

CLOUD COMPUTING

Pratik Rampyare Rai

ROLL_NO: 23



Hindi Vidya Prachar Samiti's

**RAMNIRANJAN
JHUNJHUNWALA COLLEGE
(AUTONOMOUS)**

Opposite Ghatkopar Railway Station, Ghatkopar West, Mumbai-400086



CERTIFICATE

This is to certify that Mr. / Miss/Mrs. **Pratik Rampyare Rai** with Seat No.**23** has successfully completed the necessary course of experiments in the subject of **CLOUD COMPUTING** 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

Date:-

Internal Examiner

Head of Department

College Seal

External

CLOUD COMPUTING

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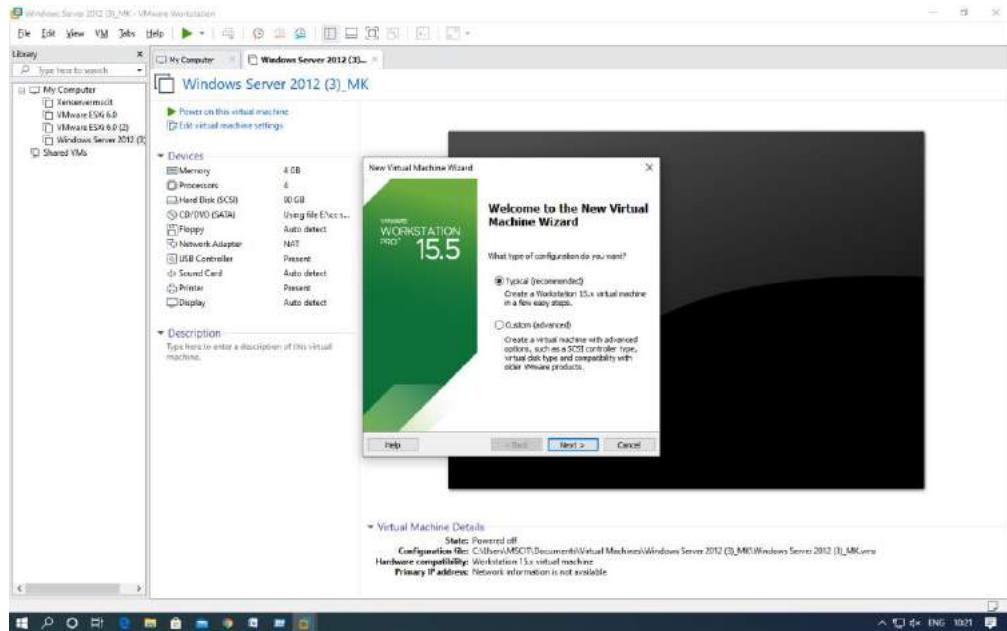
SR.NO	PRACTICAL TITLE	DATE	SIGNATURE
1	Implement cluster on Windows	23-01-2021	
2	Developing application for Windows Azure	13-2-2021	
3	Implementing private cloud with Xen Server	2-01-2021	
4	Implement Search Engine Google App Engine(GAE)	6-02-2021	
5	Implement ESXi Server	19-12-2020	
6	Native Virtualization using Hyper-V	20-02-2021	
7	Implement Open Nebula	16-01-2021	
8	Implement Big Web Service	13-02-2021	

CLOUD COMPUTING

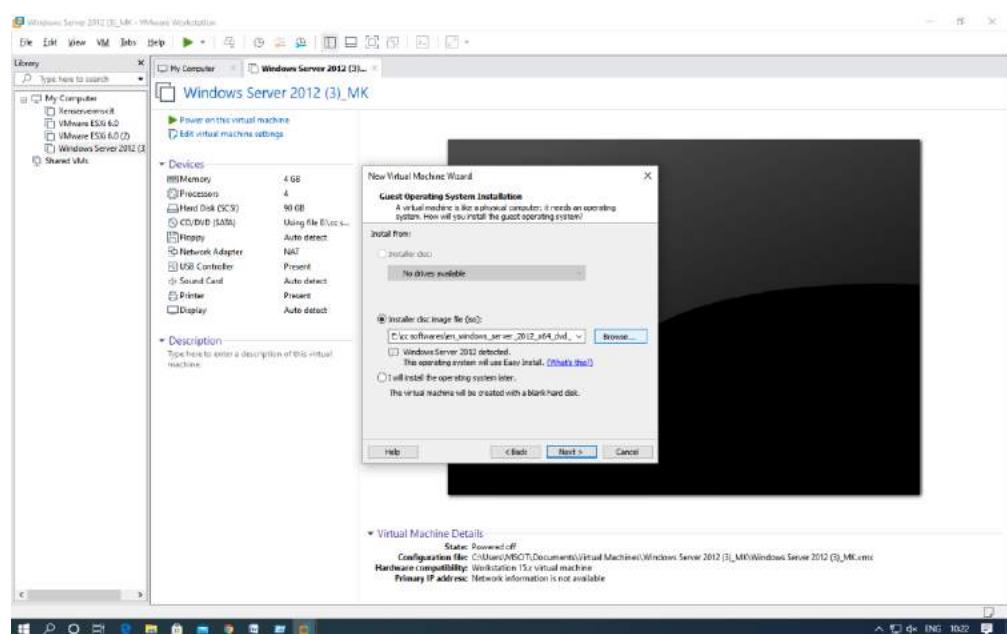
PRACTICAL: 1

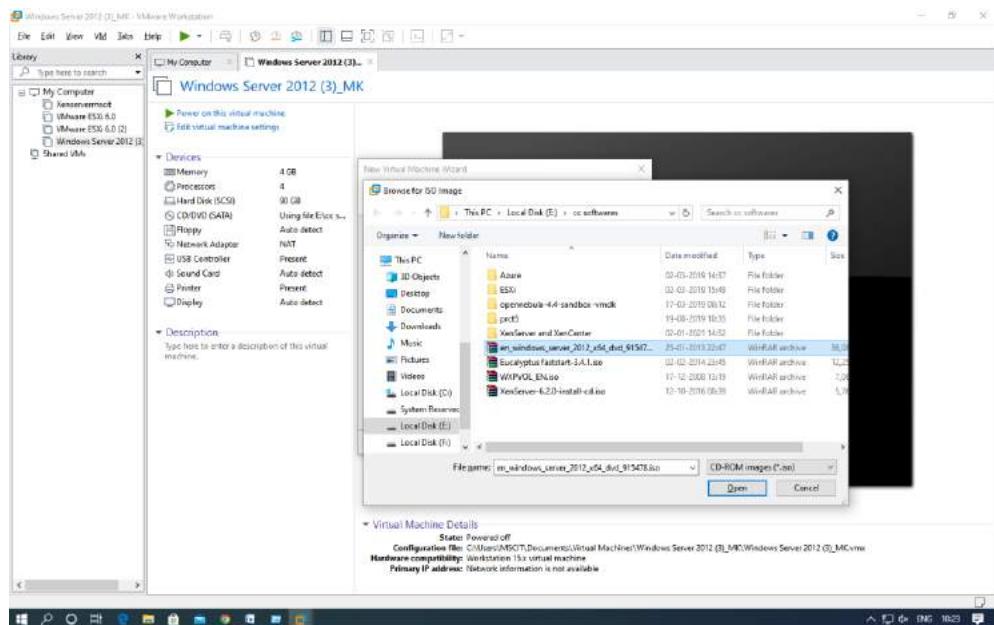
IMPLEMENTING CLUSTER ON WINDOWS

Install the VMWare Workstation. The Home page of VMWare Workstation looks like the picture below. To create a new Virtual Machine, click on “Create a New Virtual Machine”. In the “New Virtual Machine Wizard” select the “Typical” option. And click on “Next” button

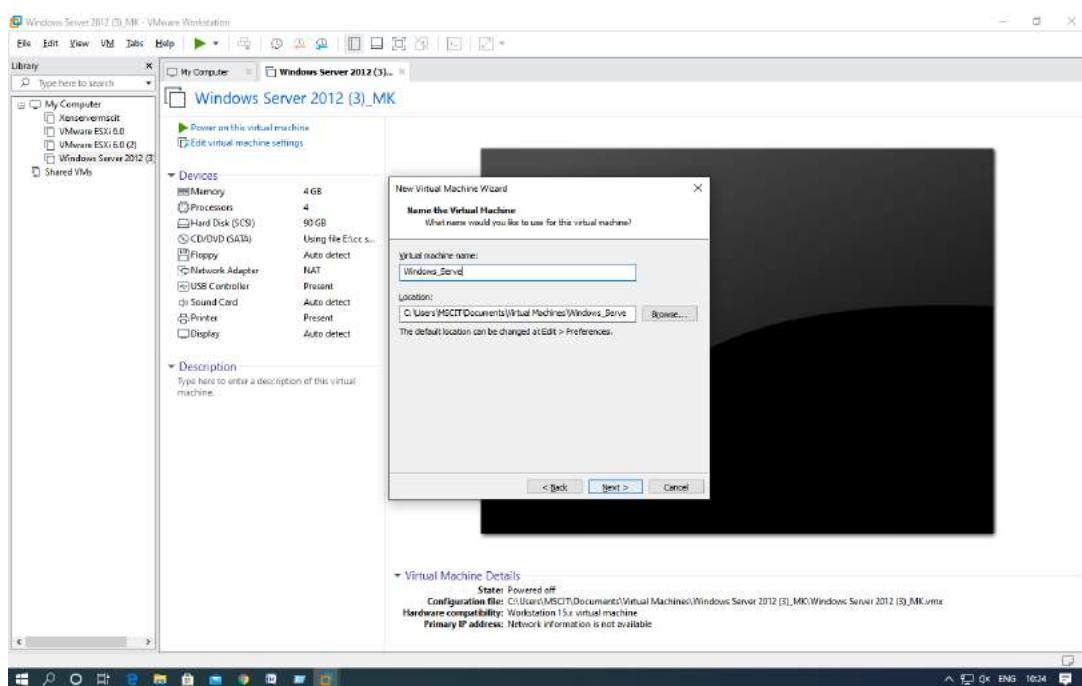


In the Next window, select the option Install Disc and click on Browse to select the windows server 2012 iso file and then click on Next.

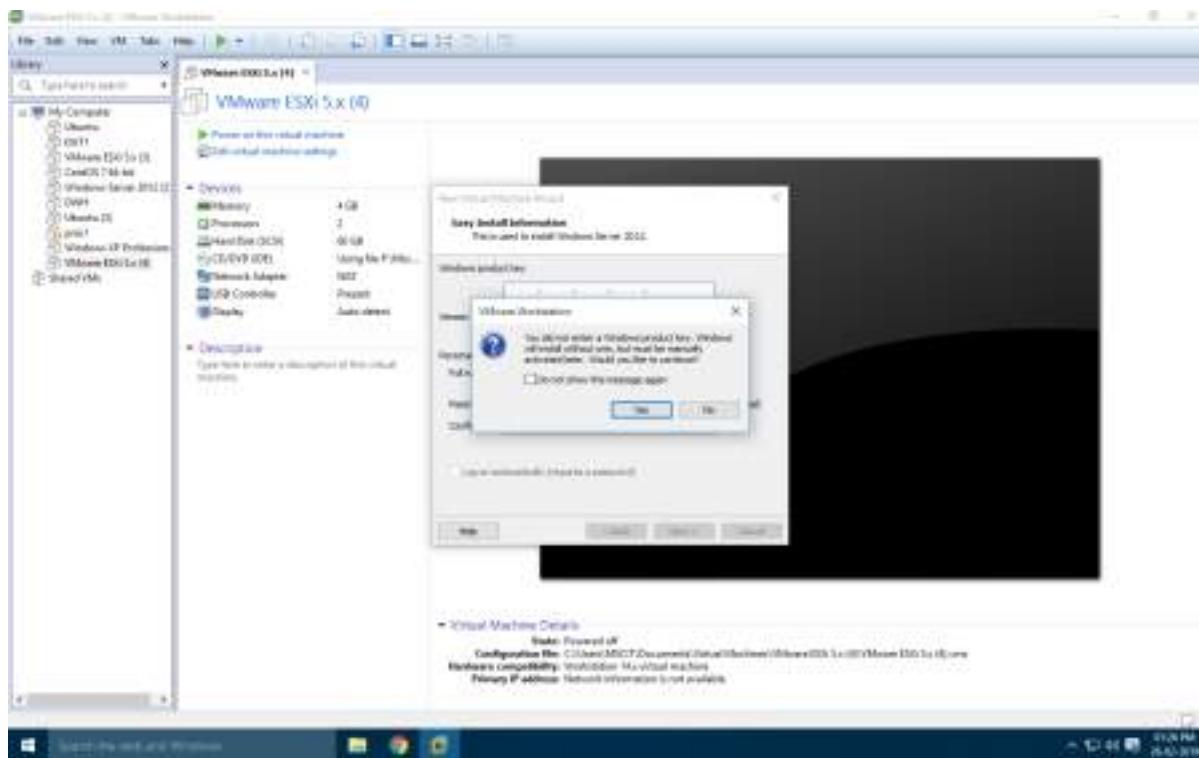




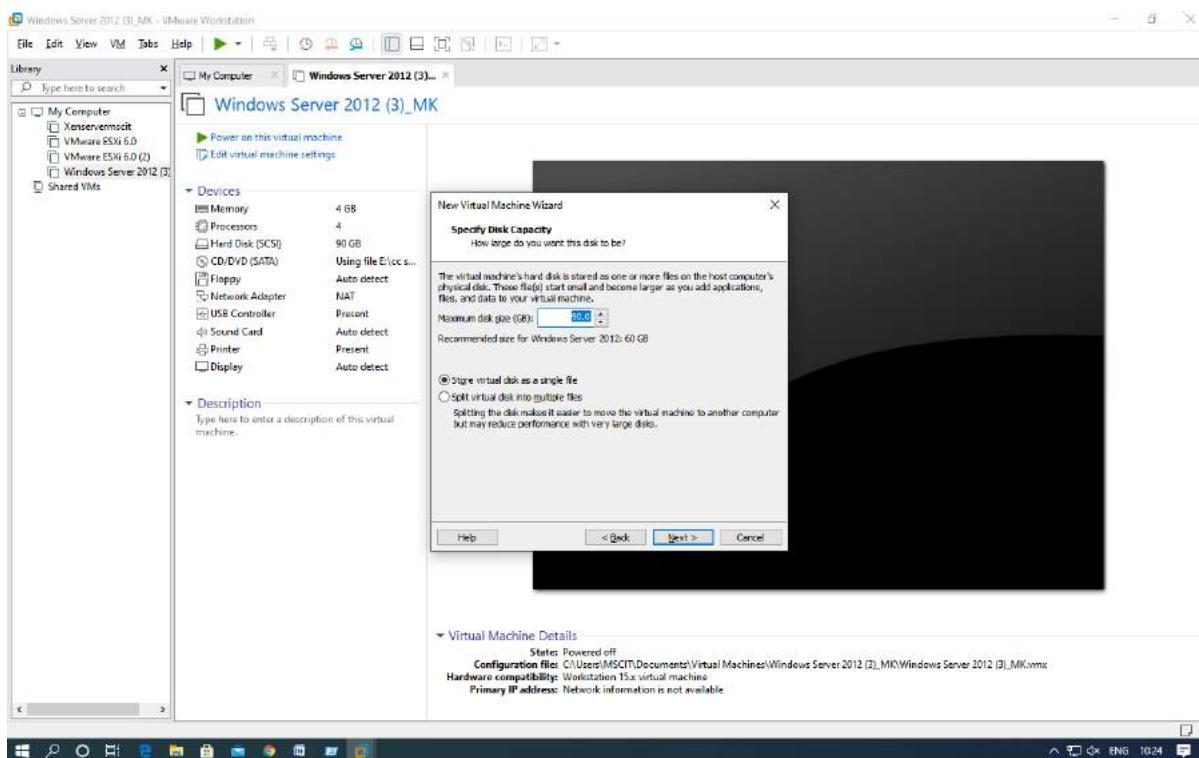
In this window, select the name of operating system and its version.



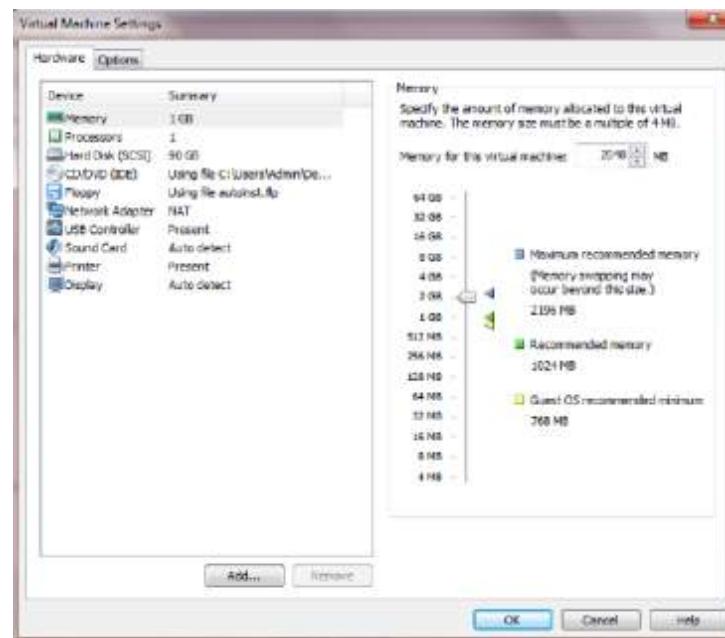
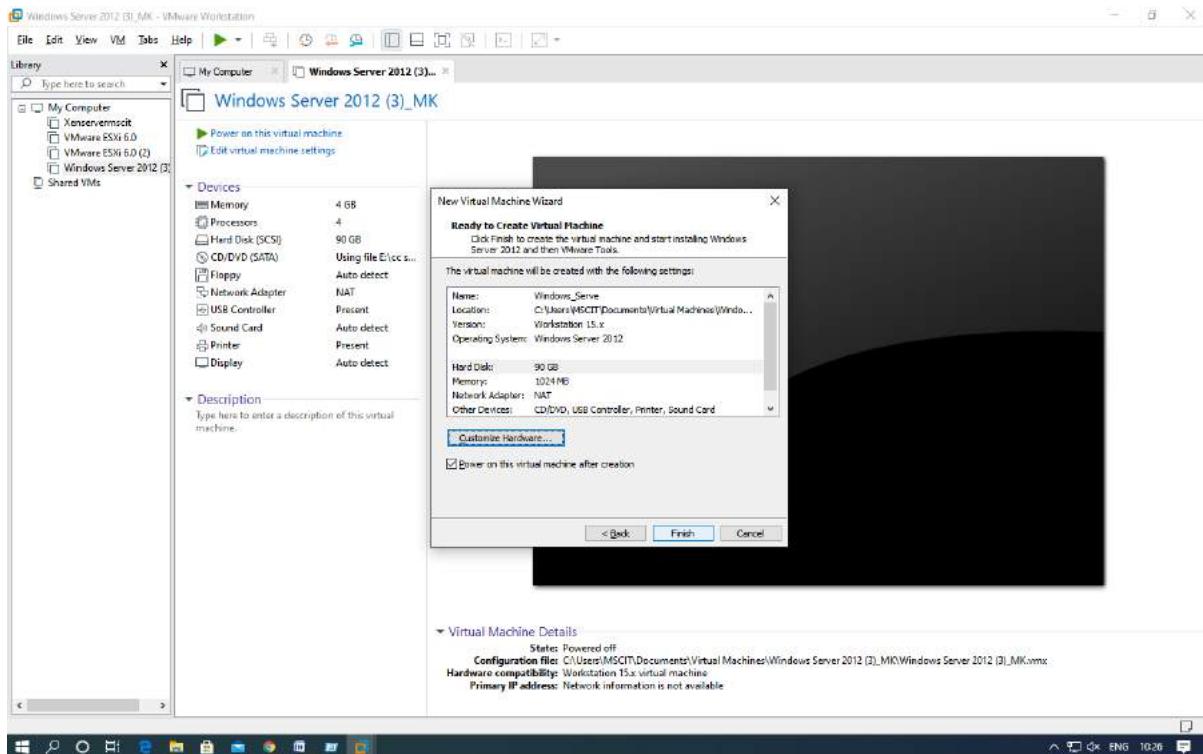
Click "Next", And click on yes

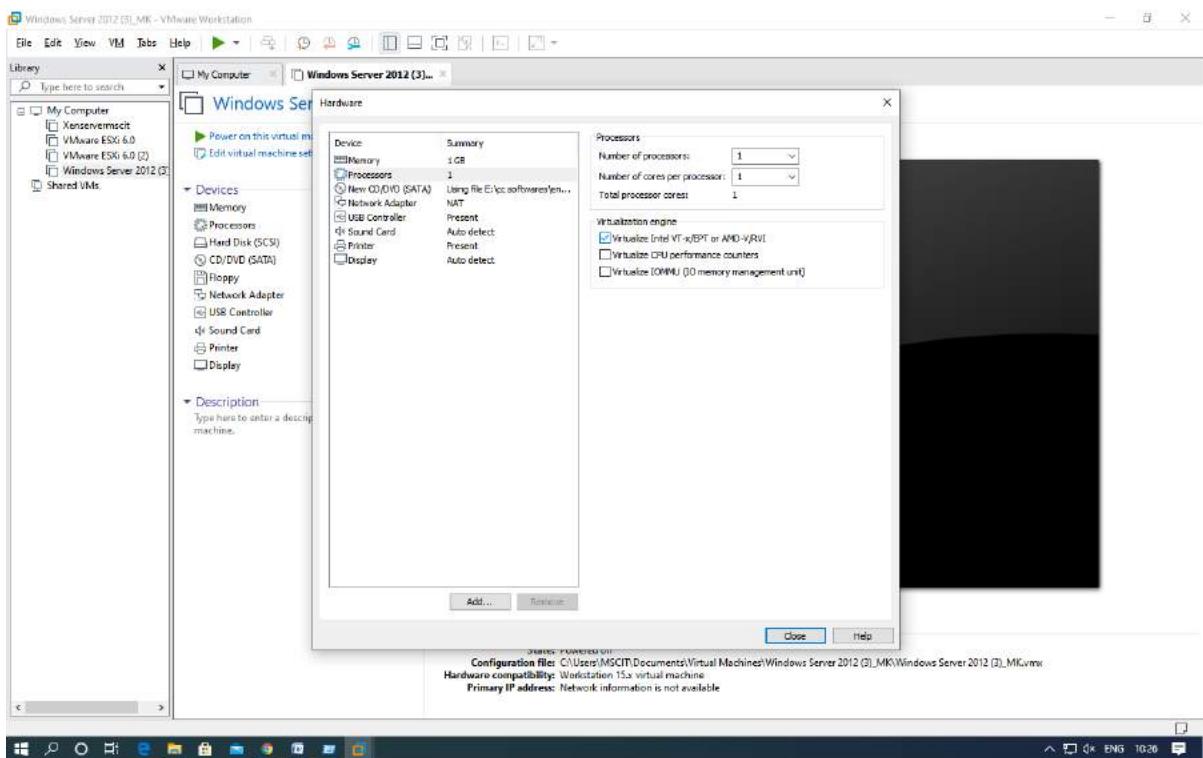


Choose “Store virtual disk as a single file” and Keep the memory size as 90GB. Click on “Next”.



Click on Customize hardware and then go to memory under Device and make it to 2GB. Power on the virtual machine by clicking on “Power on this virtual machine”.



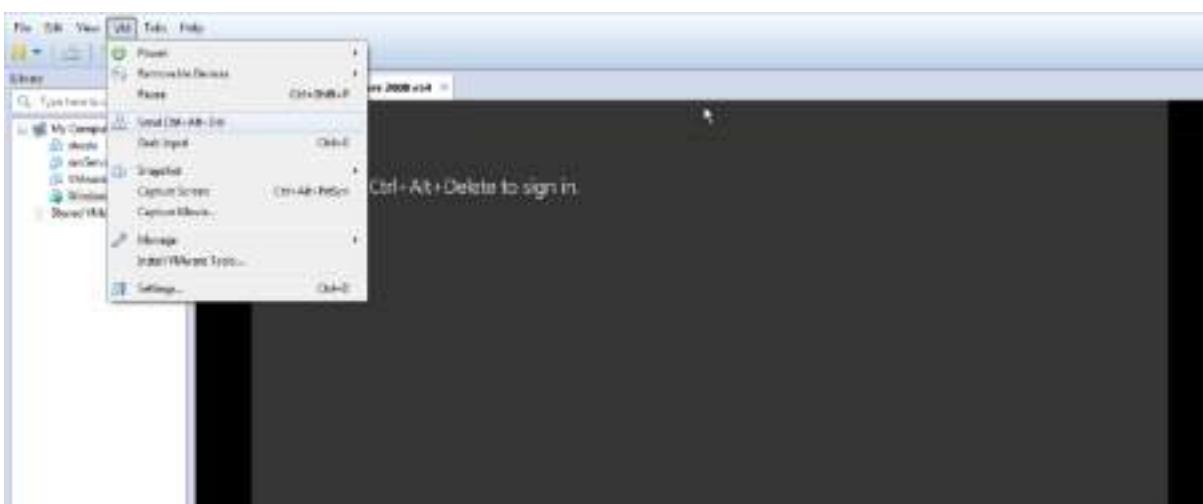


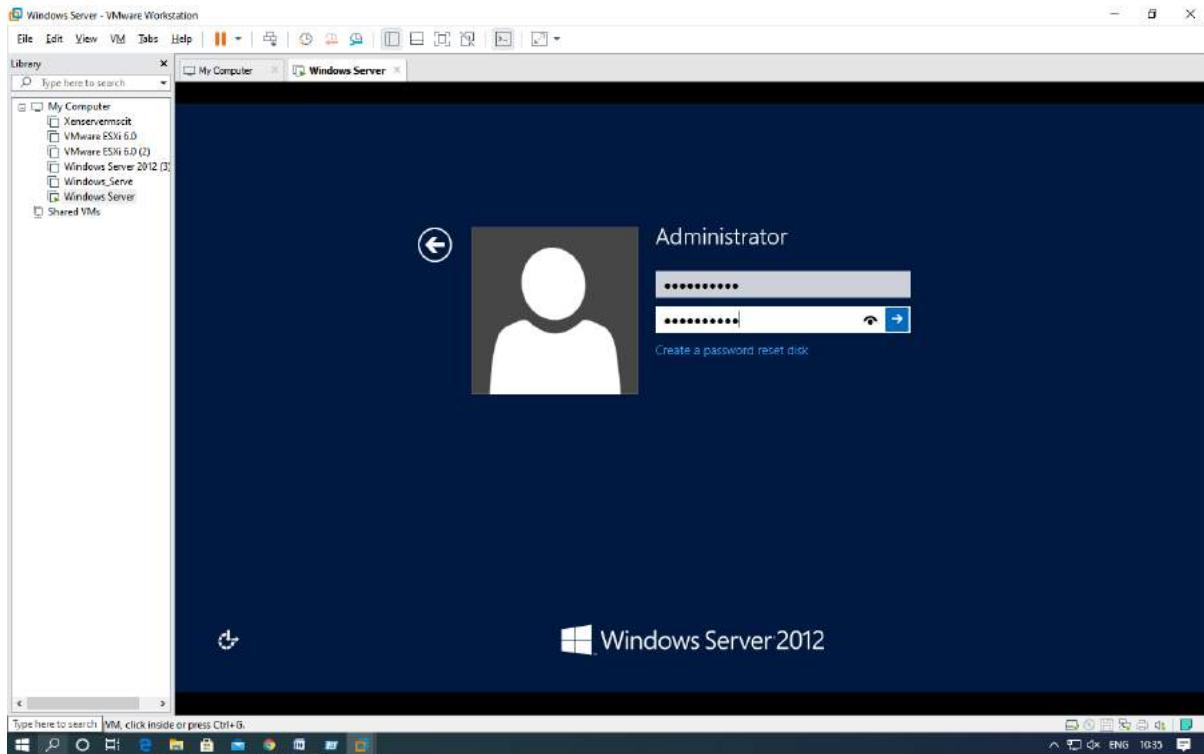
Copying of System Files will start.

After copying files it will automatically start.

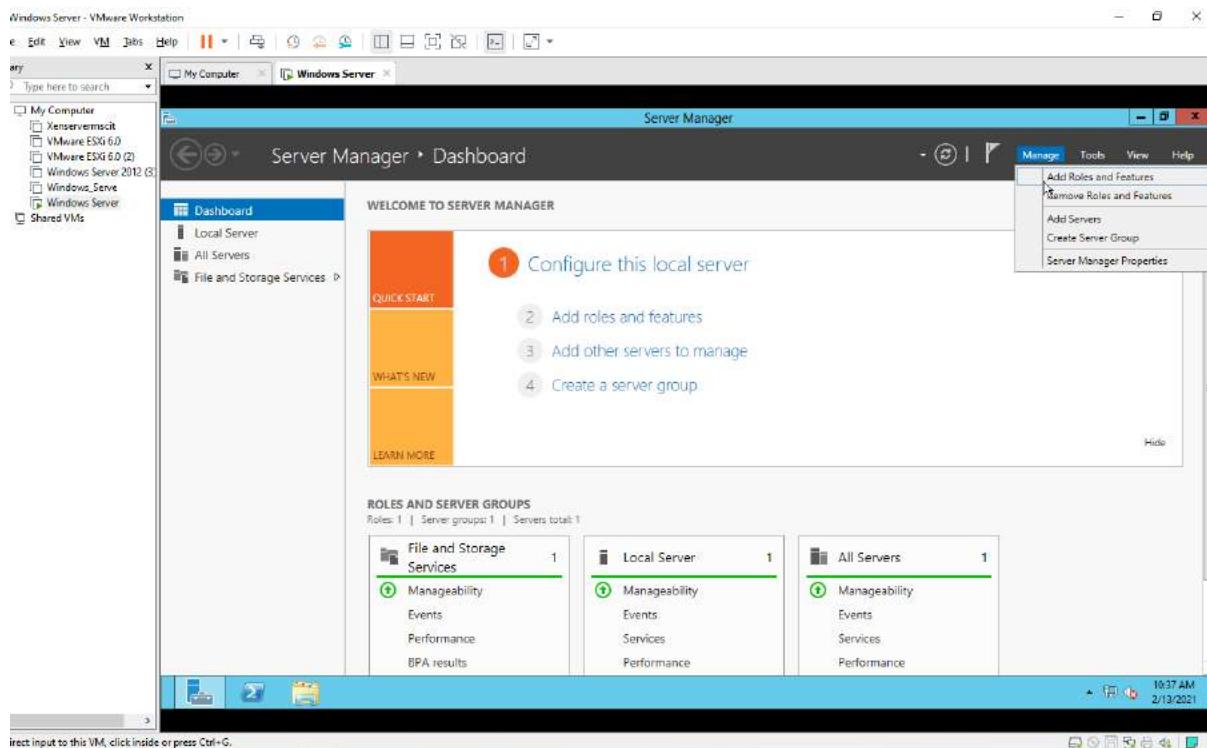
If installing on the Virtual Machine like VMWare then you need to click on the menu as show in the next screen to sign in as Admin.

Enter Below password:- Admin12345

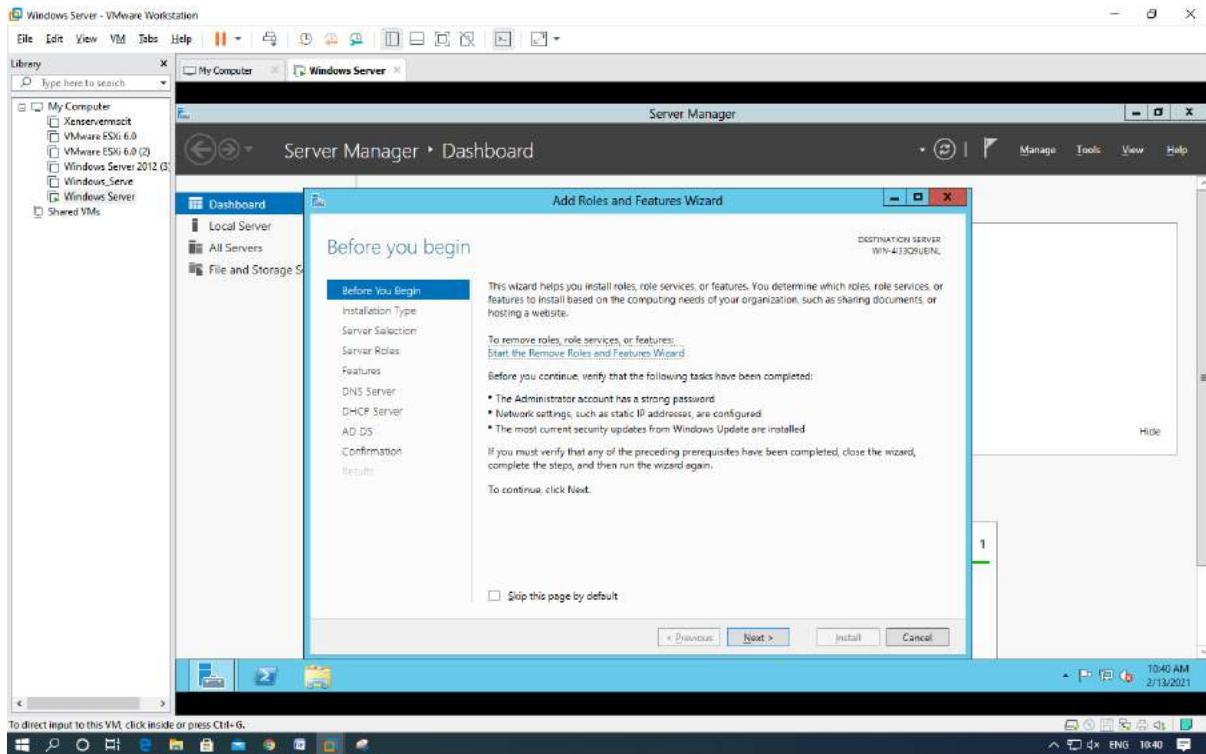




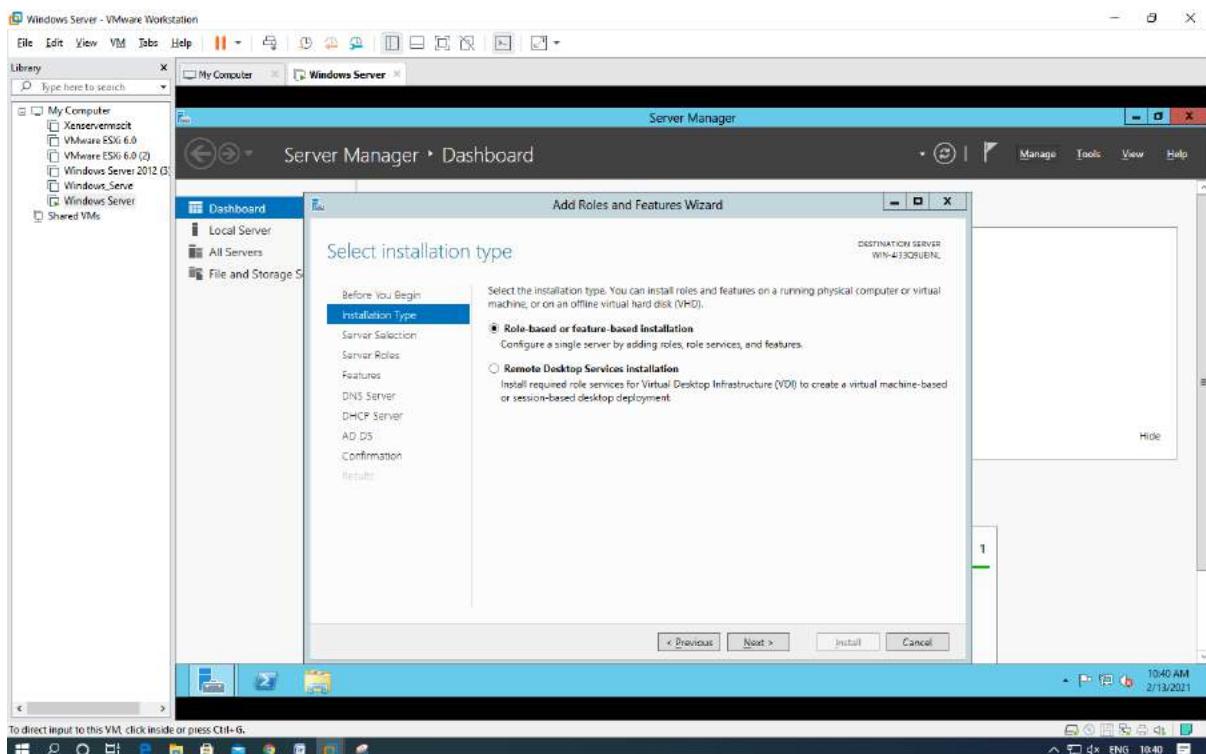
To make the current system a Domain Controller click on “Add Roles and Features” under the “Manage” menu at the top of the screen and get the “Add Roles and Feature Wizard”



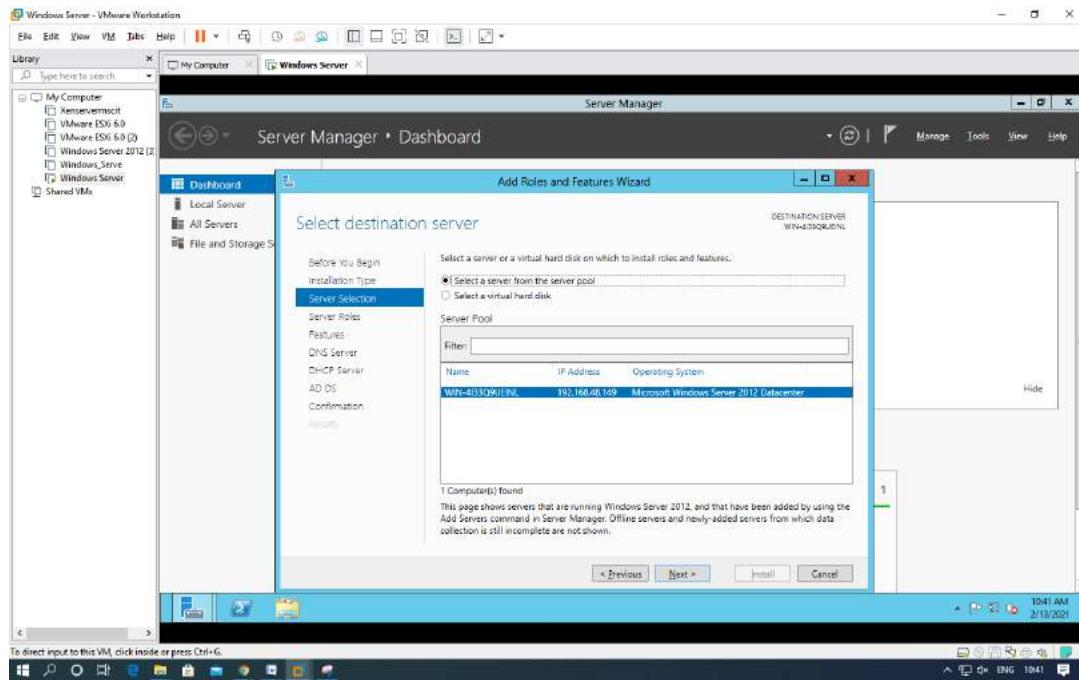
In Add Roles and Features Wizard, under “Before you Login” no changes – click next



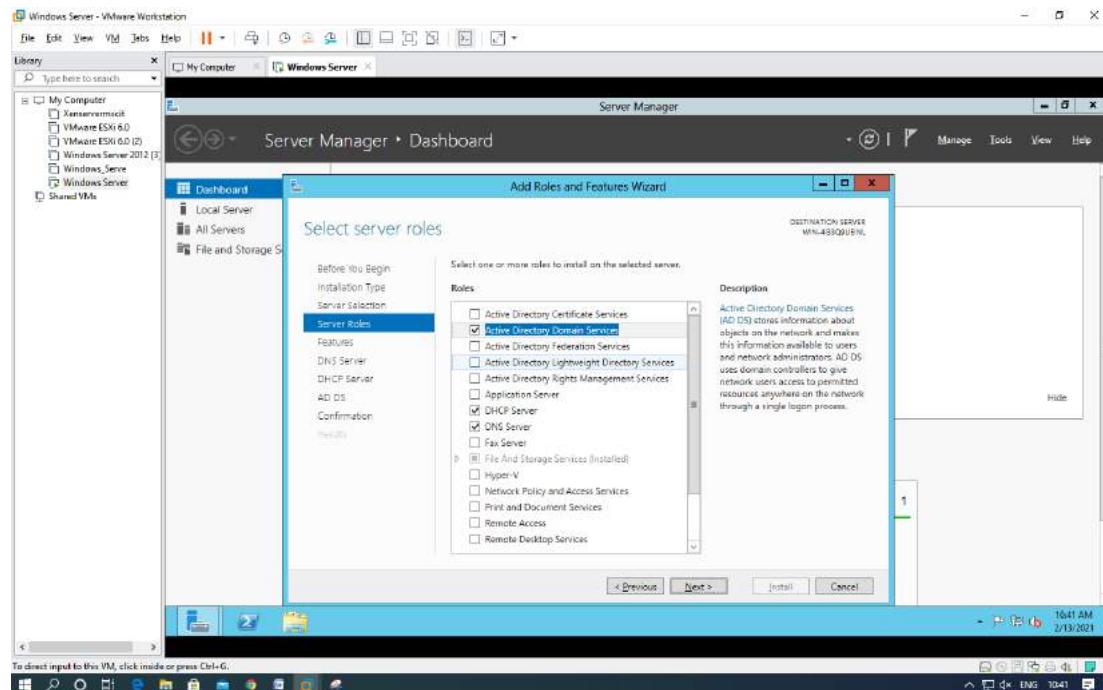
Under “select installation Type” select “Role-based or feature-based installation” and click “Next” button.



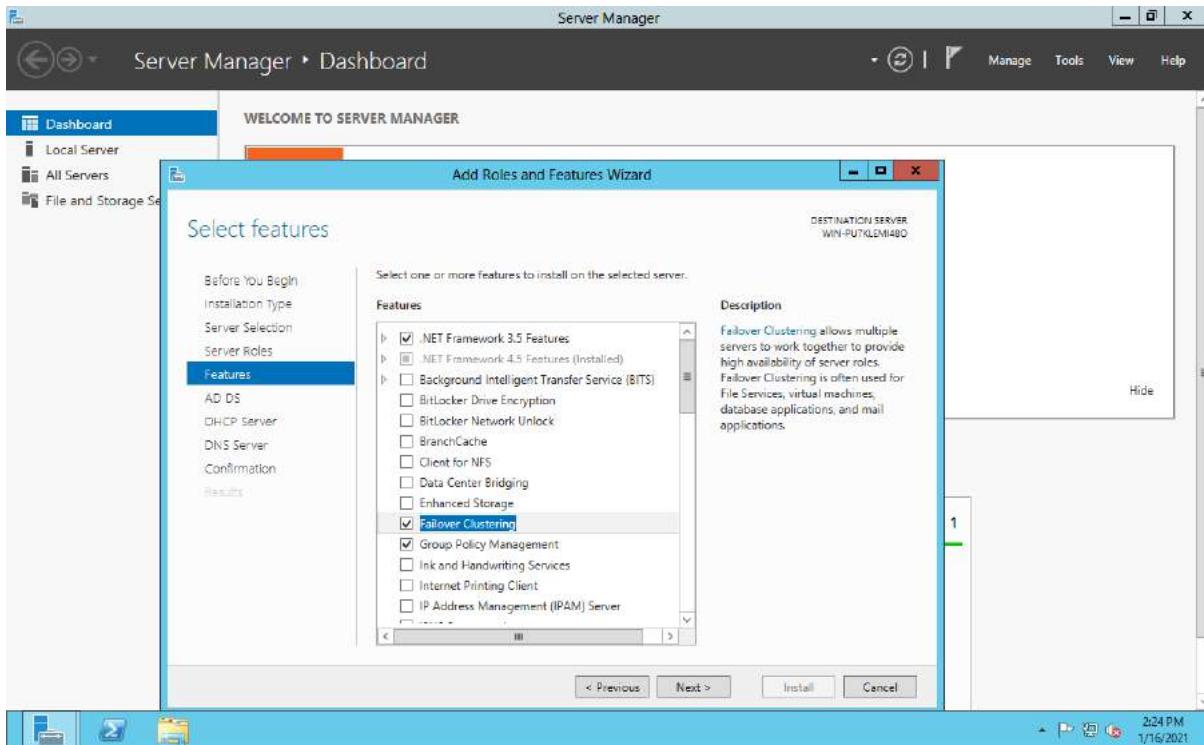
Under “Select Destination server” select “Select a server from the server pool” option and select the server as shown in the screen below and click “Next”



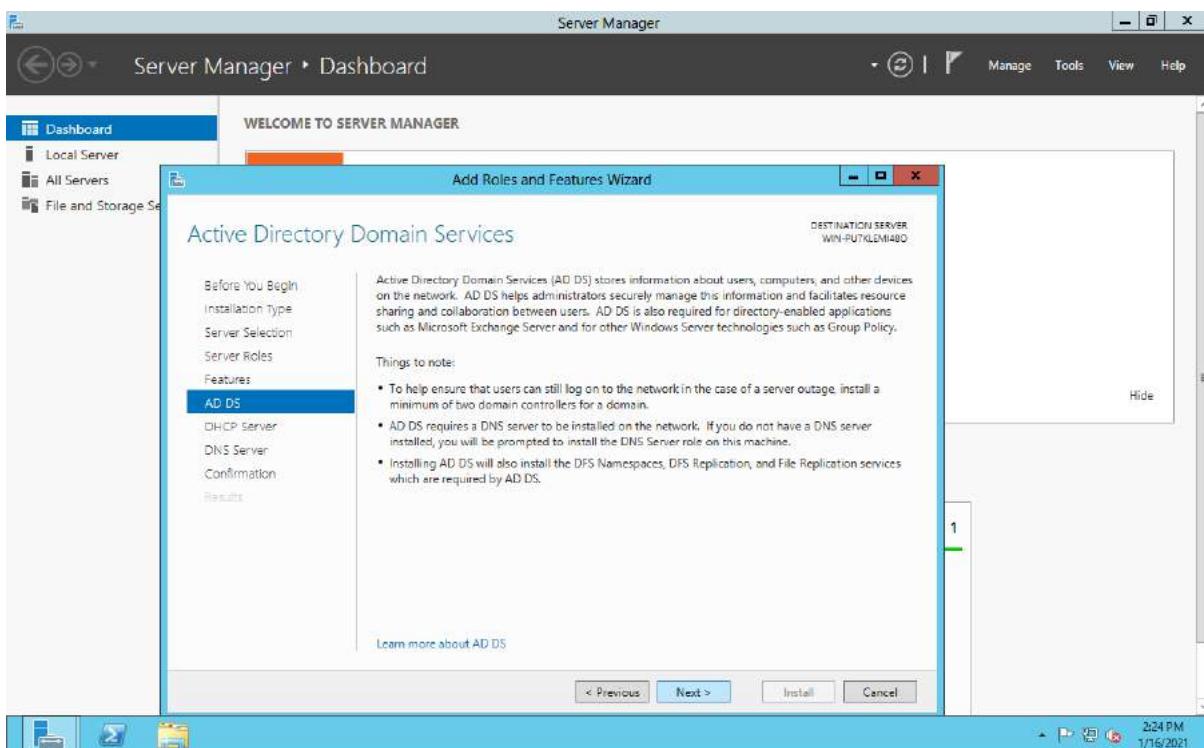
Click on “Active Directory Services”, “DNS” and “File And Storage Services” roles from the list of roles provided and click on “Add Features” button as shown in the screen. Add Features button will appear as you click on any of the roles. After selecting the Role click “Next”.

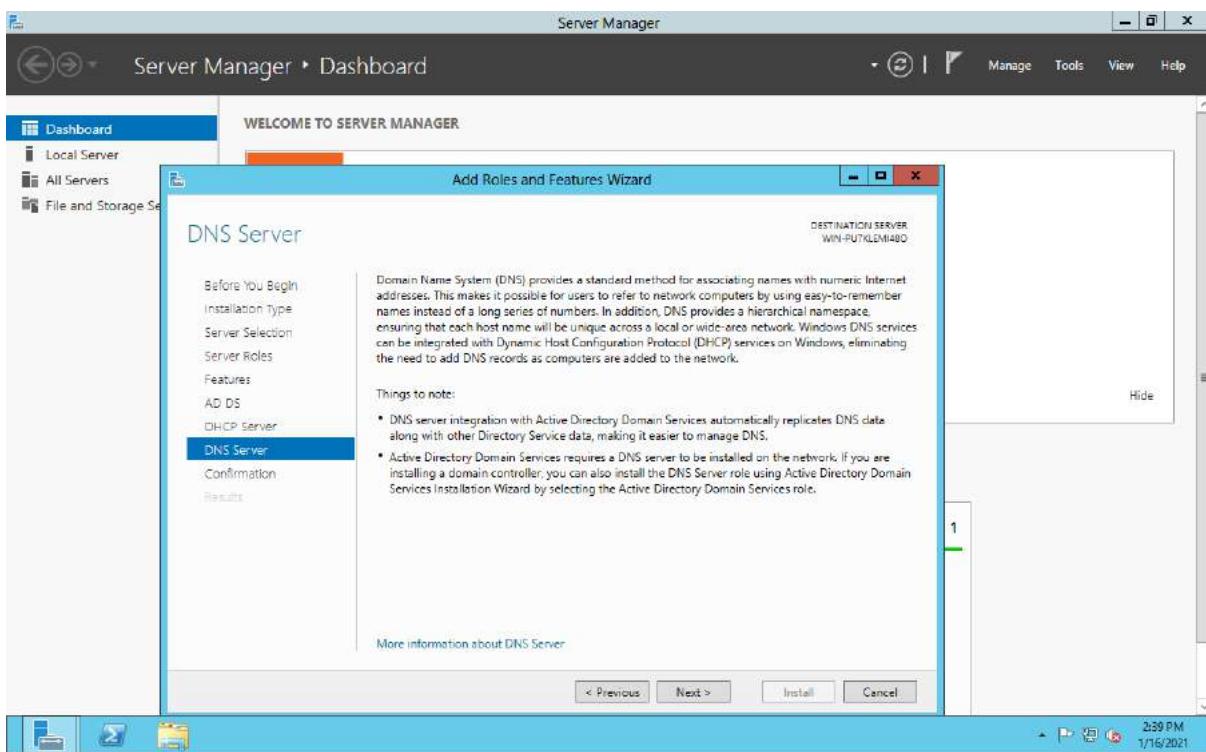
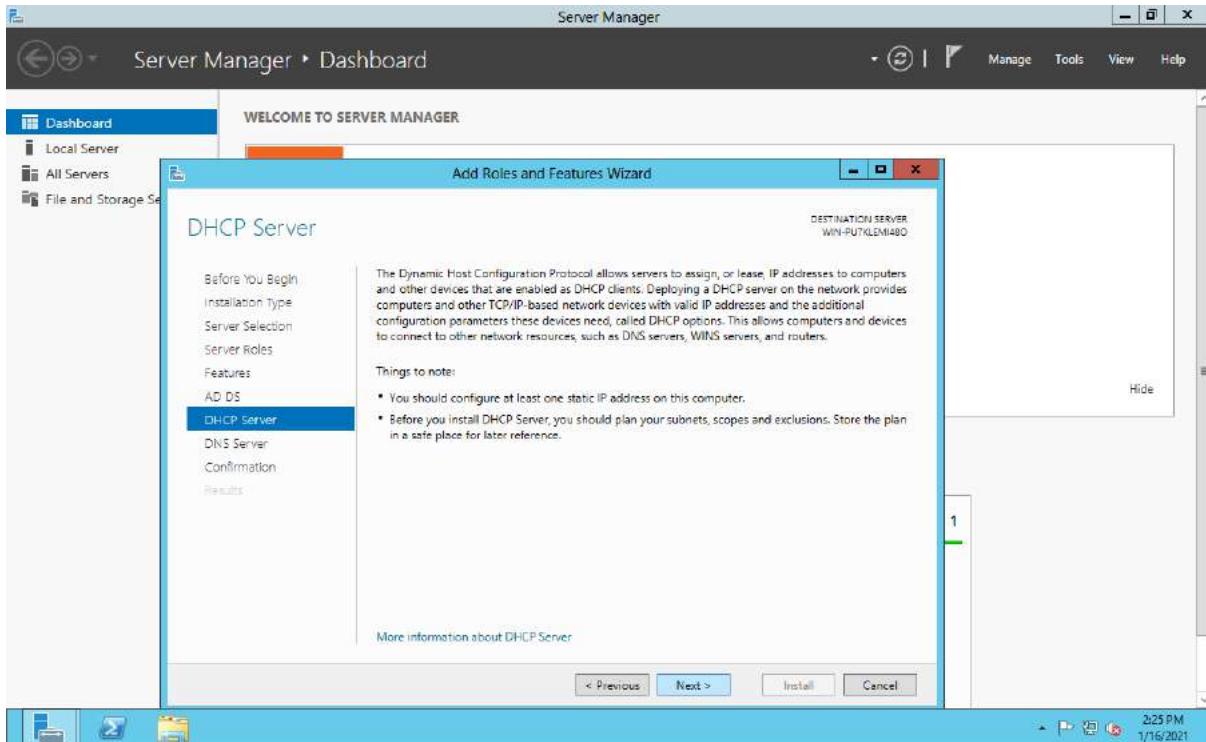


Under “Select Features” select “Failover Clustering” and “.NET Framework 3.5 Features” and click “Next”.

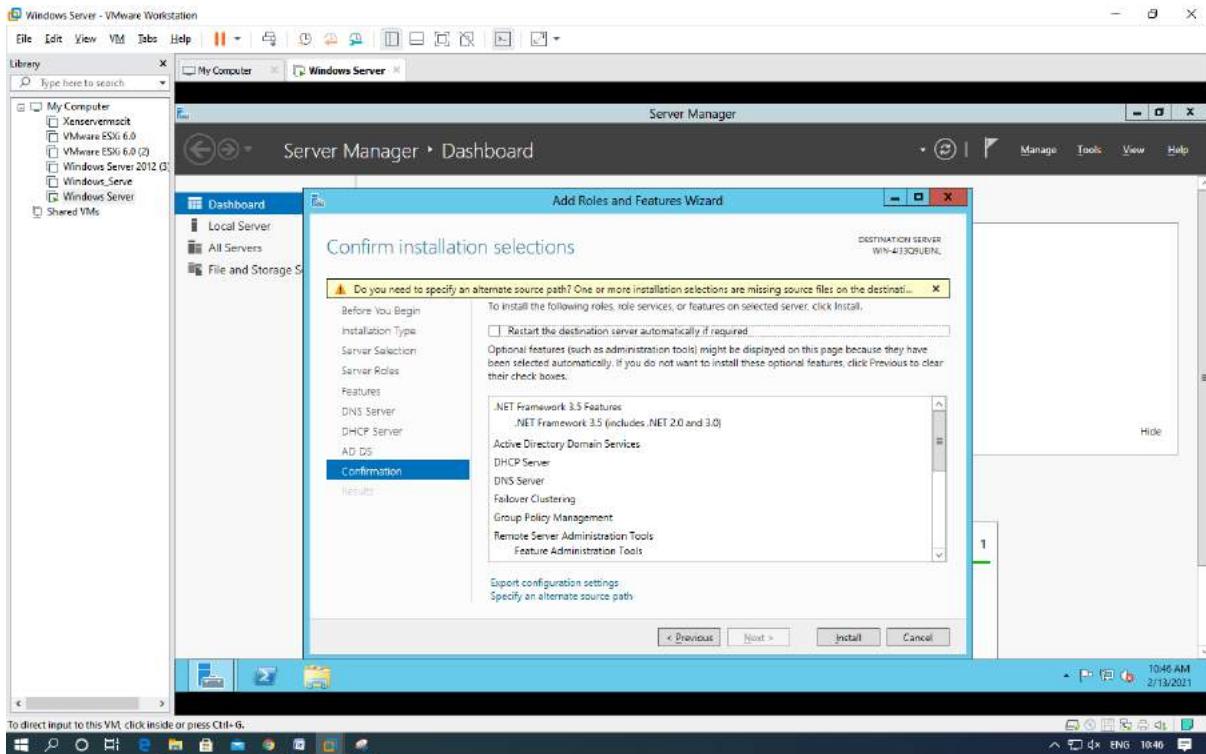


You will see the “Confirm Installation selections” then click on link “specify an alternate path”. As shown in below two screens.

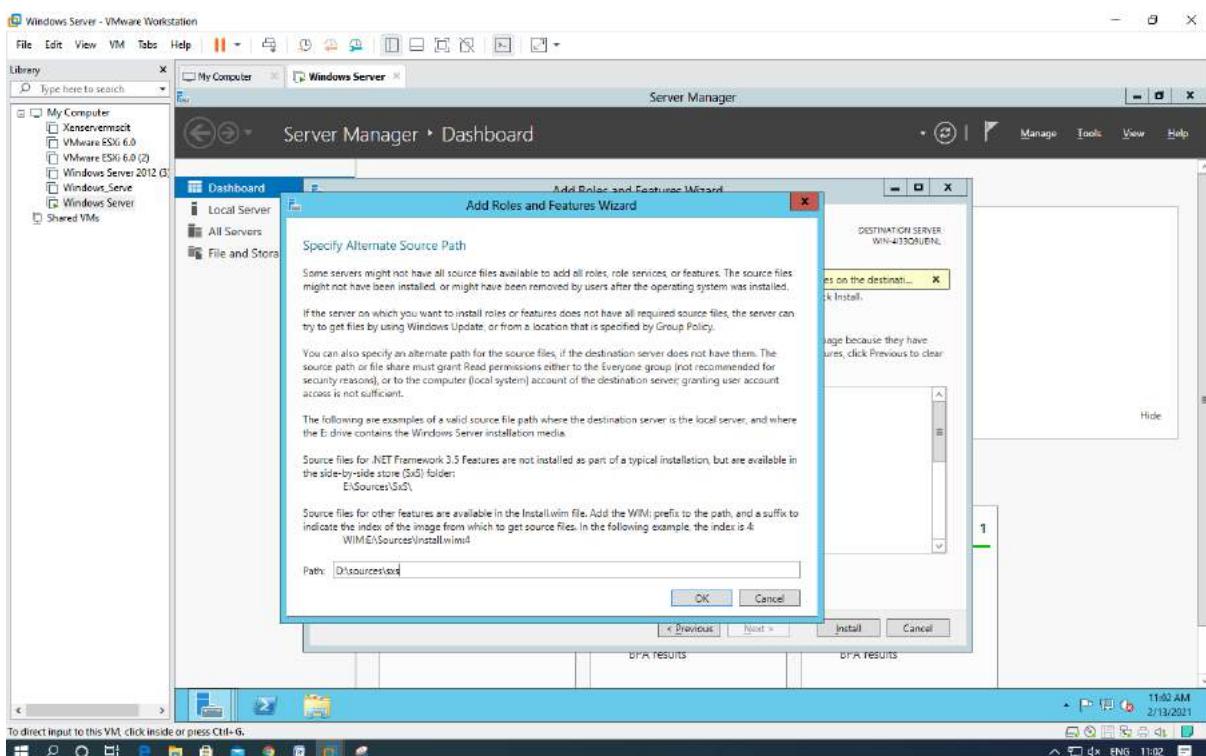


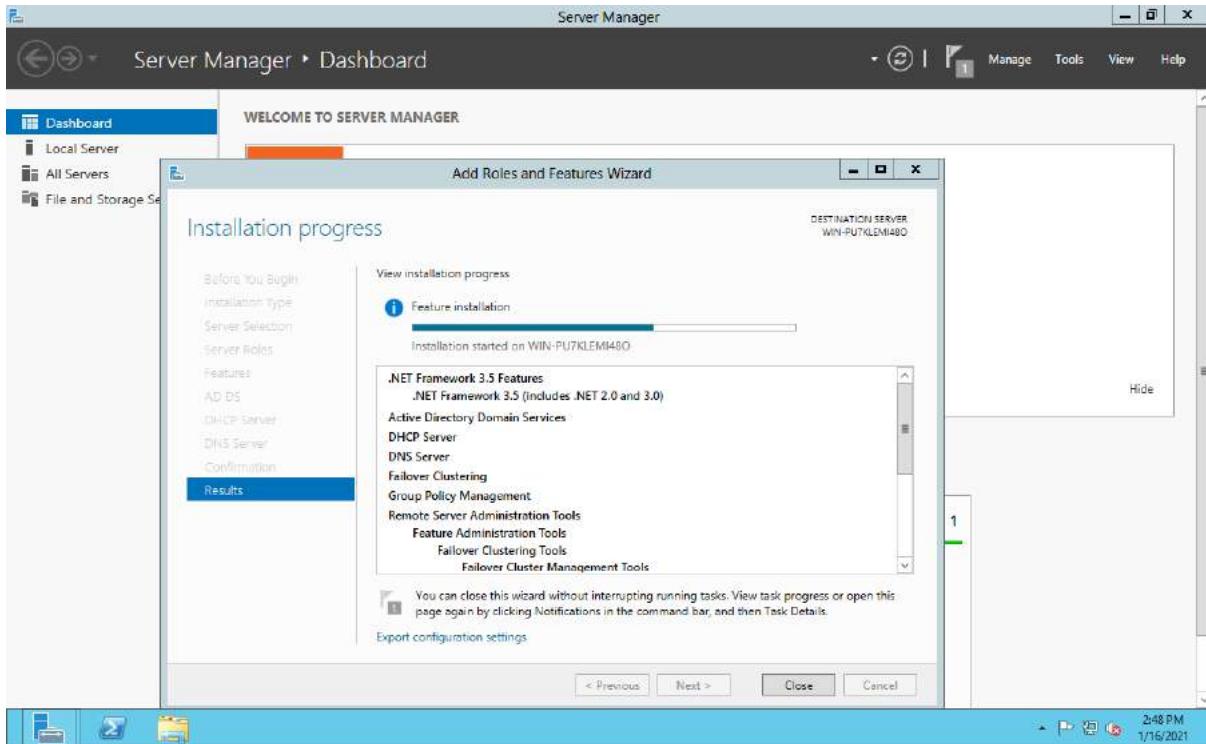


In confirmation tab,..click on spifyc alternate path and Now, For path specification Go to menu VM->use Iso image file of windows server 2012->Ok Then, Go to File Explorer->Computer -> select the DVD->VIEW FILE-> SOURCES->SXS:



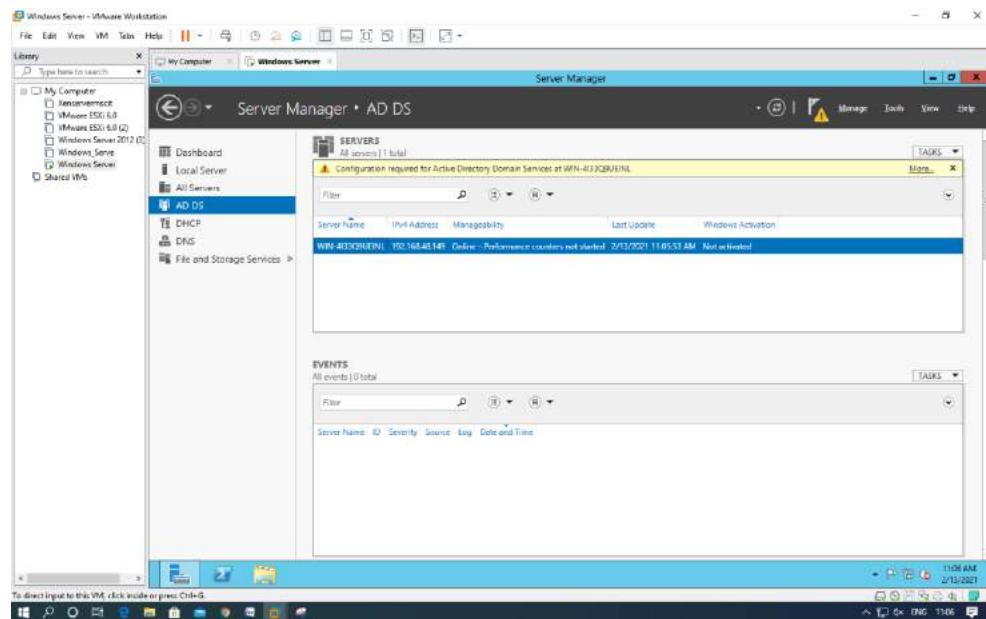
Copy the path and paste it.
Now click on Install

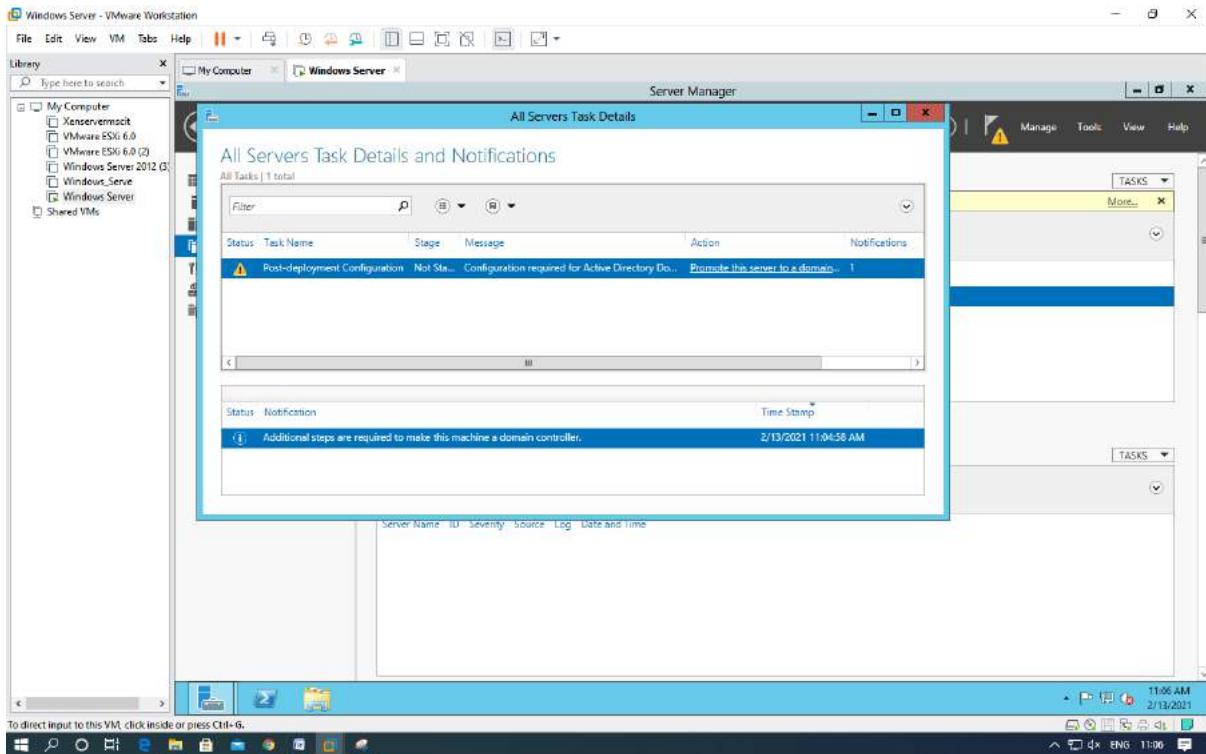




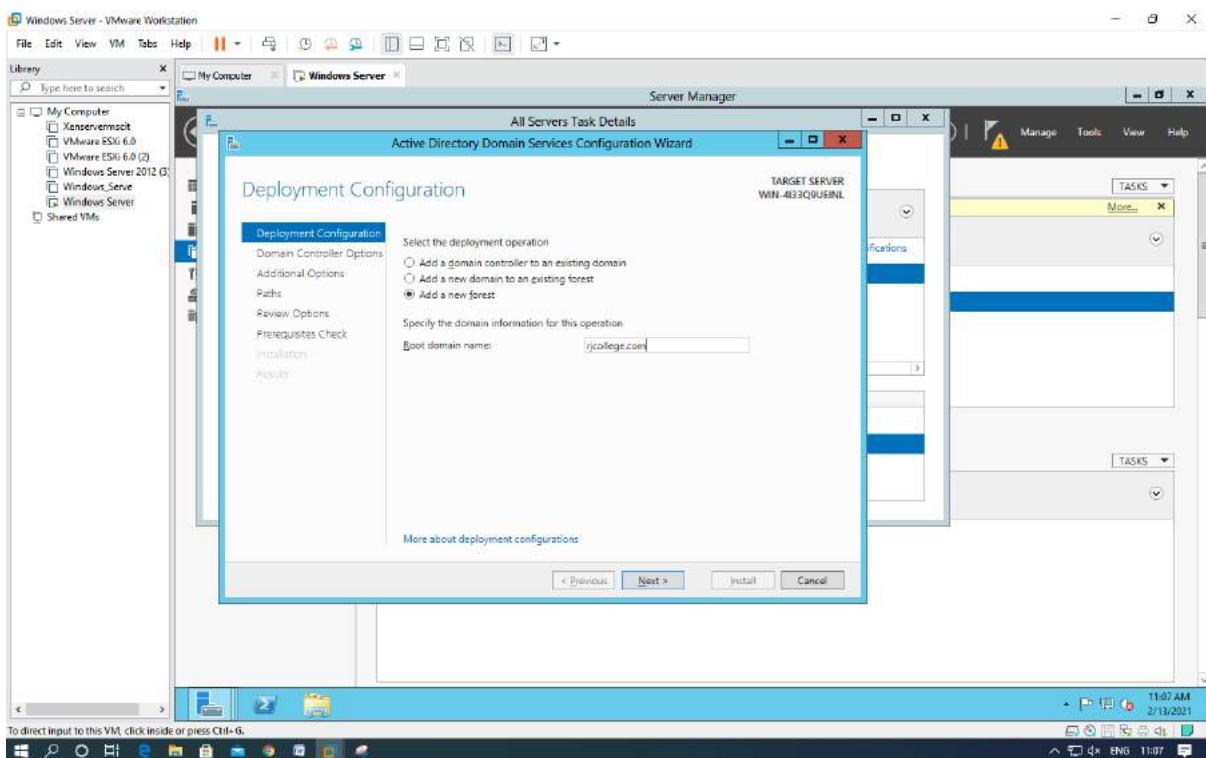
PROMOTING AS DOMAIN CONTROLLER

After installation Go to the “ADDS” shown on the left side in the server Manger Dashboard as shown in next screen and click on More, then Click on “Promote this server to a domain controller”.



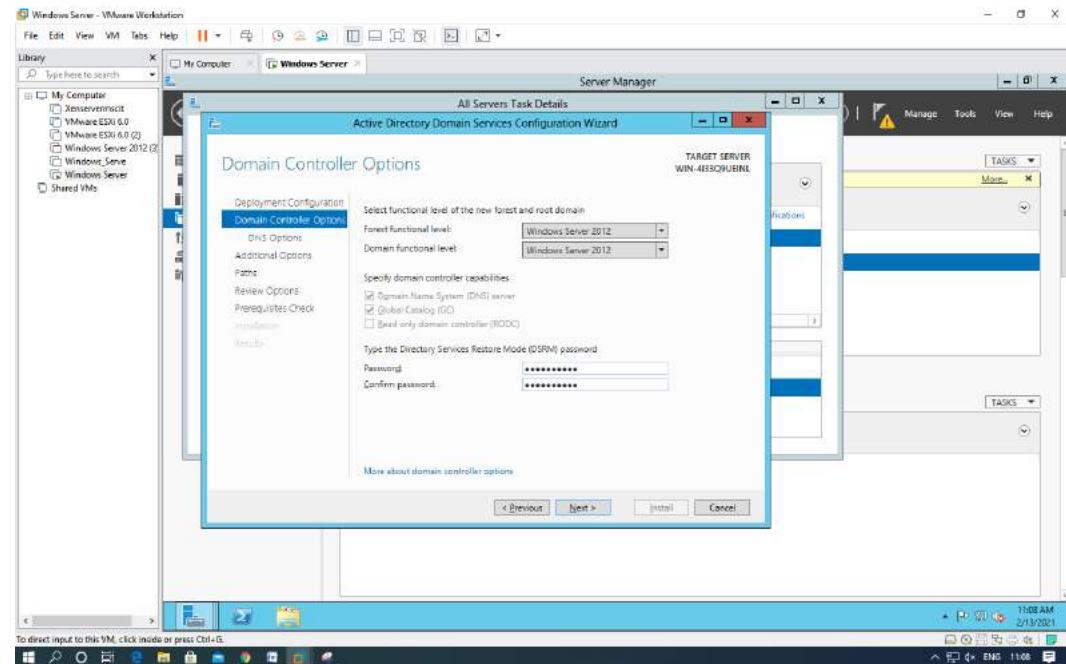


Choose “Add a new forest” option in the “Active Directory Domain services Configuration Wizard” window. Enter the Domain Name “rjcollege.com” as shown in the screen and click “Next”.

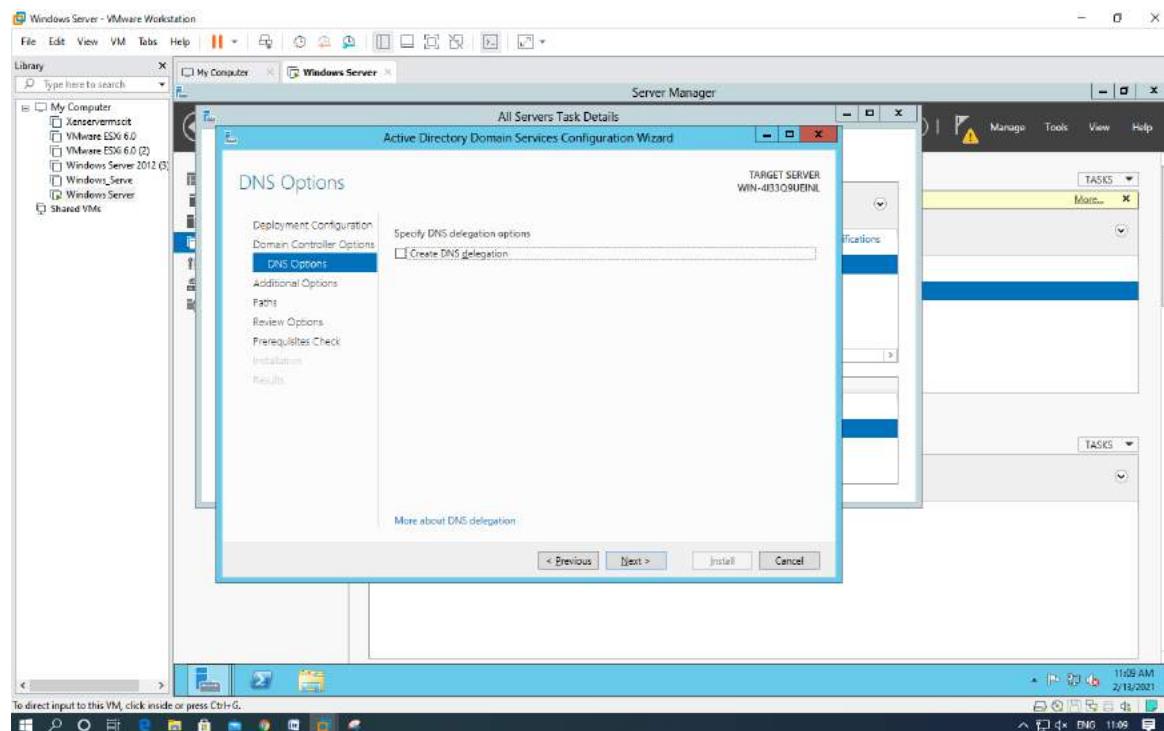


Under “Domain Controller Options” enter the alphanumeric password for the “Directory Services Restore Mode (DSRM) PASSWORD”. Preferably use the password given to the Administrators account.

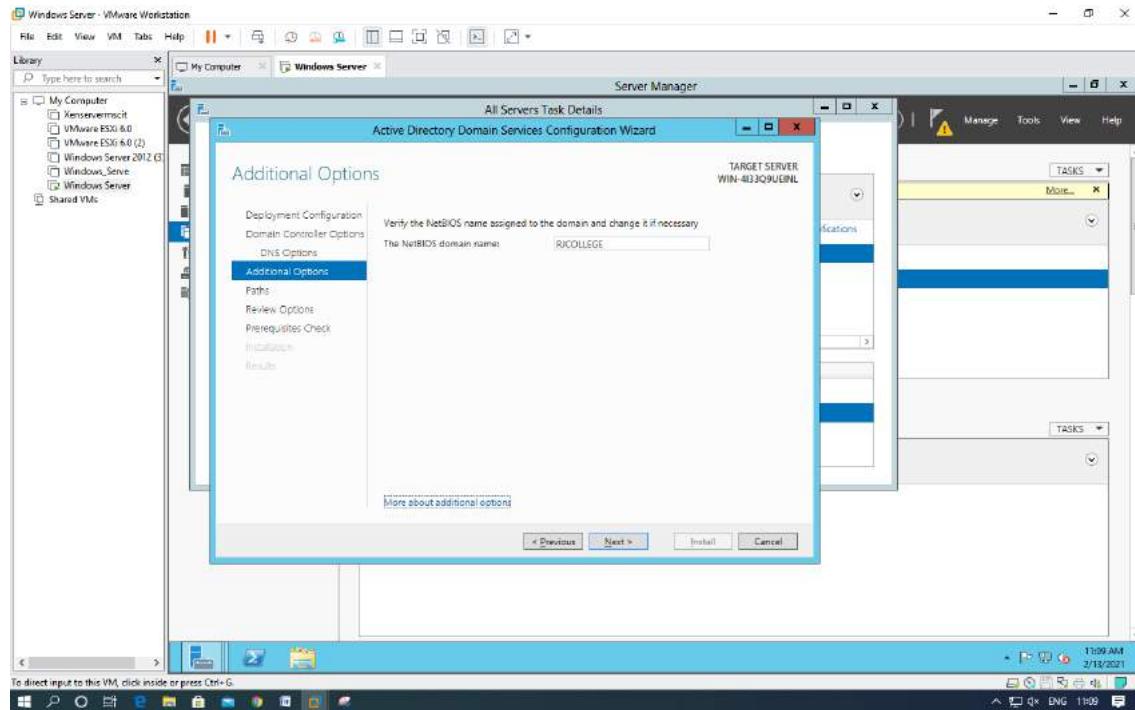
Password:- Admin12345



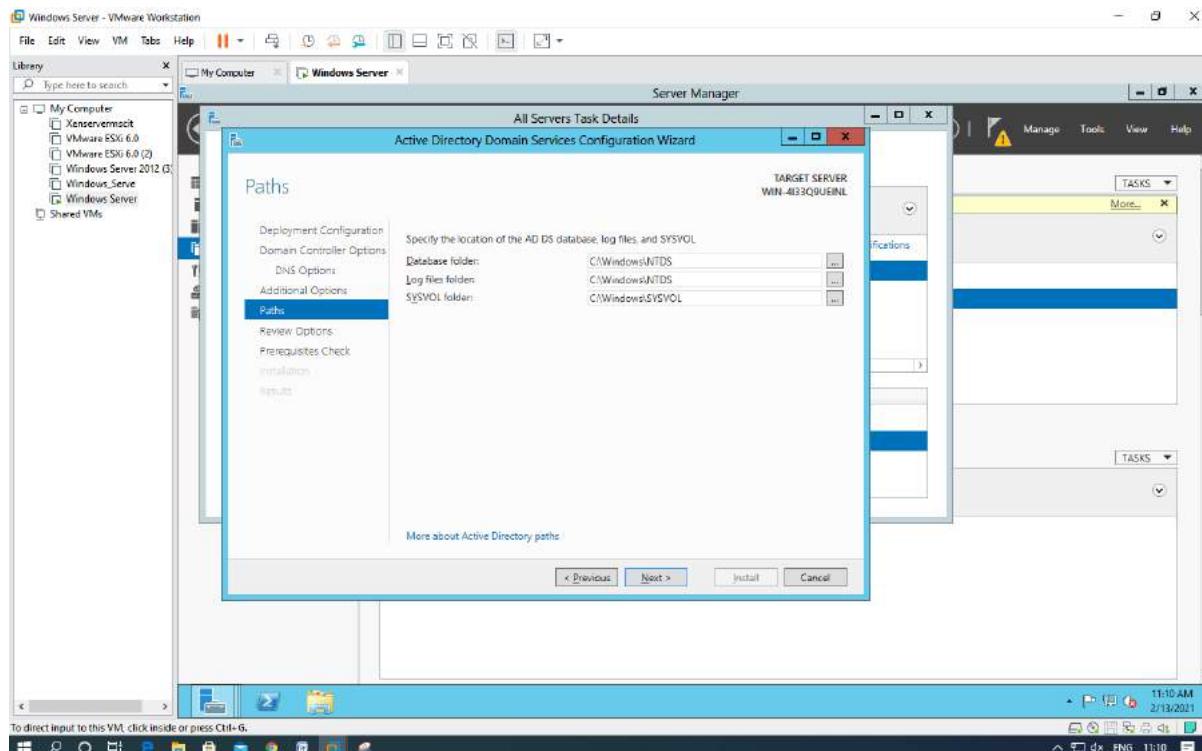
Click “Next”



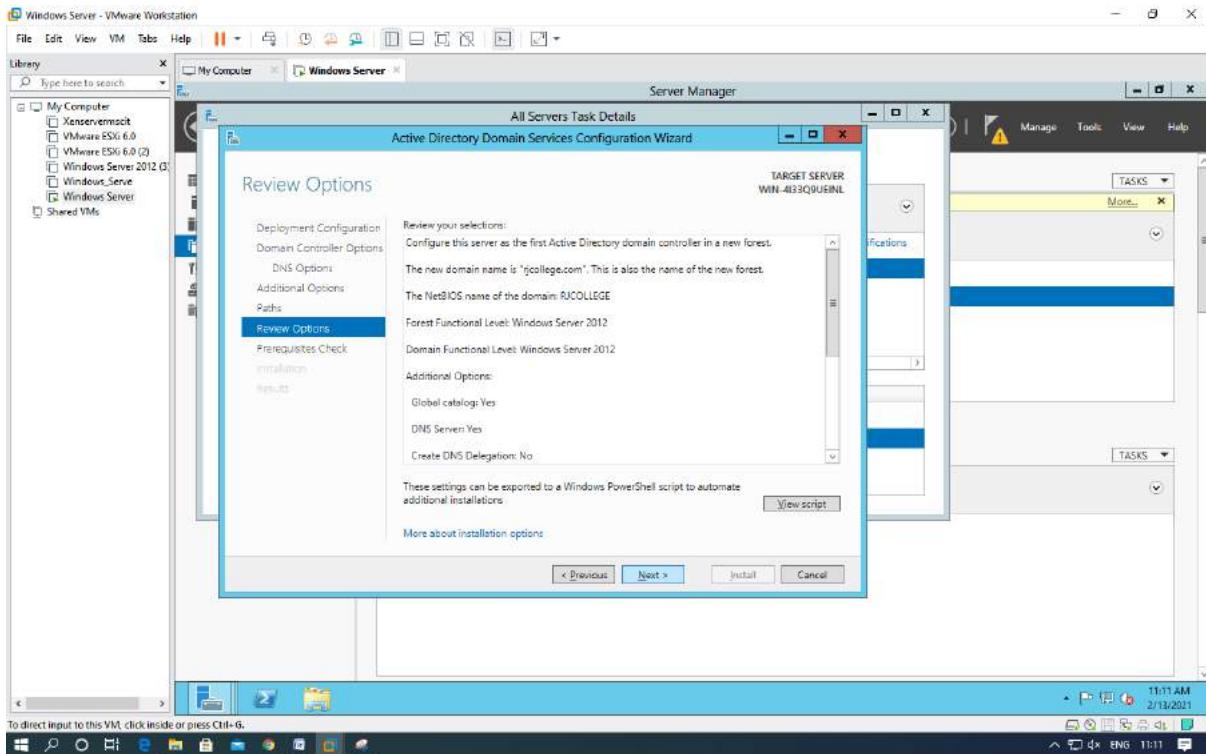
The NetBIOS Domain Name appears here automatically. Click “Next”.



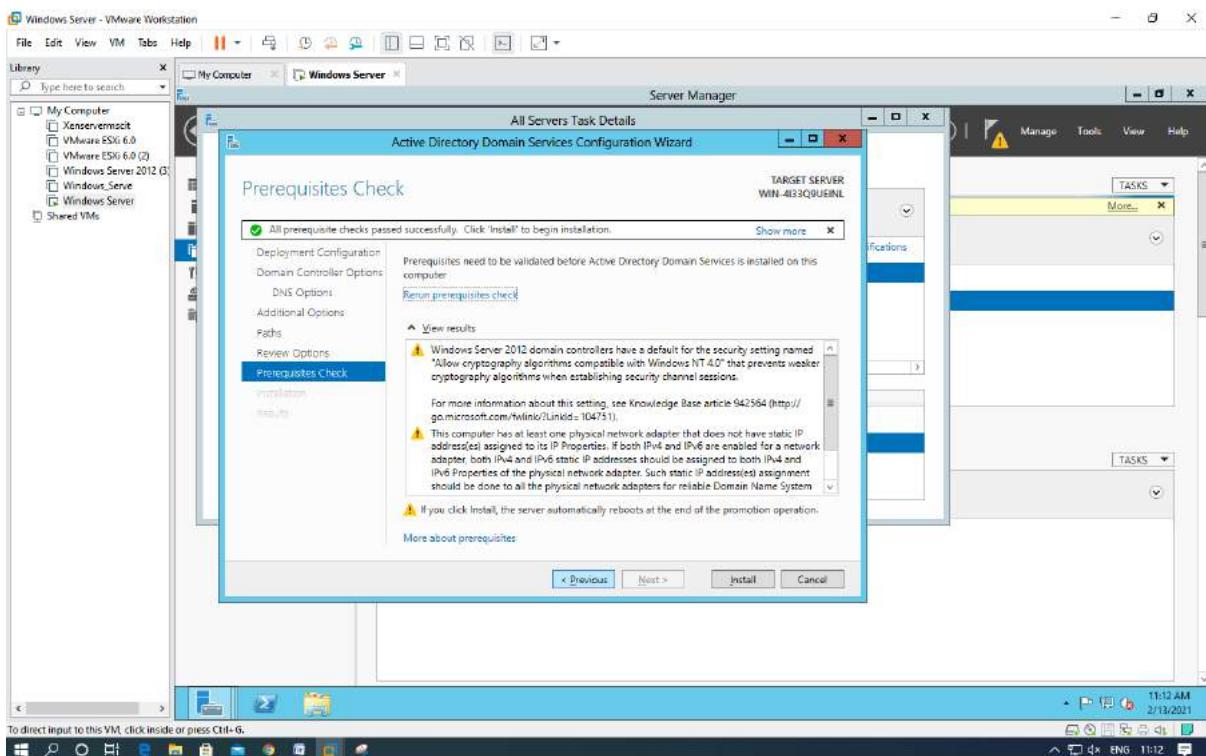
Click “Next”



Under “Review Options” it shows us whatever we have selected for the Domain Controller.

