



Tribhuvan University
Faculty of Humanities and Social Sciences

Cloud Computing

A LAB REPORT

Submitted to
Department of Computer Application
Shahid Smarak College

In partial fulfillment of the requirements for the Bachelors in Computer Application

Submitted by: -
Amir Maharjan

Instructor
Hari Lal Chalise

External Examiner

Table of Contents

Question 1: Write down step by step instruction to install Virtual Box with different flavors of Linux or windows OS.....	1
Question 2: Take Snapshot of each VM OS and restore it.	7
Question 3: Register an” amazon educate” account with college email address.....	9
Question 4: Upload any file to amazon s3.....	12
Question 5: Amazon Instance EC2.....	16
Question 6: Creating a Virtual Private Cloud (VPC)	21

Question 1

Write down step by step instruction to install Virtual Box with different flavors of Linux or windows OS.

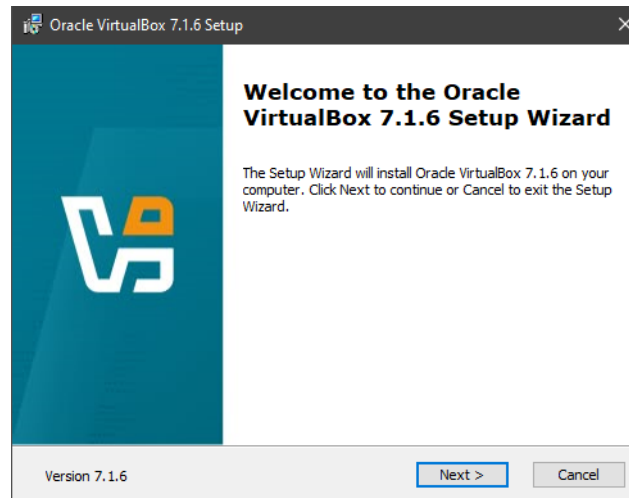
Objective: To help install Oracle VM VirtualBox and set up various operating systems (Linux or Windows) as virtual machines.

Steps 1: Download virtual box from <https://www.virtualbox.org/wiki/Downloads>.

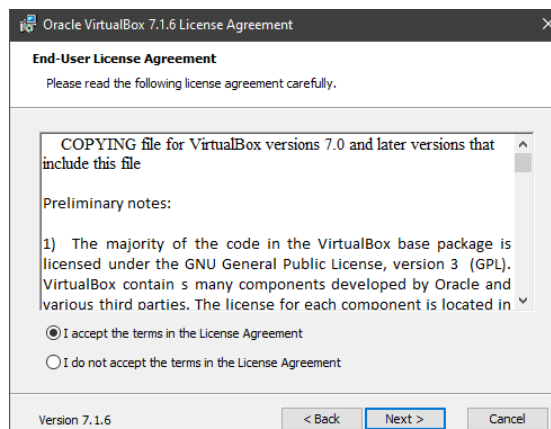


Steps 2: Open the downloaded file.

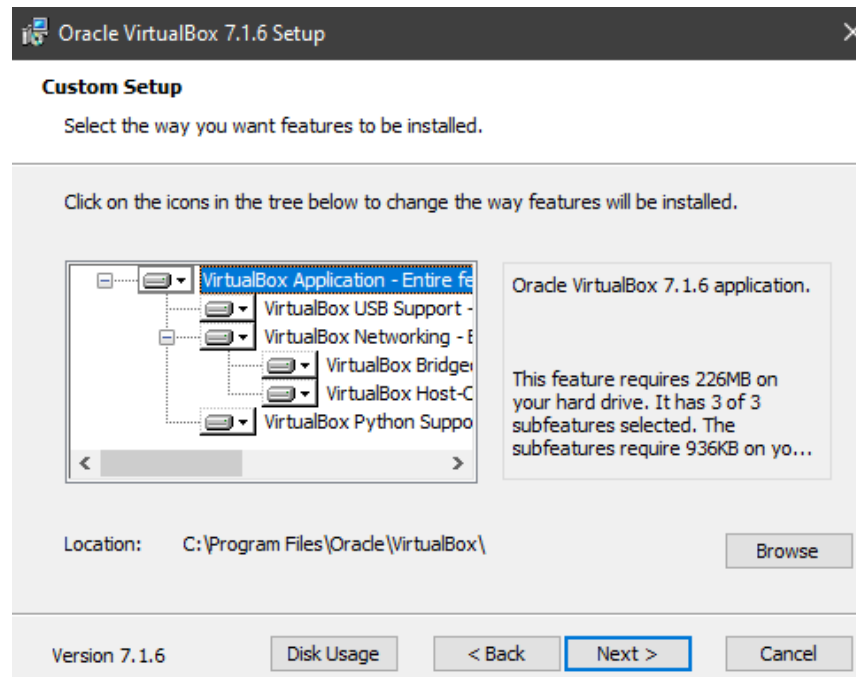
Step 2.1: Initial interface is shown below. Click Next Button.



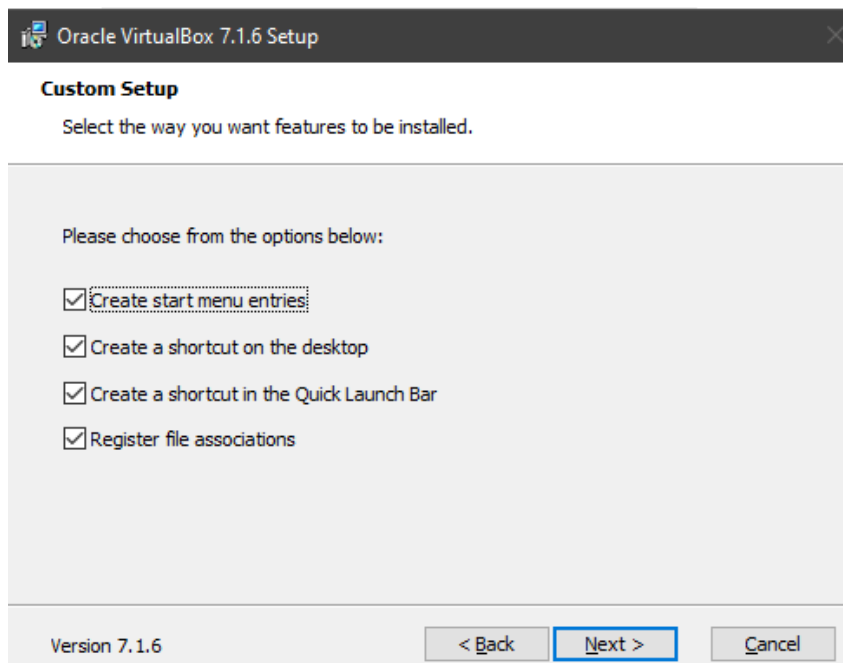
Step 2.2: After clicking the next button, this interface will be shown, check I accept and click next.



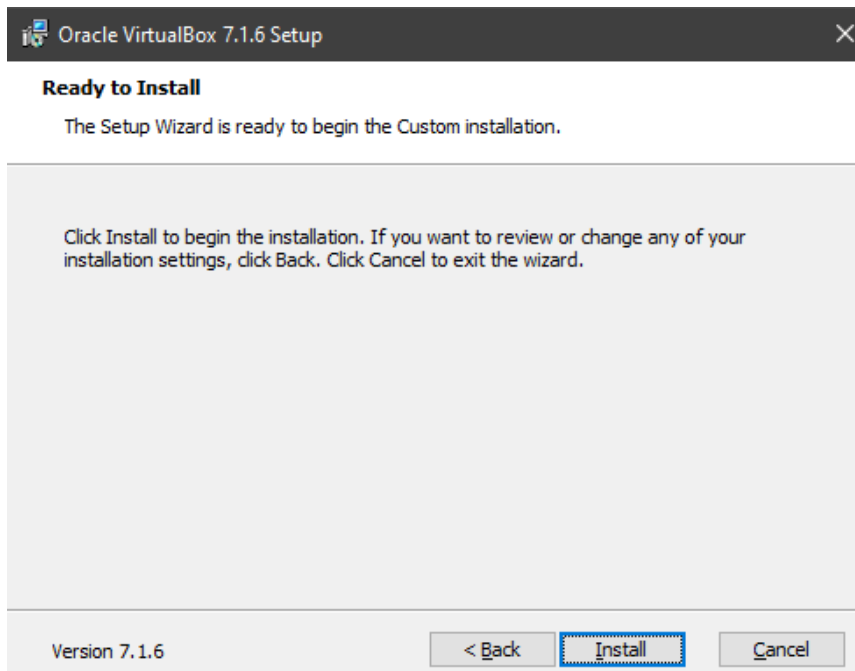
Step 2.3: Now select a location and click next.



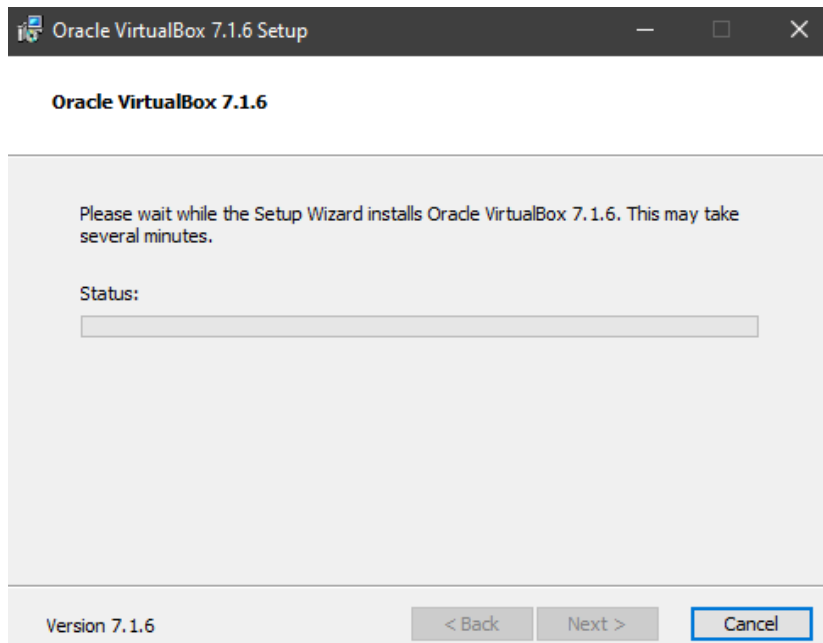
Step 2.4: Select the way you want features to be installed.



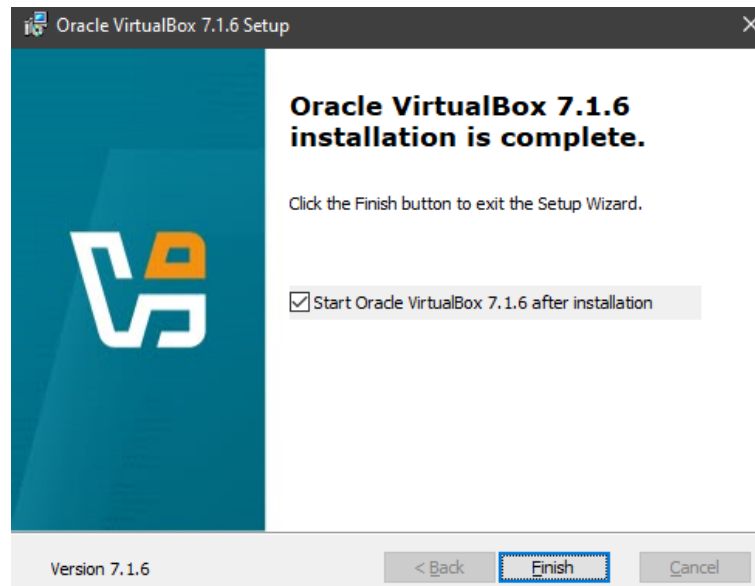
Step 2.5: Ready to Install, click install.



