

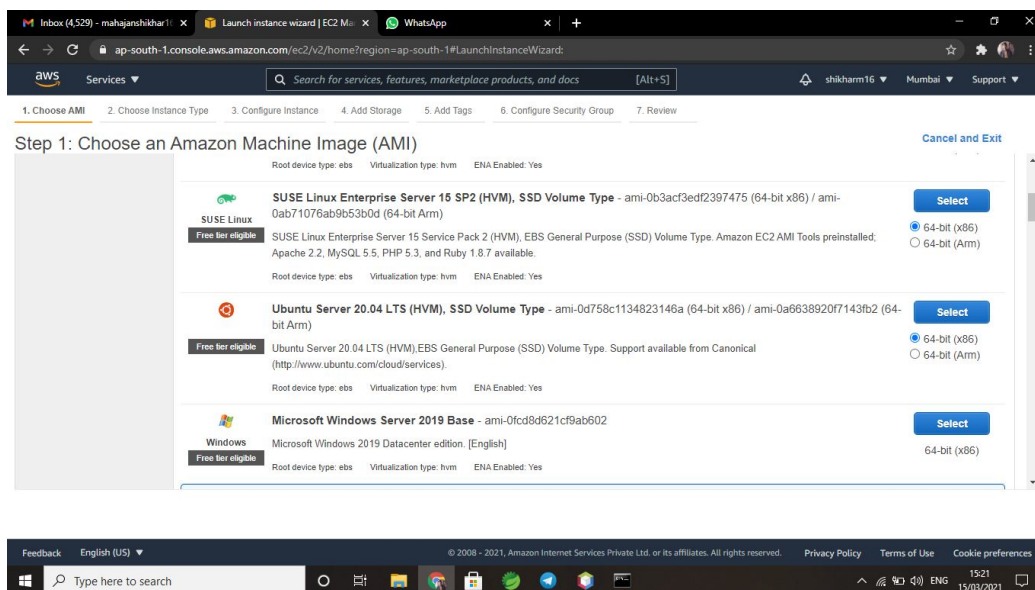
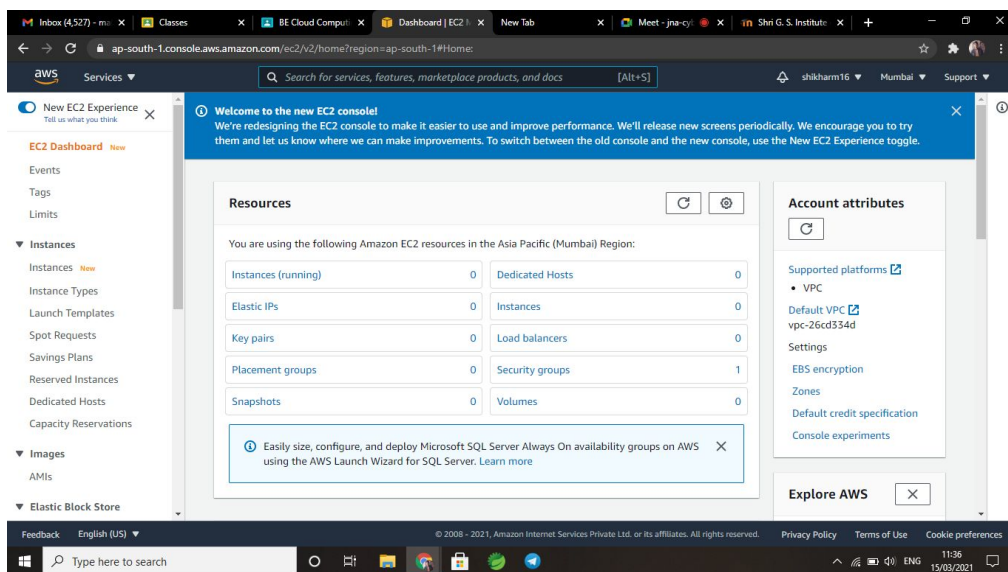
ASSIGNMENT - 01

Question 1:

Objective: To learn about Amazon/Google cloud. Use Public cloud computing platforms and learn their virtual computing platform that allows users to rent virtual machines on which they can run their applications.

Title: Getting Started in the Public Cloud Computing Platform like AWS/Google.