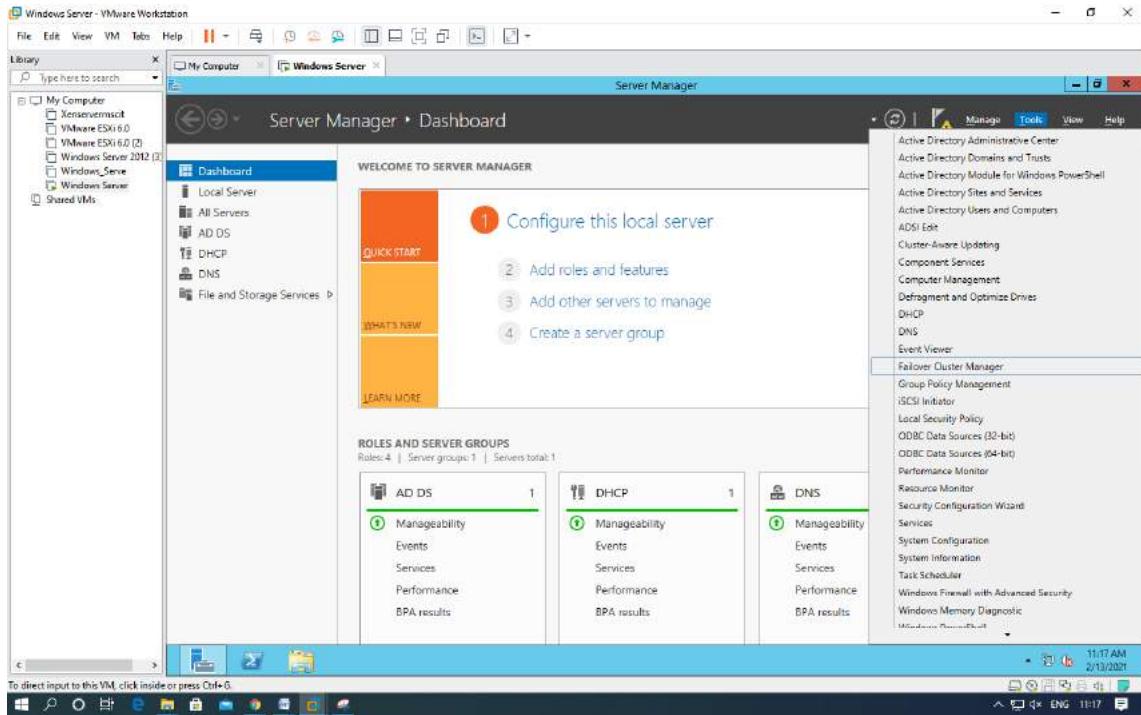


It checks for all the Prerequisites required to create a Domain Controller under “Prerequisites Check”. Click on “Install” button.

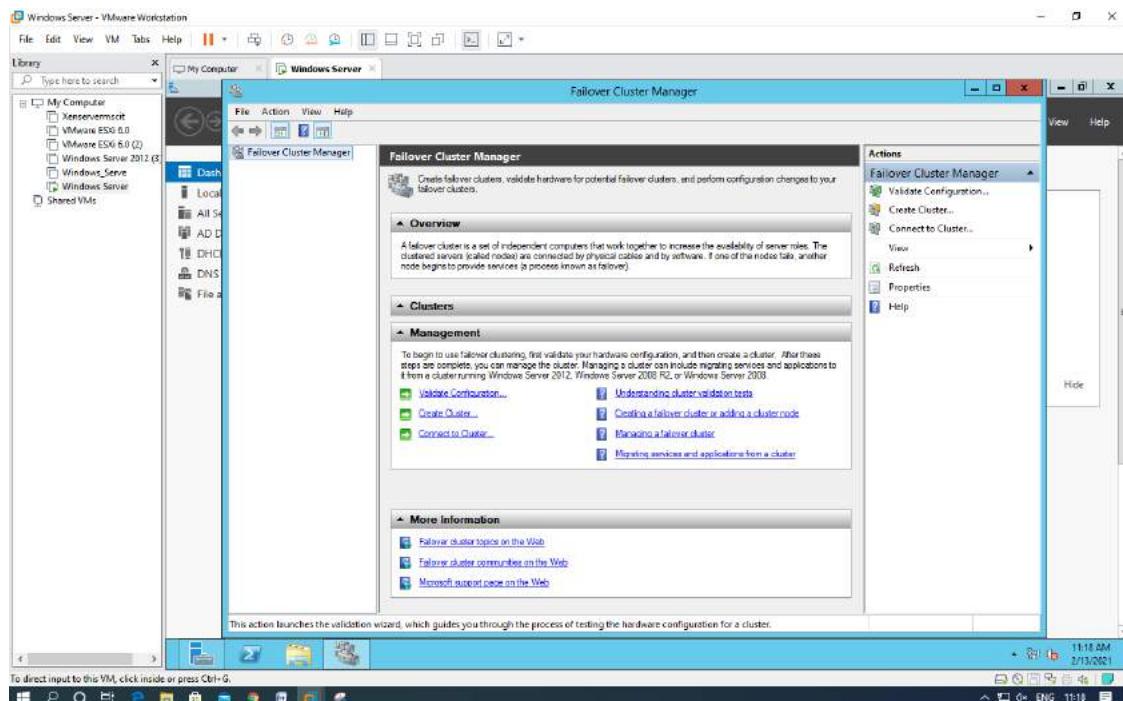


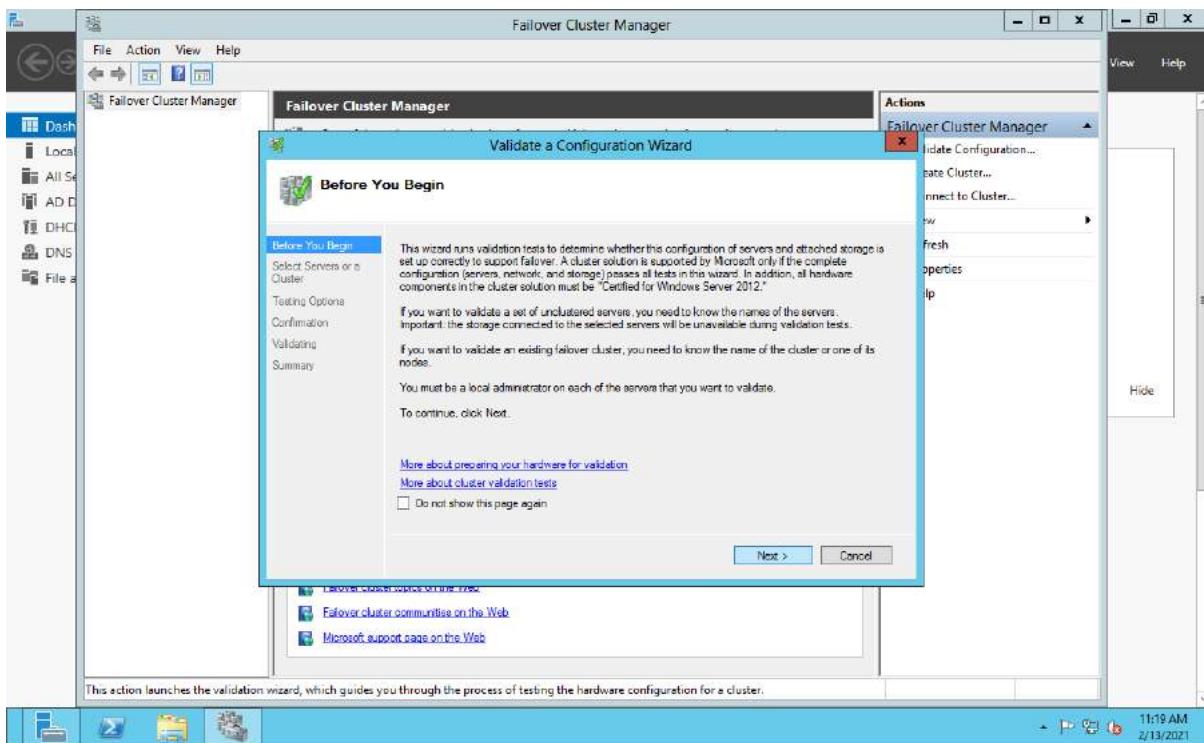
CREATING FAILOVER CLUSTER

Click on the “Failover Cluster Manager” under the tools menu to get the following screen.

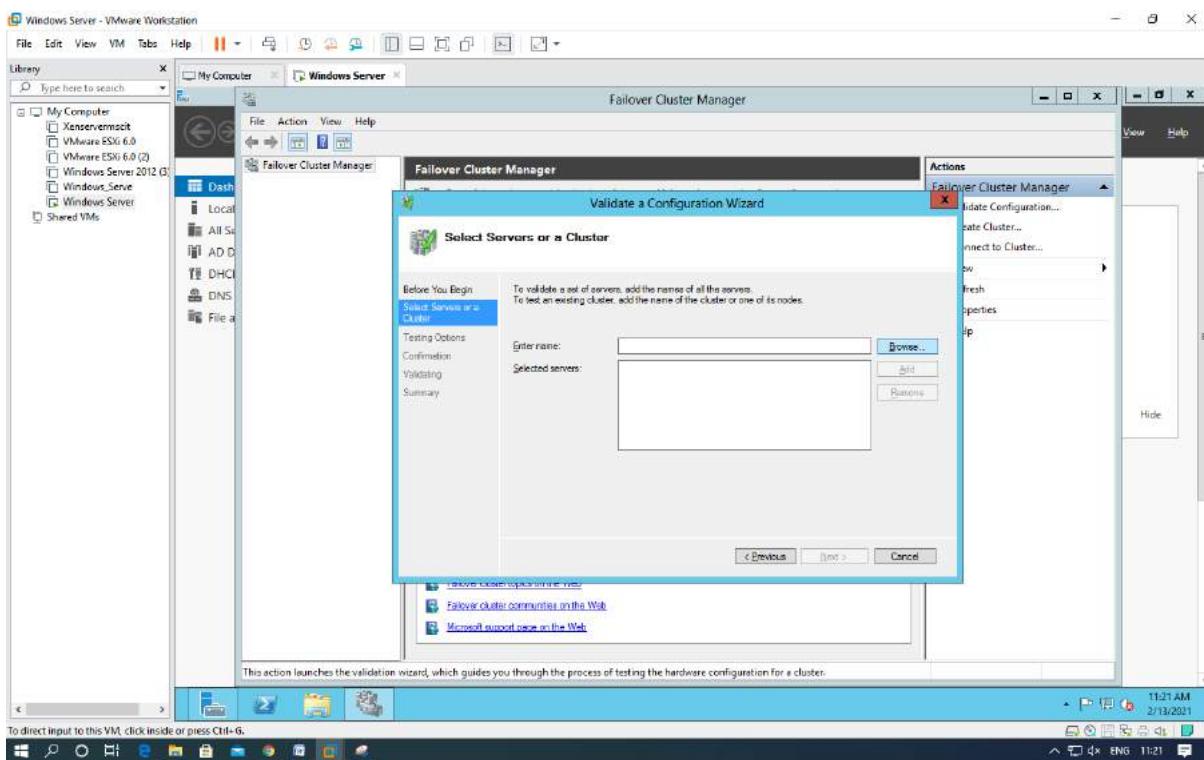


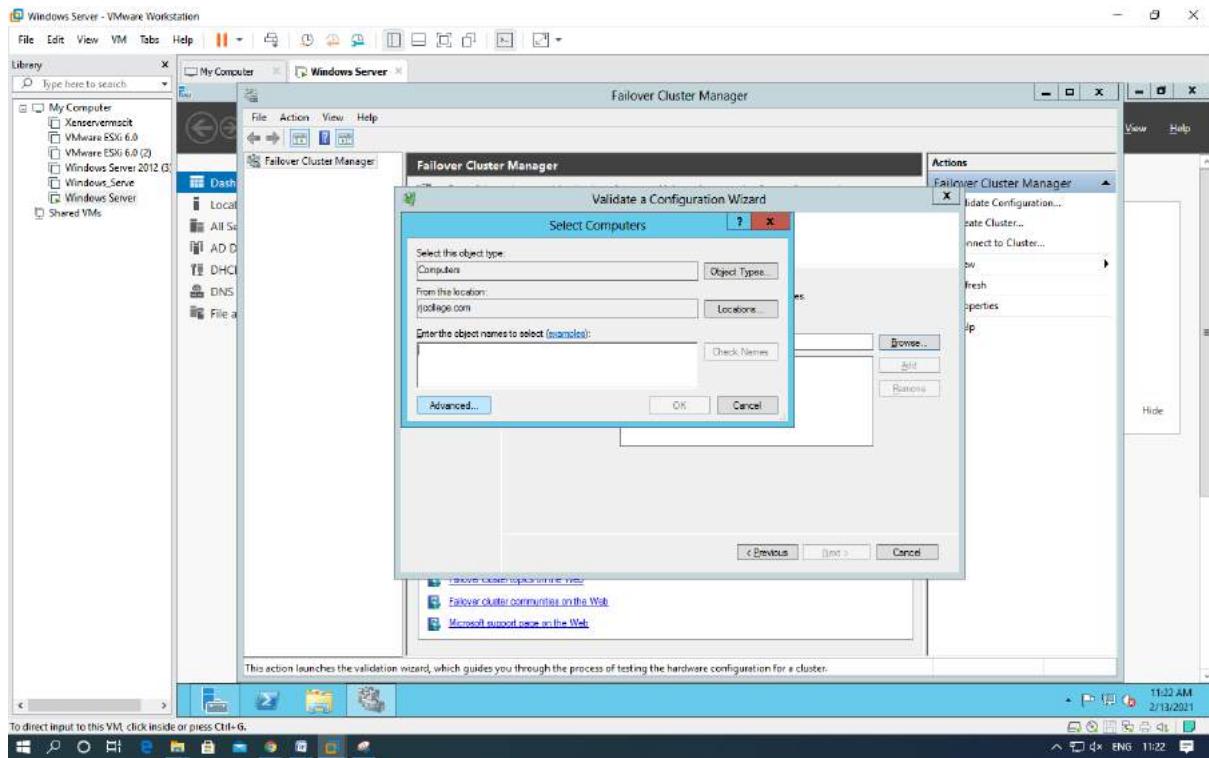
Click on “Validation Configuration” to open the “Validate a Configuration Wizard” by clicking on the “Validate Configuration” under the Management section at the bottom or right side of the screen. The nodes to be added must be validated prior to add in the cluster. Click “Next”.



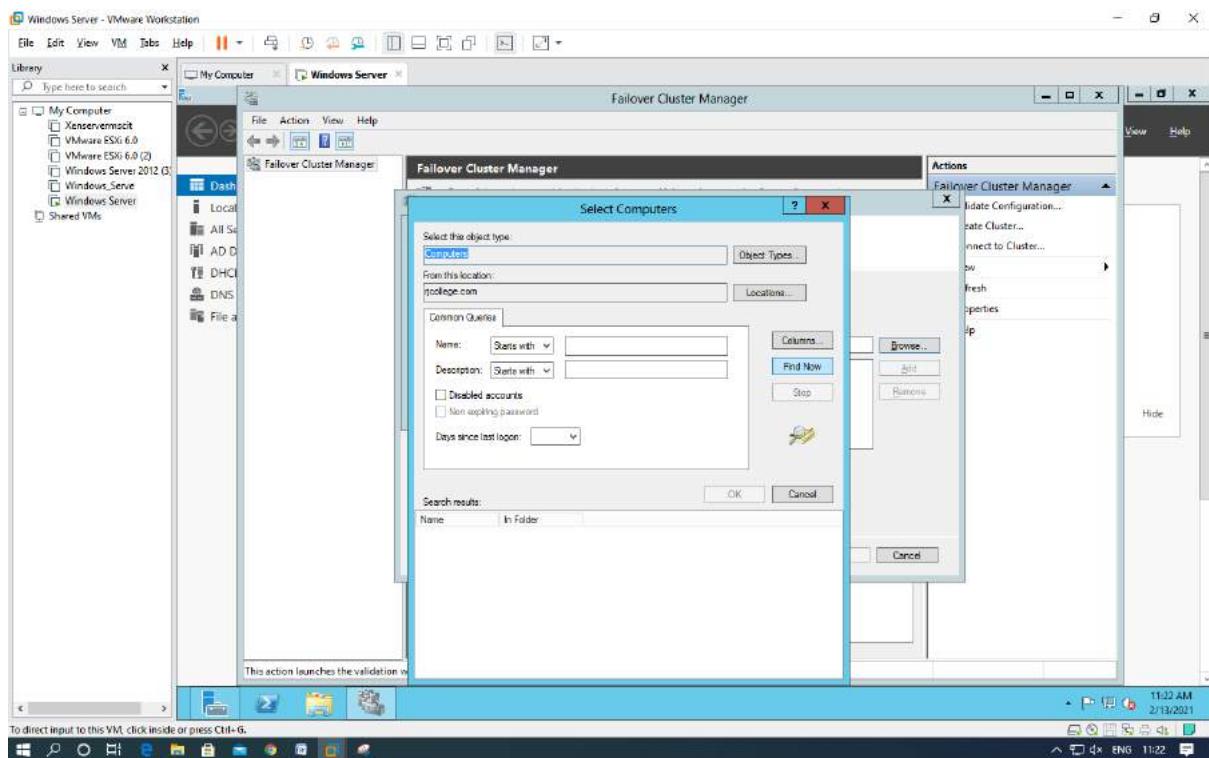


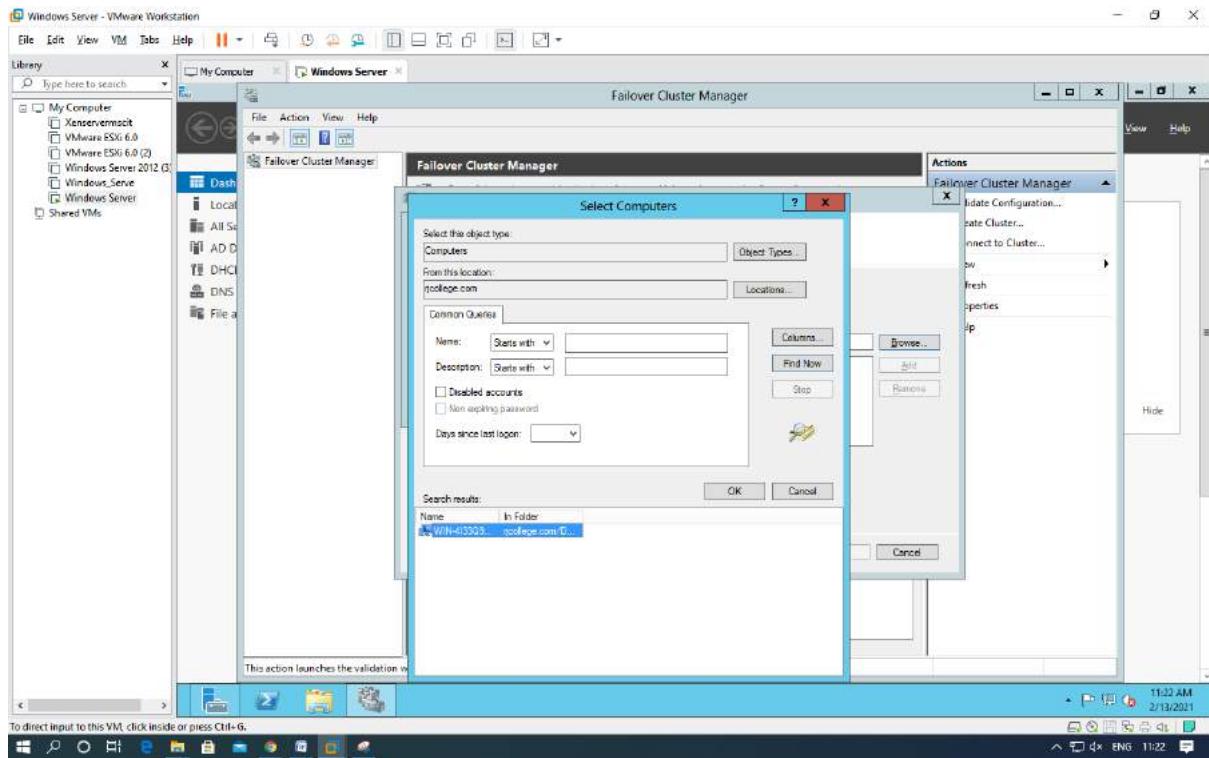
In this screen, click on Browse button and then Advanced for finding the domain node. As shown in below screens.



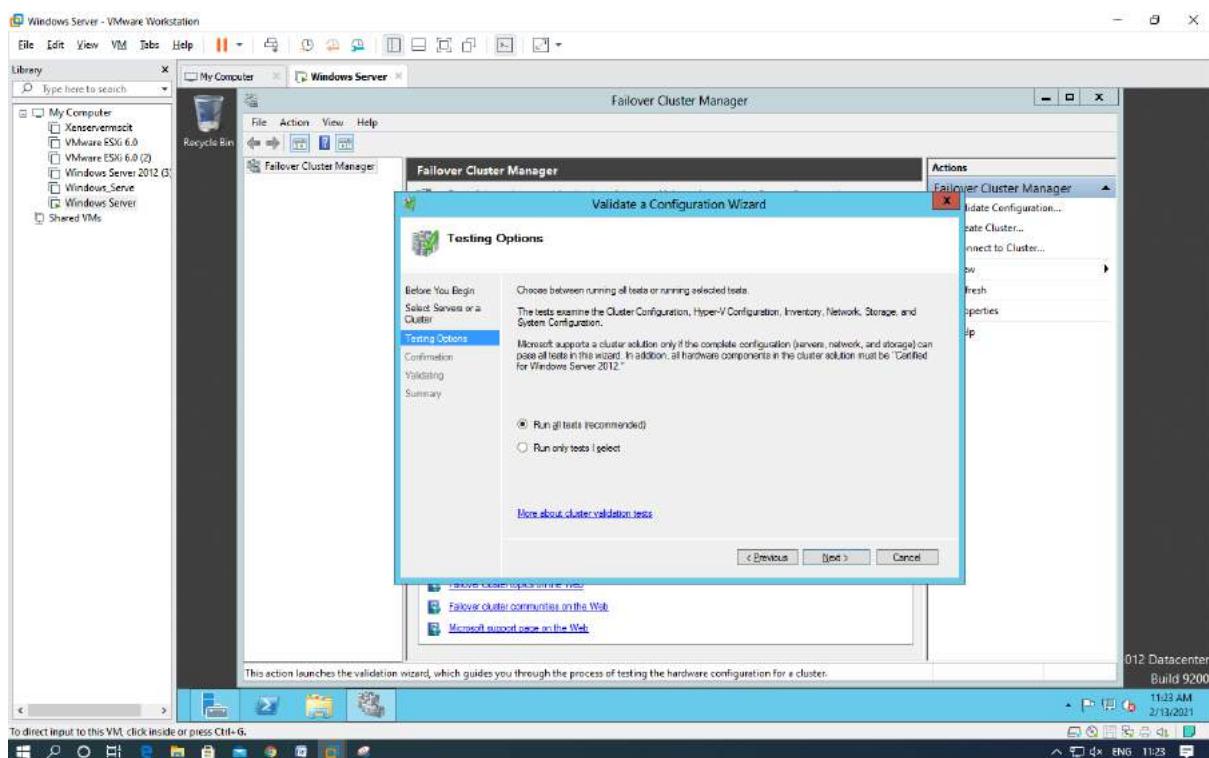


Click on Find now

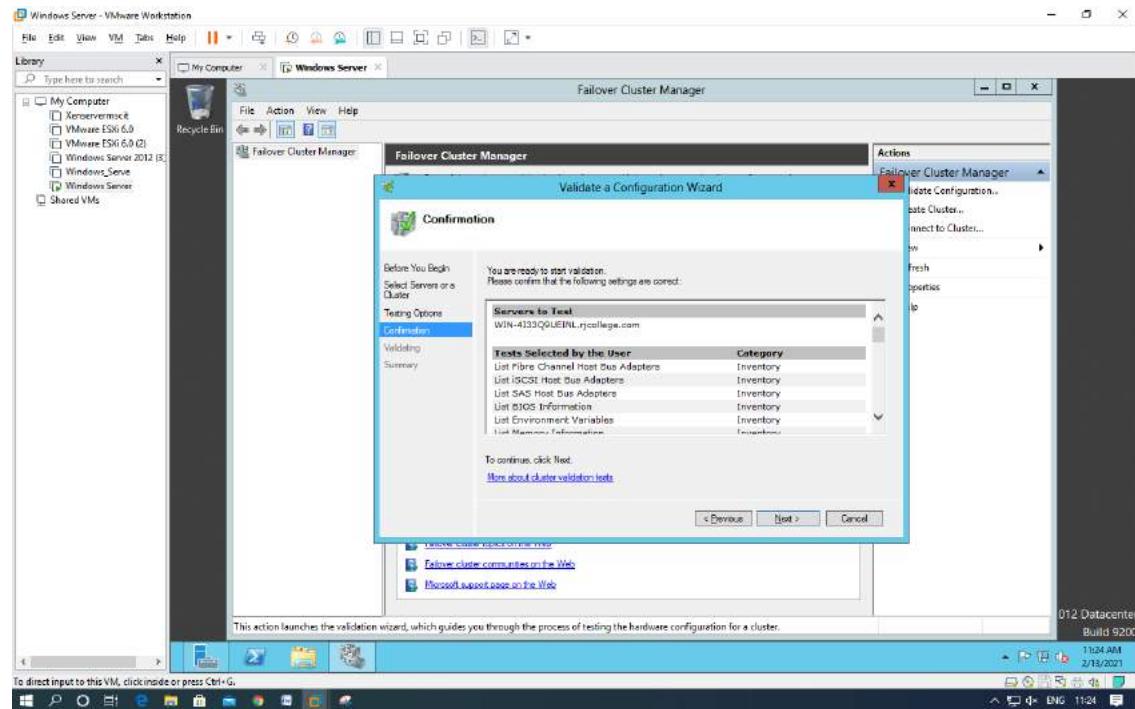




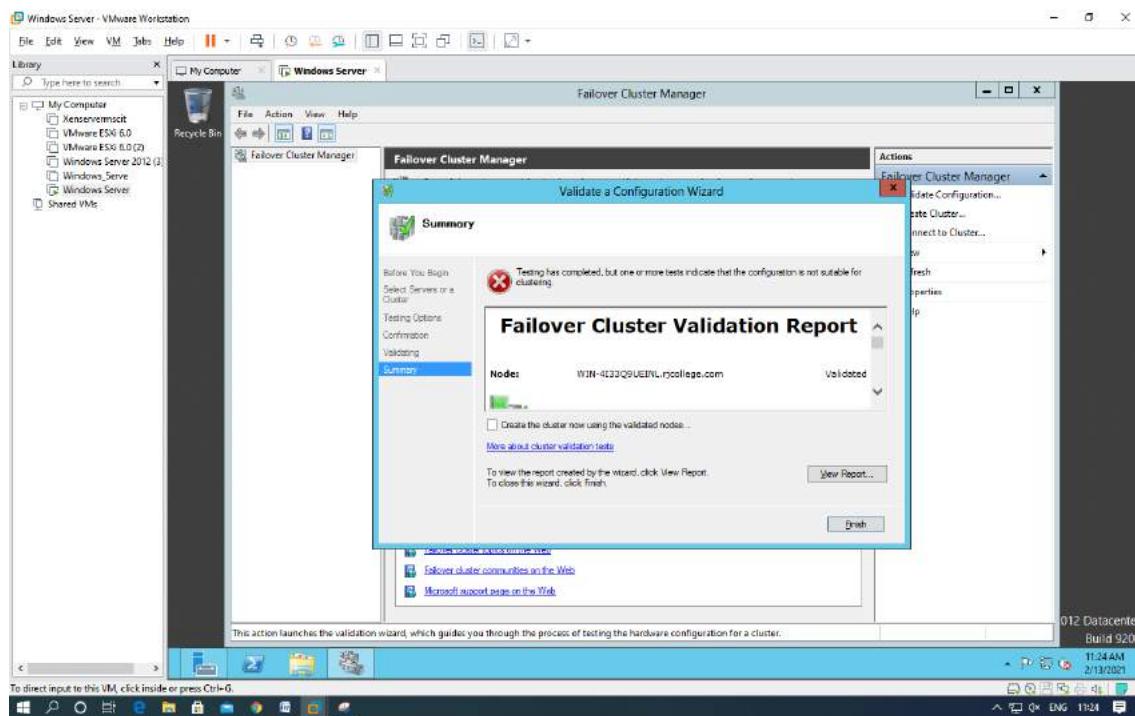
Click on run all test and then Next



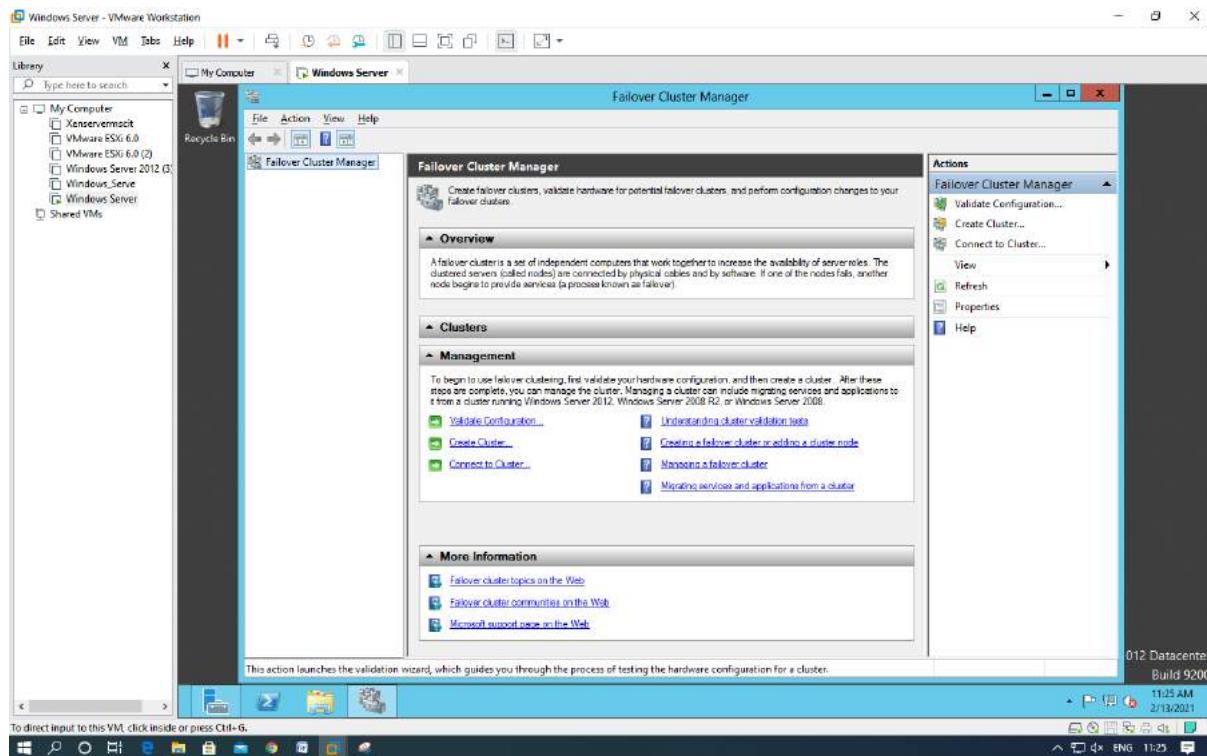
Choose “Run all the tests(recommended)” and click “Next” and then it will ask for the confirmation click “Next”. It will start all test validation.



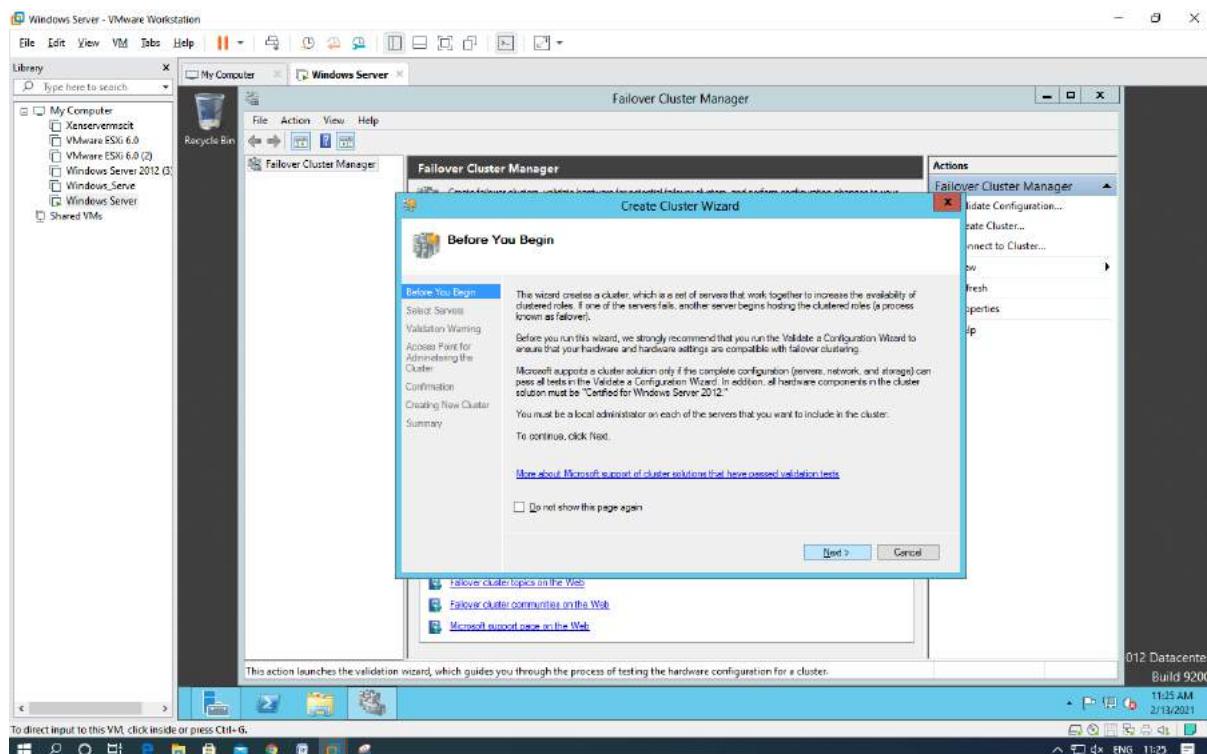
After completion it will display the summary report as shown below. If there are any errors can be seen here and you will not be allowed to create the cluster. As shown in the screen we can see that the nodes are validated. Click on finish.



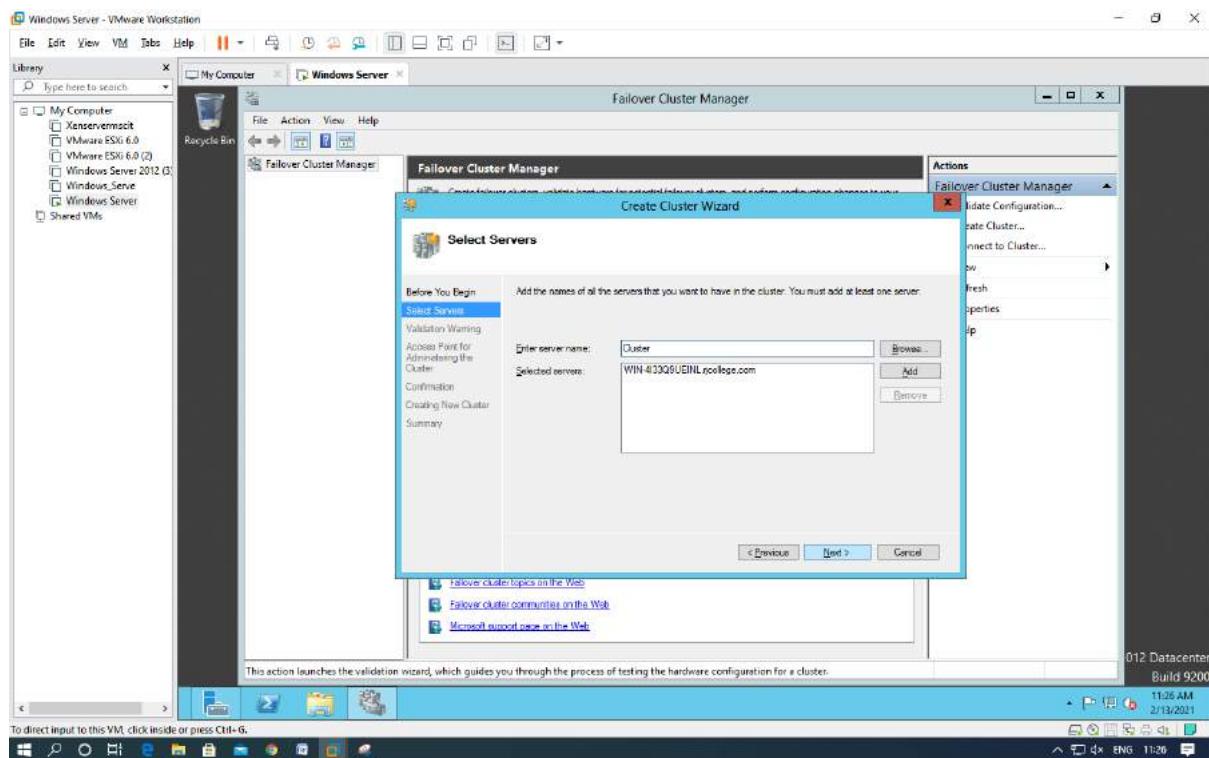
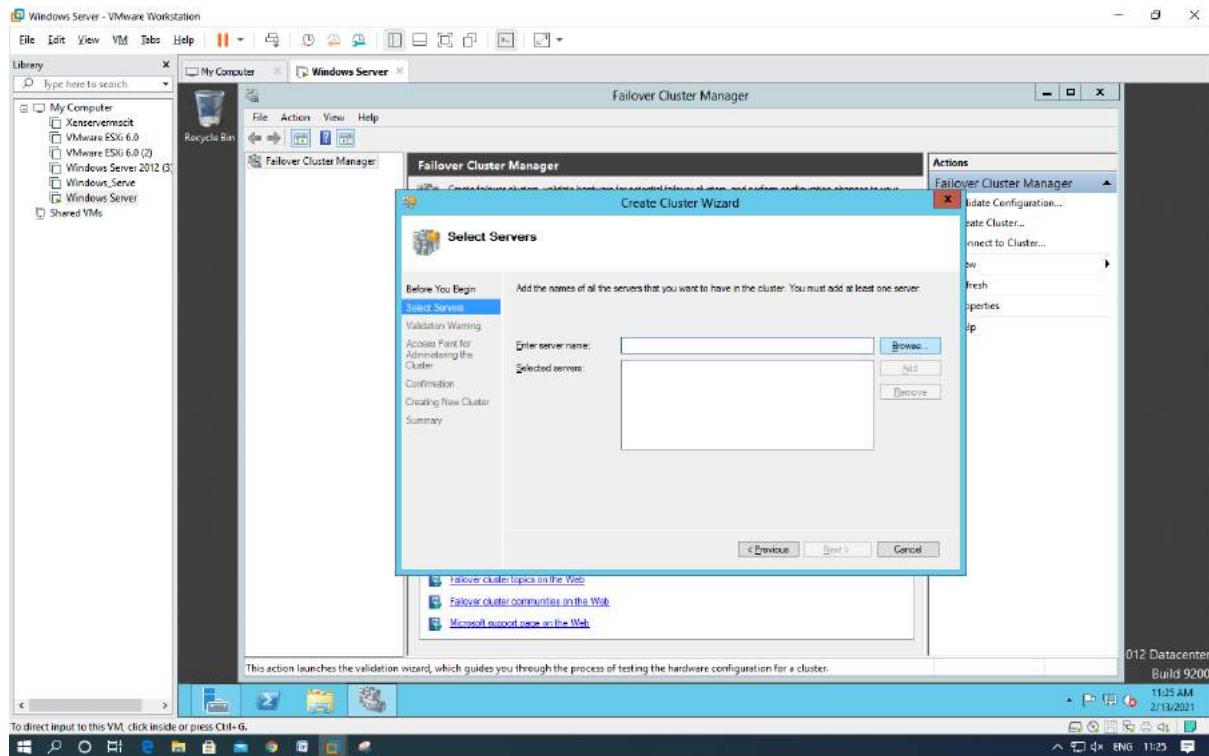
After validation completion you will create the “Create Cluster Wizard” click Next.

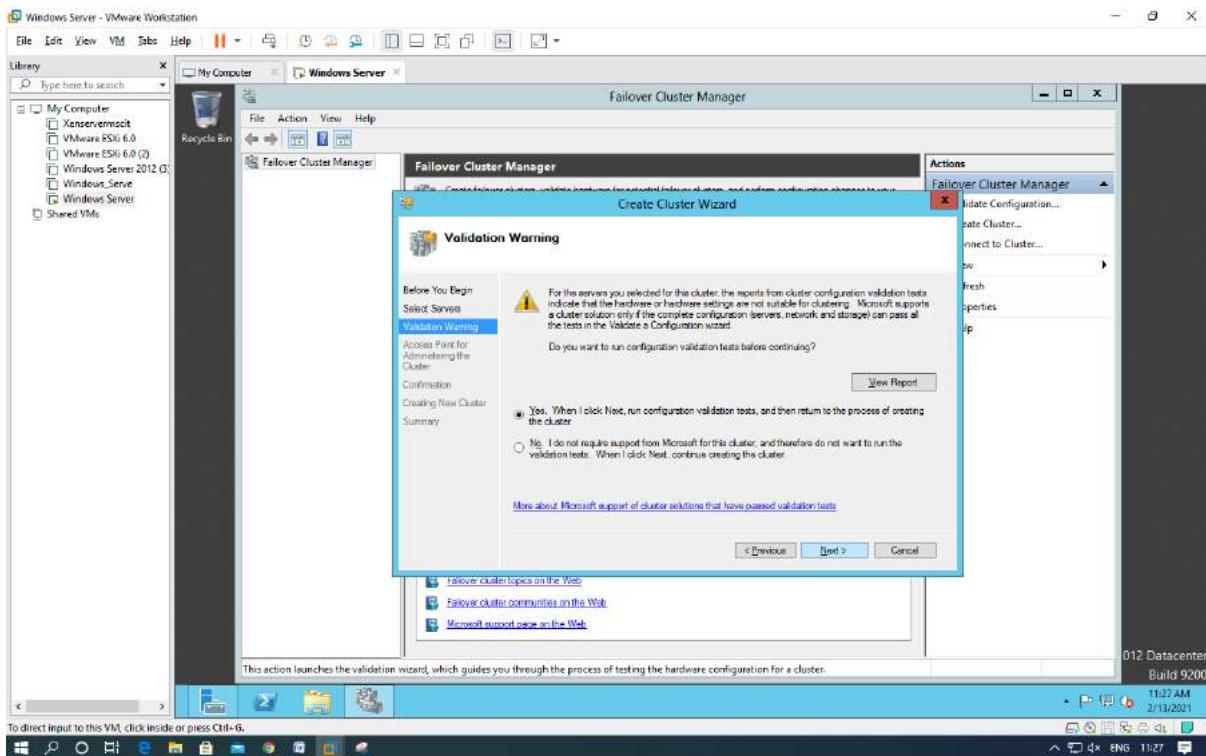


Click next

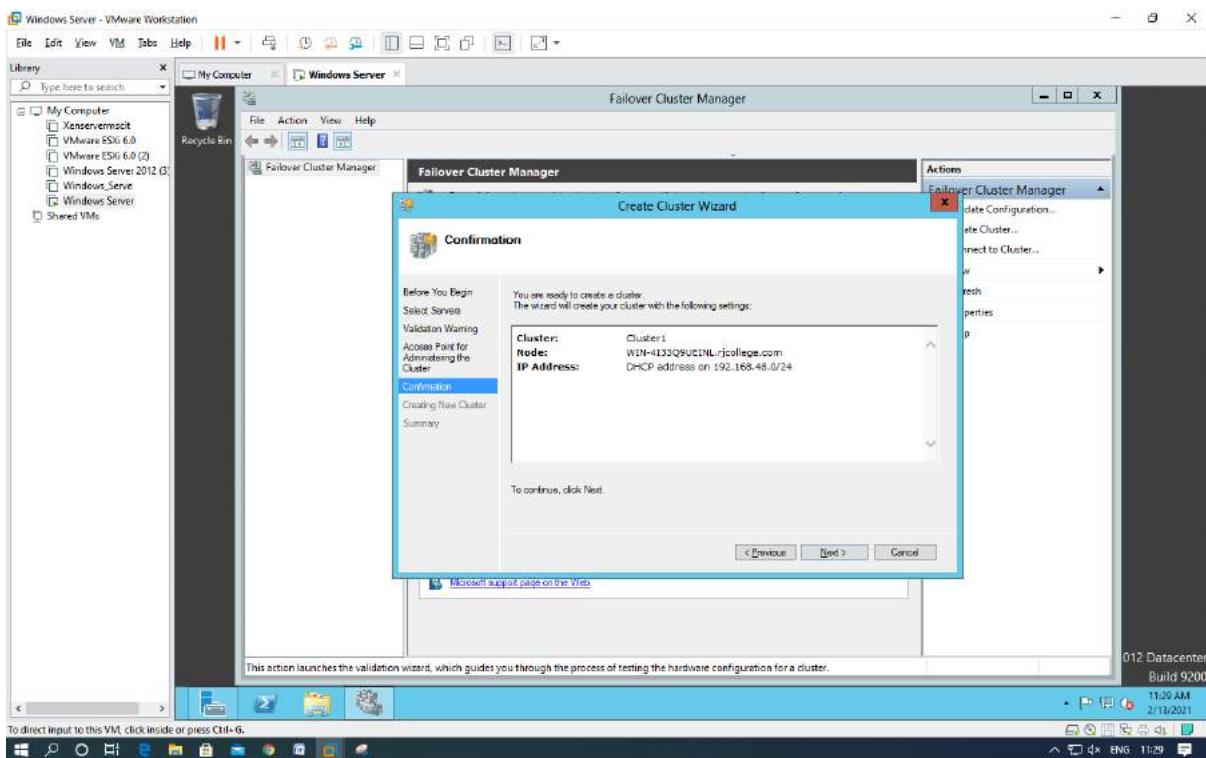


Specify the Cluster name. Cluster name here should be the NetBIOS name of the Domain Controller, so here it is RJC_Node. Click next

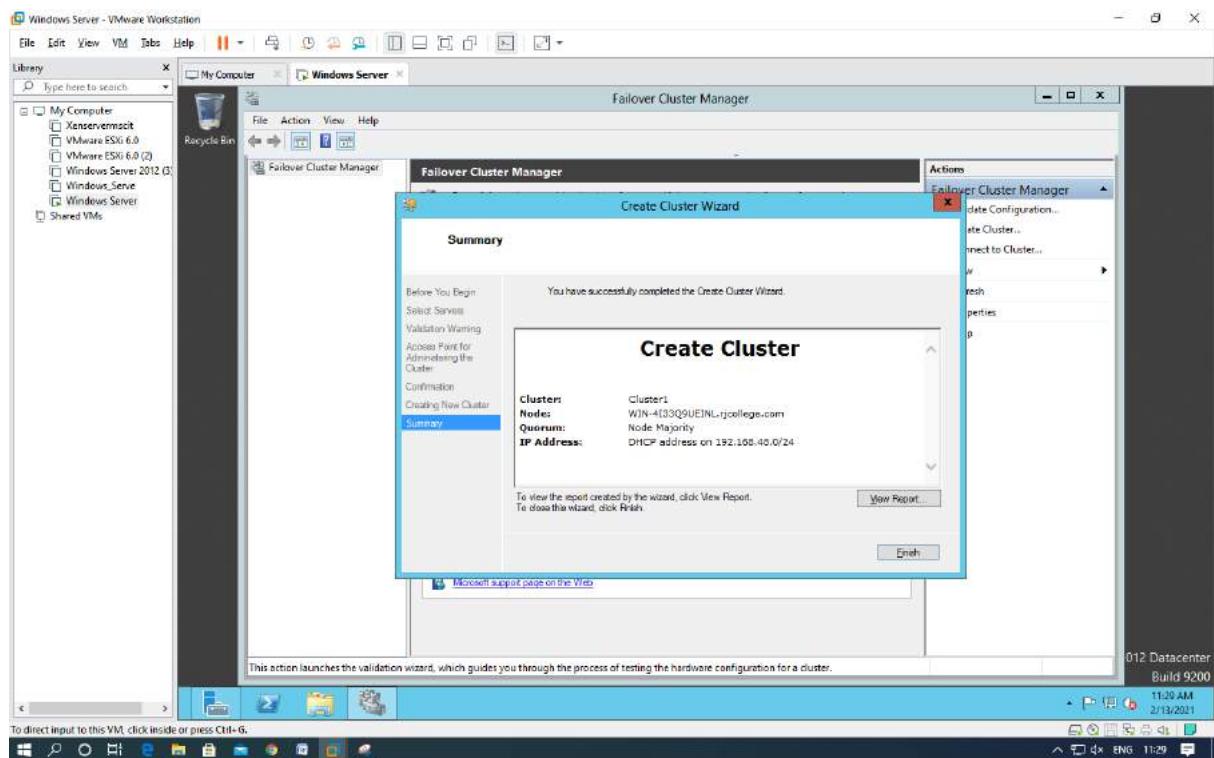
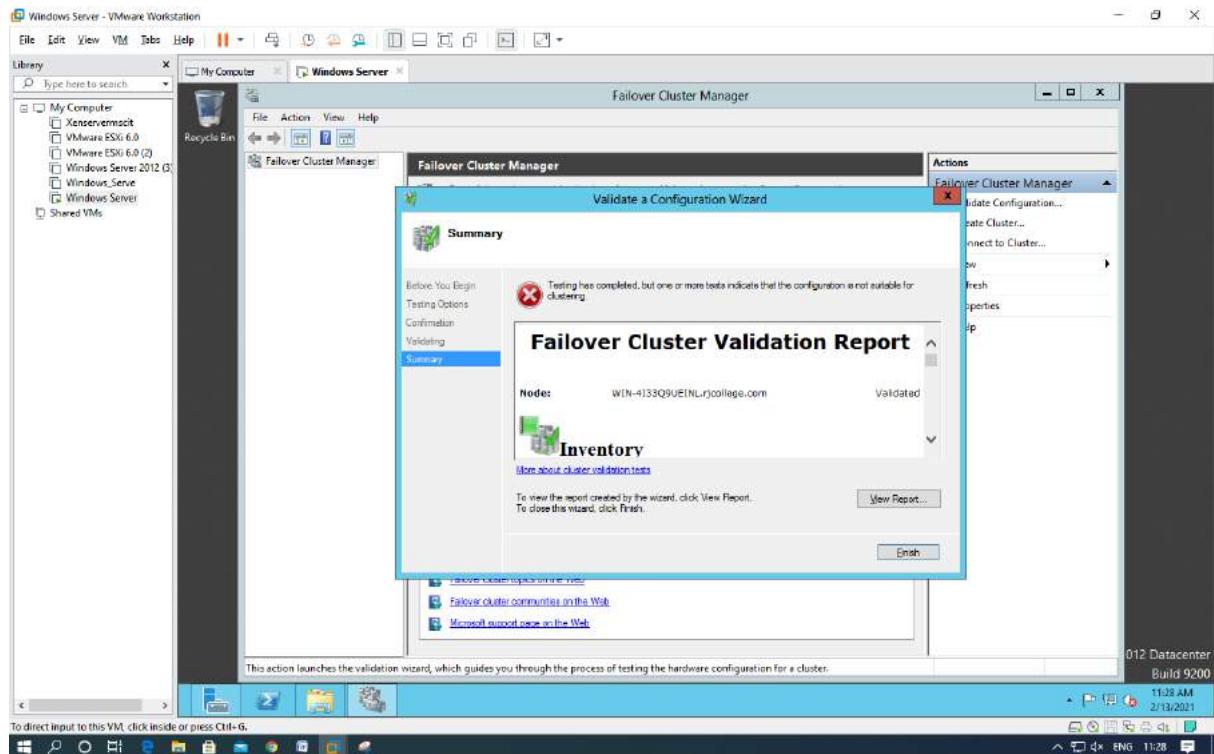




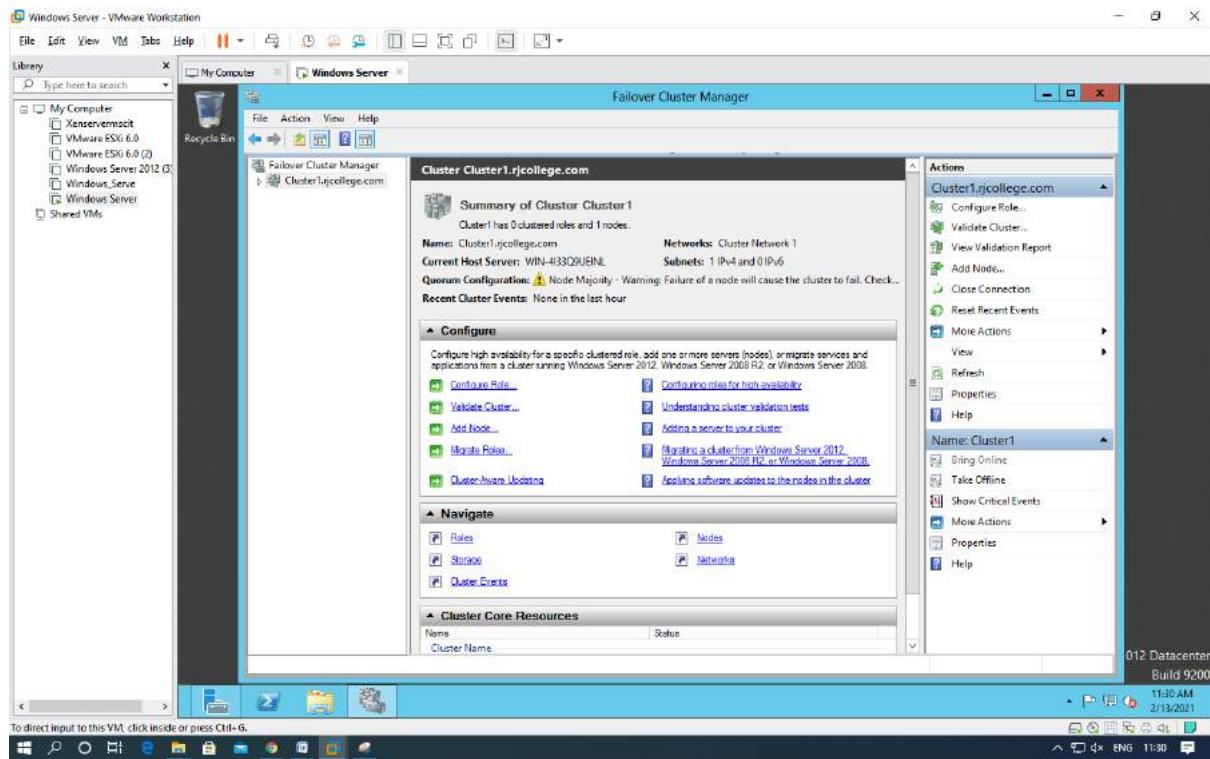
It will ask for the confirmation of cluster Creation. Click “Next”.



If the Cluster creation is successful you should see the following screen that shows a message “You have successfully completed the Create Cluster Wizard”



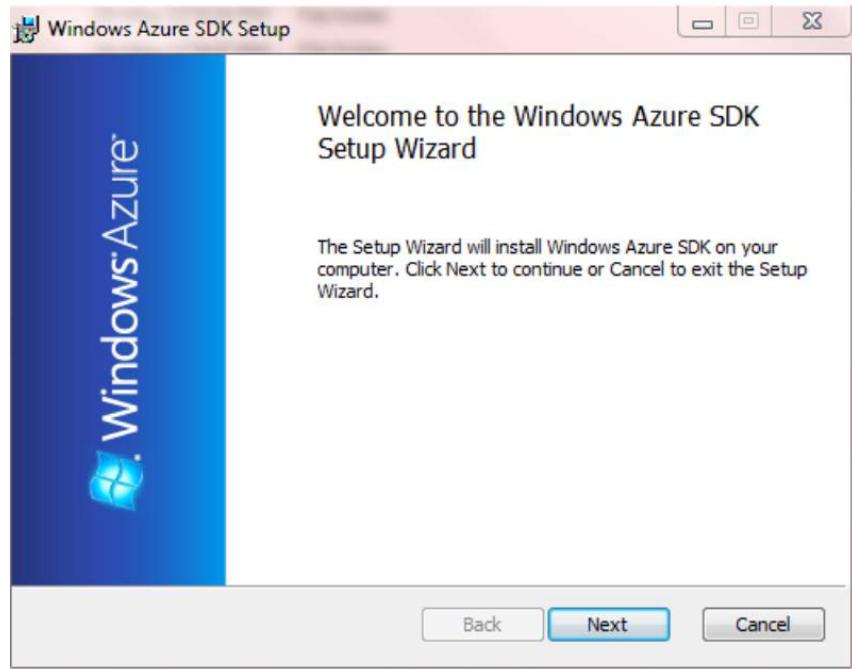
After cluster gets created you can see the cluster on the left side as shown in the screen below.



Practical 2

DEVELOPING APPLICATION FOR WINDOWS AZURE

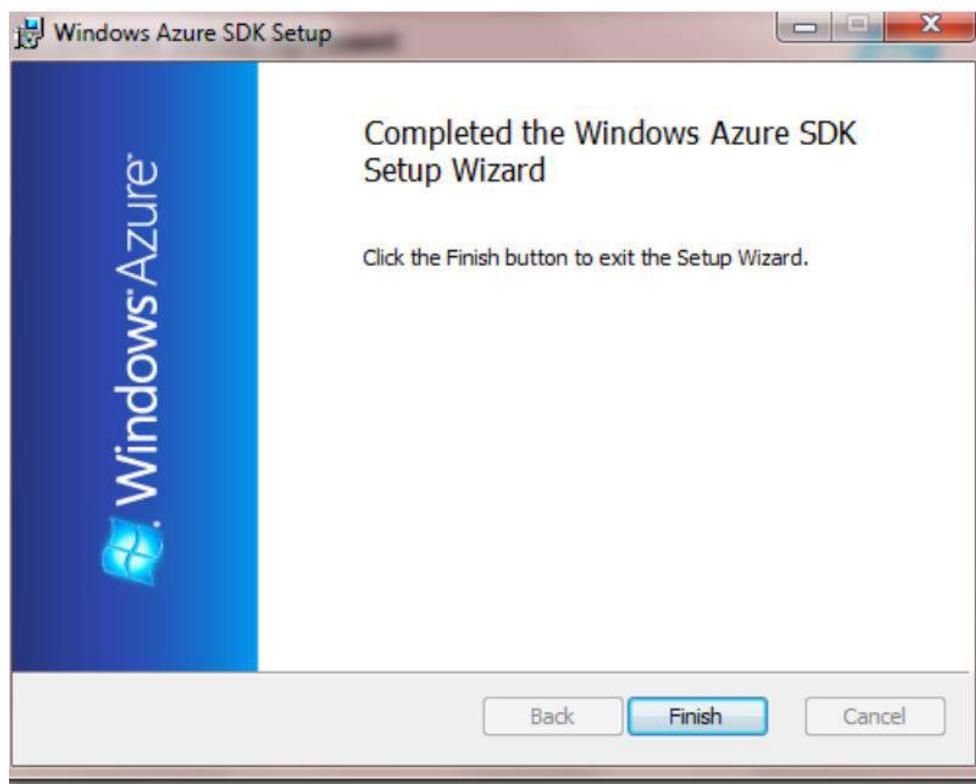
To develop an application for Windows Azure on Visual Studio install the “Microsoft Azure SDK for .NET (VS 2010) – 2.8.2.1”



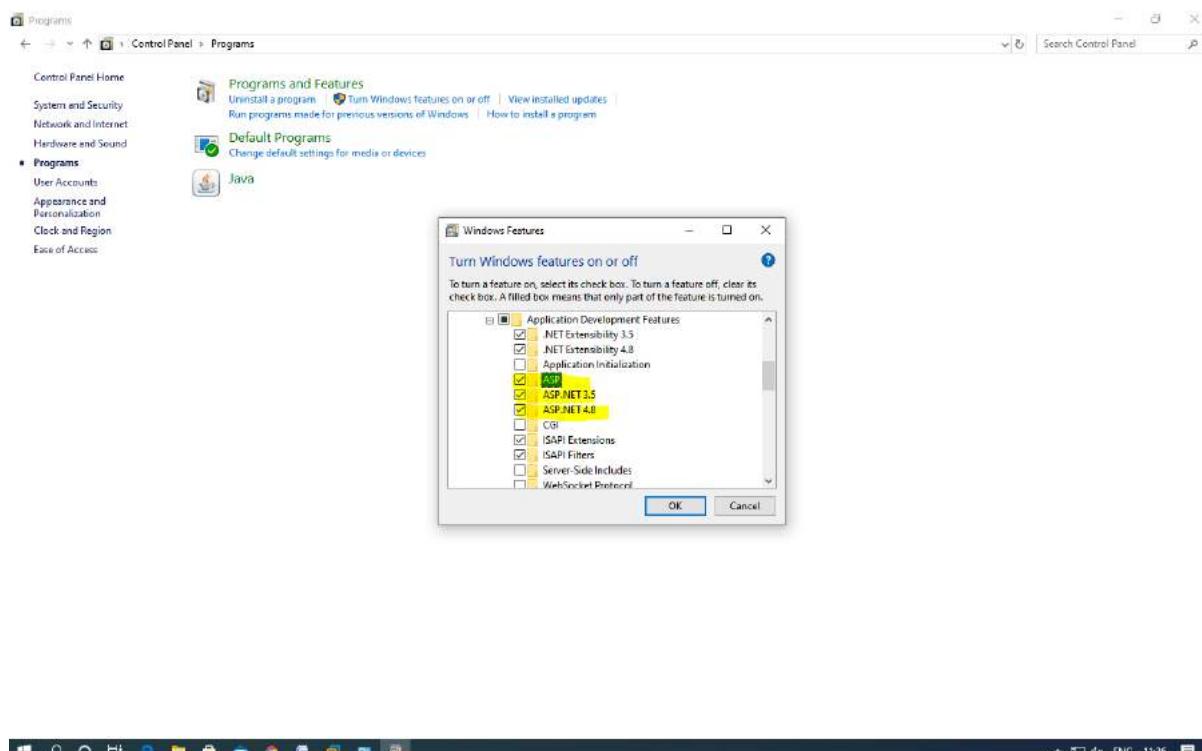
Accept the license and Click on Next.



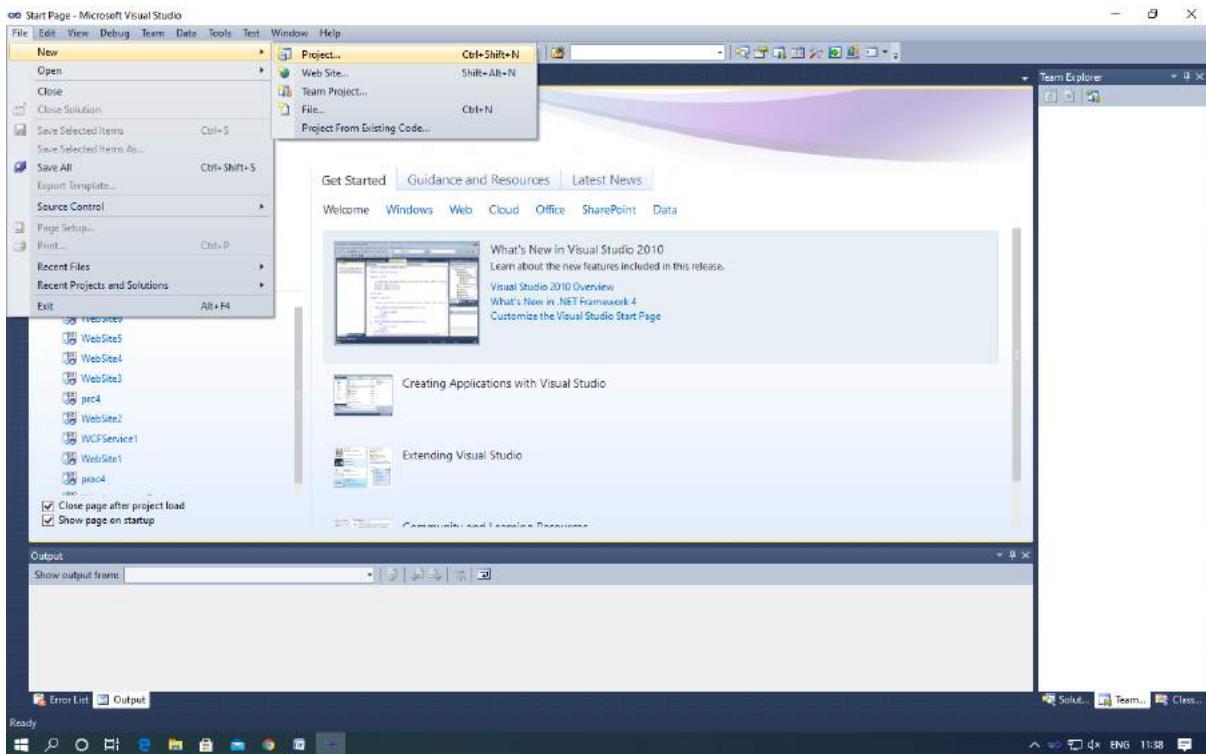
Click on Finish



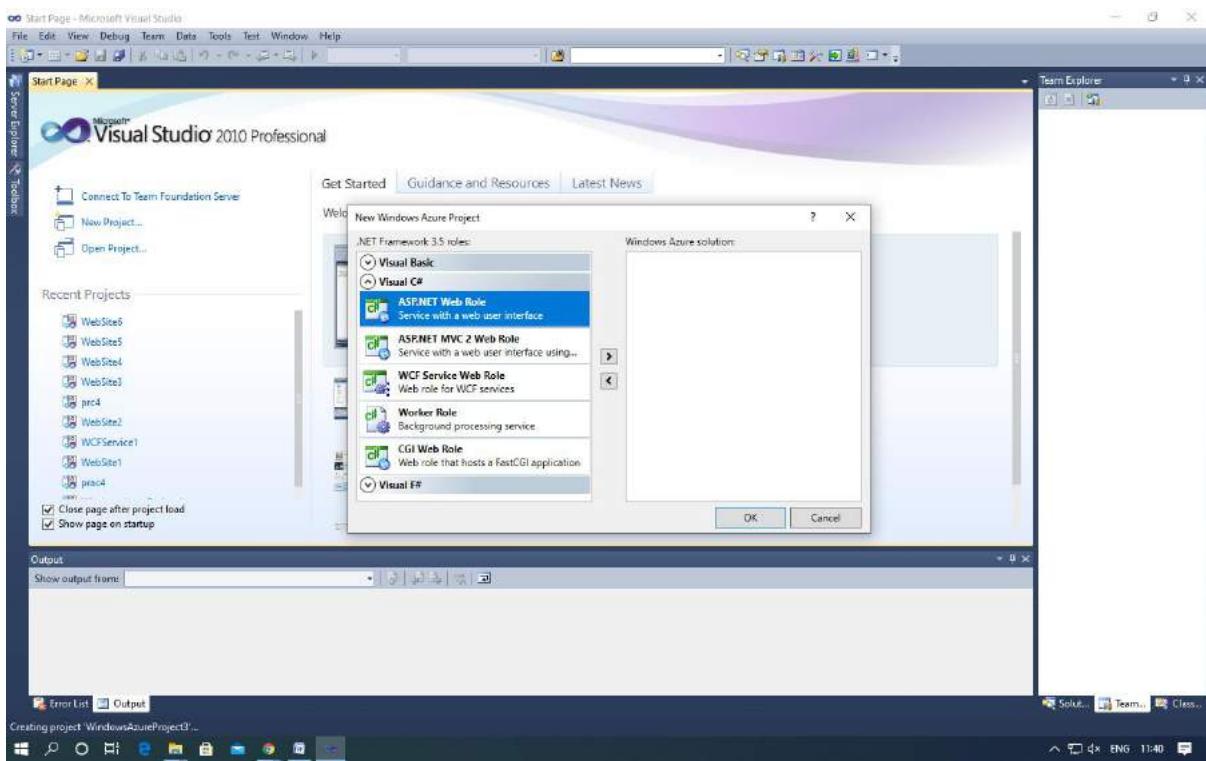
Step2: Turn windows Features ON or OFF: Go to Control panel and click on programs.

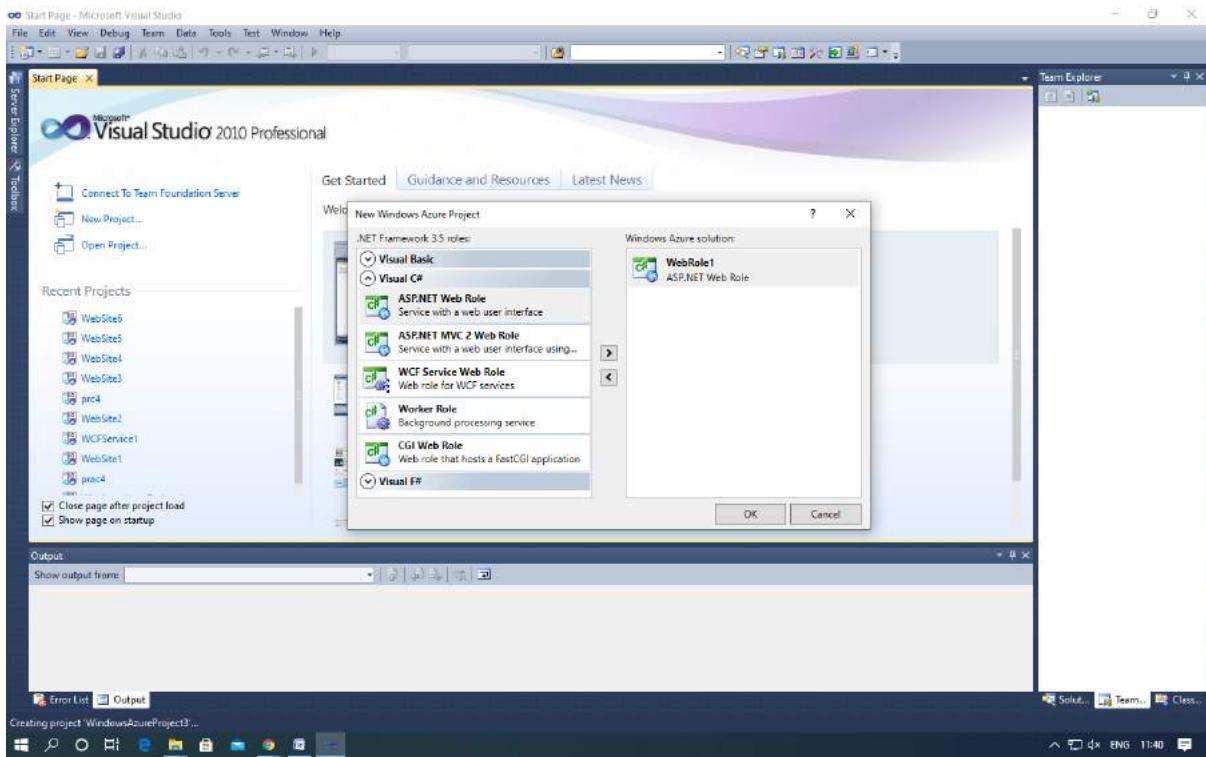


Now, Start the visual studio 2010 and Go To File->New->Project

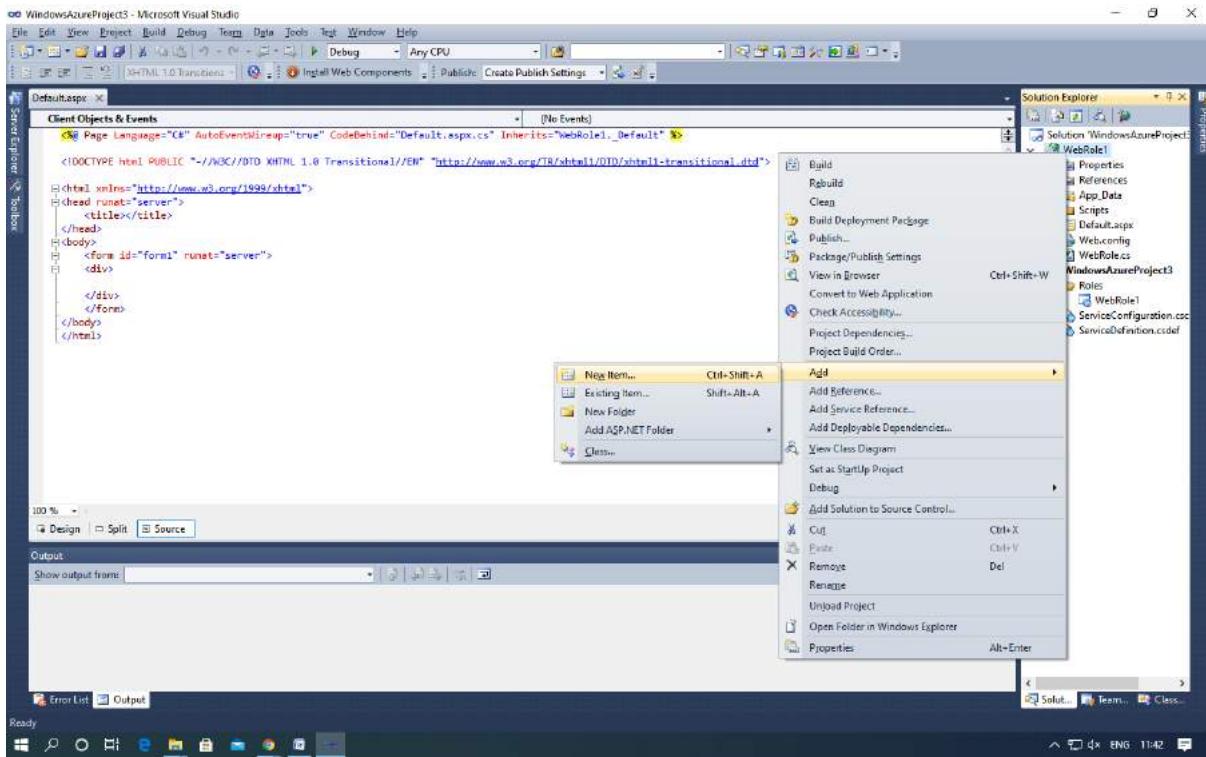


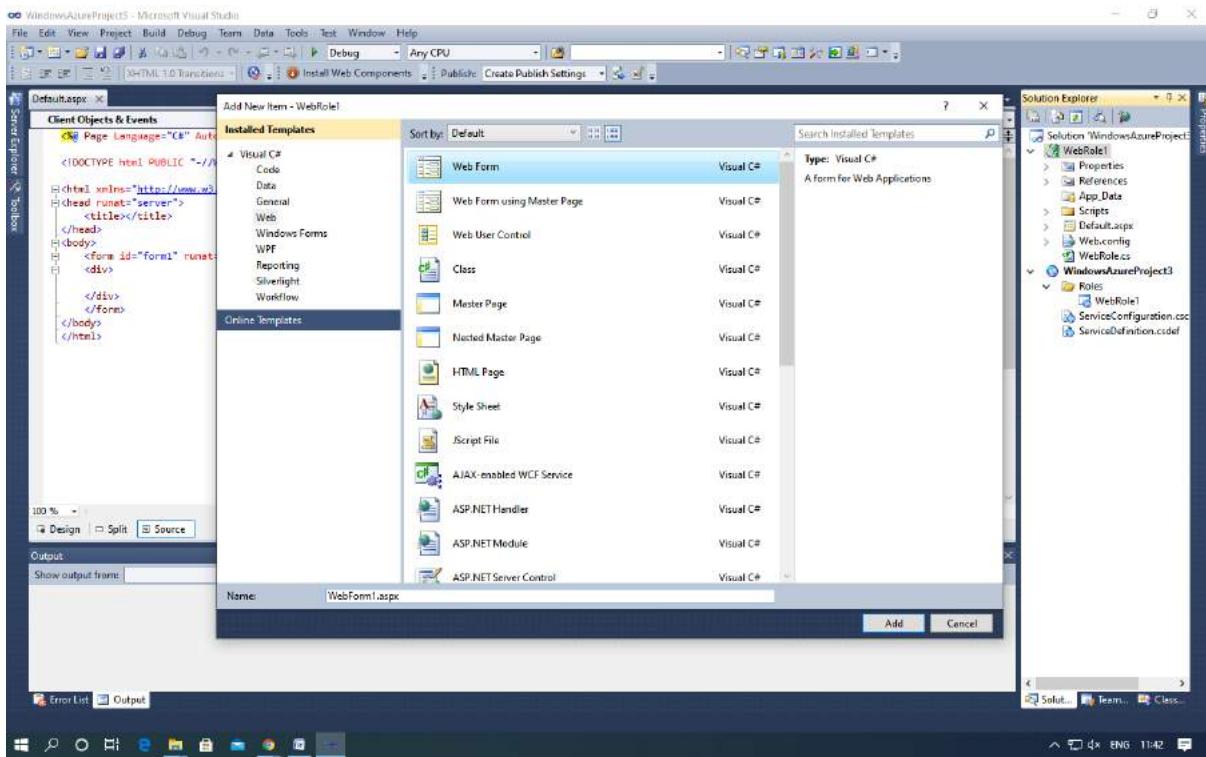
Add asp.net roles



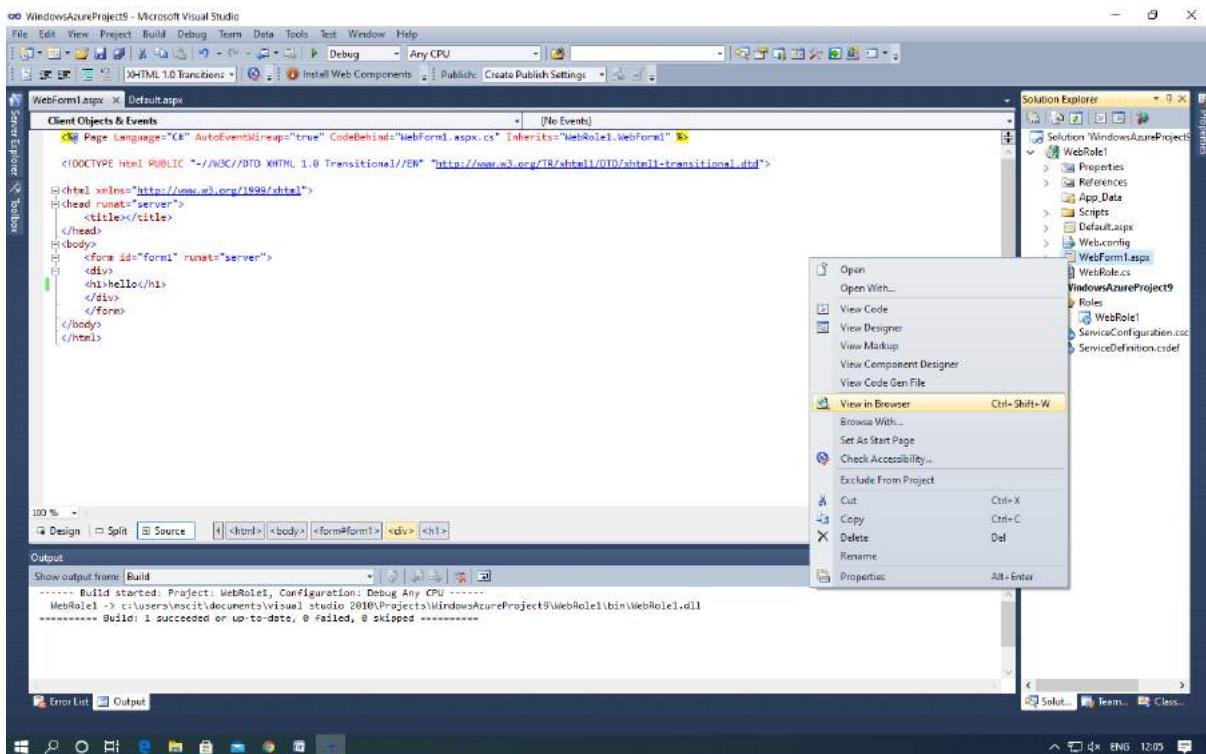


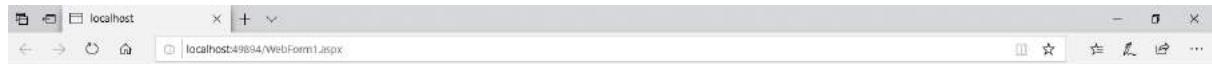
Create a web form





Run the website

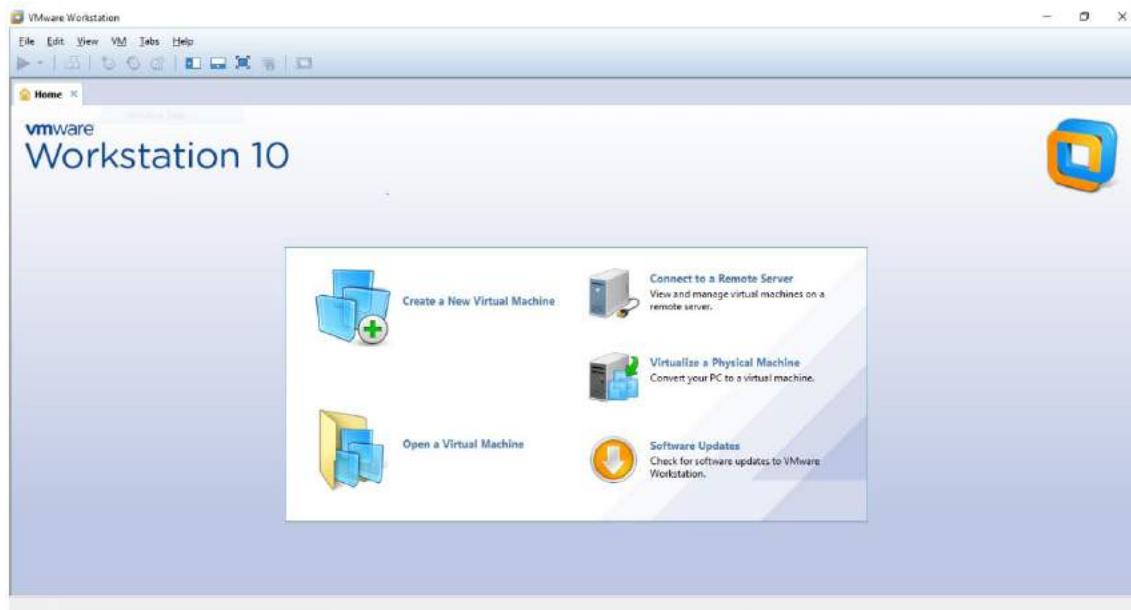




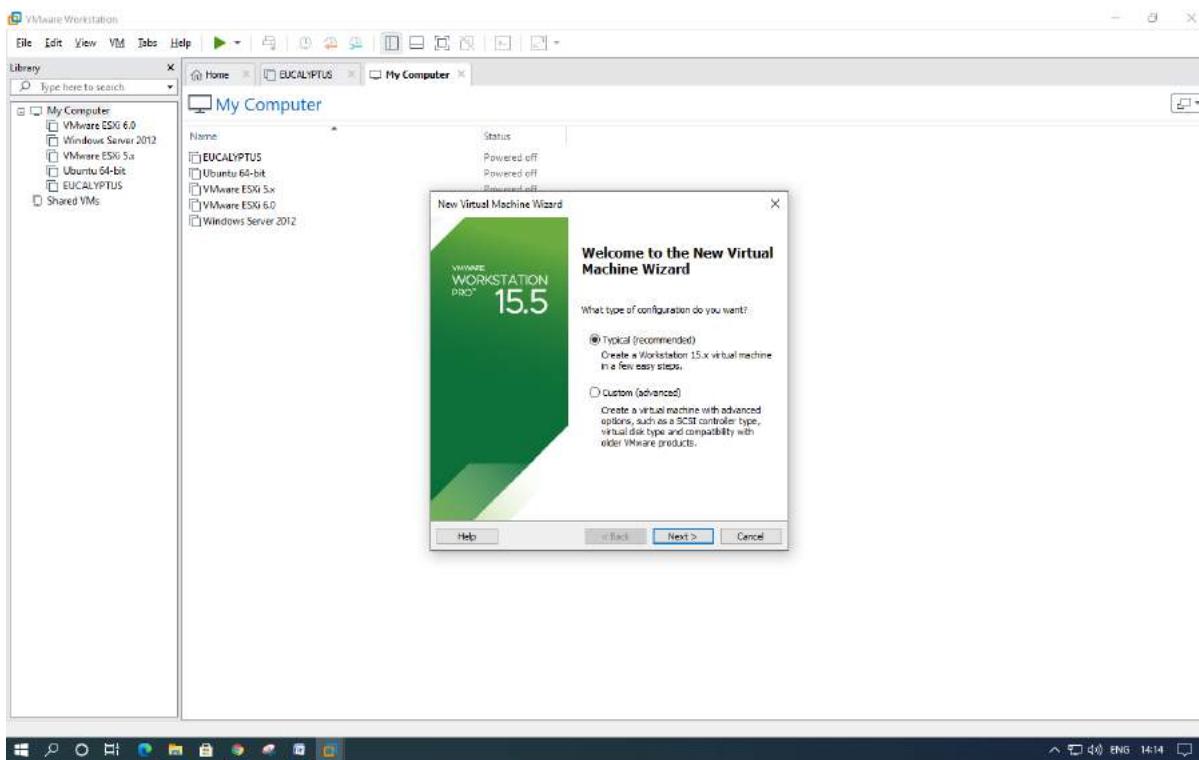
PRACTICAL: 3

IMPLEMENTING PRIVATE CLOUD WITH XEN SERVER

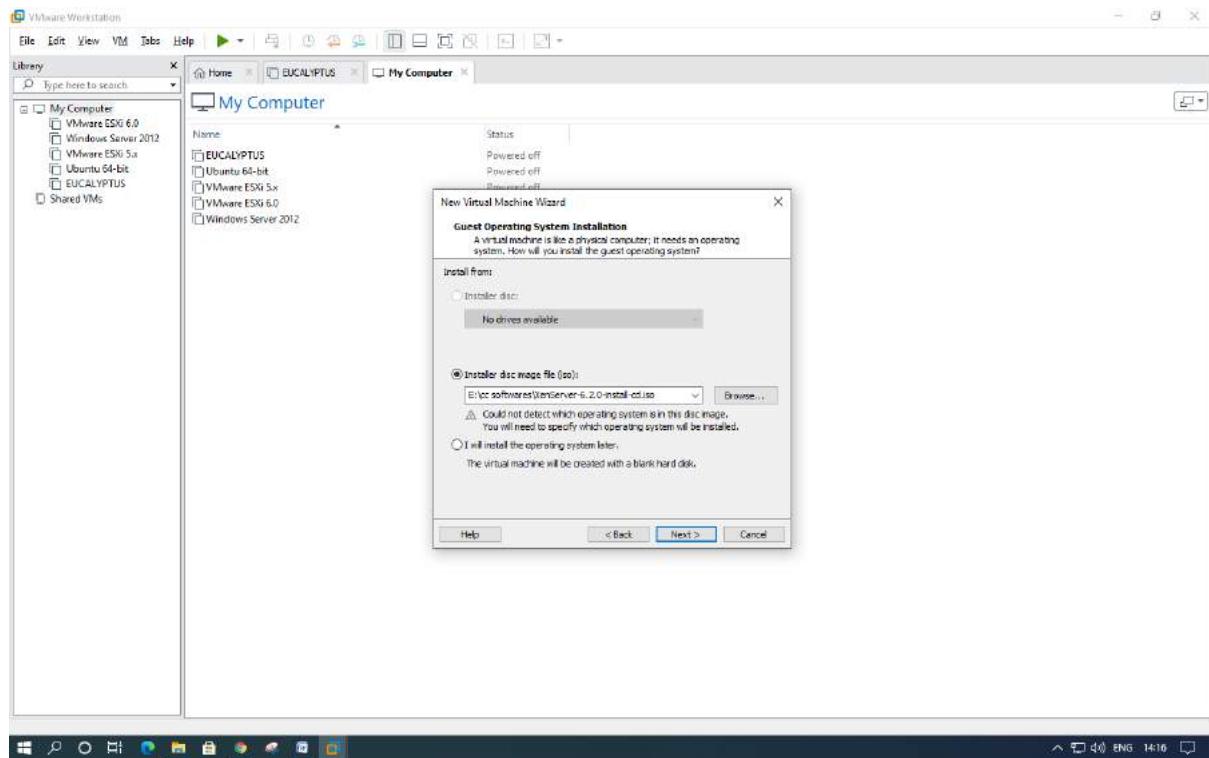
Open VMware Workstation – And select Create a New Virtual Machine



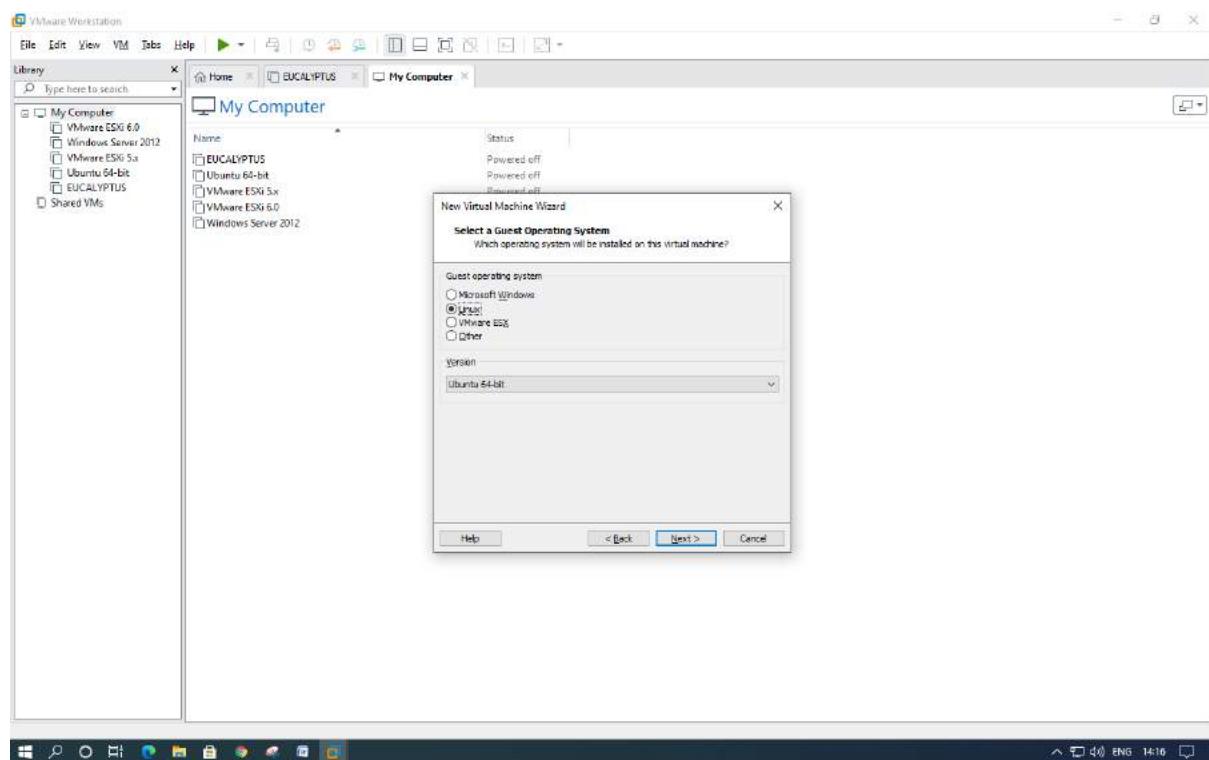
Select Typical and click Next



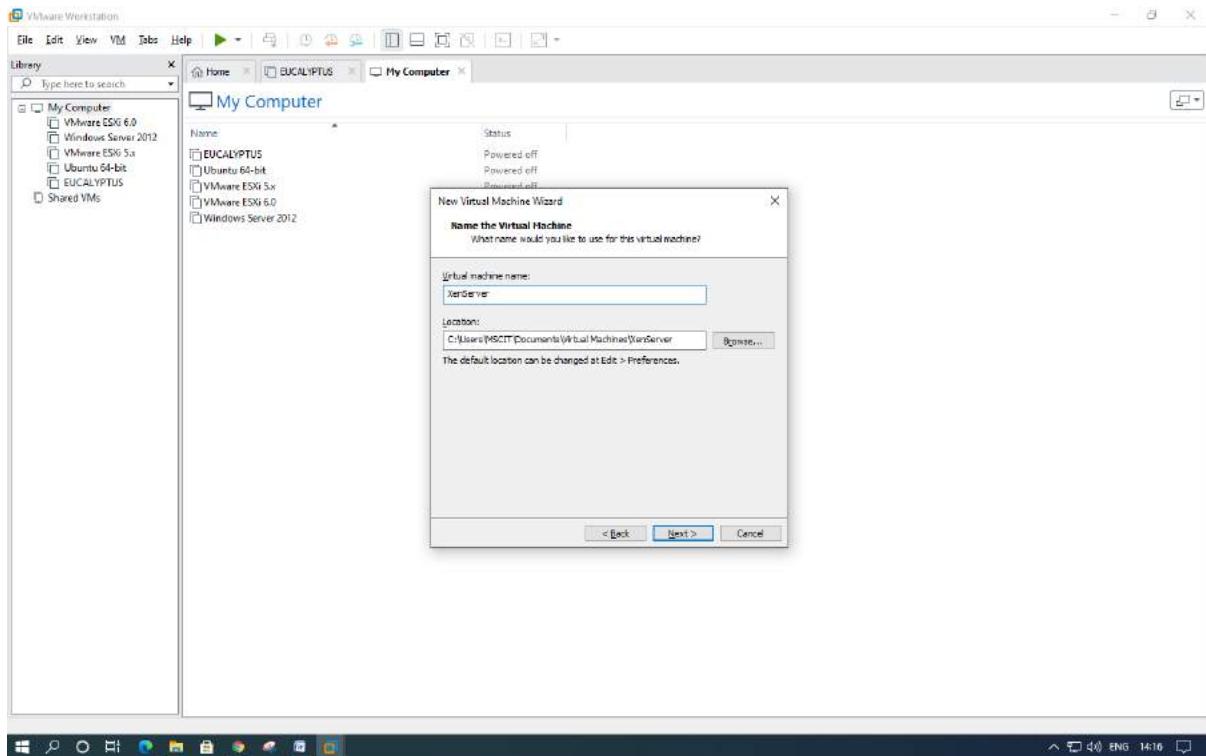
Select Installer disc_image file(ISO). Click Browse - XenServer Iso File – For Example “D:\ccpraxrj\XenServer-6.2.0-install-cd.iso” And click on next



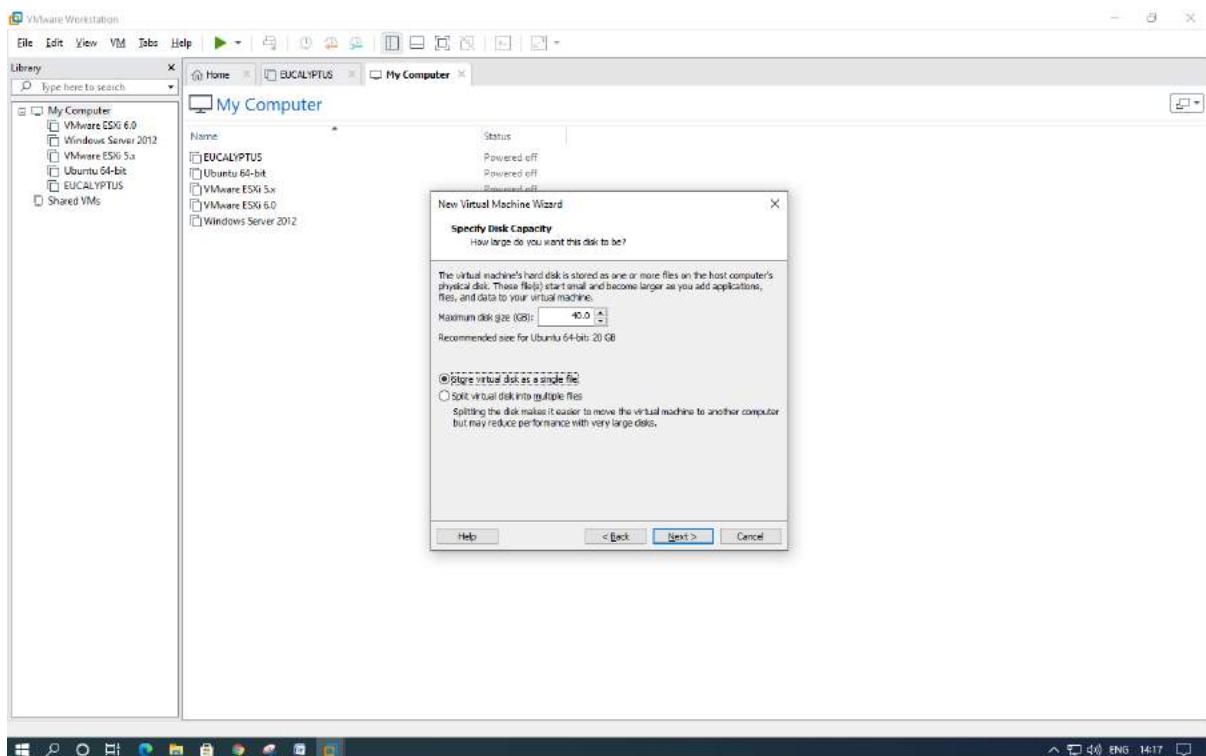
Select Guest Operating system as Linux. Version as Ubuntu. Click Next.