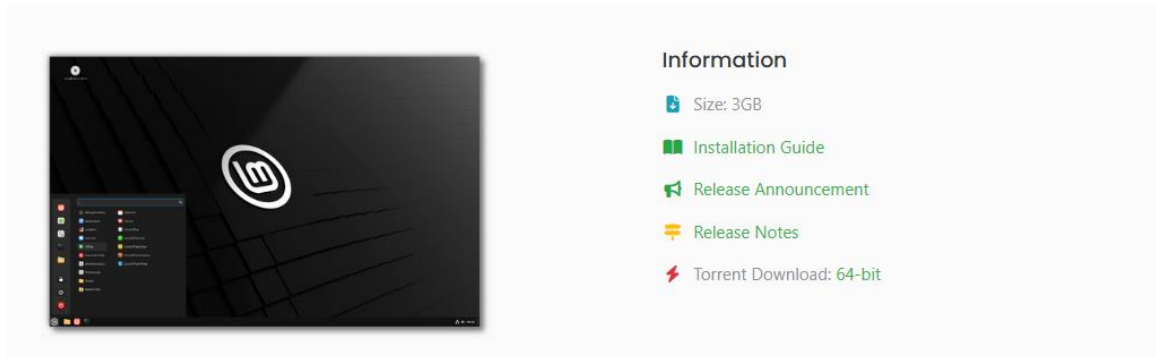
Step 2.6: Wait for installation to be completed.



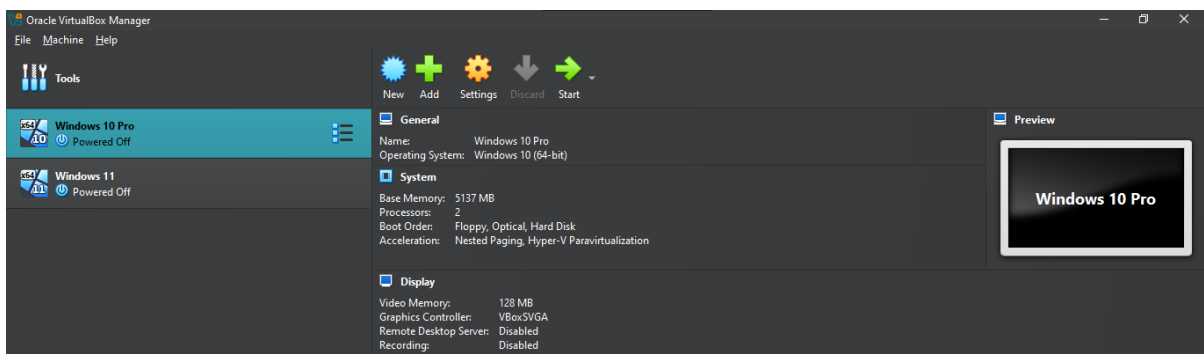
Step 2.6: Installation is completed. Click Finish.



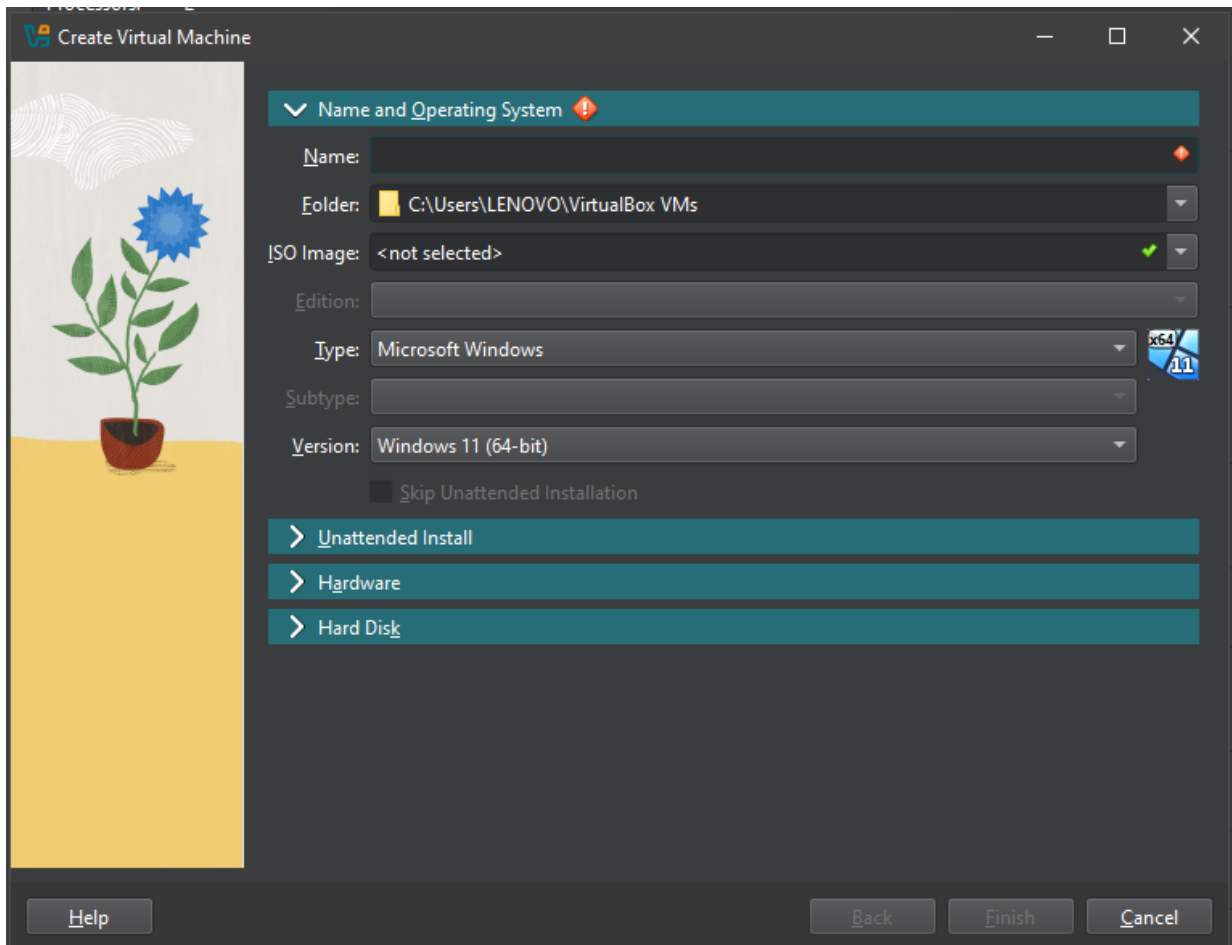
Step 3: Download the OS disc file that you want to install in the virtual box. We will install [linuxmint](https://linuxmint.com/).



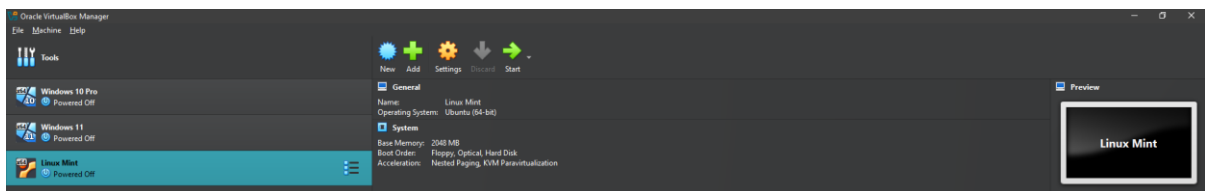
Step 4: While we wait for download to complete, lets fire up the virtual box. The initial interface is shown below.



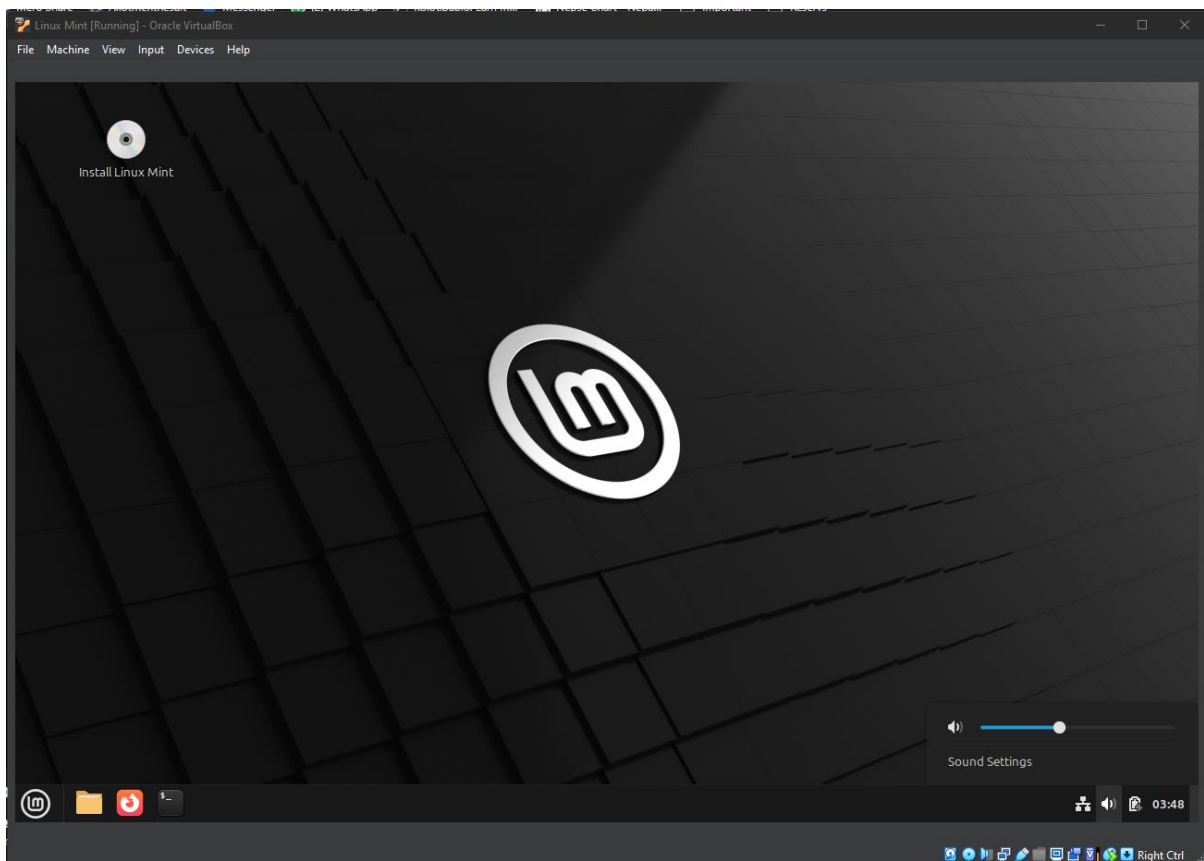
Step 5: Click on the New button in the top bar, a popup will be shown.



Step 6: Fill out the details and select the downloaded iso disc file in iso image field and click finish. The added OS will be shown in the left-hand side of the screen.



Step 7: Click the start button in the top bar and the linux mint OS should fire up.

