



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

**DEPARTMENT OF INFORMATION  
TECHNOLOGY**

**2020 - 2021**

**M.Sc.( I.T.) SEM I  
Cloud Computing**

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**Roll No. : 11**



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## **CERTIFICATE**

This is to certify that Miss. **Sneha Ramchandra Pawar** with Roll No. **11** has successfully completed the necessary course of experiments in the subject of **CLOUD COMPUTING** during the academic year **2019 – 2020** complying with the requirements of **RAMNIRANJAN JHUNJHUNWALA COLLEGE OF ARTS, SCIENCE AND COMMERCE**, for the course of **M.Sc. (IT)** semester -I.

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Internal Examiner

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External Examiner

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Head of Department

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College Seal

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# PRACTICAL: 1

## Implementing Cluster on Windows

### Softwares Required :-

- **VMware Workstation 15.5 PRO**
- **Windows Server 2012 iso file**

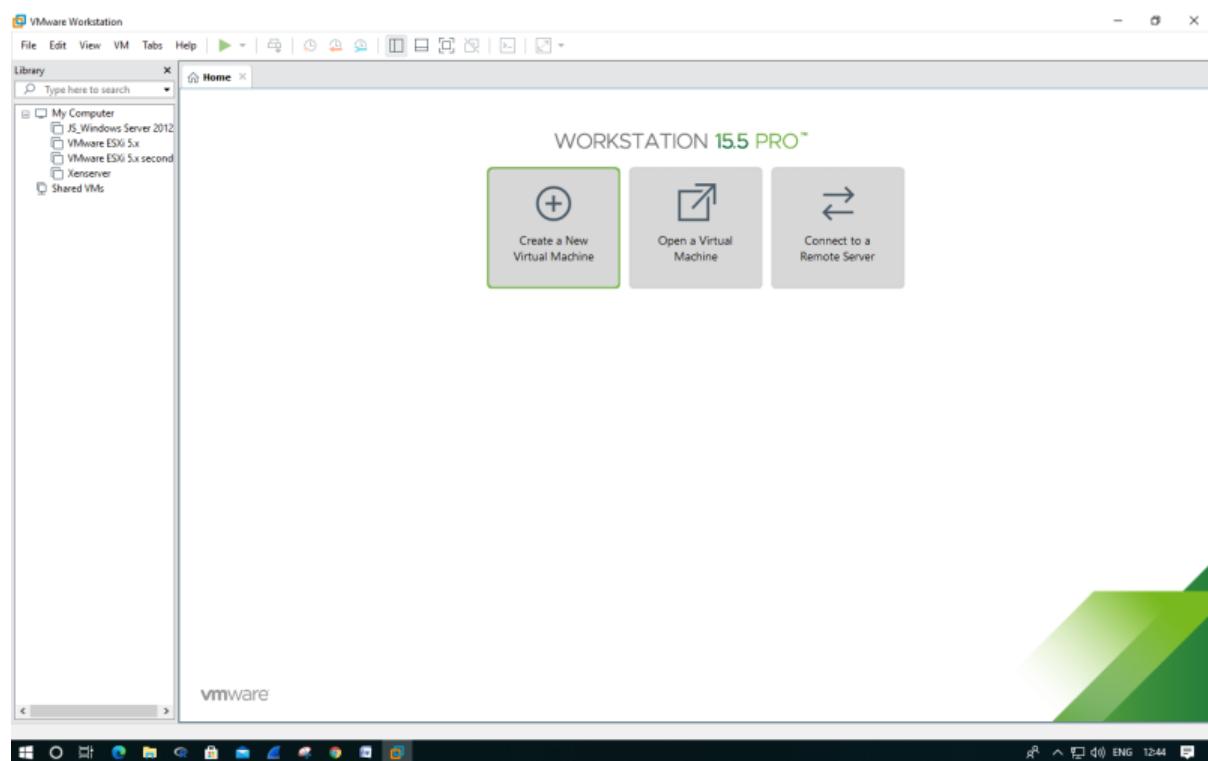
### Steps :

#### What is a Cluster ?

A Computer cluster is a group of two or more computers, or nodes, that run in parallel to achieve a common goal. This allows workloads consisting of a high number of individual, parallelizable tasks to be distributed among the nodes in the cluster. As a result, these tasks can leverage the combined memory and processing power of each computer to increase overall performance.

>> Install the WMWare Workstation.

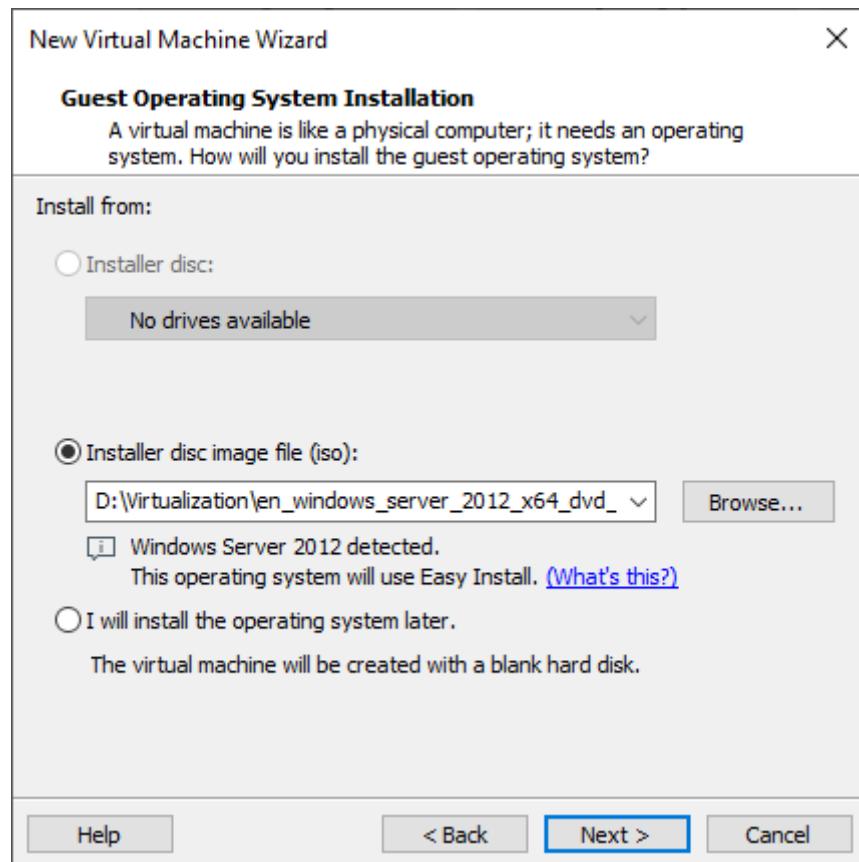
>> To create a new virtual machine click on ‘Create a New Virtual Machine’.



>> In the New Virtual Machine Wizard window select ‘**Typical**’ as a type of configuration of virtual machine and click on **Next**.

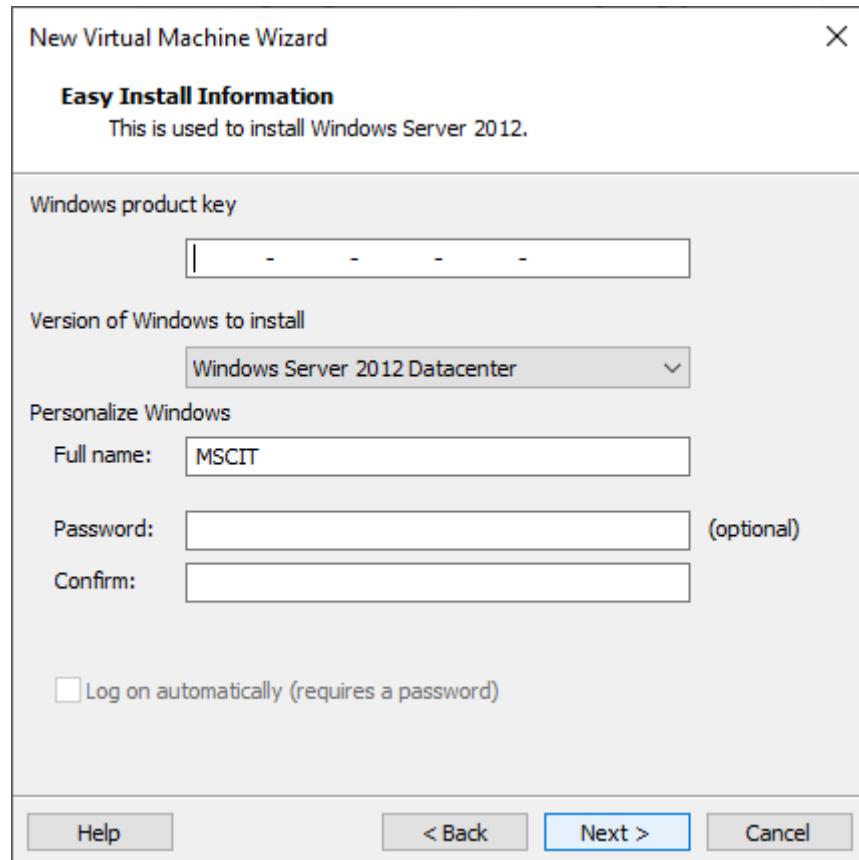


>> Then select ‘**Installer disk image file (iso):**’ option and browse for ‘**Windows Server iso file**’ and then click on **Next**.

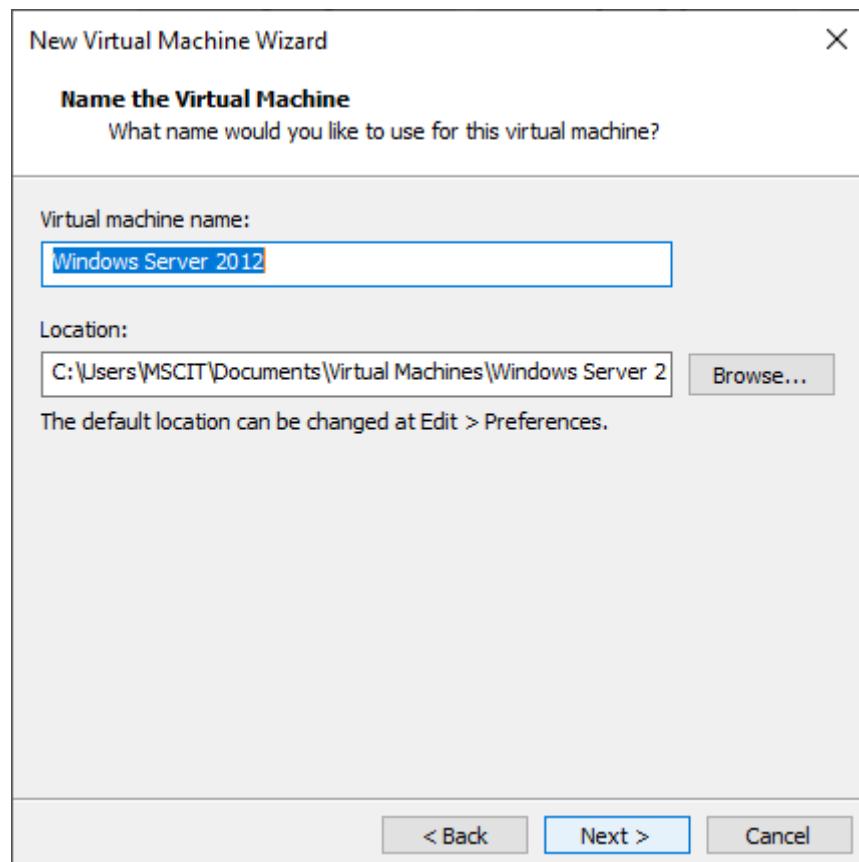


>> In the next tabs

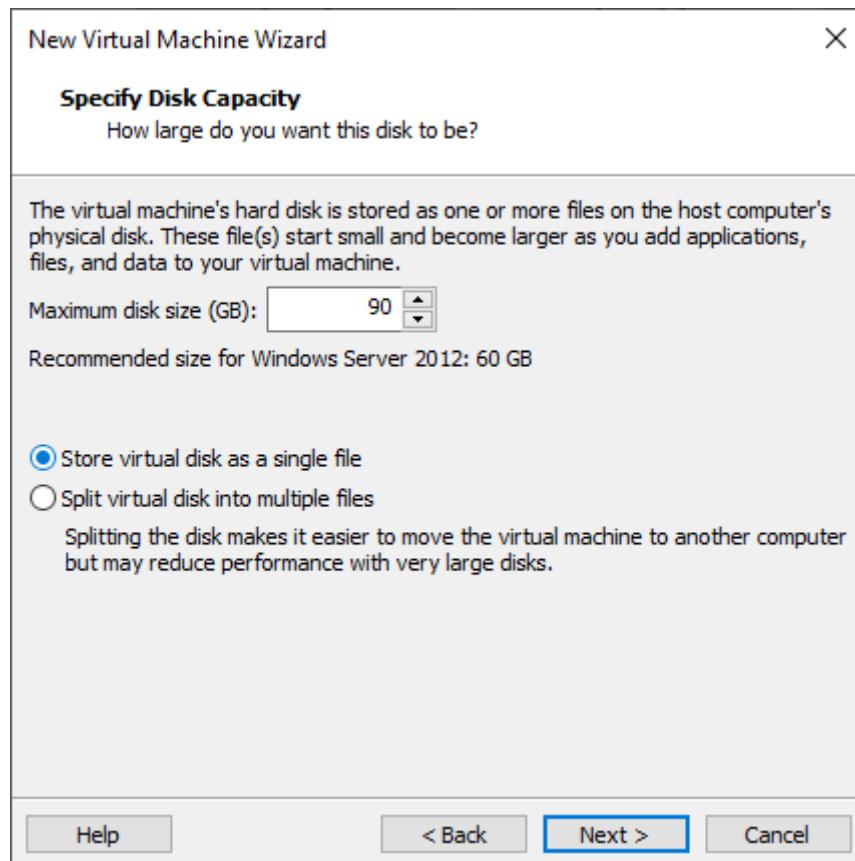
keep the options as default and click on **Next**.



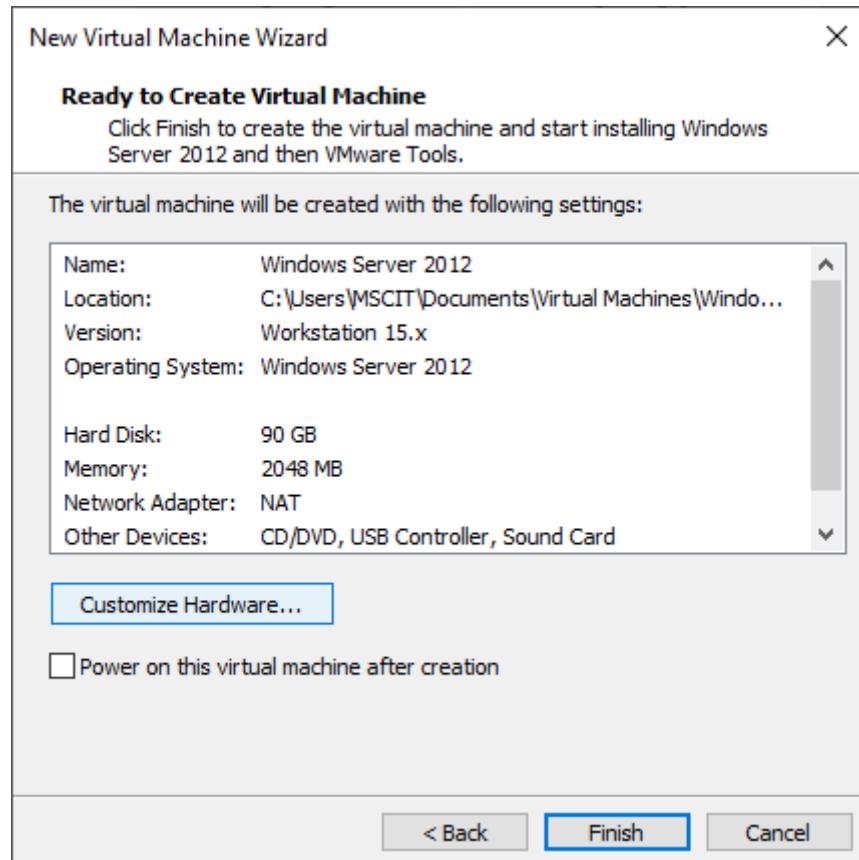
>> Enter a name for your Virtual Machine, and then click on **Next**.



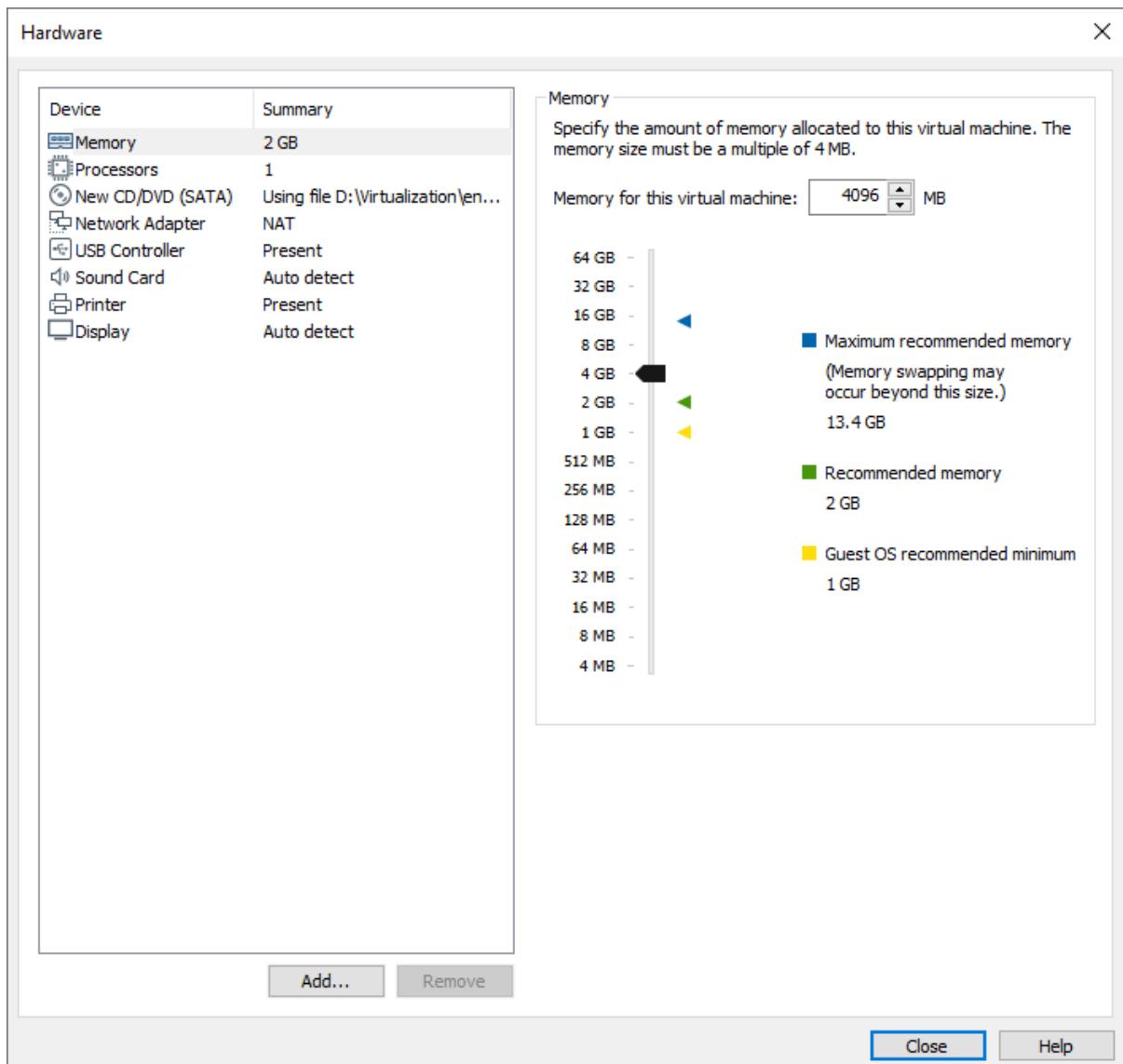
>> In the next tab specify ‘**Maximum disk size (GB): as 90GB**’ and select ‘**Store Virtual Disk as a single file**’ option.



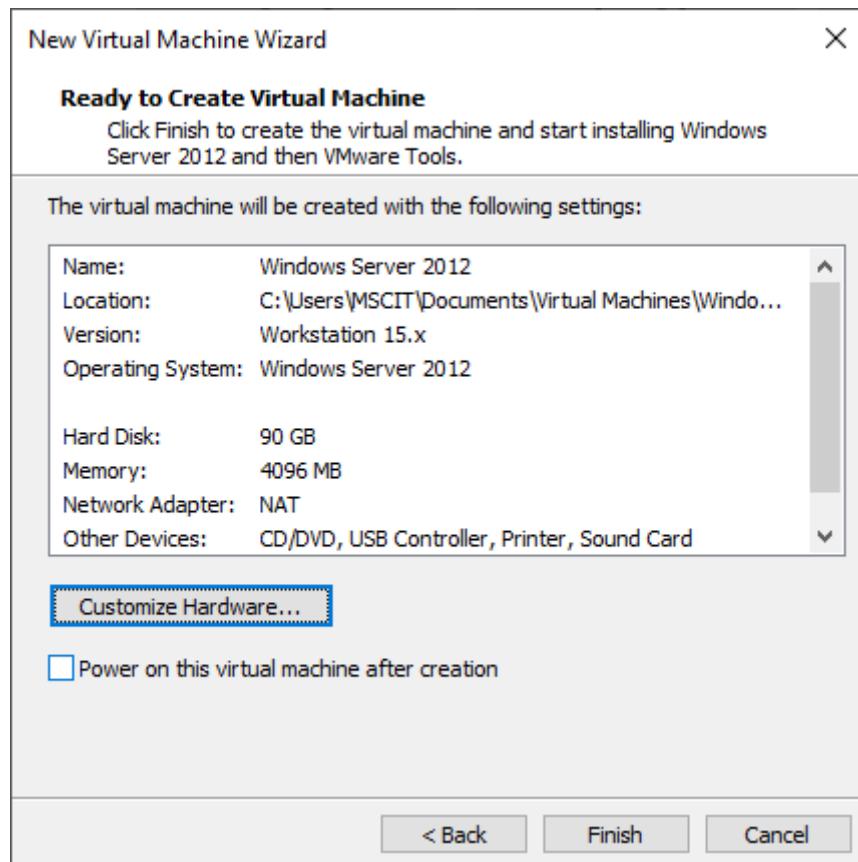
>> In the next tab select ‘**Customize Hardware**’ option.



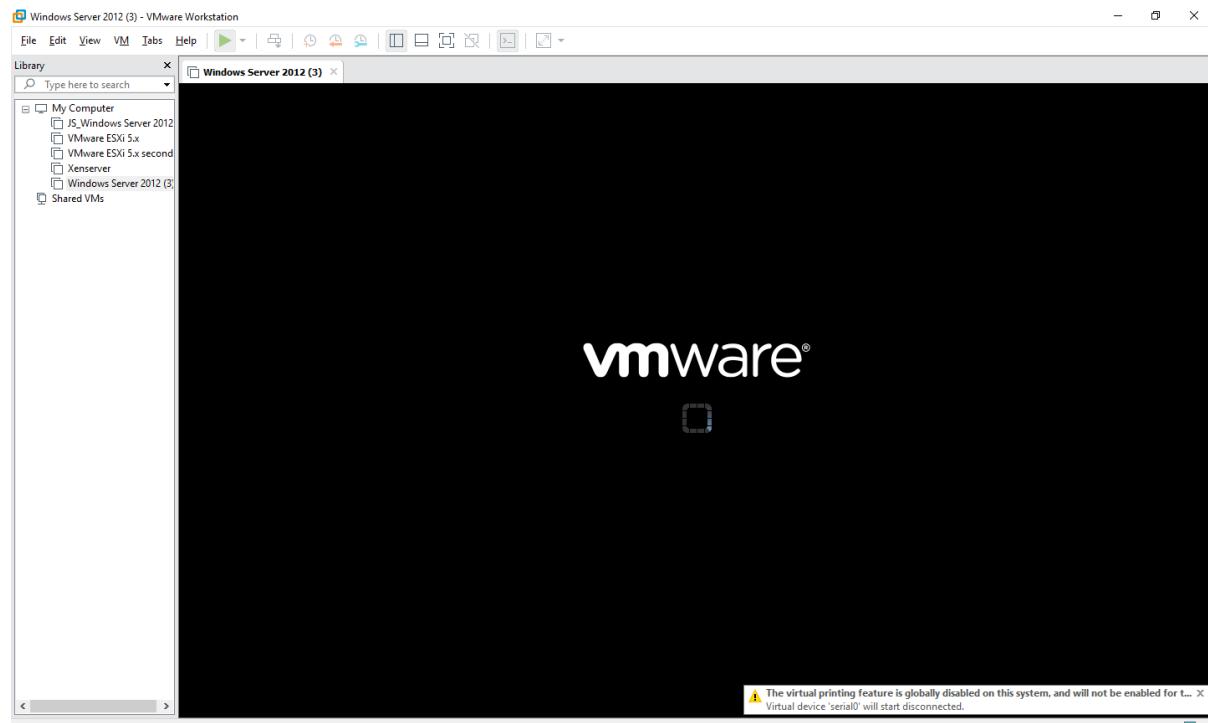
>> In that specify the **memory as 4GB**, and click on **Close**.



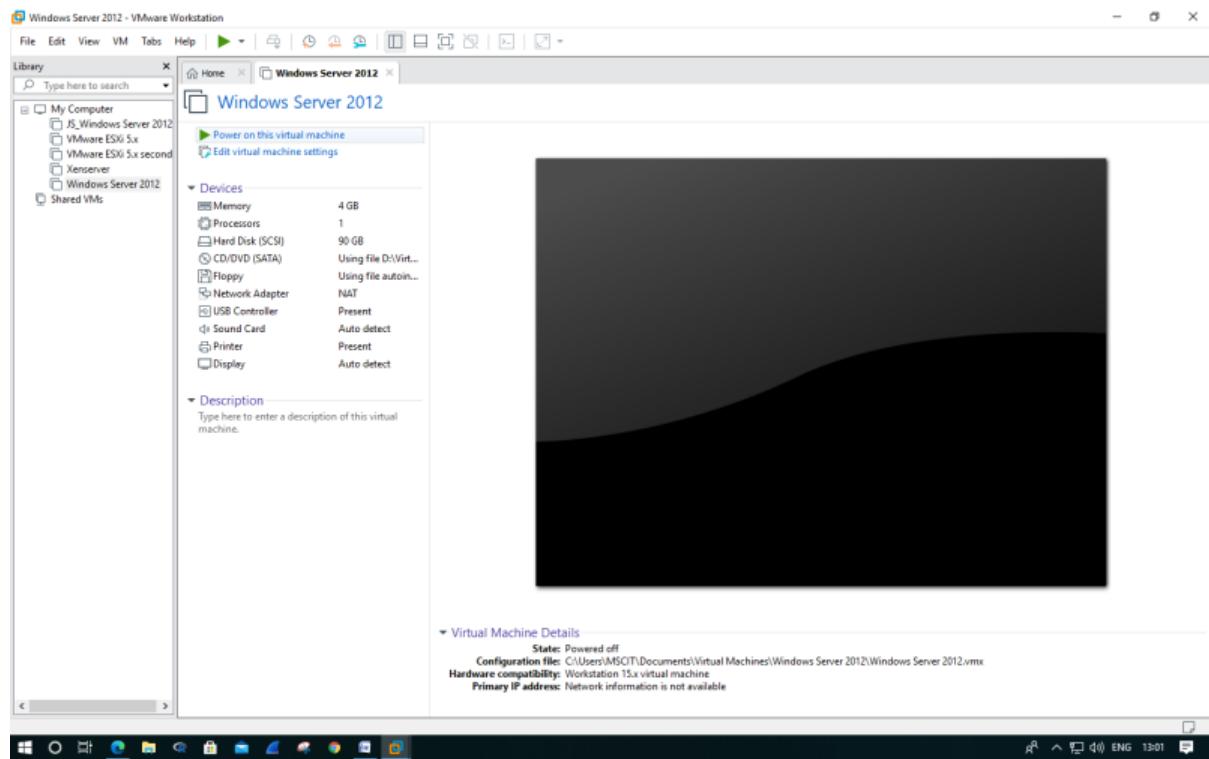
>> And then click on **Finish**.



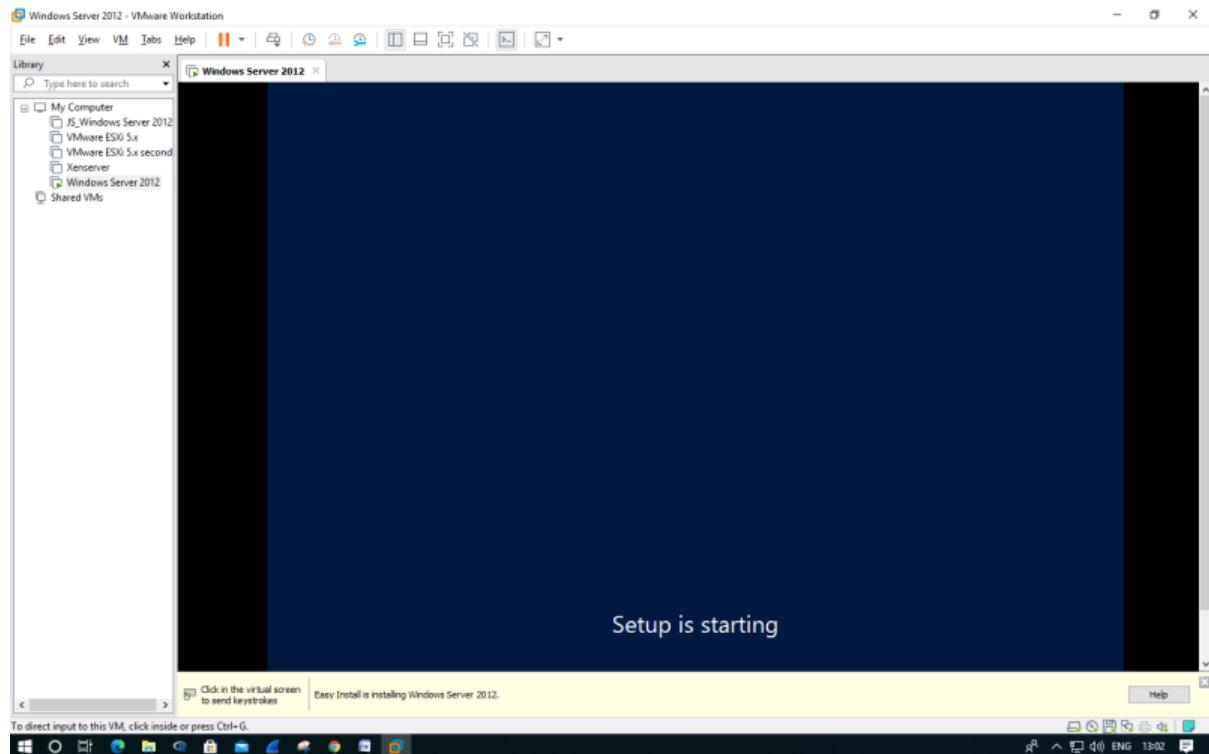
>> Our Virtual Machine will be created.

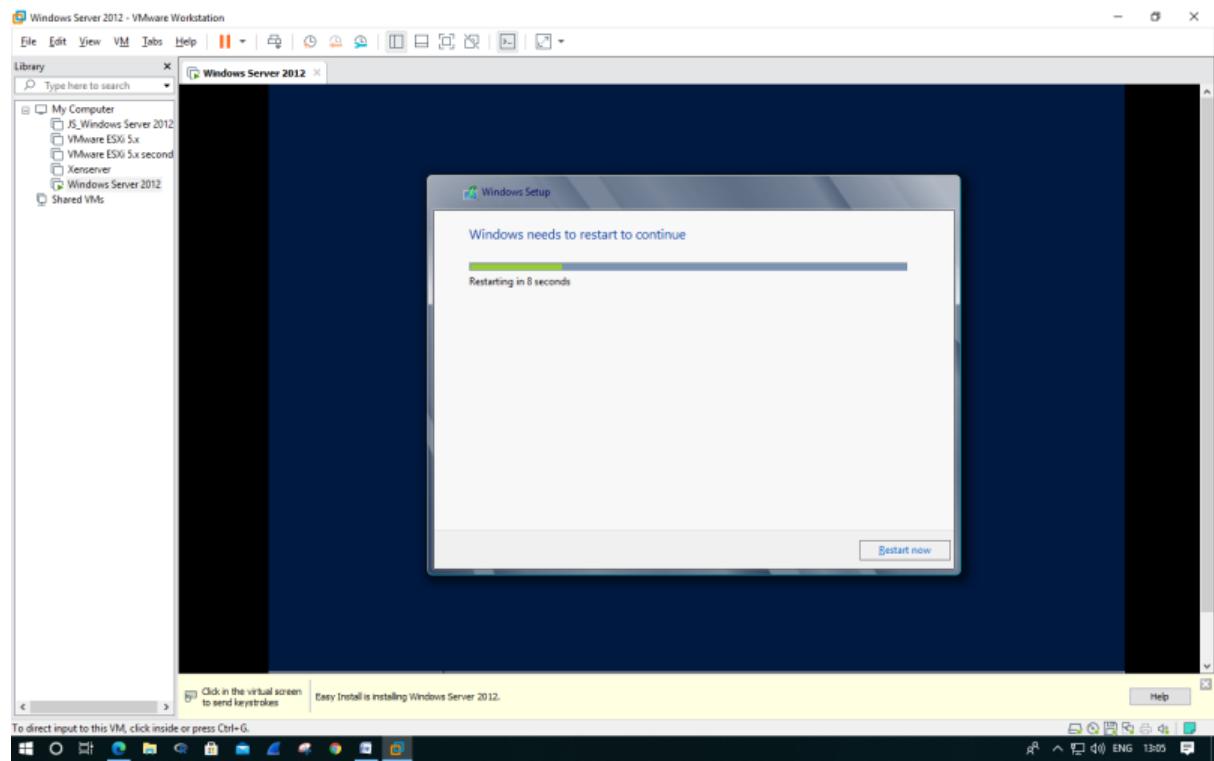
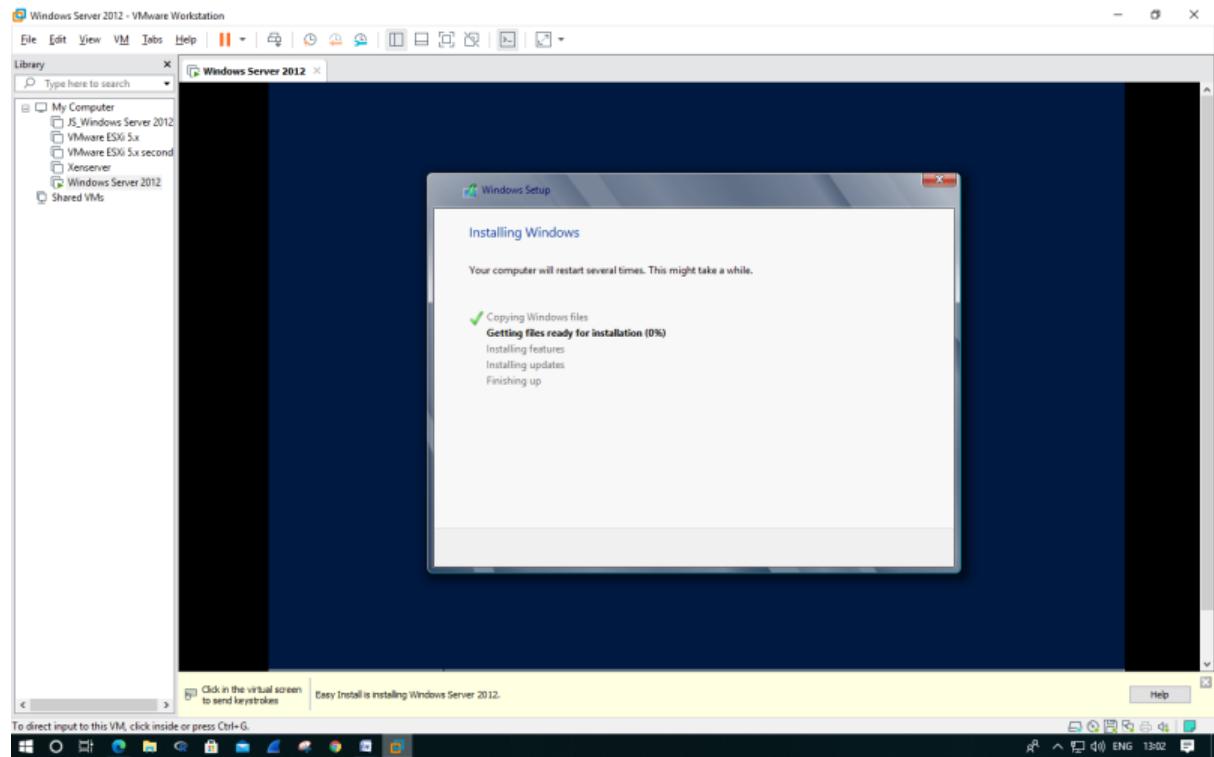


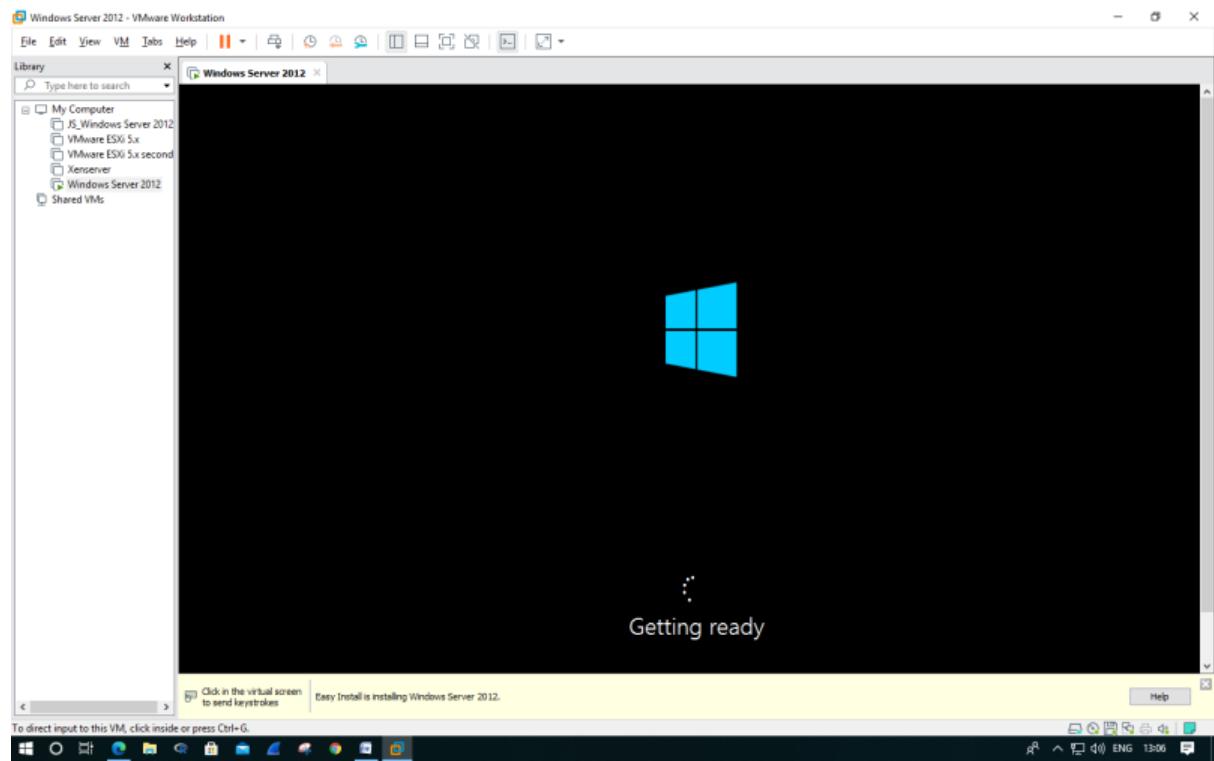
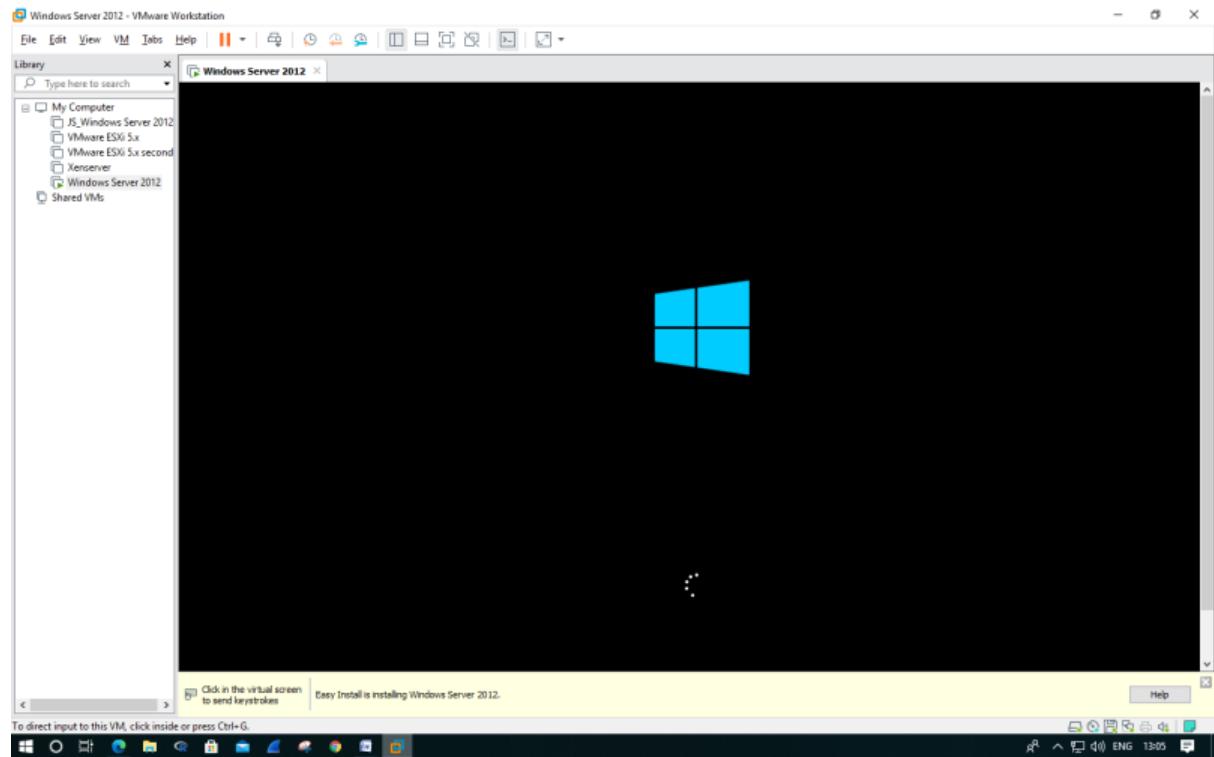
>> Click on 'Power on the Virtual Machine'.

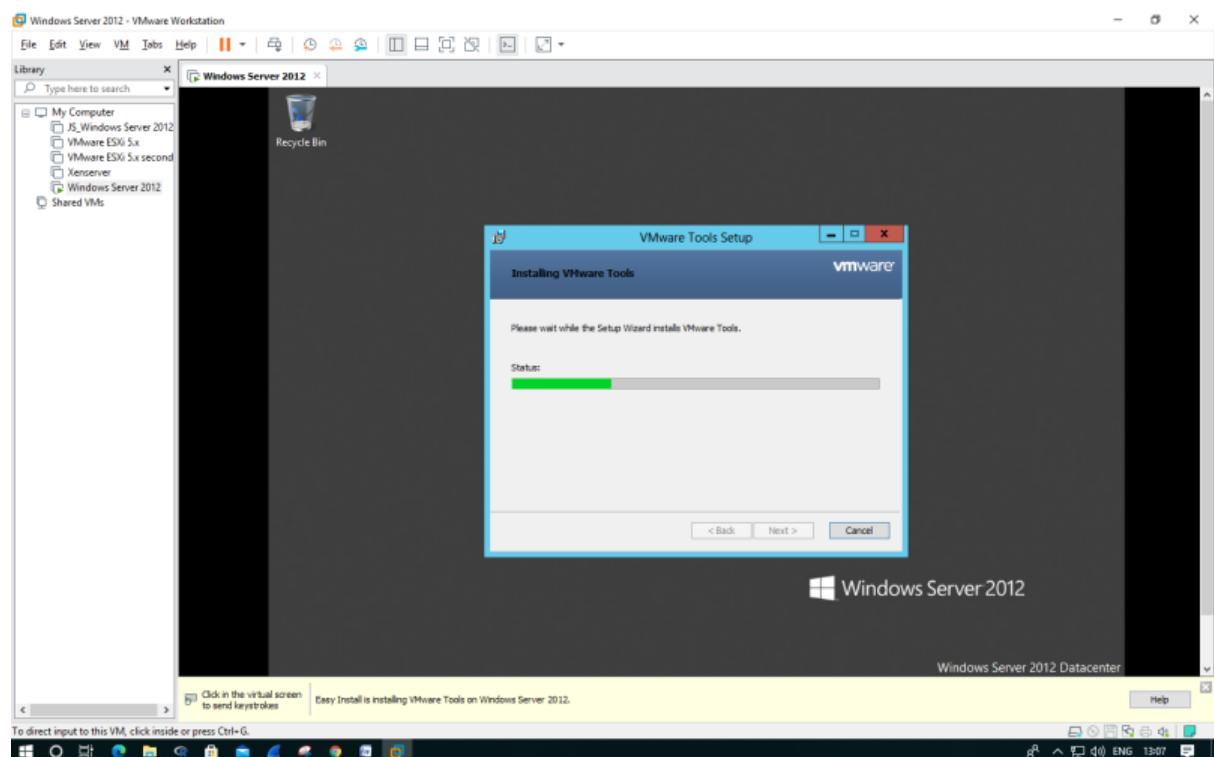
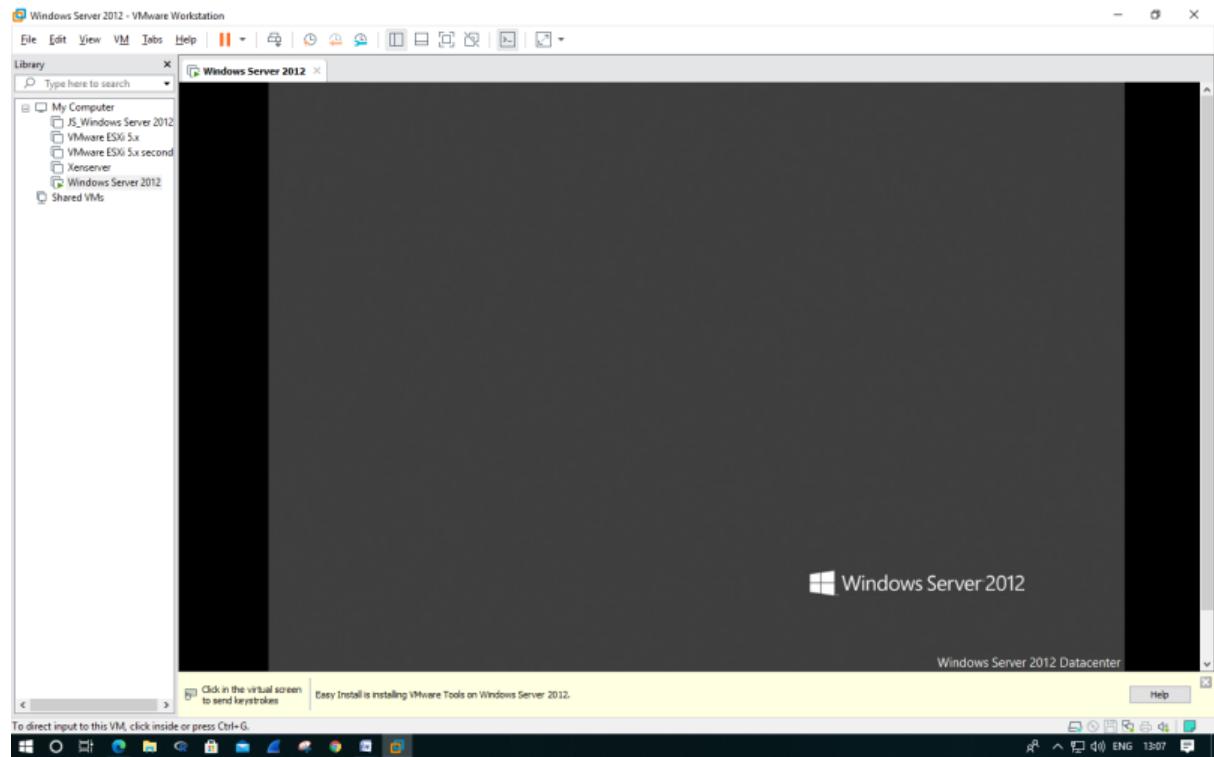


>> Next screens will be displayed to us after powering on the virtual machine.

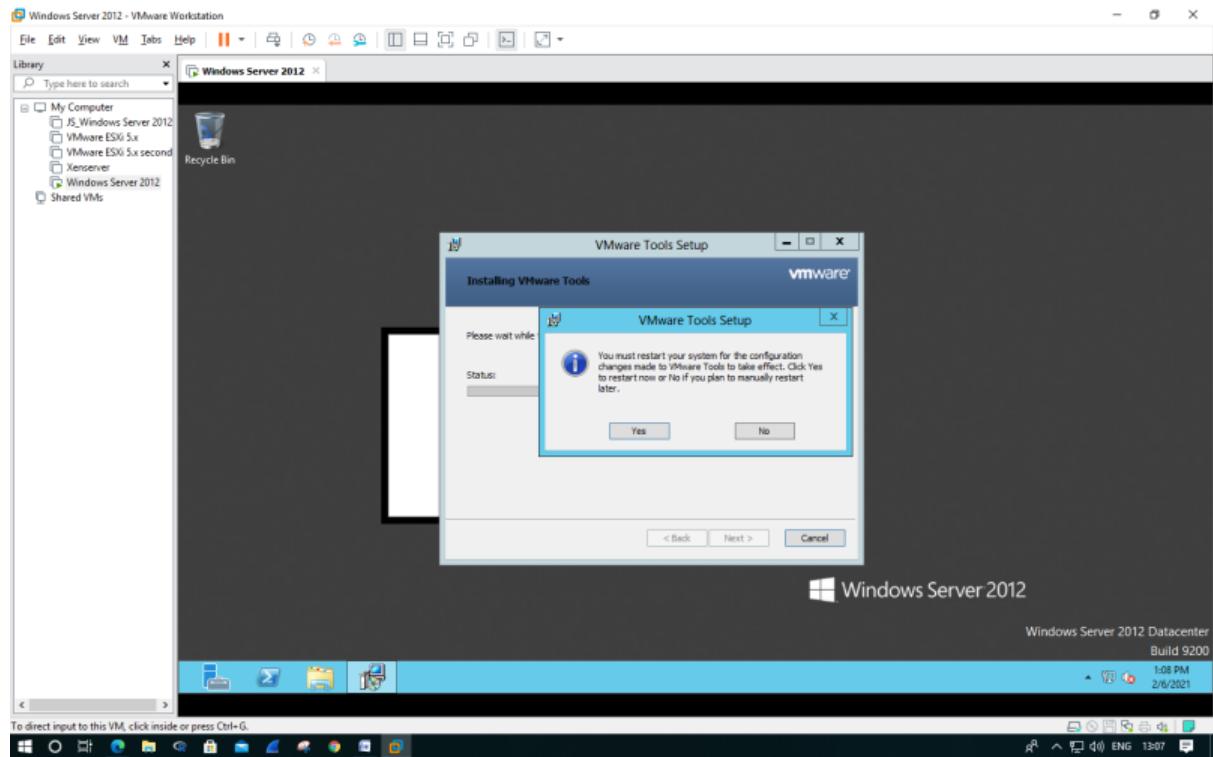




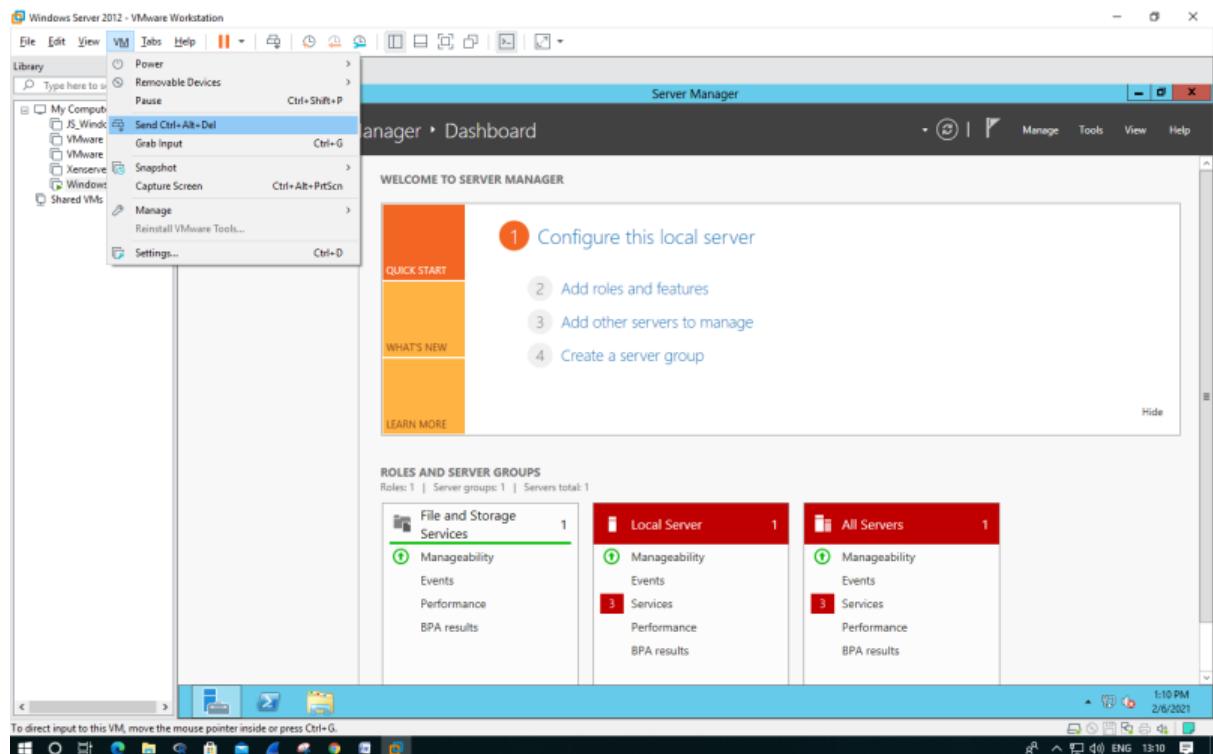


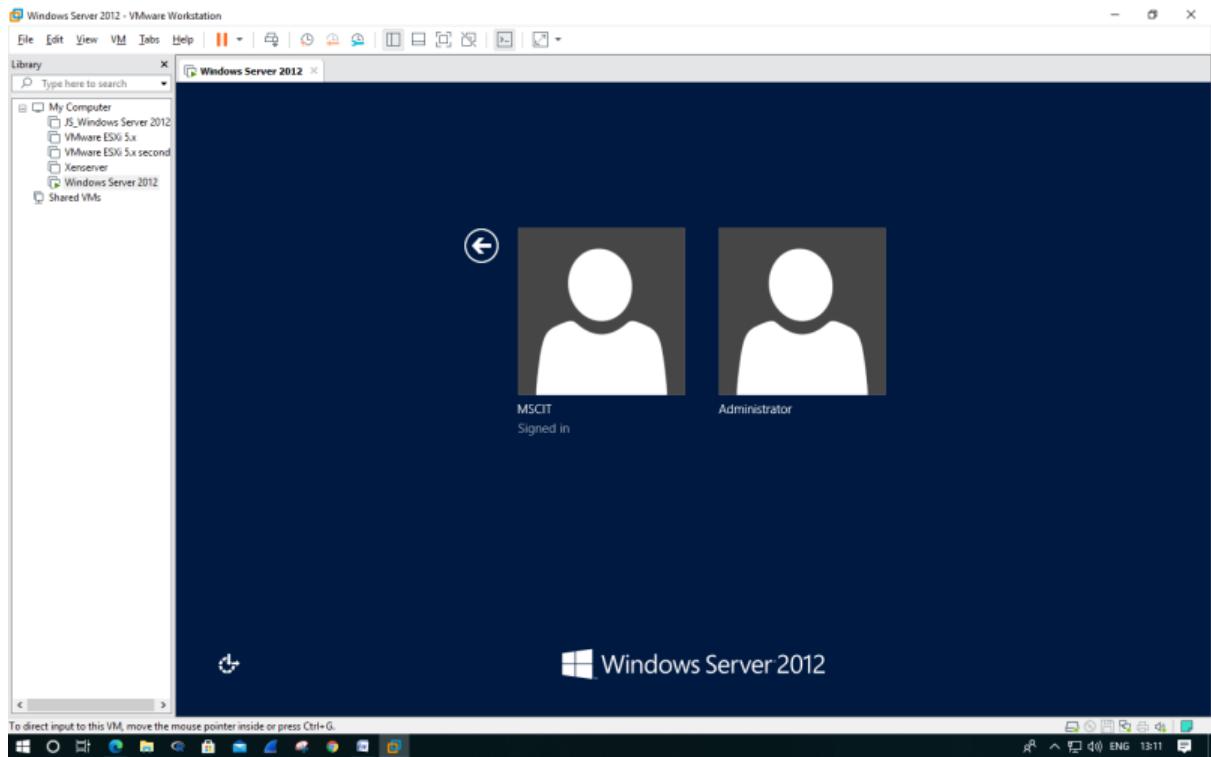


>> Click on 'Yes'.

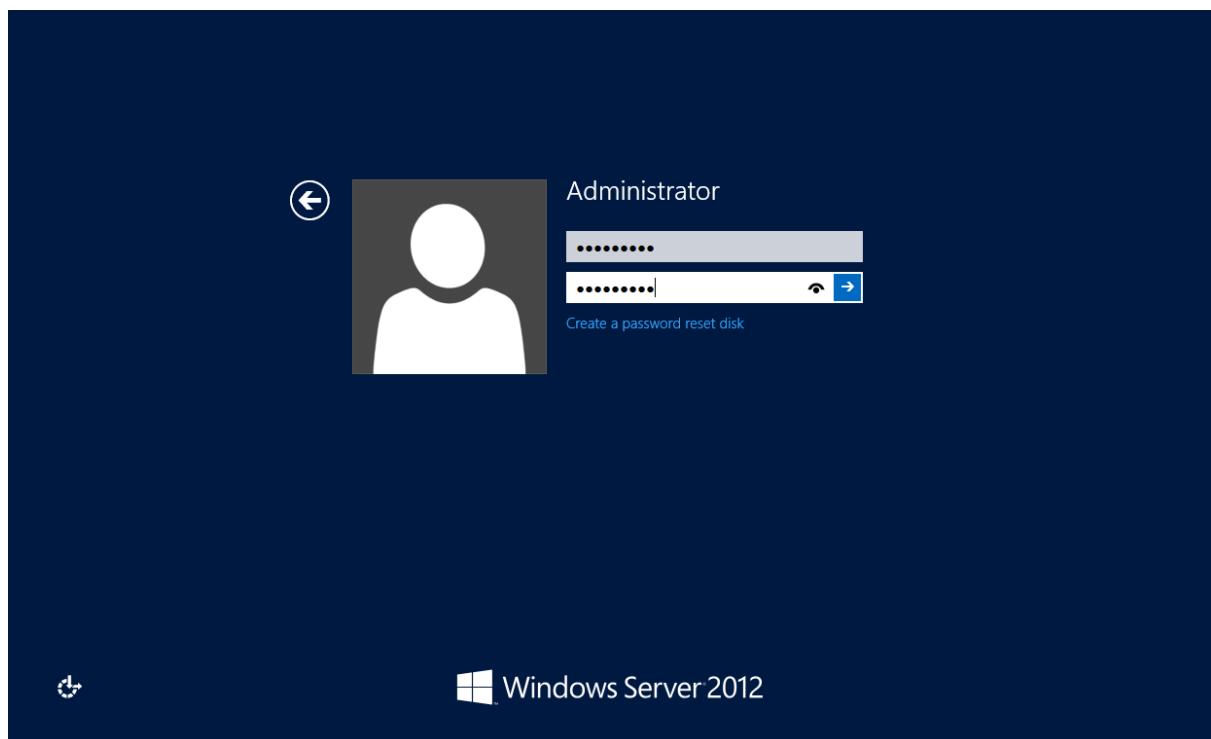


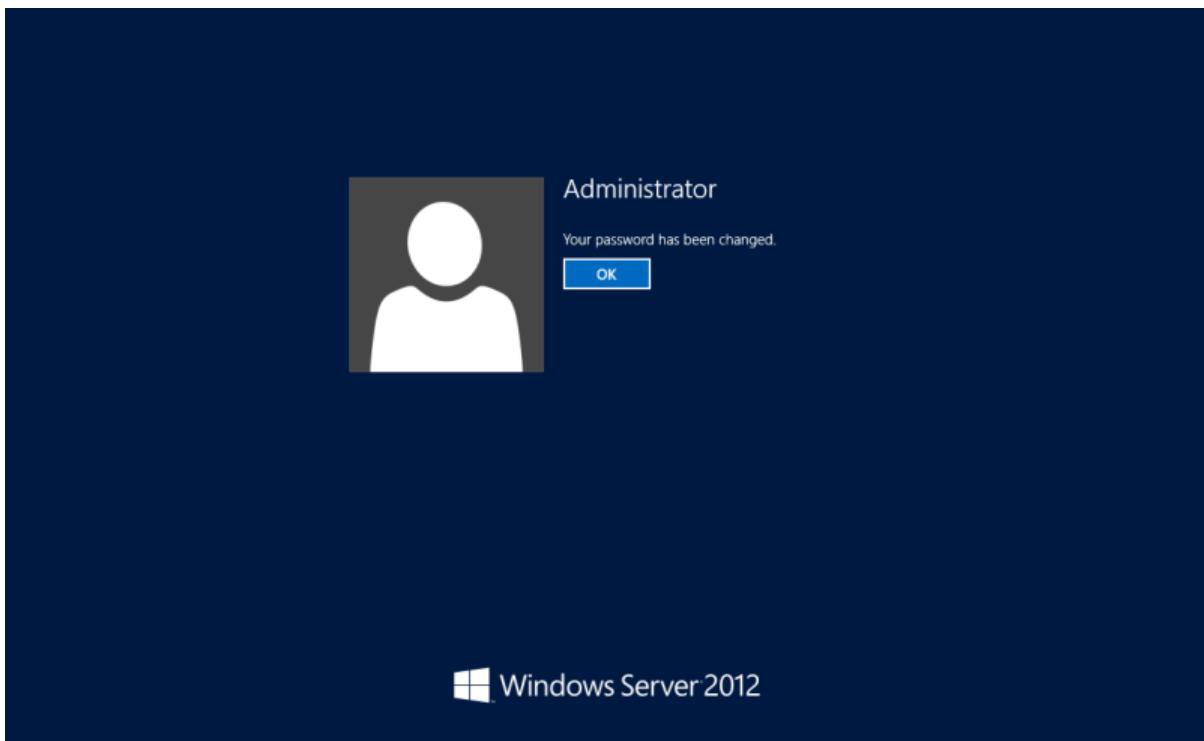
>> Following window will appear. Click on ‘VM’ >> ‘Send Ctrl+Alt+Del’. And switch the user, Select ‘Administrator’.





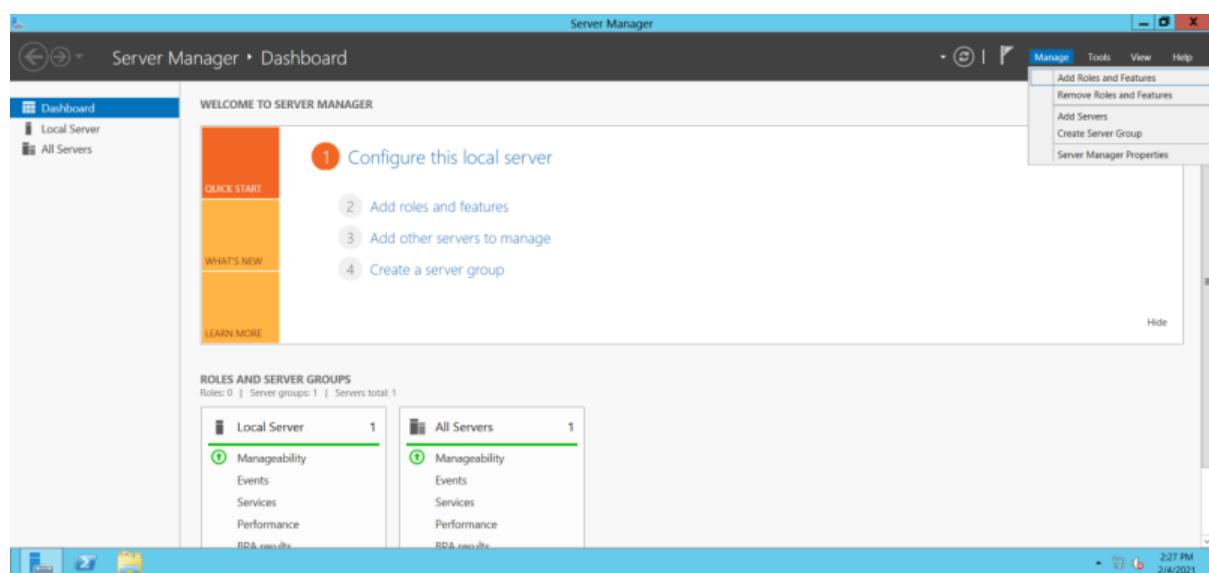
>> Enter a password that you want.



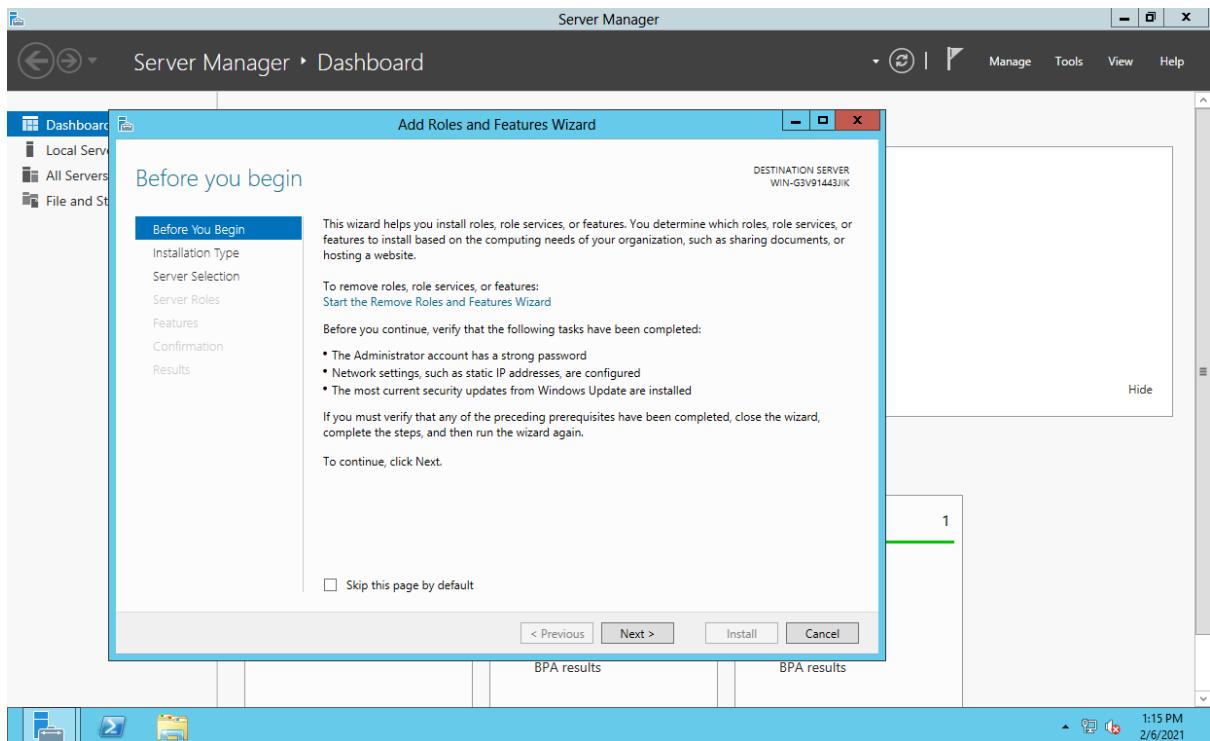


>> Click on '**Manage**' >> '**Add Roles and Features**'.

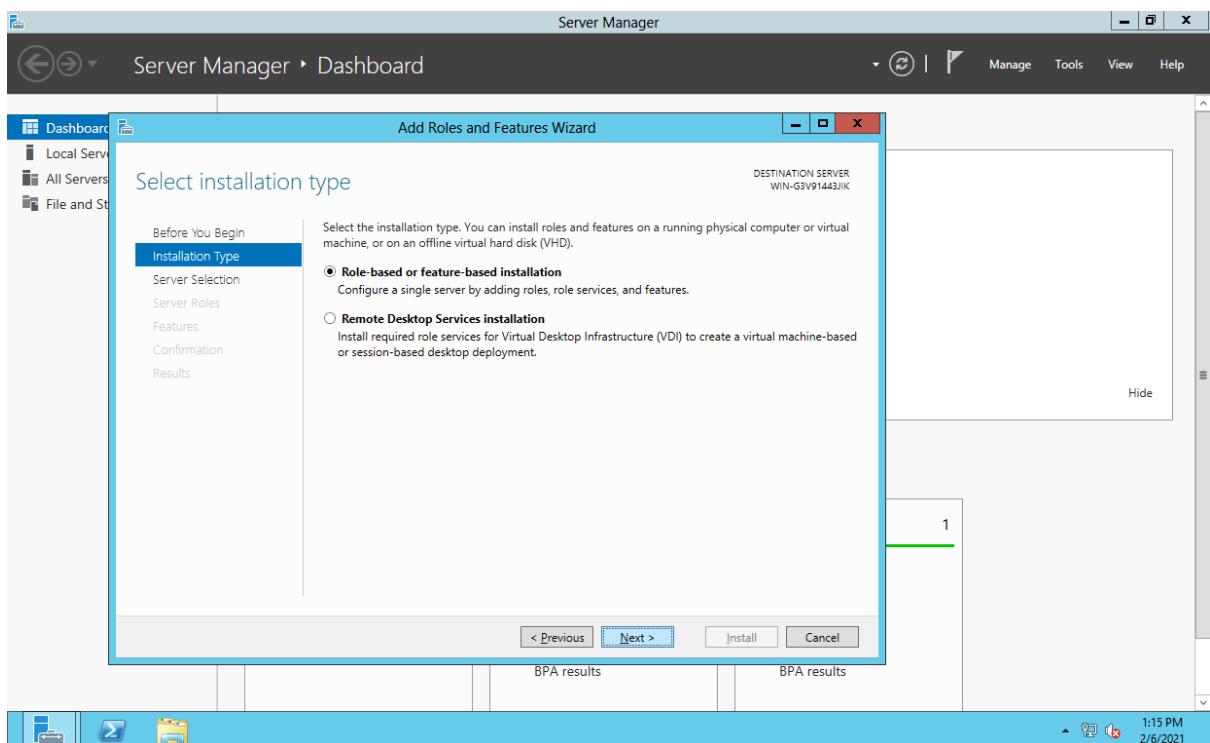
>> **Add roles and Features wizard** will appear.



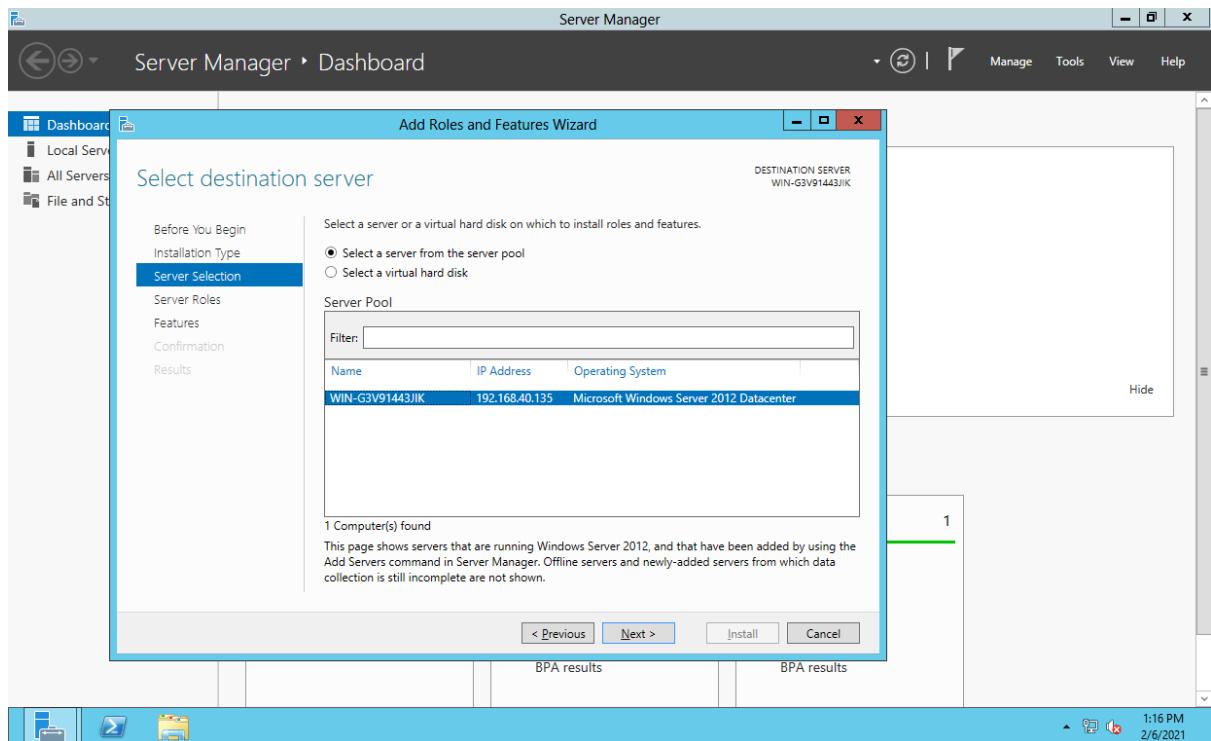
>> Click on **Next**.



>> Select Role-based or feature-based installation, and then click on Next.

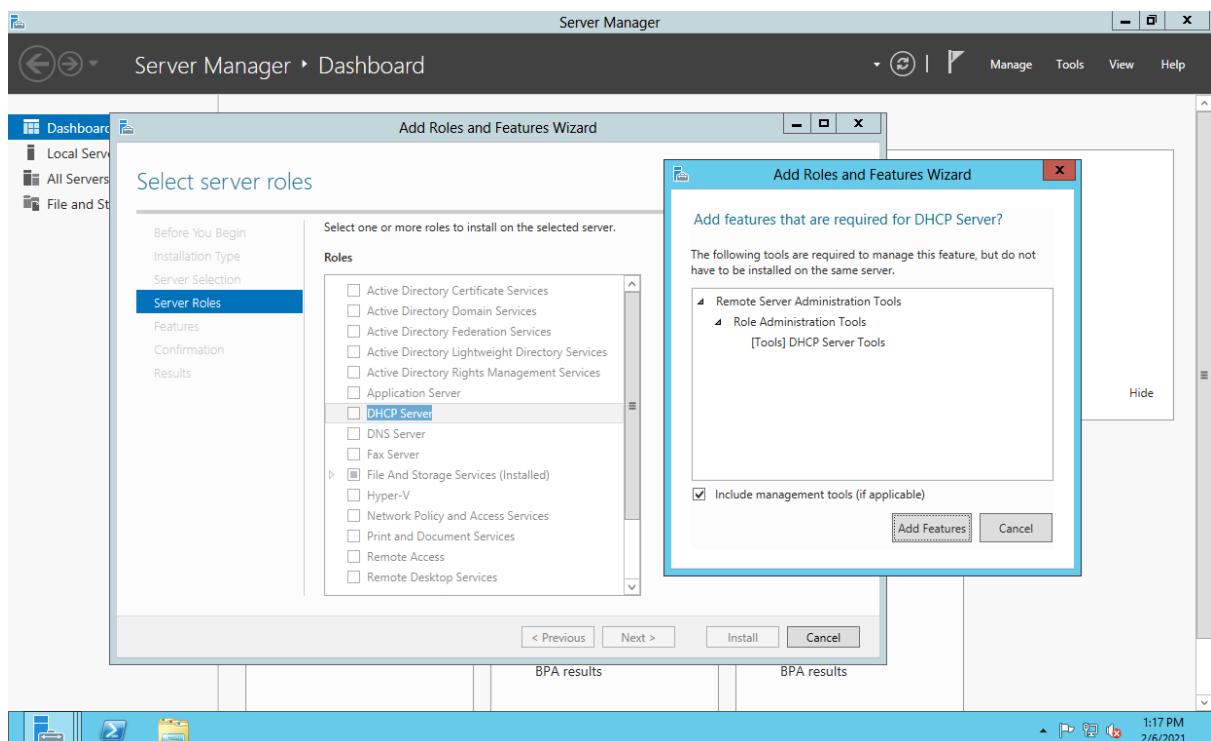


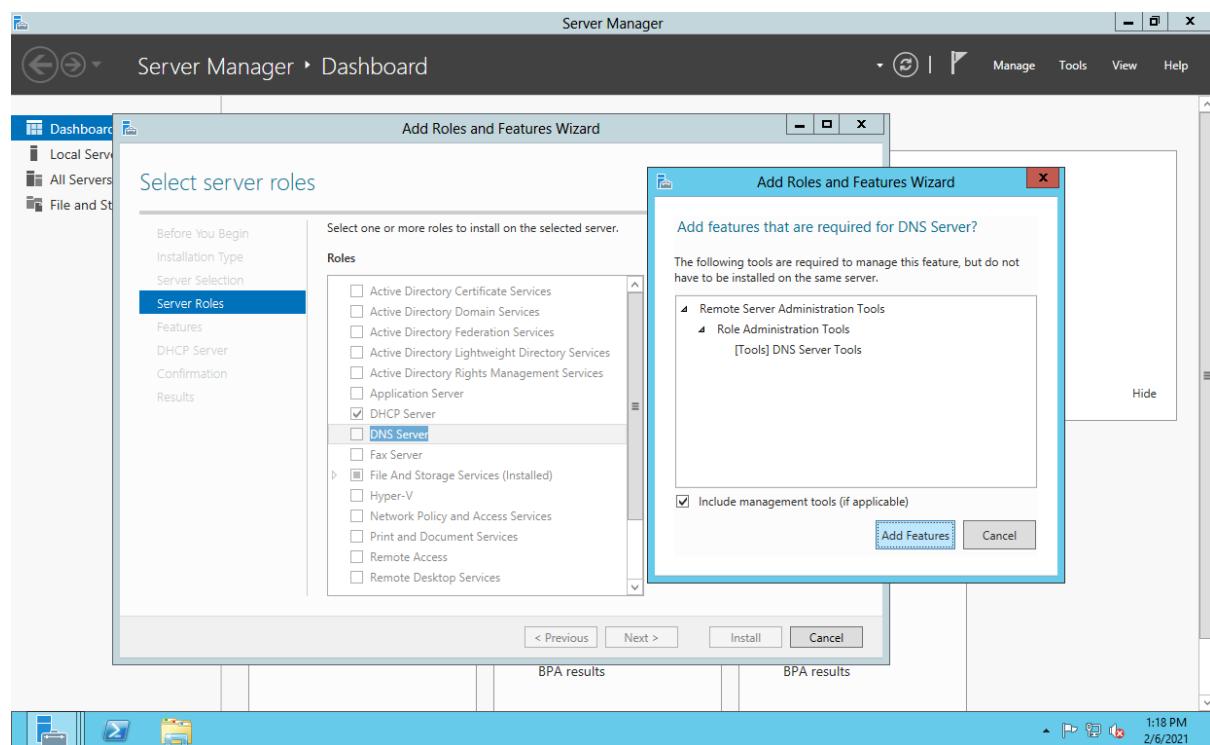
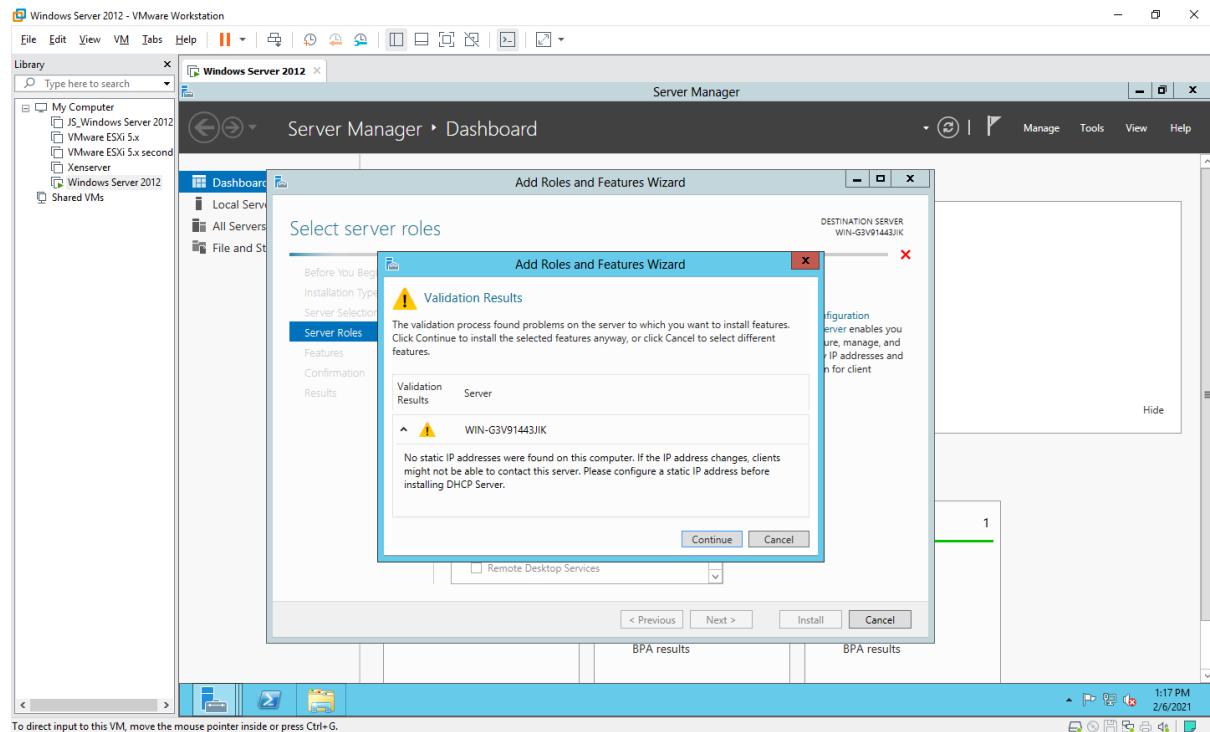
>> Select 'Select a server from the server pool' and select the server from the Server Pool. Click on Next.

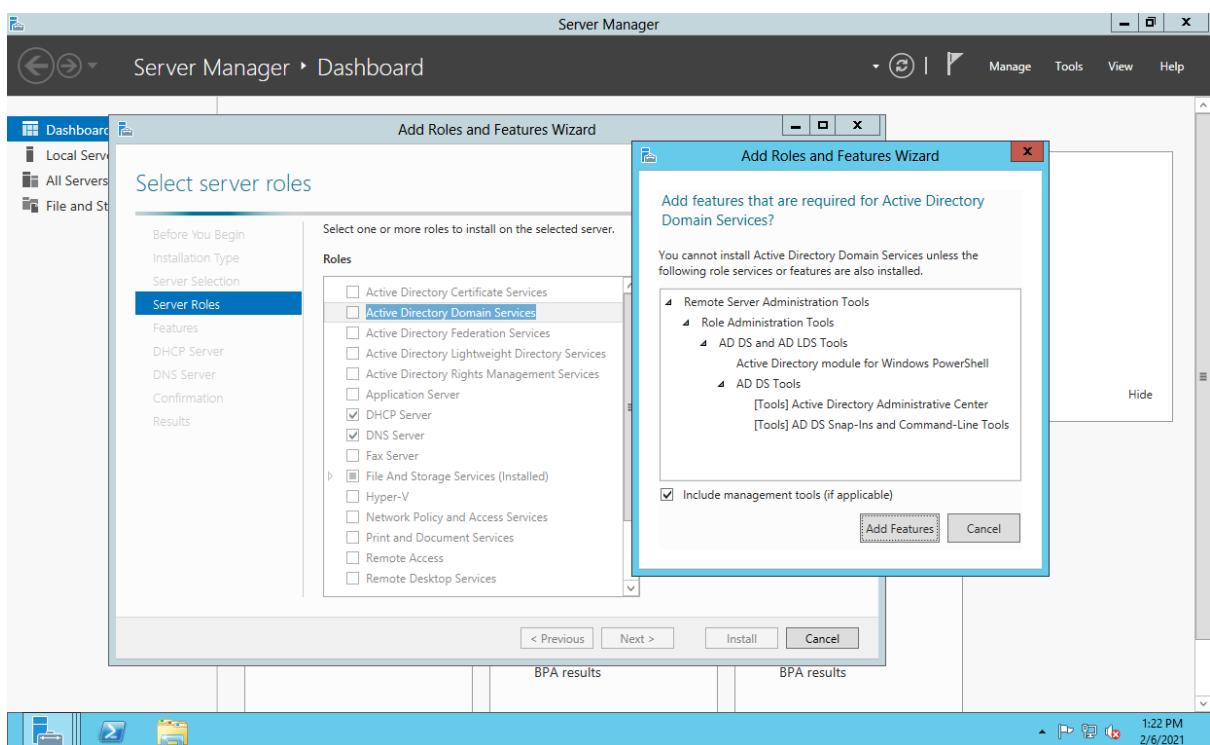
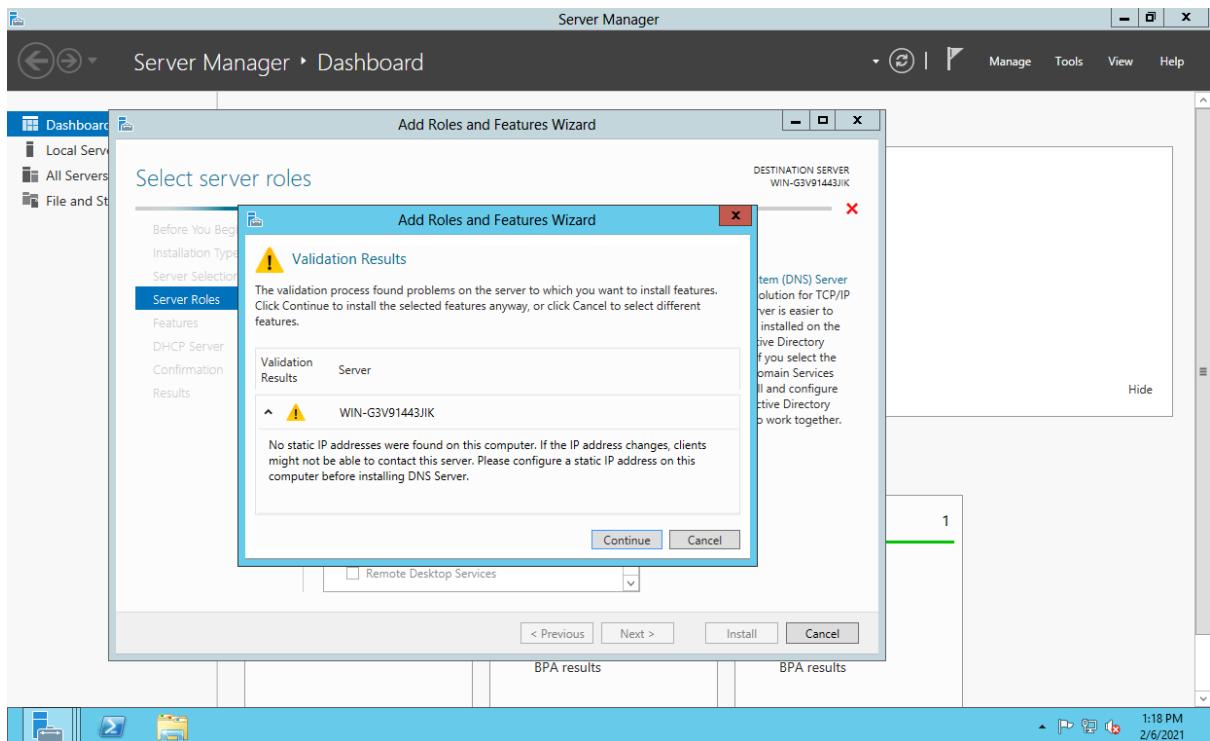


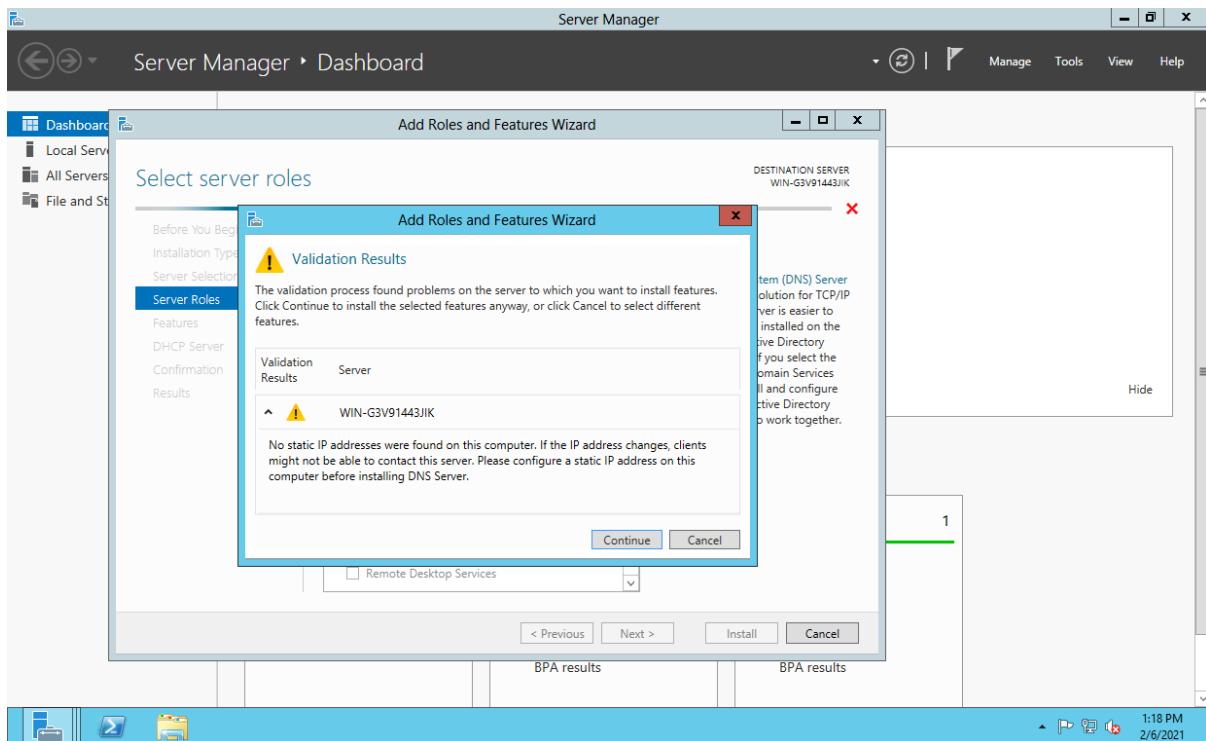
>> Add the following server roles, and click on **Next**.

- **Active Directory Domain Service.**
- **DHCP Server**
- **DNS Server**



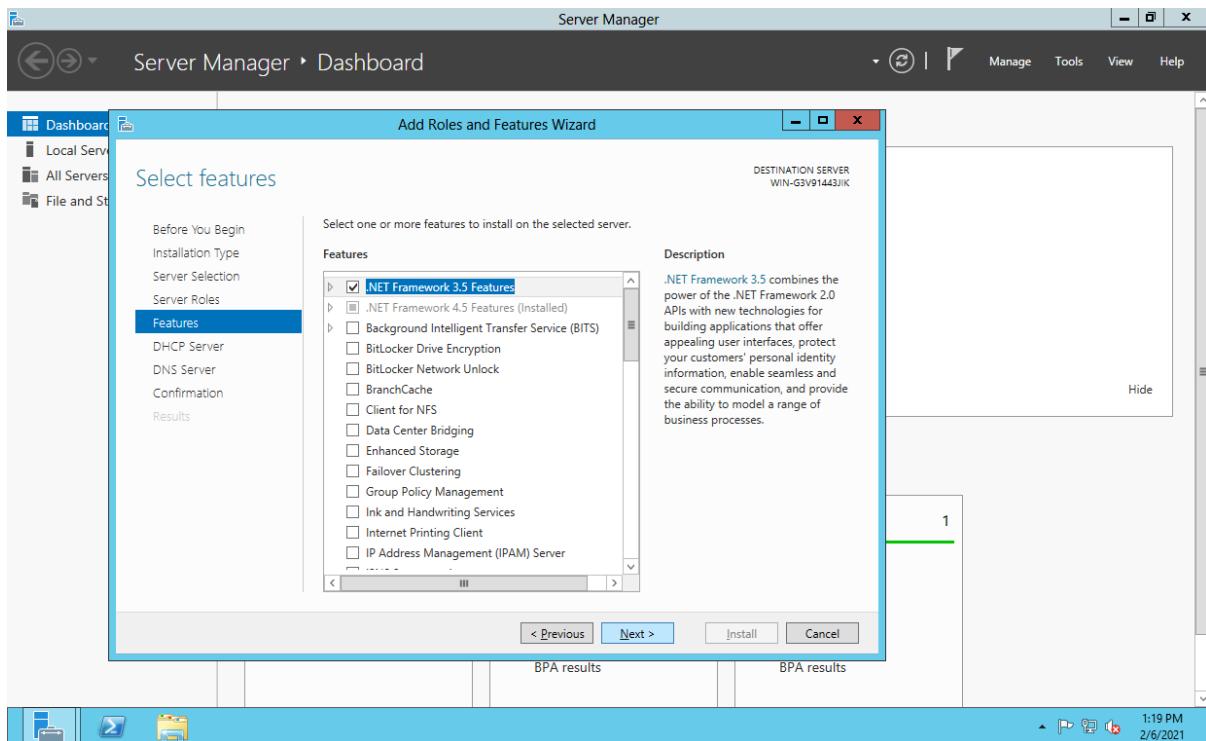


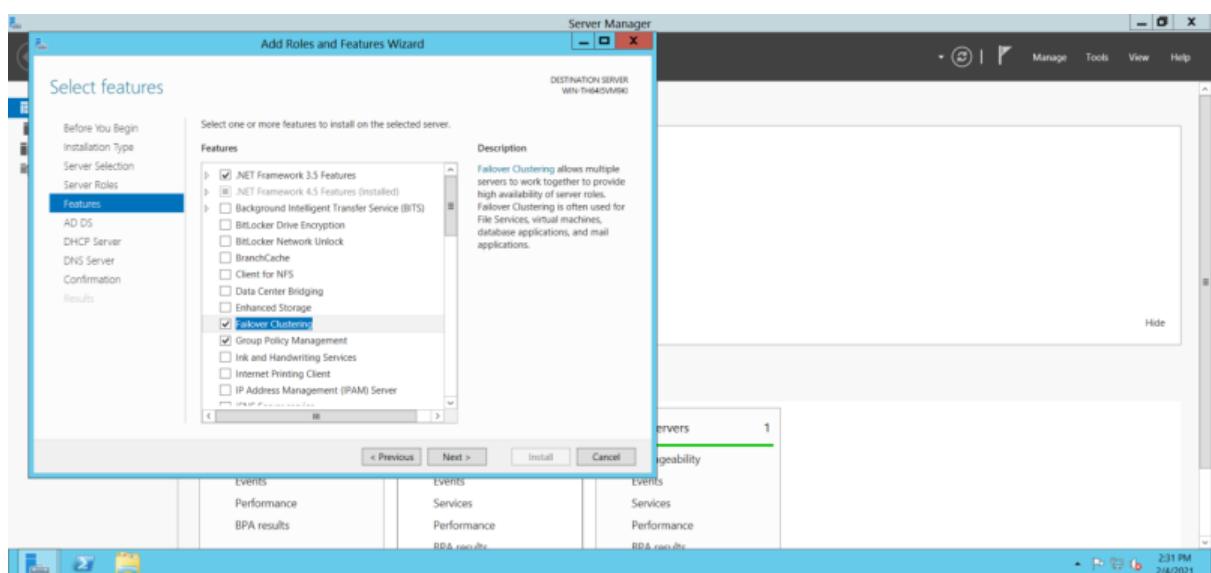
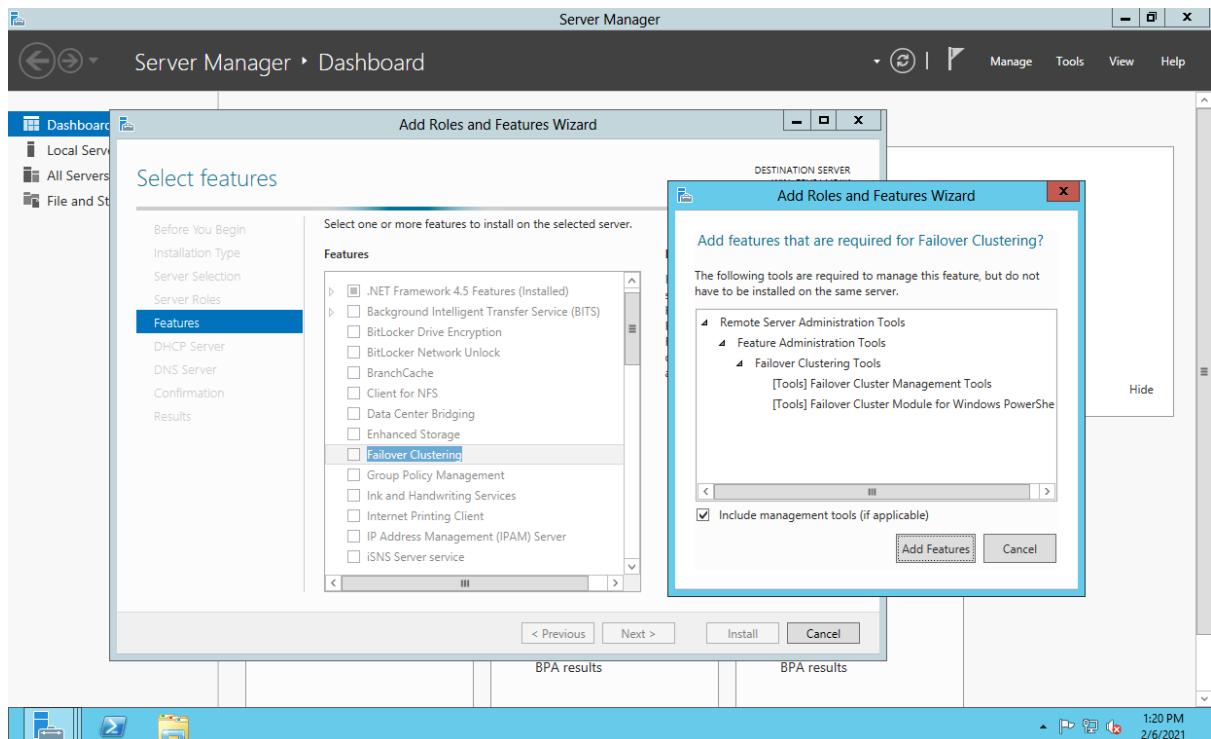




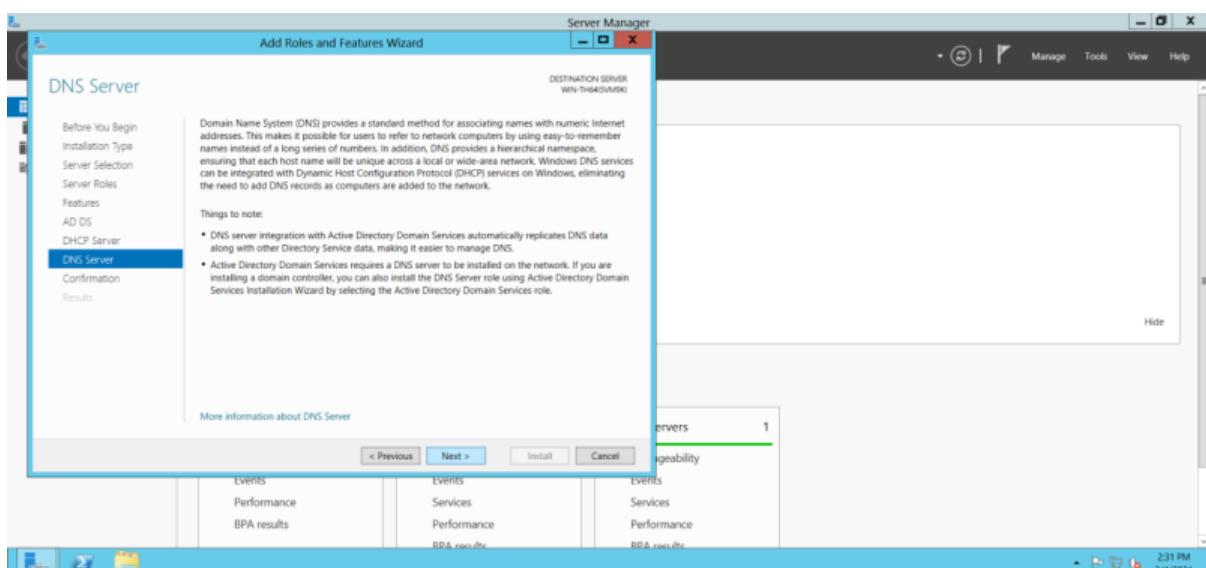
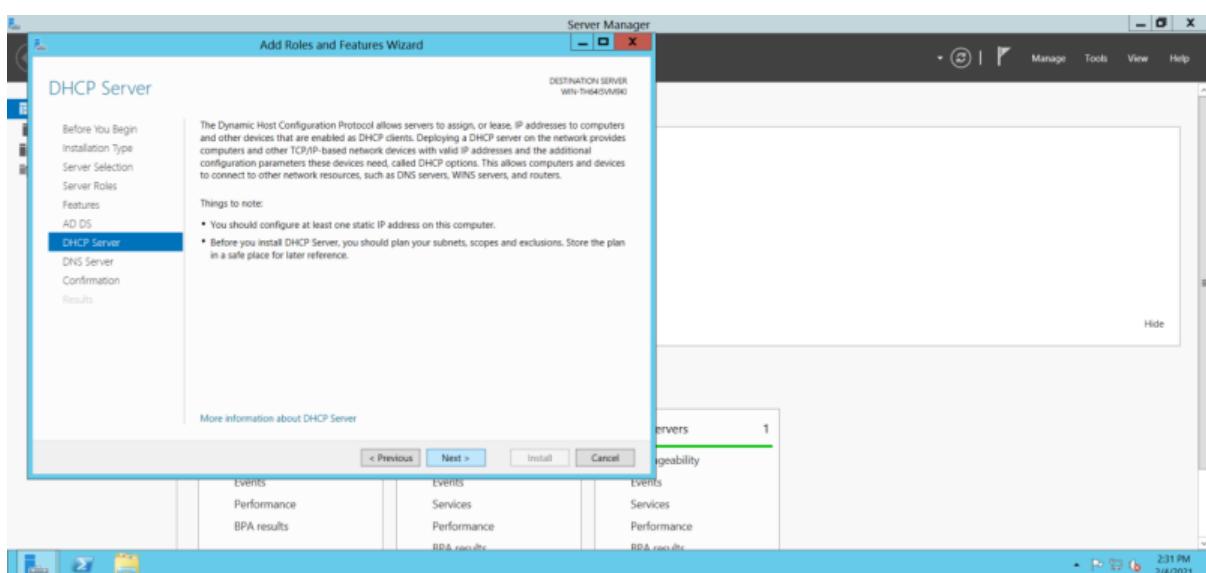
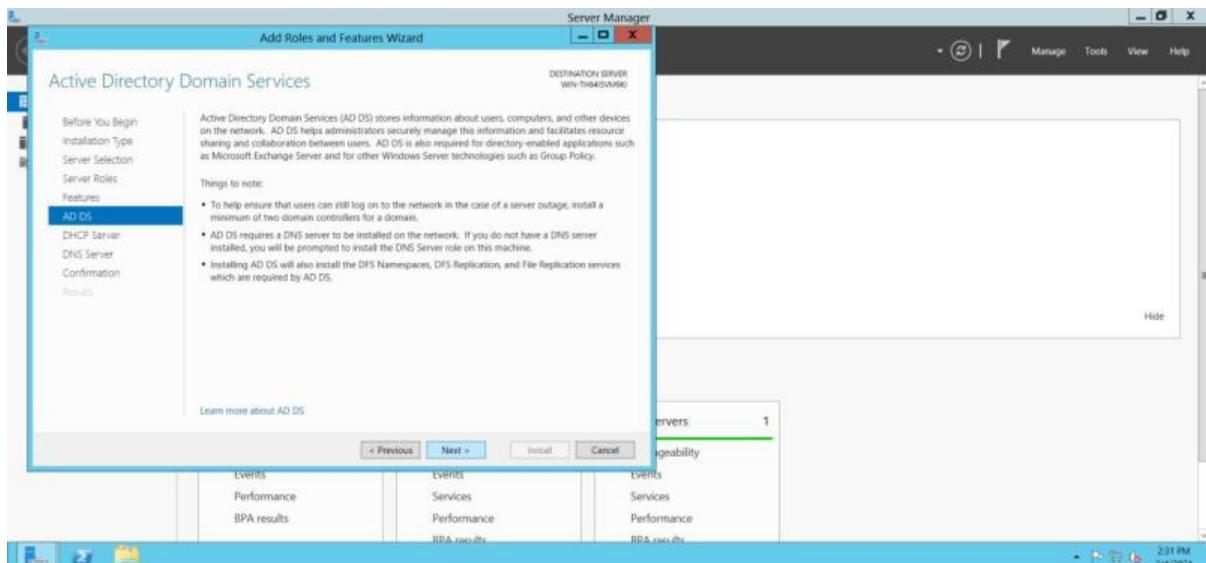
>> Under Features tick the following options and click on **Next**.

- **Failover Clustering**
- **Group Policy Management**
- **.NET Framework 3.5 Features**



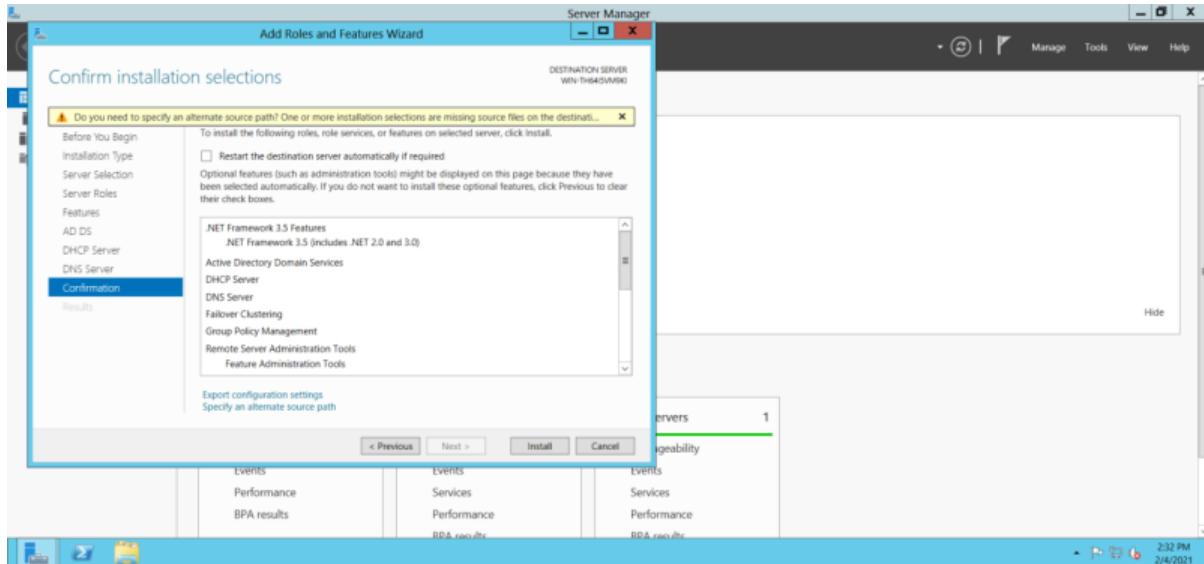


>> Click on **Next**.

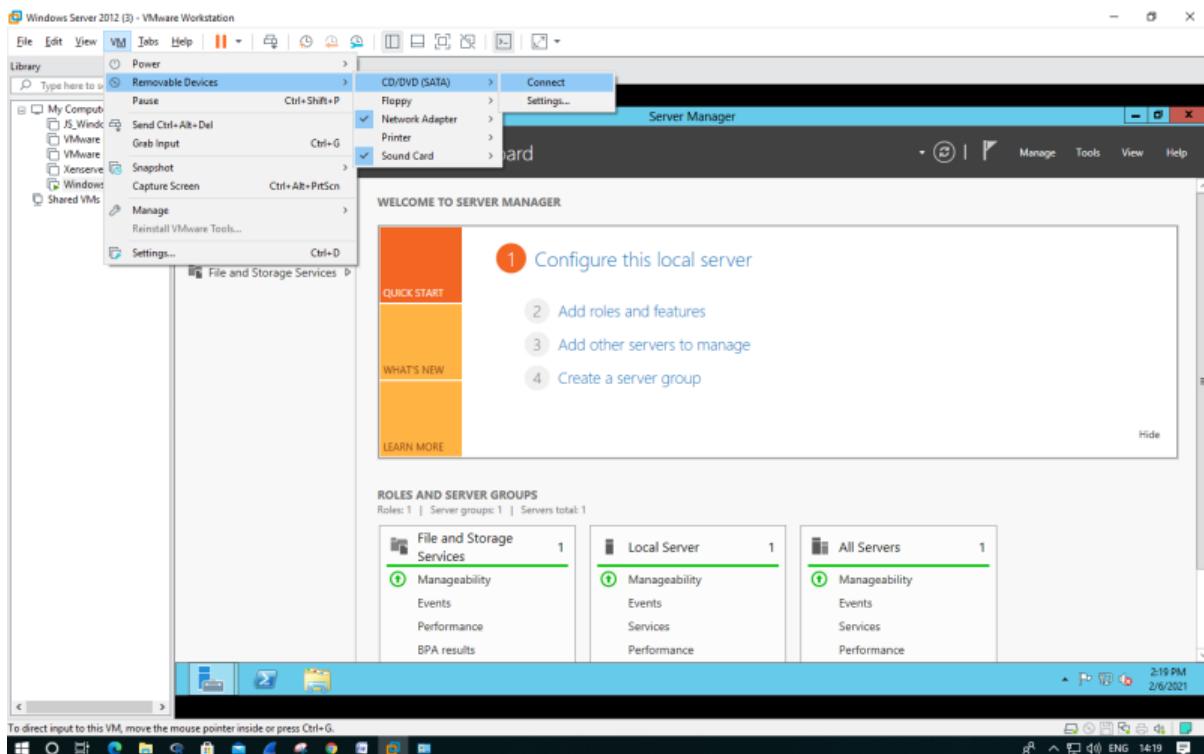


>> Click on **Next**.

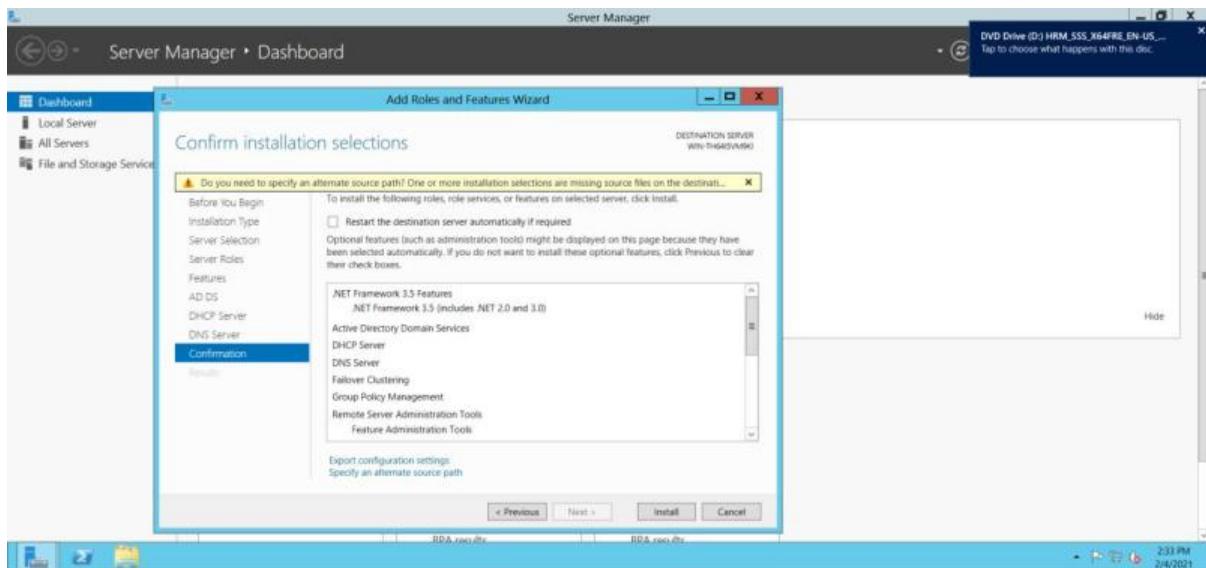
>>Here we need to ‘Specify an alternate source path’ for files.



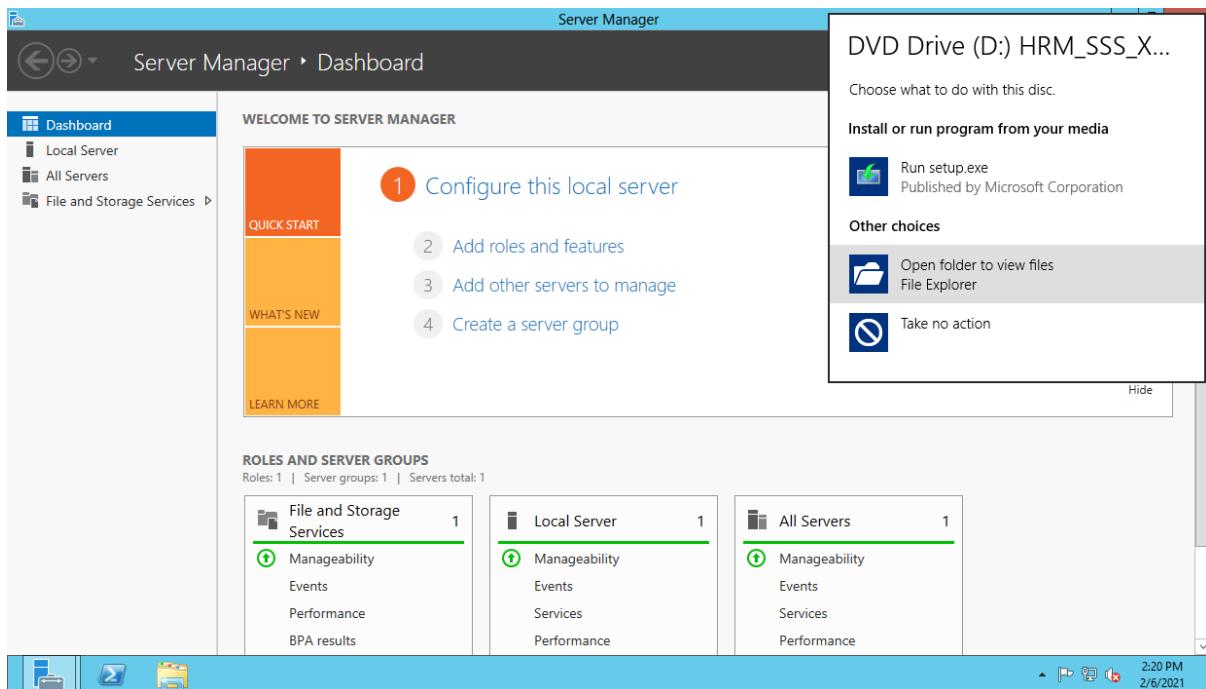
>> To specify an alternate source path click on **VM >> Removable Devices >> CD/DVD (SATA) >> Connect**.



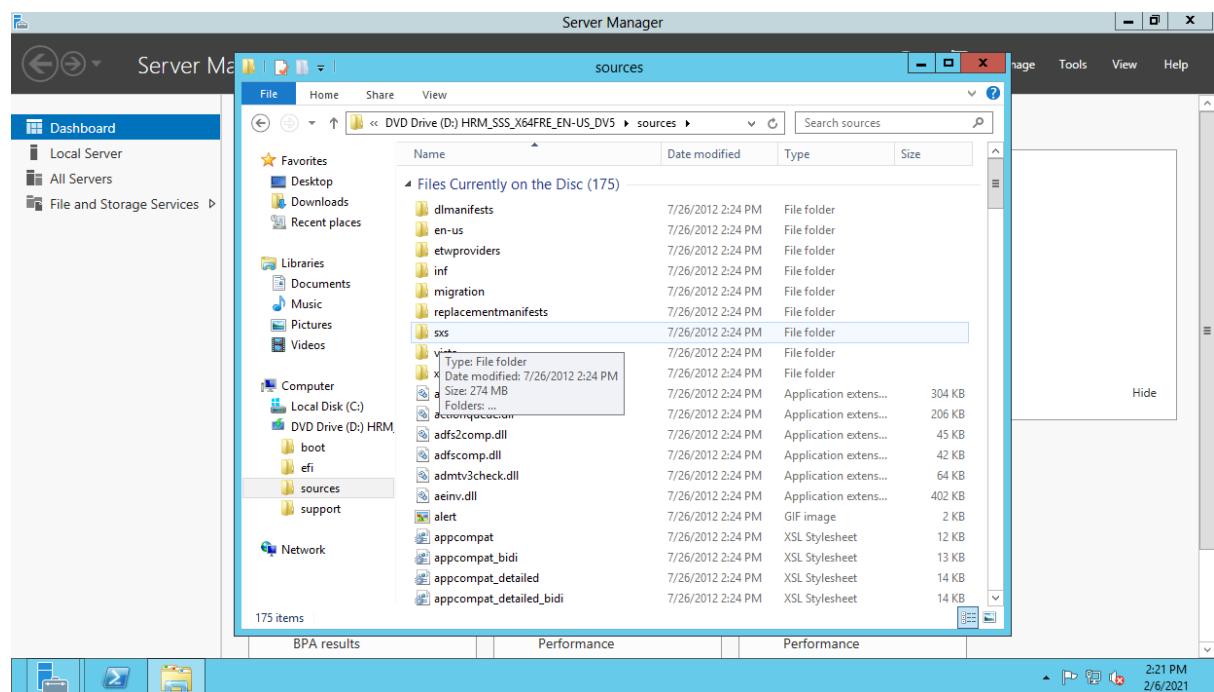
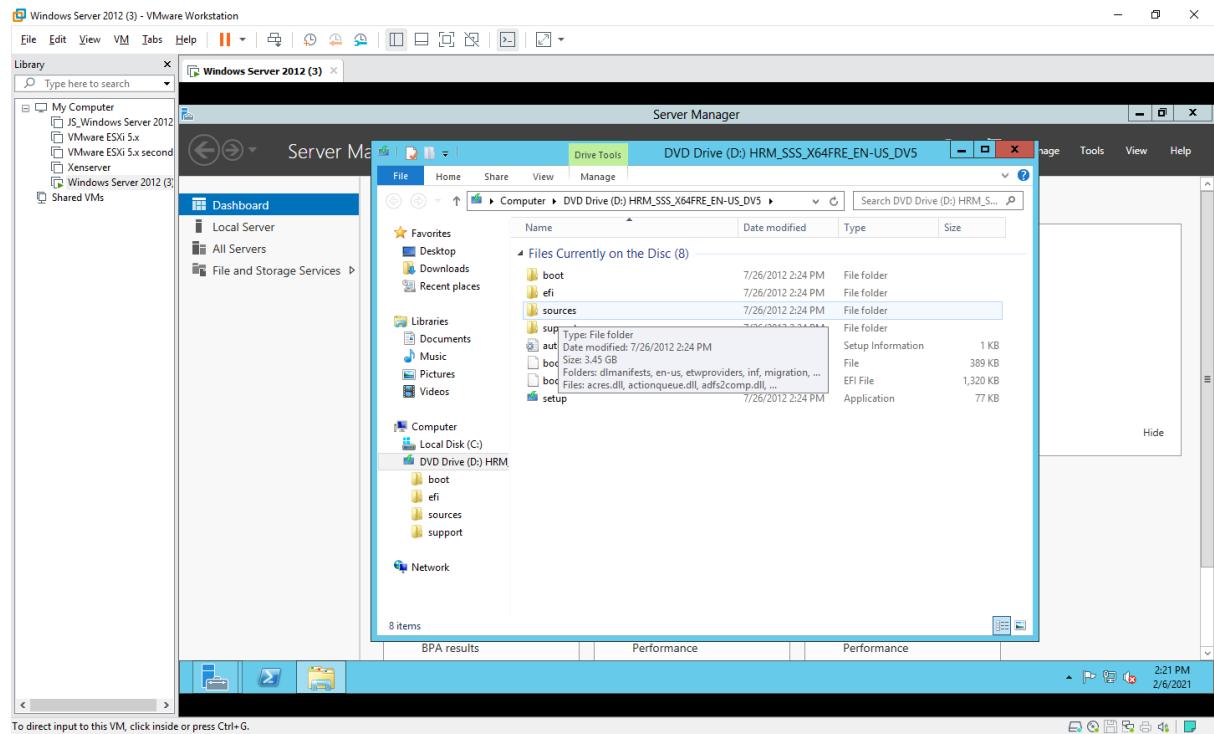
>> Tap on the pop-up in the corner.

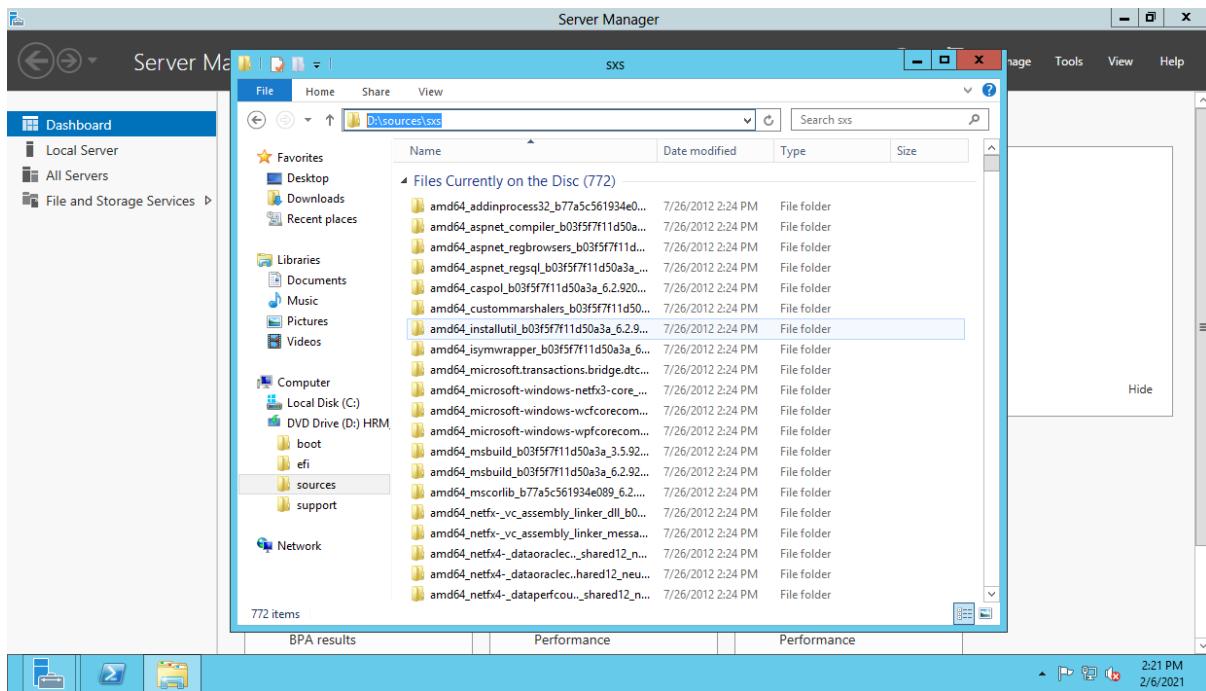


>> Select 'Open folder to View Files'.

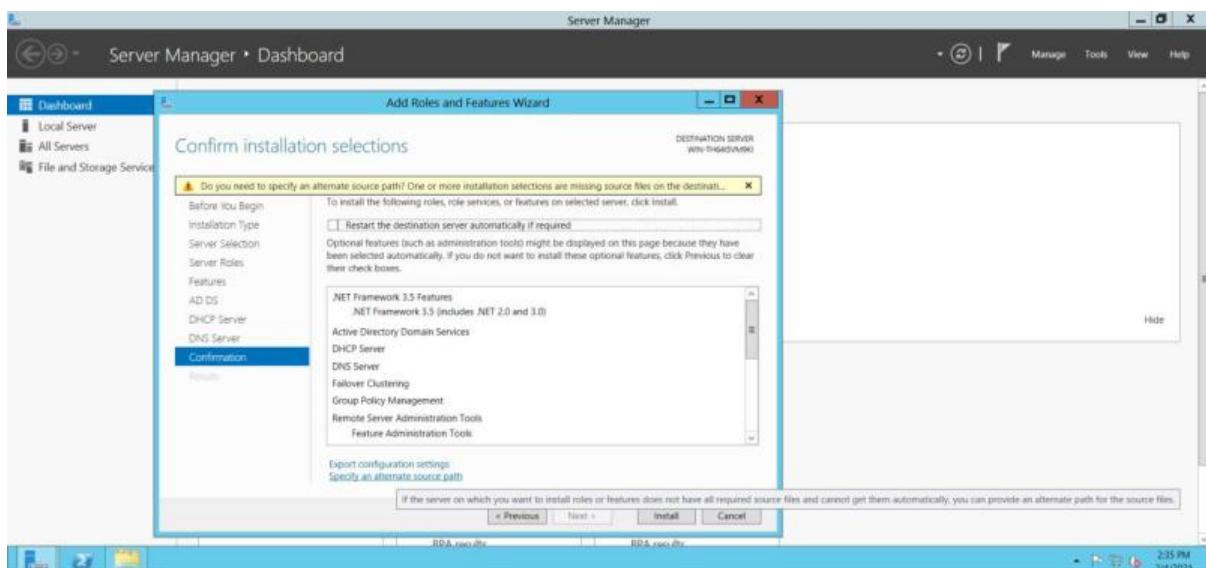


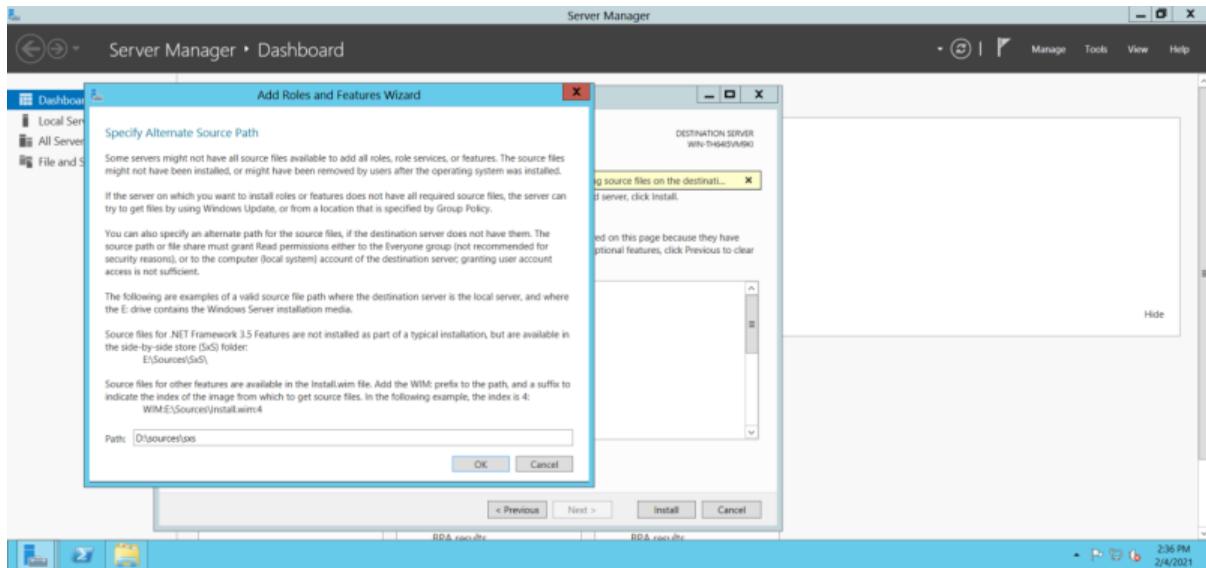
>> Go to the path : D:\sources\sxs. Copy this path. And close the window.



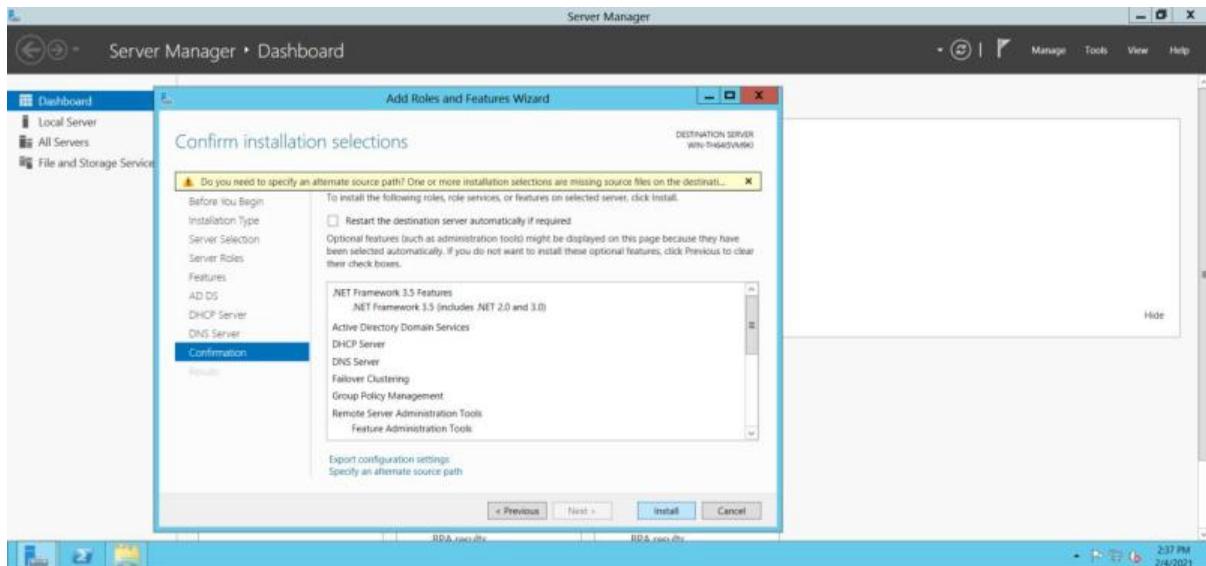


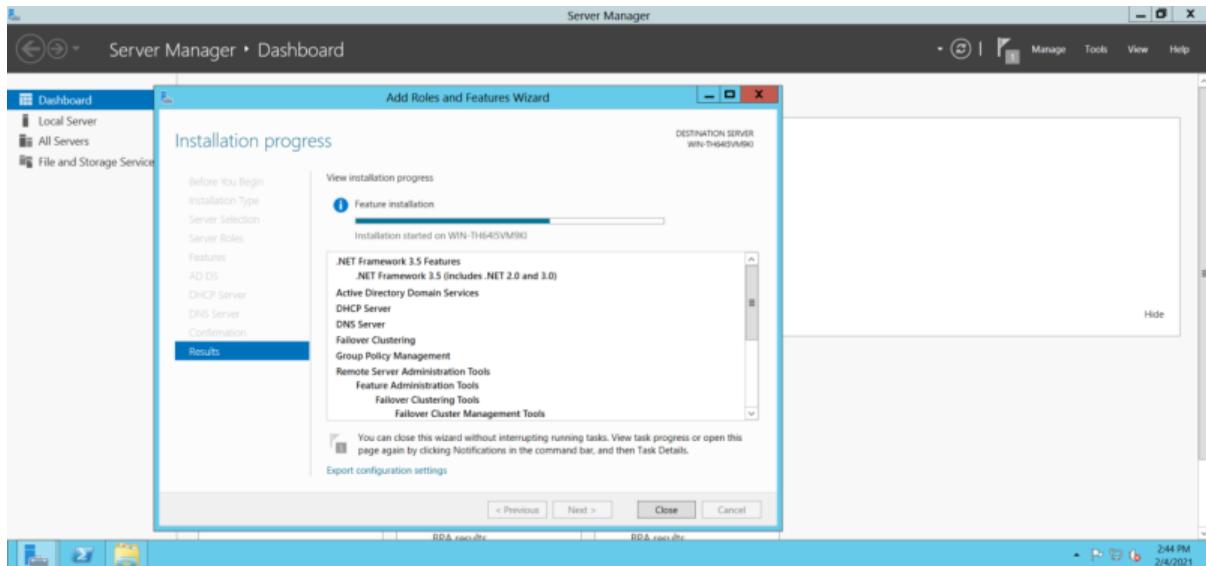
>> Now, click on '**Specify an alternate source path**', paste the path in the textbox Path: and click on **Ok**.



