

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: 11.07.2016.

Due Date: 11. 07.2016 & 13 .07.2016

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

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 YouTube link given above>

3. Create Calculator Web service using Apache Axis.

- i. <http://aragorn.pb.bialystok.pl/~dmalyszko/PaWWW/ps34-axis2.htm>
- ii. <https://codezone4.wordpress.com/2012/11/03/java-web-service-with-apache-axis2-in-netbeans/>

4. Deploy the web service on server and test the web service.

II. Steps to install Apache Axis manually and to run 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 Apace Tomcat

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

Web Service Using Apache Axis

Installation of Axis2

1. Download the **axis2-1.7.3.war** file from Apache website.
2. Extract the war file into the **webapps** folder in Tomcat7.0.72(any version of Tomcat).
3. Now in the NetBeans ,Go to Services tab and right click Tomcat (under Servers) . Select restart .
4. The axis2.war file will be unpacked by Tomcat and the file axis2 must be created.

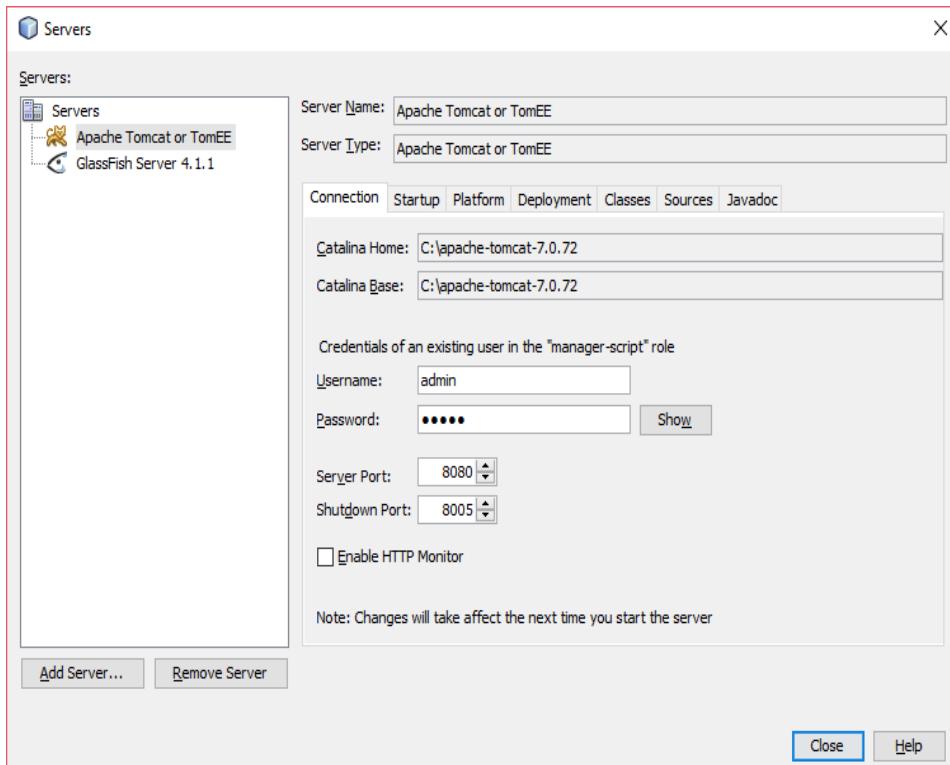
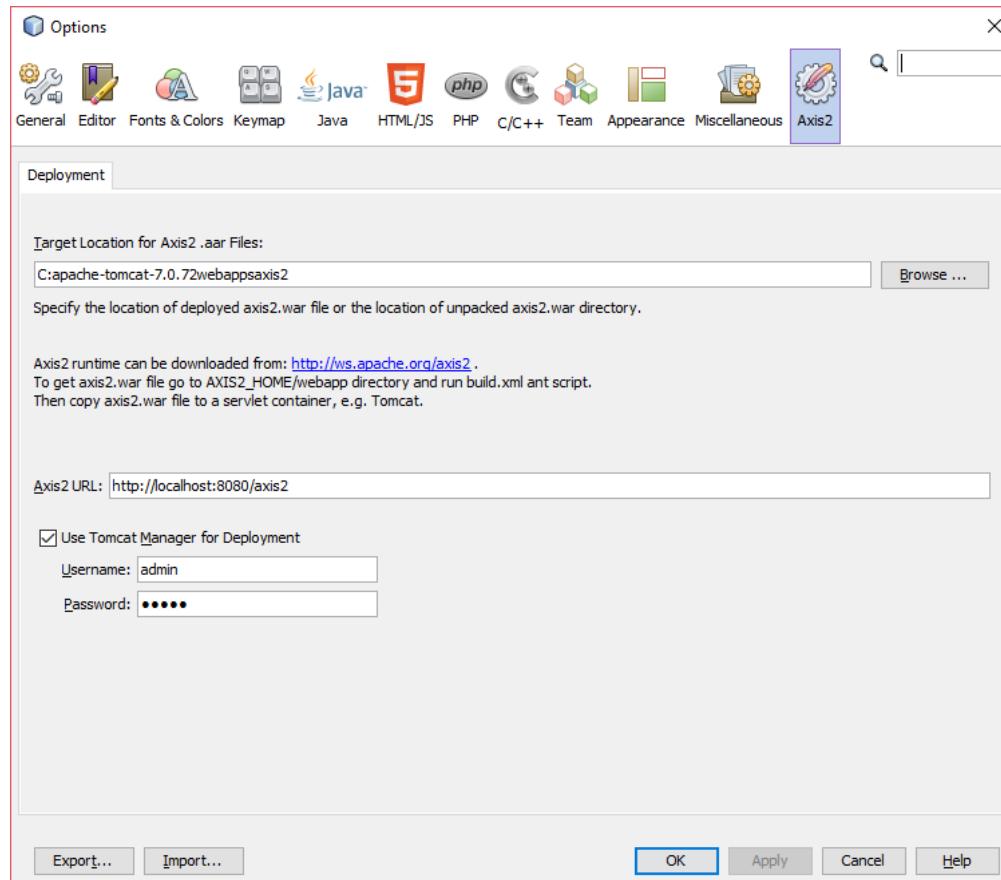


Illustration 1: Tomcat Properties

5. Now in the Netbeans , Click Tools Tab and select Axis2.
6. Provide the path for war file (the above unpacked axis2 folder).
7. Check the box Use Tomcat Manager for Deployment.
8. Enter the same username and password as in Tomcat.
9. Press Ok to complete configuration of Axis2 .
10. Create a folder '**websvc**' in C:\Users\USER\AppData\Roaming\NetBeans\8.1\config\Preferences\org\netbeans .
11. Create a new file **axis2.properties** with the following content

```
AXIS_DEPLOY=C:\apache-tomcat-7.0.72\webapps\axis2  
AXIS_URL=http://localhost:8080/axis2  
TOMCAT_MANAGER_USER=admin  
TOMCAT_MANAGER_PASSWORD=axis2
```

Save the file and close it.



Axis2 Configuration

12. Now restart the tomcat server .
13. In the browser , go to the URL : <http://localhost:8080/axis2>
14. If the below web page appears , the installation is successful.

Welcome!

Welcome to the new generation of Axis. If you can see this page you have successfully deployed the Axis2 Web Application. However, to ensure that Axis2 is properly working, we encourage you to click on the validate link.

- [Services](#)
View the list of all the available services deployed in this server.
- [Validate](#)
Check the system to see whether all the required libraries are in place and view the system information.
- [Administration](#)
Console for administering this Axis2 installation.

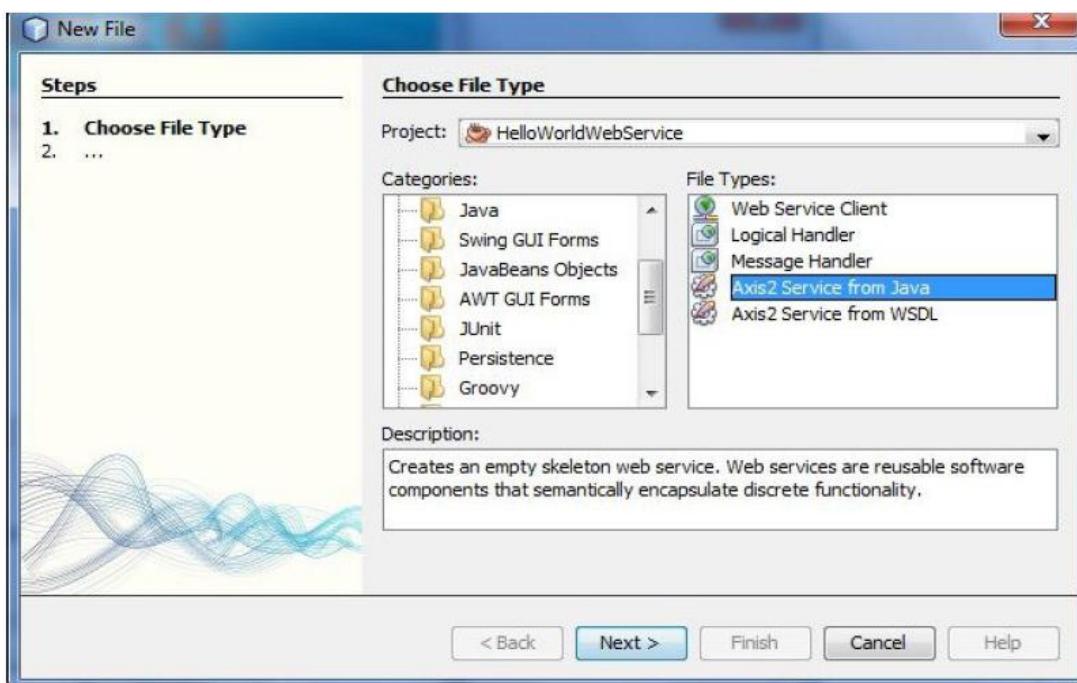
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Axis2 Service

Running

Running a Web Service Using Axis2

1. File >> New Project. The New Project wizard opens. From the Java category, select a Java class library project. Click Next.
2. Right-click the project and choose New >> Other. The New File wizard opens. From the Web Services category, choose Axis2 Service from Java and click Next.



3. Keep settings as it is in the following wizard and click Next.
4. In this wizard enter Java Web Service class name and click Finish .
5. The IDE generates a **HelloAxisWorld.java** class in the axishello source package and a **HelloAxisWorld** Axis2 web service that mirrors this Java class.
6. Right-click the web service's node. The context menu opens. Select Deploy to Server.
7. The IDE compiles an Axis2 AAR file and copies it to the axis2.war file used by the application server.
8. To test the service, expand the web service node to reveal the operations. Right-click the **hello:String** node and select Test Operation in Browser.

The screenshot shows a web browser window with the title "List Services". The address bar contains "localhost:8080/axis2/services/listServices". The page content is as follows:

Available services

Version

Service Description : Version
Service EPR : http://localhost:8080/axis2/services/Version
Service Status : Active

Available Operations

- getVersion

NewAxisFromJava

Service Description : NewAxisFromJava
Service EPR : http://localhost:8080/axis2/services/NewAxisFromJava
Service Status : Active

Available Operations

- newservice

calculate

Service Description : calculate
Service EPR : http://localhost:8080/axis2/services/calculate
Service Status : Active

Available Operations

- add

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Assignment -5 : Private Cloud Setup using OpenNebula or Eucalyptus

Assigned Date: 01.08.2016.

Due Date: 08. 08.2016 & 10 .08.2016

I. Install OpenNebula in Ubuntu Host Operating System.

- Install Front-End controller and Node in the same physical machine.

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

OR

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

- Cloud Controller (CLC) on CentOS1VM
- Cluster Controller (CC) on CentOS1VM
- Walrus on CentOS1VM
- Storage Controller (SC) on CentOS1VM
- Node Controller (NC) on CentOS2VM

Follow the Eucalyptus Documentation in the below link.

<https://docs.hpcloud.com/eucalyptus/4.2.1/index.html#install-guide/eucalyptus.html>

Private Cloud setup using Opennebula

1) To add OpenNebula repository on Debian/Ubuntu execute as root:

```
wget -q -O- http://downloads.opennebula.org/repo/Debian/repo.key | apt-key add -
```

and

```
echo "deb http://downloads.opennebula.org/repo/5.0/Ubuntu/14.04 stable  
opennebula" > /etc/apt/sources.list.d/opennebula.list
```

2) Installing the software :

Execute the following commands as root user

apt-get update

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

3) Some OpenNebula components need Ruby libraries. OpenNebula provides a script that installs the required gems as well as some development libraries packages needed.

As root execute: **/usr/share/one/install_gems** to install the gems required for ruby.

4) The **/var/lib/one/.one/one_auth** file will have been created with a randomly-generated password. It should contain the following: oneadmin:<password>

5) To start the OpenNebula daemons, execute the following commands :

sudo service opennebula start

sudo service opennebula-sunstone start

To restart or stop the opennebula use the following commands:

sudo service opennebula stop

sudo service opennebula-sunstone stop

sudo service opennebula restart

sudo service opennebula-sunstone restart

6) We can verify the installation either by command line or graphical user interface

CLI: Log in as oneadmin user by **su – oneadmin** as a root user and execute the command **oneuser show**. If the command executes without any errors, then opennebula has been installed correctly and it shows the user information.

Graphical User Interface: Open the <http://localhost:9869> in the web browser. This opens the sunstone web interface. Enter the username as **oneadmin** and the **password present in /var/lib/one/.one/one_auth file**.

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Assignment -5b : Private Cloud Setup using Eucalyptus

Assigned Date: 01.09.2016.

Due Date: 03. 09.2016 & 03.09.2016

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

- Cloud Controller (CLC) on Ubuntu Server 16.04 VM
- Cluster Controller (CC) on Ubuntu Server 16.04 VM
- Walrus on Ubuntu Server 16.04 VM
- Storage Controller (SC) on Ubuntu Server 16.04 VM
- Node Controller (NC) on Ubuntu Server 16.04 VM
- Client to access Cloud components : Ubuntu Desktop 14.04 / 16.04 VM

Follow the Eucalyptus Documentation in the below link.

<https://docs.hpcloud.com/eucalyptus/4.2.1/index.html#install-guide/eucalyptus.html>

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 Web Interface, login as <https://<cloud-ip>:8443>

Username: admin

Password: admin

Check all the resources available.

