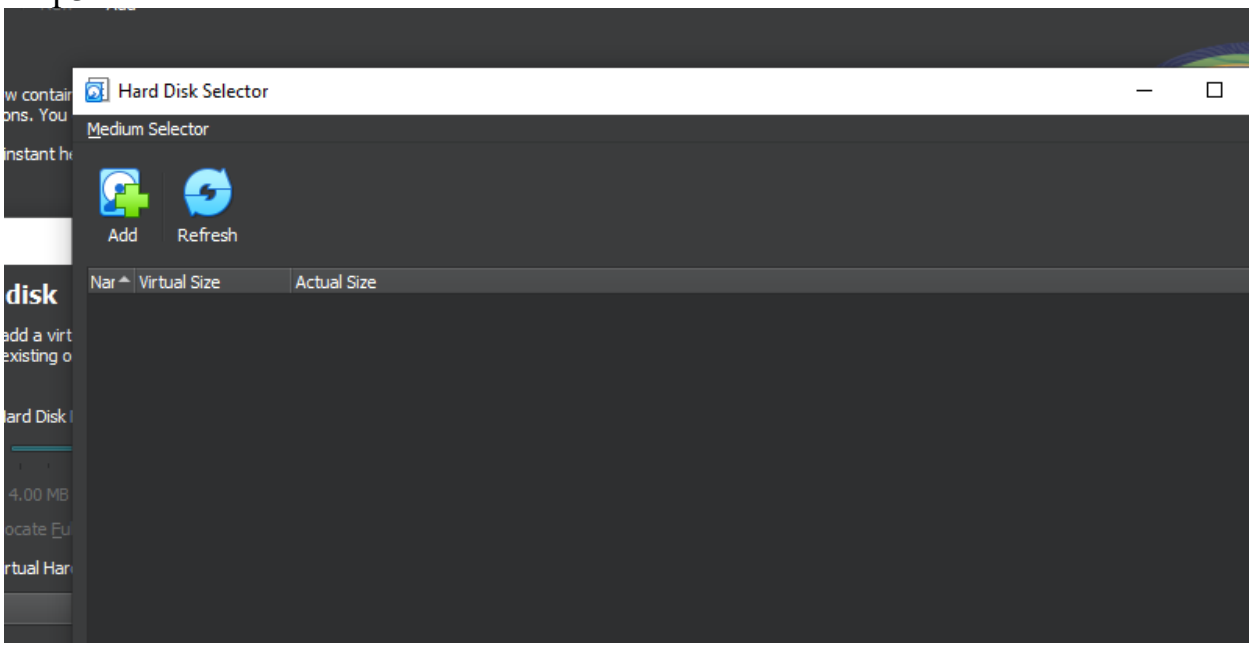


Step2: - Click on a "use **existing virtual hard disk file"**

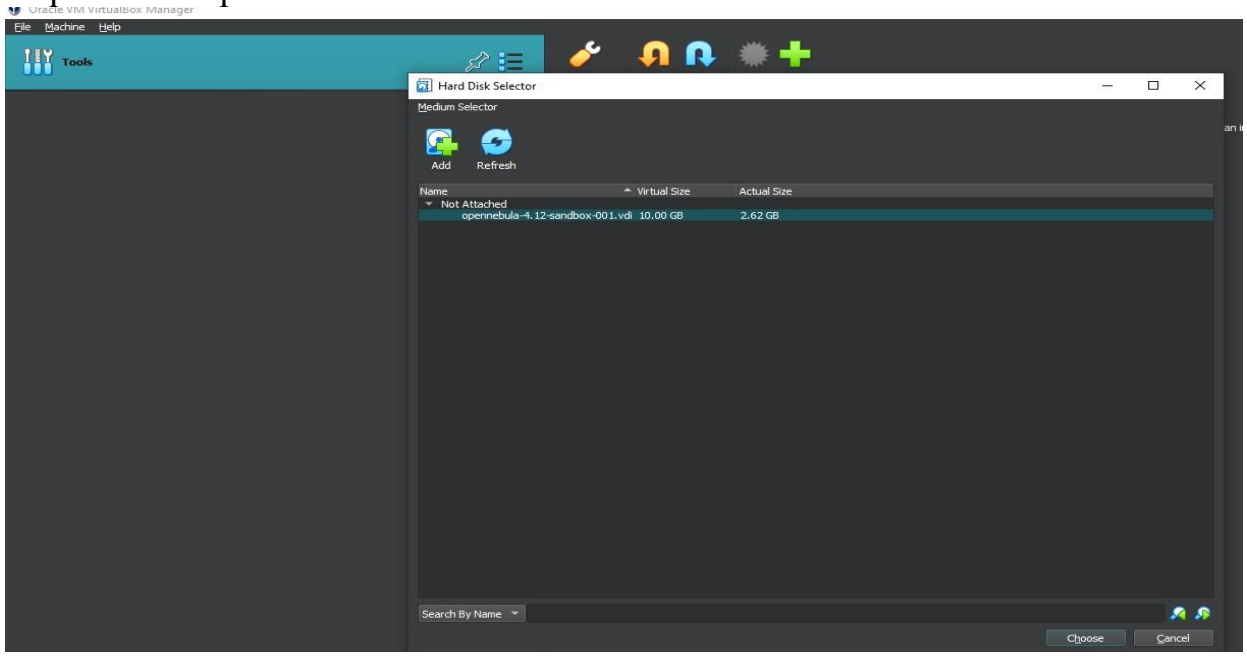




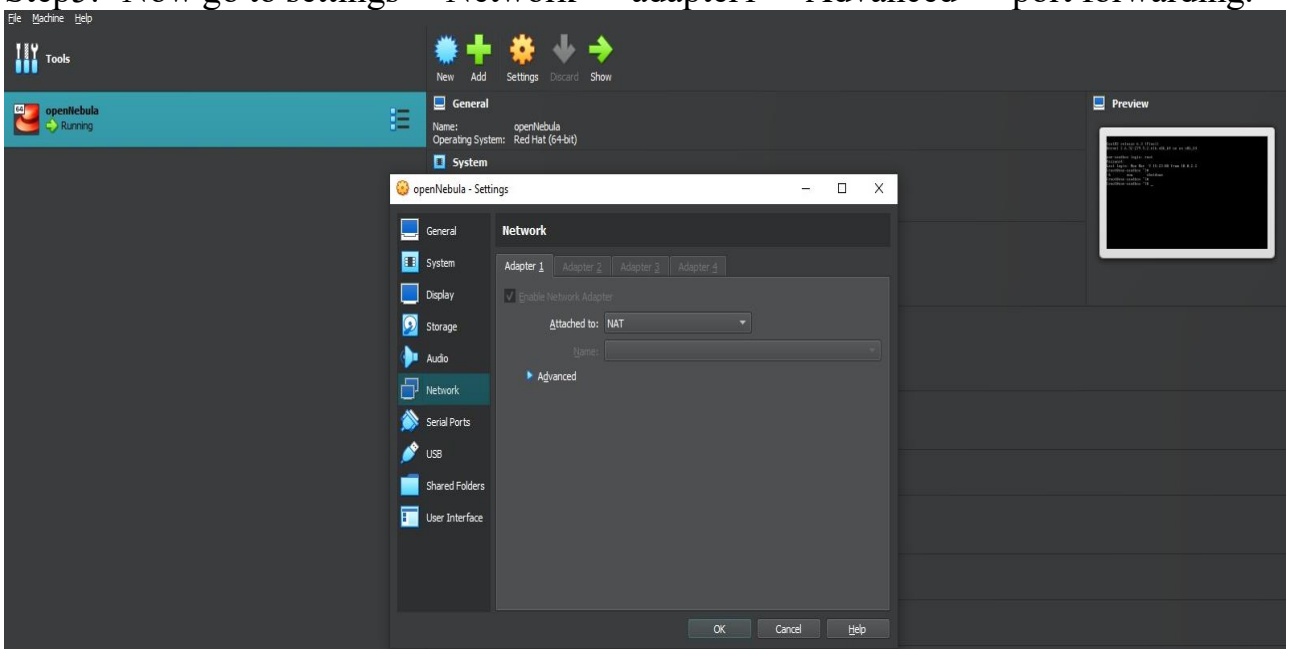