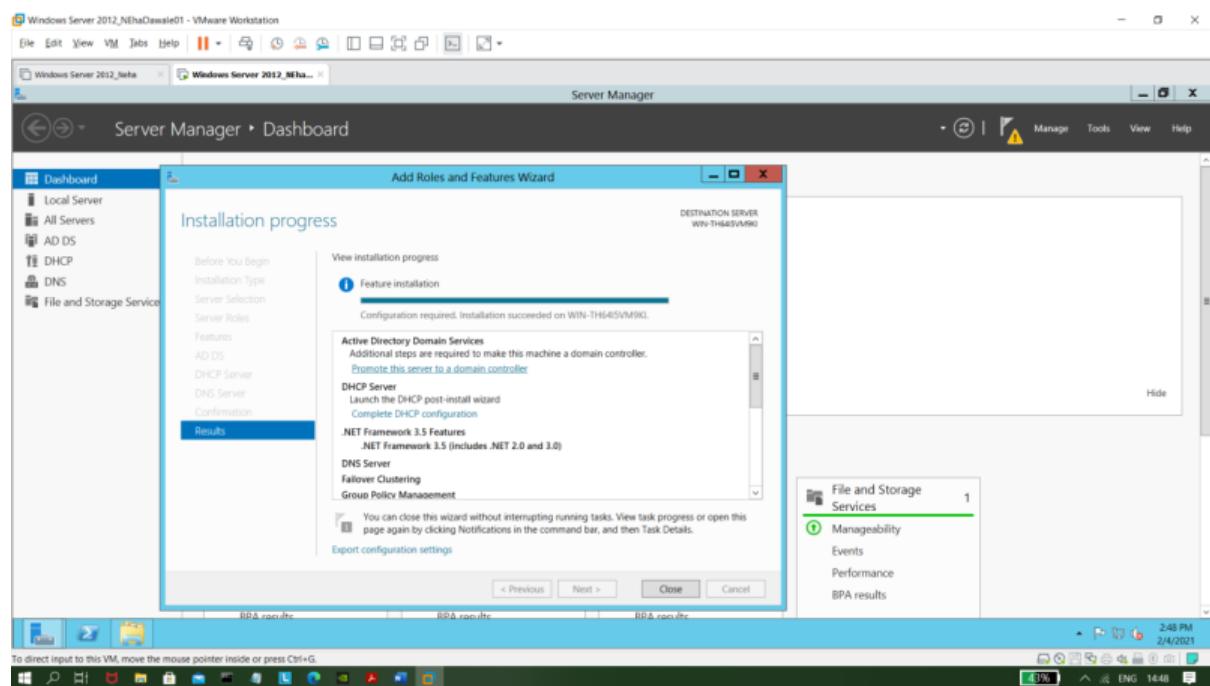


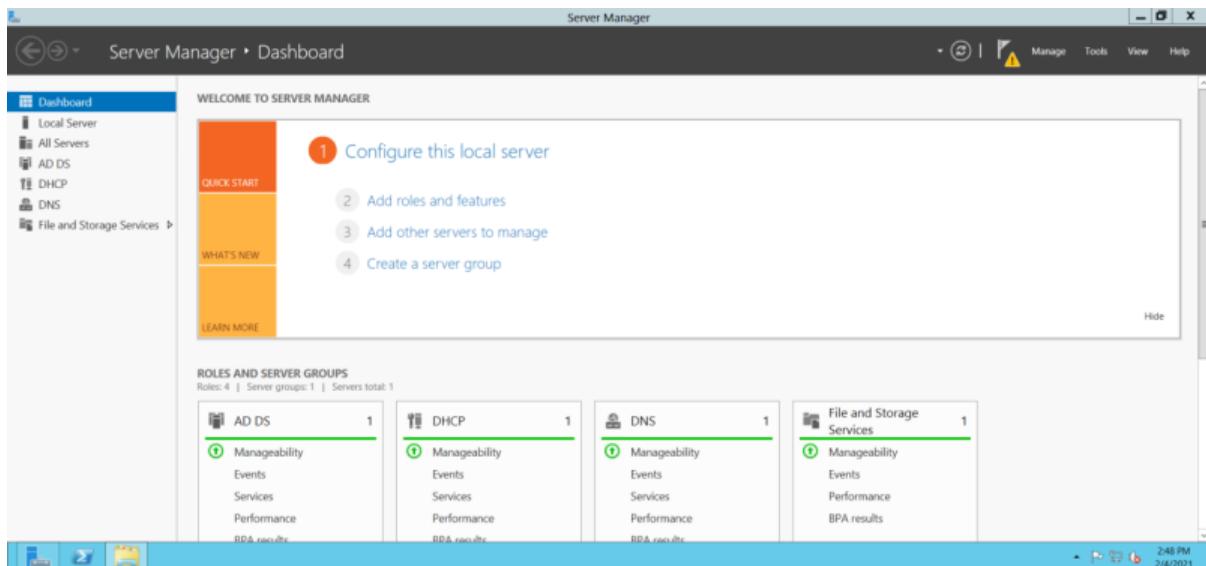
>> Now click on **Install**.





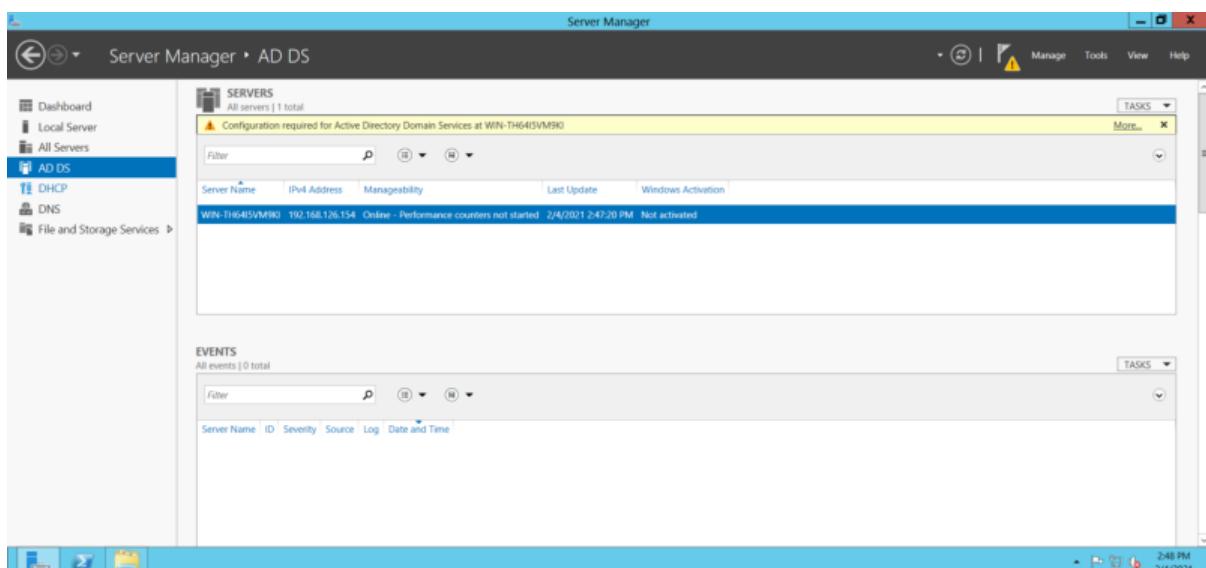
>> Click on Close after installation finishes.



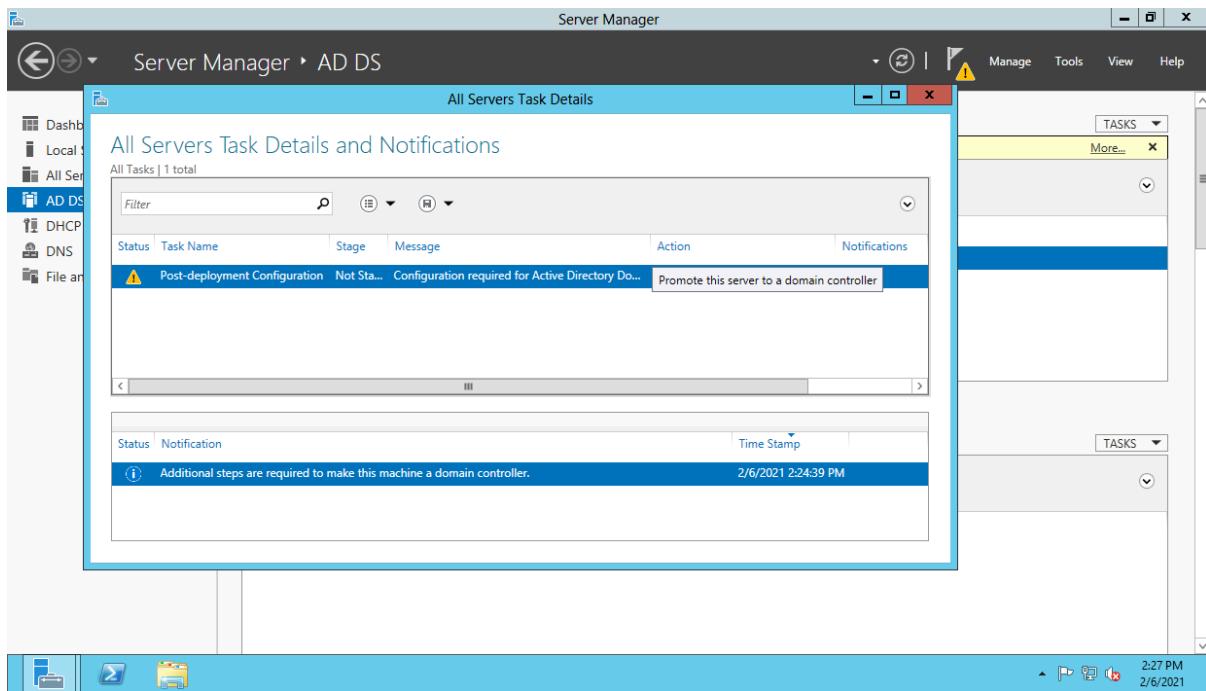


## - Promoting as a domain controller

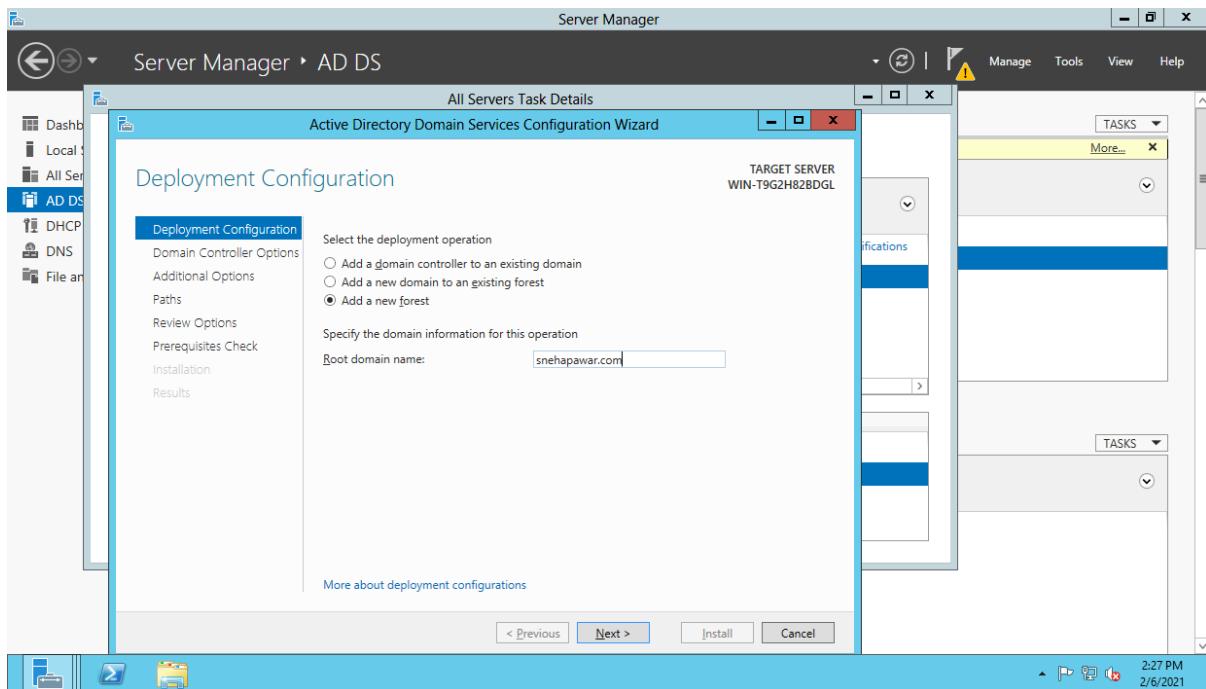
>> Now click on AD DS >> More.



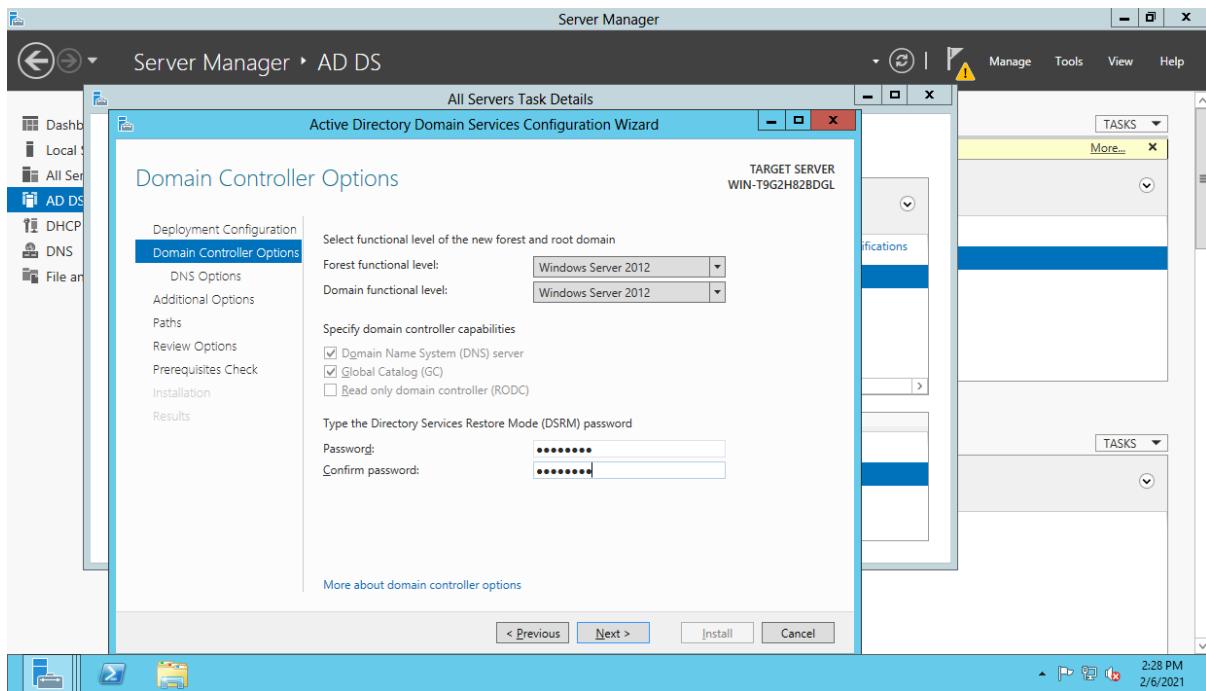
>> Now , Click on Promote this server to a domain Controller.



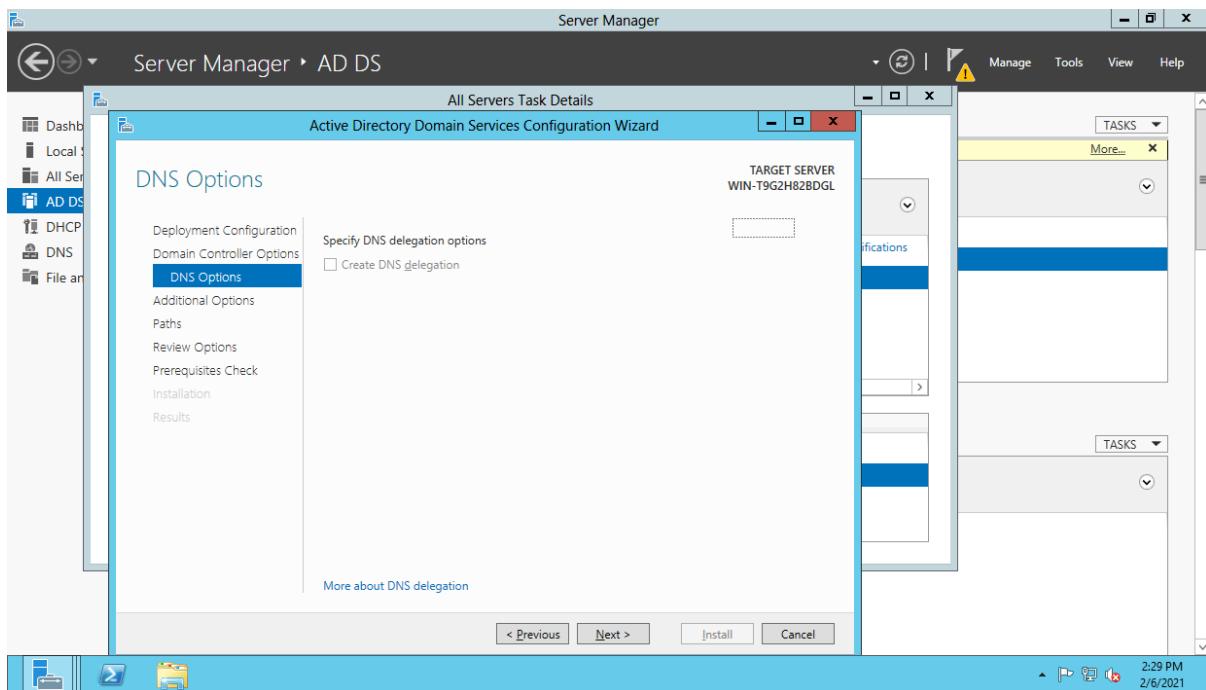
>> Select Add a New Forest.

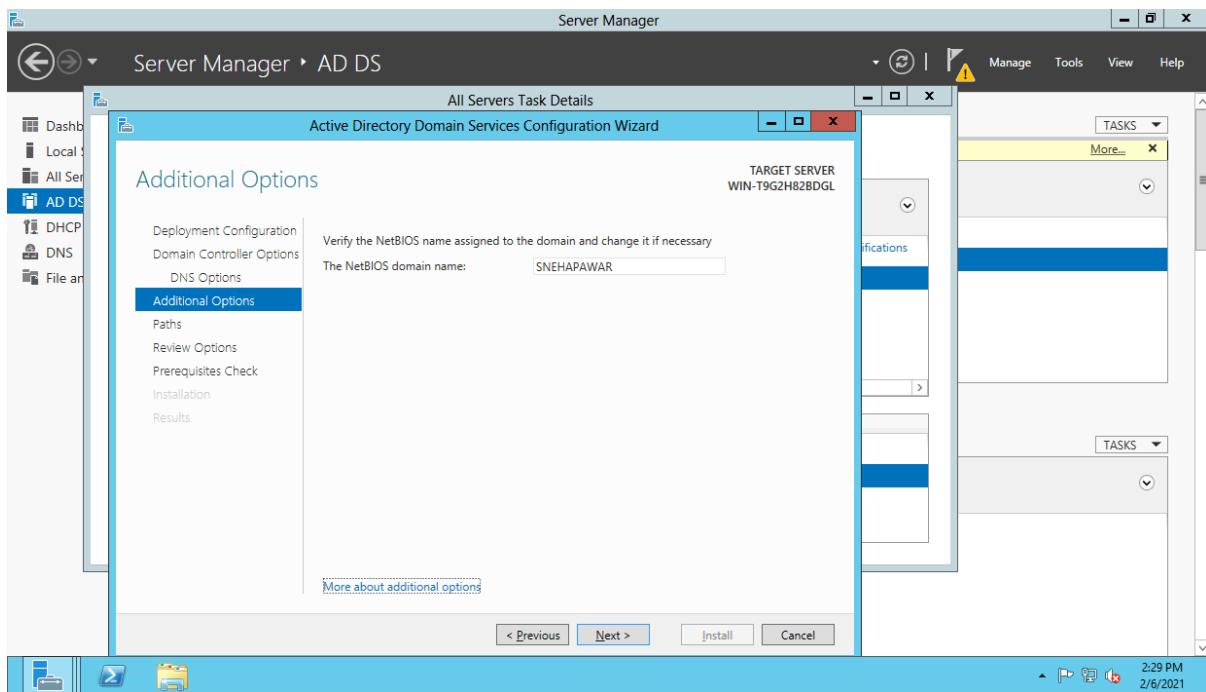
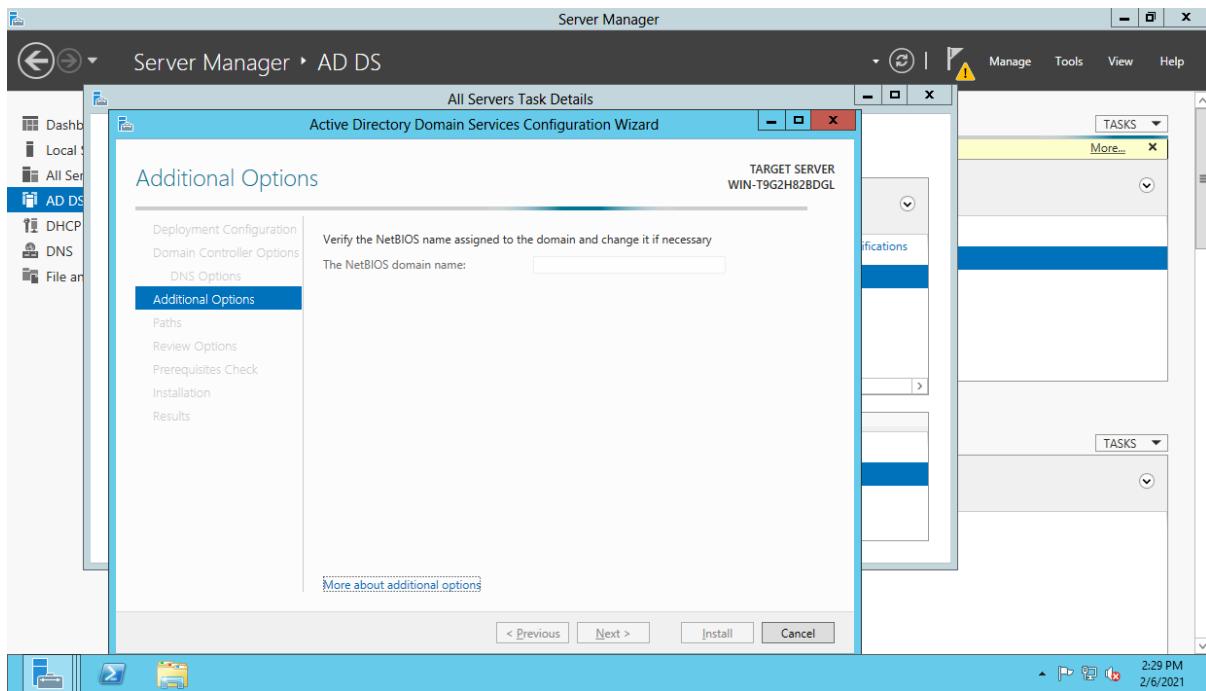


>> Enter a password. And Click on Next.

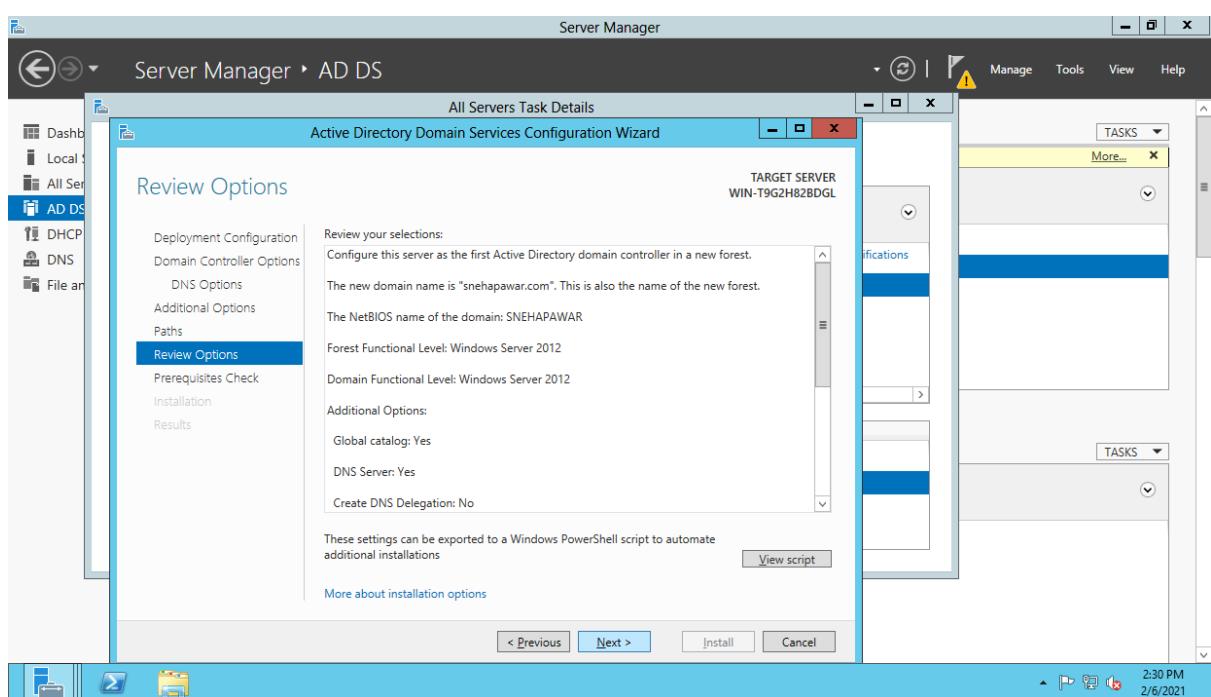
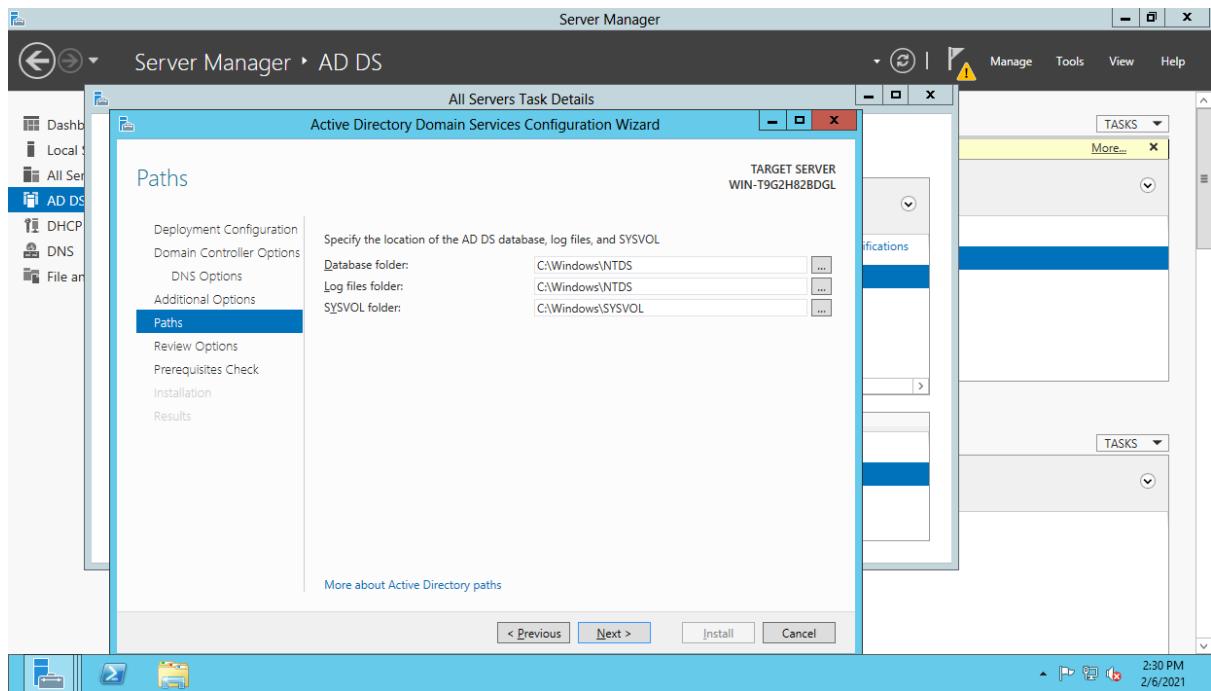


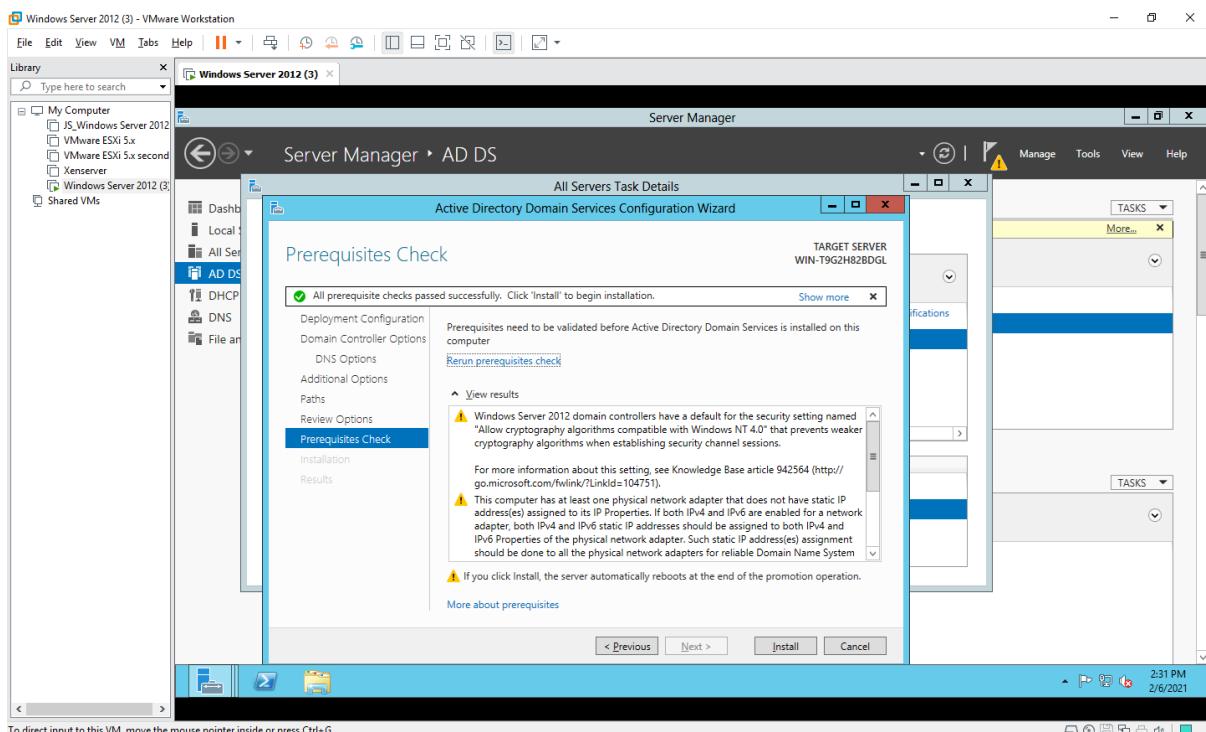
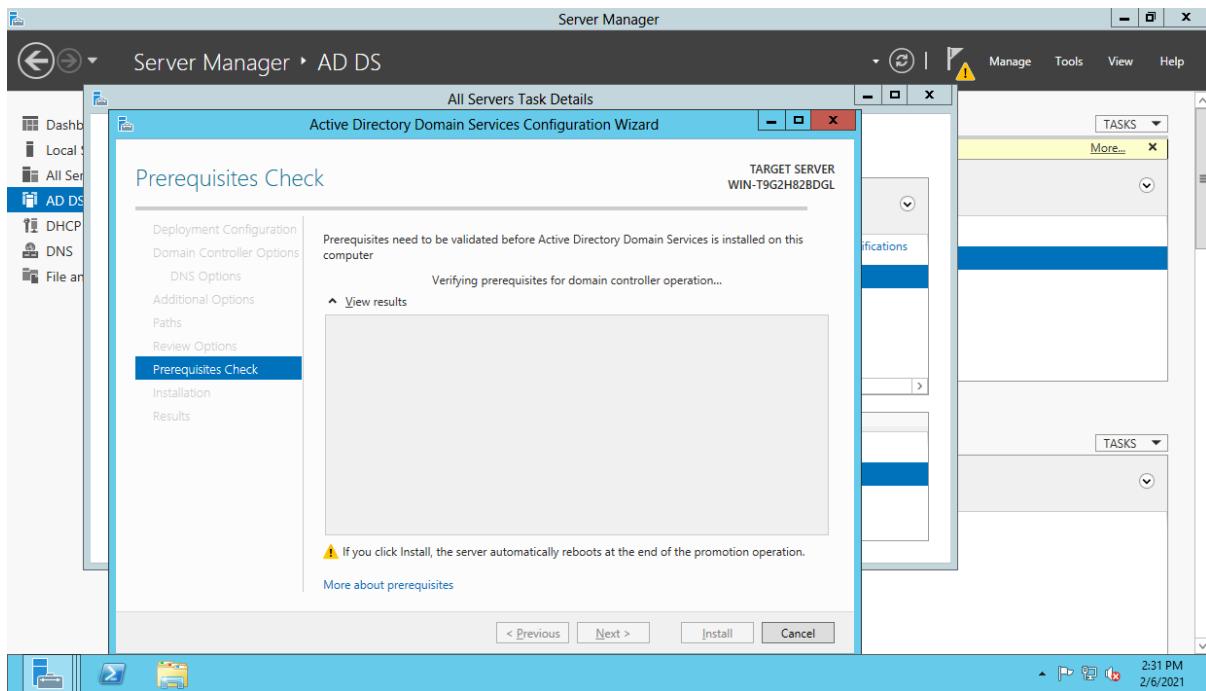
>> Click on **Next**.

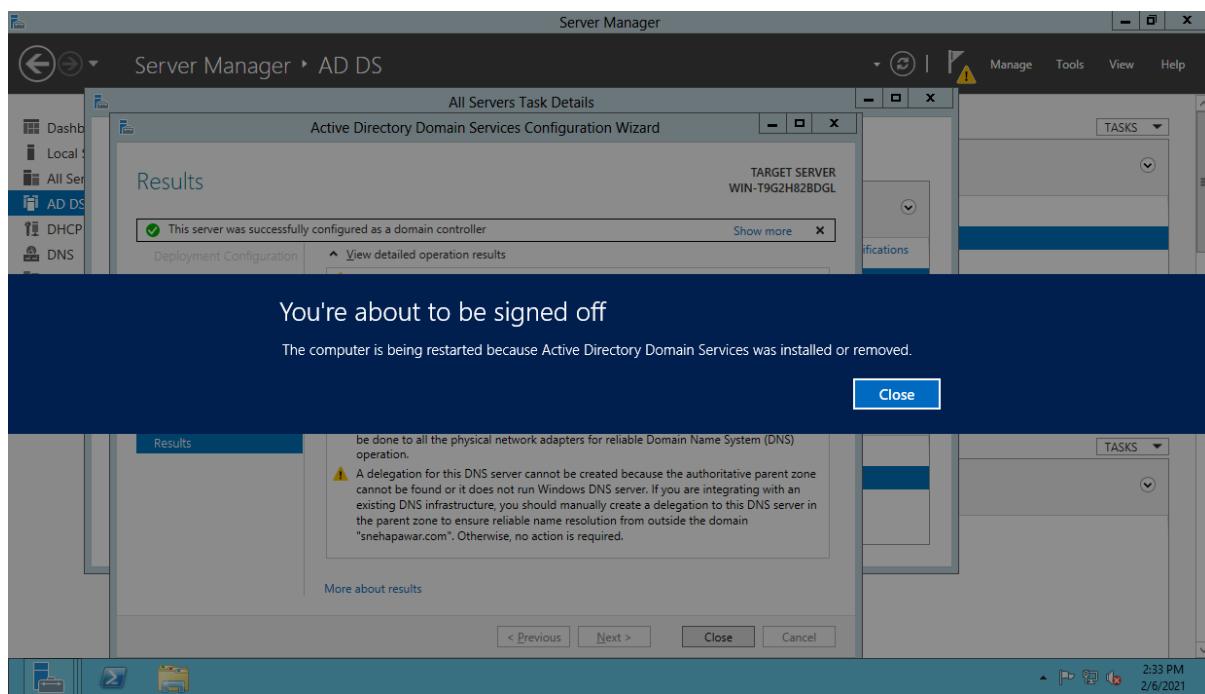
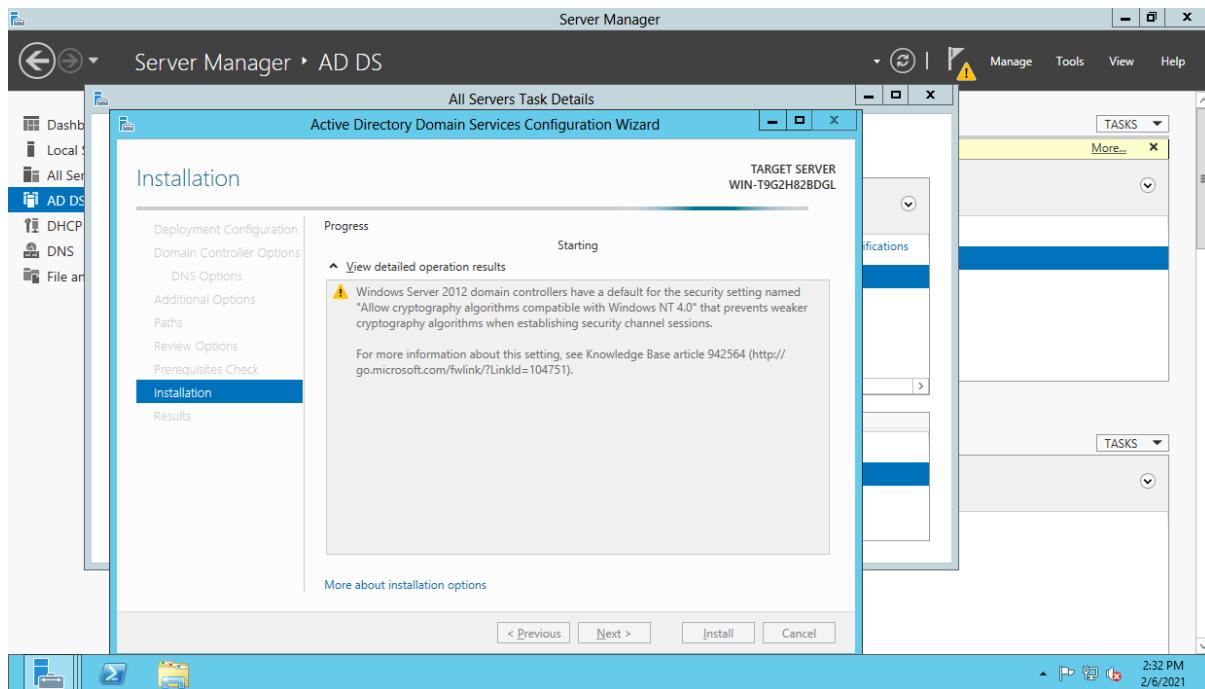


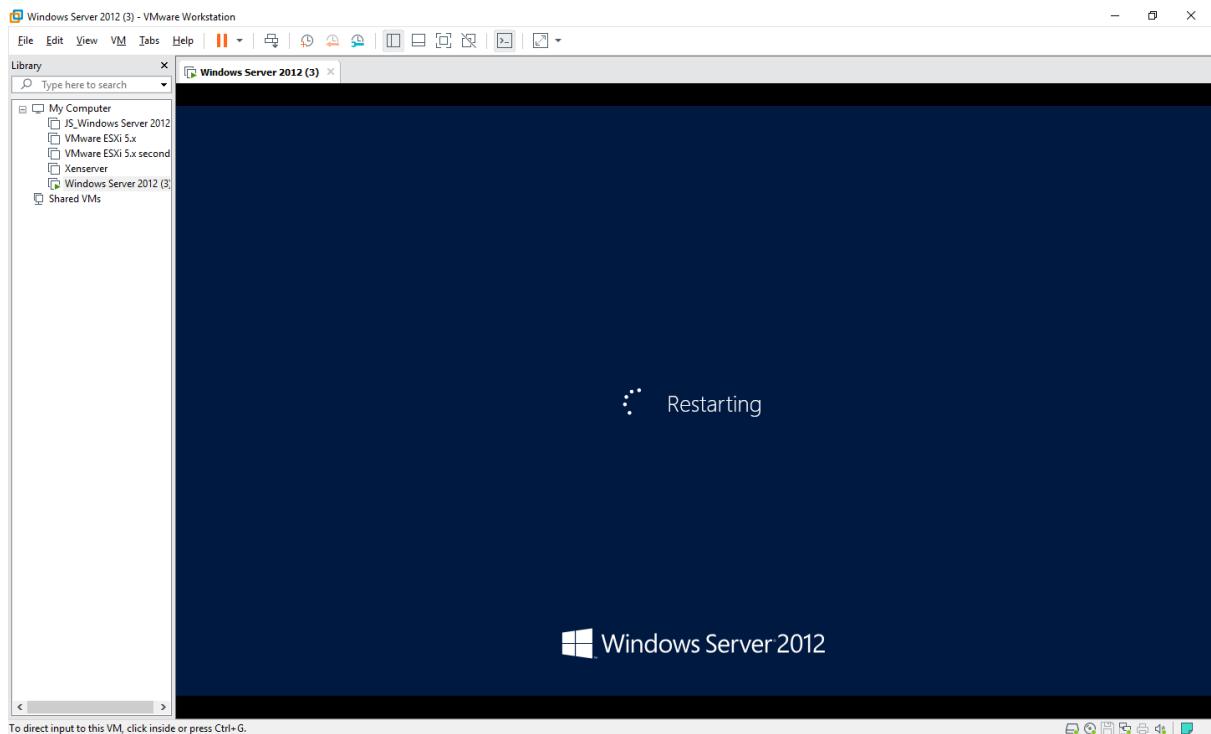


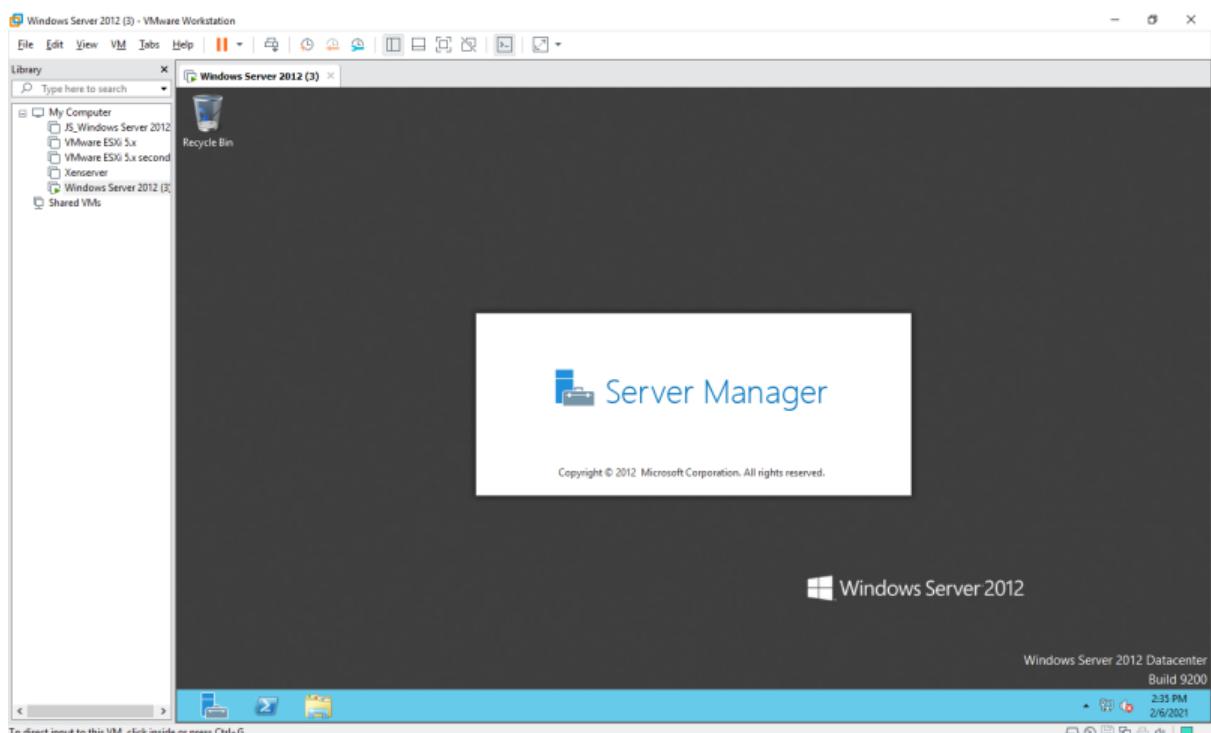
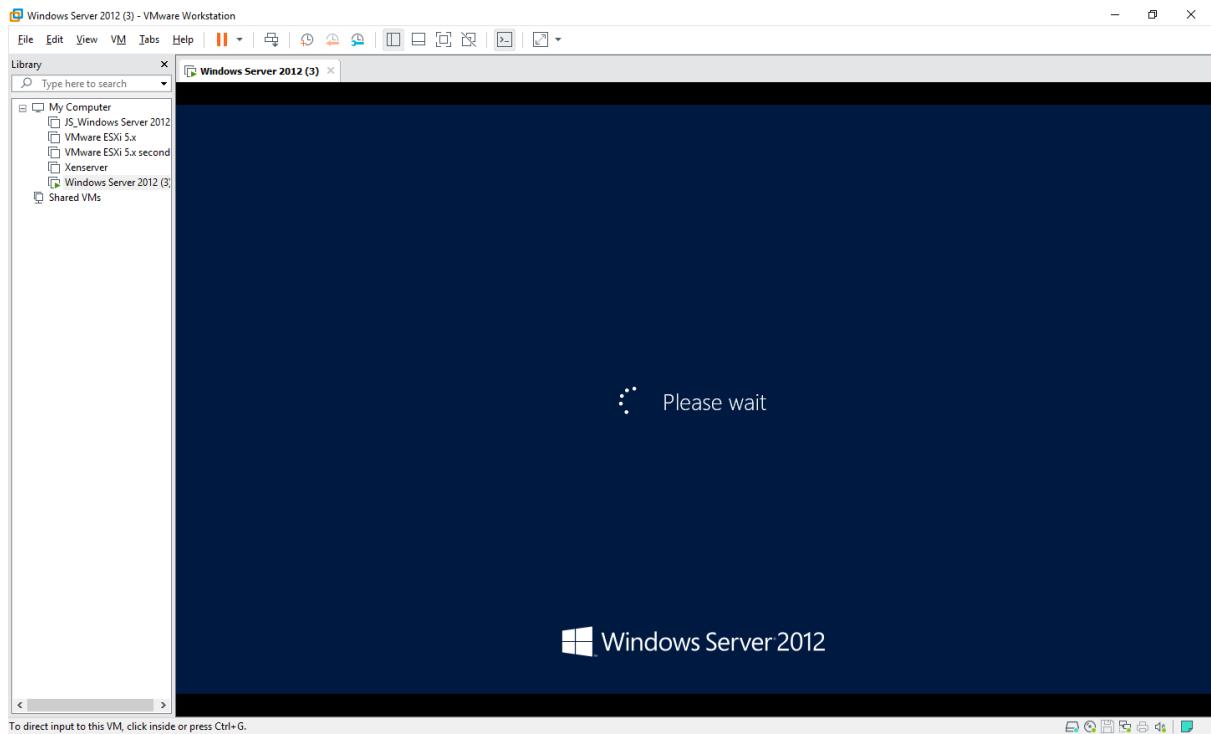
>> Click on **Next**.





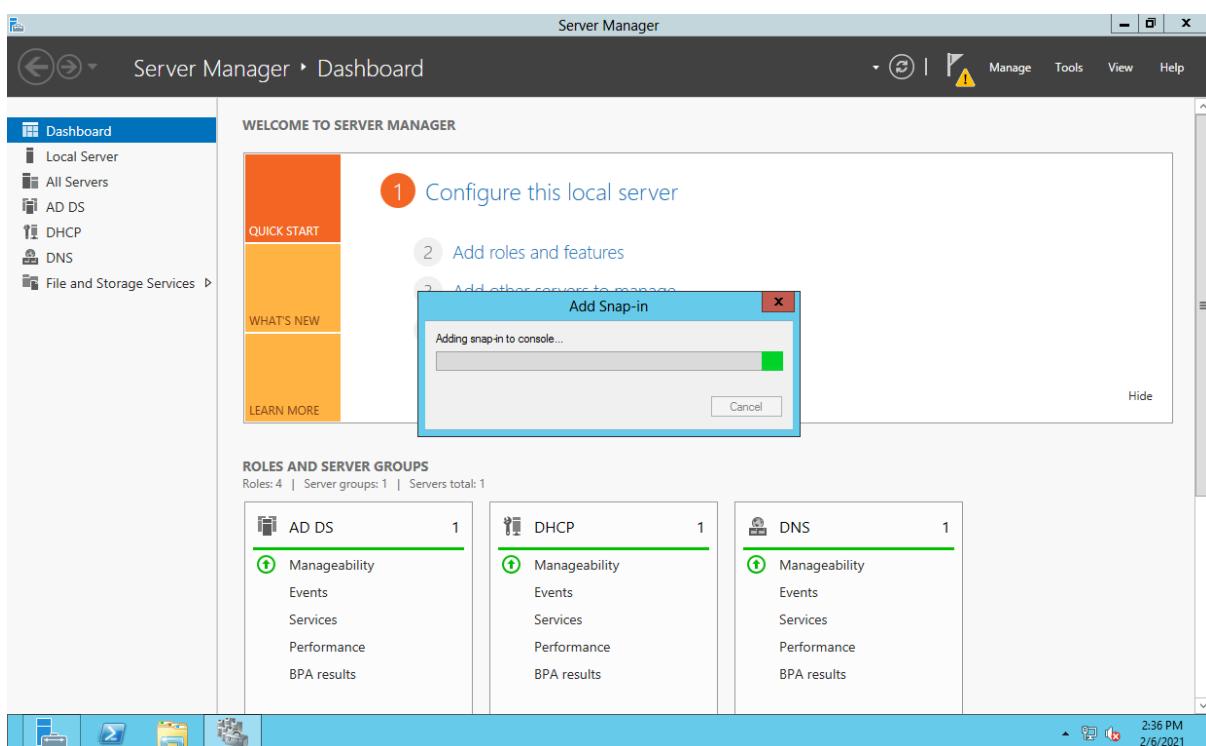
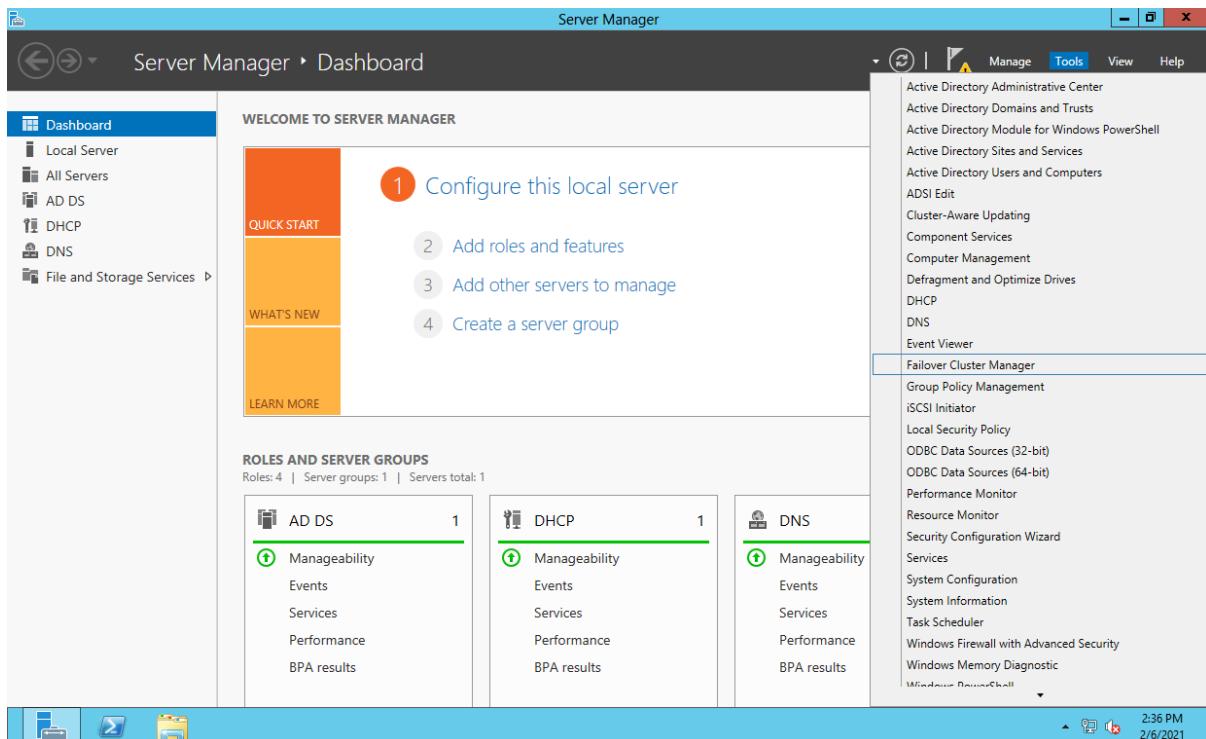






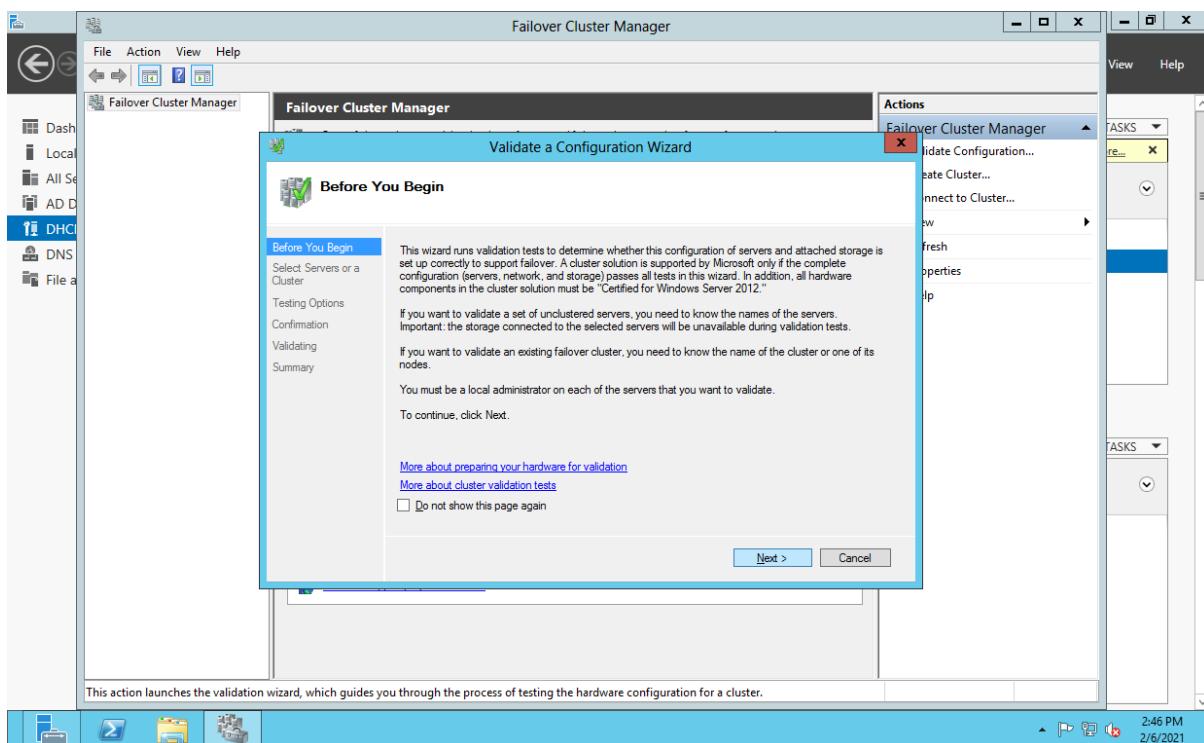
## - Creating a Failover Cluster

>> Click on Tools >> Failover cluster Manager

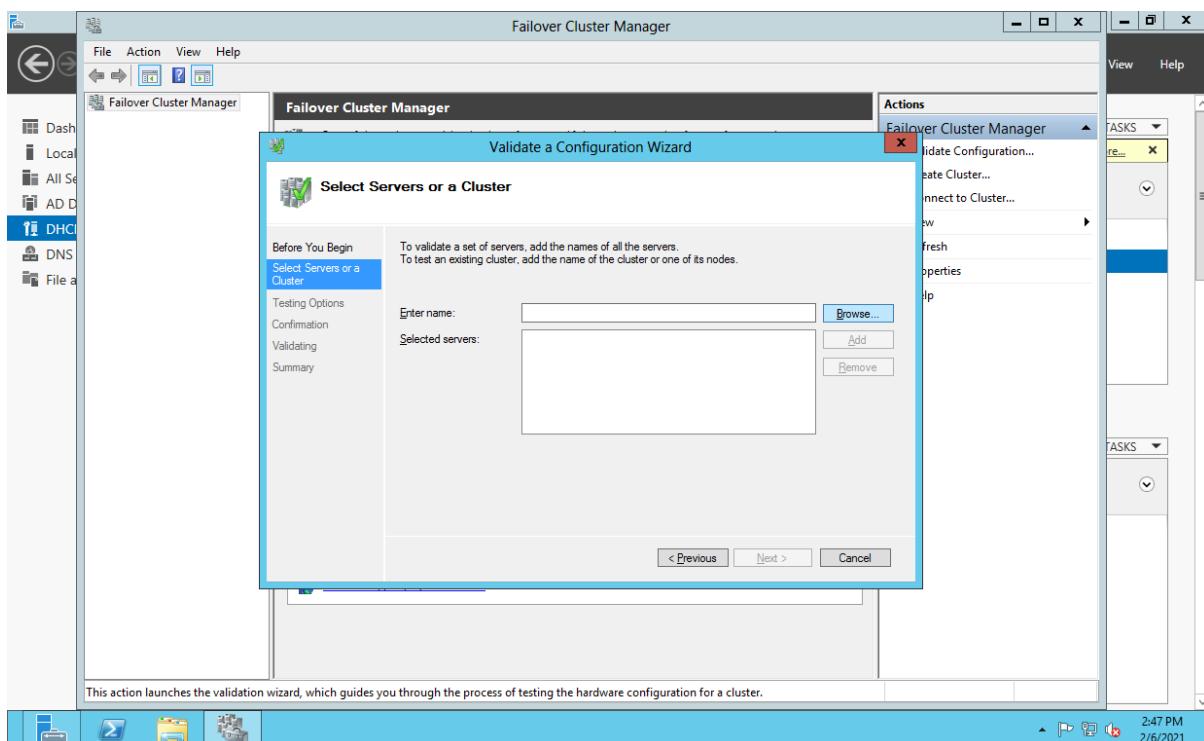


>> Failover Cluster Manager wizards will appear. Click on **Validate Configuration**, and click on **Next**. **Validate Configuration Wizard** will appear.

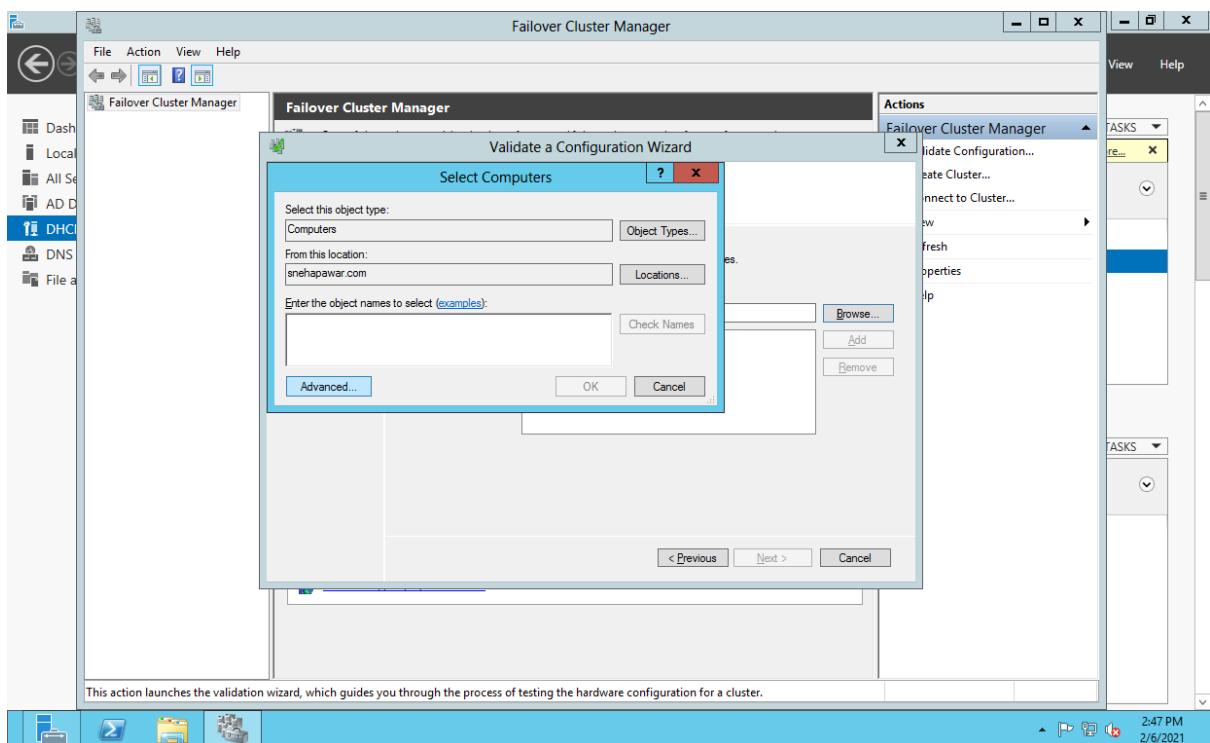
The nodes to be added must be validated prior to add in the cluster.



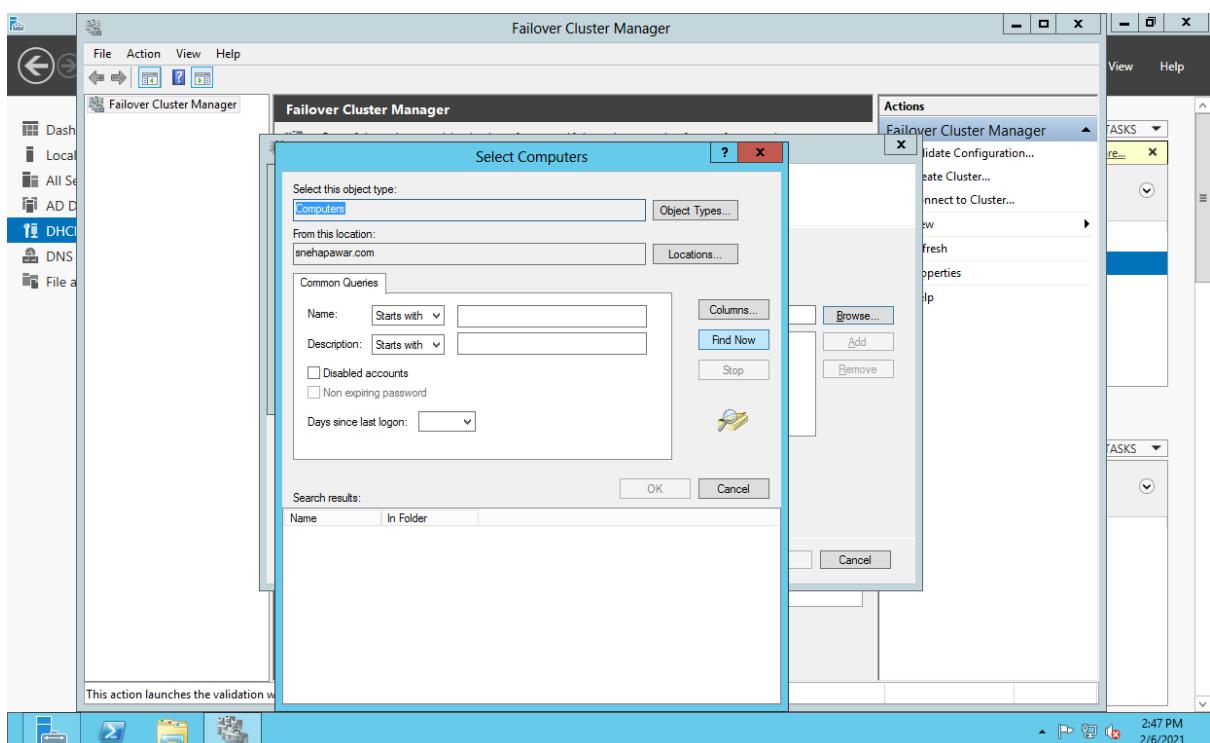
>> Click on **Browse**.

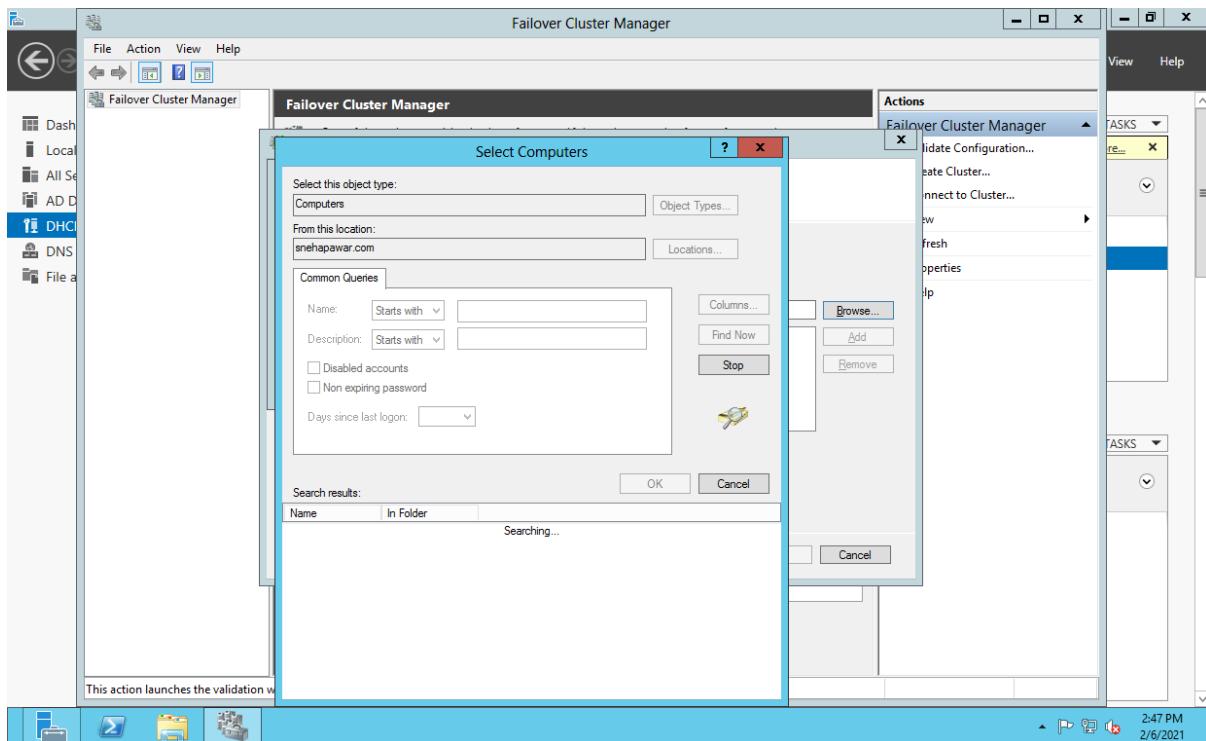


>> Click on **Advanced**.

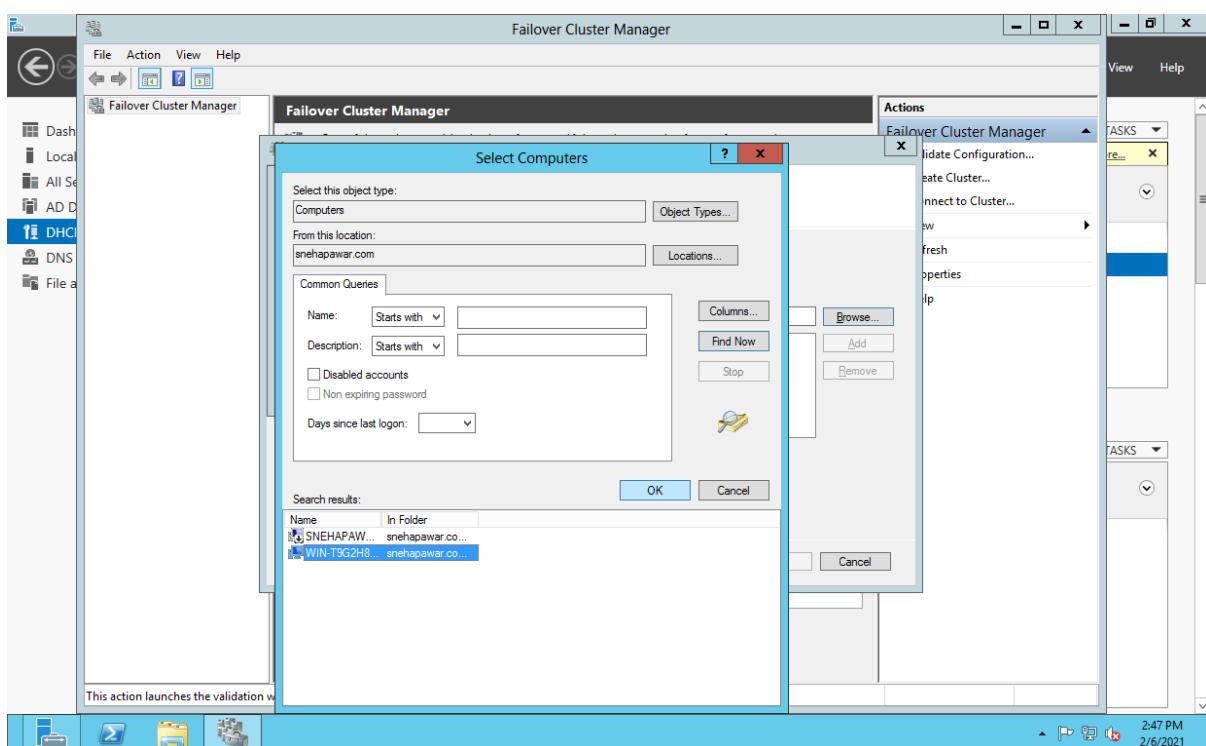


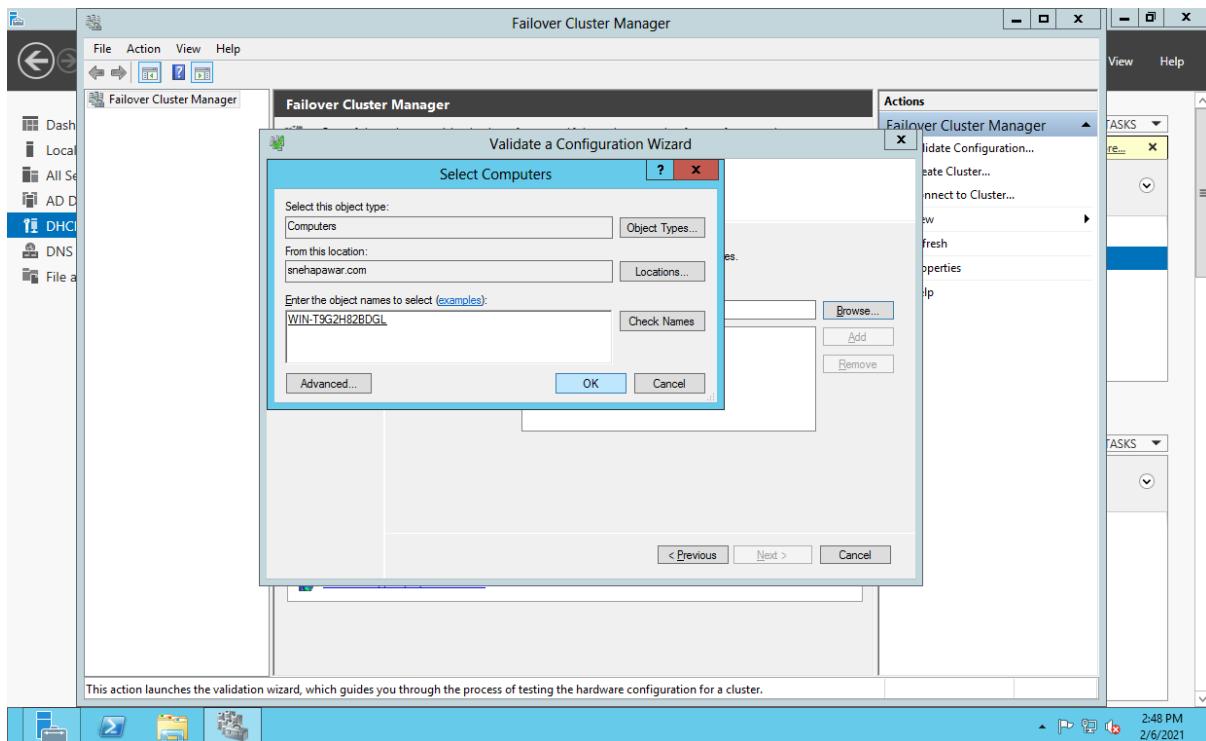
>> Click on **Find Now** to find the domain node.



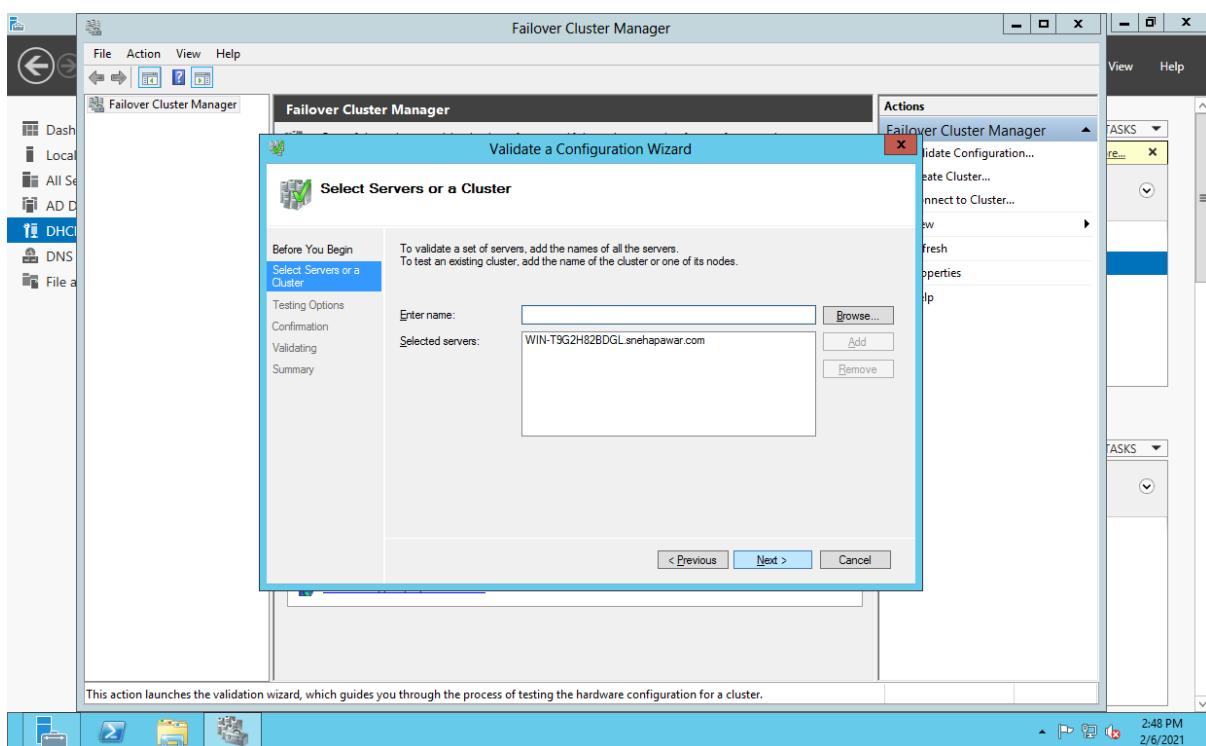


>> Click on the domain that you have created and click on **OK**.

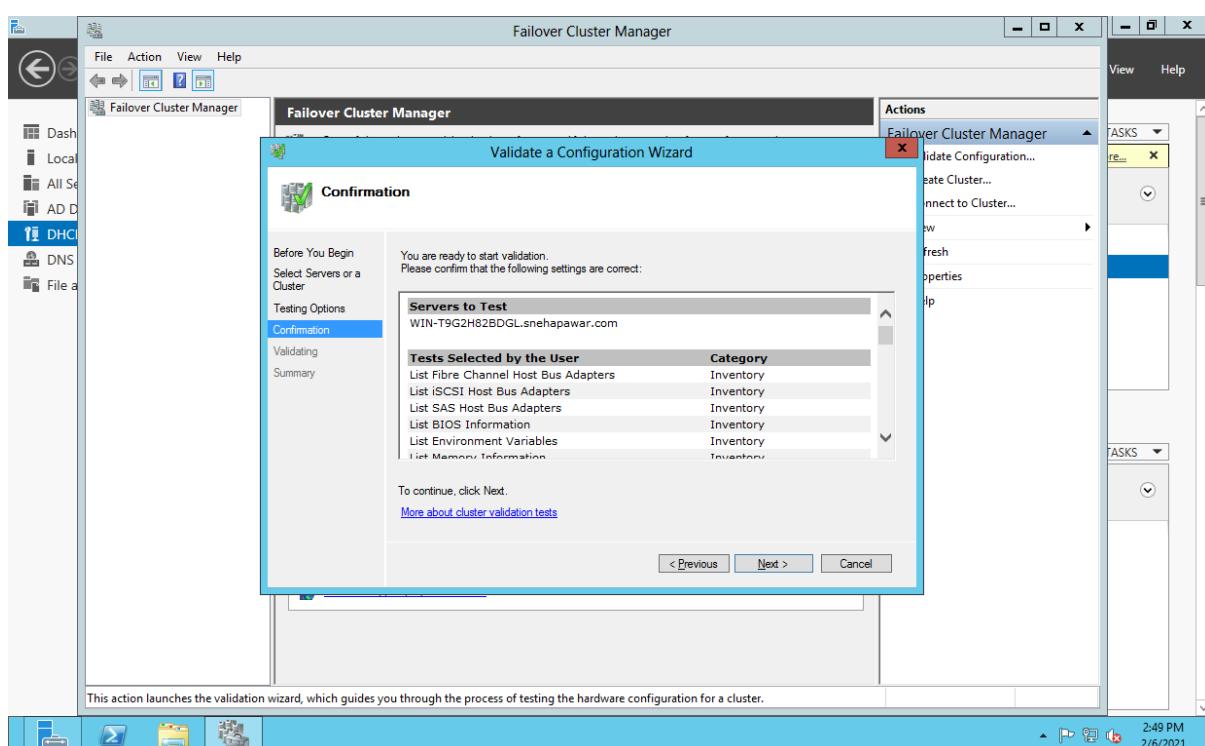
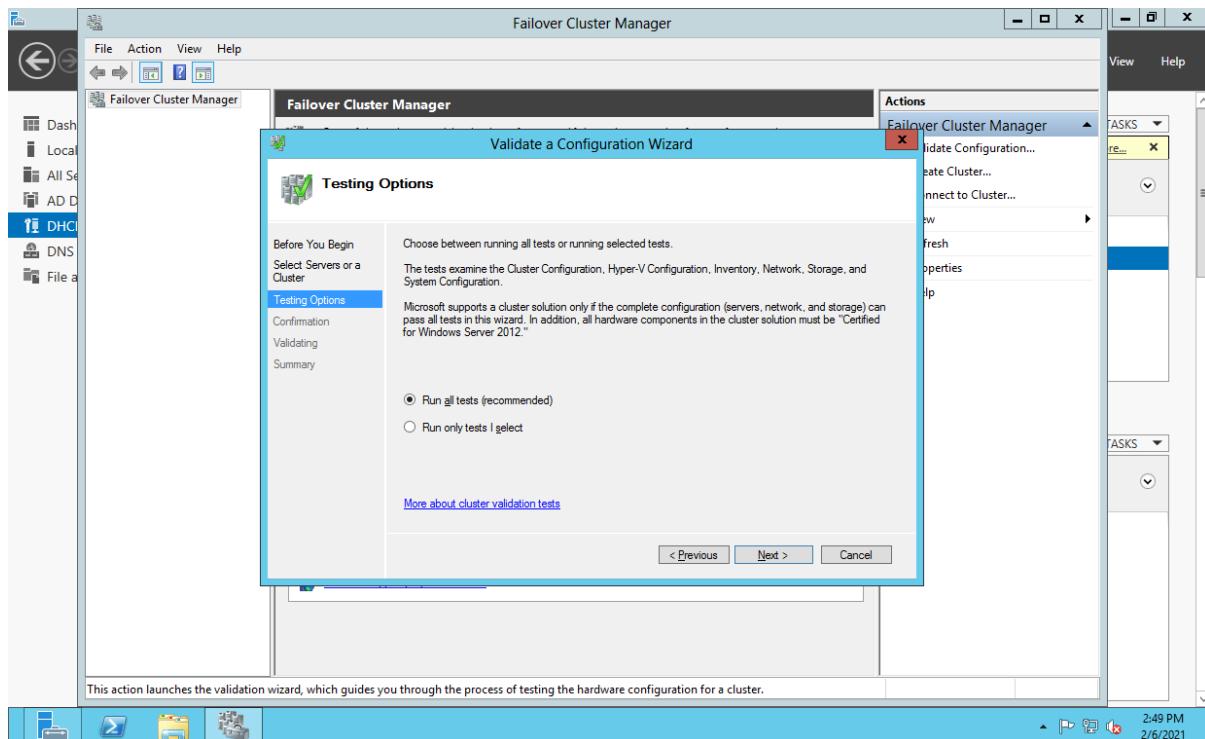


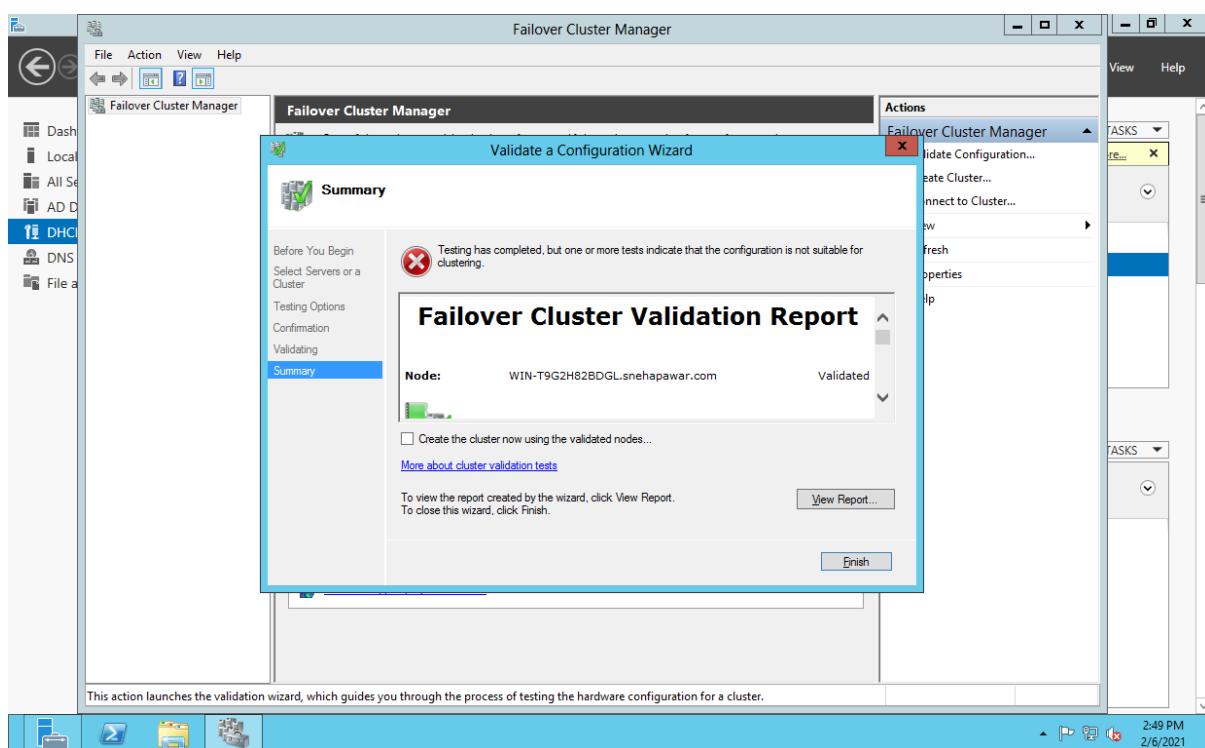
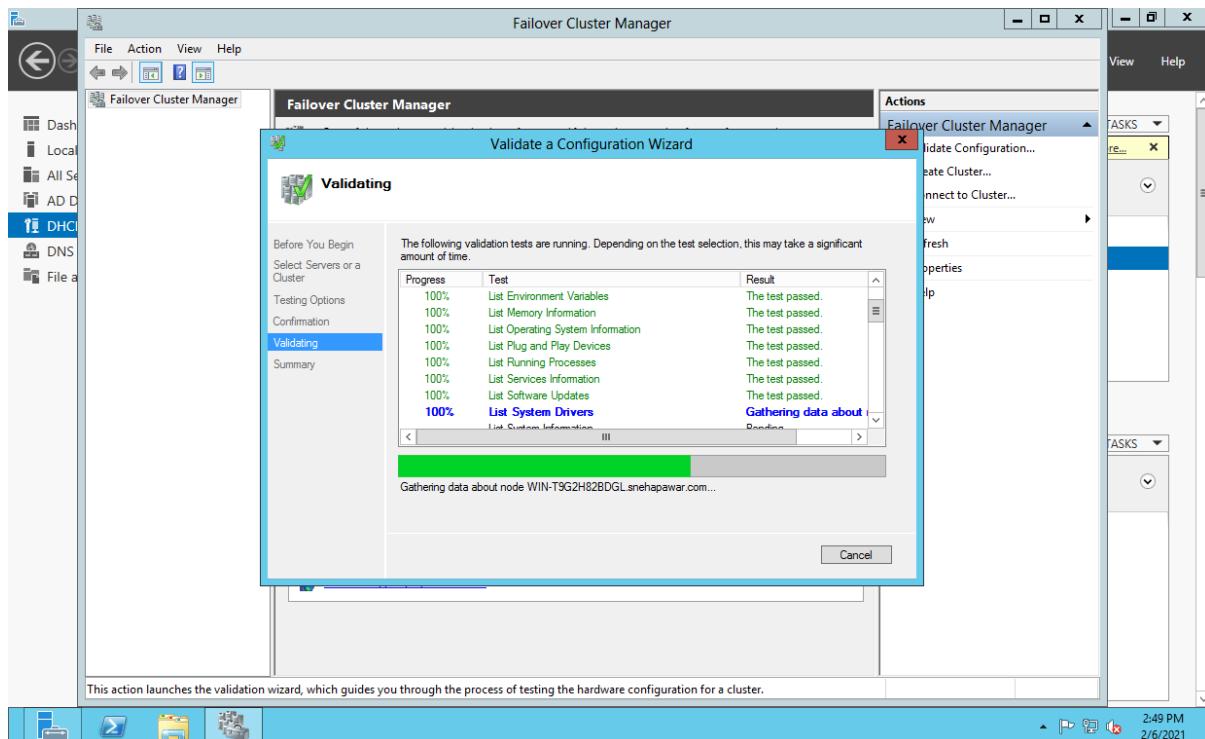


>> Click on **Next**.

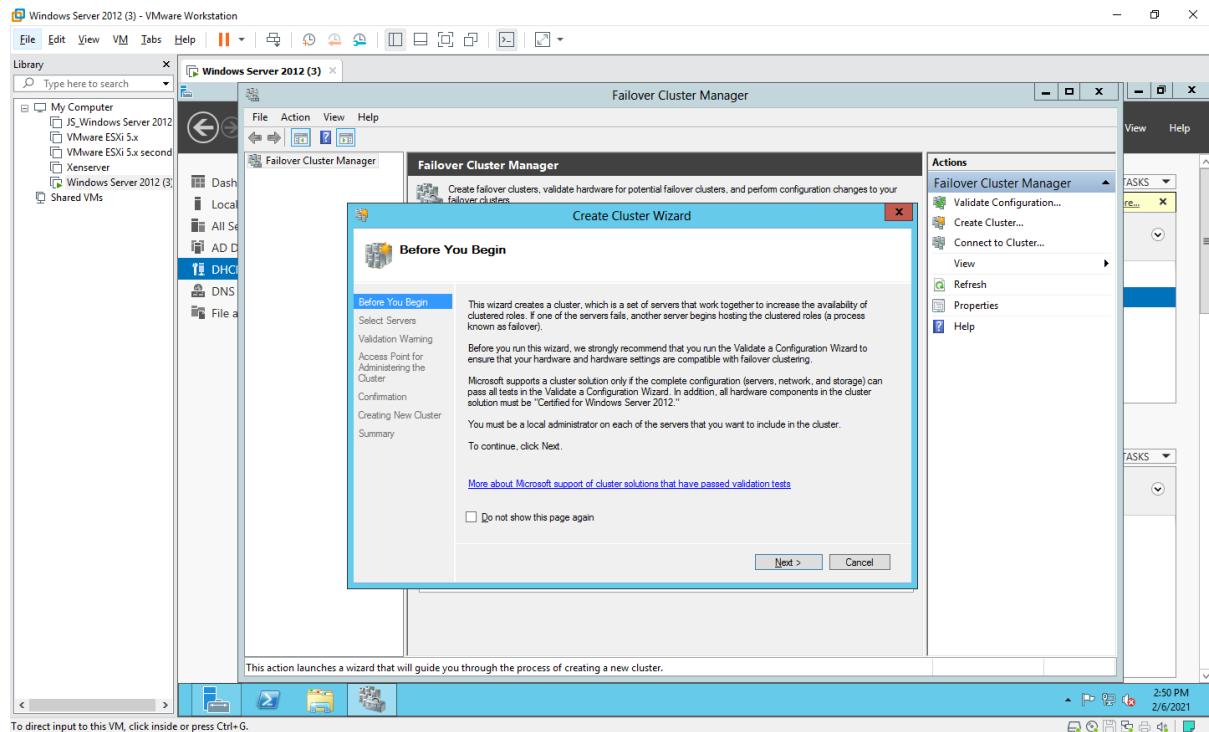


>> Click on '**Run all Tests Recommended**'. and click on **Next**. It will ask for confirmation, click on **Next**.

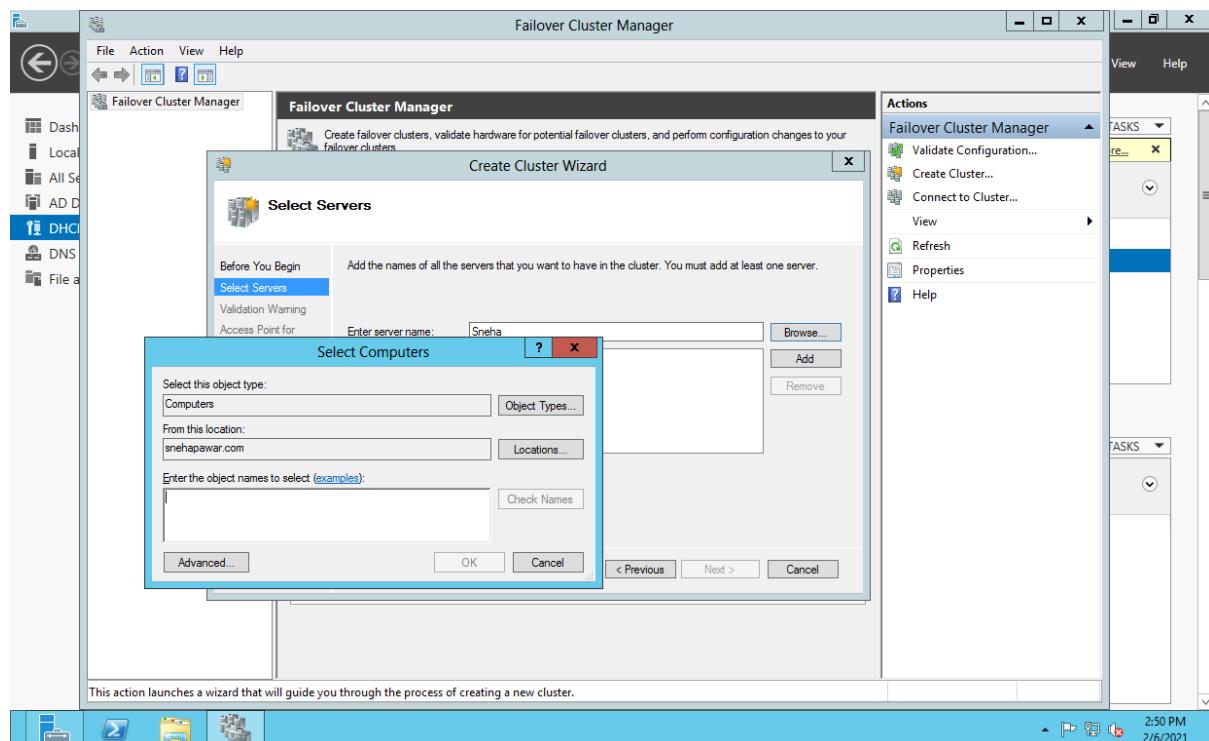


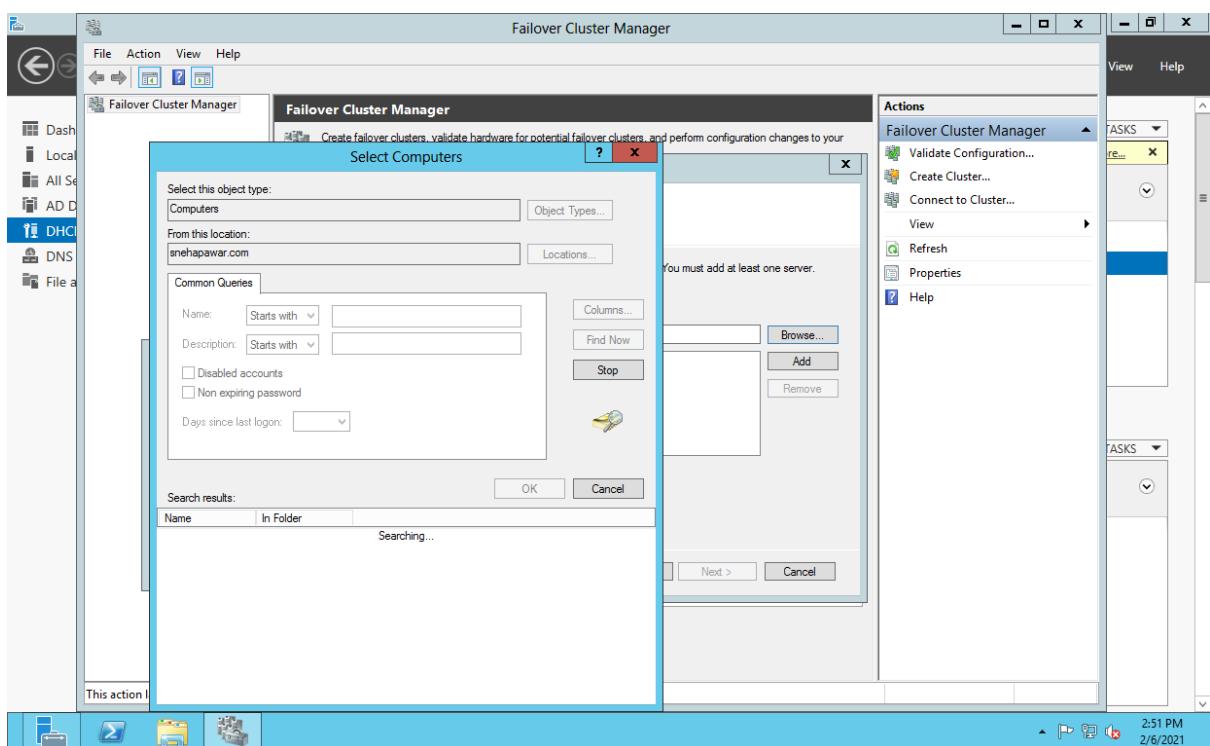
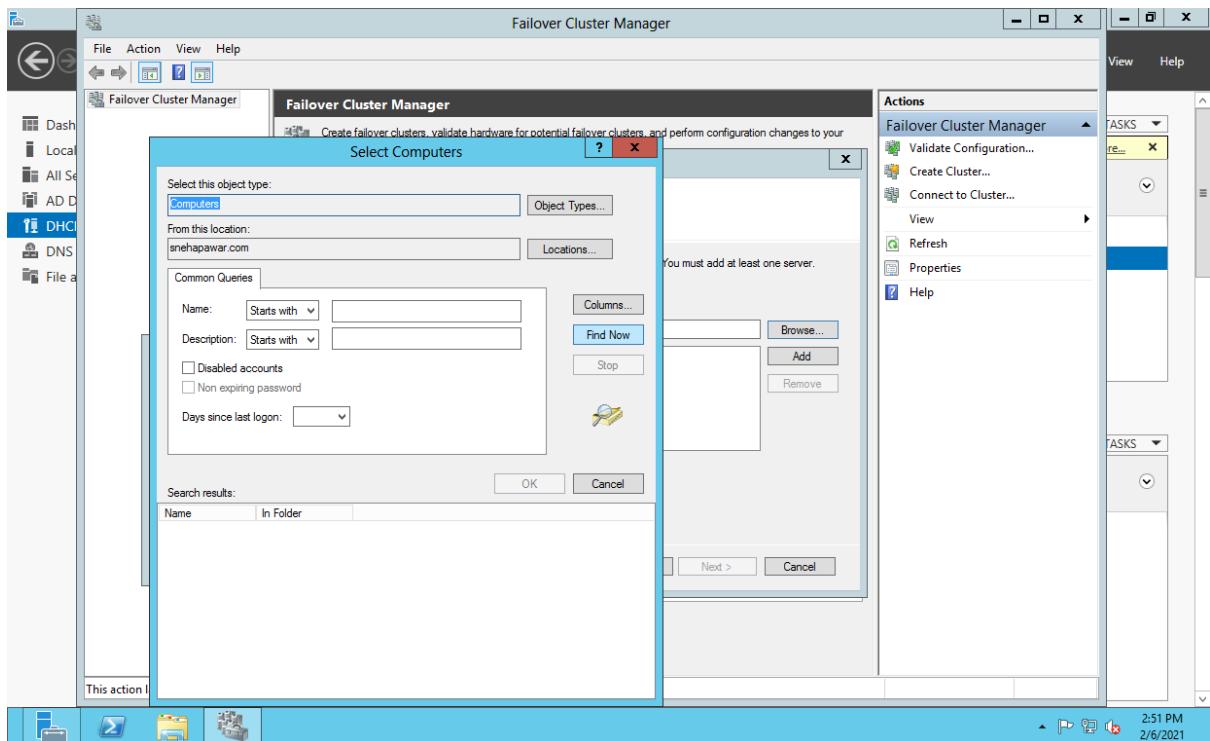


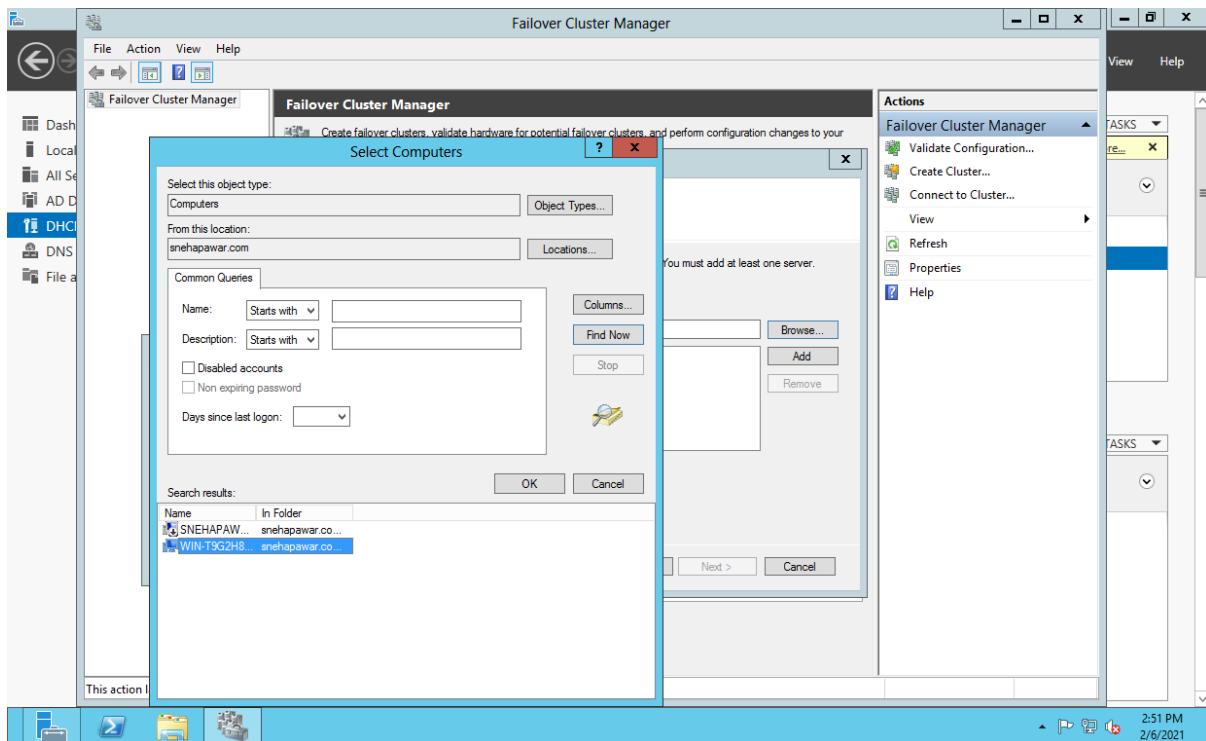
>> After that click on **Create Cluster**. Create cluster wizard will open.



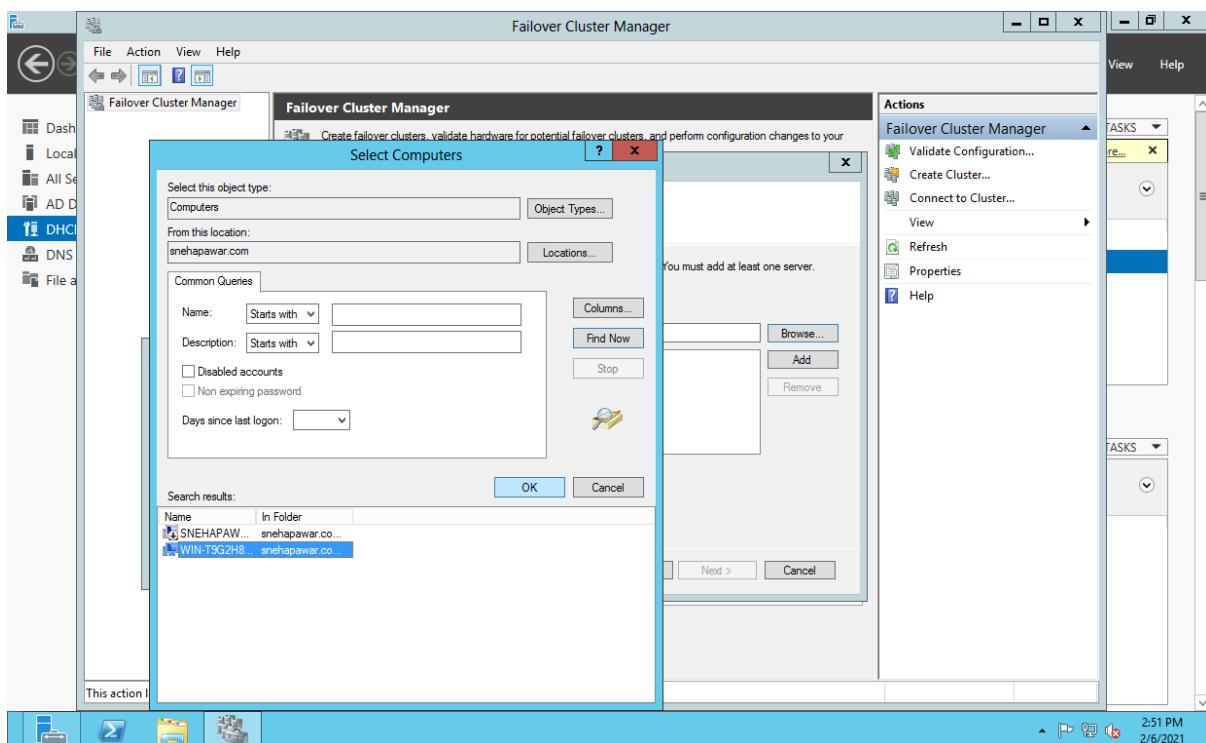
>> Here Specify the cluster name and browse for the domain node that we have created.



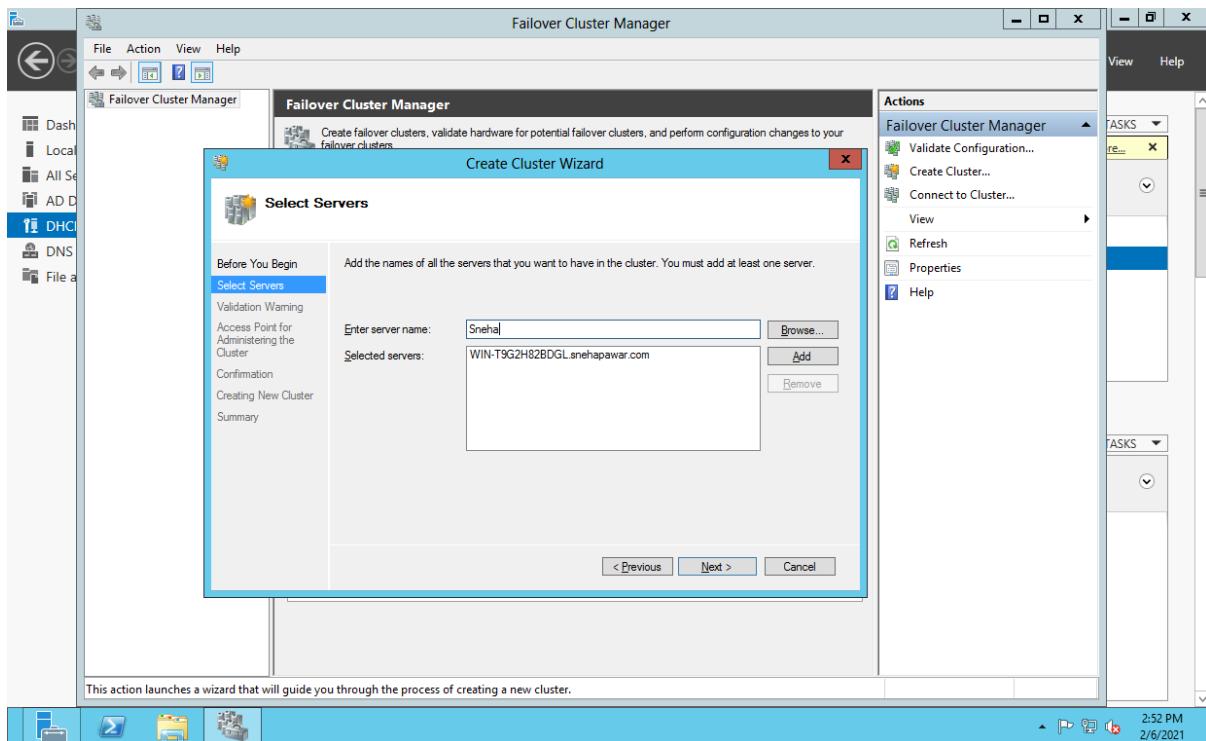




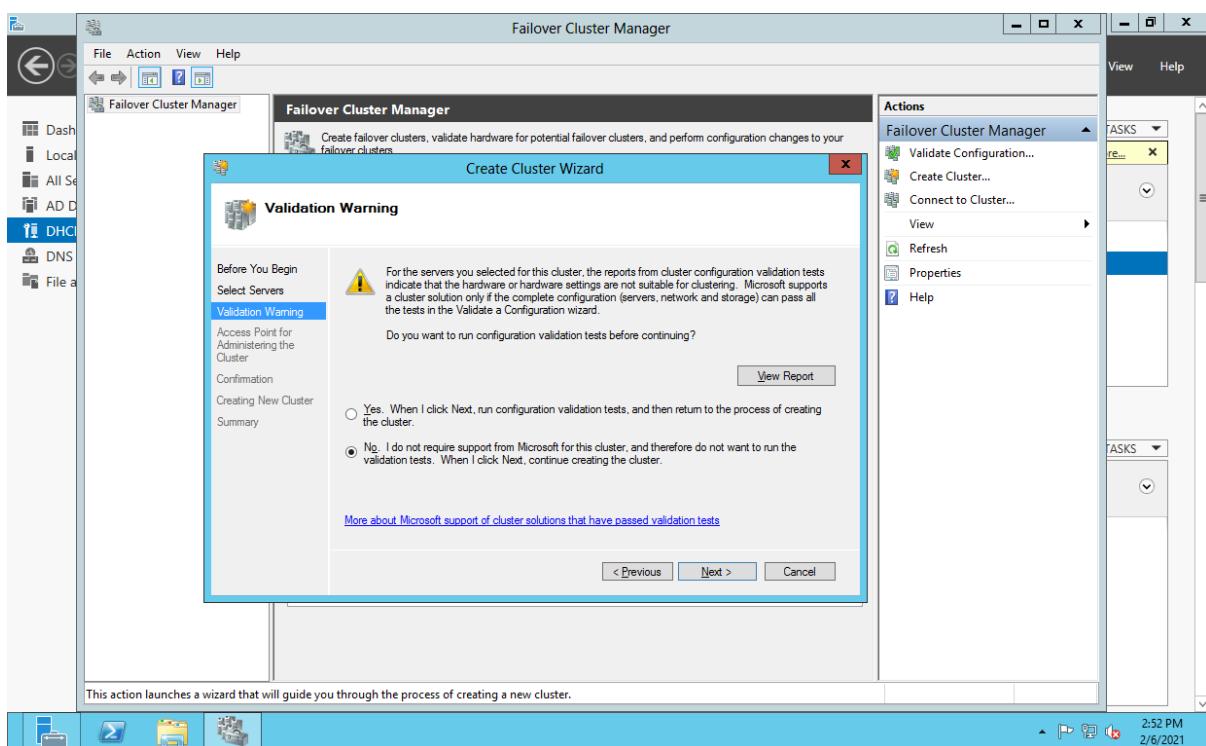
>> Click on OK.



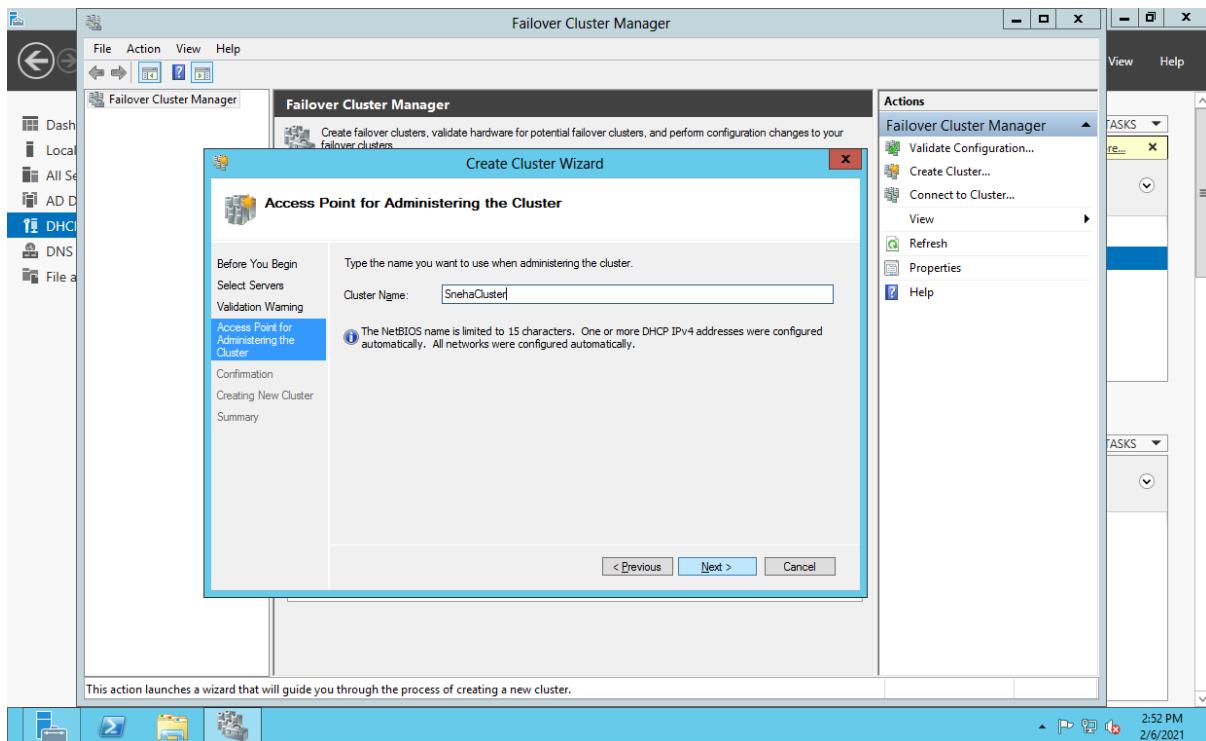
>> click on Next.



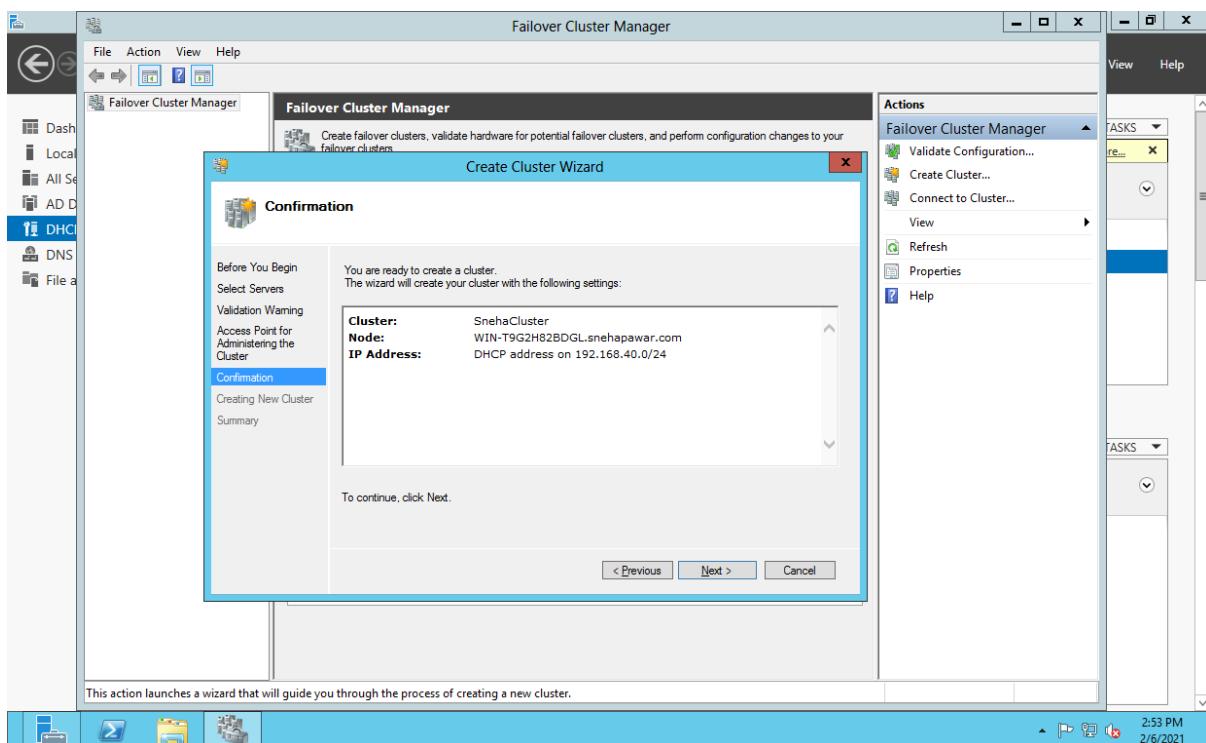
>> In Validation Warning select No.



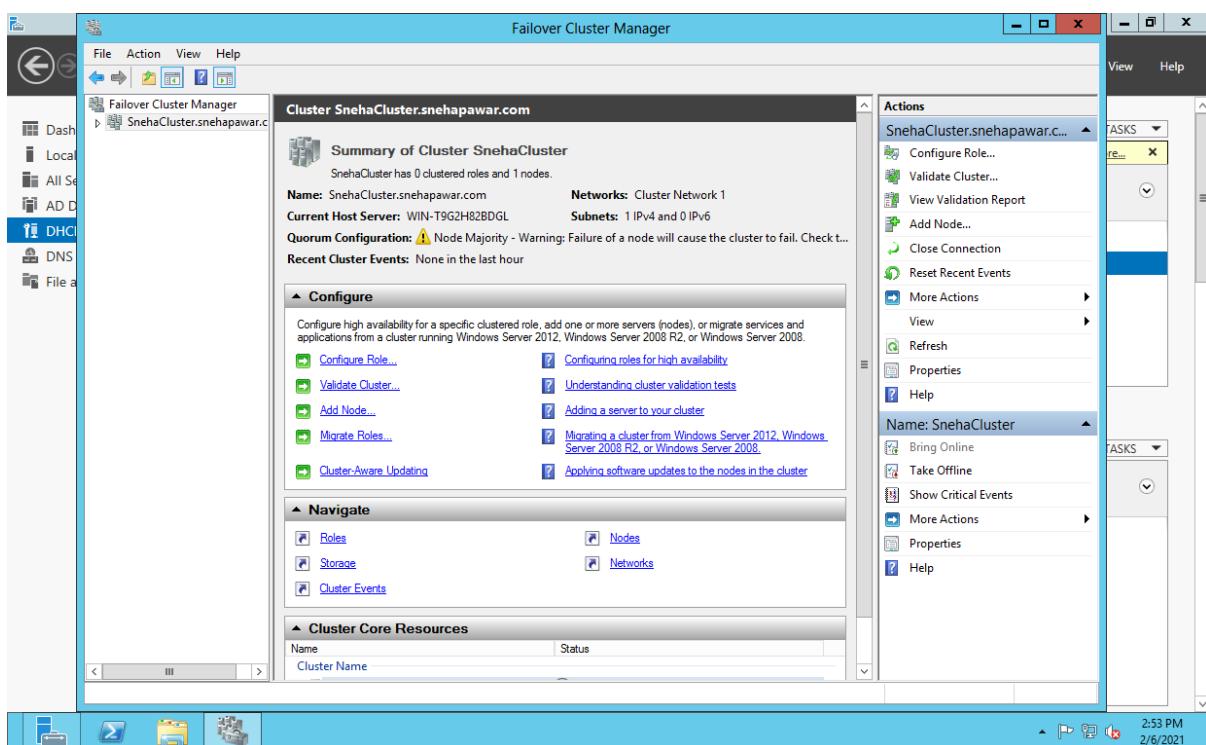
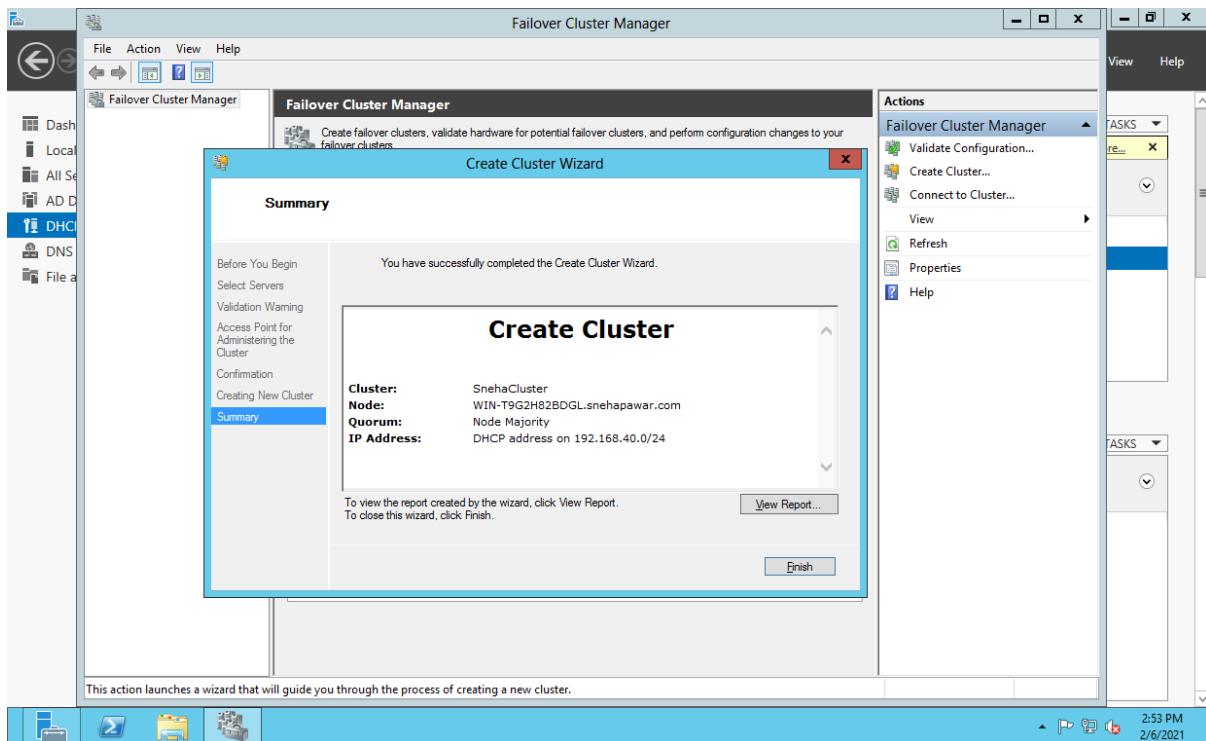
>> Specify the cluster name and click on Next.

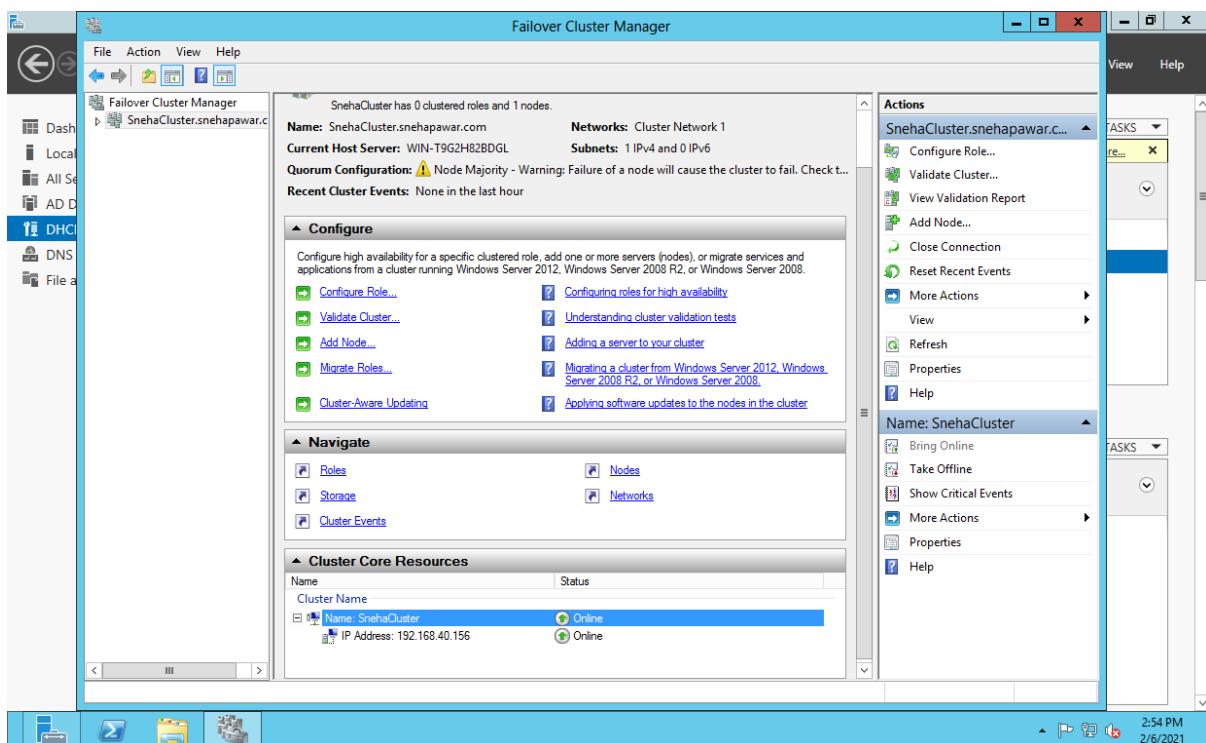
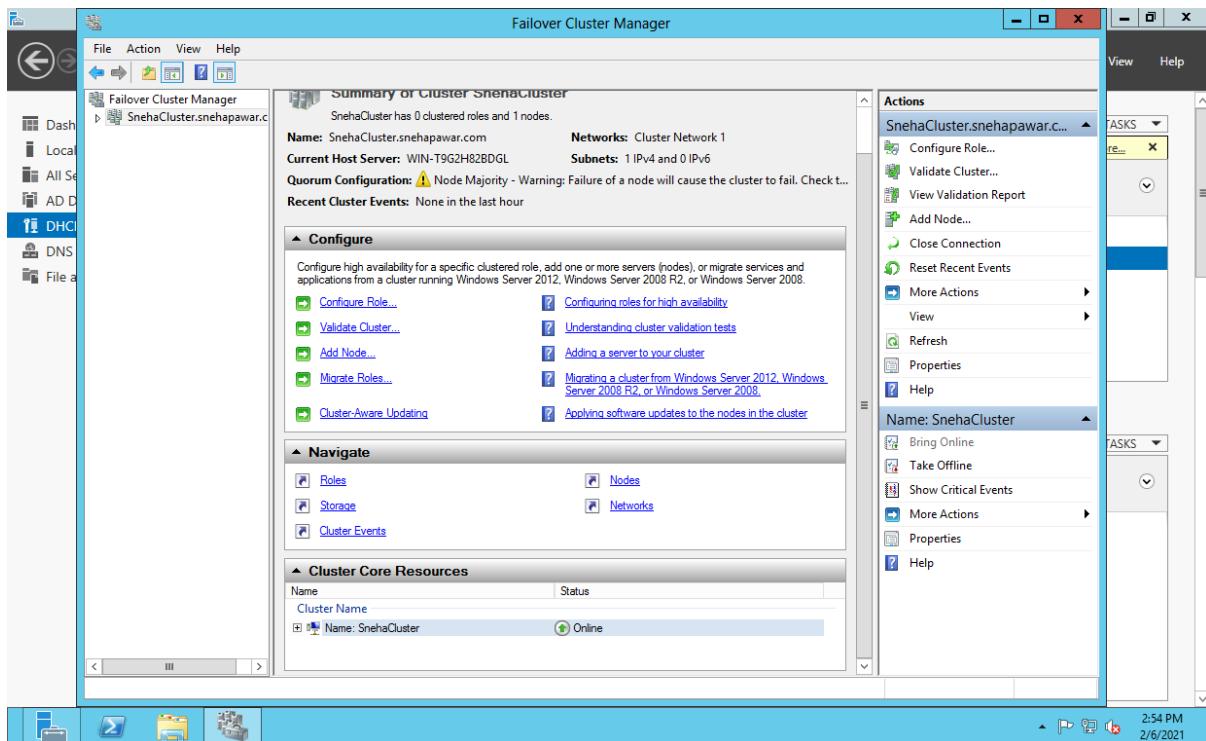


>> click on **Next**.



>> Click on **Finish**.





## PRACTICAL: 2

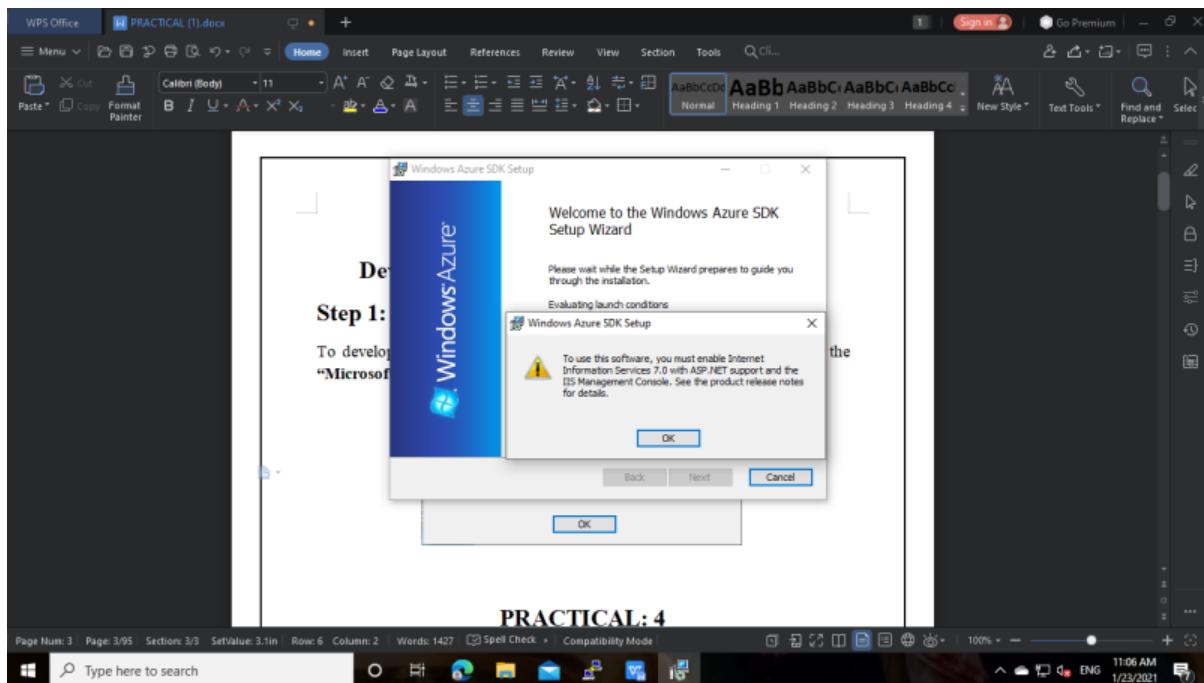
### Developing application for Windows Azure .

#### Softwares Required :-

- Microsoft Visual Studio 2010 Professional
- Windows Azure SDK
- Windows Azure Tools for Microsoft Visual Studio 2010

#### Steps:

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



>> While installing this we will get the above popup.

>> We need to enable internet information services with ASP.NET support and the IIS Management Console.

IIS stands for Internet Information Services or internet Information Server also known as Windows Web Server is available on most versions of Microsoft Windows operating systems and takes second place in overall usage behind Apache HTTP Server on the internet.

IIS is a web server package designed for windows server. It is used for hosting websites and other content on the web.

### **Enabling IIS and required IIS components on Windows 10.**

>> Open **Control Panel** and click **Programs and Features > Turn Windows features on or off.**

>> **Enable internet information services.**

>> Expand the **Internet Information Services** feature and verify that the web server components listed in the next section are enabled.