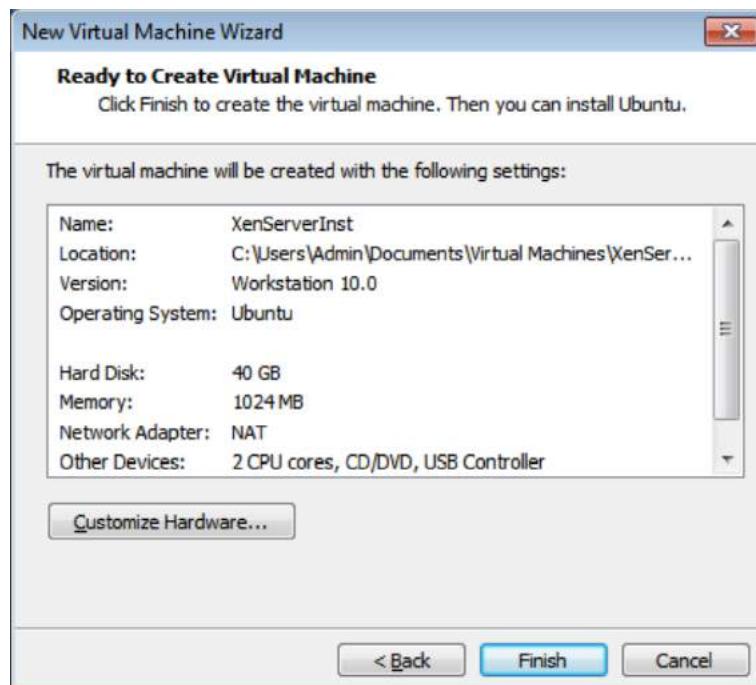
Give Virtual name – for Example “XenServer” and click on next



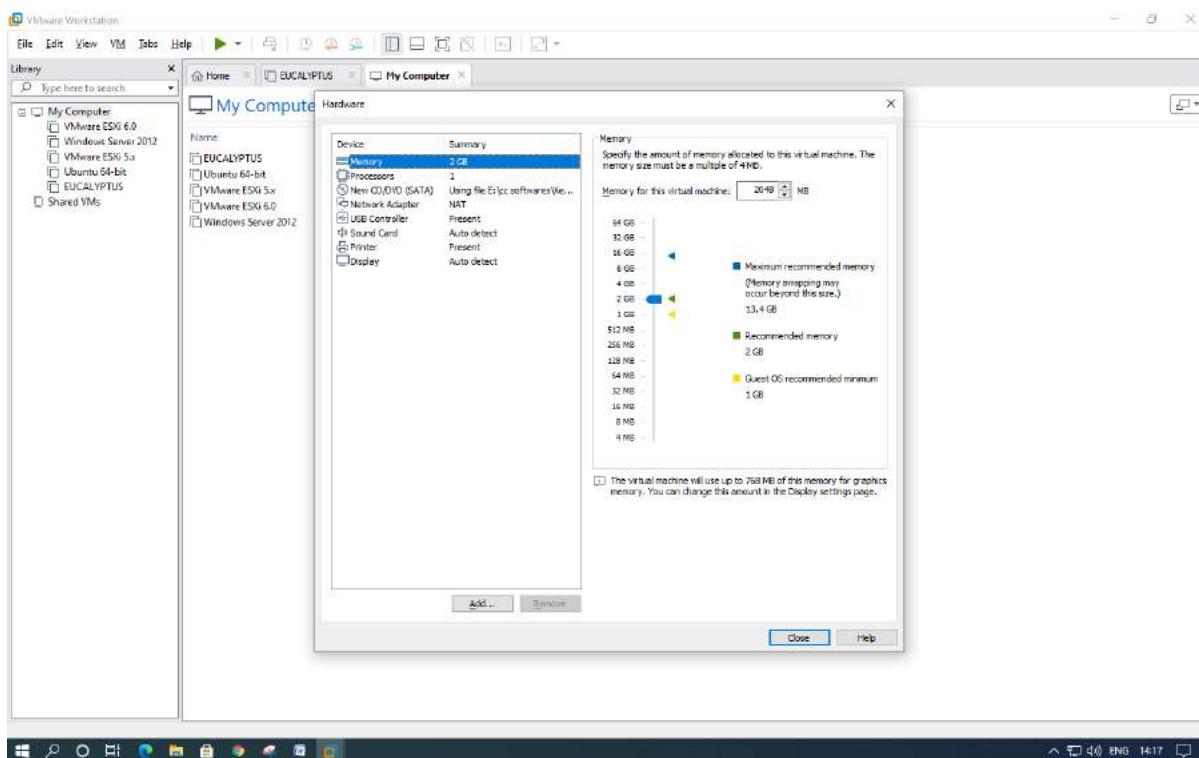
Change maximum disk size to 40 GB and check –Store virtual disk as single file



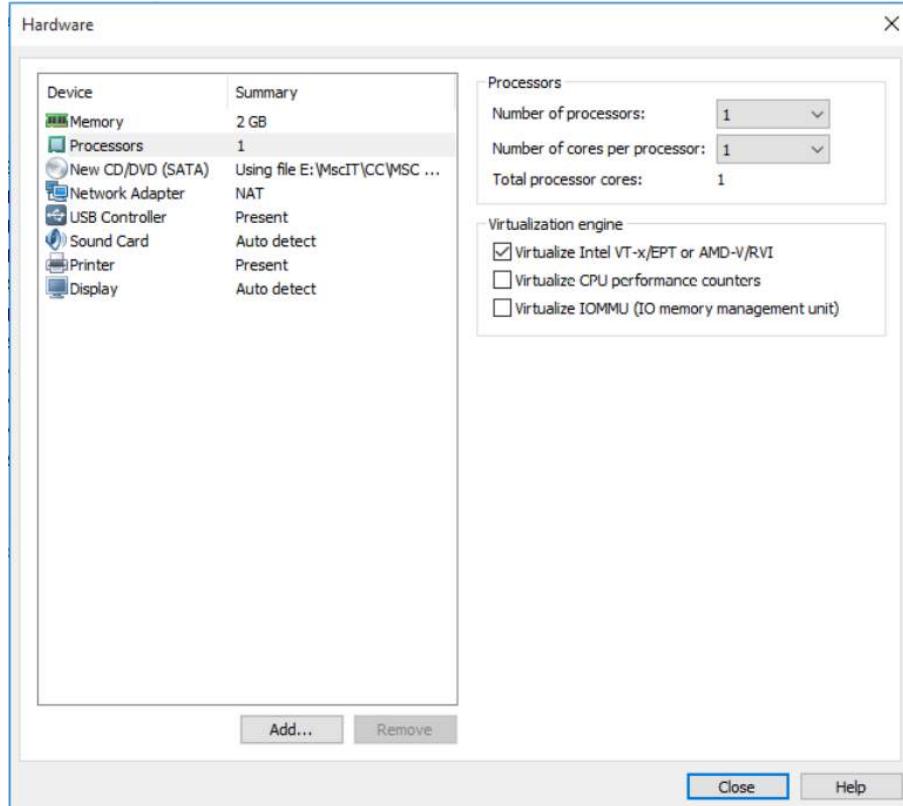
Click on Customize Hardware option



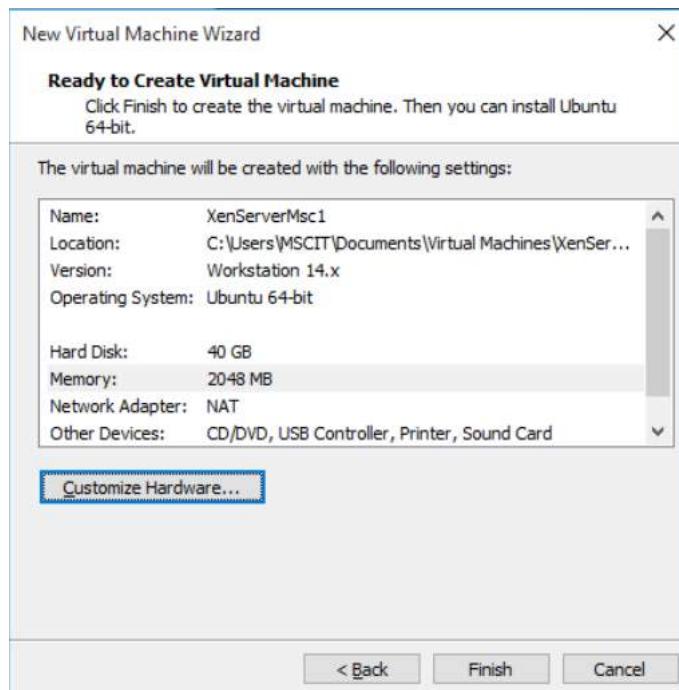
Change – Memory for this virtual machine to 2 GB and click on close



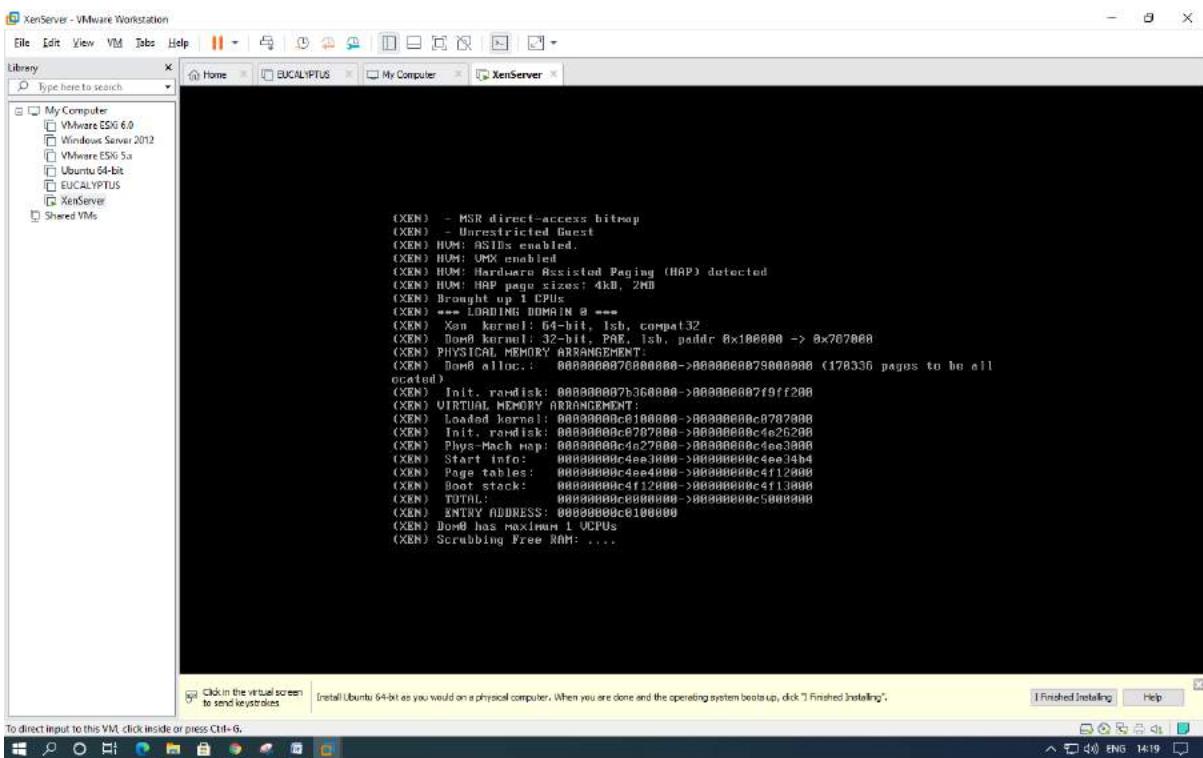
Click on Processor and select virtualize Intel VT



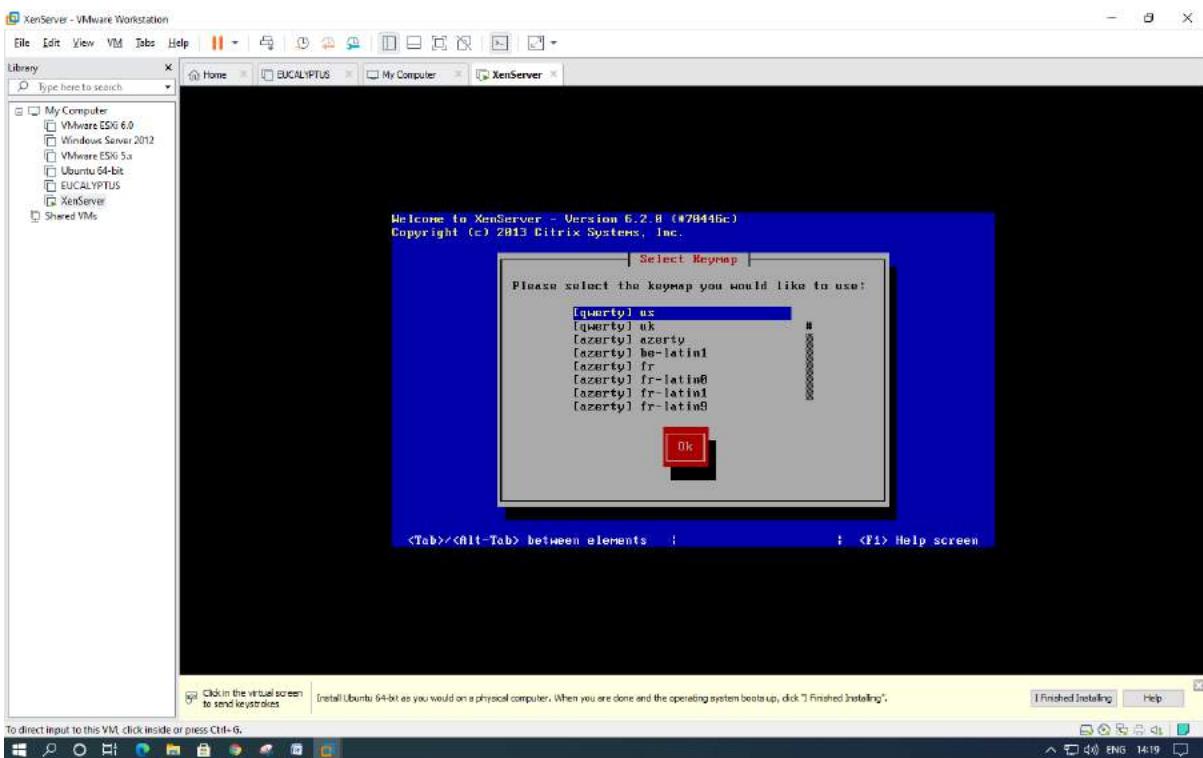
Click on Finish –



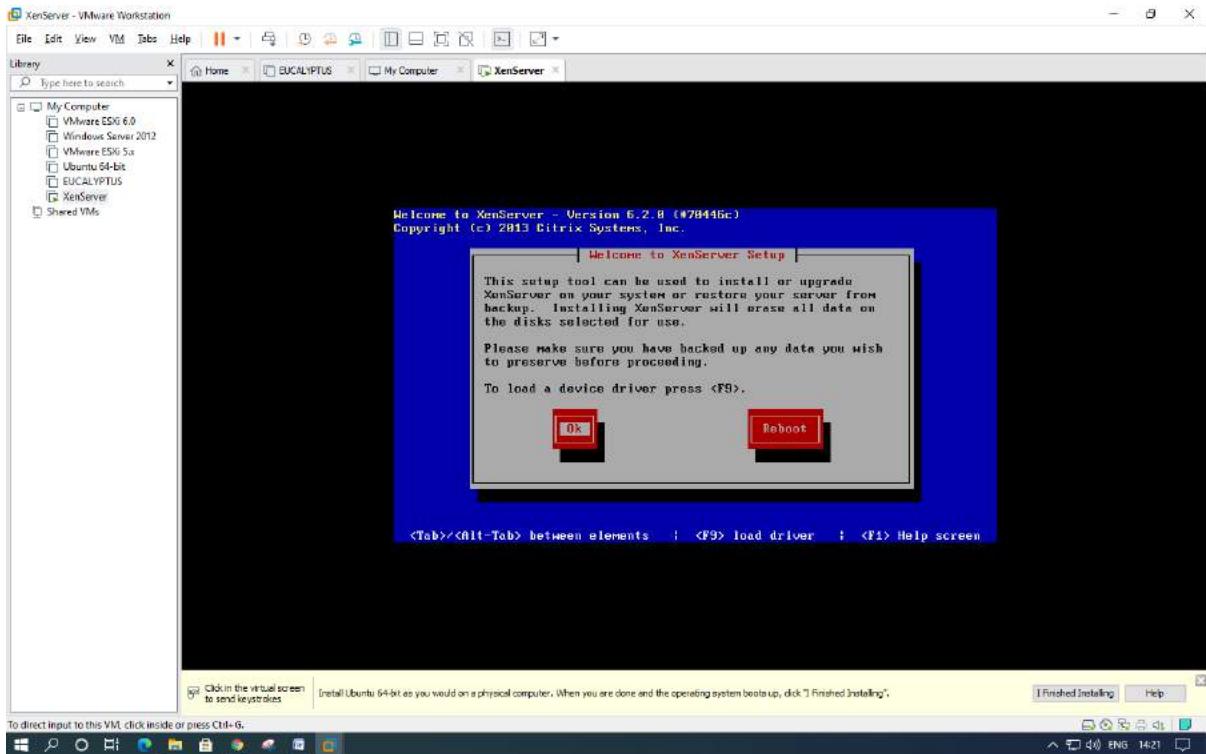
Now Power on newly created Virtual machine



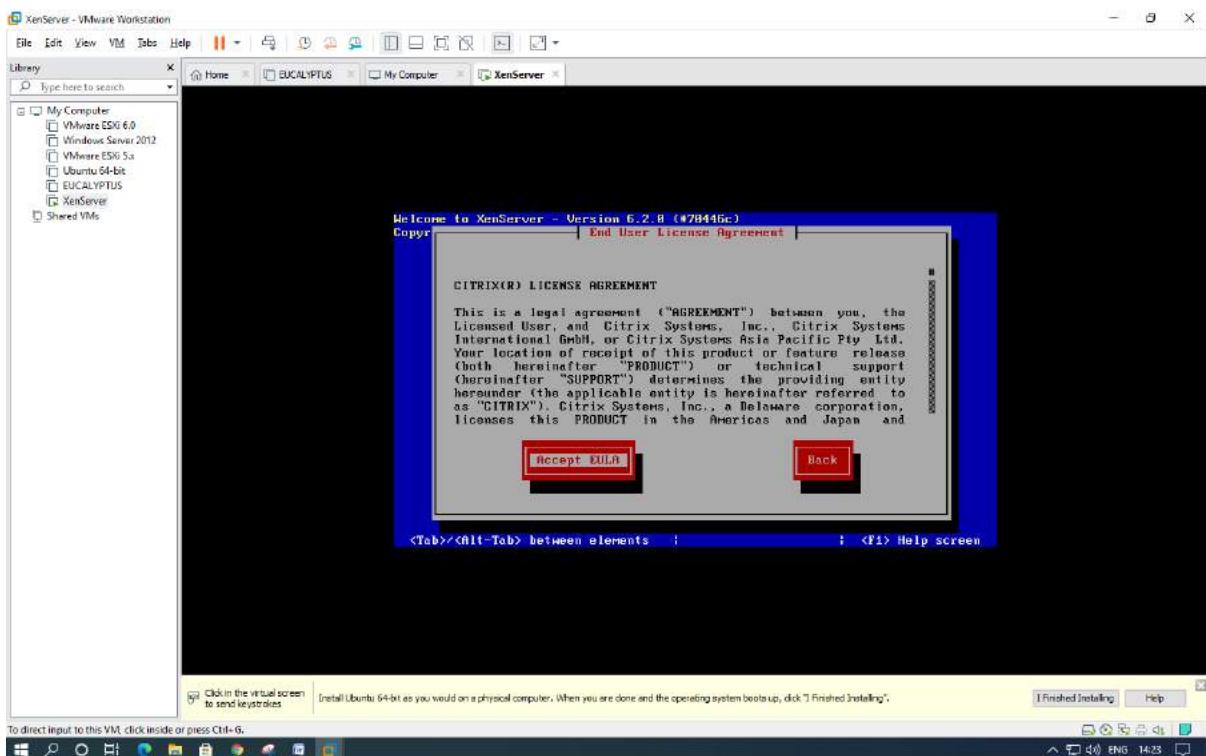
– Now select US and click on OK



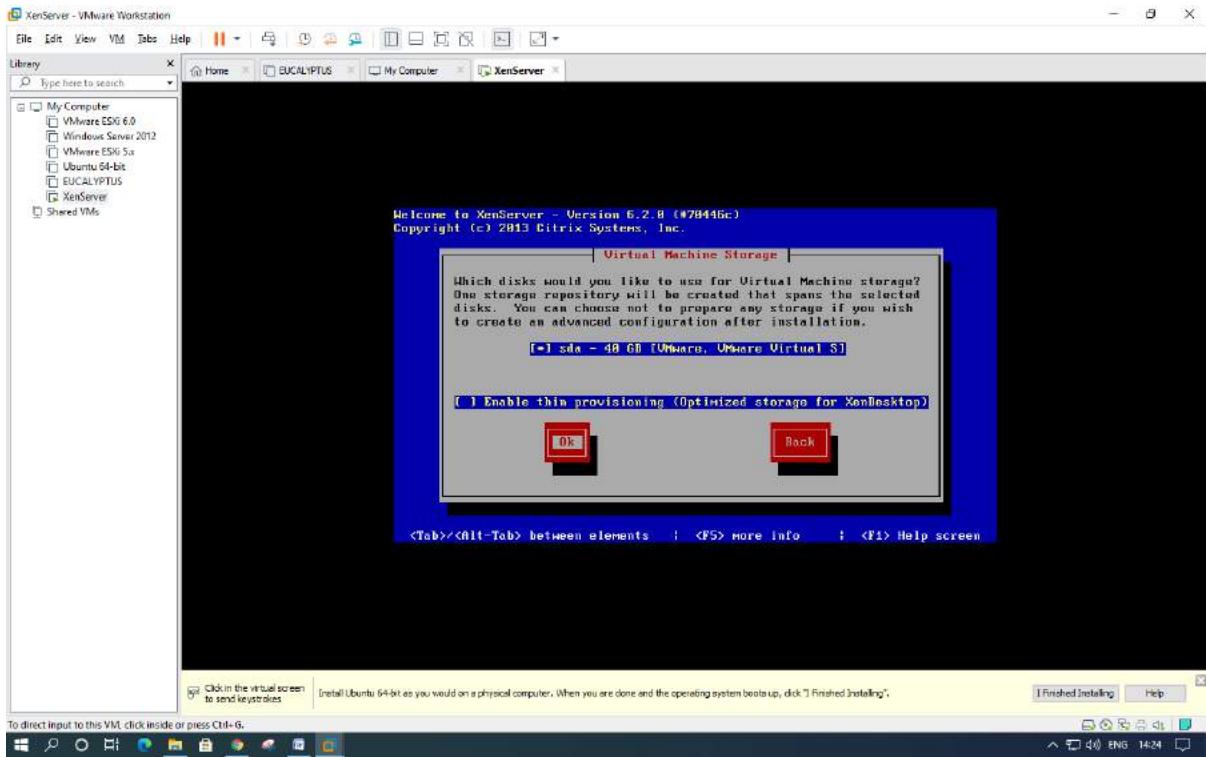
Click on OK as seen in below screenshot –



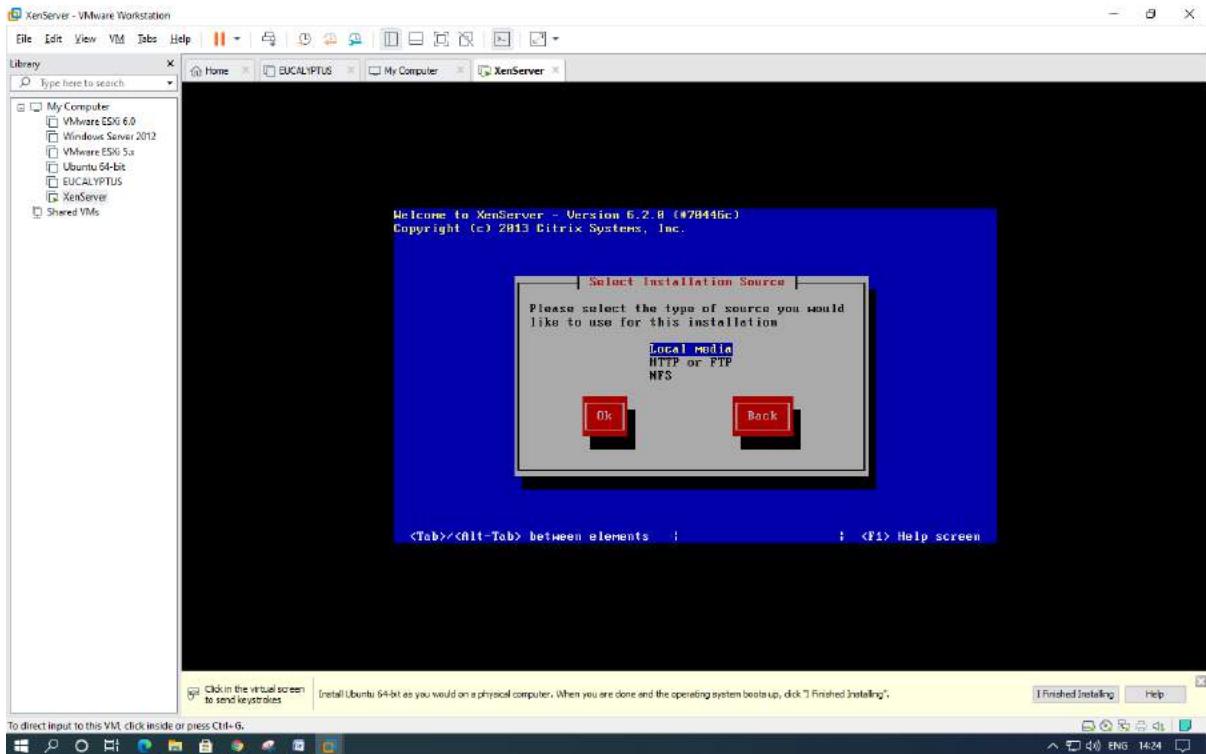
Click “Accept EULA”



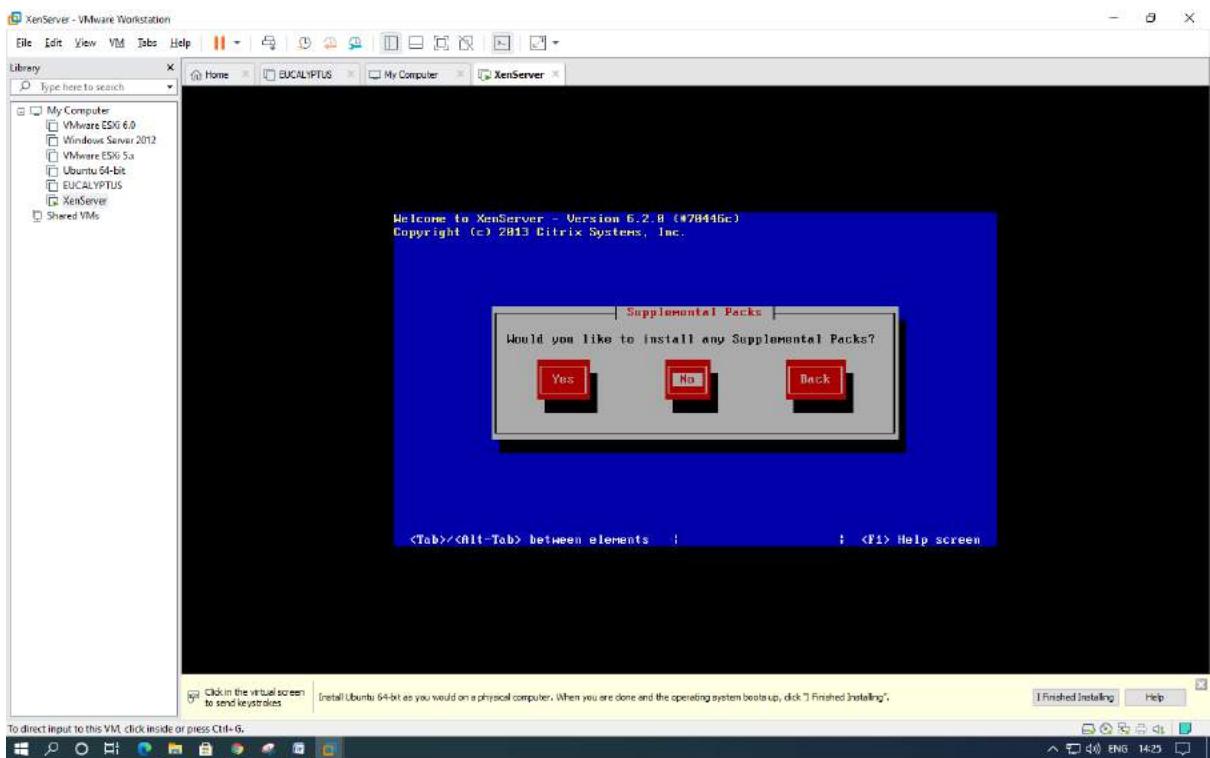
Click ok



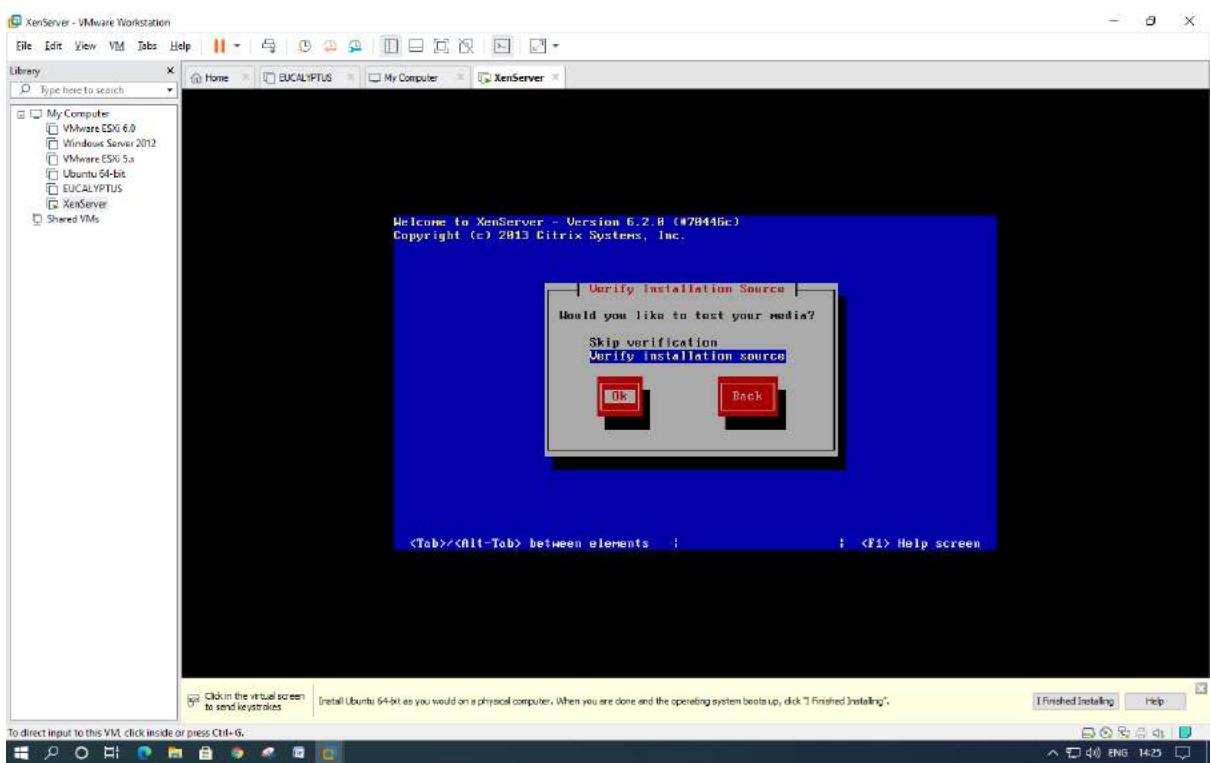
Select Local media and ok

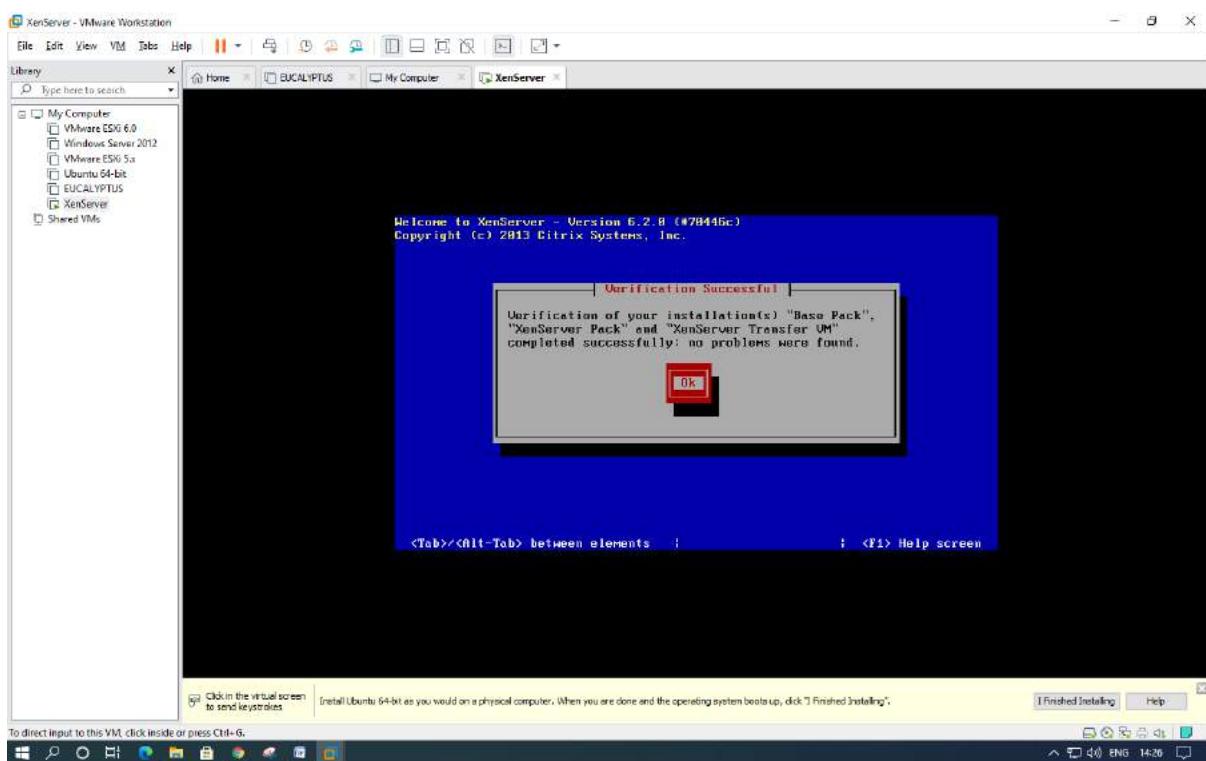
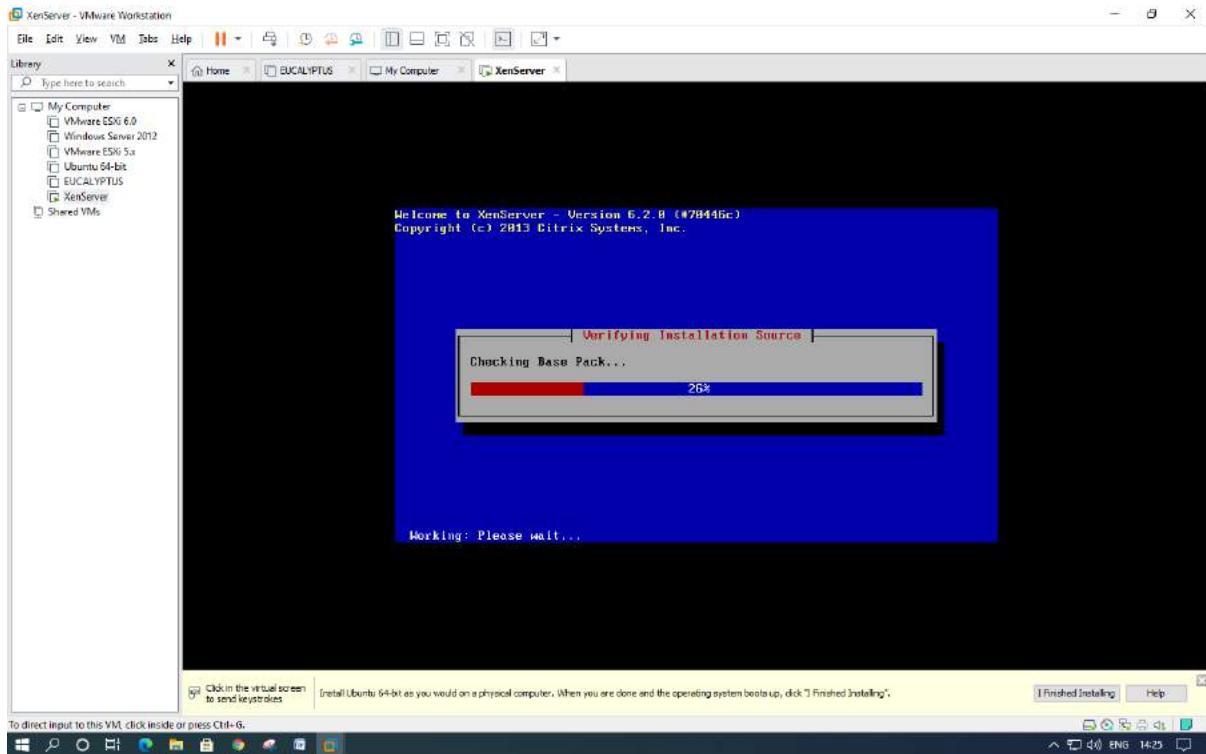


Click No

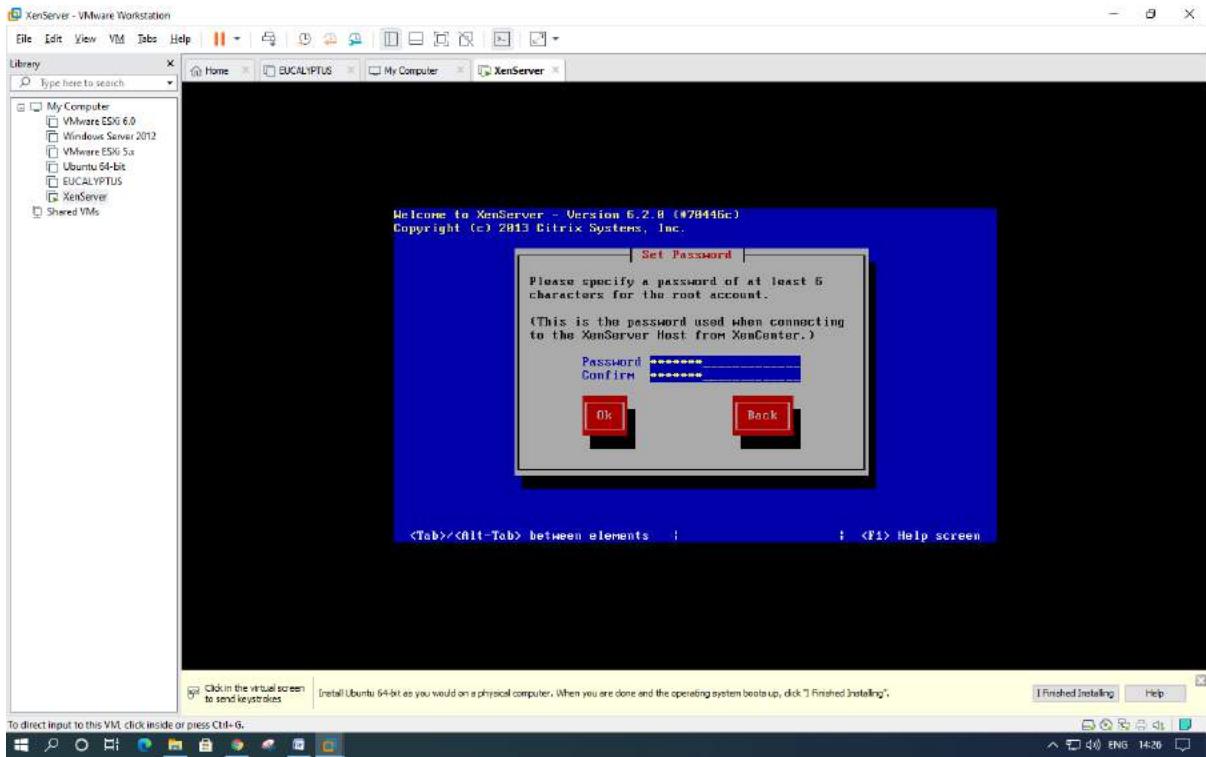


Here click verify installation

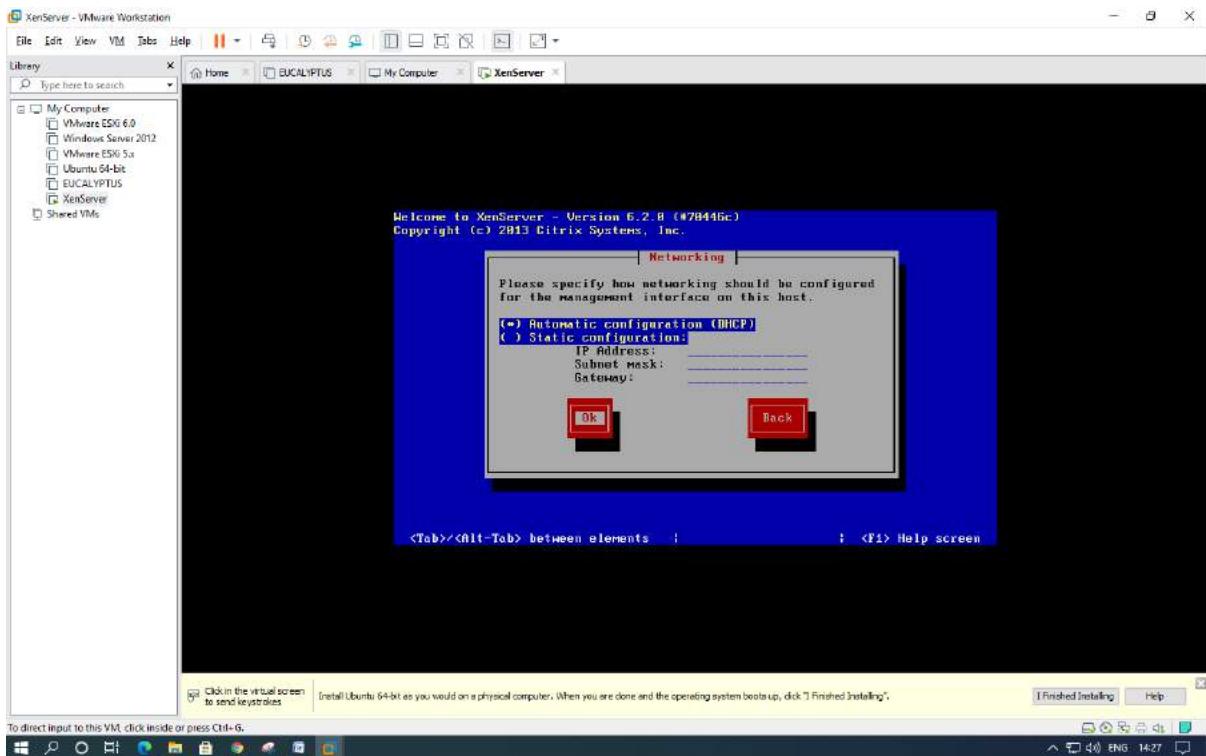


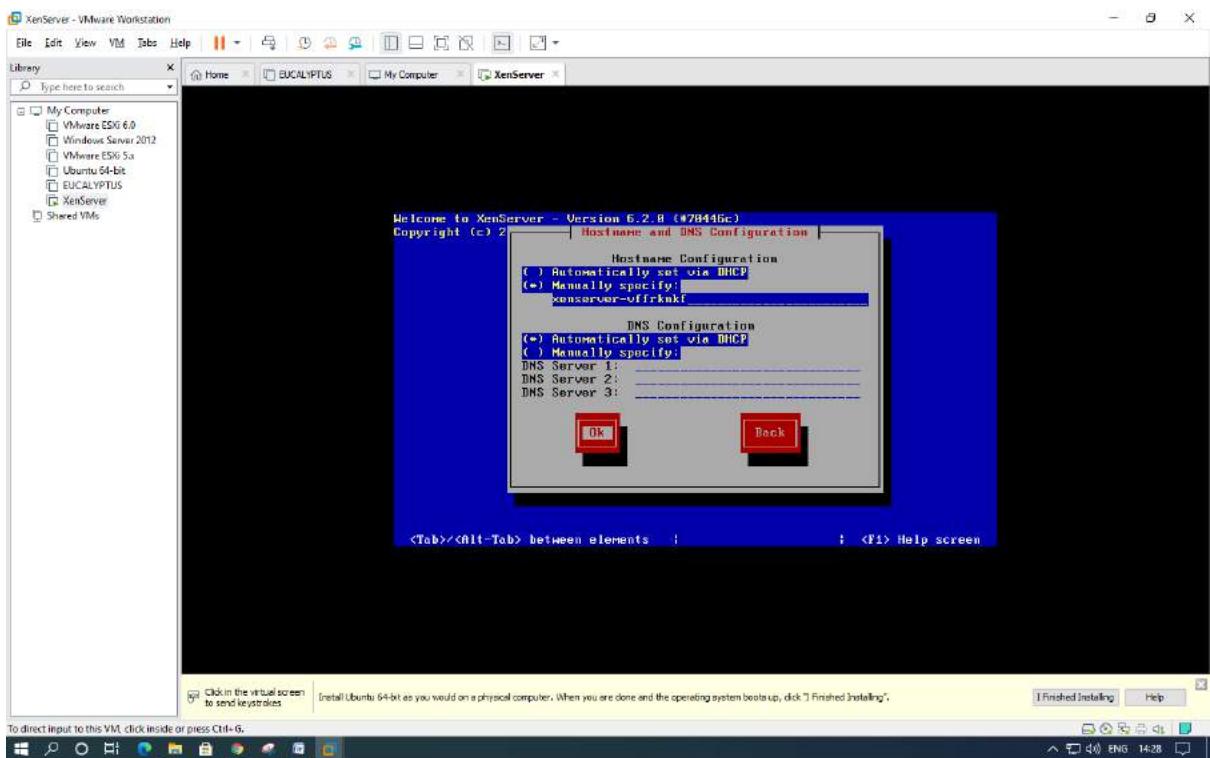


Insert password (Remember password entered) and click on Ok – Password:root123

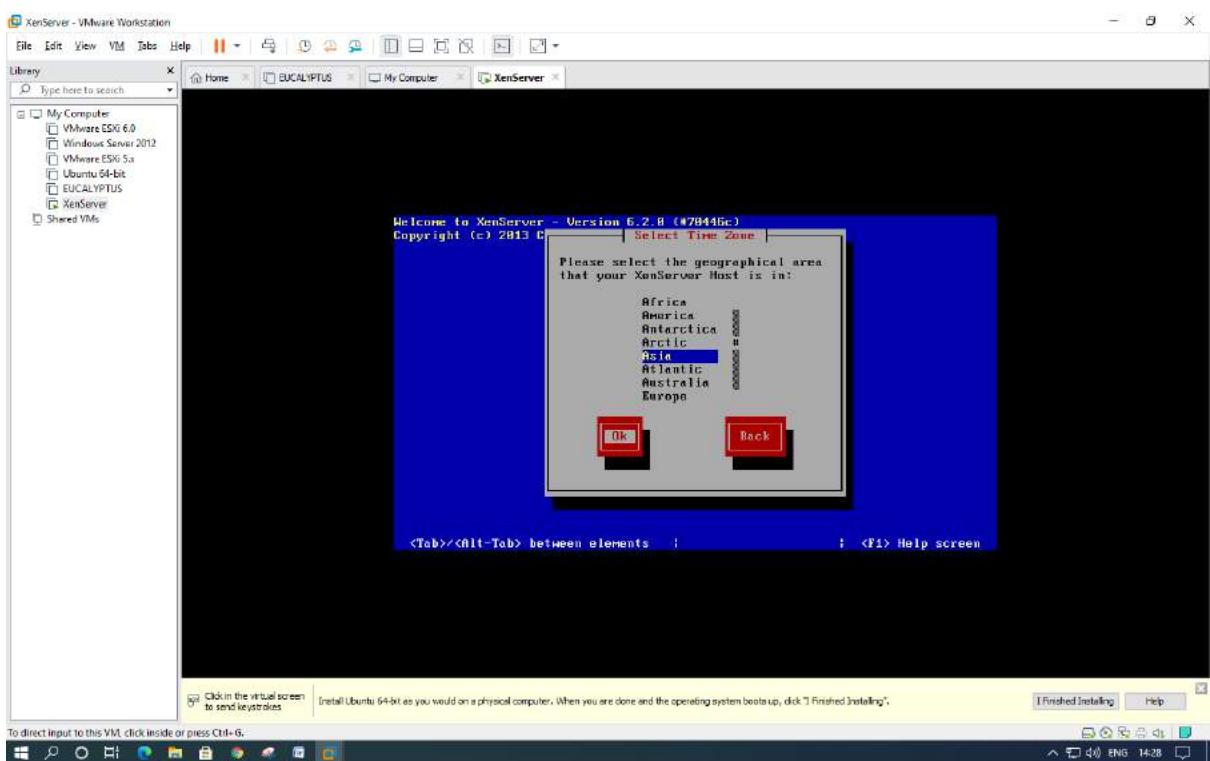


Select Automatically set via DHCP and click on OK

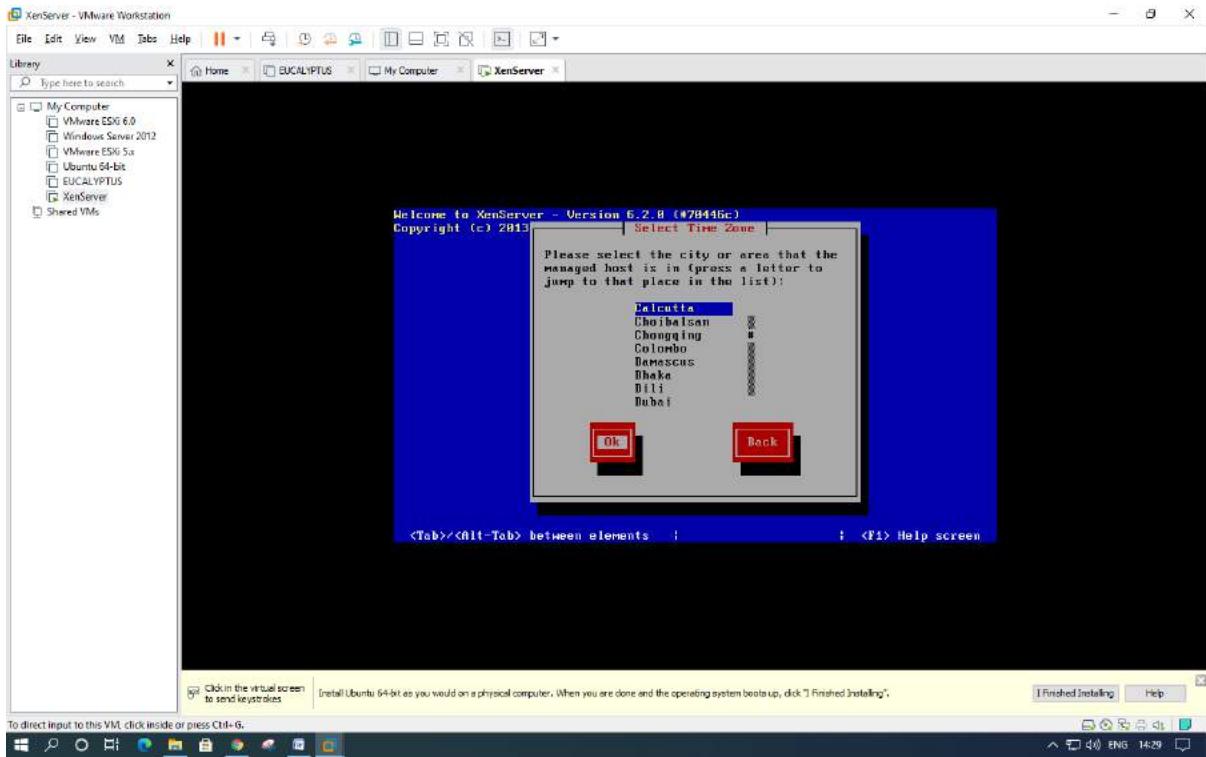




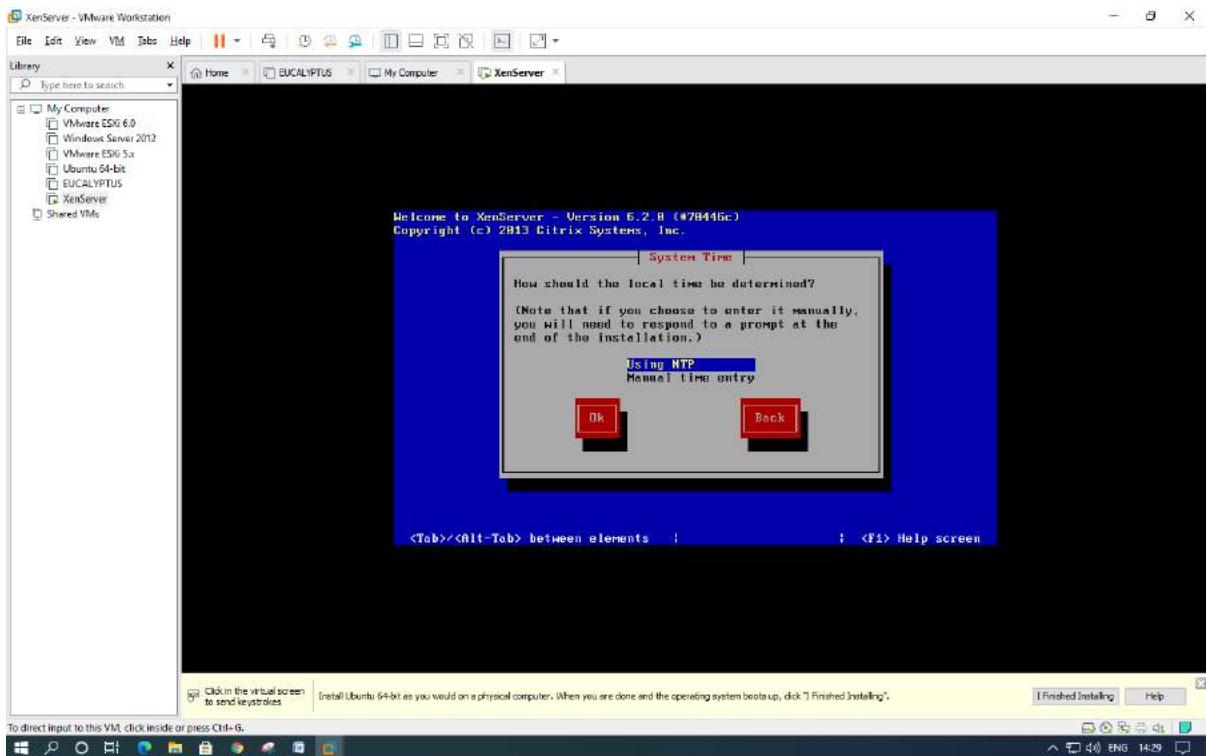
Select Asia and click on OK –



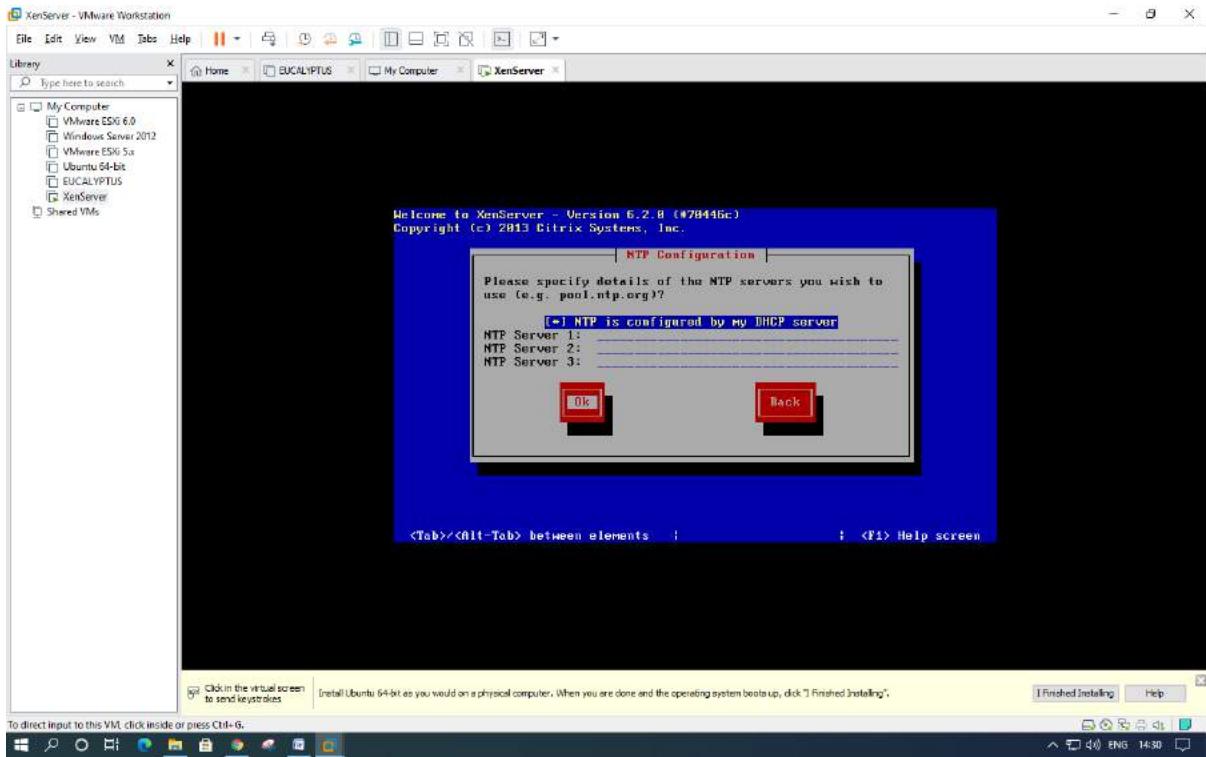
Select Calcutta



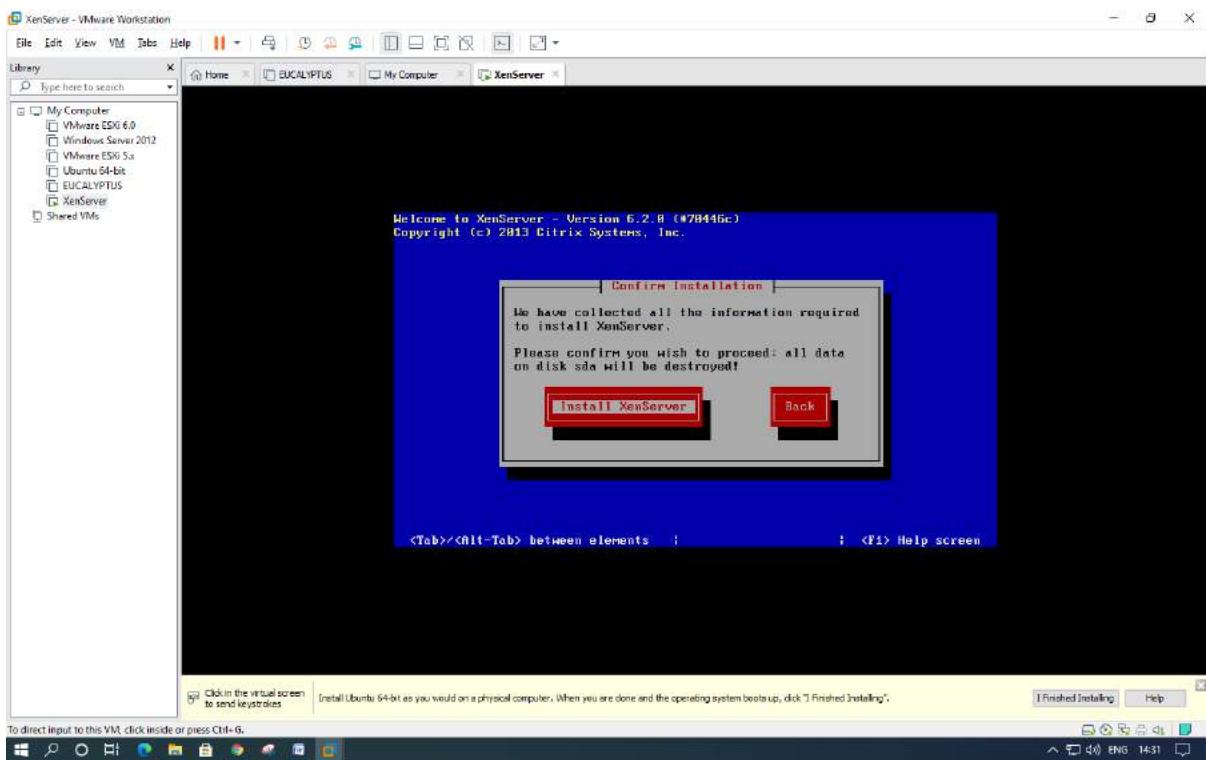
Select “Using NTP” and click on OK

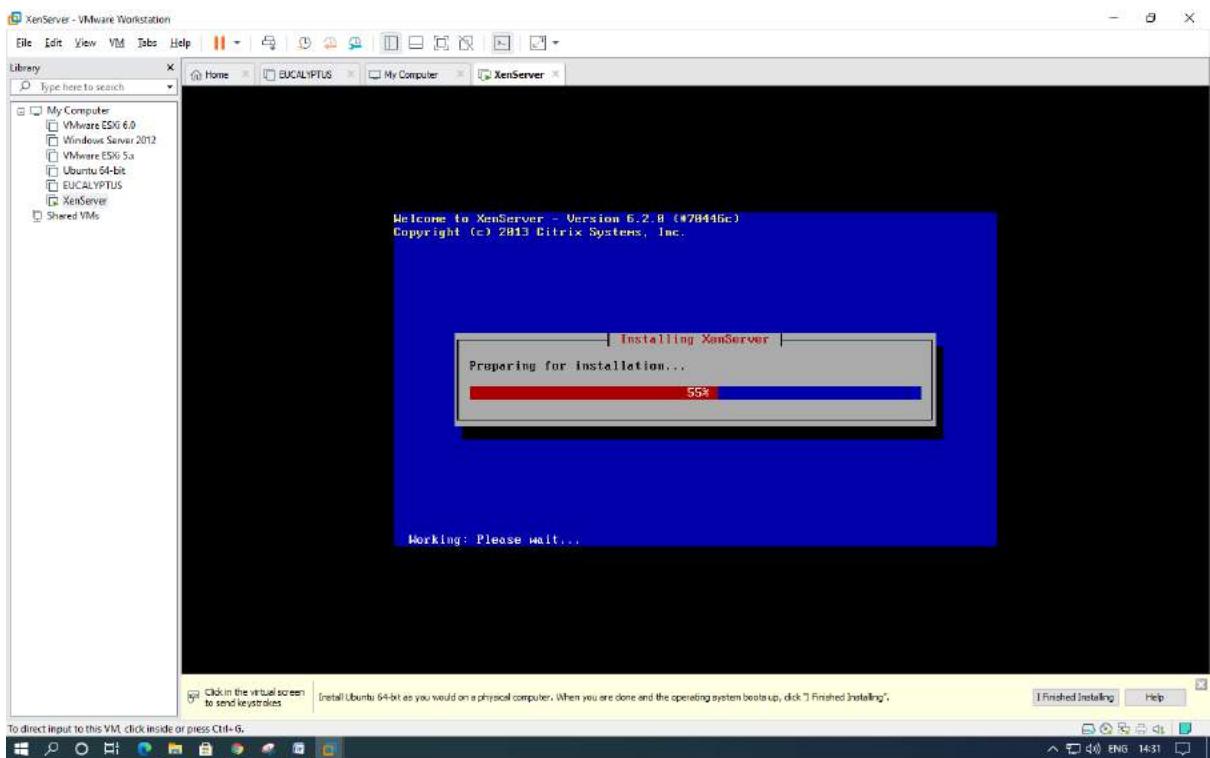


Click OK

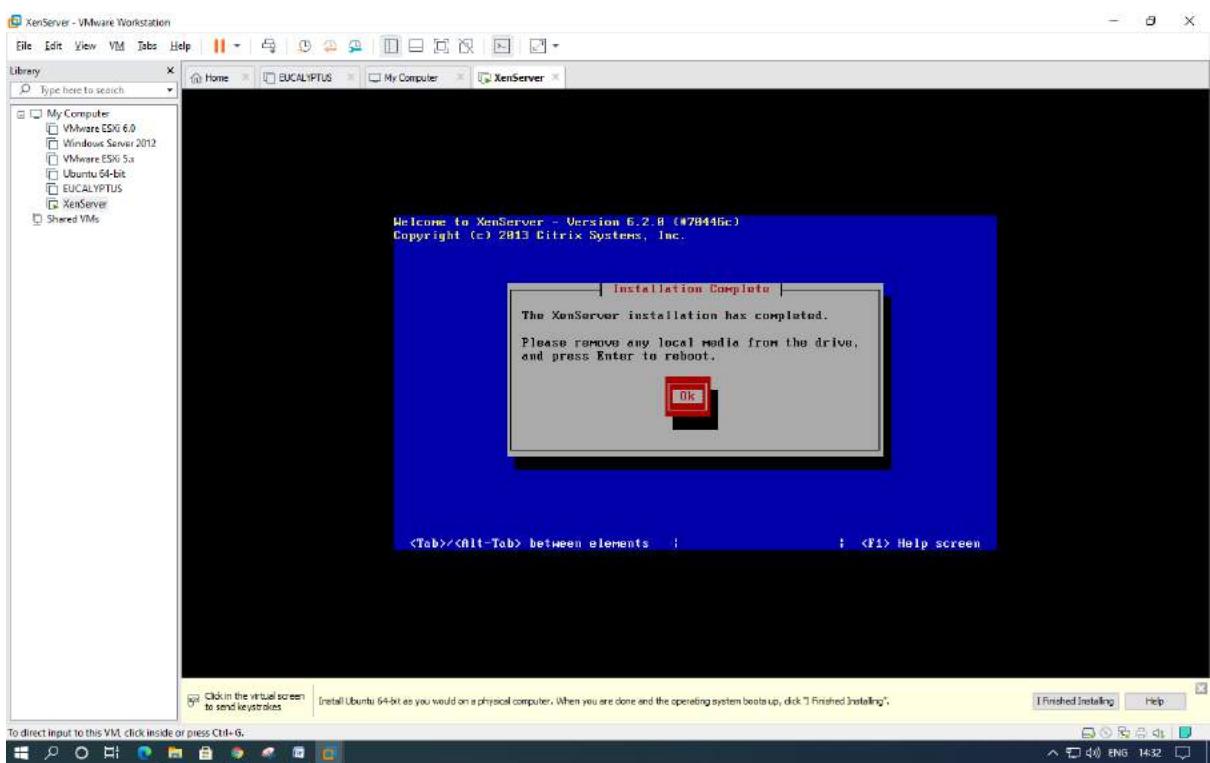


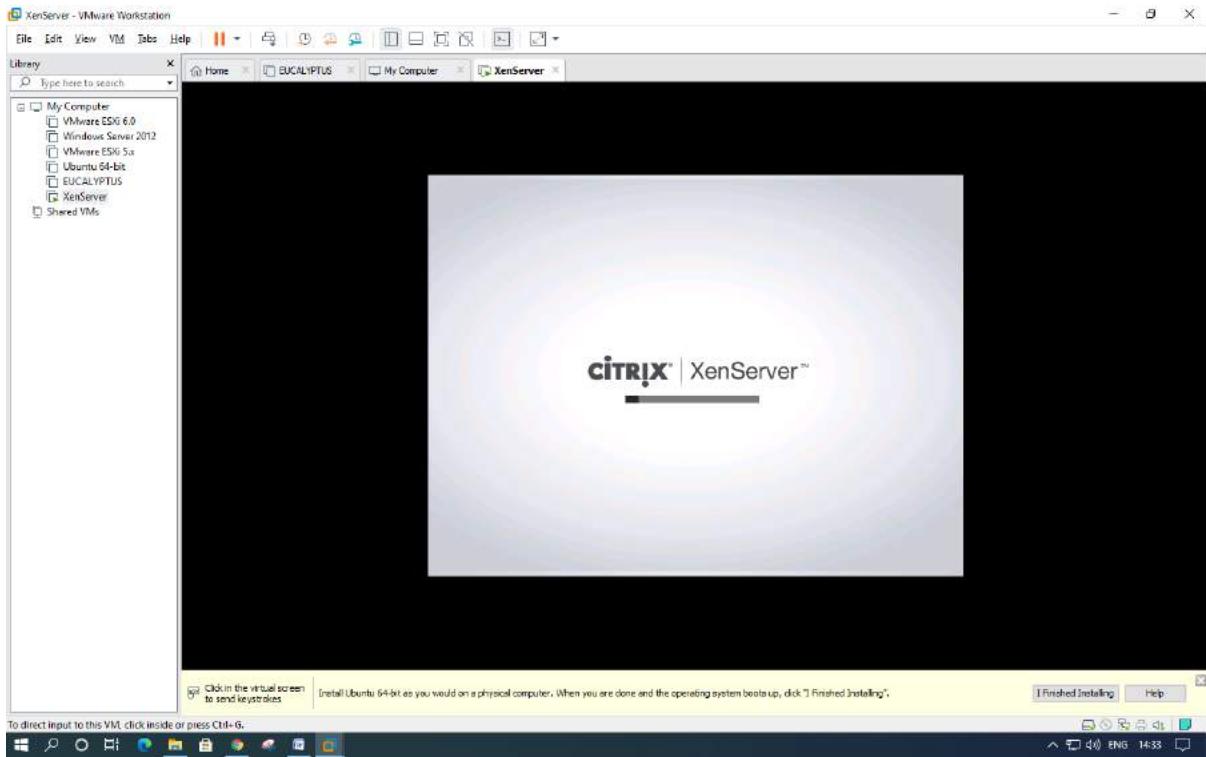
Click Install Xen server



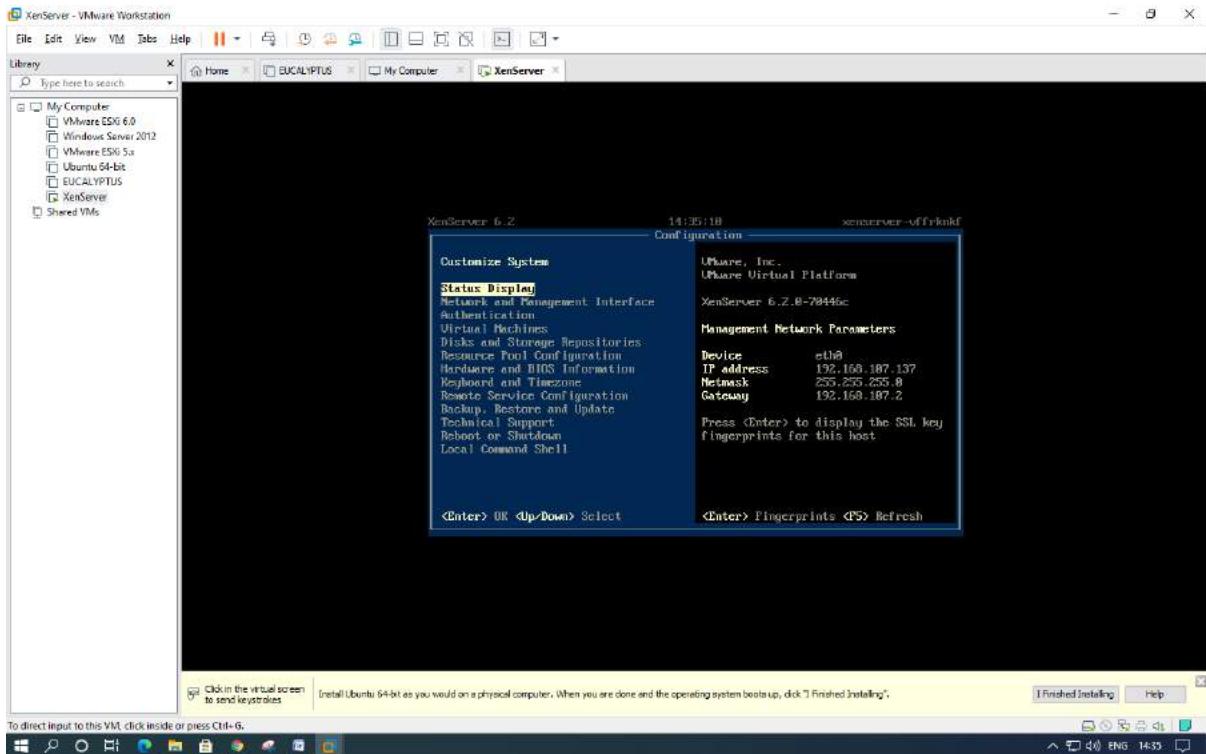


Click OK

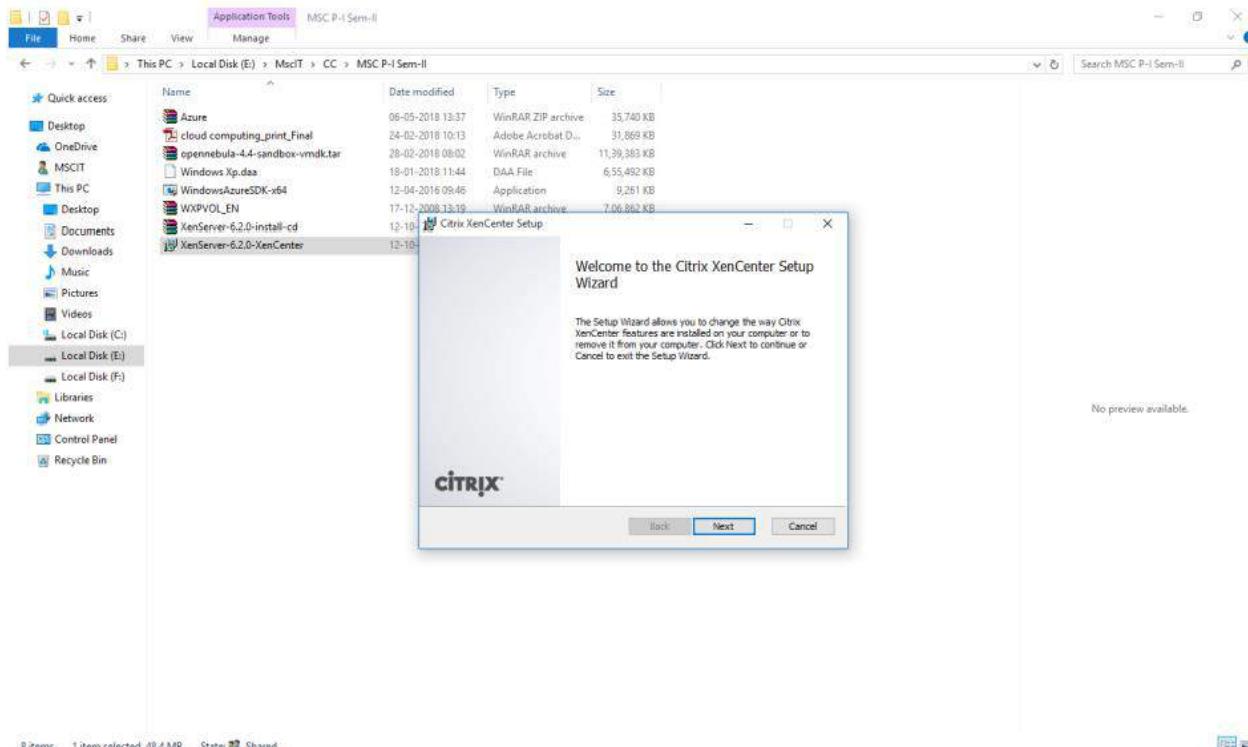




Note IP Address – “ 192.168.107.137” ping it from command prompt

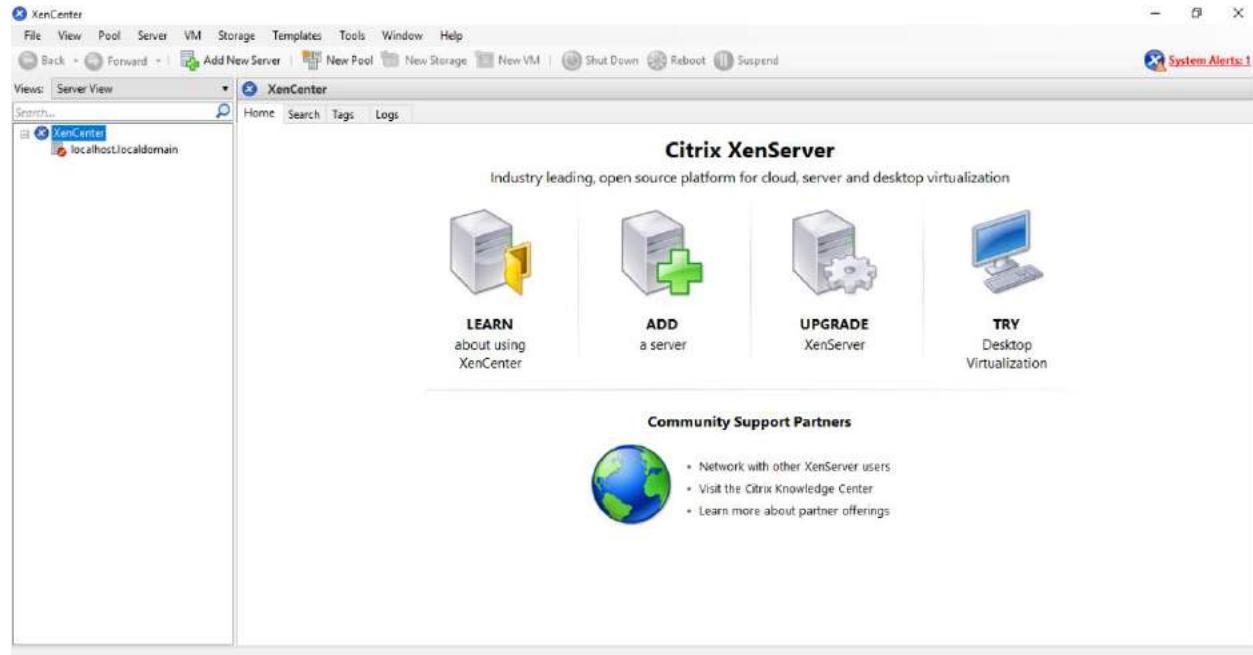


Now Install Citrix App if not installed –

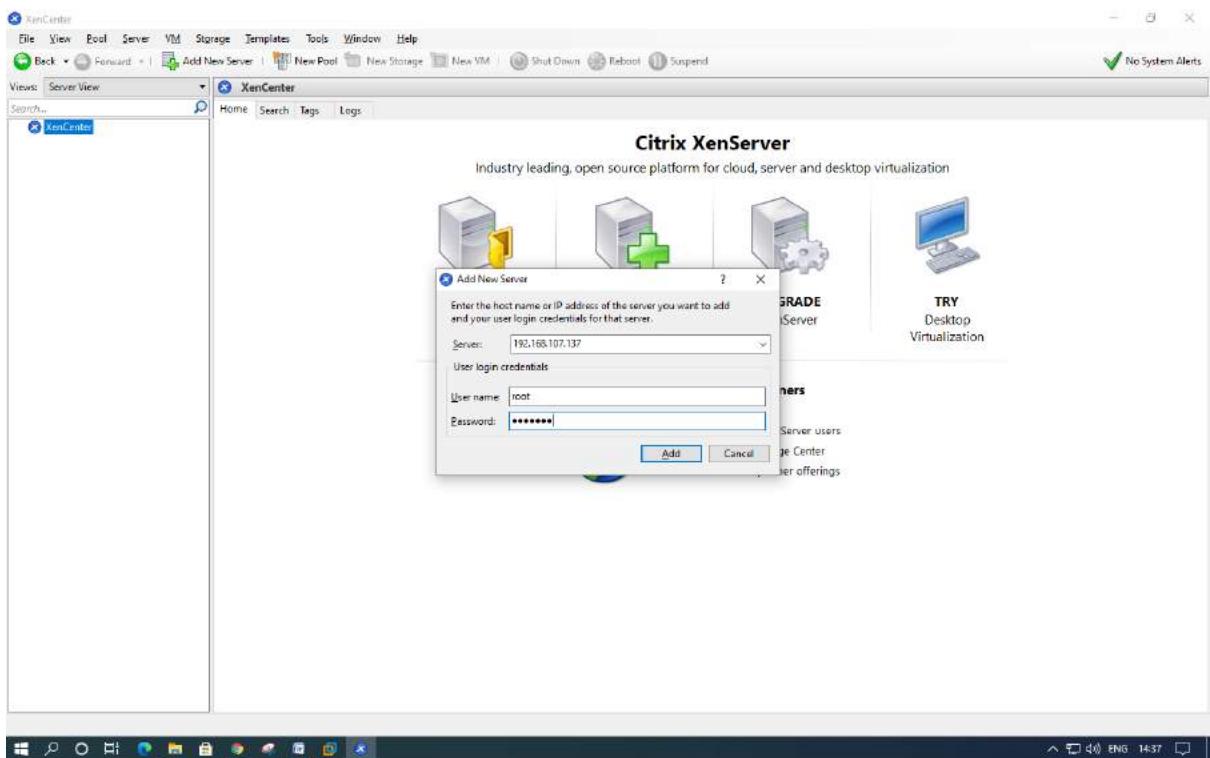


Items: 1 item selected 48.4 MB State: Shared

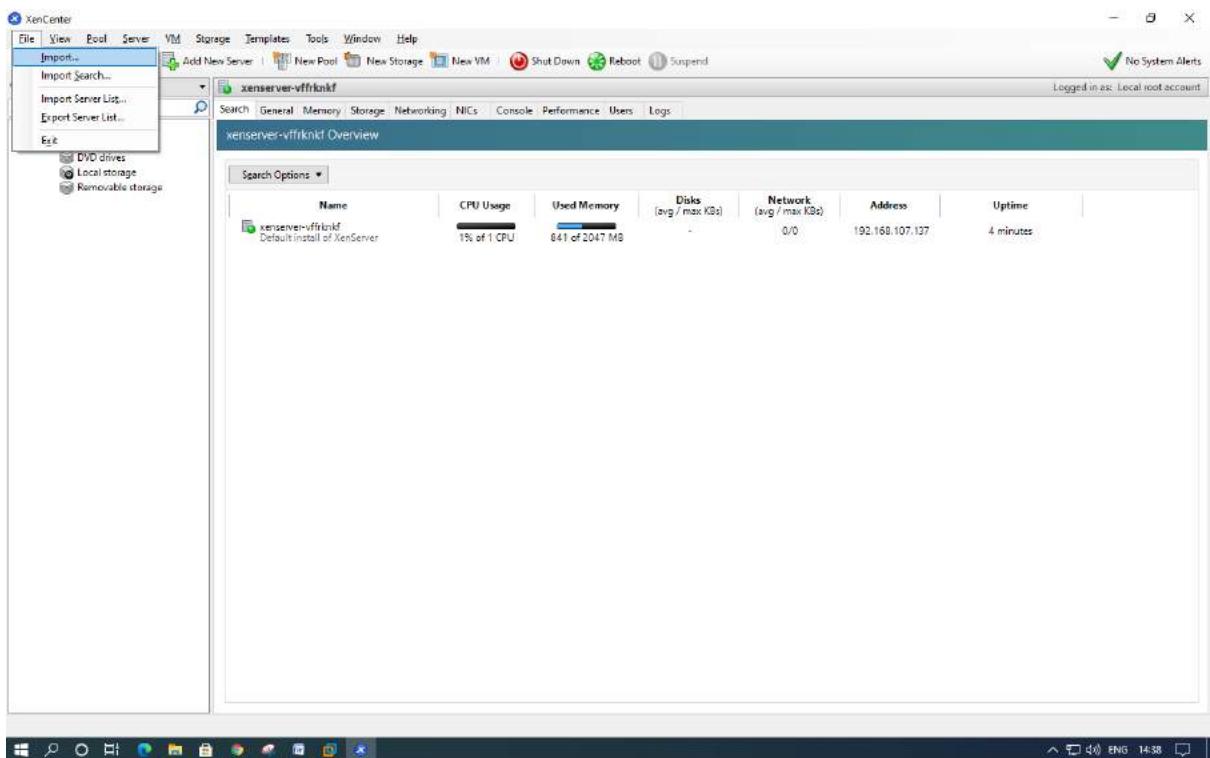
Now Open Citrix XenCenter – and Click and Add Server



