CLOUD COMPUTING PRACTICAL WORK

Objective:
- To develop web applications in cloud
- Designing, Implementing and managing the issues of Cloud Computing.

LIST OF EXPERIMENTS:

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Find a procedure to transfer the files from one virtual machine to another virtual machine.
4. Install Google App Engine. Create hello world app and other simple web applications using python/java.
5. Install Hadoop single node cluster and run simple applications like wordcount.
6. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
7. Case-Study

Outcome:
On completion of this, the students will be able to:

- Configure various virtualization tools such as Virtual Box, VMware workstation.
- Design and deploy a web application in a PaaS environment.
- Learn how to simulate a cloud environment to implement new schedulers.
- Install and use a generic cloud environment that can be used as a private cloud.
- Manipulate large data sets in a parallel environment.

EX.No:1   Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of widndows
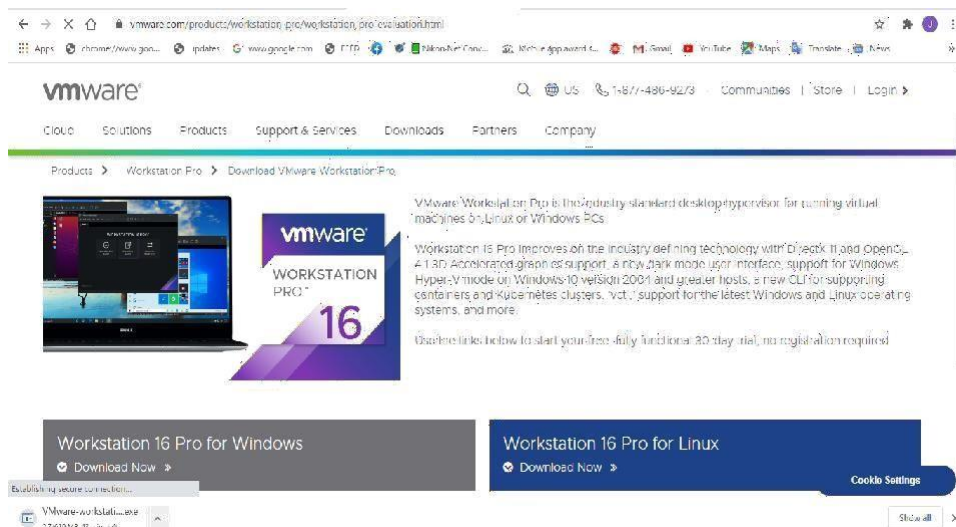
Aim:

To install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8 or 10.
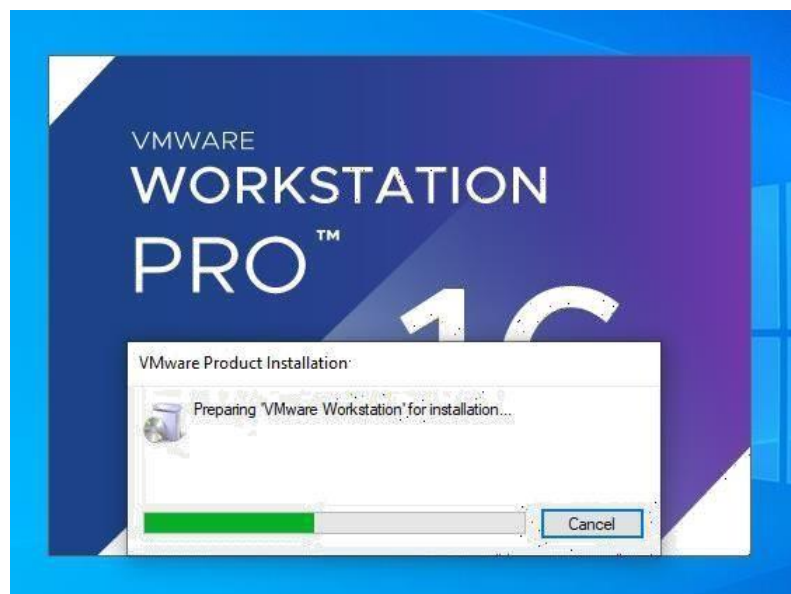
Procedure:
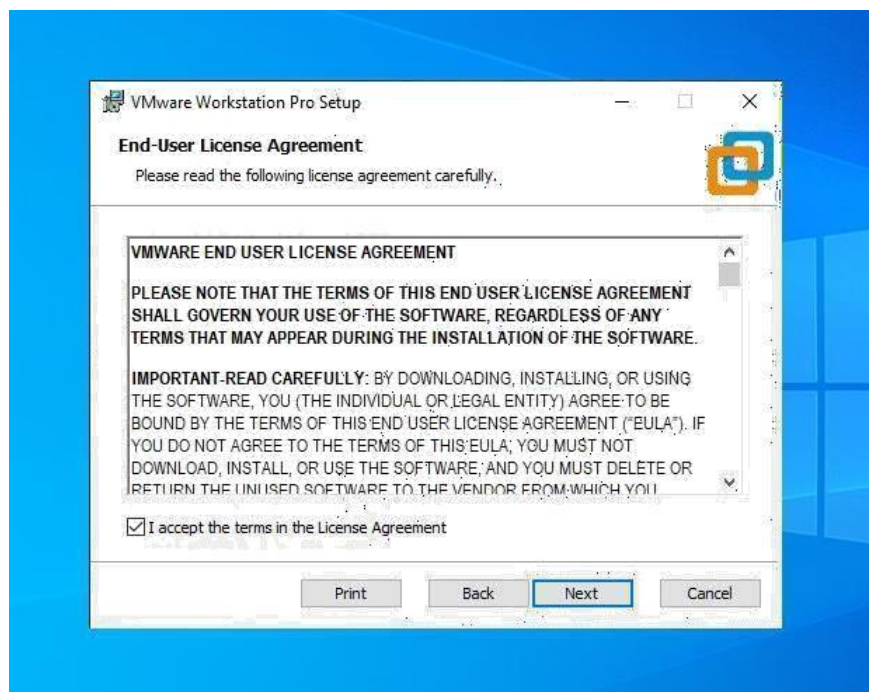
Downloading and installing VMware
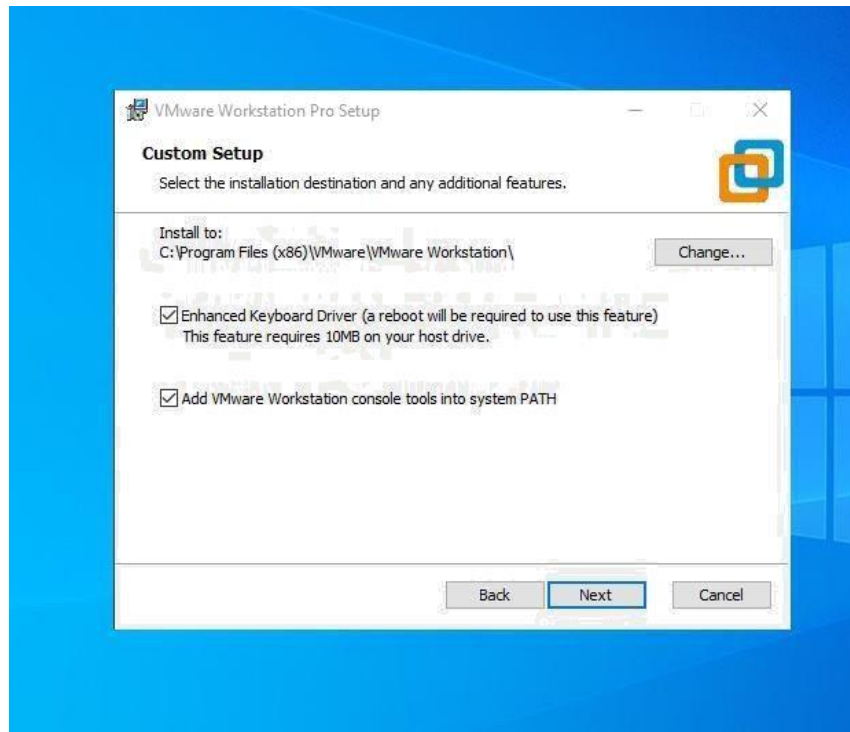
Step 1: Download VMware
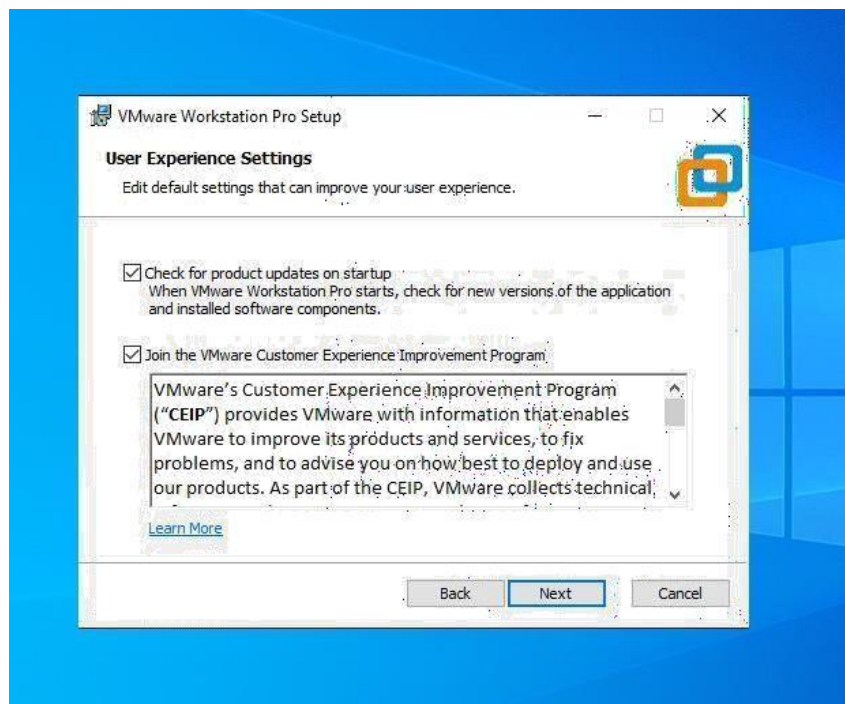

Step 2: Install the VMware Application

Step 3: Click Next

Step 4: Accept and Click Next

Step 5: Click Next

Step 6: Click Next

Step 7: Click Next
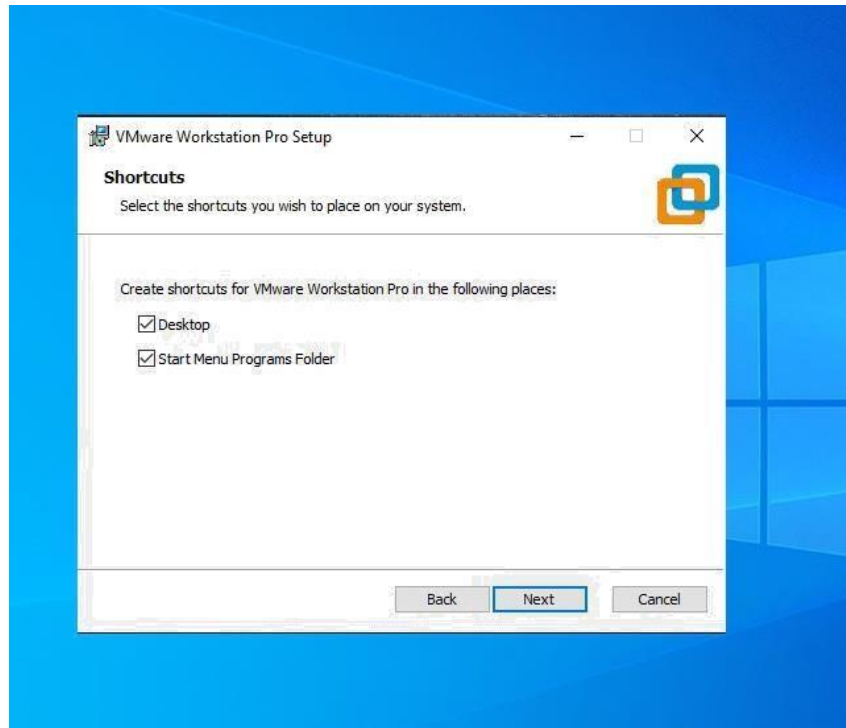
Step 8: Click Install
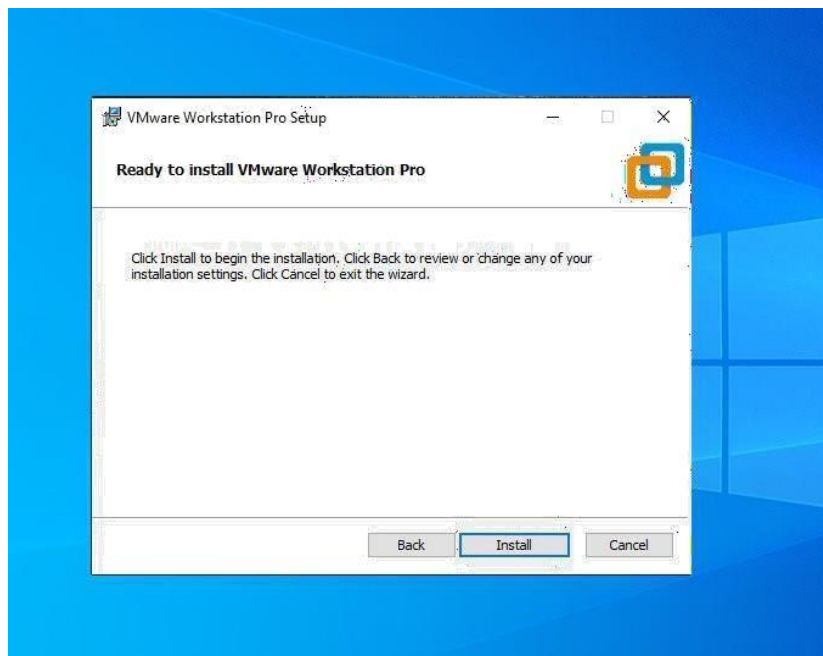
Step 9: Installing
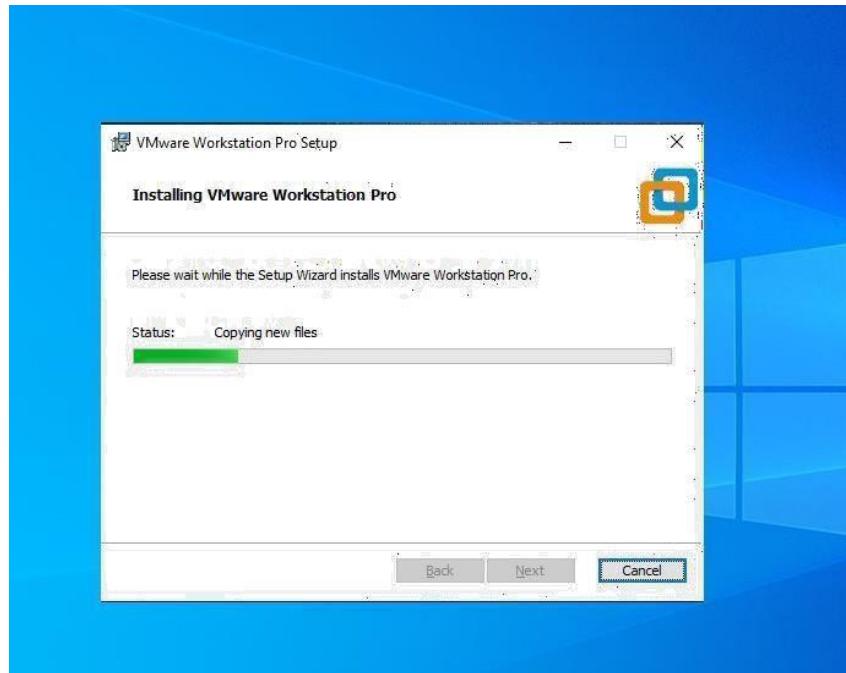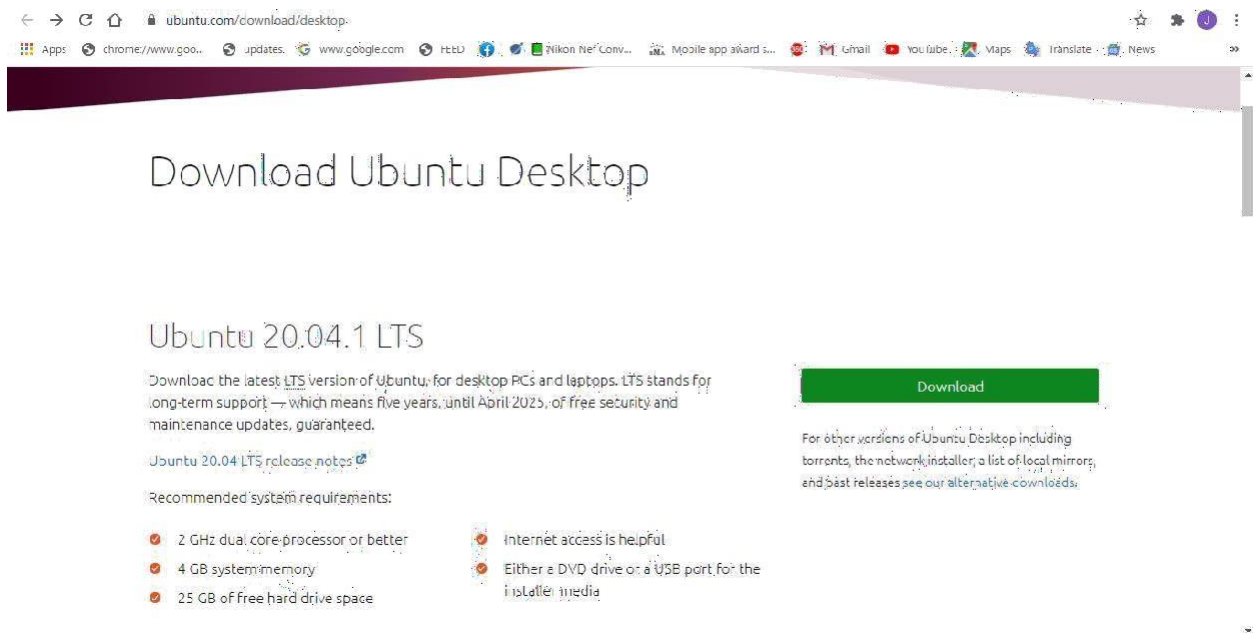
Step 10: Click Finish
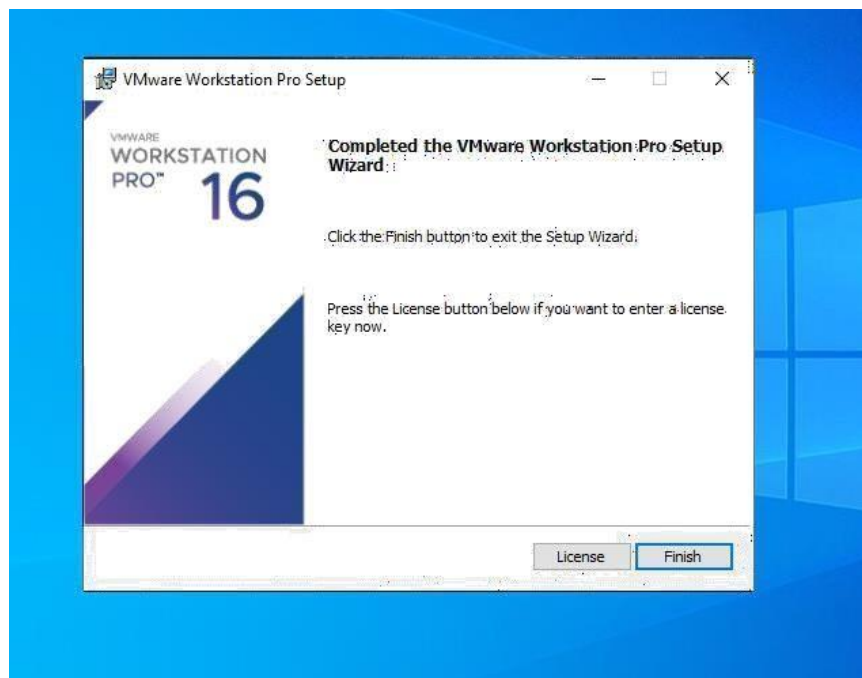
Downloading Ubuntu