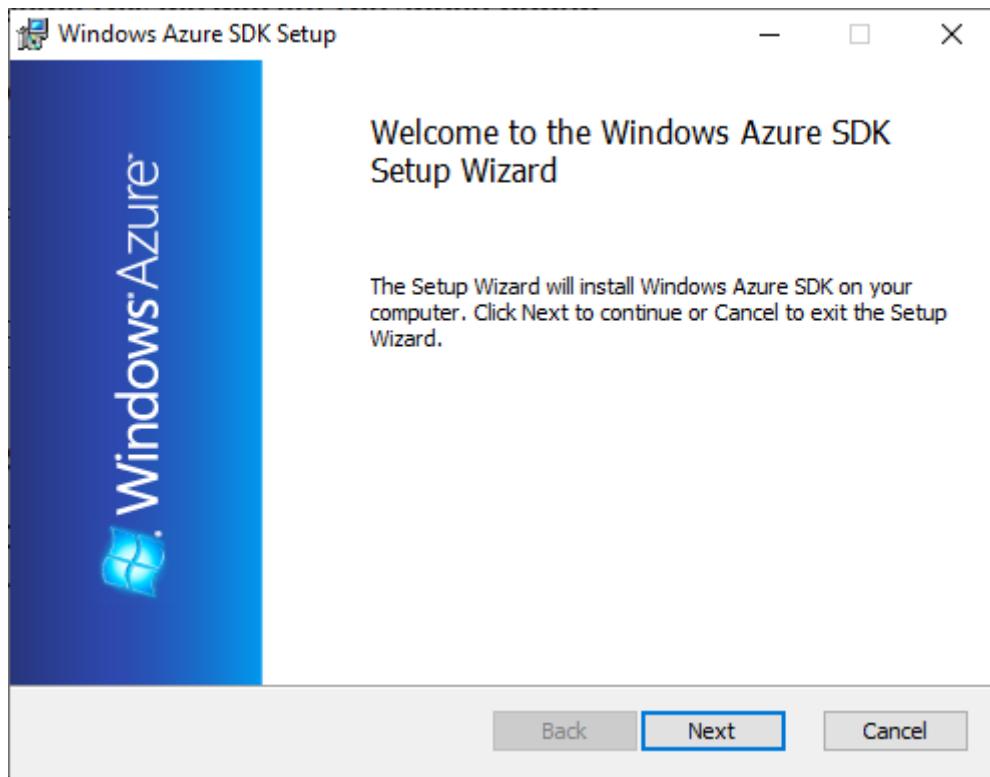
>> Click **OK.**

### **Required IIS Components :**

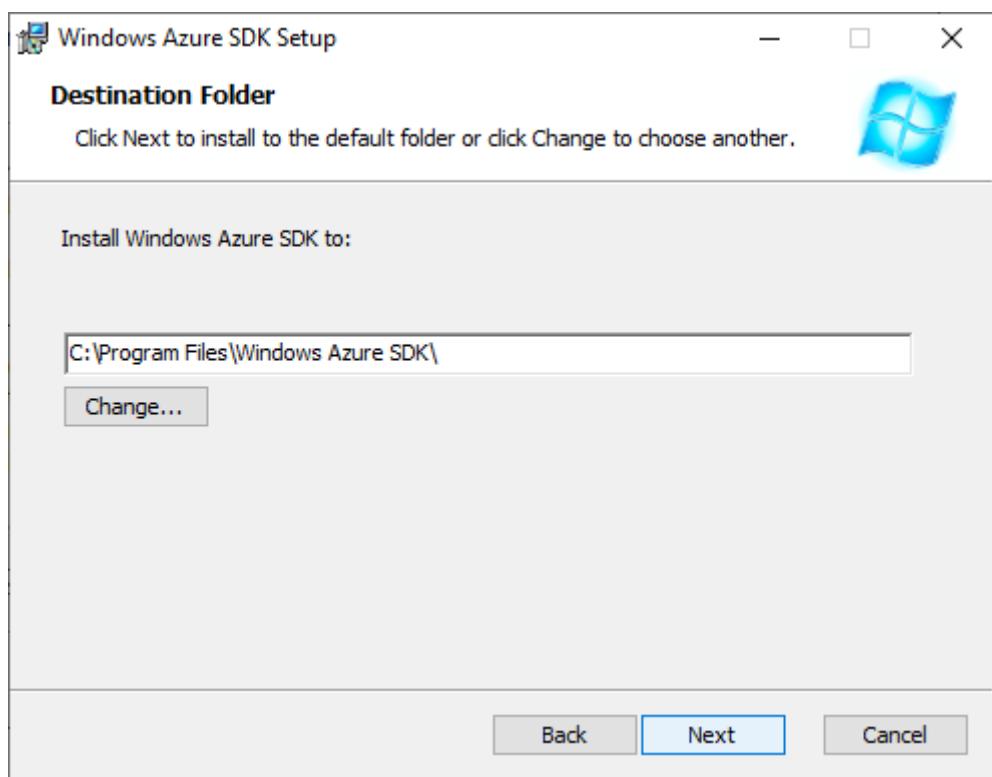
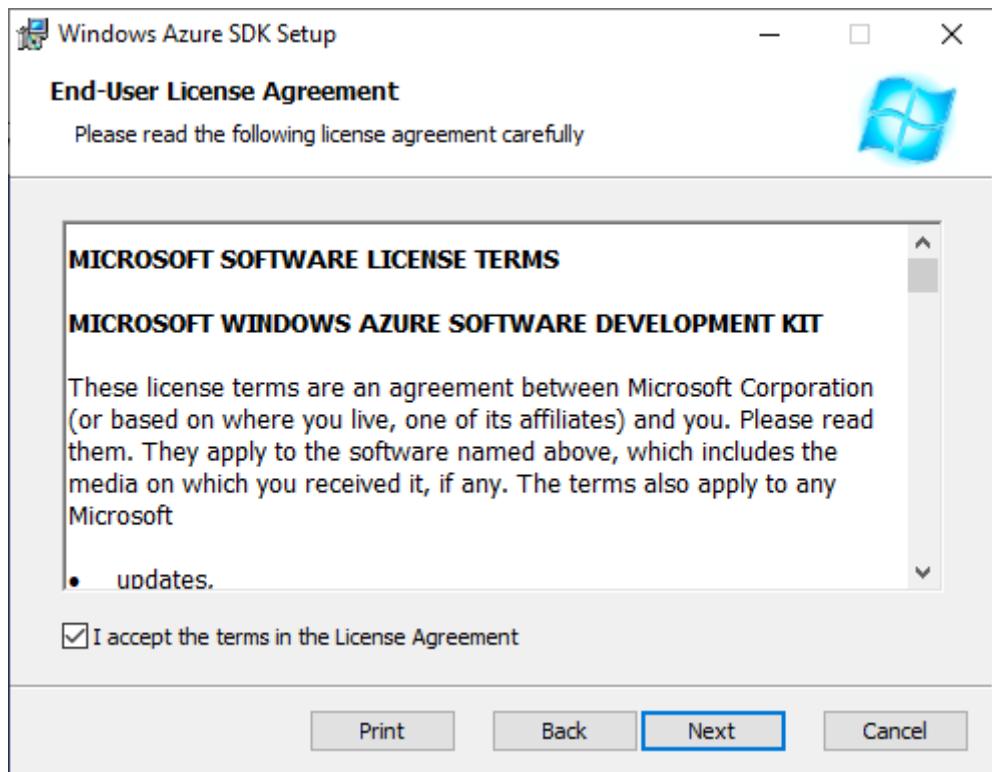
The IIS components listed below satisfy the minimum requirements. If other IIS components are enabled, they do not need to be removed.

- Web Manager Tools
  - IIS 6 Management Compatibility
    - IIS Metabase and IIS 6 configuration compatibility
    - IIS Management Console
    - IIS Management Scripts and Tools
    - IIS Management Service
- World Wide Web Services
  - Application Development Features
    - .NET Extensibility 4.5
    - ASP.NET 4.5
    - ISAPI Extensions
    - ISAPI Filters
    - WebSocket Protocol
  - Common HTTP Features

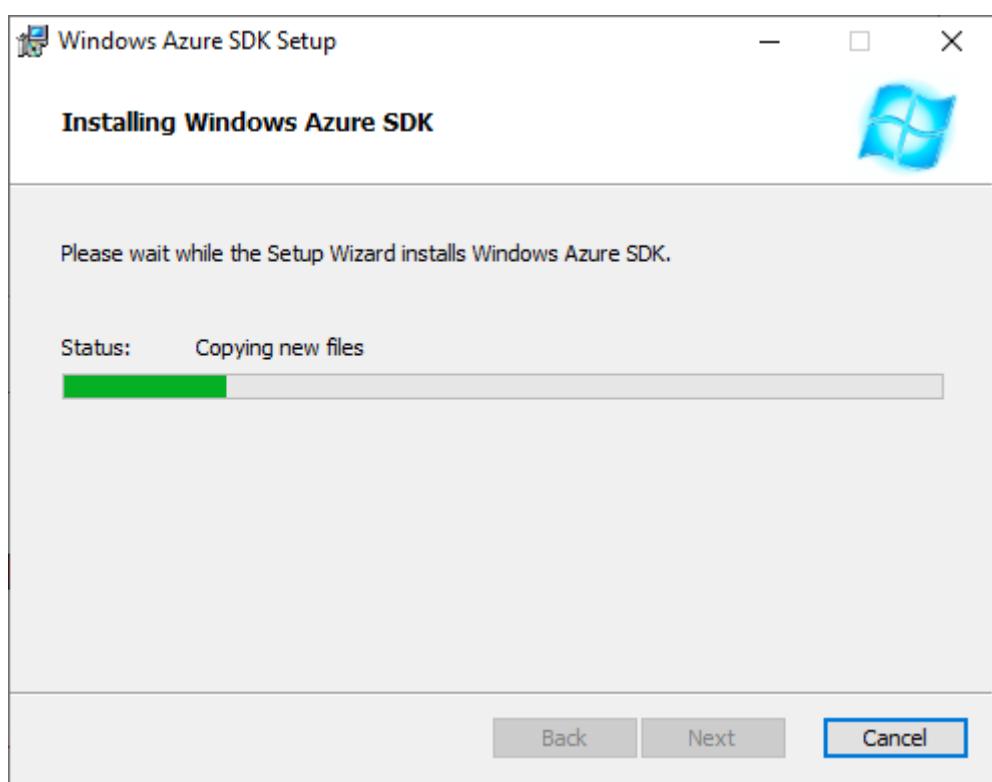
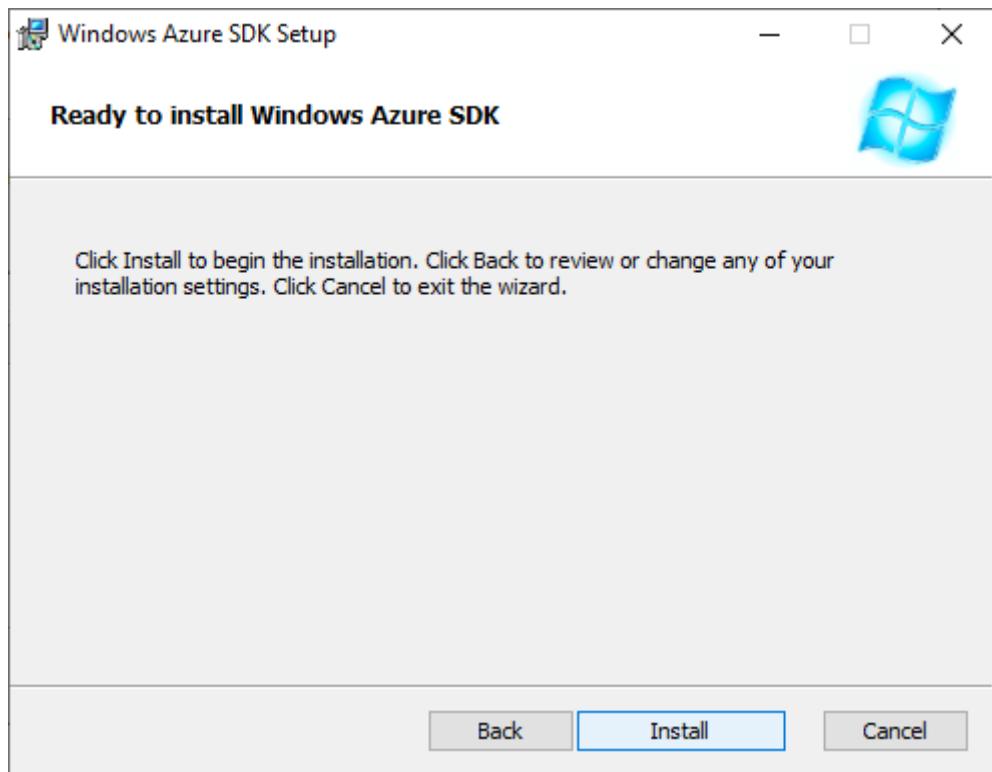
- Default Document
- Static Content
- Security
  - Basic Authentication
  - Request Filtering
  - Windows Authentication



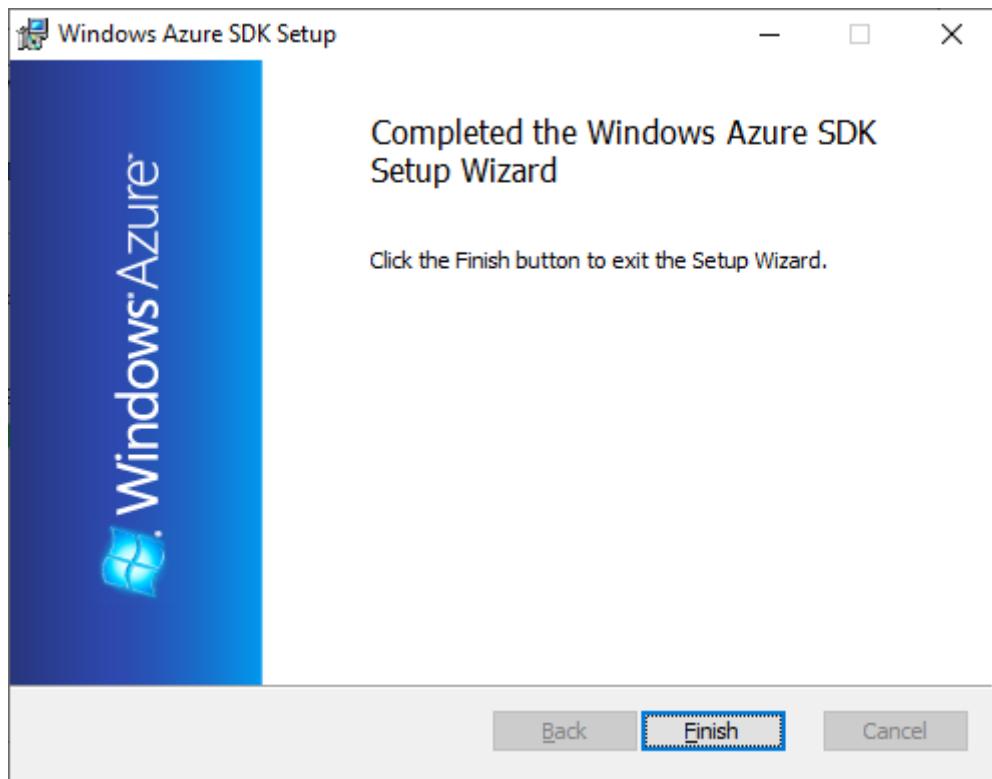
>> Accept the license agreement and click on **Next**.



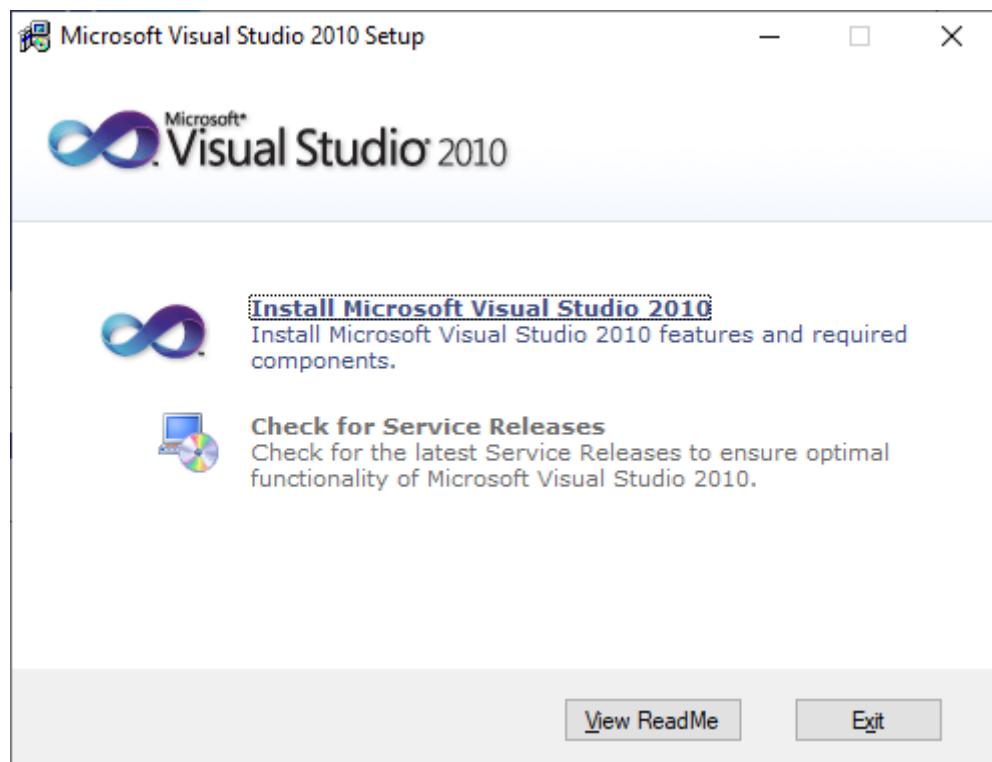
>> Click on **Install**.

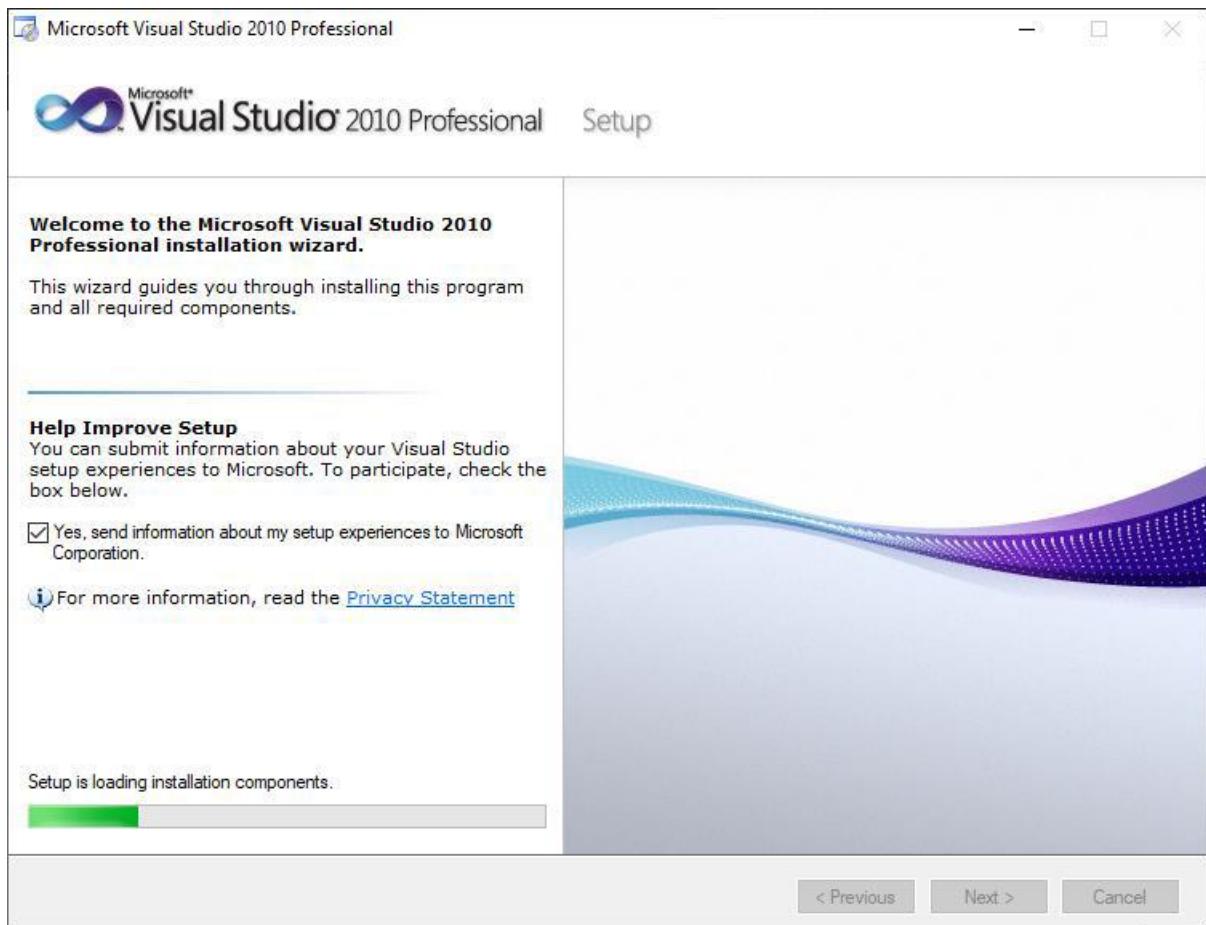


>> Click on **Finish**.

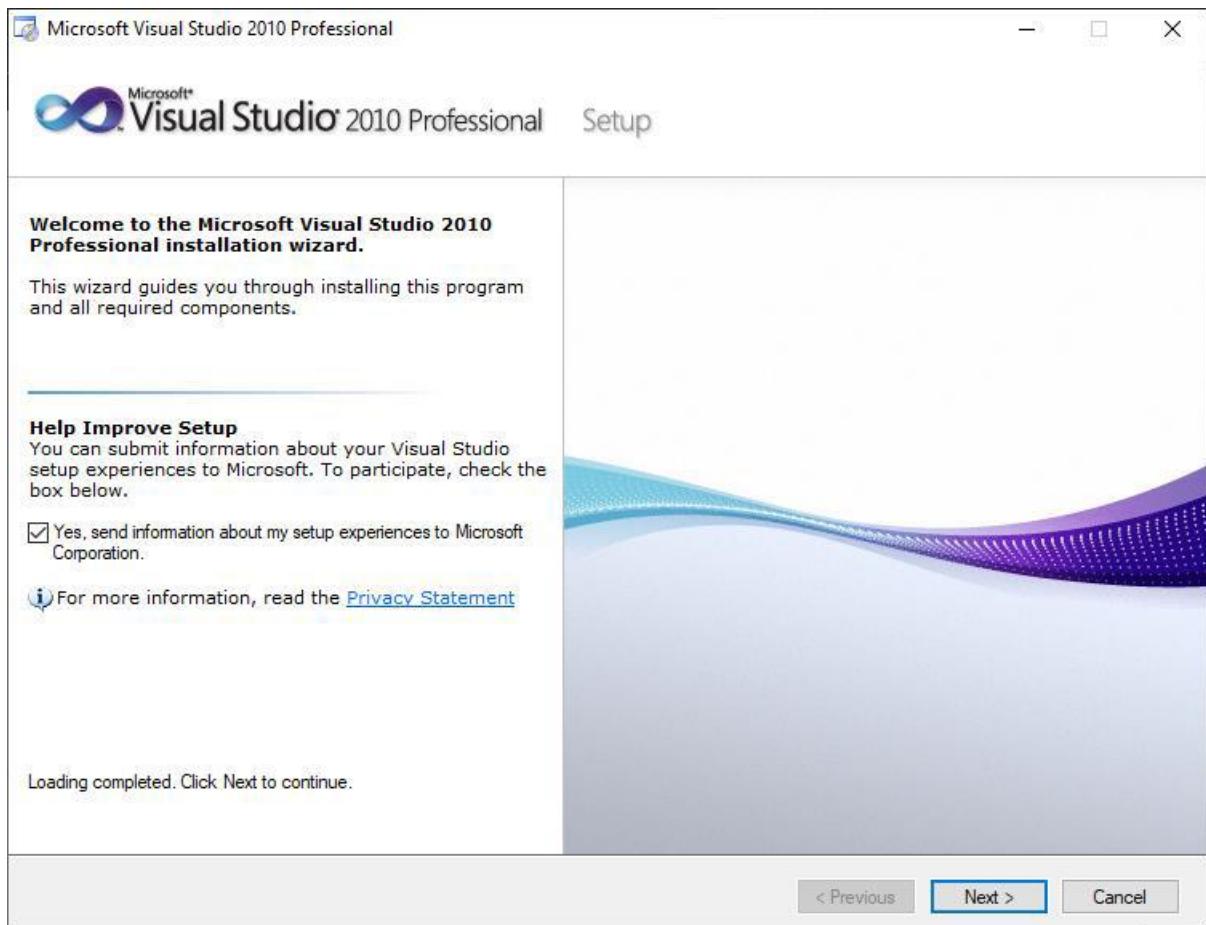


>> Now, Install the “Microsoft Visual Studio 2010”.

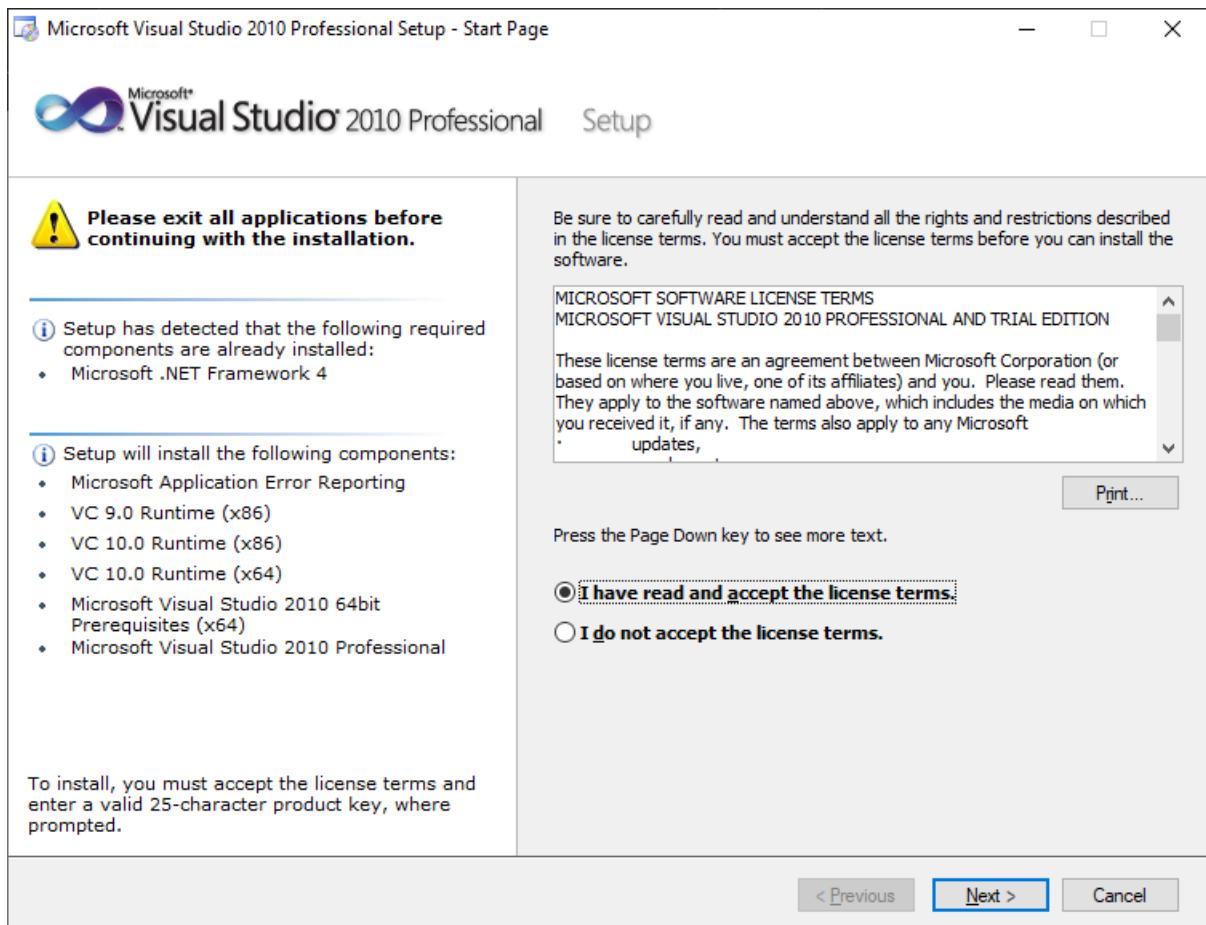




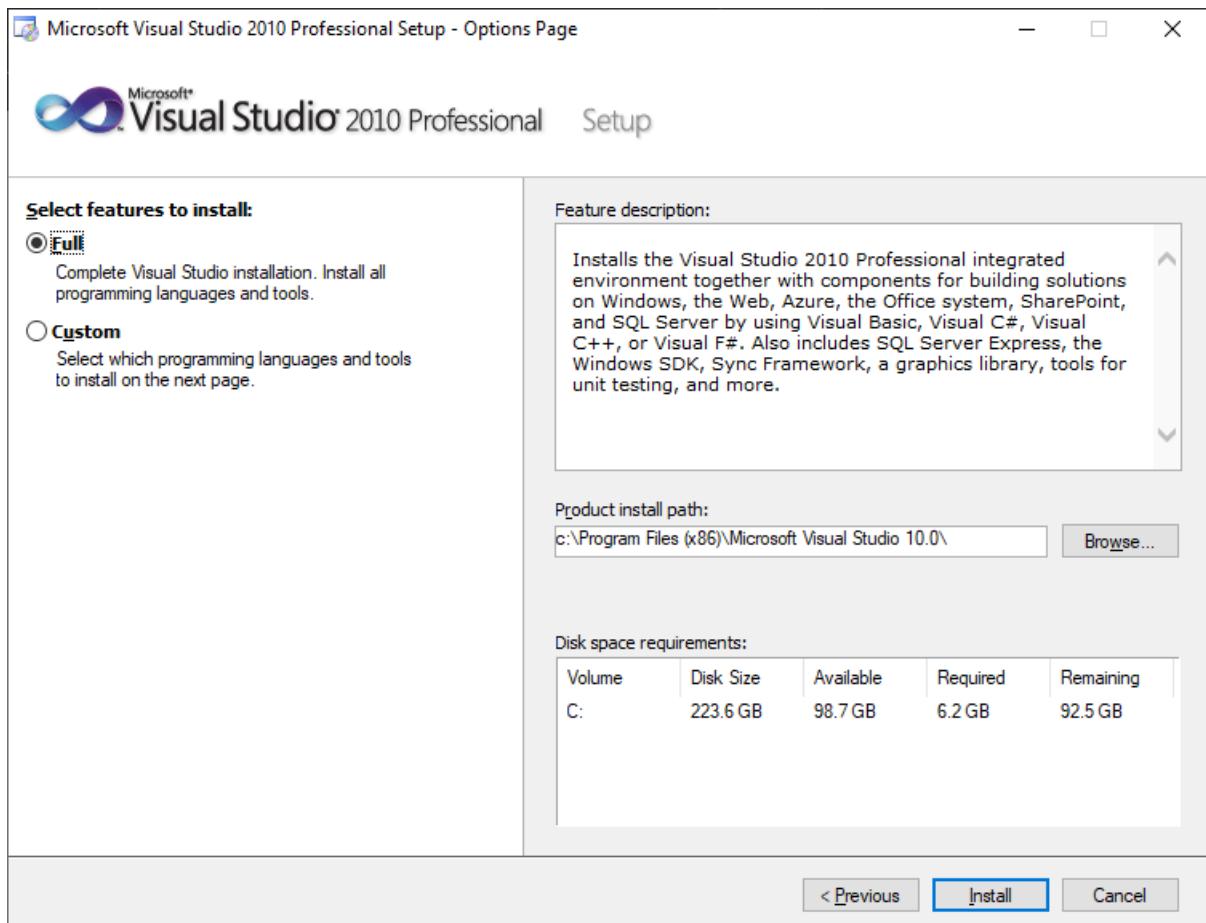
>> Now, Click on Next.

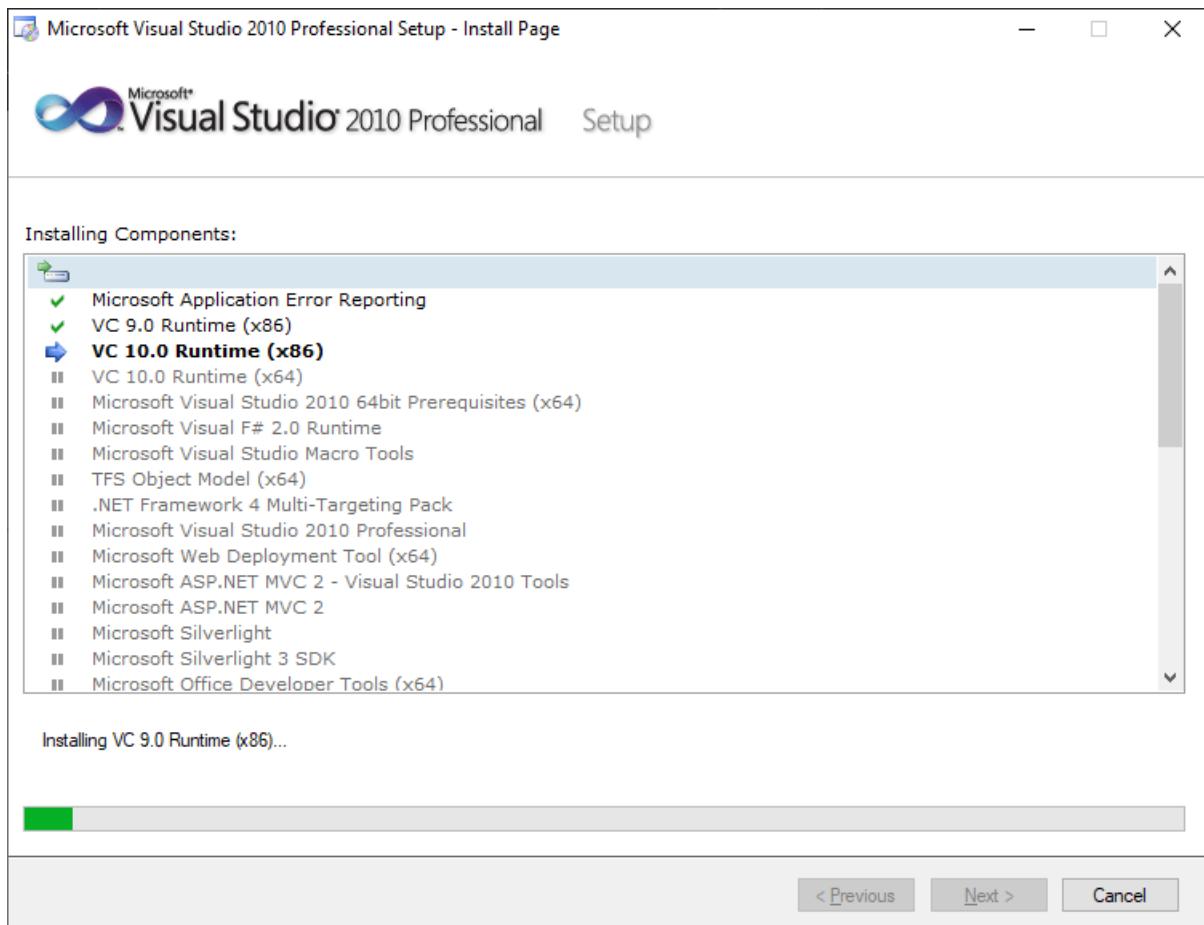


>> Click on **Next**.

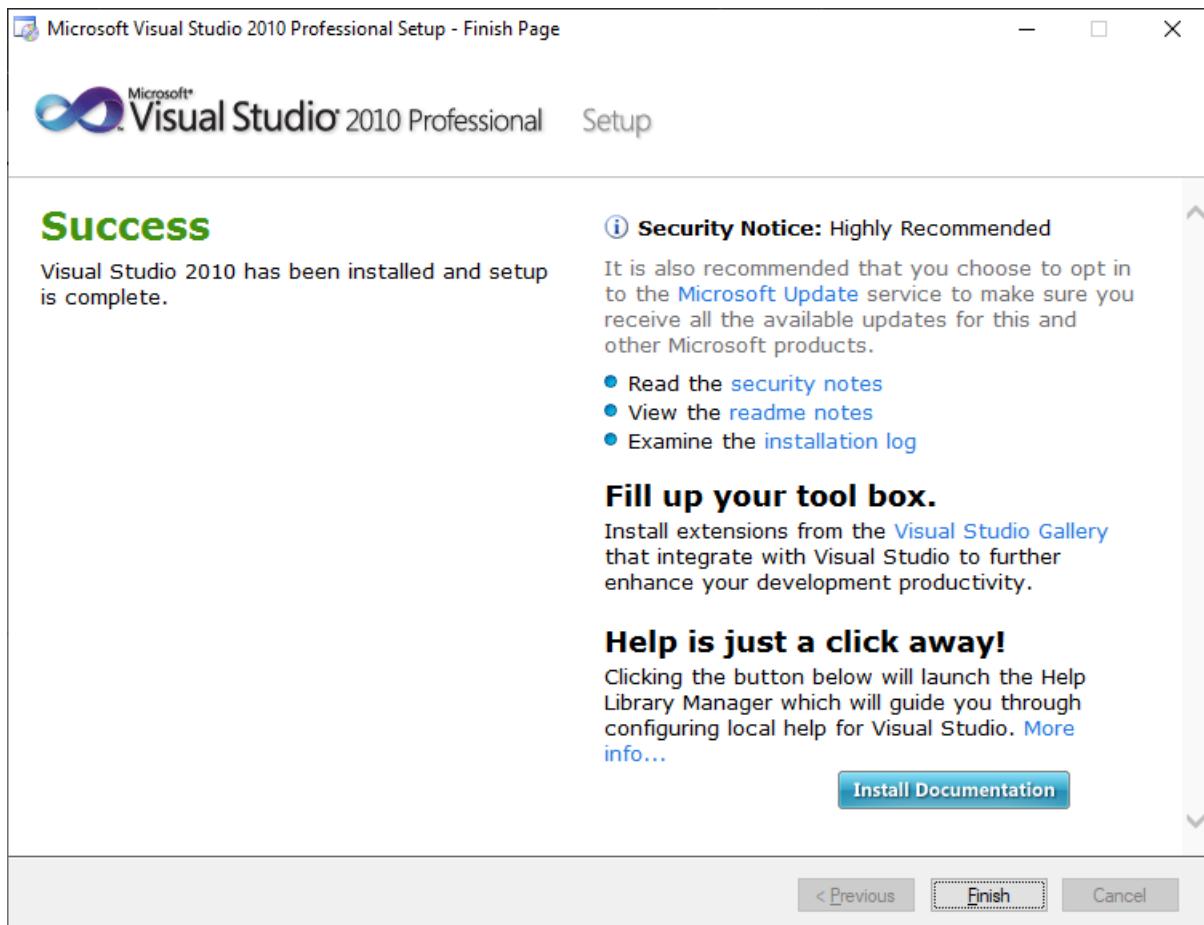


>> Select Features to Install >> Full. and click on Install.

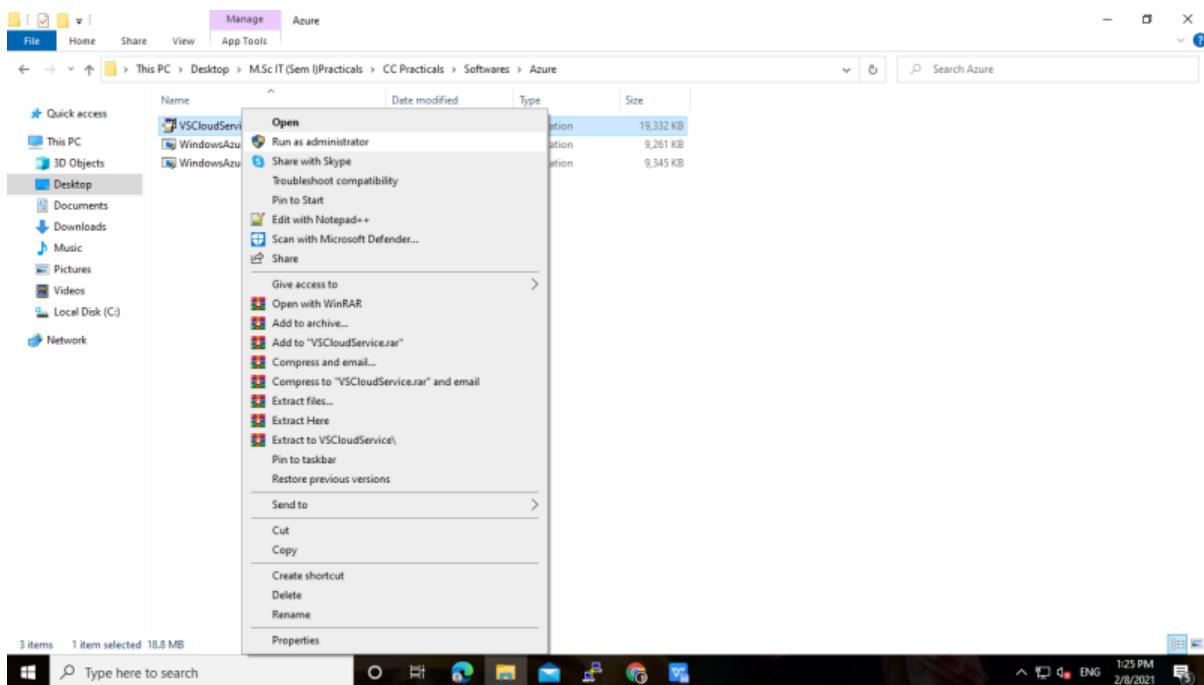


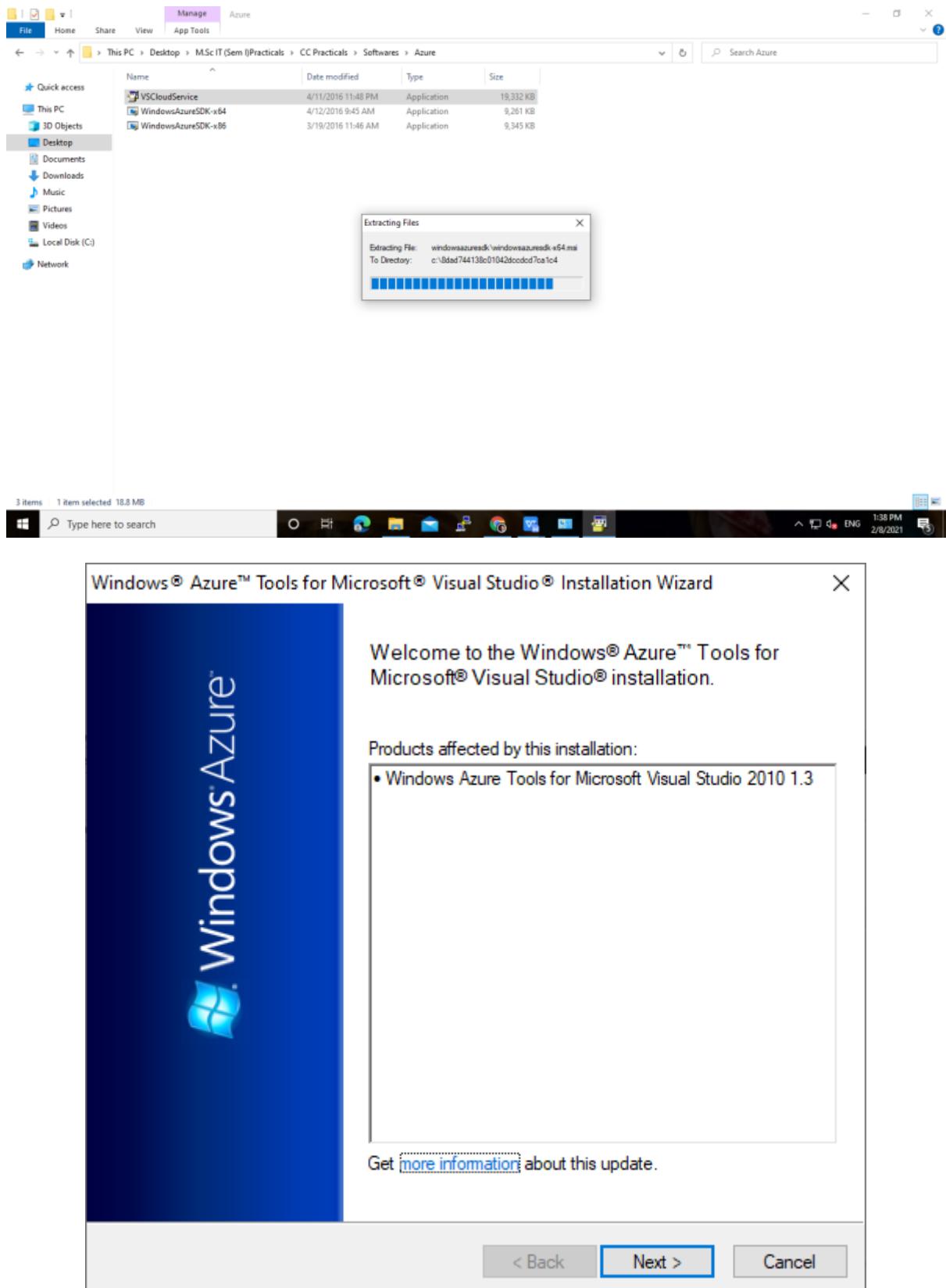


>> Click on **Finish**.



>> Now Install Windows Azure Tools for Microsoft Visual Studio 2010(VSCloudServices) application. Without this we can't create cloud based web application in Visual Studio.





Windows® Azure™ Tools for Microsoft® Visual Studio® Installation Wizard

X

**Microsoft Software License Terms**

Please accept the license terms to continue.



This installation contains the following software, the license terms of each of which are included below:

- Windows Azure Tools 1.3 for Microsoft Visual Studio 2010
- Microsoft Windows Azure Software Development Kit

**MICROSOFT SOFTWARE LICENSE TERMS**

[Print License Terms](#)

[Save License Terms](#)

I have read and accept the license terms.

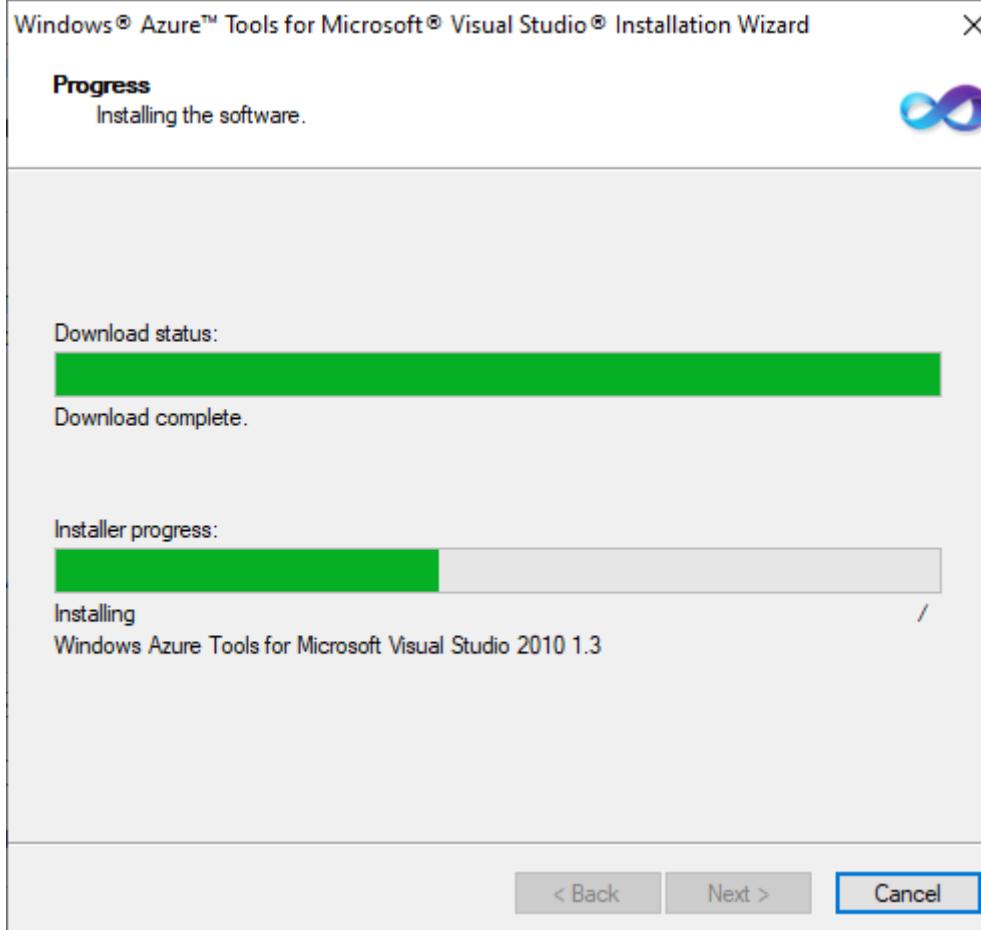
I would like to improve the installation experience by sending anonymous feedback.

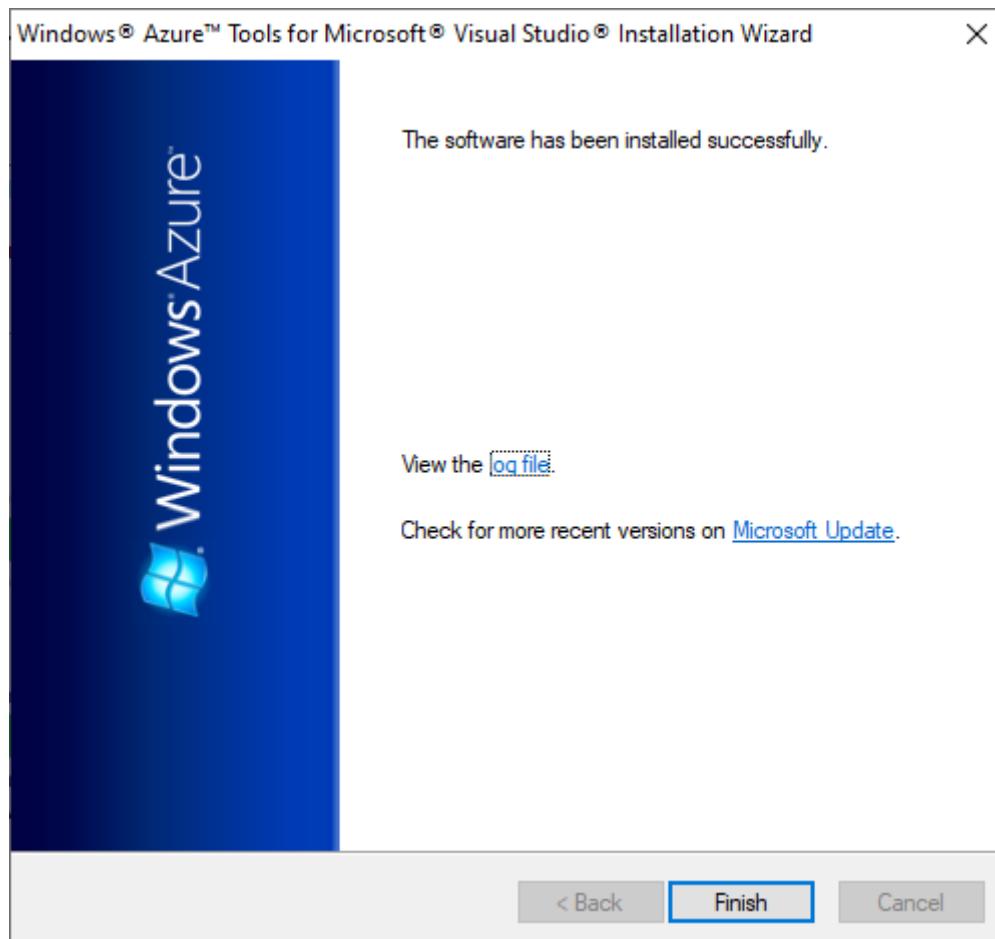
Please read the [Microsoft Customer Experience Improvement Program](#) and privacy policy.

< Back

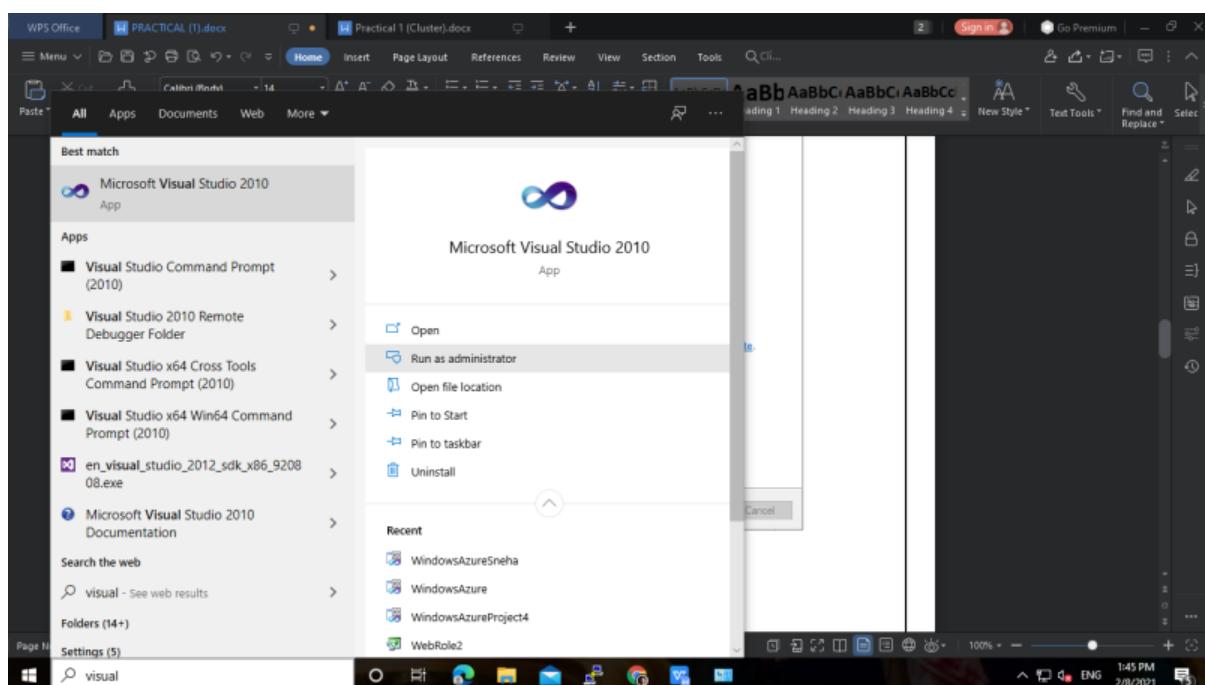
Next >

Cancel

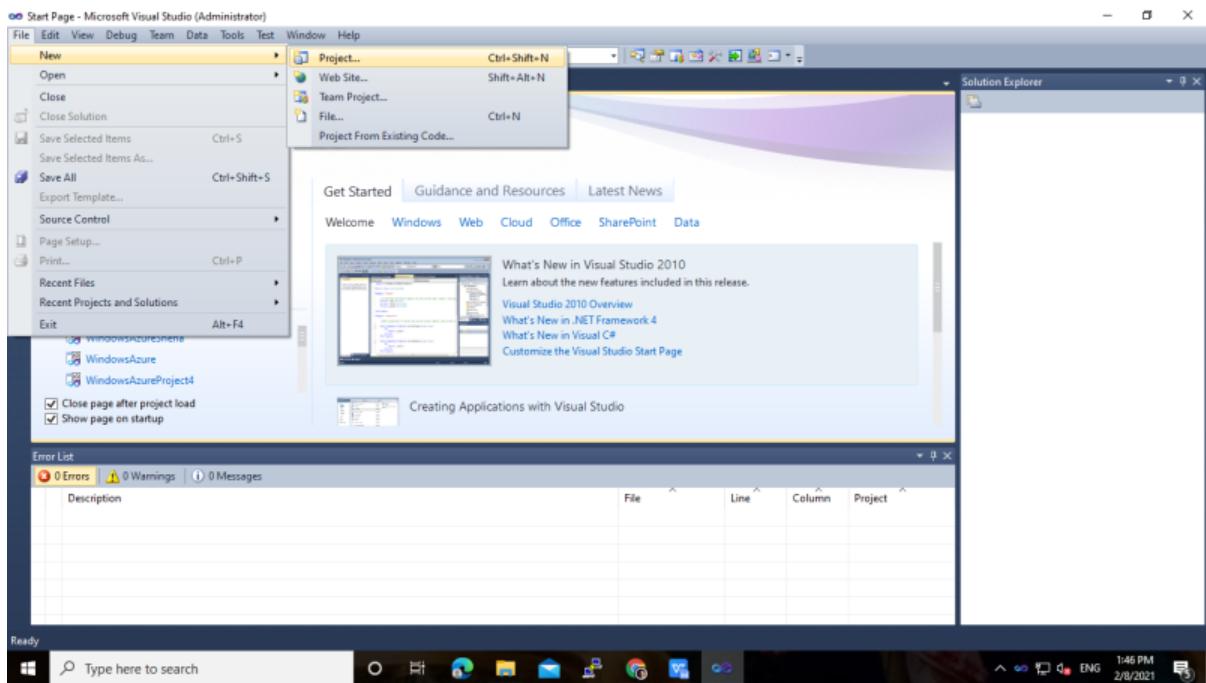




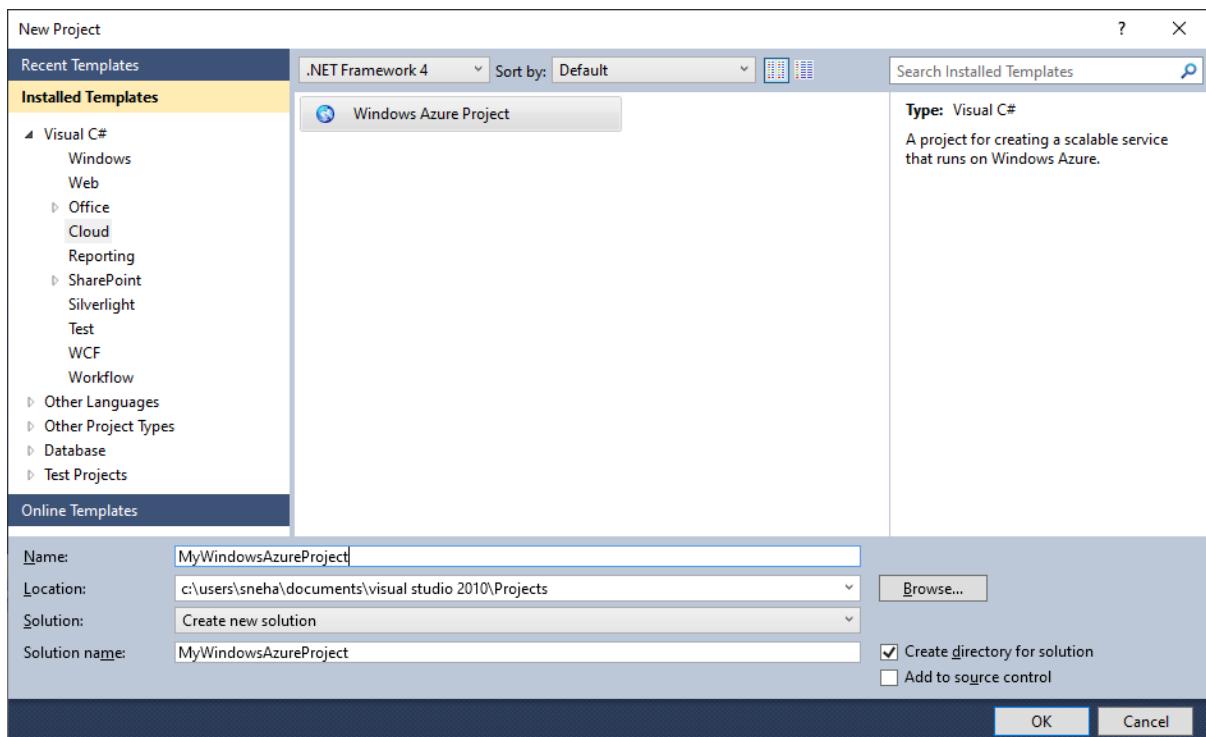
>> Now, Run the visual studio as an Administrator.



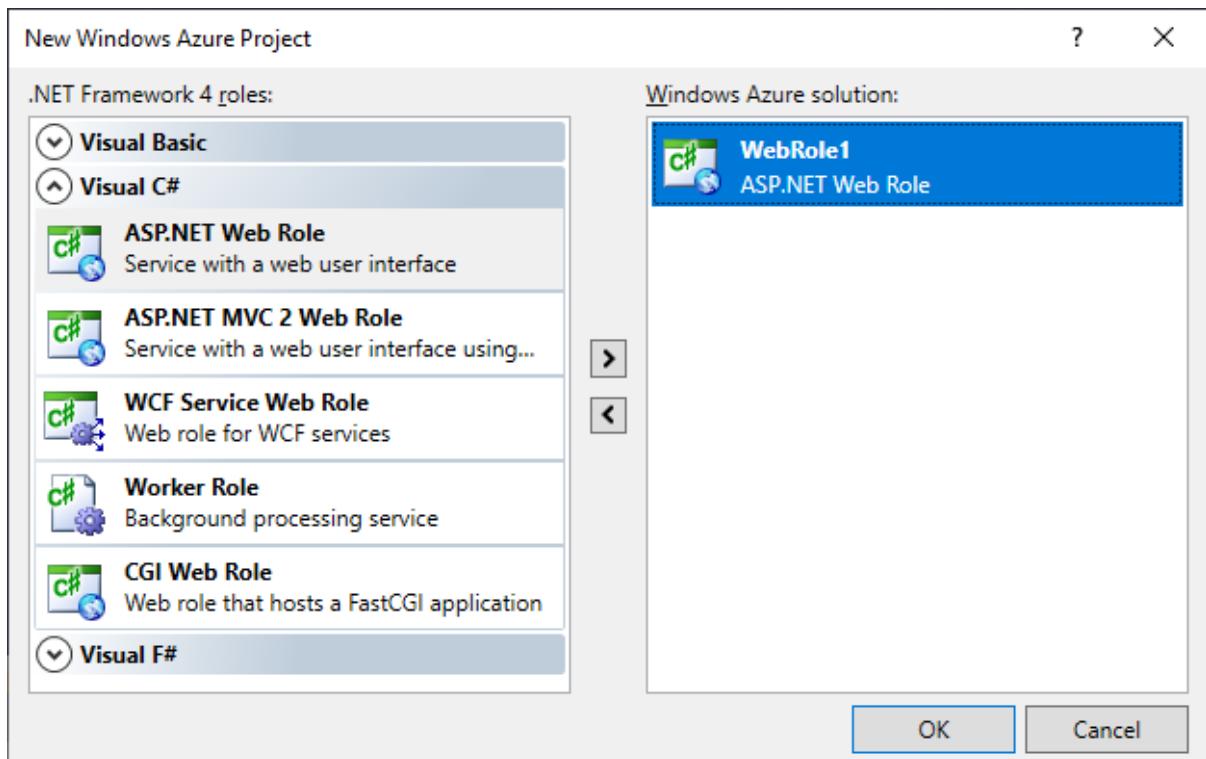
>> Click on File >> New >> Project.



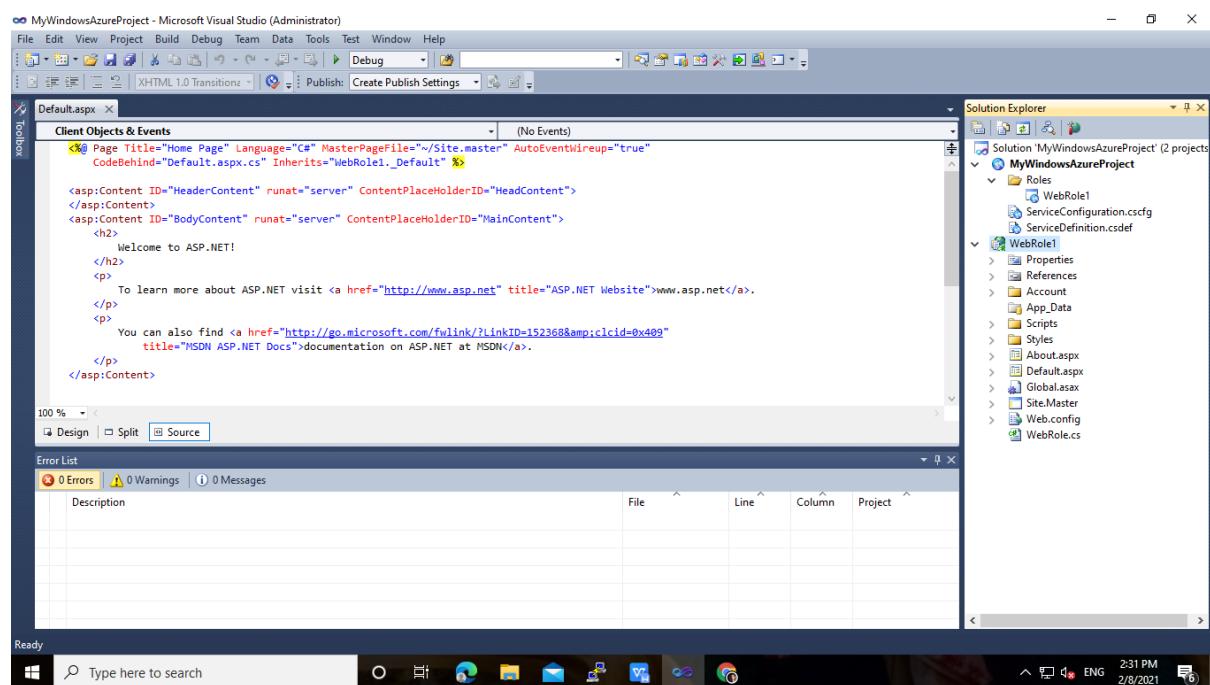
>> Click on **Cloud**. Enter the name for project. Click on **Ok**.



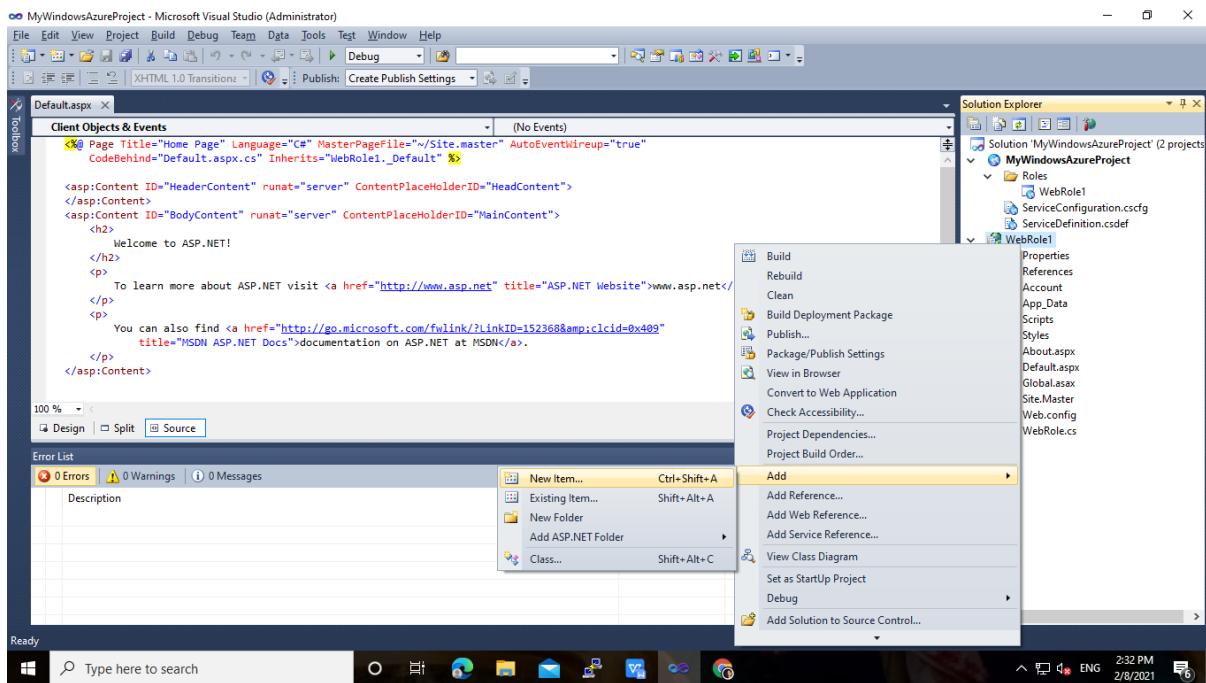
>> **New Windows Azure Project** window will open. In that we have to add **ASP.NET Web Role** under **Visual C#** and click on **OK**.



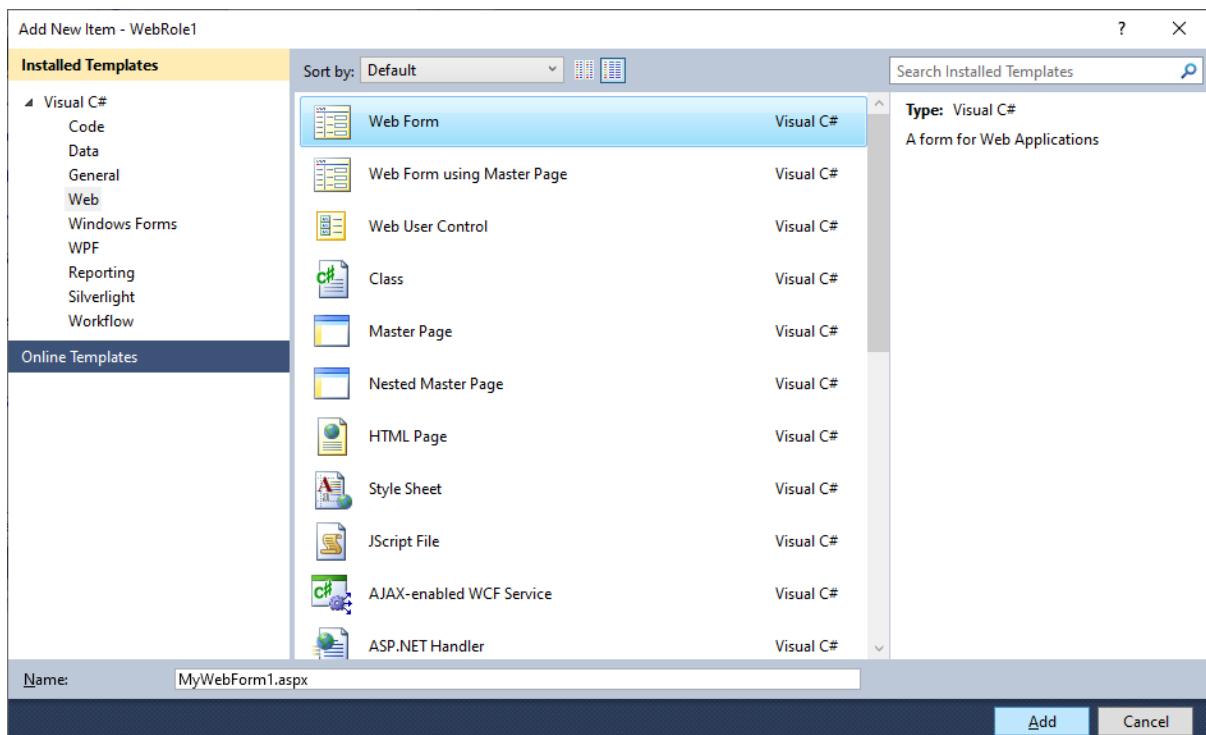
>> Now , we will get to see project hierarchy and sample generated code.



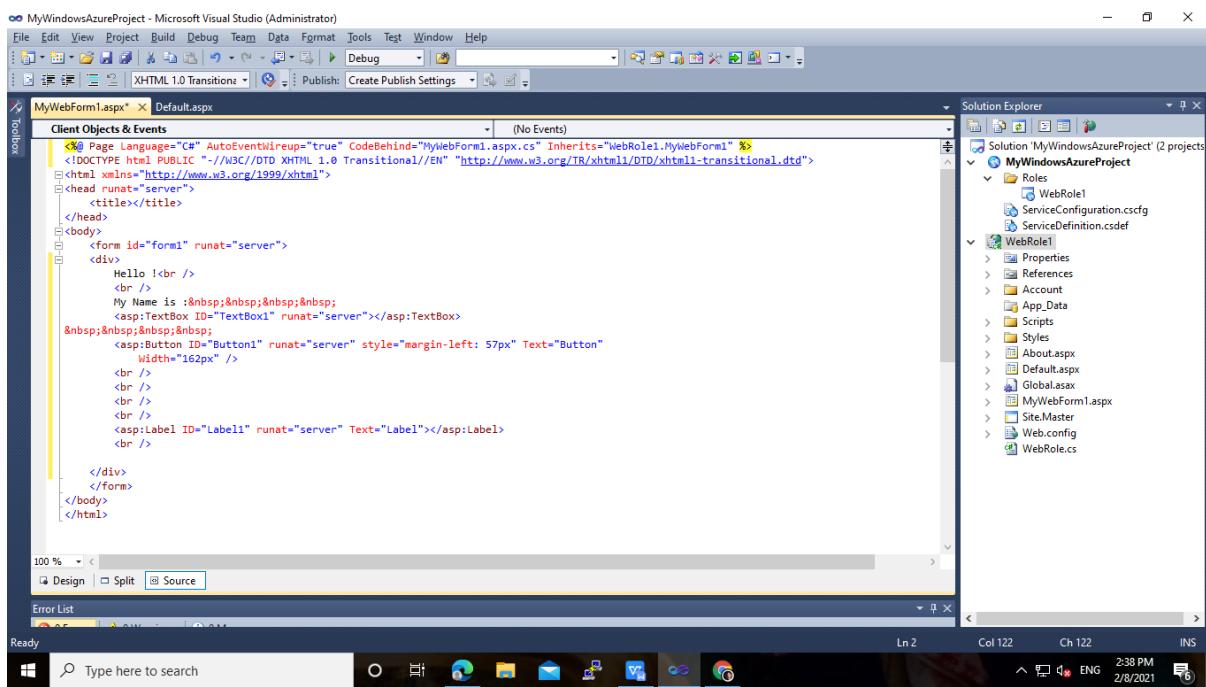
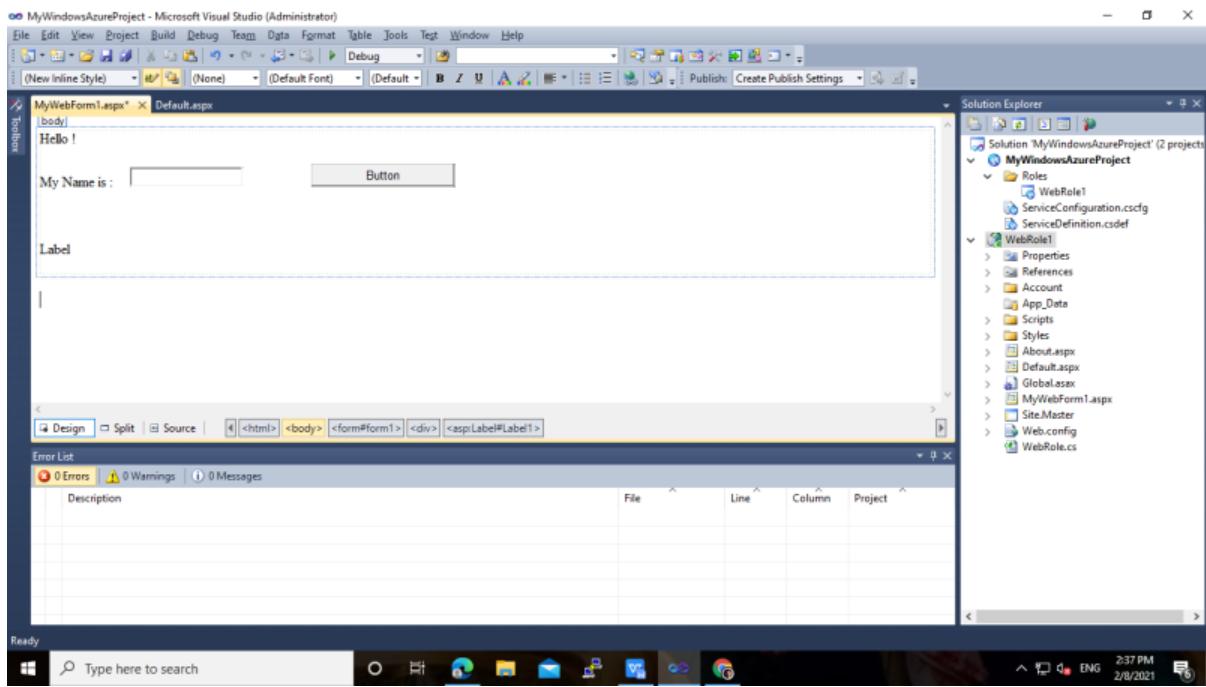
>> Right click on **WebRole1** >> Add >> New Item.

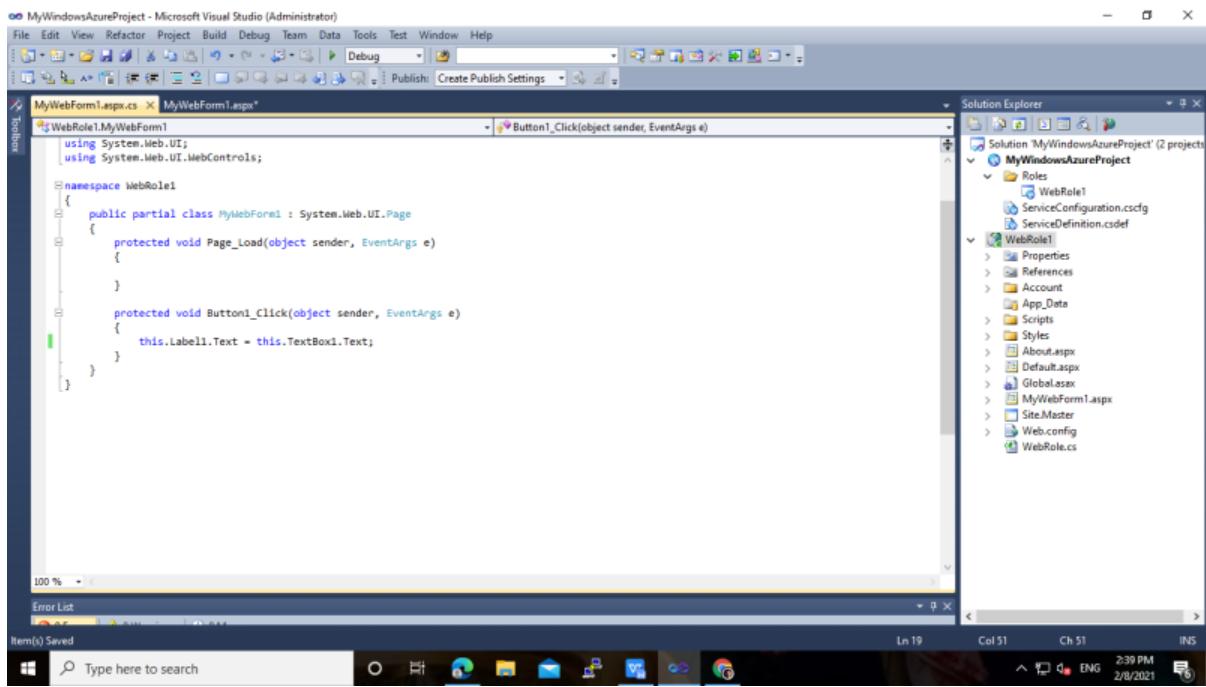


>> Select Web Form, give name to a webform, and click on Add.

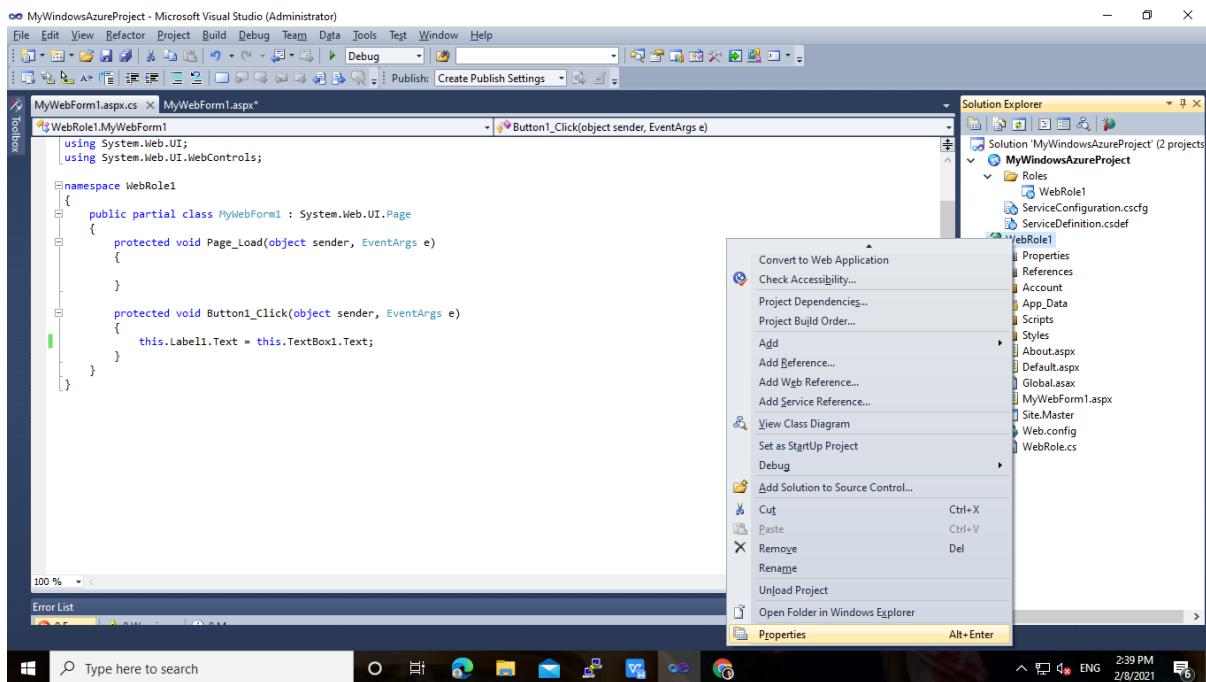


>> Design web form as you want.

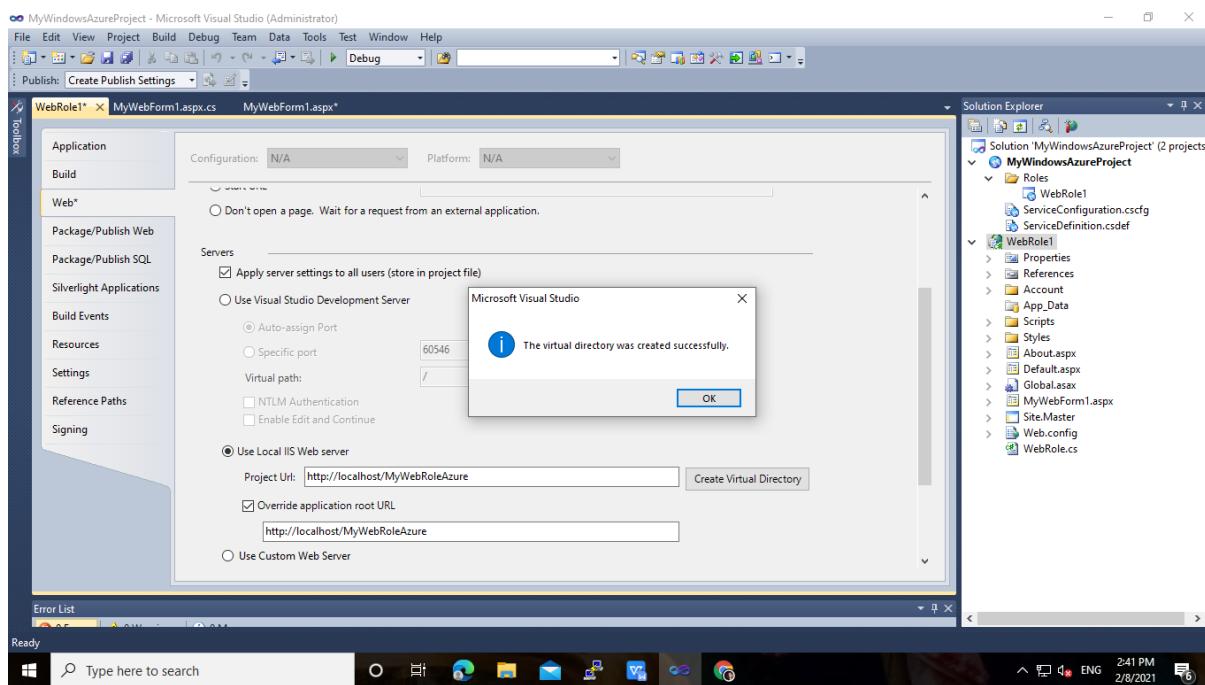
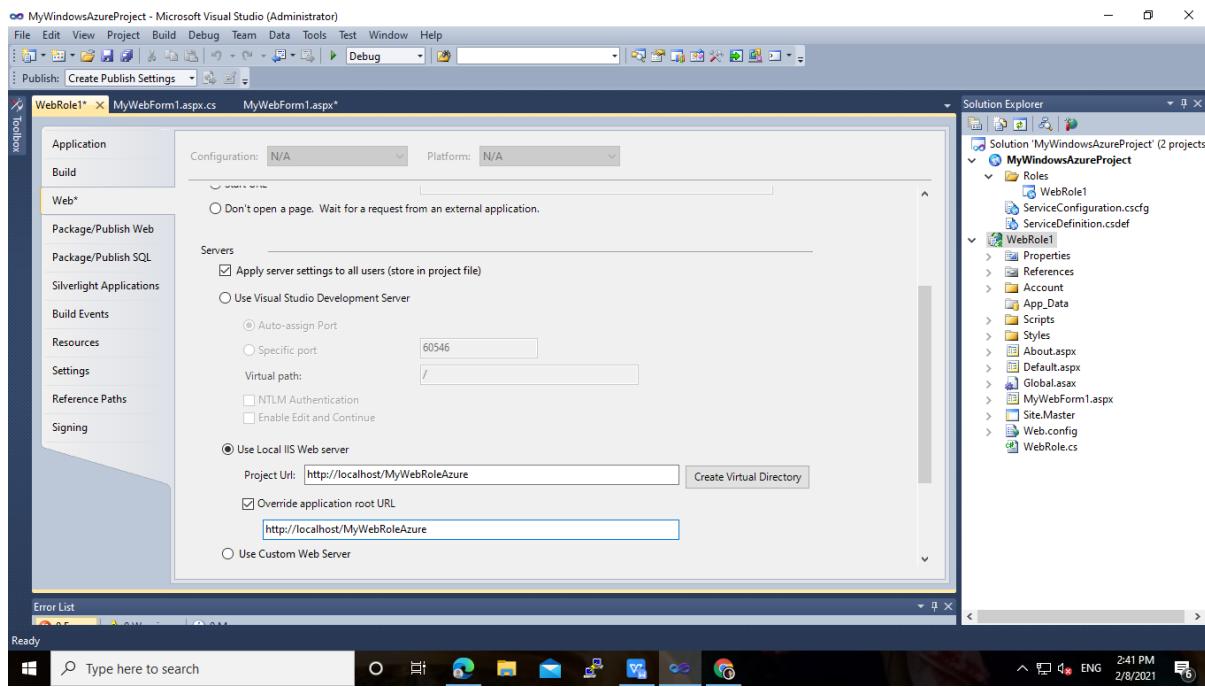




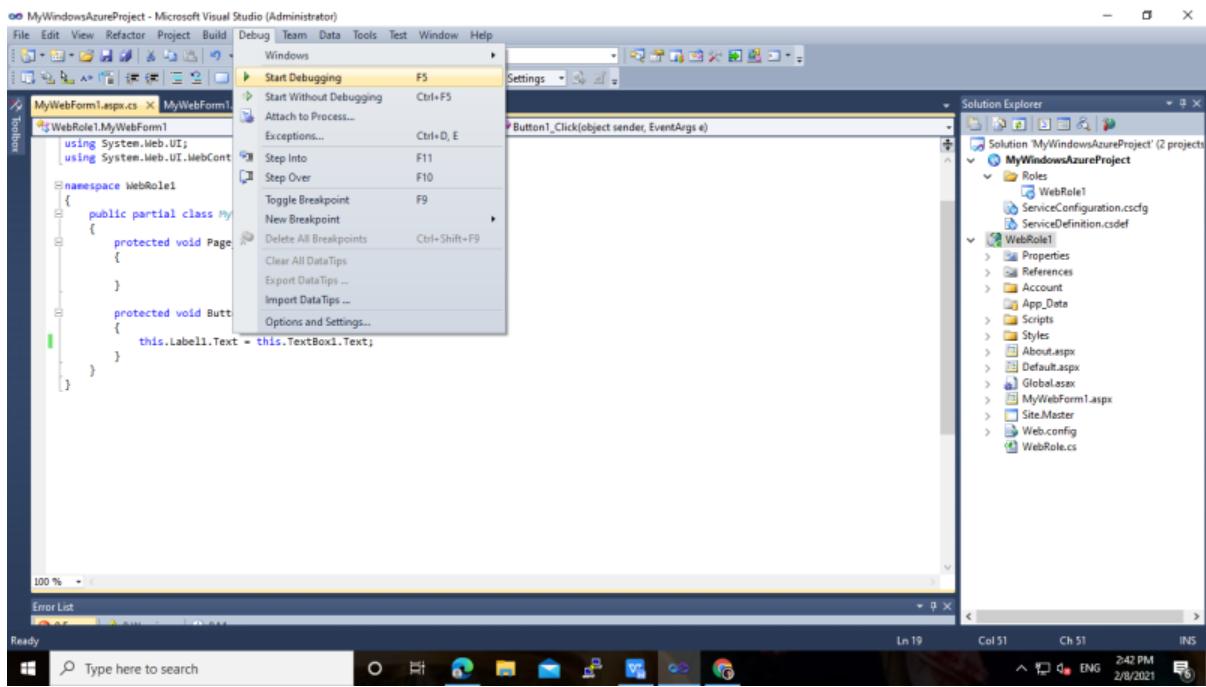
>> Right click on **WebRole1** >> go to **Properties**.



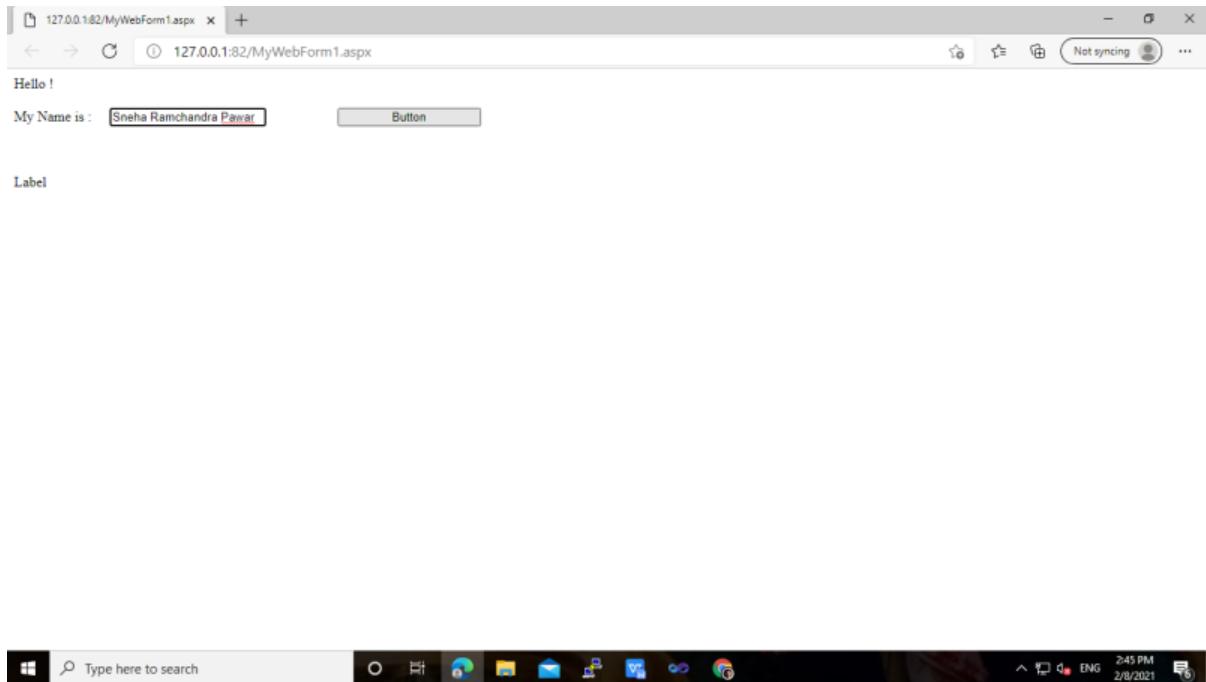
>> under **Web** tab select '**Use Local IIS Web server**' and you can change the name of web role. And Click on '**Create Virtual Directory**'.

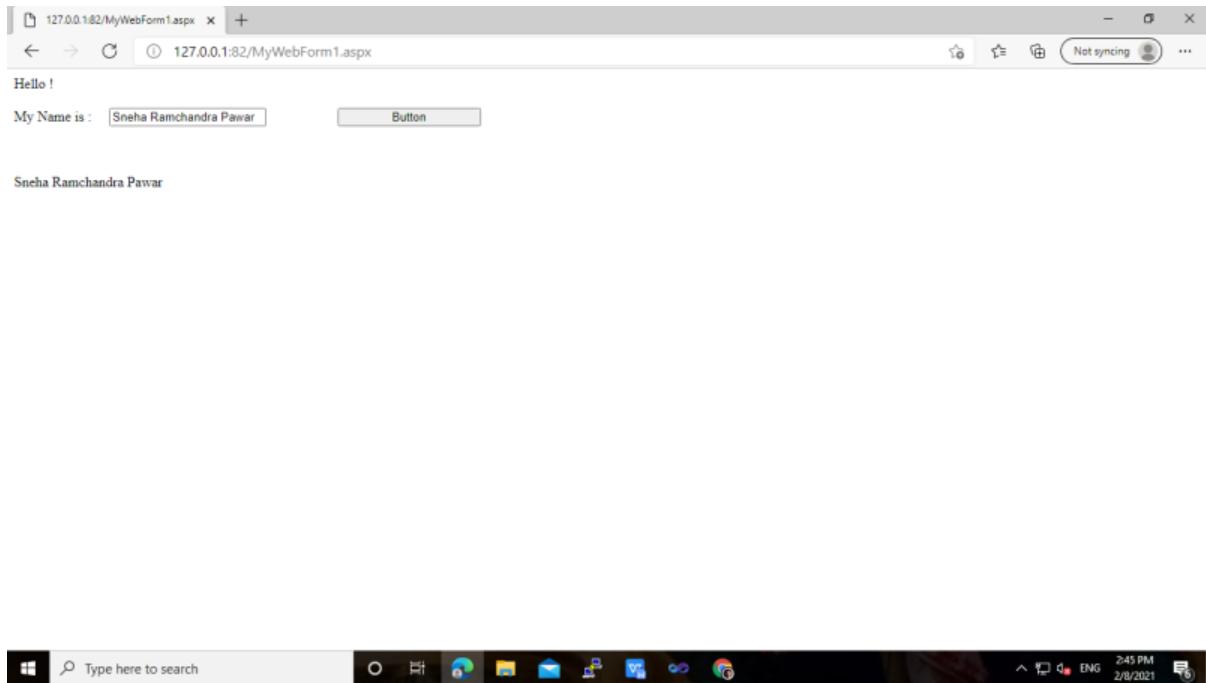


>> Now click on **Debug** >> Start Debugging.



## >> OUTPUT :





>> Similarly you can implement web applications for windows Azure.

**>> Here I have created Simple calculator Application.**

### CalculatorWebform.aspx

```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="CalculatorWebForm.aspx.cs"
Inherits="WebRole1.CalculatorWebForm" %>
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

```
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
```

Number 1 :  &nbsp;&nbsp;

```

<asp:TextBox ID="TextBox1" runat="server" style="margin-left: 0px"></asp:TextBox>

<br />

<br />

Number 2:&nbsp;&nbsp;&nbsp;

<asp:TextBox ID="TextBox2" runat="server"></asp:TextBox>

<br />

<br />

Result&nbsp;&nbsp;&nbsp; :&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;

<asp:TextBox ID="TextBox3" runat="server"></asp:TextBox>

<br />

<br />

<asp:Button ID="btnsum" runat="server" onclick="btnsum_Click" Text="+" Width="119px" />

<asp:Button ID="btndiv" runat="server" onclick="btndiv_Click" Text="/" Width="160px" />

<asp:Button ID="btnclear" runat="server" onclick="btnclear_Click" Text="Clear" Width="168px" />

<br />

<br />

<br />

<br />

<asp:Button ID="Button2" runat="server" onclick="Button2_Click" style="margin-left: 105px" Text="Clear" Width="168px" />

<br />

</div>

</form>

</body>

```

```
</html>
```

## CalculatorWebform.aspx.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace WebRole1
{
    public partial class CalculatorWebForm : System.Web.UI.Page
    {
        protected void Button2_Click(object sender, EventArgs e)
        {
            TextBox1.Text = "";
            TextBox2.Text = "";
            TextBox3.Text = "";
        }

        protected void btnsum_Click(object sender, EventArgs e)
        {
            int sum = Int32.Parse(TextBox1.Text) + Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(sum);
        }

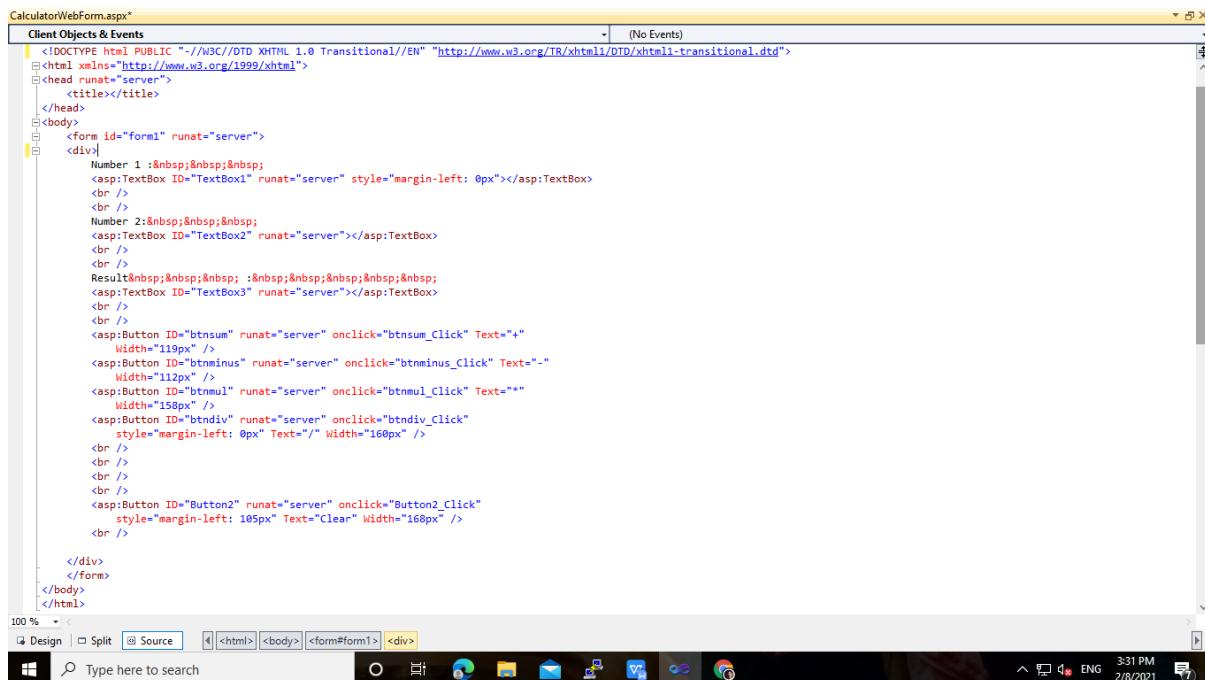
        protected void btnminus_Click(object sender, EventArgs e)
        {
            int minus = Int32.Parse(TextBox1.Text) - Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(minus);
        }
    }
}
```

```

protected void btnmul_Click(object sender, EventArgs e)
{
    int multiply = Int32.Parse(TextBox1.Text) * Int32.Parse(TextBox2.Text);
    TextBox3.Text = Convert.ToString(multiply);
}

protected void btndiv_Click(object sender, EventArgs e)
{
    int division = Int32.Parse(TextBox1.Text) / Int32.Parse(TextBox2.Text);
    TextBox3.Text = Convert.ToString(division);
}
}

```



```
CalculatorWebForm.aspx.cs*
WebRole1.CalculatorWebForm
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;

namespace WebRole1
{
    public partial class CalculatorWebForm : System.Web.UI.Page
    {
        protected void Button2_Click(object sender, EventArgs e)
        {
            TextBox1.Text = "";
            TextBox2.Text = "";
            TextBox3.Text = "";
        }

        protected void btnsum_Click(object sender, EventArgs e)
        {
            int sum = Int32.Parse(TextBox1.Text) + Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(sum);
        }

        protected void btnminus_Click(object sender, EventArgs e)
        {
            int minus = Int32.Parse(TextBox1.Text) - Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(minus);
        }

        protected void btmul_Click(object sender, EventArgs e)
        {
            int multiply = Int32.Parse(TextBox1.Text) * Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(multiply);
        }

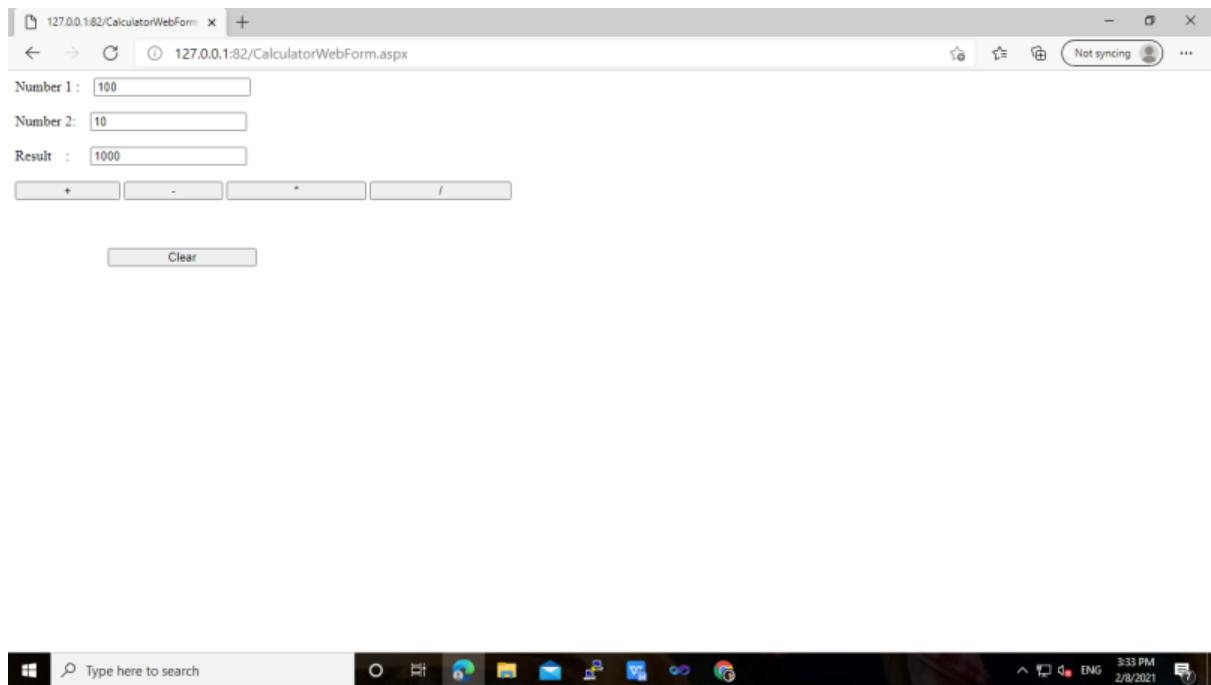
        protected void btndiv_Click(object sender, EventArgs e)
        {
            int division = Int32.Parse(TextBox1.Text) / Int32.Parse(TextBox2.Text);
            TextBox3.Text = Convert.ToString(division);
        }
    }
}
```

## OUTPUT :

On Click on Addition Button.



On Click on Multiplication Button.



## **PRACTICAL: 3**

### **Implementing private cloud with XenServer.**

**Softwares Required :-**

- **VMware Workstation 15.5 PRO**
- **XenServer-6.2.0-install-cd.iso**
- **XenCenter\_6.2\_en.msi**

**Download files from the link:**

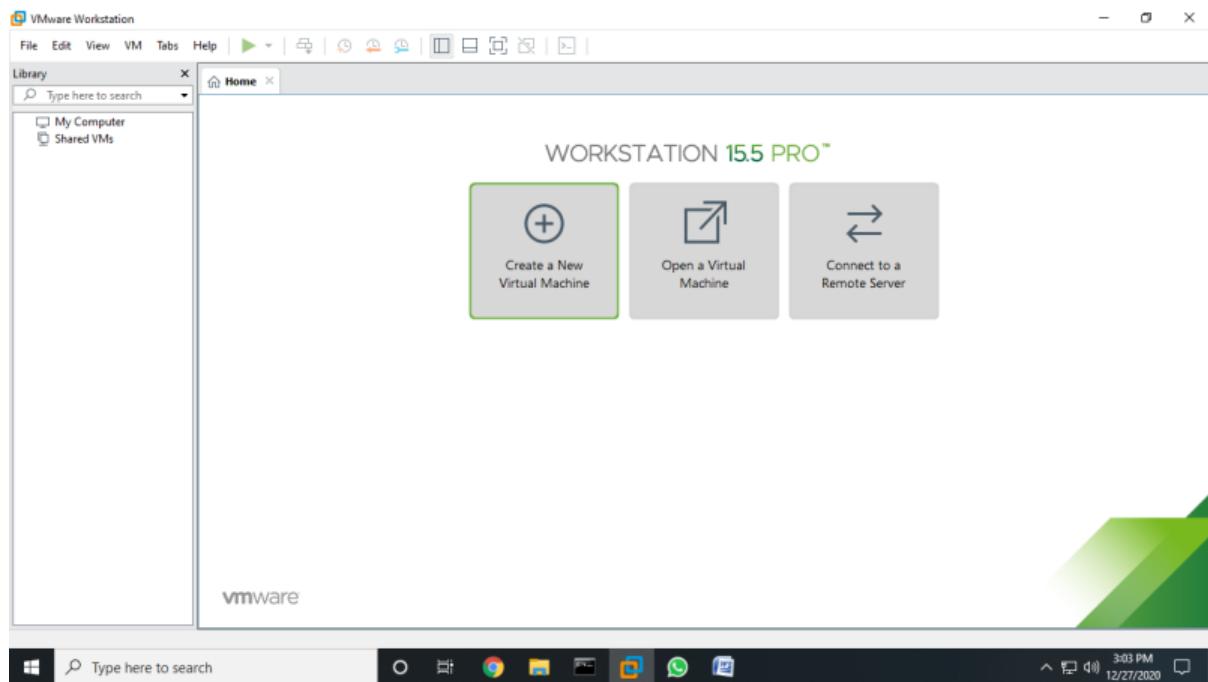
<http://download.wx.51idc.com:8000/%b2%d9%d7%f7%cf%b5%cd%b3/Xenserver/>

---

#### **What is XenServer & XenCenter?**

Citrix XenServer is a server virtualization platform that enables users to host, deploy, and manage virtual machines. XenCenter is a system that enables users to install and manage XenServer environments via a user interface.

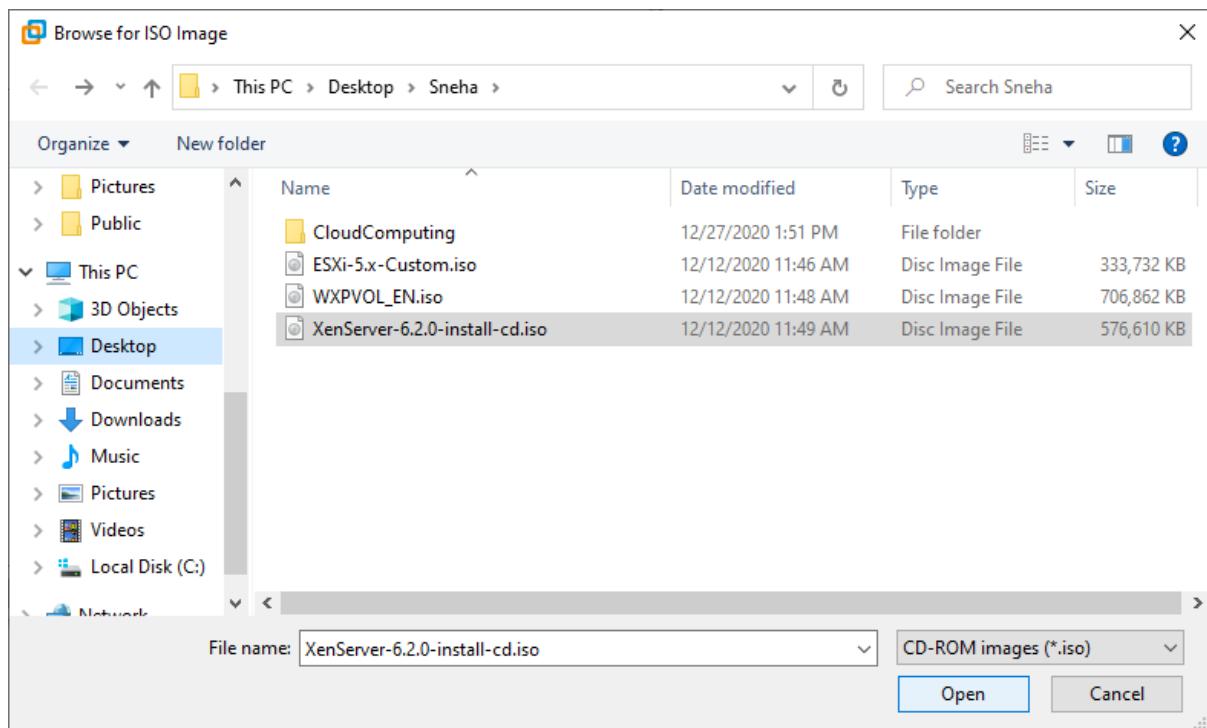
>> Open VMware Workstation – And select Create a New Virtual Machine.

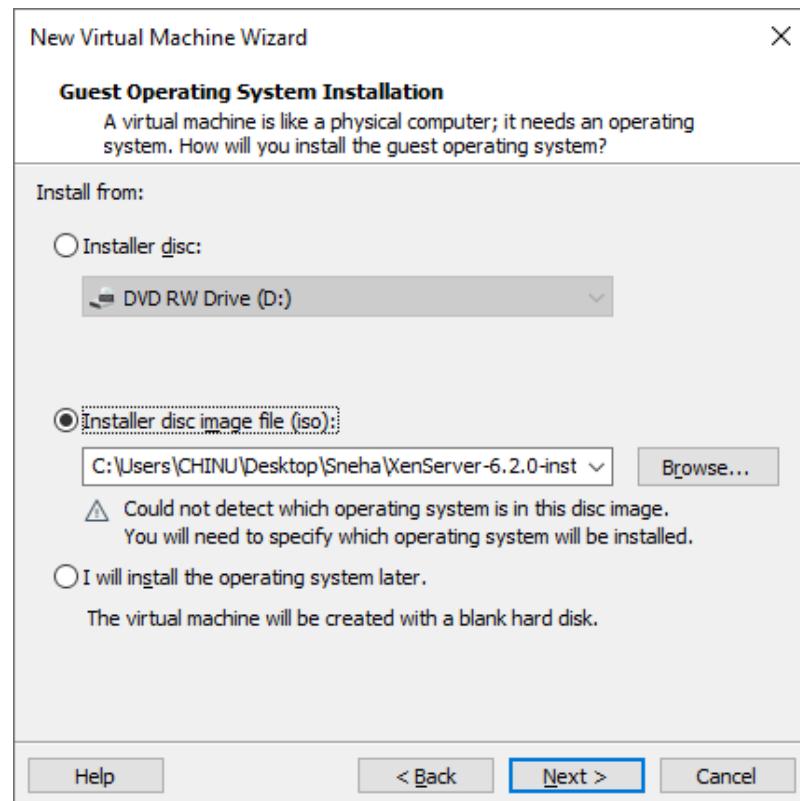


>> Select typical and then click Next.

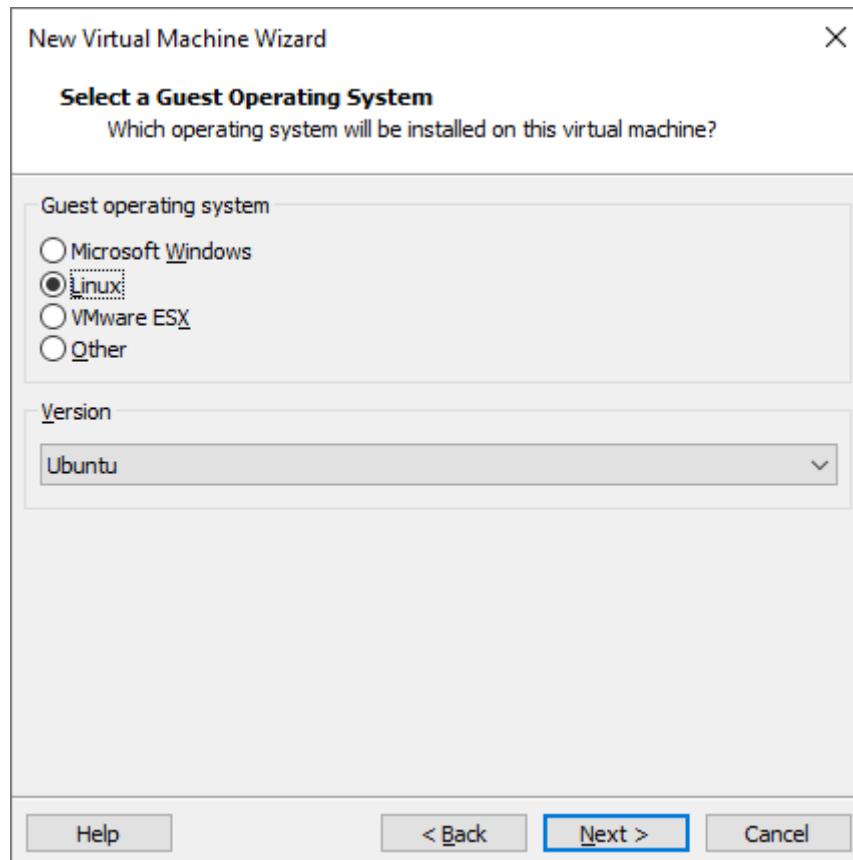


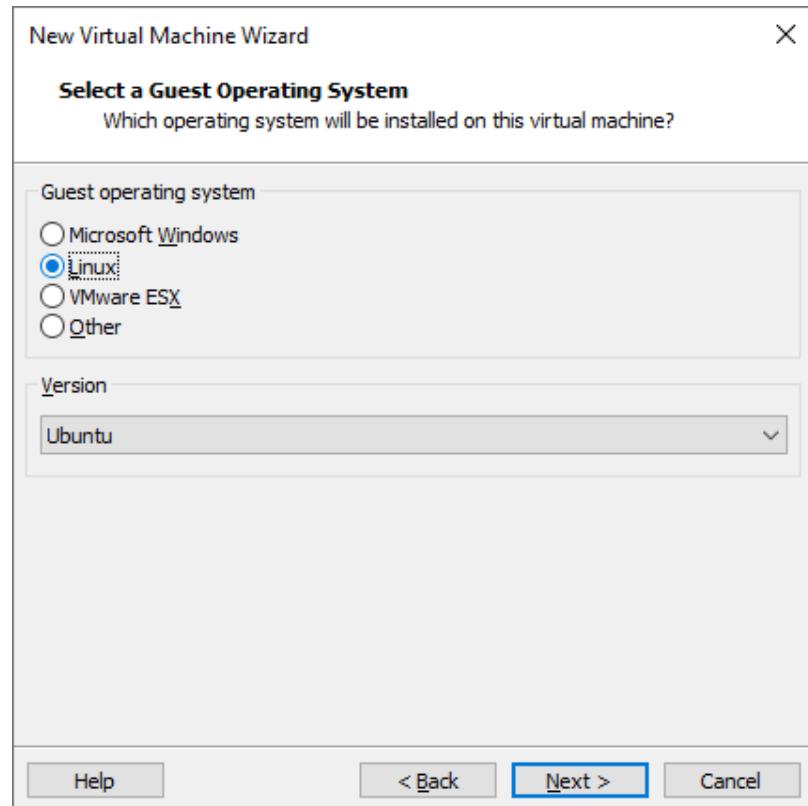
>> Select Installer disc\_image file (ISO). Click Browse – XenServer Iso File – For Example “C:\Users\CHINU\Desktop\Sneha\ XenServer-6.2.0-install-cd.iso” And click on next.



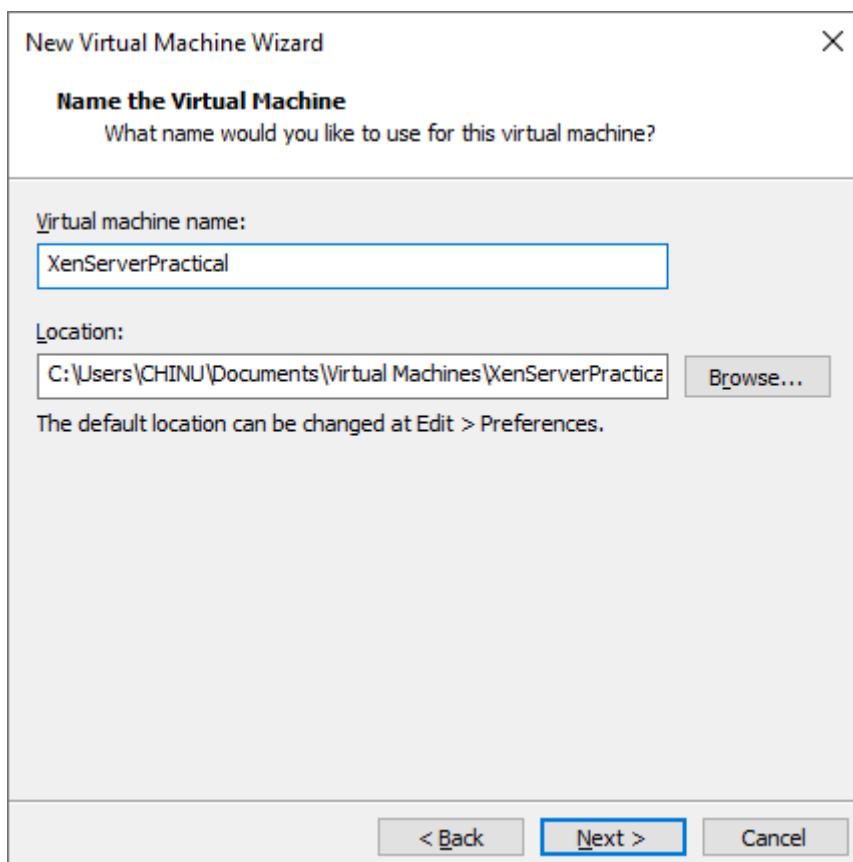


>> Select Guest Operating System as Linux. Select version as Ubuntu. Click next.

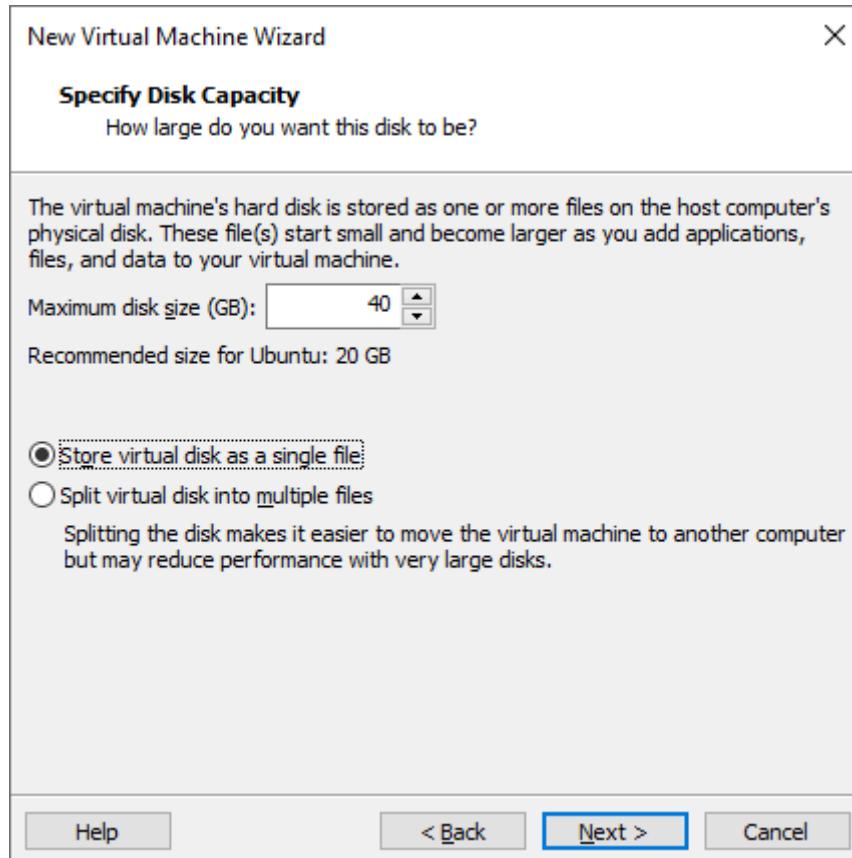




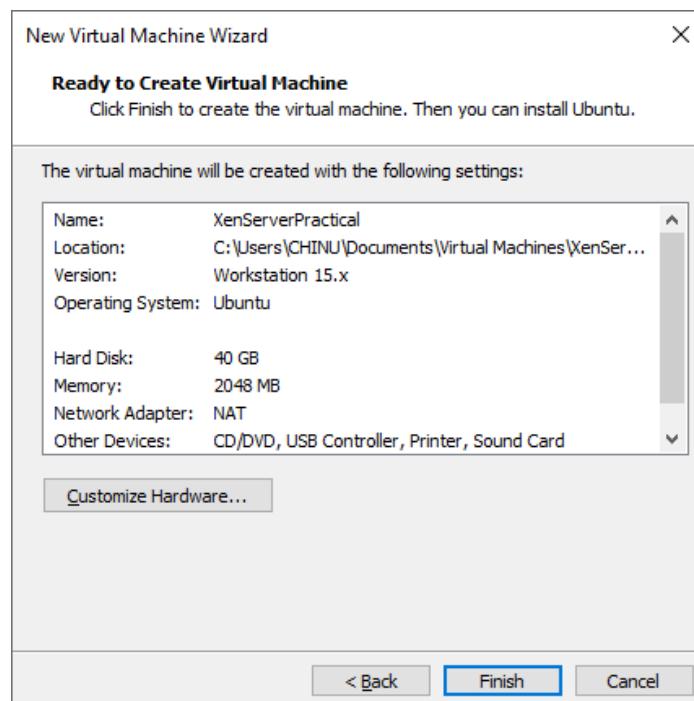
>> Give Virtual machine a name as “XenServerPractical” and click on next.



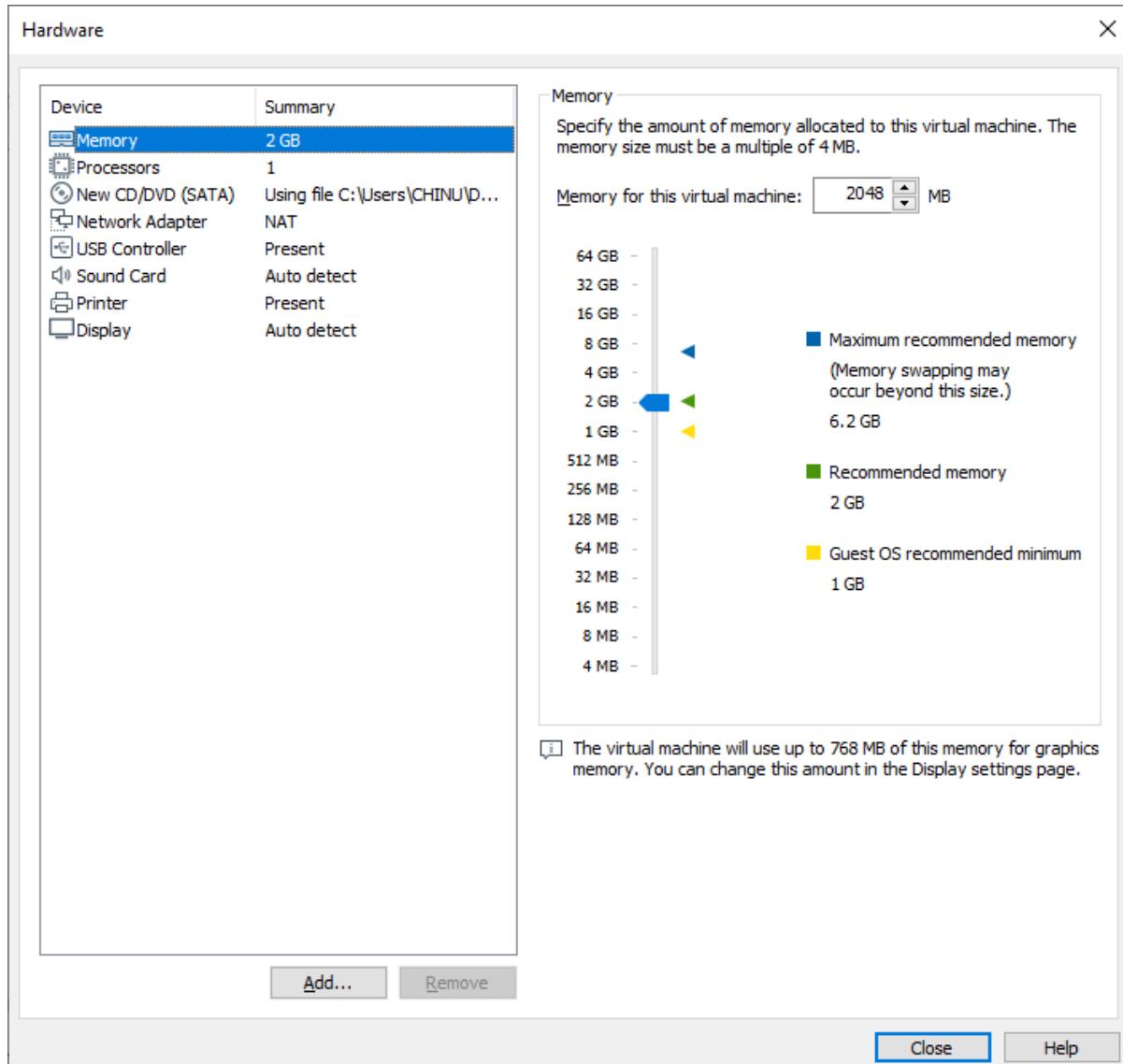
>> Change maximum disk size to 40 GB and check – Store virtual disk as a single file.



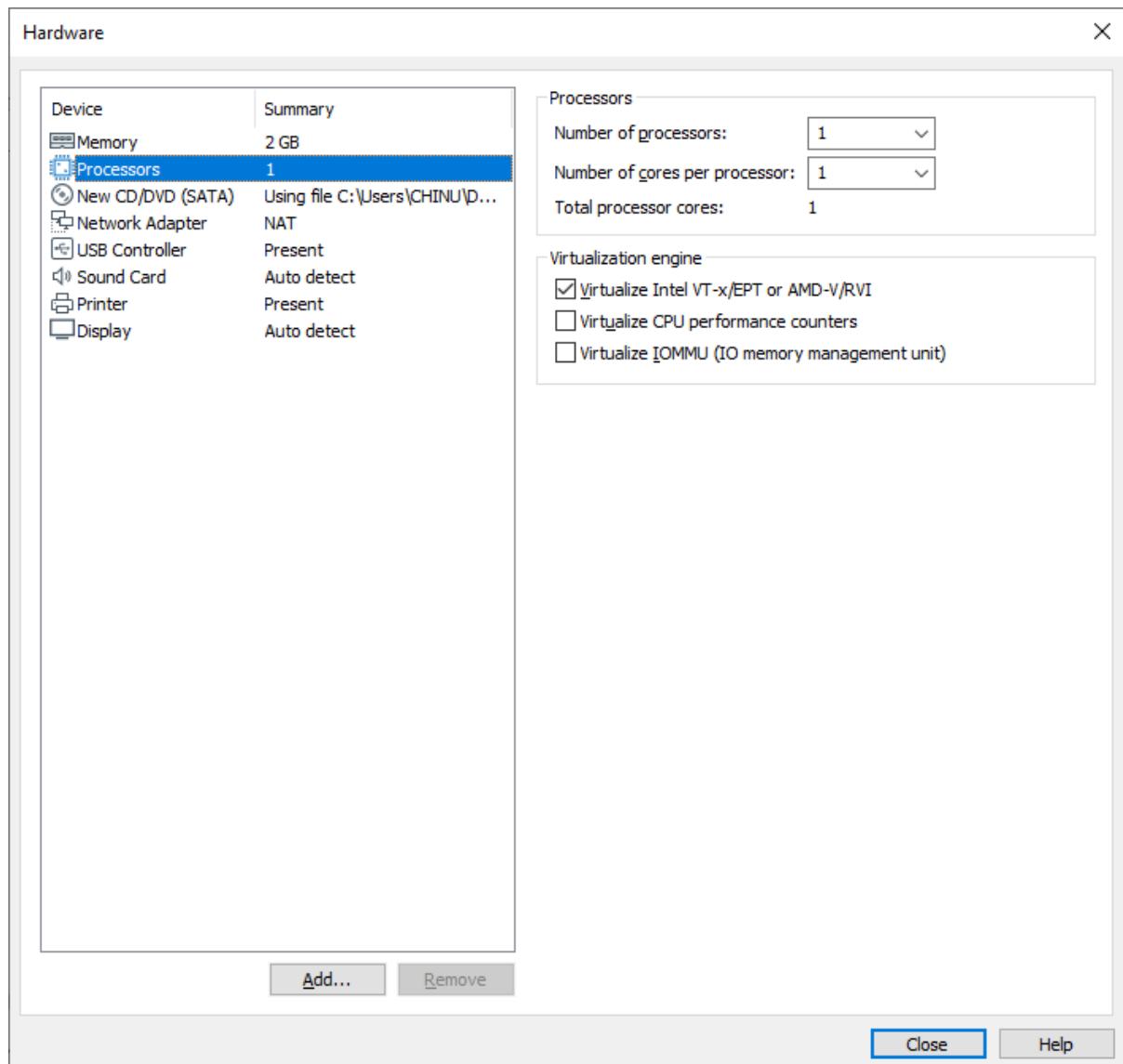
>> Click on **Customize hardware** option



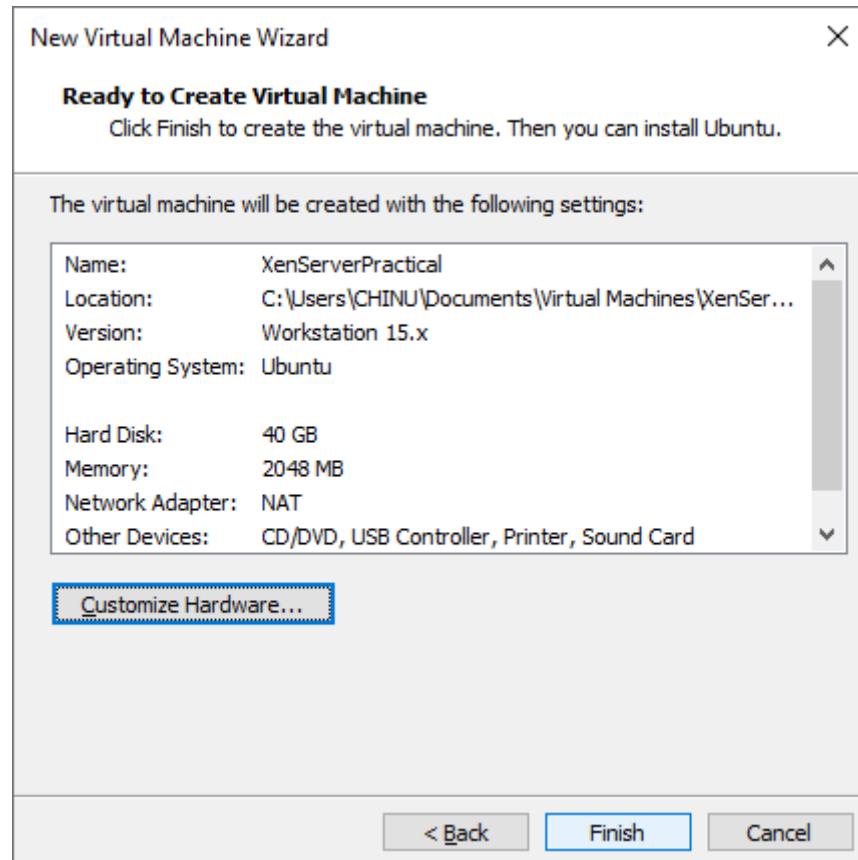
>> Change – Memory for this virtual machine to 2 GB and click on close button.



>> Click on processor and select Virtualized Intel VT-x/ EPT or AMD-V/RVI. And then close

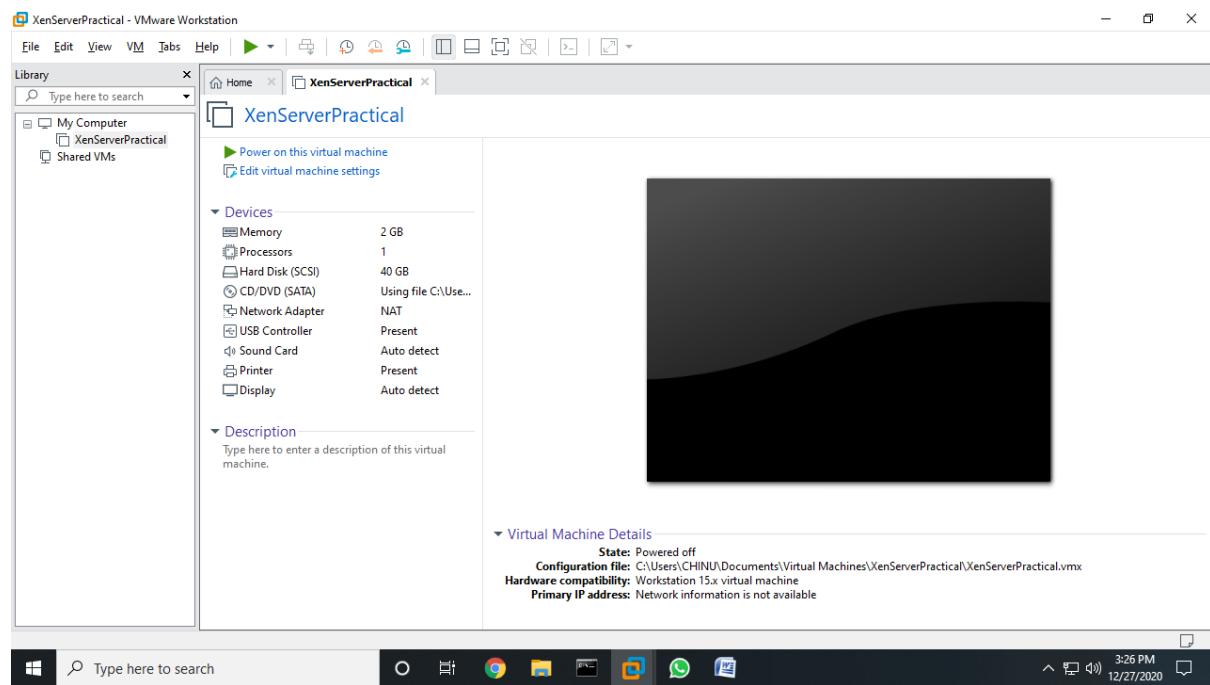


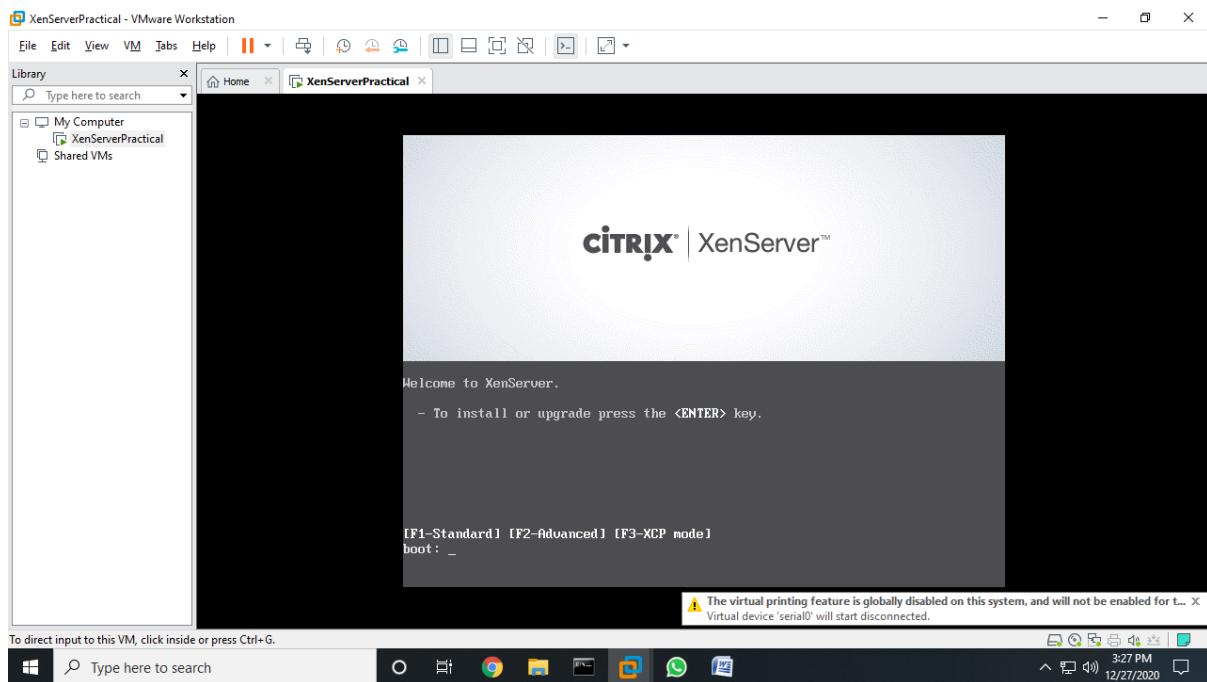
>> Click on Finish.