Task: Create AWS instances, Connecting to Your Linux Instance Using SSH and Run a Linux OS in a Virtual Machine .Explore its Computing and Storage.



ap-south-1.console.aws.amazon.com/ec2/v2/home?region=ap-south-1#LaunchInstanceWizard

Services Search for services, features, marketplace products, and docs [Alt+S]

shikharm16 Mumbai Support

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance families Current generation Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, -, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes

Cancel Previous **Review and Launch** Next: Configure Instance Details

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Type here to search

ap-south-1.console.aws.amazon.com/ec2/v2/home?region=ap-south-1#LaunchInstanceWizard

Services Search for services, features, marketplace products, and docs [Alt+S]

shikharm16 Mumbai Support

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances 1 Launch into Auto Scaling Group

Purchasing option ☐ Request Spot instances

Network vpc-26cd334d (default) Create new VPC

Subnet No preference (default subnet in any Availability Zone) Create new subnet

Auto-assign Public IP Use subnet setting (Enable)

Placement group ☐ Add instance to placement group

Capacity Reservation Open

Domain join directory No directory Create new directory

IAM role None Create new IAM role

Cancel Previous **Review and Launch** Next: Add Storage

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Type here to search

11:37 15/03/2021

The image shows two screenshots of the AWS Management Console during the instance launch wizard. The top screenshot is Step 3: Configure Instance Details, and the bottom screenshot is Step 7: Review Instance Launch.

Step 3: Configure Instance Details

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Stop - Hibernate behavior ☐ Enable hibernation as an additional stop behavior

Enable termination protection ☐ Protect against accidental termination

Monitoring ☐ Enable CloudWatch detailed monitoring
Additional charges apply.

Tenancy
Additional charges will apply for dedicated tenancy.

Credit specification ☐ Unlimited
Additional charges may apply

File systems

Advanced Details

Enclave ☐ Enable

Metadata accessible

Metadata version

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

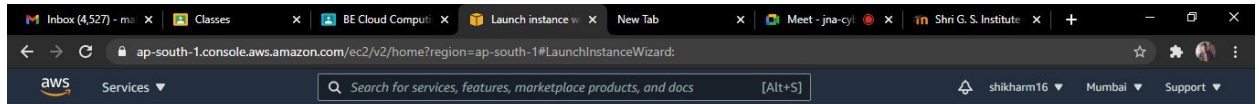
Improve your instances' security. Your security group, launch-wizard-1, is open to the world.
Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.
You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

AMI Details [Edit AMI](#)

Ubuntu Server 20.04 LTS (HVM), SSD Volume Type - ami-0d758c1134823146a
Free tier eligible
Ubuntu Server 20.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).
Root Device Type: ebs Virtualization type: hvm

Instance Type [Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate



Launch Status

✓ Your instances are now launching

The following instance launches have been initiated: [i-0cde8ba1a0db89f7d](#) [View launch log](#)

ℹ Get notified of estimated charges

Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

How to connect to your instances

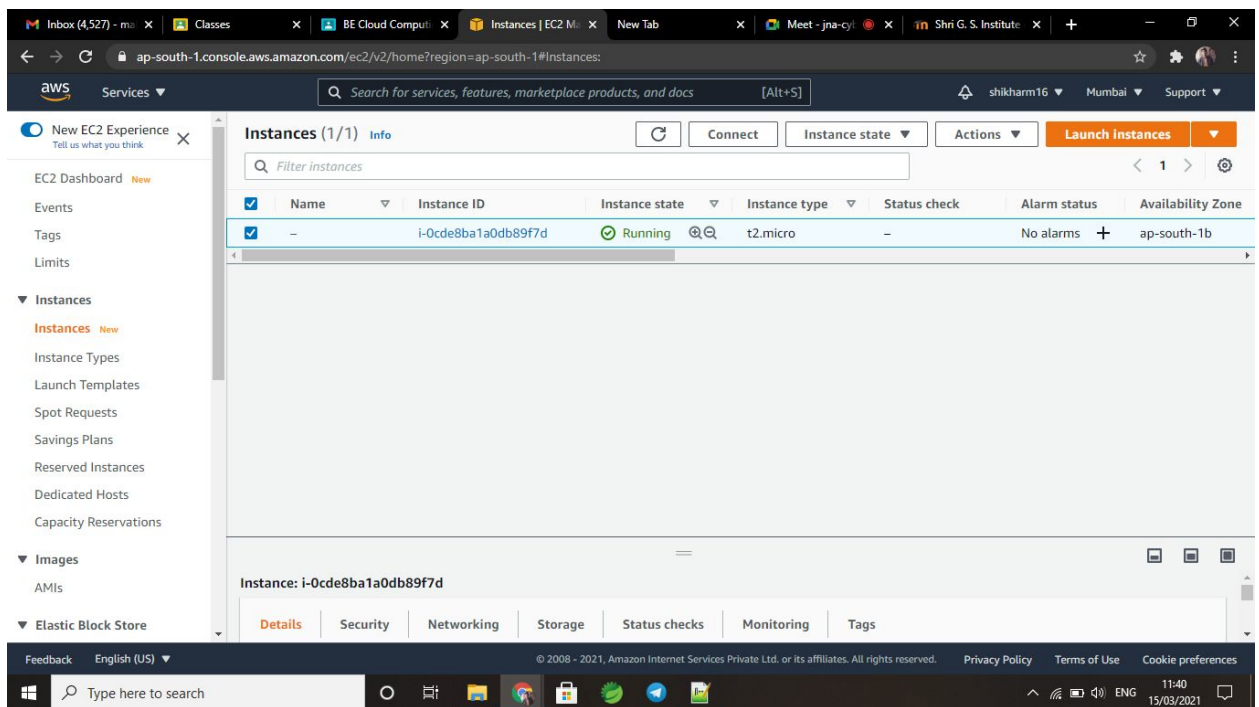
Your instances are launching, and it may take a few minutes until they are in the **running** state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.