Step 11: Download the Ubuntu OS

Step 12: Create new virtual machine
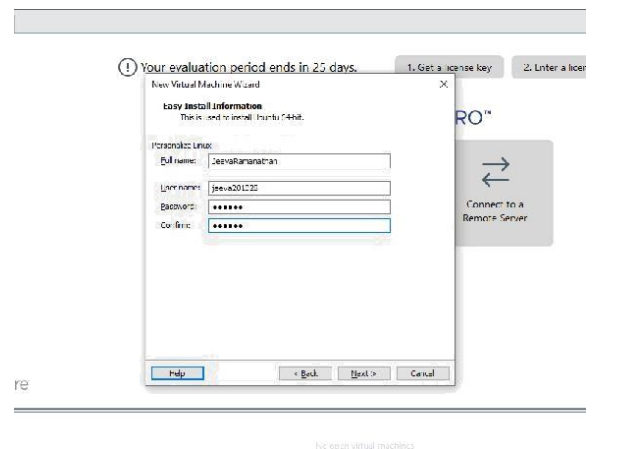
Step 13: Click Next
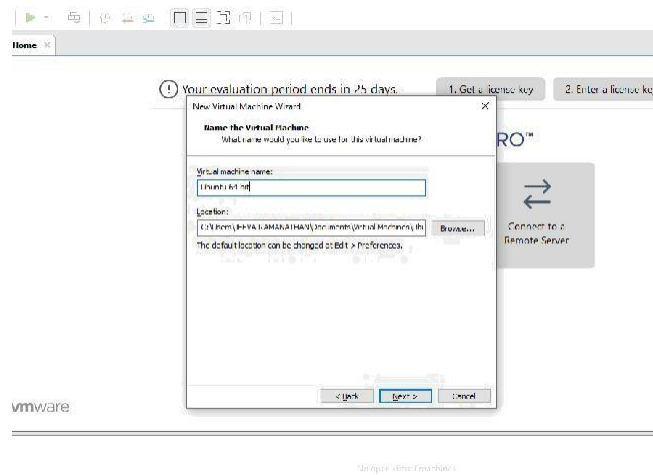

Step 14: Browse the downloaded Ubuntu file and click next
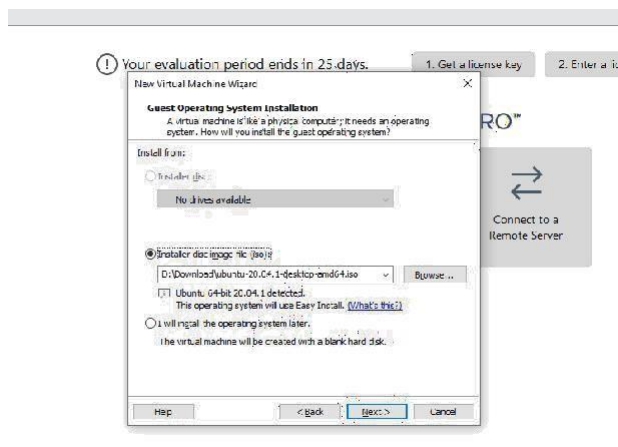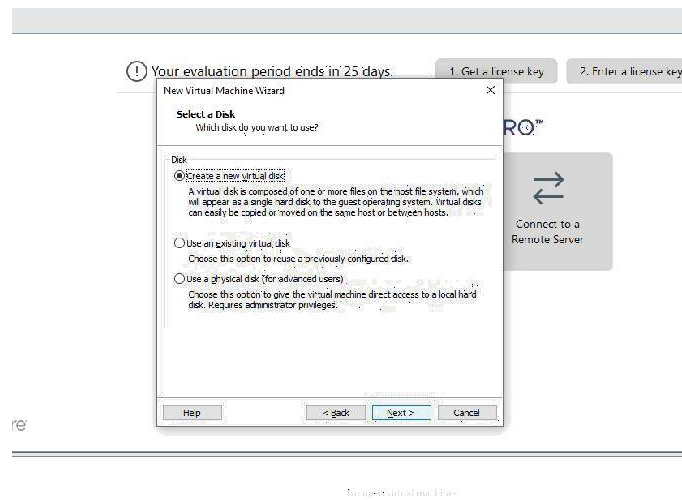

Step 15: Create an username and password and click next
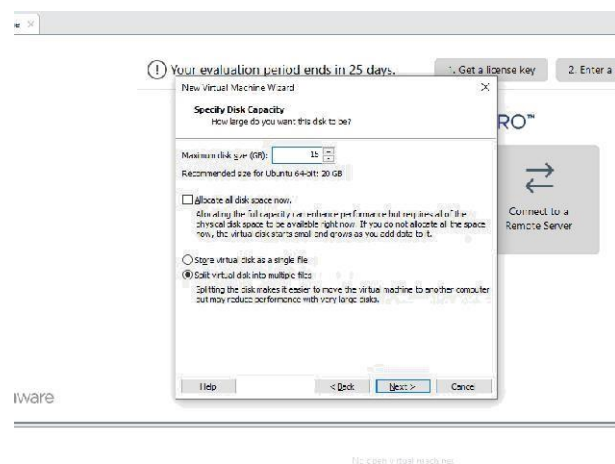
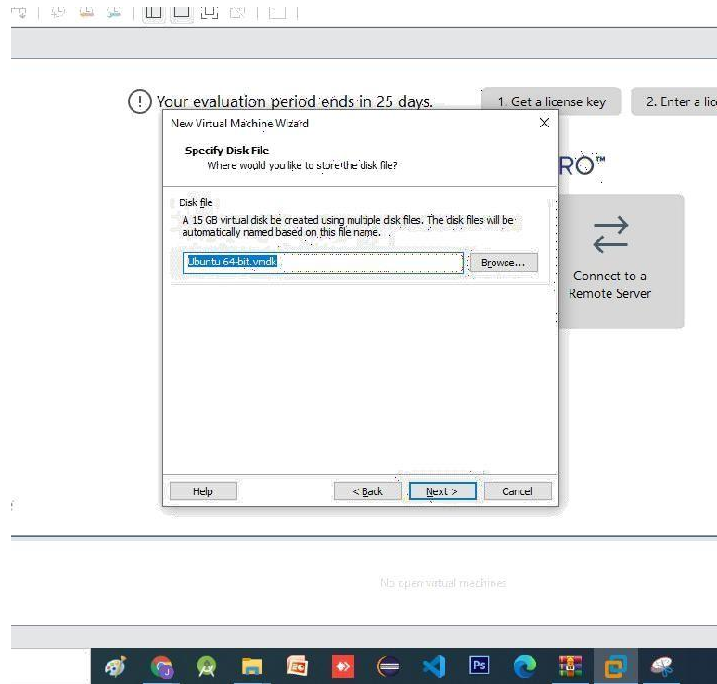Step 16: Choose the location to use your virtual machine and click next
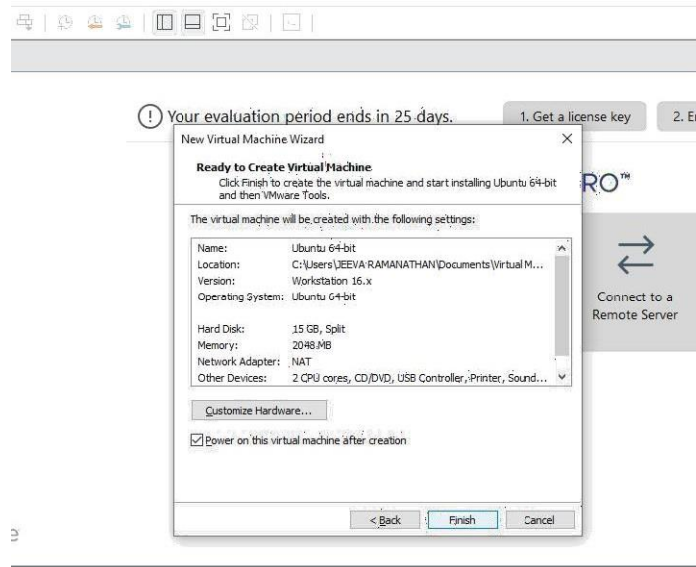

Step 17: Select create a new virtual disk and click next
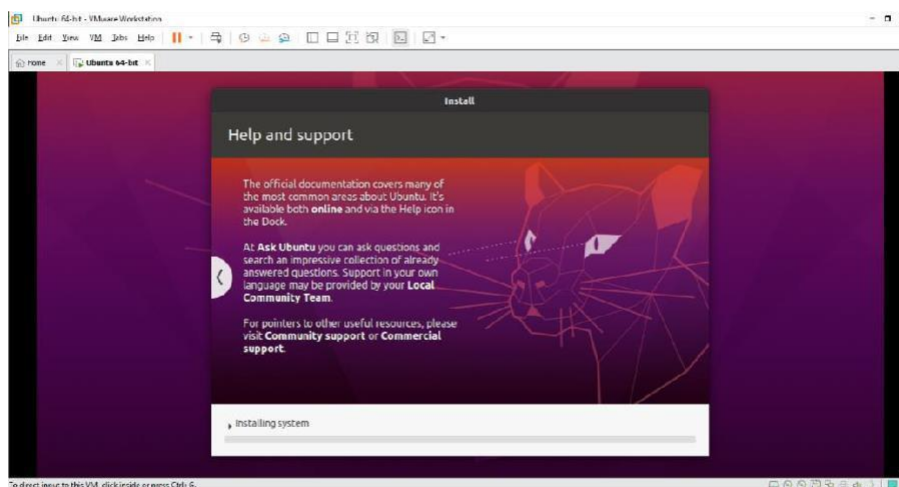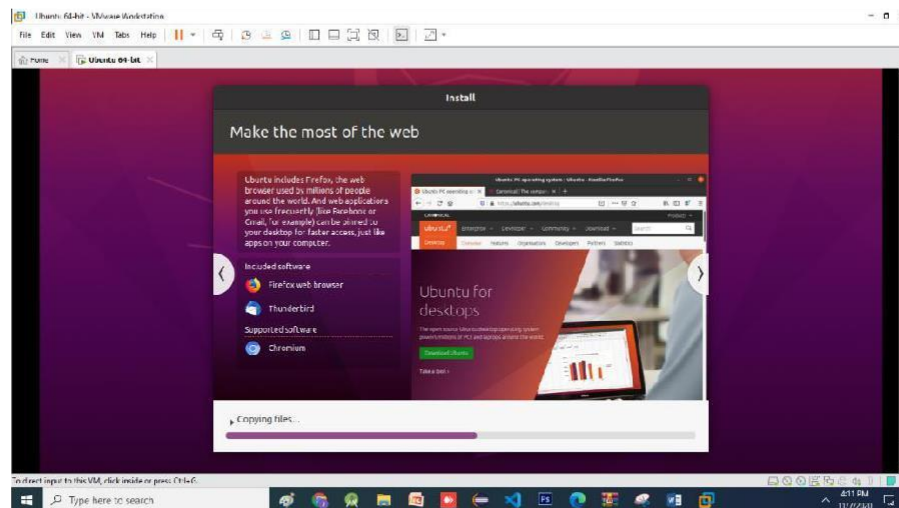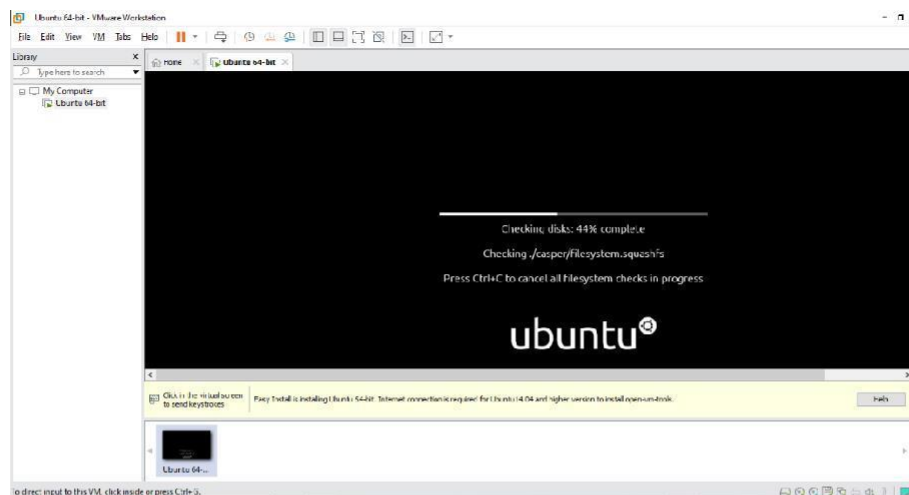

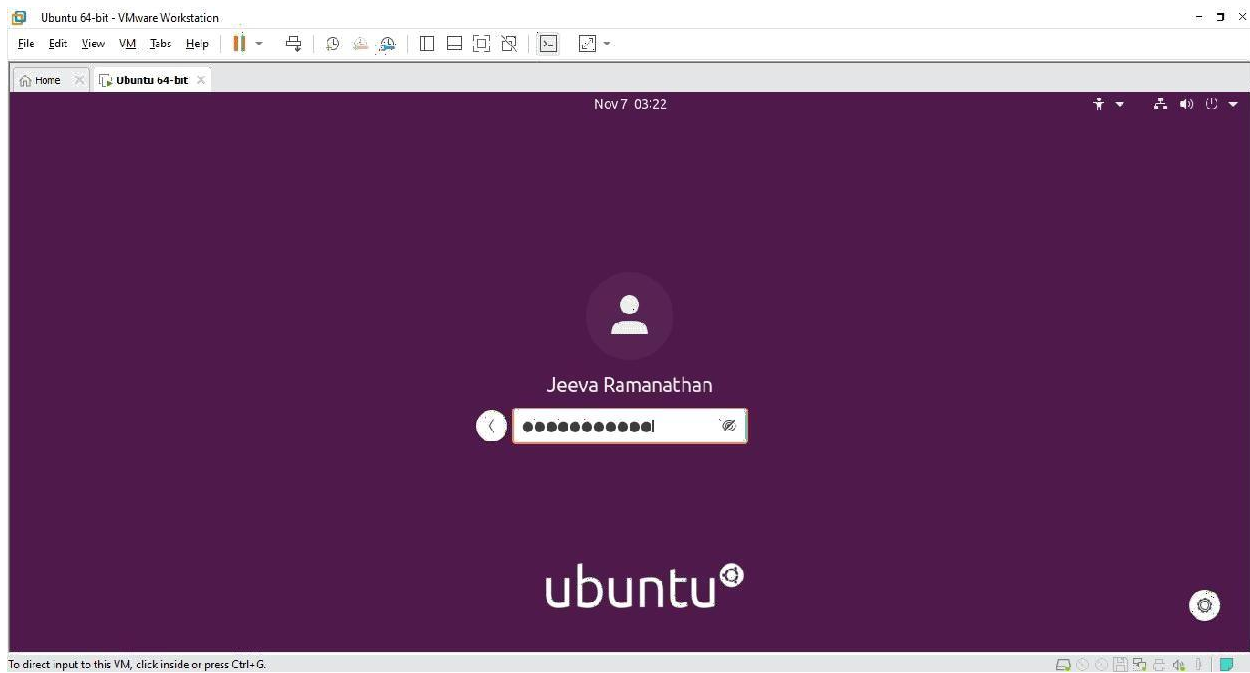Step 18: Specify the disk size and click next
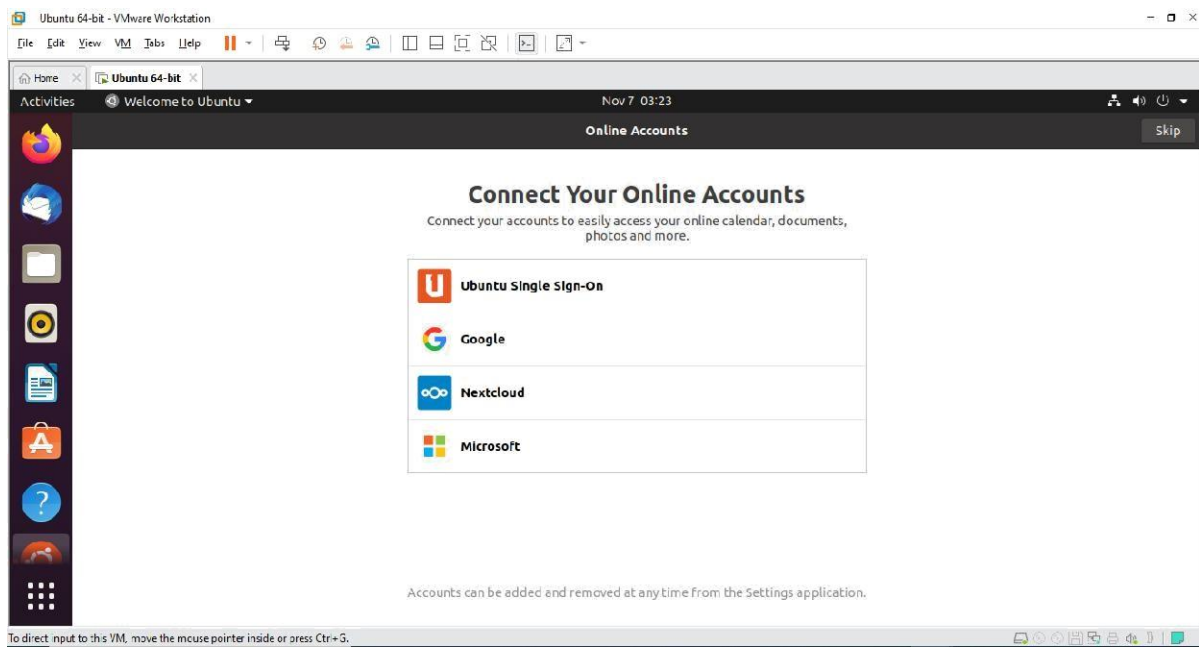
Step 19: Click Next