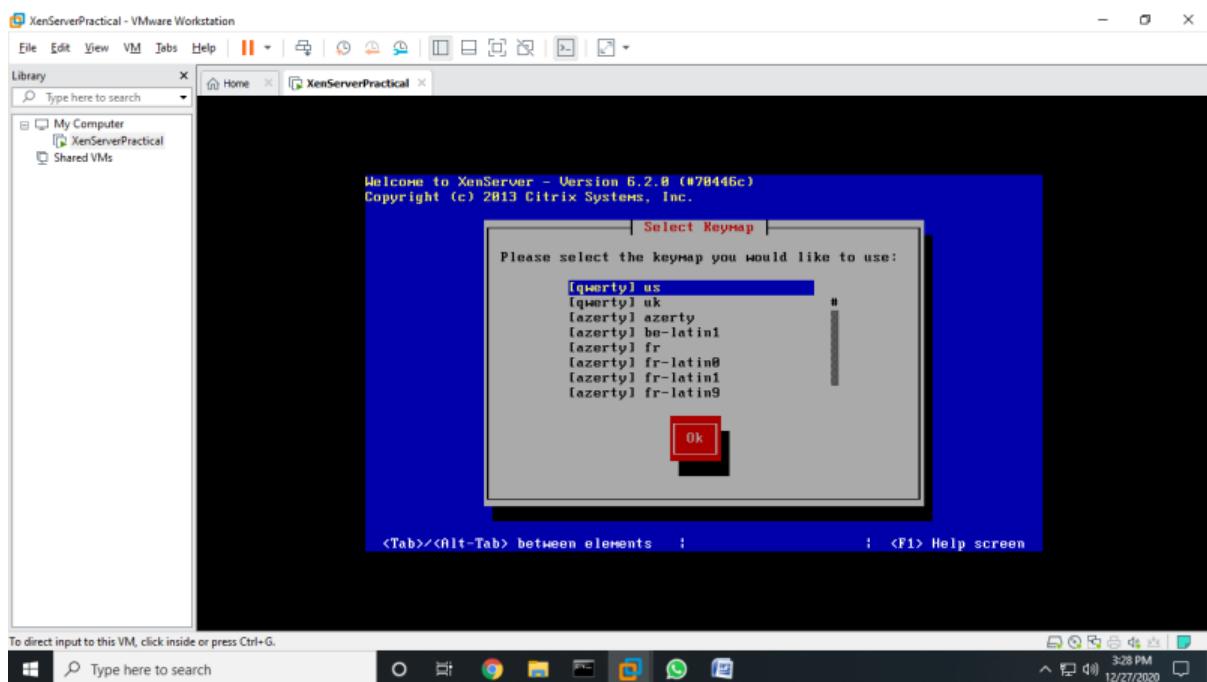
>> Now power on newly created virtual machine –

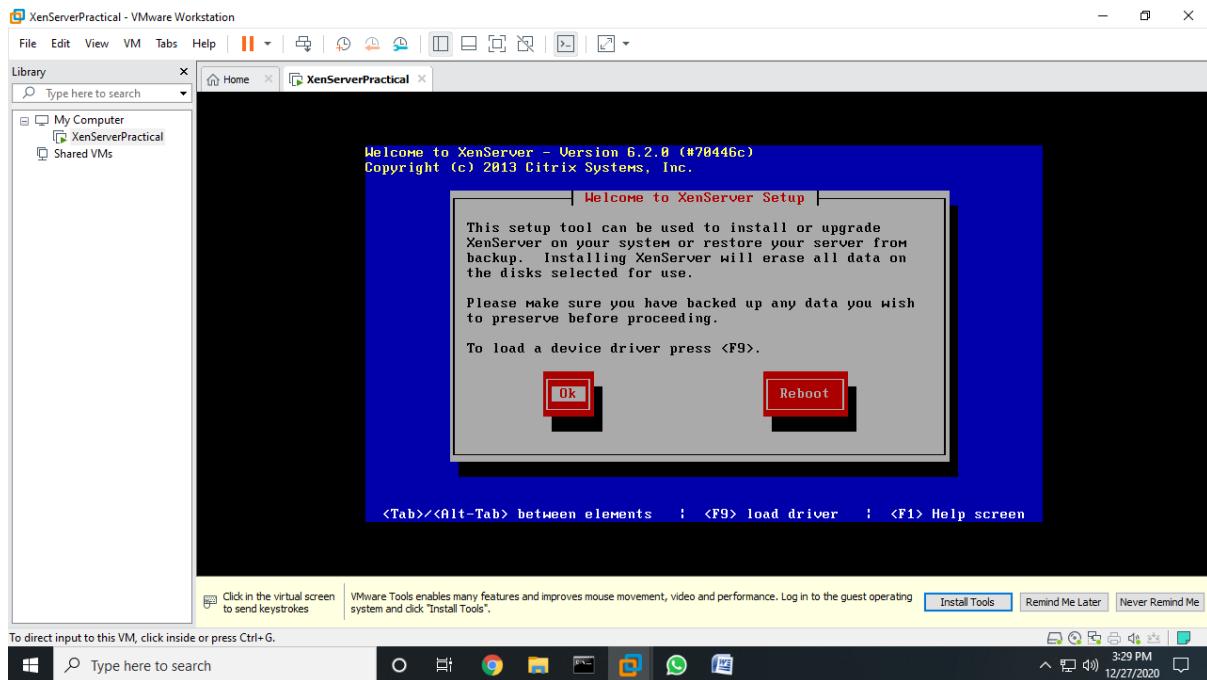
>> Now select US and click on Ok.



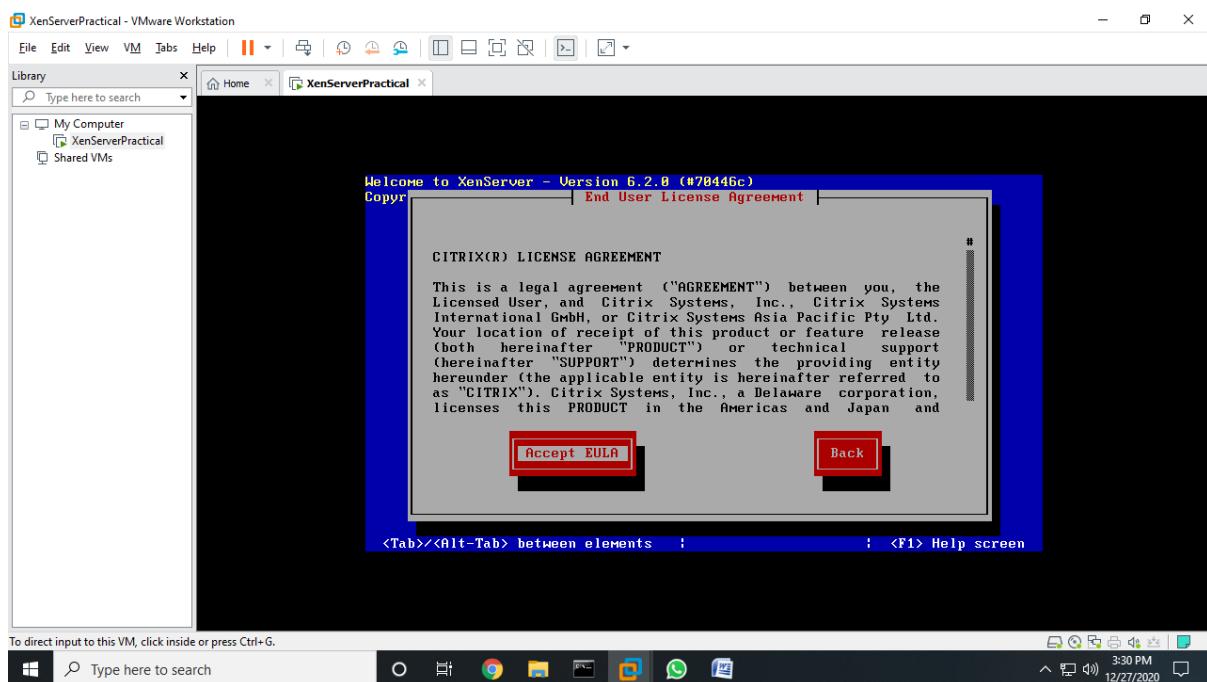


>> Click on Ok.

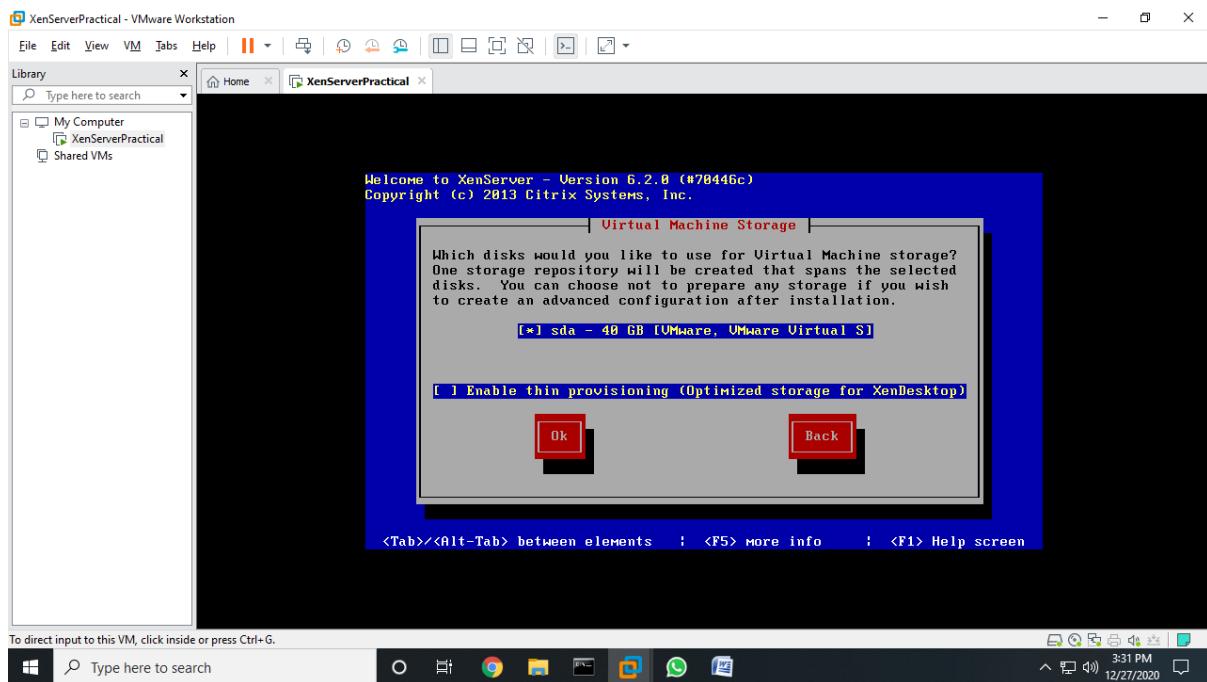




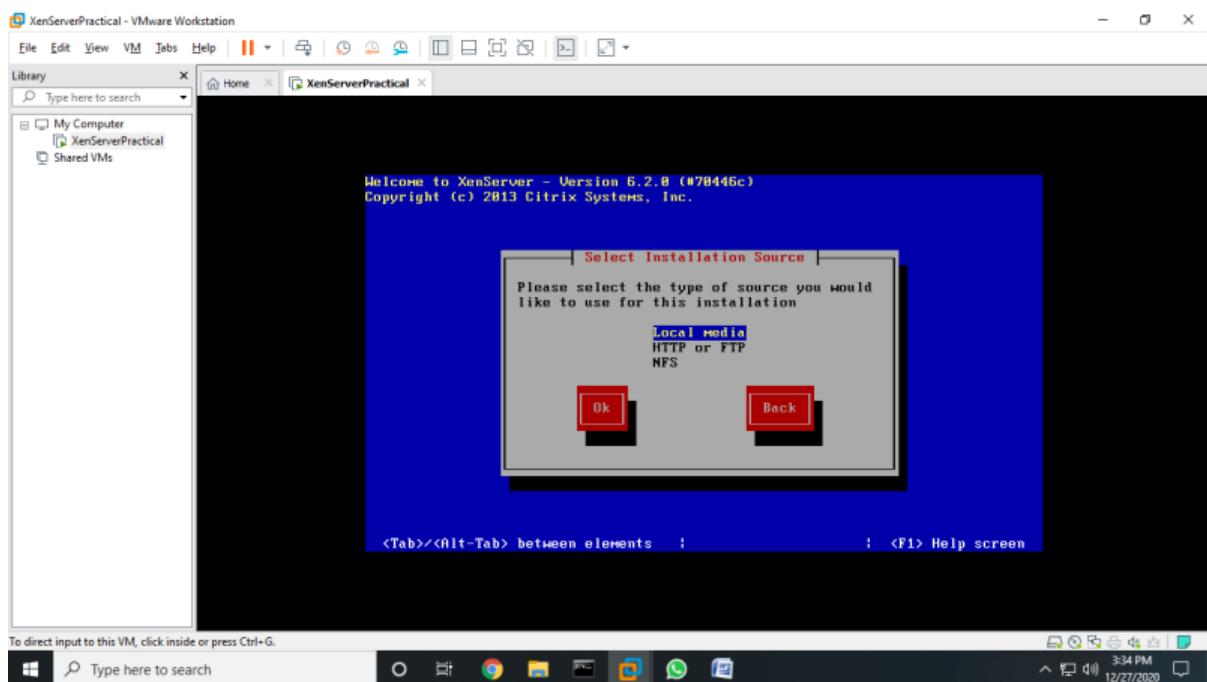
>> Click on Accept Eula.



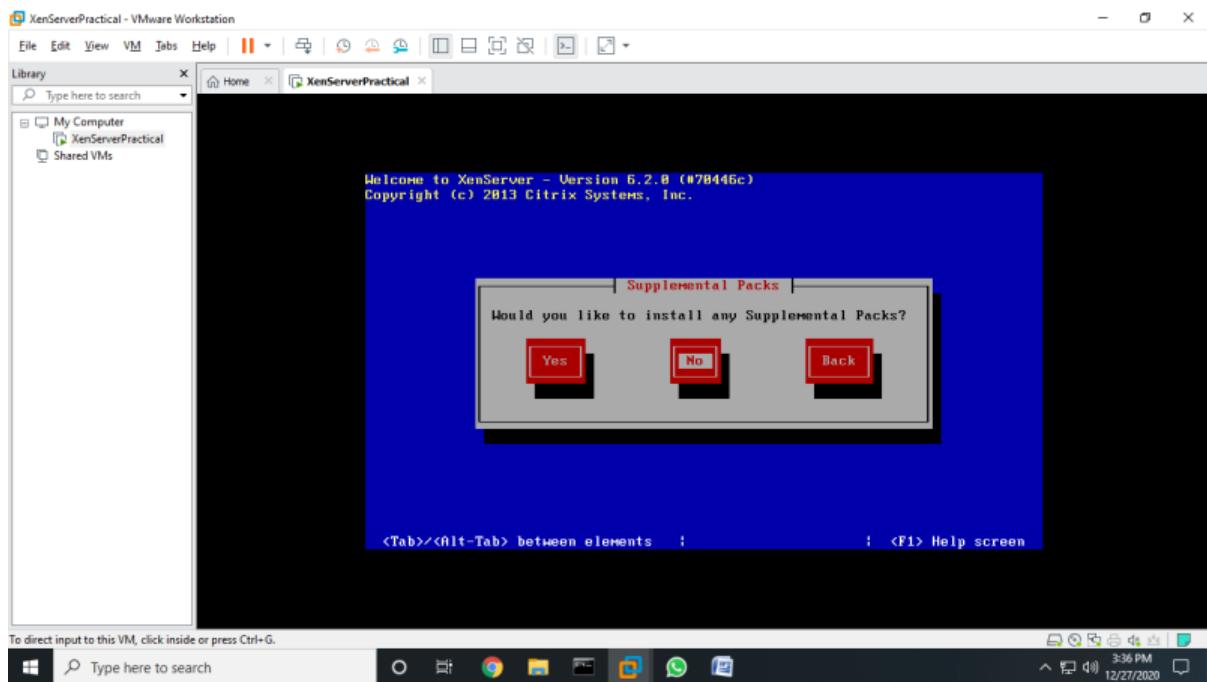
>> Click on Ok.



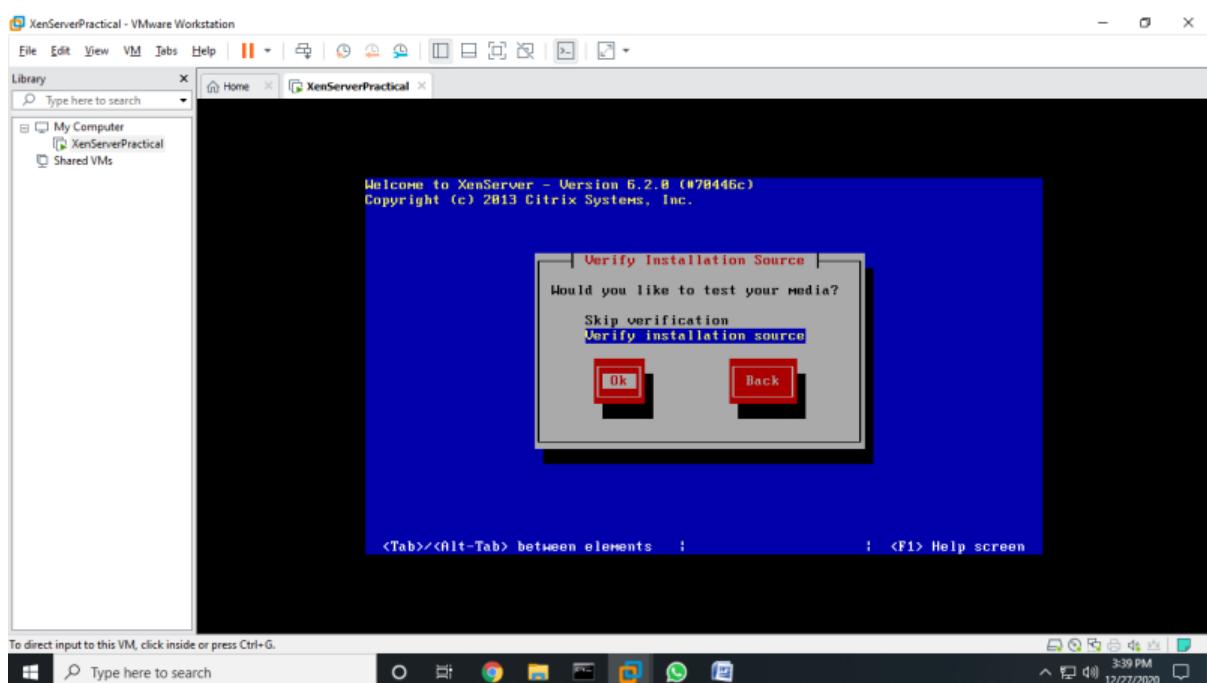
>> Select Local media and click Ok.

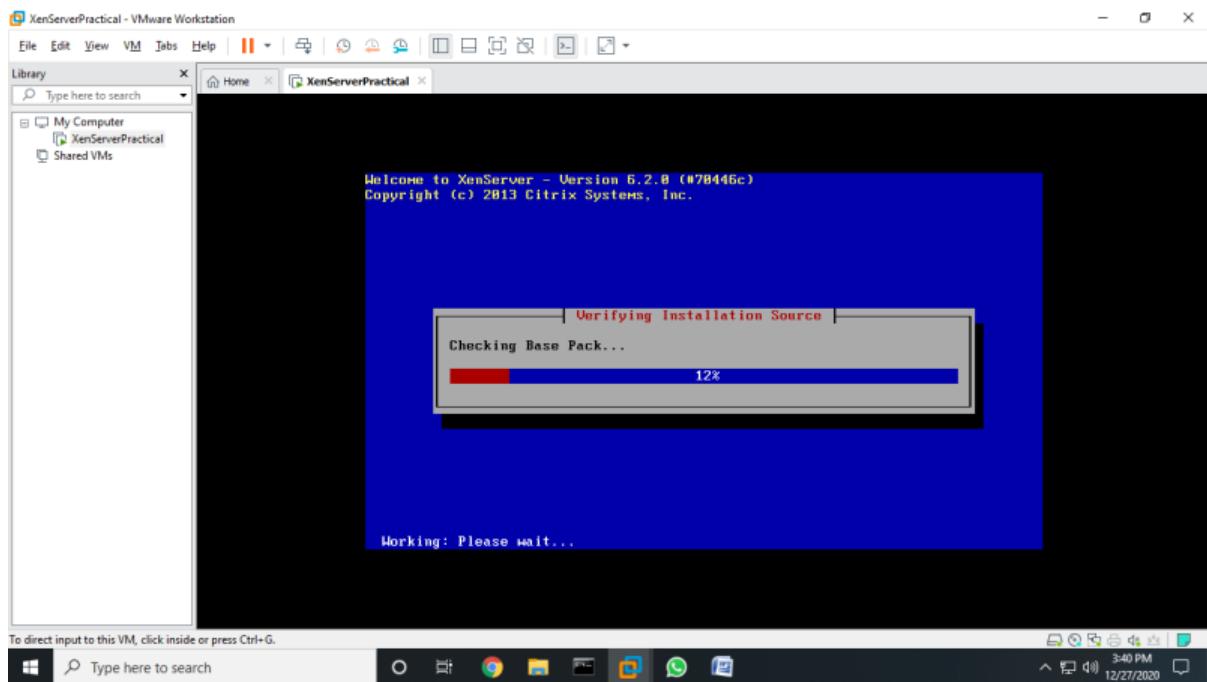


>> Click No.

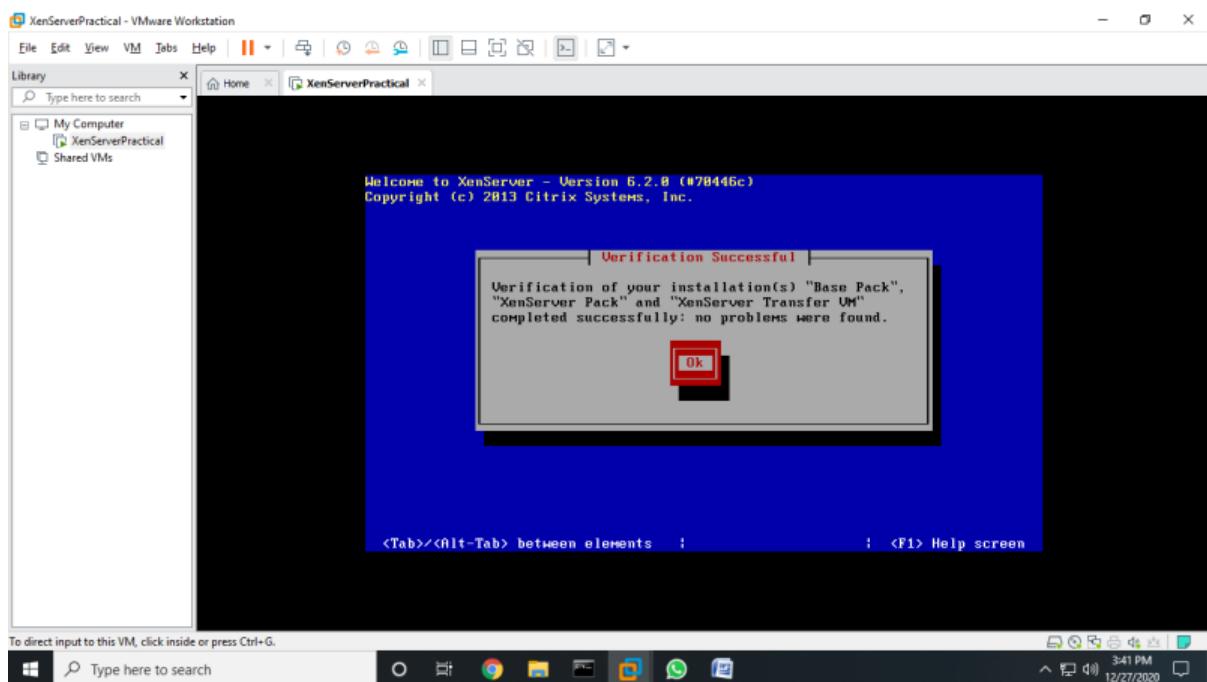


>> Select Verify Installation Source. Click Ok.

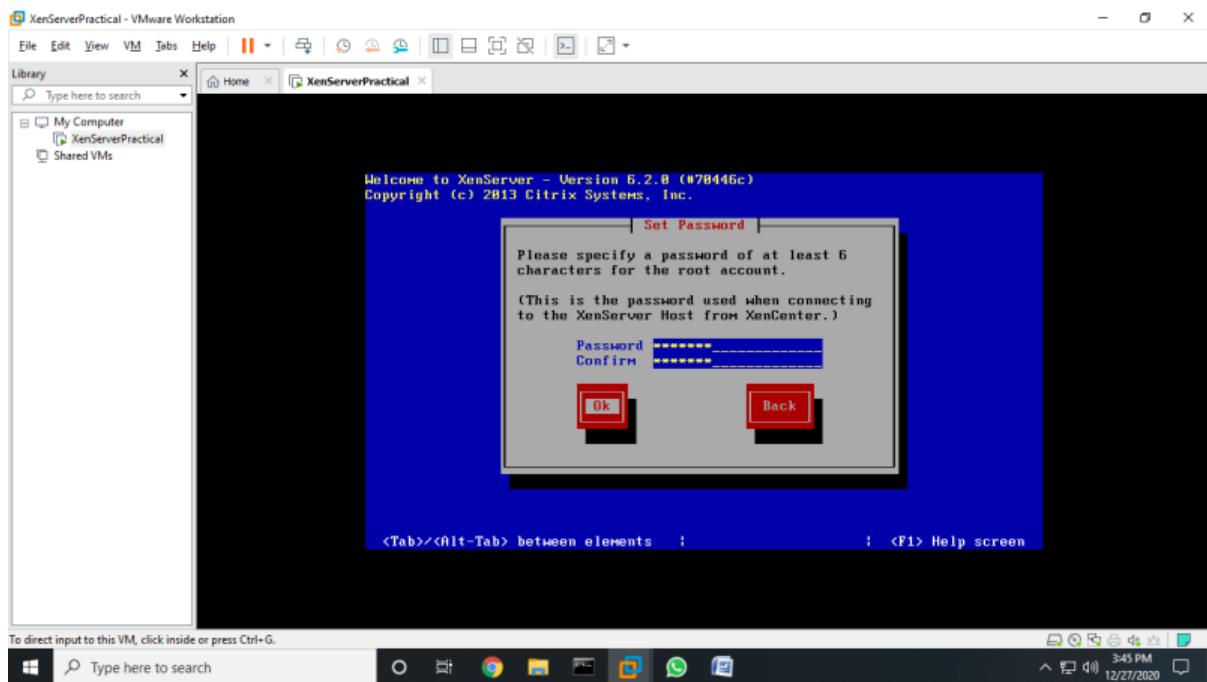




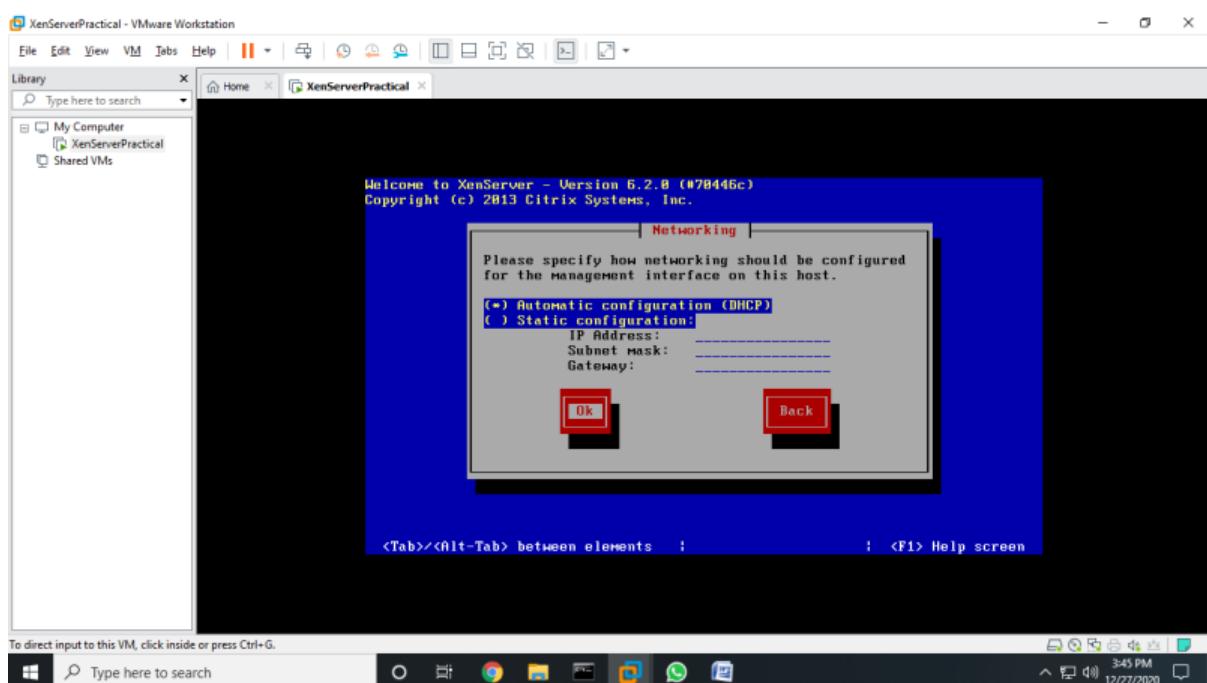
>> Click Ok.



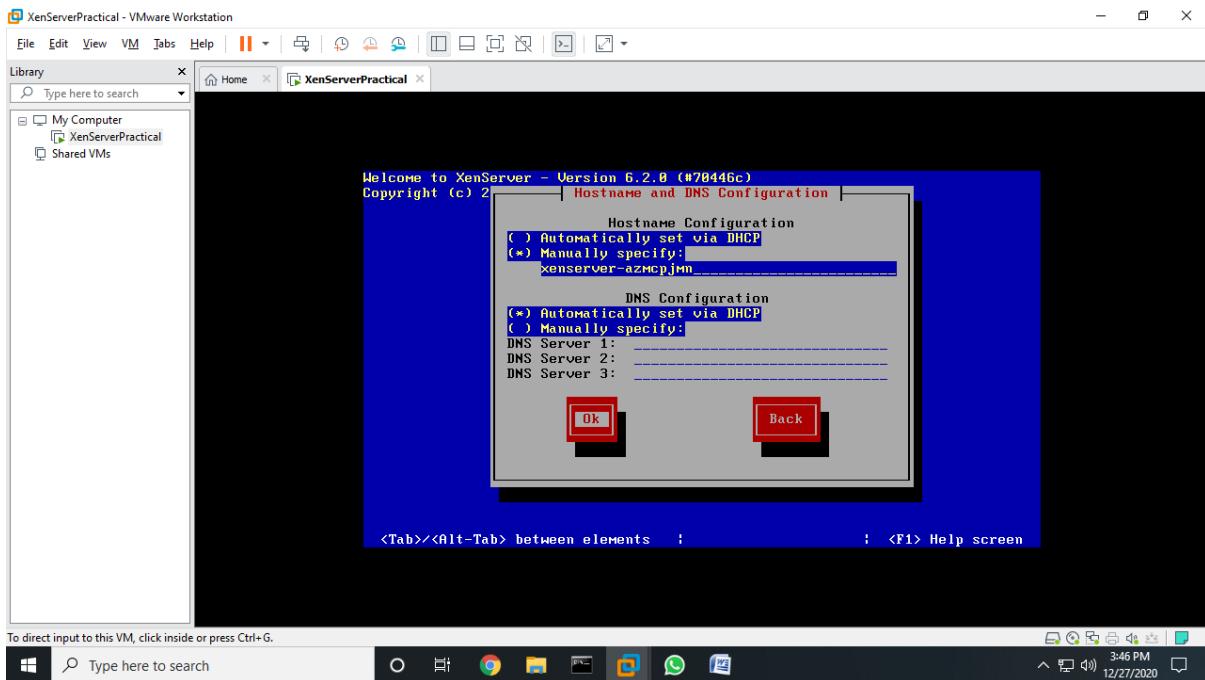
>> Enter Password: root123 and click on Ok.



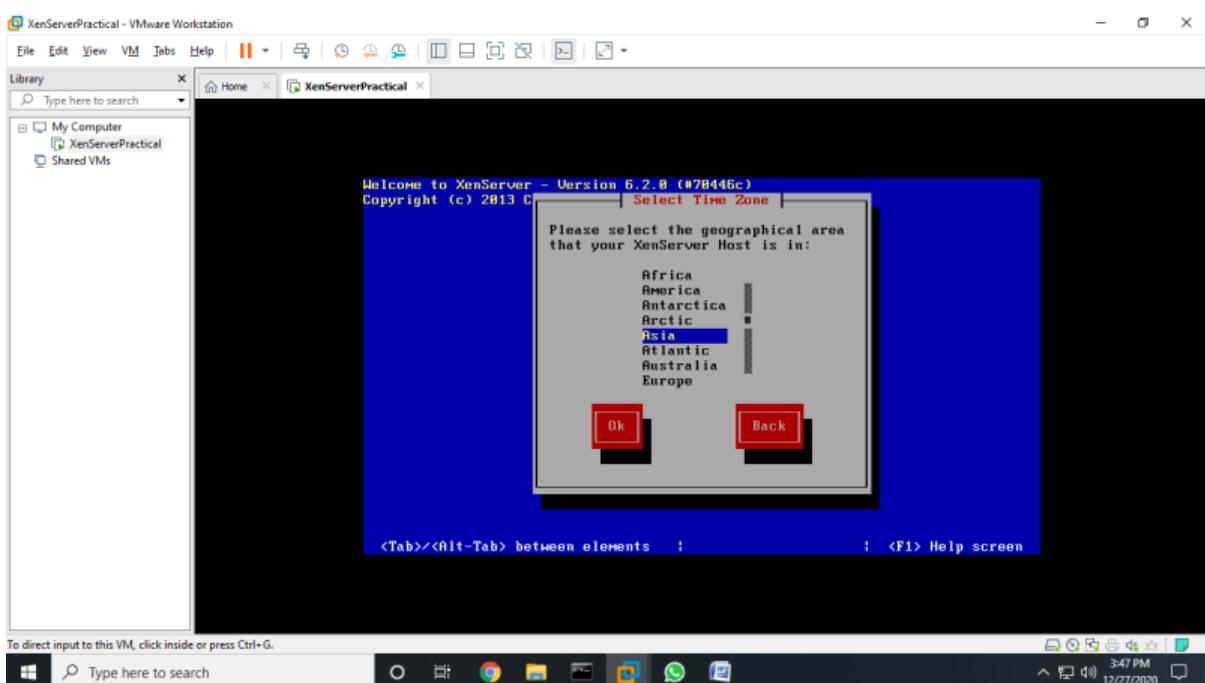
>> Select Automatic Configuration (DHCP) and Click OK.



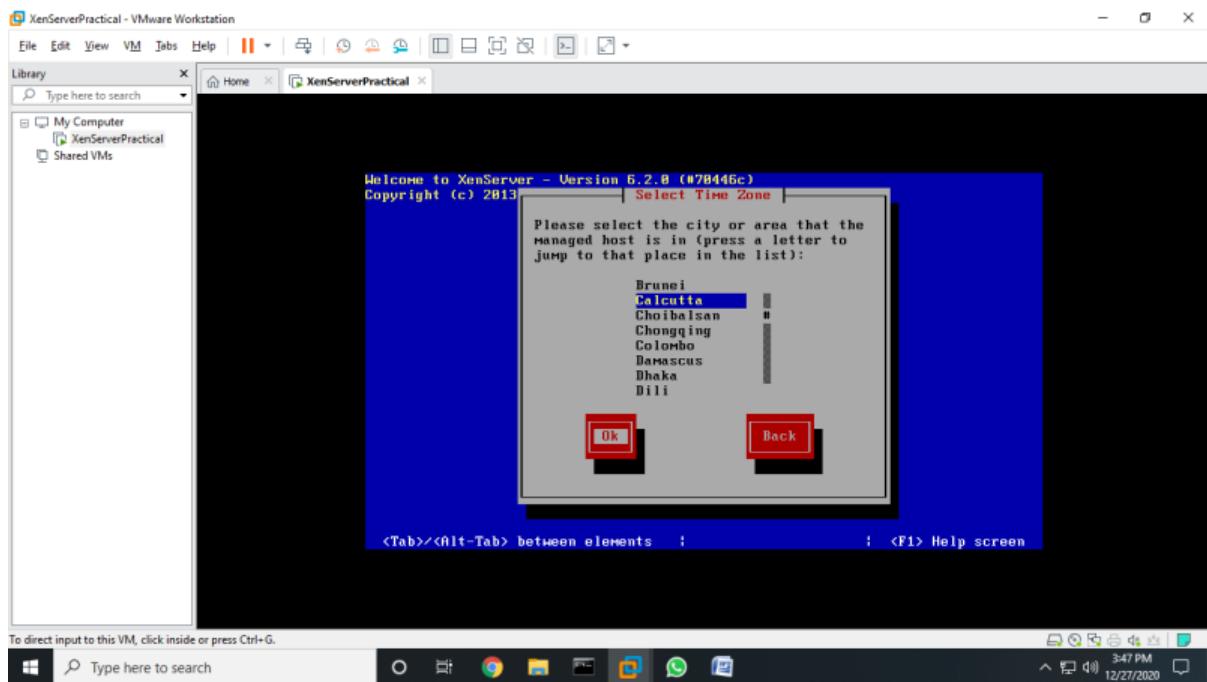
>> Select Automatically set via (DHCP) and Click OK.



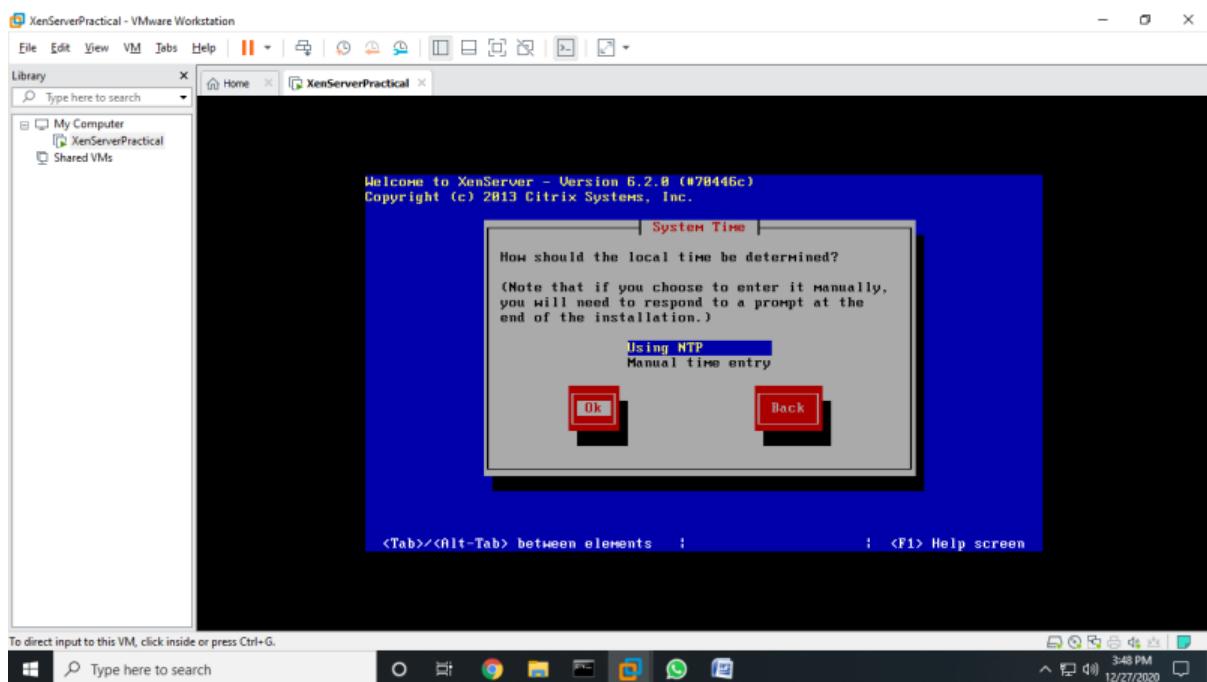
>> Select Asia and click OK.

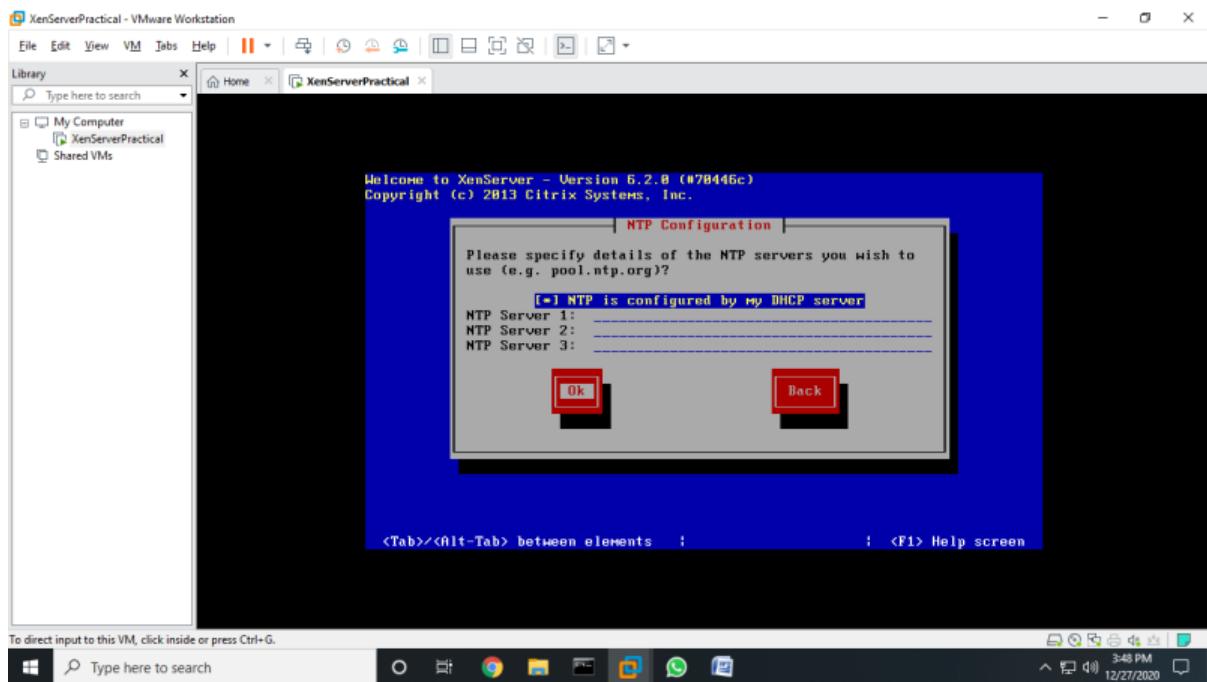


>> Select Calcutta and Click OK.

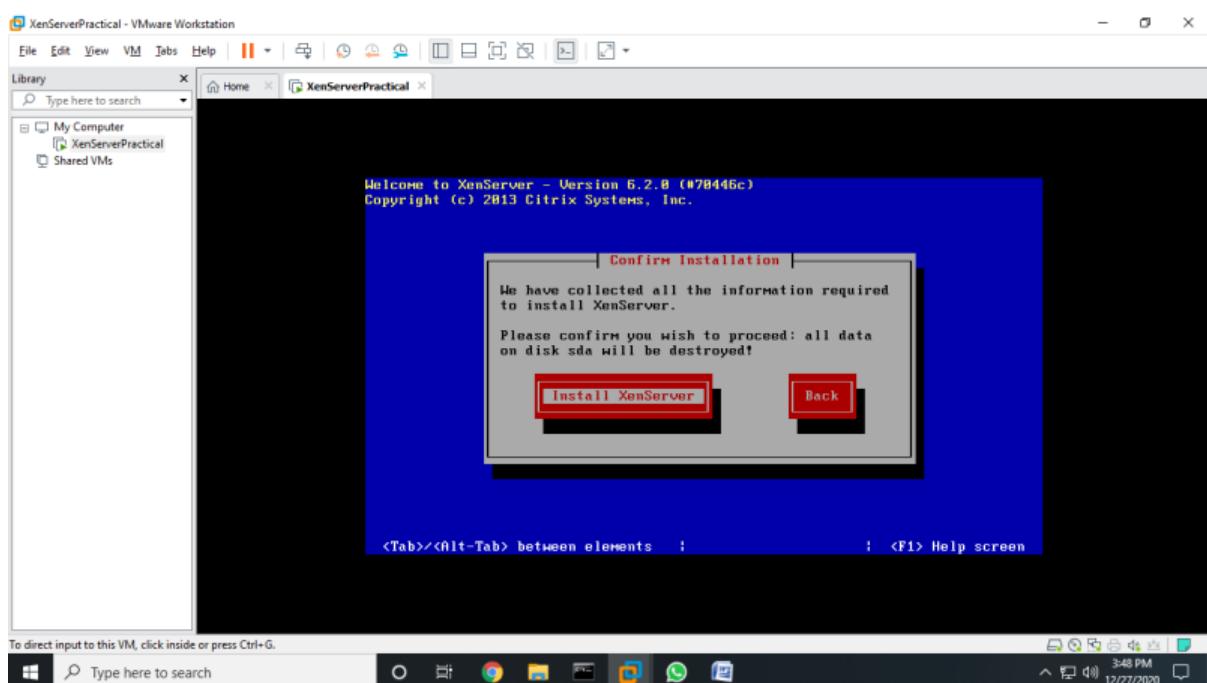


>> Select Using NTP and Click OK.

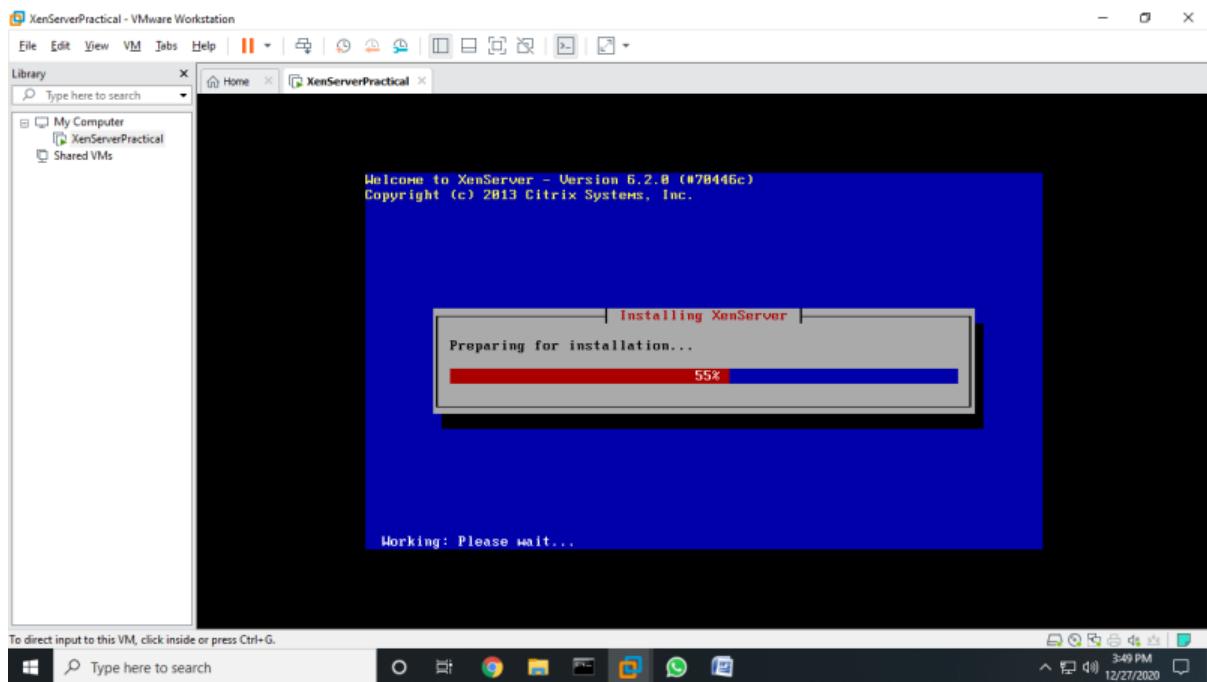




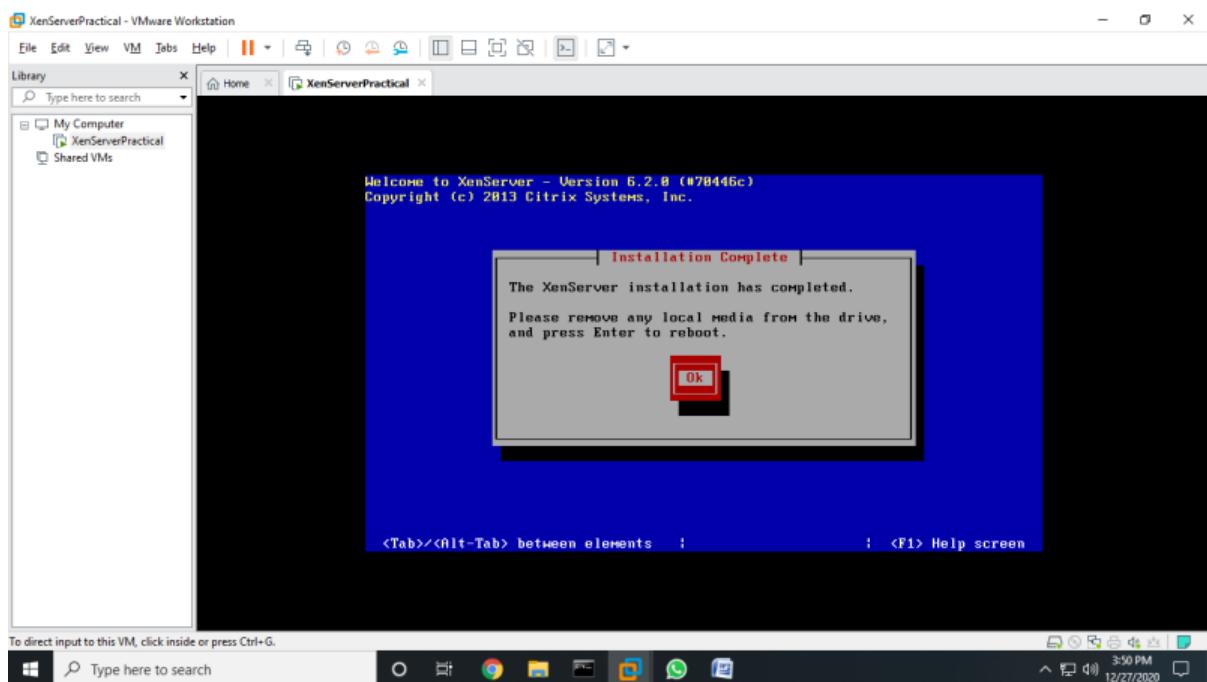
>> Click Install XenServer.



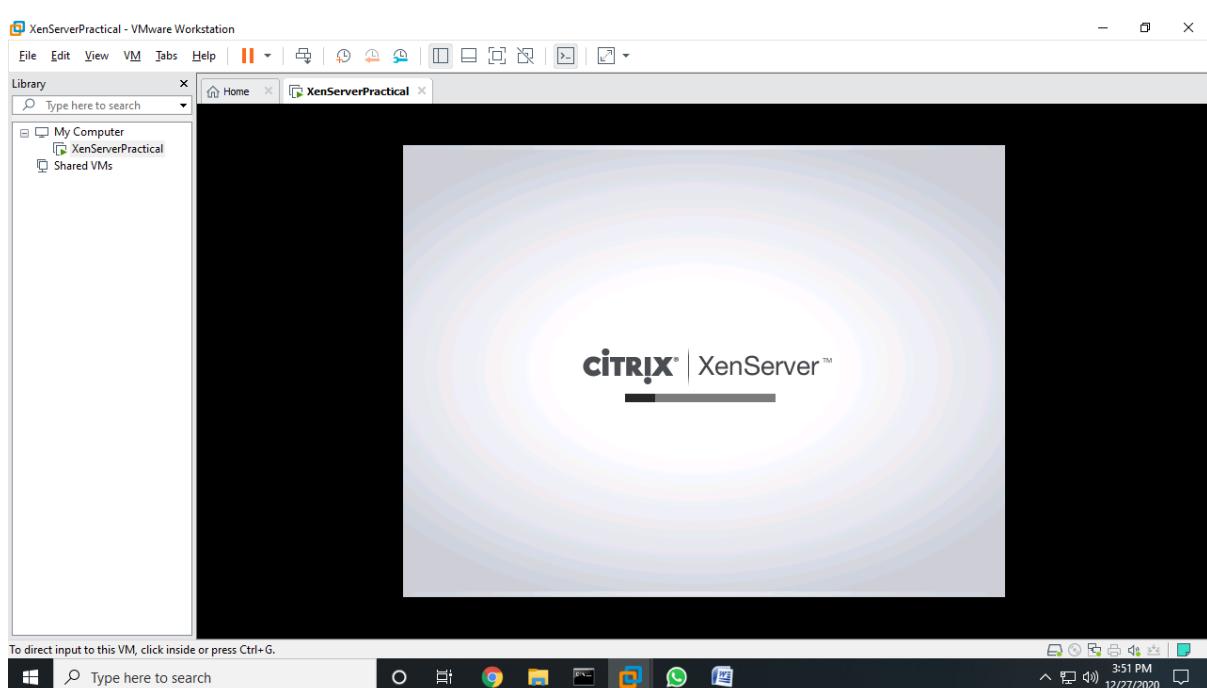
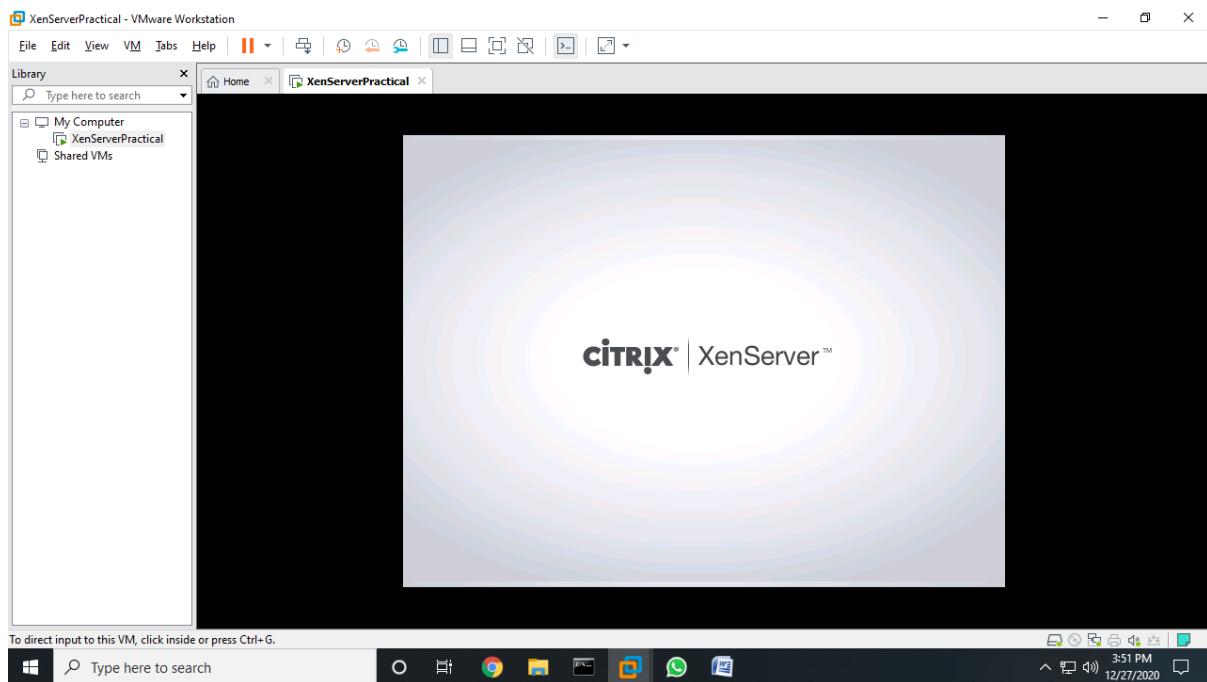
>> Wait a while till it is installing.



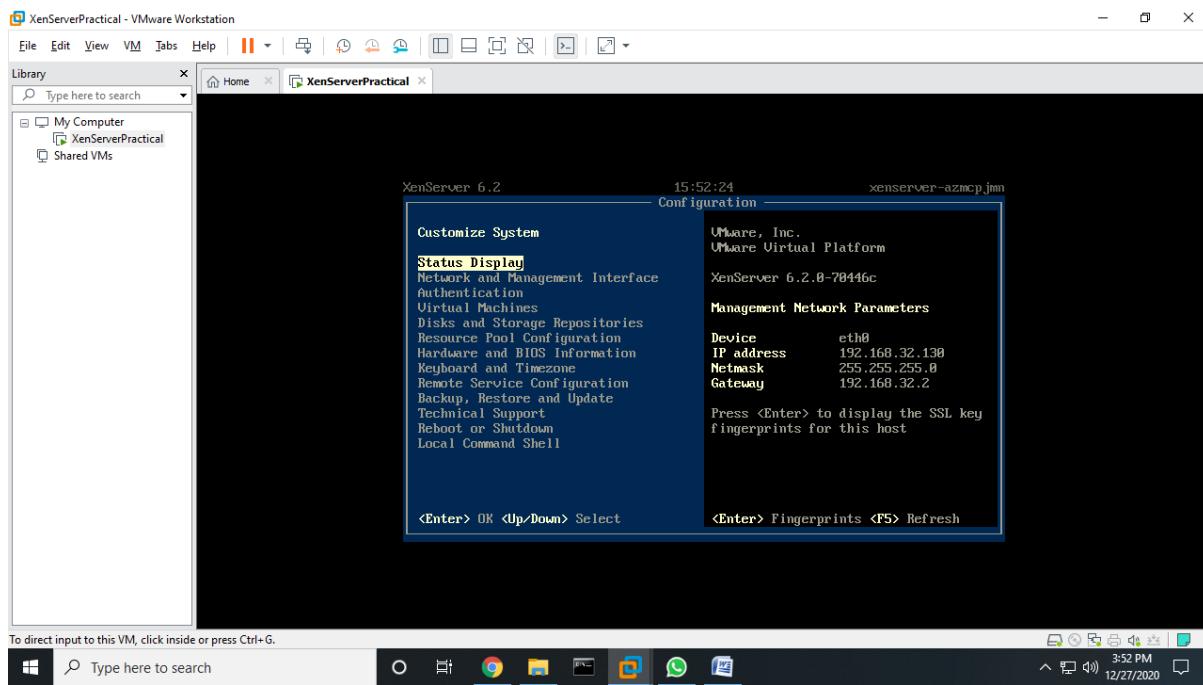
>> Click OK to Reboot.



>> XenServer is loading.



>> Note down the IP Address “ 192.168.32.130” ping it from command prompt to verify connection.



>> The ping details from command prompt.

```
Microsoft Windows [Version 10.0.19041.685]
(c) 2020 Microsoft Corporation. All rights reserved.

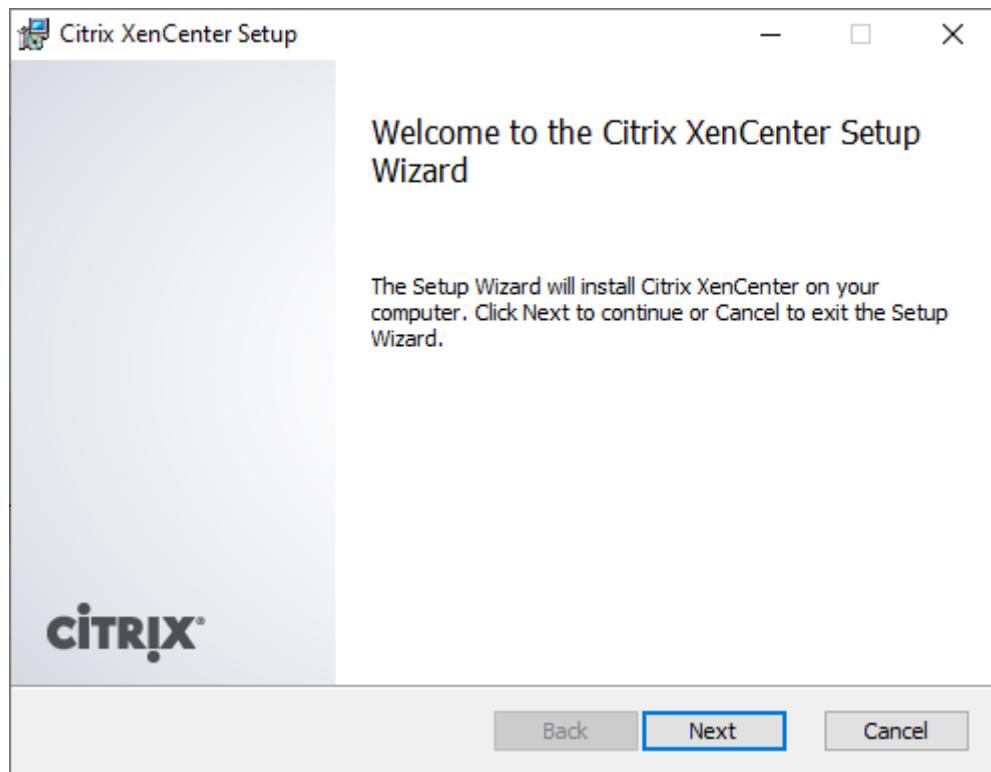
C:\Users\CHINU>ping 192.168.32.130

Pinging 192.168.32.130 with 32 bytes of data:
Reply from 192.168.32.130: bytes=32 time=2ms TTL=64
Reply from 192.168.32.130: bytes=32 time<1ms TTL=64
Reply from 192.168.32.130: bytes=32 time<1ms TTL=64
Reply from 192.168.32.130: bytes=32 time<1ms TTL=64

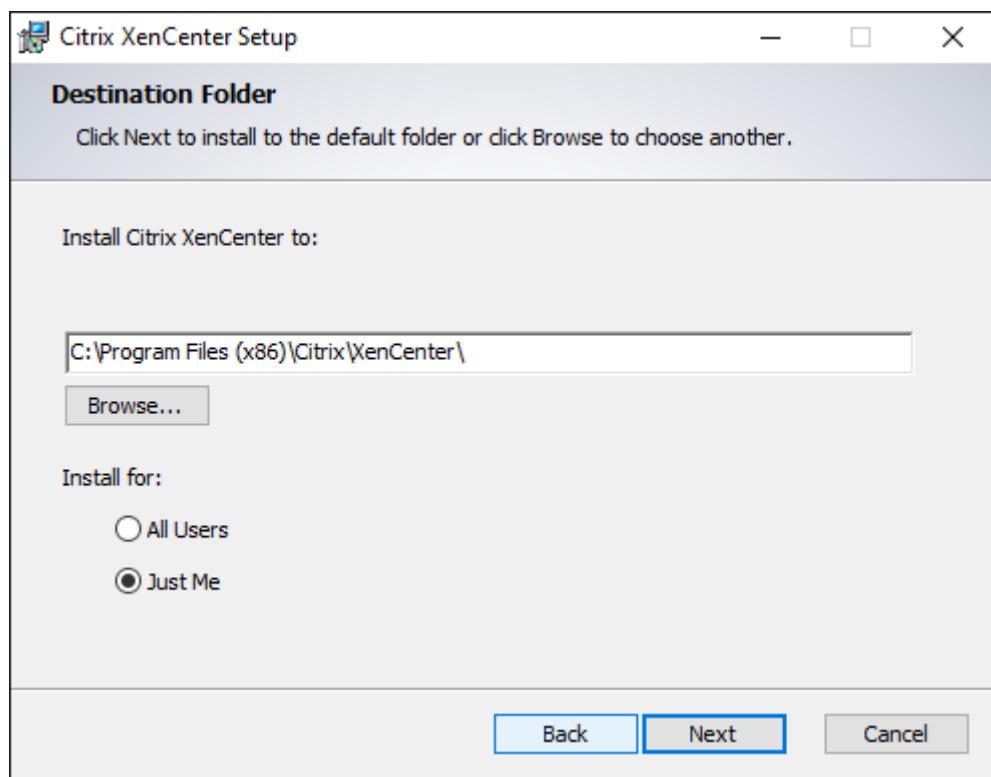
Ping statistics for 192.168.32.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\Users\CHINU>
```

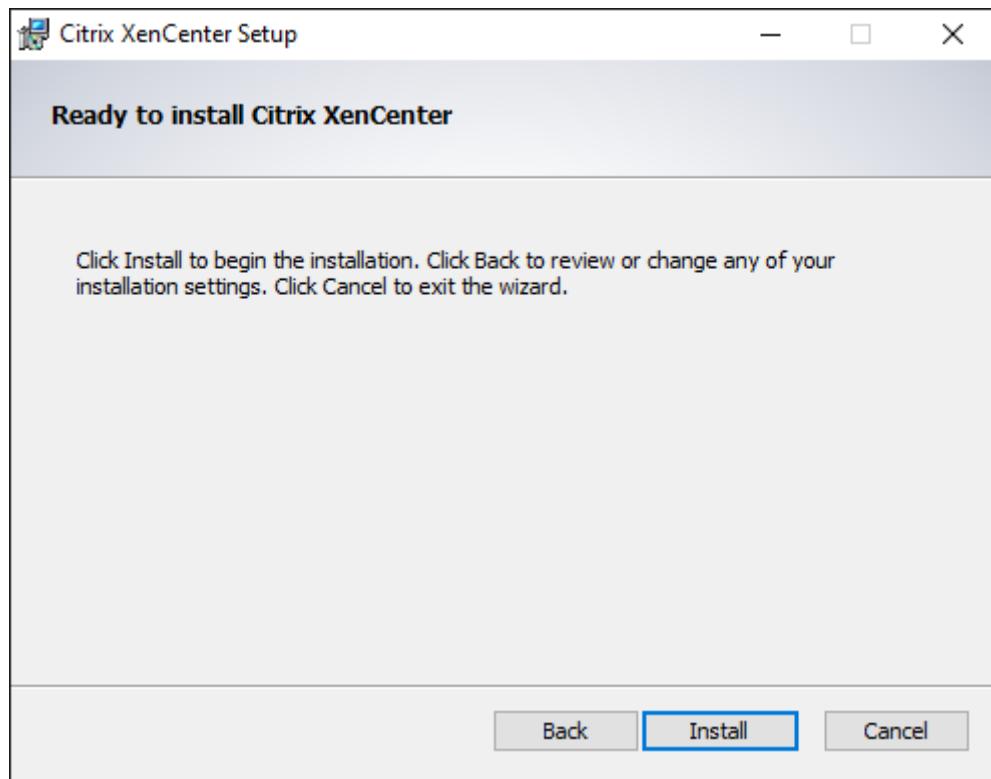
>> Now install Citrix App if not installed (i.e. Citrix XenCenter). Click Next.



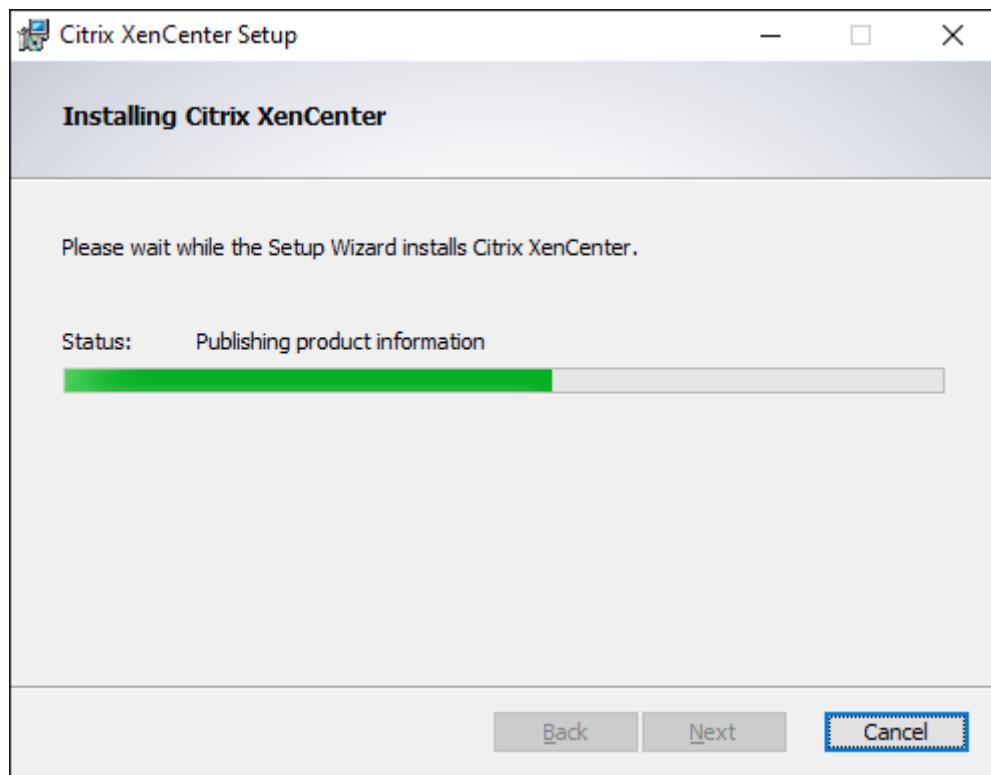
>> Browse the desired folder and click Next.



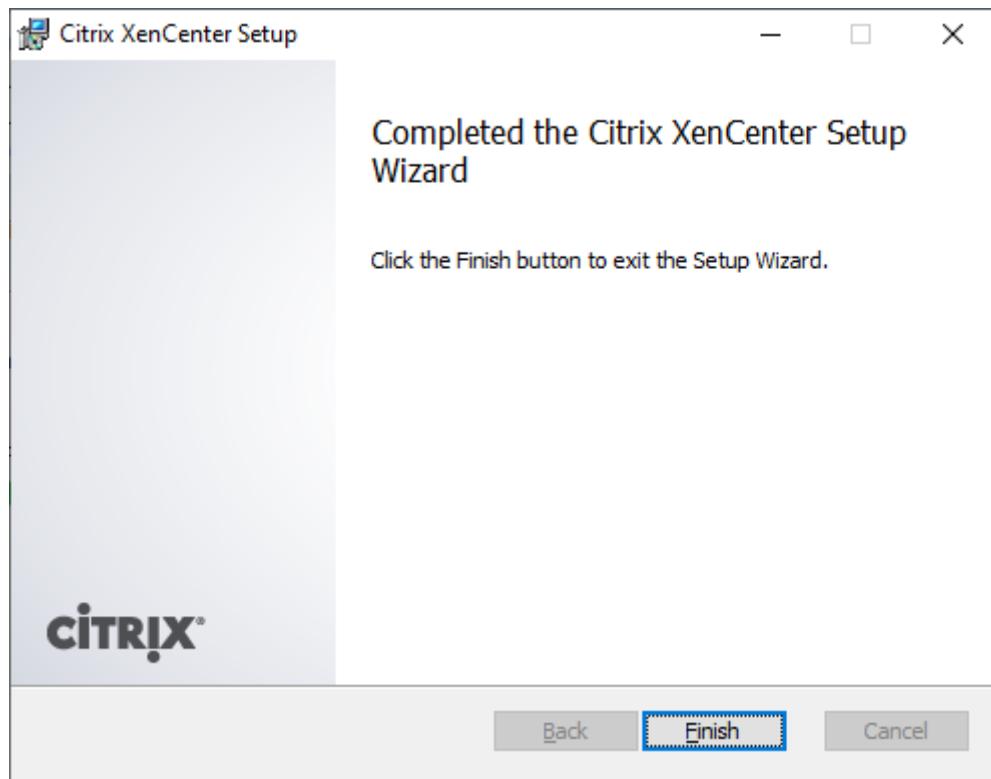
>> Click **Install**.



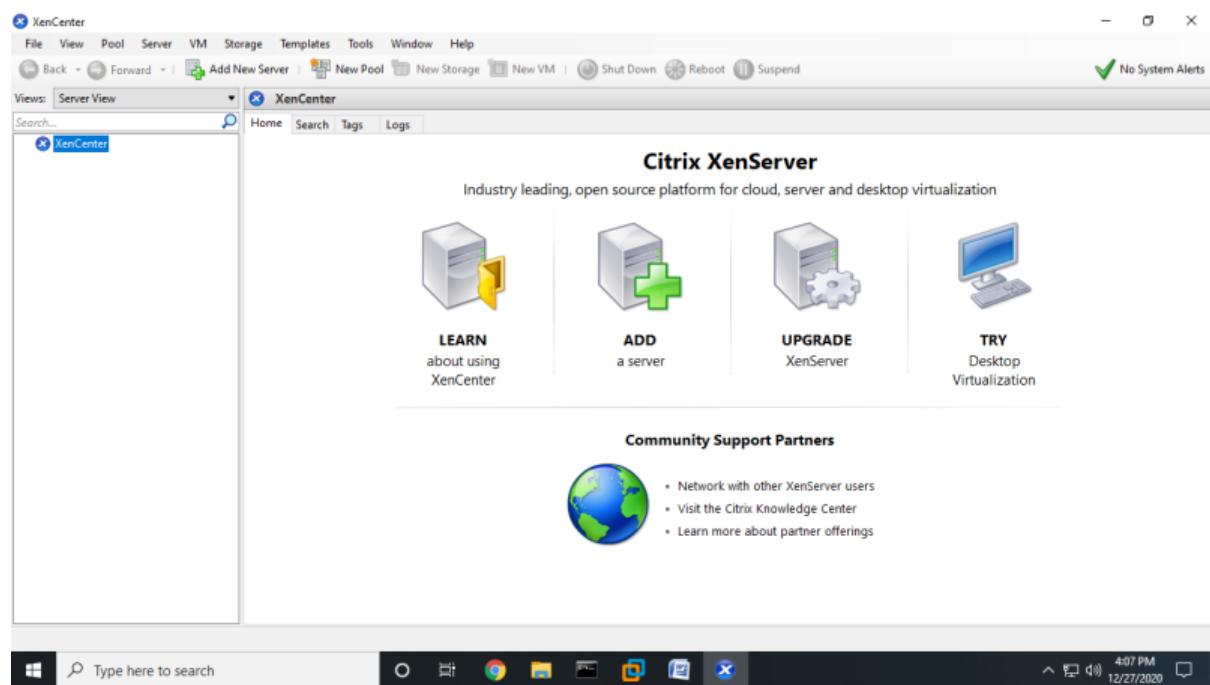
>> Wait a while till it gets installed.



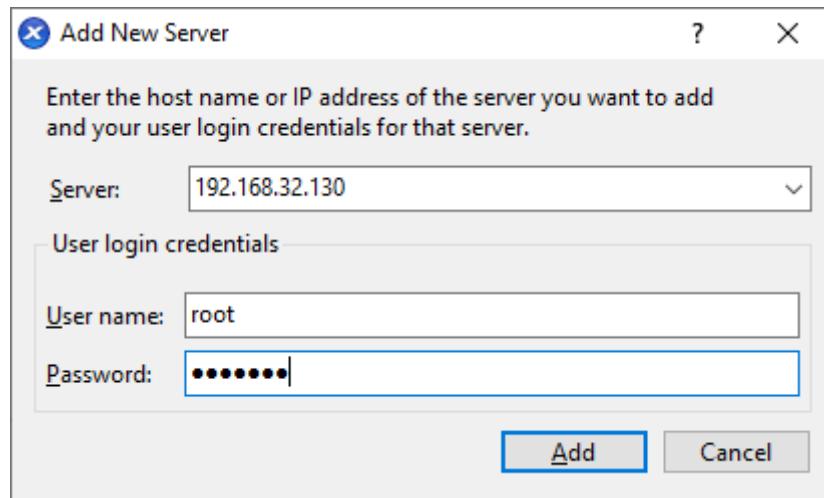
>> Click Finish. Your Citrix XenCenter is Installed Successfully.



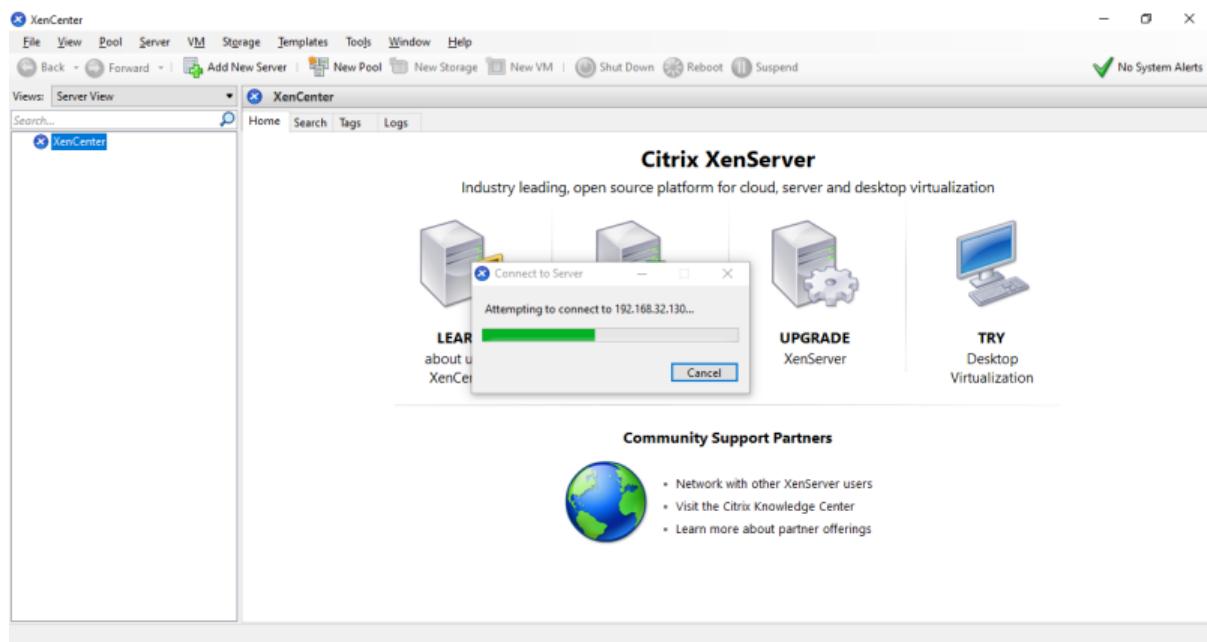
>> Now Open Citrix XenCenter – and Click **Add Server**.



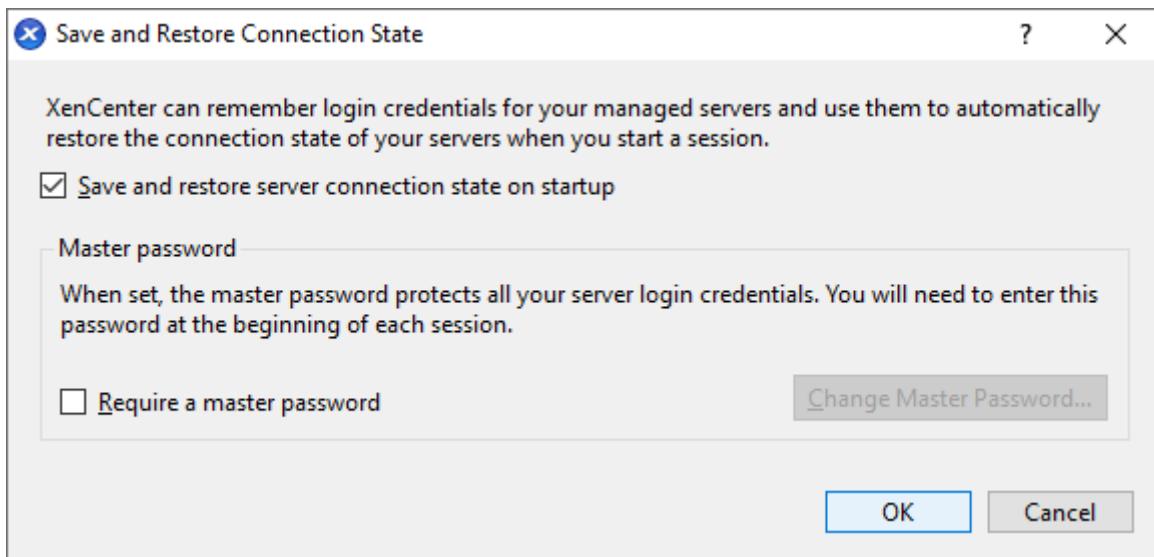
>> Fill the IP address that we have noted down from installation and User name: “**root**” and Password: “**root123**” which we have given during installation and Click **Add**.



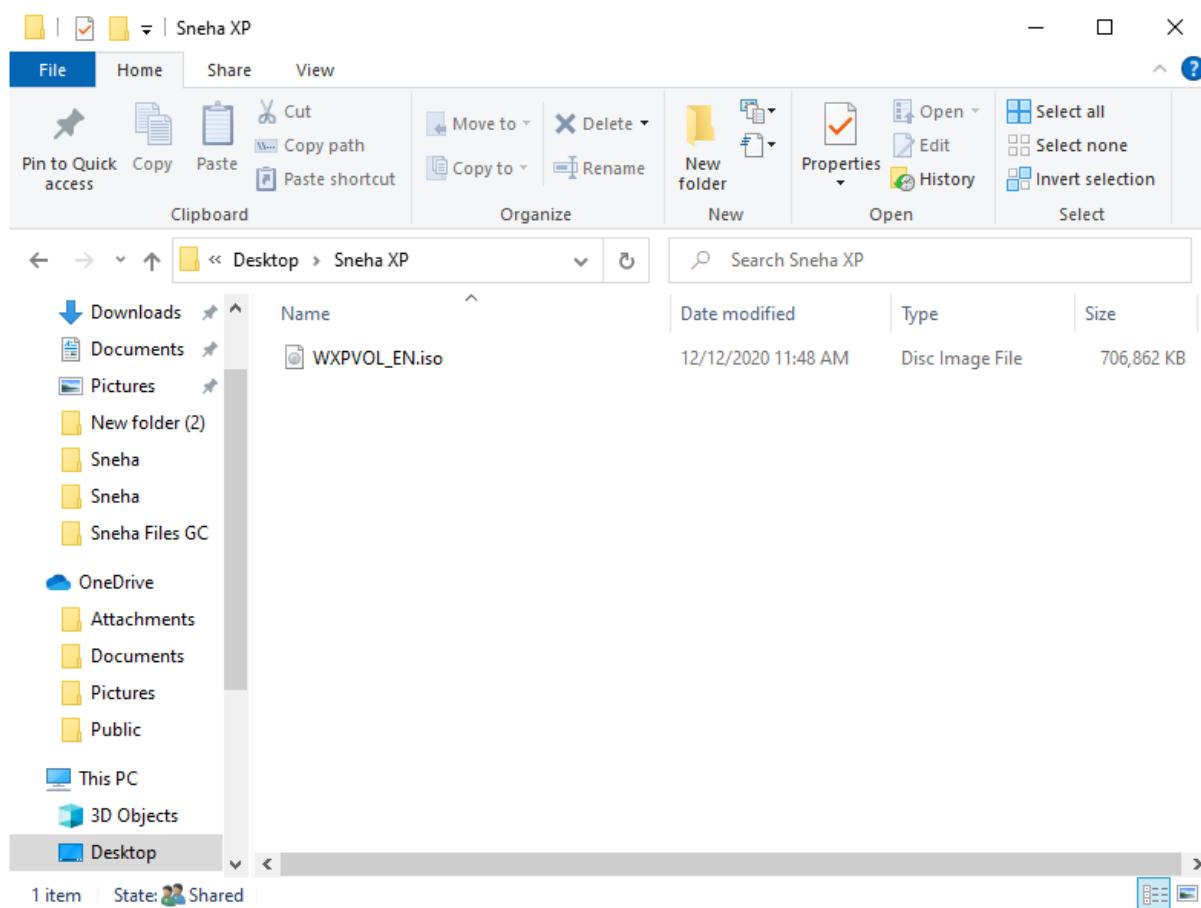
>> Wait until it is loading.



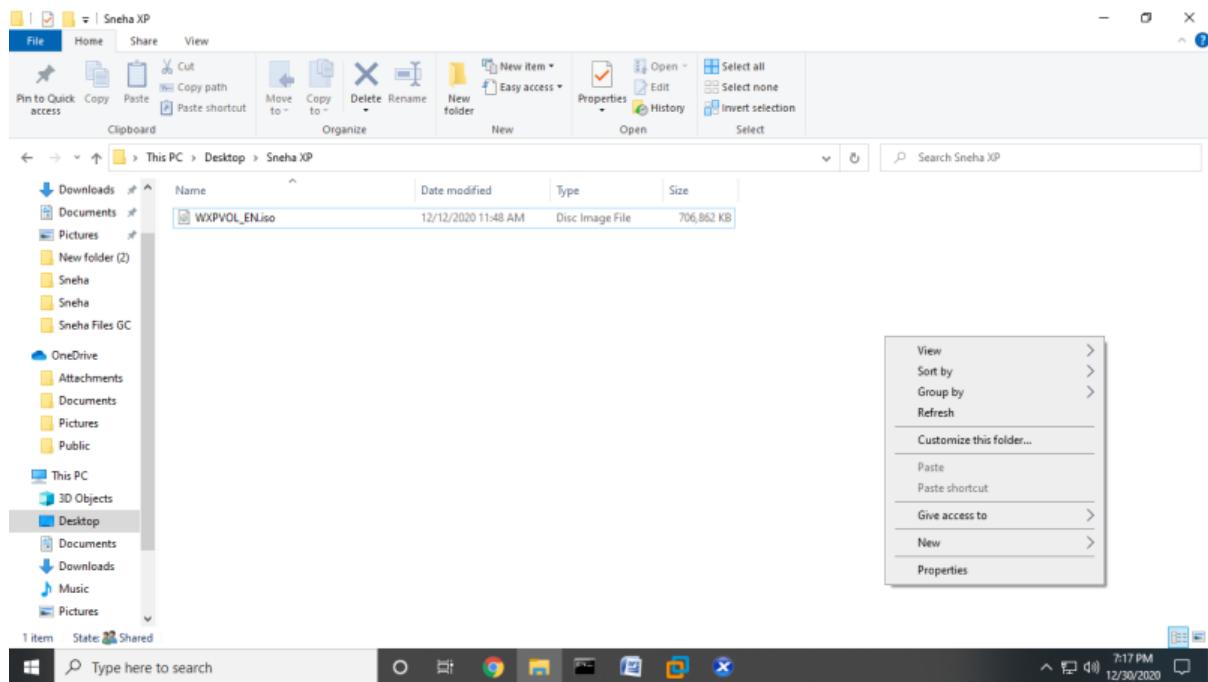
>> Check the **Save and Restore server connection state on startup** and Click **OK**.



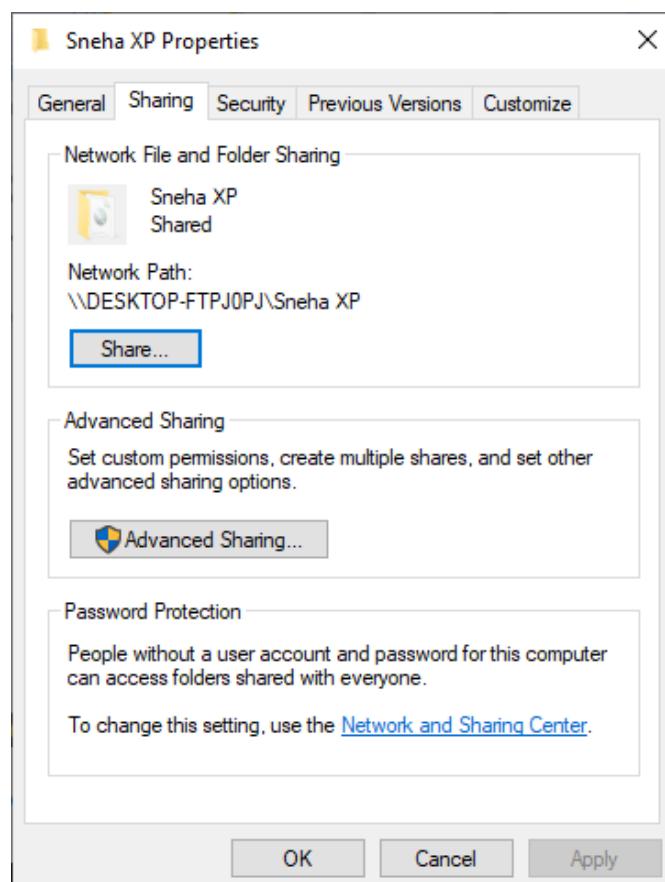
>> Before proceeding further create a New Folder on desktop and add the windows.iso file in that folder.



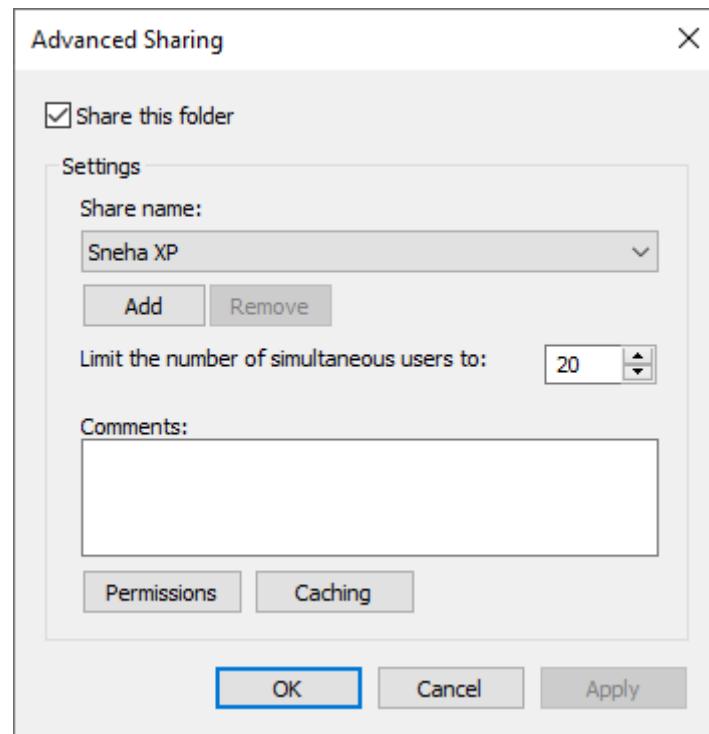
>> Now right Click anywhere in the folder and go to properties.



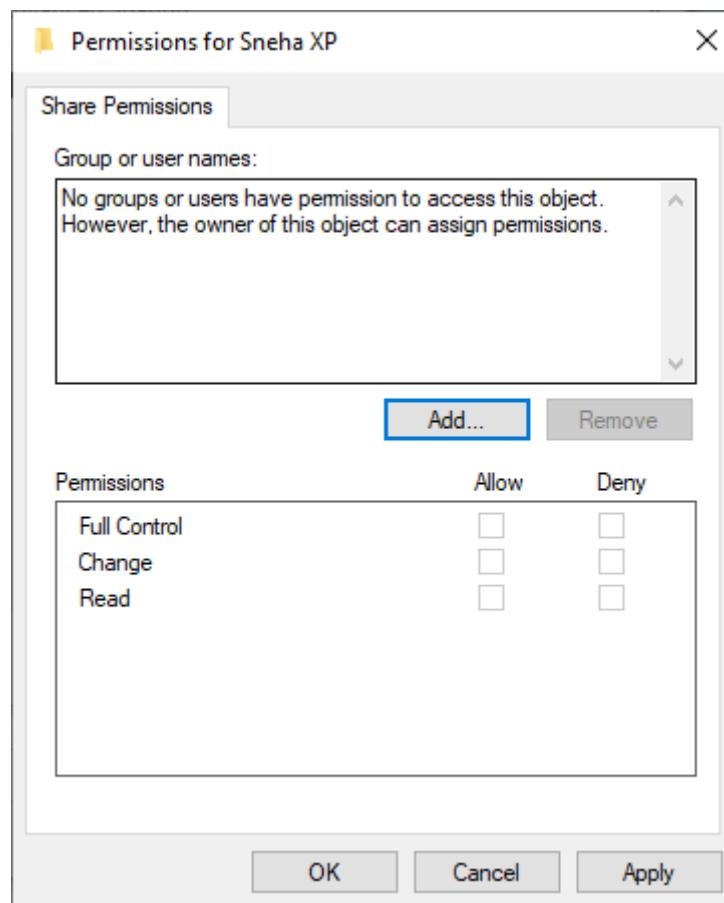
>> In properties go to sharing option and click Advance Sharing and note down the Network path: \\DESKTOP-FTPJ0PJ\Sneha XP



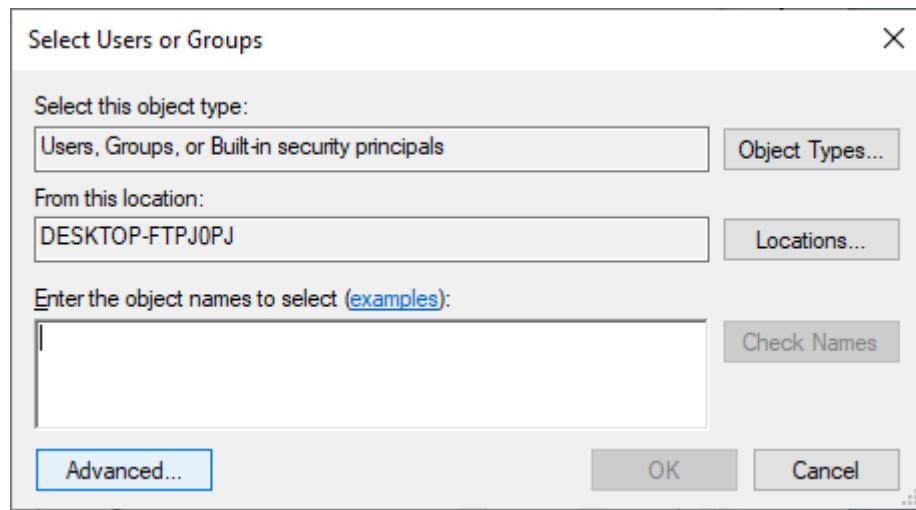
>> Click on 'Permissions'.



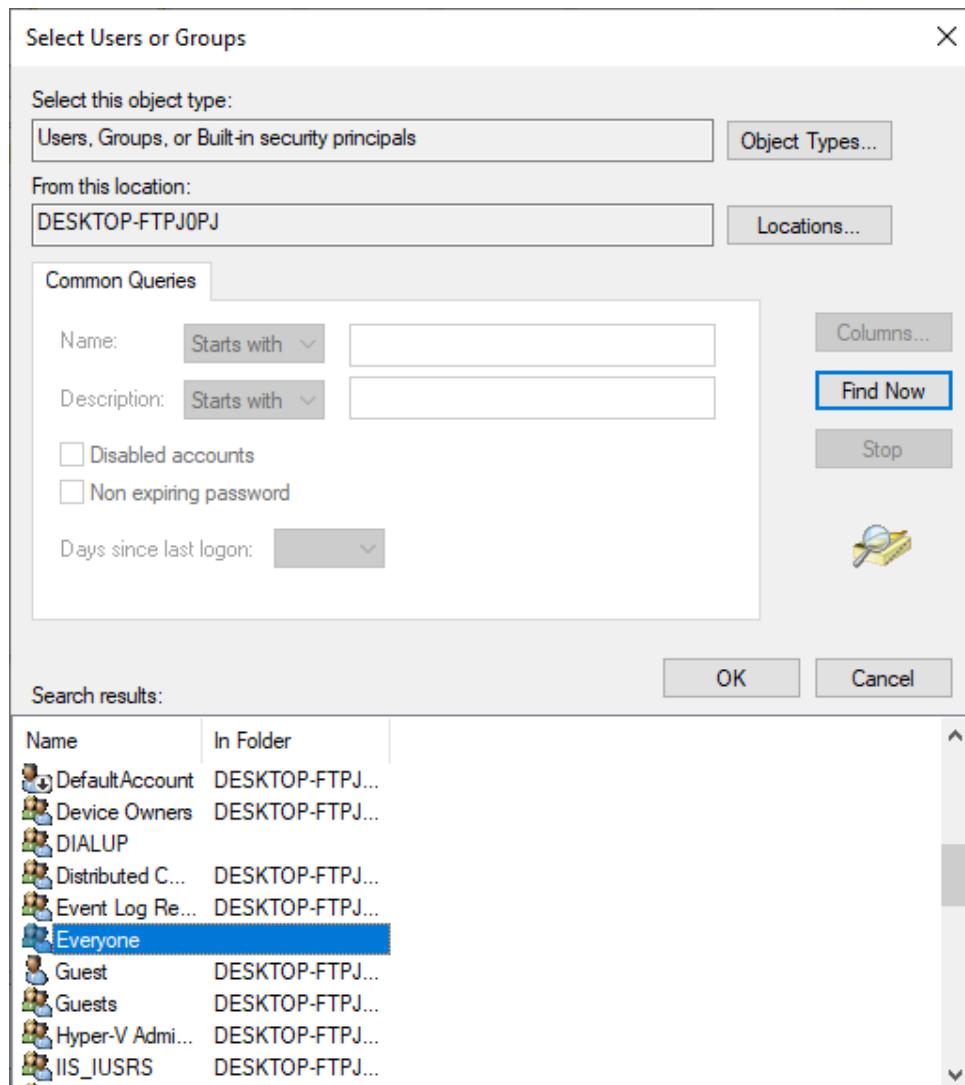
>> Click on Add.



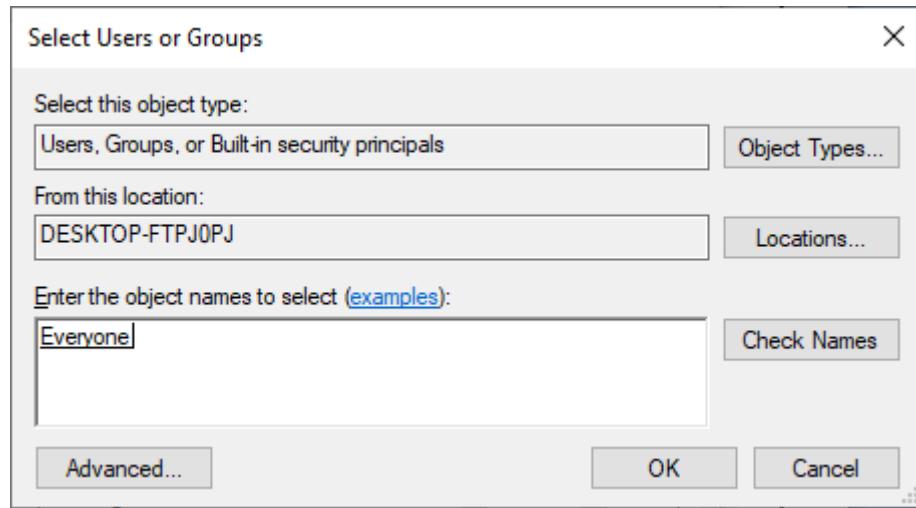
>> Click Advanced.



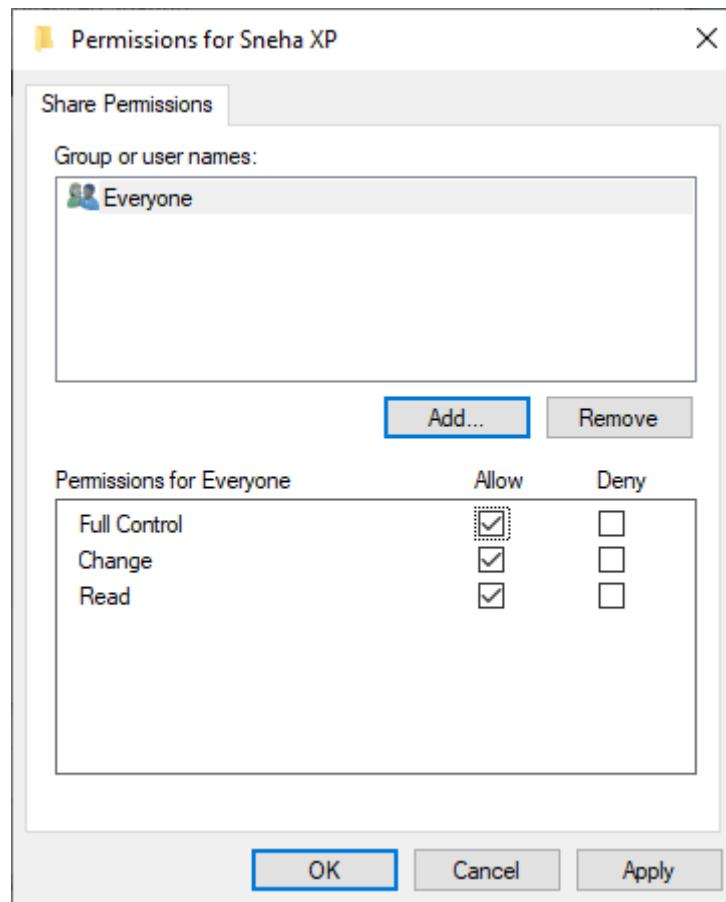
>> Click Find Now and search for Everyone and Select Everyone and Click OK.



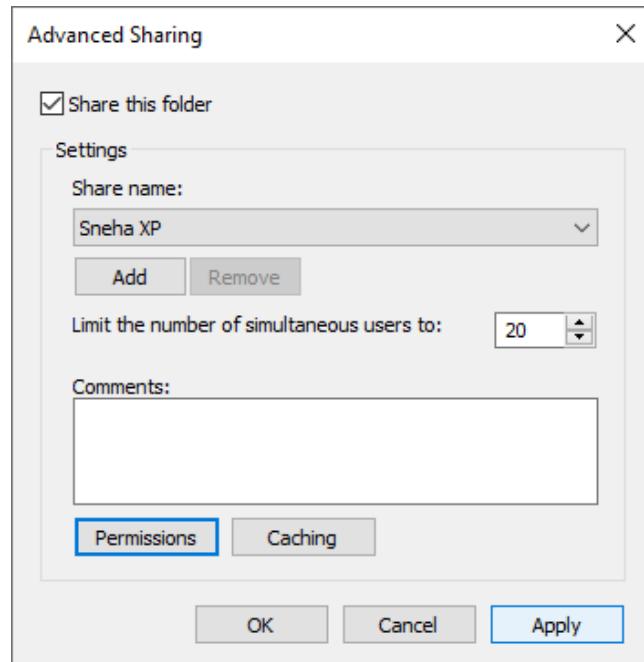
>> Click OK.



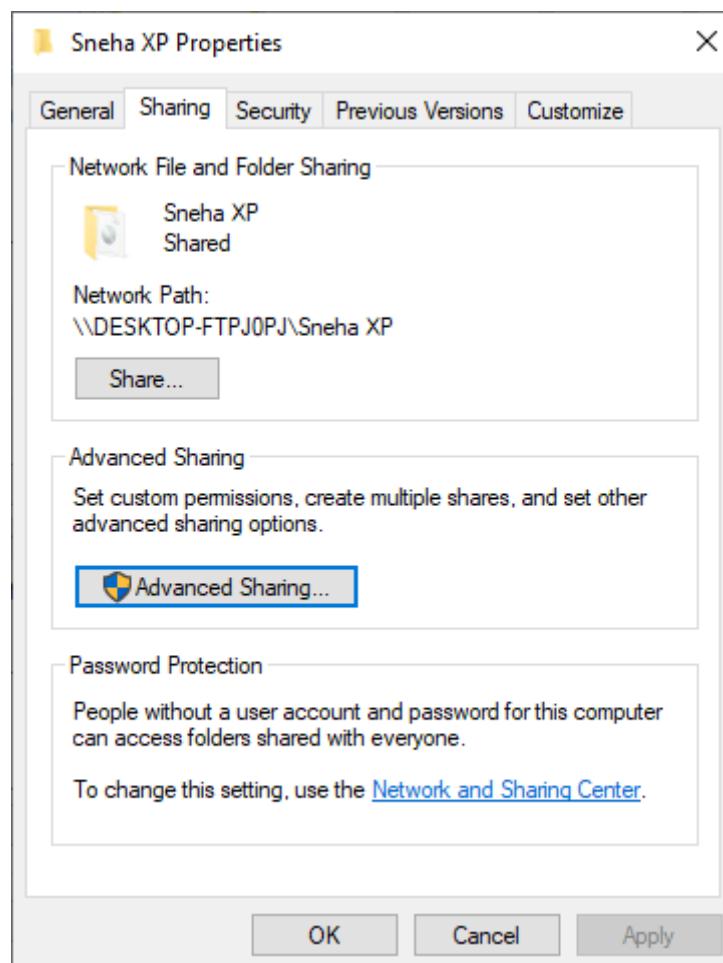
>> Check on full control and Change. Then click Apply and OK



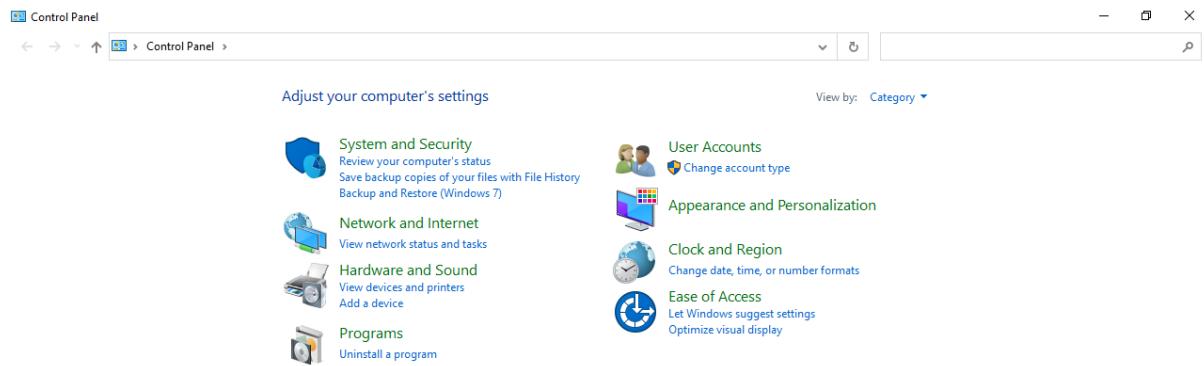
>> Click Apply and OK.



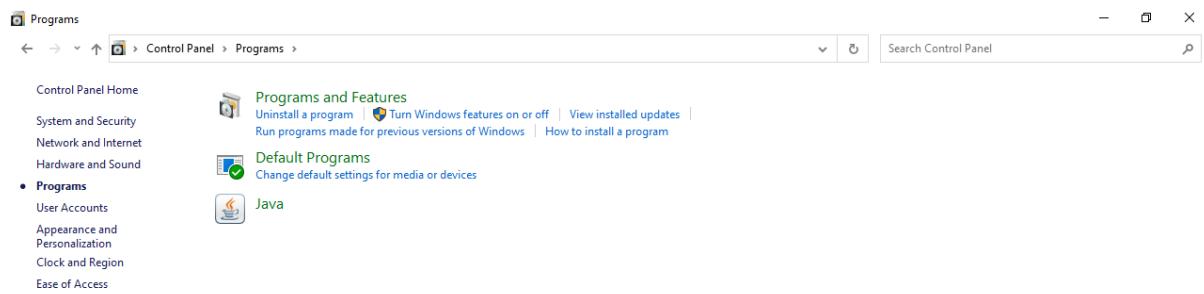
>> Click OK. Now the folder has become Shareable.



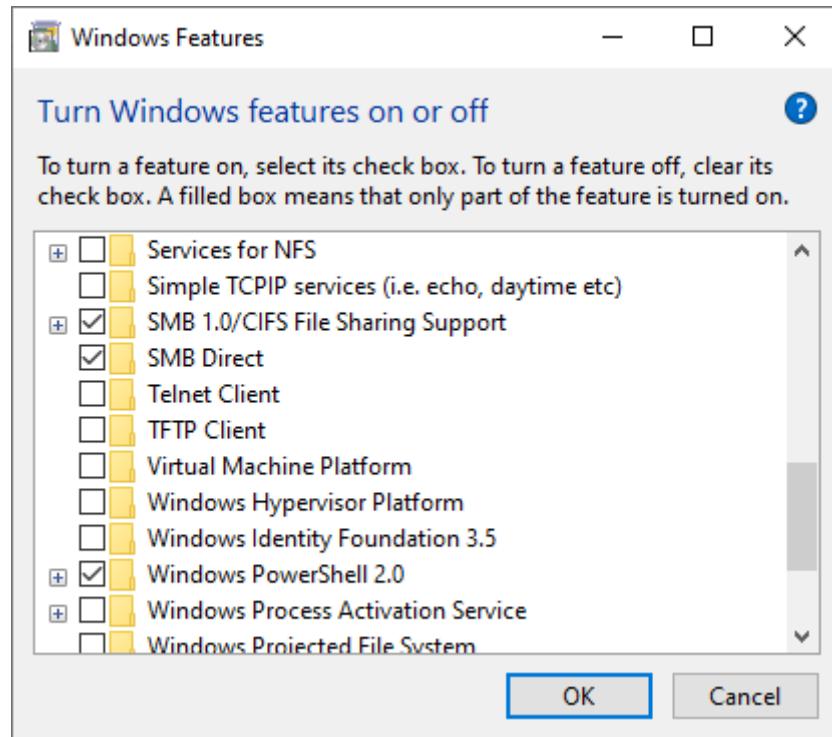
>> Now go to Control Panel and select Programs.



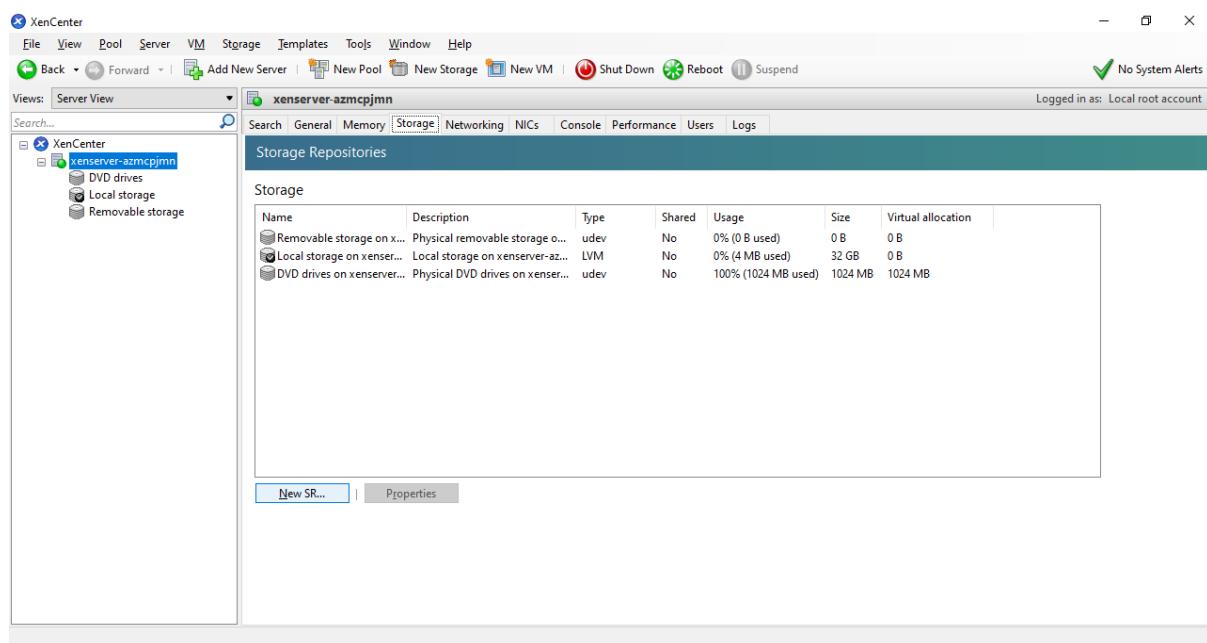
>> Go to Turn Windows features on and off.



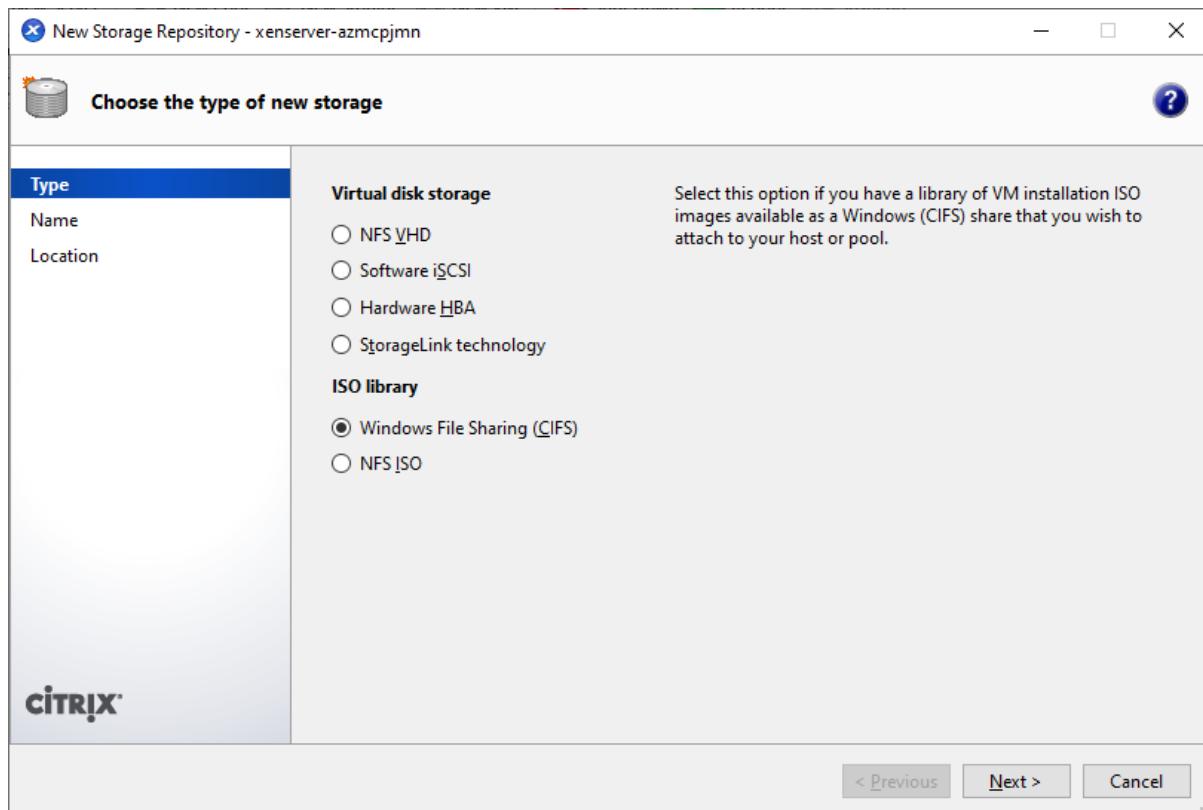
>> Check SMB 1.0/CIFS File Sharing Support and click OK.



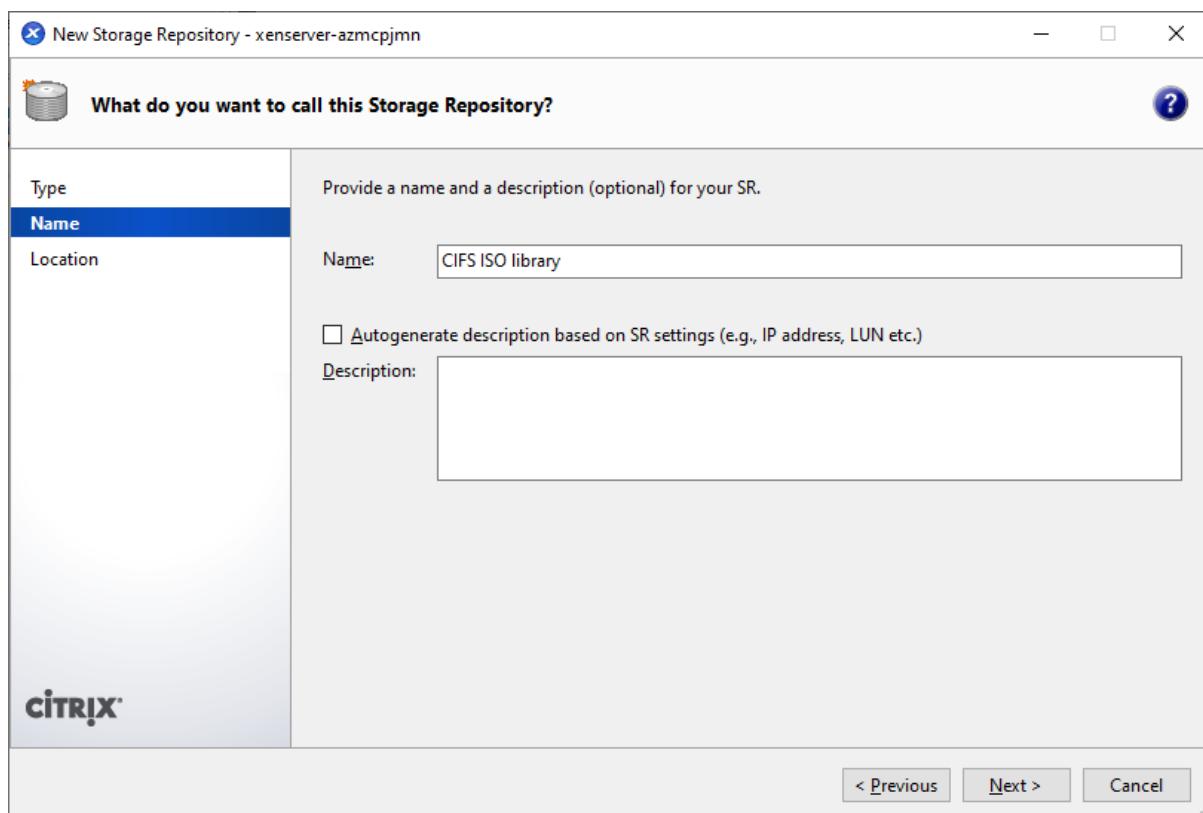
>> Now open XenCenter again and click on **Storage** and **New SR** to create new storage.



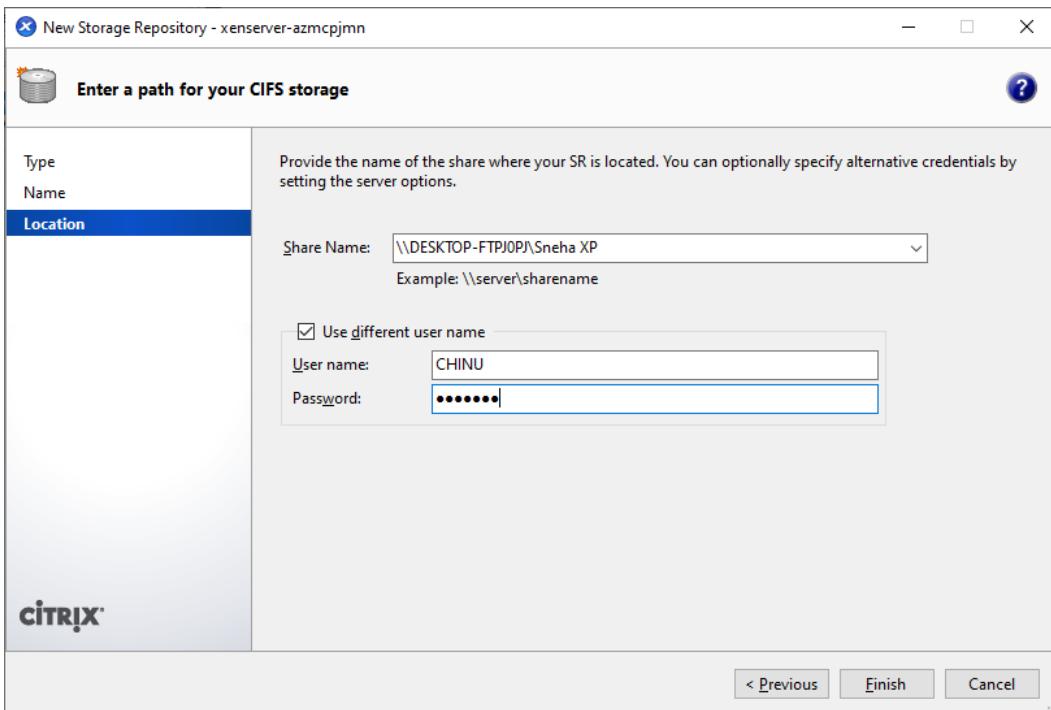
>> Select **Windows File Sharing (CIFS)** and Click Next.



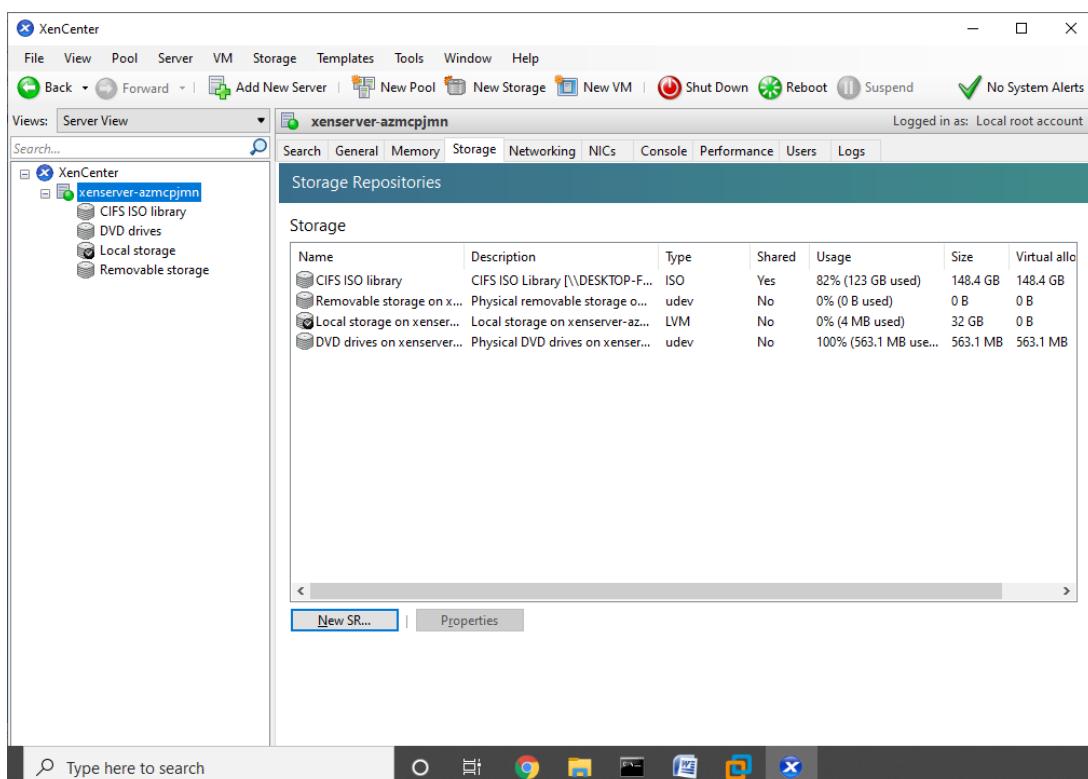
>> Uncheck **Auto generate description** and Click Next.



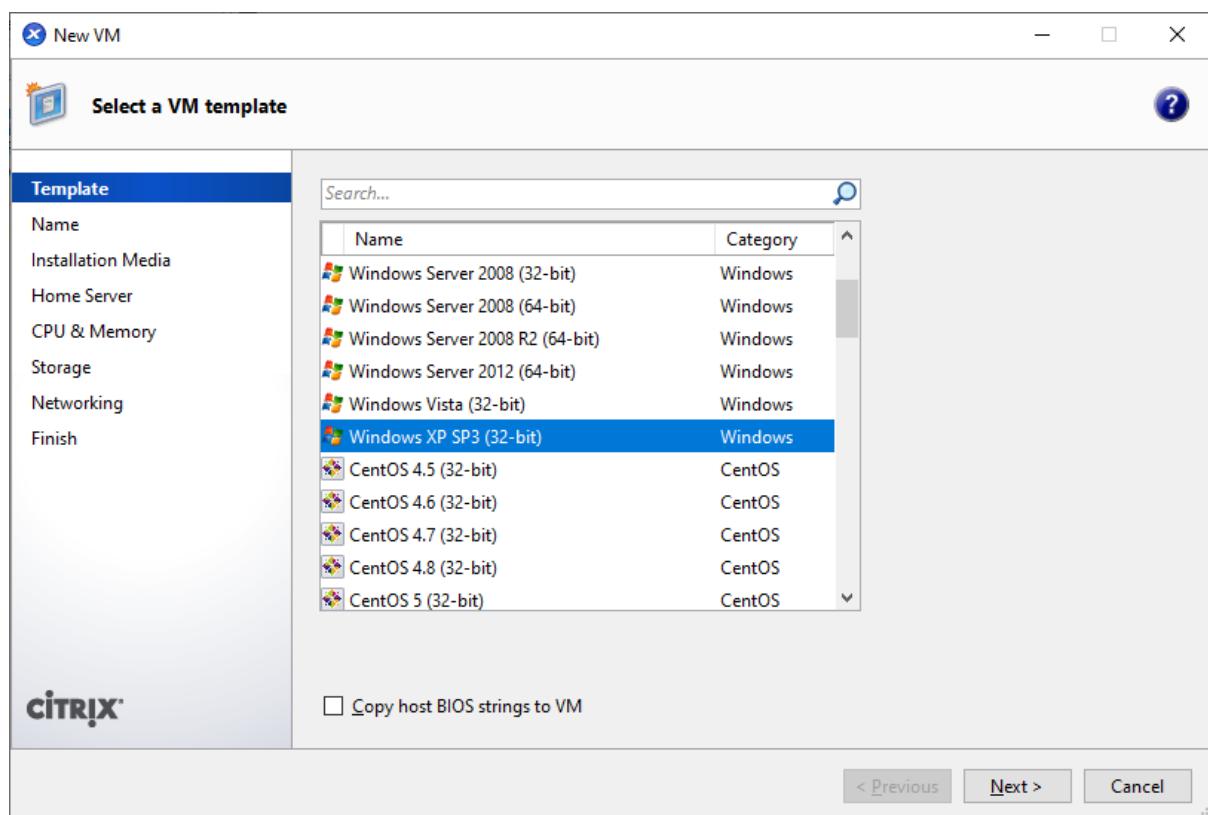
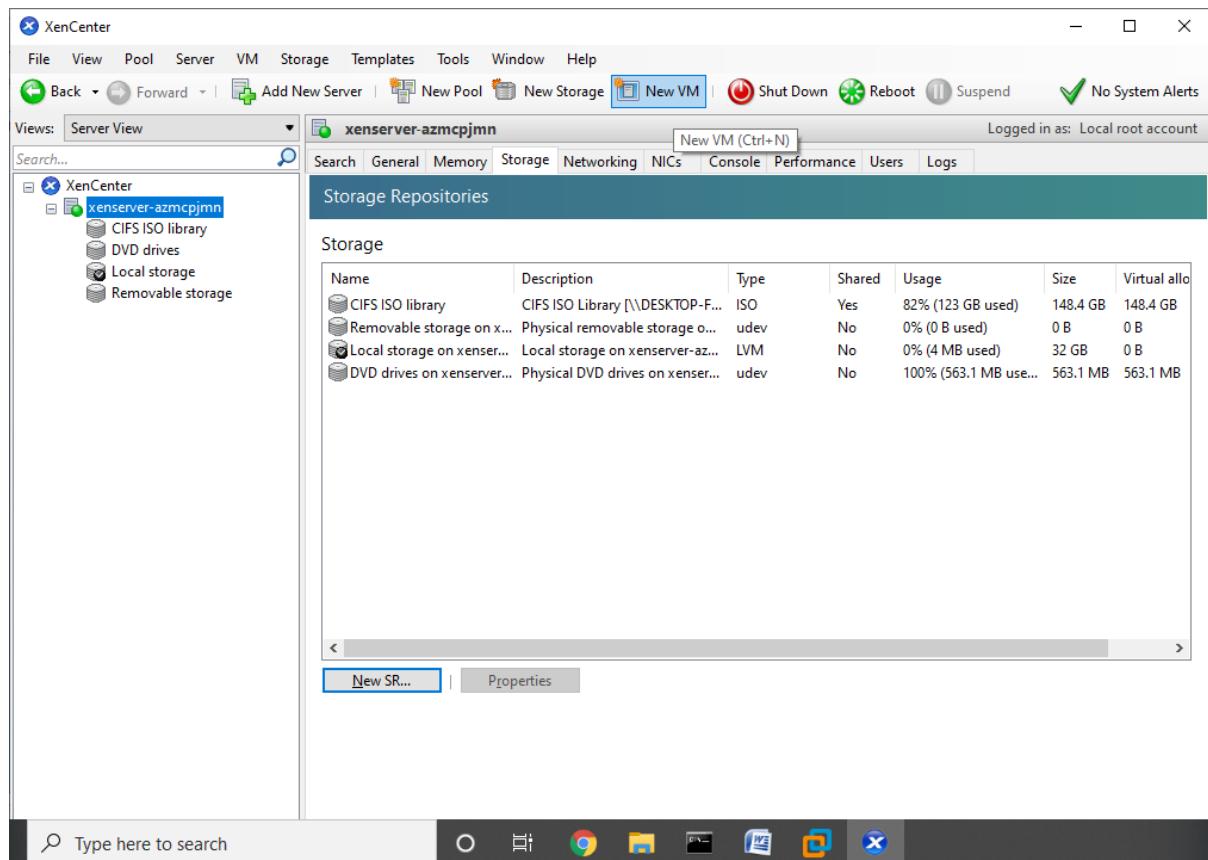
>> Enter the Network Path that we have noted down earlier (Network path: \\DESKTOP-FTPJ0PJ\Sneha XP) and Enter User Name and Password if you have it for login into your pc. (Else if not the it's Not required).



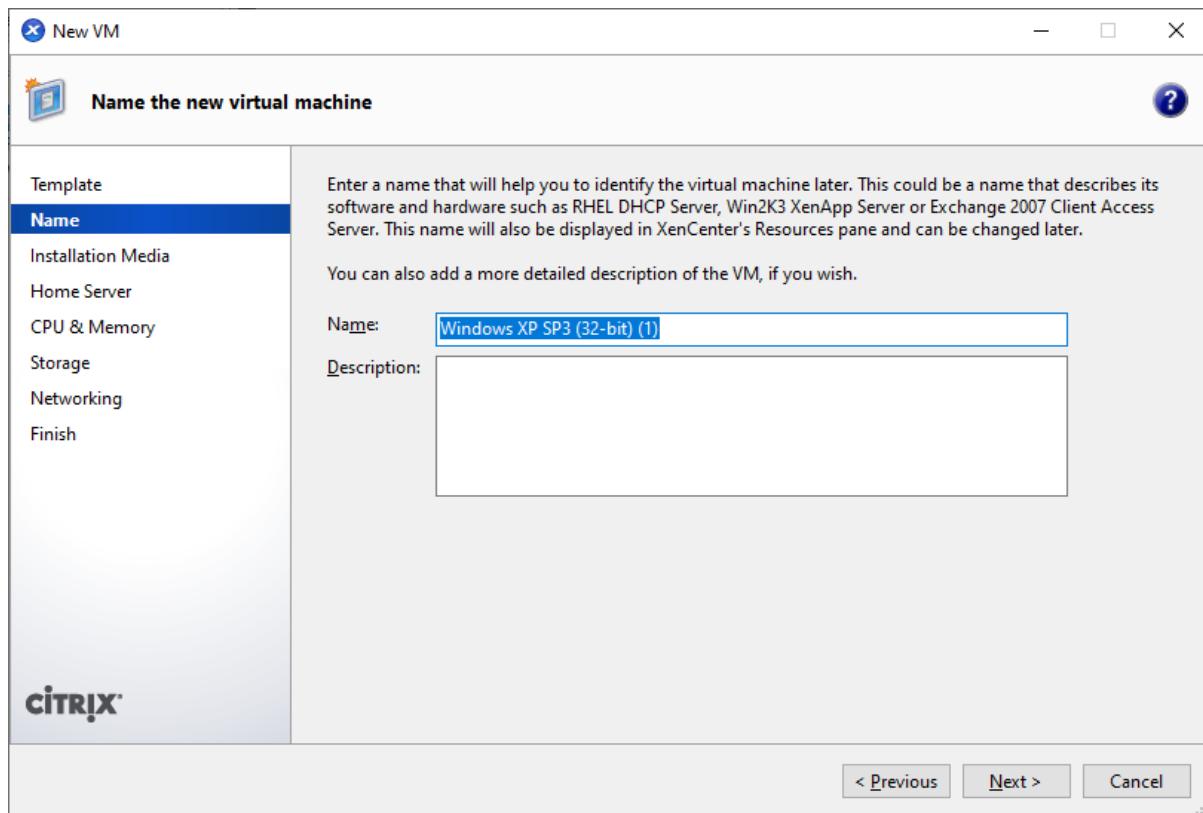
>> You can see that the CIFS ISO library is created.