Click **View Instances** to monitor your instances' status. Once your instances are in the **running** state, you can **connect** to them from the Instances screen. [Find out](#) how to connect to your instances.

▼ Here are some helpful resources to get you started

- [How to connect to your Linux instance](#)
- [Amazon EC2: User Guide](#)
- [Learn about AWS Free Usage Tier](#)
- [Amazon EC2: Discussion Forum](#)

While your instances are launching you can also



The image displays two screenshots of the AWS Management Console interface, showing the details and connection options for an EC2 instance.

Top Screenshot: Instance summary for i-0cde8ba1a0db89f7d

The top screenshot shows the "Instance summary" page for the EC2 instance **i-0cde8ba1a0db89f7d**. The instance is in the **Running** state. The summary includes the following details:

- Instance ID:** i-0cde8ba1a0db89f7d
- Public IPv4 address:** 15.206.127.146 | [open address](#)
- Private IPv4 addresses:** 172.31.6.252
- Public IPv4 DNS:** ec2-15-206-127-146.ap-south-1.compute.amazonaws.com | [open address](#)
- Private IPv4 DNS:** ip-172-31-6-252.ap-south-1.compute.internal
- Instance type:** t2.micro
- Elastic IP addresses:** -
- IAM Role:** -
- VPC ID:** vpc-26cd334d
- Subnet ID:** subnet-a9f0a5e5

The instance is associated with the **AWS Compute Optimizer** finding: "Opt-in to AWS Compute Optimizer for recommendations. [Learn more](#)".

Bottom Screenshot: Connect to instance

The bottom screenshot shows the "Connect to instance" page for the same EC2 instance. It provides options to connect using **EC2 Instance Connect**, **Session Manager**, or **SSH client**. The **EC2 Instance Connect** tab is selected, showing the instance ID, public IP address (15.206.127.146), and the user name (ubuntu). A note states: "Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name." The **Connect** button is highlighted.

Question 2

Objective: To learn HDFS commands and design Map Reduce Algorithms.

Title: Explore HDFS and design Map Reduce algorithm.