9. On Cloud controller run the following command

```
]$ sudo start uec-component-listener
```

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
```

From a Command Line

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.

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

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. 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)

16. 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`

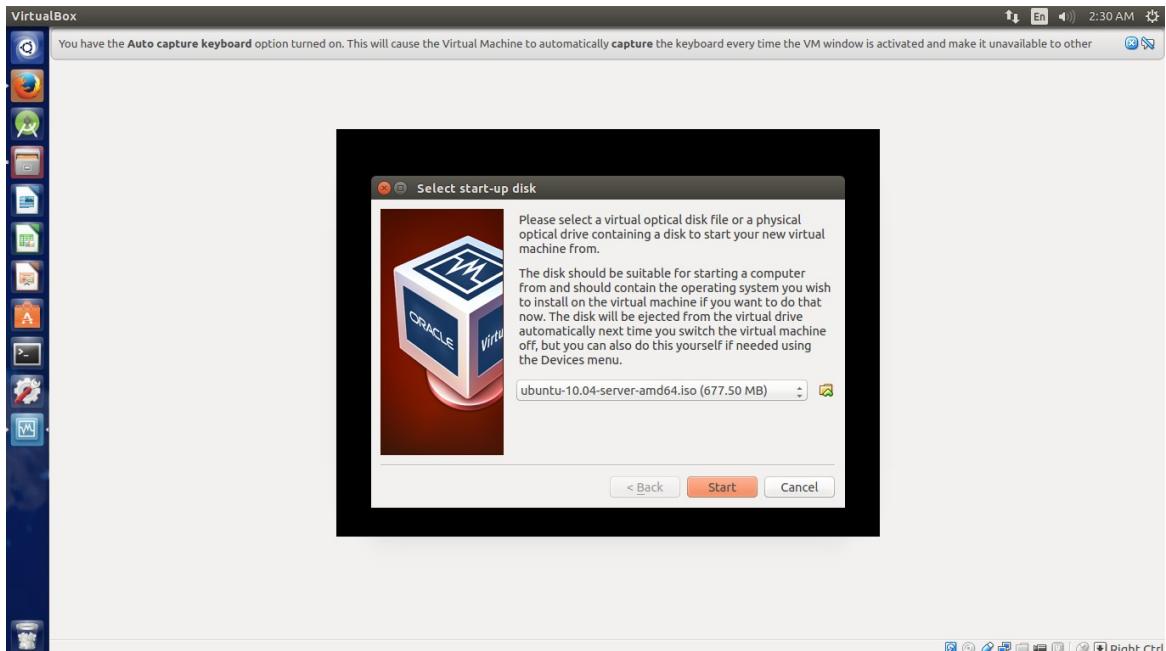
Notes:

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

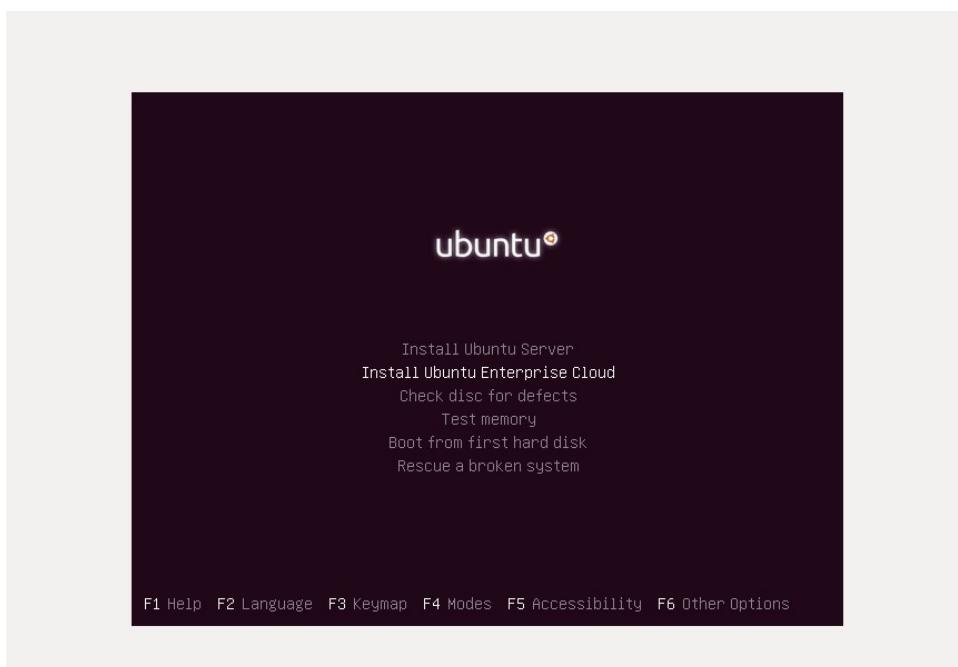
PRIVATE CLOUD SETUP USING EUCALYPTUS

STEP1: INSTALLATION OF CLOUD CONTROLLER

Mount the installation media and boot from it

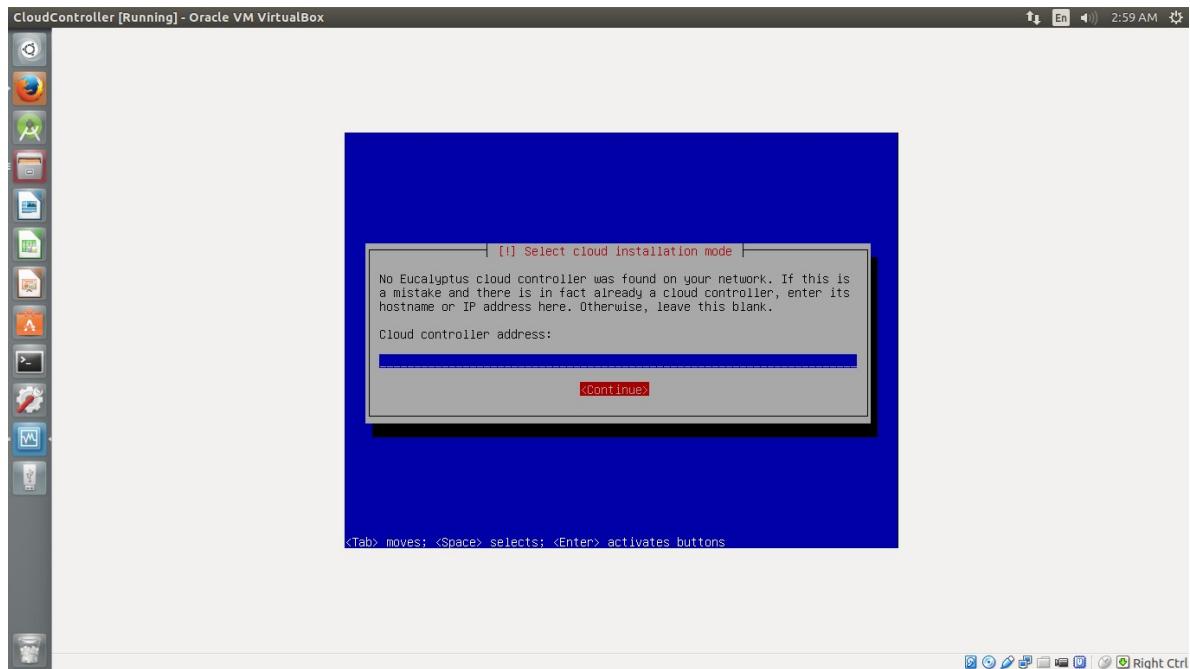


Choose install “Ubuntu enterprise cloud”



Select the language and location accordingly. Choose ‘No’ for configuring your keyboard. The installation now starts loading additional components.

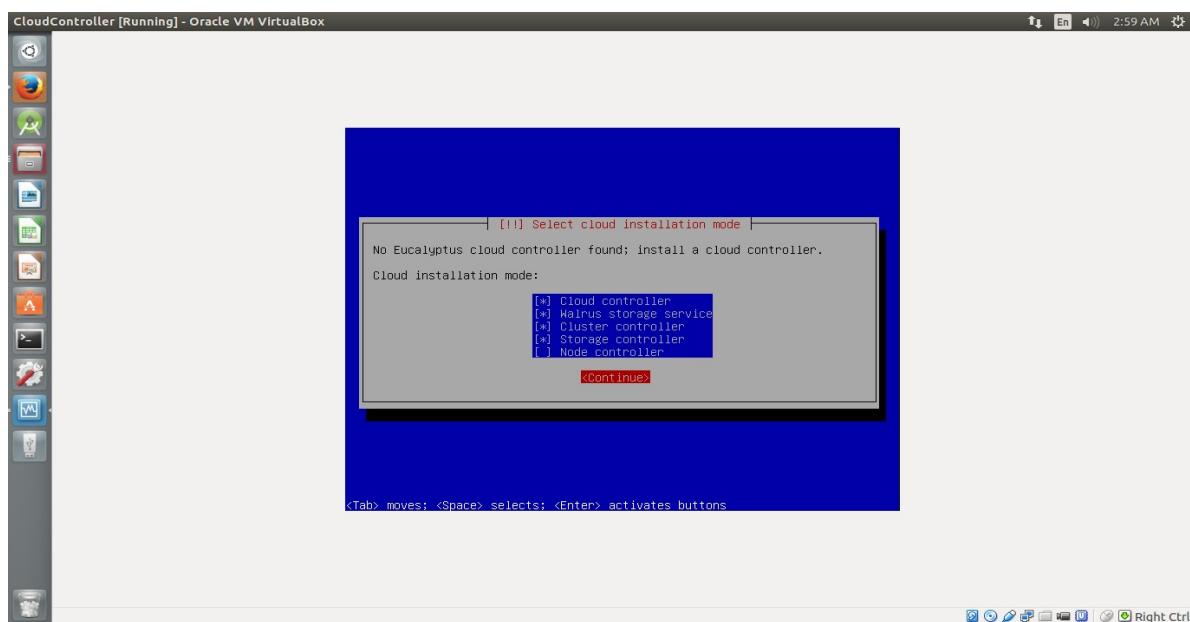
Do not specify any IP address. This is done because only then the 'Cloud Controller' option will be displayed in the next step.



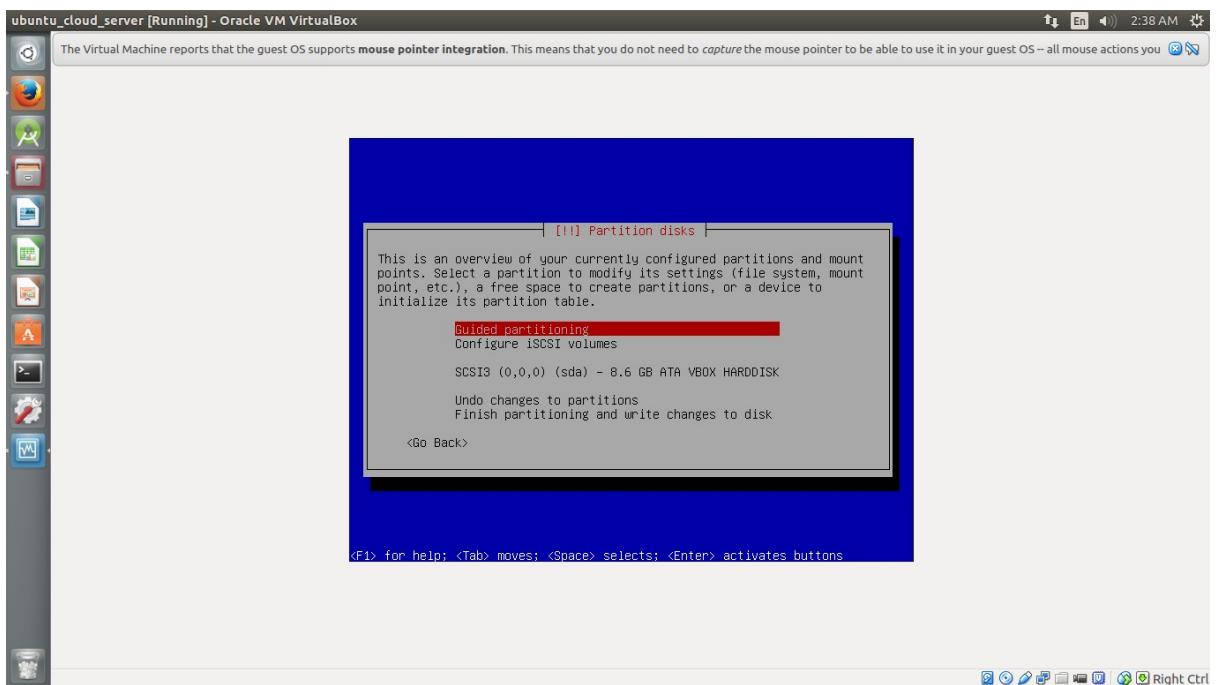
In the next step we will be asked to specify the range of IP addresses for the Virtual Machine. Provide the range as follows:

192.168.1.100-192.168.1.150

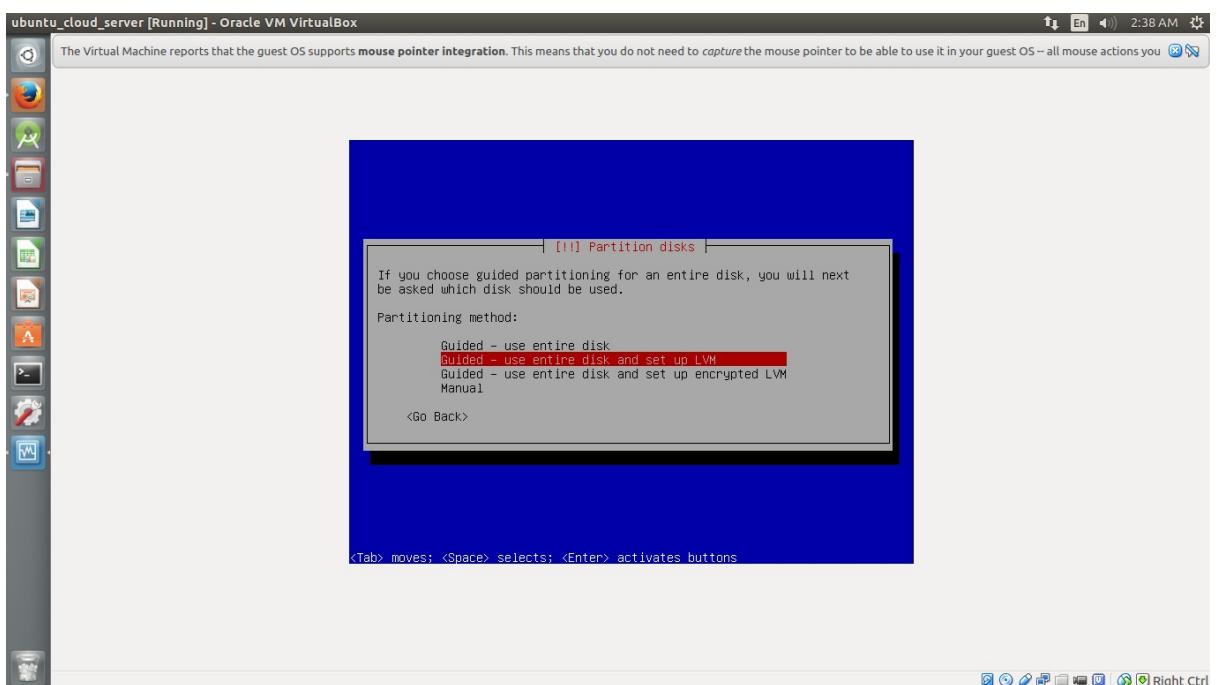
Choose the following options to be installed



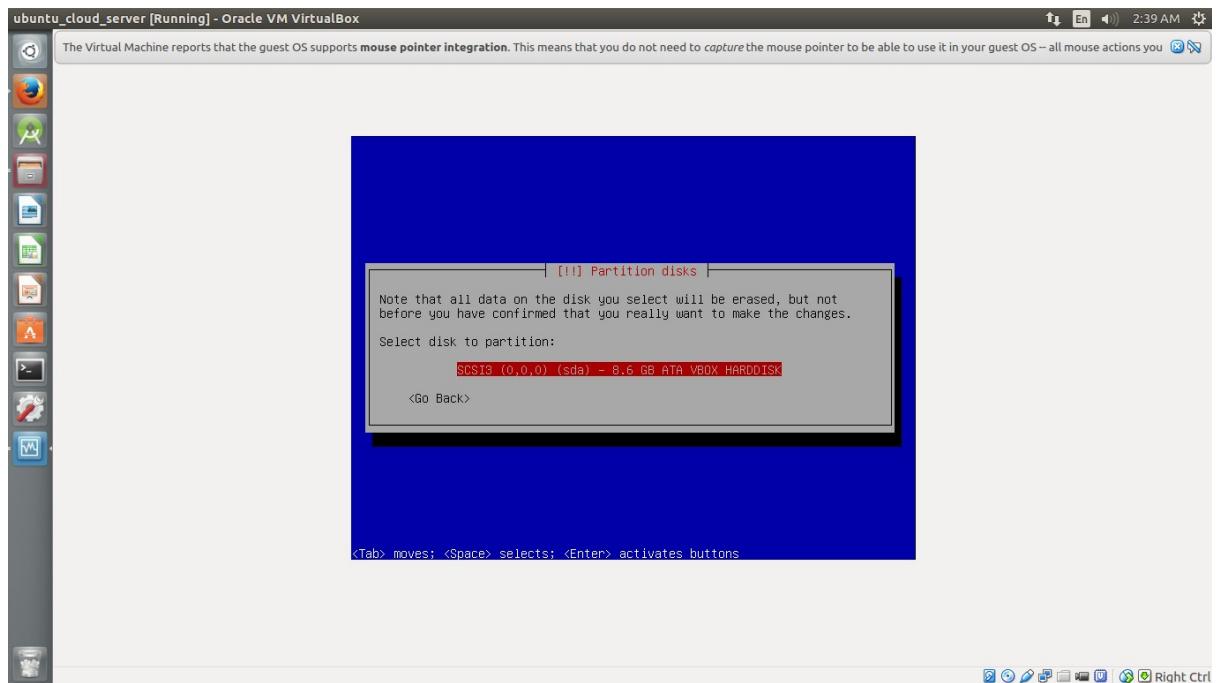
Specify the type of partitioning as guided



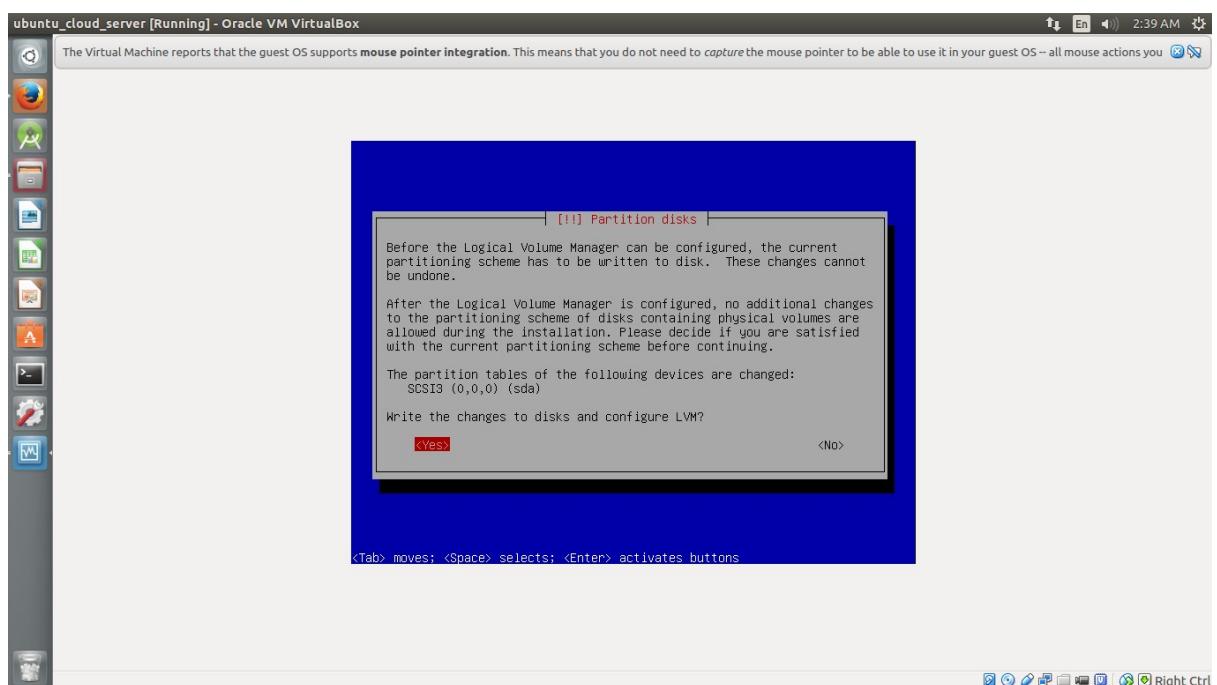
Choose the option 'Guided-use entire disk and set up LVM'.



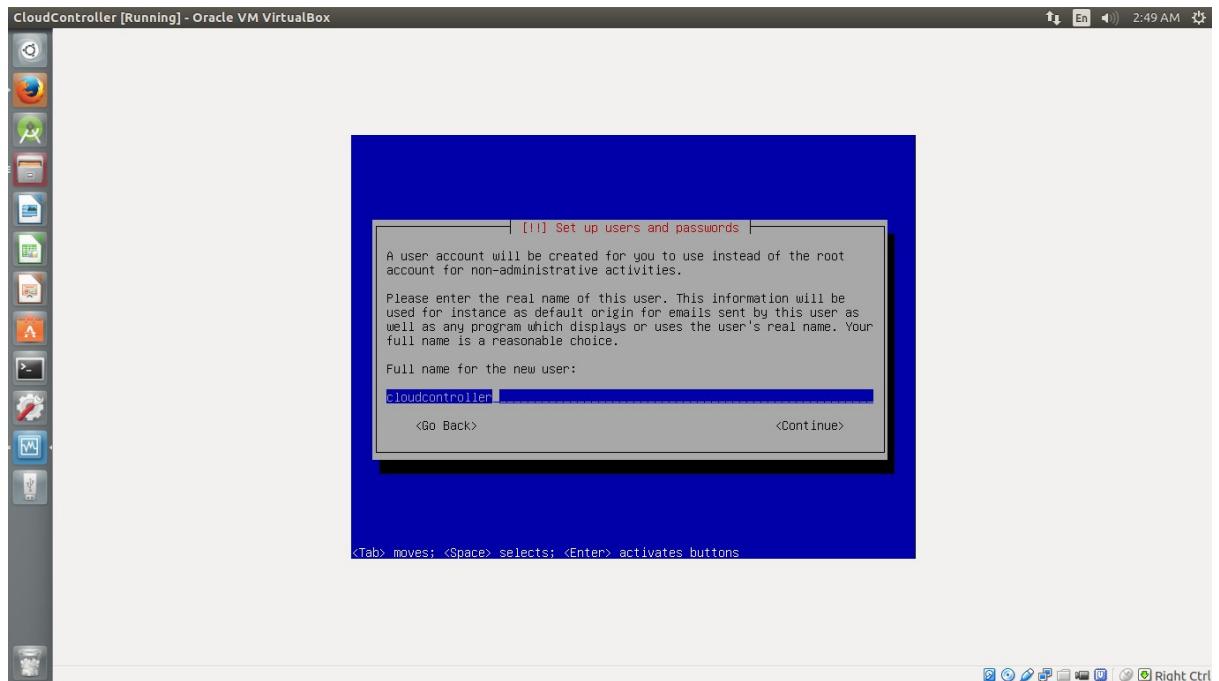
Press 'enter' to go to the next step.



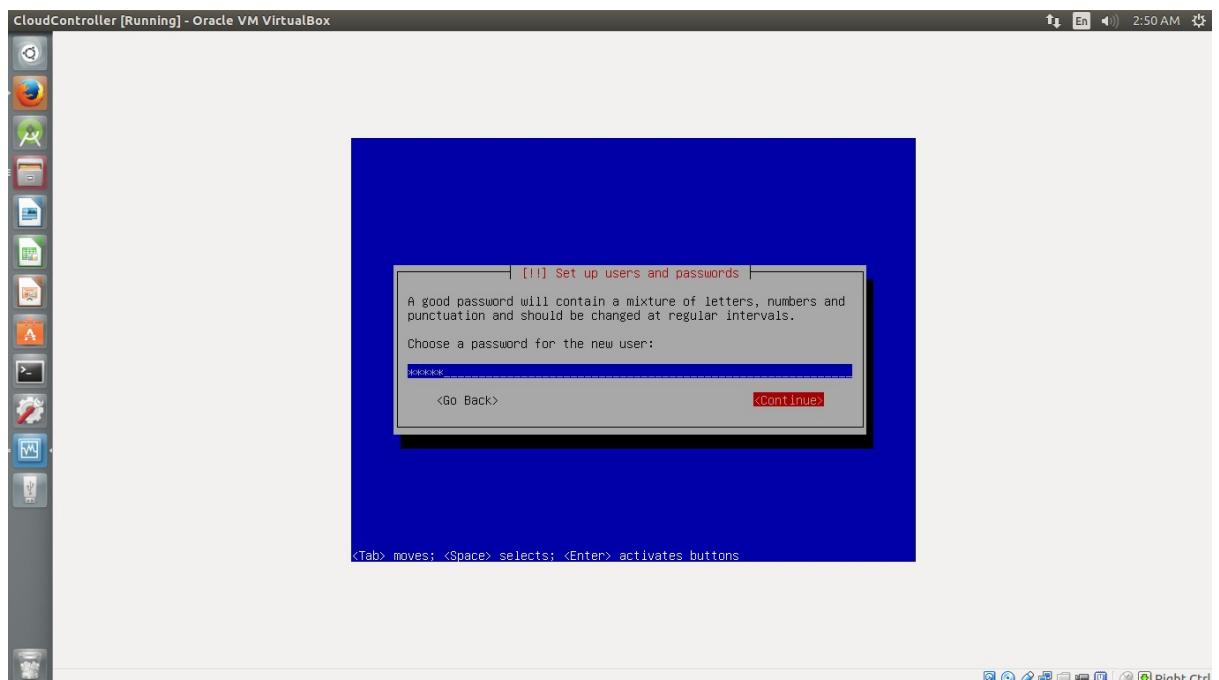
Write the partition scheme to disk



We should now set up the user. This user would be used to log on to the server. Choose the full name for the user- this is the display name

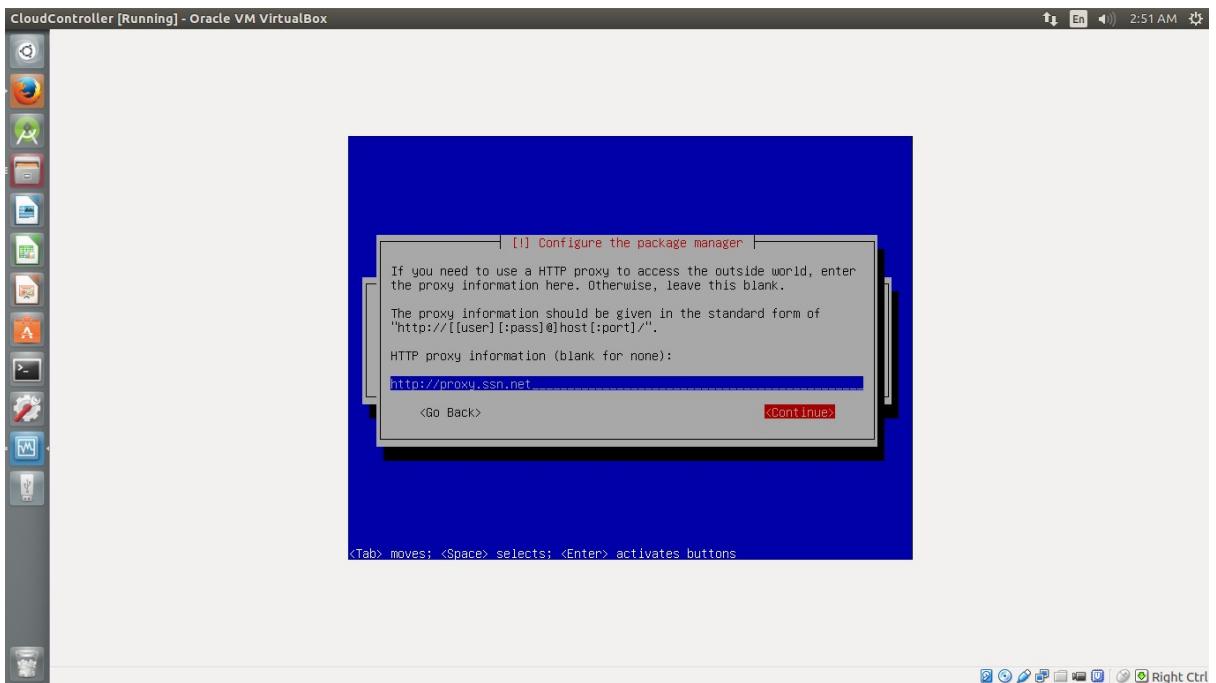


Set password

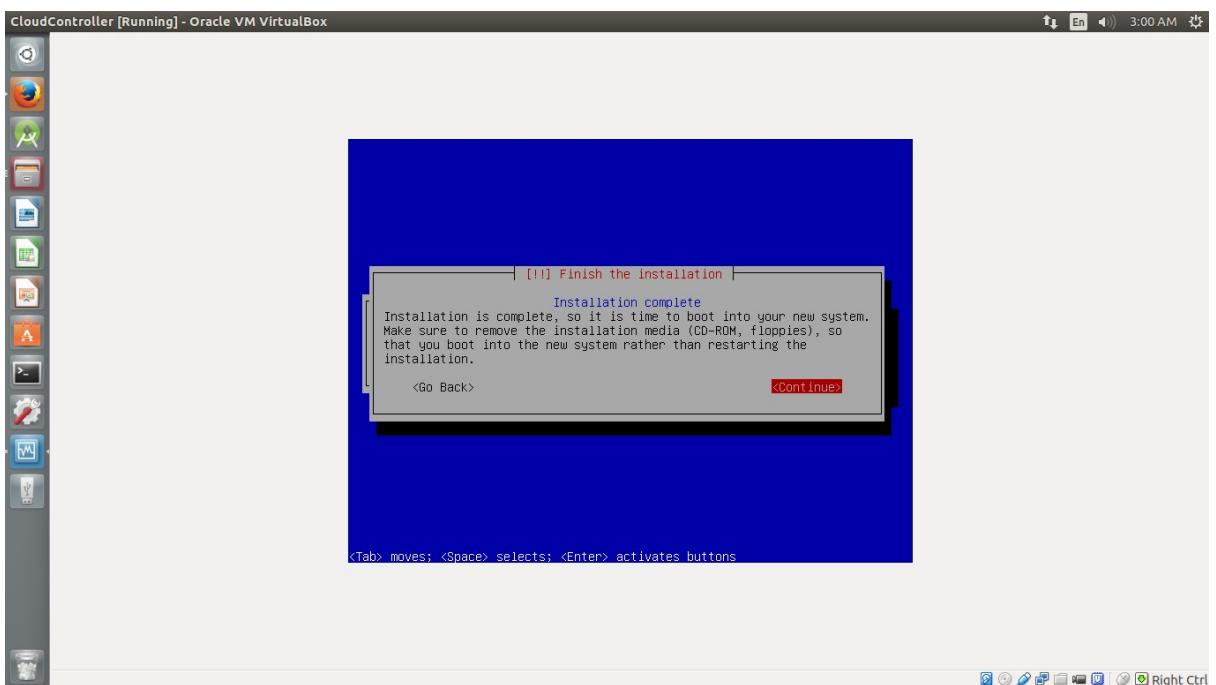


We choose not to encrypt our home directory as it is putting some overhead on storage and processing power. Select no in the respective step and proceed.

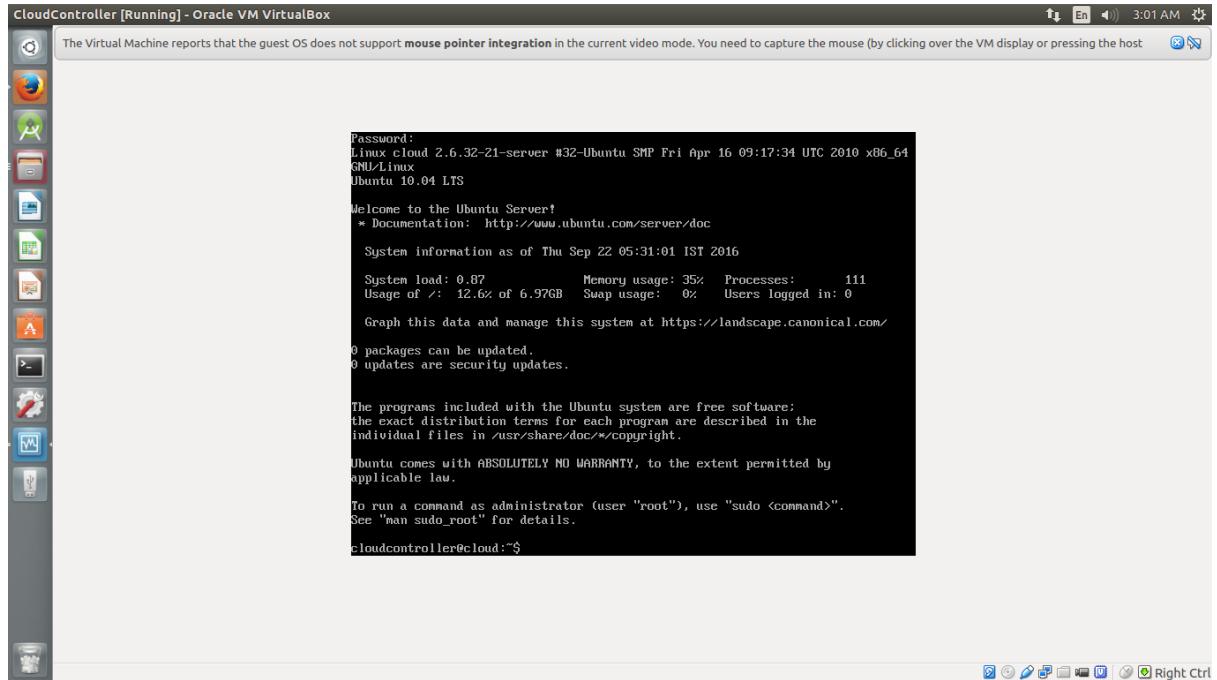
Add the proxy server's address



Installation is completed after a few intermediate steps



Login and you will get the welcome screen listing information about the system running on your machine



Set the IP address using the command:

```
sudo vi /etc/network/interfaces
```

Add the following line:

```
auto eth0
iface eth0 inet static
    address:within the range (10.6.3.100-10.6.3.200)
    netmask:255.255.168.0
    network:192.168.1.4
    broadcast:192.168.1.255
    gateway:10.6.0.1
```

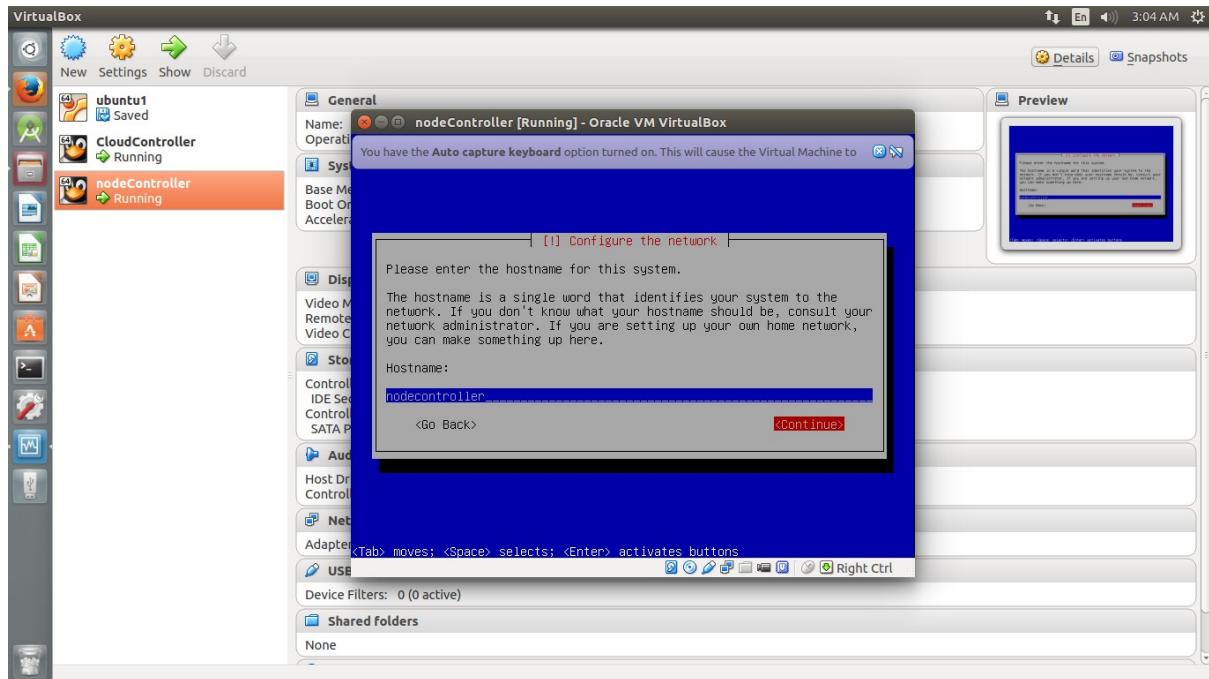
Restart the networking to apply the changes:

```
sudo /etc/init.d/networking restart
```

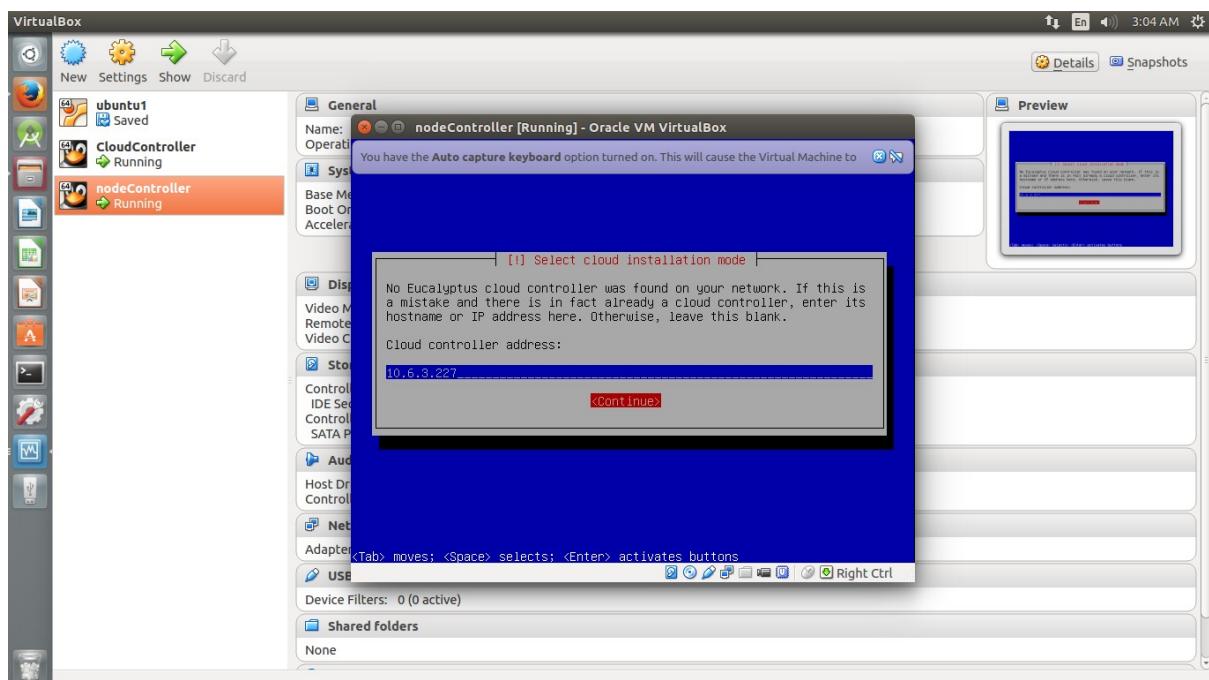
STEP 2: INSTALLATION OF SECOND SERVER: NODE CONTROLLER

The first few steps are the same for both the installations.

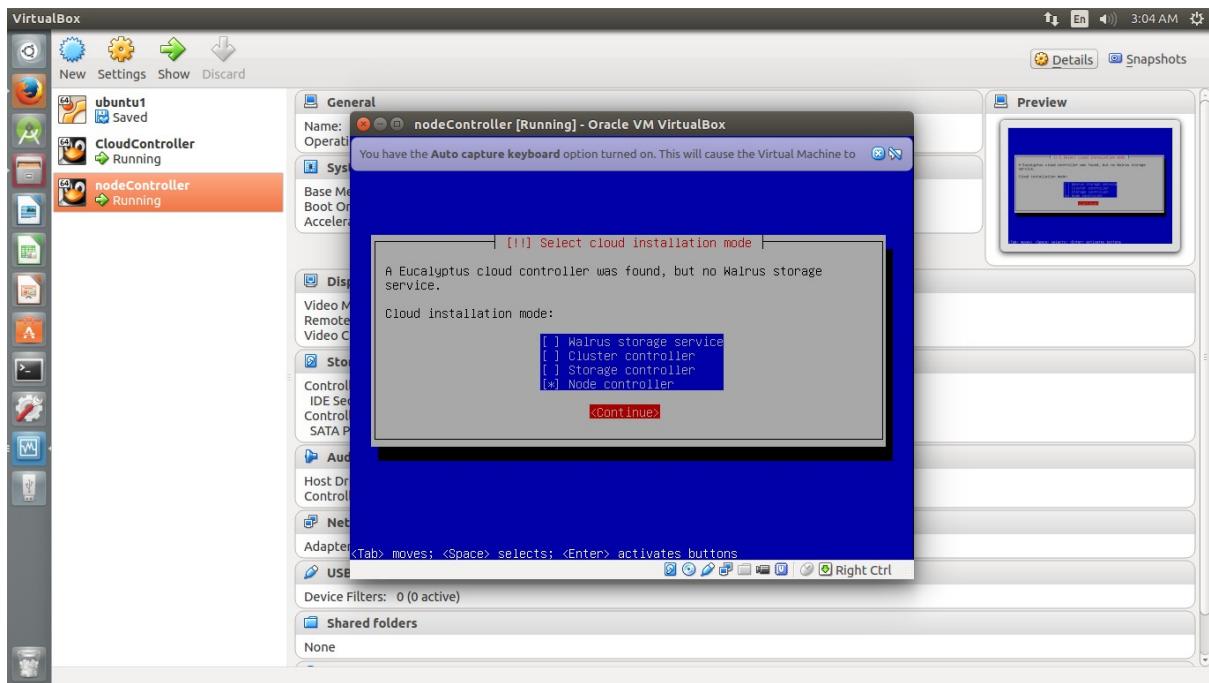
Give a desired Host name.



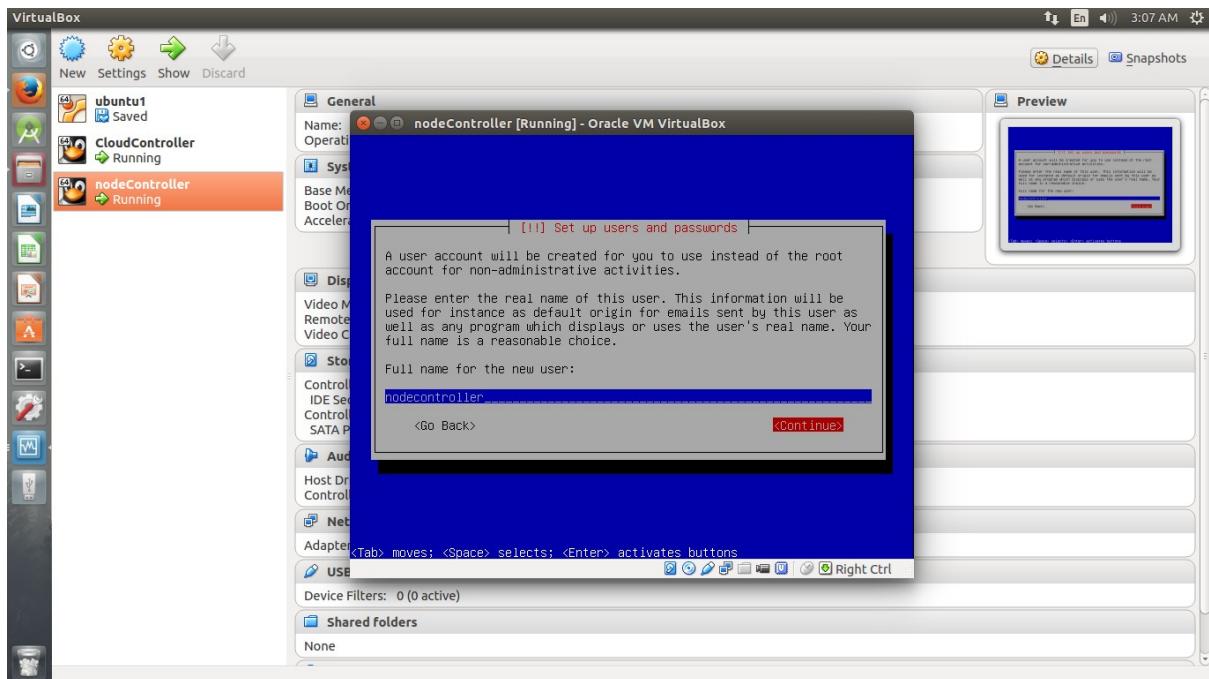
Set the IP address for the **cloud controller**.



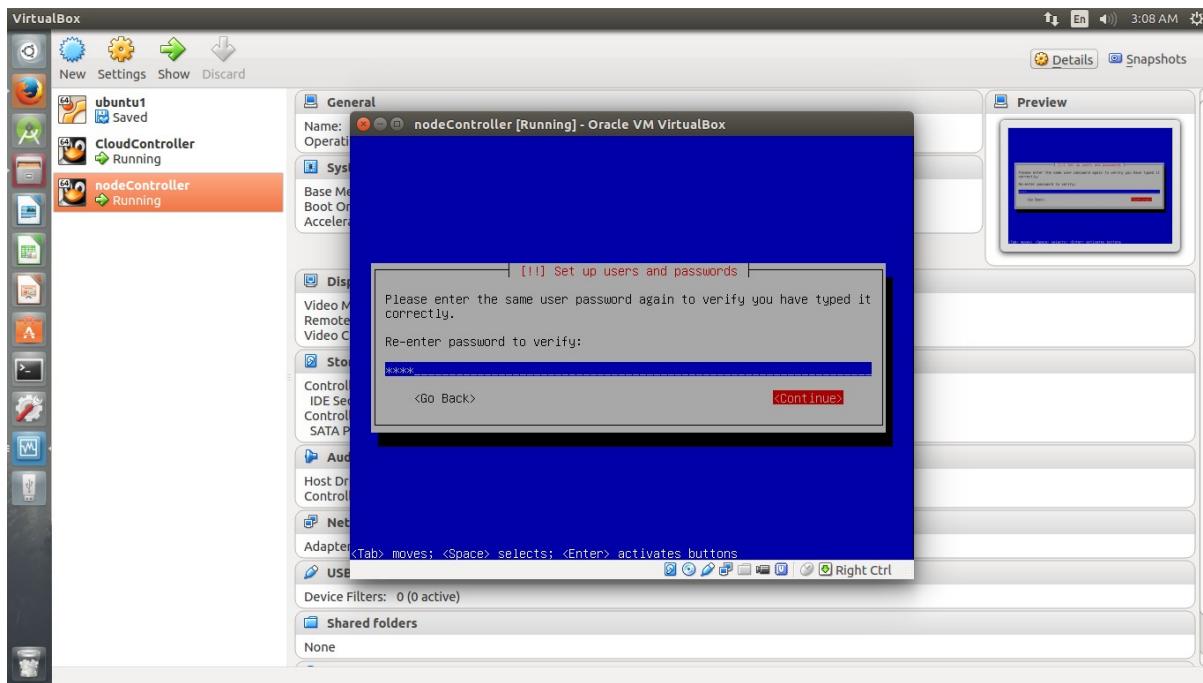
Select only the 'Node Controller' option and install it.



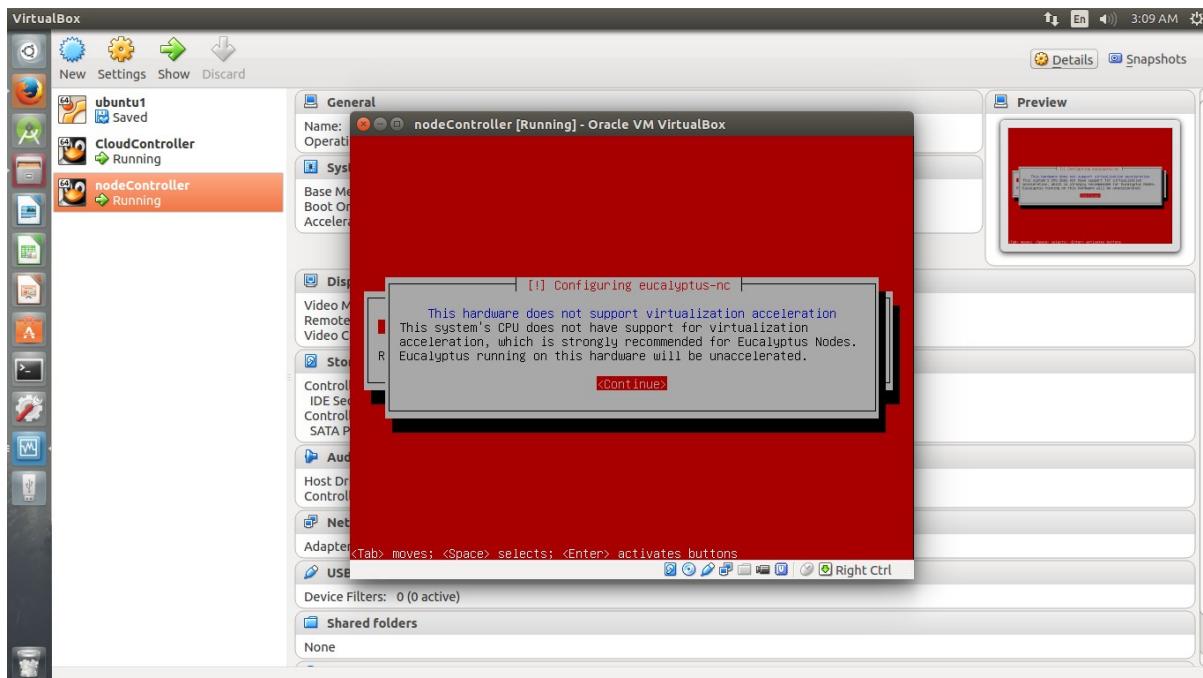
Give a desired name for the user to access the node controller



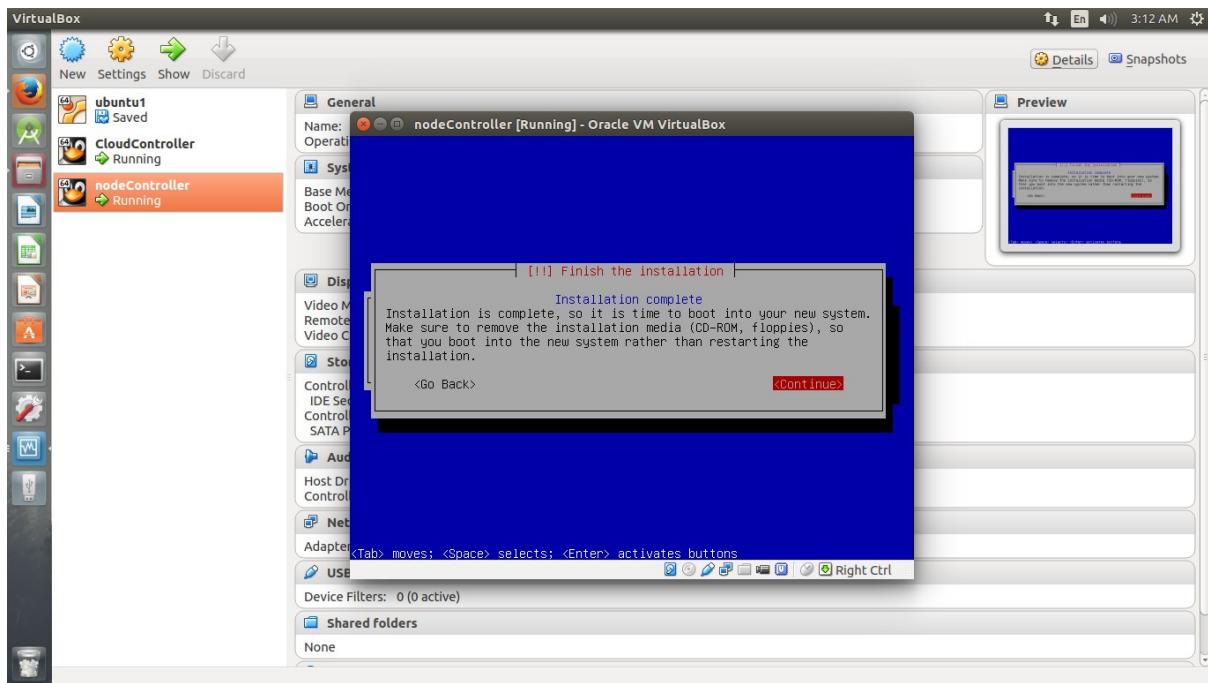
Set a password.



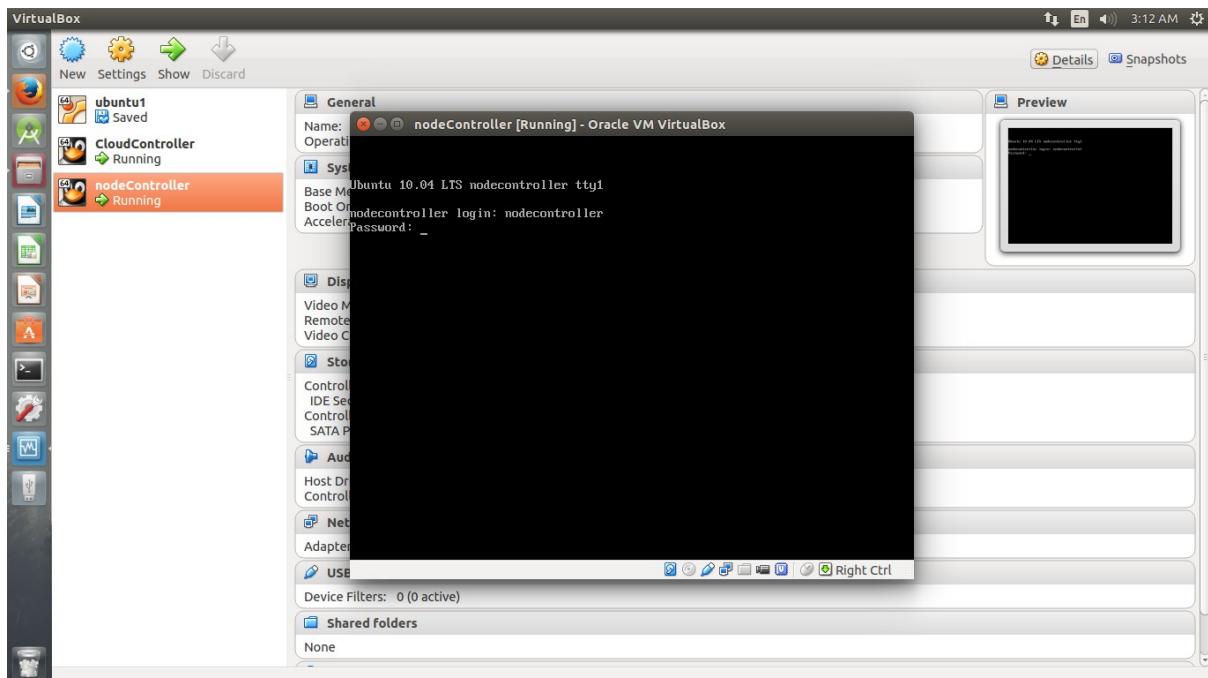
Virtualization is not required to install this software. Click on the 'Continue' button to proceed further.



Click on the continue button to finish the installation process.



The node controller window boots. Give the required 'username' and 'password' to log in.



EUCALYPTUS CLIENT

STEP1:

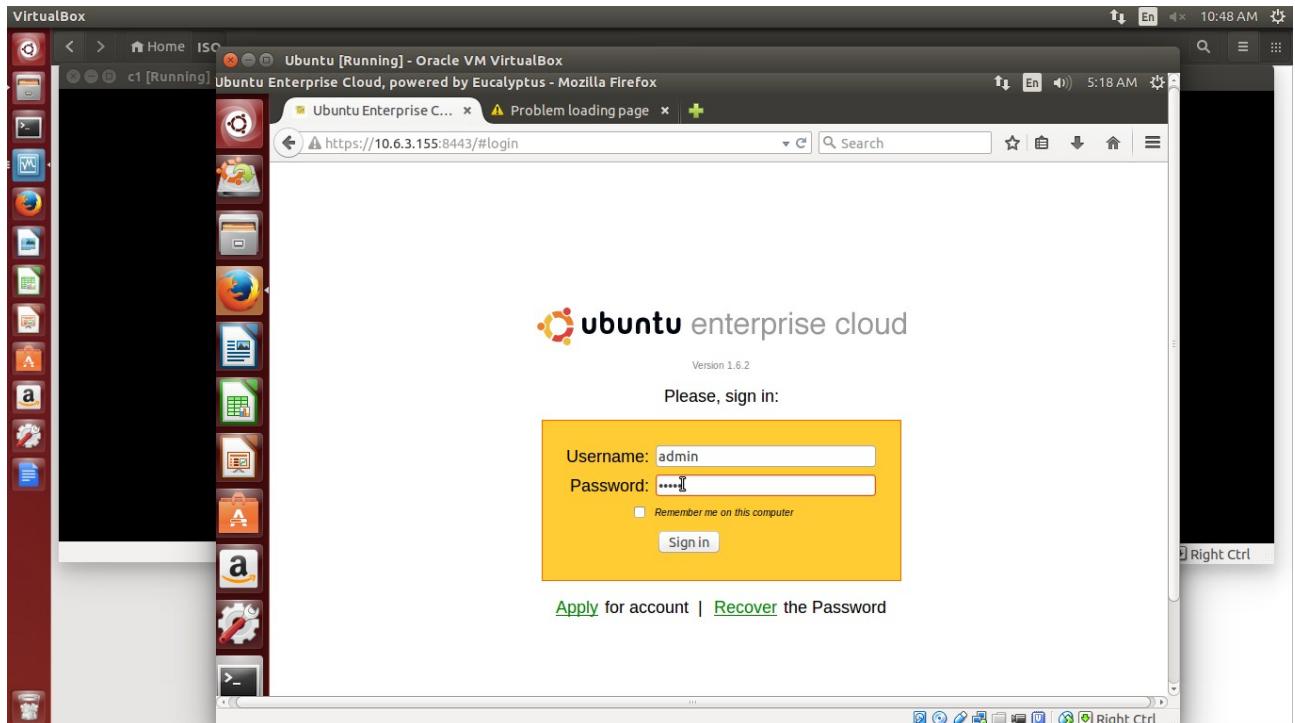
Open the web Browser and type:

<https://cloud Controller ip address:8443>

The following window should be displayed.

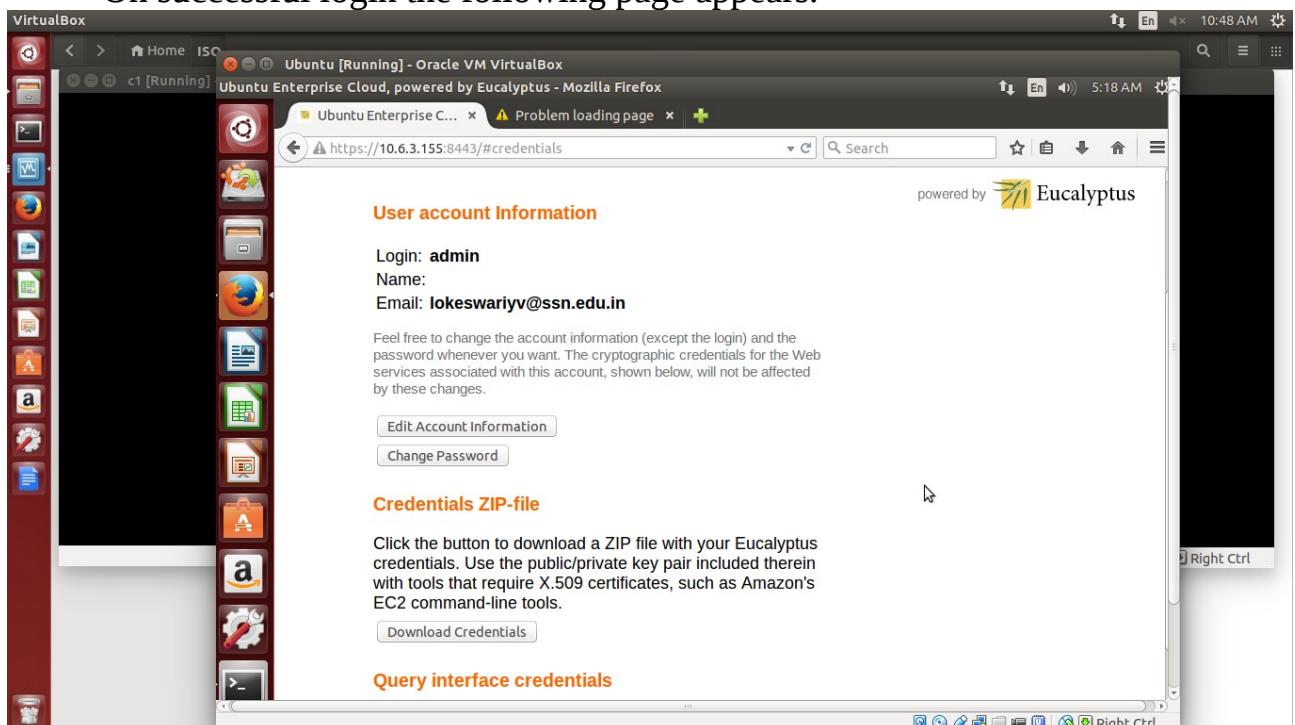
Username:admin

Password:admin

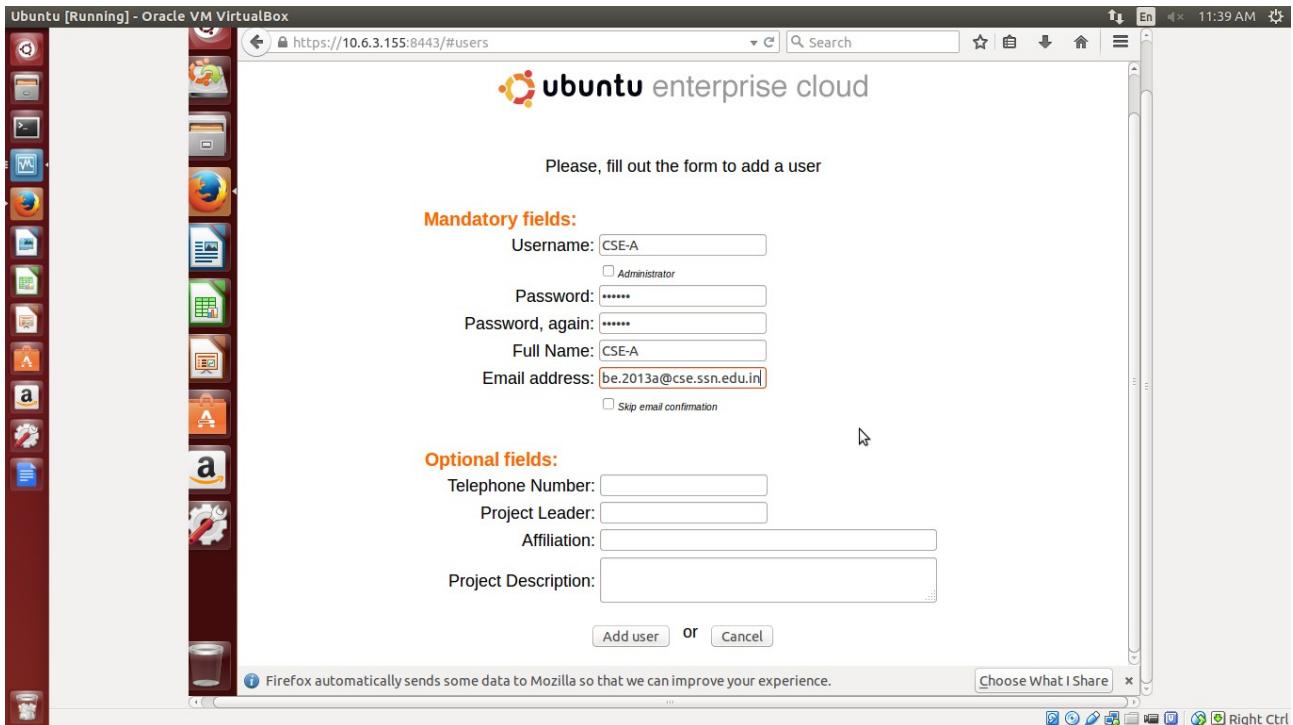


Step2:

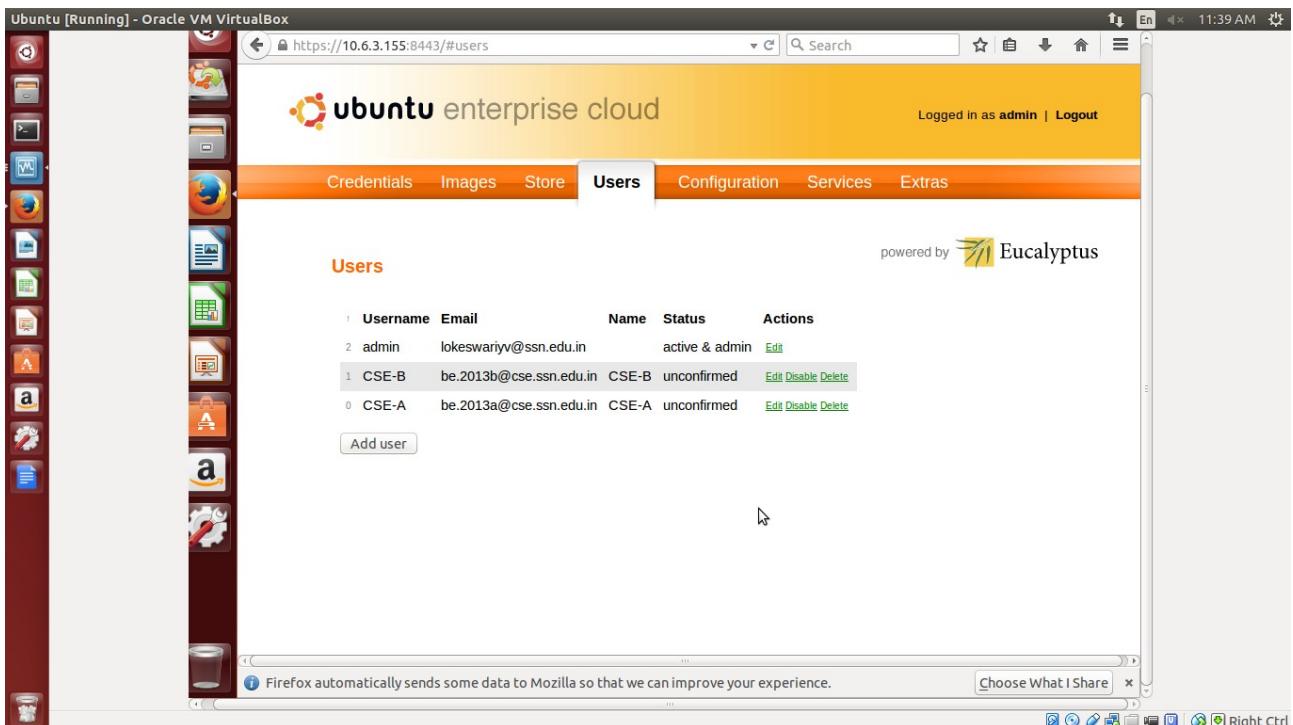
On successful login the following page appears.



To add users:



List of users available can be seen here:



Configuration details:

The following screenshots show the configuration details of the **Cloud Controller**, **Walrus**, **Cluster Controller** and the **Storage Controller**.

This screenshot shows the configuration interface for the Cloud Controller. It includes sections for Cloud configuration, DNS configuration, and Walrus Configuration.

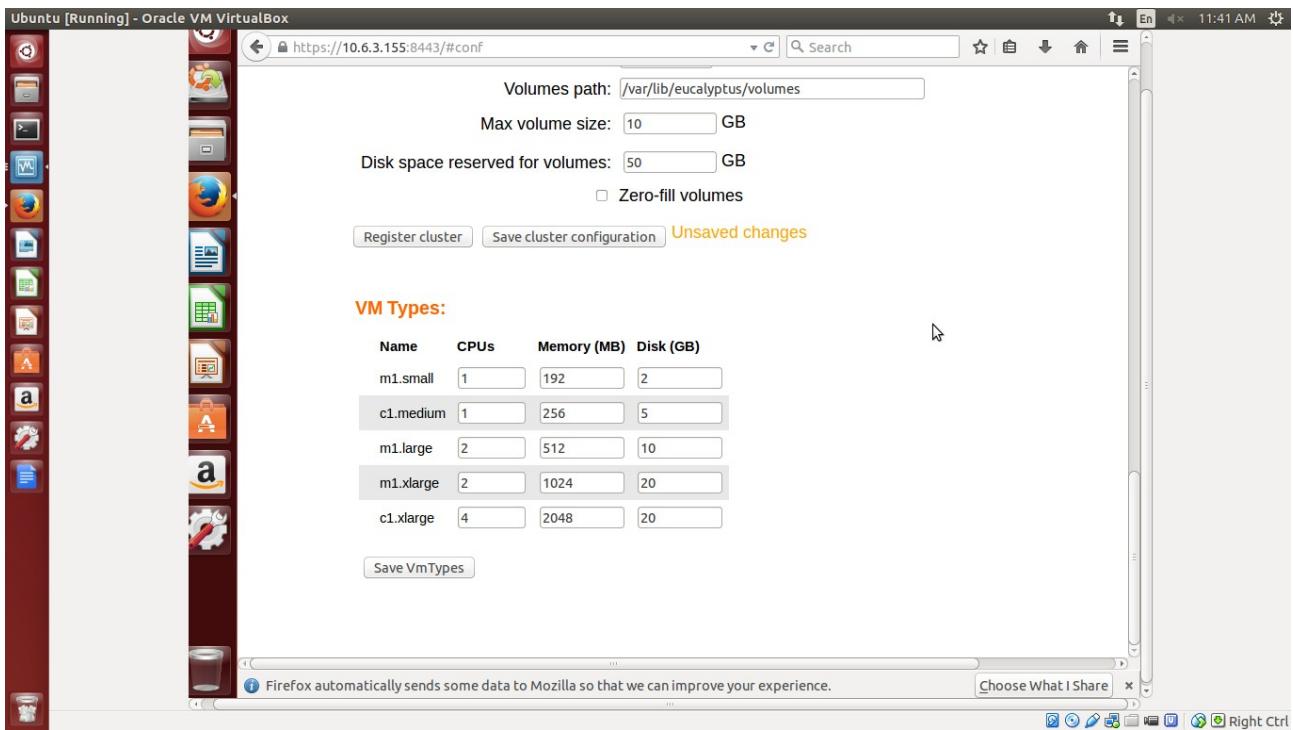
Cloud configuration:
Cloud Host: 10.6.3.155
Default kernel: [empty]
Default ramdisk: [empty]
Save Configuration
Saved configuration to server

DNS configuration:
Domain name: localhost
Nameserver: nshost.localhost
IP: 127.0.0.1
Save Configuration
Saved configuration to server

Walrus Configuration:
Walrus host: 10.6.3.155
Buckets path: /var/lib/eucalyptus/buckets
Maximum buckets per user: 5
MR maximum bucket size: 5120
Firefox automatically sends some data to Mozilla so that we can improve your experience.
Choose What I Share

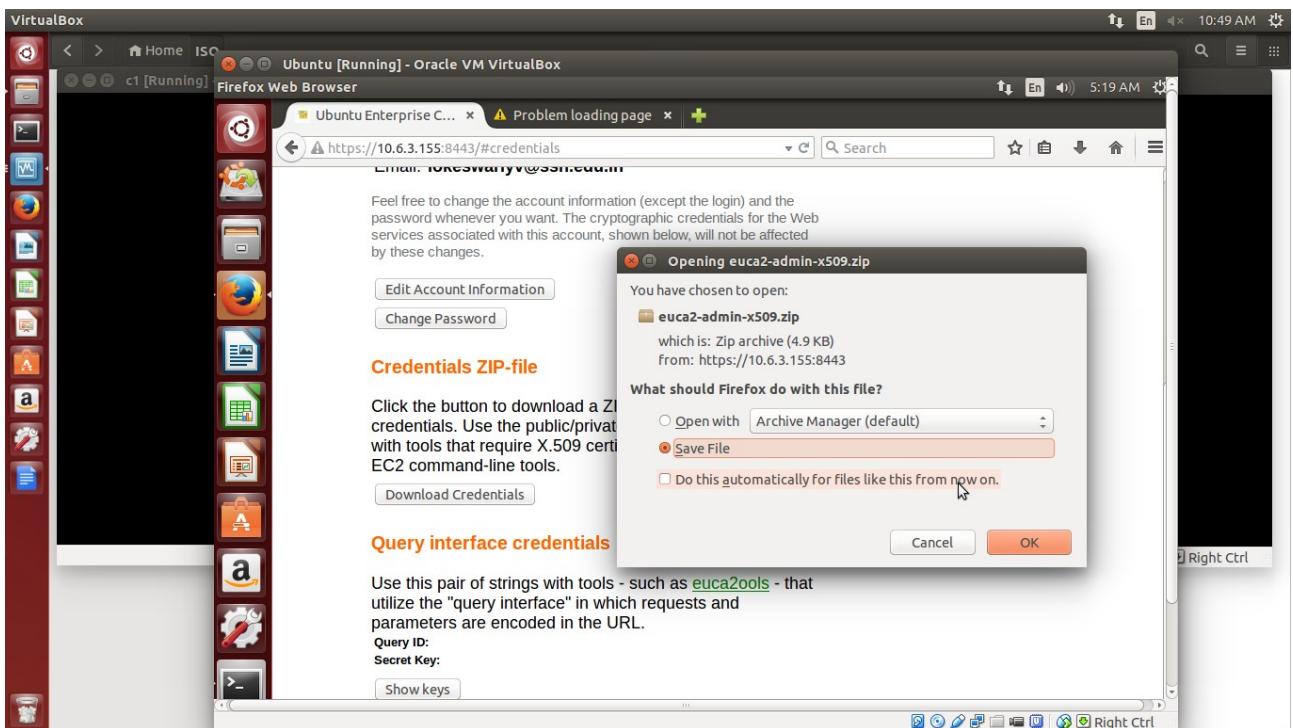
This screenshot shows the configuration interface for the Cluster Controller. It allows creating a new cluster named "cluster1".

Clusters:
Name: cluster1
Cluster Controller
Host: 10.6.3.155
Port: 8774
 Dynamic public IP address assignment
Reserve for assignment: 10 public IP addresses
Maximum of 5 public IP addresses per user
Use VLAN tags 10 through 4095
Storage Controller
Host: 10.0.2.15
Interface: eth0
Volumes path: /var/lib/eucalyptus/volumes
Max volume size: 10 GB
Disk space reserved for volumes: 50 GB
 Zero-fill volumes
Register cluster
Save cluster configuration
Unsaved changes
Firefox automatically sends some data to Mozilla so that we can improve your experience.
Choose What I Share



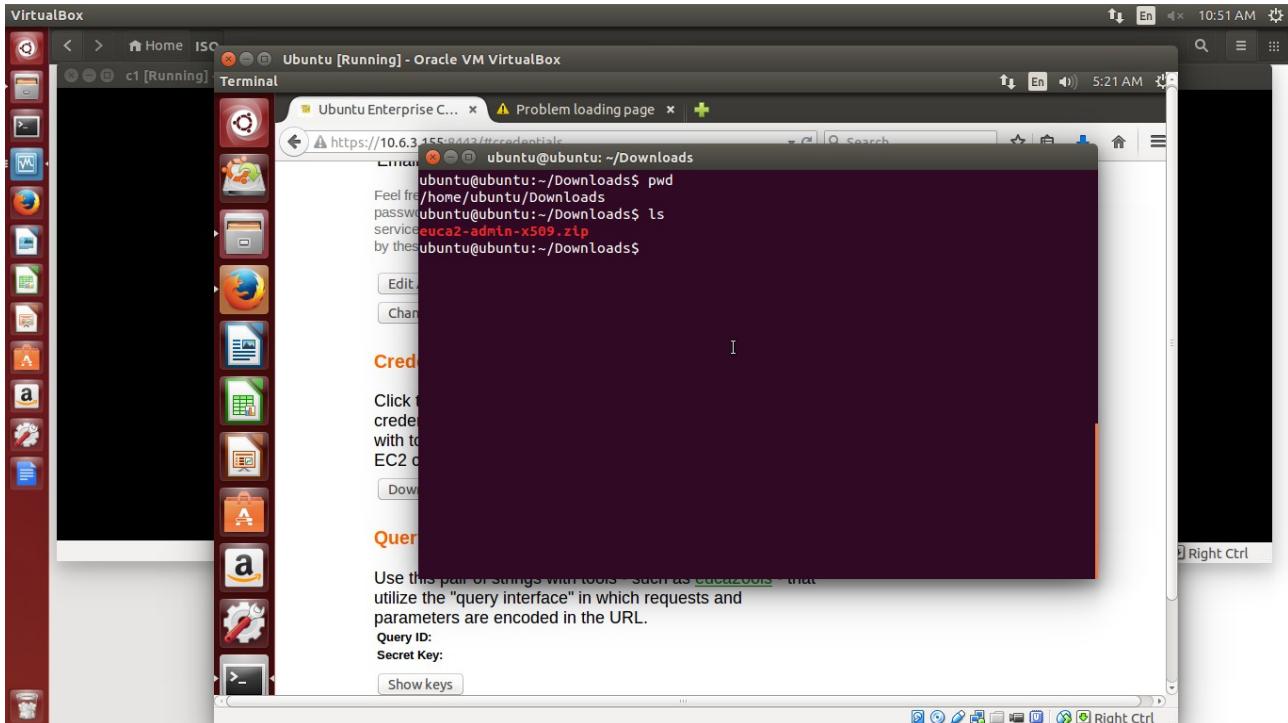
Step3:

Download the Credentials by clicking on the 'Download Credentials' button.
Save the zip file.



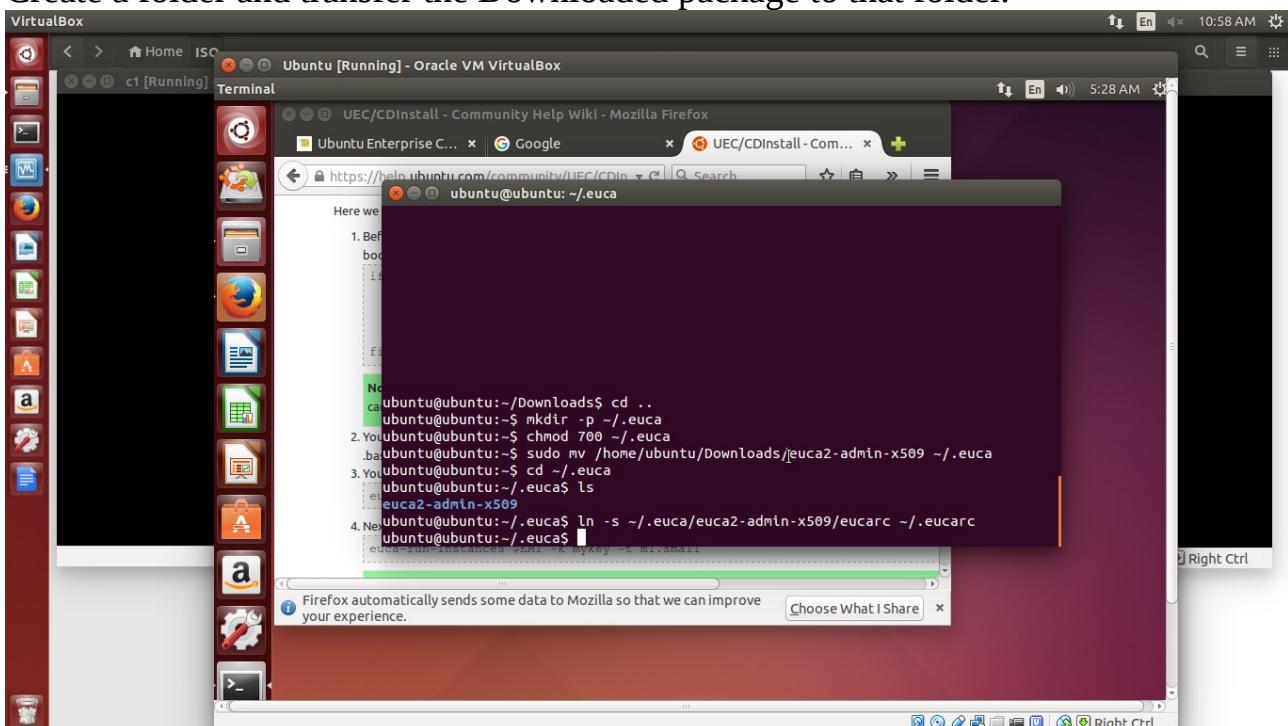
Step 4:

The downloaded package will be present in the Downloads folder as seen here.



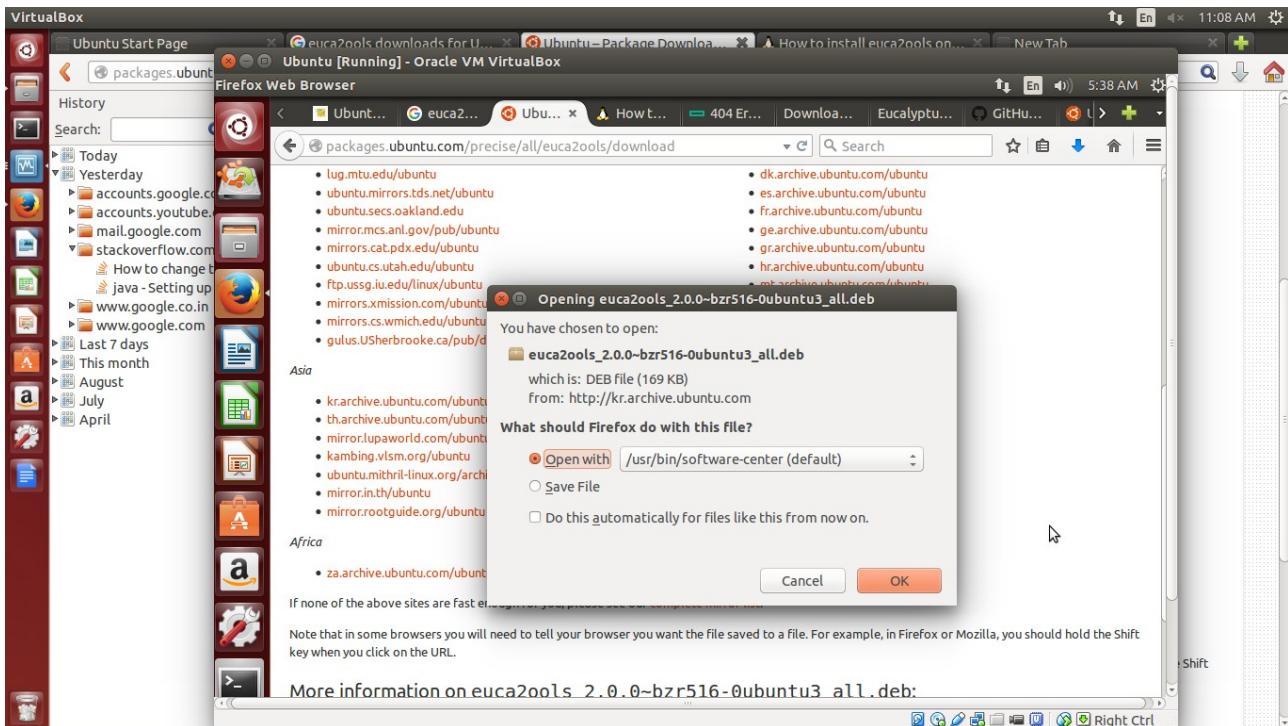
Step 5:

Create a folder and transfer the Downloaded package to that folder.



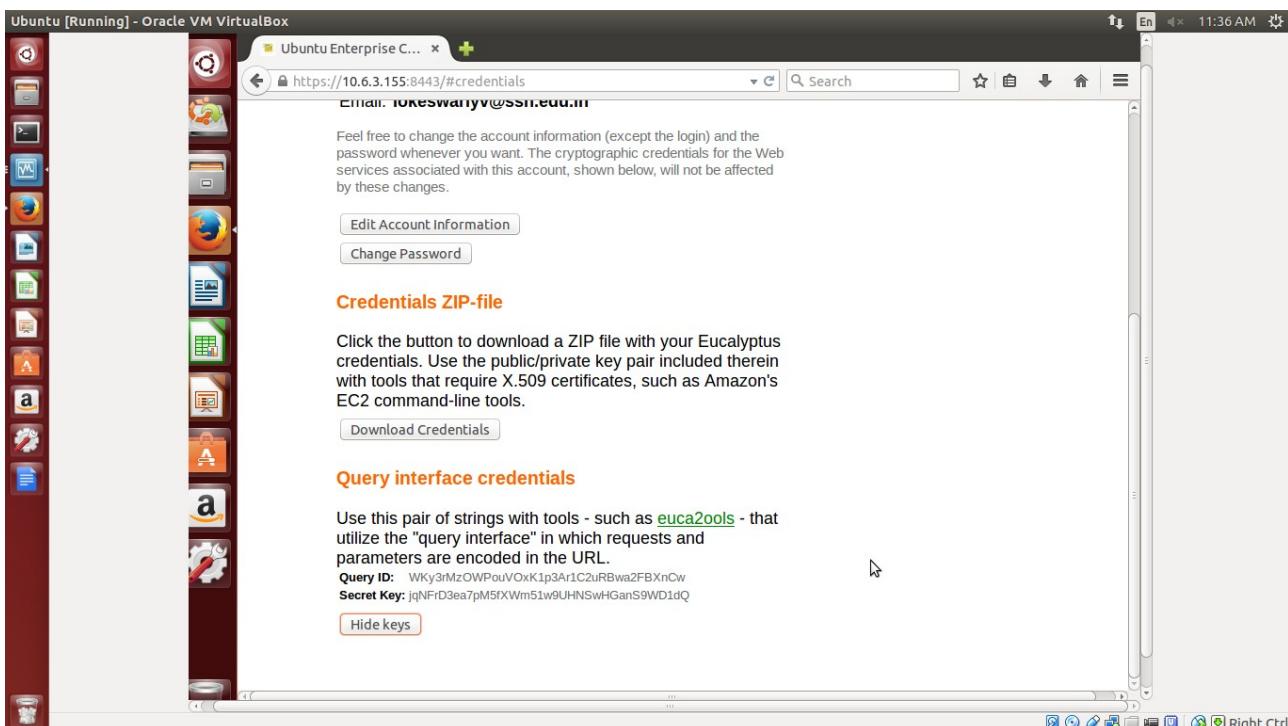
Step 6:

Download the Euca Tools .



Step 7:

To hide the keys click on the 'Hide keys' button.



**Source eucarc using the command]\$ source eucarc
Or]\$. ~/euca/eucarc**

Install euca2ools in client machine.

]\$ sudo apt-get install <euca2ools package>

Execute the following commands after the installation of Euca2ools

- a. Image Management - <euca-bundle-image>, <euca-describe-images>
- b. Instance Management - <euca-describe-instances>
- c. Storage Management - <euca-attach-volume>, <euca-create-volume>, <euca-delete-volume>, <euca-describe-volumes>
- d. Network Management - <euca-describe-address>
- e. General - <euca-version>

Creating Keypairs

