

SRI BALAJI CHOCKALINGAM ENGINEERING COLLEGE

A.C.S Nagar(Irumbetu), Arni,

T.V.Malai Dt.-632 317.



*Department
Of
Information Technology*

CCS335-Cloud Computing Laboratory



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*Department
of
Information Technology*

BONAFIDE CERTIFICATE

*Certified that this is a bonafide record of work done by
Of Third Year / V Semester **B.Tech Information Technology** in the Anna University Practical
Examination during the year 20 - 20 in CCS335 Cloud Computing Laboratory.*



Register No. :

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Staff In-Charge

Head of the Department

Submitted for Practical Examination held on

Internal Examiner

External Examiner

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EX.NO: 1	Install Virtualbox/VMware/ Equivalent open source cloud Workstation with different flavours of Linux or Windows OS on top of windows 8 and above.
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Introduction

❖ Virtualization:

- Virtualization is the creation of virtual servers, infrastructures, devices and computing resources.
- Virtualization changes the hardware-software relations and is one of the foundational elements of cloud computing technology that helps utilize the capabilities of cloud computing to the full.
- Virtualization techniques allow companies to turn virtual their networks, storage, servers, data, desktops and applications.

❖ Hypervisor or Virtual Machine Monitor (VMM)

A **hypervisor** or **virtual machine monitor (VMM)** is a piece of computer software, firmware or hardware that creates and runs virtual machines. A computer on which a hypervisor is running one or more virtual machines is defined as a *host machine*. Each virtual machine is called a *guest machine*. The hypervisor presents the guest operating systems with a virtual operating platform and manages the execution of the guest operating systems. Multiple instances of a variety of operating systems may share the virtualized hardware resources.

❖ Types of Virtualization

- **Operating-system-level virtualization** - is a server-virtualization method where the kernel of an operating system allows for multiple isolated user-space instances, instead of just one. Such instances (sometimes called **containers**, **software containers**,^[1] virtualization engines (VE), virtual private servers (VPS), or jails) may look and feel like a real server from the point of view of its owners and users
- **Platform / Hardware virtualization** - Hardware virtualization or platform virtualization refers to the creation of a virtual machine that acts like a real computer with an operating system. Software executed on these virtual machines is separated from the underlying hardware resources. For example, a computer that is

running Microsoft Windows may host a virtual machine that looks like a computer with the Ubuntu Linux operating system; Ubuntu-based software can be run on the virtual machine.

- **In hardware virtualization**, the host machine is the actual machine on which the virtualization takes place, and the guest machine is the virtual machine. The words *host* and *guest* are used to distinguish the software that runs on the physical machine from the software that runs on the virtual machine. Different types of **Full virtualization**: Almost complete simulation of the actual hardware to allow software, which typically consists of a guest operating system, to run unmodified.
 - **Partial virtualization**: Some but not all of the target environment is simulated. Some guest programs, therefore, may need modifications to run in this virtual environment.
 - **Para virtualization**: A hardware environment is not simulated; however, the guest programs are executed in their own isolated domains, as if they are running on a separate system.
- **Application virtualization** is software technology that encapsulates computer programs from the underlying operating system on which it is executed. A fully virtualized application is not installed in the traditional sense, although it is still executed as if it were.

❖ Oracle Virtualbox

- VirtualBox is a general-purpose full virtualizer for x86 hardware, targeted at server, desktop and embedded use. Each virtual machine can execute its own operating system, including versions of Microsoft Windows, Linux, BSD, and MS-DOS. VMware Workstation is developed and sold by VMware, Inc., a division of EMC Corporation

❖ Ubuntu

- Ubuntu is an operating system like any other and it is free & open source. It means that we can download it freely and install on as many computers as we like. By the term open source it means that we can actually see its code. To provide a more secure environment, the -SUDO|| tool is used to assign temporary privileges for performing administrative tasks. Ubuntu comes installed with a wide range of Software that includes Libre Office , Firefox, Thunderbird

Steps in Installing Oracle Virtualbox with CentOS 7

Step1:

Download and Install Oracle Virtual Box latest version & Extensionpackage

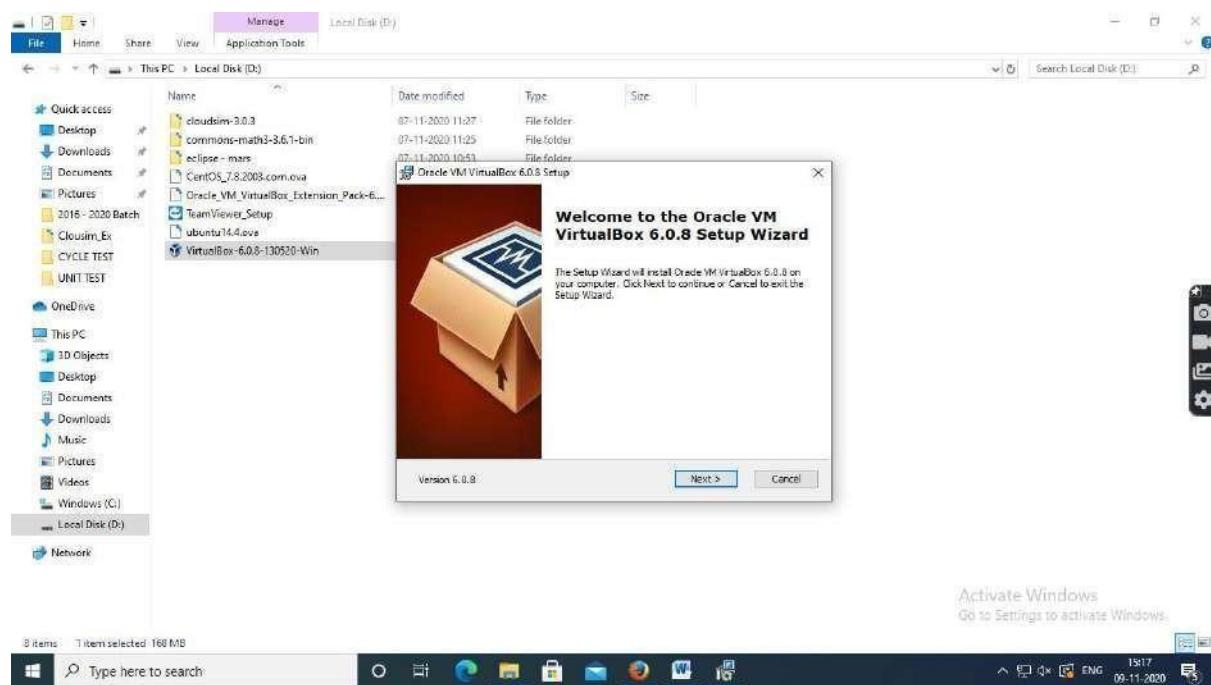
- o <https://virtualbox.org/wiki/downloads>

Step 2:

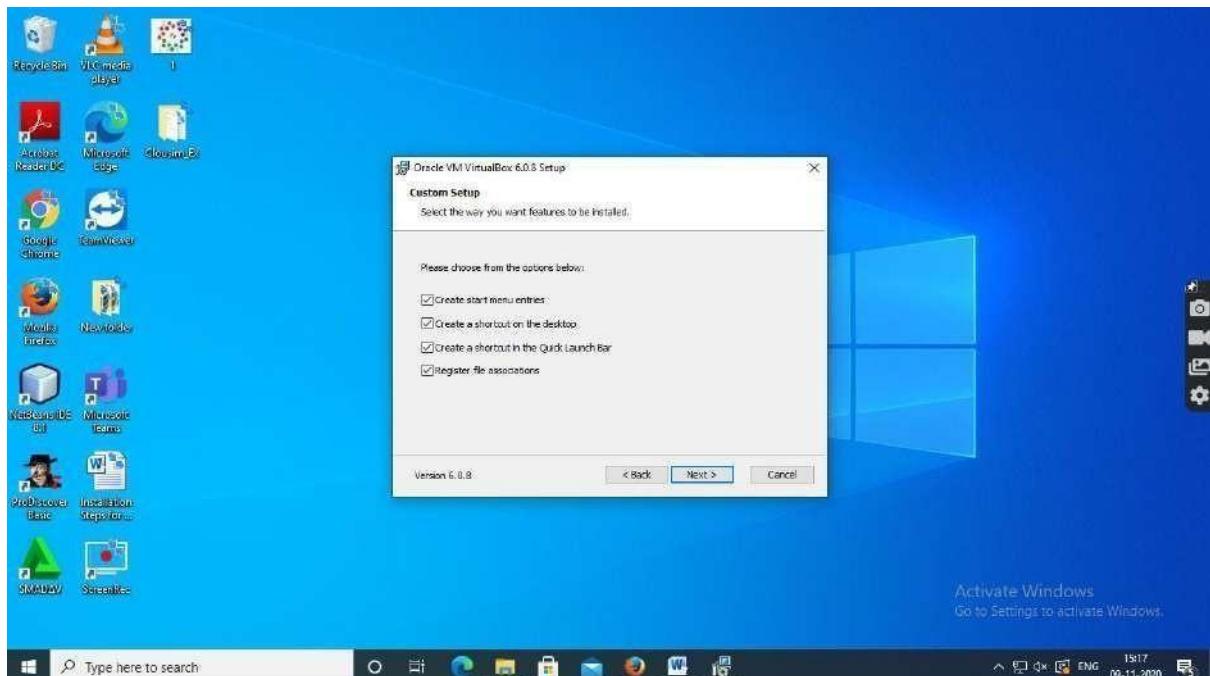
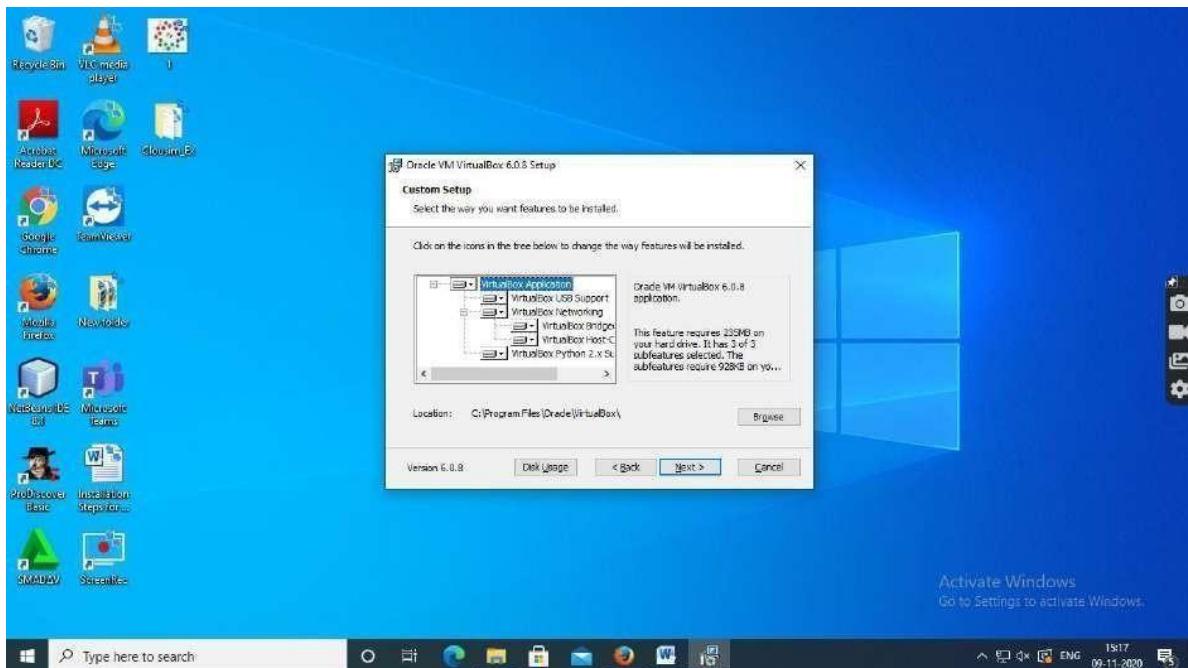
- Download CentOS 7 OVA(Open Virtual Appliance) from

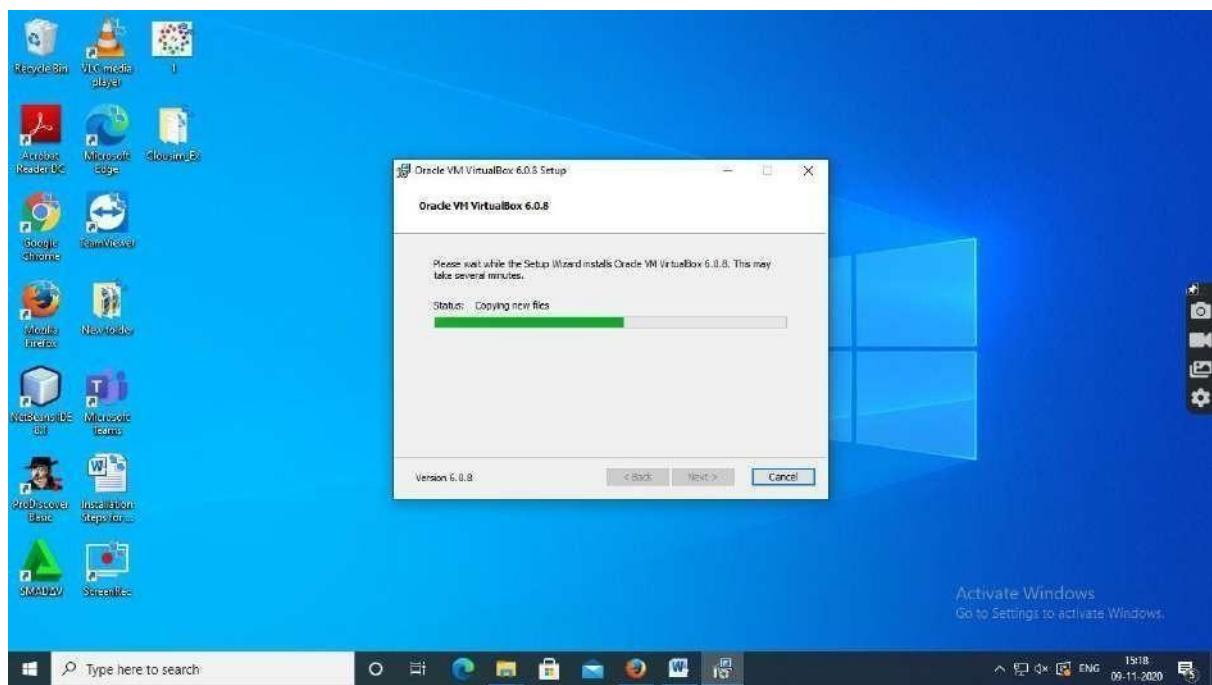
Link : <https://linuxvmimages.com/images/centos-7>

Step 3: The files are downloaded in your Local machine and Click the Oracle VMVirtualBox 6.0.8 Setup Wizard



Oracle VM VirtualBox 6.0.8 Setup Wizard is open and follows the steps to install

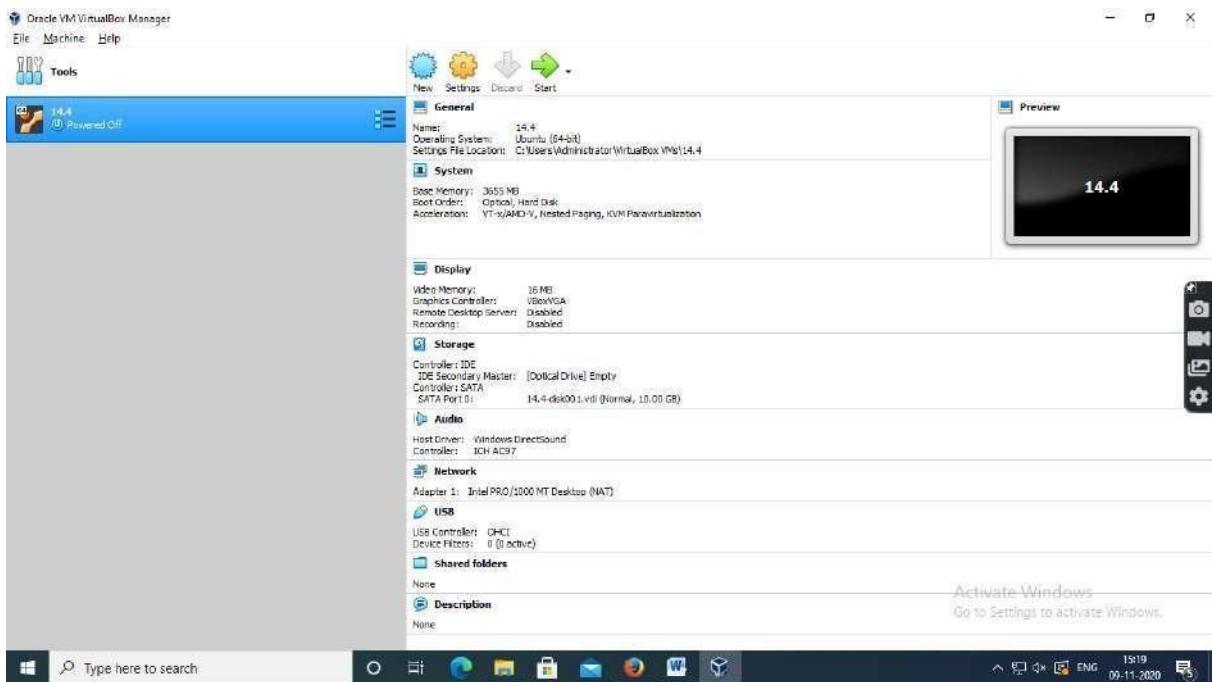


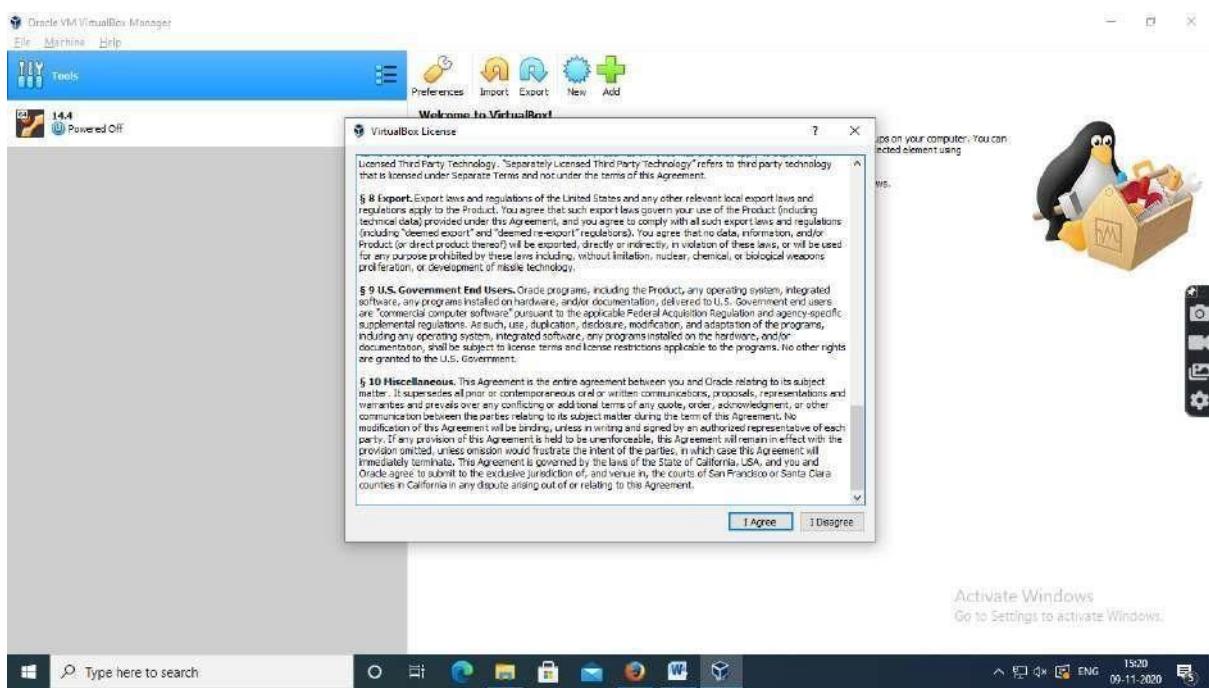
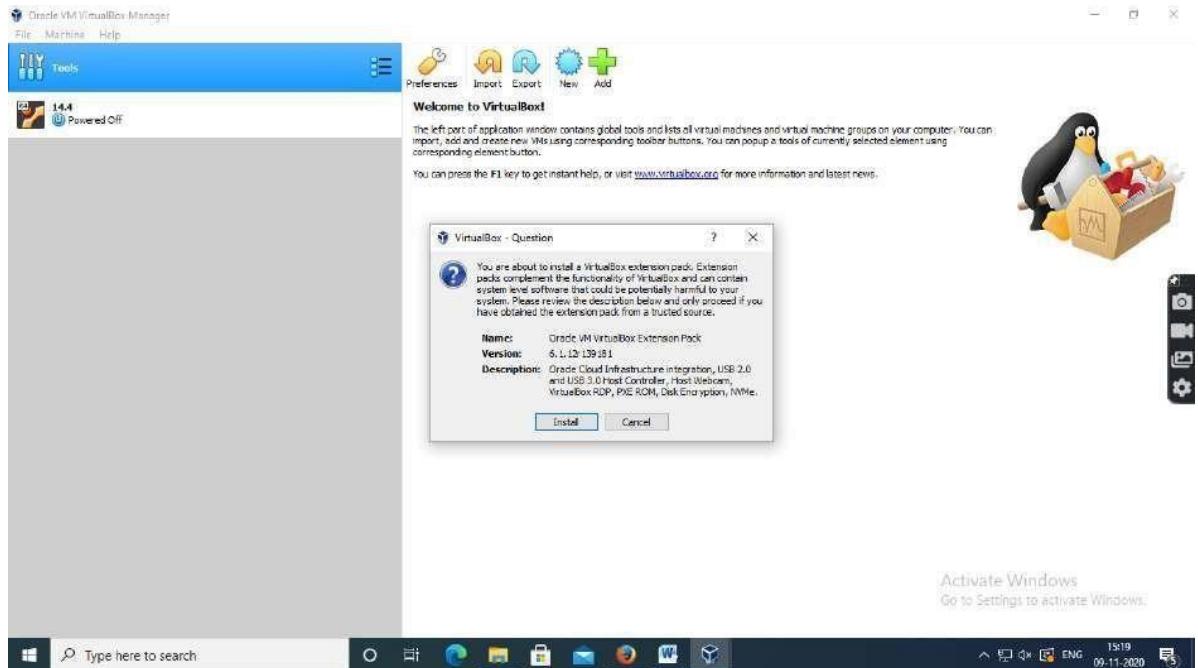


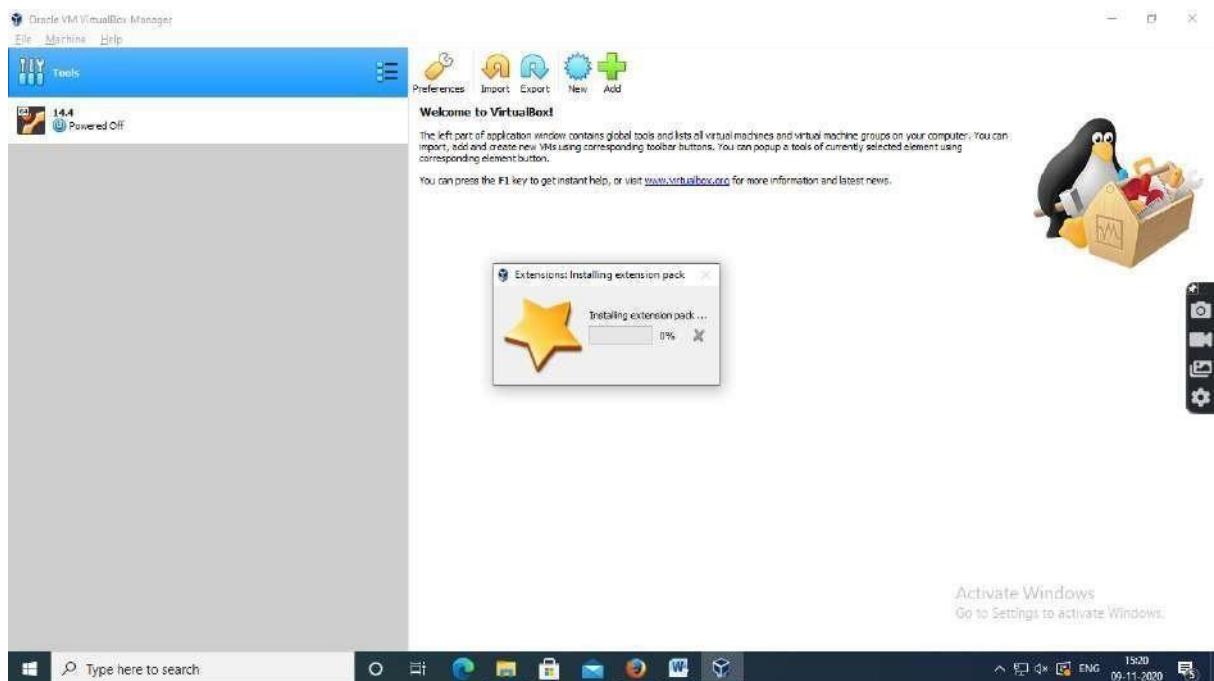


Oracle VM VirtualBox 6.0.8 installation is complete

Step 4: Import the Oracle VM Virtual Extension pack into the Oracle Virtual Box

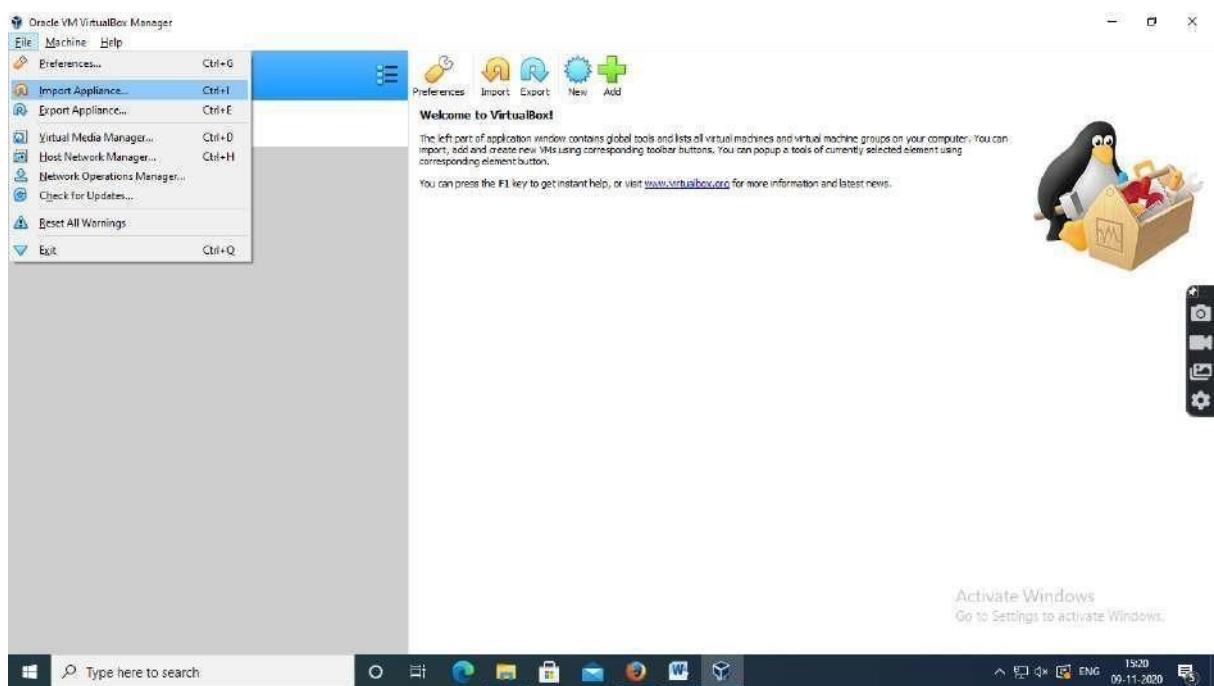


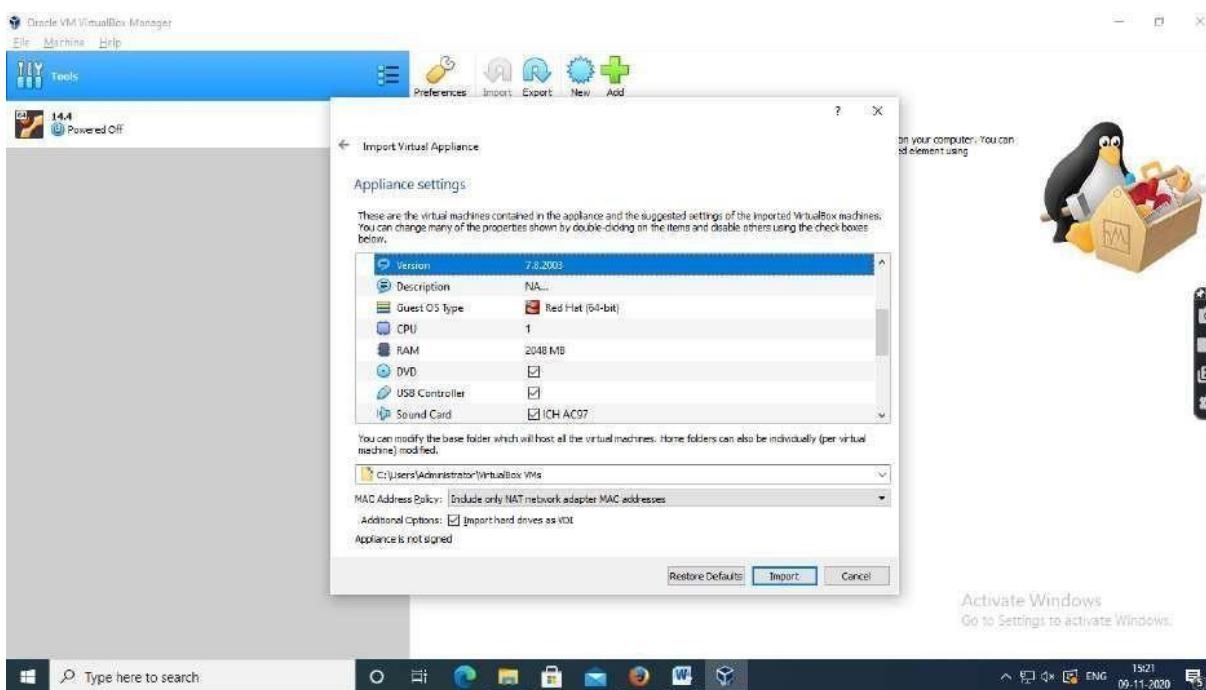
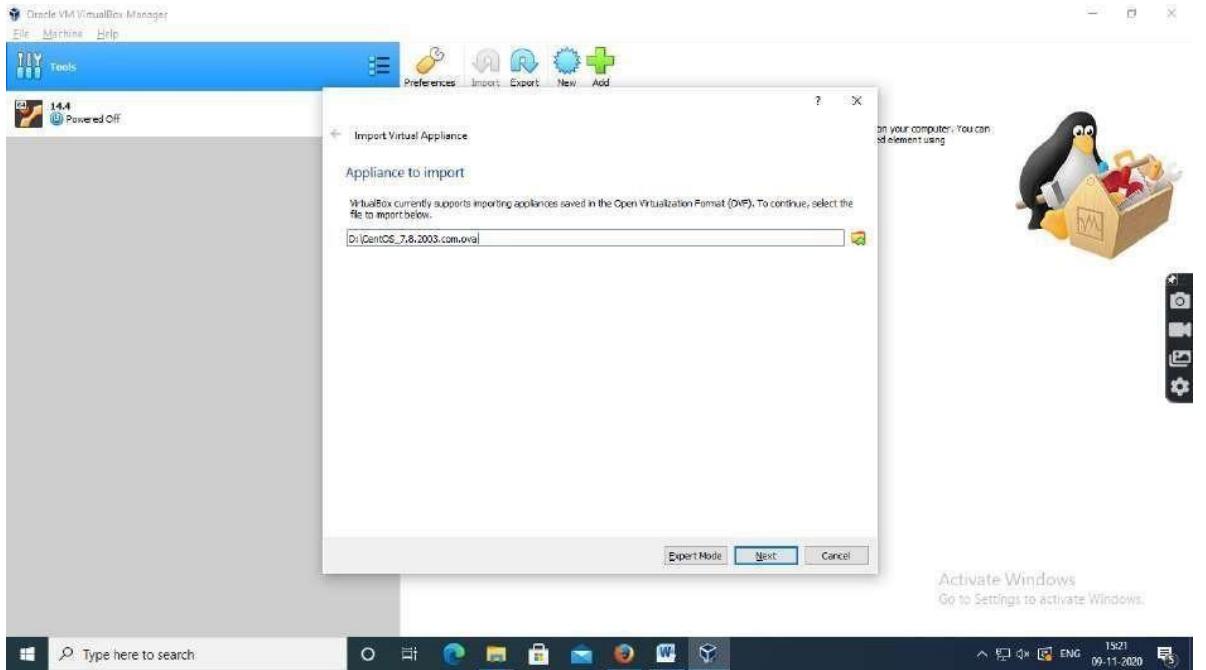


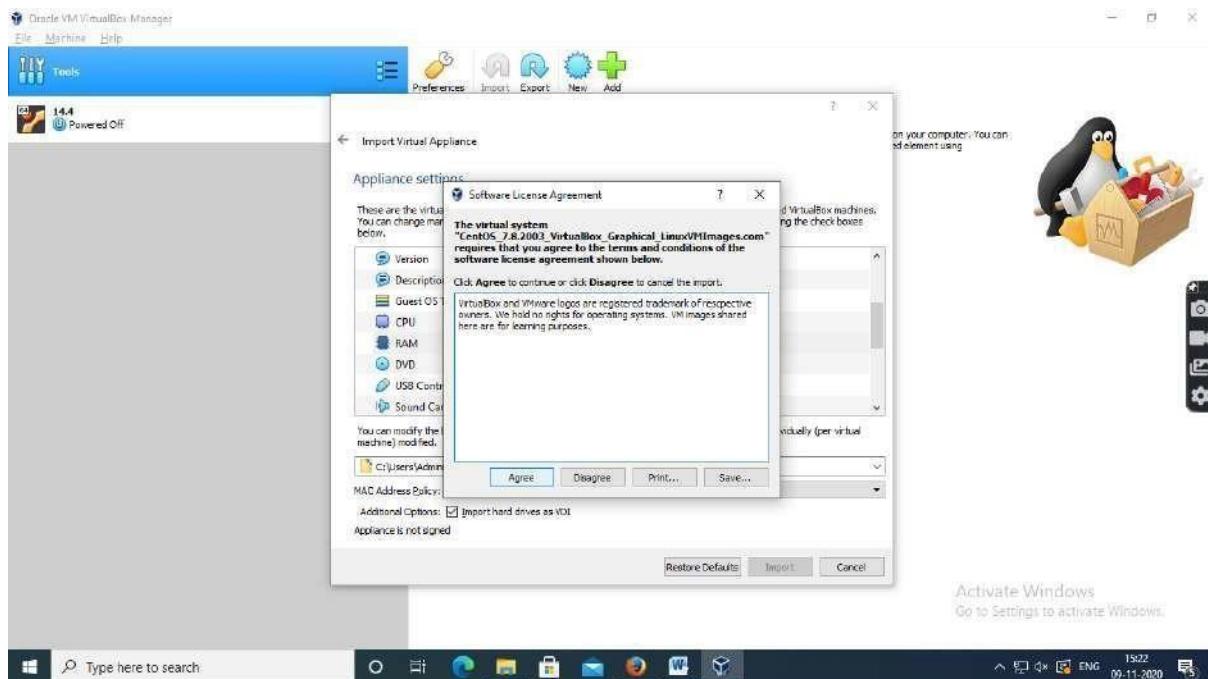
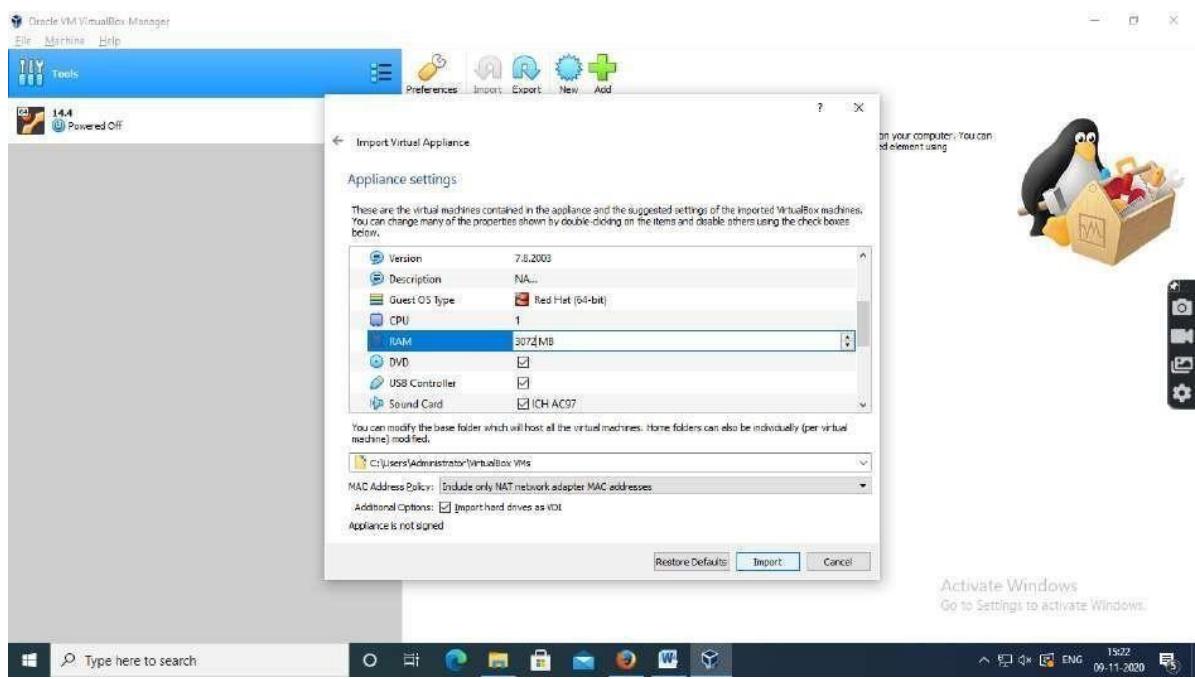


Oracle VMVirtual Extension pack is imported into the Oracle Virtual Box successfully.

