



Updated LAB Manual Cloud(2) compressed

Computer Science and Engineering (National Institute of Technology Andhra Pradesh)

Ex.No:1a	Install Virtualbox/VMware Workstation with different flavors of linux or windows OS on top of windows7 or 8.
Date:	

Aim:

To Install Virtualbox/VMware Workstation with different flavors of linux or windows OS on top of windows7 or 8.

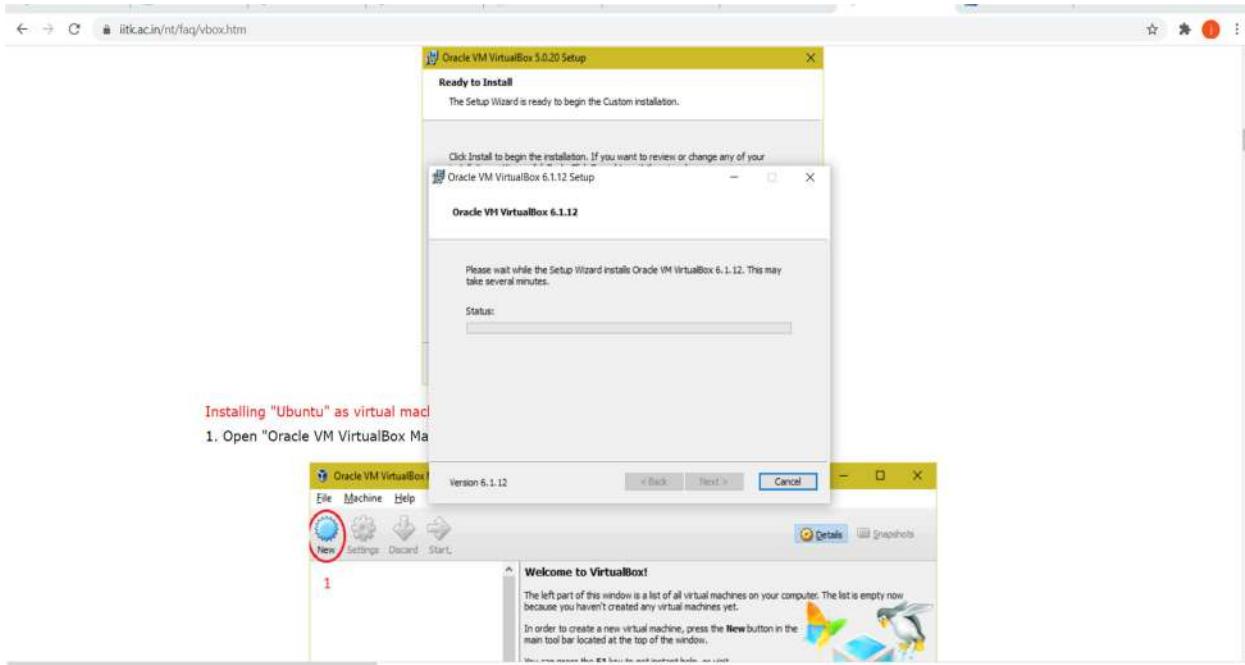
Procedure:

STEP:1 Open the VirtualBox website. Go to <https://www.virtualbox.org/> in your computer's Internet browser. This is the website from which you'll download the VirtualBox setup file.

STEP:2 Click download virtual box. It's a blue button in the middle of the page. Doing so will open the downloads page.



STEP 3: Click windows host. You'll see this link below the "VirtualBox 5.2.8 platform packages" heading. The VirtualBox EXE file will begin downloading onto your computer.



STEP:4 Open the VirtualBox EXE file. Go to the location to which the EXE file downloaded and double-click the file. Doing so will open the VirtualBox installation window.

Navigate through the installation prompts. Do the following:

- Click **Next** on the first three pages.
- Click **Yes** when prompted.
- Click **Install**
- Click **Yes** when prompted.
- **Click install when prompted.** Doing so will allow VirtualBox to begin installing on your computer.
- **Click finish when prompted.** It's in the lower-right side of the window. Doing so will close the installation window and open VirtualBox.



RESULT:

Thus the oracle VM Virtual box is installed in windows.

Ex.No:1b

INSTALLATION OF VIRTUAL MACHINE

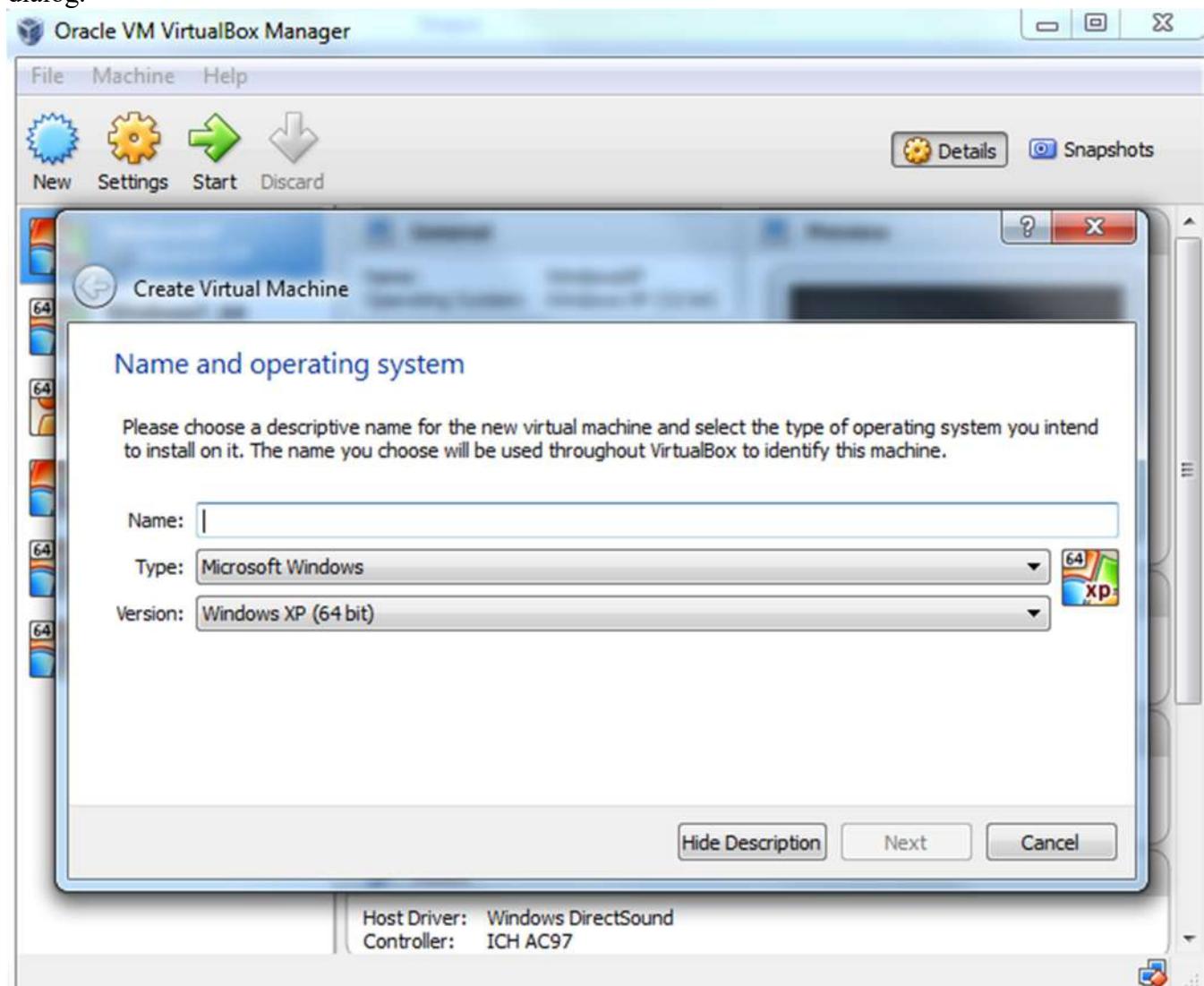
Date:

Aim:

To create a virtual machine using Virtualbox/VMware Workstation on top of windows7 or 8.

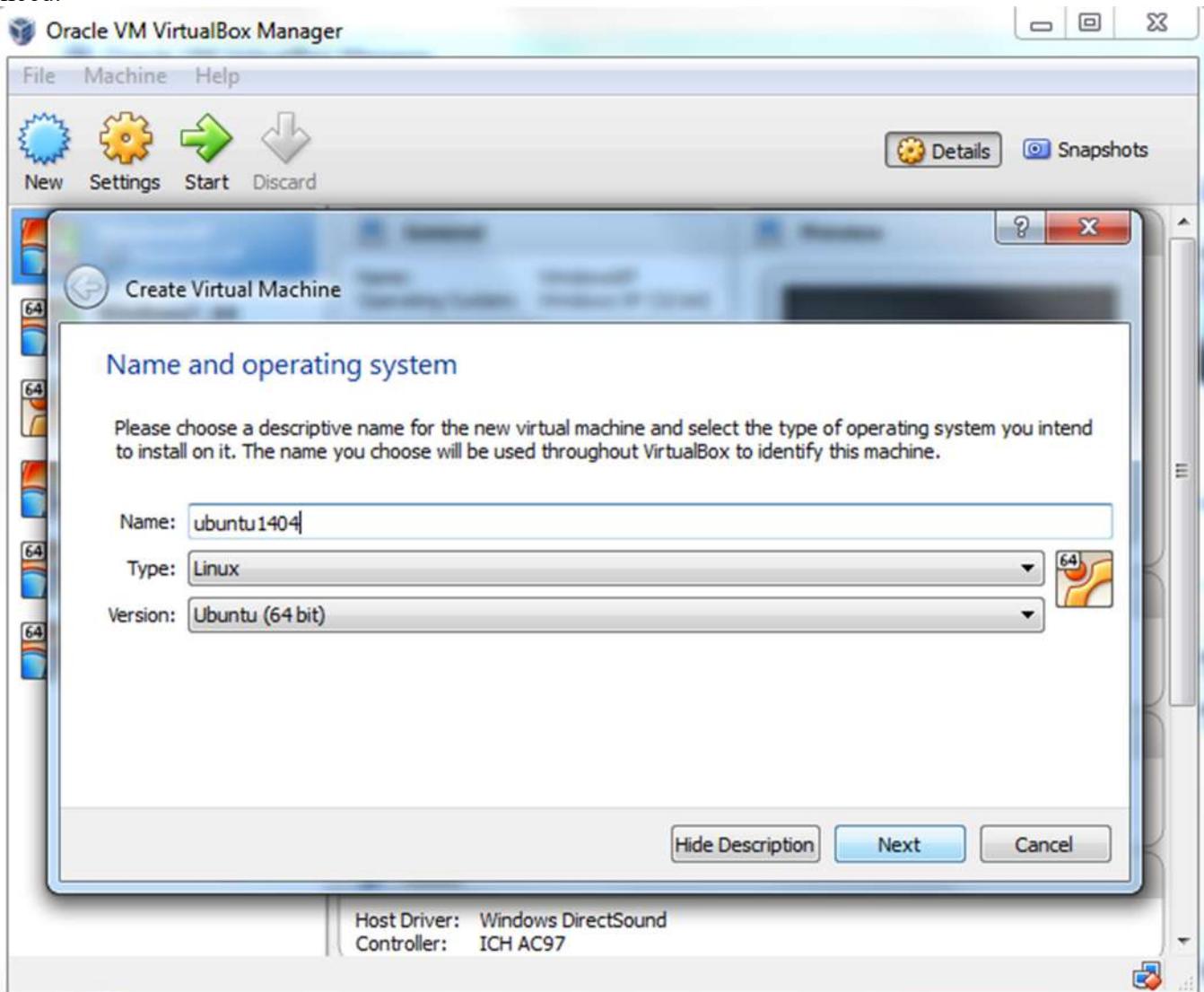
Procedure:

Step:1.Click 'New' button to open a dialog.

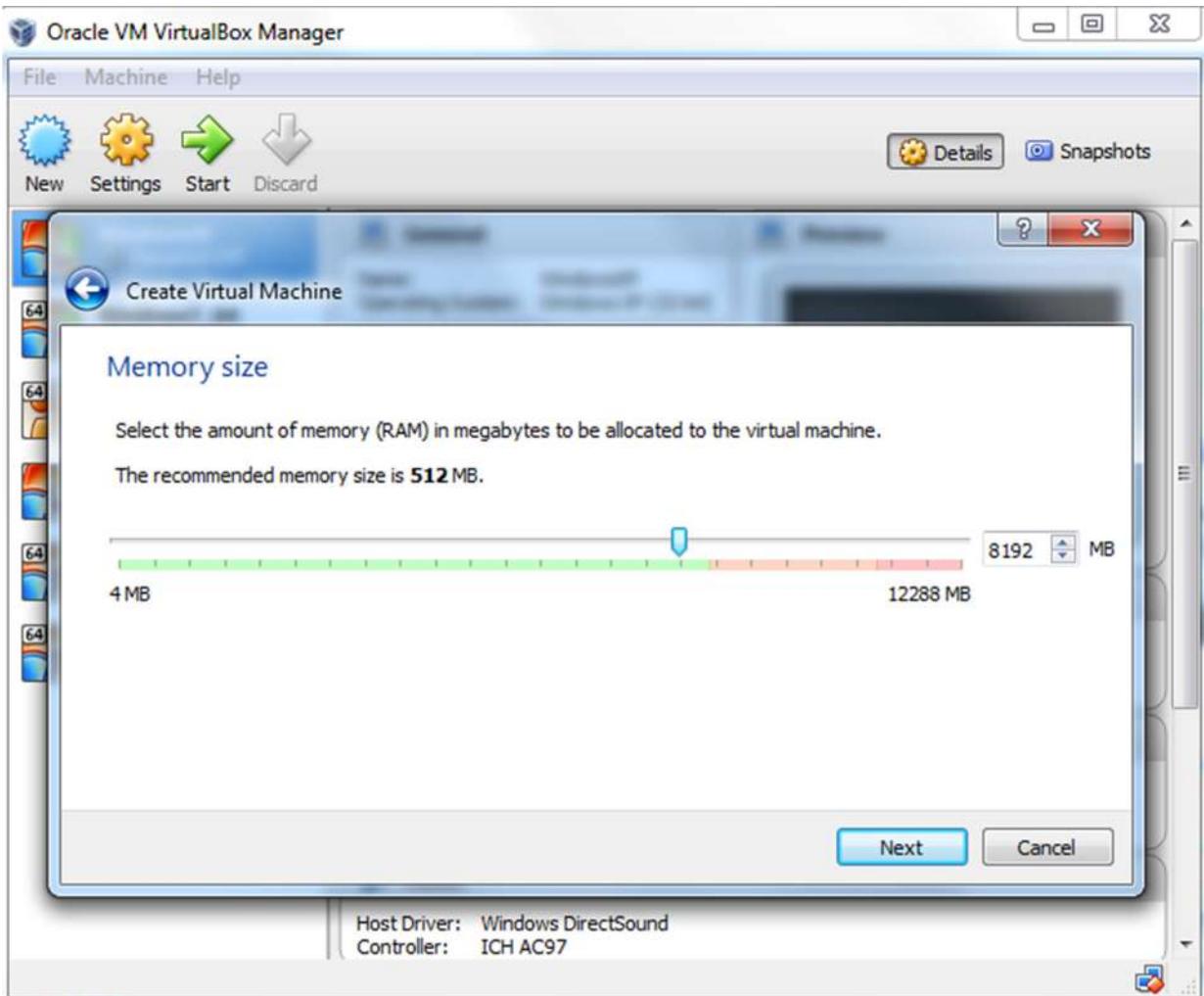


Step 2: Type a name for the new virtual machine. Since I am planning to install Ubuntu 14.04, I'll enter 'ubuntu1404'. Note that VirtualBox automatically changes 'Type' to Linux and 'Version' to 'Ubuntu (64 bit)'. These two options are exactly what we

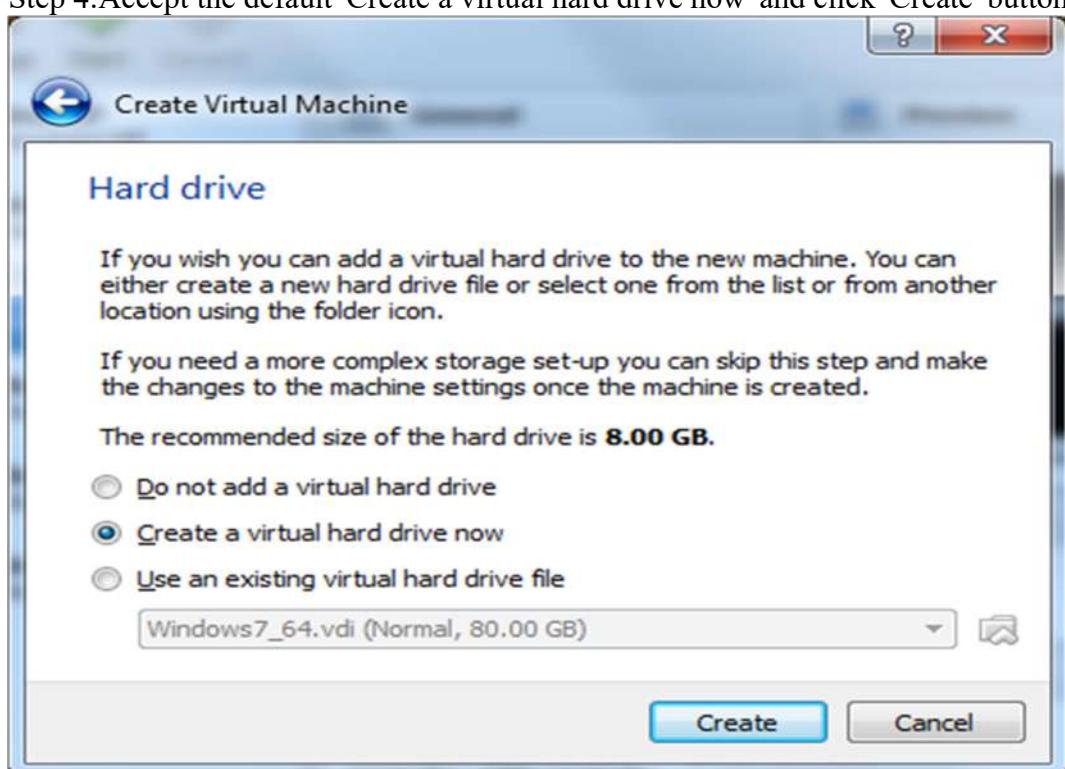
need.



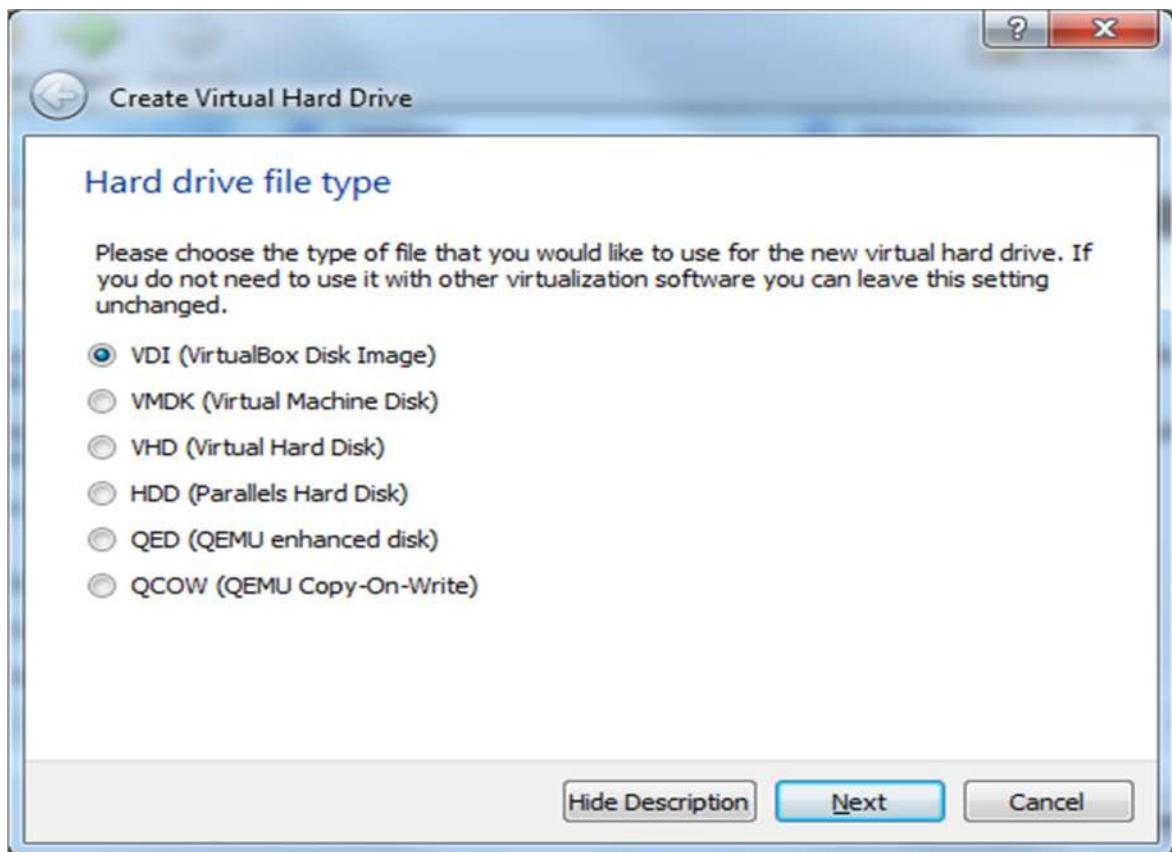
Step 3: The memory size depends on your host machine memory size. In my case, I have 12GB physical RAM. I like to allocate as much as possible for Ubuntu but leave some for my Windows host machine. I pick 8192 MB for my Ubuntu. Note that VirtualBox will create a swap partition with the same amount space as base memory you have entered here. So later when you are selecting the size of the virtual hard drive, make sure it is large enough since the hard drive will be splitted into root (/) and swap partitions. The root partition contains by default all your system files, program settings and documents.



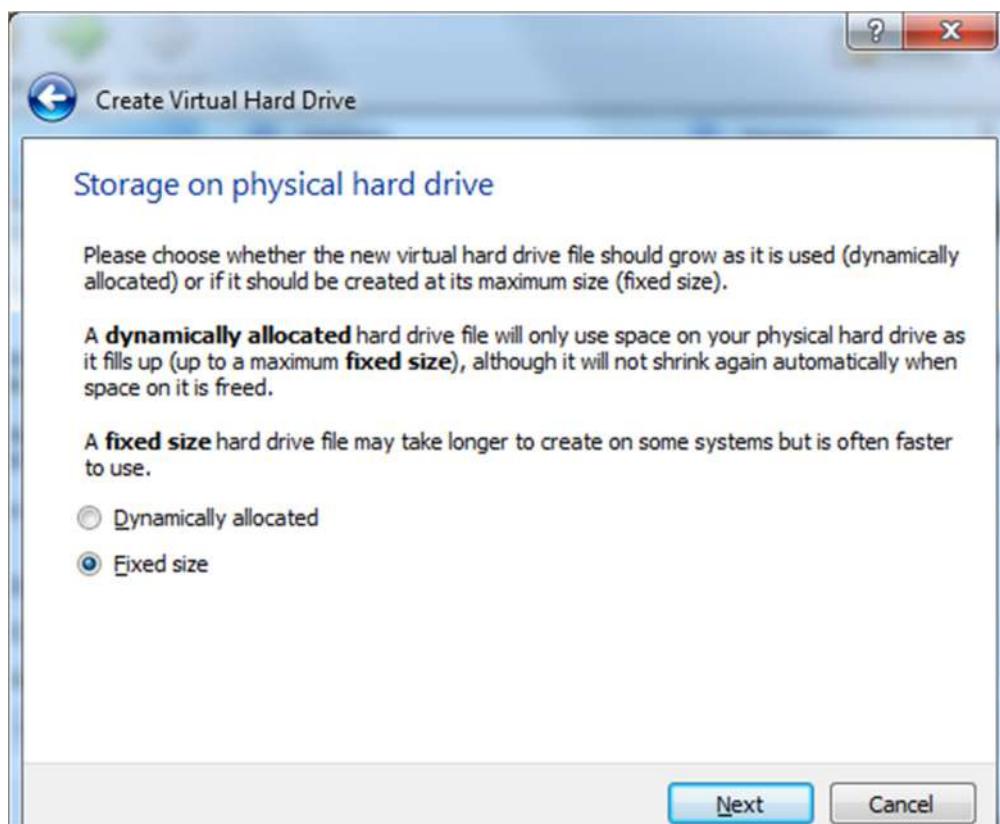
Step 4:Accept the default 'Create a virtual hard drive now' and click 'Create' button



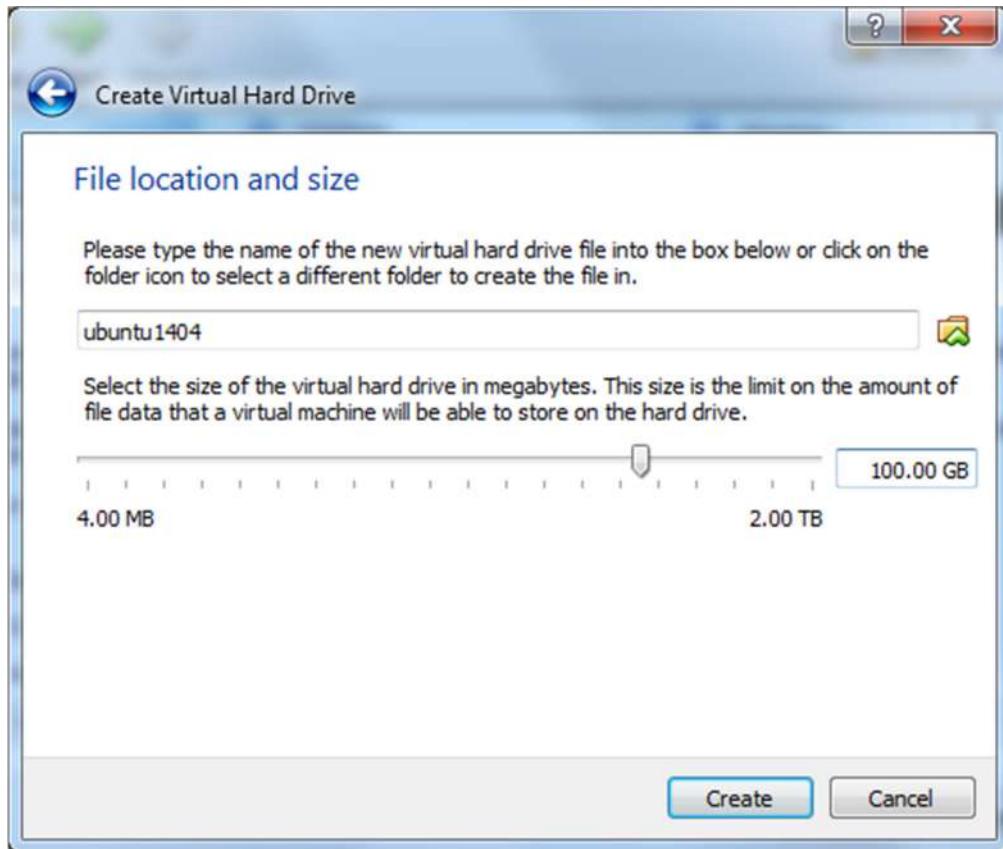
Step 5:Continue to accept the default 'VDI' drive file type and click 'Next' button.



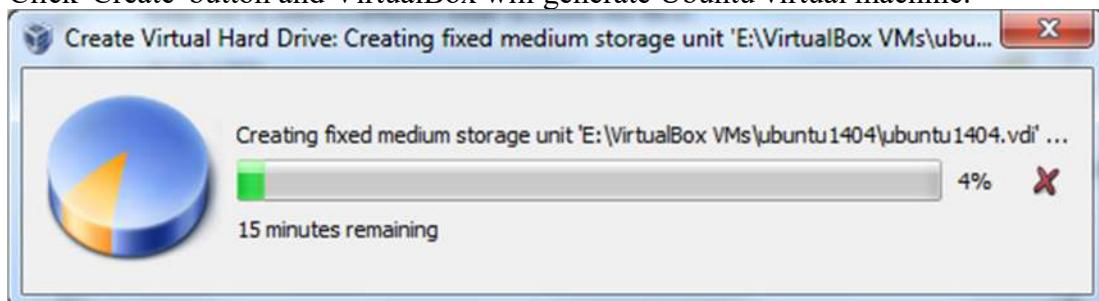
Step 6: Change the storage type from the default 'Dynamically allocated' to 'Fixed size' to increase performance.



Step 7: For the virtual hard drive space, the default value is 8GB which is too little for RNA-Seq analysis. I'll pick 100GB since I have plenty of space in my hard disk. You want to choose a good size for your RNA-Seq analysis. If you realize the drive space is not large enough, you'll need to go over these steps again to create another virtual machine.