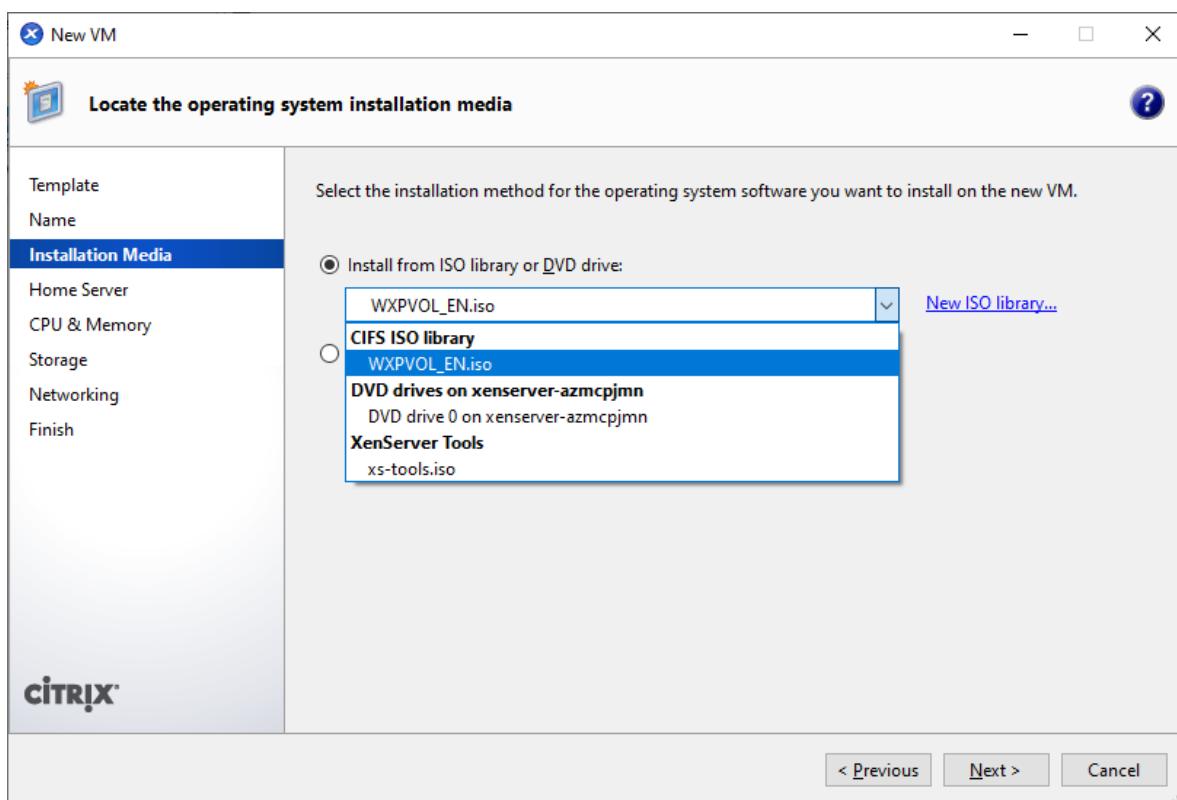
>> Click on New VM and Select Windows XP SP3 and Click Next.



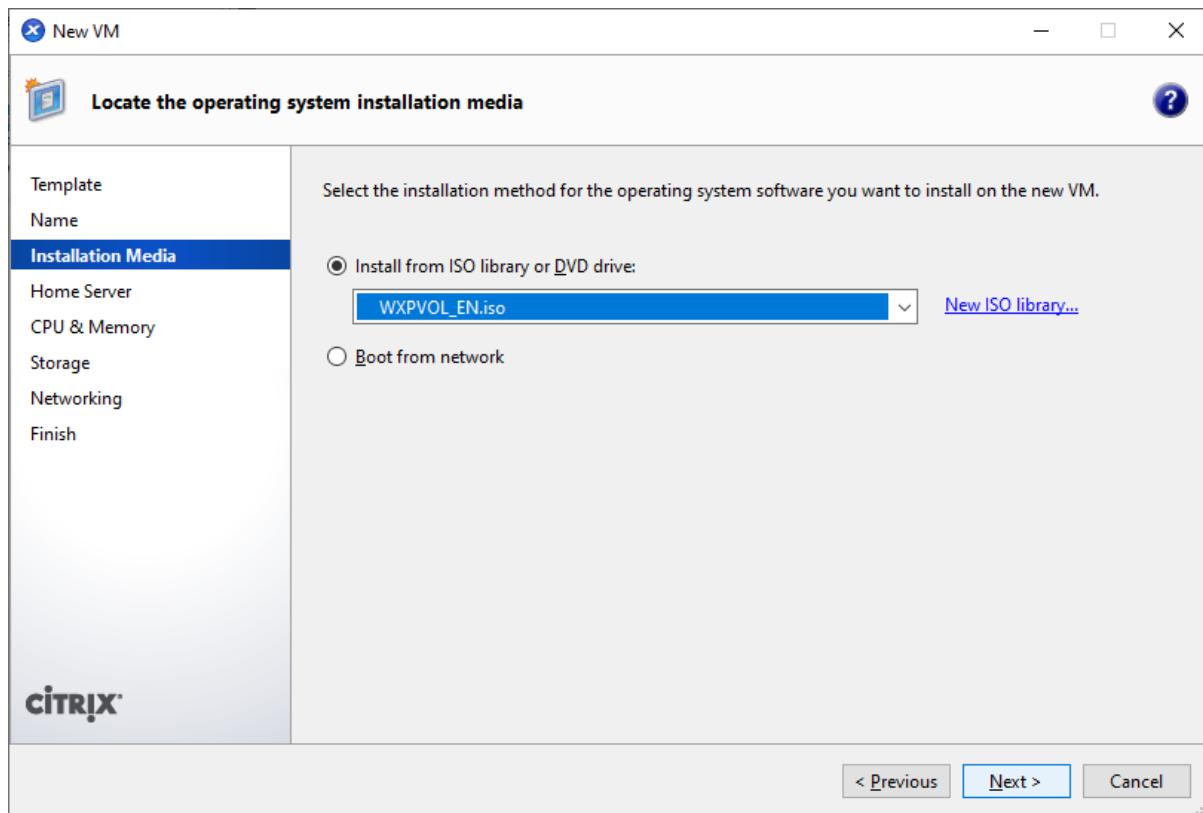
>> Enter name as desired and Click Next.



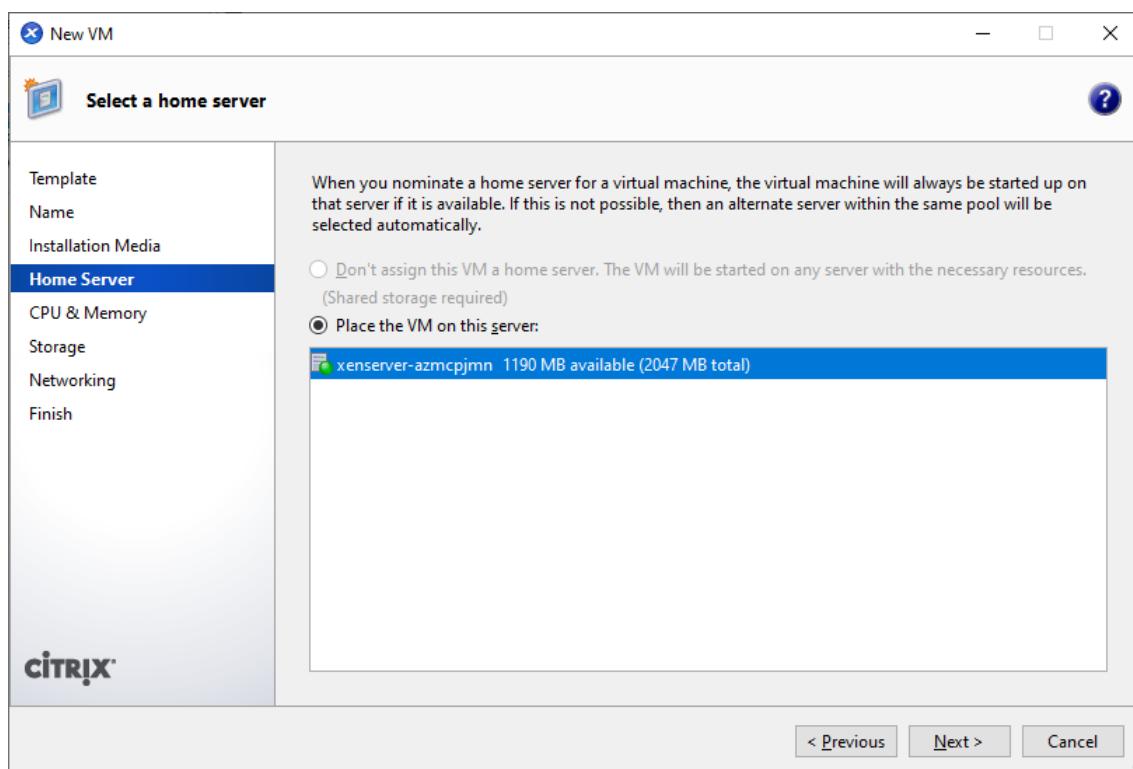
>> Click on drop down List Select the WXPVOL\_EN.iso file under CIFS ISO Library.



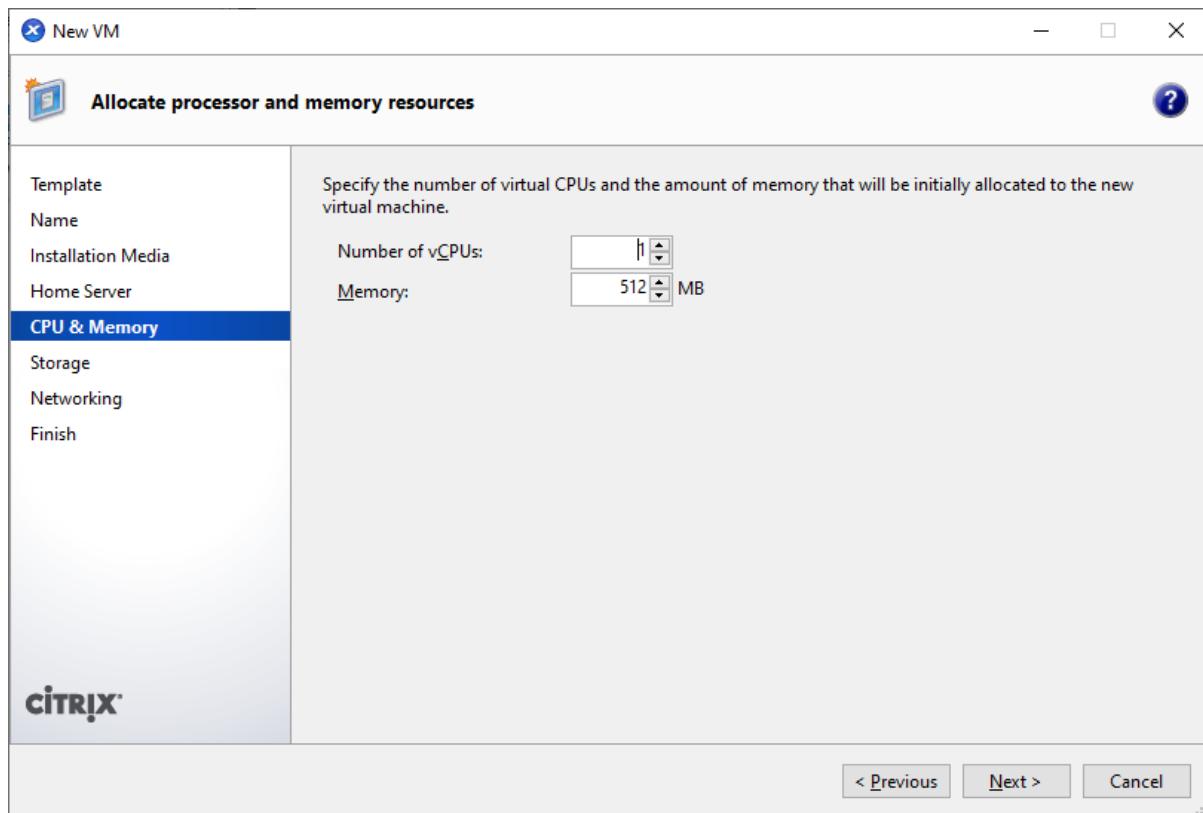
>> Click Next.



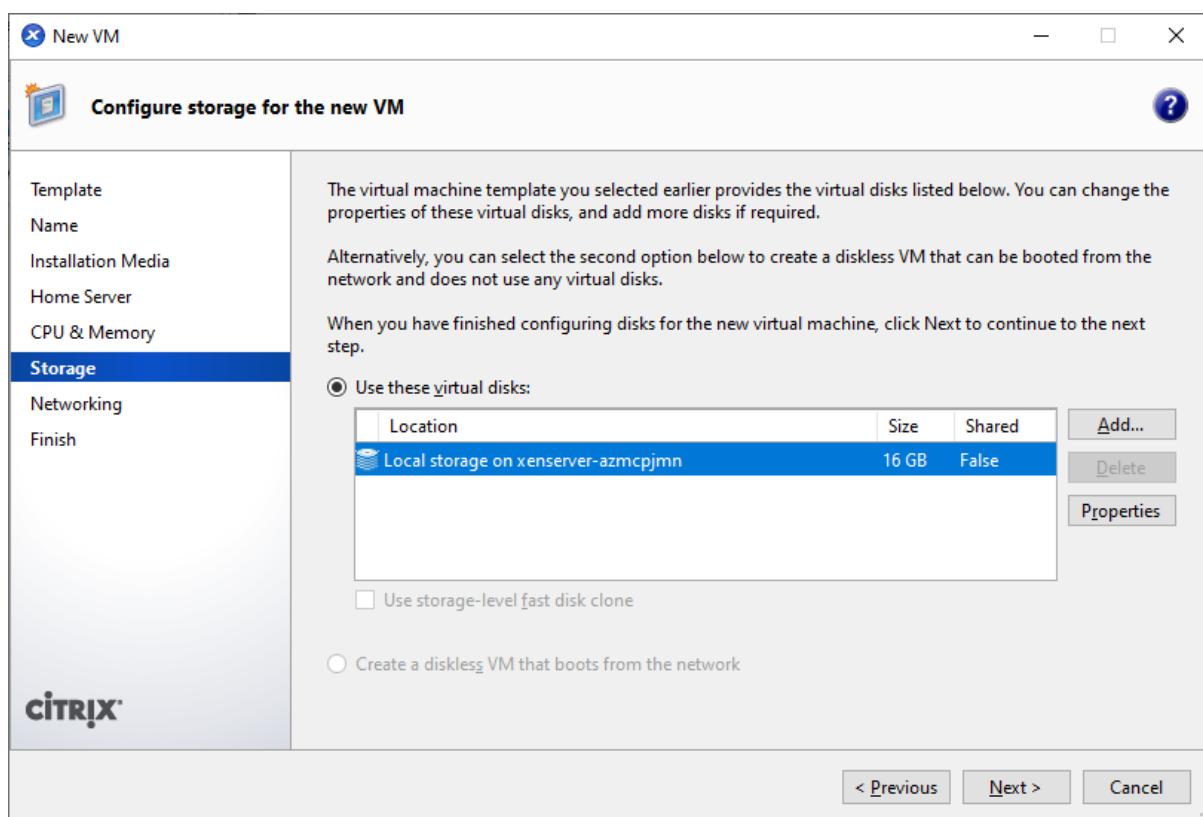
>> Select xenserver-azmcpjmn 1190 MB available (2047 MB total) and click Next.



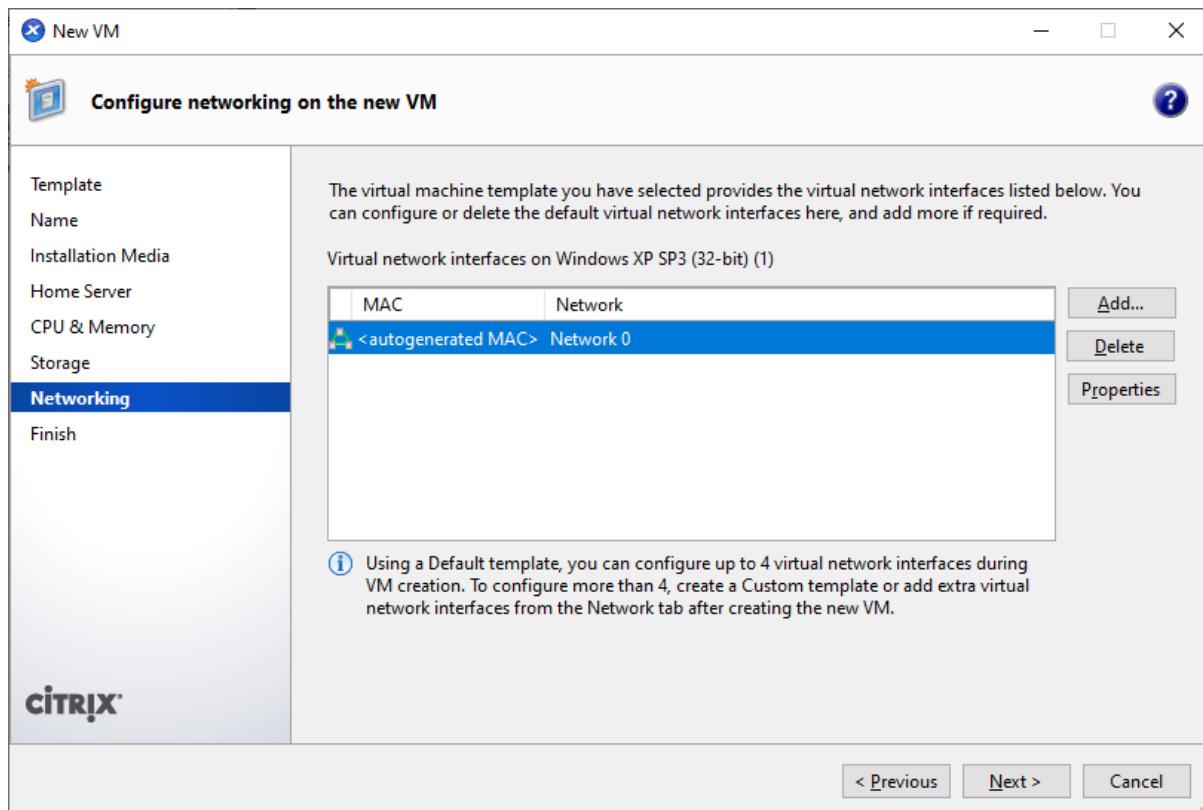
>> Click Next.



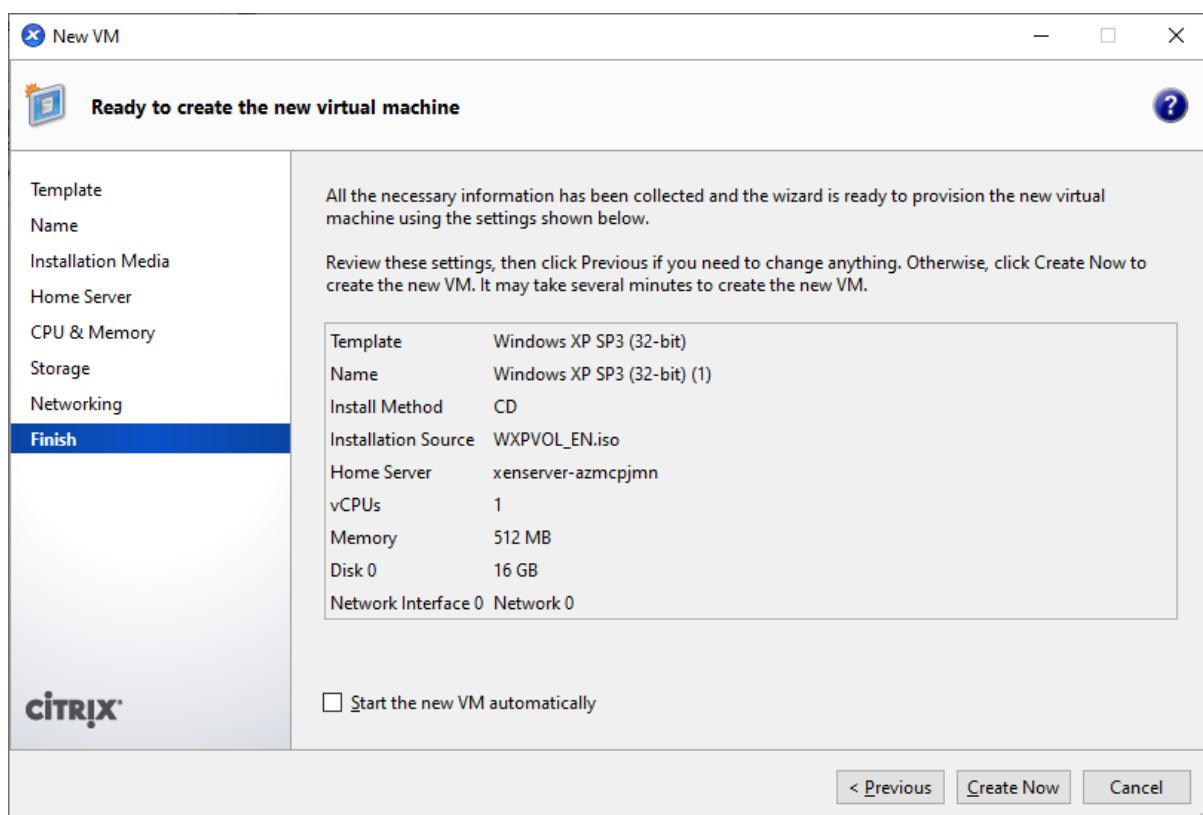
>> Click Next.



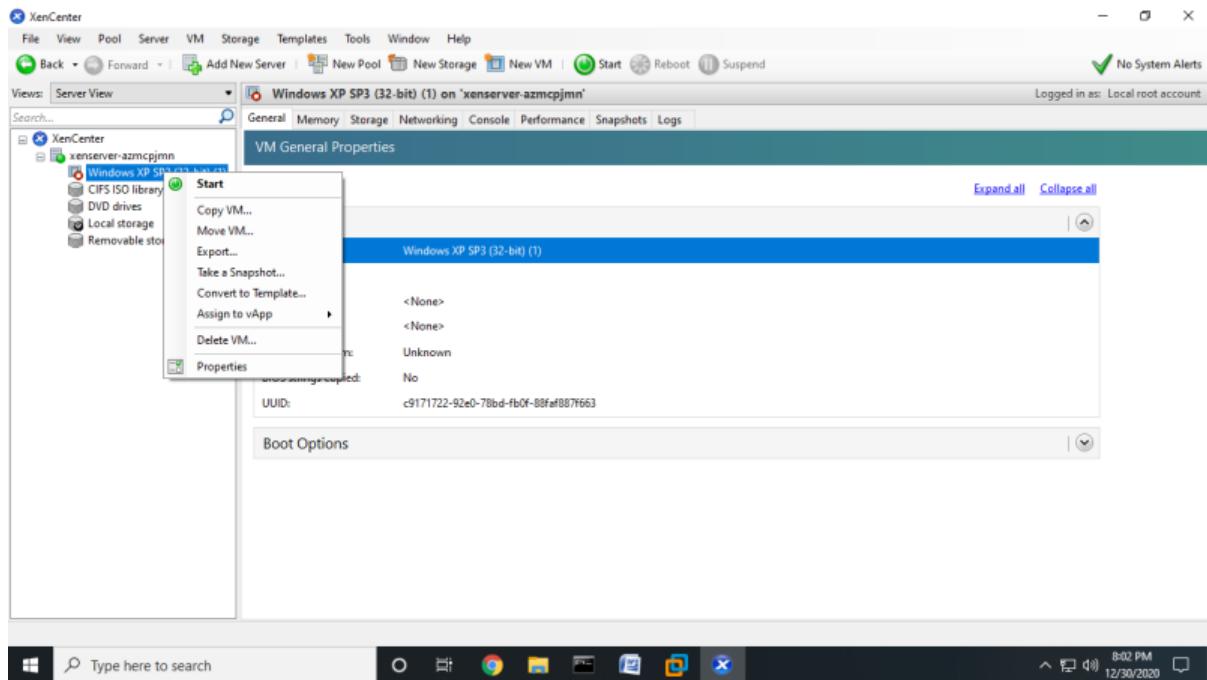
>> Click Next.



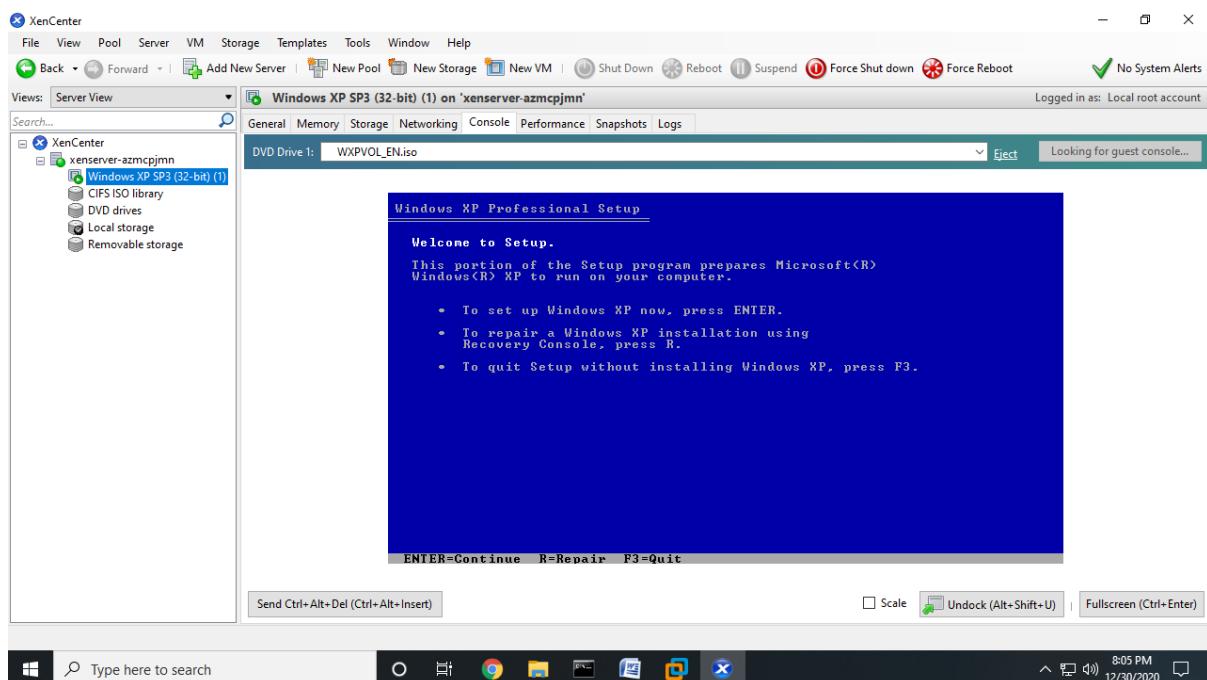
>> Uncheck – Start the new VM and click on Create New VM.



>> Right click on Windows XP SP3 and select Start.



>> Go to Console to see the final Output.



## **PRACTICAL: 4**

### **Develop application using Google App Engine (GAE)**

**Softwares Required :-**

- **Eclipse IDE for Enterprise Java Developers**
- **Google Cloud Tools for Eclipse**

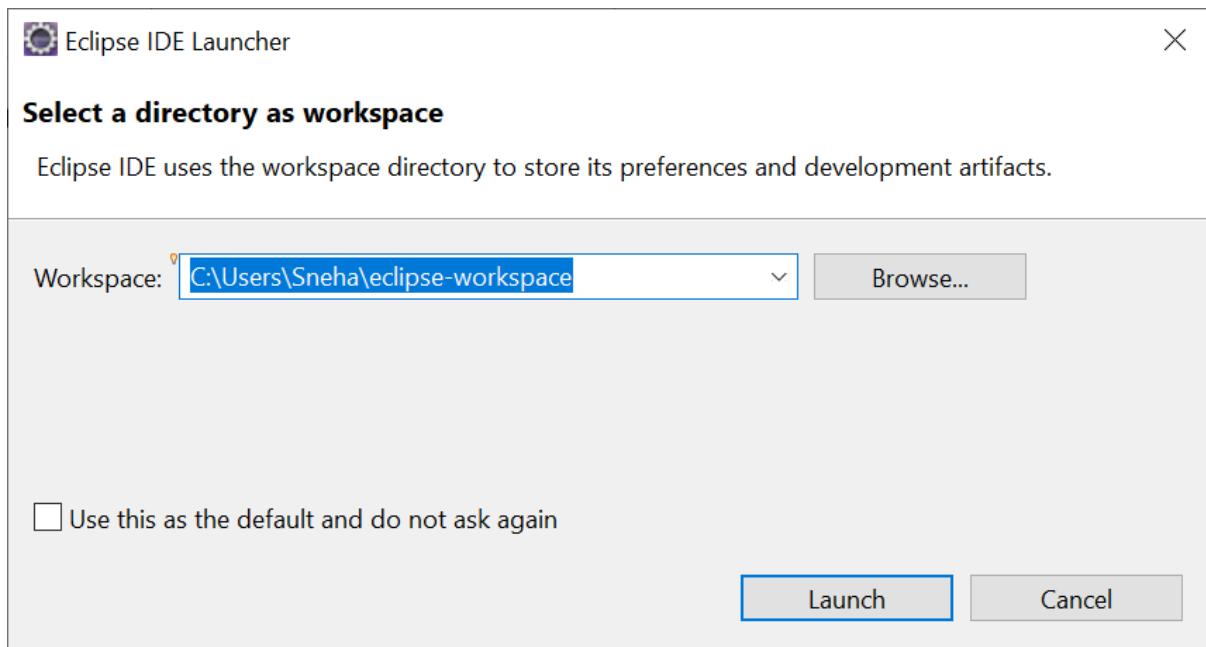
**Steps:**

>> Download Eclipse IDE for Enterprise java Developers and install.

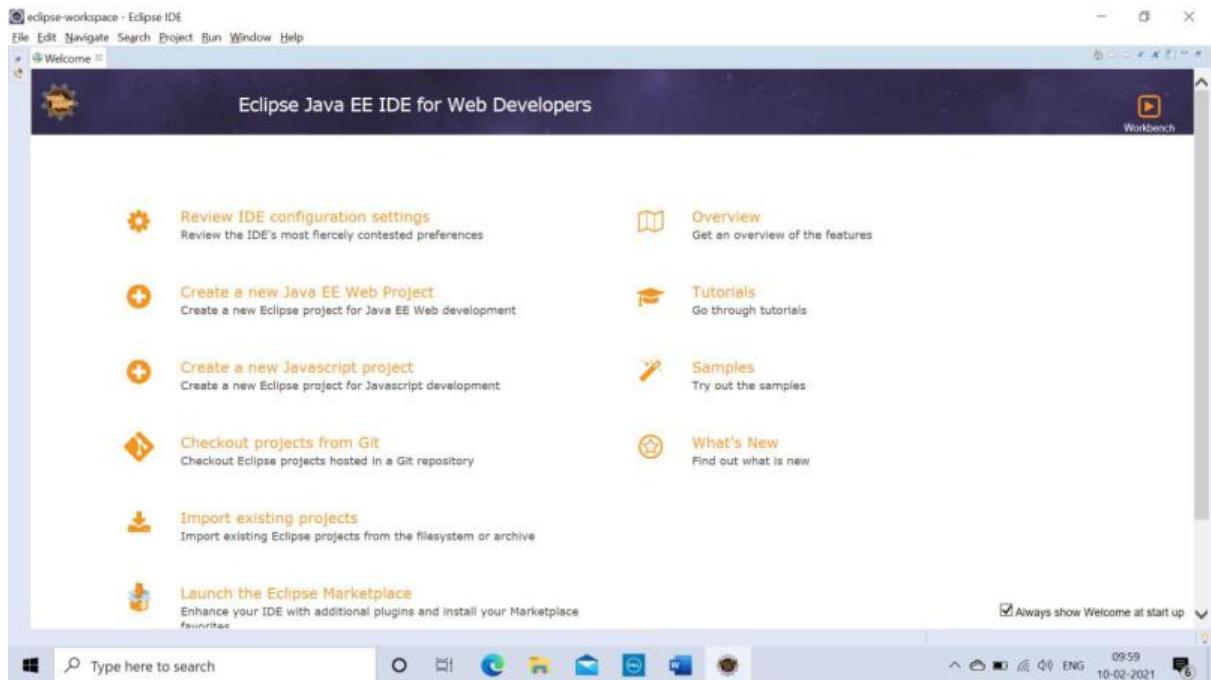
>> Open Eclipse IDE and **Browse** your **Workspace** and click on it. You can use the default workspace as well.



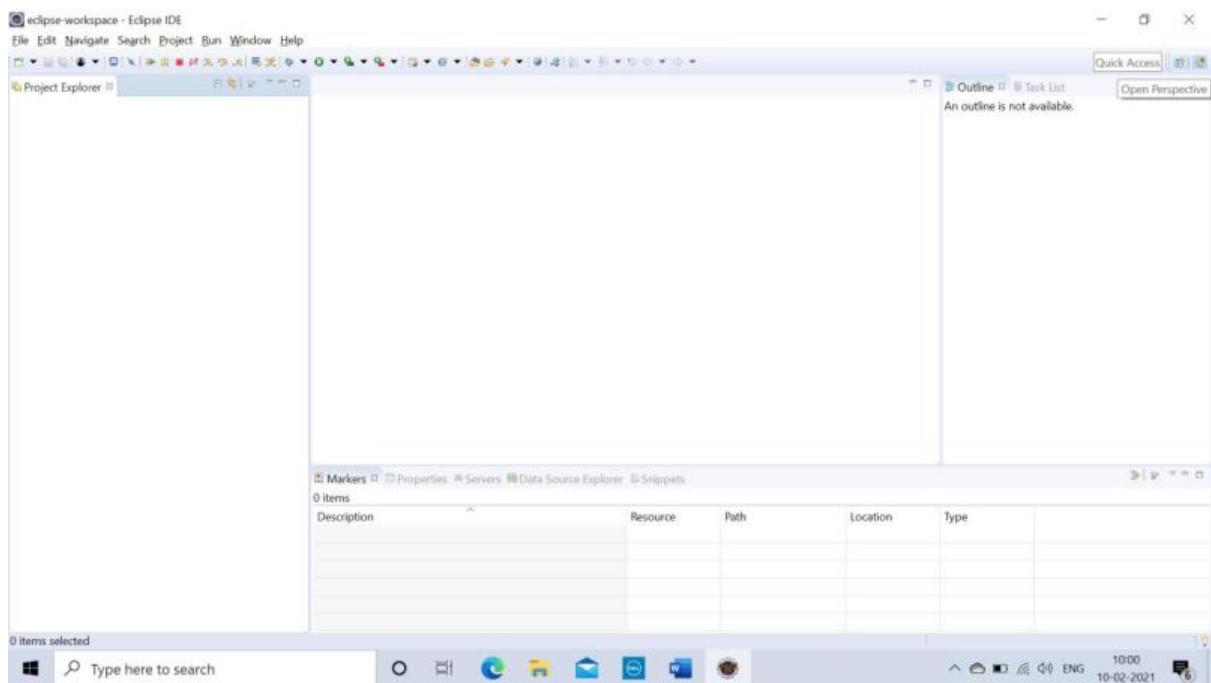
>> And click on **Launch**.



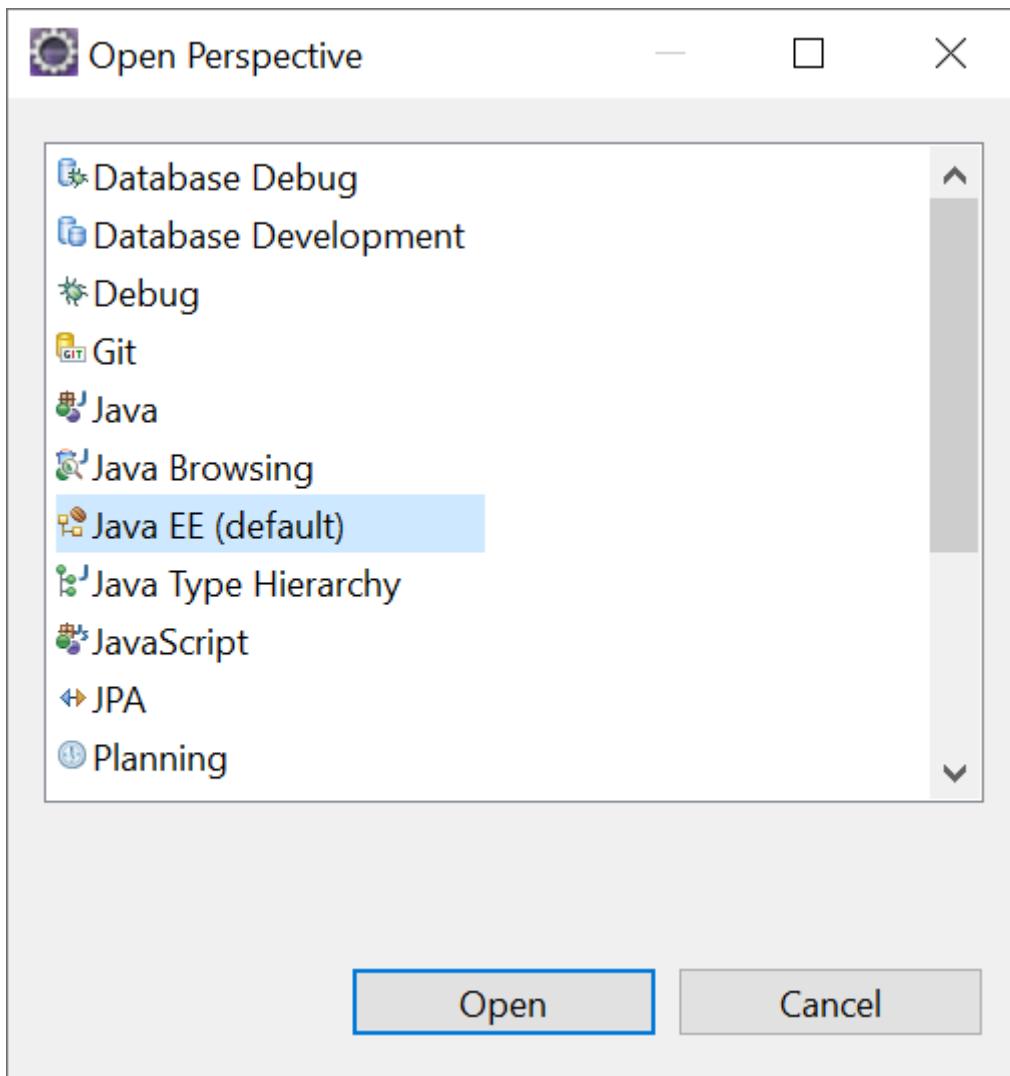
>> Following window will appear.



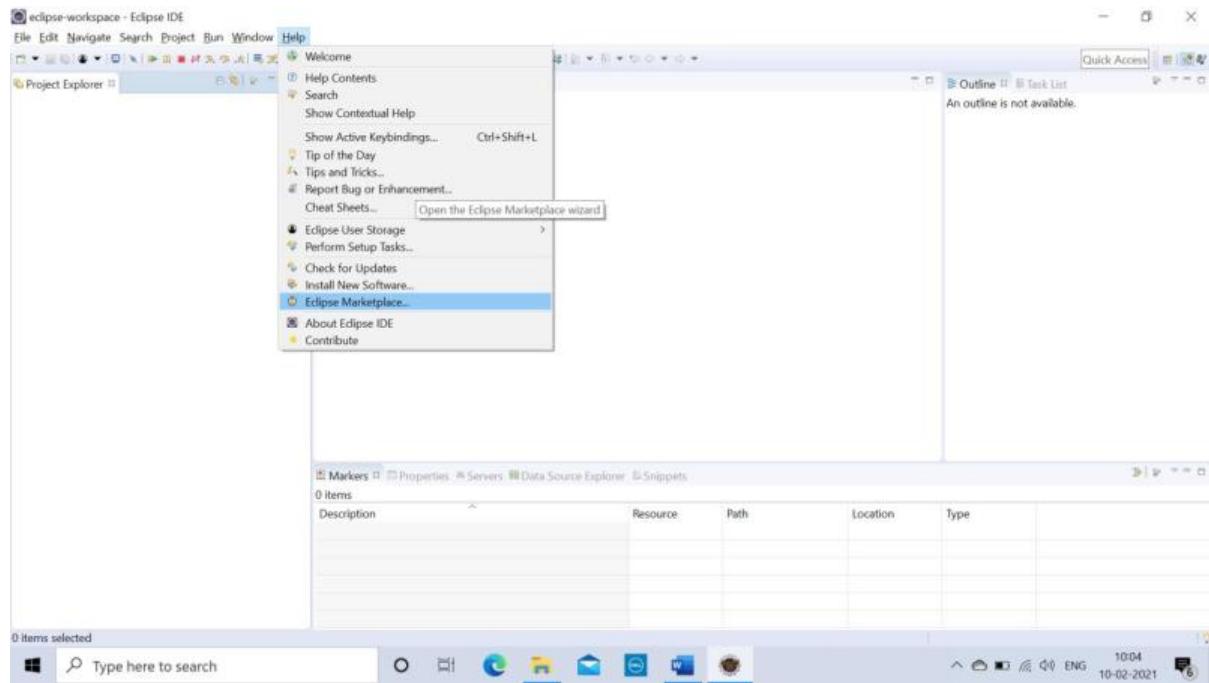
>> Close the Welcome window. And click on '**Open Perspective**' option in the right corner.



>> Choose '**Java EE (Default)**'. And click on **Open**.



>> Now click on 'Help' and choose '**Eclipse Marketplace**' option.



>> In Find Search Box Search for '**Google Cloud Tools For Eclipse**'. And click on **Install**.

Eclipse Marketplace

**Eclipse Marketplace**

Select solutions to install. Press Install Now to proceed with installation.  
Press the "more info" link to learn more about a solution.

Search Recent Popular Favorites Installed  Giving IoT an Edge

Find: Google cloud tools for eclipse  All Markets  All Categories 

**Google Cloud Tools for Eclipse 1.8.3**

 Cloud Tools for Eclipse is a Google-sponsored open source plugin that supports the Google Cloud Platform. Cloud Tools for Eclipse enables you to create, import,...  
[more info](#)

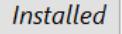
by [Google LLC](#), Apache 2.0  
[Google Cloud Platform](#) [dataflow](#) [GCP](#) [app engine](#) [google](#)

 129  Installs: **90.3K** (1,184 last month) 

**Eclipse Tools for Cloud Foundry 1.2.0**

 This listing installs support into Eclipse Tools for Cloud Foundry, the industry's first open platform as a service. A Java 8 Execution Environment is required.... [more info](#)

by [Pivotal](#), [IBM](#), EPL  
[spring](#) [Cloud](#) [paas](#) [java](#) [paas](#) [cloudfoundry](#)

 145  Installs: **30.2K** (216 last month) 

**Oracle Cloud Tools**

**Marketplaces**





>> Click on **Confirm**.



Eclipse Marketplace



## Confirm Selected Features

Press Confirm to continue with the installation. Or go back to choose more solutions to install.

- ✓ Google Cloud Tools for Eclipse 1.8.3 <https://dl.google.com/eclipse/google-cloud-eclipse/stable>,
- ✓ Google Cloud Platform for Eclipse (required)
- ✓ YEdit Feature

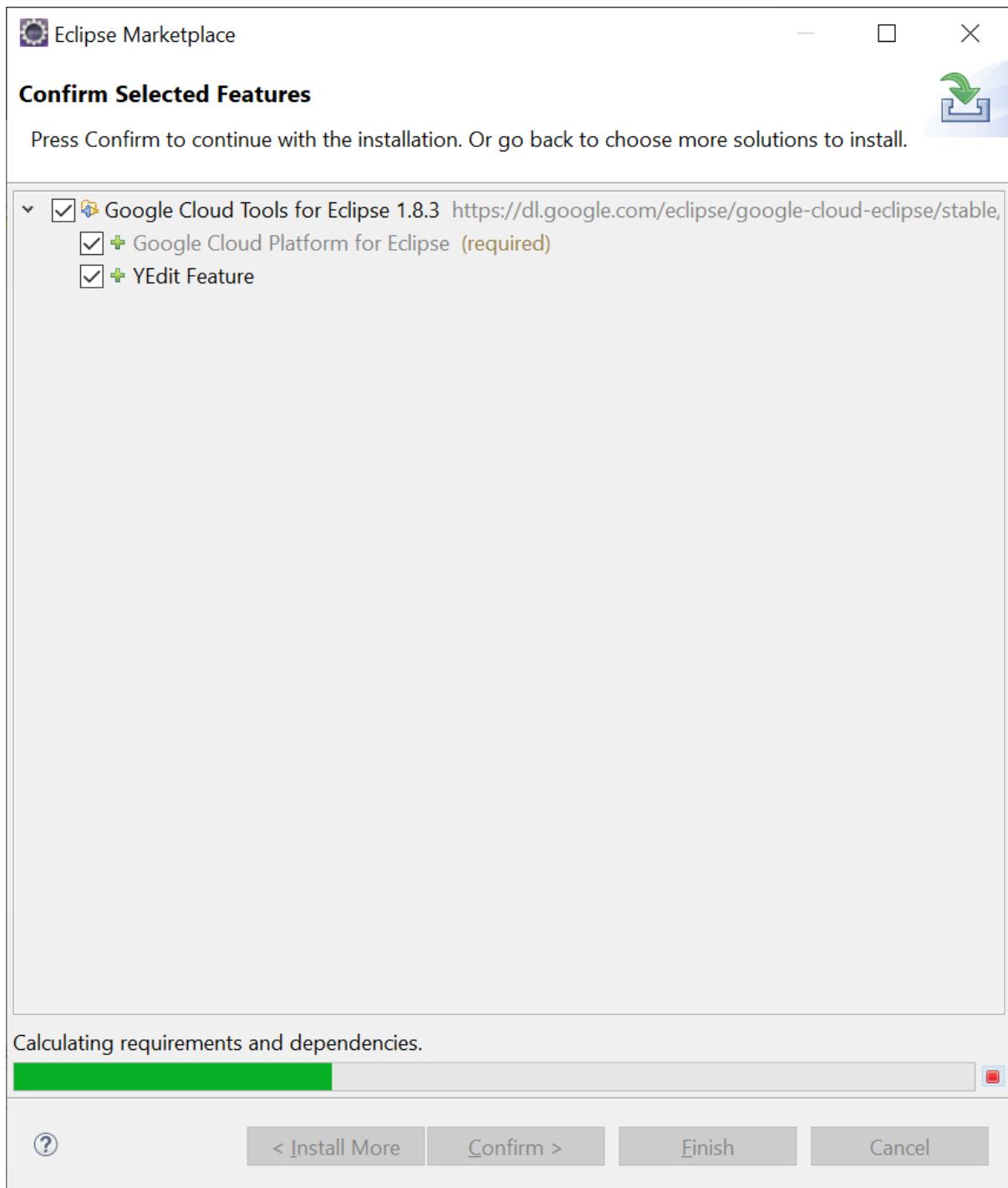


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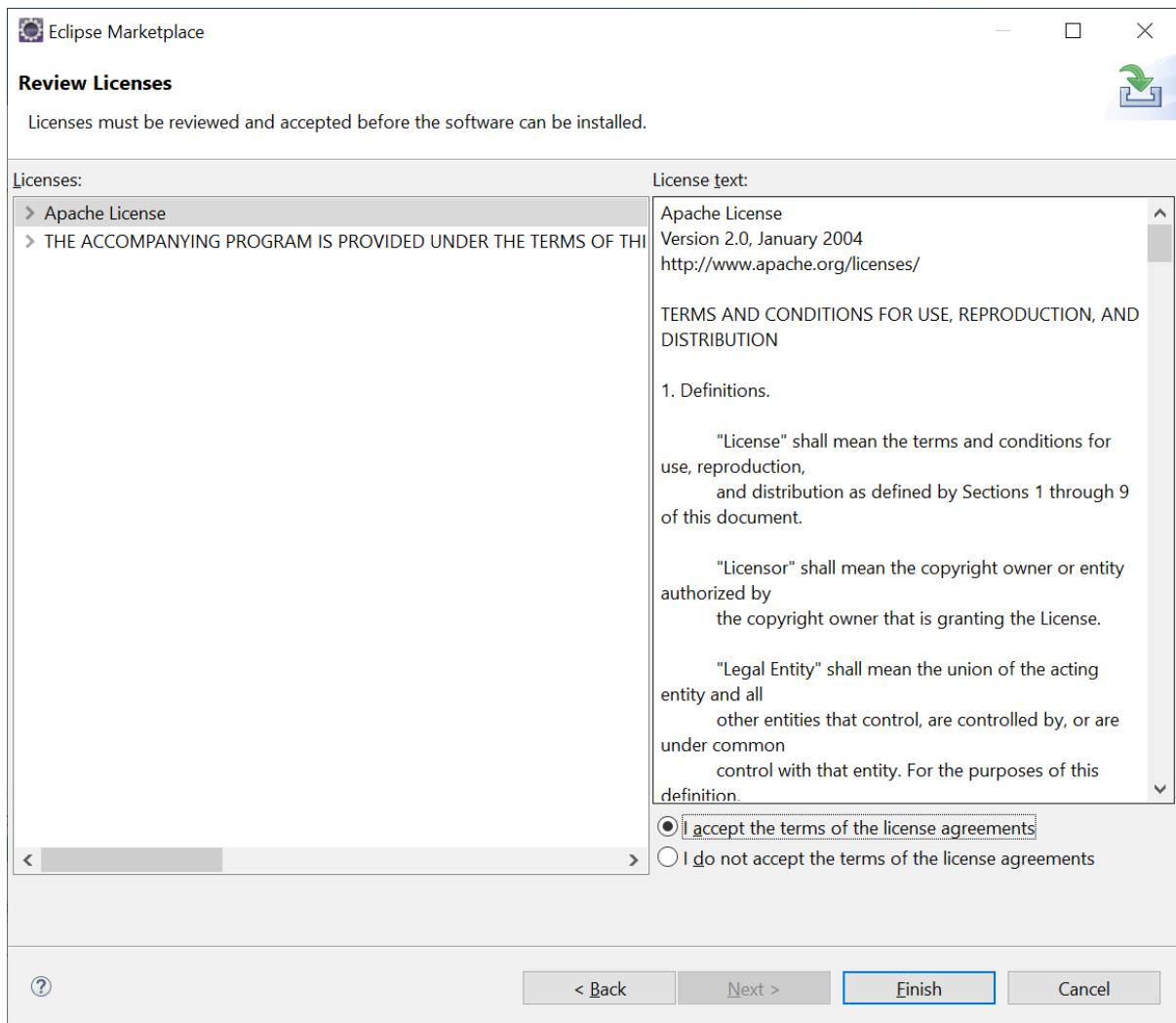
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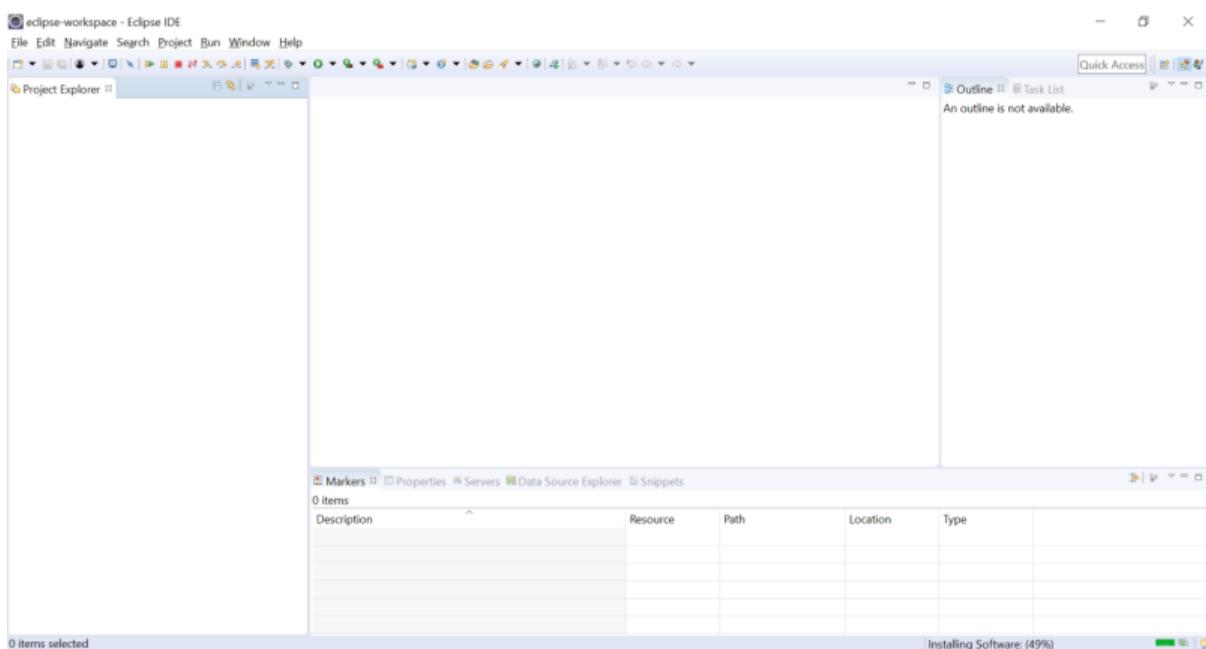
Cancel



>> Accept the terms of the license agreement. And click on **Finish**.

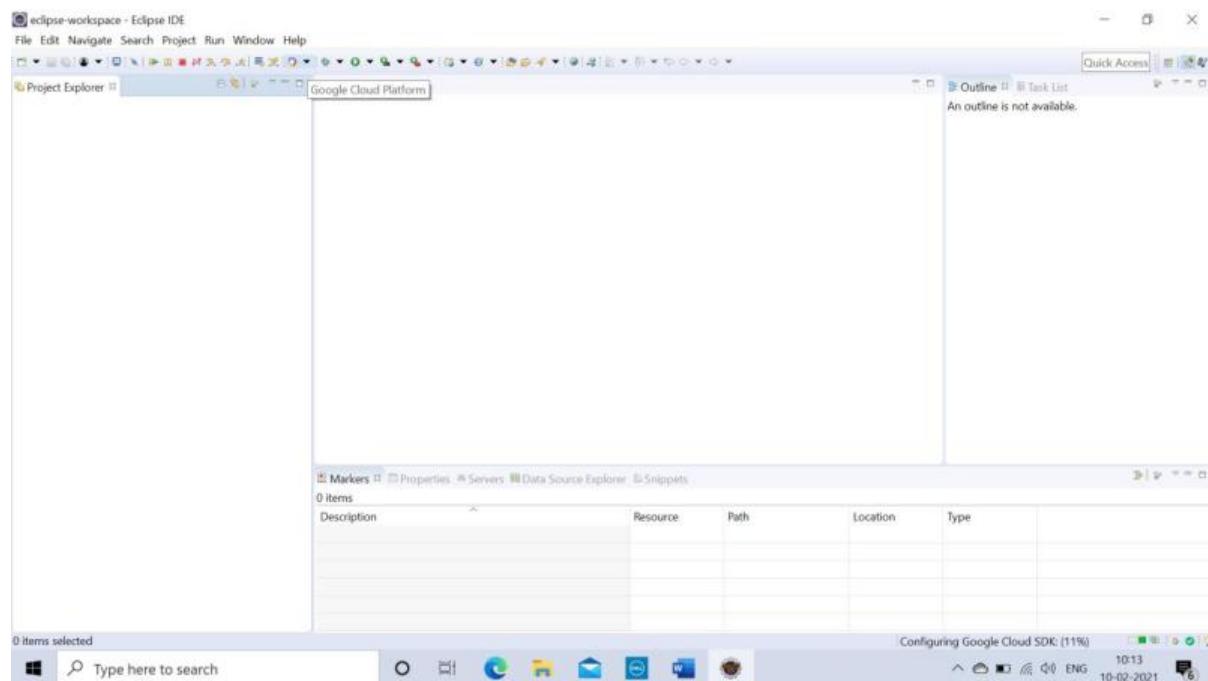


>> Software will start to install. You will get to see it in the right side bottom corner.

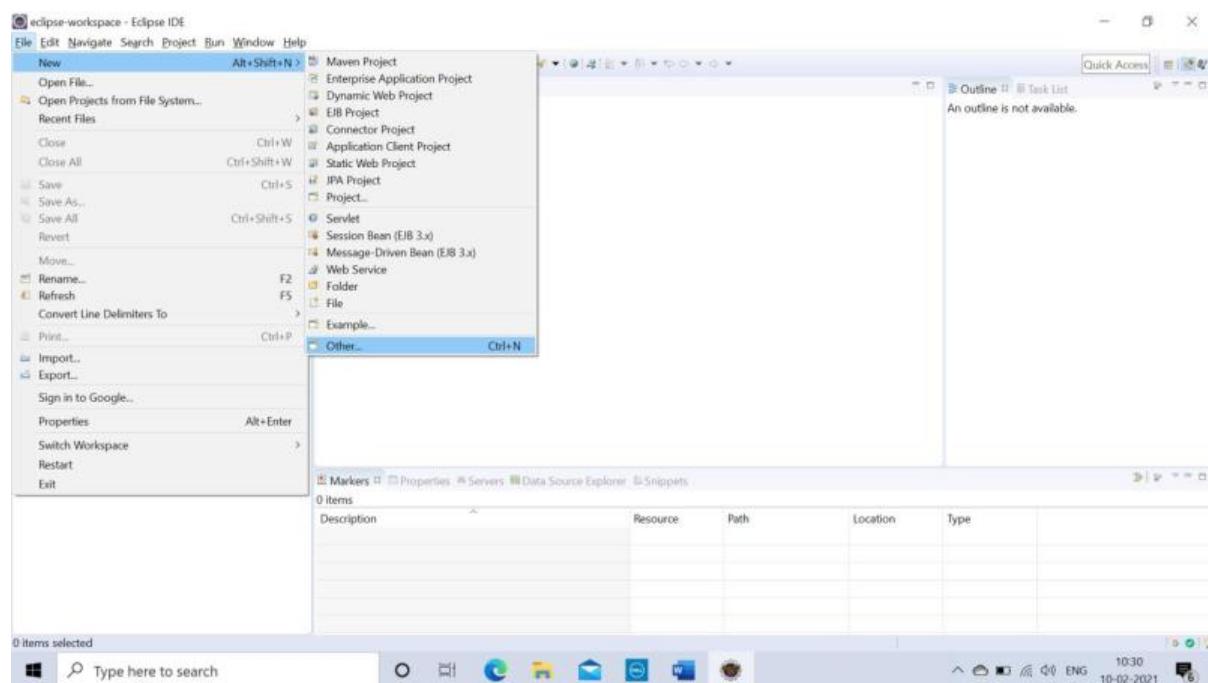


>> Now , restart the Eclipse IDE. After restarting you will get to see the '**Google Cloud Platform**' option in the menu bar.

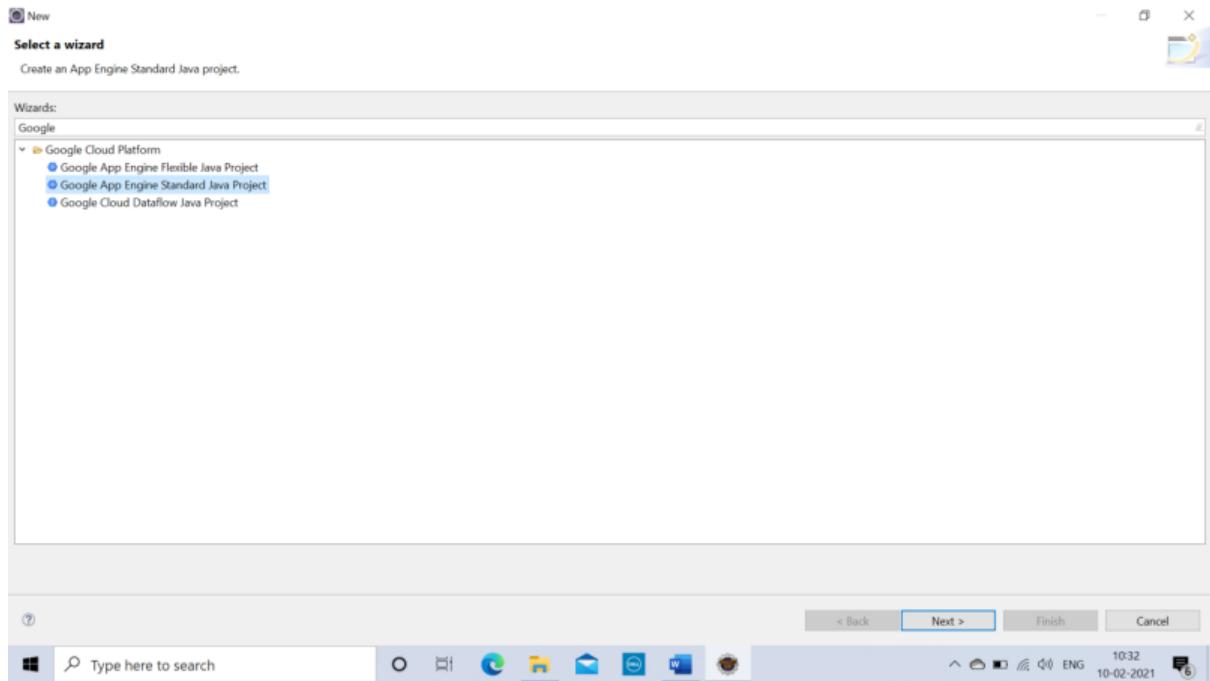
>> And also at the right side bottom corner we will get to see '**Configuring Google Cloud SDK**'. Let that be complete.



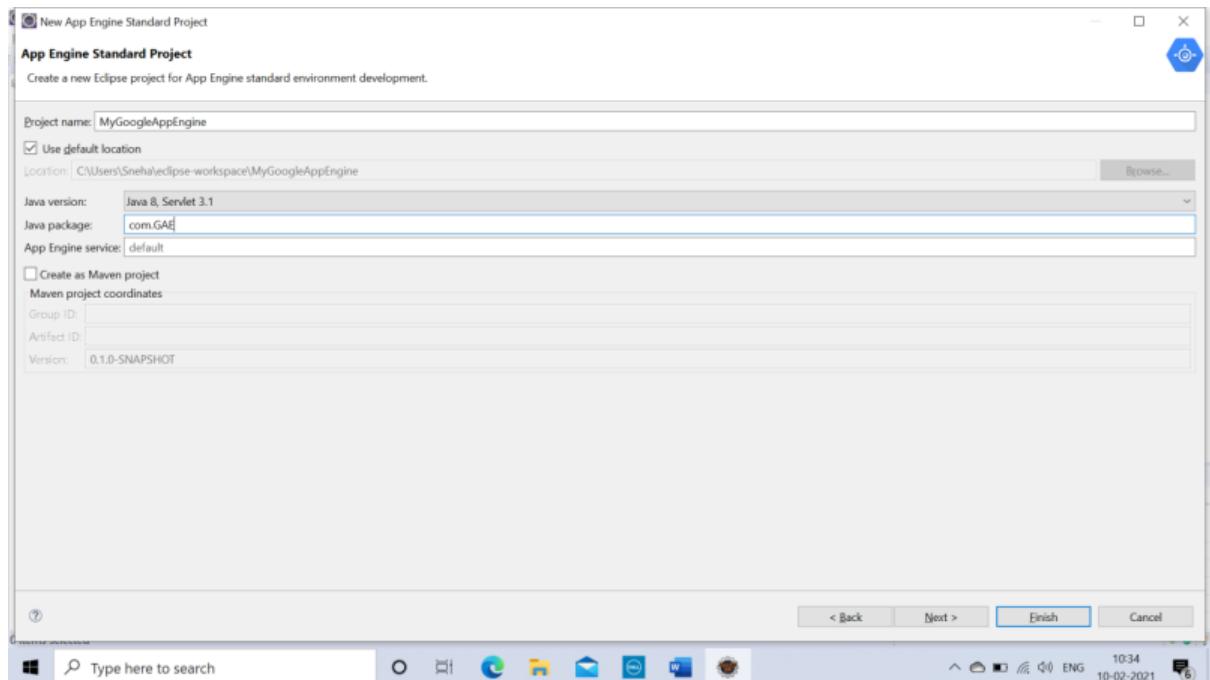
>> Now click on **File >> New >> Other**.

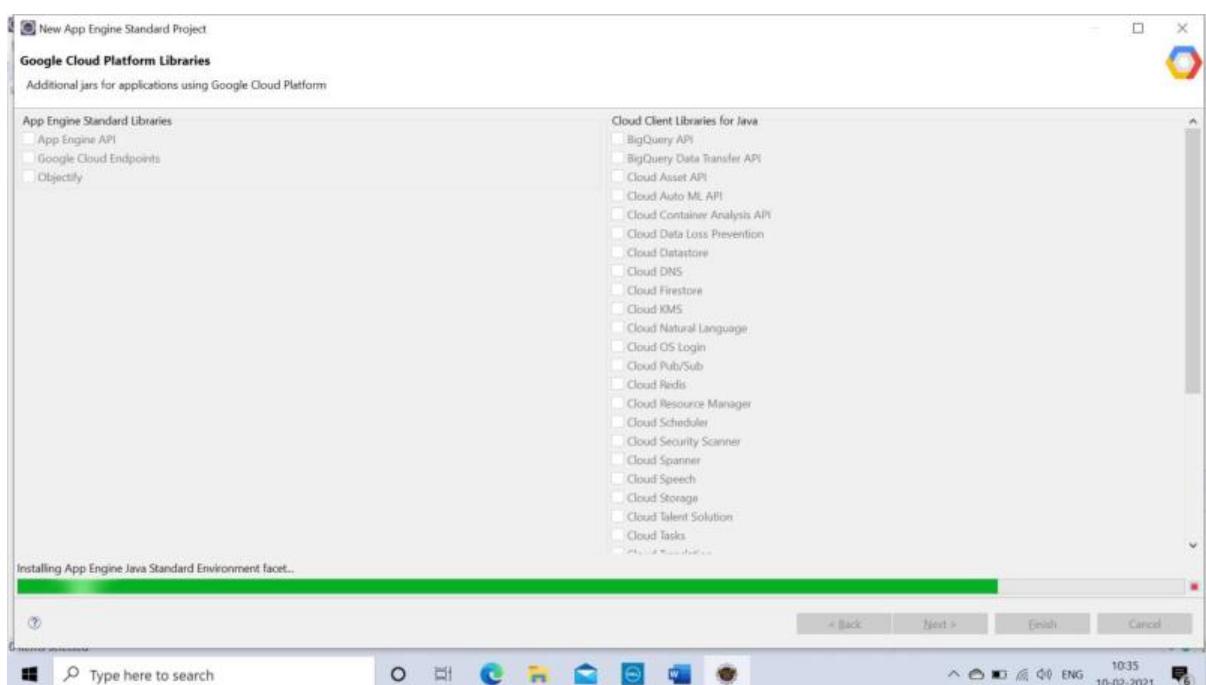
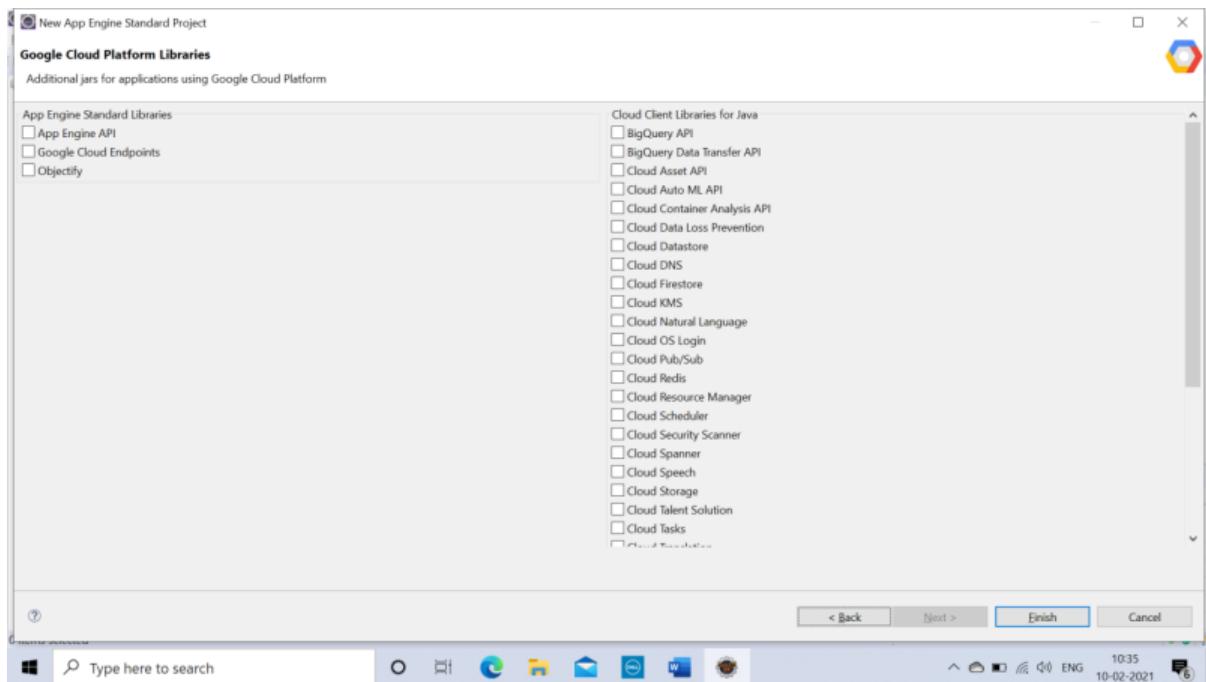


>> Search ‘Google’ and select ‘Google App Engine Standard Java Project’. And click on **Next**.



>> Enter **Project Name** and **Package Name**. Click on **Next**, and then click on **Finish**.





```

eclipse-workspace - MyGoogleAppEngine/src/main/java/com/GAE/HelloAppEngine.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Project Explorer MyGoogleAppEngine
HelloAppEngine.java
1 package com.GAE;
2
3 import java.io.IOException;
4
5 @WebServlet(
6     name = "HelloAppEngine",
7     urlPatterns = {"/*hello"})
8 )
9
10 public class HelloAppEngine extends HttpServlet {
11
12     @Override
13     public void doGet(HttpServletRequest request, HttpServletResponse response)
14         throws IOException {
15
16         response.setContentType("text/plain");
17         response.setCharacterEncoding("UTF-8");
18
19         response.getWriter().print("Hello App Engine!\r\n");
20
21     }
22
23 }

```

Markers Properties Servers Data Source Explorer Snippets

0 errors, 1 warning, 0 others

Description Resource Path Location Type

Java Problems (1 item)

Type here to search

>> Open project hierarchy. Edit the files as required (Unedited file too can be used, Here the editing is done to ‘What should be displayed on the browser’ as an output). Save the file.

### HelloAppEngine.java

```

eclipse-workspace - MyGoogleAppEngine/src/main/java/com/GAE/HelloAppEngine.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Project Explorer MyGoogleAppEngine
App Engine [standard: java] - appengine-web.xml
Deployment Descriptor: MyGoogleAppEngine
JAX-WS Web Services
Java Resources
src/main/java
com.GAE
HelloAppEngine
src/test/java
Libraries
JavaScript Resources
build
src
main
java
webapp
META-INF
WEB-INF
favicon.ico
index.html
test
Index.html
1 <!DOCTYPE html>
2
3 <html>
4     <head>
5         <title>Hello App Engine!</title>
6     </head>
7     <body>
8         <h1>Hello App Engine!</h1>
9     </body>
10 </html>

```

Markers Properties Servers Data Source Explorer Snippets

0 errors, 1 warning, 0 others

Description Resource Path Location Type

Java Problems (1 item)

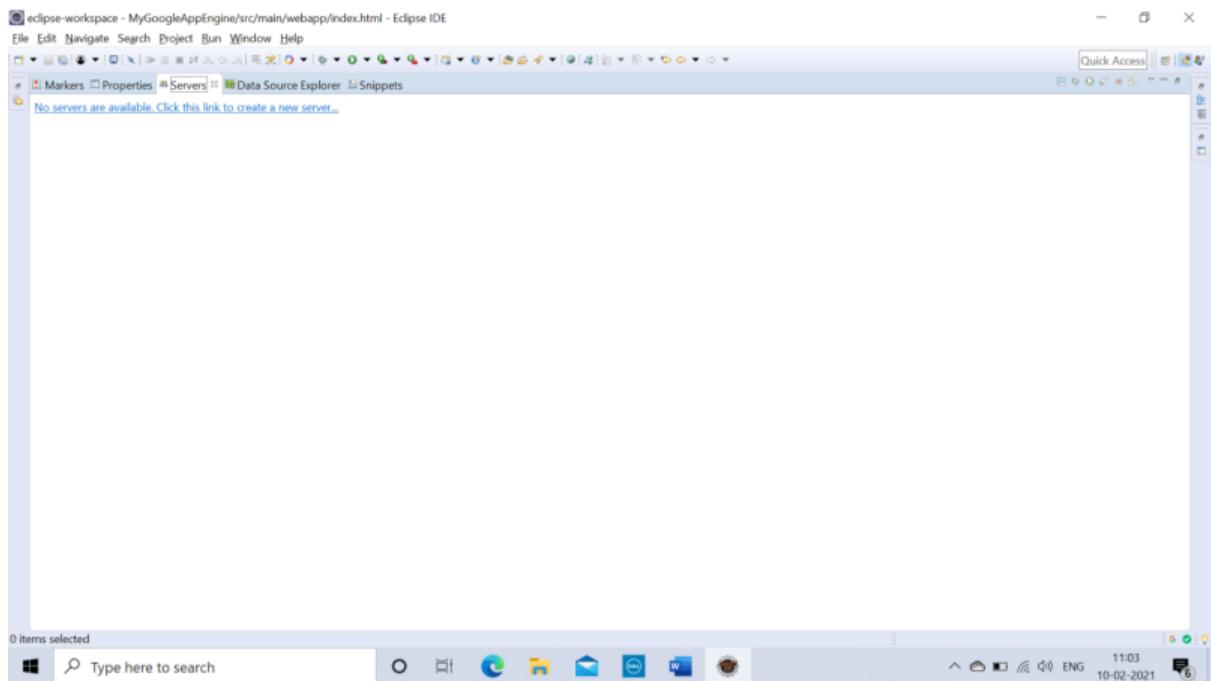
Type here to search

### Index.html

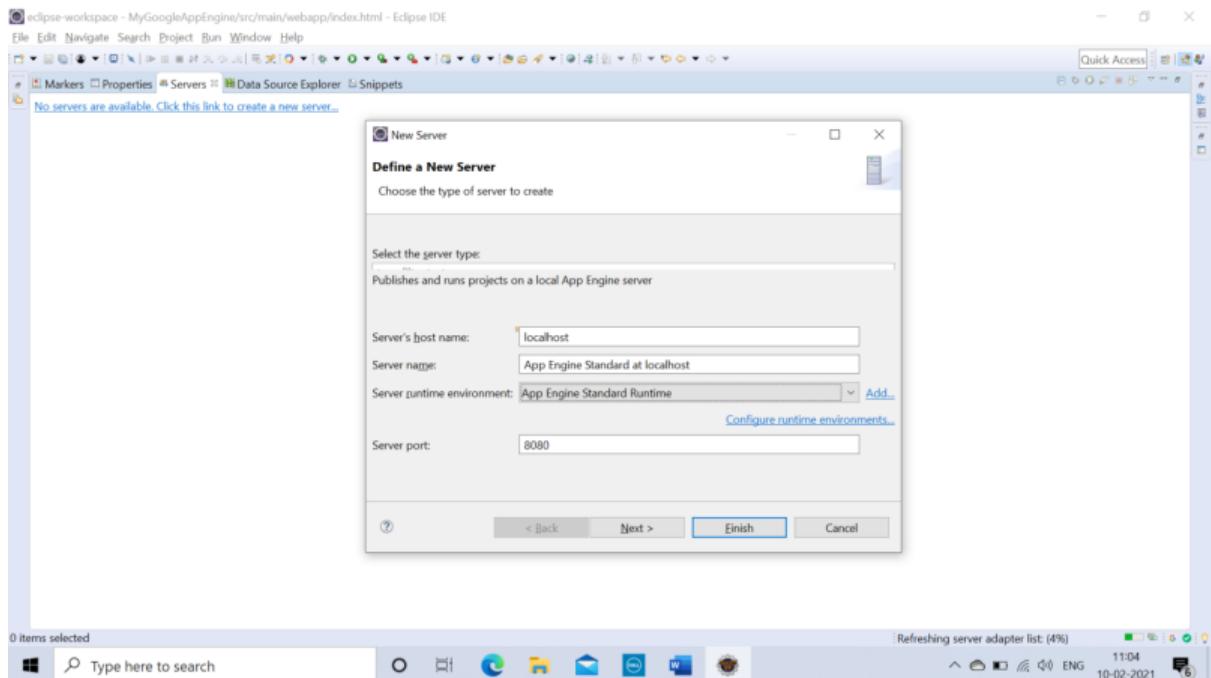
The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows the project structure for "MyGoogleAppEngine".
- Code Editor:** Displays the file "HelloAppEngine.java" containing Java code for a servlet.
- Outline View:** Shows the outline of the HTML document "index.html".
- Markers View:** Shows 1 warning and 0 errors.
- Task List:** Shows the DOCTYPE declaration and the first few lines of the HTML code.

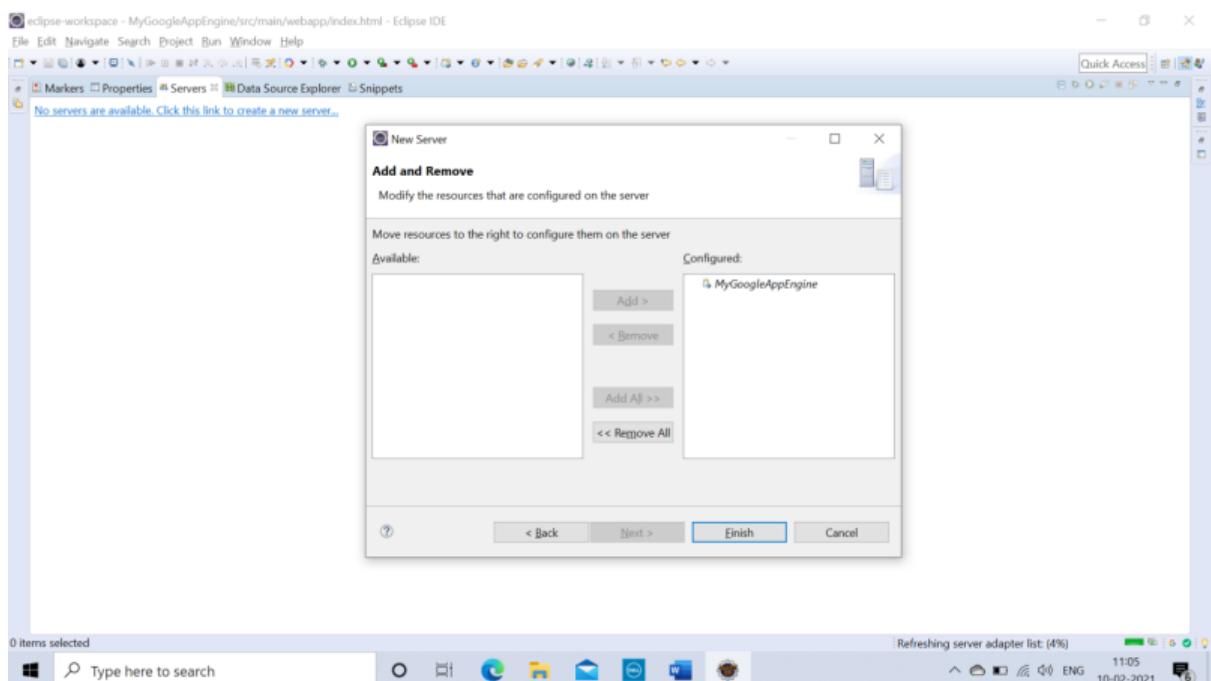
>> To configure the '**App Engine Standard Server**', Click on the link to create a new server under **Server** tab.



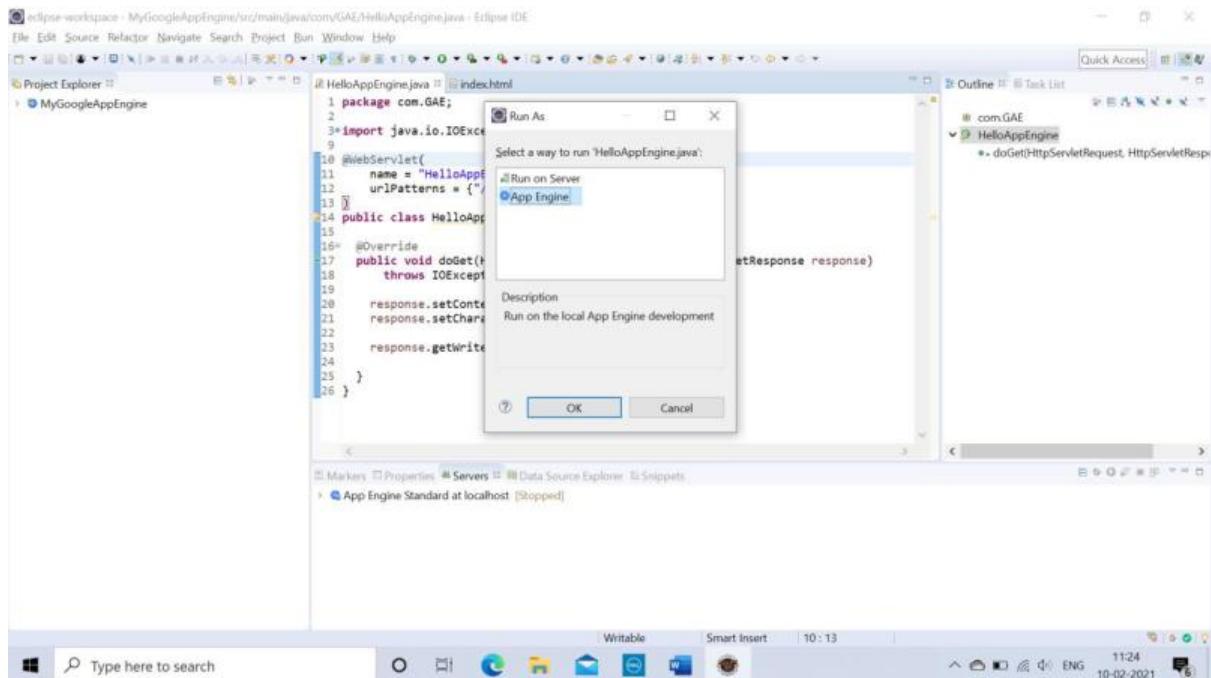
>> Click on **Next**.



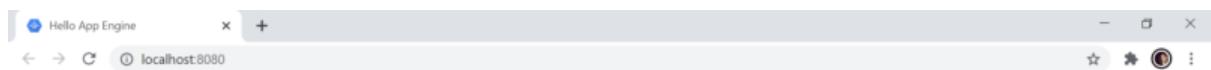
>> Click on 'Add all', and then click on Finish.



>> Now click on Run as >> App Engine



## OUTPUT:



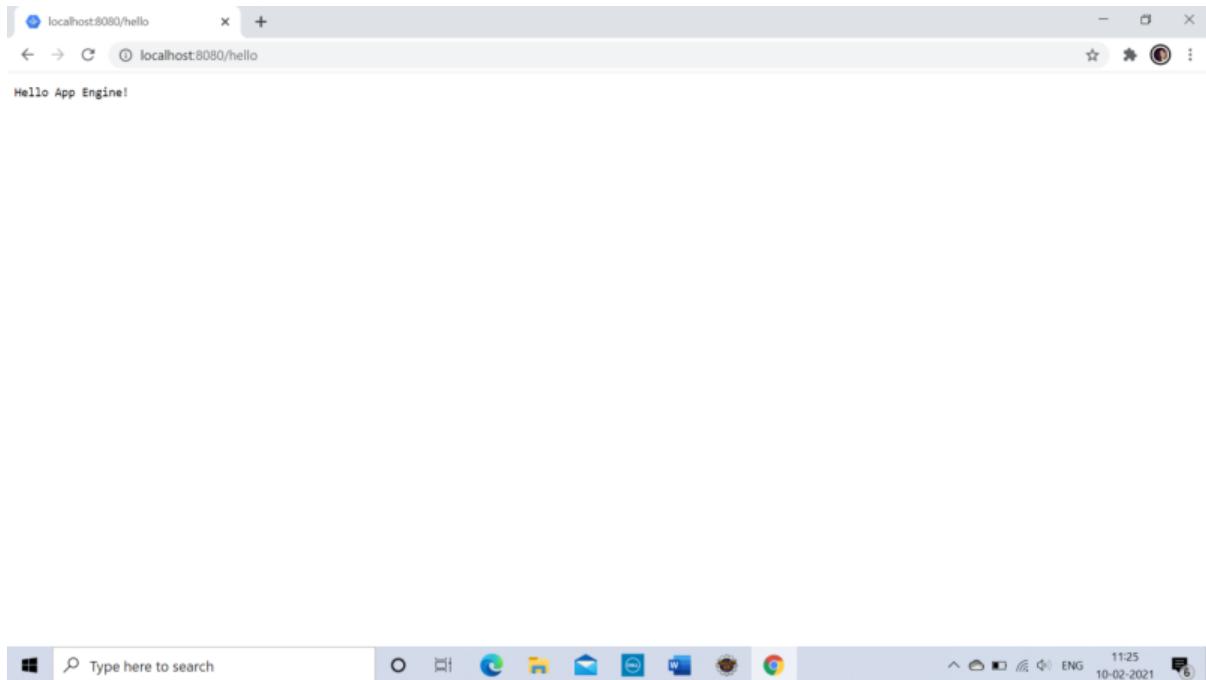
### Hello App Engine!

"src/main/webapp/index.html"

Available Servlets:

[The servlet](#)





**>> Similarly you can create web applications with the help of Google App Engine.**

**>> Here I have created simple login form.**

### LoginPage.java

```
package com.LoginForm;

import java.io.IOException;
import java.io.PrintWriter;

import javax.servlet.ServletException;

import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

public class LoginPage extends HttpServlet
{
    protected void doPost(HttpServletRequest req,HttpServletResponse res)
    throws ServletException , IOException
    {
        PrintWriter out =res.getWriter();
        String uname = req.getParameter("myusername");
        String upass = req.getParameter("mypassword");
        if(uname.equals("snehapawar") && upass.equals("Sneha@123"))
        {
            out.println("Login Successful !");
        }
        else
        {
            out.println("Please Enter Correct Username and Password.");
        }
    }
}
```

```
}
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}
```

The screenshot shows the Eclipse IDE interface. The top menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, and Help. The left sidebar displays a project structure with 'index.html' and 'LoginPage.java'. The main editor area contains the code for 'LoginPage.java' and 'index.html'. The status bar at the bottom shows the search bar, toolbar icons, and system information like date and time.

```
eclipse-workspace - MyLoginForm/src/main/java/com/LoginForm/LoginPage.java - Eclipse IDE
```

```
File Edit Source Refactor Navigate Search Project Run Window Help
```

```
index.html *LoginPage.java web.xml
```

```
1 package com.LoginForm;
```

```
2
```

```
3 import java.io.IOException;
```

```
4 import java.io.PrintWriter;
```

```
5 import javax.servlet.ServletException;
```

```
6 import javax.servlet.http.HttpServlet;
```

```
7 import javax.servlet.http.HttpServletRequest;
```

```
8 import javax.servlet.http.HttpServletResponse;
```

```
9
```

```
10 public class LoginPage extends HttpServlet
```

```
11 {
```

```
12     protected void doPost(HttpServletRequest req,HttpServletResponse res) throws ServletException , IOException
```

```
13     {
```

```
14         PrintWriter out =res.getWriter();
```

```
15         String uname = req.getParameter("myusername");
```

```
16         String upass = req.getParameter("mypassword");
```

```
17         if(uname.equals("snehapawan") && upass.equals("Sneha@123"))
```

```
18         {
```

```
19             out.println("Login Successful !");
```

```
20         }
```

```
21         else
```

```
22         {
```

```
23             out.println("Please Enter Correct Username and Password.");
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24         }
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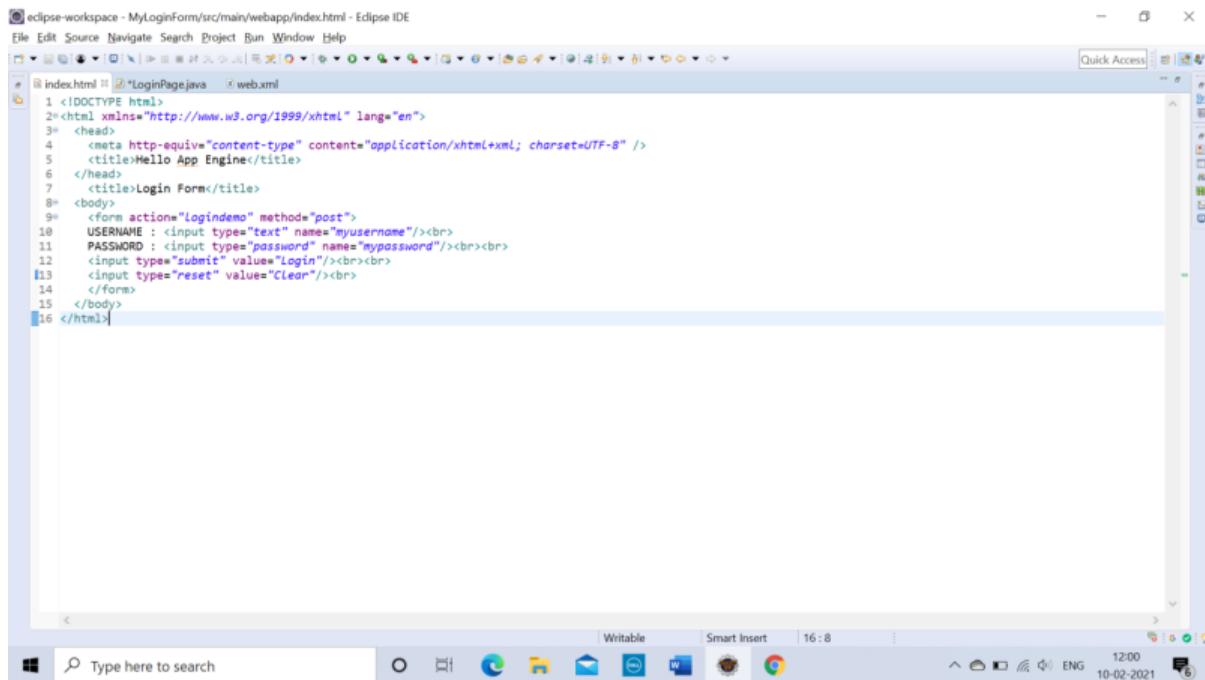
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## index.html

```
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml" lang="en">
    <head>
        <meta http-equiv="content-type" content="application/xhtml+xml; charset=UTF-8" />
    </head>
    <title>Hello App Engine</title>
    <title>Login Form</title>
</body>
<form action="Logindemo" method="post">
    USERNAME : <input type="text" name="myusername"/><br>
    PASSWORD : <input type="password" name="mypassword"/><br><br>
    <input type="submit" value="Login"/><br><br>
    <input type="reset" value="Clear"/><br>
</form>
</body>
</html>
```

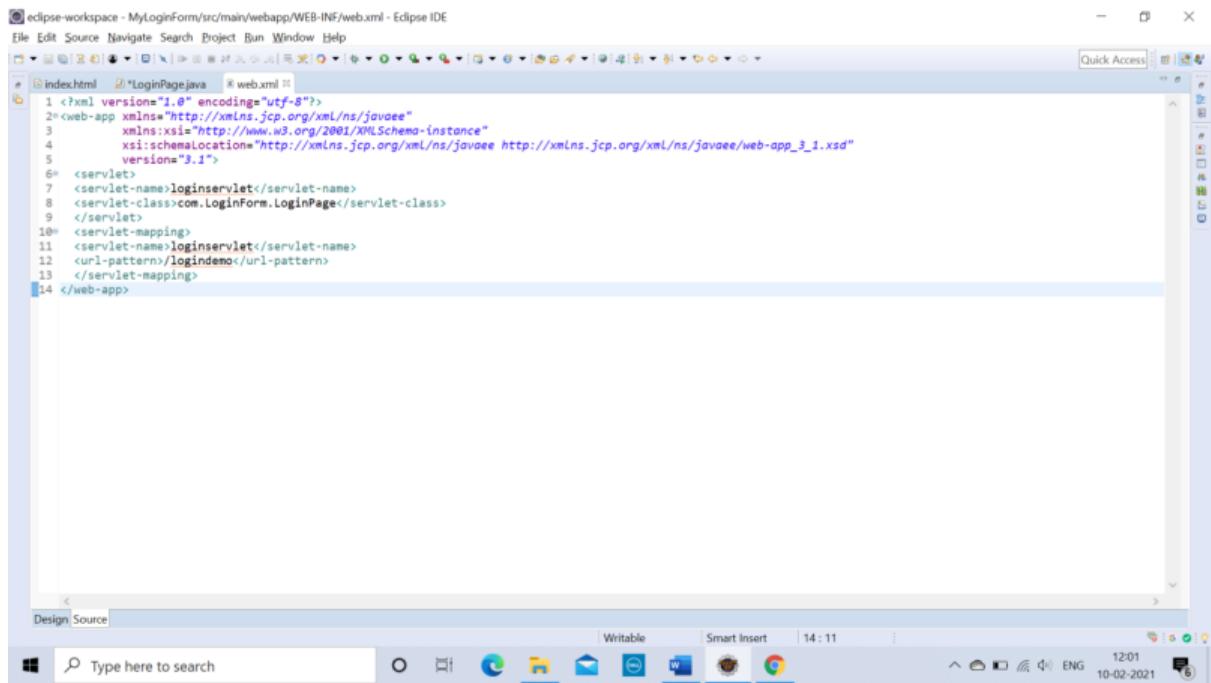


The screenshot shows the Eclipse IDE interface with two files open: `index.html` and `LoginPage.java`. The `index.html` file contains the following code:

```
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml" lang="en">
<head>
<meta http-equiv="content-type" content="application/xhtml+xml; charset=UTF-8" />
<title>Hello App Engine</title>
</head>
<title>Login Form</title>
<body>
<form action="logindemo" method="post">
    USERNAME : <input type="text" name="myusername"/><br>
    PASSWORD : <input type="password" name="mypassword"/><br><br>
    <input type="submit" value="Login"/><br><br>
    <input type="reset" value="Clear"/><br>
</form>
</body>
</html>
```

## web.xml