```
]$ euca-add-keypair mykey | tee mykey.private  
]$ chmod 0600 mykey.private
```

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
```

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)

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

Note:

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

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Assignment -7 : Live Migration of Virtual Machine

Assigned Date: 20.08.2016.

Due Date: 29. 08.2016 & 24 .08.2016

- 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.

Live Migration of Virtual Machine

1) Add 4 hosts (nodes) to /etc/hosts as follows

127.0.0.1	node1
127.0.0.2	node2
127.0.0.3	node3
127.0.0.4	node4

2) Create above mentioned 4 hosts in oneadmin user as follows.

```
oneadmin@ ]$ onehost create node1 -i kvm -v kvm -n dummy
oneadmin@ ]$ onehost create node2 -i kvm -v kvm -n dummy
oneadmin@ ]$ onehost create node3 -i kvm -v kvm -n dummy
oneadmin@ ]$ onehost create node4 -i kvm -v kvm -n dummy
```

3) Next step is to create a VM template for Cent OS in the UI(<http://localhost:9869>).

4) An VM Image has to be created for the Cent OS by clicking on storages ->Images in the dashboard and providing the details of path of Cent OS, RAM size etc.,

OpenNebula

Image 1 CentOsNew

oneadmin OpenNebula

Dashboard Instances Templates Storage Network Infrastructure System Support Not connected Sign in

OpenNebula 5.0.2 by OpenNebula Systems

Info VMs Snapshots

Information		Permissions	Use	Manage	Admin
ID	1	Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Name	CentOsNew	Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Datastore	default	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Register time	04:39:15 22/09/2016	Ownership			
Type	OS	Owner	oneadmin		<input type="checkbox"/>
Persistent	no	Group	oneadmin		<input type="checkbox"/>
Filesystem type	-				
Size	692MB				
State	READY				
Running VMS	0				

Attributes

DEV_PREFIX	hd
DRIVER	raw

5)In the dashboard of the UI , click on the template and select VM to create a new VM template. Click on the + icon and specify the necessary details such as VM Image to create a VM template, name of template.

Information		Permissions	Use	Manage	Admin
ID	1	Owner	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Name	CentOsTemplate	Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Register time	04:48:42 22/09/2016	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ownership	
Owner	oneadmin
Group	oneadmin

6)Create two VMs (VM1 and VM2) with CentOS 6.5 (64-bit) from the above created CentOS6.5 (64-bit) template by selecting VM in instances.

7)List all VMs and hosts running in Opennebula Cloud using **onevm list** command in the terminal.

8)Deploy VM1 in node1 host and VM2 in node1 host using the command **oneadmin@]\$ onevm deploy <vm-id> <host-id>**

(or) using UI select the deploy option in the corresponding VM page and select the node in which the VM has to be deployed.

The screenshot shows the OpenNebula web interface for deploying a virtual machine. The main title is "Deploy Virtual Machine" under "2VM2". A sub-section titled "Select a Host" displays a table of hosts:

ID	Name	Cluster	RVMs	Allocated CPU	Allocated MEM	Status
10	node4	default	0	0 / 0	OKB / -	ERROR
9	node3	default	0	0 / 0	OKB / -	ERROR
8	node2	default	0	0 / 0	OKB / -	ERROR
5	node1	default	1	100 / 0	1GB / -	ERROR

Below the table, a message says "Showing 1 to 4 of 4 entries". On the right, there is a "Search" input field and a "Deploy" button. A red notification bar at the bottom right says "Cannot contact server: is it running and reachable?".

After the two VM's have been deployed on the corresponding hosts, on executing **onevm list**, we get

```
sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/one
sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/... x sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/... x
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$ onevm list
  ID USER      GROUP     NAME      STAT UCPU    UMEM HOST      TIME
  1 oneadmin  oneadmin  VM        fail   0       0K node1      0d 00h45
  2 oneadmin  oneadmin  VM2       fail   0       0K node2      0d 00h02
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$
```

9) Migrate VM1 to node host using following command
oneadmin@]\$ onevm migrate <vm-id> <host-id>

These id's can be found in the ID column of the onevm list and onehost list command.

```
sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/one
sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/one... x sel-47@sel47-HP-Compaq-Pro-6305-SFF: /var/log/one...
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$ onevm list
  ID USER      GROUP     NAME      STAT UCPU    UMEM HOST        TIME
  1 oneadmin  oneadmin   VM       fail    0     0K node1  0d 00h46
  2 oneadmin  oneadmin   VM2      fail    0     0K node2  0d 00h03
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$ onehost list
  ID NAME      CLUSTER   RVM      ALLOCATED_CPU      ALLOCATED_MEM STAT
  5 node1      default    1        100 / -          1024M / - err
  8 node2      default    1        100 / -          1024M / - err
  9 node3      default    0        -           -          -           - err
 10 node4      default    0        -           -          -           - err
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$ onevm migrate 1 9
[VirtualMachineMigrate] Migrate action is not available for state BOOT_FAILURE
oneadmin@sel47-HP-Compaq-Pro-6305-SFF:~$
```

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Assignment -9 : Mounting Hadoop using FUSE

Assigned Date: 12.09.2016.

Due Date: 14. 09.2016 & 17 .09.2016

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/>

Mounting Hadoop using FUSE

To start Hadoop fuse installation and configuration follow the steps:

Step 1 : Required Dependencies

Hadoop single / multinode Cluster (started mode)
jdk (preinstalled)

Fuse mount Installation and configuration guide has prepared on following platform and services.

Operating System : CentOS release 6.4 (Final) 32bit

hadoop : hadoop-1.2.1

mysql-server : 5.1.71

JDK : java version "1.7.0_45" 32bit (jdk-7u45-linux-i586.rpm)

fuse : hdfs-fuse-0.2.linux2.6-gcc4.1-x86.tar.gz

fuse RPMs : fuse-libs-2.8.3-4.el6.i686,

 fuse-2.8.3-4.el6.i686,

 fuse-devel-2.8.3-4.el6.i686.

Step2 : Download and install fuse

login as hadoop user to a node in hadoop cluster (master / datanode)

Download hdfs-fuse from following location

```
[hadoop@hadoop ~]#wget https://hdfs-fuse.googlecode.com/files/hdfs-fuse-0.2.linux2.6-gcc4.1-x86.tar.gz
```

Extract hdfs-fuse-0.2.linux2.6-gcc4.1-x86.tar.gz

```
[hadoop@hadoop ~]#tar -zvxf hdfs-fuse-0.2.linux2.6-gcc4.1-x86.tar.gz
```

Step 3 : Install rpm packages

switch to root user to install following rpm packages

fuse-libs-2.8.3-4.el6.i686

fuse-2.8.3-4.el6.i686

fuse-devel-2.8.3-4.el6.i686

```
[hadoop@hadoop ~]#su – root
```

```
[root@hadoop ~]#yum install fuse*
```

```
[root@hadoop ~]#chmod +x /usr/bin/fusermount
```

Step 4 : Modify hdfs fuse

After installation of rpm packages, switch back to hadoop user

```
[root@hadoop ~]# su – hadoop
```

Modify hdfs fuse configuration / environmental variables

```
[hadoop@hadoop ~]$cd hdfs-fuse/conf/
```

Add following lines in hdfs-fuse.conf

```
[hadoop@hadoop conf]$vi hdfs-fuse.conf

export JAVA_HOME=/usr/java/jdk1.7.0_45          # JAVA HOME path

export HADOOP_HOME=/home/hadoop/hadoop-1.2.1      # hadoop installation home path
export FUSE_HOME=/home/hadoop                      #fuse installation path

export HDFS_FUSE_HOME=/home/hadoop/hdfs-fuse       # fuse home path

export HDFS_FUSE_CONF=/home/hadoop/hdfs-fuse/conf   # fuse configuration

path LogDir /tmp LogLevel LOG_DEBUG Hostname 192.168.1.52

# hadoop master    node

IP Port 9099

# hadoop port number (you can modify as per your hadoop  configuration) Save & Exit(wq!)
```

Step 5 : Check hadoop services

```
[hadoop@hadoop conf]$cd ..

verify hadoop instance is running

[hadoop@hadoop hdfs-fuse]$ jps

2643 TaskTracker

4704 Jps

2206 NameNode

2516 JobTracker

2432 SecondaryNameNode

2316 DataNode
```

```
[hadoopuser@sel56-HP-Compaq-Pro-6305-SFF: ~]
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ jps
14960 ResourceManager
14475 DataNode
15100 NodeManager
14751 SecondaryNameNode
15781 Jps
14335 NameNode
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ln -s /usr/local/hadoop/lib/native/li
bhdfs .
ln: failed to create symbolic link './libhdfs': File exists
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ echo $HADOOP_HOME

hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ vi hdfs-mount
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ln -s /usr/local/hadoop/lib/native/li
bhdfs .
ln: failed to create symbolic link './libhdfs': File exists
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ./hdfs-mount -d /home/hadoop/hdfsmoun
t
-su: ./hdfs-mount: Permission denied
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ./hdfs-mount -d /home/hadoopuser/hdfs
mount
-su: ./hdfs-mount: Permission denied
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ sudo ./hdfs-mount -d /home/hadoopuser
/hdfsmount
```

Step 6 : Create a directory to mount hadoop

create a folder to mount hadoop file system to it

```
[hadoop@hadoop hdfs-fuse]#mkdir /home/hadoop/hdfsmount
```

```
[hadoop@hadoop hdfs-fuse]# cd
```

```
[hadoop@hadoop ~]#pwd
```

Step 7 : Modify hdfs-mount script

switch to hdfc fuse binary folder in order to run mount script.

```
[hadoop@hadoop ~]#cd hdfs-fuse/bin/
```

modify hdfs-mount script to show jvm path location and other environmental settings, in our installation guide this is the location for jvm
(usr/java/jdk1.7.0_45/jre/lib/i386/server)

```
[hadoop@hadoop bin]$ vi hdfs-mount
```

```
JAVA_JVM_DIR=/usr/java/jdk1.7.0_45/jre/lib/i386/server
```

```
export JAVA_HOME=/usr/java/jdk1.7.0_45
```

```
export HADOOP_HOME=/home/hadoop/hadoop-1.2.1
```

```
export FUSE_HOME=/home/hadoop
```

```
export HDFS_FUSE_HOME=/home/hadoop/hdfs-fuse
```

```
export HDFS_FUSE_CONF=/home/hadoop/hdfs-fuse/conf
```

Save & Exit(wq!)

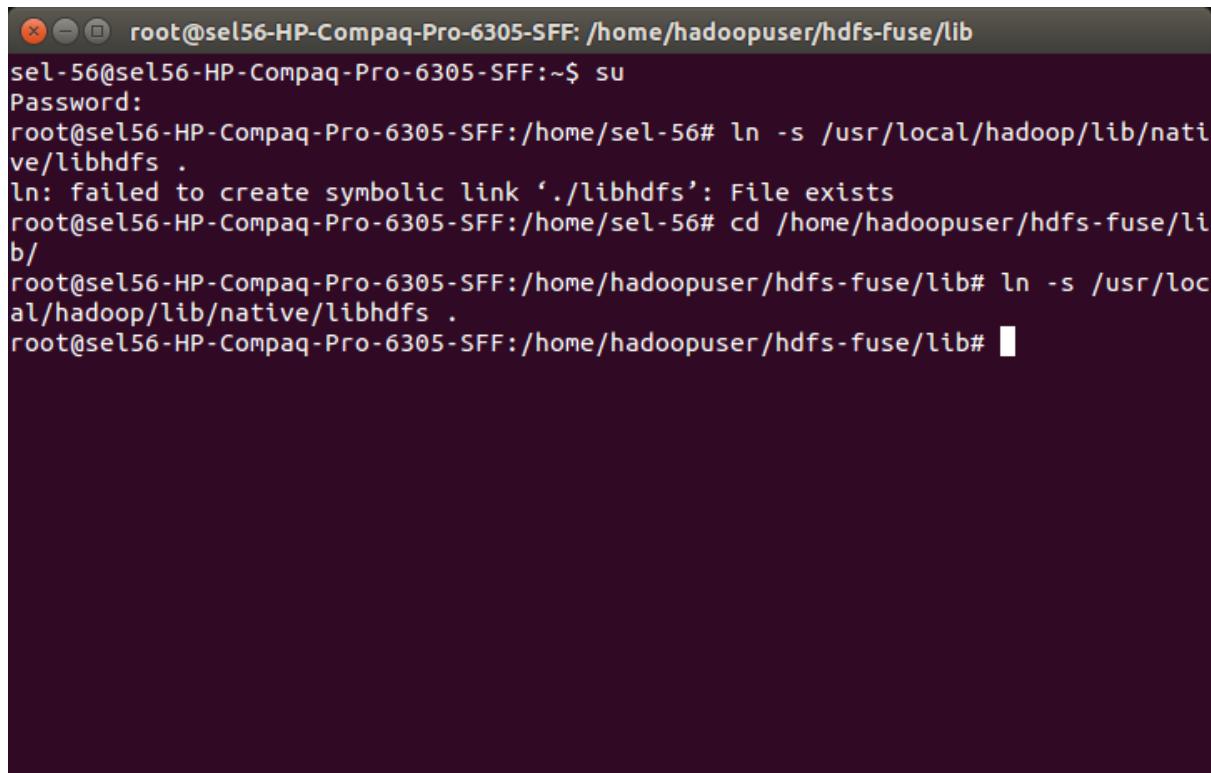
Step 8 : Create softlinks of libhdfs.so

create softlinks of libhdfs.so which is located in (/home/hadoop/hadoop-1.2.1/c++/Linux-i386-32/lib/libhdfs.so)

```
[root@hadoop ~]# cd /home/hadoop/hdfs-fuse/lib/
```

```
[root@hadoop lib]# ln -s /home/hadoop/hadoop-1.2.1/c++/Linux-i386-32/lib/libhdfs .
```

Mount HDFS file system to /home/hadoop/hdfsmount



A terminal window titled "root@sel56-HP-Compaq-Pro-6305-SFF: /home/hadoopuser/hdfs-fuse/lib". The session shows the user navigating to the lib directory and attempting to create symbolic links. The first attempt fails because the target file already exists. The second attempt succeeds.

```
root@sel56-HP-Compaq-Pro-6305-SFF: /home/hadoopuser/hdfs-fuse/lib
sel-56@sel56-HP-Compaq-Pro-6305-SFF:~$ su
Password:
root@sel56-HP-Compaq-Pro-6305-SFF:/home/sel-56# ln -s /usr/local/hadoop/lib/native/libhdfs .
ln: failed to create symbolic link './libhdfs': File exists
root@sel56-HP-Compaq-Pro-6305-SFF:/home/sel-56# cd /home/hadoopuser/hdfs-fuse/lib/
root@sel56-HP-Compaq-Pro-6305-SFF:/home/hadoopuser/hdfs-fuse/lib# ln -s /usr/local/hadoop/lib/native/libhdfs .
root@sel56-HP-Compaq-Pro-6305-SFF:/home/hadoopuser/hdfs-fuse/lib#
```

```
[hadoop@hadoop bin]#./hdfs-mount /home/hadoop/hdfsmount
```

or

```
[hadoop@hadoop bin]$. ./hdfs-mount -d /home/hadoop/hdfsmount (-d option to enable debug)
```

Step 9 : Check memory details

```
[hadoop@hadoop bin]# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/mapper/vg_hadoop-lv_root	50G	1.4G	46G	3%	/
tmpfs	504M	0	504M	0%	/dev/shm
/dev/sda1	485M	30M	430M	7%	/boot
/dev/mapper/vg_hadoop-lv_home	29G	1.2G	27G	5%	/home
hdfs-fuse	768M	64M	704M	9%	/home/hadoop/hdfsmount

```
[hadoopuser@sel56-HP-Compaq-Pro-6305-SFF: ~]
urcmanager-sel56-HP-Compaq-Pro-6305-SFF.out
localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-hadoopuser-nodemanager-sel56-HP-Compaq-Pro-6305-SFF.out
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ df -h
df: '/run/user/1000/gvfs': Permission denied
df: '/media/sel-56/60397e22-3372-4ca2-9ecc-2daf67d40a36': Permission denied
df: '/media/sel-56/707AEE367AEDF8AC': Permission denied
df: '/media/sel-56/F25E78CF5E788E5B': Permission denied
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda7       239G   52G  176G  23% /
none            4.0K    0  4.0K  0% /sys/fs/cgroup
udev            3.5G  4.0K  3.5G  1% /dev
tmpfs           712M  1.3M  711M  1% /run
none            5.0M    0  5.0M  0% /run/lock
none            3.5G  396K  3.5G  1% /run/shm
none            100M  112K  100M  1% /run/user
none            3.5G  1.5M  3.5G  1% /tmp/guest-fEZb0a
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ./hdfs-mount /home/hadoopuser/hdfsmount
-su: ./hdfs-mount: No such file or directory
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$ ln -s /usr/local/lib/libfuse.so.2 /lib64/
ln: failed to create symbolic link '/lib64/libfuse.so.2': File exists
hadoopuser@sel56-HP-Compaq-Pro-6305-SFF:~$
```

[hadoop@hadoop bin]\$ ls /home/hadoop/hdfsmount/

tmp user

use below “fusermount” command to unmount hadoop file system

[hadoop@hadoop bin]\$fusermount -u /home/hadoop/hdfsmount

fuse mount is ready to use as local file system!

Result :

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Assignment -10 :Installation of Globus Toolkit

Assigned Date: 23.09.2016.

Due Date: 24. 09.2016 & 24 .09.2016

Installation of Globus Toolkit 6 in Ubuntu 14.04 physical machine.

I. Install Java, set path, environment variables for Java and verify it.

II. Install Globus components as follows

1. globus-toolkit-repo_latest_all.deb
2. globus-data-management-client
3. globus-gridftp
4. globus-gram5
5. globus-gsi
6. globus-data-management-server
7. globus-data-management-client
8. globus-data-management-sdk
9. globus-resource-management-server
10. globus-resource-management-client
11. globus-resource-management-sdk
12. myproxy
13. gsi-openssh
14. myproxy-server
15. myproxy-admin

Use the following link

<http://www.fosstips.com/2016/07/installing-globus-toolkit-6-on-ubuntu.html>

1.globus-toolkit-repo_latest_all.deb

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ wget http://www.globus.org/ftppub/gt6/installers/repo/globus-toolkit-repo_latest_all.deb
--2016-09-27 07:26:38--  http://www.globus.org/ftppub/gt6/installers/repo/globus-toolkit-repo_latest_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... 301 Moved Permanently
Location: http://toolkit.globus.org/ftppub/gt6/installers/repo/globus-toolkit-repo_latest_all.deb [following]
--2016-09-27 07:26:39--  http://toolkit.globus.org/ftppub/gt6/installers/repo/globus-toolkit-repo_latest_all.deb
Connecting to proxy.ssn.net (proxy.ssn.net)|192.168.2.5|:8080... connected.
Proxy request sent, awaiting response... 200 OK
Length: 8534 (8.3K) [application/x-debian-package]
Saving to: 'globus-toolkit-repo_latest_all.deb.1'

100%[=====] 8,534      31.9KB/s   in 0.3s

2016-09-27 07:26:40 (31.9 KB/s) - 'globus-toolkit-repo_latest_all.deb.1' saved [8534/8534]

sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo dpkg -i globus-toolkit-repo_latest_all.deb
(Reading database ... 246275 files and directories currently installed.)
Preparing to unpack globus-toolkit-repo_latest_all.deb ...
Unpacking globus-toolkit-repo (6.0.7-1) over (6.0.7-1) ...
OK
Setting up globus-toolkit-repo (6.0.7-1) ...
Adding Globus Package GPG Key
OK
Adding Globus Repo GPG Key
OK
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$
```

2.globus-data-management-client

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-data-management-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-copy-progs globus-gsi-cert-utils-progs
  globus-proxy-utils libglobus-callout0 libglobus-common0
  libglobus-ftp-client2 libglobus-ftp-control1 libglobus-gass-copy2
  libglobus-gass-transfer2 libglobus-gsi-callback0 libglobus-gsi-cert-utils0
  libglobus-gsi-credential1 libglobus-gsi-openssl-error0
  libglobus-gsi-proxy-core0 libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1
  libglobus-gss-assist3 libglobus-gssapi-error2 libglobus-gssapi-gsi4
  libglobus-io3 libglobus-openssl-module0 libglobus-xio-gsi-driver
  libglobus-xio-popen-driver libglobus-xio0
The following NEW packages will be installed:
  globus-common-progs globus-data-management-client globus-gass-copy-progs
  globus-gsi-cert-utils-progs globus-proxy-utils libglobus-callout0
  libglobus-common0 libglobus-ftp-client2 libglobus-ftp-control1
  libglobus-gass-copy2 libglobus-gass-transfer2 libglobus-gsi-callback0
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-xio-gsi-driver
  libglobus-xio-popen-driver libglobus-xio0
0 upgraded, 26 newly installed, 0 to remove and 221 not upgraded.
Need to get 82.0 kB/936 kB of archives.
After this operation, 3,621 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-common0 amd64 6.0.7-1
Get:2 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-common1 amd64 6.0.7-1
Get:3 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib globus-common1 amd64 6.0.7-1
Fetched 16.6 kB in 0s (377 kB/s)
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/libglobus-common0 amd64.deb  Size mismatch
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/libglobus-common1 amd64.deb  Size mismatch
```

3. globus-gridftp

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-gridftp
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-copy-progs globus-gridftp-server-progs
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-proxy-utils
  libglobus-authz-callout-error0 libglobus-authz0 libglobus-callout0
  libglobus-common0 libglobus-ftp-client2 libglobus-ftp-control1
  libglobus-gass-copy2 libglobus-gass-transfer2 libglobus-gfork0
  libglobus-gridftp-server-control0 libglobus-gridftp-server6
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-usage0 libglobus-xio-gsi-driver
  libglobus-xio-pipe-driver libglobus-xio-popen-driver
  libglobus-xio-udt-driver libglobus-xio0 libudt0
The following NEW packages will be installed:
  globus-common-progs globus-gass-copy-progs globus-gridftp
  globus-gridftp-server-progs globus-gsi-cert-utils-progs
  globus-gss-assist-progs globus-proxy-utils libglobus-authz-callout-error0
  libglobus-authz0 libglobus-callout0 libglobus-common0 libglobus-ftp-client2
  libglobus-ftp-control1 libglobus-gass-copy2 libglobus-gass-transfer2
  libglobus-gfork0 libglobus-gridftp-server-control0 libglobus-gridftp-server6
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-usage0 libglobus-xio-gsi-driver
  libglobus-xio-pipe-driver libglobus-xio-popen-driver
  libglobus-xio-udt-driver libglobus-xio0 libudt0
0 upgraded, 37 newly installed, 0 to remove and 221 not upgraded.
Need to get 82.0 kB/1,405 kB of archives.
```

4. globus-gram5

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-gram5
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-client-tools
  globus-gram-job-manager globus-gram-job-manager-doc
  globus-gram-job-manager-fork globus-gram-job-manager-fork-doc
  globus-gram-job-manager-fork-setup-poll globus-gram-job-manager-scripts
  globus-gram-job-manager-scripts-doc globus-gsi-cert-utils-progs
  globus-gss-assist-progs globus-proxy-utils libglobus-callout0
  libglobus-common0 libglobus-ftp-client2 libglobus-ftp-control1
  libglobus-gass-cache5 libglobus-gass-copy2 libglobus-gass-server-ez2
  libglobus-gass-transfer2 libglobus-gram-client3
  libglobus-gram-job-manager-callout-error0 libglobus-gram-protocol3
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-rsl2
  libglobus-scheduler-event-generator0 libglobus-usage0
  libglobus-xio-gsi-driver libglobus-xio-popen-driver libglobus-xio0
The following NEW packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-client-tools
  globus-gram-job-manager globus-gram-job-manager-doc
  globus-gram-job-manager-fork globus-gram-job-manager-fork-doc
  globus-gram-job-manager-fork-setup-poll globus-gram-job-manager-scripts
  globus-gram-job-manager-scripts-doc globus-gram5 globus-gsi-cert-utils-progs
  globus-gss-assist-progs globus-proxy-utils libglobus-callout0
  libglobus-common0 libglobus-ftp-client2 libglobus-ftp-control1
```

5. globus-gsi

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~  
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/globus-proxy-utils/globus-proxy-utils_6.15-1+gt6.trusty_amd64.deb  Size mismatch  
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?  
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-gsi  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following extra packages will be installed:  
  globus-common-progs globus-gsi-cert-utils-progs globus-gss-assist-progs  
  globus-proxy-utils globus-simple-ca libglobus-callout0 libglobus-common0  
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1  
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0  
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3  
  libglobus-gssapi-gsi4 libglobus-openssl-module0  
The following NEW packages will be installed:  
  globus-common-progs globus-gsi globus-gsi-cert-utils-progs  
  globus-gss-assist-progs globus-proxy-utils globus-simple-ca  
  libglobus-callout0 libglobus-common0 libglobus-gsi-callback0  
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1  
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0  
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3  
  libglobus-gssapi-gsi4 libglobus-openssl-module0  
0 upgraded, 18 newly installed, 0 to remove and 221 not upgraded.  
Need to get 83.9 kB/499 kB of archives.  
After this operation, 2,101 kB of additional disk space will be used.  
Do you want to continue? [Y/n] y  
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi-proxy-ssl1 amd64 5.8-1+gt6.trusty [13.3 kB]  
Get:2 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi-proxy-core0 amd64 7.9-1+gt6.trusty [27.5 kB]
```

