Terna Engineering College
Computer Engineering Department
Program: Sem VIII

Course: Cloud Computing Lab (CSL803)

Faculty: Reshma Koli

Experiment No. 3

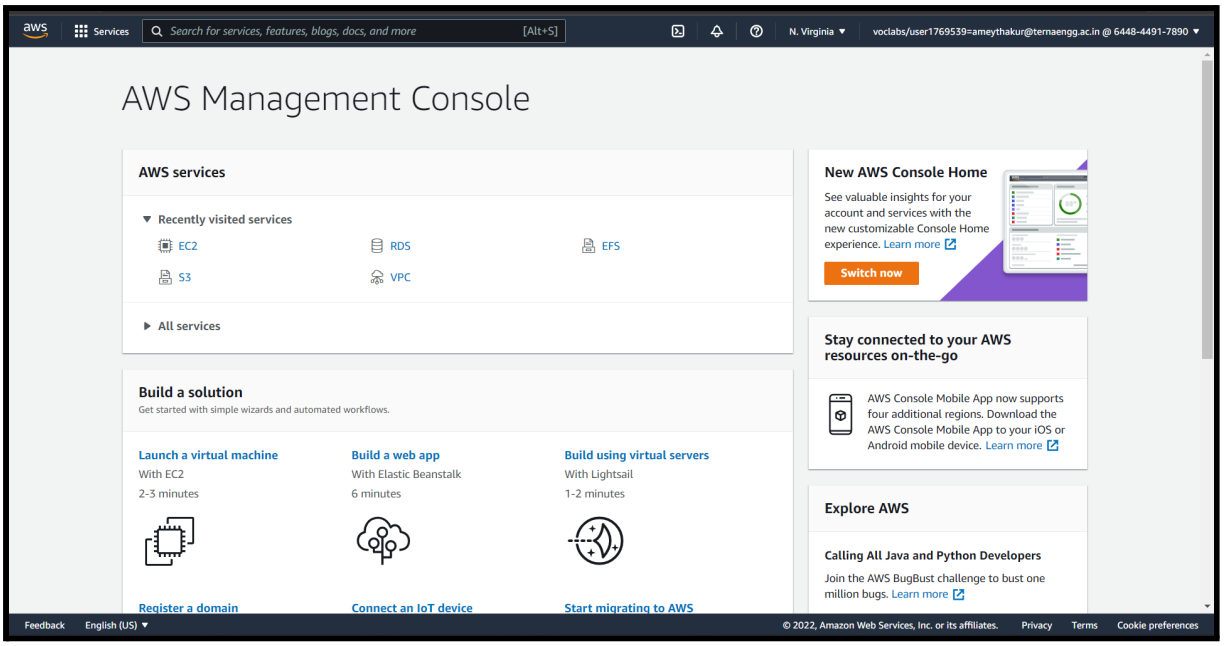
A.1 Aim: To demonstrate and implement IAAS service using AWS (Use t2.Micro) (Free tier eligible) (instance only).

PART B
(PART B: TO BE COMPLETED BY STUDENTS)

Roll No. 50	**Name:** AMEY MAHENDRA THAKUR
Class: BE COMPS B 50	**Batch:** B3
Date of Experiment: 31-01-2022	**Date of Submission:** 31-01-2022
Grade:	

B.1 Question of Curiosity:
Q1: Create VM using AWS EC2 (attach screen shots of the same).
ANS:
Practical Video (AWS EC2 Instance): https://youtu.be/y-oACtu8djc

Step 1:



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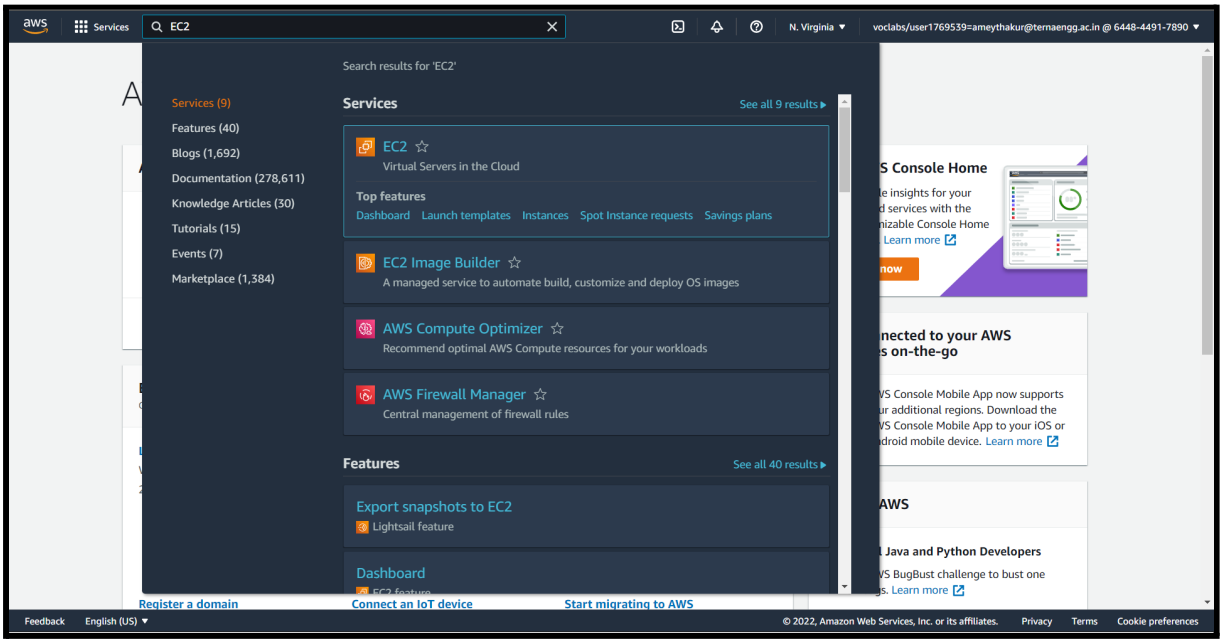
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EC2
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Search results for 'EC2'
Services (9)
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EC2 Image Builder
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AWS Compute Optimizer
Recommend optimal AWS Compute resources for your workloads
AWS Firewall Manager
Central management of firewall rules
Features
See all 40 results
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Lightsail feature
Dashboard
Register a domain
Connect an IoT device
Start migrating to AWS
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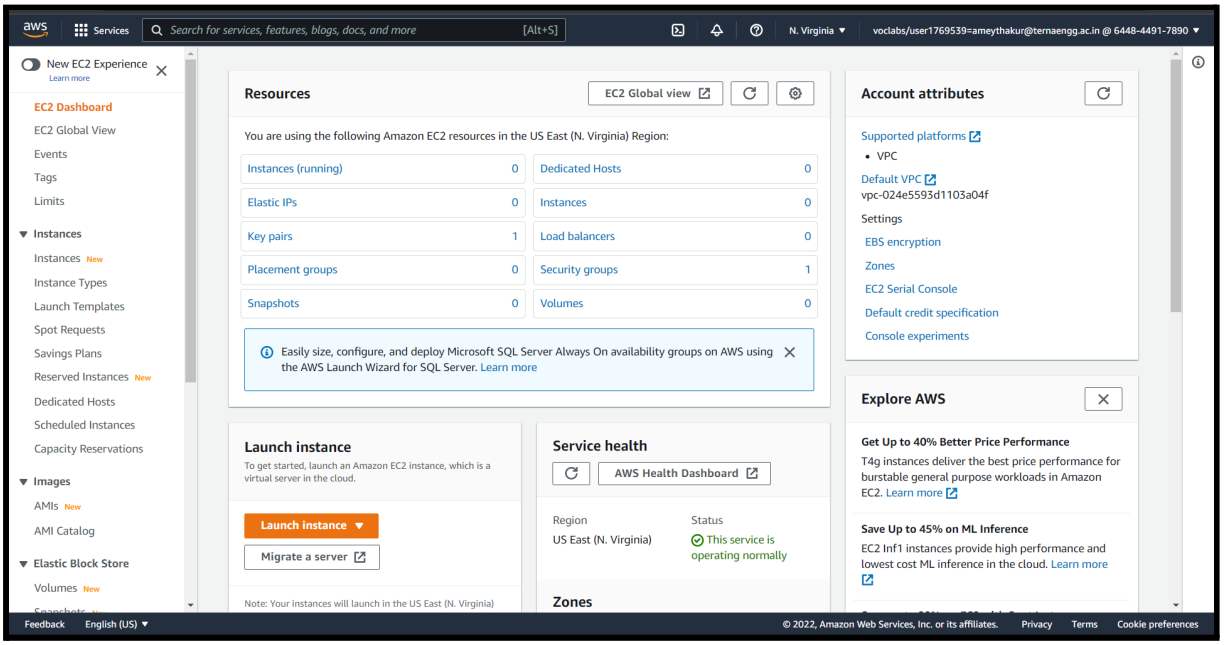
Step 3: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New EC2 Experience
Learn more
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
AMIs New
AMI Catalog
Elastic Block Store
Volumes New
Resources
EC2 Global view
You are using the following Amazon EC2 resources in the US East (N. Virginia) Region:
Instances (running) 0
Dedicated Hosts 0
Elastic IPs 0
Instances 0
Key pairs 1
Load balancers 0
Placement groups 0
Security groups 1
Snapshots 0
Volumes 0
Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. Learn more
Account attributes
Supported platforms
VPC
Default VPC
vpc-024e5593d1103a04f
Settings
EBS encryption
Zones
EC2 Serial Console
Default credit specification
Console experiments
Explore AWS
Get Up to 40% Better Price Performance
T4g instances deliver the best price performance for burstable general purpose workloads in Amazon EC2. Learn more
Save Up to 45% on ML Inference
EC2 Inf1 instances provide high performance and lowest cost ML inference in the cloud. Learn more
Launch instance
To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.
Launch instance
Migrate a server
Note: Your instances will launch in the US East (N. Virginia)
Service health
AWS Health Dashboard
Region
US East (N. Virginia)
Status
This service is operating normally
Zones
Feedback
English (US)
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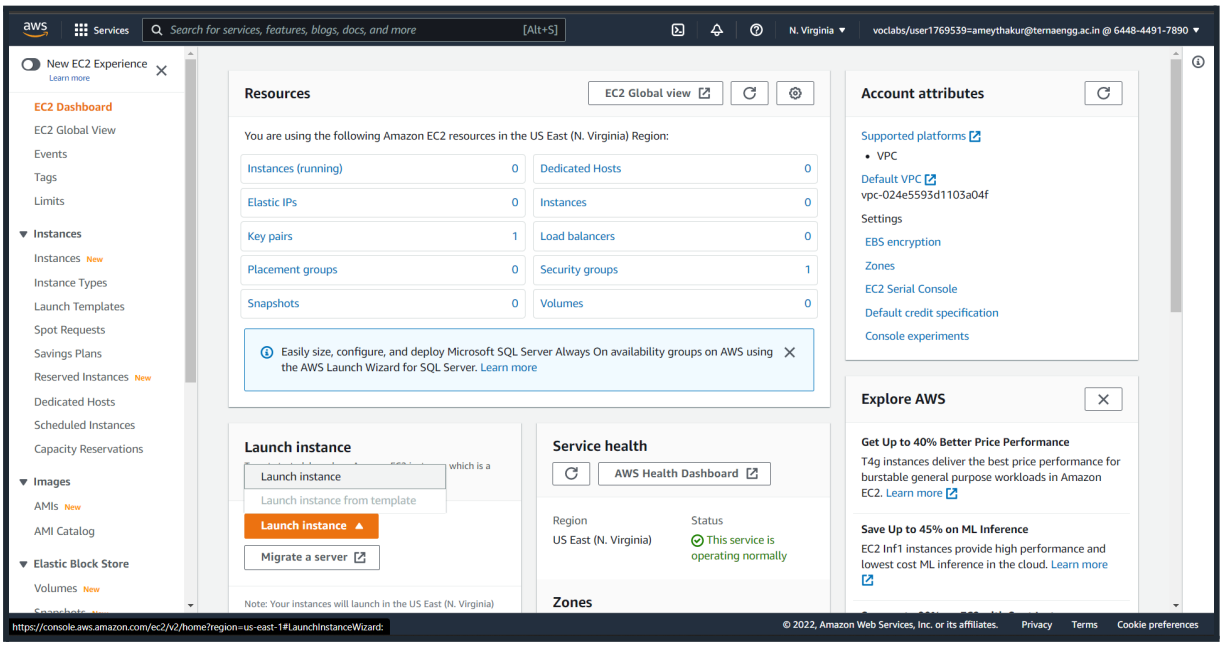
Step 4: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https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#LaunchInstanceWizard:
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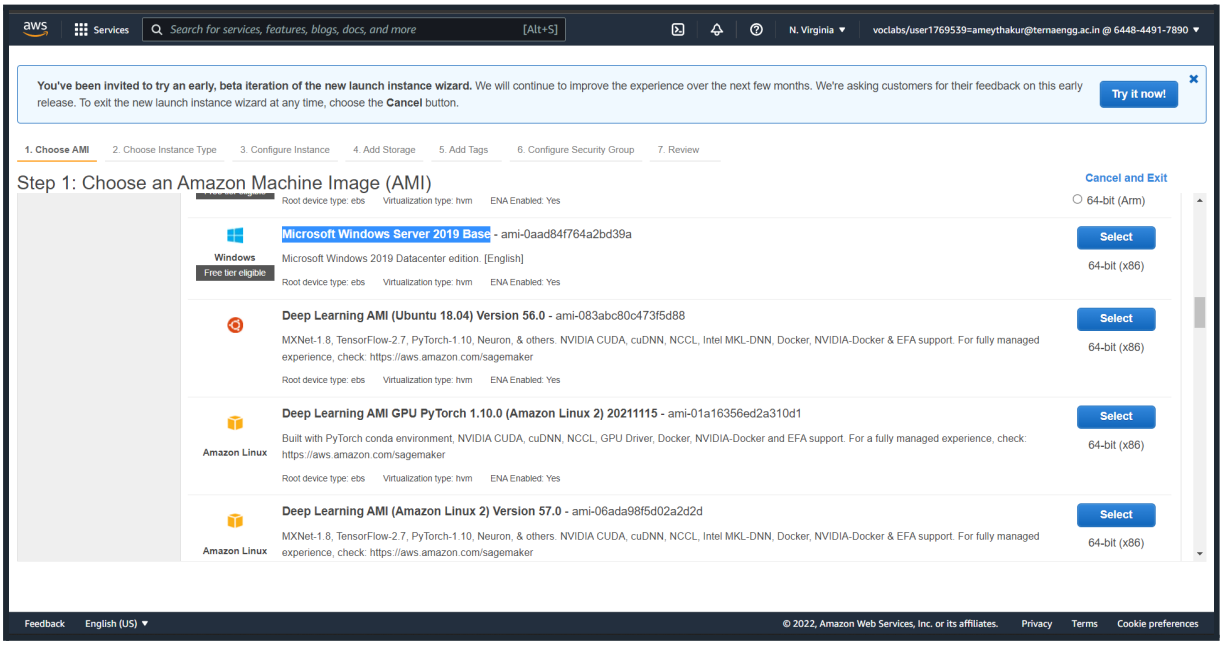
Step 5: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You've been invited to try an early, beta iteration of the new launch instance wizard. We will continue to improve the experience over the next few months. We're asking customers for their feedback on this early release. To exit the new launch instance wizard at any time, choose the Cancel button.
Try it now!
1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review
Step 1: Choose an Amazon Machine Image (AMI)
Cancel and Exit
64-bit (Arm)
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Windows
Free tier eligible
Microsoft Windows Server 2019 Base - ami-0aad84f764a2bd39a
Microsoft Windows 2019 Datacenter edition. [English]
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Select
64-bit (x86)
Deep Learning AMI (Ubuntu 18.04) Version 56.0 - ami-083abc80c473f5d88
MXNet-1.8, TensorFlow-2.7, PyTorch-1.10, Neuron, & others. NVIDIA CUDA, cuDNN, NCCL, Intel MKL-DNN, Docker, NVIDIA-Docker & EFA support. For fully managed experience, check: https://aws.amazon.com/sagemaker
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Select
64-bit (x86)
Amazon Linux
Deep Learning AMI GPU PyTorch 1.10.0 (Amazon Linux 2) 20211115 - ami-01a16356ed2a310d1
Built with PyTorch conda environment, NVIDIA CUDA, cuDNN, NCCL, GPU Driver, Docker, NVIDIA-Docker and EFA support. For a fully managed experience, check: https://aws.amazon.com/sagemaker
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Select
64-bit (x86)
Amazon Linux
Deep Learning AMI (Amazon Linux 2) Version 57.0 - ami-06ada98f5d02a2d2d
MXNet-1.8, TensorFlow-2.7, PyTorch-1.10, Neuron, & others. NVIDIA CUDA, cuDNN, NCCL, Intel MKL-DNN, Docker, NVIDIA-Docker & EFA support. For fully managed experience, check: https://aws.amazon.com/sagemaker
Select
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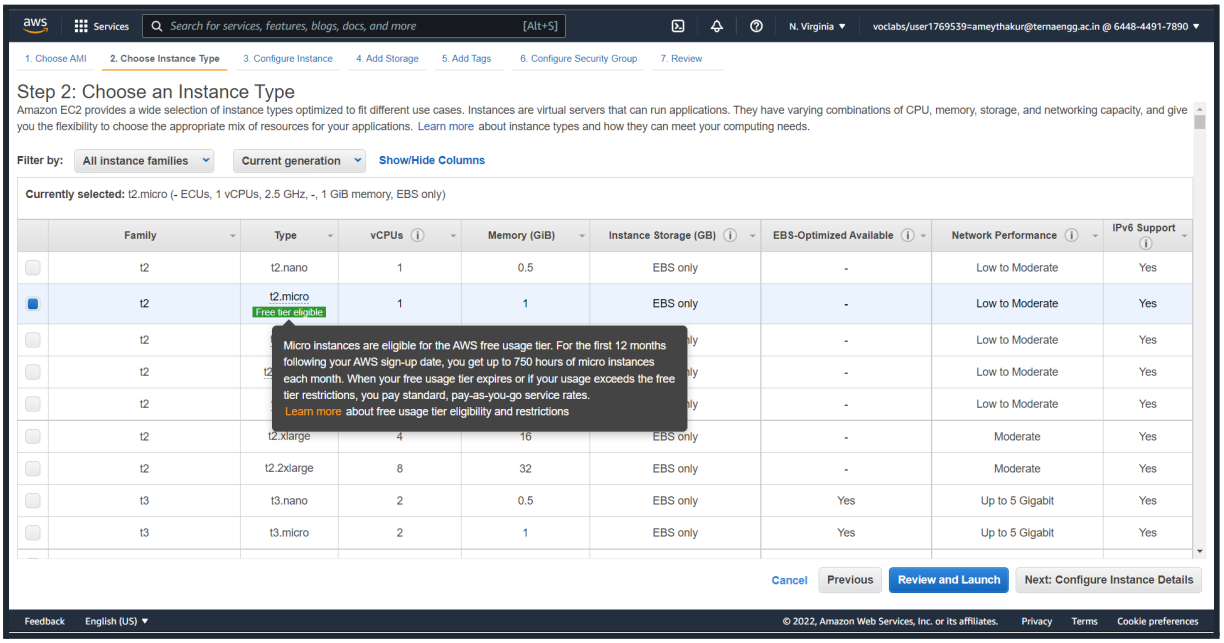
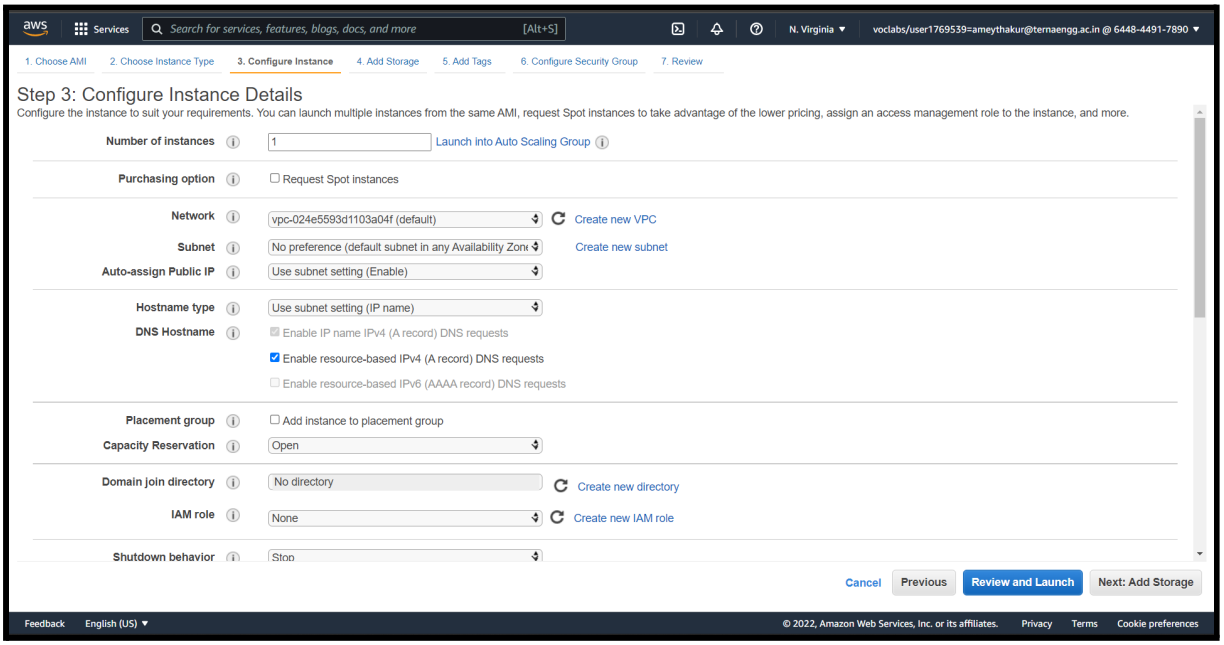
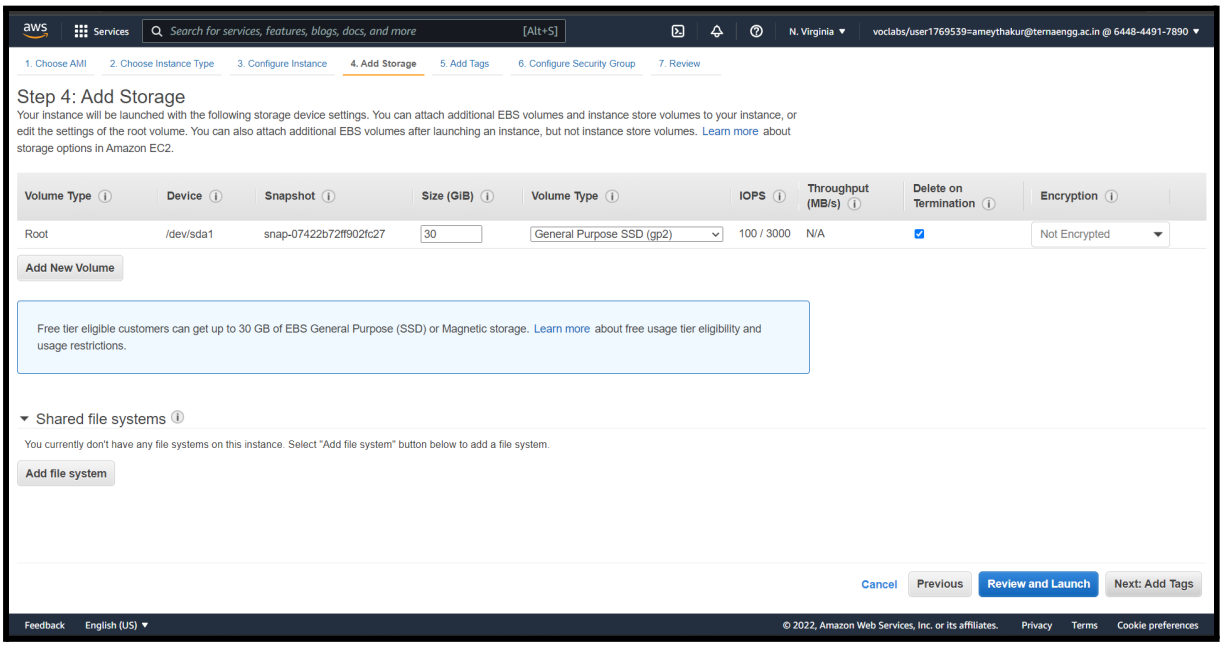
Step 6:


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
t2 t2.nano 1 0.5 EBS only - Low to Moderate Yes
t2 t2.micro Free tier eligible 1 1 EBS only - Low to Moderate Yes
Micro instances are eligible for the AWS free usage tier. For the first 12 months following your AWS sign-up date, you get up to 750 hours of micro instances each month. When your free usage tier expires or if your usage exceeds the free tier restrictions, you pay standard, pay-as-you-go service rates.
Learn more about free usage tier eligibility and restrictions
t2 Low to Moderate Yes
t2 Low to Moderate Yes
t2 Low to Moderate Yes
t2 t2.xlarge 4 16 EBS only - Moderate Yes
t2 t2.2xlarge 8 32 EBS only - Moderate Yes
t3 t3.nano 2 0.5 EBS only Yes Up to 5 Gigabit Yes
t3 t3.micro 2 1 EBS only Yes Up to 5 Gigabit Yes
Cancel Previous Review and Launch Next: Configure Instance Details

Step 7:


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-024e5593d1103a04f (default) Create new VPC
Subnet No preference (default subnet in any Availability Zone) Create new subnet
Auto-assign Public IP Use subnet setting (Enable)
Hostname type Use subnet setting (IP name)
DNS Hostname Enable IP name IPv4 (A record) DNS requests
Enable resource-based IPv4 (A record) DNS requests
Enable resource-based IPv6 (AAAA record) DNS requests
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
Cancel Previous Review and Launch Next: Add Storage