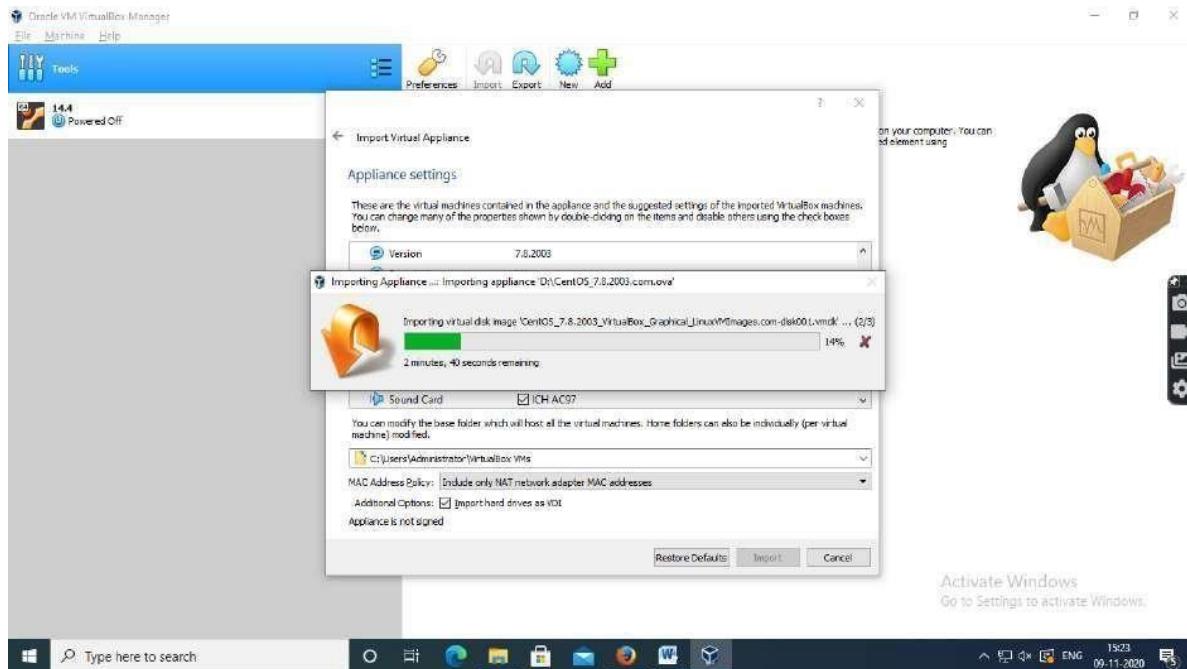
Step 5: Click import Appliance and select CentOS-7.8.2003.com OVA (Open VirtualAppliance) file from download directory



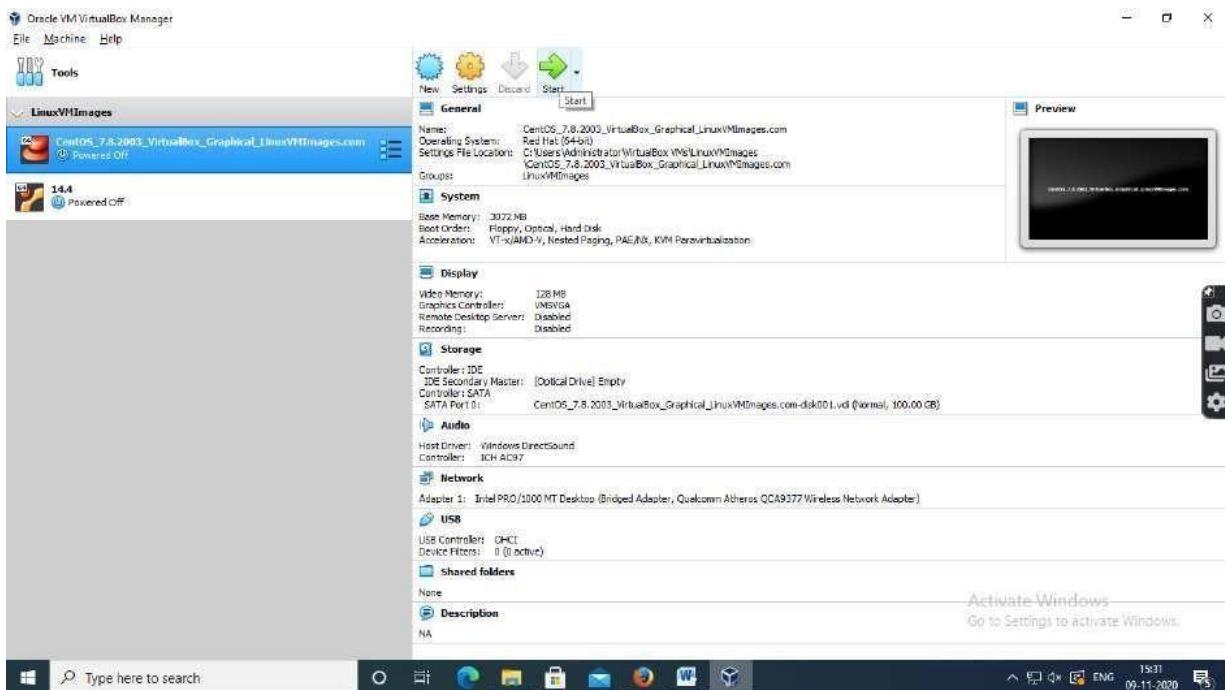




Installation process started



Step 6: CentOS-7.8.2003.com is installed successfully and click start button to launch the virtual machine



Step 7: Login into CentOS 7

- Login Details

User name : centos

- **Password : centos**

Result:

Oracle VirtualBox is installed with different flavours of CentOS 7 on top of windows 10 successfully.

EX.NO: 2

DATE:

Install a C compiler in the virtual machine created using a virtual box and execute Simple Programs.

Steps in Installing C or C++ Compiler in Virtual machine and executing simple programs

Step 1 : Install the C or C++ compiler on Ubuntu-14.04 Virtual Machine by

\$ sudo apt install g++

Step 2: Create a file for writing C program.

\$ sudogedit add.c

Source Code:

```
Sum of two numbers
#include<stdio.h>
int main()
{
    int a,b,c;
    printf("Enter two nos:");
    scanf("%d%d",&a,&b);
    c=a+b;
    printf("Sum of two nos is: %d",c);
}
```

Step 3: Compile the Program

\$sudo g++ add.c

Step 4: Run the Program

\$./a.out

Expected Output:

Enter two nos : 2 3

Sum of two nos is

Output:

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

The terminal window (bottom right) displays the following session:

```
centos@centos7:~$ ls
add.c  Documents  Music  Public  Videos
Desktop  Downloads  Pictures  Templates
[centos@centos7 ~]$ cc add.c
[centos@centos7 ~]$ ./a.out
Enter two no.s: 2 3
Sum of two no.s is 5[centos@centos7 ~]$
```

The code editor window (top left) contains the following C code:

```
#include<stdio.h>
int main()
{
    int a,b,c;
    printf("Enter two no.s");
    scanf("%d%d",&a,&b);
    c=a+b;
    printf("Sum of two no.s is %d",c);
    return 0;
}
```

Result:

The simple C programs are executed with C compiler in the Virtual Machines successfully and different programs are executed and verified.

EX.NO: 3 , 4

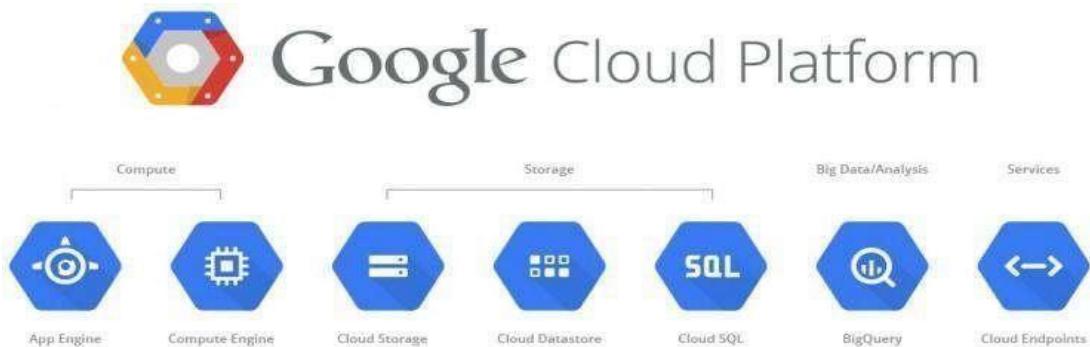
DATE:

Install Google App Engine. Create a hello world app and other simple web applications using python/java. Use the GAE launcher to launch the web applications.

Introduction

Google Cloud Platform (GCP)

- **Google Cloud Platform (GCP)**, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, file storage, and YouTube.
- Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning.
- Google Cloud Platform provides infrastructure as a service, platform as a service, and serverless computing environments.



Platform as a Service (PaaS)

- Cloud computing service which provides a computing platform and a solution stack as a service.
- Consumer creates the software using tools and/or libraries from the provider.
- Provider provides the networks, servers, storage, etc.



- Google App Engine was first released as a beta version in April 2008.
- It is a Platform as a Service (PaaS) cloud computing platform for developing and hosting web applications in Google-managed data centers.

- Google's App Engine opens Google's production to any person in the world at no charge.
- Google App Engine is software that facilitates the user to run his web applications on Google infrastructure.
- It is more reliable because failure of any server will not affect either the performance of the end user or the service of the Google.
- It virtualizes applications across multiple servers and data centers.
 - Other cloud-based platforms include offerings such as Amazon Web Services and Microsoft's Azure Services Platform.

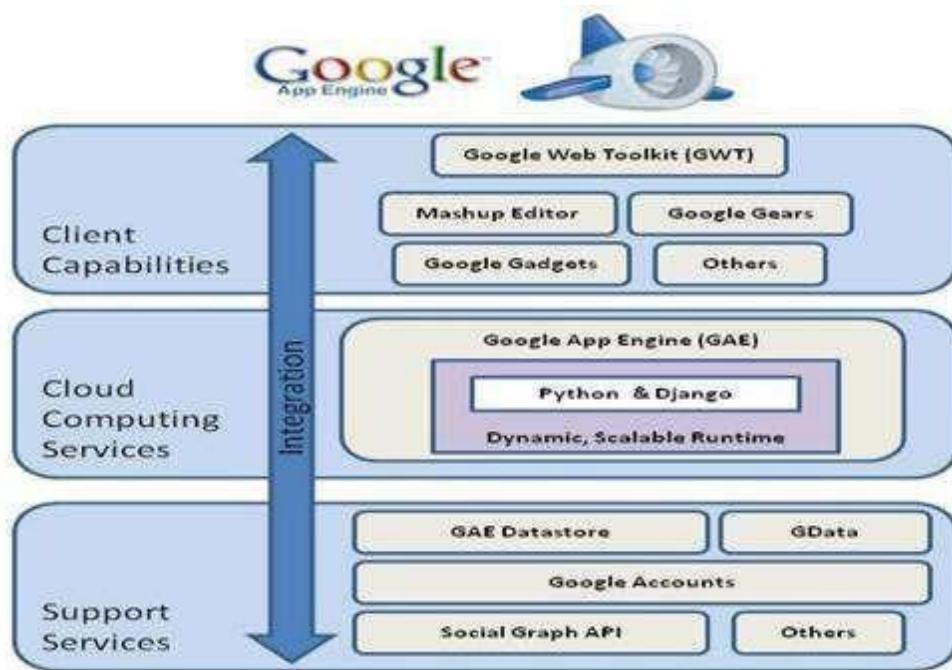
□ Introduction of Google App Engine

- Google App Engine lets you run your web applications on Google's infrastructure. App Engine applications are easy to build, easy to maintain, and easy to scale as your traffic and data storage needs grow. With App Engine, there are no servers to maintain: You just upload your application, and it's ready to serve your users.
- You can serve your app from your own domain name (such as <https://www.example.com/>) using Google Apps. Or, you can serve your app using a free name on the appspot.com domain. You can share your application with the world, or limit access to members of your organization.
- Google App Engine supports apps written in several programming languages. With App Engine's Java runtime environment, you can build your app using standard Java technologies, including the JVM, Java servlets, and the Java programming language—or any other language using a JVM-based interpreter or compiler, such as JavaScript or Ruby. App Engine also features a dedicated Python

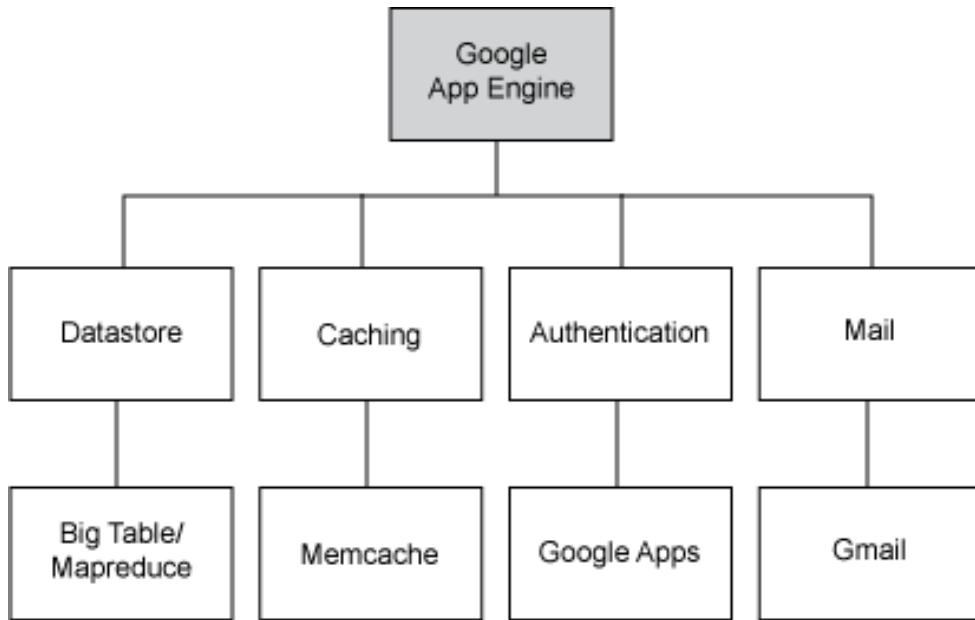
runtime environment, which includes a fast Python interpreter and the Python standard library. The Java and Python runtime environments are built to ensure that your application runs quickly, securely, and without interference from other apps on the system.

- With App Engine, you only pay for what you use. There are no set-up costs and no recurring fees. The resources your application uses, such as storage and bandwidth, are measured by the gigabyte, and billed at competitive rates. You control the maximum amounts of resources your app can consume, so it always stays within your budget. App Engine costs nothing to get started. All applications can use up to 500 MB of storage and enough CPU and bandwidth to support an efficient app serving around 5 million page views a month, absolutely free. When you enable billing for your application, your free limits are raised, and you only pay for resources you use above the free levels.

□ Architecture of Google App Engine



□ Features of Google App Engine



□ **GAE Application Environment:**

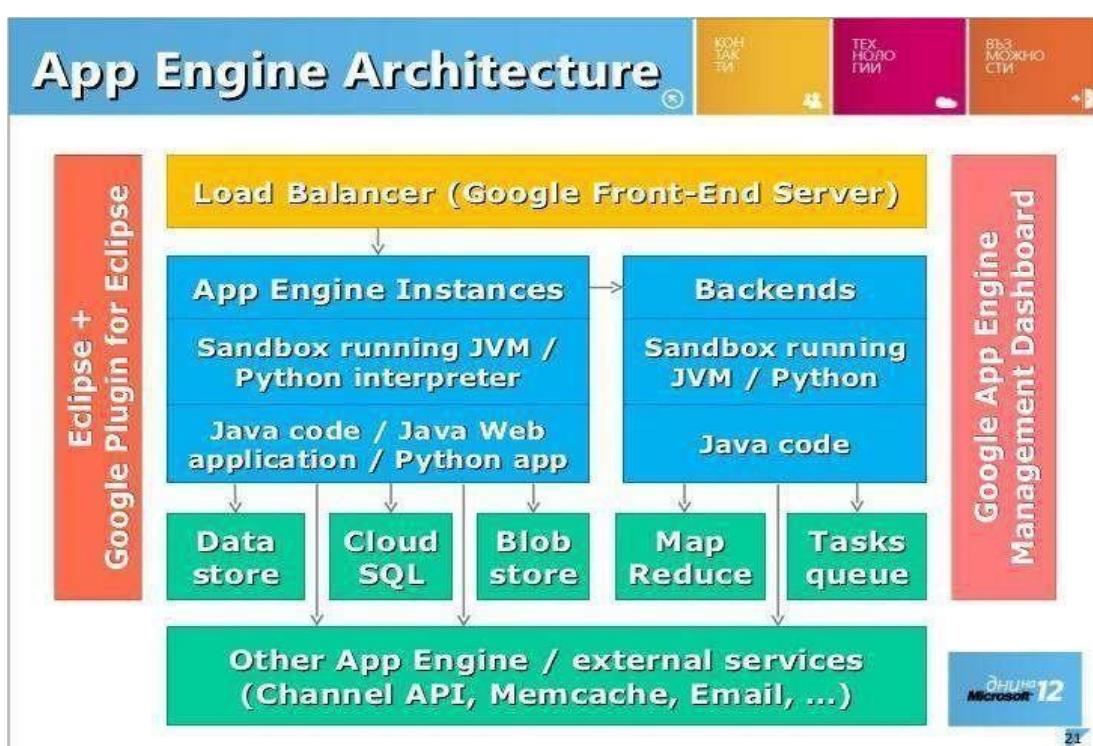
- Google App Engine makes it easy to build an application that runs reliably, even under heavy load and with large amounts of data. App Engine includes the following features:
- Persistent storage with queries, sorting and transactions
- Automatic scaling and load balancing
- APIs for authenticating users and sending email using Google Accounts
- Task queues for performing work outside of the scope of a web request
- Scheduled tasks for triggering events at specified times and regular intervals
- Dynamic web serving, with full support for common web technologies

□ **Java Runtime Environment**

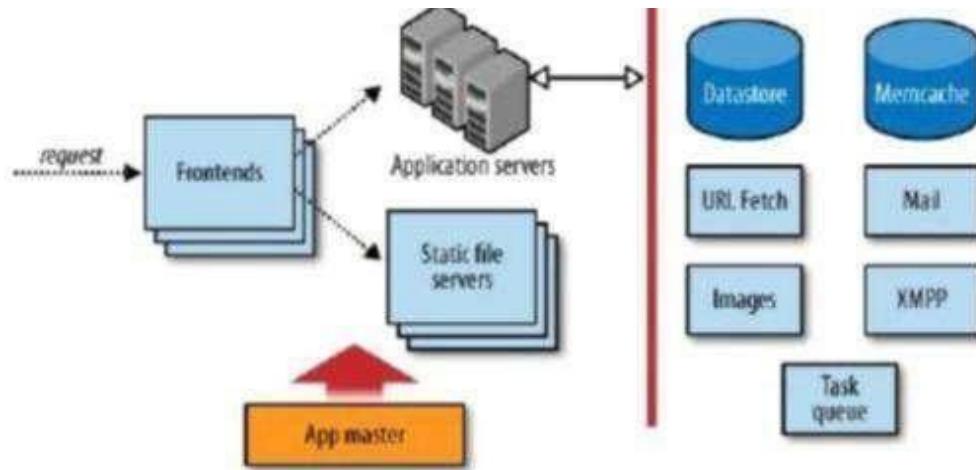
- You can develop your application for the Java runtime environment using common Java web development tools and API standards. Your app interacts with the environment using the Java Servlets standard, and can use common web application technologies such as Java Server Pages
- The Java runtime environment uses Java 6. The App Engine Java SDK supports developing apps using either Java 5 or 6. The environment includes the Java SE Runtime Environment (JRE) 6

platform and libraries. The restrictions of the sandbox environment are implemented in the JVM. An app can use any JVM byte code or library feature, as long as it does not exceed the sandbox restrictions. For instance, byte code that attempts to open a socket or write to a file will throw a runtime exception.

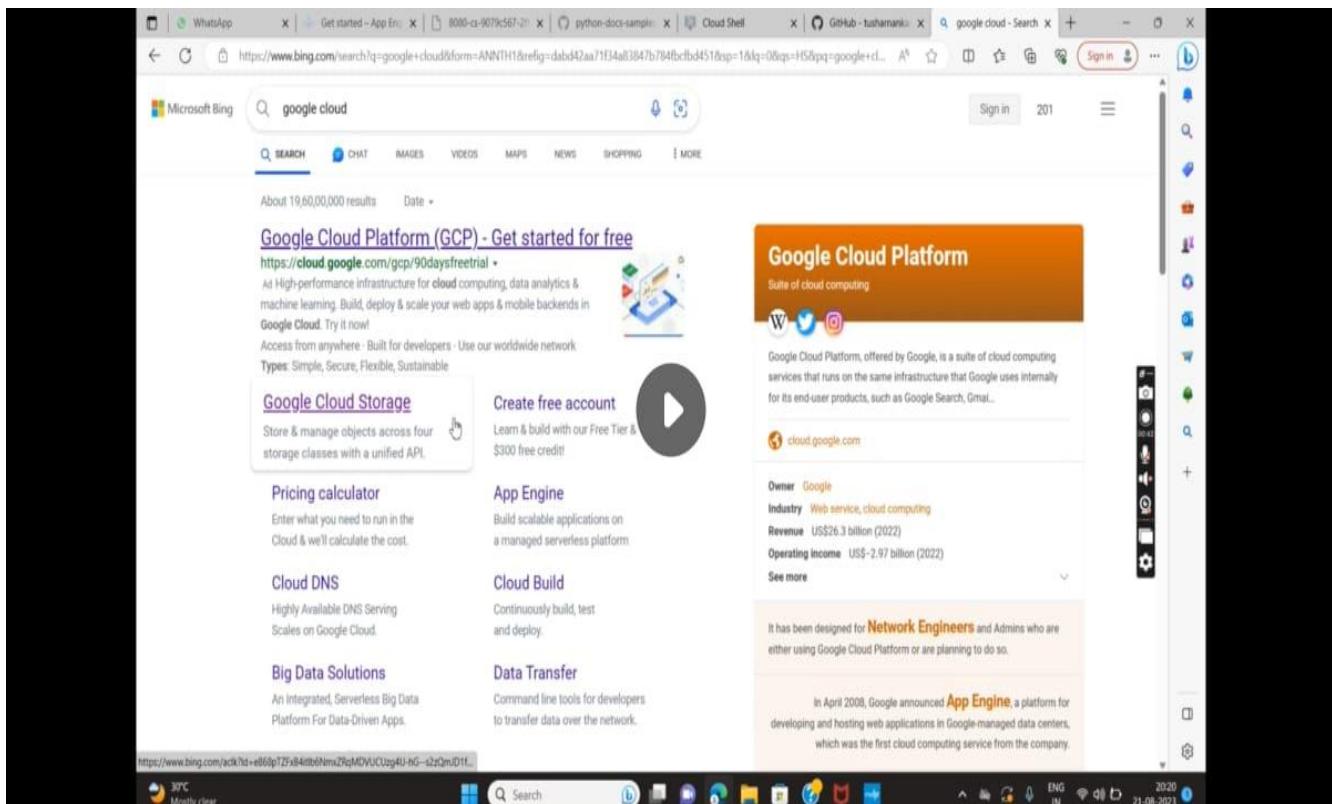
- Your app accesses most App Engine services using Java standard APIs. For the App Engine data store, the Java SDK includes implementations of the Java DataObjects (JDO) and Java Persistence API (JPA) interfaces. Your app can use the JavaMail API to send email messages with the App Engine Mail service. The java.net HTTP APIs access the App Engine URL fetch service.
- App Engine also includes low-level APIs for its services to implement additional adapters, or to use directly from the application. See the documentation for the data store, memcache, URL fetch, mail, images and Google Accounts APIs. Typically, Java developers use the Java programming language and APIs to implement web applications for the JVM. With the use of JVM-compatible compilers or interpreters, you can also use other languages to develop web applications, such as JavaScript, Ruby.



□ Workflow of Google App Engine



Step1 : Login to www.cloud.google.com



Step2 : Goto Console

Step 3 : Google Cloud Platform is shown . Click Dashboard in the Google Cloud Platform

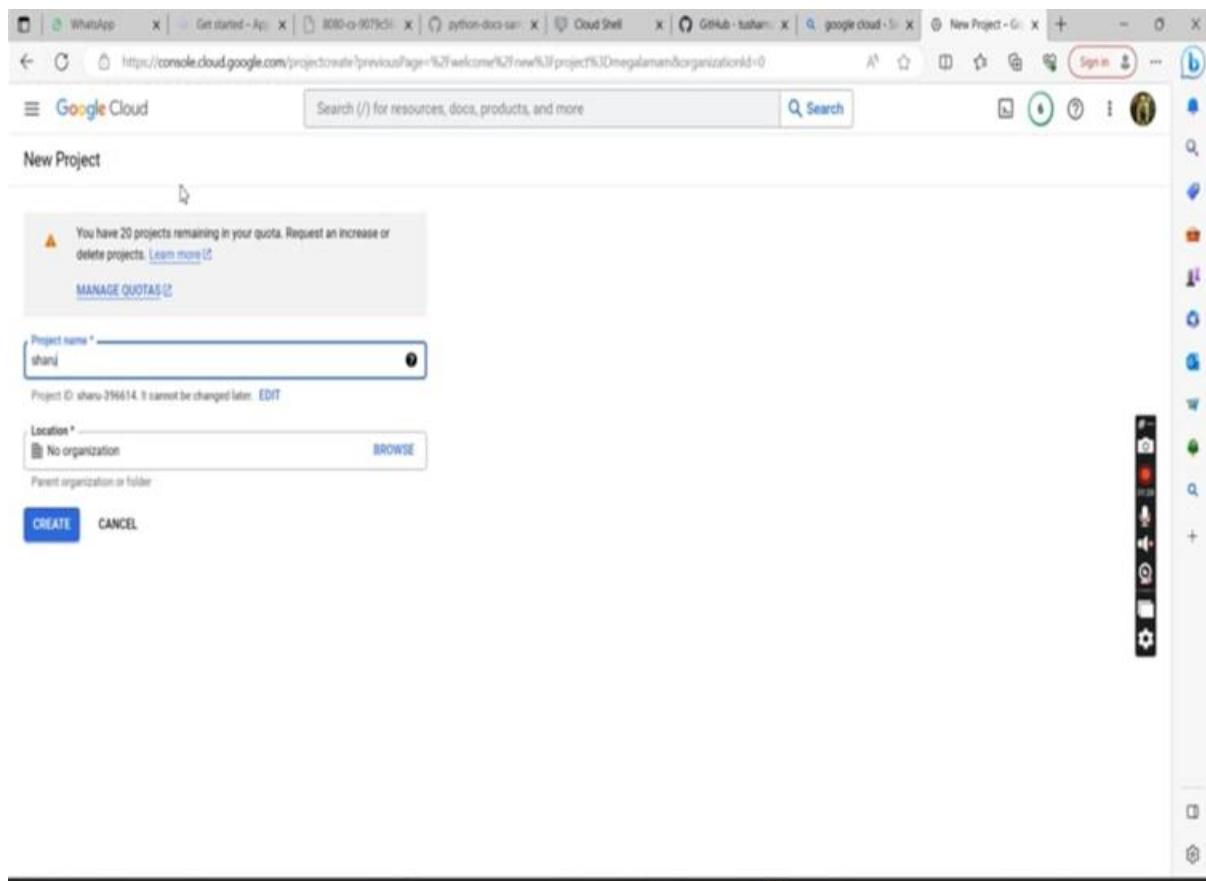
The screenshot shows the Google Cloud Platform (GCP) Welcome page. At the top, there's a banner for a free trial with 24,582.01 credits and 87 days remaining. Below the banner, the user's name 'megala Mani' is displayed with a 'PREVIEW' link. A large play button icon is centered on the page. To the left, there's a section for 'You're in Free Trial' showing 0 out of 24,582 credits used, with an 'ACTIVATE FULL ACCOUNT' button. To the right, there's a box titled 'Explore curated resources to help you build and deploy your first project'. Below these sections, a 'Recommended based on your interest in Web, Mobile, Game, Storage' section lists three pre-built solution templates: 'Deploy a three-tier web app', 'Create a dynamic web app with Python and JS', and 'Create a serverless ecommerce platform'. The URL in the browser is <https://console.cloud.google.com/welcome/home?project=megalamani>.

Step 4 : Since the page called select a project will be visible in that click new project.

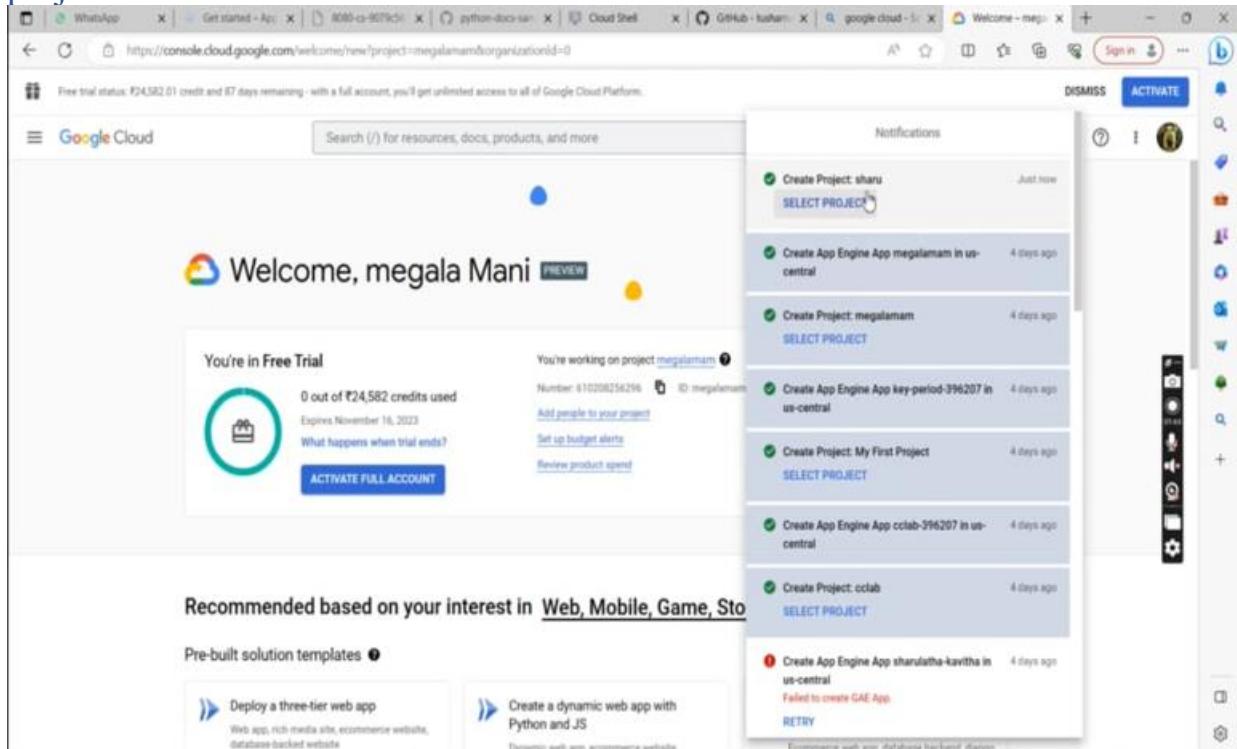
The screenshot shows a 'Select a project' dialog box overlaid on the GCP Welcome page. The dialog has a search bar at the top and three tabs: 'RECENT', 'STARRED', and 'ALL'. Under 'RECENT', there are four projects listed: 'megalamani' (selected), 'My First Project', 'cclab', and 'icel-cloud platform'. Below the list, there's a note about curated resources to help build and deploy projects. At the bottom of the dialog, there are 'CANCEL' and 'OPEN' buttons. The URL in the browser is <https://console.cloud.google.com/welcome/new?project=megalamani>.

Step 5 : Click New Project and give unique Project Name.

Example : sharu



Step 6 : Now, a notification will be given as “ the project is created “. Then click on select project.



Step 7 : In dashboard , click on products and solutions. Later click on all products.

The screenshot shows the Google Cloud Platform dashboard. On the left, there's a sidebar with various services like Cloud overview, Products & solutions, APIs & Services, Billing, IAM & Admin, Marketplace, Compute Engine, Kubernetes Engine, Cloud Storage, BigQuery, VPC network, Cloud Run, and Cloud Build. The 'Products & solutions' item is expanded, showing 'All products', 'Jump Start Solutions', and 'Solution deployments'. The main area displays a 'Welcome' message for a project named 'sharu-296614' with a free trial status. It includes sections for 'Free Trial', 'What happens when trial ends?', and 'ACTIVATE FULL ACCOUNT'. Below this, there's a recommendation for 'Web, Mobile, Game, Storage' solution templates, with links to 'Deploy a three-tier web app', 'Create a dynamic web app with Python and JS', and 'Create a serverless ecommerce platform'. A sidebar on the right contains icons for various tools and resources.

