



ERODE SENGUNTHAR ENGINEERING COLLEGE

(APPROVED BY AICTE, NEW DELHI & PERMANENTLY AFFILIATED TO ANNA UNIVERSITY, CHENNAI
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PERUNDURAI, ERODE - 638 057.

An Autonomous Institution

BONAFIDE CERTIFICATE

Register No.

Certified that this is the Bonafide Record of Work Done

Name of the Student : _____

Branch : _____

Name of the Lab : _____

Faculty Incharge

Head of the Department

Submitted for the End Semester Practical

held on.....

Internal Examiner

External Examiner

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EX.No:1

Install Virtualbox/VMware Workstation with different

Date:

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.

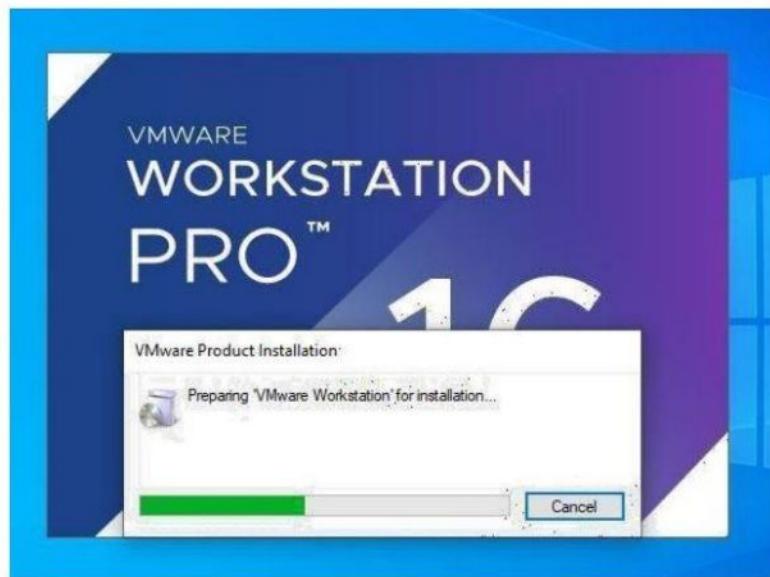
Procedure:

Downloading and installing VMware

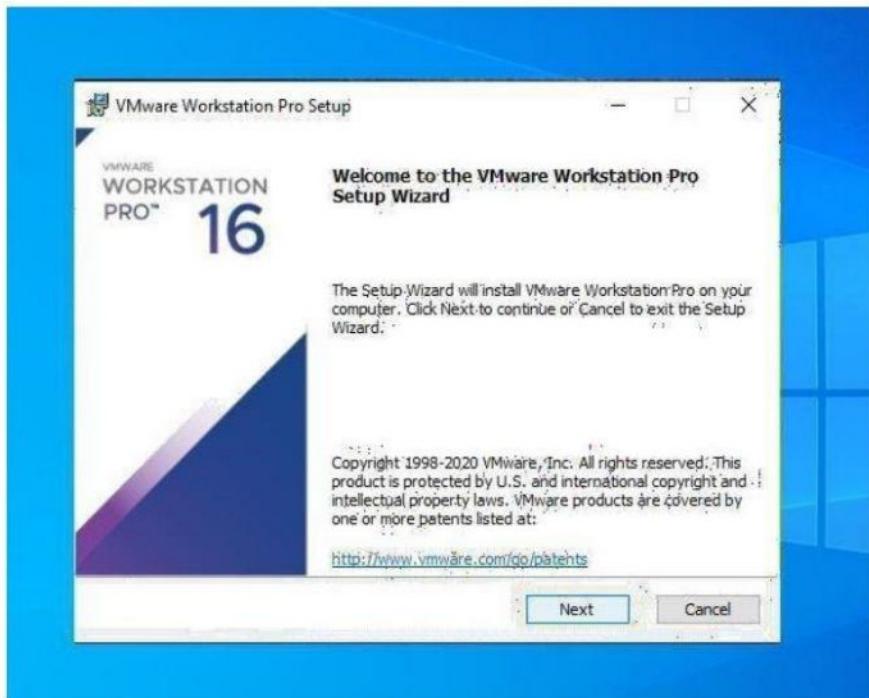
Step 1: Download VMware



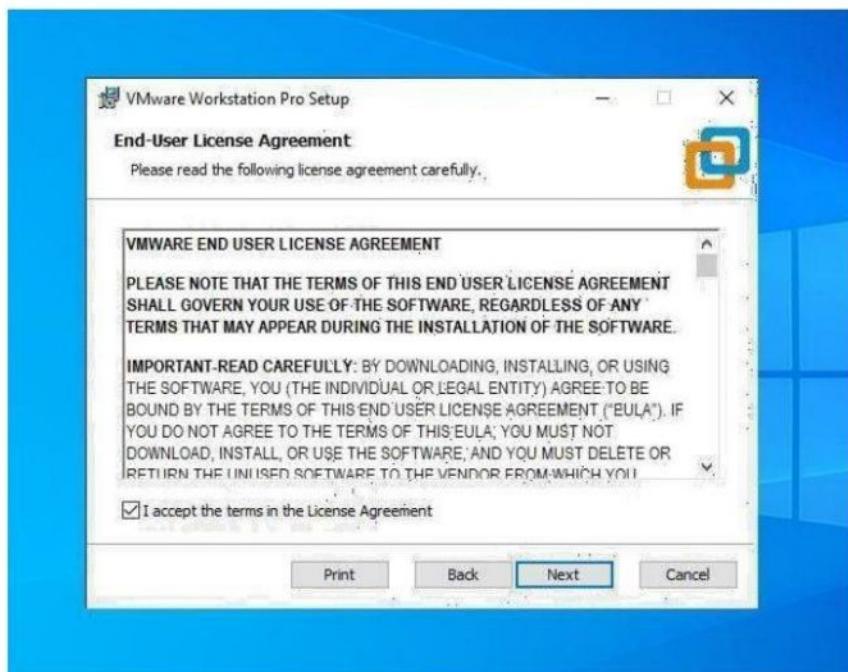
Step 2: Install the VMware Application



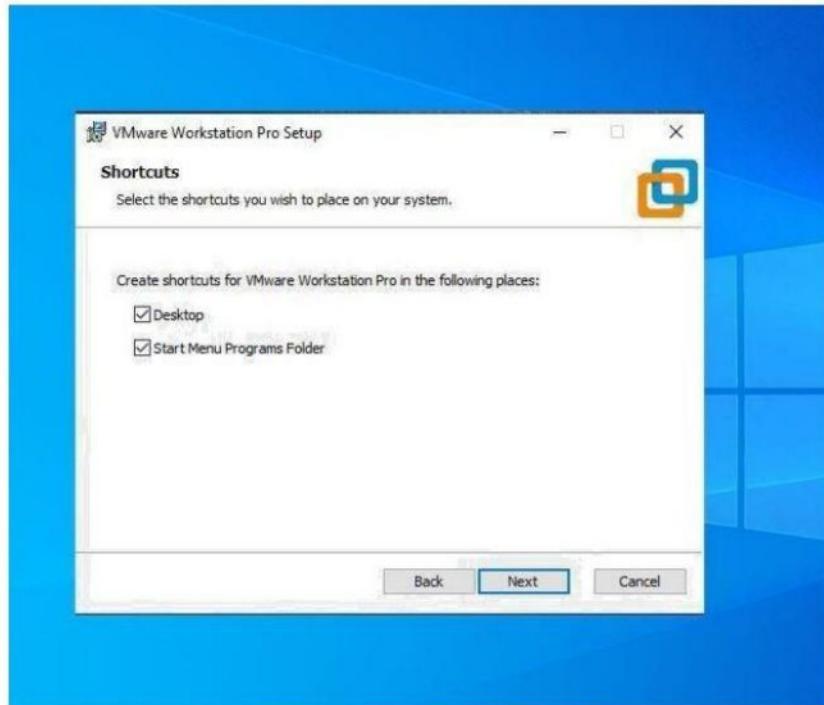
Step 3: Click Next



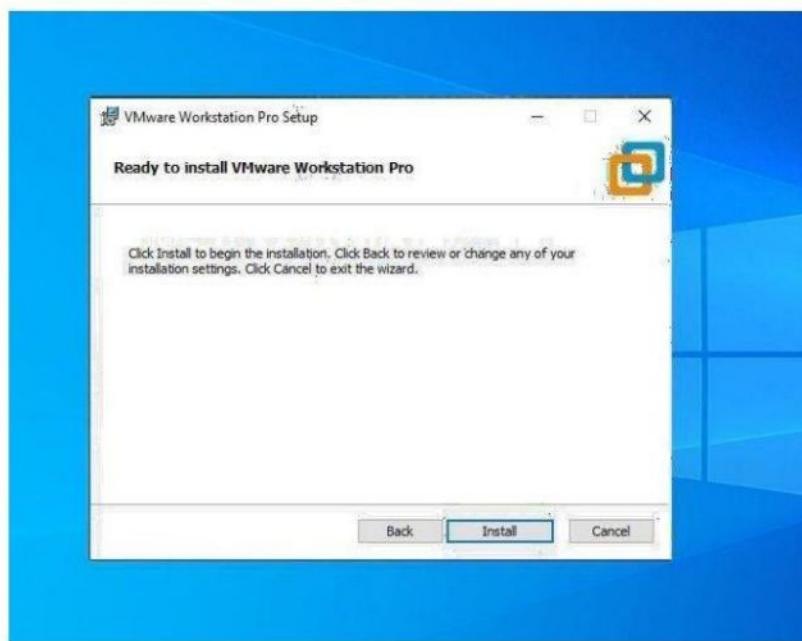
Step 4: Accept and Click Next



Step 7: Click Next



Step 8: Click Install



Step 9: Installing



Step 10: Click Finish



Downloading Ubuntu

Step 11: Download the Ubuntu OS



Ubuntu 20.04.1 LTS

Download the latest LTS version of Ubuntu for desktop PCs and laptops. LTS stands for long-term support → which means five years, until April 2025, of free security and maintenance updates, guaranteed.

[Download](#)

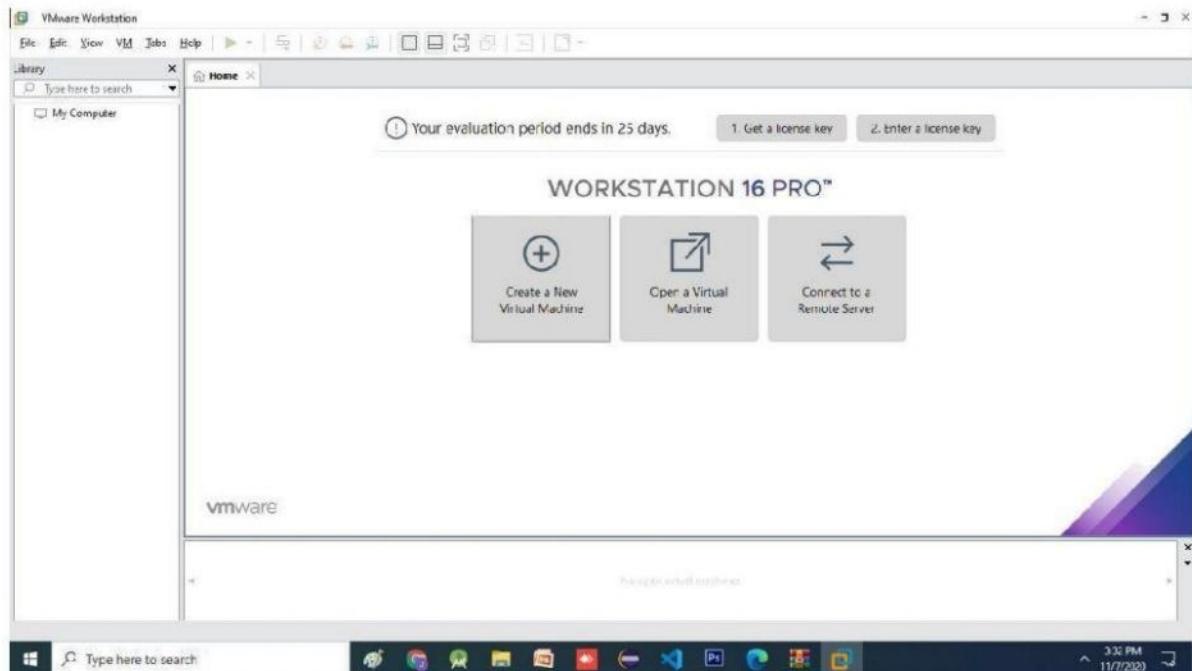
[Ubuntu 20.04 LTS release notes](#)

For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors, and beta releases see our [alternative download](#).

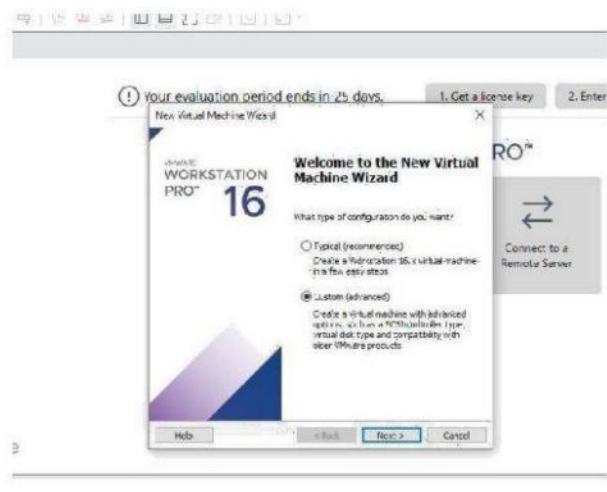
Recommended system requirements:

- ➊ 2 GHz dual core processor or better
- ➋ 4 GB system memory
- ➌ 25 GB of free hard drive space
- ➍ Internet access is helpful
- ➎ Either a DVD drive or a USB port for the installer media

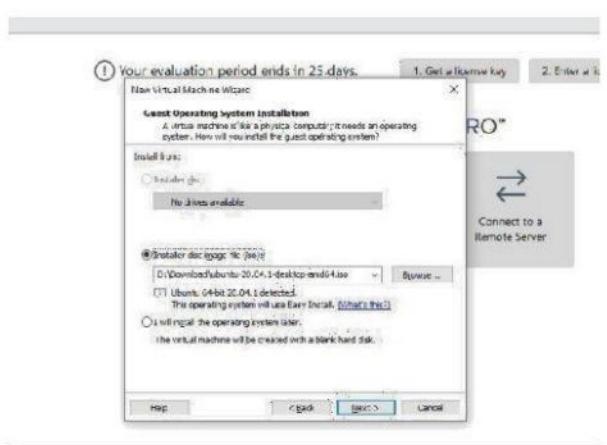
Step 12: Create new virtual machine



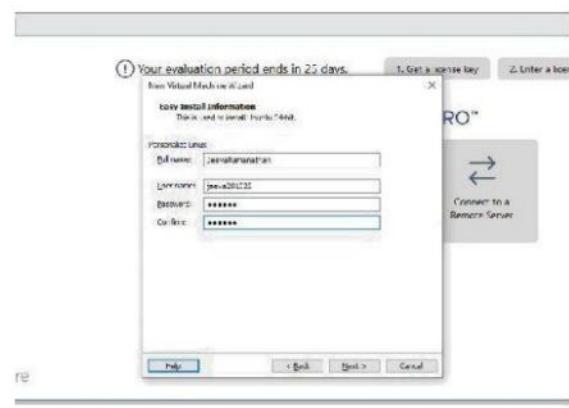
Step 13: Click Next



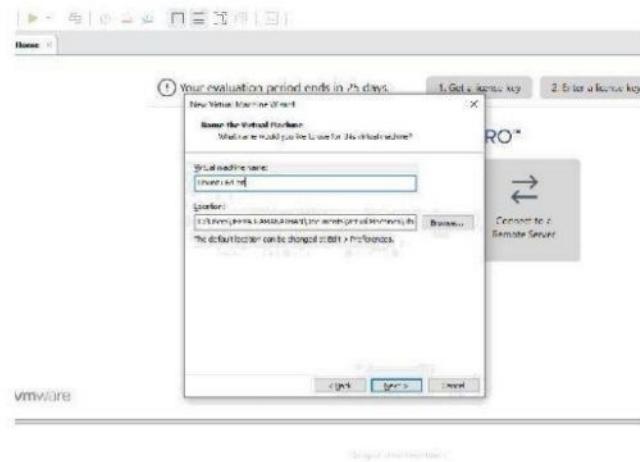
Step 14: Browse the downloaded Ubuntu file and click next



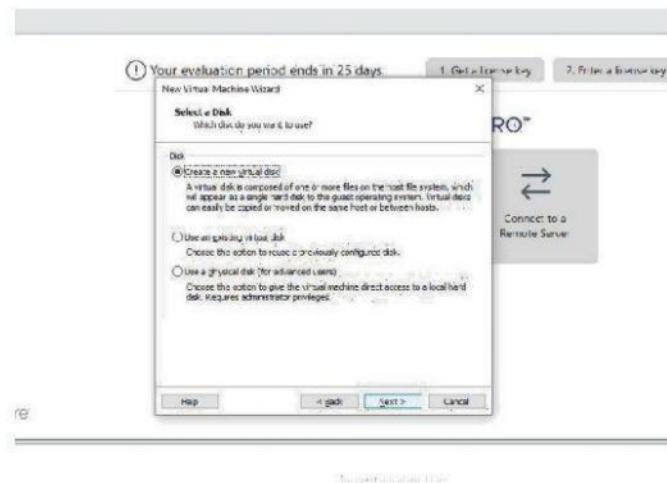
Step 15: Create an username and password and click next



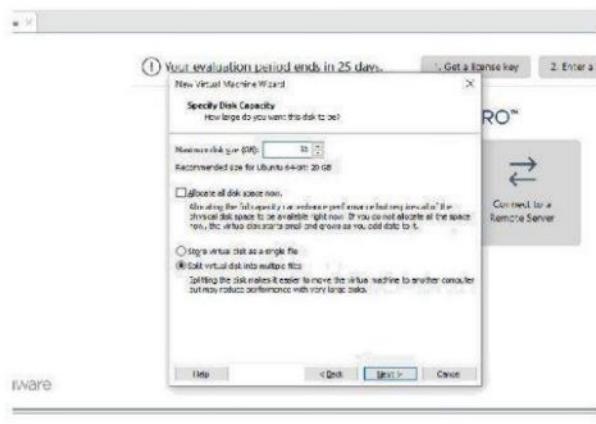
Step 16: Choose the location to use your virtual machine and click next



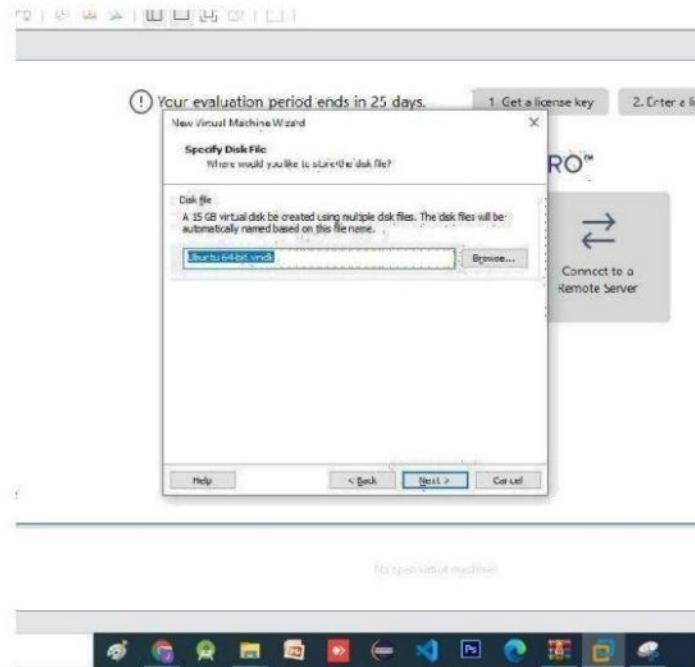
Step 17: Select create a new virtual disk and click next



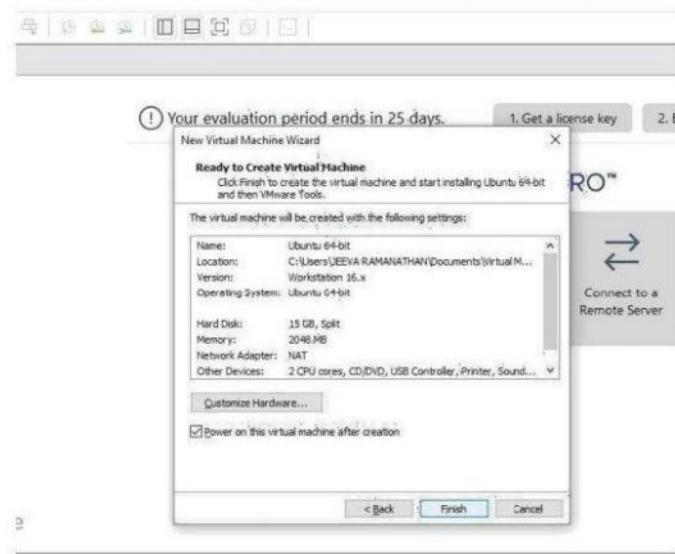
Step 18: Specify the disk size and click next



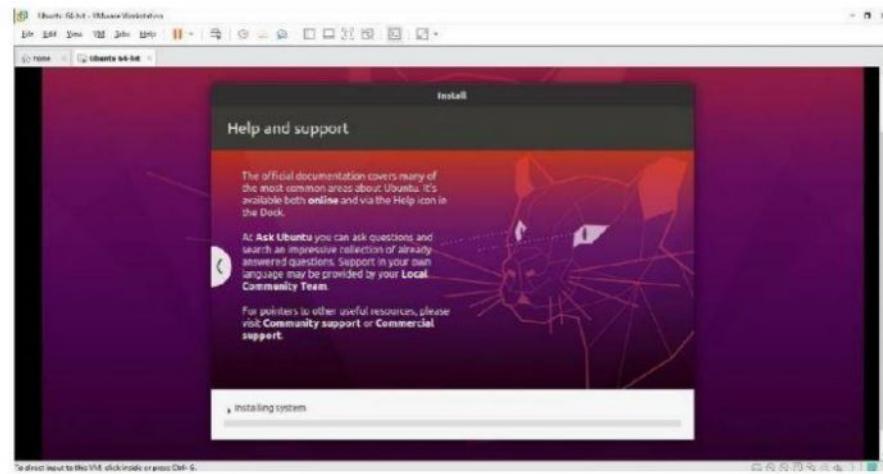
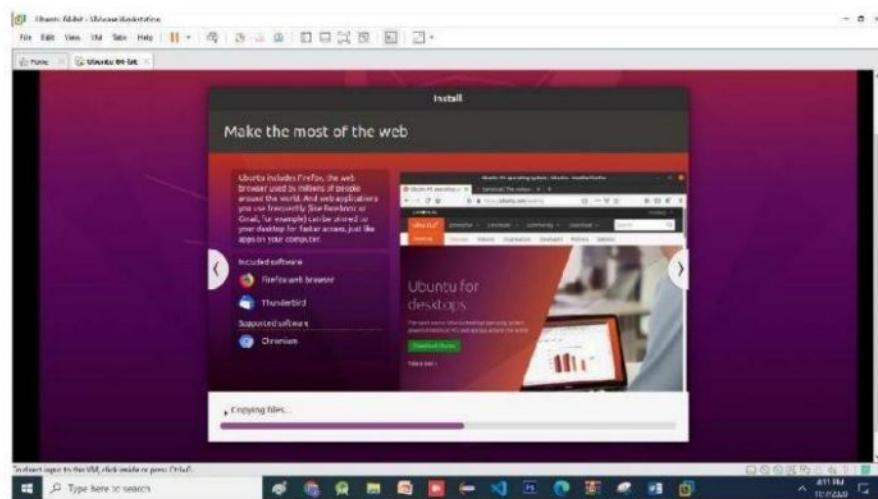
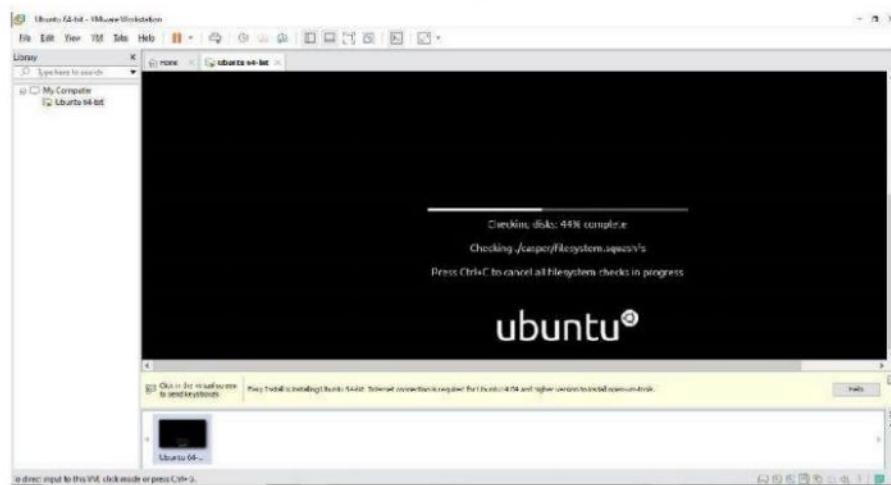
Step 19: Click Next