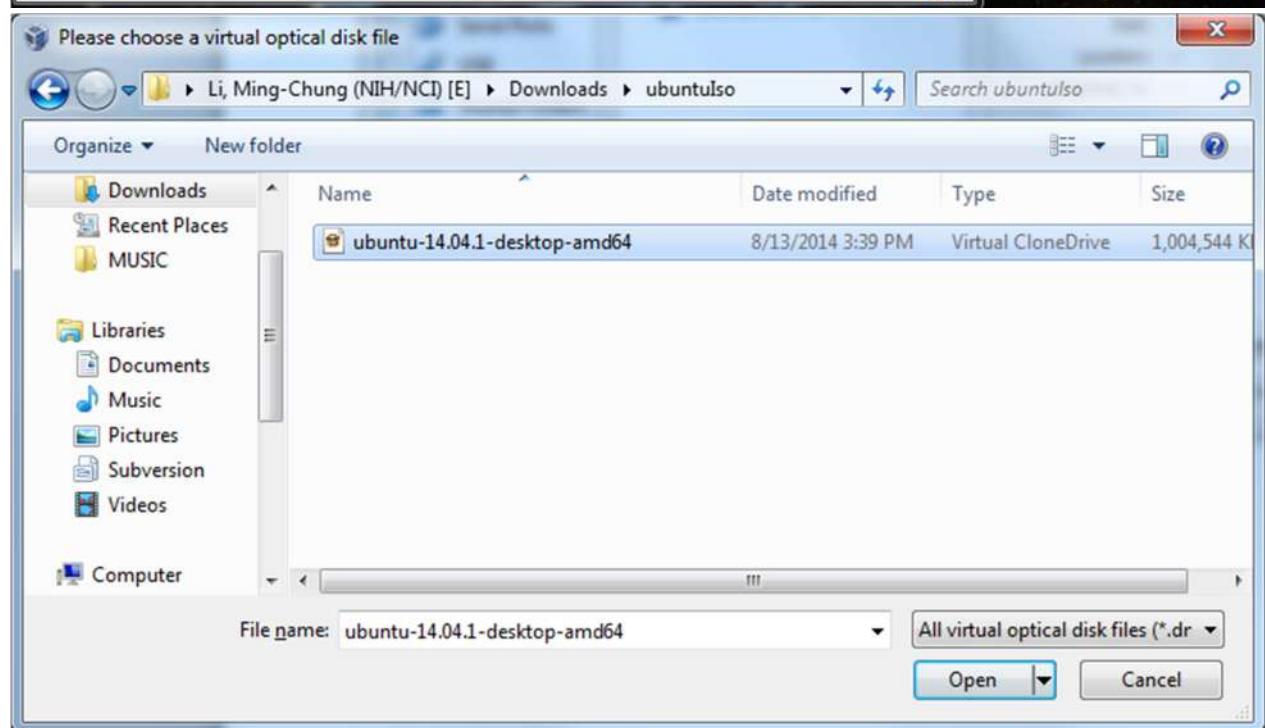
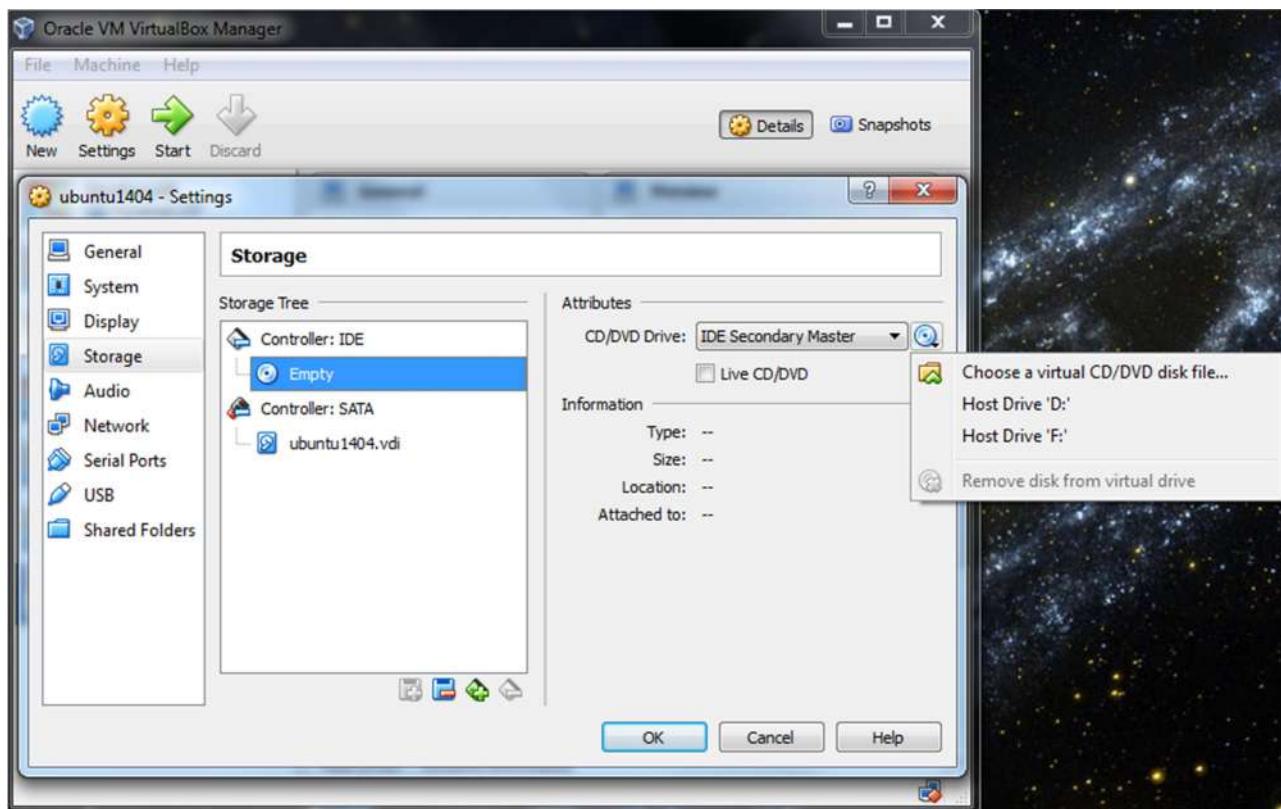
Click 'Create' button and VirtualBox will generate Ubuntu virtual machine.

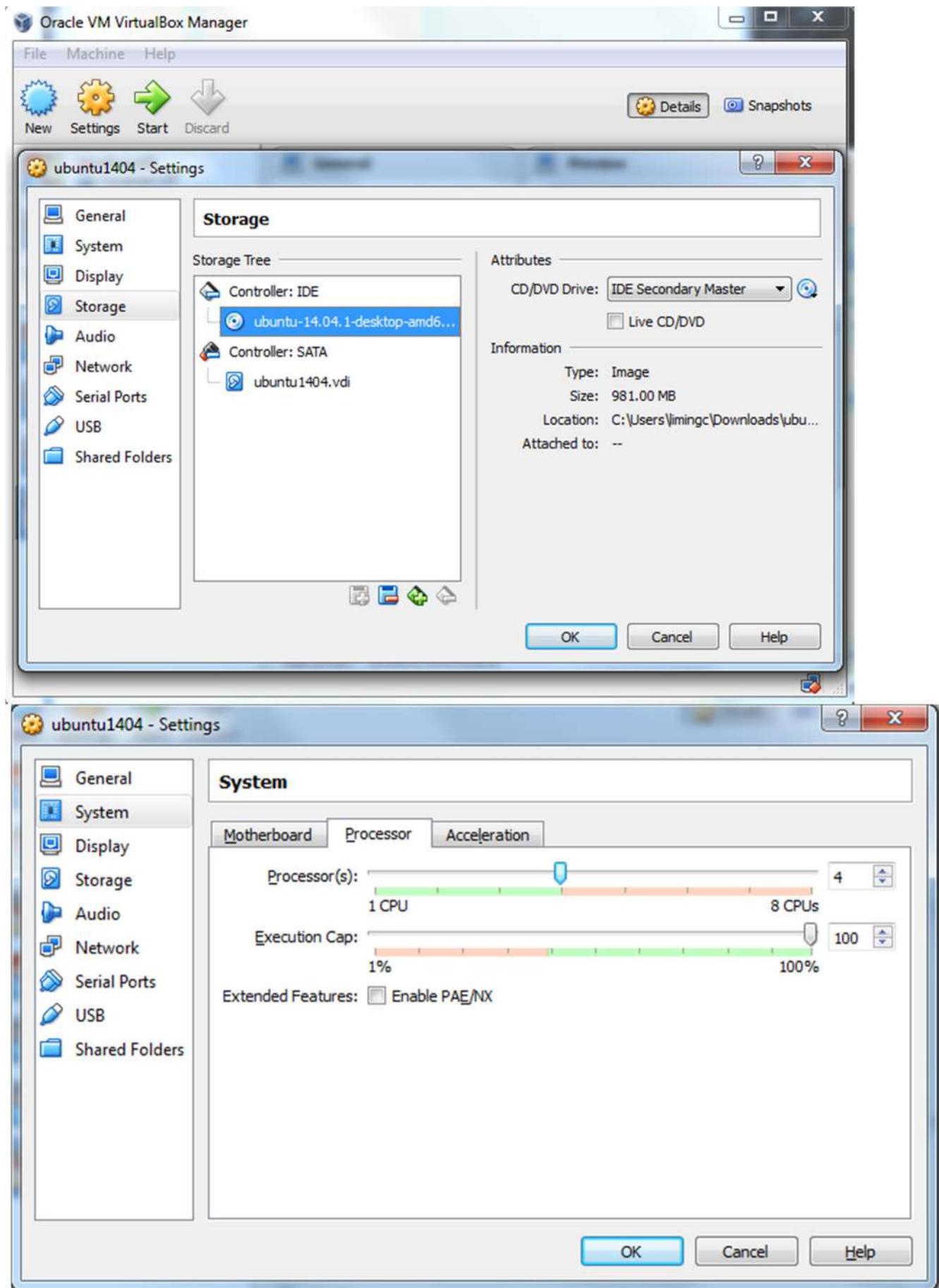


Now the virtual machine is created.

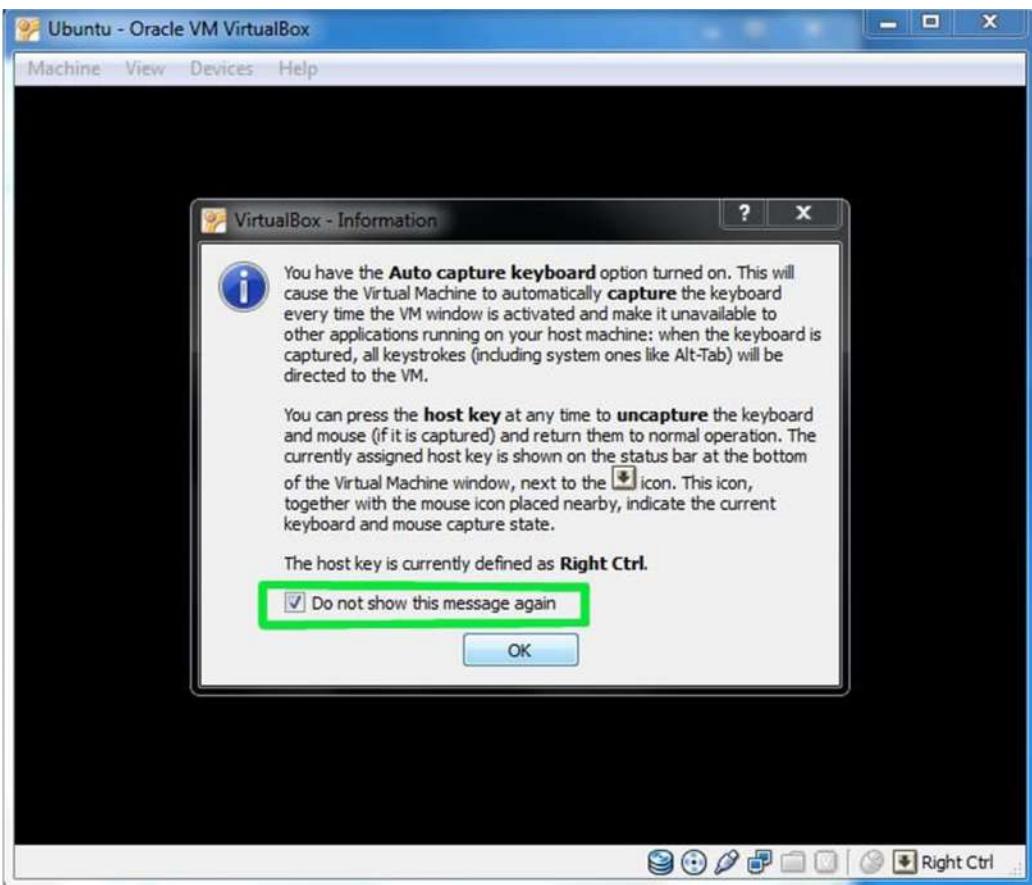
We are ready to install Ubuntu in this virtual machine. Select your new virtual machine and click 'Settings' button. Click on 'Storage' category and then 'Empty' under Controller:IDE. Click "CD/DVD" icon on right hand side and select the ubuntu ISO file to mount.

Note that if you have not downloaded 64-bit Ubuntu ISO file, download it and When downloading Ubuntu ISO file, make sure to select 64-bit version.



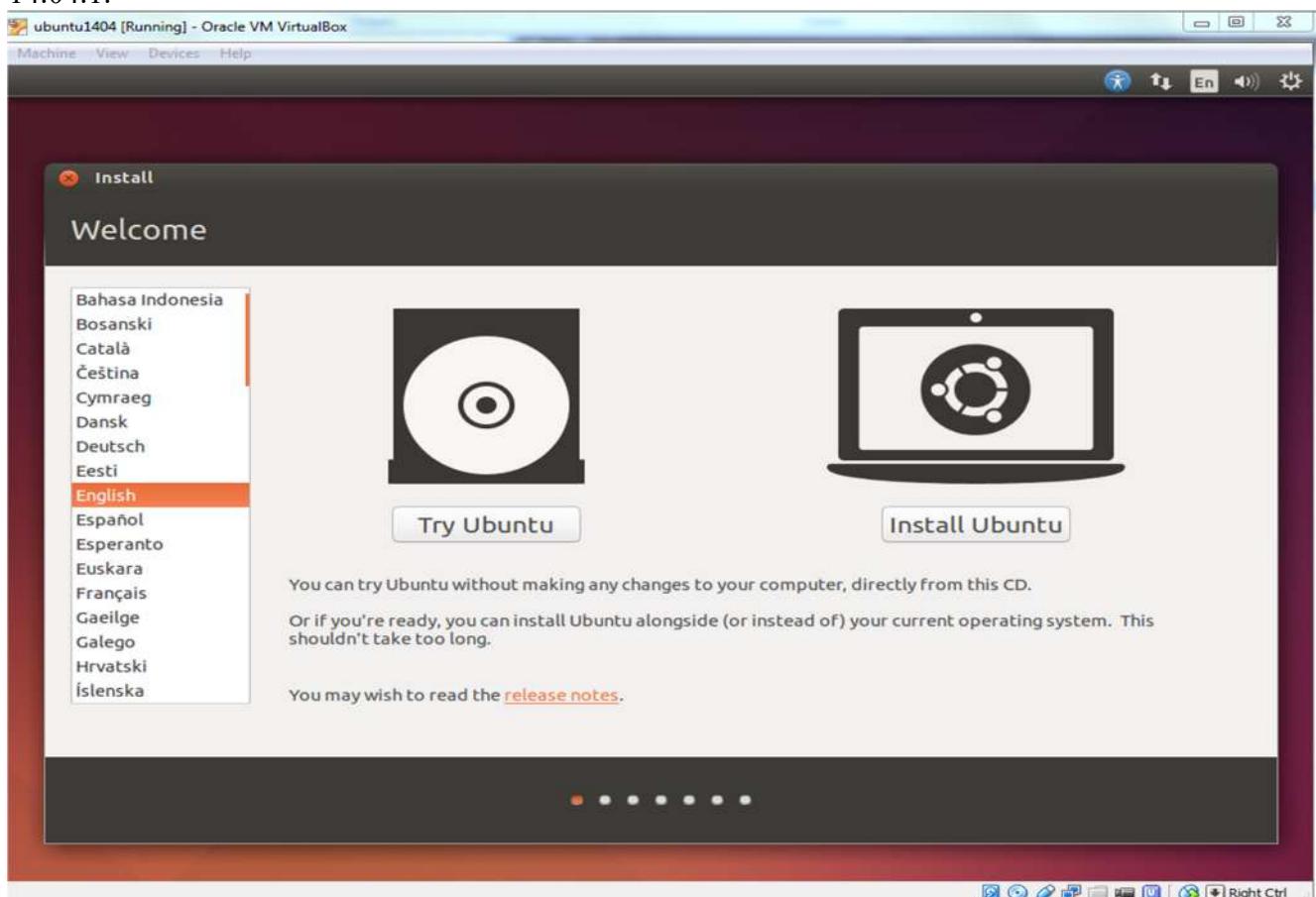


VirtualBox may pop up a message about 'Auto capture keyboard' option. Read the message there and check 'Do not show this message again' option before clicking OK.

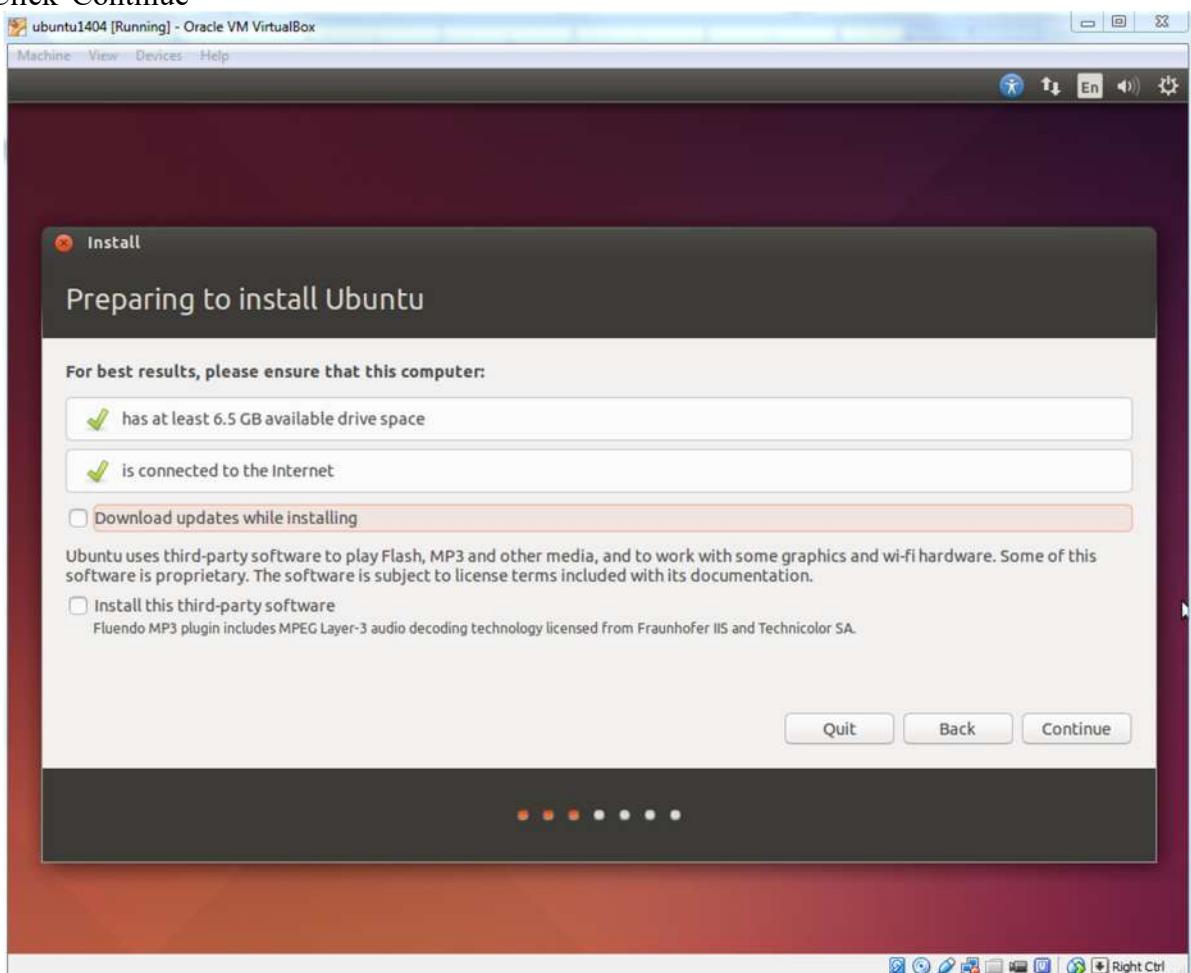


Install Ubuntu

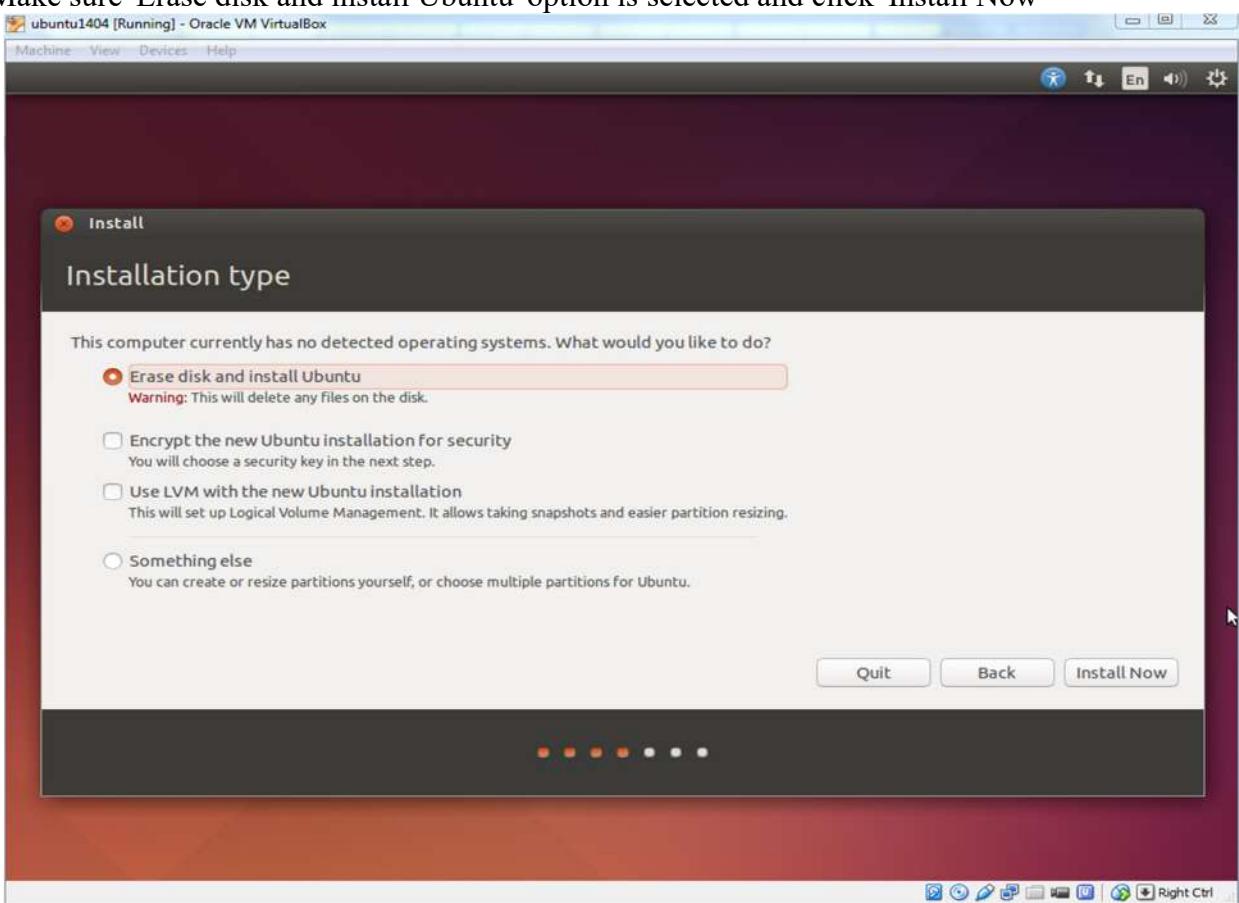
Back to Oracle VM VirtualBox Manager, click on the new Ubuntu virtual machine and hit 'Start' button. Now you shall see a 'Welcome' screen. Click 'Install Ubuntu' button. Note that the installation process may differ a little bit from version to version. The screenshots here are based on Ubuntu 14.04.1.



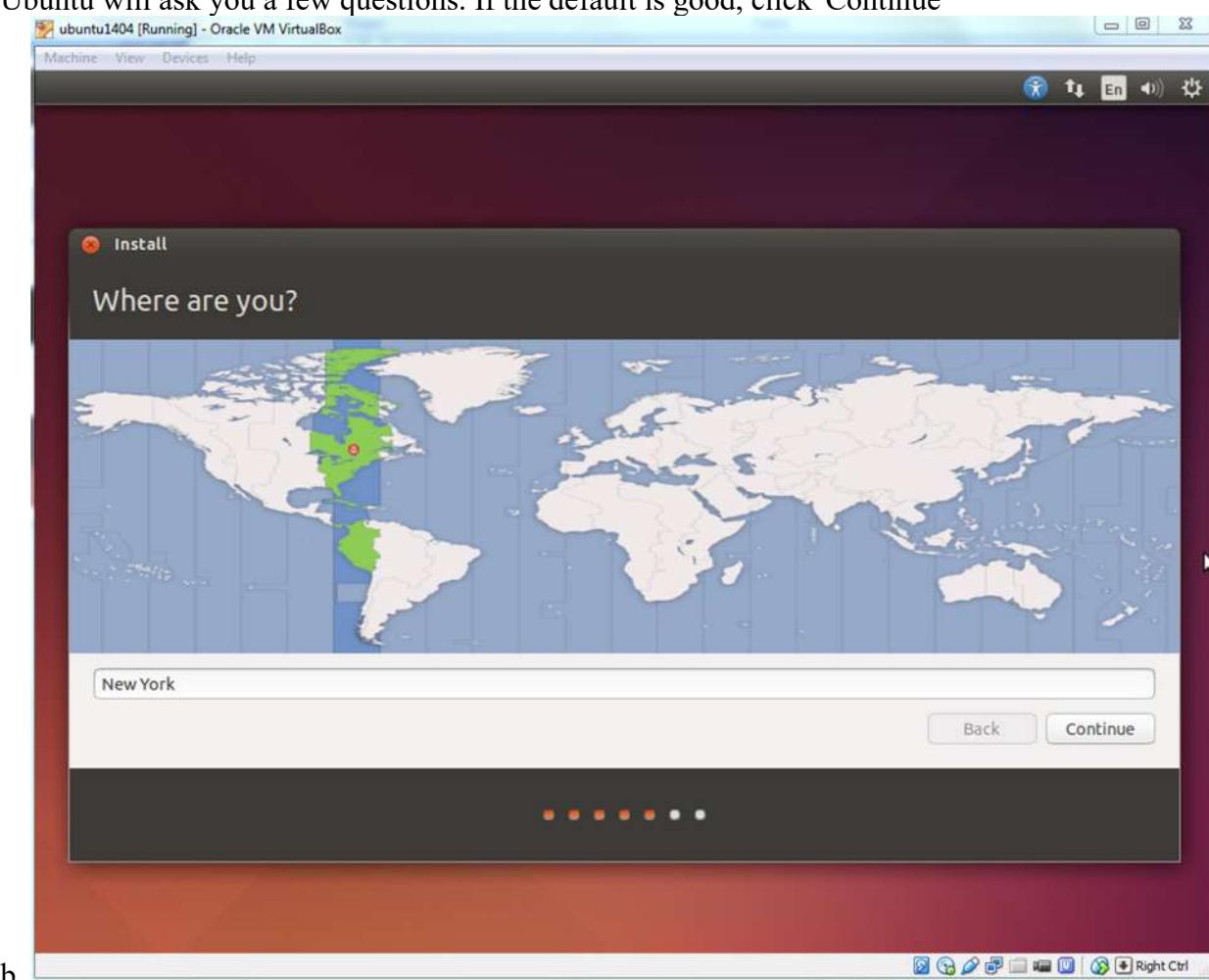
Click 'Continue'