```
<?xml version="1.0" encoding="utf-8"?>
<web-app xmlns="http://xmlns.jcp.org/xml/ns/javaee"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
http://xmlns.jcp.org/xml/ns/javaee/web-app_3_1.xsd"
          version="3.1">
    <servlet>
        <servlet-name>login servlet</servlet-name>
        <servlet-class>com.LoginForm.LoginPage</servlet-class>
    </servlet>
    <servlet-mapping>
        <servlet-name>login servlet</servlet-name>
        <url-pattern>/logindemo</url-pattern>
    </servlet-mapping>
</web-app>
```

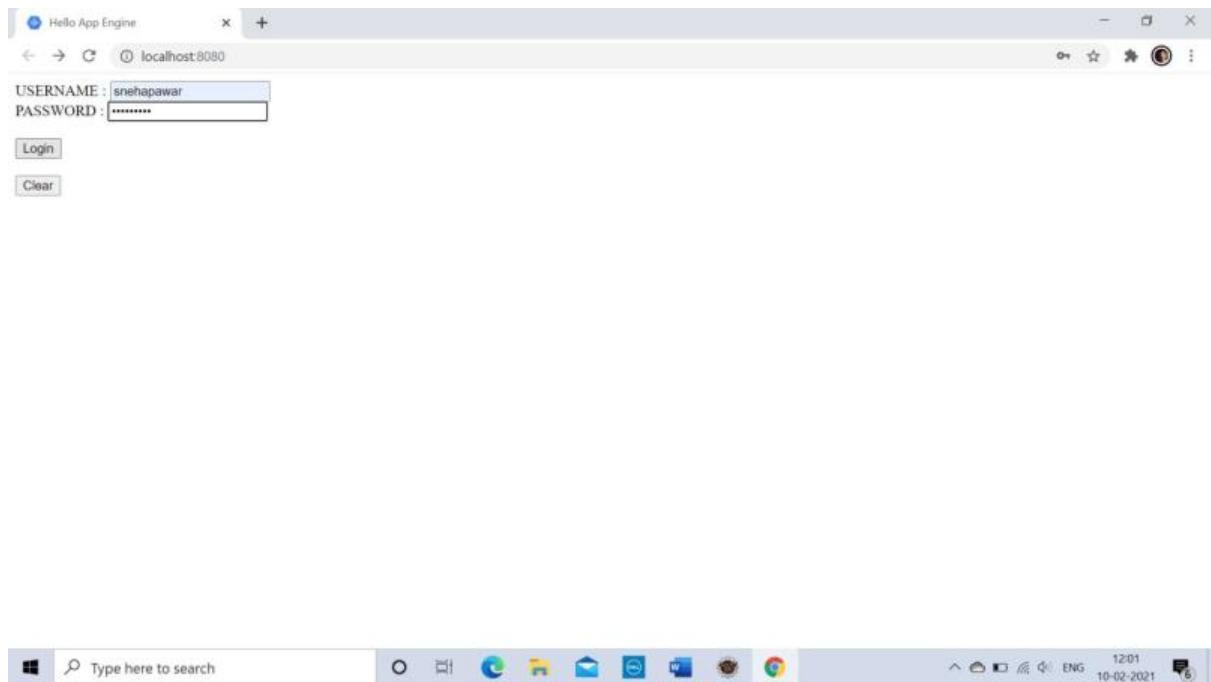


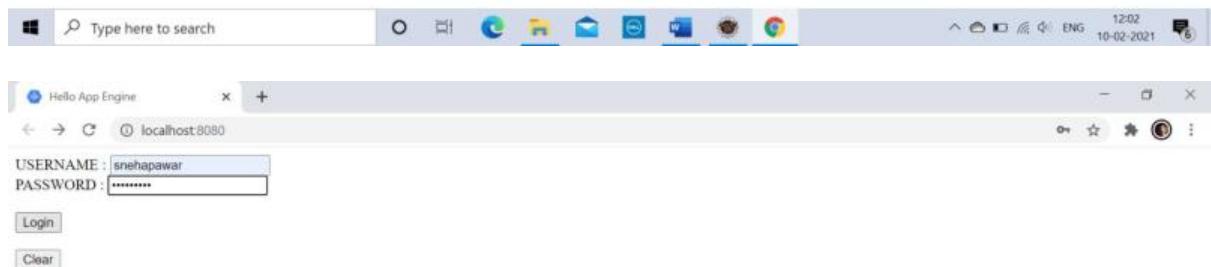
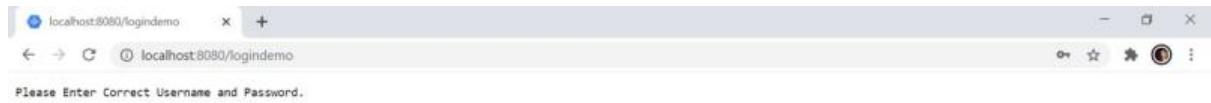
The screenshot shows the Eclipse IDE interface with the title bar "eclipse-workspace - MyLoginForm/src/main/webapp/WEB-INF/web.xml - Eclipse IDE". The menu bar includes File, Edit, Source, Navigate, Search, Project, Run, Window, Help. The toolbar has various icons for file operations. The left sidebar shows project files: index.html, LoginPage.java, and web.xml. The main editor area displays the XML code for web.xml:

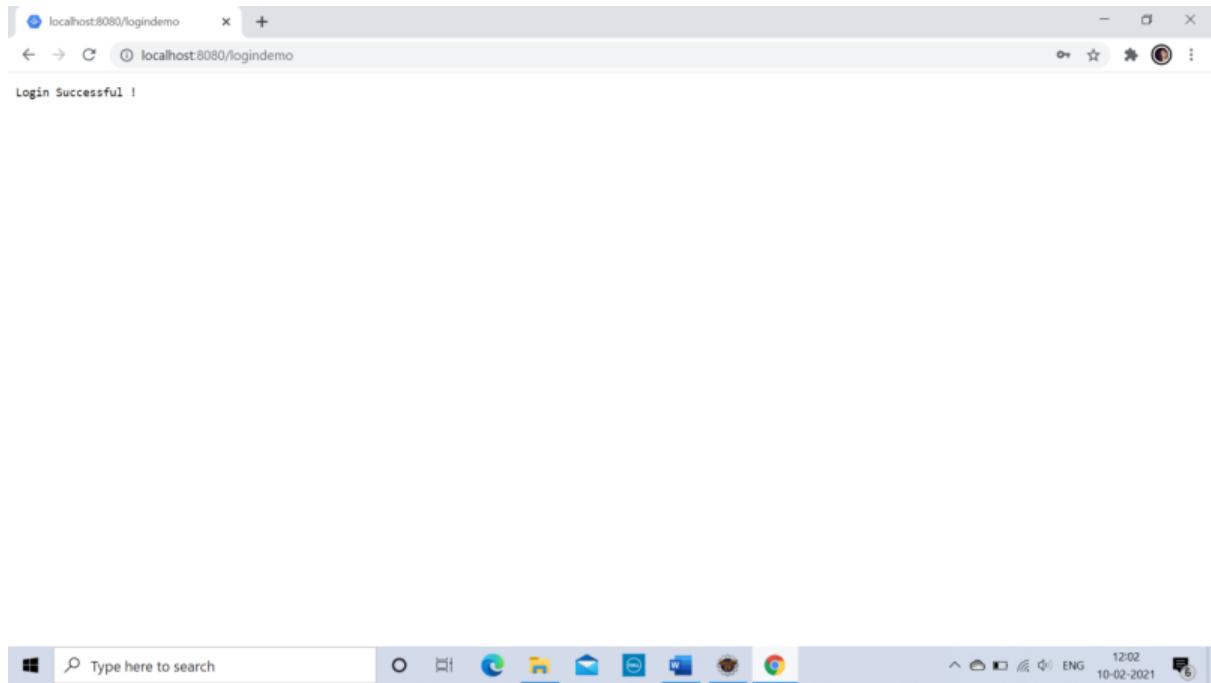
```
1 <?xml version="1.0" encoding="utf-8"?>
2 <web-app xmlns="http://xmlns.jcp.org/xml/ns/javaee"
3   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/web-app_3_1.xsd"
5   version="3.1">
6   <servlet>
7     <servlet-name>loginServlet</servlet-name>
8     <servlet-class>com.LoginForm.LoginPage</servlet-class>
9   </servlet>
10  <servlet-mapping>
11    <servlet-name>loginServlet</servlet-name>
12    <url-pattern>/logindemo</url-pattern>
13  </servlet-mapping>
14 </web-app>
```

The status bar at the bottom shows "Design Source", "Writable", "Smart Insert", "14 : 11", and a system tray with icons for battery, signal, and date/time "12:01 10-02-2021".

## OUTPUT :







# **PRACTICAL: 5**

## **IMPLEMENT ESXi SERVER**

### **Softwares Required :**

- **VMware Workstation 15.5 PRO**
- **VMware ESXi-5.x-Custom.iso file**
- **vSphere Client**
- **Windows XP iso file**

### **What is VMWare ESXi :**

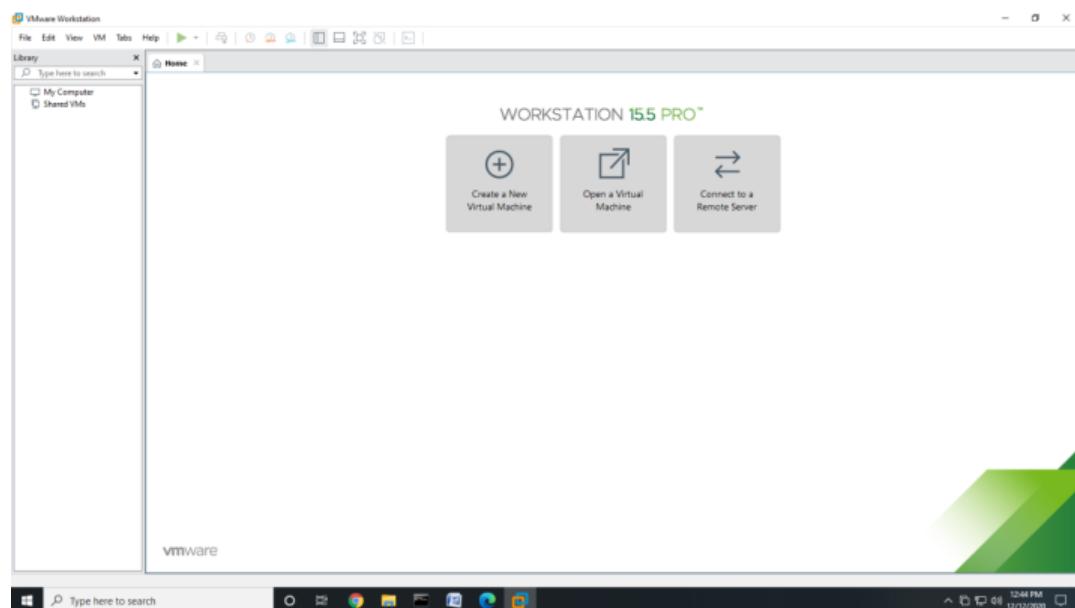
VMWare ESXi is just an OS that sits on your hardware and give you the power to virtualize your hardware resources eg, CPU, RAM etc.

### **What is VMWare vSphere Client :**

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

### **Steps:**

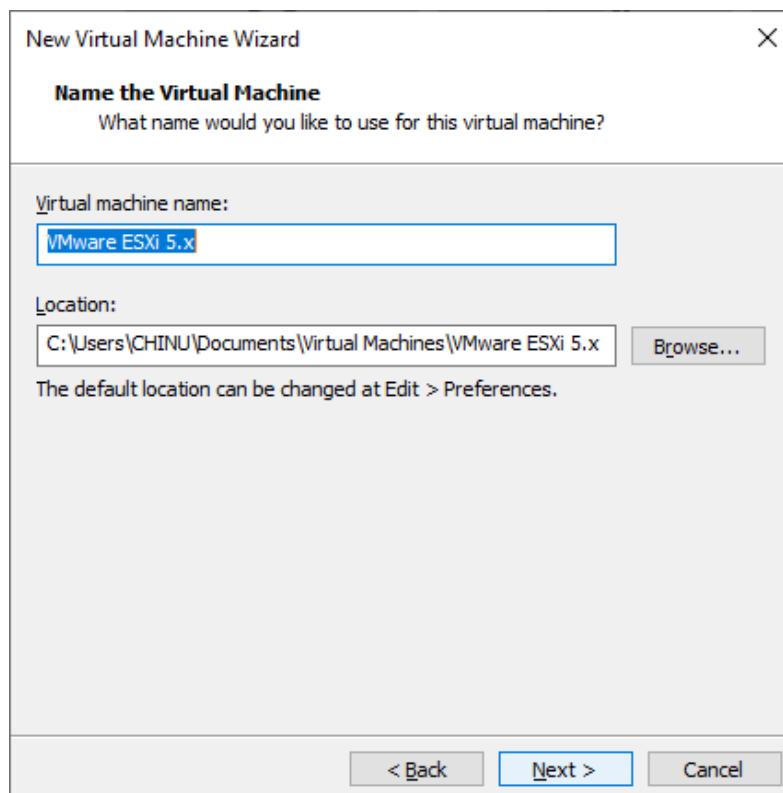
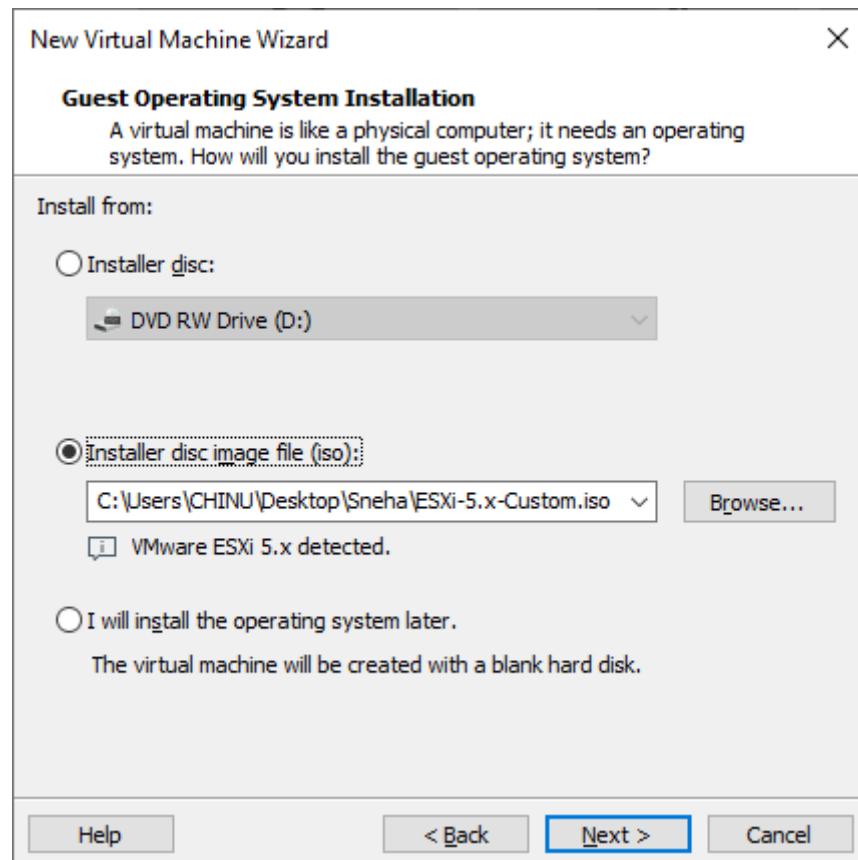
>> Open VMware Workstation and select Create a New Virtual Machine.



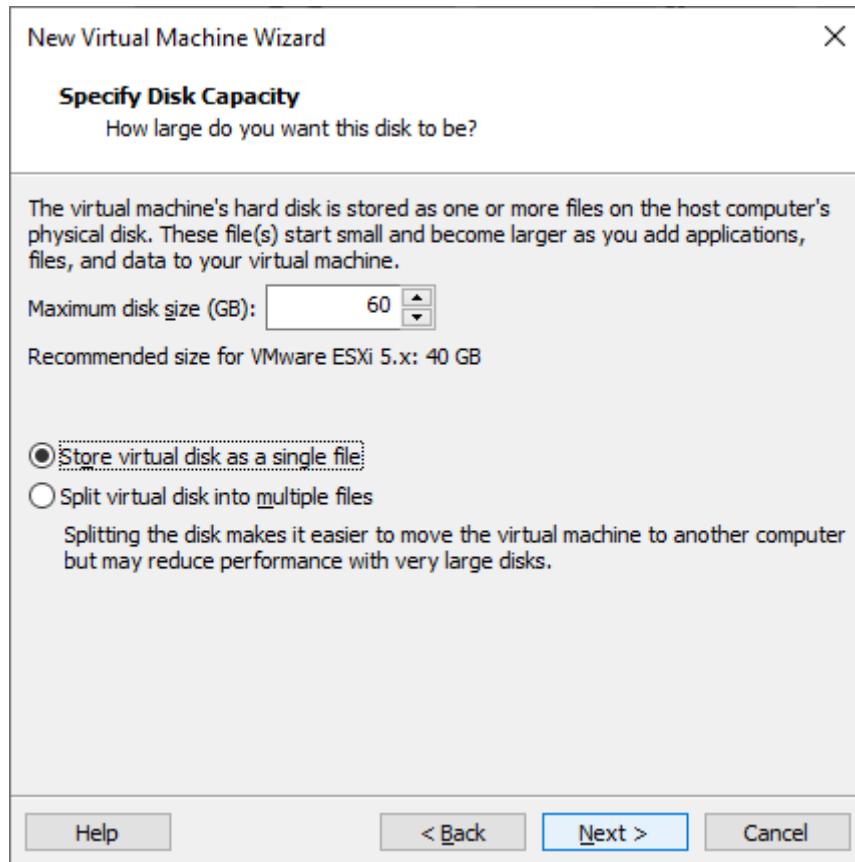
>> Select Typical and click “Next”.



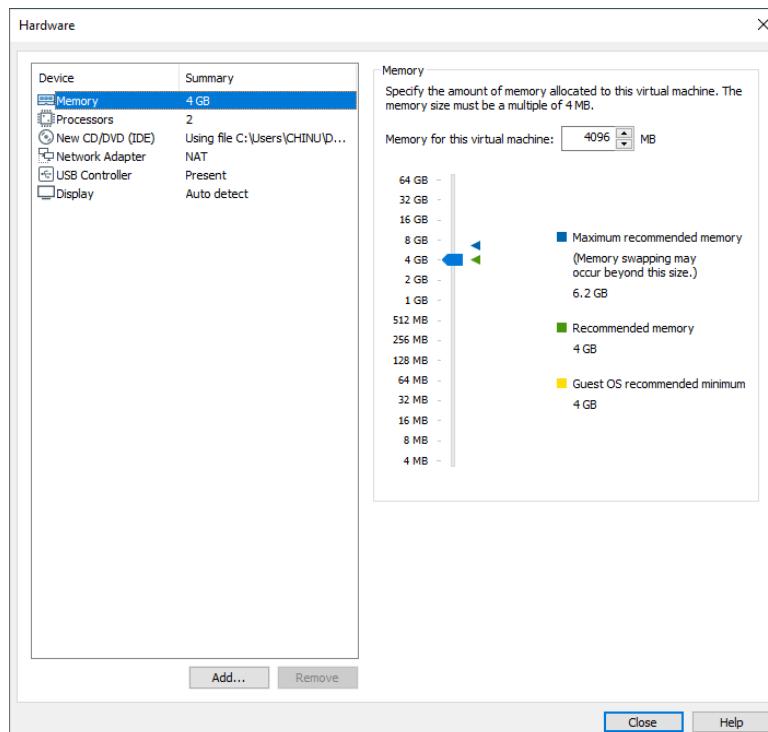
>> Select Installer disc\_image file(ISO). Click Browse>>ESXi 5.xCustom.iso (Iso File)>>For Example “C:\Users\CHINU\Desktop\Sneha\ESXi-5.x-Custom.iso” And click “NEXT”.



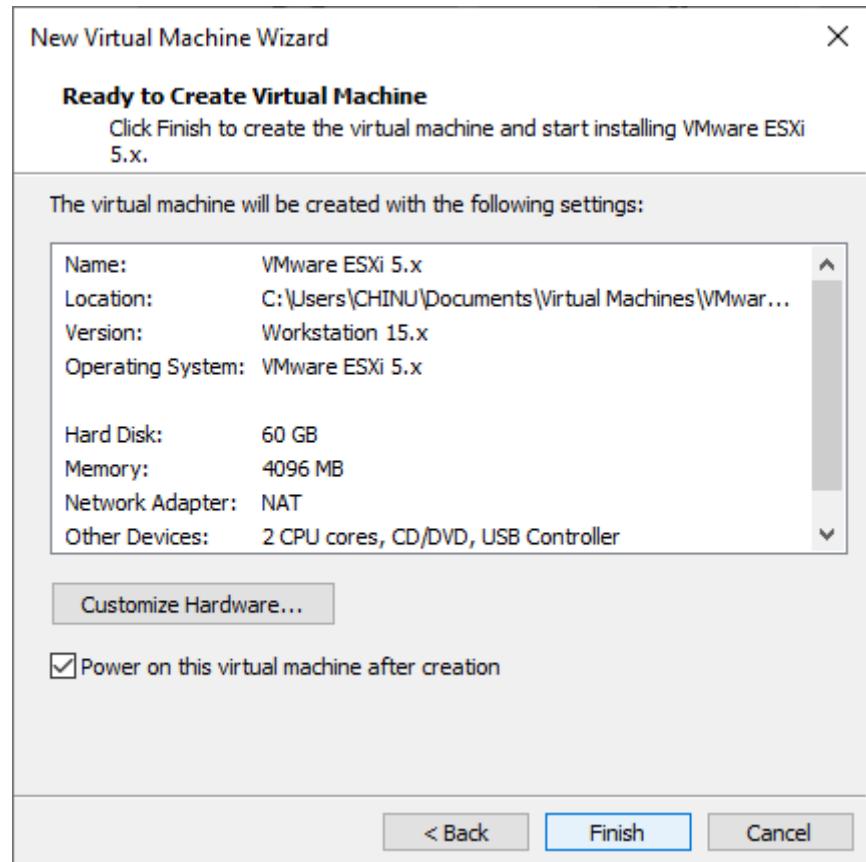
>> Choose “Store virtual disk as a single file” and Keep the memory size as 60GB. Click “NEXT”.



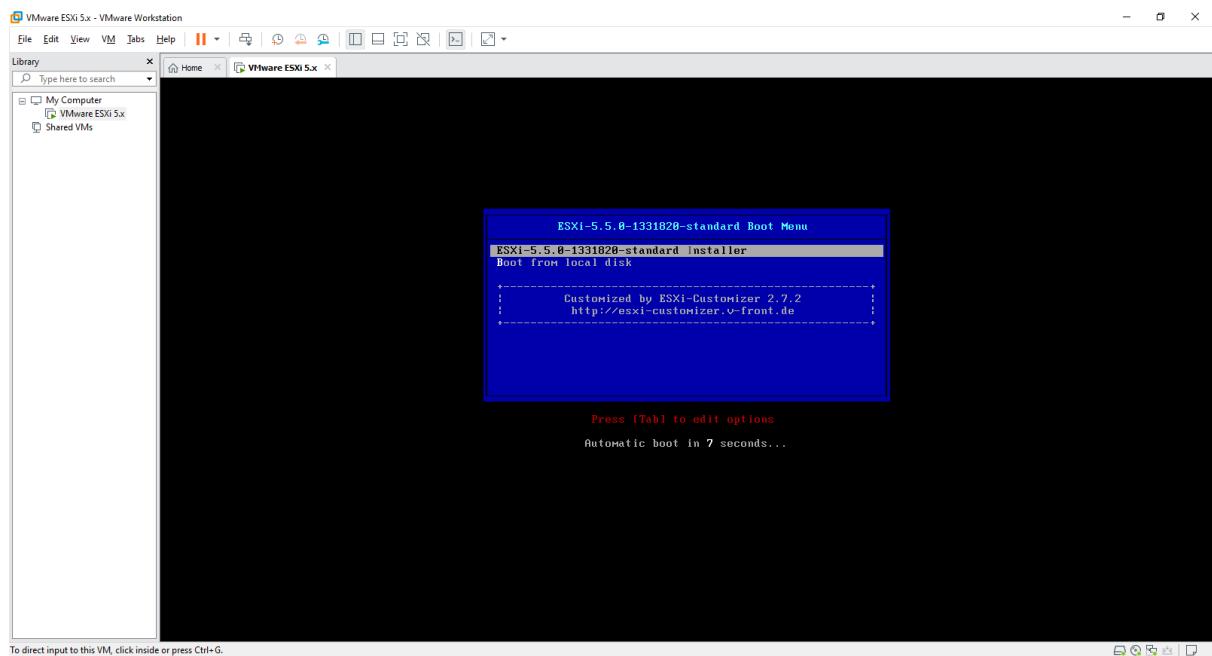
>> Click on Memory under Devices on the right side and make it to **4GB**. Power on the virtual machine by clicking check box “**Power on this virtual machine**”. Click on Processor and select **Virtualize Intel VT-x**.

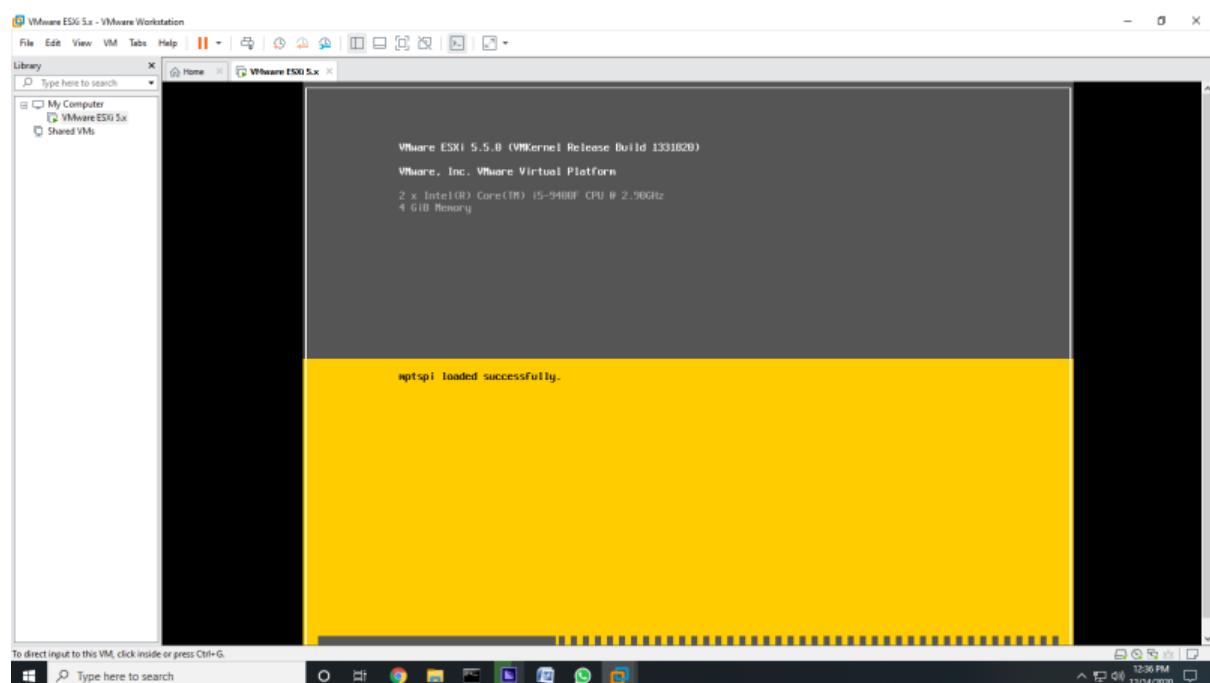
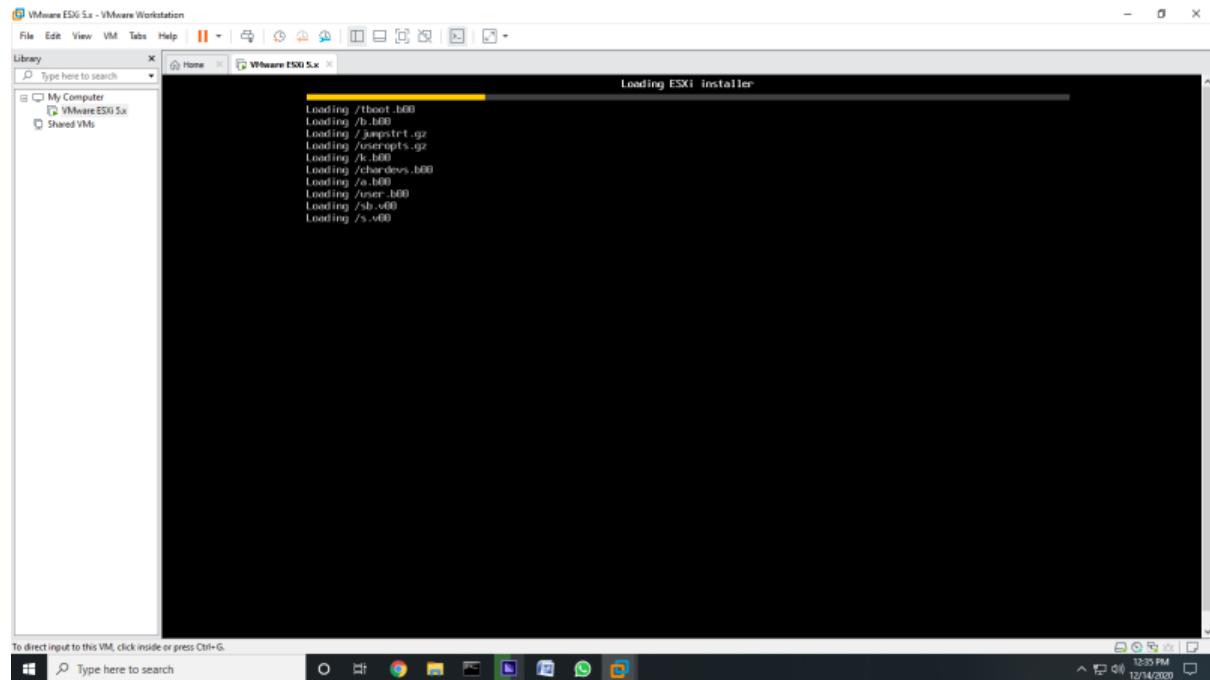


>> Click on “**Finish**” button.

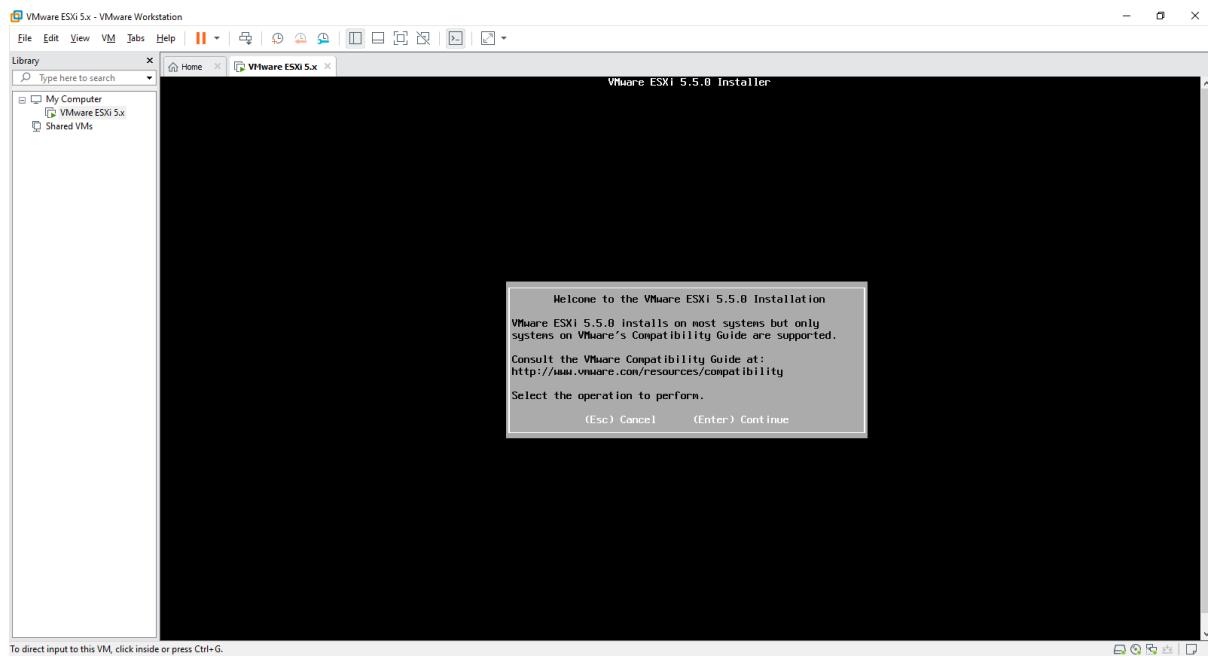


>> Wait until it boots automatically.

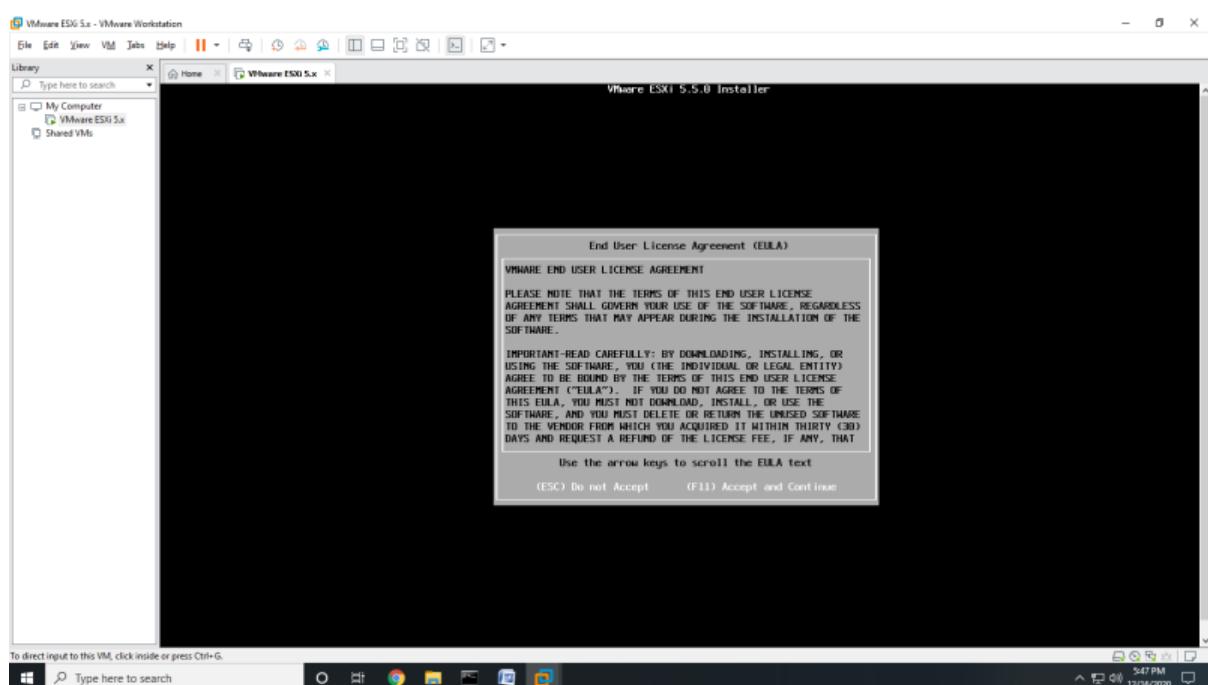




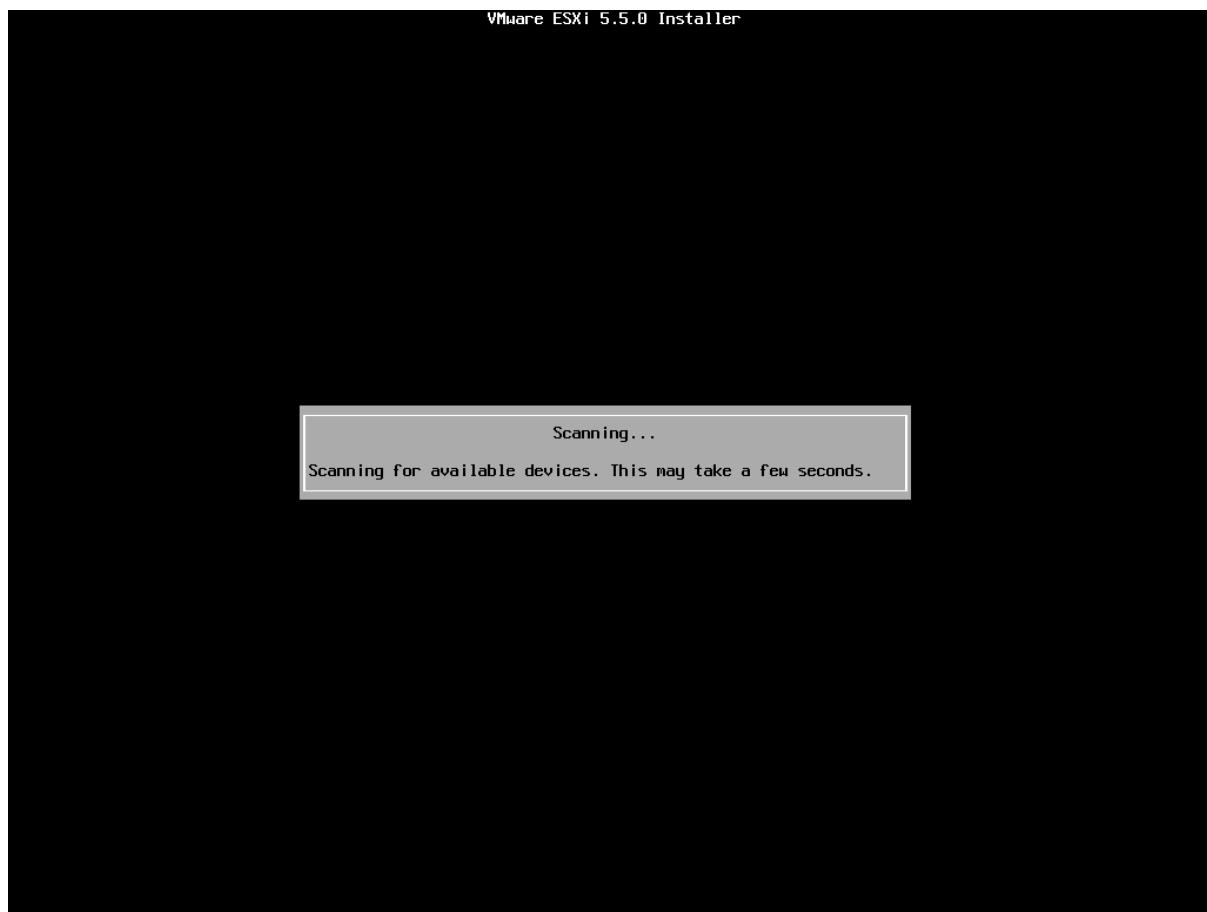
>> Press Enter to Continue.



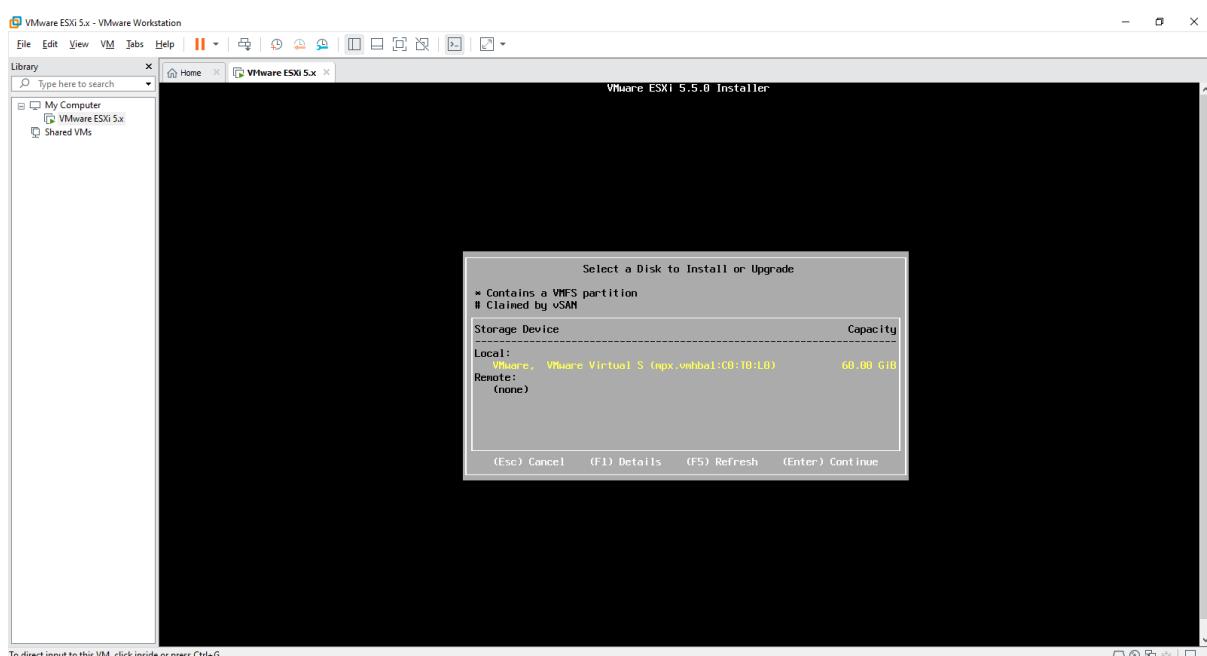
>> Press Function key 11 (F11) to Accept and Continue.



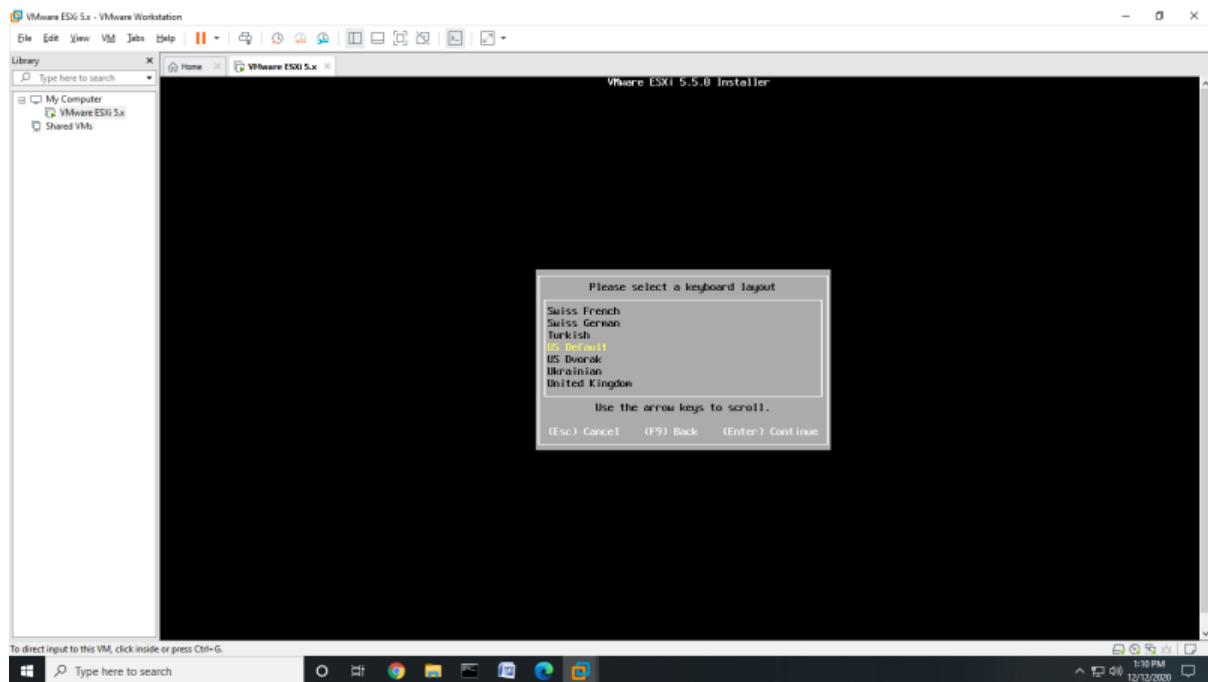
>> Wait until finish scanning.



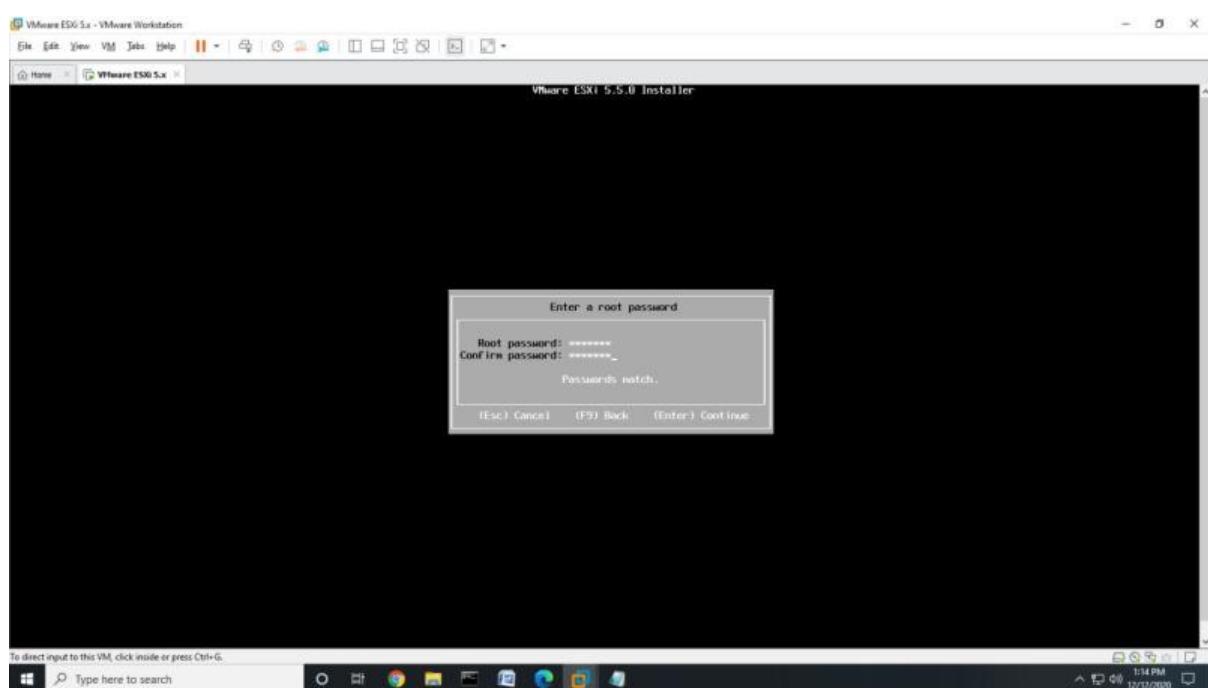
>> Press Enter to Continue.

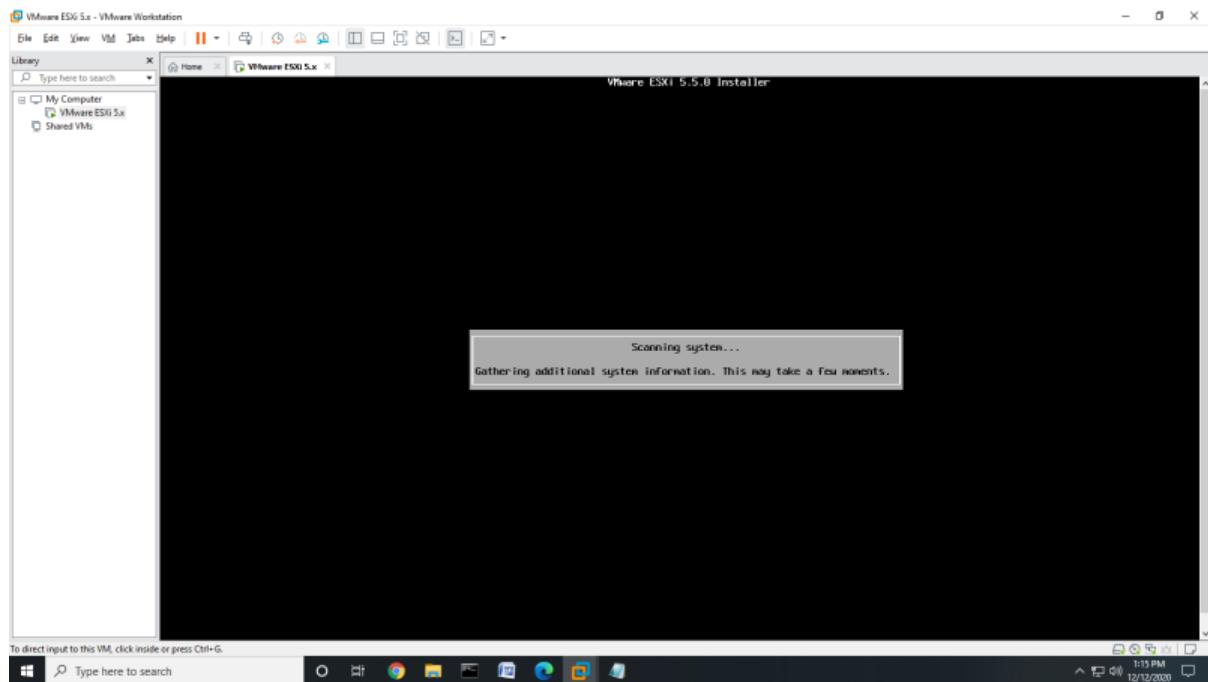


>> Select “US Default” and press “Enter”.

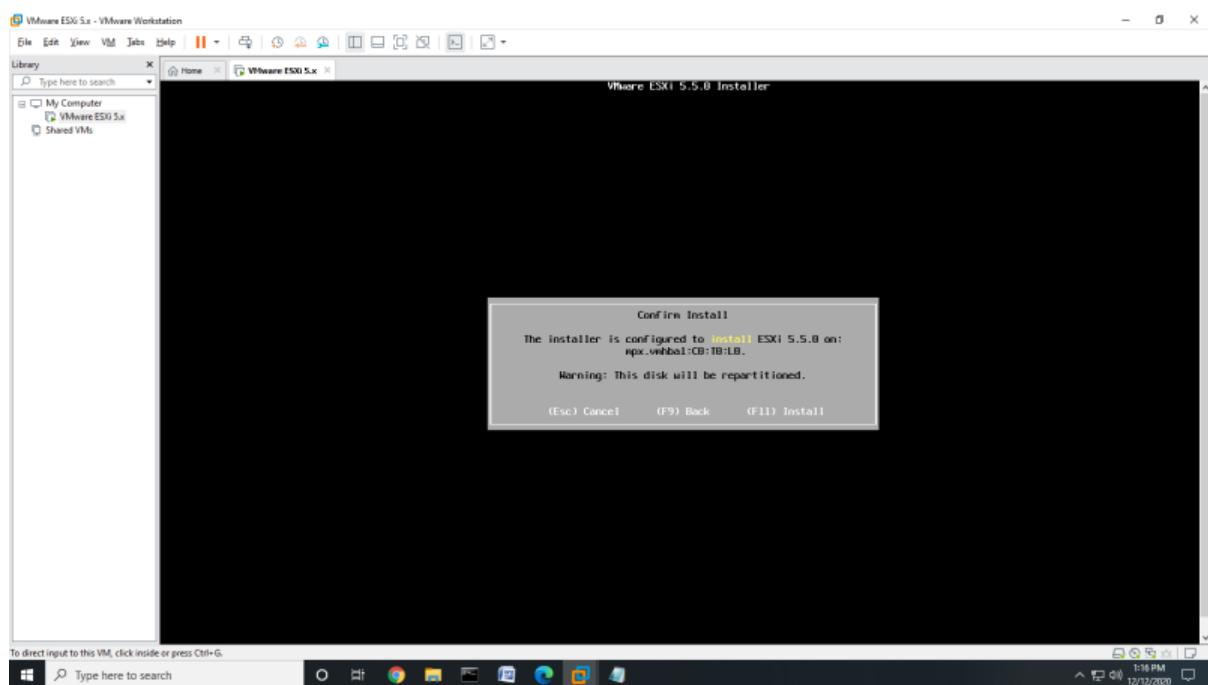


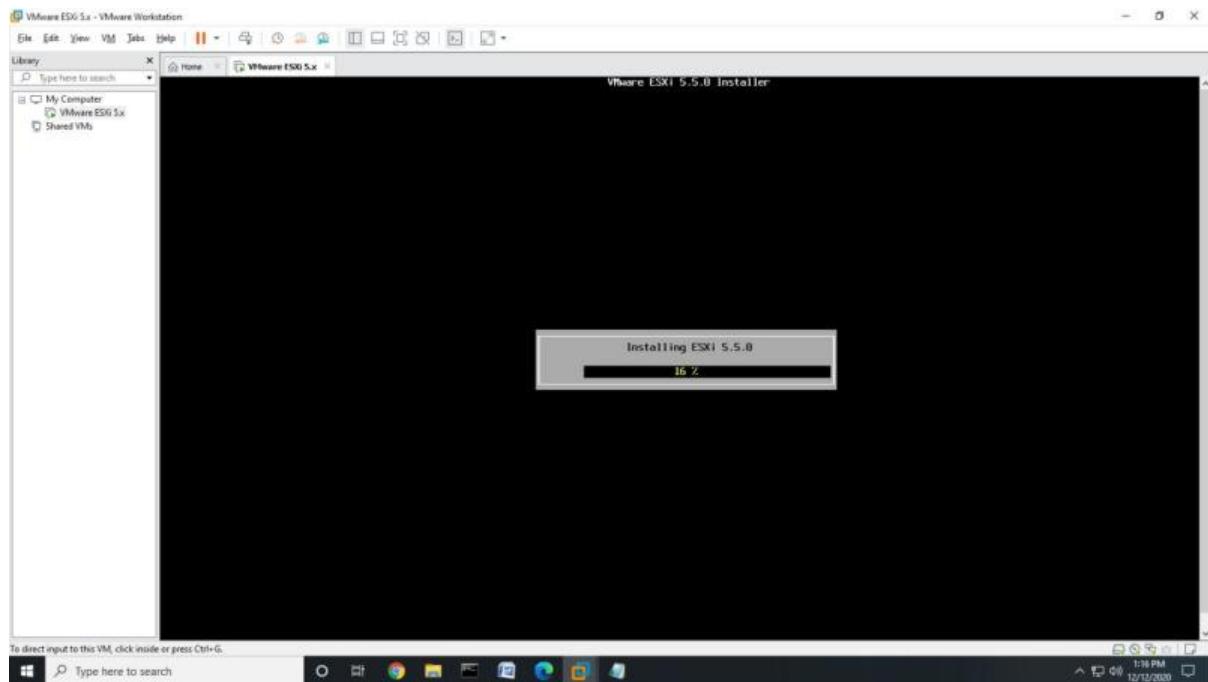
>> Enter the Password “**rjit123**” and press “**Enter**”.



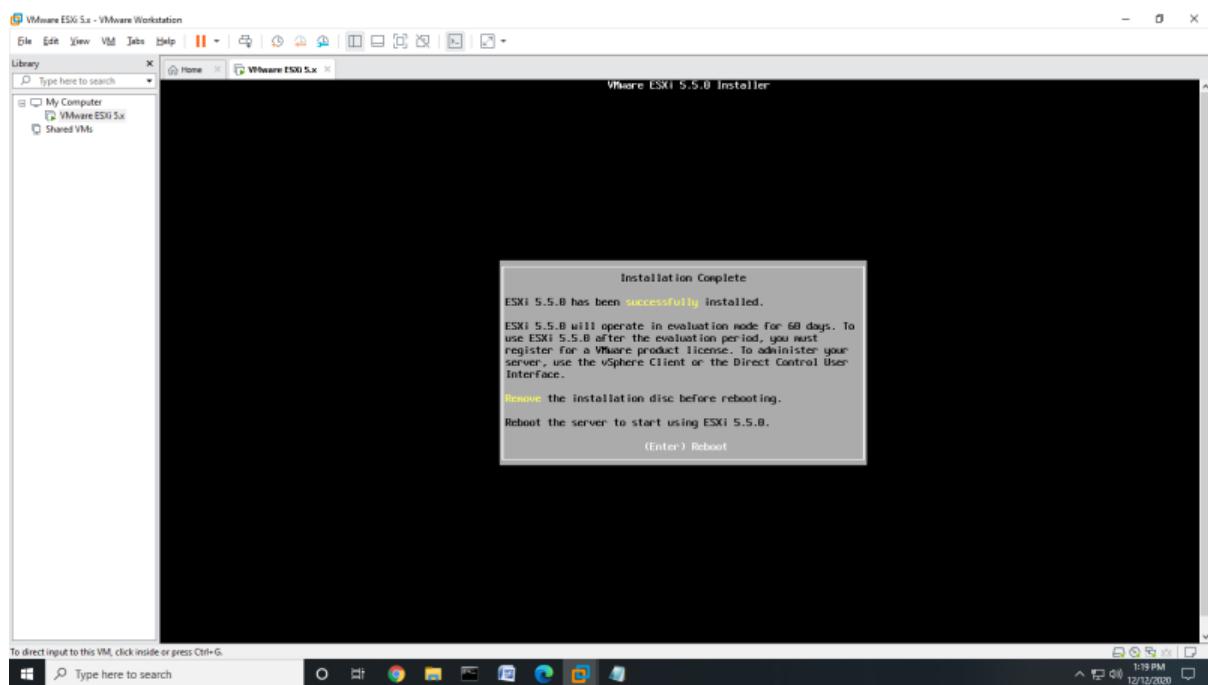


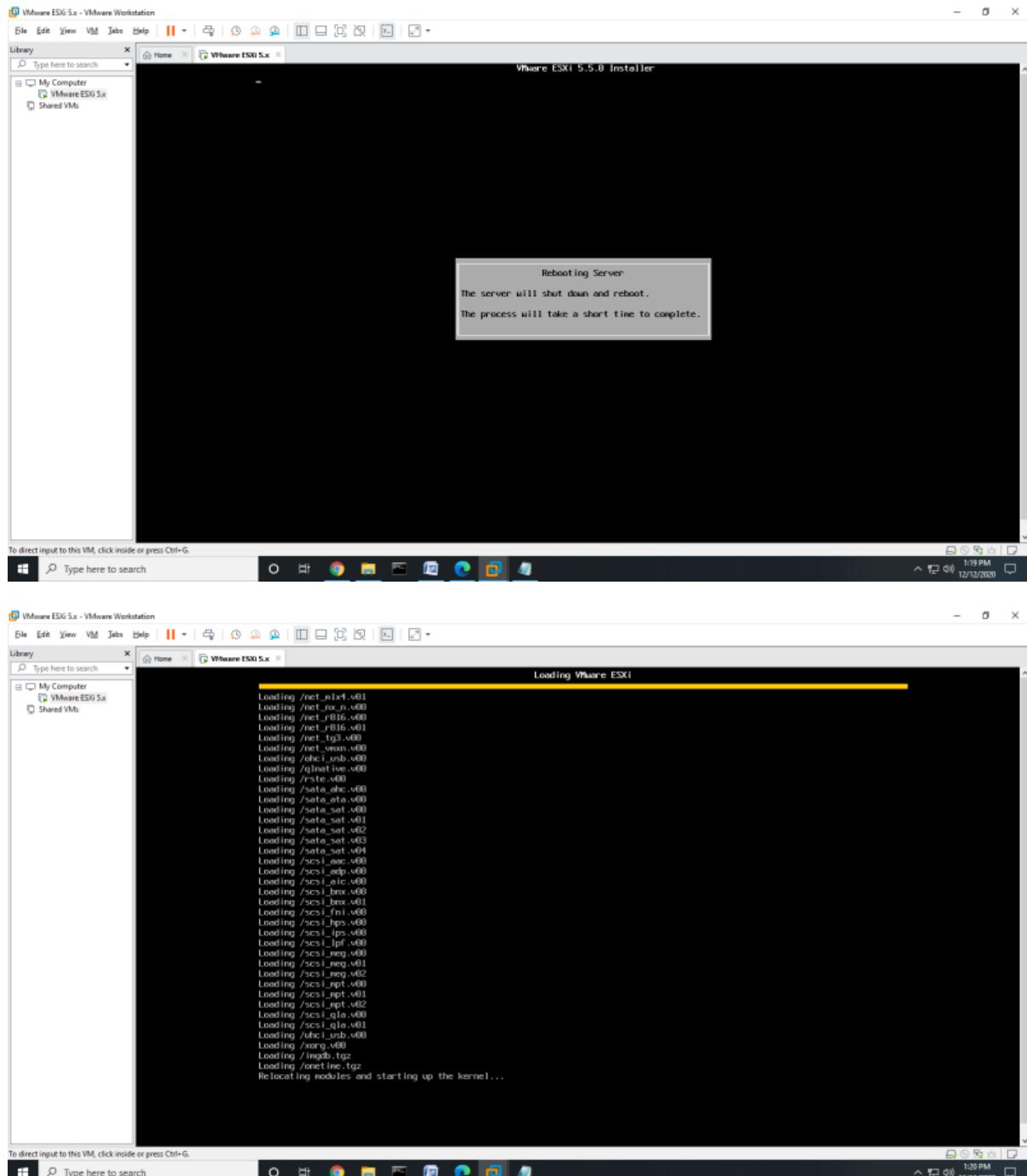
>> Press Function Key 11 “**F11**” to install EX-Si 5.5.8.

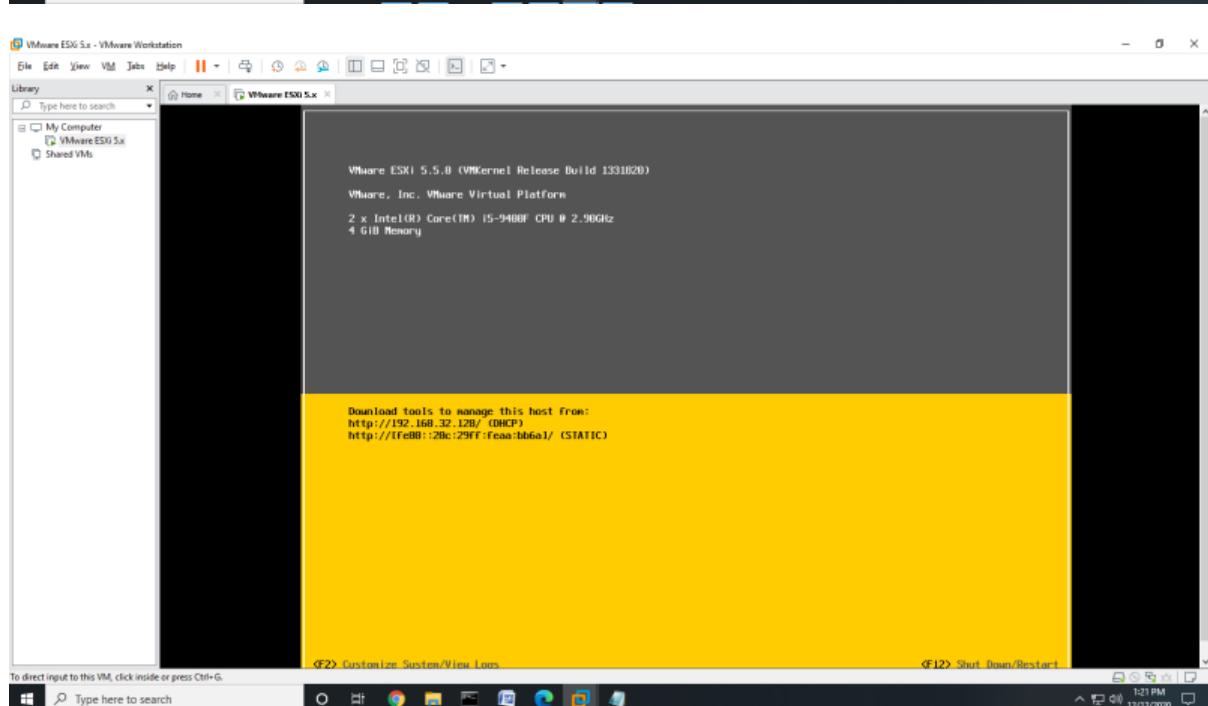
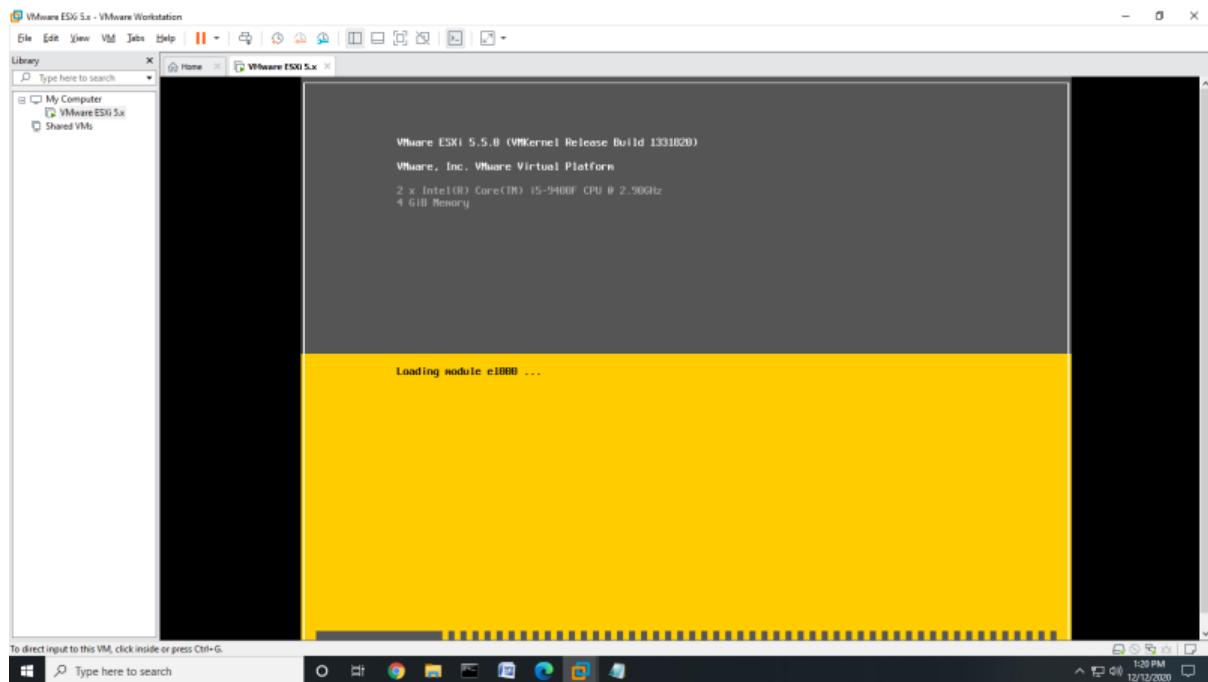




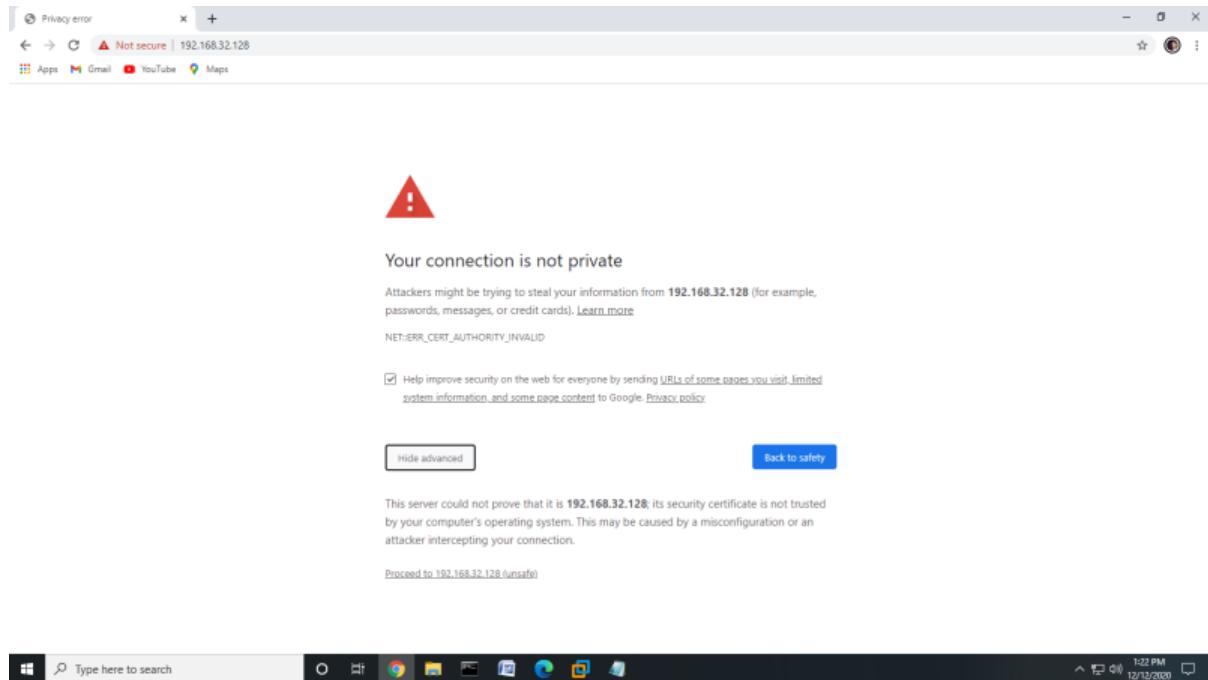
>> Press “Enter” to reboot.



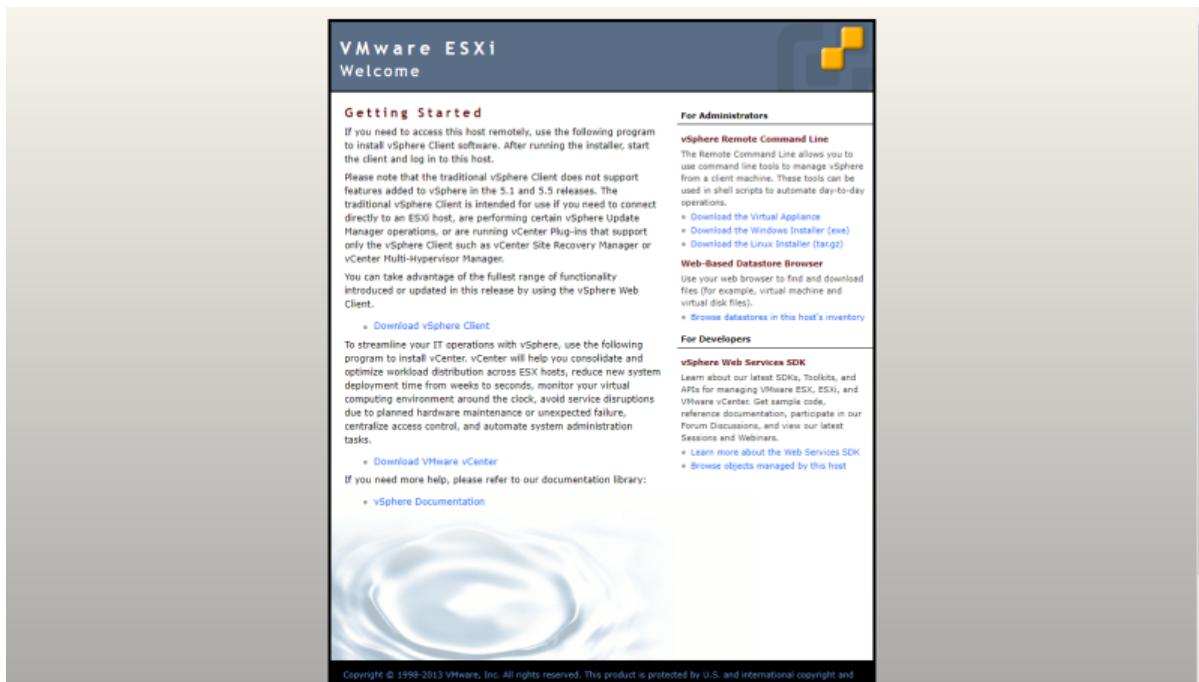




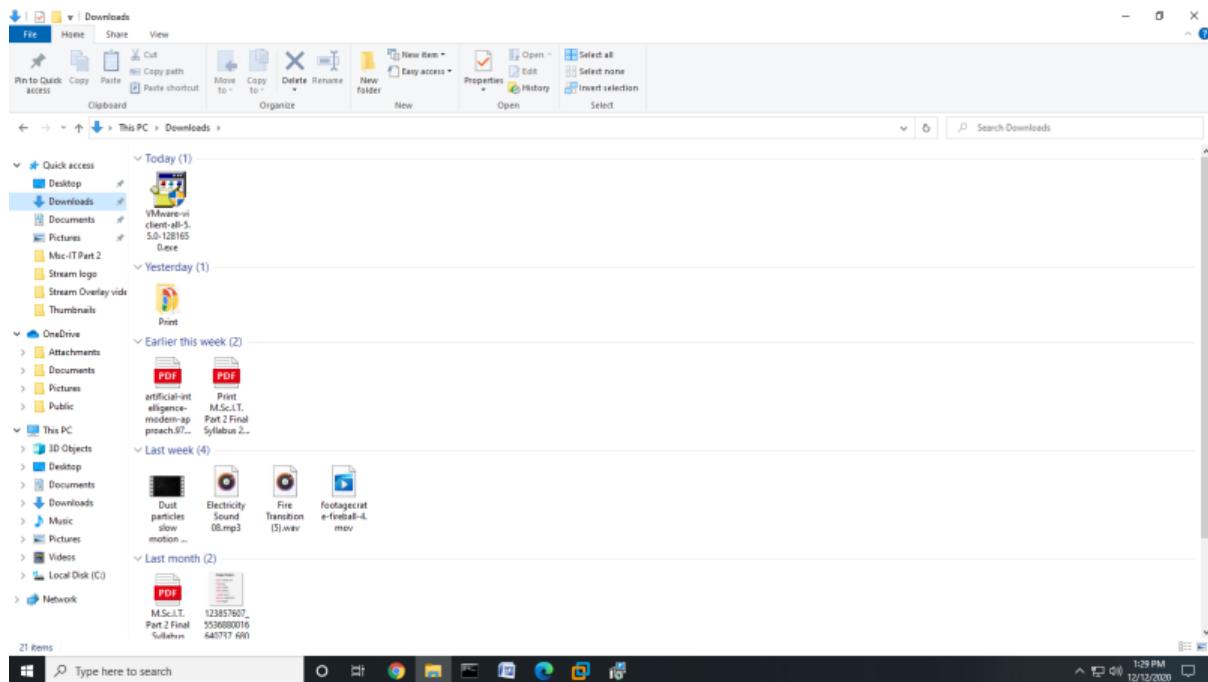
>> Open Browser & type respective IP Address “192.168.32.128”. Click on Advance and Click Proceed to 192.168.32.128.



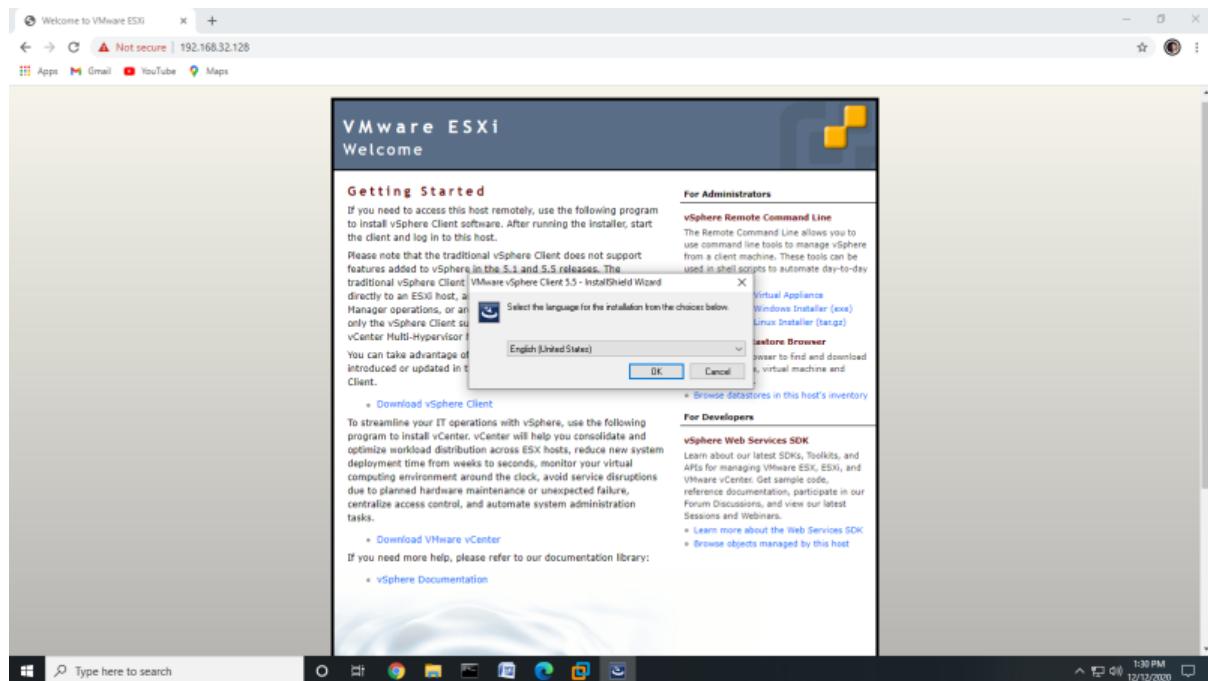
>> Right Click on “Download vsphere Client” and select Open in new tab.  
This will download the file instantly.

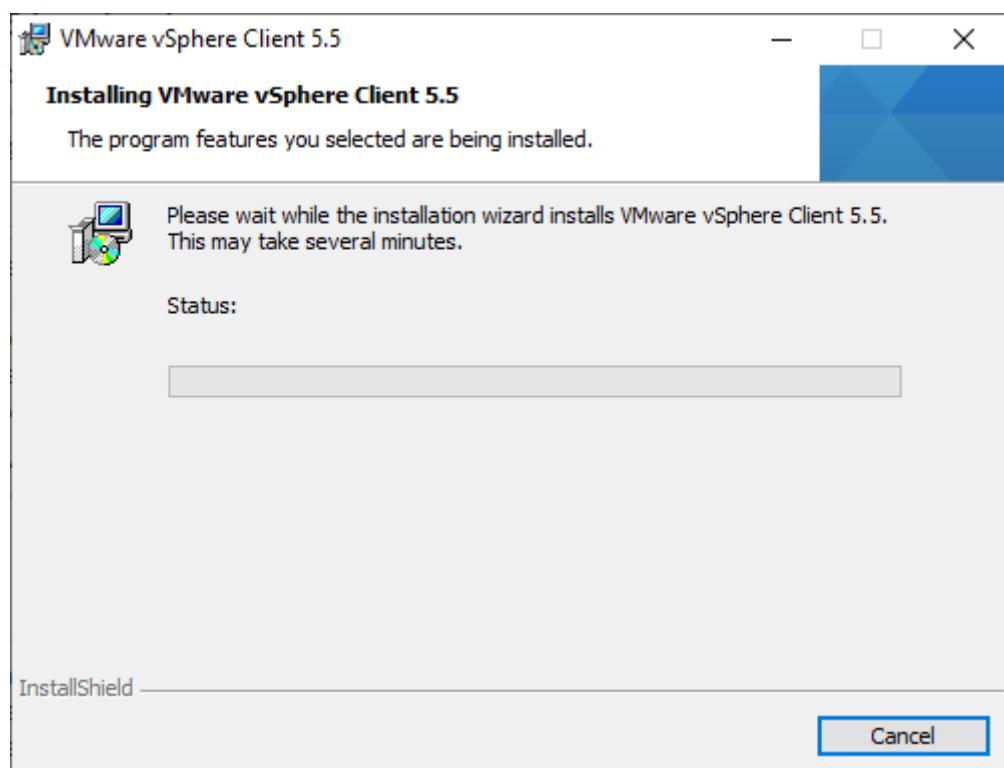
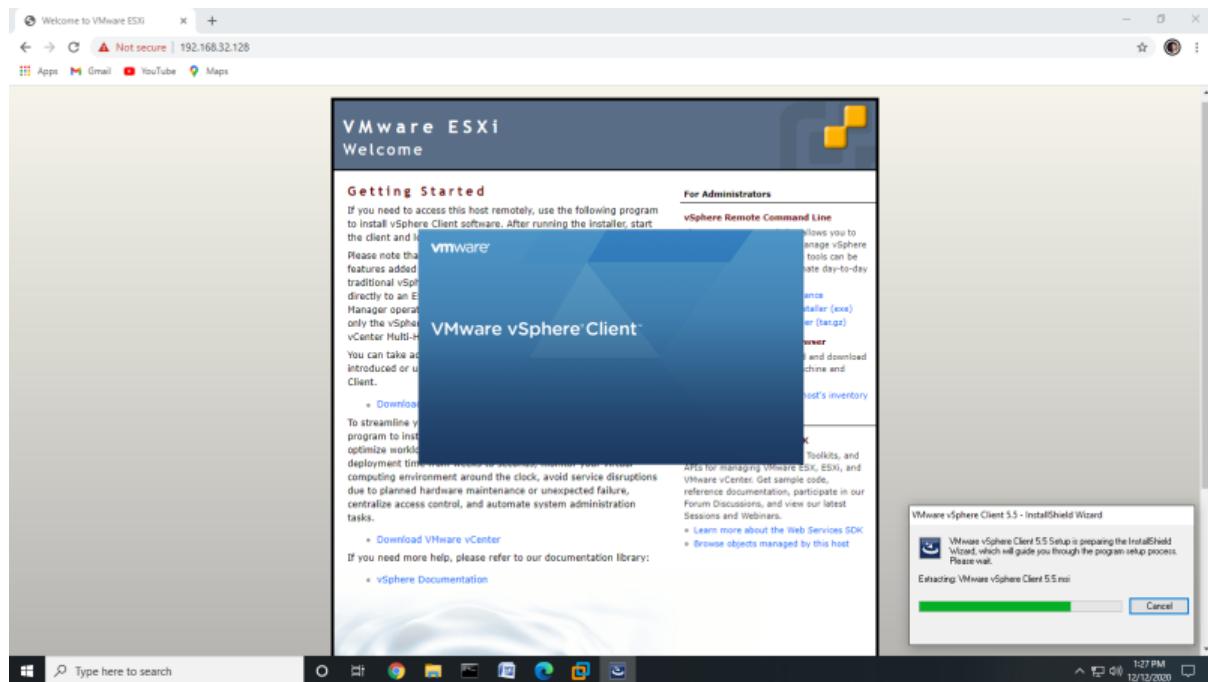


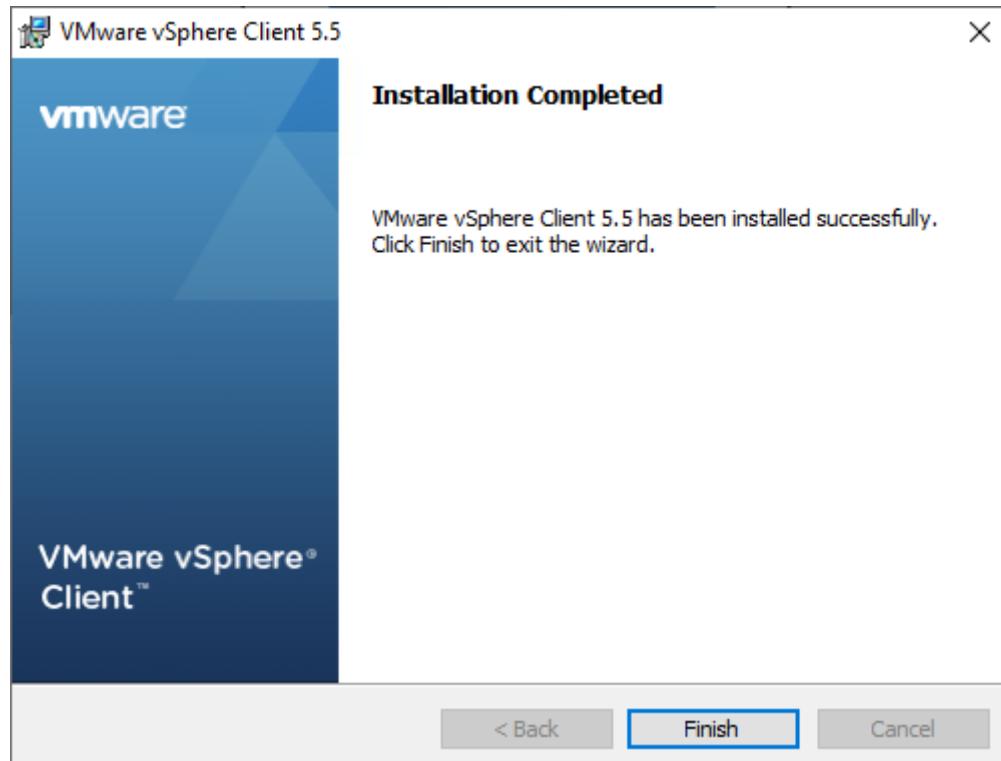
>> Go to downloads Folder and install by selecting run as administrator.



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

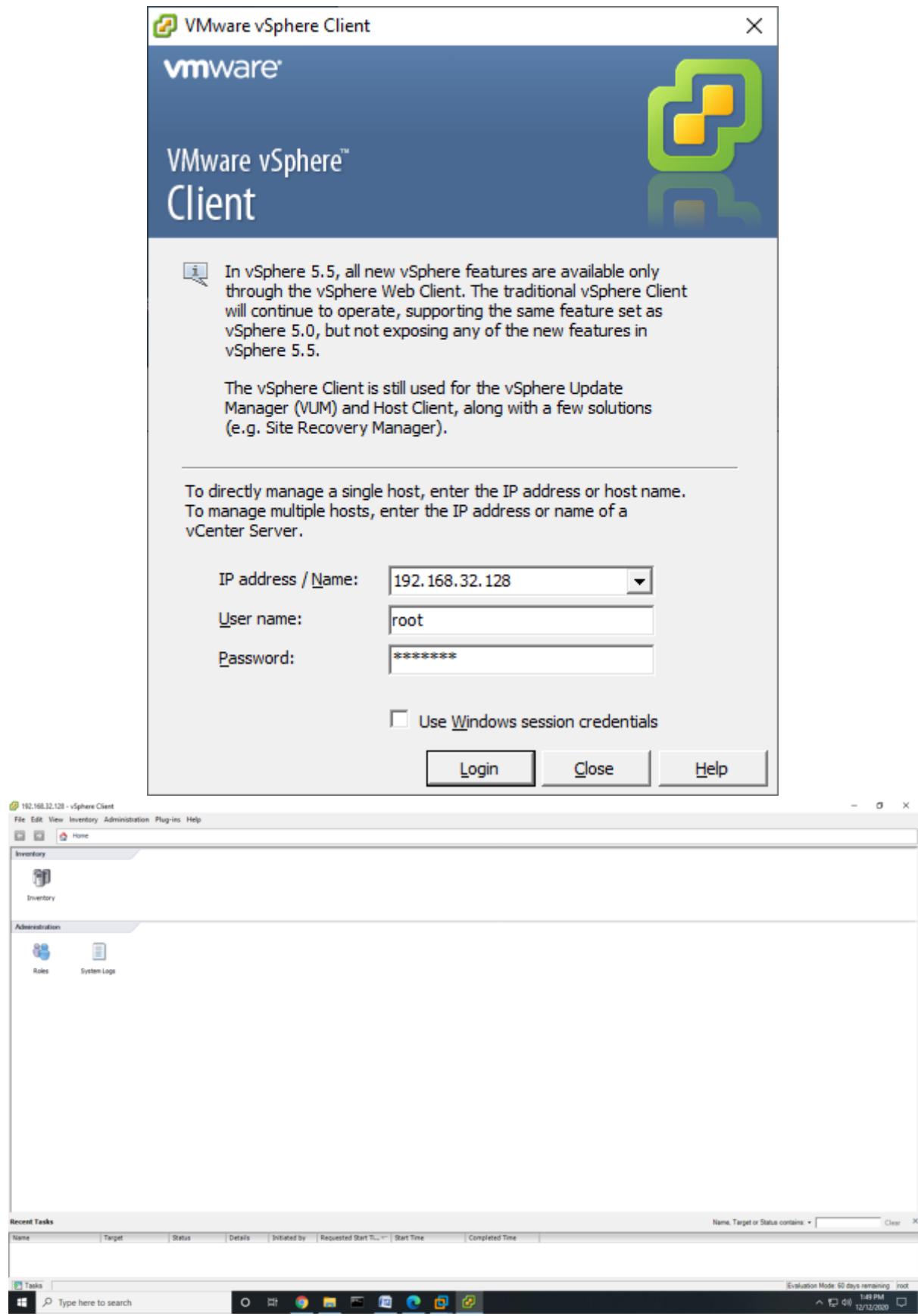


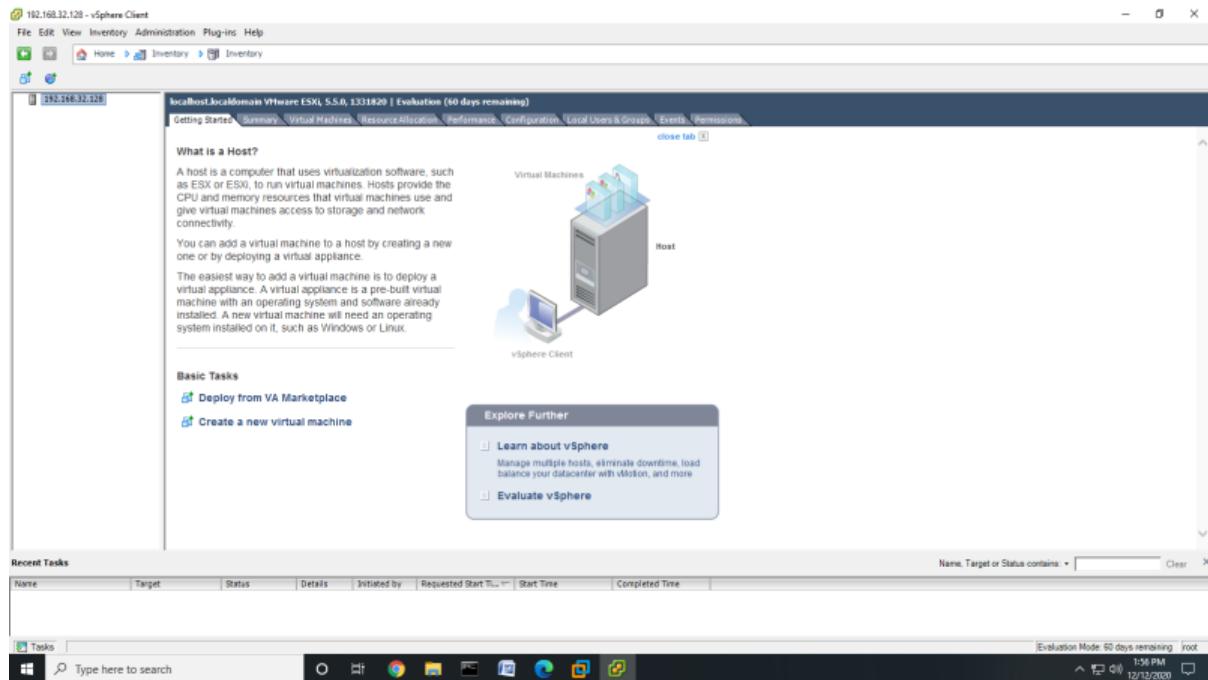




>> Open VMware vSphere Client

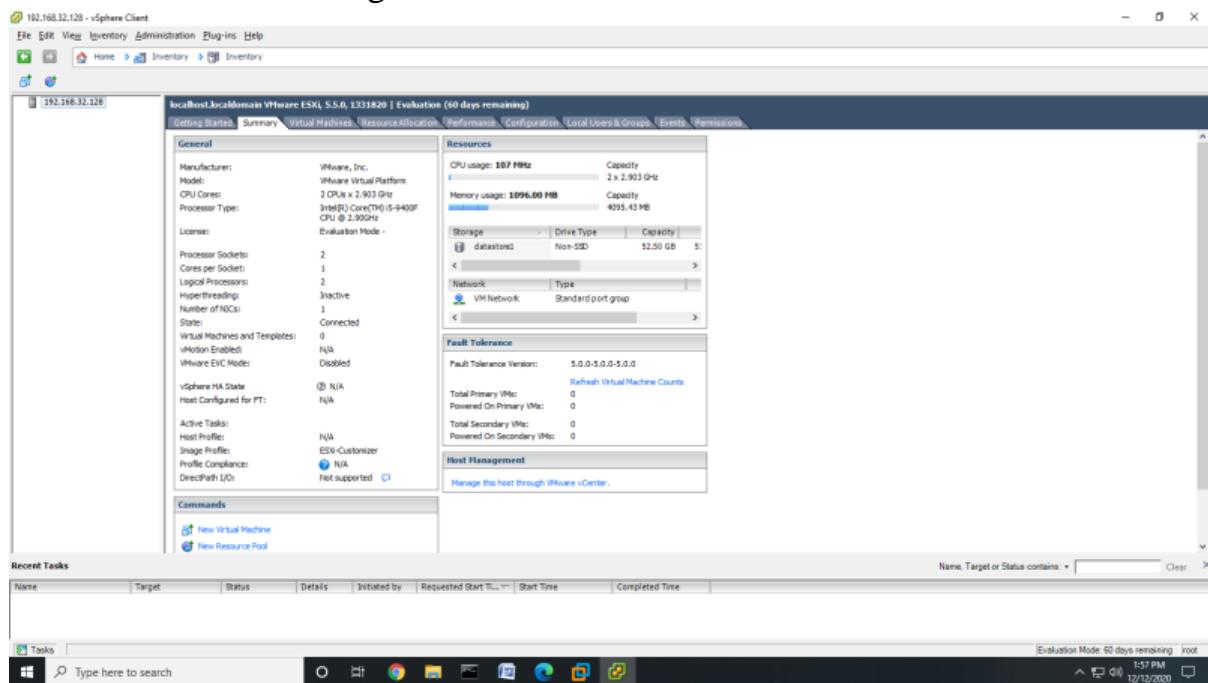
- Enter IP address (Which was assigned dynamically) (root)
- Enter Username and Password. (rjit123)





>> Select summary tab.

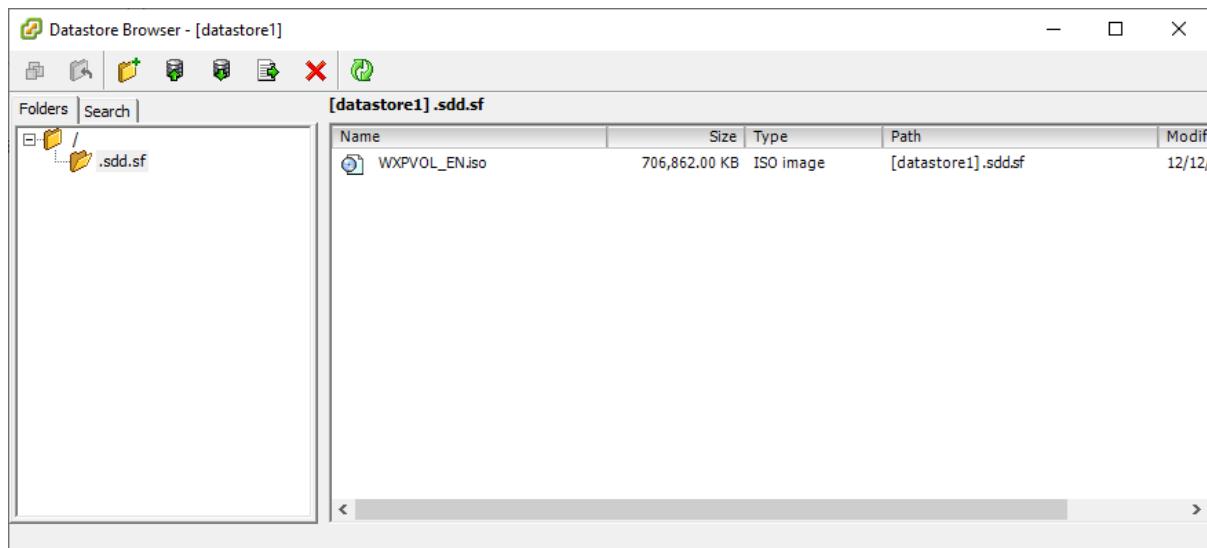
>> In Storage section, Select on datastore1 and Right-click on Browse Datastore to add iso image of Windows XP in Datastore.



>> Click on Upload Icon and Select Upload File.

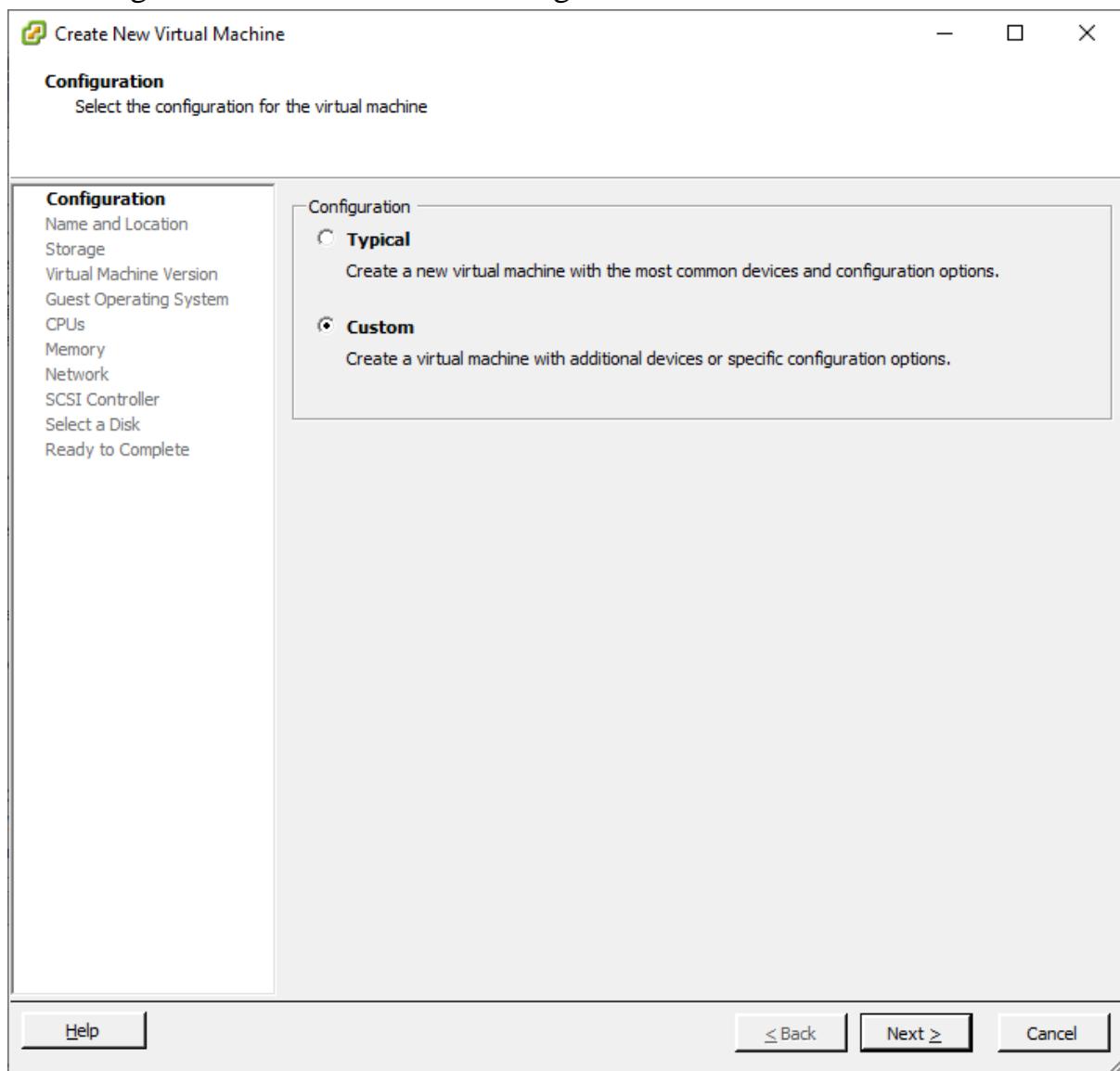
The image consists of three vertically stacked windows illustrating the file upload process:

- Datastore Browser - [datastore1]**: Shows the contents of the [datastore1] folder, which contains a single folder named ".sddsf".
- Upload Items**: A file selection dialog box. The left sidebar shows local drives and folders: Stream logo, Stream Overlay, Thumbnails, OneDrive, Attachments, Documents, Pictures, Public, This PC, 3D Objects, Desktop, and Documents. The main area lists files and folders from the "Sneha" folder on the Desktop. The file "WXPVOL\_EN.iso" is selected. The status bar at the bottom shows "File name: WXPVOL\_EN.iso".
- Uploading...**: A progress dialog box. It displays the source file path "C:\Users\CHINU\Desktop\Sneha\WXPVOL\_EN.iso", the destination path "From C:\Users\CHINU\Desktop\Sneha\WXPVOL\_EN.iso to [datastore1]", and the file name "WXPVOL\_EN.iso". A progress bar indicates the upload is 1 minute(s) and 3 second(s) remaining. A "Cancel" button is visible at the bottom right.

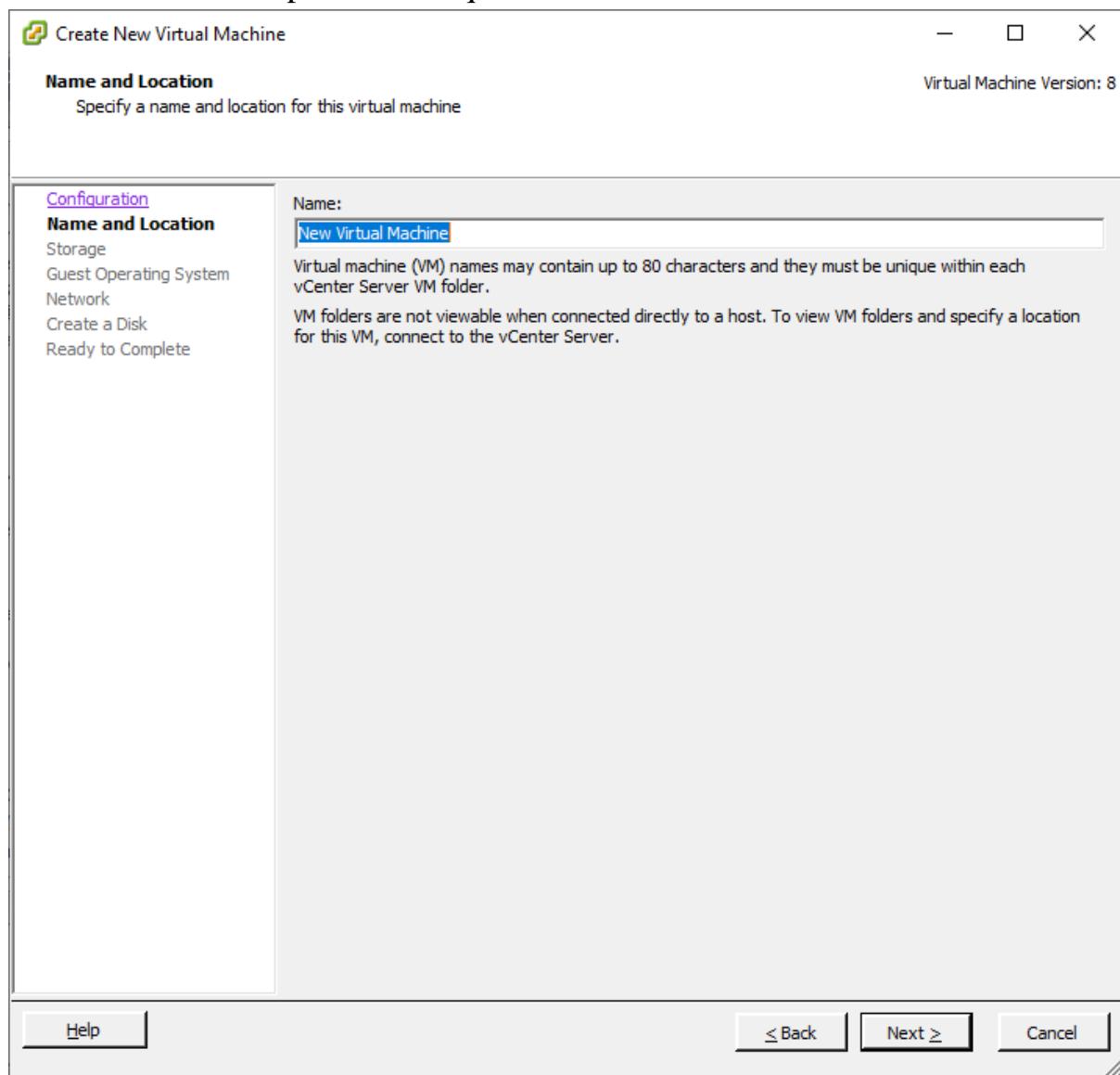


>> Click on File >> New >> Virtual Machine.

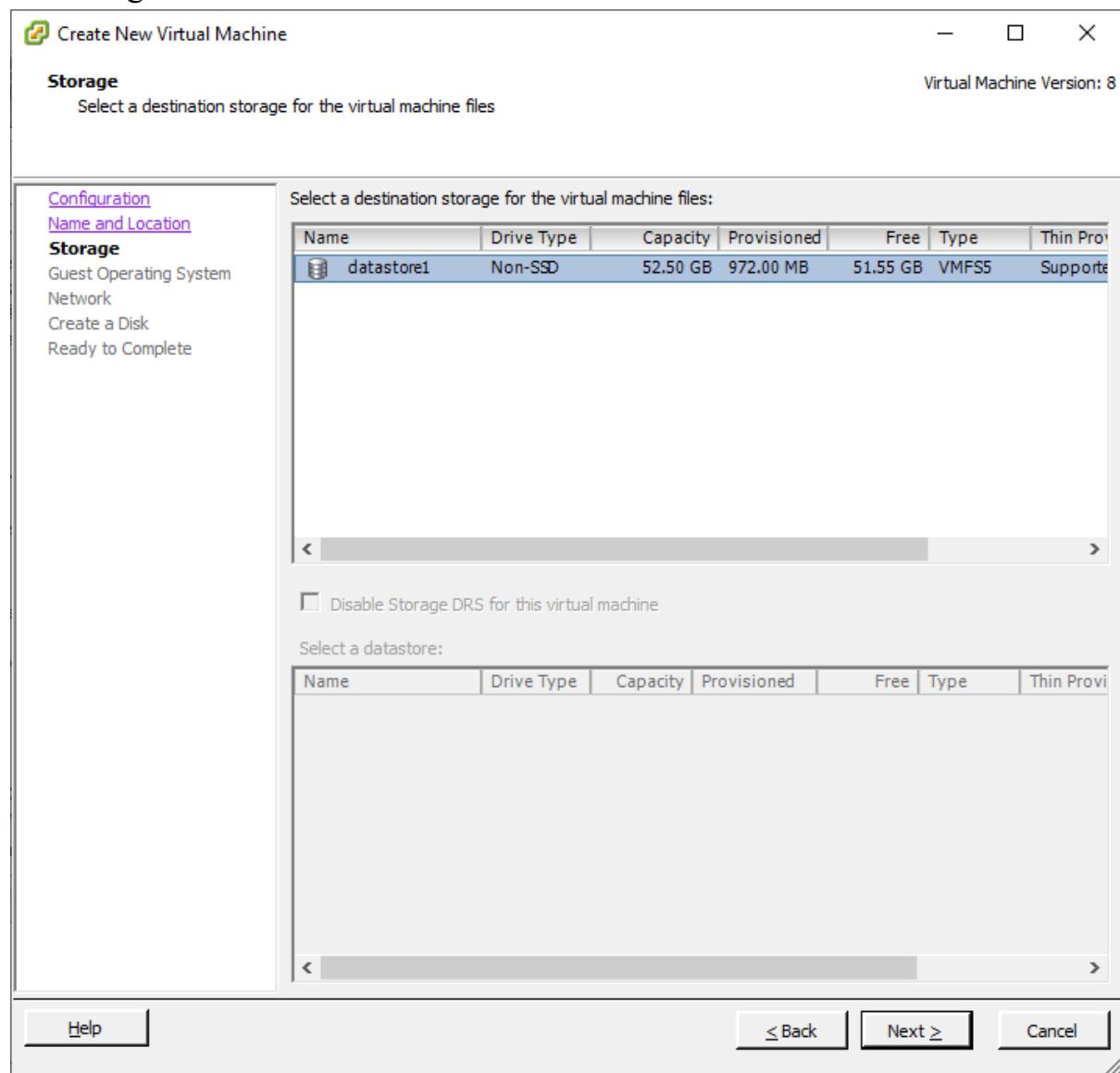
>> Configuration : Select Custom configuration.

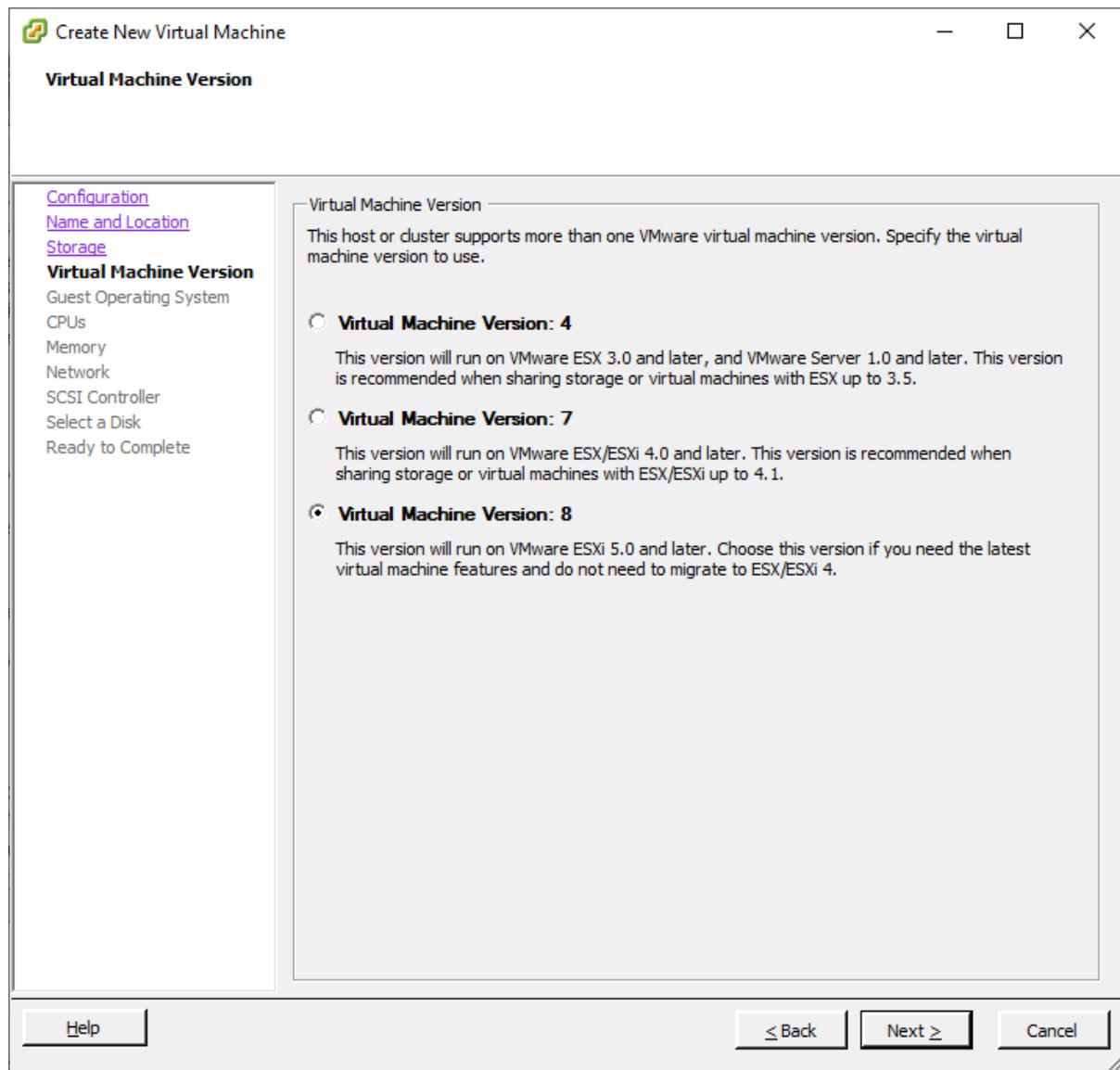


>> Name the file as per Your Requirement. Click Next.

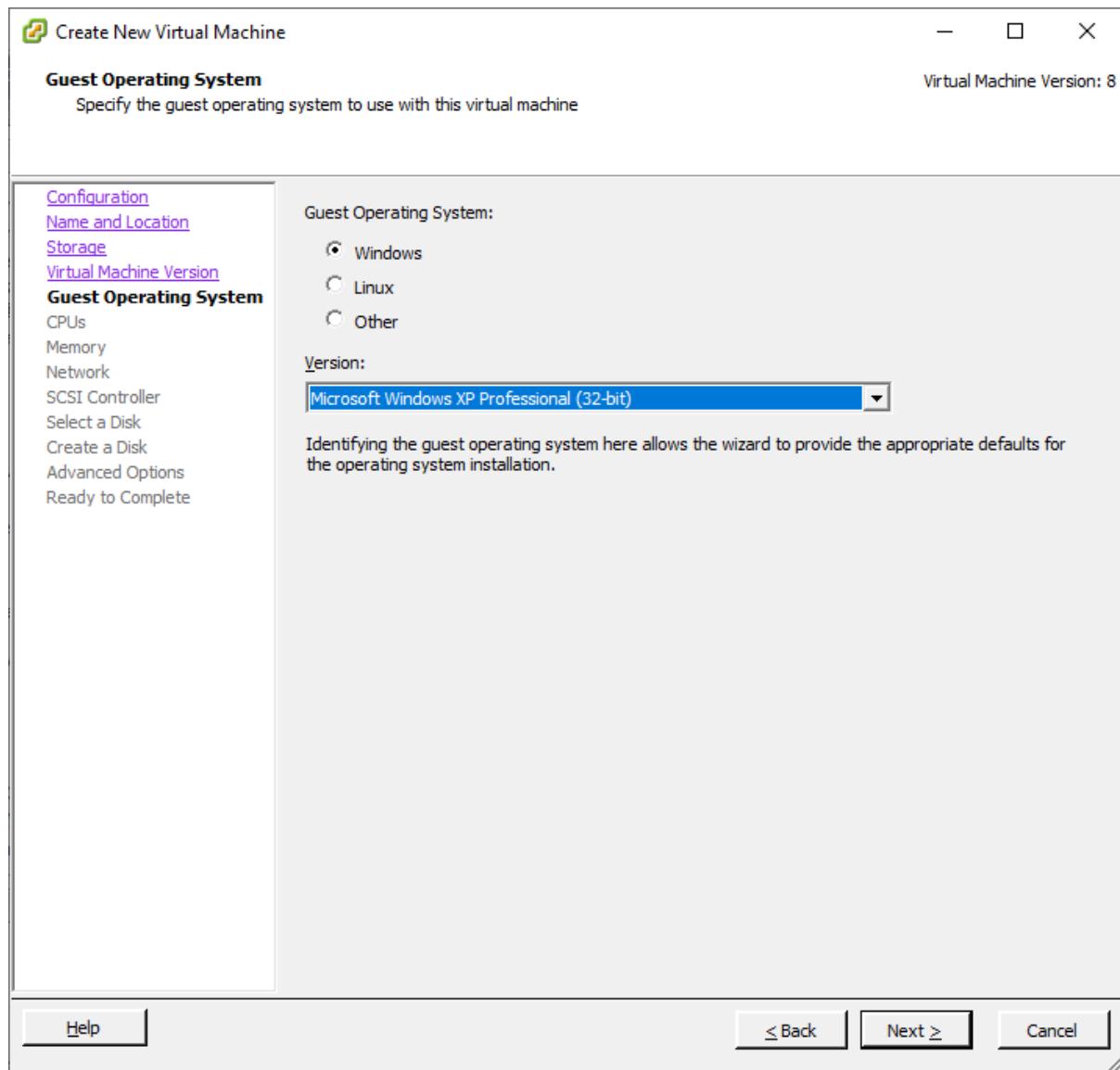


>> Storage: Select datastore1 and click “Next”.





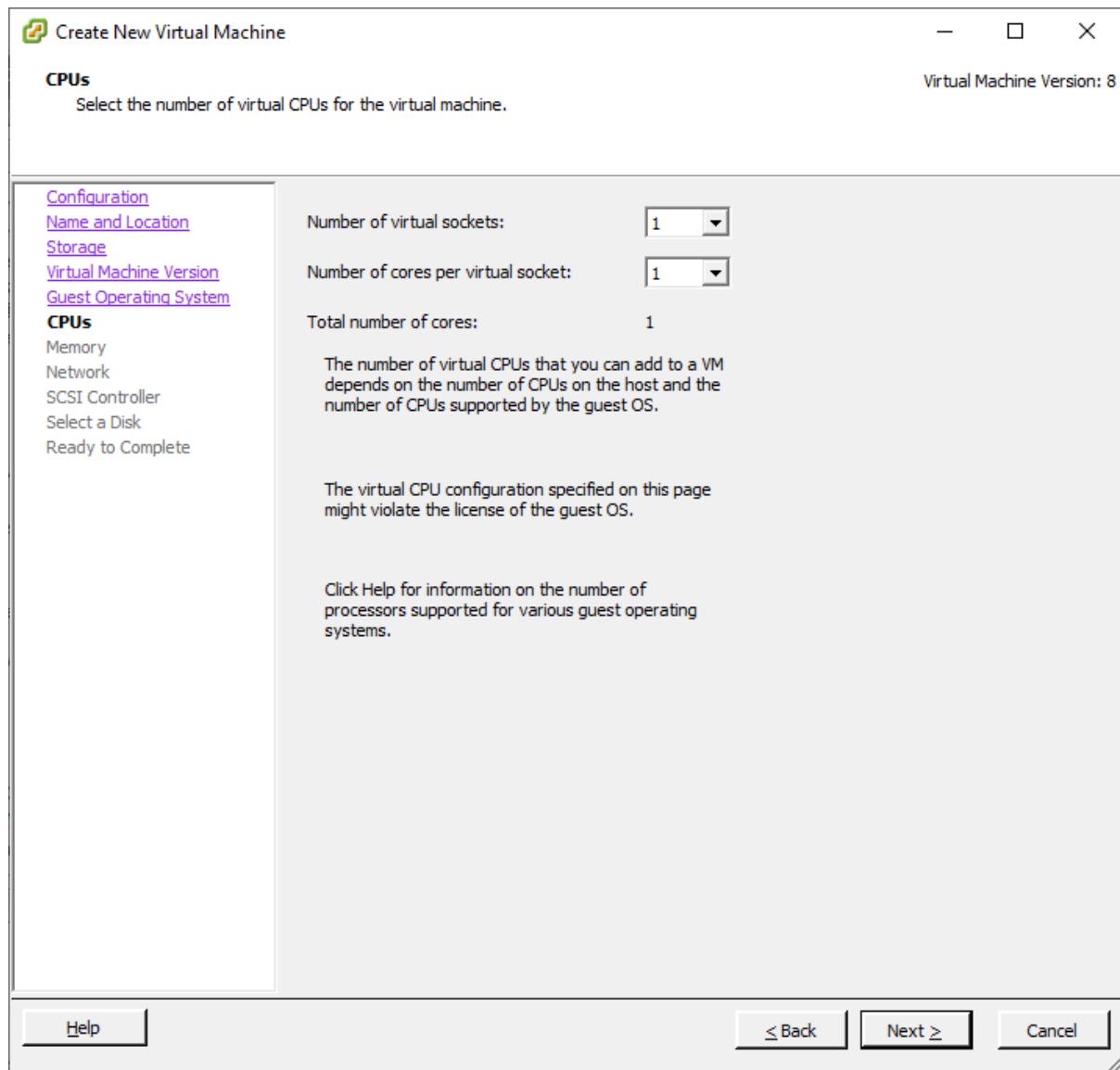
>> **Guest Operating System:** Windows  
**Version:** Microsoft windows XP Professional (32-bit)



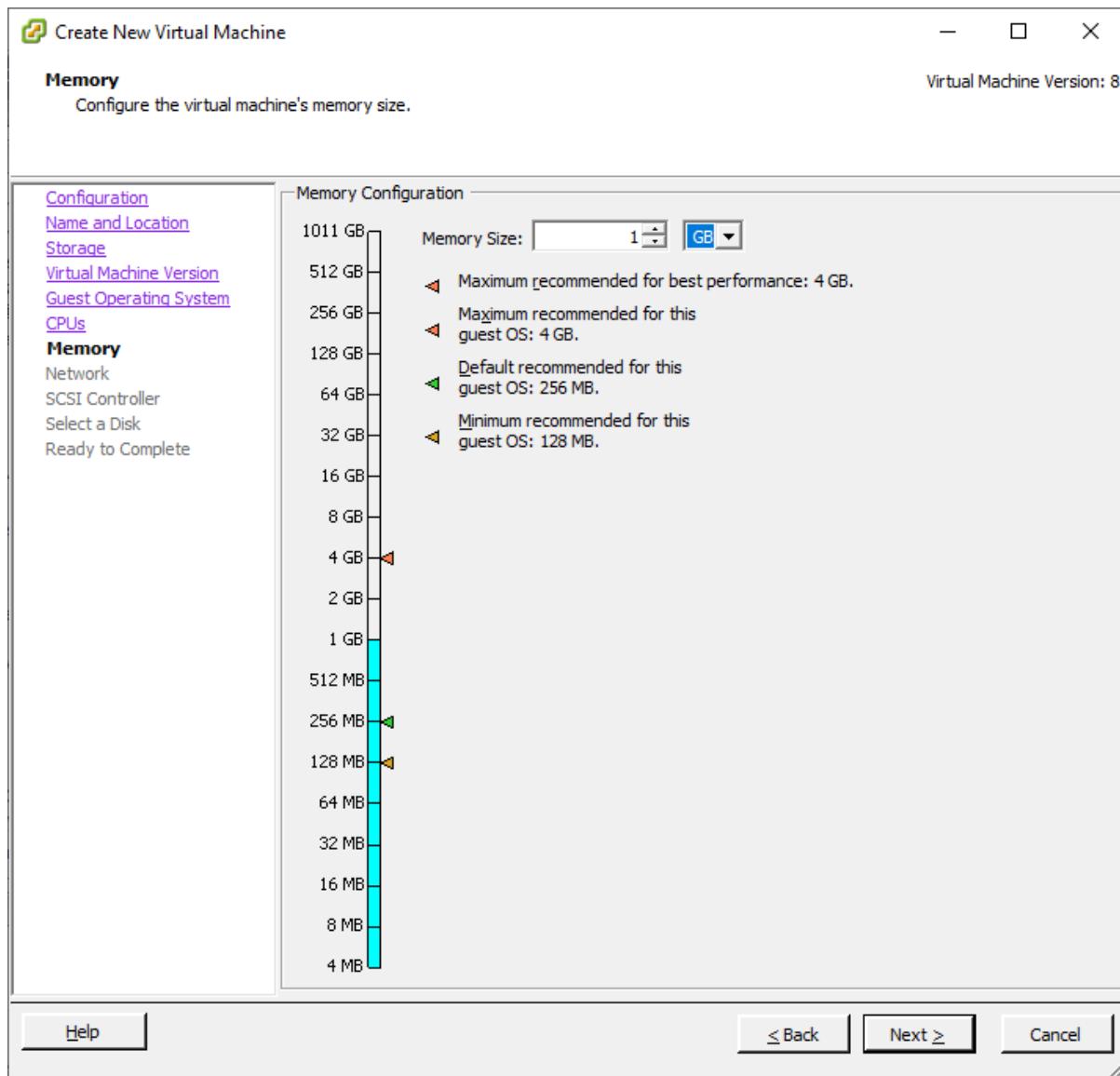
**CPUs:**

>> Number of virtual sockets: 1

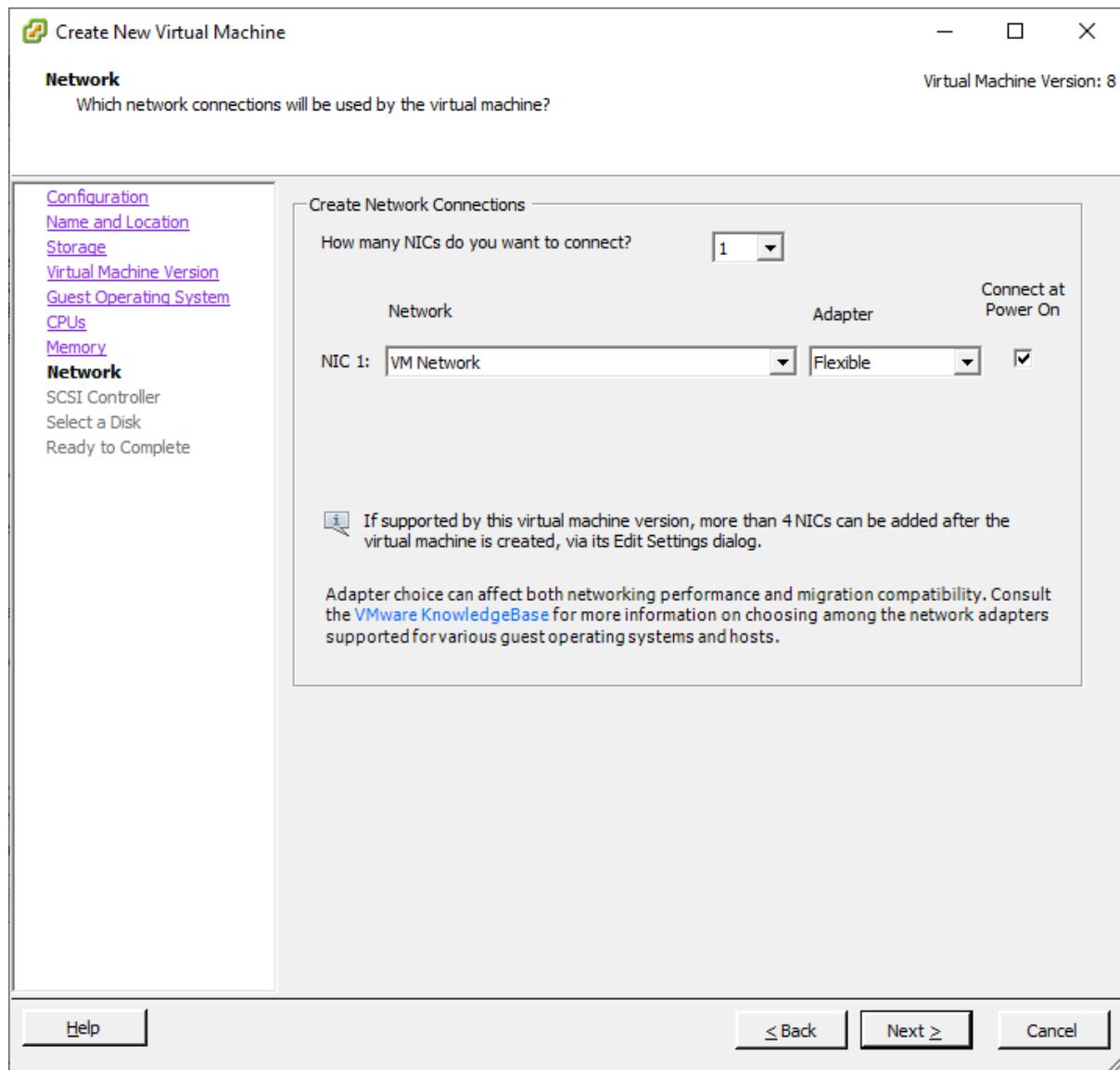
Number of cores per virtual socket: 1



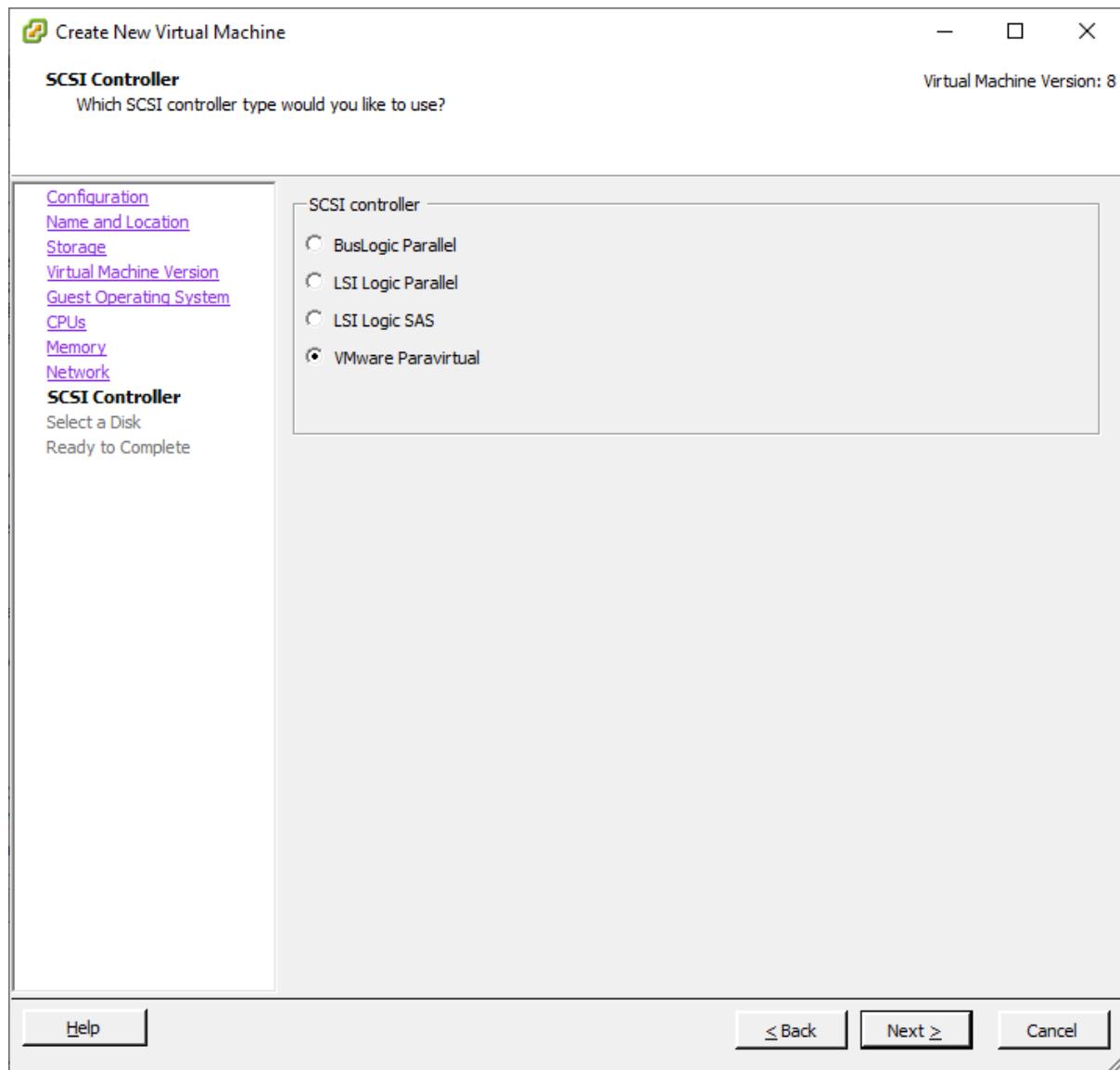
>> **Memory:** 1 GB



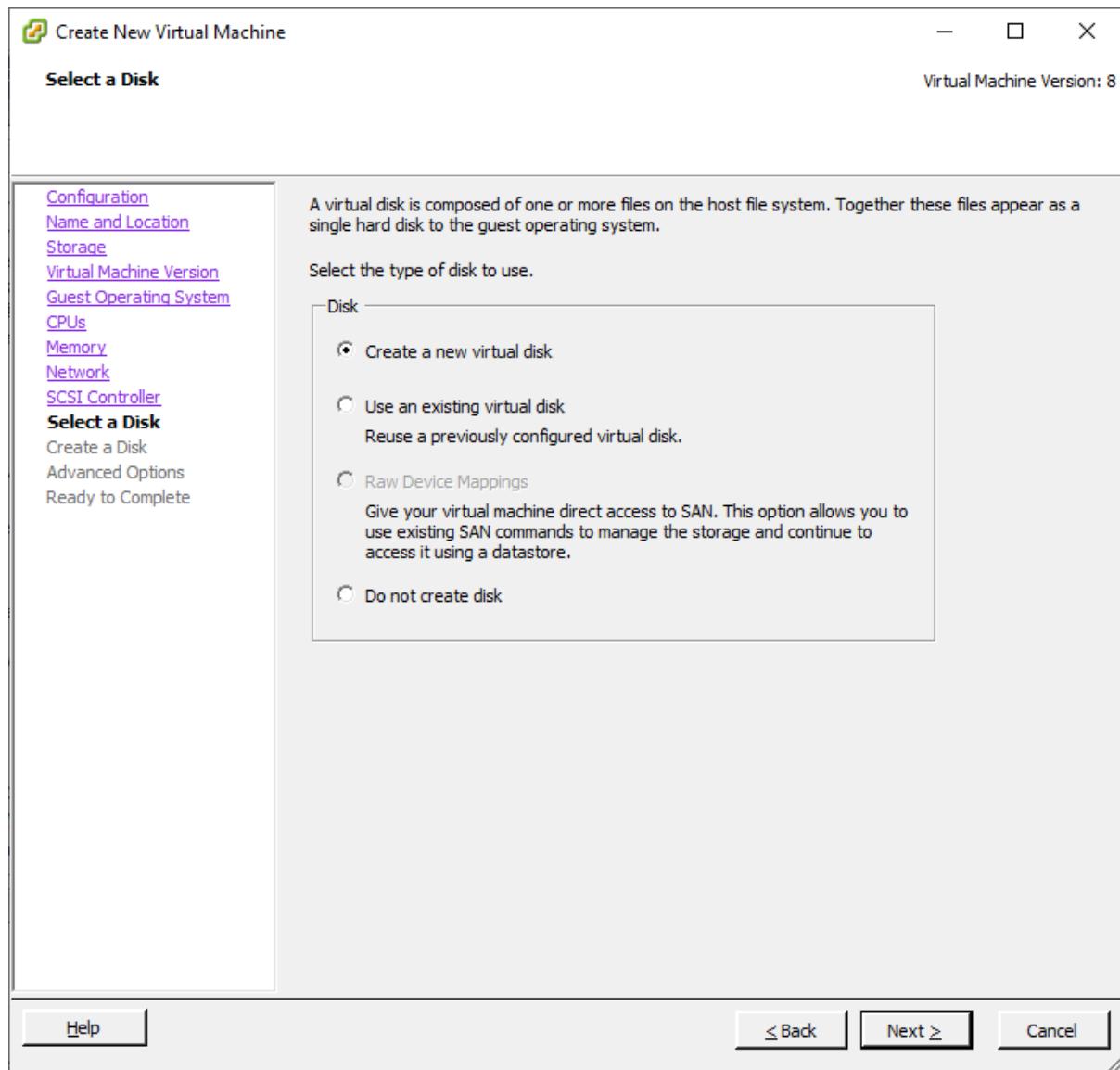
>> NICs: Number of NICs : 1



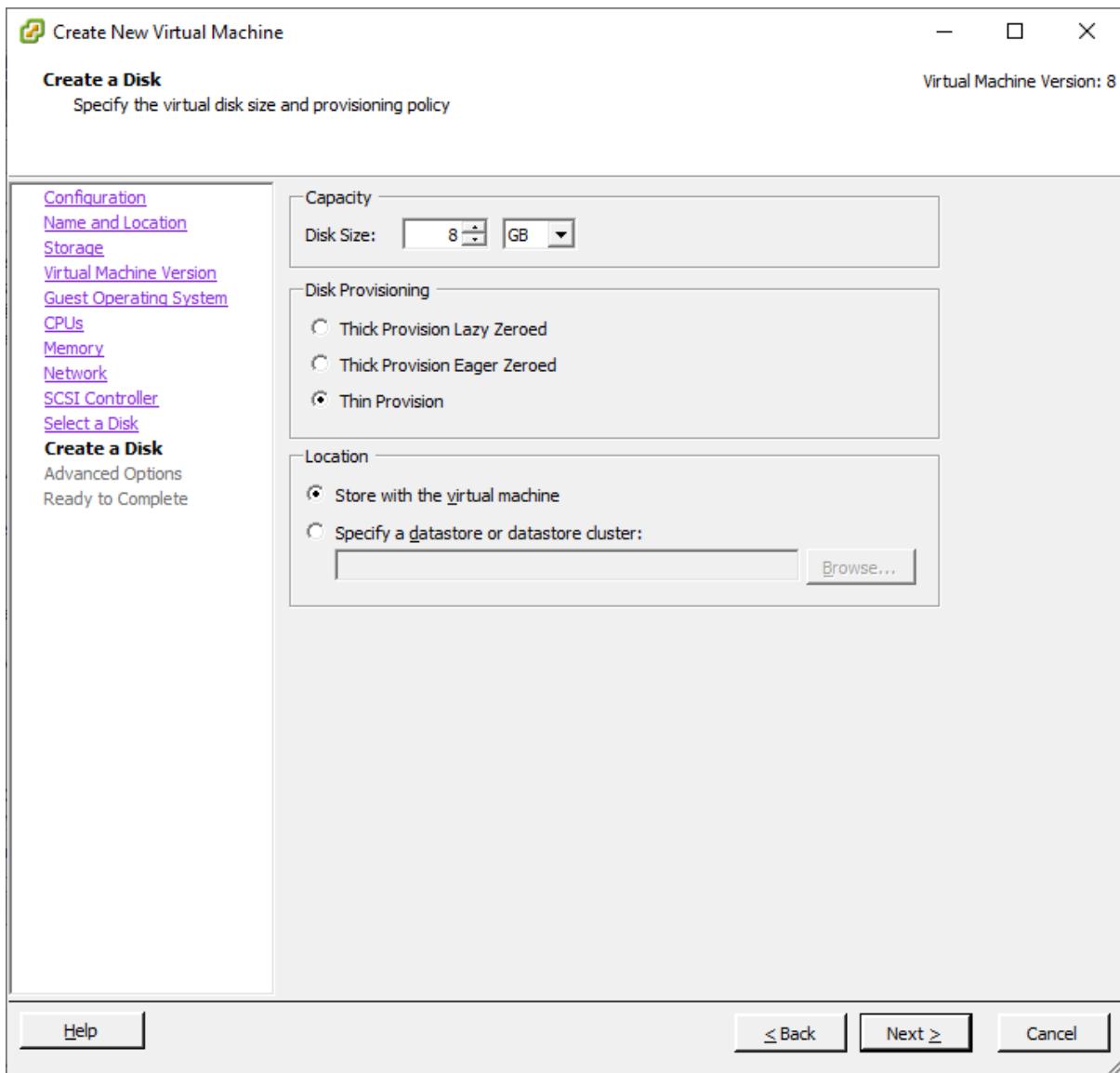
>> **SCSI Controller:** VMware Paravirtual

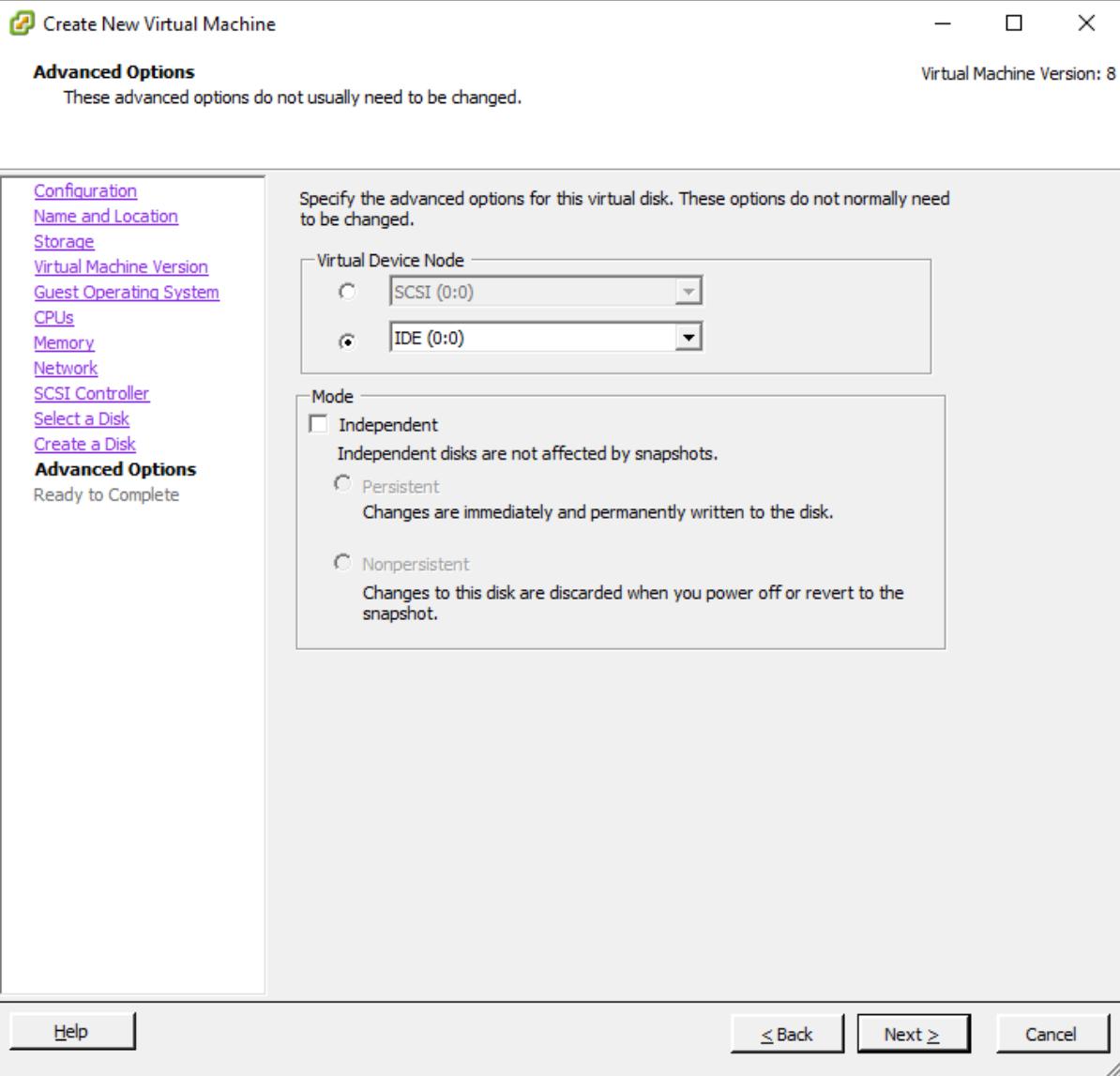


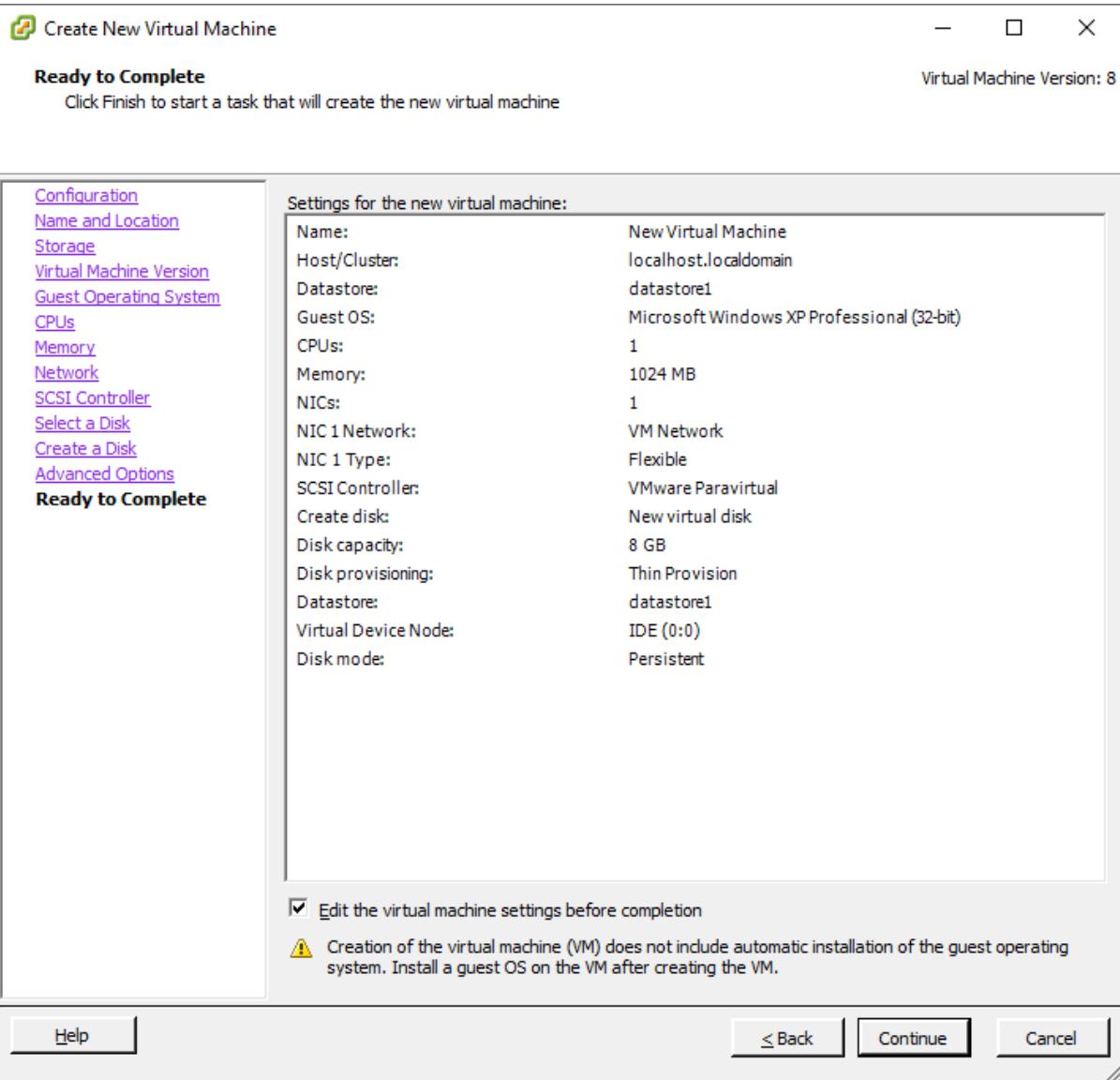
**Select a Disk:** Create a new virtual disk.



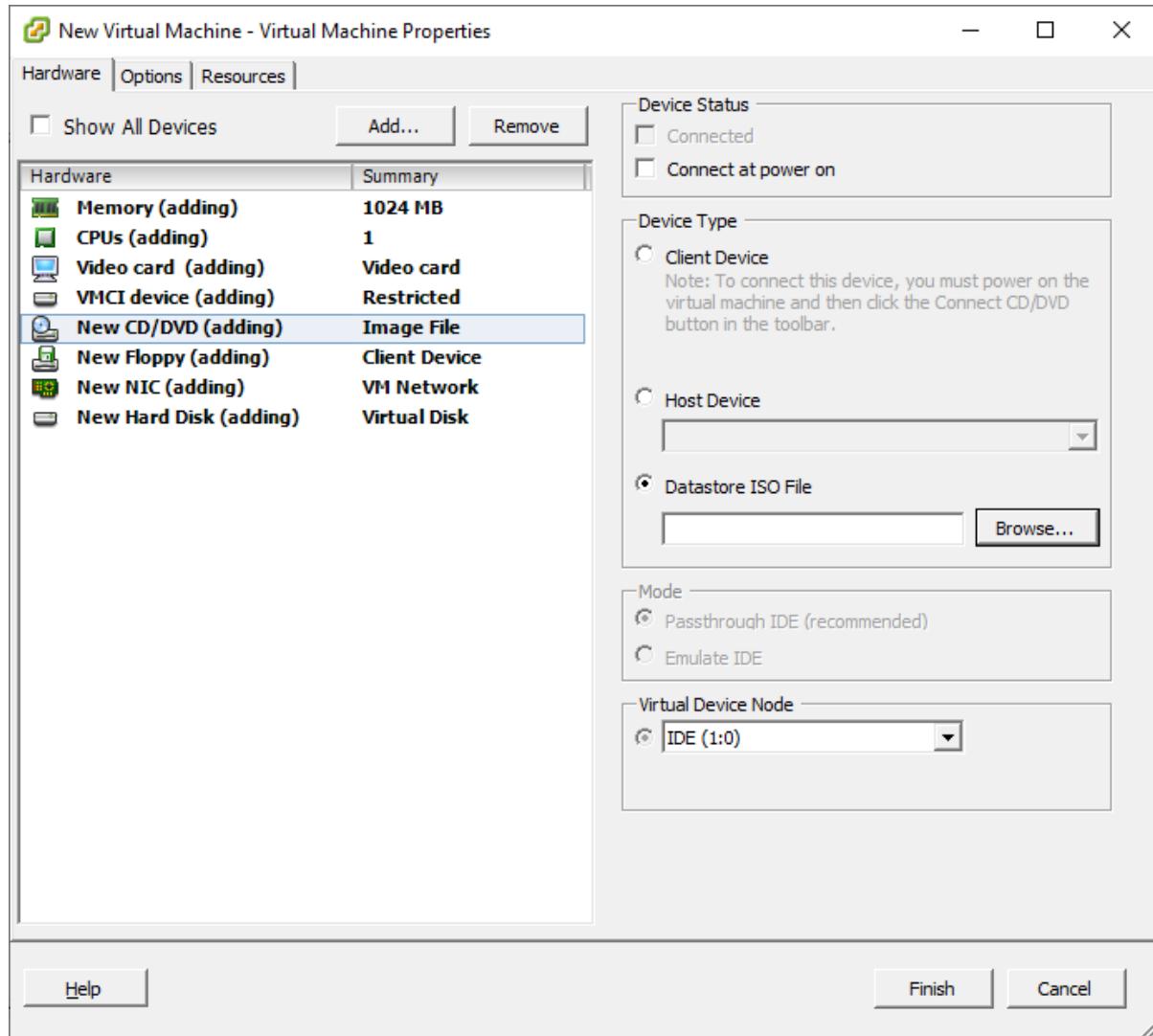
**>> Disk Provisioning: Select Thin Provision.**

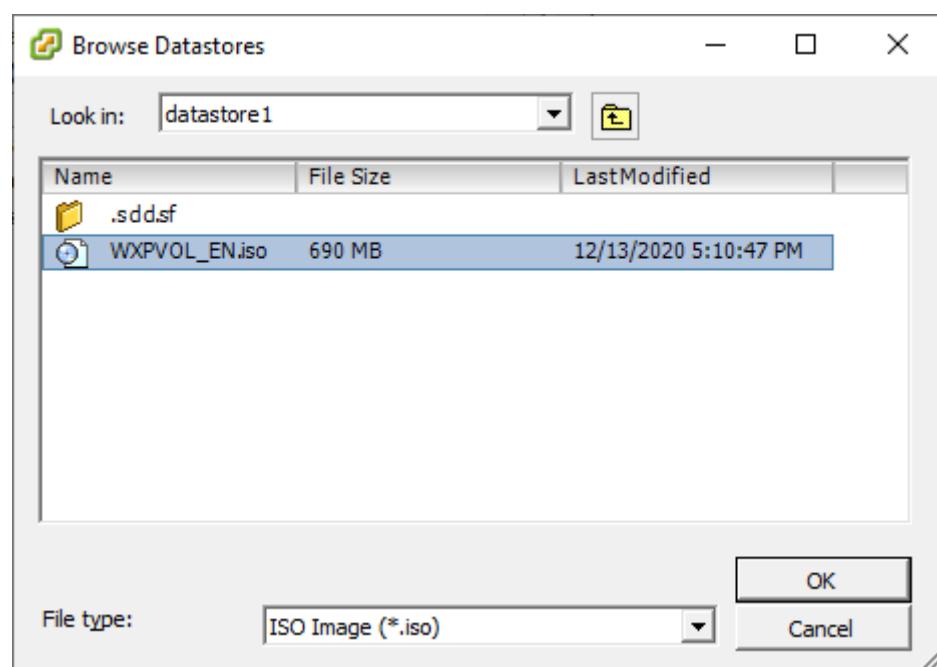
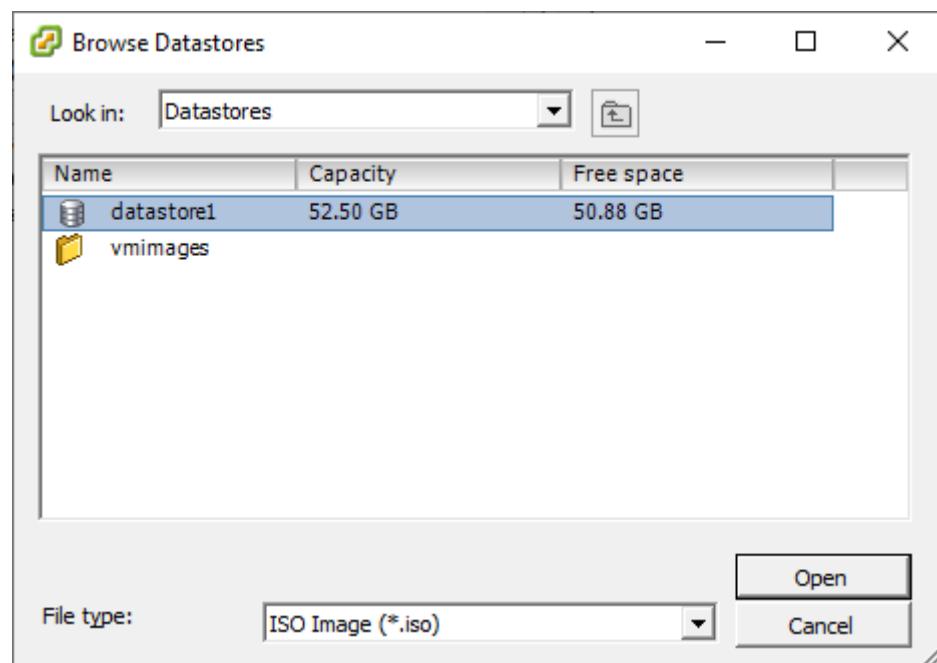




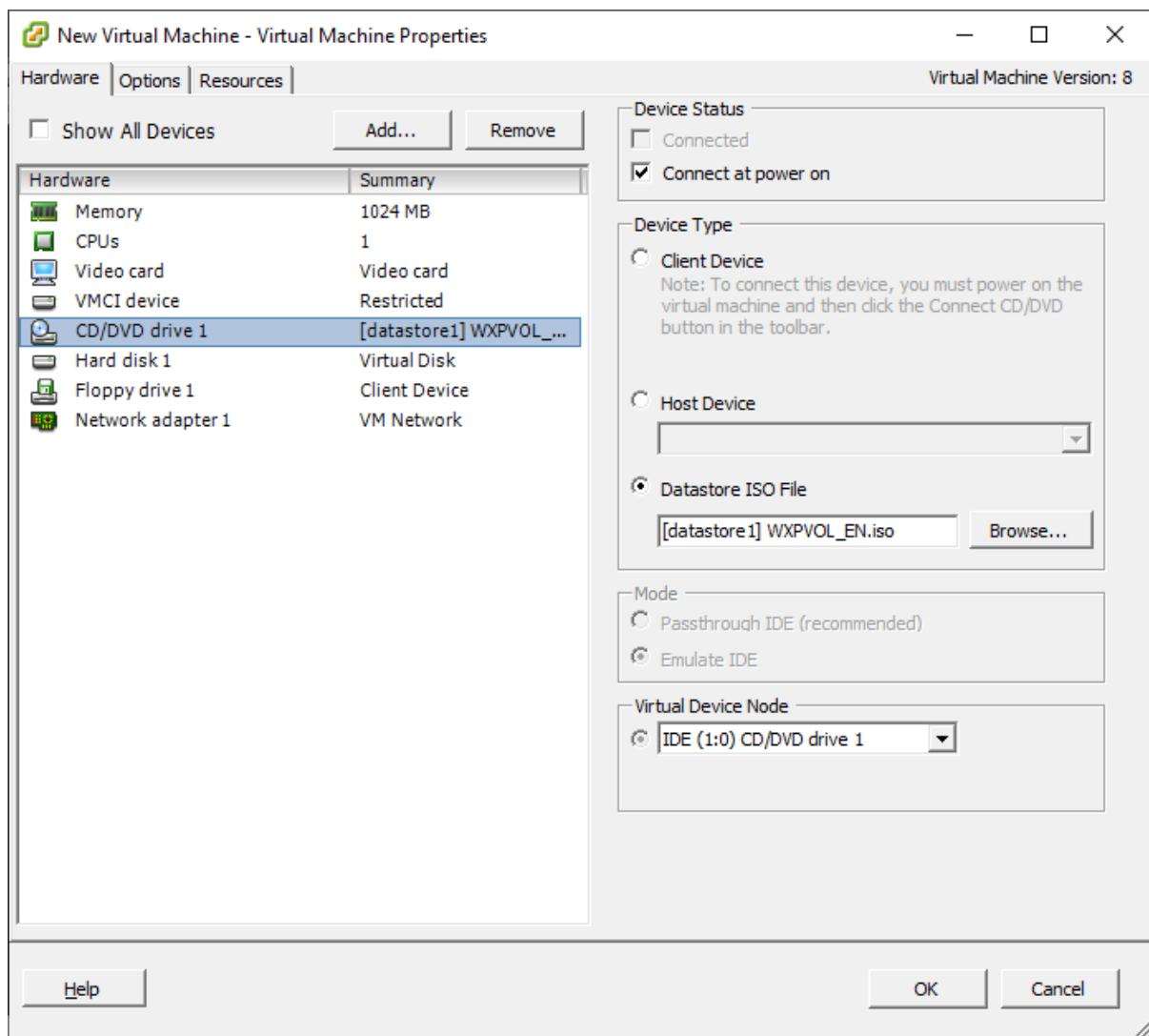


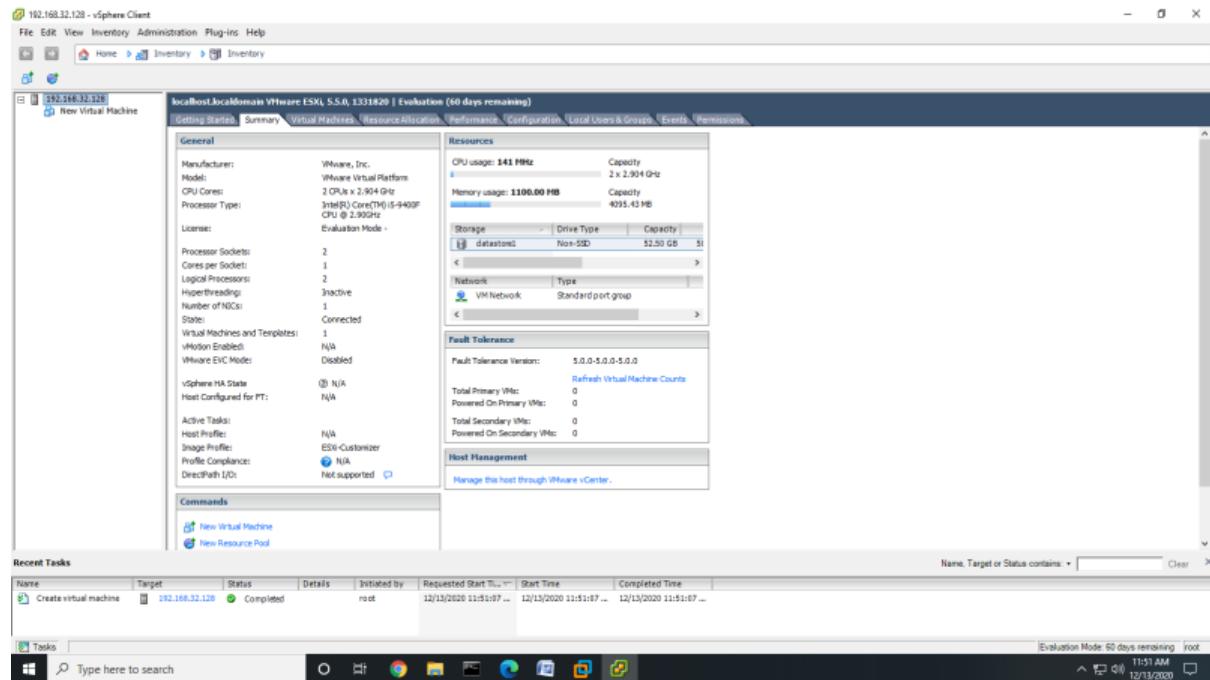
>> Go to New CD/DVD >> Select Datastore ISO File >> Click Browse >> datastore1 >> WXPVOL\_EN.iso. Click OK.



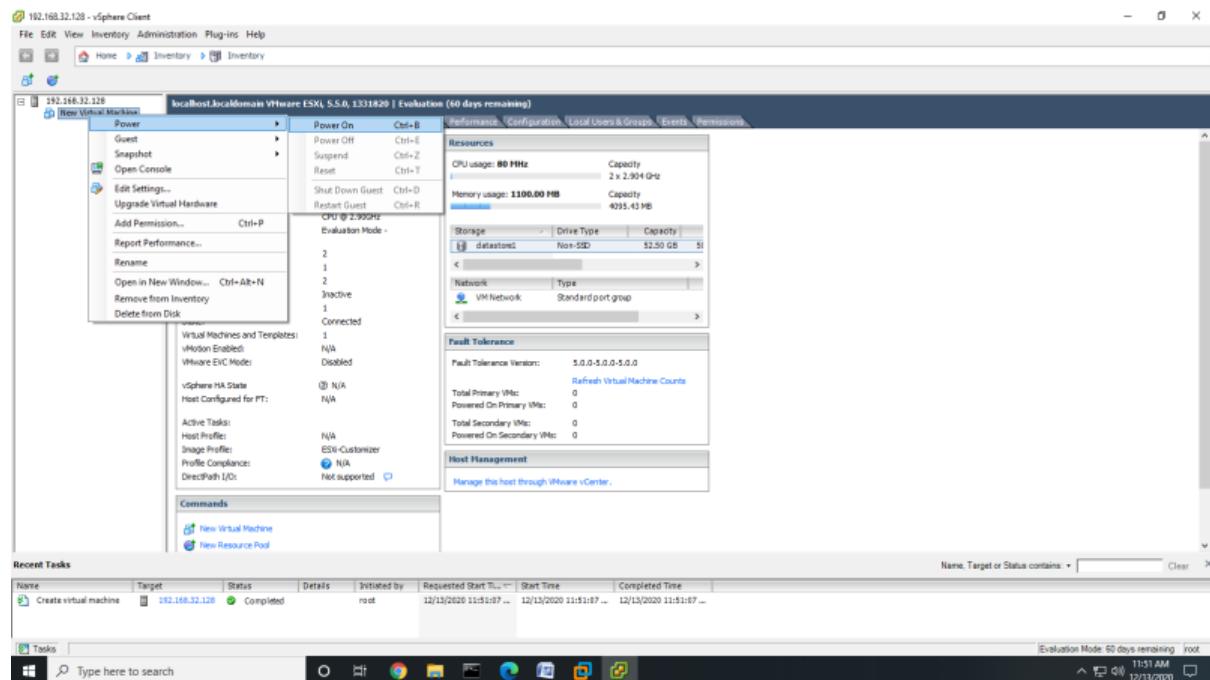


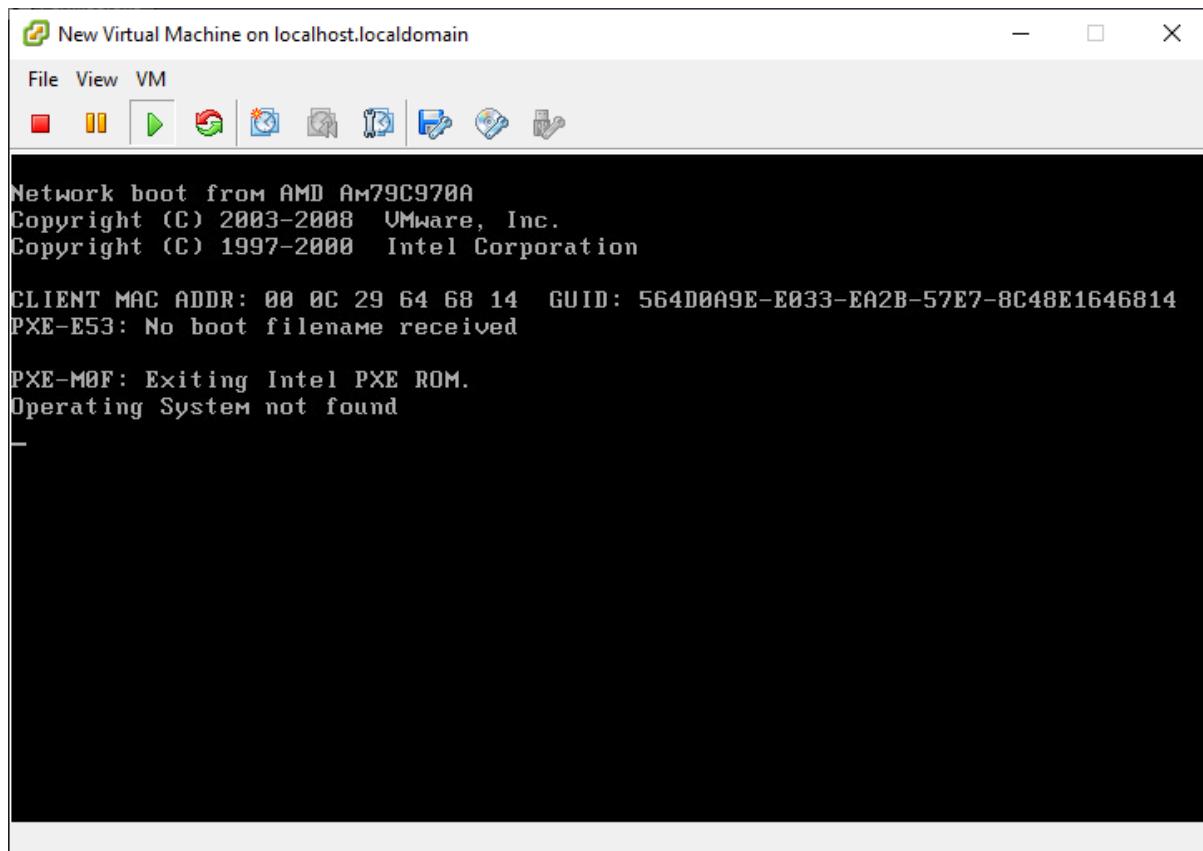
>> Click Check Box Connect at power on.





>> Right Click on New Virtual Machine >> Power >> Power On.

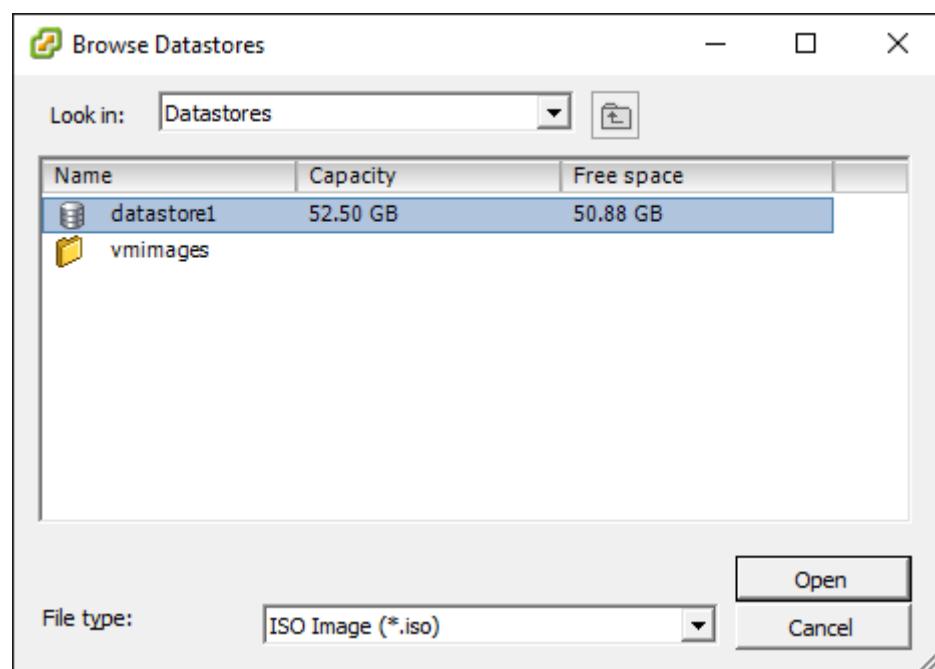
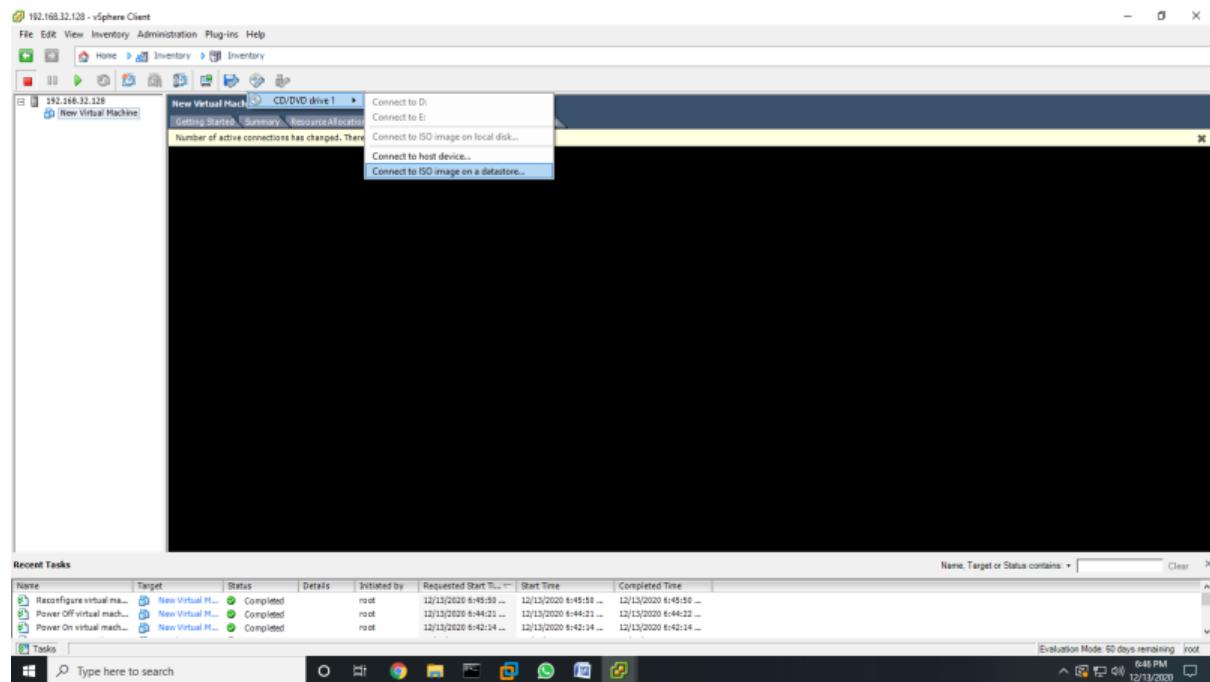


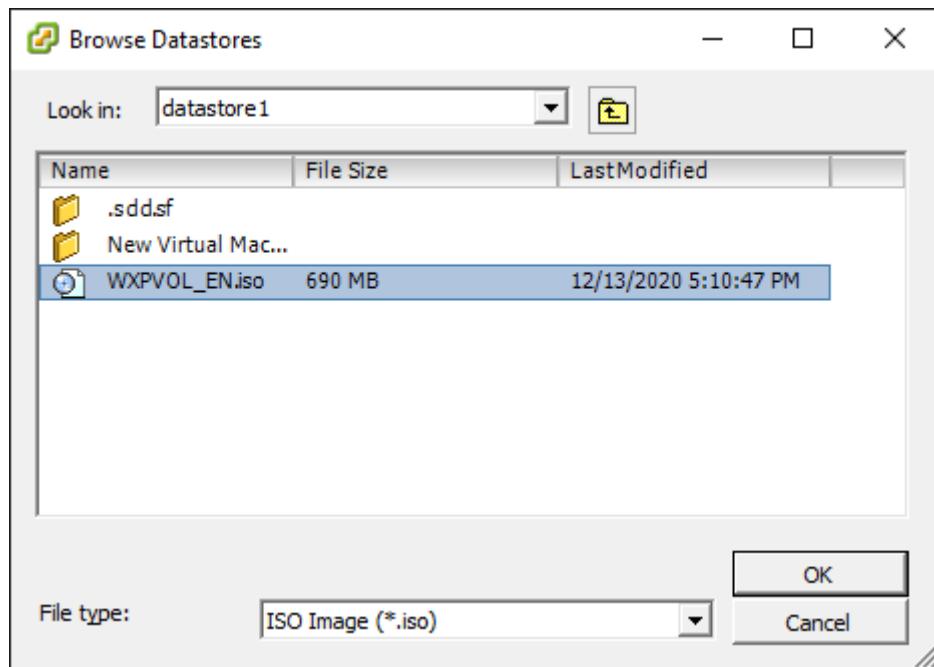


>> If this error occurs then follow the below steps:

>> Solution 1 :

>> Go to connect or disconnect CD/DVD devices of the virtual machine>> CD drive 1>> Connect ISO image file on a database>> Open Database 1>>Select WXPVOL\_EN.iso>>Click OK>>Power ON the virtual machine.

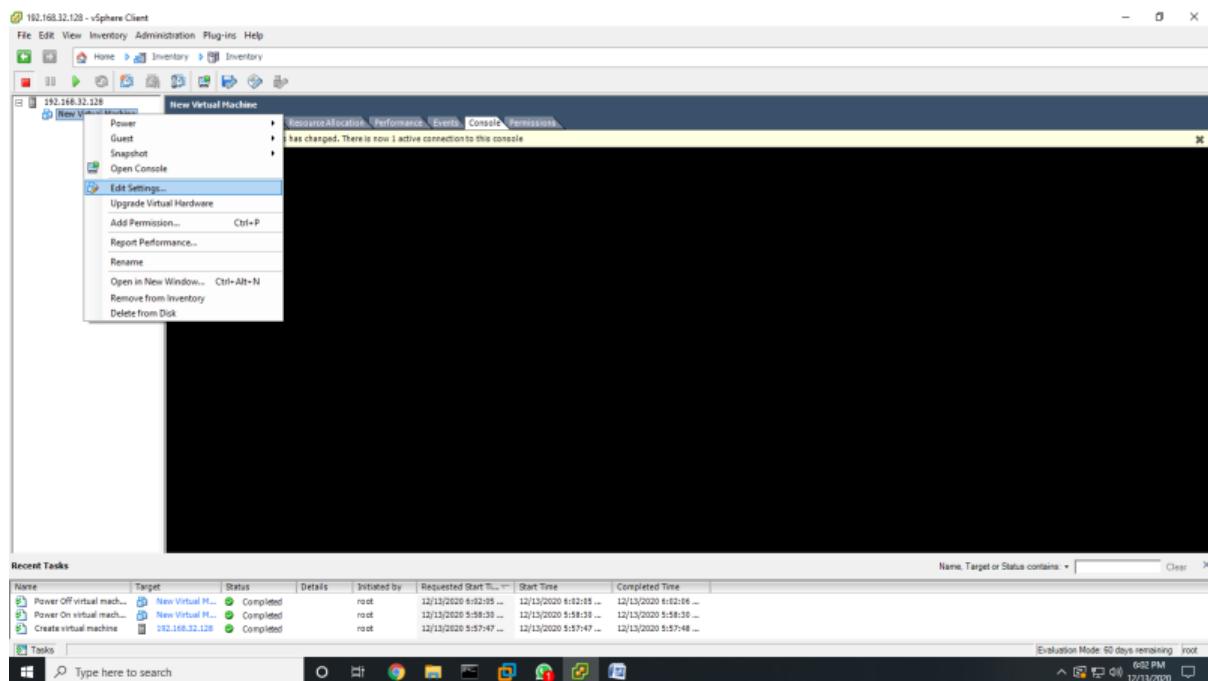




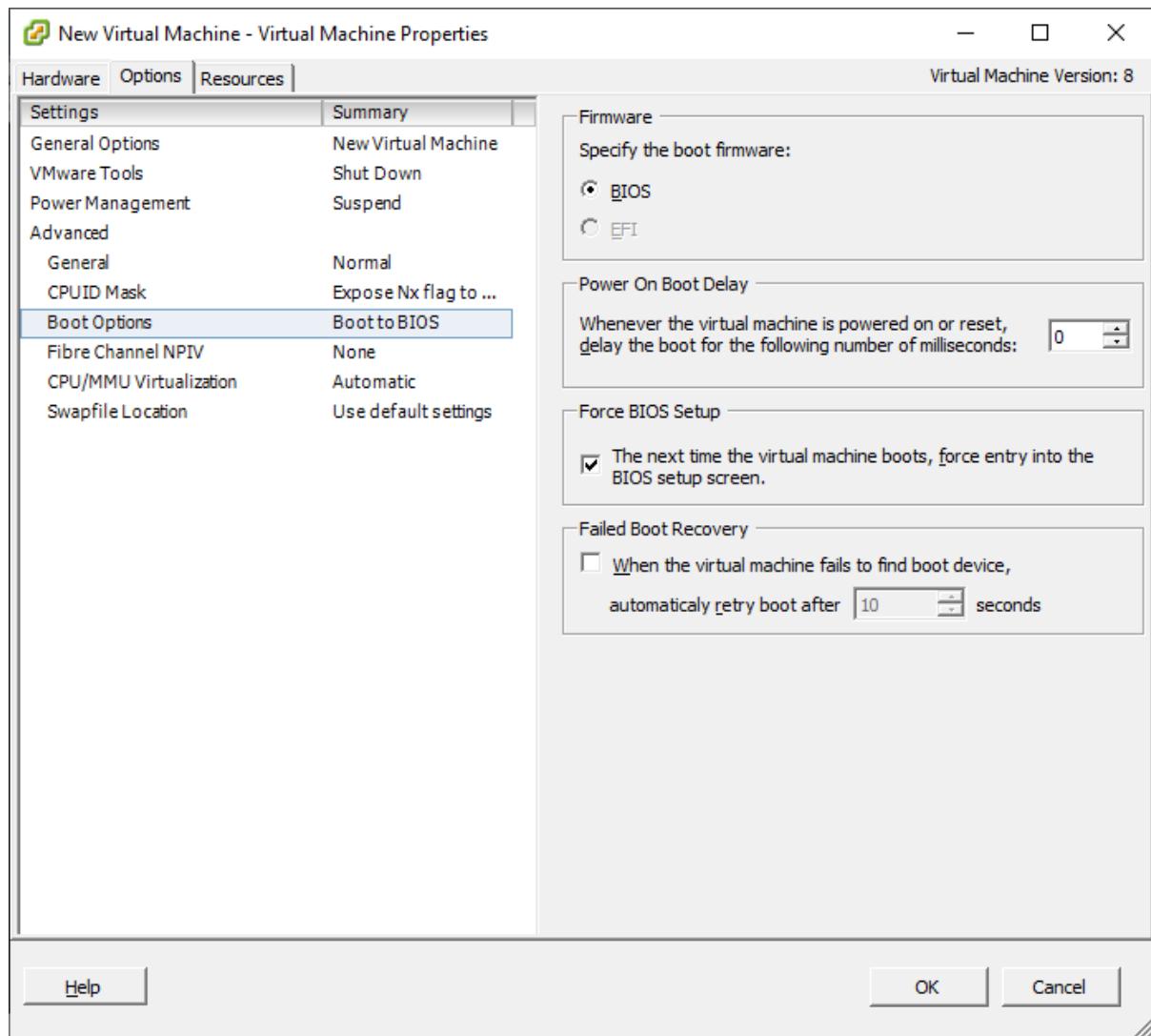
## Solution 2 :

>> Perform these steps after Solution 1 doesn't work.

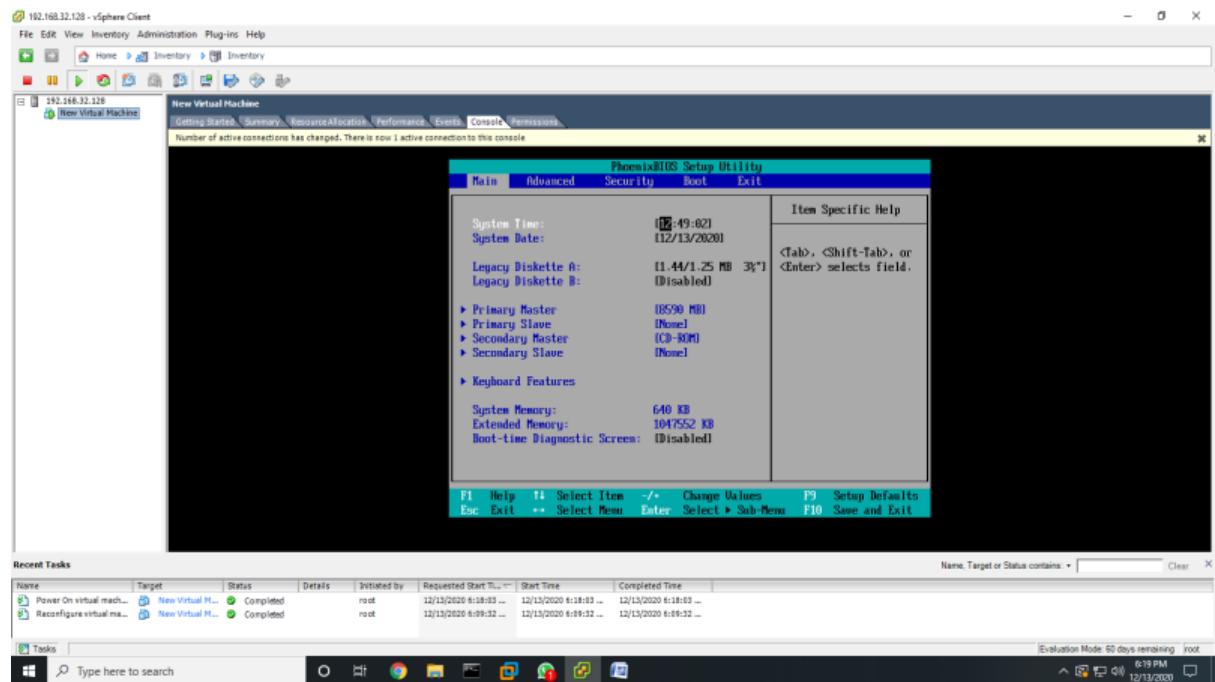
1. Power off the Virtual Machine.
2. Right Click >> Edit Settings.



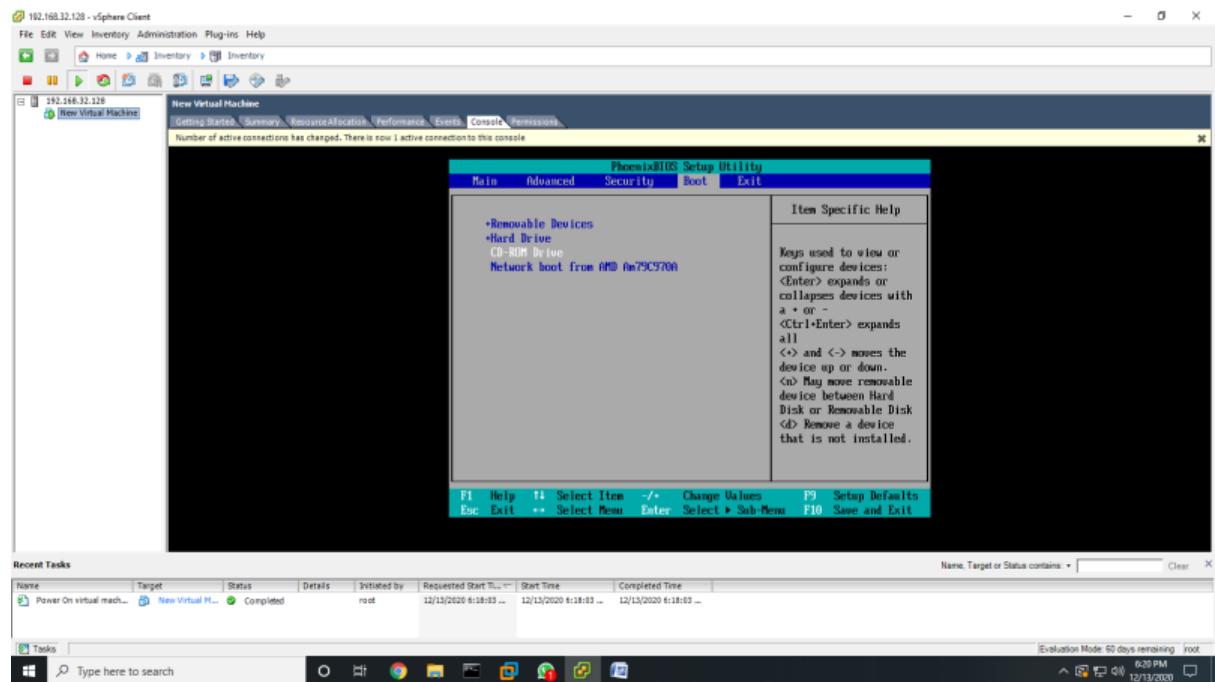
3. Options>>Boot Options.
4. Check The box () Force BIOS Setup and press OK.

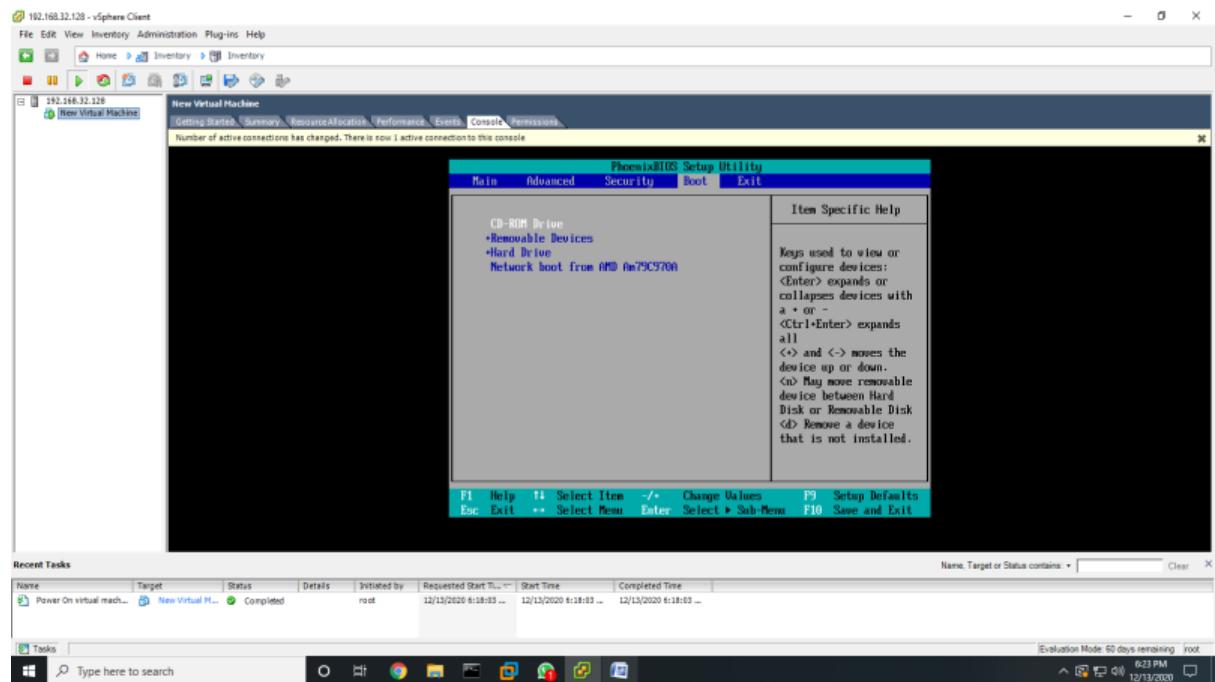


5. Power on the Virtual Machine.
6. Boot Menu will appear.

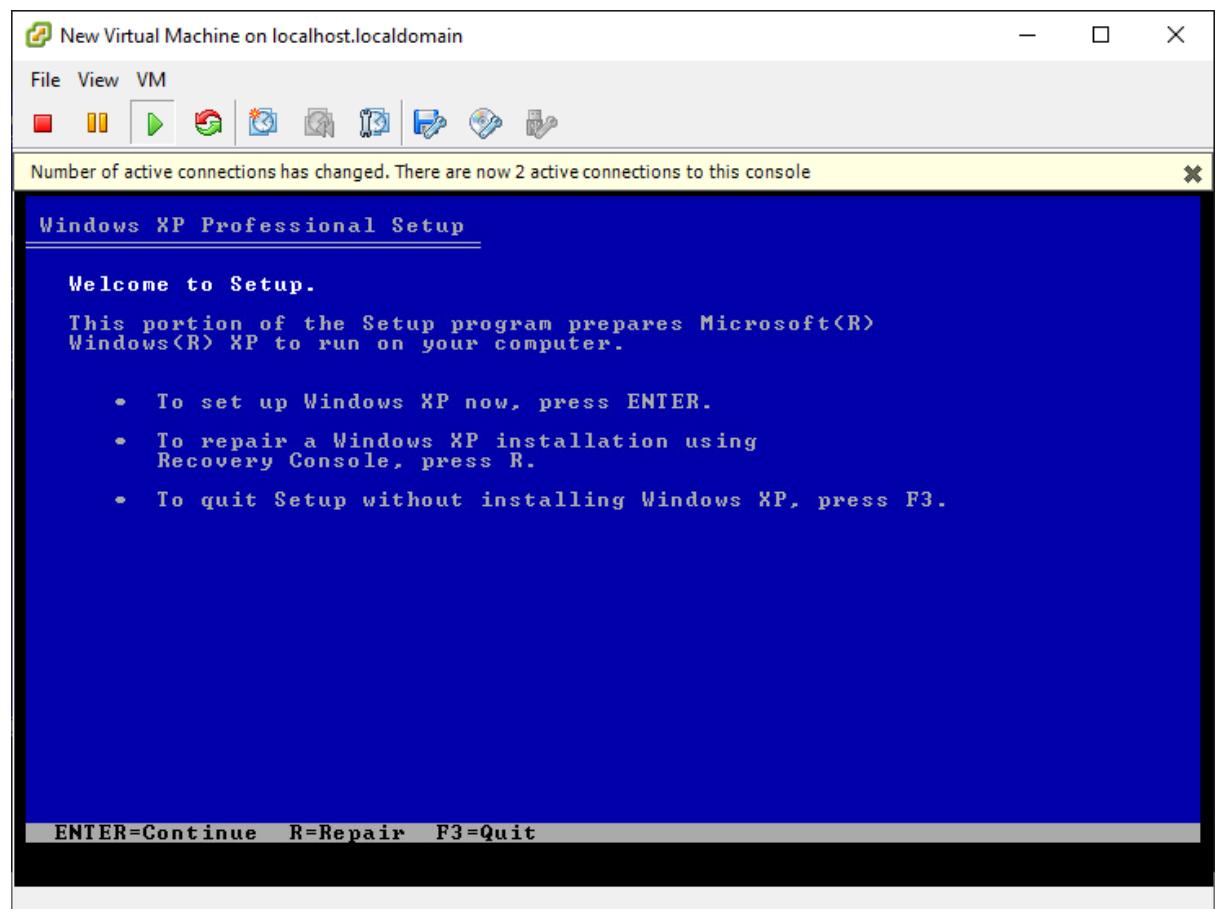


7. Go to Boot option using arrow keys.
8. Go to CD-ROM Drive and click the (+) sign option and move it to the top.





## 9. Press F10 and Y to save the settings.



## Practical 6

### Native Virtualization using Hyper-V

#### What is Hyper - V ?

>> Hyper-V is Microsoft's hardware virtualization product. It lets you create and run a software version of a computer, called a virtual machine. Hyper-V runs each virtual machine in its own isolated space, which means you can run more than one virtual machine on the same hardware at the same time.

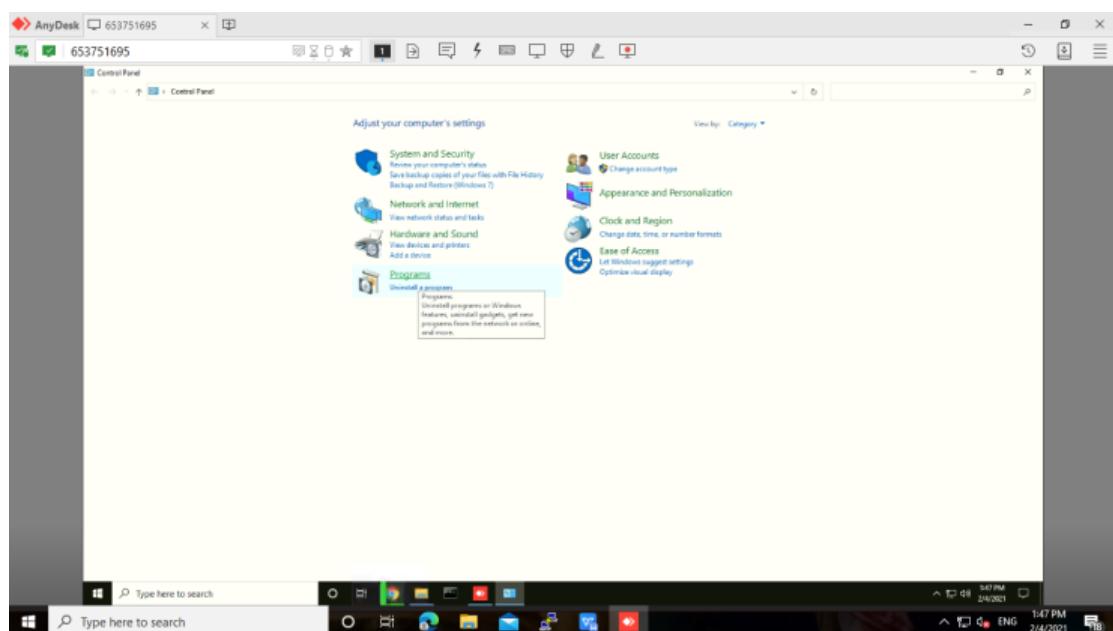
>> If you have installed VMware workstation or any other virtual machine creator previously and trying to create virtual machine with the help of Hyper-V, you may confront an error - **VMware workstation & Hyper-V are not compatible**.

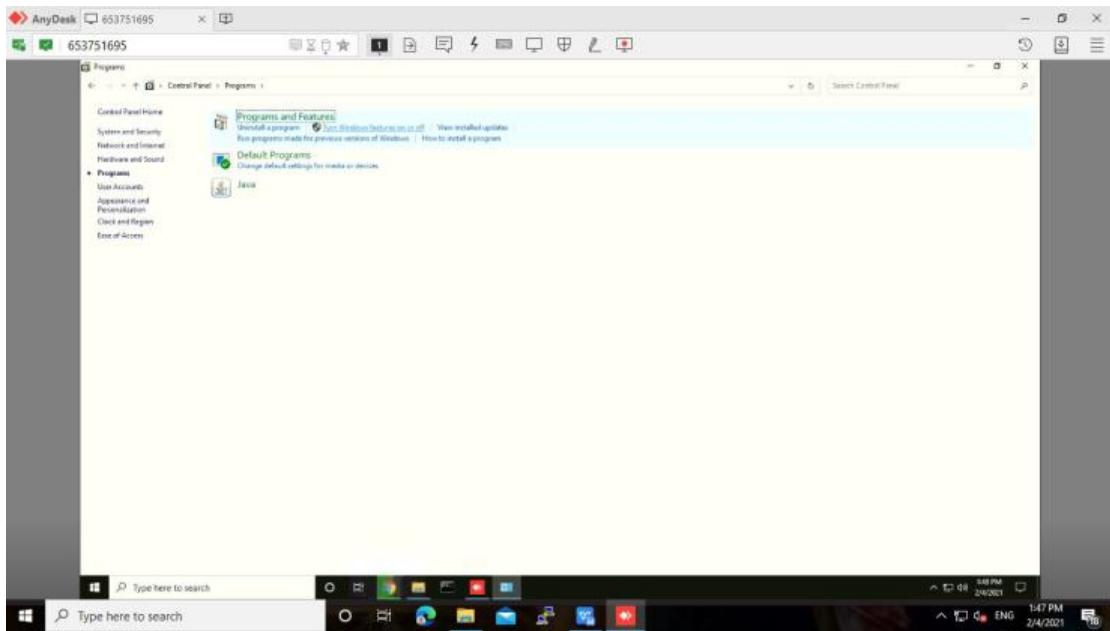
So, you need to Uninstall VMware workstation or any other virtual machine creator before creating and running virtual machine with the help of Hyper-V and vice versa.

#### Steps:

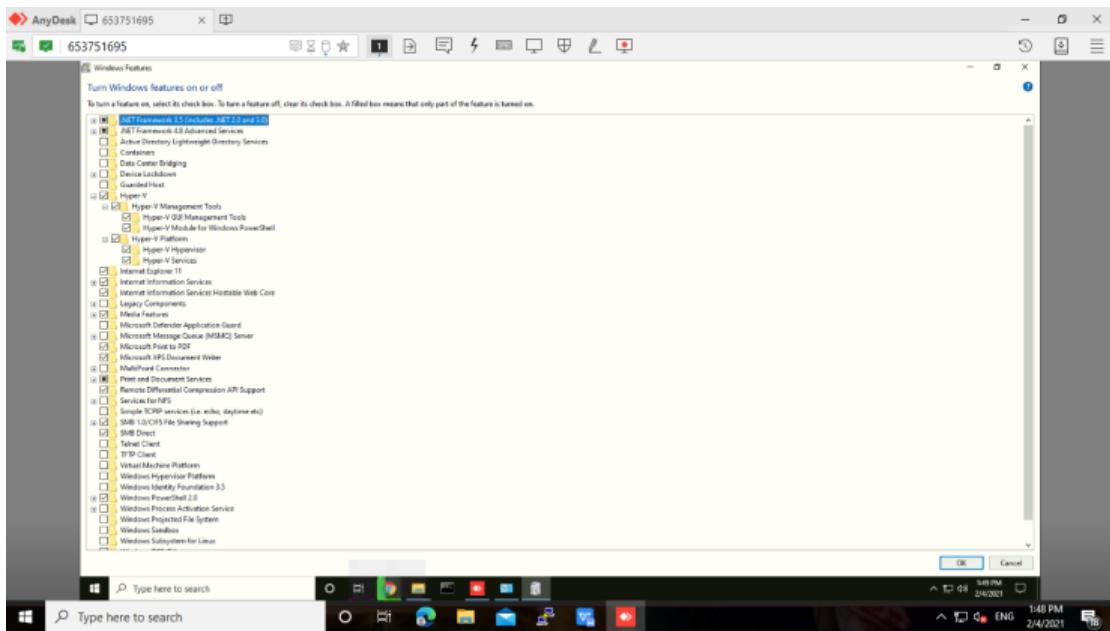
>> Search for **Control Panel** in Windows search bar.

>> Go to **Programs >> Programs and Features >> Turn Windows Features on or off**

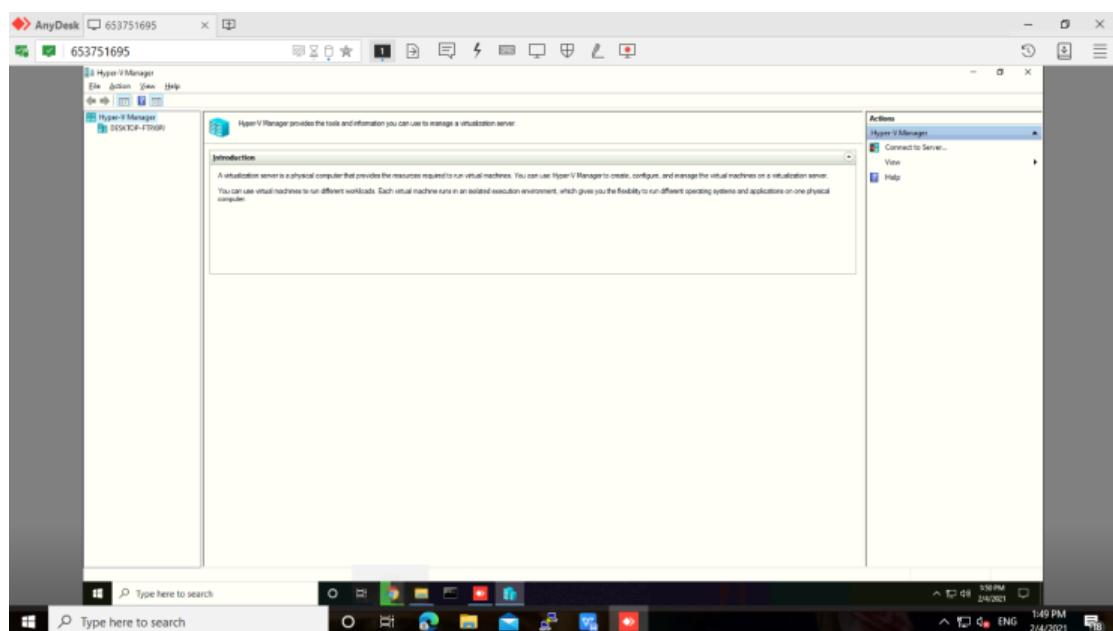
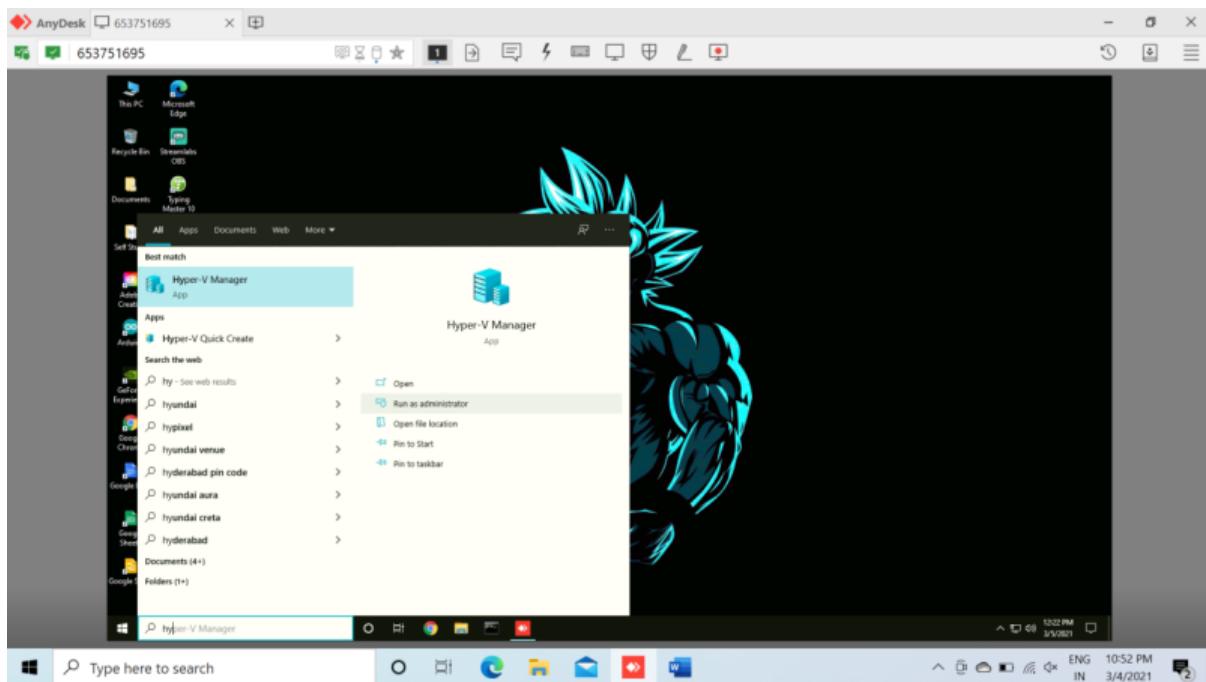




>> Enable the **Hyper-V** option.

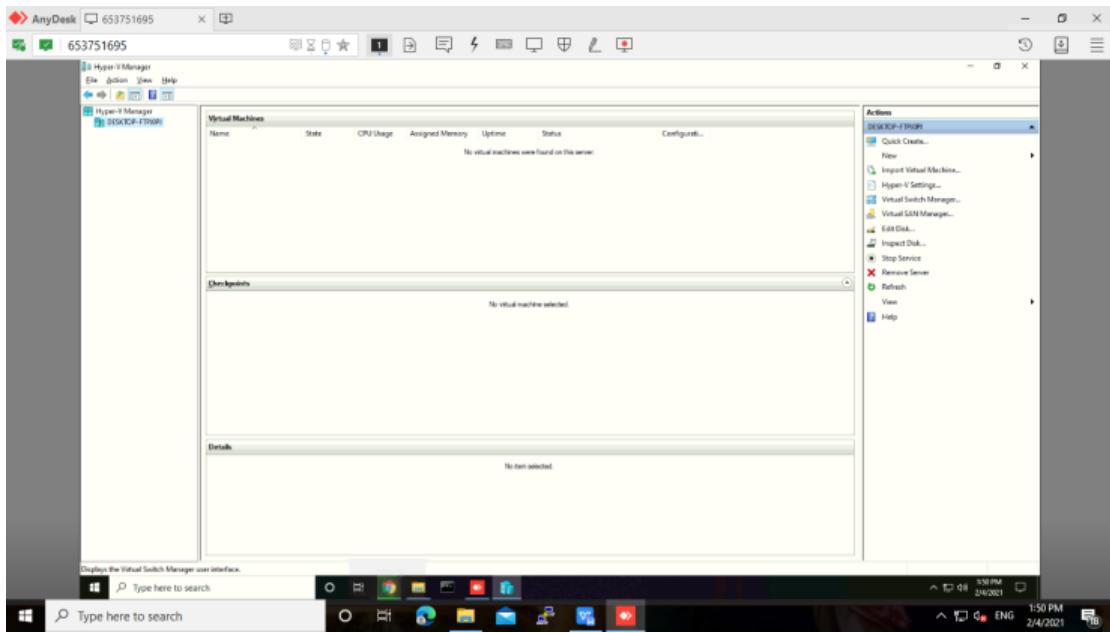


>> Then search for **Hyper-V Manager** in windows search bar. Run it as an Administrator.

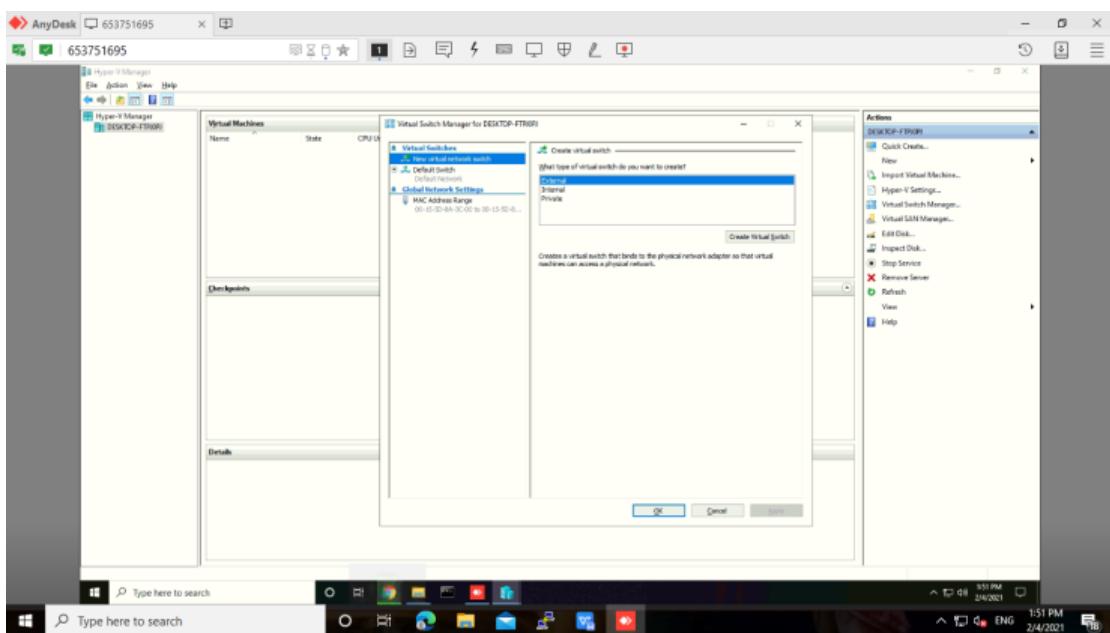


>> For creating virtual machine first we have to create a virtual switch.

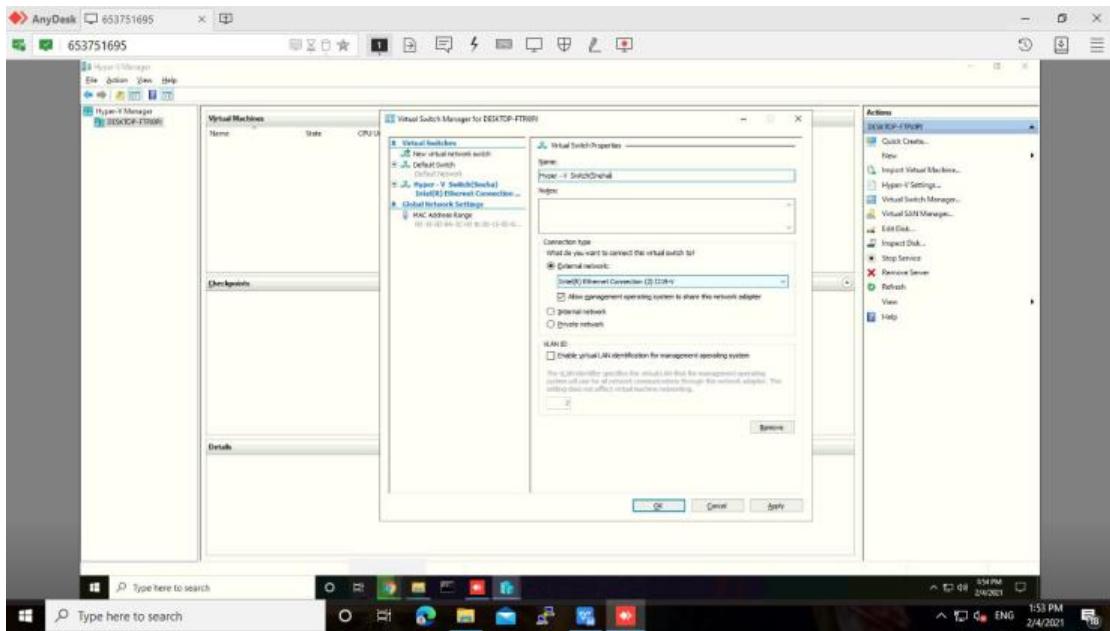
>> To create a virtual switch, click on **Virtual Switch Manager**.



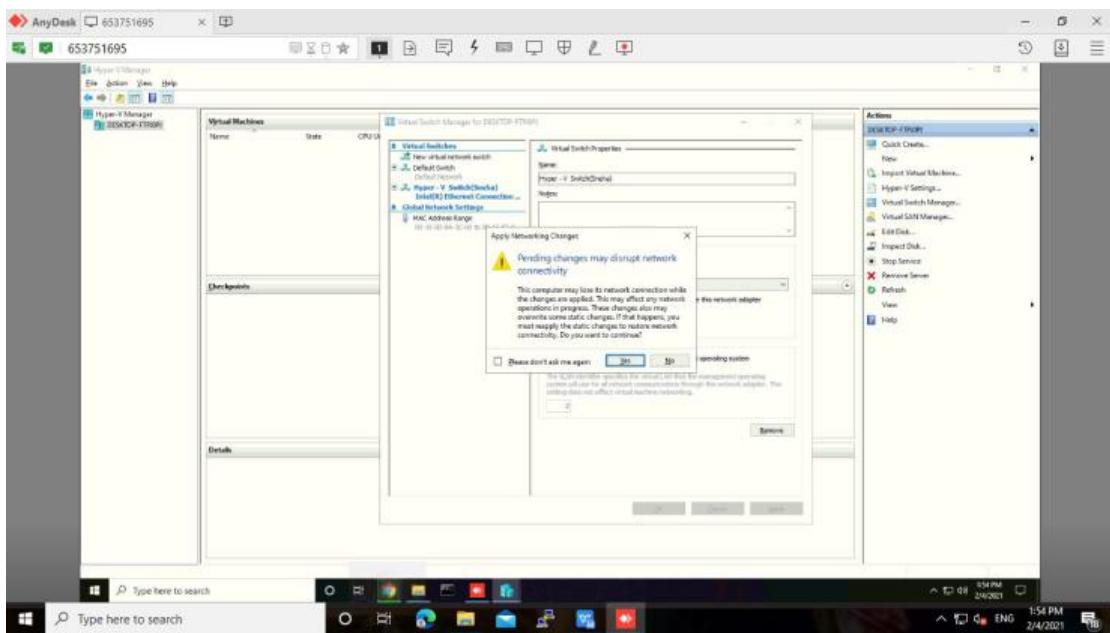
>> Select **External** under **What type of virtual switch do you want to create ?**

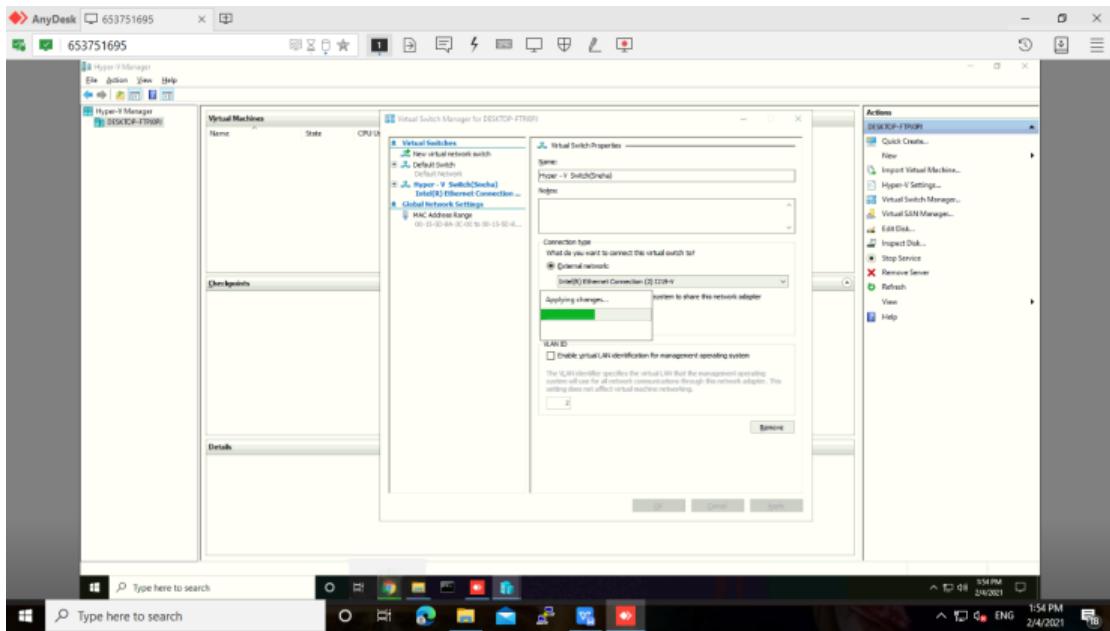


>> Enter name for virtual switch, under virtual switch properties. Then click on **Apply**.

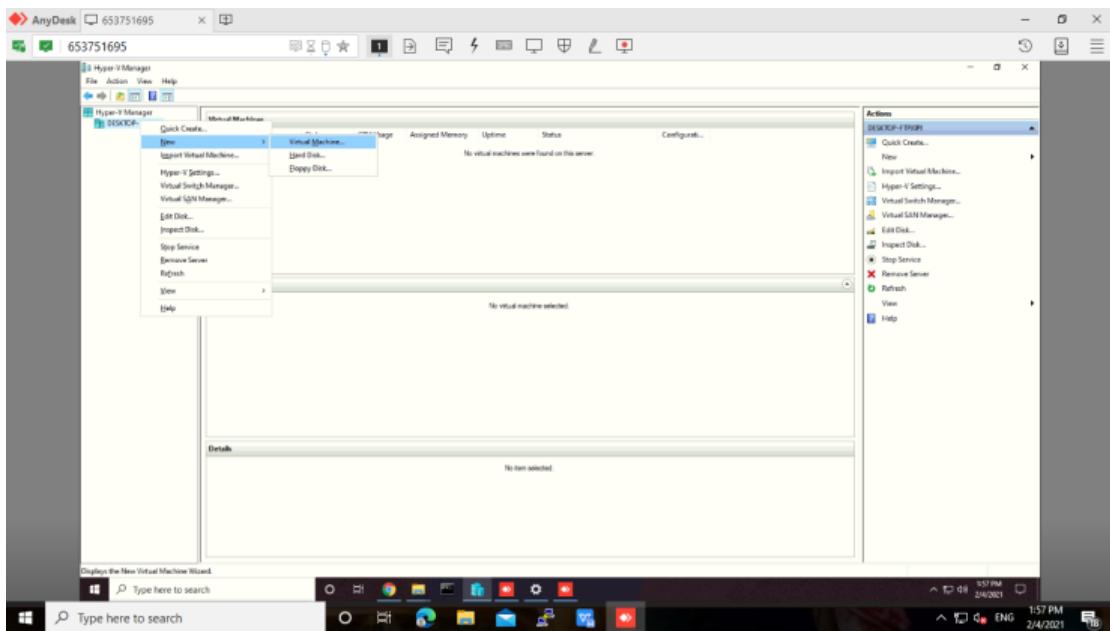


>> The we will get the pop-up as **Apply Networking Changes**, and click on Yes.

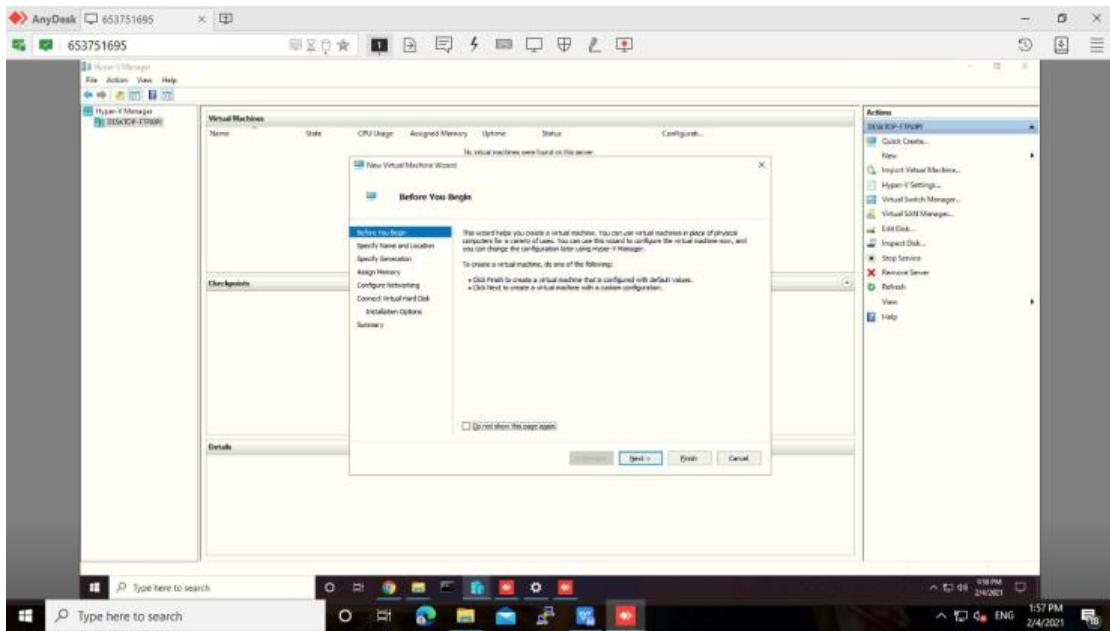




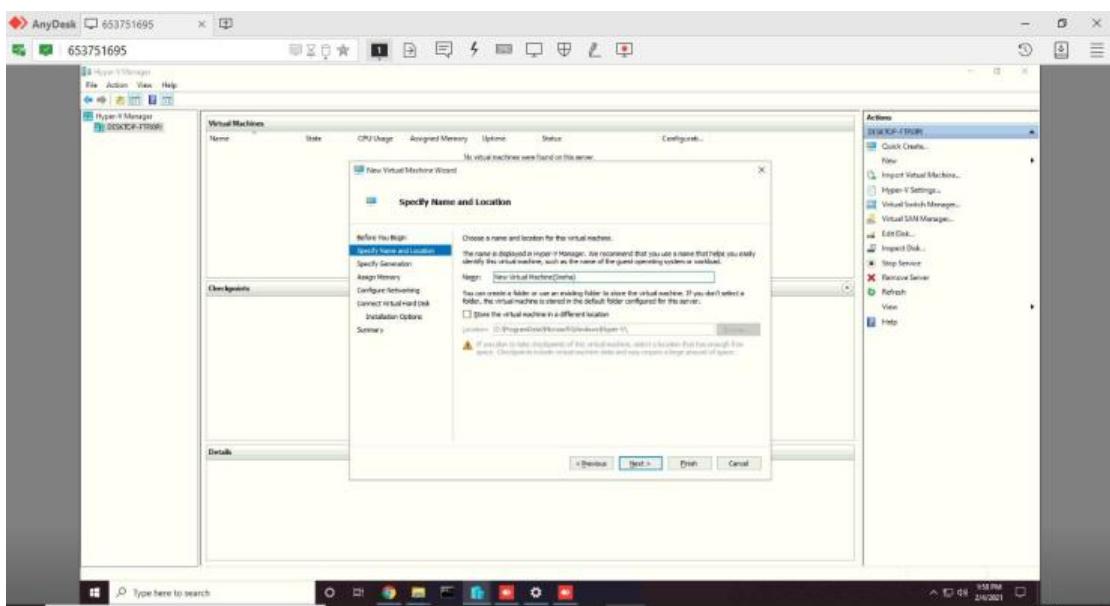
>> Now, right click on Desktop under Hyper-V Manager and select new virtual machine.



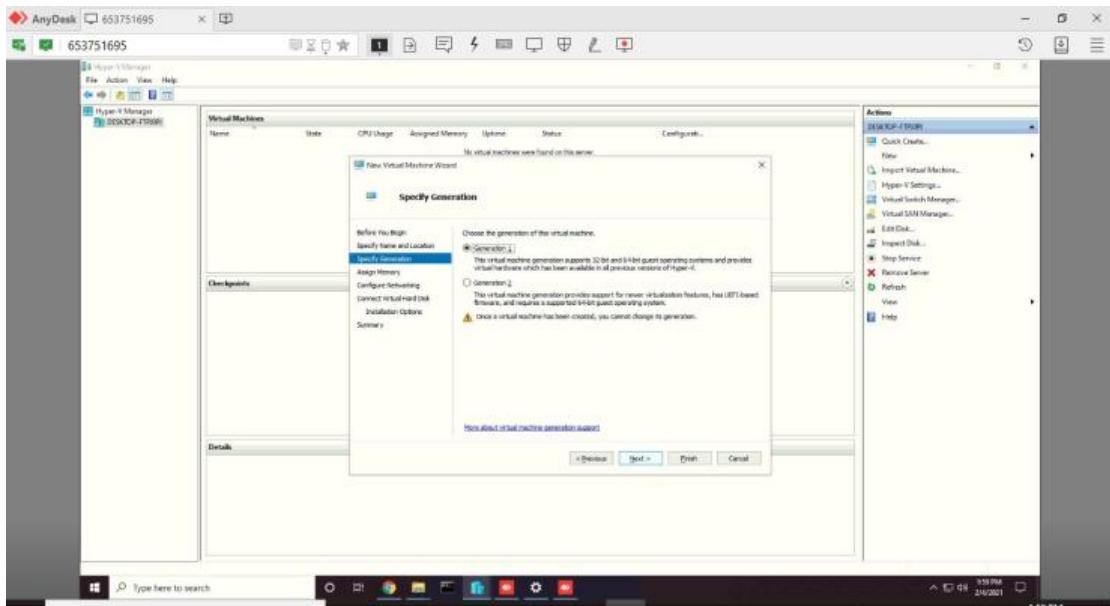
>> Click on **Next**.



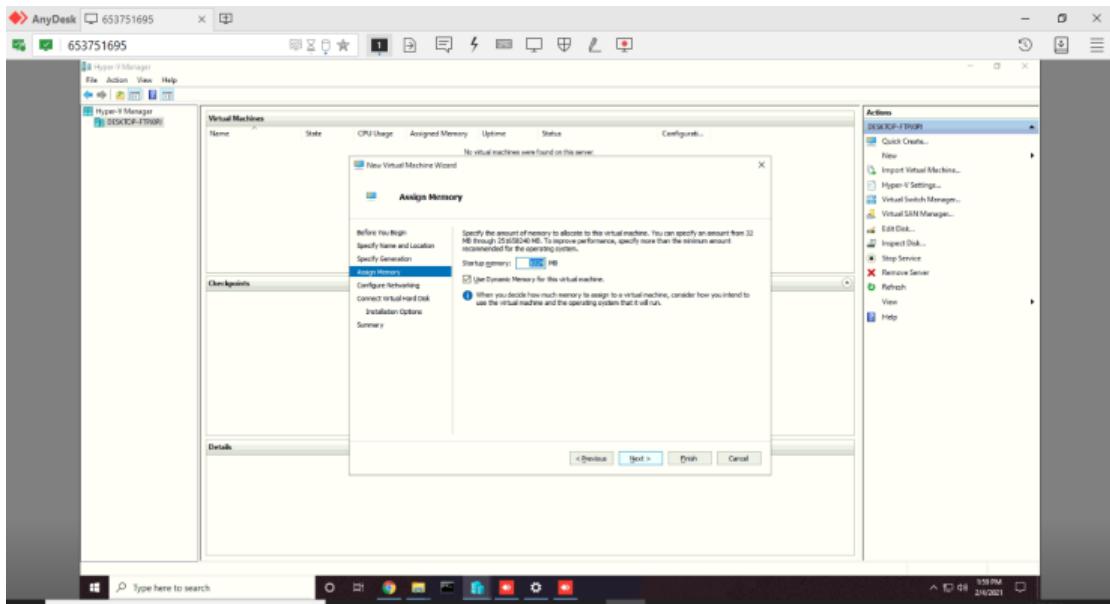
>> Enter a name for virtual machine.



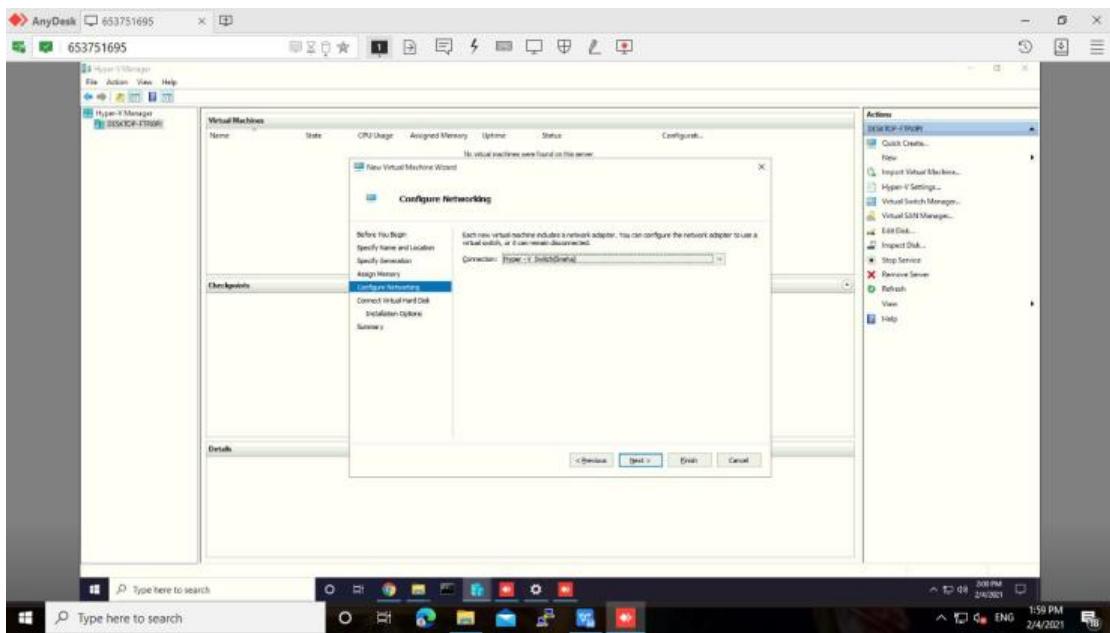
>> Choose the generation of this virtual machine as **Generation 1**.



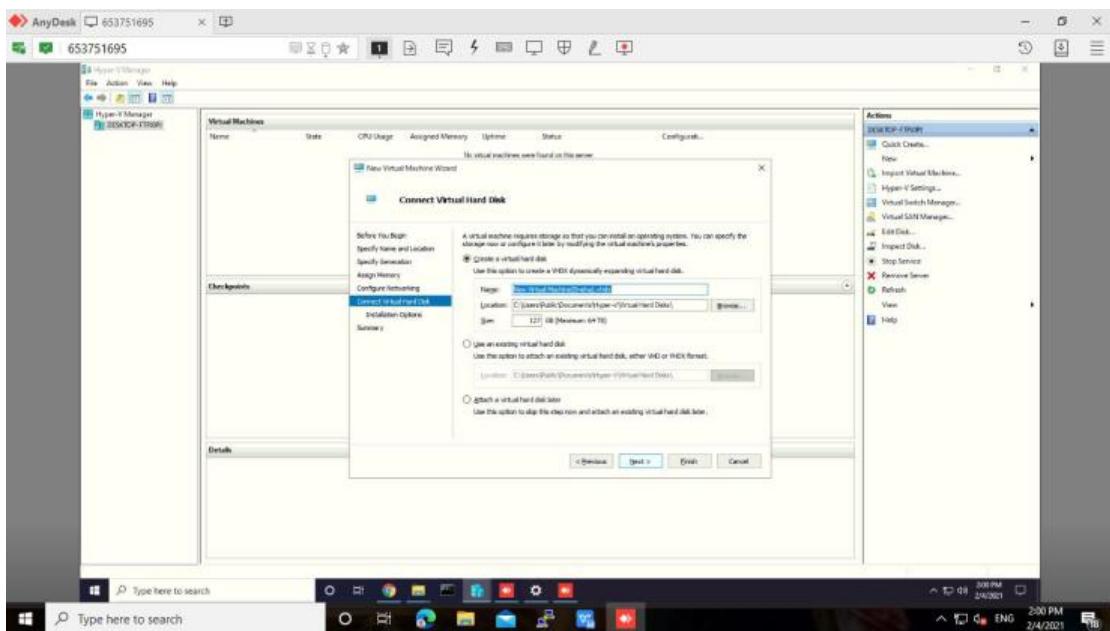
>> Tick on **Use Dynamic Memory** for this virtual Machine, and click on **Next**.



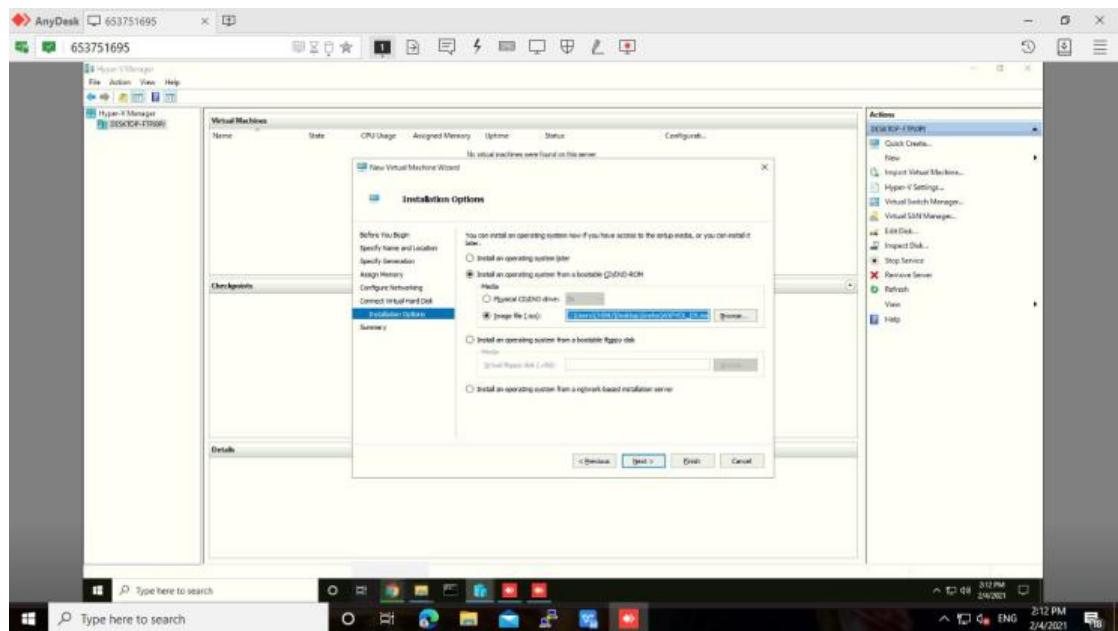
>> Choose the virtual switch that you have created under the Connection dropdown list.



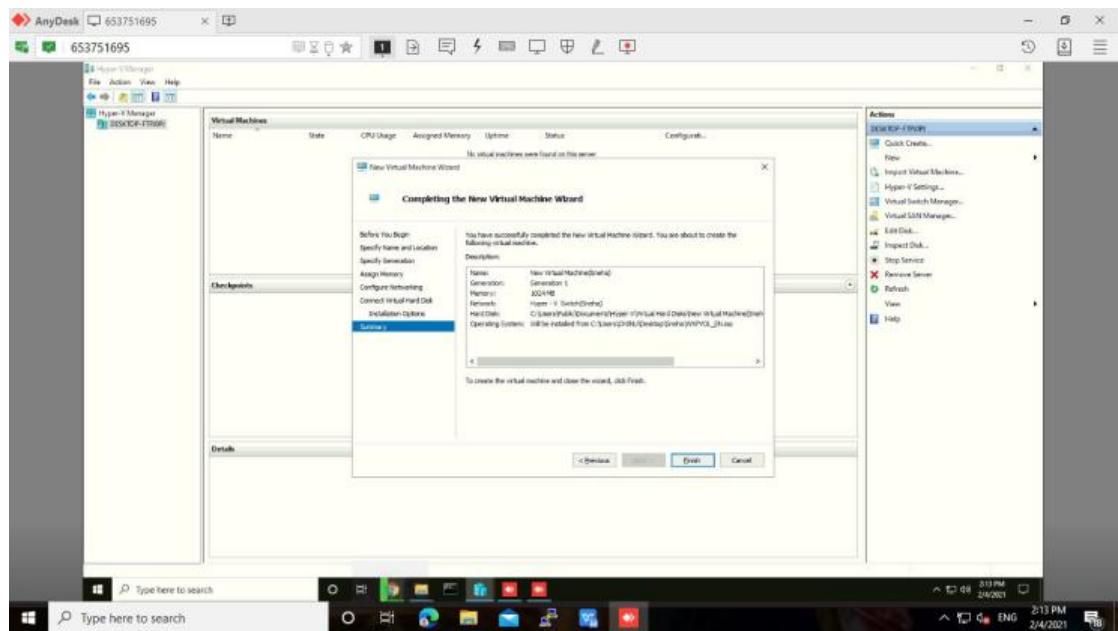
>> Specify the name of virtual machine, location where it will store all virtual machine related files and size required for the virtual machine and click on Next.

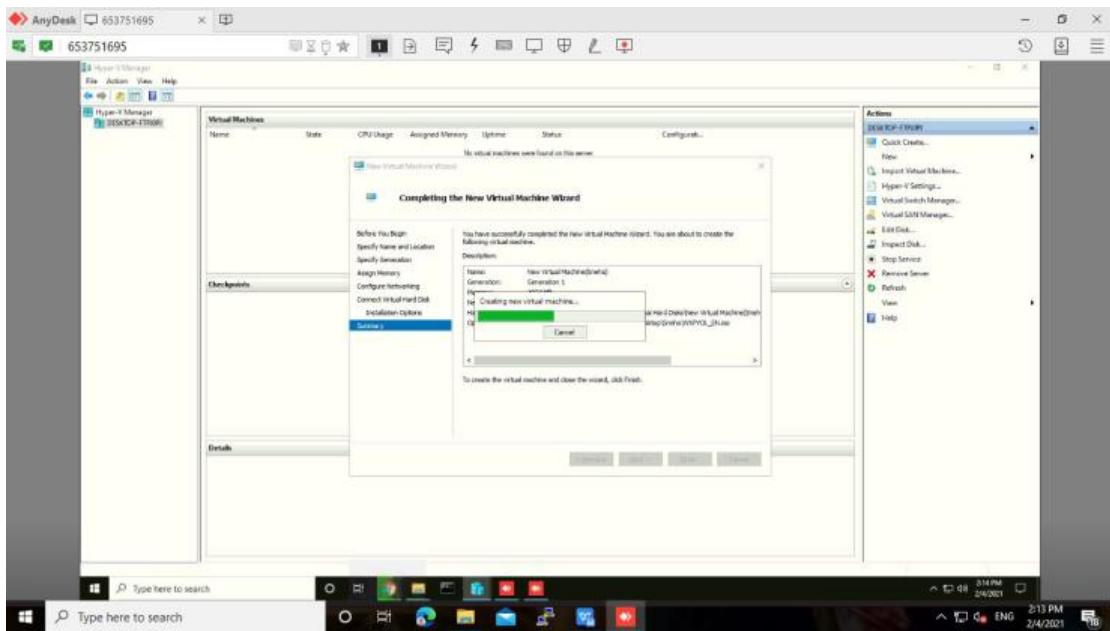


>> Under installation options, select tick on **Install an operating system from a boot CD/DVD-ROM**. and tick on **Image File (.iso)** and browse the **Windows XP.iso** file location.



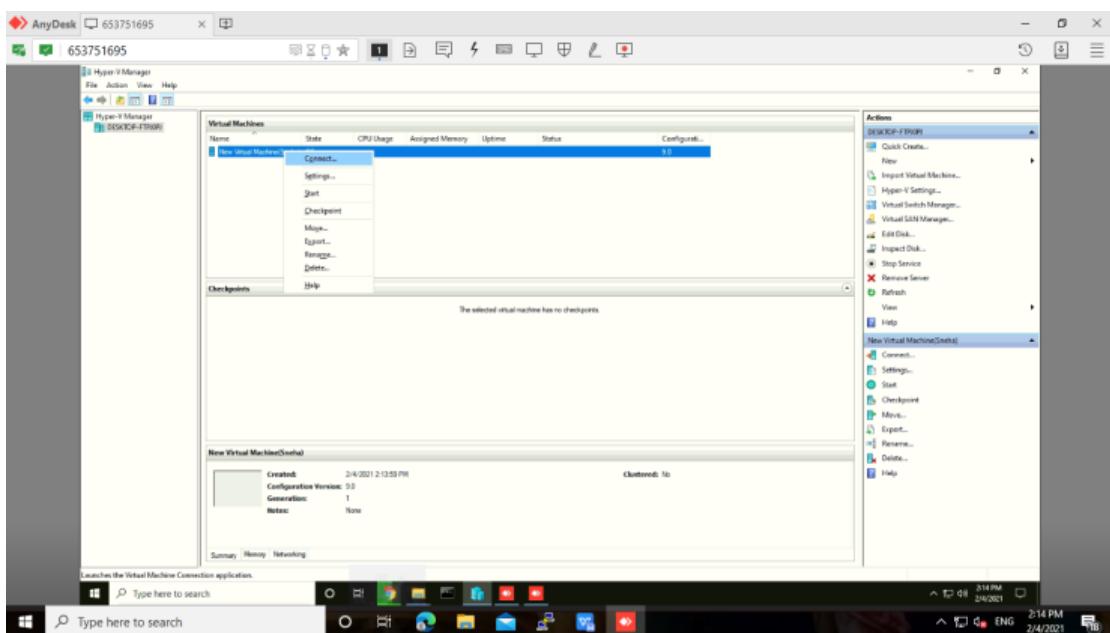
>> Summary report will be generated about virtual machine. Then click on **Finish**.

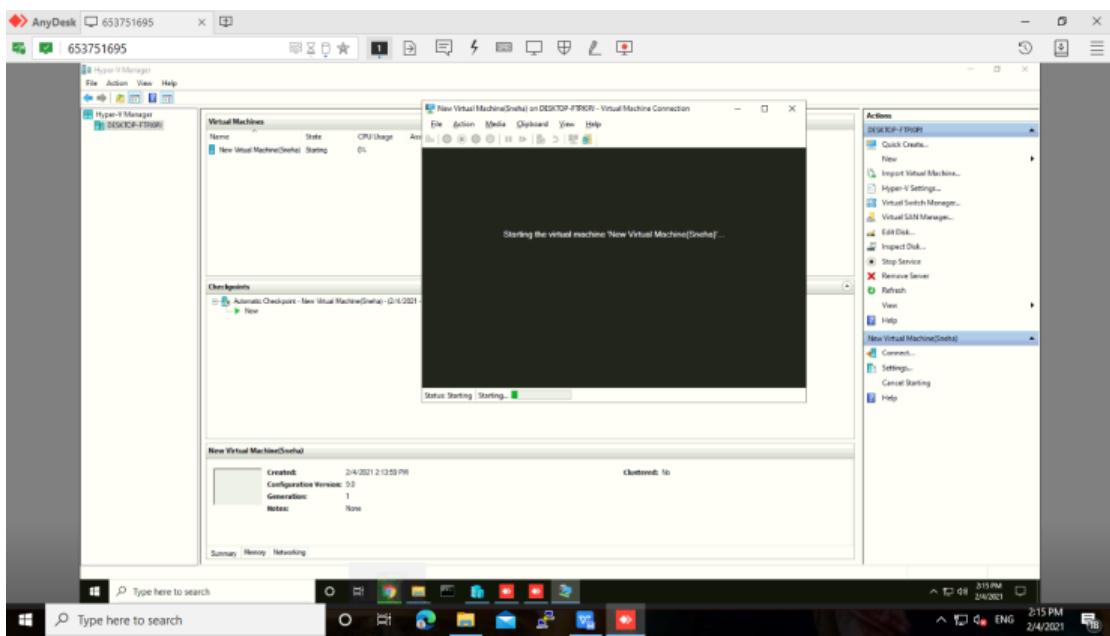
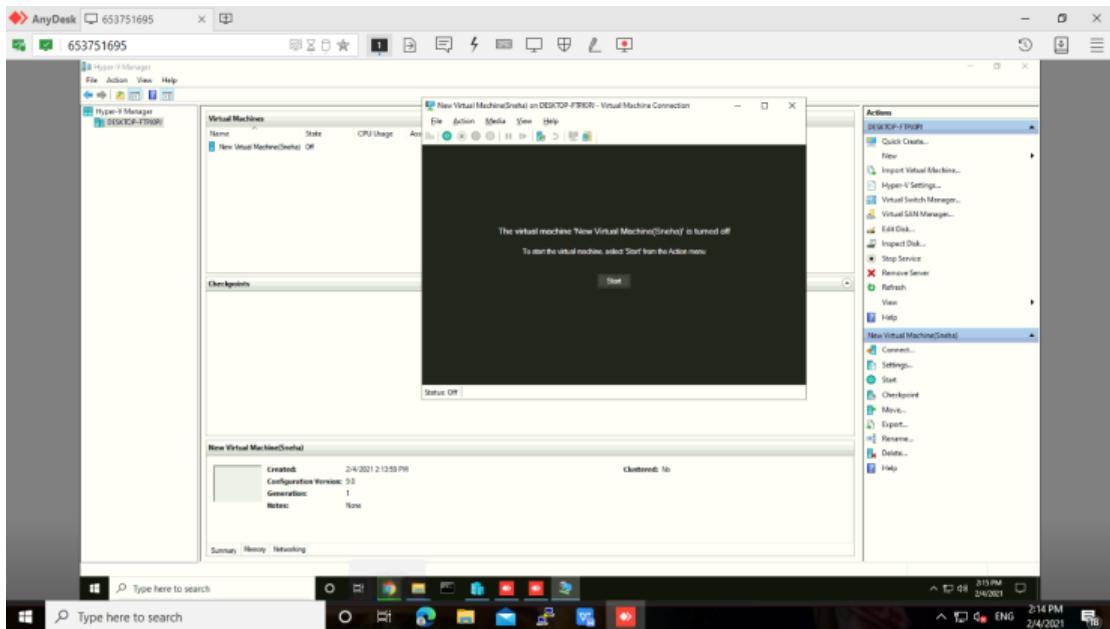




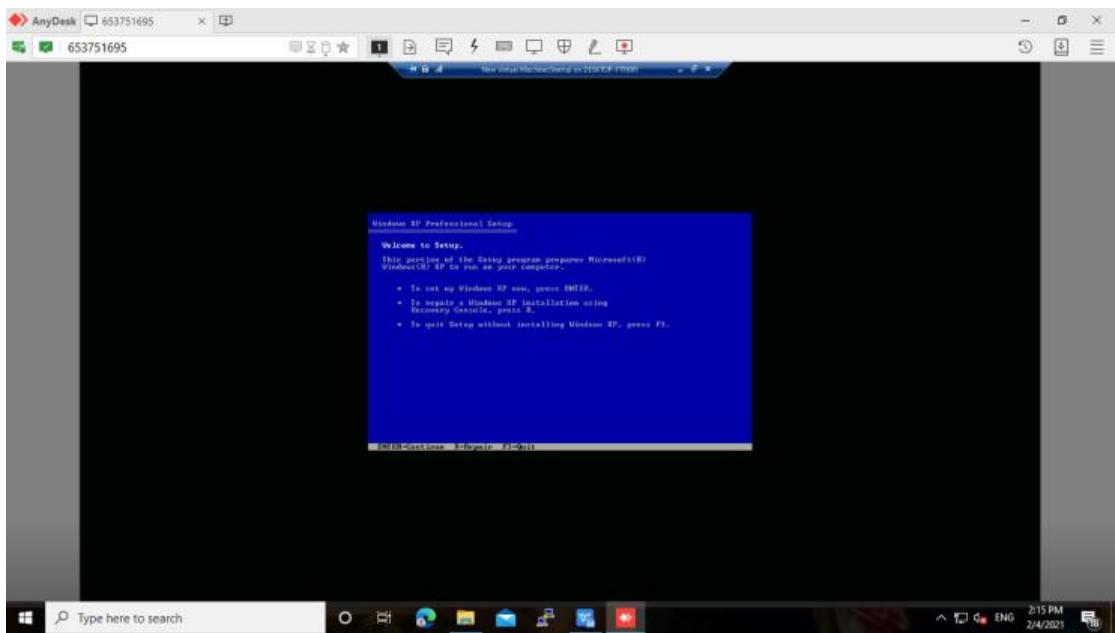
>> In Virtual Machines panel our virtual machine will appear in off state.

>> Right click on virtual machine and click on **Connect option**.





>> Virtual Machine will start with below screen.



## Practical 7

### **Implement OpenNebula**

#### **What is OpenNebula ?**

OpenNebula is a cloud computing platform for managing heterogenous distributed data center infrastructures. The OpenNebula platform manages a data center's virtual infrastructure to build private, public and hybrid implementations of infrastructure as a service.

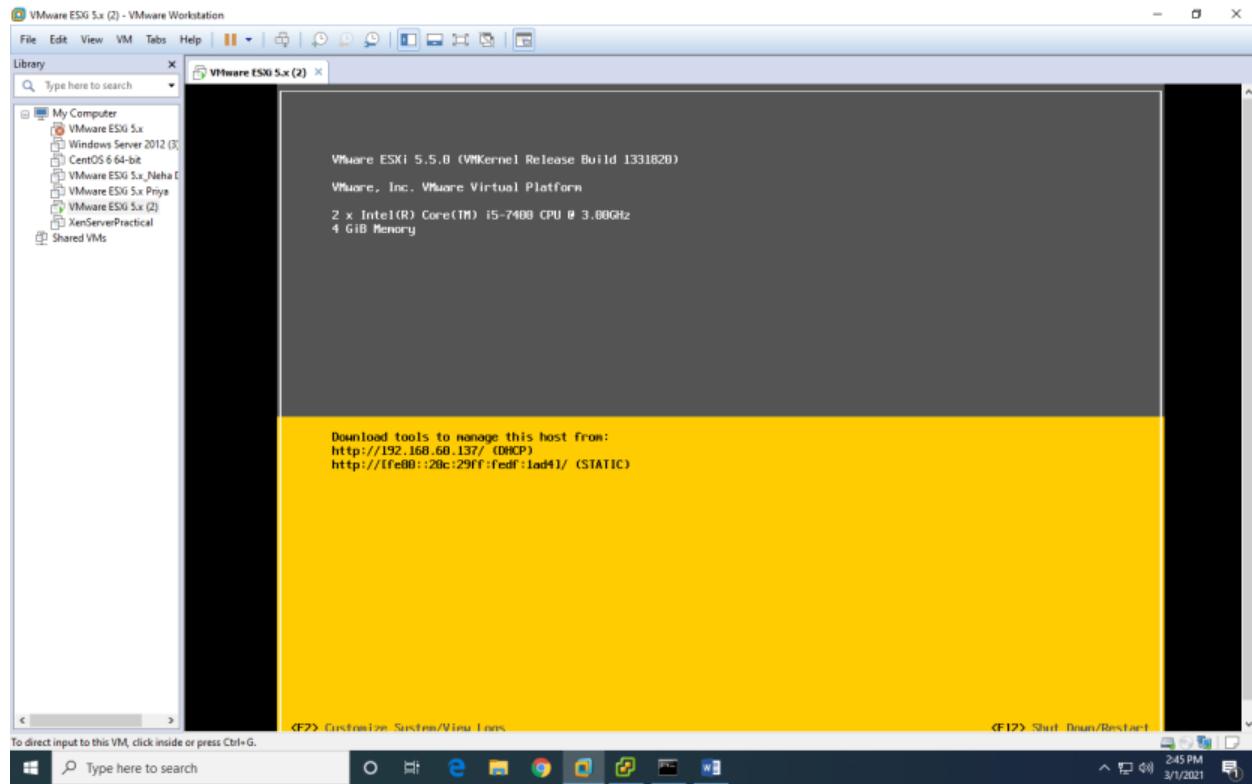
#### **Softwares Required:**

- **VMware Workstation 15.5 PRO**
- **VMware ESXi-5.x-Custom.iso file**
- **vSphere Client**
- **Windows XP iso file**
- **OpenNebula Sandbox Software**

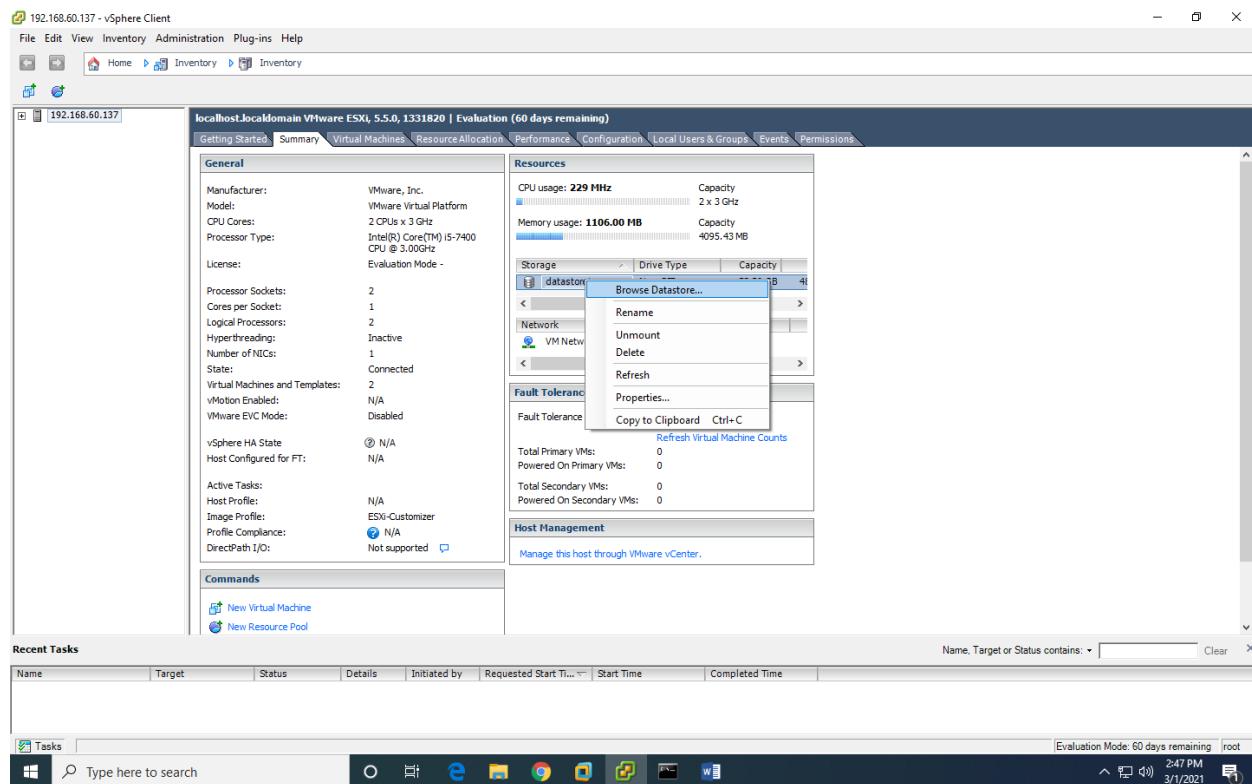
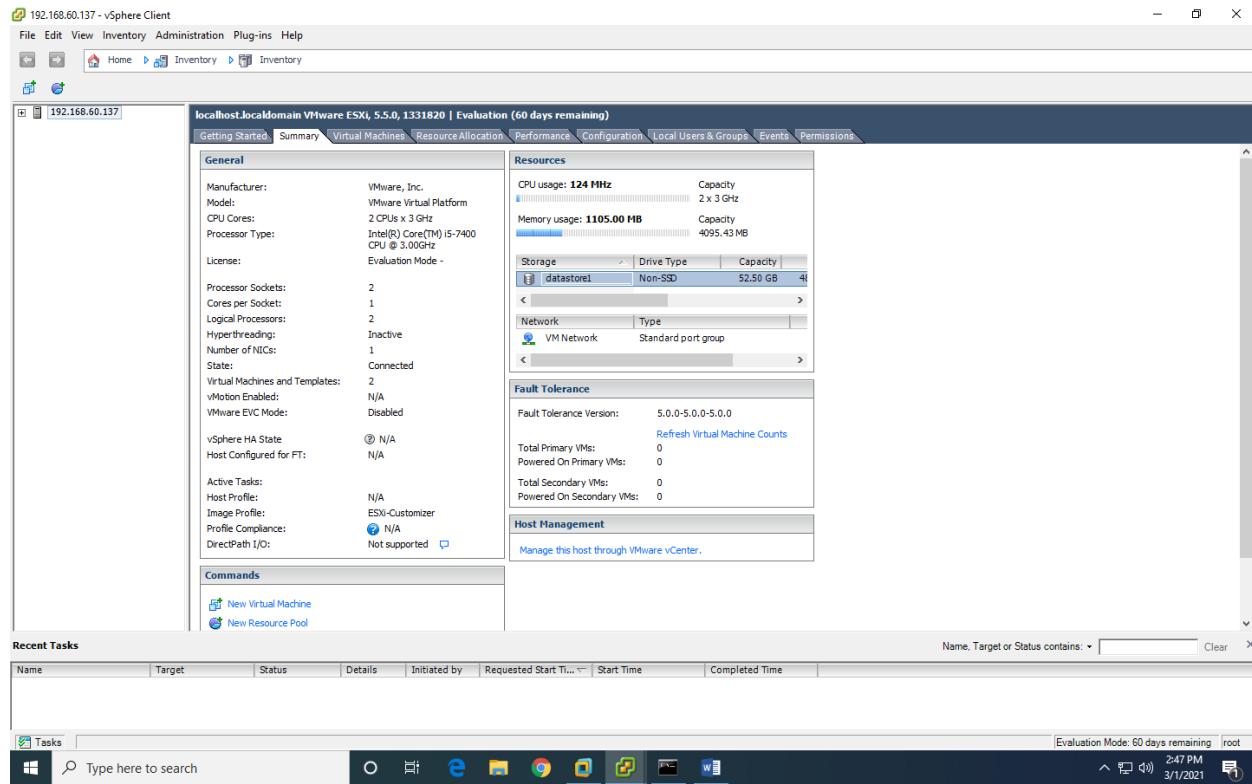
Client configuration software needed (Download Opennebula sandbox software from open nebula.org)

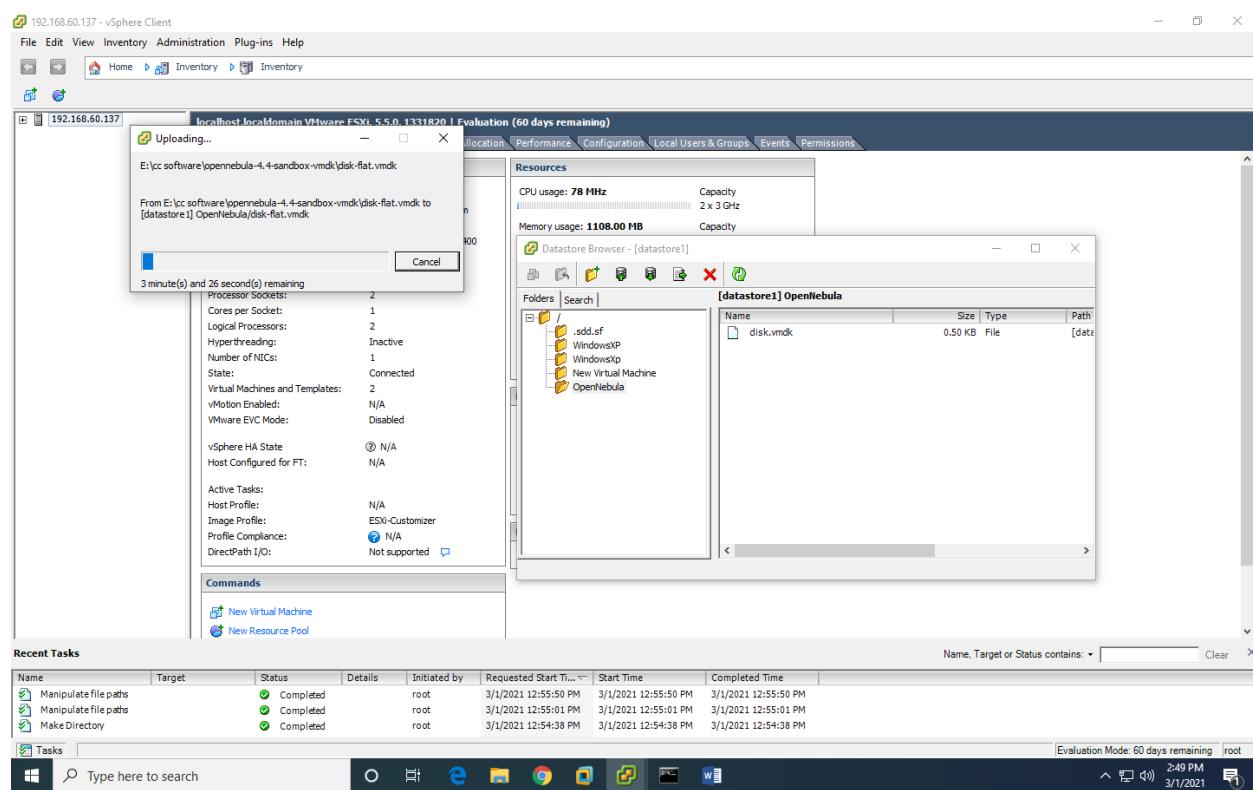
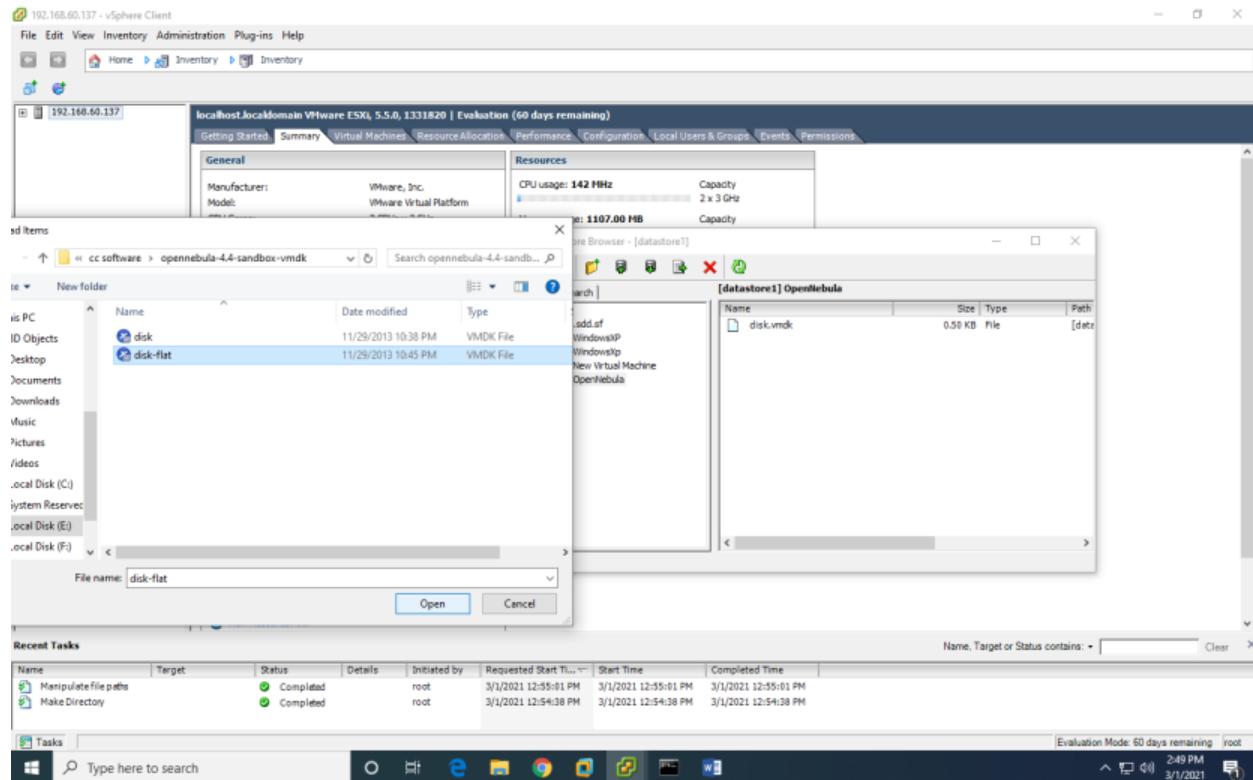
>> Perform the Esxi practical to get an IP address to connect to vSphere client.

>> Start vSphere Client. Enter Static IP address Enter Username and Password. Click Login.

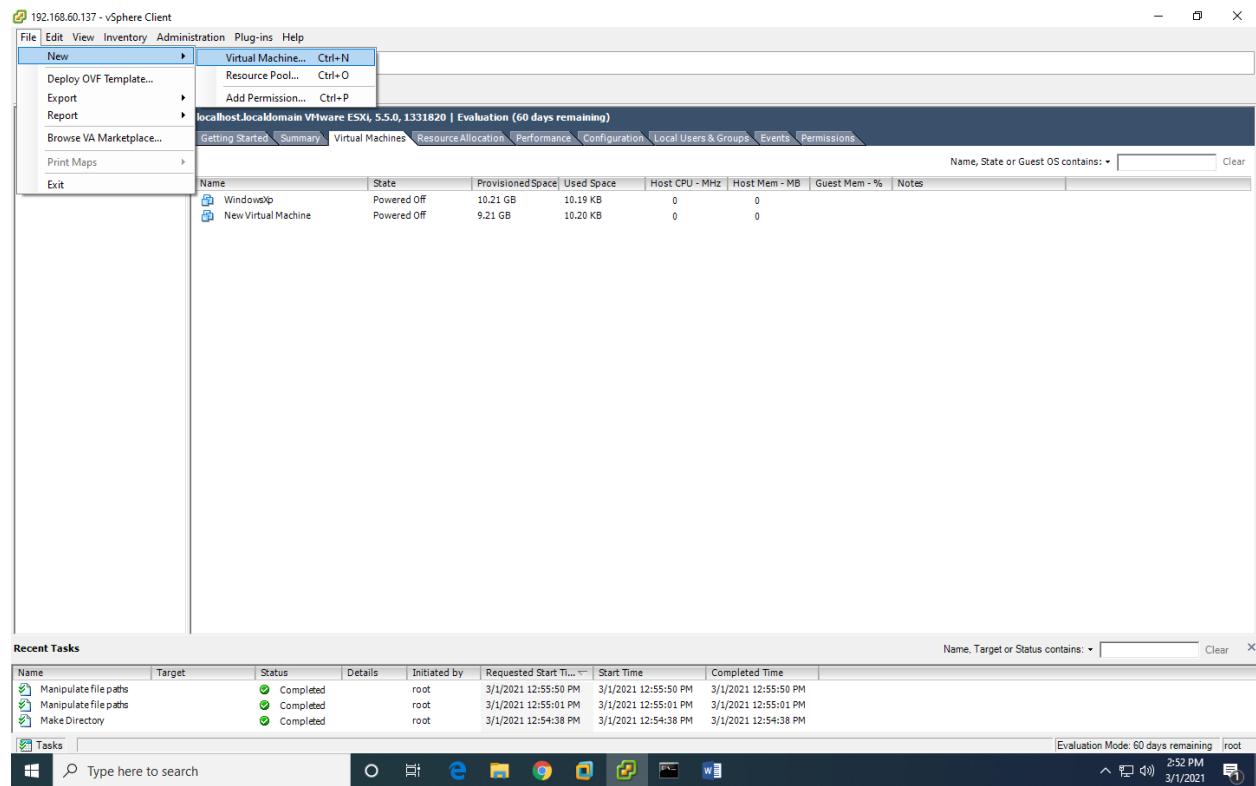


>> In vSphere client Browse for Datastore to add the opennebula sandbox file

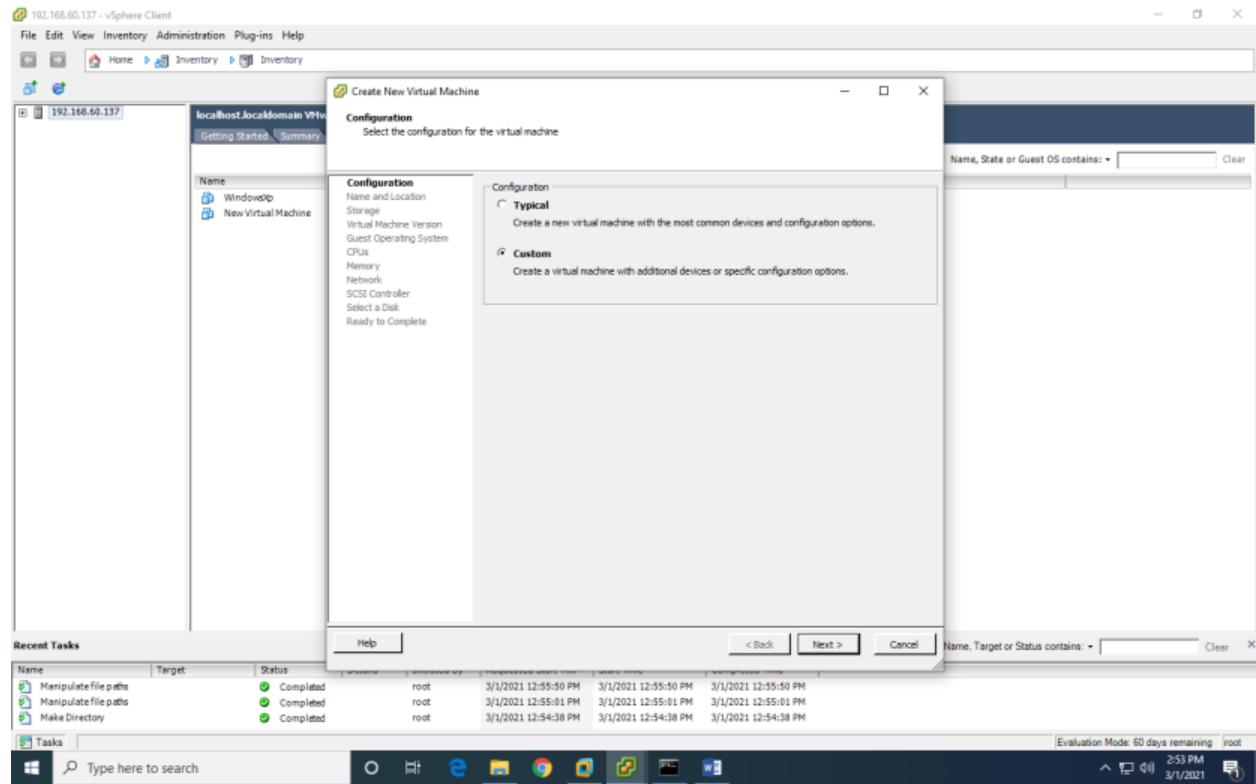




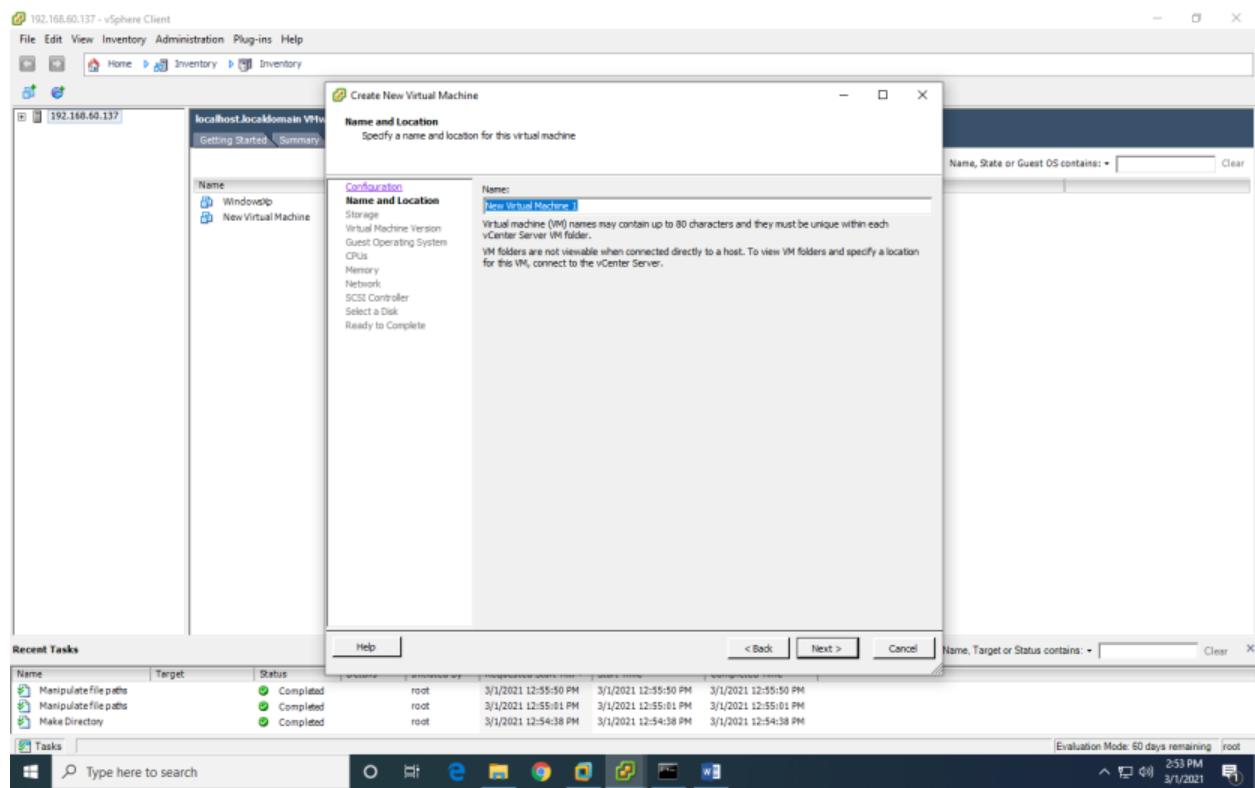
>> After adding the disk-vmdk sandbos file to the datastore the create a new Virtual Machine



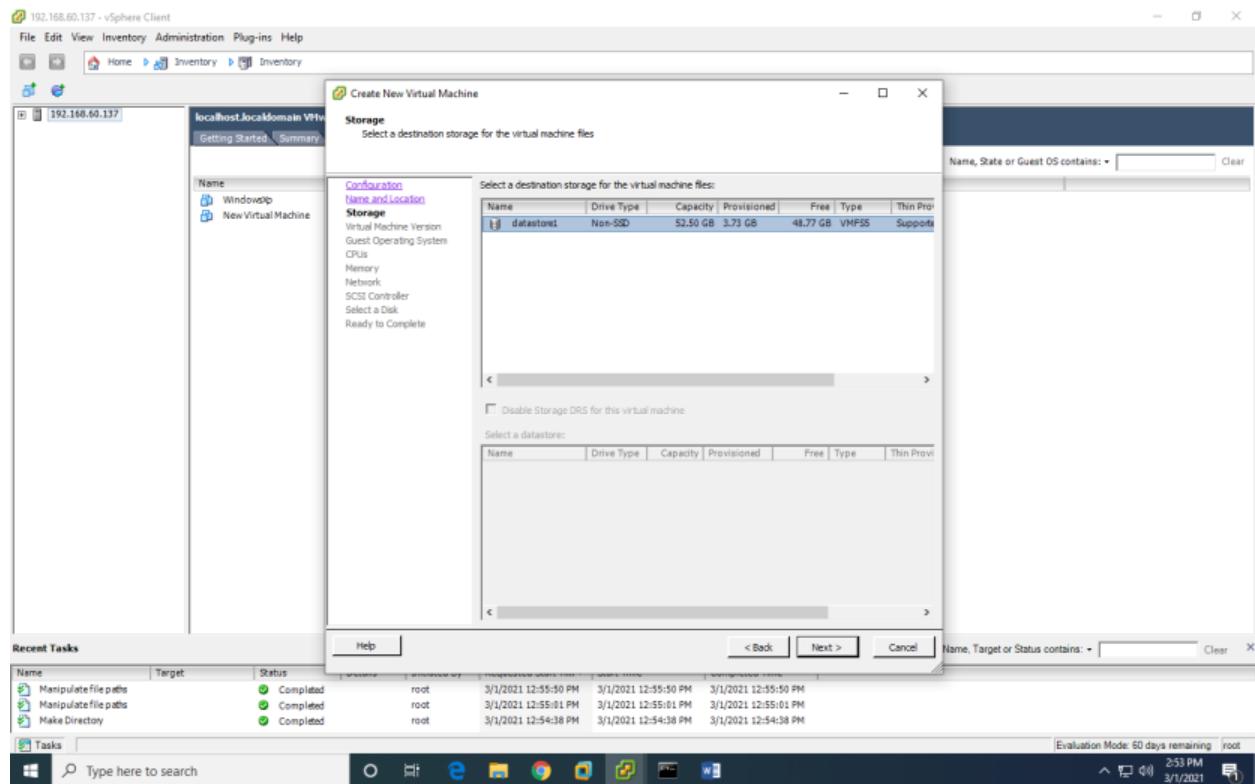
>> Select configuration type as Custom.



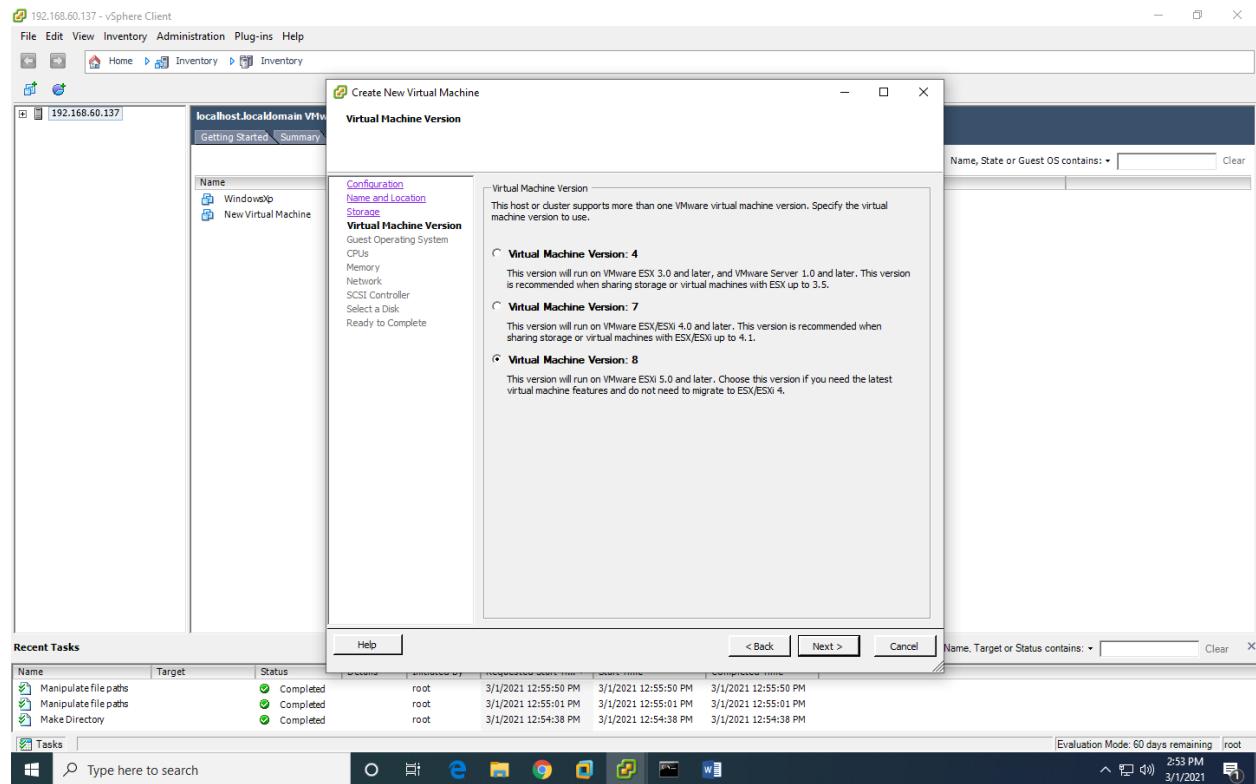
>> Give the name to the virtual machine.



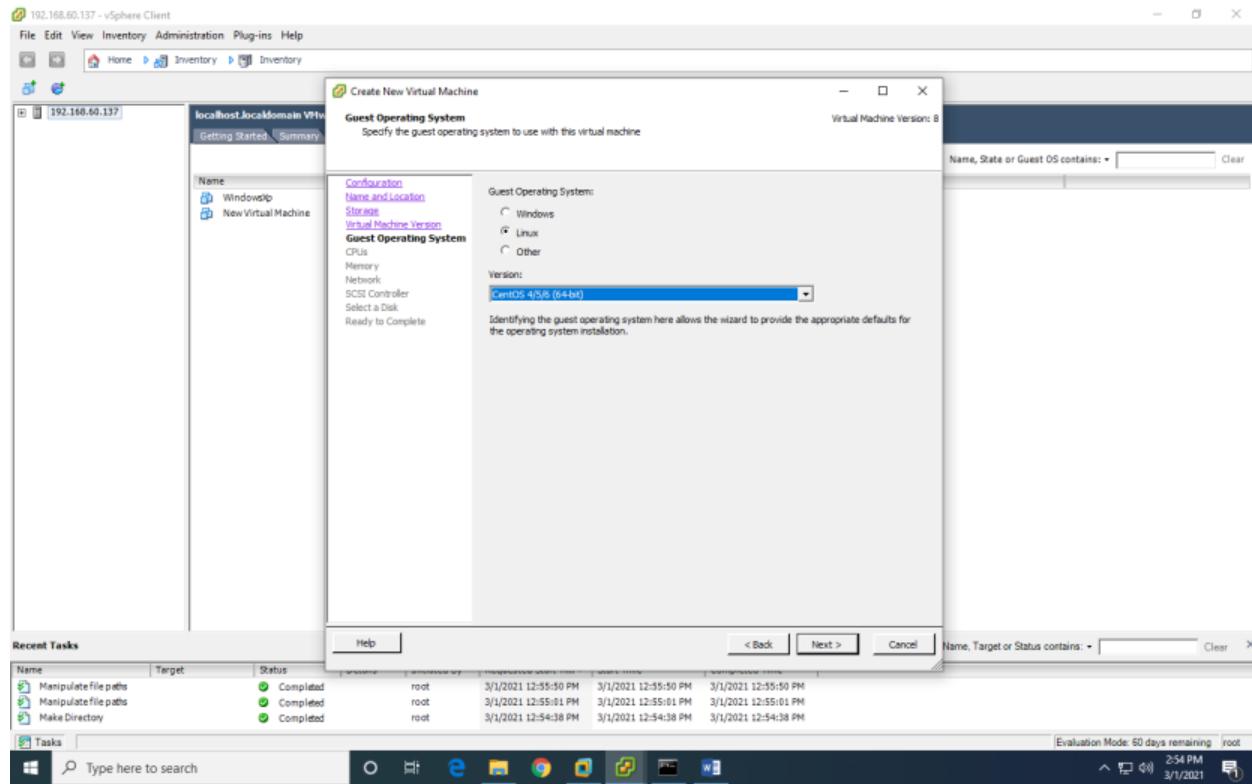
>> Click on Next.



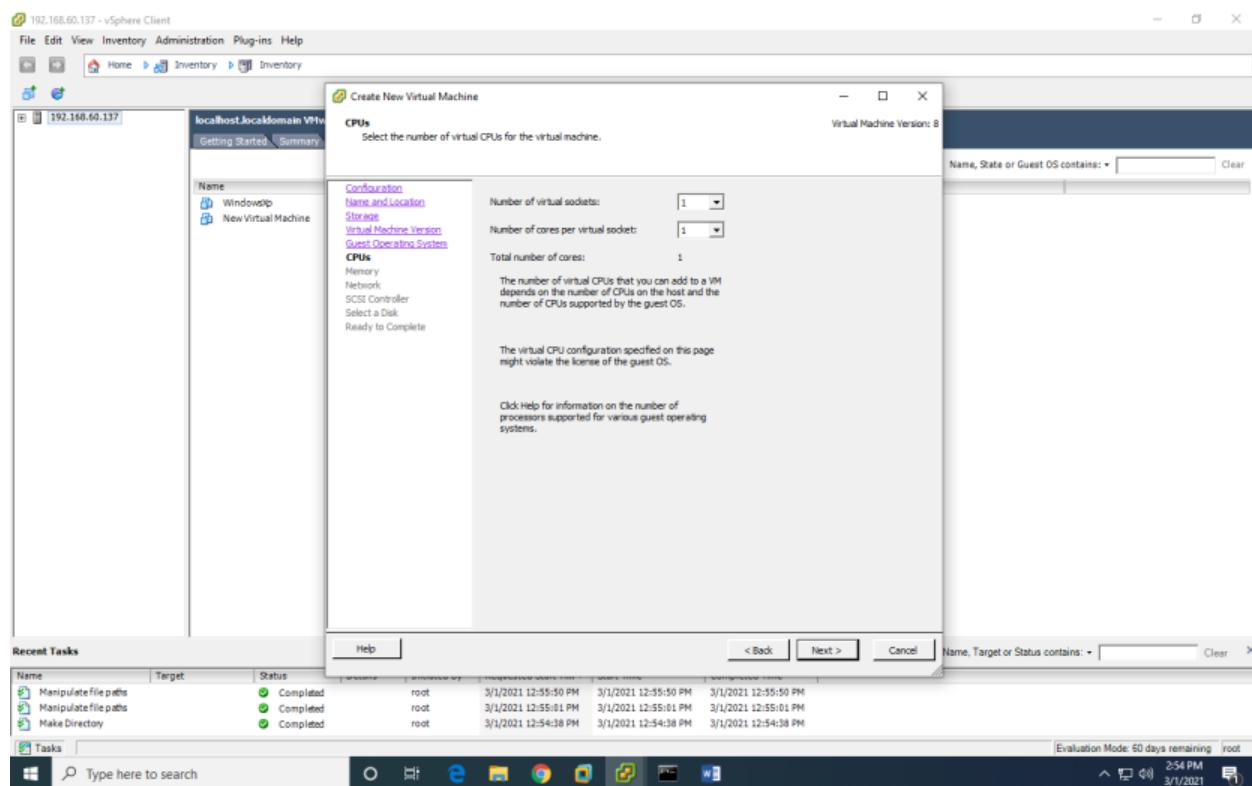
>> Select Virtual Machine Version : 8 and click on Next.



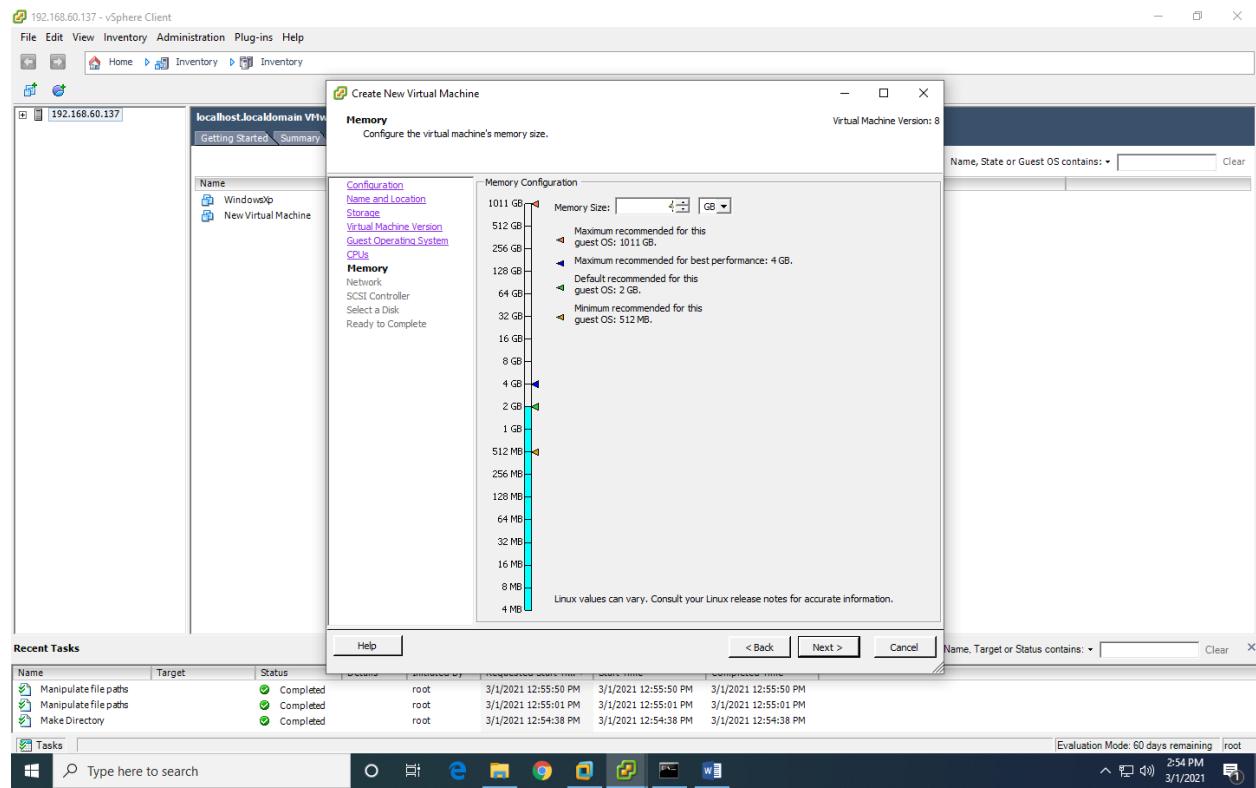
>> Select Guest operating system as Linux and Version as Ubuntu.



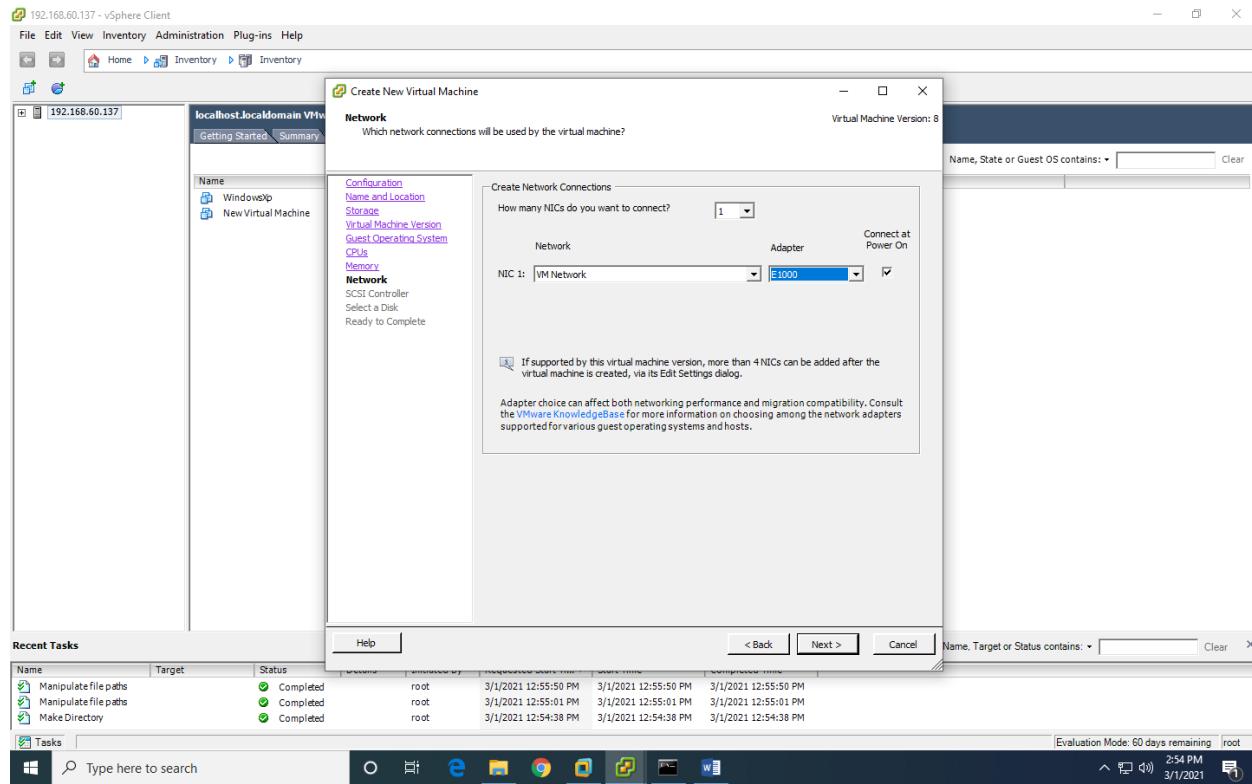
>> Click on Next.



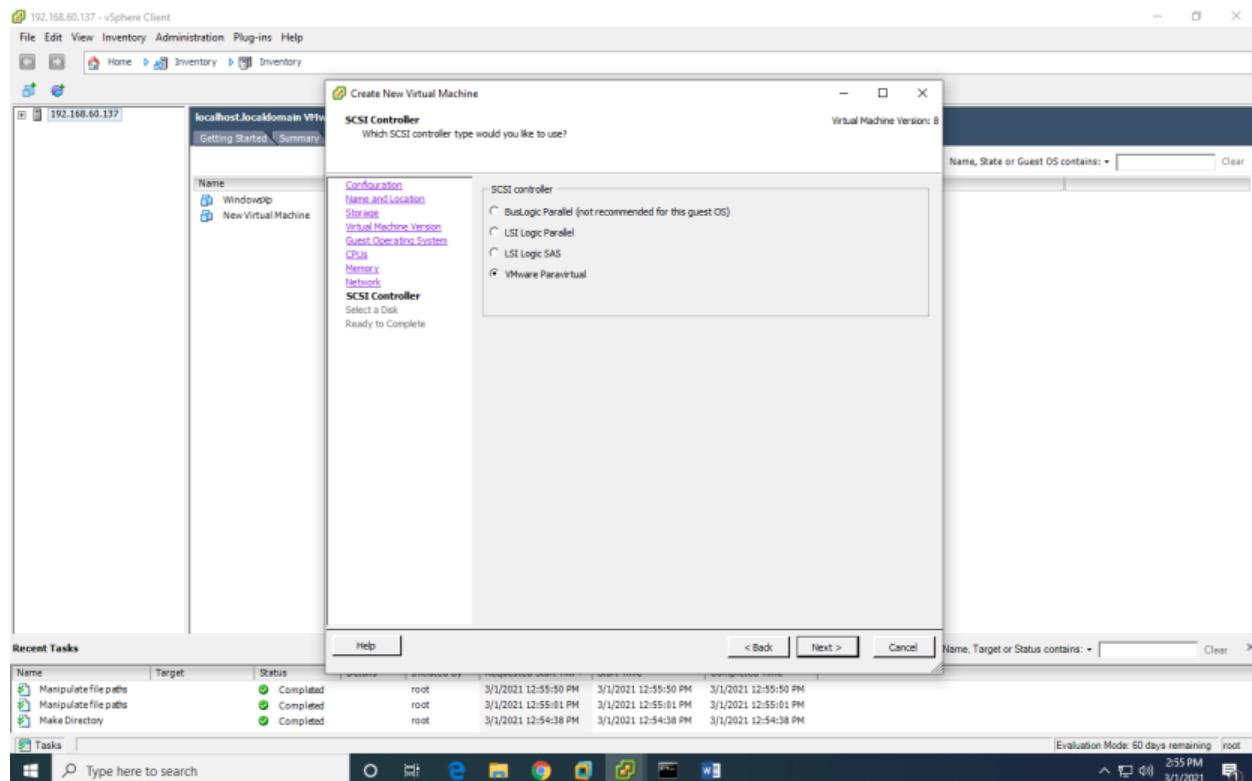
>> Allocate memory as 1GB.



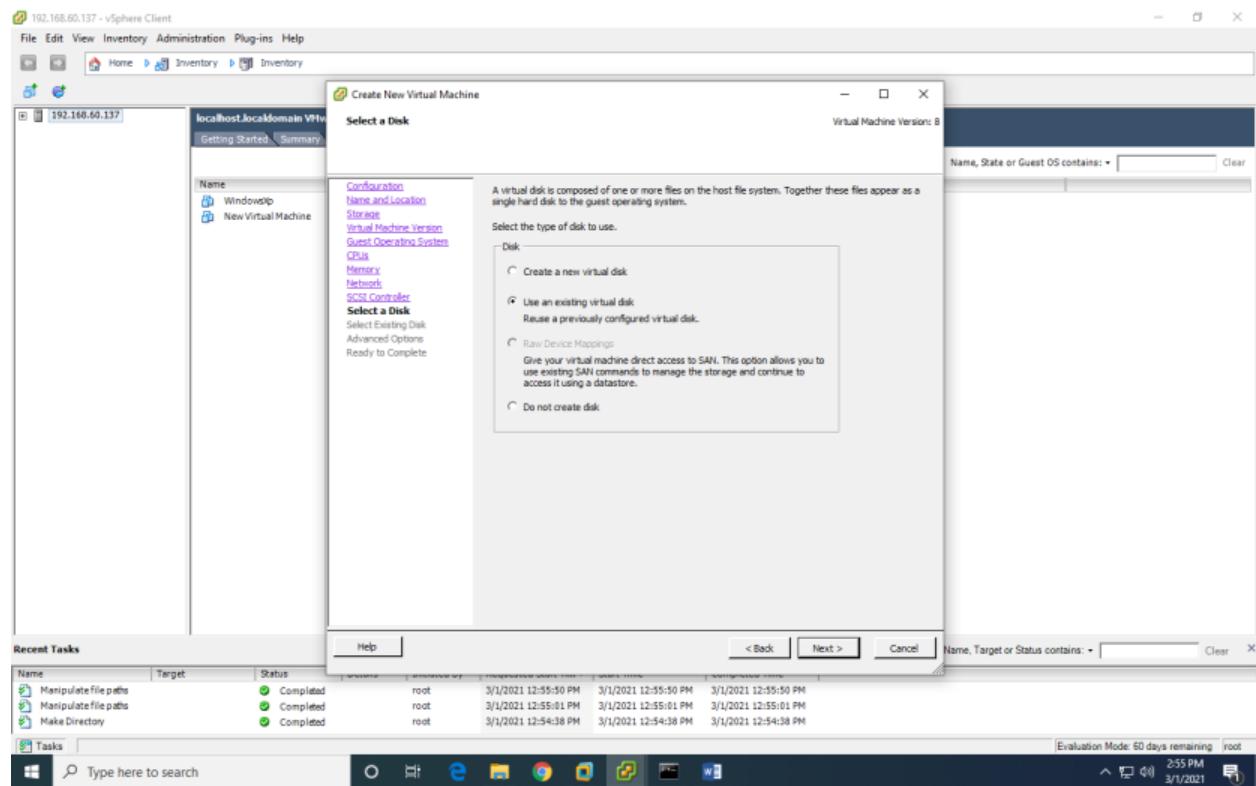
>> Click on Next.



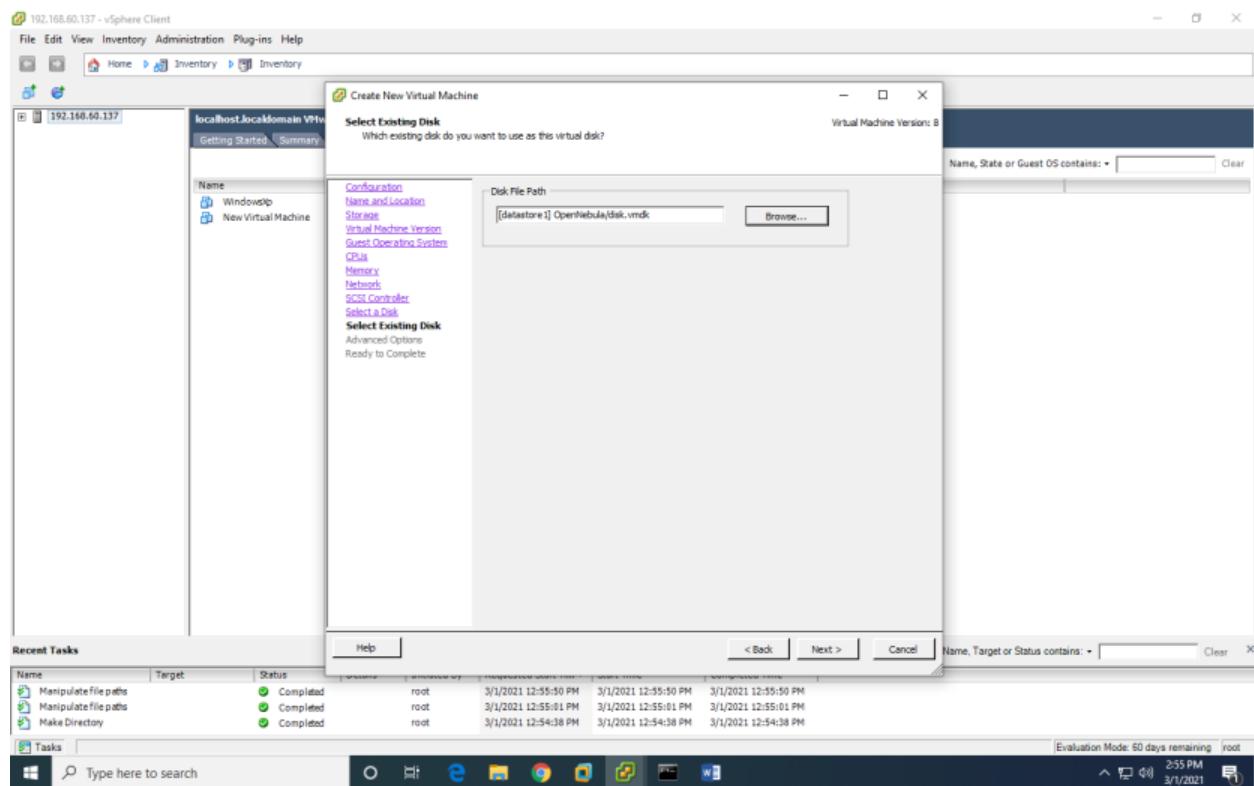
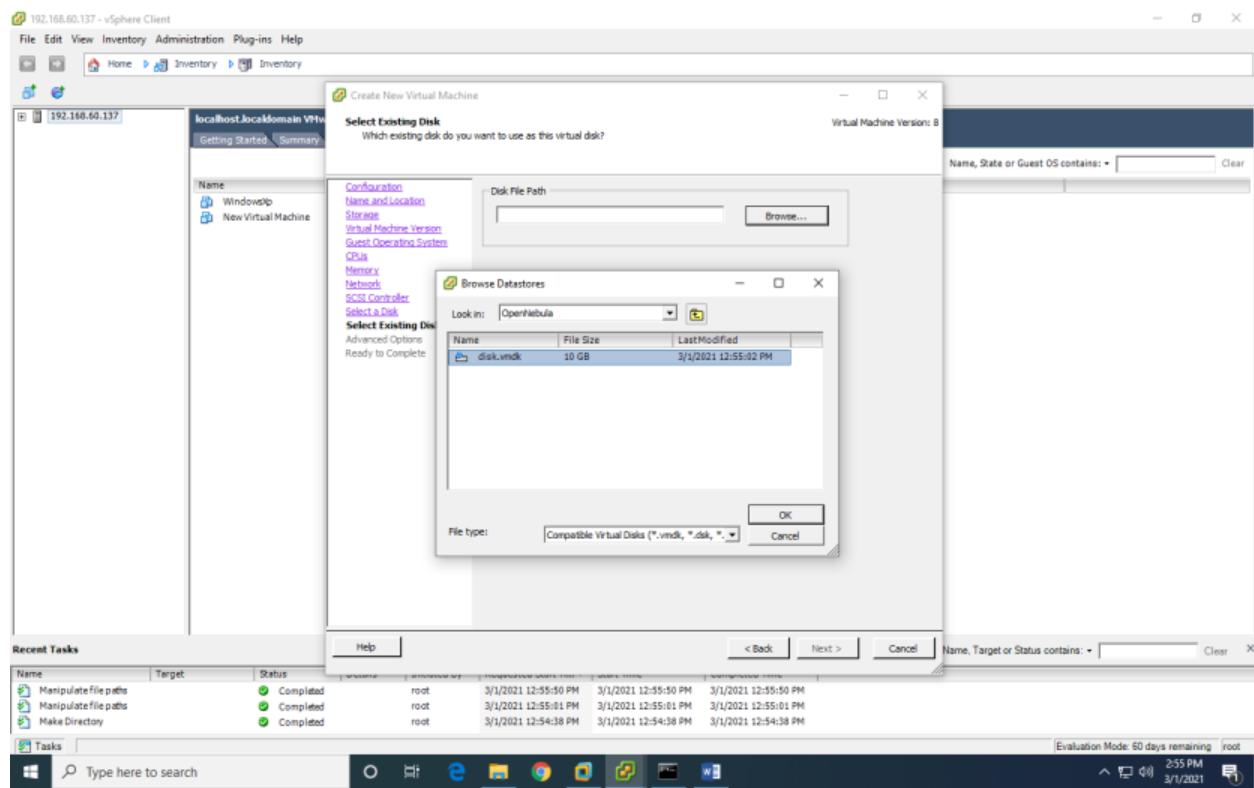
>> Select VMWare Paravirtual as SCSI controller.



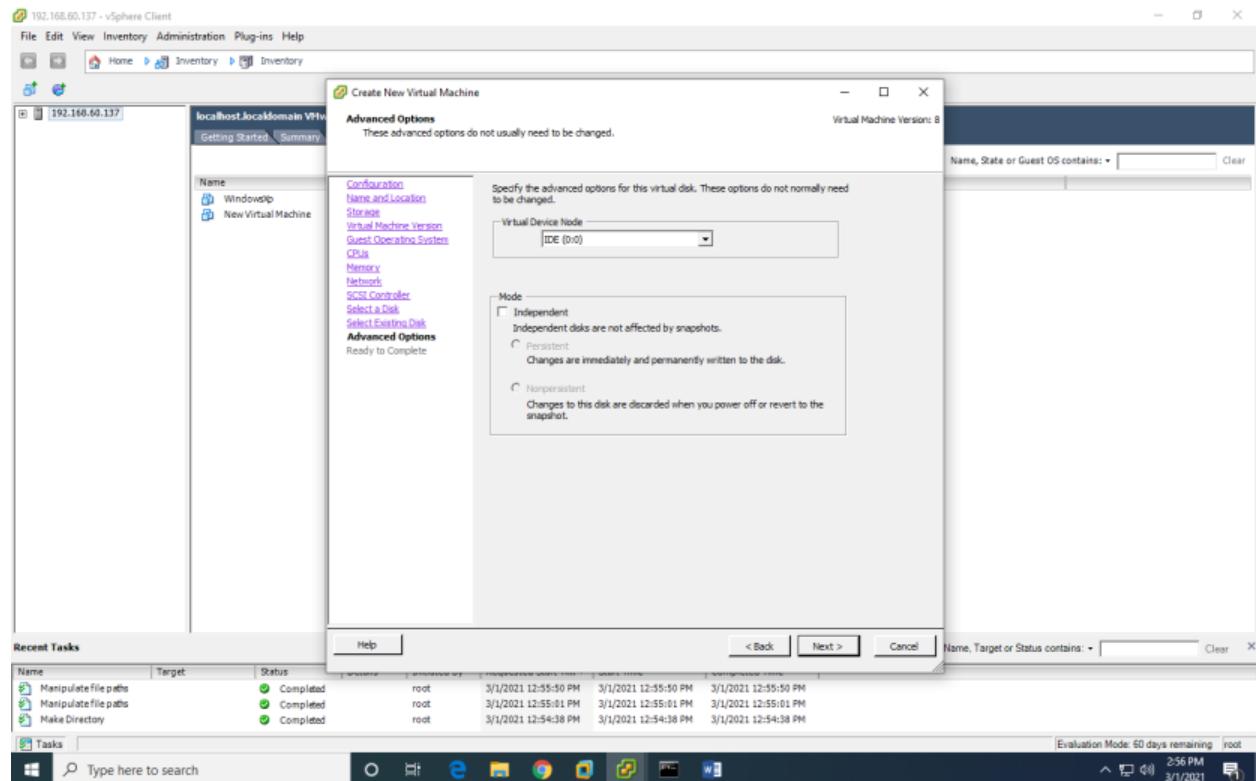
>> Under Disk type select 'Use an existing virtual Disk'.



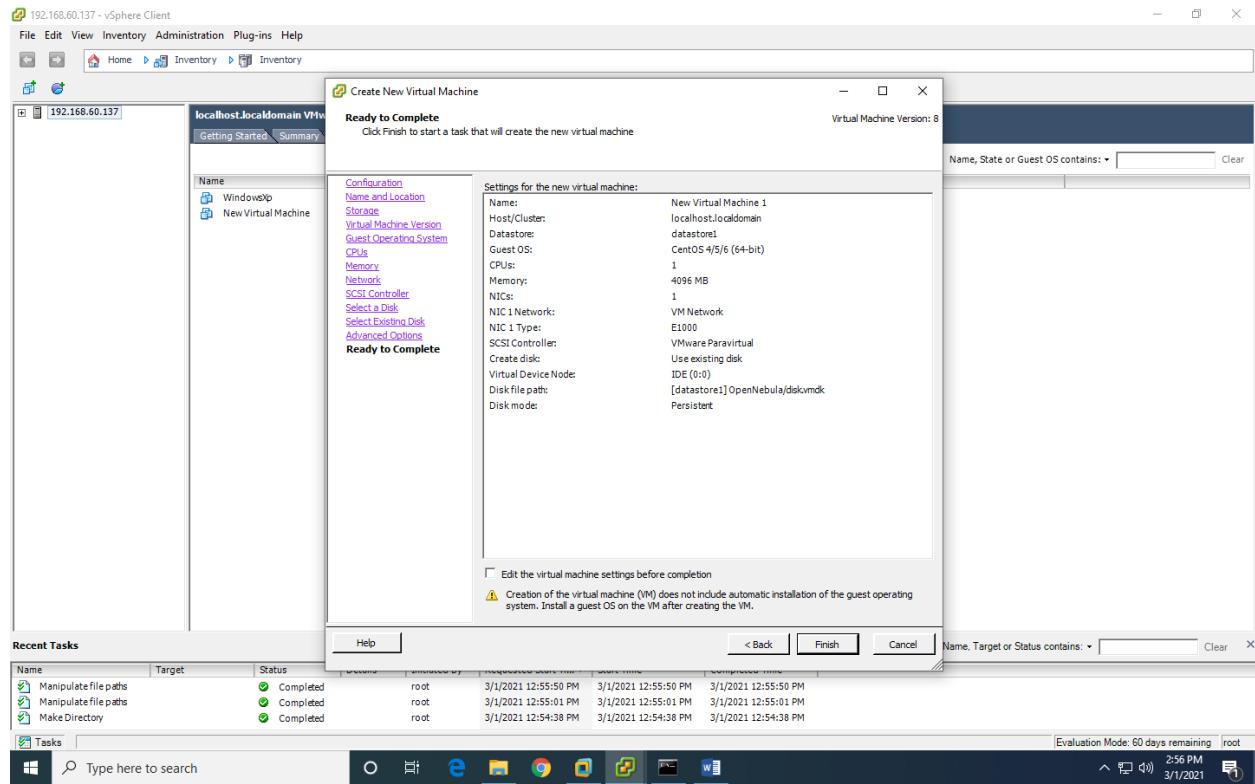
>> Now browse for the disk.vmdk file from the datastore. And click on Next.



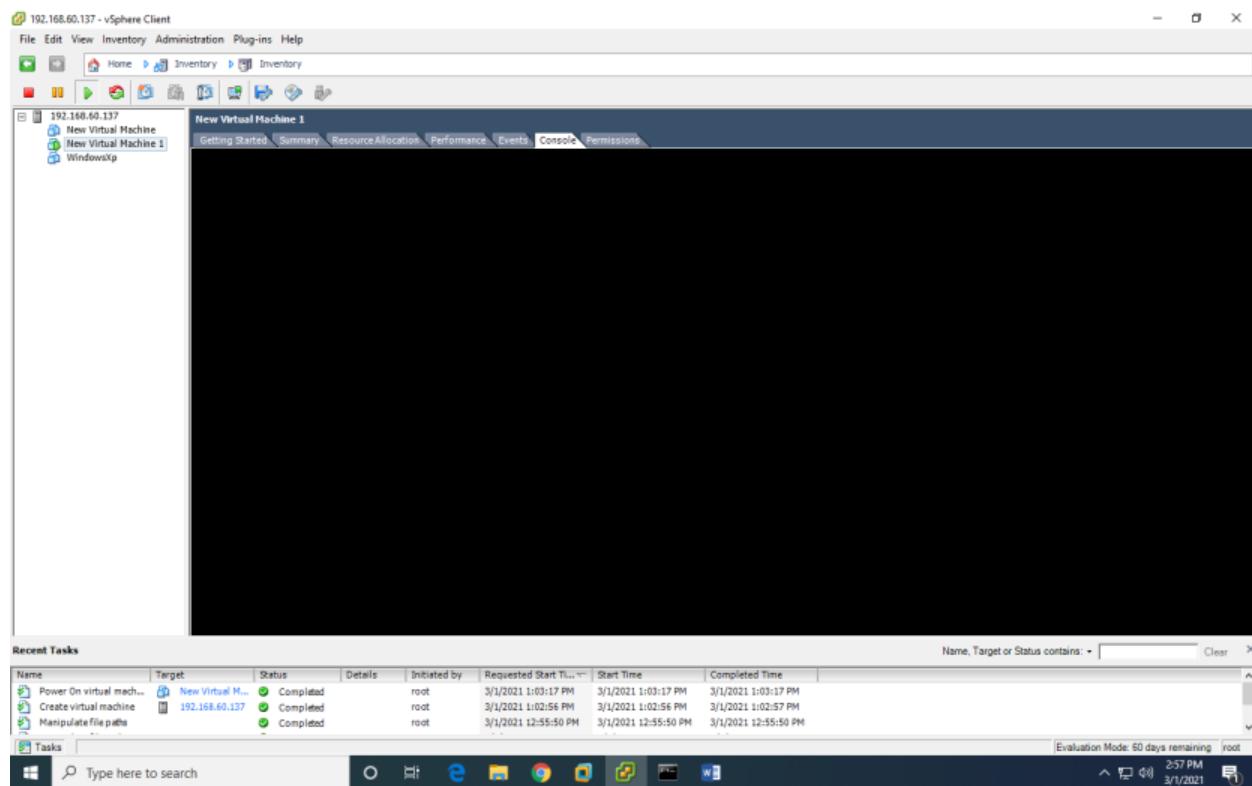
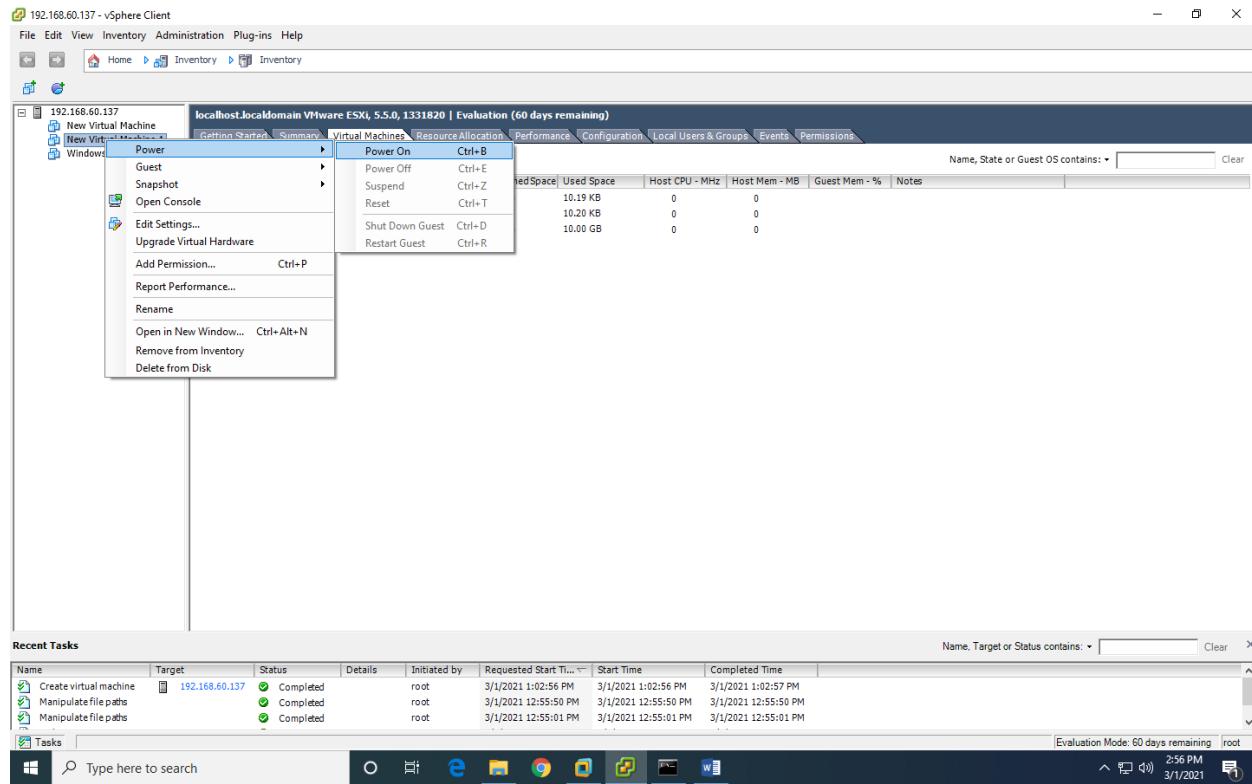
>> Click on Next.



>> Click on Next.

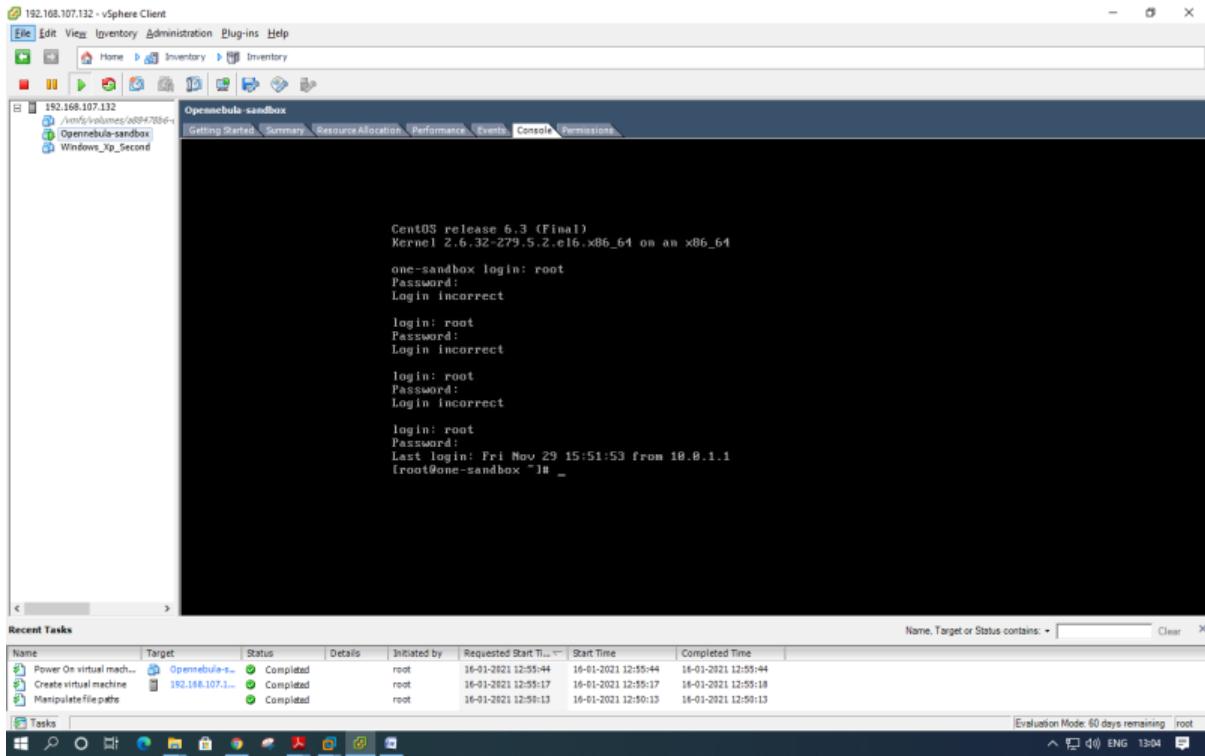


>> Now power on the virtual machine.



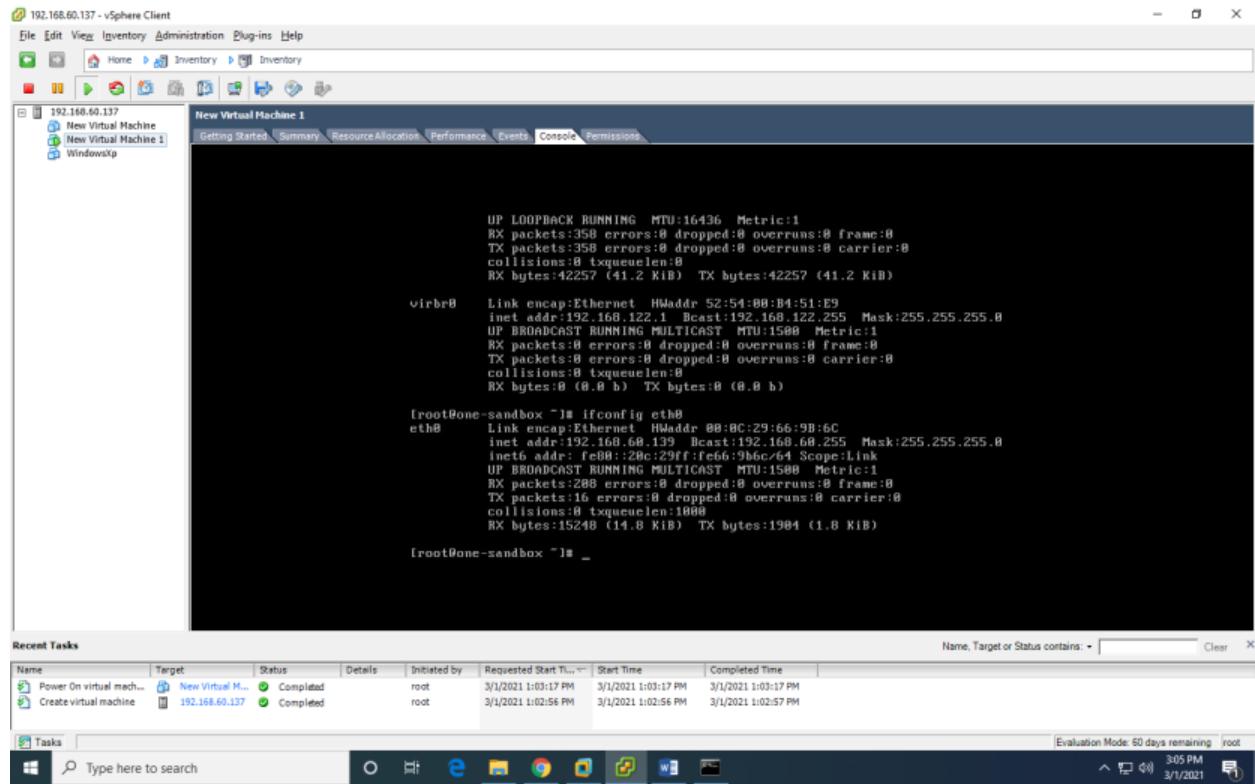
>> Now login by username : root

Password : opennebula



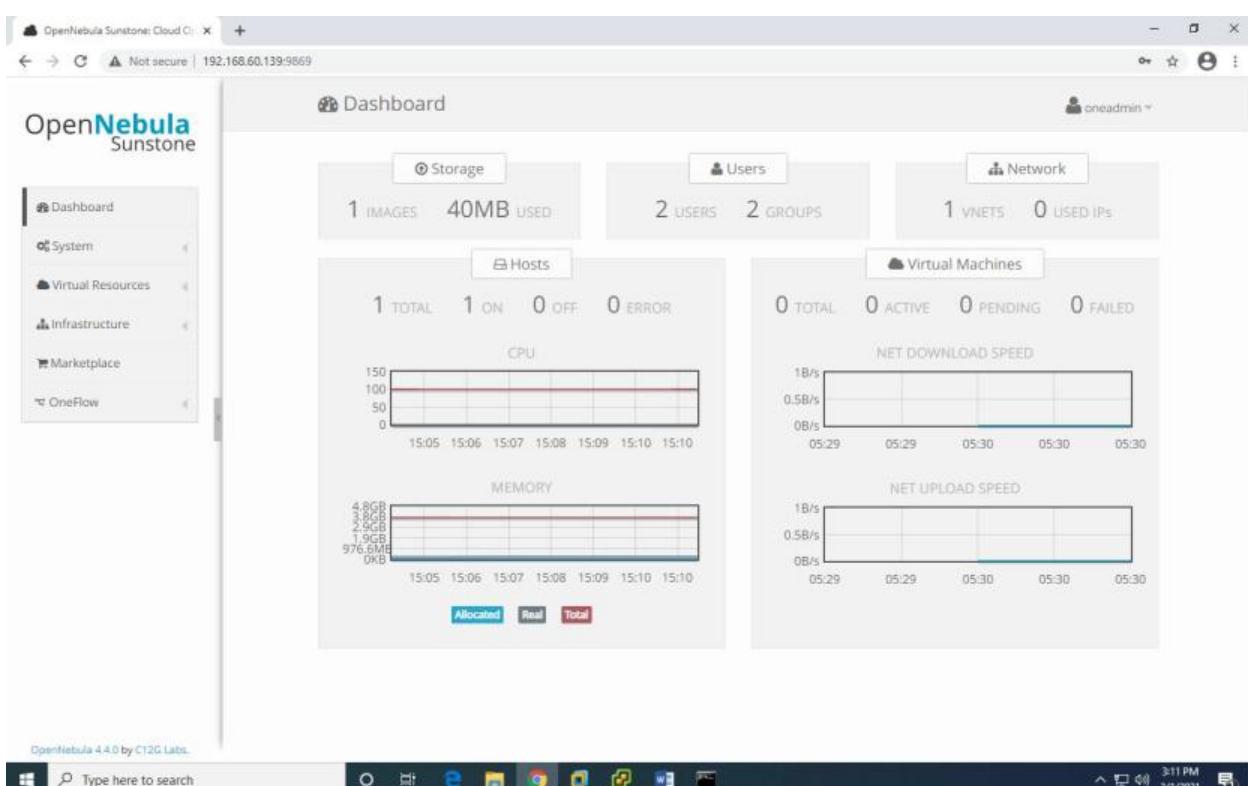
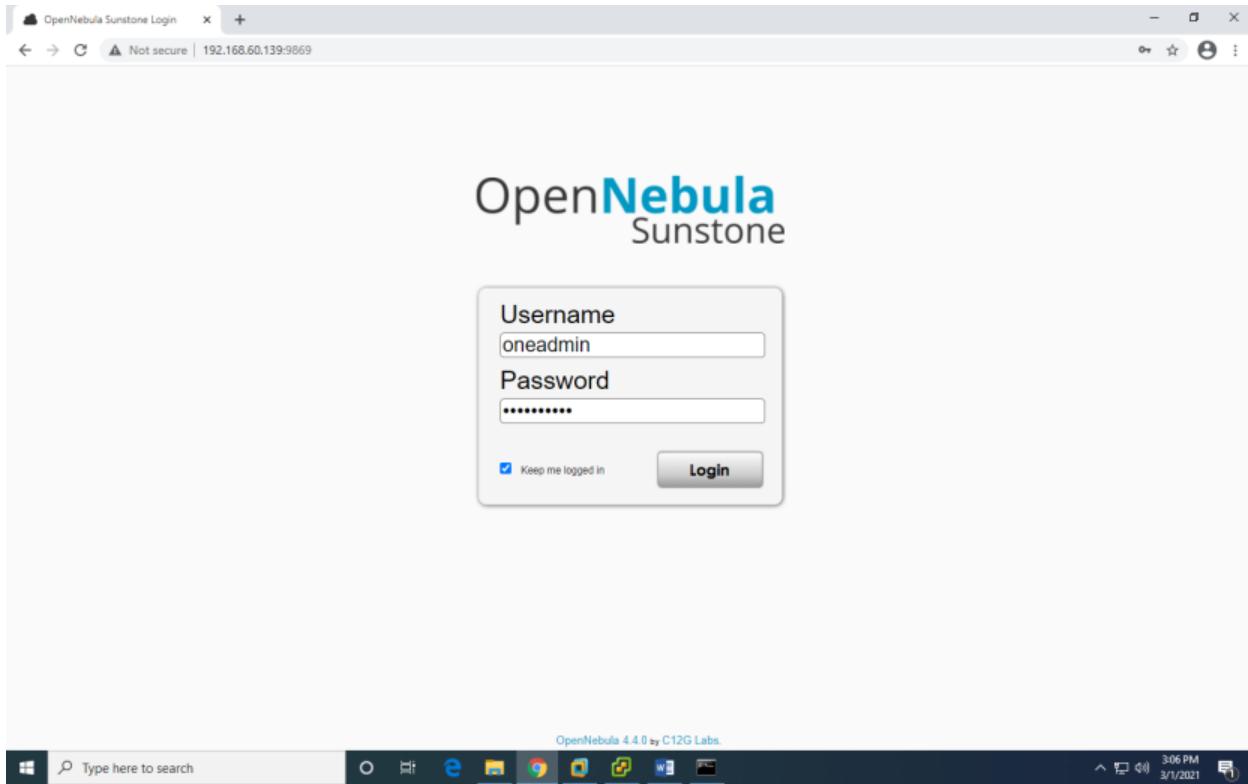
>> Now type ifconfig eth0 to get ip configuration details for login to OpenNebula Dashboard.

Since ip address of opennebulla is 192.168.60.139 Now try to ping 192.168.60.139 opennebulla on host OS



>> Now login by using Username : oneadmin

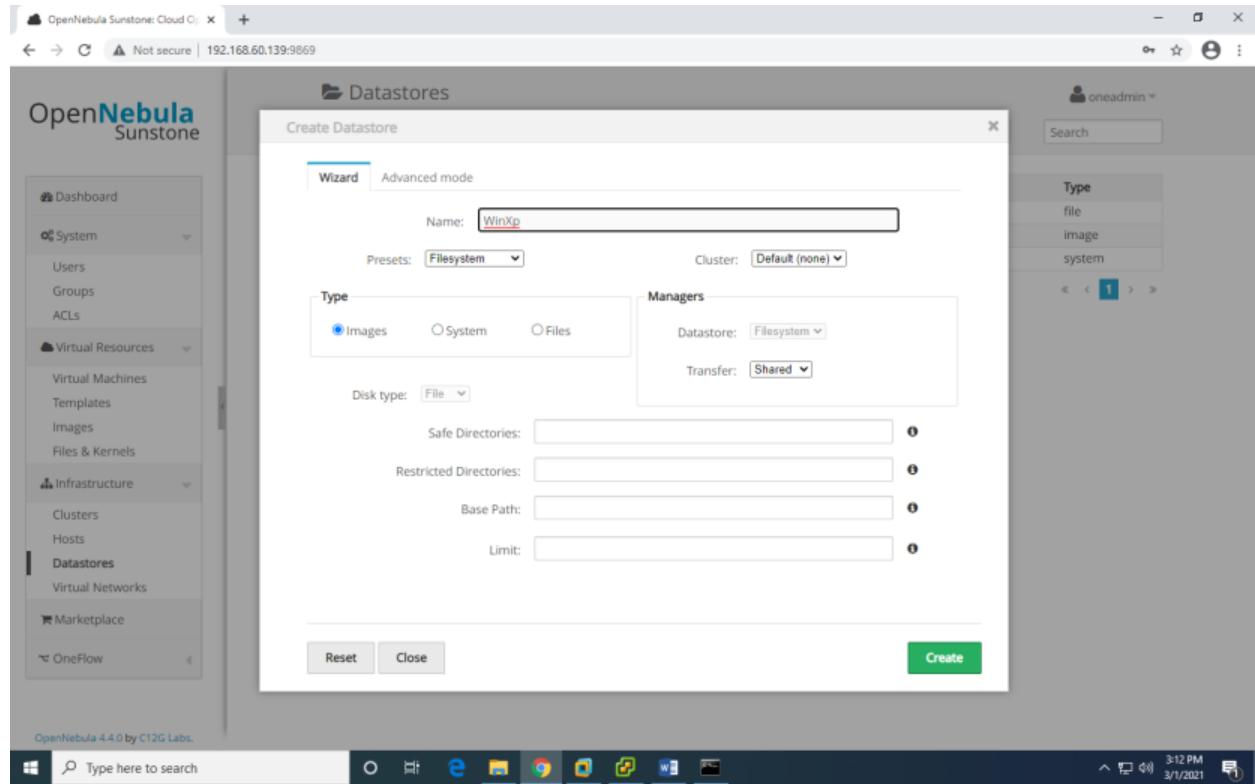
Password : Opennebula



The screenshot displays two windows of the OpenNebula Sunstone Cloud Client. The top window shows the **Dashboard** with metrics for Storage (1 IMAGE, 40MB USED), Users (2 USERS, 2 GROUPS), and Network (1 VNets, 0 USED IPs). It also includes performance graphs for CPU and Memory usage over time, and network speeds (NET DOWNLOAD SPEED, NET UPLOAD SPEED) over a 1-minute interval. The bottom window shows the **Datastores** section, listing three entries: files (Capacity: 1.9GB / 9.8GB (19%), Type: file), default (Capacity: 1.9GB / 9.8GB (19%), Type: image), and system (Capacity: 1.9GB / 9.8GB (19%), Type: system). The sidebar on the left provides navigation links for Dashboard, System, Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), Marketplace, and OneFlow.

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

>> Now in Datastore create one datastore Give it a name and then click on create.



>> Now perform the steps as follows.

OpenNebula Sunstone: Cloud C... Not secure | 192.168.60.139:9869

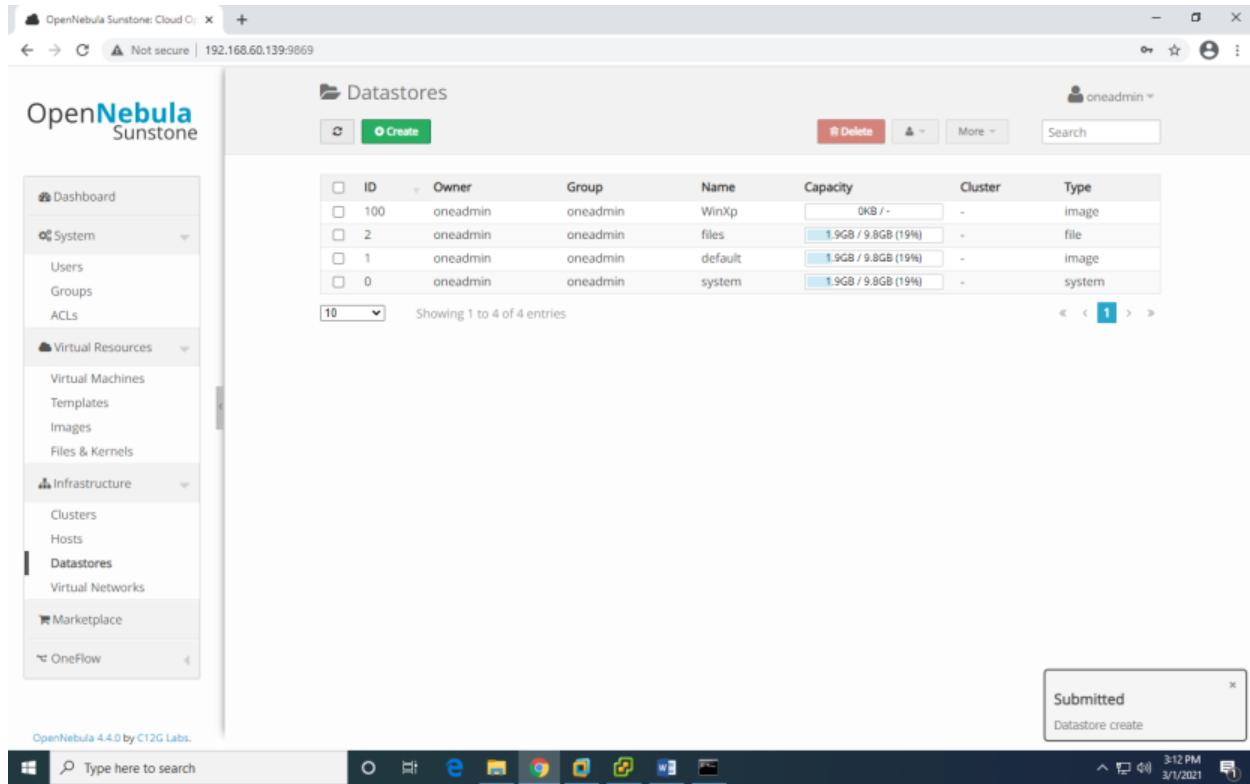
## Datastores

ID	Owner	Group	Name	Capacity	Cluster	Type
100	oneadmin	oneadmin	WinXp	0KB / -	-	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

Submitted  
Datastore create

OpenNebula 4.4.0 by C12G Labs.

Windows Taskbar: Type here to search, 3:12 PM, 3/1/2021



OpenNebula Sunstone: Cloud C... Not secure | 192.168.60.139:9869

## Datastores

ID	Owner	Group	Name	Capacity	Cluster	Type
100	oneadmin	oneadmin	WinXp	0KB / -	-	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

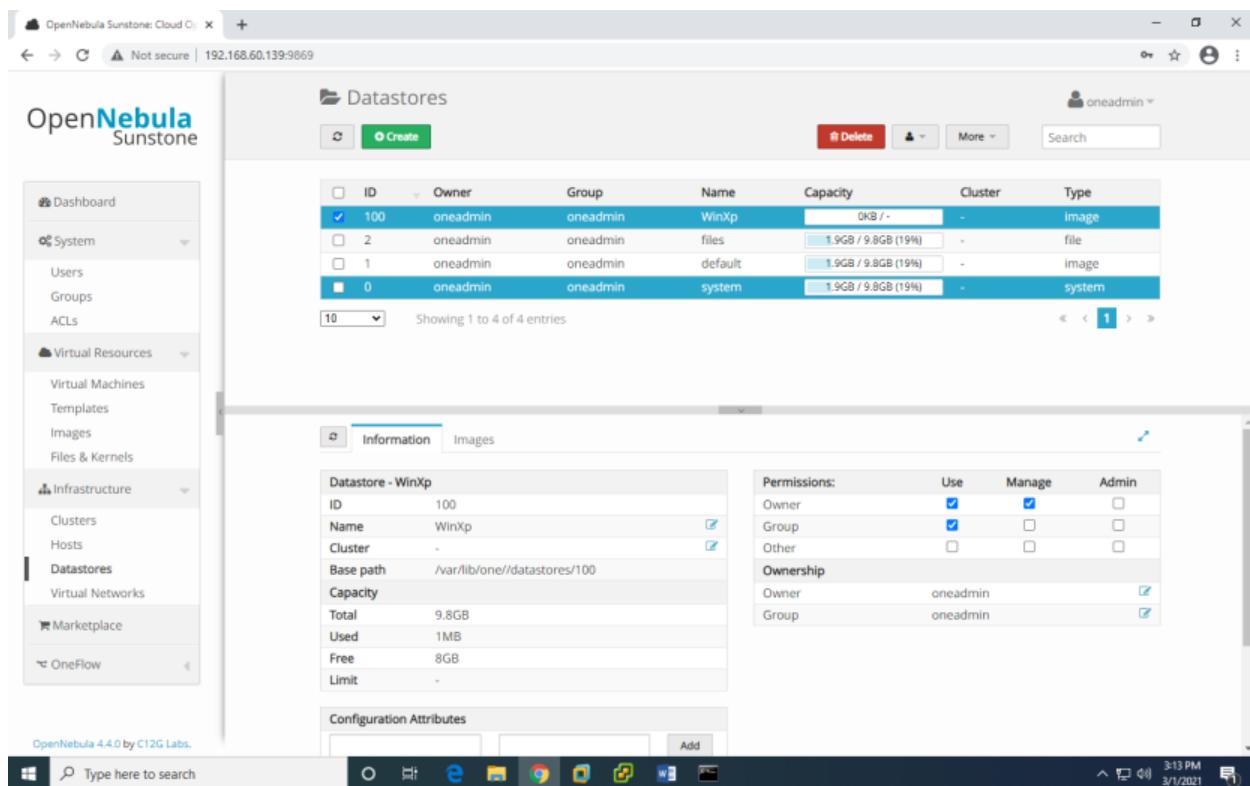
Information Images

<b>Datastore - WinXp</b>	<b>Permissions:</b>
ID: 100	Use: <input checked="" type="checkbox"/>
Name: WinXp	Manage: <input checked="" type="checkbox"/>
Cluster: -	Admin: <input type="checkbox"/>
Base path: /var/lib/one//datastores/100	
<b>Capacity</b>	
Total: 9.8GB	
Used: 1MB	
Free: 8GB	
Limit: -	

Configuration Attributes

OpenNebula 4.4.0 by C12G Labs.

Windows Taskbar: Type here to search, 3:13 PM, 3/1/2021



>> Now Datastore is created.

The screenshot shows the OpenNebula Sunstone web interface. On the left, there is a sidebar with navigation links: Dashboard, System (Users, Groups, ACLs), Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), Marketplace, and OneFlow. The main area is titled "Datastores". It displays a table with four entries:

ID	Owner	Group	Name	Capacity	Cluster	Type
100	oneadmin	oneadmin	WinXp	0KB / -	-	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

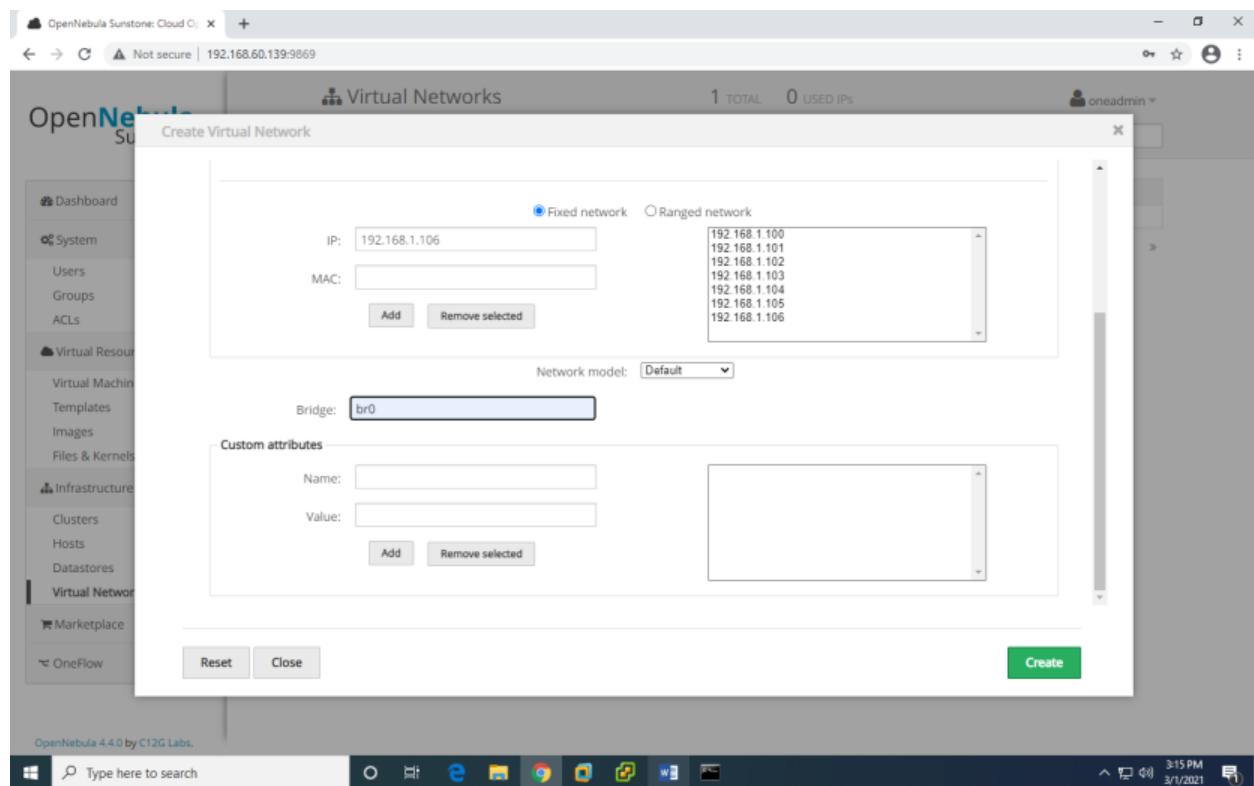
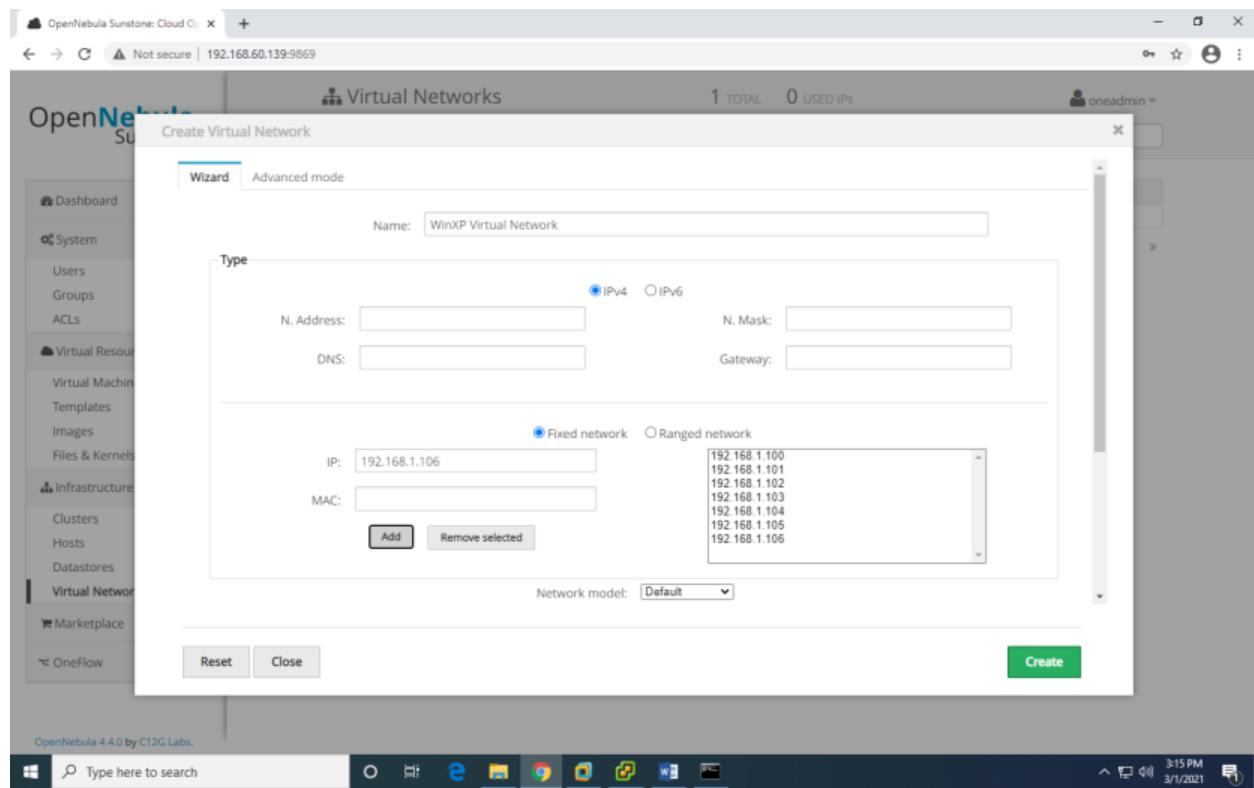
A modal window is open for the "WinXp" datastore, showing its details and configuration attributes. The "Information" tab is selected, displaying the following data:

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

The "Permissions" section shows checkboxes for Use, Manage, and Admin for Owner, Group, and Other roles. The "Ownership" section shows the owner and group as "oneadmin".

>> Now we will create virtual network.

click on "Create" provide name as "WinXp VirualNetwork" click on Fixed Network provied ip address in range "192.168.1.100" to "192.168.1.106" and also provide Bridge name :"br0"



>> Now Virtual Network is created.

The screenshot shows the OpenNebula Sunstone web interface. The left sidebar has a navigation menu with sections like Dashboard, System, Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), Marketplace, and OneFlow. The 'Virtual Networks' section is currently selected. The main content area displays a table titled 'Virtual Networks' with the following data:

ID	Owner	Group	Name	Cluster	Type	Leases
1	oneadmin	oneadmin	WinXP Virtual Network	-	FIXED	0
0	oneadmin	oneadmin	cloud	-	FIXED	0

Below the table, it says 'Showing 1 to 2 of 2 entries'. A success message 'Submitted' and 'Network create' is displayed in a box at the bottom right. The browser address bar shows 'Not secure | 192.168.60.139:9869'.

The screenshot shows the OpenNebula Sunstone web interface. On the left, a sidebar navigation menu includes: Dashboard, System (Users, Groups, ACLs), Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), Marketplace, and OneFlow. The main content area displays the 'Virtual Networks' list with two entries:

ID	Owner	Group	Name	Cluster	Type	Leases
1	oneadmin	oneadmin	WinXP Virtual Network	-	FIXED	0
0	oneadmin	oneadmin	cloud	-	FIXED	0

Below the list, a message says "Showing 1 to 2 of 2 entries". A navigation bar at the bottom shows page 1 of 1. The right side of the screen shows a detailed view for the selected 'WinXP Virtual Network' entry, with tabs for 'Information' and 'Lease management'. The 'Information' tab displays configuration details:

Virtual Network - WinXP Virtual Network	
ID	1
Name	WinXP Virtual Network
Cluster	-
Bridge	br0
VLAN	no
Physical device	--
VLAN ID	--

The 'Permissions' section shows:

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

The 'Ownership' section shows:

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

The 'Configuration Attributes' section has an 'Add' button.

>> Now in the Users Tab

The screenshot shows the OpenNebula Sunstone web interface. The left sidebar contains a navigation menu with sections like Dashboard, System, Virtual Resources, Infrastructure, Marketplace, and OneFlow. The 'Virtual Resources' section is currently selected. The main content area displays a table titled 'Users' with 2 TOTAL entries. The table columns are ID, Name, Group, Auth driver, VMs, Memory, and CPU. The data shows two users: 'serveradmin' (ID 1) and 'oneadmin' (ID 0). Both users belong to the 'oneadmin' group and use the 'core' auth driver. The 'VMs' column shows '0 /-' for both, while 'Memory' and 'CPU' show '-' for both. A pagination bar at the bottom indicates 'Showing 1 to 2 of 2 entries'. The bottom of the screen shows a Windows taskbar with the date and time as 3/1/2021 3:16 PM.

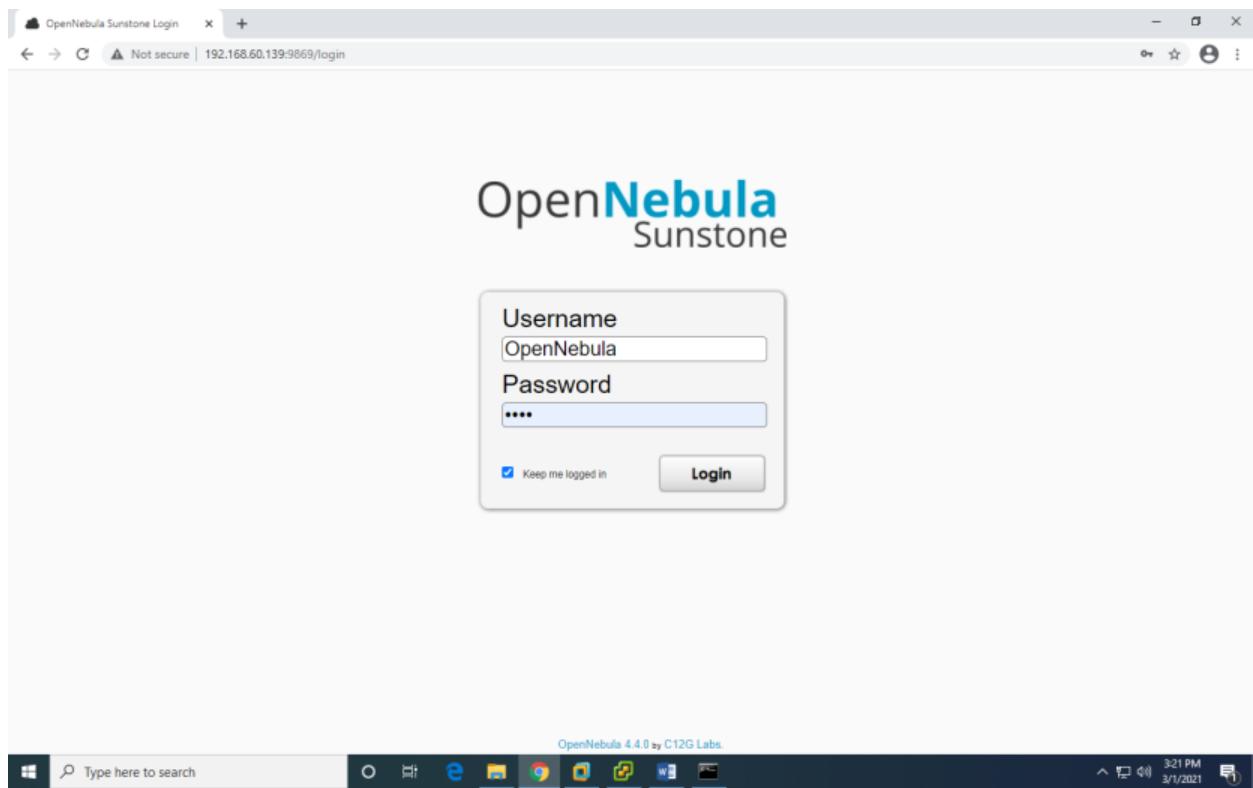
ID	Name	Group	Auth driver	VMs	Memory	CPU
1	serveradmin	oneadmin	server_cipher	0 /-	0KB /-	0 /-
0	oneadmin	oneadmin	core	-	-	-

>> Create User with Username as : OpenNebula and Password as root.

The screenshot shows the OpenNebula Sunstone web interface. On the left, there's a sidebar with navigation links like Dashboard, System (Users, Groups, ACLs), Virtual Resources, Infrastructure, Marketplace, and OneFlow. The main area is titled 'Users' and shows a table with three entries: 'OpenNebula' (ID 3, Group users, Auth driver core), 'serveradmin' (ID 1, Group oneadmin, Auth driver server\_cipher), and 'oneadmin' (ID 0, Group oneadmin, Auth driver core). A modal window titled 'Create User' is open, prompting for 'Username' (OpenNebula), 'Password' (left blank), and 'Authentication' (Core). Below the table, there are tabs for 'User information' and 'Quotas', and a section for 'Configuration Attributes' with a 'TOKEN\_PASSWORD' field containing a long hex string.

>> Now, logout and login with the credentials of created user.

This screenshot shows the same OpenNebula Sunstone interface after logging in as the 'OpenNebula' user. The user list table now highlights the 'OpenNebula' entry (ID 3) with a blue selection bar. The rest of the interface remains the same, displaying the 'User information' tab and configuration attributes for the selected user.



The screenshot shows a web browser window titled "OpenNebula Sunstone: Cloud C...". The address bar indicates the URL is "Not secure | 192.168.60.139:9869". The main content area displays the "OpenNebula Sunstone" logo and a sidebar menu. The sidebar includes options for Dashboard, Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Datastores, Virtual Networks), Marketplace, and OneFlow. The "Images" option is selected. The main panel shows a table titled "Images" with 1 TOTAL entry. The table includes columns for ID, Owner, Group, Name, Datastore, Type, Status, and #VMS. The single entry listed is ID 0, Owner oneadmin, Group oneadmin, Name ttylinux, Datastore default, Type OS, Status READY, and #VMS 0. A pagination control shows "Showing 1 to 1 of 1 entries". The status bar at the bottom of the browser window shows "OpenNebula 4.4.0 by C12G Labs." and the system tray shows the date and time as "3/1/2021 3:22 PM".

>> Now add image file of windowsXp by creating new image.

The screenshot shows the OpenNebula Sunstone web interface. A modal dialog box titled "Create Image" is open, overlaid on the main "Images" list page. The "Wizard" tab is selected in the dialog. Inside, the "Name" field contains "WinXPImage", the "Type" dropdown is set to "CDROM", and the "Datastore" dropdown is set to "default (id:1)". Below these fields is a "Choose File" button with the path "WXPVOL\_EN.iso" displayed. At the bottom right of the dialog is a green "Create" button. The background shows a list of images with one item named "WXPVOL\_EN" selected. The overall interface has a modern, clean design with a dark header bar.

OpenNebula Sunstone: Cloud C... Not secure | 192.168.60.139:9869

## OpenNebula Sunstone

Dashboard Virtual Resources Virtual Machines Templates Images Files & Kernels Infrastructure Datastores Virtual Networks Marketplace OneFlow

### Images

1 TOTAL 40MB USED

Uploading... 0 WXPVOL\_EN.iso

ID	Owner	Group	Name	Datastore	Type	Status	#VMs
0	oneadmin	oneadmin	ttylinux	default	OS	READY	0

Showing 1 to 1 of 1 entries

OpenNebula 4.4.0 by C12G Labs.

Type here to search 3:23 PM 3/1/2021

The screenshot shows the 'Images' section of the OpenNebula Sunstone web interface. It displays a single image entry named 'WXPVOL\_EN.iso'. The table shows columns for ID, Owner, Group, Name, Datastore, Type, Status, and #VMs. The status is 'READY' with 0 VMs. The interface includes a sidebar with navigation links like Dashboard, Virtual Resources, and Infrastructure. The bottom status bar shows the date and time as 3/1/2021 at 3:23 PM.

OpenNebula Sunstone: Cloud C... Not secure | 192.168.60.139:9869

## OpenNebula Sunstone

Dashboard Virtual Resources Virtual Machines Templates Images Files & Kernels Infrastructure Datastores Virtual Networks Marketplace OneFlow

### Images

2 TOTAL 731MB USED

ID	Owner	Group	Name	Datastore	Type	Status	#VMs
1	OpenNebula	users	WinXPImage	default	CDROM	READY	0
0	oneadmin	oneadmin	ttylinux	default	OS	READY	0

Showing 1 to 2 of 2 entries

#### Information

Image - WinXPImage	Permissions:
ID: 1	Owner: <input checked="" type="checkbox"/>
Name: WinXPImage	Manage: <input checked="" type="checkbox"/>
Datastore: default	Admin: <input type="checkbox"/>
Type: CDROM	
Register time: 13:30:22 01/03/2021	
Persistent: no	
Filesystem type: --	
Size: 691MB	
State: READY	
Running VMs: 0	

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

Configuration & Tags

DEV\_PREFIX: hd

OpenNebula 4.4.0 by C12G Labs.

Type here to search 3:24 PM 3/1/2021

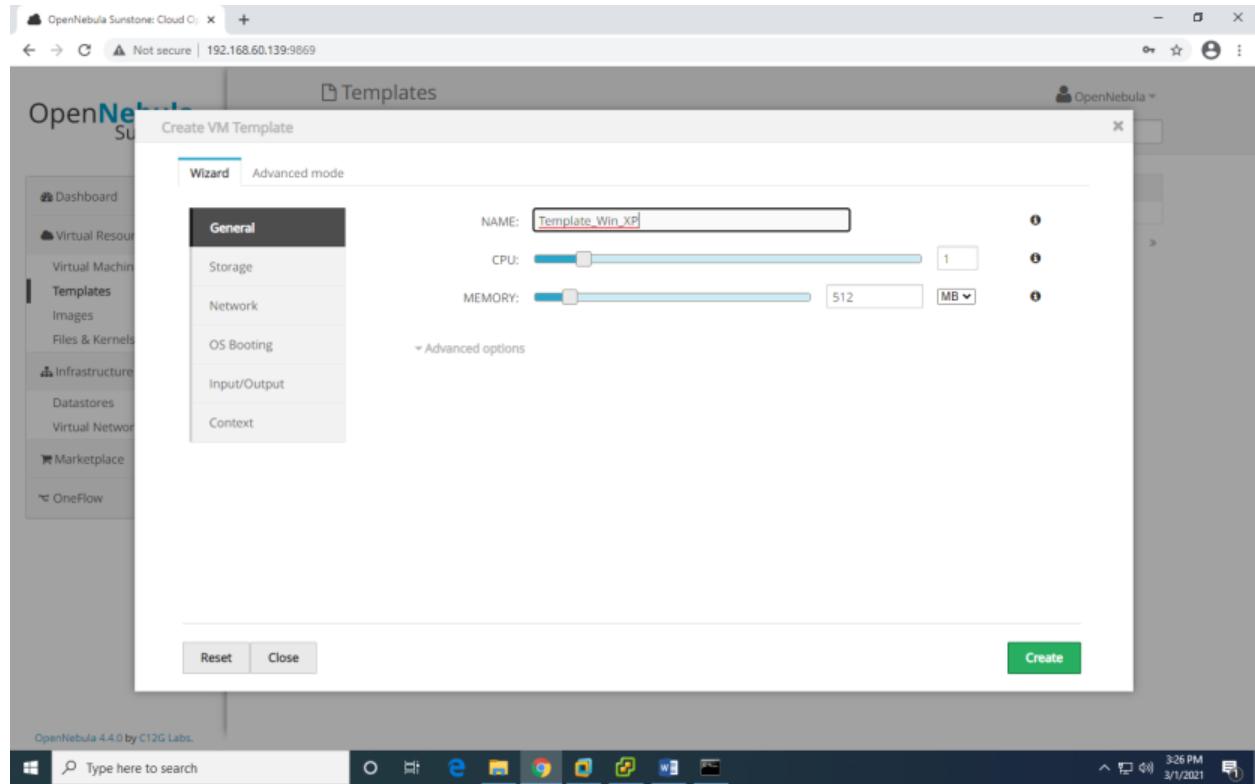
This screenshot shows the 'Images' section after a new image has been uploaded. There are now two entries: 'WinXPImage' (ID 1) and 'ttylinux' (ID 0). The 'Information' tab is selected for the 'WinXPImage' entry, displaying its details such as ID, Name, Datastore, Type, Register time, Persistent, Filesystem type, Size, State, and Running VMs. It also shows permissions for Owner, Group, and Other, all of which have checkboxes checked. A 'Configuration & Tags' section is present at the bottom.

>> Now under templates create a Template.

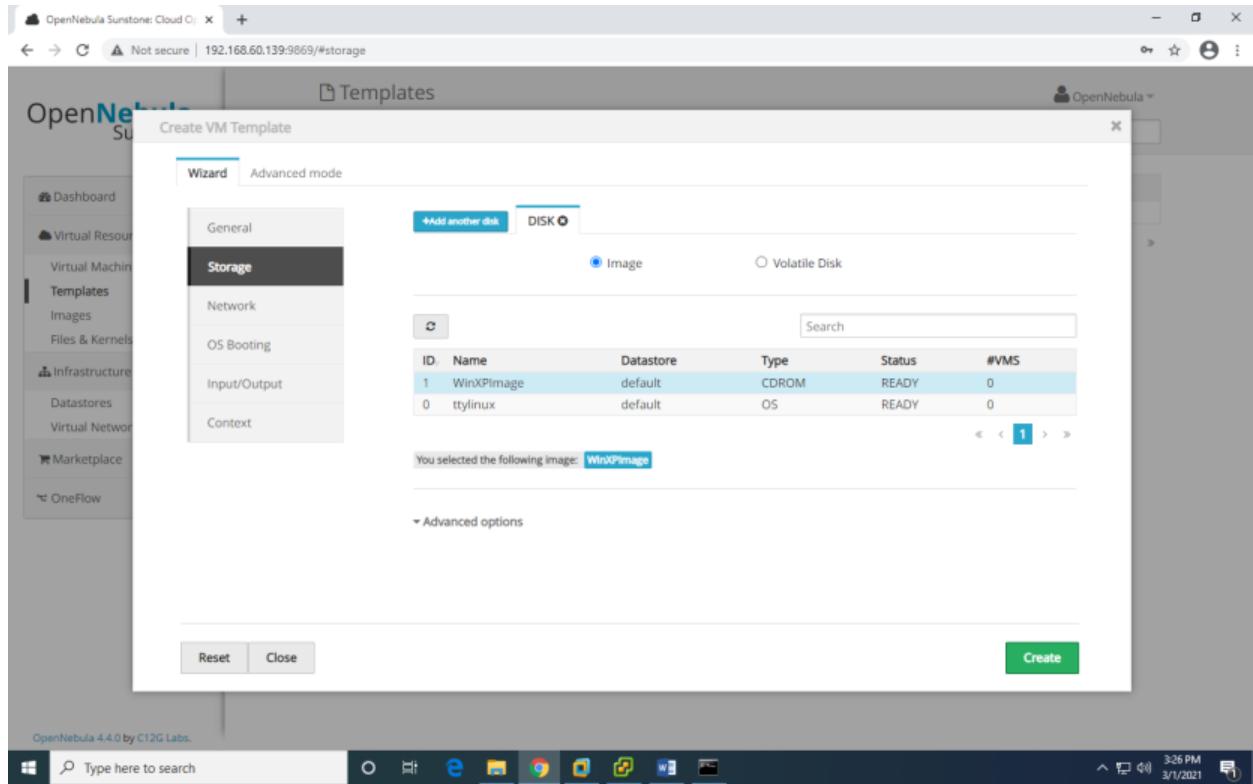
The screenshot shows the OpenNebula Sunstone web interface. The left sidebar has a 'Templates' section selected. The main content area displays a table titled 'Templates' with one entry:

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

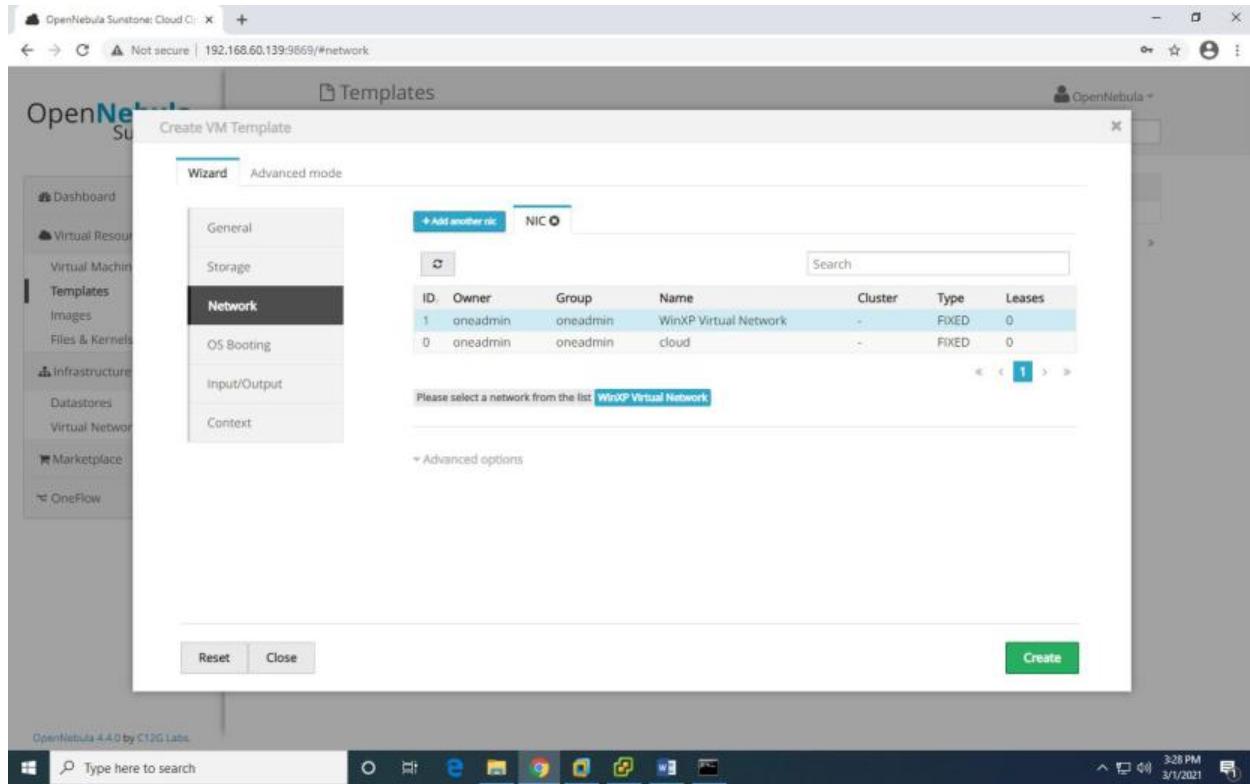
Below the table, it says 'Showing 1 to 1 of 1 entries'. The browser address bar shows 'Not secure | 192.168.60.139:9869'. The taskbar at the bottom includes icons for File Explorer, Edge, File, and others, along with a search bar and system status indicators.



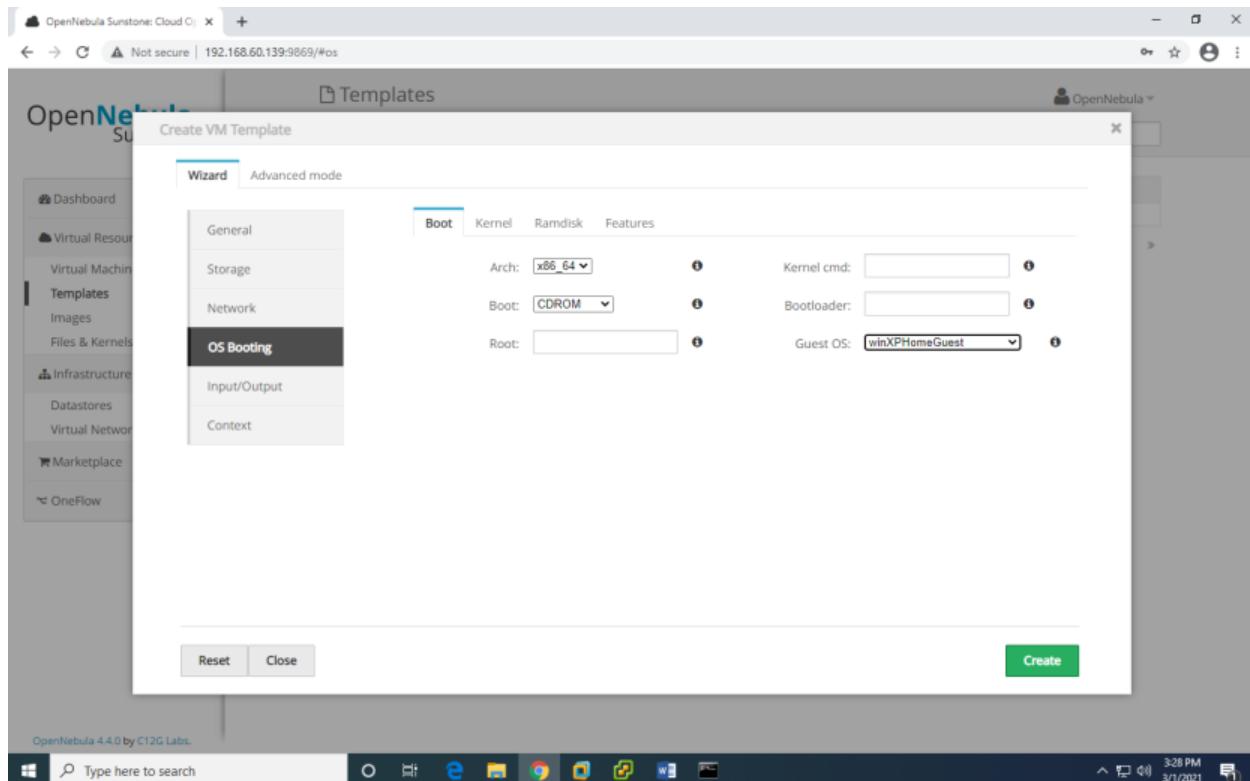
>> Now under storage browse for the image that you have created.



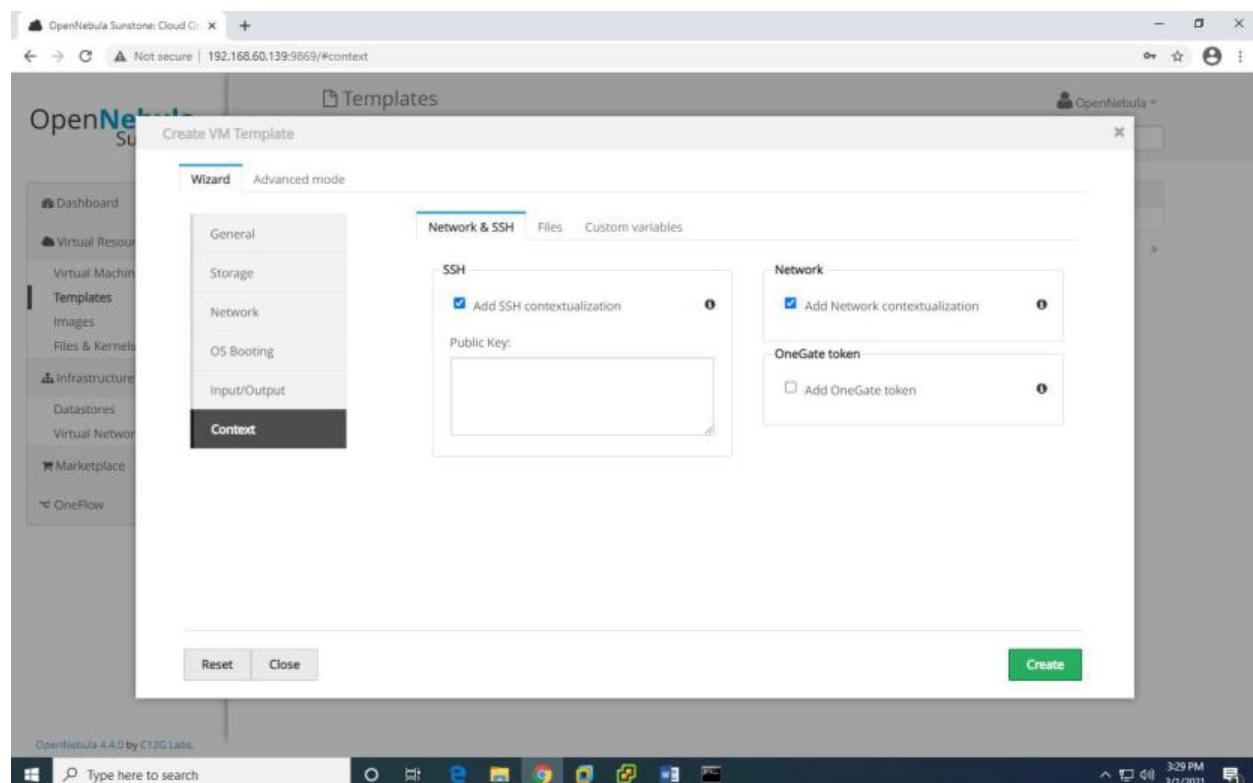
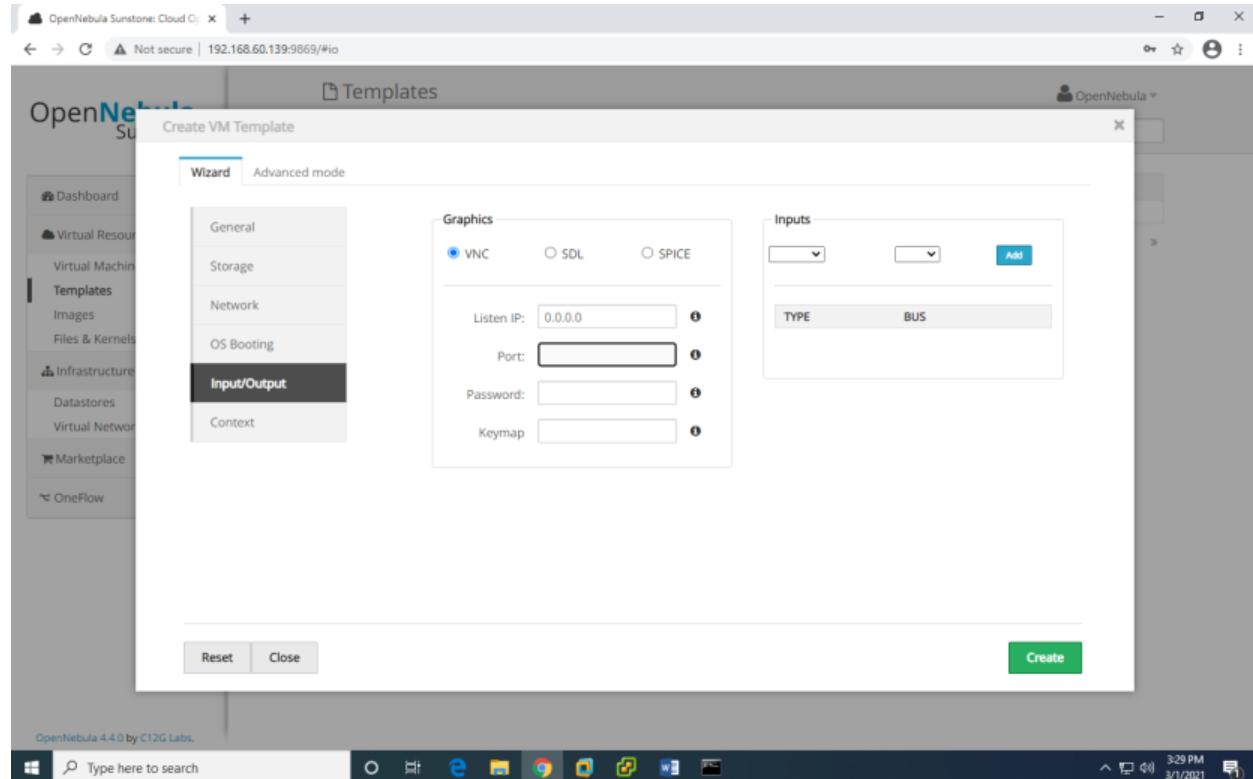
>> Select the Virtual Network that you have created.



>> Select the options as shown in the image and click on create.



click on "INPUT/OUTPUT " SELECT "VNC"



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

ID	Owner	Group	Name	Registration time
1	OpenNebula	users	Template_Win_XP	13:36:33 01/03/2021
0	oneadmin	oneadmin	ttylinux	03:16:57 21/11/2012

A green 'Create' button is at the top right of the table. A success message 'Submitted' is displayed in a box on the right.

>> Now instantiate the template that you have created.

The screenshot shows the OpenNebula Sunstone web interface. On the left, a sidebar menu includes options like Dashboard, Virtual Resources, Templates, Infrastructure, Marketplace, and OneFlow. The main area displays a table of templates. A modal window is open for the template "Template\_Win\_XP" (ID: 1), showing its details and permissions. The permissions table is as follows:

	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"/>

The screenshot shows the OpenNebula Sunstone interface with the instantiation dialog for the "Template\_Win\_XP" template. The dialog allows setting the VM name ("WindowsXP") and the number of VMs ("1"). An "Instantiate" button is visible. The background shows the same template list and permission table as the previous screenshot.

The screenshot shows the OpenNebula Sunstone web interface. On the left, a sidebar menu includes 'Dashboard', 'Virtual Resources' (selected), 'Virtual Machines', 'Templates' (selected), 'Images', 'Files & Kernels', 'Infrastructure' (selected), 'Datastores', 'Virtual Networks', 'Marketplace', and 'OneFlow'. The main content area displays a table titled 'Templates' with columns: ID, Owner, Group, Name, and Registration time. A row for 'Template\_Win\_XP' is selected, showing ID 1, Owner OpenNebula, Group users, Name Template\_Win\_XP, and Registration time 13:36:33 01/03/2021. Below the table, a message box says 'Submitted' and 'Template instantiate: 1'. At the bottom, a Windows taskbar shows the date and time as 3/1/2021 9:31 PM.

>> CLICK ON "VIRTUAL MACHINES"

The screenshot shows the OpenNebula Sunstone web interface. The sidebar menu is identical to the previous screen. The main content area displays a table titled 'Virtual Machines' with columns: ID, Owner, Group, Name, Status, Host, IPs, and VNC. A single entry for 'WindowsXP' is listed with ID 1, Owner OpenNebula, Group users, Name WindowsXP, Status PENDING, Host -, IPs 192.168.1.100, and VNC. Below the table, a detailed view for 'Virtual Machine - WindowsXP' shows fields like Name, State, LCM State, Host, Start time, Deploy ID, and Reschedule. A 'Permissions' section and a 'Tags' section are also present. At the bottom, a Windows taskbar shows the date and time as 3/1/2021 9:31 PM.

## >> CLICK ON REFRESH ICON

The screenshot shows the OpenNebula Sunstone web interface. On the left, a sidebar menu includes 'Dashboard', 'Virtual Resources' (selected), 'Virtual Machines', 'Templates', 'Images', 'Files & Kernels', 'Infrastructure' (selected), 'Datastores', 'Virtual Networks', 'Marketplace', and 'OneFlow'. The main area displays a table of 'Virtual Machines' with one entry:

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

A modal window is open for the 'WindowsXP' VM, showing its 'Information' tab with details like ID, Name, State, LCM State, Host, Start time, Deploy ID, and Reschedule. It also shows 'Permissions' for Owner, Group, and Other, and a 'Tags' section.

The screenshot shows the same OpenNebula Sunstone interface after refreshing. A VNC session is now active for the 'WindowsXP' VM, indicated by the message 'VNC Connected (unencrypted) to: QEMU (one-1)' at the top of the modal window. The modal window displays the 'Windows XP Professional Setup' welcome screen. The sidebar and main interface remain the same as in the previous screenshot.

# Practical 8

## Implementing “Big” Web Service.

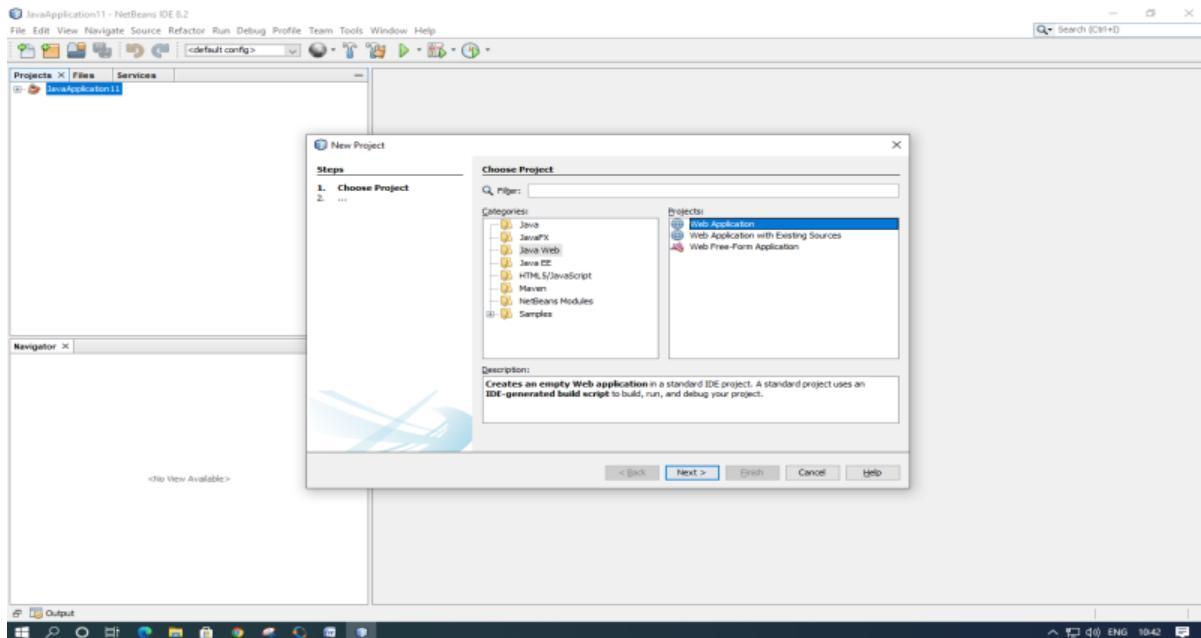
### Softwares Required

- Netbeans IDE 8.2

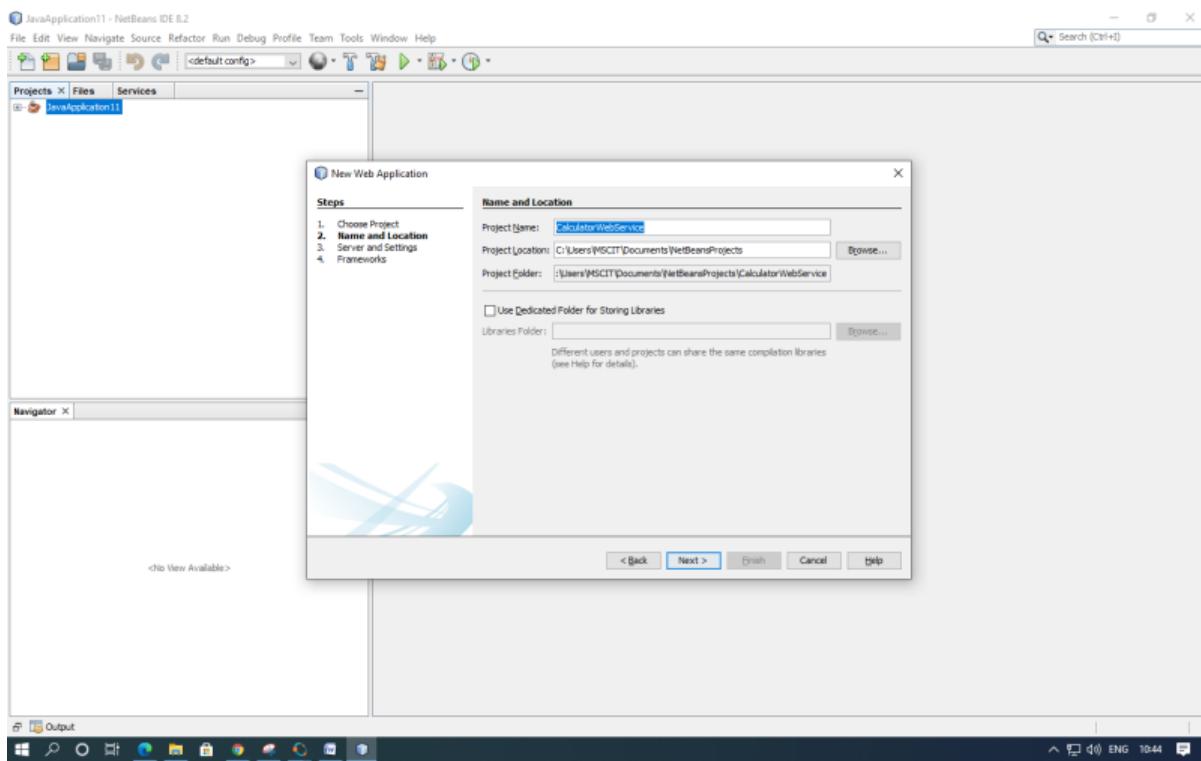
1) Creating a Web Service

A. Choosing a Container: Open NetBeans IDE 8.2

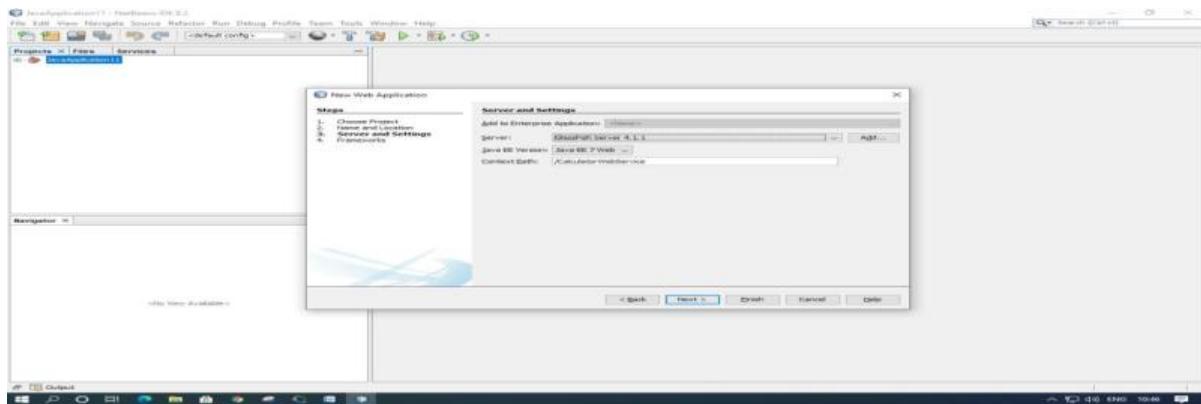
1. Choose File > New Project. Select Web Application from the Java Web.



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

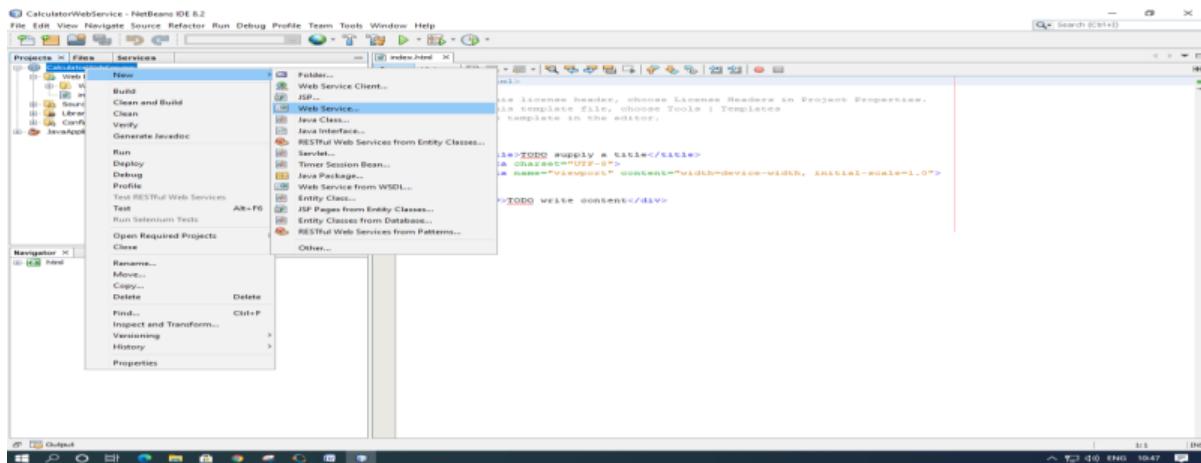


3. Select your server and Java EE version and click Finish. (Do not do anything in Framework)

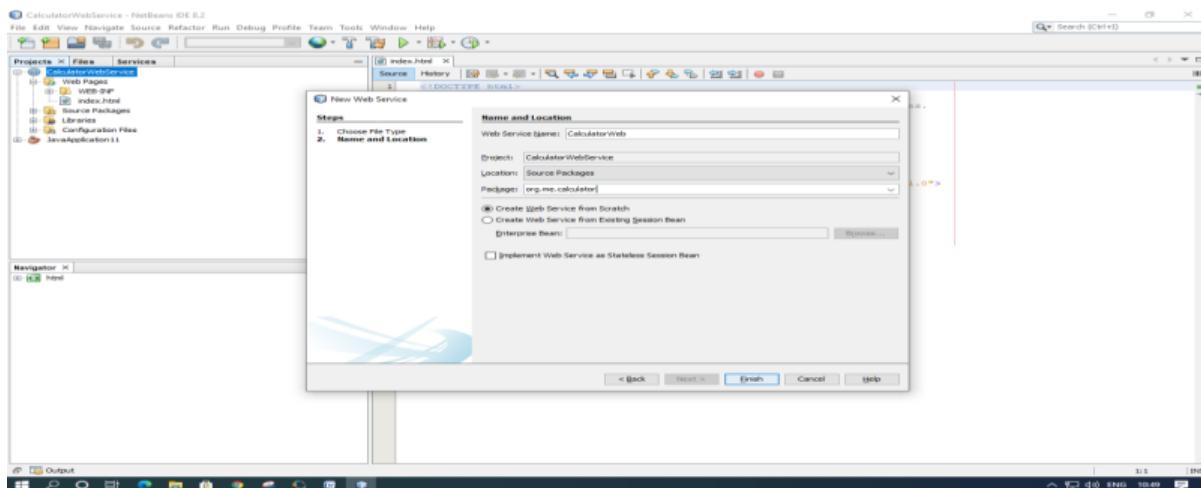


## B. Creating a Web Service from a Java Class

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.

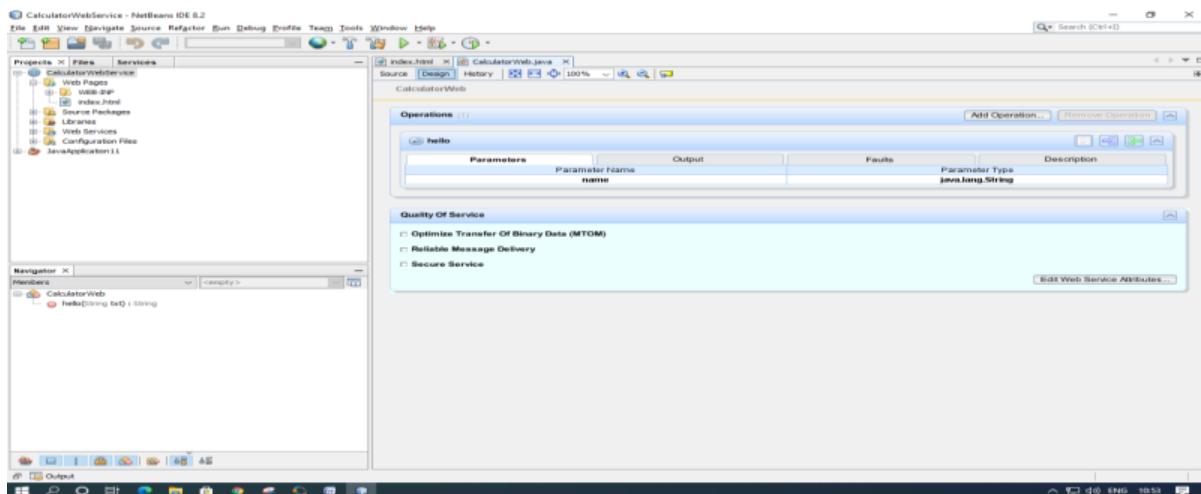


3. Click Finish. The Projects window displays the structure of the new web service and the source code is shown in the editor area.

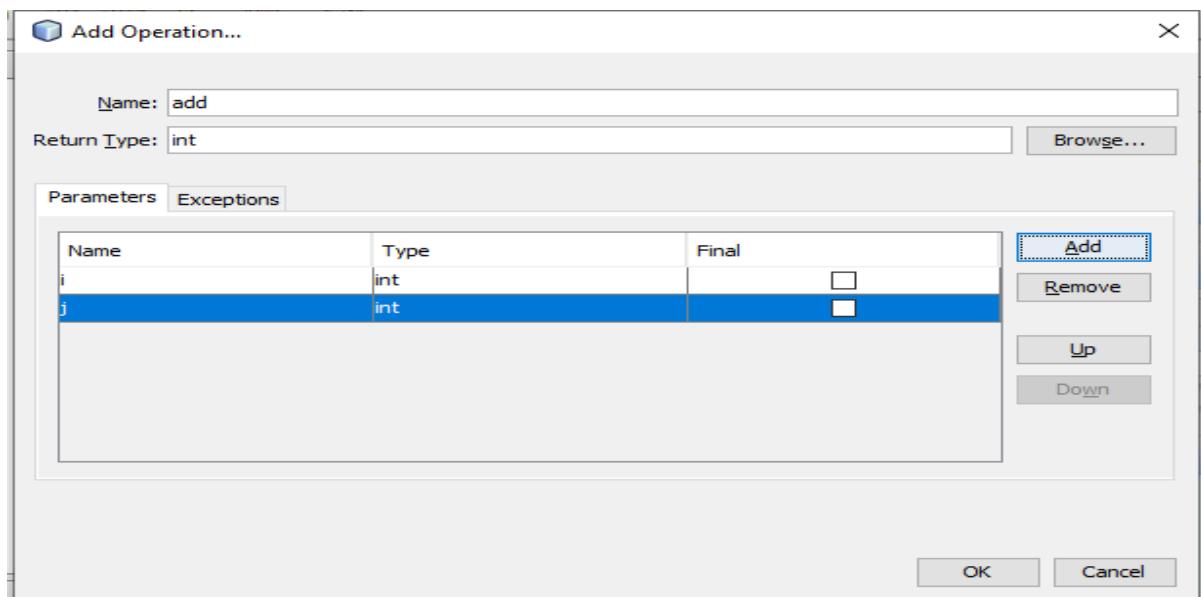
2) Adding an Operation to the Web Service : The goal of this exercise is to add to the web service an operation that adds two numbers received from a client. The NetBeans IDE provides a dialog for adding an operation to a web service. You can open this dialog either in the web service visual designer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

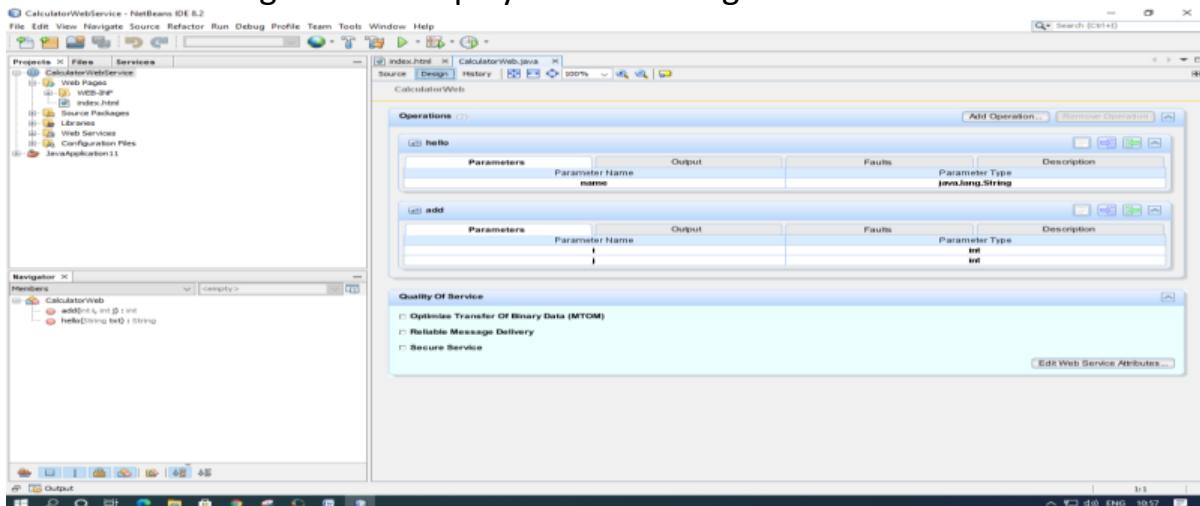


2. Click Add Operation in either the visual designer or the context menu. The Add Operation dialog opens.
3. In the upper part of the Add Operation dialog box, type add in Name and type int in the Return Type drop-down list.
4. In the lower part of the Add Operation dialog box, click Add and create a parameter of type int named i.
5. Click Add again and create a parameter of type int called j. You now see the following:



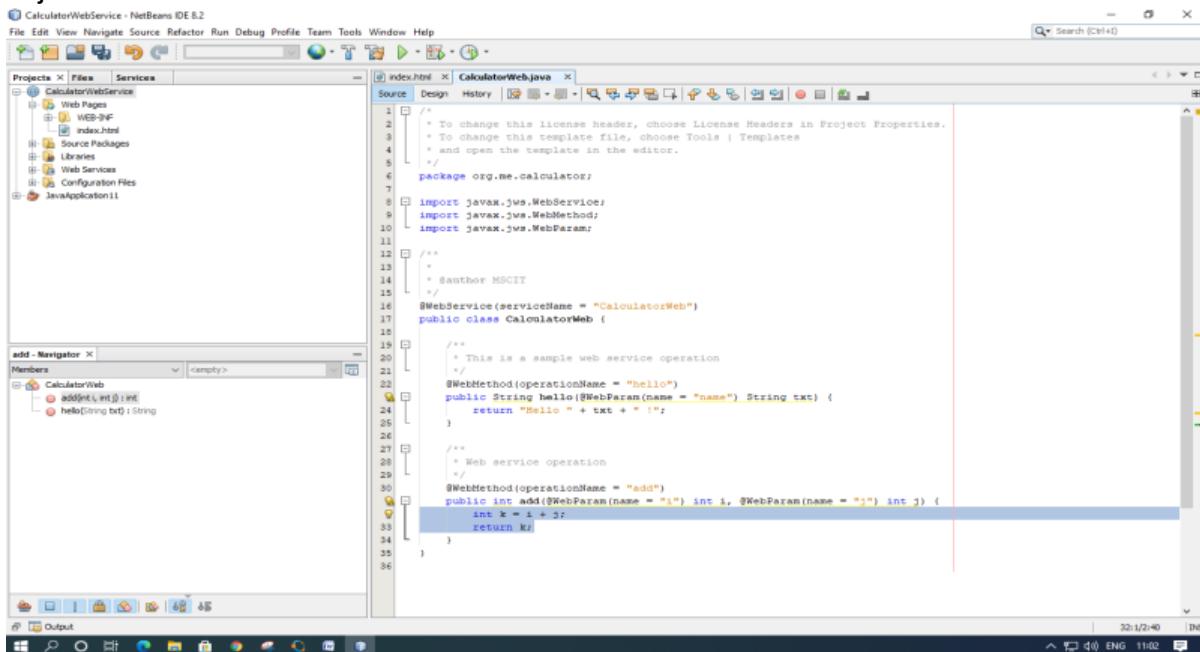
6. Click OK at the bottom of the Add Operation dialog box. You return to the editor.

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;
}
```