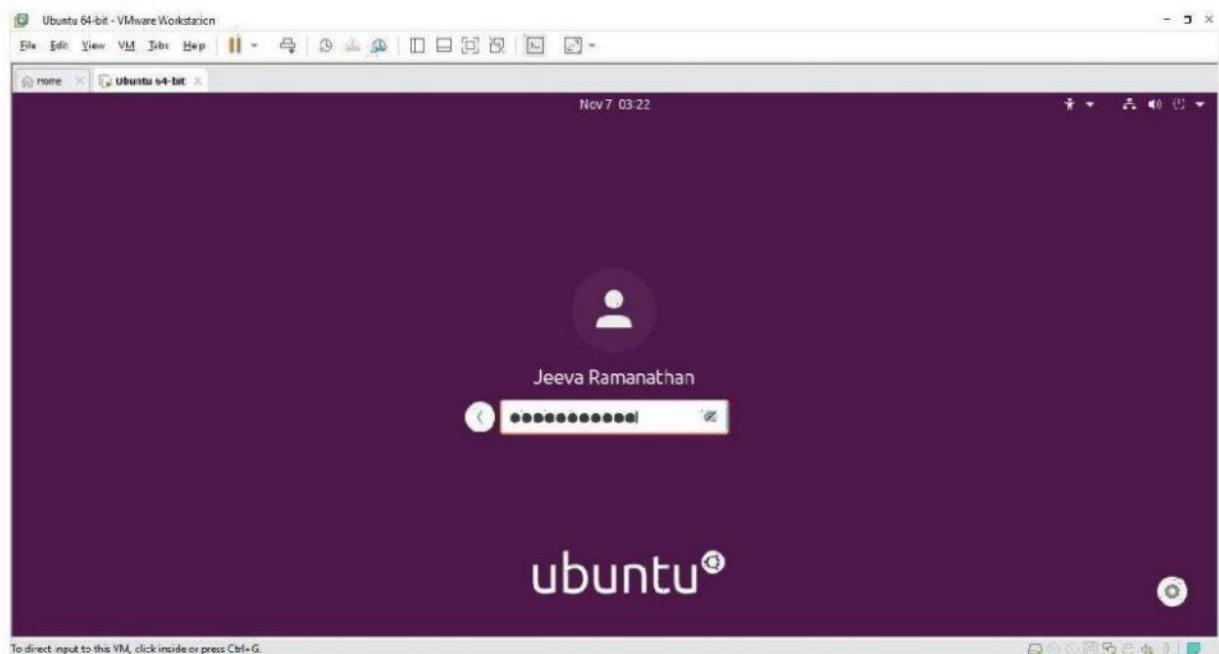
Step 20: Click Finish



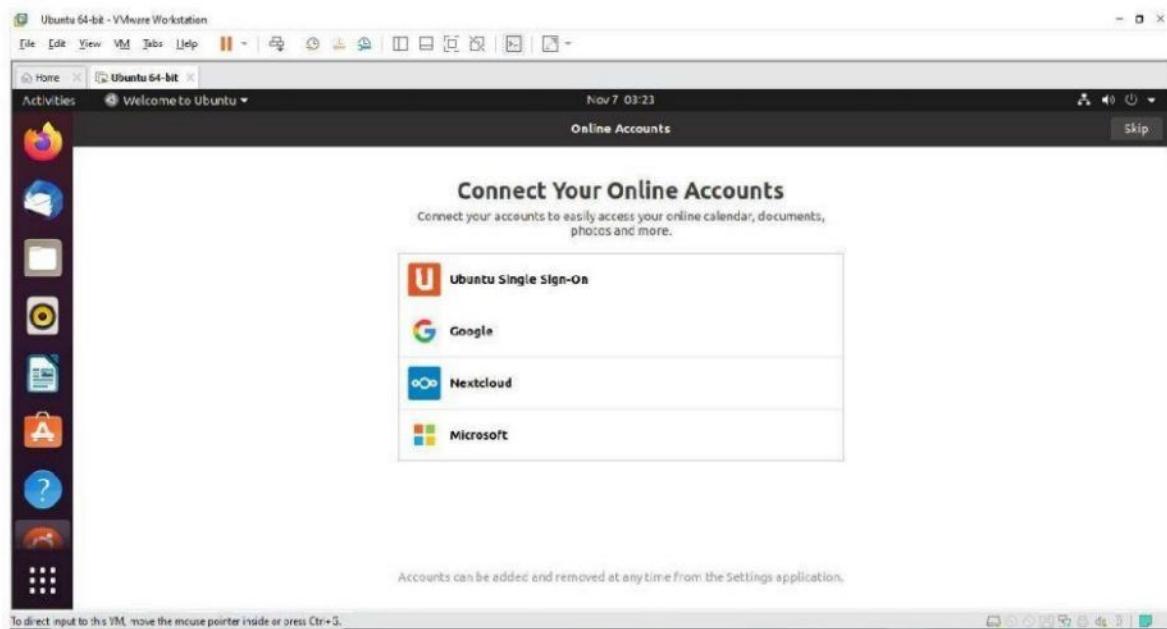
Step 21: Installing Ubuntu on VMware and unzipping files



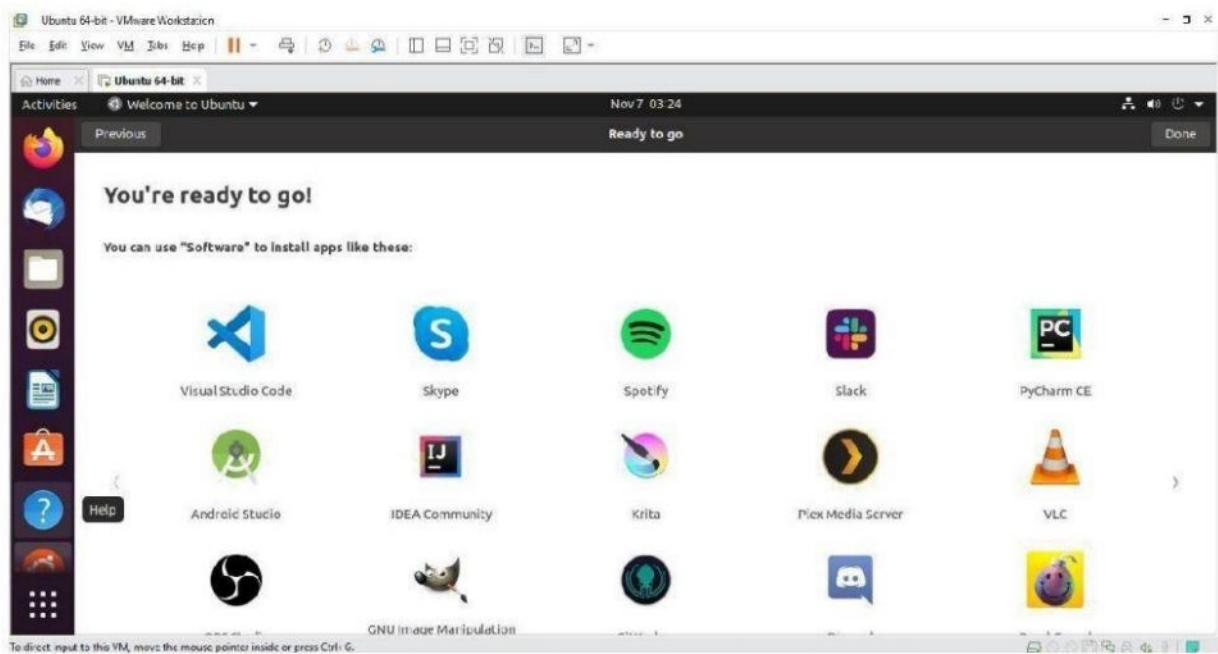
Step 22: Login to Ubuntu



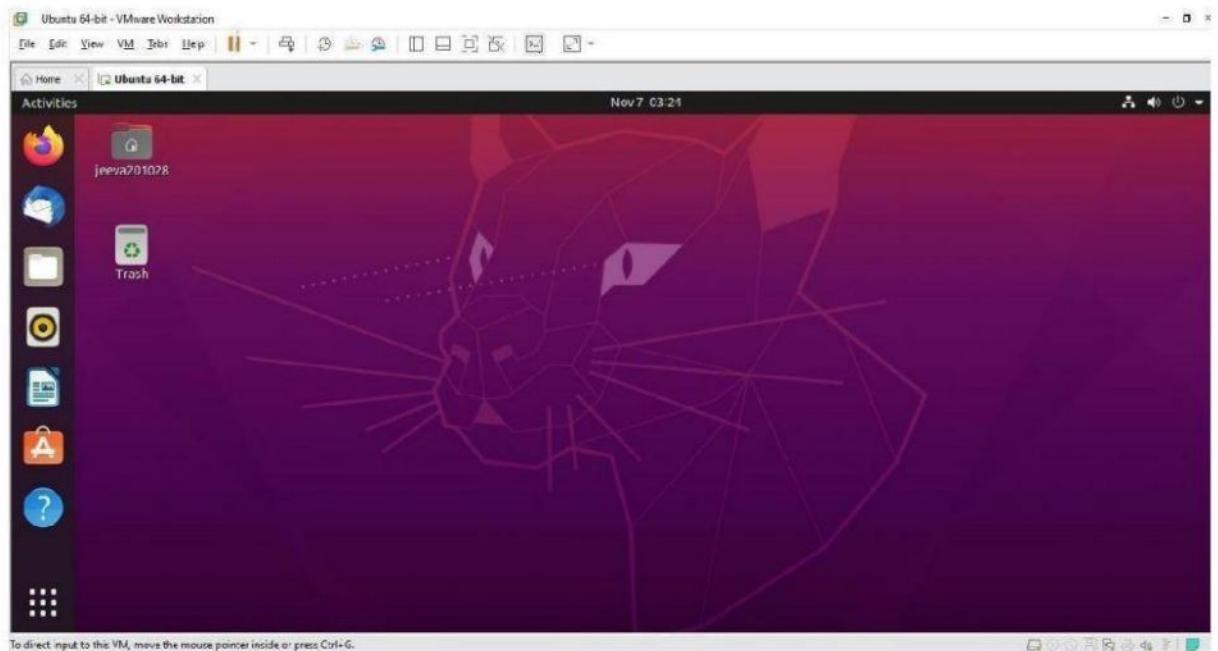
Step 23: Skip everything



Step 24: Click Done



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



DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

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

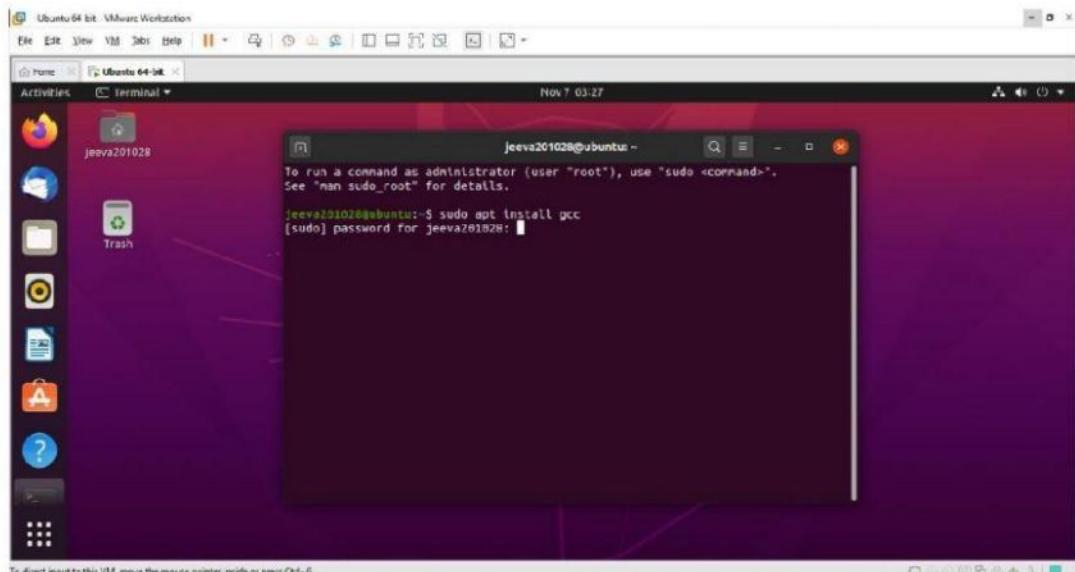
**Install a C compiler in the virtual machine created using
virtual box and execute a simple program**

Aim:

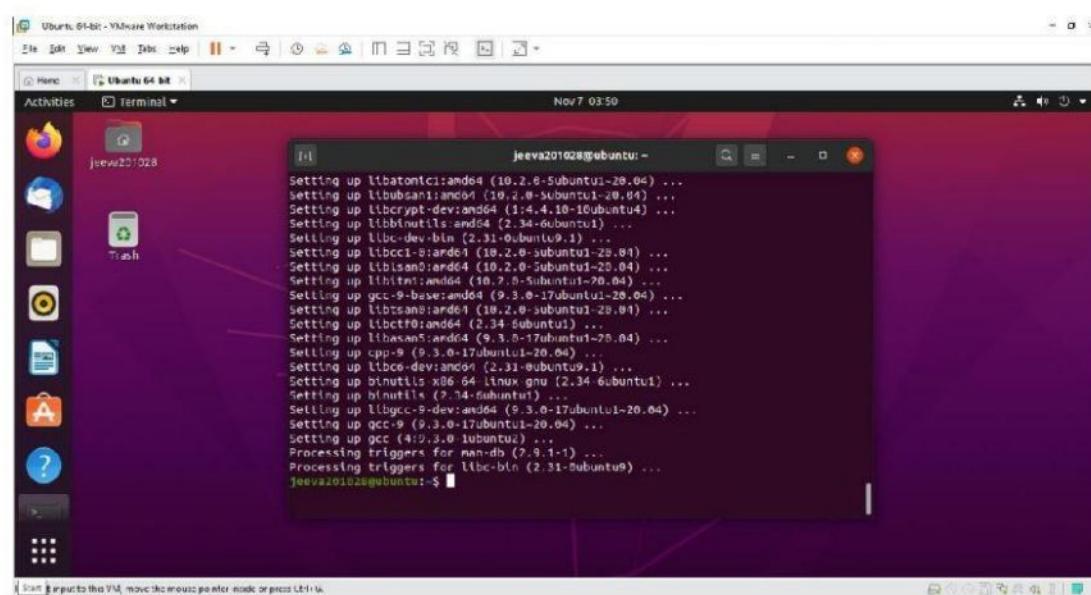
To install a C Compiler in the virtual machine created using virtual box and execute a simple C program.

Procedure:

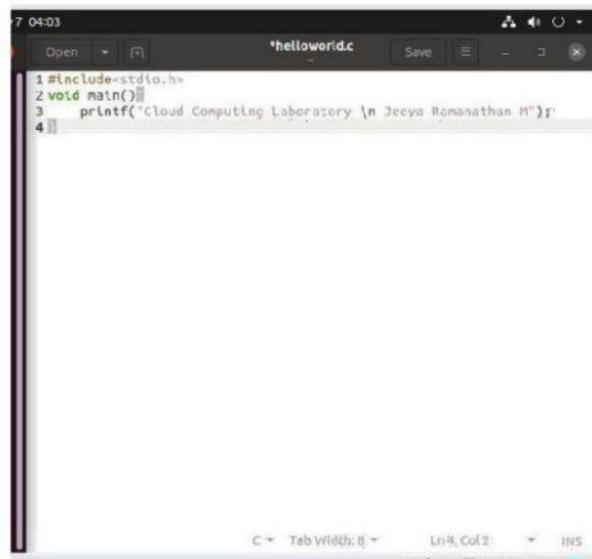
Step 1: Open the terminal on Ubuntu and install C compiler – “sudo apt install gcc”



Step 2: Once the installation finished open the editor

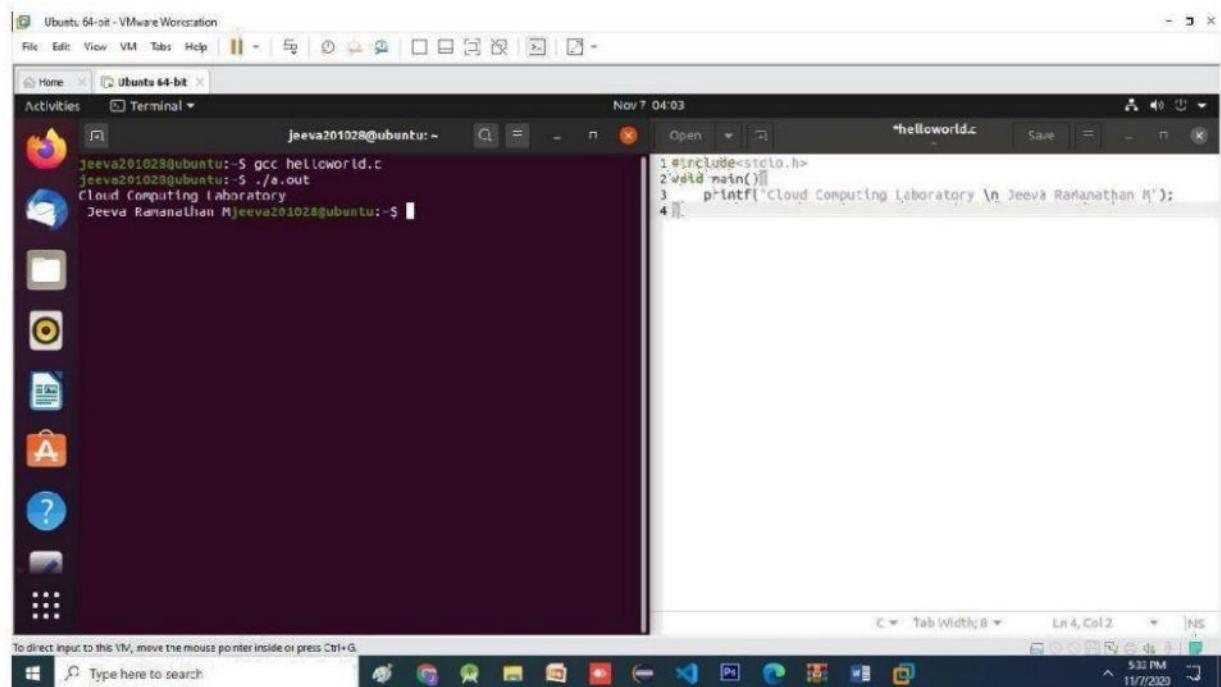


Step 3: Type a simple C program on editor and save it



```
1 #include<stdio.h>
2 void main()
3 { printf("Cloud Computing Laboratory \n Jeeya Ramanathan M");}
```

Step 4: Compile and run the C program



The screenshot shows a desktop environment with a terminal window and a code editor window.

Terminal Window:

```
jeeva201028@ubuntu:~$ gcc helloworld.c
jeeva201028@ubuntu:~$ ./a.out
Cloud Computing Laboratory
Jeeya Ramanathan M
jeeva201028@ubuntu:~$
```

Code Editor Window:

```
1 #include<stdio.h>
2 void main()
3 { printf("Cloud Computing Laboratory \n Jeeya Ramanathan M");}
```

DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

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

EX.No: 3

Installation of a Google App Engine

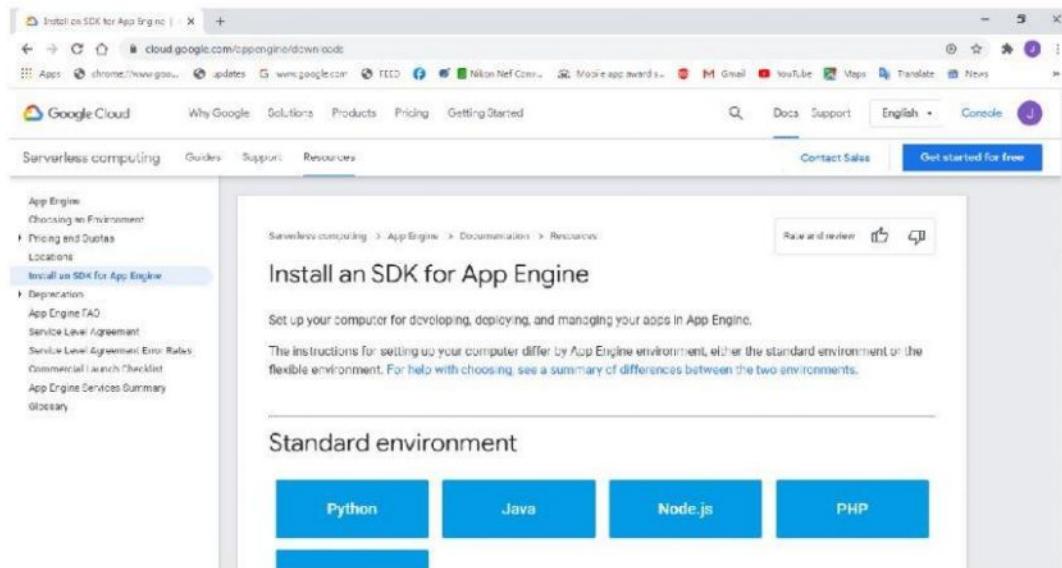
Date:

Aim:

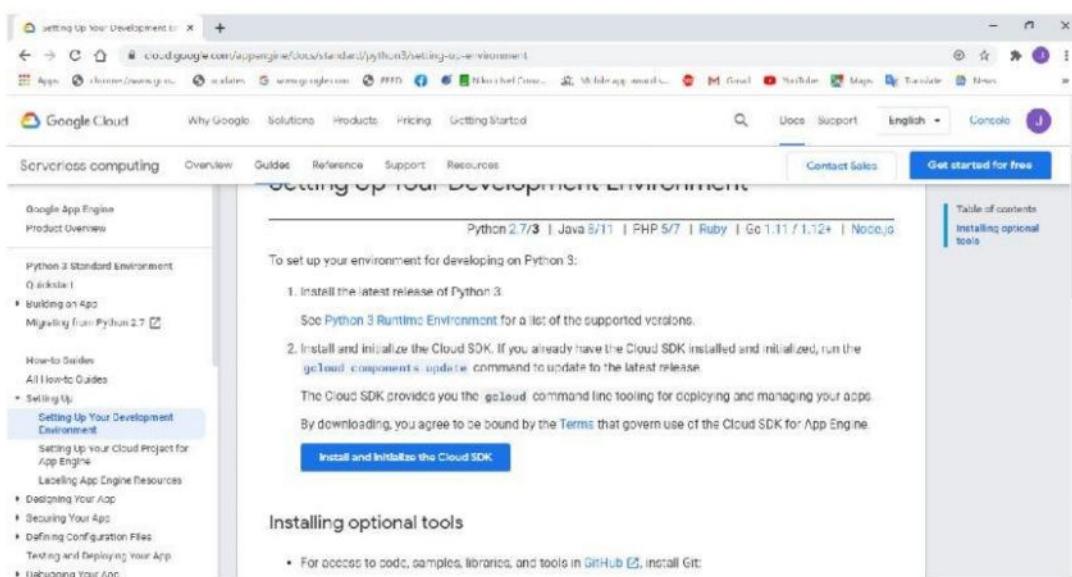
To install the google app engine in the system.

Procedure:

Step 1:Open the following link - <https://cloud.google.com/appengine/downloads> and click python.



Step 2:Select setting up your environment development and click on install the and initialize the cloud sdk.



Step 3: Download the sdk installer and install it.

The screenshot shows a web browser window with the URL cloud.google.com/sdk/docs/install. The page is titled "Cloud SDK: Command Line Interface". On the left, there's a sidebar with links for "Cloud SDK", "Quickstarts", "How-to guides", and "Recommended installation". The "Recommended installation" section is expanded, showing "Setting up the SDK", "Managing SDK components", "Scripting guidelines", "Enabling accessibility features", and "Using gcloud interactive shell". The main content area has a title "Installation instructions" and a note about proxy settings. Below it, the "Windows" tab is selected, showing two steps: 1. Download the Cloud SDK installer (PowerShell command: `New-Object Net.WebClient).DownloadFile('https://dl.google.com/dl/cloudsdk/channels/rapid/GcloudCloudSDKInstaller.exe')`) and 2. Launch the installer and follow the prompts. A sidebar on the right contains links for "Table of contents", "Installation instructions", "Optional install the latest Google Cloud Client Libraries", "Other installation options", "What's in the box?", "Managing an installation", and "Older versions of Cloud SDK".

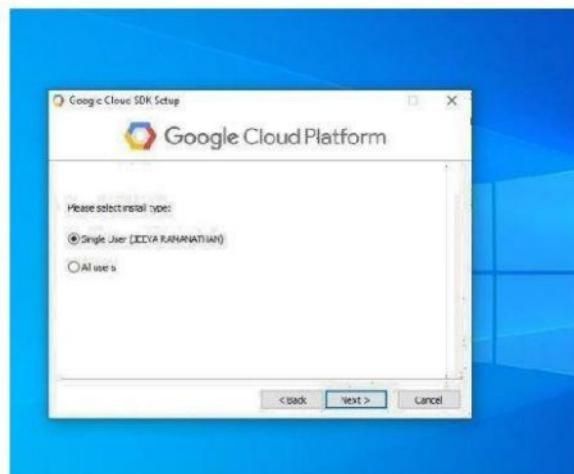
Step 4: Click Next.



Step 5:Click I Agree.



