

# LAB Exercise - 1

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**DATE:** 04-AUG-2021

**REGISTER No.:** 2048057

**COURSE:** Cloud Analytics

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**EXERCISE:** Use the following platform to demonstrate the following exercises.

AWS Academy Canvas / AWS Management Console (Free Tier)

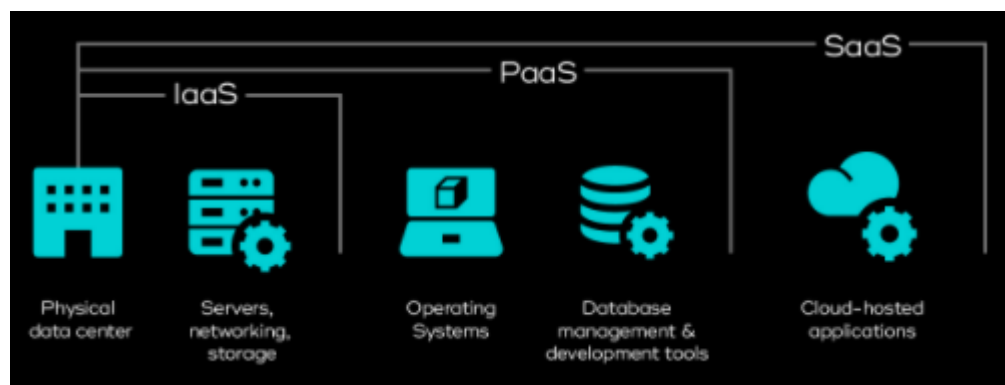
GCP Academy Qwiklab / GCP Management Console (Free Tier)

## 1. Describe IaaS

Infrastructure as a Service (IaaS) is a genre of cloud computing that offers instant virtual computing resources over the internet. IaaS contains the basic building blocks for cloud IT and typically provides access to networking features, computers, and data storage space. Infrastructure as a Service provides you with the highest level of flexibility and management control over your IT resources.

IaaS benefits:

- Pay-per-use and cost-efficiency
- Flexibility and Scalability
- Time Saving
- Enhanced security
- Sturdy service



## 2. List the Compute Services available in AWS and GCP.

- Amazon Web Services

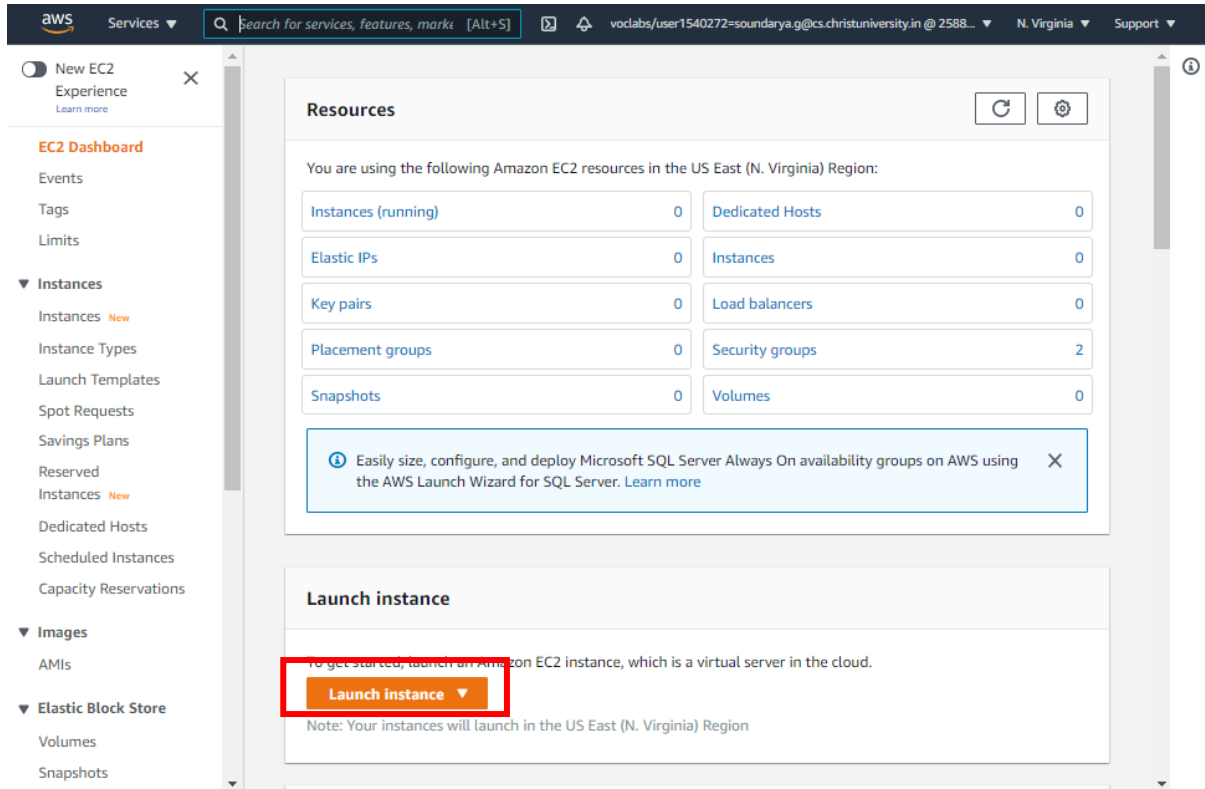
AWS Compute Services	Service Description
Amazon EC2	Virtual servers in the cloud
Amazon Lightsail	Launch and manage virtual private servers
Amazon EC2 Spot	Run fault-tolerant workloads for up to 90% off
Amazon EC2 Autoscaling	Scale compute capacity to meet demand
AWS Batch	Run batch jobs at any scale
AWS Lambda	Run code without thinking about servers
AWS Elastic Beanstalk	Run and manage web apps
AWS Serverless Application Repository	Discover, deploy, and publish serverless applications
AWS Snow Family	Physical devices to aggregate and process data in edge locations, then transfer to AWS
AWS Outposts	Run AWS infrastructure on-premises
AWS Wavelength	Deliver ultra-low latency applications for 5G devices