Step 20: Click Finish

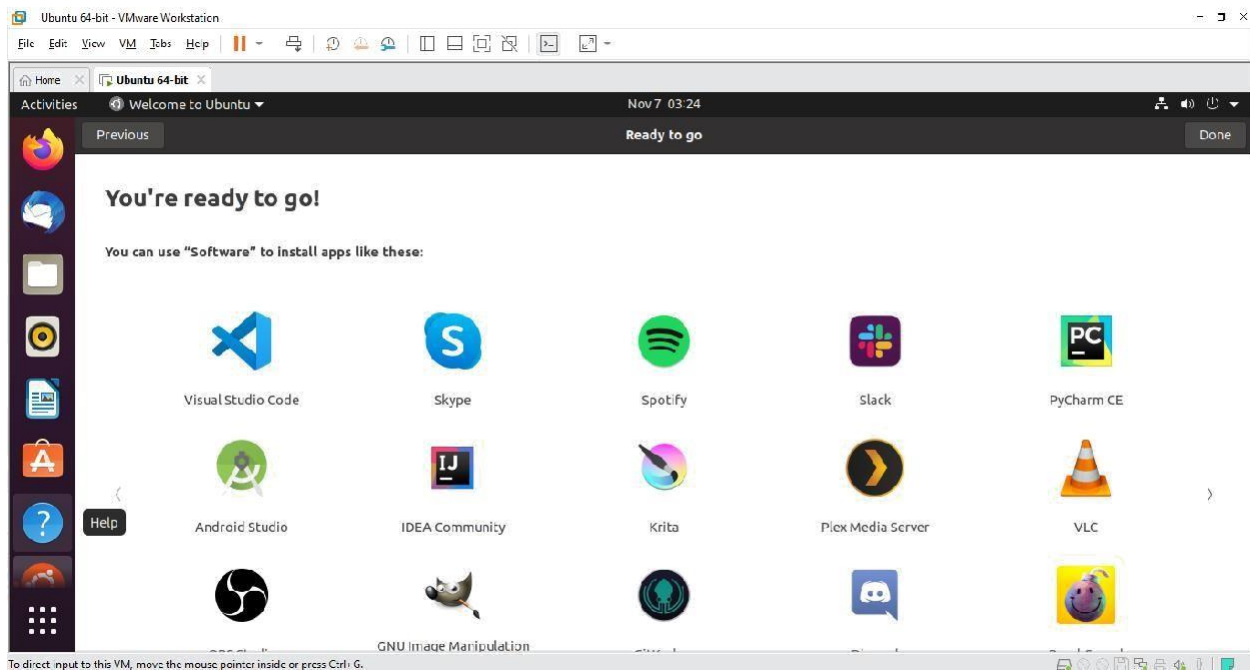Step 21: Installing Ubuntu on VMware and unzipping files
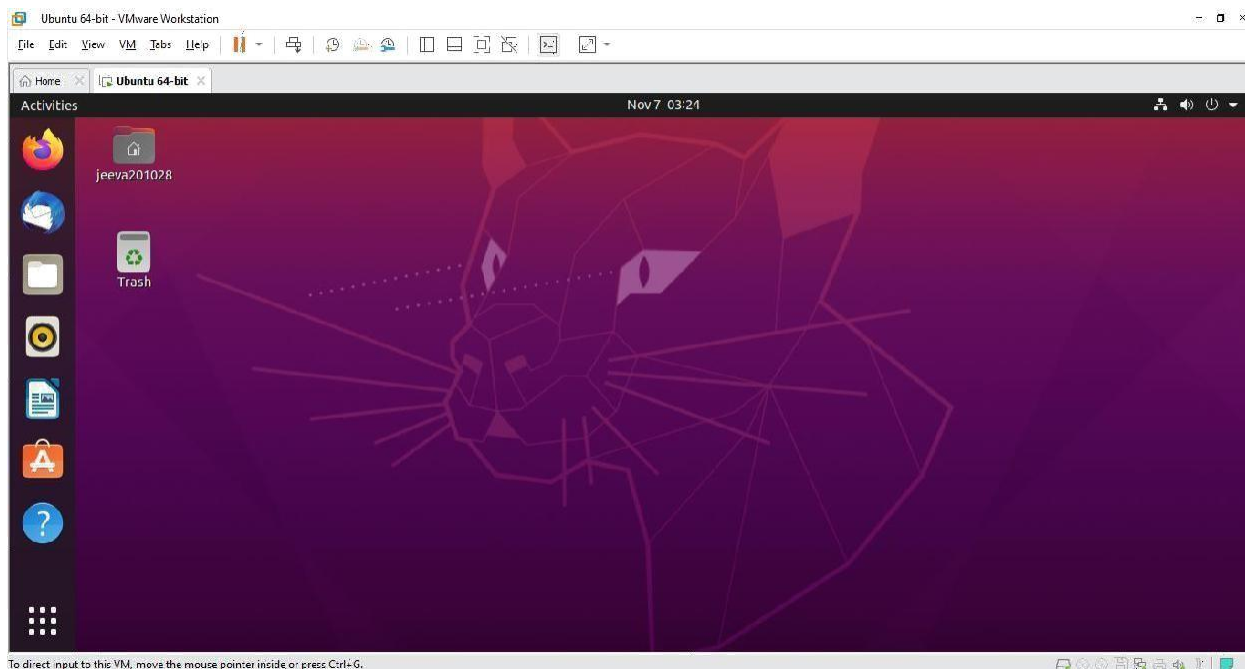
Step 22: Login to Ubuntu

Step 23: Skip everything

Step 24: Click Done

Step 25: Thus we have installed VMware Workstation with different flavours of linux on top of windows

Result: Thus, VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8 or 10.has been successfully installed and executed.
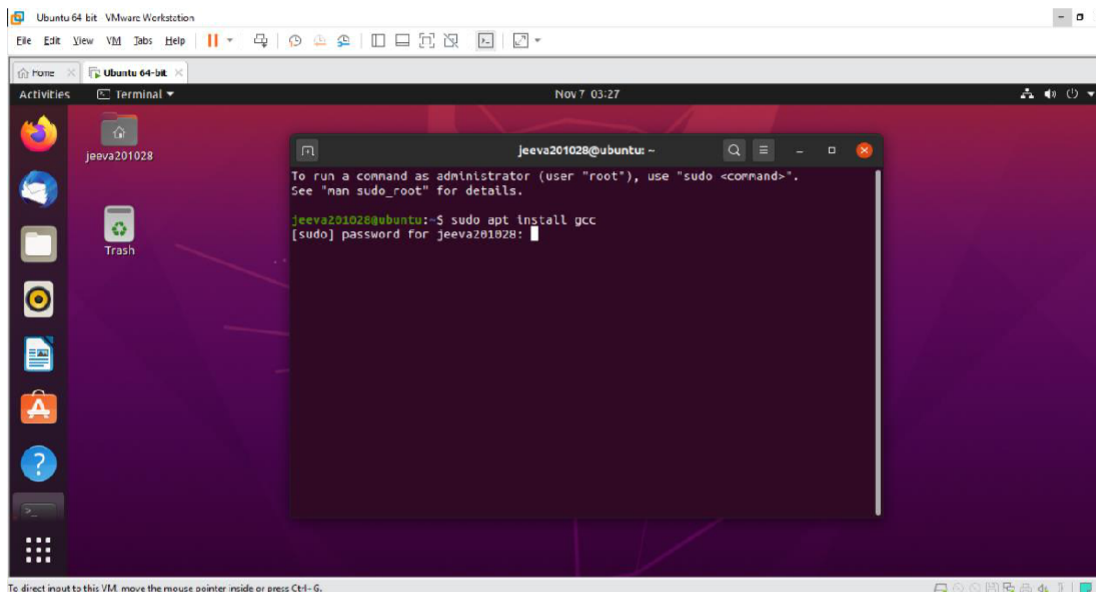
EX.No:2   Install a C compiler in the virtual machine created using virtual box and execute a simple program
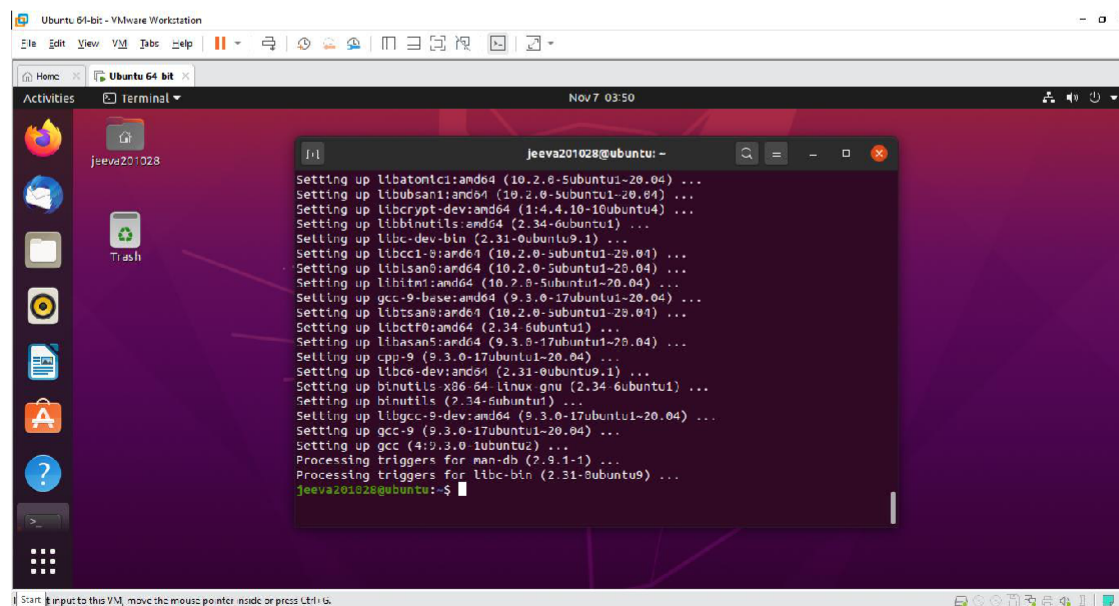
Aim:

To install a C Compiler in the virtual machine created using virtual box and executes a simple C program.
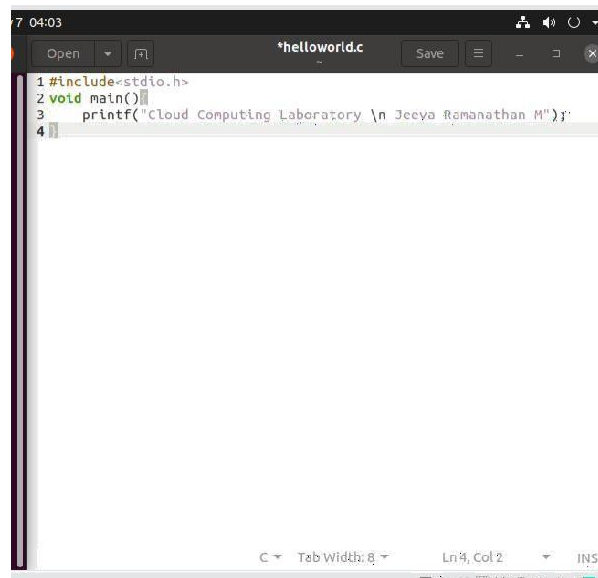
Procedure:

Step 1: Open the terminal on Ubuntu and install C compiler – "sudo apt install gcc"

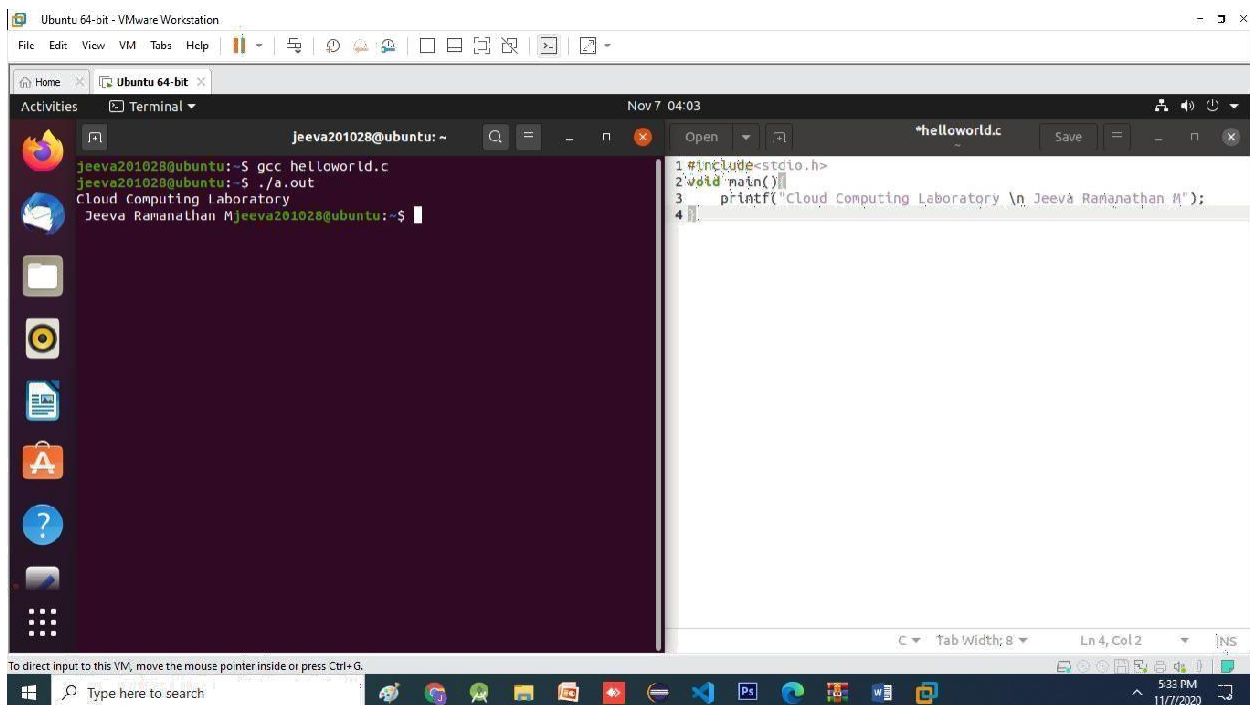Step 2: Once the installation finished open the editor

Step 3: Type a simple C program on editor and save it

Step 4: Compile and run the C program

Result:

Thus a C compiler is installed in the virtual machine and C program was executed and output was obtained successfully.