Step3: -Click on add.



Step4: - Add open nebula sandbox → Choose → finish.

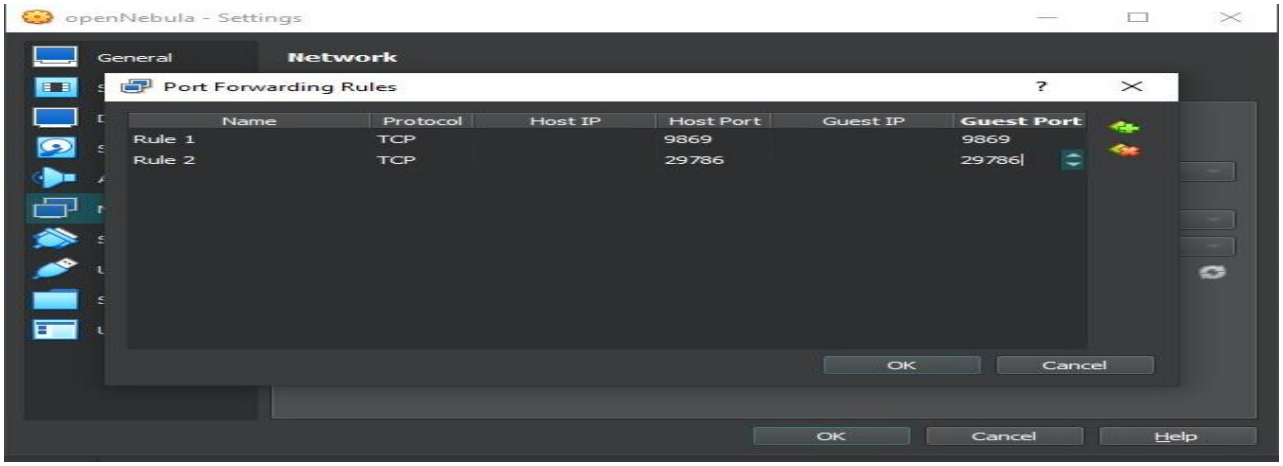


Step5: -Now go to settings →Network → adapter1 →Advanced → port forwarding.