Task: Write Map reduce code for some basic problems like word count problem.

```
root@f84d3a858db7:/# mkdir input1
root@f84d3a858db7:/# echo "I am computer science student from SGSITS">input1/f1.txt
root@f84d3a858db7:/# echo "I am BE 4th year student">input1/f2.txt
root@f84d3a858db7:/# hadoop fs -mkdir -p input1
root@f84d3a858db7:/# hdfs dfs -put ./input1/* input1
2021-03-12 11:35:05,626 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
2021-03-12 11:35:05,916 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
root@f84d3a858db7:/# ls
KEYS boot entrypoint.sh hadoop hadoop-mapreduce-examples-2.7.1-sources.jar input lib media opt root run.sh srv tmp var
bin dev etc hadoop-data home input1 lib64 mnt proc run/sbin sys usr
root@f84d3a858db7:/# hadoop jar hadoop-mapreduce-examples-2.7.1-sources.jar org.apache.hadoop.examples.WordCount input1 output1
Exception in thread "main" java.lang.ClassNotFoundException: org.apache.hadoop.examples.WordCount
    at java.net.URLClassLoader.findClass(URLClassLoader.java:382)
    at java.lang.ClassLoader.loadClass(ClassLoader.java:418)
    at java.lang.ClassLoader.loadClass(ClassLoader.java:351)
    at java.lang.Class.forName0(Native Method)
    at java.lang.Class.forName(Class.java:348)
    at org.apache.hadoop.util.RunJar.run(RunJar.java:316)
    at org.apache.hadoop.util.RunJar.main(RunJar.java:236)
root@f84d3a858db7:/# hdfs dfs -cat output1/*
cat: 'output1/*': No such file or directory
root@f84d3a858db7:/# hadoop jar hadoop-mapreduce-examples-2.7.1-sources.jar org.apache.hadoop.examples.WordCount input1 output1
2021-03-12 11:39:22,277 INFO client.RMPProxy: Connecting to ResourceManager at resourcemanager/172.18.0.2:8032
2021-03-12 11:39:22,583 INFO client.AHSProxy: Connecting to Application History server at historyserver/172.18.0.5:10200
2021-03-12 11:39:23,045 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/root/.staging/job_1615544228106_0002
2021-03-12 11:39:23,292 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
2021-03-12 11:39:23,551 INFO input.FileInputFormat: Total input files to process : 2
2021-03-12 11:39:23,640 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
2021-03-12 11:39:23,724 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
2021-03-12 11:39:23,764 INFO mapreduce.JobSubmitter: number of splits:2
2021-03-12 11:39:24,062 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
```

```
File Actions Edit View Help
2021-03-12 11:39:23,764 INFO mapreduce.JobSubmitter: number of splits:2
2021-03-12 11:39:24,062 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