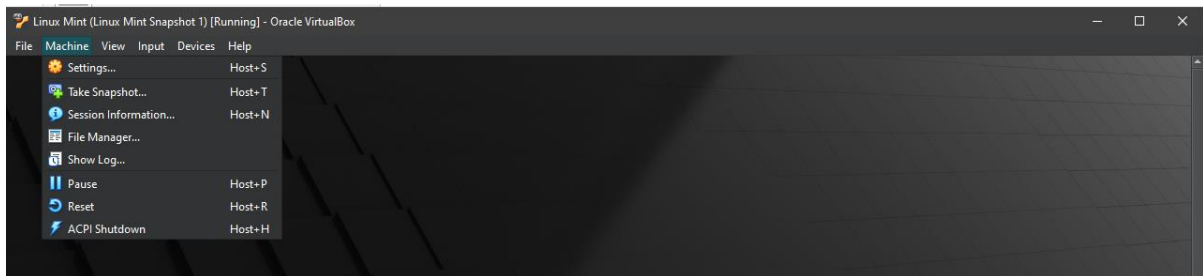


Question 2

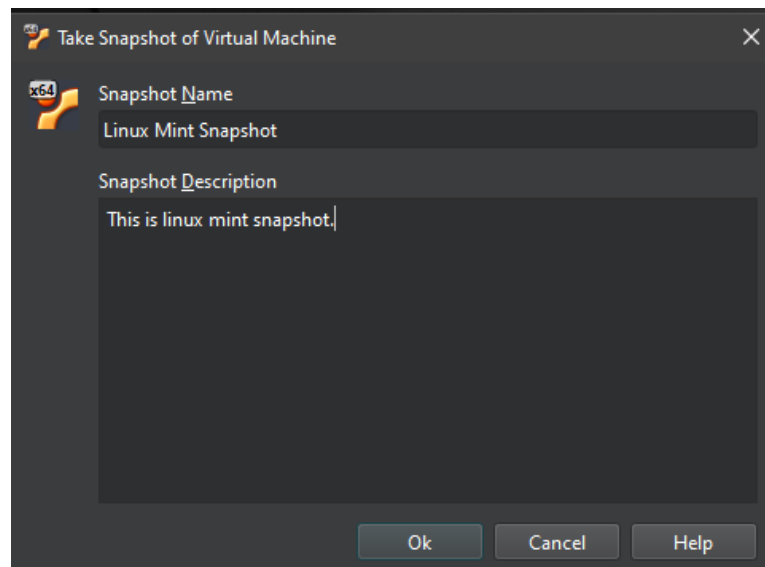
Take Snapshot of each VM OS and restore it.

Objective: To help take snapshots of each virtual machine (VM) operating system and restore them using Oracle VM VirtualBox.

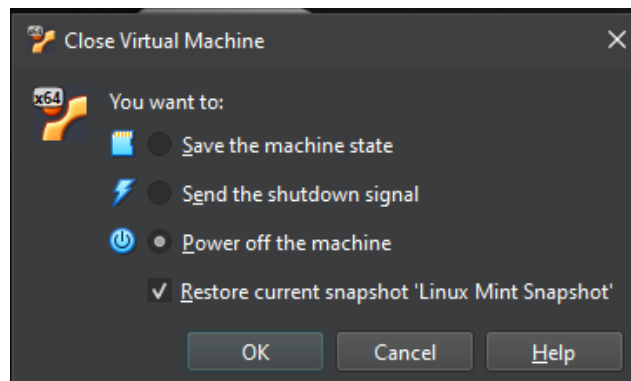
Step 1: In the machine tab, you will see take a snapshot option, click on it.



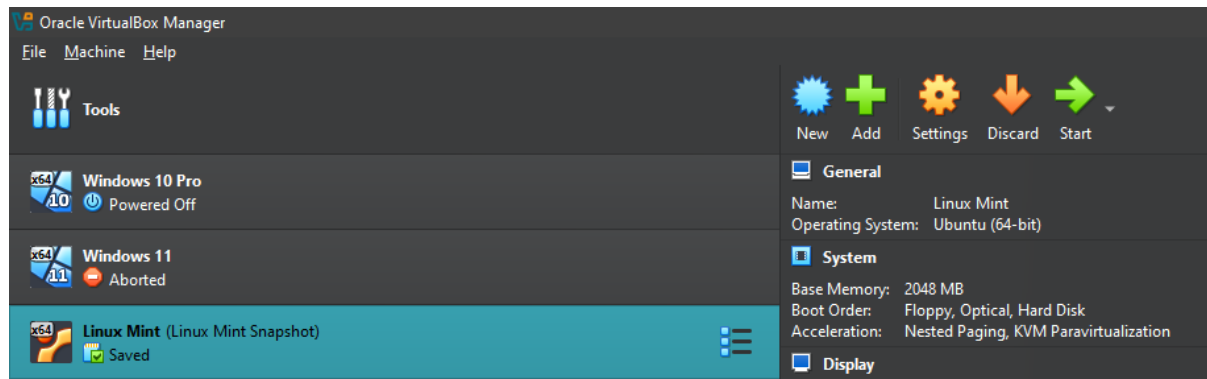
Step 2: A new popup will show, fill out the details and click ok.



Step 3: When closing the OS, you will see a new option “Restore current snapshot Linux Mint Snapshot”. Check it and click ok.



Step 4: You will see the name of the snapshot in the left-hand side of the screen

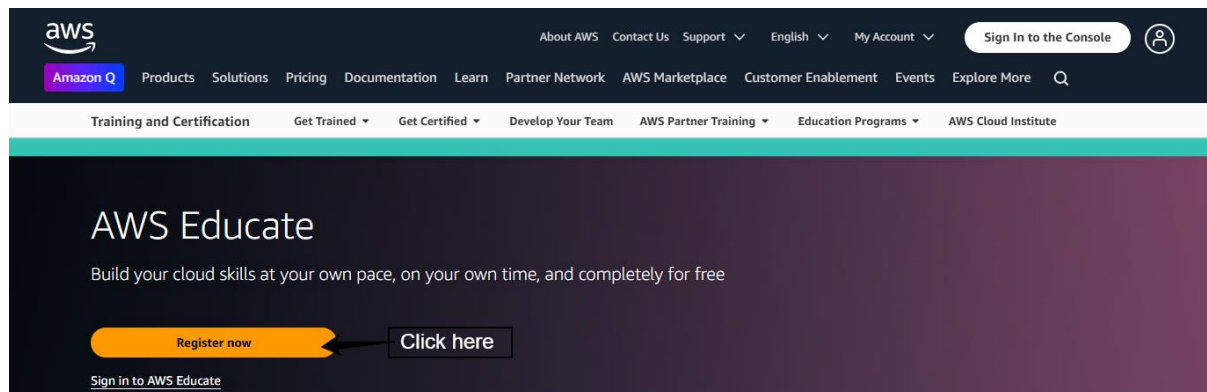


Question 3

Register an "amazon educate" account with college email address.

Objective: To help walk through the process of registering an **Amazon Educate** account using your college email address

Step 1: Go to aws.amazon.com/education/awseducate/ and click register now.



Step 2: Fill out the form and click create account.

Create your account

Already have a learner account? [Sign in](#)
Looking to hire cloud talent? [Register as a recruiter](#)

First name

Amir

Middle name - *optional*

Last name

Maharjan

Country

Nepal

State or province

Bagmati Zone

City

Kathmandu

Birth month

January

Birth year

2001

Email

mhrznamir.am@gmail.com

What program(s) are you associated with?

AWS Academy

Language

English

Registration code - *optional*

EducateLP

protected by reCAPTCHA

[Privacy](#) - [Terms](#)

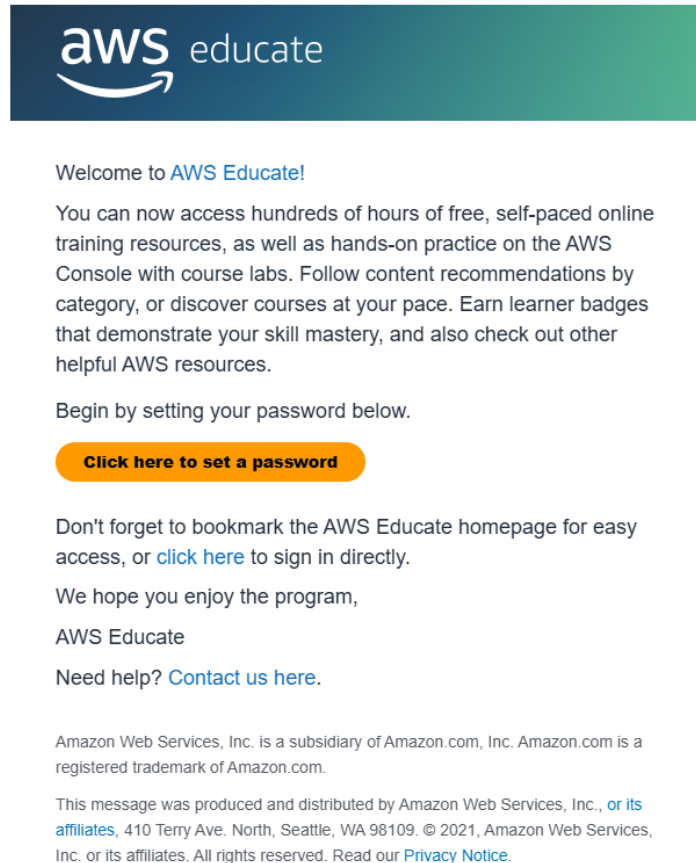
☒ Yes, I'd like Amazon Web Services (AWS) to share the latest news about AWS services and related offerings with me by email, post or telephone. You may unsubscribe from receiving AWS news and offers at any time by following the instructions in the communications received.

By creating your account, you agree to the [AWS Learner Terms and Conditions](#). The information you provide will be handled by AWS as described in the [AWS Privacy Notice](#).

[Back](#)

[Create account](#)

Step 3: Check email to verify your registration and shortly after another email will be sent to you to set a password.



Step 4: After clicking on “Click here to set a password”, you will be redirected to a popup like below.

A screenshot of a "Set your password" popup. The title "Set your password" is in bold. Below it, the instruction "Enter a password that contains at least:" is followed by four green checkmarks indicating requirements: 8 characters, 1 letter, 1 number, and 1 special character. There are two input fields: "Enter a password" and "Confirm password", both containing masked characters (dots). An orange "Continue" button is located at the bottom right of the popup.

Step 5: After clicking continue in step 4, you will be redirected to a page below:

The screenshot displays the AWS Educate homepage. At the top, the AWS Educate logo is on the left, and navigation links for 'Courses & labs', 'Jobs', and a user profile 'Amir Maharjan' are on the right. A large teal banner reads 'Your cloud journey starts here' with the subtext 'No matter your goal, we've gathered the most useful content to build your cloud skills.'

Below the banner, a 'Filters' sidebar on the left lists 'Course Features', 'Skills', 'Level', and 'Duration'. The main content area is titled 'Getting Started' with the subtitle 'New to cloud computing? Start here.' and a pagination indicator '1/2'. It features five course cards, each with an AWS logo icon, a title, a duration, and a category tag:

- Introduction to the AWS Management Console**: Foundational | 1 hour(s), Cloud Computing
- Introduction to Cloud 101**: Foundational | 3 hour(s), Cloud Computing
- Getting Started with Storage**: Foundational | 2 hour(s), Cloud Computing
- Getting Started with Compute**: Foundational | 2 hour(s), Cloud Computing
- Getting Started with Networking**: Foundational | 2 hour(s), Network & Infrastructure

On the right, a sidebar contains an 'Explore' section with the text 'Learn more from AWS'. Below it, a section titled 'We want to hear from you! Tell us about your AWS Educate experience so we can improve' includes a 'Share your feedback now' link. Further down, there are promotional banners for the AWS Cloud Institute, AI Practitioner certification, and GenAI training.

Question 4

Upload any file to amazon s3.

Objective: to through the process of uploading a file to **Amazon S3** (Simple Storage Service). **Amazon S3** is a scalable object storage service provided by Amazon Web Services (AWS) that allows you to store and retrieve any amount of data at any time.

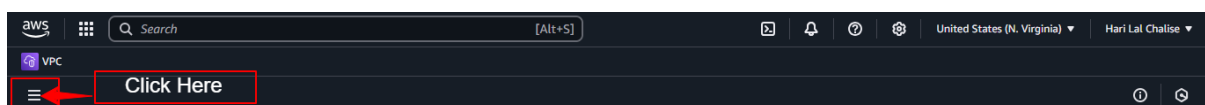
Bucket: A bucket is a container for storing objects (files) in S3. Every object is stored in a bucket and is identified by a unique key (name). You can think of a bucket as a folder in a file system, but it exists at a global level, meaning each bucket name in S3 must be unique across all AWS users.

Usage:

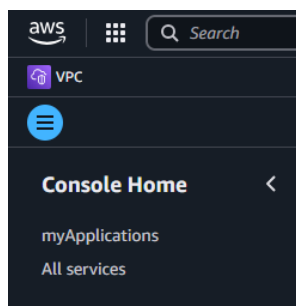
- **Store files:** You can store any type of data (images, videos, documents, backups, etc.) in an S3 bucket.
- **Organize:** Buckets help organize your files in a way that they are easy to access and manage.
- **Access control:** You can set permissions on a bucket and its contents to control access, allowing only authorized users to upload or download files.