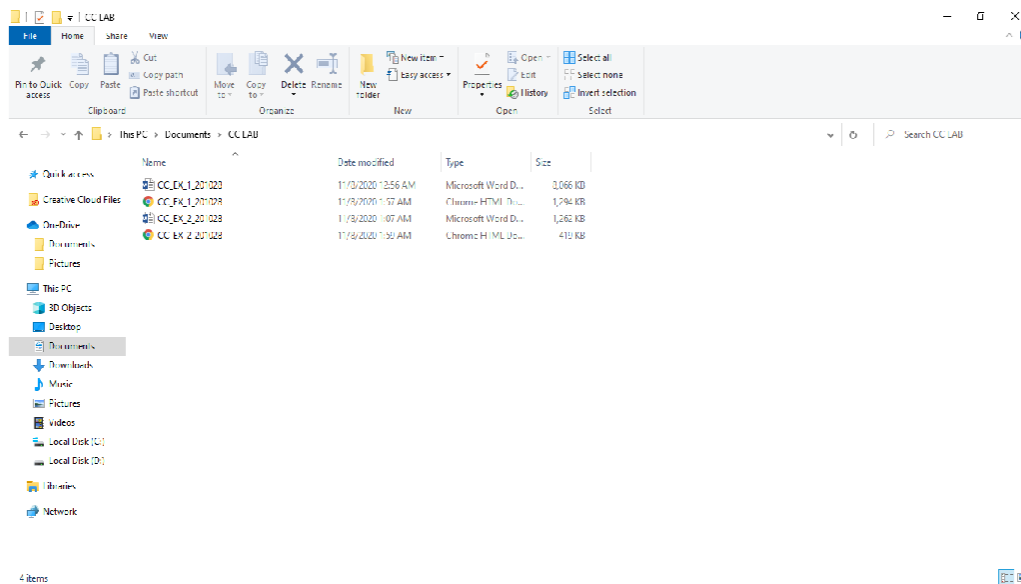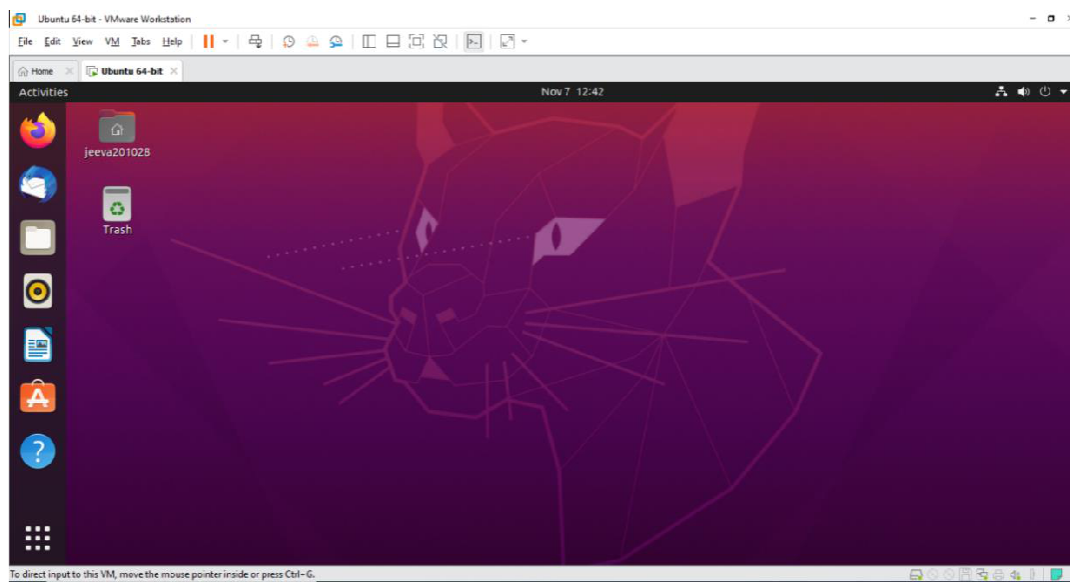# EX.No:3   Transfer files from one host machine to another virtual machine

Aim:

To transfer files/folders from the host machine to the virtual machine.

Procedure:
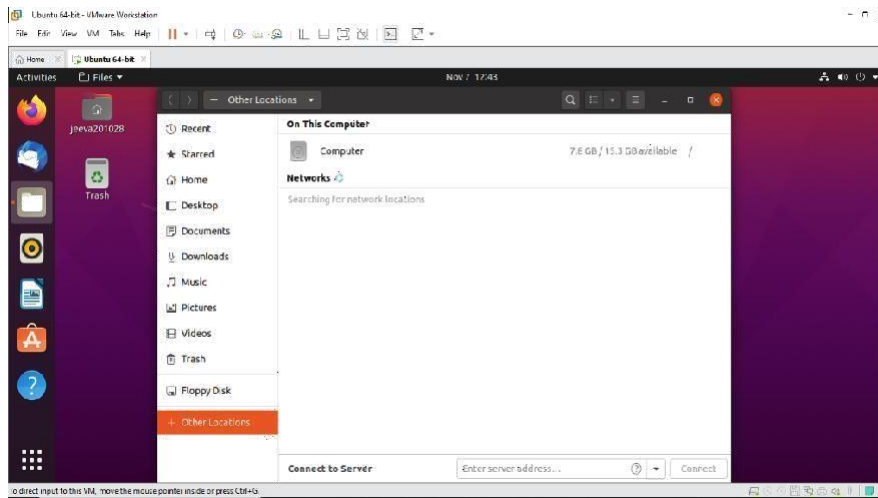
Files that are to be shared to virtual machine
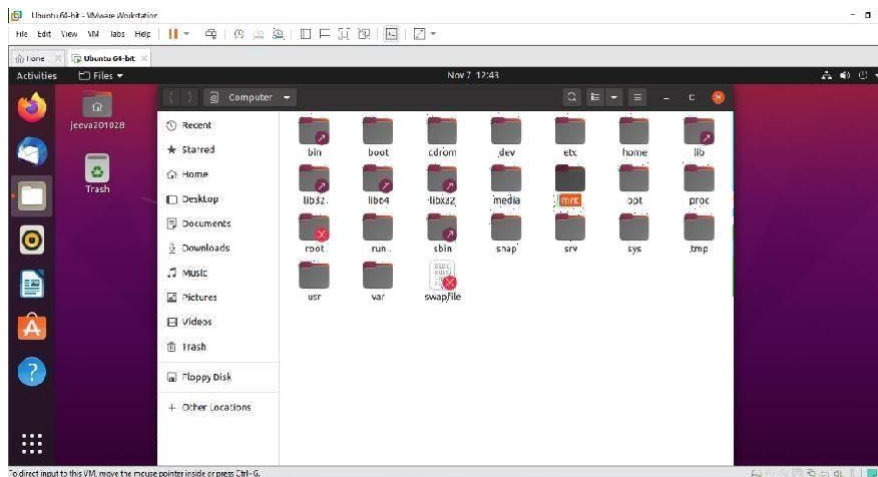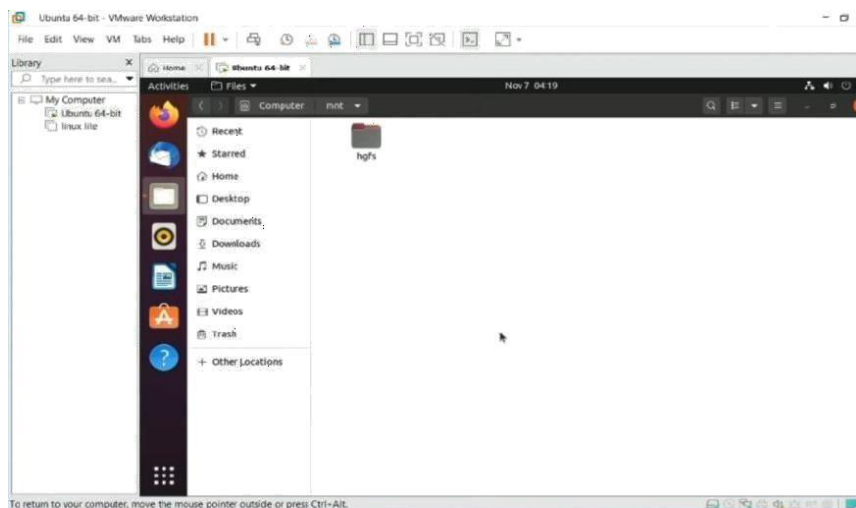

Step 1: Open the ubuntu in VM

Step 2: Open the file manager and go to Other Locations
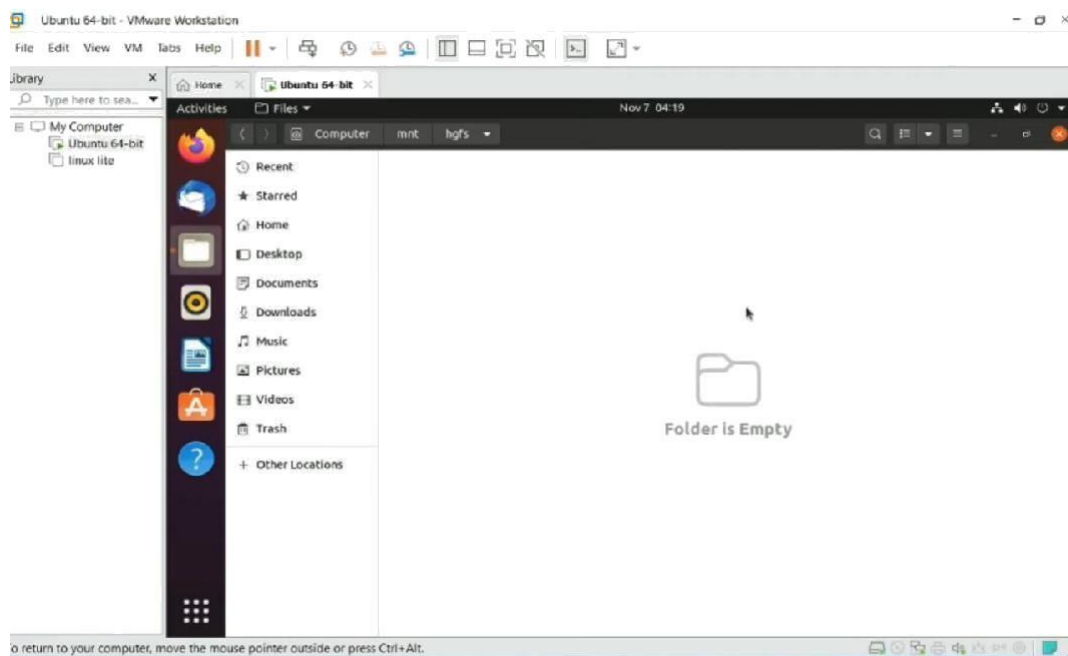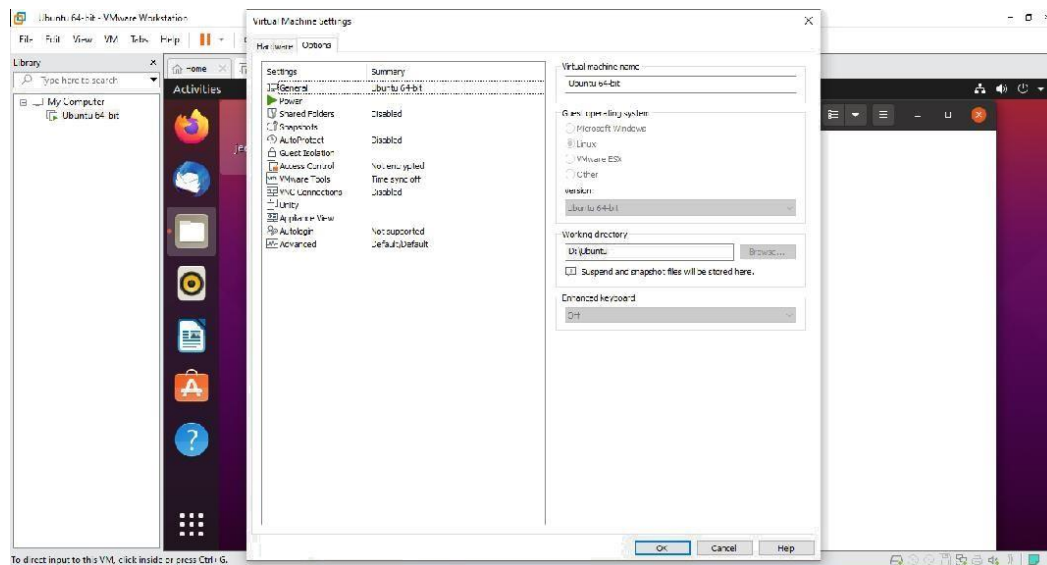

Step 3: Open the folder named "mnt"
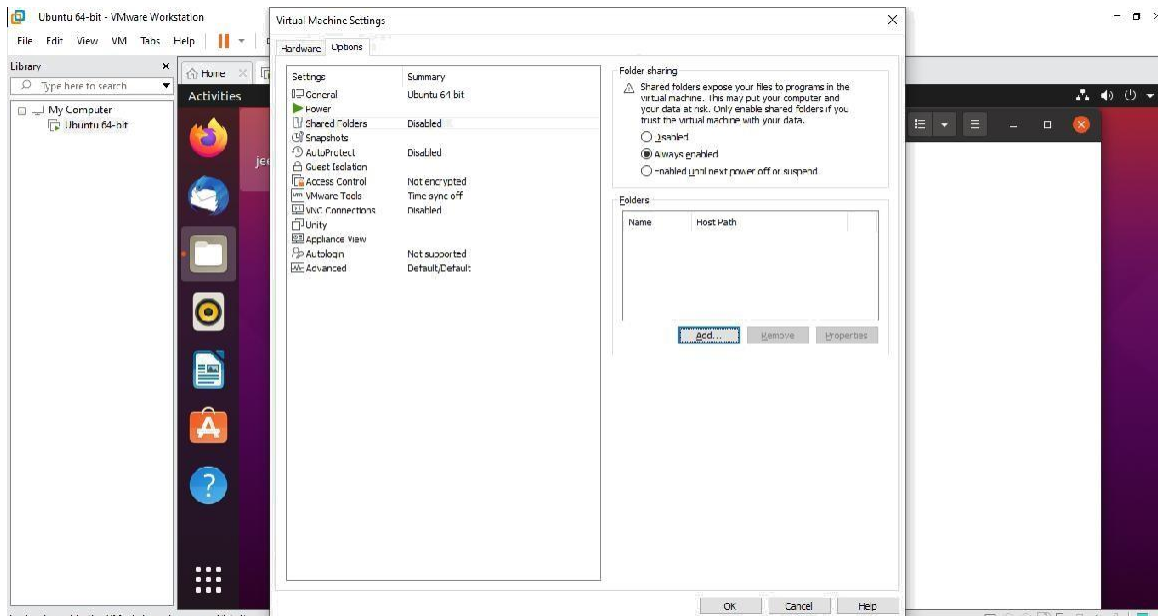

Step 4: Now open the "hgfs" folder

Initially the folder will be empty

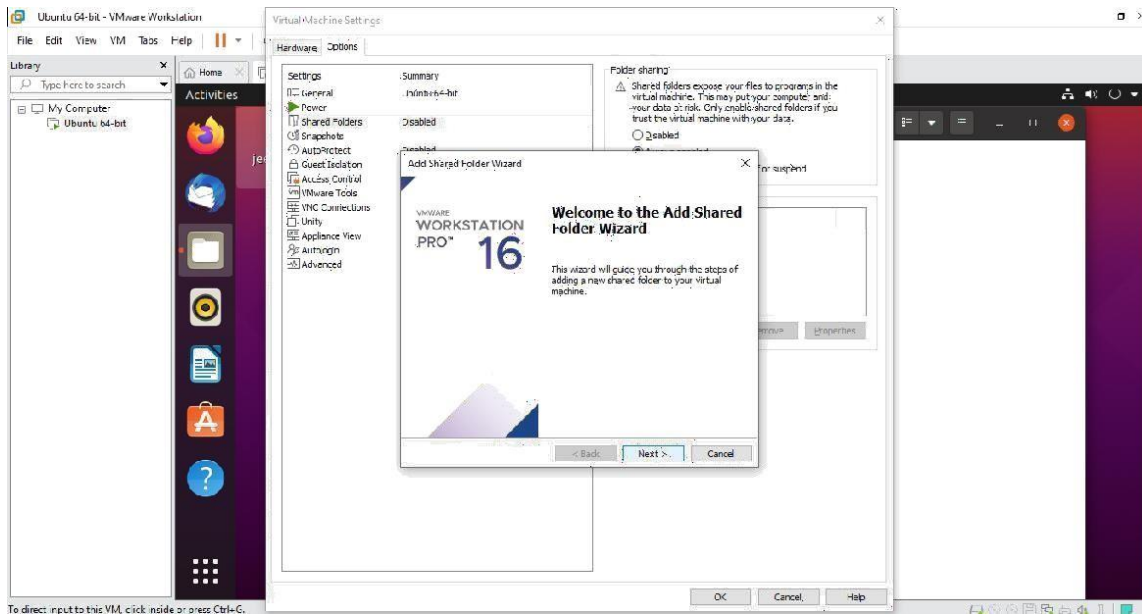
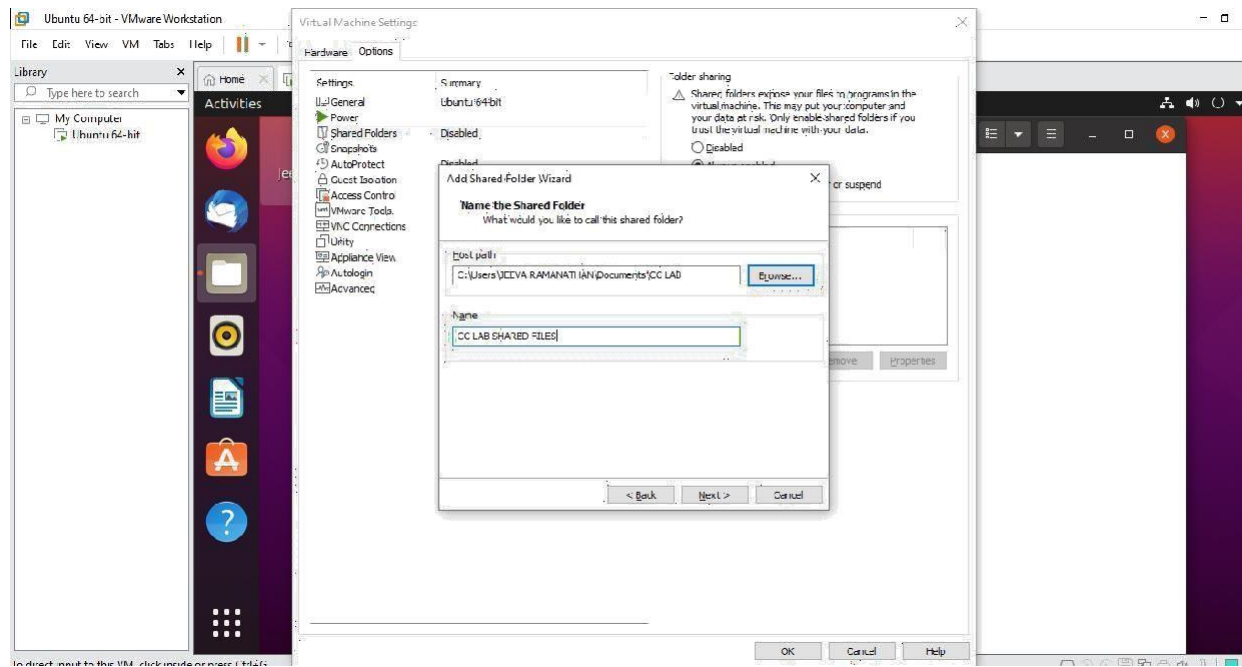Step 5: Now right click ubuntu 64-bit(VM name) and select properties, then go to options tab