2021-03-12 11:39:24,136 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1615544228106_0002
2021-03-12 11:39:24,137 INFO mapreduce.JobSubmitter: Executing with tokens: []
2021-03-12 11:39:24,540 INFO conf.Configuration: resource-types.xml not found
2021-03-12 11:39:24,541 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2021-03-12 11:39:25,315 INFO impl.YarnClientImpl: Submitted application application_1615544228106_0002
2021-03-12 11:39:25,384 INFO mapreduce.Job: The url to track the job: http://resourcemanager:8088/proxy/application_1615544228106_0002/
2021-03-12 11:39:25,385 INFO mapreduce.Job: Running job: job_1615544228106_0002
2021-03-12 11:39:36,718 INFO mapreduce.Job: Job job_1615544228106_0002 running in uber mode : false
2021-03-12 11:39:36,720 INFO mapreduce.Job: map 0% reduce 0%
2021-03-12 11:39:47,911 INFO mapreduce.Job: map 50% reduce 0%
2021-03-12 11:39:48,919 INFO mapreduce.Job: map 100% reduce 0%
2021-03-12 11:39:55,008 INFO mapreduce.Job: map 100% reduce 100%
2021-03-12 11:39:56,033 INFO mapreduce.Job: Job job_1615544228106_0002 completed successfully
2021-03-12 11:39:56,193 INFO mapreduce.Job: Counters: 54
File System Counters
  FILE: Number of bytes read=107
  FILE: Number of bytes written=688111
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=285
  HDFS: Number of bytes written=74
  HDFS: Number of read operations=11
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2
  HDFS: Number of bytes read erasure-coded=0
Job Counters
  Launched map tasks=2
  Launched reduce tasks=1
  Rack-local map tasks=2
  Total time spent by all maps in occupied slots (ms)=63328
  Total time spent by all reduces in occupied slots (ms)=34232
  Total time spent by all map tasks (ms)=15832
```

```

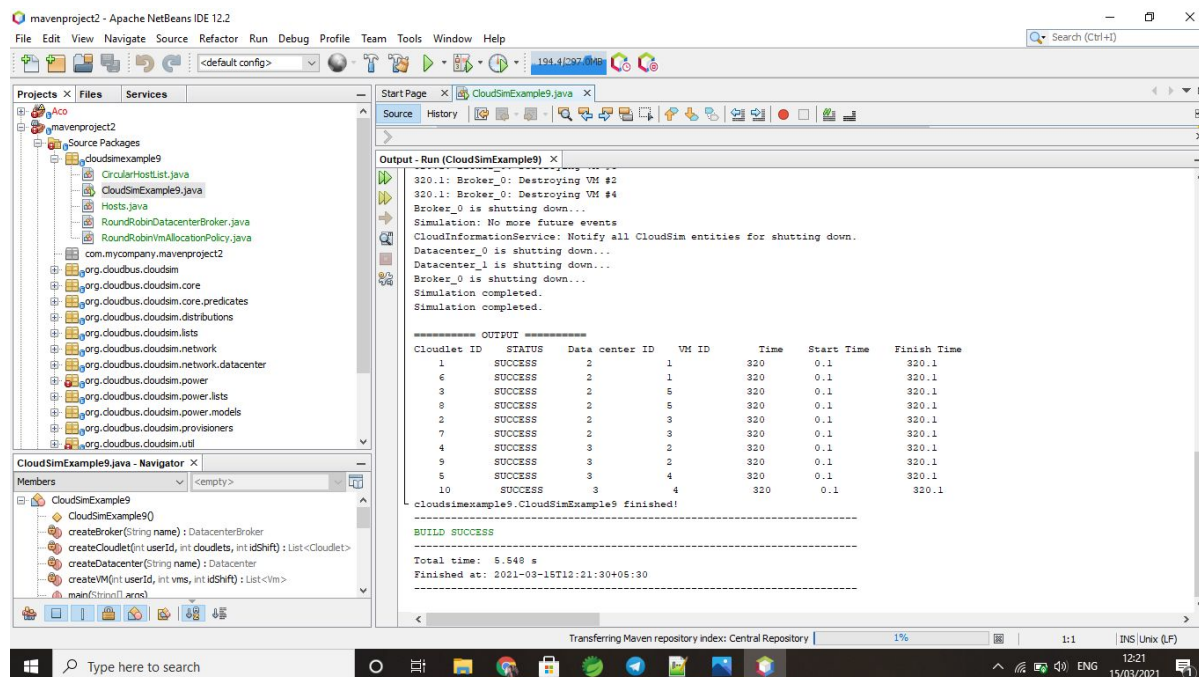
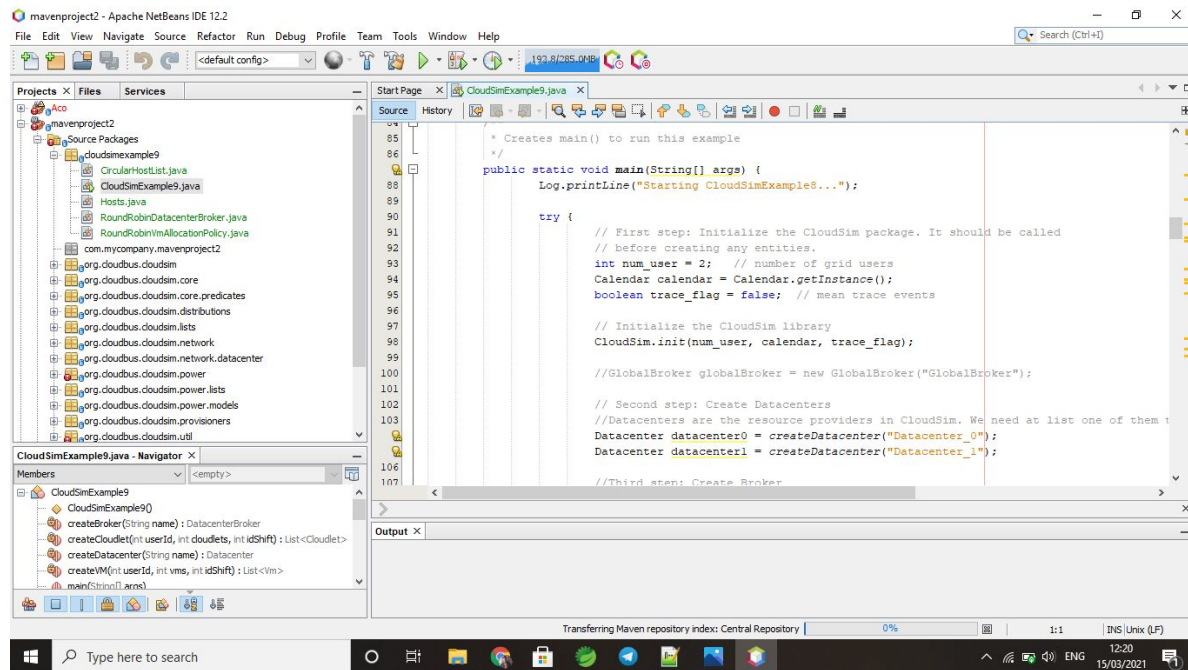
File Actions Edit View Help
Failed Shuffles=0
Merged Map outputs=2
GC time elapsed (ms)=354
CPU time spent (ms)=1460
Physical memory (bytes) snapshot=563159040
Virtual memory (bytes) snapshot=18899900416
Total committed heap usage (bytes)=398663680
Peak Map Physical memory (bytes)=222162944
Peak Map Virtual memory (bytes)=4953161728
Peak Reduce Physical memory (bytes)=118964224
Peak Reduce Virtual memory (bytes)=8193576960
Shuffle Errors
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format Counters
Bytes Read=67
File Output Format Counters
Bytes Written=74
root@f84d3a858db7:/# hdfs dfs -cat output1/*
2021-03-12 11:40:05,493 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
4th 1
BE 1
I 2
SGSITS 1
am 2
computer 1
from 1
science 1
student 2
year 1
root@f84d3a858db7:/#