Step 1: Open the amazon console <http://console.aws.amazon.com/>.

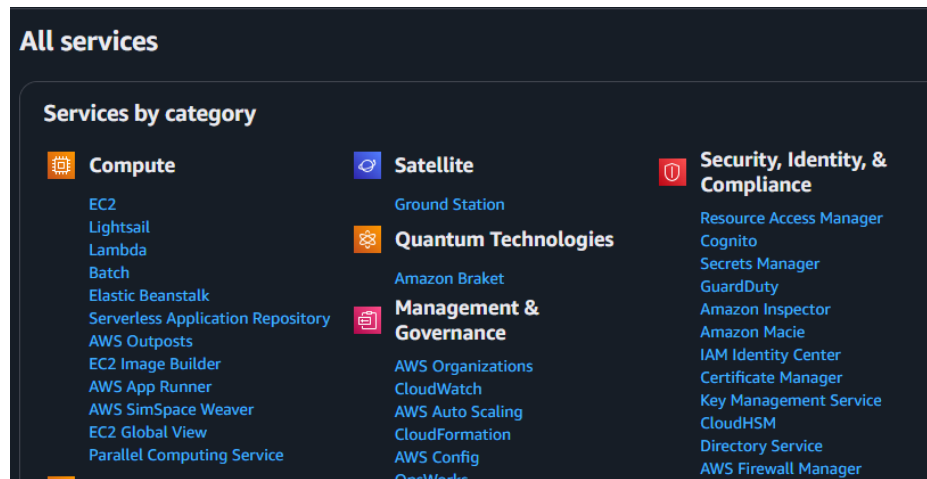
Step 2: Click on the bar in the left-hand side of the screen



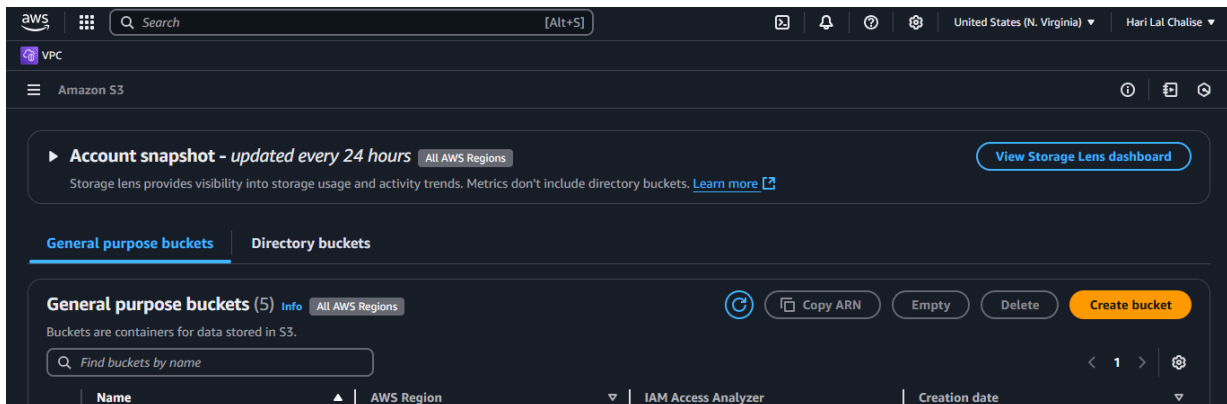
Step 3: A sidebar will open, click on all services.



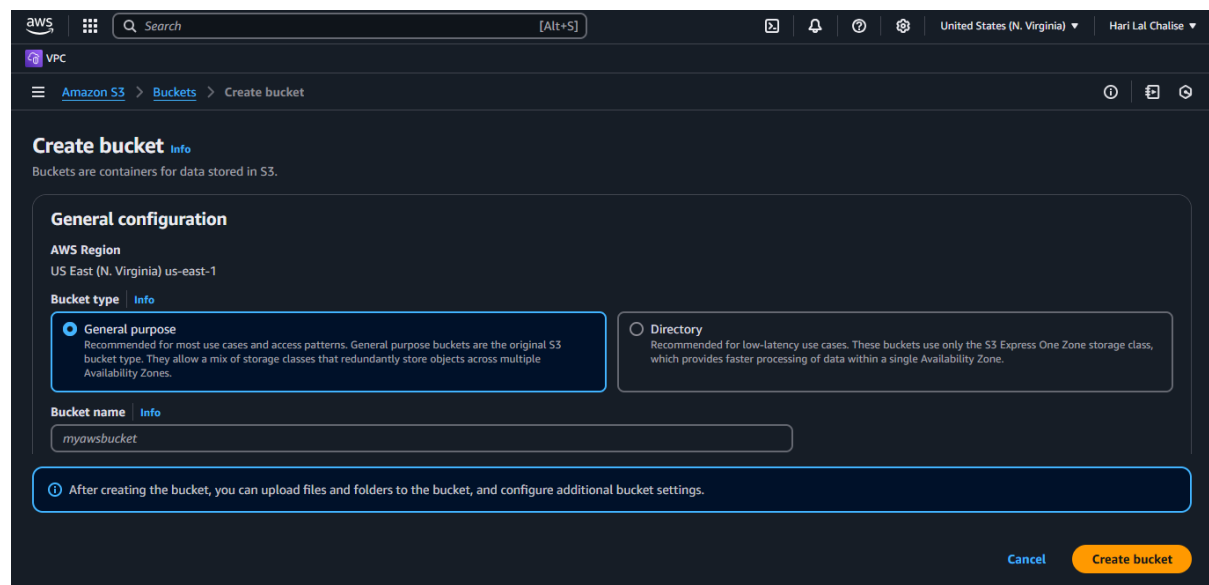
Step 4: A full list of services will be shown to you, find and select a service called S3.



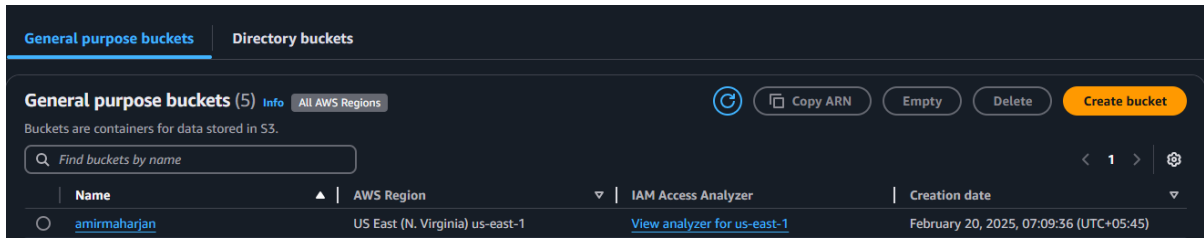
Step 5: After select S3, you will be redirected to a new page.



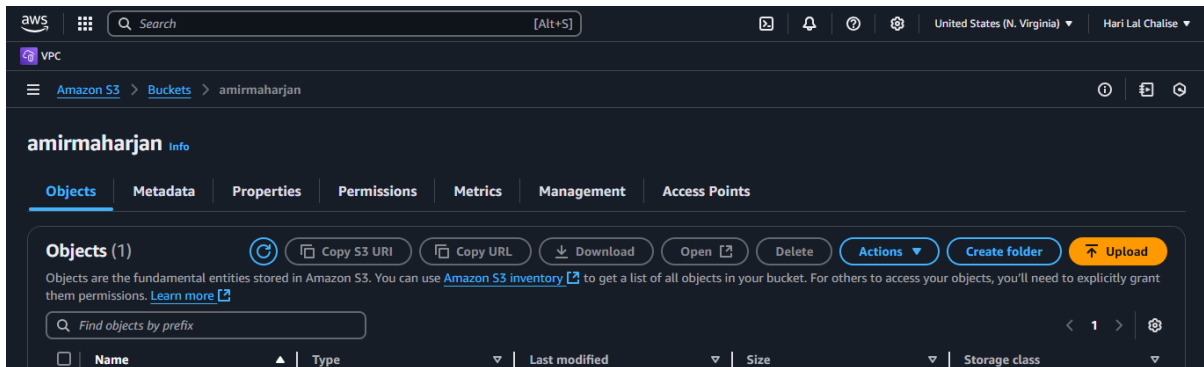
Step 6: You will see a “Create Bucket” button click on it and you will be redirected to this page.



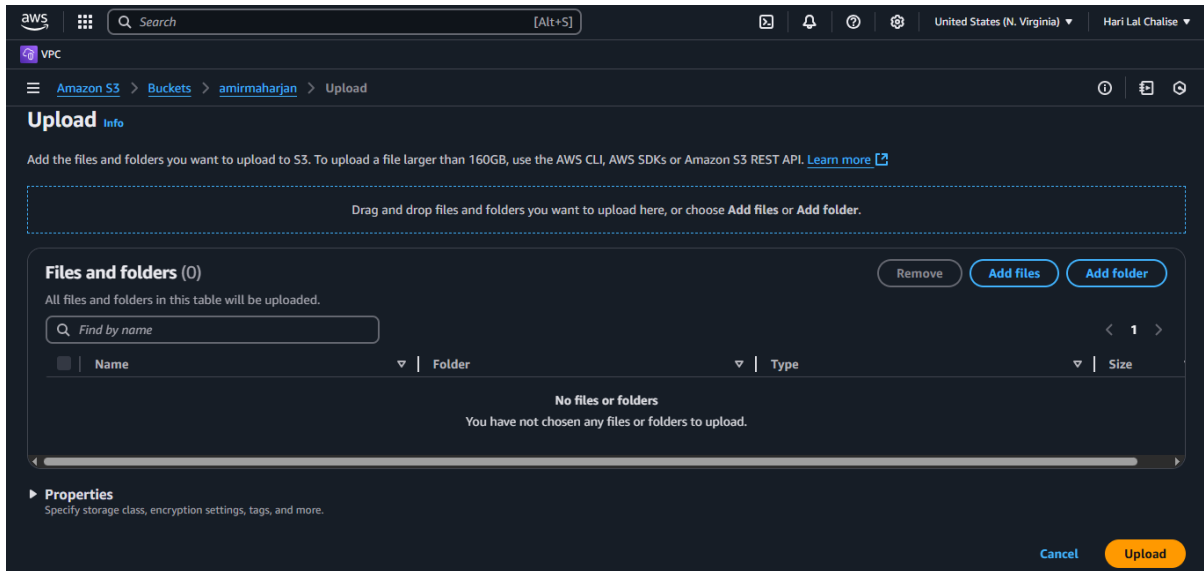
Step 7: After creating a bucket, you will see the bucket you created here.



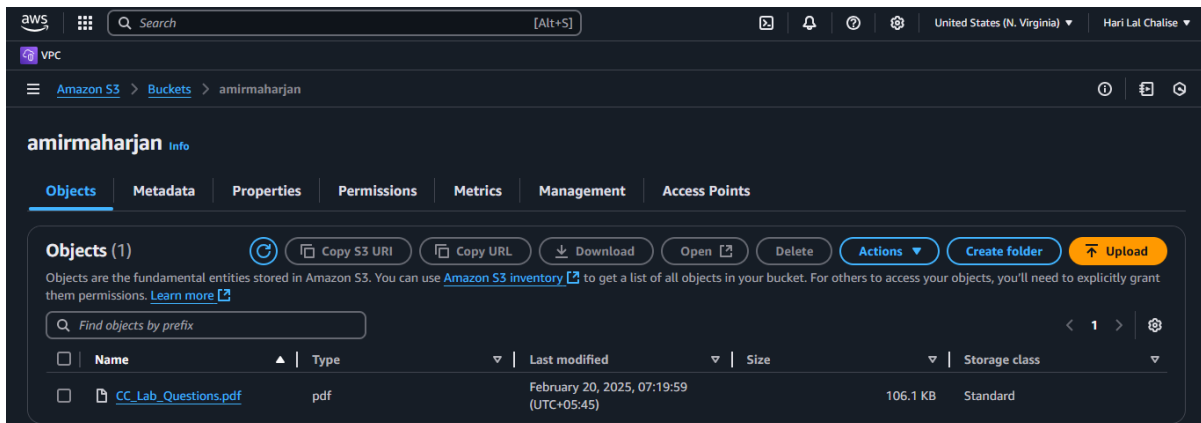
Step 8: From the list of buckets, click on the one you just created. You will be redirected here.