Step 8 : In next page click the serverless.

This screenshot shows the 'Products & solutions' page with the 'Serverless' category selected in the sidebar. The sidebar also lists other categories like Management, Compute, Storage, Analytics, Networking, Distributed Cloud, Databases, Operations, and Security. The main content area shows the 'Serverless' category with a brief description: 'Build applications powered by serverless functions and containers'. It lists several services under 'Name': Edge, Appliances, Cloud Run, Cloud Functions, App Engine, API Gateway, and Endpoints. Each service has a brief description and a dropdown arrow icon.

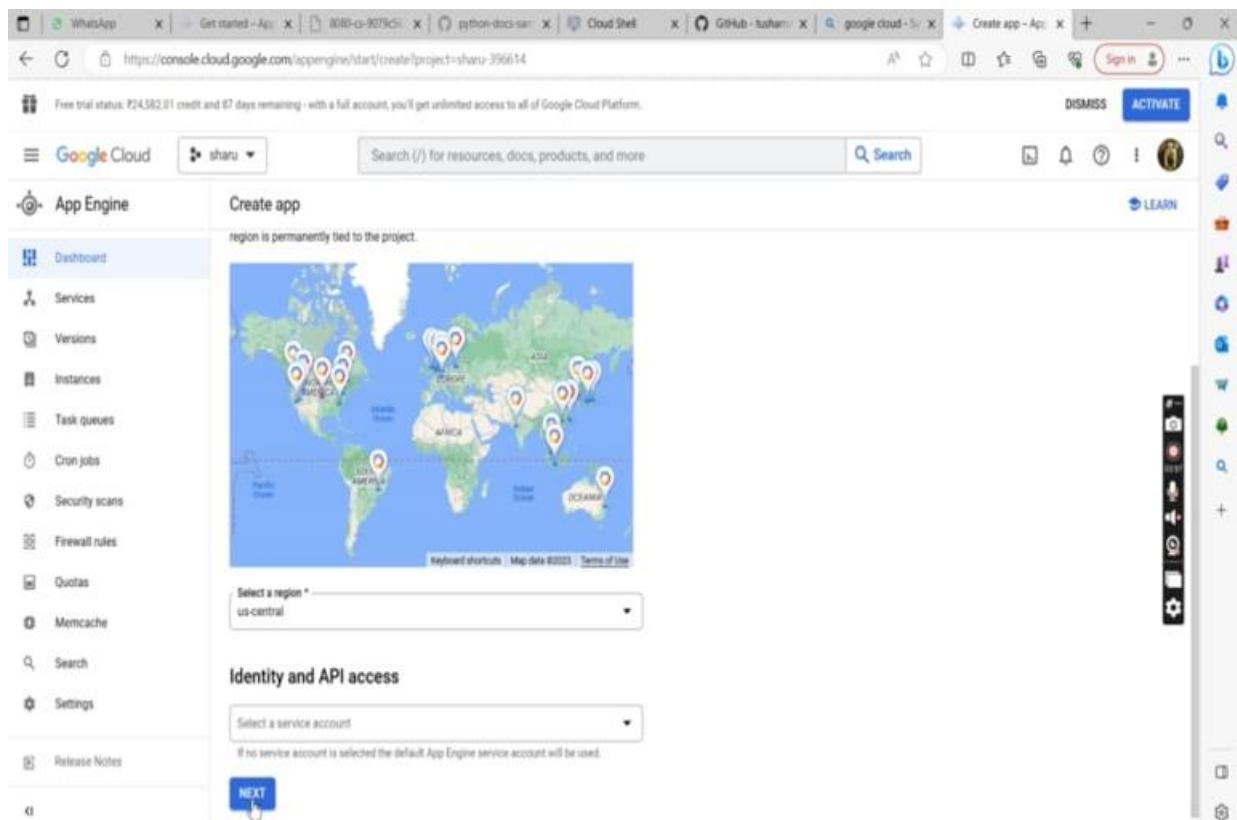
Step 9 : In that , click App Engine to initiate it.

The screenshot shows the Google Cloud Platform console with the URL <https://console.cloud.google.com/appengine?project=sharu-396614>. The left sidebar has a 'Products & solutions' section with various categories like Management, Compute, Storage, Analytics, Networking, Distributed Cloud, and Serverless. The 'Serverless' category is currently selected. Under 'Serverless', there are several services listed: Edge, Appliances, Cloud Run, Cloud Functions, App Engine (which is highlighted with a cursor), API Gateway, and Endpoints. The main content area displays a table for each service with columns for Name and Description.

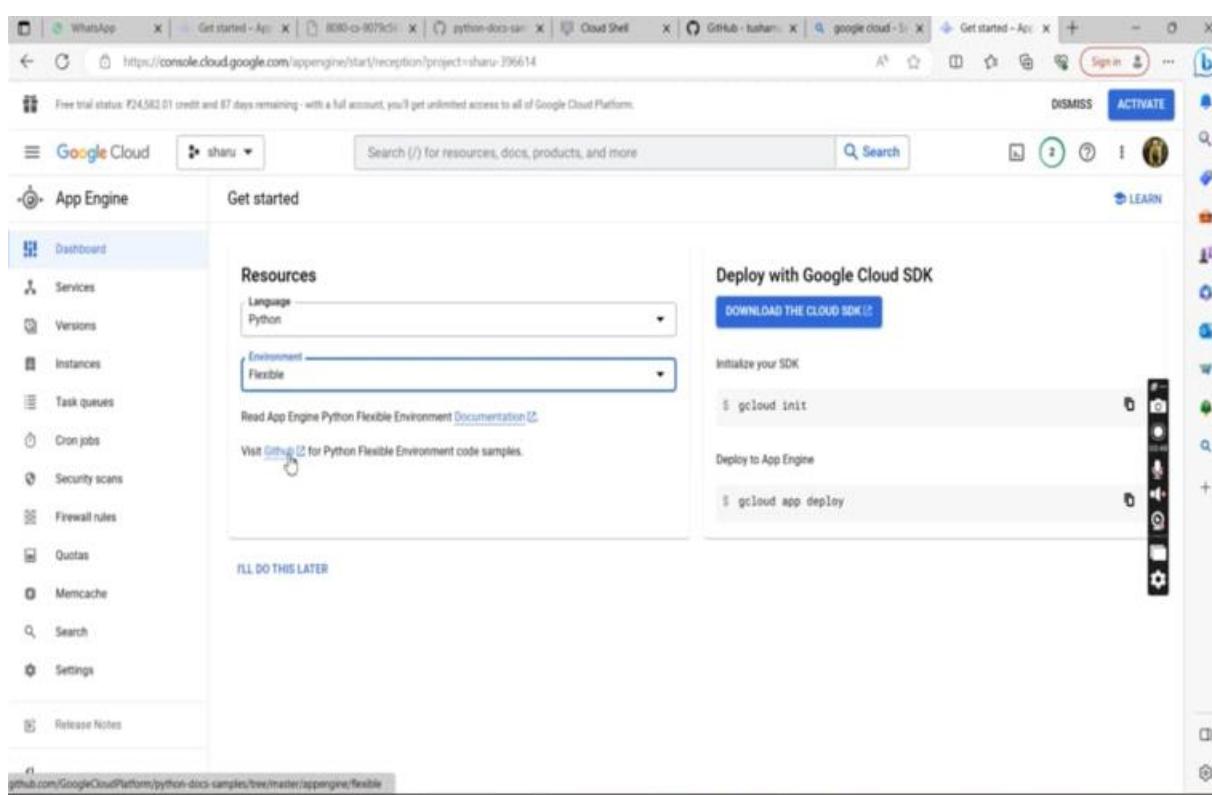
Step 10 : A new page will be opened ,then click the create application.

The screenshot shows the Google Cloud Platform console with the URL <https://console.cloud.google.com/appengine/start?project=sharu-396614>. The left sidebar shows the 'App Engine' dashboard with links for Dashboard, Services, Versions, Instances, Task queues, Cron jobs, Security scans, Firewall rules, Quotas, Memcache, Search, Settings, and Release Notes. The main content area is titled 'Welcome to App Engine' with the sub-instruction 'Build scalable apps in any language on Google's infrastructure'. A large blue 'CREATE APPLICATION' button is centered at the bottom of the main content area.

Step 11 : It navigates to a new page , there click next simply.

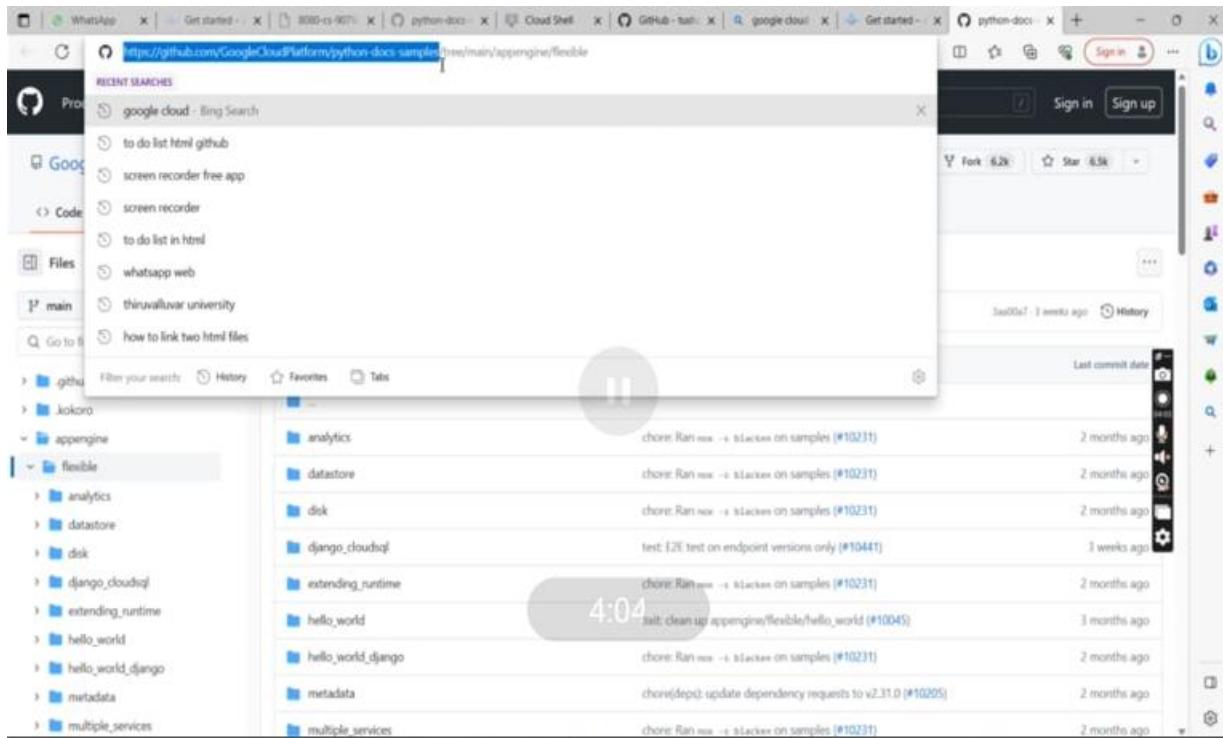


Step 12 : Then the python app engine page is show . There give the details :-
In place of , language – python and environment – flexible.
Later click on the github link provided in that page.

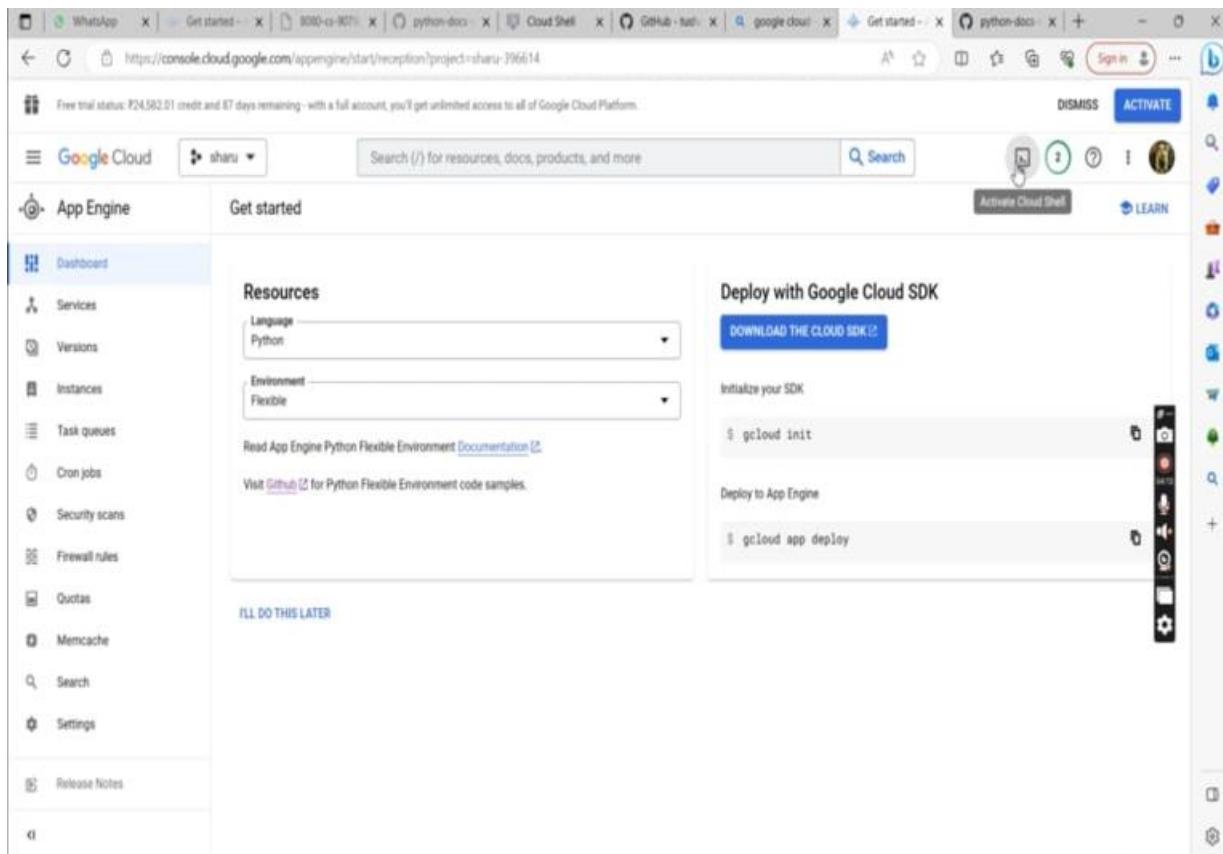


Step 13 : In that page, go to url given . Copy the url link till samples.

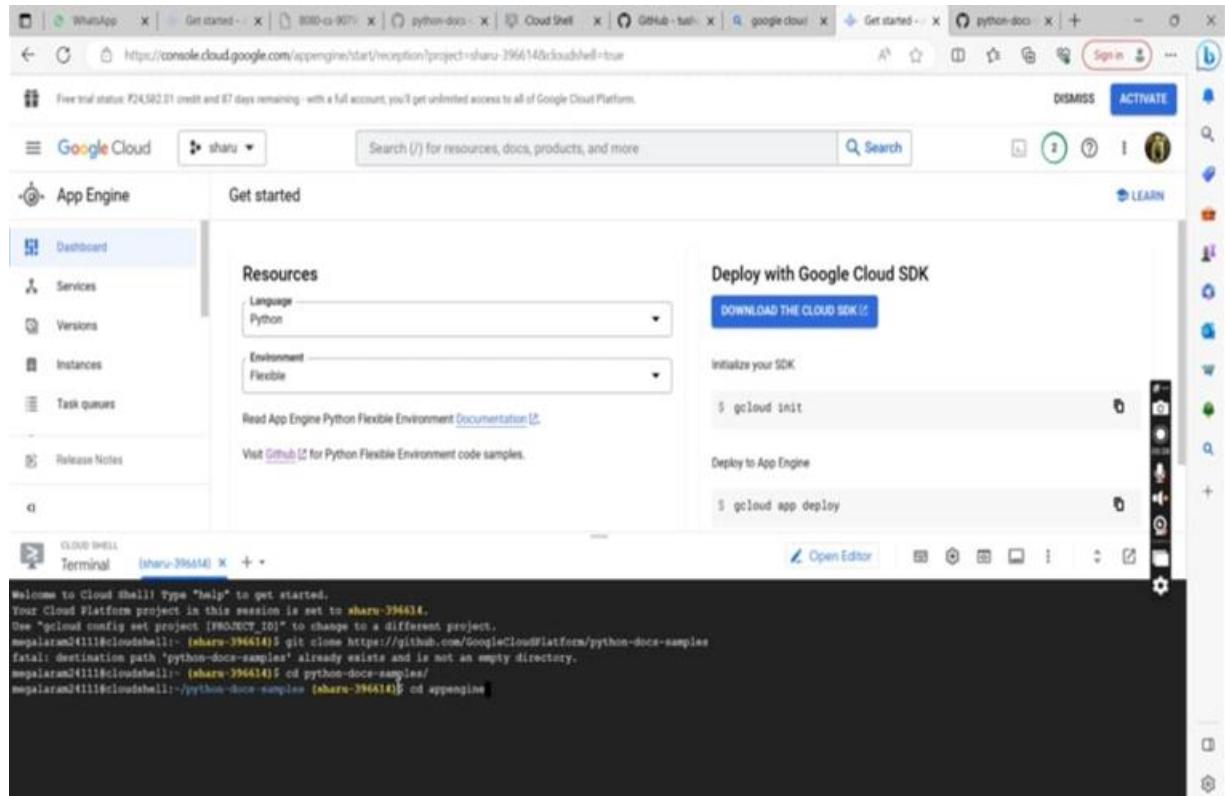
Then move back to the previous page.



Step 14 : While clicking the download cloud sdk . It will navigate to a page -Make a billing account set a common email-id and a password. There click the activate cloud shell.



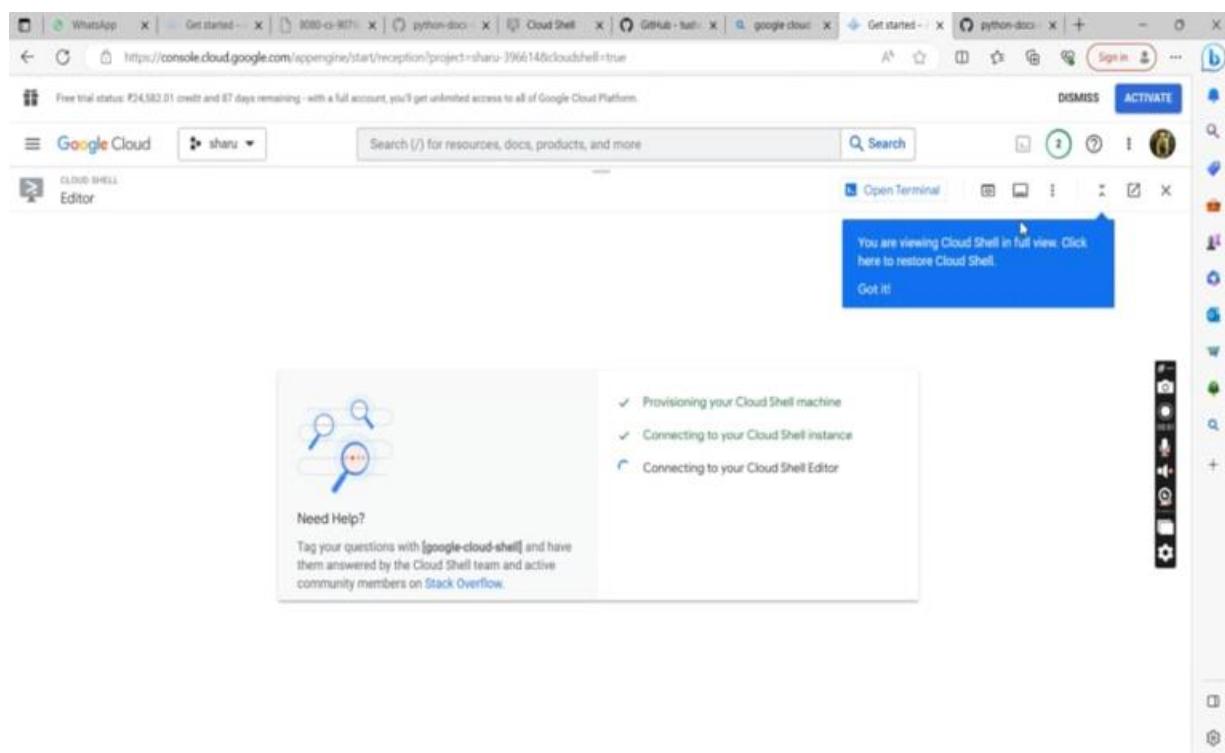
Step 15 : The cloud shell is initiated. Type - git clone and copy the url that was been copied in the github page. Hit enter. It's time to change the directory using the command :- cd python-docs-samples/ . Then type the cmd:- cd appengine/ .



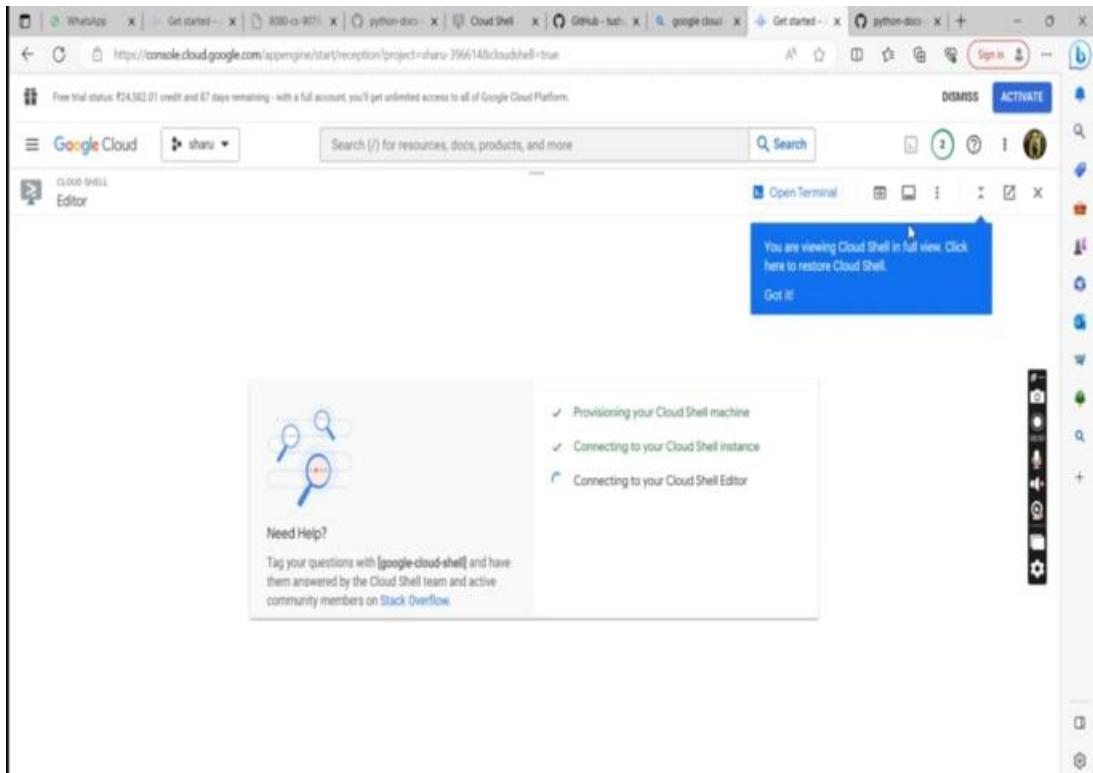
The screenshot shows the Google Cloud Platform Cloud Shell interface. The left sidebar is titled "App Engine" and includes links for Dashboard, Services, Versions, Instances, Task queues, Release Notes, and CLOUD SHELL. The main area has a "Resources" section with dropdowns for Language (Python) and Environment (Flexible). To the right, there is a "Deploy with Google Cloud SDK" section with "DOWNLOAD THE CLOUD SDK" and "INITIALIZE YOUR SDK" buttons, along with commands for "gcloud init", "Deploy to App Engine", and "gcloud app deploy". Below these is a terminal window titled "Terminal (sharu-396614)". The terminal output shows:

```
Welcome to Cloud Shell! Type "help" to get started.  
Your Cloud Platform project in this session is set to sharu-396614.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
mopalaram@4111ecloudshell:~ (sharu-396614)$ git clone https://github.com/GoogleCloudPlatform/python-docs-samples  
fatal: destination path 'python-docs-samples' already exists and is not an empty directory.  
mopalaram@4111ecloudshell:~ (sharu-396614)$ cd python-docs-samples/  
mopalaram@4111ecloudshell:~/python-docs-samples (sharu-396614)$ cd appengine
```

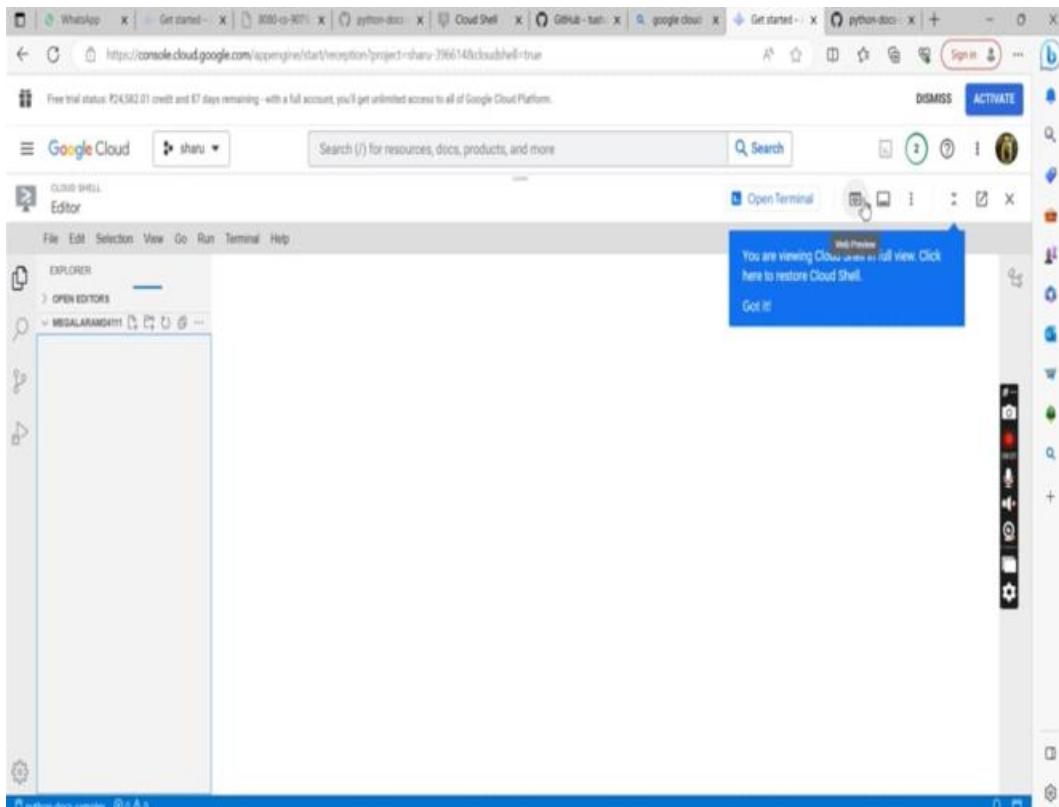
Step 16 : Next click the cloud editor.



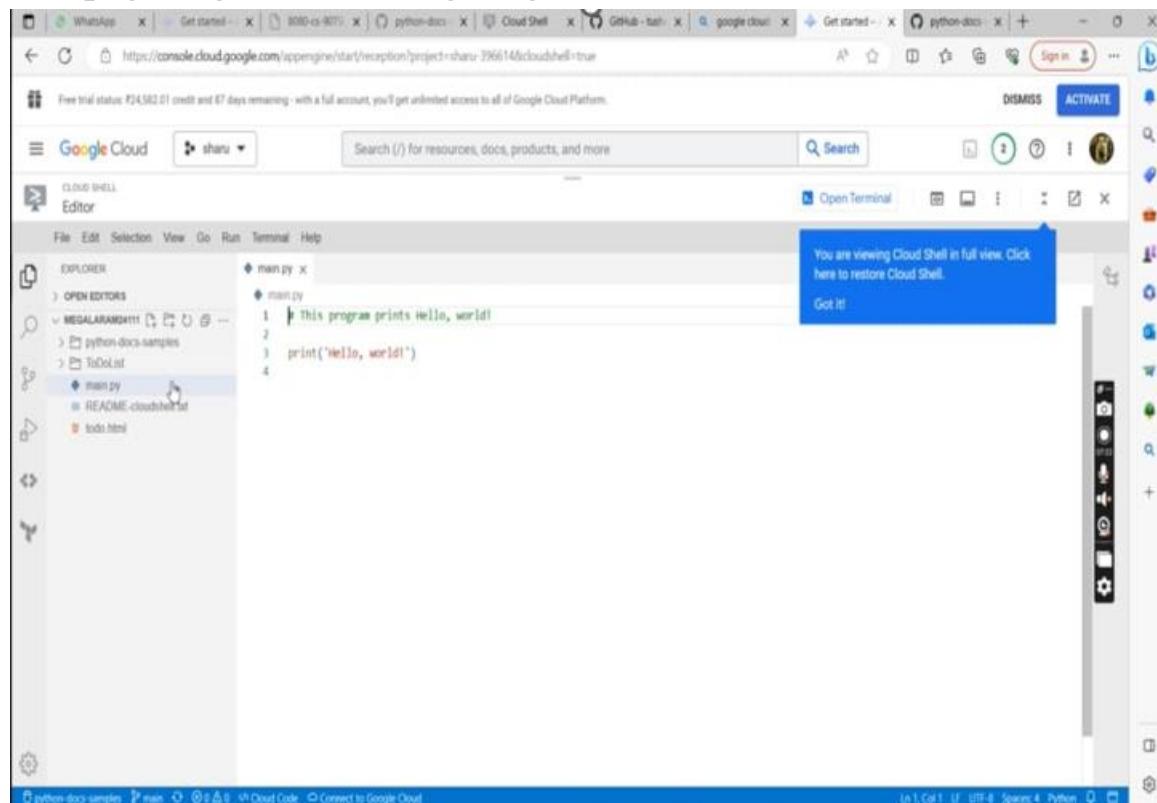
Step 17 : So that , the cloud editor page gets initiated.



Step 18 : Create a folder .



Step 19 : In that folder create a file called main.py . A code in python is written in that page as given in that figure given.



The screenshot shows the Google Cloud Shell interface. The left sidebar displays a file tree under 'EXPLORER'. Inside the 'MEGALARANDHII1' folder, there are several files: 'main.py', 'README.cloudshell', and 'todo.html'. The 'main.py' file is selected and its contents are visible in the central editor area:

```
1 # This program prints Hello, world!
2
3 print('Hello, world!')
```

A blue tooltip message at the top right of the editor area says: "You are viewing Cloud Shell in full view. Click here to restore Cloud Shell." Below it is a "Got It!" button. The bottom status bar shows the current session details: 'In 1 Cell 1: DTF-8 Spans 4 Python 0: 0'.

Step 20 : enter the cmd :-

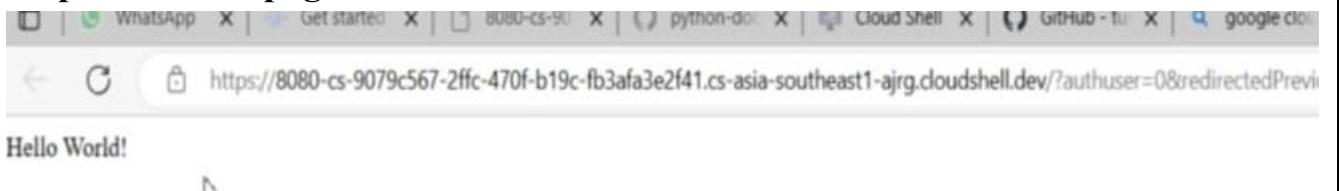
1. **Cd flexible/**
2. **Cd hello_world , ls**
3. **Python3 main.py**

```

Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to share-396414.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
share-396414:~$ git clone https://github.com/GoogleCloudPlatform/python-docs-samples
share-396414:~/python-docs-samples$ ls
share-396414$ cd python-docs-samples/
share-396414$ python -m appengine
share-396414$ python -m appengine (share-396414) is flexible!
share-396414$ python -m appengine/appengine/flexible (share-396414) is hello_world
share-396414$ python -m appengine/appengine/flexible/hello_world (share-396414) is
app.yaml main.py main_test.py module.config.py requirements-test.txt requirements.txt
share-396414$ python -m appengine/appengine/flexible/hello_world (share-396414) $ python3 main.py
* Serving Flask app 'main'
* Debug mode on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:8000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PID: 785-437-089

```

Step 21: Then click on that url given in the cloud shell page. It will generate the output in a new page as “Hello World!”