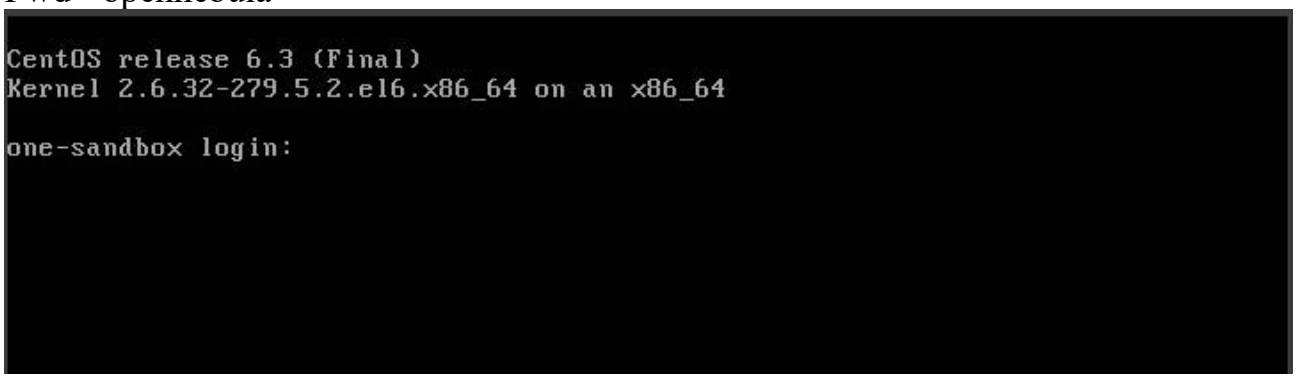


Step6: -Now add host port and guest port number then add one more.
(Remember the port numbers)

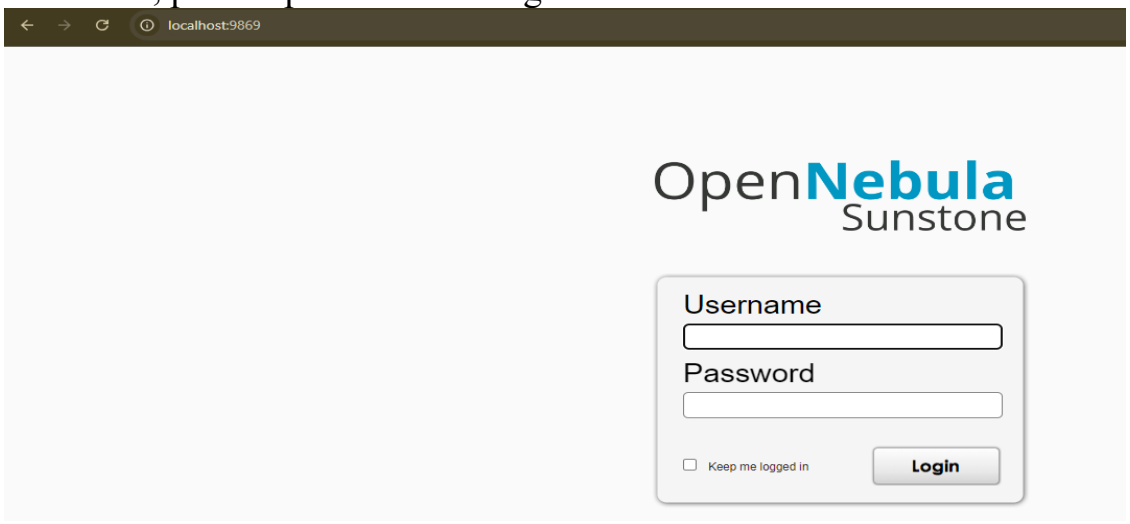
Step7: - Click Ok → ok → click
on start



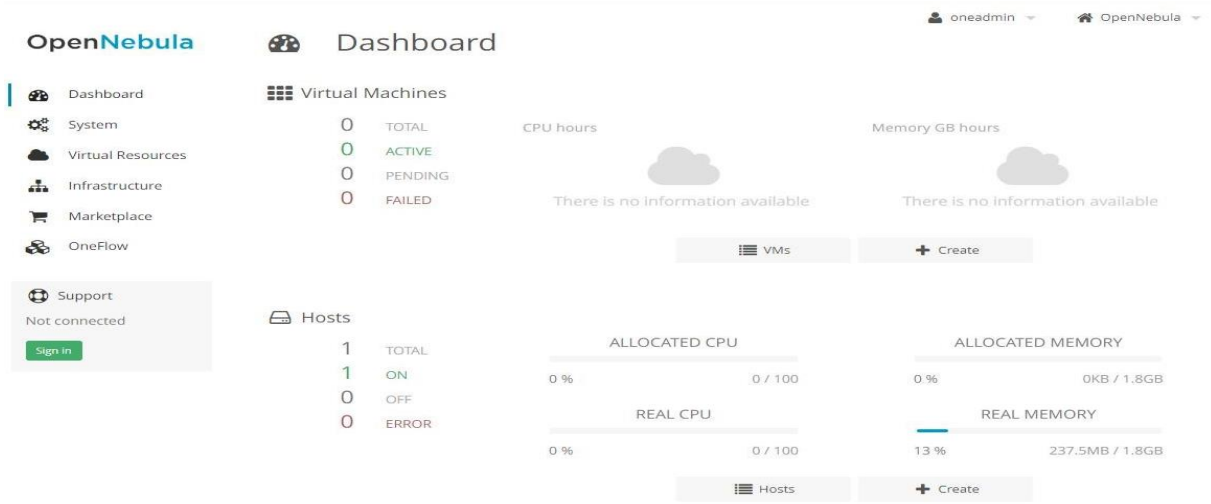
Step8: - Login - root.
Pwd - opennebula



Step9: -Now minimize and open browser(chrome) → localhost:9869 → username - oneadmin, pwd - opennebula → login.