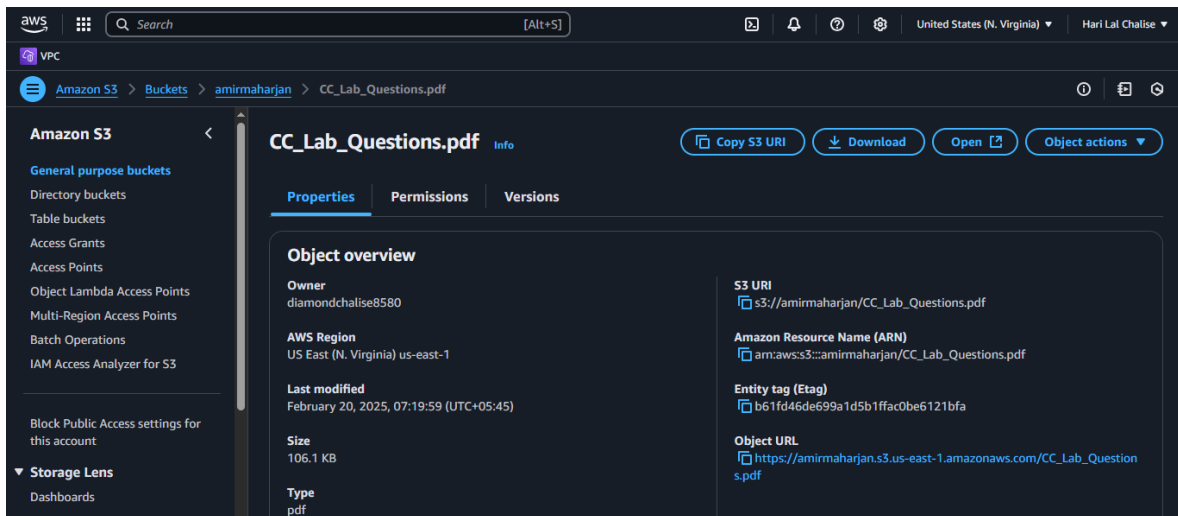
Step 9: You will see an “Upload” button. Click on it and you will be redirected here. There are “Add Files” and “Add Folders” buttons that will allow you to upload objects like pdf, images, etc.



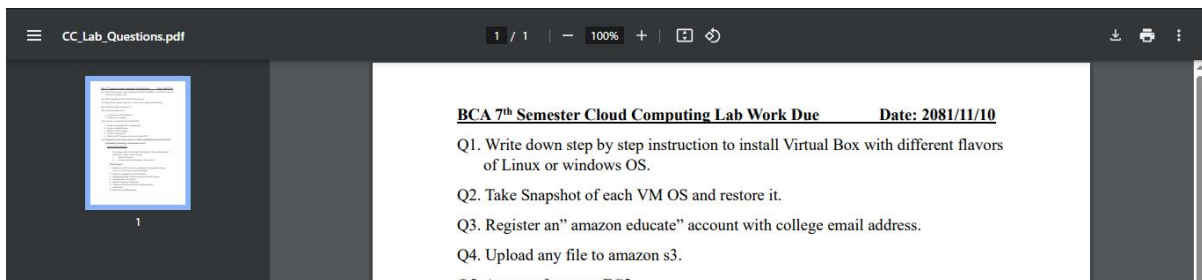
Step 10: After uploading your desired files, you will see them here.



Step 11: Click on the object you have uploaded and you will see something like this. Click on the “Object URL” link.



Step 12: When you click on the link you will be redirected to contents of your uploaded objects.



Question 5

Amazon Instance EC2

- a. Launching an EC2 Instance
- b. Monitor your instance

Objective: to learn how to launch an EC2 instance and monitor it.

EC2: a virtual server in Amazon's Elastic Compute Cloud (EC2) scalable compute platform for running applications on the Amazon Web Services (AWS) cloud.

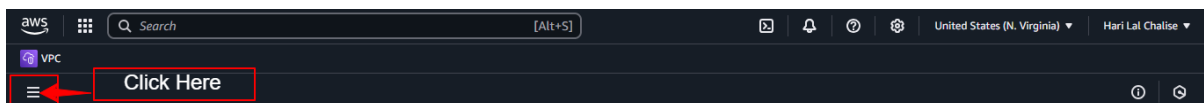
Usage

- **Web Hosting:** Host dynamic websites and applications.
- **Data Processing:** Run big data analytics and machine learning models.
- **Application Hosting:** Host microservices and backend applications.

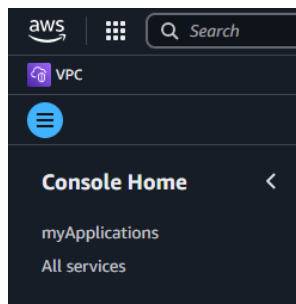
1. Launching an EC2 Instance

Step 1: Open the amazon console <http://console.aws.amazon.com/>.

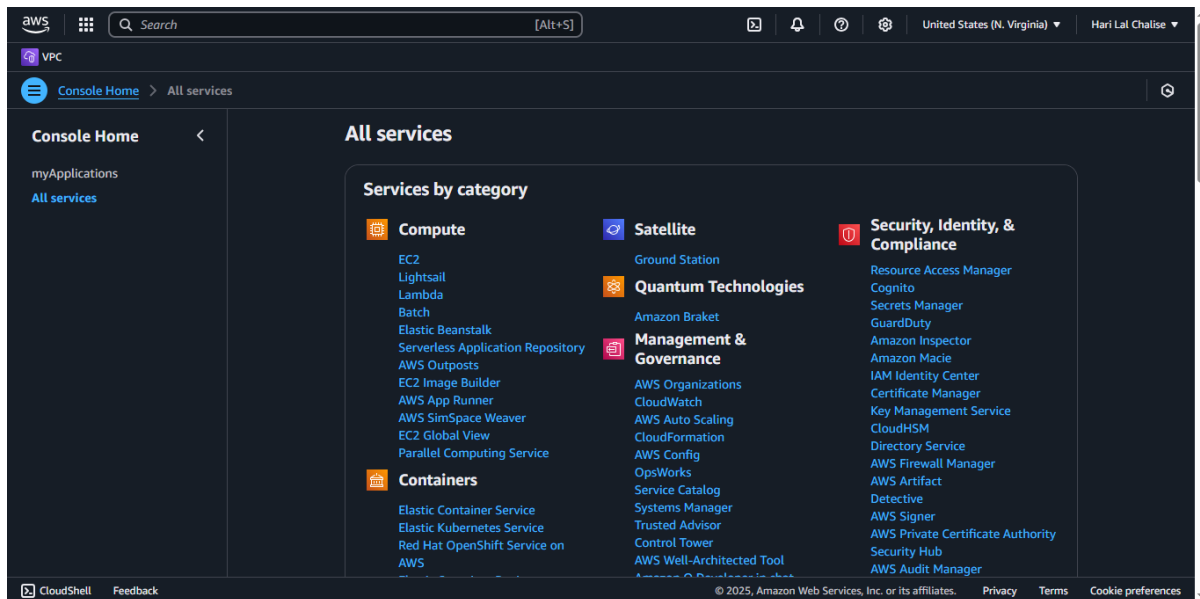
Step 2: Click on the bar in the left-hand side of the screen



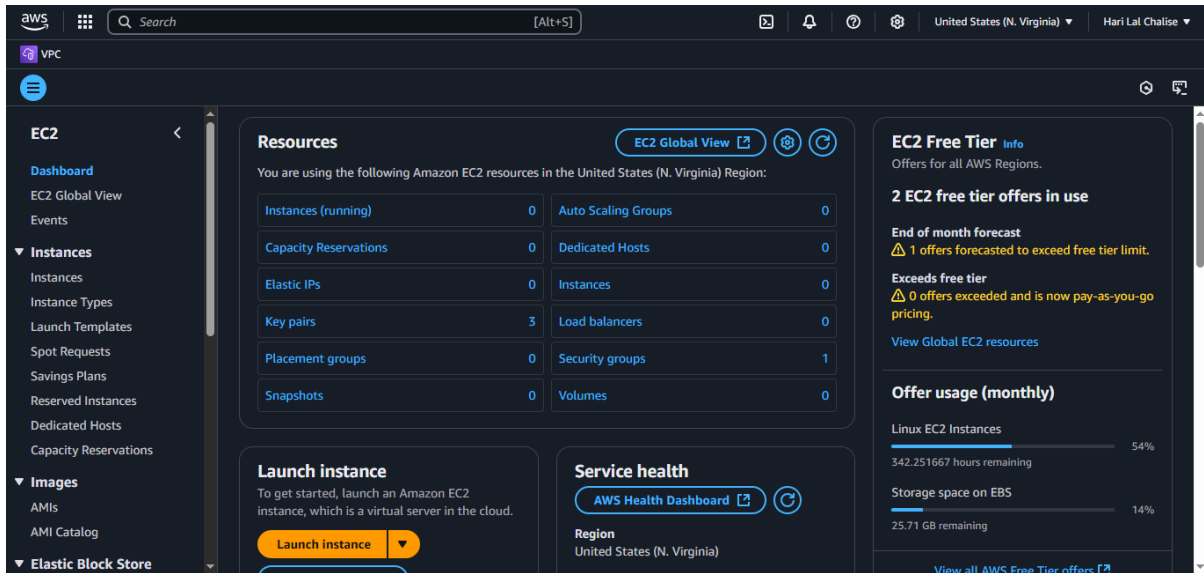
Step 3: A sidebar will open, click on all services.



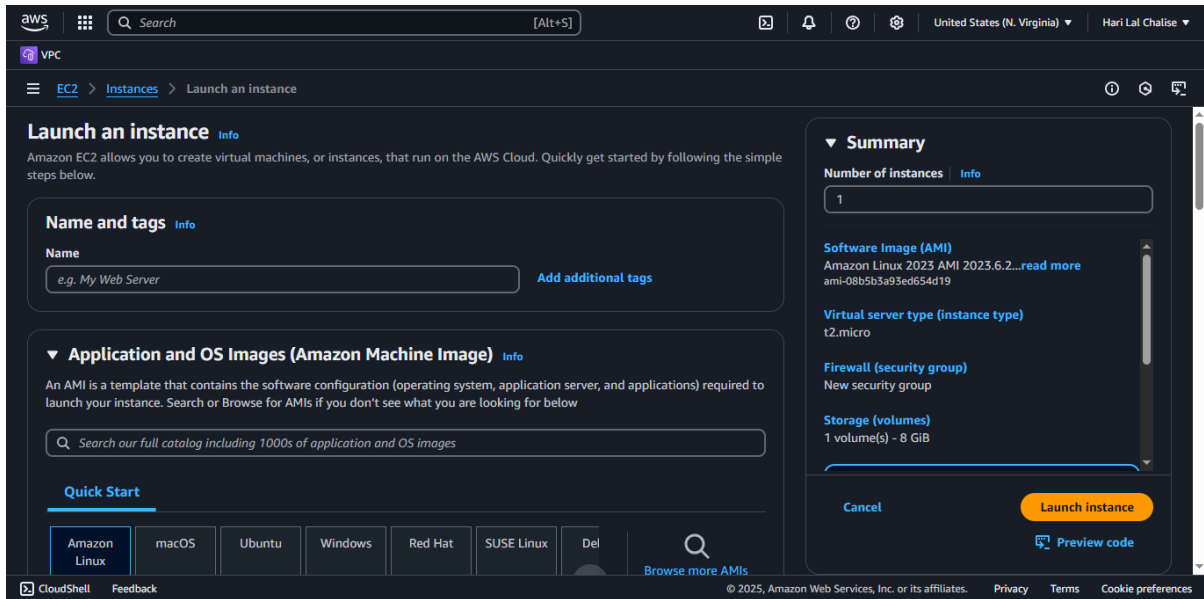
Step 4: A full list of services will be shown to you, find and select a service called EC2.