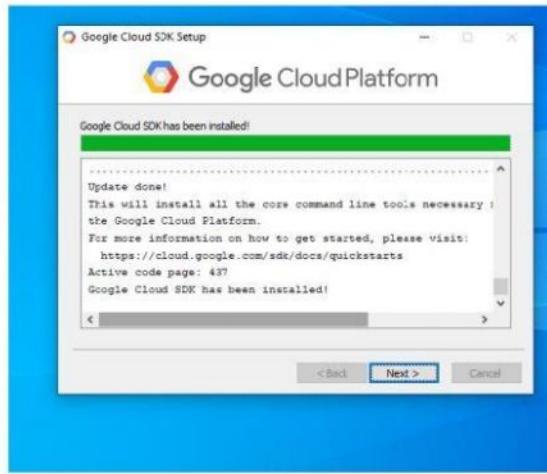
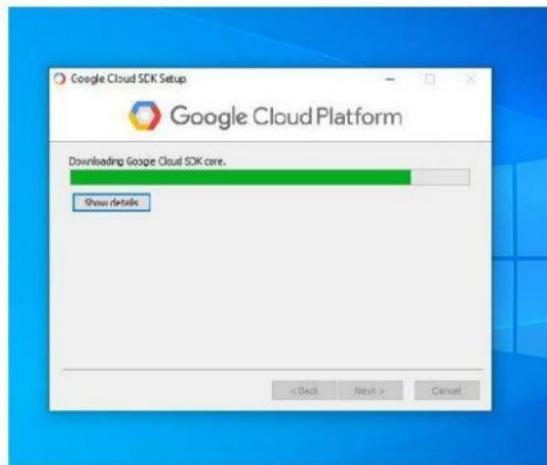
Step 6:Select single user and click Next.



Step 7:Select the destination location and click Next.



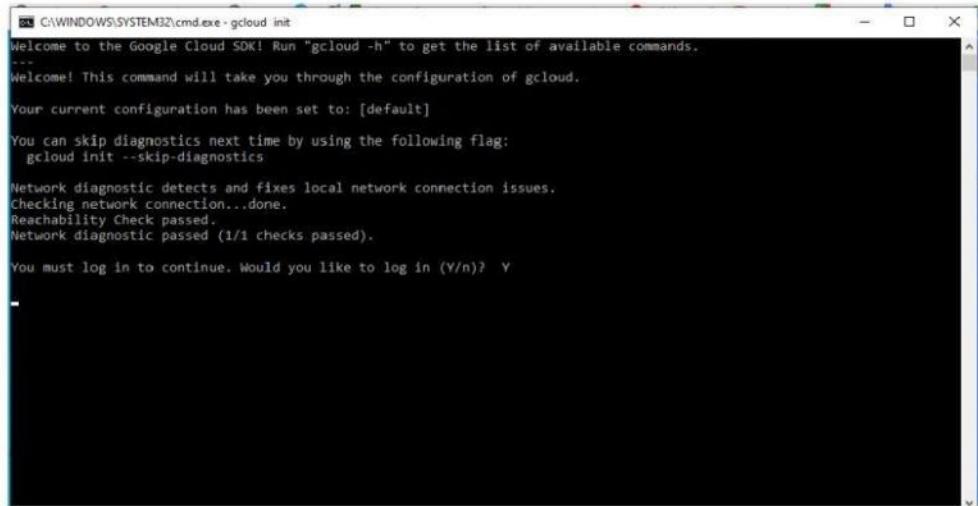
Step 8: Downloading all the requirements and installing



Step 9: Click Finish.



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



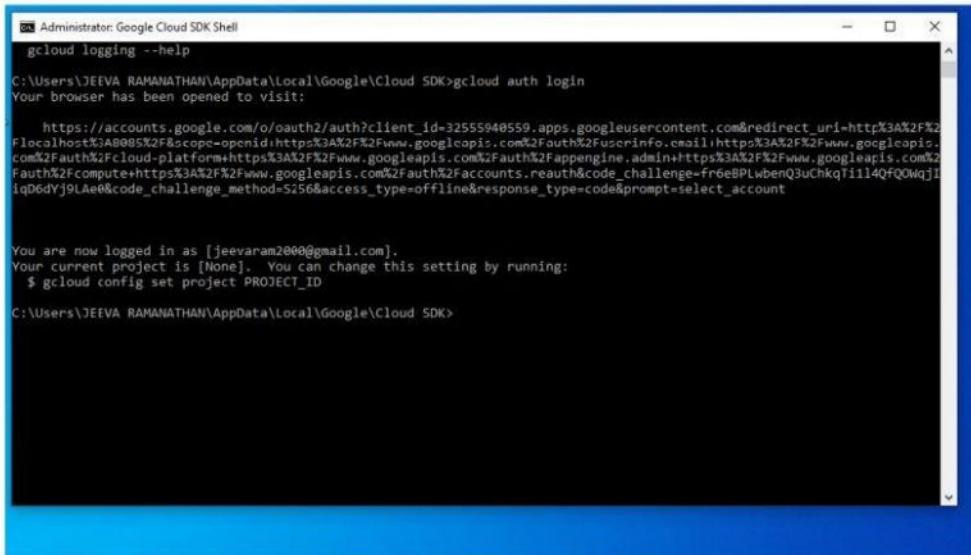
```
C:\WINDOWS\SYSTEM32\cmd.exe - gcloud init
Welcome to the Google Cloud SDK! Run "gcloud -h" to get the list of available commands.
...
Welcome! This command will take you through the configuration of gcloud.

Your current configuration has been set to: [default]

You can skip diagnostics next time by using the following flag:
  gcloud init --skip-diagnostics

Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).

You must log in to continue. Would you like to log in (Y/n)? Y
```



```
Administrator: Google Cloud SDK Shell
gcloud logging --help
C:\Users\JEEVA RAMANATHAN\AppData\Local\Google\Cloud SDK>gcloud auth login
Your browser has been opened to visit:

https://accounts.google.com/o/oauth2/auth?client_id=32555940559.apps.googleusercontent.com&redirect_uri=http%3A%2F%2Flocalhost%3A0052&scope=openid+https%3A%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fappengine.admin+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcompute+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Faccounts.reauth&code_challenge=fr6e8PlwbenQ3uChkqTi1l4QfQ0WqjIiqD6dyj9Lae0&code_challenge_method=S256&access_type=offline&response_type=code&prompt=select_account

You are now logged in as [jeevaram2000@gmail.com].
Your current project is [None]. You can change this setting by running:
$ gcloud config set project PROJECT_ID
C:\Users\JEEVA RAMANATHAN\AppData\Local\Google\Cloud SDK>
```

DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

Thus google app engine is installed successfully in the system.

EX.No:4

Launch a web application using GAE launcher

Date:

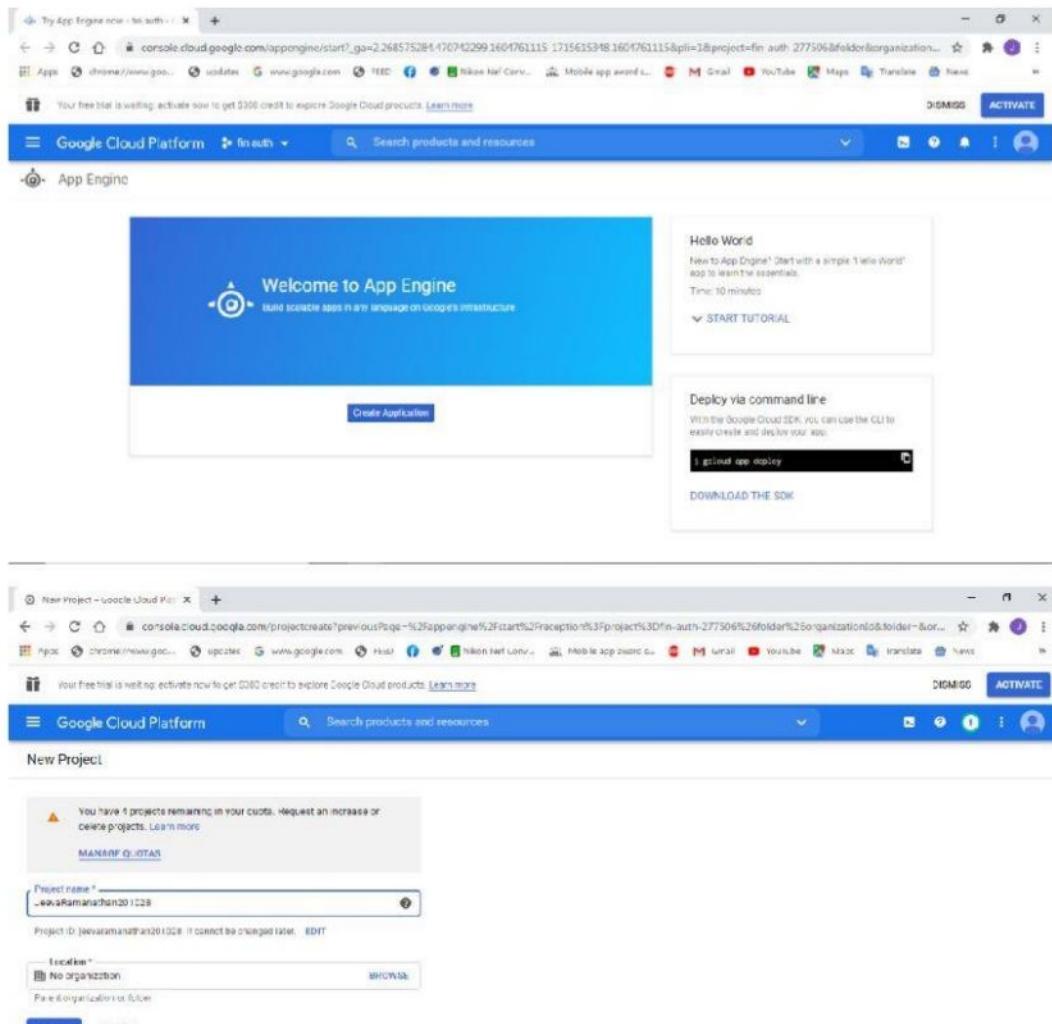
Aim:

To launch the web applications by using the GAE launcher.

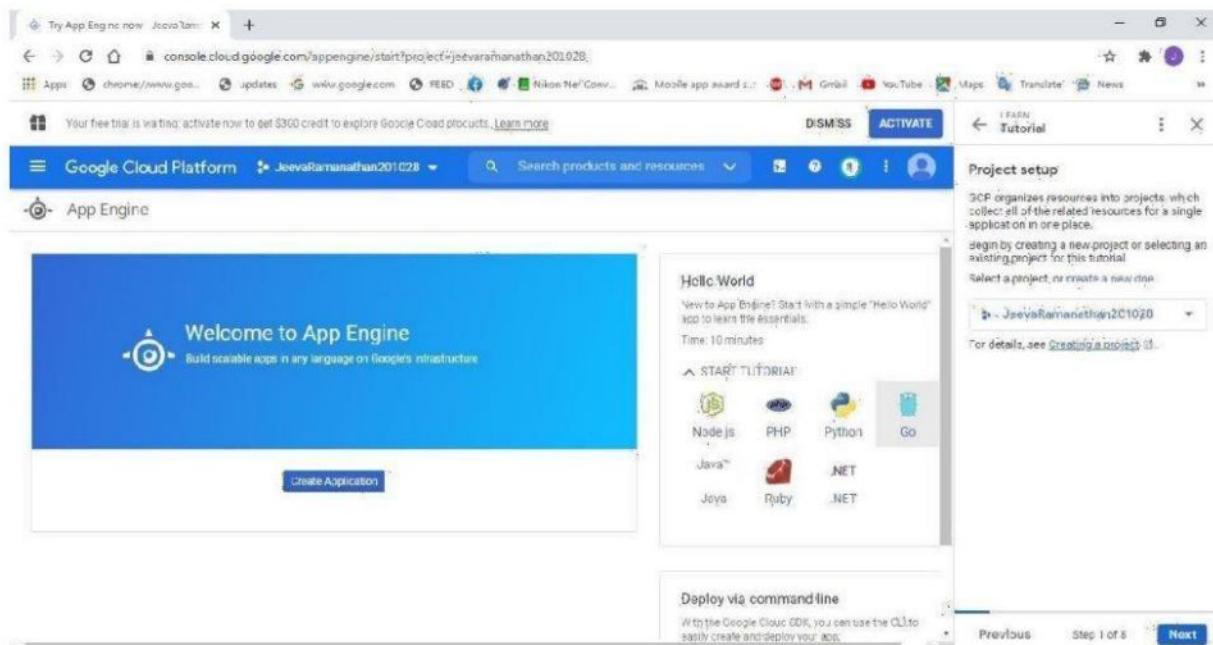
Procedure:

Step 1: Go to the following website

https://console.cloud.google.com/start/appengine?_ga=2.268575284.470742299.1604761115-1715615348.1604761115&pli=1 and create a new project.

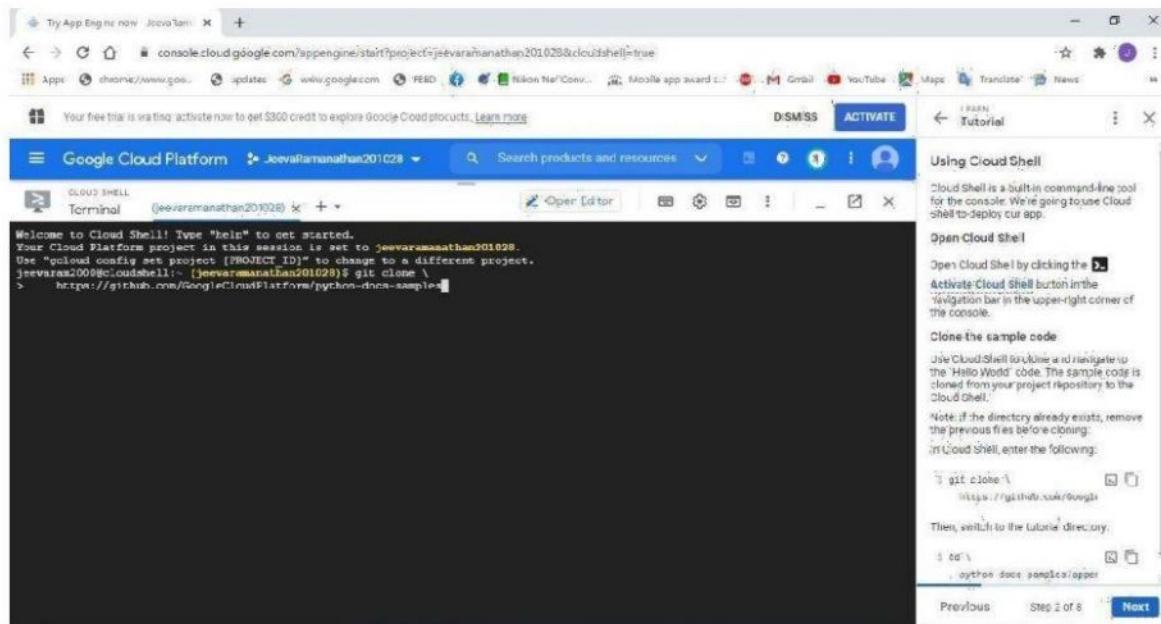


Step 2:Select python and click next.



Step 3:Open the cloud shell and follow the steps in the tutorial.

Clone the repository by using the given command



Step 4: Create the virtual environment

The screenshot shows a Google Cloud Platform Cloud Shell interface. On the left, a terminal window displays Python code for a 'Hello World' application. The code includes imports for Flask, defines a hello() function that returns 'Hello World', and sets up a main() function to run the app. It also shows the command to run the application with gunicorn and the port number 8080. On the right, a sidebar titled 'Testing your app' provides instructions for testing the application on Cloud Shell. It includes steps for activating the virtual environment, using pip to install dependencies, and running the application with gunicorn. A 'Code copied to clipboard' message is visible at the bottom right.

```
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.

# [START gae_python3_app]
from flask import Flask

app = Flask(__name__)

@app.route('/')
def hello():
    """Return a friendly HTTP greeting."""
    return 'Hello World!'

if __name__ == '__main__':
    # This is used when running locally only. When deploying to Google App
    # Engine, a webserver process such as Gunicorn will serve the app. This
    # can be configured by adding an 'entrypoint' to app.yaml.
    # app.run(host='127.0.0.1', port=8080, debug=True)
# [END gae_python3_app]
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ cat app.yaml
runtime: python38
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ virtualenv --python python3
> /envs/hello_world

```

Step 5: Activate your virtual environment.

The screenshot shows the same Google Cloud Platform Cloud Shell interface. The terminal window now displays the activation of the virtual environment. It shows the command 'source /envs/hello_world/bin/activate' being run, which activates the virtual environment. The sidebar on the right remains the same, providing instructions for testing the application. A 'Code copied to clipboard' message is visible at the bottom right.

```
# if 'entrypoint' is not defined in app.yaml, App Engine will look for an app
# called 'app' in 'main.py'.
app = Flask(__name__)

@app.route('/')
def hello():
    """Return a friendly HTTP greeting."""
    return 'Hello World!'

if __name__ == '__main__':
    # This is used when running locally only. When deploying to Google App
    # Engine, a webserver process such as Gunicorn will serve the app. This
    # can be configured by adding an 'entrypoint' to app.yaml.
    # app.run(host='127.0.0.1', port=8080, debug=True)
# [END gae_python3_app]
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ cat app.yaml
runtime: python38
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ virtualenv --python python3
> /envs/hello_world
created virtual environment CPython3.7.3.final.0-64 in 701ms
  created CPython3.7.3.final.0-64\Scripts\python3.7
  created CPython3.7.3.final.0-64\Scripts\pythonw3.7
  added seed packages: pip==20.2.3, setuptools==50.9.1, wheel==0.35.1
  executing BaselineActivator,CShellActivator,FishActivator,PowerShellActivator,PythonActivator,KonsoleActivator
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ source \
> /envs/hello_world/bin/activate
(hello_world) jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$
```

Step 6: Installing requirements and run the app.

The screenshot shows a Google Cloud Platform Cloud Shell terminal window. The user has run the command `pip install -r requirements.txt`. The output shows the download and installation of various Python packages, including Flask, click, itsdangerous, MarkupSafe, Jinja2, Werkzeug, and Flask. A warning message indicates that pip version 20.2.4 is being used, while 20.2.6 is available, suggesting an upgrade.

```

created virtual environment CPython3.7.5.final.0-64 in 70ms
creator CPython3Posix(dest=/home/jeevaramanathan201028/.envs/hello_world, clear=False, global=False)
seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=/home/jeevaramanathan201028/.local/share/virtualenvs)
added created package: pip==20.2.3, setuptools==50.3.1, wheel==0.36.1
activators EnvironmentActivator, CloudShellActivator, FishActivator, PowershellActivator, PythonActivator, XonshActivator
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ source \
> /envs/hello_world/bin/activate
(jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ pip instal
l -r requirements.txt
Collecting Flask==1.1.2
  Downloading Flask-1.1.2-py2.py3-none-any.whl (54 kB)
Collecting click==5.1
  Downloading click-7.1.2-py2.py3-none-any.whl (62 kB) 94 kB 2.6 MB/s
Collecting itsdangerous==0.24
  Downloading itsdangerous-0.24-py3-none-any.whl (16 kB)
Collecting Jinja2==2.11.2
  Downloading Jinja2-2.11.2-py3-none-any.whl (125 kB) 82 kB 1.3 MB/s
Collecting Werkzeug==0.15
  Downloading Werkzeug-0.15.1-py2.py3-none-any.whl (298 kB) 128 kB 13.1 MB/s
Collecting MarkupSafe==0.21
  Downloading MarkupSafe-0.21-cp37-cp37m-manylinux1_x86_64.whl (27 kB)
Successfully installed Flask-1.1.2 Jinja2-2.11.2 MarkupSafe-0.21 Werkzeug-0.15.1 click-7.1.2 itsdangerous-0.24
WARNING: You are using pip version 20.2.4; however, version 20.2.6 is available.
You should consider upgrading via the 'pip install --upgrade pip' command.
(jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$

```

The screenshot shows the same Google Cloud Platform Cloud Shell terminal window. The user has run the command `python main.py`. The output shows the application starting and listening on port 9000. The status message "Hello world!" is displayed, indicating the application is running correctly.

```

if __name__ == '__main__':
    # This is used when running locally only. When deploying to Google App
    # Engine, Google App Engine will serve the app. This
    # can be configured by adding an 'entrypoint' to app.yaml.
    # app.run(host='127.0.0.1', port=9000, debug=True)
# END gae_python38_app
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ cat app.yaml
runtime: python38
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ virtualenv --python python38 \
> /envs/hello_world
created virtual environment CPython3.7.5.final.0-64 in 70ms
creator CPython3Posix(dest=/home/jeevaramanathan201028/.envs/hello_world, clear=False, global=False)
seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=/home/jeevaramanathan201028/.local/share/virtualenvs)
added created package: pip==20.2.3, setuptools==50.3.1, wheel==0.36.1
activators EnvironmentActivator, CloudShellActivator, FishActivator, PowershellActivator, PythonActivator, XonshActivator
jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ source \
> /envs/hello_world/bin/activate
(jeevaramanathan201028@cloudshell:~/python-docs-samples/appengine/standard_python3/hello_world (jeevaramanathan201028)$ pip instal
l -r requirements.txt
Collecting Flask==1.1.2
  Downloading Flask-1.1.2-py2.py3-none-any.whl (54 kB) 94 kB 2.6 MB/s
Collecting click==5.1
  Downloading click-7.1.2-py2.py3-none-any.whl (62 kB) 84 kB 1.3 MB/s
Collecting itsdangerous==0.24
  Downloading itsdangerous-0.24-py3-none-any.whl (16 kB)

```

Step 7: Create an application and deploy it in cloud shell.

The screenshot shows a Google Cloud Platform Cloud Shell terminal window. The terminal output displays the deployment process for a Flask application:

```
Downloading Flask==1.1.2-py2.py3-none-any.whl (94 kB)
Collecting click==5.1
  Downloading click-5.1.0-py2.py3-none-any.whl (82 kB)
Collecting itsdangerous==0.24
  Downloading itsdangerous-0.1.0-py2.py3-none-any.whl (16 kB)
Collecting Jinja2==2.11.2
  Downloading Jinja2-2.11.2-py2.py3-none-any.whl (125 kB)
Collecting Werkzeug==0.15
  Downloading Werkzeug-0.15.1-py2.py3-none-any.whl (398 kB)
Collecting MarkupSafe==0.23
  Downloading MarkupSafe-0.1.1-cp37-macosx10_6-x86_64.whl (27 kB)
Installing collected packages: click, itsdangerous, MarkupSafe, Jinja2, Werkzeug, Flask
Successfully installed Flask-1.1.2 Jinja2-2.11.2 MarkupSafe-0.1.1 Werkzeug-0.15.1 click-7.1.2 itsdangerous-0.24
WARNING: You are using pip version 20.2.3; however, version 20.2.4 is available.
You should consider upgrading via the '/home/jeevaramanathan201028/.envs/hello_world/bin/python -m pip install --upgrade pip' command.
(jeevah world) jeevaramanathan201028@python-docs-samples/appeng:~/standard python3/hello_world [jeevaramanathan201028]$ python main.py
* Serving Flask app "main" (lazy loading)
* Environment: production
WARNING: This is a development server. Do not use it in a production environment.
Use a production WSGI server instead.
* Debug mode: on
* Running on http://127.0.0.1:8080/ (Press CTRL+C to quit)
* Restarting with stat
* Debugger is active!
* Debugger PIN: 123-976-332
gcloud app create
```

The right pane of the interface provides instructions for deploying to App Engine, creating an application, and visiting the app's URL. It also includes a note about upgrading pip.

Step 8: Click preview on port 8080 to see your deployed application

The screenshot shows a Google Cloud Platform Cloud Shell terminal window. A context menu is open over the deployment log, with the following options:

- Preview on port 8080
- Change port
- About web preview

The right pane of the interface provides instructions for viewing your app's status, monitoring its status on the App Engine dashboard, and navigating to the App Engine section.

Step 9:Finally the application is deployed and the output is seen.



DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

Thus a web application is launched by using the GAE launcher and the output is obtained successfully.

EX.No:5**Simulate a cloud scenario using CloudSim and run a scheduling algorithm****Date:****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.

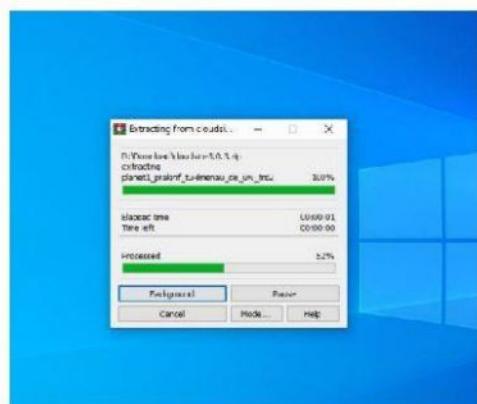
Google Code Archive - Long-term

code.google.com/archive/p/cloudsim/downloads

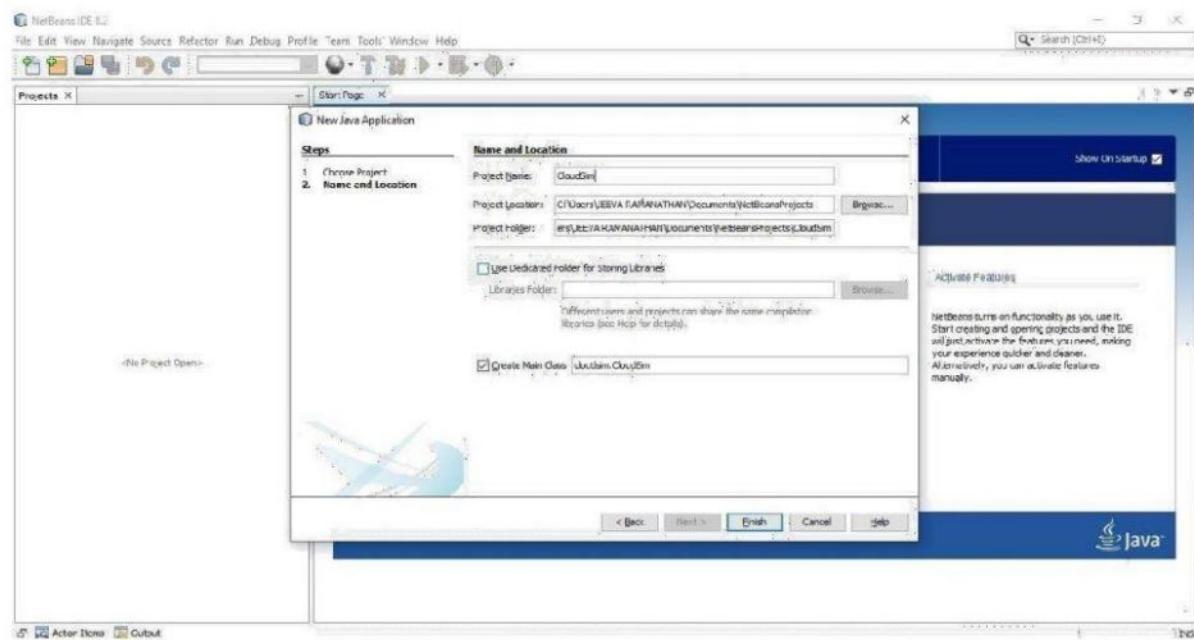
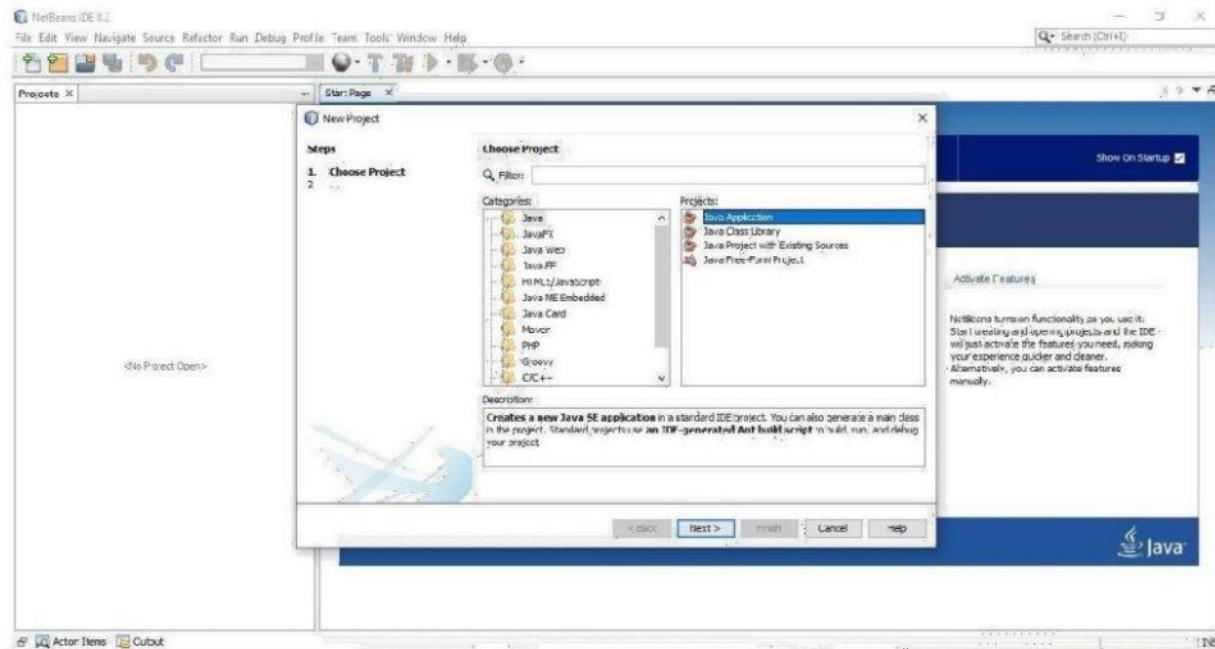
Projects Search About

cloudsim

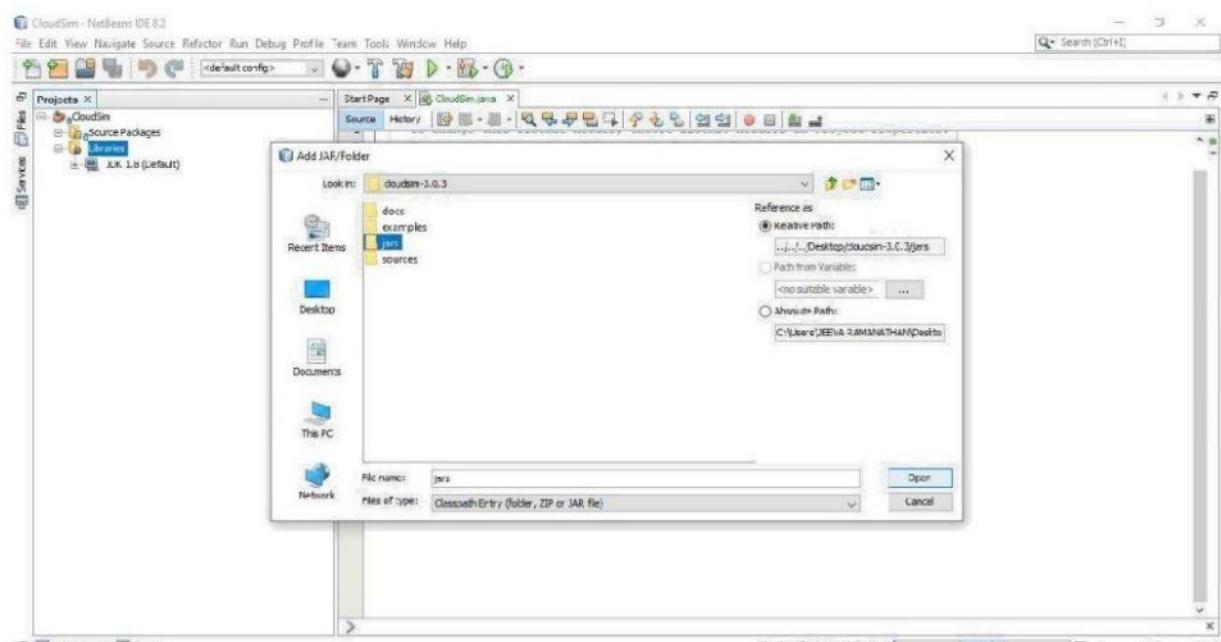
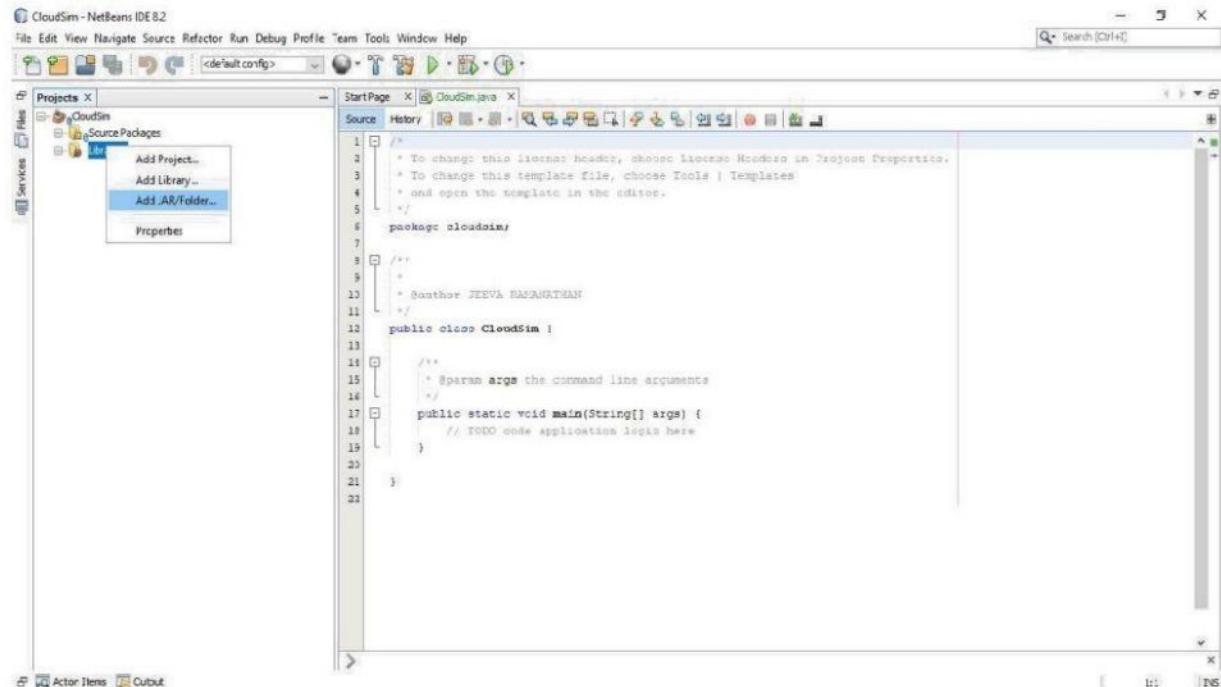
File	Summary + Labels	Uploaded	Size
cloudsim-3.0.3.tar.gz	CloudSim 3.0.3: bug fix release	May 3, 2013	9.9MB
cloudsim-3.0.2.zip	CloudSim 3.0.3: bug fix release	May 3, 2013	13.05MB
cloudsim-3.0.2.tar.gz	CloudSim 3.0.2: bug fix release	Nov 7, 2012	9.9MB
cloudsim-3.0.2.zip	CloudSim 3.0.2: bug fix release	Nov 7, 2012	13.05MB
cloudsim-3.0.1.tar.gz	CloudSim 3.0.1: bug fix release	Oct 17, 2012	9.05MB
cloudsim-3.0.1.zip	CloudSim 3.0.1: bug fix release	Oct 17, 2012	13.04MB
cloudsim-3.0.0.zip	CloudSim 3.0	Jan 11, 2012	9.85MB

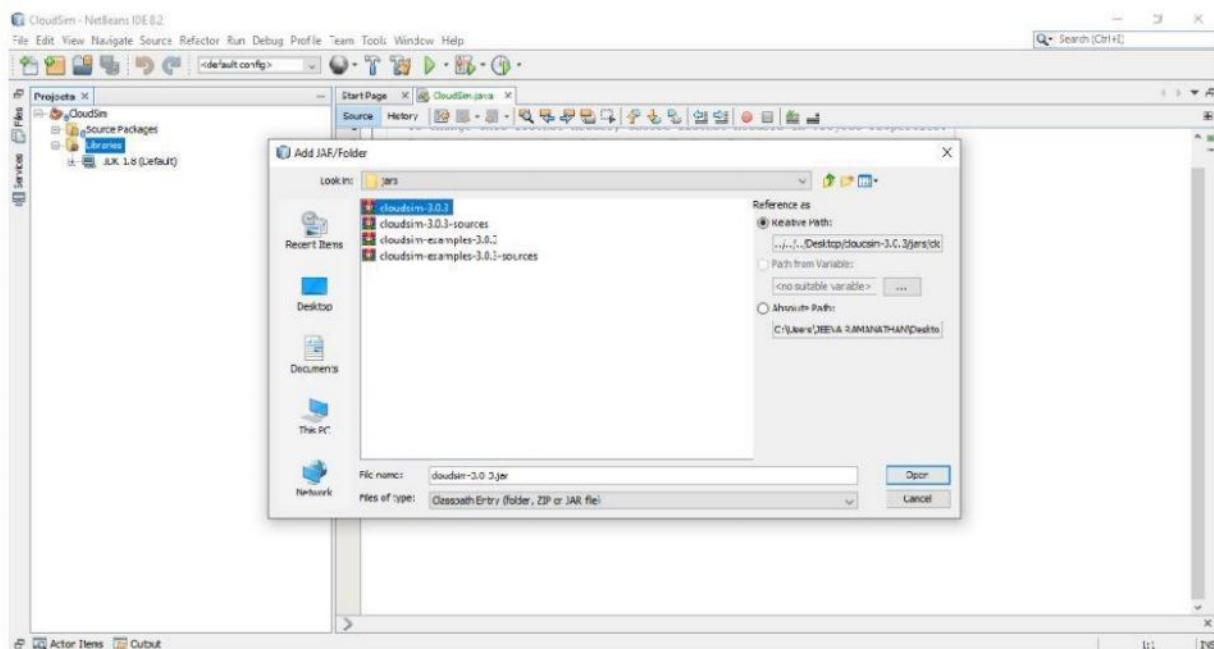


Step 2: Open Netbeans and create a new project named “Clousim”

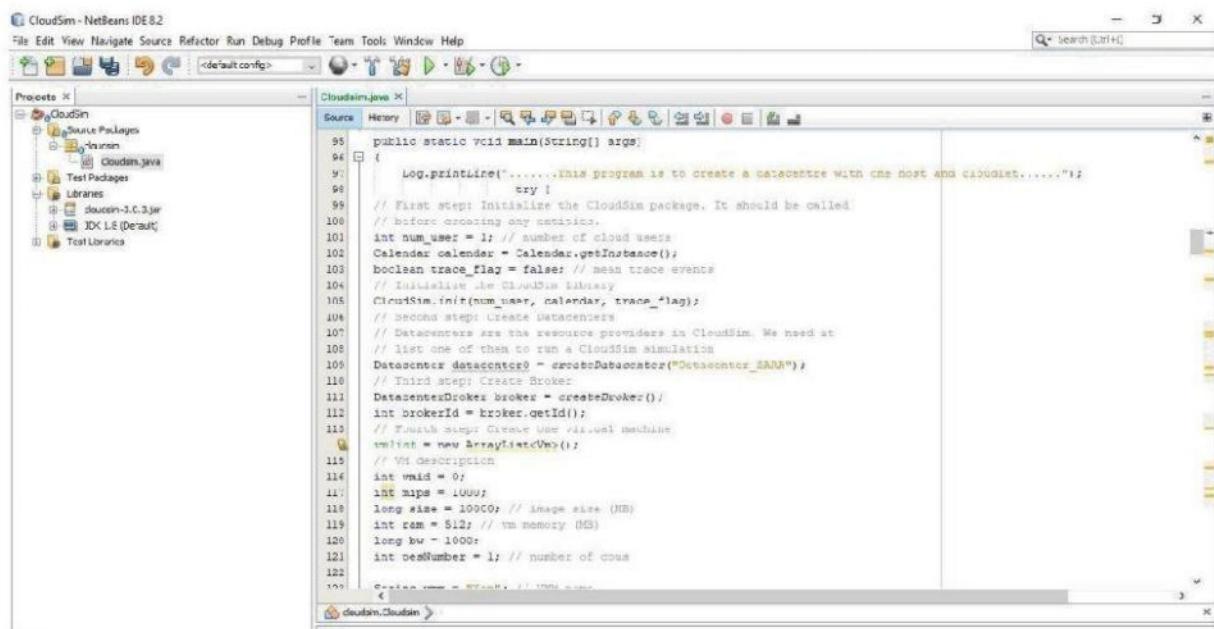


Step 3: Type the code and add the jar file to the libraries. The jar file will be in the extracted cloudsim.





Step 4: Run the application



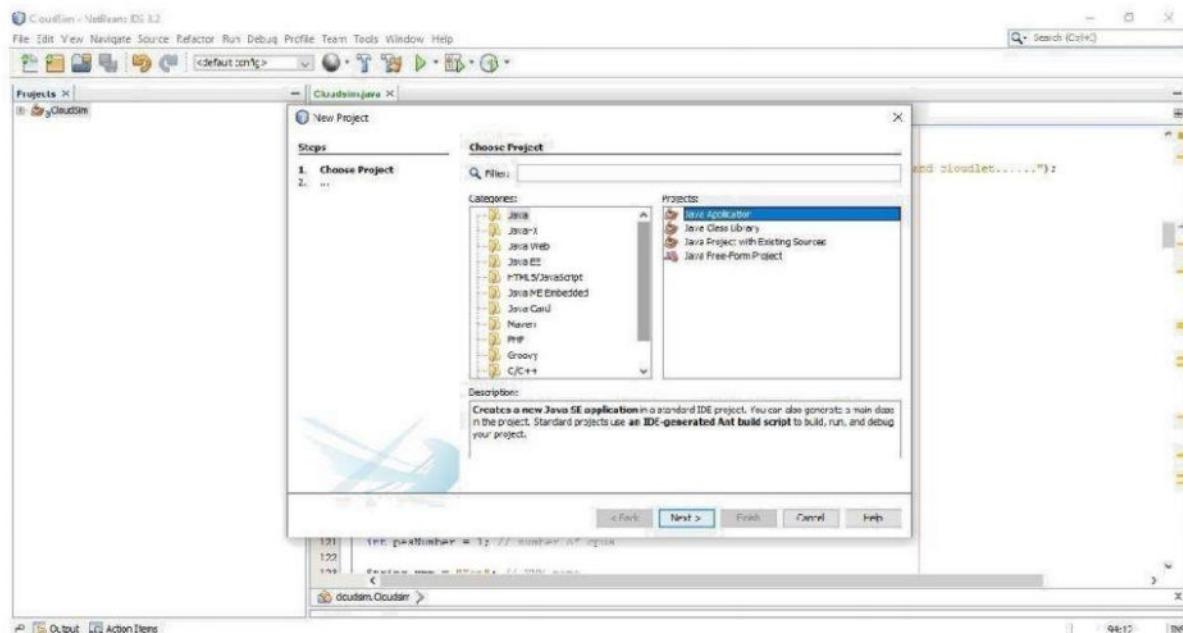
OUTPUT:

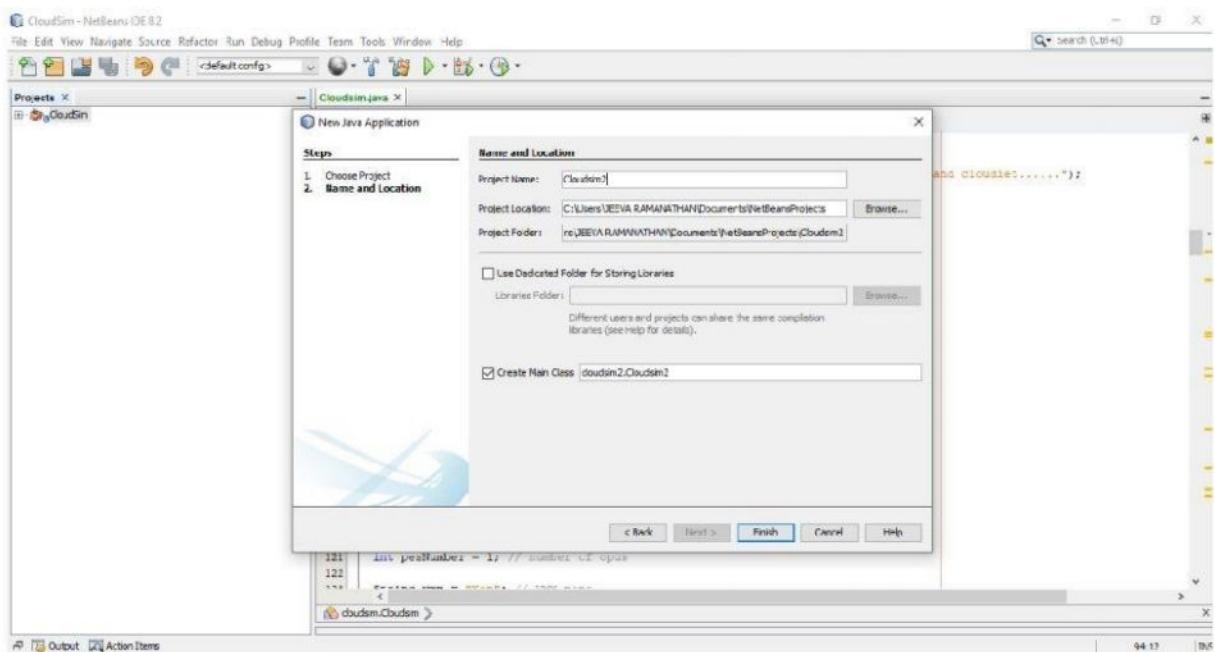
```
CloudSim - NetBeans IDE 8.2
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Projects CloudSim Output - CloudSim [run]
CloudSim Characteristics:
Architecture: x86 OS: Linux VMM: xen
Cost for:
PE: 3.0 Memory: 0.35 Storage: 0.01 Bandwidth: 0.0
Starting CloudSim version 3.0
Datacenter_SDDP is starting
Broker is starting...
Broker started.
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_SDDP
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: Sending cloudlet 0 to VM #0
400.1: Broker: Cloudlet 0 received
400.1: Broker: All Cloudlets executed. Finishing...
400.1: Broker: Destroying VM #0
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down
Datacenter_SDDP is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

----- OUTPUT -----
Cloudlet ID STATUS Data center ID VM ID TIME Start time Finish time
0 SUCCESS 0 0 400 0.1 400.1

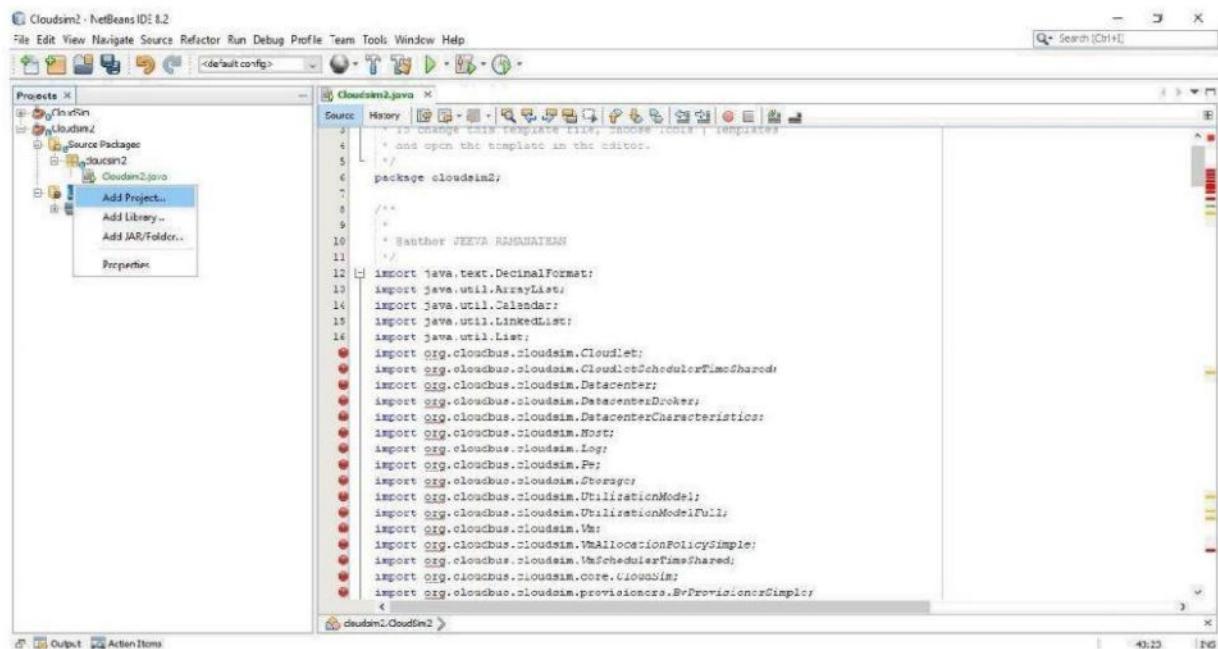
End of program !!
BUILD SUCCESSFUL (total time: 0 seconds)
Output Action Items
```

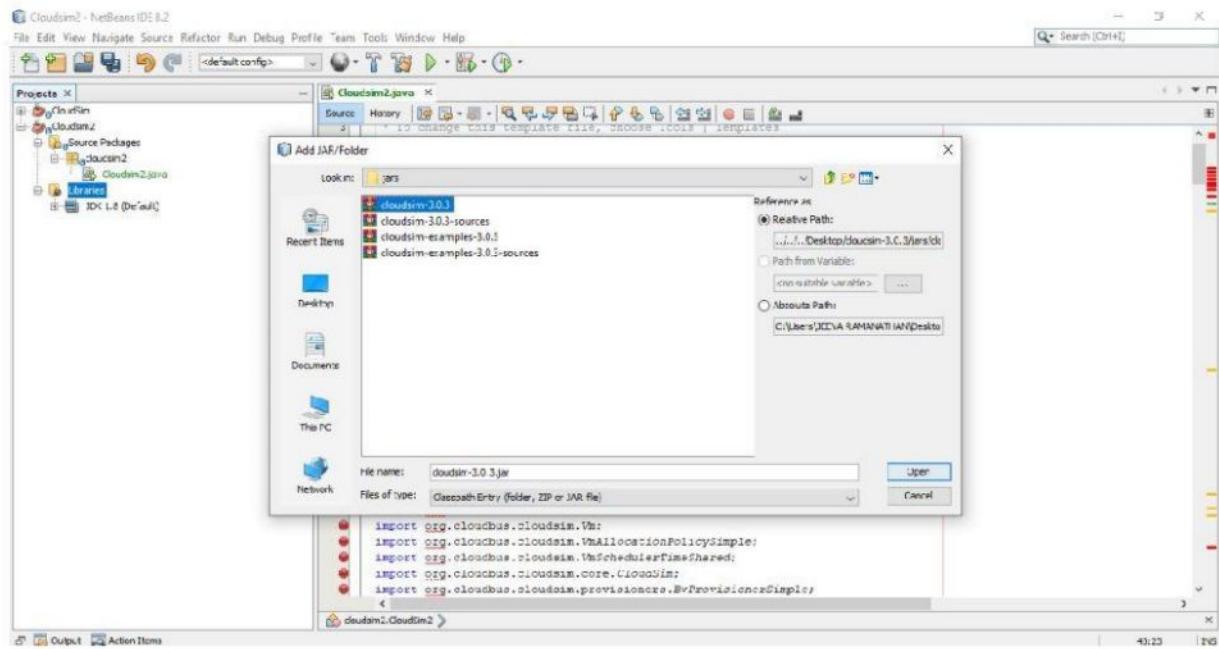
Step 5: Again create a new project and name it as "Cloudsim2"



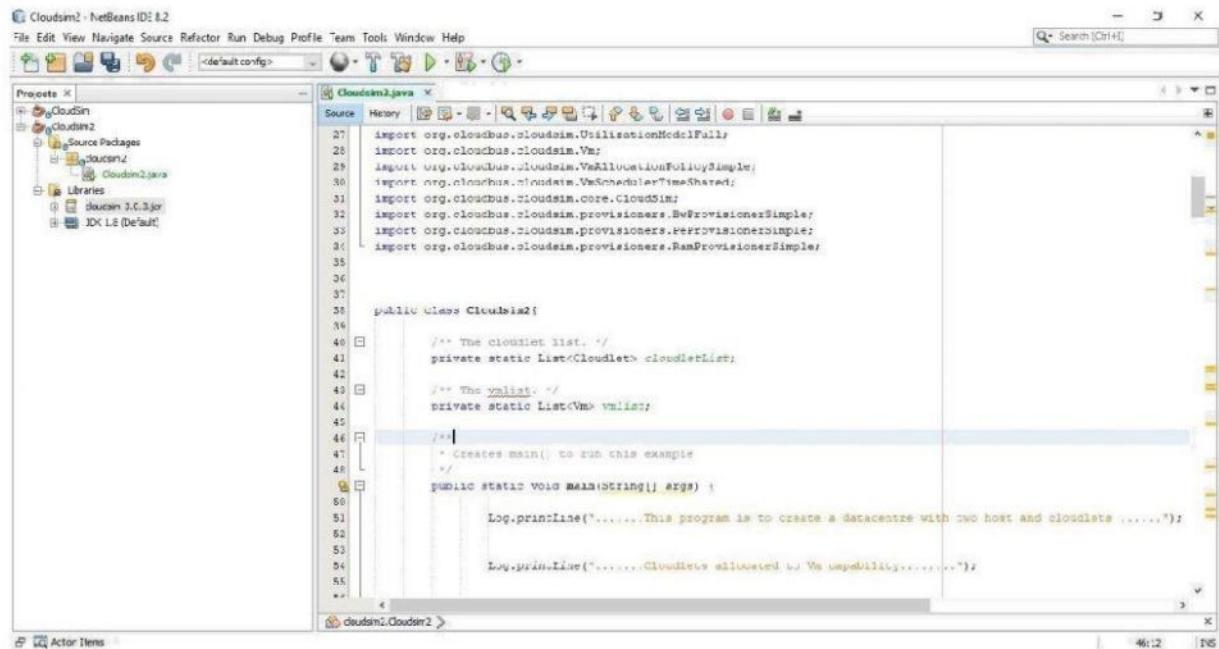


Step 6: Type the code and include the jar file

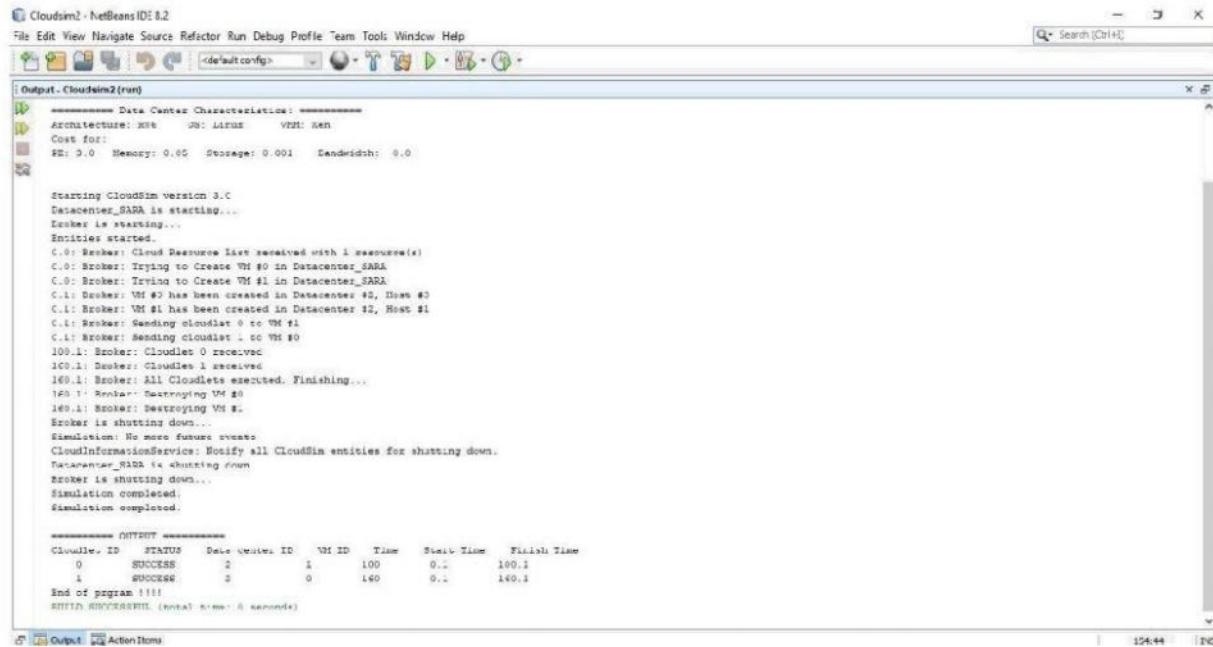




Step 7: Run the application



OUTPUT:



The screenshot shows the NetBeans IDE interface with the title bar "Cloudsim2 - NetBeans IDE 8.2". The main window displays the "Output" tab for the "Cloudsim2 (run)" configuration. The output window contains log messages from the CloudSim simulation. Key messages include:

```

Data Center Characteristics:
Architecture: x86   OS: Linux   VMM: Xen
Cost for:
PE: 0.0  Memory: 0.05  Storage: 0.001  Bandwidth: 0.0

Starting CloudSim version 3.0
Datacenter_SARA is starting...
Broker is starting...
Entities started.
C.0: Broker: Cloud Resource List received with 1 resource(s)
C.0: Broker: Trying to Create VM #0 in Datacenter_SARA
C.0: Broker: Trying to Create VM #1 in Datacenter_SARA
C.1: Broker: VM #0 has been created in Datacenter #0, Host #0
C.1: Broker: VM #1 has been created in Datacenter #2, Host #1
C.1: Broker: Sending cloudlet #0 to VM #1
C.1: Broker: Sending cloudlet #0 to VM #0
100.1: Broker: Cloudlet 0 received
100.1: Broker: Cloudlet 1 received
100.1: Broker: All Cloudlets executed. Finishing...
100.1: Broker: Destroying VM #0
100.1: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_SARA is shutting down
Broker is shutting down...
Simulation completed;
Simulation completed.

----- OUTPUT -----
Cloudlet, ID  STATUS  Datacenter ID  VM ID  Time  Start Time  Finish Time
0  SUCCESS    2      1      100  0.1  100.1
1  SUCCESS    3      0      140  0.1  140.1
End of program !!!!
```

The bottom status bar shows "124:44" and "125".

DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

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

EX.No:6 Transfer files from one host machine to another virtual machine

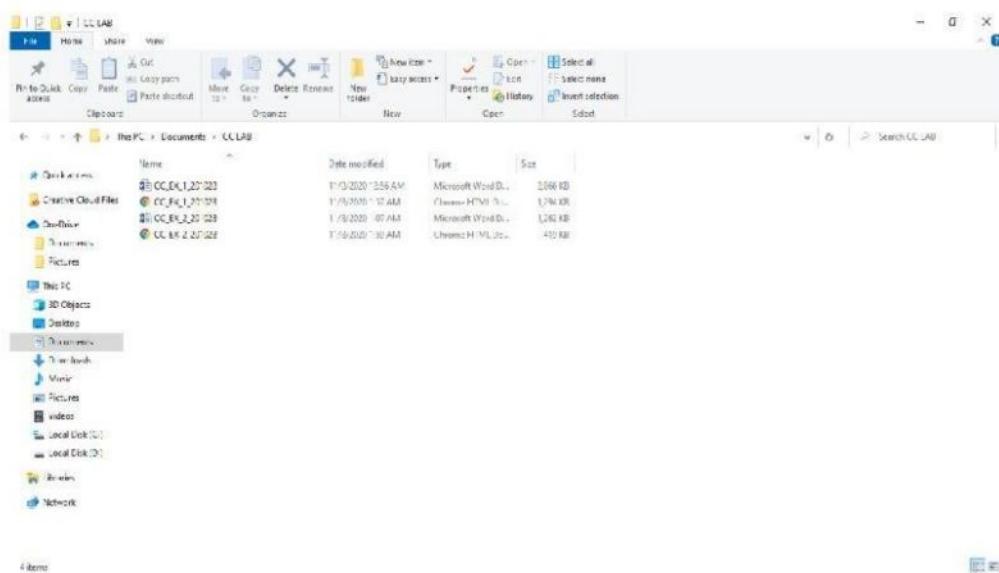
Date:

Aim:

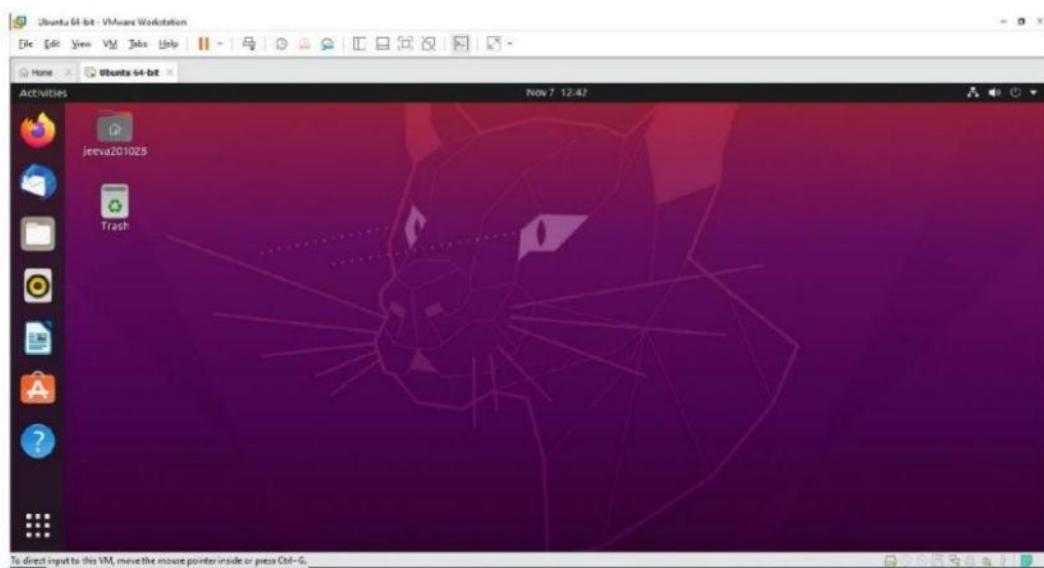
To transfer files/folders from the host machine to the virtual machine.

Procedure:

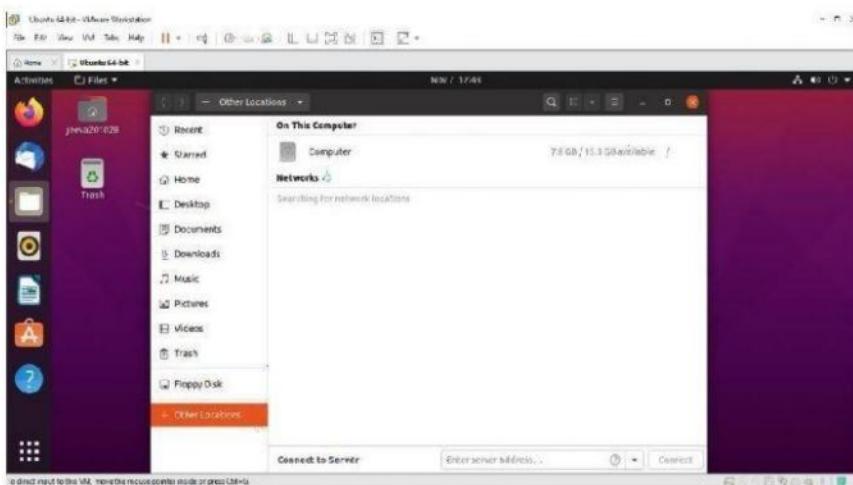
Files that are to be shared to virtual machine



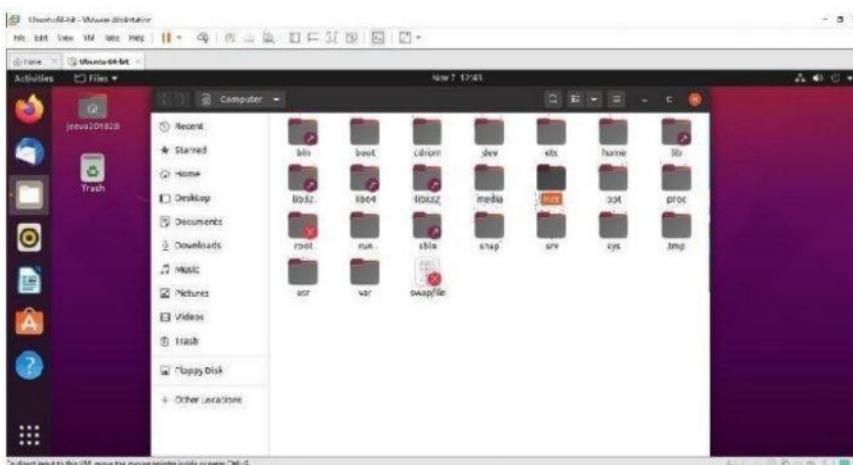
Step 1: Open the ubuntu in VM



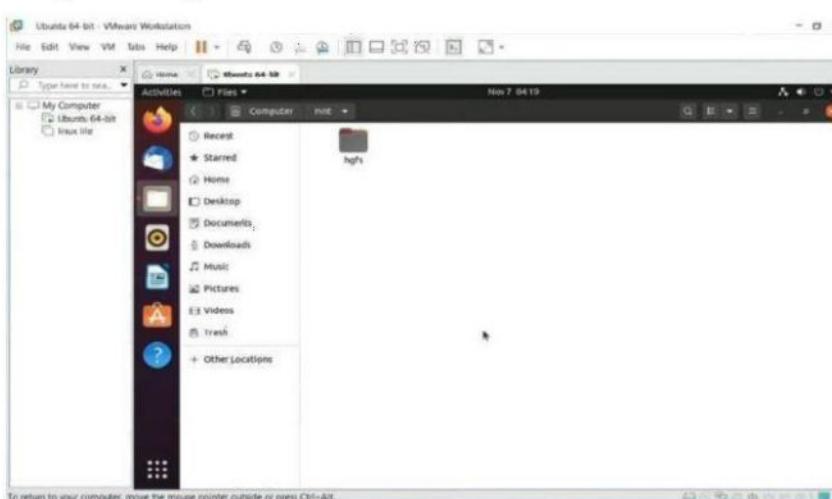
Step 2:Open the file manager and go to Other Locations



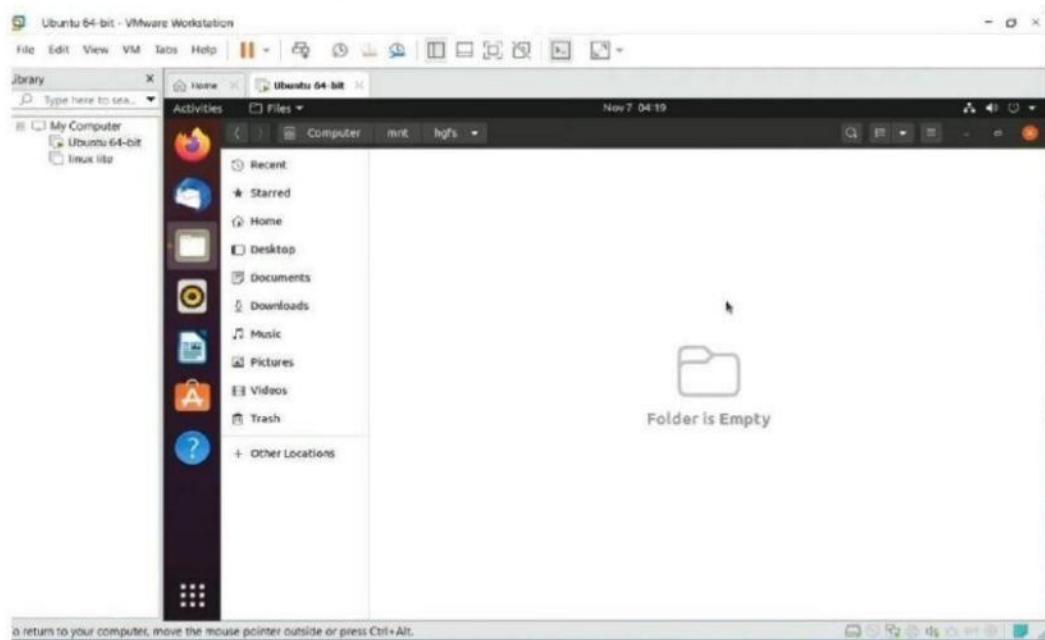
Step 3:Open the folder named “mnt”



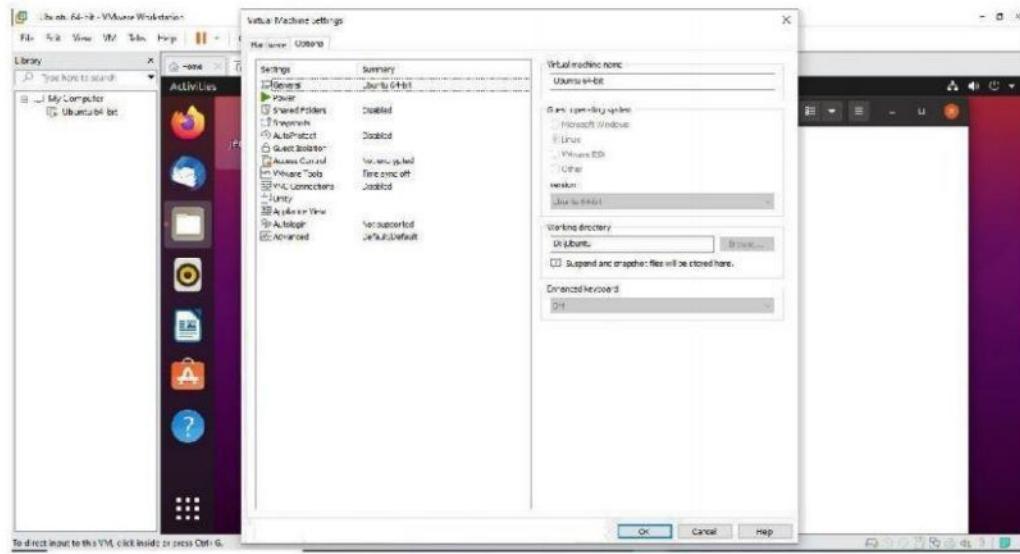
Step 4:Now open the “hgfs” folder



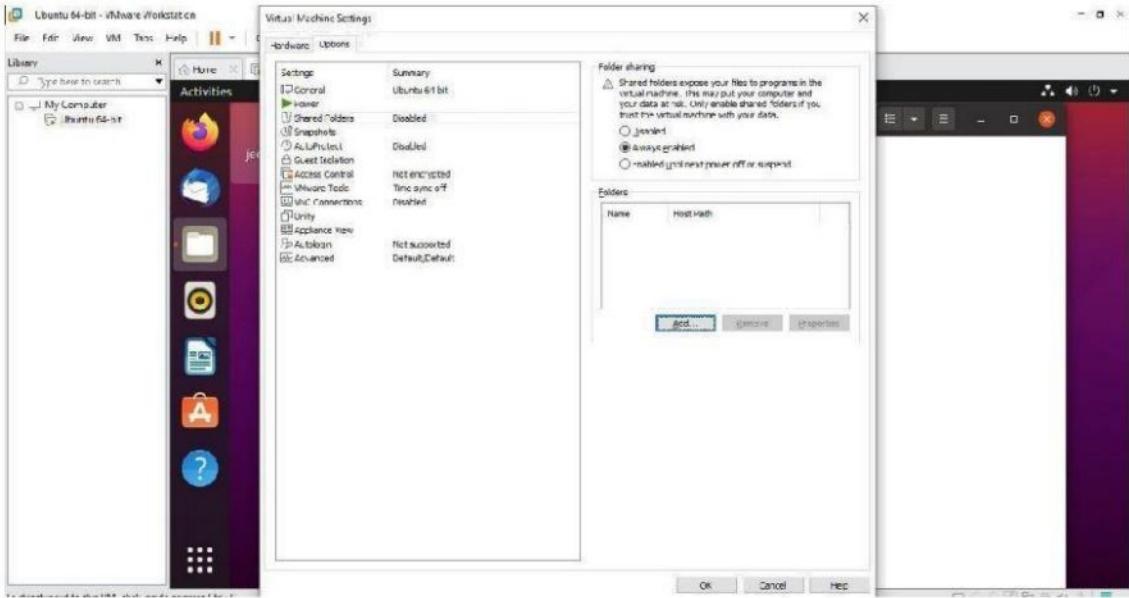
Initially the folder will be empty



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



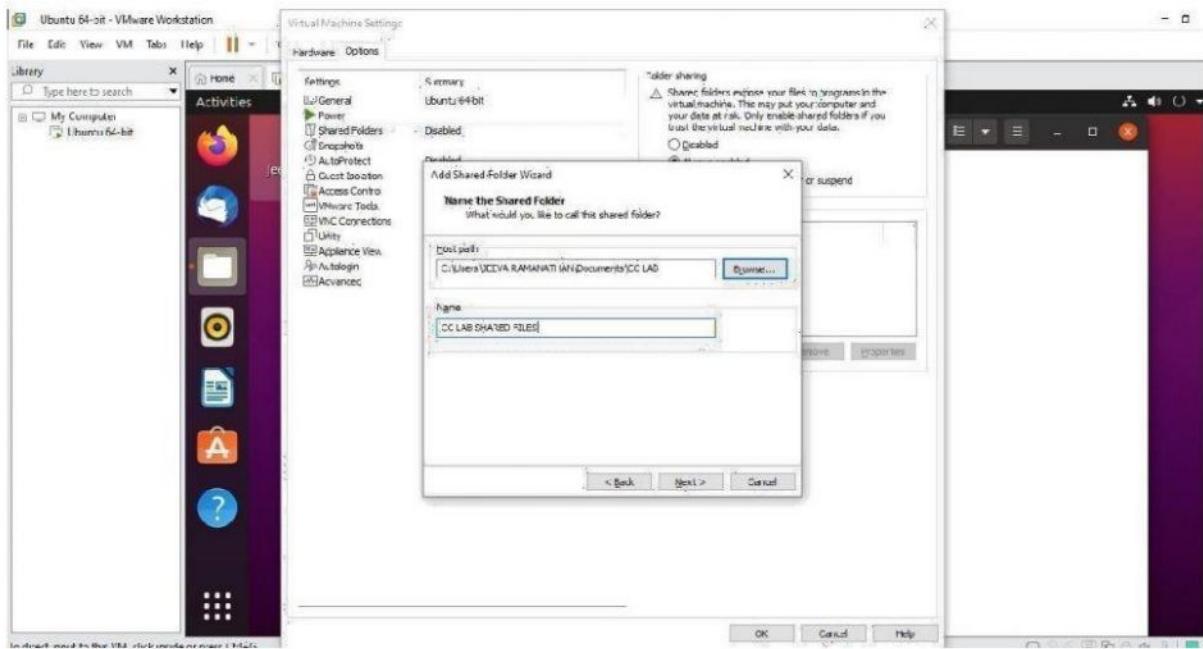
Step 6:Select the shared folders,change the radio button to “Always enabled” and click Add



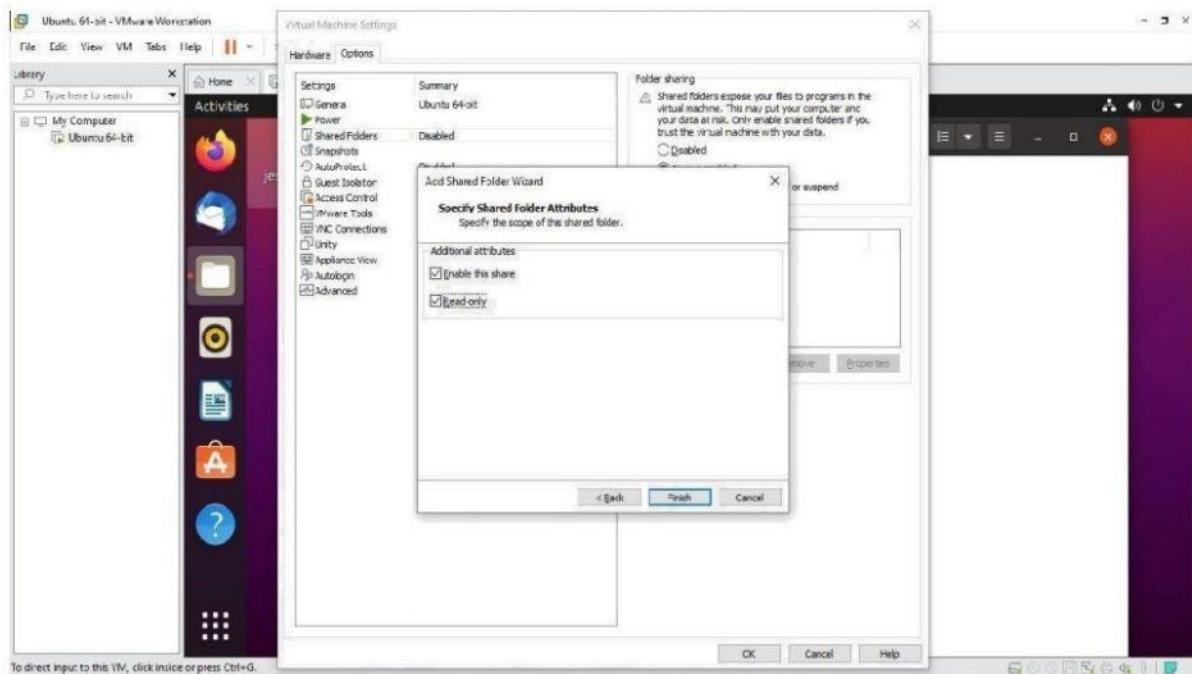
Step 7:Click Next



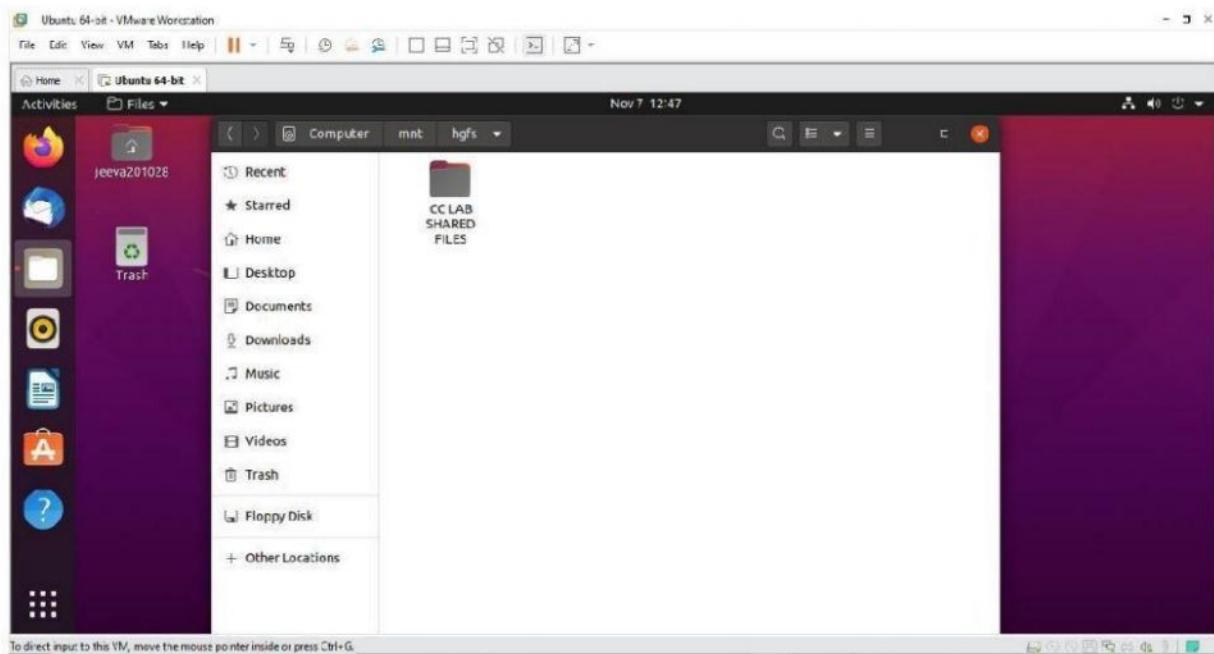
Step 8.Select the folder/file that has to be shared to VM in Host Path



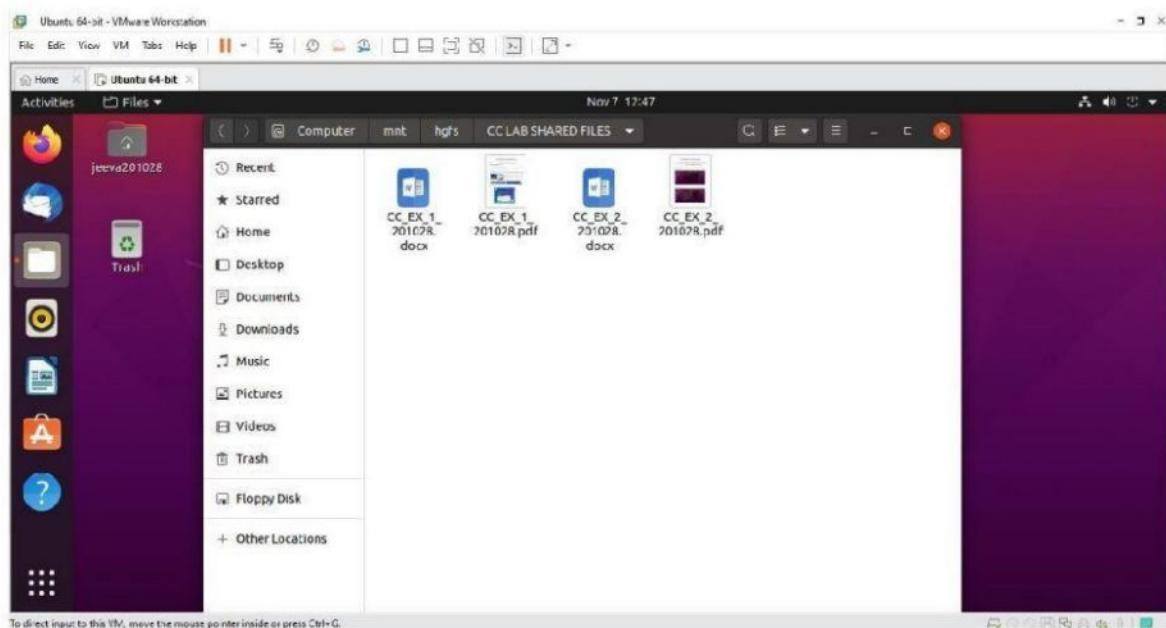
Step 9:Check Read Only and click Finish



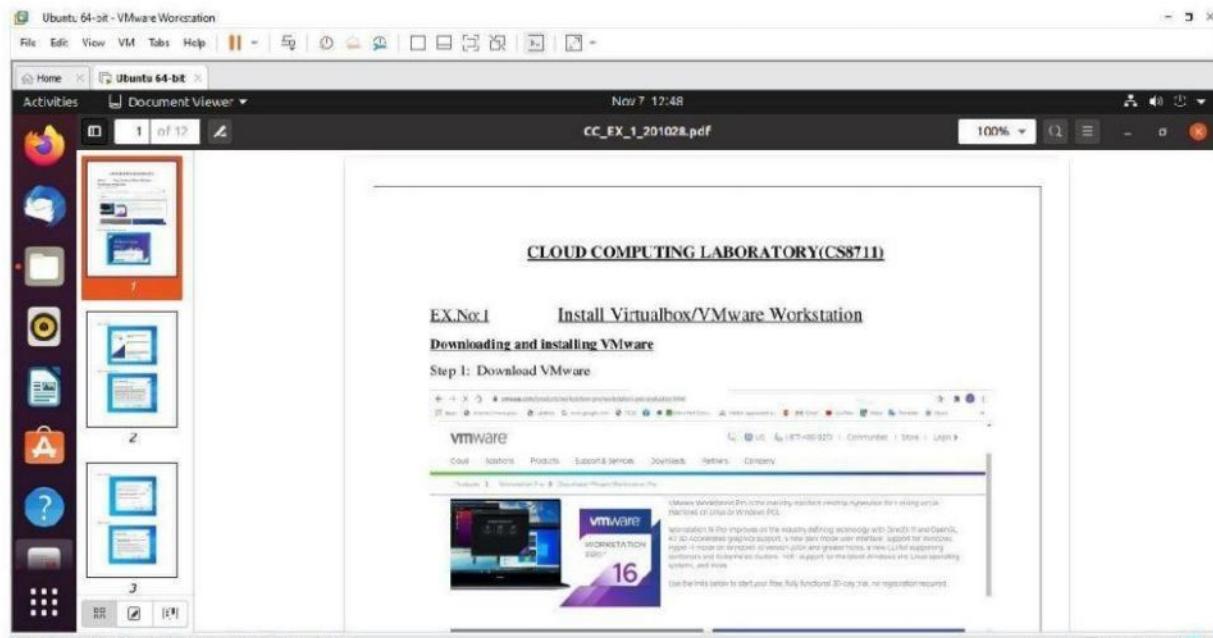
Step 10: Now in the same location “Computer>mnt>hgfs” the folder that are shared from host is visible



Step 11:



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



DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

Thus file sharing between one host machine to another virtual machine is transferred and obtained successfully.

EX.No:7

**Find a procedure to launch virtual machine using
trystack (Online Openstack Demo Version)**

OpenStack is an open-source software cloud computing platform. OpenStack is primarily used for deploying an infrastructure as a service (IaaS) solution like Amazon Web Service (AWS). In other words, you can make your own AWS by using OpenStack. If you want to try out OpenStack, TryStack is the easiest and free way to do it.

Overview: What we will do? In this , I will show you how to run an OpenStack instance. The instance will be accessible through the internet (have a public IP address).

Step 1: Create Network

Yes, the network in here is our own local network. So, your instances will be not mixed up with the others. You can imagine this as your own LAN (Local Area Network) in the cloud.

1. Go to Network > Networks and then click Create Network.
2. In Network tab, fill Network Name for example internal and then click Next.
3. In Subnet tab,
 1. Fill Network Address with appropriate CIDR, for example 192.168.1.0/24.
Use private network CIDR block as the best practice.
 2. Select IP Version with appropriate IP version, in this case IPv4.
 3. Click Next.
4. In Subnet Details tab, fill DNS Name Servers with 8.8.8.8 (Google DNS) and then click Create.

Step 2: Create Instance

Now, we will create an instance. The instance is a virtual machine in the cloud, like AWS EC2. You need the instance to connect to the network that we just created in the previous step.

1. Go to Compute > Instances and then click Launch Instance.
2. In Details tab,

1. Fill Instance Name, for example Ubuntu 1.
2. Select Flavor, for example m1.medium.
3. Fill Instance Count with 1.
4. Select Instance Boot Source with Boot from Image.
5. Select Image Name with Ubuntu 14.04 amd64 (243.7 MB) if you want install Ubuntu 14.04 in your virtual machine.

3. In Access & Security tab,

1. Click [+] button of Key Pair to import key pair. This key pair is a public and private key that we will use to connect to the instance from our machine.

2. In Import Key Pair dialog,

1. Fill Key Pair Name with your machine name (for example Edward-Key).
2. Fill Public Key with your SSH public key (usually is in `~/.ssh/id_rsa.pub`). See description in Import Key Pair dialog box for more information. If you are using Windows, you can use Puttygen to generate key pair.
3. Click Import key pair.

3. In Security Groups, mark/check default.

4. In Networking tab,

1. In Selected Networks, select network that have been created in Step 1, for example internal.

5. Click Launch.

6. If you want to create multiple instances, you can repeat step 1-5. I created one more instance with instance name Ubuntu 2.

Step 3: Create Router

I guess you already know what router is. In the step 1, we created our network, but it is isolated. It doesn't connect to the internet. To make our network has an

internet connection, we need a router that running as the gateway to the internet.

1. Go to Network > Routers and then click Create Router.
2. Fill Router Name for example router1 and then click Create router.
3. Click on your router name link, for example router1, Router Details page.
4. Click Set Gateway button in upper right: 1. Select External networks with external.
2. Then OK.
5. Click Add Interface button.
 1. Select Subnet with the network that you have been created in Step 1.
 2. Click Add interface.
6. Go to Network > Network Topology. You will see the network topology. In the example, there are two network, i.e. external and internal, those are bridged by a router. There are instances those are joined to internal network.

Step 4: Configure Floating IP Address

Floating IP address is public IP address. It makes your instance is accessible from the internet. When you launch your instance, the instance will have a private network IP, but no public IP. In OpenStack, the public IPs is collected in a pool and managed by admin (in our case is TryStack). You need to request a public (floating) IP address to be assigned to your instance.

1. Go to Compute > Instance.
2. In one of your instances, click More > Associate Floating IP.
3. In IP Address, click Plus [+].
4. Select Pool to external and then click Allocate IP.
5. Click Associate.
6. Now you will get a public IP, e.g. 8.21.28.120, for your instance.

Step 5: Configure Access & Security

OpenStack has a feature like a firewall. It can whitelist/blacklist your in/out connection. It is called Security Group.

1. Go to Compute > Access & Security and then open Security Groups tab.

2. In default row, click Manage Rules.
3. Click Add Rule, choose ALL ICMP rule to enable ping into your instance, and then click Add.
4. Click Add Rule, choose HTTP rule to open HTTP port (port 80), and then click Add.
5. Click Add Rule, choose SSH rule to open SSH port (port 22), and then click Add.
6. You can open other ports by creating new rules.

Step 6: SSH to Your Instance

Now, you can SSH your instances to the floating IP address that you got in the step 4. If you are using Ubuntu image, the SSH user will be ubuntu.

DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

Thus to find A procedure to launch virtual machine using try stack has been successfully executed.

EX.No:8 Install Hadoop single mode cluster and run simple application

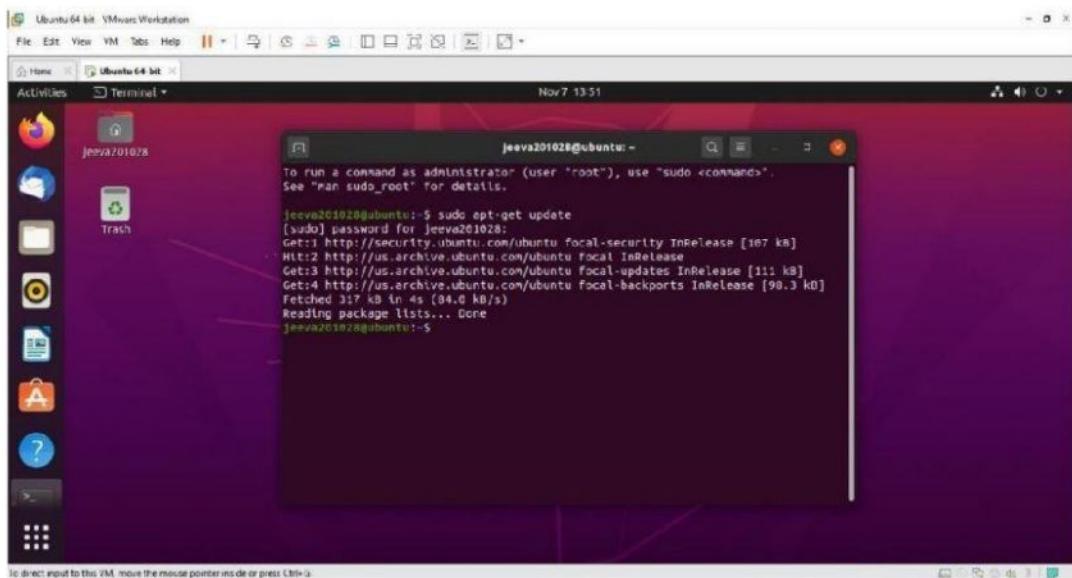
Date:

Aim:

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

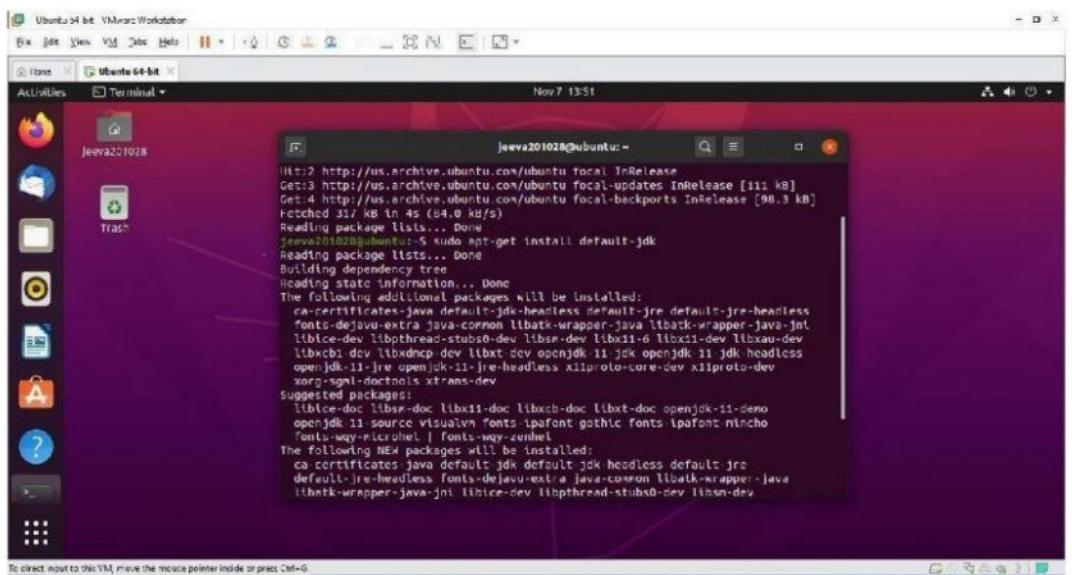
Procedure:

Update the packages



```
jeeva201028@ubuntu:~$ sudo apt-get update
[sudo] password for jeeva201028:
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [167 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease [111 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease [90.3 kB]
Fetched 317 kB in 4s (84.0 kB/s)
Reading package lists... Done
```

Installing java



```
jeeva201028@ubuntu:~$ sudo apt-get install default-jdk
Reading package lists...
Building dependency tree...
Reading state information...
The following additional packages will be installed:
ca-certificates-java default-jdk-headless default-jre default-jre-headless
fonts-dejavu-extra java-common libatk-wrapper-java libatk-wrapper-java-jni
libclc-dev libpthread-stubs0-dev libsrw-dev libx11-6 libx11-dev libxau-dev
libxcb1-dev libxdp-dev libxt-dev openjdk-11-jdk openjdk-11-jdk-headless
openjdk-11-jre openjdk-11-jre-headless x11proto-core-dev x11proto-dev
xorg-sgml-doctools xtrans-dev
Suggested packages:
libclc-dev libsrw-dev libx11-doc libxcb-dev libxt-dev openjdk-11-demo
openjdk-11-source visualvm fonts-ipafont gothic fonts-ipafont-nincho
fonts-wqy-microhei1 fonts-wqy-zhhei
The following NEW packages will be installed:
ca-certificates java default-jdk default-jdk-headless default-jre
default-jre-headless fonts-dejavu-extra java-common libatk-wrapper-java-jni
libatk-wrapper-java-jni libclc-dev libpthread-stubs0-dev libsrw-dev
```

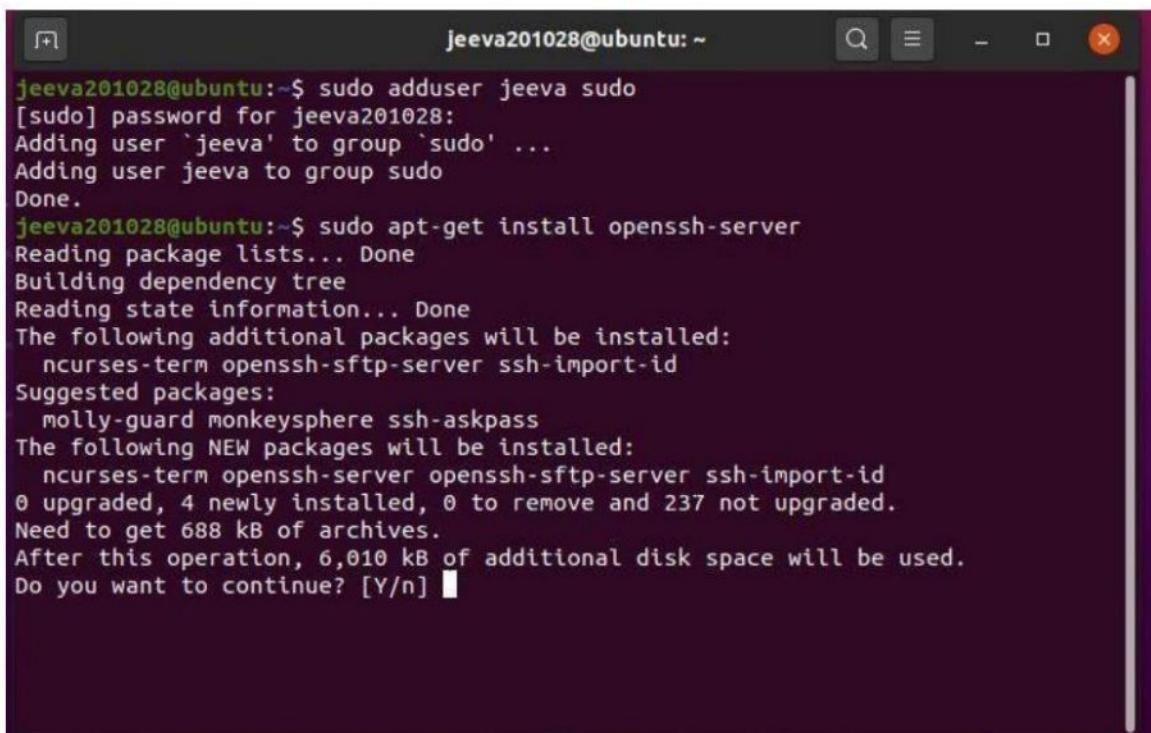
Assigning a dedicated user on hadoop to perform operations

```
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:~$
```

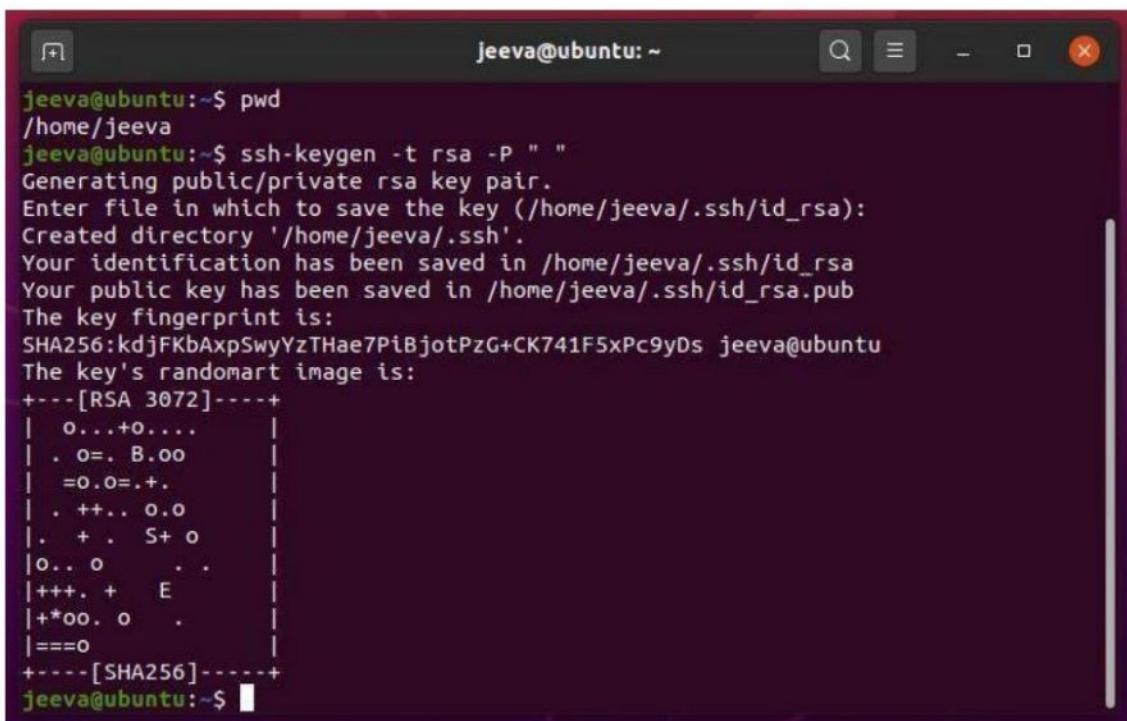
Next install a package ssh(secured shell login)



A screenshot of a terminal window titled "jeeva201028@ubuntu: ~". The terminal shows the following command and its output:

```
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:~$ sudo apt-get install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 237 not upgraded.
Need to get 688 kB of archives.
After this operation, 6,010 kB of additional disk space will be used.
Do you want to continue? [Y/n] 
```

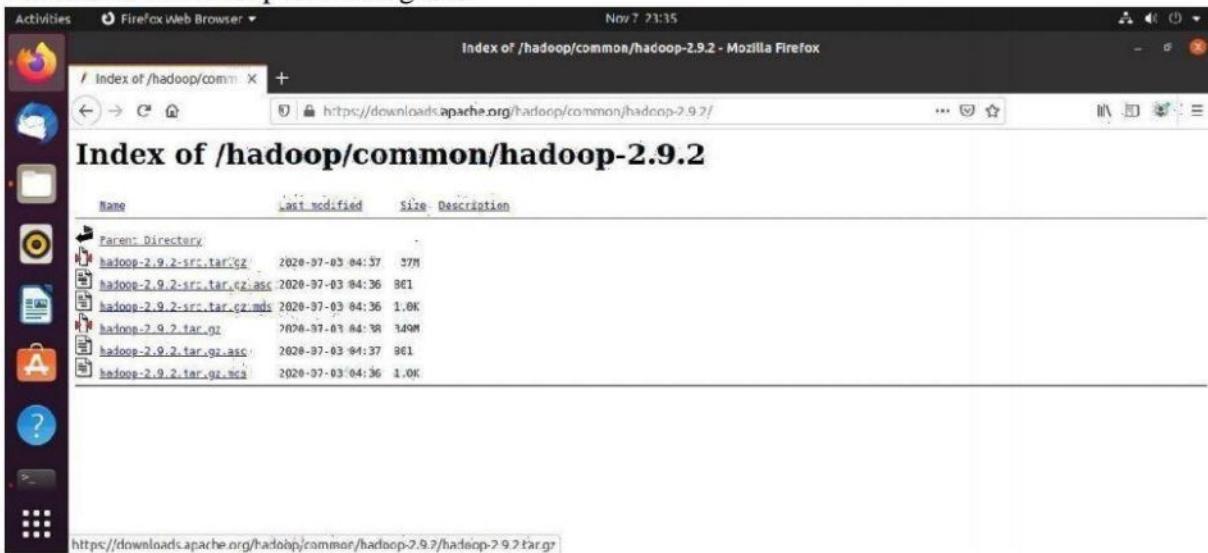
Next step is key generation and add a key to the file



A screenshot of a terminal window titled "jeeva@ubuntu: ~". The terminal shows the following command and its output:

```
jeeva@ubuntu:~$ pwd
/home/jeeva
jeeva@ubuntu:~$ ssh-keygen -t rsa -P ""
Generating public/private rsa key pair.
Enter file in which to save the key (/home/jeeva/.ssh/id_rsa):
Created directory '/home/jeeva/.ssh'.
Your identification has been saved in /home/jeeva/.ssh/id_rsa
Your public key has been saved in /home/jeeva/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:kdjFKbAxpSwyZtHae7PiBjotPzG+CK741F5xPc9yDs jeeva@ubuntu
The key's randomart image is:
+---[RSA 3072]---+
|   o...+o.... |
| . o=. B.oo   |
| =o.o=.=+.   |
| . +... o.o   |
| . + . S+ o   |
|o... o       . |
|+++.. +     E |
|+*oo. o     . |
|==o          |
+---[SHA256]---+
jeeva@ubuntu:~$ 
```

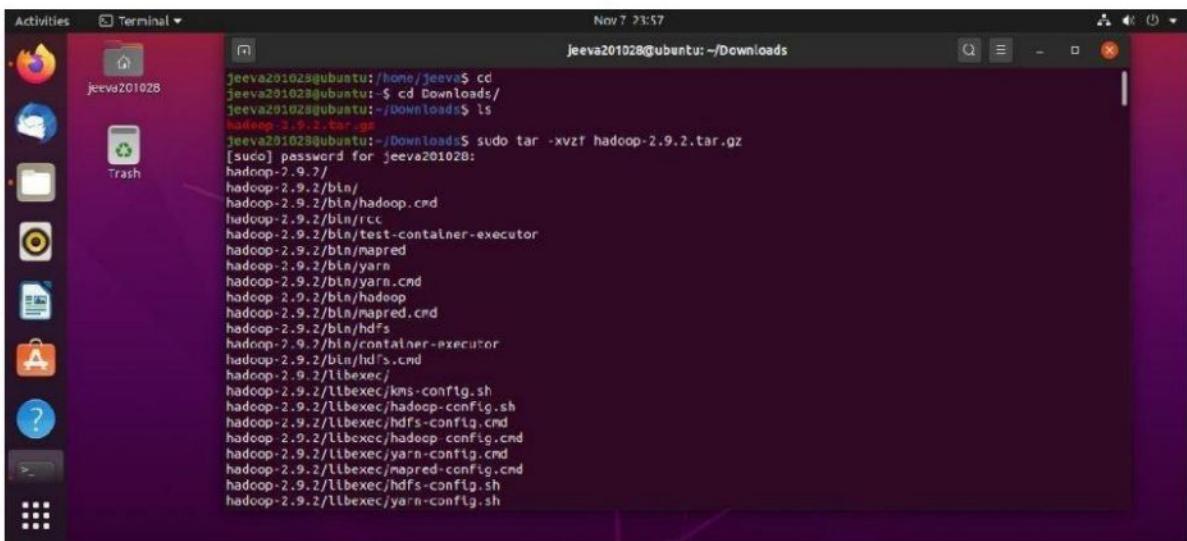
Download the hadoop-2.9.2.tar.gz file



The screenshot shows a Firefox browser window with the title "Index of /hadoop/common/hadoop-2.9.2 - Mozilla Firefox". The address bar contains the URL <https://downloads.apache.org/hadoop/common/hadoop-2.9.2/>. The page displays a list of files under the heading "Index of /hadoop/common/hadoop-2.9.2". The table has columns for Name, Last modified, Size, and Description. The files listed are:

Name	Last modified	Size	Description
Parent: Directory			
hadoop-2.9.2-src.tar.gz	2020-07-03 04:37	37M	
hadoop-2.9.2-src.tar.gz.asc	2020-07-03 04:36	861	
hadoop-2.9.2-src.tar.gz.md5	2020-07-03 04:36	1.0K	
hadoop-2.9.2.tar.gz	2020-07-03 04:38	140M	
hadoop-2.9.2.tar.gz.asc	2020-07-03 04:36	961	
hadoop-2.9.2.tar.gz.md5	2020-07-03 04:36	1.0K	

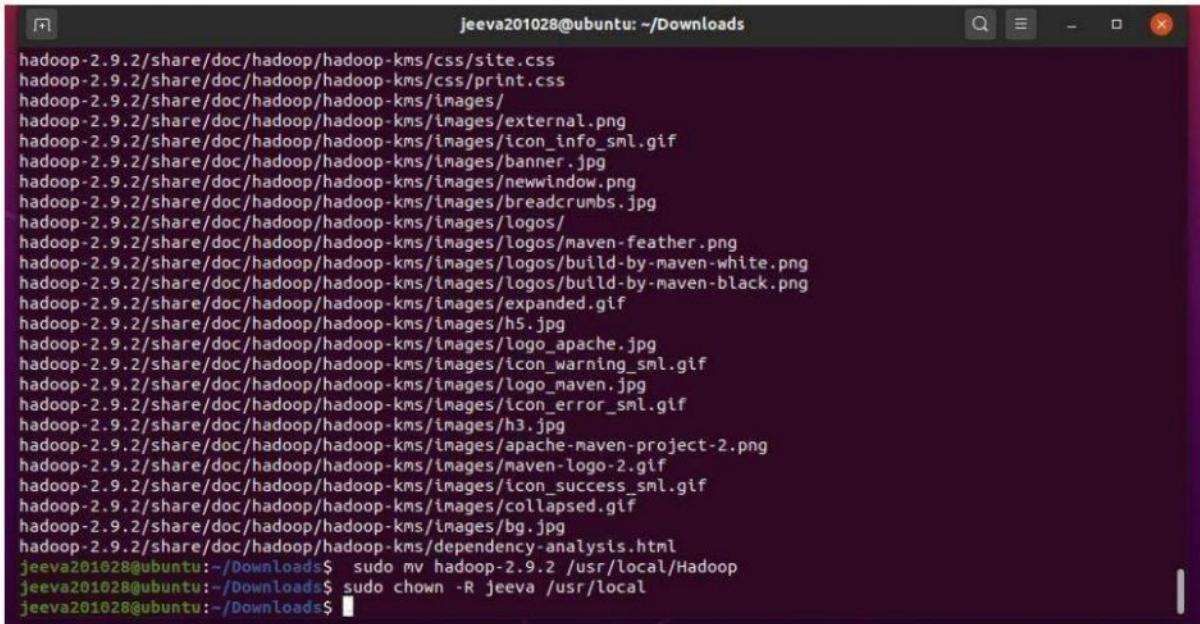
Now extract the tar file



The screenshot shows a terminal window with the title "Terminal" and the command line "jeeva201028@ubuntu: ~/Downloads". The terminal output shows the user navigating to the Downloads directory and extracting the tar file using the command "sudo tar -xvzf hadoop-2.9.2.tar.gz". The password is entered, and the extraction process begins, displaying a long list of extracted files and directories.

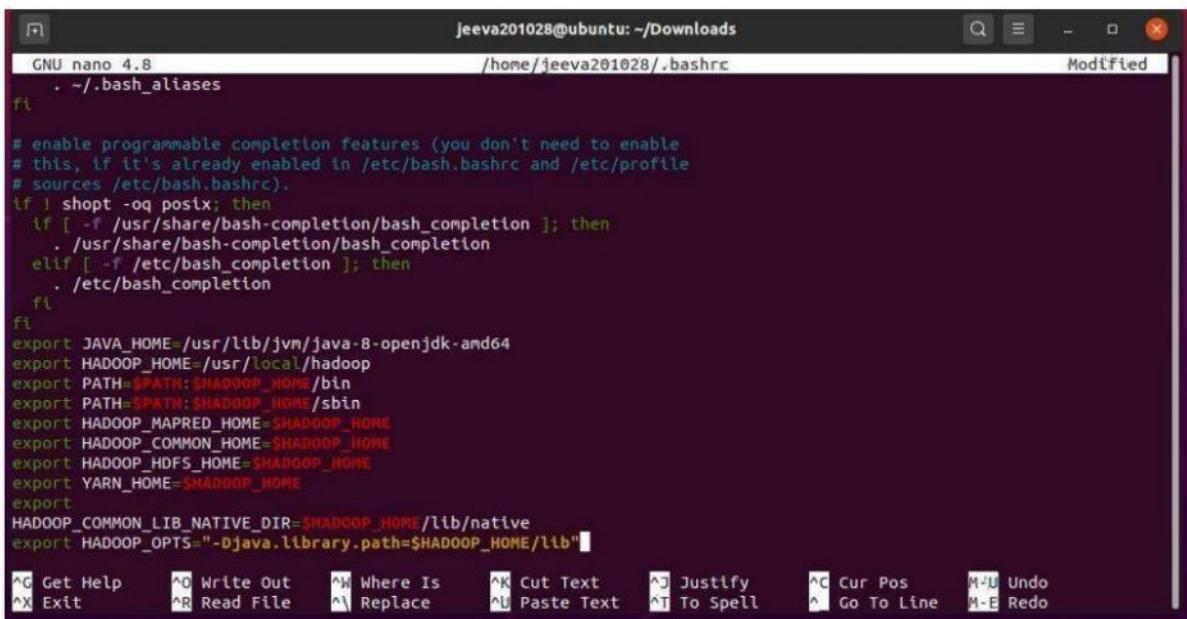
```
jeeva201028@ubuntu:~/Downloads$ cd  
jeeva201028@ubuntu:~$ cd Downloads/  
jeeva201028@ubuntu:~/Downloads$ ls  
hadoop-2.9.2.tar.gz  
jeeva201028@ubuntu:~/Downloads$ sudo tar -xvzf hadoop-2.9.2.tar.gz  
[sudo] password for jeeva201028:  
hadoop-2.9.2/  
hadoop-2.9.2/bin/  
hadoop-2.9.2/bin/hadoop.cmd  
hadoop-2.9.2/bin/rcc  
hadoop-2.9.2/bin/test-contalner-executor  
hadoop-2.9.2/bin/mapred  
hadoop-2.9.2/bin/yarn  
hadoop-2.9.2/bin/yarn.cmd  
hadoop-2.9.2/bin/hadoop  
hadoop-2.9.2/bin/mapred.cmd  
hadoop-2.9.2/bin/hdfs  
hadoop-2.9.2/bin/contalner-executor  
hadoop-2.9.2/bin/hdfs.cmd  
hadoop-2.9.2/libexec/  
hadoop-2.9.2/libexec/kms-confg.sh  
hadoop-2.9.2/libexec/hadoop-confg.sh  
hadoop-2.9.2/libexec/hdfs-confg.cmd  
hadoop-2.9.2/libexec/hadoop-confg.cmd  
hadoop-2.9.2/libexec/yarn-confg.cmd  
hadoop-2.9.2/libexec/mapred-confg.cmd  
hadoop-2.9.2/libexec/hdfs-confg.sh  
hadoop-2.9.2/libexec/yarn-confg.sh
```

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



```
jeeva201028@ubuntu: ~/Downloads
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



```
jeeva201028@ubuntu: ~/Downloads
GNU nano 4.8
/home/jeeva201028/.bashrc
Modified
.
.
.

# 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"
```

```
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_cabb_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

```
jeeva201028@ubuntu:/usr/local/Hadoop/etc/hadoop$ nano hadoop-env.sh
# limitations under the License.

# Set Hadoop-specific environment variables here.

# The only required environment variable is JAVA_HOME. All others are
# optional. When running a distributed configuration it is best to
# set JAVA_HOME in this file, so that it is correctly defined on
# remote nodes.

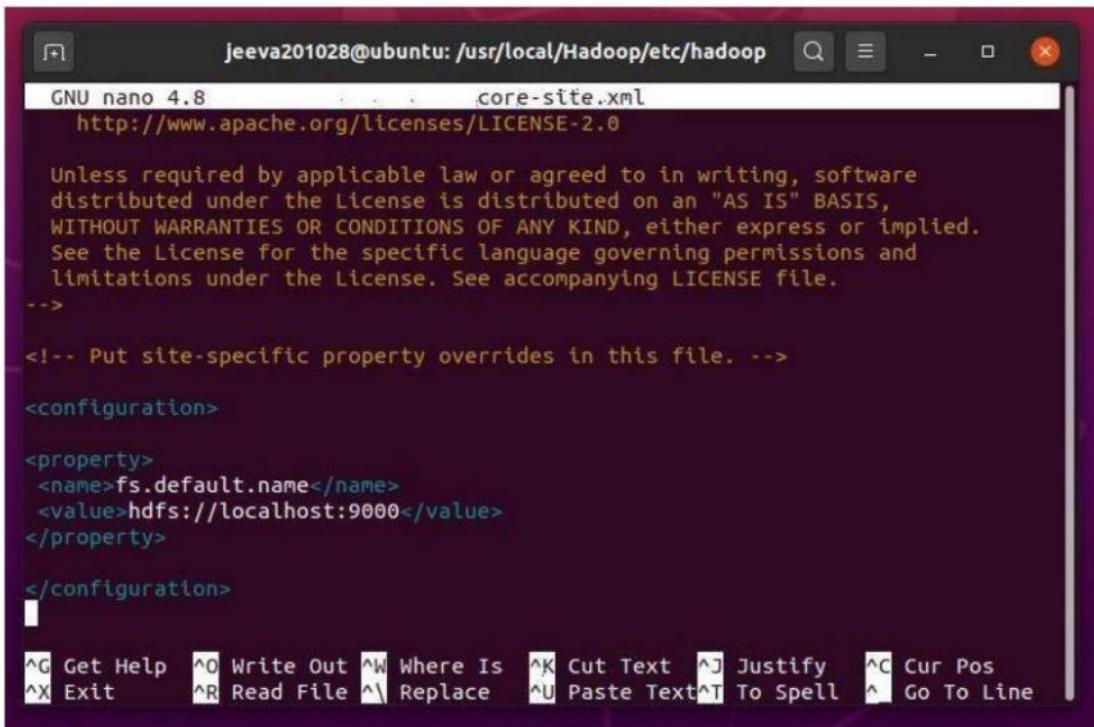
# The java implementation to use.

#export JAVA_HOME=${JAVA_HOME}

export JAVA_HOME=/usr/lib/jvm/java-11-openjdk-amd64

# The jsvc implementation to use. Jsvc is required to run secure datanodes
# that bind to privileged ports to provide authentication of data transfer
# protocol. Jsvc is not required if SASL is configured for authentication of
# data transfer protocol using non-privileged ports.
#export JSVC_HOME=${JSVC_HOME}
[ line 28/121 (23%), col 52/52 (100%), char 1175/5024 (23%) ]
^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 ^L Go To Line
```

Edit the core-site.xml



The screenshot shows a terminal window titled "core-site.xml" with the command "jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop". The file content is displayed in a monospaced font. It includes a license notice from Apache, followed by XML configuration code. The XML code defines a property for the default file system name and its value. The terminal window has a dark background with light-colored text. A status bar at the bottom shows various keyboard shortcuts.

```
GNU nano 4.8 . . . core-site.xml
http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.

-->

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

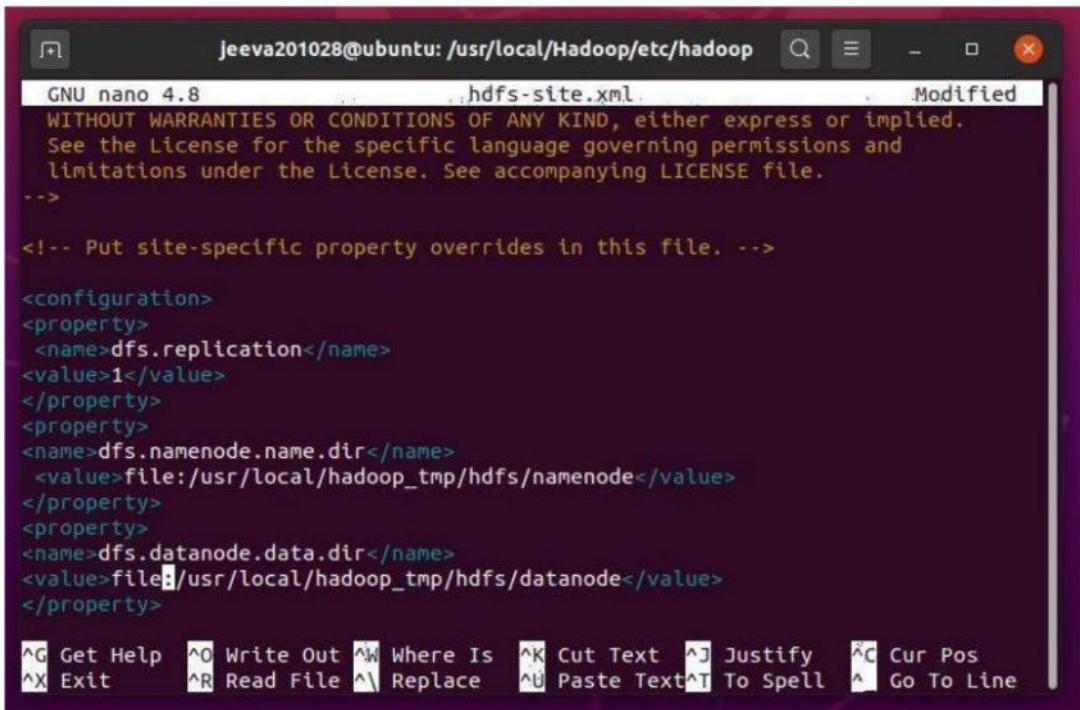
<configuration>

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

</configuration>

^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
```

Edit the hdfs-site.xml



The screenshot shows a terminal window titled "hdfs-site.xml" with the command "jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop". The file content is displayed in a monospaced font. It includes a license notice from Apache, followed by XML configuration code. The XML code defines properties for DFS replication, namenode name directory, and datanode data directory. The terminal window has a dark background with light-colored text. A status bar at the bottom shows various keyboard shortcuts.

```
GNU nano 4.8 . . . hdfs-site.xml . . . Modified
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.

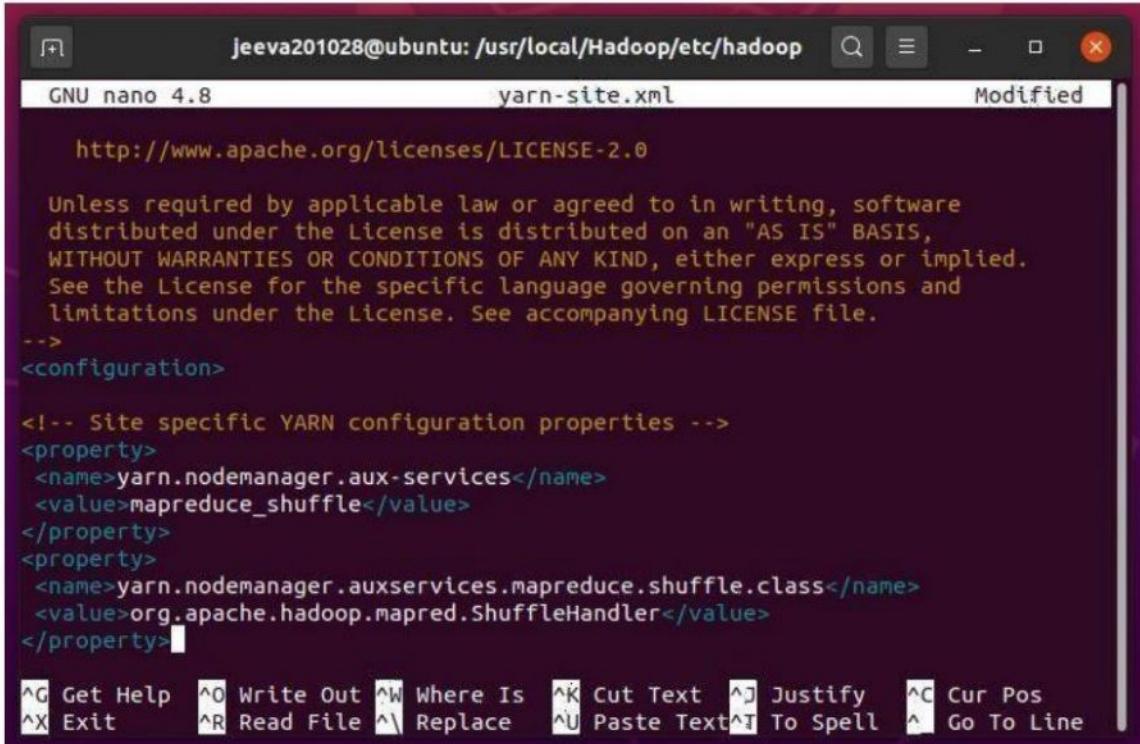
-->

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

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

Edit the yarn-site.xml



The screenshot shows a terminal window titled "jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop". The file being edited is "yarn-site.xml", which is marked as "Modified". The content of the file includes the Apache License 2.0 header and XML configuration for YARN. The XML code defines properties for the nodemanager aux-services, specifically setting the mapreduce_shuffle value. The terminal also shows a menu bar at the bottom with various keyboard shortcuts.

```
jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop$ nano yarn-site.xml
GNU nano 4.8          yarn-site.xml          Modified

http://www.apache.org/licenses/LICENSE-2.0

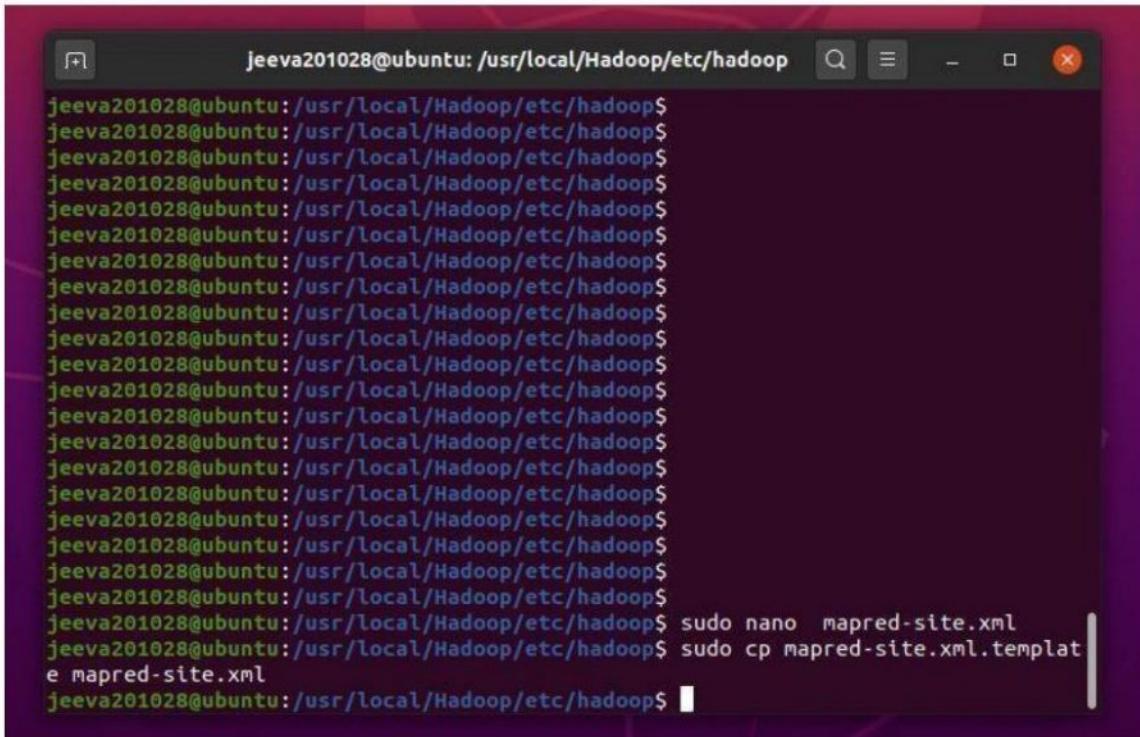
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.

-->
<configuration>

<!-- Site specific YARN configuration properties -->
<property>
  <name>yarn.nodemanager.aux-services</name>
  <value>mapreduce_shuffle</value>
</property>
<property>
  <name>yarn.nodemanager.auxservices.mapreduce.shuffle.class</name>
  <value>org.apache.hadoop.mapred.ShuffleHandler</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  ^L Go To Line
```

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



The screenshot shows a terminal window with a history of commands. The user has run several "jeeva201028@ubuntu:" prompts. At the bottom, the user runs two commands: "sudo nano mapred-site.xml" and "sudo cp mapred-site.xml.template mapred-site.xml". The terminal uses a dark theme.

```
jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop$ sudo nano mapred-site.xml
jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop$ sudo cp mapred-site.xml.template mapred-site.xml
jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop$
```

```
jeeva201028@ubuntu: /usr/local/Hadoop/etc/hadoop          mapred-site.xml      Modified  
GNU nano 4.8  
Licensed under the Apache License, Version 2.0 (the "License");  
you may not use this file except in compliance with the License.  
You may obtain a copy of the License at  
http://www.apache.org/licenses/LICENSE-2.0  
Unless required by applicable law or agreed to in writing, software  
distributed under the License is distributed on an "AS IS" BASIS,  
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.  
See the License for the specific language governing permissions and  
limitations under the License. See accompanying LICENSE file.  
-->  
<!-- Put site-specific property overrides in this file. -->  
<configuration>  
<property>  
    <name>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 ^Y Replace ^U Paste Text ^T To Spell ^L Go To Line
```

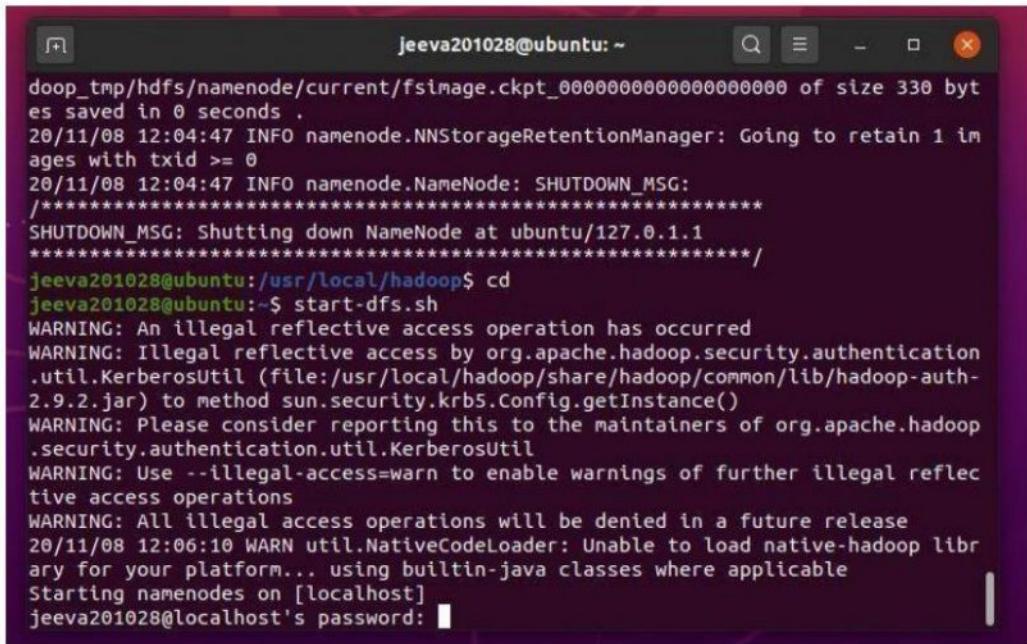
Create the following directory

```
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.template 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$
```

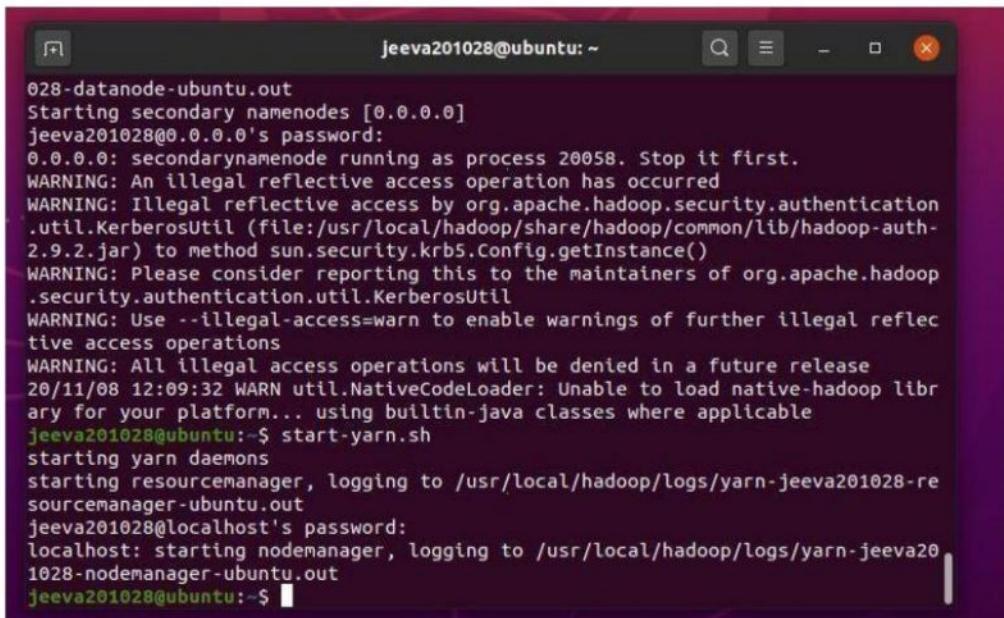
```
$ start-dfs.sh
```

```
$ start-yarn.sh
```

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



```
jeeva201028@ubuntu:~ doop_tmp/hdfs/namenode/current/fsimage.ckpt_00000000000000000000 of size 330 bytes saved in 0 seconds . 20/11/08 12:04:47 INFO namenode.NNStorageRetentionManager: Going to retain 1 images with txid >= 0 20/11/08 12:04:47 INFO namenode.NameNode: SHUTDOWN_MSG: /***** SHUTDOWN_MSG: Shutting down NameNode at ubuntu/127.0.1.1 *****/ jeeva201028@ubuntu:/usr/local/hadoop$ cd jeeva201028@ubuntu:~/start-dfs.sh WARNING: An illegal reflective access operation has occurred WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Config.getInstance() WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations WARNING: All illegal access operations will be denied in a future release 20/11/08 12:06:10 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable Starting namenodes on [localhost] jeeva201028@localhost's password: 
```



```
028-datanode-ubuntu.out Starting secondary namenodes [0.0.0.0] jeeva201028@0.0.0.0's password: 0.0.0.0: secondarynamenode running as process 20058. Stop it first. WARNING: An illegal reflective access operation has occurred WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Config.getInstance() WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations WARNING: All illegal access operations will be denied in a future release 20/11/08 12:09:32 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable jeeva201028@ubuntu:$ start-yarn.sh starting yarn daemons starting resourcemanager, logging to /usr/local/hadoop/logs/yarn-jeeva201028-re sourcemanager-ubuntu.out jeeva201028@localhost's password: localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-jeeva201028-nodemanager-ubuntu.out jeeva201028@ubuntu:$ 
```

Input: ‘sample.txt’ file

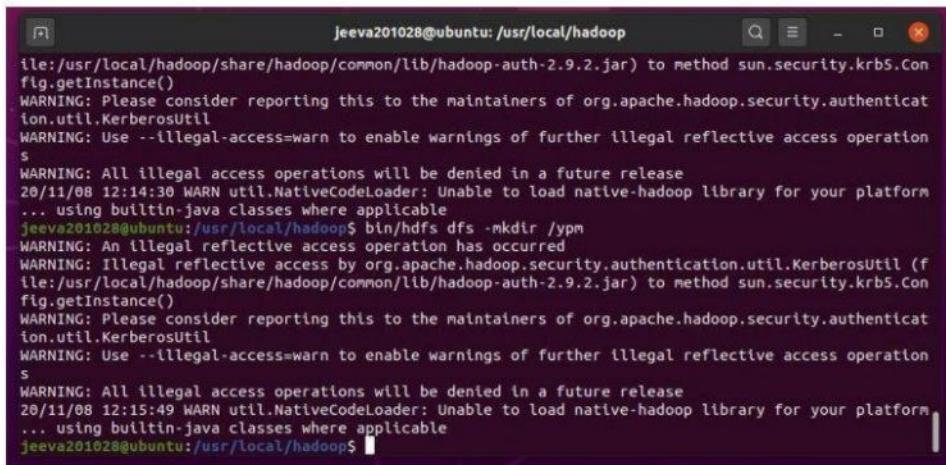
```
hello
how are you
communication
components
computational
computer
computing
coordinate
compiler
distributed file system
hadoop
single node cluster
word count
```

Get Help Write Out Where Is Cut Text Justify Cur Pos Undo Mark Text To Bracket
Exit Read File Replace Paste Text To Spell Go To Line Redo Copy Text Where Was

Now run bin/hdfs dfs -mkdir /user

```
jeeva201028@ubuntu: /usr/local/hadoop
20058 SecondaryNameNode
jeeva201028@ubuntu:~$ cd /home/jeeva201028/Desktop/
jeeva201028@ubuntu:~/Desktop$ mkdir data1
jeeva201028@ubuntu:~/Desktop$ cd data1
jeeva201028@ubuntu:~/Desktop/data1$ sudo nano sample.txt
jeeva201028@ubuntu:~/Desktop/data1$ cd
jeeva201028@ubuntu:~$ cd /usr/local/hadoop
jeeva201028@ubuntu:/usr/local/hadoop$ bin/hdfs dfs -mkdir /user
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
20/11/08 12:14:30 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
```

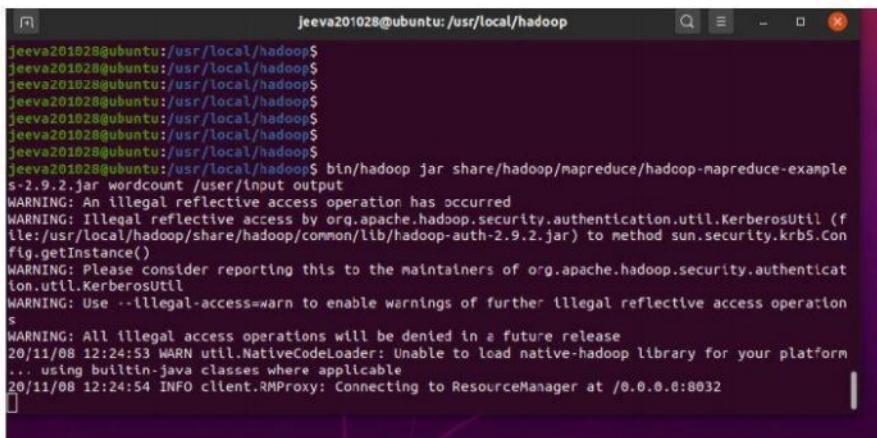
Then run bin/hdfs dfs -mkdir /ypm



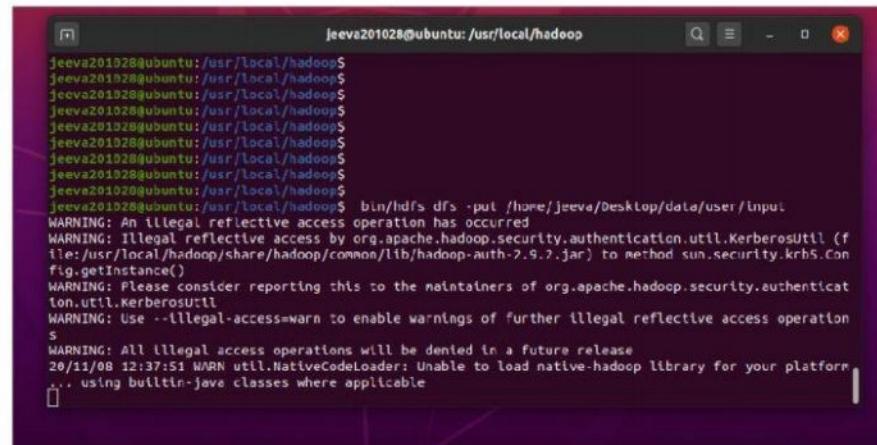
```
jeeva201028@ubuntu:/usr/local/hadoop
file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Con
flg.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authenticat
ion.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operation
s
WARNING: All illegal access operations will be denied in a future release
20/11/08 12:14:30 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform
... using builtin-java classes where applicable
jeeva201028@ubuntu:/usr/local/hadoop$ bin/hdfs dfs -mkdir /ypm
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (f
ile:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Con
fig.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authenticat
ion.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operation
s
WARNING: All illegal access operations will be denied in a future release
20/11/08 12:15:49 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform
... using builtin-java classes where applicable
jeeva201028@ubuntu:/usr/local/hadoop$
```

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

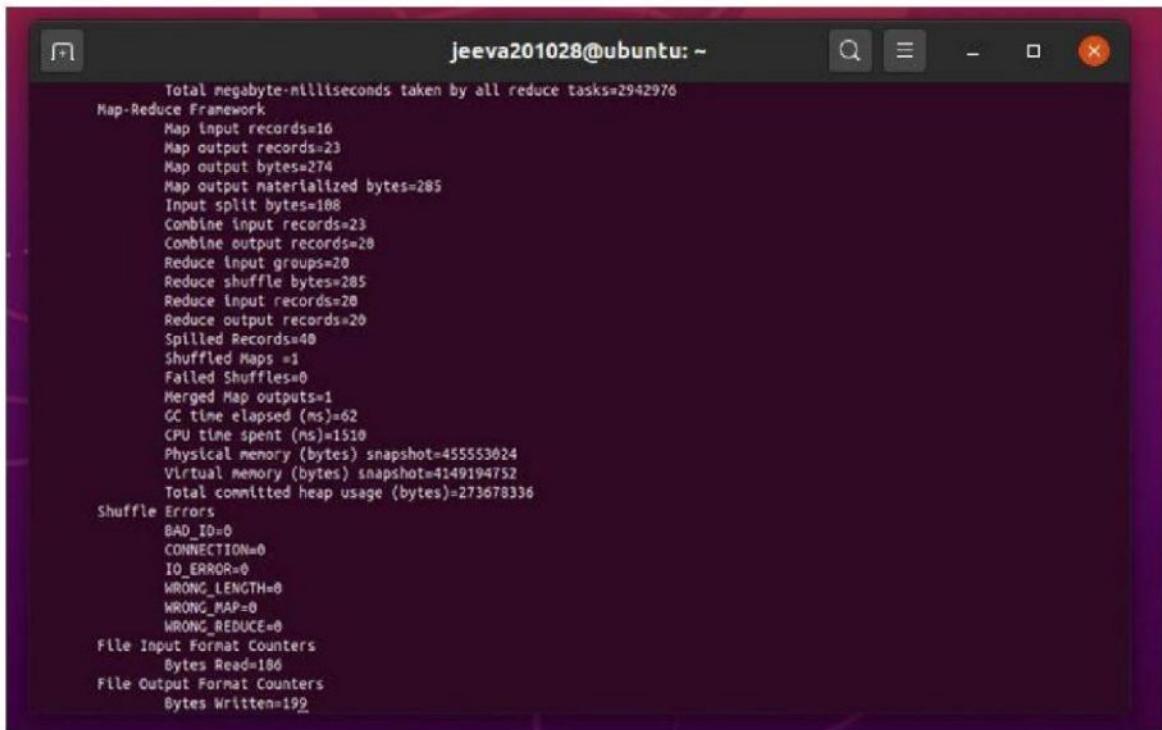
```
$ bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.9.2.jar
wordcount /user/input output
```



```
jeeva201028@ubuntu:/usr/local/hadoop
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$ bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-exampl
e-2.9.2.jar wordcount /user/input output
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (f
ile:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Con
fig.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authenticat
ion.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operation
s
WARNING: All illegal access operations will be denied in a future release
20/11/08 12:24:53 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform
... using builtin-java classes where applicable
20/11/08 12:24:54 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.6:8032
```



```
jeeva201028@ubuntu:/usr/local/hadoop
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$
jeeva201028@ubuntu:/usr/local/hadoop$ bin/hdfs dfs -put /home/jeeva/Desktop/data/user/input
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (f
ile:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Con
fig.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authenticat
ion.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operation
s
WARNING: All illegal access operations will be denied in a future release
20/11/08 12:37:51 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform
... using builtin-java classes where applicable
```

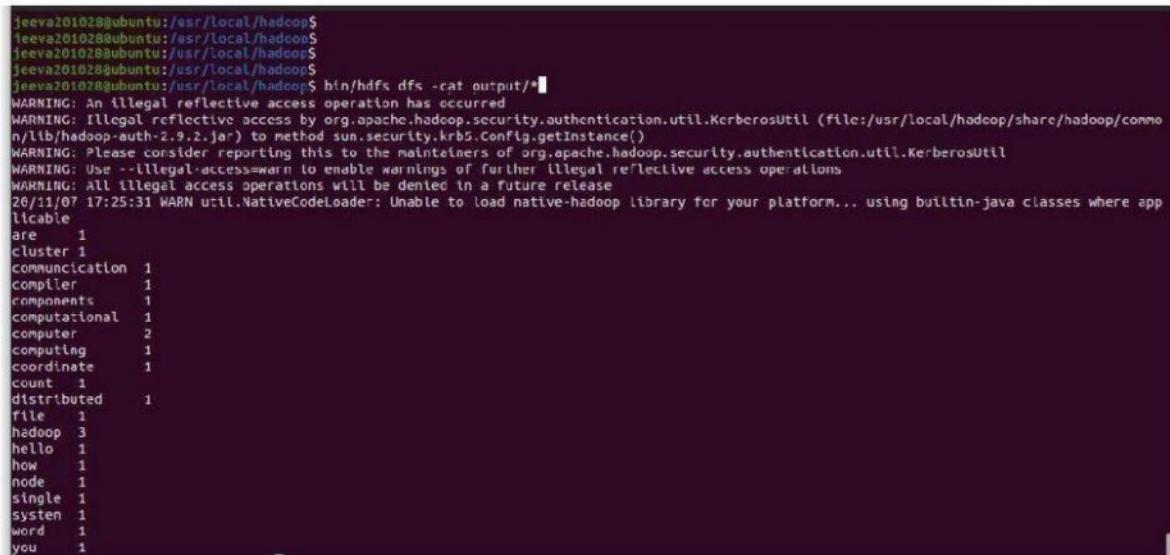


jeeva201028@ubuntu: ~

```
Total megabyte-milliseconds taken by all reduce tasks=2942976
Map-Reduce Framework
  Map input records=16
  Map output records=23
  Map output bytes=274
  Map output materialized bytes=285
  Input split bytes=108
  Combine input records=23
  Combine output records=28
  Reduce input groups=20
  Reduce shuffle bytes=285
  Reduce input records=28
  Reduce output records=20
  Spilled Records=40
  Shuffled Maps =1
  Failed Shuffles=0
  Merged Map outputs=1
  GC time elapsed (ms)=62
  CPU time spent (ms)=1510
  Physical memory (bytes) snapshot=455553024
  Virtual memory (bytes) snapshot=4149194752
  Total committed heap usage (bytes)=273678336
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=186
File Output Format Counters
  Bytes Written=199
```

Now run the following command to see the output

```
$ bin/hdfs dfs -cat output/*
```



```
jeeva201028@ubuntu:/usr/local/hadoop$ 
jeeva201028@ubuntu:/usr/local/hadoop$ 
jeeva201028@ubuntu:/usr/local/hadoop$ 
jeeva201028@ubuntu:/usr/local/hadoop$ 
jeeva201028@ubuntu:/usr/local/hadoop$ bin/hdfs dfs -cat output/*
WARNING: An illegal reflective access operation has occurred.
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.9.2.jar) to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denoted in a future release
20/11/07 17:25:31 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-Java classes where applicable
are 1
cluster 1
communication 1
compiler 1
components 1
computational 1
computer 2
computing 1
coordinate 1
count 1
distributed 1
file 1
hadoop 3
hello 1
how 1
node 1
single 1
system 1
word 1
you 1
```

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

The screenshot shows the Hadoop Overview page. At the top, there is a navigation bar with links for Apps, Gmail, YouTube, and Maps. Below the navigation bar, there is a green header bar with tabs for Hadoop, Overview, Datanodes, Datanode Volume Failures, Snapshot, Startup Progress, and Utilities. The Utilities tab is currently selected. The main content area is titled "Overview 'localhost: 9000' (active)". It displays various system statistics:

Stat	Value
Started:	Sat Nov 07 19:45:51 +0530 2010
Version:	2.0.2-hadoop2.0.2-140697bc2847dc841d99e52c0704
Completed:	Tue Nov 13 18:12:00 +0530 2010 by ajitakar from branch-2.0.2
Cluster ID:	CID-4220582-0f67-4068-898b-e2791099270
Block Pool ID:	BP-424539900-127.0.1.1-1604743299079

Below the statistics, there is a "Summary" section with detailed information about DFS usage:

Configured Capacity	97.63 GB
DFS Used	296 kB (0%)
Non DFS Used	15.41 GB
DFS Remaining	77.2 GB (79.07%)

The screenshot shows the Datanode Information page. At the top, there is a navigation bar with links for Apps, Gmail, YouTube, and Maps. Below the navigation bar, there is a green header bar with tabs for Hadoop, Overview, Datanodes, Datanode Volume Failures, Snapshot, Startup Progress, and Utilities. The Utilities tab is currently selected. A dropdown menu under Utilities shows options: "Browse the filesystem" and "Log". The main content area is titled "Datanode Information". It includes a "Datanode usage histogram" which shows a single green bar at the 0 mark. Below the histogram, there is a table titled "In operation".

Node	HTTP Address	Last contact	Last Block Report	Capacity	Used	Block pre used	Version
localhost:50070 (27.0.1.1:50070)	http://localhost:50070	On	24h	57.63 GB	0	296 kB (0%)	2.0.2

localhost:8080/replicator.html

Apps Gmail YouTube Maps

Hadoop Overview Databases Document Version History Snapshot Status Progress Utilities

Browse Directory

Show 25 entries Search:

	Permissions	Owner	Group	Size	Last Modified	Replication	Block Size	Name
0	drwxr-xr-x	hadoop	supergroup	0 B	Mon 07/17/13	8	0 B	imp
1	drwxr-xr-x	hadoop	supergroup	0 B	Mon 07/17/13	8	0 B	map
2	drwxr-xr-x	hadoop	supergroup	0 B	Mon 07/17/13	8	0 B	redu

Showing 1 to 3 of 3 entries

Filesize: 1 MB

Hadoop 2013.

localhost:8080/replicator.html/one/input

Apps Gmail YouTube Maps

Hadoop Overview Databases Document Version History Snapshot Status Progress Utilities

Browse Directory

Show 25 entries Search:

File information - sample.txt

Download Hash file (first 520) Tail file (last 520)

Block ID: 2072742829
Block Pos ID: BP-4363239402-127.0.1.1-1404743869075
Generation Stamp: 1403
Size: 238 Availability: [a file](#) (2009)

File content:

```
Hello  
How are you?  
I am fine.  
Communication  
Components  
Computer  
Computer  
Computer
```

Close

Hadoop 2013.

localhost:8080/replicator.html/locked

Apps Gmail YouTube Maps

Hadoop Overview Databases Document Version History Snapshot Status Progress Utilities

Browse Directory

Show 25 entries Search:

	Permissions	Owner	Group	Size	Last Modified	Replication	Block Size	Name
0	drwxr-xr-x	hadoop	supergroup	0 B	Mon 07/17/13	8	0 B	output

Showing 1 to 1 of 1 entries

Filesize: 1 MB

Hadoop 2013.

Name	Size	Last Modified	Replication	Block Size	Owner	Group	Permission
_SUCCESS	0 B	Nov 07 17:15	1	128 MB	jeeva01028	supergroup	-rwxr--r--
part-r-00000	399 B	Nov 07 17:15	1	128 MB	jeeva01028	supergroup	-rwxr--r--

After completing stop hadoop \$ stop-all.sh

```
jeeva201028@ubuntu:/usr/local/hadoop$  
jeeva201028@ubuntu:/usr/local/hadoop$ stop-all.sh  
This script is Deprecated. Instead use stop-dfs.sh and stop-yarn.sh  
WARNING: An illegal reflective access operation has occurred  
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.  
util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.  
9.2.jar) to method sun.security.krb5.Config.getInstance()  
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.  
security.authentication.util.KerberosUtil  
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflect  
ive access operations  
WARNING: All illegal access operations will be denied in a future release  
20/11/09 00:21:44 WARN util.NativeCodeLoader: Unable to load native-hadoop libra  
ry for your platform... using builtin-java classes where applicable  
Stopping namenodes on [localhost]  
jeeva201028@localhost's password: [REDACTED]
```

DESCRIPTION	MAX. MARKS	MARKS AWARDED
Aim	05	
Software/Tools Required & Algorithm	10	
Coding/Programming & Execution	20	
Record	20	
Viva-voice	10	
Result	10	
Total	75	

Result:

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