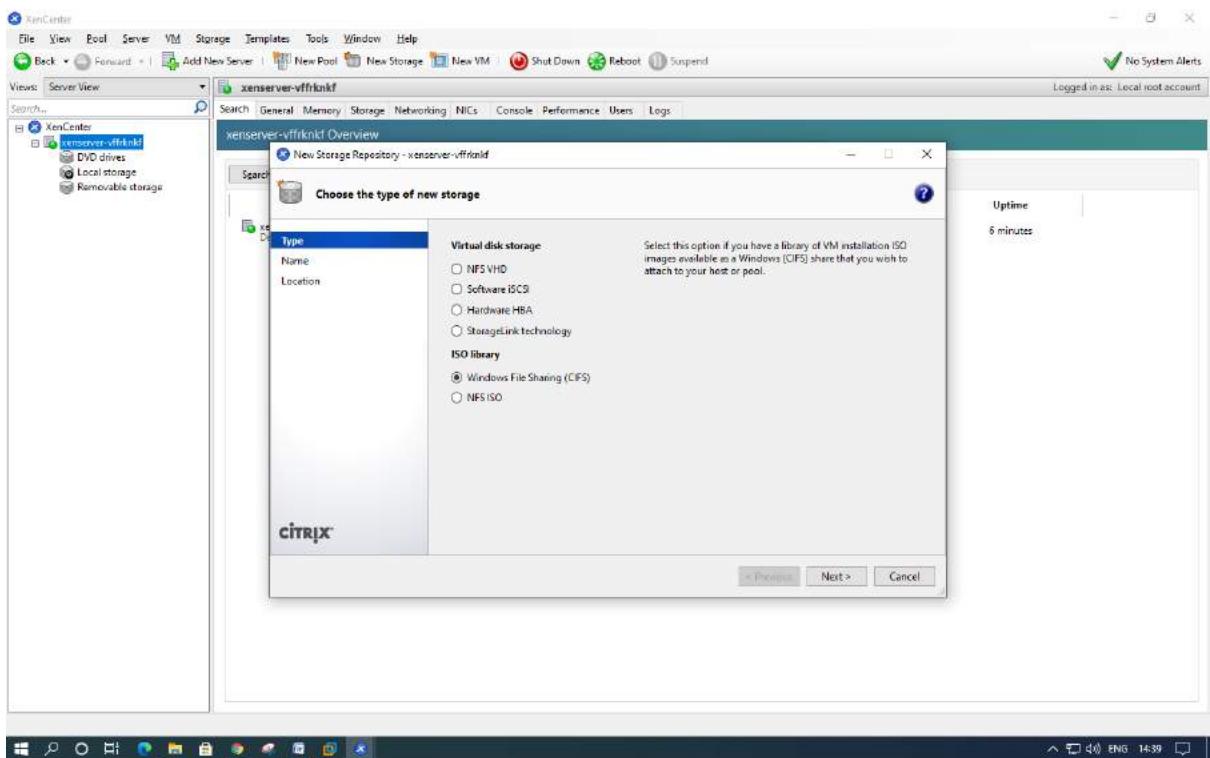
Fill IP address copied from Installation and User name as “root” and Password as “root123” which we had given during installation and Click on Add



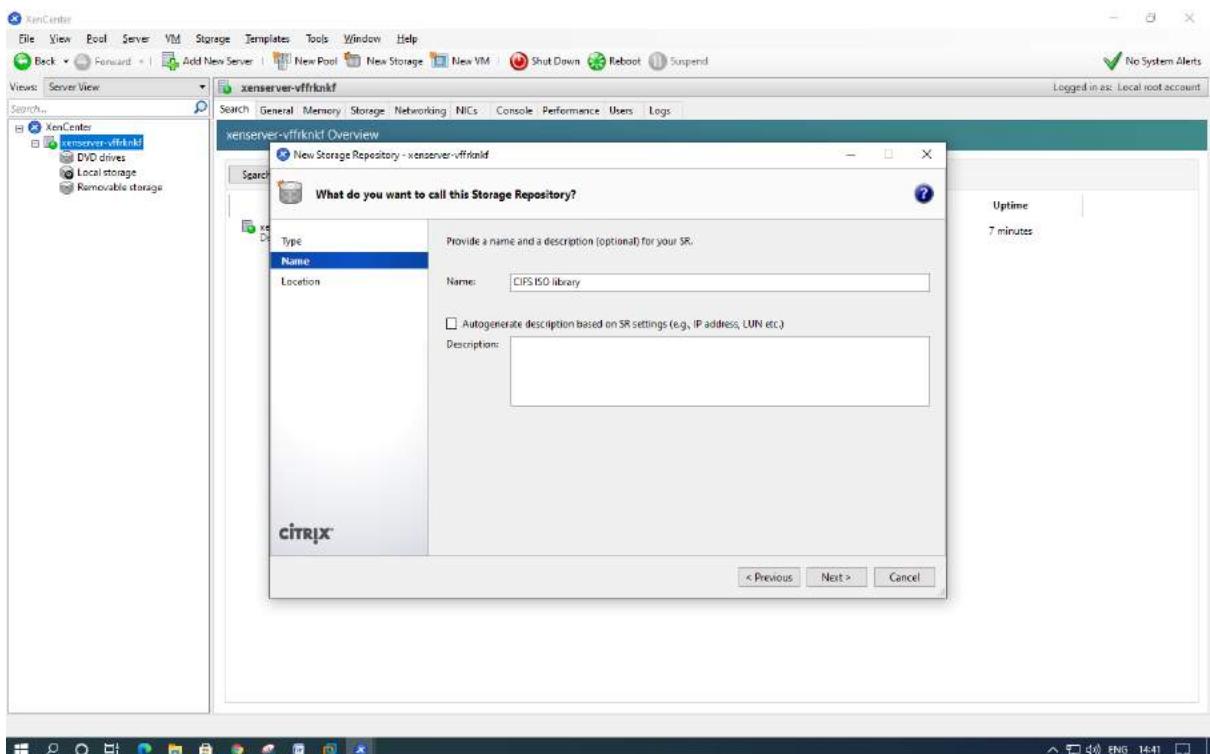
Now Click on New Storage –under Storage Tab.



Select Window File Sharing (CIFS) and click on next –

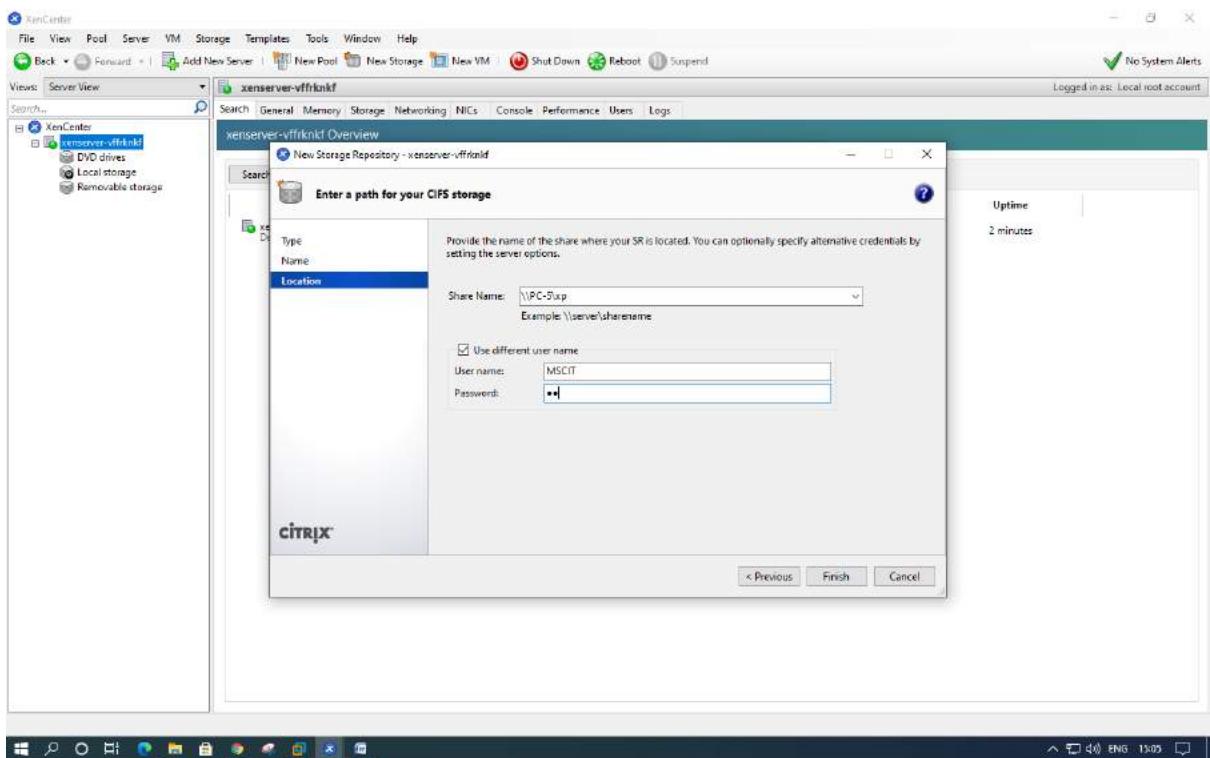


Uncheck Auto generate option Click on Next

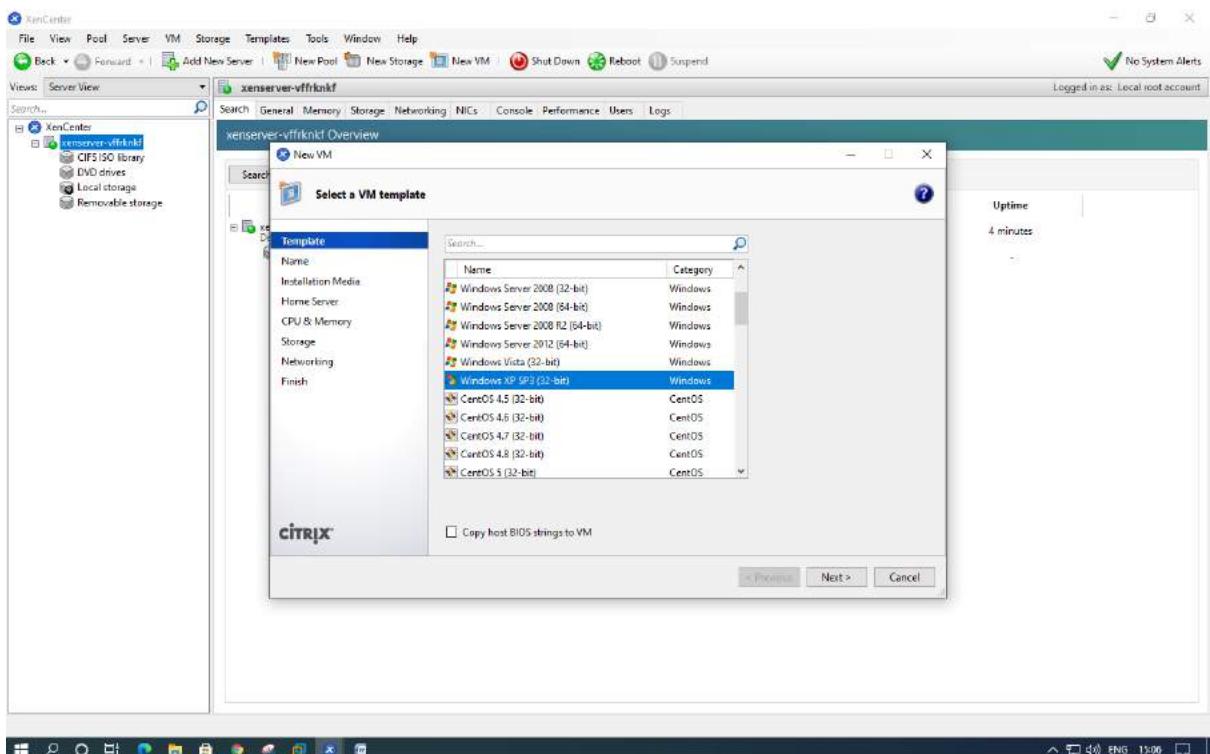


Provide the path of shared windows XP image and enter local pc credential , , click on Finish

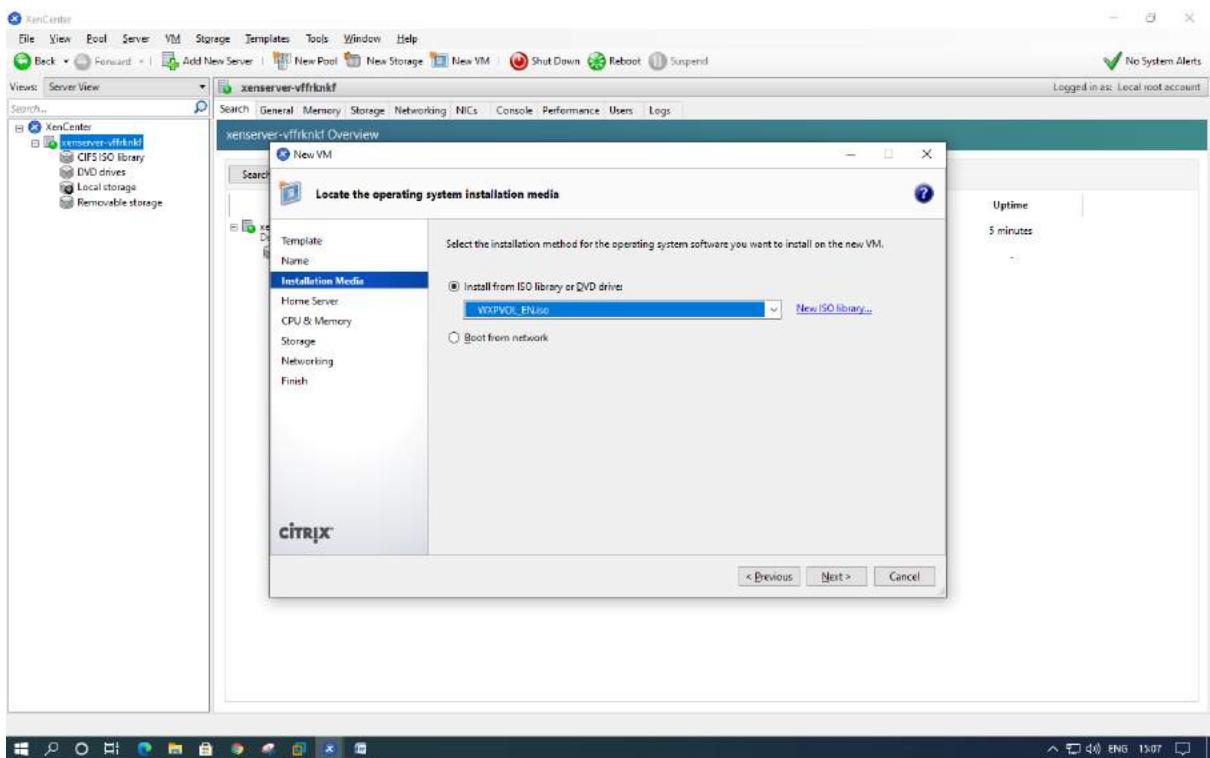
And enter Local PC Credentials



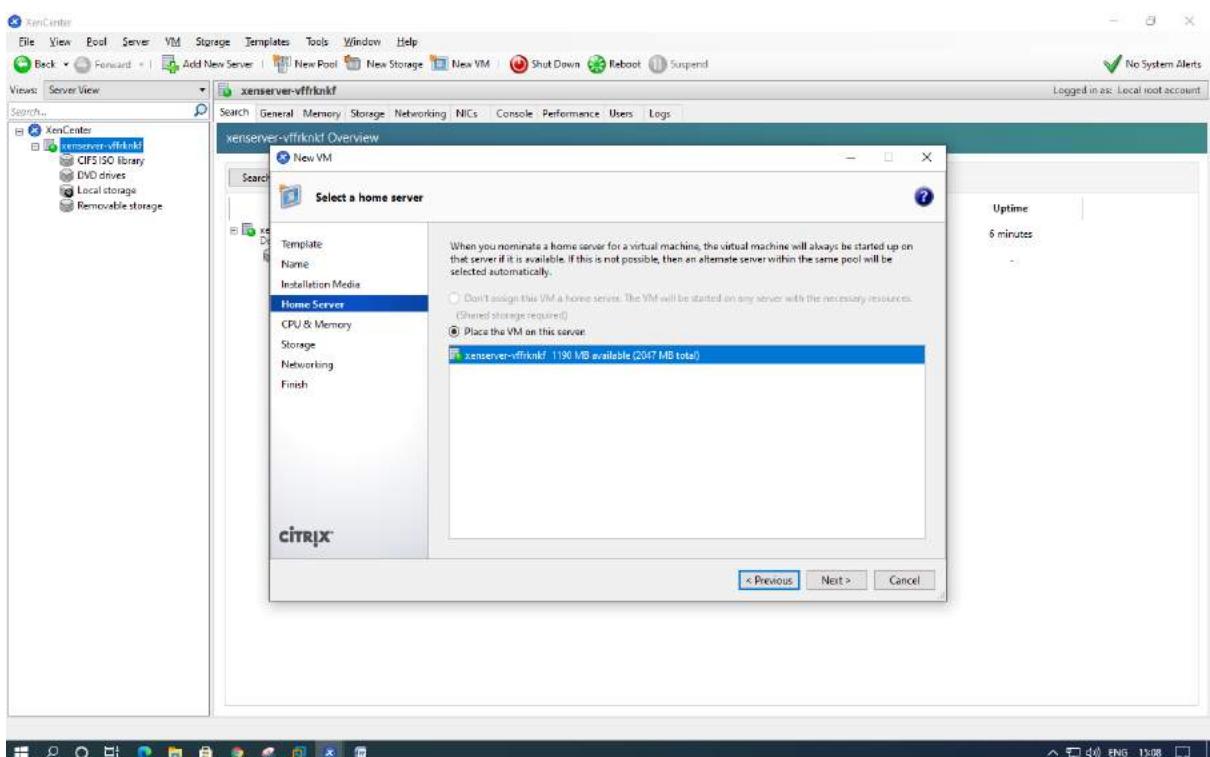
Click on New VM – and Windows XP SP3



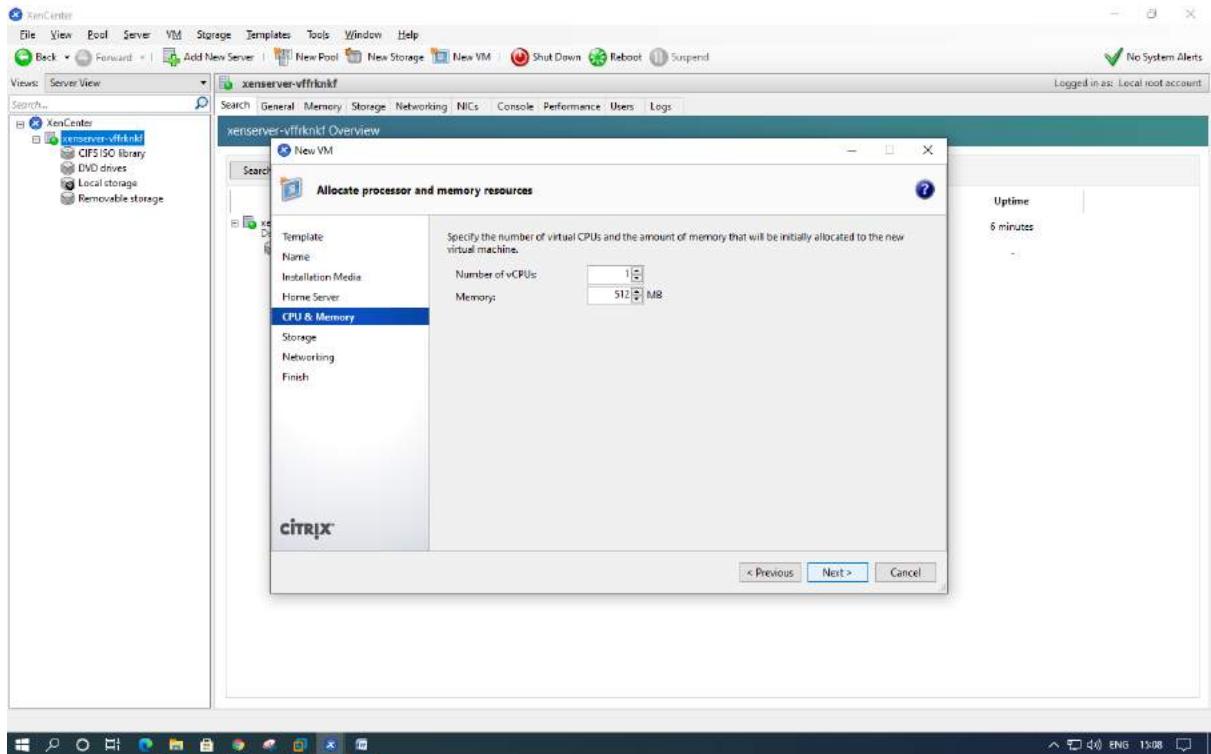
Select ISO file and click on next



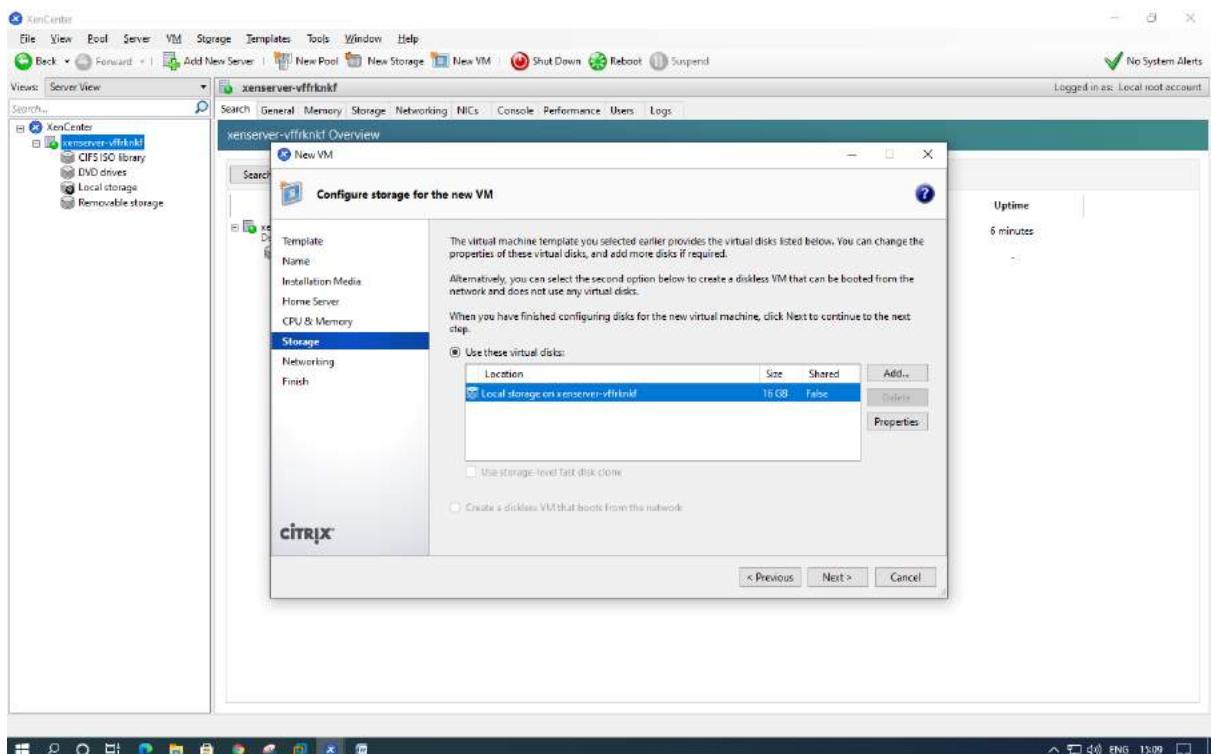
Select Place the VM on this server and click on next.



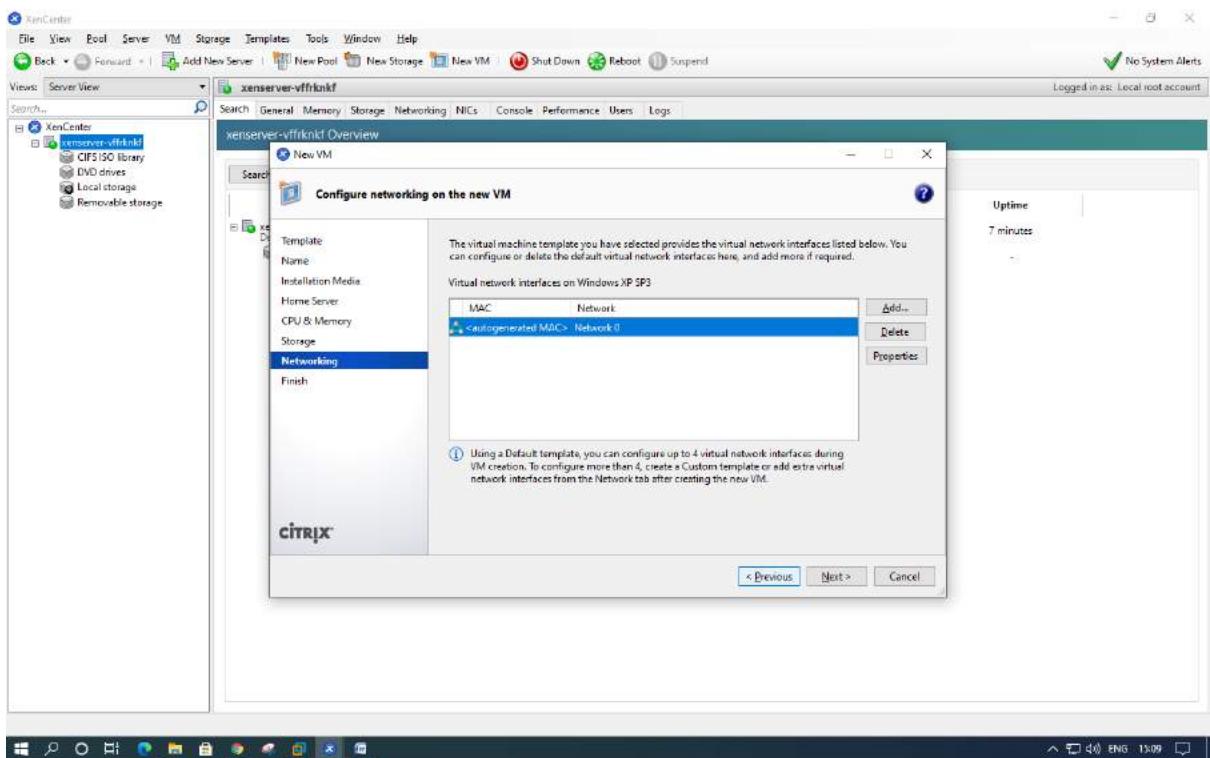
Next –



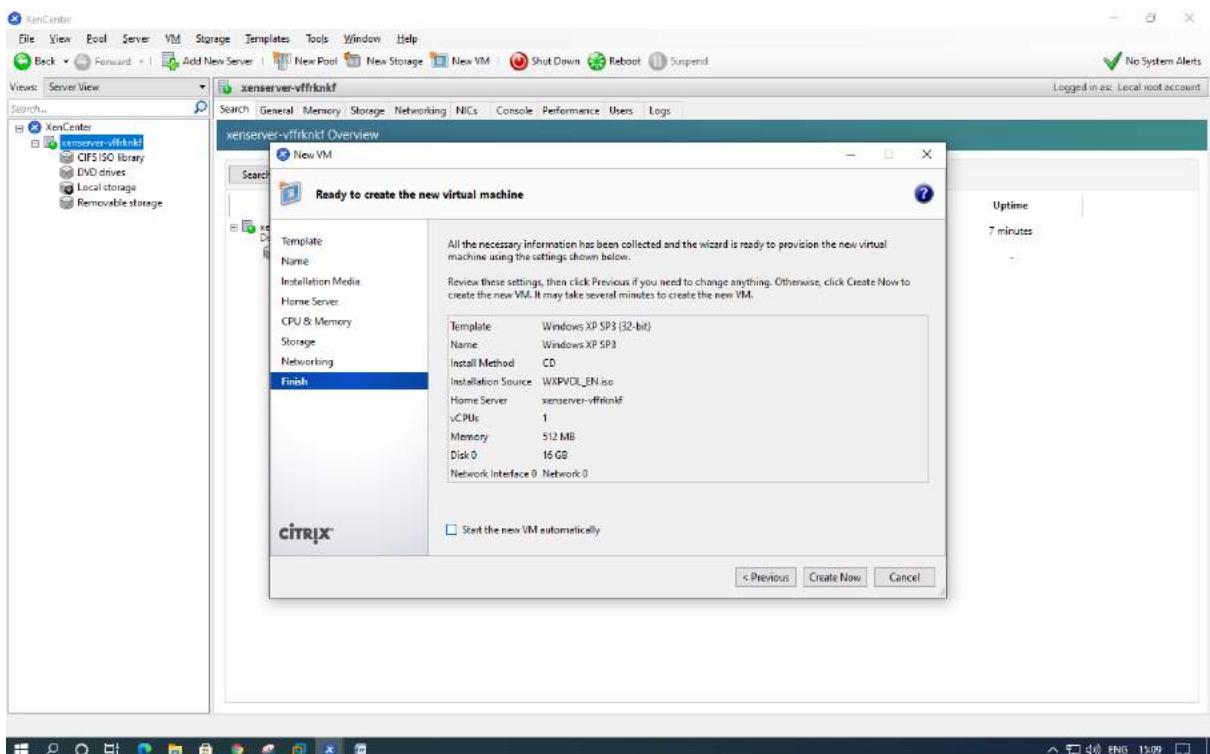
Select the Storage and click on Next.

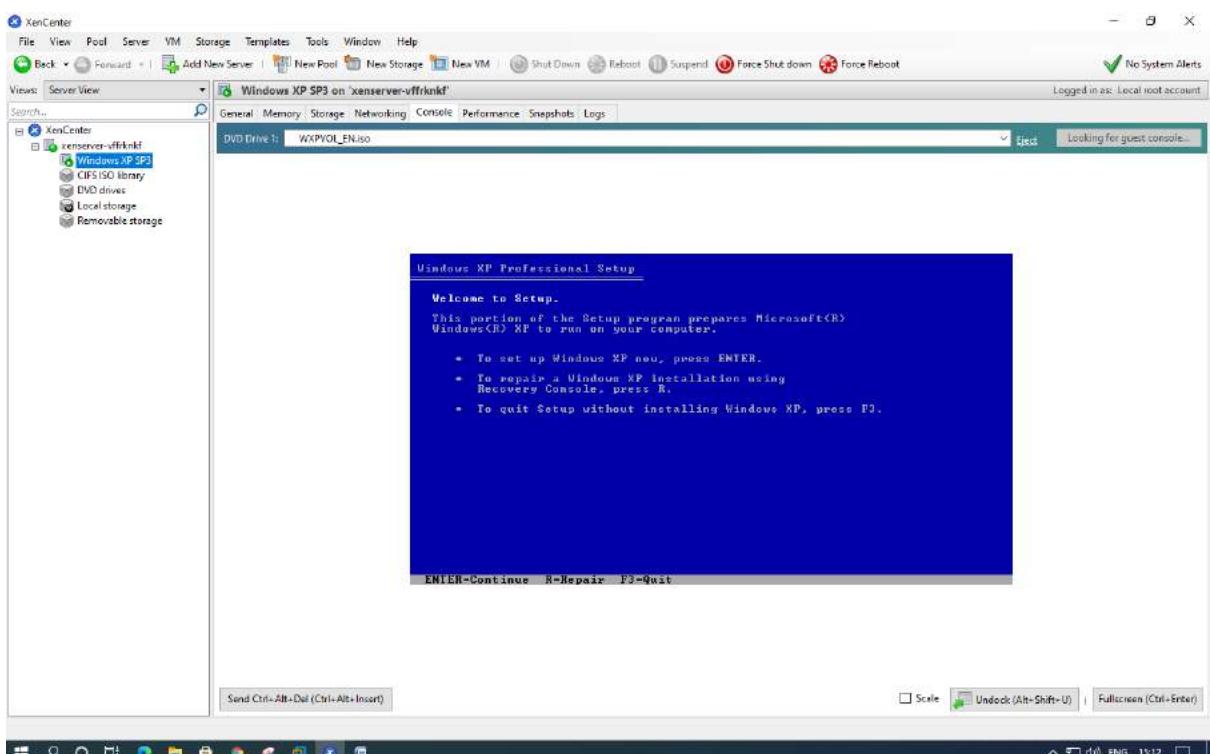
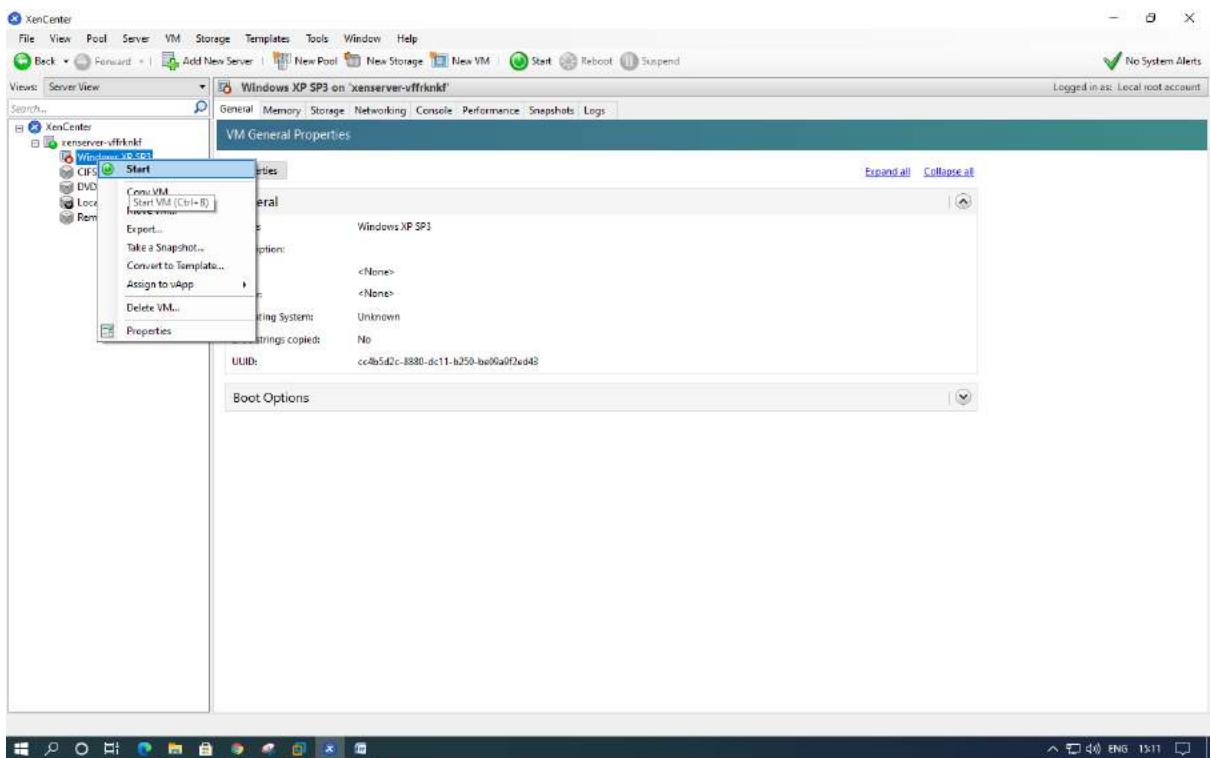


Next-



Uncheck – Start the new VM and click on create now

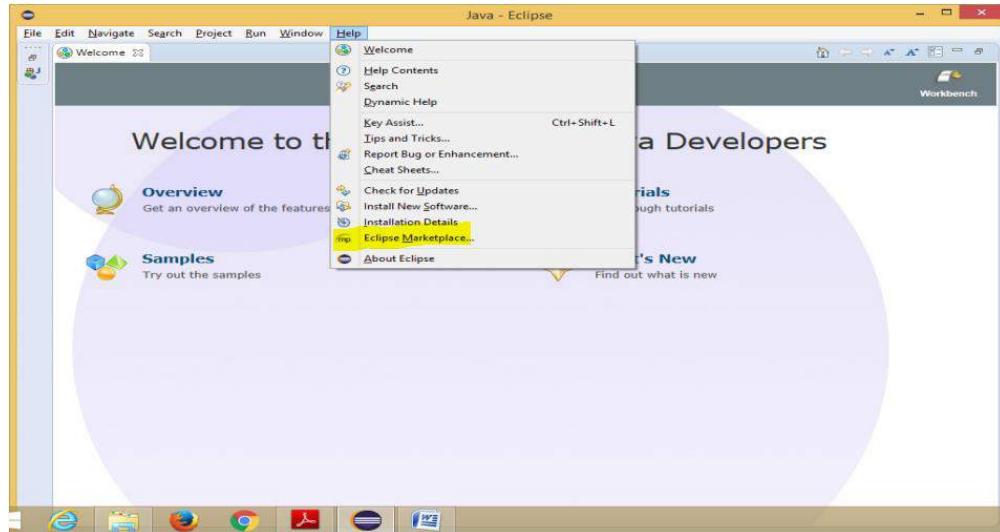




PRACTICAL: 4

IMPLEMENT SEARCH ENGINE _ GOOGLE APP ENGINE (GAE)

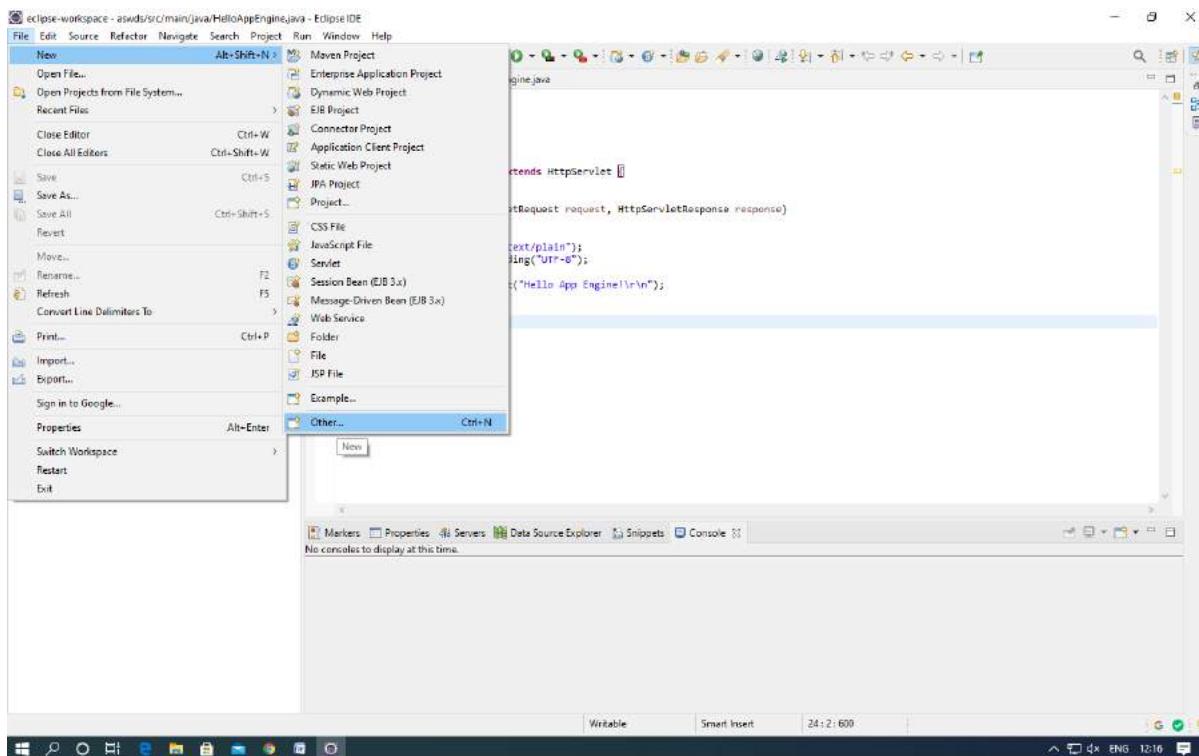
Open Eclipse and go to Help and select Eclipse Market place



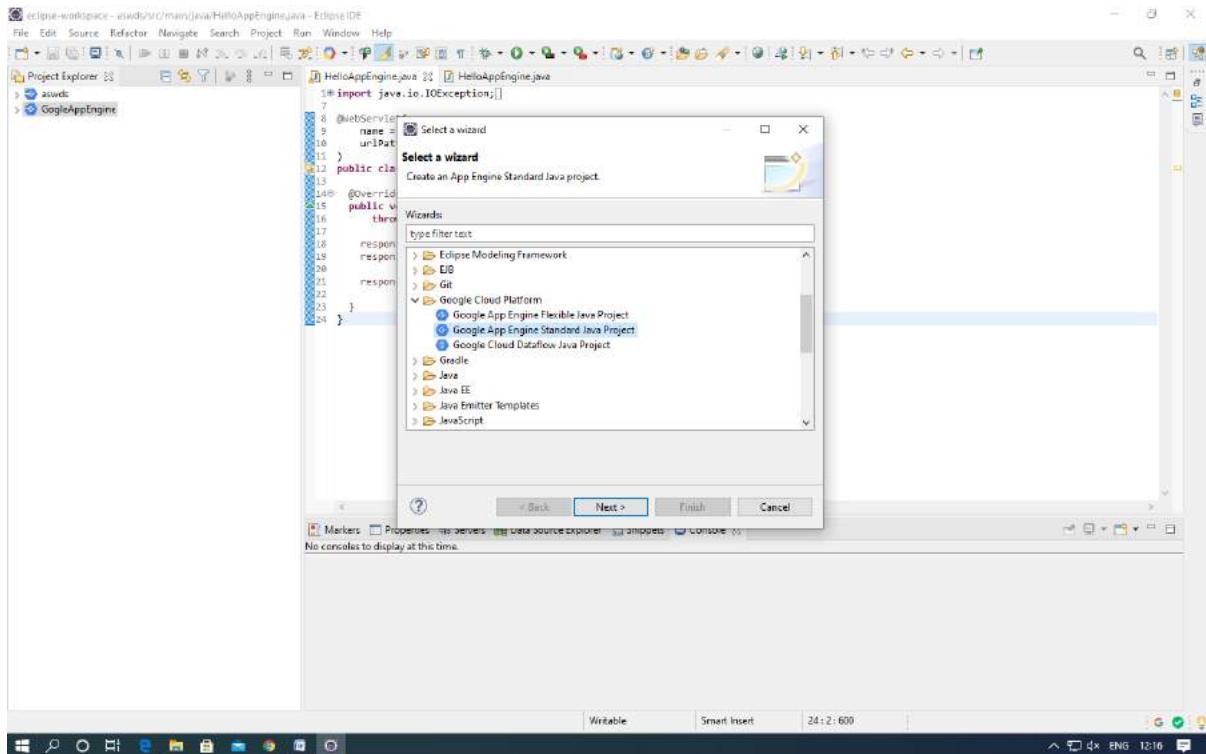
Search got Google Google Cloud and install it.

Restart Eclipse if asked.

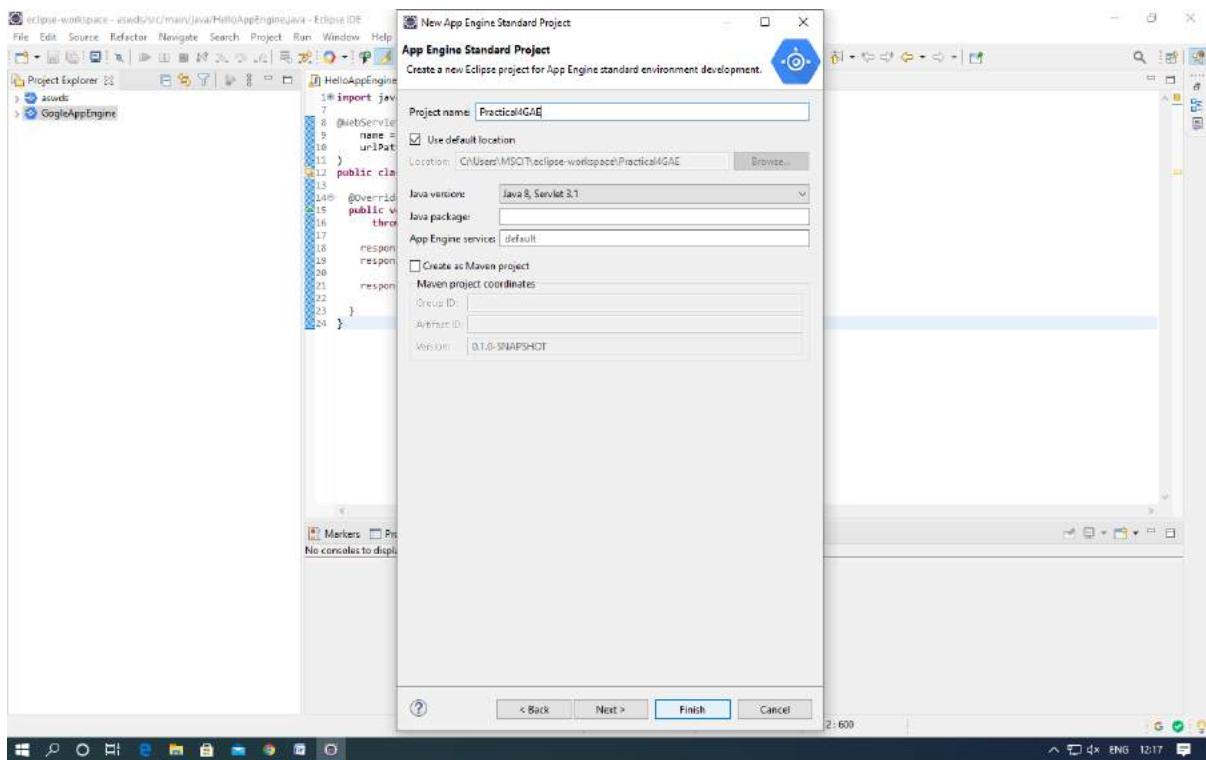
Now Go to File→New→Others..



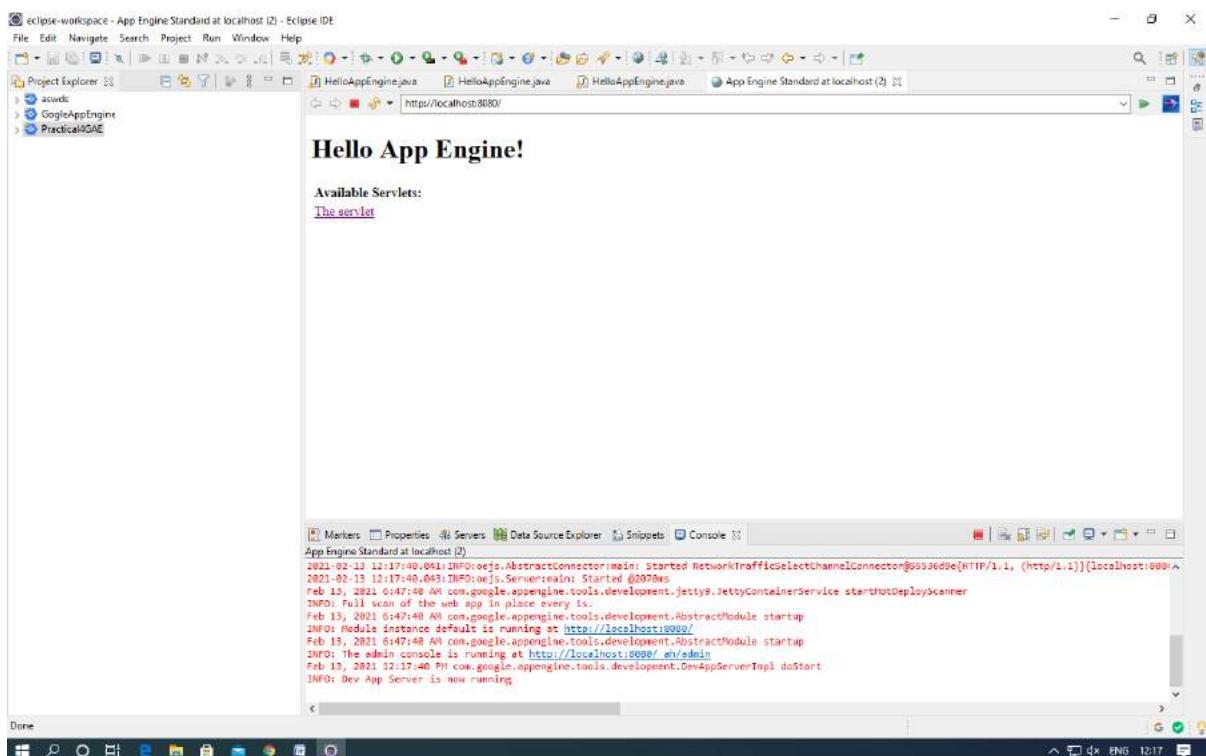
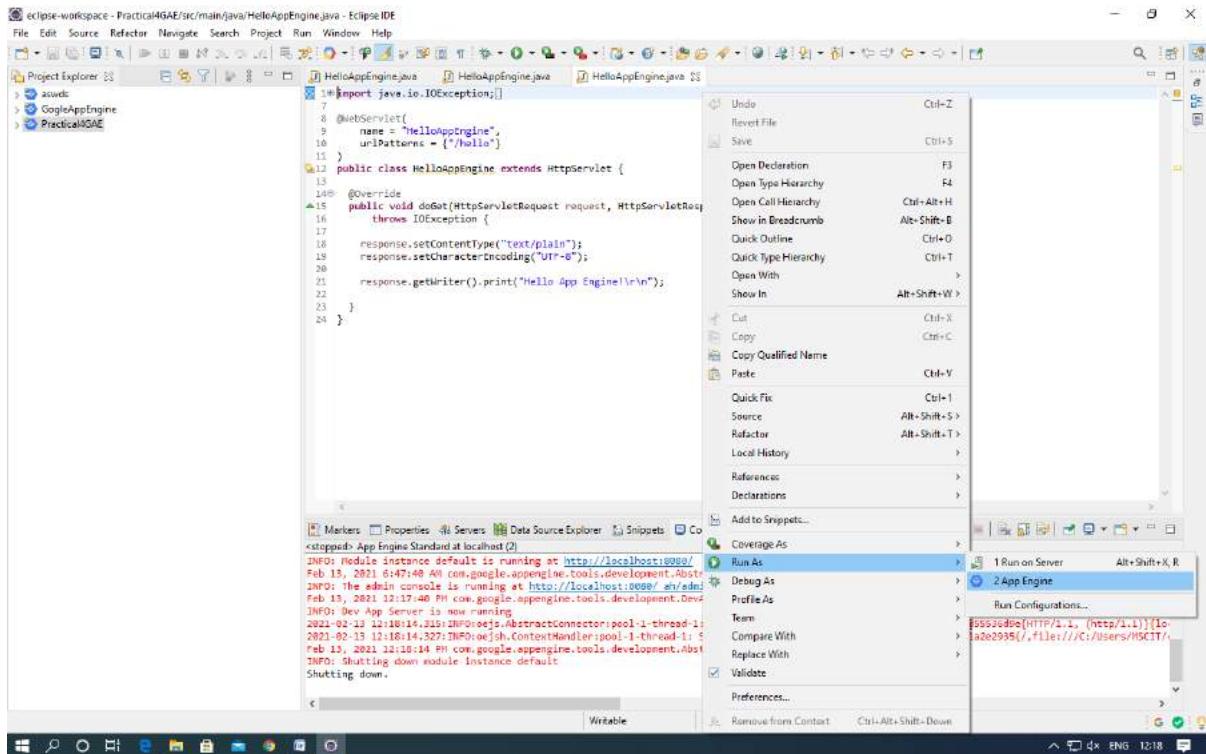
Select Google App Engine Standard Java Project



Give the name to your project and click Finish.



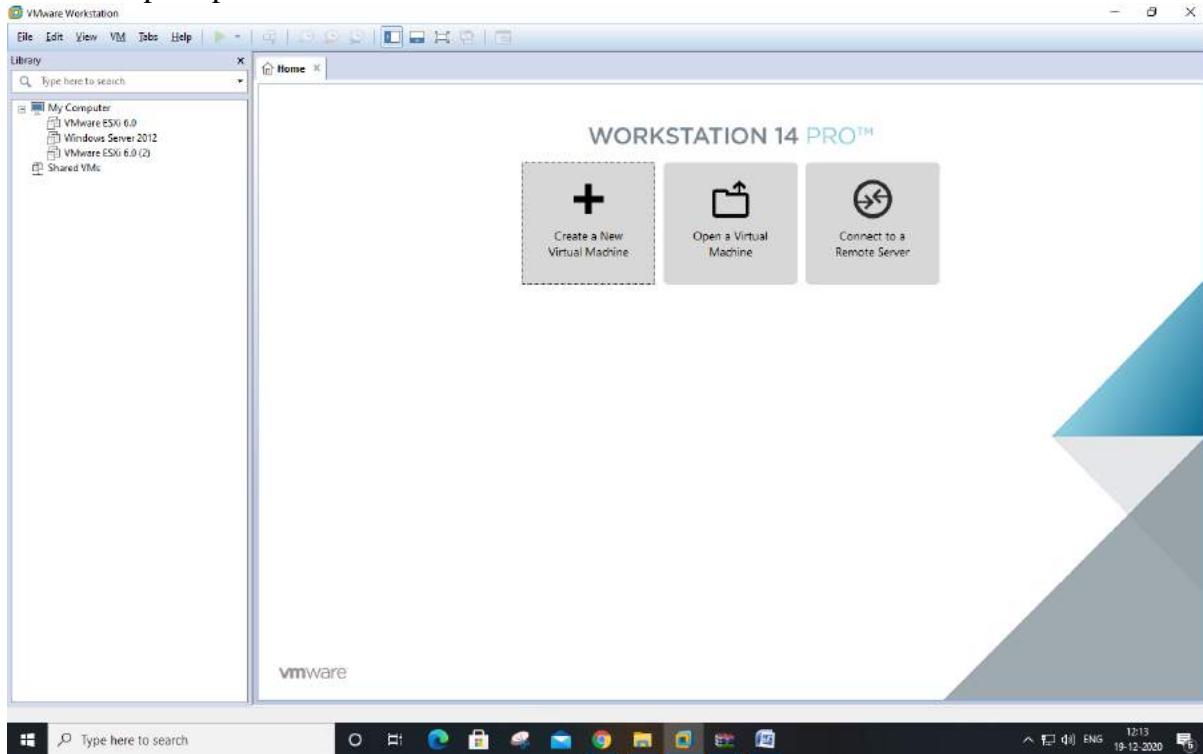
Type Code as per logic and right click to run as App Engine.



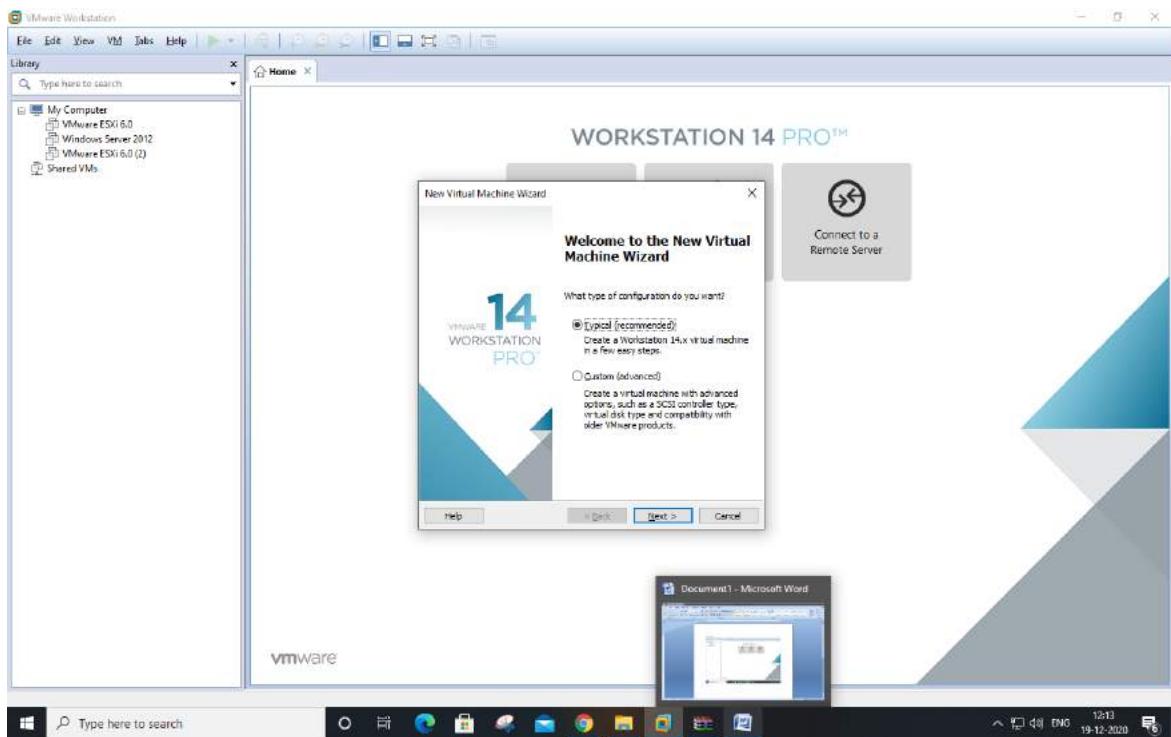
PRACTICAL: 5

IMPLEMENT ESXi SERVER

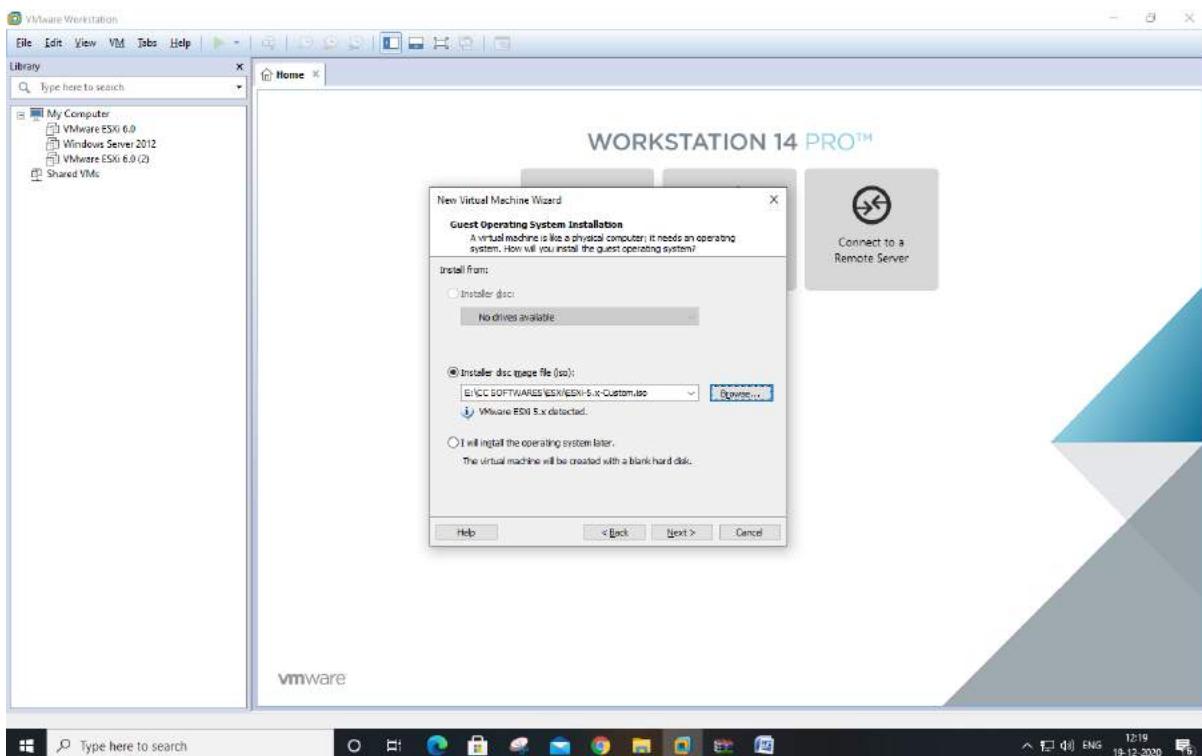
Steps: Open VMware Workstation – And select Create a New Virtual Machine



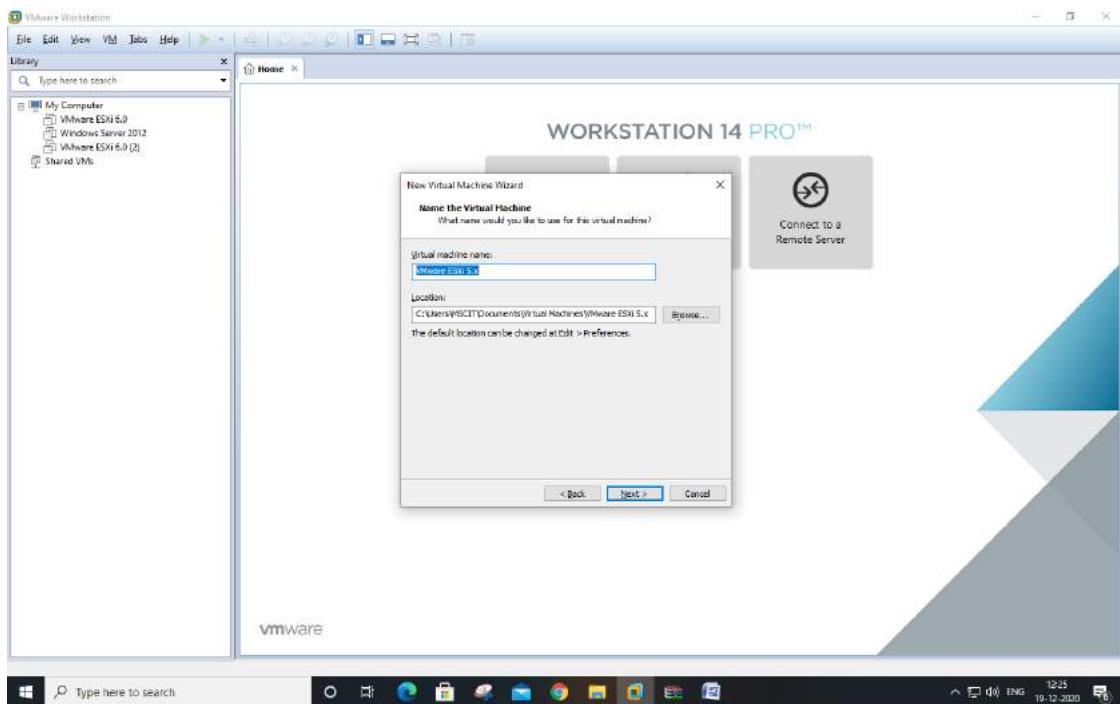
Select Typical and click Next



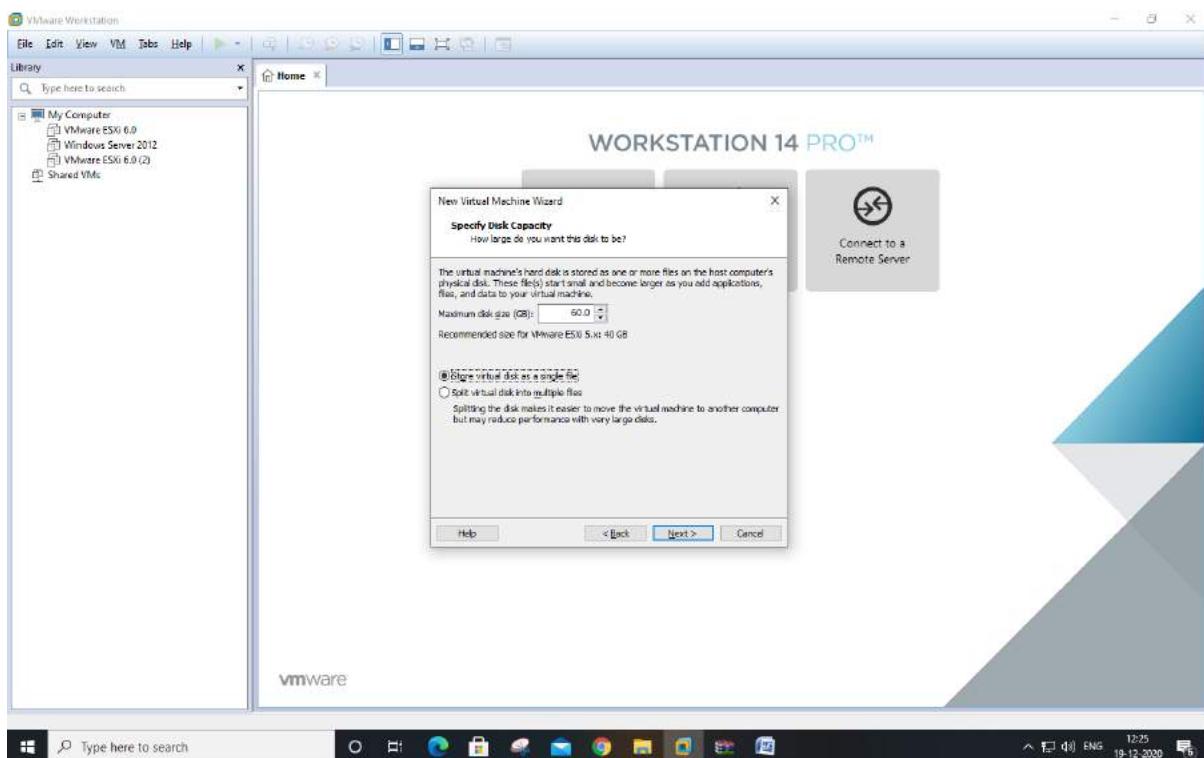
Select Installer disc_image file(ISO). Click Browse -ESXi-5.x-Custom.iso Iso File – For Example “D:\ccpraxrj\ESXi-5.x-Custom.iso” And click on next



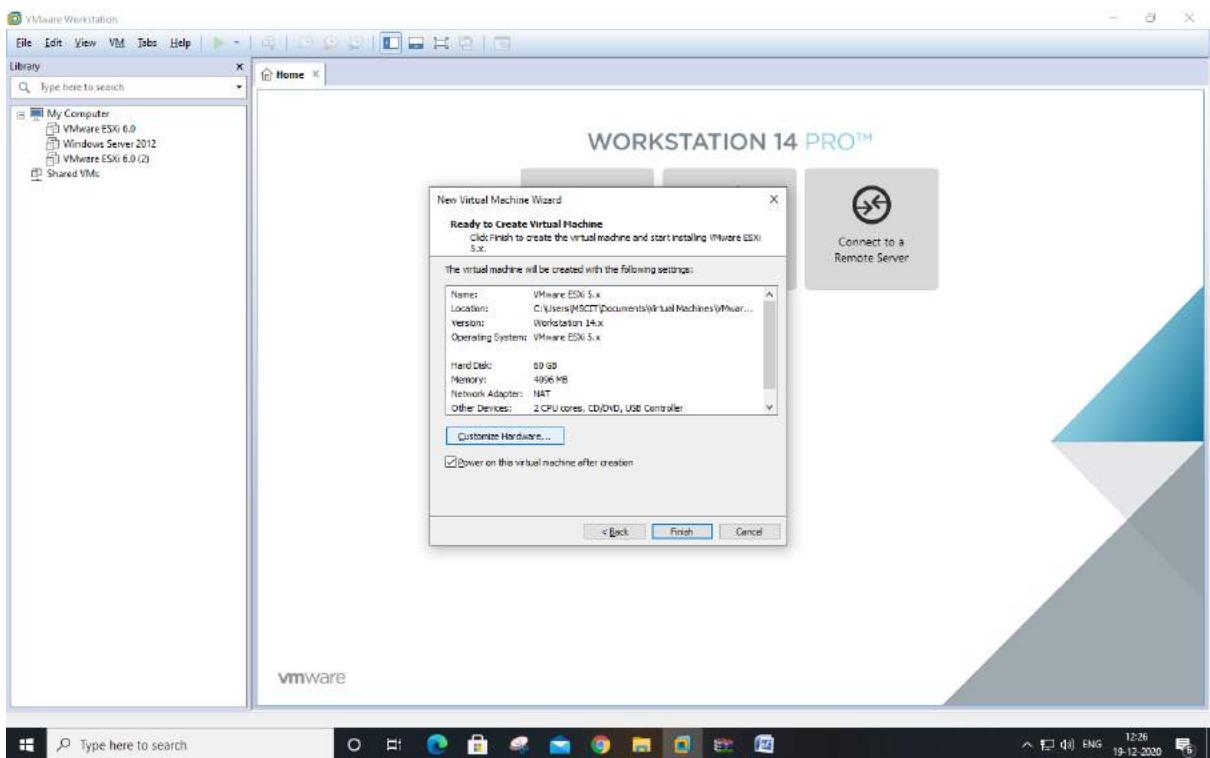
Give Virtual Machine Name and click on next.



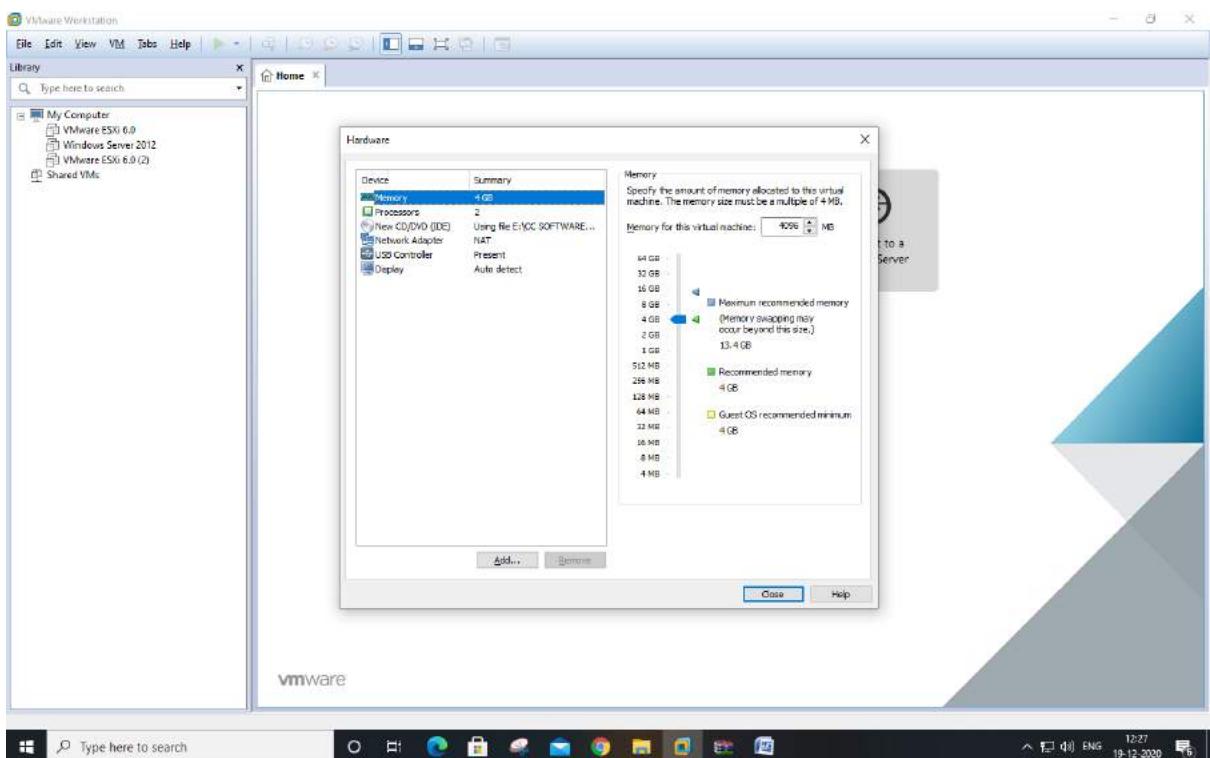
Change maximum disk size to 60 GB and check –Store virtual disk as single file

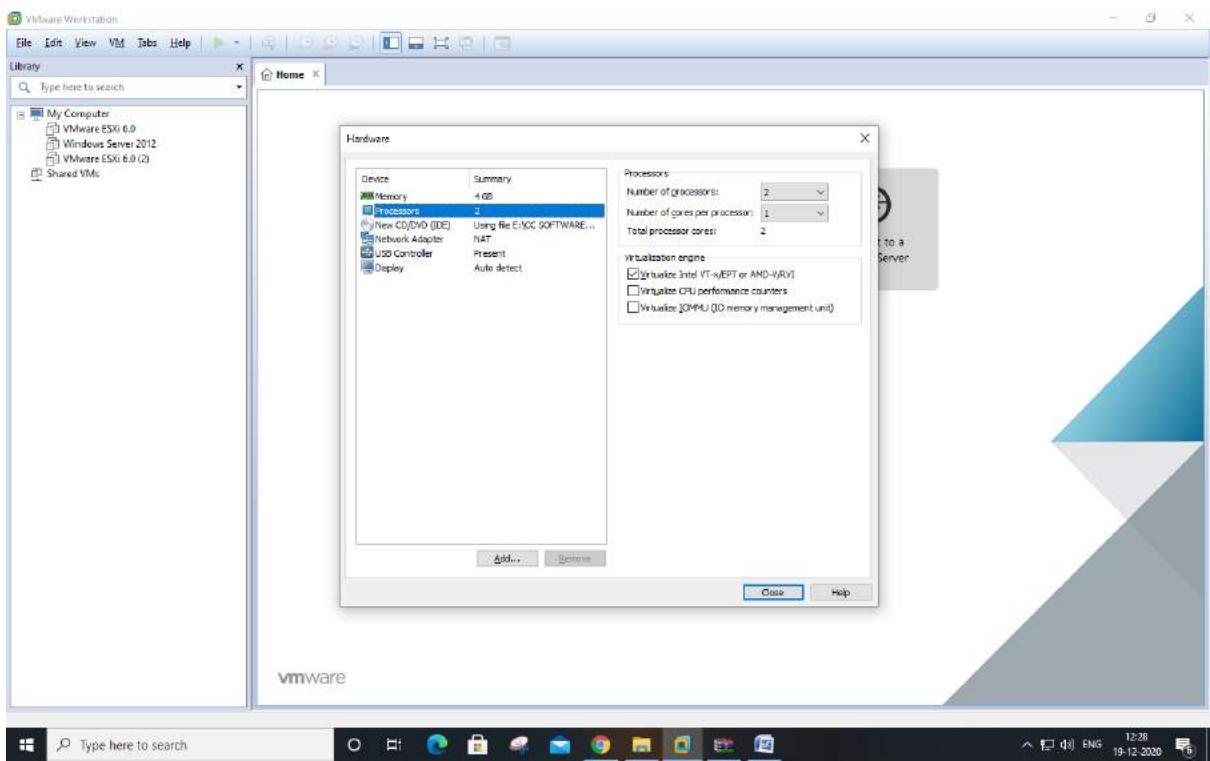


Click on Customize Hardware option



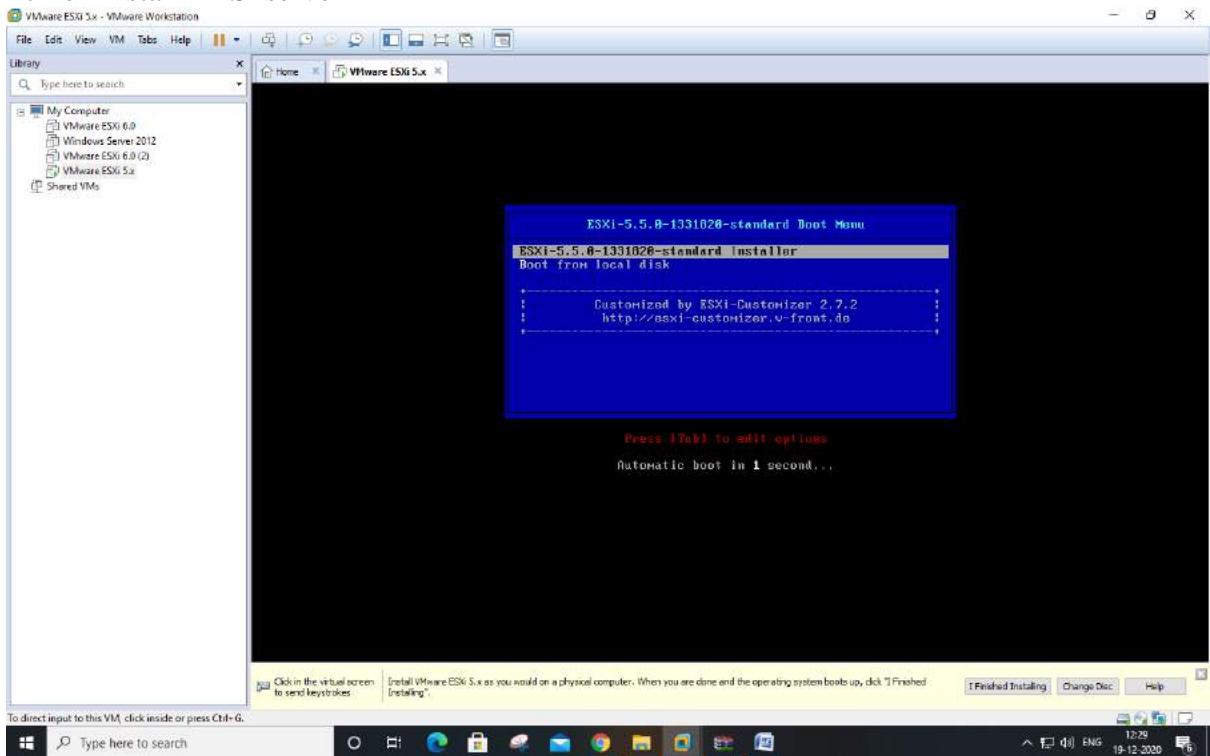
Change – Memory for this virtual machine to 4 GB and Click on Processor and select virtualize Intel VT and Click on Close.