- Google Cloud Platform

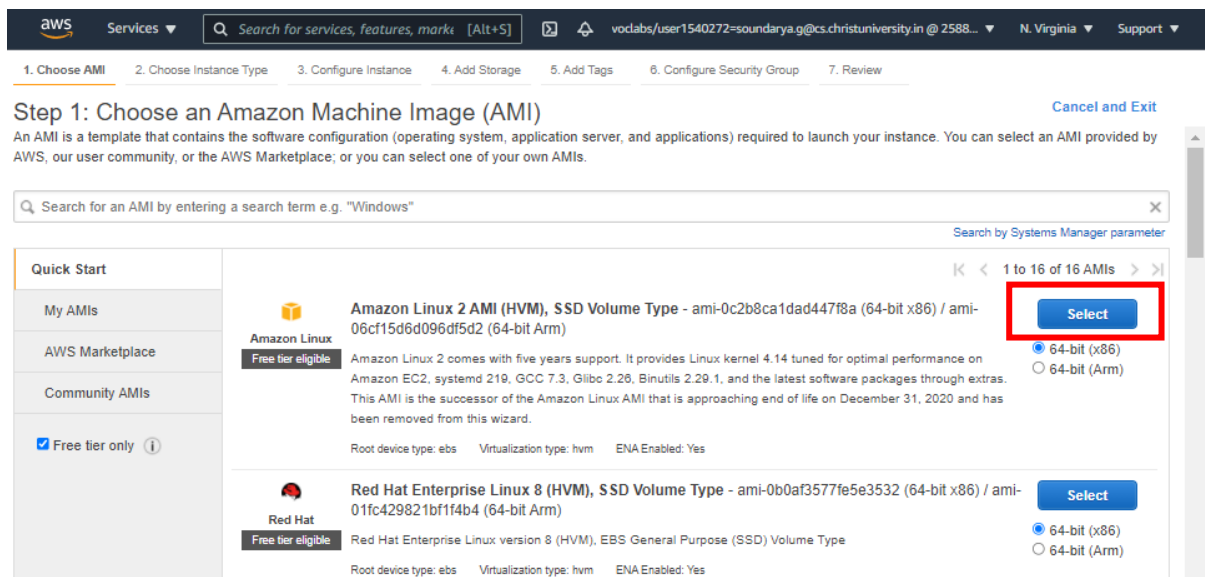
GCP Compute Services	Service Description
Google App Engine	Serverless application platform for apps and back ends.
Compute Engine	Create and run virtual machines on Google's infrastructure.
Graphics Processing Unit	GUPs for ML, scientific computing, and 3D visualization.
Kubernetes Engine	A simple way to automatically deploy, scale, and manage Kubernetes.
Google Cloud Functions	Scalable pay-as-you-go FaaS to run your code with zero server management.
Shielded VMs	Hardened virtual machines on Google Cloud.
Migrate for compute Engine	Fast, flexible, and safe migration to Google Cloud with Migrate for Compute Engine.
Google Cloud Run	Fully managed environment for running containerized apps.
Preemptible VMs	Affordable compute instances suitable for batch jobs and fault-tolerant workloads.

### 3. Create an AWS EC2 Instance and install the necessary packages to execute a program of your choice in it.

#### STEP 1: Launching new instance



#### STEP 2: Selecting Amazon Linux 2 AMI



## STEP 3: Choosing instance type

aws Services Search for services, features, marks [Alt+S] voclabs/user1540272=soundarya.g@cs.christuniversity.in @ 2588... N. Virginia 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

Cancel Previous Review and Launch Next: Configure Instance Details

## STEP 4: Configuring instance details

aws Services Search for services, features, marks [Alt+S] voclabs/user1540272=soundarya.g@cs.christuniversity.in @ 2588... N. Virginia 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-59f39b24 (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

Shutdown behavior Stop

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 Shared - Run a shared hardware instance

Cancel Previous Review and Launch Next: Add Storage

## STEP 5: Adding storage details

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1. Choose AMI2. Choose Instance Type3. Configure Instance4. Add Storage5. Add Tags6. Configure Security Group7. Review

### Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/xvda	snap-090e9376979c86d7b	8	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypt

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

CancelPreviousReview and LaunchNext: Add Tags

## STEP 6: Adding Tags

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1. Choose AMI2. Choose Instance Type3. Configure Instance4. Add Storage5. Add Tags6. Configure Security Group7. Review

### Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. A copy of a tag can be applied to volumes, instances or both. Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	Value	Instances	Volumes	Network Interfaces
This resource currently has no tags				

Choose the [Add tag](#) button or [click to add a Name tag](#).  
Make sure your [IAM policy](#) includes permissions to create tags.

Add Tag (Up to 50 tags maximum)

CancelPreviousReview and LaunchNext: Configure Security Group

## STEP 7: Configuring security group

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Support

1. Choose AMI2. Choose Instance Type3. Configure Instance4. Add Storage5. Add Tags6. Configure Security Group7. Review

### Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☒ Create a new security group ☐ Select an existing security group

Security group name:

Description:

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

Add Rule

Warning

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

CancelPreviousReview and Launch

## STEP 8: Launching the instance

**aws** Services Search for services, features, marks [Alt+S] voclabs/user1540272=soundarya.g@cs.christuniversity.in @ 2588... N. Virginia Support

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

### Step 7: Review Instance Launch

**Improve your instances' security.** Your security group, launch-wizard-2, 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](#)

**Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0c2b8ca1dad447f8a**

Free tier eligible

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is a...

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

**Security Groups** [Edit security groups](#)

Security group name: launch-wizard-2  
Description: launch-wizard-2 created 2021-08-07T18:05:16.487+05:30

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	0.0.0.0/0	

[Cancel](#) [Previous](#) [Launch](#)

## STEP 9: Creating a new key pair

**aws** Services Search for services, features, marks [Alt+S] voclabs/user1540272=soundarya.g@cs.christuniversity.in @ 2588... N. Virginia Support

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**AMI Details** [Edit AMI](#)

**Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0c2b8ca1dad447f8a**

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Root Device Type: ebs Virtualization type: hvm

**Instance Type** [Edit instance type](#)

Instance Type	ECUs
t2.micro	-

**Security Groups** [Edit security groups](#)

Security group name: launch-wizard-2  
Description: launch-wizard-2 created 2021-08-07T18:05:16.487+05:30

**Select an existing key pair or create a new key pair**

A key pair consists of a **public key** that AWS stores, and a **private key** file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

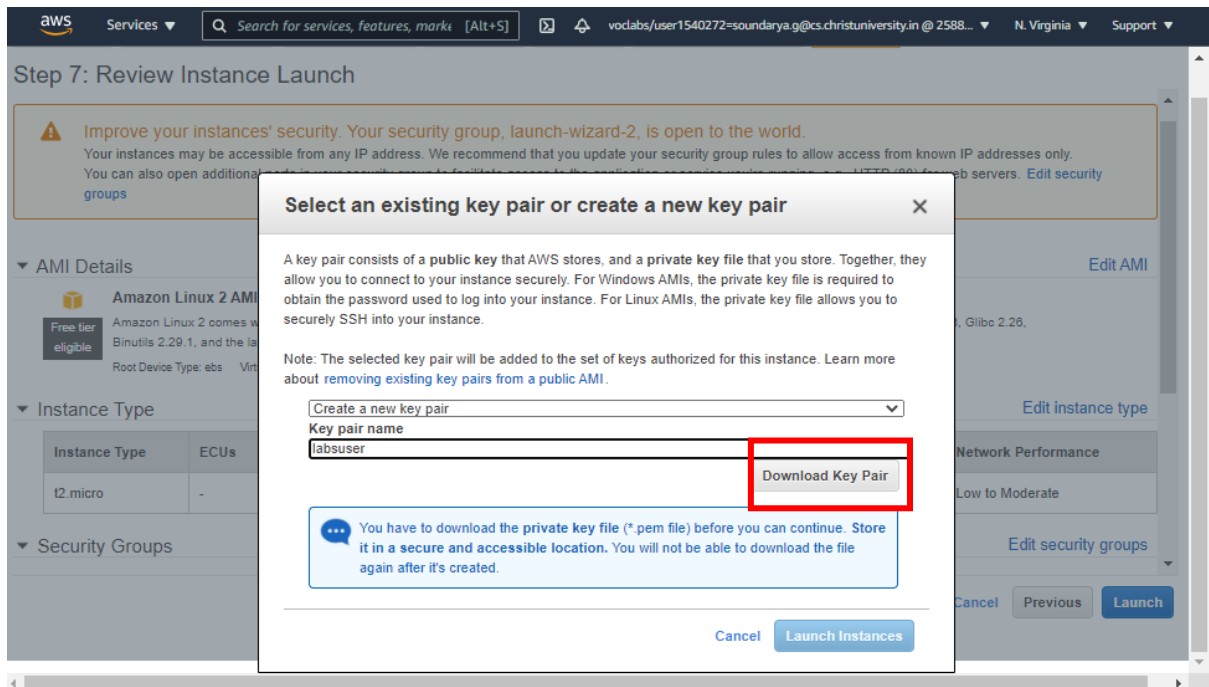
Choose an existing key pair  
**Create a new key pair**  
Proceed without a key pair

**No key pairs found**  
You don't have any key pairs. Please create a new key pair by selecting the **Create a new key pair** option above to continue.

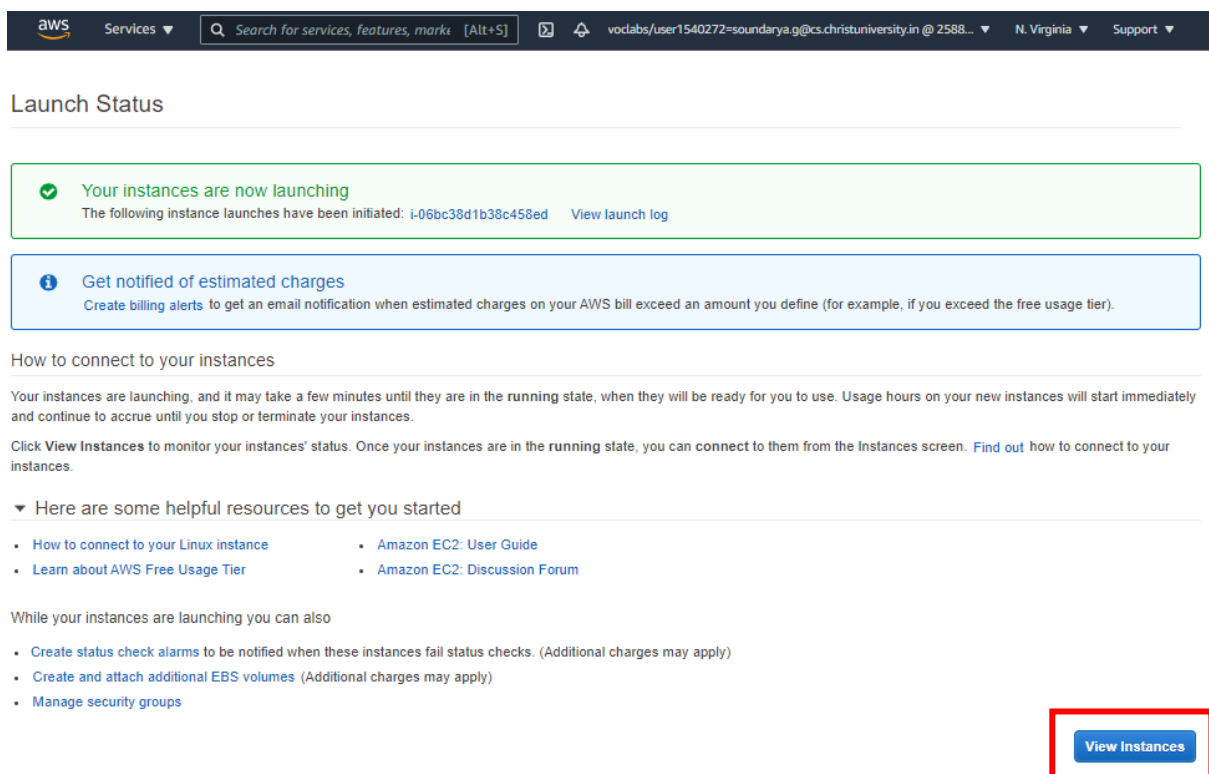
[Cancel](#) [Launch Instances](#)

[Cancel](#) [Previous](#) [Launch](#)

## STEP 10: Downloading key pair



## STEP 11: View Instance created



## STEP 12: Editing instance details

The screenshot shows the AWS Management Console interface. On the left is a navigation sidebar with categories like EC2 Dashboard, Events, Tags, Limits, Instances, Images, and Elastic Block Store. The main area displays a table of EC2 instances. One instance is selected, and an 'Edit Name' dialog box is open. The dialog has a text input field containing '2048057\_EC2' and buttons for 'Cancel' and 'Save'. Below the dialog, the 'Instance: i-06bc38d1b38c458ed' details panel is visible, showing tabs for Details, Security, Networking, Storage, Status checks, Monitoring, and Tags. The 'Details' tab is active, showing links for Instance summary, Instance details, Host and placement group, Capacity reservation, and Accelerators.

## STEP 13: Connecting the instance using its Public DNS and private key file

The screenshot shows the 'Connect to instance' page in the AWS Management Console. The page title is 'Connect to instance' and it provides instructions on how to connect to the instance i-06bc38d1b38c458ed. There are four tabs: EC2 Instance Connect, Session Manager, SSH client, and EC2 Serial Console. The 'SSH client' tab is selected. The page lists the Instance ID and provides a series of steps to connect via SSH. Step 4 shows the Public DNS address: ec2-54-162-222-125.compute-1.amazonaws.com. An example command is provided: `ssh -i "labsuser.pem" ec2-user@ec2-54-162-222-125.compute-1.amazonaws.com`. A note at the bottom 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.'



## STEP 14: Development Tools are installed and factorial python program is executed

```
Microsoft Windows [Version 10.0.19043.1110]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin\Downloads>ssh -i "labsuser.pem" ec2-user@ec2-54-162-222-125.compute-1.amazonaws.com
The authenticity of host 'ec2-54-162-222-125.compute-1.amazonaws.com (54.162.222.125)' can't be established.
ECDSA key fingerprint is SHA256:Jr3Bnv3+KR9LeBq4LsEUQXjdEs8nIs7ncAb3i3GssRE.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-54-162-222-125.compute-1.amazonaws.com,54.162.222.125' (ECDSA) to the list
of known hosts.

 _ | _ | _ )
 _ | ( _ /   Amazon Linux 2 AMI
 _ | \ _ | _ |

https://aws.amazon.com/amazon-linux-2/
4 package(s) needed for security, out of 16 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-56-76 ~]$ sudo yum groupinstall "Development Tools"
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
| 3.7 kB 00:00:00
Resolving Dependencies
--> Running transaction check
---> Package autoconf.noarch 0:2.69-11.amzn2 will be installed

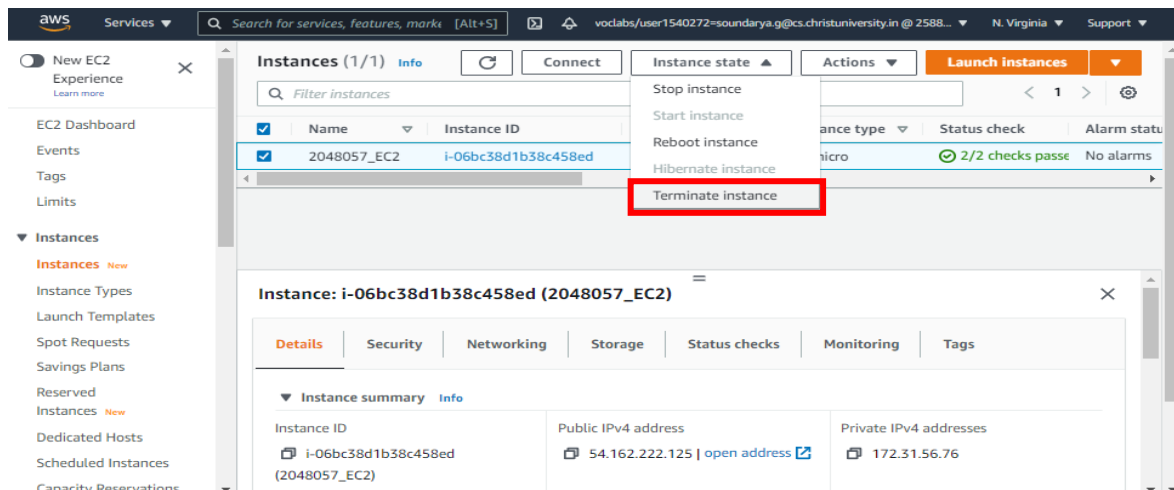
Complete!
[ec2-user@ip-172-31-56-76 ~]$ mkdir Lab1
[ec2-user@ip-172-31-56-76 ~]$ ls
Lab1
[ec2-user@ip-172-31-56-76 ~]$ cd Lab1
[ec2-user@ip-172-31-56-76 Lab1]$ cat>factorial.py
# Factorial of a number using recursion

def recur_factorial(n):
    if n == 1:
        return n
    else:
        return n*recur_factorial(n-1)

num = 7

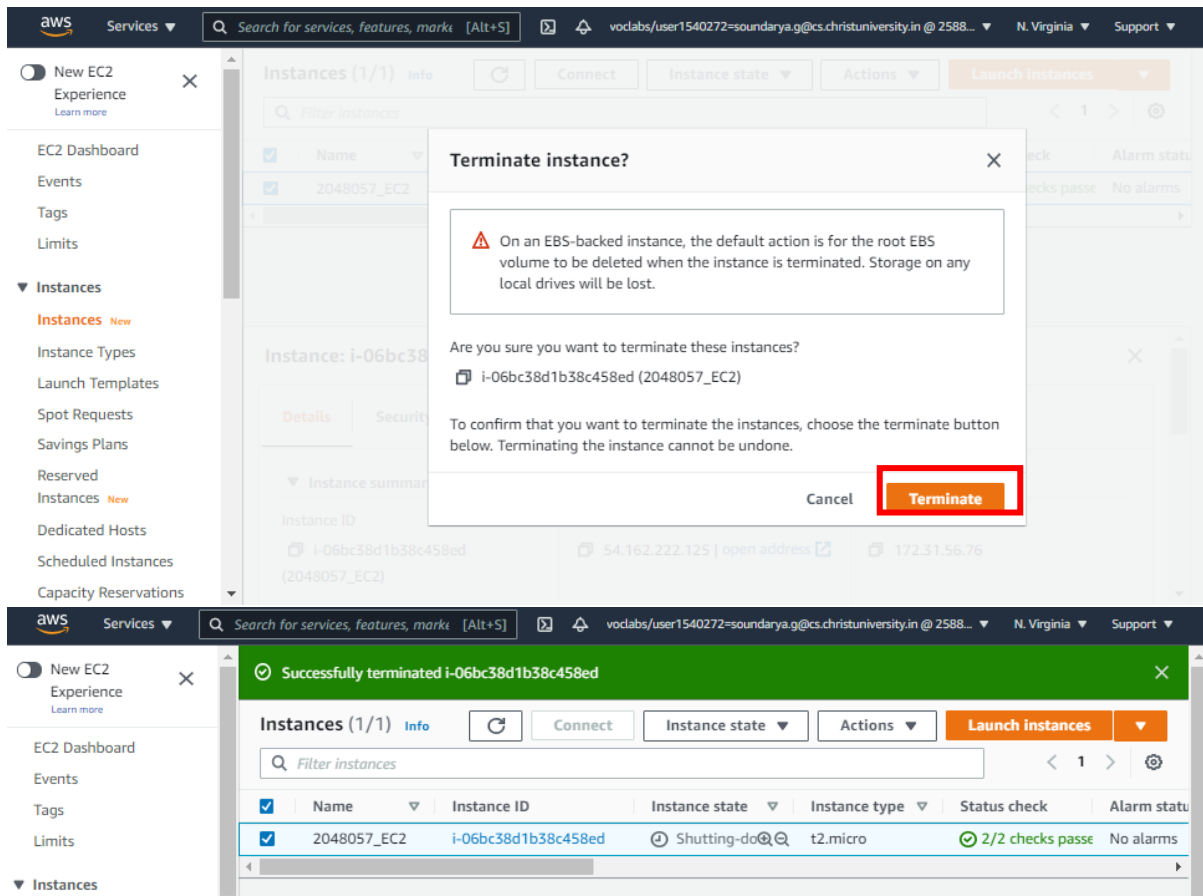
# check if the number is negative
if num < 0:
    print("Sorry, factorial does not exist for negative numbers")
elif num == 0:
    print("The factorial of 0 is 1")
else:
    print("The factorial of", num, "is", recur_factorial(num))
[ec2-user@ip-172-31-56-76 Lab1]$ python factorial.py
('The factorial of', 7, 'is', 5040)
```

## STEP 15: After use of instance changing the Instance status to Terminate



The screenshot displays the AWS Management Console interface. On the left, the 'Instances' section is expanded. The main panel shows a list of instances with columns for Name, Instance ID, and Instance state. The instance '2048057\_EC2' with ID 'i-06bc38d1b38c458ed' is selected. A dropdown menu for 'Instance state' is open, showing options like 'Stop instance', 'Start instance', 'Reboot instance', 'Hibernate instance', and 'Terminate instance', with 'Terminate instance' highlighted. Below this, the 'Instance: i-06bc38d1b38c458ed (2048057\_EC2)' details are shown, including the 'Instance summary' with fields for Instance ID, Public IPv4 address (54.162.222.125), and Private IPv4 address (172.31.56.76).

## STEP 16: Terminating the instance



The screenshot shows the AWS Management Console interface. On the left, the 'Instances' section is expanded. The main content area displays the 'Instances (1/1)' page. A modal dialog box titled 'Terminate instance?' is open, showing a warning about EBS-backed instances and a confirmation message. The 'Terminate' button is highlighted with a red box.

**Terminate instance?**

⚠ On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated. Storage on any local drives will be lost.

Are you sure you want to terminate these instances?

☐ i-06bc38d1b38c458ed (2048057\_EC2)

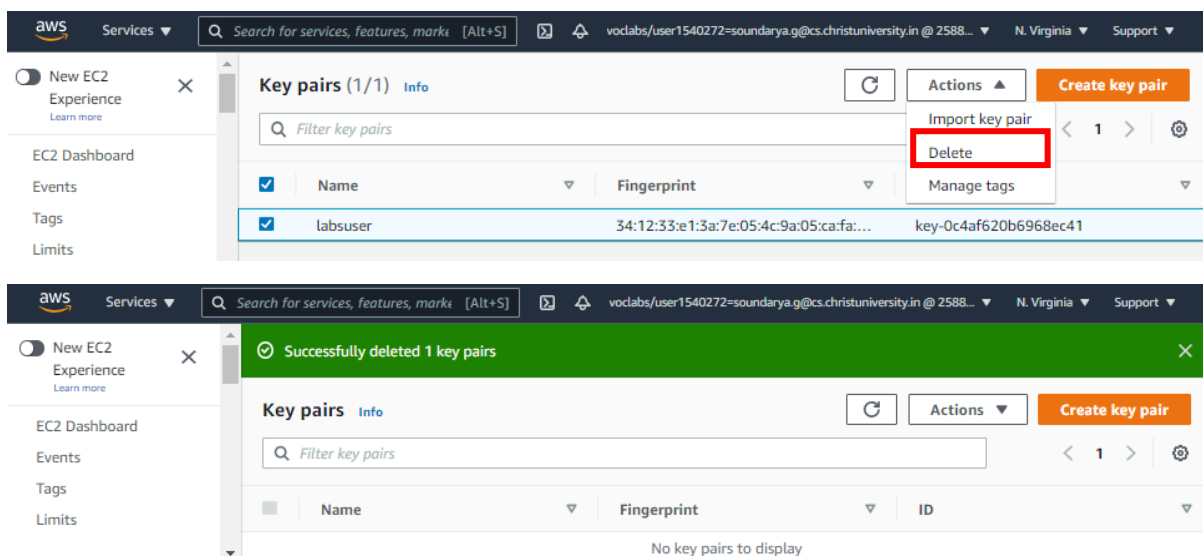
To confirm that you want to terminate the instances, choose the terminate button below. Terminating the instance cannot be undone.

Cancel **Terminate**

**Successfully terminated i-06bc38d1b38c458ed**

Name	Instance ID	Instance state	Instance type	Status check	Alarm status
2048057_EC2	i-06bc38d1b38c458ed	Shutting-down	t2.micro	2/2 checks passed	No alarms

## STEP 17: Deleting the key pair created



The screenshot shows the AWS Management Console interface. On the left, the 'Key pairs' section is expanded. The main content area displays the 'Key pairs (1/1)' page. The 'Delete' button is highlighted with a red box. Below, a confirmation message states 'Successfully deleted 1 key pairs'.

**Key pairs (1/1)**

Filter key pairs

Name	Fingerprint	ID
labsuser	34:12:33:e1:3a:7e:05:4c:9a:05:ca:fa:...	key-0c4af620b6968ec41

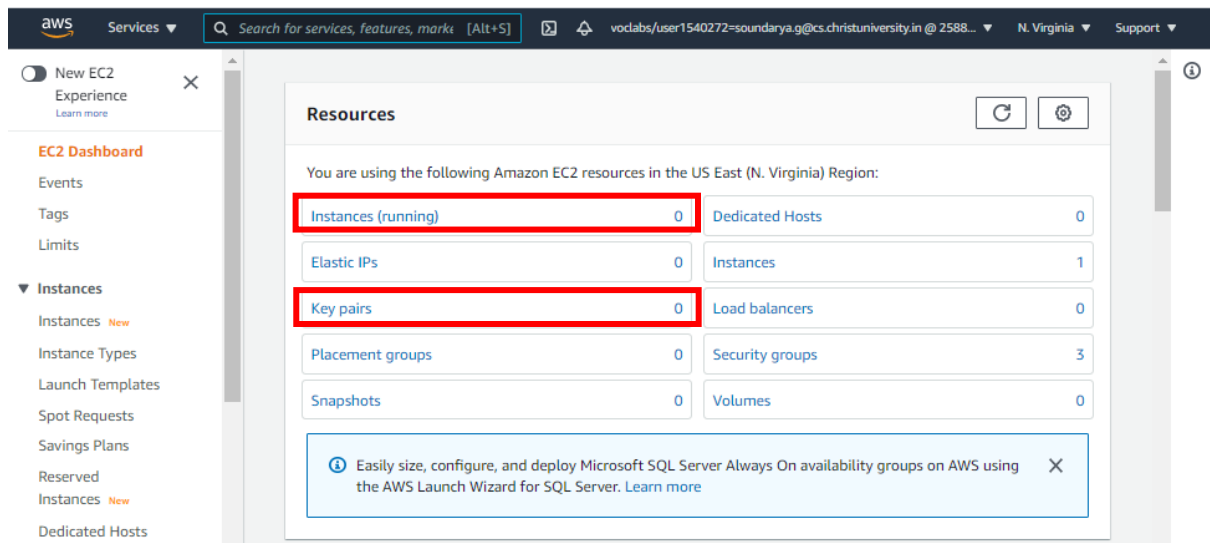
**Successfully deleted 1 key pairs**

**Key pairs**

Filter key pairs

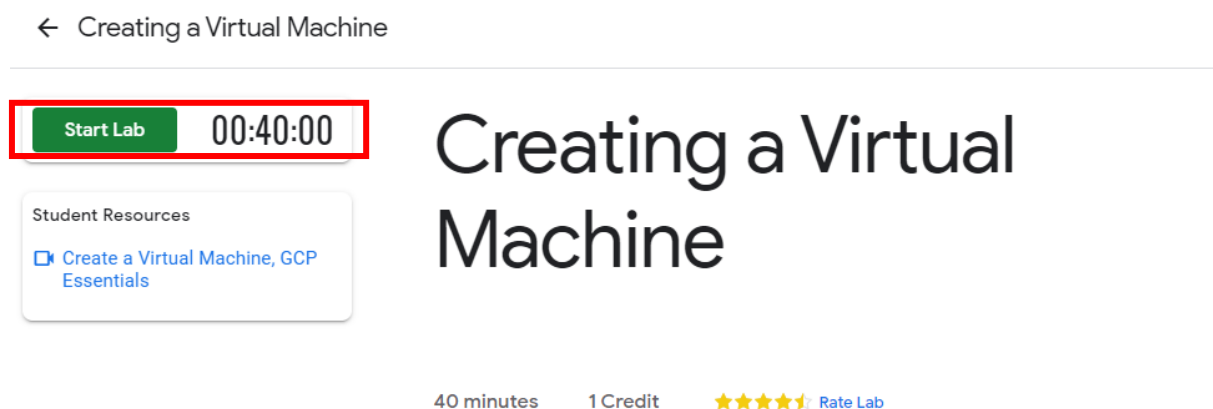
No key pairs to display

## STEP 18: Confirming if any instance running and any key pair is existing



## 4. Create a GCP VM Instance and install Nginx Web server.

### STEP 1: Create a Virtual Machine



**STEP 2:** Follow the instructions given to **create an VM instance** in the qwiklabs. The instance is now created with name **gcelab** and other requirements are specified while creating the instance.

The screenshot shows the Google Cloud Platform interface for VM instances. The left sidebar lists various resources, and the main area displays a table of VM instances. A red box highlights the instance named 'gcelab'. Below the table, a terminal window shows the execution of gcloud commands to set the active account and list project details.