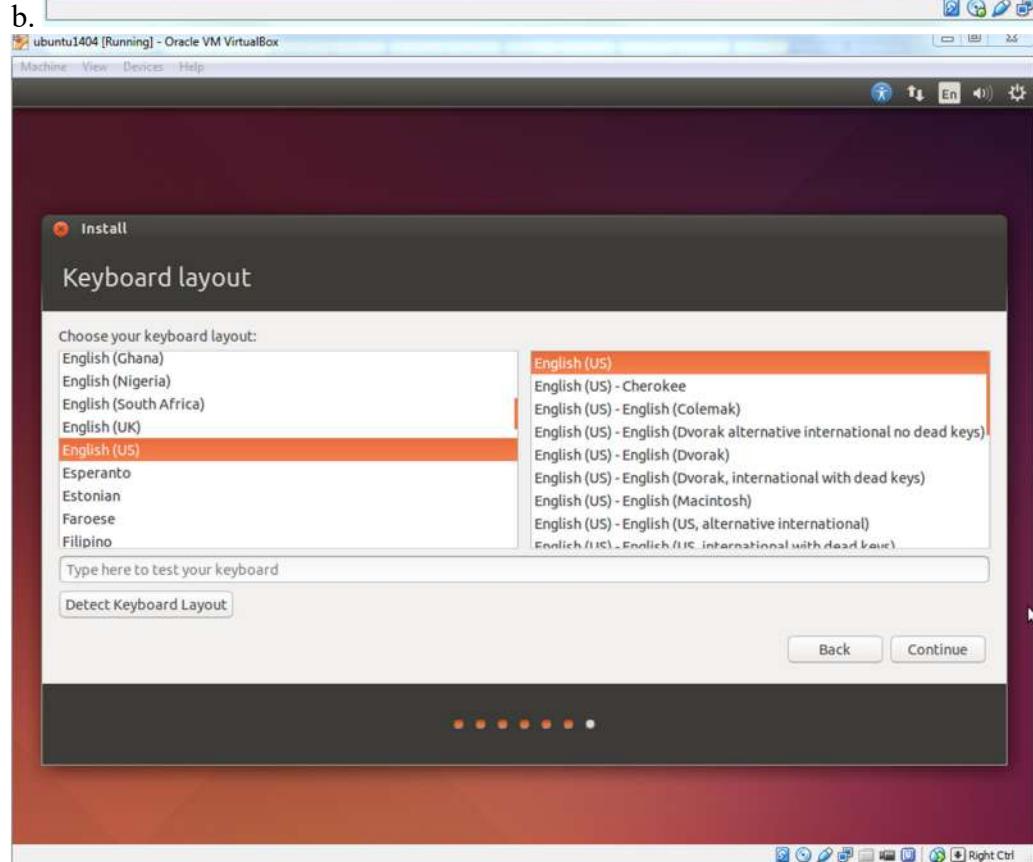
Make sure 'Erase disk and install Ubuntu' option is selected and click 'Install Now'



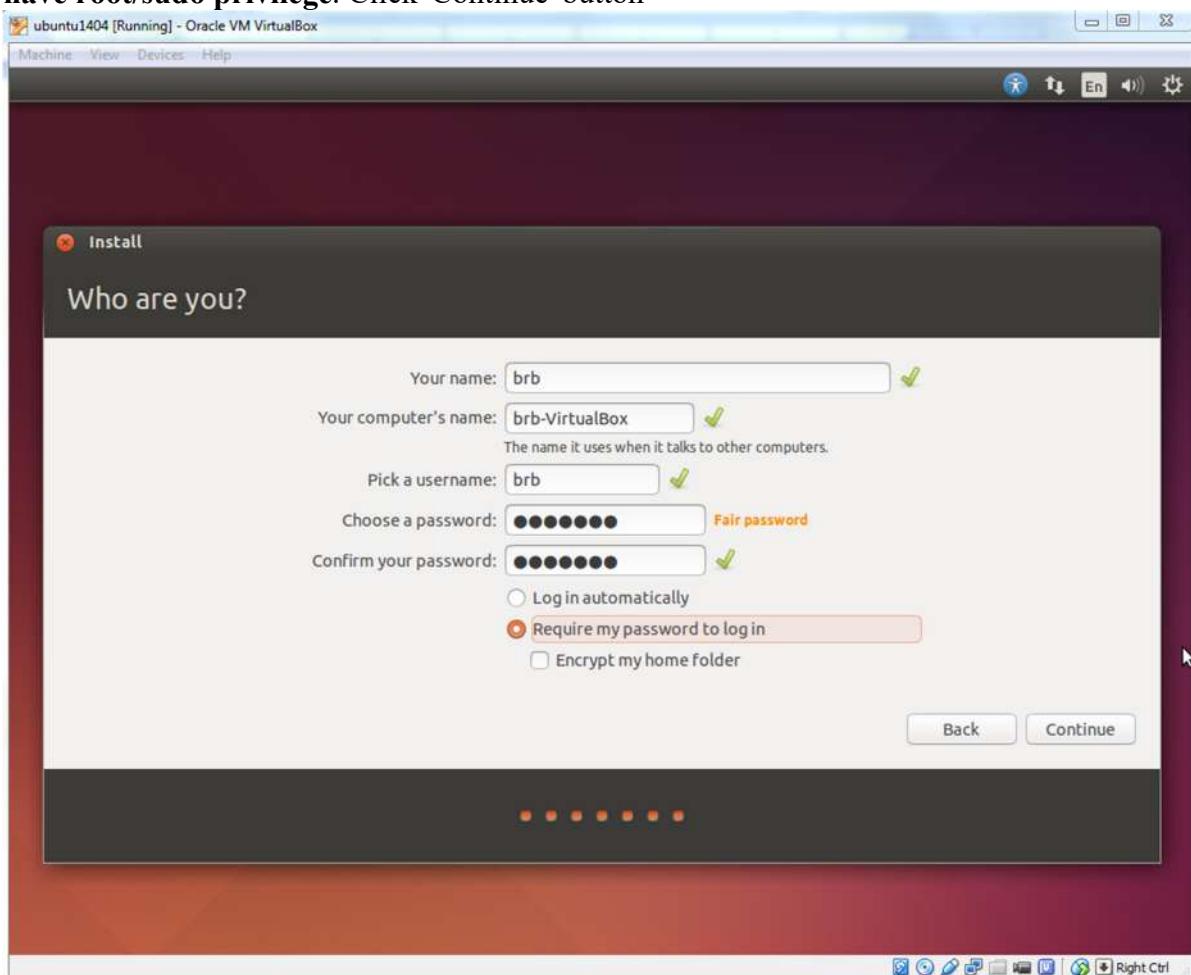
Ubuntu will ask you a few questions. If the default is good, click 'Continue'



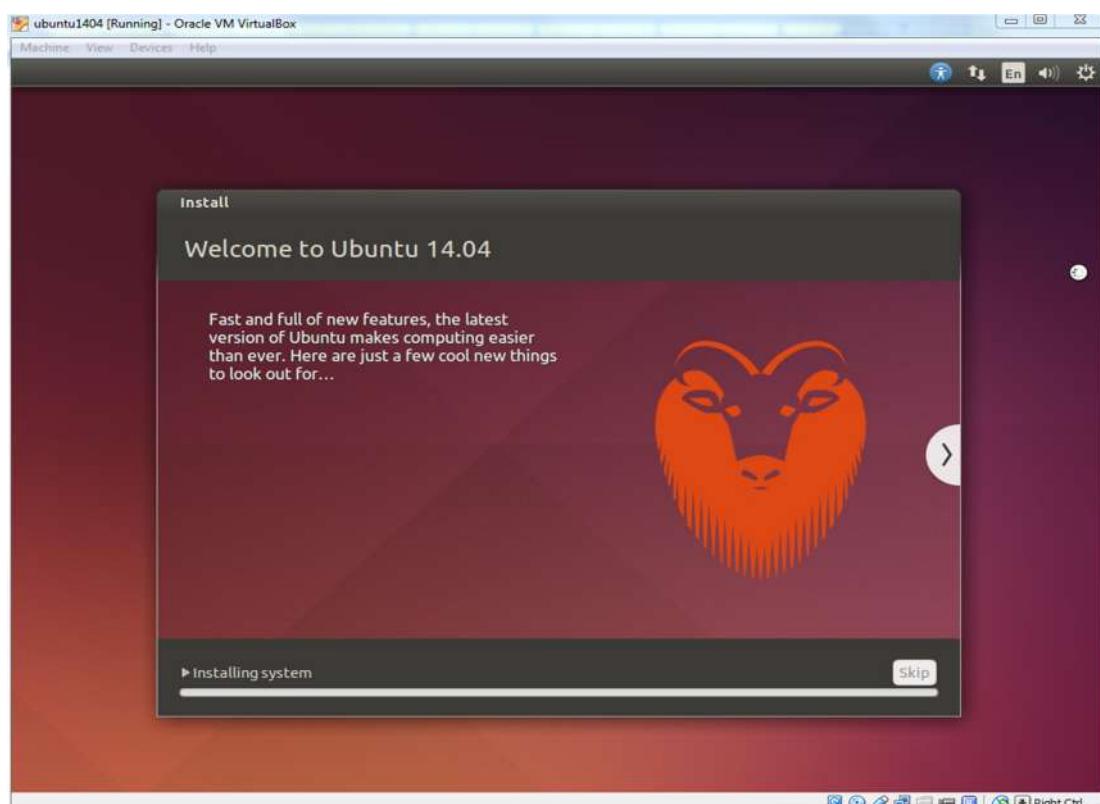
b.



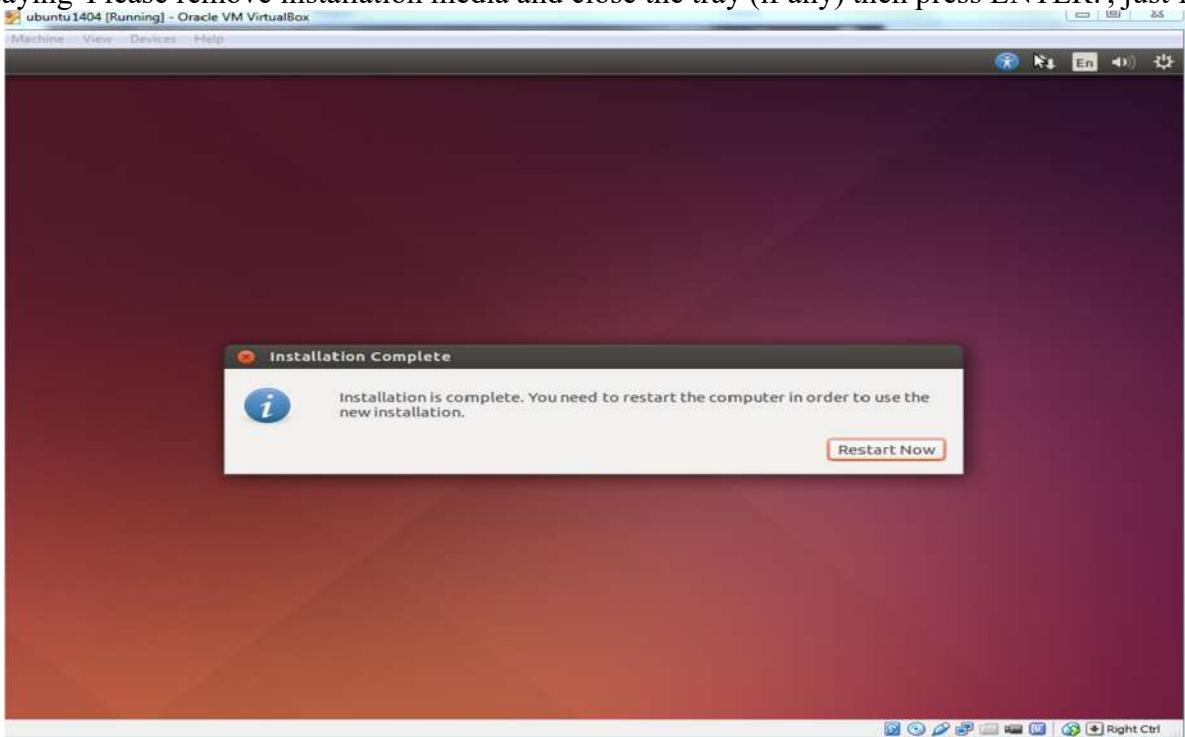
In 'Who are you?' dialog, enter your preferred name, username and password. **Note that this user will have root/sudo privilege.** Click 'Continue' button



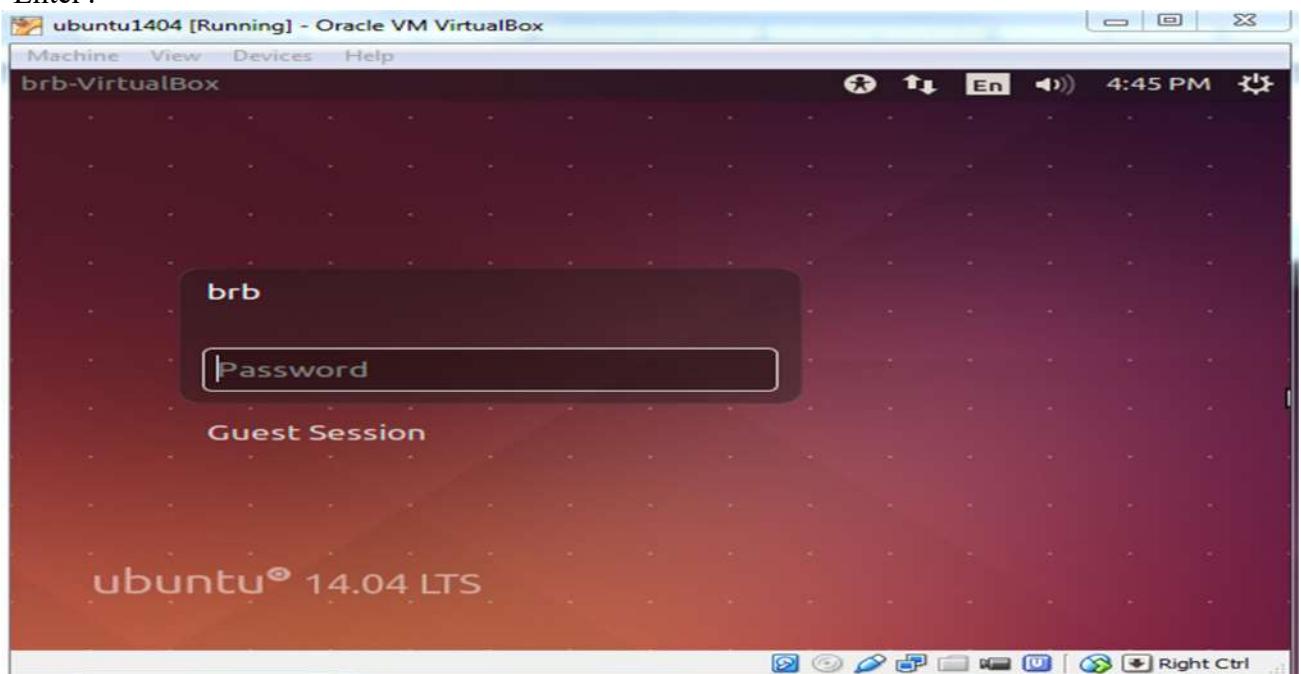
The installation will continue until it is finished.



After installation is complete, click 'Restart Now' button. When you see a screen with a black background saying 'Please remove installation media and close the tray (if any) then press ENTER:', just follow



Enter the password you have chosen and press
'Enter'.



RESULT:

Thus the installation of a virtual machine using Virtualbox/VMware Workstation on top of windows7 or 8 is done successfully.

Ex.No:2	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
Date:	

Aim:

To find the procedure to install a C Compiler in the Virtual Machine and execute a C program.

INSTALLATION OF C COMPILER

Steps:

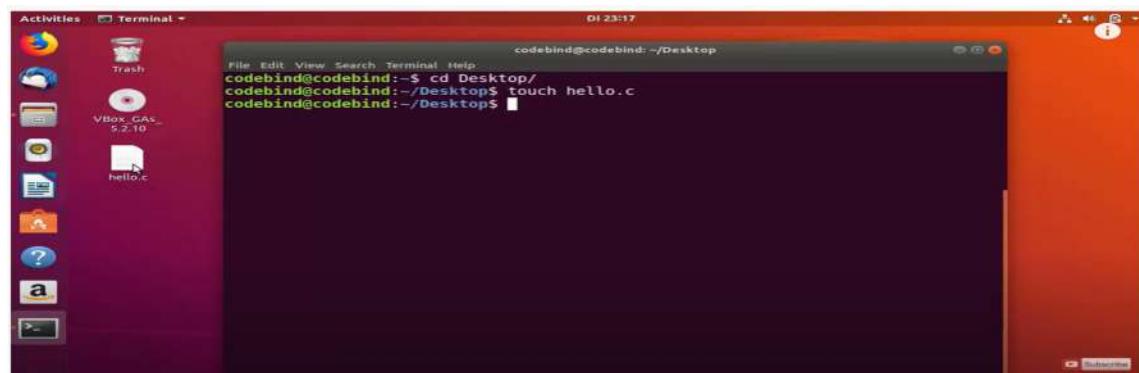
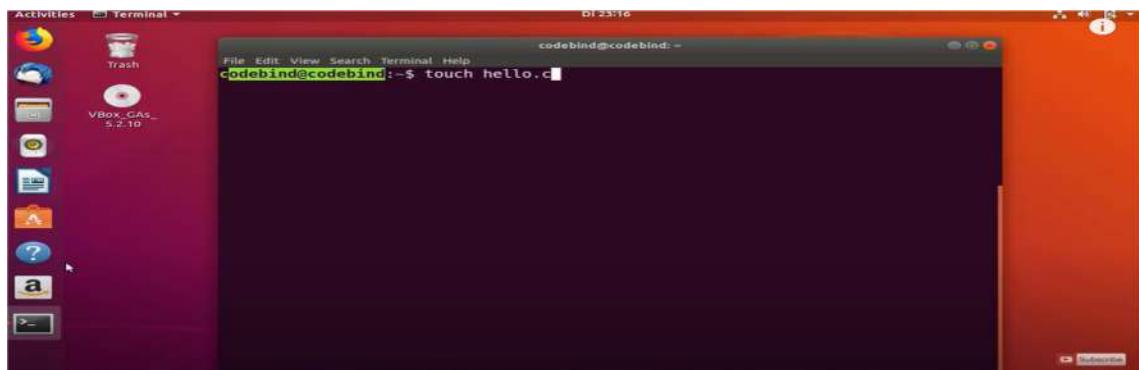
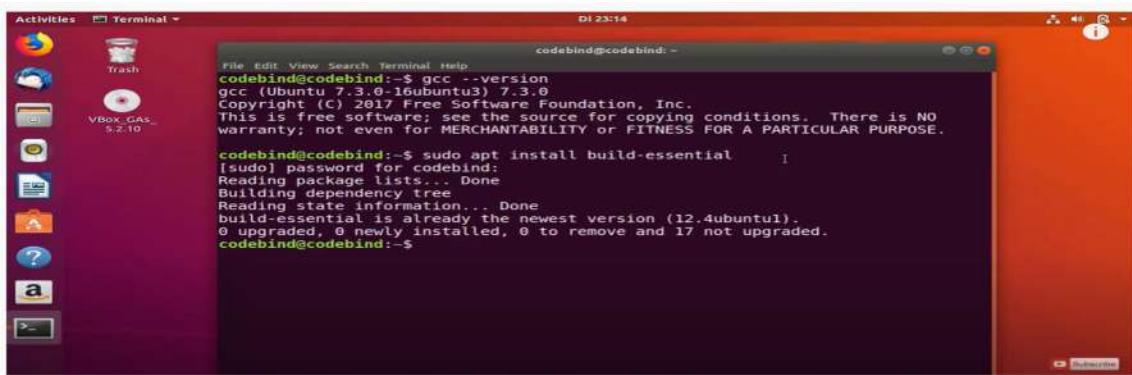
1. To install the C Compiler in the guest os, install the following package.
 - a. 1.Sudo apt install gcc
 - b. 2.Sudo apt install build-essential
 - c. Cd Desktop
2. open the text editor using the command touch hello.c
3. In Desktop hello. c text editor is created. Then Write a sample program in text editor and save the program
- 4.Compile the C program using the compiler installed.

```
gcc hello.c
```

- 5.Run the object file and get the output.

```
./a.out
```

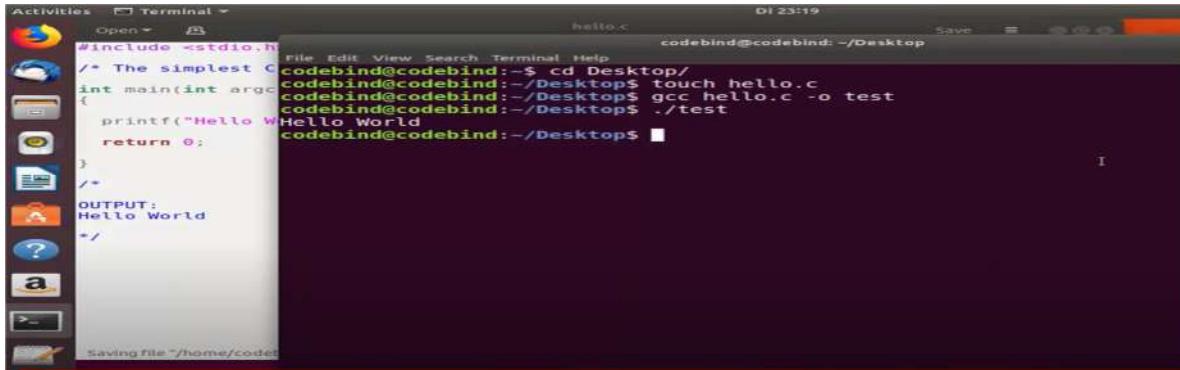






```
#include <stdio.h>
/* The simplest C Program */
int main(int argc, char **argv)
{
    printf("Hello World\n");
    return 0;
}
/*
OUTPUT:
Hello World
*/

```



```
#include <stdio.h>
/* The simplest C Program */
int main(int argc, char **argv)
{
    printf("Hello World\n");
    return 0;
}
/*
OUTPUT:
Hello World
*/

```

```
File Edit View Search Terminal Help
codebind@codebind:~/Desktop/
codebind@codebind:~/Desktop$ touch hello.c
codebind@codebind:~/Desktop$ gcc hello.c -o test
codebind@codebind:~/Desktop$ ./test
Hello World
codebind@codebind:~/Desktop$ ■
```

Result:

Thus the C Compiler is installed successfully and executed a sample C program.

Ex.No:3	Install Google App Engine. Create hello world app and other simple web applications using python/java.
Date:	

Aim:

To Install Google App Engine and Create hello world app and other simple web applications using python/java.

PROCEDURE:

STEP:1

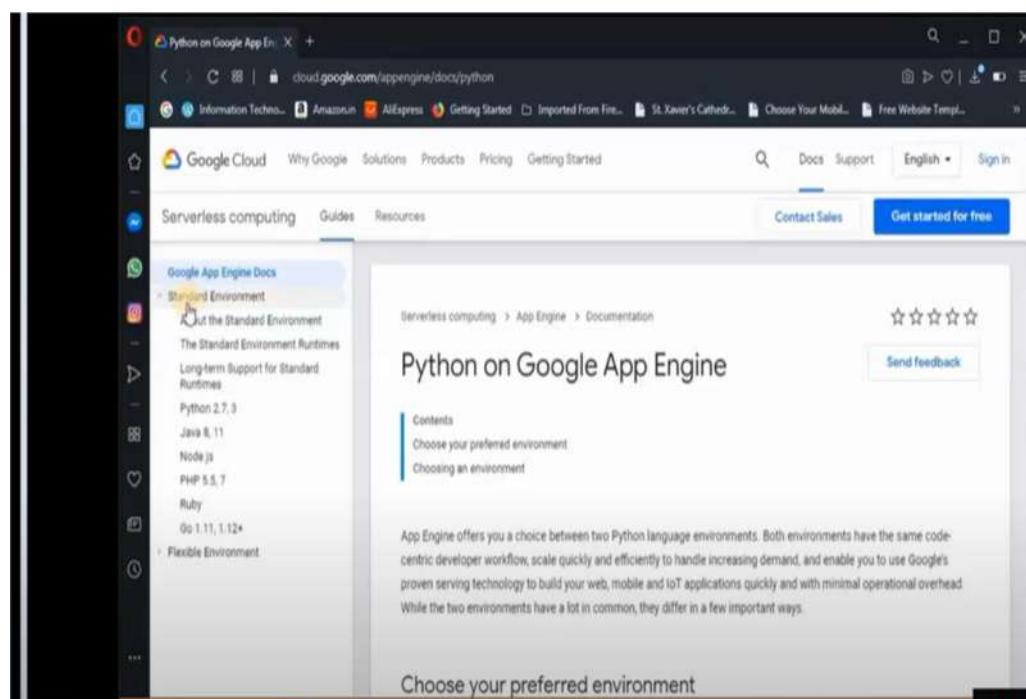
1. Download Python 3.5.8
2. Download GoogleCloudSDK

This will allow you to fork apps onto your local machine, make changes (edit and develop the app), and deploy your app back to the cloud.

3. Set the Python path in the Google App Engine launcher
After downloading the SDK, launch the App Engine launcher, go to Edit -> Preferences and make sure you set the path for where you installed Python in step 1 above.

STEP 2. APP ENGINE SIGN-UP

1. Install python latest version
2. cloud.google.com/appengine/docs/python



The screenshot shows the Google Cloud App Engine Documentation page. On the left, there's a sidebar with links for Standard environment (About the standard environment, Standard environment runtimes, Long-term support for legacy runtimes), Go, Java, Node.js, PHP, Python, and Ruby. Below that is a section for Flexible environment (About the flexible environment, Known issues, Custom runtimes, Go). The main content area has two boxes: 'Standard environment' and 'Flexible environment'. The 'Standard environment' box lists: Support for Python 3.7, Python 3.8, and Python 3.9; The Python 3.9 runtime is capable of running any framework, library, or binary; Optimized to scale nearly instantaneously to handle huge traffic spikes; and a 'Free tier'. The 'Flexible environment' box lists: Open source runtimes capable of running any framework, library, or binary; Greater CPU and memory instance types; Can access resources in the same Compute Engine network; Python 2.7 and 3.6; and No free tier, Application always has a minimum number of running instances. Both boxes have 'VIEW DOCS' buttons at the bottom. The top navigation bar includes 'Google Cloud', 'App Engine', 'Guides', 'Support', 'Resources', 'Contact Us', and 'Get started for free'. The status bar at the bottom shows 'python-3.9.7-amd64.exe' and 'meetingAttendance.csv'.

Click python 3.8 or 3.9

The screenshot shows the Google Cloud Cloud SDK Command Line Interface documentation page. The sidebar includes links for Cloud SDK (Product overview, gcloud CLI overview, gcloud CLI cheat sheet), Quickstarts (All quickstarts, Getting started with Cloud SDK), How-to guides (Installing the SDK, Recommended installation, Other installation methods, Setting up the SDK, Managing SDK components, Scripting guidelines, Enabling accessibility features, Using gcloud interactive shell, Uninstalling the Cloud SDK). The main content area is titled 'Installation instructions'. It says: These instructions are for installing Cloud SDK. For information about installing additional components, such as `gcloud` tool commands at the alpha or beta release level, see [Managing SDK components](#). A note states: ★ Note: If you are behind a proxy/firewall, see the [proxy settings](#) page for more information on installation. Below this, there are tabs for Linux, Debian/Ubuntu, Red Hat/Fedora/CentOS, macOS, and Windows. The Windows tab is selected, showing steps: 1. Download the Cloud SDK installer. Alternatively, open a PowerShell terminal and run the following PowerShell command:

```
(New-Object Net.WebClient).DownloadFile("https://dl.google.com/dl/cloudsdk/channels/rapid/Cloud%20SDK%20Setup.exe") & $env:Temp\GoogleCloudSDKInstaller.exe
```

2. Launch the installer and follow the prompts. The installer is signed by Google LLC. A note at the bottom says: If you're using a screen reader, check the [Turn on screen reader mode](#) checkbox. This online configuration is available to users of screen readers.

Steps:

1. Choose standard environment
2. Click → Quick Start
3. click → Download and install SDK

The screenshot shows the Google Cloud App Engine Python 3 Quickstart page. On the left, there's a sidebar with navigation links for Serverless computing, Guides, Reference, and Resources. Under 'Python 3 Standard Environment', 'Quickstart' is selected, showing 'Building an App' as the current section. The main content area contains instructions for running and deploying the quickstart. It includes a step to download and install the Cloud SDK, with a 'Download Cloud SDK' button highlighted by a mouse cursor. Below this, a note says 'Note: If you already have the Cloud SDK installed, update it by running the following command:' followed by the command 'gcloud components update'. Another step is to create a new project, with the command 'gcloud projects create [YOUR_PROJECT_ID] --set-as-default' shown. A note at the bottom says 'Replace [YOUR_PROJECT_ID] with a string of characters that uniquely identifies your project. For example, my-project-24.'.