```

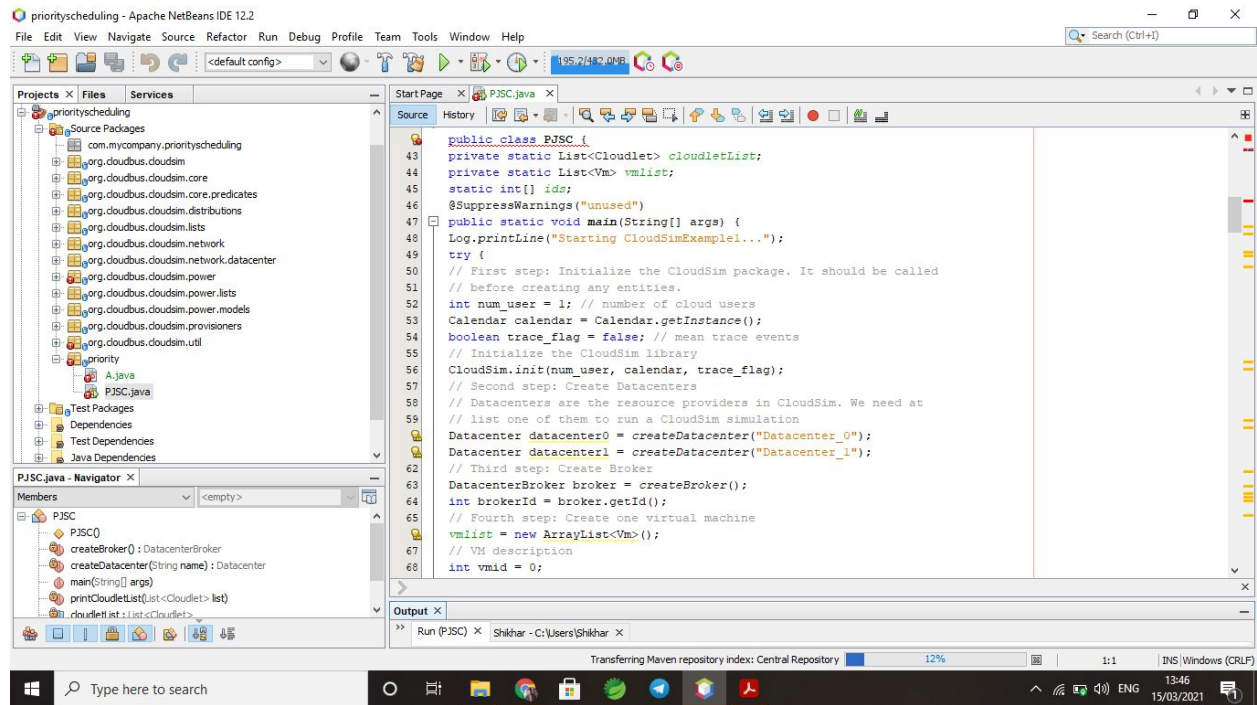
```

kali linux [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
shikhar@kali: ~/Desktop...
06:08 AM
shikhar@kali: ~/Desktop/docker-hadoop-master
File Actions Edit View Help
shikhar@kali:~/Desktop/
ls
docker-hadoop-master master.zip
shikhar@kali:~/Desktop/
cd docker-hadoop-master
shikhar@kali:~/Desktop/docker-hadoop-master/
sudo docker exec -i namenode bash
[sudo] password for shikhar:
root@f84d3a858db7:/# ls
KEYS boot entrypoint.sh hadoop hadoop-mapreduce-examples-2.7.1-sources.jar input lib64 mnt proc run sbin sys usr
bin dev etc hadoop-data home lib media opt root run.sh srv tmp var
root@f84d3a858db7:/# cd input
root@f84d3a858db7:/input# cat f1.txt
hello from computer science
root@f84d3a858db7:/input# cat f2.txt
shikhar mahajan from computer science
root@f84d3a858db7:/input# hdfs dfs -cat output/*
2021-03-12 11:06:19,220 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
computer 2
from 2
hello 1
mahajan 1
science 2
shikhar 1
root@f84d3a858db7:/input#

```


Question 3 :**Objective:** To learn basic Task scheduling algorithms in the cloud .**Title:** Implement cloud Task Scheduling algorithm using cloud simulator.**Task:** Install cloudsim and implement basic task scheduling algorithm.**1. Round Robin**

2. Priority Scheduling



Question 4:**Objective :** To learn use and design of REST APIs**Title:** Designing a web application that uses REST API's .**Task:** Design any application that uses the REST interface in json format and xml format.**REST-API in python using django framework**

Project Name: CloudRest

Two files were used:

1. **Views.py** : Here functionality of api is coded.
2. **Urls.py** : Url of api is mentioned.