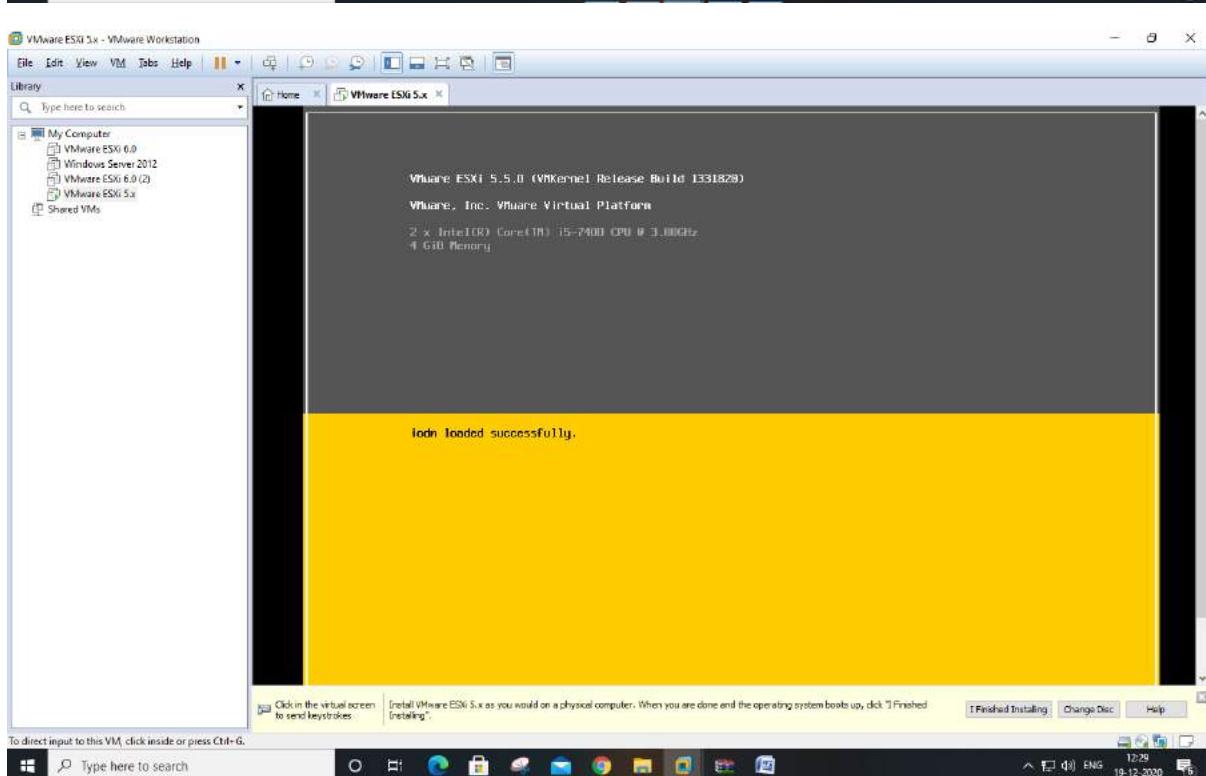
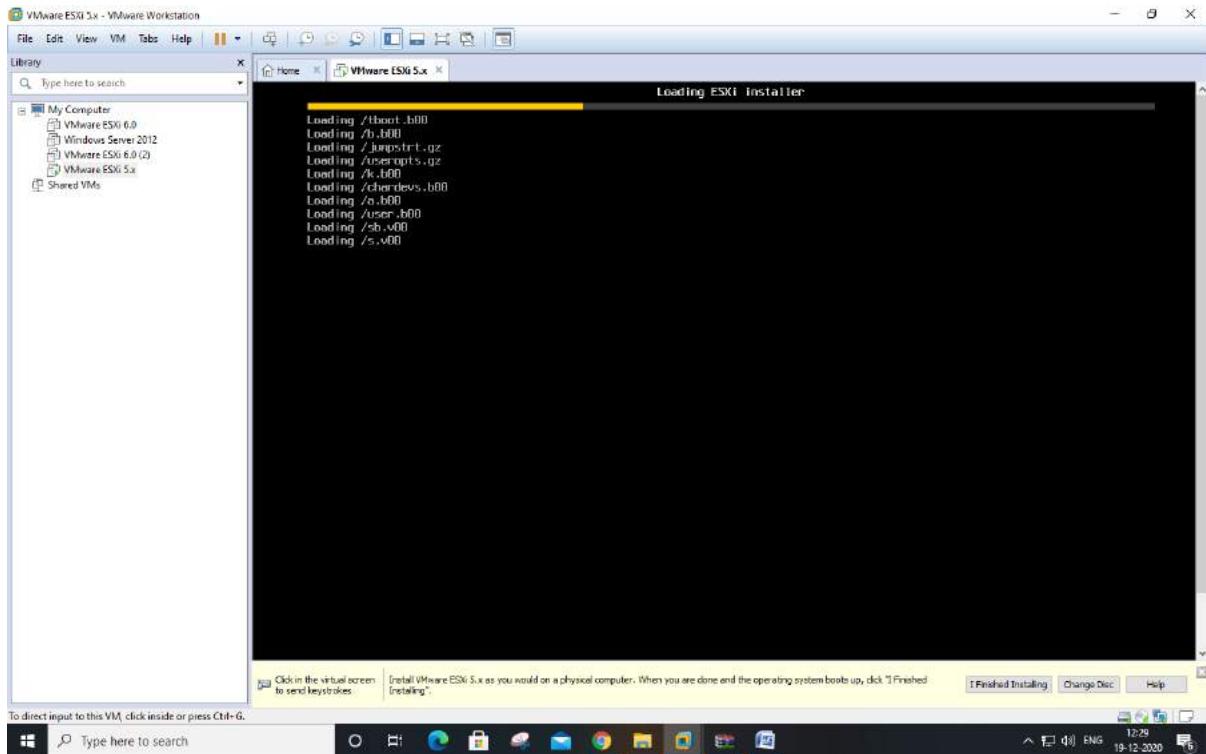




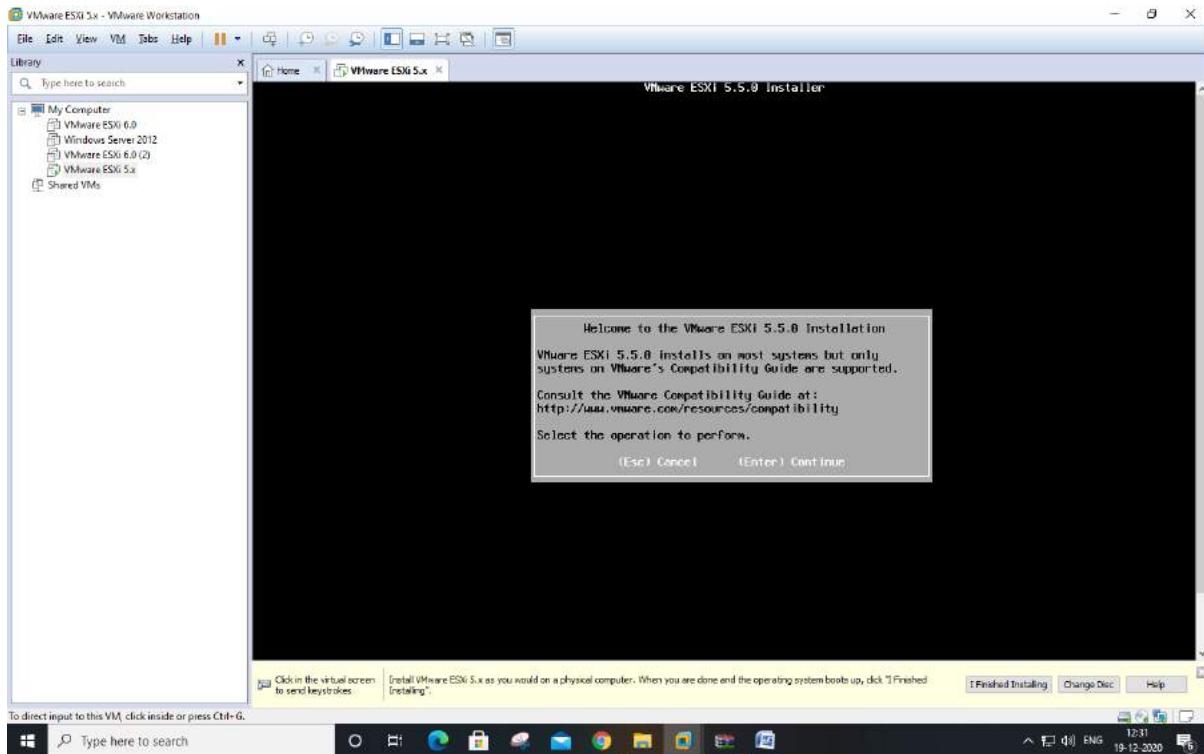
Now Power on newly created Virtual machine –

Click on install EXSi server

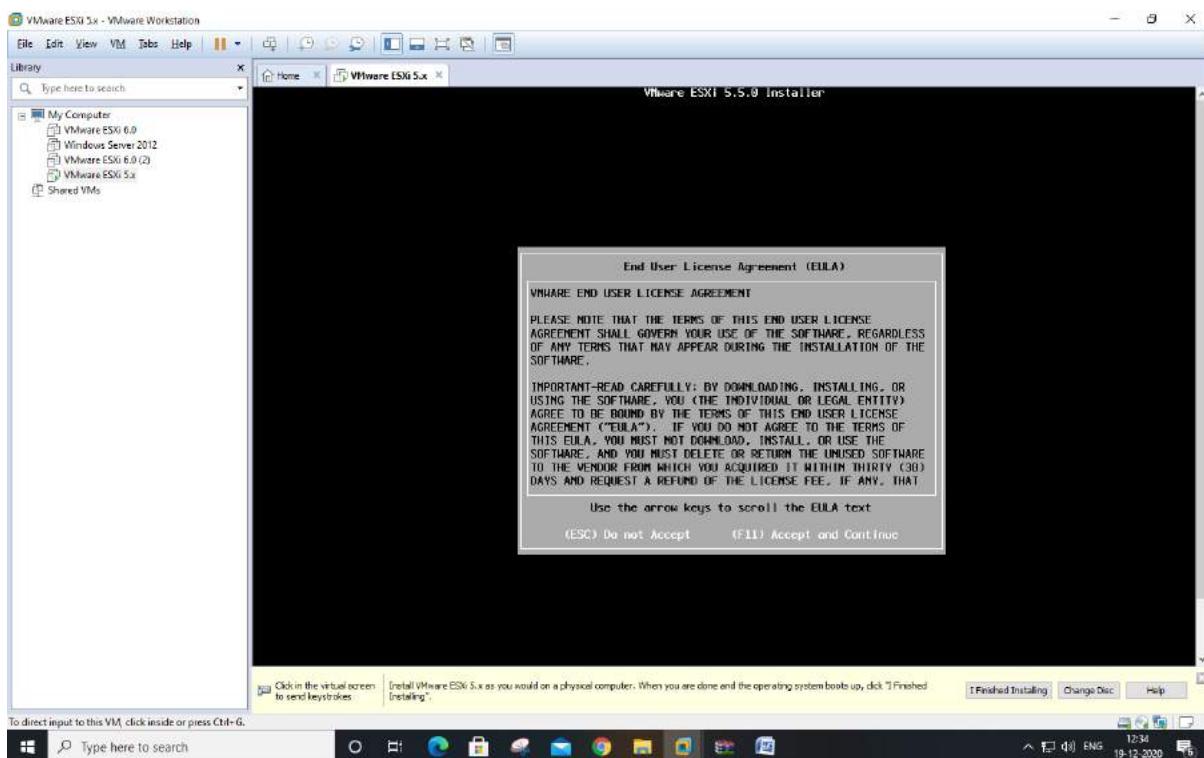




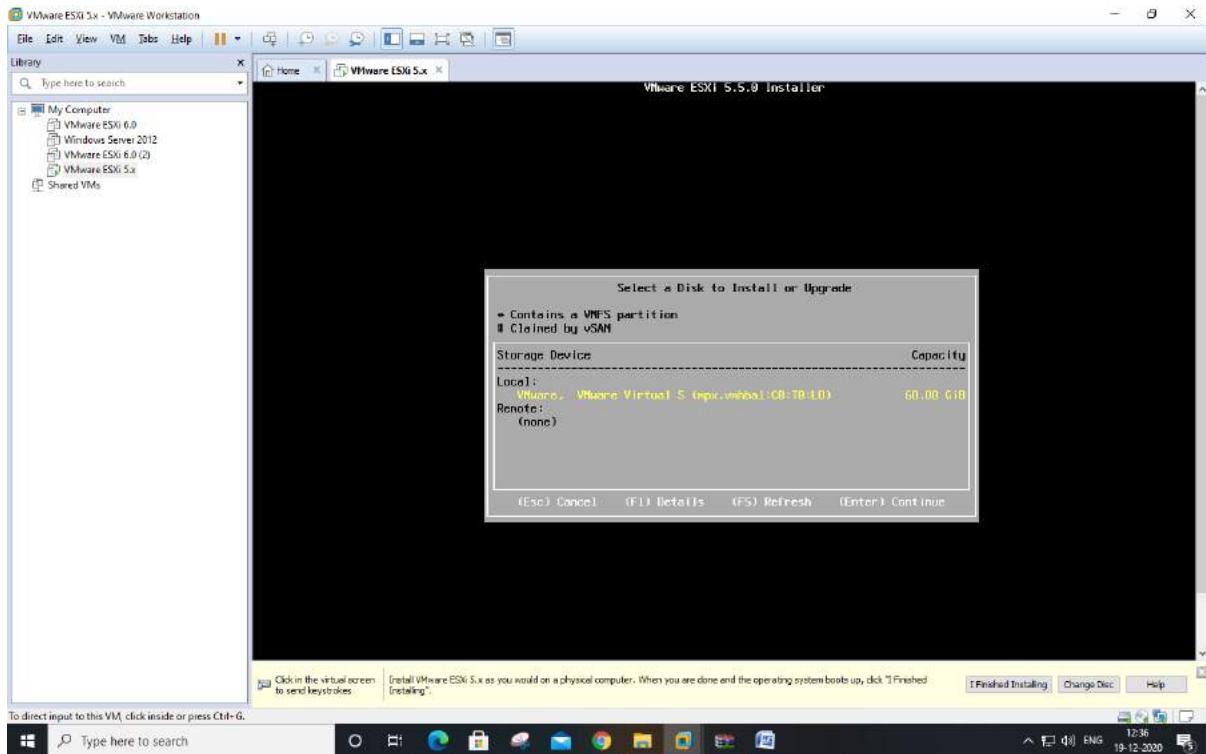
Press enter



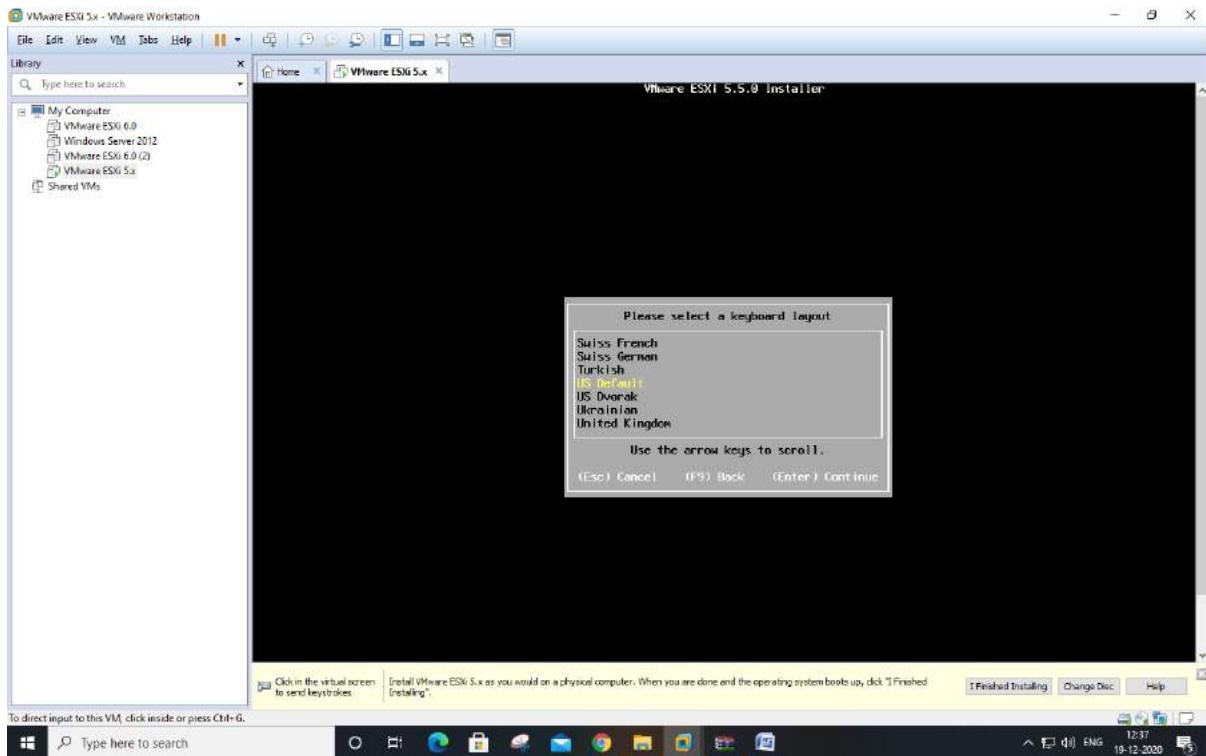
Select Accept and Continue.



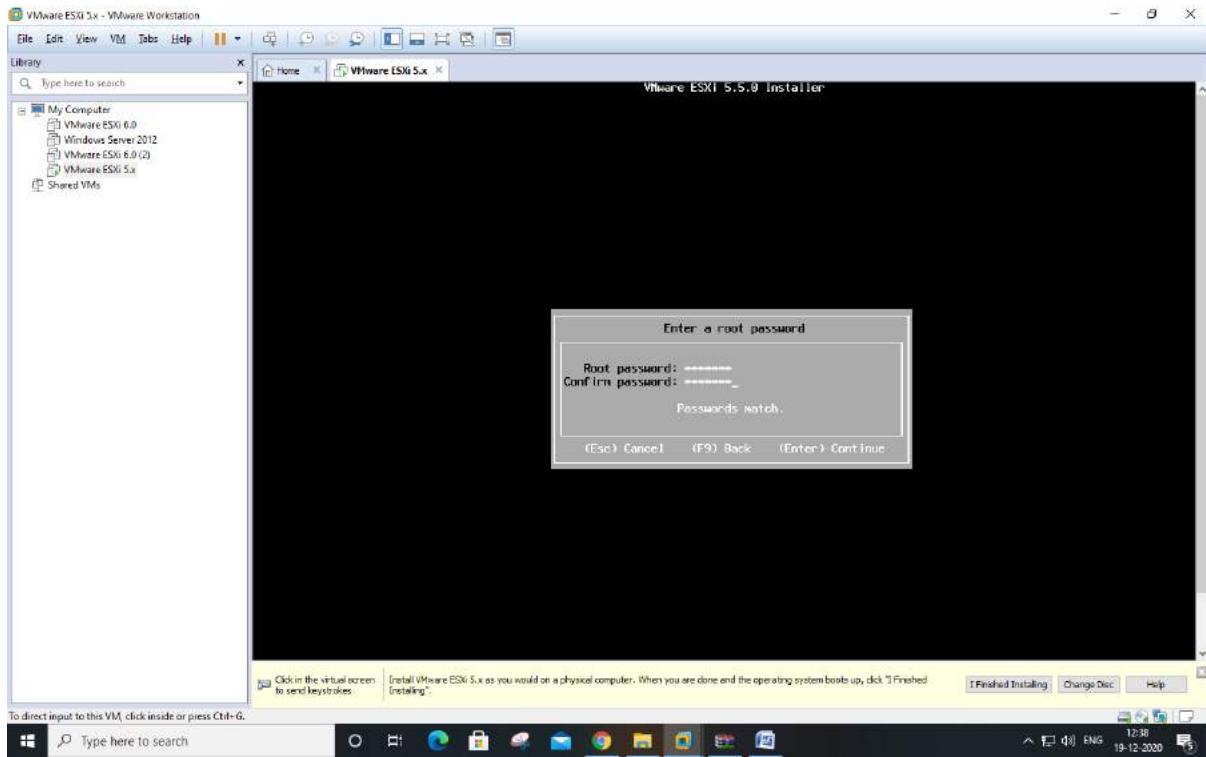
Click Continue



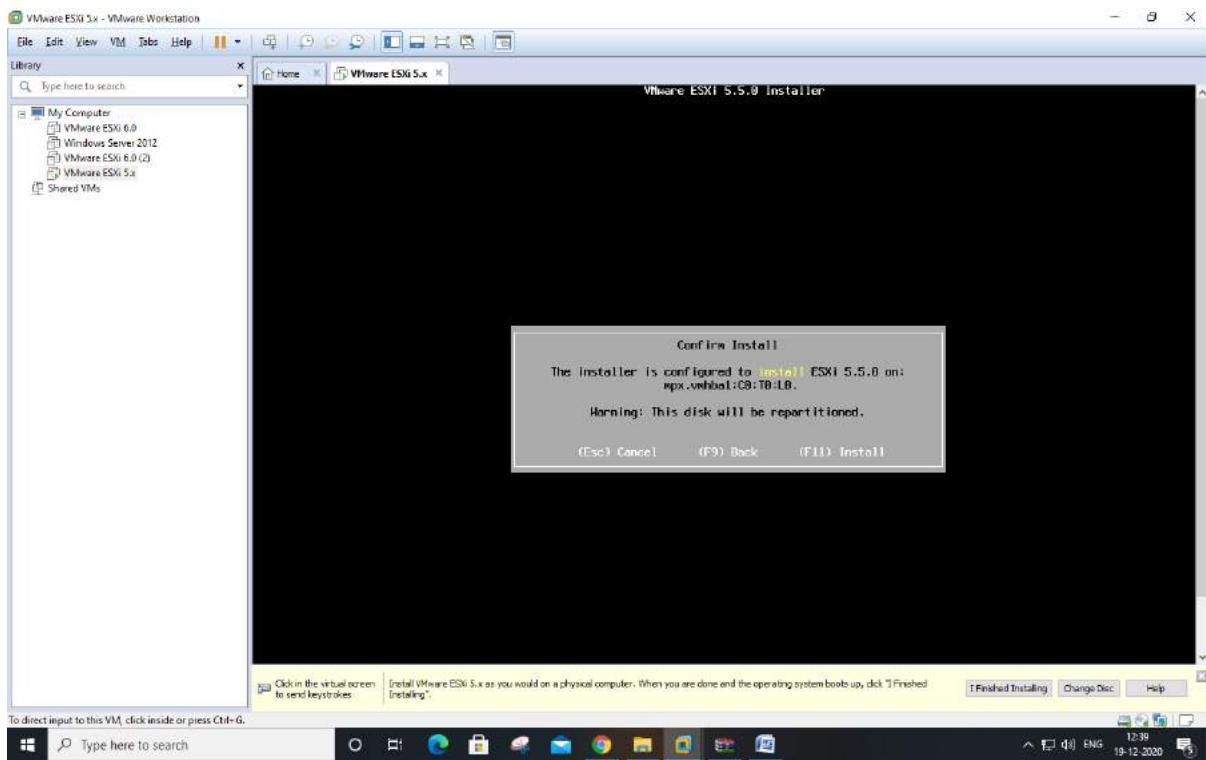
Select us default and click enter

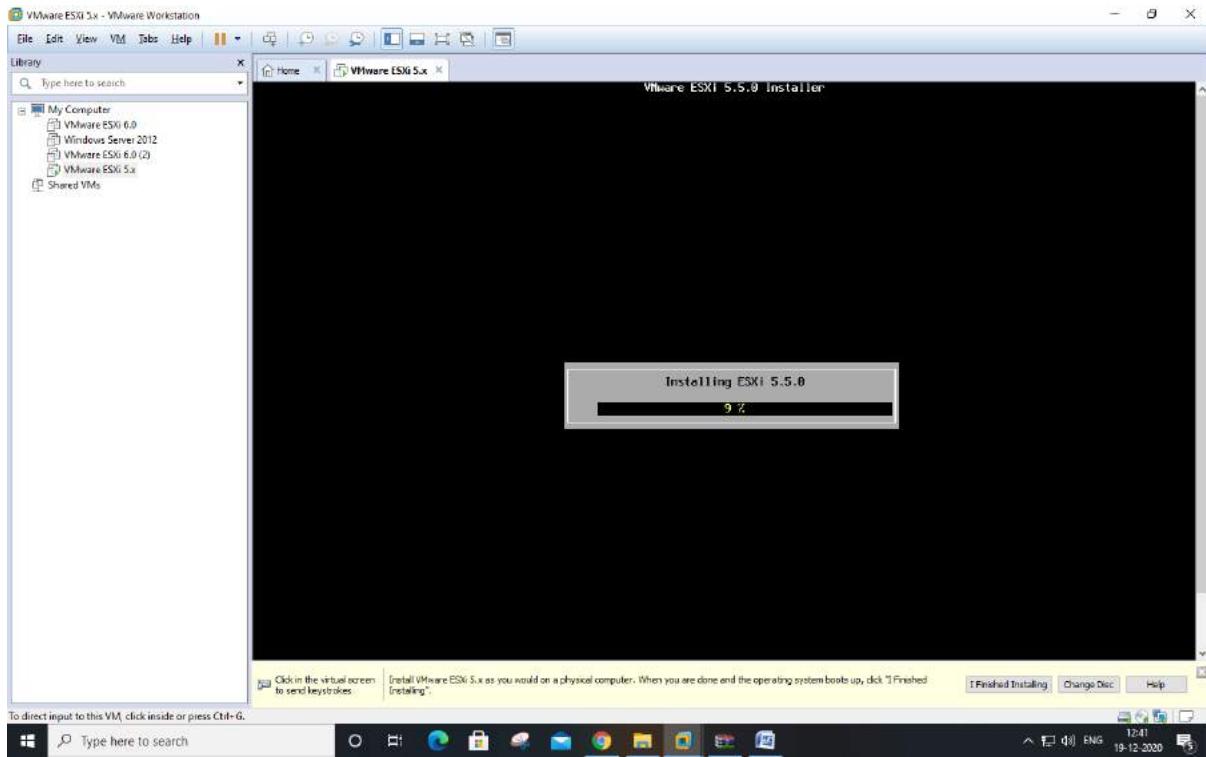


Create the root password and remember as you have to login VMWare Vsphere client using this password.

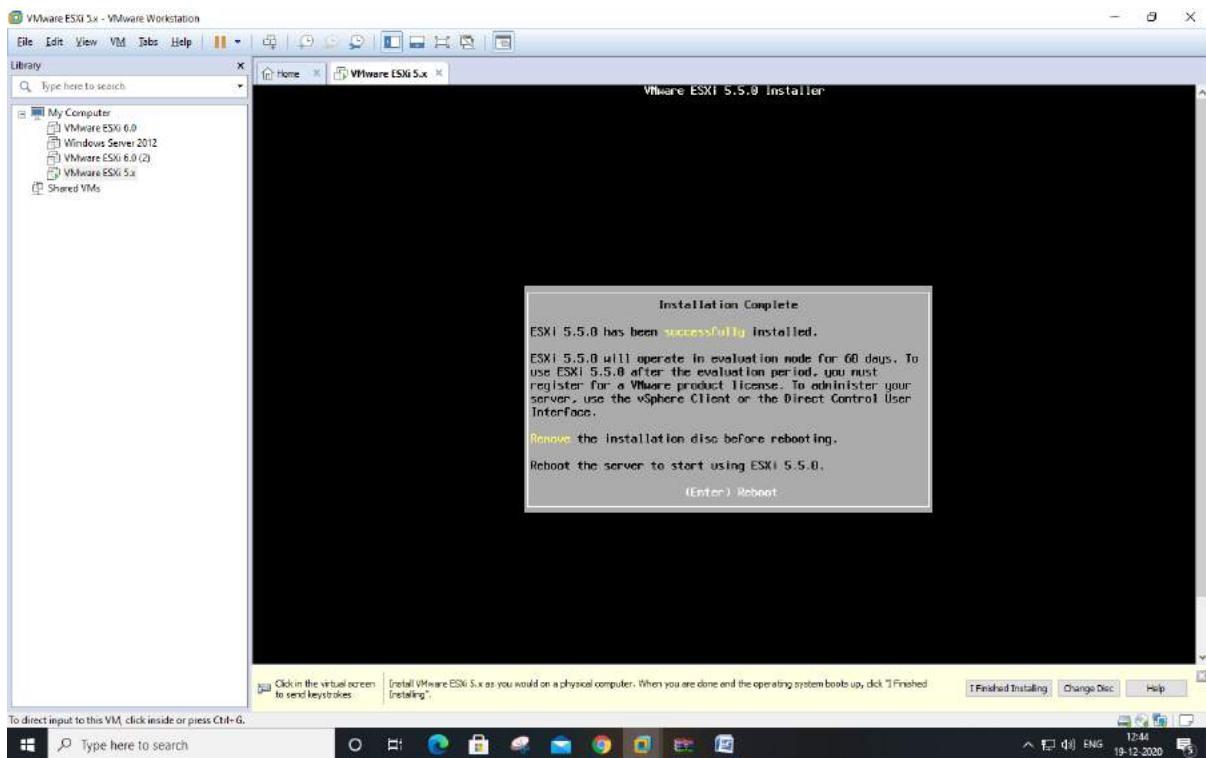


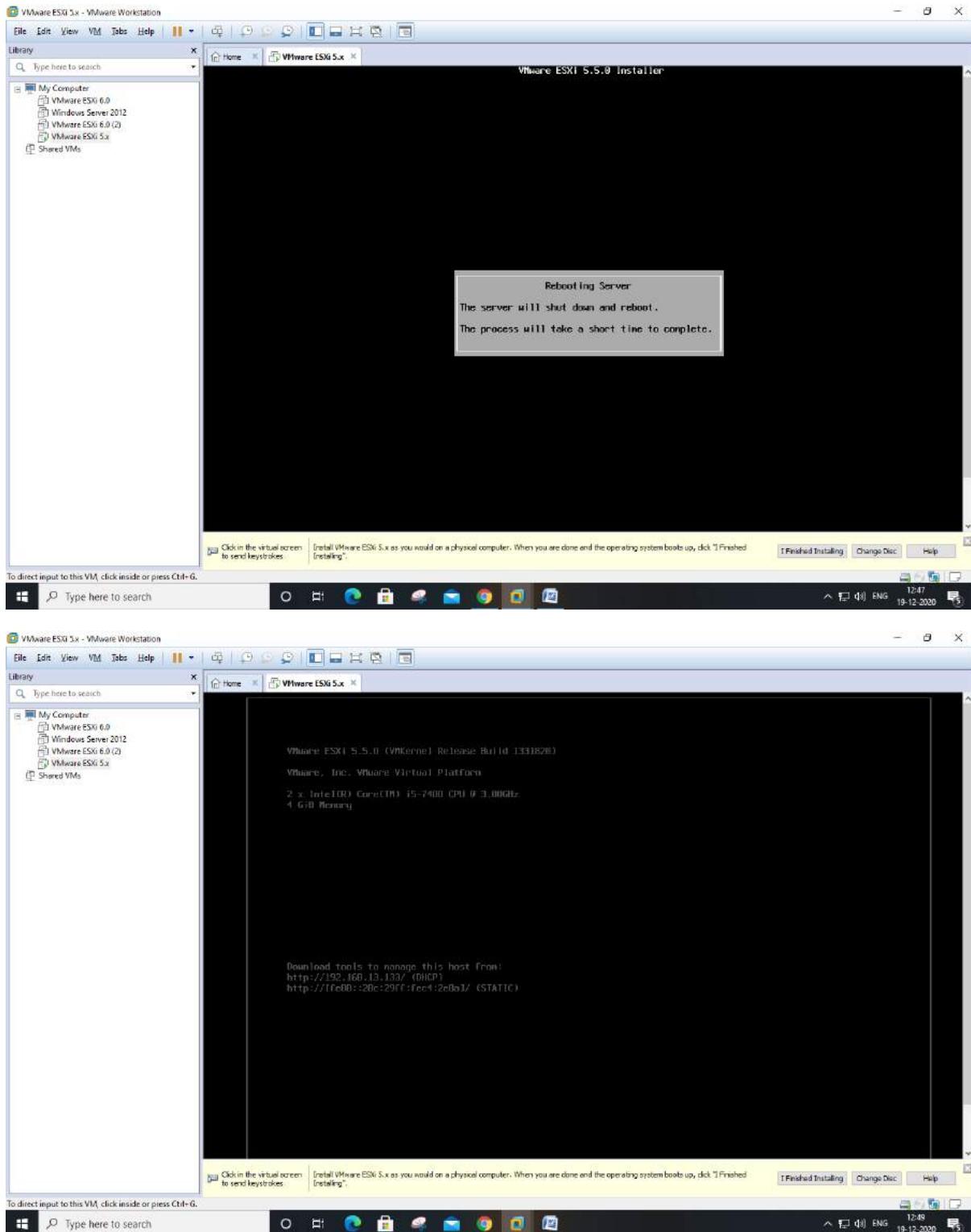
Click install



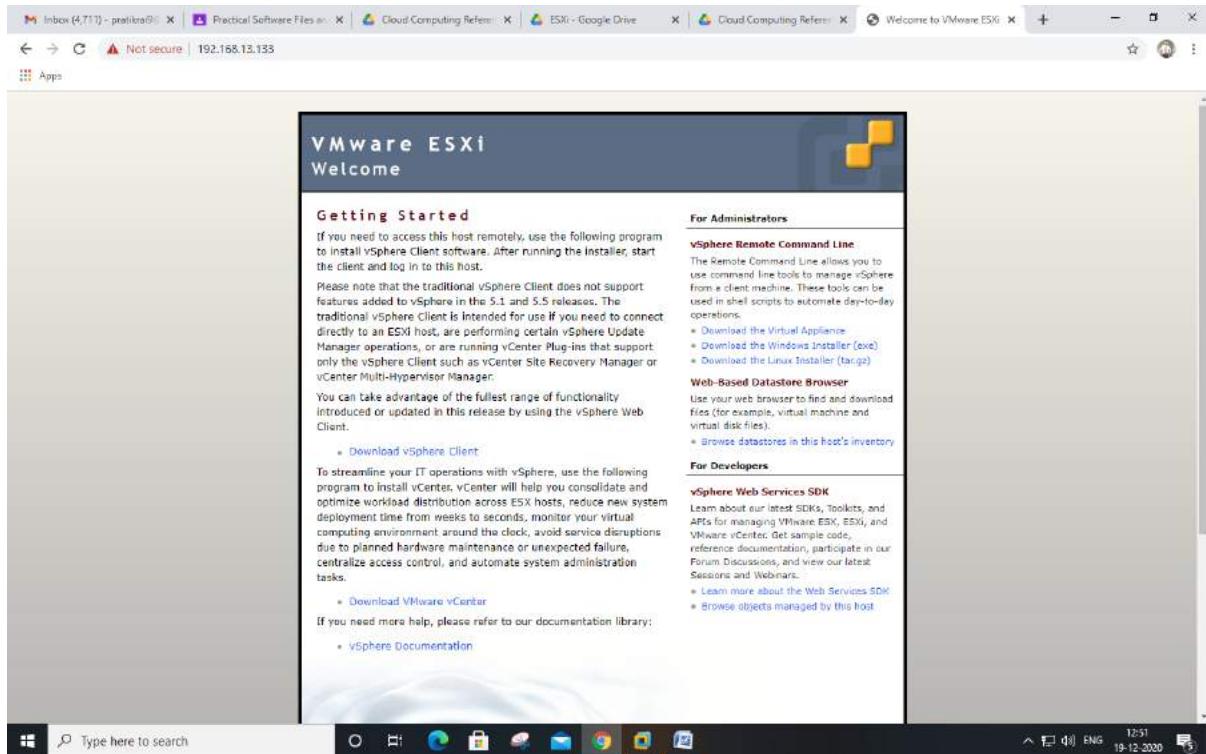


Press enter to reboot the system



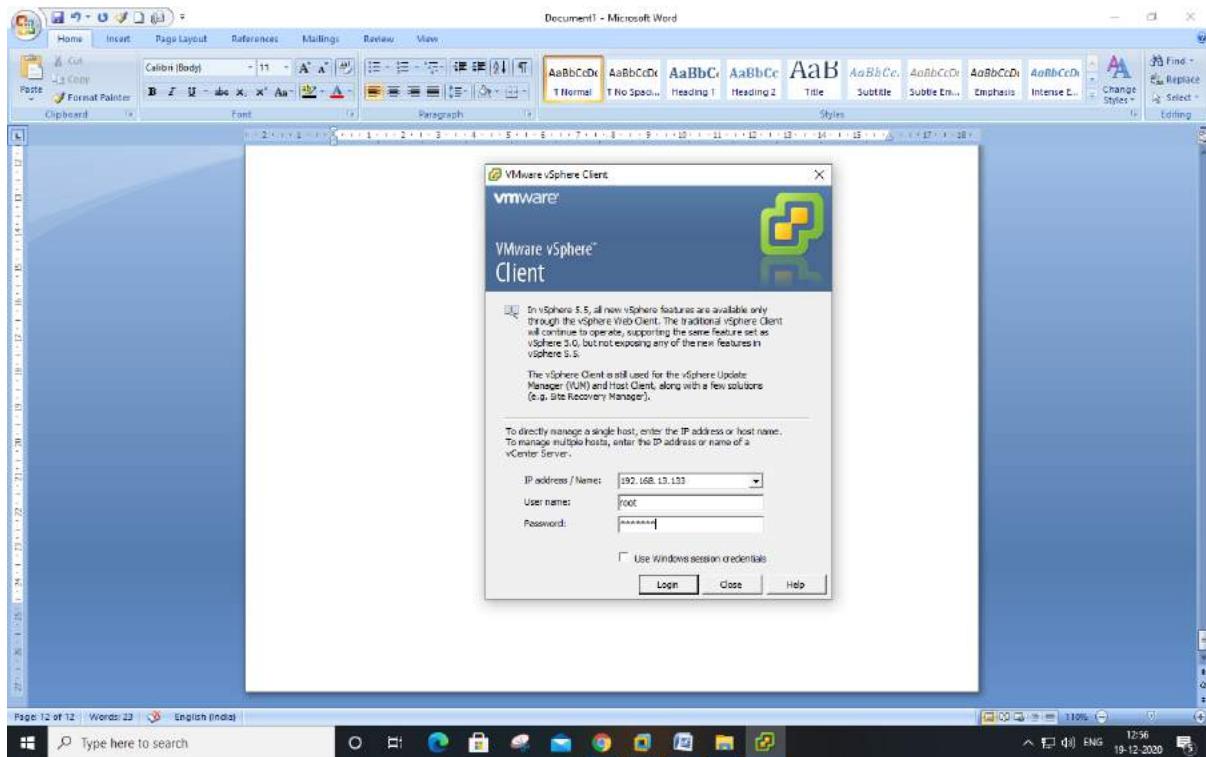


Browse the IP on Internet



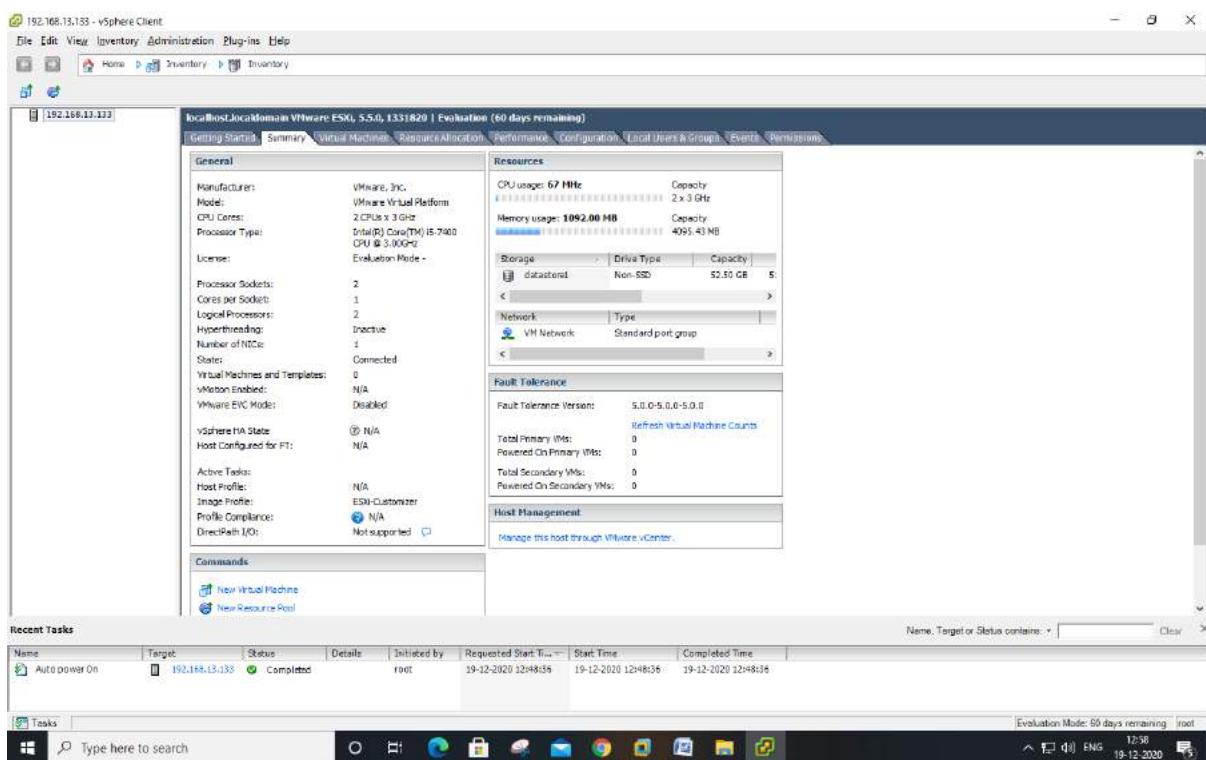
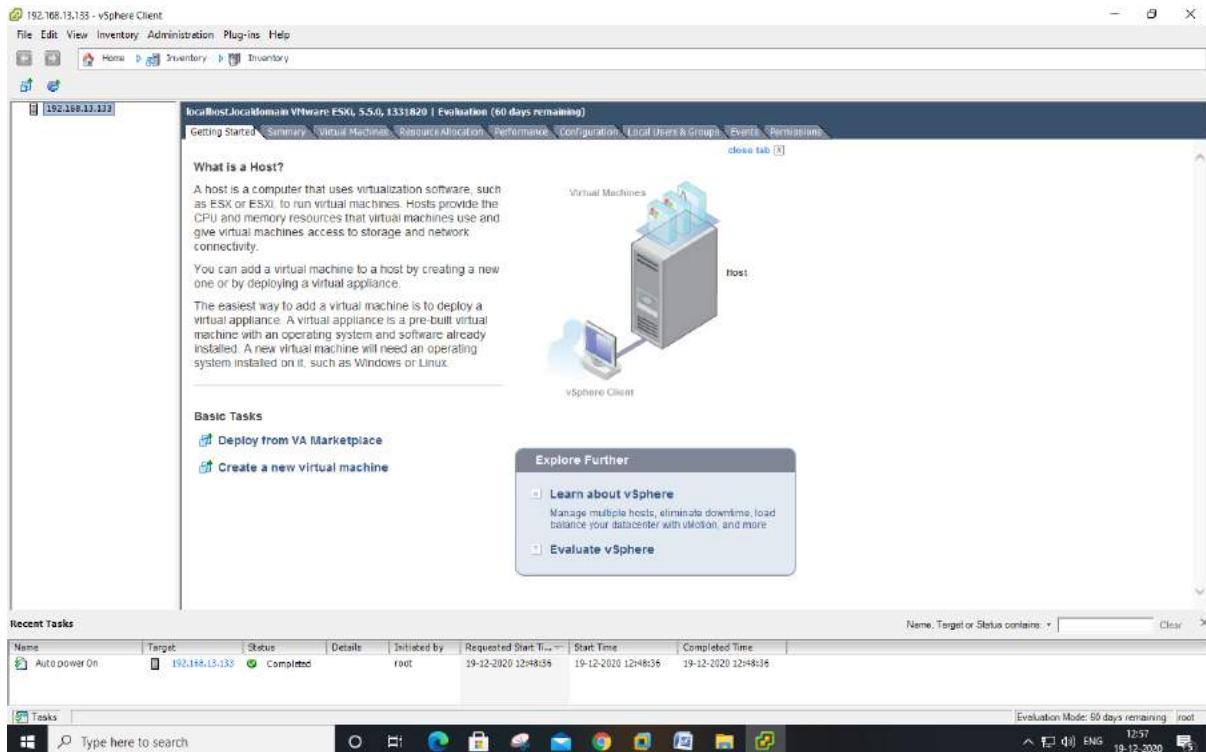
Installation of vSphere Client

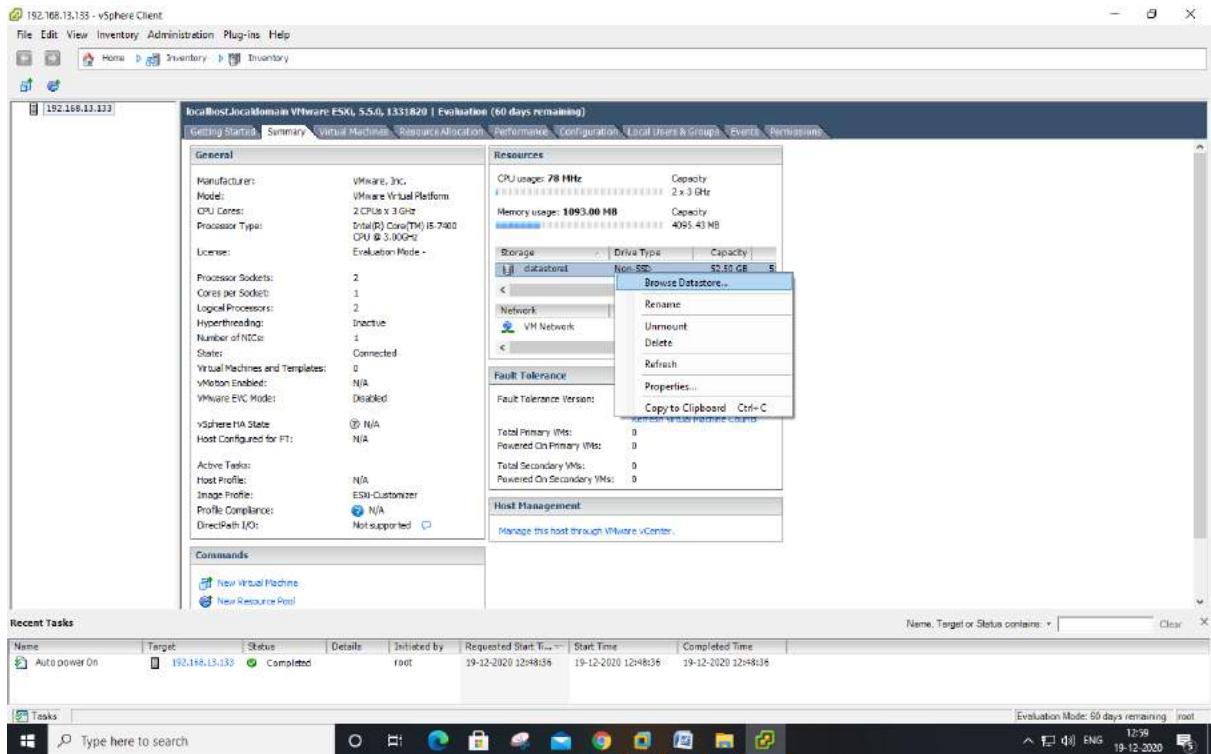
Vsphere client is already installed, open it and enter the IP, Username and password



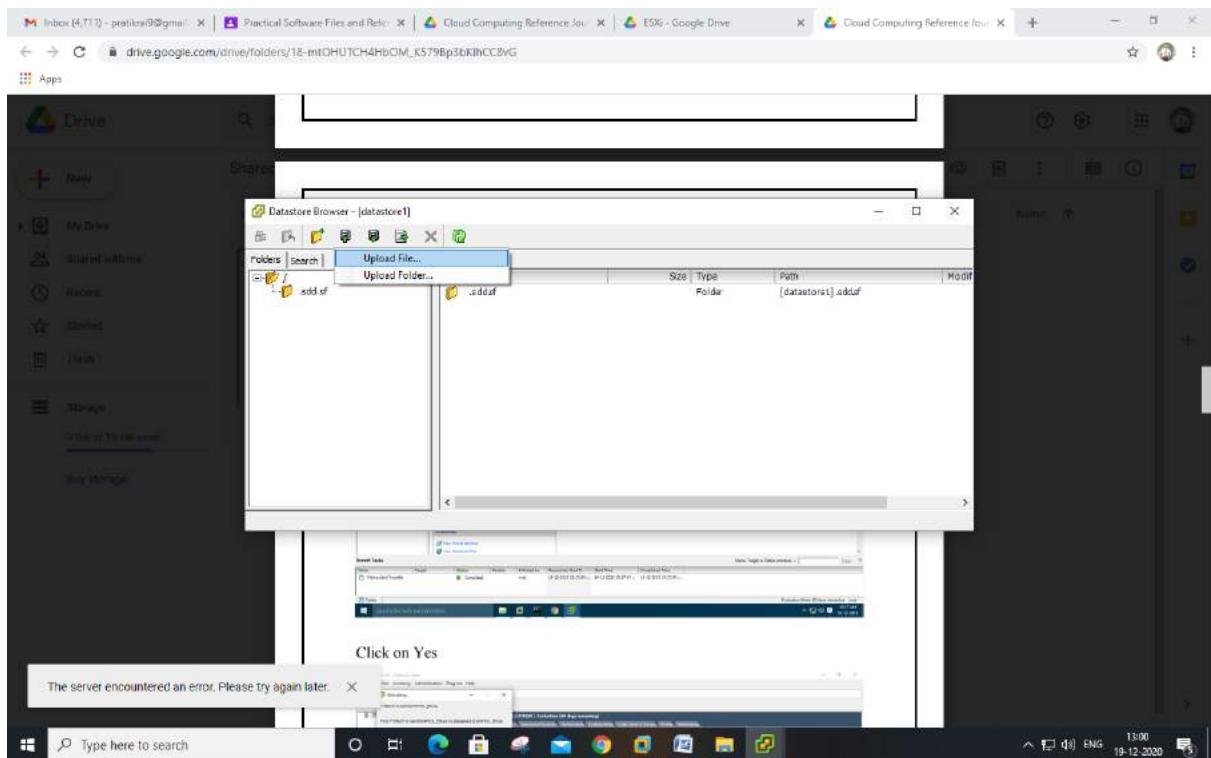
Select Summary tab.

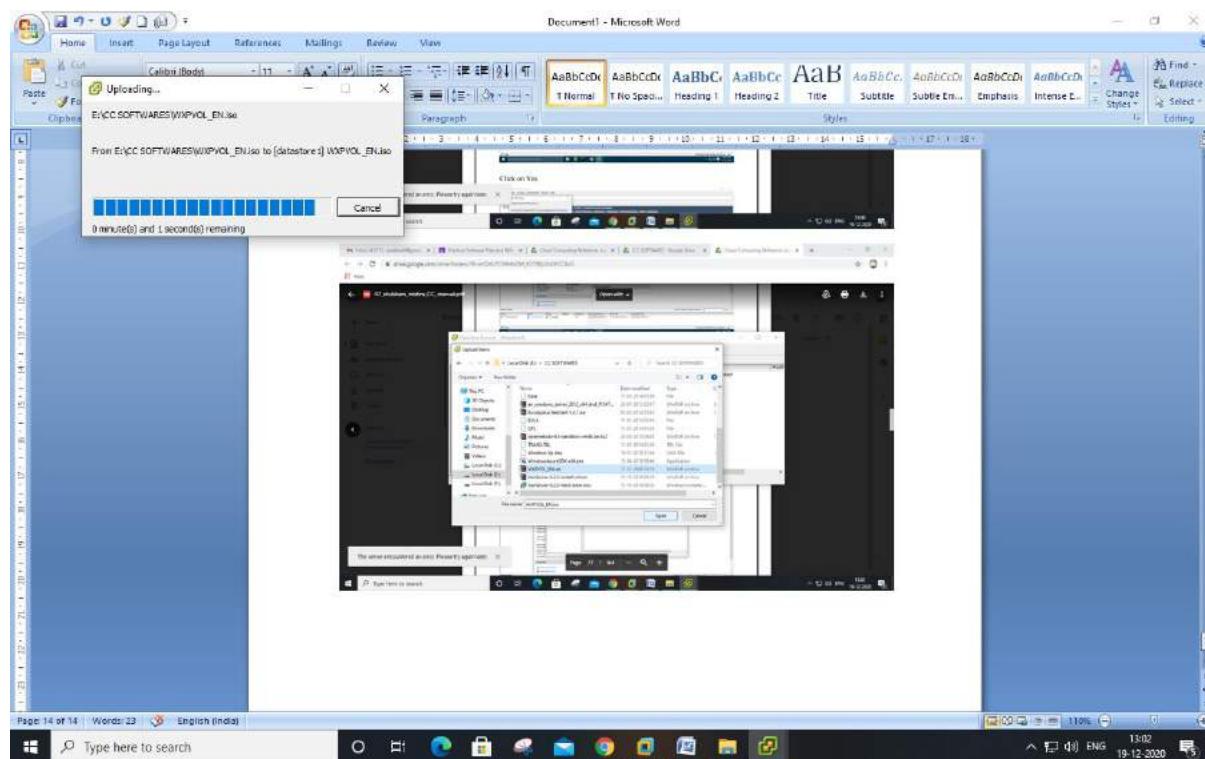
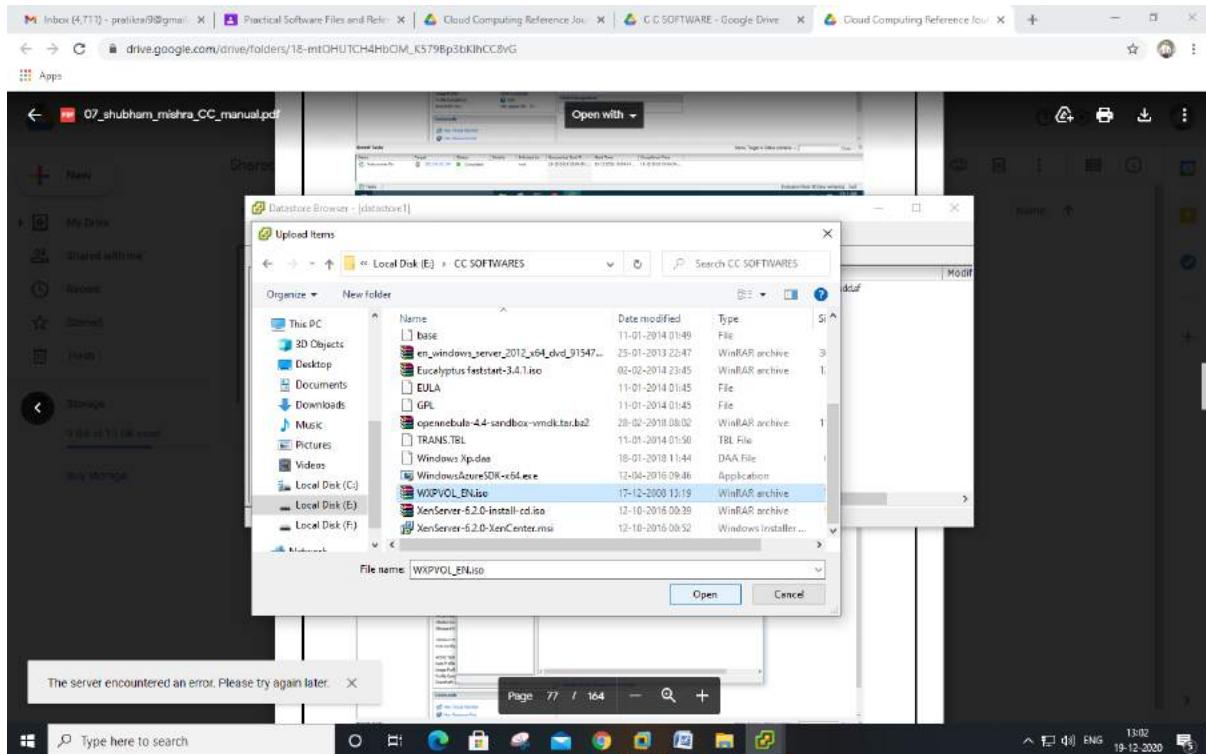
In Storage section, Select on datastore1 and Right-click on Browse Datastore to add iso image of Windows XP in Datastore.

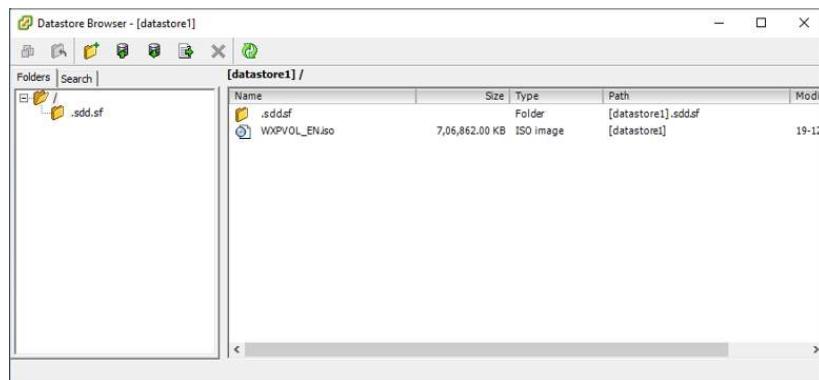




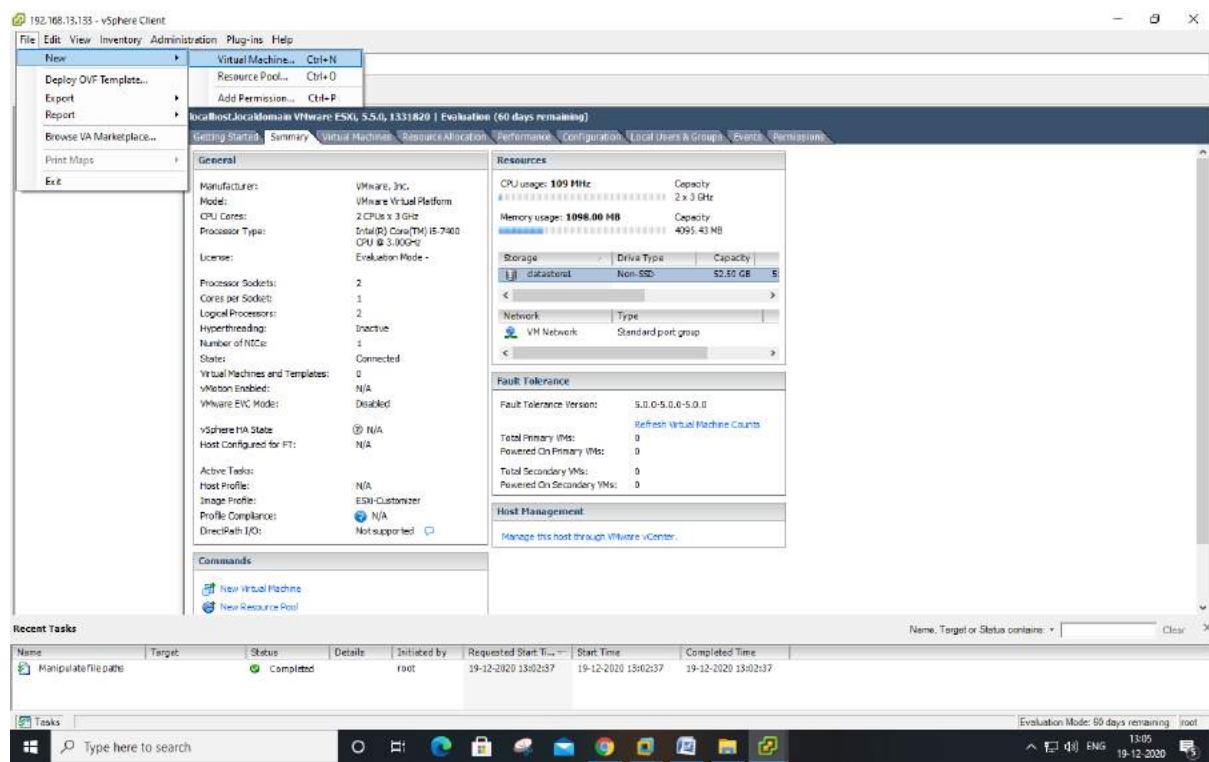
Click on Upload Icon and Select Upload File

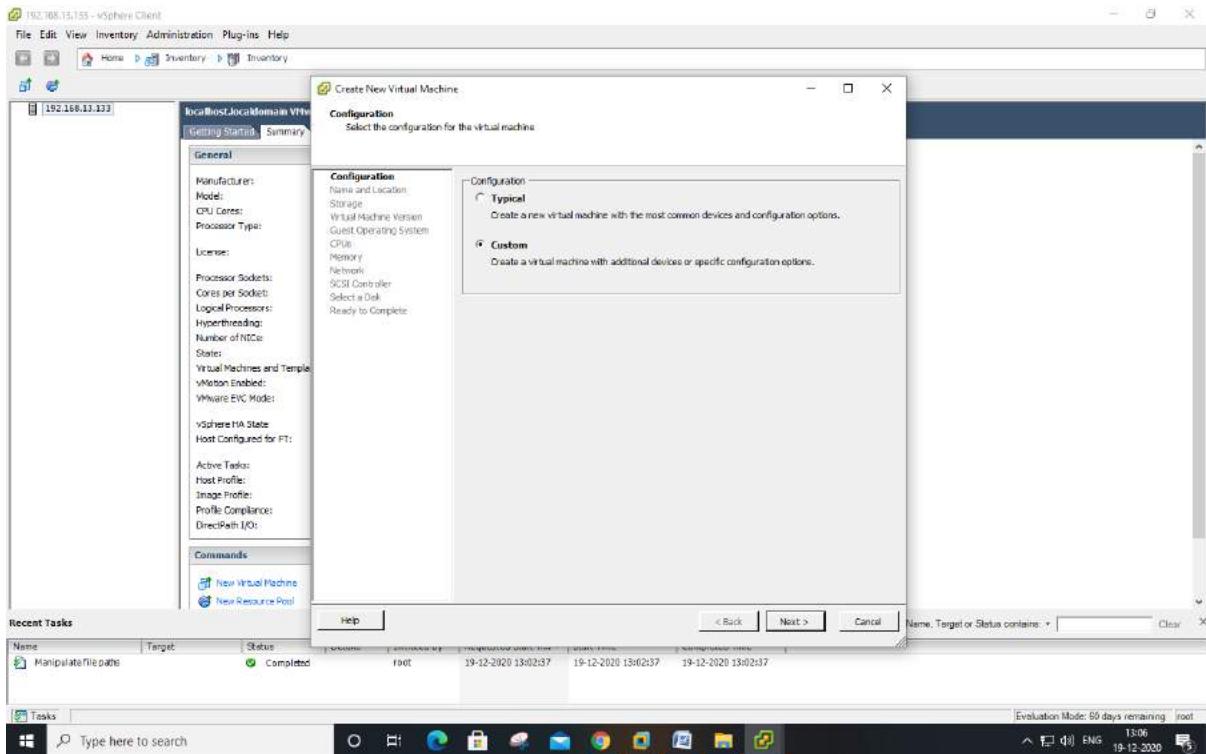




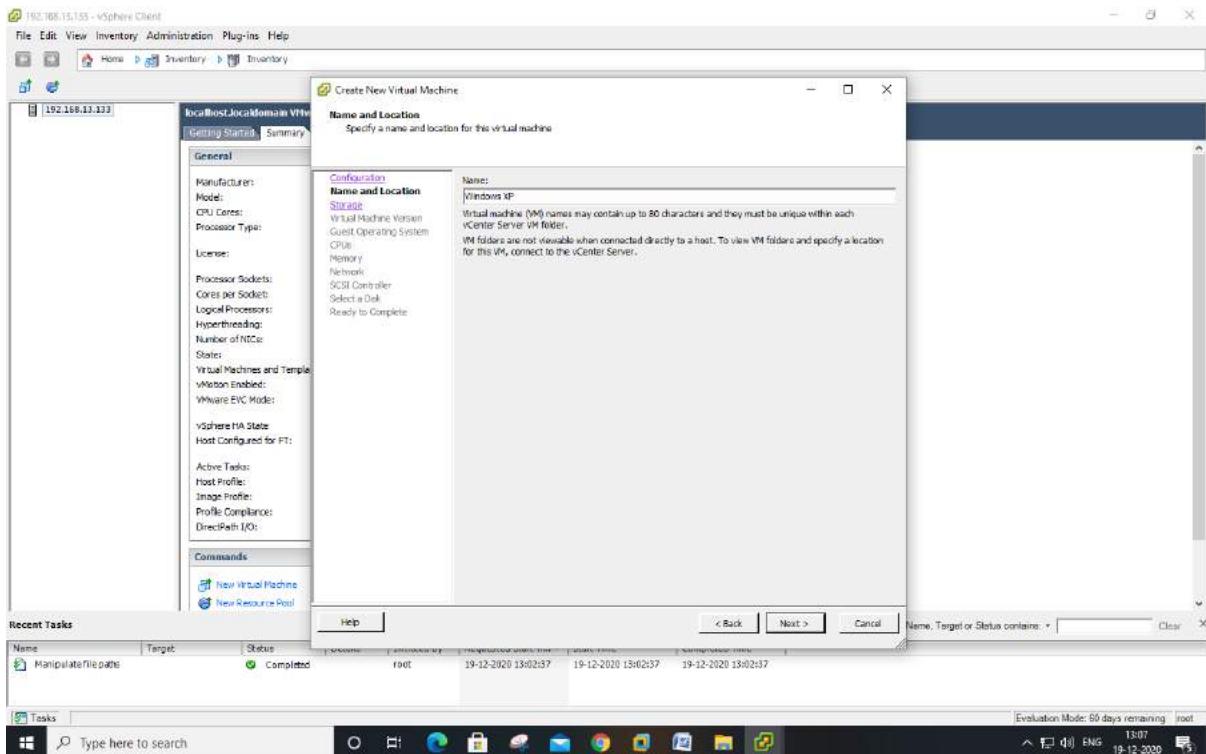


Go to Vsphere client and click on file-new- VM Configuration : Select Custom configuration.

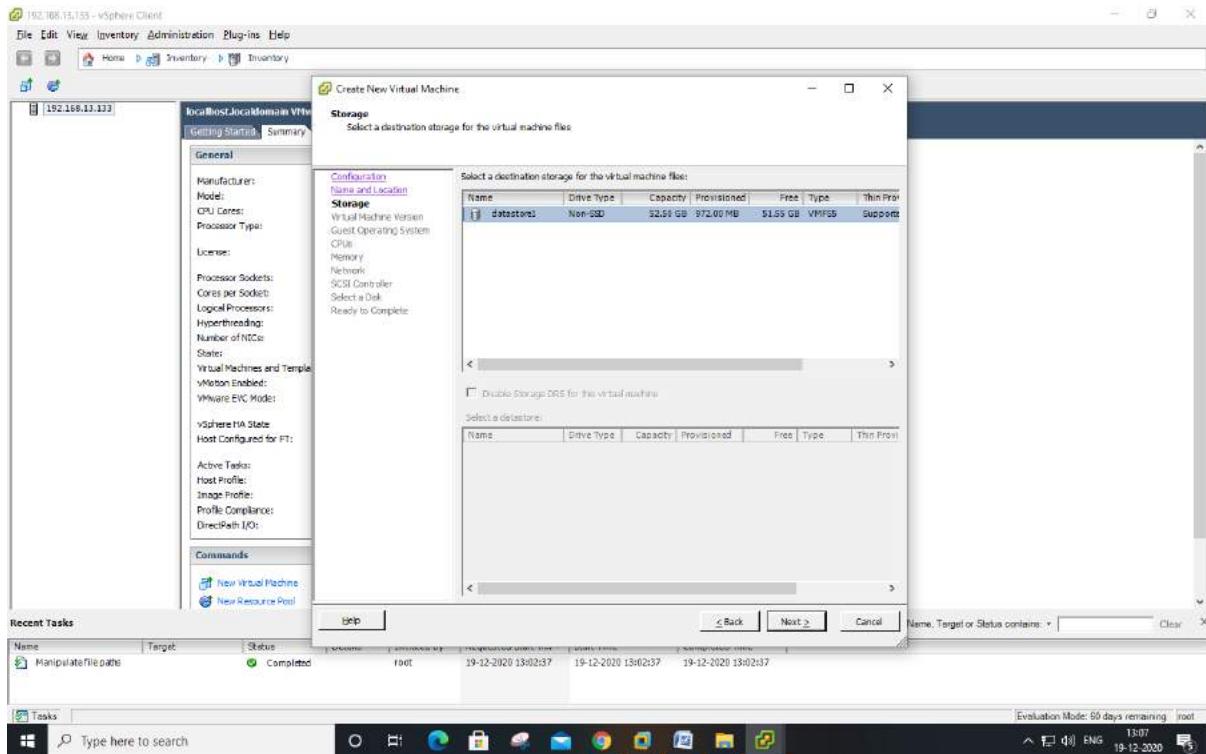




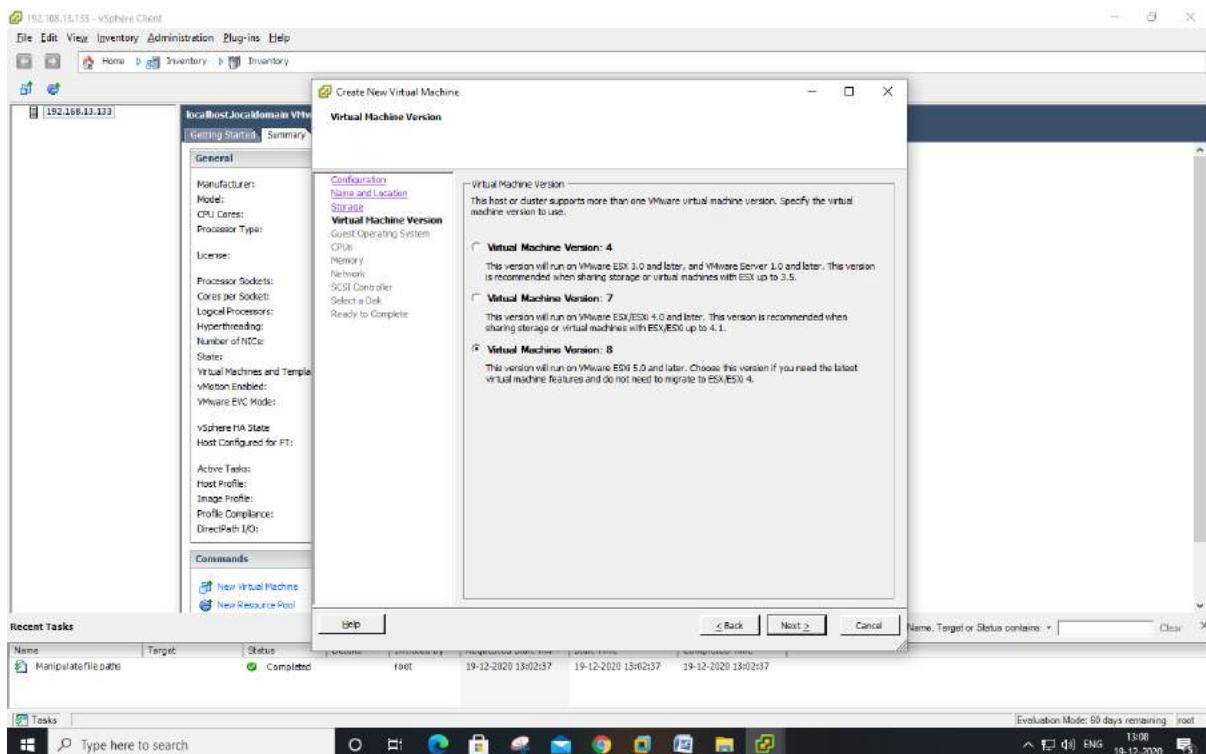
Name and Location: Give name to a Virtual Machine(Windows XP)



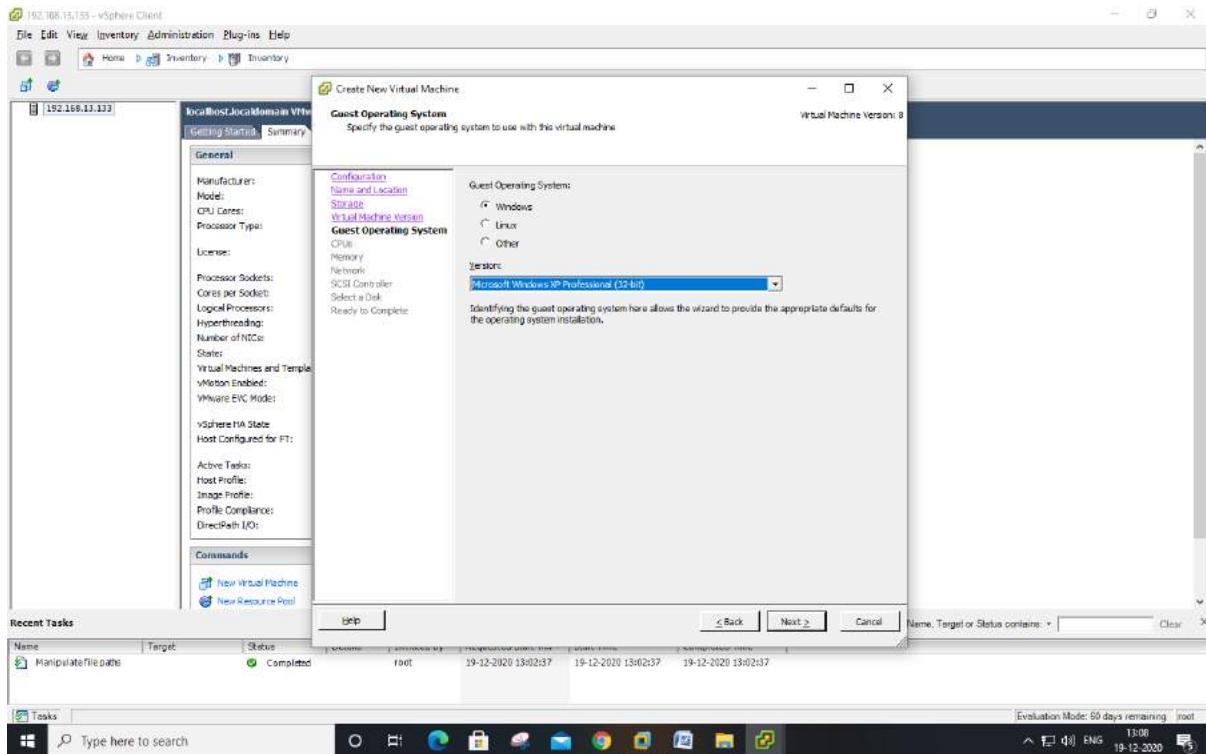
Storage:Select datastore1 and click Next



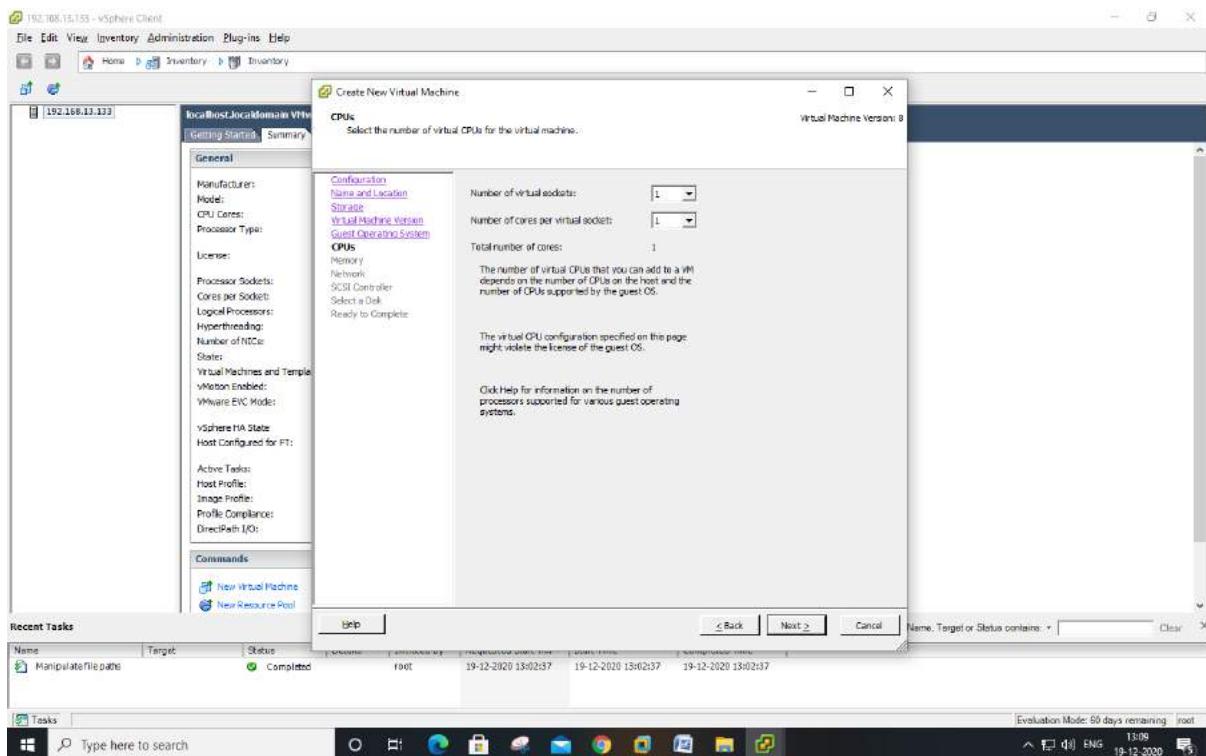
Virtual Machine version : Select Virtual Machine version 8



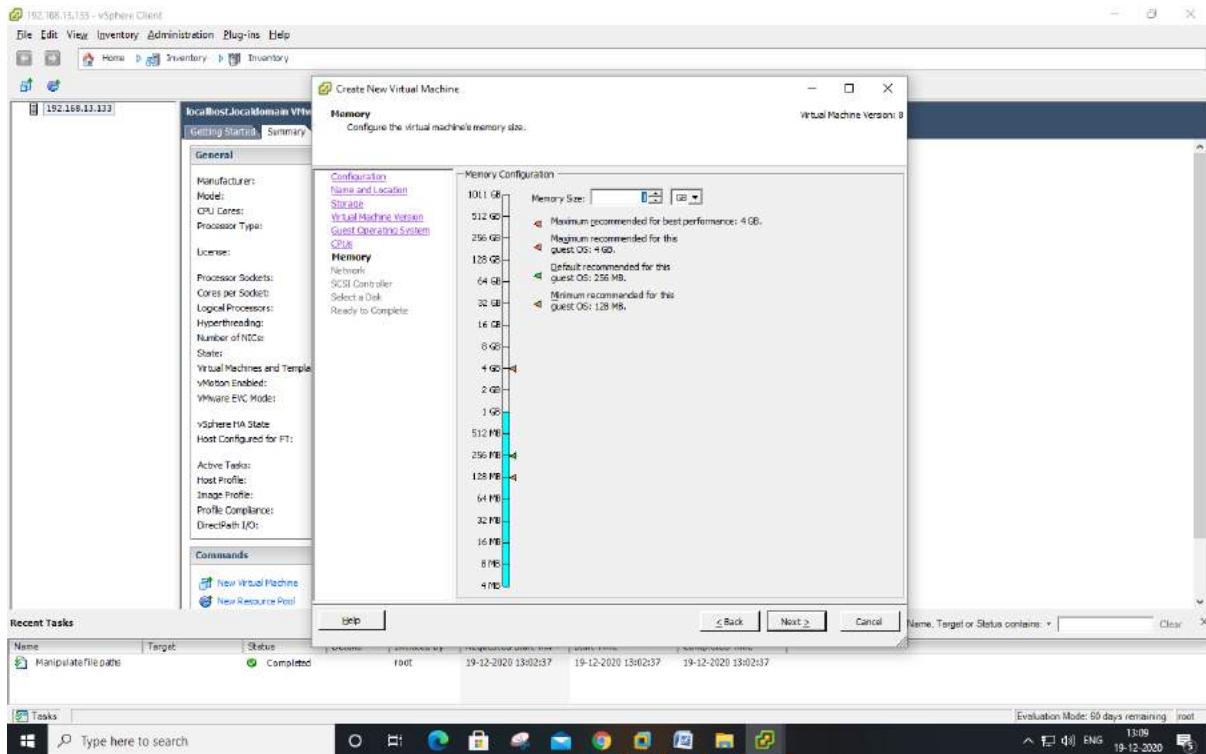
Guest Operating System: Windows Version: Microsoft windows XP Professional (32-bit)



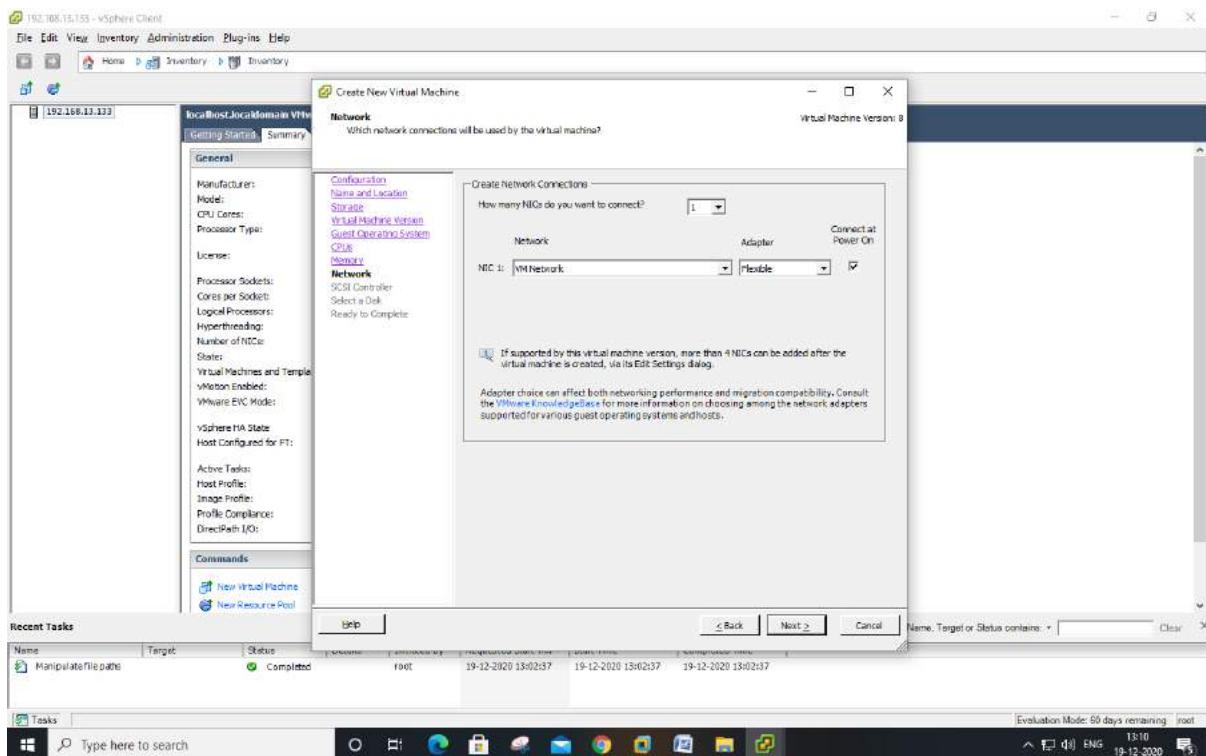
CPUs : Number of virtual sockets : 1 Number of cores per virtual socket: 1