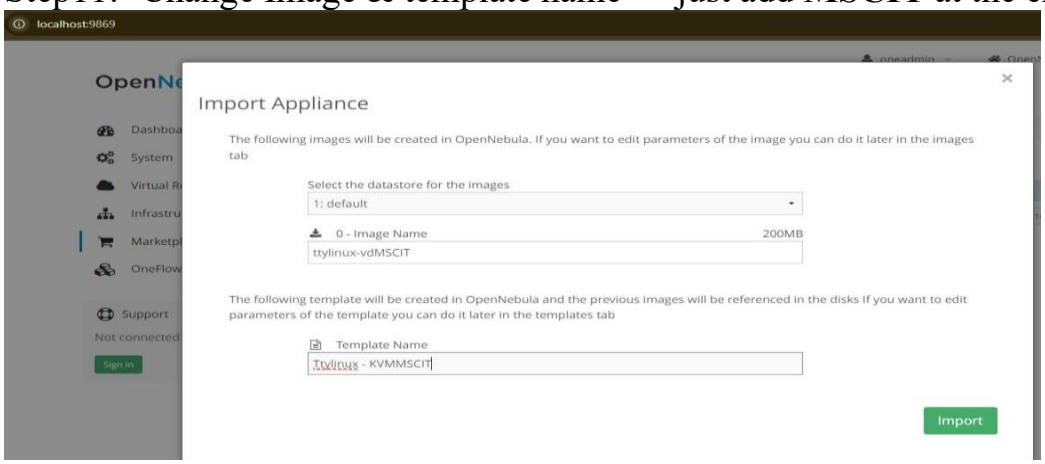


Step10: -Now u can see this interface.

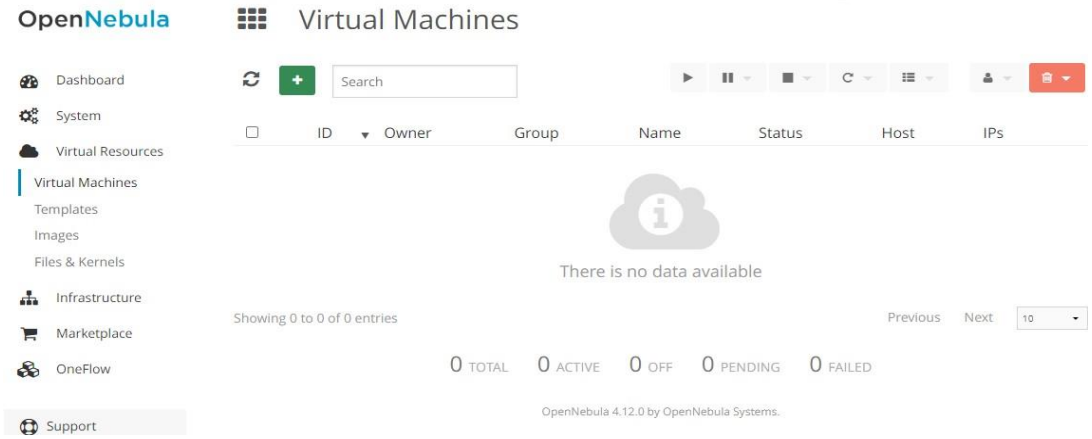


Step10: -Click Marketplace → search “tty” → TtyLinux KVM → Click on checkbox and then refresh → once the status is “running” → click **import.**

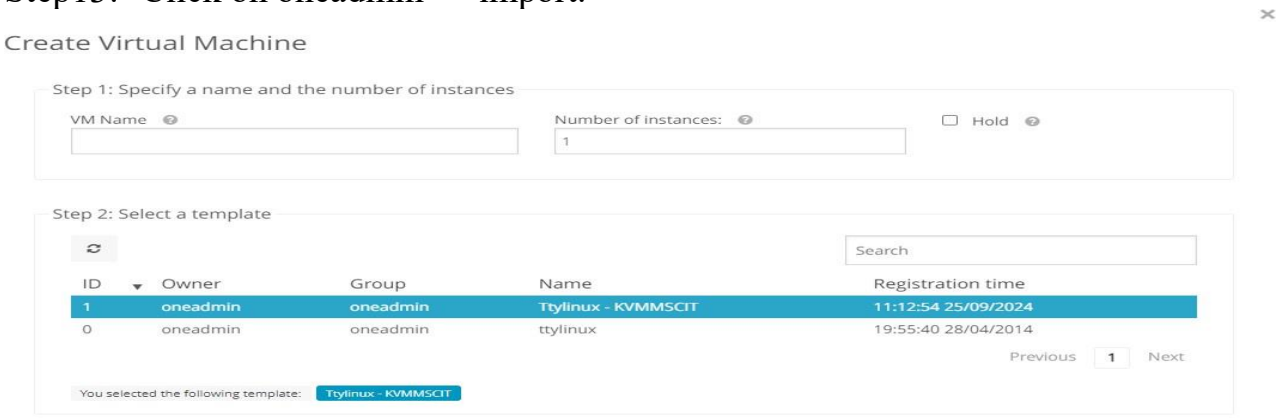
Step11: -Change Image & template name → just add **MSCIT** at the end → import.