Todo list code in HTML:

```

<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body {
  margin: 0;
  min-width: 250px;

```

```
}

/* Include the padding and border in an element's total width and height */
* {
  box-sizing: border-box;
}

/* Remove margins and padding from the list */
ul {
  margin: 0;
  padding: 0;
}
/* Style the list items */

ul li {

  cursor: pointer;
  position: relative;
  padding: 12px 8px 12px 40px;
  list-style-type: none;
  background: #eee;
  font-size: 18px;
  transition: 0.2s;

  /* make the list items unselectable */
  -webkit-user-select: none;
  -moz-user-select: none;
  -ms-user-select: none;
  user-select: none;
}

/* Set all odd list items to a different color (zebra-stripes) */
ul li:nth-child(odd) {
  background: #f9f9f9;
}

/* Darker background-color on hover */
ul li:hover {
```

```
background: #ddd;
}

/* When clicked on, add a background color and strike out text */
ul li.checked {
    background: #888;
    color: #fff;
    text-decoration: line-through;
}

/* Add a "checked" mark when clicked on */
ul li.checked::before {
    content: "";
    position: absolute;
    border-color: #fff;
    border-style: solid;
    border-width: 0 2px 2px 0;
    top: 10px;
    left: 16px;

    transform: rotate(45deg);
    height: 15px;

    width: 7px;
}

/* Style the close button */
.close {
    position: absolute;
    right: 0;
    top: 0;
    padding: 12px 16px 12px 16px;
}

.close:hover {
    background-color: #f44336;
    color: white;
}
```

```
/* Style the header */
.header {
    background-color: #f44336;
    padding: 30px 40px;
    color: white;
    text-align: center;
}

/* Clear floats after the header */
.header:after {
    content: "";
    display: table;
    clear: both;
}

/* Style the input */
input {
    margin: 0;
    border: none;
    border-radius: 0;
    width: 75%;
    padding: 10px;
    float: left;
    font-size: 16px;
}

.addButton {
    padding: 10px;
    width: 25%;
    background: #d9d9d9;
    color: #555;
    float: left;
    text-align: center;
    font-size: 16px;
    cursor: pointer;
    transition: 0.3s;
    border-radius: 0;
}
```

```
}

.btnAdd:hover {
    background-color: #bbb;
}

</style>
</head>
<body>
<div id="myDIV" class="header">
    <h2 style="margin:5px">My To Do List</h2>
    <input type="text" id="myInput" placeholder="Title...">
    <span onclick="newElement()" class="addBtn">Add</span>
</div>

<ul id="myUL">
    <li>Hit the gym</li>
    <li class="checked">Pay bills</li>
    <li>Meet George</li>
    <li>Buy eggs</li>
    <li>Read a book</li>
    <li>Organize office</li>
</ul>
<script>
    // Create a "close" button and append it to each list item
    var myNodelist = document.getElementsByTagName("LI");
    var i;
    for (i = 0; i < myNodelist.length; i++) {
        var span = document.createElement("SPAN");
        var txt = document.createTextNode("\u00D7");
        span.className = "close";
        span.appendChild(txt);

        myNodelist[i].appendChild(span);
    }
    var close = document.getElementsByClassName("close");
    var i;

    for (i = 0; i < close.length; i++) {
```

```
close[i].onclick = function() {
    var div = this.parentElement;
    div.style.display = "none";
}
}

// Add a "checked" symbol when clicking on a list item
var list = document.querySelector('ul');
list.addEventListener('click', function(ev) {
    if (ev.target.tagName === 'LI') {
        ev.target.classList.toggle('checked');
    }
}, false);

// Create a new list item when clicking on the "Add" button
function createElement() {
    var li = document.createElement("li");
    var inputValue = document.getElementById("myInput").value;
    var t = document.createTextNode(inputValue);
    li.appendChild(t);
    if (inputValue === "") {
        alert("You must write something!");
    } else {
        document.getElementById("myUL").appendChild(li);
    }
    document.getElementById("myInput").value = "";
    var span = document.createElement("SPAN");
    var txt = document.createTextNode("\u00D7");
    span.className = "close";
    span.appendChild(txt);
    li.appendChild(span);

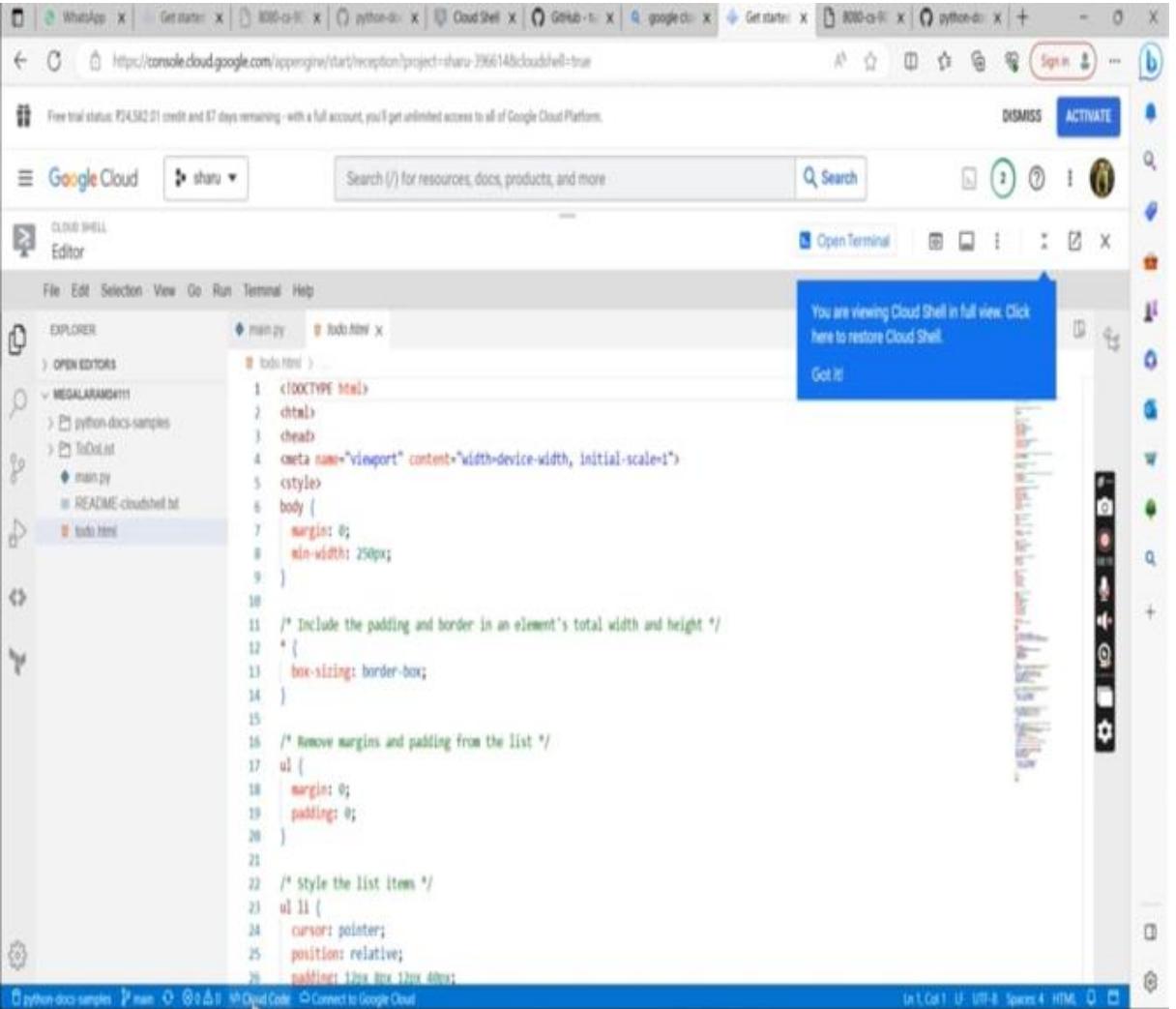
    for (i = 0; i < close.length; i++) {
        close[i].onclick = function() {
            var div = this.parentElement;
            div.style.display = "none";
        }
    }
}

</script>
```

```
</body>  
</html>
```

Step 22: The page where you typed the file called main.py , create a new file called

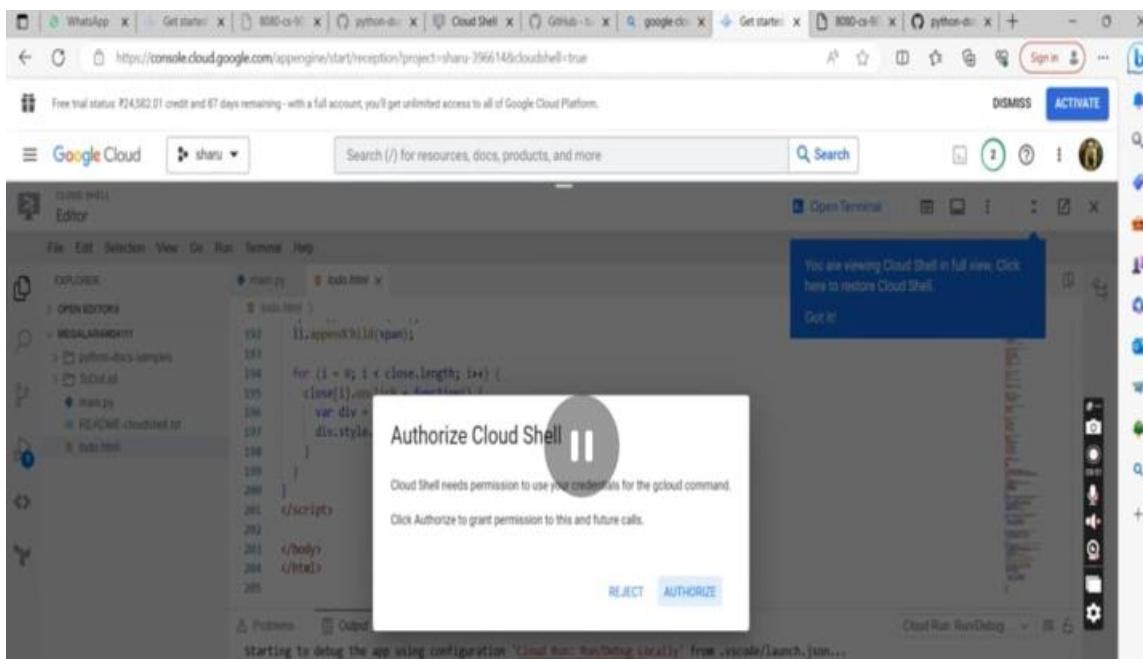
**todo.html .This is to make a web application. Type the above given code.
After typing the code , click on cloud code.**



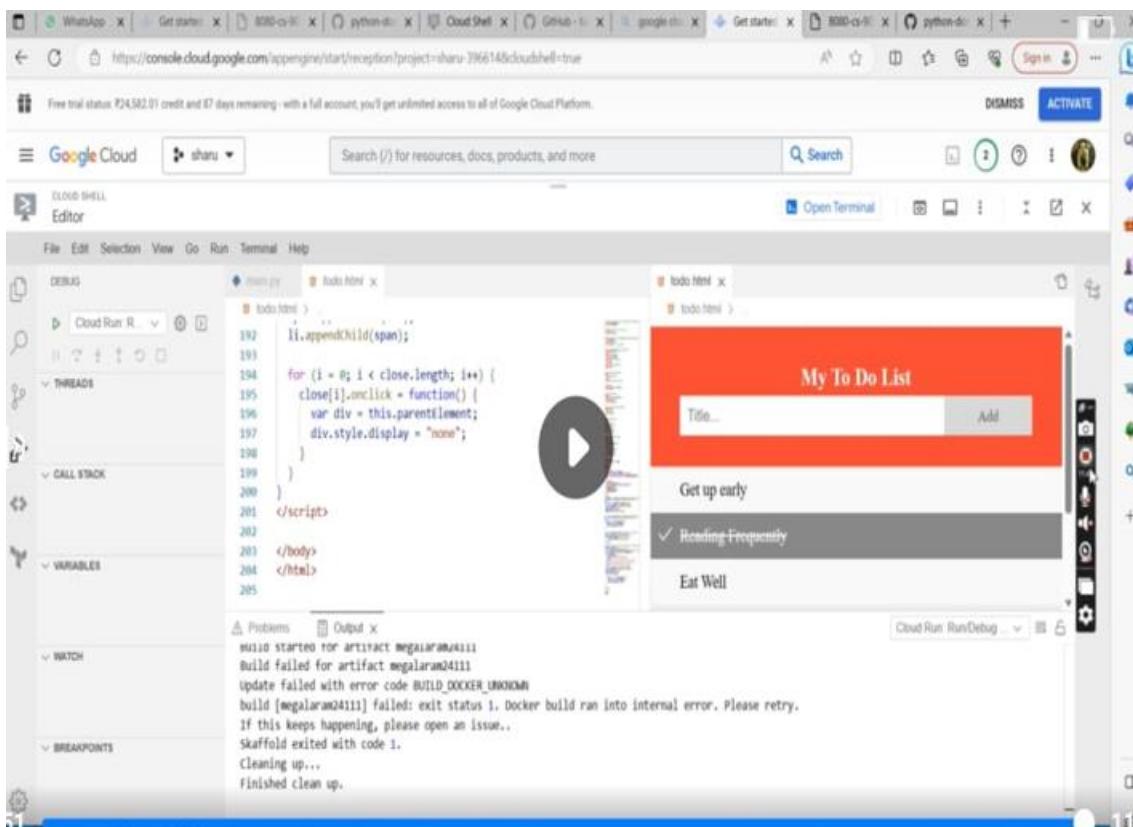
The screenshot shows the Google Cloud Shell Editor interface. The top navigation bar includes tabs for 'WhoisApp', 'Get started', '8080-0-0-0', 'python-doc', 'Cloud Shell', 'Cloud Shell - 1', 'Google Cloud', 'Get started', '8080-0-0-0', 'python-doc', and a '+' button. Below the navigation is a banner about a free trial and a 'Sign in' button. The main area has a 'Google Cloud' logo and a search bar. On the left is an 'EXPLORER' sidebar with files: 'main.py', 'todo.html' (which is selected), 'README-cloudshell.html', and 'TodoList'. The right side is the code editor with the following content:

```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body {
  margin: 0;
  min-width: 250px;
}
/* Include the padding and border in an element's total width and height */
* {
  box-sizing: border-box;
}
/* Remove margins and padding from the list */
ul {
  margin: 0;
  padding: 0;
}
/* Style the list item */
ul li {
  cursor: pointer;
  position: relative;
  padding-left: 15px;
  margin-bottom: 10px;
}
```

Step 23: It will ask for the authentication. In that click on authorize.



Step 24: Then by clicking the terminal the output will be shown in that page itself.



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 and used GAE Launcher to launch the web applications.

EX NO:5	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
DATE:	

Introduction:

❖ **CloudSim**

- A Framework for modeling and simulation of Cloud Computing Infrastructures and services
- Originally built at the Cloud Computing Distributed Systems (CLOUDS) Laboratory, The University of Melbourne, Australia
- It is completely written in JAVA

❖ **Main Features of CloudSiM**

- Modeling and simulation
- Data centre network topologies and message-passing applications
- Dynamic insertion of simulation elements
- Stop and resume of simulation
- Policies for allocation of hosts and virtual machines

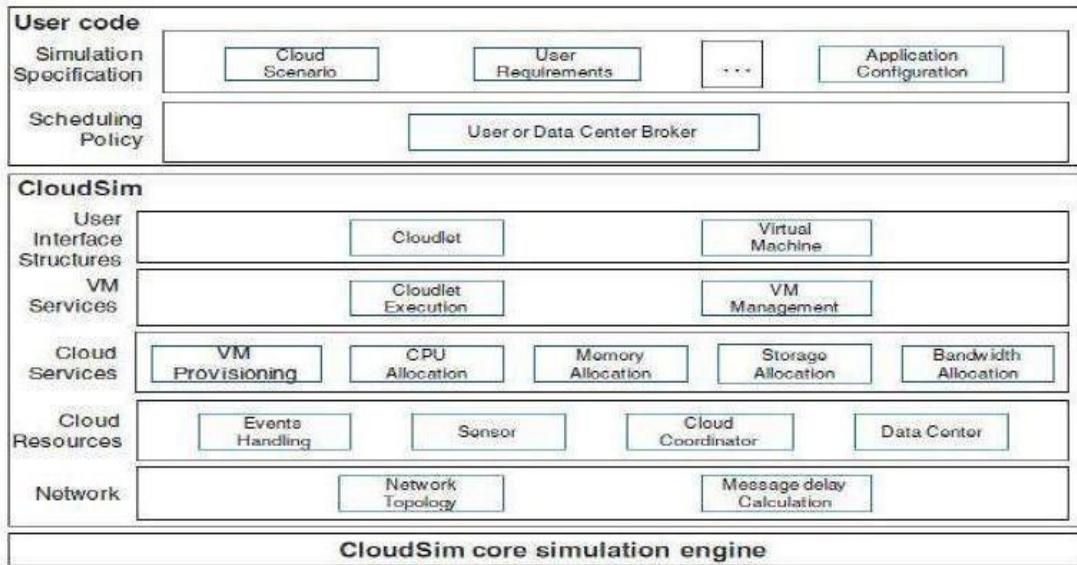
❖ **Cloudsim – Essentials**

- JDK 1.6 or above <http://tinyurl.com/JNU-JAVA>
- Eclipse 4.2 or above <http://tinyurl.com/JNU-Eclipse>
- Program link: [cloudsim-task-scheduling/src/SJF/SJFDatacenterBroker.java at master · michaelfahmy/cloudsim-task-scheduling · GitHub](https://github.com/michaelfahmy/cloudsim-task-scheduling)
- Up & Running with cloudsim guide: <https://goo.gl/TPL7Zh>

❖ **Cloudsim-Directory structure**

- cloudsim/ -- top level CloudSim directory
- docs/ -- CloudSim API Documentation
- examples/ -- CloudSim examples
- jars/ -- CloudSim jar archives
- sources/ -- CloudSim source code

Cloudsim - Layered Architecture



Step 1: Go to Google enter the link <https://www.eclipse.org/downloads/>. Installing eclipse.

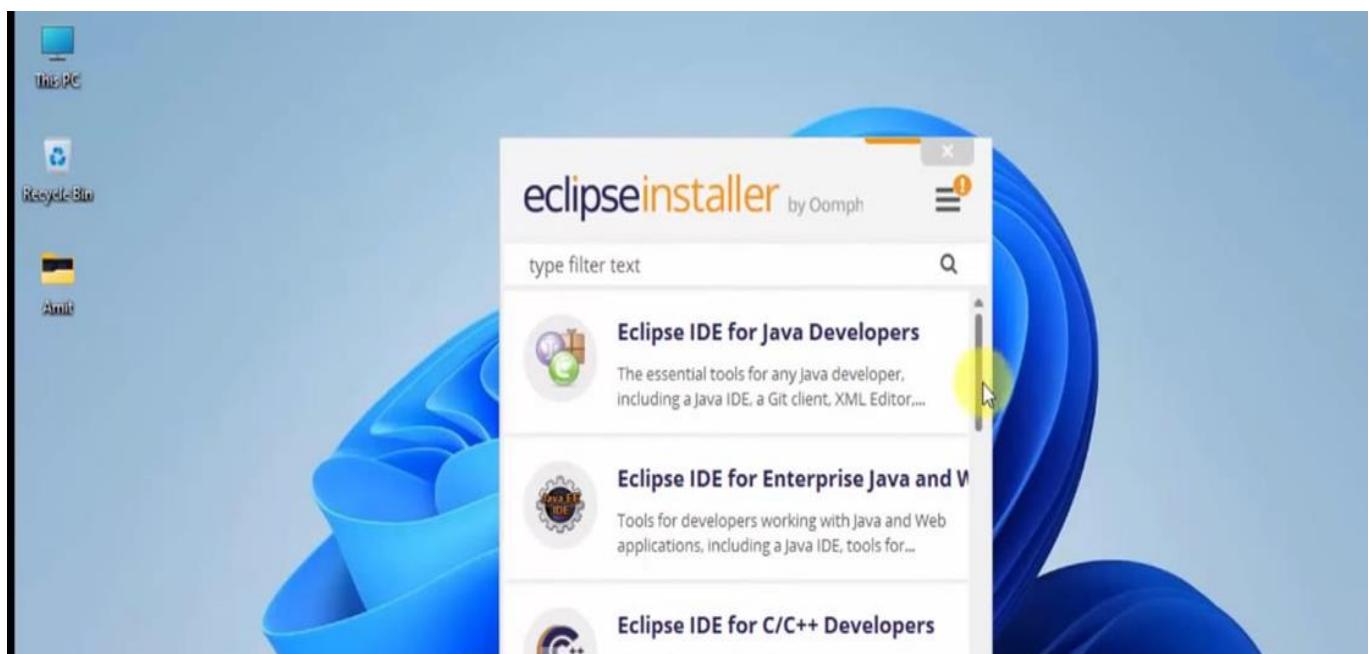
The screenshot shows a web browser window with the URL <https://www.eclipse.org/downloads/> in the address bar. The page content includes:

- A message: "The Eclipse Installer 2023-06 R now includes a JRE for macOS, Windows and Linux."
- A "Download x86_64" button for the Eclipse IDE 2023-06 release.
- A "OpenJDK Runtimes" button.
- The Eclipse logo.
- The Temurin logo with the text: "The Eclipse Temurin™ project provides high-quality, TCK certified OpenJDK runtimes and associated technology for use across the Java™ ecosystem."

Step 2: Click on download button .

The screenshot shows a web browser window with the URL <https://www.eclipse.org/downloads/download.php?file=/oomph/epp/2023-06/R/eclipse-inst-jre-win64.exe>. The page is titled "ECLIPSE FOUNDATION". The main content area displays a large orange "Download" button with a white arrow icon. Below the button, the text "Download from: China - Dalian Neusoft University of Information (大连东软信息学院) (https)" and "File: eclipse-inst-jre-win64.exe SHA-512" are visible. To the right, a sidebar titled "Other options for this file" lists "All mirrors (xml)" and "Direct link to file (download starts immediately from best mirror)". At the bottom right of the sidebar, there is a "Related Links" section.

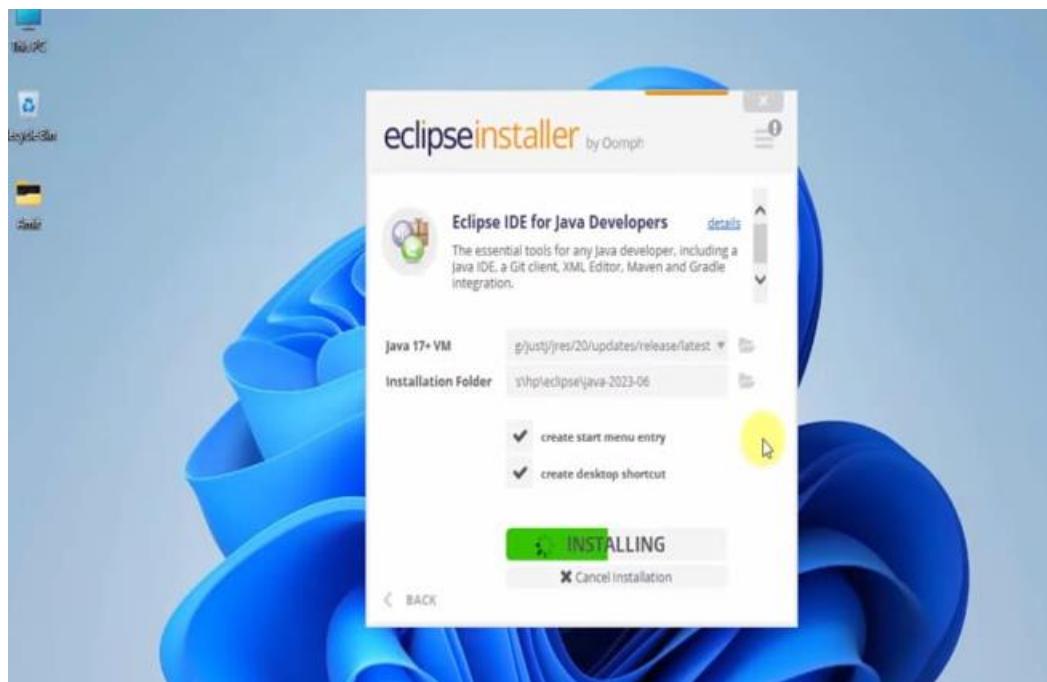
Step 3: After installing the exe file , click that and give “ Run as Administrator” . Once installation is done, click that installed eclipse. Here click on the eclicpse IDE for java developers.



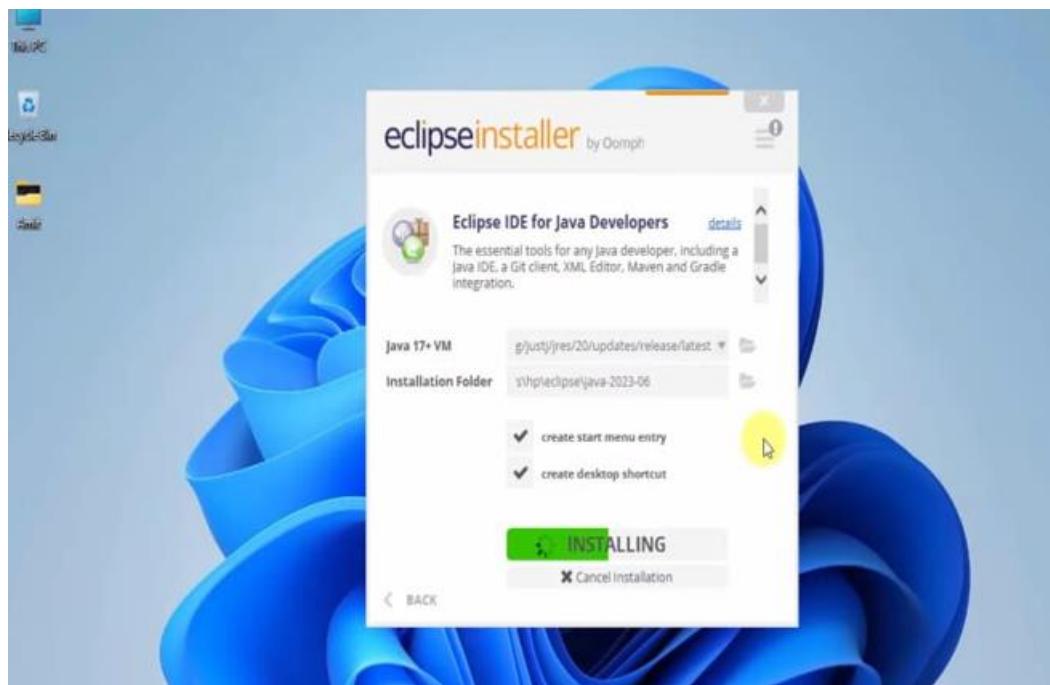
Step 4: Then it gives this page , here if we already have java jdk link the path to eclipse else download java jdk. Once installed jdk link it to eclipse. After all this configuration click on the install button.



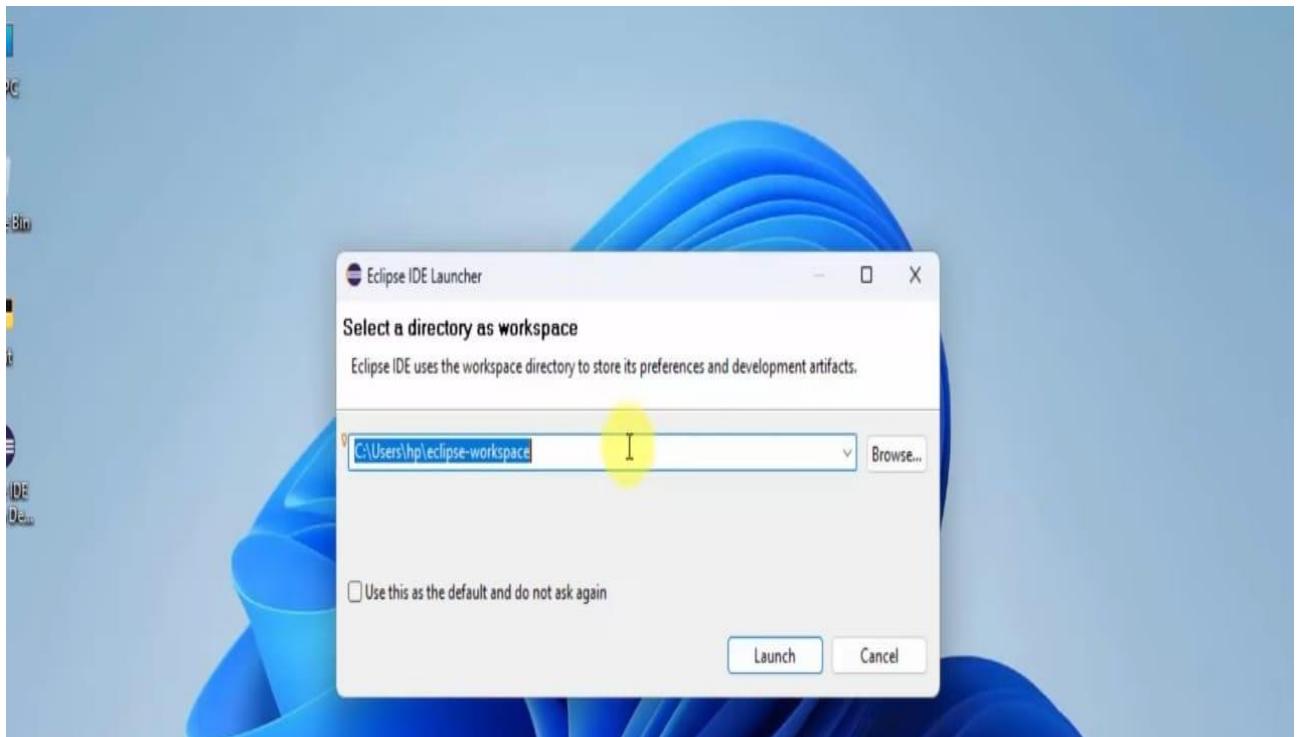
Step 5: After the installation gets started.



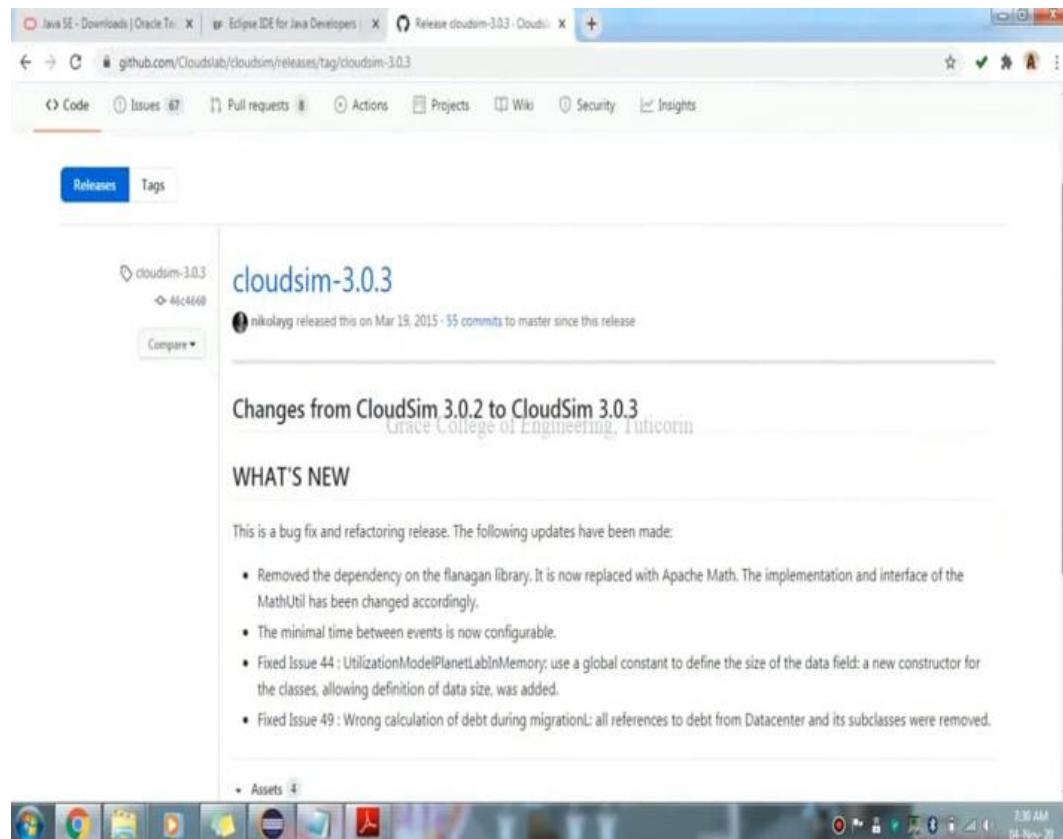
Step 6: Once the installation is completed it will ask to launch. Click on launch.



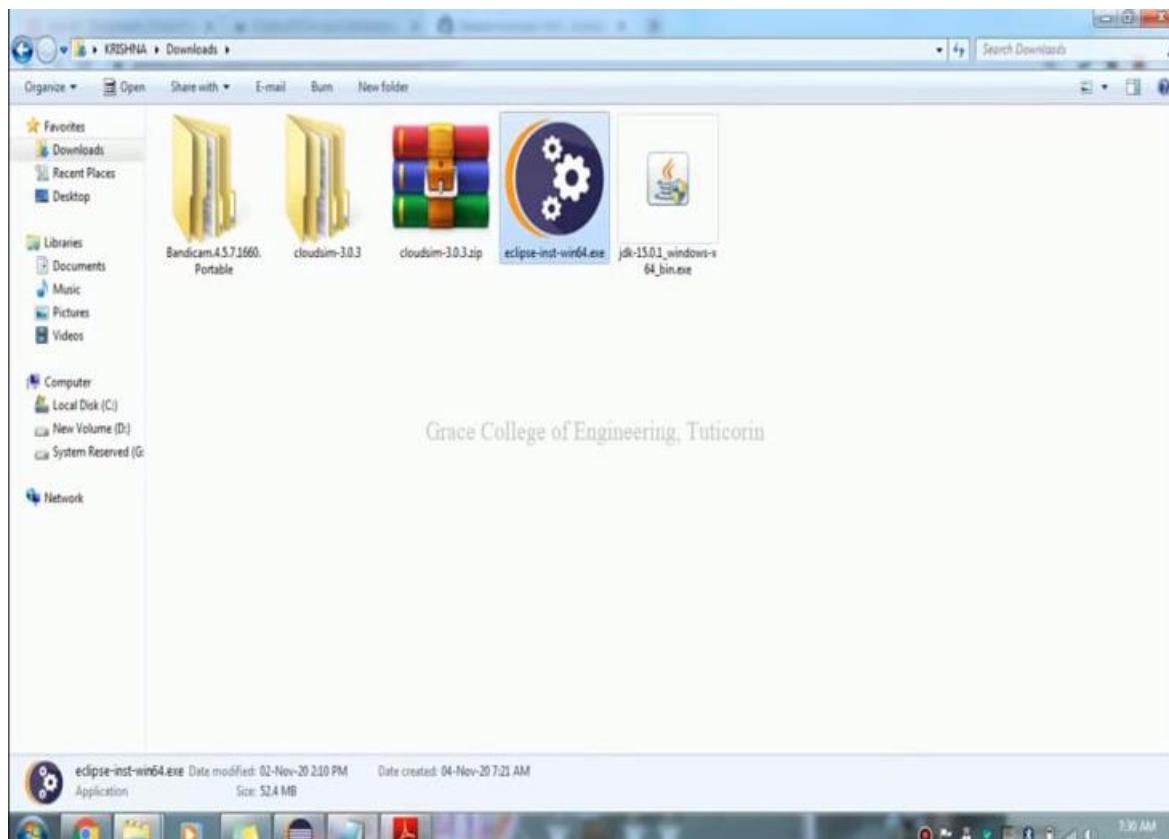
Step 7: It will ask for a directory . simply click launch.



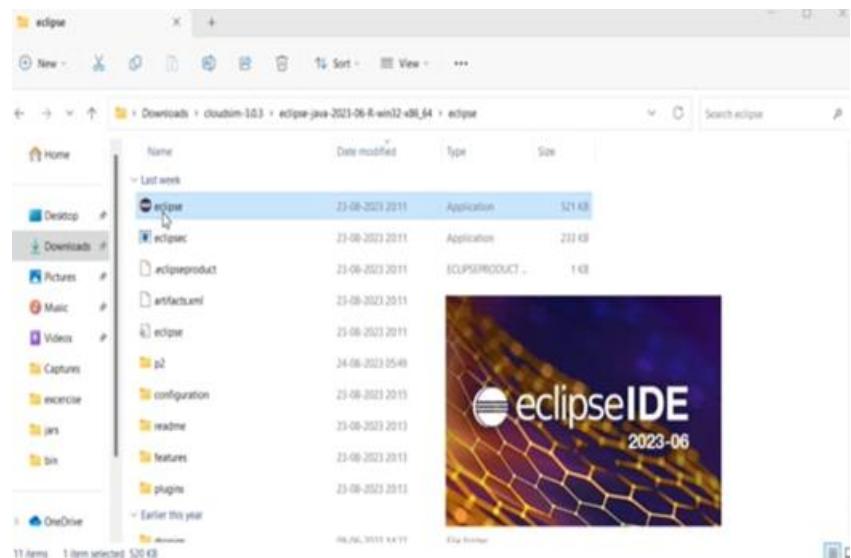
Step 8: Its time to install cloudsim. Since download it for windows.
It will be provided as a jar file using winrar or any other software extract that file.