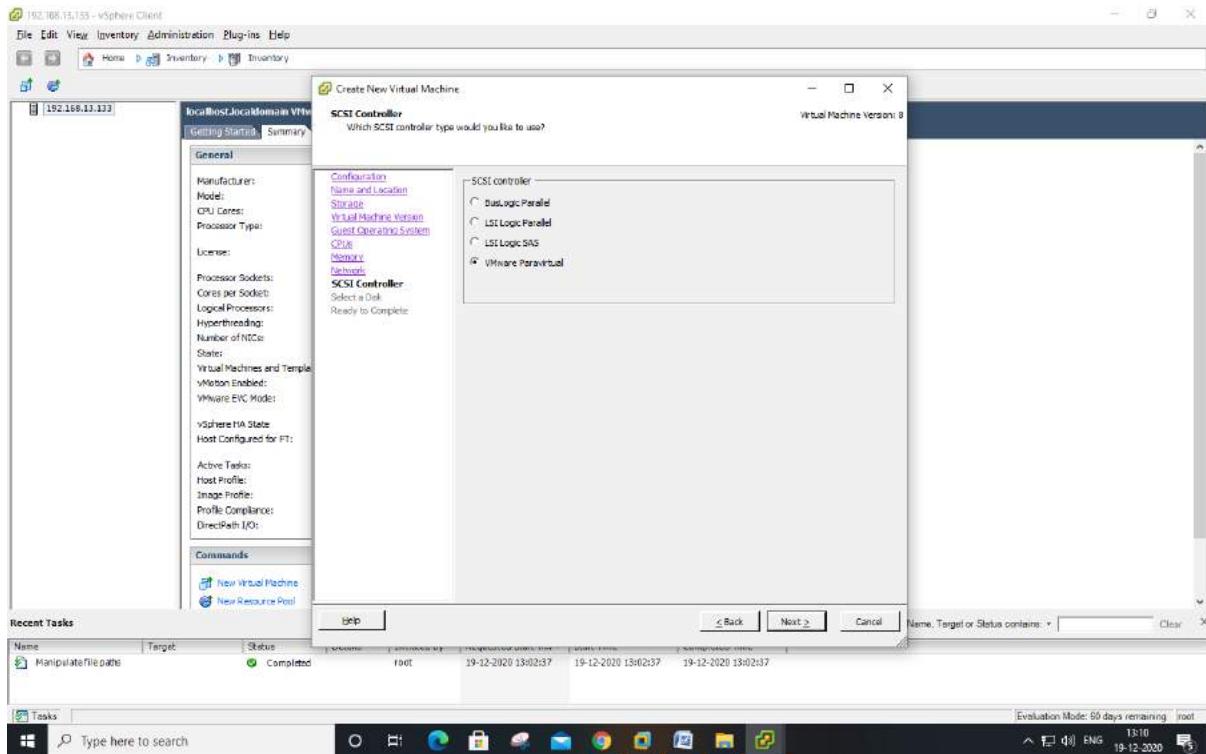
Memory: Memory Size : 1 GB



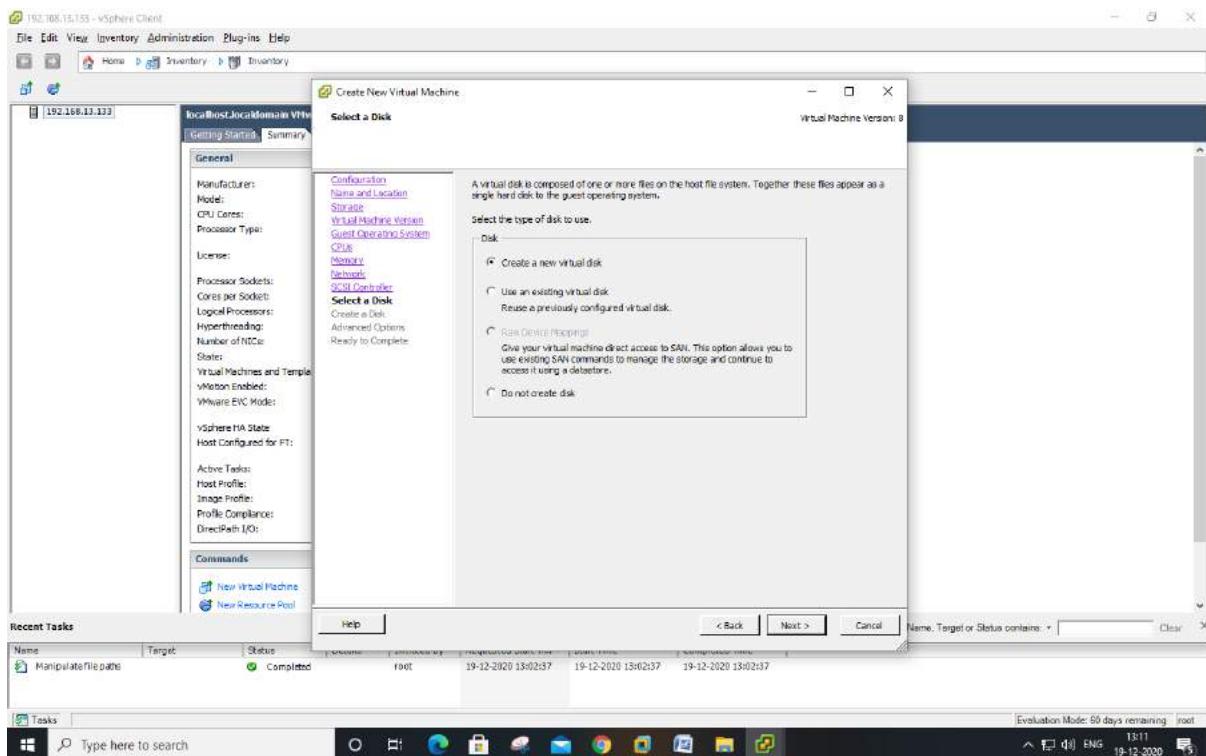
Network: Number of NICs : 1

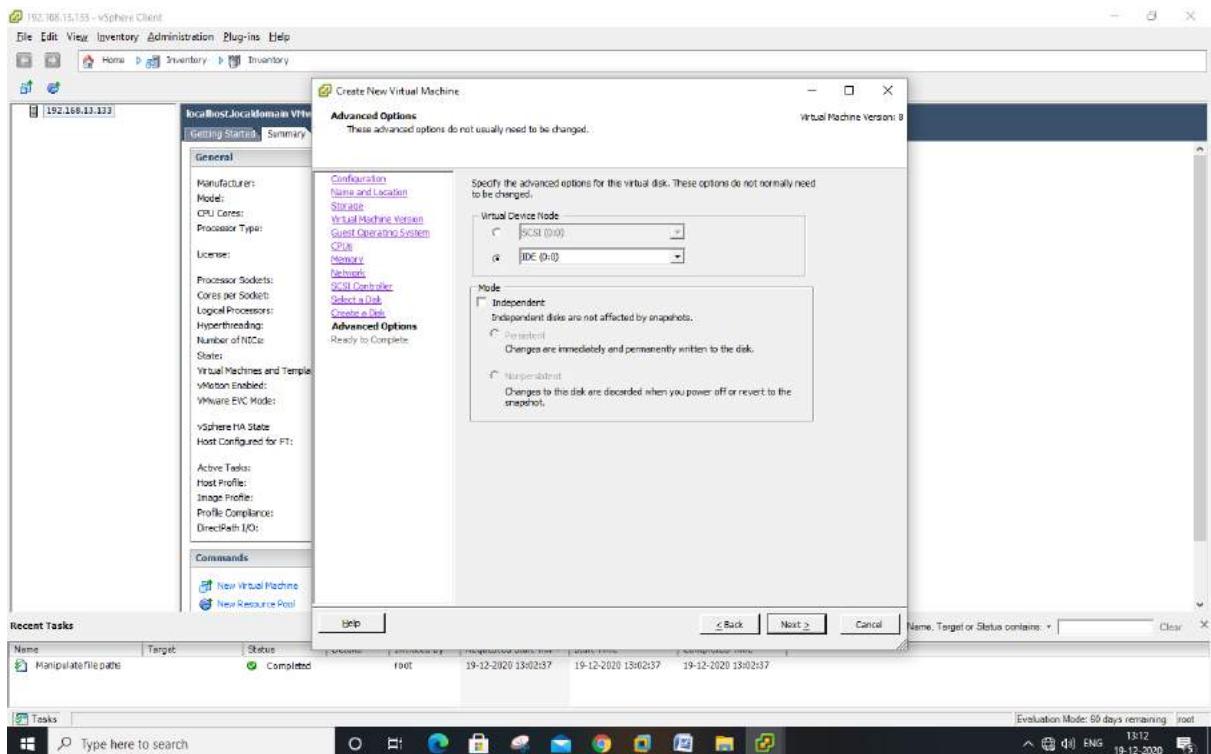
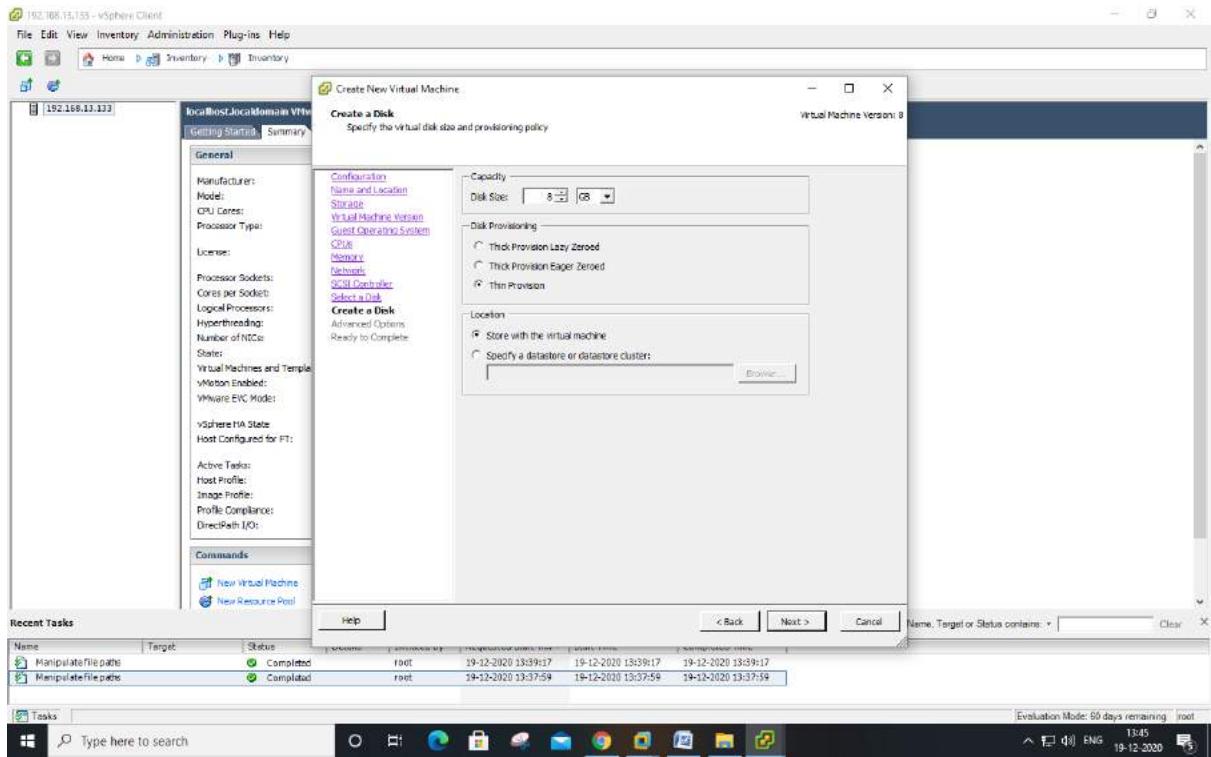


SCSI Controller : VMware Paravirtual

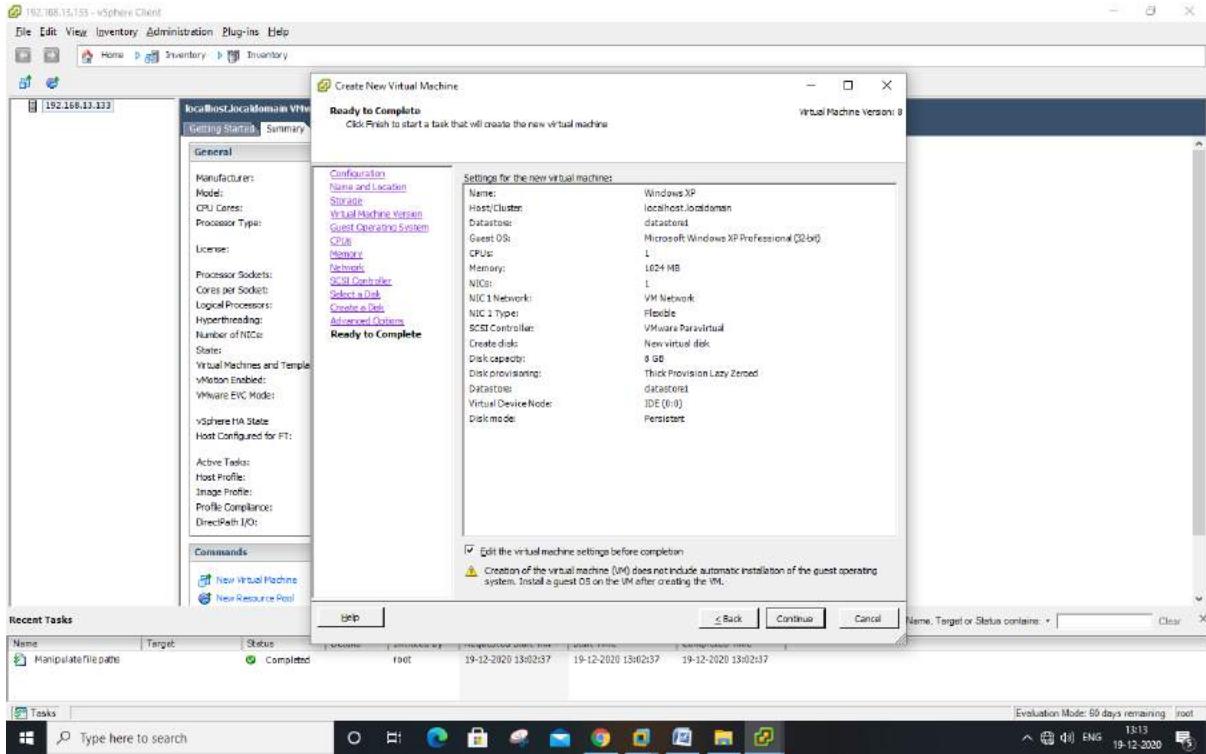


Select a Disk: create new virtual disk.

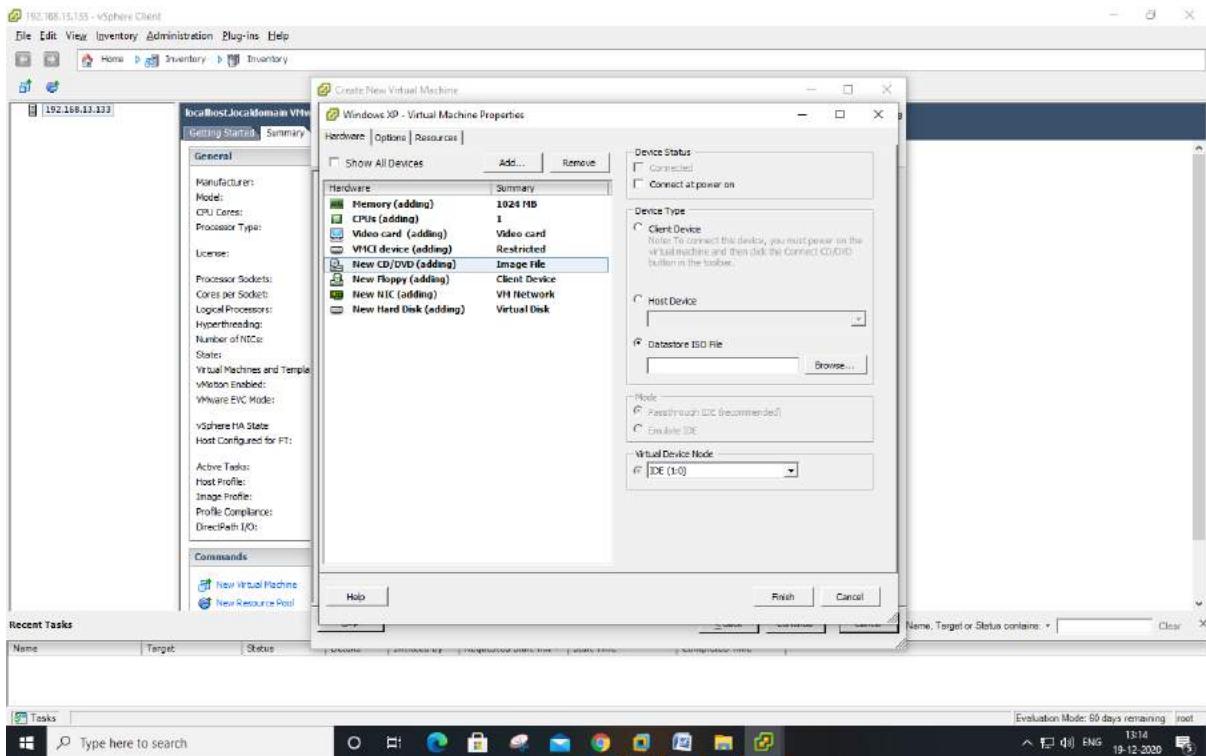


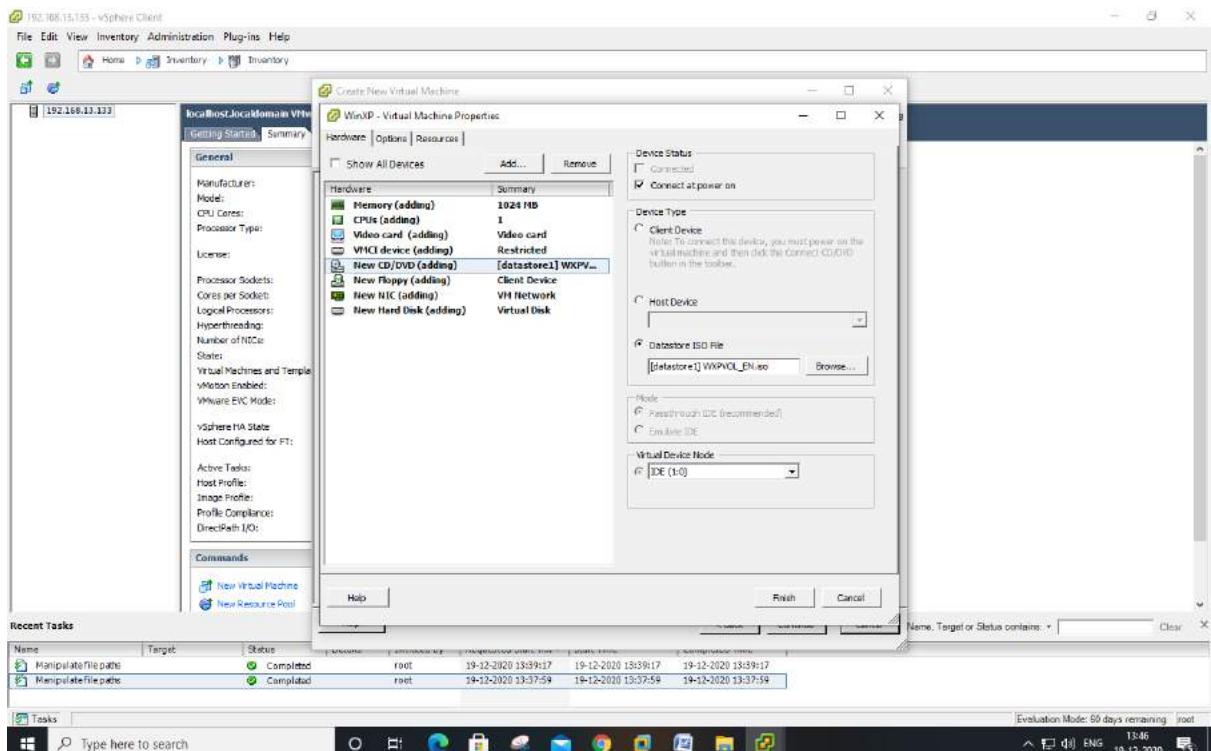
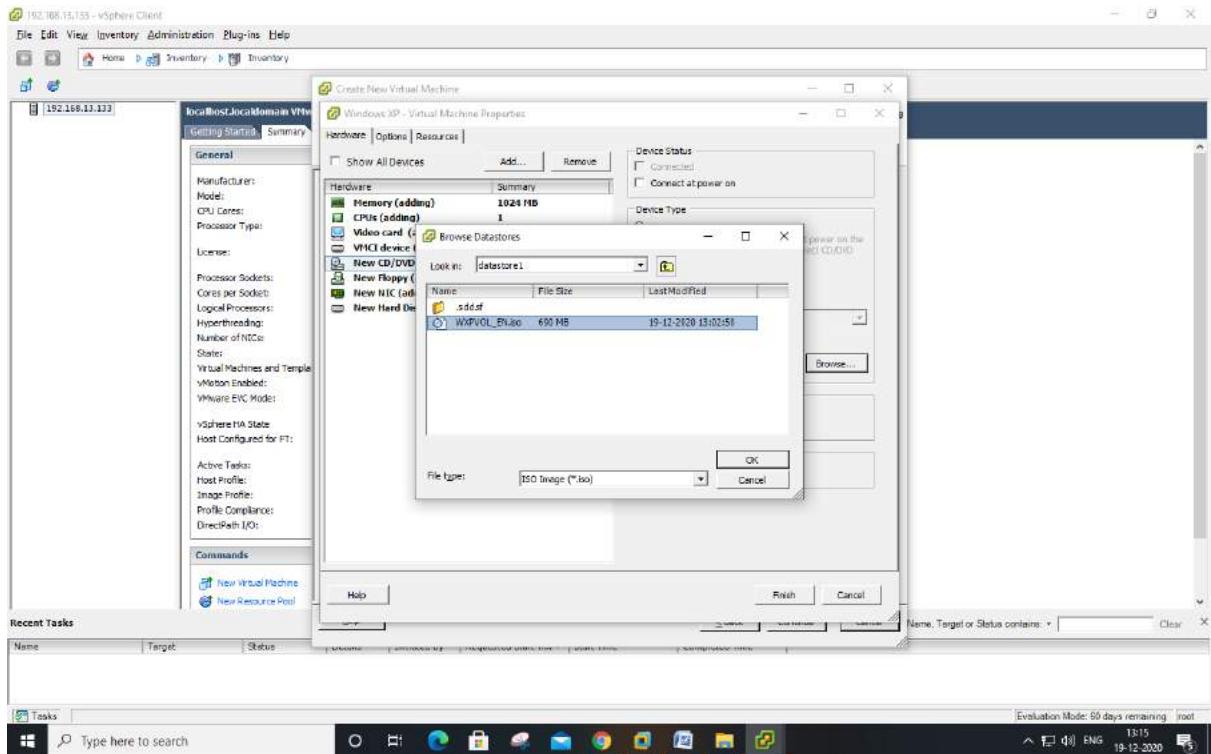


Click edit



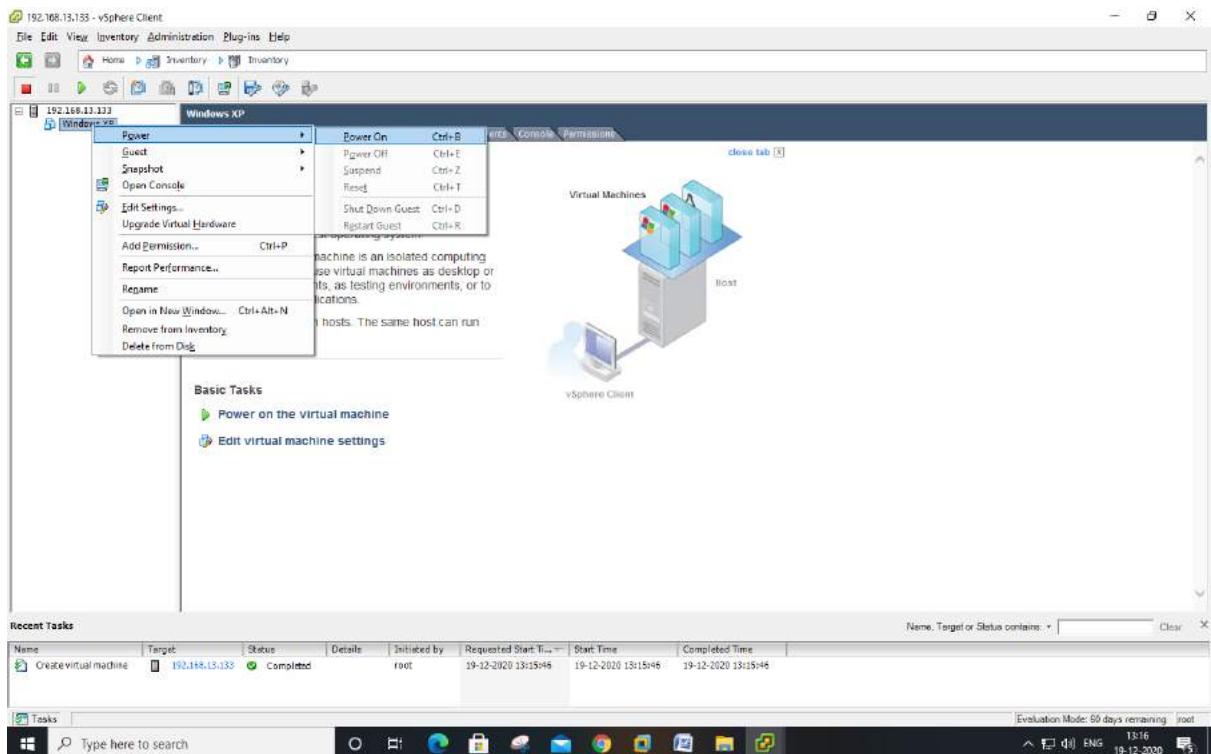
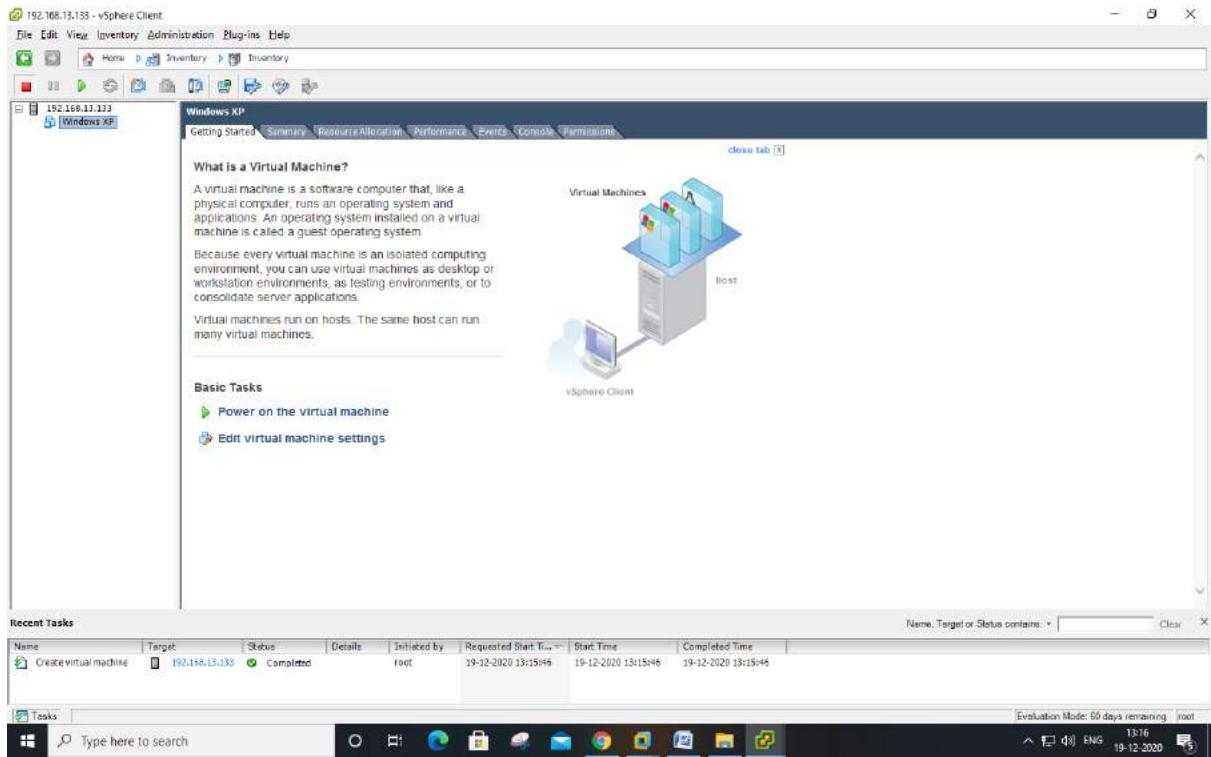
Click on Datastore ISO File and Browse the datastore you added (WXPVOL_EN.iso)

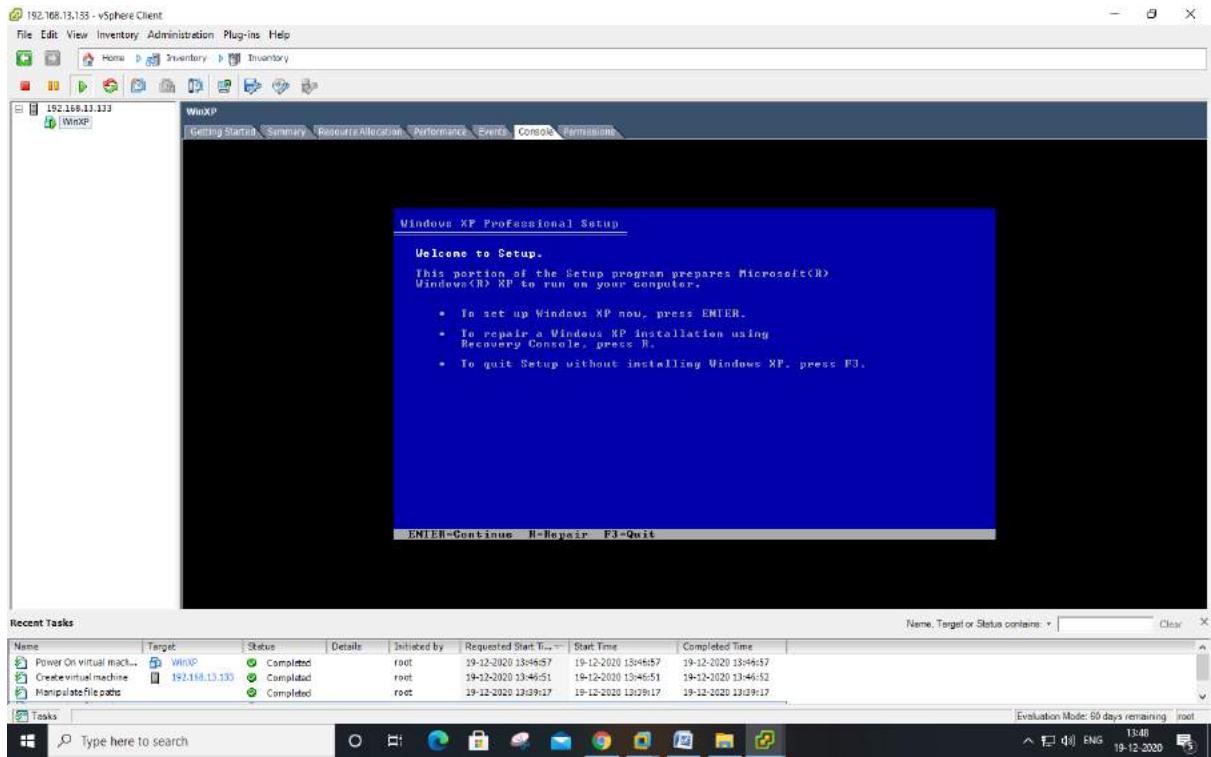




Click on Finish.

Right Click on Windows XP >> Power >> Power On



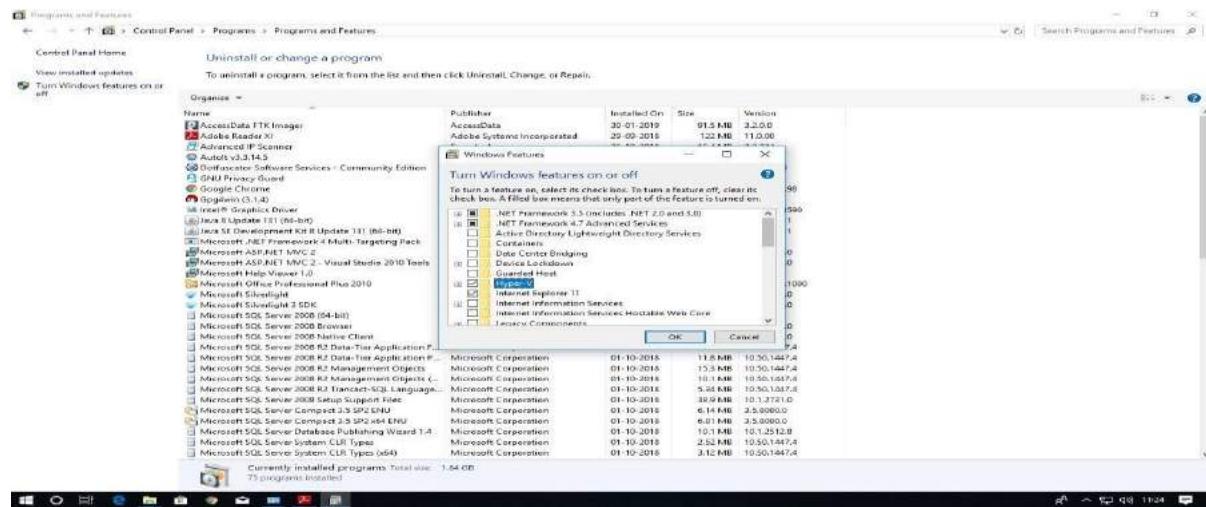


PRACTICAL: 6

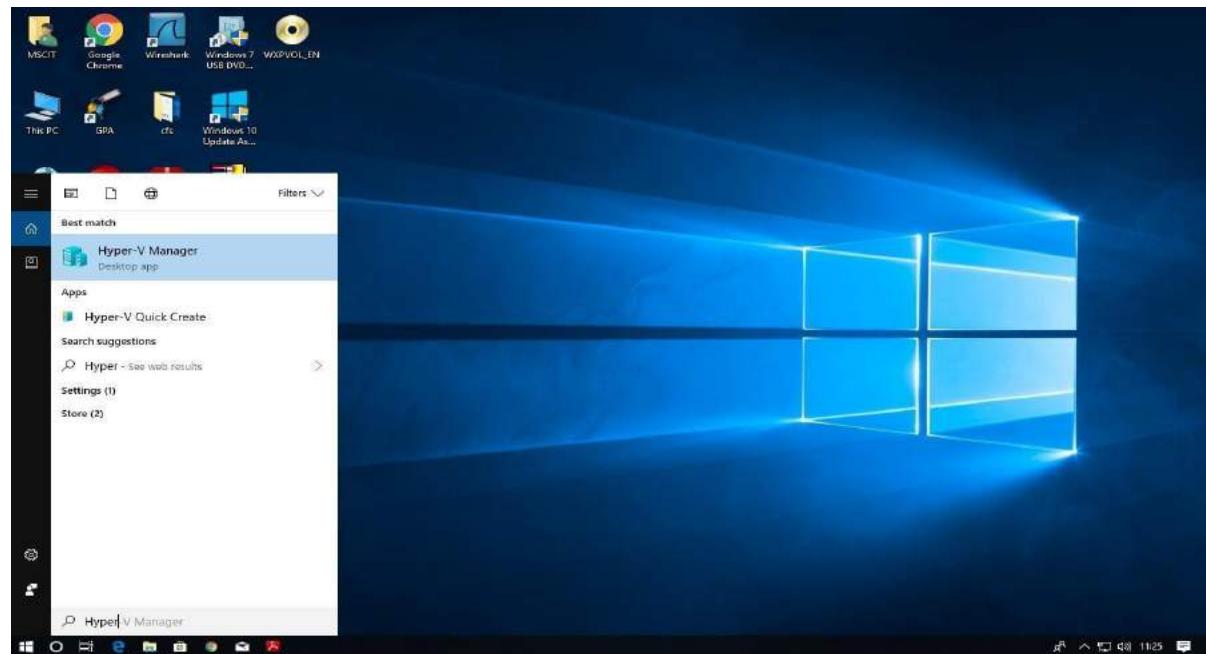
NATIVE VIRTUALIZATION USING Hyper-V

First we have to uninstall vmware software if already installed on computer because the VMware Workstation installer does not support running on a Hyper-V virtual machine.

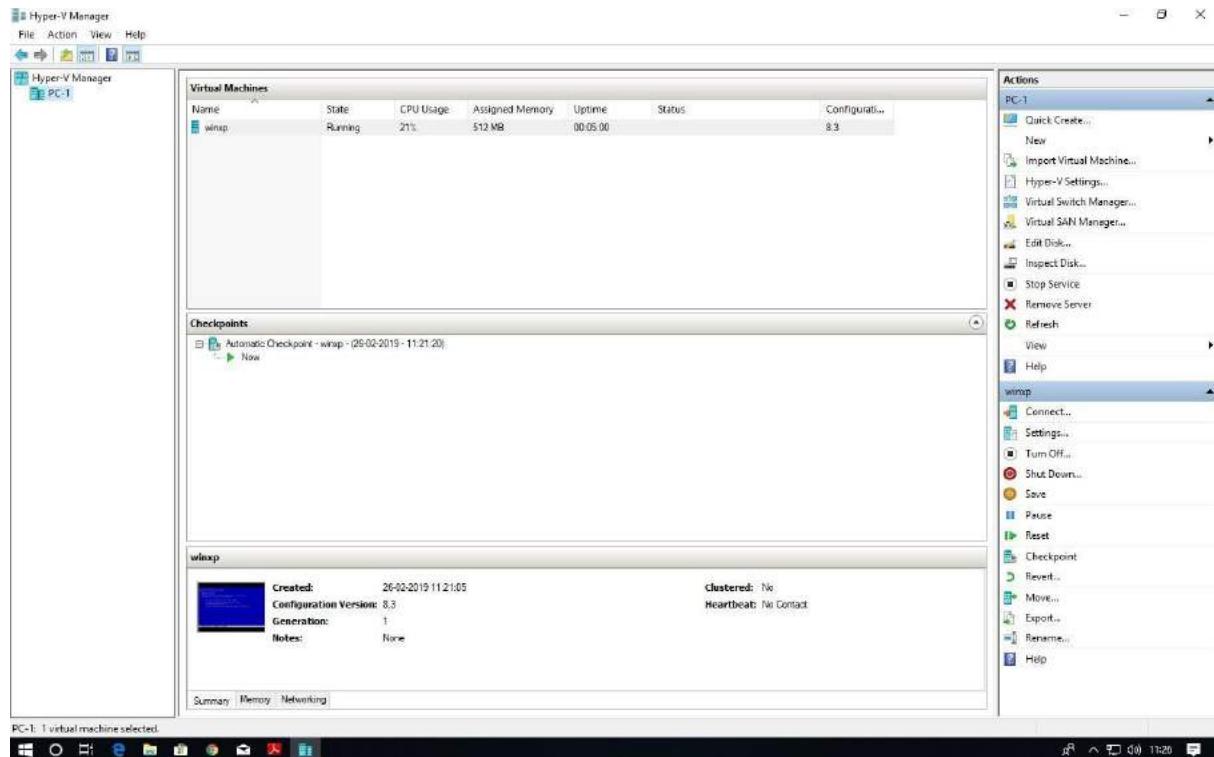
After uninstalling VMware, we can proceed to next step - go to control panel and click on uninstall a program



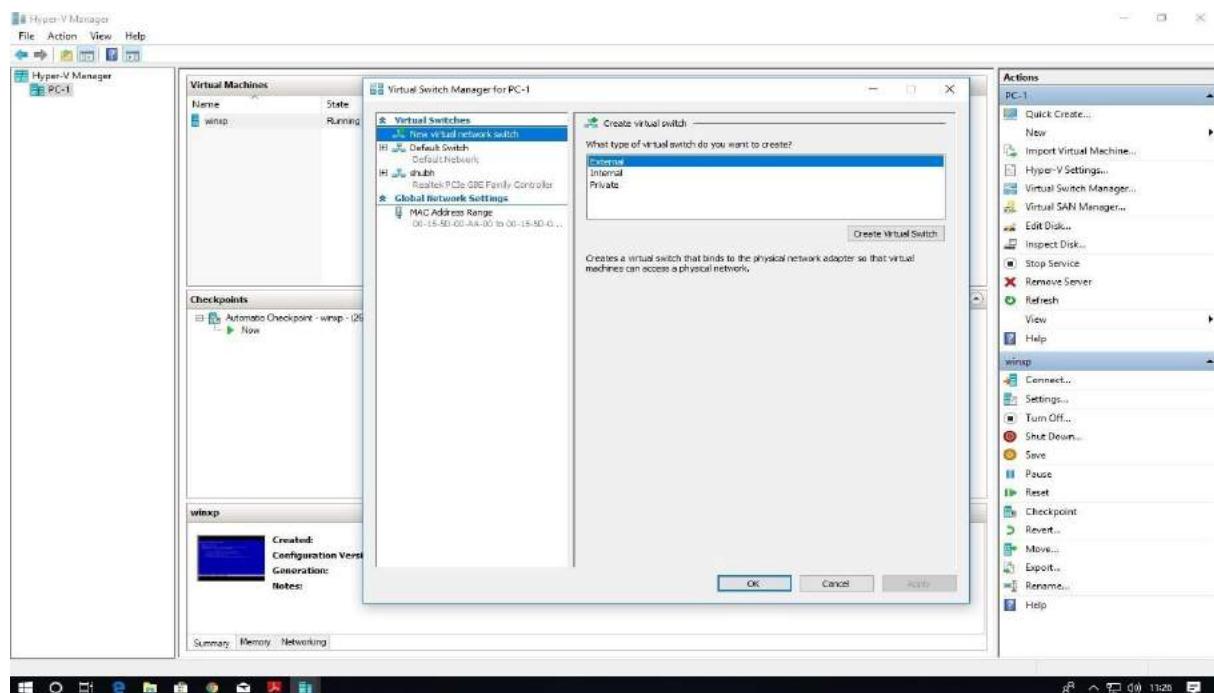
After Restart Search for hyper-v manager in search box and click on that



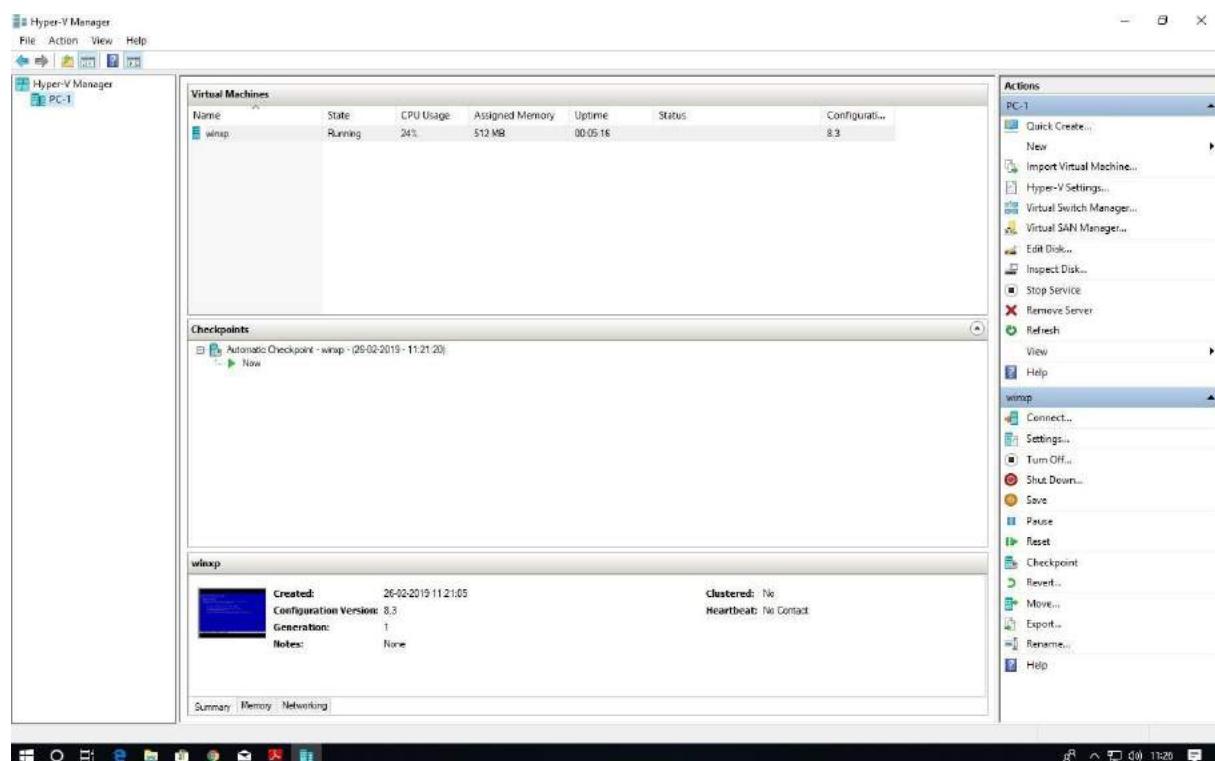
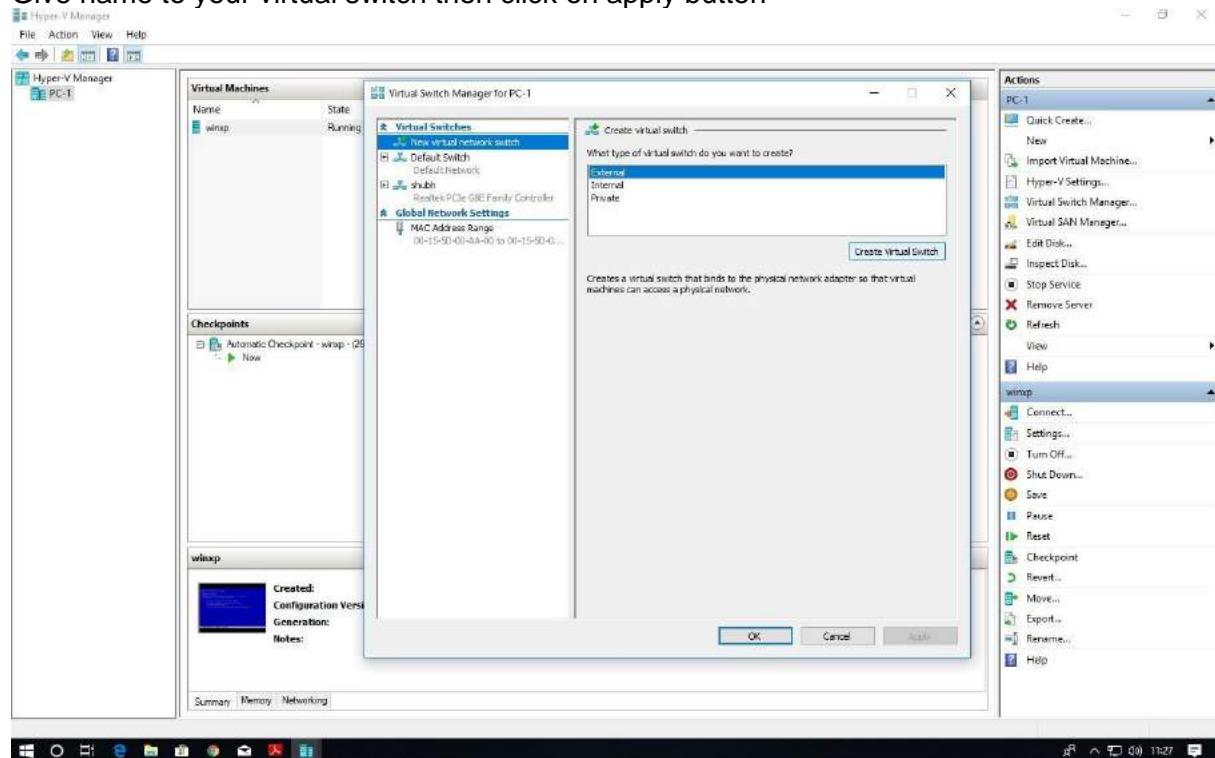
for creating virtual machine, first we have to create virtual switch
click on virtual switch manager option

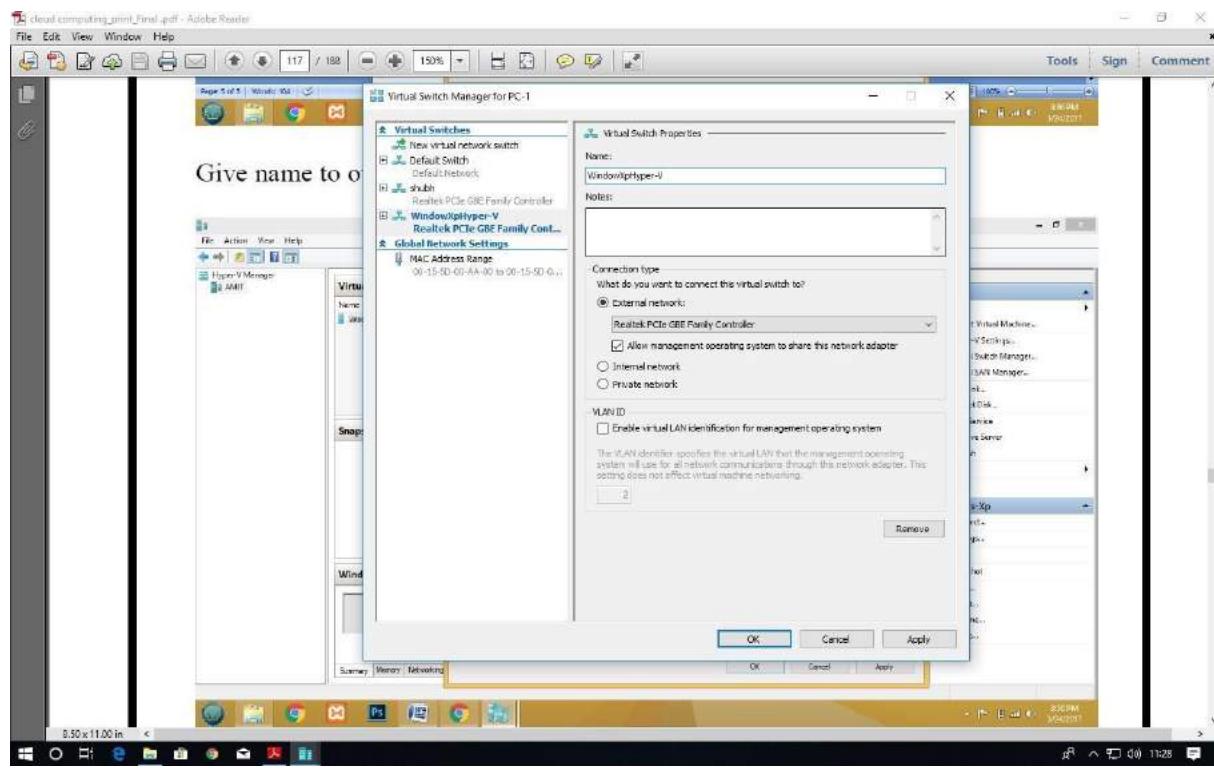


Select External as a connection type and then click on create virtual switch

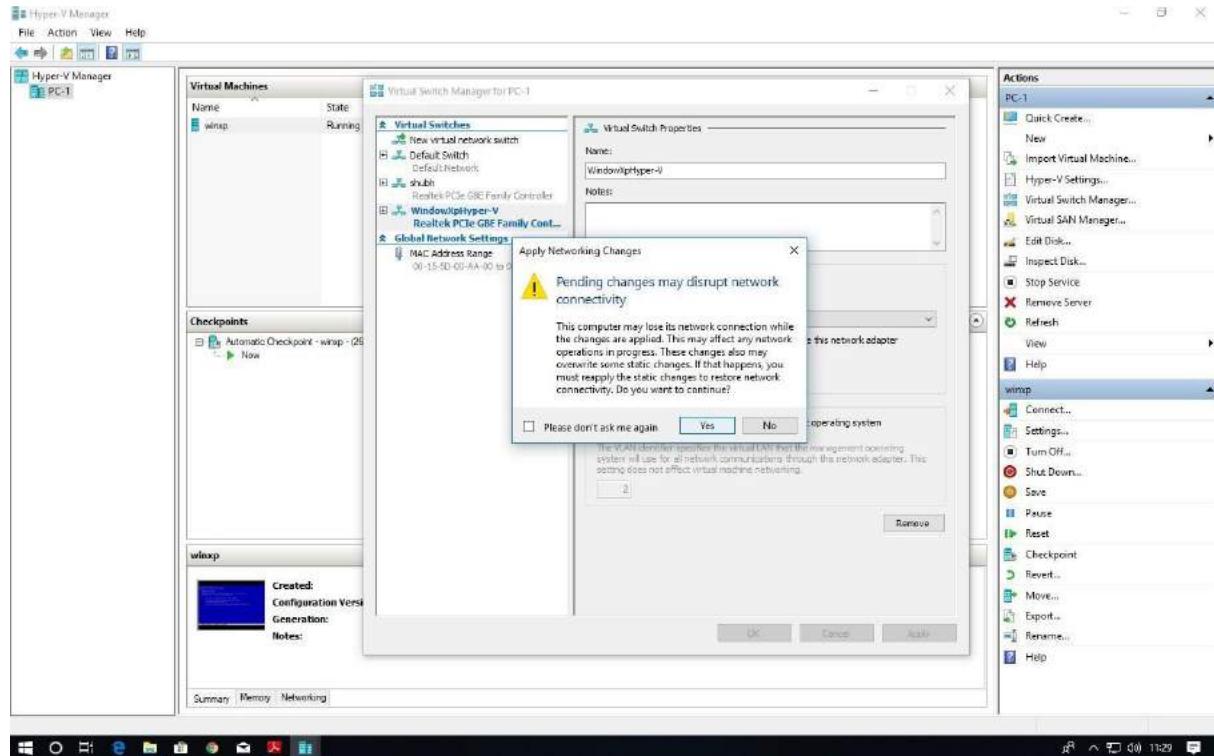


Give name to your virtual switch then click on apply button

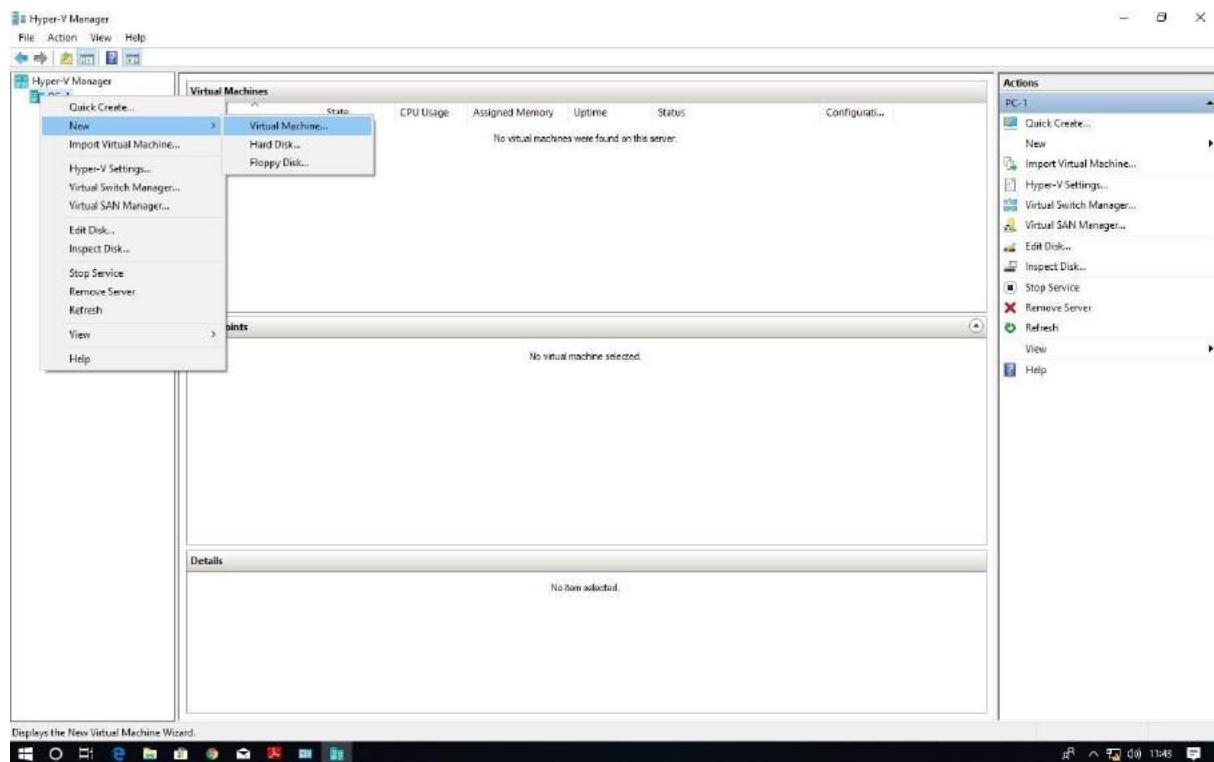




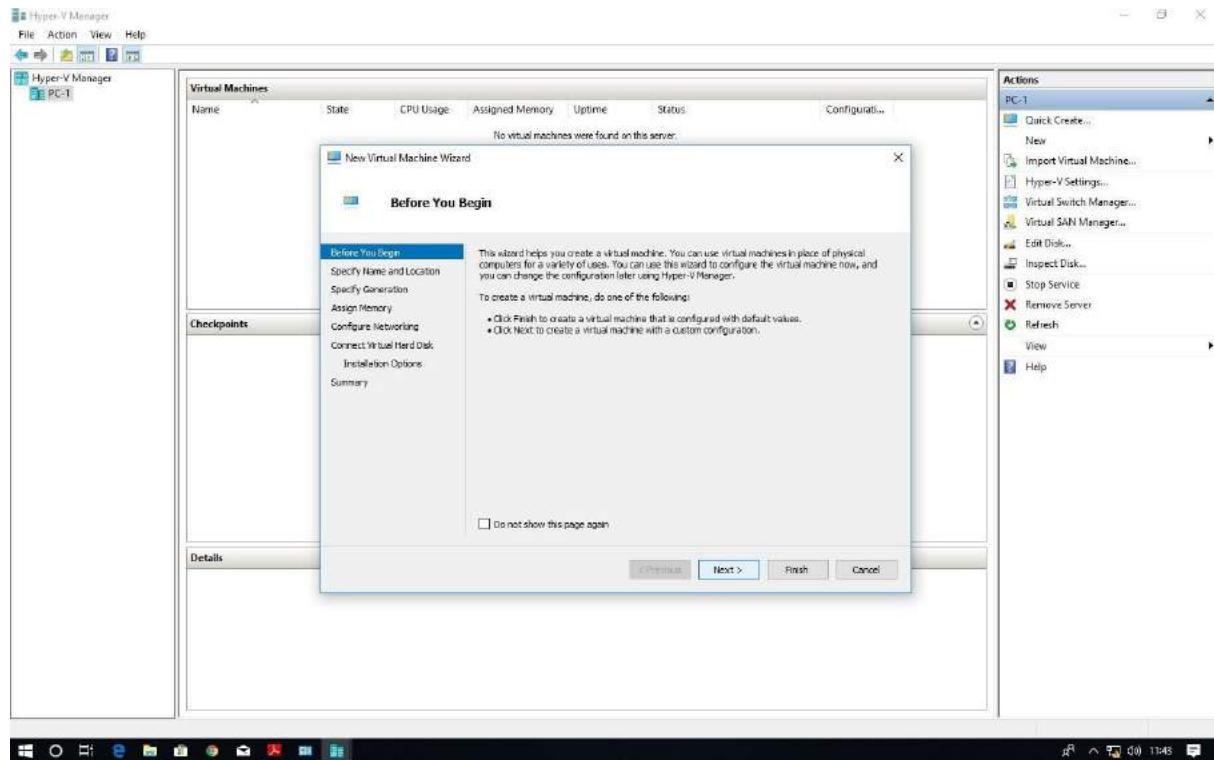
after click on Apply button it will show warning about our connection click on yes



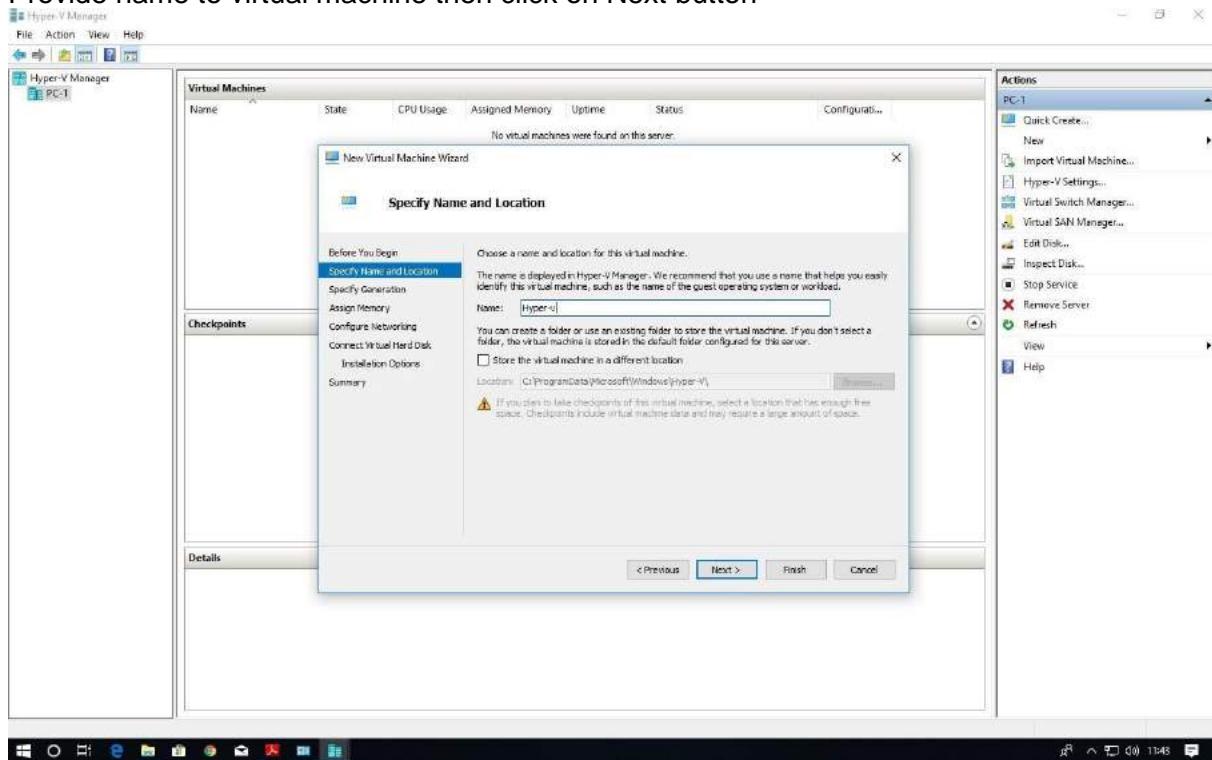
Now right click on server and select new virtual machine



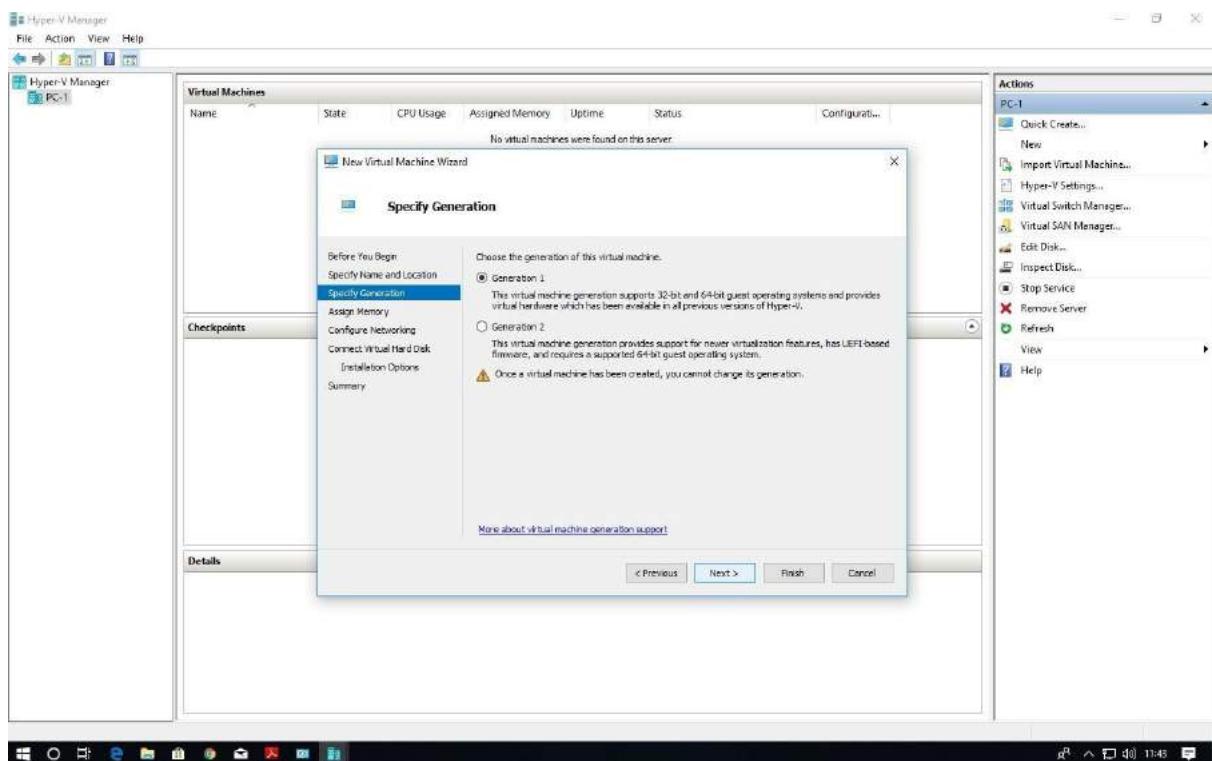
click on next button



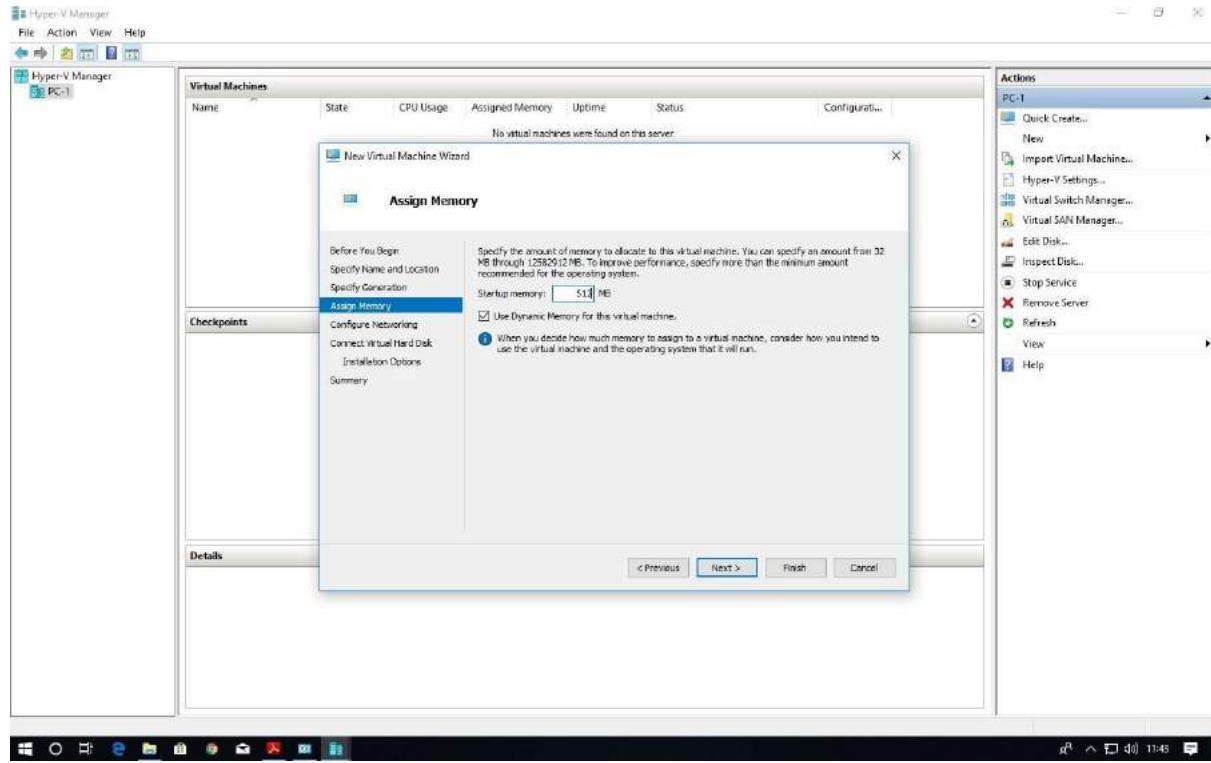
Provide name to virtual machine then click on Next button



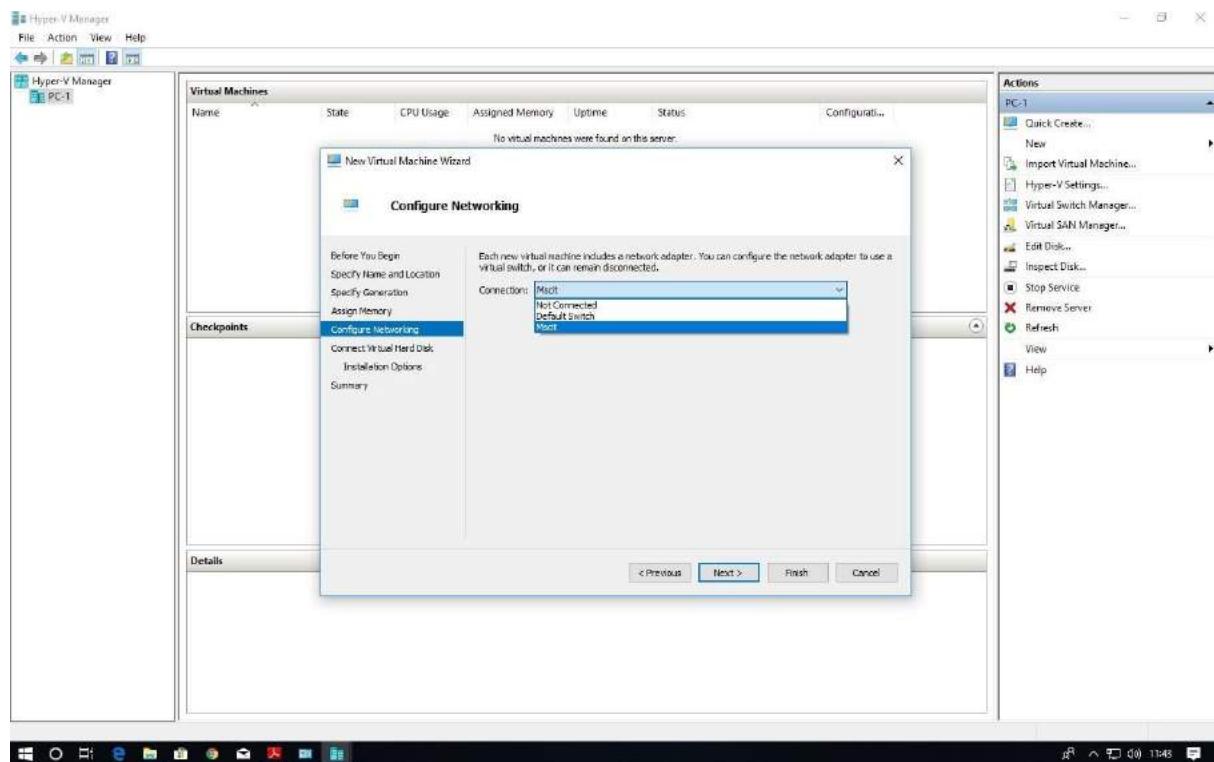
Specify generation : generation 1



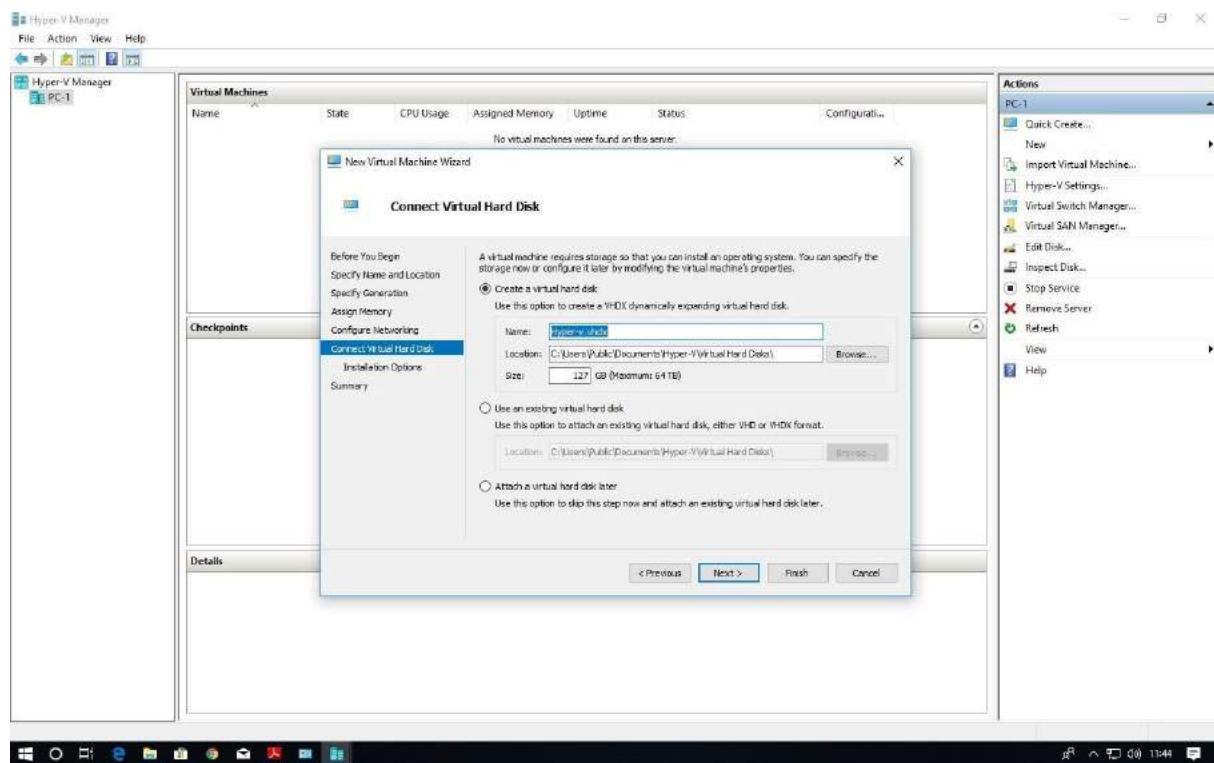
tick on use dynamic memory for this virtual machine



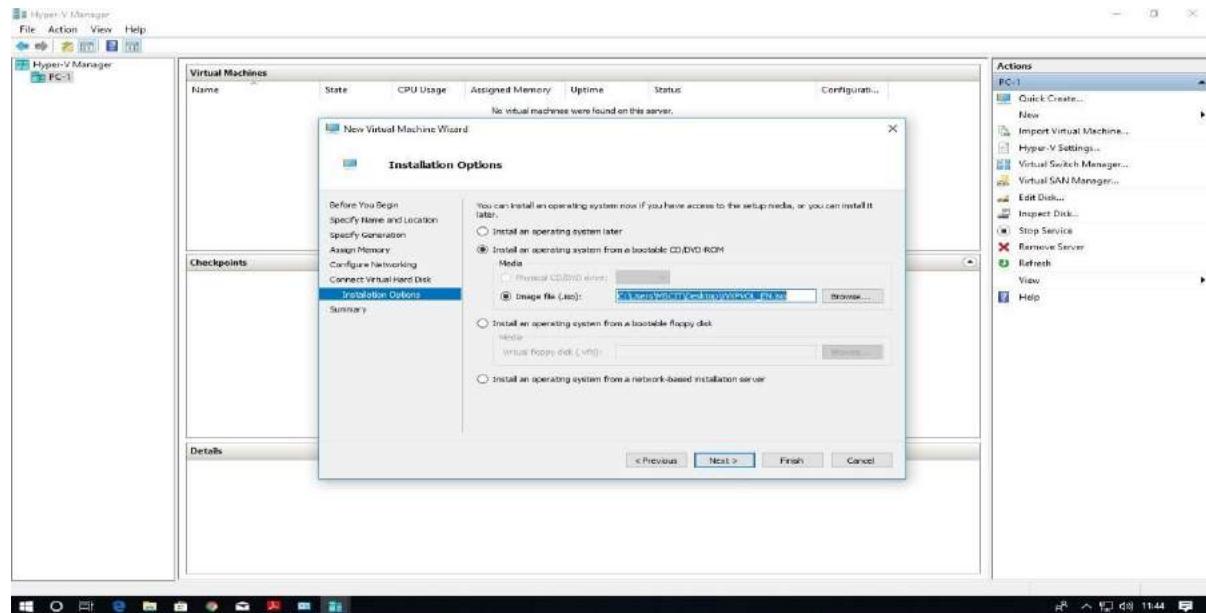
Select switch which we created earlier for our virtual machine from drop-down list
and then click on next



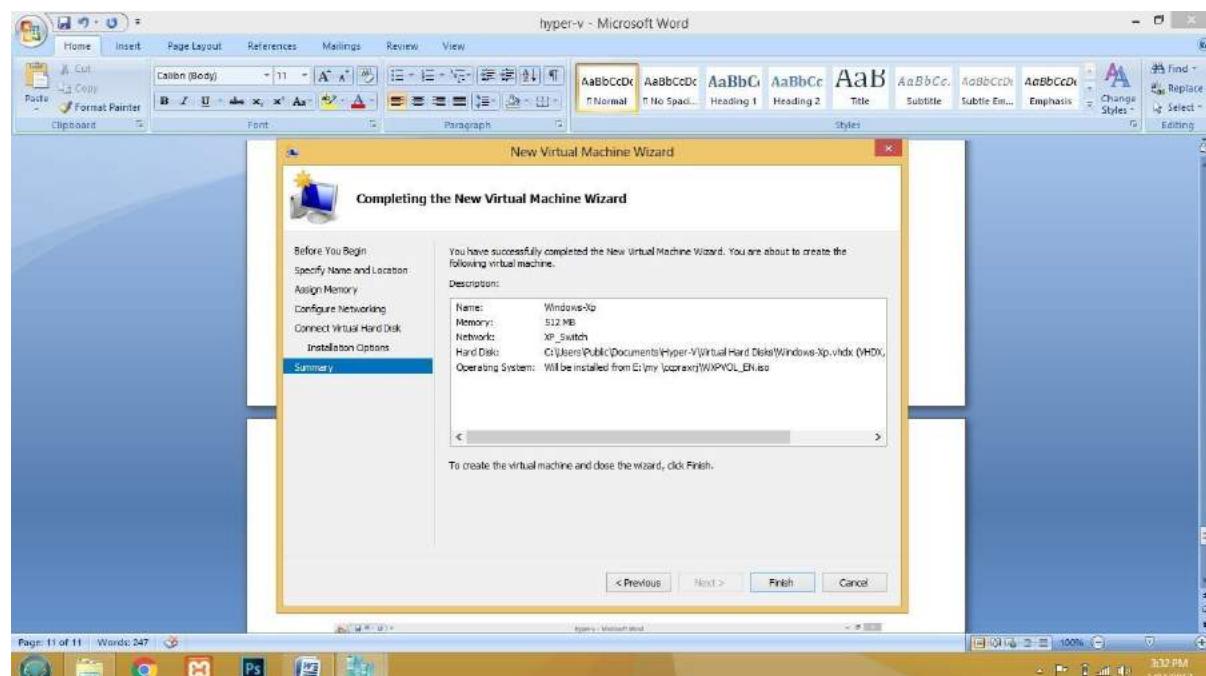
Description of virtual machine and location where it will store virtual machine related files and size require for this machine click on next



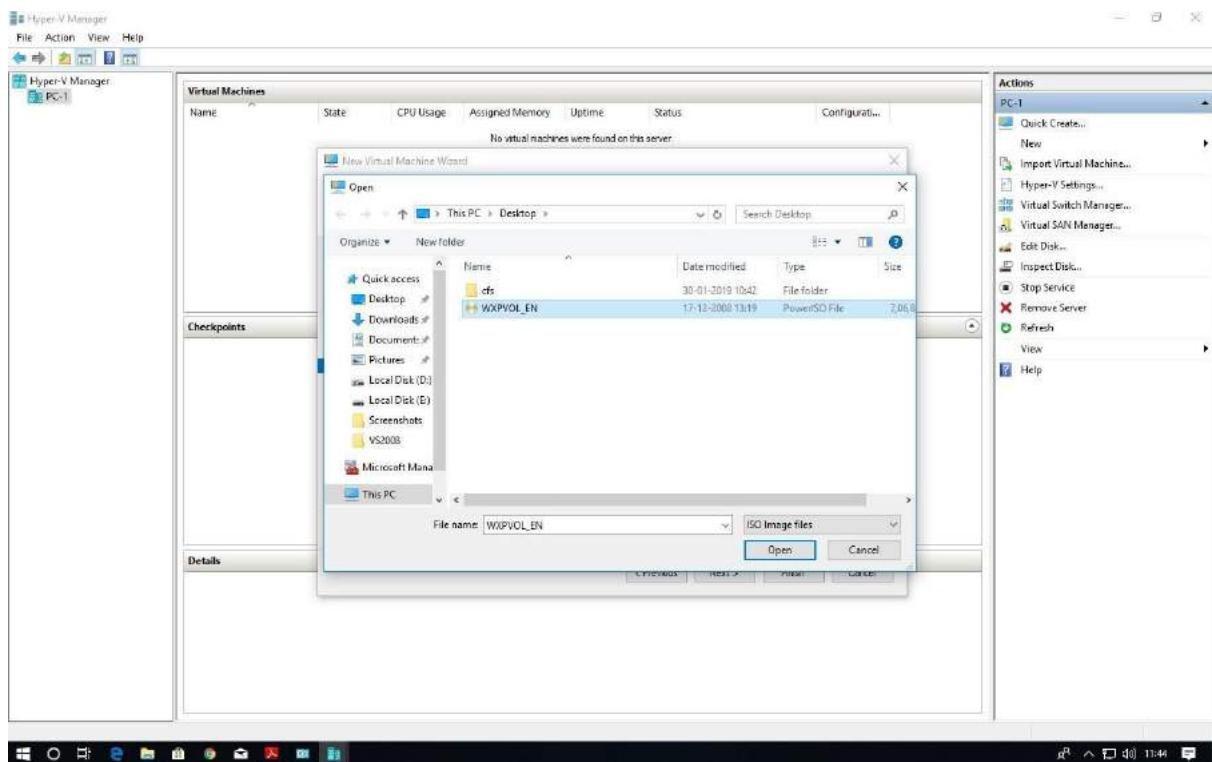
New virtual machine wizard panel will appear, where we will choose operating system which we want to install on virtual machine
 select install an operating system from boot CD/DVD-ROM and then select Image file(.iso) and browse your OS iso file then click on next button



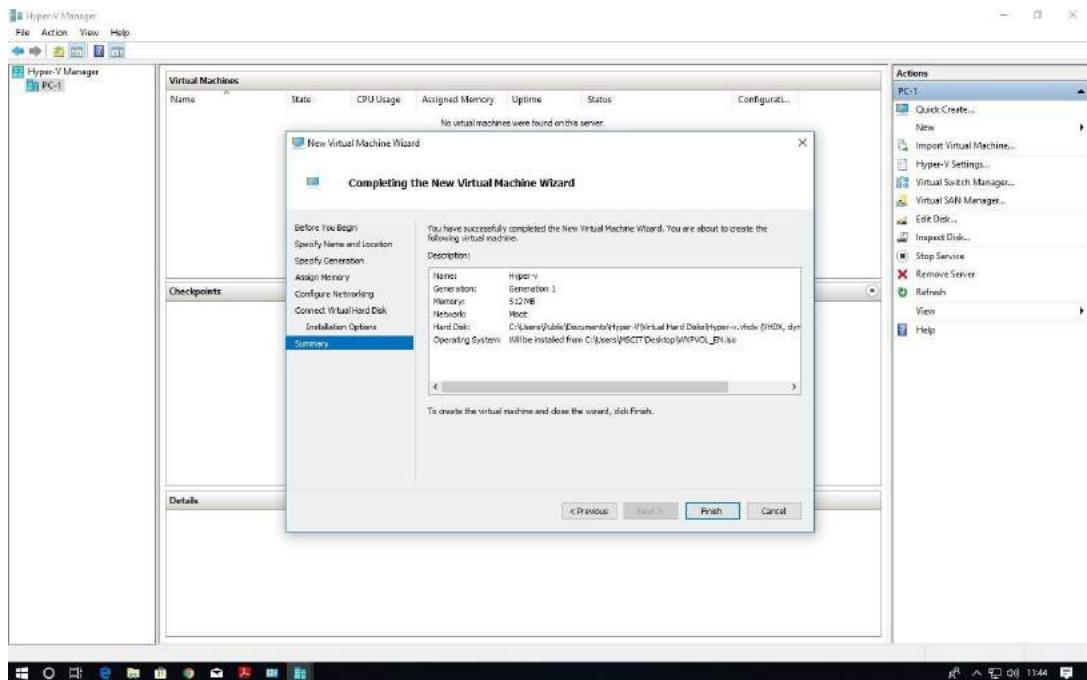
Summary report will be generated about virtual machine then click on Finish button