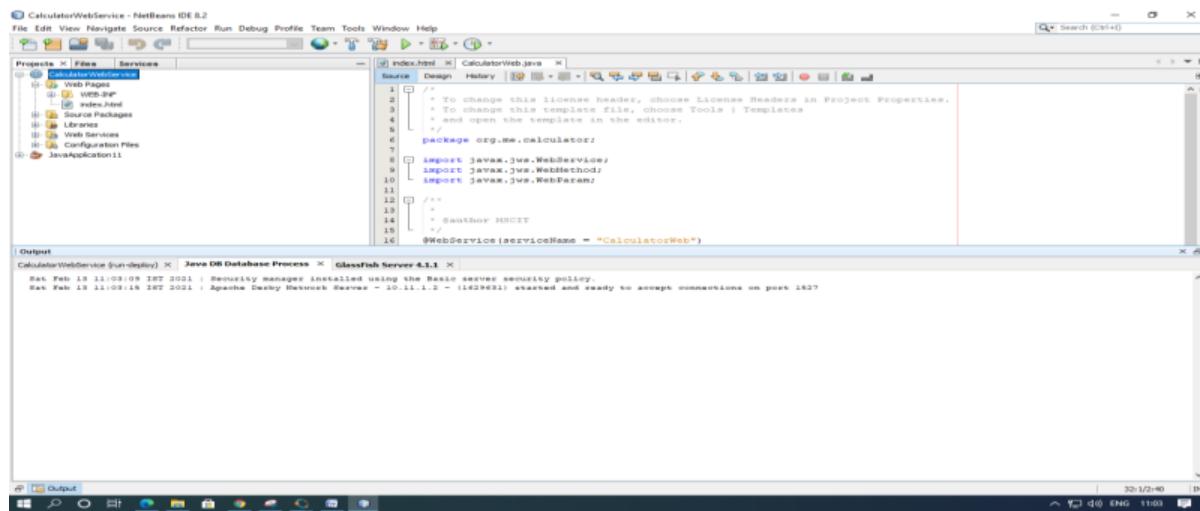
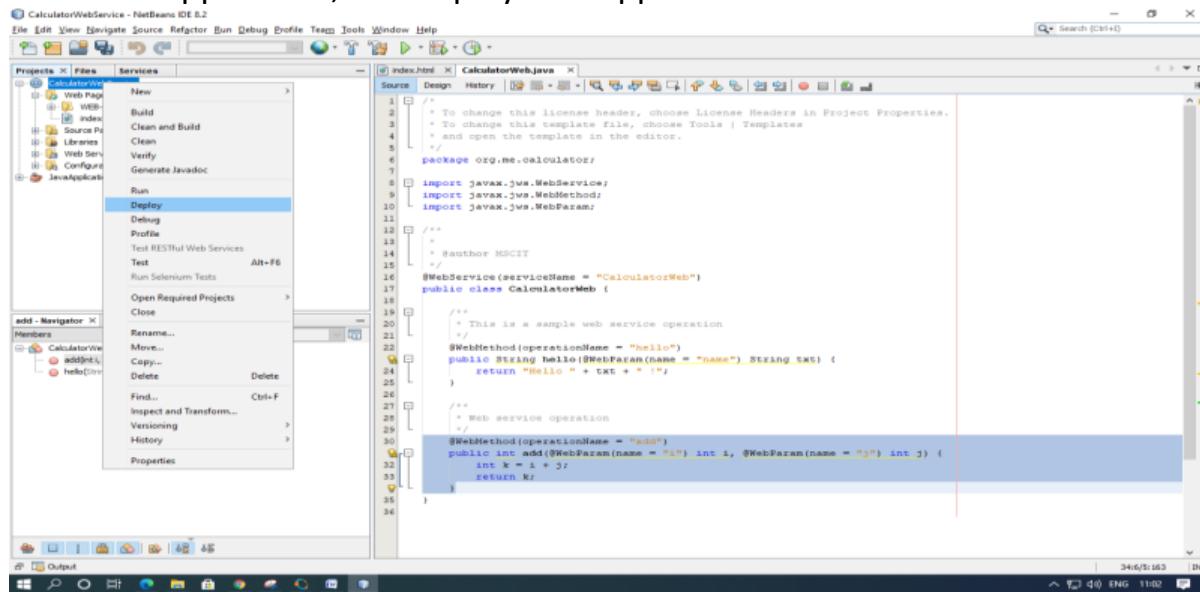