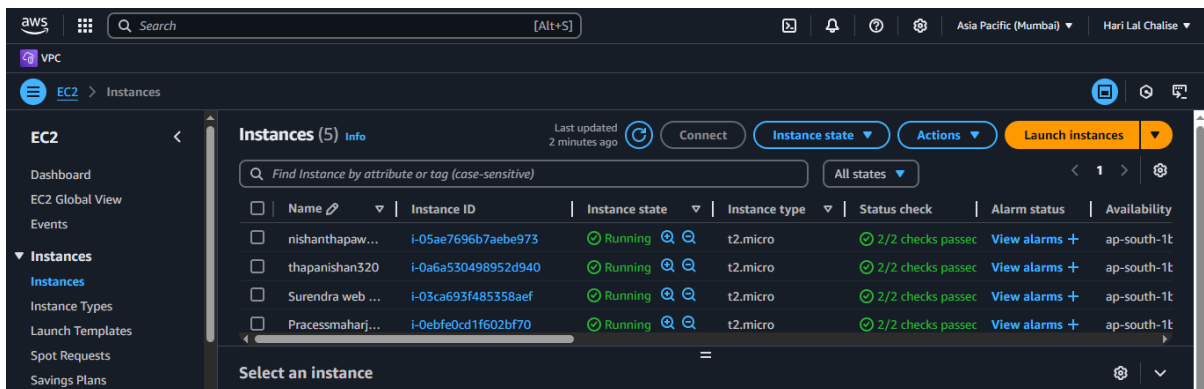
Step 5: After click on EC2 service, you will be redirected here.



Step 6: Fill the necessary details like “Name and tags”, “Instance Types”, “Key pair” and click on “Launch Instance” button. Note: “Instance Types” may charge additional costs depending on the type you choose. As for “Key pair”, if a key pair already exists select that or create a new key pair by clicking on the “create new key pair” button.

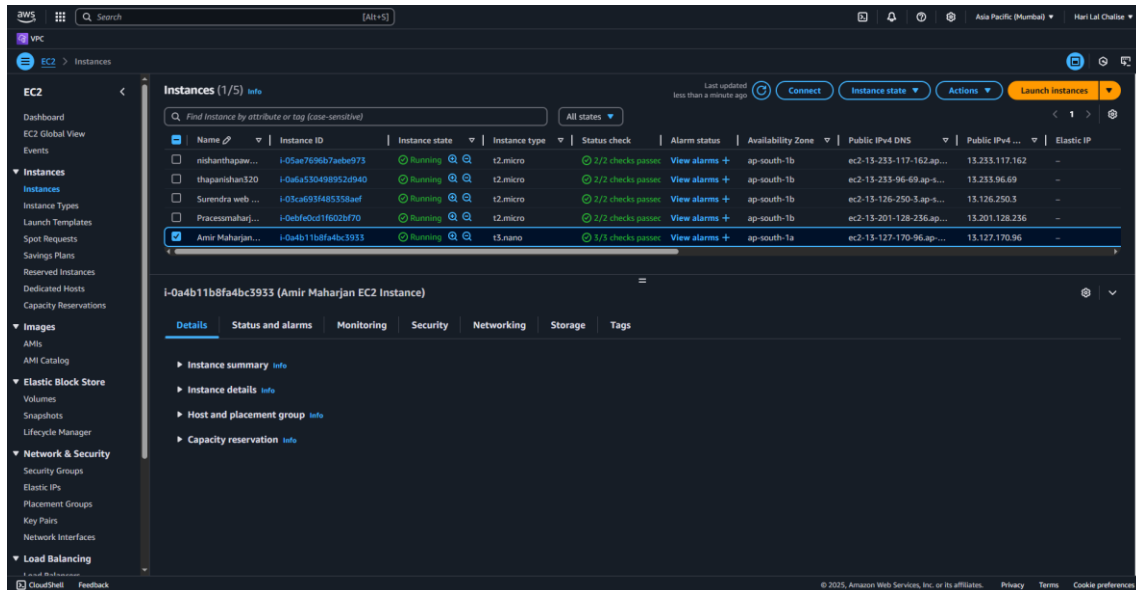


Step 7: Launching an instance will take a while. After instance is successfully launched you will see a “View all instances” button, click on it and it will show you the list of all the EC2 instances.

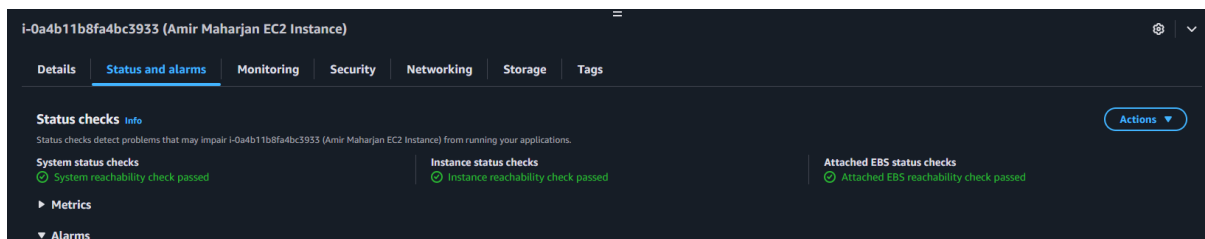


2. Monitor your instance

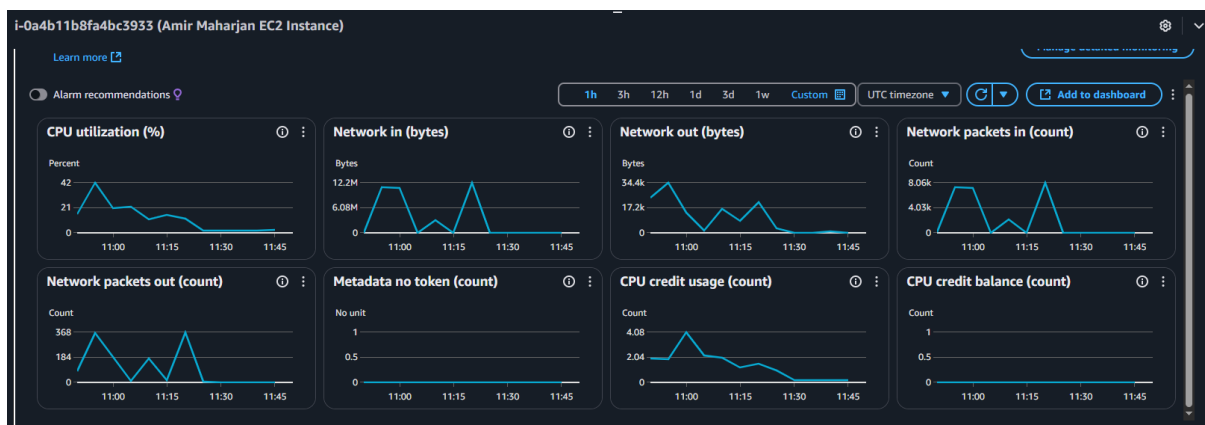
Step 1: Check on your instance and you will see details of that instance. It should look something like this.



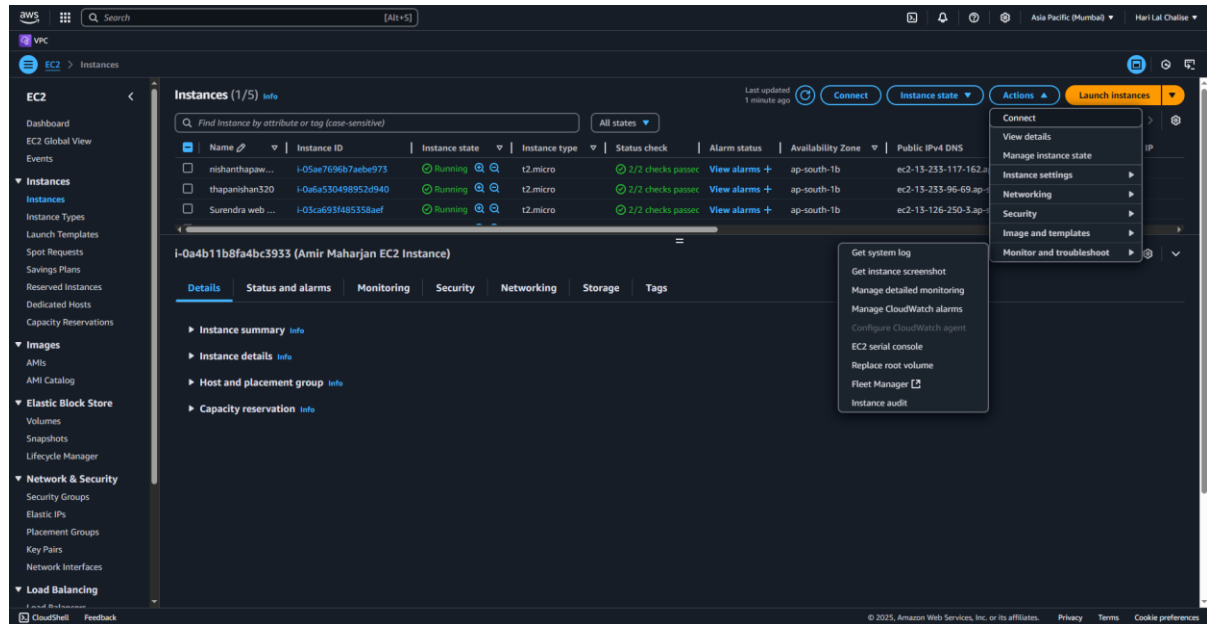
Step 2: There are a couple of tabs we should focus on like “Status and alarms” and “Monitoring”. In “Status and alarms” make sure that “System status checks” and “Instance status checks” have passed.



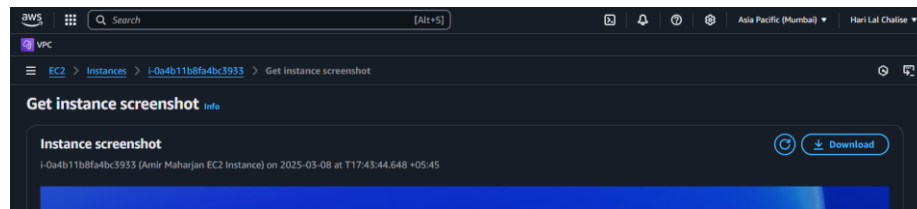
Step 3: In “Monitoring” tab, you can view details like cpu utilization, network in, network out, etc.