Step 8: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1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. 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/sda1
snap-07422b72ff902fc27
30
General Purpose SSD (gp2)
100 / 3000
N/A
Not Encrypted
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.
Shared file systems
You currently don't have any file systems on this instance. Select "Add file system" button below to add a file system.
Add file system
Cancel
Previous
Review and Launch
Next: Add Tags
Feedback
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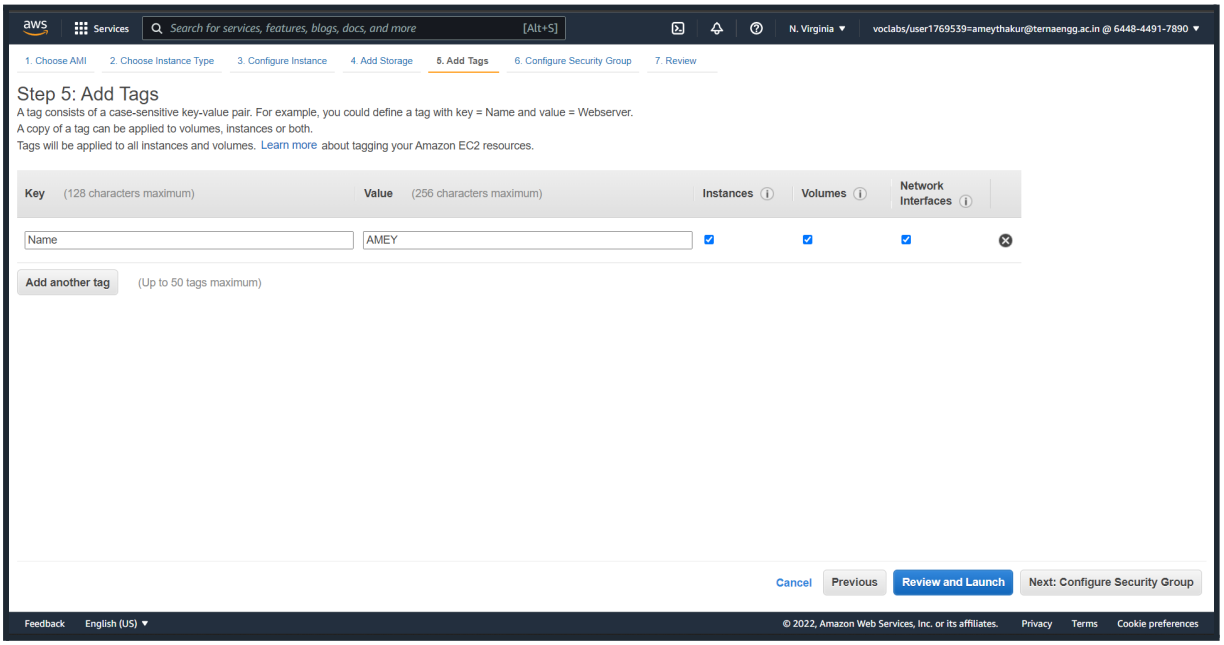
Step 9:


Services
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N. Virginia
voclabs/user1769539=ameythakur@ternaengg.ac.in @ 6448-4491-7890
1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. 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 (128 characters maximum)
Value (256 characters maximum)
Instances
Volumes
Network Interfaces
Name
AMEY
Add another tag
(Up to 50 tags maximum)
Cancel
Previous
Review and Launch
Next: Configure Security Group
Feedback
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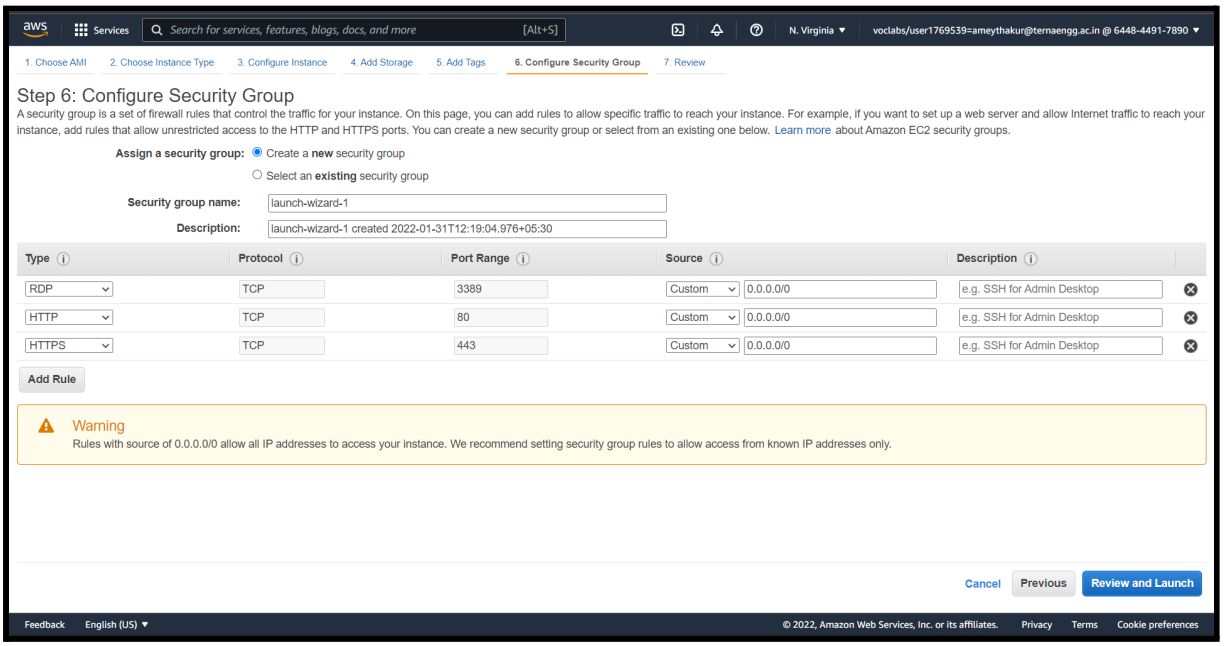
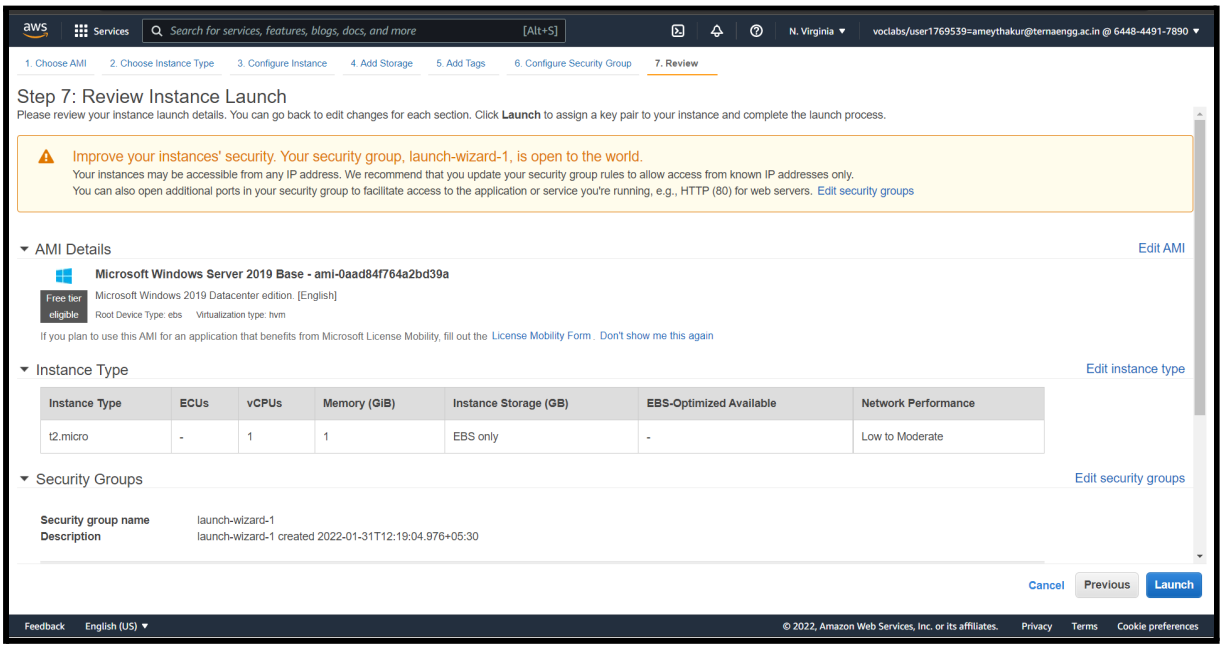
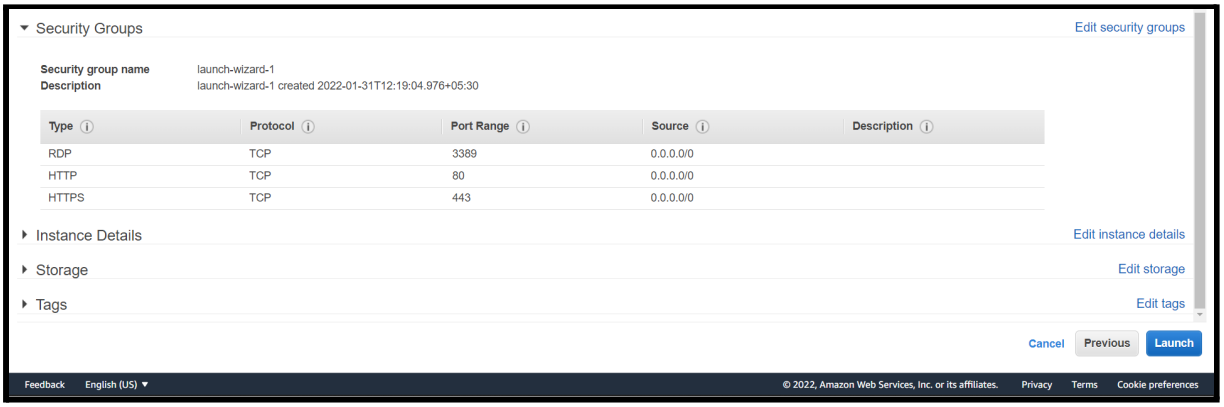
Step 10:



Step 11:





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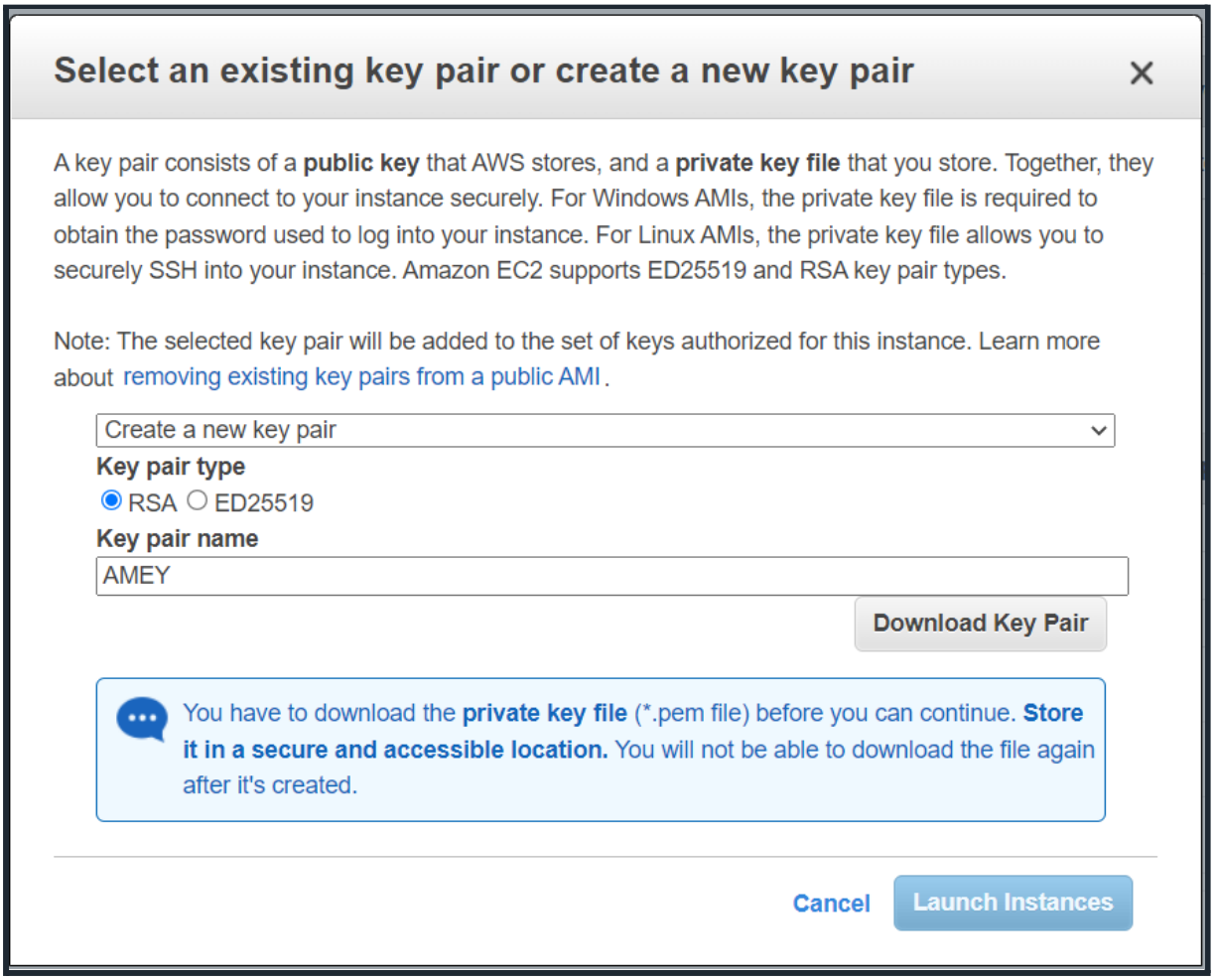

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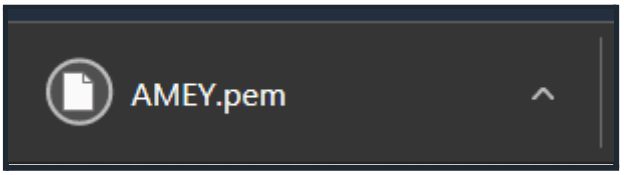
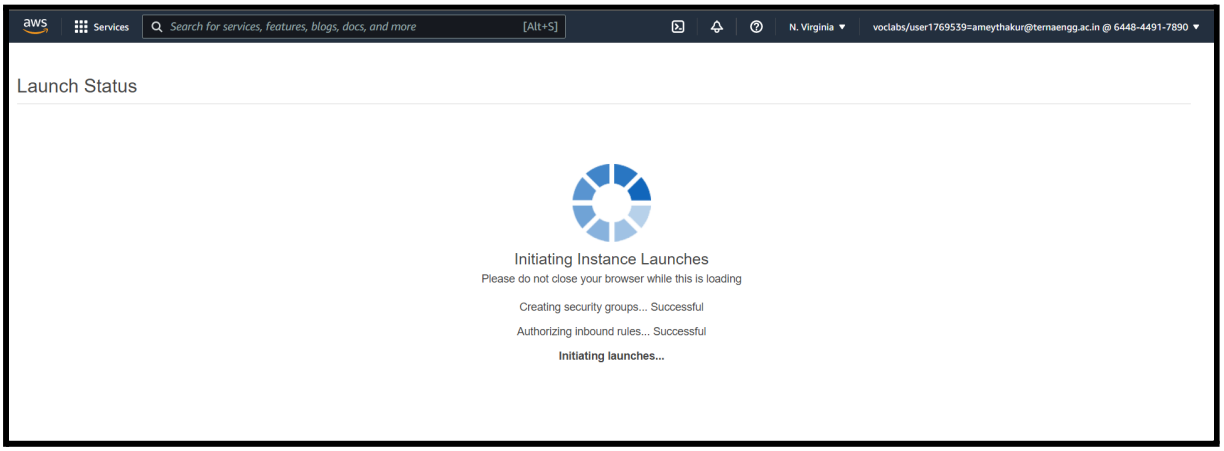


Step 14:



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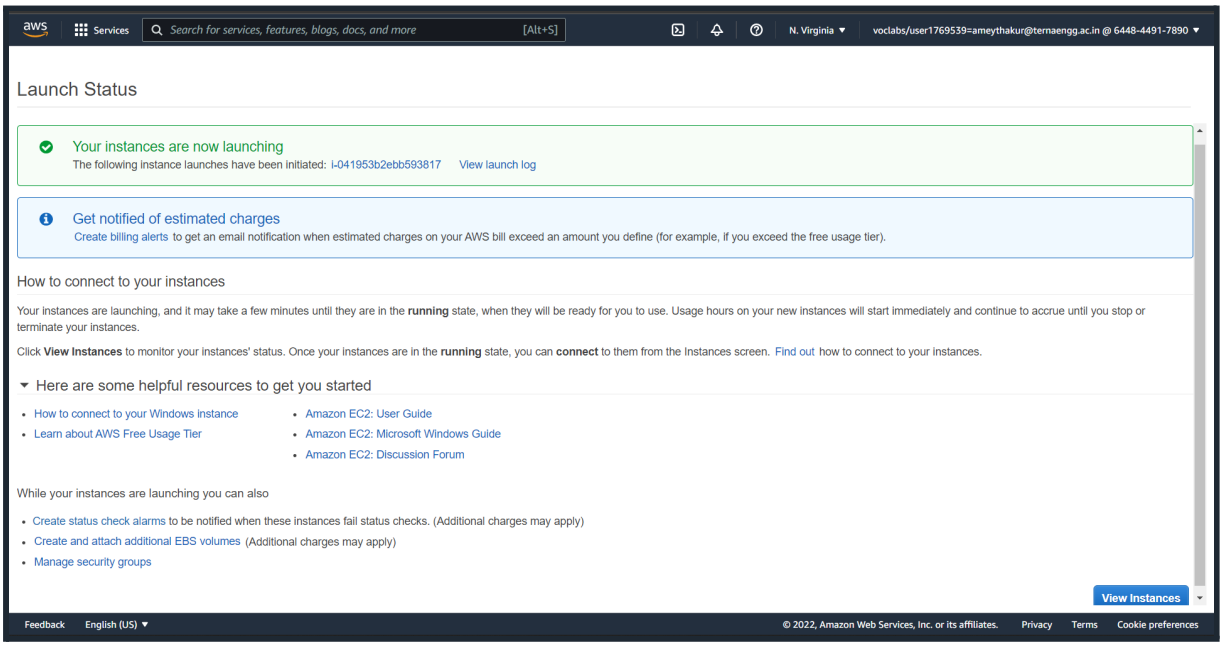