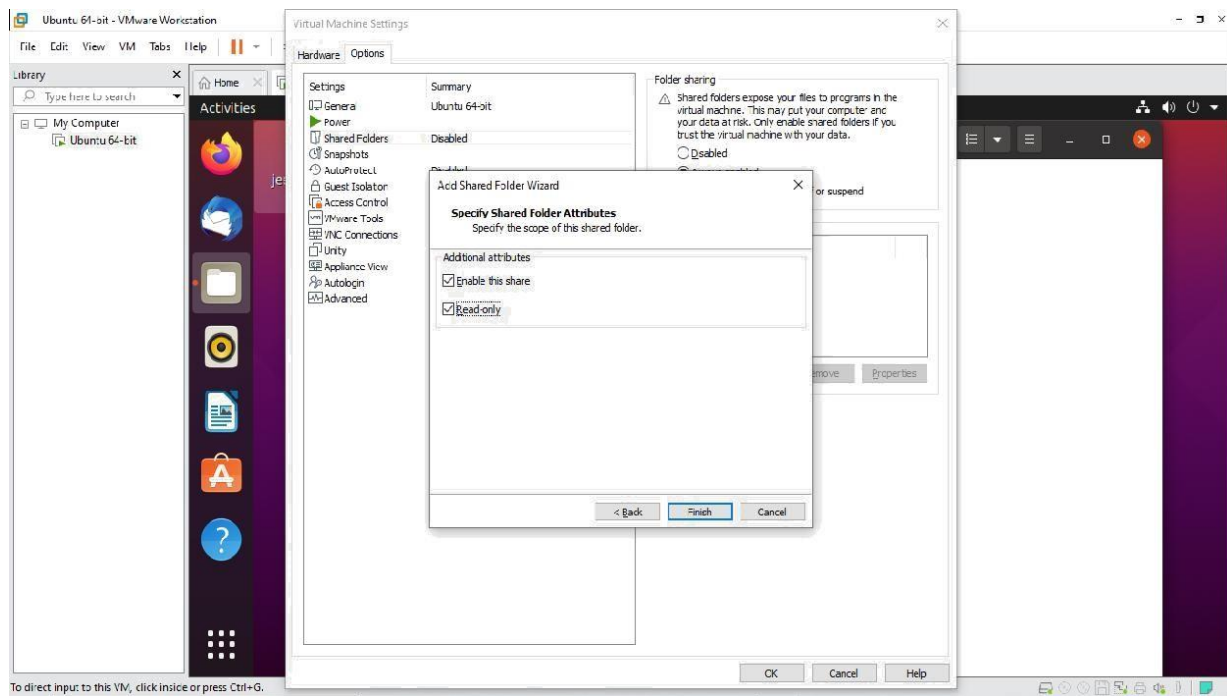Step 6:Select the shared folders,change the radio button to "Always enabled" and click Add
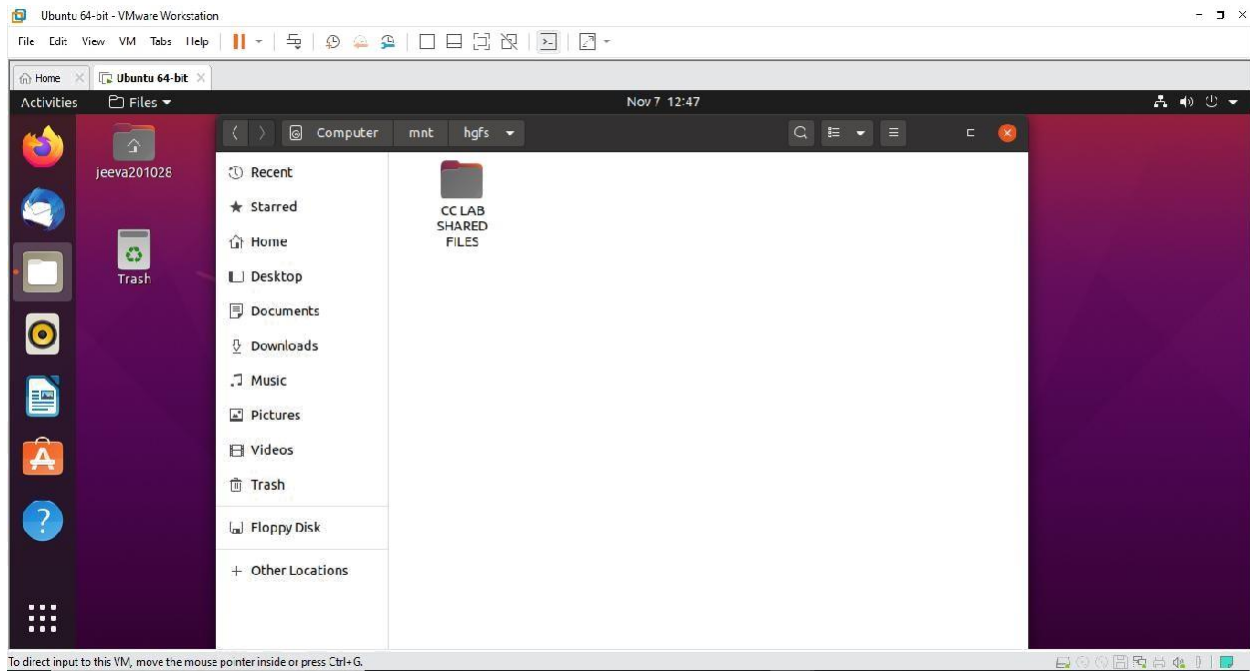

Step 7: Click Next

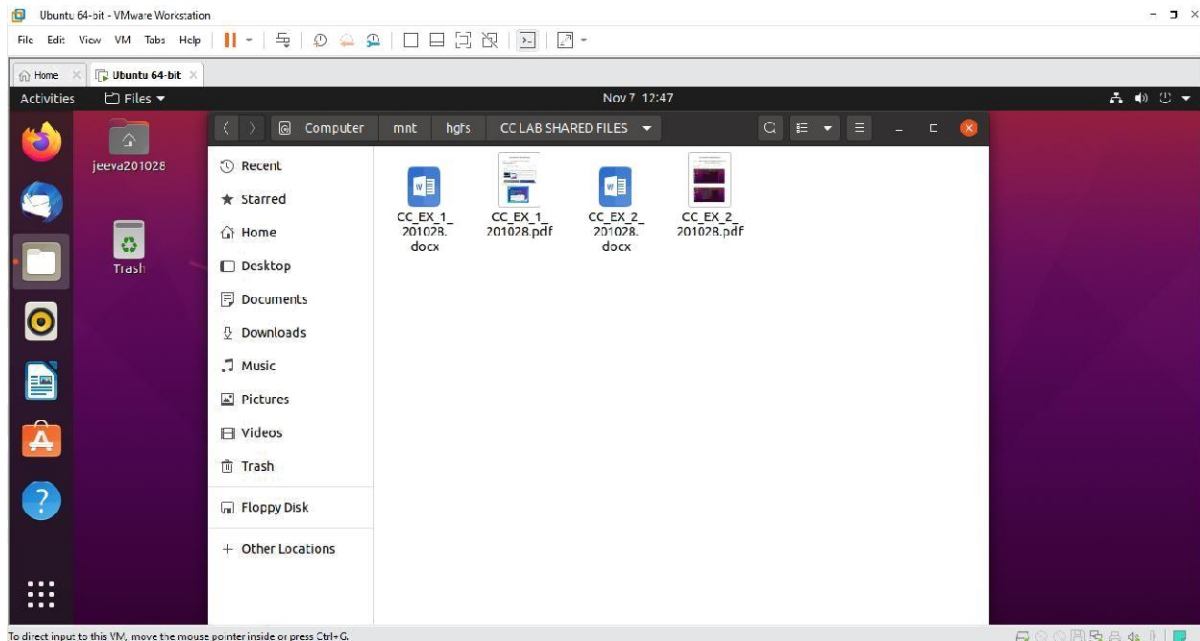Step 8.Select the folder/file that has to be shared to VM in Host Path

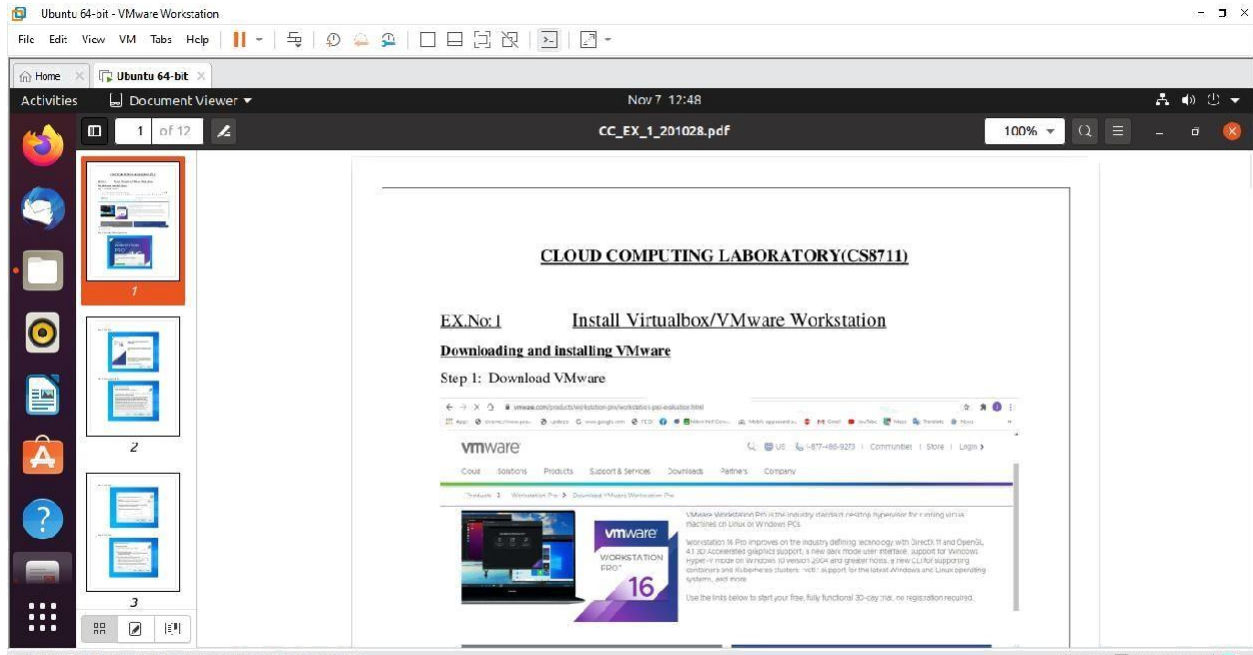Step 9: Check Read Only and click Finish

Step 10: Now in the same location "Computer>mnt>hgfs" the folder that are shared from hostis visible

Step 11:

Step 12: The files can be accessed in Read Only Mode in the VM now

Result:

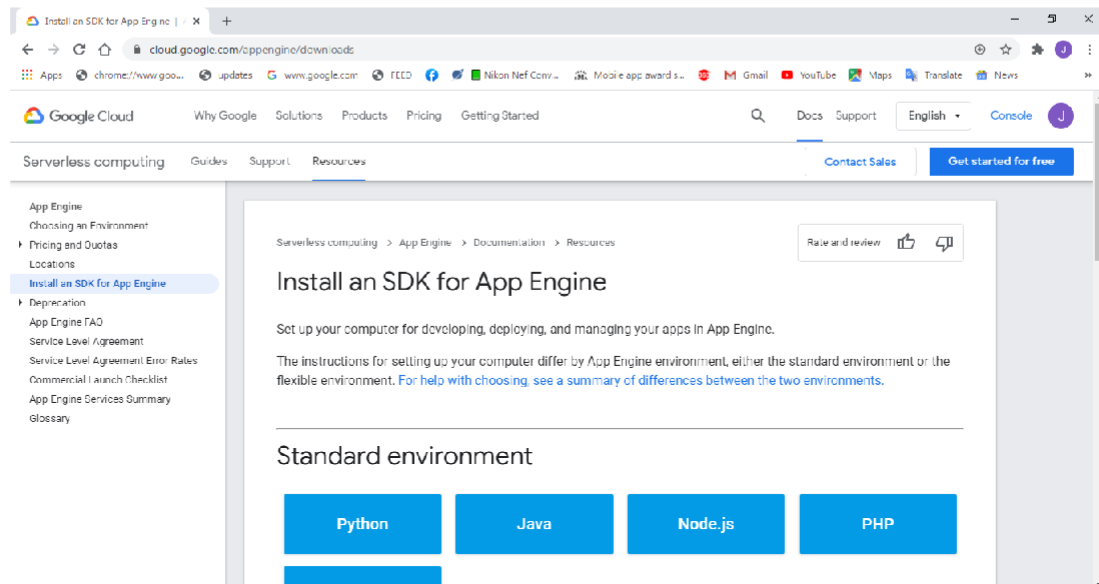Thus file sharing between is done between host machine and the virtual machine successfully.

EX.No:4	**Installation of a Google App Engine**

Aim:

To install the google app engine in the system.

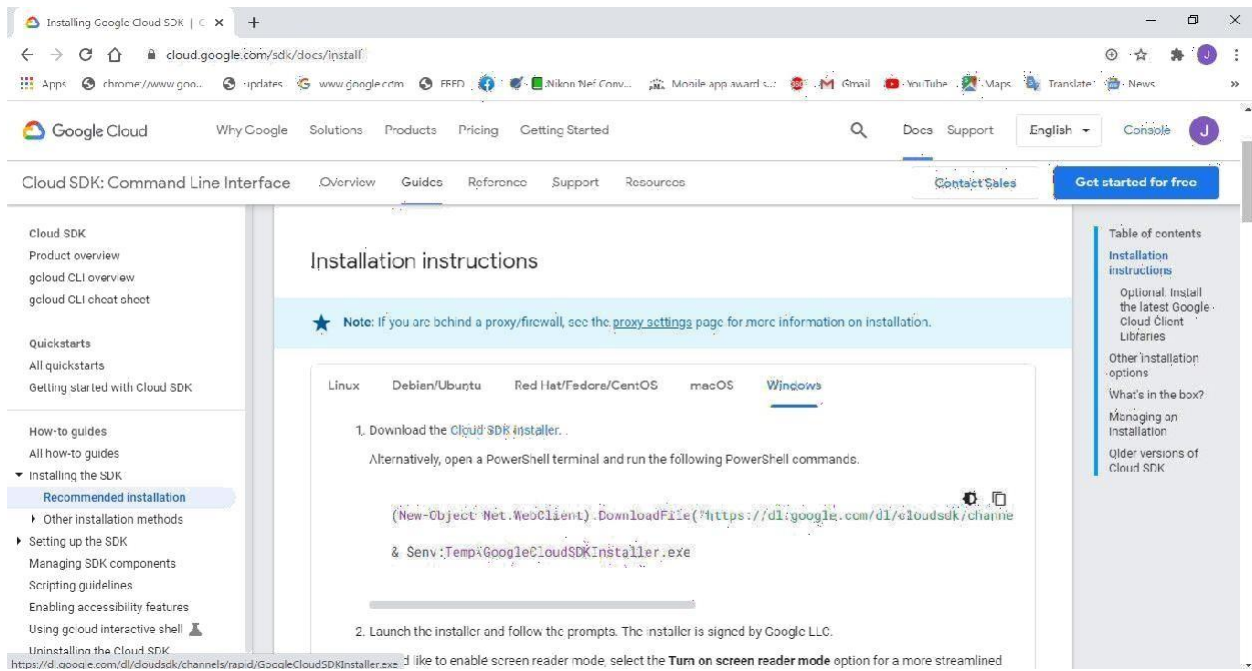**Procedure:**

Step 1: Open the following link - https://cloud.google.com/appengine/downloads and clickpython.