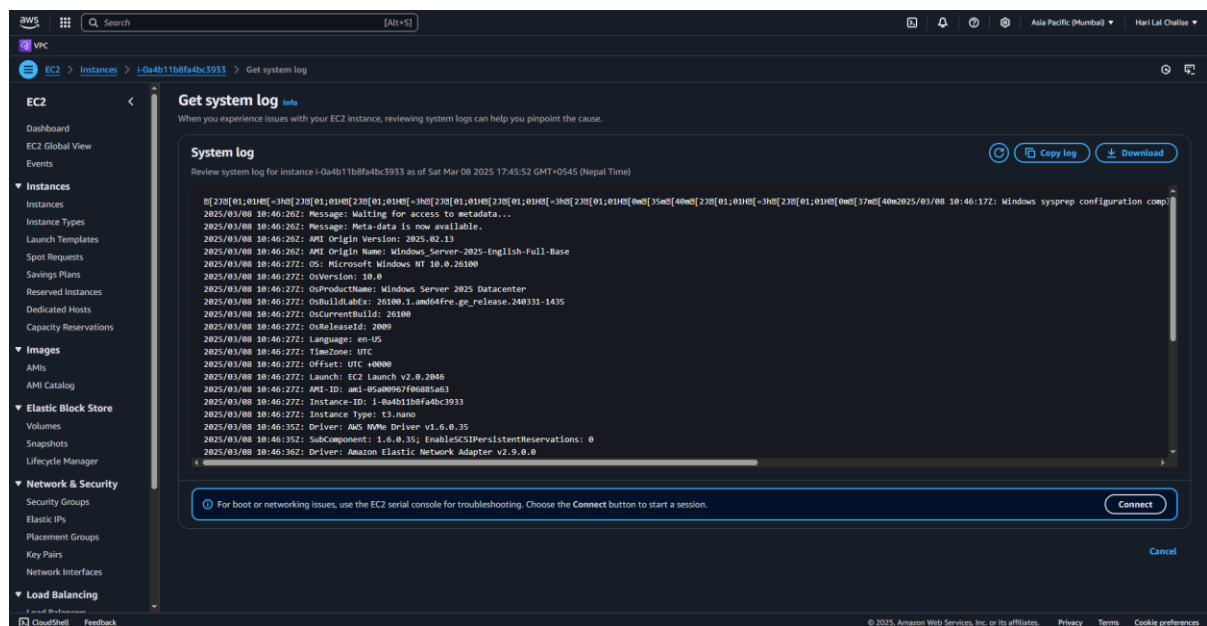
Step 4: To take screenshot of instance, click on the actions tab, a dropdown will be show, click on “Monitor and troubleshoot”, another dropdown will show and click on “Get instance screenshot”.



Step 5: You will be redirected to a page similar to below.



Step 6: You can also view the system log. Similar to taking an instance screenshot.



Question 6

Creating a Virtual Private Cloud (VPC)

- Explore the default VPC configuration
- Explore a default Subnet
- Create a custom VPC
- Deploy an EC2 instance into your custom VPC

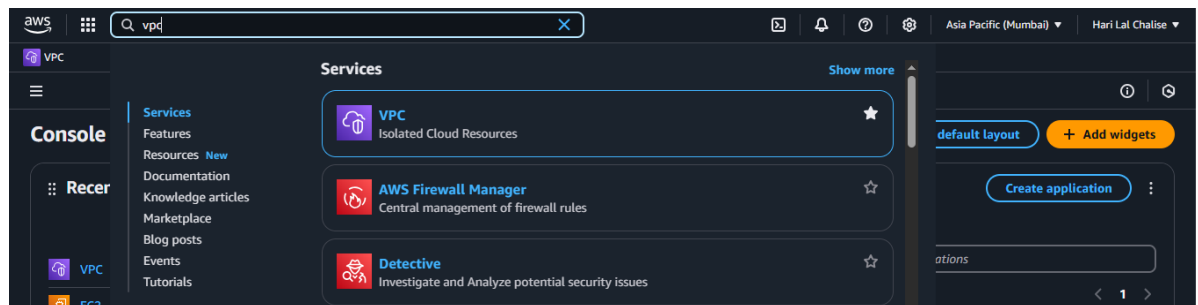
Objective: To explore VPC configuration, default subnets, create a custom VPC and deploy an EC2 instance into a custom VPC.

Virtual Private Cloud (VPC): a secure, isolated private cloud hosted within a public cloud.

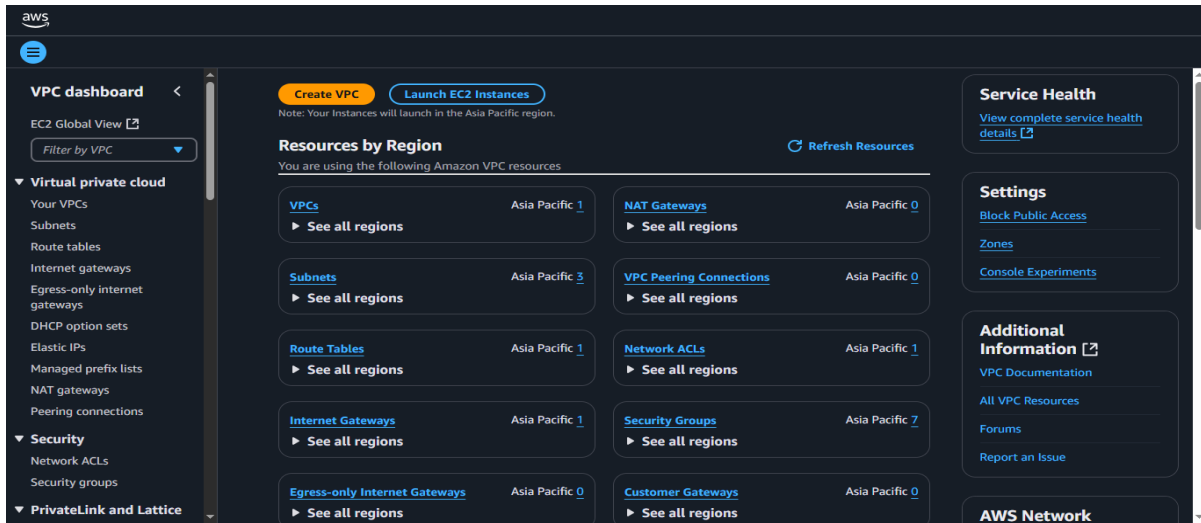
Usage:

- **Network Isolation:** Create isolated networks for AWS resources.
- **Security:** Control inbound and outbound traffic with security groups and network ACLs.
- **Private Subnets:** Run private resources like databases or application servers in isolated subnets.

On the console dashboard, there is a search field. Search for “VPC”. One of the search results will be VPC service. Click on it and it will lead you to VPC dashboard.

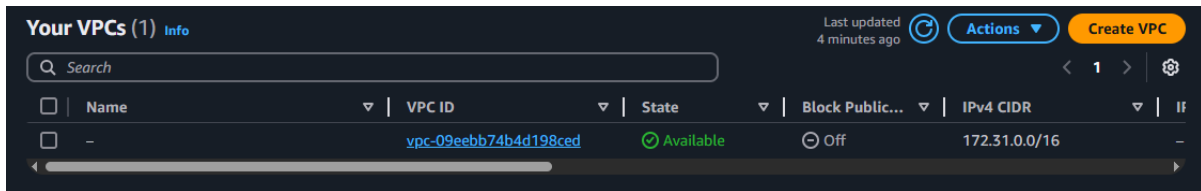


The VPC dashboard will look something like this.

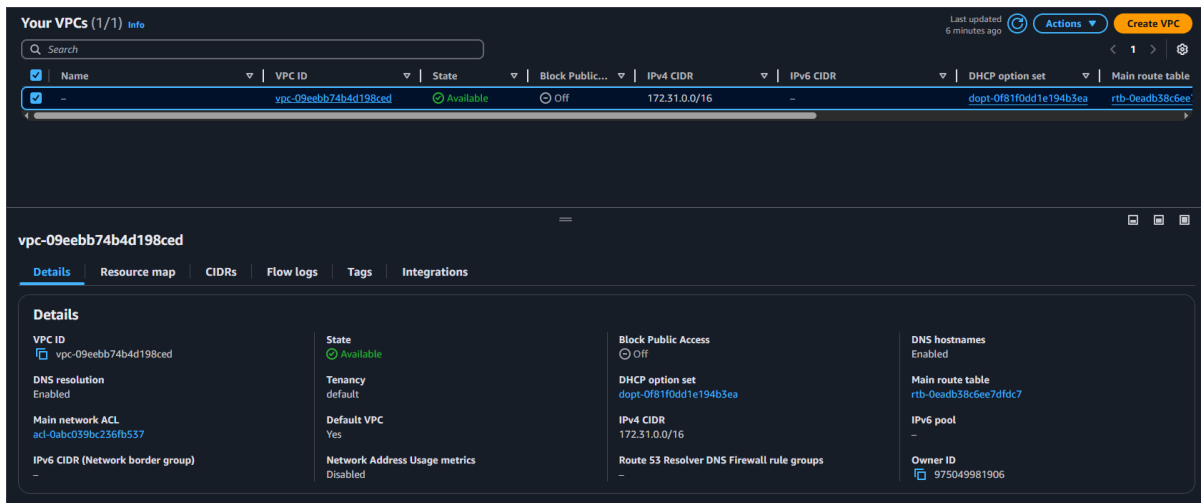


1. Explore the default VPC Configuration

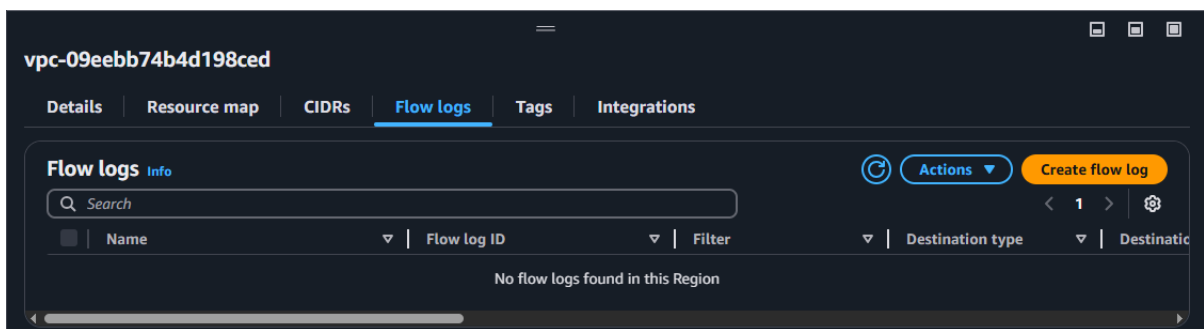
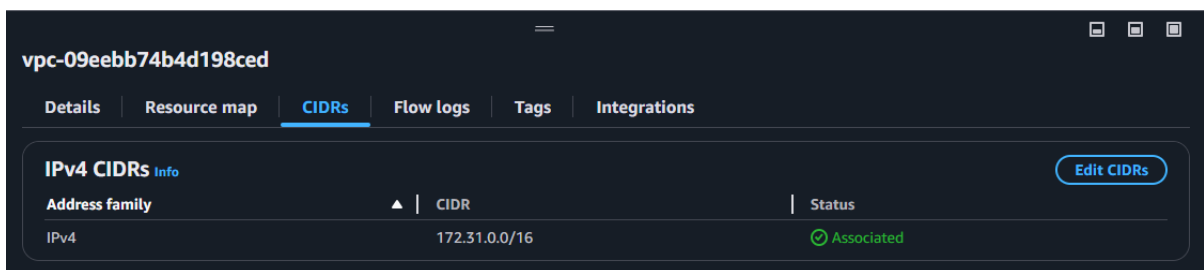
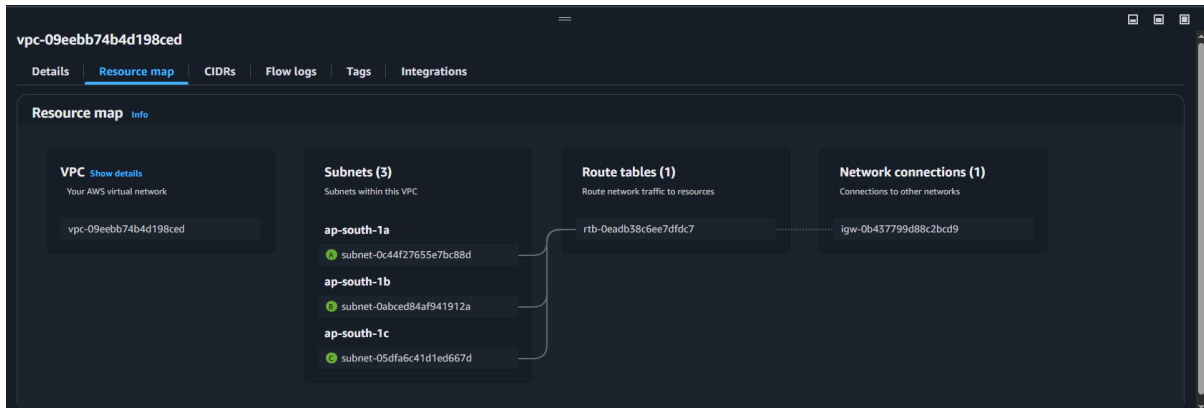
Step 1: On the left-hand side, there is an option known as “Virtual Private Cloud”. One of its options is “Your VPCs” click on it and you will see default VPCs.