6. globus-data-management-server

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~  
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?  
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-data-management-server  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following extra packages will be installed:  
  globus-common-progs globus-gfork-progs globus-gridftp-server-progs  
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-xioperf  
  libglobus-authz-callout-error0 libglobus-authz0 libglobus-callout0  
  libglobus-common0 libglobus-ftp-control1 libglobus-gfork0  
  libglobus-gridftp-server-control0 libglobus-gridftp-server6  
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1  
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0  
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3  
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3  
  libglobus-openssl-module0 libglobus-usage0 libglobus-xio-gsi-driver  
  libglobus-xio-pipe-driver libglobus-xio-udt-driver libglobus-xio0 libudt0  
The following NEW packages will be installed:  
  globus-common-progs globus-data-management-server globus-gfork-progs  
  globus-gridftp-server-progs globus-gsi-cert-utils-progs  
  globus-gss-assist-progs globus-xioperf libglobus-authz-callout-error0  
  libglobus-authz0 libglobus-callout0 libglobus-common0 libglobus-ftp-control1  
  libglobus-gfork0 libglobus-gridftp-server-control0 libglobus-gridftp-server6  
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1  
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0  
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3  
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3  
  libglobus-openssl-module0 libglobus-usage0 libglobus-xio-gsi-driver  
  libglobus-xio-pipe-driver libglobus-xio-udt-driver libglobus-xio0 libudt0  
0 upgraded, 33 newly installed, 0 to remove and 221 not upgraded.  
Need to get 70.7 kB/1,188 kB of archives.  
After this operation, 4,412 kB of additional disk space will be used.
```

7. globus-data-management-client

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-data-management-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-copy-progs globus-gsi-cert-utils-progs
  globus-proxy-utils libglobus-callout0 libglobus-common0
  libglobus-ftp-client2 libglobus-ftp-control1 libglobus-gass-copy2
  libglobus-gass-transfer2 libglobus-gsi-callback0 libglobus-gsi-cert-utils0
  libglobus-gsi-credential1 libglobus-gsi-openssl-error0
  libglobus-gsi-proxy-core0 libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1
  libglobus-gss-assist3 libglobus-gssapi-error2 libglobus-gssapi-gsi4
  libglobus-io3 libglobus-openssl-module0 libglobus-xio-gsi-driver
  libglobus-xio-popen-driver libglobus-xio0
The following NEW packages will be installed:
  globus-common-progs globus-data-management-client globus-gass-copy-progs
  globus-gsi-cert-utils-progs globus-proxy-utils libglobus-callout0
  libglobus-common0 libglobus-ftp-client2 libglobus-ftp-control1
  libglobus-gass-copy2 libglobus-gass-transfer2 libglobus-gsi-callback0
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-xio-gsi-driver
  libglobus-xio-popen-driver libglobus-xio0
0 upgraded, 26 newly installed, 0 to remove and 221 not upgraded.
Need to get 82.0 kB/936 kB of archives.
After this operation, 3,621 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi-proxy-ssl1 amd64 5.8-1+gt6.trusty [13.3 kB]
Get:2 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi-proxy-core0 amd64 7.9-1+gt6.trusty [27.5 kB]
```

8. globus-data-management-sdk

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-data-management-sdk
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  autotools-dev globus-common-progs libglobus-callout-dev
  libglobus-callout-doc libglobus-callout0 libglobus-common-dev
  libglobus-common-doc libglobus-common0 libglobus-ftp-client-dev
  libglobus-ftp-client-doc libglobus-ftp-client2 libglobus-ftp-control-dev
  libglobus-ftp-control-doc libglobus-ftp-control1 libglobus-gass-copy-dev
  libglobus-gass-copy-doc libglobus-gass-copy2 libglobus-gass-transfer-dev
  libglobus-gass-transfer-doc libglobus-gass-transfer2
  libglobus-gsi-callback-dev libglobus-gsi-callback-doc
  libglobus-gsi-callback0 libglobus-gsi-cert-utils-dev
  libglobus-gsi-cert-utils-doc libglobus-gsi-cert-utils0
  libglobus-gsi-credential-dev libglobus-gsi-credential-doc
  libglobus-gsi-credential1 libglobus-gsi-openssl-error-dev
  libglobus-gsi-openssl-error-doc libglobus-gsi-openssl-error0
  libglobus-gsi-proxy-core-dev libglobus-gsi-proxy-core-doc
  libglobus-gsi-proxy-core0 libglobus-gsi-proxy-ssl-dev
  libglobus-gsi-proxy-ssl-doc libglobus-gsi-proxy-ssl1
  libglobus-gsi-proxy-ssl-dev libglobus-gsi-proxy-ssl2
  libglobus-gsi-sysconfig-dev libglobus-gsi-sysconfig-doc
  libglobus-gsi-sysconfig1 libglobus-gss-assist-dev libglobus-gss-assist-doc
  libglobus-gss-assist3 libglobus-gssapi-error-dev libglobus-gssapi-error-doc
  libglobus-gssapi-error2 libglobus-gssapi-gsi-dev libglobus-gssapi-gsi-doc
  libglobus-gssapi-gsi4 libglobus-io-dev libglobus-io3
  libglobus-openssl-module-dev libglobus-openssl-module-doc
  libglobus-openssl-module0 libglobus-xio-dev libglobus-xio-doc
  libglobus-xio-gsi-driver libglobus-xio-gsi-driver-dev
  libglobus-xio-gsi-driver-doc libglobus-xio-popen-driver
  libglobus-xio-popen-driver-dev libglobus-xio0 libltdl-dev libtool
```

9. globus-resource-management-server

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/
q/globus-gsi-proxy-ssl/libglobus-gsi-proxy-ssl-doc_5.8-1+gt6.trusty_amd64.deb  S
ize mismatch

E: Unable to fetch some archives, maybe run apt-get update or try with --fix-mis-
sing?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-resource-manag-
ment-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-job-manager
  globus-gram-job-manager-doc globus-gram-job-manager-fork
  globus-gram-job-manager-fork-doc globus-gram-job-manager-fork-setup-poll
  globus-gram-job-manager-scripts globus-gram-job-manager-scripts-doc
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-proxy-utils
  globus-simple-ca libglobus-callout0 libglobus-common0 libglobus-ftp-client2
  libglobus-ftp-control1 libglobus-gass-cache5 libglobus-gass-copy2
  libglobus-gass-server-ez2 libglobus-gass-transfer2 libglobus-gram-client3
  libglobus-gram-job-manager-callout-error0 libglobus-gram-protocol3
  libglobus-gsi-callback0 libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-rsl2
  libglobus-scheduler-event-generator0 libglobus-usage0
  libglobus-xio-gsi-driver libglobus-xio-popen-driver libglobus-xio0
The following NEW packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-job-manager
  globus-gram-job-manager-doc globus-gram-job-manager-fork
  globus-gram-job-manager-fork-doc globus-gram-job-manager-fork-setup-poll
```

10. globus-resource-management-client

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missin-
g?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-resource-manag-
ment-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-server-ez-progs globus-gram-client-tools
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-proxy-utils
  globus-simple-ca libglobus-callout0 libglobus-common0
  libglobus-gass-server-ez2 libglobus-gass-transfer2 libglobus-gram-client3
  libglobus-gram-protocol3 libglobus-gsi-callback0 libglobus-gsi-cert-utils0
  libglobus-gsi-credential1 libglobus-gsi-openssl-error0
  libglobus-gsi-proxy-core0 libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1
  libglobus-gss-assist3 libglobus-gssapi-error2 libglobus-gssapi-gsi4
  libglobus-io3 libglobus-openssl-module0 libglobus-rsl2
  libglobus-xio-gsi-driver libglobus-xio0
The following NEW packages will be installed:
  globus-common-progs globus-gass-server-ez-progs globus-gram-client-tools
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-proxy-utils
  globus-resource-management-client globus-simple-ca libglobus-callout0
  libglobus-common0 libglobus-gass-server-ez2 libglobus-gass-transfer2
  libglobus-gram-client3 libglobus-gram-protocol3 libglobus-gsi-callback0
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-error2 libglobus-gssapi-gsi4 libglobus-io3
  libglobus-openssl-module0 libglobus-rsl2 libglobus-xio-gsi-driver
  libglobus-xio0
```

11. globus-resource-management-sdk

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi
-proxy-ssl1 amd64 5.8-1+gt6.trusty [13.3 kB]
Get:2 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi
-proxy-core0 amd64 7.9-1+gt6.trusty [27.5 kB]
Get:3 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib globus-proxy-
utils amd64 6.15-1+gt6.trusty [41.2 kB]
Fetched 16.6 kB in 0s (602 kB/s)
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/g
lobus-gsi-proxy-ssl/libglobus-gsi-proxy-ssl1_5.8-1+gt6.trusty_amd64.deb  Size misma
tch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/g
lobus-gsi-proxy-core/libglobus-gsi-proxy-core0_7.9-1+gt6.trusty_amd64.deb  Size mis
match

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/g
lobus-proxy-utils/globus-proxy-utils_6.15-1+gt6.trusty_amd64.deb  Size mismatch

E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missin
g?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-resource-manag
ment-sdk
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  autotools-dev globus-common-progs globus-gsi-cert-utils-progs
  globus-simple-ca libglobus-callout-dev libglobus-callout-doc
  libglobus-callout0 libglobus-common-dev libglobus-common-doc
  libglobus-common0 libglobus-ftp-client-dev libglobus-ftp-client-doc
  libglobus-common0 libglobus-ftp-client-dev libglobus-ftp-client-doc
```

12. myproxy

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/g
lobus-gsi-proxy-ssl/libglobus-gsi-proxy-ssl-doc_5.8-1+gt6.trusty_amd64.deb  Size mi
smatch

E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missin
g?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install myproxy
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  libglobus-callout0 libglobus-common0 libglobus-gsi-callback0
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-gsi4 libglobus-openssl-module0 libglobus-usage0
  libglobus-xio0 libmyproxy6
The following NEW packages will be installed:
  libglobus-callout0 libglobus-common0 libglobus-gsi-callback0
  libglobus-gsi-cert-utils0 libglobus-gsi-credential1
  libglobus-gsi-openssl-error0 libglobus-gsi-proxy-core0
  libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1 libglobus-gss-assist3
  libglobus-gssapi-gsi4 libglobus-openssl-module0 libglobus-usage0
  libglobus-xio0 libmyproxy6 myproxy
0 upgraded, 16 newly installed, 0 to remove and 221 not upgraded.
Need to get 168 kB/635 kB of archives.
After this operation, 2,434 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib libglobus-gsi
-proxy-ssl1 amd64 5.8-1+gt6.trusty [13.3 kB]
```

13. gsi.openssh

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/globus-gsi-proxy-core/libglobus-gsi-proxy-core0_7.9-1+gt6.trusty_amd64.deb  Size mismatch
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/mproxy/libmyproxy6_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/mproxy/myproxy_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install gsi.openssh
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  gsi.openssh
0 upgraded, 1 newly installed, 0 to remove and 221 not upgraded.
Need to get 230 kB of archives.
After this operation, 1,268 kB of additional disk space will be used.
Get:1 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib gsi.openssh amd64 7.1p2f-2+gt6.trusty [230 kB]
Fetched 230 kB in 0s (6,311 kB/s)
Selecting previously unselected package gsi.openssh.
(Reading database ... 246275 files and directories currently installed.)
Preparing to unpack .../gsi.openssh_7.1p2f-2+gt6.trusty_amd64.deb ...
Unpacking gsi.openssh (7.1p2f-2+gt6.trusty) ...
Processing triggers for man-db (2.6.7.1-1ubuntu1) ...
Setting up gsi.openssh (7.1p2f-2+gt6.trusty) ...
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$
```

14. myproxy-server

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$ sudo apt-get install globus-gridftp globus-gridram5 globus-gsi myproxy myproxy-server myproxy-admin
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-client-tools
  globus-gram-job-manager globus-gram-job-manager-doc
  globus-gram-job-manager-fork globus-gram-job-manager-fork-doc
  globus-gram-job-manager-fork-setup-poll globus-gram-job-manager-scripts
  globus-gram-job-manager-scripts-doc globus-gridftp-server-progs
  globus-gsi-cert-utils-progs globus-gss-assist-progs globus-proxy-utils
  globus-simple-ca libglobus-authz-callout-error0 libglobus-authz0
  libglobus-callout0 libglobus-common0 libglobus-ftp-client2
  libglobus-ftp-control1 libglobus-gass-cache5 libglobus-gass-copy2
  libglobus-gass-server-ezz libglobus-gass-transfer2 libglobus-gfork0
  libglobus-gram-client3 libglobus-gram-job-manager-callout-error0
  libglobus-gram-protocol3 libglobus-gridftp-server-control0
  libglobus-gridftp-server6 libglobus-gsi-callback0 libglobus-gsi-cert-utils0
  libglobus-gsi-credential1 libglobus-gsi-openssl-error0
  libglobus-gsi-proxy-core0 libglobus-gsi-proxy-ssl1 libglobus-gsi-sysconfig1
  libglobus-gss-assist3 libglobus-gssapi-error2 libglobus-gssapi-gsi4
  libglobus-io3 libglobus-openssl-module0 libglobus-rsl2
  libglobus-scheduler-event-generator0 libglobus-usage0
  libglobus-xio-gsi-driver libglobus-xio-pipe-driver
  libglobus-xio-popen-driver libglobus-xio-udt-driver libglobus-xio0
  libmyproxy6 libudt0
The following NEW packages will be installed:
  globus-common-progs globus-gass-cache-program globus-gass-copy-progs
  globus-gass-server-ez-progs globus-gatekeeper globus-gram-client-tools
```

15. myproxy-admin

```
sel-46@sel46-HP-Compaq-Pro-6305-SFF: ~
Get:6 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib myproxy-admin
  amd64 6.1.18-1+gt6.trusty [42.0 kB]
Get:7 http://toolkit.globus.org/ftppub/gt6/stable/deb/ trusty/contrib myproxy-server
  amd64 6.1.18-1+gt6.trusty [43.9 kB]
Fetched 38.8 kB in 0s (683 kB/s)
E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/globus-gsi-proxy-ssl/libglobus-gsi-proxy-ssl1_5.8-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/globus-gsi-proxy-core/libglobus-gsi-proxy-core0_7.9-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/g/globus-proxy-utils/globus-proxy-utils_6.15-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/myproxy/libmyproxy6_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/myproxy/myproxy_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/myproxy/myproxy-admin_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch

E: Failed to fetch http://toolkit.globus.org/ftppub/gt6/stable/deb/pool/contrib/m/myproxy/myproxy-server_6.1.18-1+gt6.trusty_amd64.deb  Size mismatch

E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$
```


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Department of Computer Science and Engineering
CS6712 Grid and Cloud Computing Laboratory

Assignment -11 : Study on GridFTP

Assigned Date: 26.09.2016.

Due Date: 28. 09.2016 & 01.10.2016

Grid FTP Components

GridFTP is a high-performance, secure, reliable data transfer protocol optimized for high-bandwidth wide-area networks. The GridFTP protocol is based on FTP, the highly-popular Internet file transfer protocol.

One of the foundational issues in HPC computing is the ability to move large (multi Gigabyte, and even Terabyte), file-based data sets between sites. Simple file transfer mechanisms such as FTP and SCP are not sufficient either from a reliability or performance perspective.

GridFTP extends the standard FTP protocol to provide a high-performance, secure, reliable protocol for bulk data transfer.

GridFTP Protocol

GridFTP is a protocol defined by Global Grid Forum Recommendation GFD.020, RFC 959, RFC 2228, RFC 2389, and a draft before the IETF FTP working group. Key features include:

Performance - GridFTP protocol supports using parallel TCP streams and multi-node transfers to achieve high performance.

Checkpointing - GridFTP protocol requires that the server send restart markers (checkpoint) to the client.

Third-party transfers - The FTP protocol on which GridFTP is based separates control and data channels, enabling third-party transfers, that is, the transfer of data between two end hosts, mediated by a third host.

Security - Provides strong security on both control and data channels. Control channel is encrypted by default. Data channel is authenticated by default with optional integrity protection and encryption.

Globus Implementation of GridFTP

The GridFTP protocol provides for the secure, robust, fast and efficient transfer of (especially bulk) data. The Globus Toolkit provides the most commonly used implementation of that protocol, though others do exist (primarily tied to proprietary internal systems).

The Globus Toolkit provides:

- i. a server implementation called `globus-gridftp-server`,
- ii. a scriptable command line client called `globus-url-copy`, and
- iii. a set of development libraries for custom clients.

While the Globus Toolkit does not provide a client with Graphical User Interface (GUI), Globus Online provides a web GUI for GridFTP data movement.

Globus GridFTP framework implements all the key features of GridFTP protocol mentioned above. It supports both Grid Security Infrastructure (GSI) and SSH for securing the data transfer. Unlike sftp, SSH based GridFTP supports multiple security options on the data channel - authentication only, authentication and integrity protection, fully encrypted. Globus implementation of GridFTP is modular and extensible. XIO based Globus GridFTP framework makes it easy to plugin alternate transport protocols. The Data Storage Interface (DSI) allows for easier integration with various storage systems.

Globus GridFTP has been deployed at thousands of sites with more than 10 million data transfers per day.

GridFTP Clients

Globus Online is the recommended interface to move data to and from GridFTP servers. Globus Online provides a web GUI, command line interface and a REST API for GridFTP data movement. It provides automatic fault recovery and automatic tuning of optimization parameters to achieve high performance.

The Globus Toolkit provides a GridFTP client called `globus-url-copy`, a command line interface, suitable for scripting. For example, the following command:

```
globus-url-copy gsiftp://remote.host.edu/path/to/file file:///path/on/local/host
```

would transfer a file from a remote host to the locally accessible path specified in the second URL. Finally, if you wish to add access to files stored behind GridFTP servers, or you need custom client functionality, you can use our very powerful client library to develop custom client functionality.

References.

<http://www.gridftp.org>

<http://www.globus.org/toolkit>

gridftp-user@globus.org

<http://toolkit.globus.org/toolkit/docs/latest-stable/gridftp/key/>

Install

Download the installer

Start downloading the installer software immediately to the machine where you wish to run the GridFTP clients and servers presented in this tutorial (your laptop or an off site UNIX machine). While GridFTP can run on many UNIX platforms, for this tutorial we only have pre-built binaries for i386 Linux and MacOS (ppc). If you plan to use a different platform please download the source bundle (note that compiling the source bundle can take over a half hour). The installers are available at:

<http://gridftp.org/tutorials/>

Building

Choose a directory where you wish to have Globus installed. This directory will be referred to as your GLOBUS_LOCATION. In this example we use /path/to/install. The following commands will install everything we need for GridFTP and the Simple CA software which we will use in a later exercise.

```
% tar xvzf gt-gridftp*.tar.gz
% cd gt-gridftp-installer
% ./configure --prefix /path/to/install
    ignore any java/ant warnings.
% make gridftp install
```

Setup your environment

In order to more easily use GridFTP various environment variables must be set based off of your GLOBUS_LOCATION. In every shell where you use Globus software you will need to perform the steps below. For convenience users often add these commands to their shell initiation files (.bashrc, .tcshrc, .login, etc).

```
sh
% export GLOBUS_LOCATION=/path/to/install
% source $GLOBUS_LOCATION/etc/globus-user-env.sh
csh
% setenv GLOBUS_LOCATION /path/to/install
% source $GLOBUS_LOCATION/etc/globus-user-env.csh
```

Environment setup steps must be repeated for every shell

Exercise 1

Getting to know the globus-gridftp-server

The Globus GridFTP server has many configuration options. All of these options are documented at: <http://www.globus.org/toolkit/docs/4.0/data/gridftp/admin-index.html>, but you can see them running the server with the -help command also. This will display every command line option, and will further verify that your install was successful. Take note of the *-aa* option and the *-control-interface* option because we will be using it in this exercise.

```
% globus-gridftp-server -help
```

If you have lynx installed you can get prettier output with the following command

```
% globus-gridftp-server -help -html | lynx -stdin
```

Anonymous Mode

To get a quick warm fuzzy that your server can actually do file transfers we are going to run it in anonymous mode. Anonymous mode allows any user with an ftp client to read and write (and delete) files that the server process can similarly access. To minimize potential damages we will use the *-control-interface localhost* option. This will limit access to clients running on the same machine.

```
% globus-gridftp-server -control-interface 127.0.0.1 -aa
Server listening at 127.0.0.1:58806
```

Once you run this command a contact string will be printed to stdout. In the example the contact string is localhost:58806. This is the hostname and port where FTP clients can contact the GridFTP server. Alternatively you can specify the port:

```
% globus-gridftp-server -control-interface 127.0.0.1 -aa -p 5000
```

Standard FTP Client

Since your server is run with no special security options (GSI or SSH) you can use any FTP client that you wish to access it. Open up another shell and set up the environment for that shell as previously described. Connect to the server using the standard ftp client. When prompted for a username enter *anonymous*, and enter anything at all for a password. Once connected experiment with some FTP commands. A sample session follows (*depending on your client you may see authentication errors before being prompted for a user name*):

```
% ftp 127.0.0.1 5000
Connected to localhost.
220 localhost GridFTP Server 3.3 (gcc32dbg, 1170451261-1) ready.
Name (localhost:bresnaha): anonymous
331 Password required for ftp.
Password:
230 User ftp logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
257 "/home/bresnaha" is current directory.
ftp>
```

Two Party Transfers

Here we will do a simple two party transfer using `globus-url-copy`. `globus-url-copy` is the standard GridFTP client designed for transferring files. It is different than typical FTP clients in that it is not interactive. It is designed for batch copies. Here we will copy a known file `/etc/group` to the globus-gridftp-server and store it in `/tmp`. Feel free to transfer any files you wish. Once complete verify the transfer with `diff`.

```
% globus-url-copy -v file:/etc/group ftp://localhost:5000/tmp/group
Source: file:/etc/
Dest:  ftp://localhost:5000/tmp/
      group
% diff /etc/group /tmp/group
```

Third Party Transfer

In a third party transfer a client acts as an intermediary between two GridFTP servers. The client contacts both servers, tells one to send a file and the other to receive it. The data is never seen by the client. The client simply orchestrates the transfer. For simplicity sake, in this example we will contact the same server for both ends of the transfer. If we were contacting two different servers for a transfer across a real network the only difference in the command would be the hostname portion of the source and destination URL.

```
% globus-url-copy -v ftp://localhost:5000/etc/group ftp://localhost:5000/tmp/group2
Source: ftp://localhost:5000/etc/
Dest:  ftp://localhost:5000/tmp/
      group -> group2
```

Experiment with options

One very helpful option to `globus-url-copy` is `-dbg`. This option prints the entire control channel session (along with some other information) to stdout. This allows the user to see all of the commands sent to the server and all of the replies received from the server. This is very useful when debugging or when learning about FTP communication.

```
% globus-url-copy -dbg file:/etc/group ftp://localhost:5000/tmp/group
```

Another interesting option is `-vb`. This will show you the current performance of a transfer. Here we will run a transfer between `/dev/zero` and `/dev/null`. Because `/dev/zero` has no end of file, this allows the transfer to carry on until it is manually terminated (`<ctrl>+<c>`).

```
% globus-url-copy -vb ftp://localhost:5000/dev/zero ftp://localhost:5000/dev/null
Source: ftp://localhost:5000/dev/
Dest:  ftp://localhost:5000/dev/
      zero -> null
      2401501184 bytes    458.05 MB/sec avg    458.05 MB/sec inst
Canceling copy...
```

Kill The Server

Make sure the anonymous server is no longer running. Kill it with `<ctrl>+<c>`, or killall `globus-gridftp-server`

Exercise 2 : password file

Not supported on mac

Create a password file

If you trust your network and want a minimal amount of security you can run the globus-gridftp-server with clear text passwords. This security model is the one originally introduced in RFC959. We do not recommend it for long running servers open to the internet. To run the server in clear text password mode we first need to create a password file dedicated to it. The format of the password file is the same as standard system password files, however it is ill advised to use system password file. To create an entry in a GridFTP password file run the following commands:

```
% touch pwfile  
% gridftp-password.pl >> pwfile  
Password:
```

This will ask you for a password and then create an entry in the password file for the current user name and the given password. Take a look at the file created. You will notice that the password you typed in is not in the file in a clear text form. We have run it though a one way hash algorithm before storing it in the file.

Run the server in password mode

Simply start the server pointing it at the password file you just created.