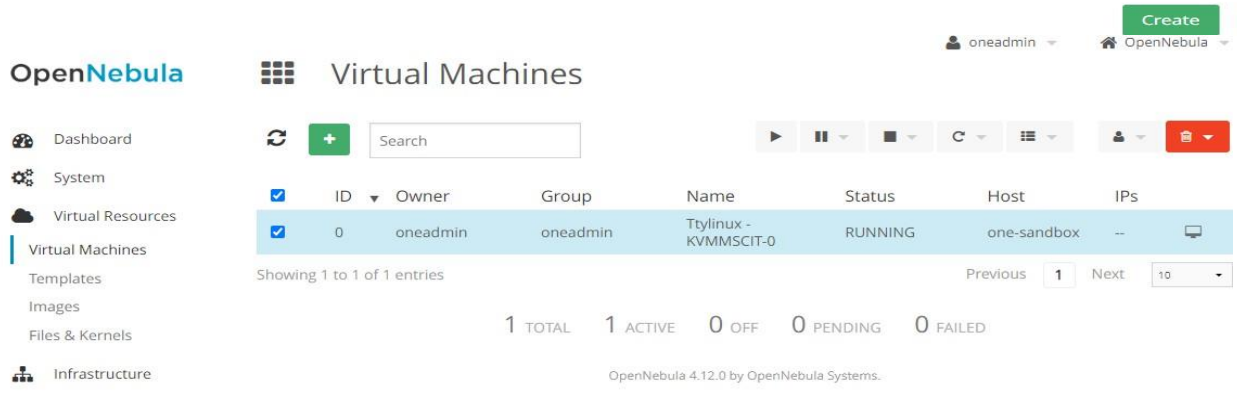


Step12: -Click Virtual Resources → Virtual Machines → Click on "+" button.



Step13: -Click on oneadmin → import.





PRACTICAL 8

Aim - Implementing Amazon Web Service AWS

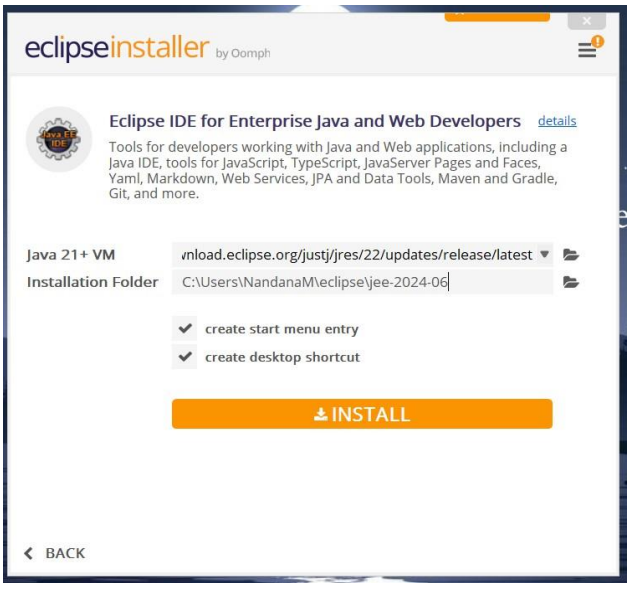
Requirements: - Eclipse installer, tomcat Apache 10.1 v

Steps: -

Step1: -Install tomcat Apache in your pc. install 10.1 version and then execute it Install eclipse from its official website.