Step 2: To view default configuration of the default VPC, check the default VPC.

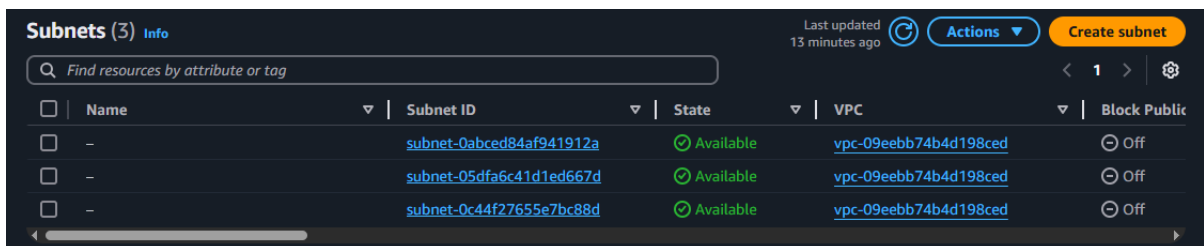


Step 3: There are multiple tabs like “Details”, “Resource Map”, “CIDRs”, etc.



2. Explore a default subnet.

Step 1: On the left-hand side, there is an option known as “Virtual Private Cloud”. One of its options is “Subnets” click on it and you will see 3 default subnets.



Step 2: To view default configuration of the subnets, check the one of the subnets.

The screenshot shows the AWS Management Console 'Subnets' page. At the top, there's a search bar and a table of subnets. The table has columns for Name, Subnet ID, State, VPC, Block Public..., IPv4 CIDR, and IPv6 CIDR. Three subnets are listed, all with a state of 'Available'. Below the table, there are tabs for Details, Flow logs, Route table, Network ACL, CIDR reservations, Sharing, and Tags. The 'Details' tab is selected, showing various configuration options for the selected subnet (subnet-0abced84af941912a). The details are organized into four columns: Subnet ID, Subnet ARN, State, and Block Public Access. Other details include IPv4 CIDR, Availability Zone, Route table, Auto-assign IPv4 address, IPv4 CIDR reservations, Resource name DNS A record, Network ACL, Auto-assign customer-owned IPv4 address, IPv6 CIDR reservations, Resource name DNS AAAA record, Network border group, Default subnet, Customer-owned IPv4 pool, IPv6-only, DNS64, Outpost ID, Hostname type, and Owner.

Name	Subnet ID	State	VPC	Block Public...	IPv4 CIDR	IPv6 CIDR
-	subnet-0abced84af941912a	Available	vpc-09eebb74b4d198ced	Off	172.31.0.0/20	-
-	subnet-05dfa6c41d1ed667d	Available	vpc-09eebb74b4d198ced	Off	172.31.16.0/20	-
-	subnet-0c44f27655e7bc88d	Available	vpc-09eebb74b4d198ced	Off	172.31.32.0/20	-

Details

Subnet ID: subnet-0abced84af941912a

Subnet ARN: arn:aws:ec2:ap-south-1:975049981906:subnet/subnet-0abced84af941912a

State: Available

Block Public Access: Off

IPv4 CIDR: 172.31.0.0/20

Availability Zone: ap-south-1b

Route table: rtb-0eadb38c6ee7dfdc7

Auto-assign IPv4 address: No

IPv4 CIDR reservations: -

Resource name DNS A record: Disabled

Network ACL: acl-0abcc039bc236fb337

Auto-assign customer-owned IPv4 address: No

IPv6 CIDR reservations: -

Resource name DNS AAAA record: Disabled

Network border group: ap-south-1

Default subnet: Yes

Customer-owned IPv4 pool: -

IPv6-only: No

DNS64: Disabled

Outpost ID: -

Hostname type: IP name

Owner: 975049981906

Step 3: There are multiple tabs like “Details”, “Flow logs”, “Route table”, “Network ACL”etc.

The screenshot shows the 'Route table' tab for the subnet 'subnet-0abced84af941912a'. The tab is selected, and the 'Route table: rtb-0eadb38c6ee7dfdc7' is displayed. There is an 'Edit route table association' button. Below this, there's a section for 'Routes (2)' with a search bar and a table of routes. The table has columns for Destination and Target. Two routes are listed: one for destination 172.31.0.0/16 with target 'local', and another for destination 0.0.0.0/0 with target 'igw-0b437799d88c2bcd9'.

Route table: rtb-0eadb38c6ee7dfdc7

Routes (2)

Destination	Target
172.31.0.0/16	local
0.0.0.0/0	igw-0b437799d88c2bcd9

subnet-0abced84af941912a

Details | Flow logs | Route table | Network ACL | **CIDR reservations** | Sharing | Tags

IPv4 CIDR reservations (0)

Q Filter reservations

CIDR reservation ID | CIDR | Reservation type

You have no IPv4 CIDR reservations

IPv6 CIDR reservations (0)

Q Filter reservations

CIDR reservation ID | CIDR | Reservation type

You have no IPv6 CIDR reservations

subnet-0abced84af941912a

Details | Flow logs | Route table | **Network ACL** | CIDR reservations | Sharing | Tags

Network ACL: **acl-0abc039bc236fb537** [Edit network ACL association](#)

Inbound rules (2)

Q Filter inbound rules

Rule number	Type	Protocol	Port range	Source	Allow/Deny
100	All traffic	All	All	0.0.0.0/0	Allow
*	All traffic	All	All	0.0.0.0/0	Deny

Outbound rules (2)

Q Filter outbound rules

Rule number	Type	Protocol	Port range	Destination	Allow/Deny
100	All traffic	All	All	0.0.0.0/0	Allow
*	All traffic	All	All	0.0.0.0/0	Deny

3. Create a custom VPC.

Step 1: In “Your VPCs” tab inside “Virtual Private Cloud”, click “Create VPC” button.

Your VPCs (1) [Info](#)

Last updated 22 minutes ago [Actions](#) [Create VPC](#)

Q Search

Name	VPC ID	State	Block Public...	IPv4 CIDR	IF
-	vpc-09eebb74b4d198ced	Available	Off	172.31.0.0/16	-

Step 2: After clicking the button, you should see an interface like below.

Create VPC [Info](#)

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

VPC settings

Resources to create [Info](#)
Create only the VPC resource or the VPC and other networking resources.

☒ VPC only ☐ VPC and more

Name tag - optional
Creates a tag with a key of 'Name' and a value that you specify.

IPv4 CIDR block [Info](#)

☒ IPv4 CIDR manual input ☐ IPAM-allocated IPv4 CIDR block

IPv4 CIDR

CIDR block size must be between /16 and /28.

IPv6 CIDR block [Info](#)

☒ No IPv6 CIDR block ☐ IPAM-allocated IPv6 CIDR block ☐ Amazon-provided IPv6 CIDR block ☐ IPv6 CIDR owned by me

Tenancy [Info](#)

Tags
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key **Value - optional**

Q Name X Q Amir Maharjan X Remove tag

Add tag

You can add 49 more tags

Cancel Preview code Create VPC

Step 3: After clicking “Create VPC”, you will see a success message.

You successfully created vpc-03e9c3186a6b3b157 / Amir Maharjan

vpc-03e9c3186a6b3b157 / Amir Maharjan Actions

Details Info

VPC ID vpc-03e9c3186a6b3b157 State Available

DNS resolution Enabled Tenancy default

Main network ACL ac-03bfc4698f0cb0dd Default VPC No

IPv6 CIDR (Network border group) - Network Address Usage metrics Disabled

Block Public Access Off

DHCP option set dopt-0f81f0dd1e194b3ea

IPv4 CIDR 172.31.0.0/16

Route 53 Resolver DNS Firewall rule groups -

DNS hostnames Disabled

Main route table rtb-03b0839db7048b608

IPv6 pool -

Owner ID 975049981906

Resource map CIDRs Flow logs Tags Integrations

Resource map Info

VPC Show details Your AWS virtual network Amir Maharjan

Subnets (0) Subnets within this VPC

Route tables (1) Route network traffic to resources rtb-03b0839db7048b608

Network connections (0) Connections to other networks

Step 4: You can view all your custom VPCs from “Your VPCs” tab and you can view its details the same way you viewed details of default VPC.

Your VPCs (2) Info Last updated 4 minutes ago Actions Create VPC

Q Search

<input type="checkbox"/>	Name	VPC ID	State	Block Public...	IPv4 CIDR	IF
<input type="checkbox"/>	-	vpc-09eebb74b4d198ced	Available	Off	172.31.0.0/16	-
<input type="checkbox"/>	Amir Maharjan	vpc-03e9c3186a6b3b157	Available	Off	172.31.0.0/16	-

4. Deploy an EC2 instance into your custom VPC.

Step 1: Create an EC2 instance. Follow the steps we followed in Question 5 except one key difference, the selection of our custom VPC.

Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags Info

Name e.g. My Web Server Add additional tags

► Application and OS Images (Amazon Machine Image) Info

► Instance type Info Get advice

► Key pair (login) Info

► Network settings Info Edit

► Configure storage Info Advanced

► Advanced details Info

Summary

Number of instances 1

Software Image (AMI) Amazon Linux 2023 AMI 2023.6.2...read more ami-0dc17fced4e4b04a

Virtual server type (instance type) t2.micro

Firewall (security group) New security group

Storage (volumes) 1 volume(s) - 8 GiB

Free tier: In your first year of opening an AWS account, you get 750 hours per month of t2.micro instance usage for t3.micro where t2.micro isn't available) when used with free tier AMIs, 750 hours per month of public IPv4 address usage, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GiB of bandwidth to the internet.

Cancel Launch instance Preview code

Step 2: In the “Network Settings” tab, click the “Edit” button. We can see a VPC field. Select our custom VPC and Subnet.

▼ Network settings

Info

VPC - required

Info

vpc-03e9c3186a6b3b157 (Amir Maharjan)
172.31.0.0/16

select custom VPC here.

Subnet

Info

Select

Create new subnet

Auto-assign public IP

Info

Select

Firewall (security groups)

Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group

Select existing security group

Security group name - required

launch-wizard-7

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _-./()#,@[]+=&:;!\$*

Description - required

Info

launch-wizard-7 created 2025-03-08T13:21:11.721Z

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 0.0.0.0/0)

Remove

Type	Protocol	Port range
ssh	TCP	22

Source	Description - optional
Anywhere	e.g. SSH for admin desktop

Add security group rule

Step 3: Click the “Launch Instance” button and click “View all instances”, it will direct us here.

Instances (5) info

Last updated 2 minutes ago

Connect

Instance state ▾

Actions ▾

Launch instances ▾

Find Instance by attribute or tag (case-sensitive)

All states ▾

< 1 >

⚙️

<input type="checkbox"/>	Name ▾	Instance ID	Instance state ▾	Instance type ▾	Status check	Alarm status	Availability Zone ▾	Public IP
<input type="checkbox"/>	nishanthapaw...	i-05ae7696b7aeb973	Running	t2.micro	2/2 checks passec	View alarms +	ap-south-1b	ec2-13-2
<input type="checkbox"/>	thapanishan320	i-0a6a530498952d940	Running	t2.micro	2/2 checks passec	View alarms +	ap-south-1b	ec2-13-2
<input type="checkbox"/>	Surendra web ...	i-03ca693f485358aef	Running	t2.micro	2/2 checks passec	View alarms +	ap-south-1b	ec2-13-1
<input type="checkbox"/>	Pracessmaharj...	i-0ebfe0cd1f602bf70	Running	t2.micro	2/2 checks passec	View alarms +	ap-south-1b	ec2-13-2
<input type="checkbox"/>	Amir Maharjan...	i-0e3eb846b787dbe8b	Running	t3.nano	Initializing	View alarms +	ap-south-1a	-

Step 4: Select our custom EC2 to view its details. As we can see our custom VPC and subnet is select as we desired.