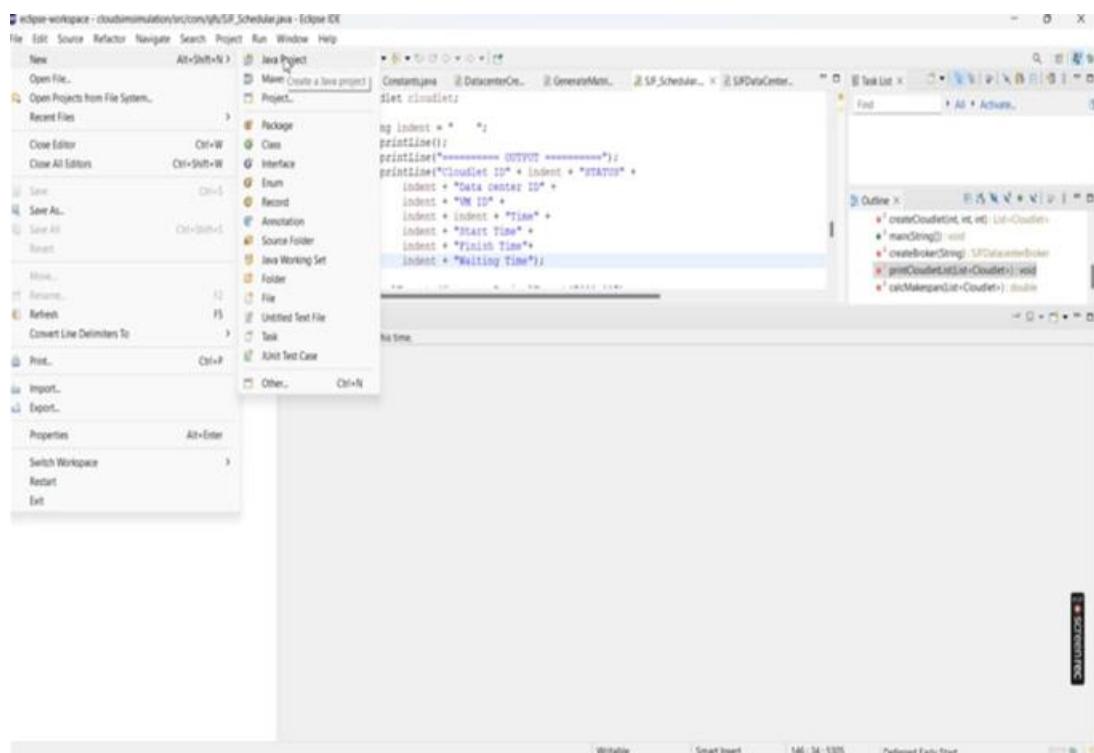
Step 9: Thus all the requirements are installed.



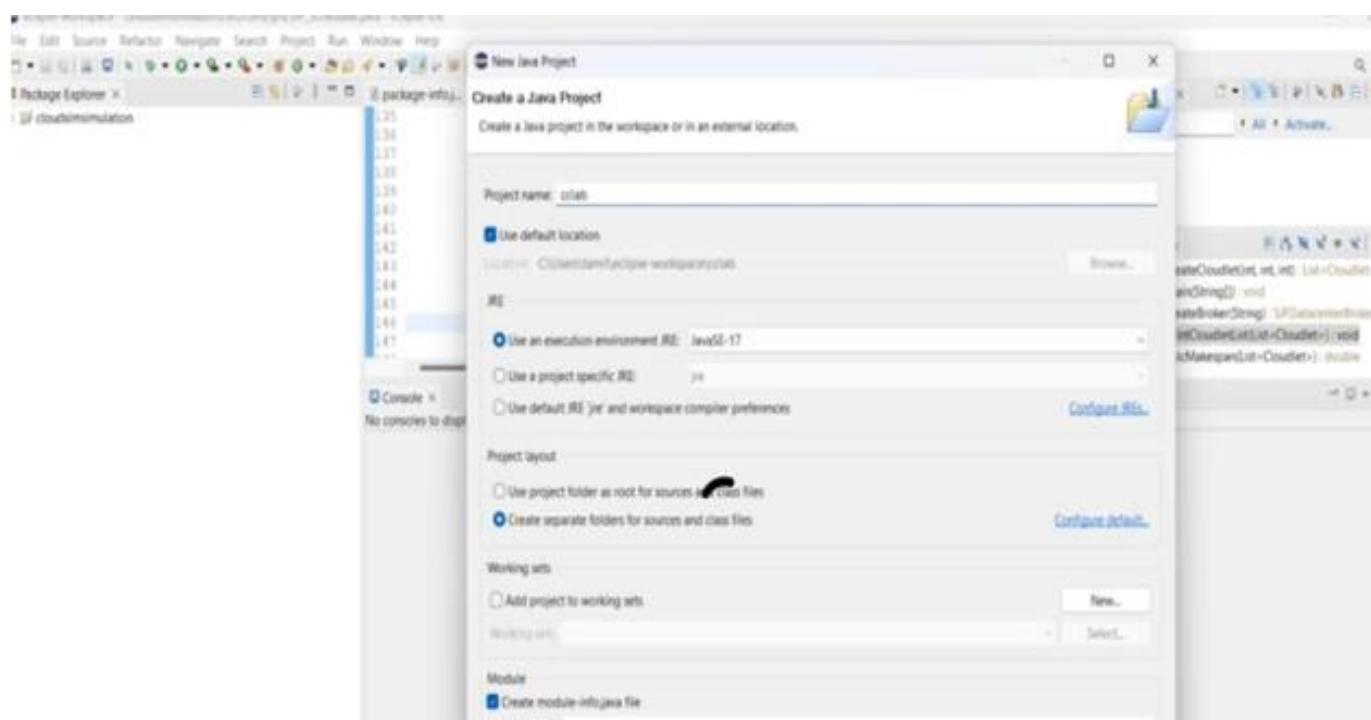
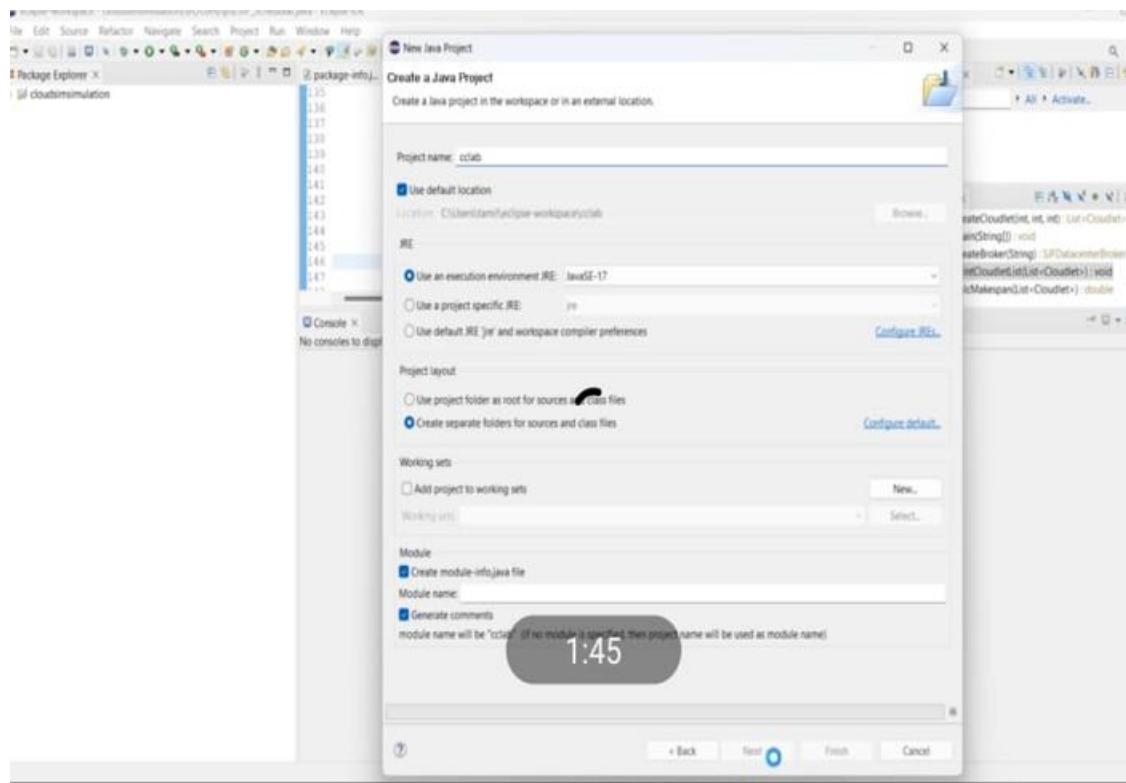
Step 10: click on the eclipse.



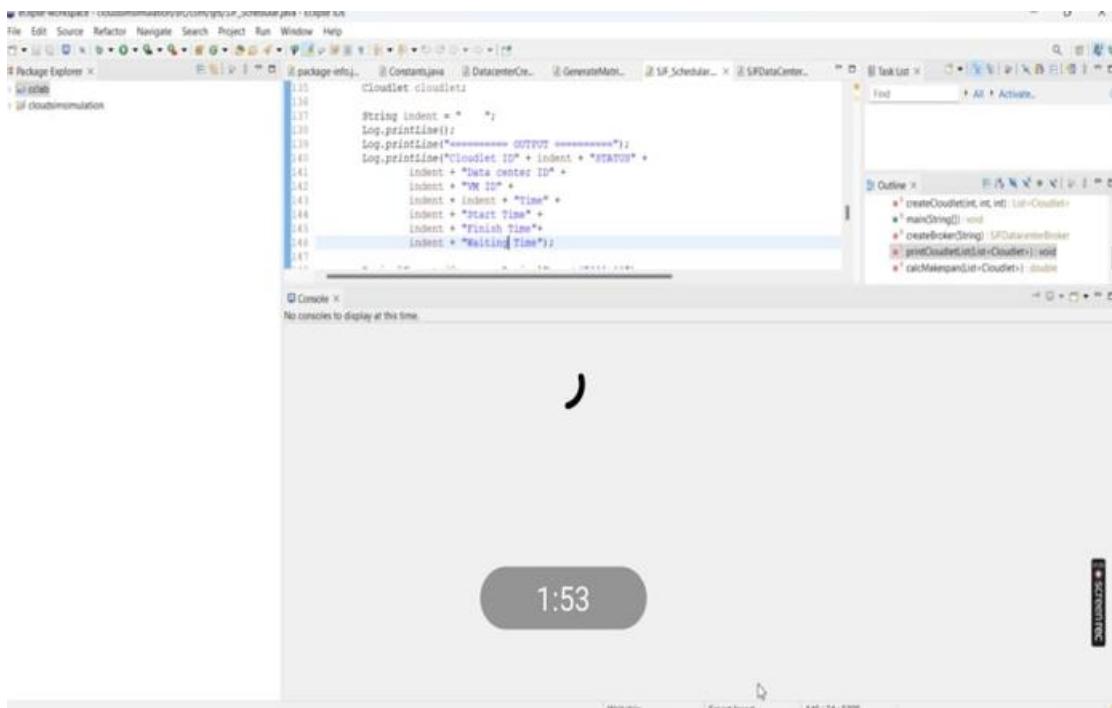
Step 11: click on new then go to java project and click it.



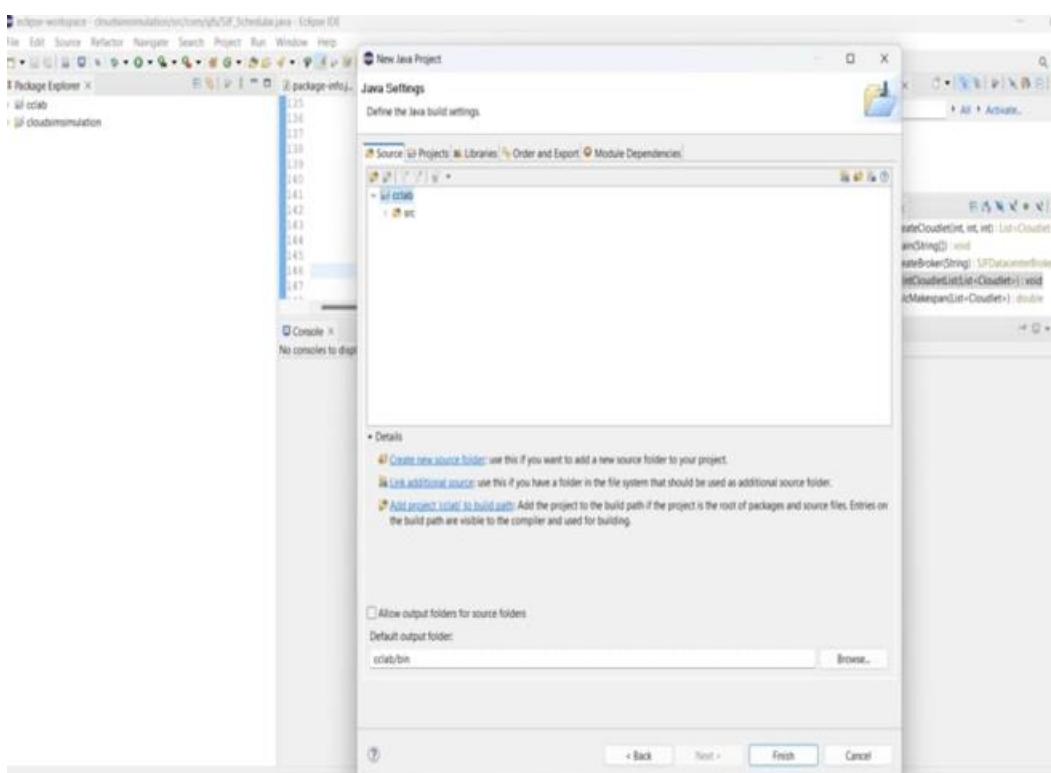
Step 12: give a project name .
(Example: cclab) then click on next.



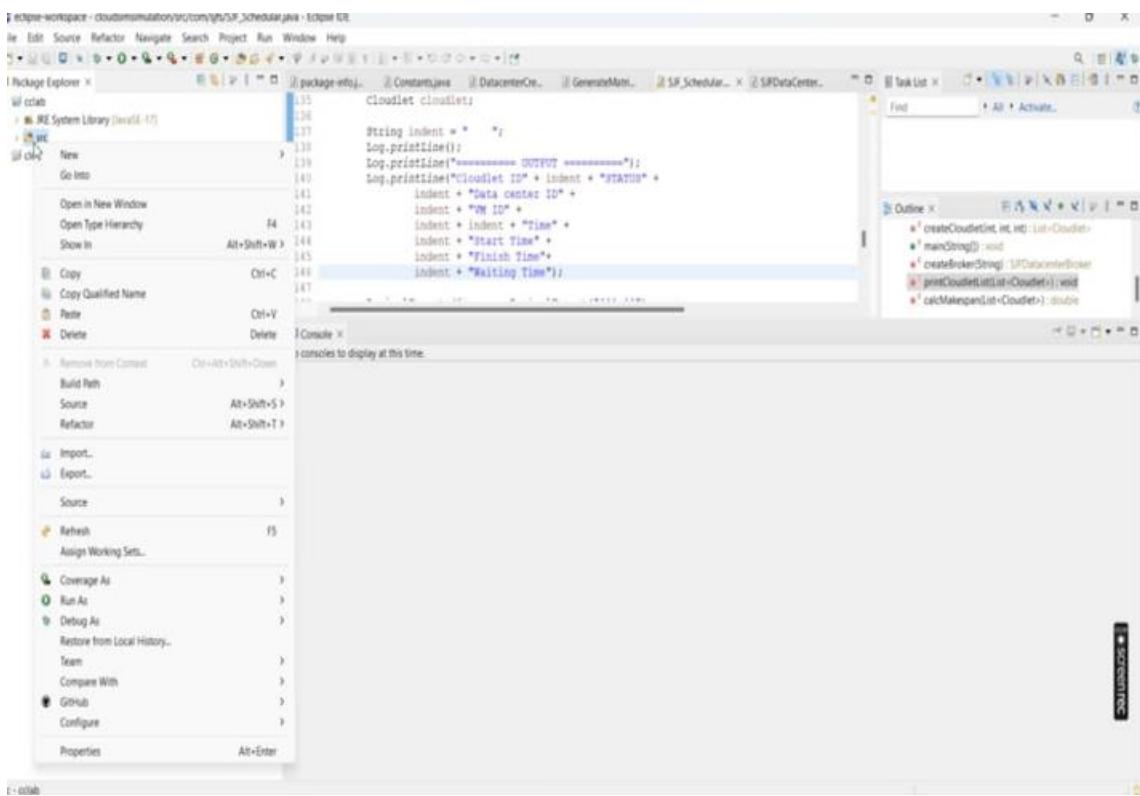
Step 13: Since the project was created . click on that .



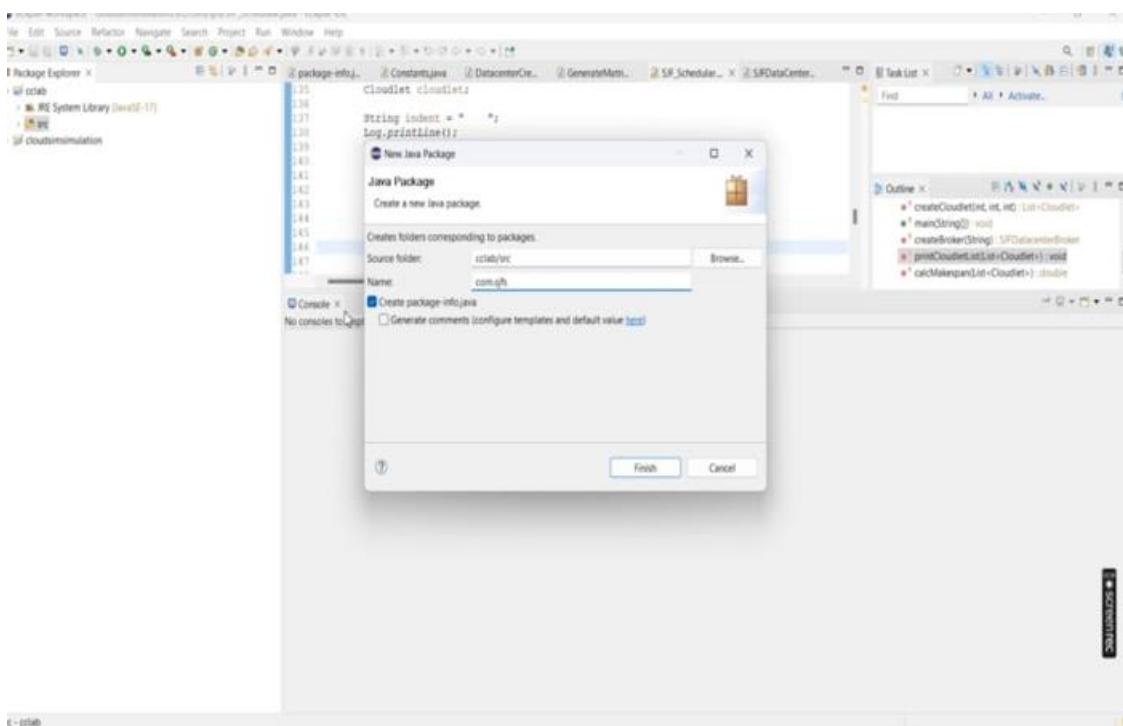
Step 14: After this the java settings will be opened . Just click on finish to confirm our setups .



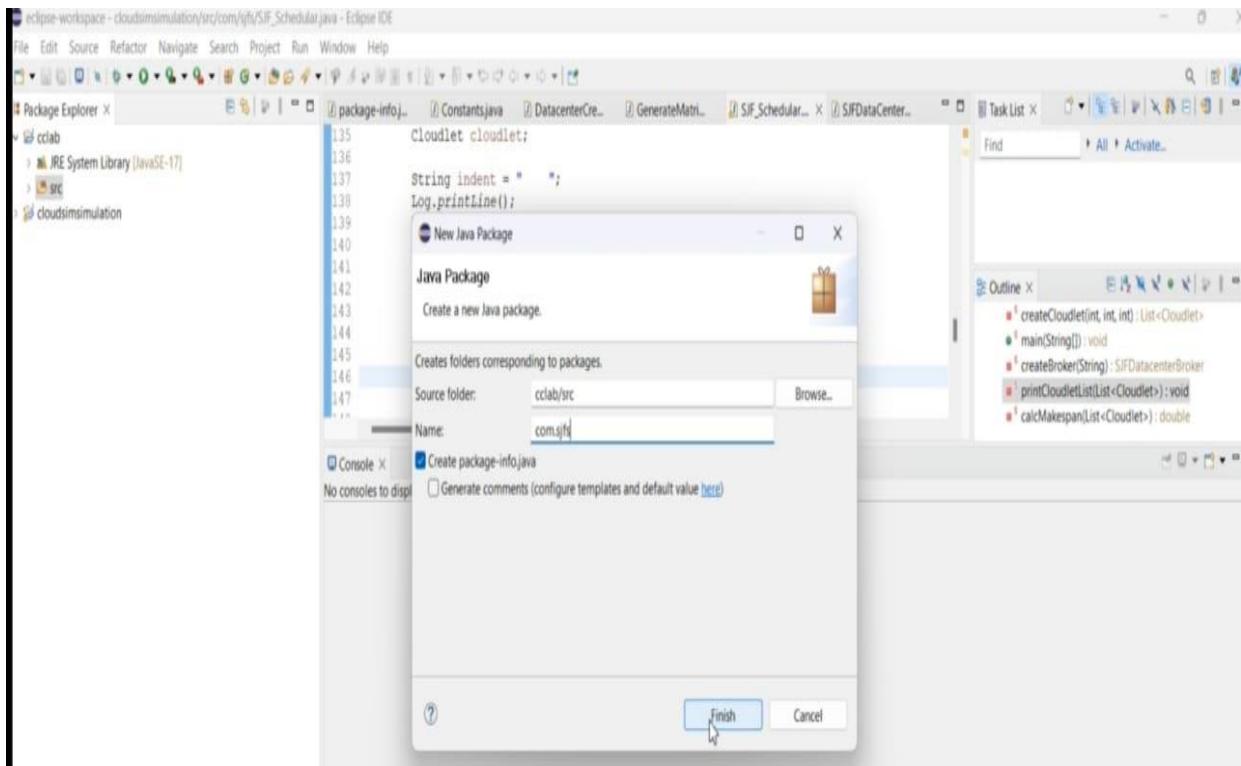
Step 15: The src will be created as a sub directory of the project we have created. Do right click that , in new choose a package



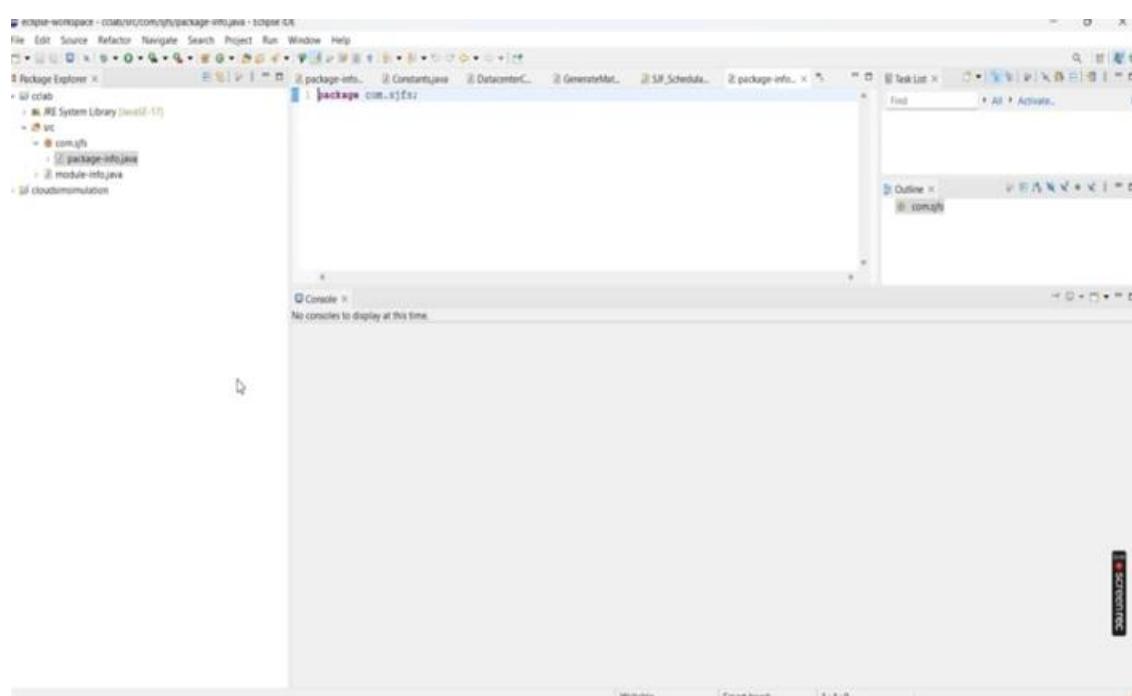
Step 16: give the package name as com.sjfs



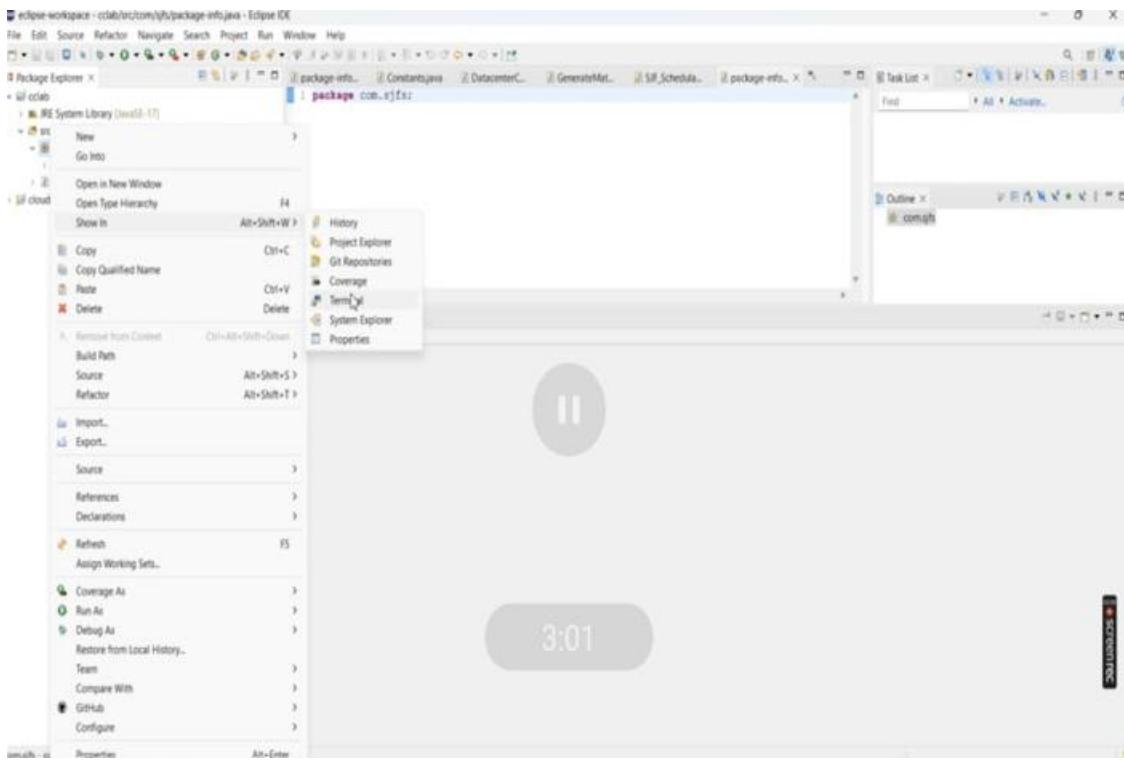
Step 17: Later see whether the check box is ticked or not . If ticked leave as it as else mark the check box . Then click finish.



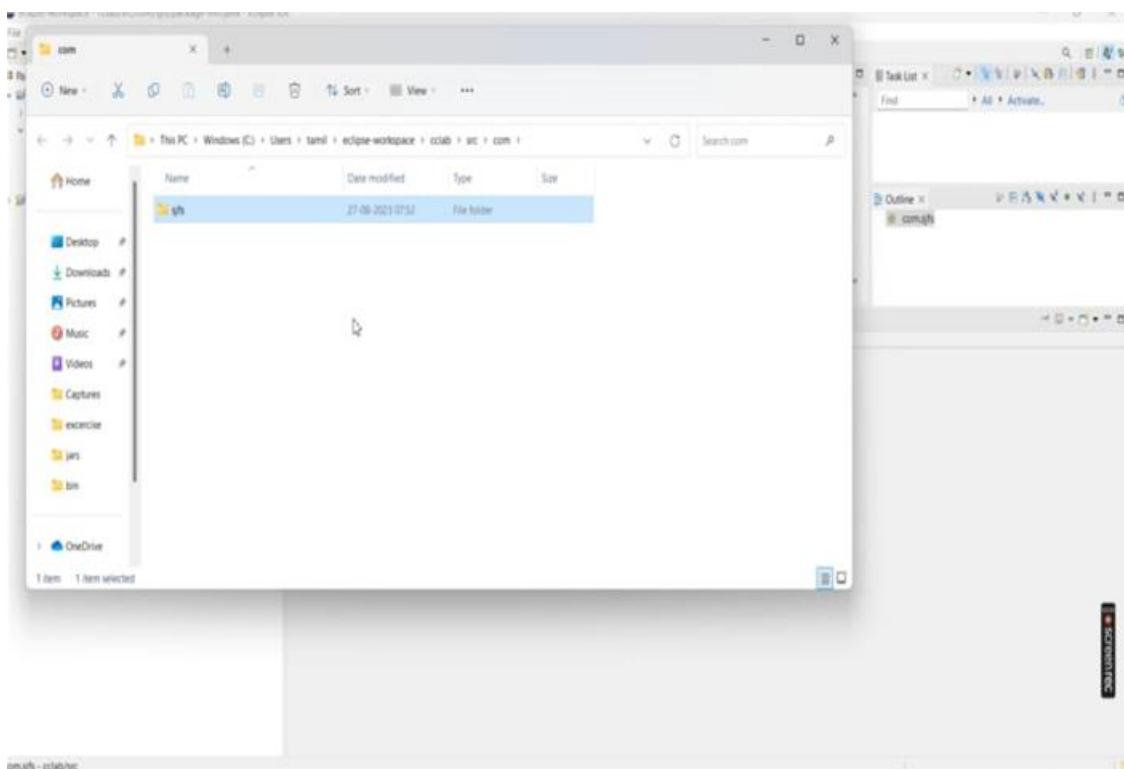
Step 18: Then refresh the page . here the package com.sjfs is seen.



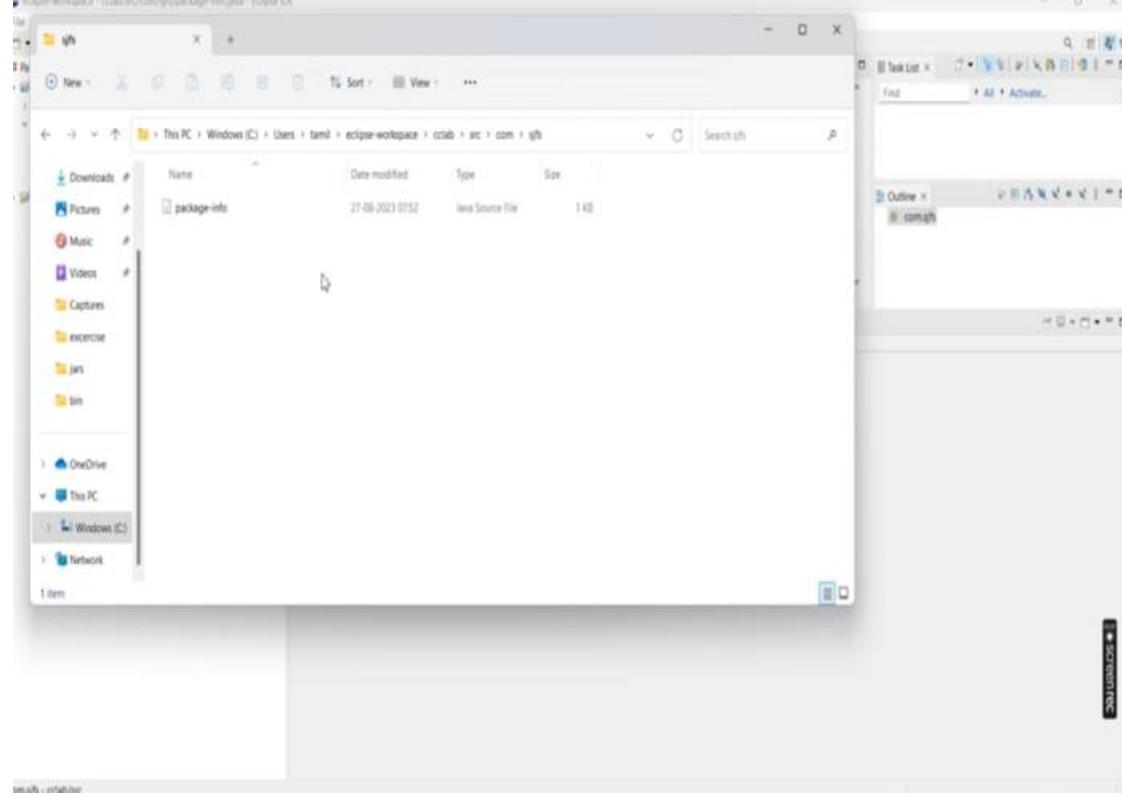
Step 19: Do right click the com.sjf's there click "show in" within that click system explorer.



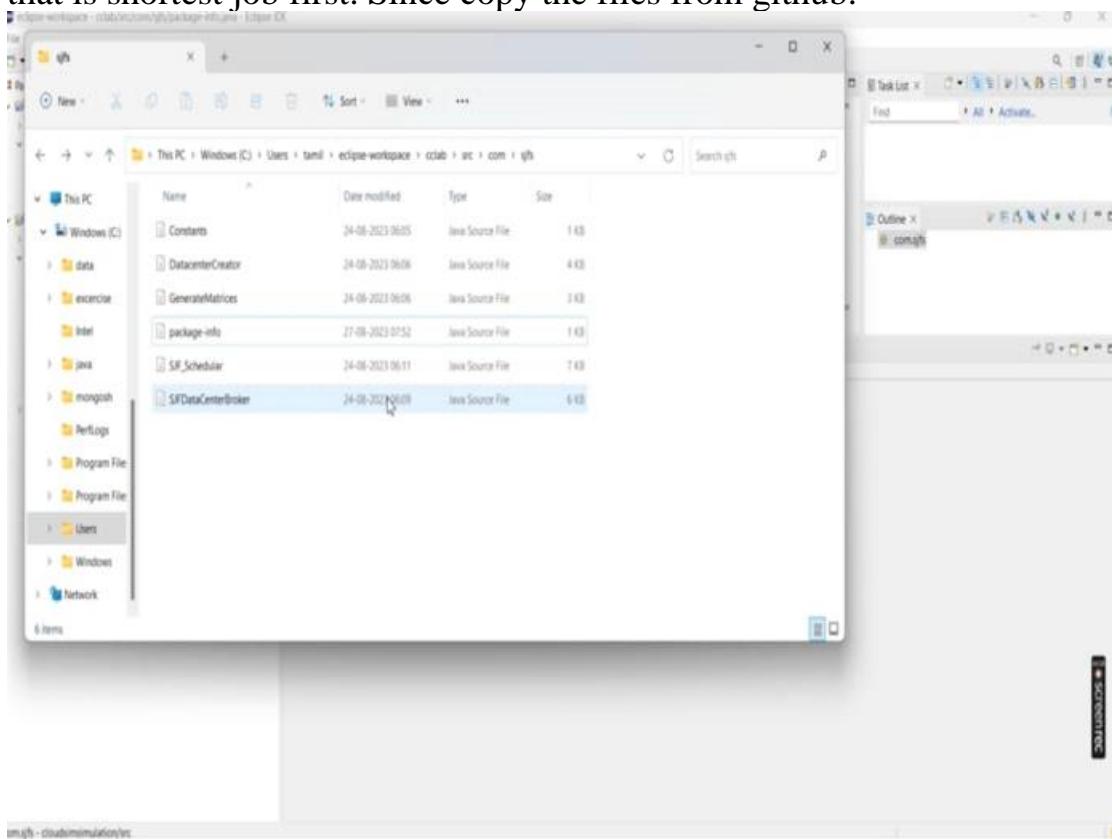
Step 20: here the file path where the file is created will be displayed .