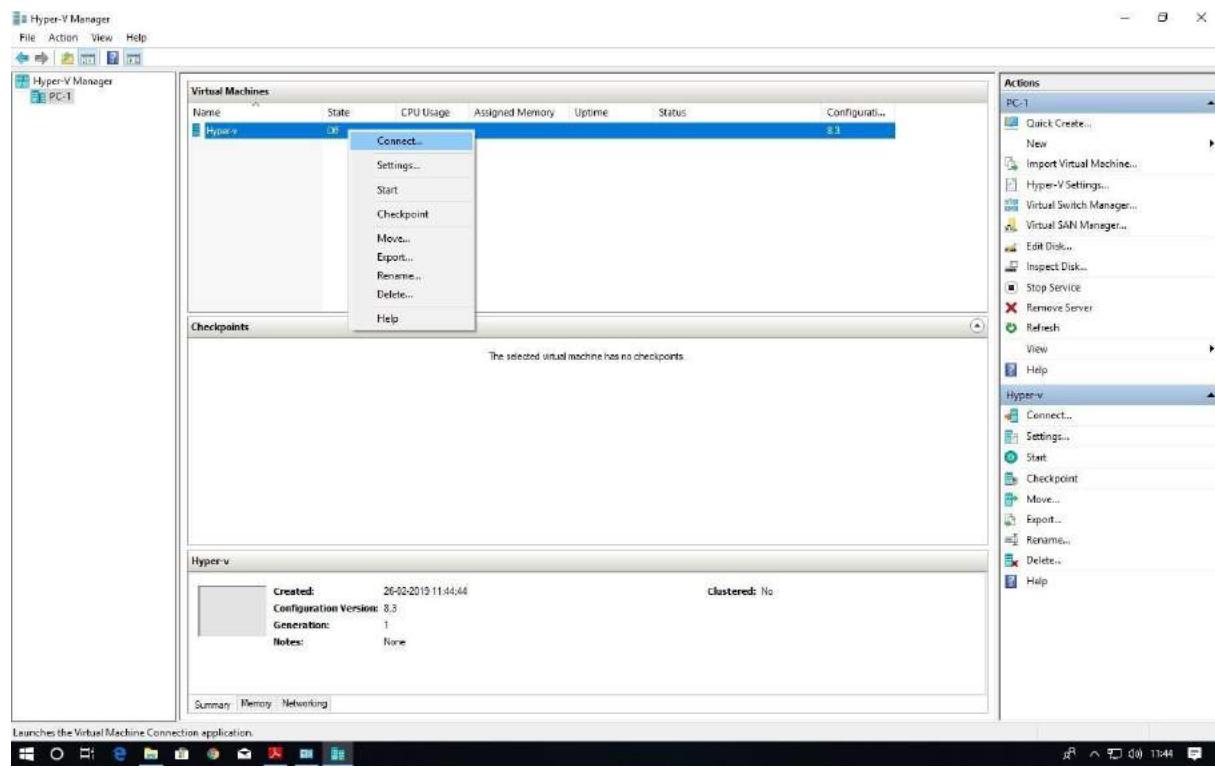
In virtual machine panel your virtual machine will appear which has off state



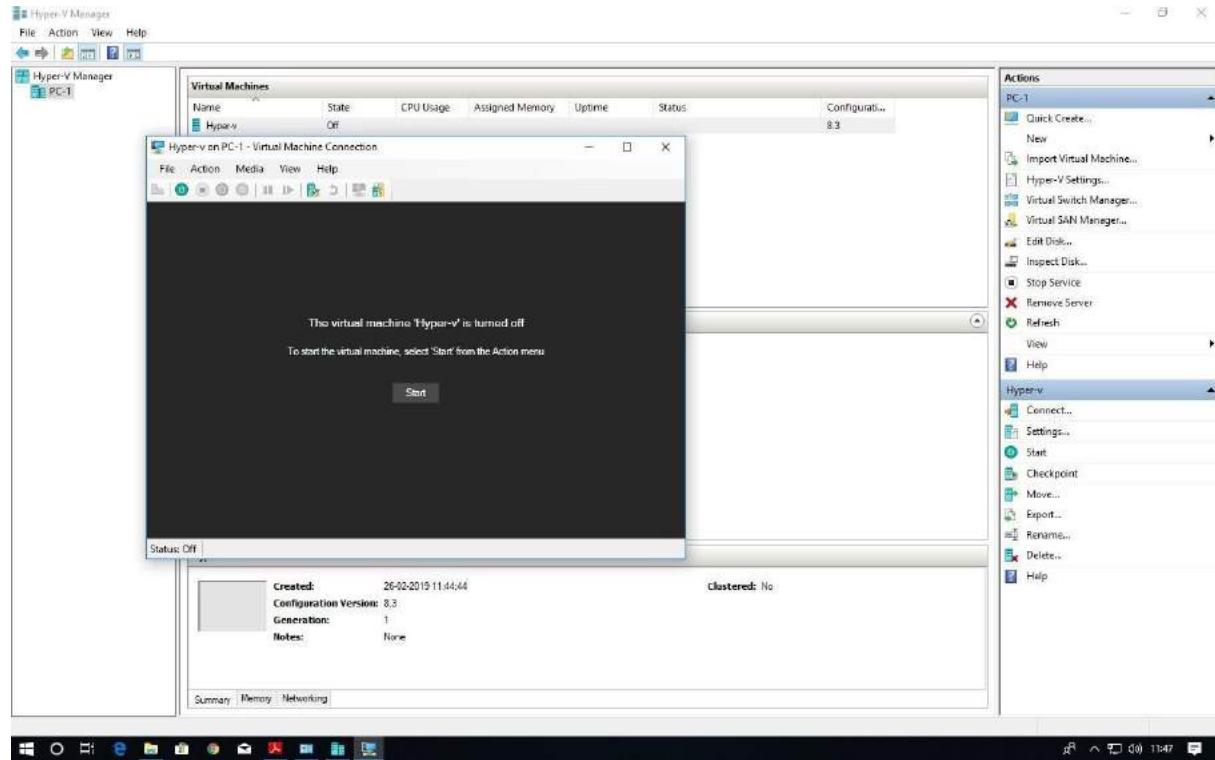
Click finish



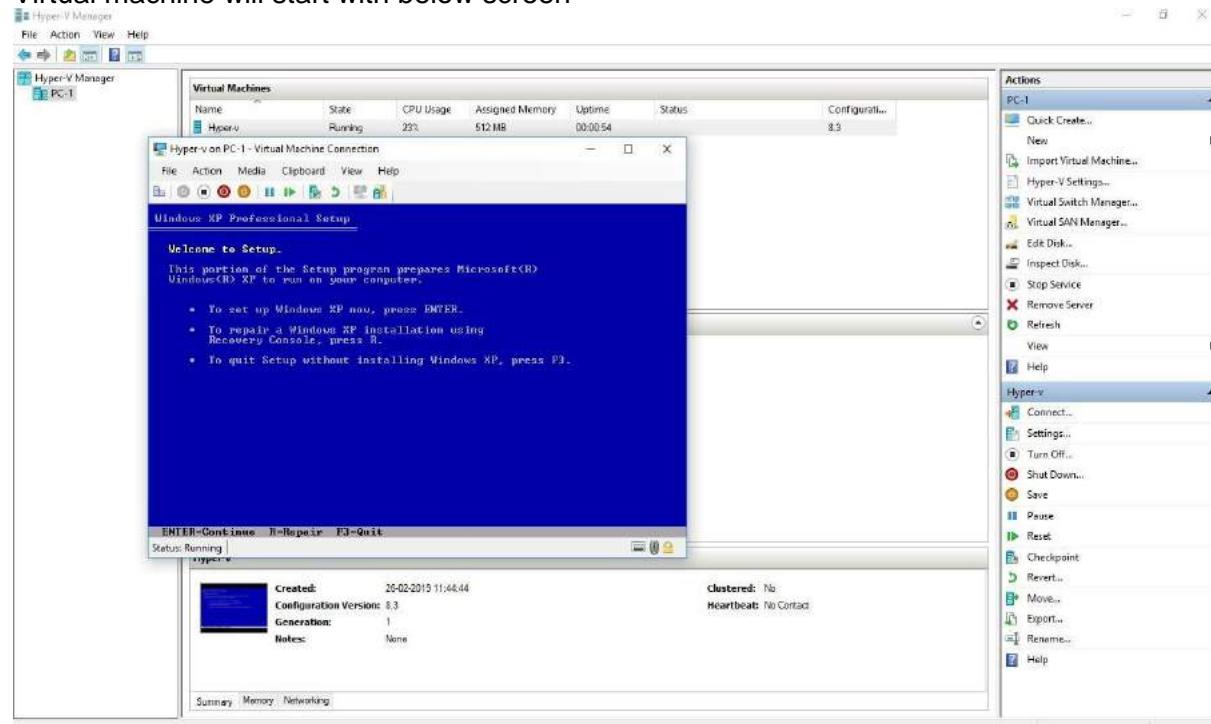
Right click on virtual machine and click on connect option



Now turn on virtual machine



Virtual machine will start with below screen



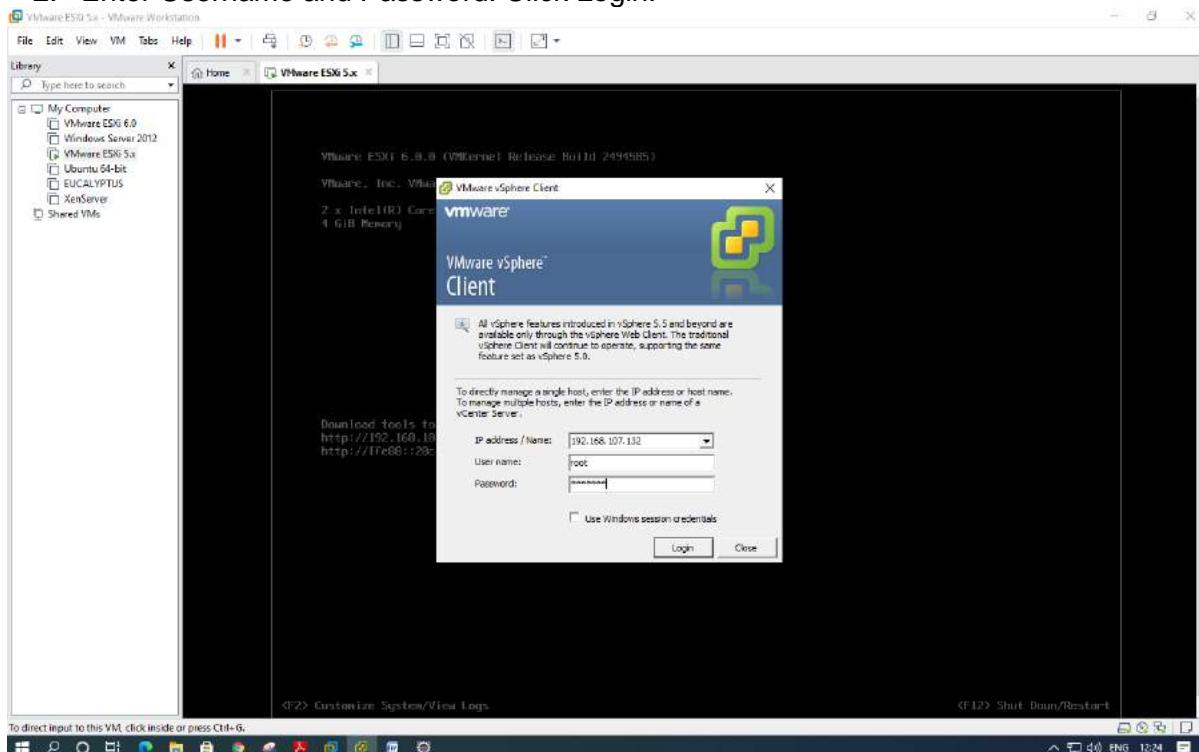
PRACTICAL: 7

IMPLEMENT OPENNEBULA

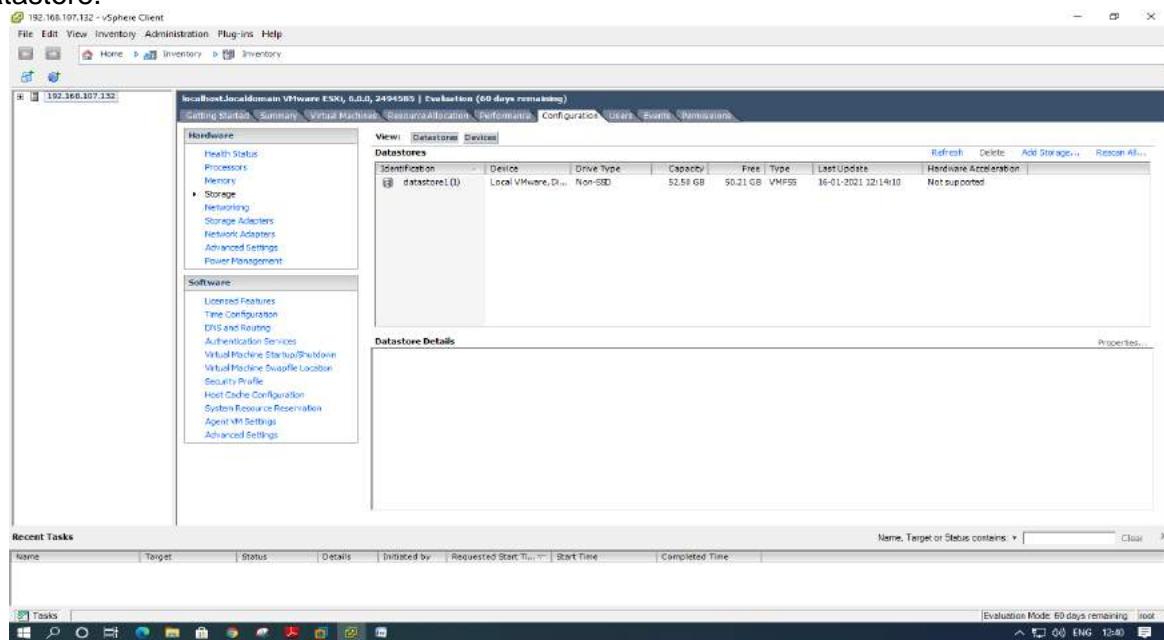
To perform Open Nebula, EXSI VM should be kept on.

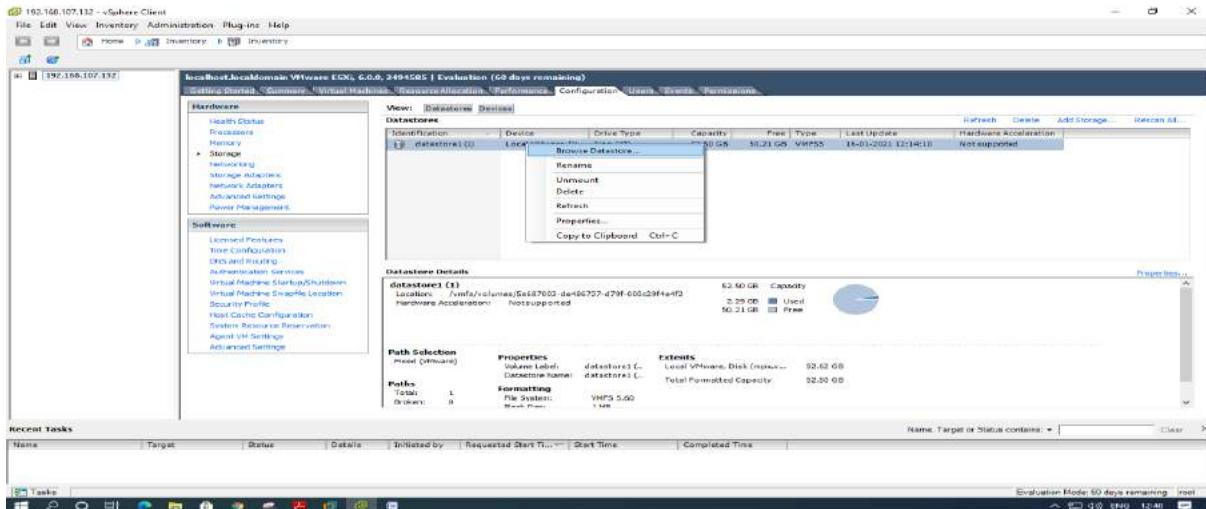
Start vSphere Client.

1. Enter Static IP address
2. Enter Username and Password. Click Login.

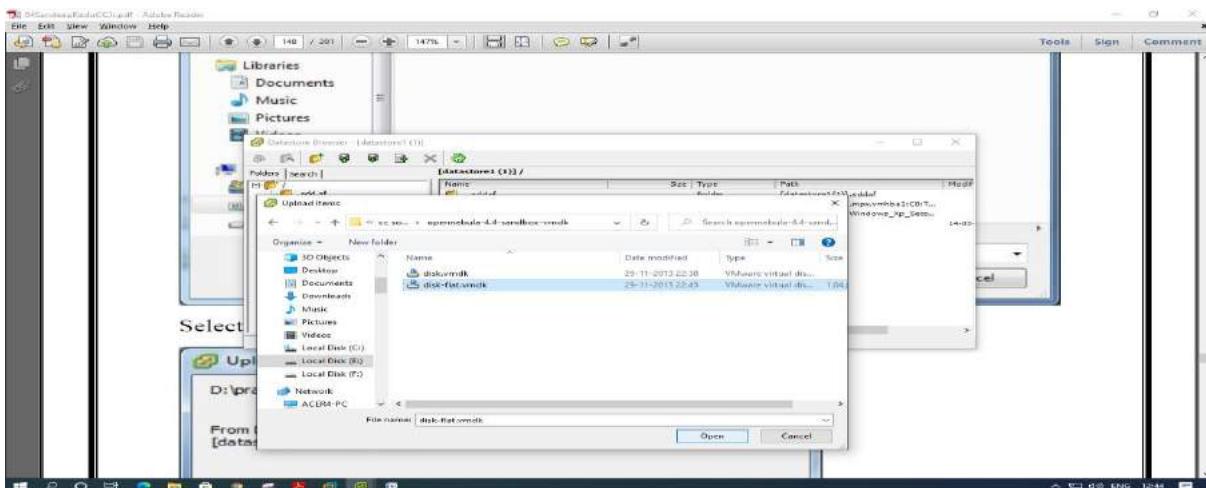


Go to Configuration tab select storage and right click on data store1 and select Browse Datastore.

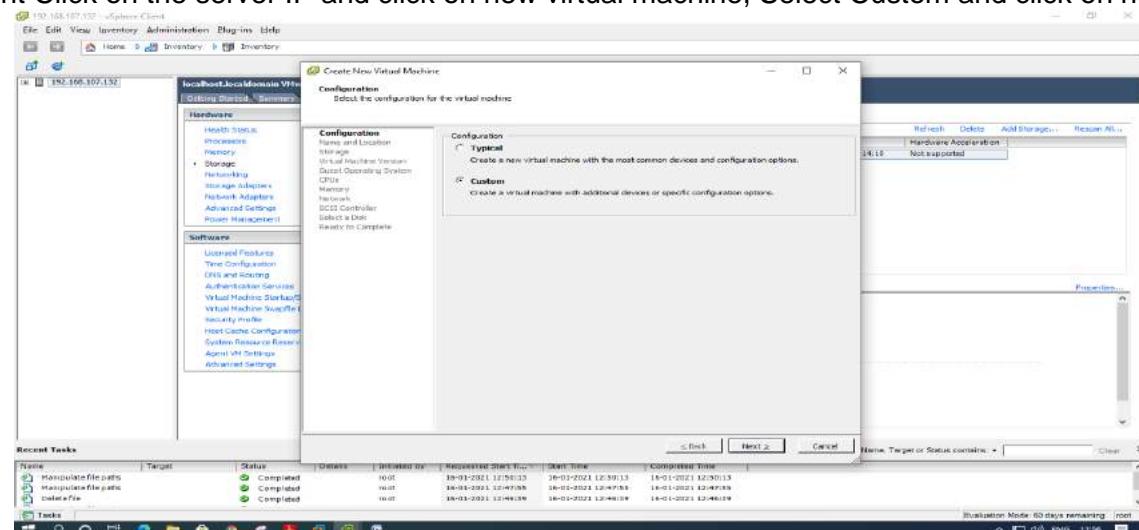




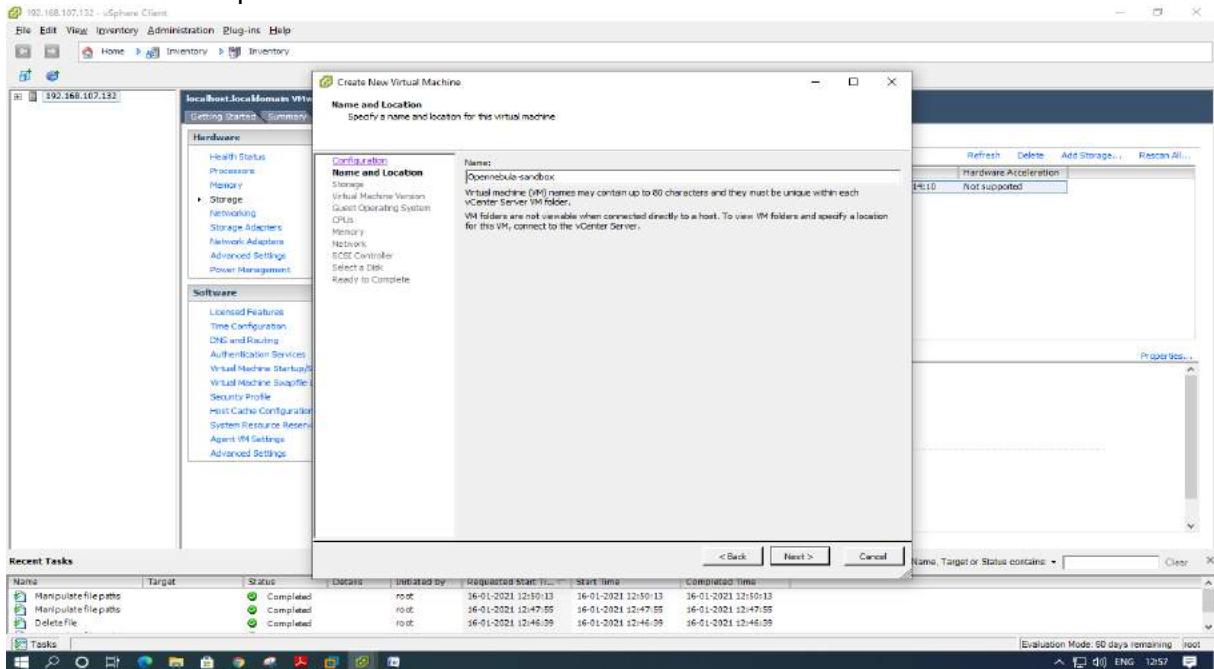
Go in this particular folder opennebula-4.4-sandbox-vmdk and select disk-flat file.



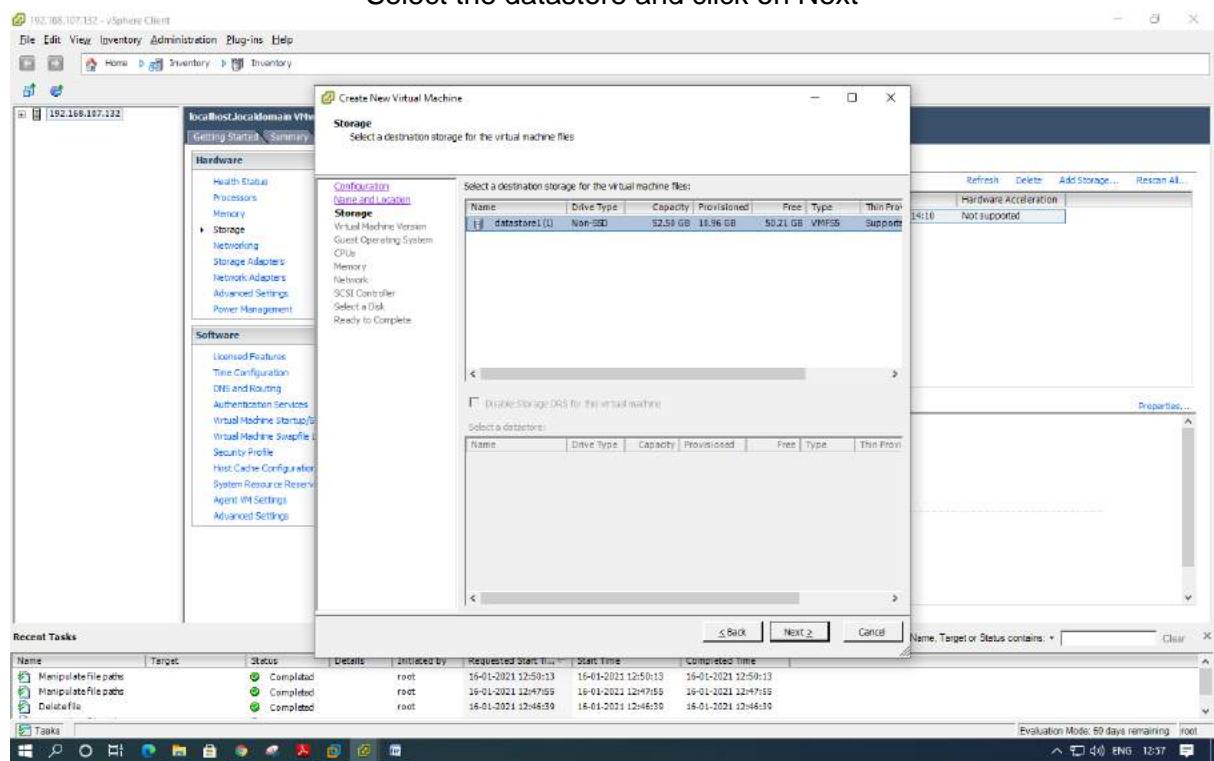
Right Click on the server IP and click on new virtual machine, Select Custom and click on next



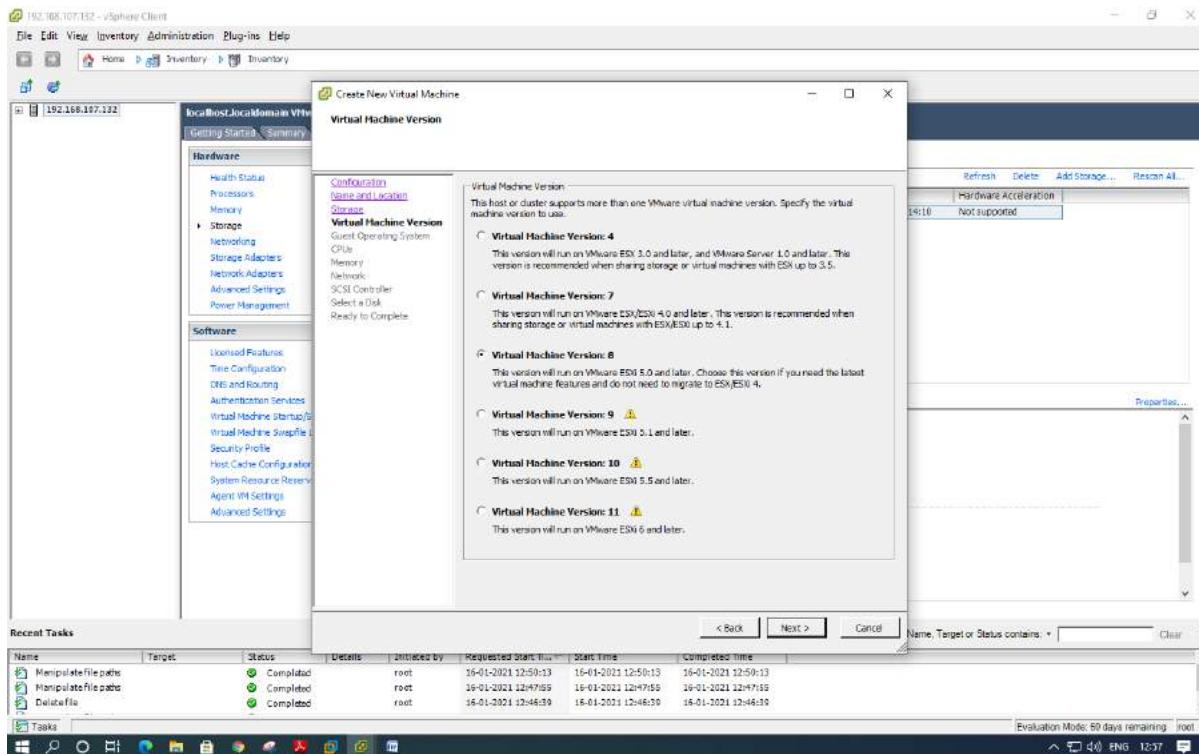
Name the VM as Opennebula-sandbox and click on next.



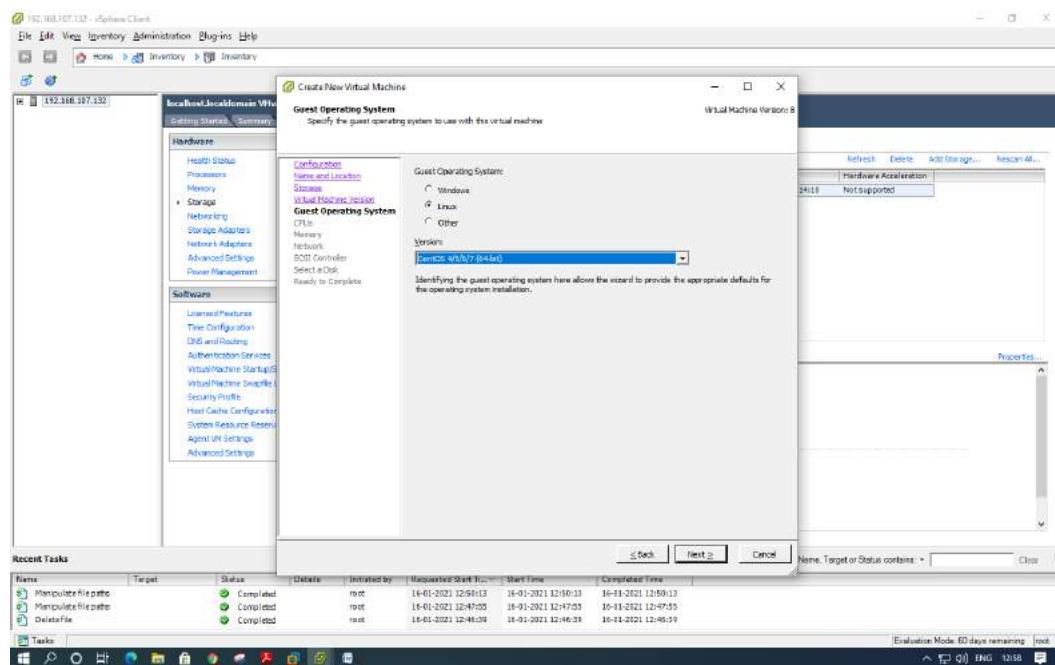
Select the datastore and click on Next



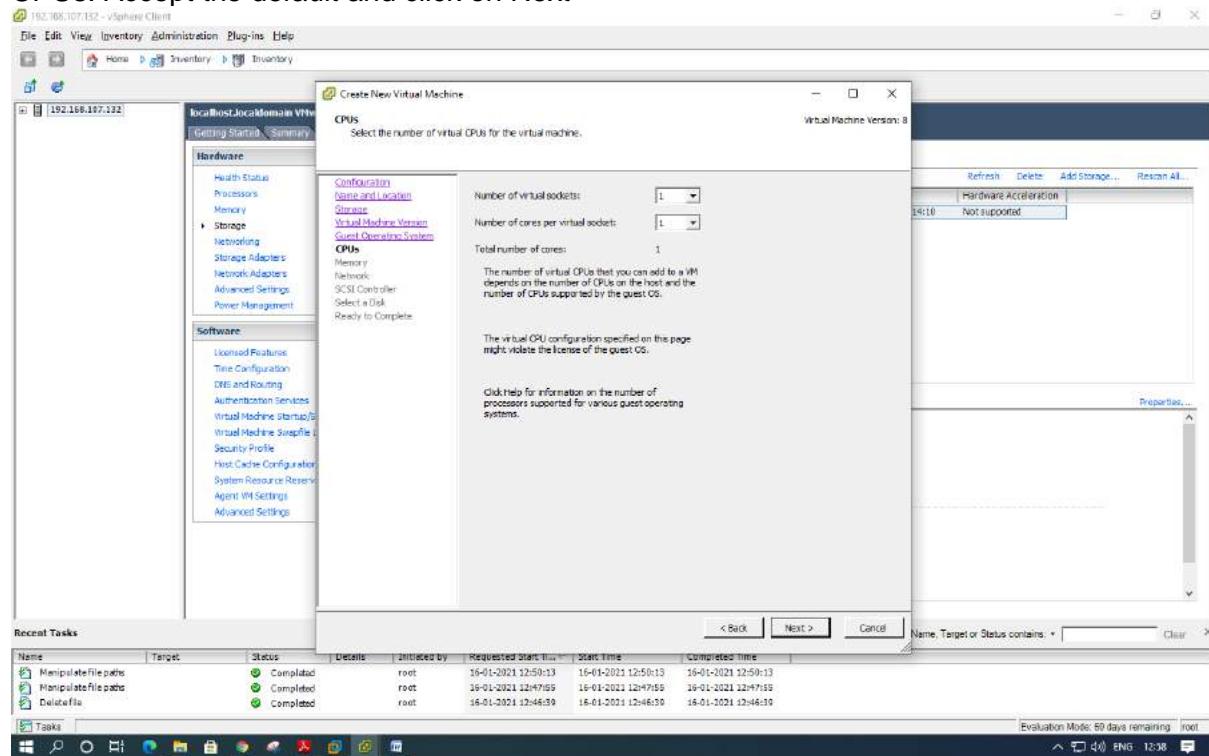
Select Virtual Machine version :8 and click on Next



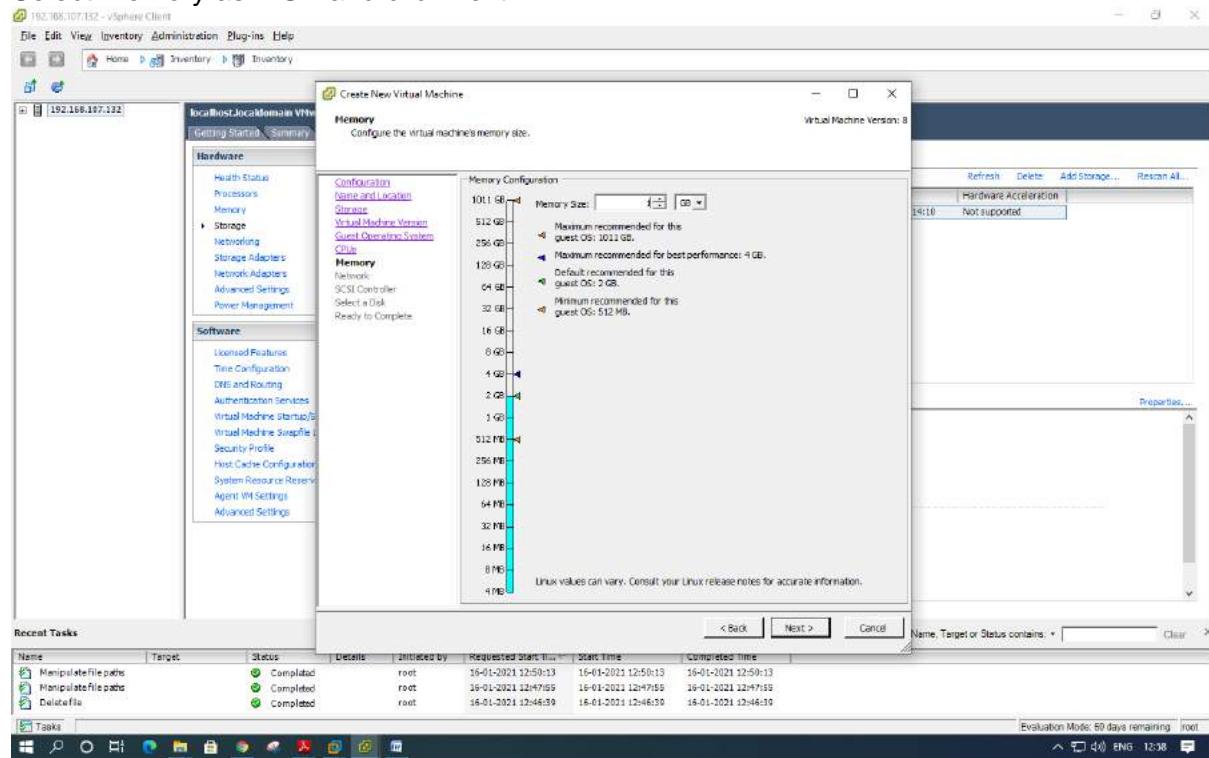
Select Linux as Guest OS and version as CentOS 4/5/6/7 (64-bit)



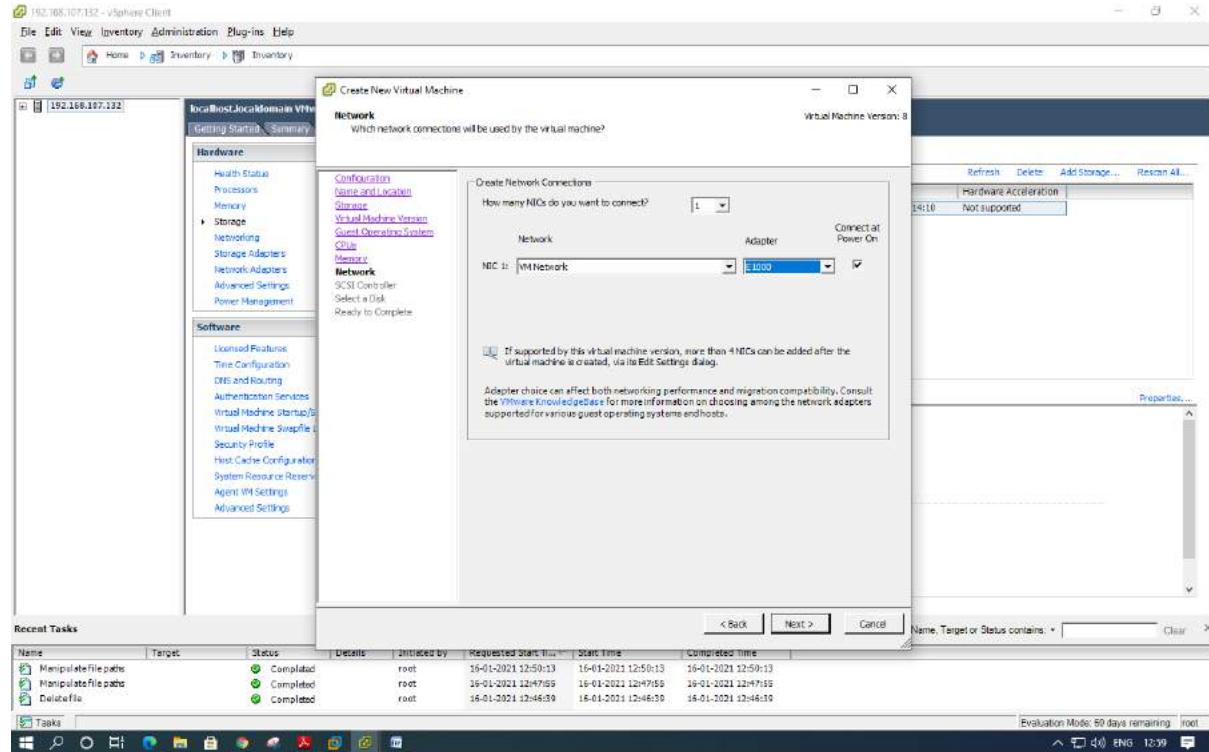
CPUs: Accept the default and click on Next



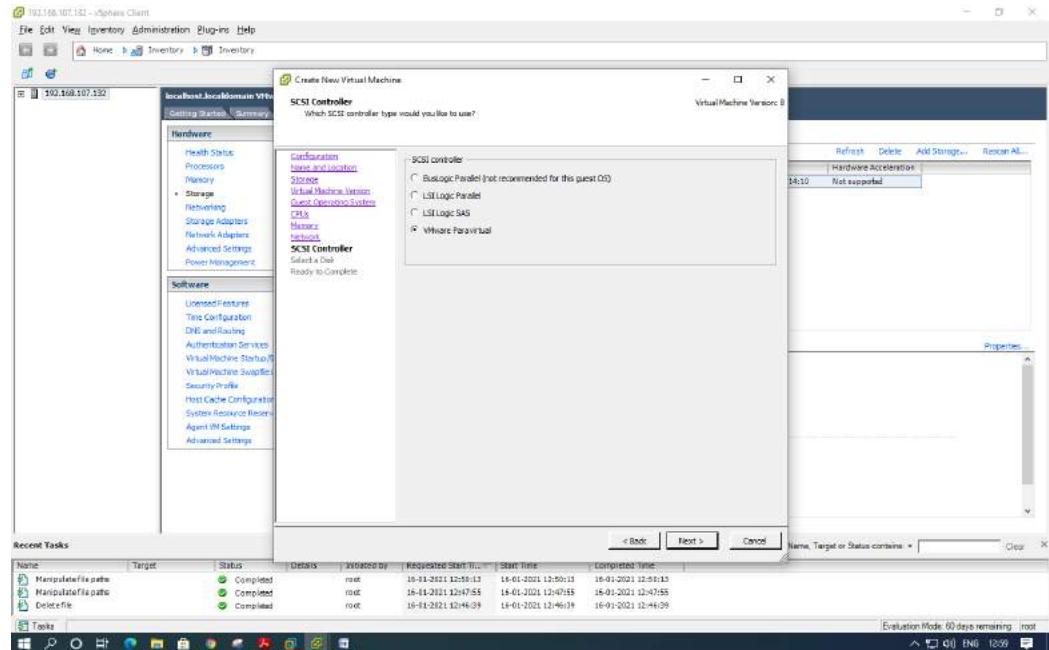
Select memory as 1 GB and click next



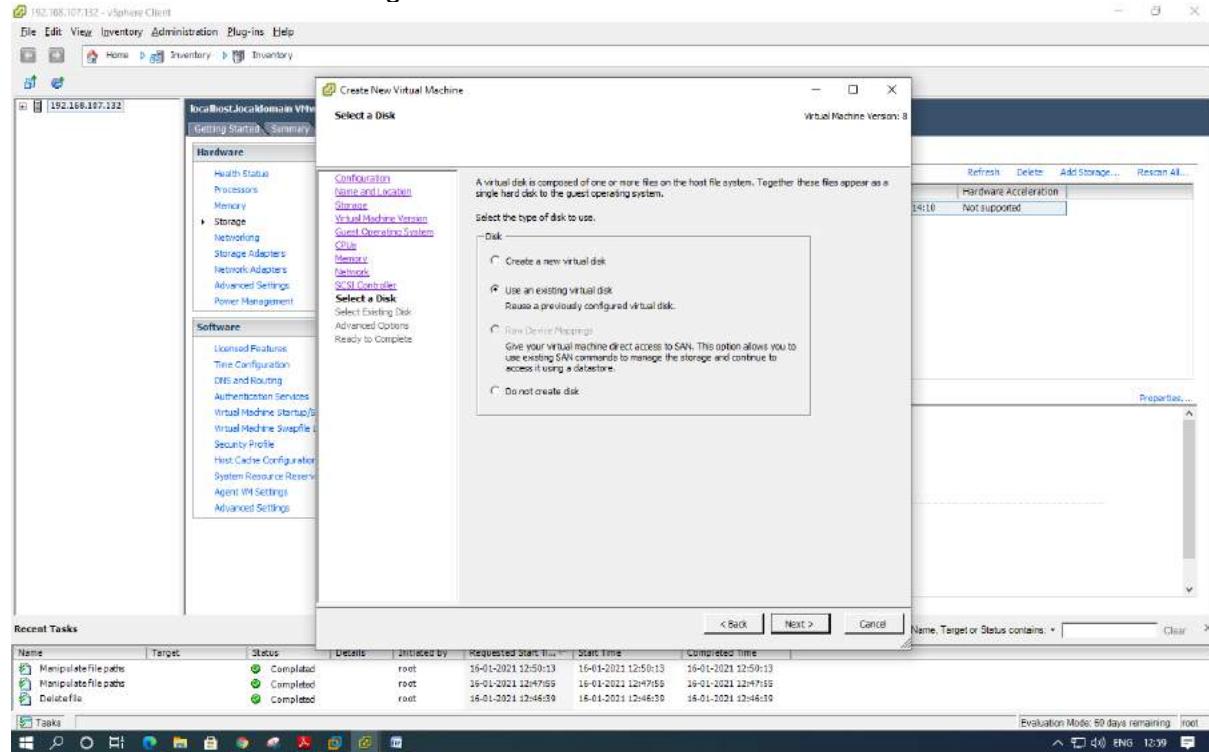
Select it as default and click next



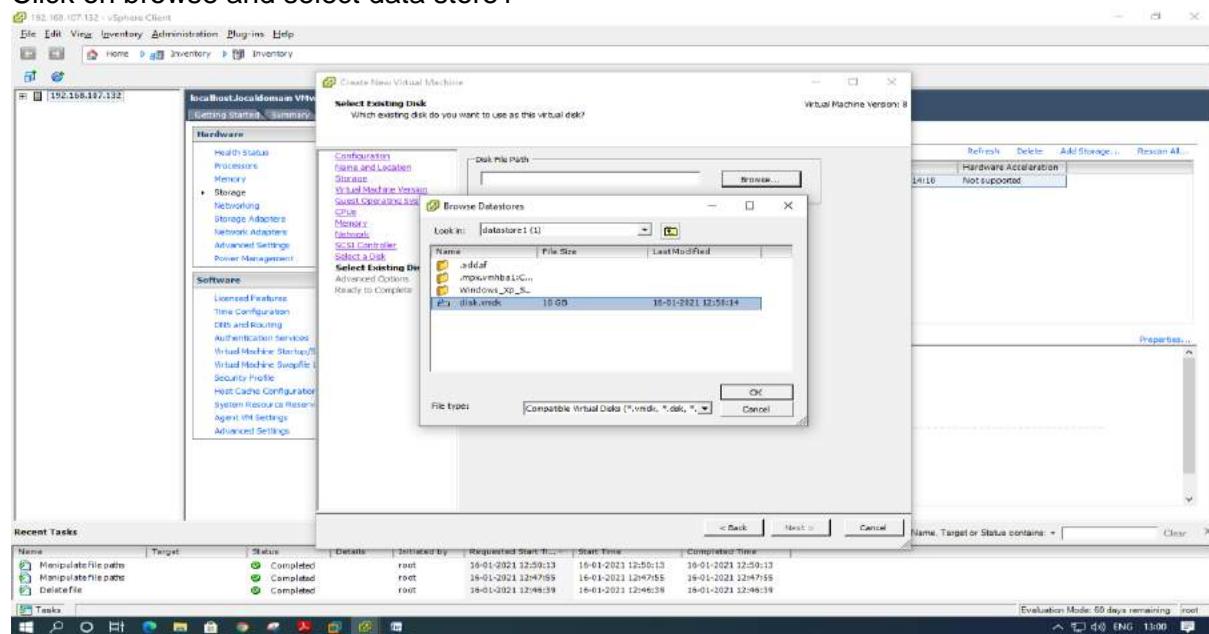
In the SCSI controller select as VMware Paravirtual and click next.

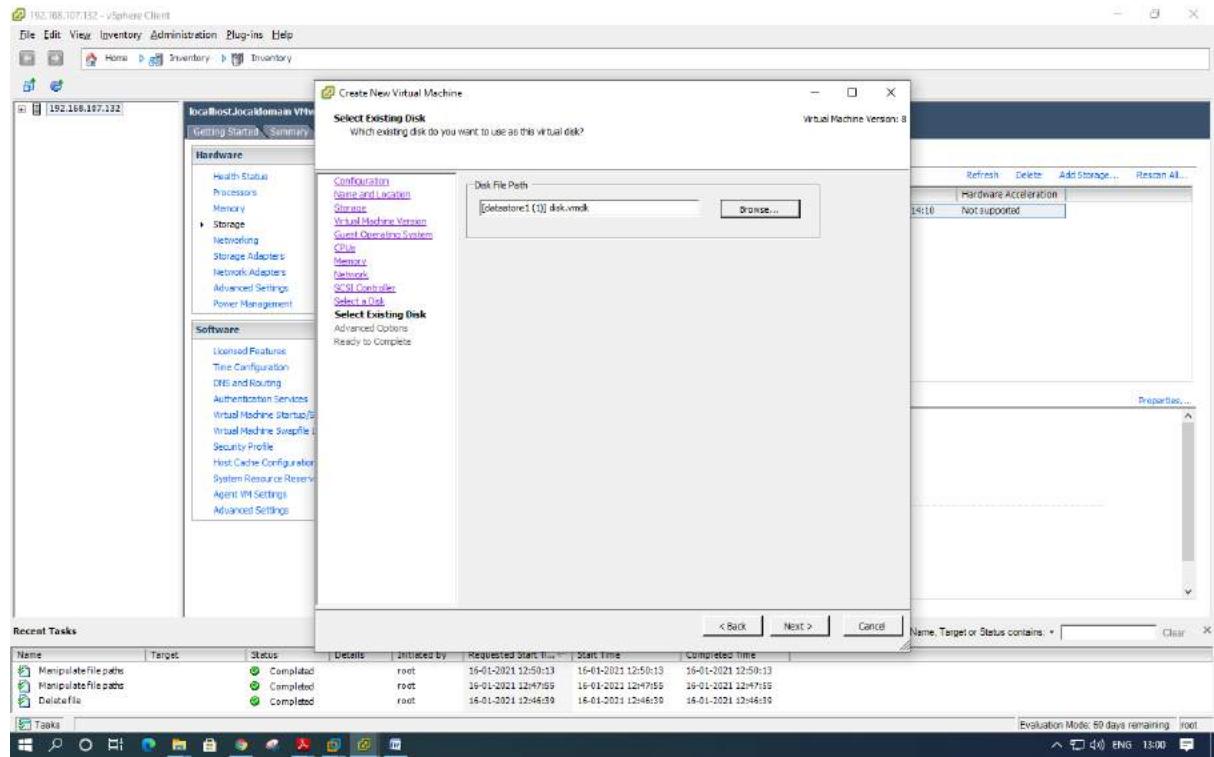


Select disk --> use an existing virtual disk and click next.

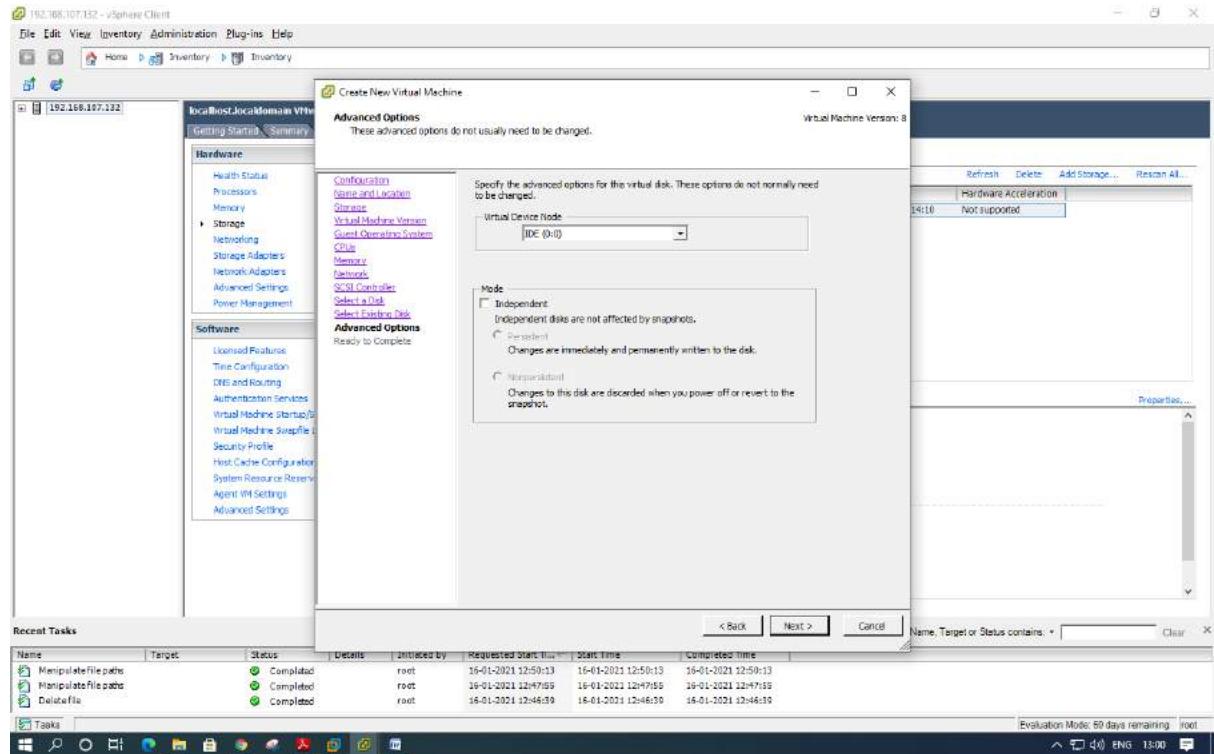


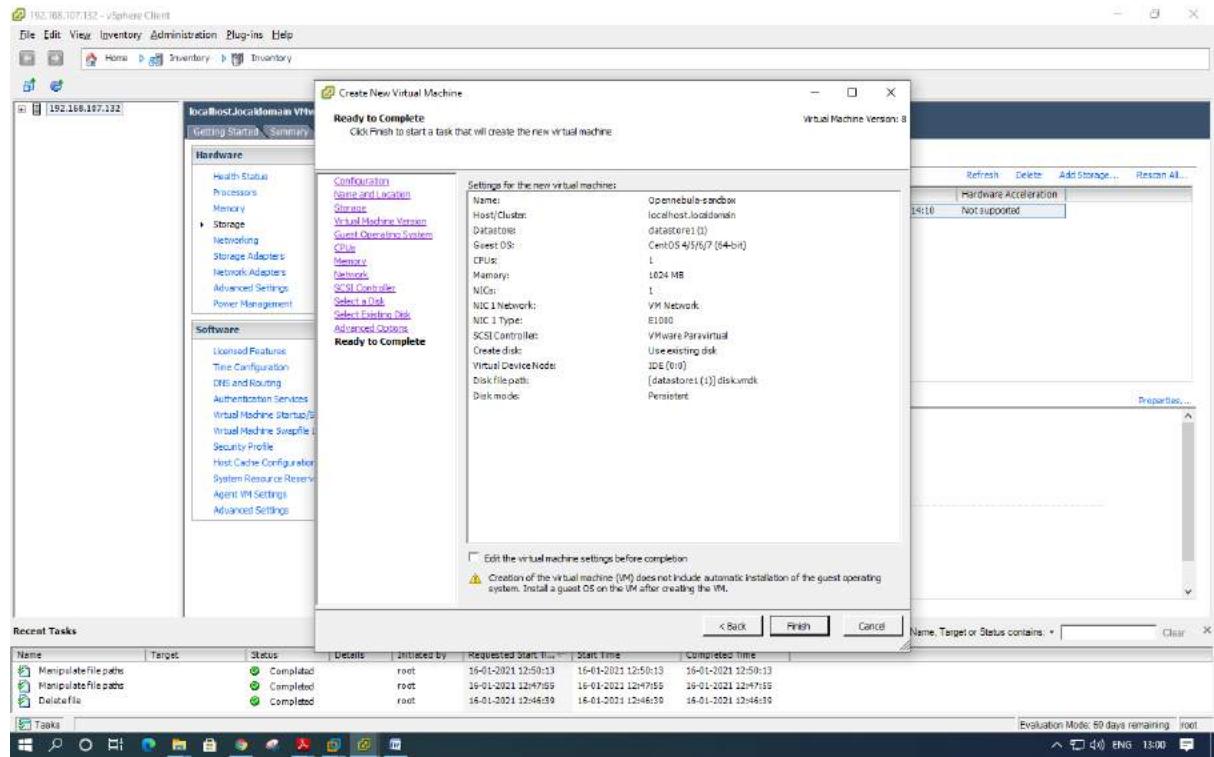
Click on browse and select data store1



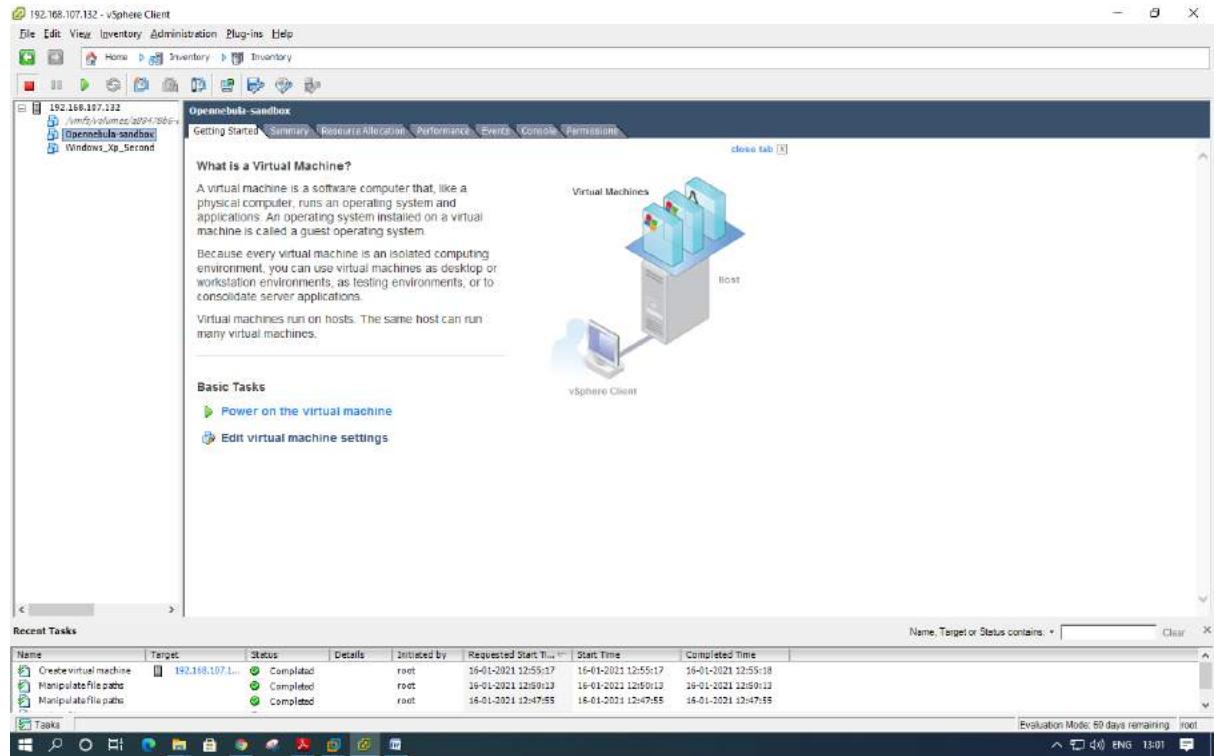


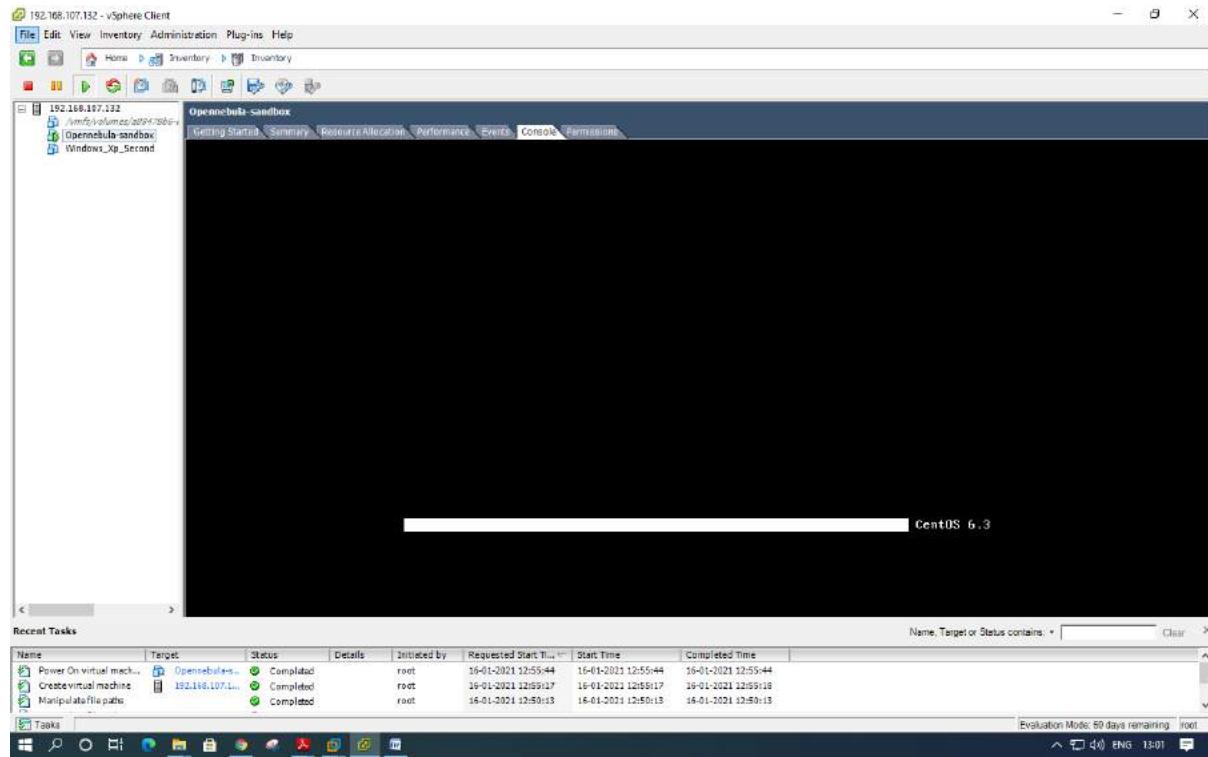
Click on Next and Finish.



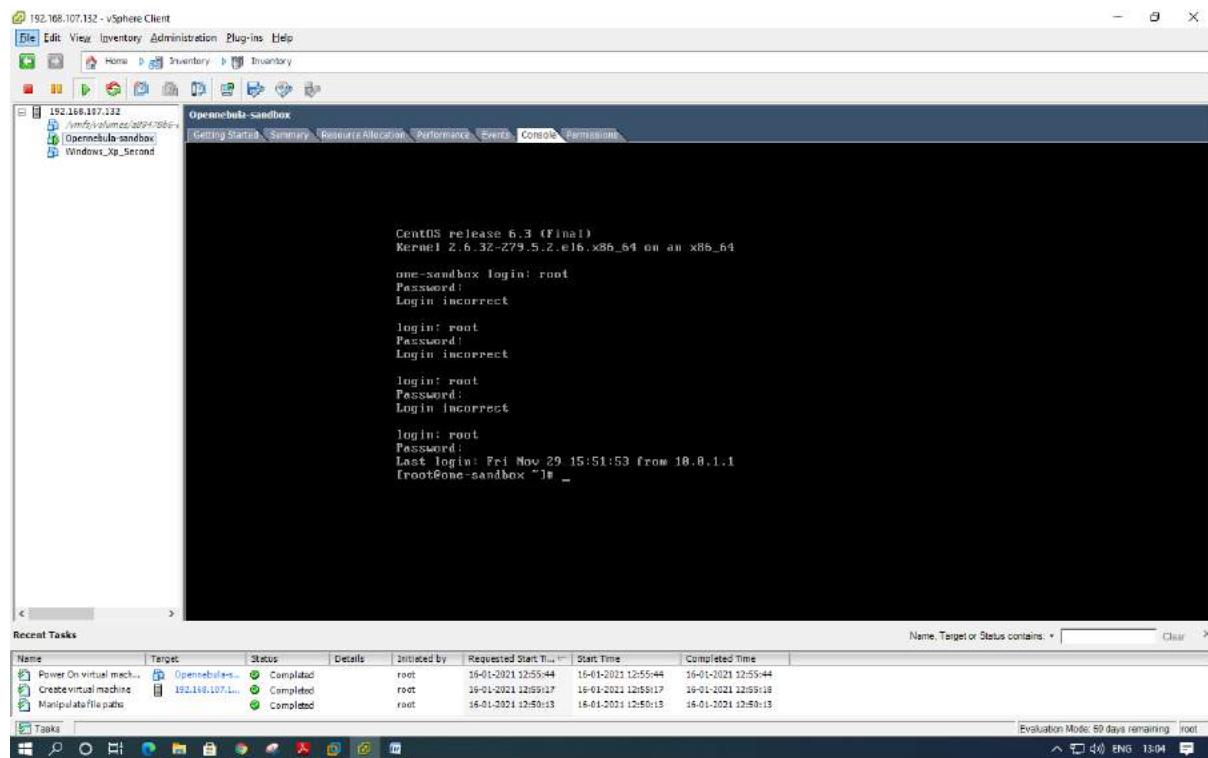


Power on the virtual machine and click on console tab

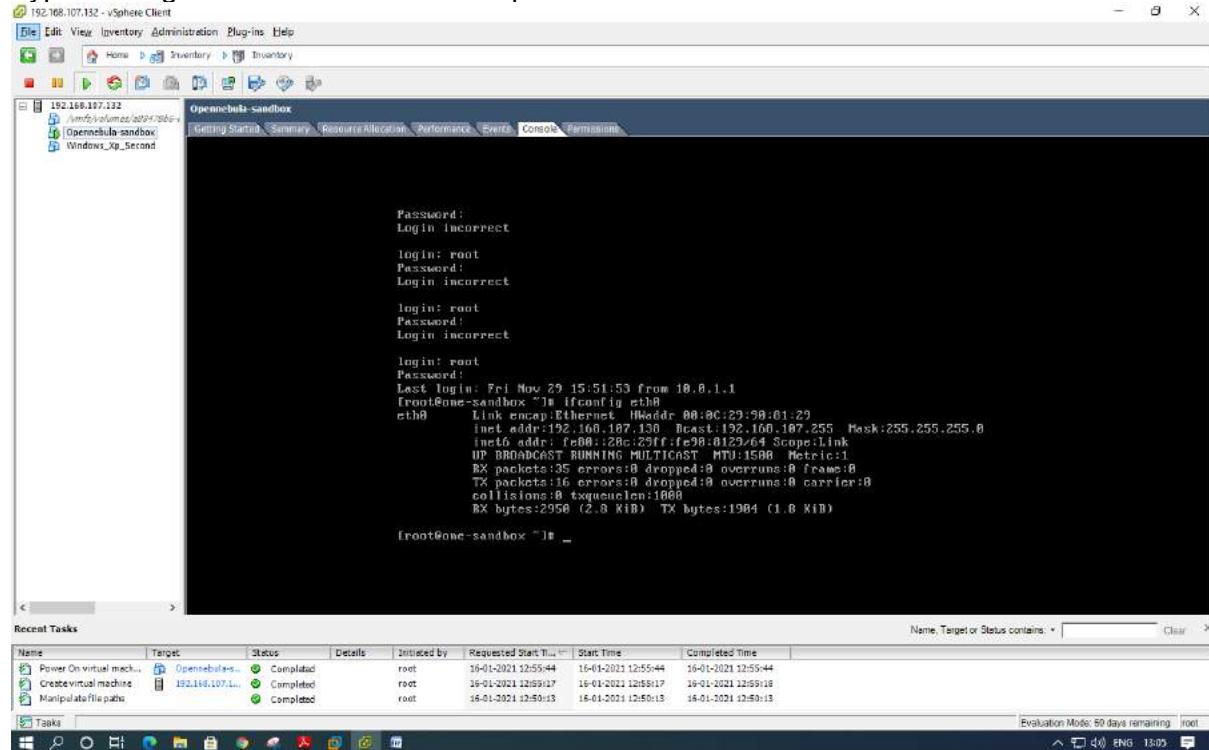




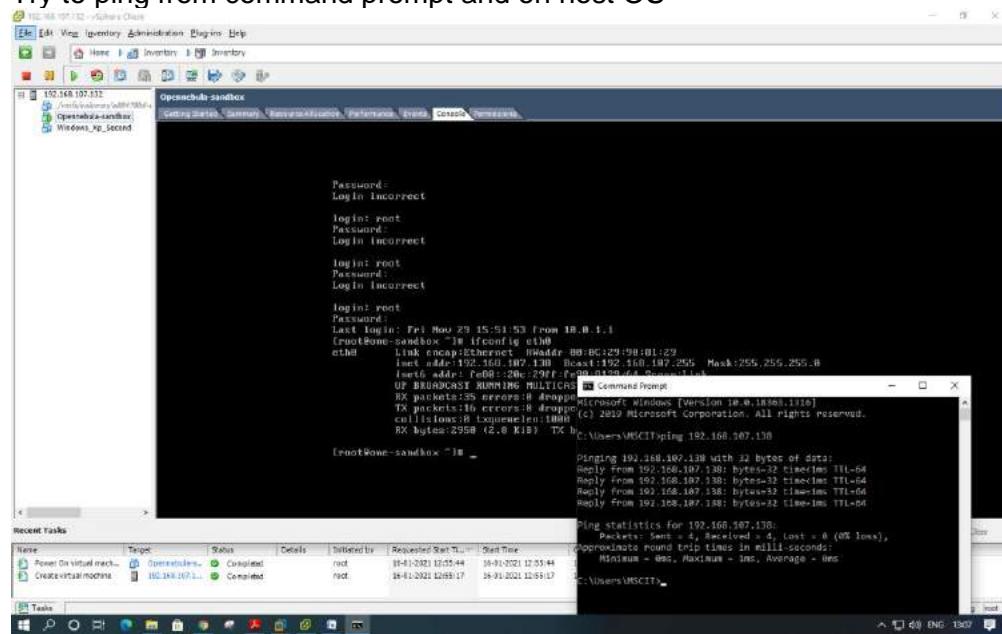
Login: root
Password: opennebula

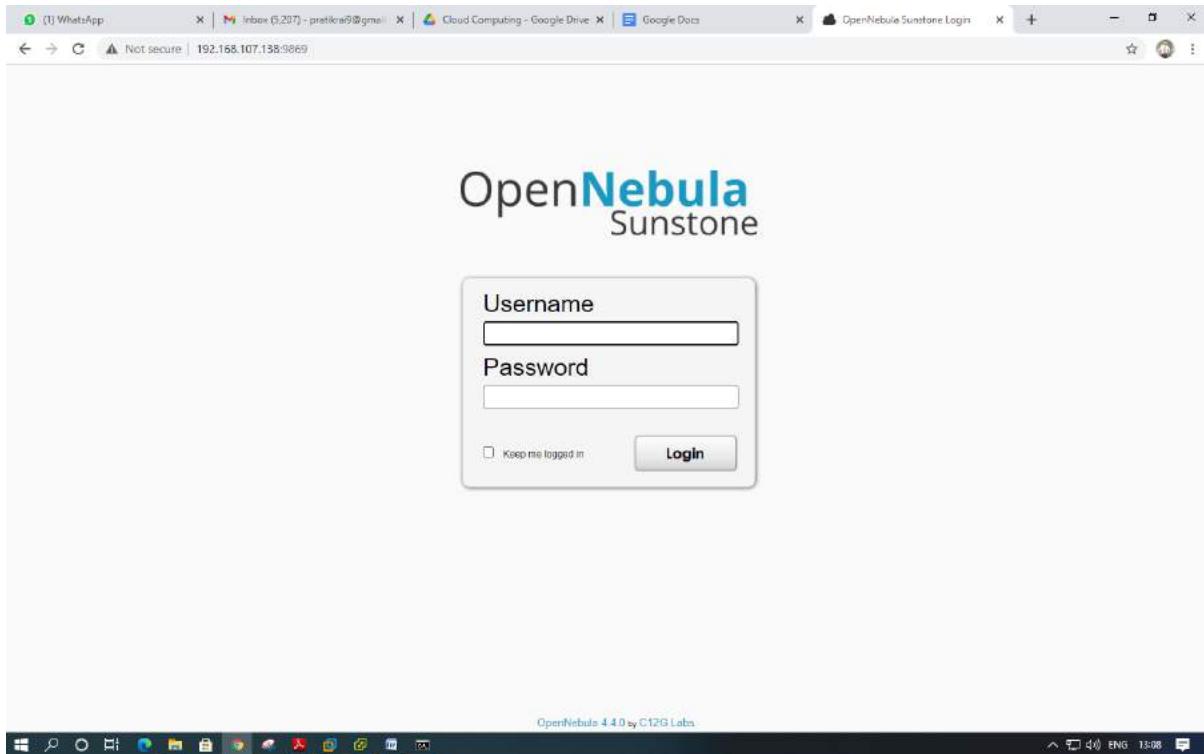


Type ifconfig eth0 command to check ip address of linux centos machine

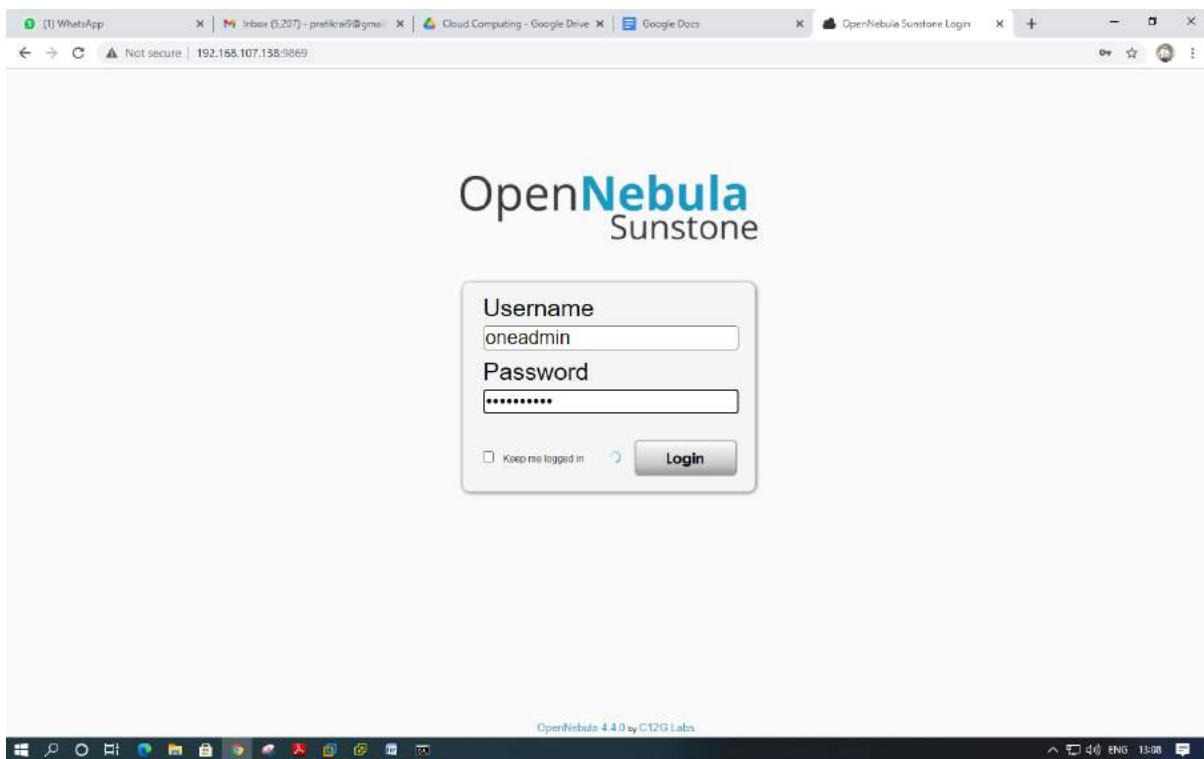


Since IP address of open nebula is 192.168.107.138
Try to ping from command prompt and on host OS





Type username : oneadmin
Password : opennebula



Dashboard of Open nebula.

The screenshot shows the OpenNebula Sunstone dashboard. On the left, a sidebar menu includes options like Dashboard, System, Virtual Resources, Infrastructure, Marketplace, and OneFlow. The main area features several cards: Storage (1 IMAGE, 40MB USED), Users (2 USERS, 2 GROUPS), Network (1 VNets, 0 USED IPs), Hosts (1 TOTAL, 1 ON, 0 OFF, 0 ERROR), Virtual Machines (0 TOTAL, 0 ACTIVE, 0 PENDING, 0 FAILED), CPU (a graph from 13:09 to 13:10 showing usage around 100%), Memory (a graph from 13:09 to 13:10 showing usage between 488.3MB and 976.5MB), Net Download Speed (a graph from 05:29 to 05:30 showing speeds between 0.5B/s and 1B/s), and Net Upload Speed (a graph from 05:29 to 05:30 showing speeds between 0.5B/s and 1B/s). The bottom status bar indicates OpenNebula 4.4.0 by C12G Labs.

Create datastore -- > click on create

The screenshot shows the OpenNebula Sunstone Datastores page. The sidebar menu includes Dashboard, System, Virtual Resources, Infrastructure, Clusters, Hosts, Datastores (which is selected and highlighted in blue), Virtual Networks, Marketplace, and OneFlow. The main content area displays a table of datastores:

ID	Owner	Group	Name	Capacity	Cluster	Type
2	oneadmin	oneadmin	files	1.9GB / 9.8GB (19%)	-	file
1	oneadmin	oneadmin	default	1.9GB / 9.8GB (19%)	-	image
0	oneadmin	oneadmin	system	1.9GB / 9.8GB (19%)	-	system

A message at the bottom says "Showing 1 to 3 of 3 entries". The bottom status bar indicates OpenNebula 4.4.0 by C12G Labs.

Give the name to Datastore and click create.

The screenshot shows the OpenNebula Sunstone web interface. On the left, there is a sidebar with navigation links: Dashboard, System, Virtual Resources, Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), Marketplace, and OneFlow. The main area is titled "Datastores" and contains a "Create Datastore" dialog box. The dialog has two tabs: "Wizard" (selected) and "Advanced mode". In the "Name" field, "Winxp" is entered. Under "Presets", "Filesystem" is selected. The "Cluster" dropdown is set to "Default (none)". The "Type" section has three options: "Images" (radio button selected), "System", and "Files". The "Managers" section includes dropdowns for "Datastore" (set to "Filesystem") and "Transfer" (set to "Shared"). Below these are fields for "Safe Directories", "Restricted Directories", "Base Path", and "Limit". At the bottom of the dialog are "Reset" and "Close" buttons, and a prominent green "Create" button. To the right of the dialog, there is a sidebar titled "oneadmin" with a search bar and a "Type" dropdown showing "file", "image", and "system". The status bar at the bottom indicates "OpenNebula 4.4.0 by C12G Labs".

Provide Full rights to datastore.

Screenshot of the OpenNebula Sunstone interface showing the Datastores page.

Datastores

ID	Owner	Group	Name	Capacity	Cluster	Type
100	oneadmin	oneadmin	Winxp	1.9GB / 9.8GB (19%)	-	Image
2	oneadmin	oneadmin	files	1.9GB / 9.8GB (19%)	-	file
1	oneadmin	oneadmin	default	1.9GB / 9.8GB (19%)	-	Image
0	oneadmin	oneadmin	system	1.9GB / 9.8GB (19%)	-	system

Showing 1 to 4 of 4 entries

Information **Images**

Datastore - Winxp

ID	100
Name	Winxp
Cluster	-
Base path	/var/lib/one//datastores/100
Capacity	
Total	9.8GB
Used	1MB
Free	8GB
Limit	-

Permissions:

Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ownership:

Owner	oneadmin
Group	oneadmin

Configuration Attributes

OpenNebula 4.4.0 by C12G Labs.

Create Virtual network Expand Infrastructure Tab from menu and select Virtual Network and click on create

Screenshot of the OpenNebula Sunstone interface showing the Virtual Networks page.

Virtual Networks

ID	Owner	Group	Name	Cluster	Type	Leases
0	oneadmin	oneadmin	cloud	-	FIXED	0

Showing 1 to 1 of 1 entries

OpenNebula 4.4.0 by C12G Labs.

Provide name to virtual network and click on fixed network and provied ip address in range "192.168.1.100" to "192.168.1.106" and also provide Bridge name :"br0" and give full rights to Virtual network.

The screenshot shows the 'Create Virtual Network' dialog box. The 'Name' field is filled with 'WinXPVirtualNetwork'. Under 'Type', 'IPv4' is selected. In the 'IP' field, '192.168.1.106' is entered. Below it, 'MAC' is set to '00:0C:29:00:00:00'. The 'Bridge' field contains 'br0'. The 'Create' button at the bottom right is highlighted in green. The background shows the main 'Virtual Networks' list with two entries: 'WinXPVirtualNetwork' and 'cloud'.

ID	Owner	Group	Name	Cluster	Type	Leases
1	oneadmin	oneadmin	WinXPVirtualNetwork	-	FIXED	0
0	oneadmin	oneadmin	cloud	-	FIXED	0

Create a new user with below details:

Username : opennebula
Password : opennebula

The screenshot shows the OpenNebula Sunstone web interface. The top part displays a 'Create User' dialog box with the following fields:

Username:	opennebula
Password:	*****
Authentication:	Core

Below the dialog, the main 'Users' page is shown with the following table:

ID	Name	Group	Auth driver	VMs	Memory	CPU
2	opennebula	users	core	-	0 / -	0 / -
1	serveradmin	oneadmin	server_cipher	0 / -	0K / -	0 / -
0	oneadmin	oneadmin	core	-	-	-

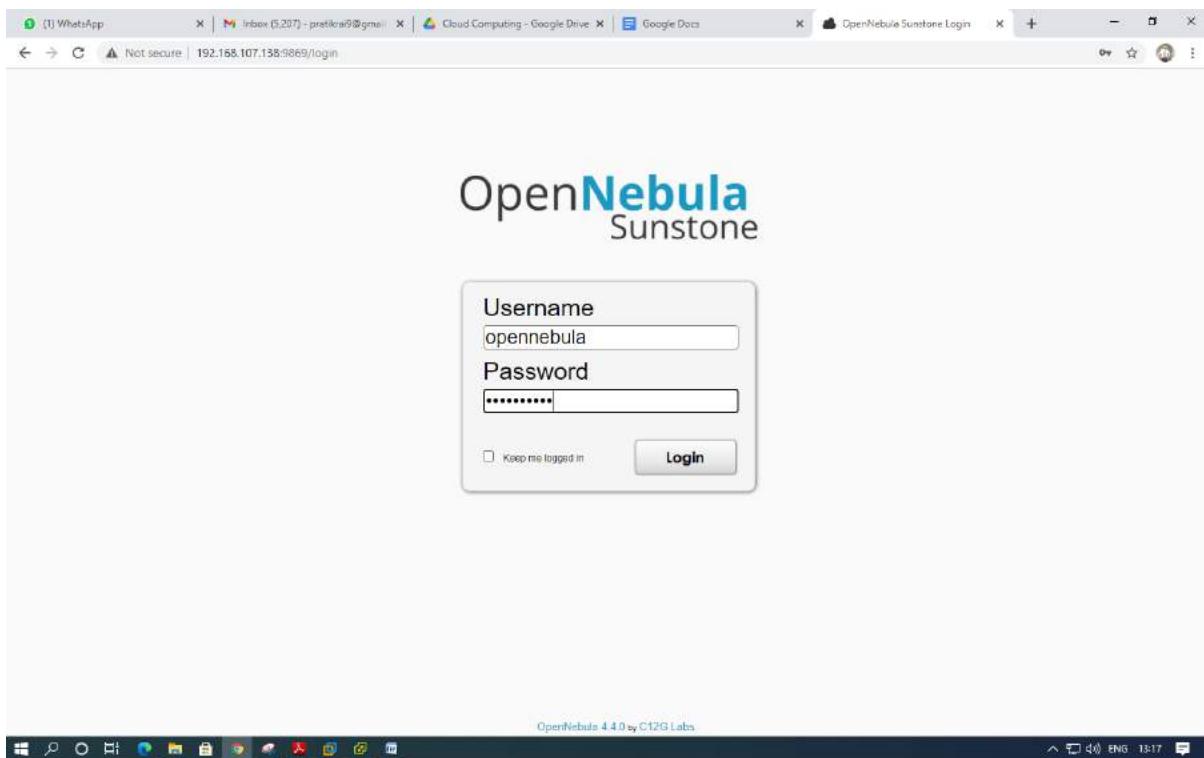
The bottom part of the screenshot shows the 'User information' tab for the 'opennebula' user, displaying the following details:

ID	2
Group	users
Secondary groups	-
Authentication driver	core

Configuration Attributes section:

TOKEN_PASSWORD	885bf5e87be8d7cfb04344ea8577a bbb5490c67e
----------------	--

Login Using newly created user



Click on virtual resources and select images

The screenshot shows the "OpenNebula Sunstone" interface with the "Cloud" tab selected. On the left, a sidebar menu is visible with options like "Dashboard", "Virtual Resources" (selected), "Virtual Machines", "Templates", "Images" (selected), "Files & Kernels", "Infrastructure", "Marketplace", and "OneFlow". The main content area is titled "Images" and shows a table with one entry. The table columns are ID, Owner, Group, Name, Datastore, Type, Status, and #VMS. The single entry is: ID 0, Owner oneadmin, Group oneadmin, Name ttylex, Datastore default, Type OS, Status READY, #VMS 0. There are buttons for "Create", "Delete", "Clone", and "More". A search bar is also present. The footer bar at the bottom includes icons and text indicating "OpenNebula 4.4.0 by C12G Labs".