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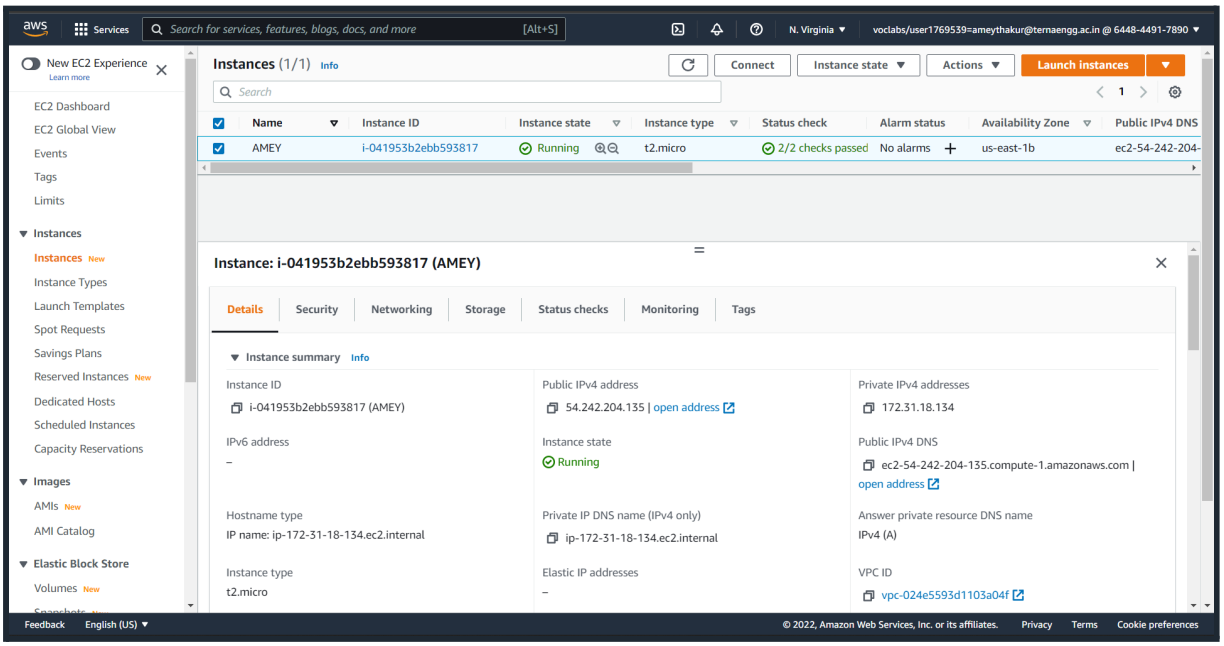

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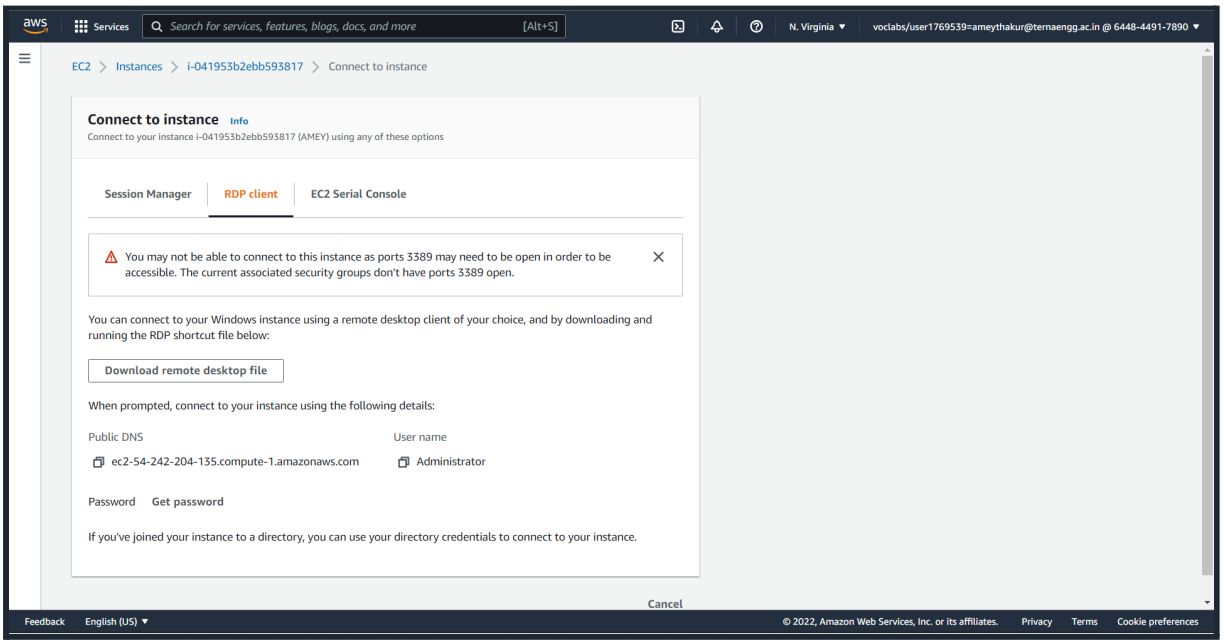

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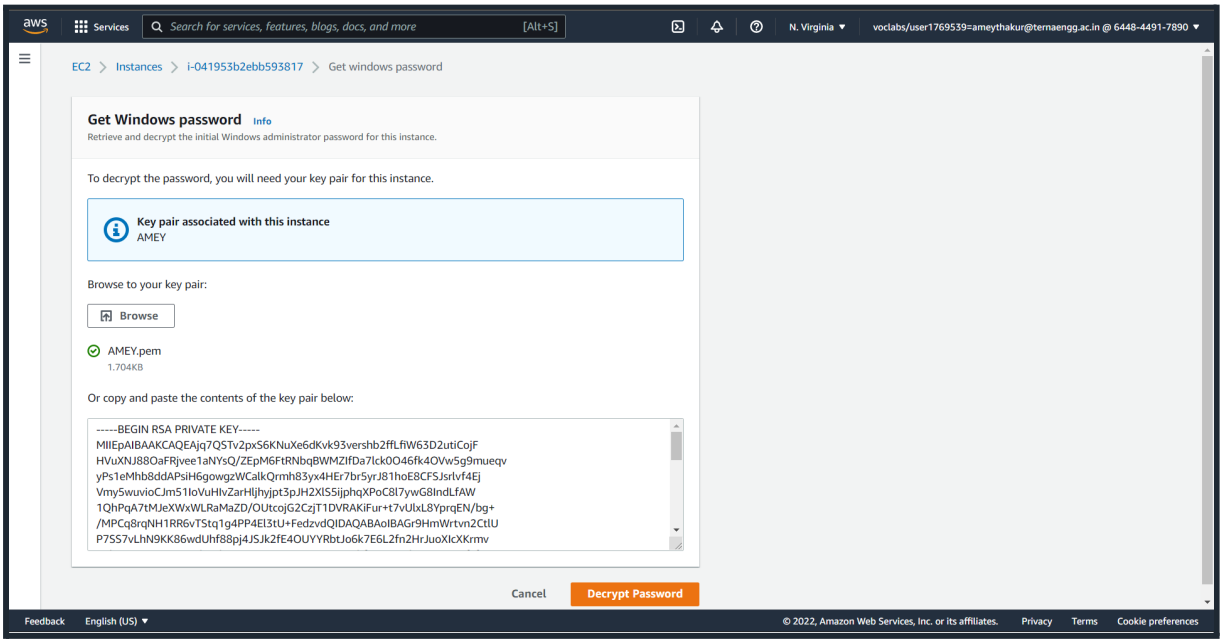

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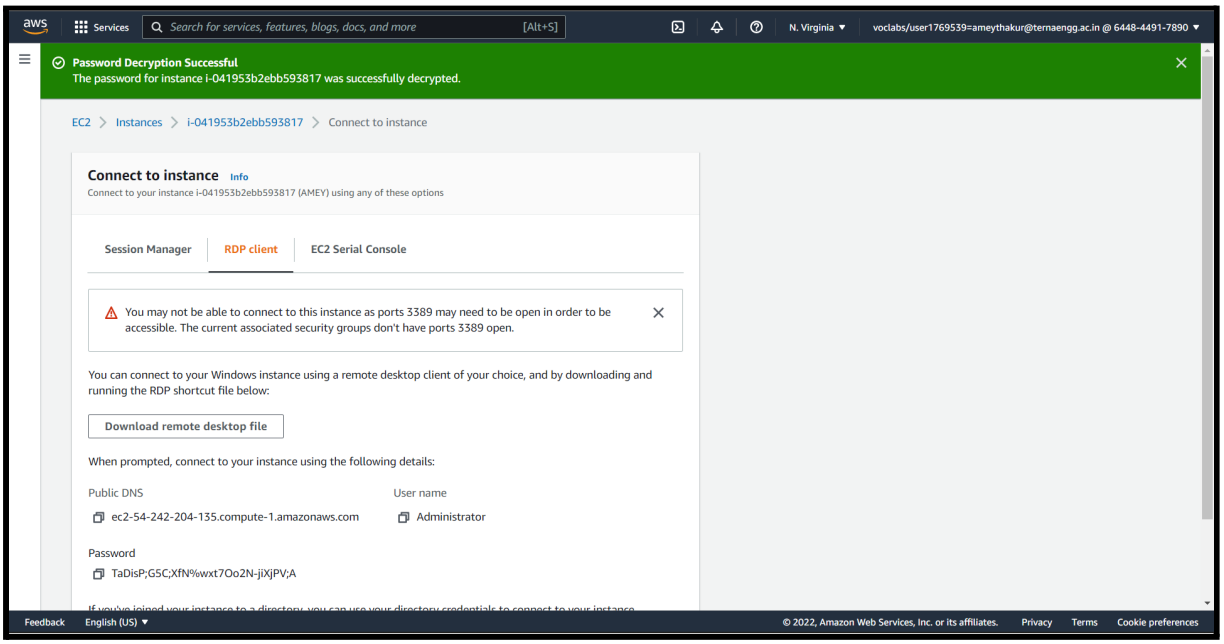