Step2: -Click on

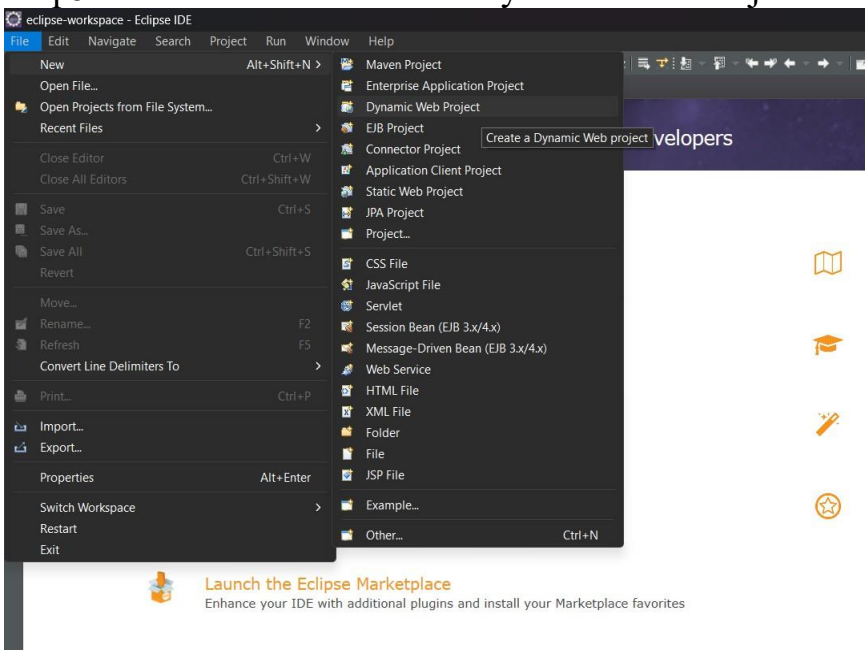
Step3: - Click on Install



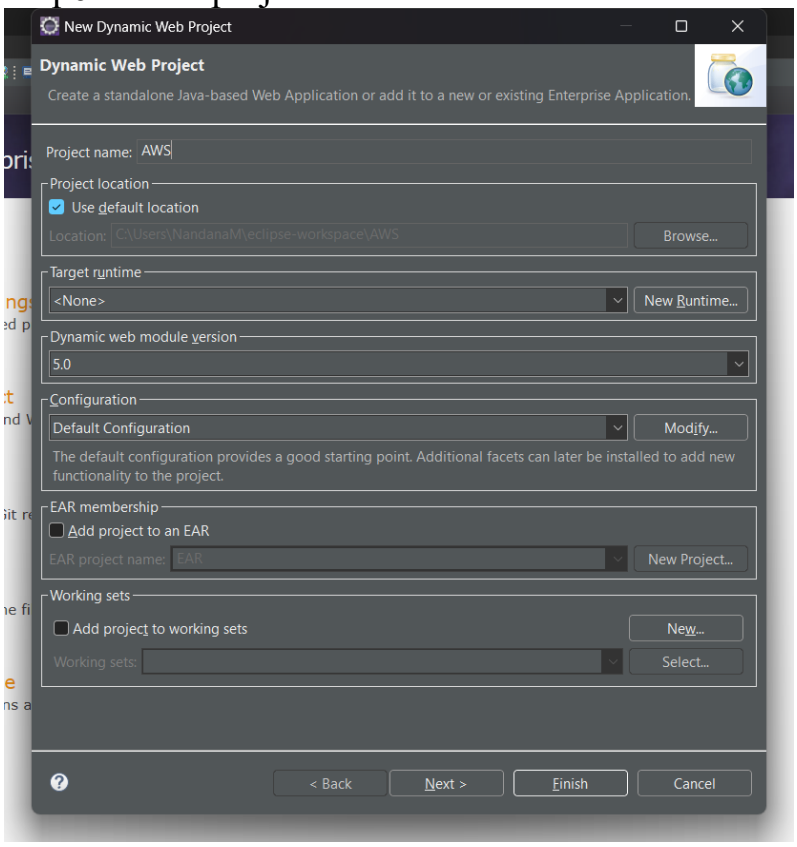
Wait until the installation is completed.

Step4: - Click on Launch

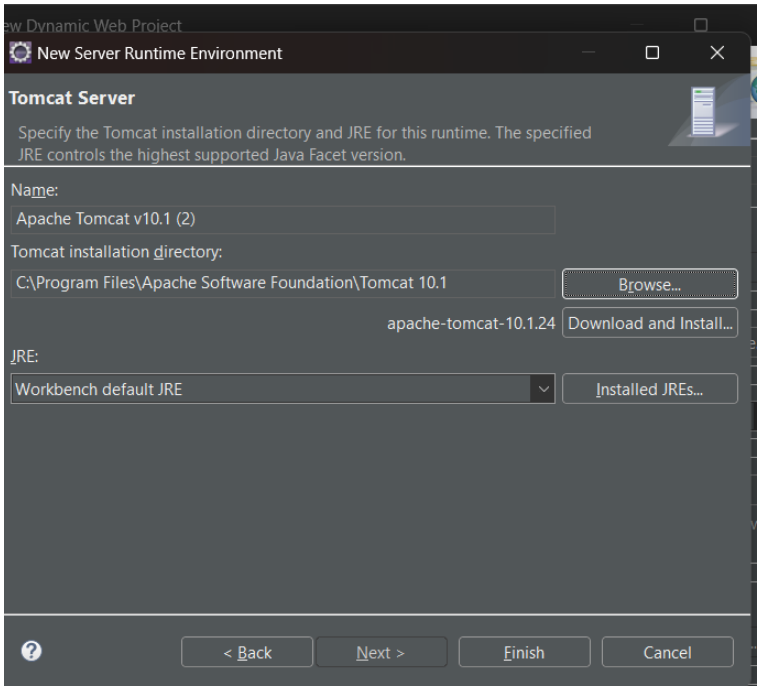
Step5: - Click on File > New > Dynamic Web Project