Two **GET METHOD** url are their:

“/” - Home url , prints hello world as http response

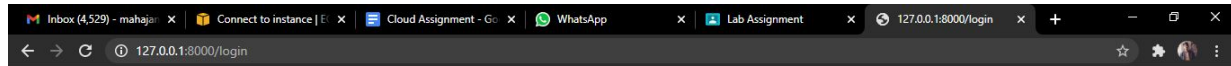
“Login” - JSON response url where user data is printed (data is hardcoded)

Server port: http://127.0.0.1:8000/

The screenshot shows a code editor with two files open: `views.py` and `urls.py`. The `views.py` file contains two functions: `hello` and `login`. The `hello` function returns a `HttpResponse` with the text "hello world". The `login` function returns a `JsonResponse` with a dictionary containing user data: `{ 'name': 'Test Response', 'user': 'Shikhar Mahajan', 'roles': ['Admin', 'User'], 'Department': 'CSE', 'roll Number': 'CS77' }`. The `urls.py` file contains two URL patterns: a root path `''` pointing to the `hello` view, and a `login` path pointing to the `login` view. The left sidebar shows the project structure, including folders like `cloudrest` and `sgsits_app`, and files like `views.py` and `urls.py`. The bottom status bar shows the date and time as 15/03/2021 14:45.

```
views.py
1 from django.shortcuts import render
2 from django.http import HttpResponse
3 import json
4 from django.http import JsonResponse
5
6 def hello(request):
7     return HttpResponse("hello world")
8
9
10 def login(request):
11     responseData = {
12         'name': 'Test Response',
13         'user': 'Shikhar Mahajan',
14         'roles': ['Admin', 'User'],
15         'Department': 'CSE',
16         'roll Number': 'CS77'
17     }
18     return JsonResponse(responseData)
19
```

```
urls.py
1 from . import views
2 from django.urls import path
3
4 urlpatterns = [
5     path('', views.hello, name='hello'),
6     path('login', views.login, name='login'),
7 ]
8
```