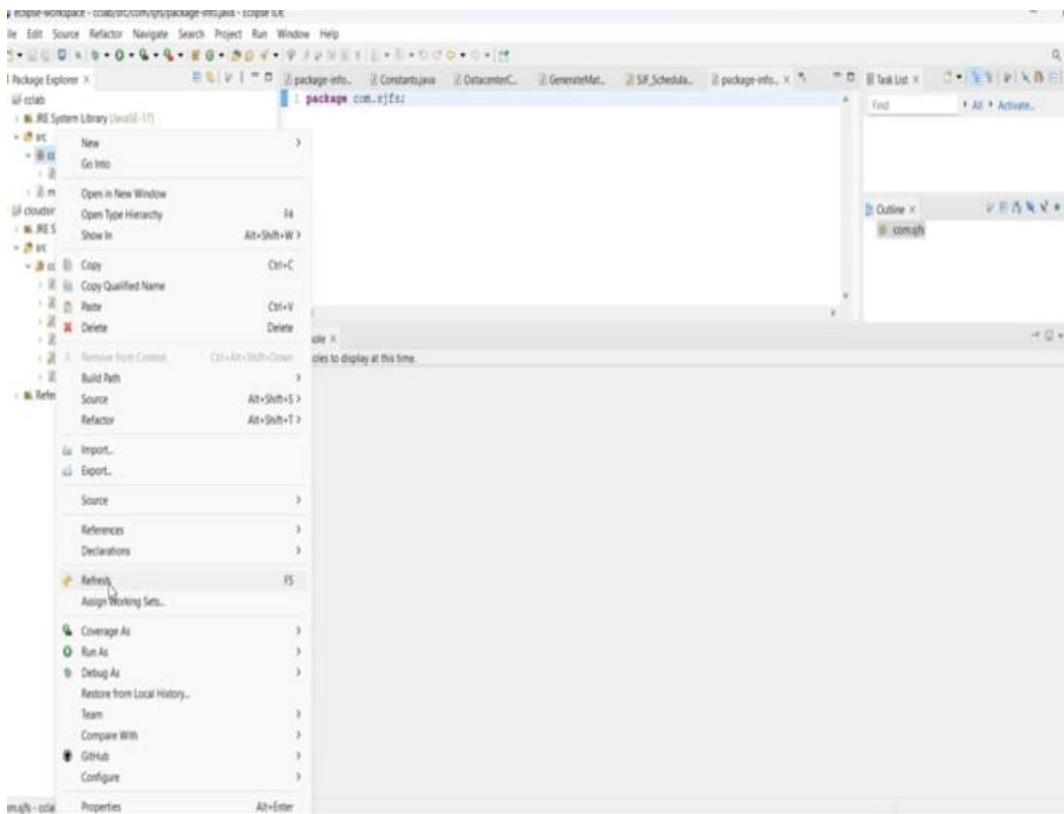
Step 21: Then click the src , within that package.sjfs will be shown.



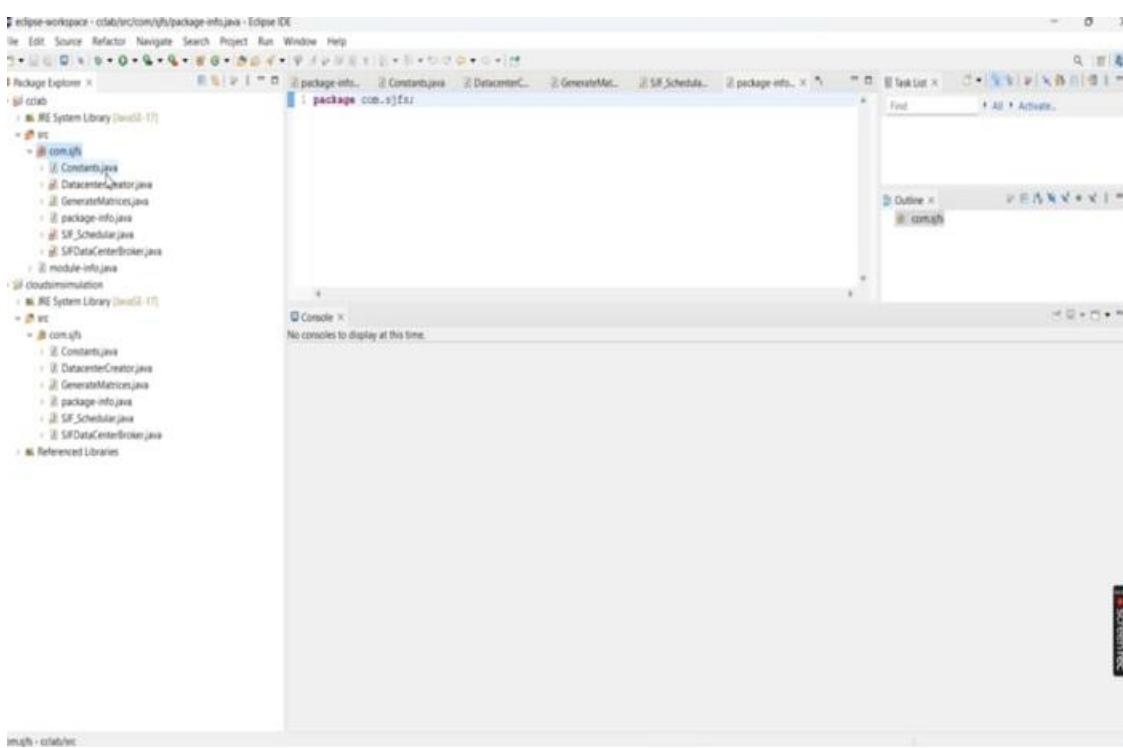
Step 22: There add 4 more files that links the cloud sim concept and the java program for sjfs that is shortest job first. Since copy the files from github.



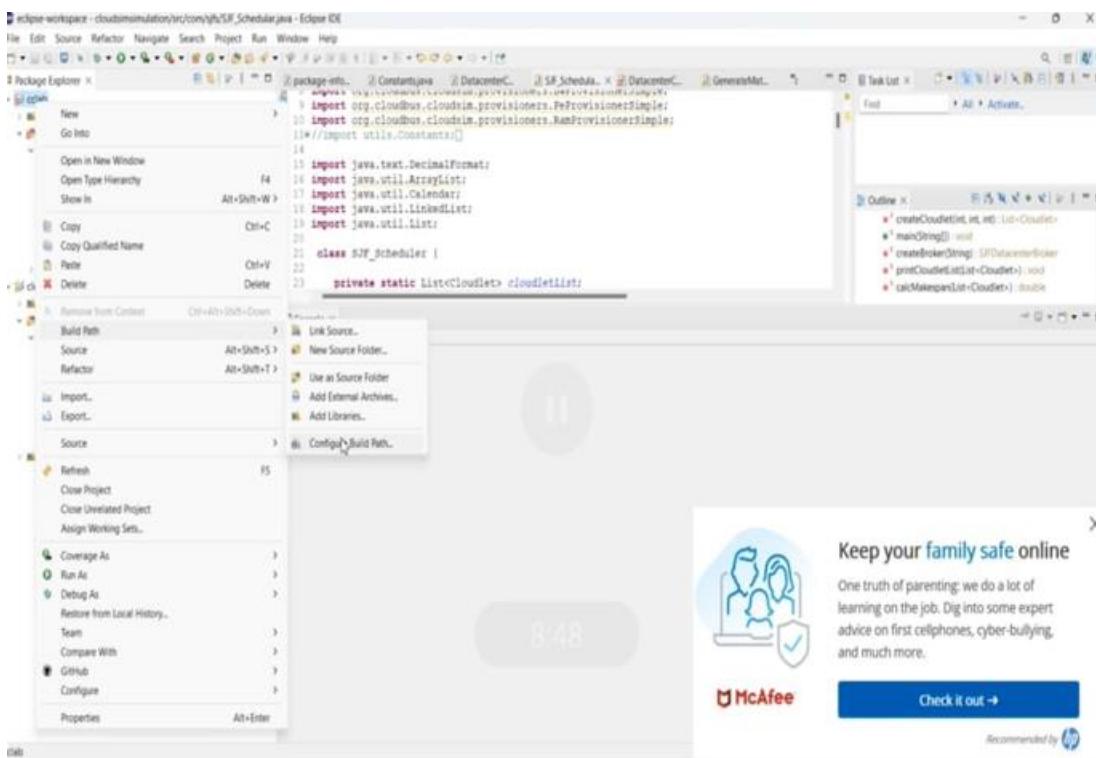
Step 23: do refresh the page and will be able to see the files we are added.



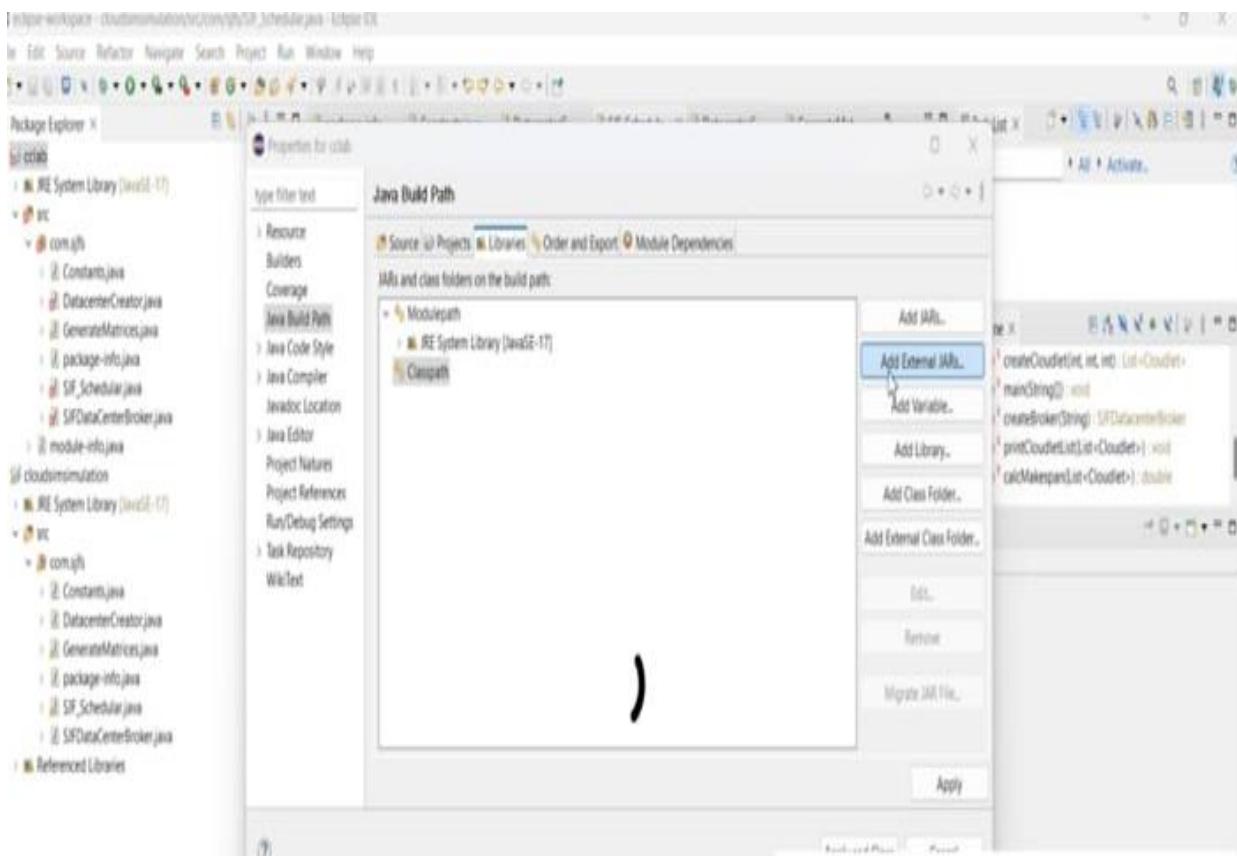
Step 24: The files that are added will be shown . Do some changes in the files only in the first line as the package name to be com.sjfs



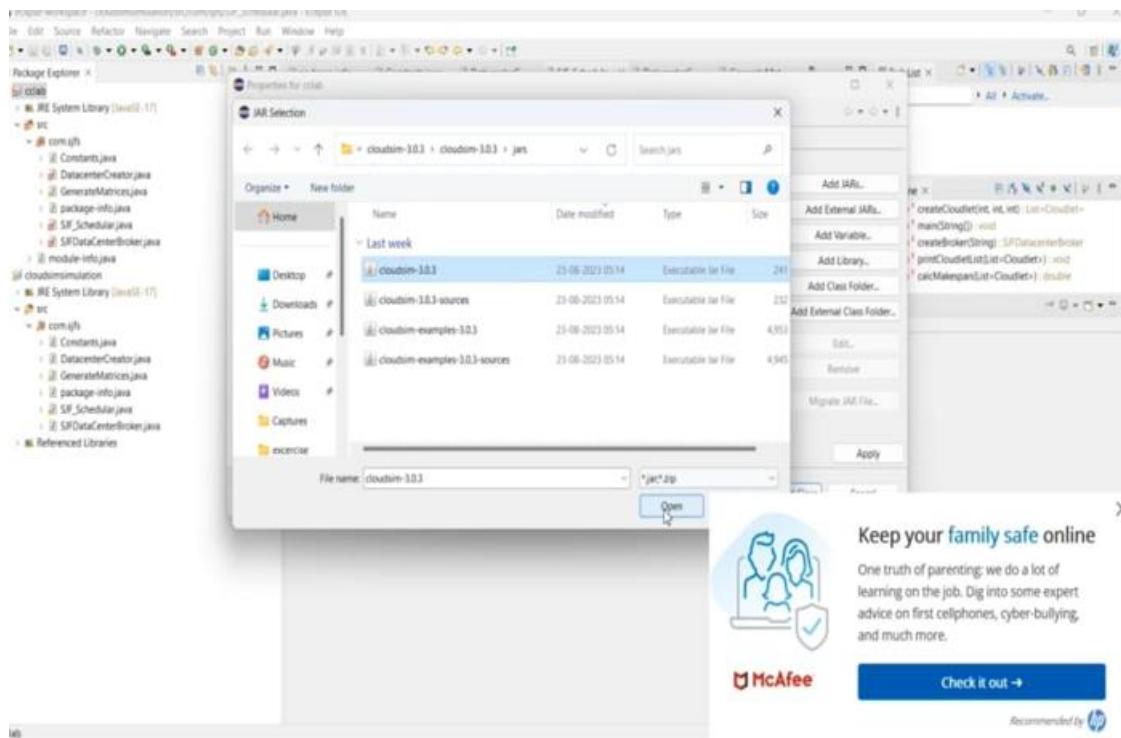
Step 25: Again click the src within that click build path then click the configured path.



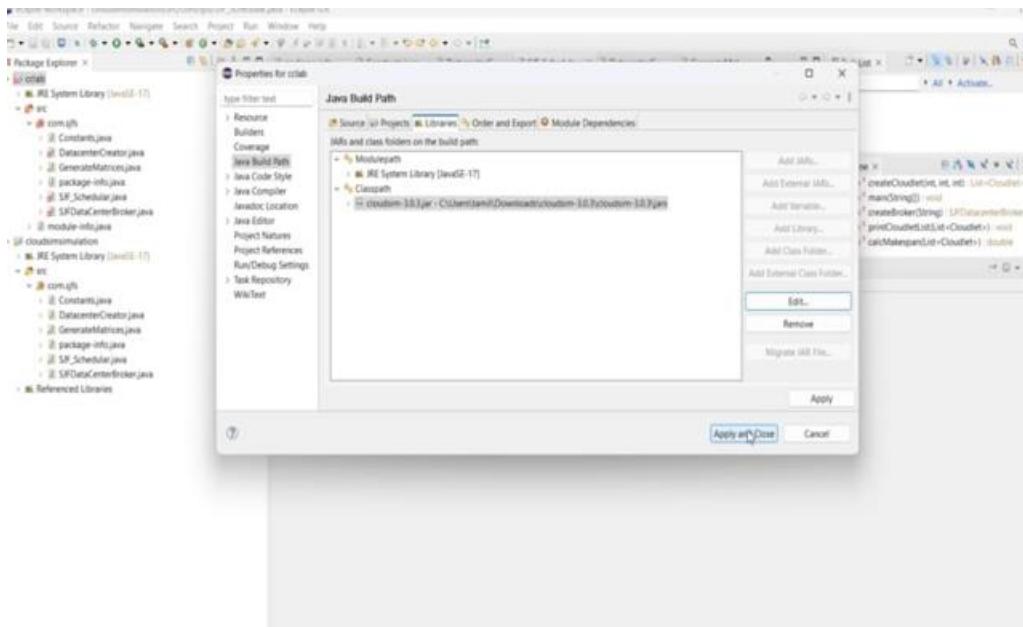
Step 26: here click the java build path within that ,click the add extract files.



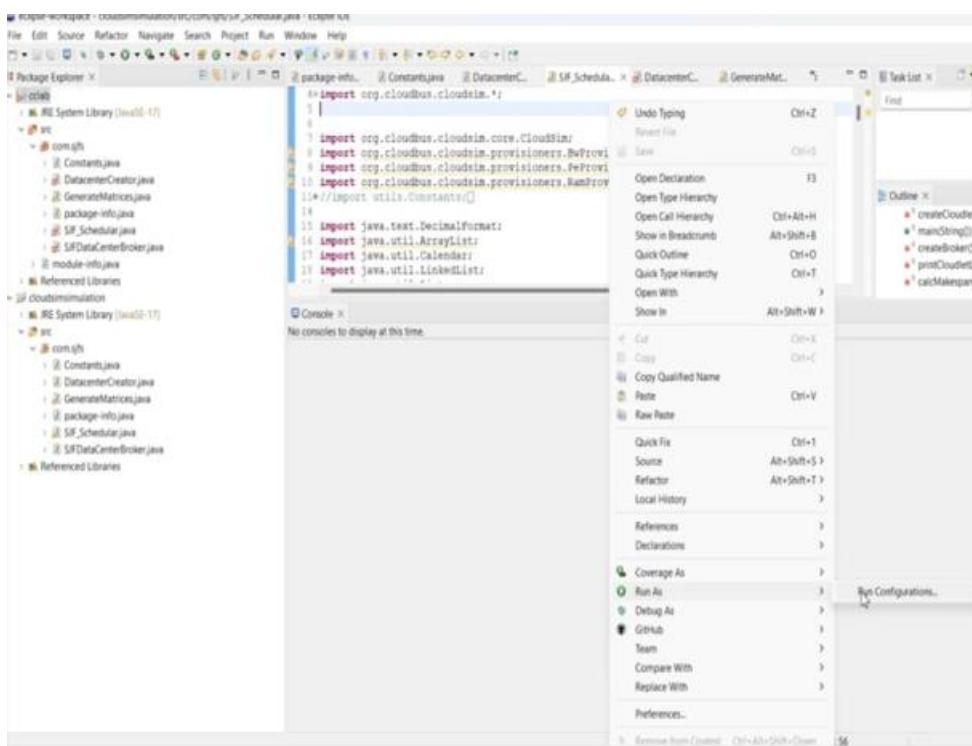
Step 27: within that choose the cloudsim file.



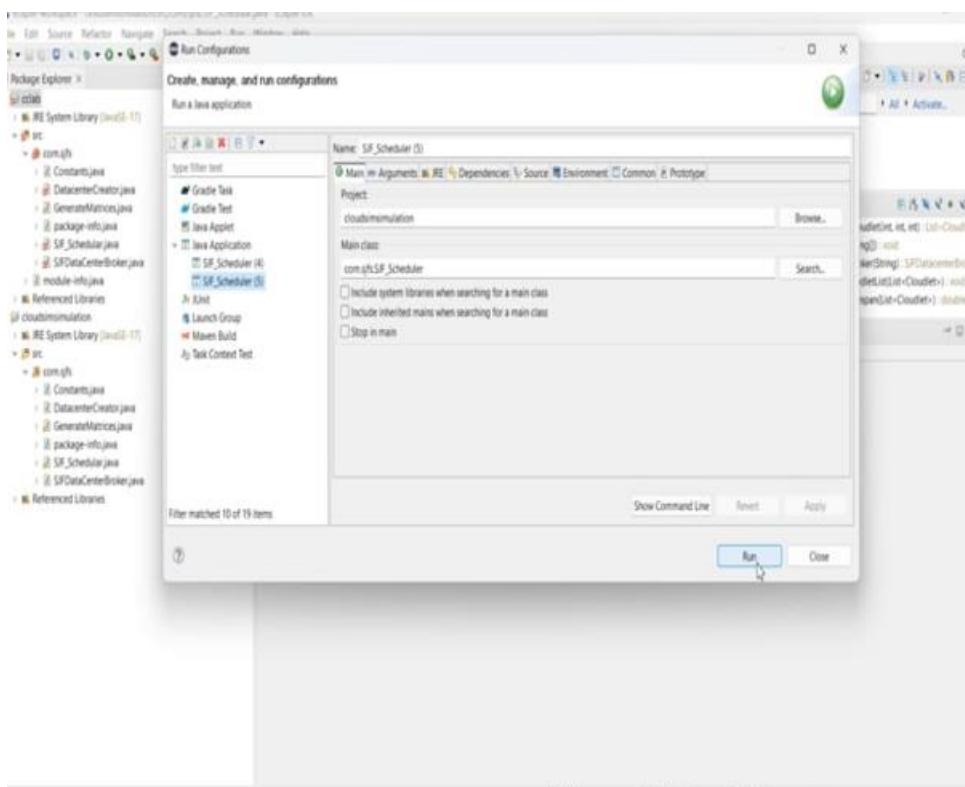
Step 28: then click the apply and close close button.



Step 29: Now keep the SJF_Schedular.java file. Do right click then click “run as” and run configure”



Step 30:click the run button.



Step 31: The output will be displayed as follows.

```
import org.cloudsim.sfs.SFScheduler;
import org.cloudsim.core.Cloudlet;
import org.cloudsim.provisioners.BProvisionerSimple;
import org.cloudsim.provisioners.WProvisionerSimple;
import org.cloudsim.provisioners.RamProvisionerSimple;
import util.Constants;
import java.text.DecimalFormat;
import java.util.ArrayList;
import java.util.Calendar;
import java.util.LinkedList;
```

Online

- * createCloudlet(int id, int len, String name)
- * createBrokerString (IDatacenter)
- * printCloudletList(Cloudlet[] list)
- * calcMigratableCloudlets()

Console

```
24 SUCCESS 02 02 2120.1 2421.21 5:1.56
04 SUCCESS 04 04 2421.21 4642.12 4545.93
12 SUCCESS 03 03 2420.06 3433.25 4199.32
20 SUCCESS 06 06 2403.31 3750.47 4253.76
08 SUCCESS 05 05 2401.27 3046.14 4327.41
27 SUCCESS 02 02 083.95 5345.44 6524.41
24 SUCCESS 06 06 2216.79 4253.78 7470.54
13 SUCCESS 03 03 2135.52 6199.32 8324.84
19 SUCCESS 05 05 2279.58 4327.41 5604.99
14 SUCCESS 04 04 2371.11 7475.56 11341.47
07 SUCCESS 04 04 2230.18 3953.42 12169.4
21 SUCCESS 05 05 2421.26 9604.99 12217.36
22 SUCCESS 05 05 2377.86 22217.34 13295.23
15 SUCCESS 04 04 2221.12 32165.4 14294.72
17 SUCCESS 04 04 497.2 14294.72 24713.93
20 SUCCESS 04 04 3809.44 11341.47 15150.11
25 SUCCESS 05 05 2167.35 13295.21 15462.76
29 SUCCESS 05 05 1202.56 15462.76 16745.3
10 SUCCESS 04 04 2124.31 14713.93 14913.54
23 SUCCESS 04 04 274.44 16913.94 17293.46
26 SUCCESS 06 06 3961.82 13150.11 19112.02
28 SUCCESS 04 04 1391.48 17293.46 19105.16
```

Migrating using RPF: T1H,4K21G23H44L1
com.sfs.SFScheduler finished!

5:1.56

Result:

Thus the cloudsim is simulated using Eclipse Environment successfully

EX NO:6	Find a procedure to transfer the files from one virtual machine to another virtual machine
DATE:	

Aim:

To procedure File Transfer in Client & Server using virtual machine

Steps:

Steps to perform File Transfer in Client & Server using virtual machine.

Step 1: Open a virtual machine to do file transfer.

Step 2: Write the java program for FTP Client and
FTP Server. Step 3: Run the program.

Source Code:

FTPClient.java

```

import
java.io.*;
import
java.net.*;
import
java.util.*;
public class FTPClient{
    public static void main(String args[])throws
        IOException

    { try {
        int number;
        Socket s=new
        Socket("127.0.0.1",10087); Scanner
        sc=new Scanner(System.in);
        System.out.println("Enter the file
        name:");String fn=sc.next();
        DataOutputStream dos=new
        DataOutputStream(s.getOutputStream());dos.writeUTF(fn);
        DataInputStream dis=new
        DataInputStream(s.getInputStream());String
        input=(String)dis.readUTF();
        FileInputStream fis=new
        FileInputStream(input);
        System.out.println("The file "+fn+" consists
        of numbers");int i=0;
        while((i=fis.read())!=-1){
    }
}

```

```
        System.out.println((char)i);
    }
    s.close();
}
catch(Exception e){
    System.out.println("Port not available "+e);
}
}
```

FTPServer.java

```
import  
java.io.*;  
import  
java.net.*;  
import  
java.util.*;  
public class FTPServer{  
    public static void main(String args[])throws  
        IOException{ try{  
            int num;  
            Scanner sc=new Scanner(System.in);  
            ServerSocket ss=new  
                ServerSocket(10087);Socket  
                s=ss.accept();  
                System.out.println("Waiting      ");  
                DataInputStream dis=new  
                    DataInputStream(s.getInputStream());String  
                    input=(String)dis.readUTF();  
                DataOutputStream dos=new  
                    DataOutputStream(s.getOutputStream());FileInputStream  
                    fis = new FileInputStream("out.txt"); FileOutputStream fos  
                    = new FileOutputStream(input); while((num=fis.read())!= -  
                    1) {  
                        if(num%2==0) {  
                            fos.write(num);  
                        }  
                    }  
                    dos.writeUTF(input);  
                    System.out.println("File is sent to  
client");ss.close();  
s.close();
```

```
        }
    catch(Exception e) {
        System.out.println("Port not available"+e);
    }
}
```

Out.txt

```
1
2
3
4
5
6
7
8
9
```

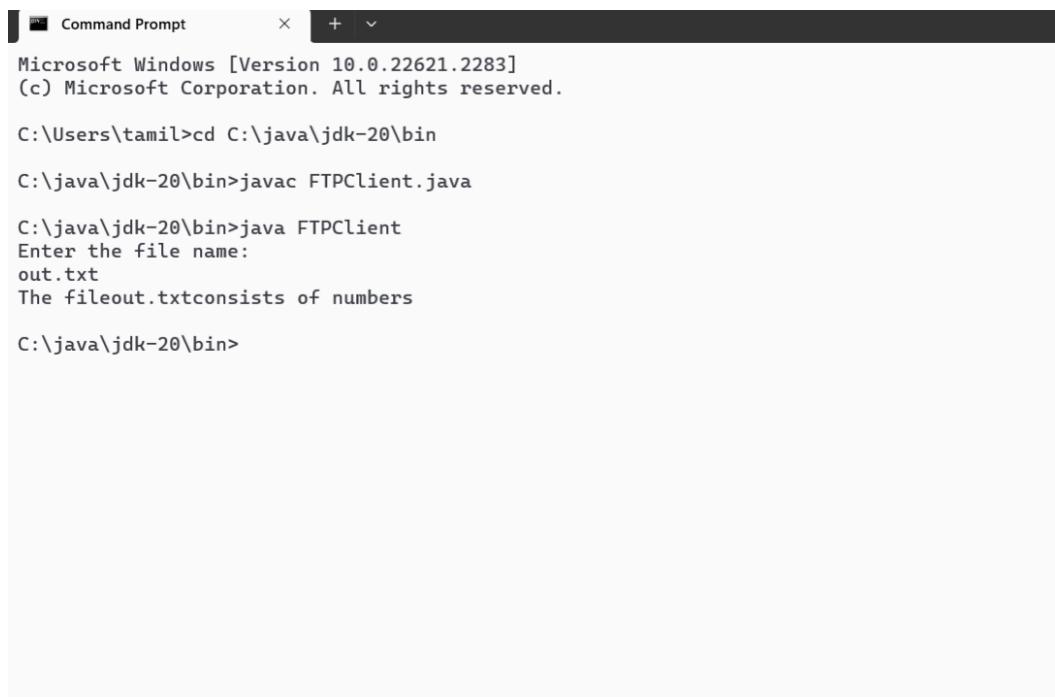
Output:



```
Command Prompt - cmd
Microsoft Windows [Version 10.0.22621.2283]
(c) Microsoft Corporation. All rights reserved.

C:\Users\tamil>cmd
Microsoft Windows [Version 10.0.22621.2283]
(c) Microsoft Corporation. All rights reserved.

C:\Users\tamil>cd C:\java\jdk-20\bin
C:\java\jdk-20\bin>javac FTPServer.java
C:\java\jdk-20\bin>java FTPServer
Waiting
File is sent to client
C:\java\jdk-20\bin>
```



```
Command Prompt
Microsoft Windows [Version 10.0.22621.2283]
(c) Microsoft Corporation. All rights reserved.

C:\Users\tamil>cd C:\java\jdk-20\bin
C:\java\jdk-20\bin>javac FTPClient.java
C:\java\jdk-20\bin>java FTPClient
Enter the file name:
out.txt
The file out.txt consists of numbers
C:\java\jdk-20\bin>
```

Result:

Thus the program was successfully verified.

EX NO:7

DATE:

Install Hadoop single node cluster and run simple applications like wordcount.

AIM:

Install Hadoop single node cluster and run simple applications like wordcount.

Java Installation and Configuration

Java Download

As stated in Hadoop Java Versions:

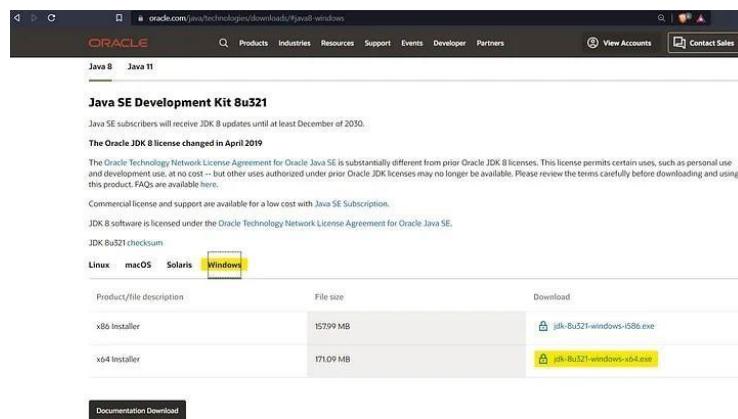
Apache Hadoop 3.3 and upper supports Java 8 and Java 11 (runtime only), but Hadoop compilation with Java 8 is mandatory.

Apache Hadoop from 3.0.x to 3.2.x now supports only Java 8. Apache Hadoop from 2.7.x to 2.10.x support both Java 7 and 8.

In this guide, I will explain how to install Hadoop 3.2.2, so you need Java 8.

First of all, you need an Oracle account. If you don't have one create it here. The procedure is very straightforward, you just need to complete a form and verify your email.

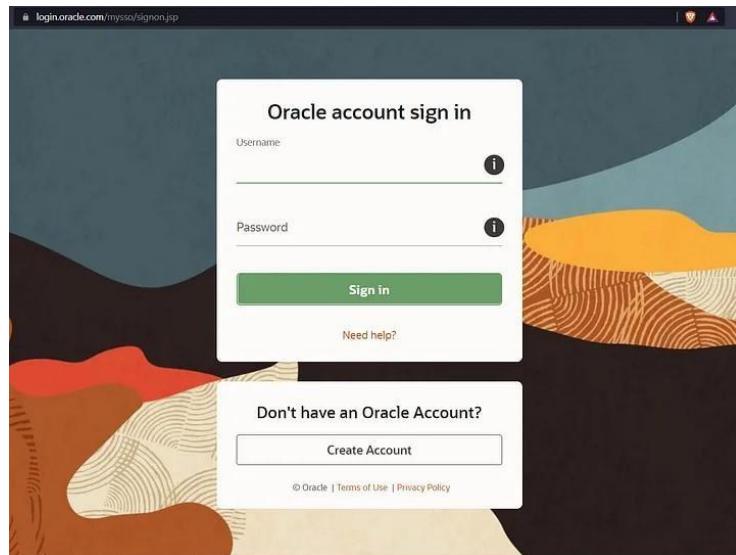
After your Oracle account is created, you need to go to Windows Java 8 SE Development Kit official download site and download the x64 Installer:



Then, you will be asked to accept (clicking on the checkbox) the Oracle Technology Network License Agreement for Oracle Java SE. Once the checkbox is marked, click the button to download the installer:

The screenshot shows the Oracle Java SE Development Kit 8u321 download page. At the top, there are links for Java 8 and Java 11. Below that, a section titled "Java SE Development Kit 8u321" is shown. It includes a note about receiving JDK 8 updates until December 2030. A message states that the Oracle JDK 8 license changed in April 2019. There is a checkbox for accepting the Oracle Technology Network License Agreement, which is required to download the software. Below the checkbox, it says "You will be redirected to the login screen in order to download the file." Two download links are provided: "Download jdk-8u321-windows-x64.exe" and "Download jdk-8u321-windows-i586.exe".