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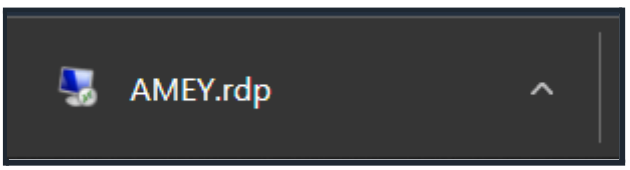

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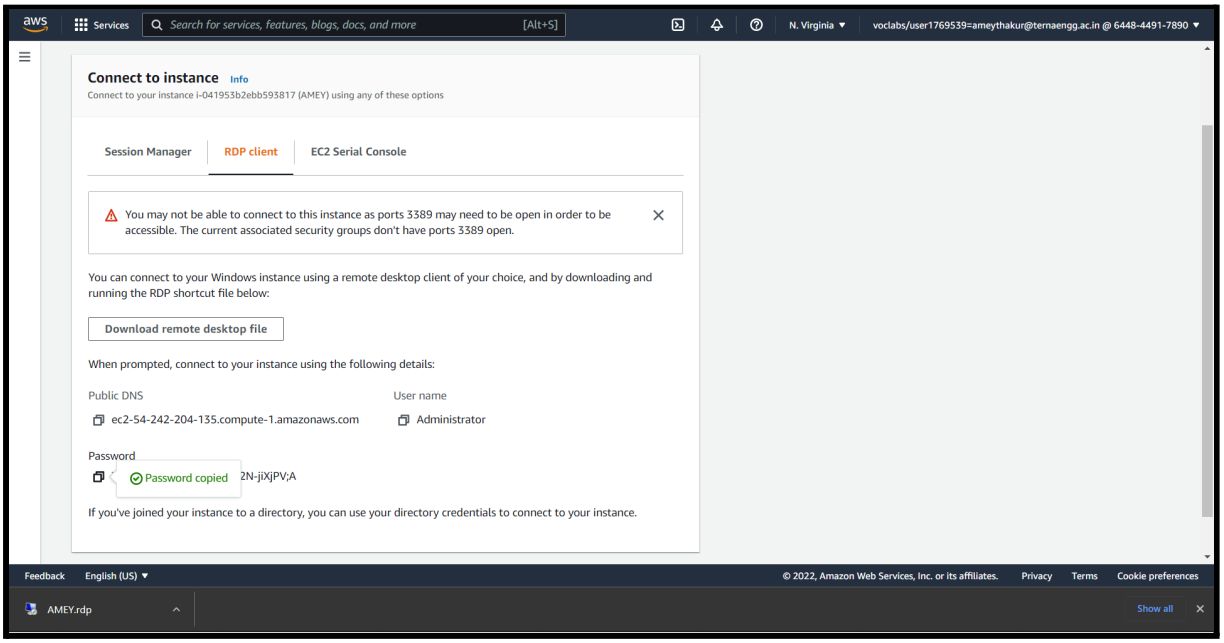

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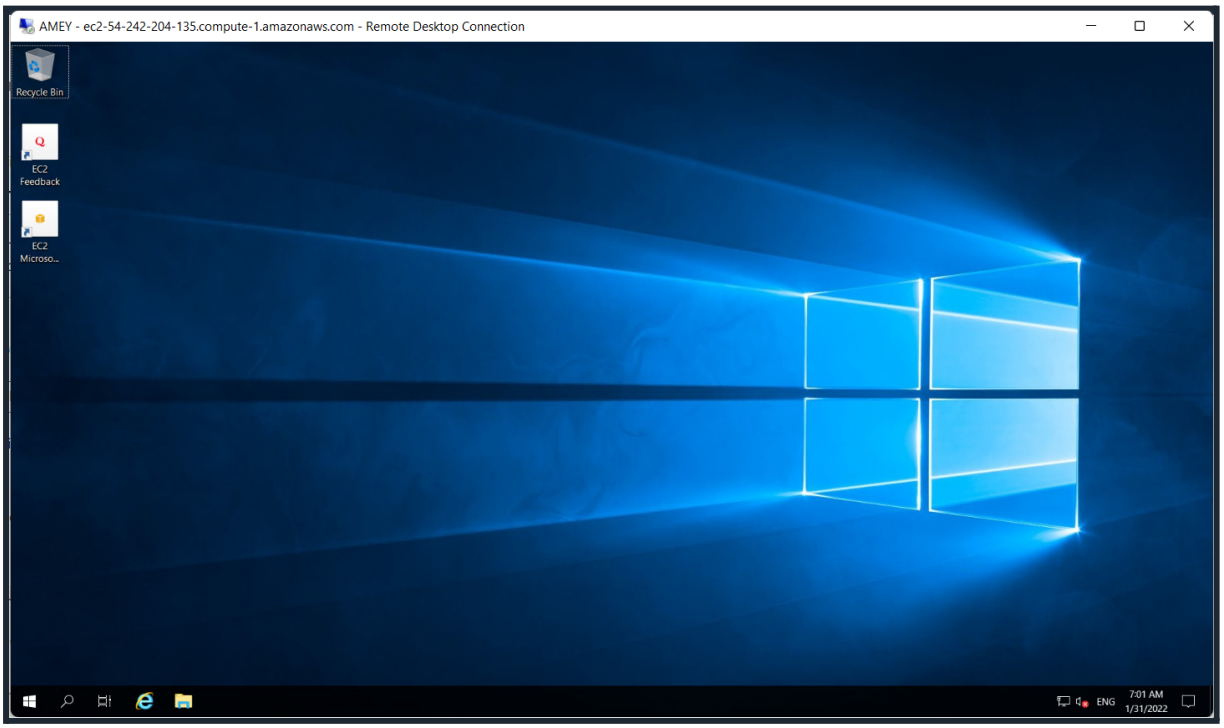


Q2: What is AWS? Explain.

ANS:

- The full form of AWS is Amazon Web Services. It is a platform that offers flexible, reliable, scalable, easy-to-use and cost-effective cloud computing solutions.
- AWS is a comprehensive, easy to use computing platform offered by Amazon. The platform is developed with a combination of infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS) offerings.
- Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centres globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

Q3: What are various features of AWS? List and explain in brief various services of AWS.

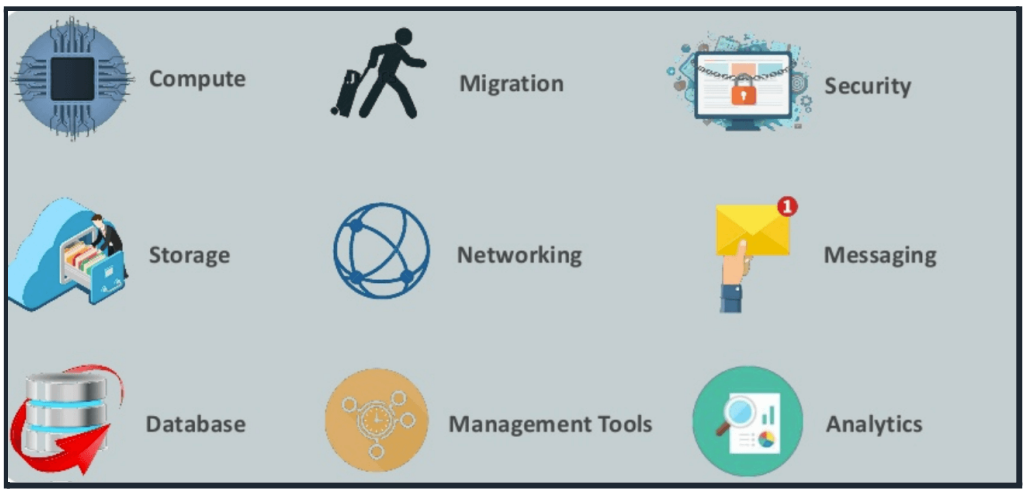
ANS:

The following are the features of AWS:

1. Flexibility
2. Cost-effective
3. Scalable and elastic
4. Secure
5. Experienced

Important AWS Services

- Amazon Web Services offers a wide range of different business purpose global cloud-based products. The products include storage, databases, analytics, networking, mobile, development tools, enterprise applications, with a pay-as-you-go pricing model.



Important AWS Services

AWS Compute Services

1. EC2(Elastic Compute Cloud) - EC2 is a virtual machine in the cloud on which you have OS level control. You can run this cloud server whenever you want.
2. LightSail - This cloud computing tool automatically deploys and manages the computer, storage, and networking capabilities required to run your applications.
3. Elastic Beanstalk - The tool offers automated deployment and provisioning of resources like a highly scalable production website.
4. EKS (Elastic Container Service for Kubernetes) - The tool allows you to Kubernetes on Amazon cloud environment without installation.
5. AWS Lambda - This AWS service allows you to run functions in the cloud. The tool is a big cost saver for you as you pay only when your functions execute.

Migration

Migration services used to transfer data physically between your datacenter and AWS.

1. DMS (Database Migration Service) – DMS service can be used to migrate on-site databases to AWS. It helps you to migrate from one type of database to another — for example, Oracle to MySQL.
2. SMS (Server Migration Service) – SMS migration services allows you to migrate on-site servers to AWS easily and quickly.
3. Snowball — Snowball is a small application which allows you to transfer terabytes of data inside and outside of the AWS environment.