Step 2: Select setting up your environment development and click on install the and initializethe cloud sdk.
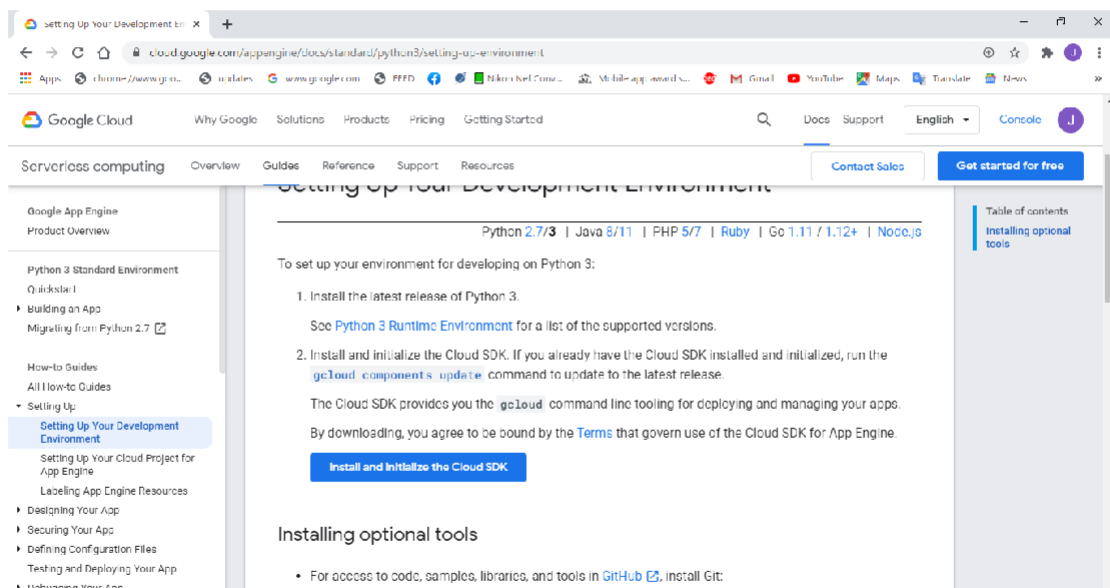
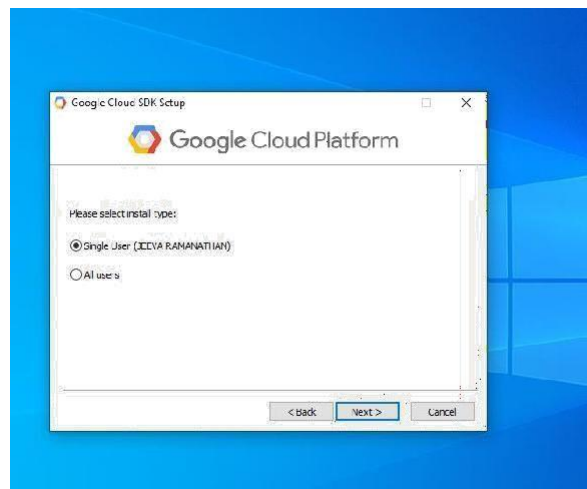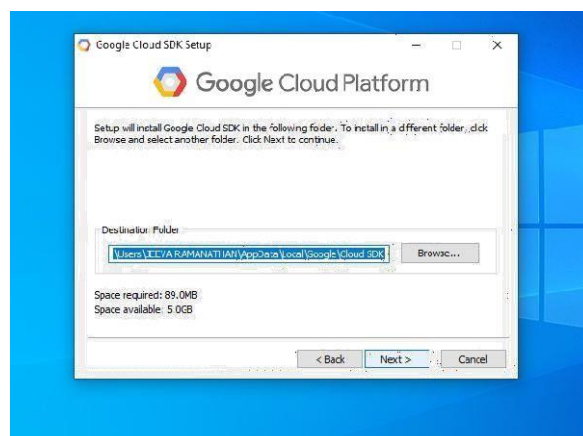Step 3: Download the sdk installer and install it.
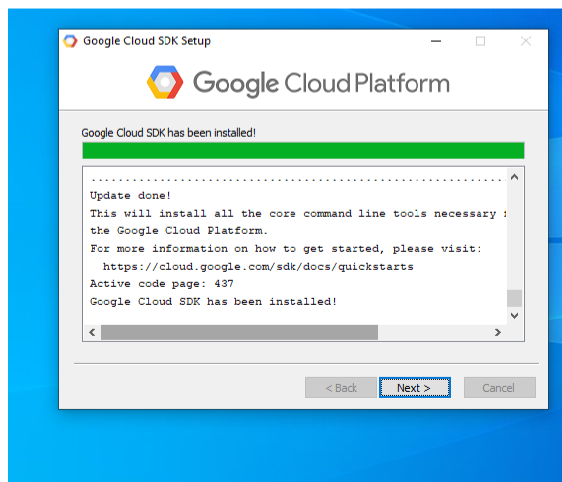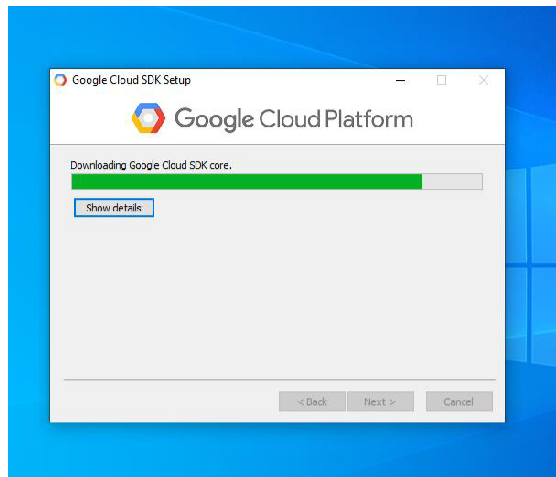

Step 4: Click Next.

Step 5: Click I Agree.
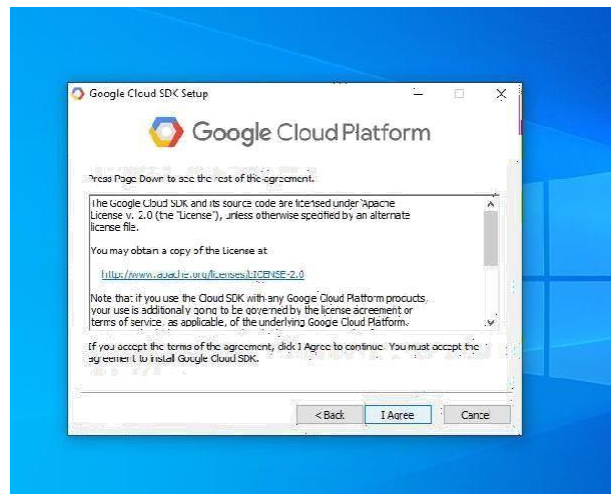
Step 6: Select single user and click Next.

Step 7: Select the destination location and click Next.

Step 8: Downloading all the requirements and installing

Step 9: Click Finish.

Step 10: Once successfully installed cmd line in login with your google account.

Result:

Thus google app engine is installed successfully in the system.

EX.No:5 Install Hadoop single mode cluster and run simple applications

Aim:

To install hadoop single mode cluster and run a simple word count application.
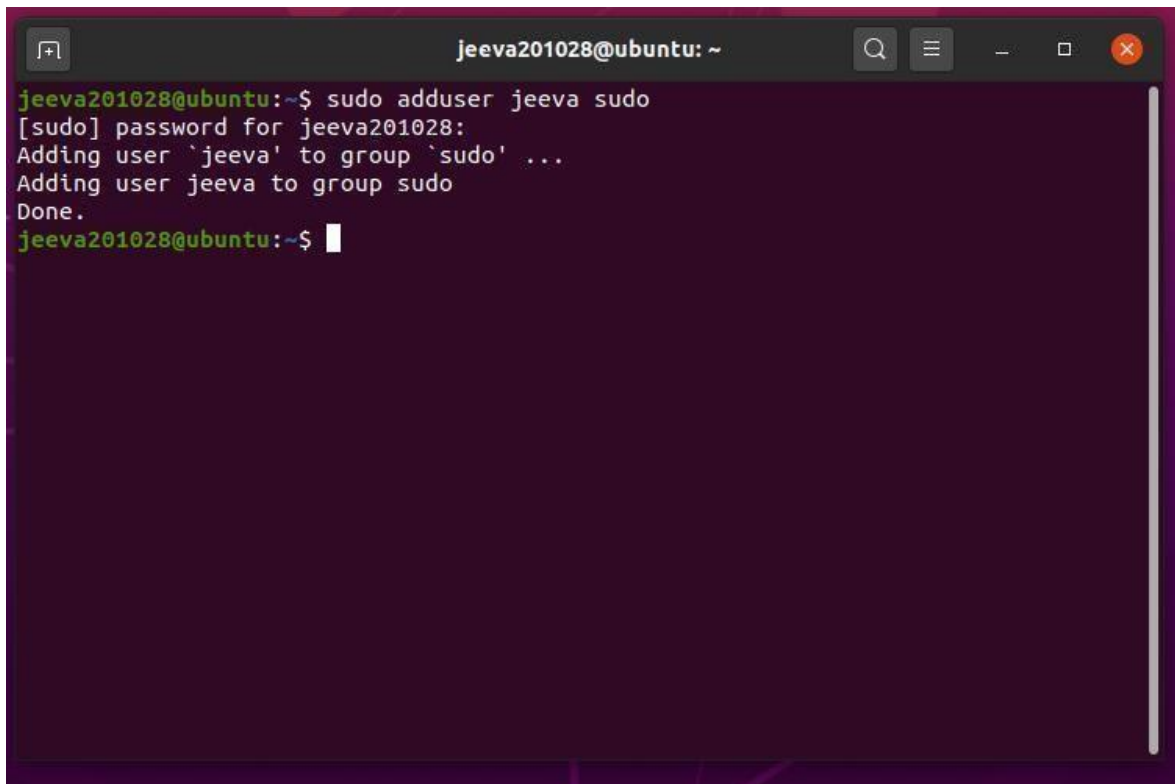
Procedure:

Update the packages

Installing java

Assigning a dedicated user on hadoop to perform operations
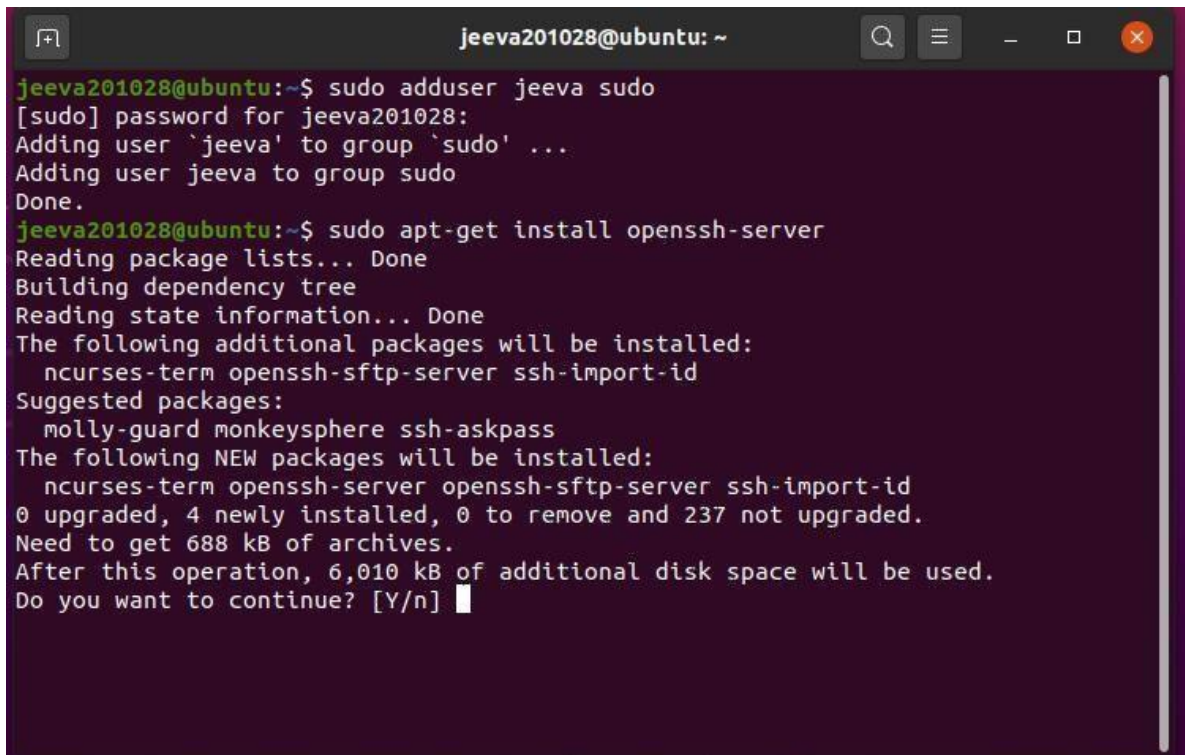


```
OpenJDK Runtime Environment (build 11.0.9+11-Ubuntu-0ubuntu1.20.04)
OpenJDK 64-Bit Server VM (build 11.0.9+11-Ubuntu-0ubuntu1.20.04, mixed mode, sha
ring)
jeeva201028@ubuntu:~$ sudo addgroup hadoop
[sudo] password for jeeva201028:
Adding group `hadoop' (GID 1001) ...
Done.
jeeva201028@ubuntu:~$ sudo adduser --ingroup hadoop jeeva
Adding user `jeeva' ...
Adding new user `jeeva' (1001) with group `hadoop' ...
Creating home directory `/home/jeeva' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for jeeva
Enter the new value, or press ENTER for the default
        Full Name []: Jeeva
        Room Number []: 1
        Work Phone []: 98765
        Home Phone []: 43210
        Other []:
Is the information correct? [Y/n] Y
jeeva201028@ubuntu:~$
```
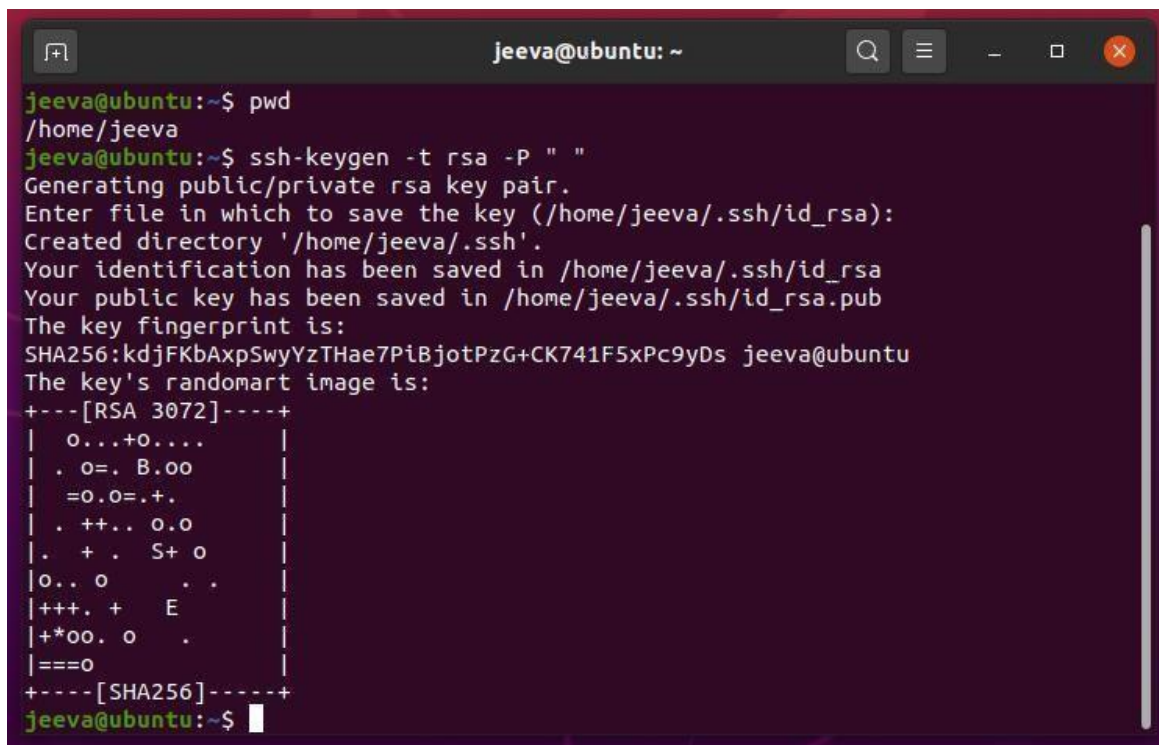
Adding user to sudo list


```
jeeva201028@ubuntu:~$ sudo adduser jeeva sudo
[sudo] password for jeeva201028:
Adding user `jeeva' to group `sudo' ...
Adding user jeeva to group sudo
Done.
jeeva201028@ubuntu:~$
```

Next install a package ssh(secured shell login)