After that, you will be asked to sign in with your Oracle account and then the installer download will start immediately:



Java Installation

Then, you must proceed with the Java installation. Just open the folder where installer is in and run it:

Next, the installation wizard will be shown, click on Next in the following two views:

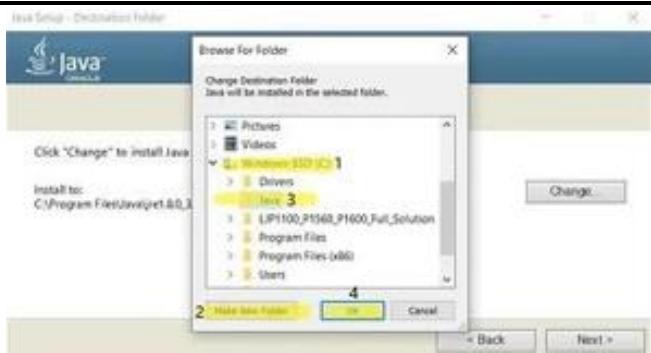


The third view is to select the destination folder where SDK files will be stored. Here, you need to create the folder “Java” in the root path of your storage drive

1.- Select Change:



2.- In the Browse for Folder window, select your storage drive (In my case, the C: drive), click on Make New Folder button and assign the name “Java” to the new directory, then click OK:



After that, you need to check if the destination folder has been updated. Once you have verified it, click on Next > and wait the installation to finish:



When this view displays, the installation has been finished and you can close the wizard:



After this, you will see that there are two folders named "Java" the one you've just created and the other one will be inside the "Program Files" folder in your storage drive, the latter was created by the Java Installation Wizard:

You need to move the content of the folder created by the wizard (C:\Program Files\Java) to the Java folder you have created (C:\Java) to

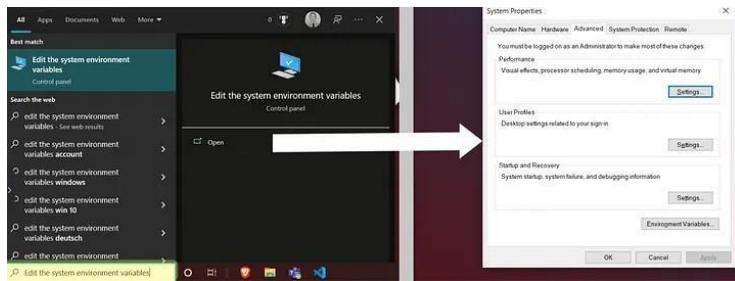
avoid problems latter when you configure the environment variables:

After that, C:\Program Files\Java folder will be empty:

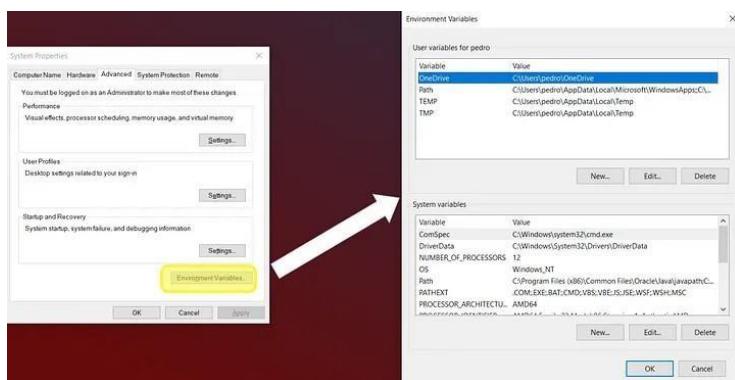
Then, you need to remove C:\Program Files\Java . As you can see, this folder no longer exists:

Java Environment Variable Configuration

Now, you need to create an environment variable for Java. To do so, type “Edit the system environment variables” in the Windows search bar and select that option:

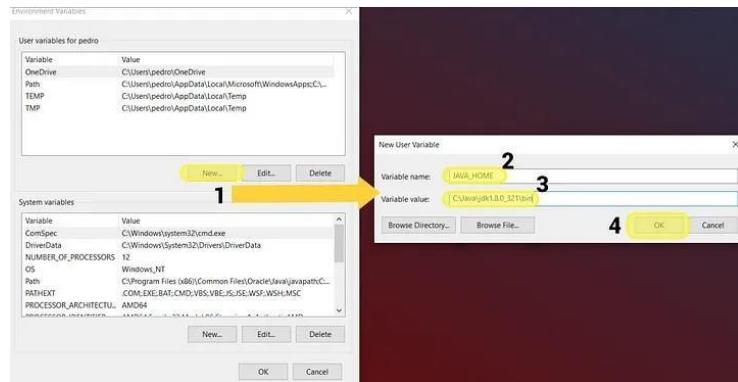


In the “System properties” view click on Environment Variables to open that window:

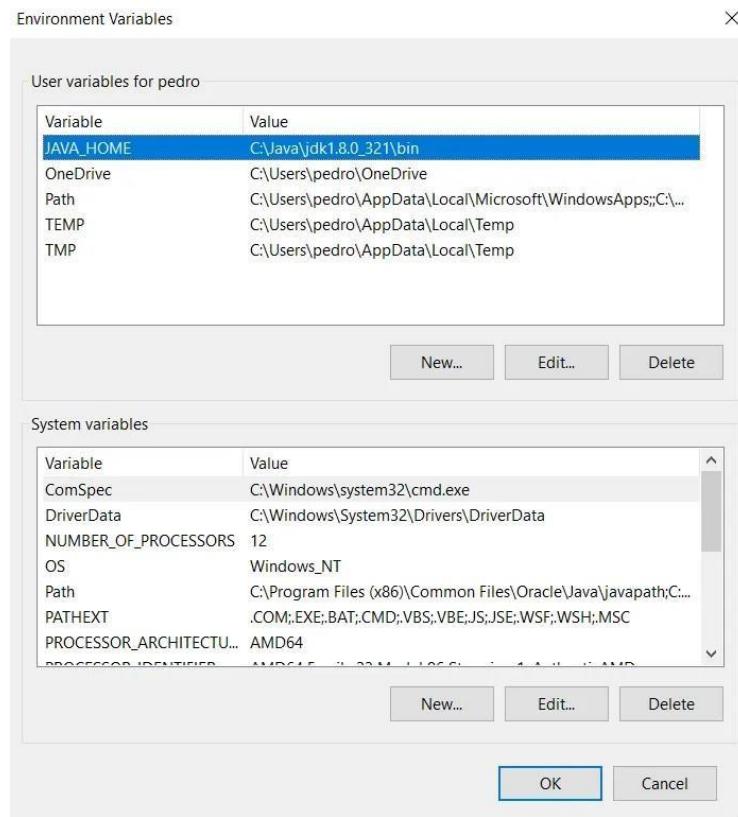


Now, in the “Environment Variables” window click on the New... button of the “User variables for <username>” panel. After that, “New User Variable” window will appear; there, you have to create the JAVA_HOME variable. In the Variable value field you need to write the path of the bin directory which is inside of the jdk folder.

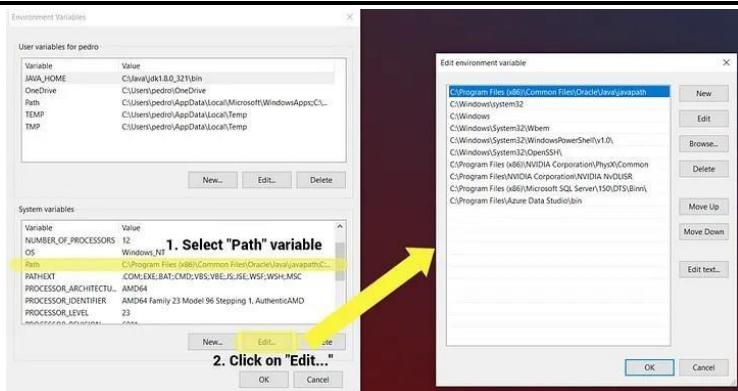
Recall that jdk folder is located inside of the Java folder you previously created in the root of your storage drive. In my case I had to write C:\Java\jdk1.8.0_321\bin :



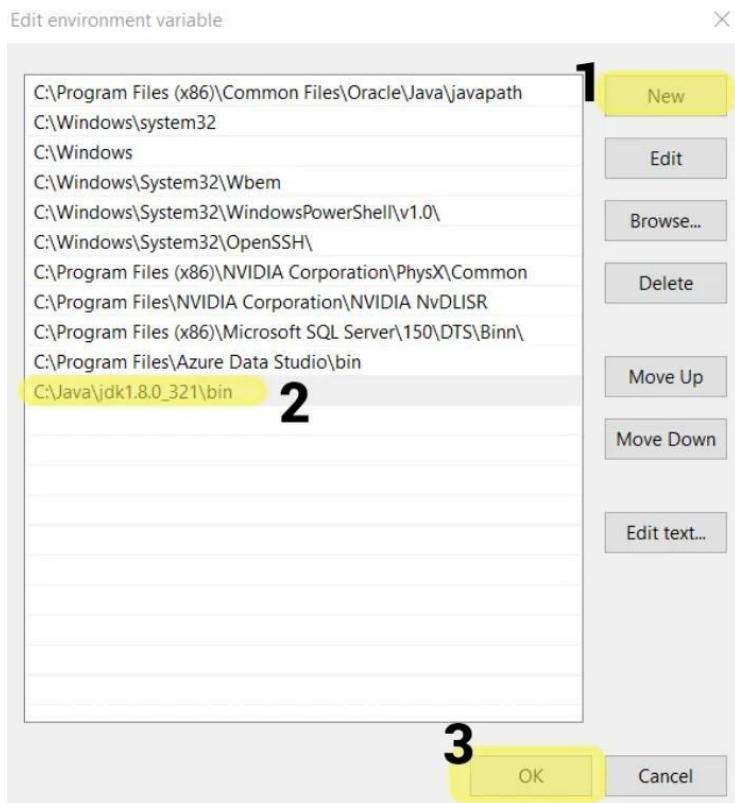
When you click on OK, the previous window will close and you can see the new variable at the top of the User variables for <username> list:



Now, in the System variables panel, find the Path variable, select it and click on Edit... to open the Edit environment variable window:



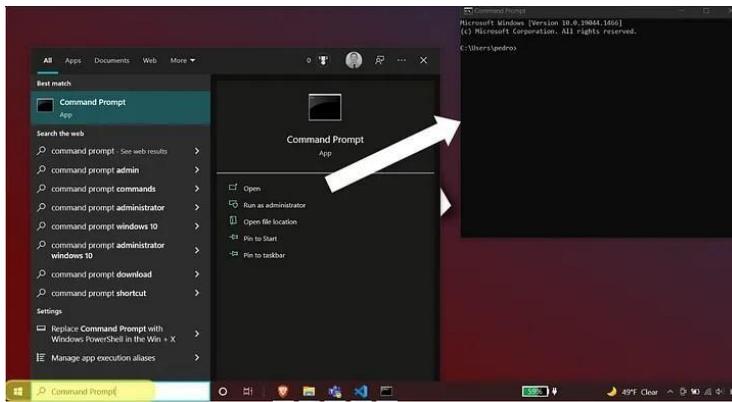
In the Edit environment variable window, click on New and write the path to the jdk folder, the exact same path you've just assigned to the JAVA_HOME user variable. Then, click on OK:



Now, be careful and click on OK in all windows related to the environment variables to save the changes; otherwise, you will need to repeat this process again.

Java Installation Verification

To check if Java was correctly installed, open the Windows Command Prompt. You can do this typing Command Prompt in the Windows search bar:



In the command prompt write javac and hit Enter. If you see this output, then Java is working properly:

Now, you can check the installed Java version typing java -version :

If you have had no problems, congratulations! that means you have installed Java successfully on your computer.

Hadoop File System Configuration

Hadoop Download

Once Java is working properly, you need to download and configure Hadoop File System. To do so, go to [Hadoop official downloads site](#):

 Apache Hadoop [Download](#) [Documentation](#) [Community](#) [Development](#) [Help](#) [Apache Software Foundation](#)

Download

Hadoop is released as source code tarballs with corresponding binary tarballs for convenience. The downloads are distributed via mirror sites and should be checked for tampering using GPG or SHA-512.

Version	Release date	Source download	Binary download	Release notes
3.3.1	2021 Jun 15	source (checksum signature)	binary (checksum signature) binary-aarch64 (checksum signature)	Announcement
3.2.2	2021 Jan 9	source (checksum signature)	binary (checksum signature)	Announcement
2.10.1	2020 Sep 21	source (checksum signature)	binary (checksum signature)	Announcement

To verify Hadoop releases using GPG:

1. Download the release hadoop-X.Y.Z-src.tar.gz from a mirror site.
2. Download the signature file hadoop-X.Y.Z-src.tar.gz.asc from Apache.
3. Download the Hadoop KEYS file.
4. gpg --import KEYS
5. gpg --verify hadoop-X.Y.Z-src.tar.gz.asc

To perform a quick check using SHA-512:

1. Download the release hadoop-X.Y.Z-src.tar.gz from a mirror site.
2. Download the checksum hadoop-X.Y.Z-src.tar.gz.sha512 or hadoop-X.Y.Z-src.tar.gz.md5 from Apache.
3. sha512 -a 512 hadoop-X.Y.Z-src.tar.gz

All previous releases of Hadoop are available from the [Apache release archive](#).

Many third parties distribute products that include Apache Hadoop and related tools. Some of these are listed on the [Distributions](#) wiki page.

License

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Copyright © 2006-2021 The Apache Software Foundation



Once there, you need to download the latest stable version, how do we know which is this? For example, in the previous image latest version is 3.3.1, but

latest stable version is the immediate previous version, which is the 3.2.2, click on binary in the Binary download column:

Version	Release date	Source download	Binary download	Release notes
3.3.1	2021 Jun 15	source (checksum signature)	binary (checksum signature) Be careful and just click on "binary" word	Announcement
3.2.2	2021 Jan 9	source (checksum signature)	binary (checksum signature)	Announcement
2.10.1	2020 Sep 21	source (checksum signature)	binary (checksum signature)	Announcement

You will be redirected to another site from where you can download a .tar.gz file corresponding to the selected Hadoop version. To start the download just click in the first link:

The screenshot shows the Apache Hadoop download page. The 'Binary download' column for version 3.2.2 is highlighted in yellow. The URL for the download is https://d3dn1q3vzqj97g.cloudfront.net/apache/hadoop/common/hadoop-3.2.2/hadoop-3.2.2.tar.gz. Below the URL, there are instructions for verifying the integrity of the file using PGP or GPG signatures.

Hadoop Extraction

Once you have the .tar.gz file locally, extract it directly in the root of your storage drive (the same folder where you

have previously created Java directory) with WinRAR

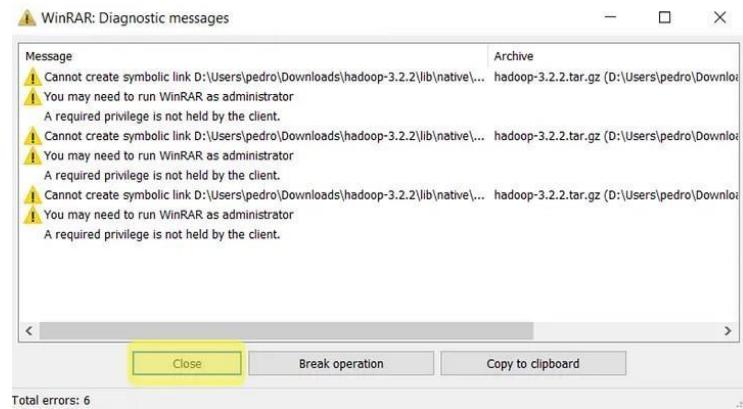
Extract files... option. If you don't do it this way (i.e. extract it on the current folder and after that move the result manually) you may encounter with

Destination Path Too Long error as I did:



Just before extraction finishes, some error messages may be shown. If this occurs,

don't worry, just ignore them clicking on Close:



Now, you have Java and Hadoop folders in the same location:

Hadoop Configuration

Now, you need to configure some Hadoop files. If you have downloaded the same Hadoop version as me, then you need to go to etc\hadoop folder within the previously extracted Hadoop directory (in my case, the complete path is C:\hadoop-3.2.2\etc\hadoop). Once there, open the following five files with your preferred text editor:

core-site.xml hadoop-

env.cmd hdfs-site.xml

mapred-site.xml yarn-

site.xml

In the core-site.xml you need to set the default Hadoop File System location. Paste this chunk of code inside <configuration> tag:

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

In the hadoop-env.cmd file you need to provide the path to Java. This path was previously used when you set the JAVA_HOME environment variable. In my case, I set the JAVA_HOME value to : C:\Java\jdk1.8.0_321\bin ; but now, \bin folder must be

removed from the path, i.e. I had to use C:\Java\jdk1.8.0_321 path. You need to assign this path as JAVA_HOME value around line 25:

Before you edit hdfs-site.xml file, you need to create some new folders. Go to Hadoop main directory in the root of your storage drive and create data folder inside of it:

Now, create the datanode and namenode folders inside the new data directory:

As you can see, datanode folder has the path C:\hadoop-3.2.2\data\datanode and namenode directory path is C:\hadoop-3.2.2\data\namenode

Once this is done, you need to provide this folders paths as properties in the hdfs-site.xml file. You can copy the following chunk directly into <configuration> tag, just be careful to adjust the datanode and namenode paths according to your machine locations:

```

<property>
  <name>dfs.replication</name>
  <value>1</value>
</property>

<property>
  <name>dfs.namenode.name.dir</name>
  <value>C:\hadoop-3.2.2\data\namenode</value>
</property>

<property>
  <name>dfs.datanode.data.dir</name>
  <value>C:\hadoop-3.2.2\data\datanode</value>
</property>

```

```

<property>
  <name>dfs.replication</name>
  <value>1</value>
</property>

<property>
  <name>dfs.namenode.name.dir</name>
  <value>C:\hadoop-3.2.2\data\namenode</value>
</property>

<property>
  <name>dfs.datanode.data.dir</name>
  <value>C:\hadoop-3.2.2\data\datanode</value>
</property>

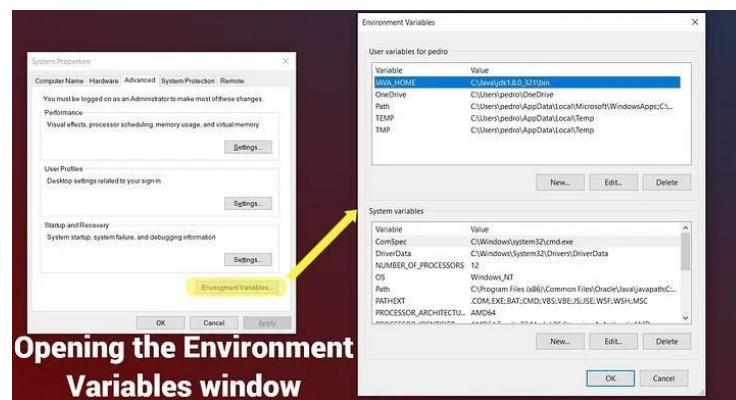
```

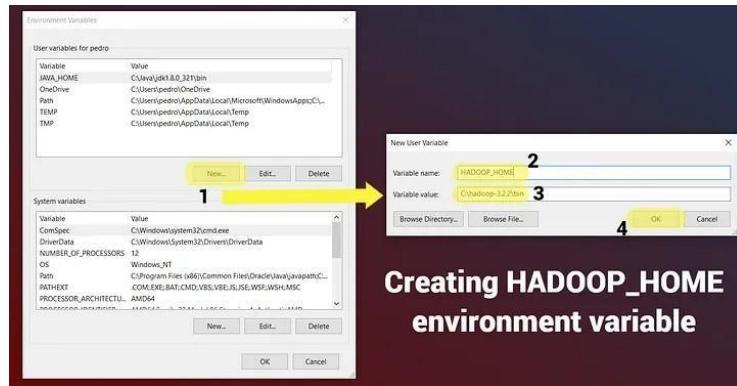
In the mapred-site.xml file you need to set yarn as the MapReduce framework.
Copy the following code inside <configuration> tag:

```

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

```





Creating HADOOP_HOME environment variable

Now, you need to edit the Path system variable to add paths to bin and sbin folders of Hadoop. Both folders are in the root directory of Hadoop.

So, bin path is the same you've just assigned to HADOOP_HOME variable (C:\hadoop-3.2.2\bin); sbin path, in my case will be C:\hadoop-3.2.2\sbin :

Once done, be careful and click on OK in all windows related to the environment variables to save the changes; otherwise, you will need to repeat this process again.

Fix of Hadoop ‘bin’ Folder

Now, you need to fix some configuration files. To do it, you need to replace the Hadoop bin folder with another bin folder which already contains all the files properly configured. First, download this compressed file ([hadoop3_xFixedbin.rar](#)). Then, you need to delete bin folder:

After that, you must decompress [hadoop3_xFixedbin.rar](#) in order to move the fixed bin folder to the Hadoop root location:

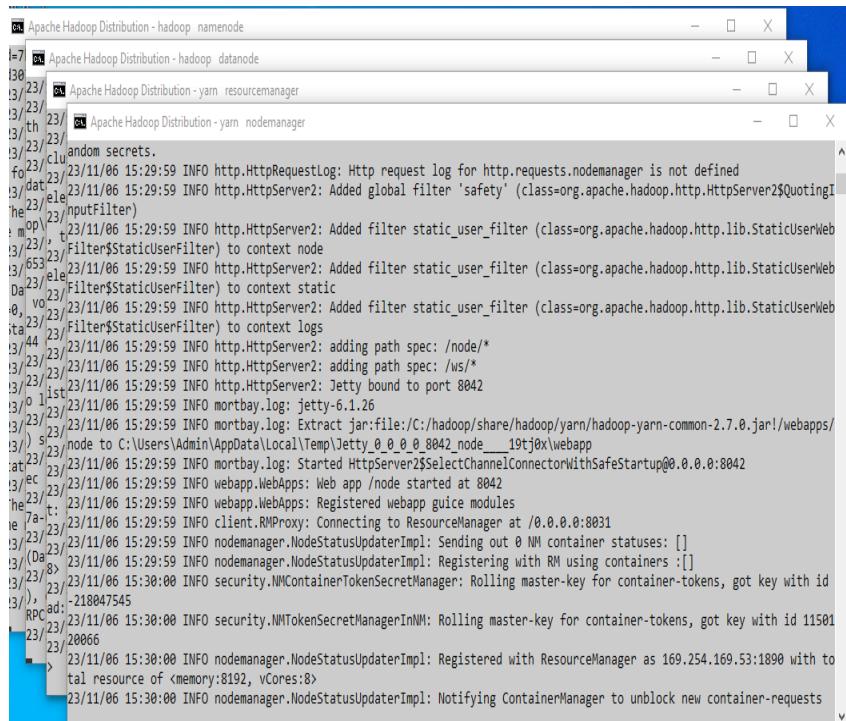
Now, you can check the new and fixed bin folder is in Hadoop root:

You will see that several command prompts will open. If Hadoop is properly configured, then this four command prompts will remain open and running:

- hadoop datanode
 - hadoop namenode
 - yarn resourcemanager
 - yarn nodemanager

Congratulations, Hadoop is running

OPEN COMMAND PROMPT:



The screenshot shows three separate command-line windows side-by-side, all titled "Apache Hadoop Distribution -". The first window contains the command "hadoop datanode". The second window contains "yarn resourcemanager". The third window contains "yarn nodemanager". Each window displays a continuous stream of log messages from the Hadoop system, indicating successful startup and configuration. The logs include entries like "INFO http.HttpRequestLog: Http request log for http.requests.nodemanager is not defined", "INFO http.HttpServer2: Added global filter 'safety' (class=org.apache.hadoop.http.HttpServer2\$QuotingInputFilter)", and "INFO http.HttpServer2: Adding path spec: /node/*". The windows are set against a dark background.

```
Windows Command Prompt
6988 NodeManager

C:\Users\Admin>hadoop fs -mkdir /input1
mkdir: `/input1': File exists

C:\Users\Admin>hadoop fs -ls /
Found 8 items
drwxr-xr-x  - Admin supergroup          0 2023-09-15 12:12 /input
drwxr-xr-x  - Admin supergroup          0 2023-09-15 12:44 /input1
drwxr-xr-x  - Admin supergroup          0 2023-11-02 12:07 /input2
drwxr-xr-x  - Admin supergroup          0 2023-10-26 12:37 /ipdir
drwxr-xr-x  - Admin supergroup          0 2023-09-15 12:17 /out
drwxr-xr-x  - Admin supergroup          0 2023-10-05 15:02 /outte
drwxrwx-wx  - Admin supergroup          0 2023-10-05 12:54 /tmp
drwxr-xr-x  - Admin supergroup          0 2023-10-05 12:55 /user

C:\Users\Admin>hadoop fs -mkdir /sbcec
C:\Users\Admin>hadoop fs -put C:/data.txt /sbcec
put: `.': No such file or directory

C:\Users\Admin>hadoop fs -put C:\data.txt /sbcec
C:\Users\Admin>hadoop fs -ls /sbcec
Found 1 items
-rw-r--r--  1 Admin supergroup      61 2023-11-06 15:44 /sbcec/data.txt

C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
cat: `/sbcec': Is a directory
cat: `/data.txt': No such file or directory

C:\Users\Admin>hadoop fs -cat / sbcec /data.txt
cat: `/': Is a directory
cat: `sbcec': No such file or directory
cat: `/data.txt': No such file or directory

C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
-cat/sbcec: Unknown command

C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
hi
hello
world
hi
```

```
Windows Command Prompt
C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
cat: `/sbcec': Is a directory
cat: `/data.txt': No such file or directory

C:\Users\Admin>hadoop fs -cat / sbcec /data.txt
cat: `/': Is a directory
cat: `sbcec': No such file or directory
cat: `/data.txt': No such file or directory

C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
-cat/sbcec: Unknown command

C:\Users\Admin>hadoop fs -cat /sbcec /data.txt
hi
hello
world
hi
hello
kavitha
how
are you
hi
C:\Users\Admin>hadoop jar

C:\Users\Admin>hadoop jar C:/hadoop/share/hadoop/mapreduce/hadoop-mapreduce-examples-2.7.0.jar wordcount /sbcec /output
Unknown program 'wordcount/sbcec/output' chosen.
Valid program names are:
  aggregatewordcount: An Aggregate based map/reduce program that counts the words in the input files.
  aggregatewordhist: An Aggregate based map/reduce program that computes the histogram of the words in the input files.
  bbp: A map/reduce program that uses Bailey-Borwein-Plouffe to compute exact digits of Pi.
  dbcount: An example job that count the pageview counts from a database.
  distbbp: A map/reduce program that uses a BBP-type formula to compute exact bits of Pi.
  grep: A map/reduce program that counts the matches of a regex in the input.
  join: A job that effects a join over sorted, equally partitioned datasets
  multifilewc: A job that counts words from several files.
  pentomino: A map/reduce tile laying program to find solutions to pentomino problems.
  pi: A map/reduce program that estimates Pi using a quasi-Monte Carlo method.
  randomtextwriter: A map/reduce program that writes 10GB of random textual data per node.
  randomwriter: A map/reduce program that writes 10GB of random data per node.
  secondarysort: An example defining a secondary sort to the reduce.
  sort: A map/reduce program that sorts the data written by the random writer.
  sudoku: A sudoku solver.
  teragen: Generate data for the terasort
```

Command Prompt

```
wordmedian: A map/reduce program that counts the median length of the words in the input files.
wordstandarddeviation: A map/reduce program that counts the standard deviation of the length of the words in the input file.

:\Users\Admin>hadoop jar C:\hadoop\share\hadoop\mapreduce\hadoop-mapreduce-examples-2.7.0.jar wordcount /sbcec/output1
usage: wordcount <in> [<in>...] <out>

:\Users\Admin>hadoop jar C:\hadoop\share\hadoop\mapreduce\hadoop-mapreduce-examples-2.7.0.jar wordcount /sbcec/out11
usage: wordcount <in> [<in>...] <out>

:\Users\Admin>hadoop jar C:\hadoop\share\hadoop\mapreduce\hadoop-mapreduce-examples-2.7.0.jar wordcount /sbcec /out11
3/11/06 15:51:37 INFO Configuration.deprecation: session.id is deprecated. Instead, use dfs.metrics.session-id
3/11/06 15:51:37 INFO jvm.JvmMetrics: Initializing JVM Metrics with processName=JobTracker, sessionId=
3/11/06 15:51:37 INFO input.FileInputFormat: Total input paths to process : 1
3/11/06 15:51:37 INFO mapreduce.JobSubmitter: number of splits:1
3/11/06 15:51:38 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local868039374_0001
3/11/06 15:51:38 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
3/11/06 15:51:38 INFO mapreduce.Job: Running job: job_local868039374_0001
3/11/06 15:51:38 INFO mapred.LocalJobRunner: OutputCommitter set in config null
3/11/06 15:51:38 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 1
3/11/06 15:51:38 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
3/11/06 15:51:38 INFO mapred.LocalJobRunner: Waiting for map tasks
3/11/06 15:51:38 INFO mapred.LocalJobRunner: Starting task: attempt_local868039374_0001_m_000000_0
3/11/06 15:51:38 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 1
3/11/06 15:51:38 INFO util.ProcfsBasedProcessTree: ProcfsBasedProcessTree currently is supported only on Linux.
3/11/06 15:51:38 INFO mapred.Task: Using ResourceCalculatorProcessTree : org.apache.hadoop.yarn.util.WindowsBasedProcessTree
3/11/06 15:51:38 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/sbcec/data.txt:0+61
3/11/06 15:51:38 INFO mapred.MapTask: (EQUATOR) 0 kv1 26214396(104857584)
3/11/06 15:51:38 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
3/11/06 15:51:38 INFO mapred.MapTask: soft limit at 83886080
3/11/06 15:51:38 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
3/11/06 15:51:38 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
3/11/06 15:51:38 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer
3/11/06 15:51:38 INFO mapred.LocalJobRunner:
3/11/06 15:51:38 INFO mapred.MapTask: Starting flush of map output
3/11/06 15:51:38 INFO mapred.MapTask: Spilling map output
3/11/06 15:51:38 INFO mapred.MapTask: bufstart = 0; bufend = 87; bufvoid = 104857600
3/11/06 15:51:38 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26214360(104857440); length = 37/6553600
3/11/06 15:51:38 INFO mapred.MapTask: Finished spill 0
3/11/06 15:51:38 INFO mapred.Task: Task:attempt_local868039374_0001_m_000000_0 is done. And is in the process of committing
3/11/06 15:51:38 INFO mapred.LocalJobRunner: map
3/11/06 15:51:38 INFO mapred.Task: Task 'attempt_local868039374_0001_m_000000_0' done.
3/11/06 15:51:38 INFO mapred.LocalJobRunner: Finishing task: attempt_local868039374_0001_m_000000_0
3/11/06 15:51:38 INFO mapred.LocalJobRunner: map task executor complete.
3/11/06 15:51:38 INFO mapred.LocalJobRunner: Waiting for reduce tasks
```

Command Prompt

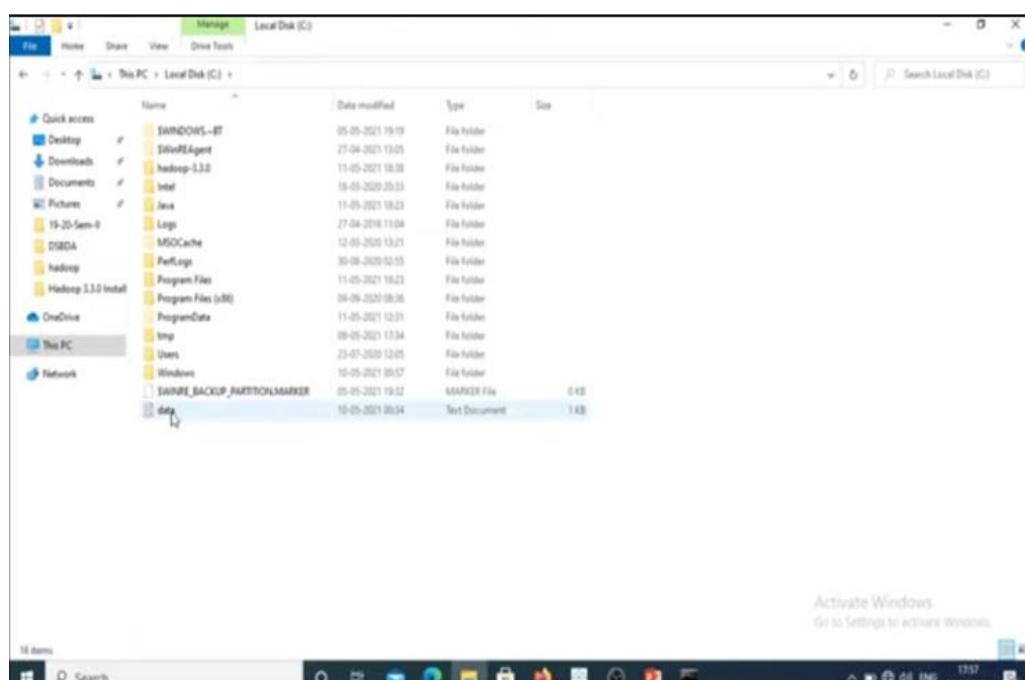
```
23/11/06 15:51:39 INFO mapred.LocalJobRunner: reduce > reduce
23/11/06 15:51:39 INFO mapred.Task: Task 'attempt_local868039374_0001_r_000000_0' done.
23/11/06 15:51:39 INFO mapred.LocalJobRunner: Finishing task: attempt_local868039374_0001_r_000000_0
23/11/06 15:51:39 INFO mapred.LocalJobRunner: reduce task executor complete.
23/11/06 15:51:39 INFO mapreduce.Job: Job job_local868039374_0001 running in uber mode : false
23/11/06 15:51:39 INFO mapreduce.Job: map 100% reduce 100%
23/11/06 15:51:40 INFO mapreduce.Job: Job job_local868039374_0001 completed successfully
23/11/06 15:51:40 INFO mapreduce.Job: Counters: 35
    File System Counters
        FILE: Number of bytes read=547390
        FILE: Number of bytes written=1100105
        FILE: Number of read operations=0
        FILE: Number of large read operations=0
        FILE: Number of write operations=0
        HDFS: Number of bytes read=122
        HDFS: Number of bytes written=49
        HDFS: Number of read operations=13
        HDFS: Number of large read operations=0
        HDFS: Number of write operations=4
    Map-Reduce Framework
        Map input records=9
        Map output records=10
        Map output bytes=87
        Map output materialized bytes=83
        Input split bytes=101
        Combine input records=10
        Combine output records=7
        Reduce input groups=7
        Reduce shuffle bytes=83
        Reduce input records=7
        Reduce output records=7
        Spilled Records=14
        Shuffled Maps =1
        Failed Shuffles=0
        Merged Map outputs=1
        GC time elapsed (ms)=4
        Total committed heap usage (bytes)=494927872
    Shuffle Errors
        BAD_ID=0
        CONNECTION=0
        IO_ERROR=0
        WRONG_LENGTH=0
        WRONG_MAP=0
        WRONG_REDUCE=0
```