```
% globus-gridftp-server -password-file /full/path/of/pwfile -p 5000
```

Connect With the Standard FTP Client

Password mode is still 100% backward compatible with RFC959 therefore we can communicate with any FTP client. Try with the standard program 'ftp'.

```
% ftp localhost 5000
```

Transfer with globus-url-copy

Try a few transfers with globus-url-copy as we did in the previous exercise

```
% globus-url-copy file:/etc/group ftp://username:password@localhost:5000/tmp/group  
% globus-url-copy -list ftp://username:password@localhost:5000/tmp/
```

Exercise 3 : sshftp://

In this exercise we introduce the sshftp control channel protocol. This is a very simple means of obtaining strong security on the control channel only (the data channel is not authenticated). With this approach you can run a GridFTP transfer anywhere that you can ssh. sshftp:// leverages the ubiquitous ssh/sshd programs to form control channel connections much in the same way that inetd forms connections.

Configure Client Side sshftp://

Every \$GLOBUS_LOCATION must be configured for client side sshftp:// connections. In order words, if we wish to use globus-url-copy with sshftp:// URLs we must first configure the \$GLOBUS_LOCATION that contains globus-url-copy in the following way:

```
% $GLOBUS_LOCATION/setup/globus/setup-globus-gridftp-sshftp
```

Configure Server Side sshftp://

Every host that wishes to run a globus-gridftp-server which can accept sshftp:// connections must run the following command as root:

```
% $GLOBUS_LOCATION/setup/globus/setup-globus-gridftp-sshftp -server
```

In the absence of root access a user can configure the server to allow sshftp:// connections **for that user only** with the following command:

```
% $GLOBUS_LOCATION/setup/globus/setup-globus-gridftp-sshftp -server -nonroot
```

sshftp:// Transfers

In this case a globus-gridftp-server does not need to be running. The server will be started via the sshd program. Therefore the hostname and port should be that of the sshd server. Run globus-url-copy just as you have before, simply change ftp:// to sshftp://.

```
% globus-url-copy -v file:/etc/group sshftp://localhost/tmp/group
% globus-url-copy -list sshftp://localhost/tmp/
```

Exercise 4 : GSI Security

Here we introduce the gsiftp:// security protocol. GSI provides strong security for both the control and data channel. Although it is more complicated to setup than sshftp:// it provides additional functionality, such as delegation and data channel protection, that make it well worth it.

Setup Simple CA

In order to perform transfers with GSI security we must first have the proper credentials. In order to create the needed certificates we first need a trusted certificate authority (CA). In this exercise we will create a CA using the *simple CA* software in the Globus toolkit. To do this we need to run the script *setup-simple-ca*. This user of this script will be presented with many questions. In most cases default answers to these questions are fine for this exercise. When prompted for a password enter anything you like, just remember it, you will need it for later steps. A sample session follows:

```
% $GLOBUS_LOCATION/setup/globus/setup-simple-ca
Do you want to keep this as the CA subject (y/n) [y]:
...
requests will be sent to be signed by the CA): bresnaha@mcs.anl.gov
...
[default: 5 years (1825 days)]:
...
Enter PEM pass phrase:
...
*****
```

Note: To complete setup of the GSI software you need to run the following script as root to configure your security configuration directory:

/home/globus/LCI/GL/setup/globus_simple_ca_e802b091_setup/setup-gsi

For further information on using the setup-gsi script, use the -help option. The -default option sets this security configuration to be the default, and -nonroot can be used on systems where root access is not available.

Note the output instructing you to run an additional setup script. If you do not have root access run the script with the *-nonroot* option:

```
% /home/globus/LCI/GL/setup/globus_simple_ca_e802b091_setup/setup-gsi -default -nonroot
```

At this point all configuration files and programs needed to create and sign certificates are installed in the \$GLOBUS_LOCATION.

Create a User Credential

In this step a user credential is created. We will be acting as both the user requesting the credential and the CA signing the credential. In most cases these will be separate entities, but we present both sides here. First we create a certificate request:

```
% grid-cert-request
...
```



Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
...

Again you are prompted for a password. This is the proxy password. The file `~/.globus/usercert_request.pem` now exists. Ordinarily you would email this to the CA for signing, but since we are the CA, we already have it and can sign it:

```
% grid-ca-sign -in ~/.globus/usercert_request.pem -out ~/.globus/signed.pem  
please enter the password for the CA key:  
The new signed certificate is at: /home/globus/.globus/simpleCA/newcerts/01.pem
```

Note that prompt for the CA password. This is the password selected in the step where we created the CA, not the proxy password. The output file `01.pem` is the signed user certificate. Ordinarily the CA would mail this back to the user, but since we are both the user and the CA we simply must copy it into `~/.globus/` with the following command:

```
cp ~/.globus/simpleCA/newcerts/01.pem ~/.globus/usercert.pem
```

Now in your `~/.globus` directory you should see the following files:

(* these files can be removed)

```
signed.pem *  
simpleCA  
usercert_request.pem *  
userkey.pem  
usercert.pem
```

Create a proxy

The user credentials are not valid until they are activated and a proxy is created. A proxy is created with the command `grid-proxy-init` and by using the proxy password selected above. The proxy is only valid for a short amount of time and thus provides the user with some additional security. Running `grid-proxy-init` with the `-debug` and `-verify` options will help verify that we have successfully obtained a user certificate.

```
% grid-proxy-init -debug -verify
```

Create a Gridmap File

Part of the gsiftp:// authentication process with the GridFTP server involves a gridmap file. This file maps a client's certificate *distinguished name* (DN) to a local user account. If the DN is not found in the gridmap file the client cannot access the server. When the GridFTP server is run as a user, it expects to find the gridmap file at `$HOME/.gridmap`. The file has the following format:

“<DN>” <unix account name>

To get the DN of your cert run `grid-cert-info`:

```
% grid-cert-info -subject  
/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester  
% whoami  
bresnaha  
% vi $HOME/.gridmap  
“/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester” bresnaha
```

Run the GridFTP Server

Most of the time a host certificate is used by a GridFTP server. However, you can use a user certificate just as easily. Here we will run transfers using the user certificate for both the server and the client. The previous step created an active proxy in the users environment and he environment setup steps in the first exercise set all the proper variables to so that the server can find the proxy. All that is left to do is simply run the server:

```
% globus-gridftp-server -p 5000
```

Perform a Transfer

Similarly we do not need to do anything special to run the client with the user's proxy. However, we do need to tell the client what to expect as a subject from the server. By default the client assumes the server will use a host based subject name in its security hand shake, but since our server is using a user certificate the subject will be different. Therefore we must tell our client the right subject to expect. To discover our subject run:

```
% grid-cert-info -subject  
/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester
```

Now run a transfer as we have in previous exercises but using the -subject switch:

```
% globus-url-copy -subject "/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester" -vb file:/etc/group  
gsiftp://localhost:5000/tmp/group
```

Experiment with various data channel security options and observe the effects on performance:

```
% globus-url-copy -dcsafe --subject "/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester" -vb  
gsiftp://localhost:5000/dev/zero gsiftp://localhost:5000/dev/null
```

```
% globus-url-copy -dcpriv --subject "/O=Grid/OU=GlobusTest/OU=simpleCA-laptroll/CN=Globus Tester" -vb  
gsiftp://localhost:5000/dev/zero gsiftp://localhost:5000/dev/null
```

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CS6712 Grid and Cloud Computing Laboratory

Assignment -8 : Installation of Single Node Hadoop and Executing WordCount Program

Assigned Date: 31.08.2016.

Due Date: 03.09.2016 & 03.09.2016

- I. Pre-requisites
 1. Operating System: Ubuntu 14.04/15.04 LTS (64-Bit only) OS
 2. Installation Mode : Install in Host OS, (Virtual Machine can be slower to work when Hadoop Cluster starts)
 3. Java: jdk 1.8
 4. Download Apache Hadoop 2.7.1 package
 5. Eclipse Luna 64-bit for Linux (Can be downloaded from SSN Intranet – Tech Support). Install Eclipse.
- 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 utmost care while making changes in **~/.bashrc file)**
To check java version: **]\$ java –versio**
- 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.

Assignment -8 : Installation of Single Node Hadoop and Executing WordCount Program

PROCEDURE:

- Create user named as hduser and add hduser in a group named Hadoop.
- Login as hduser using]\$ su – hduser command
 - Generate ssh key-pairs and move id_rsa.pub key to authorized_key
 - Install openssh-server and openssh-client packages using root privilege.
 - Download Hadoop and Java packages from internet and move them to the path /usr/local/hadoop
 -
- 1) Set the Path and ClassPath Variables in ~/.bashrc
 - 2) Create and Setup SSH Certificates (Setup passphraseless ssh)

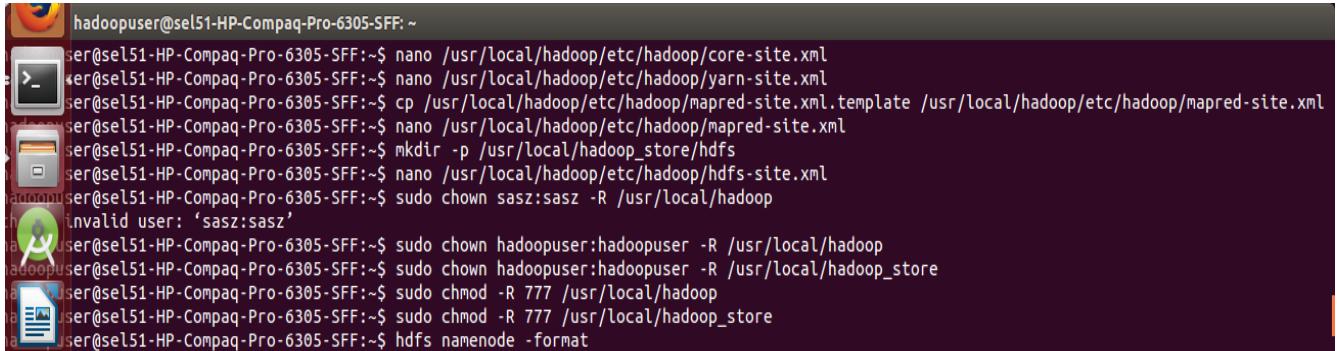
To enable password-less login, generate a new SSH key with an empty passphrase:

Use Hadoop User(hduser/hadoop):

```
Linux>ssh-keygen -t dsa -P '' -f ~/.ssh/id_dsa  
Linux>cat ~/.ssh/id_dsa.pub >> ~/.ssh/authorized_keys
```

```
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:/home/sel-51$ sudo gedit ~/.bashrc  
[sudo] password for hadoopuser:  
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:/home/sel-51$ ssh-keygen -t dsa -P '' -f ~/.ssh/id_dsa  
Generating public/private dsa key pair.  
/home/hadoopuser/.ssh/Id_dsa already exists.  
Overwrite (y/n)? y  
Your identification has been saved in /home/hadoopuser/.ssh/id_dsa.  
Your public key has been saved in /home/hadoopuser/.ssh/id_dsa.pub.  
The key fingerprint is:  
9d:1:9f:a4:c3:d1:bd:61:fe:c8:91:99:d4:1c:a1:8d hadoopuser@sel51-HP-Compaq-Pro-6305-SFF  
The key's randomart image is:  
++-[ DSA 1024]----+  
          o . |  
         . . +o . |  
        + oE=.=o |  
       o B = * |  
      S * o B |  
       . . + |  
       o . |  
      | |  
+-----+  
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:/home/sel-51$ cat ~/.ssh/id_dsa.pub >> ~/.ssh/authorized_keys  
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:/home/sel-51$ ssh localhost  
Welcome to Ubuntu 14.04 LTS (GNU/Linux 3.13.0-24-generic x86_64)  
  
* Documentation: https://help.ubuntu.com/  
  
692 packages can be updated.  
317 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.
```

- 3) Add the required <property> tags to core-site.xml,yarn-site.xml,hdfs-site.xml
- 4) Copy the MapRed-site.xml.template file to MapRed-site.xml
- 5) Create Namenode and Datanode directories
- 6) Replace sasz: with your hadoop users(hduser/hadoop) to be the owner of the folder
- 7) Also give the folder the full permission

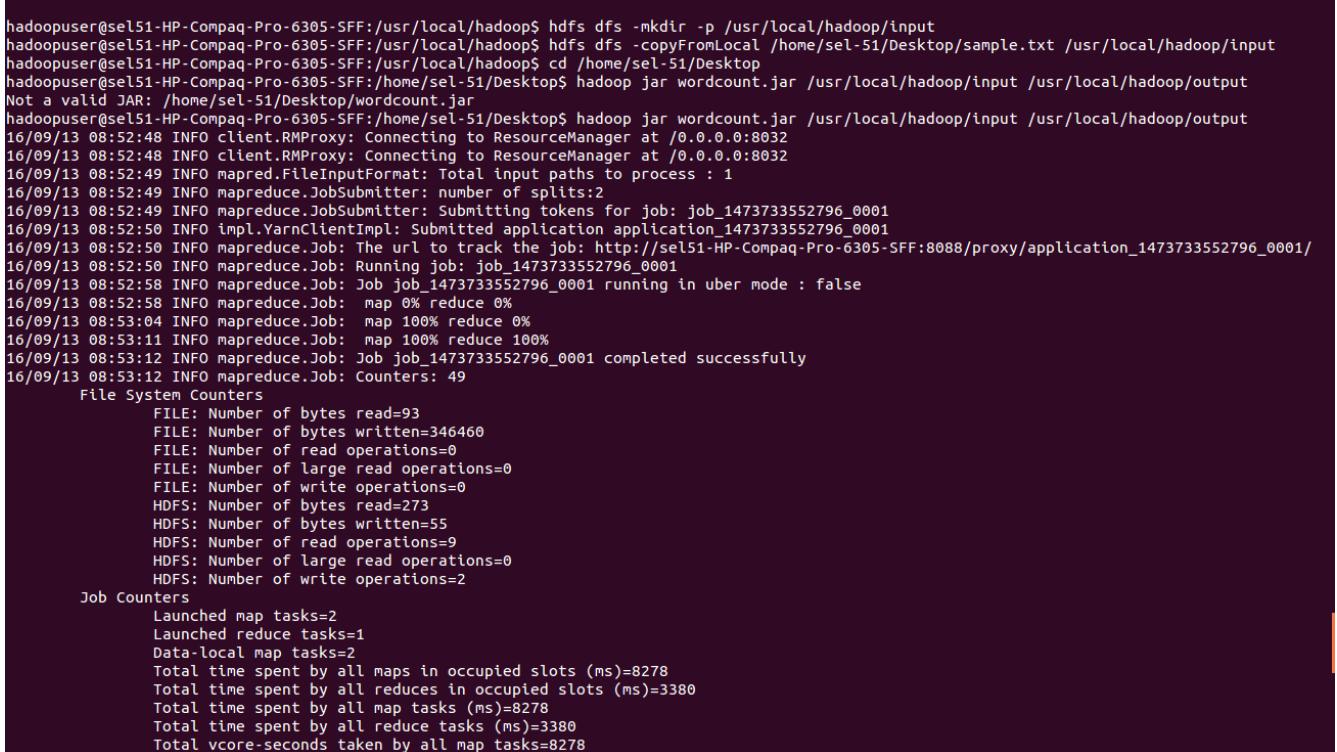


```

hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: ~
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ nano /usr/local/hadoop/etc/hadoop/core-site.xml
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ nano /usr/local/hadoop/etc/hadoop/yarn-site.xml
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ cp /usr/local/hadoop/etc/hadoop/mapred-site.xml.template /usr/local/hadoop/etc/hadoop/mapred-site.xml
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ nano /usr/local/hadoop/etc/hadoop/mapred-site.xml
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ mkdir -p /usr/local/hadoop_store/hdfs
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ nano /usr/local/hadoop/etc/hadoop/hdfs-site.xml
ser@sel51-HP-Compaq-Pro-6305-SFF:~$ sudo chown sasz:sasz -R /usr/local/hadoop
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~$ sudo chown hadoopuser:hadoopuser -R /usr/local/hadoop
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~$ sudo chown hadoopuser:hadoopuser -R /usr/local/hadoop_store
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~$ sudo chmod -R 777 /usr/local/hadoop
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~$ sudo chmod -R 777 /usr/local/hadoop_store
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~$ hdfs namenode -format

```

8)Format your HDFS, make sure you have logged in as hadoop/hduser user



```

hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~/usr/local/hadoop$ hdfs dfs -mkdir -p /usr/local/hadoop/input
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~/usr/local/hadoop$ hdfs dfs -copyFromLocal ~/home/sel-51/Desktop/sample.txt /usr/local/hadoop/input
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~/usr/local/hadoop$ cd ~/home/sel-51/Desktop
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~/home/sel-51/Desktop$ hadoop jar wordcount.jar /usr/local/hadoop/input /usr/local/hadoop/output
Not a valid JAR: /home/sel-51/Desktop/wordcount.jar
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF:~/home/sel-51/Desktop$ hadoop jar wordcount.jar /usr/local/hadoop/input /usr/local/hadoop/output
16/09/13 08:52:48 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
16/09/13 08:52:48 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
16/09/13 08:52:49 INFO mapred.FileInputFormat: Total input paths to process : 1
16/09/13 08:52:49 INFO mapreduce.JobSubmitter: number of splits:2
16/09/13 08:52:49 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1473733552796_0001
16/09/13 08:52:50 INFO impl.YarnClientImpl: Submitted application application_1473733552796_0001
16/09/13 08:52:50 INFO mapreduce.Job: The url to track the job: http://sel51-HP-Compaq-Pro-6305-SFF:8088/proxy/application_1473733552796_0001/
16/09/13 08:52:50 INFO mapreduce.Job: Running job: job_1473733552796_0001
16/09/13 08:52:58 INFO mapreduce.Job: Job job_1473733552796_0001 running in uber mode : false
16/09/13 08:52:58 INFO mapreduce.Job: map 0% reduce 0%
16/09/13 08:53:04 INFO mapreduce.Job: map 100% reduce 0%
16/09/13 08:53:11 INFO mapreduce.Job: map 100% reduce 100%
16/09/13 08:53:12 INFO mapreduce.Job: Job job_1473733552796_0001 completed successfully
16/09/13 08:53:12 INFO mapreduce.Job: Counters: 49
  File System Counters
    FILE: Number of bytes read=93
    FILE: Number of bytes written=346460
    FILE: Number of read operations=0
    FILE: Number of large read operations=0
    FILE: Number of write operations=0
    HDFS: Number of bytes read=273
    HDFS: Number of bytes written=55
    HDFS: Number of read operations=9
    HDFS: Number of large read operations=0
    HDFS: Number of write operations=2
  Job Counters
    Launched map tasks=2
    Launched reduce tasks=1
    Data-local map tasks=2
    Total time spent by all maps in occupied slots (ms)=8278
    Total time spent by all reduces in occupied slots (ms)=3380
    Total time spent by all map tasks (ms)=8278
    Total time spent by all reduce tasks (ms)=3380
    Total vcore-seconds taken by all map tasks=8278

```

9) Start/Stop the Hadoop Cluster.

10) Enter hdfs dfs -cat /usr/local/hadoop/part-00000

```
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: /home/sel-51/Desktop
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: /home/sel-51/Desktop$ hdfs dfs -cat /usr/local/hadoop/output/part-00000
.
  1
afternoon      1
good          1
gv            1
hello..       1
hi            1
is             1
this          1
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: /home/sel-51/Desktop$ script ex6.txt
script: open failed: ex6.txt: Permission denied
Terminated
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: /home/sel-51/Desktop$ Script ex6.txt
No command 'Script' found, did you mean:
 Command 'script' from package 'bsdutils' (main)
Script: command not found
hadoopuser@sel51-HP-Compaq-Pro-6305-SFF: /home/sel-51/Desktop$ script ex6.txt
```

11) Access the User Interfaces

ResourceManager @ - <http://localhost:8088/>

NameNode @ - <http://localhost:50070/>

The screenshot shows the ResourceManager's "All Applications" page. At the top, there are cluster and scheduler metrics. Below that is a table of running applications, with two entries visible:

ID	User	Name	Application Type	Queue	StartTime	FinishTime	State	FinalStatus	Progress	Tracking UI
application_1473733552796_0002	hadoopuser	WordCount	MAPREDUCE	default	Tue Sep 13 09:07:33 +0550 2016	N/A	RUNNING	UNDEFINED	<div style="width: 100%;"></div>	ApplicationMaster
application_1473733552796_0001	hadoopuser	WordCount	MAPREDUCE	default	Tue Sep 13 08:52:50 +0550 2016	Tue Sep 13 08:53:10 +0550 2016	FINISHED	SUCCEEDED	<div style="width: 100%;"></div>	History

At the bottom, it says "Showing 1 to 2 of 2 entries".

The screenshot shows the NameNode's "Overview" page. It displays basic system information and DFS usage statistics.

Started:	Tue Sep 13 07:55:44 IST 2016
Version:	2.7.1, r15ecc87ccf4a0228f35af08fc56de536e6ce657a
Compiled:	2015-06-29T06:04Z by jenkins from (detached from 15ecc87)
Cluster ID:	CID-014a45c3-48a5-4dbd-8ba9-aeb1bedd35b6
Block Pool ID:	BP-457267014-127.0.1.1-1473291928455

Summary

Security is off.
Safemode is off.
26 files and directories, 9 blocks = 35 total filesystem object(s).
Heap Memory used 107.82 MB of 197 MB Heap Memory. Max Heap Memory is 889 MB.
Non Heap Memory used 47.39 MB of 48.15 MB Committed Non Heap Memory. Max Non Heap Memory is -1 B.

Configured Capacity:	238.54 GB
DFS Used:	375.87 KB (0%)
Non DFS Used:	40.35 GB
DFS Remaining:	198.19 GB (83.08%)

Running a Wordcount Map... All Applications Namenode information +

localhost:50070/dfshealth.html#tab-overview

Star E Google

Summary

Security is off.

Safemode is off.

26 files and directories, 9 blocks = 35 total filesystem object(s).

Heap Memory used 107.82 MB of 197 MB Heap Memory. Max Heap Memory is 889 MB.

Non Heap Memory used 47.39 MB of 48.15 MB Committed Non Heap Memory. Max Non Heap Memory is -1 B.

Configured Capacity:	238.54 GB
DFS Used:	375.87 KB (0%)
Non DFS Used:	40.35 GB
DFS Remaining:	198.19 GB (83.08%)
Block Pool Used:	375.87 KB (0%)
DataNodes usages% (Min/Median/Max/stdDev):	0.00% / 0.00% / 0.00% / 0.00%
Live Nodes	1 (Decommissioned: 0)
Dead Nodes	0 (Decommissioned: 0)
Decommissioning Nodes	0
Total Datanode Volume Failures	0 (0 B)
Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion	0

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

Assignment -12 : Remote Login into a VM

Assigned Date: 27.09.2016.

Due Date: 01. 10.2016 & 01.10.2016

- I. Create two VMs and install Ubuntu 16.06 server for amd64
Install openssh-server while installing OS.
 - II. **Remote login with password**
 - i. Set network configurations and ping both VMs
 - ii. In VM1 : **ssh <usernameVM2>@<IP_Address_VM2>**
 - 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>**
 - 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.

Remote Login in VM

1) Create two Ubuntu 16.04 Server Edition VM's in Virtualbox.

2) Remote login with password :

Set network configurations and ping both Vms

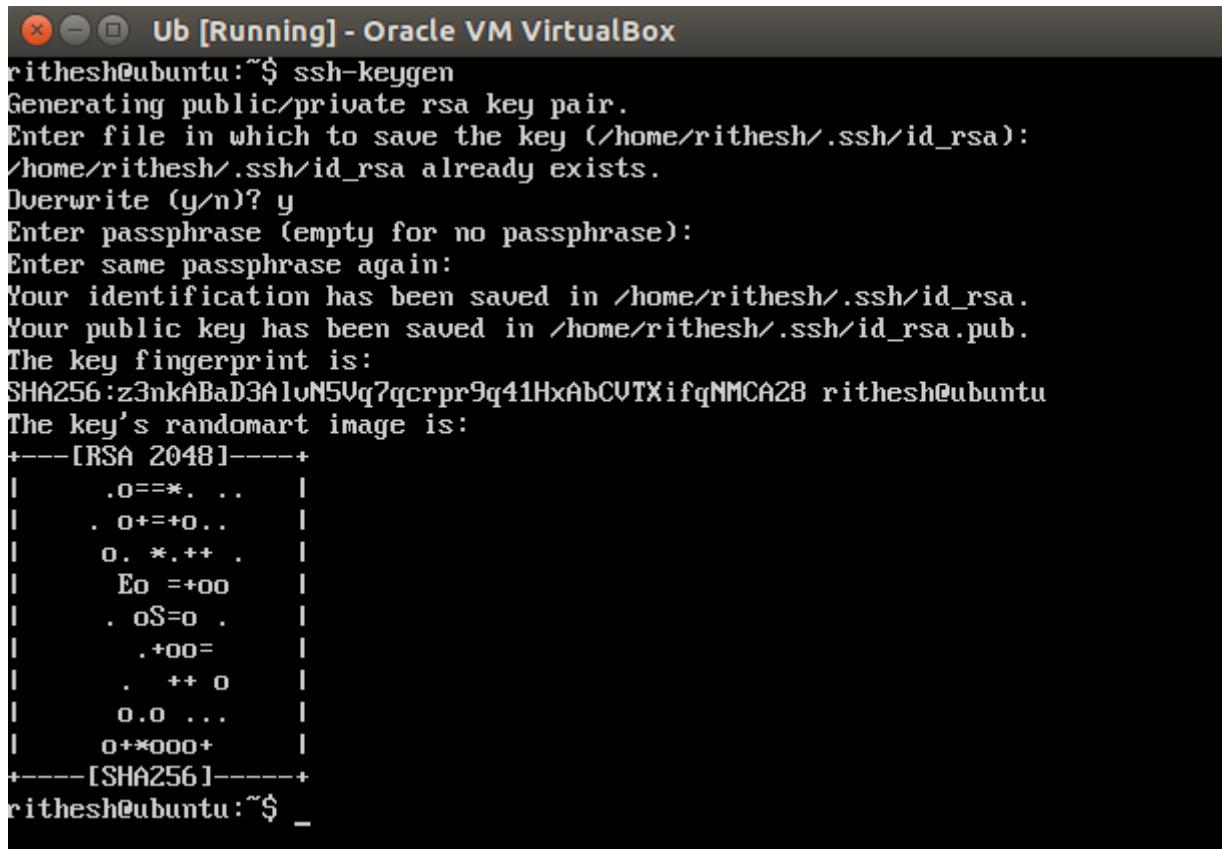
In VM 1 : ssh <usernameVM2>@<IP_Address_VM2>

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

Login into VM2

3) Remote login without password:

Create ssh-keypair using the command]\$ ssh-keygen

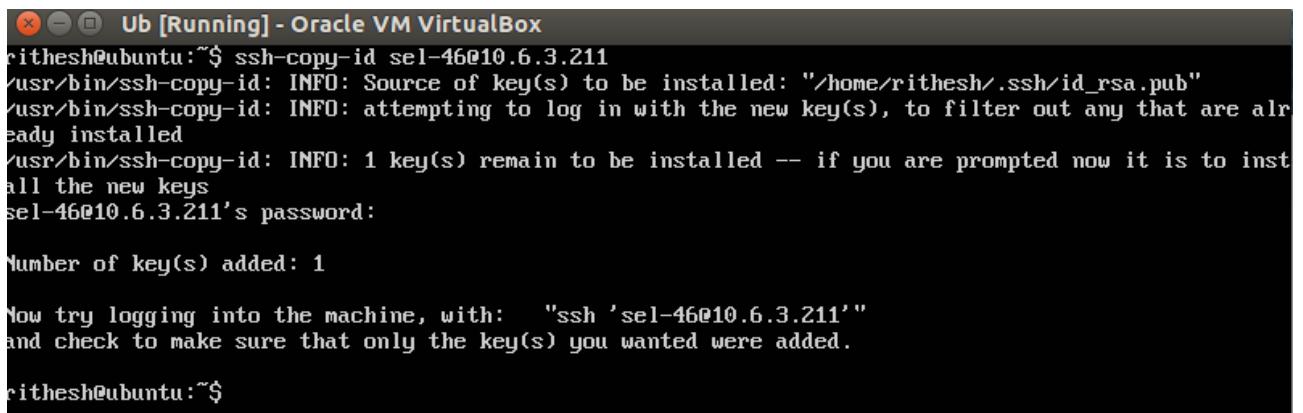