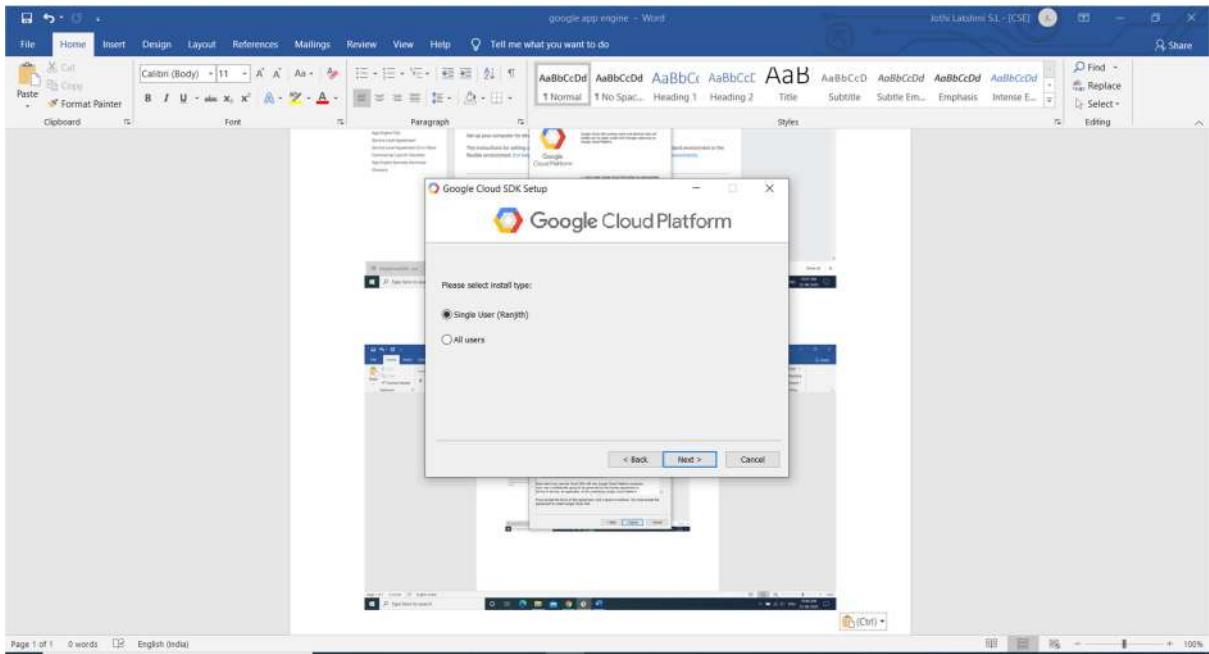
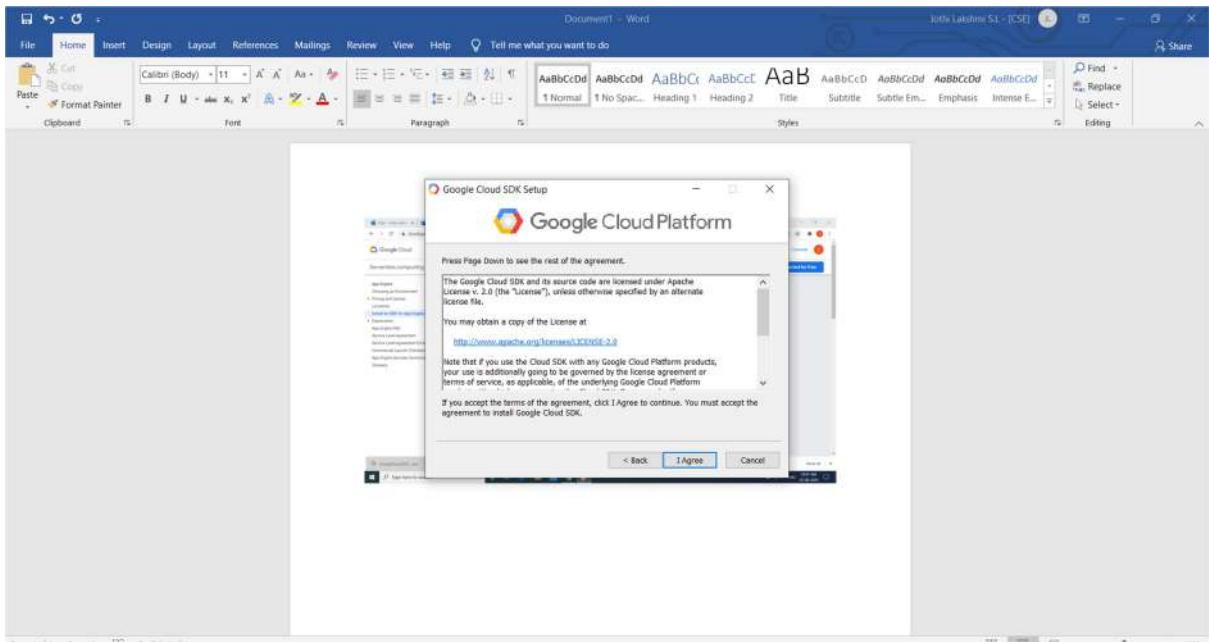
4.GOOGLE cloud installer .exe file downloaded in your PC.

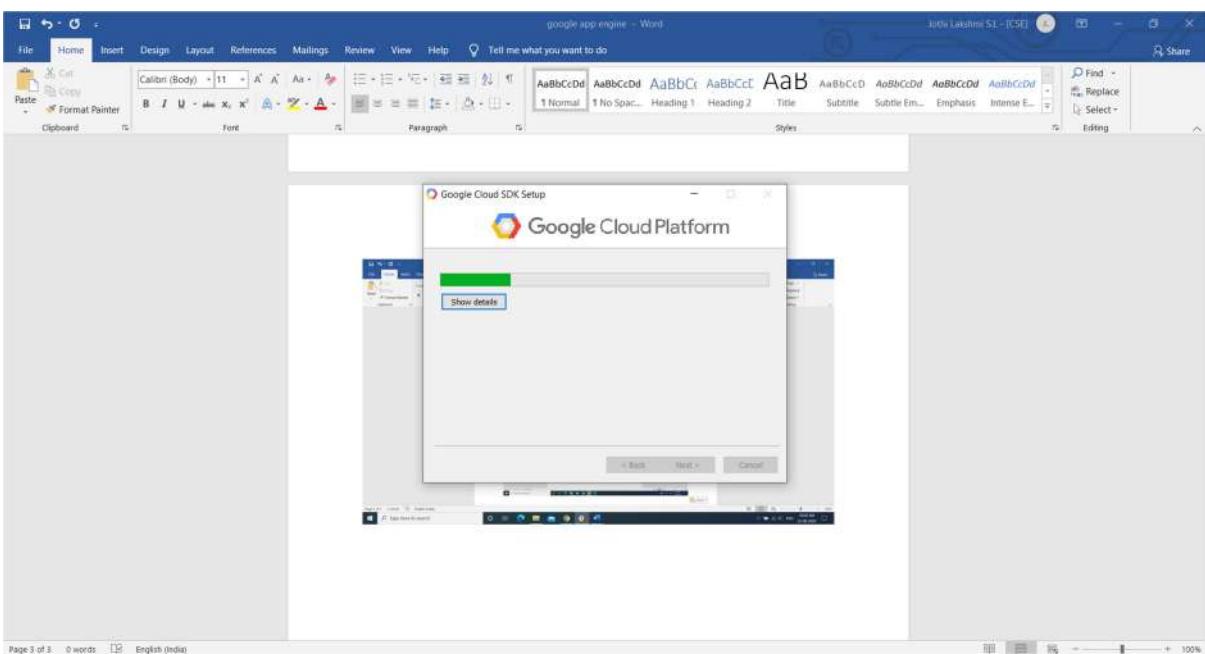
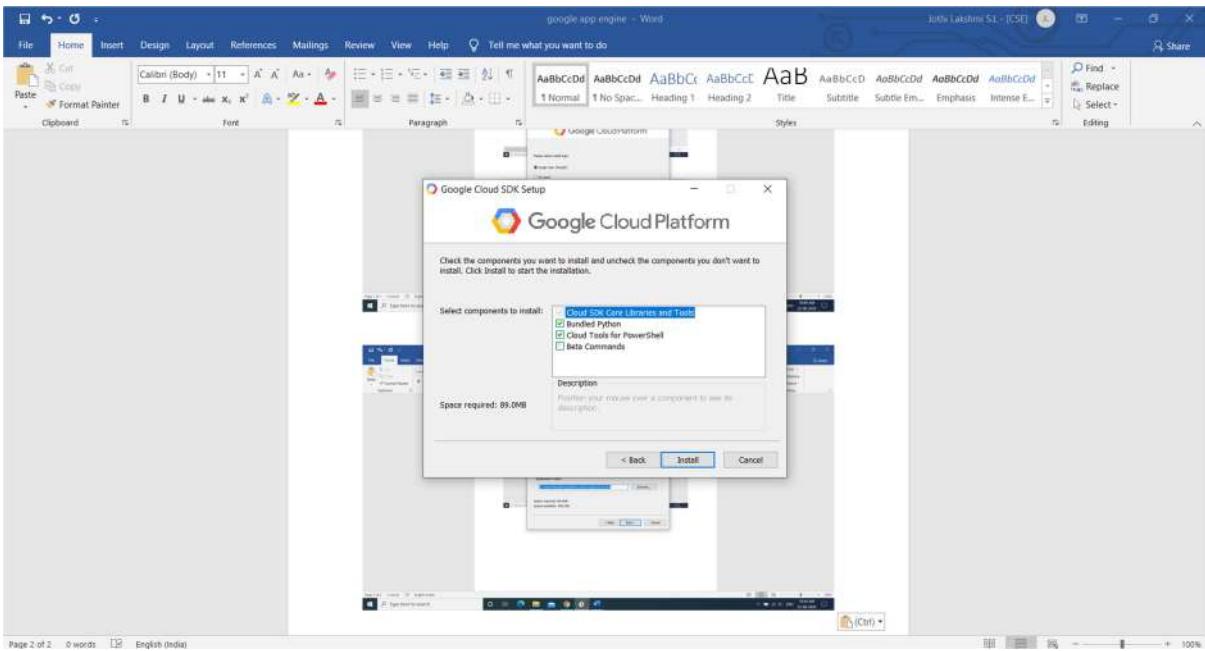
5.Click that exe file.

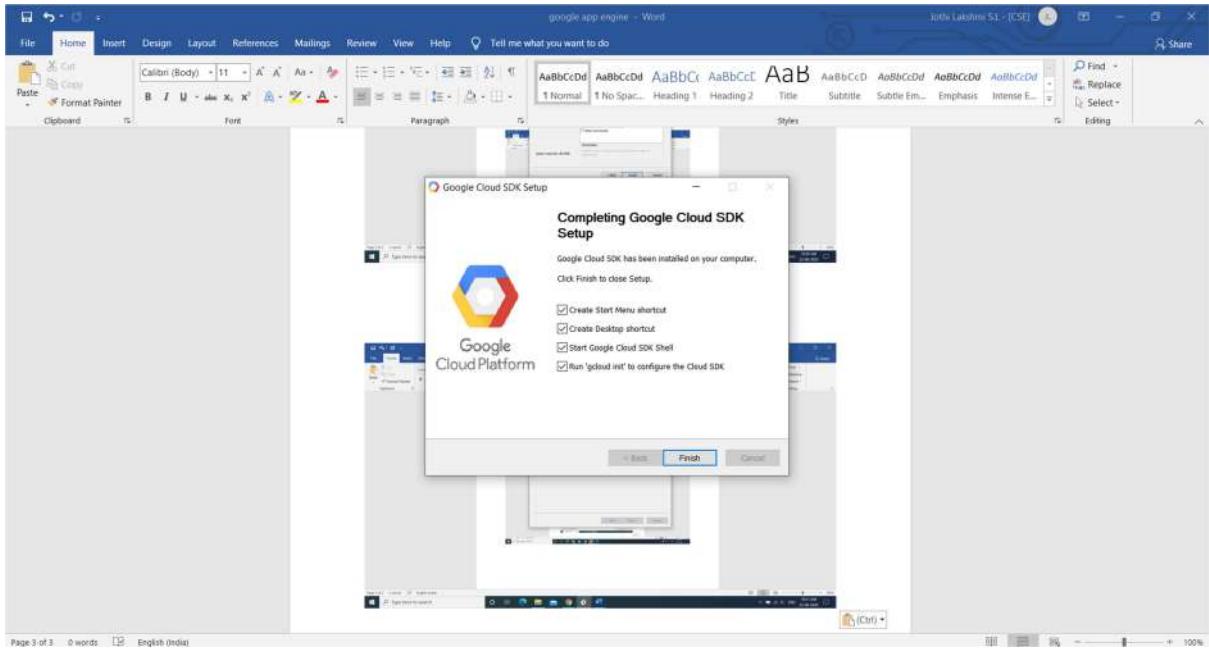
6.Installation started

Note: install python and google cloud SDK IN desktop

The screenshot shows the 'Google Cloud SDK Setup' wizard. The title bar says 'Welcome to Google Cloud SDK Setup'. The main window is titled 'Install an SDK' and shows the 'Standard environment' tab selected. It displays the Google Cloud Platform logo and a brief description of the setup process. Below the description are four tabs: 'Python' (selected), 'Java', 'Node.js', and 'PHP'. At the bottom of the window are 'Next >' and 'Cancel' buttons. To the right of the window, there's a sidebar with a star rating and a 'Send feedback' button. The left side of the screen shows the same Google Cloud App Engine Python 3 Quickstart page as the previous screenshot, with the 'Install an SDK for App Engine' link in the sidebar also highlighted.







7.Create a folder in desktop and open a notepad and type the following code and save that file in index.py extension

index.py

```
print 'content-Type:text/plain';
print";
print'hai welcome to the college';
```

8.Open a notepad type the following code and save app.yaml

App.yaml

```
runtime: python27
api_version: 1
threadsafe: false
```

handlers:

```
- url: /
  script: hello.py
```

9. Open the google cloud SDK shell

10. Give the commands like C:\Users\Ranjith\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py "C:\Users\Ranjith\Desktop\MY CLOUD PROGRAM"

```
survey | version

For detailed information on this command and its flags, run:
  gcloud --help

C:\Users\Ranjith\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py" C:\Users\Ranjith\Desktop\MY CLOUD
PROGRAM"
The filename, directory name, or volume label syntax is incorrect.

C:\Users\Ranjith\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py "C:\Users\Ranjith\Desktop\MY CLOUD
PROGRAM"

Updates are available for some Cloud SDK components. To install them,
please run:
  $ gcloud components update

This action requires the installation of components: [cloud-datastore-
emulator, app-engine-python]

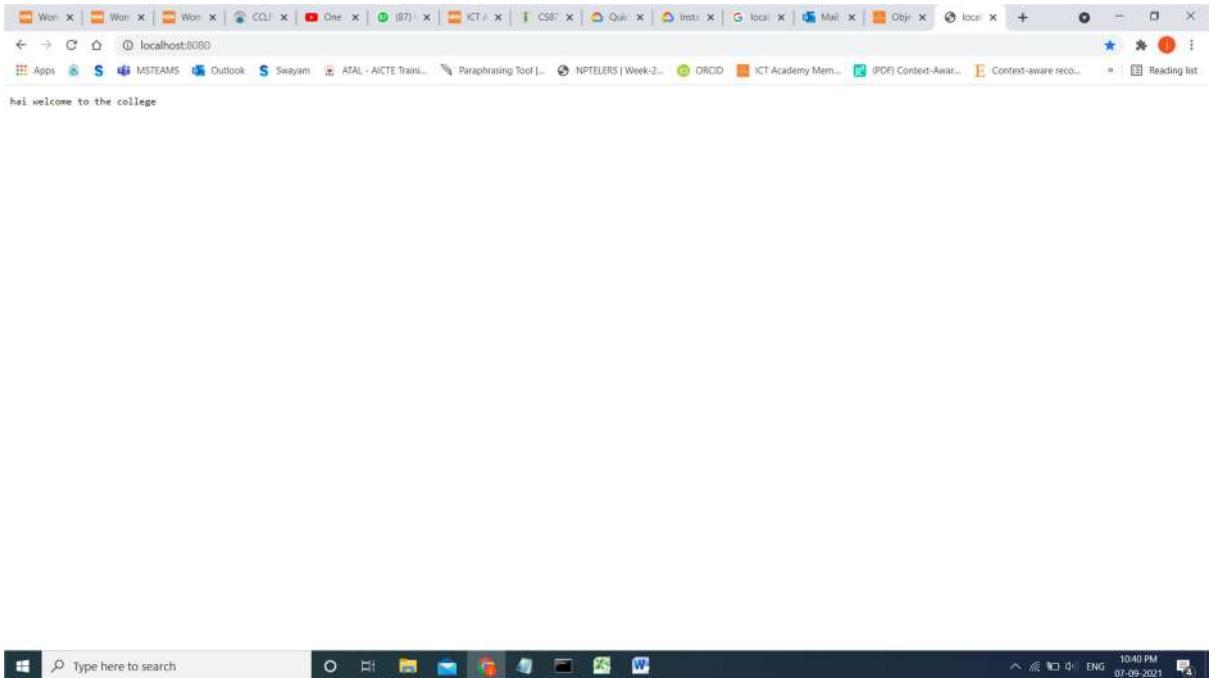
Your current Cloud SDK version is: 306.0.0
Installing components from version: 306.0.0

+-----+
| These components will be installed. |
+-----+
| Name          | Version | Size   |
+-----+
| Cloud Datastore Emulator | 2.1.0 | 18.4 MiB |
```

```
Google Cloud Shell - google-cloud-sdk\bin\dev_appserver.py "C:\Users\Ranjith\Desktop\MY CLOUD PROGRAM"
  config_files = appinfo/includes.ParseAndReturnIncludePaths()
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\api\appinfo/includes.py", line 82, in ParseAndReturnIncludePaths
    _appyaml = appinfo.LoadSingleAppInfoFile(appinfo_file)
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\api\appinfo\appinfo.py", line 2688, in LoadSingleAppInfo
    _list(APPINFO_APP_INFO))
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\api\yaml_listener.py", line 240, in Parse
    stream, loader_class, version=version, **loader_args)
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\api\yaml_listener.py", line 173, in _HandleEvents
    for event in events:
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\api\yaml_listener.py", line 217, in _GenerateEventParameters
    raise yaml_errors.EventListenerYAMLError(e)
  google.appengine.api.yaml_errors.EventListenerYAMLError: mapping values are not allowed here
  in "C:\Users\Ranjith\Desktop\MY CLOUD PROGRAM\app.yaml", line 5, column 9

C:\Users\Ranjith\AppData\Local\Google\Cloud SDK>google-cloud-sdk\bin\dev_appserver.py "C:\Users\Ranjith\Desktop\MY CLOUD PROGRAM"
INFO 2021-09-07 21:55:37,880 devappserver2.py:289] Skipping SDK update check.
INFO 2021-09-07 21:55:38,563 devappserver2.py:232] Using Cloud Datastore Emulator.
INFO 2021-09-07 21:55:38,563 devappserver2.py:155] Starting Cloud Datastore emulator at: http://localhost:17007
WARNING 2021-09-07 21:55:38,905 simple_search_stub.py:1198] Could not read search indexes from c:\users\ranjith\appdata\local\temp\appengine.None\search_indexes
Exception in thread Thread-1:
Traceback (most recent call last):
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\bundledpython2\lib\threading.py", line 881, in _bootstrap_inner
    self.run()
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\bundledpython2\lib\threading.py", line 754, in run
    self._target(*self._args, **self._kwargs)
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\tools\devappserver2\api_server.py", line 502, in __launch
    self._start()
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\tools\devappserver2\cloud_emulators\cloud_emulator_manager.py", line 123, in launch
    emulator.cmd(self._cmd, start_options=options, silent=silent)
  File "C:\Users\Ranjith\AppData\Local\Google\Cloud SDK\google-cloud-sdk\platform\google_appengine\google\appengine\tools\devappserver2\cloud_emulators\datastore\datastore_emulator.py", line 135, in __init__
    raise IOError('emulator did not respond within %ds' % deadline)
IOError: emulator did not respond within 10s

INFO 2021-09-07 21:56:08,707 api_server.py:282] Starting API server at: http://localhost:57807
INFO 2021-09-07 21:56:08,648 api_server.py:272] Starting gRPC API server at: http://localhost:61451
INFO 2021-09-07 21:56:08,648 dispatcher.py:267] Starting module 'default' running at: http://localhost:8000
INFO 2021-09-07 21:56:08,648 admin_server.py:150] Starting Admin server at: http://localhost:8000
INFO 2021-09-07 21:56:08,562 instance.py:294] Instance PID: 25200
INFO 2021-09-07 22:31:58,868 module.py:865] default: "GET / HTTP/1.1" 200 29
INFO 2021-09-07 22:31:59,927 module.py:865] default: "GET /favicon.ico HTTP/1.1" 404 -
INFO 2021-09-07 22:32:04,174 instance.py:294] Instance PID: 9144
INFO 2021-09-07 22:39:55,924 module.py:865] default: "GET / HTTP/1.1" 200 27
```



RESULT:

Thus the Google App Engine is installed successfully and a web application to display hello world using python is developed and deployed in the GAE

Ex.No:4	Use GAE launcher to launch the web applications
Date:	

AIM:

To Use GAE launcher to launch the web applications

PROCEDURE:

STEP:1 Create a new Cloud Console project or retrieve the project ID of an existing project to

use

STEP:2 Go to the project page

STEP:3 Install and then initialize the Google Cloud SDK

STEP:4 Download SDK

STEP:5 Creating a website to host on Google App Engine

STEP:6 Basic structure for the project

STEP:7 This guide uses the following structure for the project:

- app.yaml: Configure the settings of your App Engine application.
- www/: Directory to store all of your static files, such as HTML, CSS, images, and JavaScript.
- css/: Directory to store stylesheets.
- style.css: Basic stylesheet that formats the look and feel of your site.
- images/: Optional directory to store images.
- index.html: An HTML file that displays content for your website.
- js/: Optional directory to store JavaScript files.
- Other asset directories.

STEP: 8 Creating the app.yaml file

- ✓ The app.yaml file is a configuration file that tells App Engine how to map URLs to your static files. In the following steps, you will add handlers that will load www/index.html when someone visits your website, and all static files will be stored in and called from the www directory.
- ✓ Create the app.yaml file in your application's root directory:

- ✓ Create a directory that has the same name as your project ID. You can find your project ID in the Console.
- ✓ In directory that you just created, create a file named app.yaml.
- ✓ Edit the app.yaml file and add the following code to the file:

```
runtime: python27
api_version: 1
threadsafe: true

handlers:
- url: /
  static_files: www/index.html
  upload: www/index.html

- url: /(.*)
  static_files: www\1
  upload: www/(.*)
```

More reference information about the app.yaml file can be found in the [app.yaml reference documentation](#).

STEP: 9 creating the index.html file

- ✓ Create an HTML file that will be served when someone navigates to the root page of your website. Store this file in your www directory.

```
<html>
<head>
  <title>Hello, world!</title>
  <link rel="stylesheet" type="text/css" href="/css/style.css">
</head>
<body>
  <h1>Hello, world!</h1>
  <p>
    This is a simple static HTML file that will be served from Google App
    Engine.
  </p>
</body>
</html>
```

STEP: 10 Deploying your application to App Engine

- ✓ When you deploy your application files, your website will be uploaded to App Engine. To deploy your app, run the following command from within the root directory of your application where the app.yaml file is located:
- ✓ gcloud app deploy
- ✓ Optional flags:
- ✓ Include the --project flag to specify an alternate Cloud Console project ID to what you initialized as the default in the gcloud tool. Example: --project [YOUR_PROJECT_ID]

- ✓ Include the -v flag to specify a version ID, otherwise one is generated for you. Example: -v [YOUR_VERSION_ID]
- ✓ To learn more about deploying your app from the command line, see Deploying a Python 2 App.

STEP: 11 Viewing your application

- ✓ To launch your browser and view the app at https://PROJECT_ID.REGION_ID.r.appspot.com, run the following command:

```
gcloud app browse
```

RESULT:

Thus a GAE launcher is used to launch the web applications

Ex.No:5a

Date:

Simulate a cloud scenario using CloudSim

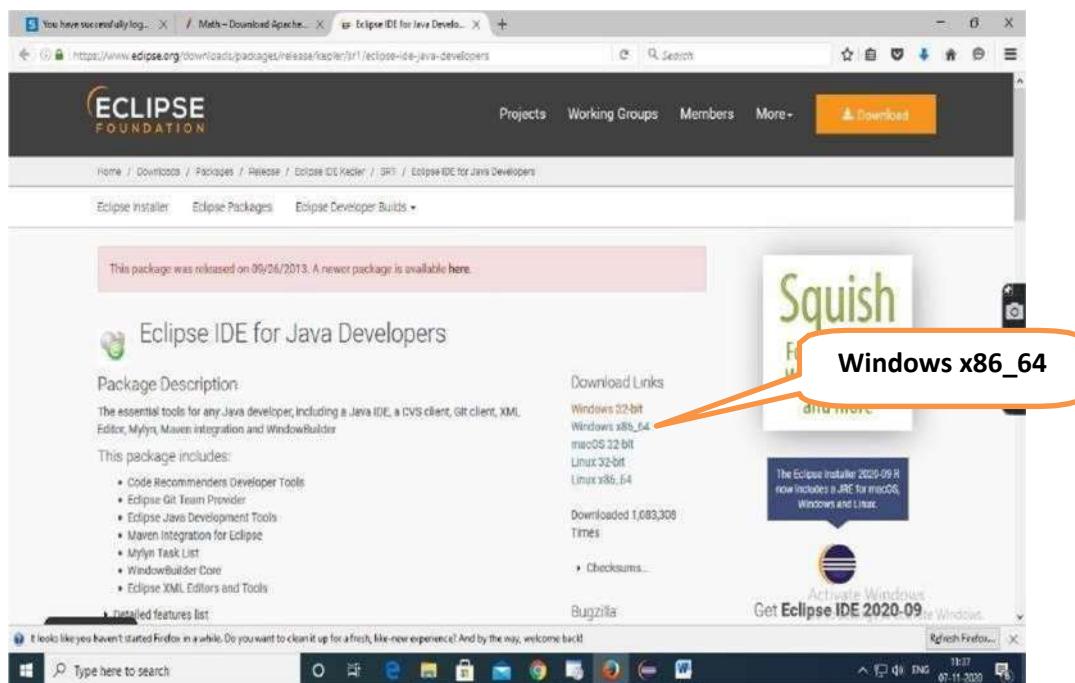
AIM:

To Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim

PROCEDURE:

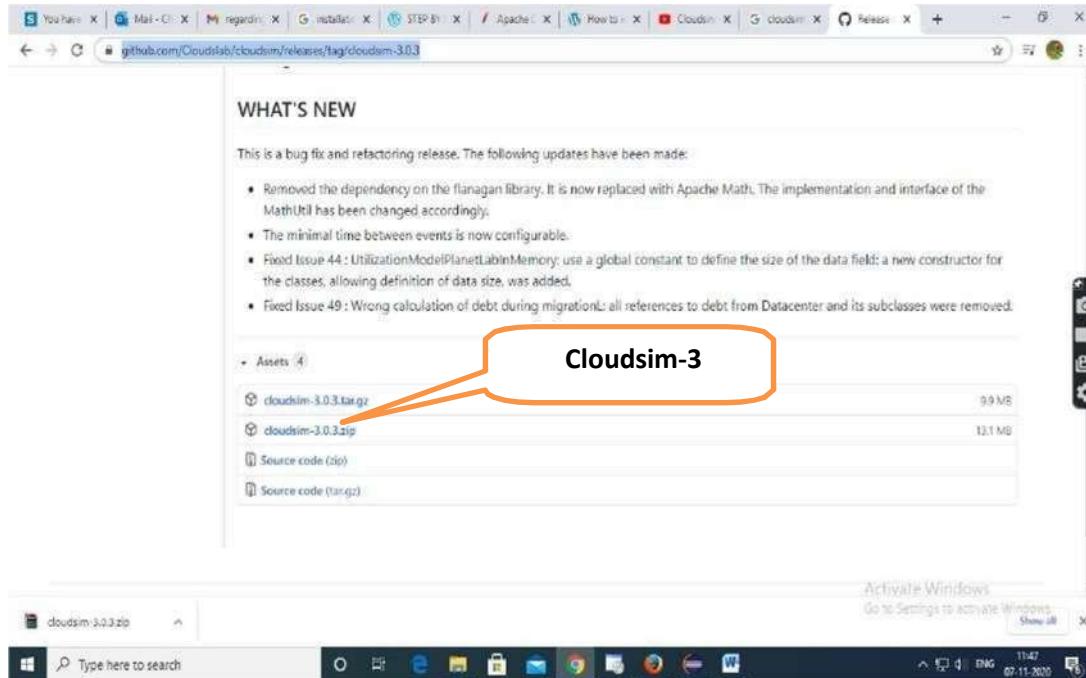
Step 1: Link to download Eclipse and download Eclipse for Windows 64bit into your Local machine

<https://www.eclipse.org/downloads/packages/release/kepler/sr1/eclipse-ide-java-developers>



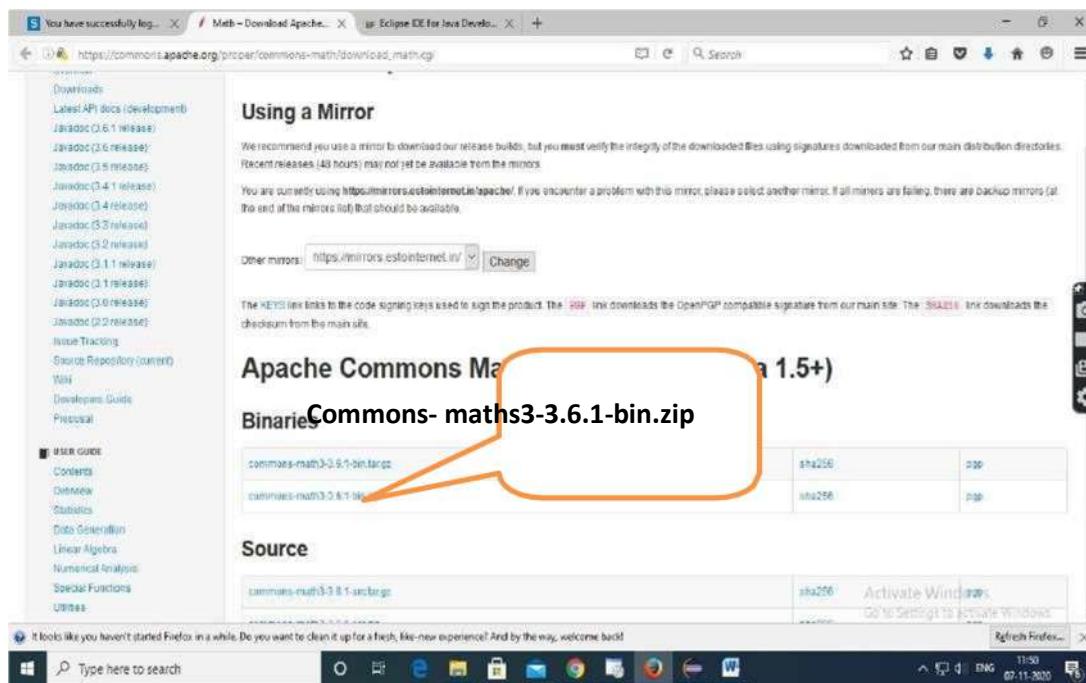
Step 2: Download cloudsim-3.0.3 from git hub repository in your local machine