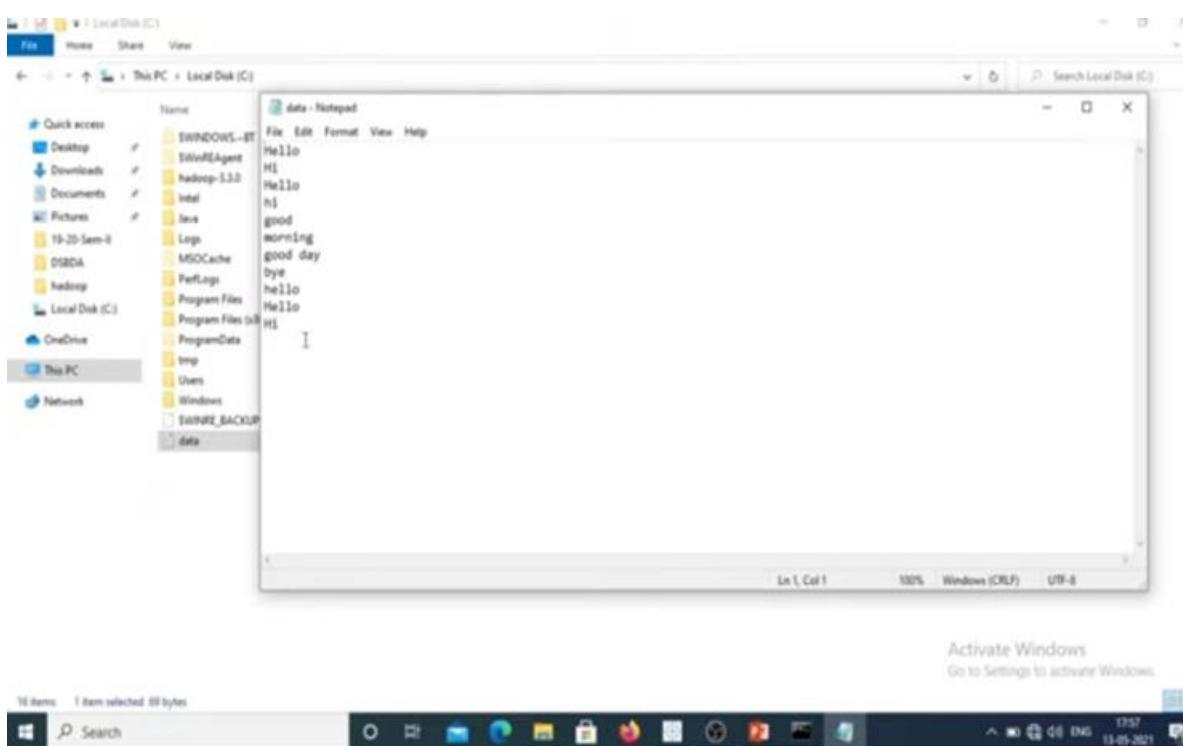
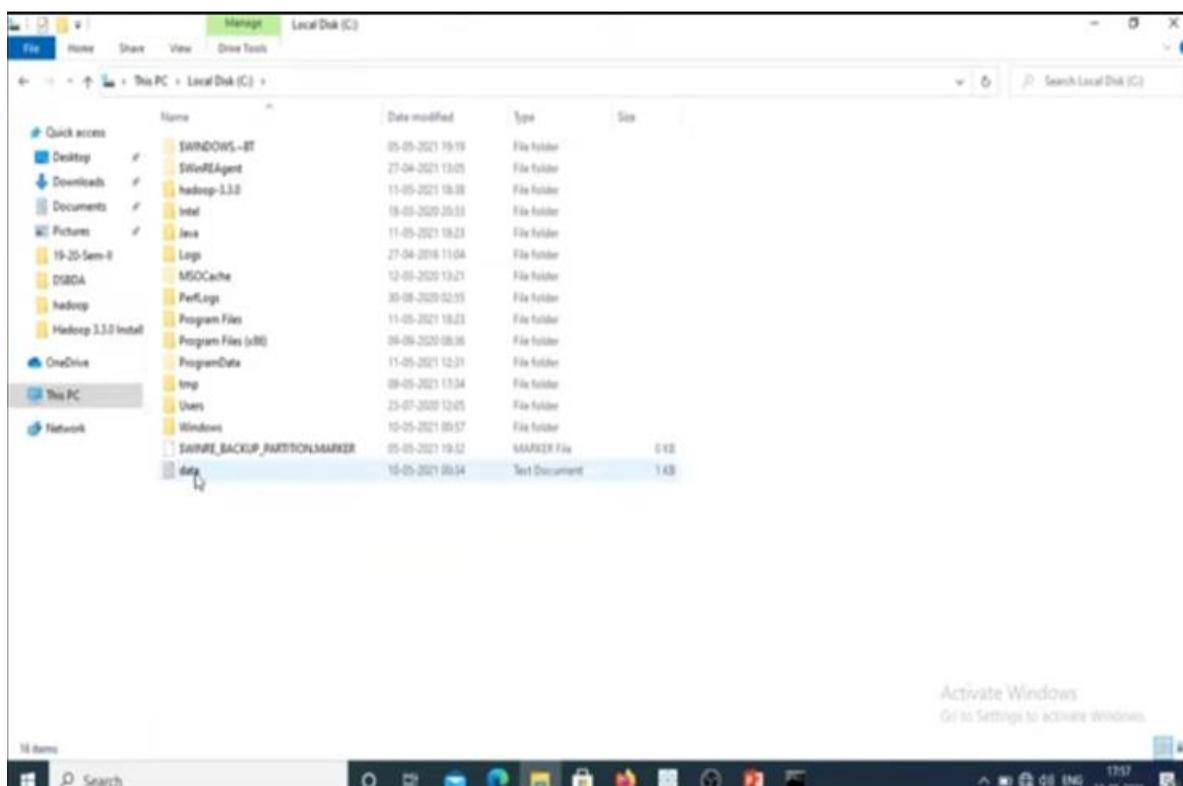
cmd Command Prompt

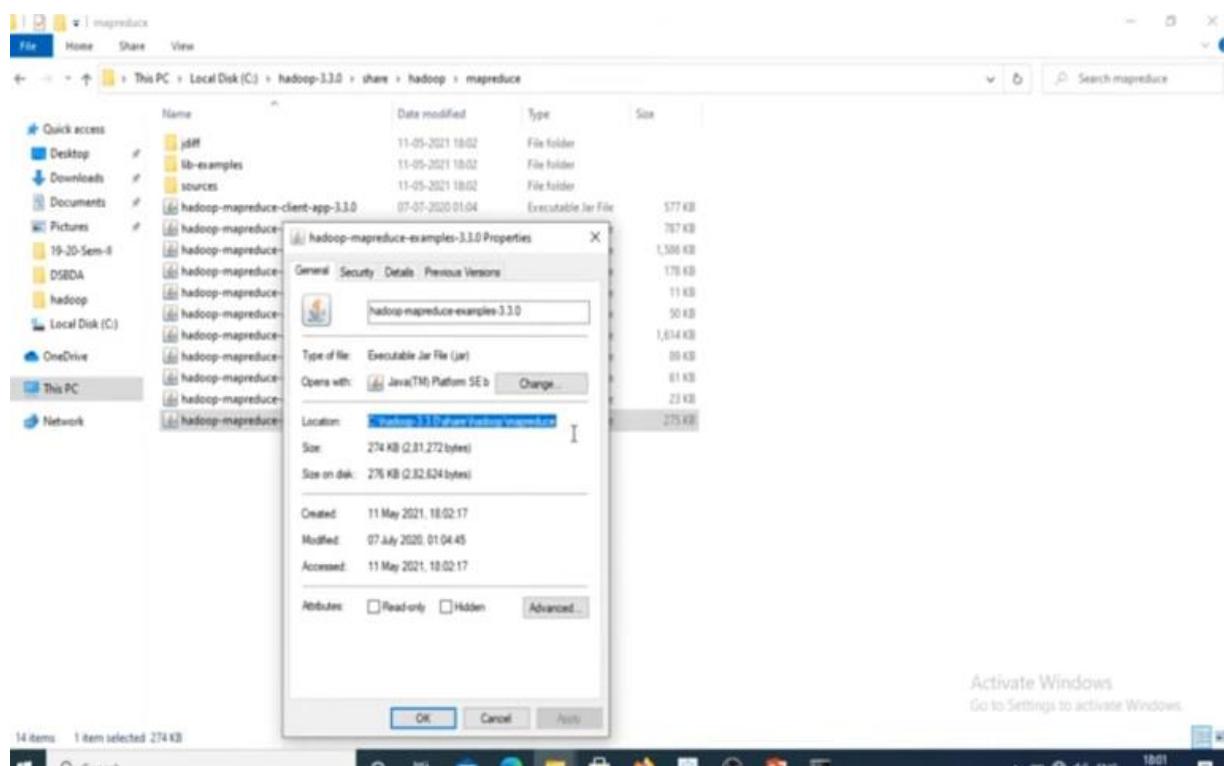
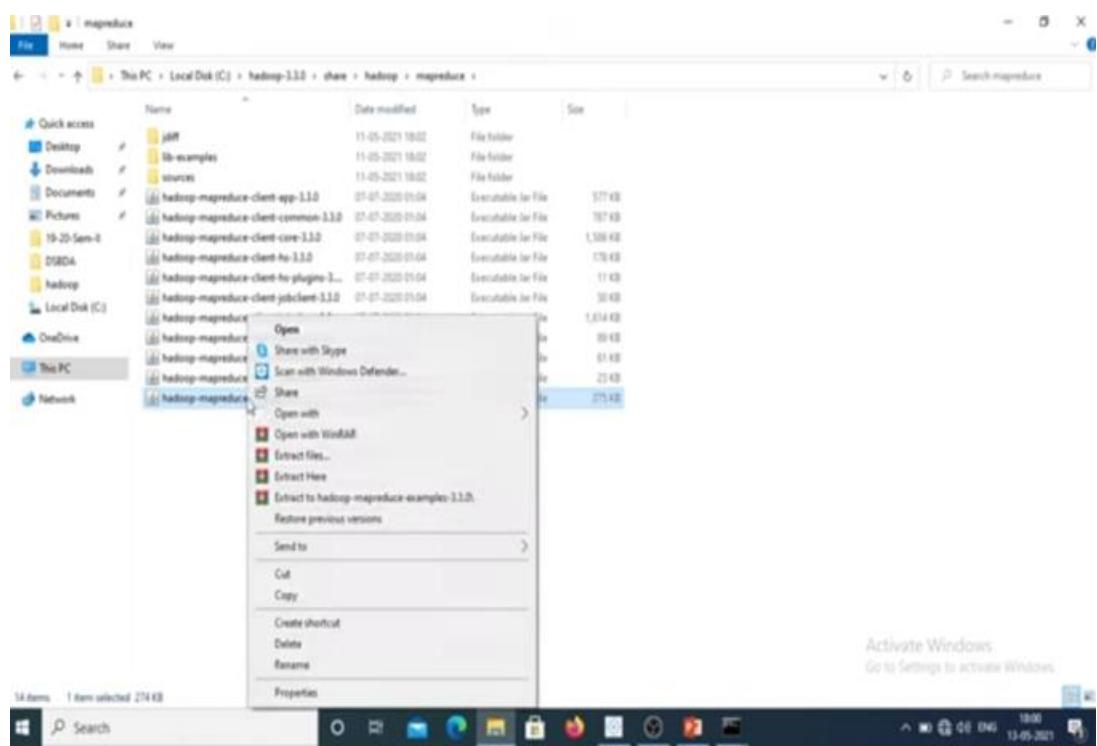
Bytes Written=49

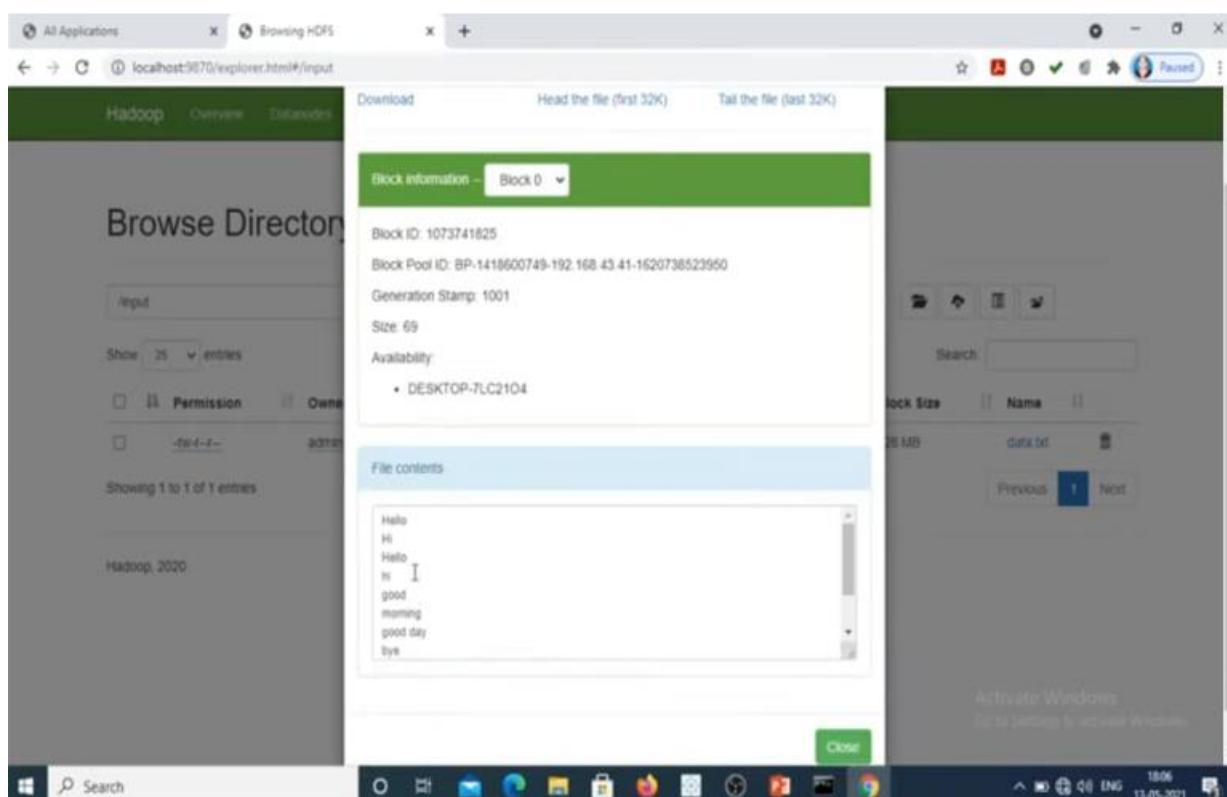
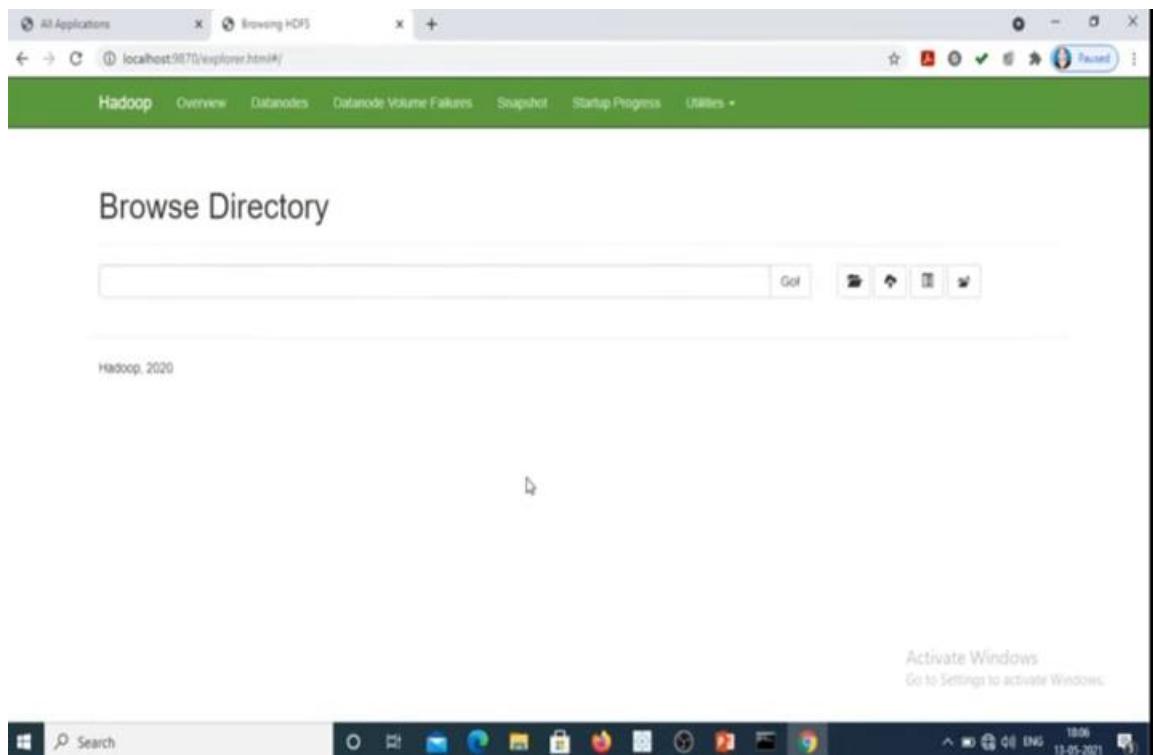
```
C:\Users\Admin>hadoop fs -cat /out11/*
are      1
hello    2
hi       3
how     1
kavitha 1
world   1
you     1

C:\Users\Admin>
```









Browsing HDFS

Hadoop Overview Datanodes Datanode Volume Failures Snapshot Startup Progress Utilities

Browse Directory

	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
□	-rwx-r--r--	admin	supergroup	0 B	May 13 17:58	0	0 B	input
□	-rwx-r--r--	admin	supergroup	0 B	May 13 18:04	0	0 B	tmp
□	-rwxr--r--	admin	supergroup	0 B	May 13 18:03	0	0 B	

Show 25 entries Search

Showing 1 to 3 of 3 entries Previous Next

Hadoop, 2020

Activate Windows Go to Settings to activate Windows.

Browsing HDFS

Hadoop Overview Datanodes Datanode Volume Failures Snapshot Startup Progress Utilities

Browse Directory

	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
□	-rw-r--r--	admin	supergroup	69 B	May 13 17:58	1	128 MB	data1

Show 25 entries Search

Showing 1 to 1 of 1 entries Previous Next

Hadoop, 2020

Activate Windows Go to Settings to activate Windows.

Result:

Thus Hadoop single node cluster was installed successfully and hence simple applications called wordcount was executed successfully.

EX NO:8 , 9

DATE:

Creating and Executing Your First Container Using Docker.

Run a Container from Docker Hub.

AIM:

Creating and Executing Your First Container Using Docker.
Run a Container from Docker Hub.

Step 1: Install the docker using the below given link.

Pulling container from docker hub



Finally its time to work with some of the containers available in
<http://hub.docker.com>

In this demo we will work with following containers

- *Hello World (using kitematics)*
- *Ubuntu (using command)*

4



Step 2: Do the following :- cmds

```
[& Select Windows PowerShell]
Windows PowerShell
Copyright (C) 2015 Microsoft Corporation. All rights reserved.

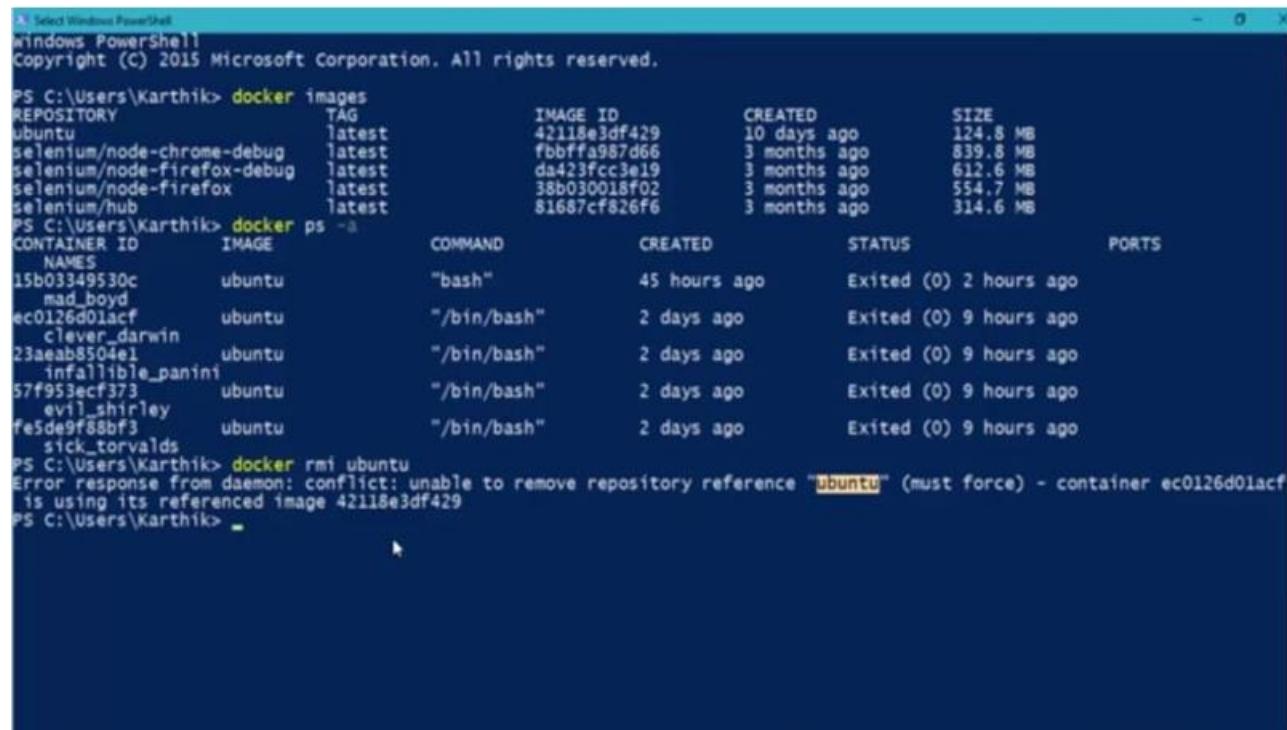
PS C:\Users\Karthik> docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
ubuntu              latest   42118e3df429  10 days ago   124.8 MB
selenium/node-chrome-debug  latest   fbbffa987d66  3 months ago  839.8 MB
selenium/node-firefox-debug  latest   da423fcc3e19  3 months ago  612.6 MB
selenium/node-firefox       latest   38b030018f02  3 months ago  554.7 MB
selenium/hub           latest   81687cf826f6  3 months ago  314.6 MB
PS C:\Users\Karthik>
```

Step 3: the container that are already available will be showed along with its status at present.

```
[& Select Windows PowerShell]
Windows PowerShell
Copyright (C) 2015 Microsoft Corporation. All rights reserved.

PS C:\Users\Karthik> docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
ubuntu              latest   42118e3df429  10 days ago   124.8 MB
selenium/node-chrome-debug  latest   fbbffa987d66  3 months ago  839.8 MB
selenium/node-firefox-debug  latest   da423fcc3e19  3 months ago  612.6 MB
selenium/node-firefox       latest   38b030018f02  3 months ago  554.7 MB
selenium/hub           latest   81687cf826f6  3 months ago  314.6 MB
PS C:\Users\Karthik> docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS
 NAMES
15b03349530c        ubuntu              "bash"              45 hours ago     Exited (0) 2 hours ago
 mad_boyd
ec0126d0iacf        ubuntu              "/bin/bash"        2 days ago       Exited (0) 9 hours ago
 clever_darwin
23aab5504e1         ubuntu              "/bin/bash"        2 days ago       Exited (0) 9 hours ago
 infallible_panini
57f953ecf373        ubuntu              "/bin/bash"        2 days ago       Exited (0) 9 hours ago
 evil_shirley
fe5de9f88bf3        ubuntu              "/bin/bash"        2 days ago       Exited (0) 9 hours ago
 sick_torvalds
PS C:\Users\Karthik>
```

Step 4: for removing the already created containers the below cmd is used :-
docker rmi ubuntu.



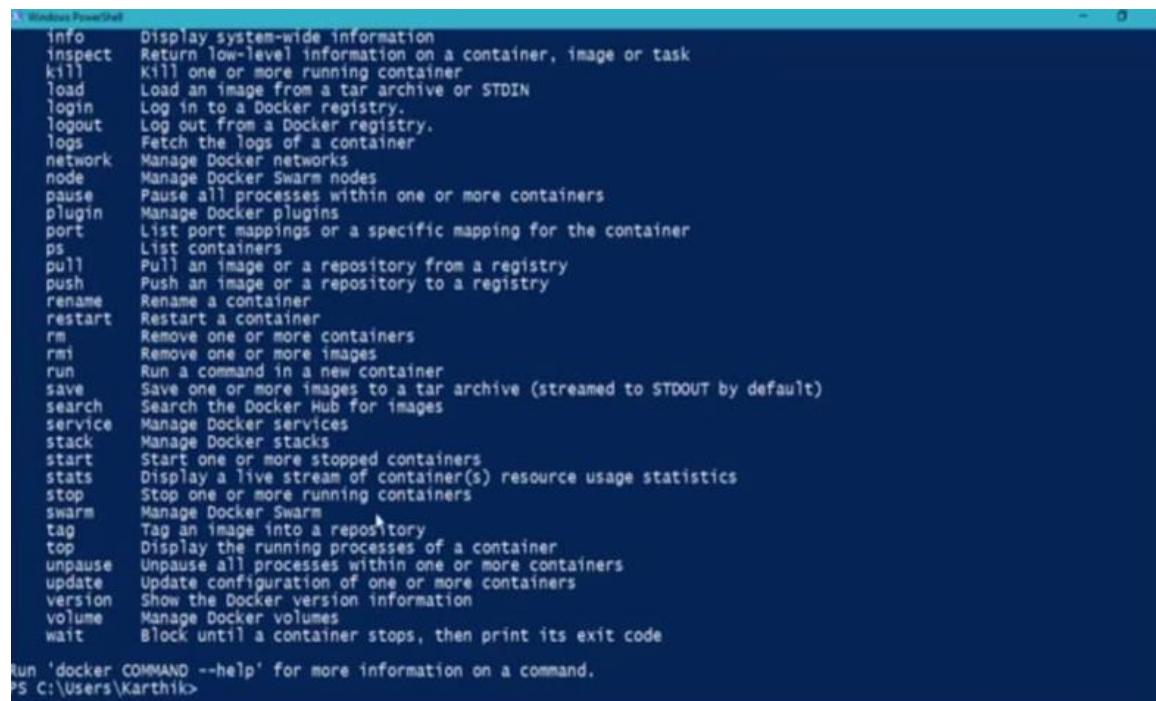
```
Windows PowerShell
Copyright (C) 2015 Microsoft Corporation. All rights reserved.

PS C:\Users\Karthik> docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
ubuntu              latest   42118e3df429  10 days ago   124.8 MB
selenium/node-chrome-debug latest   fbbfffa987d66  3 months ago  839.8 MB
selenium/node-firefox-debug latest   da423fcc3e19  3 months ago  612.6 MB
selenium/node-firefox      latest   38b030018f02  3 months ago  554.7 MB
selenium/hub          latest   81687cf826f6  3 months ago  314.6 MB

PS C:\Users\Karthik> docker ps -a
CONTAINER ID        IMAGE           COMMAND          CREATED         STATUS          PORTS
 NAMES
15b03349530c      ubuntu          "bash"          45 hours ago   Exited (0) 2 hours ago
mad_boyd           ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
ec0126d01acf      ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
clever_darwin       ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
23aeab8504e1       ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
infallible_panini  ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
57f953ecf373      ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
evil_shirley        ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
f55de9f88bf3      ubuntu          "/bin/bash"     2 days ago    Exited (0) 9 hours ago
sick_torvalds      ubuntu          "bash"          45 hours ago   Exited (0) 2 hours ago

PS C:\Users\Karthik> docker rmi ubuntu
Error response from daemon: conflict: unable to remove repository reference "ubuntu" (must force) - container ec0126d01acf
is using its referenced image 42118e3df429
PS C:\Users\Karthik>
```

Step 5: It show's the key words and its description



```
Windows PowerShell
info      Display system-wide information
inspect   Return low-level information on a container, image or task
kill      Kill one or more running container
load      Load an image from a tar archive or STDIN
login     Log in to a Docker registry.
logout    Log out from a Docker registry.
logs      Fetch the logs of a container
network   Manage Docker networks
node      Manage Docker Swarm nodes
pause     Pause all processes within one or more containers
plugin   Manage Docker plugins
port      List port mappings or a specific mapping for the container
ps        List containers
pull     Pull an image or a repository from a registry
push     Push an image or a repository to a registry
rename   Rename a container
restart  Restart a container
rm       Remove one or more containers
rmi     Remove one or more images
run      Run a command in a new container
save    Save one or more images to a tar archive (streamed to STDOUT by default)
search  Search the Docker Hub for images
service Manage Docker services
stack    Manage Docker stacks
start   Start one or more stopped containers
stats   Display a live stream of container(s) resource usage statistics
stop    Stop one or more running containers
swarm   Manage Docker Swarm
tag     Tag an image into a repository
top     Display the running processes of a container
unpause Unpause all processes within one or more containers
update  Update configuration of one or more containers
version Show the Docker version information
volume  Manage Docker volumes
wait    Block until a container stops, then print its exit code

Run 'docker COMMAND --help' for more information on a command.
PS C:\Users\Karthik>
```

Step 6:do the cmd :- docker --help

```
A Windows PowerShell window showing Docker command history and help output.

PS C:\Users\Karthik> docker ps -a
CONTAINER ID        IMAGE       COMMAND      CREATED     STATUS      PORTS
 NAMES
15b03349530c        ubuntu      "bash"       45 hours ago Exited (0) 2 hours ago
mad_boyd
ec0126d01acf        ubuntu      "/bin/bash"   2 days ago  Exited (0) 9 hours ago
clever_darwin
23aaeb8504e1        ubuntu      "/bin/bash"   2 days ago  Exited (0) 9 hours ago
infallible_panini
57f953ecf373        ubuntu      "/bin/bash"   2 days ago  Exited (0) 9 hours ago
evil_shirley
fe5de9f88bf3        ubuntu      "/bin/bash"   2 days ago  Exited (0) 9 hours ago
sick_torvalds

PS C:\Users\Karthik> docker rmi ubuntu
Error response from daemon: conflict: unable to remove repository reference "ubuntu" (must force) - container ec0126d01acf
is using its referenced image 42118e3df429
PS C:\Users\Karthik> docker --help
Usage: docker [OPTIONS] COMMAND [arg...]
      docker [ --help | -v | --version ]

A self-sufficient runtime for containers.

Options:
  --config=%USERPROFILE%\.docker           Location of client config files
  -D, --debug                            Enable debug mode
  -H, --host=[]                          Daemon socket(s) to connect to
  -h, --help                             Print usage
  -l, --log-level=info                  Set the logging level
  --tls                                Use TLS; implied by --tlsv1
  --tlscacert=%USERPROFILE%\.docker\ca.pem Trust certs signed only by this CA
```

Step 7: These are the commands that are used to remove the files.

```
A Windows PowerShell window showing the full list of Docker commands with descriptions. The 'rm' command is highlighted with a yellow box.

events  Get real time events from the server
exec   Run a command in a running container
export  Export a container's filesystem as a tar archive
history Show the history of an image
images  List images
import  Import the contents from a tarball to create a filesystem image
info    Display system-wide information
inspect Return low-level information on a container, image or task
kill    Kill one or more running container
load    Load an image from a tar archive or STDIN
login   Log in to a Docker registry
logout  Log out from a Docker registry
logs    Fetch the logs of a container
network Manage Docker networks
node    Manage Docker Swarm nodes
pause   Pause all processes within one or more containers
plugin  Manage Docker plugins
port    List port mappings or a specific mapping for the container
ps      List containers
pull   Pull an image or a repository from a registry
push   Push an image or a repository to a registry
rename  Rename a container
rm     Remove one or more containers
rmi    Remove one or more images
run    Run a command in a new container
save   Save one or more images to a tar archive (streamed to STDOUT by default)
search  Search the Docker Hub for images
service Manage Docker services
stack   Manage Docker stacks
start   Start one or more stopped containers
stats   Display a live stream of container(s) resource usage statistics
stop   Stop one or more running containers
tag    Tag an image into a repository
top    Display the running processes of a container
unpause Unpause all processes within one or more containers
update Update configuration of one or more containers
```

Step 8: cmd:- docker ps -a

```
A Windows PowerShell window showing the output of docker commands. It first lists all containers with docker ps -a, then stops a specific container (15b03349530c) with docker stop, and finally removes it with docker rm.
```

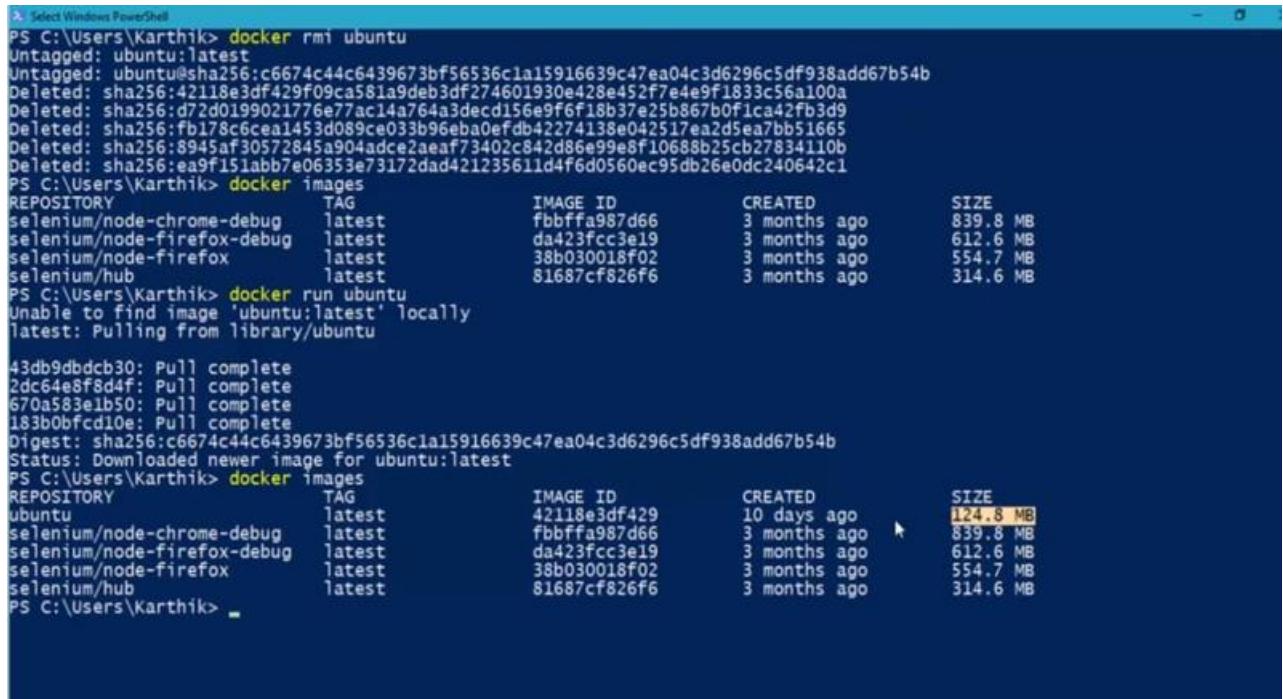
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
15b03349530c	ubuntu	"bash"	45 hours ago	Exited (0) 2 hours ago	
mad_boyd	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
ec0126d01acf	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
clever_darwin	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
23aeab8504e1	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
infallible_panini	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
57f953ecf373	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
evil_shirley	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
fe5de9f88bf3	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
sick_torvalds	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	

Step 9: The below are the commands used to delete a particular file containers.

```
A Windows PowerShell window showing the deletion of specific Docker containers. It starts by listing all containers with docker ps -a, then removes three specific containers (ec0126d01acf, 23aeab8504e1, and 57f953ecf373) using docker rm, and finally lists them again with docker ps -a to show they are gone.
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
ec0126d01acf	ubuntu	"bash"	2 days ago	Exited (0) 9 hours ago	
clever_darwin	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
23aeab8504e1	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
infallible_panini	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
57f953ecf373	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
evil_shirley	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
fe5de9f88bf3	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	
sick_torvalds	ubuntu	"/bin/bash"	2 days ago	Exited (0) 9 hours ago	

Step 10: to run: docker images cmd is used.



```
PS C:\Users\Karthik> docker rmi ubuntu
Untagged: ubuntu:latest
Untagged: ubuntu@sha256:c6674c44c6439673bf56536clal5916639c47ea04c3d6296c5df938add67b54b
Deleted: sha256:42118e3df429f09ca581a9deb3df274601930e428e452f7e4e9f1833c56a100a
Deleted: sha256:d72d0199021776e77ac14a764a3decd156e9f6f18b37e25b867b0fica42fb3d9
Deleted: sha256:fb178c6ceal453d089ce033b96eba0efdb42274138e042517ea2d5ea7bb51665
Deleted: sha256:8945af30572845a904adce2aeaf73402c842d86e99e8f10688b25cb27834110b
Deleted: sha256:ea9f151abb7e06353e73172dad421235611d4f6d0560ec95db26e0dc240642c1
PS C:\Users\Karthik> docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
selenium/node-chrome-debug    latest    fbbffa987d66   3 months ago   839.8 MB
selenium/node-firefox-debug   latest    da423fcc3e19   3 months ago   612.6 MB
selenium/node-firefox        latest    38b030018f02   3 months ago   554.7 MB
selenium/hub                latest    81687cf826f6   3 months ago   314.6 MB
PS C:\Users\Karthik> docker run ubuntu
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
43db9dbdc30: Pull complete
2dc64e8f8d4f: Pull complete
670a583e1b50: Pull complete
183b0bfcd10e: Pull complete
Digest: sha256:c6674c44c6439673bf56536clal5916639c47ea04c3d6296c5df938add67b54b
Status: Downloaded newer image for ubuntu:latest
PS C:\Users\Karthik> docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
ubuntu              latest    42118e3df429   10 days ago   124.8 MB
selenium/node-chrome-debug    latest    fbbffa987d66   3 months ago   839.8 MB
selenium/node-firefox-debug   latest    da423fcc3e19   3 months ago   612.6 MB
selenium/node-firefox        latest    38b030018f02   3 months ago   554.7 MB
selenium/hub                latest    81687cf826f6   3 months ago   314.6 MB
PS C:\Users\Karthik>
```

Result:

Thus the first container using docker was created and hence executed the container in docker hub was done successfully.