Storage

1. Amazon Glacier - It is an extremely low-cost storage service. It offers secure and fast storage for data archiving and backup.
2. Amazon Elastic Block Store (EBS) - It provides block-level storage to use with Amazon EC2 instances. Amazon Elastic Block Store volumes are network-attached and remain independent from the life of an instance.
3. AWS Storage Gateway - This AWS service is connecting on-premises software applications with cloud-based storage. It offers secure integration between the company's on-premises and AWS's storage infrastructure.

Security Services

1. IAM (Identity and Access Management) — IAM is a secure cloud security service which helps you to manage users, assign policies, form groups to manage multiple users.
2. Inspector — It is an agent that you can install on your virtual machines, which reports any security vulnerabilities.
3. Certificate Manager — The service offers free SSL certificates for your domains that are managed by Route53.

4. WAF (Web Application Firewall) — WAF security service offers application-level protection and allows you to block SQL injection and helps you to block cross-site scripting attacks.
5. Cloud Directory — This service allows you to create flexible, cloud-native directories for managing hierarchies of data along multiple dimensions.
6. KMS (Key Management Service) — It is a managed service. This security service helps you to create and control the encryption keys which allows you to encrypt your data.
7. Organisations — You can create groups of AWS accounts using this service to manage security and automation settings.
8. Shield — Shield is managed DDoS (Distributed Denial of Service protection service). It offers safeguards against web applications running on AWS.
9. Macie — It offers a data visibility security service which helps classify and protect your sensitive critical content.
10. GuardDuty — It offers threat detection to protect your AWS accounts and workloads.

Database Services

1. Amazon RDS - This Database AWS service is easy to set up, operate, and scale a relational database in the cloud.
2. Amazon DynamoDB - It is a fast, fully managed NoSQL database service. It is a simple service which allows cost-effective storage and retrieval of data. It also allows you to serve any level of request traffic.
3. Amazon ElastiCache - It is a web service which makes it easy to deploy, operate, and scale an in-memory cache in the cloud.
4. Neptune - It is a fast, reliable and scalable graph database service.
5. Amazon RedShift - It is Amazon's data warehousing solution which you can use to perform complex OLAP queries.

Analytics

1. Athena — This analytics service allows perm SQL queries on your S3 bucket to find files.
2. CloudSearch — You should use this AWS service to create a fully managed search engine for your website.
3. ElasticSearch — It is similar to CloudSearch. However, it offers more features like application monitoring.
4. Kinesis — This AWS analytics service helps you to stream and analyse real-time data at massive scale.
5. QuickSight — It is a business analytics tool. It helps you to create visualisations in a dashboard for data in Amazon Web Services. For example, S3, DynamoDB, etc.
6. EMR (Elastic Map Reduce) — This AWS analytics service is mainly used for big data processing like Spark, Splunk, Hadoop, etc.

7. Data Pipeline — Allows you to move data from one place to another. For example from DynamoDB to S3.

Management Services

1. CloudWatch — Cloud watch helps you to monitor AWS environments like EC2, RDS instances, and CPU utilisation. It also triggers alarms depending on various metrics.
2. CloudFormation — It is a way of turning infrastructure into the cloud. You can use templates for providing a whole production environment in minutes.
3. CloudTrail — It offers an easy method of auditing AWS resources. It helps you to log all changes.
4. OpsWorks — The service allows you to automated Chef/Puppet deployments on AWS environments.
5. Config — This AWS service monitors your environment. The tool sends alerts about changes when you break certain defined configurations.
6. Service Catalog — This service helps large enterprises to authorise which services users will use and which won't.
7. AWS Auto Scaling — The service allows you to automatically scale your resources up and down based on given CloudWatch metrics.
8. Systems Manager — This AWS service allows you to group your resources. It allows you to identify issues and act on them.
9. Managed Services — It offers management of your AWS infrastructure which allows you to focus on your applications.

Internet of Things

1. IoT Core — It is a managed cloud AWS service. The service allows connected devices?like cars, light bulbs, sensor grids, to securely interact with cloud applications and other devices.
2. IoT Device Management — It allows you to manage your IoT devices at any scale.
3. IoT Analytics — This AWS IOT service is helpful to perform analysis on data collected by your IoT devices.
4. Amazon FreeRTOS — This real-time operating system for microcontrollers helps you to connect IoT devices in the local server or into the cloud.

Application Services

1. Step Functions— It is a way of visualising what's going inside your application and what different microservices it is using.
2. SWF (Simple Workflow Service)— The service helps you to coordinate both automated tasks and human-led tasks.
3. SNS (Simple Notification Service)— You can use this service to send you notifications in the form of email and SMS based on given AWS services.

4. SQS (Simple Queue Service)— Use this AWS service to decouple your applications. It is a pull-based service.
5. Elastic Transcoder— This AWS service tool helps you to change a video's format and resolution to support various devices like tablets, smartphones, and laptops of different resolutions.

Deployment and Management

1. AWS CloudTrail: The service records AWS API calls and sends backlog files to you.
2. Amazon CloudWatch: The tools monitor AWS resources like Amazon EC2 and Amazon RDS DB Instances. It also allows you to monitor custom metrics created by user's applications and services.
3. AWS CloudHSM: This AWS service helps you meet corporate, regulatory, and contractual, compliance requirements for maintaining data security by using the Hardware Security Module(HSM) appliances inside the AWS environment.

Developer Tools

1. CodeStar — Codestar is a cloud-based service for creating, managing, and working with various software development projects on AWS.
2. CodeCommit — It is AWS's version control service which allows you to store your code and other assets privately in the cloud.
3. CodeBuild — This Amazon developer service helps you to automates the process of building and compiling your code.
4. CodeDeploy — It is a way of deploying your code in EC2 instances automatically.
5. CodePipeline — It helps you create a deployment pipeline like testing, building, testing, authentication, deployment on development and production environments.
6. Cloud9 — It is an Integrated Development Environment for writing, running, and debugging code in the cloud.

Mobile Services

1. Mobile Hub — Allows you to add, configure and design features for mobile apps.
2. Cognito — Allows users to sign up using his or her social identity.
3. Device Farm — Device farm helps you to improve the quality of apps by quickly testing hundreds of mobile devices.
4. AWS AppSync — It is a fully managed GraphQL service that offers real-time data synchronisation and offline programming features.

Business Productivity

1. Alexa for Business — It empowers your organisation with voice, using Alexa. It will help you to Allow you to build custom voice skills for your organisation.

2. Chime — Can be used for online meetings and video conferencing.
3. WorkDocs — Helps to store documents in the cloud
4. WorkMail — Allows you to send and receive business emails.

Desktop & App Streaming

1. WorkSpaces — Workspace is a VDI (Virtual Desktop Infrastructure). It allows you to use remote desktops in the cloud.
2. AppStream — A way of streaming desktop applications to your users in the web browser. For example, using MS Word in Google Chrome.

Artificial Intelligence

1. Lex — Lex tool helps you to build chatbots quickly.
2. Polly — It is AWS's text-to-speech service that allows you to create audio versions of your notes.
3. Rekognition — It is AWS's face recognition service. This AWS service helps you to recognize faces and objects in images and videos.
4. SageMaker — Sagemaker allows you to build, train, and deploy machine learning models at any scale.
5. Transcribe — It is AWS's speech-to-text service that offers high-quality and affordable transcriptions.
6. Translate — It is a very similar tool to Google Translate which allows you to translate text in one language to another.

AR & VR (Augmented Reality & Virtual Reality)

1. Sumerian— Sumerian is a set of tools for offering high-quality virtual reality (VR) experiences on the web. The service allows you to create interactive 3D scenes and publish it as a website for users to access.

Customer Engagement

1. Amazon Connect — Amazon Connect allows you to create your customer care centre in the cloud.
2. Pinpoint — Pinpoint helps you to understand your users and engage with them.
3. SES (Simple Email Service) — Helps you to send bulk emails to your customers at a relatively cost-effective price.

Game Development

1. GameLift – It is a service which is managed by AWS. You can use this service to host dedicated game servers. It allows you to scale seamlessly without taking your game offline.

Q4: Explain in Detail EC2 Service of AWS.

ANS:

- Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) Cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

Features of Amazon EC2

1. Virtual computing environments, known as instances
2. Preconfigured templates for your instances, known as Amazon Machine Images (AMIs), that package the bits you need for your server (including the operating system and additional software)
3. Various configurations of CPU, memory, storage, and networking capacity for your instances, known as instance types
4. Secure login information for your instances using key pairs (AWS stores the public key, and you store the private key in a secure place)
5. Storage volumes for temporary data that's deleted when you stop, hibernate, or terminate your instance, known as instance store volumes
6. Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as Amazon EBS volumes
7. Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as Regions and Availability Zones
8. A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using security groups
9. Static IPv4 addresses for dynamic cloud computing, known as Elastic IP addresses
10. Metadata, known as tags, that you can create and assign to your Amazon EC2 resources
11. Virtual networks you can create that are logically isolated from the rest of the AWS Cloud, and that you can optionally connect to your own network, known as virtual private clouds (VPCs)

B.2 Conclusion:

We successfully created an Amazon EC2 instance using Amazon AWS Free Tier Account.