<https://github.com/Cloudslab/cloudsim/releases/tag/cloudsim-3.0.3>

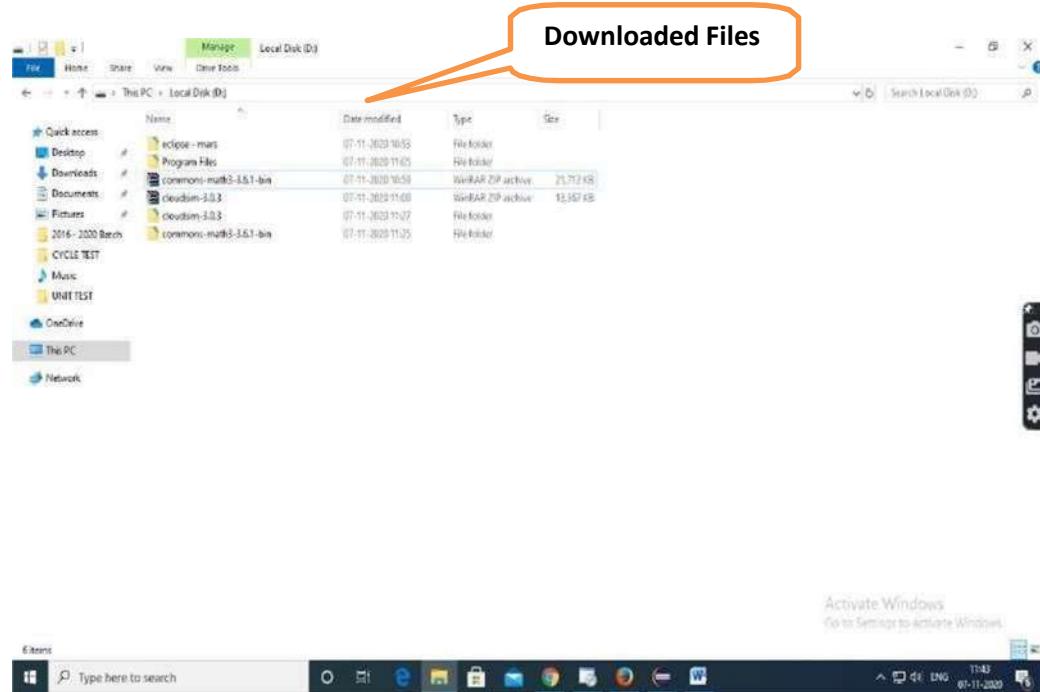


Step 3: Download commons-math3-3.6.1 from git hub repository in your local machine

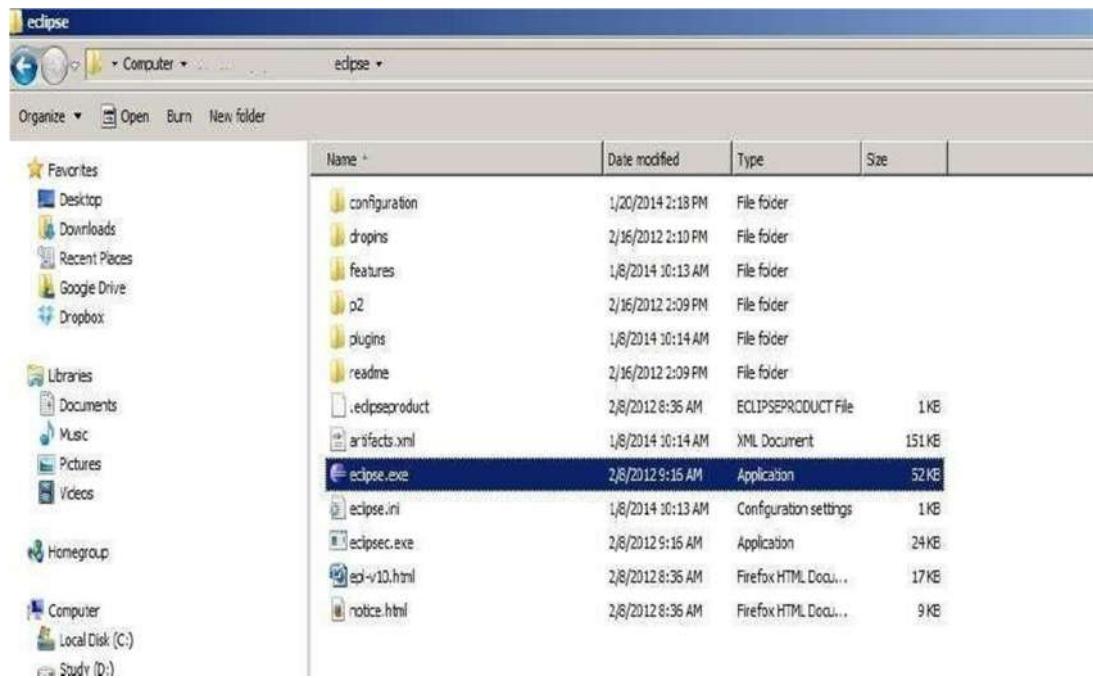
https://commons.apache.org/proper/commons-math/download_math.cgi



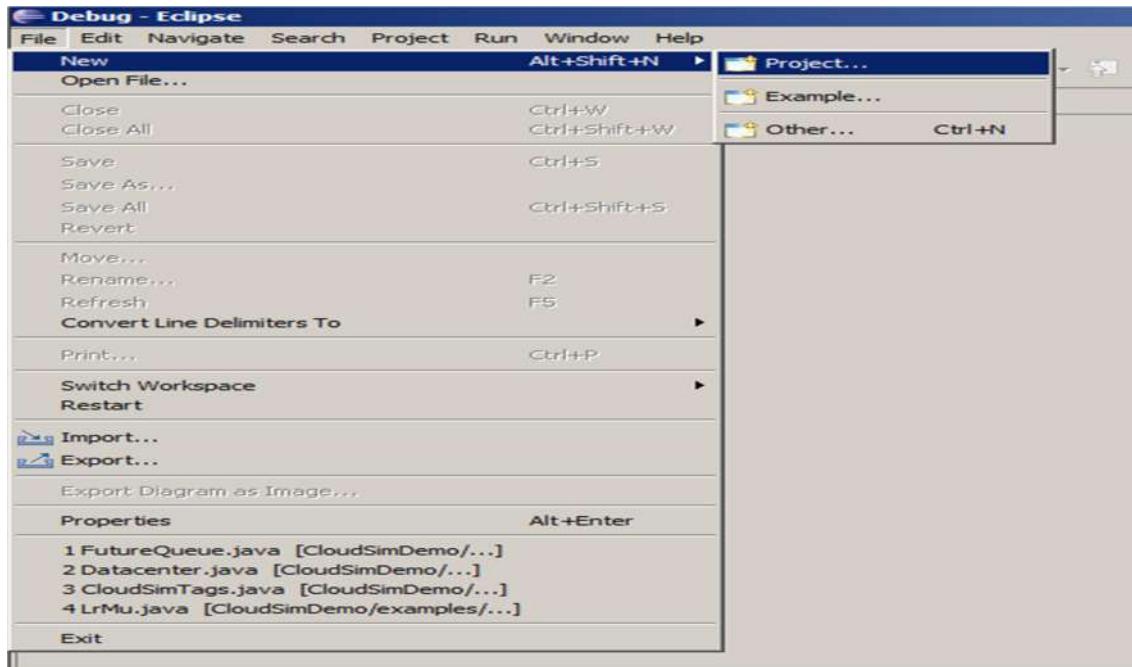
Step 4: Downloaded Eclipse, cloudsim-code-master and Apache Commons Math 3.6.1 in your local machine and extract cloudsim-3.0.3 and Apache Commons Math 3.6.1



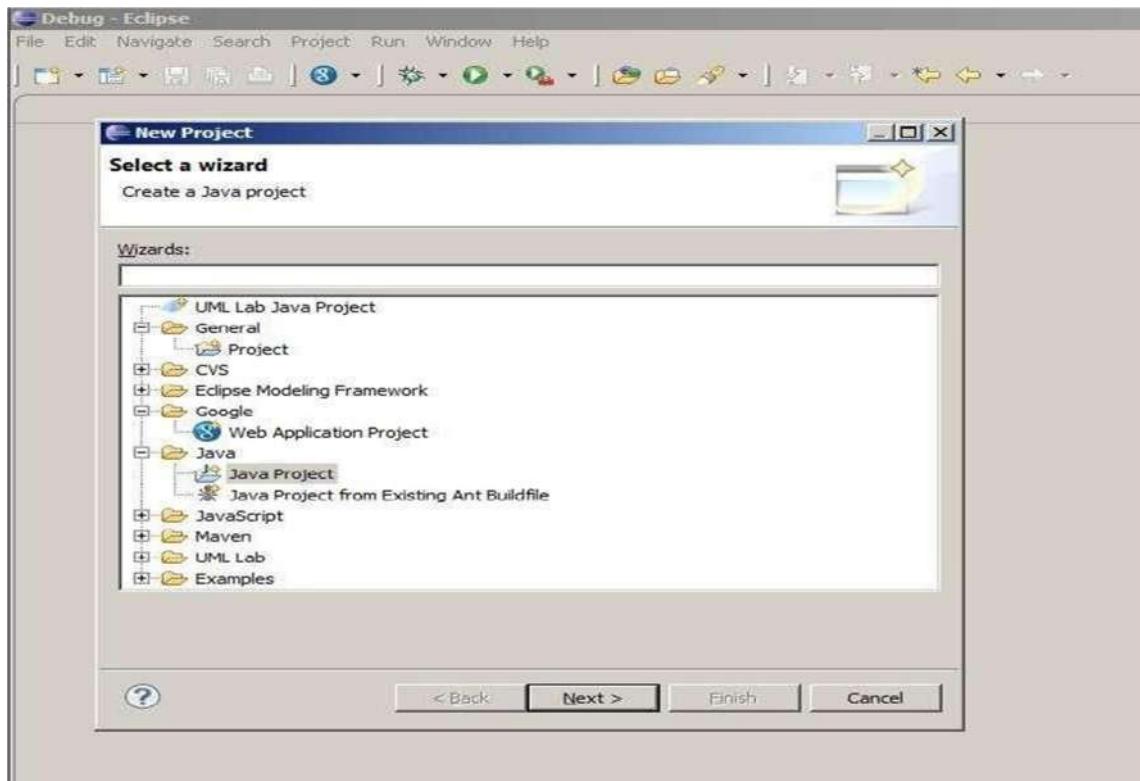
Step 5: First of all, navigate to the folder where you have unzipped the eclipse folder and open Eclipse.exe



Step 6: Now within Eclipse window navigate the menu: File -> New -> Project, to open the new project wizard

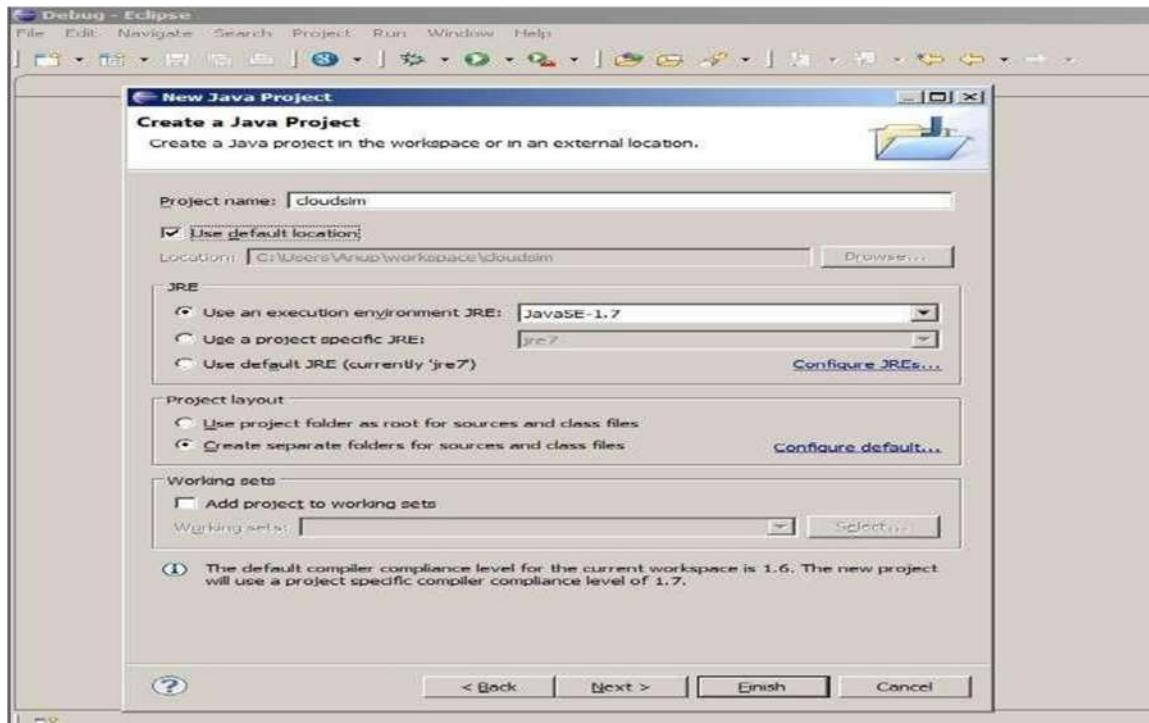


Step 7: A New Project wizard should open. There are a number of options displayed and you have to find & select the Java Project option, once done click 'Next'

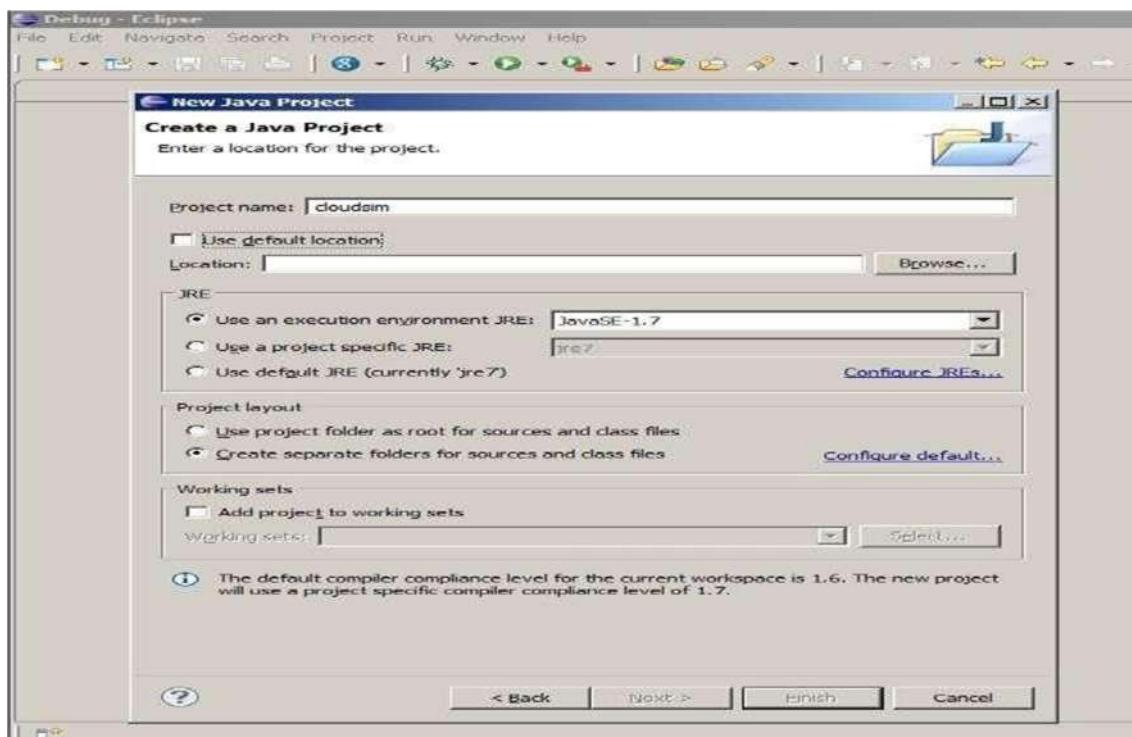


Step 8: Now a detailed new project window will open, here you will provide the project name and the path of CloudSim project source code, which will be done as follows:

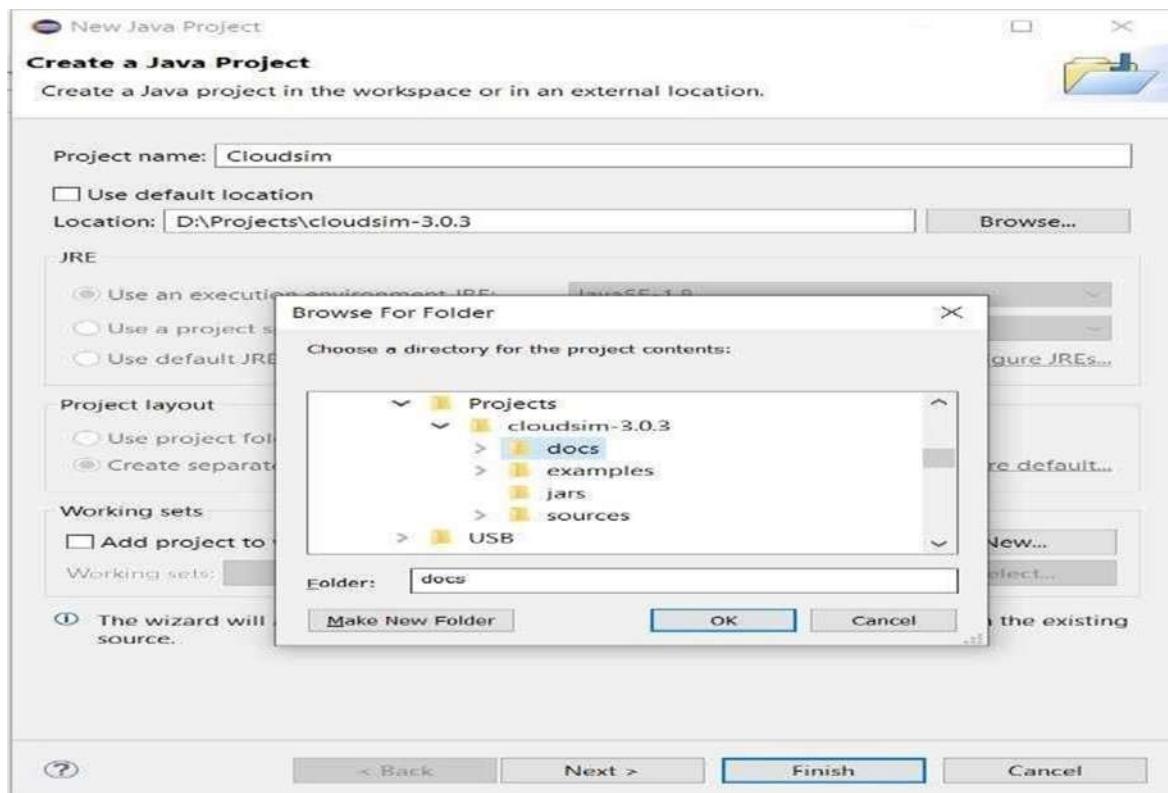
Project Name: CloudSim.



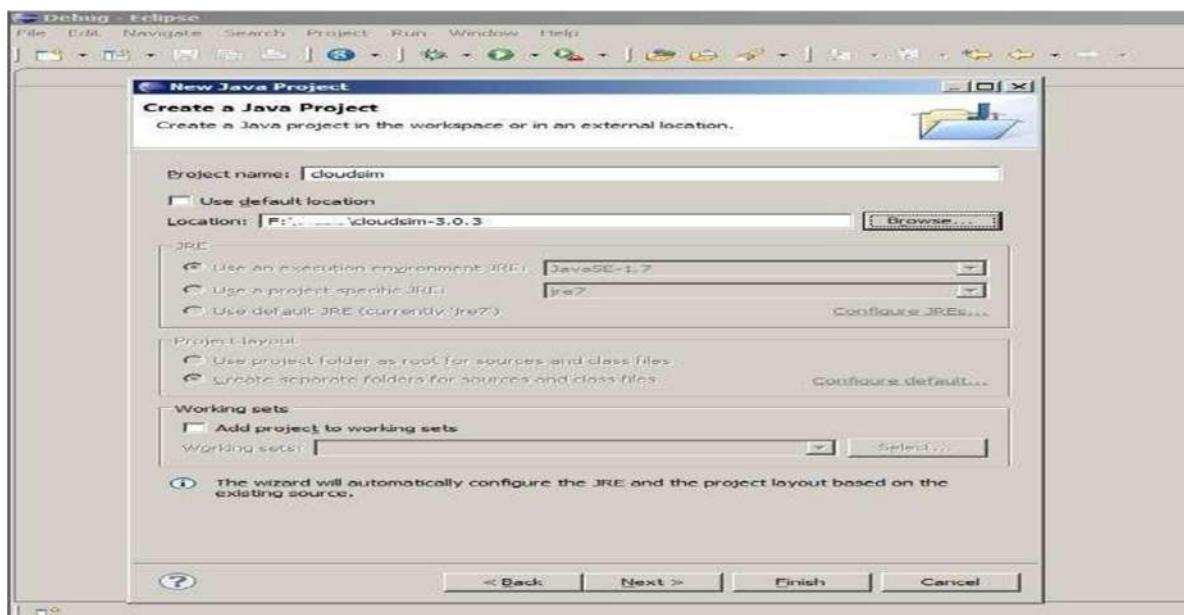
Step 9: Unselect the ‘Use default location’ option and then click on ‘Browse’ to open the path where you have unzipped the Cloudsim project and finally click Next to set project settings.



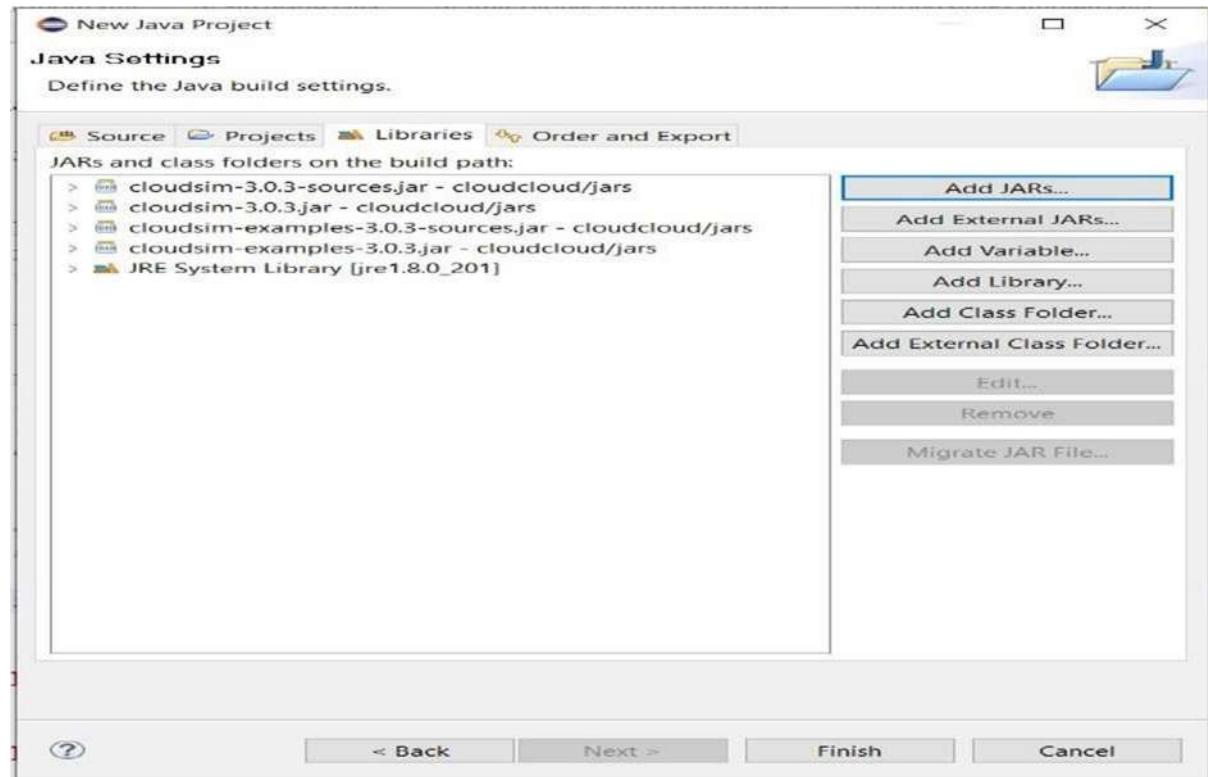
Step 10: Make sure you navigate the path till you can see the bin, docs, examples etc folder in the navigation plane.



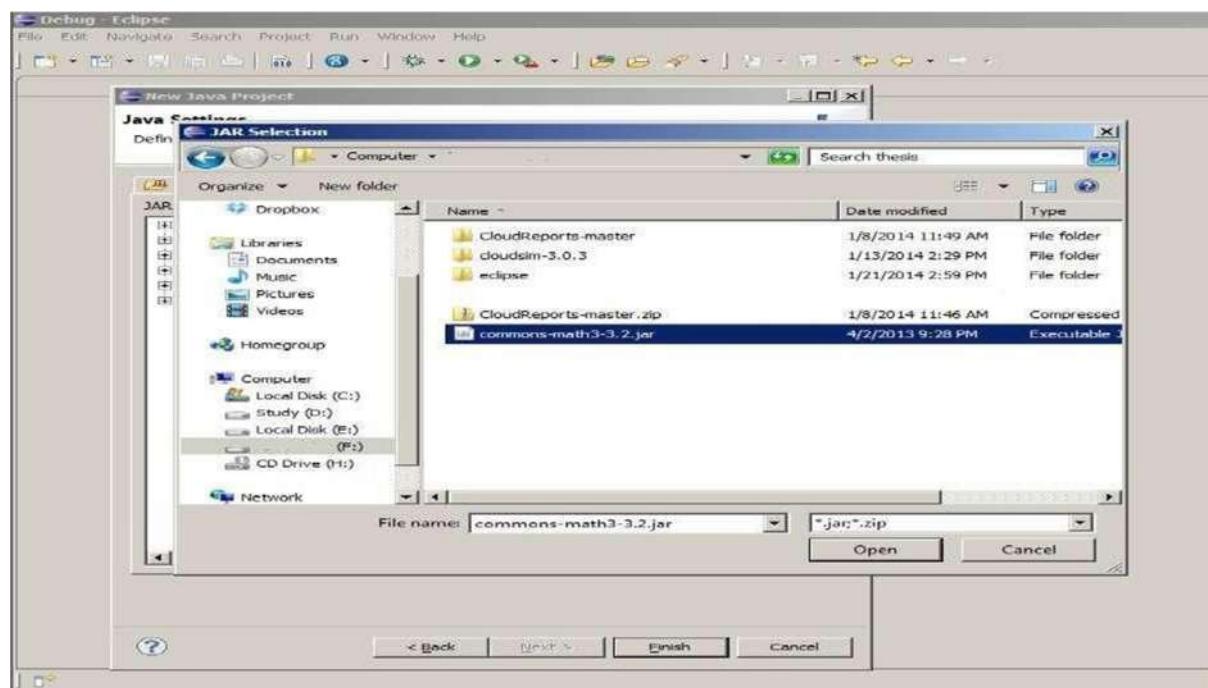
Step 11: Once done finally, click 'Next' to go to the next step i.e. setting up of project settings



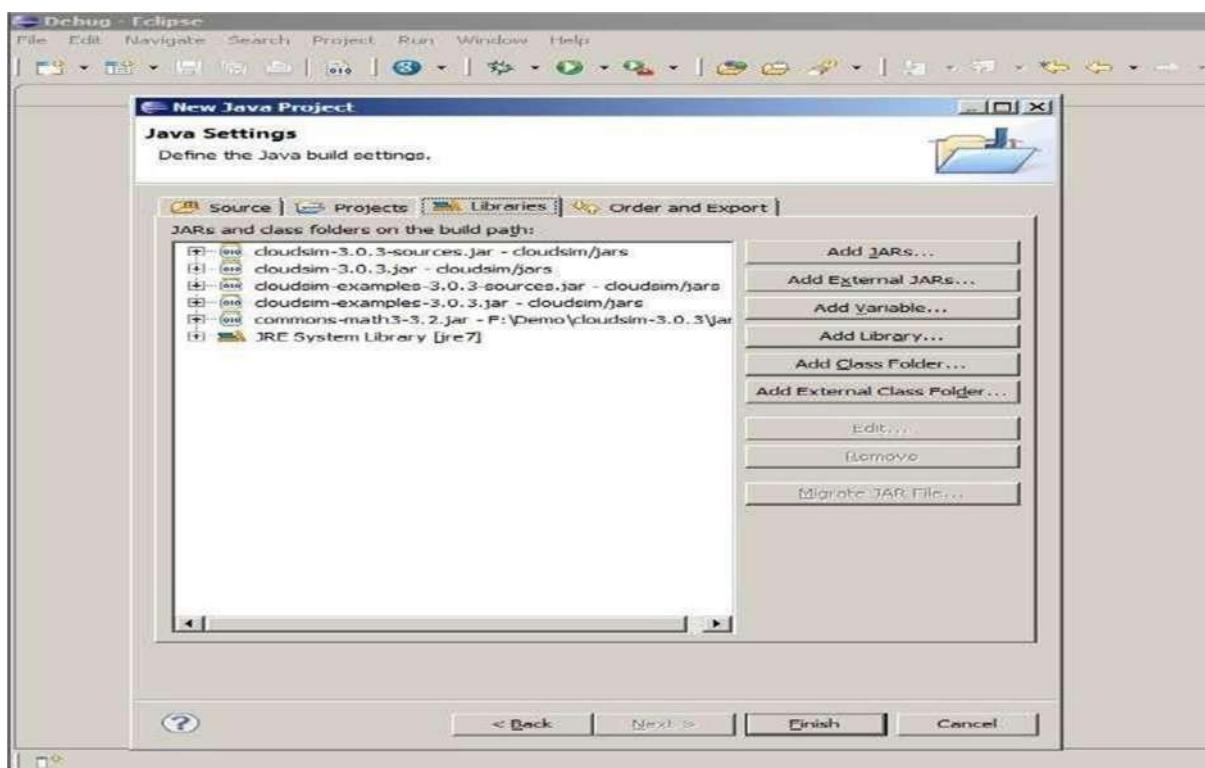
Step 12: Now open ‘Libraries’ tab and if you do not find commons-math3-3.x.jar (here ‘x’ means the minor version release of the library which could be 2 or greater) in the list then simply click on ‘Add External Jar’ (commons-math3-3.x.jar will be included in the project from this step)



Step 13: Once you have clicked on Add External JAR's Open the path where you have unzipped the commons-math binaries and select Commons-math3-3.x.jar and click on open.

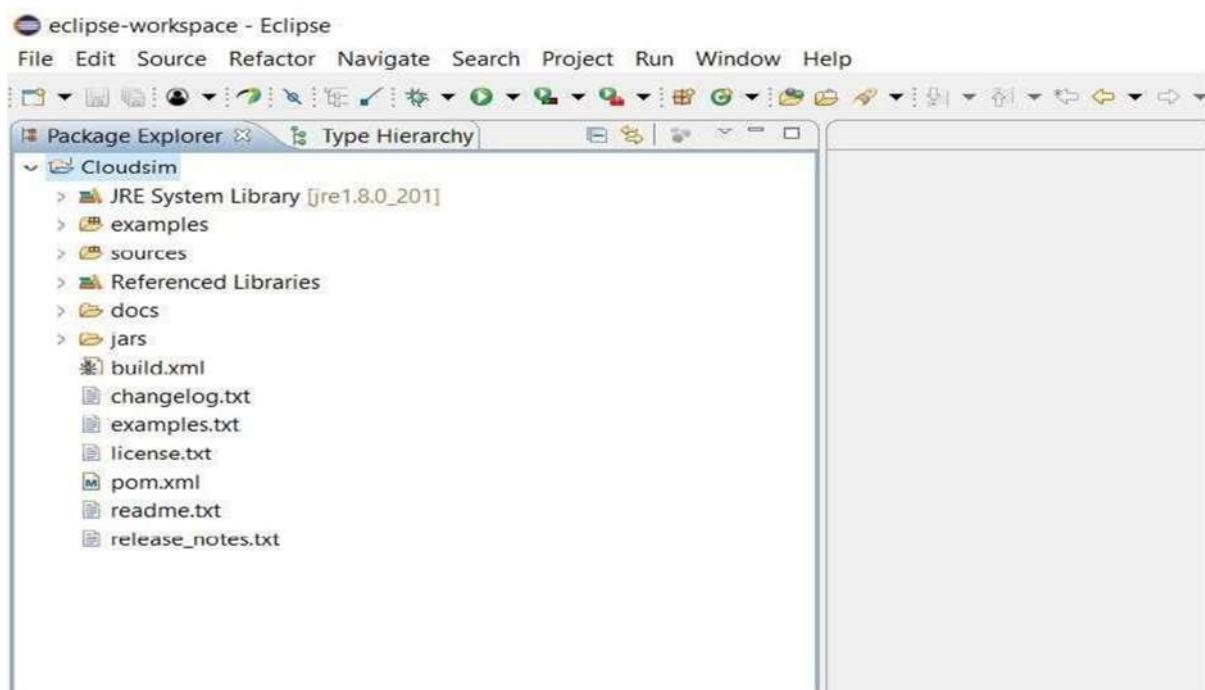


Step 14: Ensure external jar that you opened in the previous step is displayed in the list and then click on ‘Finish’ (your system may take 2-3 minutes to configure the project)

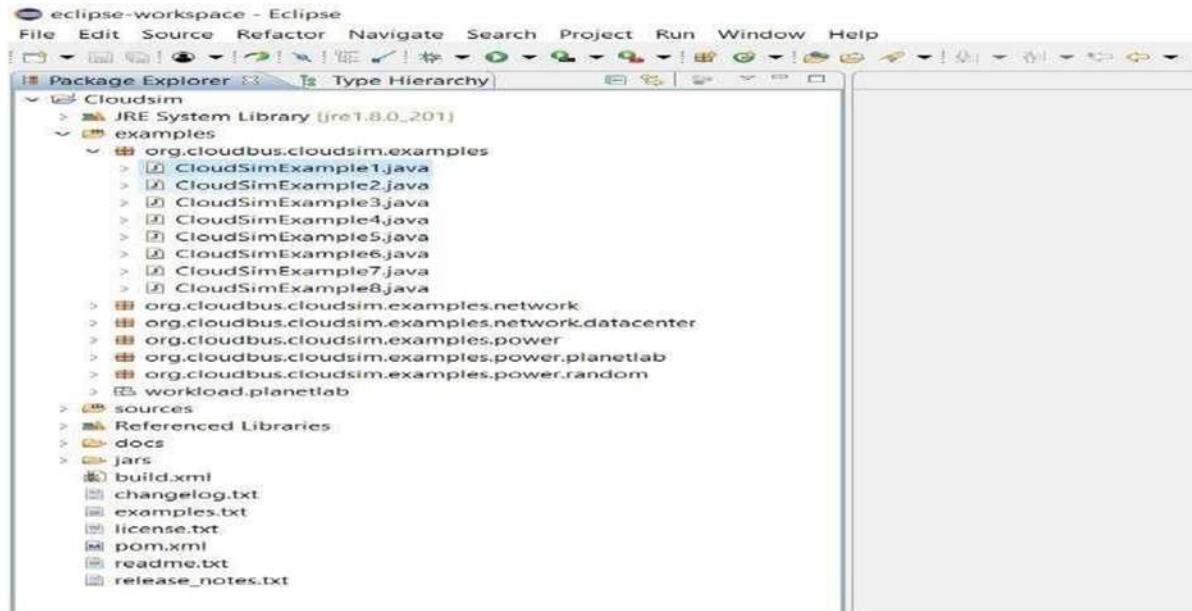


Step 15: Once the project is configured you can open the Project Explorer and start exploring the Cloudsim project. Also for the first time eclipse automatically start building the workspace for newly configured Cloudsim project, which may take some time depending on the configuration of the computer system.

Following is the final screen which you will see after Cloudsim is configured.



Step 16: Now just to check you within the **Project Explorer**, you should navigate to the **examples** folder, then expand the package **org.cloudbus.cloudsim.examples** and doubleclick to open the **CloudsimExample1.java**

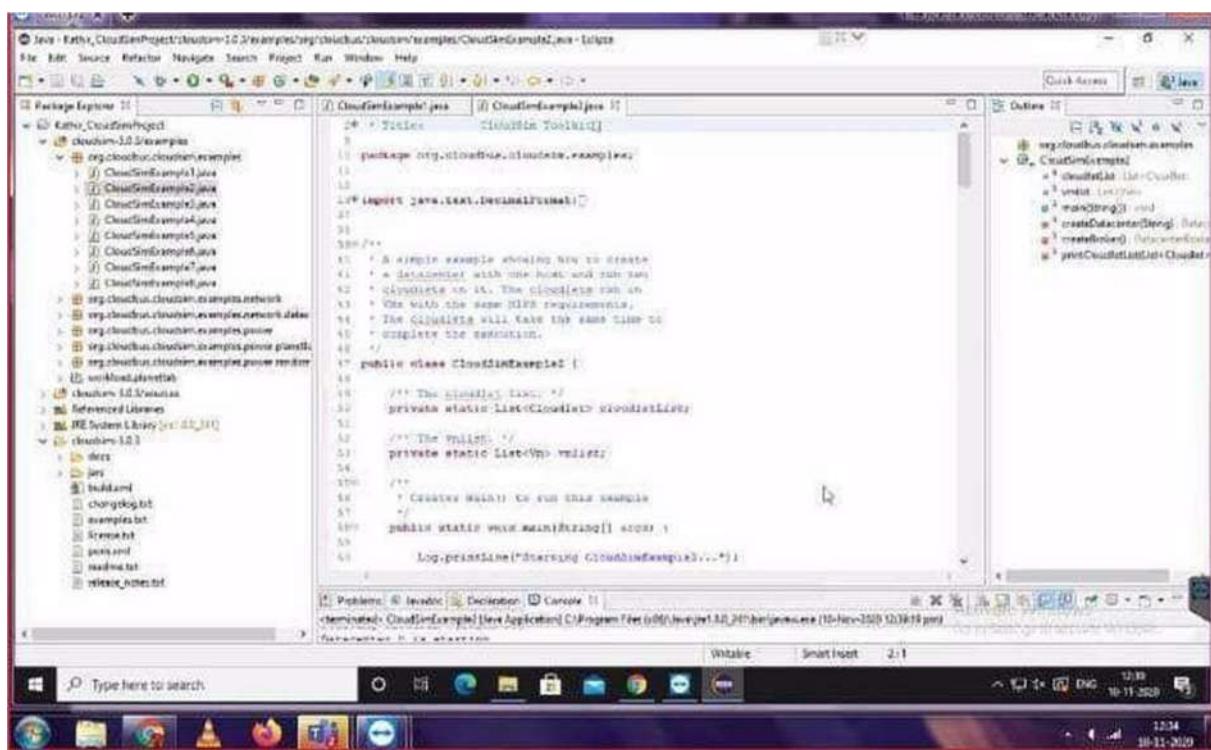


eclipse-workspace - Cloudsimexamples/org/cloudbus/cloudsim/examples/CloudSimExample1.java - Eclipse

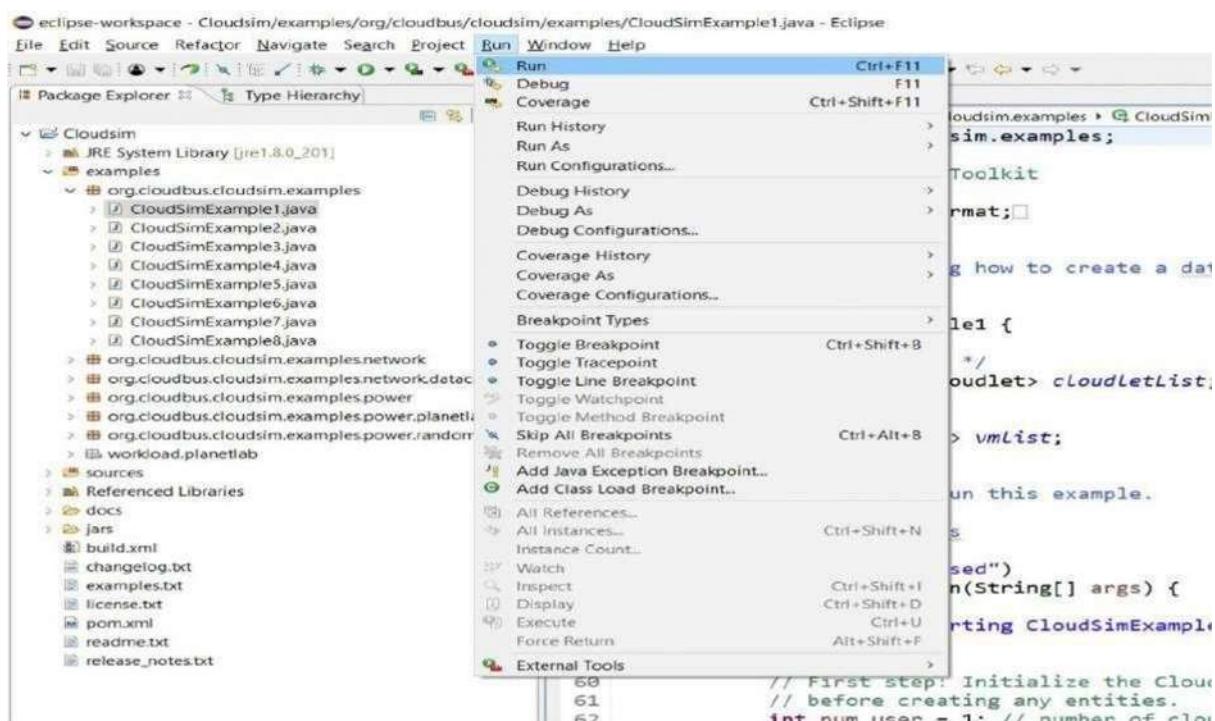
```

package org.cloudbus.cloudsim.examples;
public class CloudSimExample1 {
    /**
     * Title: CloudSim Toolkit
     */
    import java.text.DecimalFormat;
    /**
     * A simple example showing how to create a datacenter with one host and run one
     * cloudlet on it.
     */
    public class CloudSimExample1 {
        /**
         * The cloudlet list.
         */
        private static List<Cloudlet> cloudletList;
        /**
         * The vmlist.
         */
        private static List<Vm> vmList;
        /**
         * Creates main() to run this example.
         */
        /**
         * @param args the args
         */
        @SuppressWarnings("unused")
        public static void main(String[] args) {
            Log.println("Starting CloudSimExample1...");
            try {
                // First step: Initialize the CloudSim package. It should be called
                // before creating any entities.
                int numUser = 1; // number of cloud users
                Calendar calendar = Calendar.getInstance();
                boolean traceFlag = false; // mean trace events
                // Initialize the CloudSim library
                CloudSim.init(numUser, calendar, traceFlag);
            }
        }
    }
}

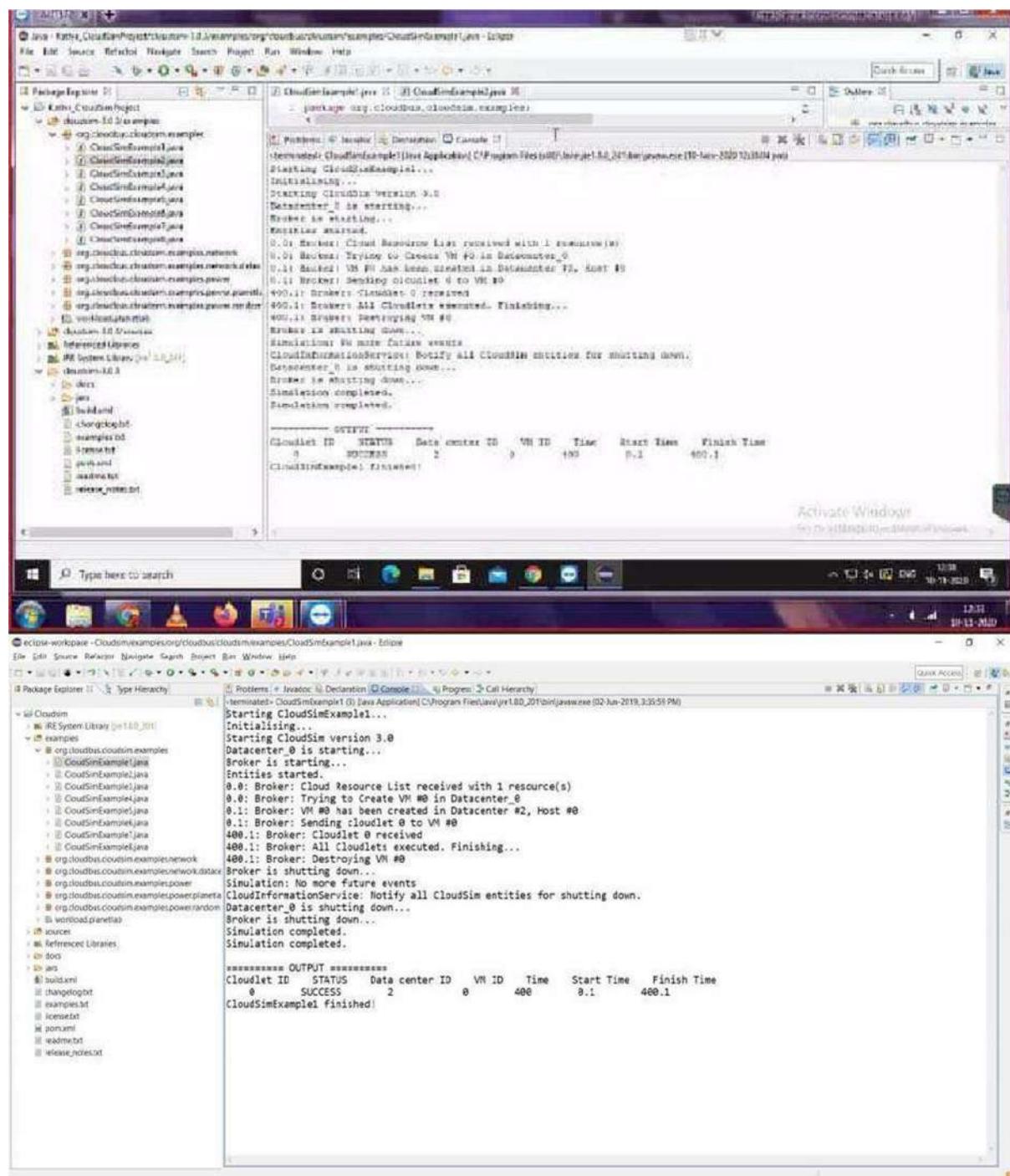
```



Step 17: Now navigate to the Eclipse menu Run ->Run_ or directly use a keyboard shortcut ‘Ctrl + F11’ to execute the CloudSimExample1.java.



Step 18: If it is successfully executed it should be displaying the following type to output inthe console window of the Eclipse IDE.



Result:

Thus the cloudsim is simulated using Eclipse Environment successfully.

Ex No. 5 b

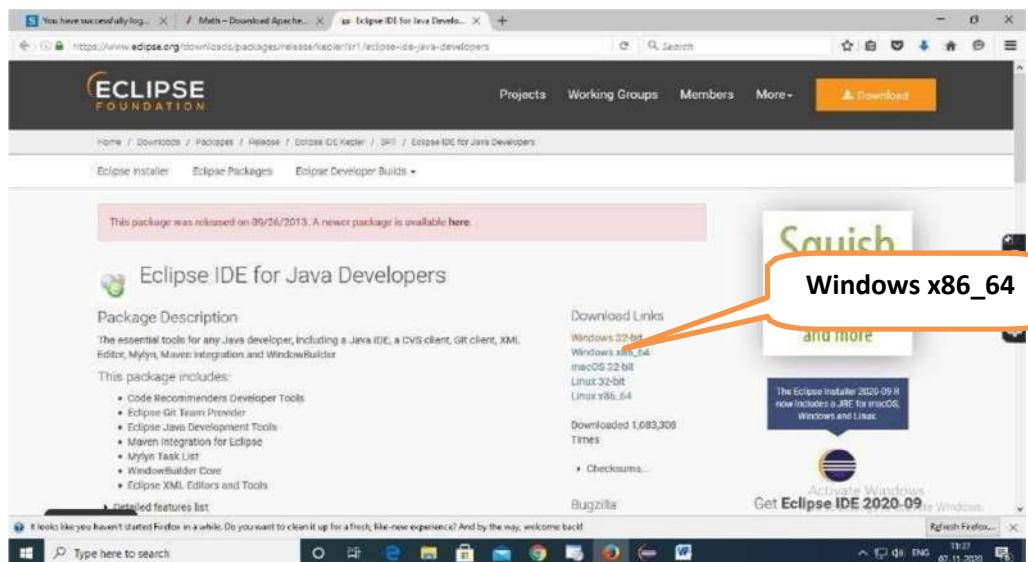
Date:

Simulate a cloud scenario using CloudSim and running a scheduling algorithm

Procedure to import Eclipse, running scheduling algorithms in your system

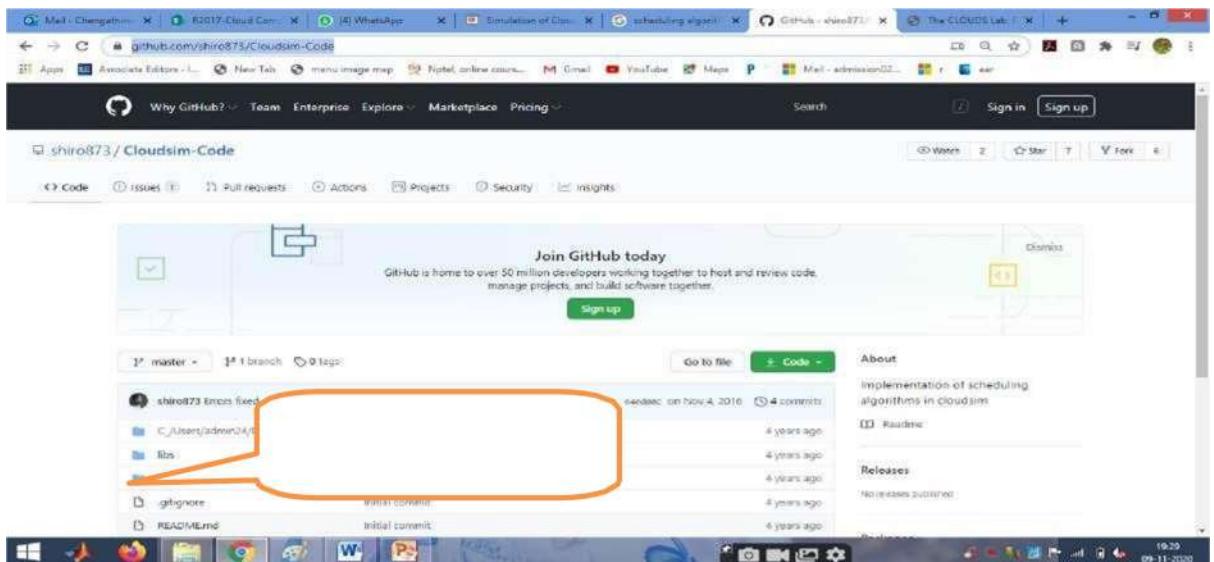
Step 1: Link to download Eclipse and download Eclipse for Windows 64bit into your Localmachine

<https://www.eclipse.org/downloads/packages/release/kepler/sr1/eclipse-ide-java-developers>

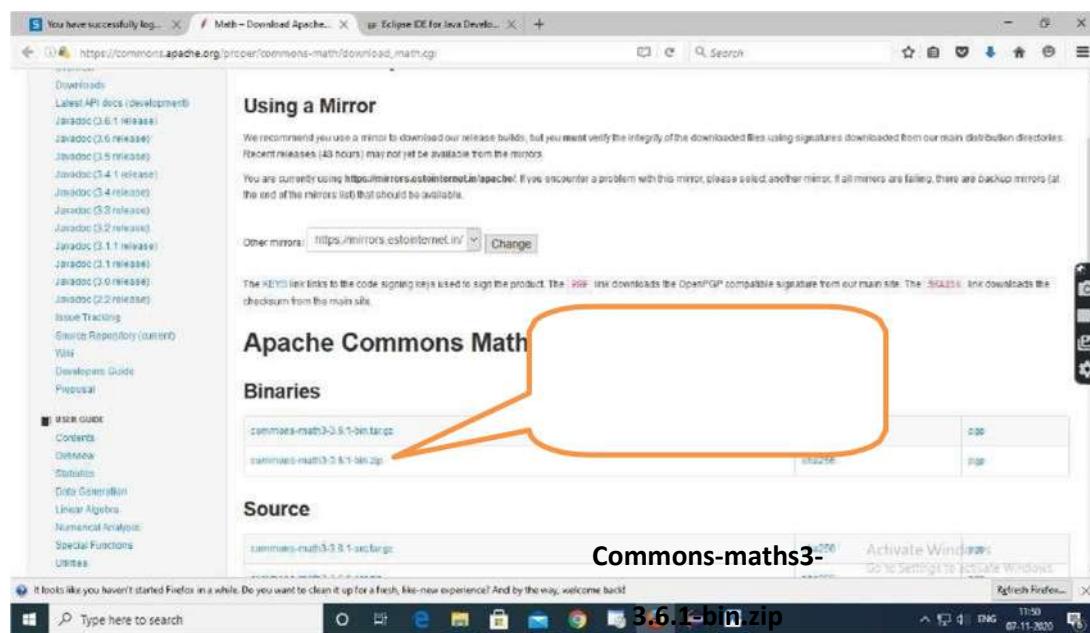


Step 2: Download scheduling source code **cloudsim-code-master** from git hub repository inyour local machine

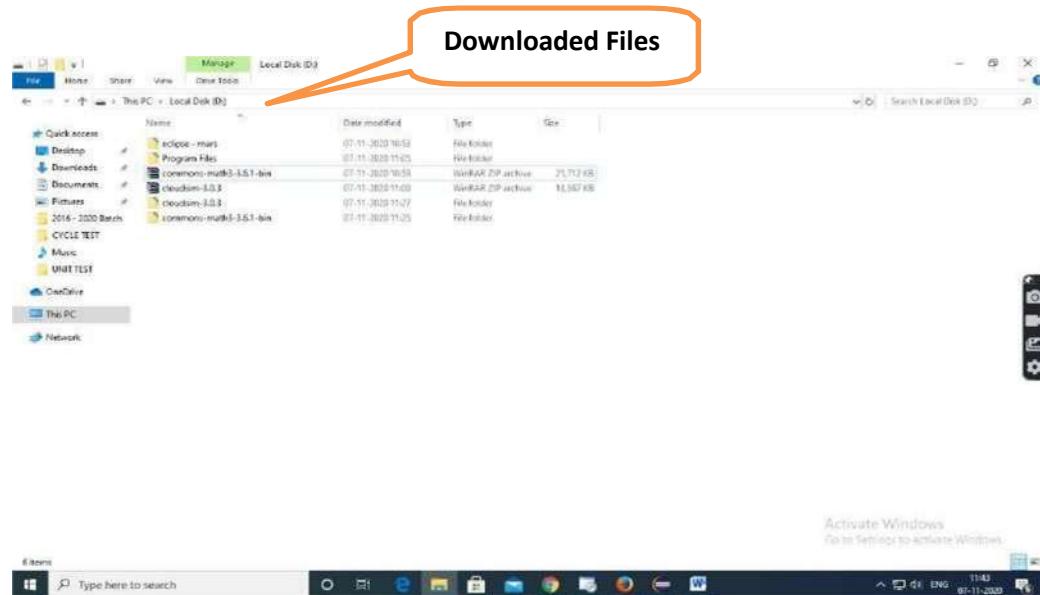
<https://github.com/shiro873/Cloudsim-Code>



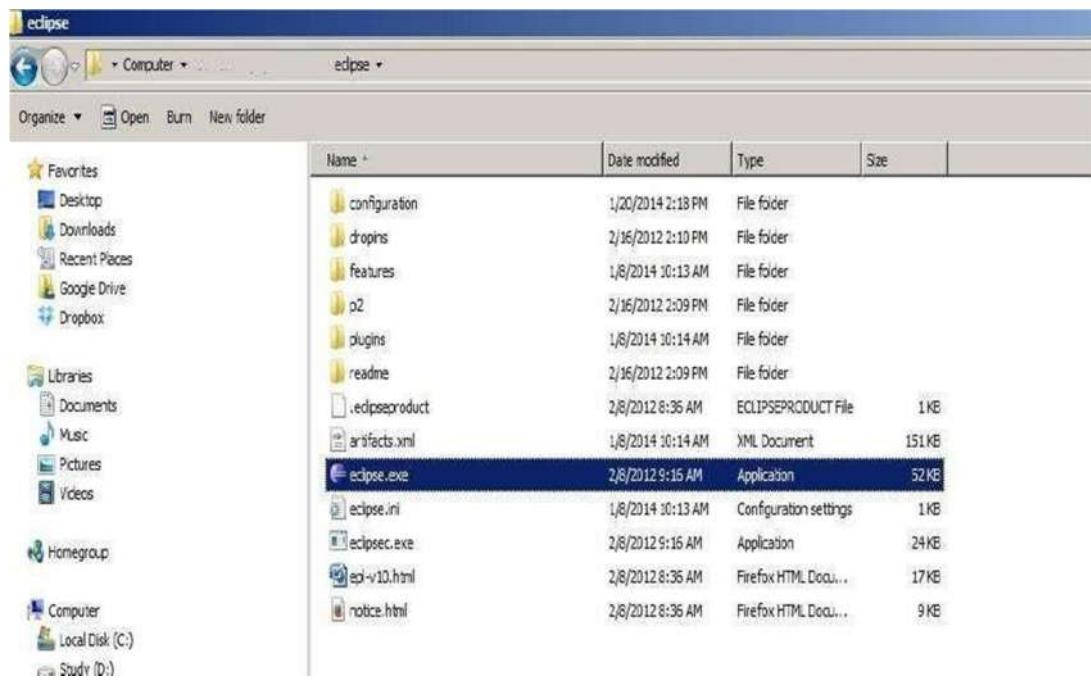
Step 3: Download commons-math3-3.6.1 from git hub repository in your local machine https://commons.apache.org/proper/commons-math/download_math.cgi



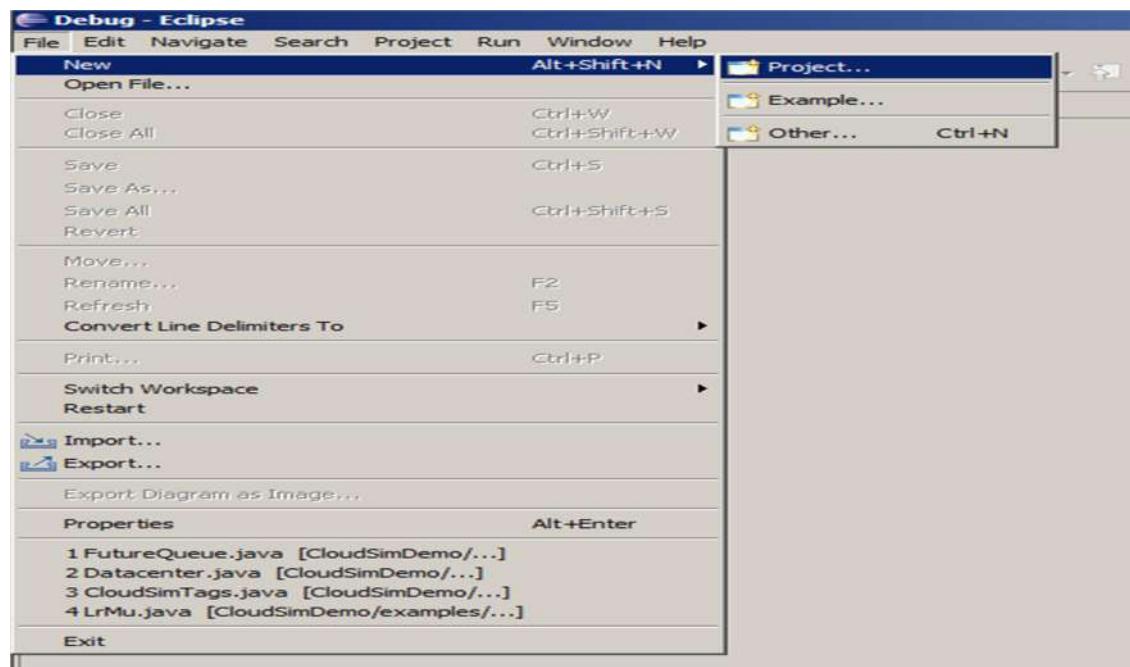
Step 4: Downloaded Eclipse, cloudsim-3.0.3 and Apache Commons Math 3.6.1 in your local machine and extract cloudsim-3.0.3 and Apache Commons Math 3.6.1



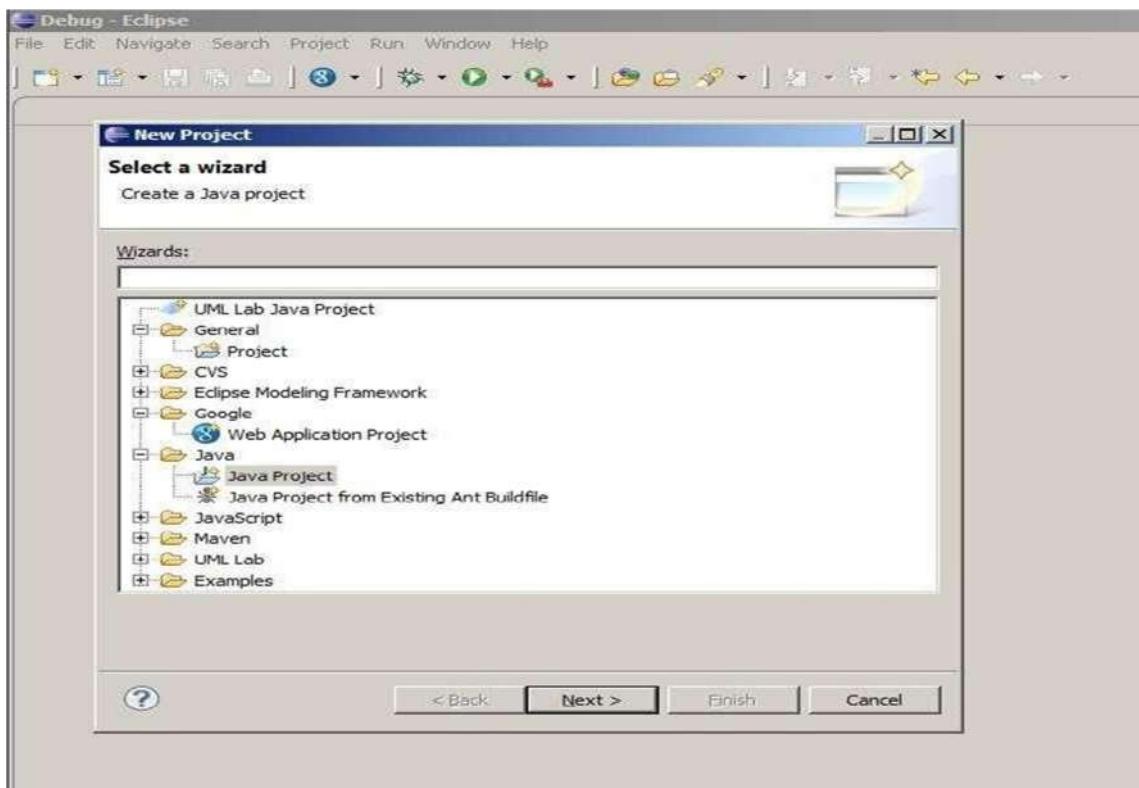
Step 5: First of all, navigate to the folder where you have unzipped the eclipse folder and open Eclipse.exe



Step 6: Now within Eclipse window navigate the menu: *File -> New -> Project*, to open the new project wizard

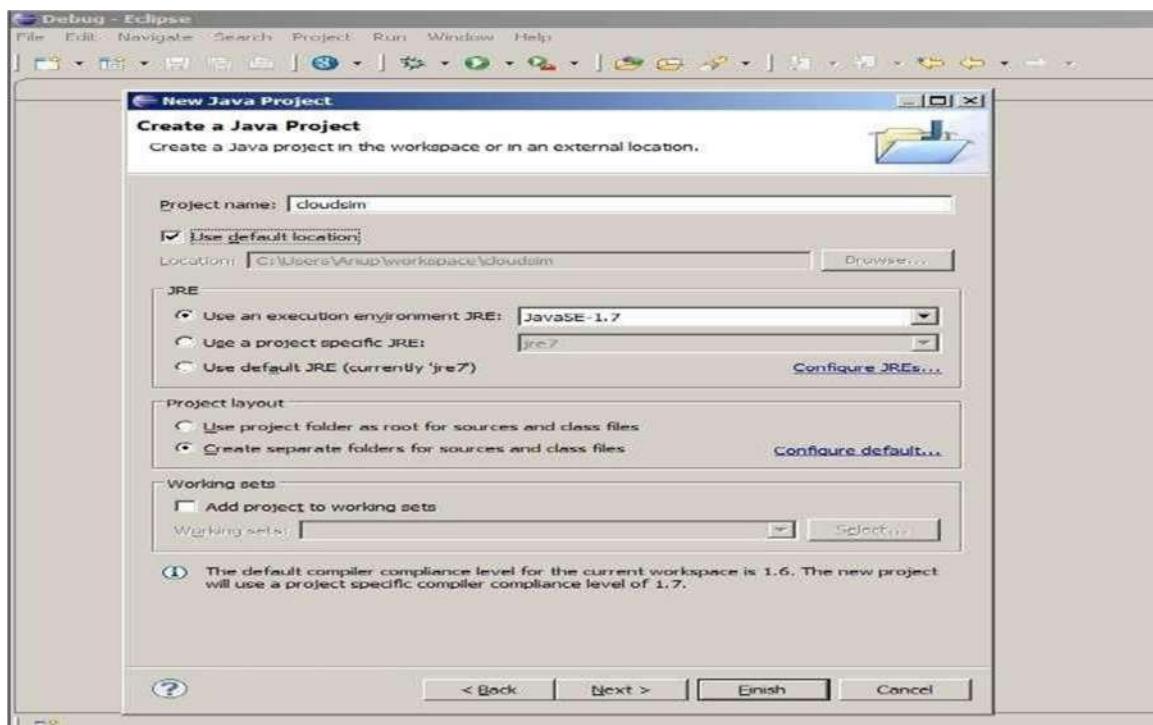


Step 7: A New Project wizard should open. There are a number of options displayed and you have to find & select the Java Project option, once done click ‘Next’

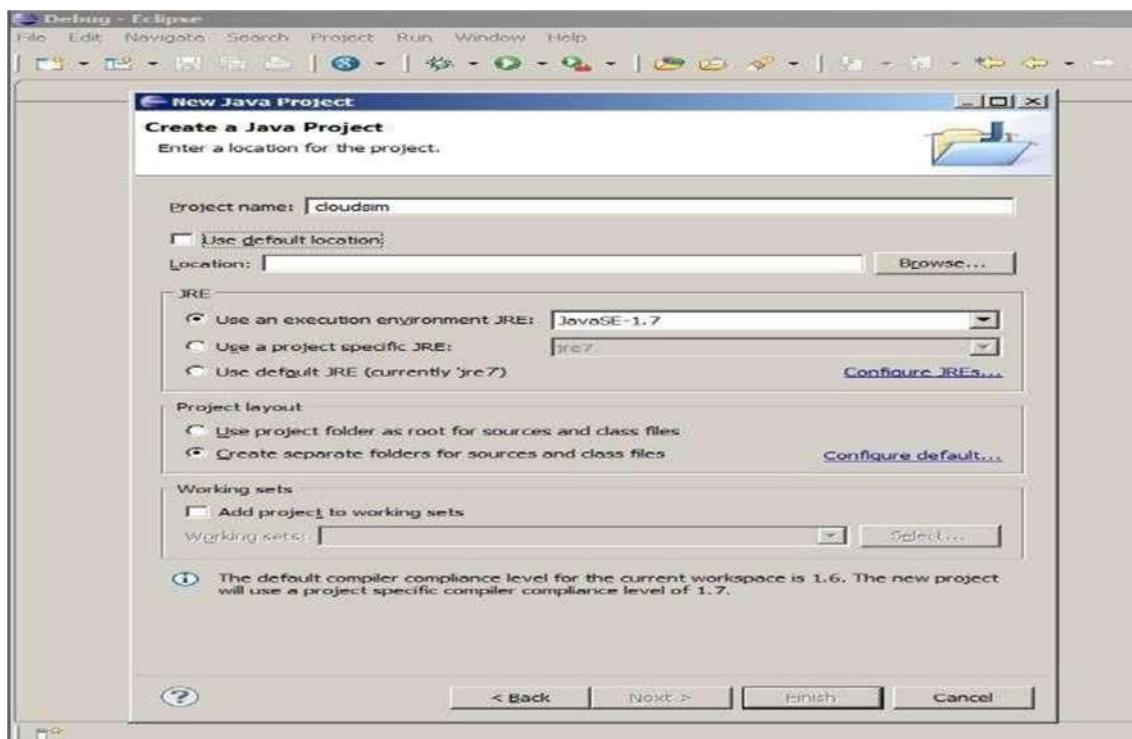


Step 8: Now a detailed new project window will open, here you will provide the project name and the path of CloudSim-master-code project source code, which will be done as follows:

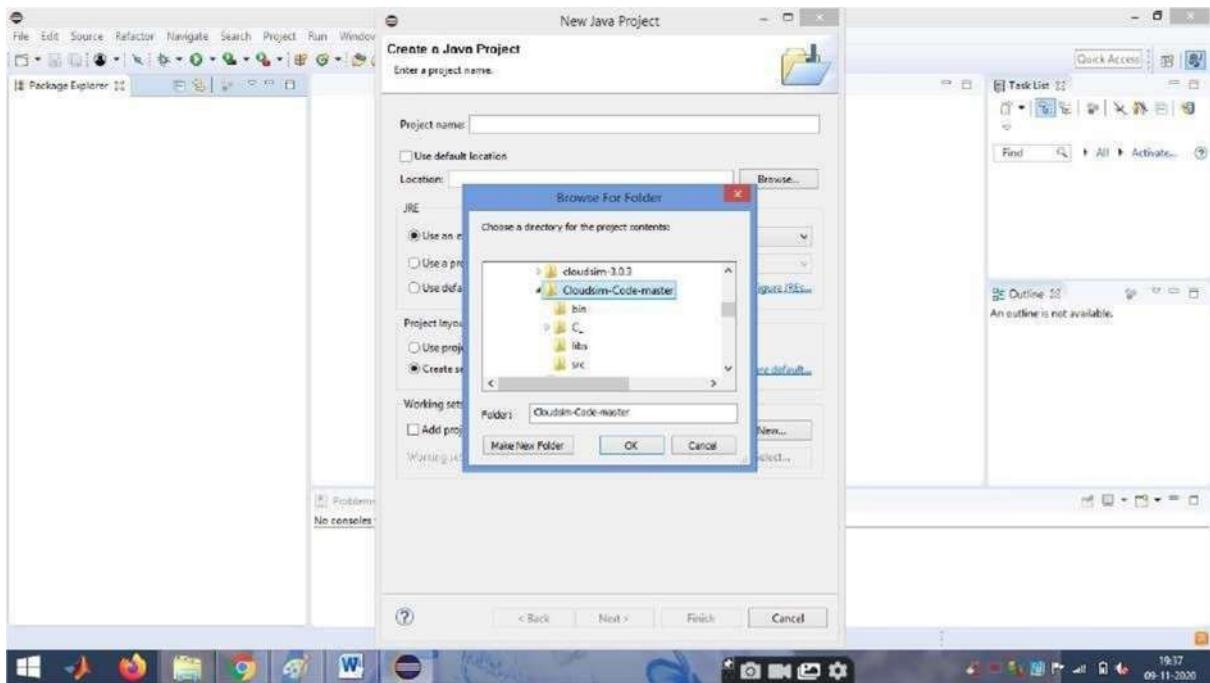
Project Name: CloudSim



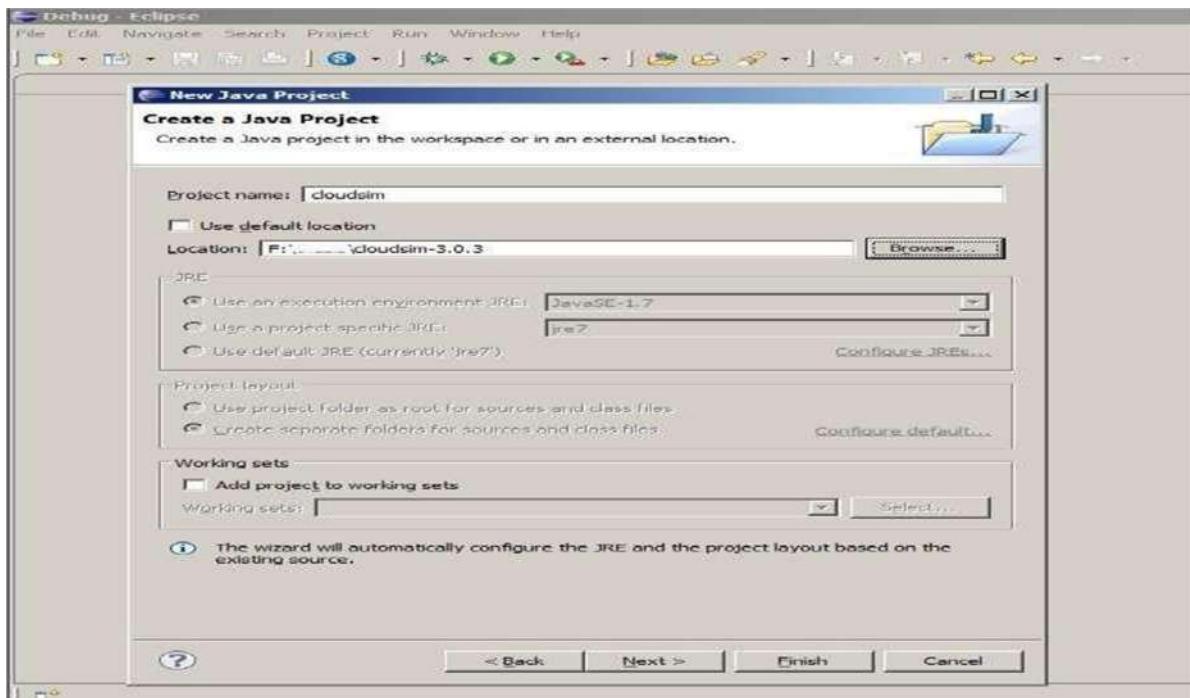
Step 9: Unselect the '*Use default location*' option and then click on '*Browse*' to open the path where you have unzipped the Cloudsim-code-master project and finally click Next to set project settings.



Step 10: Make sure you navigate the path till you can see the bin, docs, examplesetc folder inthe navigation plane.



Step 11: Once done finally, click 'Next' to go to the next step i.e. setting up of project settings



Step 12: Once the project is configured you can open the *Project Explorer* and start exploring the Cloudsim project. Also for the first time eclipse automatically start building the workspace for newly configured Cloudsim project, which may take some time depending on the configuration of the computer system.

Following is the final screen which you will see after Cloudsim is configured.

```

eclipse-workspace - CloudSim/src/RoundRobin.java - Eclipse
File Edit Source Refactor Navigate Project Run Window Help
Package Explorer 22 IRE System Library [rel.0.0_26]
Cloudsim
  + IRE System Library [rel.0.0_26]
    + default package
      + CloudletCreator.java
      + CloudletCreator.java
      + CloudletCreator.java
      + CloudletCreatorDynamic.java
      + DataCenterCreator.java
      + EnhancedCloudlet.java
      + EnhancedCloudletBroker.java
      + FCFS.java
      + FIFOBroker.java
      + Flag.java
      + H.java
      + Mash.java
      + MinMinBroker.java
      + MinMin.java
      + MinMinBroker.java
      + RoundRobin.java
      + RoundRobinDatacentreBroker.java
      + Selective.java
      + SelectiveBroker.java
      + SPT.java
      + SPTBroker.java
      + VmCreator.java
    + Reference Libraries
    + C_
    + lib
    + README.md
  Problems 23 JavaDoc Declaration
  0 errors, 2 warnings, 0 others
  Description Resource Path Location Type
  Warnings (2 items)
  Outline 52
  RoundRobin
    + cloudletList: List<Cloudlet>
    + vmlist: List<Vm>
    + reqTasks: int
    + reqMs: int
    + main(String[] args): void
    + createDatacenterSet(): DatacenterSet
    + createBroker(): RoundRobinBroker
    + printCloudletList(List<Cloudlet>)
  Problems 23 JavaDoc Declaration
  0 errors, 2 warnings, 0 others
  Description Resource Path Location Type
  Writable Smart Insert 2:1
  19:38 09-11-2020

```

Step 13: Now just to check you within the **Project Explorer**, you should navigate to the **src** folder, then expand the package *default package* and double click to open the *RoundRobin.java*.

```

Java - Item2_CloudSim/RoundRobin.java - Eclipse
File Edit Source Refactor Navigate Project Run Window Help
Package Explorer 22 IRE System Library [rel.0.0_26]
  + Kather_CloudSimProject
    + cloudsim-3.0.2/examples
    + cloudsim-3.0.2/examples
    + lib
    + Reference Libraries
    + IRE System Library [rel.0.0_26]
    + cloudsim-3.0.2
  TeamCloudSim
    + src
      + default package
        + CloudletCreator.java
        + CloudletCreator.java
        + CloudletCreator.java
        + CloudletCreatorDynamic.java
        + DataCenterCreator.java
        + EnhancedCloudlet.java
        + EnhancedCloudletBroker.java
        + FCFS.java
        + FIFOBroker.java
        + Flag.java
        + H.java
        + Mash.java
        + MinMinBroker.java
        + MinMin.java
        + MinMinBroker.java
        + RoundRobin.java
        + RoundRobinDatacentreBroker.java
        + Selective.java
        + SelectiveBroker.java
        + SPT.java
        + SPTBroker.java
        + VmCreator.java
      + Reference Libraries
    + Problems 23 JavaDoc Declaration
    0 errors, 2 warnings, 0 others
    Description Resource Path Location Type
    Warnings (2 items)
  Outline 52
  RoundRobin
    + cloudletList: List<Cloudlet>
    + vmlist: List<Vm>
    + reqTasks: int
    + reqMs: int
    + main(String[] args): void
    + createDatacenterSet(): DatacenterSet
    + createBroker(): RoundRobinBroker
    + printCloudletList(List<Cloudlet>)
  Problems 23 JavaDoc Declaration
  0 errors, 2 warnings, 0 others
  Description Resource Path Location Type
  Writable Smart Insert 32:1
  19:38 10-11-2020

```

Step 14: Now navigate to the Eclipse menu Run ->Run or directly use a keyboard shortcut '*Ctrl + F11*' to execute the '*RoundRobin.java*'. If it is successfully executed it

should be displaying the following type to output in the console window of the Eclipse IDE.

```
Java - Test2_CloudServiceRoundRobin.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer Problems Java Declaration Console
Generated RoundRobin [Java Application] C:\Program Files (x86)\Java\javac\bin\javac.exe (10-Nov-2020 1:05:41 pm)
Starting RoundRobin...
Initialising...
Broker:!! DatacenterCloudlet is executed!
Broker:!! VirtualMachine Executed... SUCCESS!
SUCCESSFULLY CloudletList created !
Starting CloudSim Version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started.
0.0 Broker: Cloud Resource List received with 1 resource(s)
0.0 Broker: Trying to Create VM #0 in Datacenter_0
0.0 Broker: Trying to Create VM #1 in Datacenter_0
0.0 Broker: Trying to Create VM #2 in Datacenter_0
0.0 Broker: Trying to Create VM #3 in Datacenter_0
0.1 Broker: VM #0 has been created in Datacenter #2, Host #0
0.1 Broker: VM #1 has been created in Datacenter #2, Host #0
0.1 Broker: VM #2 has been created in Datacenter #2, Host #0
0.1 Broker: VM #3 has been created in Datacenter #2, Host #0
0.1 Broker: Sending cloudlet 0 to VM #0
0.1 Broker: Sending cloudlet 1 to VM #1
0.1 Broker: Sending cloudlet 2 to VM #2
0.1 Broker: Sending cloudlet 3 to VM #3
0.1 Broker: Sending cloudlet 4 to VM #0
0.1 Broker: Sending cloudlet 5 to VM #1
0.1 Broker: Sending cloudlet 6 to VM #2
0.1 Broker: Sending cloudlet 7 to VM #3
0.1 Broker: Sending cloudlet 8 to VM #0
0.1 Broker: Sending cloudlet 9 to VM #1
0.999999999999999 Broker: Cloudlet 4 received
```

```
Java - Test2_CloudServiceRoundRobin.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer Problems Java Declaration Console
Generated RoundRobin [Java Application] C:\Program Files (x86)\Java\javac\bin\javac.exe (10-Nov-2020 1:05:41 pm)
44.389000000000005 Broker: Cloudlet 1 received
47.38901818181818 Broker: Cloudlet 0 received
47.38901818181818 Broker: All Cloudlets executed. Finishing...
47.38901818181818 Broker: Destroying VM #0
47.38901818181818 Broker: Destroying VM #1
47.38901818181818 Broker: Destroying VM #2
47.38901818181818 Broker: Destroying VM #3
Broker is shutting down...
Simulations No more future events
CloudInformationVersion: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.
```

Cloudlet ID	Status	Data center ID	VM ID	Time	Start Time	Finish Time	Waiting time
3	SUCCESS	2	3	8.95	0.1	8.95	0
1	SUCCESS	2	3	12.22	0.1	12.22	0
5	SUCCESS	2	1	13.5	0.1	13.5	0
6	SUCCESS	2	2	14.64	0.1	14.76	0
5	SUCCESS	2	1	20.5	0.1	20.4	0
2	SUCCESS	2	2	31.33	0.1	34.43	0
8	SUCCESS	2	0	38.17	0.1	38.27	0
9	SUCCESS	2	0	38.95	0.1	40.35	0
1	SUCCESS	2	1	44.55	0.1	44.55	0
0	SUCCESS	2	0	47.27	0.1	47.37	0

```
RoundRobin finished!
```

Result:

Thus the scheduling algorithm is executed in cloudsim is simulated using EclipseEnvironment successfully.

Ex.No:6

Date:

Find a procedure to transfer the files from one virtual machine to another virtual machine.

AIM:

To Find a procedure to transfer the files from one virtual machine to another virtual machine.

PROCEDURE

There are three ways to transfer the files from one virtual machine to another virtual machine

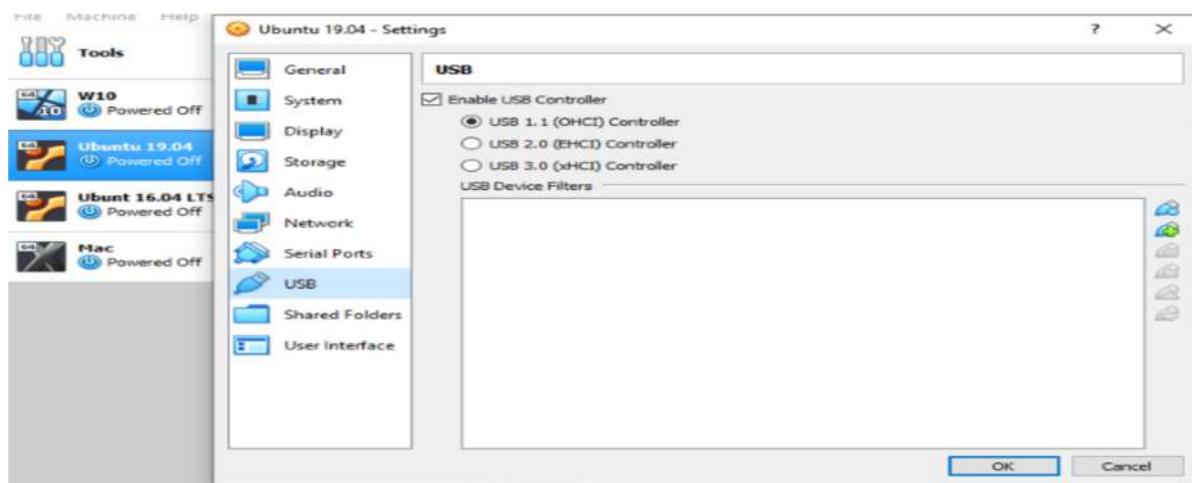
- Copy and paste
- USB drive
- Network share

STEP 1.Copy And Paste Data In VirtualBox

If you're using VirtualBox, with your virtual machine running, select Devices > Drag and Drop. Here, you can choose from Host to Guest, Guest to Host, and Bidirectional. There's also the default option, Disabled. For the best results, use Bidirectional.

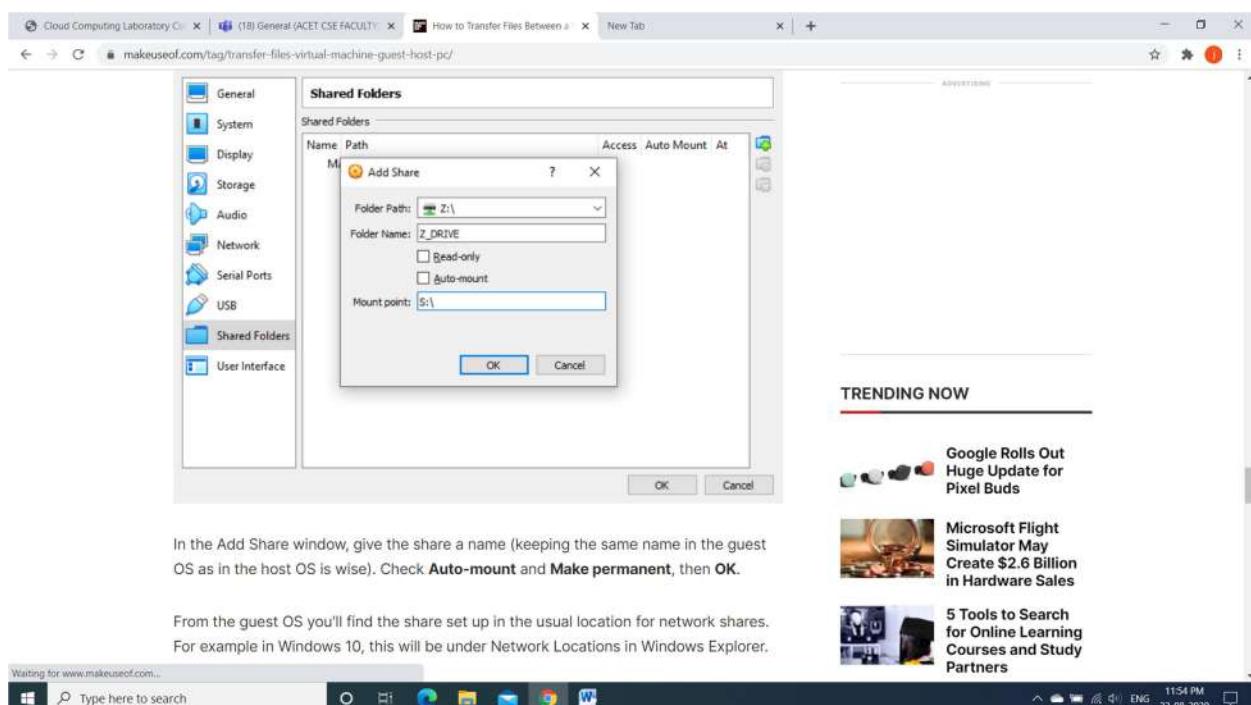
STEP 2:Share Files From A USB Stick In VirtualBox

- To be able to access USB devices from within VirtualBox, you'll need to enable USB access. For this, the VirtualBox Extension Pack is required from www.virtualbox.org/wiki/Downloads.
- Once you've done that, insert the USB device you wish to use. Next, open VirtualBox and click File > Preferences, then Extensions and click +. Browse to the downloaded Extension Pack, click Open, then when prompted, Install. Follow the prompts to complete the process. You can then check to confirm USB is enabled in Settings > USB



STEP 3. Create A Share In VirtualBox

- You should have already downloaded VirtualBox Guest Additions. This should be installed via Devices > Install Guest Additions, where you should browse for the appropriate EXE file. Follow the steps to the end, choosing the default options, then Finish.
- Launch VirtualBox and open Devices > Shared Folders > Shared Folders Settings. Click +, then in Folder Path click the arrow and select Other. Browse (the host OS) for the folder you're using as a share, highlight it, then Select Folder.in the Add Share window, give the share a name (keeping the same name in the guest OS as in the host OS is wise).
- Check Auto-mount and Make permanent, then OK.



RESULT:

Thus the procedure to transfer the files from one virtual machine to another virtual machine is executed successfully.

Ex.No:7

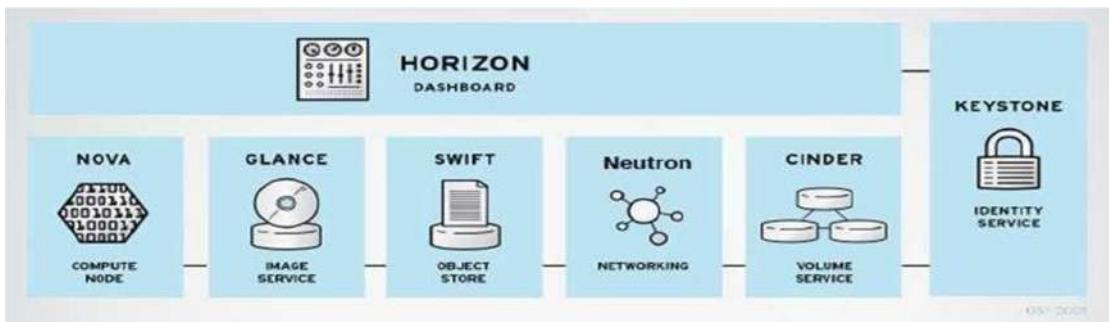
Date:

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

Introduction:

- ❖ OpenStack was introduced by Rackspace and NASA in July 2010.
- ❖ OpenStack is an Infrastructure as a Service known as Cloud Operating System, that take resources such as Compute, Storage, Network and Virtualization Technologies and control those resources at a data center level
- ❖ The project is building an open source community - to share resources and technologies with the goal of creating a massively scalable and secure cloud infrastructure.
- ❖ The software is open source and limited to just open source APIs such as Amazon.

The following figure shows the OpenStack architecture



OpenStack architecture

- It is modular architecture
- Designed to easily scale out
- Based on (growing) set of core services

The major components are

1. **Keystone**
2. **Nova**
3. **Glance**
4. **Swift**
5. **Quantum**
6. **Cinder**

- **KEYSTONE :**

- Identity service
- Common authorization framework
- Manage users, tenants and roles
- Pluggable backends (SQL,PAM,LDAP, IDM etc)

- **NOVA**

- Core compute service comprised of
 - Compute Nodes – hypervisors that run virtual machines
 - Supports multiple hypervisors KVM,Xen,LXC,Hyper-V and ESX
 - Distributed controllers that handle scheduling, API calls, etc
 - Native OpenStack API and Amazon EC2 compatible API

- **GLANCE**

- Image service
- Stores and retrieves disk images (Virtual machine templates)
- Supports RAW,QCOW,VHD,ISO,OVF & AMI/AKI
- Backend Storage : File System, Swift, Gluster, Amazon S3

- **SWIFT**

- Object Storage service
- Modeled after Amazon's Service
- Provides simple service for storing and retrieving arbitrary data
- Native API and S3 compatible API

- **NEUTRON**

- Network service
- Provides framework for Software Defined Network
- Plugin architecture
 - Allows integration of hardware and software based network solutions
 - Open vSwitch, Cisco UCS, Standard Linux Bridge, NiCira NVP

- **CINDER**
 - Block Storage (Volume) service
 - Provides block storage for Virtual machines(persistent disks)
 - Similar to Amazon EBS service
 - Plugin architecture for vendor extensions
 - NetApp driver for cinder
- **HORIZON**
 - Dashboard
 - Provides simple self service UI for end-users
 - Basic cloud administrator functions
 - Define users, tenants and quotas
 - No infrastructure management
- **HEAT OpenStack Orchestration**
 - Provides template driven cloud application orchestration
 - Modeled after AWS Cloud Formation
 - Targeted to provide advanced functionality such as high availability and auto scaling
 - Introduced by Redhat
- **CEILOMETER – OpenStack Monitoring and Metering**
 - Goal: To Provide a single infrastructure to collect measurements from an entire OpenStack Infrastructure; Eliminate need for multiple agents attaching to multiple OpenStack Projects
 - Primary targets metering and monitoring: Provided extensibility

❖ Steps in Installing Openstack

Step 1:

- Download and Install Oracle Virtual Box latest version & Extension package
 - <https://virtualbox.org/wiki/downloads>

Step 2:

- Download CentOS 7 OVA(Open Virtual Appliance) from
 - Link : <https://linuxvmimages.com/images/centos-7>
- Import CentOS 7 OVA(Open Virtual Appliance) into Oracle Virtual Box

```
File Edit View Search Terminal Help  
[edureka@localhost ~]$ su  
Password:  
[root@localhost edureka]#
```



Step 3: Login into CentOS 7

- Login Details
 - **User name : centos**
 - **Password : centos**
- To change into root user in Terminal

#sudosu-

Step 4: Installation Steps for OpenStack

Step5: Command to disable and stop firewall

```
# systemctl  
    disable firewalld  
#systemctl stop  
firewalld
```

```
[root@localhost ~]# systemctl disable firewalld  
Removed symlink /etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service.  
Removed symlink /etc/systemd/system/basic.target.wants/firewalld.service.  
[root@localhost ~]# systemctl stop firewalld  
[root@localhost ~]# █
```

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Step 6: Command to disable and stop Network Manager

```
# systemctl disable  
NetworkManager  
  
# systemctl stop  
NetworkManager
```

```
[root@localhost ~]# systemctl disable NetworkManager
Removed symlink /etc/systemd/system/multi-user.target.wants/NetworkManager.service.
Removed symlink /etc/systemd/system/dbus-org.freedesktop.NetworkManager.service.
Removed symlink /etc/systemd/system/dbus-org.freedesktop.nm-dispatcher.service.
[root@localhost ~]# systemctl stop NetworkManager
[root@localhost ~]#
```

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Step 7: Enable and start Network

```
#systemctl
enable network
#systemctl start
network
```

```
[root@localhost ~]# systemctl enable network
network.service is not a native service, redirecting to /sbin/chkconfig.
Executing /sbin/chkconfig network on
[root@localhost ~]# systemctl start network
[root@localhost ~]#
```

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Step 8: OpenStack will be deployed on your Node with the help of PackStack package provided by rdo repository (RPM Distribution of****

OpenStack). In order to enable **rdo** repositories on Centos 7 run the below command.

```
#yum install -y https://rdoproject.org/repos/rdo-release.rpm
```

```
[root@localhost ~]# yum install -y centos-release-openstack-newton
```

I

Step 9: Update Current packages `#yum update -y`

```
[root@localhost ~]# yum update -y
Loaded plugins: fastestmirror, langpacks
centos-ceph-jewel
centos-openstack-newton
centos-qemu-ev
(1/3): centos-ceph-jewel/7/x86_64/primary_db | 2.9 kB 00:00:00
(2/3): centos-qemu-ev/7/x86_64/primary_db | 2.9 kB 00:00:00
(3/3): centos-openstack-newton/x86_64/primary_db | 2.9 kB 00:00:00
Loading mirror speeds from cached hostfile
 * base: centos.excellmedia.net
 * extras: centos.excellmedia.net
 * updates: mirrors.viethosting.com
```

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Step 10: Install OpenStack Release for CentOS

```
#yum install -y openstack-packstack
```

```
[root@localhost ~]# yum install -y openstack-packstack
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: centos.excellmedia.net
 * extras: centos.excellmedia.net
 * updates: mirrors.viethosting.com
```

Step 11:Start packstack to install OpenStack Newton

#packstak --allinone

```
[root@localhost ~]# packstack --allinone
Welcome to the Packstack setup utility

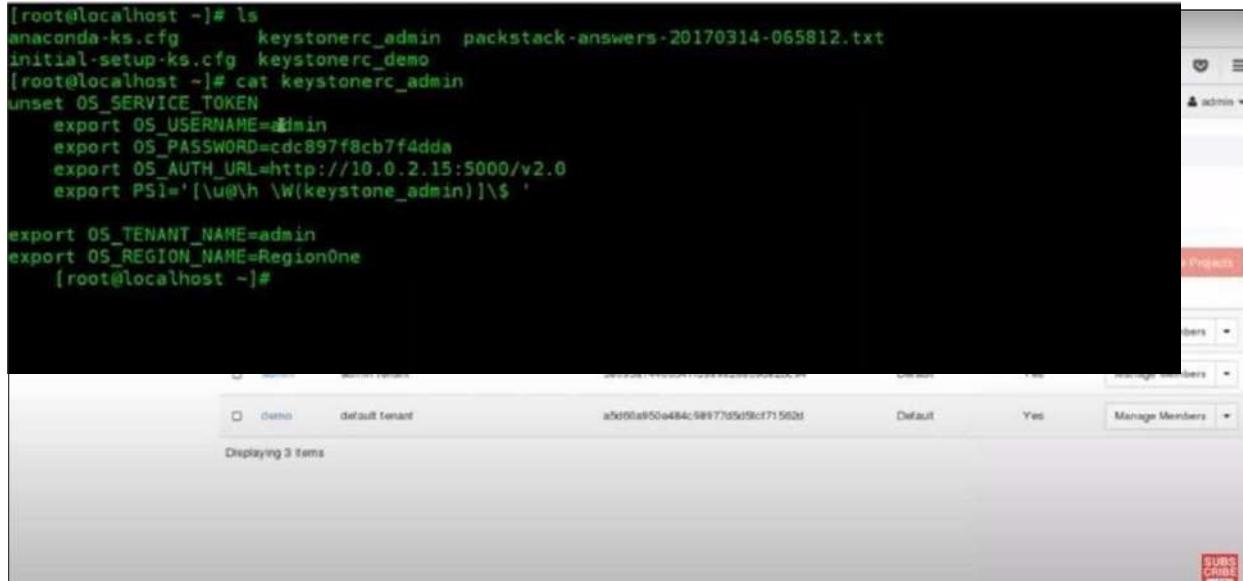
The installation log file is available at: /var/tmp/packstack/20170314-065810-b8cxch/openstack-setup.log
Packstack changed given value  to required value /root/.ssh/id_rsa.pub

Installing:
Clean Up                                [ DONE ]
Discovering ip protocol version          [ DONE ]
Setting up ssh keys                      [ DONE ]
Preparing servers                        [ DONE ]
Pre installing Puppet and discovering hosts' details [ DONE ]
Preparing pre-install entries           [ DONE ]
Setting up CACERT                         [ DONE ]
Preparing AMQP entries                   [ DONE ]
Preparing MariaDB entries                [ DONE ]
Fixing Keystone LDAP config parameters to be undef if empty[ DONE ]
Preparing Keystone entries               [ DONE ]
Preparing Glance entries                 [ DONE ]
Checking if the Cinder server has a cinder-volumes vg[ DONE ]
Preparing Cinder entries                 [ DONE ]
Preparing Nova API entries              [ DONE ]
```

Step 12:Note the user name and password from keystonec_admin

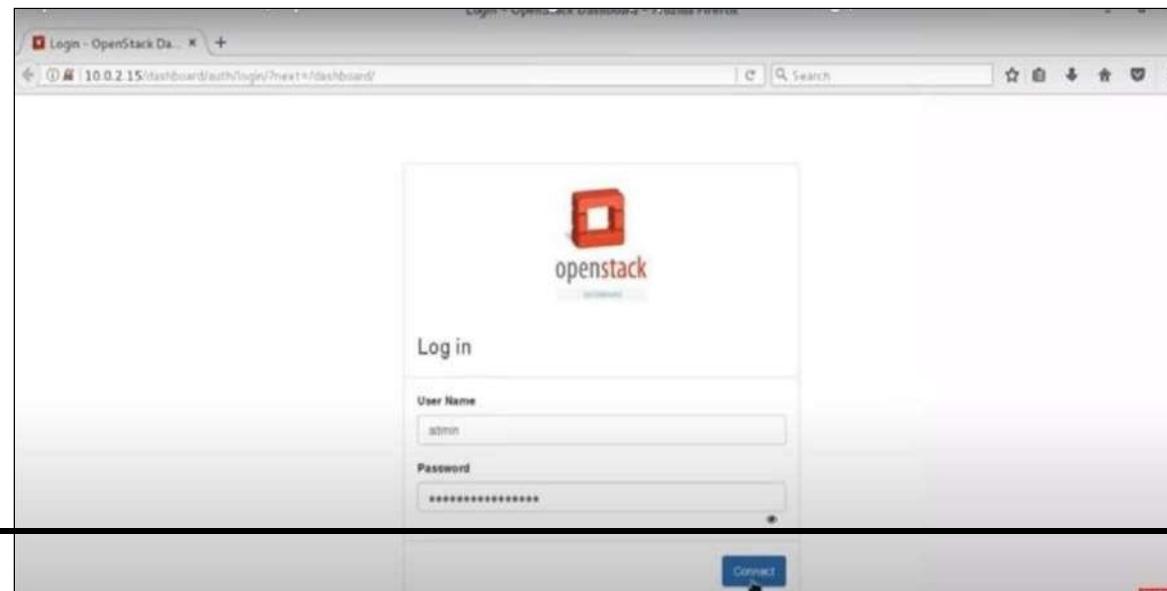
#cat keystonec_admin

```
[root@localhost ~]# ls
anaconda-ks.cfg      keystonerc_admin  packstack-answers-20170314-065812.txt
initial-setup-ks.cfg  keystonerc_demo
[root@localhost ~]# cat keystonerc_admin
unset OS_SERVICE_TOKEN
export OS_USERNAME=admin
export OS_PASSWORD=cdc897f8cb7f4dda
export OS_AUTH_URL=http://10.0.2.15:5000/v2.0
export PS1='[\u@\h \W(keystone_admin)]\$ '
export OS_TENANT_NAME=admin
export OS_REGION_NAME=RegionOne
[root@localhost ~]#
```



Step 13: Click the URL and enter the user name and password to start OpenStack

OpenStack is successfully launched in your machine



The screenshot shows the OpenStack dashboard interface. The top navigation bar includes 'Projects - OpenStack...', a search bar, and user information for 'admin'. Below the header, the URL '10.0.2.15/dashboard/identity/' is visible. The main content area is titled 'Resource Usage' and displays the following table:

	Name	Description	Project ID	Domain Name	Enabled	Actions
Hypervisors	services	Tenant for the openstack services	2e6451398c8340bb01264e073b74e483	Default	Yes	<button>Manage Members</button>
Host Aggregates						
Instances	admin	admin tenant	58095814406547d088982e6f69d82c94	Default	Yes	<button>Manage Members</button>
Volumes	demo	default tenant	a5050a950e484c98977d569cf71562d	Default	Yes	<button>Manage Members</button>
Flavors	Displaying 3 items					
Images						
Networks						
Routers						
Floating IPs						
Details						
Metadata Definitions						
System Information						

The 'Networks' tab is currently selected, indicated by a pink background. The URL '10.0.2.15/dashboard/admin/networks/' is shown at the bottom of the browser window.

Result:

Thus the OpenStack Installation is executed successfully.

Ex.No:8	Install Hadoop single node cluster and run simple applications like wordcount.
Date:	

Aim:

To find the procedure to set up the one node Hadoop cluster.

1.HADOOP:

Apache Hadoop is an open-source software framework for storage and large-scale processing of data-sets on clusters of commodity hardware. Hadoop is an Apache top-level project being built and used by a global community of contributors and users. It is licensed under the Apache License 2.0.

The Apache Hadoop framework is composed of the following modules:

- **Hadoop Common** – contains libraries and utilities needed by other Hadoop modules
- **Hadoop Distributed File System (HDFS)** – a distributed file-system that stores data on commodity machines, providing very high aggregate bandwidth across the cluster.
- **Hadoop YARN** – a resource-management platform responsible for managing compute resources in clusters and using them for scheduling of users' applications.
- **Hadoop MapReduce** – a programming model for large scale data processing.

InstallationSteps:

Aim:

To find procedure to set up the one node Hadoop cluster.

Procedure:Step 1:

Installing Java is the main prerequisite for Hadoop. Install java1.7.

```
$sudo apt-get update
$sudo apt-get install openjdk-7-jdk
$sudo apt-get install openjdk-7-jre
$ java -version
```

java version "1.7.0_79"

OpenJDK Runtime Environment (IcedTea 2.5.6) (7u79-2.5.6-0ubuntu1.14.04.1)OpenJDK 64-Bit Server VM (build 24.79-b02, mixed mode)

Step 2:

SSH Server accepting password authentication (at least for the setup time). To install, run:
student@a4cse196:~\$ suPassword:

```
root@a4cse196:/home/student# apt-get install openssh-server
```

Step 3:

Generate the ssh key

```
root@a4cse196:/home/student# ssh-keygen -t rsa -P "" -f ~/.ssh/id_rsa
```

Generating public/private rsa key pair.Created directory '/root/.ssh'.

Your identification has been saved in /root/.ssh/id_rsa. Your public key has been saved in /root/.ssh/id_rsa.pub.

The key fingerprint is: 77:a1:20:bb:db:95:6d:89:ce:44:25:32:b6:81:5d:d5 root@a4cse196 The key's random art image is:

```
+--[ RSA 2048] ---+
```

```
| ... |
| o. E |
| o B . o |
| + * + . |
| . S + . |
| . o = . |
| . = + |
| o = . |
| .. o |
```

```
+_____+
```

Step 4:

If the master also acts a slave ('ssh localhost' should work without a password)

```
root@a4cse196:/home/student# cat $HOME/.ssh/id_rsa.pub
```

```
>>$HOME/.ssh/authorized_keys
```

Step 5:
Create hadoop group and user:

Step 5.1 root@a4cse196:/home/student# **sudo addgroup hadoop**

Adding group 'hadoop' (GID 1003) ...Done.

Step 5.2 root@a4cse196:/home/student# **sudo adduser --ingroup hadoop hadoop**

Adding user 'hadoop' ...

Adding new user 'hadoop' (1003) with group 'hadoop' ...Creating home directory '/home/hadoop' ...

Copying files from '/etc/skel' ...Enter new UNIX password:

Retype new UNIX password:

passwd: password updated successfully Changing the user information for hadoop

Enter the new value, or press ENTER for the defaultFull Name []:

Room Number []:Work Phone []: Home Phone []: Other []:

Is the information correct? [Y/n] yroot@a4cse196:/home/student#

Step 6:

Copy your .tar file to home.(hadoop-2.7.0.tar.gz)

Step 7:

Extracting the tar file.

```
root@a4cse196:/home/student# sudo tar -xzvf hadoop-2.7.0.tar.gz -C /usr/local/lib/
```

Step 8:

Changing the Ownership

```
root@a4cse196:/home/student# sudo chown -R hadoop:hadoop /usr/local/lib/hadoop-2.7.0
```

Step 9:

Create HDFS directories:

```
root@a4cse196:/home/student# sudo mkdir -p /var/lib/hadoop/hdfs/namenode
```

```
root@a4cse196:/home/student# sudo mkdir -p /var/lib/hadoop/hdfs/datanode
```

```
root@a4cse196:/home/student# sudo chown -R hadoop /var/lib/hadoop
```

Step 10:

Check where your Java is installed: root@a4cse196:/home/student# **readlink -f /usr/bin/java**
/usr/lib/jvm/java-7-openjdk-amd64/jre/bin/java

Step 11:

Open gedit and do it root@a4cse196:/home/student# **gedit ~/.bashrc****Add to ~/.bashrc file:**

```
export JAVA_HOME=/usr/lib/jvm/java-7-openjdk-amd64
```

```
export HADOOP_INSTALL=/usr/local/lib/hadoop-2.7.0
```

```
PATH=$PATH:$HADOOP_INSTALL/bin
```

```
export PATH=$PATH:$HADOOP_INSTALL/sbin
```

```
export HADOOP_MAPRED_HOME=$HADOOP_INSTALL  
export HADOOP_COMMON_HOME=$HADOOP_INSTALL  
export HADOOP_HDFS_HOME=$HADOOP_INSTALL export  
YARN_HOME=$HADOOP_INSTALL  
export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_INSTALL/lib/native  
export HADOOP_OPTS="-Djava.library.path=$HADOOP_INSTALL/lib/native"
```

Step 12:

Reload source
root@a4cse196:/home/student# **source ~/.bashrc**

Step 13:

Modify JAVA_HOME in /usr/local/lib/hadoop-2.7.0/etc/hadoop/hadoop-env.sh:
root@a4cse196:/home/student# **cd /usr/local/lib/hadoop-2.7.0/etc/hadoop**
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **gedit hadoop-env.sh** export
JAVA_HOME=\${ JAVA_HOME}
Changed this to below path

```
export JAVA_HOME=/usr/lib/jvm/java-7-openjdk-amd64
```

Step 14:

Modify /usr/local/lib/hadoop-2.7.0/etc/hadoop/core-site.xml to have something like:
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **gedit core-site.xml**
<configuration>

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

Step 15:

Modify /usr/local/lib/hadoop-2.7.0/etc/hadoop/yarn-site.xml to have something like:
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **gedit yarn-site.xml**

```
<configuration>  
<property>  
<name>yarn.nodemanager.aux-services</name>
```

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

Step 16:

Create /usr/local/lib/hadoop-2.7.0/etc/hadoop/mapred-site.xml from template:
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **cp /usr/local/lib/hadoop-2.7.0/etc/hadoop/mapred-site.xml.template /usr/local/lib/hadoop-2.7.0/etc/hadoop/mapred-site.xml**

Step 17:

Modify /usr/local/lib/hadoop-2.7.0/etc/hadoop/mapred-site.xml to have something like:
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **gedit mapred-site.xml**

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

Step 18:

Modify /usr/local/lib/hadoop-2.7.0/etc/hadoop/hdfs-site.xml to have something like:
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# **gedit hdfs-site.xml**

```
<configuration>
<property>
```

```
<name>dfs.replication</name>
<value>1</value>
</property>
<property>
<name>dfs.namenode.name.dir</name>
<value>file:/var/lib/hadoop/hdfs/namenode</value>
</property>
<property>
<name>dfs.datanode.data.dir</name>
<value>file:/var/lib/hadoop/hdfs/datanode</value>
</property>
</configuration>
```

Step 19:

Make changes in /etc/profile

```
$gedit /etc/profile
JAVA_HOME=/usr/lib/jvm/java-7-openjdk-amd64
PATH=$PATH:$JAVA_HOME/bin
export JAVA_HOME
export PATH
$source /etc/profile
```

Step 20:

```
root@a4cse196:/usr/local/lib/hadoop-2.7.0/etc/hadoop# hdfs namenode -format
```

Step 21:

Switch to hadoop user

```
start-dfs.sh
```

```
yes
yes
```

```
start-yarn.sh
root@a4cse196:/home/hadoop# jps
6334 SecondaryNameNode
6498 ResourceManager
```

6927 Jps

6142 DataNode

5990 NameNode

6696 NodeManager

Step 22:

Browse the web interface for the **Name Node**; by default it is available at:

http://localhost:50070

The terminal window shows the following command output:

```
cc4@cc4-OptiPlex-3020:~$ cd /gcclab/hadoop-2.7.0/sbin/start-yarn.sh
starting yarn daemons
starting resourcemanager, logging to /home/cc4/gcclab/hadoop-2.7.0/logs/yarn-cc4-resourcemanager-cc4-optiPlex-3020.out
localhost: starting nodemanager, logging to /home/cc4/gcclab/hadoop-2.7.0/logs/yarn-cc4-nodemanager-cc4-optiPlex-3020.out
12288 Jps
11553 SecondaryNameNode
12098 NodeManager
11355 ResourceManager
11355 DataNode
11196 NameNode
cc4@cc4-OptiPlex-3020:~/gcclab/hadoop-2.7.0$ cc4@cc4-OptiPlex-3020:~/gcclab/hadoop-2.7.0$
```

The browser window displays the "Overview" page for the HDFS NameNode at `localhost:9000`. The "Summary" section shows:

- Security is off.
- Safemode is off.
- 1 files and directories, 0 blocks = 1 total filesystem object(s).
- Heap Memory used 102.6 MB of 210 MB Heap Memory. Max Heap Mem
- Non Heap Memory used 35.64 MB of 37.09 MB Committed Non Heap Mem

Configured Capacity: 125.99 GB

Create the HDFS directories:

The terminal window shows the command:

```
cc4@cc4-OptiPlex-3020:~$ /gcclab/hadoop-2.7.0/bin/hdfs dfs -mkdir /userdata
cc4@cc4-OptiPlex-3020:~/gcclab/hadoop-2.7.0$
```

Result:

Thus the procedure to set up the one node Hadoop cluster was successfully done and verified

Ex.No:8b	Word Count Program Using Map And Reduce
Date:	.

AIM:

To write a word count program to demonstrate the use of Map and Reduce tasks.

Mapreduce:

MapReduce is a programming model and an associated implementation for processing and generating large data sets with a parallel, distributed algorithm on a cluster. A MapReduce program is composed of a **Map()** procedure that performs filtering and sorting and a **Reduce()** method that performs a summary operation.

- **"Map" step:** Each worker node applies the "map()" function to the local data, and writes the output to a temporary storage. A master node ensures that only one copy of redundant input data is processed.
- **"Shuffle" step:** Worker nodes redistribute data based on the output keys (produced by the "map()" function), such that all data belonging to one key is located on the same worker node.
- **"Reduce" step:** Worker nodes now process each group of output data, per key, in parallel.

Steps:

Source Code:

```

import java.io.IOException;
import java.util.StringTokenizer;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class WordCount {

    public static class TokenizerMapper

```

```

    extends Mapper<Object, Text, Text, IntWritable>{

    private final static IntWritable one = new IntWritable(1);
    private Text word = new Text();

    public void map(Object key, Text value, Context context
        ) throws IOException, InterruptedException {
        StringTokenizer itr = new StringTokenizer(value.toString());
        while (itr.hasMoreTokens()) {
            word.set(itr.nextToken());
            context.write(word, one);
        }
    }
}

public static class IntSumReducer
    extends Reducer<Text,IntWritable,Text,IntWritable> {
    private IntWritable result = new IntWritable();

    public void reduce(Text key, Iterable<IntWritable> values,
                      Context context
                      ) throws IOException, InterruptedException {
        int sum = 0;
        for (IntWritable val : values) {
            sum += val.get();
        }
        result.set(sum);
        context.write(key, result);
    }
}

public static void main(String[] args) throws Exception {
    Configuration conf = new Configuration();
    Job job = Job.getInstance(conf, "word count");
    job.setJarByClass(WordCount.class);
    job.setMapperClass(TokenizerMapper.class);
    job.setCombinerClass(IntSumReducer.class);
    job.setReducerClass(IntSumReducer.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
    FileInputFormat.addInputPath(job, new Path(args[0]));
    FileOutputFormat.setOutputPath(job, new Path(args[1]));
    System.exit(job.waitForCompletion(true) ? 0 : 1);
}

```

```
}
```

1. Set Environmental Variables:

```
export JAVA_HOME=/usr/java/default
export PATH=${JAVA_HOME}/bin:${PATH}
export HADOOP_CLASSPATH=${JAVA_HOME}/lib/tools.jar
```

2. Compile the source file to jar file,

```
$ bin/hadoop com.sun.tools.javac.Main WordCount.java
$ jar cf wc.jar WordCount*.class
```

3. Run the Application

```
$ bin/hadoop jar wc.jar WordCount /user/joe/wordcount/input /user/joe/wordcount/output
```

Output:

```
$ bin/hadoop fs -cat /user/joe/wordcount/output/part-r-00000`  
Bye 1  
Goodbye 1  
Hadoop 2  
Hello 2  
World 2`
```

RESULT:

Thus the one node Hadoop cluster is installed and word count program to demonstrate the Map and Reduce task is done successfully.