### 3) Deploying and Testing the Web Service

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.

```

/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates.
 * and open the template in the editor.
 */
package org.me.calculator;

import javax.jws.WebService;
import javax.jws.WebMethod;
import javax.jws.WebParam;

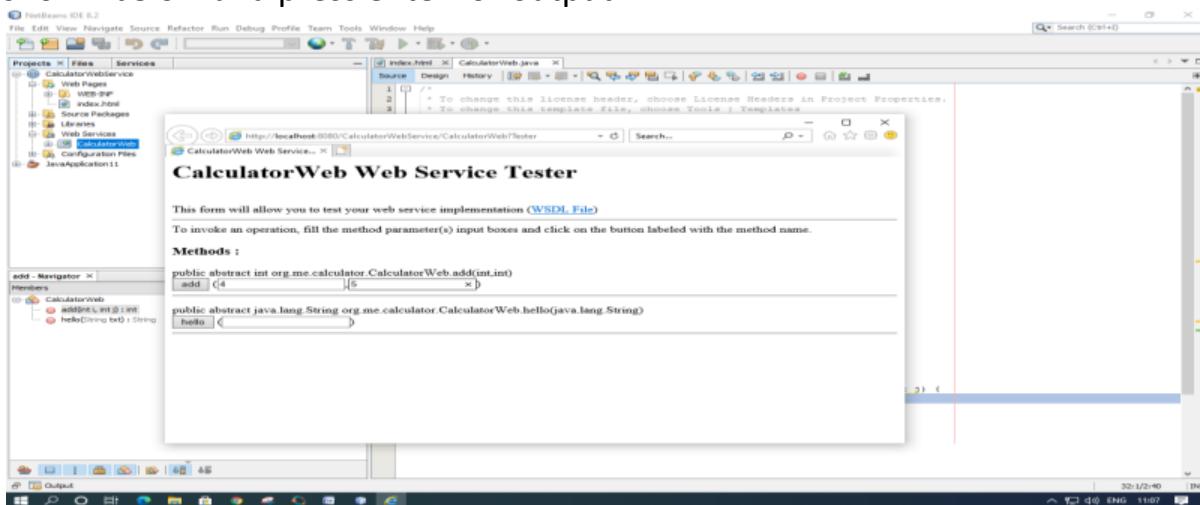
@WebService(serviceName = "CalculatorWeb")
public class CalculatorWeb {

    /**
     * This is a sample web service operation
     */
    @WebMethod(operationName = "hello")
    public String hello(@WebParam(name = "name") String txt) {
        return "Hello " + txt + " !";
    }

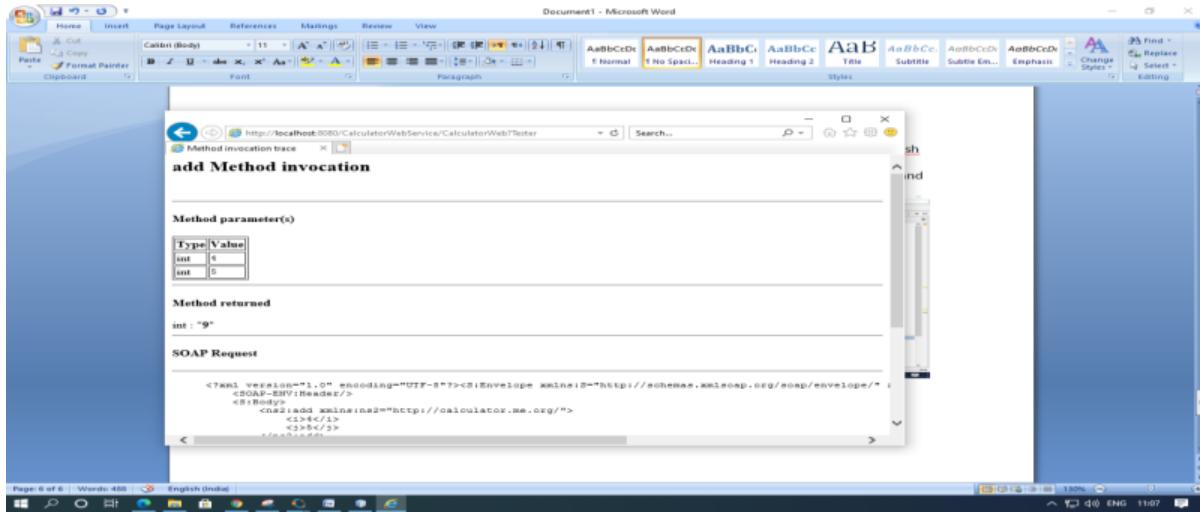
    /**
     * Web service operation
     */
    @WebMethod(operationName = "add")
    public int add(@WebParam(name = "i1") int i, @WebParam(name = "i2") int j) {
        int k = i + j;
        return k;
    }
}

```

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:

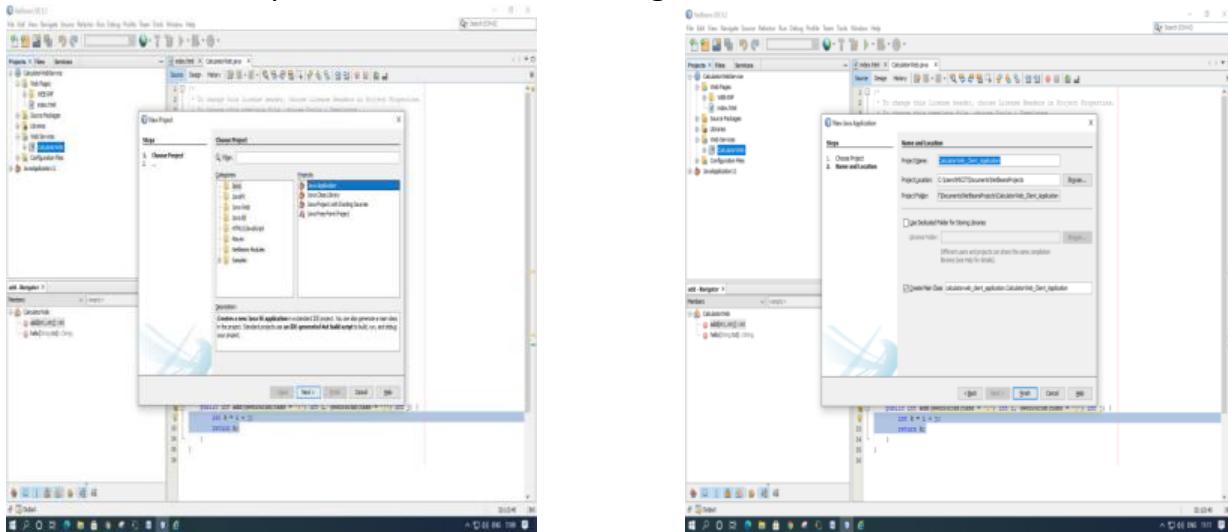


## 4) Consuming the Web Service

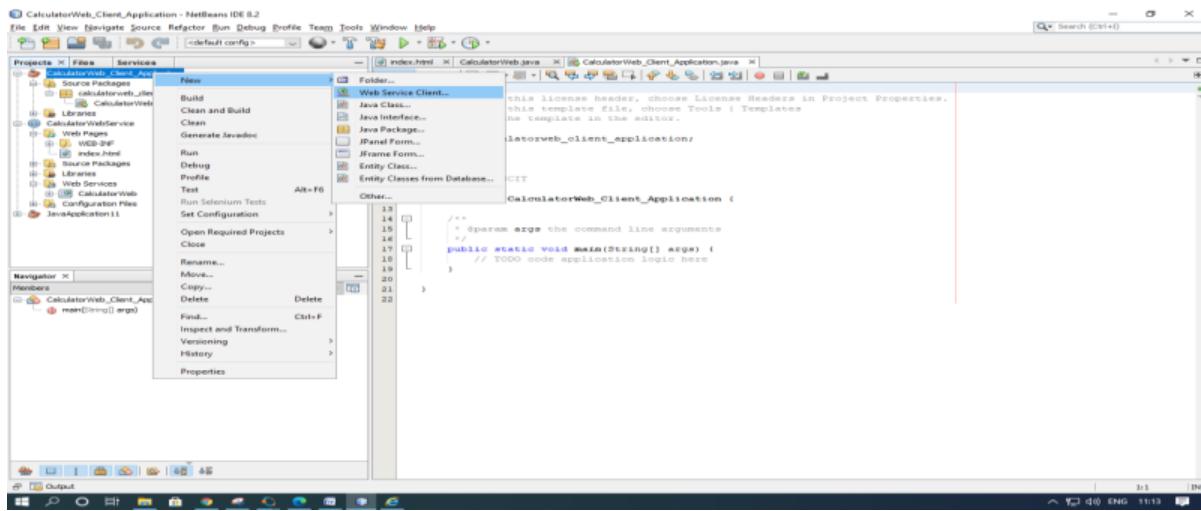
Now that you have deployed the web service, you need to create a client to make use of the web service's add method.

## 1. Client: Java Class in Java SE Application

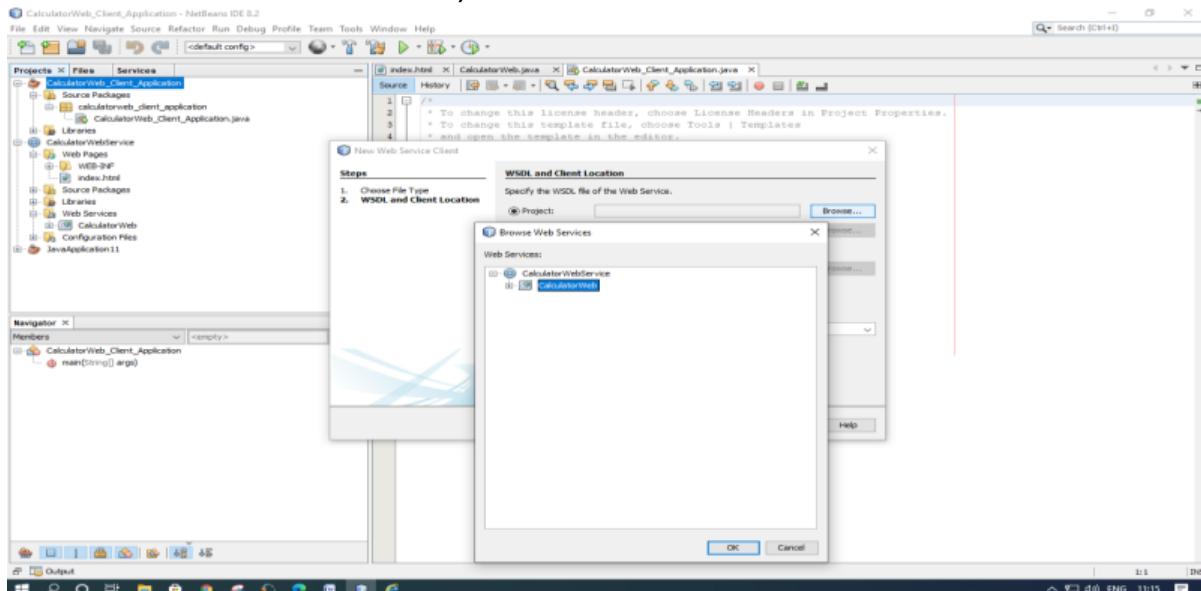
1. Choose File > New Project. Select Java Application from the Java category. Name the project “CalculatorWeb\_Client\_Application”. Leave Create Main Class selected and accept all other default settings. Click Finish.



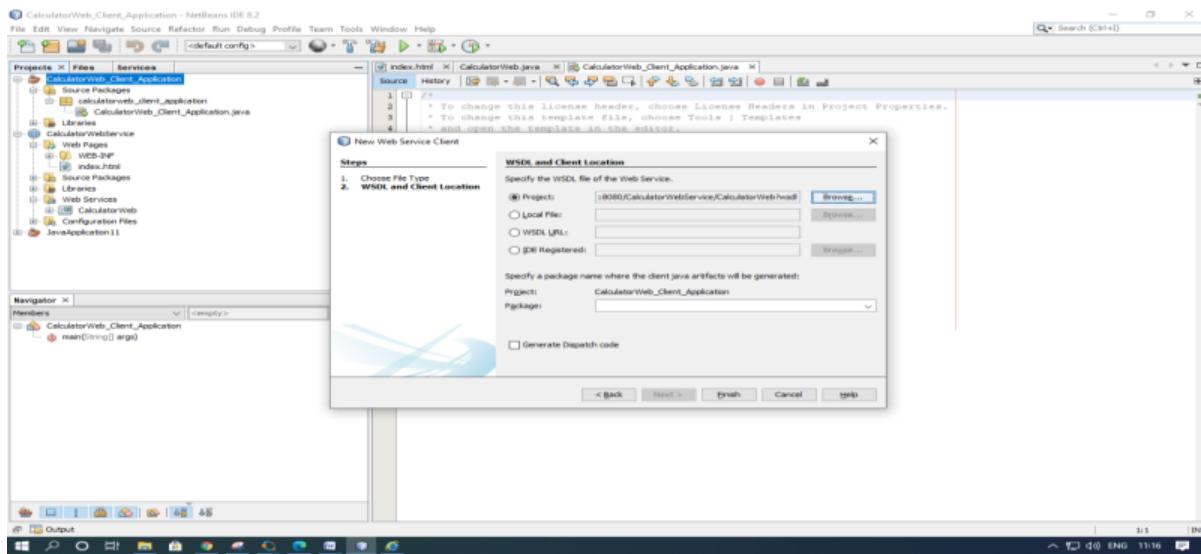
2. Right-click the “CalculatorWeb\_Client\_Application” node and choose New > Web Service Client. The New Web Service Client wizard opens.



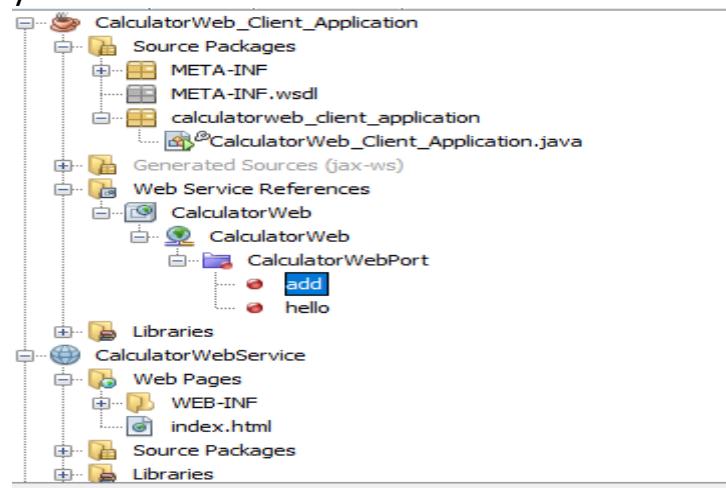
3. Select Project as the WSDL source. Click Browse. Browse to the “CalculatorWeb” web service in the “CalculatorWebService” project. When you have selected the web service, click OK.



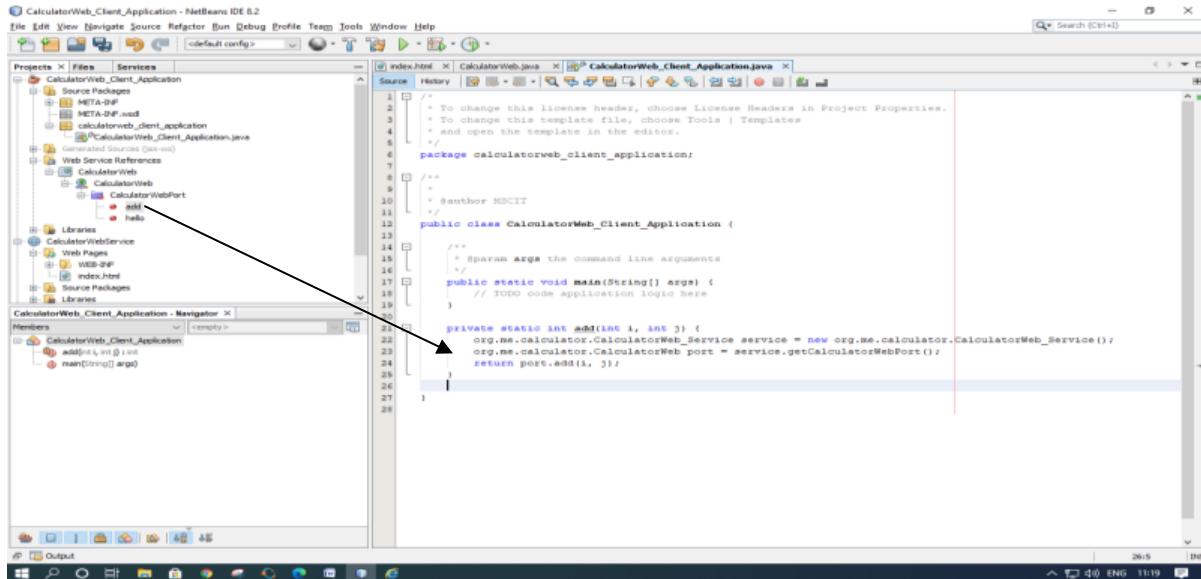
4. Do not select a package name. Leave this field empty. Leave the other settings at default and click Finish.



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 Tools Window Help
- Toolbar:** Standard NetBeans toolbar with icons for file operations.
- Project Explorer (Left):**
  - CalculatorWeb\_Client\_Application
  - Source Packages
  - META-INF
  - META-INF.wsdl
  - calculator\_client\_application
  - calculator\_client\_Application.java
- Generated Sources (Left):** Web Service References, Generated Sources (src-gen), Libraries.
- Code Editor (Right):** The code editor displays Java code for the `CalculatorWeb_Client_Application` class. The code includes a main method that adds two integers (3 and 4) and prints the result. It also includes a private static add method that uses a service port to perform the addition.

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

- Output (Bottom):** Shows the output of the build process, indicating success with 100% completion and 0 errors.

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.
- Projects Tab:** Shows the project structure:
  - CalculatorWeb\_Client\_Application (selected)
  - Source Packages
    - META-INF
    - META-INF.ws
    - calculatorweb\_client\_application
    - CalculatorWeb\_Client\_Application.java
    - calculatorweb-client.war
  - Web Service References
    - CalculatorWeb
    - CalculatorWeb
      - CalculatorWebPort
      - add
      - field
  - Libraries
    - CalculatorWebService
    - Web Pages
    - WEB-INF
    - WEB-INF
- Code Editor:** Displays the `CalculatorWeb_Client_Application.java` file content:

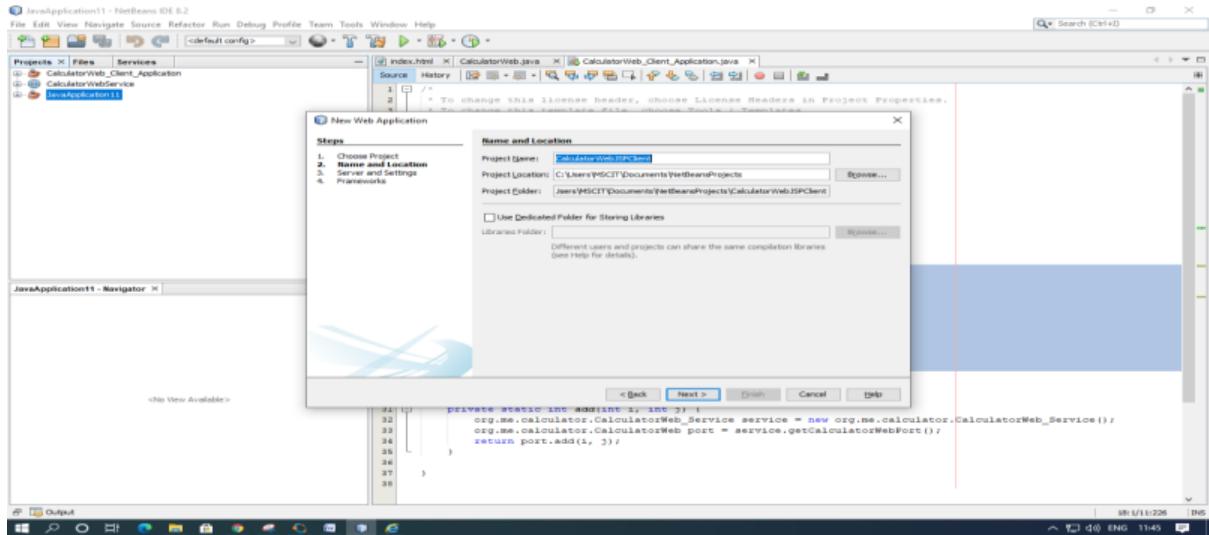
```
1 // To change this license header, choose License Headers in Project Properties.
2 // To change this template file, choose Tools | Templates
3 // and open the template in the editor.
4 /*
5  * package calculatorweb_client_application;
6  *
7  */
8 /**
9  * Author MHCIT
10 */
11 public class CalculatorWeb_Client_Application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

```
Java DB Database Process x GlassFish Server 4.1.1 x Retriever Output x CalculatorWeb_Client_Application (run) x
ant -f C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application -Dnb.internal.action.name=run
init:
deps-jar:
Updating property file: C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\built-jar.properties
warning: file 'C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes' is marked for deletion
warning: file 'C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\empty' is marked for deletion
Created dir: C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\empty
Created dir: C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\generated-sources\ap-source-output
Compiling 9 source files to C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
Copying 2 empty directories to C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
Copied 2 empty directories to an empty directory under C:\Users\mhcit\Documents\NetBeansProjects\CalculatorWeb_Client_Application\build\classes
compile:
run:
Result = ??
BUILD SUCCESSFUL (total time: 1 second)
```

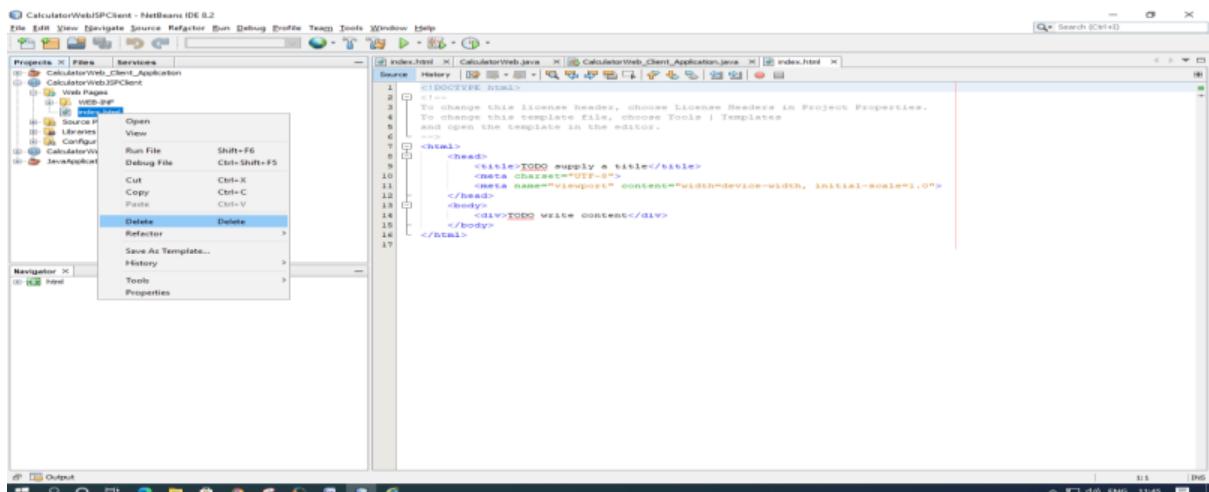
## **Client : JSP Page in Web Application**

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.

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

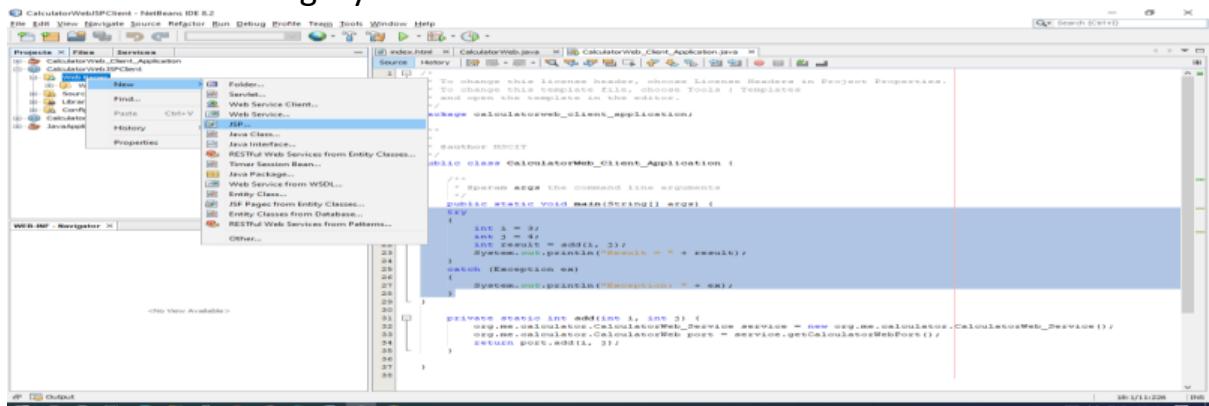


2. Expand the Web Pages node under the project node and delete index.html.

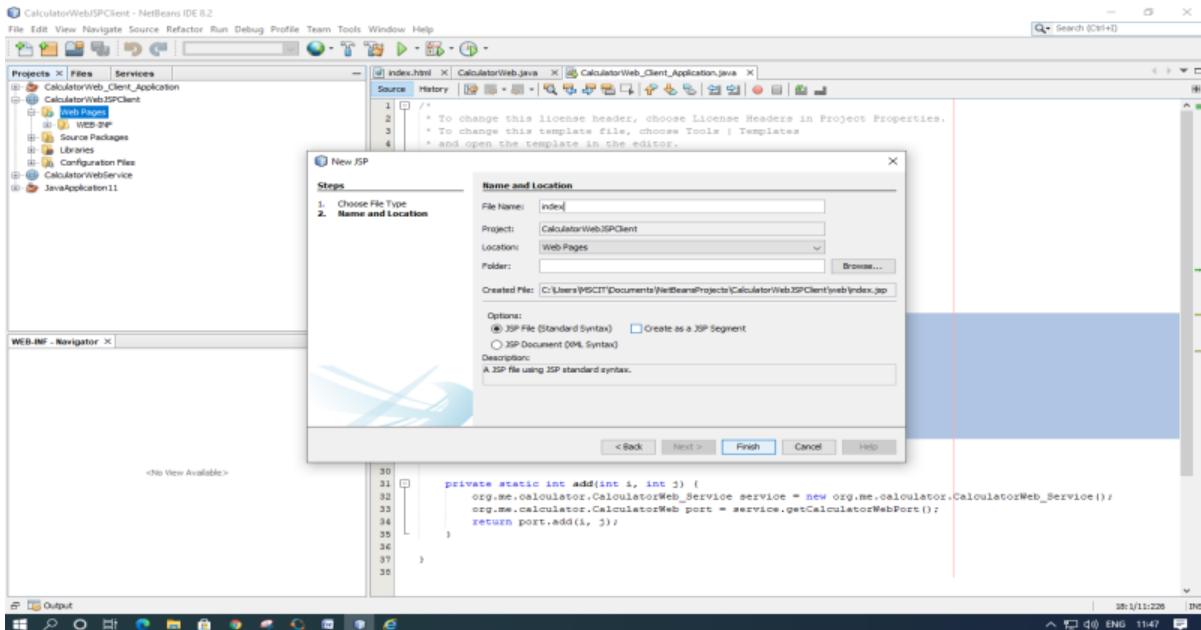


3. Right-click the Web Pages node and choose New > JSP in the popup menu.

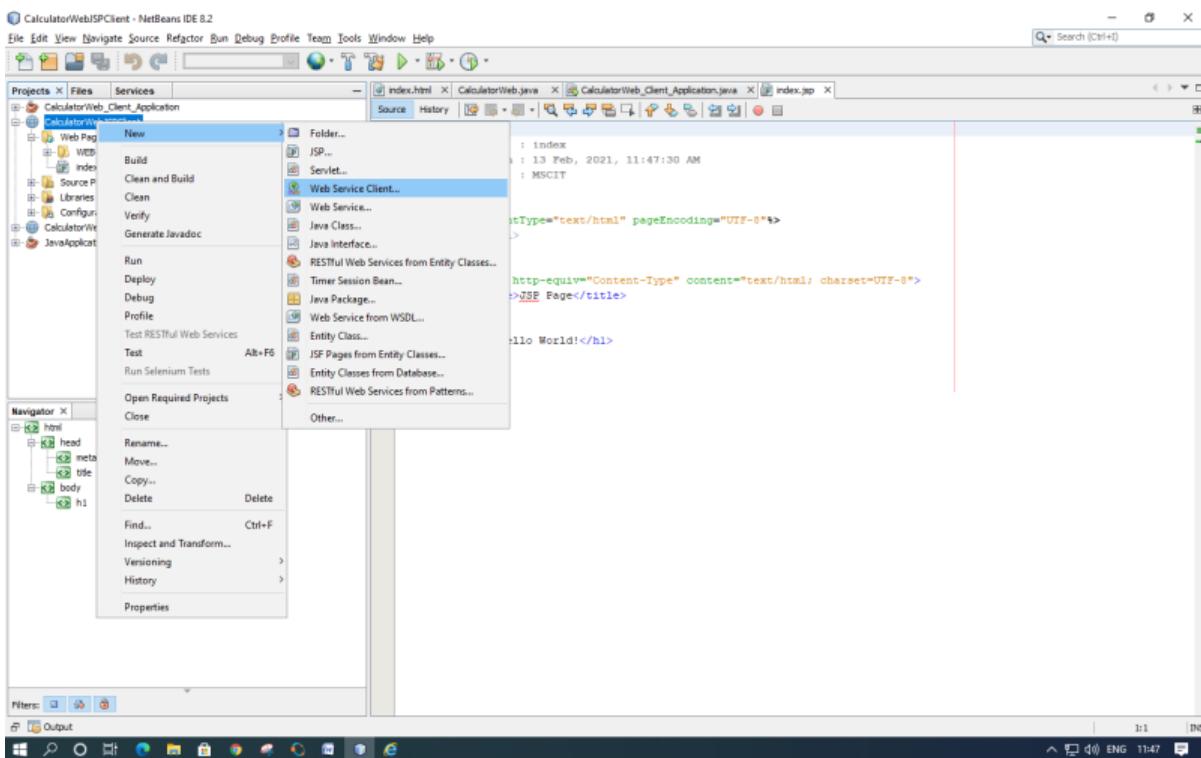
If JSP is not available in the popup menu, choose New > Other and select JSP in the Web category of the New File wizard.



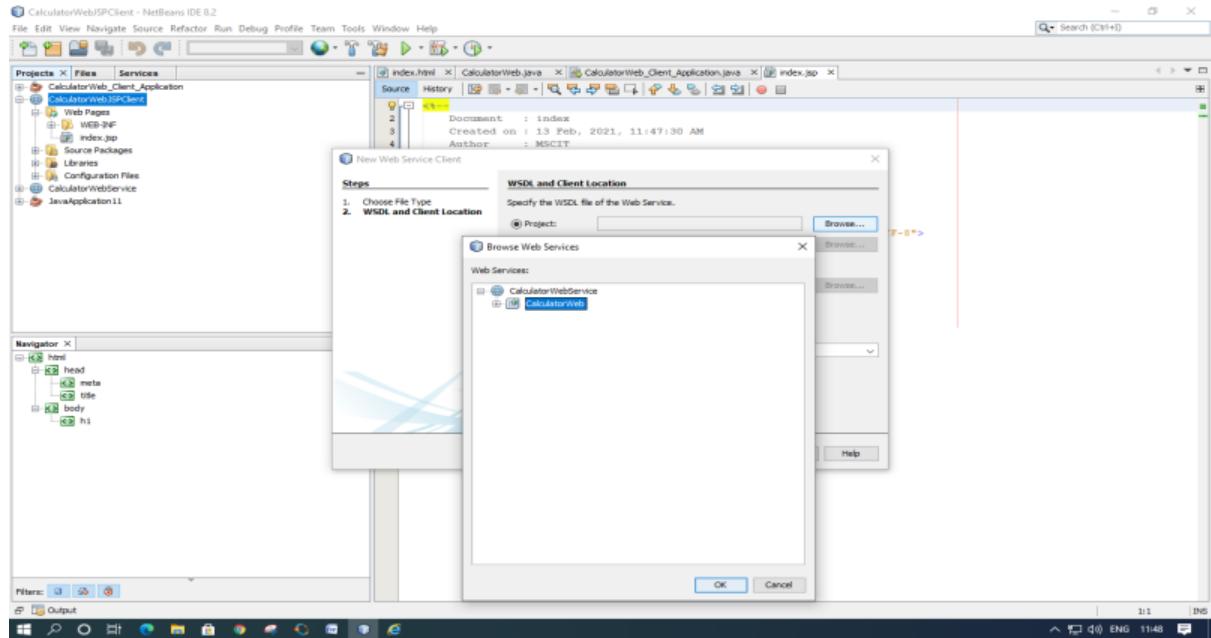
4. Type index for the name of the JSP file in the New File wizard. Click Finish.



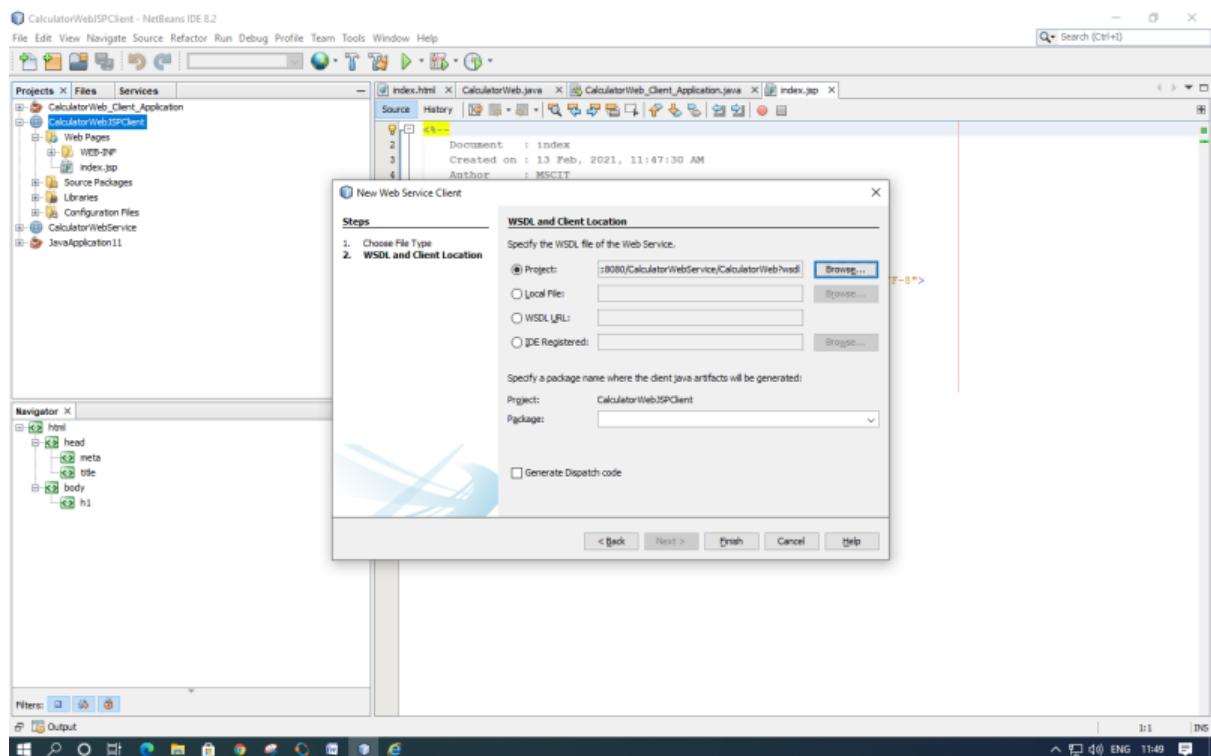
- Right-click the CalculatorWebJSPClient node and choose New > Web Service Client.



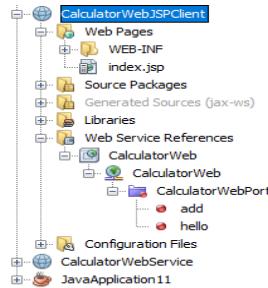
- Select Project as the WSDL source. Click Browse. Browse to the CalculatorWeb web service in the CalculatorWebService project. When you have selected the web service, click OK.



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



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



9. 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.
10. 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:

```

<%-- Document : index
Created on : 13 Feb, 2021, 11:47:30 AM
Author : MSCIT
--%>
<%page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
    <head>
        <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
        <title>JSP Page</title>
    </head>
    <body>
        <h1>
            <%-- start web service invocation --%><hr/>
            <%>
            <%> 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 = 0;
                int j = 0;
                // TODO process result here
                int result = port.add(i, j);
                out.println("Result = " + result);
            } catch (Exception ex) {
                // TODO handle custom exceptions here
            }
            <%-- end web service invocation --%><hr/>
            <%>
        </h1>
    </body>
</html>

```

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/>
```

## 11.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:

