SSN COLLEGE OF ENGINEERING
Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -1 : Developing a Web Service for Simple Calculator

Assigned Date : **Due Date :**

I. Create a Web Service for a simple calculator application in Java for the following operations

i. Arithmetic Operations (Addition, Subtraction, Multiplication, Division, Modulo).

ii. Trigonometric Operations. (Sine, Cos, Cosecant, Secant, Tan, Cot)

iii. Logarithmic functions (log x)

iv. Exponential functions (x^2, x^3, x^4, ...), where x is any number.

1. Deploy application on Tomcat / GlassFish Server.
2. Test the deployed Web Service by giving sample test cases.
3. Handle the following Exceptions and handle them appropriately by giving correct values.

   i. Divide by Zero

   ii. Negative values given for θ in Trigonometric Operations

   Eg: $\sin(-\theta) = -\sin(\theta)$; $\cos(-\theta) = \cos(\theta)$; $\tan(-\theta) = -\tan(\theta)$

References

http://programmerguru.com/webservice-tutorial/how-to-create-java-webservice-in-netbeans/

https://netbeans.org/kb/docs/websvc/jax-ws.html

II. Develop a Web Service for simple calculator using Apache Axis

1. Install Apache Axis

   https://axis.apache.org/axis2/java/core/docs/installationguide.html

2. Develop a POJO web service for calculator using Apache Axis on Apace Tomcat

   https://axis.apache.org/axis2/java/core/docs/pojoguide.html

EX NO. 1	DEVELOPING A WEB SERVICE FOR A SIMPLE CALCULATOR

AIM :

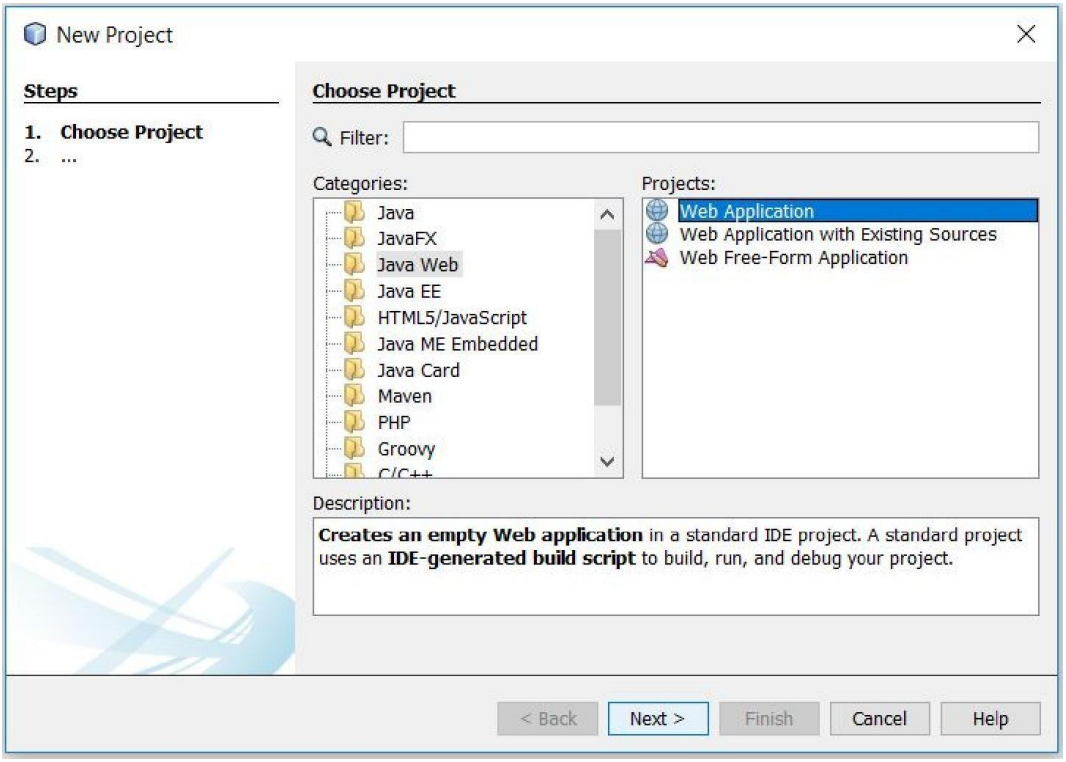
To Create a Web Service for a simple calculator application in Java for the following operations

i. Arithmetic Operations (Addition, Subtraction, Multiplication, Division, Modulo).
ii. Trigonometric Operations. (Sine, Cos, Cosecant, Secant, Tan, Cot)
iii. Logarithmic functions (log x) iv. Exponential functions (x^2 , x^3 , x^4 , ...), where x is any number.

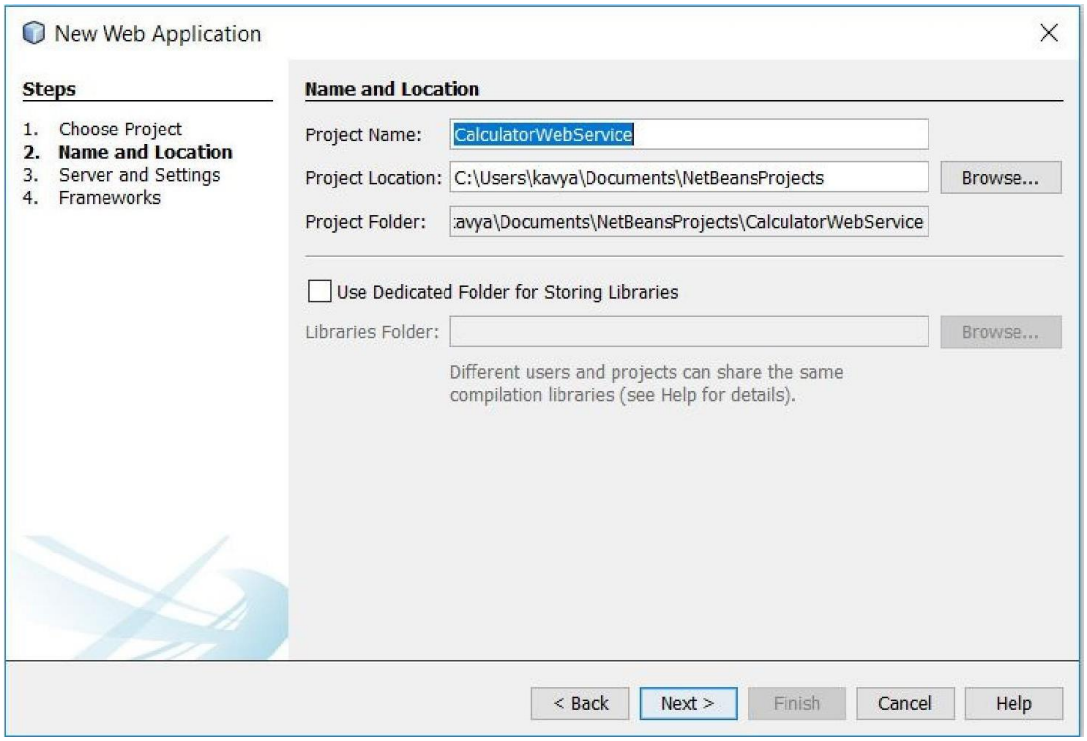
PROCEDURE :

1. Create a New Project- Calculator Server:

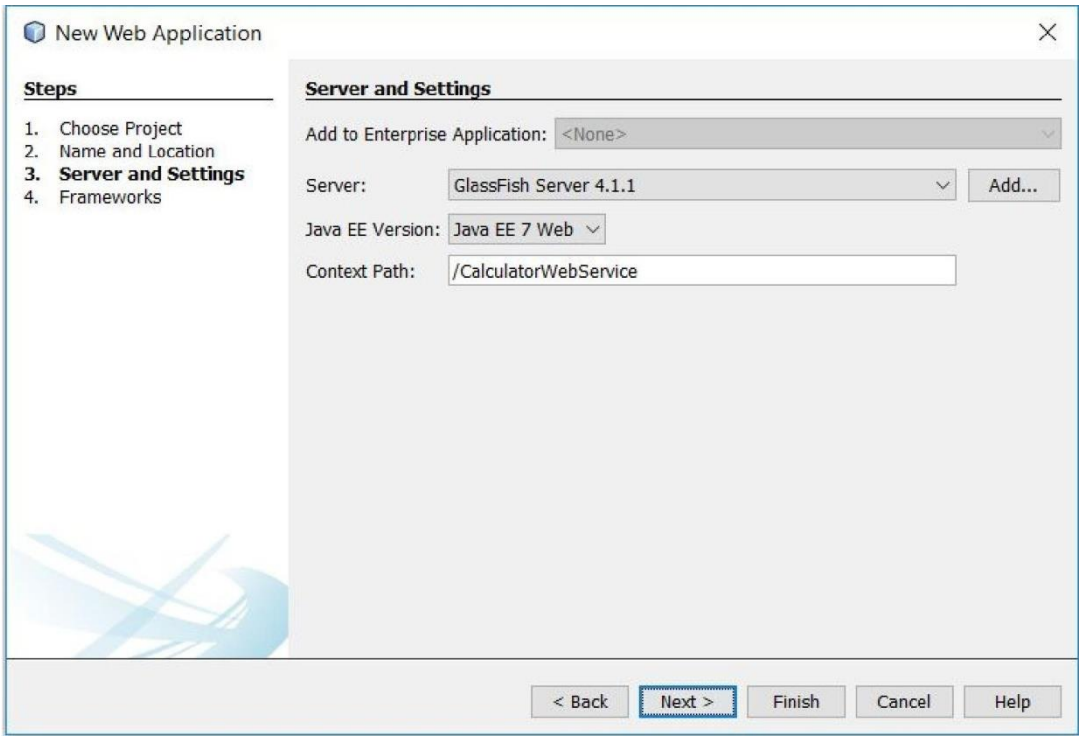
1.1 .File > New Project (Ctrl + Shift + N) > Java Web > Web Application



1.2. Create a New Web Application by specifying the Name and Location:

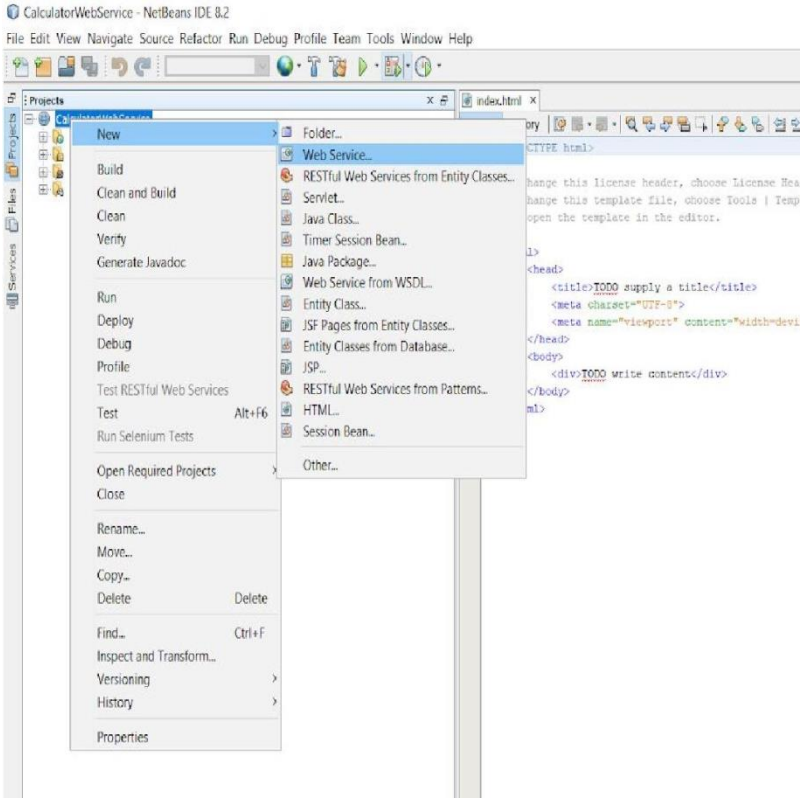


1.3. Set the server settings and Click Finish:

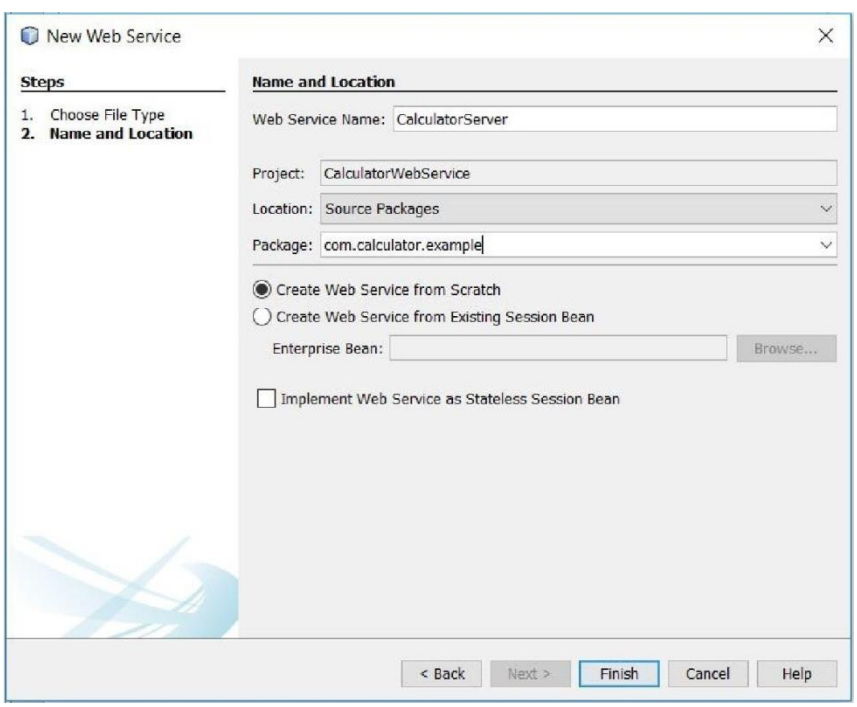


2. Create a new Web Service by right click on project **:**

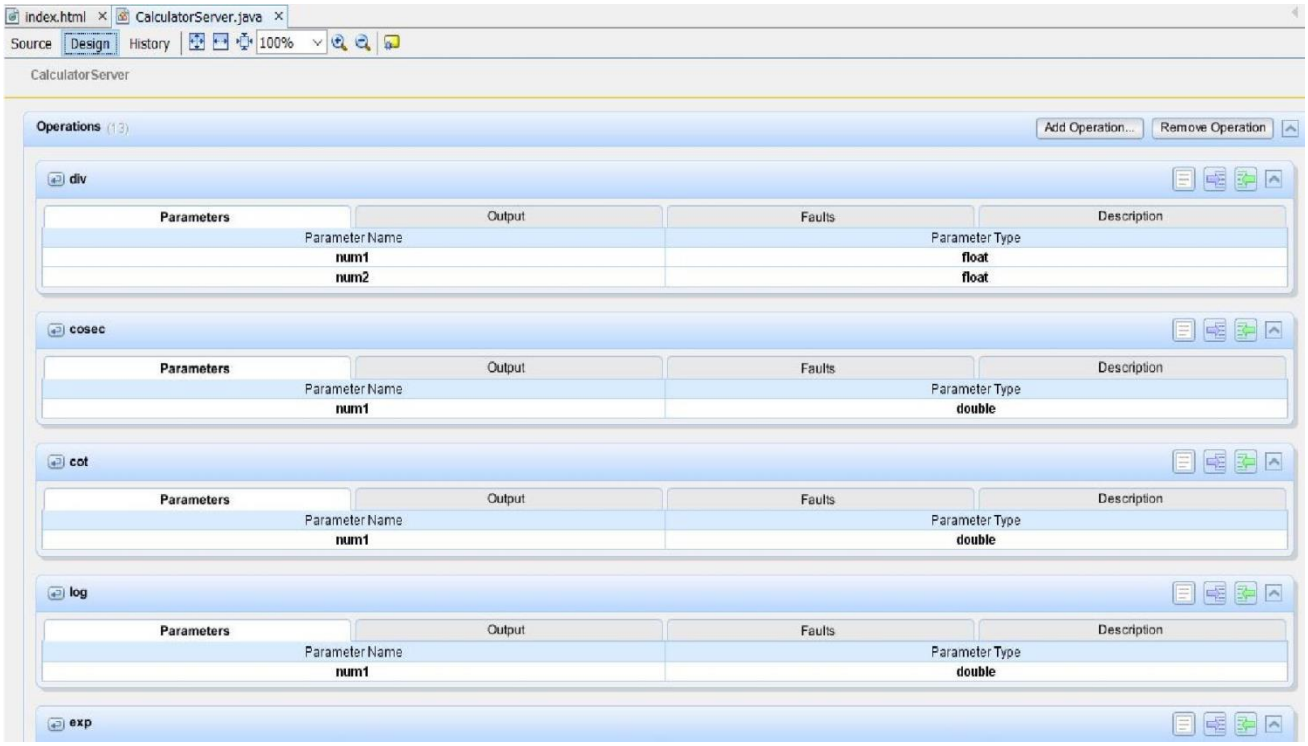
2.1. New > Web Service



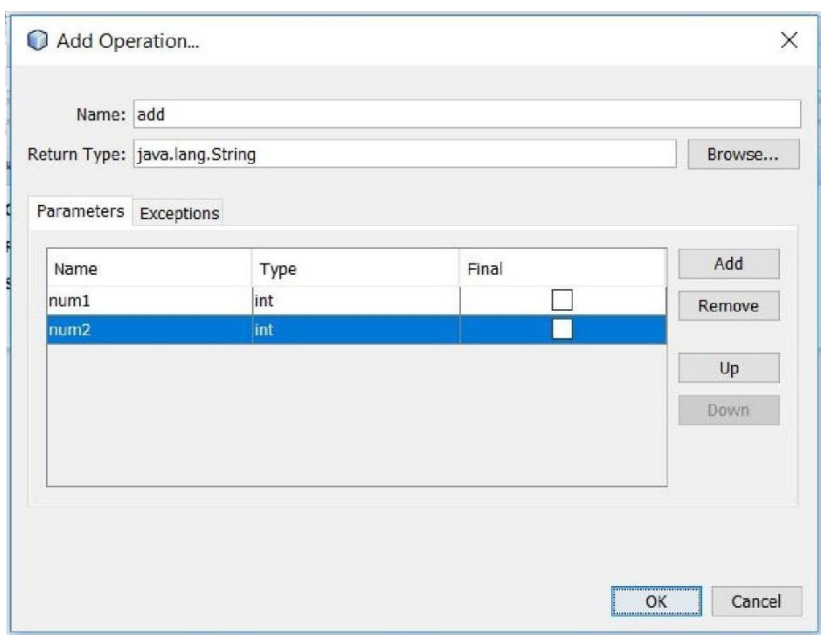
2.2 Specify the name as "CalculatorServer" and Location:



3. Click on "**Add operation**" in **"Design"** tab in **"CalculatorServer.java"**and add operations for addition,subtraction,Multiplication,Division, Modulo,Trignometric and Exponential functions.



4. Operations are added by specifying the Return Type and the Parameters as shown below:



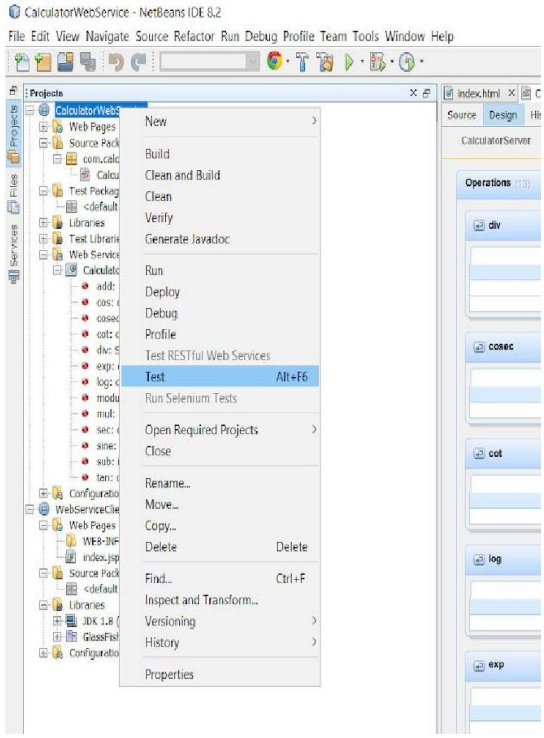
Code for CalculatorServer.java :

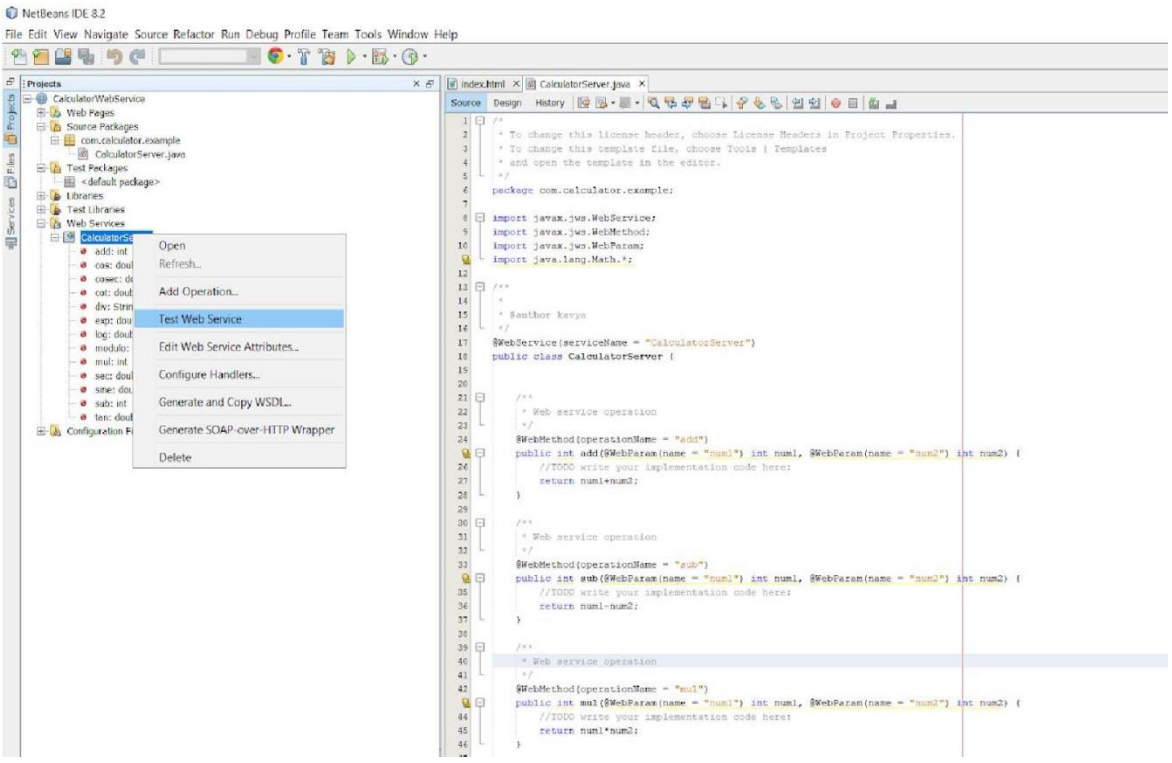
```
package com.calculator.example;
import javax.jws.WebService;
import javax.jws.WebMethod;
import javax.jws.WebParam;
import java.lang.Math.*;

@WebService(serviceName = "CalculatorServer")
public class CalculatorServer {
   @WebMethod(operationName = "add")
   public int add(@WebParam(name = "num1") int num1, @WebParam(name = "num2") int num2) {
      return num1+num2;
   }
   @WebMethod(operationName = "sub")
   public int sub(@WebParam(name = "num1") int num1, @WebParam(name = "num2") int num2) {
      return num1-num2;
   }
   @WebMethod(operationName = "mul")
   public int mul(@WebParam(name = "num1") int num1, @WebParam(name = "num2") int num2) {
      return num1*num2;
   }
   @WebMethod(operationName = "div")
   public String div(@WebParam(name = "num1") float num1, @WebParam(name = "num2") float
         num2) {
      if(num2==0)
         return "Divide by zero! Not possible!";
else{
         float res= num1/num2;
         return Float.toString(res);
      }
   }
   @WebMethod(operationName = "modulo")
   public int modulo(@WebParam(name = "num1") int num1, @WebParam(name = "num2") int
         num2) {
      return num1%num2;
   }
   @WebMethod(operationName = "sine")
   public double sine(@WebParam(name = "num1") double num1) {
      double b = Math.toRadians(num1);
      return (Math.sin(b));
   }
   @WebMethod(operationName = "cos")
   public double cos(@WebParam(name = "num1") double num1) {
      double b = Math.toRadians(num1);
      return (Math.cos(b));
   }
```

```
    @WebMethod(operationName = "tan")
    public double tan(@WebParam(name = "num1") double num1) {
        //TODO write your implementation code here:
        double b = Math.toRadians(num1);
        return (Math.tan(b));
    }

   @WebMethod(operationName = "sec")
    public double sec(@WebParam(name = "num1") double num1) {
        double b = Math.toRadians(num1);
        return (1/Math.sin(b));
    }
    @WebMethod(operationName = "cosec")
    public double cosec(@WebParam(name = "num1") double num1) {
        double b = Math.toRadians(num1);
        return (1/Math.cos(b));
    }
    @WebMethod(operationName = "cot")
    public double cot(@WebParam(name = "num1") double num1) {
        double b = Math.toRadians(num1);
        return (1/Math.tan(b));
    }
    @WebMethod(operationName = "log")
    public double log(@WebParam(name = "num1") double num1) {
        return (Math.log(num1));
    }
    @WebMethod(operationName = "exp")
    public double exp(@WebParam(name = "num1") double num1, @WebParam(name = "num2")
            double num2) {
        return (Math.pow(num1,num2));
    }
}
```

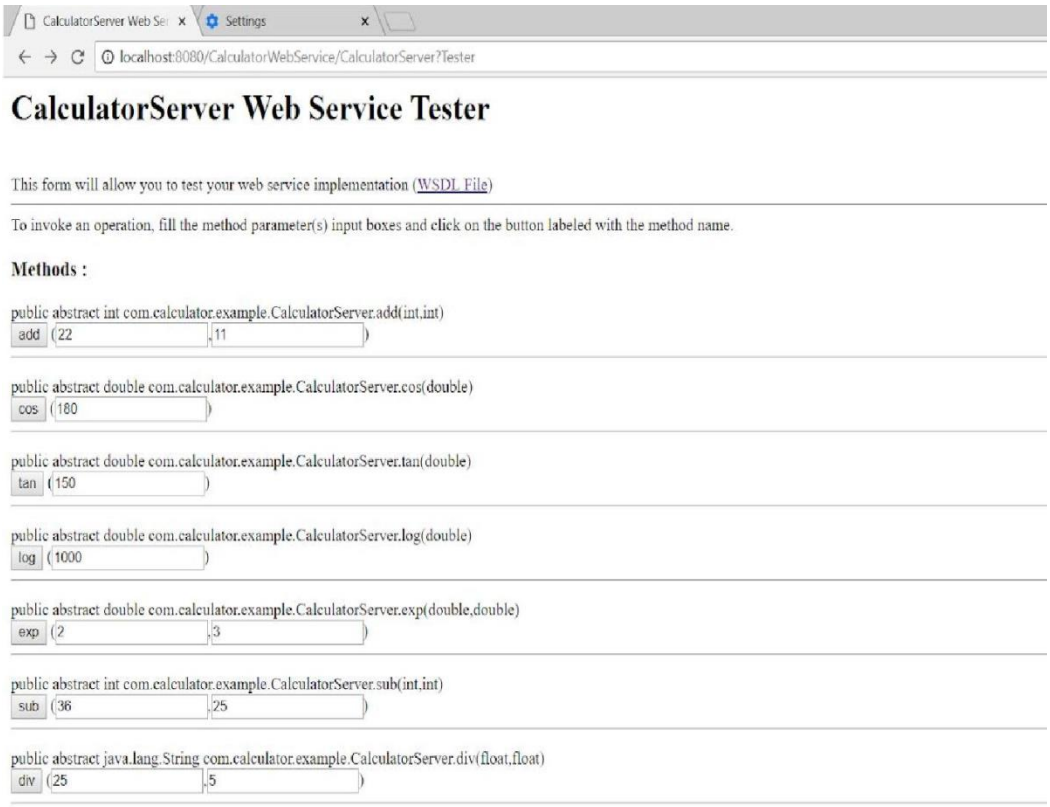
5. Test the WebService Server:

5.1.1 **Right Click on Server Project and click Deploy after which test it by clicking Test (Alt + F6) .**





5.2 Test the web Service by giving Sample Test Cases



5.3. On clicking the Exp method with input (2,3) , the output with SOAP request and response is given as:

Method invocation trace

localhost:8080/CalculatorWebService/CalculatorServer?Tester

exp Method invocation

Method parameter(s)

Type	Value
double	2
double	3

Method returned

double : "8.0"

SOAP Request

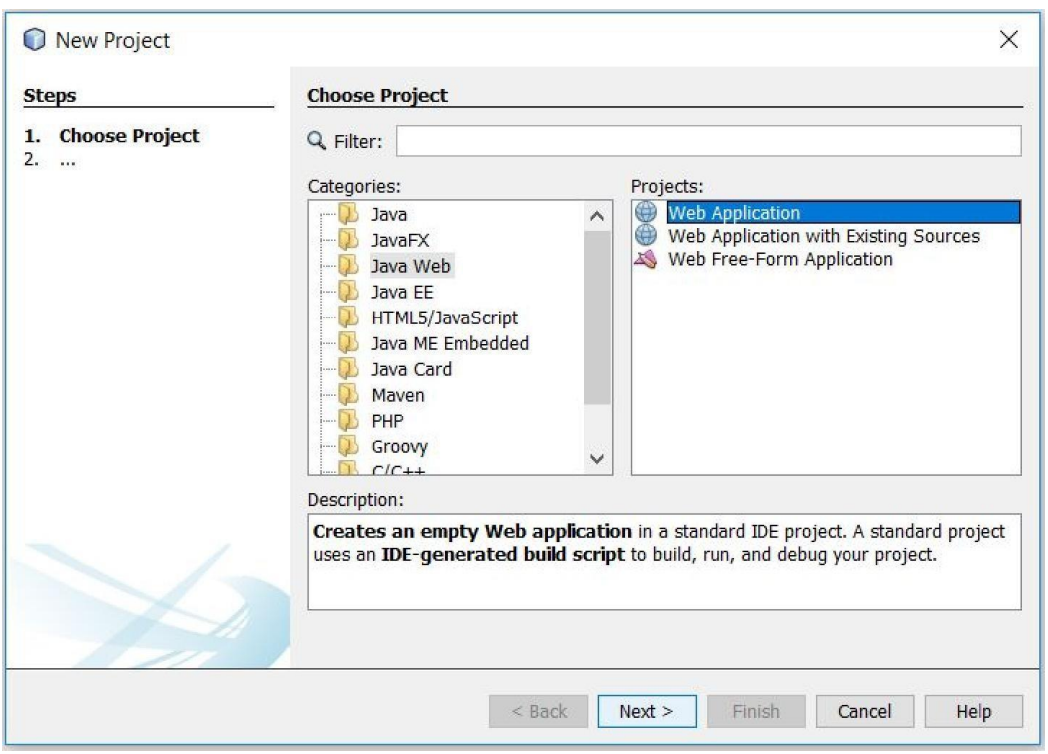

```
<?xml version="1.0" encoding="UTF-8"?><S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Header/>
    <S:Body>
        <ns2:exp xmlns:ns2="http://example.calculator.com/">
            <num1>2.0</num1>
            <num2>3.0</num2>
        </ns2:exp>
    </S:Body>
</S:Envelope>
```


SOAP Response

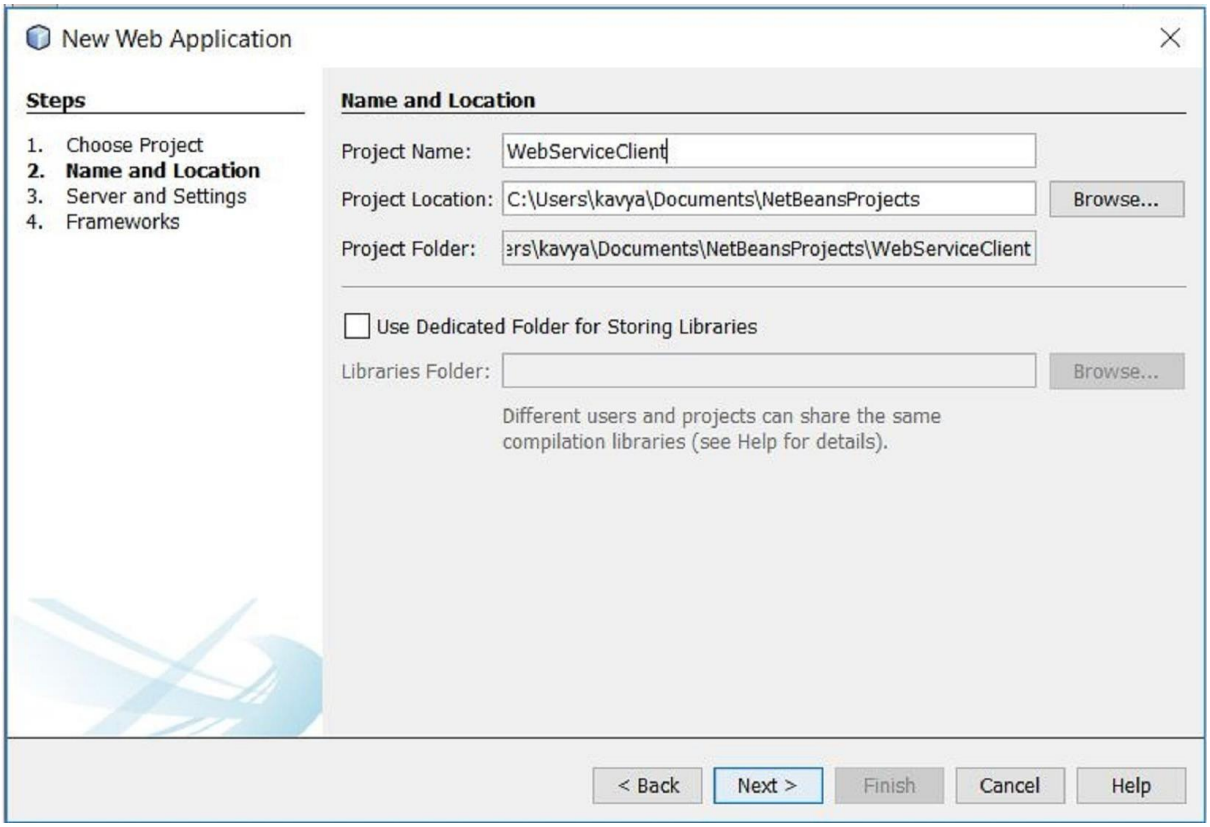

```
<?xml version="1.0" encoding="UTF-8"?><S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Header/>
    <S:Body>
        <ns2:expResponse xmlns:ns2="http://example.calculator.com/">
            <return>8.0</return>
        </ns2:expResponse>
    </S:Body>
</S:Envelope>
```


6. Create a Web Service Client as:

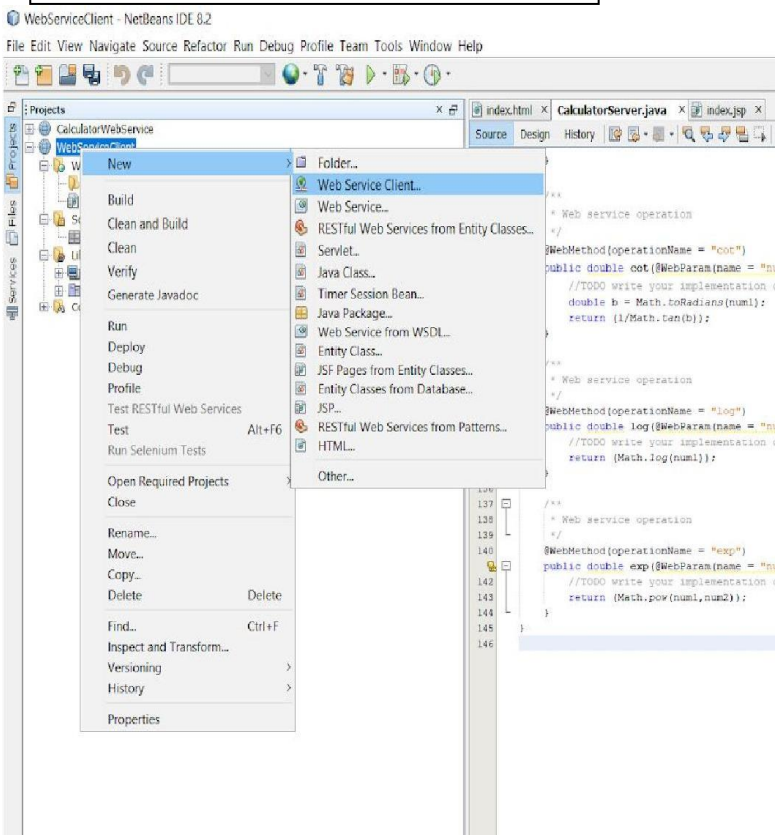
6.1. File > New Project (Ctrl + Shift + N) > Java Web > Web Application



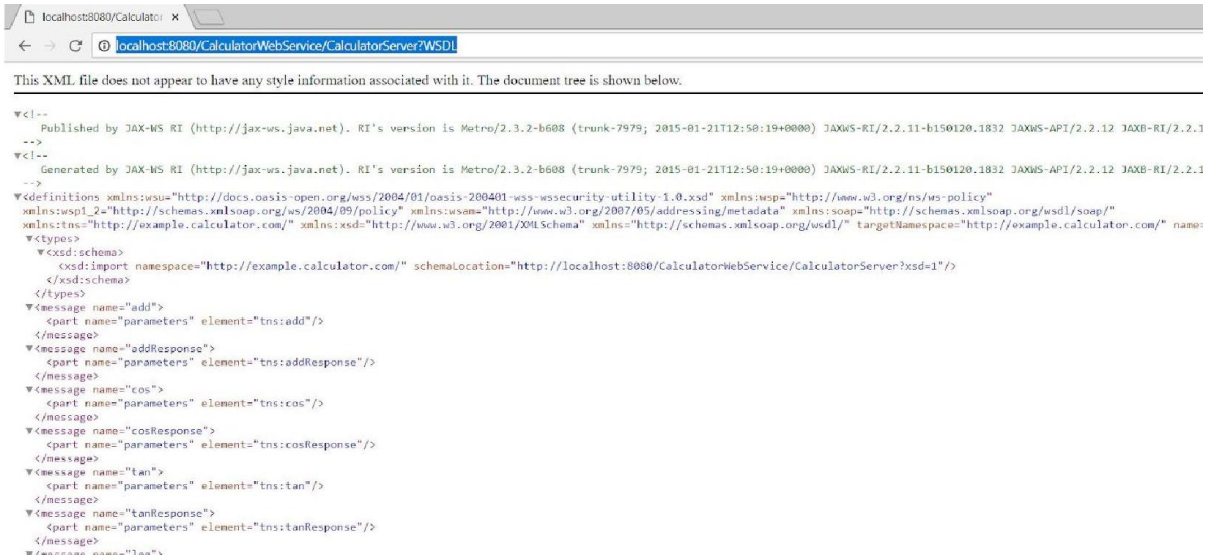
6.2. Give the Project Name and Location and finally Click Finish

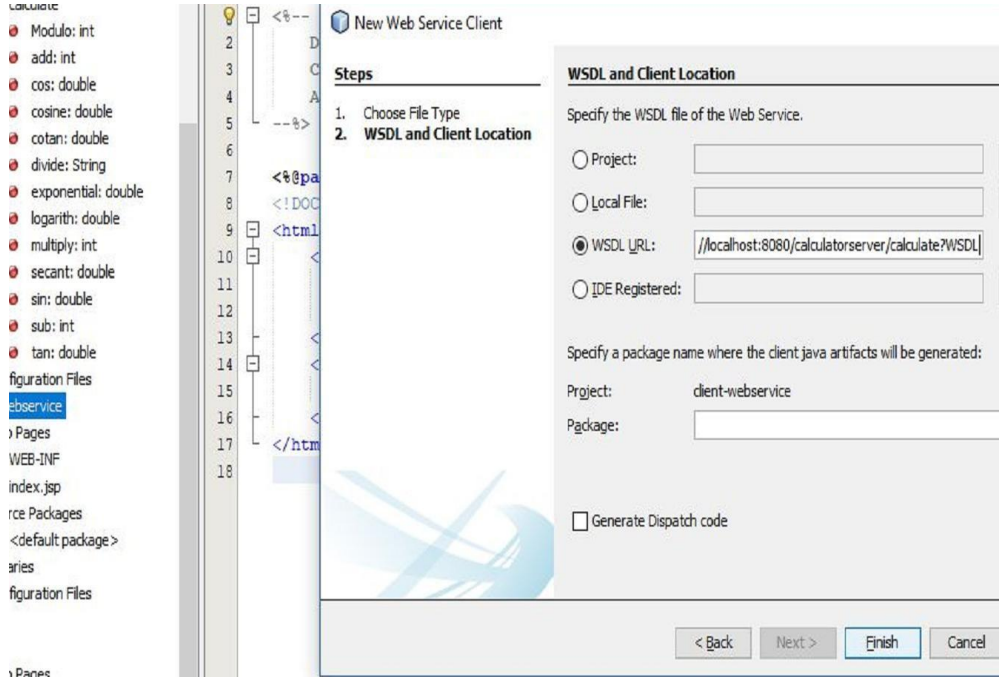


7. Create a New WebService Client by Right Clicking on Client Project:

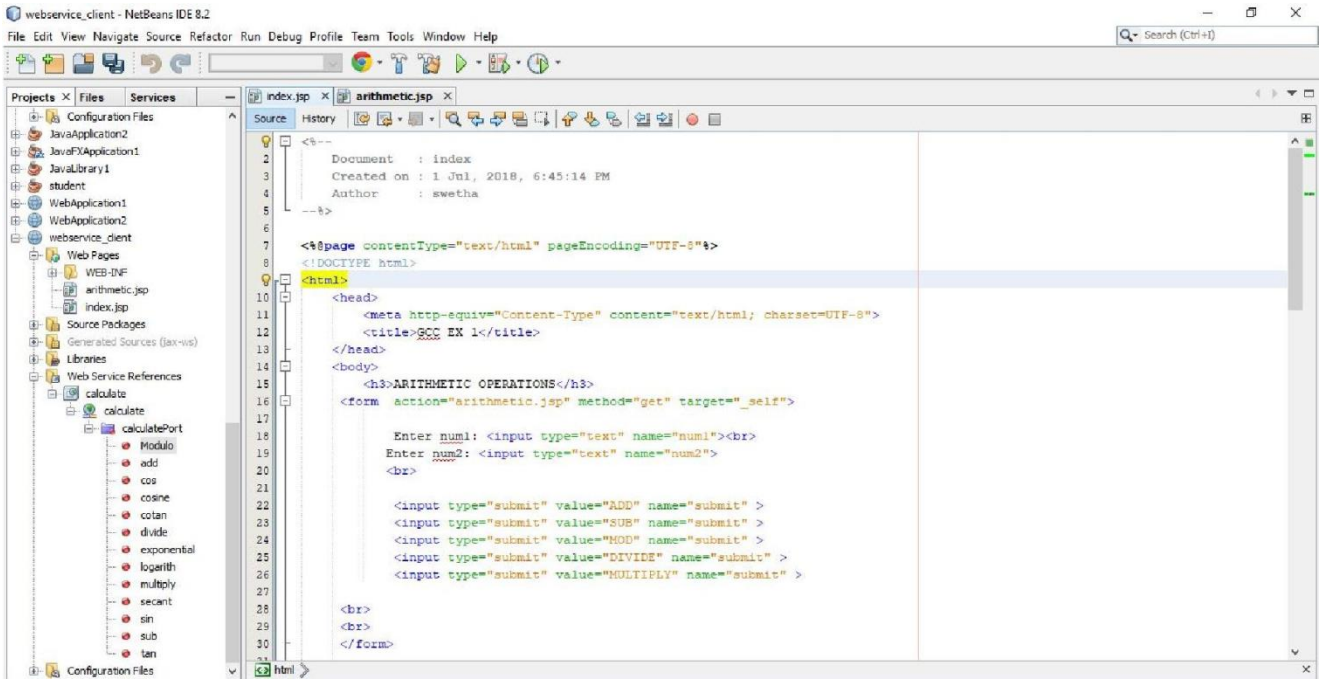


8. **Specify the WSDL URL (highlighted) of the Server in the Web Service Client Window that pops up as shown (next page):**





10 .Web Service References : Drag and drop the modules to form the Arithmetic.jsp file.



11. Code for index.jsp :

```
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>GCC EX 1</title>
</head>
<body>
<h3>ARITHMETIC OPERATIONS</h3>
<form  action="arithmetic.jsp" method="get" target="_self">
        Enter num1: <input type="text" name="num1"><br>
       Enter num2: <input type="text" name="num2">
<br>
<input type="submit" value="ADD" name="submit" >
<input type="submit" value="SUB" name="submit" >
<input type="submit" value="MOD" name="submit" >
<input type="submit" value="DIVIDE" name="submit" >
<input type="submit" value="MULTIPLY" name="submit" >
<br>
<br>
```

```
</form>
<br>

<h3>LOGARITHM OPERATION</h3>
<form  action="arithmetic.jsp" method="get" target="_self">
        Enter number: <input type="text" name="num1"><br>
<br>
<input type="submit" value="LOG" name="submit" >
<br>
</form>
<br>
<h3>TRIGNOMETRIC OPERATION</h3>
<form  action="arithmetic.jsp" method="get" target="_self">
          Enter angle: <input type="text" name="num1"><br>
<br>
<input type="submit" value="SIN" name="submit" >
<input type="submit" value="COS" name="submit" >
<input type="submit" value="TAN" name="submit" >
<input type="submit" value="COSECANT" name="submit" >
<input type="submit" value="COTANGET" name="submit" >
<input type="submit" value="SECANT" name="submit" >
<br>
</form>
<h3>EXPONENTIAL OPERATION</h3>
<form  action="arithmetic.jsp" method="get" target="_self">
                Enter number X: <input type="text" name="num1"><br>
<br>
        Enter POWER to raise X: <input type="text" name="num2">
<br>
<input type="submit" value="POW" name="submit" >
<br>
</form>
</body>
</html>
```

12. Code for arithmetic.jsp :

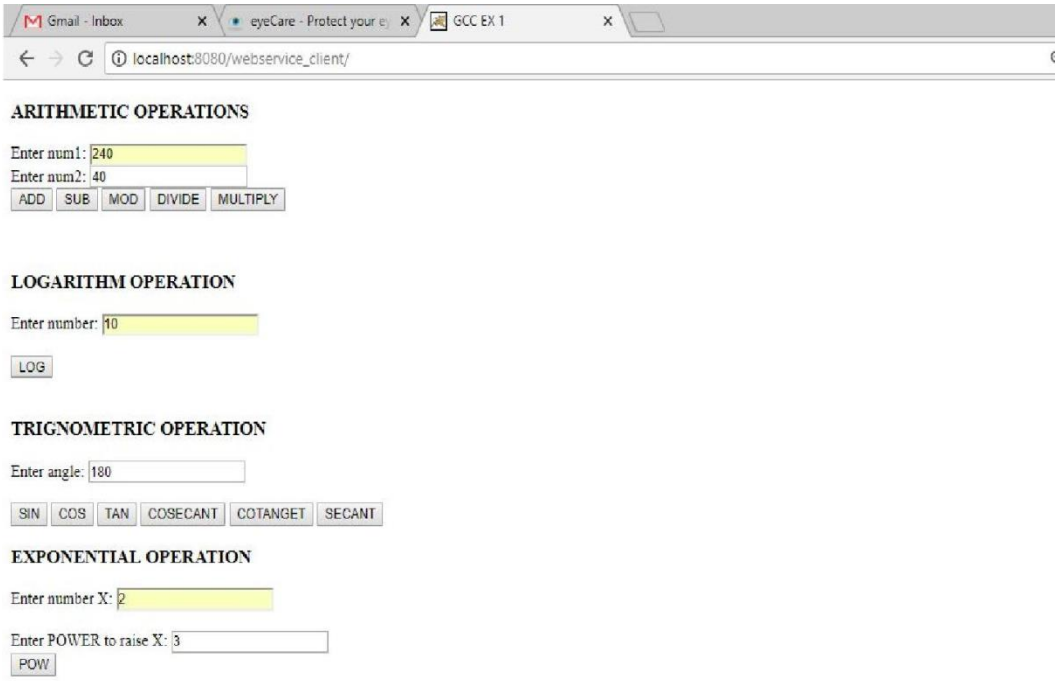
```
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<title>ARITHMETIC PAGE</title>
</head>
<body>
<%-- start web service invocation --%><hr/>
<%
   try {
          com.cal.example.Calculate_Service service = new com.cal.example.Calculate_Service();
          com.cal.example.Calculate port = service.getCalculatePort();
```

```
String no1=request.getParameter("num1");
String no2=request.getParameter("num2");
String subty=request.getParameter("submit");


        if(subty.equals("ADD"))
        {


          int num1=Integer.parseInt(no1);
          int num2=Integer.parseInt(no2);

         int   result= port.add(num1, num2);

out.println("ADD Result = "+result);
        }


        else if(subty.equals("SUB"))
        {
          int num1=Integer.parseInt(no1);
          int num2=Integer.parseInt(no2);

        int result= port.sub(num1, num2);
             out.println("SUB Result = "+result);
        }

       else if(subty.equals("MOD"))
        {
          int num1=Integer.parseInt(no1);
          int num2=Integer.parseInt(no2);

        int result= port.modulo(num1, num2);
             out.println("MODULO Result = "+result);
        }

       else if(subty.equals("DIVIDE"))
        {
       float num1=Float.parseFloat(no1);
       float num2=Float.parseFloat(no2);


       String result= port.divide(num1, num2);
             out.println("DIVISION Result = "+result);
        }

       else if(subty.equals("MULTIPLY"))
        {
       int num1=Integer.parseInt(no1);
       int num2=Integer.parseInt(no2);
```

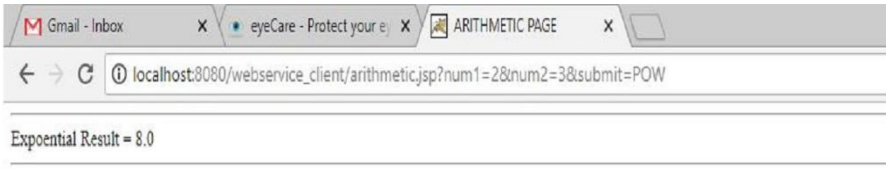
```
int result= port.multiply(num1, num2);
     out.println("MULTIPLICATION Result = "+result);
 }

else if(subty.equals("LOG"))
 {
double num1=Double.parseDouble(no1);

double result= port.logarith(num1);
     out.println("Logarithm Result = "+result);
 }

else if(subty.equals("SIN"))
 {
double num1=Double.parseDouble(no1);

double result= port.sin(num1);
     out.println("SIN Result = "+( Math.round(result*100.0)/100.0));
 }

else if(subty.equals("COS"))
 {
double num1=Double.parseDouble(no1);

double result= port.cos(num1);
     out.println("COS Result = "+  ( Math.round(result*100.0)/100.0));
 }

else if(subty.equals("TAN"))
 {
double num1=Double.parseDouble(no1);

double result= port.tan(num1);
if((num1%360)!=90)
     out.println("TAN Result = "+( Math.round(result*100.0)/100.0));
else
out.println("NOT DEFINED");
 }

else if(subty.equals("COTANGET"))
 {
double num1=Double.parseDouble(no1);

double result= port.cotan(num1);
if((num1%360)!=0)
out.println("COTANGET Result = "+( Math.round(result*100.0)/100.0));
 else
out.println("NOT DEFINED");
```

```
        }


       else if(subty.equals("SECANT"))
        {
       double num1=Double.parseDouble(no1);

       double result= port.secant(num1);
       if((num1%360)!=90)

            out.println("SECANT Result = "+( Math.round(result*100.0)/100.0));
        else
out.println("NOT DEFINED");

        }


       else if(subty.equals("COSECANT"))
        {
       double num1=Double.parseDouble(no1);

       double result= port.cosine(num1);
         if((num1%360)!=0)

            out.println("COSECANT Result = "+( Math.round(result*100.0)/100.0));
        else
out.println("NOT DEFINED");

        }

       else if(subty.equals("POW"))
        {

       double num1=Double.parseDouble(no1);
       double num2=Double.parseDouble(no2);

       double result= port.exponential(num1,num2);
            out.println("Expoential Result = "+result);

        }

   } catch (Exception ex) {
            // TODO handle custom exceptions here
   }
   %>
<%-- end web service invocation --%><hr/>
</body>
</html>
```

13 . Running the Web Service Client: Right Click on WebService Client and Click Run :



On Clicking POW , the result is :



RESULT

Thus, webservice is created for simple calculator application in Java for the given operations and it is deployed on server and tested for various cases.

SSN COLLEGE OF ENGINEERING
Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -2 : Developing a Web Service for Simple Calculator Using Apache Axis

Assigned Date : **Due Date :**

I. Develop a Web Service for simple calculator using Apache Axis.

Method 1: Using Eclipse Helios, Apache Axis 1.5.2, Apache Tomcat 6 or above

http://blog.sencide.com/2011/06/create-web-service-using-apache-axis2.html

Setting path for axis2
http://axis.apache.org/axis2/java/core/docs/installationguide.html

Few additional steps to list services
http://www.eclipse.org/webtools/community/tutorials/BottomUpAxis2WebService/bu_tutorial.html

Method 2: Netbeans IDE

i. Requires Netbeans 6.1 , JDK 6 or 5, Apache Axis2 v1.3 or later, Apache Tomcat 6 or above
https://dzone.com/articles/axis2-web-service-support-netb

ii. Requires Netbeans (6.5, 6.7, 6.8) , JDK 6 or 5, Apache Axis2 v1.3 or later, Apache Tomcat 6 or above
http://aragorn.pb.bialystok.pl/~dmalyszko/PaWWW/ps34-axix2.htm

iii. Requires Netbeans (7.3.1 and above) JDK 8 or later, Apache Axis2 v1.3 or later, Apache Tomcat 6 or above
https://codezone4.wordpress.com/2012/11/03/java-web-service-with-apache-axis2-in-netbeans/

Refer file: Ex2_WebService_UsingApacheAxis2_Steps.pdf for detailed steps.

1. Install Axis2 plug-in in Netbeans IDE
https://www.youtube.com/watch?v=JY7yGCTvMZY
URL for Plugins:
http://deadlock.netbeans.org/hudson/job/nbms-and-javadoc/lastStableBuild/artifact/nbbuild/nbms/updates.xml.gz

2. Configure Apache Axis WAR files on Tomcat or Glassfish server

   <Follow the above given YouTube link >

3. Create Calculator Web service using Apache Axis.
4. Deploy the web service on server and test the web service.

II. Steps to install Apache Axis manually and to run web service java code in terminal.

1. Install Apache Axis

   https://axis.apache.org/axis2/java/core/docs/installationguide.html

2. Develop a POJO web service for calculator using Apache Axis on Apache Tomcat

   https://axis.apache.org/axis2/java/core/docs/pojoguide.html

EX NO. 2	DEVELOPING A WEB SERVICE FOR A SIMPLE CALCULATOR USING APACHE AXIS

AIM :

To Create a Web Service for a simple calculator application in Java for the following operations using Apache Axis

i. Arithmetic Operations (Addition, Subtraction, Multiplication, Division, Modulo).
ii. Trigonometric Operations. (Sine, Cos, Cosecant, Secant, Tan, Cot)
iii. Logarithmic functions (log x)
iv. Exponential functions (x^2 , x^3 , x^4 , ...), where x is any number

PROCEDURE:

<u>Steps to deploy and Test web service through Axis2 tool</u>

Requirements:

Eclipse Helios

Tomcat 6

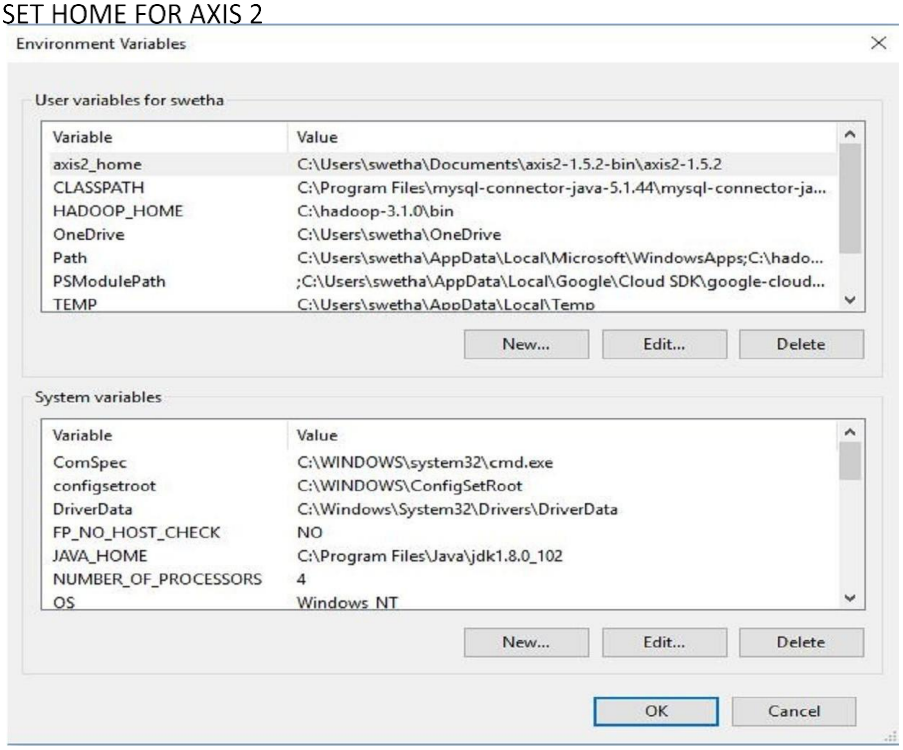
Axis2 – 1.5.2 Version

JDK 7 (JDK 8 –does not support-change path and java_home to JDK 7 after installation)

1. Install Axis2 tool and start the server through axis2server.bat file under bin folder

RESOURCE: http://axis.apache.org/axis2/java/core/docs/installationguide.html

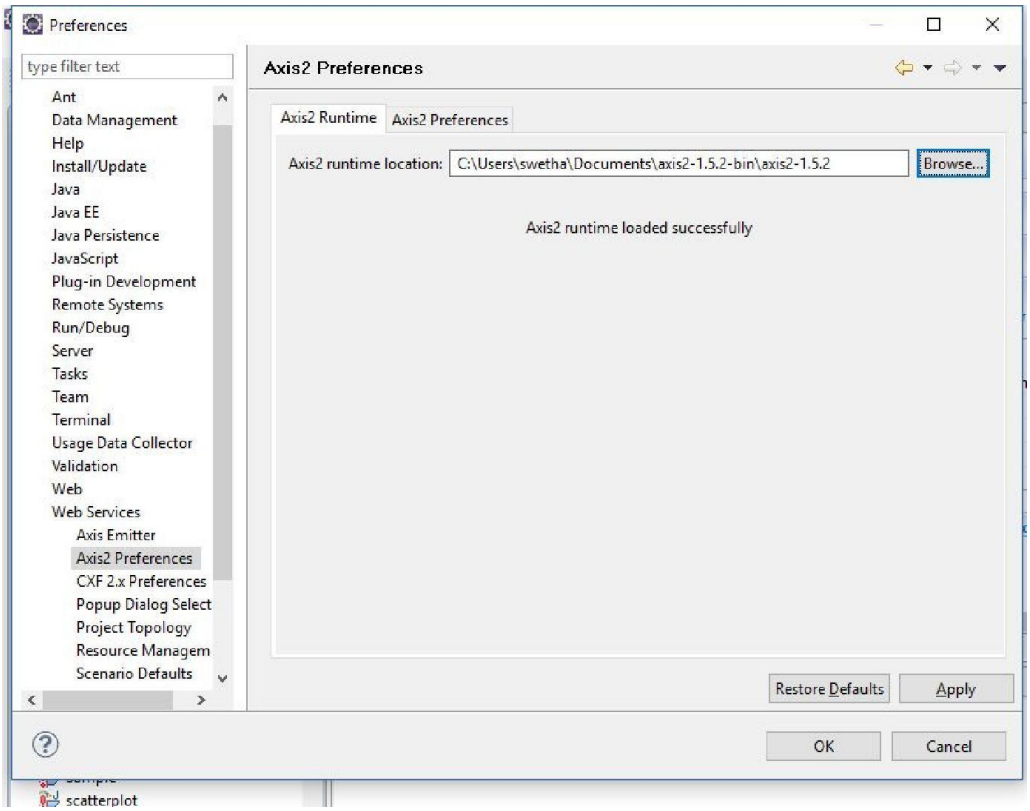
SET HOME FOR AXIS 2



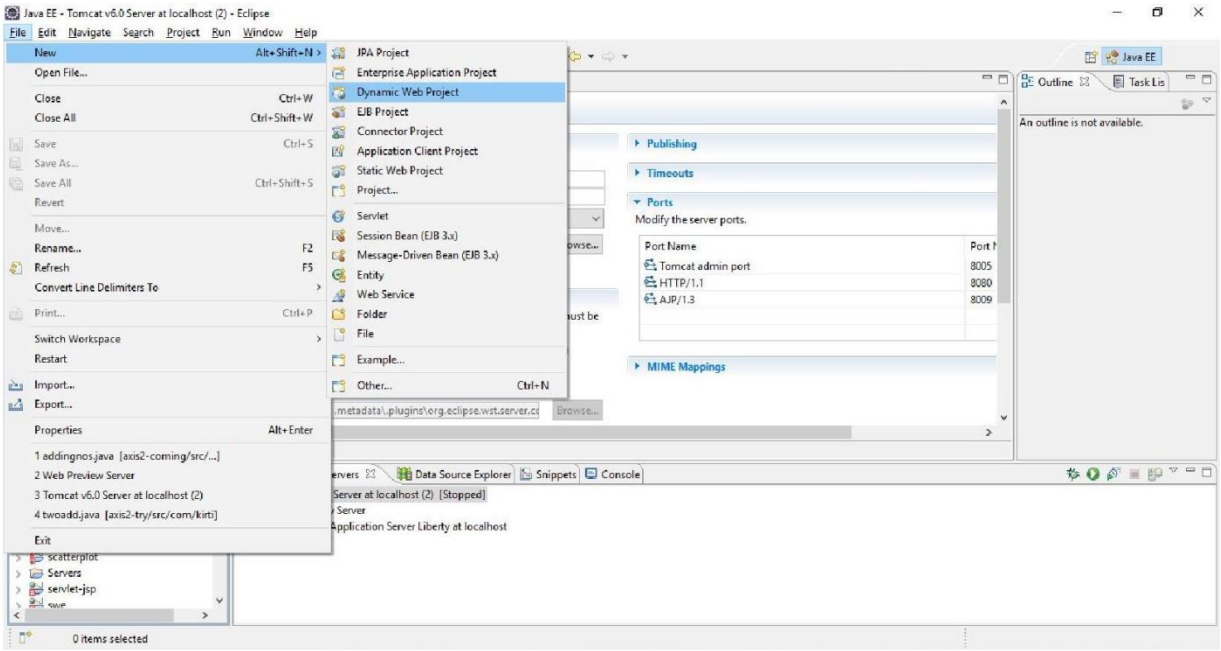
AFTER STARTING AXIS2 SERVER

```
C:\WINDOWS\system32\cmd.exe
Using JAVA_HOME    C:\Program Files\Java\jdk1.8.0_102
Using AXIS2_HOME   C:\Users\swetha\Documents\axis2-1.5.2-bin\axis2-1.5.2
[INFO] [SimpleAxisServer] Starting
[INFO] [SimpleAxisServer] Using the Axis2 RepositoryC:\Users\swetha\Documents\axis2-1.5.2-bin\axis2-1.5.2\repository
[SimpleAxisServer] Using the Axis2 RepositoryC:\Users\swetha\Documents\axis2-1.5.2-bin\axis2-1.5.2\repository
[SimpleAxisServer] Using the Axis2 Configuration FileC:\Users\swetha\Documents\axis2-1.5.2-bin\axis2-1.5.2\conf\axis2.xml
[INFO] Clustering has been disabled
[INFO] Deploying module: addressing-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/addressing-1.5.2.mar
[INFO] Deploying module: metadataExchange-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/mex-1.5.2.mar
[INFO] Deploying module: mtompolicy-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/mtompolicy-1.5.2.mar
[INFO] Deploying module: ping-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/ping-1.5.2.mar
[INFO] Deploying module: script-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/scripting-1.5.2.mar
[INFO] Deploying module: soapmonitor-1.5.2 - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/modules/soapmonitor-1.5.2.mar
[INFO] Deploying Web service: version.aar - file:/C:/Users/swetha/Documents/axis2-1.5.2-bin/axis2-1.5.2/repository/services/version.aar
[INFO] Listening on port 8888
[INFO] [SimpleAxisServer] Started
[SimpleAxisServer] Started
```

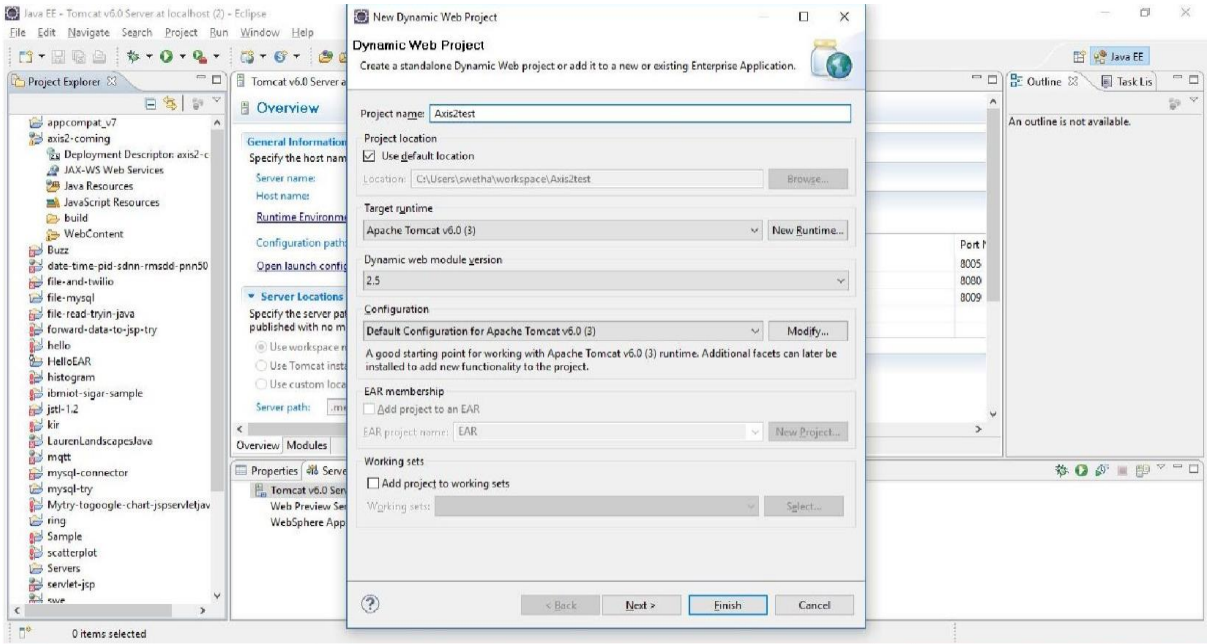
2. Open **Window -> Preferences -> Web Services -> Axis2 Emitter**



3. Open **File -> New -> Other... -> Web -> Dynamic Web Project**



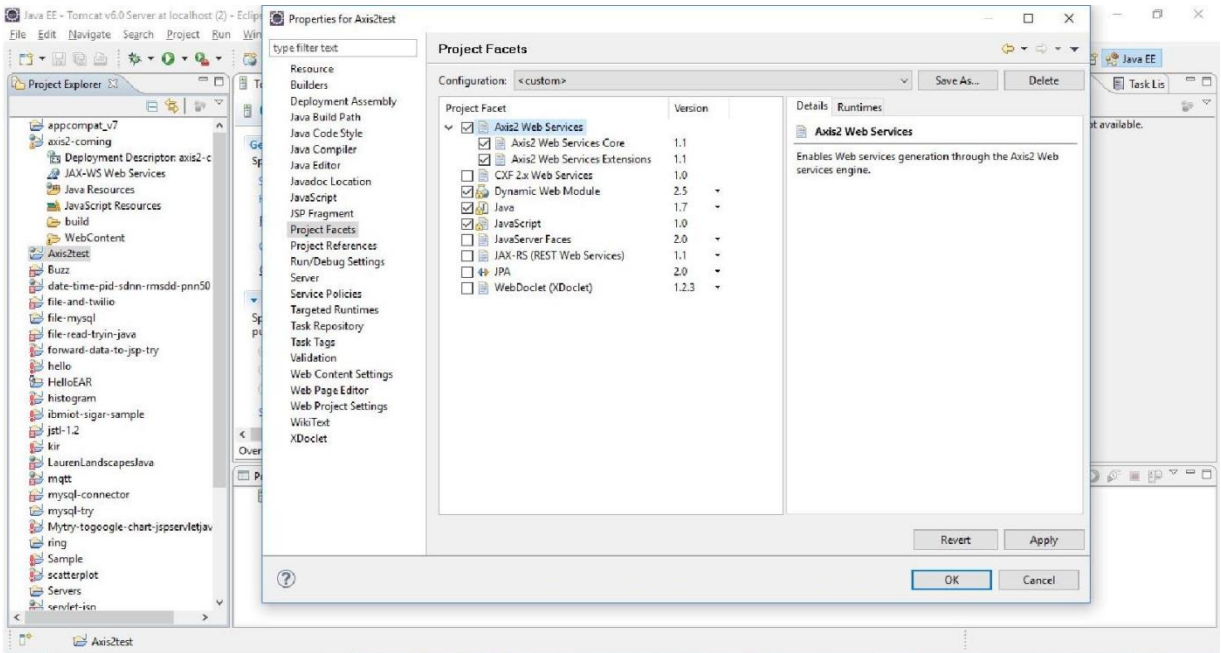
4. Name the project : Axis2test(here)



Click finish.

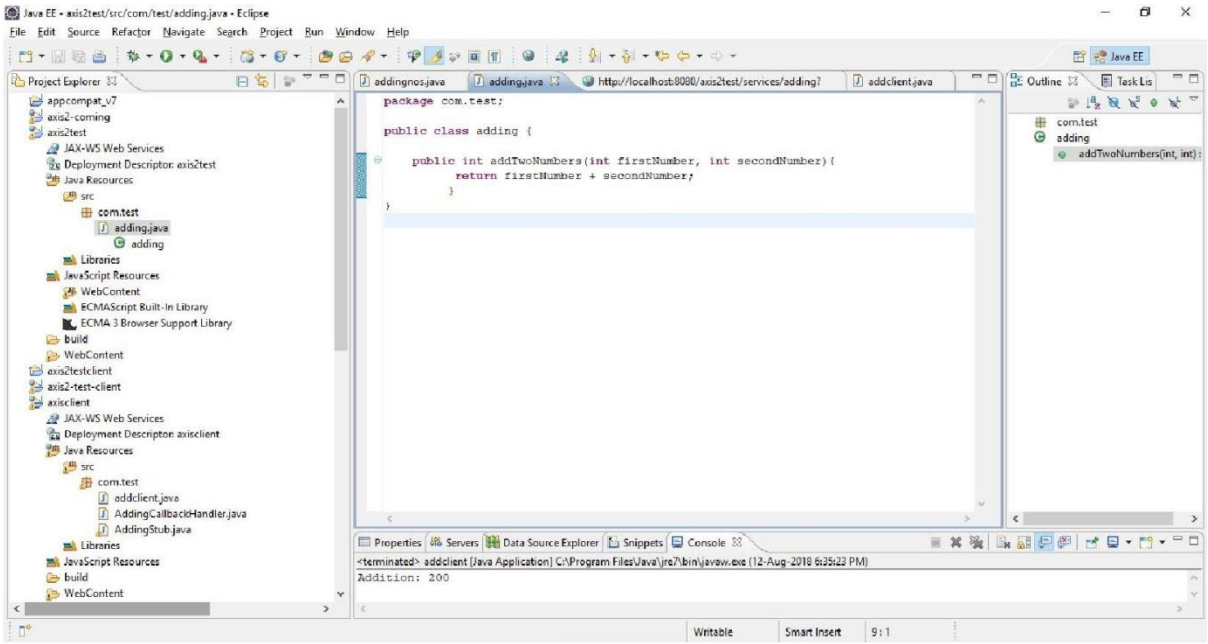
5. Right click the created project and select Properties->Project Facets

Select everything under Axis2 Web services, then click ok



6. Under axis2test/src, create a package and create a class inside the package defined. (com.test is the package here and adding.java is the class created)

Define the function inside the adding class



7. Select adding.java, open File -> New -> Other... -> Web Services -> Web Service

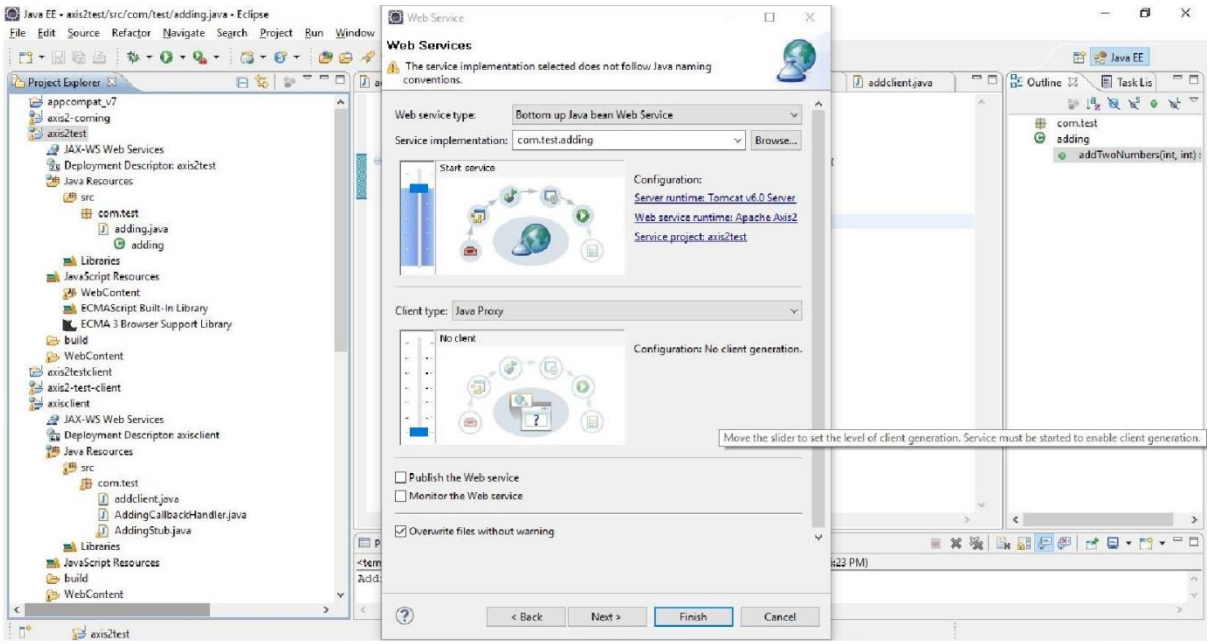
The Web service wizard would be brought up with Web service type set to **Bottom up Java bean Web Service** with the service implementation automatically filled in.

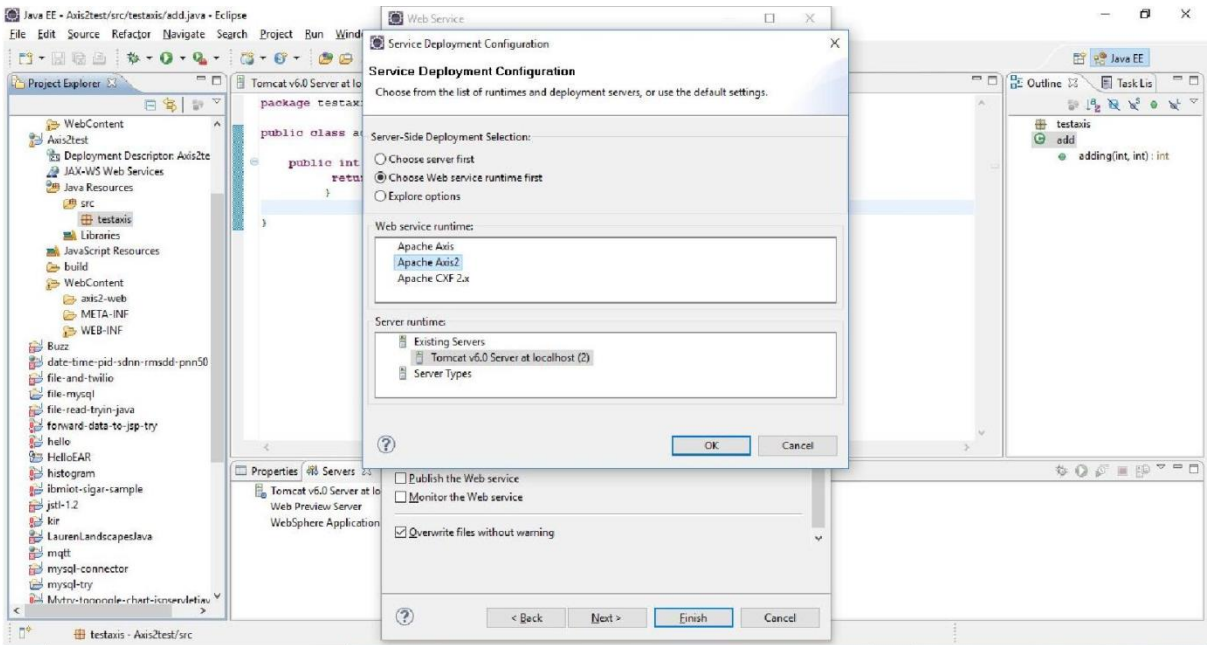
Select the proper service implementation: com.test.adding

Select web service runtime as Apache Axis2

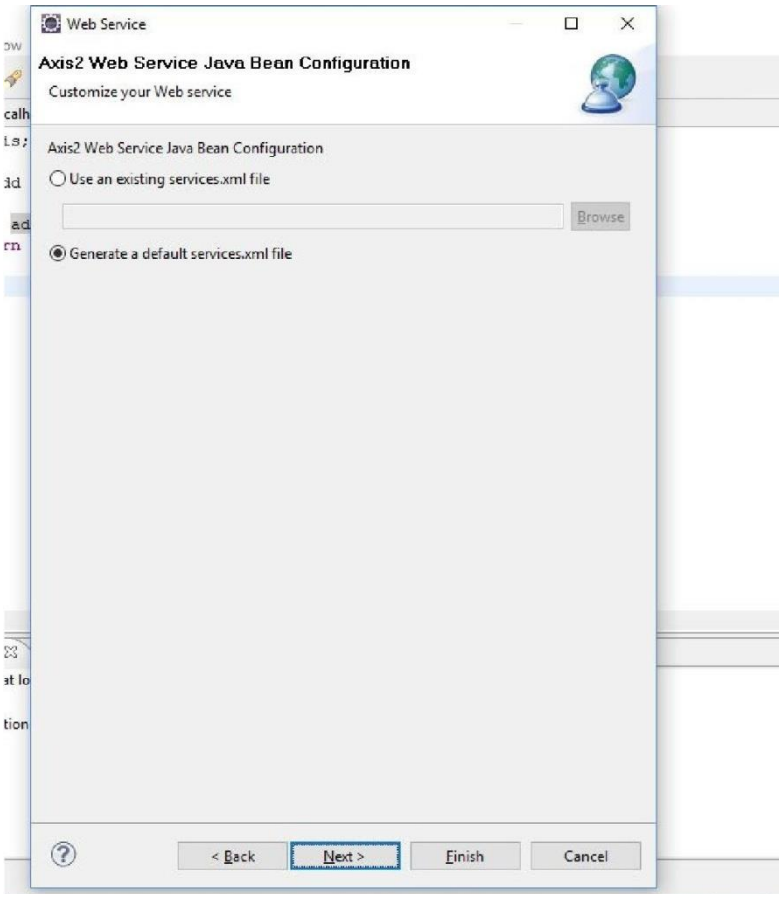
Server runtime: Tomcat v6.0 Server

Click next.



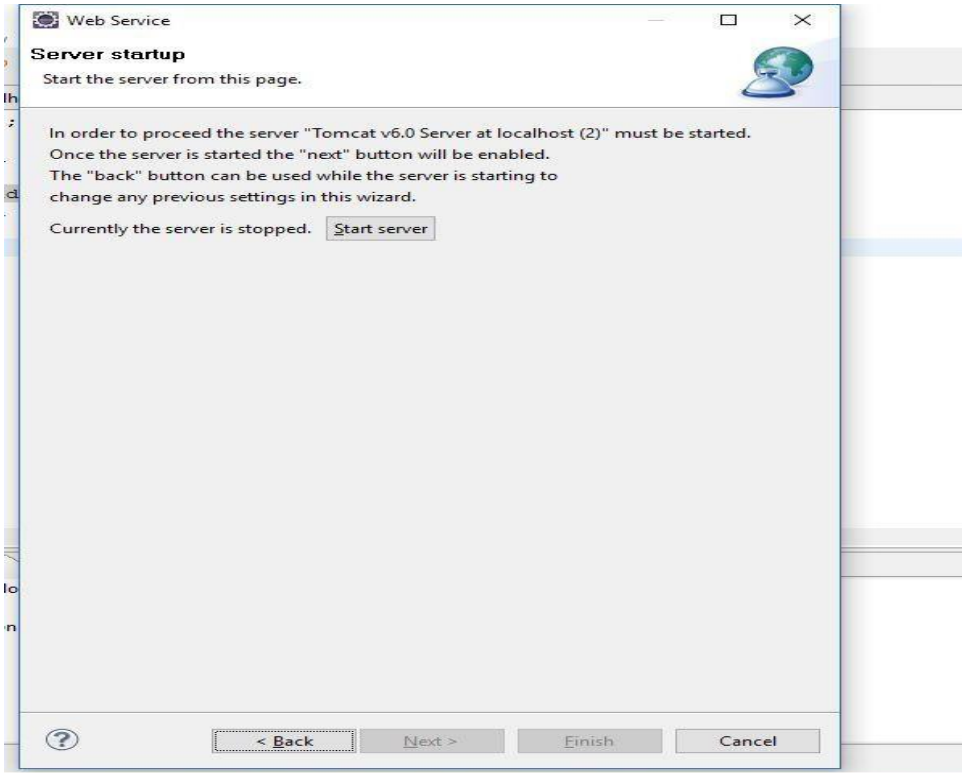


8. This page is the service.xml selection page. Select default

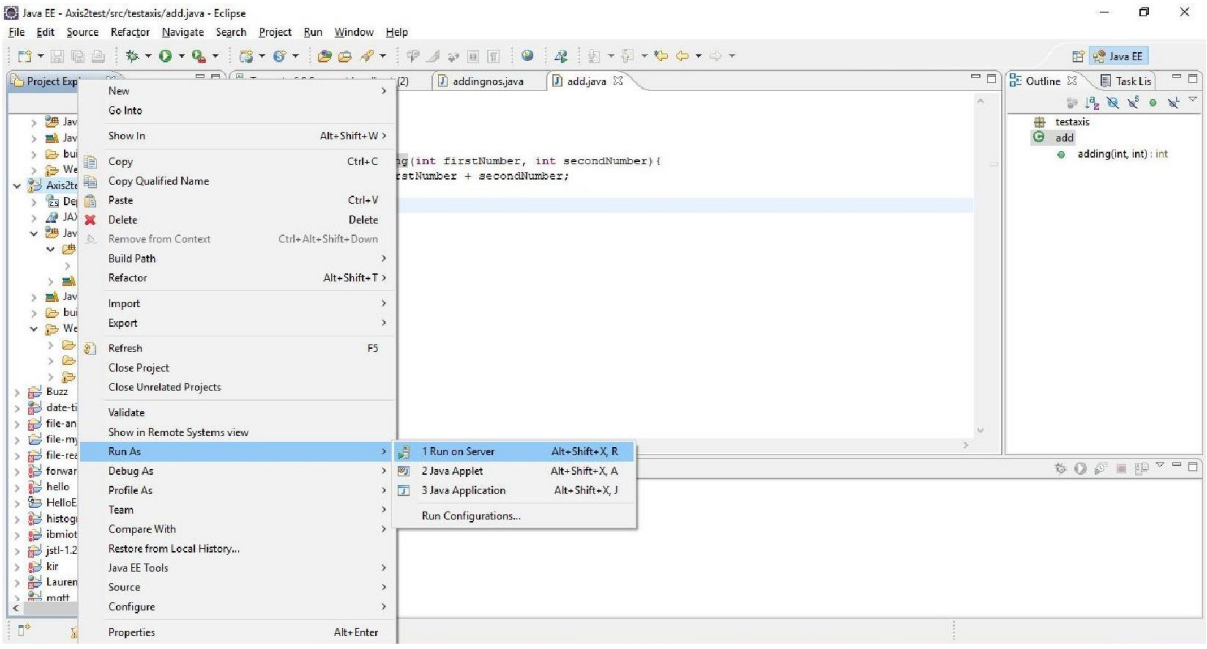


Click next

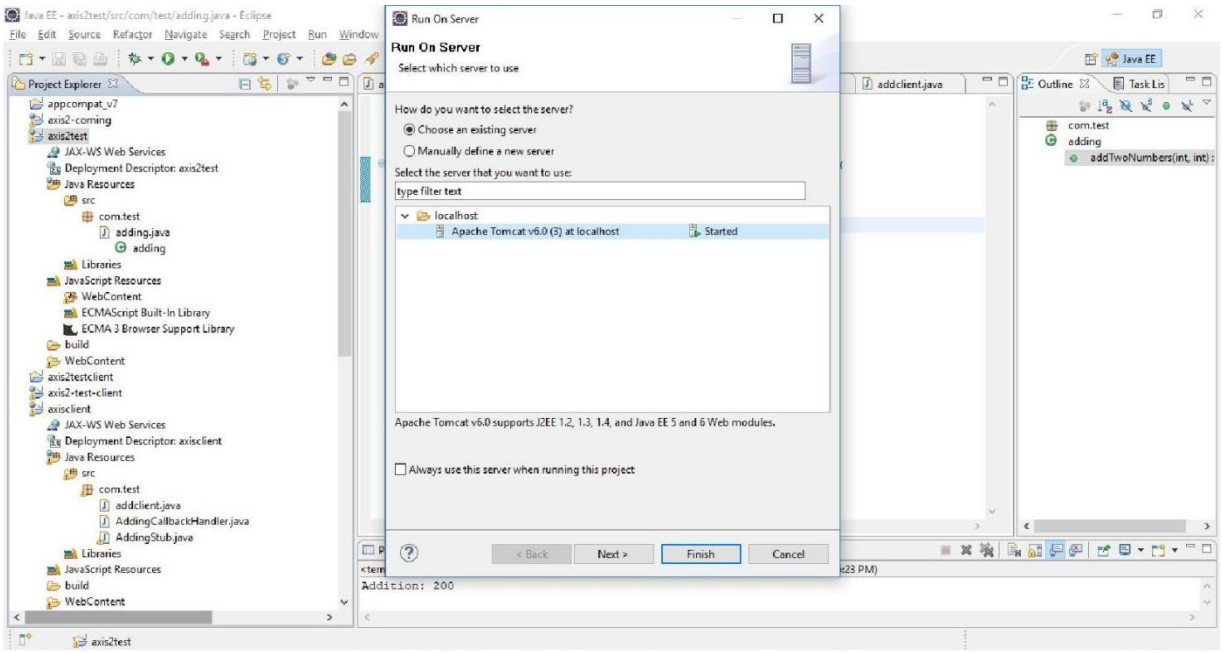
9. Start tomcat server



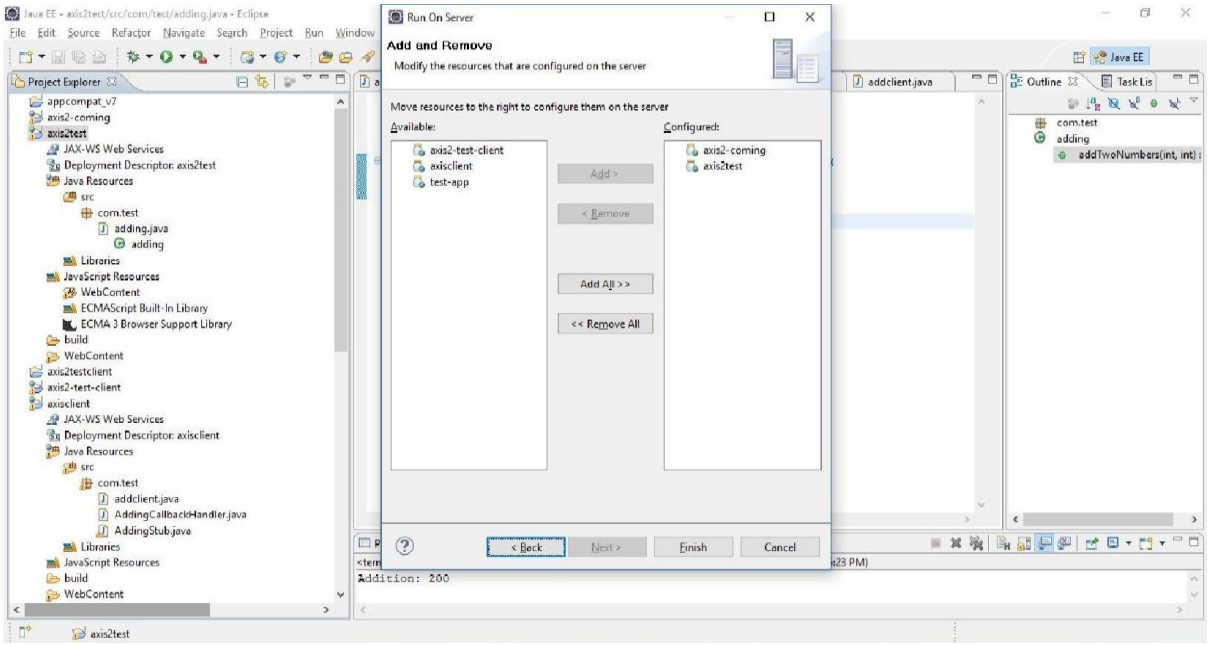
10. Now, select the **axis2test** dynamic Web project, right-click and select Run -> Run As -> Run on Server to bring up the Axis2 servlet



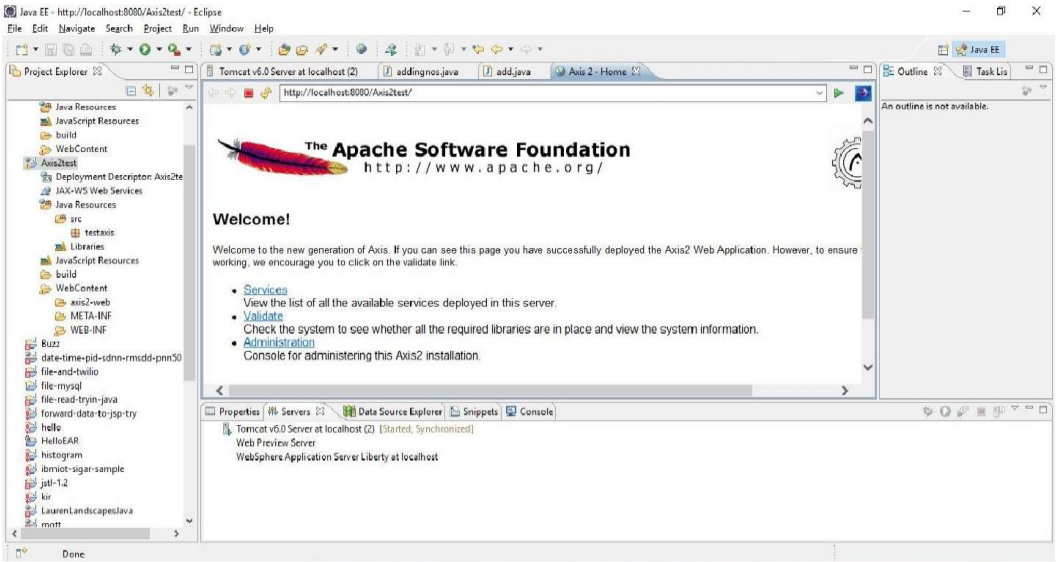
Select the running tomcat server, then click next



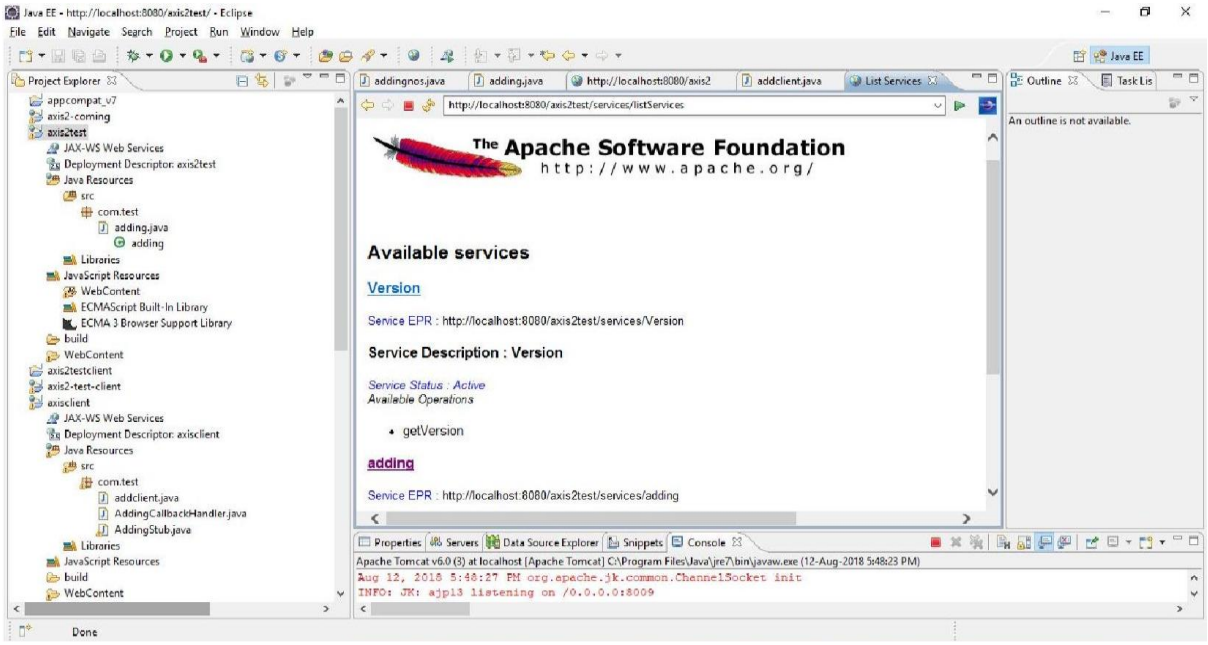
Make sure you have the **axis2Test** dynamic Web project on the right-hand side under the Configured project. Click finish then.



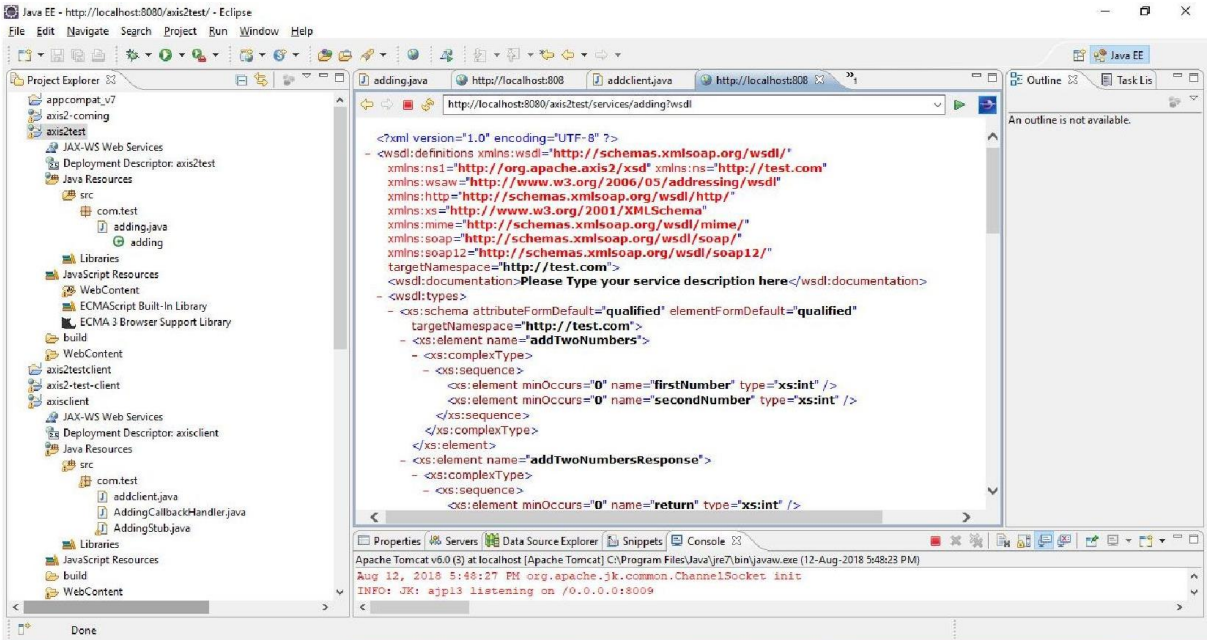
11. This will deploy the Axis2 server webapp on the configured servlet container and will display the Axis2 home page. Note that the servlet container will start up according to the Server configuration files on your workspace.



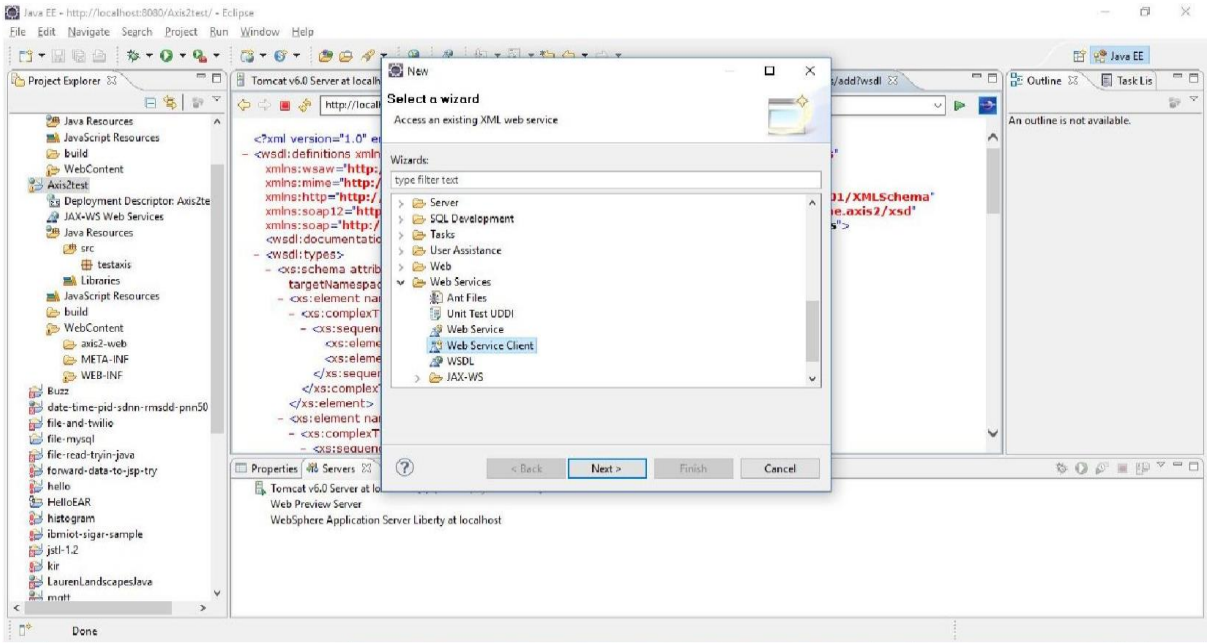
Click services, and the created webservice namely adding will be listed as below



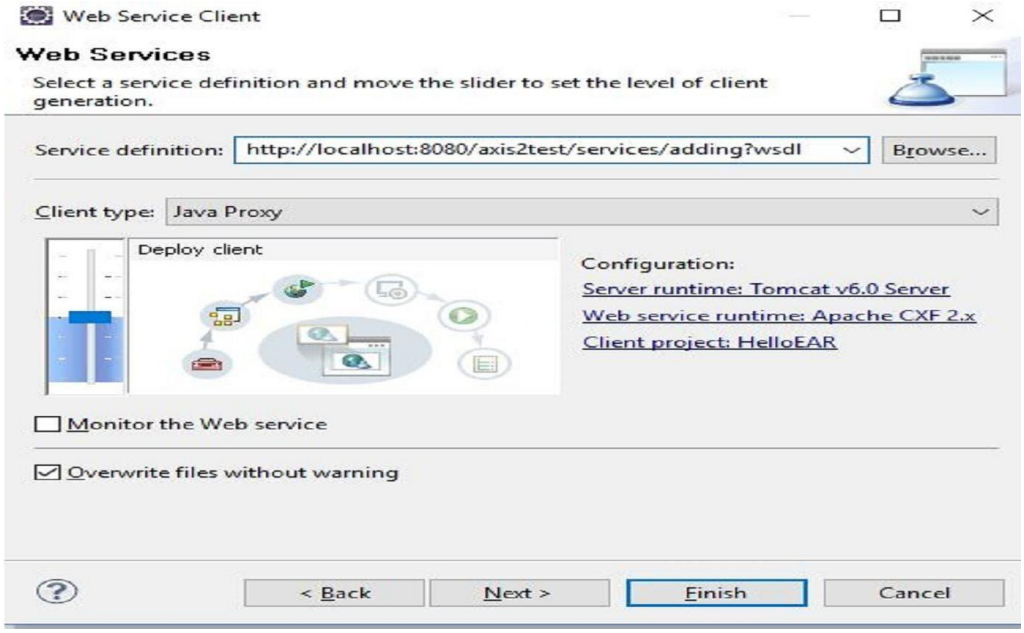
12. Click on the service listed (adding) to view the WSDL. Copy the URL



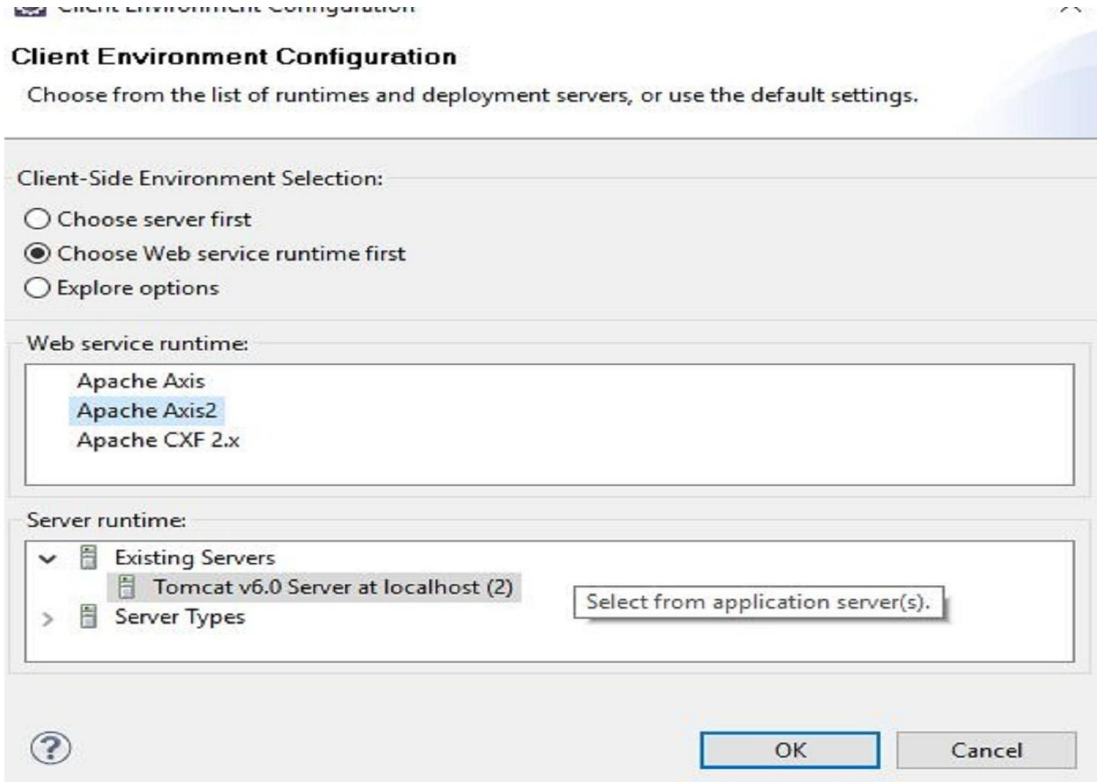
13. Now we'll generate the client for the newly created service by referring the wsdl generated by the Axis2 Server. Open File -> New -> Other... -> Web Services -> Web ServiceClient



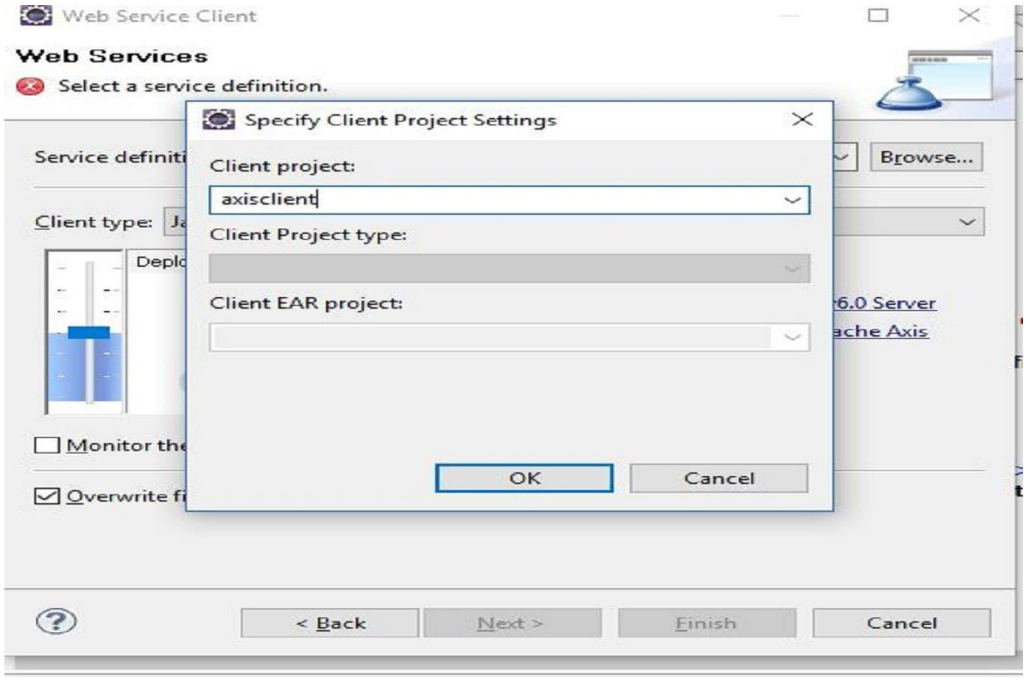
14. Paste the URL that was copied earlier into the service definition field.



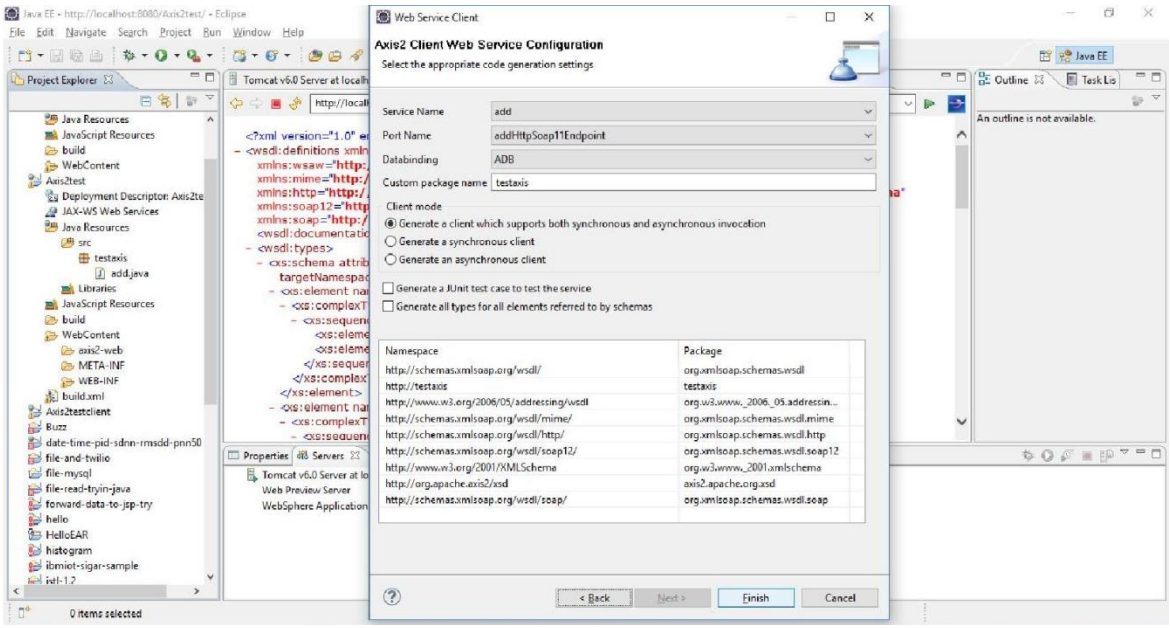
Select proper runtime as below



Click on the **Client project** hyperlink and enter **axisclient** as the name of the client project. Click next.

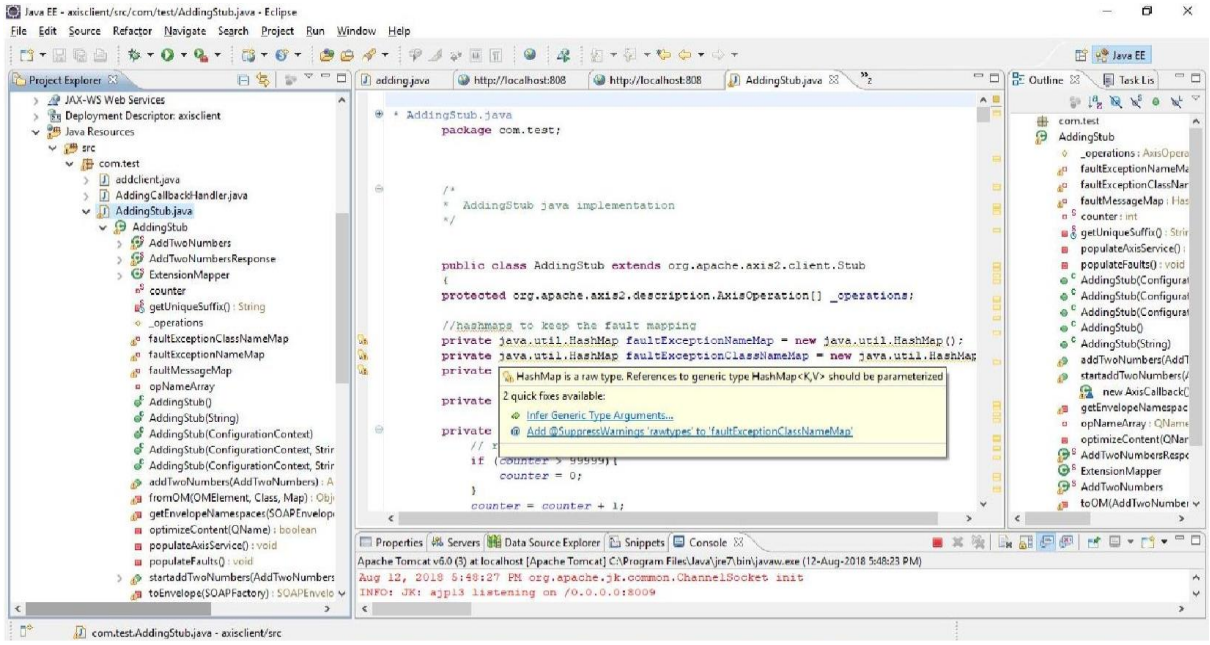


15. Next page is the Client Configuration Page. Accept the defaults and make sure port name is selected as below. Click Finish.



16. The Clients stubs will be generated to your Dynamic Web project**axisclient**.

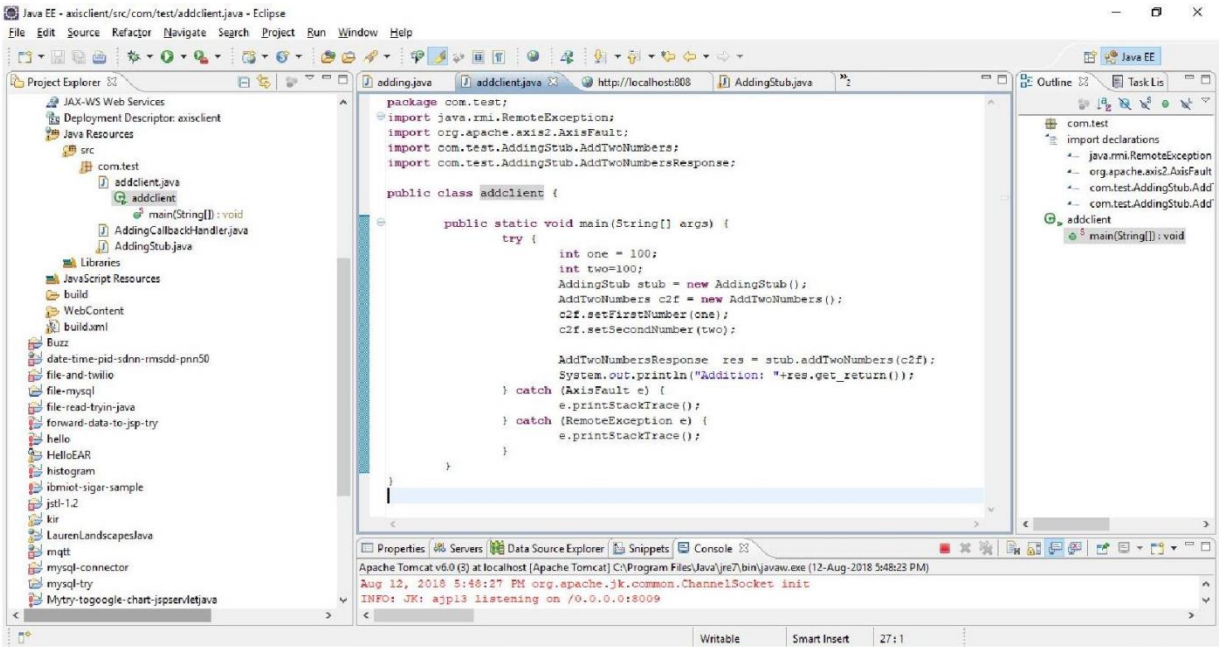
AddingStub is added in left plane and auto generated code is on right.



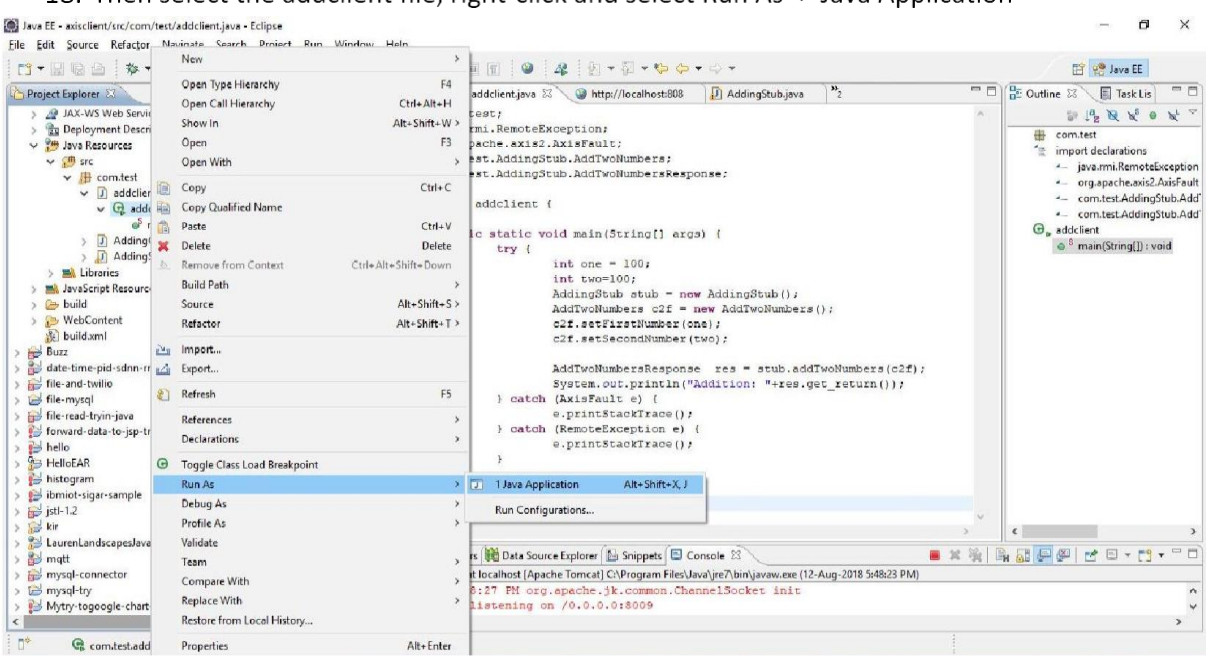
17. Add a class under com.test. package to implement main program to invoke client stub.

The stub generated incorporates two classes namely AddTwoNumbers that holds methods to call the function define in server side and AddTwoNumbersResponse which makes reuqests to the functions defined and returns the response of the function.

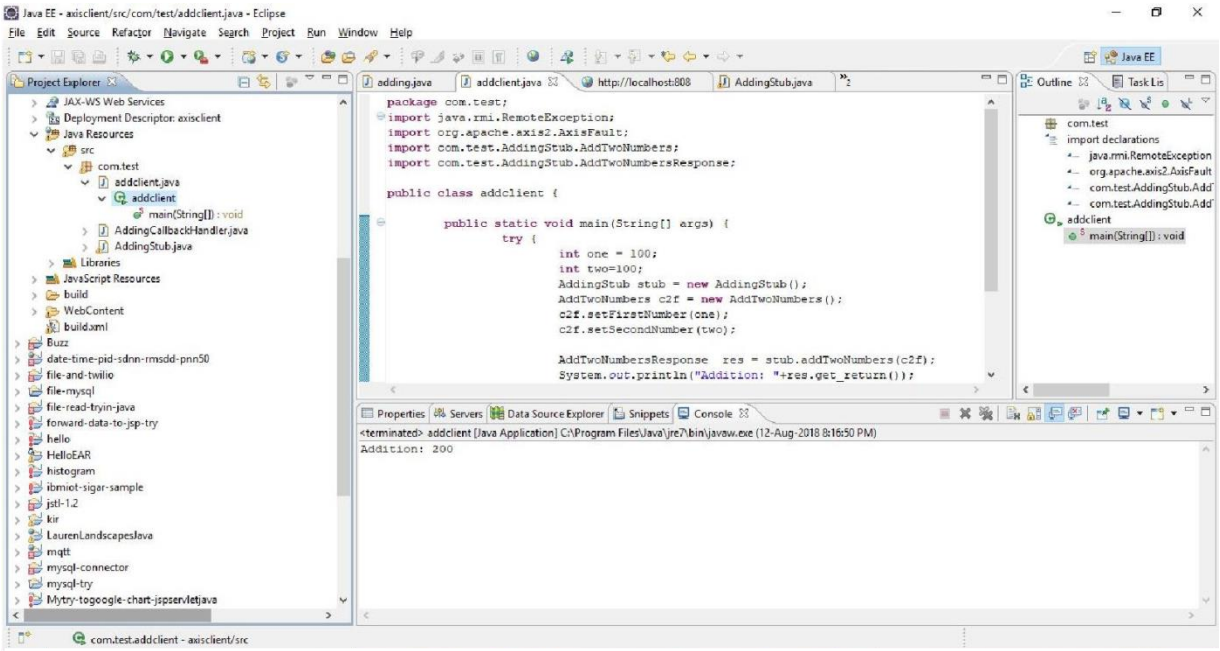
Create object for class AddTwoNumbers c2f and use it to set parameters through functions setFirstNumber and setSecondNumber (as two parameters in addTwoNumbers function). 100 is set as value to both numbers. Call addTwoNumbers function through stub object, the res object stores the result and res.get_return function is defined to print the returned result.



18. Then select the addclient file, right-click and select Run As -> Java Application



19. Since 100 is passed as values to first and second number of addTwoNumbers function, it returns the summation as 200 which is seen in the output console.



<u>SOURCE FILES:</u>

<u>Adding.java at sever end</u>

```
packagecom.test;

public class adding {

        publicintaddTwoNumbers(intfirstNumber, intsecondNumber){
                returnfirstNumber + secondNumber;
                }
}
```

<u>Addclient.java at client side</u>

```
packagecom.test;
importjava.rmi.RemoteException;
import org.apache.axis2.AxisFault;
importcom.test.AddingStub.AddTwoNumbers;
importcom.test.AddingStub.AddTwoNumbersResponse;

public class addclient {

public static void main(String[] args) {
```

```
try {
int one = 100;
int two=100;
AddingStub stub = new AddingStub();
AddTwoNumbers c2f = new AddTwoNumbers();
c2f.setFirstNumber(one);
c2f.setSecondNumber(two);

AddTwoNumbersResponse  res = stub.addTwoNumbers(c2f);
System.out.println("Addition: "+res.get_return());
            } catch (AxisFault e) {
e.printStackTrace();
            } catch (RemoteException e) {
e.printStackTrace();
            }
      }
}
```

RESULT

Thus ,a webservice is created for simple calculator application using Apache Axis and it is deployed on server and tested for various cases.

SSN COLLEGE OF ENGINEERING

Department of Computer Science and Engineering

CS6712 Grid and Cloud Computing Laboratory

Assignment -3 : Creation of Virtual Machine and Running a Java Program in Virtual Machine

Assigned Date : **Due Date :**

I. Creating a Virtual Machine (Hosted- Virtual Machine)

1. Install Virtual Box in Host Operating System (amd- 64 bit processor architecture).
2. Check whether the processor supports virtualization or not by giving following command in terminal

Command to check if CPU supports Virtualization or Not.

]$ grep --color vmx /proc/cpuinfo

]$ cat /proc/cpuinfo| egrep "vmx|svm"

]$ grep –E 'svm|vmx' /proc/cpuinfo

vmx – Intel VT-x, virtualization support enabled in BIOS.
svm – AMD SVM,virtualization enabled in BIOS.

3. Create a Virtual Machine (VM) with 2GB RAM and 10GB Hard disk and install Ubuntu 16.04 Desktop as guest OS. Name the VM as VM1.

4. Switch the login into root user privilege mode by using the command
$ sudo -i
When asked for password, give your system password
give **$ ifconfig** and check default IP address

5. Set up Network in Virtual Machine for connecting to internet.

Network Confirguration in

sudo gedit /etc/network/interfaces

auto eth0

iface eth0 inet static

address 10.6.128. X

netmask 255.255.128.0

gateway 10.6.128.1

DNS server list 10.101.1.10

Network Confirguration in

sudo gedit /etc/resolv.conf

nameserver 10.101.1.10

Check Virtual IP in Terminal]$ **ifconfig**

and Check for Internet connection in terminal]$ **sudo apt-get update**

I. Install Java Development Kit

Set path variables in bashrc file

https://www.wikihow.com/Set-Up-Your-Java_Home-Path-in-Ubuntu

Execute a simple Java Program in a Virtual Machine

II. Using Tomcat Server in VM1

Install Java Development Kit and Tomcat server in VM1.

Execute a simple Java Program on a Tomcat server in a Virtual Machine.

Install Tomcat Server and set path variables

[cse@localhost apache-tomcat-6.0.20]$ **cd webapps/**
[cse@localhost webapps]$ **mkdir hello**
[cse@localhost webapps]$ **cd hello**
[cse@localhost hello]$ **mkdir WEB-INF**
[cse@localhost hello]$ **cd WEB-INF**
[cse@localhost WEB-INF]$ **mkdir classes**

http://www.informit.com/articles/article.aspx?p=26920&seqNum=4

Ex.No. 3 **Creation of Virtual Machine and running a java program in virtual machine**
Date : 5-7-19

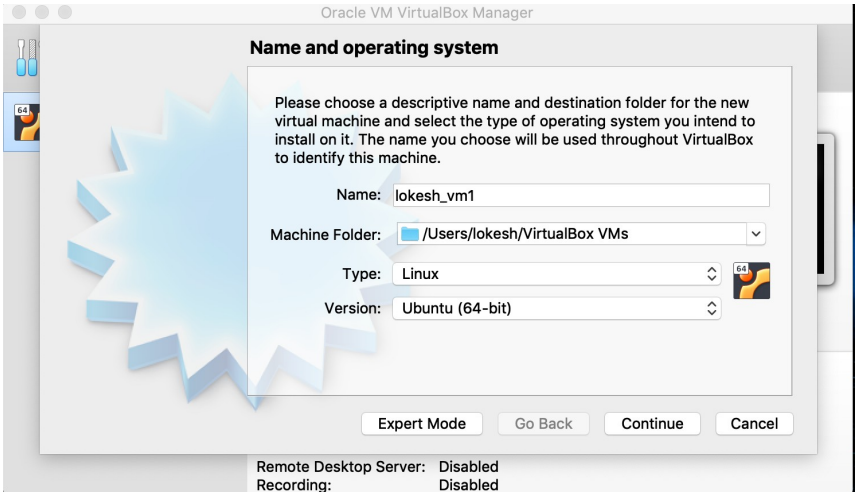
Aim :

To create a virtual machine and to run a java program in the VM

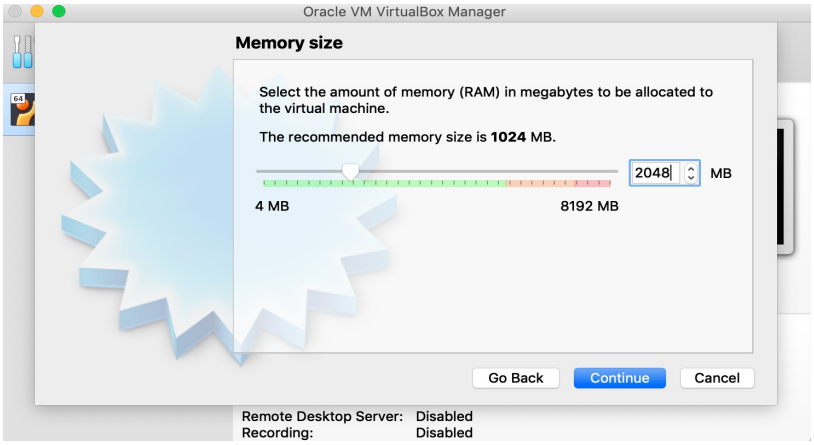
PROCEDURE TO CREATE VIRTUAL MACHINES WITH SPECIFICATONS

1. **Create a Virtual Machine with 2GB RAM and 10GB Hard Disk**

1.1 Open the OracleVM Virtual Box Manager.Click NEW.Create a new Virtual machine by specifying the Name as **VM1** and Operating System as **Linux** and type as Ubuntu (64-bit).

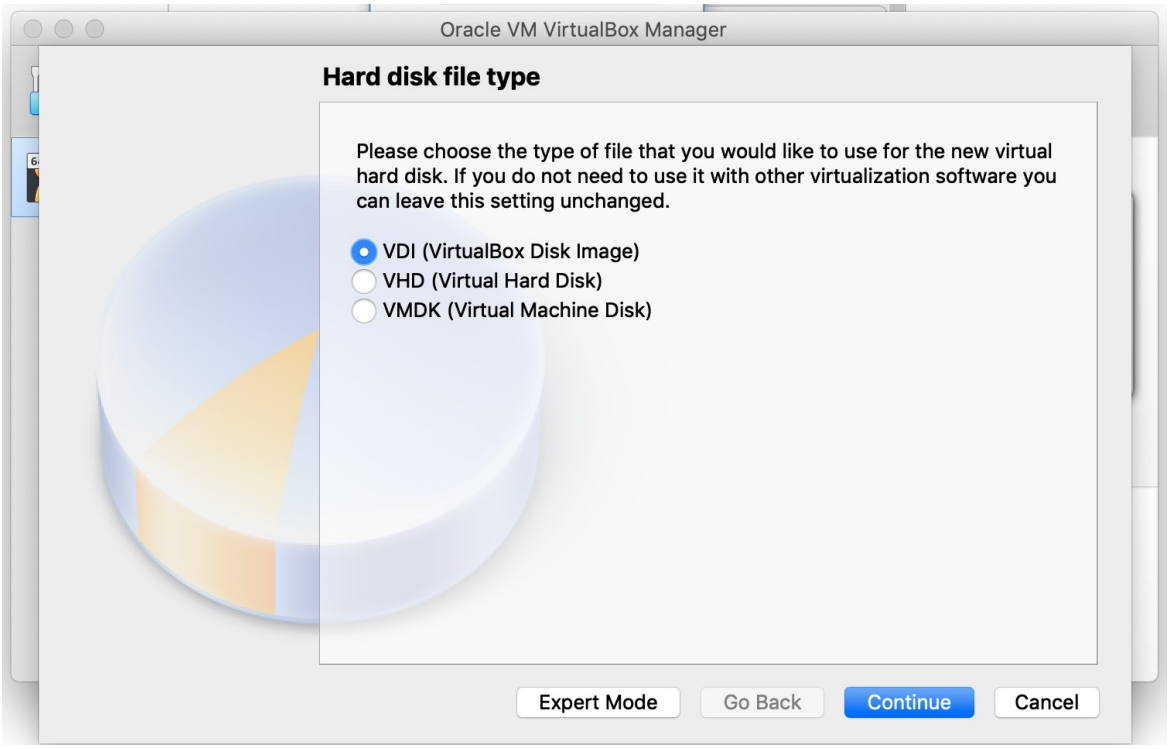


1.2. Specify the RAM memory size as **2GB (2048MB)**.



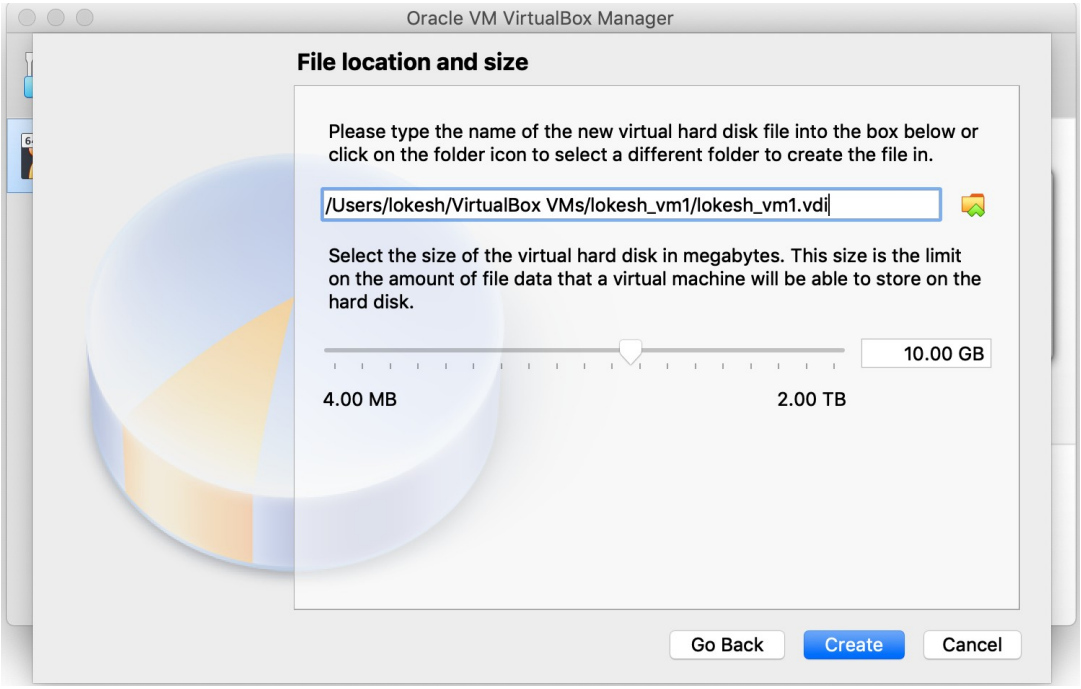
1.3. Select “Create a virtual hard disk now”

1.4. Select the default Hard Disk file type



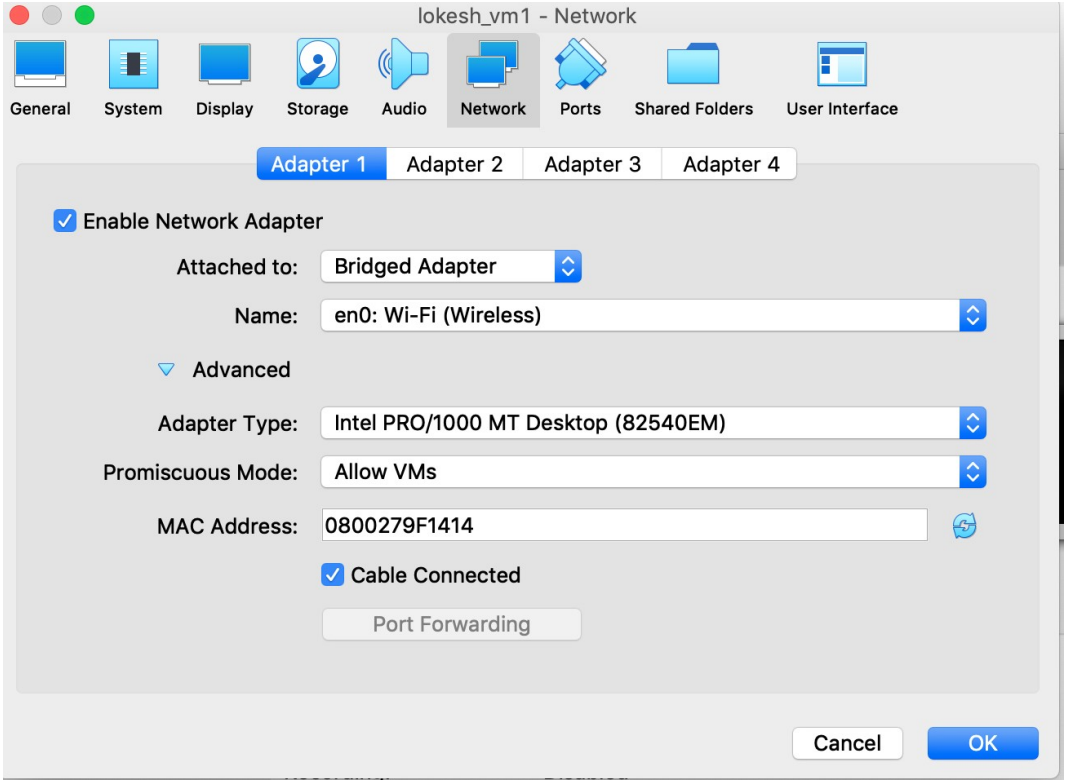
1.5. Select the Storage on physical hard disk as **Fixed size**

1.6. Finally select the **Create** option to create Virtual machine

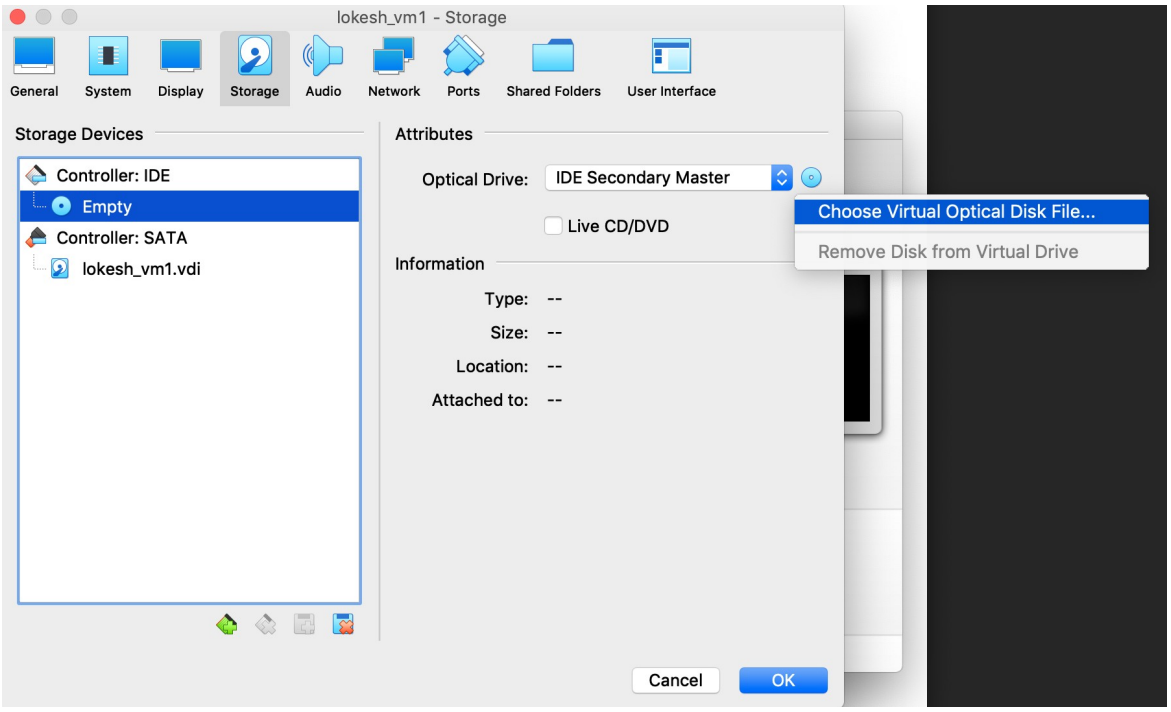


2.Setting up the Network and Storage settings

2.1. Click on **Network** tab and choose “Bridged Adapter” in **Attached to** drop down list and “Allow VMs” from **Promiscuous Mode** in the **Advanced** section.

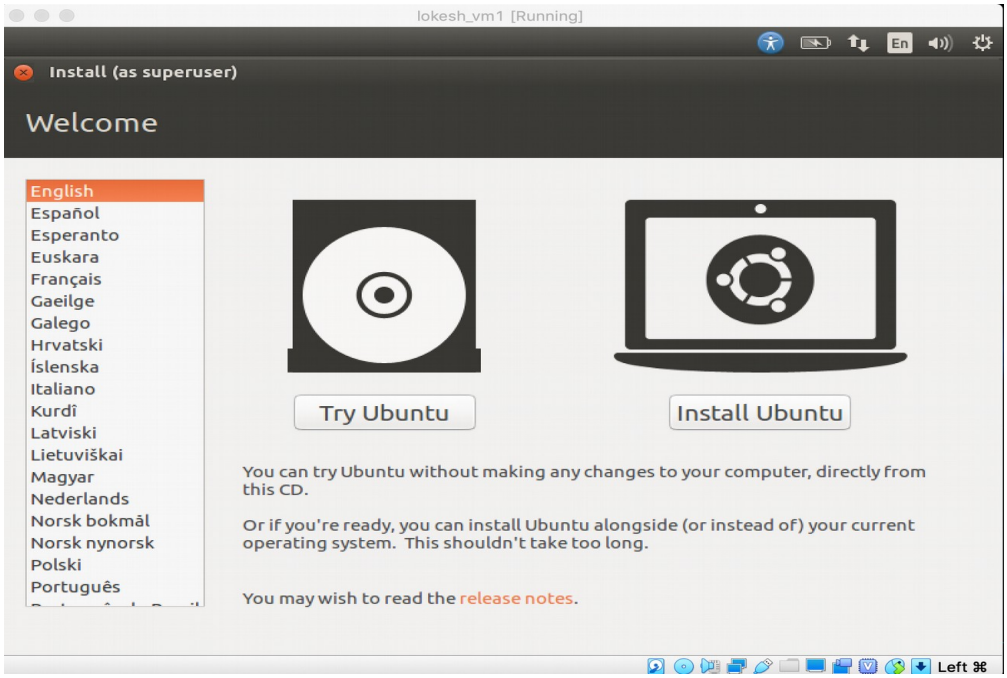


2.2. Click on **Storage** tab.Click **Empty** under **Storage Devices** Pane and choose the Ubuntu.iso file from the computer by clicking the cd icon in the **Attributes** section.

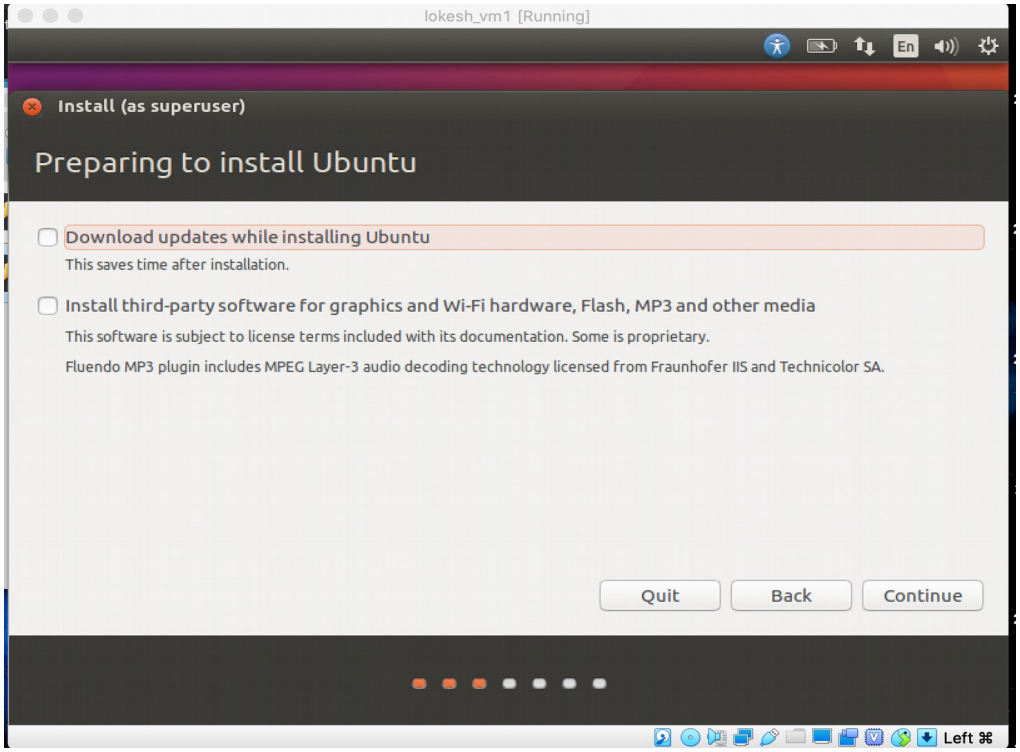


3. Ubuntu 16.04 Desktop Installation as Guest OS.

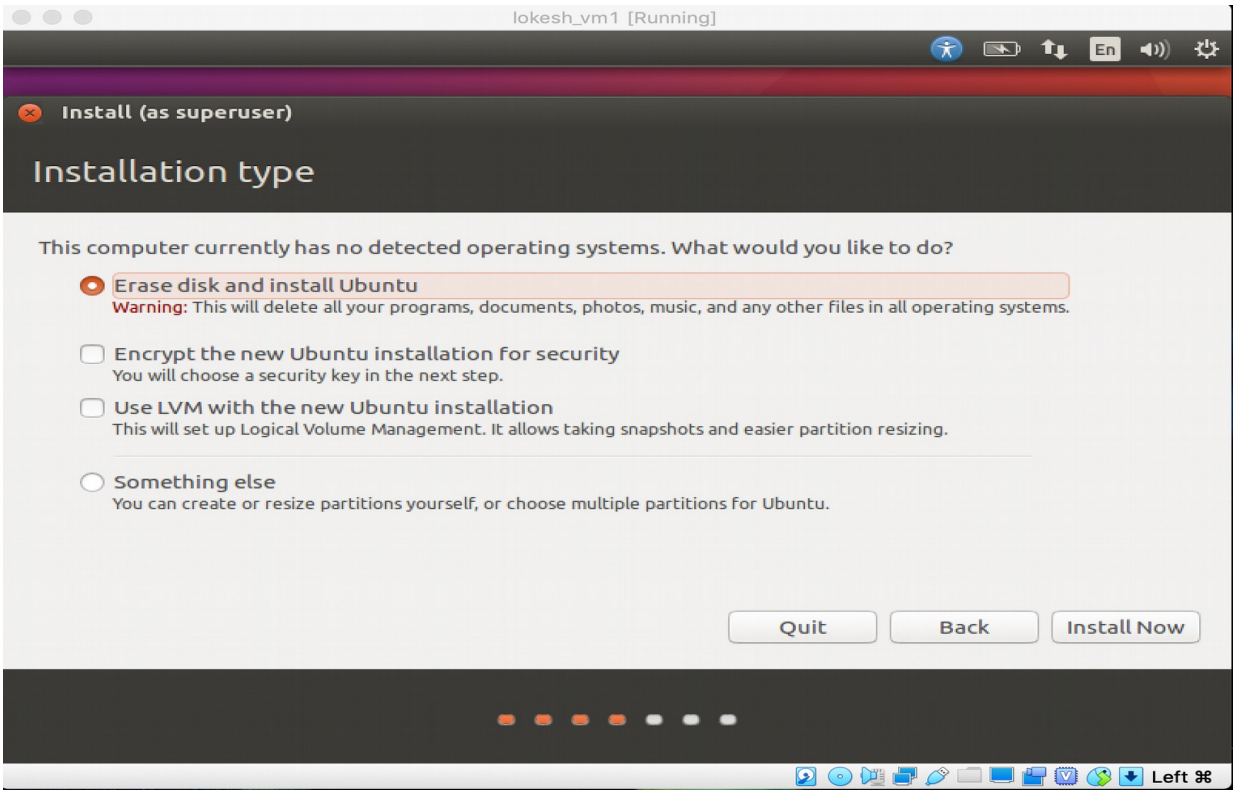
3.1. Click **Install Ubuntu** button



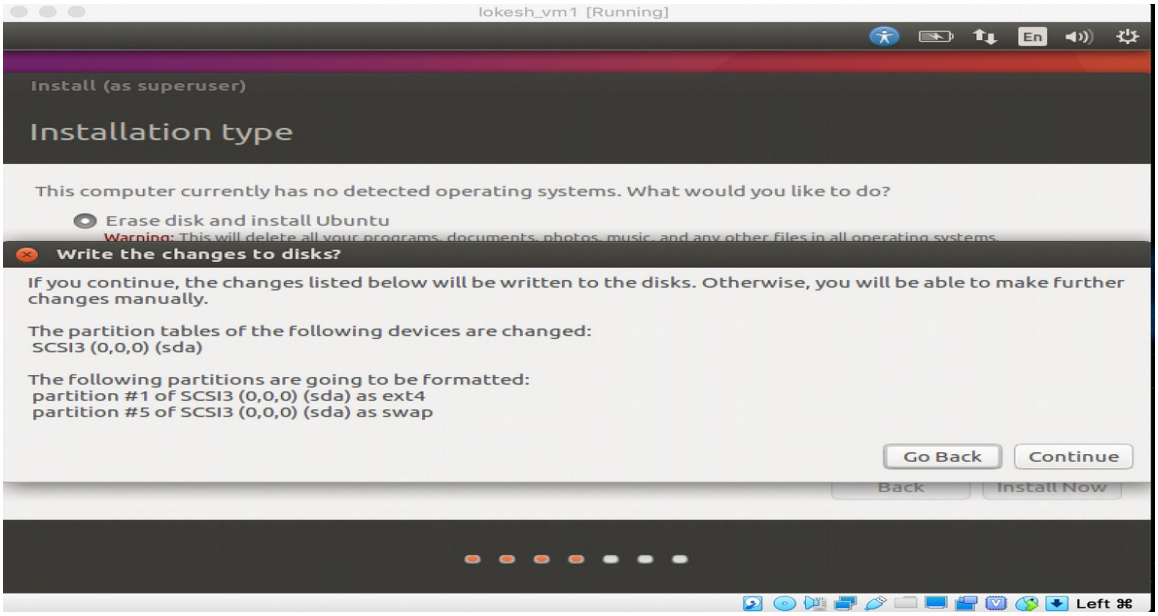
3.2. Click **Continue**

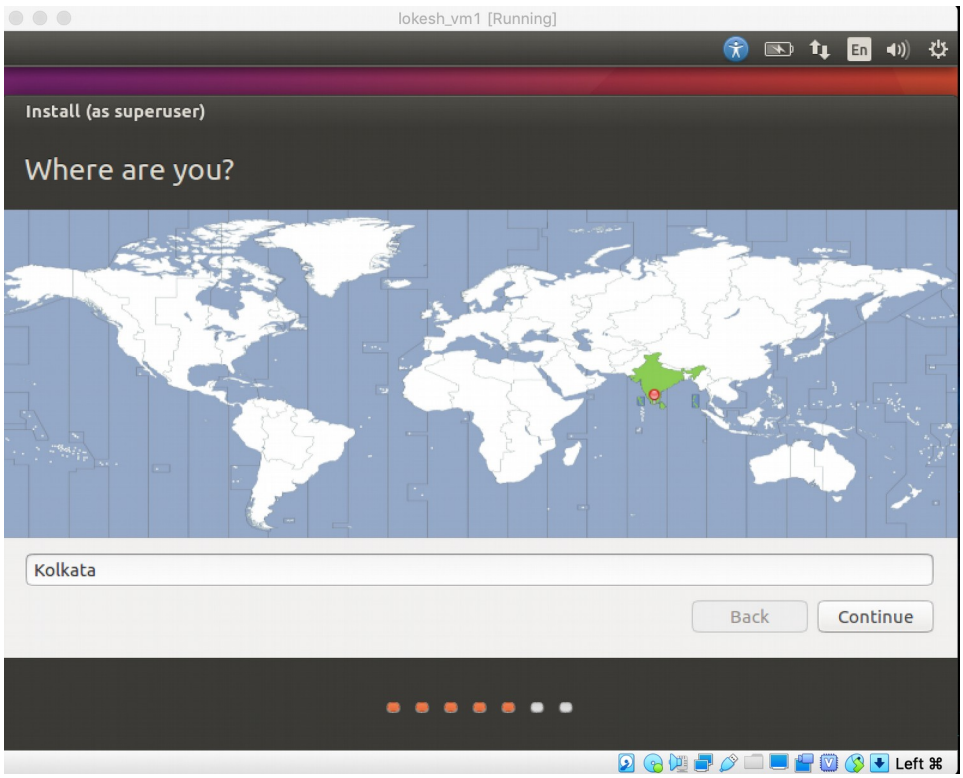


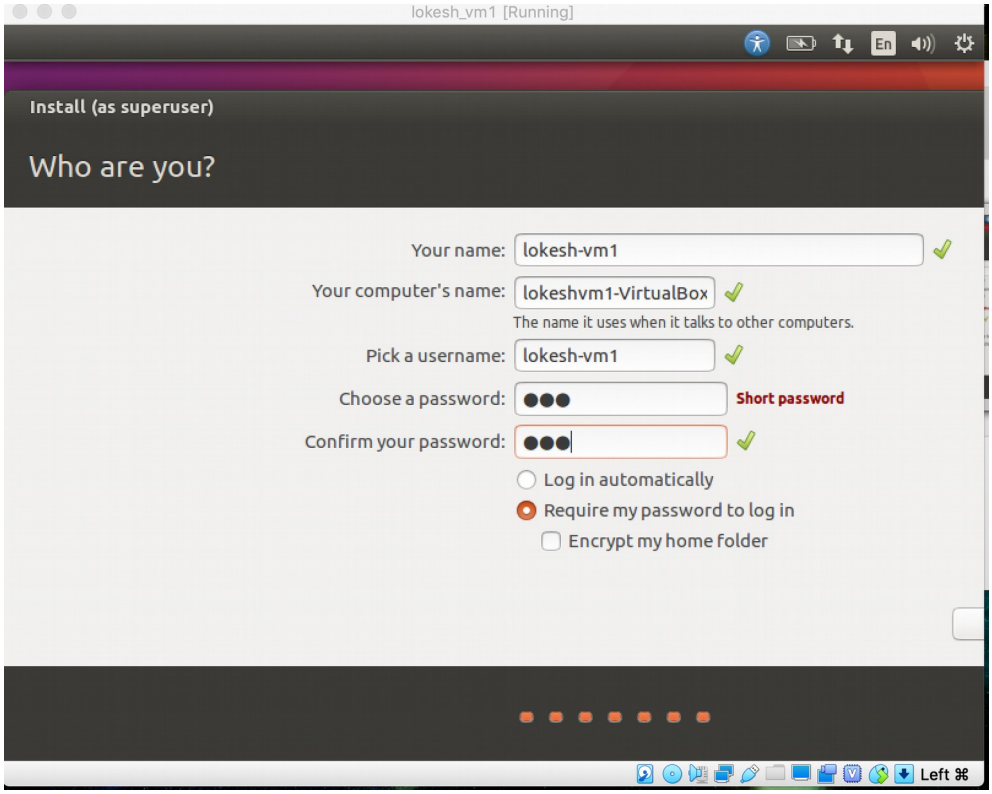
3.3. Click **Install Now**

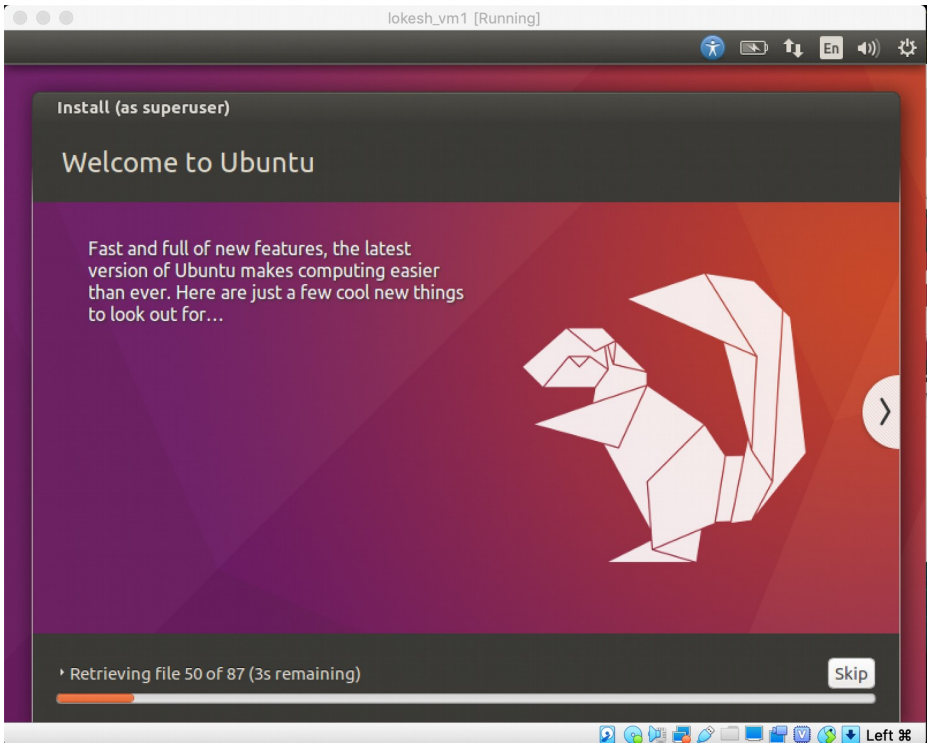


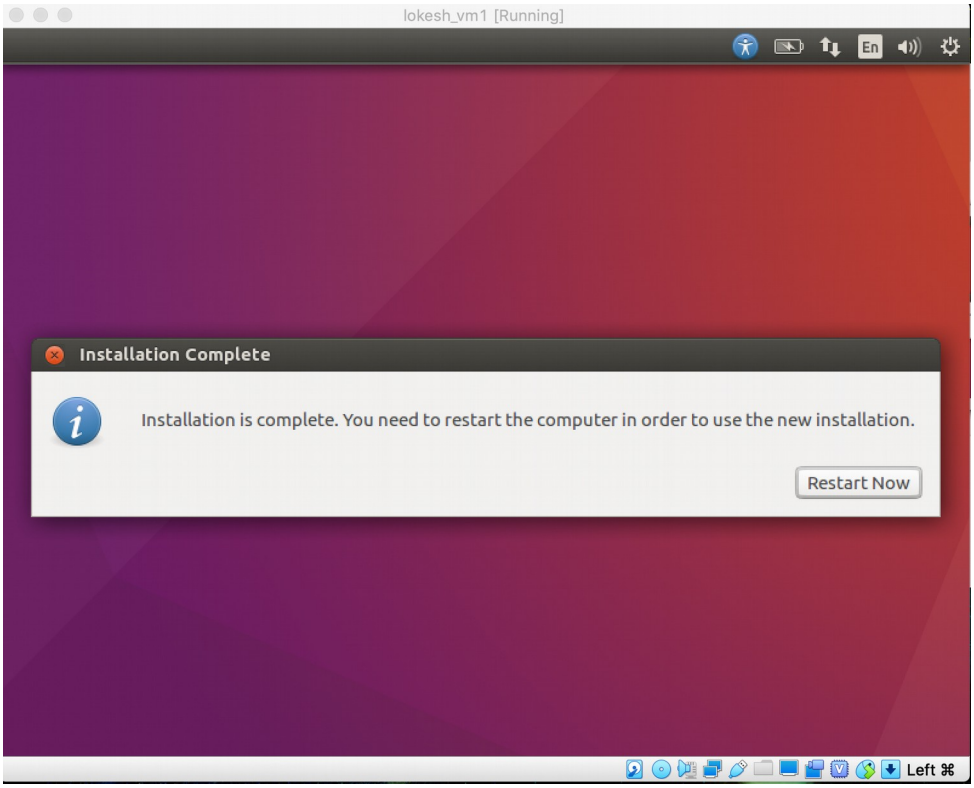
3.4. Click **Continue**




lokesh_vm1 [Running]
En
Install (as superuser)
Where are you?
Kolkata
Back
Continue
Left ⌘


lokesh_vm1 [Running]
En
Install (as superuser)
Who are you?
Your name:
lokesh-vm1
Your computer's name:
lokeshvm1-VirtualBox
The name it uses when it talks to other computers.
Pick a username:
lokesh-vm1
Choose a password:
Short password
Confirm your password:
Log in automatically
Require my password to log in
Encrypt my home folder
Left ⌘


lokesh_vm1 [Running]
En
Install (as superuser)
Welcome to Ubuntu
Fast and full of new features, the latest version of Ubuntu makes computing easier than ever. Here are just a few cool new things to look out for...
Retrieving file 50 of 87 (3s remaining)
Skip
Left ⌘


lokesh_vm1 [Running]
En
Installation Complete
Installation is complete. You need to restart the computer in order to use the new installation.
Restart Now
Left ⌘

Installing Java :

Sudo apt-get update

```
Terminal File Edit View Search Terminal Help
lokesh@lokesh-VirtualBox:~$ sudo apt-get update
[sudo] password for lokesh:
Ign:1 http://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Get:4 http://ppa.launchpad.net/webupd8team/java/ubuntu xenial InRelease [17.6 kB
]
Hit:5 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
Hit:6 http://dl.google.com/linux/chrome/deb stable Release
Hit:7 http://security.ubuntu.com/ubuntu xenial-security InRelease
Fetched 17.6 kB in 1s (10.4 kB/s)
Reading package lists... Done
lokesh@lokesh-VirtualBox:~$
```

sudo add-apt-repository ppa:webupd8team/java

```
lokesh@lokesh-VirtualBox: ~
lokesh@lokesh-VirtualBox:~$ sudo add-apt-repository ppa:webupd8team/java
 The Oracle JDK License has changed for releases starting April 16, 2019.

The new Oracle Technology Network License Agreement for Oracle Java SE is substa
ntially different from prior Oracle JDK licenses. The new license permits certai
n uses, such as personal use and development use, at no cost -- but other uses a
uthorized under prior Oracle JDK licenses may no longer be available. Please rev
iew the terms carefully before downloading and using this product. An FAQ is ava
ilable here: https://www.oracle.com/technetwork/java/javase/overview/oracle-jdk-
faqs.html

Oracle Java downloads now require logging in to an Oracle account to download Ja
va updates, like the latest Oracle Java 8u211 / Java SE 8u212. Because of this I
 cannot update the PPA with the latest Java (and the old links were broken by Or
acle).

For this reason, THIS PPA IS DISCONTINUED (unless I find some way around this li
mitation).

Oracle Java (JDK) Installer (automatically downloads and installs Oracle JDK8).
There are no actual Java files in this PPA.

Important -> Why Oracle Java 7 And 6 Installers No Longer Work: http://www.webup
d8.org/2017/06/why-oracle-java-7-and-6-installers-no.html

Update: Oracle Java 9 has reached end of life: http://www.oracle.com/technetwork
/java/javase/downloads/jdk9-downloads-3848520.html
```

```
lokesh@lokesh-VirtualBox: ~
Update: Oracle Java 9 has reached end of life: http://www.oracle.com/technetwork
/java/javase/downloads/jdk9-downloads-3848520.html

The PPA supports Ubuntu 18.10, 18.04, 16.04, 14.04 and 12.04.

More info (and Ubuntu installation instructions):
- http://www.webupd8.org/2012/09/install-oracle-java-8-in-ubuntu-via-ppa.html

Debian installation instructions:
- Oracle Java 8: http://www.webupd8.org/2014/03/how-to-install-oracle-java-8-in-
debian.html

For Oracle Java 11, see a different PPA -> https://www.linuxuprising.com/2019/06
/new-oracle-java-11-installer-for-ubuntu.html
 More info: https://launchpad.net/~webupd8team/+archive/ubuntu/java
Press [ENTER] to continue or ctrl-c to cancel adding it

gpg: keyring `/tmp/tmpm4ks5akf/secring.gpg' created
gpg: keyring `/tmp/tmpm4ks5akf/pubring.gpg' created
gpg: requesting key EEA14886 from hkp server keyserver.ubuntu.com
gpg: /tmp/tmpm4ks5akf/trustdb.gpg: trustdb created
gpg: key EEA14886: public key "Launchpad VLC" imported
gpg: no ultimately trusted keys found
gpg: Total number processed: 1
gpg:               imported: 1  (RSA: 1)
OK
lokesh@lokesh-VirtualBox:~$
```

sudo apt-get install openjdk-8-jre

```
lokesh@lokesh-VirtualBox: ~
lokesh@lokesh-VirtualBox:~$ sudo apt-get install openjdk-8-jre
[sudo] password for lokesh:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ca-certificates-java fonts-dejavu-extra java-common libgif7
  openjdk-8-jre-headless
Suggested packages:
  default-jre icedtea-8-plugin fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  ca-certificates-java fonts-dejavu-extra java-common libgif7 openjdk-8-jre
  openjdk-8-jre-headless
0 upgraded, 6 newly installed, 0 to remove and 260 not upgraded.
Need to get 29.0 MB of archives.
After this operation, 107 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu xenial/main amd64 java-common all 0.56
ubuntu2 [7,742 B]
Get:2 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openjdk-8-jr
e-headless amd64 8u222-b10-1ubuntu1~16.04.1 [27.1 MB]
Get:3 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 ca-certifica
tes-java all 20160321ubuntu1 [12.5 kB]
```

```
lokesh@lokesh-VirtualBox: ~
Adding debian:Camerfirma_Chambers_of_Commerce_Root.pem
Adding debian:DigiCert_Global_Root_G3.pem
Adding debian:GeoTrust_Global_CA_2.pem
Adding debian:Security_Communication_EV_RootCA1.pem
Adding debian:OpenTrust_Root_CA_G2.pem
Adding debian:Entrust_Root_Certification_Authority.pem
Adding debian:D-TRUST_Root_Class_3_CA_2_EV_2009.pem
Adding debian:DigiCert_Assured_ID_Root_G2.pem
Adding debian:SwissSign_Gold_CA_-_G2.pem
Adding debian:thawte_Primary_Root_CA_-_G2.pem
Adding debian:GlobalSign_Root_CA.pem
done.
Setting up openjdk-8-jre:amd64 (8u222-b10-1ubuntu1~16.04.1) ...
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/policytool
to provide /usr/bin/policytool (policytool) in auto mode
Processing triggers for libc-bin (2.23-0ubuntu11) ...
Processing triggers for ca-certificates (20170717~16.04.2) ...
Updating certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...

done.
done.
lokesh@lokesh-VirtualBox:~$
```

sudo apt-get install openjdk-8-jdk

```
lokesh@lokesh-VirtualBox: ~
lokesh@lokesh-VirtualBox:~$ sudo apt-get install openjdk-8-jdk
[sudo] password for lokesh:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libice-dev libpthread-stubs0-dev libsm-dev libx11-dev libx11-doc libxau-dev
  libxcb1-dev libxdmcp-dev libxt-dev openjdk-8-jdk-headless x11proto-core-dev
  x11proto-input-dev x11proto-kb-dev xorg-sgml-doctools xtrans-dev
Suggested packages:
  libice-doc libsm-doc libxcb-doc libxt-doc openjdk-8-demo openjdk-8-source
  visualvm
The following NEW packages will be installed:
  libice-dev libpthread-stubs0-dev libsm-dev libx11-dev libx11-doc libxau-dev
  libxcb1-dev libxdmcp-dev libxt-dev openjdk-8-jdk openjdk-8-jdk-headless
  x11proto-core-dev x11proto-input-dev x11proto-kb-dev xorg-sgml-doctools
  xtrans-dev
0 upgraded, 16 newly installed, 0 to remove and 260 not upgraded.
Need to get 13.2 MB of archives.
After this operation, 59.5 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu xenial/main amd64 xorg-sgml-doctools a
ll 1:1.11-1 [12.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 x11proto-cor
```

```
lokesh@lokesh-VirtualBox: ~
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/xjc to provide
/usr/bin/xjc (xjc) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/rmic to provide
 /usr/bin/rmic (rmic) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jstatd to provi
de /usr/bin/jstatd (jstatd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jdb to provide
/usr/bin/jdb (jdb) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/serialver to pr
ovide /usr/bin/serialver (serialver) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/wsgen to provid
e /usr/bin/wsgen (wsgen) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jcmd to provide
 /usr/bin/jcmd (jcmd) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jarsigner to pr
ovide /usr/bin/jarsigner (jarsigner) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jmap to provide
 /usr/bin/jmap (jmap) in auto mode
Setting up openjdk-8-jdk:amd64 (8u222-b10-1ubuntu1~16.04.1) ...
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/appletviewer to
 provide /usr/bin/appletviewer (appletviewer) in auto mode
update-alternatives: using /usr/lib/jvm/java-8-openjdk-amd64/bin/jconsole to pro
vide /usr/bin/jconsole (jconsole) in auto mode
lokesh@lokesh-VirtualBox:~$
```

java -version

```
lokesh@lokesh-VirtualBox: ~
lokesh@lokesh-VirtualBox:~$ java -version
openjdk version "1.8.0_222"
OpenJDK Runtime Environment (build 1.8.0_222-8u222-b10-1ubuntu1~16.04.1-b10)
OpenJDK 64-Bit Server VM (build 25.222-b10, mixed mode)
lokesh@lokesh-VirtualBox:~$
```

Result :

Virtual machine has been created with the given configurations and a Java program is executed.

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Assignment -4 : Remote Login into a VM

Assigned Date : **Due Date :**

I. Create two VMs and install **Ubuntu 16.04 server** for amd64 architecture. Name them as VM1 & VM2.

Install **openssh-server** while installing OS.

In VM2, install JDK.

Remote login with password

i. Set network configurations and ping both VMs

ii. **In VM1 : ssh <usernameVM2>@<IP_Address_VM2>**

II. iii. It will ask password of VM2. Provide password of VM2.

iv. Login into VM2

III. **Remote login without password**

i. Set network configurations and ping both VMs

ii. **Do the following in VM1:**

a. Create ssh-keypair using the command]$ **ssh-keygen –t rsa**

b. It generates id_rsa and id_rsa.pub keys.

c. Change permission for id_rsa.pub as 700.

d. Copy id_rsa.pub to authorized_keys.

e. Copy authorized_keys / id_rsa.pub into VM2 using the command

]$ **ssh-copy-id <UsernameVM2>@<IP_Address_VM2>**

It will ask password of VM2. Provide password of VM2.

f. Remote login into VM2 from VM1

]$ **ssh <usernameVM2>@<IP_Address_VM2>**

This should not prompt you for a password. It should login into VM2.

Do the following in VM

In VM1: After you remotely login to VM2, execute a Java program. Exit from VM2 in VM1

In VM2: Remotely login to VM1 and install JDK. Execute Java Program. Exit from VM1 in VM2.

Ex No. 4
Date : 12-07-19

Remote Login Using SSH

Aim:

To login in to a remote VM using SSH server.

Procedure:

Pre Requisite: Install Virtualbox

1. Install two VMs with Ubuntu server amd64 architecture.Also,install Open SSH while installation.
2. After installation of the server,generate and share public key.

Installing ssh server

sudo apt-get insatll openssh-server

```
lokesh-vm1@lokeshvm1-VirtualBox: ~
lokesh-vm1@lokeshvm1-VirtualBox:~$ sudo apt-get install openssh-server
[sudo] password for lokesh-vm1:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-client openssh-sftp-server ssh-import-id
Suggested packages:
  ssh-askpass libpam-ssh keychain monkeysphere rssh molly-guard
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
The following packages will be upgraded:
  openssh-client
1 upgraded, 4 newly installed, 0 to remove and 690 not upgraded.
Need to get 1,223 kB of archives.
After this operation, 5,146 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openssh-clie
nt amd64 1:7.2p2-4ubuntu2.8 [590 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu xenial/main amd64 ncurses-term all 6.0
+20160213-1ubuntu1 [249 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openssh-sftp
-server amd64 1:7.2p2-4ubuntu2.8 [38.9 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openssh-serv
```

```
lokesh-vm1@lokeshvm1-VirtualBox: ~
Processing triggers for systemd (229-4ubuntu7) ...
Processing triggers for ureadahead (0.100.0-19) ...
Processing triggers for ufw (0.35-0ubuntu2) ...
Setting up openssh-client (1:7.2p2-4ubuntu2.8) ...
Setting up ncurses-term (6.0+20160213-1ubuntu1) ...
Setting up openssh-sftp-server (1:7.2p2-4ubuntu2.8) ...
Setting up openssh-server (1:7.2p2-4ubuntu2.8) ...
Creating SSH2 RSA key; this may take some time ...
2048 SHA256:SnTv7Yll2Oq0pwPEAxBCj9VdxhReW6VrS0yiZIpyGSw root@lokeshvm1-VirtualBo
x (RSA)
Creating SSH2 DSA key; this may take some time ...
1024 SHA256:QLrnUIpCEZfazKUUXrHOcvkRunLl0enRDZsQ7eaXrxA root@lokeshvm1-VirtualBo
x (DSA)
Creating SSH2 ECDSA key; this may take some time ...
256 SHA256:pF/rrxWV3it7wmegmblvp5+8dDgmQgCWVepew++2VMg root@lokeshvm1-VirtualBox
 (ECDSA)
Creating SSH2 ED25519 key; this may take some time ...
256 SHA256:8y5reDPTjo1Ptf1F6B6IALhkIcnzvKj7Ye1tBiwGMoY root@lokeshvm1-VirtualBox
 (ED25519)
Setting up ssh-import-id (5.5-0ubuntu1) ...
Processing triggers for systemd (229-4ubuntu7) ...
Processing triggers for ureadahead (0.100.0-19) ...
Processing triggers for ufw (0.35-0ubuntu2) ...
lokesh-vm1@lokeshvm1-VirtualBox:~$
```

1. Create Remote login without password

1.1 Generate a public key using **ssh-keygen -t rsa**
1.2 Change directory using **cd ~/.ssh**
1.3 Change permission for id_rsa.pub file using **chmod 700 id_rsa.pub**
1.4 Copy id_rsa.pub to authorized keys using **cp id_rsa.pub known_hosts**
1.5 Change to the previous directory using **cd **
1.6 Remote login using **ssh<username2>@<ipaddressvm2>**

```
lokesh_vm2@lokeshvm2-VirtualBox: ~
ssh: connect to host 10.6.15.168 port 22: No route to host
lokesh_vm1@lokeshvm1-VirtualBox:~$ clear

lokesh_vm1@lokeshvm1-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/lokesh_vm1/.ssh/id_rsa):
/home/lokesh_vm1/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/lokesh_vm1/.ssh/id_rsa.
Your public key has been saved in /home/lokesh_vm1/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:0q/HuV9M5t8q/k1xPER+zynpN/FS+ZUE4Lo5w96m7tU lokesh_vm1@lokeshvm1-VirtualB
ox
The key's randomart image is:
+---[RSA 2048]----+
|            ... . |
|           .   +  |
|            .   +.|
|        .  .   +o*|
|       . S.   ooBB|
|        ...o o=..O|
|          B.o E=o+|
|         ..O....=o|
|        +*+=ooo.+|
+----[SHA256]-----+
lokesh_vm1@lokeshvm1-VirtualBox:~$ cd ~/.ssh
lokesh_vm1@lokeshvm1-VirtualBox:~/.ssh$ ls
id_rsa  id_rsa.pub  known_hosts
lokesh_vm1@lokeshvm1-VirtualBox:~/.ssh$ chmod 700 id_rsa.pub
lokesh_vm1@lokeshvm1-VirtualBox:~/.ssh$ cp id_rsa.pub known_hosts
lokesh_vm1@lokeshvm1-VirtualBox:~/.ssh$ cd \
>
lokesh_vm1@lokeshvm1-VirtualBox:~$ ssh lokesh_vm2@10.6.15.168
The authenticity of host '10.6.15.168 (10.6.15.168)' can't be established.
ECDSA key fingerprint is SHA256:pr8Z2t8oBDs4YktF6lGTcBibH1YmeOwHHk+VzXFWHG8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.6.15.168' (ECDSA) to the list of known hosts.
lokesh_vm2@10.6.15.168's password:
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.10.0-28-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

578 packages can be updated.
398 updates are security updates.

New release '18.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Mon Jul  8 14:29:26 2019 from 10.6.15.118
lokesh_vm2@lokeshvm2-VirtualBox:~$
```

2. Create Remote login with password

Remote login using **ssh<username2>@<ipaddressvm2>**

```
lokesh_vm1@lokeshvm1-VirtualBox: ~
lokesh-vm2@lokeshvm2-VirtualBox:~$ ssh lokesh_vm1@10.6.15.118
The authenticity of host '10.6.15.118 (10.6.15.118)' can't be established.
ECDSA key fingerprint is SHA256:FAEXlGnbeTL38SyxTIZTUiiAB7OOizspGqaqiN5kkro.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.6.15.118' (ECDSA) to the list of known hosts.
lokesh_vm1@10.6.15.118's password:
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.10.0-28-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

243 packages can be updated.
11 updates are security updates.

Last login: Mon Jul 15 15:10:48 2019 from 10.6.15.168
lokesh_vm1@lokeshvm1-VirtualBox:~$
```

Result :

SSH Server has been successfully installed and public key has been generated and shared and logged in remotely between VMs.

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Assignment -5 : File Transfer between Virtual Machines

Assigned Date : **Due Date :**

I. Creating a Virtual Machine (Hosted- Virtual Machine)

1. Install Virtual Box using Ubuntu as Host Operating System (64 bit processor architecture).
2. Create a Virtual Machine (VM) with 2GB RAM and 8 GB Hard Disk and install Ubuntu 16.04 server for amd64 architecture. Name the VM as UbuntuVM1. (If your physical machine has 4 GB RAM, the create VM with 1.5 GB RAM. If your physical machine has 2 GB RAM, the create VM with 1 GB RAM). Install openssh-server while installing Ubuntu16.04 server.

II. Creating another Virtual Machine (Hosted- Virtual Machine).

1. Install Virtual Box using Ubuntu as Host Operating System (64 bit processor architecture).
2. Create a Virtual Machine (VM) with 2GB RAM and 8 GB Hard Disk and install Ubuntu 16.04 server for amd64 architecture. Name the VM as UbuntuVM2. (If your physical machine has 4 GB RAM, the create VM with 1.5 GB RAM. If your physical machine has 2 GB RAM, the create VM with 1 GB RAM). Install openssh-server while installing Ubuntu16.04 server.

III. Establish Network between two VMs. Ping VM1 from VM2 and vice versa.

IV. Generate ssh public and private key pairs in VM1 & VM2

V. Exchange public keys between two VMs using scp command.

VI. File Transfer between VMs on same Host and different Hosts

1. Transfer File / Directory from VM1 to VM2 using Secure copy command (ssh & scp).
2. Transfer File / Directory from VM2 to VM1 using Secure copy command (ssh & scp). As well as transfer file from Host system to Guest system (VM1 or VM2).
3. Similarly transfer a file / multiple files / Directory from VM1 on one physical machine to VM1 on another physical machine.

Ex.No : 5 **File Transfer between VMs**
Date : 19.07.19

Aim:

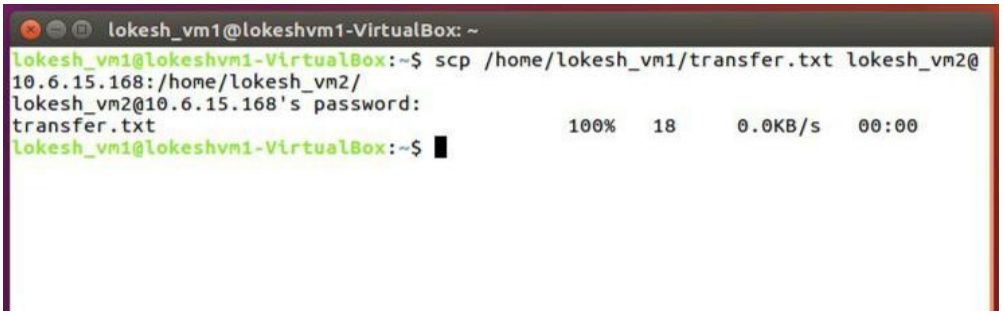
To transfer files and directories between Vms .

Procedure:

1. Transfer Files from vm1 to vm2

1.1 For sending below is the format

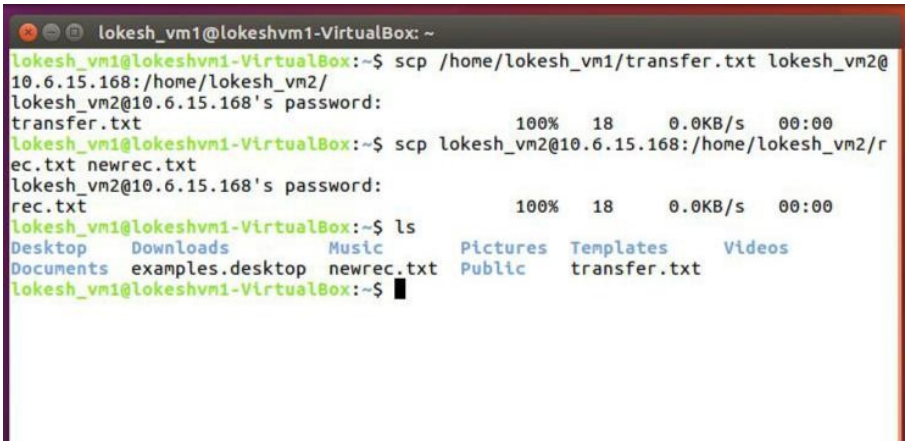
scp <source-file-path> username_vm2@ipaddress_vm2:<destination-path>



Transferred file seen in vm2

1.2 To receive file from vm2 at vm1 side

scp <username_vm2>@<ip_vm2>:<source-file-address> <newfilename>



1.3 Transfer of entire directory from vm1 to vm2

scp -r <source-directory-path><dest:path>

The transferred directory can be seen in vm2's side

Result:

Thus,file transfer between VMs has been done successfully.

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Assignment -6 : Private Cloud Setup using Eucalyptus

Assigned Date: **Due Date:**

I. Install Eucalyptus (Open Source software for Private Cloud) by configuring the below components.

- Cloud Controller (CLC) on VM1 with ubuntu-UEC-10.04-server-amd64
- Cluster Controller (CC) on VM1 with ubuntu-UEC-10.04-server-amd64
- Walrus on VM1 with ubuntu-UEC-10.04-server-amd64
- Storage Controller (SC) on VM1 with ubuntu-UEC-10.04-server-amd64
- Node Controller (NC) on VM2 with ubuntu-UEC-10.04-server-amd64
- Client to access Cloud components on VM3 with ubuntu-16.04.1-desktop-amd64

Follow the Eucalyptus Documentation in the below link.

https://help.ubuntu.com/community/UEC/CDInstall
https://help.ubuntu.com/community/UEC/PackageInstall

Follow below steps

1. Install Virtual Box.
2. Create two VMs as VM1 and VM2.
3. Configure network as DHCP and don't use Ethernet.
4. Use Bridged network along with DHCP. Ping and check correctness
5. Install Ubuntu 10.04 Server in both VMs
6. In VM1 install components like (Cloud controller, Cluster Controller, Walrus and Storage Controller)
7. In VM2 install Node controller.
8. In VM3 Web Interface, login as https://<cloud-ip>:8443

   Username: admin

   Password: admin

Check all the resources available.

In Client Ubuntu-Desktop, do the following.

1. https://<cloud-controller-ip-address>:8443/
2. Use username 'admin' and password 'admin' for the first time login (you will be prompted to change your password).
3. Then follow the on-screen instructions to update the admin password and email address.
4. Once the first time configuration process is completed, click the 'credentials' tab located in the top-left portion of the screen.
5. Click the 'Download Credentials' button to get your certificates
6. Save them to ~/.euca
7. Unzip the downloaded zip file into a safe location (~/.euca)

   ]$ unzip -d ~/.euca mycreds.zip

9. On Cloud controller run the following command

]$ sudo start uec-component-listener
Alternatively, if you are on the command line of the Cloud Controller, you can run:

```
]$ mkdir -p ~/.euca
]$ chmod 700 ~/.euca
]$ cd ~/.euca
]$ sudo euca_conf --get-credentials mycreds.zip
]$ unzip mycreds.zip
]$ ln -s ~/.euca/eucarc ~/.eucarc
]$ cd -
```

10. **Source eucarc using the command]**$

]$ **source eucarc**

Or

]$. ~/.euca/eucarc

11. Install euca2ools in client machine.

Download euca2ools debian package for Ubuntu 16.04 Desktop amd64

https://ubuntu.pkgs.org/16.04/ubuntu-main-amd64/euca2ools_3.1.0-1_all.deb.html

```
]$ sudo apt-get update
] $ sudo apt-get install <euca2ools-package>
```

To Download euca2ools rpm package

https://docs.eucalyptus.com/eucalyptus/latest/#shared/installing_euca2ools_rhel.html To convert rpm to debian package to be executed in Ubuntu 16.04 Desktop
First install packages that will convert rpm packages to Debian
]$ sudo apt-get install alien dpkg-dev debhelper build-essential
Now convert package from RPM format to Deb format, use the following command. Change your packagename in command:

]$ sudo alien packagename.rpm
To install the deb package
]$ sudo dpkg -i packagename.deb
]$ sudo apt-get -f install

12. Execute euca commands for the following.

]$ euca-describe-images
]$ euca-describe-instances
]$ euca-describe-availability-zones
]$ euca-describe-keypairs

13. Creating Keypairs

]$ euca-add-keypair mykey | tee mykey.private

]$ chmod 0600 mykey.private

14. Using Block Storage

Creating a volume
To create a dynamic block volume, use "euca-create-volume."
For instance, to create a volume that is 1GB in size in the availability zone "myzone" you may use the following command,
]$ euca-create-volume --size 1 -z <cluster-name>

]$ euca-describe-volumes

Creating a snapshot
You may create an instantaneous snapshot of a volume. A volume could be attached and in use during a snapshot operation.
For example, to create a snapshot of the volume "vol-33534456" use the following command
]$ euca-create-snapshot vol-33534456

Deleting a volume:

]$ euca-delete-volume vol-33534456

15. Using Object Storage
How to use s3cmd with Eucalyptus for accessing Walrus
https://github.com/eucalyptus/eucalyptus/wiki/HowTo-use-s3cmd-with-Eucalyptus

16. Managing Images in Eucalyptus

Creating an Image, register in Eucalyptus and creating a VM instance from the image.

Download some mini version of linux iso image

https://ftp.yzu.edu.tw/Linux/kali-images/kali-2018.2/kali-linux-2018.2-amd64.iso

Registering image in Eucalyptus

https://cssoss.wordpress.com/2010/11/11/eucalyptus-beginner%E2%80%99s-guide-%E2%80%93-uec-10-10-eucalyptus-2-0-image-management/

Refer the Eucalyptus installation paper for working on it further.

17. Controlling eucalyptus services:

- **]$ sudo service eucalyptus** [start|stop|restart] (on the CLC/CC/SC/Walrus side)
- **]$ sudo service eucalyptus-nc** [start|stop|restart] (on the Node side)

18. Locations of some important files:

- **Log files:**
  - /var/log/eucalyptus
- **Configuration files:**
  - /etc/eucalyptus
- **Database:**
  - /var/lib/eucalyptus/db
- **Keys**
  - /var/lib/eucalyptus
  - /var/lib/eucalyptus/.ssh

Notes:

- Don't forget to source your ~/.euca/eucarc before running the client tools.

To download Ubuntu 10.10 server-uec for amd64

- http://cloud-images-archive.ubuntu.com/releases/maverick/release-20101007.1/ubuntu- 10.10-server-uec-amd64.tar.gz

Ubuntu 16.04 Images Download

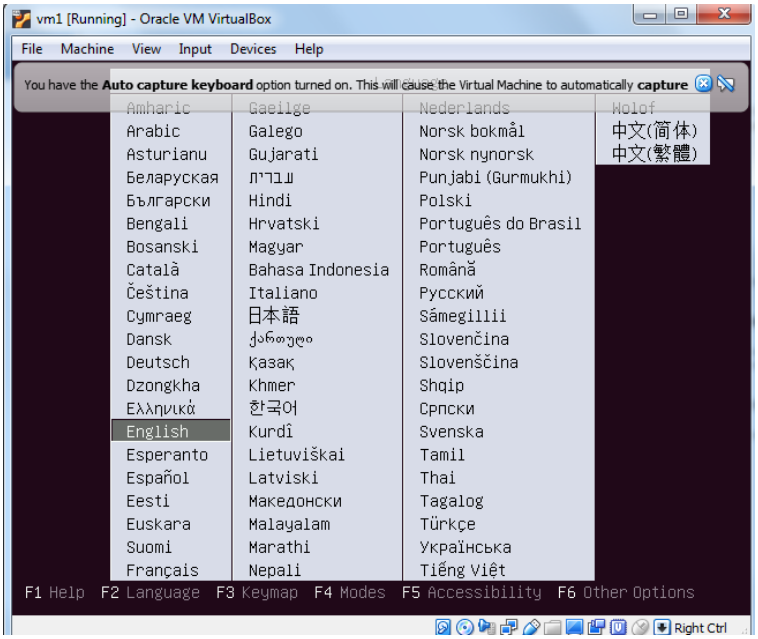
- http://uec-images.ubuntu.com/releases/16.04/release-20160420.3/

EX 6: PRIVATE CLOUD SETUP USING EUCALYPTUS

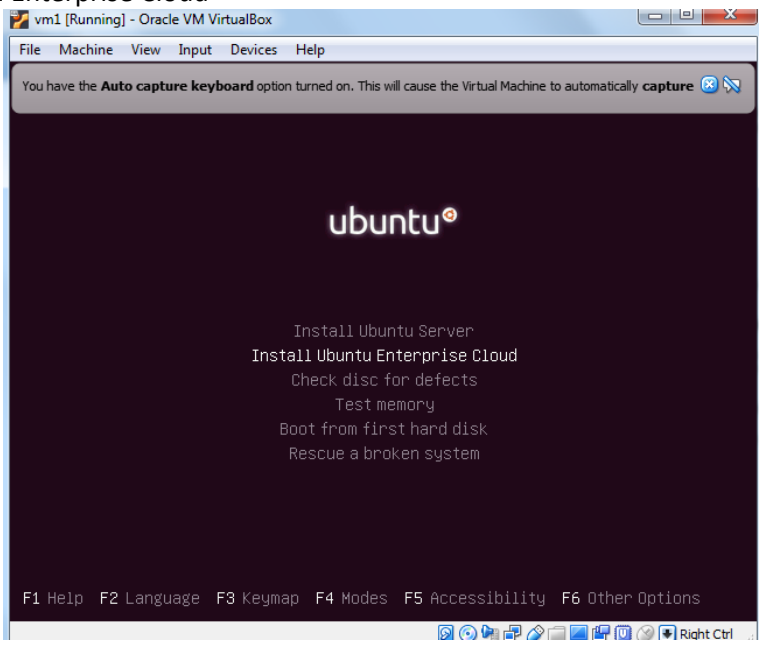
Aim: perform setting up of private cloud setup using eucalyptus

1. Install Virtual Box.
2. Create two VMs as VM1 and VM2.
3. Configure network as DHCP and don't use Ethernet.
4. Use Bridged network along with DHCP. Ping and check correctness
5. Install Ubuntu 10.04 Server in both VMs.

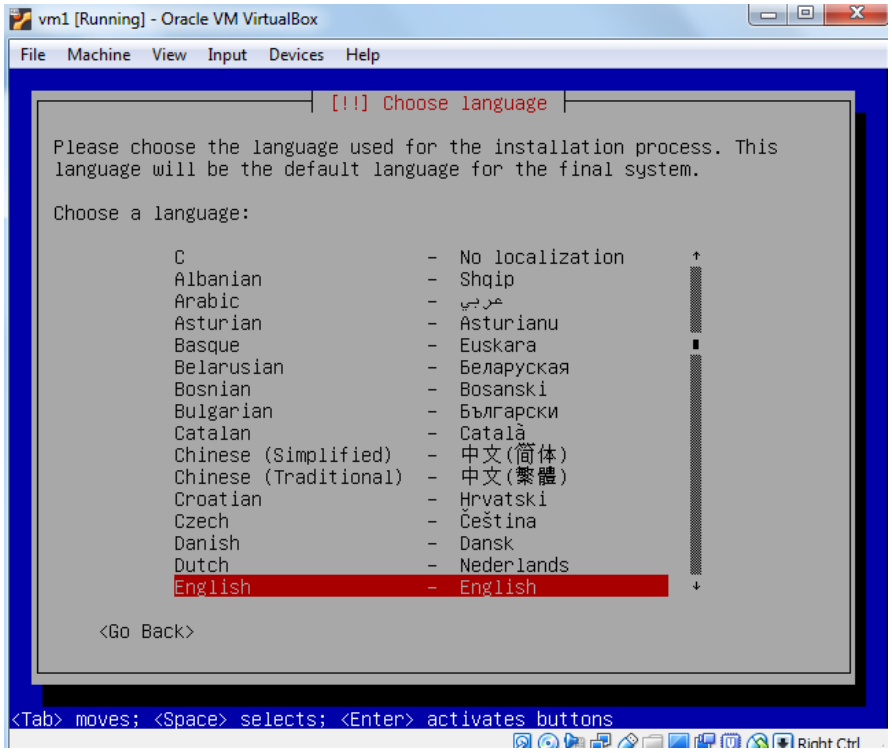
Select English



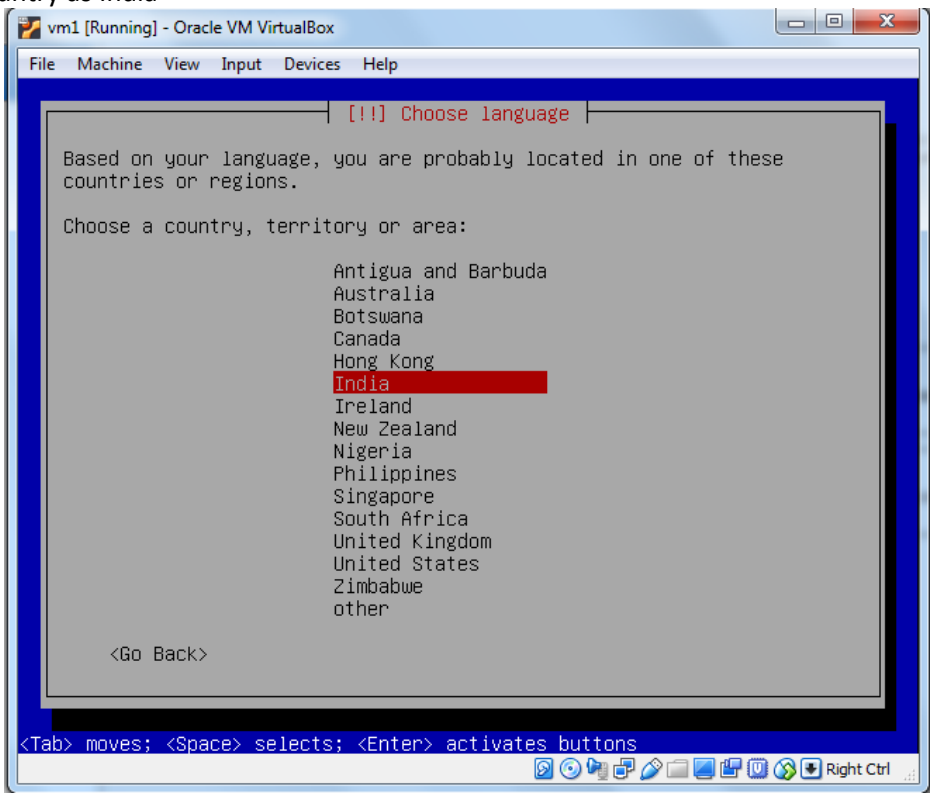
Select Install Ubuntu Enterprise Cloud



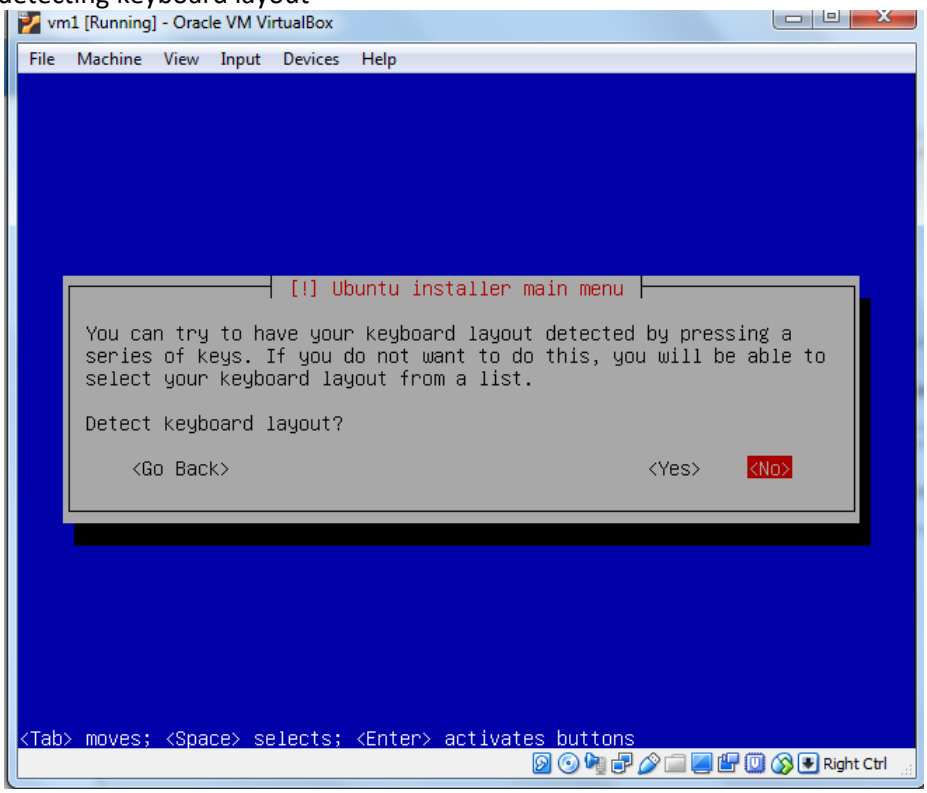
Select English



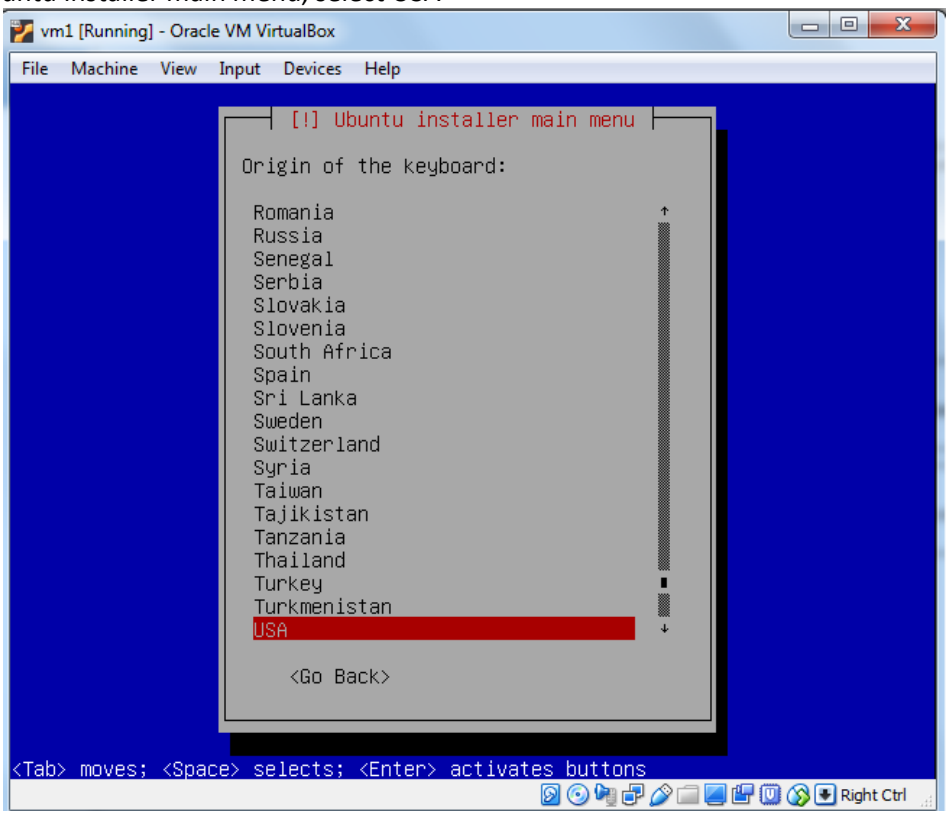
Select the country as India



Select no for detecting keyboard layout



From the Ubuntu installer main menu, select USA



vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!] Ubuntu installer main menu

There is more than one possible keyboard layout with the origin you selected. Please select the layout matching the keyboard for this machine.

Keyboard layout:

- USA
- USA - Alternative international (former us_intl)
- USA - Cherokee
- USA - Classic Dvorak
- USA - Colemak
- USA - Dvorak
- USA - Dvorak international
- USA - Group toggle on multiply/divide key
- USA - International (AltGr dead keys)
- USA - International (with dead keys)
- USA - Left handed Dvorak
- USA - Macintosh
- USA - Programmer Dvorak
- USA - Right handed Dvorak
- USA - Russian phonetic

<Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

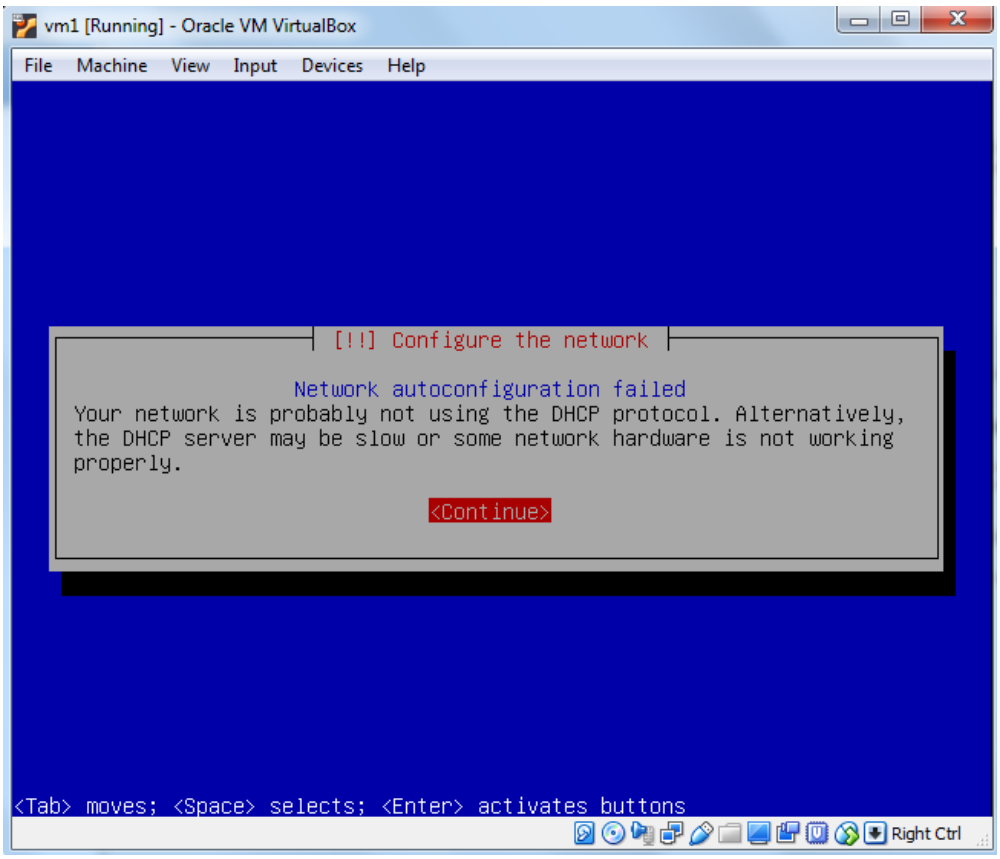
Configuring the network with DHCP

50%

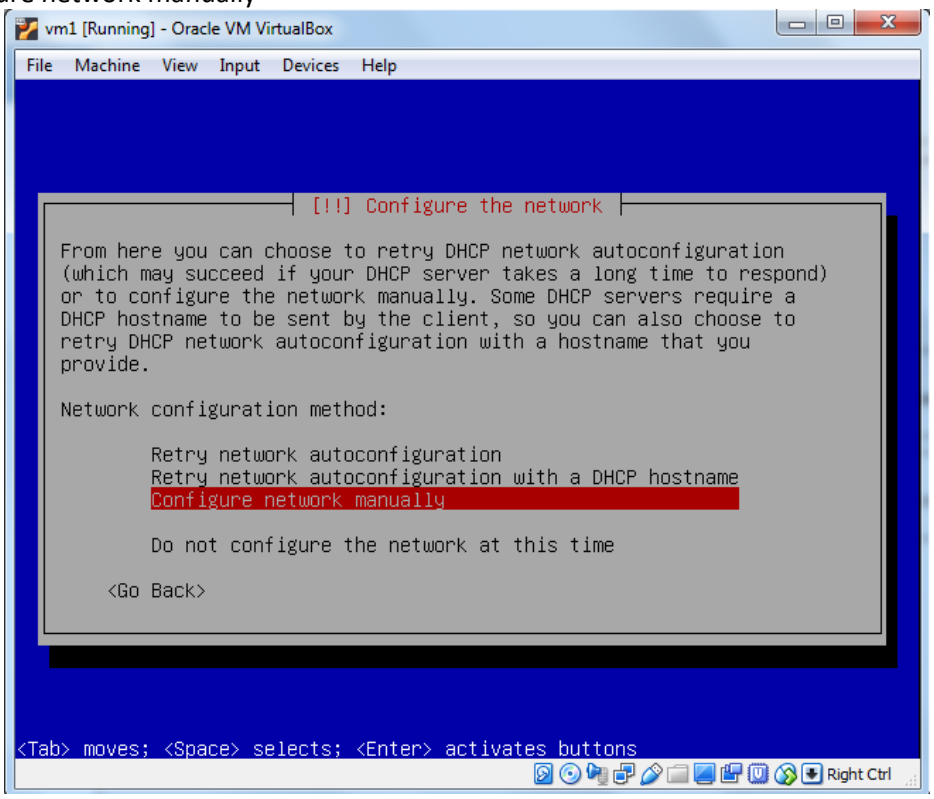
This may take some time.

<Cancel>

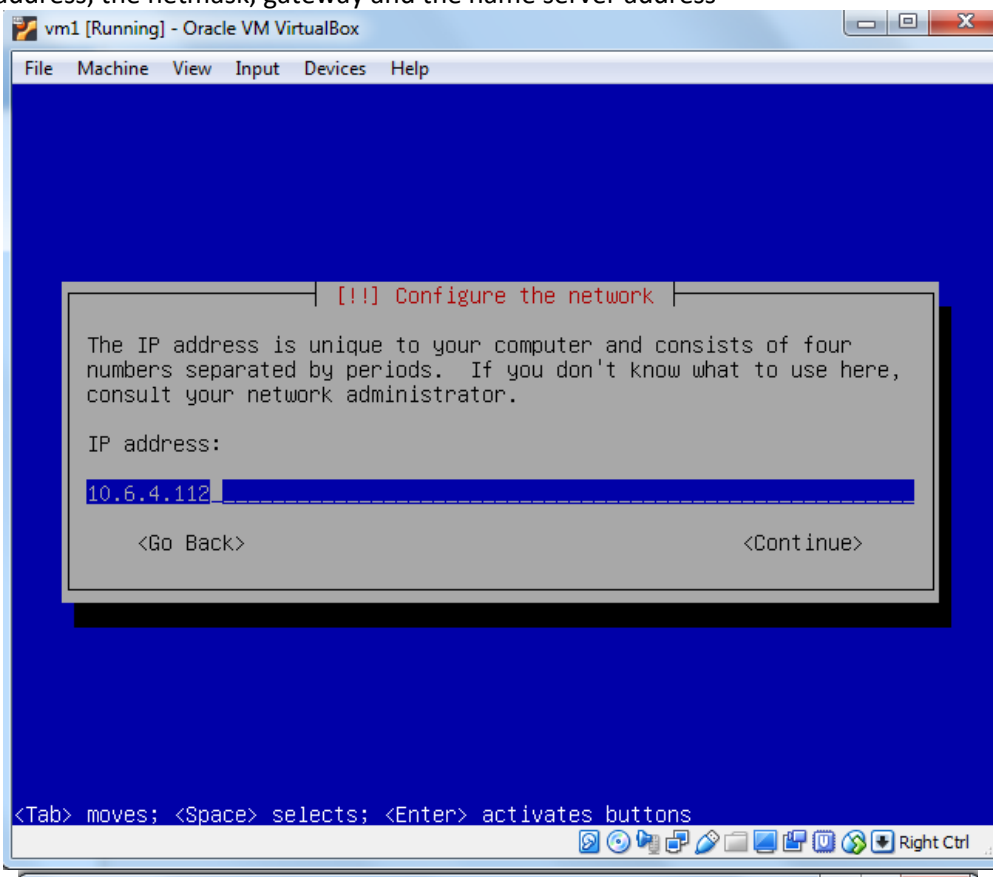
Right Ctrl

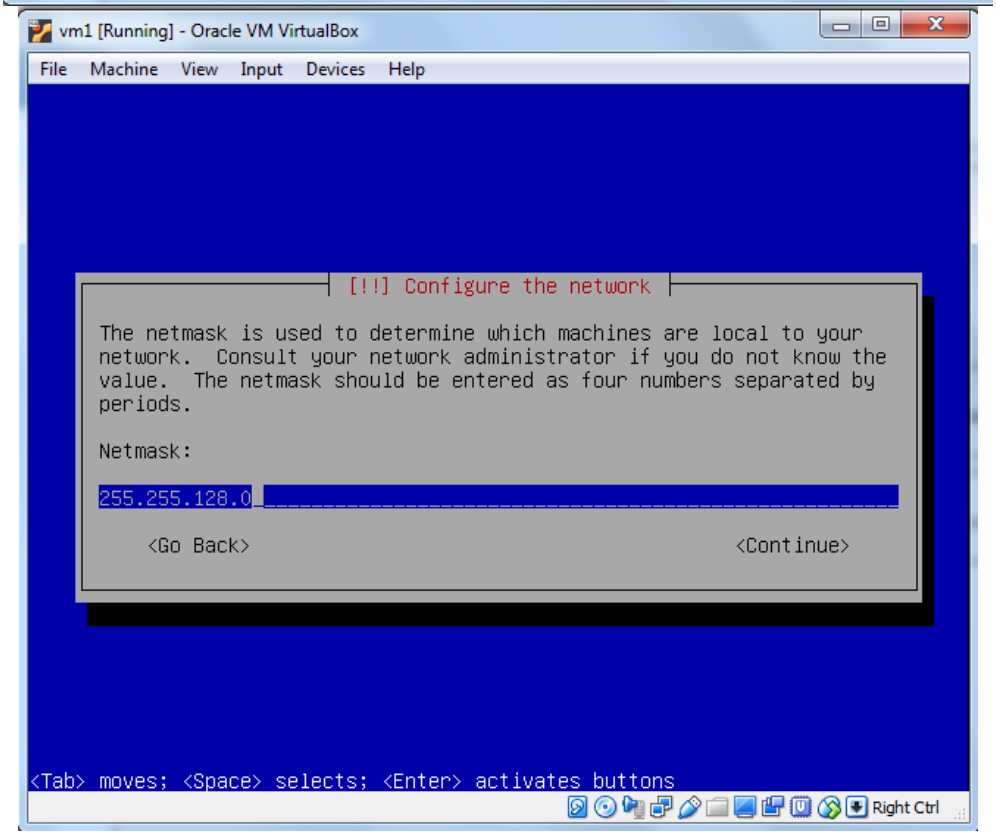


Select configure network manually



Set the IP address, the netmask, gateway and the name server address





vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!!] Configure the network

The gateway is an IP address (four numbers separated by periods) that indicates the gateway router, also known as the default router. All traffic that goes outside your LAN (for instance, to the Internet) is sent through this router. In rare circumstances, you may have no router; in that case, you can leave this blank. If you don't know the proper answer to this question, consult your network administrator.

Gateway:

10.6.0.1

<Go Back> <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!!] Configure the network

The name servers are used to look up host names on the network. Please enter the IP addresses (not host names) of up to 3 name servers, separated by spaces. Do not use commas. The first name server in the list will be the first to be queried. If you don't want to use any name server, just leave this field blank.

Name server addresses:

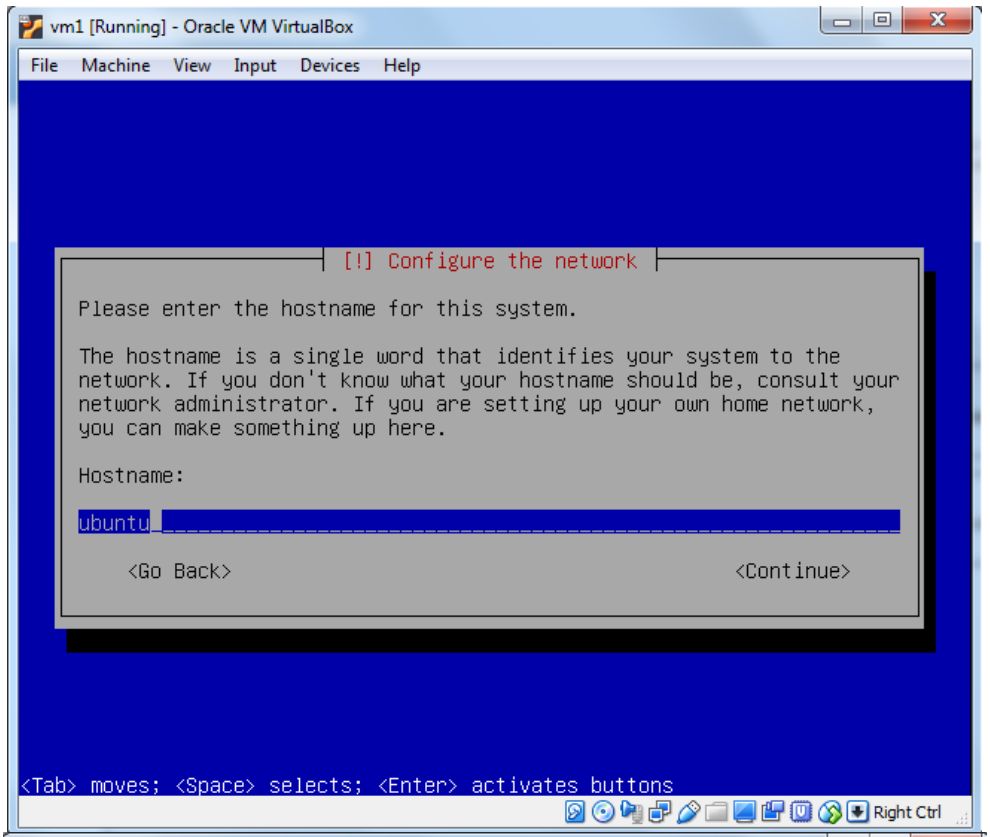
10.101.1.10

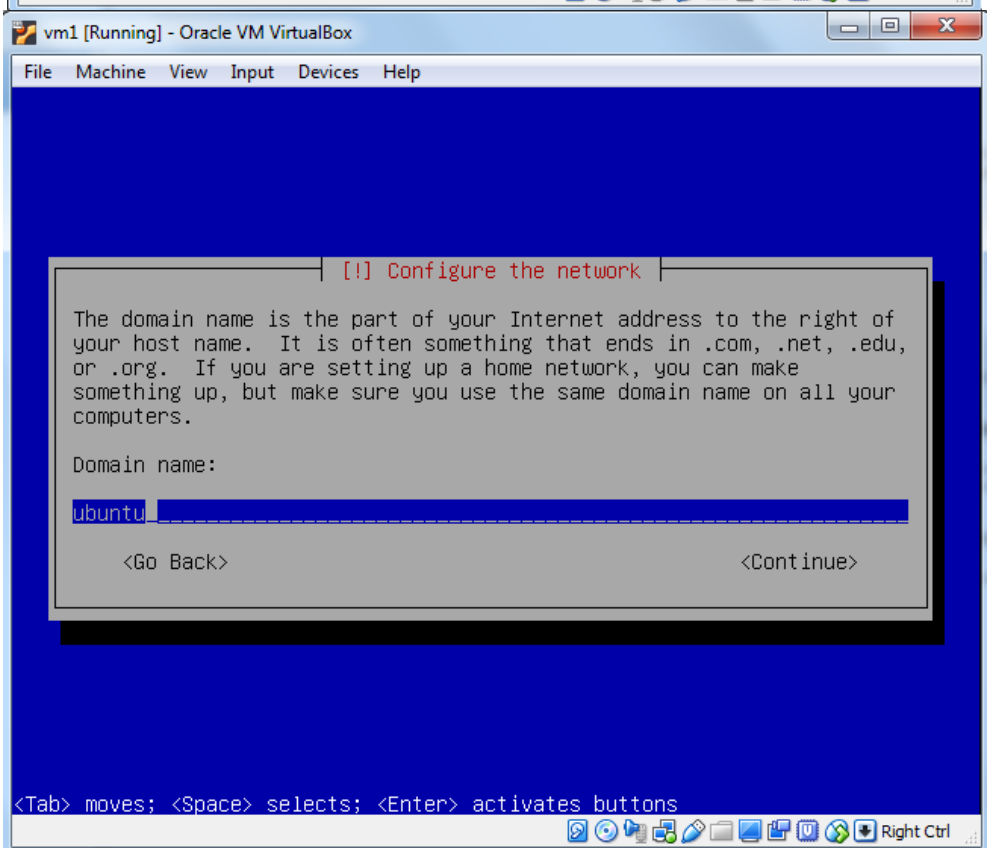
<Go Back> <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons

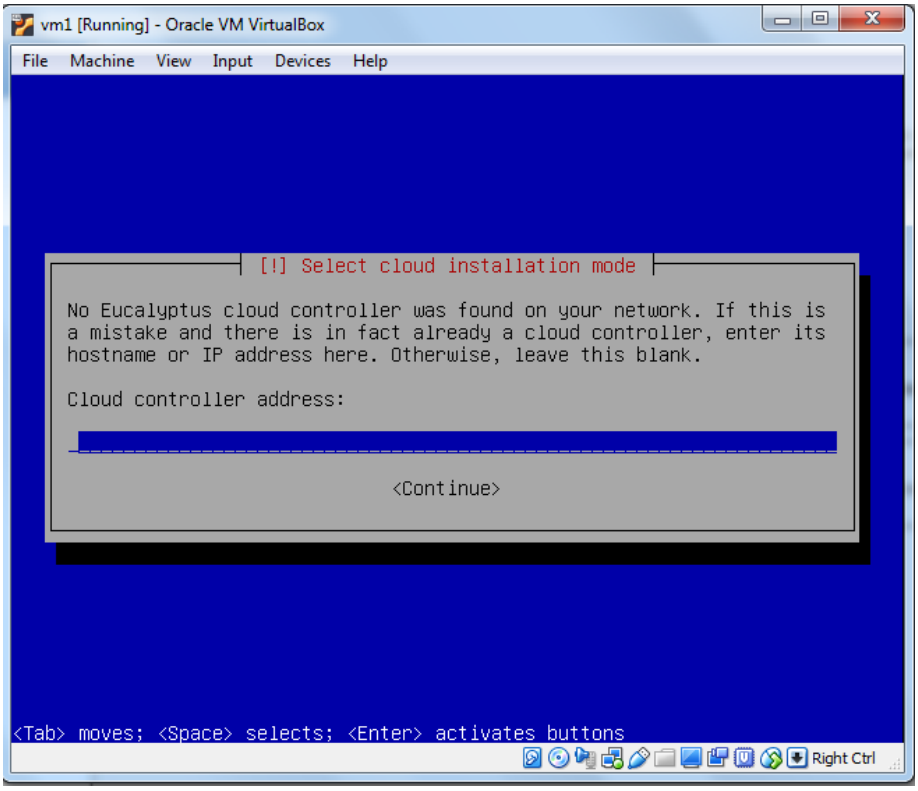
Right Ctrl

Set the hostname and the domain name as Ubuntu

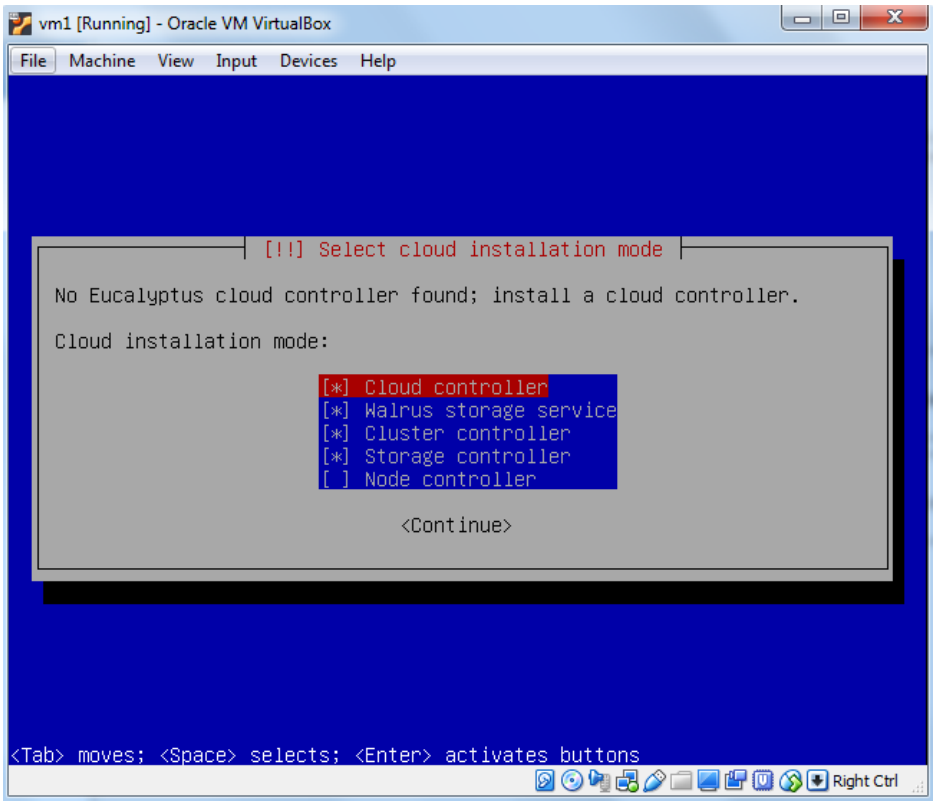




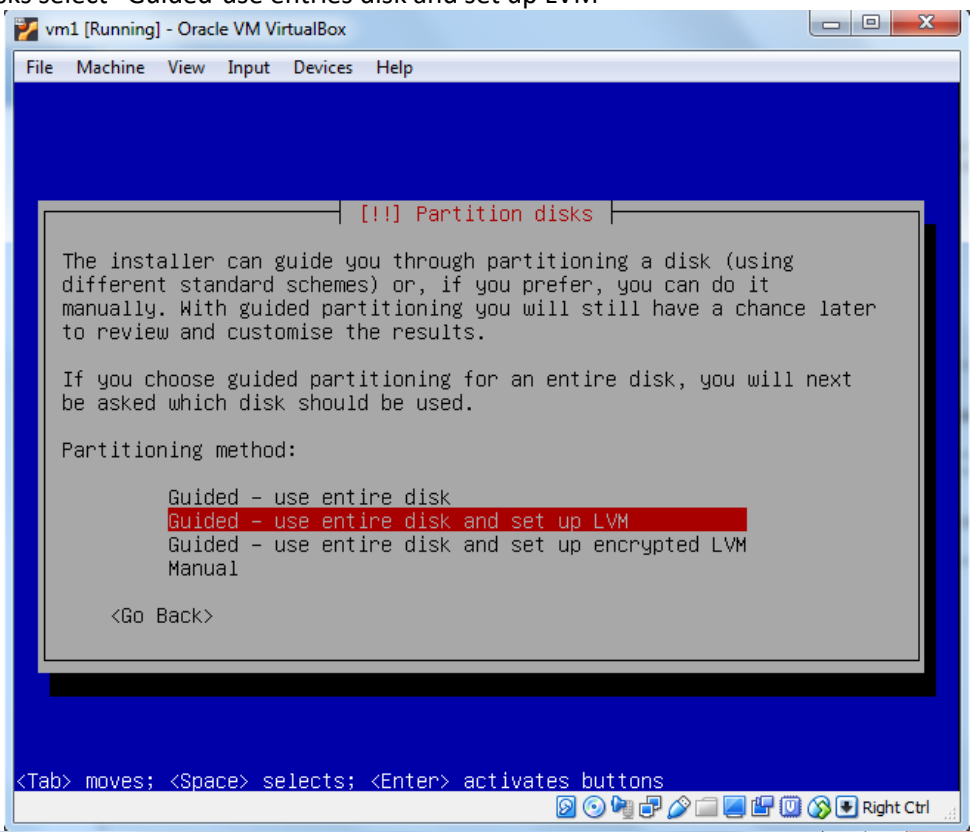
Leave the cloud controller address blank

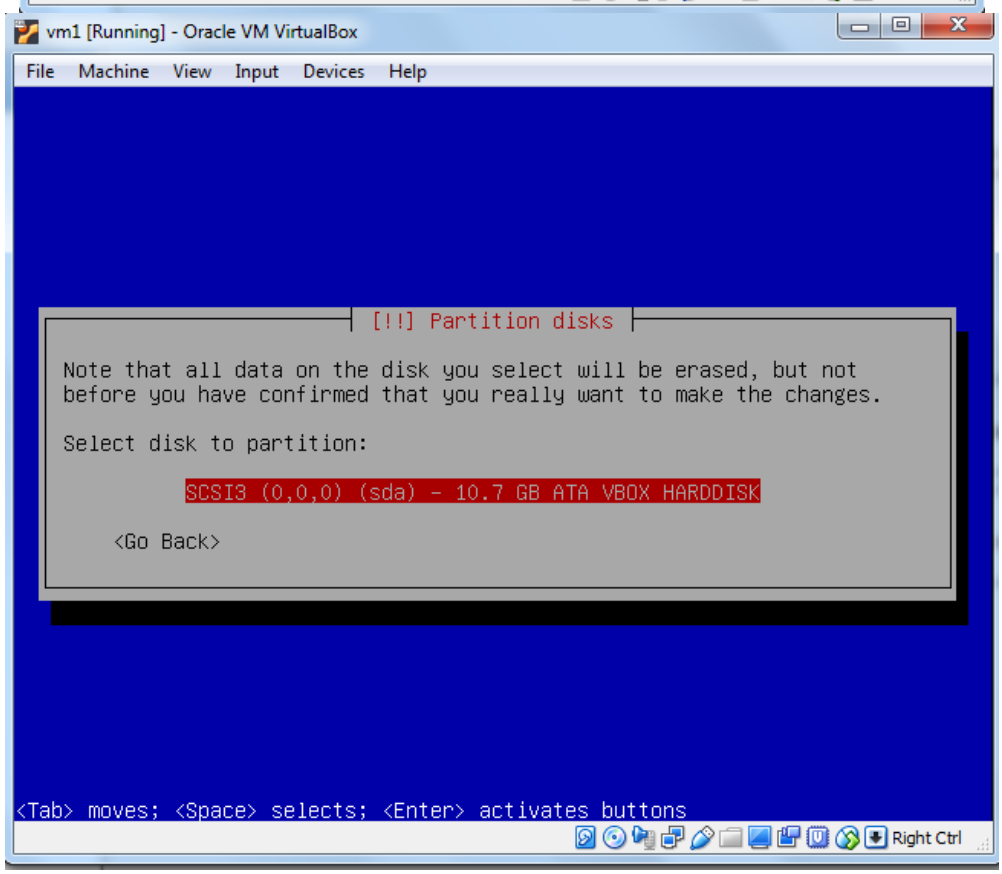


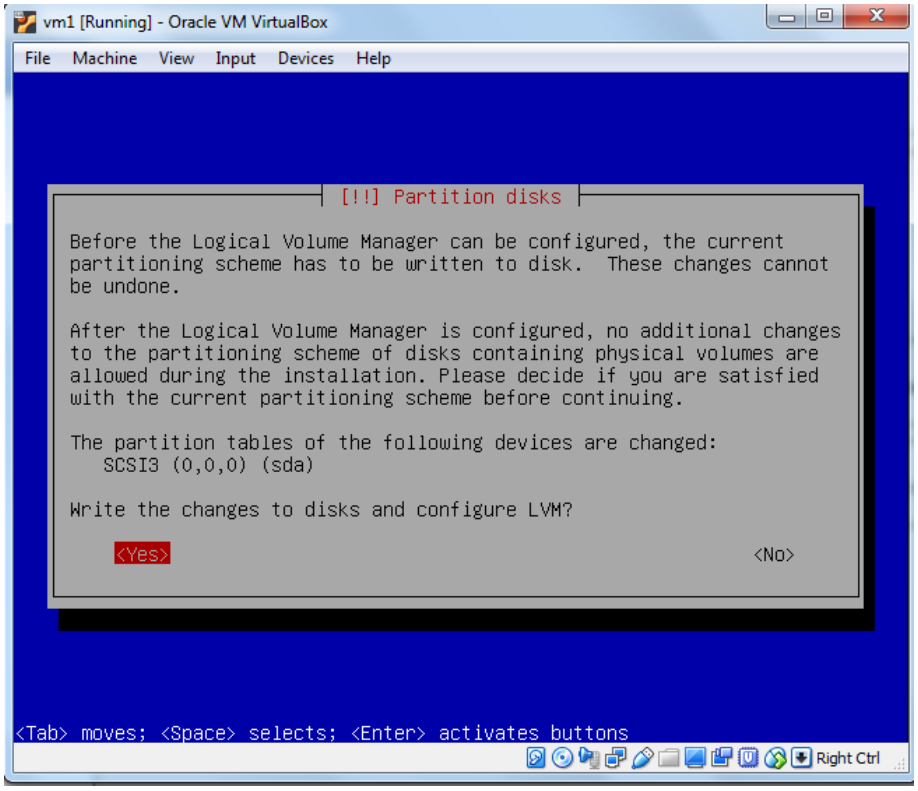
Install cloud controller



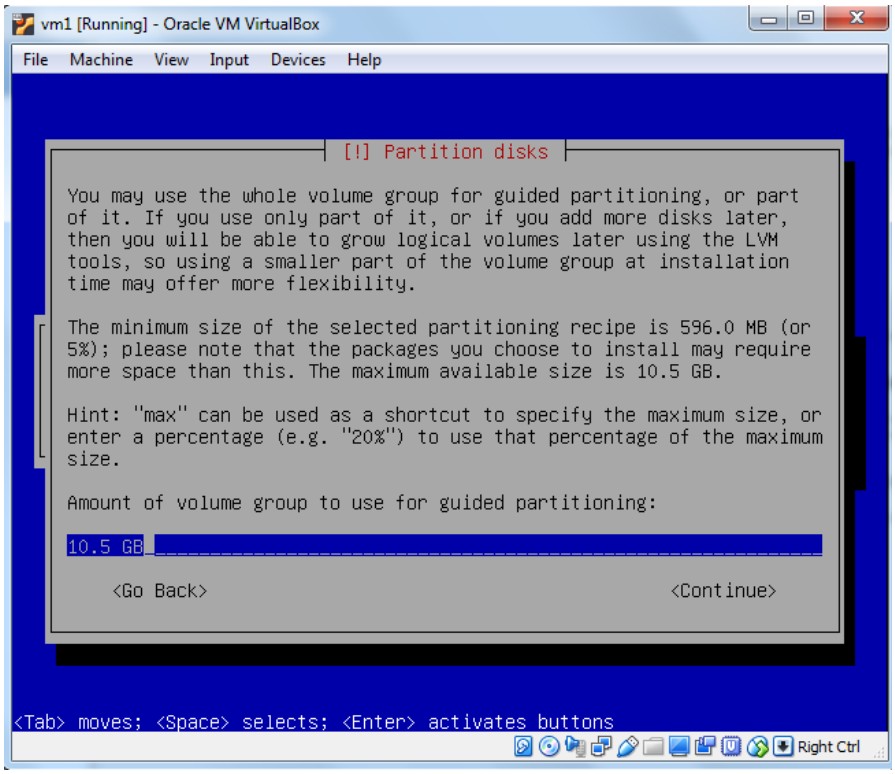
Partition disks select “Guided-use entries disk and set up LVM“







Give the amount of volume as 10.5GB



vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!!] Partition disks

If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually.

The partition tables of the following devices are changed:
LVM VG ubuntu, LV root
LVM VG ubuntu, LV swap_1
SCSI3 (0,0,0) (sda)

The following partitions are going to be formatted:
LVM VG ubuntu, LV root as ext4
LVM VG ubuntu, LV swap_1 as swap
partition #1 of SCSI3 (0,0,0) (sda) as ext2

Write the changes to disks?

<Yes> <No>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!!] Set up users and passwords

A user account will be created for you to use instead of the root account for non-administrative activities.

Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.

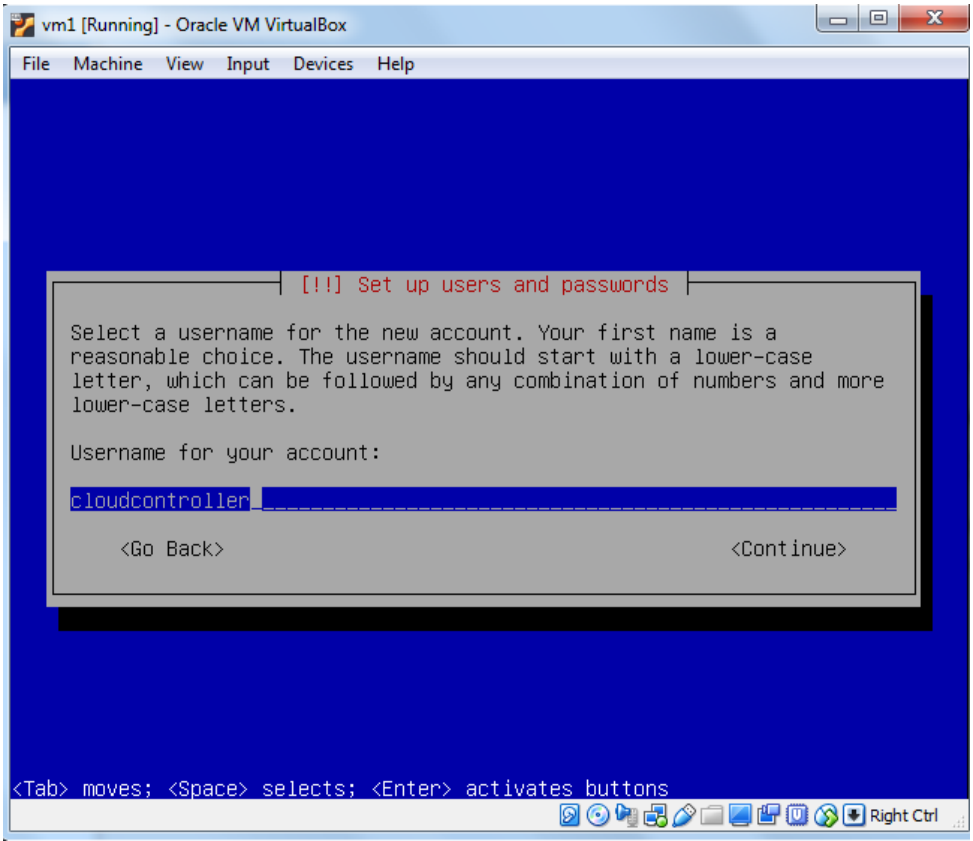
Full name for the new user:

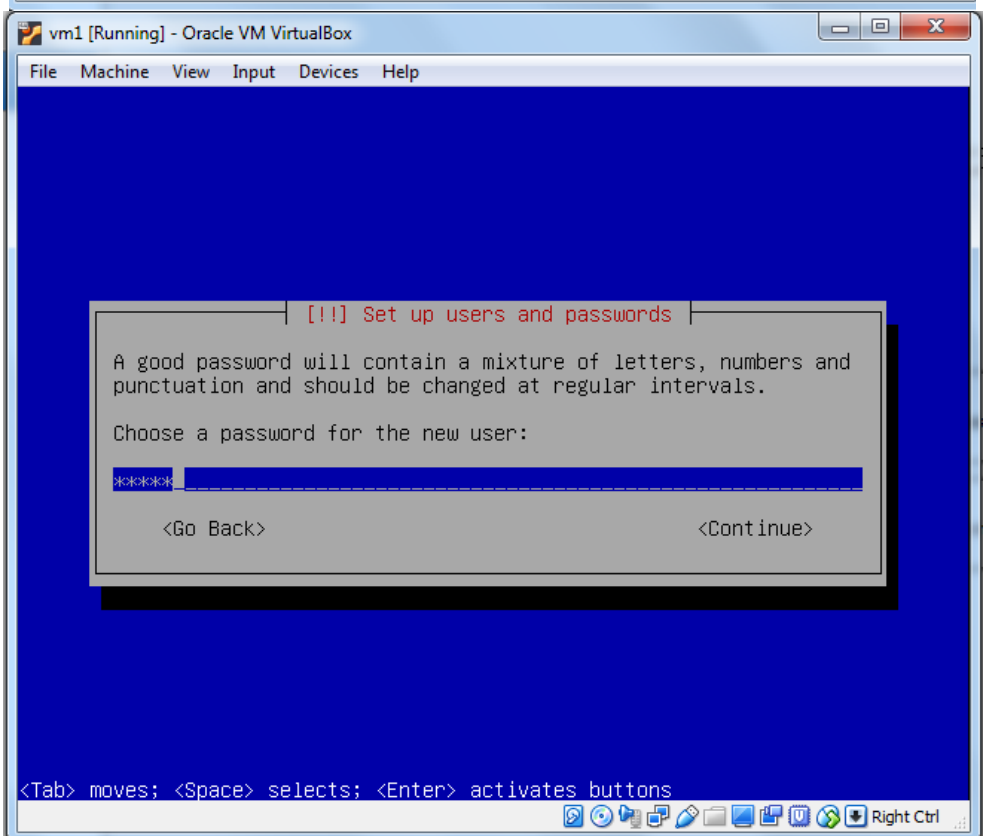
cloudcontroller

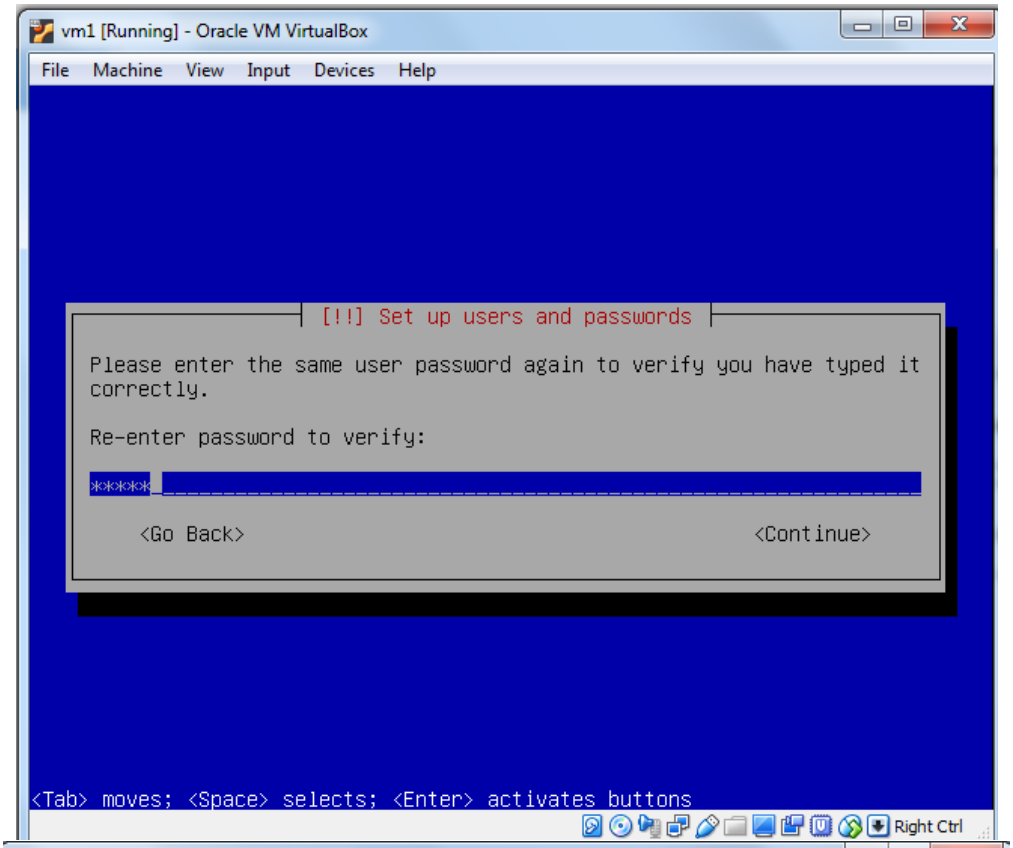
<Go Back> <Continue>

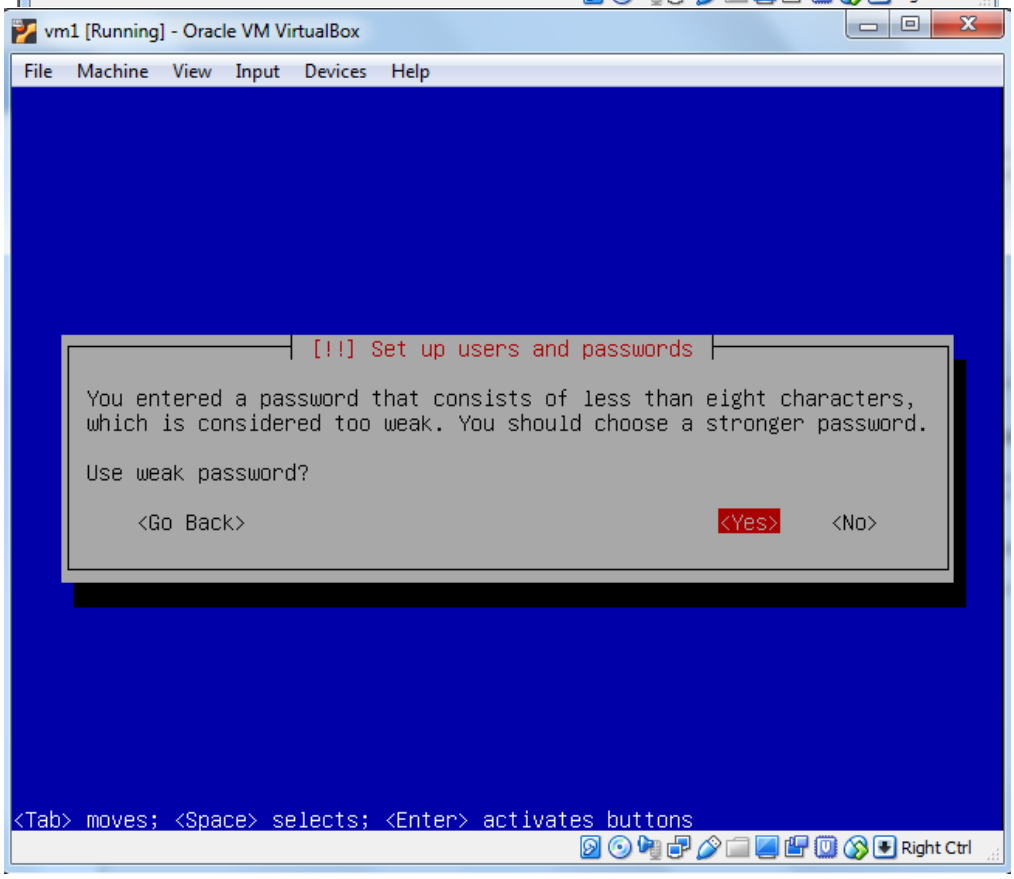
<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.
Username for your account:
cloudcontroller
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.
Choose a password for the new user:
*****
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
Please enter the same user password again to verify you have typed it correctly.
Re-enter password to verify:
******
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
You entered a password that consists of less than eight characters, which is considered too weak. You should choose a stronger password.
Use weak password?
<Go Back>
<Yes>
<No>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!] Set up users and passwords

You may configure your home directory for encryption, such that any files stored there remain private even if your computer is stolen.

The system will seamlessly mount your encrypted home directory each time you login and automatically unmount when you log out of all active sessions.

Encrypt your home directory?

<Go Back> <Yes> <No>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!] Configure the package manager

If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.

The proxy information should be given in the standard form of "http://[[user][:pass]@]host[:port]/".

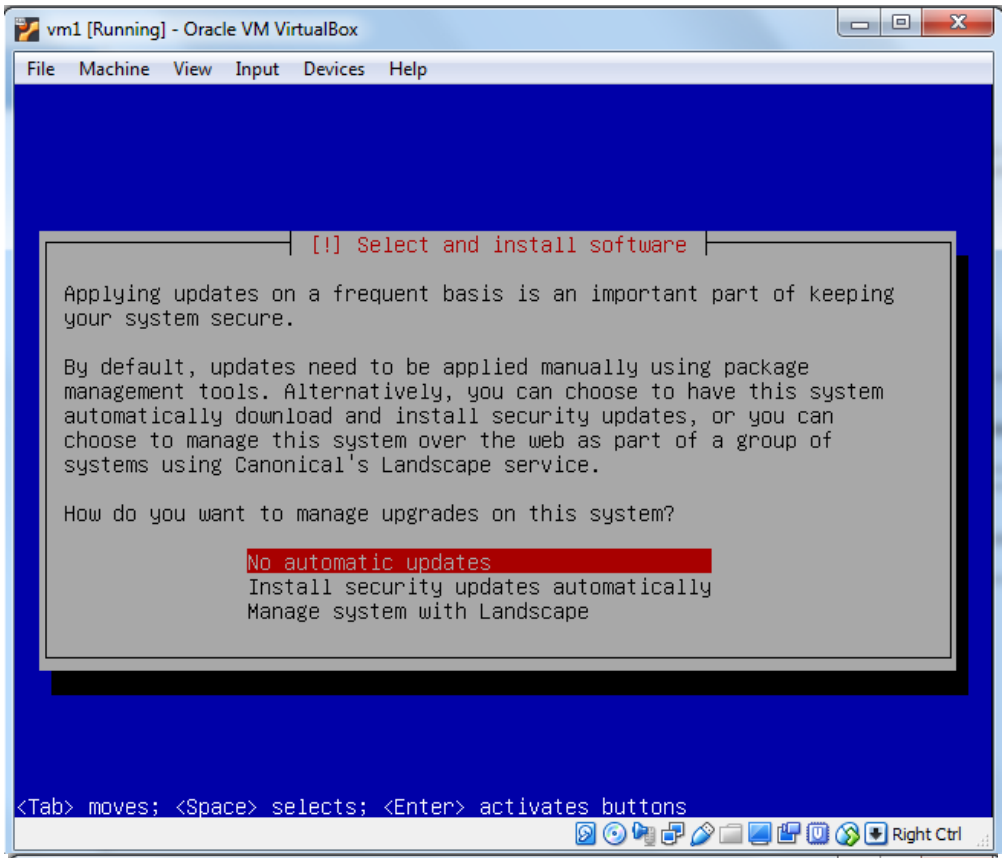
HTTP proxy information (blank for none):

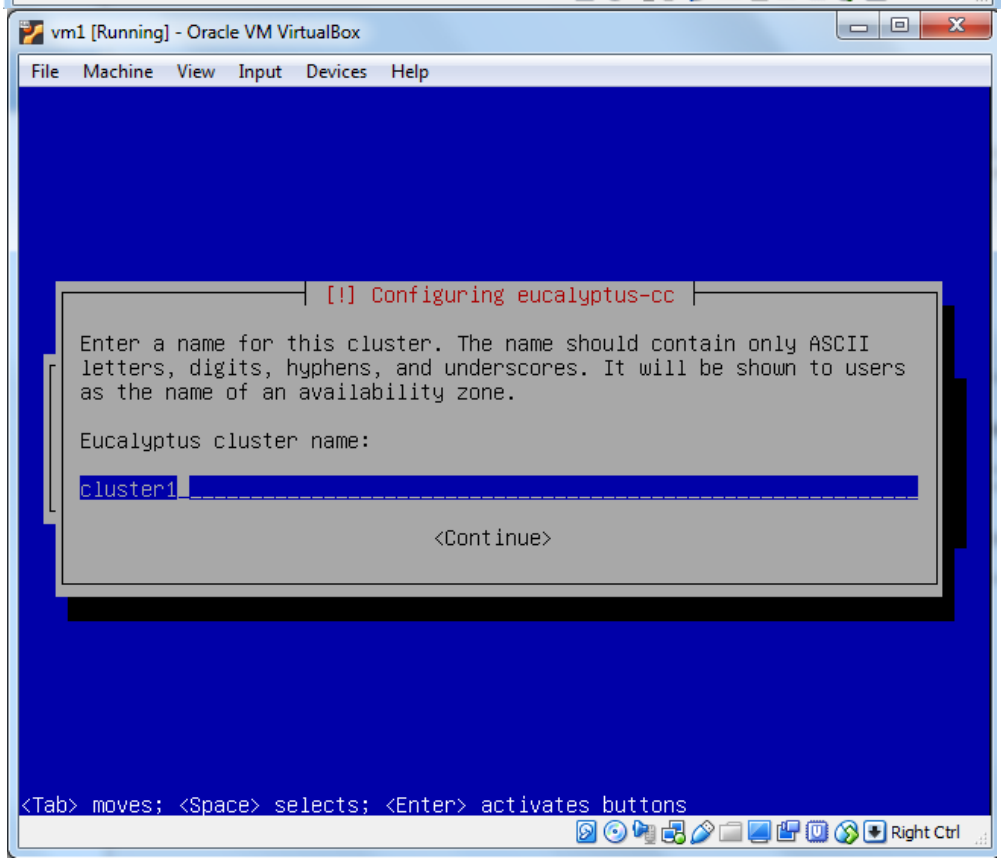
http://proxy.ssn.net:8080

<Go Back> <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Select and install software
Applying updates on a frequent basis is an important part of keeping your system secure.
By default, updates need to be applied manually using package management tools. Alternatively, you can choose to have this system automatically download and install security updates, or you can choose to manage this system over the web as part of a group of systems using Canonical's Landscape service.
How do you want to manage upgrades on this system?
No automatic updates
Install security updates automatically
Manage system with Landscape
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Configuring eucalyptus-cc
Enter a name for this cluster. The name should contain only ASCII letters, digits, hyphens, and underscores. It will be shown to users as the name of an availability zone.
Eucalyptus cluster name:
cluster1
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!] Configuring eucalyptus-cc

Eucalyptus requires a pool of IP addresses that can be dynamically assigned as the "public" IPs of virtual machines. These IPs must be unused within their Class C subnet, this system must have an interface configured with an address on this subnet, and your prospective users must be able to connect to these IPs from wherever they run the client tools.

Please specify one or more ranges of IP addresses, e.g.:
 192.168.1.100-192.168.1.199
or
 192.168.2.50-192.168.2.99 192.168.2.150-192.168.2.199

You may leave this blank if you have no IP addresses available, BUT you and your users must then request the private addressing scheme when starting a virtual machine instance. For ec2-run-instances and euca-run-instances, this is done with the option "--addressing private".

<Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

[!] Postfix Configuration

The "mail name" is the domain name used to "qualify" _ALL_ mail addresses without a domain name. This includes mail to and from <root>: please do not make your machine send out mail from root@example.org unless root@example.org has told you to.

This name will also be used by other programs. It should be the single, fully qualified domain name (FQDN).

Thus, if a mail address on the local host is foo@example.org, the correct value for this option would be example.org.

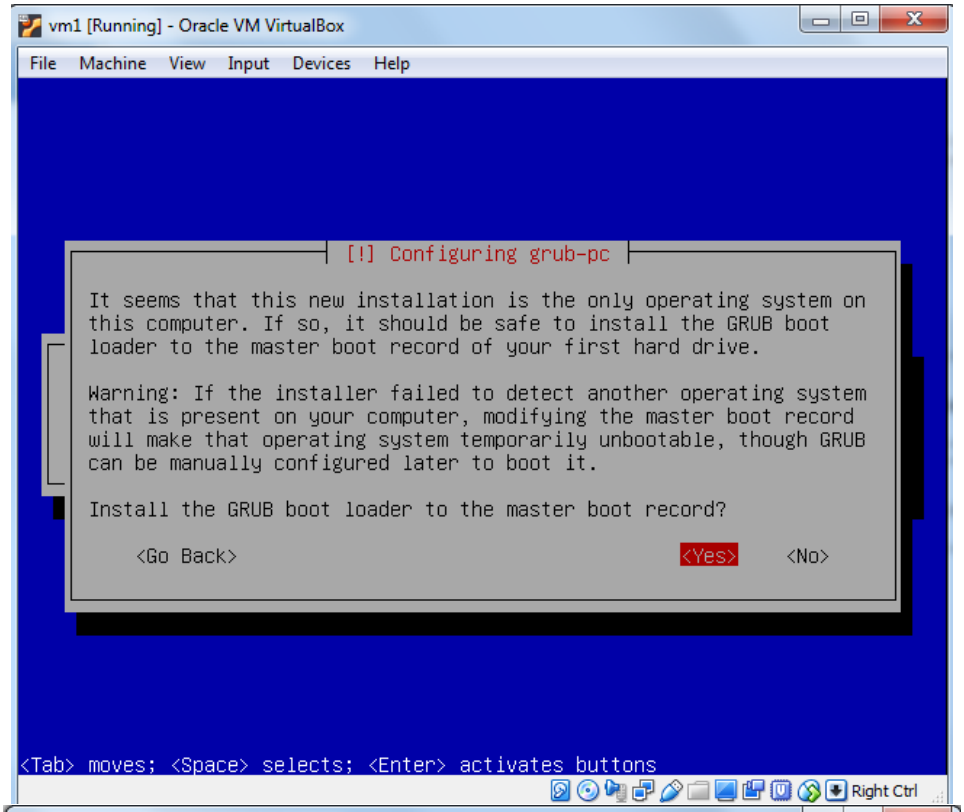
System mail name:

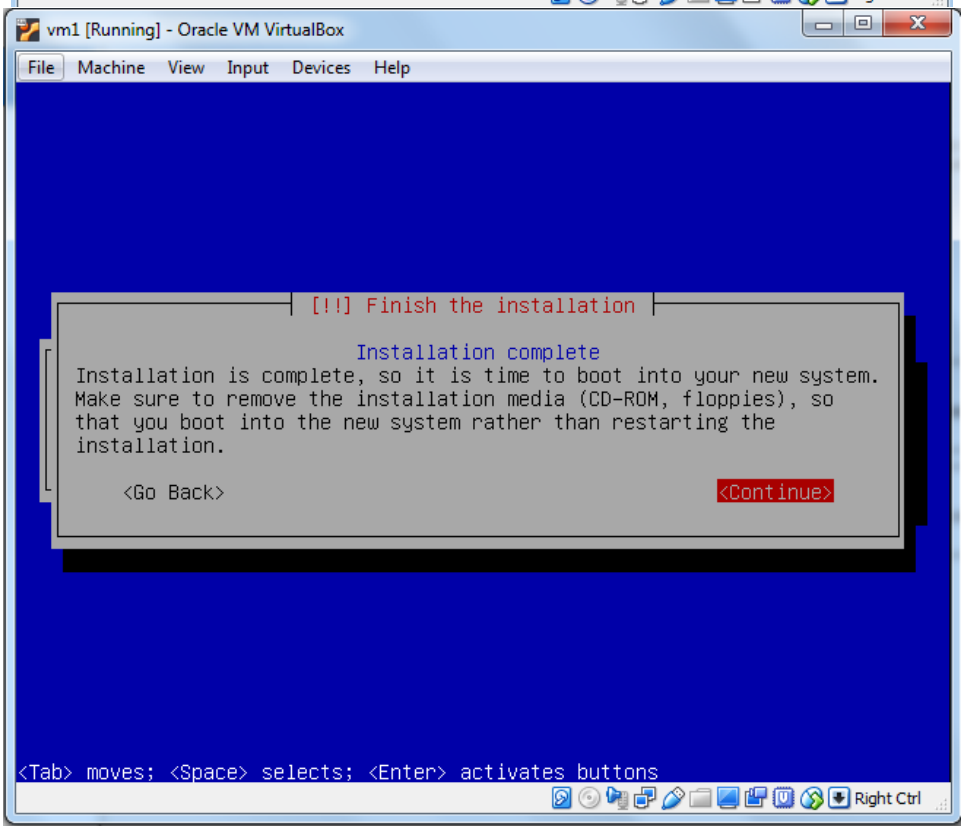
ubuntu.ubuntu

<Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons

Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Configuring grub-pc
It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to the master boot record of your first hard drive.
Warning: If the installer failed to detect another operating system that is present on your computer, modifying the master boot record will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it.
Install the GRUB boot loader to the master boot record?
<Go Back>
<Yes>
<No>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Finish the installation
Installation complete
Installation is complete, so it is time to boot into your new system. Make sure to remove the installation media (CD-ROM, floppies), so that you boot into the new system rather than restarting the installation.
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

vm1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
Ubuntu 10.04.4 LTS ubuntu tty1

ubuntu login: cloudcontroller
Password:
Linux ubuntu 2.6.32-38-server #83-Ubuntu SMP Wed Jan 4 11:26:59 UTC 2012 x86_64
GNU/Linux
Ubuntu 10.04.4 LTS

Welcome to the Ubuntu Server!
 * Documentation:  http://www.ubuntu.com/server/doc

 System information disabled due to load higher than 1.0

0 packages can be updated.
0 updates are security updates.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

cloudcontroller@ubuntu:~$ _
```

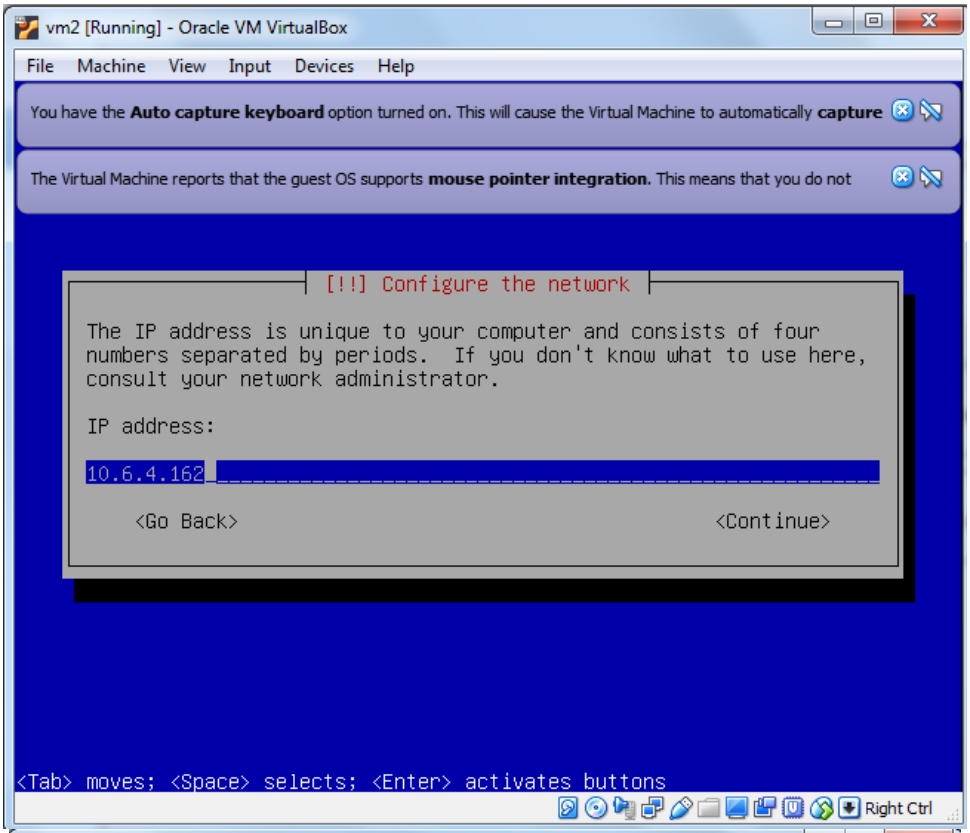
Right Ctrl

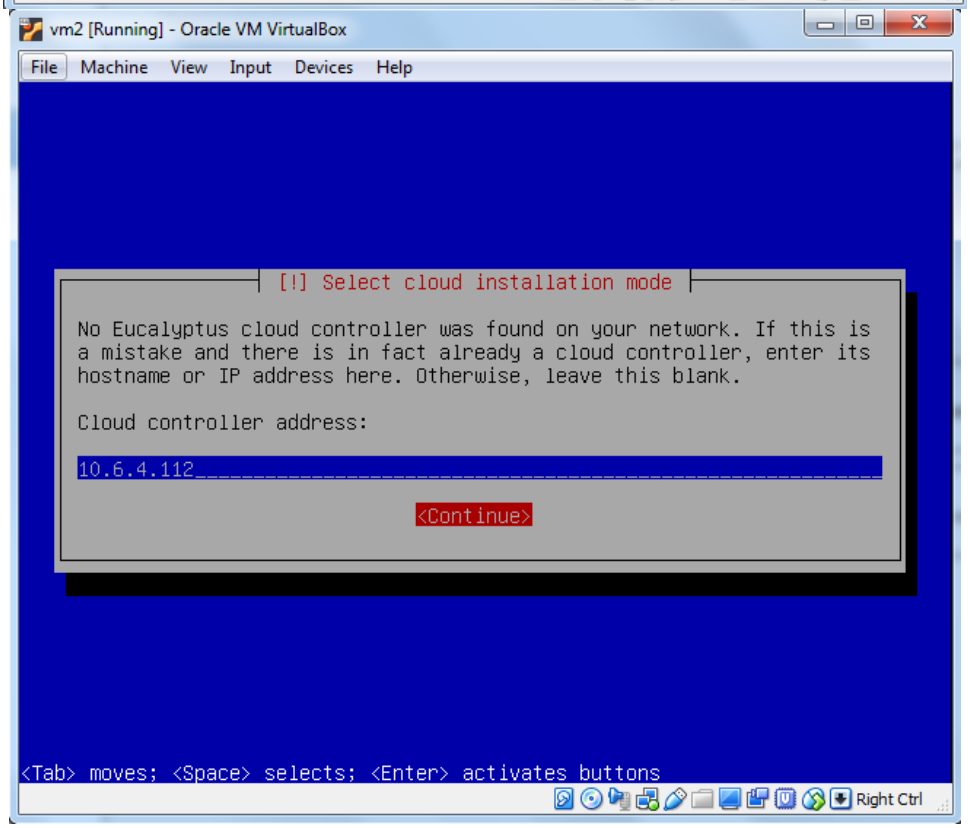
vm1 [Running] - Oracle VM VirtualBox

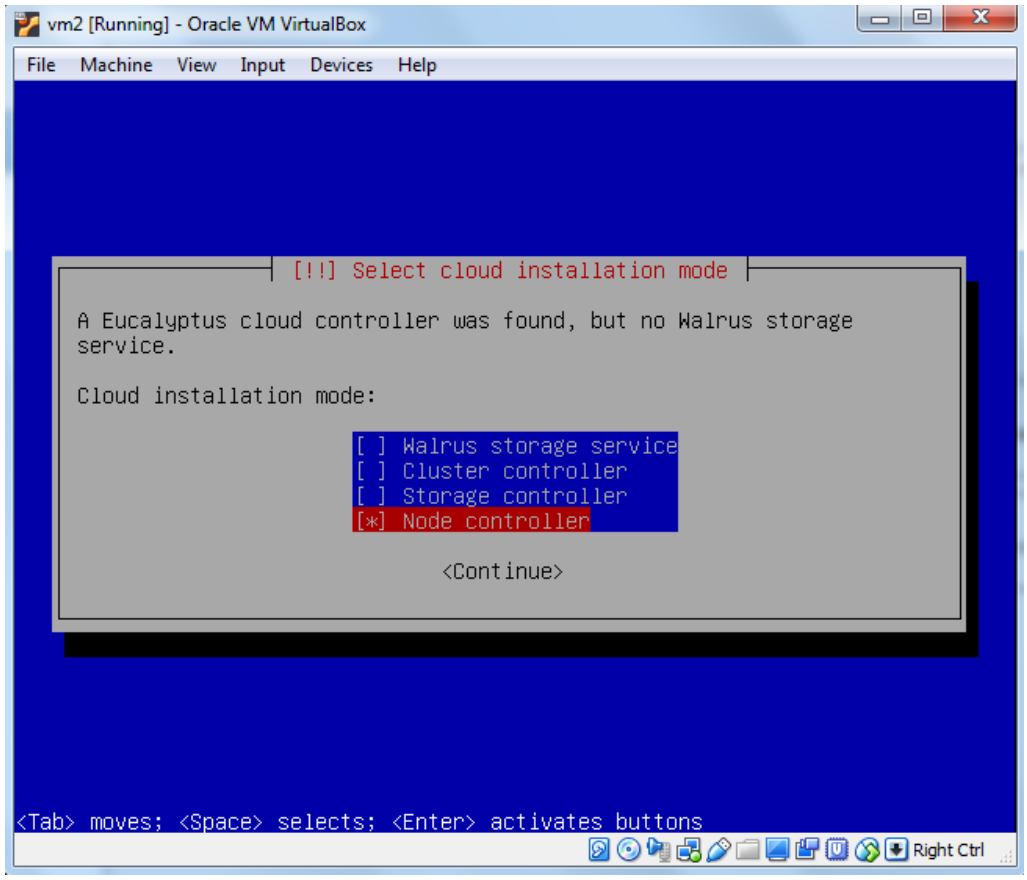
File Machine View Input Devices Help

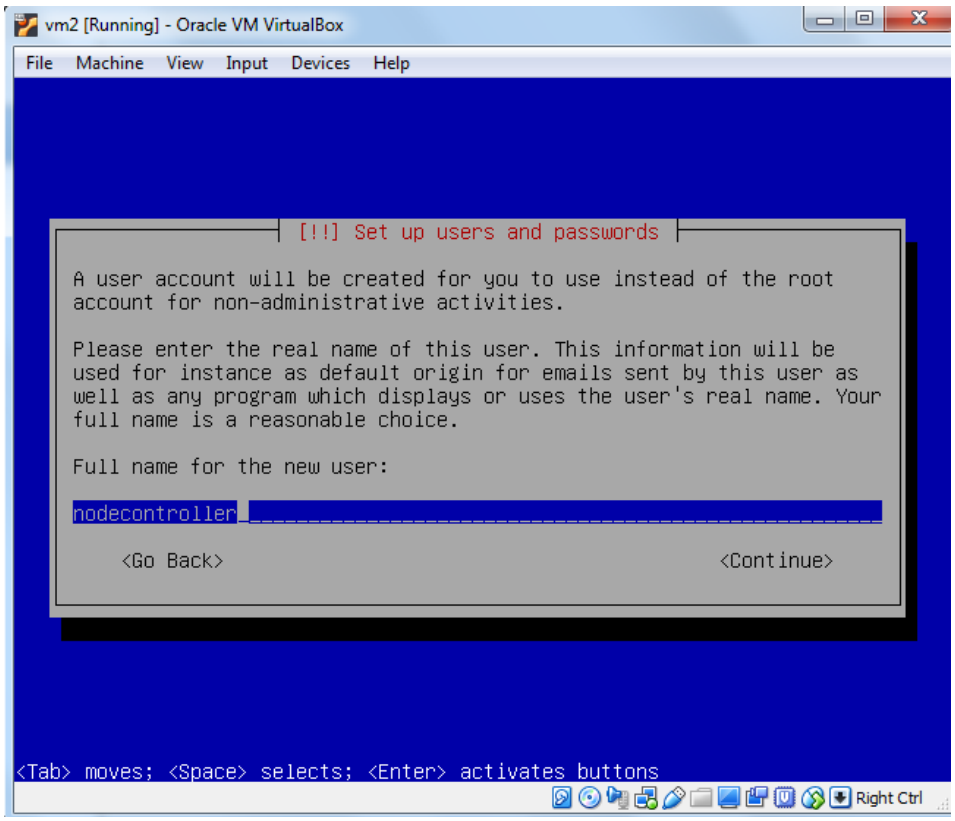
```
Ubuntu 10.04.4 LTS ubuntu tty1

ubuntu login: cloudcontroller
Password:
Linux ubuntu 2.6.32-38-server #83-Ubuntu SMP Wed Jan 4 11:26:59 UTC 2012 x86_64
GNU/Linux
Ubuntu 10.04.4 LTS

Welcome to the Ubuntu Server!
 * Documentation:  http://www.ubuntu.com/server/doc

 System information disabled due to load higher than 1.0

0 packages can be updated.
0 updates are security updates.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

cloudcontroller@ubuntu:~$ sudo init 0
```

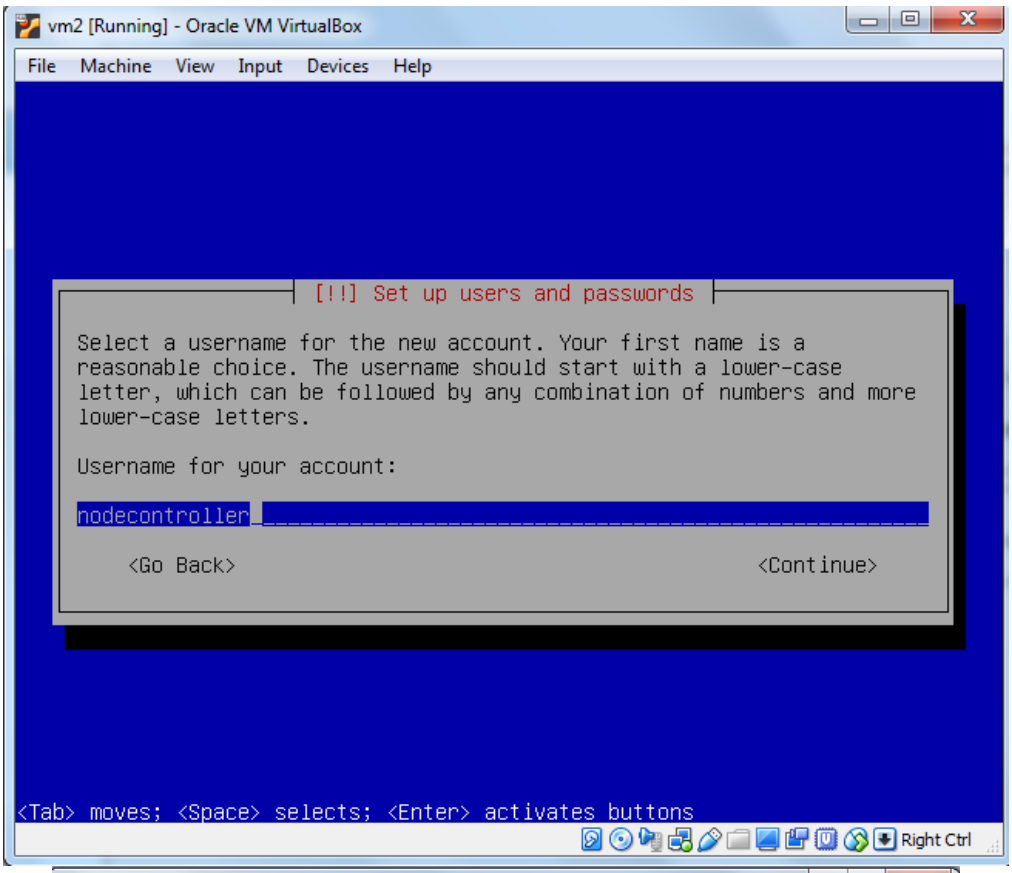
Right Ctrl

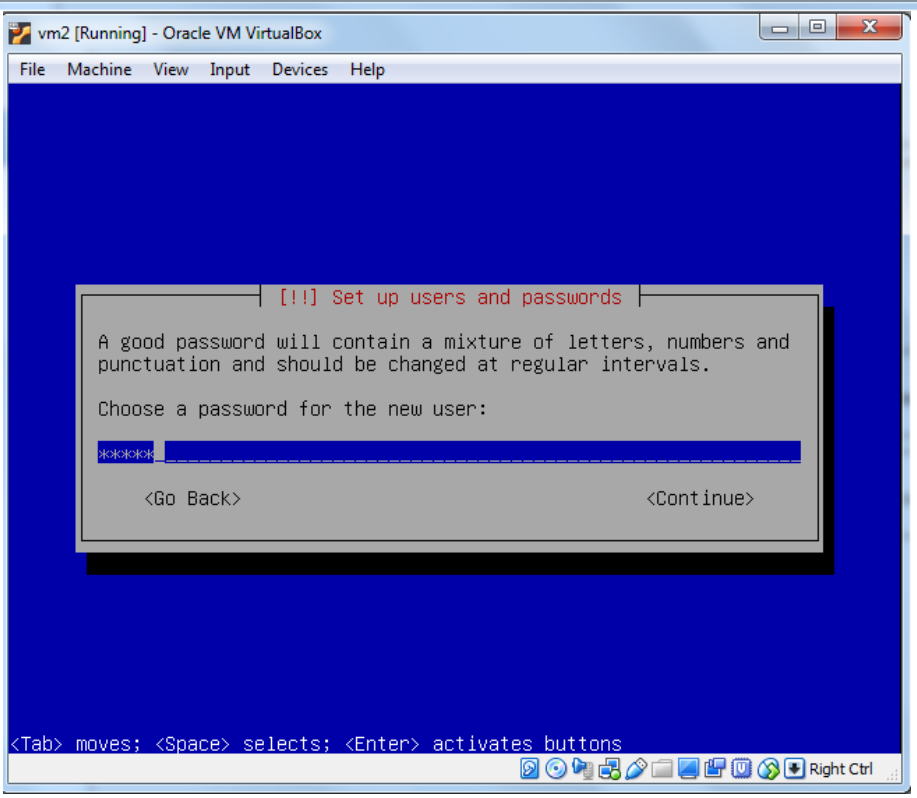

vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
You have the Auto capture keyboard option turned on. This will cause the Virtual Machine to automatically capture
The Virtual Machine reports that the guest OS supports mouse pointer integration. This means that you do not
[!!] Configure the network
The IP address is unique to your computer and consists of four numbers separated by periods. If you don't know what to use here, consult your network administrator.
IP address:
10.6.4.162
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

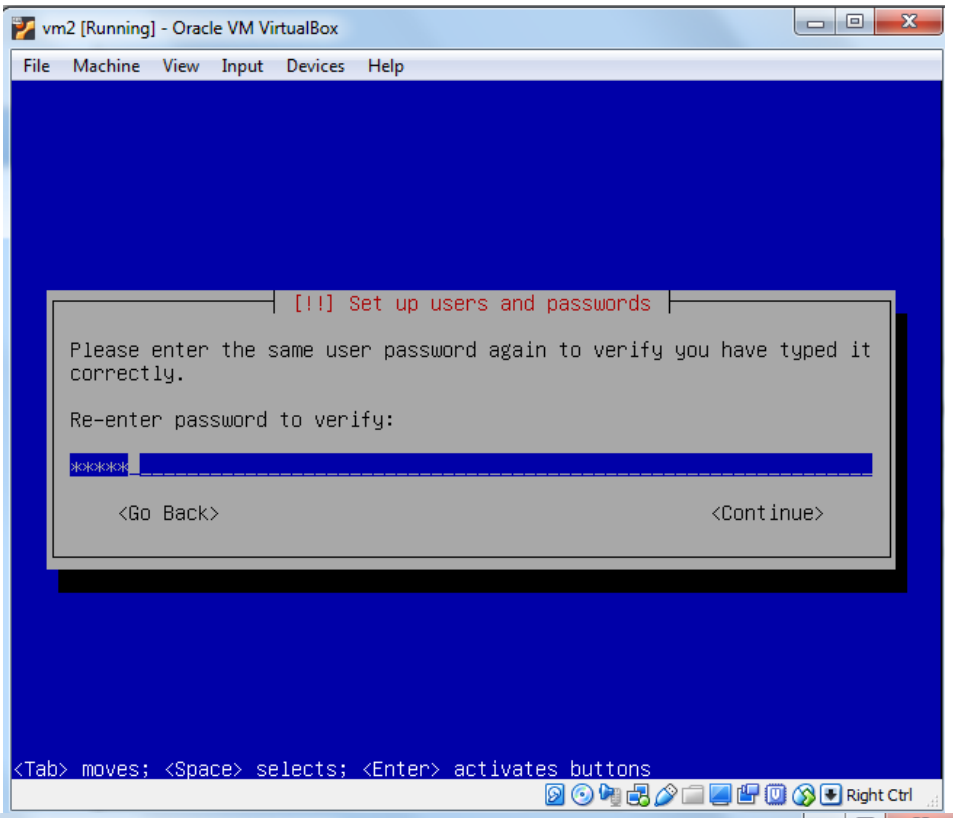

vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Select cloud installation mode
No Eucalyptus cloud controller was found on your network. If this is a mistake and there is in fact already a cloud controller, enter its hostname or IP address here. Otherwise, leave this blank.
Cloud controller address:
10.6.4.112
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

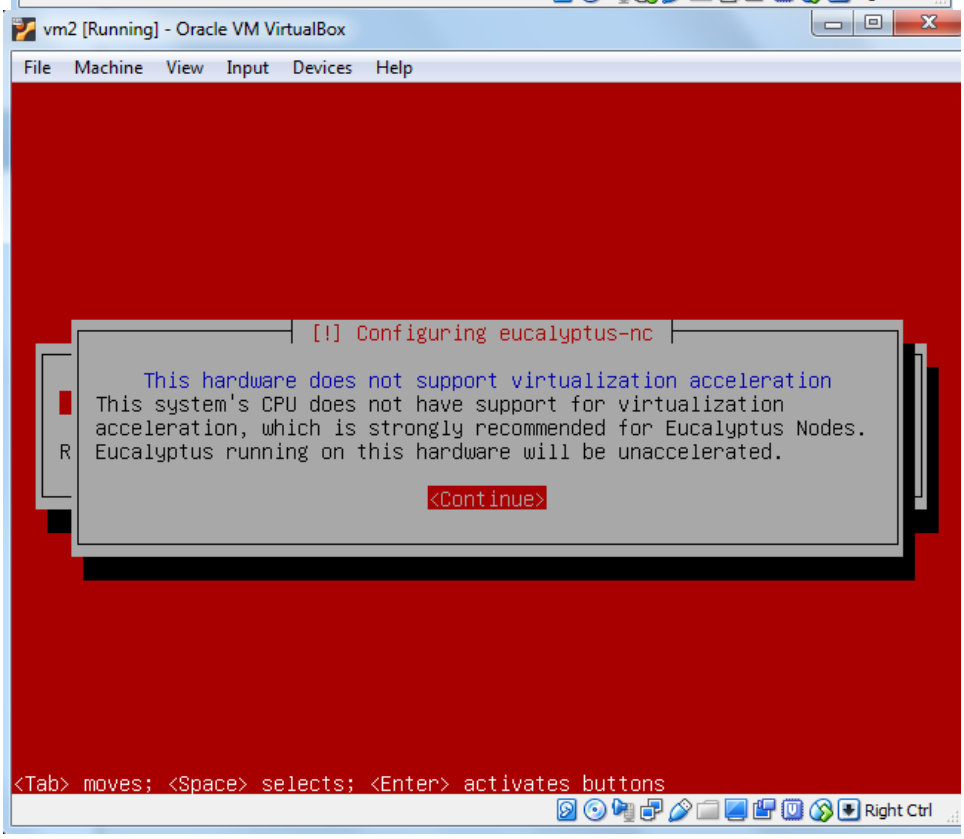

vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Select cloud installation mode
A Eucalyptus cloud controller was found, but no Walrus storage service.
Cloud installation mode:
[ ] Walrus storage service
[ ] Cluster controller
[ ] Storage controller
[*] Node controller
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
A user account will be created for you to use instead of the root account for non-administrative activities.
Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.
Full name for the new user:
nodecontroller
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
Select a username for the new account. Your first name is a reasonable choice. The username should start with a lower-case letter, which can be followed by any combination of numbers and more lower-case letters.
Username for your account:
nodecontroller
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.
Choose a password for the new user:
*****
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!!] Set up users and passwords
Please enter the same user password again to verify you have typed it correctly.
Re-enter password to verify:
<Go Back>
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl


vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
[!] Configuring eucalyptus-nc
This hardware does not support virtualization acceleration
This system's CPU does not have support for virtualization acceleration, which is strongly recommended for Eucalyptus Nodes. Eucalyptus running on this hardware will be unaccelerated.
<Continue>
<Tab> moves; <Space> selects; <Enter> activates buttons
Right Ctrl

vm2 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
GNU/Linux
Ubuntu 10.04.4 LTS

Welcome to the Ubuntu Server!
 * Documentation:  http://www.ubuntu.com/server/doc

  System information as of Tue Aug 27 11:31:08 IST 2019

  System load:  0.7               Processes:           99
  Usage of /:   8.3% of 9.15GB    Users logged in:     0
  Memory usage: 2%                IP address for br0:  10.6.4.162
  Swap usage:   0%                IP address for virbr0: 192.168.122.1

  Graph this data and manage this system at https://landscape.canonical.com/

0 packages can be updated.
0 updates are security updates.


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

nodecontroller@ubuntu:~$
```

Right Ctrl

Editing Wired connection 1

Connection name: Wired connection 1

General | Ethernet | 802.1x Security | DCB | IPv4 Settings | IPv6 Settings

Method: Manual

Addresses

Address	Netmask	Gateway
10.6.4.212	255.255.128.0	10.6.0.1

Add

Delete

DNS servers: 10.101.1.10

Search domains:

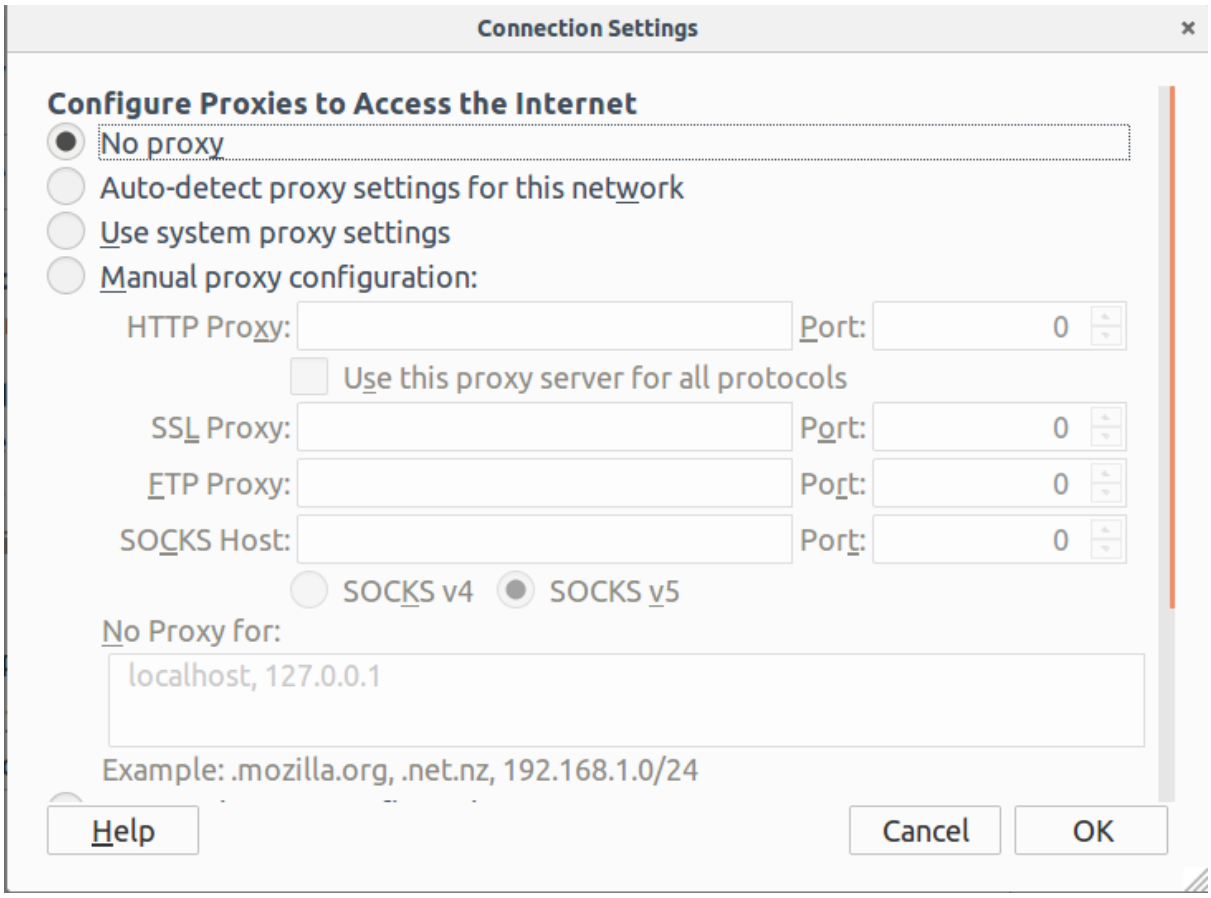
DHCP client ID:

☐ Require IPv4 addressing for this connection to complete

Routes...

Cancel Save

```
vm3@vm3-VirtualBox: ~
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

vm3@vm3-VirtualBox:~$ ping 10.6.4.112
connect: Network is unreachable
vm3@vm3-VirtualBox:~$ ping 10.6.4.112
PING 10.6.4.112 (10.6.4.112) 56(84) bytes of data.
64 bytes from 10.6.4.112: icmp_seq=1 ttl=64 time=0.555 ms
64 bytes from 10.6.4.112: icmp_seq=2 ttl=64 time=0.690 ms
64 bytes from 10.6.4.112: icmp_seq=3 ttl=64 time=0.554 ms
64 bytes from 10.6.4.112: icmp_seq=4 ttl=64 time=0.445 ms
64 bytes from 10.6.4.112: icmp_seq=5 ttl=64 time=0.759 ms
64 bytes from 10.6.4.112: icmp_seq=6 ttl=64 time=0.410 ms
64 bytes from 10.6.4.112: icmp_seq=7 ttl=64 time=0.499 ms
64 bytes from 10.6.4.112: icmp_seq=8 ttl=64 time=0.287 ms
64 bytes from 10.6.4.112: icmp_seq=9 ttl=64 time=0.693 ms
```



Insecure Connection

https://10.6.4.112:8443

Search

Your connection is not secure

The owner of 10.6.4.112 has configured their website improperly. To protect your information from being stolen, Firefox has not connected to this website.

Learn more...

Go Back

Advanced

Report errors like this to help Mozilla identify and block malicious sites

10.6.4.112:8443 uses an invalid security certificate.

The certificate is not trusted because it is self-signed.
The certificate is not valid for the name 10.6.4.112.

Error code: SEC_ERROR_UNKNOWN_ISSUER

Add Exception...

Right C

Add Security Exception

You are about to override how Firefox identifies this site.
Legitimate banks, stores, and other public sites will not ask you to do this.

Server

Location: https://10.6.4.112:8443/

Get Certificate

Certificate Status

This site attempts to identify itself with invalid information.

View...

Wrong Site

The certificate belongs to a different site, which could mean that someone is trying to impersonate this site.

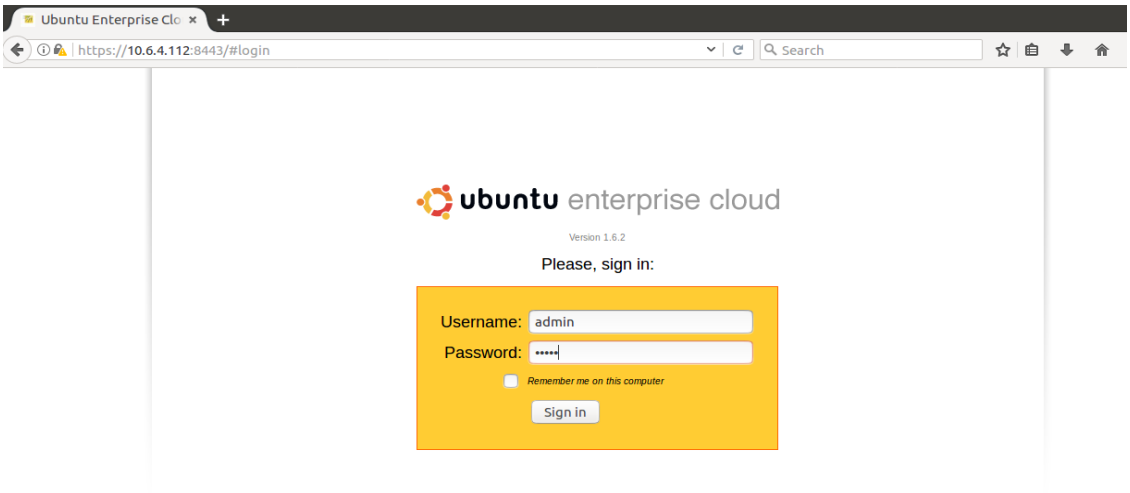
Unknown Identity

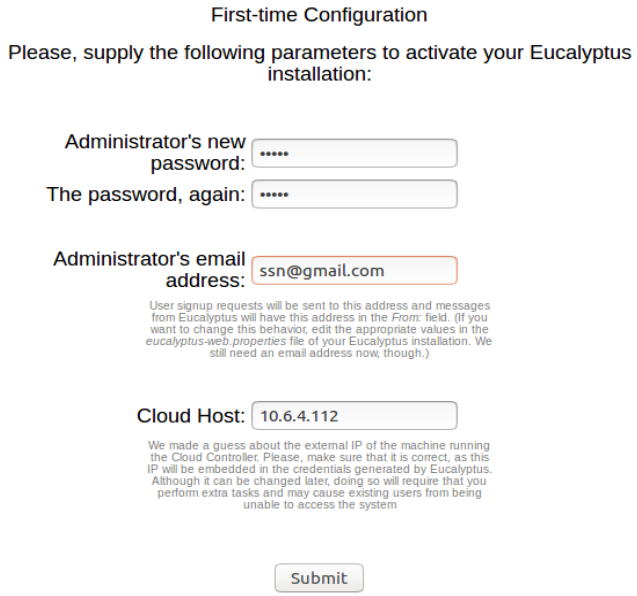
The certificate is not trusted because it hasn't been verified as issued by a trusted authority using a secure signature.

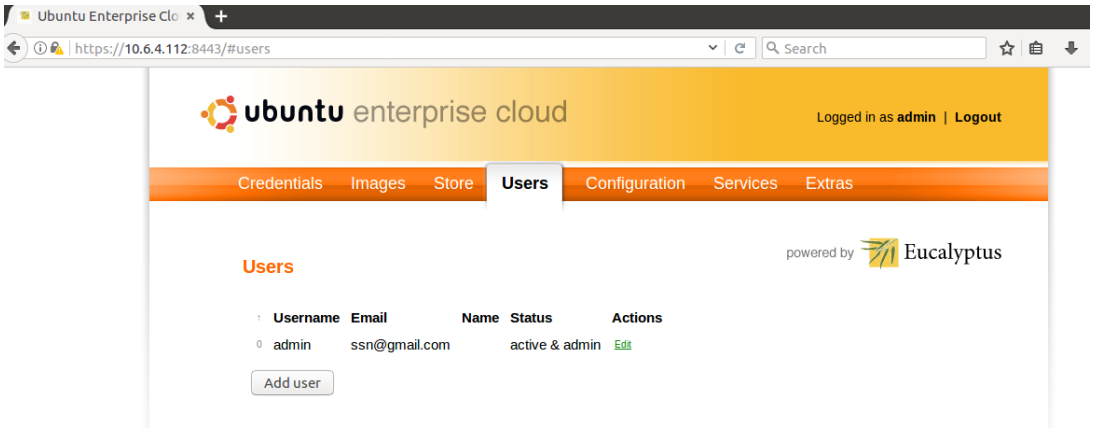
Permanently store this exception

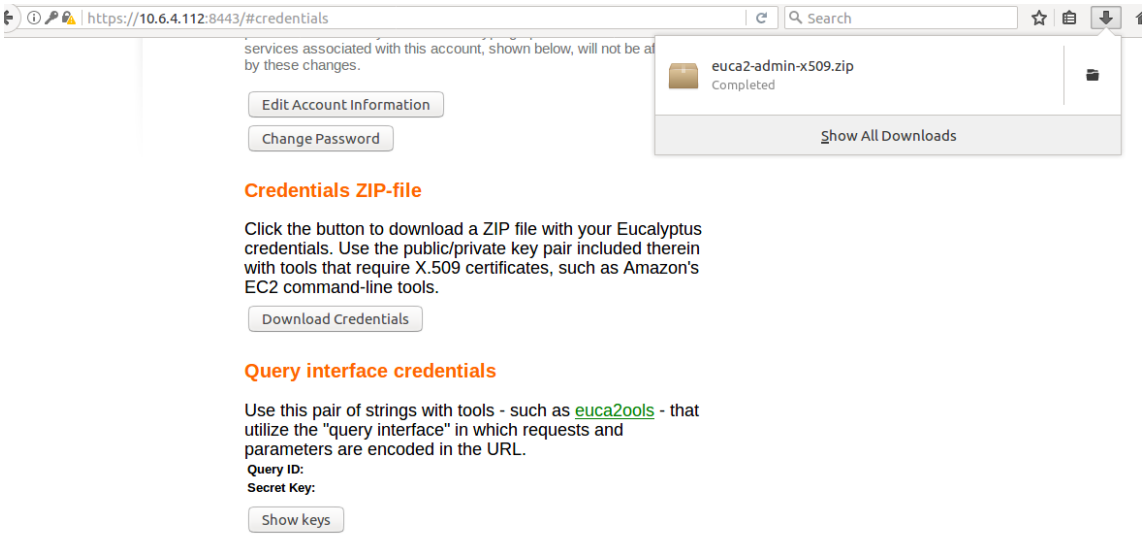
Confirm Security Exception

Cancel

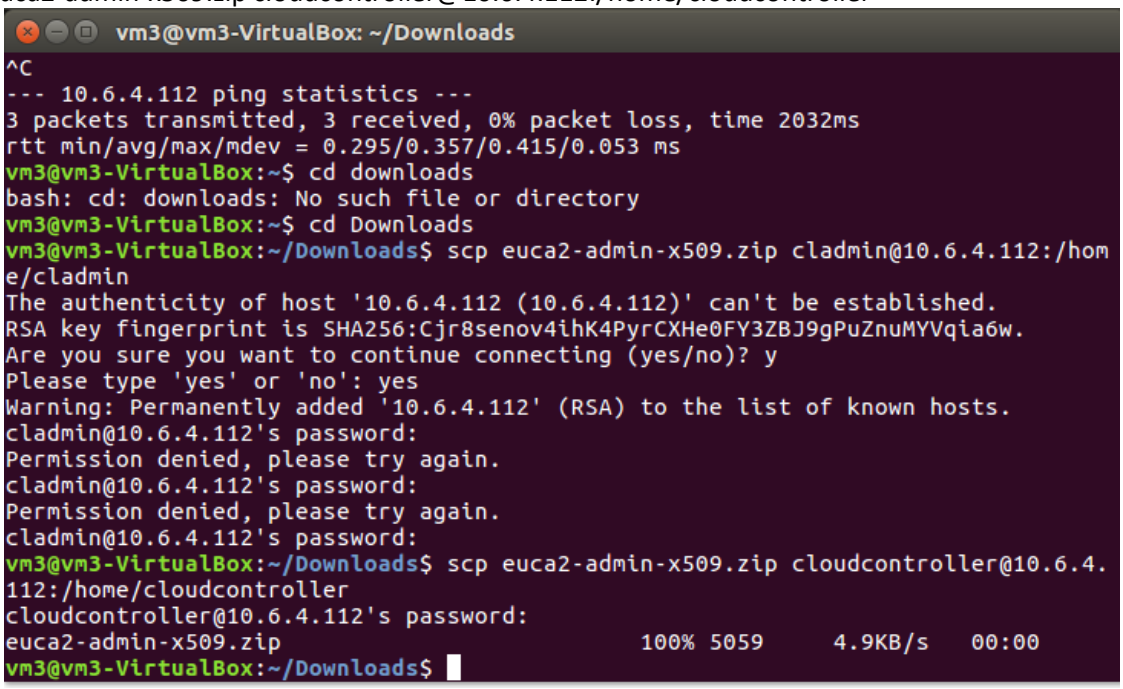

Ubuntu Enterprise Clo
https://10.6.4.112:8443/#login
Search
ubuntu enterprise cloud
Version 1.6.2
Please, sign in:
Username:
admin
Password:
Remember me on this computer
Sign in


First-time Configuration
Please, supply the following parameters to activate your Eucalyptus installation:
Administrator's new password:
The password, again:
Administrator's email address:
ssn@gmail.com
User signup requests will be sent to this address and messages from Eucalyptus will have this address in the From: field. (If you want to change this behavior, edit the appropriate values in the eucalyptus-web.properties file of your Eucalyptus installation. We still need an email address now, though.)
Cloud Host:
10.6.4.112
We made a guess about the external IP of the machine running the Cloud Controller. Please, make sure that it is correct, as this IP will be embedded in the credentials generated by Eucalyptus. Although it can be changed later, doing so will require that you perform extra tasks and may cause existing users from being unable to access the system
Submit


Ubuntu Enterprise Clo
https://10.6.4.112:8443/#users
Search
ubuntu enterprise cloud
Logged in as admin | Logout
Credentials
Images
Store
Users
Configuration
Services
Extras
powered by Eucalyptus
Users
Username
Email
Name
Status
Actions
admin
ssn@gmail.com
active & admin
Edit
Add user



scp euca2-admin-x509.zip cladmin@10.6.4.112:/home/cladmin
scp euca2-admin-x509.zip cloudcontroller@10.6.4.112:/home/cloudcontroller



```
vm3@vm3-VirtualBox: ~/Downloads
^C
--- 10.6.4.112 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2032ms
rtt min/avg/max/mdev = 0.295/0.357/0.415/0.053 ms
vm3@vm3-VirtualBox:~$ cd downloads
bash: cd: downloads: No such file or directory
vm3@vm3-VirtualBox:~$ cd Downloads
vm3@vm3-VirtualBox:~/Downloads$ scp euca2-admin-x509.zip cladmin@10.6.4.112:/hom
e/cladmin
The authenticity of host '10.6.4.112 (10.6.4.112)' can't be established.
RSA key fingerprint is SHA256:Cjr8senov4ihK4PyrCXHe0FY3ZBJ9gPuZnuMYVqia6w.
Are you sure you want to continue connecting (yes/no)? y
Please type 'yes' or 'no': yes
Warning: Permanently added '10.6.4.112' (RSA) to the list of known hosts.
cladmin@10.6.4.112's password:
Permission denied, please try again.
cladmin@10.6.4.112's password:
Permission denied, please try again.
cladmin@10.6.4.112's password:
vm3@vm3-VirtualBox:~/Downloads$ scp euca2-admin-x509.zip cloudcontroller@10.6.4.
112:/home/cloudcontroller
cloudcontroller@10.6.4.112's password:
euca2-admin-x509.zip                          100% 5059     4.9KB/s   00:00
vm3@vm3-VirtualBox:~/Downloads$
```

unzip mycreds.zip
eucarc
chmod 0700 ~/.euca
chmod 0600 ~/.ruca/*

```
100%[===================================>] 5,056       --.-K/s   in 0s

2019-08-27 12:09:45 (369 MB/s) - `mycreds.zip' saved [5056/5056]

cloudcontroller@ubuntu:~/.euca$ unzip myucreds.zip
unzip:  cannot find or open myucreds.zip, myucreds.zip.zip or myucreds.zip.ZI
cloudcontroller@ubuntu:~/.euca$ admin
No command 'admin' found, did you mean:
 Command 'radmin' from package 'freeradius' (main)
 Command 'amin' from package 'orville-write' (universe)
 Command 'kadmin' from package 'heimdal-clients' (universe)
 Command 'kadmin' from package 'krb5-user' (main)
admin: command not found
cloudcontroller@ubuntu:~/.euca$ unzip mycreds.zip
Archive:  mycreds.zip
To setup the environment run: source /path/to/eucarc
  inflating: eucarc
  inflating: cloud-cert.pem
  inflating: jssecacerts
  inflating: euca2-admin-60065456-pk.pem
  inflating: euca2-admin-60065456-cert.pem
cloudcontroller@ubuntu:~/.euca$ ls
cloud-cert.pem                euca2-admin-60065456-pk.pem  jssecacerts
euca2-admin-60065456-cert.pem  eucarc                      mycreds.zip
cloudcontroller@ubuntu:~/.euca$ chmod 0700 ~/.euca
cloudcontroller@ubuntu:~/.euca$ chmod 0600 ~/.euca/*
chmod: changing permissions of `/home/cloudcontroller/.euca/mycreds.zip': Ope
ion not permitted
```

scp euca2-admin-x509.zip cloudcontroller@10.6.4.112:/home/cloudcontroller
sudo apt-get update

```
vm3@vm3-VirtualBox: ~
e/cladmin
The authenticity of host '10.6.4.112 (10.6.4.112)' can't be established.
RSA key fingerprint is SHA256:Cjr8senov4ihK4PyrCXHe0FY3ZBJ9gPuZnuMYVqia6w.
Are you sure you want to continue connecting (yes/no)? y
Please type 'yes' or 'no': yes
Warning: Permanently added '10.6.4.112' (RSA) to the list of known hosts.
cladmin@10.6.4.112's password:
Permission denied, please try again.
cladmin@10.6.4.112's password:
Permission denied, please try again.
cladmin@10.6.4.112's password:
vm3@vm3-VirtualBox:~/Downloads$ scp euca2-admin-x509.zip cloudcontroller@10.6.4.
112:/home/cloudcontroller
cloudcontroller@10.6.4.112's password:
euca2-admin-x509.zip                          100% 5059     4.9KB/s   00:00
vm3@vm3-VirtualBox:~/Downloads$ cd ../
vm3@vm3-VirtualBox:~$ sudo apt-get update
[sudo] password for vm3:
Hit:1 http://security.ubuntu.com/ubuntu xenial-security InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
Reading package lists... Done
vm3@vm3-VirtualBox:~$
```

sudo apt-get install euca2ools

```
vm3@vm3-VirtualBox:~$ sudo apt-get update
[sudo] password for vm3:
Hit:1 http://security.ubuntu.com/ubuntu xenial-security InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
Reading package lists... Done
vm3@vm3-VirtualBox:~$ sudo apt-get install euca2ools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  python-bs4 python-cffi-backend python-chardet python-cryptography
  python-enum34 python-html5lib python-idna python-ipaddress python-lxml
  python-ndg-httpsclient python-openssl python-pkg-resources python-pyasn1
  python-requestbuilder python-requests python-setuptools python-six
  python-urllib3
```

Result :

Thus, a private cloud was set up using eucalyptus and volumes were created, described using client machine.

SSN COLLEGE OF ENGINEERING
Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -7 : Private Cloud Setup using OpenNebula

Assigned Date: **Due Date:**

I. Install OpenNebula in Ubuntu 16.04 Desktop amd64 Guest Operating System.

http://docs.opennebula.org/4.12/design_and_installation/quick_starts/qs_ubuntu_kvm.html

Front-end Installation

http://docs.opennebula.org/5.0/deployment/opennebula_installation/frontend_installation.html **KVM Node Installation**

http://docs.opennebula.org/5.0/deployment/node_installation/kvm_node_installation.html

1. Create 2 Virtual Machines and install Ubuntu 16.04 Desktop amd64.iso in both VMs. Name the VMs as FrontEndVM and NodeVM
2. In FrontEnd VM, Install opennebula packages, start services and configure NFS, SSH public key.
3. In Node VM, Install Opennebula packages, Configure Network, NFS and Qemu.
4. In FrontEnd VM browser, give http://frontend:9869
   The default password for the ***oneadmin*** user can be found in ***~/.one/one_auth*** which is randomly generated on every installation.

Do the following in the FrontEnd Machine

1. Add hosts, Virtual Machines
2. Add Virtual Resources
3. Run Virtual Machine
4. Migrate VM from one host to another.

EX NO.7	PRIVATE CLOUD SETUP USING OPENNEBULA

AIM:

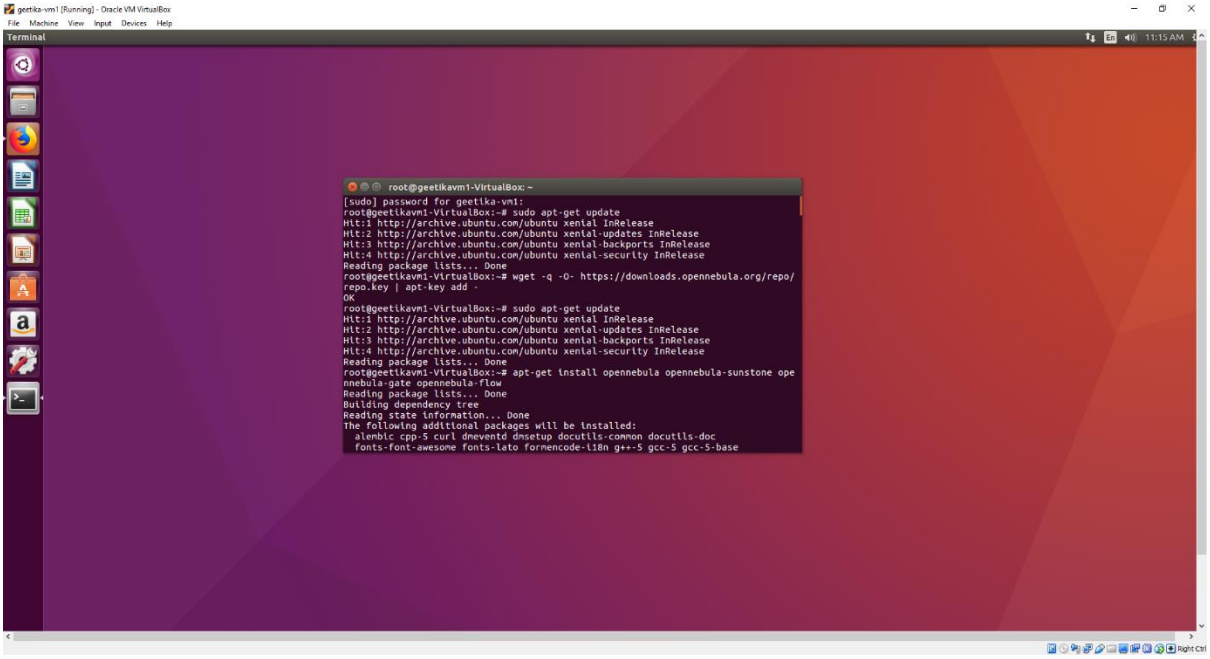
To Install **Opennebula** in Ubuntu 16.04 Desktop amd64 Guest Operating System

PREREQUISITES:

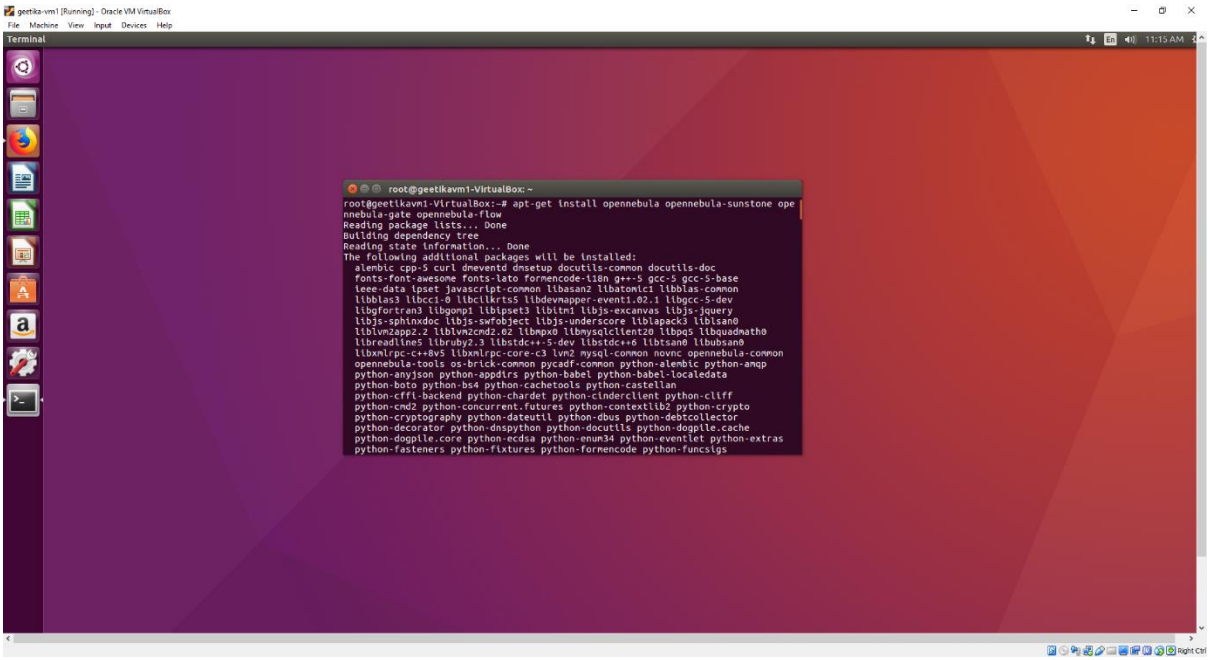
Create 2 Virtual Machines and install Ubuntu 16.04 Desktop amd64.iso in both VMs.

PROCEDURE:

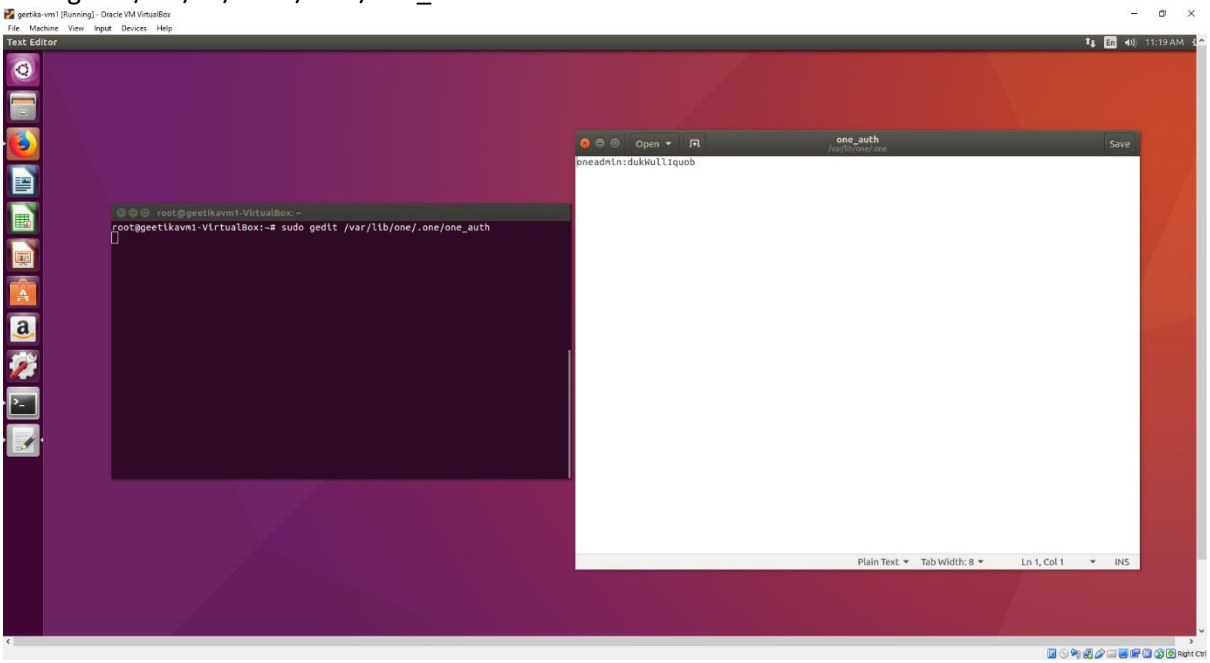
sudo apt-get update
wget -q -O- https://downloads.opennebula.org/repo/repo.key | apt-key add -
sudo apt-get update



apt-get install opennebula opennebula opennebula-sunstone opennebula-gate opennebula-flow

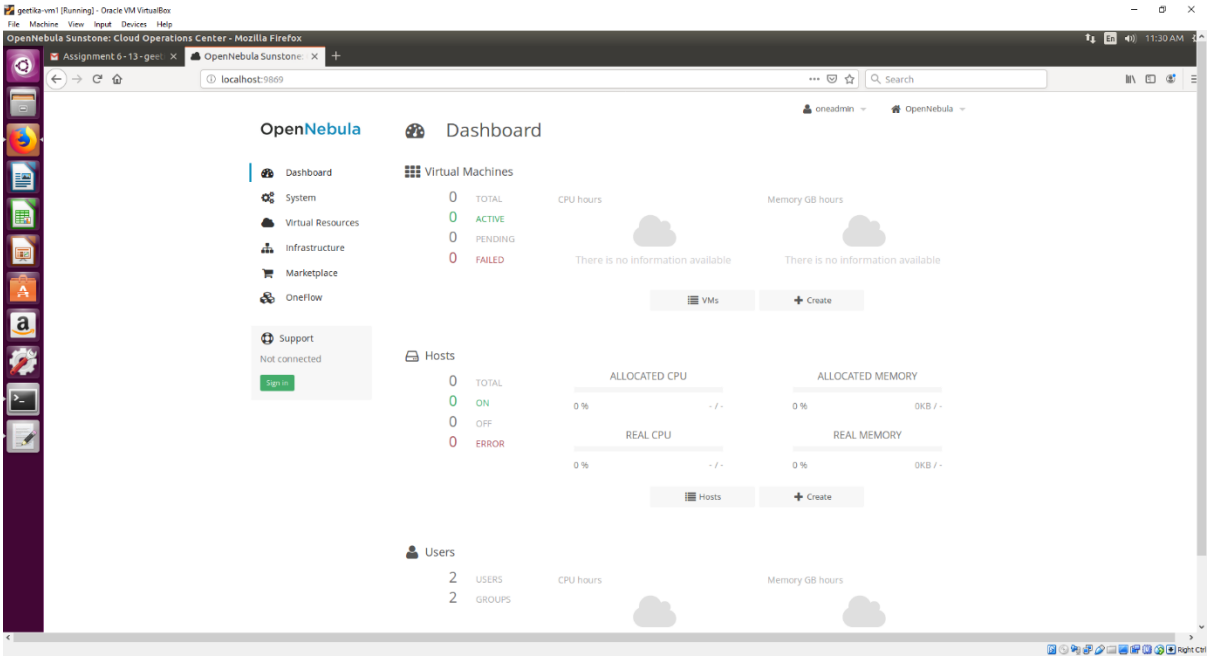


sudo gedit /var/lib/onne/.one/one_auth



sudo -i
su oneadmin
systemctl start opennebual
systemctl start opennebula-sunstone
oneuser show

```
root@geetikavm1-VirtualBox: ~
geetika-vm1@geetikavm1-VirtualBox:~$ sudo gedit /var/lib/one/.one/one_auth
[sudo] password for geetika-vm1:

** (gedit:20815): WARNING **: Set document metadata failed: Setting attribute me
tadata::gedit-position not supported
geetika-vm1@geetikavm1-VirtualBox:~$ sudo -i
root@geetikavm1-VirtualBox:~# su oneadmin
oneadmin@geetikavm1-VirtualBox:/root$ systemctl start opennebula
oneadmin@geetikavm1-VirtualBox:/root$ systemctl start opennebula-sunstone
oneadmin@geetikavm1-VirtualBox:/root$ oneuser show
USER 0 INFORMATION
ID              : 0
NAME            : oneadmin
GROUP           : oneadmin
PASSWORD        : 285aaede9a9a082518c65228085d0be3b92d99ec
AUTH_DRIVER     : core
ENABLED         : Yes

USER TEMPLATE
TOKEN_PASSWORD="c7e2e2d056adf5cce9f50d7c4f51958b76c3981a"

RESOURCE USAGE & QUOTAS

oneadmin@geetikavm1-VirtualBox:/root$
```



export http_proxy=”http://proxy.ssn.net:8080/”
export https_proxy=https://proxy.ssn.net:8080/
wget -q -0- https://downloads.opennebula.org/repo/repo.key | apt-key add -

```
root@geetikavm2-VirtualBox: ~
root@geetikavm2-VirtualBox:~# export http_proxy="http://proxy.ssn.net:8080/"
root@geetikavm2-VirtualBox:~# export https_proxy="https://proxy.ssn.net:8080/"
root@geetikavm2-VirtualBox:~# wget -q -O- https://downloads.opennebula.org/repo/
repo.key | apt-key add -
OK
root@geetikavm2-VirtualBox:~#
```

sudo apt-get update

```
root@geetikavm2-VirtualBox: ~
root@geetikavm2-VirtualBox:~# sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu xenial-security InRelease
Reading package lists... Done
root@geetikavm2-VirtualBox:~#
```

Sudo apt-get install opennebula-node

```
root@geetikavm2-VirtualBox: ~

root@geetikavm2-VirtualBox:~# sudo apt-get install opennebula-node
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  augeas-lenses bridge-utils cgmanager dmeventd dmsetup ebtables gawk
  libaugeas0 libboost-random1.58.0 libboost-thread1.58.0
  libdevmapper-event1.02.1 liblvm2app2.2 liblvm2cmd2.02 libnetcf1
  libnl-route-3-200 librados2 librbd1 libreadline5 libsigsegv2 libvirt-bin
  libvirt0 libxen-4.6 libxenstore3.0 libxml2-utils lvm2 ncurses-term
  opennebula-common openssh-server openssh-sftp-server ssh-import-id
Suggested packages:
  augeas-doc gawk-doc augeas-tools qemu-kvm | qemu radvd
  thin-provisioning-tools ssh-askpass rssh molly-guard monkeysphere
The following NEW packages will be installed:
  augeas-lenses bridge-utils cgmanager dmeventd dmsetup ebtables gawk
  libaugeas0 libboost-random1.58.0 libboost-thread1.58.0
  libdevmapper-event1.02.1 liblvm2app2.2 liblvm2cmd2.02 libnetcf1
  libnl-route-3-200 librados2 librbd1 libreadline5 libsigsegv2 libvirt-bin
  libvirt0 libxen-4.6 libxenstore3.0 libxml2-utils lvm2 ncurses-term
  opennebula-common opennebula-node openssh-server openssh-sftp-server
  ssh-import-id
0 upgraded, 31 newly installed, 0 to remove and 577 not upgraded.
```

sudo service libvirt-bin restart

```
root@geetikavm2-VirtualBox: ~
root@geetikavm2-VirtualBox:~# sudo service libvirt-bin restart
root@geetikavm2-VirtualBox:~#
```

Result:

Thus a private cloud is set up using open nebula.

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CS6712 Grid and Cloud Computing Laboratory

Assignment -8 : Creation of Virtual Machine Template, Installing C Compiler and Attaching Virtual Block

Assigned Date: **Due Date:**

I. Creating a Virtual Machine (VM) Template

1. Use CentOS 6.5 (64-bit) OS image to create virtual machine template.
2. Use "*onetemplate*" command to do it.

II. Update the VM template with SSH_PUBLIC_KEY using "*oneuser*" command.

III. Create a VM for CentOS 6.5 (64-bit) from the above created CentOS6.5 (64-bit) template.

IV. Configure the local software repository using YUM Package Manager.

V. Install a C compiler (gcc) in CentOS6.5 (64-bit) VM and run a sample C program in VM.

VI. Create a Virtual Block (DATABLOCK) using "*oneimage*" command.

VII. Attach the created Virtual Block to CentOS6.5 (64-bit) VM using the below command.

oneadmin@localhost]$ *onevm disk-attach <vm-id> --image <virtual block name>*

VIII. Detach the attached Virtual Block in the above step from CentOS6.5 (64-bit) VM using below command.

oneadmin@localhost]$ onevm disk-detach <vm-id> <vm disk id>

IX. Resizing the capacity of CPU & Memory (Scaling Up or Scaling Down) of Centos6.5 (64-bit) VM using following command

oneadmin@localhost]$ onevm resize <vm-id> --cpu <capacity> --memory <capacity>

Reference Commands:

In OpenNebula FrontEnd VM do the following.

I. **Listing all types of virtual resources.**

```
oneadmin@localhost]$ onehost list
oneadmin@localhost]$ onevnet list
oneadmin@localhost]$ oneimage list
oneadmin@localhost]$ onetemplate
list oneadmin@localhost]$ onevm list
oneadmin@localhost]$ oneuser list
oneadmin@localhost]$ onegroup list
```

Creating a host

```
oneadmin@localhost]$ onehost create localhost –i kvm –v kvm -n dummy
oneadmin@localhost]$ onehost list
```

Creating a Virtual Network

```
]$ cd /var/lib/one
]$ ls –l
]$ cat mynetwork.one
NAME = "private" BRIDGE =
br0
AR = [
        TYPE = IP4,
        IP = 192.168.0.100,
        SIZE = 100
    ]
oneadmin@localhost]$ onevnet create mynetwork.one
oneadmin@localhost]$ onevnet list
```

Creating a Virtual Disk Images

www.opennebula.org / marketplace

Download the latest CentOS 6.5 with KVM

Copy the link location

```
oneadmin@localhost]$ oneimage create - -name "CentOS-6.5_x86_64" - - path
"Centos image location" - - driver qcow2 - - datastore default
oneadmin@localhost]$ oneimagelist
```

II. **Creating a Virtual Machine (VM) Template**

```
oneadmin@localhost]$ onetemplate create - - name "CentOS-6.5" - - cpu 1
- -vcpu 1 - - memory 512 - - arch x86_64 - - disk "centos-6.5-x86_64" - - nic
"private" - - vnc - -ssh
oneadmin@localhost]$ onetemplate list
```

III. **Update the VM template with SSH_PUBLIC_KEY using "*oneuser*" command.**

```
]$ cat /var/lib/one/.ssh/id_rsa.pub
```

Copy the SSH_PUBLIC_KEY

```
]$ EDITOR = vi oneuser update oneadmin
```

TOKEN_PASSWORD = “b7 ..... ”
SSH_PUBLIC_KEY = “paste the copied key”
// If it shows error do it as root user.
In Opennebula-sunstone dashboard
Click on to settings - > right side, click public key and paste SSH_PUBLIC_KEY in the textbox.
Now you can login into CentOS VM without password.

IV. Create a VM for CentOS 6.5 (64-bit) from the above created CentOS6.5 (64- bit) template.

oneadmin@localhost]$ onetemplate instantiate “Centos-6.5” - - name “CentOS-6.5 Virtual Machine (64-Bit)”
oneadmin@localhost]$ onevm list
root@localhost]# gcc
To update password for root user
]# passwd
Changing password for root user.
Password:
Retype password:
Go to openenbula-sunstone server dashboard
Click on to CentOS-6.5 VM and open VNC at right top Login
as root user.

V. Configure the local software repository using YUM Package Manager.

]# cd /etc/yum.repos.d
]# ls –l
]# nano CentOS-Base.repo
]# vi CentOS-Base.repo
<add the centos download url in [base] section>
]# yum clean all
]# yum makecache

VI. Install a C compiler (gcc) in CentOS6.5 (64-bit) VM and run a sample C program in VM.

]# yum install gcc –y
]# rpm –qi gcc Login
as normal user
]$ vi hello.c
Write a sample hello world program in C
]$ gcc hello.c –o hello
]$ ls –l
]$ ./hello
Check the output.

VII. Create a Virtual Block (DATABLOCK) using “*oneimage*” command.

]# fdisk –l /dev/sda

]# fdisk –l /dev/sdb
PowerOff VM
oneadmin@localhost]$ onevm poweroff <vm-id>
oneadmin@localhost]$ onevm list

Creating Virtual disk block
oneadmin@localhost]$ oneimage create –d 1 - - name data - - type DATABLOCK - -size 20G - -fstype ext4

VIII. Attach the created Virtual Block to CentOS6.5 (64-bit) VM using the below command.

oneadmin@localhost]$ *onevm disk-attach <vm-id> --image <virtual block name>*

PowerON VM
oneadmin@localhost]$ onevm resume <vm-id>
oneadmin@localhost]$ onevm list

IX. Detach the attached Virtual Block in the above step from CentOS6.5 (64-bit) VM using below command.

]# fdisk –l /dev/sda
]# fdisk –l /dev/sdb
PowerOff VM
oneadmin@localhost]$ onevm poweroff <vm-id>
oneadmin@localhost]$ onevm list

Detach the datablock

oneadmin@localhost]$ onevm disk-detach <vm-id> <vm disk id>

PowerON VM
oneadmin@localhost]$ onevm resume <vm-id>
oneadmin@localhost]$ onevm list

X. Resizing the capacity of CPU & Memory (Scaling Up or Scaling Down) of Centos6.5 (64-bit) VM using following command

PowerOff VM
oneadmin@localhost]$ onevm poweroff <vm-id>
oneadmin@localhost]$ onevm list

Resize the capacity of CPU and Memory in a VM
oneadmin@localhost]$ onevm resize <vm-id> --cpu <capacity> --memory <capacity>

oneadmin@localhost]$ onevm resume <vm-id>
oneadmin@localhost]$ onevm list
oneadmin@localhost]$ onevm show <vm-id>

EX NO: 8	CREATING VM TEMPLATE AND VM DISK IMAGE

AIM:

To create a VM template and VM disk image in Ubuntu 16.04 Desktop image.

PRE-REQUISITES:

1. Ubuntu 16.04 virtual machine image.
2. Open Nebula - front end installation (Refer ex 7)
3. Download the centos6-5.4.qcow2c image file.

su oneadmin

```
root@geetikavm1-VirtualBox: ~

root@geetikavm1-VirtualBox:~# su oneadmin
oneadmin@geetikavm1-VirtualBox:/root$ onehost list
  ID NAME            CLUSTER   RVM      ALLOCATED_CPU      ALLOCATED_MEM STAT

oneadmin@geetikavm1-VirtualBox:/root$
```

onevnet list

```
oneadmin@geetikavm1-VirtualBox:/root$ onevnet list
  ID USER            GROUP        NAME                CLUSTER    BRIDGE   LEASES

oneadmin@geetikavm1-VirtualBox:/root$
```

onetemplate list

```
oneadmin@geetikavm1-VirtualBox:/root$ onetemplate list
  ID USER            GROUP           NAME                                REGTIME

oneadmin@geetikavm1-VirtualBox:/root$
```

oneimage list

```
oneadmin@geetikavm1-VirtualBox:/root$ oneimage list
  ID USER       GROUP      NAME            DATASTORE     SIZE TYPE PER STAT RVMS

oneadmin@geetikavm1-VirtualBox:/root$
```

onevm list

```
oneadmin@geetikavm1-VirtualBox:/root$ onevm list
    ID USER     GROUP    NAME            STAT UCPU    UMEM HOST             TIME

oneadmin@geetikavm1-VirtualBox:/root$
```

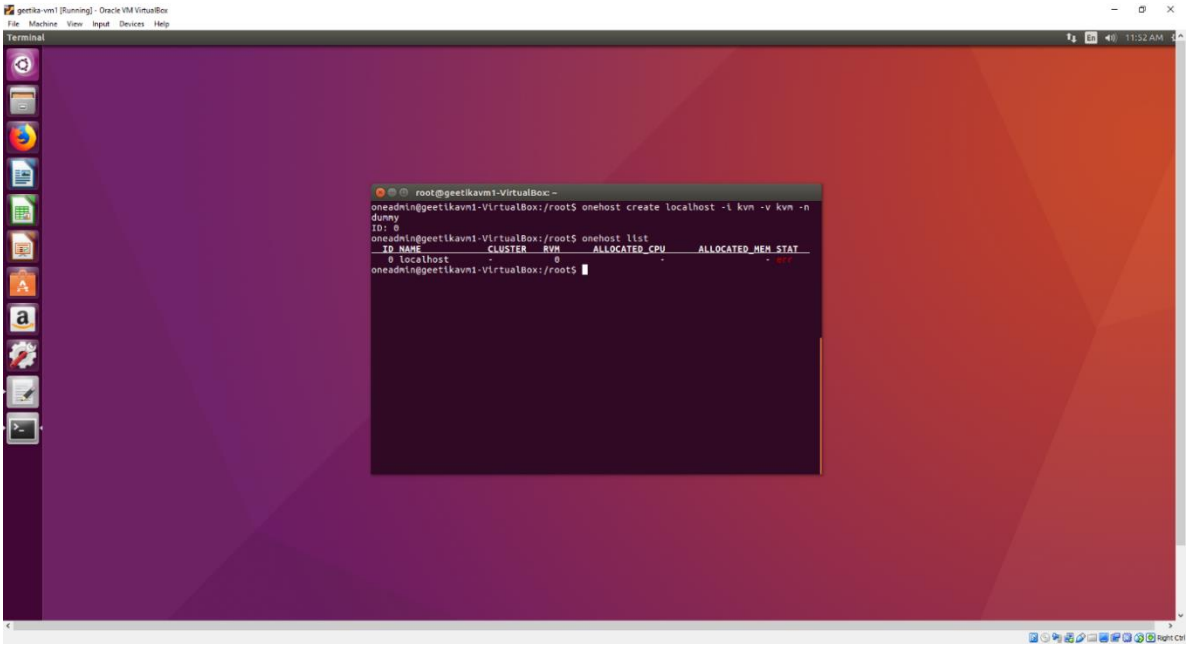
onegroup list

```
oneadmin@geetikavm1-VirtualBox:/root$ onegroup list
  ID NAME                          USERS       VMS            MEMORY         CPU
   0 oneadmin                          2         -                 -           -
   1 users                             0   0 /   -      0M /       -  0.0 /    -
oneadmin@geetikavm1-VirtualBox:/root$
```

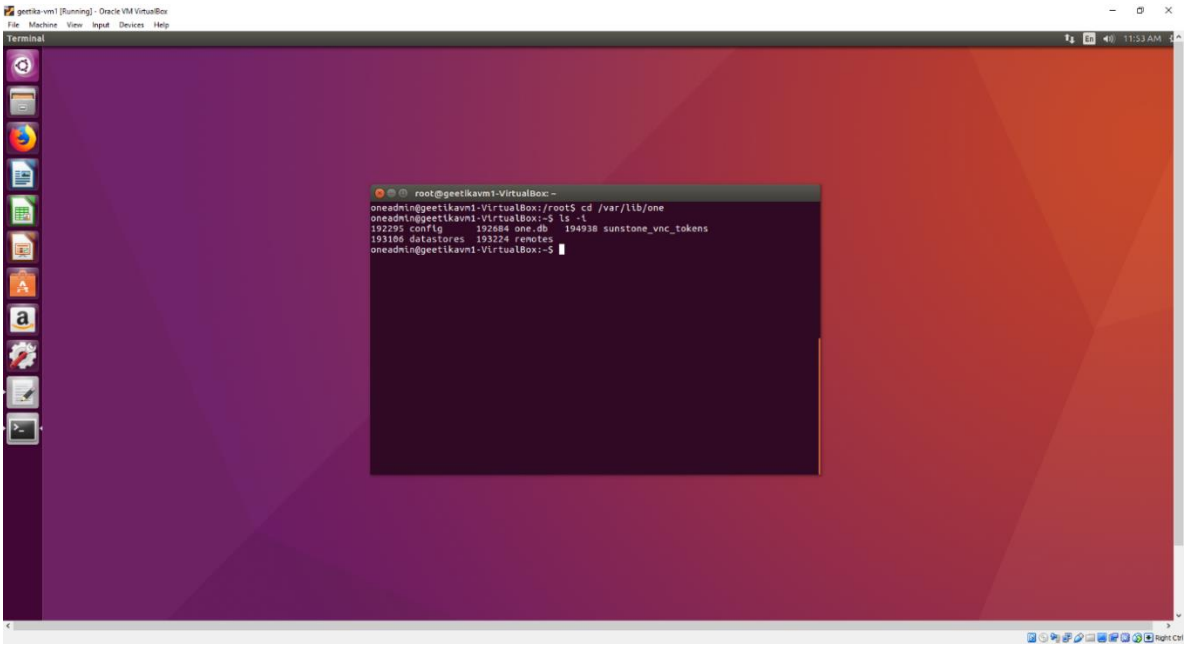
oneuser list

```
oneadmin@geetikavm1-VirtualBox:/root$ oneuser list
  ID NAME            GROUP      AUTH           VMS             MEMORY          CPU
   0 oneadmin        oneadmin   core             -                  -            -
   1 serveradmin     oneadmin   server_c   0 /   -      0M /       -    0.0 /    -
oneadmin@geetikavm1-VirtualBox:/root$
```

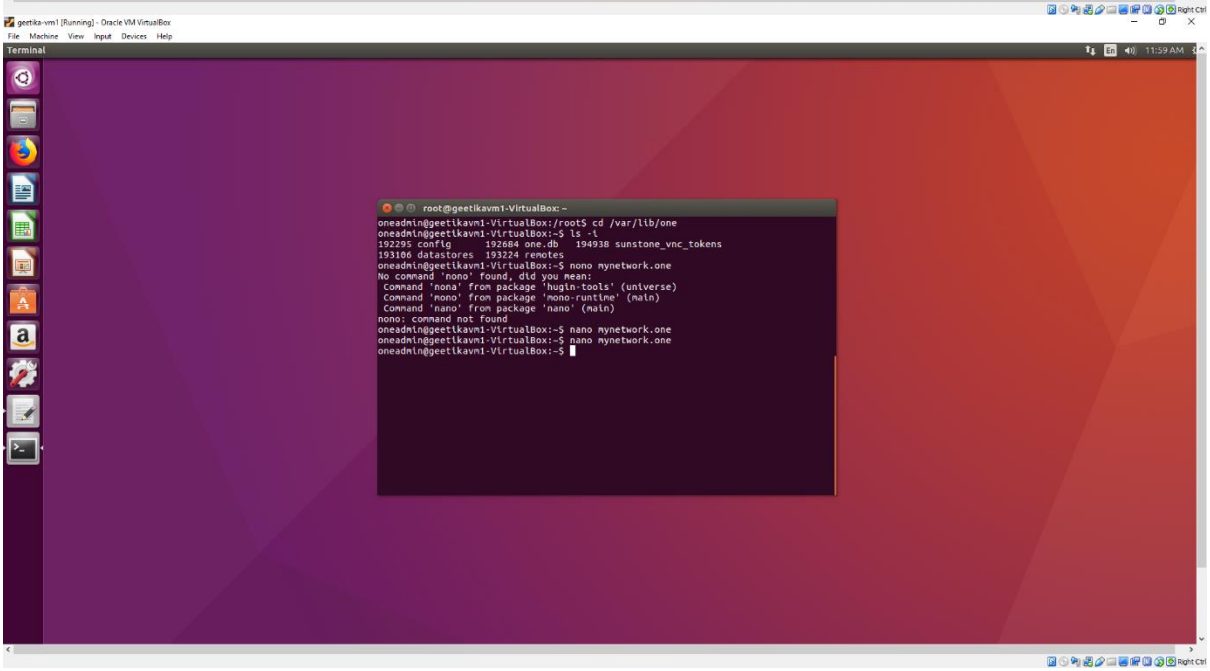
onehost create localhost -I kvm -v kvm -n dummy
onehost list



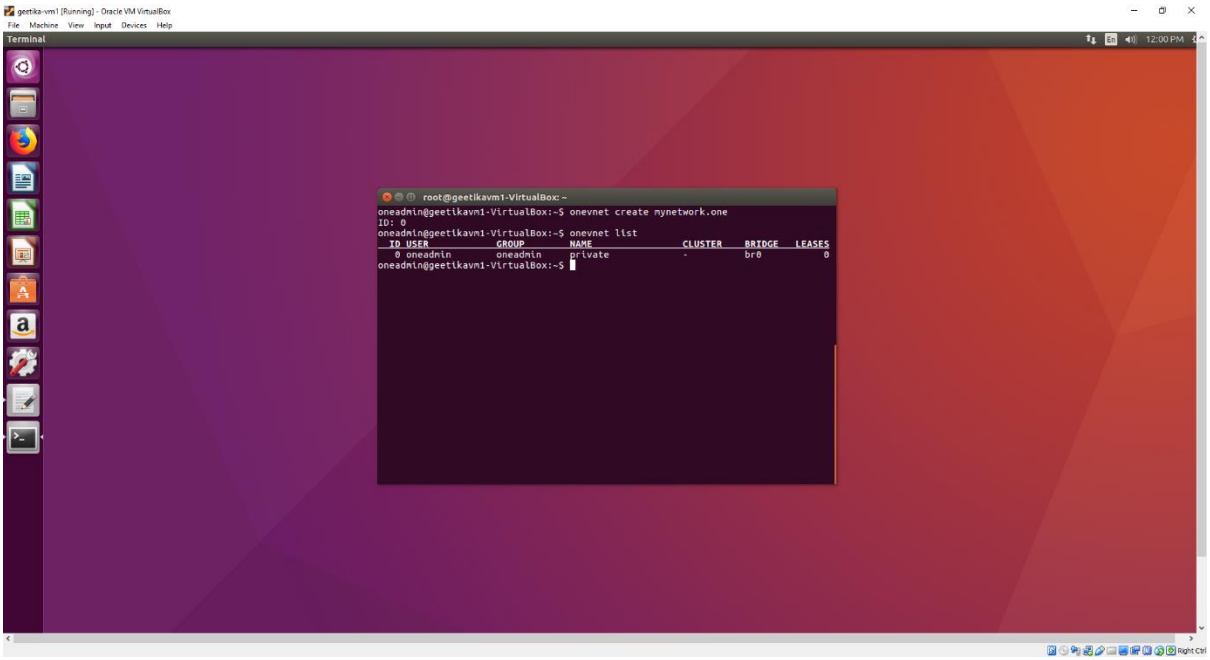
cd /var/lib/one
ls -i



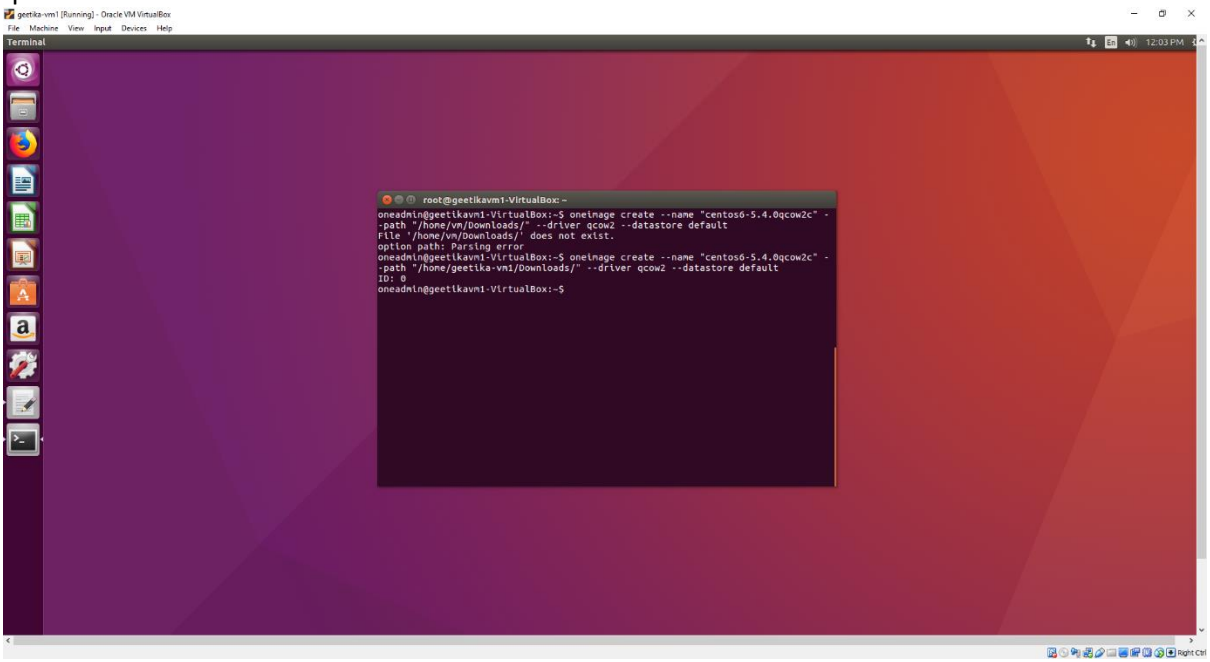
nano mynetwork.one



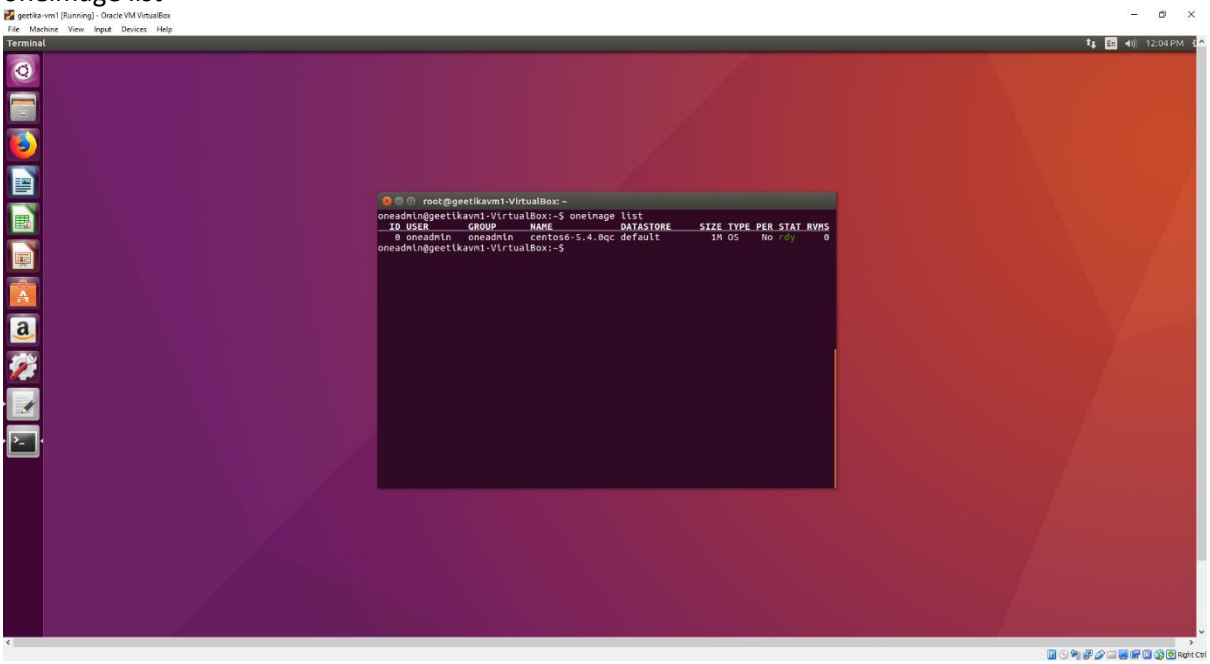
onevnet create mynetwork.one
onevnet list



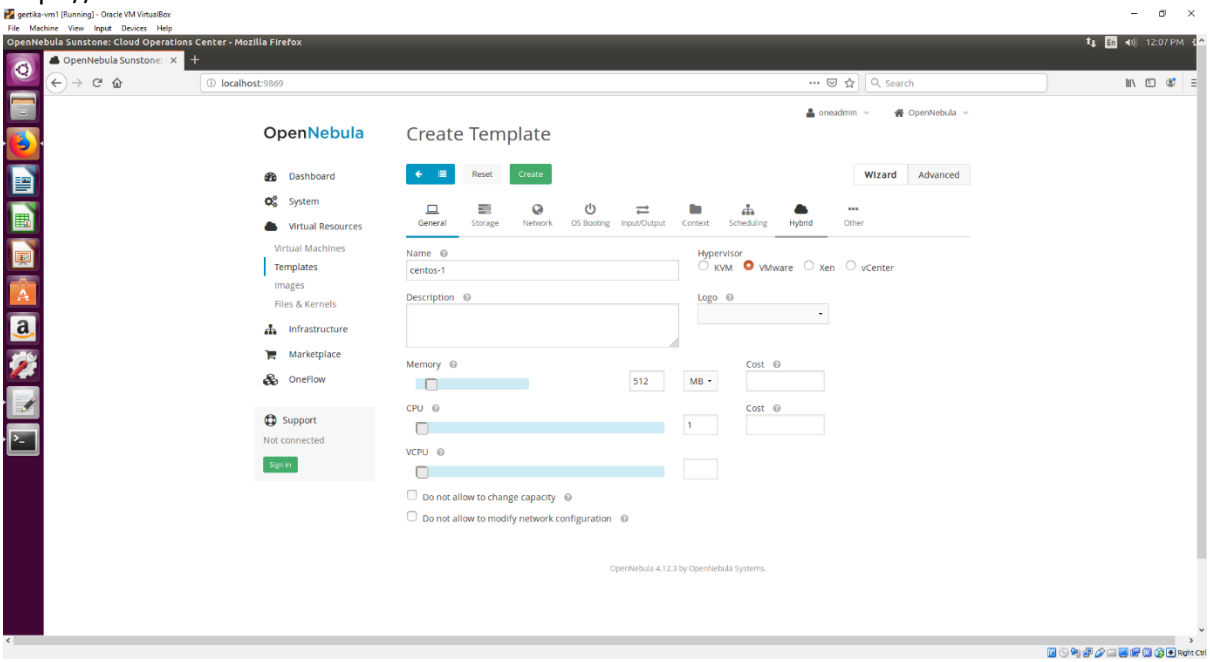
oneimage create – name “centos6-5.4.0qcoq2c” --path “/home/geetika-vm1/Downloads/” --driver qcow2 --datastore default

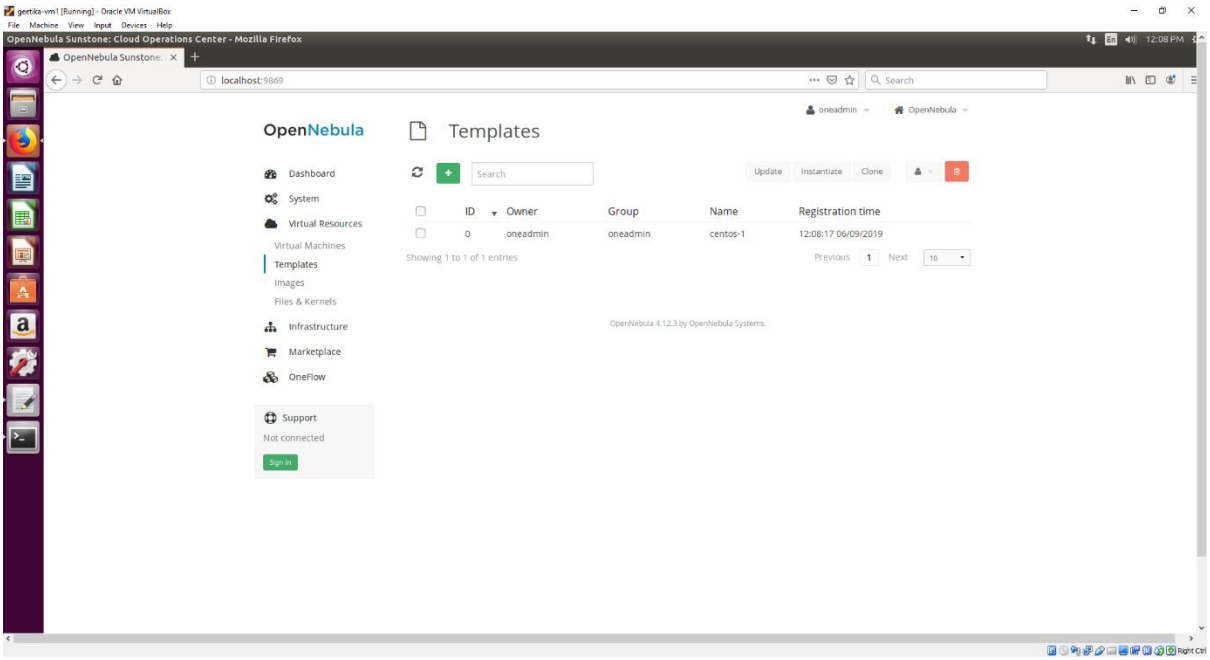


oneimage list

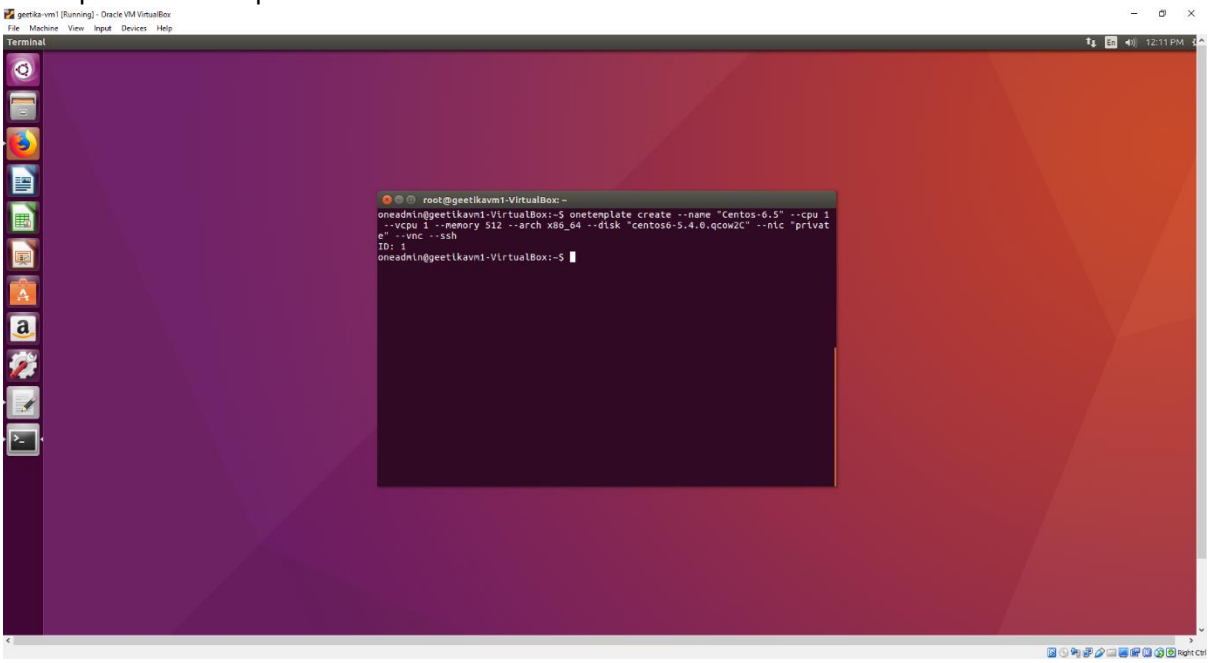


https://localhost:9869

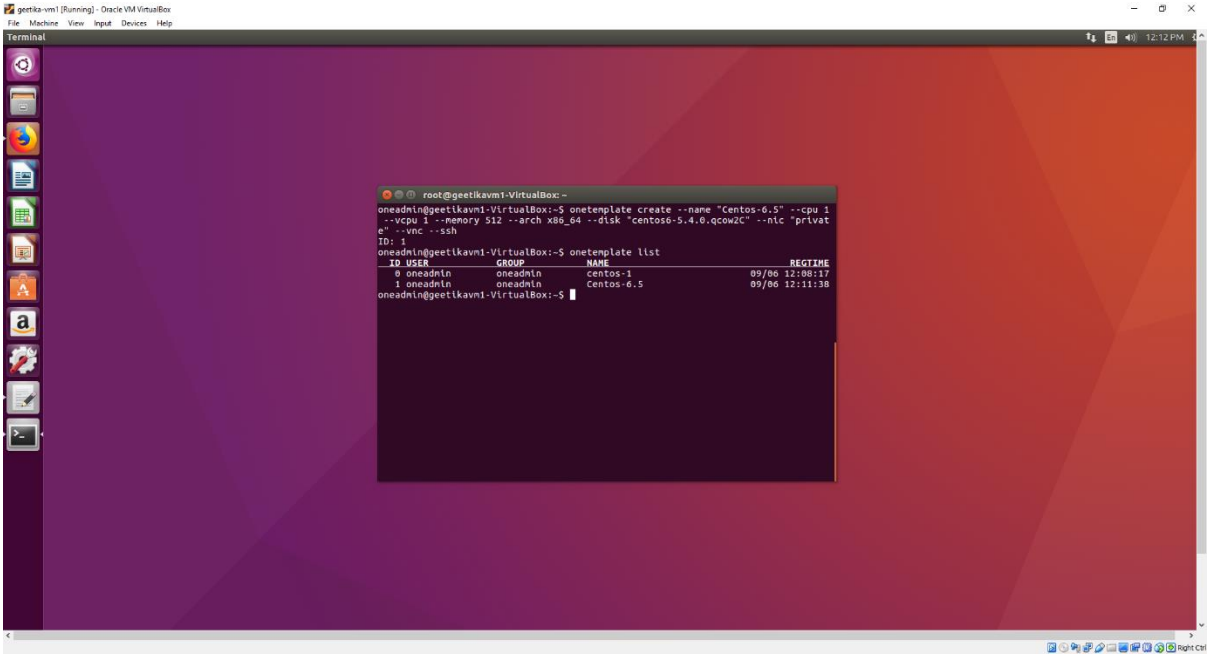




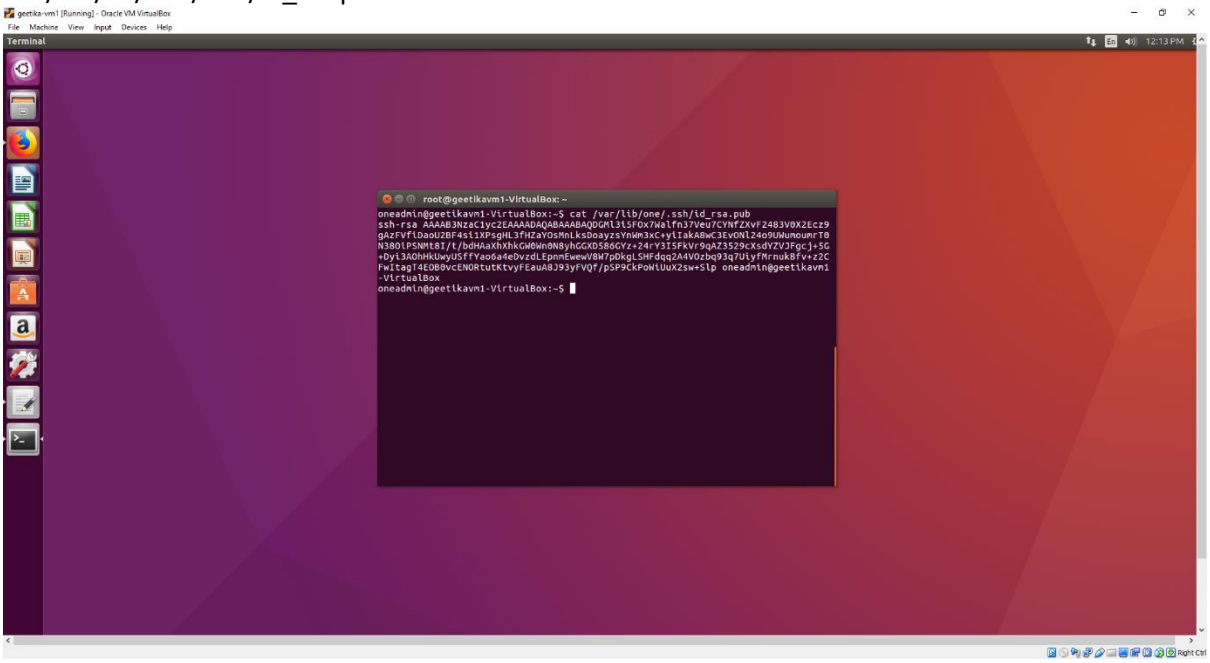
onetemplate create --name “Centos-6.5” --cpu 1 --vcpu 1 --memory 512 --arch x86_64 –disk “centos-6-5.4.0.qcow2C” --nic “private” --vnc --ssh

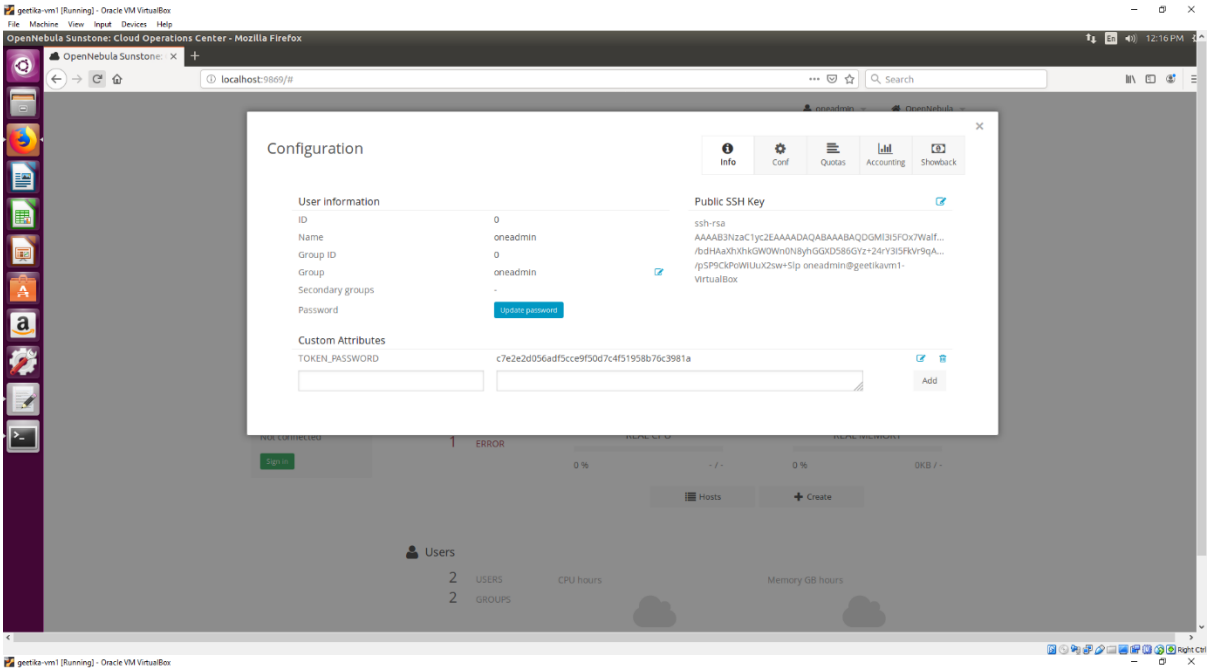


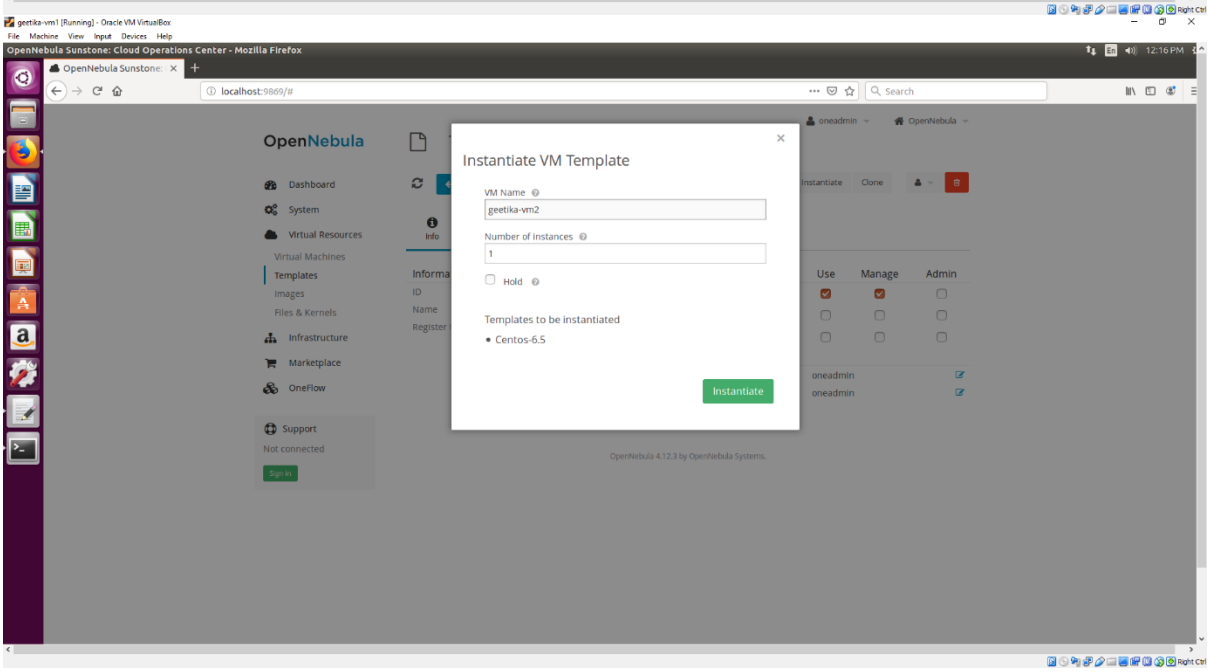
onetemplate list

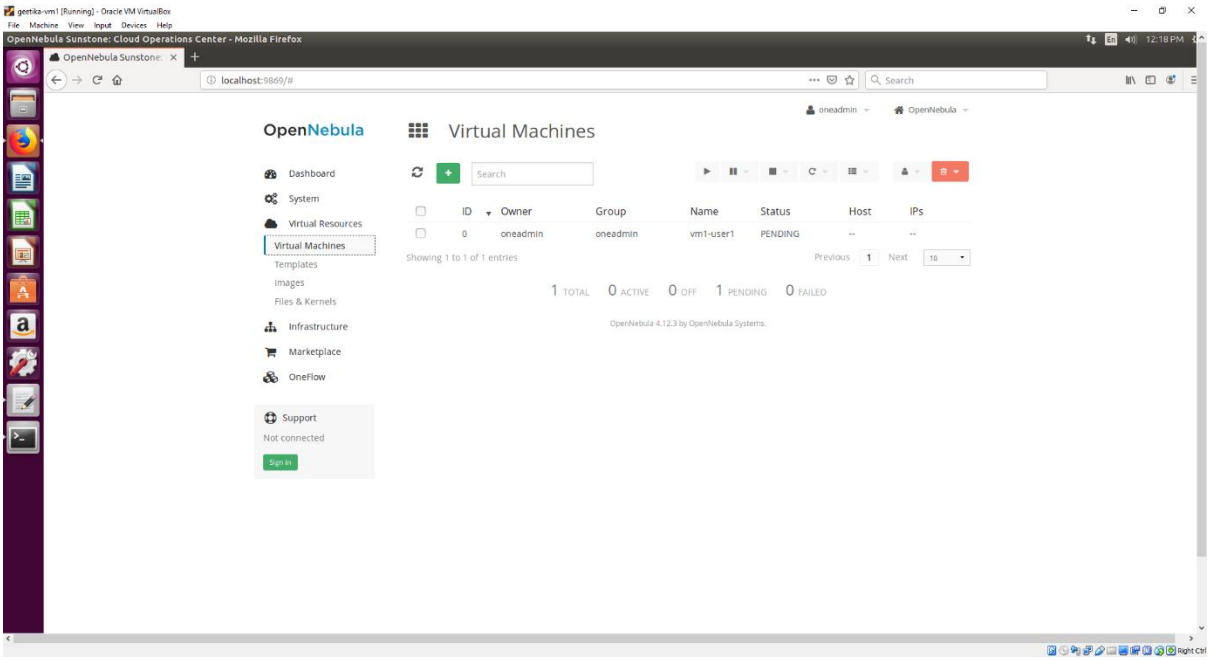


cat /var/lib/one/.ssh/id_rsa.pub




geetika-vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
OpenNebula Sunstone: Cloud Operations Center - Mozilla Firefox
localhost:9869/#
Configuration
Info
Conf
Quotas
Accounting
Showback
User information
ID 0
Name oneadmin
Group ID 0
Group oneadmin
Secondary groups -
Password
Update password
Public SSH Key
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQDGMl3I5FOx7Walf...
/bdHAaXhXhkGW0Wn0N8yhGGXD586GYz+24rY3I5FkVr9qA...
/pSP9CkPoWIUuX2sw+Slp oneadmin@geetikavm1-
VirtualBox
Custom Attributes
TOKEN_PASSWORD c7e2e2d056adf5cce9f50d7c4f51958b76c3981a
Add
Hosts
Create
Users
2 USERS
2 GROUPS
CPU hours
Memory GB hours


geetika-vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
OpenNebula Sunstone: Cloud Operations Center - Mozilla Firefox
localhost:9869/#
OpenNebula
Dashboard
System
Virtual Resources
Virtual Machines
Templates
Images
Files & Kernels
Infrastructure
Marketplace
OneFlow
Support
Not connected
Sign in
Instantiate VM Template
VM Name
geetika-vm2
Number of instances
1
Hold
Templates to be instantiated
Centos-6.5
Instantiate
Use
Manage
Admin
oneadmin
oneadmin
OpenNebula 4.12.3 by OpenNebula Systems.



onevm list

RESULT:

Thus, front-end and KVM node installation of Opennebula is performed and verified using Ubuntu 16.04 desktop image in the two VMs.

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Assignment -9 : Live Migration of Virtual Machine

Assigned Date: **Due Date:**

In OpenNebula FrontEnd VM do the following.

I. Add 4 hosts (nodes) to /etc/hosts as follows

<IP of frontend> frontend

<IP of node1> node11

<IP of node2> node12

<IP of node3> node13

II. Create above mentioned 4 hosts in oneadmin user as follows.

oneadmin@]$ onehost create frontend –i kvm –v kvm –n dummy

oneadmin@]$ onehost create node11 –i kvm –v kvm –n dummy

oneadmin@]$ onehost create node12 –i kvm –v kvm –n dummy

oneadmin@]$ onehost create node13 –i kvm –v kvm –n dummy

III. Update the VM template with SSH_PUBLIC_KEY using "*oneuser*" command.

IV. Creating a Virtual Machine (VM) Template

1. Use CentOS 6.5 (64-bit) OS image to create virtual machine template.
2. Use "*onetemplate*" command to do it.

V. Create two VMs (VM1 and VM2) with CentOS 6.5 (64-bit) from the above created CentOS6.5 (64-bit) template.

VI. List all VMs and hosts running in Opennebula Cloud.

VII. Deploy VM1 in node11 host and VM2 in node12 host using the command

oneadmin@]$ onevm deploy <vm-id> <host-id>

VIII. Migrate VM1 and VM2 to node13 host using following command

oneadmin@]$ onevm migrate <vm-id> <host-id>

IX. List all VMs and hosts running in Opennebula Cloud.

EX NO: 9	**LIVE MIGRATION OF VIRTUAL MACHINE**

AIM:

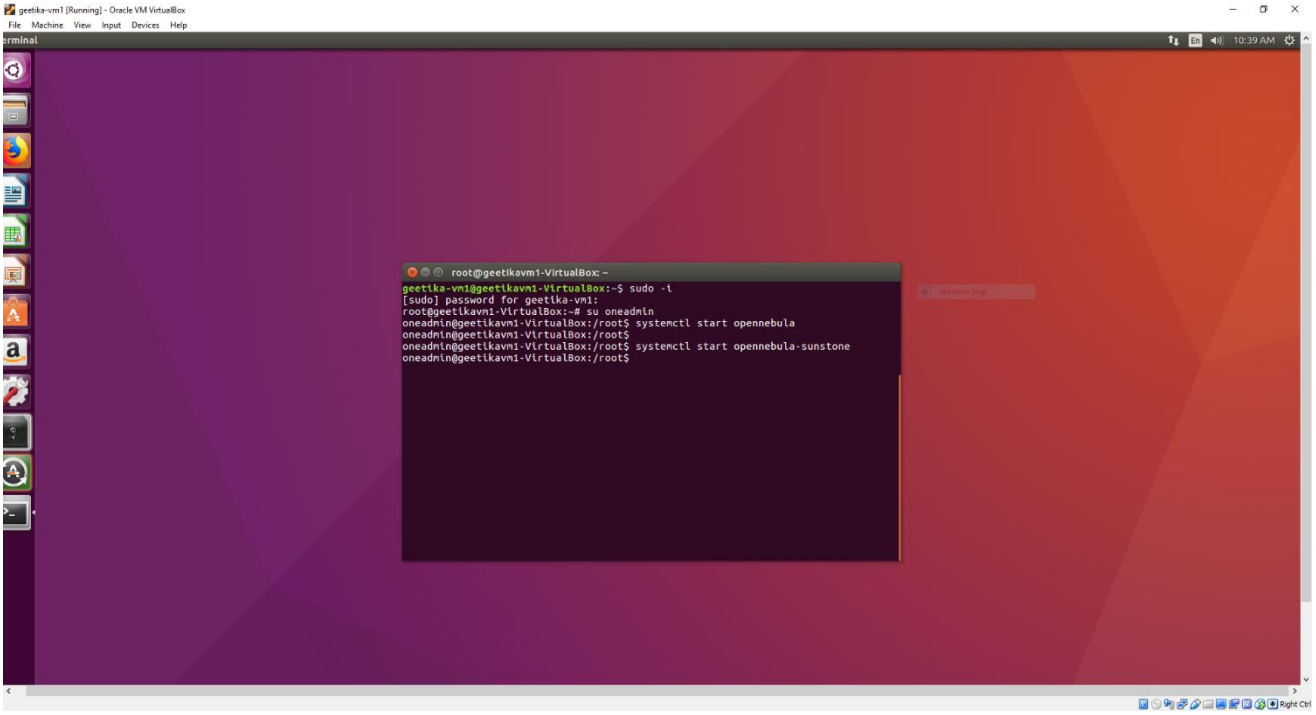
To perform live migration of Virtual Machine from One host to another host machine.

PRE-REQUISITES:

1. Install **OpenNebula Front-End VM and KVM node VM**(Refer EX: 7) [2 VMs with Ubuntu 16.04 desktop image]

PROCEDURE:

Start Open Nebula by the commands:
sudo -i
su oneadmin
systemctl start opennebula
systemctl start opennebula-sunstone

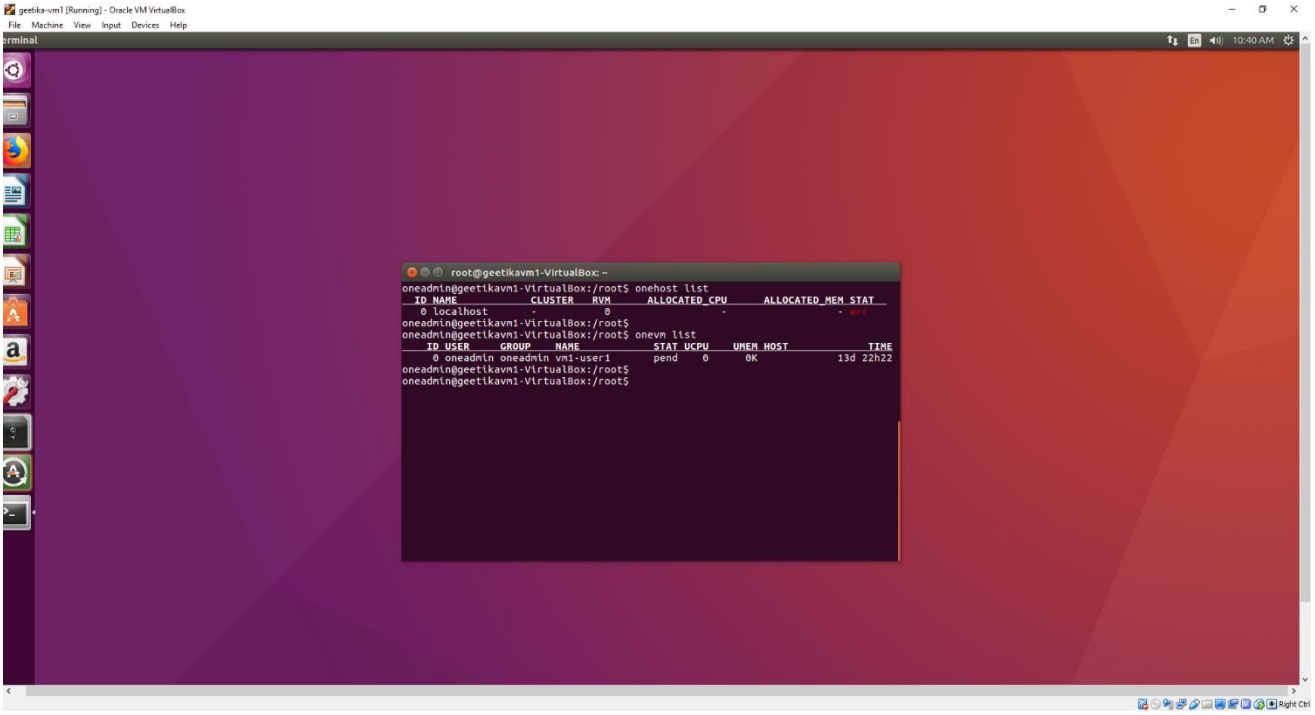


List all the hosts,templates and vms using:

$ onehost list

$ onetemplate list

$ onevm list



`

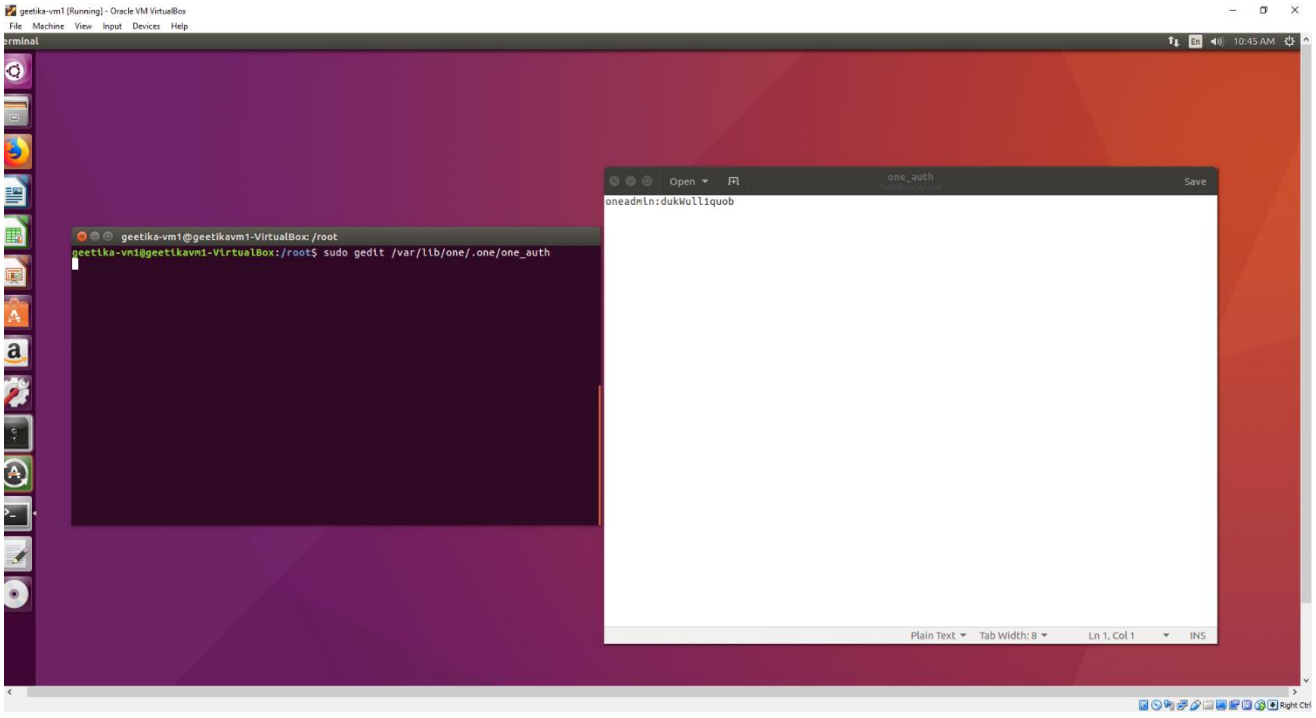
2. **CREATION OF HOSTS:**

2.1. The hosts can be created via the command line using **$ onehost create frontend –i kvm –v kvm –n dummy**

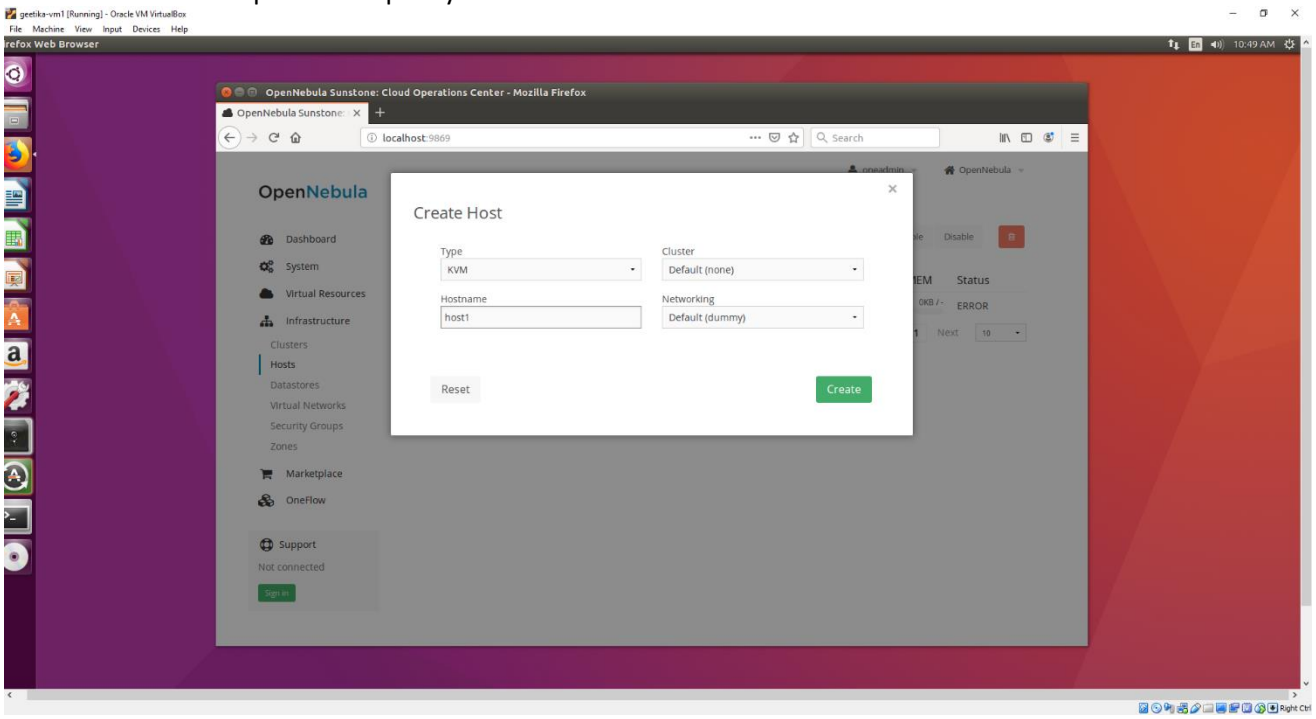
(or)

Through the open nebula web interface : **localhost:9869 .** Login with the username and password as given in **/var/lib/one/.one/one_auth** file using the command **$sudo gedit /var/lib/one/.one/one_auth**

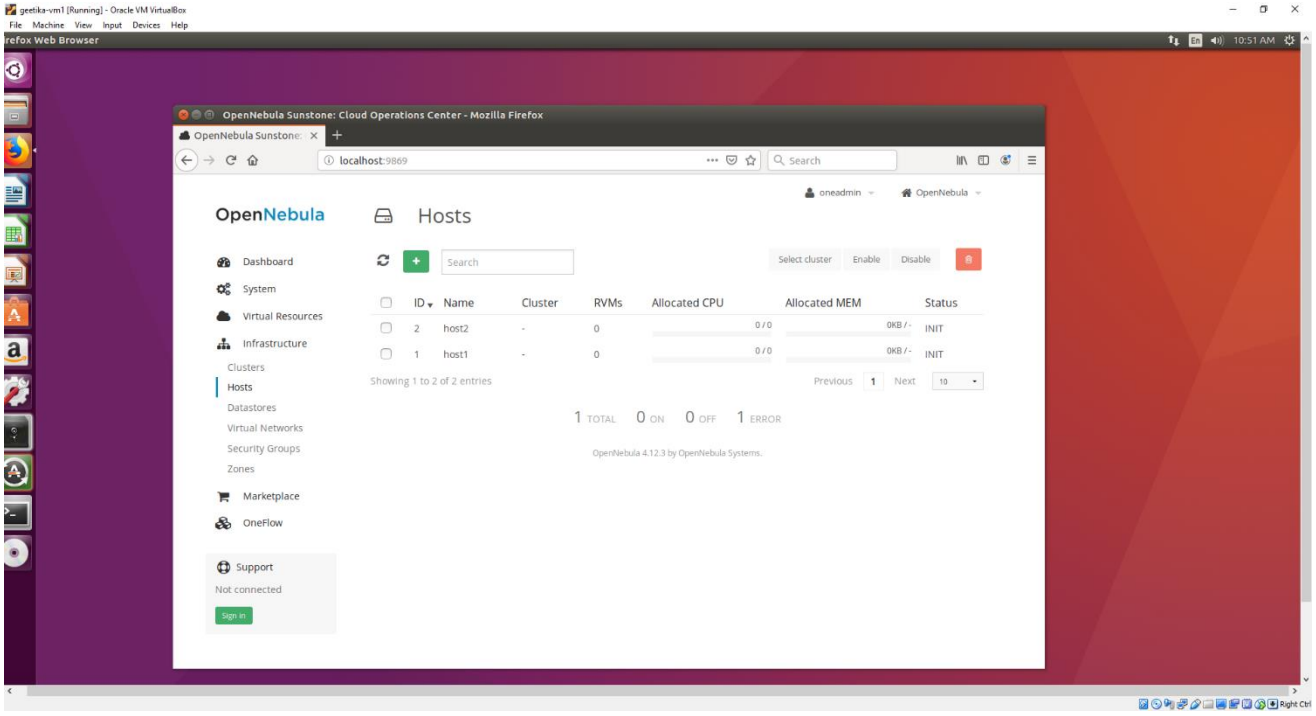
2.2 Navigate to **Infrastructure> hosts** in the left menu pane in the web interface as shown:



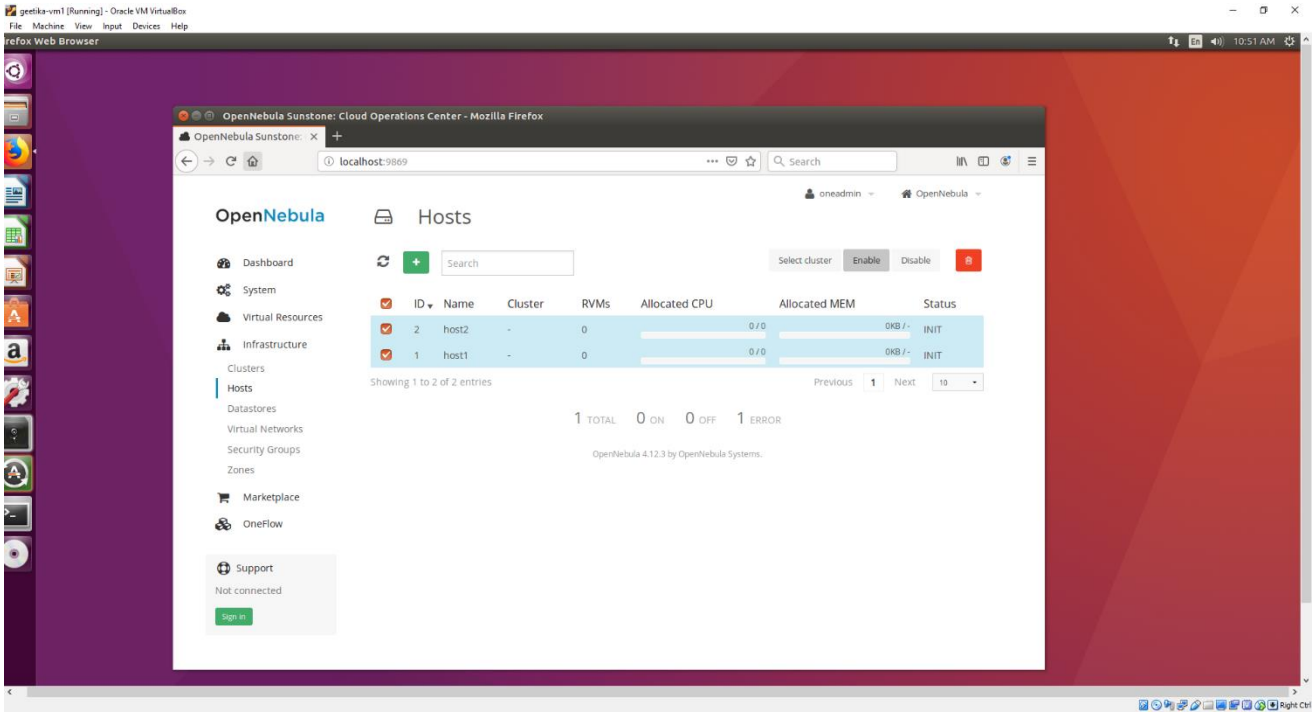
Click on the '+' add option and specify the hostname and click on "create" as shown:



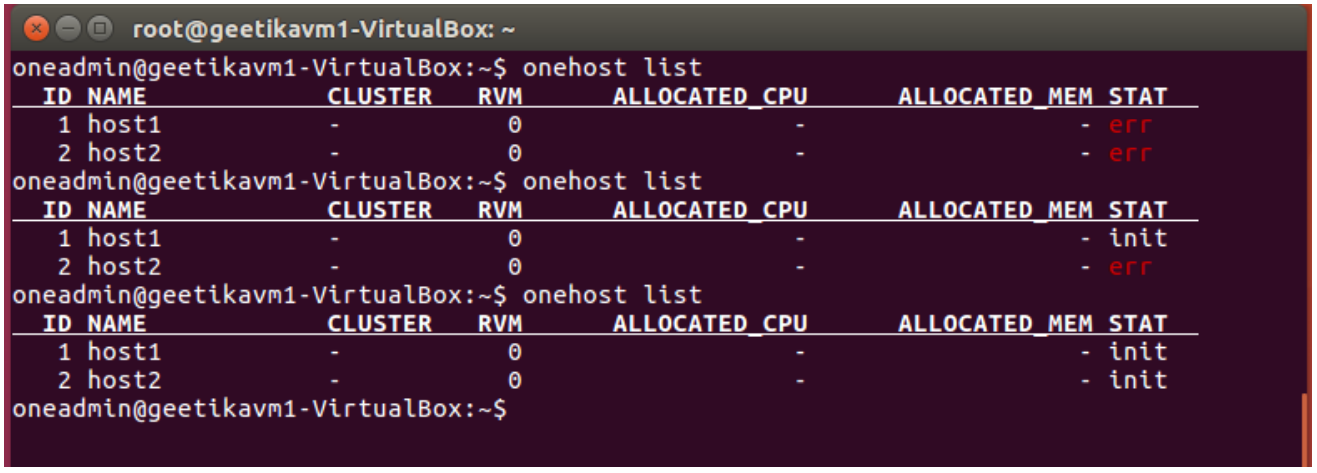
Similarly create another host and both will be listed as shown :



On clicking the **enable** button after creating the hosts, the status changes to init.



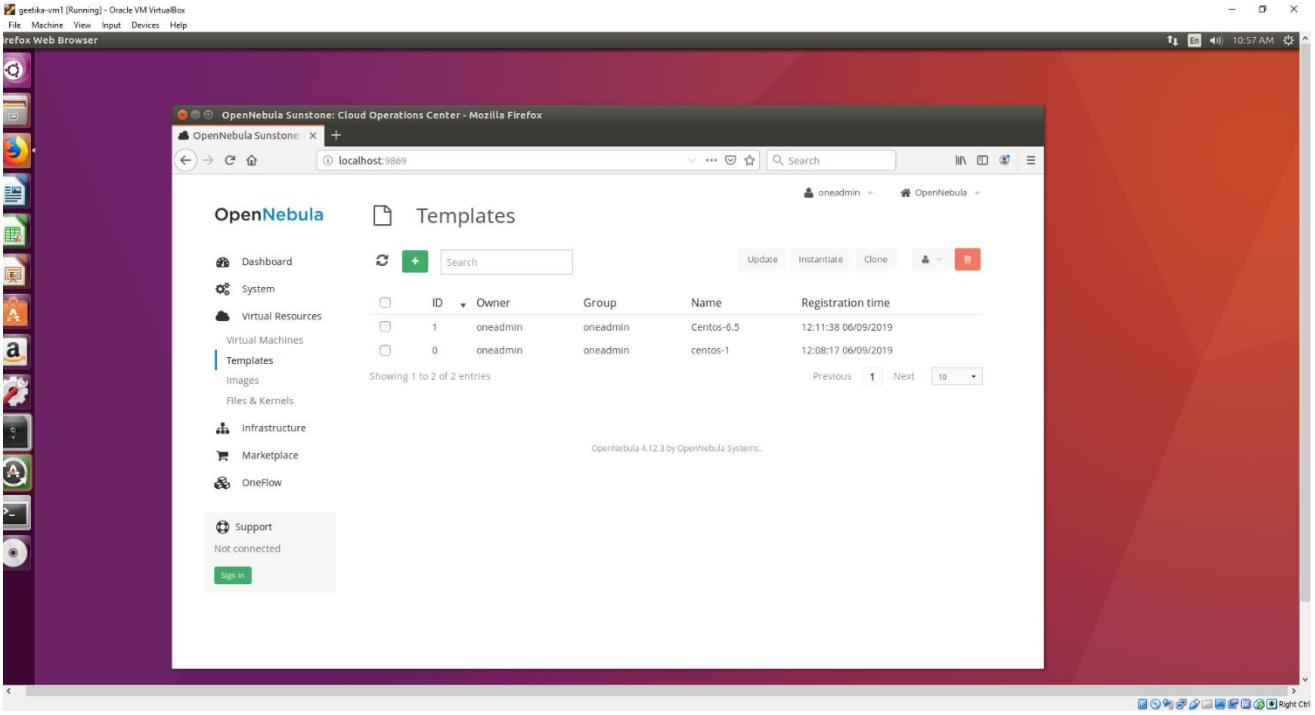
$onehost list can be used to list the hosts in the terminal which gives the following result:

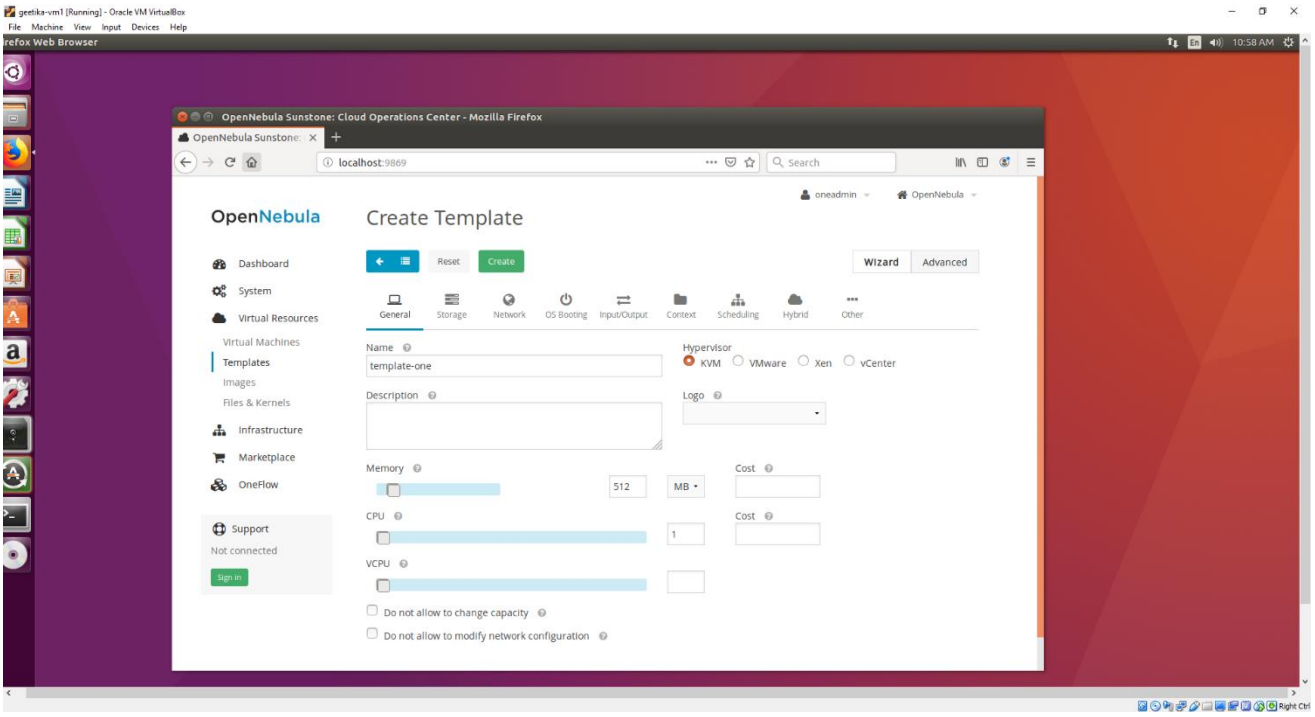


3. CREATION OF TEMPLATE:

Under the virtual resources > template option is selected and in the similar way to hosts , templates are created.

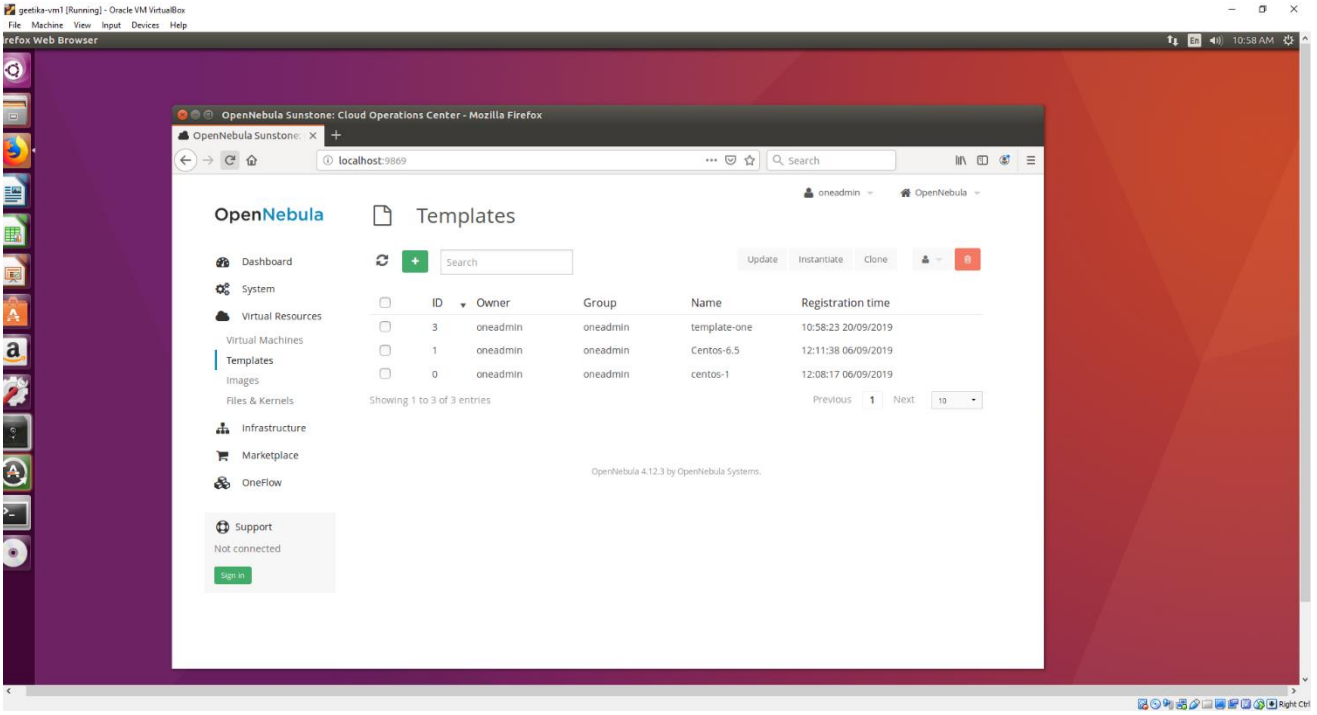
$onetemplate list will specify the new template created.

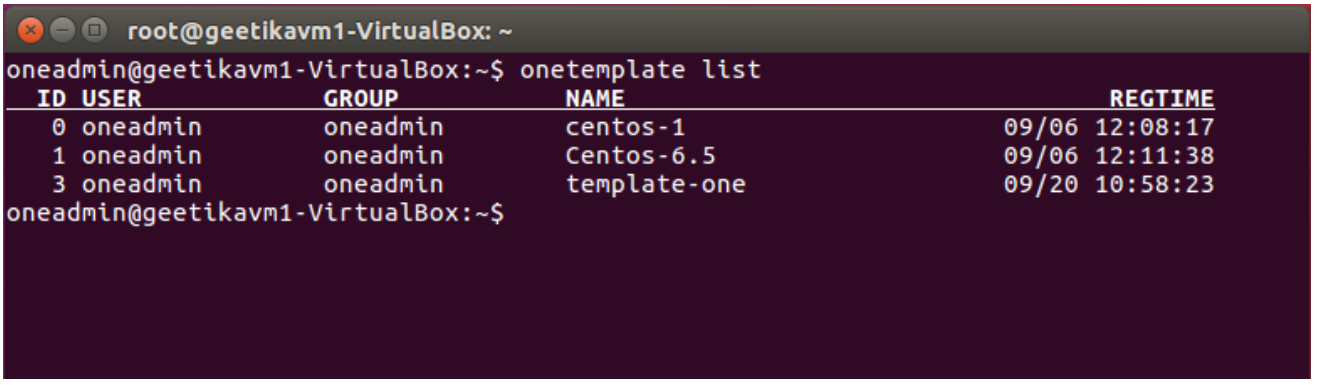




4. CREATION OF VM :

The template created is instantiated to create a virtual machine by clicking on the “instantiate” option in templates.





5. **Deploy and migrate the VM-** vm1 on host by specifying the vm id and host id.

   $onevm deploy <vm-id> <host-id>

   $onevm migrate <vm-id> <host-

```
root@geetikavm1-VirtualBox: ~
oneadmin@geetikavm1-VirtualBox:/root$ onevm deploy 5 3
oneadmin@geetikavm1-VirtualBox:/root$ onevm list
    ID USER     GROUP    NAME            STAT UCPU    UMEM HOST             TIME
     5 oneadmin oneadmin template-one    fail    0      0K              0d 00h00
oneadmin@geetikavm1-VirtualBox:/root$
```

Here, vm1 with id 5 is deployed on host 1 with id 3. host1 appears under the host column.

RESULT:

Thus, live migration of virtual machine is performed using Opennebula.

SSN COLLEGE OF ENGINEERING
Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -10 : Installation of Single Node Hadoop and Executing WordCount Program

Assigned Date: 03.09.2018. **Due Date: 04.09.2018 & 06.09.2018**

I. Pre-requisites

1. Operating System: Ubuntu 14.04/15.04 LTS (64-Bit only) OS
2. Installation Mode : Install in Guest OS (**Note**: Virtual Machine can be slower to work when Hadoop Cluster starts)
3. Java: jdk 1.8
4. Download latest version of Apache Hadoop package
5. Eclipse Luna 64-bit for Linux (Can be downloaded from SSN Intranet – Tech Support). Install Eclipse. (If Necessary)
6. Create a Virtual Machine and install Ubuntu 16.04 Desktop amd64.iso in VM. Name the VM as HadoopVM and set network configuration.

II. Create user named as hduser and add hduser in a group named Hadoop.
Login as hduser using]$ su – hduser command

III. Generate ssh key-pairs and move id_rsa.pub key to authorized_keys

IV. Install openssh-server and openssh-client packages using root privilege.

V. Download Hadoop and Java packages from internet and move them to the path /usr/local/hadoop

VI. Install Java and set path in ~/.bashrc file.
(Take atmost care while making changes in ~/.bashrc file)
To check java version:]$ java –version

VII. Install Hadoop and set path in ~/.bashrc file
To check Hadoop version:]$ hadoop version

VIII. Make changes in following Configuration files.

1. core-site.xml
2. yarn-site.xml
3. mapred-site.xml
4. hdfs-site.xml

IX. Login to hadoop / hduser user. Format the namenode

X. Start all Hadoop service.

XI. Check the running services in Web Interface.

XII. Managing files in HDFS. Follow below link.

Create an input file with few sentences in it. Upload input file into HDFS using put command / copyFromLocal command
put *command to store file in HDFS,* ***get*** *command to read / retrieve file from HDFS.*

hduser]$ /usr/local/hadoop/bin/hadoop dfs –copyFromLocal /tmp/MapReduceInput /user/hduser/MapReduceInput

hduser]$ /usr/local/hadoop/bin/hadoop dfs –ls /tmp/MapReduceInput /user/hduser/MapReduceInput

https://hadoop.apache.org/docs/r2.4.1/hadoop-project-dist/hadoop-common/FileSystemShell.html

XIII. Write word count program in Java using Map and Reduce functions. Create word count program into a jar file using Eclipse.
Follow link in reference section. Either download wordcount.jar file and execute it or use Eclipse IDE to export java program into a .jar file.

https://hadoop.apache.org/docs/stable/hadoop-mapreduce-client/hadoop-mapreduce-client-core/MapReduceTutorial.html#Example:_WordCount_v2.0

http://hortonworks.com/hadoop-tutorial/using-commandline-manage-files-hdfs/

XIV. Execute the word count program's jar file using below command in hduser.

hduser]$ ls /usr/local/hadoop/

hduser]$ /usr/local/hadoop/bin/hadoop jar /usr/local/Hadoop/Hadoop-examples-2.7.1.jar wordcount /user/hduser/MapReduceInput /user/hduser/MapReduce.output

OR

hadoop jar wordcount.jar /usr/local/hadoop/input /usr/local/hadoop/output

hduser]$ /usr/local/hadoop/bin/hadoop dfs –ls /user/hduser
hduser]$ /usr/local/hadoop/bin/hadoop dfs –ls /user/hduser/ MapReduce.output
hduser]$ /usr/local/hadoop/bin/hadoop dfs –cat /user/hduser/ MapReduce.output/part-r-00000

Finally stop all Hadoop services.

INSTALLATION OF SINGLE NODE HADOOP AND EXECUTING WORD COUNT PROGRAM

AIM:

To install single node hadoop in Ubuntu 16.04 Desktop image and execute the word count program.

PRE-REQUISITES:

1. Create a Virtual Machine and install Ubuntu 16.04 Desktop amd64.iso in VM. Name the VM as HadoopVM and set network configuration.

2. Install JDK

Sudo apt-get install default-jdk

Change the ~/.bashrc file by adding the following:
Note: Set these variables after creating the hduser

export JAVA_HOME=/usr/local/java

export PATH=$JAVA_HOME/bin:{$PATH}

export CLASSPATH=$JAVA_HOME/lib

Refresh the bashrc file - source ~/.bashrc and type java -version to verify

```
hduser@golhar-VirtualBox:~$ sudo apt-get install default-jdk
[sudo] password for hduser:
Reading package lists... Done
Building dependency tree
Reading state information... Done
default-jdk is already the newest version (2:1.8-56ubuntu2).
0 upgraded, 0 newly installed, 0 to remove and 20 not upgraded.
hduser@golhar-VirtualBox:~$ java -version
openjdk version "1.8.0_222"
OpenJDK Runtime Environment (build 1.8.0_222-8u222-b10-1ubuntu1~16.04.1-b10)
OpenJDK 64-Bit Server VM (build 25.222-b10, mixed mode)
hduser@golhar-VirtualBox:~$
```

```
hduser@golhar-VirtualBox: ~
File  Edit  Tabs  Help
  GNU nano 2.5.3                    File: /home/hduser/.bashrc

export PATH=$PATH:$HADOOP_HOME/sbin

export JAVA_HOME="/usr/lib/jvm/java-8-openjdk-amd64"
export PATH=$JAVA_HOME/bin:$PATH
export CLASSPATH=$JAVA_HOME/lib

export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"
```

Procedure:

1. Create user named as hduser and add hduser in a group named Hadoop.

$ sudo adduser hduser

$ sudo usermod -G sudo hduser

Switch to hduser - $ su hduser

```
golhar@golhar-VirtualBox:~$ sudo adduser hduser1
[sudo] password for golhar:
adduser: The user `hduser1' already exists.
golhar@golhar-VirtualBox:~$ sudo adduser hduser2
Adding user `hduser2' ...
Adding new group `hduser2' (1003) ...
Adding new user `hduser2' (1003) with group `hduser2' ...
Creating home directory `/home/hduser2' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for hduser2
Enter the new value, or press ENTER for the default
        Full Name []: hduser2
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] Y
golhar@golhar-VirtualBox:~$ su hduser
Password:
hduser@golhar-VirtualBox:/home/golhar$
```

2. Generate ssh key-pairs and move id_rsa.pub key to authorized_keys [Password-lesslogin]

$ ssh-keygen -t rsa -P '' -f ~/.ssh/id_rsa [check '' while copying]

$ cat ~/.ssh/id_rsa.pub >> ~/.ssh/authorized_keys

$ chmod 0600 ~/.ssh/authorized_keys

```
hduser@golhar-VirtualBox:/home/golhar$ ssh-keygen -t rsa -P '' -f ~/.ssh/id_rsa
Generating public/private rsa key pair.
Created directory '/home/hduser/.ssh'.
Your identification has been saved in /home/hduser/.ssh/id_rsa.
Your public key has been saved in /home/hduser/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:DAxFaSqf9S9lItiSRVCxal0rL4ZfQNwEW3MRdny5XZM hduser@golhar-VirtualBox
The key's randomart image is:
+---[RSA 2048]----+
|     o=*++ =+.  ..|
|      ++* + .. oE.|
|      +B o    . oo|
|  . .+o+ .    . .|
|   ooB+.S        |
|   .*.o+o o      |
|    ..o.o=       |
|     o o. .      |
|      . .        |
+----[SHA256]-----+
hduser@golhar-VirtualBox:/home/golhar$ chmod 0600 ~
```

```
hduser@golhar-VirtualBox:/home/golhar$ cat ~/.ssh/id_rsa.pub >> ~/.ssh/authorised_keys
hduser@golhar-VirtualBox:/home/golhar$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
```

3. If it doesn't work, install openssh-server and openssh-client packages using root privilege

   and try again.

   sudo apt-get install openssh-server openssh-client

```
hduser@golhar-VirtualBox:/home/golhar$ sudo apt-get install openssh-server openssh-client
[sudo] password for hduser:
Reading package lists... Done
Building dependency tree
Reading state information... Done
openssh-client is already the newest version (1:7.2p2-4ubuntu2.8).
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  ssh-askpass rssh molly-guard monkeysphere
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 20 not upgraded.
Need to get 633 kB of archives.
After this operation, 5,136 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu xenial/main amd64 ncurses-term all 6.0+20160213-1ubuntu1
[249 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openssh-sftp-server amd64 1:7.
p2-4ubuntu2.8 [38.9 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu xenial-updates/main amd64 openssh-server amd64 1:7.2p2-4
buntu2.8 [335 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu xenial/main amd64 ssh-import-id all 5.5-0ubuntu1 [10.2 k
]
Fetched 633 kB in 2s (293 kB/s)
Preconfiguring packages ...
```

4. Download Hadoop and Java packages from internet and move them to the path /usr/local/hadoop

   $sudo mv hadoop-2.7.1 /usr/local/hadoop

```
hduser@golhar-VirtualBox:/home/golhar/Downloads$ ls
hadoop-2.7.7.tar.gz  hadoop-2.7.7.tar.gz.part
hduser@golhar-VirtualBox:/home/golhar/Downloads$ sudo tar xfz hadoop-2.7.7.tar.gz
[sudo] password for hduser:
hduser@golhar-VirtualBox:/home/golhar/Downloads$ ls
hadoop-2.7.7  hadoop-2.7.7.tar.gz
hduser@golhar-VirtualBox:/home/golhar/Downloads$ sudo mv hadoop-2.7.7 /usr/local/hadoop
hduser@golhar-VirtualBox:/home/golhar/Downloads$ sudo nano /usr/local/hadoop/etc/hadoop/hadoop-env.sh
```

5. Add the JAVA_HOME to hadoop-env.sh file

   $ sudo nano /usr/local/hadoop/etc/hadoop/hadoop-env.sh

```
  GNU nano 2.5.3                    File: /usr/local/hadoop/etc/hadoop/had


# The java implementation to use.
export JAVA_HOME="/usr/lib/jvm/java-8-openjdk-amd64"

# The jsvc implementation to use. Jsvc is required to run secure datanodes
# that bind to privileged ports to provide authentication of data transfer
# protocol.  Jsvc is not required if SASL is configured for authentication of
```

6. Add the following lines to ~/.bashrc

$gedit ~/.bashrc

#HADOOP VARIABLES START

export HADOOP_INSTALL=/usr/local/hadoop

export PATH=$PATH:$HADOOP_INSTALL/bin

export PATH=$PATH:$HADOOP_INSTALL/sbin

export HADOOP_MAPRED_HOME=$HADOOP_INSTALL

export HADOOP_COMMON_HOME=$HADOOP_INSTALL

export HADOOP_HDFS_HOME=$HADOOP_INSTALL

export YARN_HOME=$HADOOP_INSTALL

export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_INSTALL/lib/native

export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"

export HADOOP_CLASSPATH=$JAVA_HOME/lib/tools.jar

export HADOOP_HOME=/usr/local/hadoop

export PATH=$PATH:$HADOOP_HOME/bin

export PATH=$PATH:$HADOOP_HOME/sbin

#HADOOP VARIABLES END

Refresh the .bashrc file:

source ~/.bashrc

```
  GNU nano 2.0.6              File: bashrc

export HADOOP_INSTALL=/usr/local/hadoop
export PATH=$PATH:$HADOOP_INSTALL/bin
export PATH=$PATH:$HADOOP_INSTALL/sbin
export HADOOP_MAPRED_HOME=$HADOOP_INSTALL
export HADOOP_COMMON_HOME=$HADOOP_INSTALL
export HADOOP_HDFS_HOME=$HADOOP_INSTALL
export YARN_HOME=$HADOOP_INSTALL
export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_INSTALL/lib/native
export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"
export HADOOP_CLASSPATH=$JAVA_HOME/lib/tools.jar
export HADOOP_HOME=/usr/local/hadoop
export PATH=$PATH:$HADOOP_HOME/bin
export PATH=$PATH:$HADOOP_HOME/sbi
```

7. Add the following tag to core-site.xml inside the configuration tag.

$ gedit /usr/local/hadoop/etc/hadoop/core-site.xml

<property/>

<name/>fs.default.name</name>;

<value> hdfs://localhost:9000 </value>

</property>

save the file and exit

```
  GNU nano 2.5.3              File: /usr/local/hadoop/etc/hadoop/core-site.xml

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  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
<property>
<name>fs.default.name</name>
<value> hdfs://localhost:9000 </value>
</property>
</configuration>
```

8. Add the following tags to yarn-site.xml inside the configuration tag

$ gedit /usr/local/hadoop/etc/hadoop/yarn-site.xml

<property>

<name>yarn.nodemanager.aux-services</name>

<value>mapreduce_shuffle</value>

</property>

<property>

<name>yarn.nodemanager.aux-services.mapreduce.shuffle.class</name>

<value>org.apache.hadoop.mapred.ShuffleHandler</value>

</property>

```
hduser@gol...   golhar@gol...
 GNU nano 2.5.3              File: /usr/local/hadoop/etc/hadoop/yarn-site.xml

  limitations under the License. See accompanying LICENSE file.
-->
<configuration>

<!-- Site specific YARN configuration properties -->

</configuration>


<property>
<name>yarn.nodemanager.aux-services</name>
<value>mapreduce_shuffle</value>
</property>
<property>
<name>yarn.nodemanager.aux-services.mapreduce.shuffle.class</name>
<value>org.apache.hadoop.mapred.ShuffleHandler</value>
</property>
```

9. Copy the MapRed-site.xml.template file to MapRed-site.xml

Linux>cp /usr/local/hadoop/etc/hadoop/mapred-site.xml.template

/usr/local/hadoop/etc/hadoop/mapred-site.xml

Linux> gedit /usr/local/hadoop/etc/hadoop/mapred-site.xml

<property>

<name>mapreduce.framework.name</name>

<value>yarn</value>

</property>

```
  GNU nano 2.5.3              File: /usr/local/hadoop/etc/hadoop/mapred-site.xml

  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>

<property>
<name>mapreduce.framework.name</name>
<value>yarn</value>
</property>

</configuration>
```

10. Add the following tags to hdfs-site.xml inside the configuration tag

Linux>> sudo mkdir -p /usr/local/hadoop_store/hdfs

Linux>> gedit /usr/local/hadoop/etc/hadoop/hdfs-site.xml

```
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo nano /usr/local/hadoop/etc/hadoop/mapred-site.xml
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo nano /usr/local/hadoop/etc/hadoop/mapred-site.xml
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo mkdir -p /usr/local/hadoop_store/hdfs
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo nano /usr/local/hadoop/etc/hadoop/hdfs-site.xml
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo nano /usr/local/hadoop/etc/hadoop/hdfs-site.xml
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chown hduser:hduser -R /usr/local/hadoop
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chown hduser:hduser -R /usr/local/hadoop_store
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chmod -R 777 /usr/local/hadoop
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chmod -R 777 /usr/local/hadoop_store
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$
```

<property>

<name>dfs.replication</name>

<value>1</value>

</property>

<property>

<name>dfs.namenode.name.dir</name>

<value>file:/usr/local/hadoop_store/hdfs/namenode</value>

</property>

<property>

<name>dfs.datanode.data.dir</name>

<value>file:/usr/local/hadoop_store/hdfs/datanode</value>

</property>

```
hduser@golhar-VirtualBox: /root
File  Edit  Tabs  Help
  GNU nano 2.5.3                    File: /usr/local/hadoop/etc/hadoop/hdfs-site.xml

<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
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  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>

<property>
<name>dfs.replication</name>
<value>1</value>
</property>
<property>
<name>dfs.namenode.name.dir</name>
<value>file:/usr/local/hadoop_store/hdfs/namenode</value>
</property>
<property>
<name>dfs.datanode.data.dir</name>
<value>file:/usr/local/hadoop_store/hdfs/datanode</value>
</property>
```

11.

Linux> sudo chown hduser:hduser -R /usr/local/hadoop

Linux> sudo chown hduser:hduser -R /usr/local/hadoop_store

also give the folder the full permission

Linux> sudo chmod -R 777 /usr/local/hadoop

Linux> sudo chmod -R 777 /usr/local/hadoop_store

```
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chown hduser:hduser -R /usr/local/hadoop
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chown hduser:hduser -R /usr/local/hadoop_store
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chmod -R 777 /usr/local/hadoop
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$ sudo chmod -R 777 /usr/local/hadoop_store
hduser@golhar-VirtualBox:/usr/local/hadoop/etc$
```

12. hdfs namenode format$ /usr/local/hadoop/bin/hadoop namenode -format

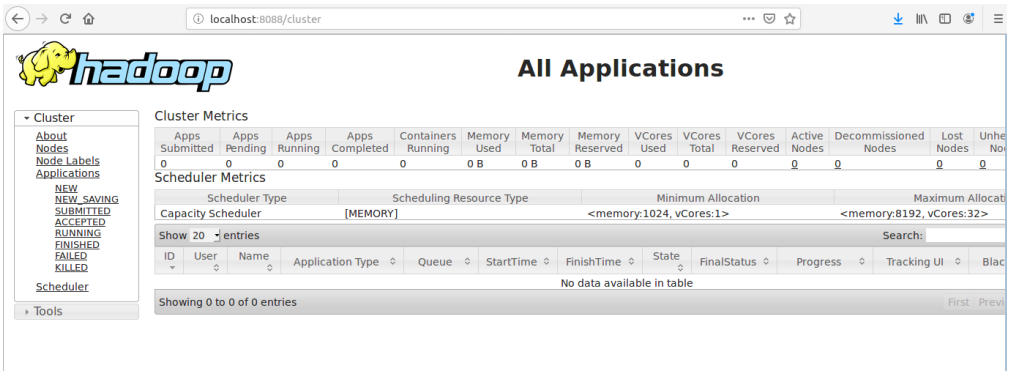
```
hduser@hadoopvm-VirtualBox: ~
hduser@hadoopvm-VirtualBox:~$ /usr/local/hadoop/bin/hadoop namenode -format
WARNING: Use of this script to execute namenode is deprecated.
WARNING: Attempting to execute replacement "hdfs namenode" instead.

WARNING: /usr/local/hadoop/logs does not exist. Creating.
2019-09-23 15:32:13,439 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = hadoopvm-VirtualBox/127.0.1.1
STARTUP_MSG:   args = [-format]
STARTUP_MSG:   version = 3.0.0
STARTUP_MSG:   classpath = /usr/local/hadoop/etc/hadoop:/usr/local/hadoop/share/hadoop/co
mmon/lib/jackson-annotations-2.7.8.jar:/usr/local/hadoop/share/hadoop/common/lib/jcip-ann
otations-1.0-1.jar:/usr/local/hadoop/share/hadoop/common/lib/commons-net-3.1.jar:/usr/loc
al/hadoop/share/hadoop/common/lib/curator-framework-2.12.0.jar:/usr/local/hadoop/share/ha
doop/common/lib/jersey-server-1.19.jar:/usr/local/hadoop/share/hadoop/common/lib/jaxb-api
-2.2.11.jar:/usr/local/hadoop/share/hadoop/common/lib/htrace-core4-4.1.0-incubating.jar:/
usr/local/hadoop/share/hadoop/common/lib/httpcore-4.4.4.jar:/usr/local/hadoop/share/hadoo
p/common/lib/jetty-server-9.3.19.v20170502.jar:/usr/local/hadoop/share/hadoop/common/lib/
kerb-server-1.0.1.jar:/usr/local/hadoop/share/hadoop/common/lib/mockito-all-1.8.5.jar:/us
r/local/hadoop/share/hadoop/common/lib/woodstox-core-5.0.3.jar:/usr/local/hadoop/share/ha
doop/common/lib/commons-cli-1.2.jar:/usr/local/hadoop/share/hadoop/common/lib/jetty-webap
p-9.3.19.v20170502.jar:/usr/local/hadoop/share/hadoop/common/lib/kerby-pkix-1.0.1.jar:/us
r/local/hadoop/share/hadoop/common/lib/jersey-servlet-1.19.jar:/usr/local/hadoop/share/ha
doop/common/lib/kerb-common-1.0.1.jar:/usr/local/hadoop/share/hadoop/common/lib/jettison-
1.1.jar:/usr/local/hadoop/share/hadoop/common/lib/kerb-simplekdc-1.0.1.jar:/usr/local/had
oop/share/hadoop/common/lib/jetty-security-9.3.19.v20170502.jar:/usr/local/hadoop/share/h
adoop/common/lib/snappy-java-1.0.5.jar:/usr/local/hadoop/share/hadoop/common/lib/jetty-se
rvlet-9.3.19.v20170502.jar:/usr/local/hadoop/share/hadoop/common/lib/jsr311-api-1.1.1.jar
:/usr/local/hadoop/share/hadoop/common/lib/jackson-mapper-asl-1.9.13.jar:/usr/local/hadoo
p/share/hadoop/common/lib/paranamer-2.3.jar:/usr/local/hadoop/share/hadoop/common/lib/jun
```

13. Start/Stop the Hadoop Cluster.

Linux> start-all.sh or stop-all.sh

```
hduser@hadoopvm-VirtualBox:/usr/local/hadoop/sbin$ bash start-all.sh
WARNING: Attempting to start all Apache Hadoop daemons as hduser in 10 seconds.
WARNING: This is not a recommended production deployment configuration.
WARNING: Use CTRL-C to abort.
Starting namenodes on [hadoopvm-VirtualBox]
hadoopvm-VirtualBox: Warning: Permanently added 'hadoopvm-virtualbox' (ECDSA) to the list
 of known hosts.
Starting datanodes
Starting secondary namenodes [hadoopvm-VirtualBox]
Starting resourcemanager
Starting nodemanagers
```

14.Check the hadoop web interface : localhost:8088. Also check if all the services are running




```
localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-hduser-nodemanager-golhar-VirtualBox.out
hduser@golhar-VirtualBox:/root$ jps
2599 NameNode
3098 ResourceManager
3467 Jps
2939 SecondaryNameNode
3403 NodeManager
2719 DataNode
hduser@golhar-VirtualBox:/root$
```

Hadoop is successfully installed

15. Executing the word count program

Create an input file with few sentences in it.

Upload input file into HDFS using put command / copyFromLocal command put command to store file in HDFS, get command to read / retrieve file from HDFS.

Create a user directory in hadoop file system hdfs using

$ hdfs dfs -mkdir -p /user/

$ hdfs dfs -mkdir -p /user/hadoop

$ hdfs dfs -mkdir -p /user/hadoop/inputfiles/

Put the text file-Mapreduce.txt into inputfiles folder as

$ hdfs dfs -ls <location_of_Mapreduce.txt> /user/hadoop/inputfiles/

List all files in hdfs is done using $hdfs dfs -ls /user/hadoop/inputfiles/

```
hduser@gol... ×   golhar@gol... ×
hduser@golhar-VirtualBox:~$ hdfs dfs -mkdir -p /user
19/09/26 14:24:27 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
hduser@golhar-VirtualBox:~$ hdfs dfs -mkdir -p /user/hadoop
19/09/26 14:26:38 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
hduser@golhar-VirtualBox:~$ hdfs dfs -mkdir -p /user/hadoop/inputfiles
19/09/26 14:28:01 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
hduser@golhar-VirtualBox:~$ ls
input.txt
hduser@golhar-VirtualBox:~$ hdfs dfs-ls input.txt /user/hadoop/inputfiles
Error: Could not find or load main class dfs-ls
hduser@golhar-VirtualBox:~$ hdfs dfs -ls input.txt /user/hadoop/inputfiles
19/09/26 14:29:55 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
ls: `input.txt': No such file or directory
hduser@golhar-VirtualBox:~$ hdfs dfs -put input.txt /user/hadoop/inputfiles
19/09/26 14:30:24 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
hduser@golhar-VirtualBox:~$ hdfs dfs -ls /user/hadoop/inputfiles
19/09/26 14:31:46 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
in-java classes where applicable
Found 1 items
-rw-r--r--   1 hduser supergroup         57 2019-09-26 14:30 /user/hadoop/inputfiles/input.txt
hduser@golhar-VirtualBox:~$
```

16. create the wordCount.java file. Compile it and create a jar file from it

$ usr/local/hadoop/bin/hadoop com.sun.tools.javac.Main WordCount.java

$ jar cf wc.jar WordCount*.class

```
hduser@golhar-VirtualBox: ~
File  Edit  Tabs  Help
hduser@golhar-VirtualBox:~$ /usr/local/hadoop/bin/hadoop com.sun.tools.javac.Main WordCount.java
hduser@golhar-VirtualBox:~$ ls
input.txt  WordCount.class  WordCount$IntSumReducer.class  WordCount.java  WordCount$TokenizerMapper.class
hduser@golhar-VirtualBox:~$ jar cf wc.jar WordCount*.class
hduser@golhar-VirtualBox:~$ ls
input.txt  wc.jar  WordCount.class  WordCount$IntSumReducer.class  WordCount.java  WordCount$TokenizerMapper.class
hduser@golhar-VirtualBox:~$ /usr/local/hadoop/bin/hadoop fs -ls /user/hadoop/inputfiles
19/09/27 20:45:25 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin
-java classes where applicable
Found 1 items
-rw-r--r--   1 hduser supergroup         57 2019-09-26 14:30 /user/hadoop/inputfiles/input.txt
hduser@golhar-VirtualBox:~$ /usr/local/hadoop/bin/hadoop fs -cat /user/hadoop/inputfiles/input.txt
19/09/27 20:45:52 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin
-java classes where applicable
test file to be given as input to the word count porgram
```

17. Run the jar file generated in the previous step and give the input file directory and output file directory as command line arguments

$ /usr/local/hadoop/bin/hadoop jar wc.jar WordCount /user/hadoop/inputfiles */user/hadoop/outputfiles4*

```
hduser@golhar-VirtualBox:~$ /usr/local/hadoop/bin/hadoop jar wc.jar WordCount /user/hadoop/inputfiles /user/hadoop/outputfiles4
19/09/27 21:10:59 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where appli
cable
19/09/27 21:11:01 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
19/09/27 21:11:03 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execu
te your application with ToolRunner to remedy this.
19/09/27 21:11:09 INFO input.FileInputFormat: Total input paths to process : 1
19/09/27 21:11:09 INFO mapreduce.JobSubmitter: number of splits:1
19/09/27 21:11:10 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1569598752176_0001
19/09/27 21:11:11 INFO impl.YarnClientImpl: Submitted application application_1569598752176_0001
19/09/27 21:11:11 INFO mapreduce.Job: The url to track the job: http://golhar-VirtualBox:8088/proxy/application_1569598752176_0001/
19/09/27 21:11:11 INFO mapreduce.Job: Running job: job_1569598752176_0001
19/09/27 21:12:12 INFO mapreduce.Job: Job job_1569598752176_0001 running in uber mode : false
19/09/27 21:12:13 INFO mapreduce.Job:  map 0% reduce 0%
19/09/27 21:12:43 INFO mapreduce.Job:  map 100% reduce 0%
19/09/27 21:13:10 INFO mapreduce.Job:  map 100% reduce 100%
19/09/27 21:13:13 INFO mapreduce.Job: Job job_1569598752176_0001 completed successfully
19/09/27 21:13:16 INFO mapreduce.Job: Counters: 49
        File System Counters
                FILE: Number of bytes read=126
                FILE: Number of bytes written=245675
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=176
                HDFS: Number of bytes written=76
                HDFS: Number of read operations=6
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=34252
                Total time spent by all reduces in occupied slots (ms)=20137
                Total time spent by all map tasks (ms)=34252
                Total time spent by all reduce tasks (ms)=20137
                Total vcore-milliseconds taken by all map tasks=34252
                Total vcore-milliseconds taken by all reduce tasks=20137
```


```
hduser@golhar-VirtualBox:~$ /usr/local/hadoop/bin/hadoop jar wc.jar WordCount /user/hadoop/inputfiles /user/hadoop/outputfiles4
19/09/27 21:10:59 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where appli
cable
19/09/27 21:11:01 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
19/09/27 21:11:03 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execu
te your application with ToolRunner to remedy this.
19/09/27 21:11:09 INFO input.FileInputFormat: Total input paths to process : 1
19/09/27 21:11:09 INFO mapreduce.JobSubmitter: number of splits:1
19/09/27 21:11:10 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1569598752176_0001
19/09/27 21:11:11 INFO impl.YarnClientImpl: Submitted application application_1569598752176_0001
19/09/27 21:11:11 INFO mapreduce.Job: The url to track the job: http://golhar-VirtualBox:8088/proxy/application_1569598752176_0001/
19/09/27 21:11:11 INFO mapreduce.Job: Running job: job_1569598752176_0001
19/09/27 21:12:12 INFO mapreduce.Job: Job job_1569598752176_0001 running in uber mode : false
19/09/27 21:12:13 INFO mapreduce.Job:  map 0% reduce 0%
19/09/27 21:12:43 INFO mapreduce.Job:  map 100% reduce 0%
19/09/27 21:13:10 INFO mapreduce.Job:  map 100% reduce 100%
19/09/27 21:13:13 INFO mapreduce.Job: Job job_1569598752176_0001 completed successfully
19/09/27 21:13:16 INFO mapreduce.Job: Counters: 49
        File System Counters
                FILE: Number of bytes read=126
                FILE: Number of bytes written=245675
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=176
                HDFS: Number of bytes written=76
                HDFS: Number of read operations=6
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=34252
                Total time spent by all reduces in occupied slots (ms)=20137
                Total time spent by all map tasks (ms)=34252
                Total time spent by all reduce tasks (ms)=20137
                Total vcore-milliseconds taken by all map tasks=34252
                Total vcore-milliseconds taken by all reduce tasks=20137
```

```
hduser@golhar-VirtualBox: ~
File  Edit  Tabs  Help
                Total time spent by all map tasks (ms)=34252
                Total time spent by all reduce tasks (ms)=20137
                Total vcore-milliseconds taken by all map tasks=34252
                Total vcore-milliseconds taken by all reduce tasks=20137
                Total megabyte-milliseconds taken by all map tasks=35074048
                Total megabyte-milliseconds taken by all reduce tasks=20620288
        Map-Reduce Framework
                Map input records=1
                Map output records=12
                Map output bytes=105
                Map output materialized bytes=126
                Input split bytes=119
                Combine input records=12
                Combine output records=11
                Reduce input groups=11
                Reduce shuffle bytes=126
                Reduce input records=11
                Reduce output records=11
                Spilled Records=22
                Shuffled Maps =1
                Failed Shuffles=0
                Merged Map outputs=1
                GC time elapsed (ms)=200
                CPU time spent (ms)=1510
                Physical memory (bytes) snapshot=284815360
                Virtual memory (bytes) snapshot=3869286400
                Total committed heap usage (bytes)=137498624
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
                WRONG_MAP=0
                WRONG_REDUCE=0
        File Input Format Counters
                Bytes Read=57
        File Output Format Counters
                Bytes Written=76
hduser@golhar-VirtualBox:~$
```

```
hduser@golhar-VirtualBox:~$ hadoop dfs -ls /user/hadoop/outputfiles4
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

19/09/27 21:17:23 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where appli
cable
Found 2 items
-rw-r--r--   1 hduser supergroup          0 2019-09-27 21:13 /user/hadoop/outputfiles4/_SUCCESS
-rw-r--r--   1 hduser supergroup         76 2019-09-27 21:13 /user/hadoop/outputfiles4/part-r-00000
hduser@golhar-VirtualBox:~$ hadoop dfs -cat /user/hadoop/outputfiles4/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

19/09/27 21:17:49 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where appli
cable
as      1
be      1
count   1
file    1
given   1
input   1
porgram 1
test    1
the     1
to      2
word    1
hduser@golhar-VirtualBox:~$
```

Result:

Thus Single Node Hadoop has been installed and word count was excecuted successfully.

SSN COLLEGE OF ENGINEERING
Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -11 : Mounting Hadoop using FUSE

Assigned Date: 08.09.2018. **Due Date: 08. 09.2018 & 08 .09.2018**

---

1. Hadoop Single node installation
2. Hadoop Fuse Installation
3. Hadoop Fuse Configuration
4. Mounting HDFS
5. HDFS mount using FUSE
6. Display the file system details
7. Unmount HDFS
8. Display the file system details

Follow the below link.

http://solutionsatexperts.com/hadoop-fuse-installation-and-configuration-on-centos/

EX NO 11	**MOUNTING HADOOP USING FUSE**

AIM:

To install hadoop fuse and mount and unmount HDFS using fuse.

PRE-REQUISITES:

Single Node Hadoop installation

PROCEDURE:

1. `$ wget http://archive.cloudera.com/cdh5/one-click-install/trusty/amd64/cdh5-repository_1.0_all.deb`

```
hadoopvm@hadoopvm-VirtualBox: ~
hadoopvm@hadoopvm-VirtualBox:~$ wget http://archive.cloudera.com/cdh5/one-click-
install/trusty/amd64/cdh5-repository_1.0_all.deb
--2019-09-28 10:43:52--  http://archive.cloudera.com/cdh5/one-click-install/trus
ty/amd64/cdh5-repository_1.0_all.deb
Resolving proxy.ssn.net (proxy.ssn.net)... 192.168.2.5
Connecting to proxy.ssn.net (proxy.ssn.net)|192.168.2.5|:8080... connected.
Proxy request sent, awaiting response... 200 OK
Length: 3508 (3.4K) [application/x-debian-package]
Saving to: ‘cdh5-repository_1.0_all.deb’

cdh5-repository_1.0 100%[===================>]   3.43K  --.-KB/s    in 0s

2019-09-28 10:43:55 (6.70 MB/s) - ‘cdh5-repository_1.0_all.deb’ saved [3508/3508
]

hadoopvm@hadoopvm-VirtualBox:~$
```

2. `$ sudo dpkg -i cdh5-repository_1.0_all.deb`

```
hadoopvm@hadoopvm-VirtualBox: ~

2019-09-28 10:43:55 (6.70 MB/s) - ‘cdh5-repository_1.0_all.deb’ saved [3508/3508
]

hadoopvm@hadoopvm-VirtualBox:~$ sudo dpkg -i cdh5-repository_1.0_all.deb
[sudo] password for hadoopvm:
Selecting previously unselected package cdh5-repository.
(Reading database ... 179779 files and directories currently installed.)
Preparing to unpack cdh5-repository_1.0_all.deb ...
Unpacking cdh5-repository (1.0) ...
Setting up cdh5-repository (1.0) ...
gpg: keyring `/etc/apt/secring.gpg' created
gpg: keyring `/etc/apt/trusted.gpg.d/cloudera-cdh5.gpg' created
gpg: /etc/apt/trustdb.gpg: trustdb created
gpg: key 02A818DD: public key "Cloudera Apt Repository" imported
gpg: Total number processed: 1
gpg:               imported: 1
hadoopvm@hadoopvm-VirtualBox:~$
```

3. `$ sudo apt-get update`

```
hadoopvm@hadoopvm-VirtualBox: ~
hadoopvm@hadoopvm-VirtualBox:~$ sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:2 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
Hit:4 http://ppa.launchpad.net/webupd8team/java/ubuntu xenial InRelease
Get:5 http://security.ubuntu.com/ubuntu xenial-security InRelease [109 kB]
Get:6 https://archive.cloudera.com/cdh5/ubuntu/trusty/amd64/cdh trusty-cdh5 InRe
lease [1,931 B]
Ign:6 https://archive.cloudera.com/cdh5/ubuntu/trusty/amd64/cdh trusty-cdh5 InRe
lease
Get:7 https://archive.cloudera.com/cdh5/ubuntu/trusty/amd64/cdh trusty-cdh5/cont
rib Sources [11.6 kB]
Get:8 https://archive.cloudera.com/cdh5/ubuntu/trusty/amd64/cdh trusty-cdh5/cont
rib amd64 Packages [27.6 kB]
Fetched 150 kB in 1s (120 kB/s)
```

4. `sudo apt-get install hadoop-hdfs-fuse`

```
hadoopvm@hadoopvm-VirtualBox: ~
hadoopvm@hadoopvm-VirtualBox:~$ sudo apt-get install hadoop-hdfs-fuse
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  avro-libs bigtop-jsvc bigtop-utils curl hadoop hadoop-0.20-mapreduce
  hadoop-client hadoop-hdfs hadoop-mapreduce hadoop-yarn libcurl3-gnutls
  libhdfs0 parquet parquet-format zookeeper
The following NEW packages will be installed:
  avro-libs bigtop-jsvc bigtop-utils curl hadoop hadoop-0.20-mapreduce
  hadoop-client hadoop-hdfs hadoop-hdfs-fuse hadoop-mapreduce hadoop-yarn
  libhdfs0 parquet parquet-format zookeeper
The following packages will be upgraded:
  libcurl3-gnutls
1 upgraded, 15 newly installed, 0 to remove and 579 not upgraded.
Need to get 445 MB/446 MB of archives.
After this operation, 517 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

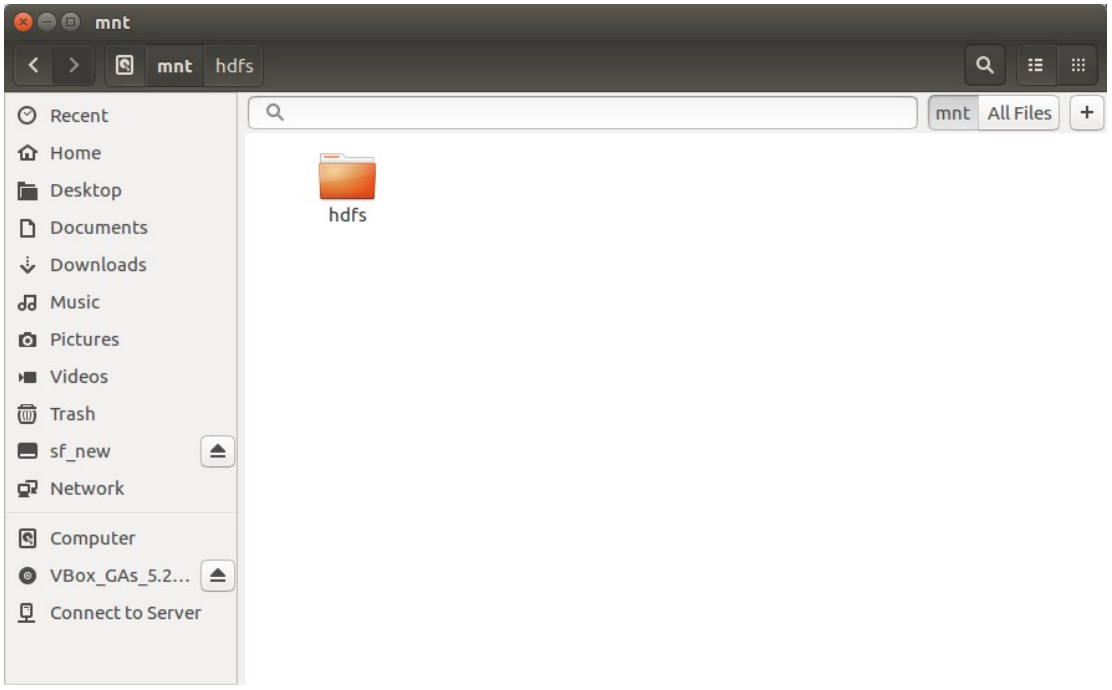
```
hadoopvm@hadoopvm-VirtualBox: ~
update-alternatives: using /etc/zookeeper/conf.dist to provide /etc/zookeeper/co
nf (zookeeper-conf) in auto mode
Setting up parquet-format (2.1.0+cdh5.16.2+22-1.cdh5.16.2.p0.22~trusty-cdh5.16.2
) ...
Setting up hadoop-client (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.16.
2) ...
Setting up parquet (1.5.0+cdh5.16.2+200-1.cdh5.16.2.p0.24~trusty-cdh5.16.2) ...
Setting up hadoop (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.16.2) ...
update-alternatives: using /etc/hadoop/conf.empty to provide /etc/hadoop/conf (h
adoop-conf) in auto mode
Setting up hadoop-yarn (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.16.2)
 ...
Setting up libhdfs0 (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.16.2) ..
.
Setting up hadoop-mapreduce (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.
16.2) ...
Setting up hadoop-hdfs (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.16.2)
 ...
Setting up hadoop-0.20-mapreduce (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-
cdh5.16.2) ...
Setting up hadoop-hdfs-fuse (2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty-cdh5.
16.2) ...
Processing triggers for libc-bin (2.23-0ubuntu9) ...
hadoopvm@hadoopvm-VirtualBox:~$
```

5. `$ sudo mkdir -p <mount_point>`

```
hadoopvm@hadoopvm-VirtualBox: ~
hadoopvm@hadoopvm-VirtualBox:~$ sudo mkdir -p /mnt/hdfs
hadoopvm@hadoopvm-VirtualBox:~$
```

6. `$ hadoop-fuse-dfs dfs://<name_node_hostname>:<namenode_port> <mount_point>`

```
hadoopvm@hadoopvm-VirtualBox: ~
hadoopvm@hadoopvm-VirtualBox:~$ sudo mkdir -p /mnt/hdfs
hadoopvm@hadoopvm-VirtualBox:~$ hadoop-fuse-dfs dfs://localhost:50070 /mnt/hdfs
INFO /data/jenkins/workspace/generic-package-ubuntu64-14-04/CDH5.16.2-Packaging-Had
oop-2019-06-03_03-26-17/hadoop-2.6.0+cdh5.16.2+2863-1.cdh5.16.2.p0.26~trusty/hadoop
-hdfs-project/hadoop-hdfs/src/main/native/fuse-dfs/fuse_options.c:164 Adding FUSE a
rg /mnt/hdfs
fusermount: user has no write access to mountpoint /mnt/hdfs
hadoopvm@hadoopvm-VirtualBox:~$
```



RESULT :

Thus, hadoop fuse is installed and hdfs is mounted and unmounted from the local file system using fuse.

EX 12

STUDY AND IMPLEMENTATION OF GRID FTP

AIM:

To study about grid-ftp tool and implement to verify its usage.

PROCEDURE:

1. Install Virtual box
2. Install a VM with Ubuntu 16.04 desktop (network configurations as done in previous exercises)
3. Check for support of Java (if not, install it as in Ex 3).
4. Install all components of globus toolkit properly as in Ex 12.

Later, follow the following steps :

5. **Change to root user and cd /hom/vm**

#install –o myproxy –m 664 /etc/grid-security/hostcert.pem /etc/grid-security/myproxy/hostcert.pem

#install –o myproxy –m 664 /etc/grid-security/hostkey.pem /etc/grid-security/myproxy/hostkey.pem

```
root@vm-VirtualBox:~# cd /home/vm
root@vm-VirtualBox:/home/vm# install -o myproxy -m 644 /etc/grid-security/hostcert.pem /etc/grid-security/myproxy/hostcert.pem
root@vm-VirtualBox:/home/vm# install -o myproxy -m 644 /etc/grid-security/hostkey.pem /etc/grid-security/myproxy/hostkey.pem
root@vm-VirtualBox:/home/vm#
```

6. Edit /etc/myproxy-server.config file to remove comments from the credential repository using **nano /etc/myproxy-server/.config**

With comments

```
  GNU nano 2.5.3                    File: /etc/myproxy-server.config                                    Modified


#
# Example myproxy server configuration file.
#
# You should modify this file to meet your specific requirements
# and install in /etc/myproxy-server.config or
# $GLOBUS_LOCATION/etc/myproxy-server.config.
#
# Any line starting with a pound sign (#) is a comment.
#
##########################################################################

#
# Complete Sample Policy #1 - Credential Repository
#
# The following lines define a sample policy that enables all
# myproxy-server credential repository features.
# See below for more examples.
#accepted_credentials       "*"
#authorized_retrievers      "*"
#default_retrievers         "*"
#authorized_renewers        "*"
#default_renewers           "none"
#authorized_key_retrievers  "*"
#default_key_retrievers     "none"
#trusted_retrievers         "*"
#default_trusted_retrievers "none"
#cert_dir /etc/grid-security/certificates

#
# Complete Sample Policy #2 - Certificate Authority
#
                                          [ Read 853 lines ]
^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos     ^Y Prev Page   M-\ First Line M-W WhereIs Next
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell    ^_ Go To Line  ^V Next Page   M-/ Last Line  M-] To Bracket
```

After removing comments

```
  GNU nano 2.5.3                    File: /etc/myproxy-server.config                                    Modified


#
# Example myproxy server configuration file.
#
# You should modify this file to meet your specific requirements
# and install in /etc/myproxy-server.config or
# $GLOBUS_LOCATION/etc/myproxy-server.config.
#
# Any line starting with a pound sign (#) is a comment.
#
#######################################################################

#
# Complete Sample Policy #1 - Credential Repository
#
# The following lines define a sample policy that enables all
# myproxy-server credential repository features.
# See below for more examples.
accepted_credentials       "*"
authorized_retrievers      "*"
default_retrievers         "*"
authorized_renewers        "*"
default_renewers           "none"
authorized_key_retrievers  "*"
default_key_retrievers     "none"
trusted_retrievers         "*"
default_trusted_retrievers "none"
cert_dir /etc/grid-security/certificates

#
# Complete Sample Policy #2 - Certificate Authority
#

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos     ^Y Prev Page   M-\ First Line M-W WhereIs Next
^X Exit        ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell    ^_ Go To Line  ^V Next Page   M-/ Last Line  M-] To Bracket
```

7. **Change usermod as below:**

#usermod –a –G simpleca myproxy

Start myproxy-server service

#service myproxy-server-start

Check status of the server status

#service myproxy-server status

Check server start on 7512 port by below command

#netstat –an | grep 7512

```
The new signed certificate is at: /var/lib/globus/simple_ca/newcerts/01.pem

/
Setting up globus-gsi (6.0-1+gt6.xenial) ...
root@kirtana-VirtualBox:~# install -o myproxy -m 644     /etc/grid-security/hostcert.pem     /etc/grid-security/myproxy/hostcert.pem
root@kirtana-VirtualBox:~# install -o myproxy -m 600     /etc/grid-security/hostkey.pem     /etc/grid-security/myproxy/hostkey.pem
root@kirtana-VirtualBox:~# nano /etc/myproxy-server.config
root@kirtana-VirtualBox:~# usermod -a -G simpleca myproxy
root@kirtana-VirtualBox:~# service myproxy-server start
root@kirtana-VirtualBox:~# service myproxy-server stat
Usage: /etc/init.d/myproxy-server {start|stop|status|restart|reload|try-restart|force-reload}
root@kirtana-VirtualBox:~# service myproxy-server status
● myproxy-server.service - Server for X.509 Public Key Infrastructure (PKI) security credentials
   Loaded: loaded (/lib/systemd/system/myproxy-server.service; disabled; vendor preset: enabled)
   Active: active (running) since Thu 2018-09-27 18:42:50 IST; 15s ago
  Process: 7567 ExecStart=/usr/sbin/myproxy-server --pidfile /var/run/myproxy-server/myproxy.pid (code=exited, status=0/SUCCESS)
 Main PID: 7570 (myproxy-server)
   CGroup: /system.slice/myproxy-server.service
           └─7570 /usr/sbin/myproxy-server --pidfile /var/run/myproxy-server/myproxy.pid

Sep 27 18:42:49 kirtana-VirtualBox systemd[1]: Starting Server for X.509 Public Key Infrastructure (PKI) security credentials...
Sep 27 18:42:50 kirtana-VirtualBox myproxy-server[7567]: myproxy-server v6.1 Dec 2015 PAM SASL KRB5 LDAP VOMS OCSP starting at Thu Sep 27 18:4
Sep 27 18:42:50 kirtana-VirtualBox myproxy-server[7567]: reading configuration file /etc/myproxy-server.config
Sep 27 18:42:50 kirtana-VirtualBox myproxy-server[7567]: using storage directory /var/lib/myproxy
Sep 27 18:42:50 kirtana-VirtualBox myproxy-server[7567]: Socket bound to 0.0.0.0:7512
Sep 27 18:42:50 kirtana-VirtualBox myproxy-server[7567]: Starting myproxy-server on *:7512...
Sep 27 18:42:50 kirtana-VirtualBox systemd[1]: Started Server for X.509 Public Key Infrastructure (PKI) security credentials.
lines 1-15/15 (END)
[1]+  Stopped                 service myproxy-server status


root@kirtana-VirtualBox:~# netstat -an | grep 7512
tcp        0      0 0.0.0.0:7512            0.0.0.0:*               LISTEN
root@kirtana-VirtualBox:~#
```

8. Execute following commands to know the options for the below commands

 # man grid-mapfile-add-entry

 # man myproxy-admin-adduser

The command to create the myproxy credential for the user is

#su - -s /bin/sh myproxy
$PATH=$PATH:/usr/sbin
$myproxy-admin-adduser –c “Gcc LAb” –l root

```
root@kirtana-VirtualBox:~# man grid-mapfile-add-entry
root@kirtana-VirtualBox:~# man myproxy-admin-adduser
root@kirtana-VirtualBox:~# su - -s /bin/sh myrpoxy
No passwd entry for user 'myrpoxy'
root@kirtana-VirtualBox:~# su - -s /bin/sh myproxy
$ PATH=$PATH:/usr/sbin
$ myproxy-admin-adduser -c "GCC LAb" -l root
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
Verify failure
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:

The new signed certificate is at: /var/lib/globus/simple_ca/newcerts/03.pem

using storage directory /var/lib/myproxy
Credential stored successfully
Certificate subject is:
/O=Grid/OU=GlobusTest/OU=simpleCA-kirtana-virtualbox/OU=Globus Simple CA/CN=GCC LAb
$ ^X
-su: 3: [illegible] not found
$ exit
```

9. **User Authorization**

create a grid map file entry for this credential, so that the holder of that credential can use it to access globus services

```
root@kirtana-VirtualBox:~# grid-mapfile-add-entry -dn "/O=GRid/OU=GLobusTest/OU=
simpleCA-frontend-virtualbox/OU=GLobus simple CA/CN=GCC LAb" -ln root
Modifying /etc/grid-security/grid-mapfile ...
New entry:
"/O=GRid/OU=GLobusTest/OU=simpleCA-frontend-virtualbox/OU=GLobus simple CA/CN=GC
C LAb" root
(1) entry added
root@kirtana-VirtualBox:~#
```

10. **Setting up grid-ftp-start**

```
root@kirtana-VirtualBox:~# service globus-gridftp-server start
root@kirtana-VirtualBox:~# service globus-gridftp-server status
● globus-gridftp-server.service - LSB: Globus GridFTP Server
   Loaded: loaded (/etc/init.d/globus-gridftp-server; bad; vendor preset: enabled)
   Active: active (running) since Thu 2018-09-27 19:02:39 IST; 30s ago
     Docs: man:systemd-sysv-generator(8)
   CGroup: /system.slice/globus-gridftp-server.service
           └─8945 /usr/sbin/globus-gridftp-server -c /etc/gridftp.conf -C /etc/gridftp.d -pidfile /var/run/globus-gridftp-server.pid -no-detac

Sep 27 19:02:39 kirtana-VirtualBox systemd[1]: Starting LSB: Globus GridFTP Server...
Sep 27 19:02:39 kirtana-VirtualBox globus-gridftp-server[8934]:  * Started GridFTP Server
Sep 27 19:02:39 kirtana-VirtualBox systemd[1]: Started LSB: Globus GridFTP Server.
Sep 27 19:02:50 kirtana-VirtualBox systemd[1]: Started LSB: Globus GridFTP Server.
lines 1-11/11 (END)
root@kirtana-VirtualBox:~#
```

11. **Check for port 2811**

```
root@kirtana-VirtualBox:~# netstat -an | grep 2811
tcp6       0      0 :::2811                 :::*                    LISTEN
root@kirtana-VirtualBox:~#
```

12. **User logon with the passphrase given during step 8.**

```
root@kirtana-VirtualBox:~# myproxy-logon -s root
Unknown host "root"
Unable to connect to root
root@kirtana-VirtualBox:~# myproxy-logon -s kirtana-VirtualBox
Enter MyProxy pass phrase:
A credential has been received for user root in /tmp/x509up_u0.
root@kirtana-VirtualBox:~#
```

13. **Transfer file using globus-url-copy command**

```
root@kirtana-VirtualBox:~# globus-url-copy file:///home/kirtana_01/Desktop/hello.txt http://localhost:2811/kirtana_01/home/Documents

error: [globus_l_gass_copy_gass_write_callback]: gass_transfer_request_status: 3
root@kirtana-VirtualBox:~#
```

RESULT : Thus, the grid-ftp tool's implementation was executed with appropriate steps.