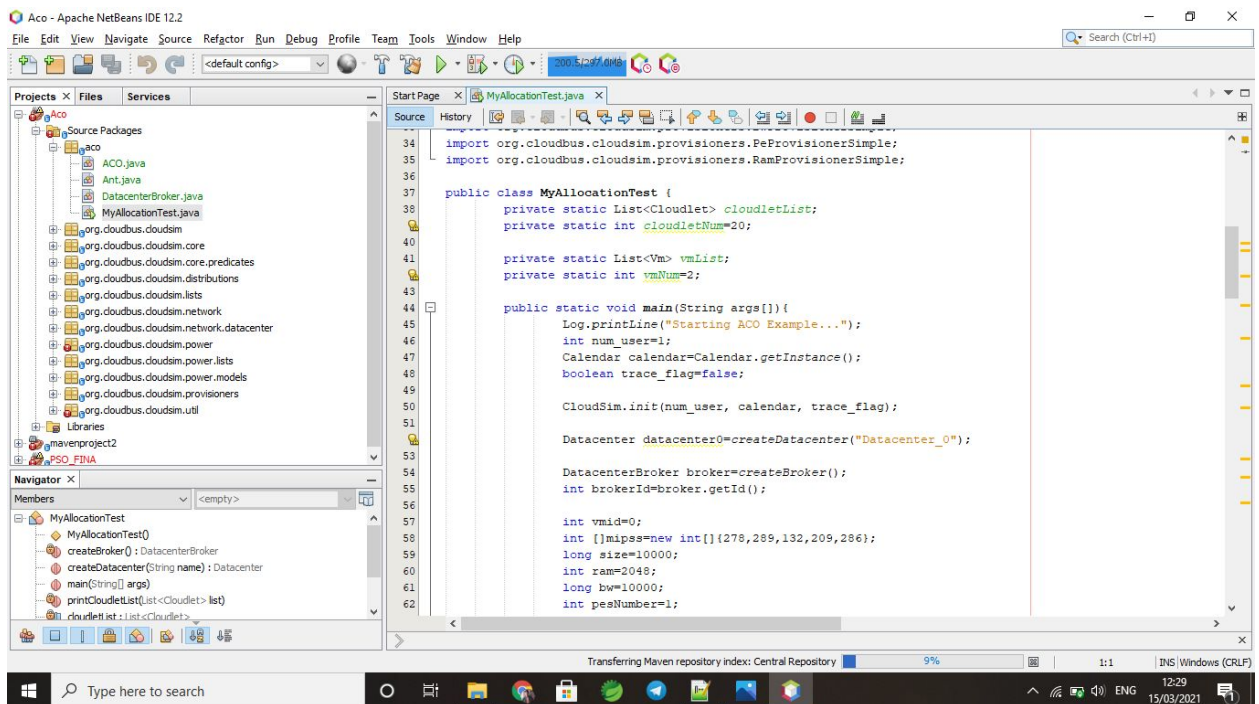


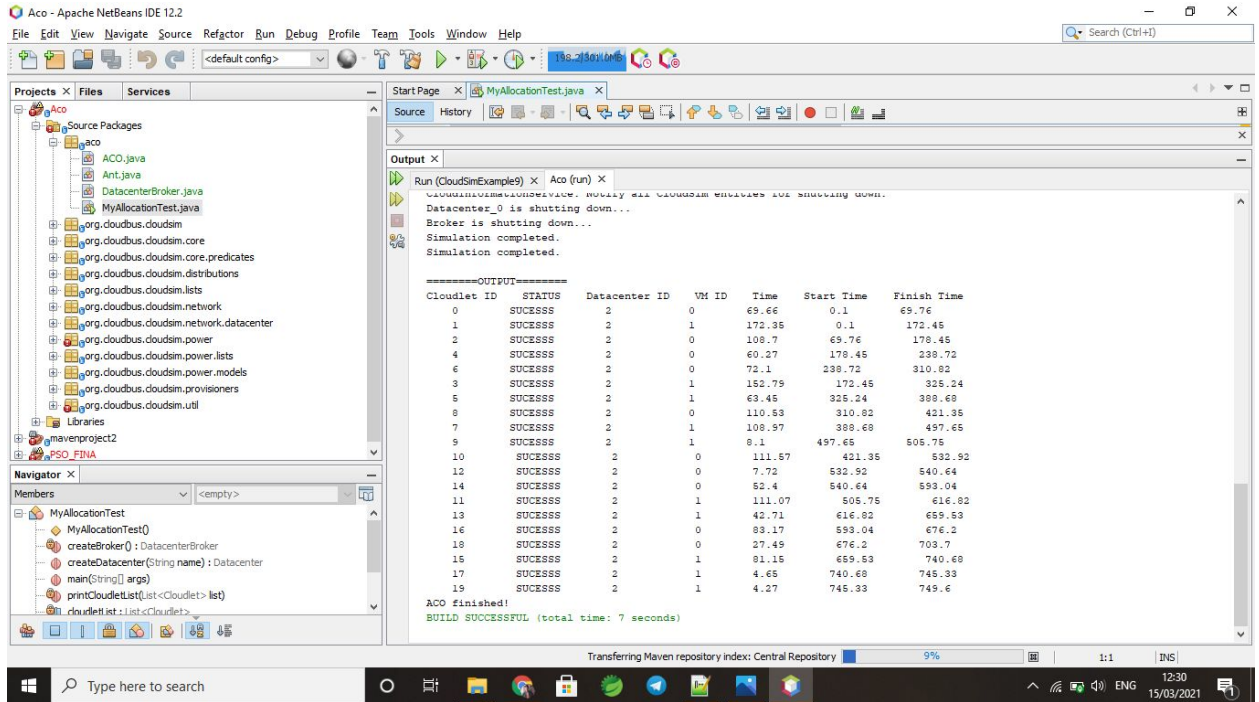
```
{
  name: "Test Response",
  user : "Shikhar Mahajan",
  - roles: [
    "Admin",
    "User"
  ],
  Department : "CSE",
  roll Number : "CS77"
}
```



Question 6:**Objective:** To learn Task Optimization in cloud environment**Title:** Explore workflow simulator and run workflow application redesign the code with some optimization algorithm like ACO,PSO.**1. ACO****Description ACO:**

Ant Colony Optimization (ACO) was first used by M. Dorigo et al. to solve discrete optimization problems, in the late 1980s. ACO is based on the behavior of ants for finding food. Ants deposit pheromone as they walk and find their route by walking along the pheromone deposition. Density of pheromone deposition increases as ants walk back to the source with food. Pheromone deposition on the way back is dependent on quality and quantity of food taken to the source point. Pheromone deposition /evaporation is directly related to the number of ants traveling on that path. Ants find the optimal path by following maximum pheromone deposition





2. PSO

Description PSO:

PSO is a heuristic global optimization technique. Particle swarm optimization (PSO), originally developed by Kennedy and Eberhart. In PSO each possible solution is called particle and the group of these possible solutions is called population. PSO is based on how a group of birds will randomly search for food. Birds don't know where exactly the food is, so they follow the bird which is nearest to the food. Each bird is known as a particle and each particle has its fitness function (here it is square of error). A group of particles is known as swarm. In each iteration, first the best solution found in the swarm is stored and is known as pbest. Another best solution is also stored, which is the best solution found so far. Values of pbest and gbest are updated.