Next step is key generation and add a key to the file

To check whether ssh is installed properly by logging in and after that exit from it


```
jeeva201028@ubuntu:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:3wO8Zvw2Q8dtjtAaSlLWahjenZ7zywgGfYjr0Im8eYM.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
jeeva201028@localhost's password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.4.0-52-generic x86_64)

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


237 updates can be installed immediately.
100 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.

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.

jeeva201028@ubuntu:~$ exit
logout
Connection to localhost closed.
```
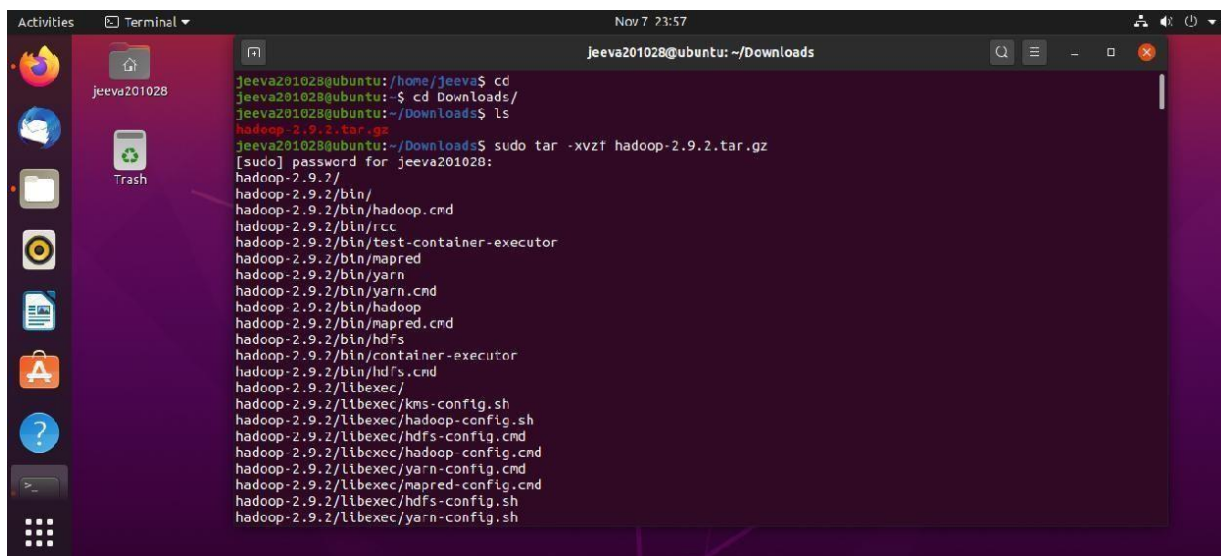
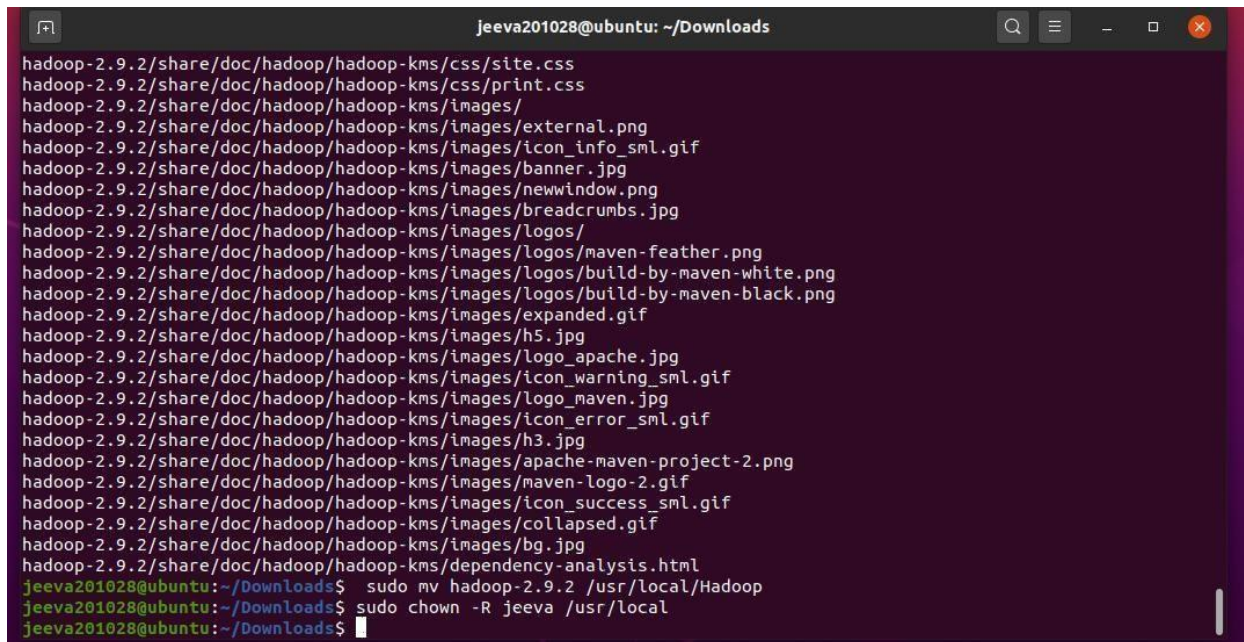Download Hadoop using this link : https://downloads.apache.org/hadoop/common/
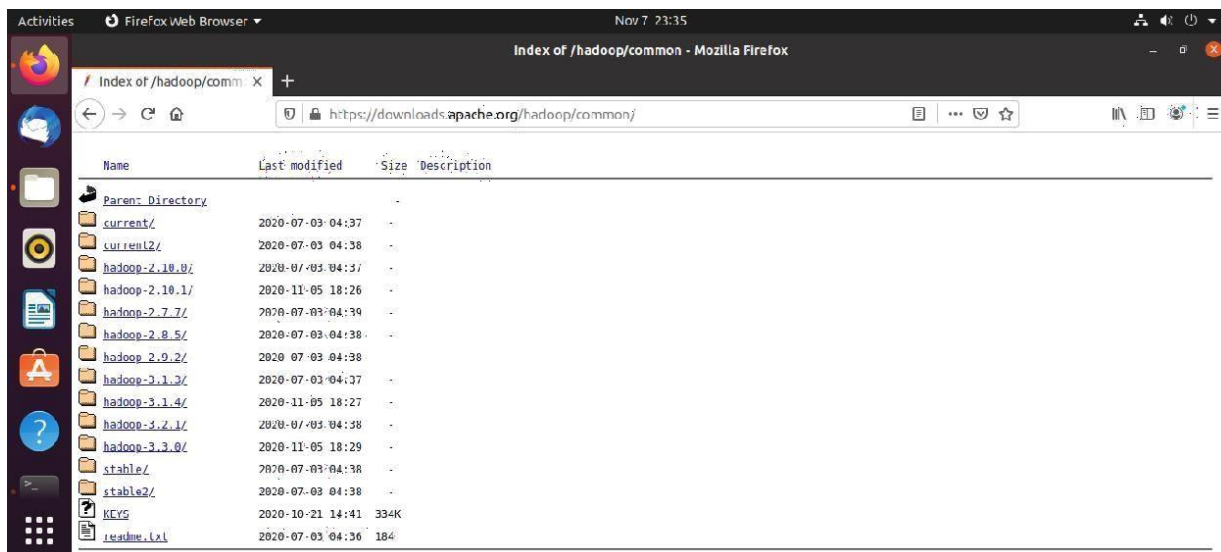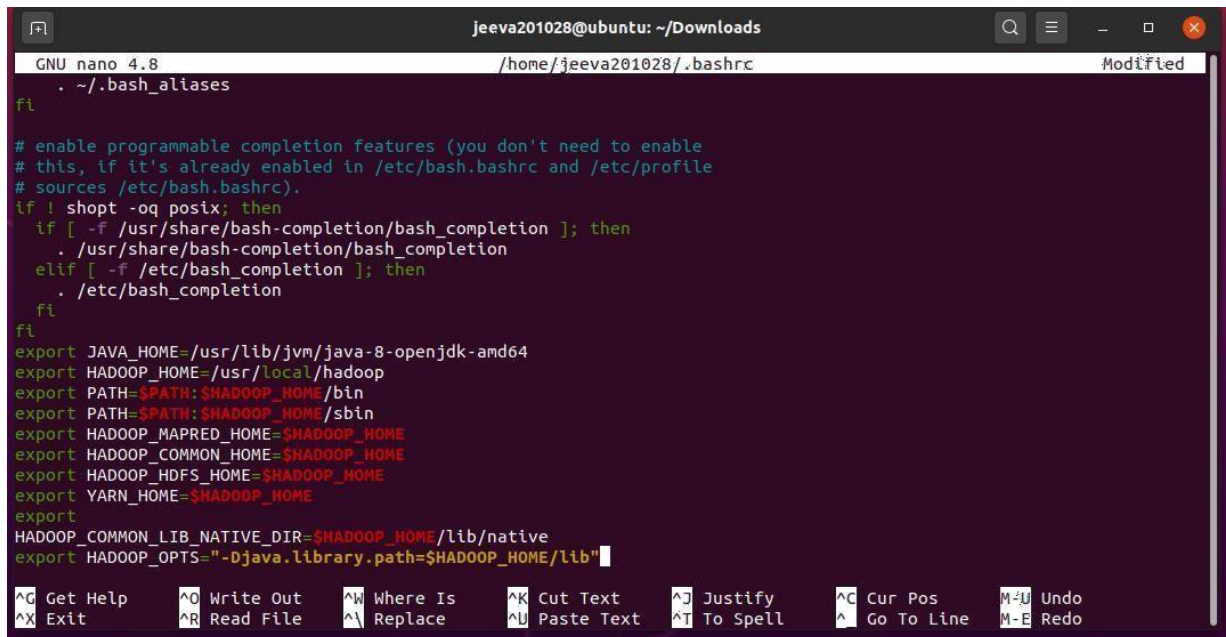
Download the hadoop-2.9.2.tar.gz file
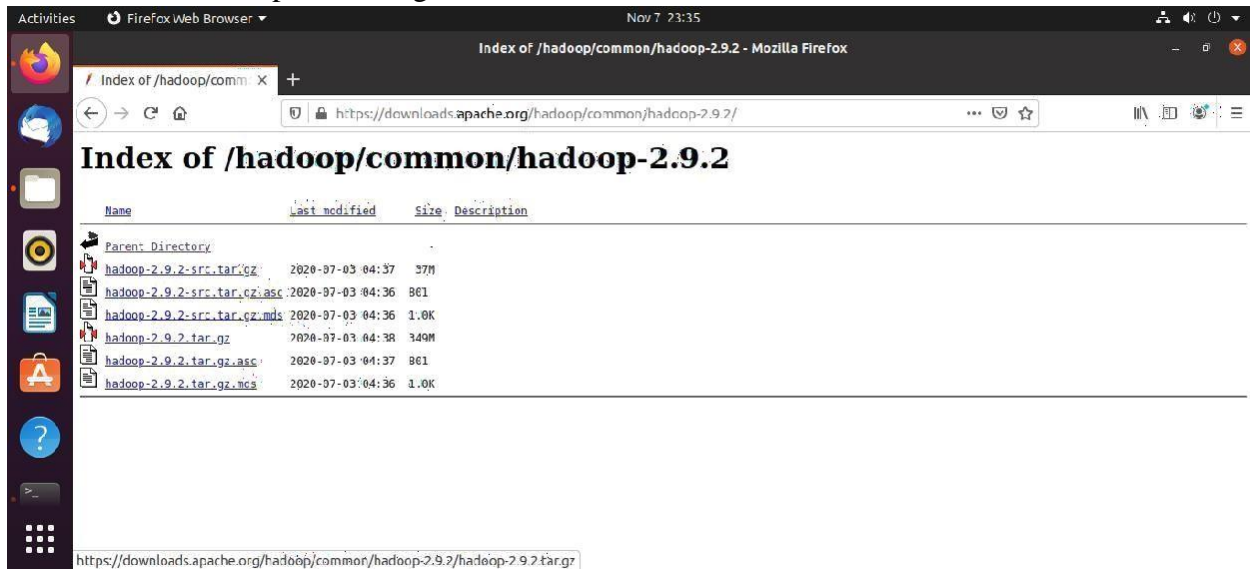
Now extract the tar file

Move the file to local and Change the ownership of hadoop folder


```
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/css/site.css
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/css/print.css
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/external.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/icon_info_sml.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/banner.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/newwindow.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/breadcrumbs.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logos/
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logos/maven-feather.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logos/build-by-maven-white.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logos/build-by-maven-black.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/expanded.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/h5.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logo_apache.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/icon_warning_sml.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/logo_maven.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/icon_error_sml.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/h3.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/apache-maven-project-2.png
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/maven-logo-2.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/icon_success_sml.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/collapsed.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/bg.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/dependency-analysis.html
jeeva201028@ubuntu:~/Downloads$  sudo mv hadoop-2.9.2 /usr/local/Hadoop
jeeva201028@ubuntu:~/Downloads$ sudo chown -R jeeva /usr/local
jeeva201028@ubuntu:~/Downloads$
```

In .bashrc file add the following and make it at source


```
  GNU nano 4.8                        /home/jeeva201028/.bashrc                        Modified
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi
export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
export HADOOP_HOME=/usr/local/hadoop
export PATH=$PATH:$HADOOP_HOME/bin
export PATH=$PATH:$HADOOP_HOME/sbin
export HADOOP_MAPRED_HOME=$HADOOP_HOME
export HADOOP_COMMON_HOME=$HADOOP_HOME
export HADOOP_HDFS_HOME=$HADOOP_HOME
export YARN_HOME=$HADOOP_HOME
export
HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_HOME/lib/native
export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos     M-U Undo
^X Exit        ^R Read File   ^\ Replace     ^U Paste Text  ^T To Spell    ^  Go To Line  M-E Redo
```

```
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/collapsed.gif
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/images/bg.jpg
hadoop-2.9.2/share/doc/hadoop/hadoop-kms/dependency-analysis.html
jeeva201028@ubuntu:~/Downloads$  sudo mv hadoop-2.9.2 /usr/local/Hadoop
jeeva201028@ubuntu:~/Downloads$ sudo chown -R jeeva /usr/local
jeeva201028@ubuntu:~/Downloads$ sudo nano ~/.bashrc
jeeva201028@ubuntu:~/Downloads$ source ~/.bashrc
declare -x CLUTTER_IM_MODULE="ibus"
declare -x COLORTERM="truecolor"
declare -x DBUS_SESSION_BUS_ADDRESS="unix:path=/run/user/1000/bus"
declare -x DESKTOP_SESSION="ubuntu"
declare -x DISPLAY=":0"
declare -x GDMSESSION="ubuntu"
declare -x GJS_DEBUG_OUTPUT="stderr"
declare -x GJS_DEBUG_TOPICS="JS ERROR;JS LOG"
declare -x GNOME_DESKTOP_SESSION_ID="this-is-deprecated"
declare -x GNOME_SHELL_SESSION_MODE="ubuntu"
declare -x GNOME_TERMINAL_SCREEN="/org/gnome/Terminal/screen/c98c3178_c4bb_40a4_9647_3c0ea63ea95a"
declare -x GNOME_TERMINAL_SERVICE=":1.128"
declare -x GPG_AGENT_INFO="/run/user/1000/gnupg/S.gpg-agent:0:1"
declare -x GTK_IM_MODULE="ibus"
declare -x GTK_MODULES="gail:atk-bridge"
declare -x HADOOP_COMMON_HOME="/usr/local/hadoop"
declare -x HADOOP_HDFS_HOME="/usr/local/hadoop"
declare -x HADOOP_HOME="/usr/local/hadoop"
declare -x HADOOP_MAPRED_HOME="/usr/local/hadoop"
declare -x HOME="/home/jeeva201028"
declare -x IM_CONFIG_PHASE="1"
```

Edit the hadoop-env.sh file as following

Edit the core-site.xml

Edit the hdfs-site.xml

Edit the yarn-site.xml

Edit the mapred-site.xml by remaning the mapred-site.xml.template

```
GNU nano 4.8                    mapred-site.xml                    Modified
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limitations under the License. See accompanying LICENSE file.
-->


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

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

^G Get Help    ^O Write Out  ^W Where Is   ^K Cut Text   ^J Justify    ^C Cur Pos
^X Exit        ^R Read File  ^\ Replace    ^U Paste Text ^T To Spell   ^  Go To Line
```
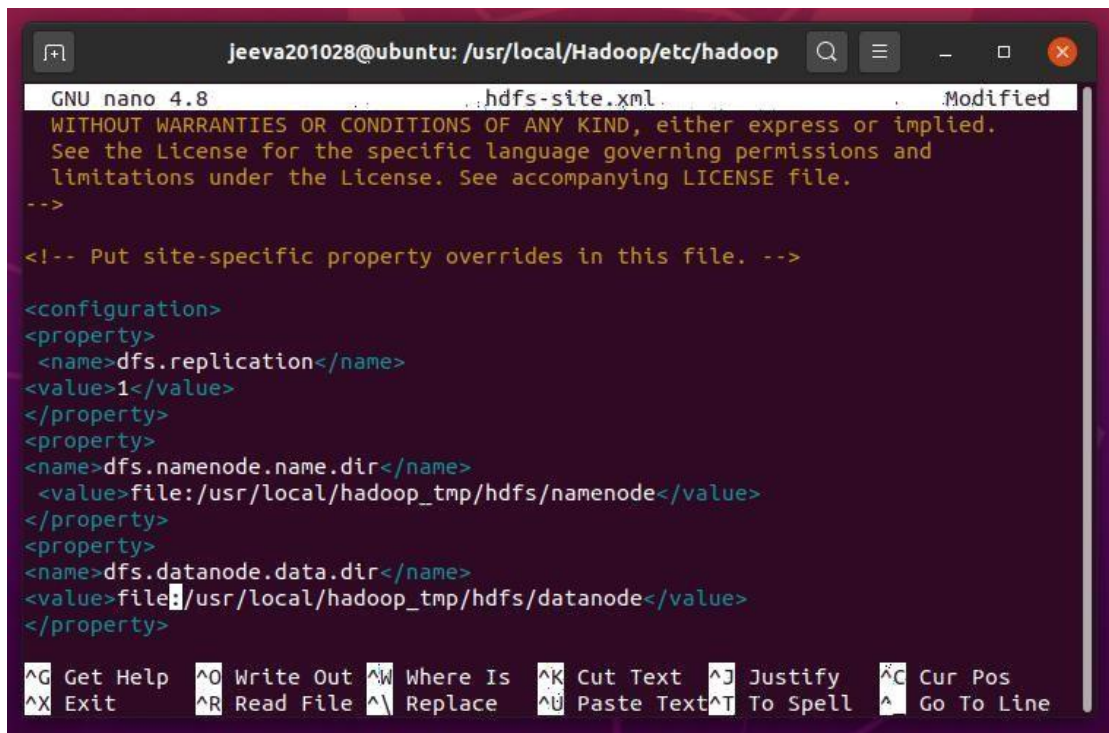
Create the following directory


```
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$ sudo nano  mapred-site.xml
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$ sudo cp mapred-site.xml.templat
e mapred-site.xml
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$ sudo nano  mapred-site.xml
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$ cd
jeeva201028@ubuntu:~$ cd Desktop/
jeeva201028@ubuntu:~/Desktop$  sudo mkdir -p /usr/local/hadoop_tmp
jeeva201028@ubuntu:~/Desktop$ sudo mkdir -p /usr/local/hadoop_tmp/hdfs/namenode
jeeva201028@ubuntu:~/Desktop$ sudo mkdir -p /usr/local/hadoop_tmp/hdfs/datanode
jeeva201028@ubuntu:~/Desktop$ sudo chown -R jeeva /usr/local/hadoop_tmp
jeeva201028@ubuntu:~/Desktop$
```