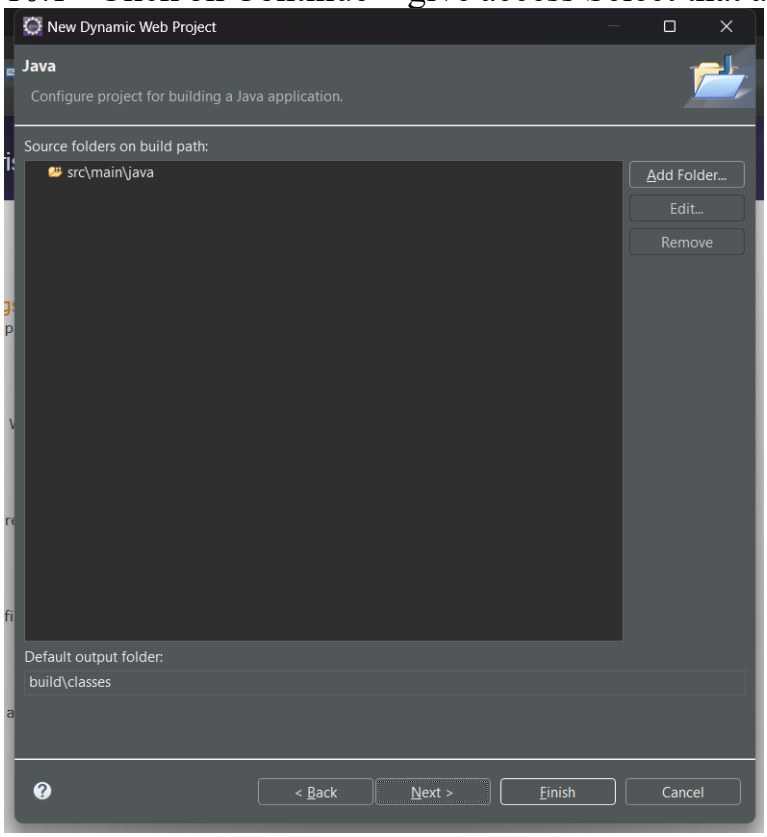
Step6: - Give project name as “AWS” and then click on “Next”



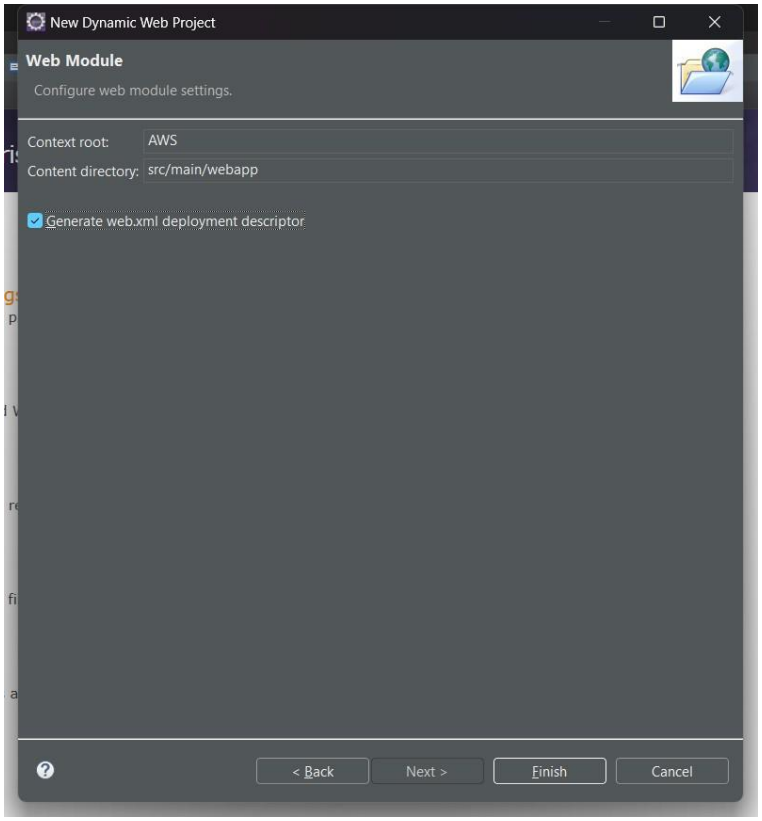
Step7: - Click on Target Runtime > New Runtime > Apache > Apache tomcat v10.1 > Next.



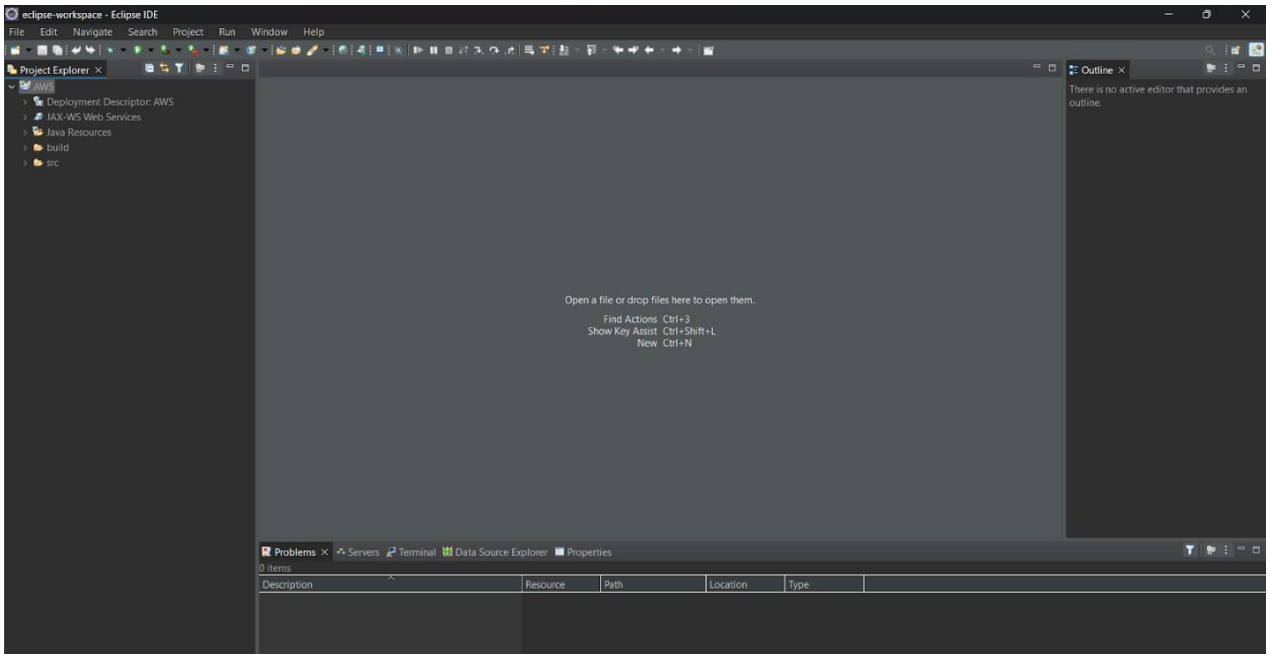
Step8: - Click Browse > C drive > program files > Apache Software foundation > Tomcat 10.1 >Click on Continue > give access Select that and then click “Next”