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
Running	gcelab	us-central1-a			10.128.0.2 (nic0)	34.66.84.198	SSH

```
student_01_2f68212a6106@cloudshell:~ (qwiklabs-gcp-00-be8efeda7cd0) $ gcloud config set account 'ACCOUNT'
bash: Credentialed: command not found
student_01_2f68212a6106@cloudshell:~ (qwiklabs-gcp-00-be8efeda7cd0) $ gcloud config list project
[core]
project = quiklabs-gcp-00-be8efeda7cd0
Your active configuration is: [cloudshell-8839]
student_01_2f68212a6106@cloudshell:~ (qwiklabs-gcp-00-be8efeda7cd0) $
```

**STEP 3:** Install Nginx web server and edit “index.nginx-debian.html” as per the requirement.

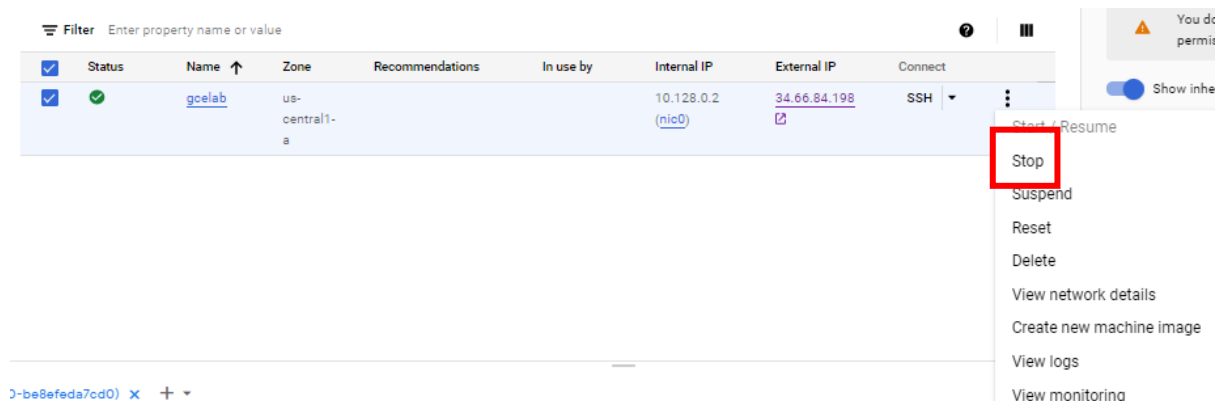
```
root@gcelab:~# cd /var/www/html
root@gcelab:/var/www/html# ls
index.nginx-debian.html
root@gcelab:/var/www/html# nano index.nginx-debian.html
root@gcelab:/var/www/html#
```

**STEP 4:** “Welcome to Cloud Analytics” web page is created and viewed with help of External IP.

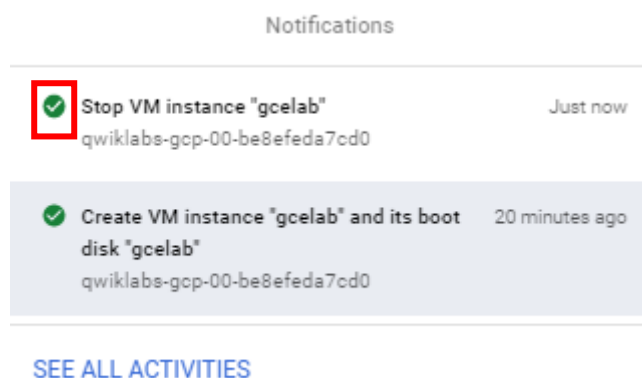
Filter Enter property name or value								
<input type="checkbox"/>	Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	✓	gcelab	us-central1-a			10.128.0.2 (nic0)	34.66.84.198 <a href="#">↗</a>	SSH ▾



**STEP 5:** STOP the instance after satisfying the requirement.



**STEP 6:** Check if the instance is stopped.



## Screenshot after the instance is stopped.

INSTANCES

INSTANCE SCHEDULE

Filter

Enter property name or value