```
rithesh@ubuntu:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/rithesh/.ssh/id_rsa):
/home/rithesh/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/rithesh/.ssh/id_rsa.
Your public key has been saved in /home/rithesh/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:z3nkABaD3AlvN5Vq7qcrpr9q41HxAbCVTXifqNMCA28 rithesh@ubuntu
The key's randomart image is:
+---[RSA 2048]---+
| .0==*.. . |
| . 0+=+0.. |
| 0. *.*++ . |
| Eo =+oo |
| . oS=o . |
| . +oo= |
| . ++ 0 |
| 0.0 ... |
| 0**000+ |
+---[SHA256]---+
rithesh@ubuntu:~$ _
```

It generates id_rsa and id_rsa.pub keys

Copy authorized_keys / id_rsa.pub into VM2 using the command

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



```
rithesh@ubuntu:~$ ssh-copy-id sel-46@10.6.3.211
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/rithesh/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
sel-46@10.6.3.211's password:

Number of key(s) added: 1

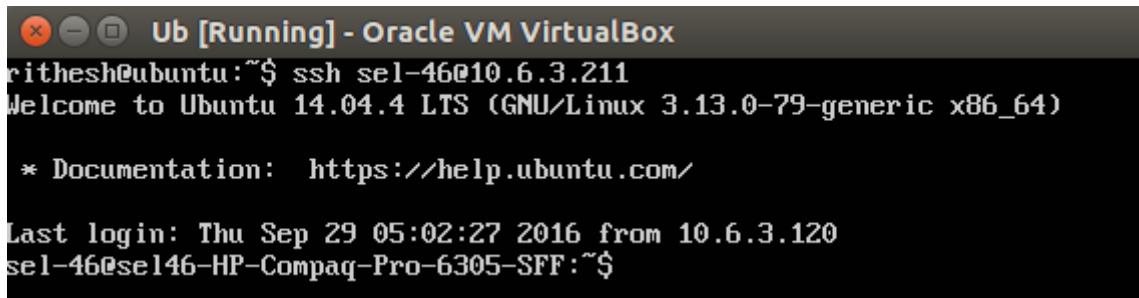
Now try logging into the machine, with: "ssh 'sel-46@10.6.3.211'"
and check to make sure that only the key(s) you wanted were added.

rithesh@ubuntu:~$
```

Remote login into VM2 from VM1

]\$ ssh <usernameVM2>@<IP_Address_VM2>

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



The screenshot shows a terminal window titled "Ub [Running] - Oracle VM VirtualBox". The window contains the following text:

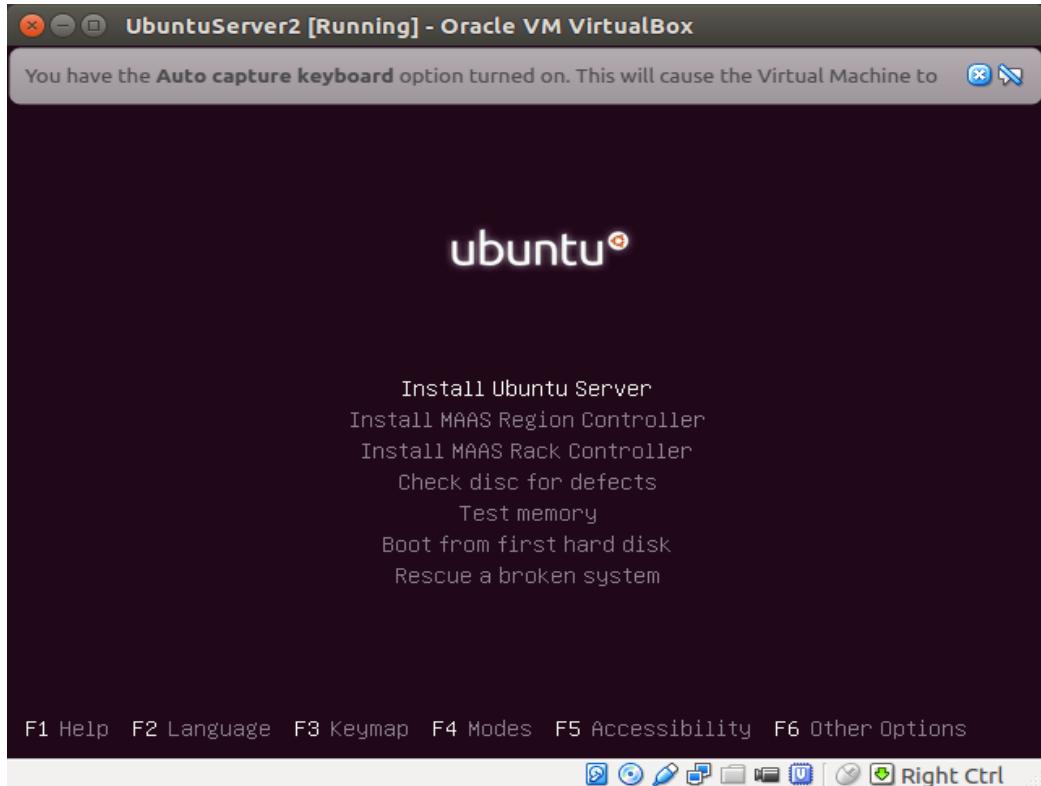
```
rithesh@ubuntu:~$ ssh sel-46@10.6.3.211
Welcome to Ubuntu 14.04.4 LTS (GNU/Linux 3.13.0-79-generic x86_64)

 * Documentation:  https://help.ubuntu.com/

Last login: Thu Sep 29 05:02:27 2016 from 10.6.3.120
sel-46@sel46-HP-Compaq-Pro-6305-SFF:~$
```

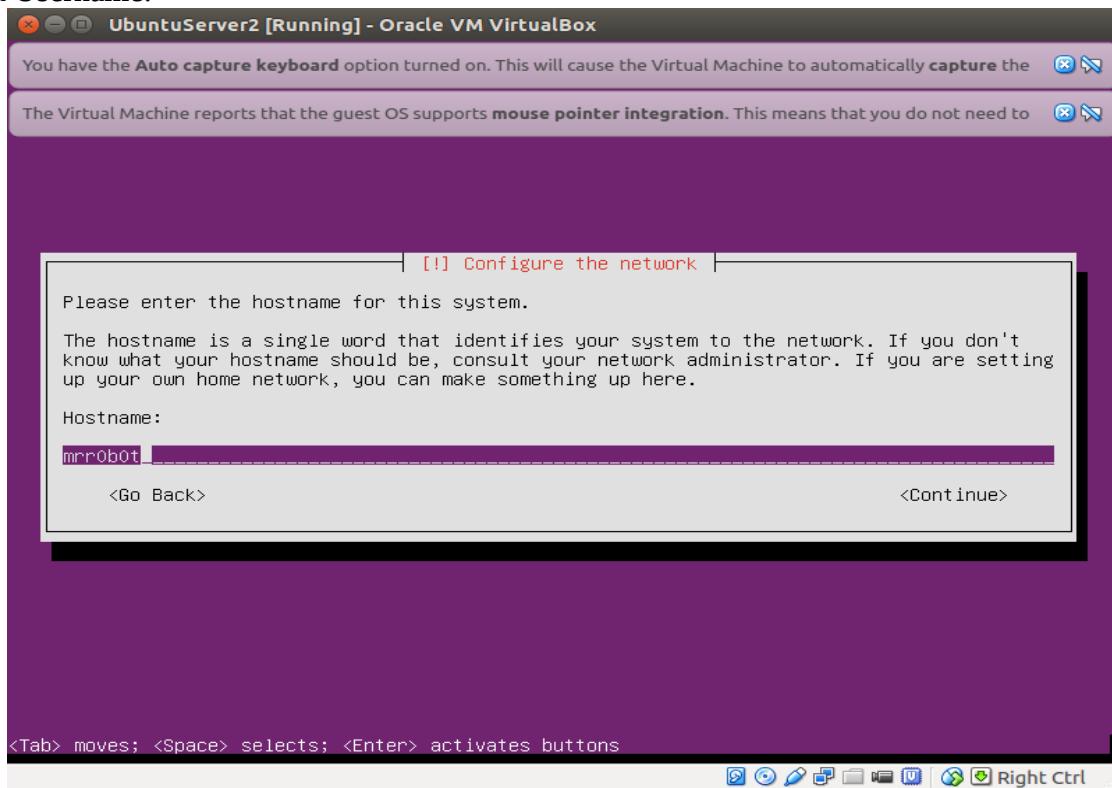
Output:

Installing Ubuntu Server 16.04

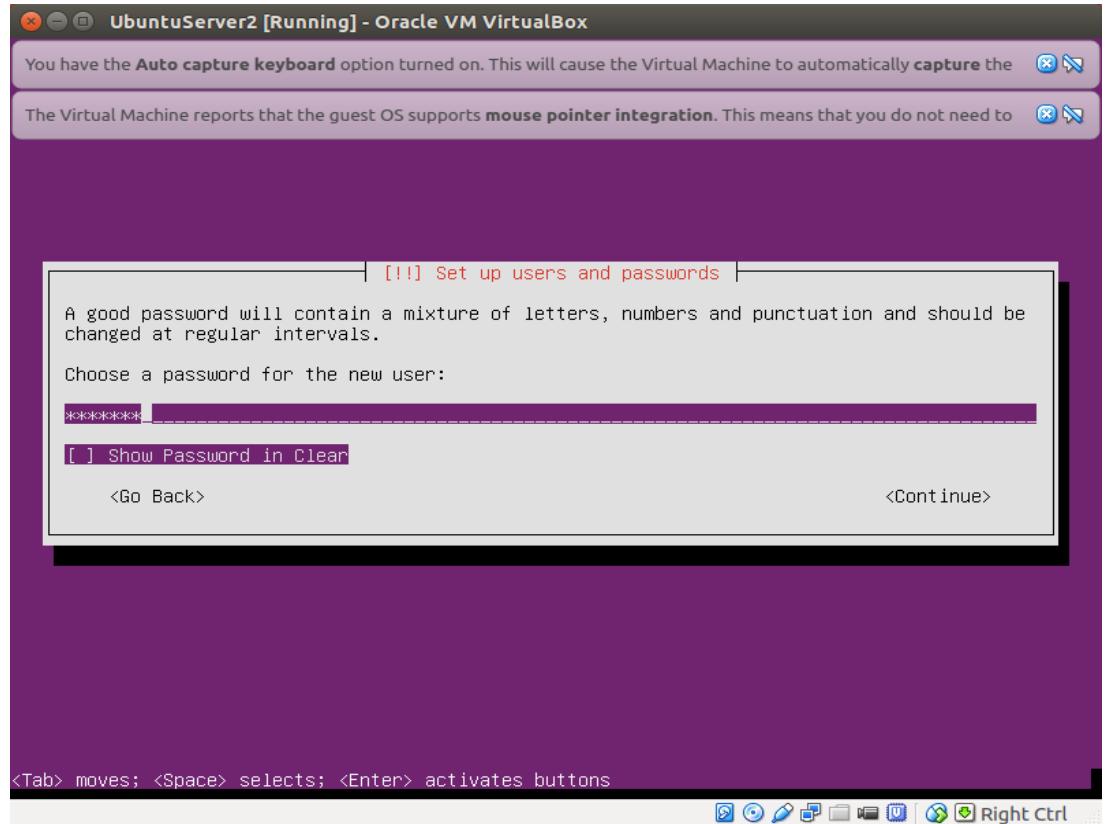


Configuring server:

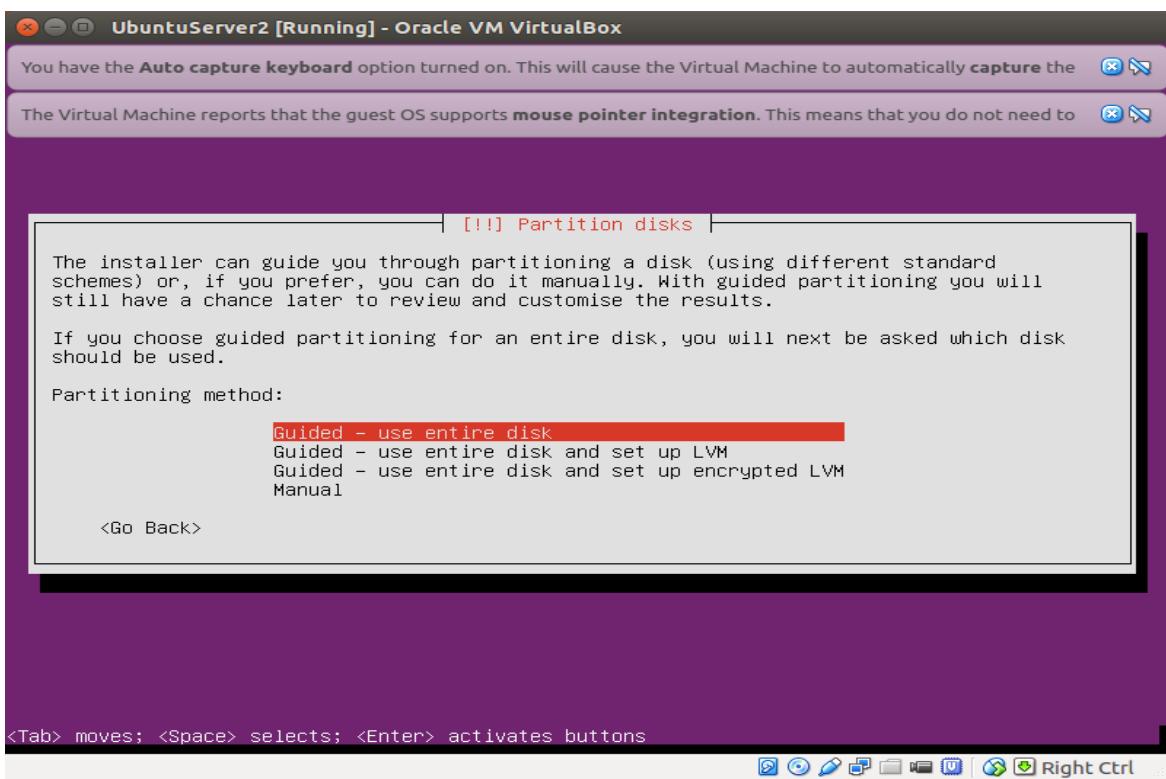
Give a Username:



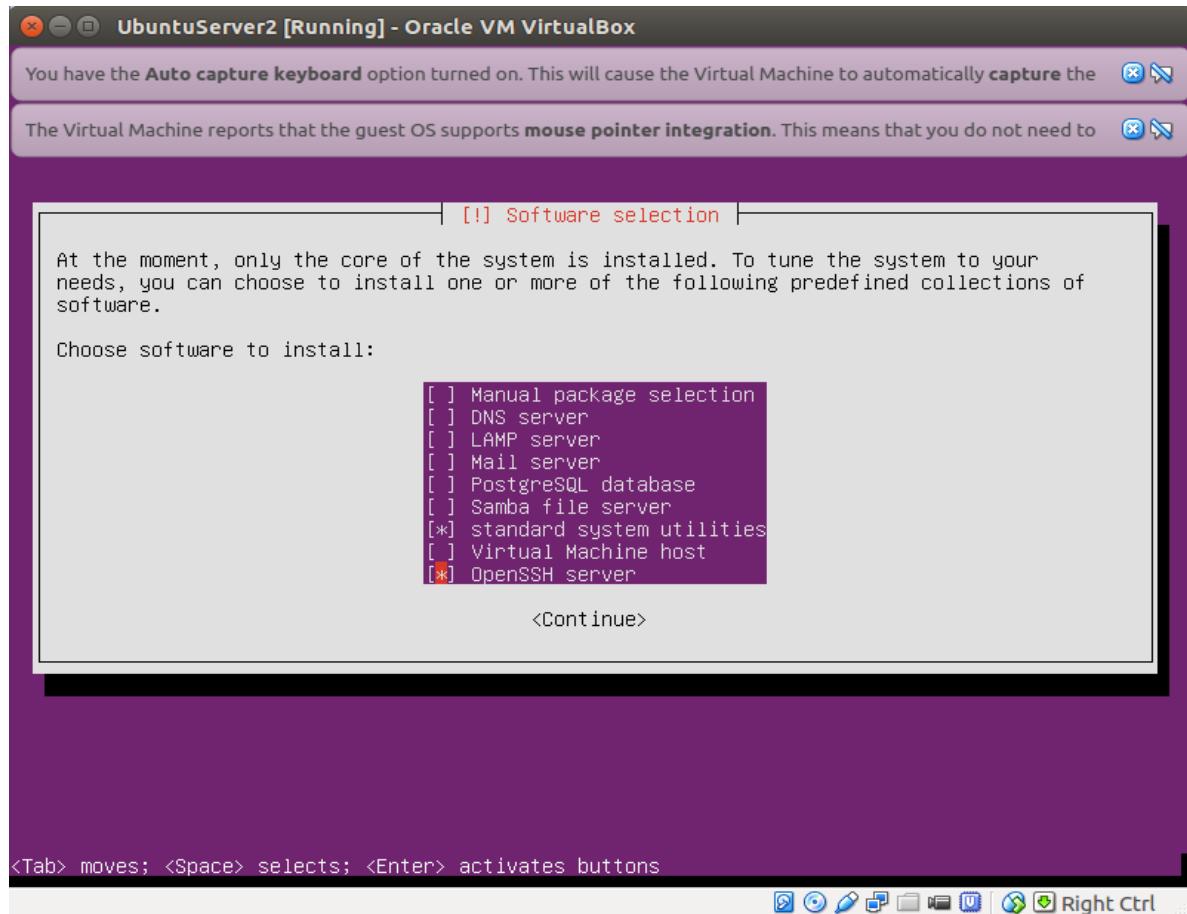
Set a Password:



This is to partition the disk



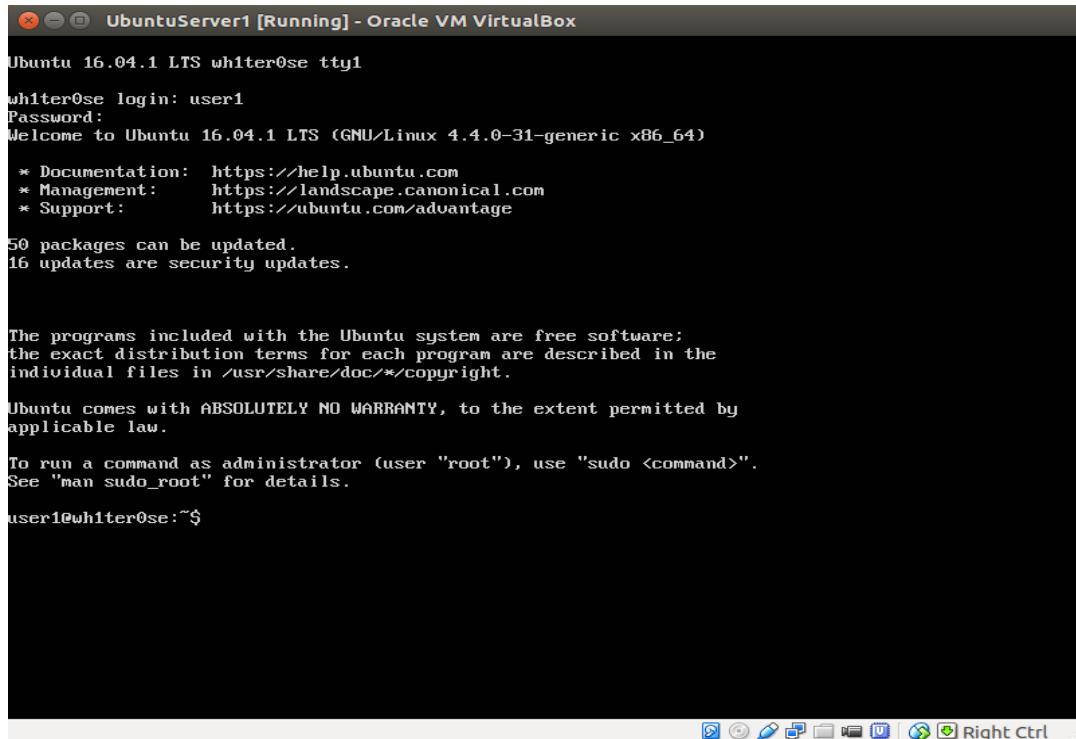
Install OpenSSH Server:



Virtual Machine 1:

To set ip :ifconfig enp0s3 10.6.3.164 netmask 255.255.255.0

Login with a Username:



Virtual Machine 2:

Files of User1 are shown using LS command.

Using the scp command copy the required file to the system.

To set ip:**ifconfig enp0s3 10.6.3.165 netmask 255.255.255.0**

SCP command:

scp user1@10.6.3.164:~/files/file1 ~/file1

The screenshot shows a terminal window titled "UbuntuServer2 [Running] - Oracle VM VirtualBox". The terminal output is as follows:

```
55 packages can be updated.  
17 updates are security updates.  
  
Last login: Mon Sep 26 17:04:23 2016  
user1@wh1ter0se:~$  
user1@wh1ter0se:~$ user1@wh1ter0se:~$ ls  
files  
user1@wh1ter0se:~$ cd files  
user1@wh1ter0se:~/files$ ls  
file1  
user1@wh1ter0se:~/files$ exit  
logout  
Connection to 10.6.3.164 closed.  
user2@mrr0b0t:~$  
user2@mrr0b0t:~$ user2@mrr0b0t:~$ scp  
usage: scp [-12346BCpqrv] [-c cipher] [-F ssh_config] [-i identity_file]  
[-l limit] [-o ssh_option] [-P port] [-S program]  
[[user@]host1:]file1 ... [[user@]host2:]file2  
user2@mrr0b0t:~$ scp user1@10.6.3.164:~/files/file1 ~/file1  
user1@10.6.3.164's password:  
Permission denied, please try again.  
user1@10.6.3.164's password:  
Permission denied, please try again.  
user1@10.6.3.164's password:  
user2@mrr0b0t:~$ scp user1@10.6.3.164:~/files/file1 ~/file1  
user1@10.6.3.164's password:  
file1  
user2@mrr0b0t:~$  
user2@mrr0b0t:~$ user2@mrr0b0t:~$ cat file1  
this is a msg from wh1ter0se  
you have only 2 mins remaining  
user2@mrr0b0t:~$ _
```

The terminal window has a toolbar at the bottom with icons for copy, paste, cut, and other functions. The status bar at the bottom right shows "Right Ctrl".