Step9: - Make sure u tick the checkbox and then click “Finish”

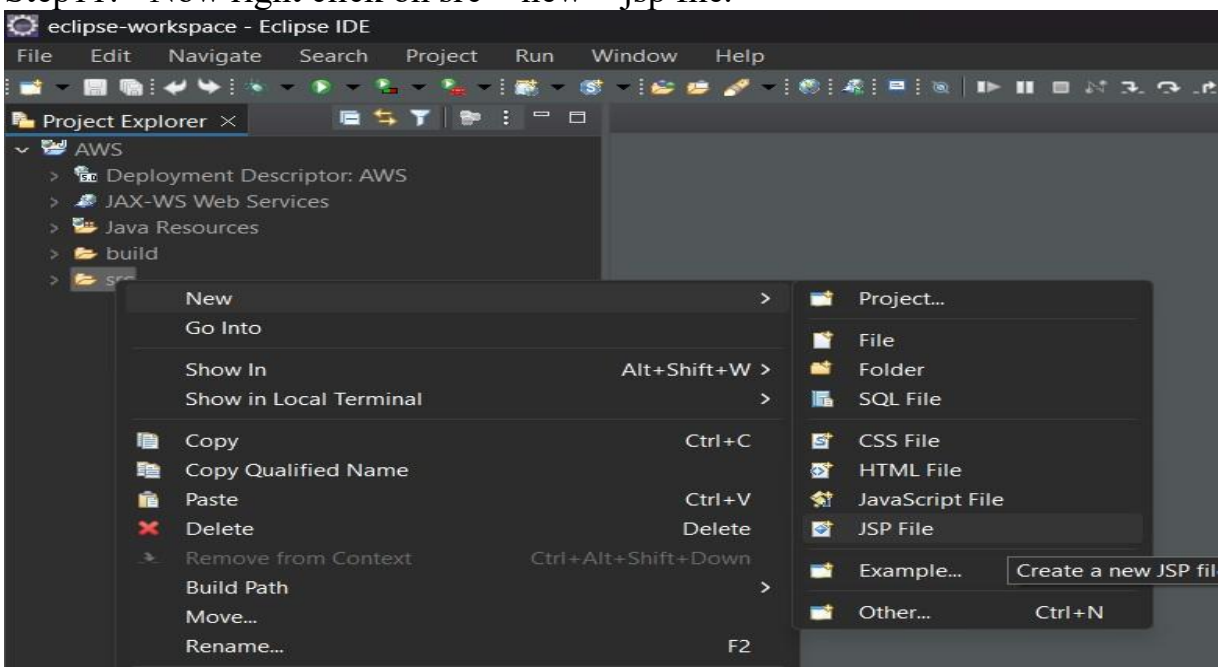


Step10: - You will be navigated to this page.



If u do not see “project explorer” which is on the left-hand-side ...then click on “windows > show view > project explorer

Step11: - Now right click on src > new > jsp file.



Step12: - Create two jsp files ...one as newfile.jsp and the other as fibonacci.jsp
Step13: - To create jsp file Click on jsp file and then name your jsp file if you want then to click next and then finish.
Step14: - Write the code.

NewFile.jsp

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Insert title here</title>
</head>
<body>
<form action="Fibonacci.jsp">
    Enter a value for n: <input type="text" name="val">
    <input type="submit" value="Submit">
</form>
</body>
</html>
```

Fibonacci.jsp

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Insert title here</title>
</head>
<body>
<%!
    int n;
    String str;

    int fibo(int n) {
       if(n<2)
          return n;
       else
          return fibo(n-1) + fibo(n-2);
    }
%>
<b>Fibonacci series: </b><br>
<%
    str = request.getParameter("val");
    n = Integer.parseInt(str);

    for(int i=0; i<=n; i++) {
       out.print(fibo(i) + " ");
    }
%>
</body>
</html>
```

Step15: - Now run the code and check the Output.