Format hdfs namenode
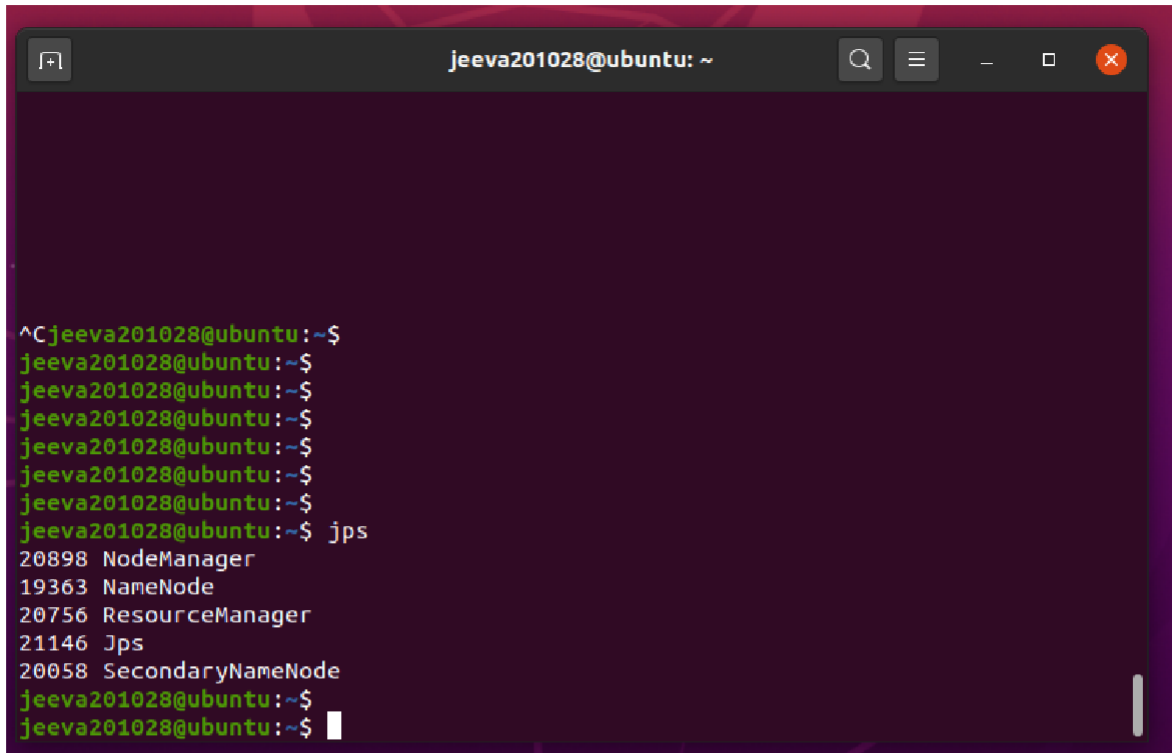
$ start-dfs.sh

$ start-yarn.sh

To check whether hadoop is correctly installed or not: $ jps

To execute word count program:

Create a directory and add a text file in it named "sample.txt"

Input: 'sample.txt" file

Now run bin/hdfs dfs -mkdir /user

Then run bin/hdfs dfs -mkdir /ypm

Run the program //word count prgm will be in the jar file by default which we are using now.

$ bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.9.2.jar wordcount /user/input output

Now run the following command to see the output

$ bin/hdfs dfs -cat output/*

Using gui: In browser open port 50700, http://localhost/50070 (Hadoop must be running)

Hadoop   Overview   Datanodes   Datanode Volume Failures   Snapshot   Startup Progress   Utilities

Browse Directory

/   Go!

Show 25 ∨ entries   Search:

	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
☐	drwx------	Jeeva201028	supergroup	0 B	Nov 07 17:11	0	0 B	tmp	🗑
☐	drwxr-xr-x	Jeeva201028	supergroup	0 B	Nov 07 17:16	0	0 B	user	🗑
☐	drwxr-xr-x	Jeeva201028	supergroup	0 B	Nov 07 17:00	0	0 B	yprs	🗑

Showing 1 to 3 of 3 entries   Previous 1 Next

Hadoop, 2018.

Hadoop   Overview   Datanodes   Datanode Volume Failures   Snapshot   Startup Progress   Utilities

Browse Directory

File information - sample.txt   ×

Download   Head the file (first 32K)   Tail the file (last 32K)

Block information -- Block 0 ∨

Block ID: 1073741825
Block Pool ID: BP-434539900-127.0.1.1-1604743869075
Generation Stamp: 1001
Size: 186
Availability:
  • Jeeva201028

File contents

```
hello
how are you
compass
communication
components
computational
computer
computing
```

Close

/user/input   Go!

Show 25 ∨ entries   Search:

	Permission	Owner	...	Block Size	Name	
☐	-rw-r--r--	kesh		128 MB	sample.txt	🗑

Showing 1 to 1 of 1 entries   Previous 1 Next

Hadoop, 2018.

Hadoop   Overview   Datanodes   Datanode Volume Failures   Snapshot   Startup Progress   Utilities

Browse Directory

/user/jeeva   Go!

Show 25 ∨ entries   Search:

	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
☐	drwxr-xr-x	Jeeva201028	supergroup	0 B	Nov 07 17:16	0	0 B	output	🗑

Showing 1 to 1 of 1 entries   Previous 1 Next

Hadoop, 2018.

After completing stop hadoop $ stop-all.sh

<u>Result:</u>

Thus the installation of hadoop single mode cluster and execution of word count program is done and the output is obtained successfully.

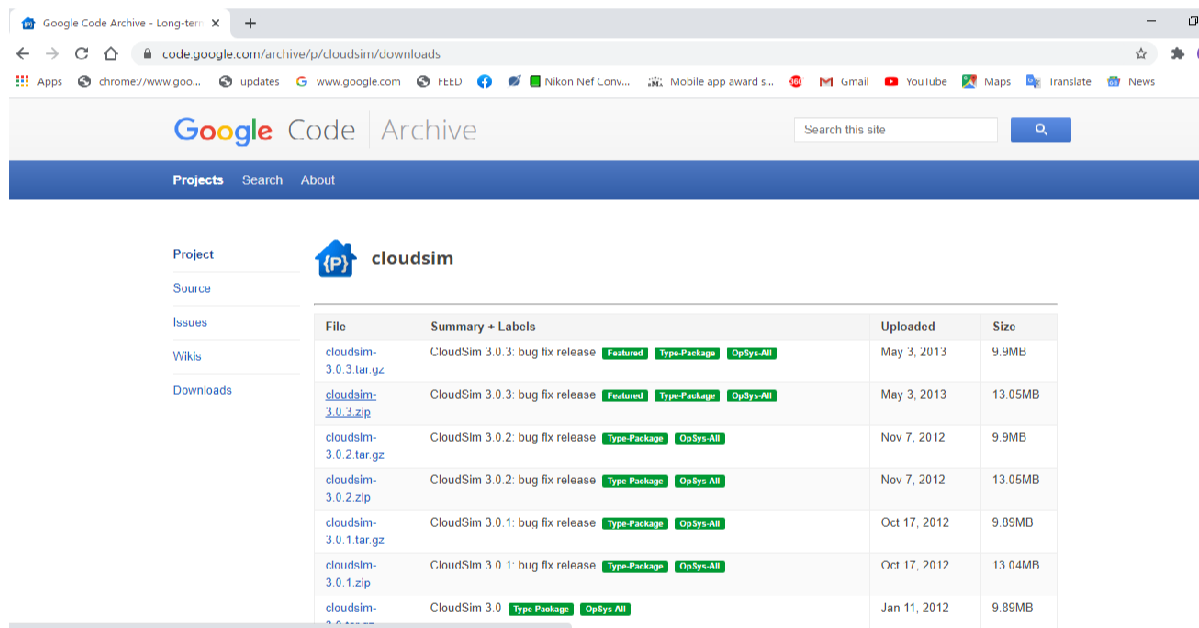| **EX.No:6**	**Simulate a cloud scenario using CloudSim and run a scheduling algorithm**

Aim:

To simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
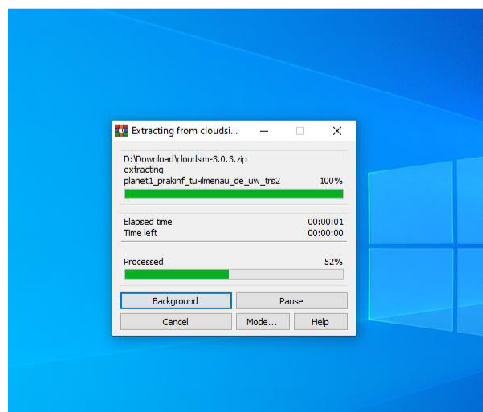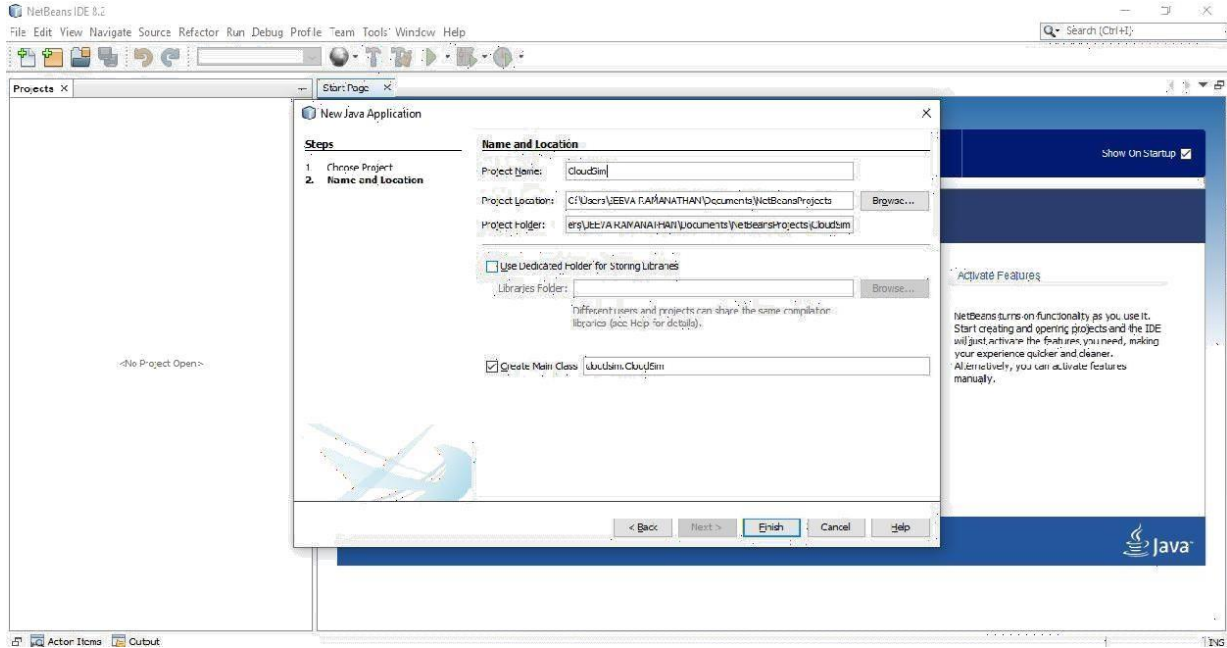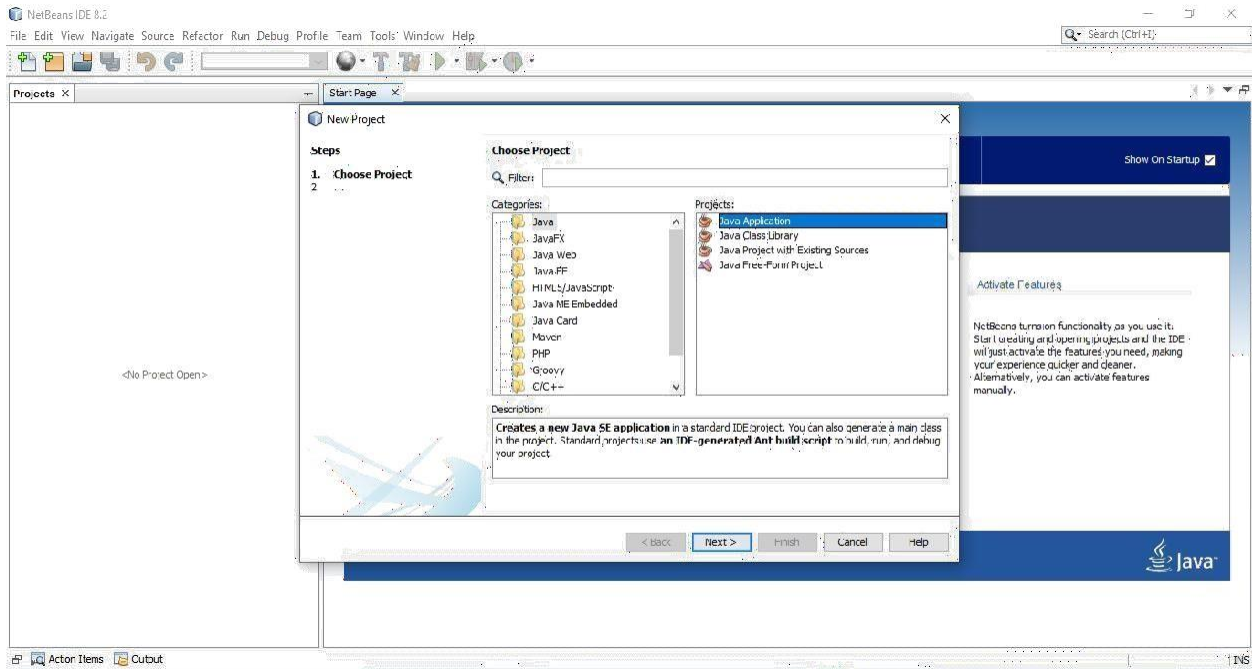
Procedure:

Step 1: Download CloudSim installable files from:
https://code.google.com/p/cloudsim/downloads/list and unzip the download.

Step 2: Open Netbeans and create a new project named "Clousim"

Step 3: Type the code and add the jar file to the libraries. The jar file will be in the extracted cloudsim.

Step 4:Run the application

OUTPUT:

Step 5:Again create a new project and name it as "Cloudsim2"
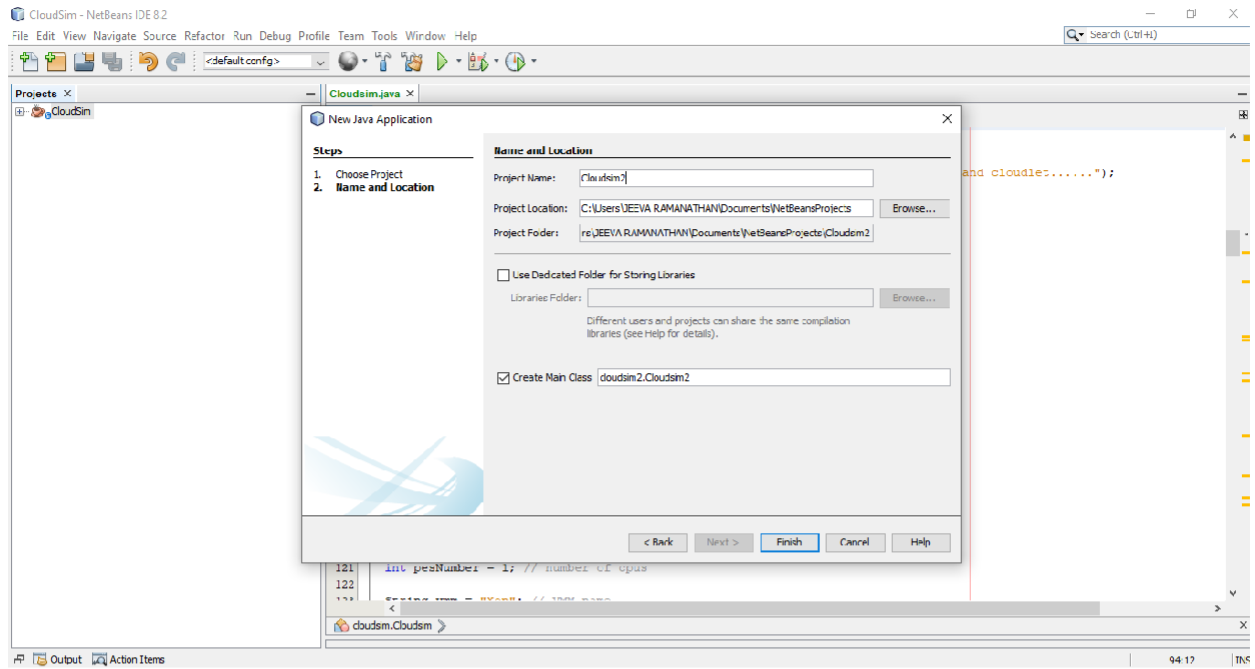
Step 6:Type the code and include the jar file

Step 7:Run the application

OUTPUT:

Result:

Thus the simulation a cloud scenario using CloudSim and run a scheduling algorithmthat is not present in CloudSim is done and the output is obtained successfully.