Create a new Image and name the image and provide full access

The screenshot shows two windows of the OpenNebula Sunstone web interface.

Top Window: Create Image

- Left Sidebar:** Includes links for Dashboard, Virtual Resources, Virtual Machines, Templates, Images (selected), Files & Kernels, Infrastructure, Marketplace, and OneFlow.
- Content Area:** A modal window titled "Create Image".
 - Wizard tab:** Selected.
 - Advanced mode:** Available but not selected.
 - Fields:**
 - Name: XP_Img1
 - Type: CDROM
 - Description: (empty)
 - Datastore: default (id:1)
 - Persistent:
 - Image location:**
 - Provide a path:
 - Upload: (selected)
 - Empty datablock:
 - File Input:** Choose File: WXPVOL_EN.iso
 - Buttons:** Reset, Close, Create (green button).

Bottom Window: Images Catalog

- Left Sidebar:** Same as the top window.
- Content Area:** A table showing the created image.

ID	Owner	Group	Name	Datastore	Type	Status	#VMs
1	opennebula	users	XP_Img1	default	CDROM	READY	0
0	oneadmin	oneadmin	ttylinux	default	DS	READY	0

Showing 1 to 2 of 2 entries.

- Details View:** An "Information" tab for the image XP_Img1.
 - Table:** Shows details like ID, Name, Datastore, Type, Register time, Persistent, Filesystem type, Size, State, and Running VMs.
 - Permissions:** Table showing permissions for Owner, Group, and Other users.
 - Configuration & Tags:** Fields for DEV_PREFIX and hd.

Click on templates under Virtual Machine and create a template by giving a name to template.

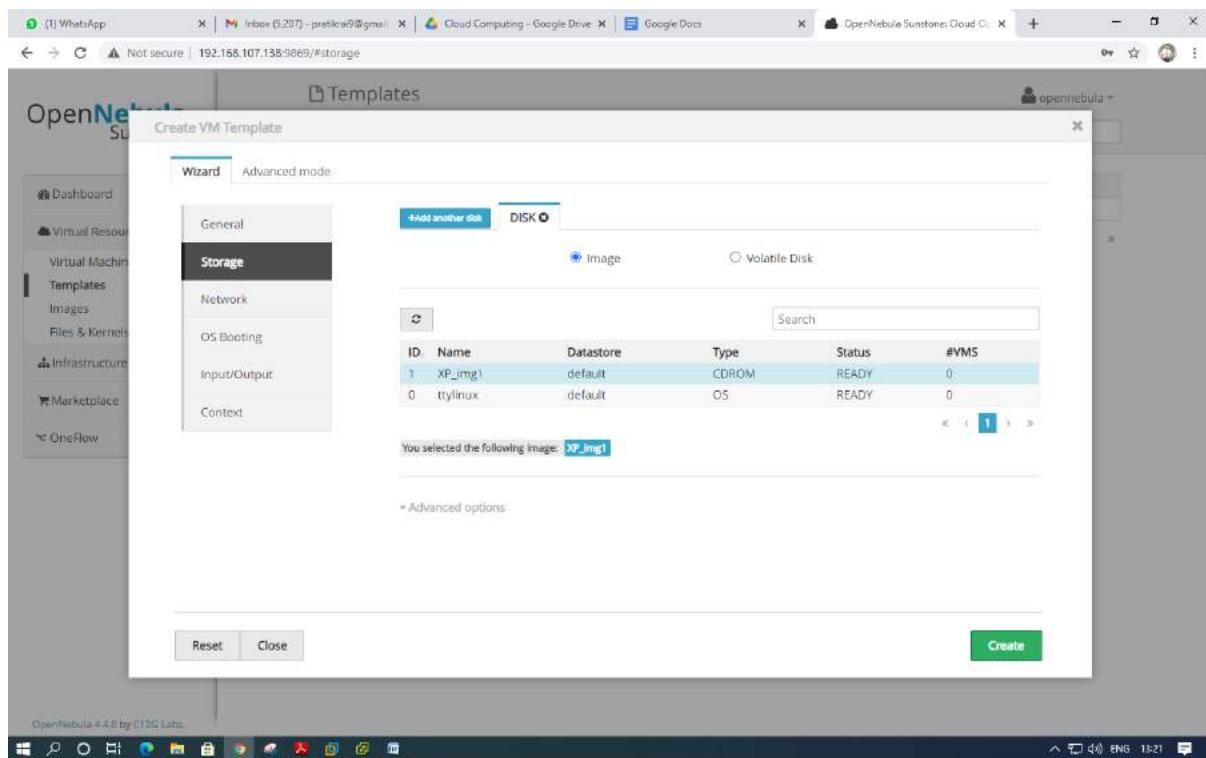
The screenshot shows the OpenNebula Sunstone web interface. The left sidebar has a 'Virtual Resources' section with 'Templates' selected. The main area displays a table titled 'Templates' with one entry:

ID	Owner	Group	Name	Registration time
0	oneadmin	oneadmin	ttylinux	03:16:57 21/11/2012

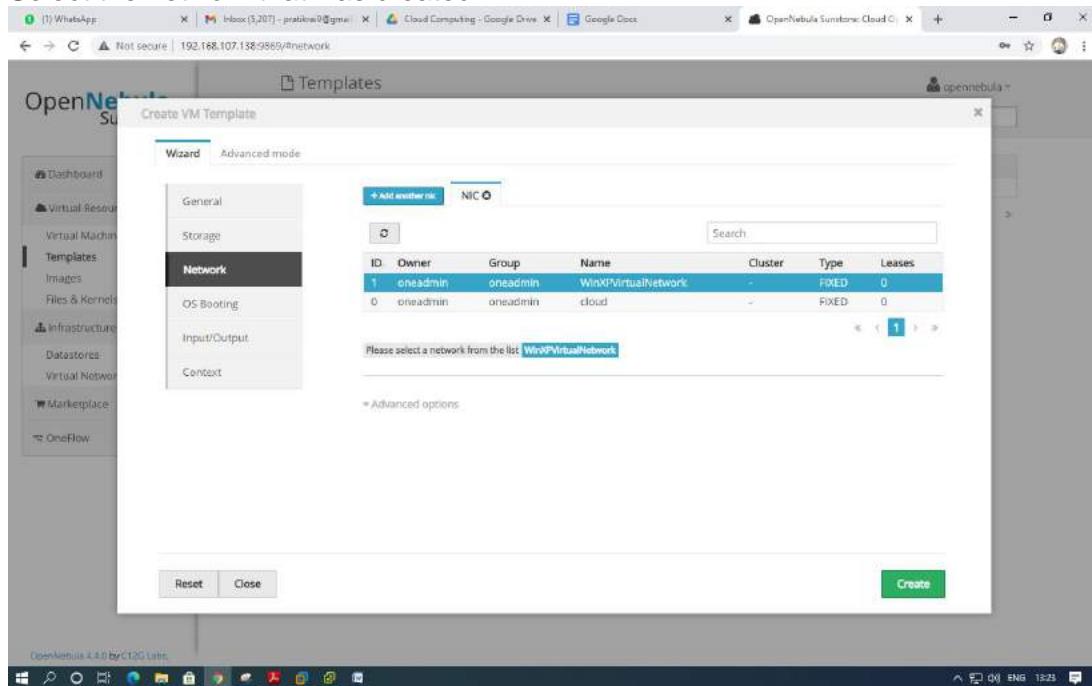
Below the table, it says 'Showing 1 to 1 of 1 entries'. The top right has buttons for 'Delete', 'Instantiate', 'More...', and a search bar.

The screenshot shows the 'Create VM Template' dialog box. The left sidebar is identical to the previous screen. The dialog has tabs for 'Wizard' (selected) and 'Advanced mode'. The 'General' tab is active, showing fields for NAME (set to 'template_winxp'), CPU (set to 1), and MEMORY (set to 512 MB). There is also an 'Advanced options' section. At the bottom are 'Reset', 'Close', and 'Create' buttons.

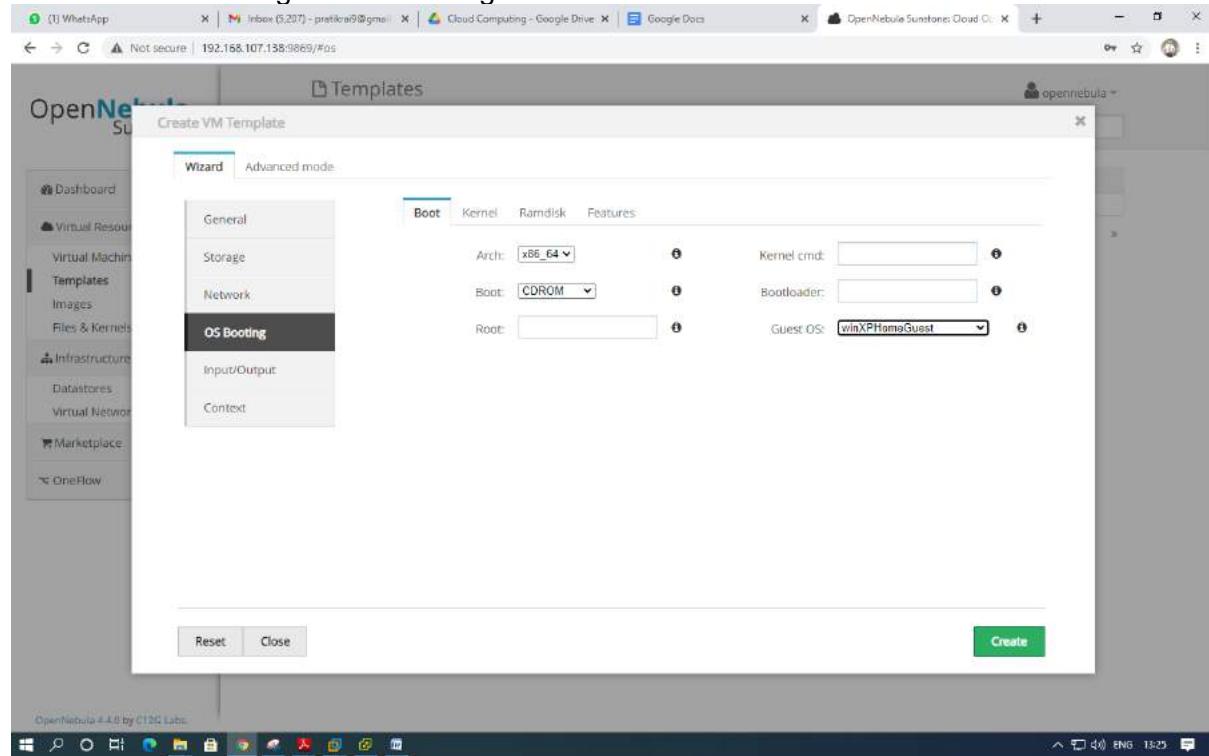
Select the storage that was created.



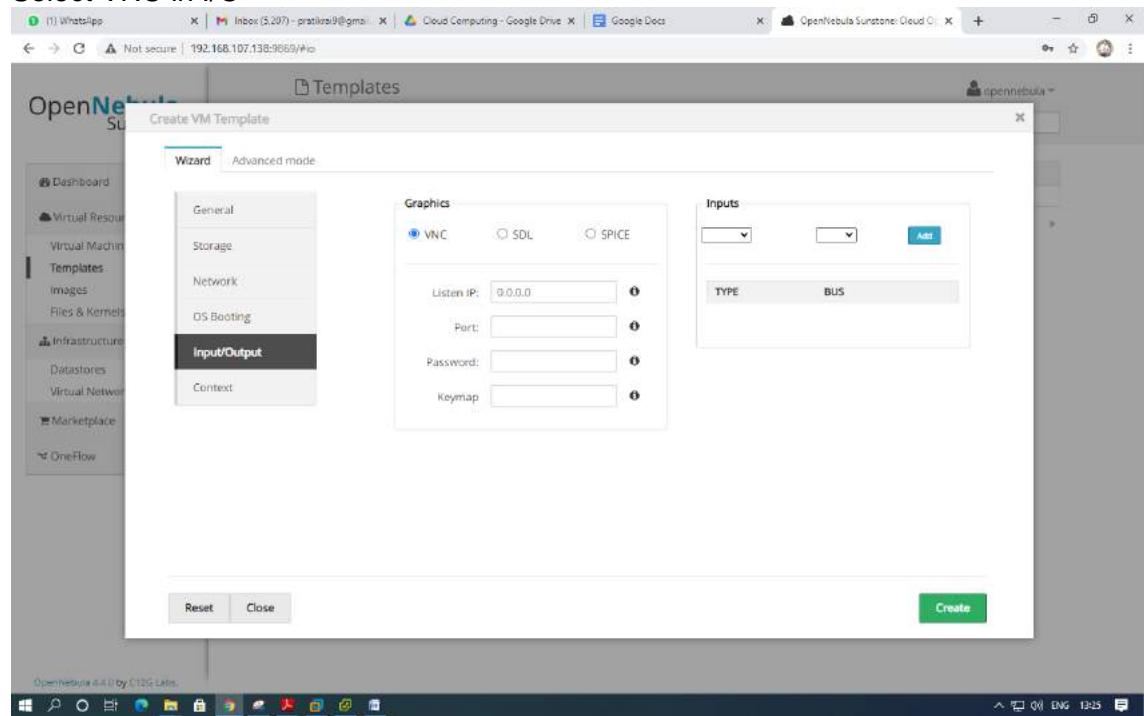
Select the network that was created.



Leave Default Settings in OS Booting



Select VNC in I/O



Leave it as default settings and click on create and give full rights.

Screenshot of the OpenNebula Sunstone interface showing the creation of a VM template.

Create VM Template Wizard

The "Context" tab is selected. Under "SSH", the "Add SSH contextualization" checkbox is checked. Under "Network", the "Add Network contextualization" checkbox is checked. Under "OneGate token", the "Add OneGate token" checkbox is unchecked.

Templates List

A table lists existing templates:

ID	Owner	Group	Name	Registration time
1	opennebula	users	template_winxp	13:20:37 16/01/2021
0	oneadmin	oneadmin	ttylinux	03:16:57 21/11/2012

Template Details

Information for template **template - template_winxp**:

ID	Name	Register time
1	template_winxp	13:20:37 16/01/2021

Permissions table:

Permissions:	Use	Manage	Admin
Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Click on instantiate

Screenshot of the OpenNebula Sunstone web interface showing the instantiation of a VM template and the resulting VM list.

Instantiation Step:

- The "Templates" section shows an "Instantiate VM Template" dialog.
- VM Name: WindowsXP
- # VMs: 1
- Instantiation button is highlighted.

Template Details:

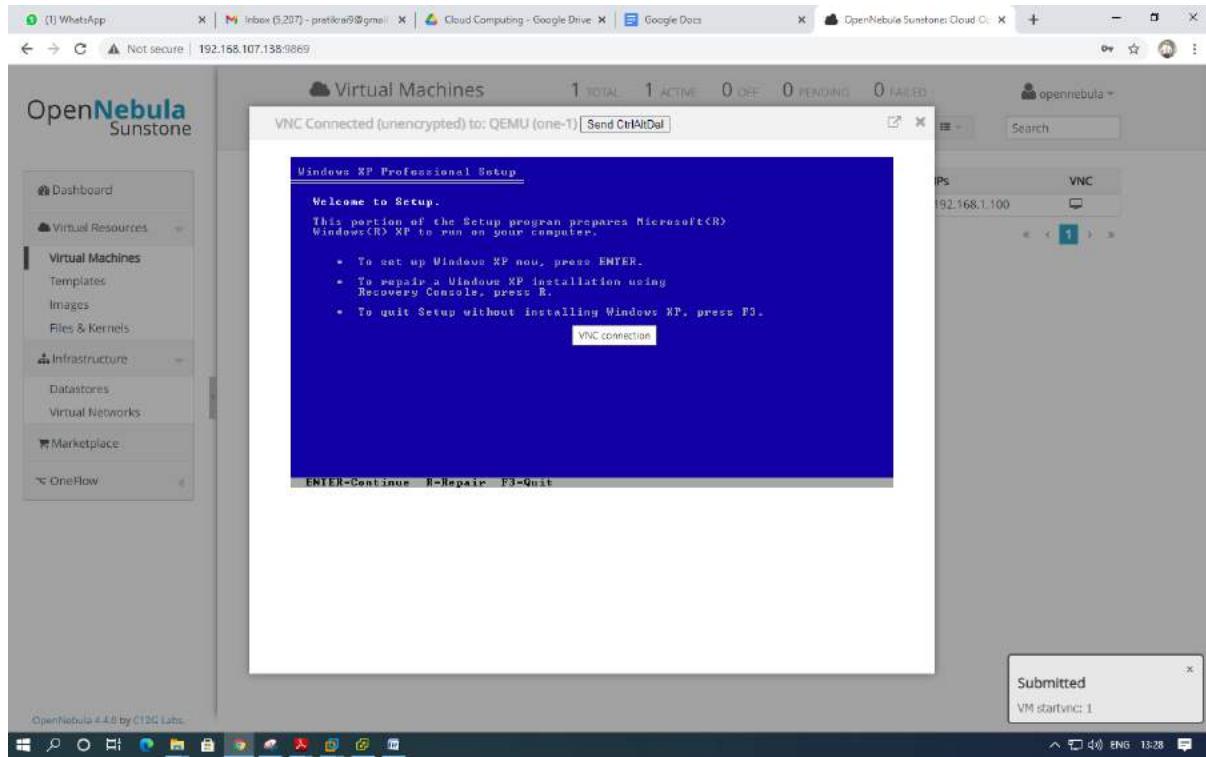
ID	Name	Register time
1	template_winxp	13:20:37 16/01/2021

Permissions:

Owner	Use	Manage	Admin
opennebula	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Virtual Machines List:

ID	Owner	Group	Name	Status	Host	IPs	VNC
1	opennebula	users	WindowsXP	RUNNING	one-sandbox	192.168.1.100	



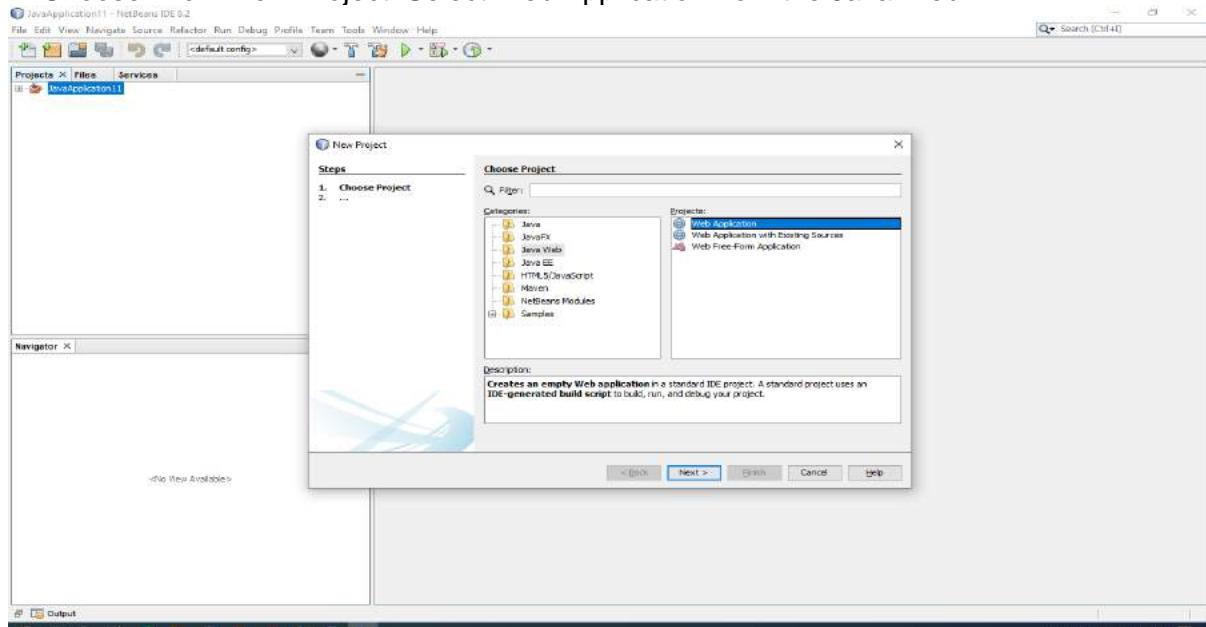
Practical 8

Implementing “Big” Web Service.

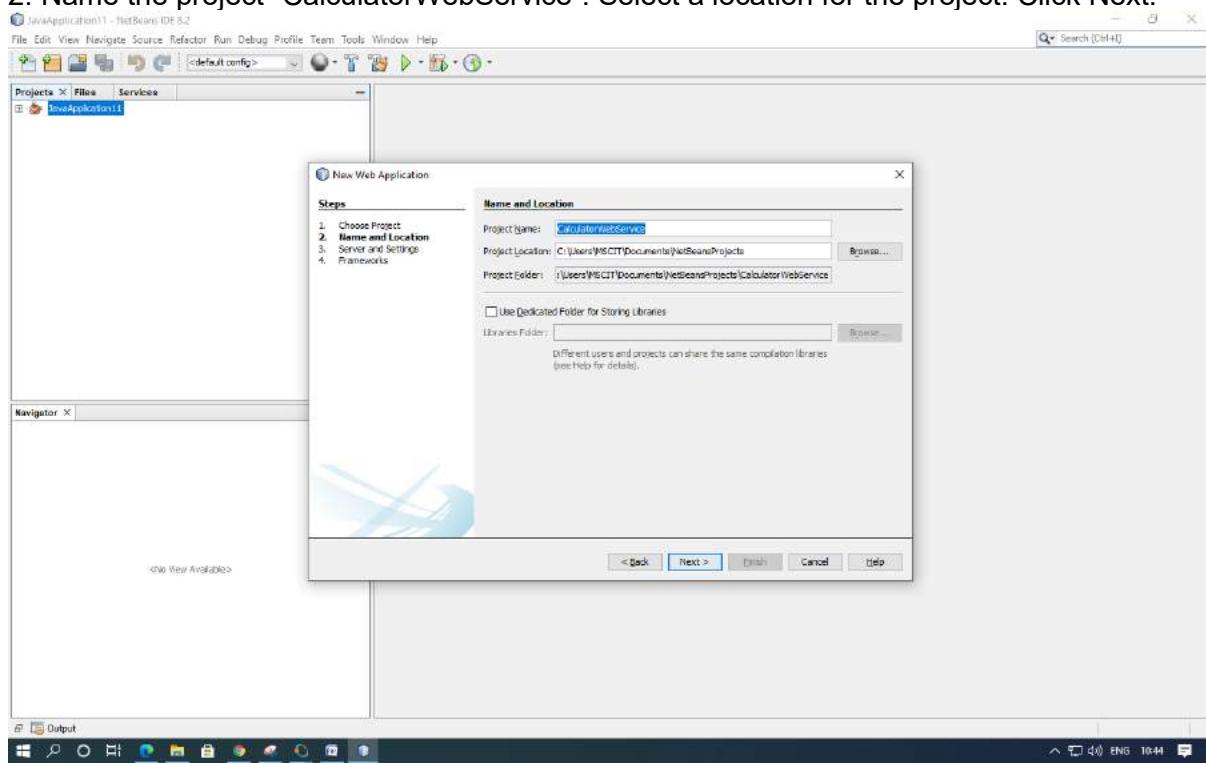
1) Creating a Web Service

A. Choosing a Container: Open NetBeans IDE 8.2

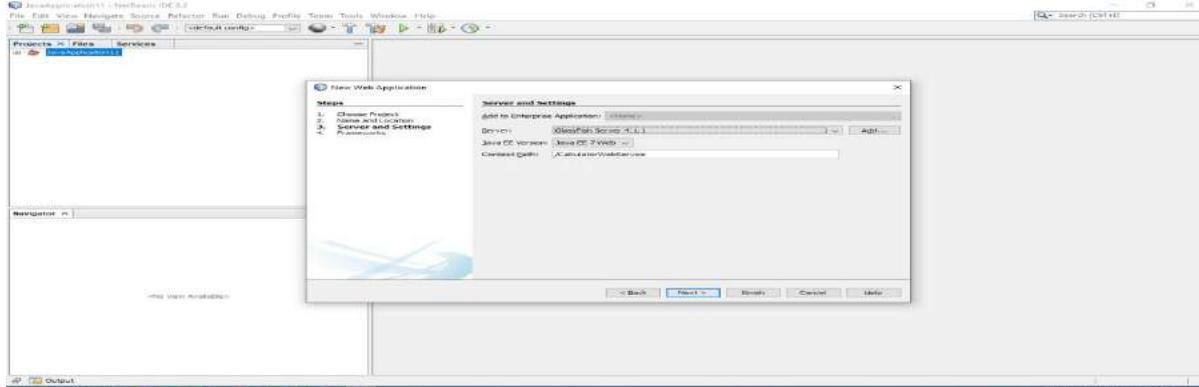
1. Choose File > New Project. Select Web Application from the Java Web.



2. Name the project “CalculatorWebService”. Select a location for the project. Click Next.

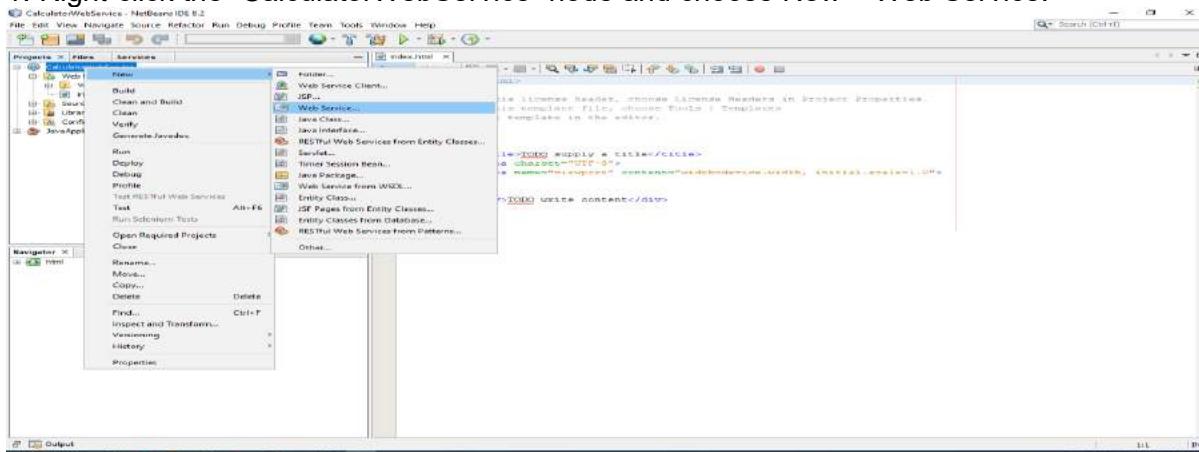


3. Select your server and Java EE version and click Finish. (Do not do anything in Framework)

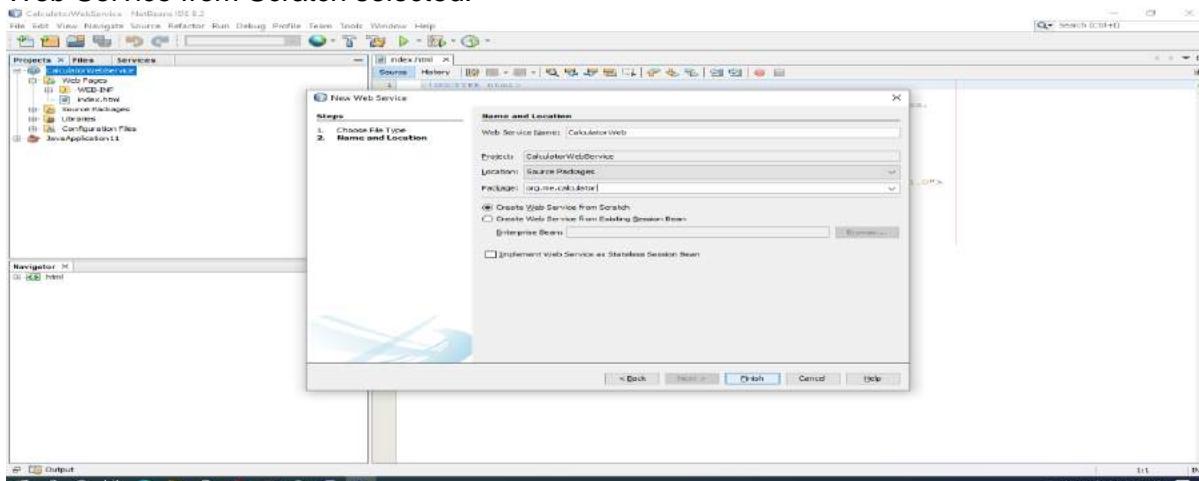


B. Creating a Web Service from a Java Class

1. Right-click the “CalculatorWebService” node and choose New > Web Service.



2. Name the web service “CalculatorWeb” and type org.me.calculator in Package. Leave Create Web Service from Scratch selected.

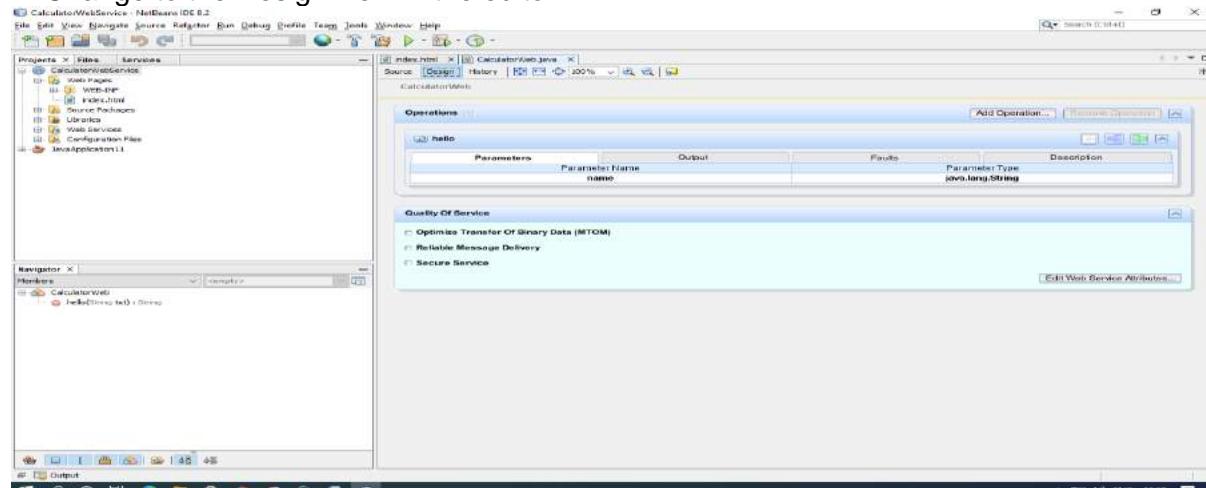


3. Click Finish. The Projects window displays the structure of the new web service and the source code is shown in the editor area.

2) Adding an Operation to the Web Service: The goal of this exercise is to add to the web service an operation that adds two numbers received from a client. The NetBeans IDE provides a dialog for adding an operation to a web service. You can open this dialog either in the web service visual designer or in the web service context menu.

A. To add an operation to the web service:

1. Change to the Design view in the editor.

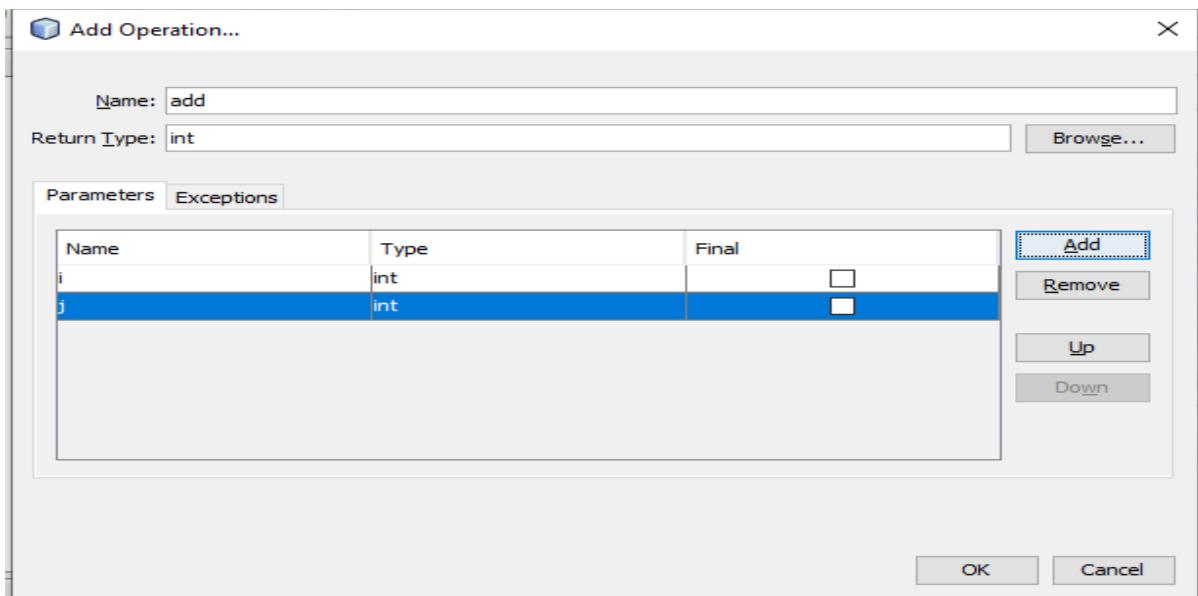


2. Click Add Operation in either the visual designer or the context menu. The Add Operation dialog opens.

3. In the upper part of the Add Operation dialog box, type add in Name and type int in the Return Type drop-down list.

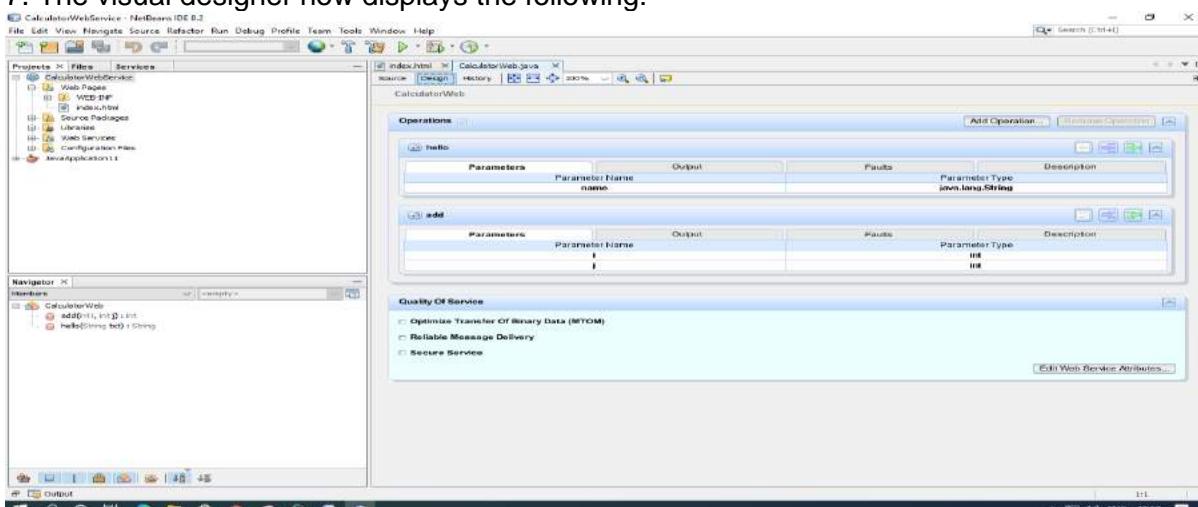
4. In the lower part of the Add Operation dialog box, click Add and create a parameter of type int named i.

5. Click Add again and create a parameter of type int called j. You now see the following:



6. Click OK at the bottom of the Add Operation dialog box. You return to the editor.

7. The visual designer now displays the following:



8. Click Source. And code the following.

```
@WebMethod(operationName = "add")
public int add(@WebParam(name = "i") int i, @WebParam(name = "j") int j) {
    int k = i + j;
    return k;
}
```

```

CalculatorWebService - NetBeans IDE 8.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Projects Files Services
CalculatorWebService
  Web Pages
    Web-HTML
      index.html
    Source Packages
    Libraries
    Web Services
    Configuration Files
    Java Application
add - Navigator
Members: CalculatorWeb
  addHello(int txt)
  hello(String txt)
Source index.html [CalculatorWeb.java]
Source Design History
1 /**
2  * To change this license header, choose License Headers in Project Properties.
3  * To change this template file, choose Tools | Templates
4  * and open the template in the editor.
5 */
6 package org.mee.calculator;
7
8 import javax.jws.WebService;
9 import javax.jws.WebMethod;
10 import javax.jws.WebParam;
11
12 /**
13  * Author NSCIT
14 */
15 @WebService(serviceName = "CalculatorWeb")
16 public class CalculatorWeb {
17
18     /**
19      * This is a sample web service operation
20     */
21     @WebMethod(operationName = "hello")
22     public String hello(@WebParam(name = "name") String txt) {
23         return "Hello " + txt + " !";
24     }
25
26     /**
27      * Web service operation
28     */
29     @WebMethod(operationName = "add")
30     public int add(@WebParam(name = "i") int i, @WebParam(name = "j") int j) {
31         int k = i + j;
32         return k;
33     }
34 }

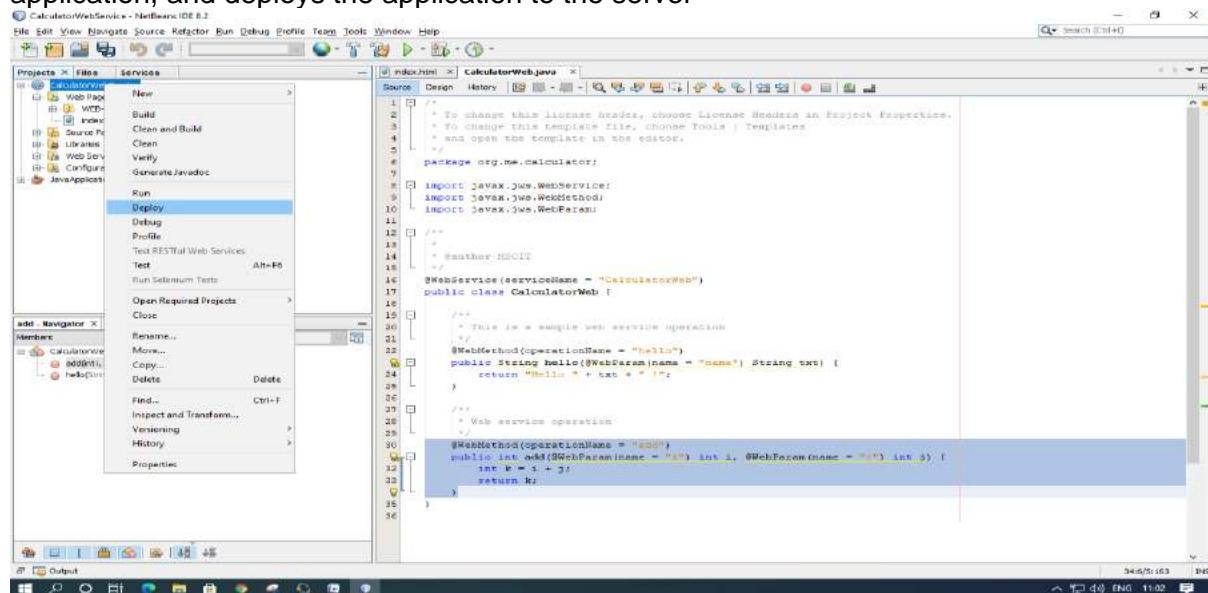
```

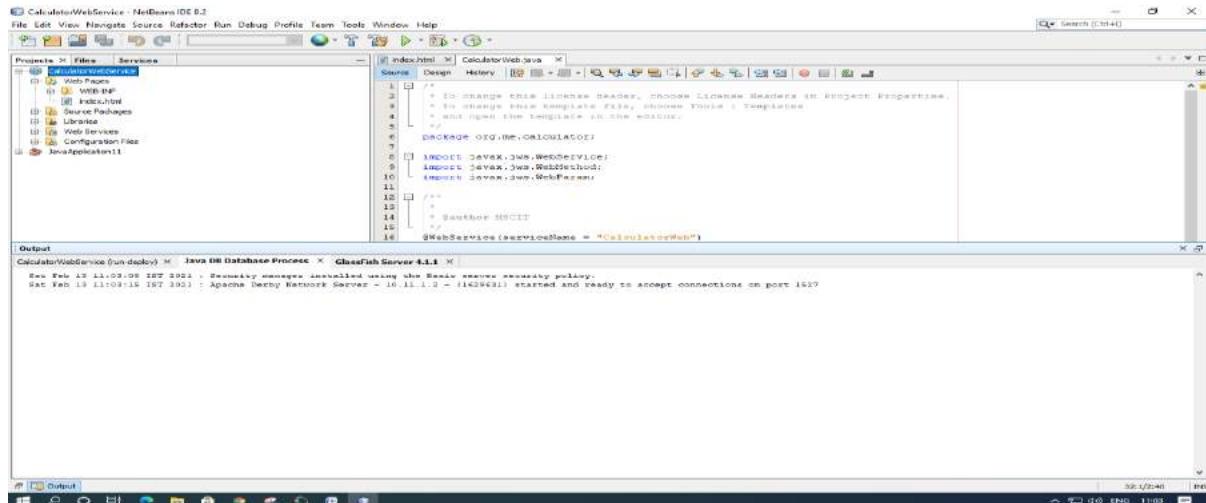
3) Deploying and Testing the Web Service

After you deploy a web service to a server, you can use the IDE to open the server's test client, if the server has a test client. The GlassFish and WebLogic servers provide test clients.

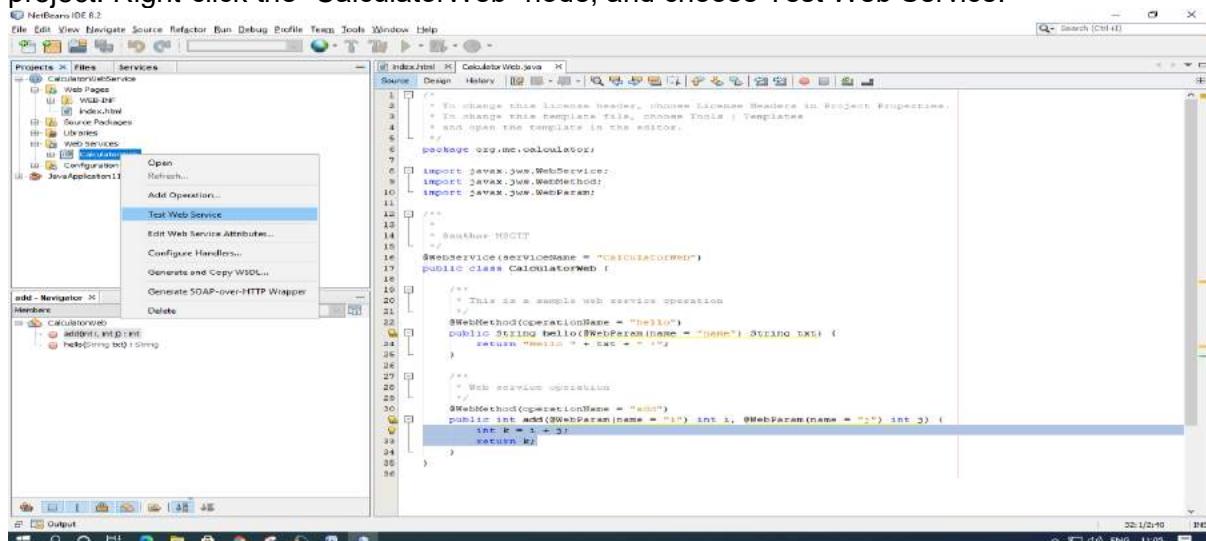
A. To test successful deployment to a GlassFish or WebLogic server:

1. Right-click the project and choose Deploy. The IDE starts the application server, builds the application, and deploys the application to the server

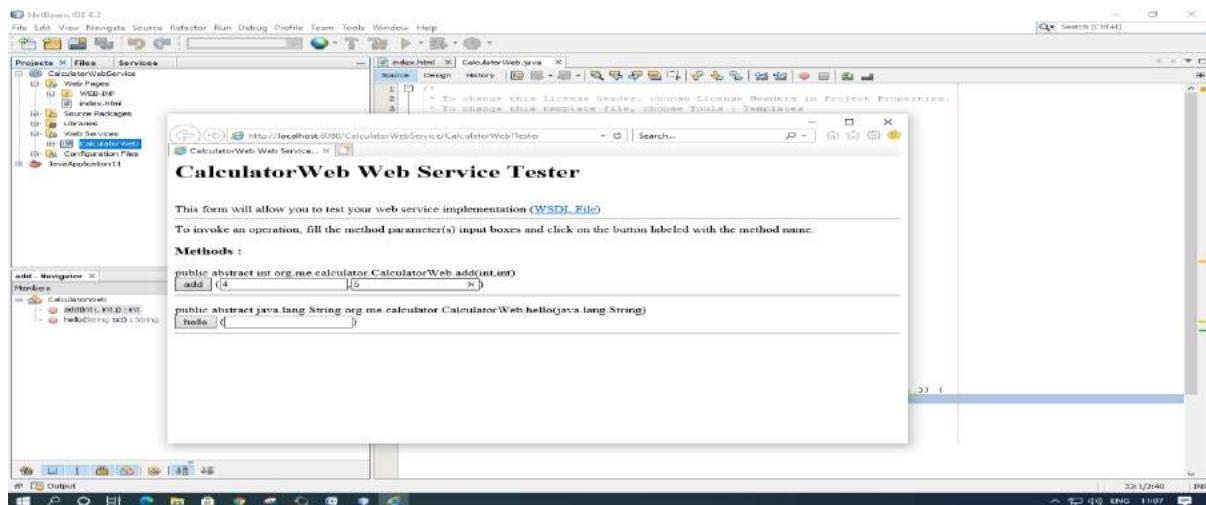




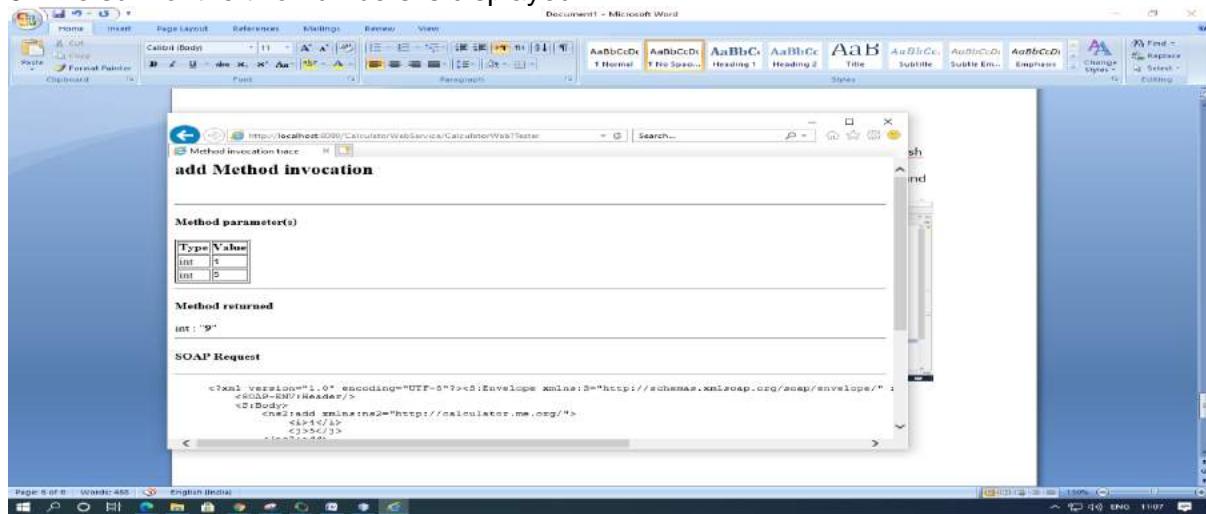
2. In the IDE's Projects tab, expand the Web Services node of the "CalculatorWebService" project. Right-click the "CalculatorWeb" node, and choose Test Web Service.



3. The IDE opens the tester page in your browser, if you deployed a web application to the GlassFish server.
 4. If you deployed to the GlassFish server, type two numbers in the tester page, as shown below and press enter for output.



5. The sum of the two numbers is displayed:

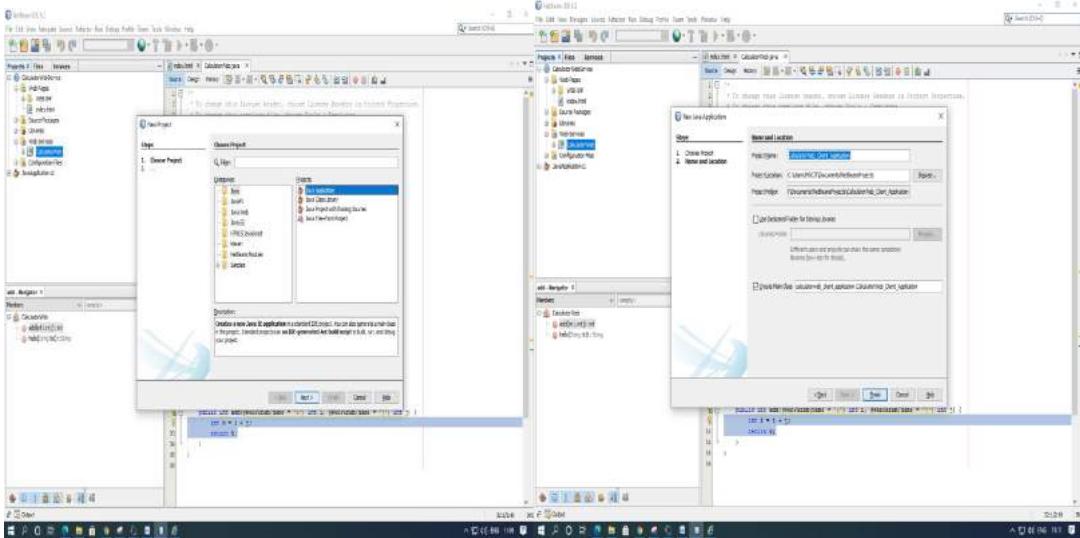


4) Consuming the Web Service

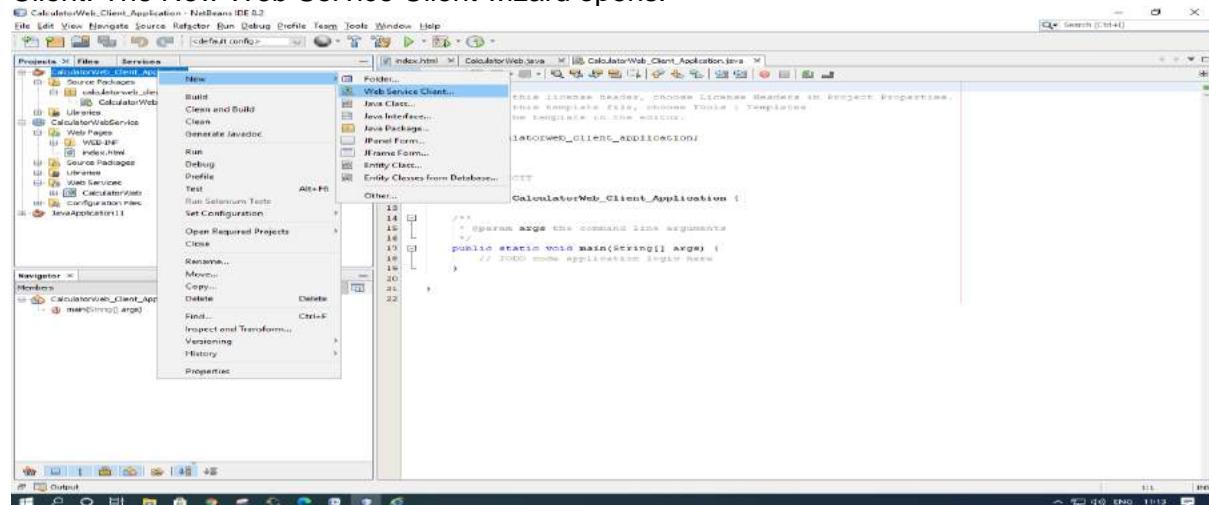
Now that you have deployed the web service, you need to create a client to make use of the web service's add method.

1. Client: Java Class in Java SE Application

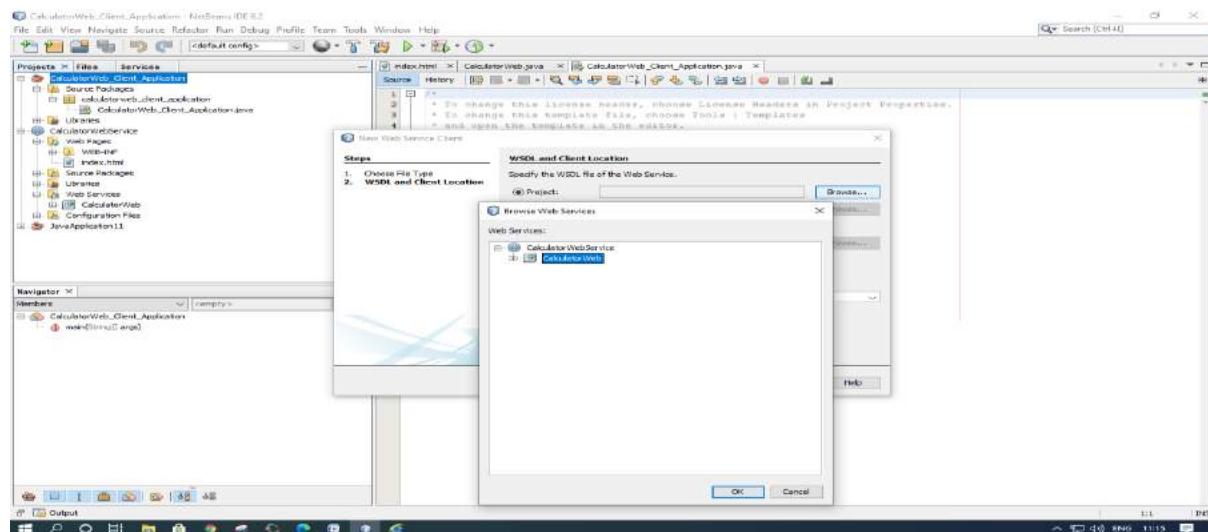
1. Choose File > New Project. Select Java Application from the Java category. Name the project “CalculatorWeb_Client_Application”. Leave Create Main Class selected and accept all other default settings. Click Finish.



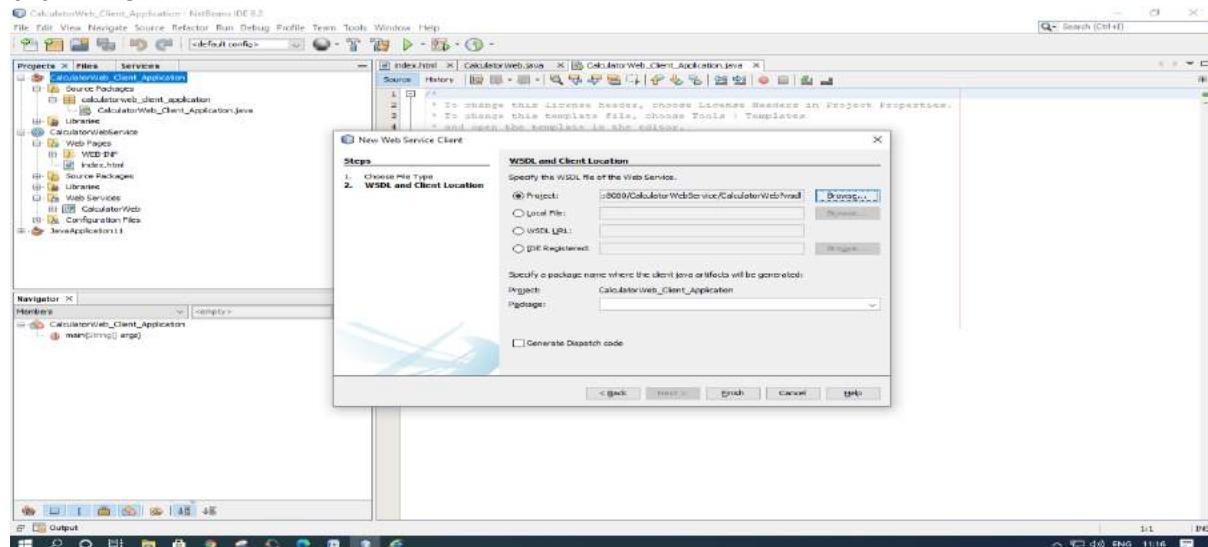
- Right-click the “CalculatorWeb_Client_Application” node and choose New > Web Service Client. The New Web Service Client wizard opens.



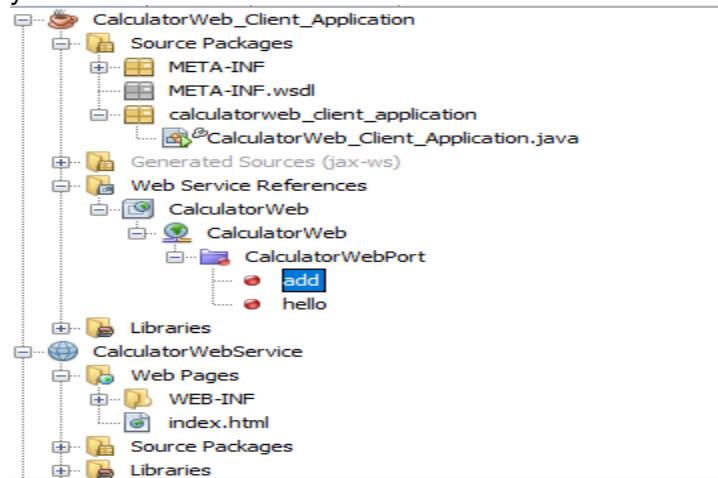
- Select Project as the WSDL source. Click Browse. Browse to the “CalculatorWeb” web service in the “CalculatorWebService” project. When you have selected the web service, click OK.



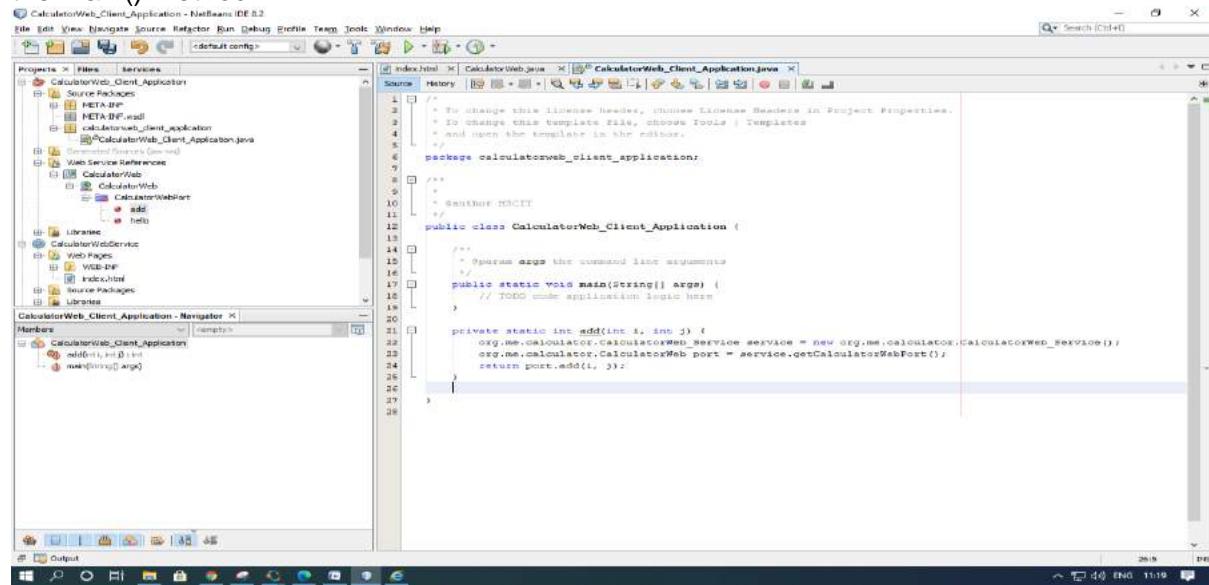
4. Do not select a package name. Leave this field empty. Leave the other settings at default and click Finish.



5. The Projects window displays the new web service client, with a node for the add method that you created:



6. Double-click your main class so that it opens in the Source Editor. Drag the add node below the main() method.



7. In the main() method body, replace the TODO comment with code that initializes values for i and j, calls add(), and prints the result.

```
try
{
    int i = 3;
    int j = 4;
    int result = add(i, j);
    System.out.println("Result = " + result);
}
catch (Exception ex)
{
    System.out.println("Exception: " + ex);
}
```

The screenshot shows the NetBeans IDE interface with the following details:

- Title Bar:** CalculatorWeb_Client_Application - NetBeans IDE 8.2
- Menu Bar:** File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
- Toolbar:** Standard NetBeans toolbar with icons for file operations.
- Project Explorer:** Shows the project structure:
 - CalculatorWeb_Client_Application
 - Source Packages
 - META-INF
 - META-INF/webs
 - calculatorweb_client_application
 - CalculatorWeb_Client_Application.java
 - Web Service References
 - CalculatorServices
 - CalculatorWeb
 - CalculatorWebPort
 - CalculatorWebService
 - CalculatorWebStub
 - CalculatorWeb
 - Libraries
 - Source Packages
 - Utilities
- Navigator:** Shows the members of the CalculatorWeb_Client_Application class:
 - CalculatorWeb_Client_Application
 - add(int, int)
 - main(String[] args)
- Code Editor:** Displays the Java code for the main class:

```
index.html CalculatorWeb.java CalculatorWeb_Client_Application.java
Source History
1  /*
2  * To change this license header, choose License Headers in Project Properties.
3  * To change this template file, choose Tools | Templates
4  * and open the template in the editor.
5  */
6
7 package calculatorweb_client_application;
8
9 /**
10  * Author MOGITH
11  */
12
13 public class CalculatorWeb_Client_Application {
14
15     /**
16      * @param args the command line arguments
17     */
18
19     public static void main(String[] args) {
20
21         try {
22             int i = 3;
23             int j = 4;
24             int result = add(i, j);
25             System.out.println("Result = " + result);
26         } catch (Exception ex) {
27             System.out.println("Exception = " + ex);
28         }
29     }
30
31     private static int add(int i, int j) {
32         org.me.calculator.CalculatorWeb_Service service = new org.me.calculator.CalculatorWeb_Service();
33         org.me.calculator.CalculatorWeb port = service.getCalculatorWebPort();
34         return port.add(i, j);
35     }
36
37 }
38
```
- Output:** Standard NetBeans output panel.

8. Right-click the project node and choose Run.

The Output window now shows the sum:

compile: run: Result = 7 BUILD SUCCESSFUL (total time: 1 second)

The screenshot shows the NetBeans IDE interface with the following details:

- Title Bar:** CalculatorWeb_Client_Application - NetBeans IDE 8.2
- Menu Bar:** File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
- Toolbar:** Standard NetBeans toolbar with icons for file operations.
- Project Explorer:** Shows the project structure:
 - CalculatorWeb_Client_Application
 - Source Packages
 - META-INF
 - calculatorweb_client_application
 - Generated Sources (Build)
 - Web Services
 - calculatorweb
 - CalculatorWeb
 - CalculatorWebServlet
 - add
 - help
- Java Editor:** Displays the `CalculatorWeb_Client_Application.java` file content:

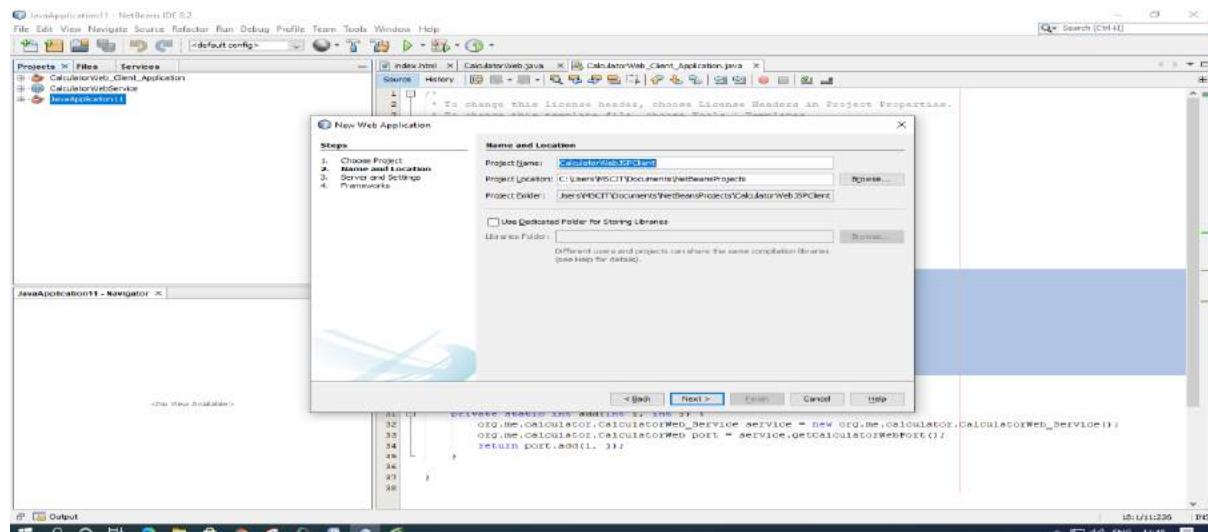
```
1 // To change this license header, choose License Headers in Project Properties.
2 // To change this template file, choose Tools | Templates.
3 // To change this template file, choose Tools | Templates.
4 //
5 package calculatorweb_client_application;
6
7 /**
8 * Author: HSCIT
9 */
10 public class CalculatorWeb_Client_Application {
11
12     /**
13      * Sparas args the command line arguments
14     */
15 }
16 
```
- Output:** Shows the build process for GlassFish Server 4.1.1.

```
Java DB Database Process X GlassFish Server 4.1.1 X Retriever Output X CalculatorWeb_Client_Application (Run) X
[INFO] -e C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\internal.action.name=run run
[LIFECYCLE]
deps.jar:
Upgrading property file: G:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\libs.properties
warning: [options] bootstrap class path not set in initial boot.properties
files are up to date
[INFO] -e C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
[INFO] -e C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\empty
Created dir: C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\empty
Created OIF: C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\generated-sources\ap-source\output
Compiling 5 source files to C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
Compiling 2 source files to C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\empty
Compiled 2 empty directories, no 1 empty directory under C:\Users\HSCIT\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
compile:
[INFO]
[INFO] Results:
[INFO] Testsuite: Test
[INFO] Tests run: 7, Failures: 0, Errors: 0, Skipped: 0
[INFO] BUILD SUCCESSFUL (total time: 1 second)
```

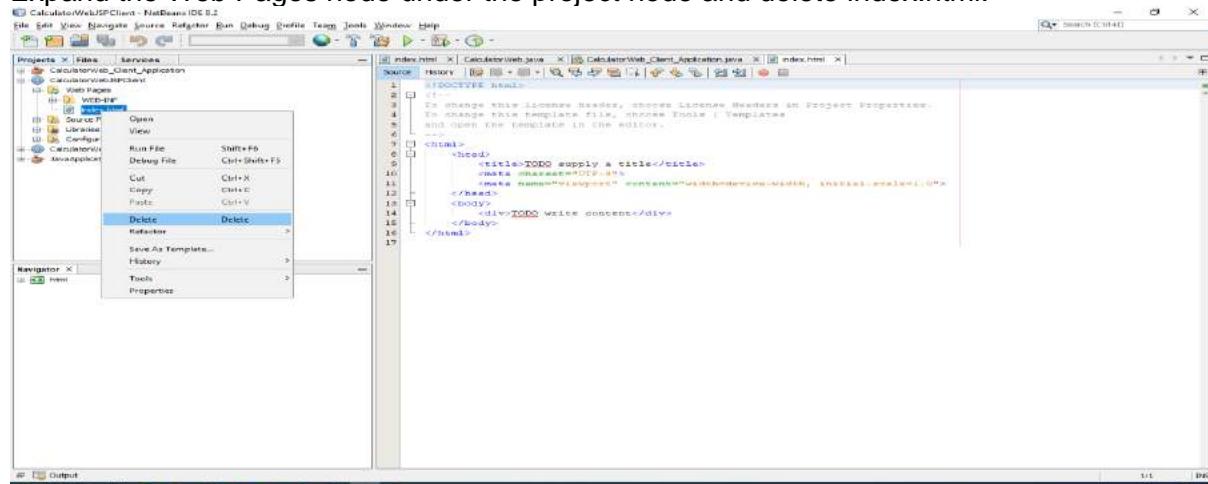
Client : JSP Page in Web Application

In this section, you create a new web application and then consume the web service in the default JSP page that the Web Application wizard creates.

Choose File > New Project. Select Web Application from the Java Web category. Name the project CalculatorWebJSPClient. Click Next and then click Finish.

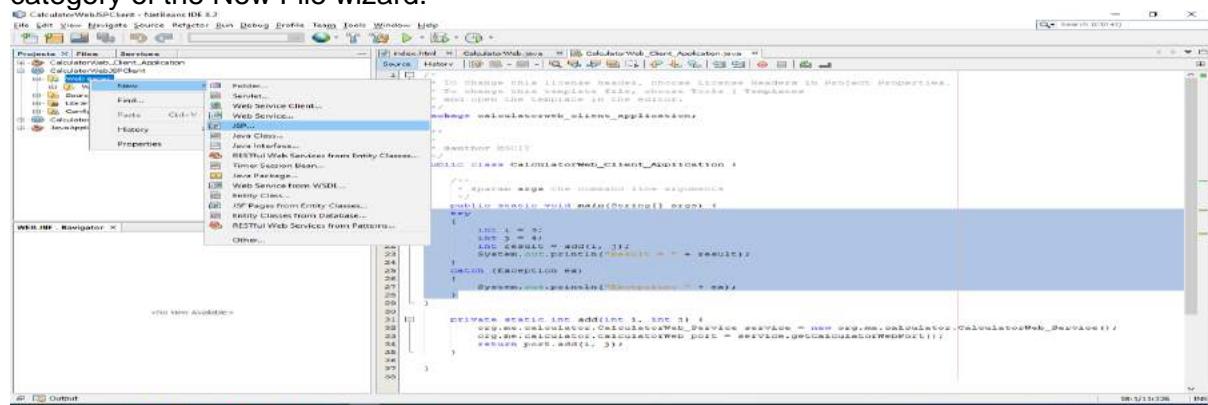


Expand the Web Pages node under the project node and delete index.html.

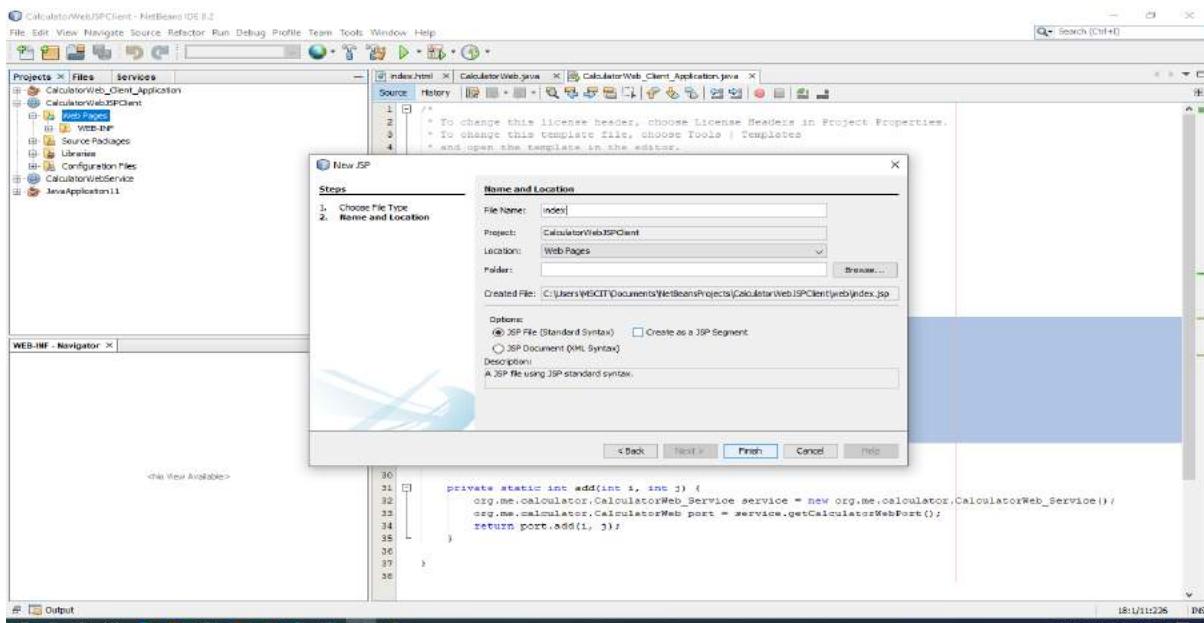


Right-click the Web Pages node and choose New > JSP in the popup menu.

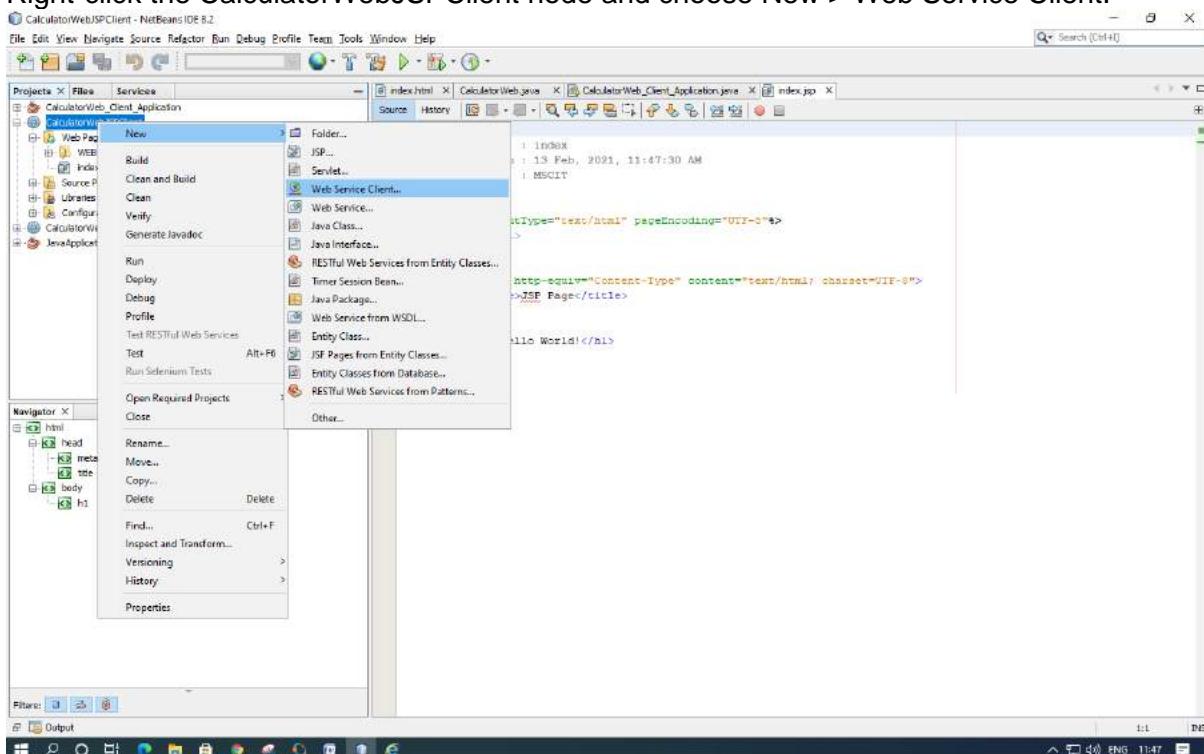
If JSP is not available in the popup menu, choose New > Other and select JSP in the Web category of the New File wizard.



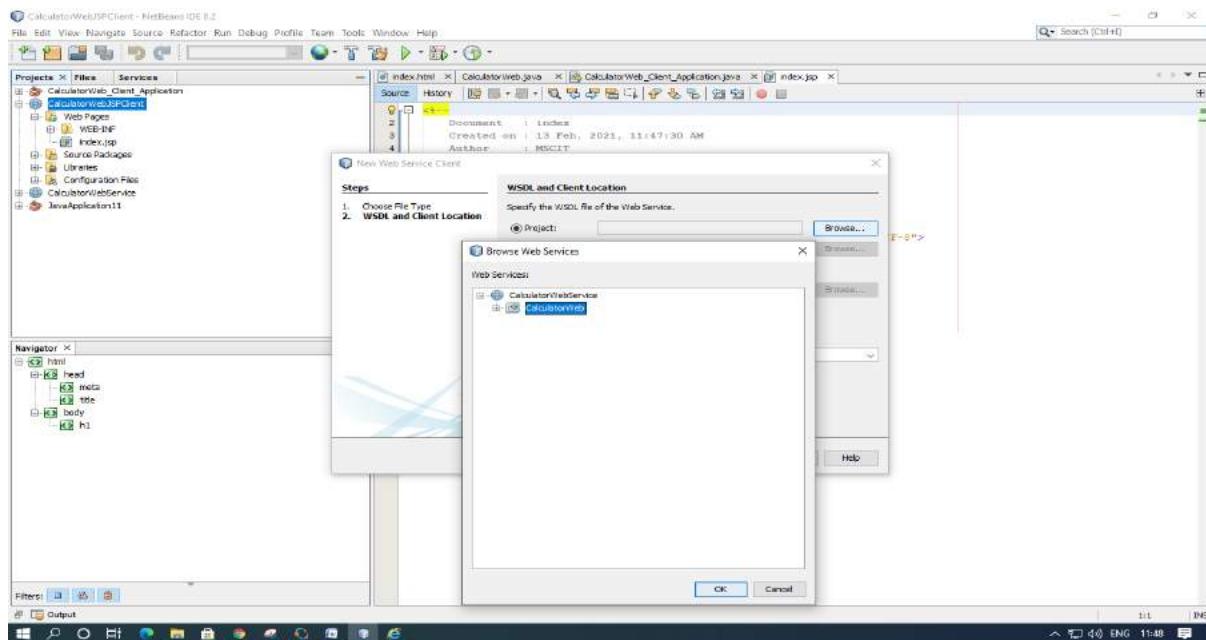
Type index for the name of the JSP file in the New File wizard. Click Finish.



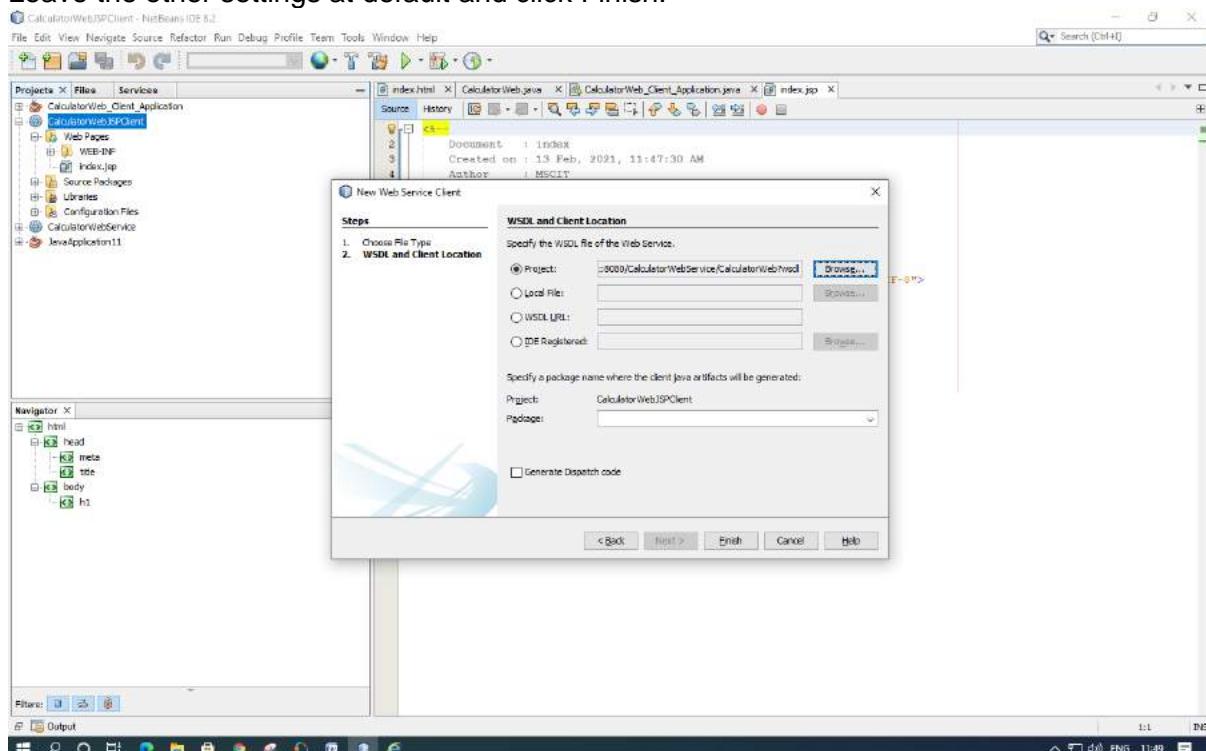
Right-click the CalculatorWebJSPClient node and choose New > Web Service Client.



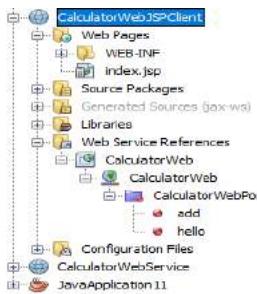
Select Project as the WSDL source. Click Browse. Browse to the CalculatorWeb web service in the CalculatorWebService project. When you have selected the web service, click OK.



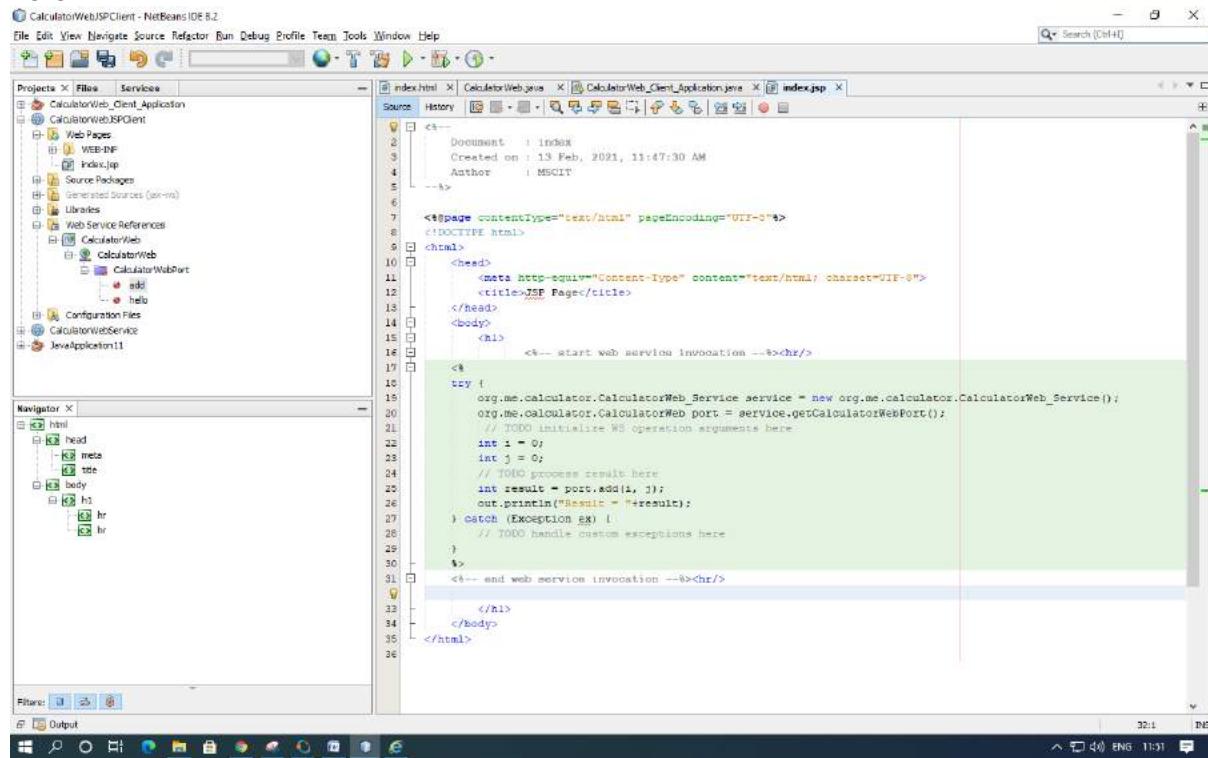
Do not select a package name. Leave this field empty.
Leave the other settings at default and click Finish.



The Projects window displays the new web service client, as shown below:



In the Web Service References node, expand the node that represents the web service. The add operation, which you will invoke from the client, is now exposed. Drag the add operation to the client's index.jsp page, and drop it below the H1 tags. The code for invoking the service's operation is now generated in the index.jsp page, as you can see here:



Change the value for i and j from 0 to other integers, such as 3 and 4. Replace the commented out TODO line in the catch block with out.println("exception" + ex);

```

<%-- Start web service invocation --%>
try {
    org.me.calculator.CalculatorWeb_Service service = new org.me.calculator.CalculatorWeb_Service();
    org.me.calculator.CalculatorWeb port = service.getCalculatorWebPort();
    // TODO initialize WS operation arguments here
    int i = 3;
    int j = 4;
    // TODO process result here
    int result = port.add(i, j);
    out.println("Result = " + result);
} catch (Exception ex) {
    out.println("exception" + ex);
}
<%-- End web service invocation --%><hr/>

```

Right-click the project node and choose Run.

The server starts, if it wasn't running already. The application is built and deployed, and the browser opens, displaying the calculation result:

