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ROLL NO: C24-2103124

EXPERIMENT NO. 04

Experiment - 4.

Aim = To Study and implement infrastructure a service using AWS.

Theory:

- i) Amazon EC2 (Elastic Compute Cloud)
- Amazon EC2 provides on-demand scalable compute capacity in the Amazon Web Services (AWS) Cloud. Amazon EC2 provides the following high level features:
- Instances (Virtual Services)
 - Amazon Machine Images (AMIs)
preconfigured templates for your instances that include the components you need for your server including operating system and additional software
 - Instance types =
Various configuration of CPU, memory, storage, networking capacity and graphics hardware for your instances
 - Key pairs =
Secure log in information for your instances. AWS stores the public key and you store the private key in a secure place.
 - Instance Store Volumes: for temporary data that is deleted when you stop, hibernate or terminate your instances.

ii) Amazon Machine Image (AMI)

An AMI is a supported and maintained image provided by AWS that provides the information required to launch an instance.

An AMI contains the following:

One or more Amazon Elastic Block Store (Amazon EBS)

Snapshots or for instance store backed AMIs template for the root volume of the instance.

- launch permissions that control which AWS accounts can use the AMI to launch instances
- A block device mapping that specifies the volume to attach to the instance when its launched

ii] Types of EC2 Computing instances -

- General purpose instances.
- Compute optimized instances
- Memory optimized instances
- Storage optimized instances
- Accelerated computing instances.

iv] Elastic IP Address -

An Elastic IP address is a static public IPv4 address designed for dynamic cloud computing. One can associate an Elastic IP address with any instance or network interface in any VPC in Account.

v] Remote desktop protocol (RDP) -

RDP is a secure network protocol developed by Microsoft. It enables network administrators to remotely diagnose problems that individual users encounter and gives users remote access to their physical work desktop computers.

B. RDP can be used by employees working from home or travelling who need access to their work computers.

Aim: To study and Implement Infrastructure as a Service using AWS.

Theory: EC2

EC2 stands for Amazon Elastic Compute Cloud. Amazon EC2 is a basic virtual machine with customizable hardware components and an OS. The system allows you to run various virtual computers and manage the same with a single hardware. Elastic Compute Cloud is the highly used and primary service system in the massive AWS ecosystem.

The cloud system provides multiple features, for instance, it facilitates computing on-demand and scales the Computing capacity in the Amazon cloud system. Amazon instances free you from making additional up-front investments for hardware. Also, no extra baggage of maintaining rented hardware. The all-in-one virtual hardware is easy to use and lets you create and run applications at a higher speed.

Adapting Elastic Computing Cloud in AWS allows you to launch multiple virtual servers. It also provides the control to scaling up or scaling down in correspondence with the rate of the site traffic. Also, the system works with multi-volume workloads and is capable of provisioning and deprovisioning resources with respect to the on-going demand.

This adaptable behavior of the system constitutes the word Elastic in Elastic Computing Cloud.

AMI

AMI stands for Amazon Machine Image. The information required to launch an instance is provided by the Amazon Machine Image. AMI must be specified when an instance is launched. One AMI can be chosen to launch multiple instances when the configuration required is the same for all the instances. However, multiple AMIs can be used to launch instances with different configurations. An AMI consists of the following: One or more EBS snapshots For instance-store-backed AMIs, a template for the root volume of the instance is provided. This includes the operating system, an application server, and applications. Launch permissions that control which AWS accounts can use the AMI to launch instances.

A block device mapping that specifies the volumes to attach to the instance when it's launched AMIs are stored in the Amazon S3 and identified by a unique identifier in the form of AMI-xxxxxx and a manifest XML file. They can be created from scratch or bundled from existing EC2 instances. Once an AMI is created, it is stored in an S3 bucket and the user can decide whether to make it available to others users or keep it for personal use. You can also associate a product code with a given AMI, thus, allowing the owner of the AMI to get revenue every time this AMI is used to create EC2 instances.

Types of EC2 computing instances

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give you the flexibility to choose the appropriate mix of resources for your applications. Each instance type includes one or more instance sizes, allowing you to scale your resources to the requirements of your target workload.

General Purpose

General purpose instances provide a balance of compute, memory and networking resources, and can be used for a variety of diverse workloads. These instances are ideal for applications that use these resources in equal proportions such as web servers and code repositories.

Use Cases: Developing, building, testing, and signing iOS, iPadOS, macOS, WatchOS, and tvOS applications on the Xcode IDE

Compute Optimized

Compute Optimized instances are ideal for compute bound applications that benefit from high performance processors. Instances belonging to this family are well suited for batch processing workloads, media transcoding, high performance web servers, high performance computing (HPC), scientific modeling, dedicated gaming servers and ad server engines, machine learning inference and other compute intensive applications.

Use Cases: High performance computing (HPC), batch processing, ad serving, video encoding, gaming, scientific modelling, distributed analytics, and CPU-based machine learning inference.

Memory Optimized

Memory optimized instances are designed to deliver fast performance for workloads that process large data sets in memory.

Use Cases: Memory-intensive applications such as open-source databases, in-memory caches, and real time big data analytics

Accelerated Computing

Accelerated computing instances use hardware accelerators, or co-processors, to perform functions, such as floating point number calculations, graphics processing, or data pattern matching, more efficiently than is possible in software running on CPUs.

Use Cases: Machine learning, high performance computing, computational fluid dynamics, computational finance, seismic analysis, speech recognition, autonomous vehicles, and drug discovery.

Storage Optimized

Storage optimized instances are designed for workloads that require high, sequential read and write access to very large data sets on local storage. They are optimized to deliver tens of thousands of lowlatency, random I/O operations per second (IOPS) to applications.

Use Cases: These instances maximize the number of transactions processed per second (TPS) for I/O intensive and business-critical workloads which have medium size data sets and can benefit from high compute performance and high network throughput such as relational databases (MySQL, MariaDB, and PostgreSQL), and NoSQL databases (KeyDB, ScyllaDB, and Cassandra).

They are also an ideal fit for workloads that require very fast access to medium size data sets on local storage such as search engines and data analytics workload.

Elastic IP addresses

An Elastic IP address is a static IPv4 address designed for dynamic cloud computing. An Elastic IP address is allocated to your AWS account, and is yours until you release it. By using an Elastic IP address, you can mask the failure of an instance or software by rapidly remapping the address to another instance in your account. Alternatively, you can specify the Elastic IP address in a DNS record for your domain, so that your domain points to your instance. For more information, see the documentation for your domain registrar, or Set up dynamic DNS on Your Amazon Linux instance.

An Elastic IP address is a public IPv4 address, which is reachable from the internet. If your instance does not have a public IPv4 address, you can associate an Elastic IP address with your instance to enable communication with the internet.

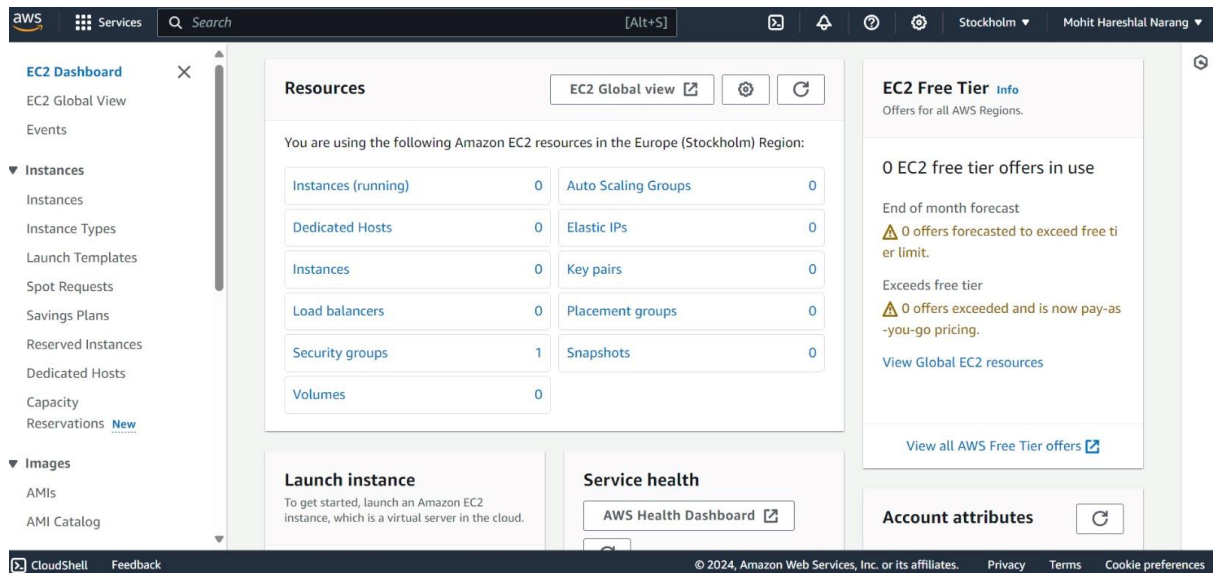
For example, this allows you to connect to your instance from your local computer. AWS currently does not support Elastic IP addresses for IPv6.

Remote Desktop Protocol (RDP)

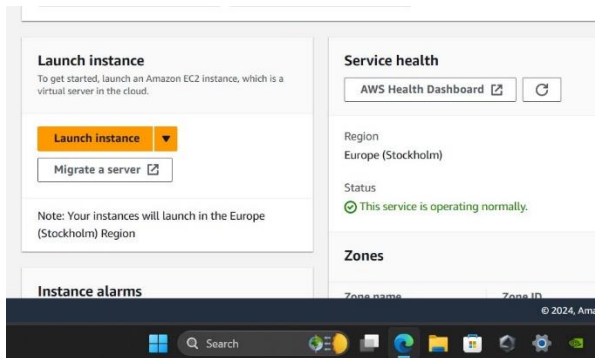
The Remote Desktop Protocol (RDP) is a protocol, or technical standard, for using a desktop computer remotely. Remote desktop software can use several different protocols, including RDP, Independent Computing Architecture (ICA), and virtual network computing (VNC), but RDP is the most commonly used protocol. RDP was initially released by Microsoft and is available for most Windows operating systems, but it can be used with Mac operating systems too. Remote desktop is the ability to connect with and use a faraway desktop computer from a separate computer. Remote desktop users can access their desktop, open and edit files, and use applications as if they were actually sitting at their desktop computer. Employees often use remote desktop software to access their work computers when they are traveling or working from home. Remote desktop access is very different from cloud computing, even though both allow employees to work remotely. In cloud computing, users access files and applications that are stored in the cloud — specifically, in cloud servers. In contrast, when using remote desktop software, users are actually accessing their physical desktop computer, and can only use files and applications saved locally on that desktop. Cloud computing is sometimes easier to use and more efficient to implement for remote workforces, but many companies have not migrated to the cloud, or cannot for security or regulatory reasons.

Implementation:

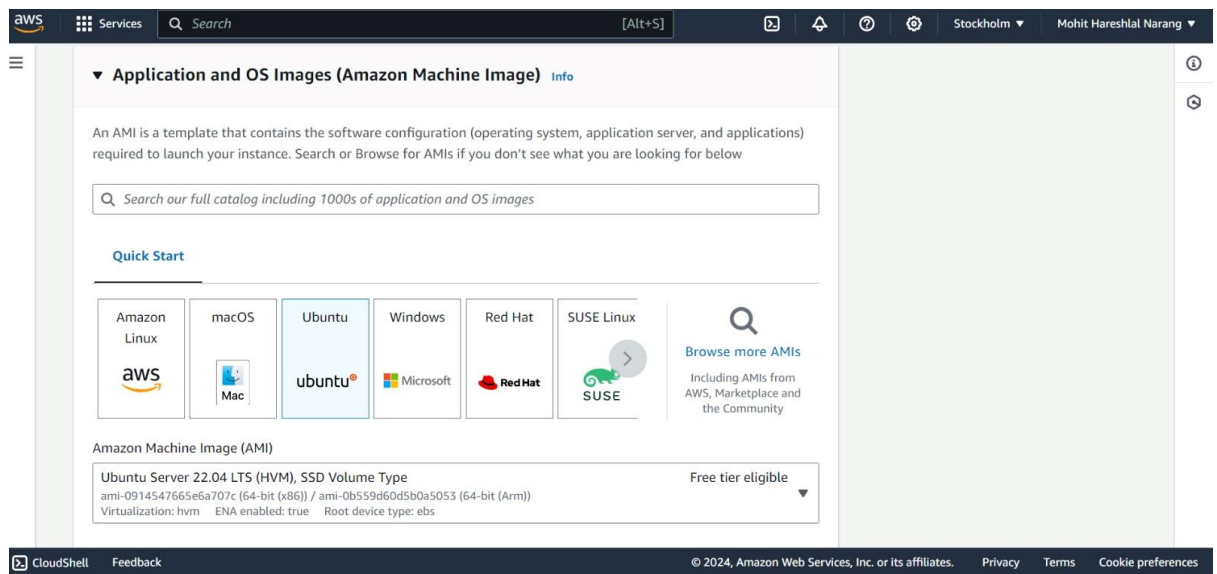
1. Open the EC2 page on amazon.



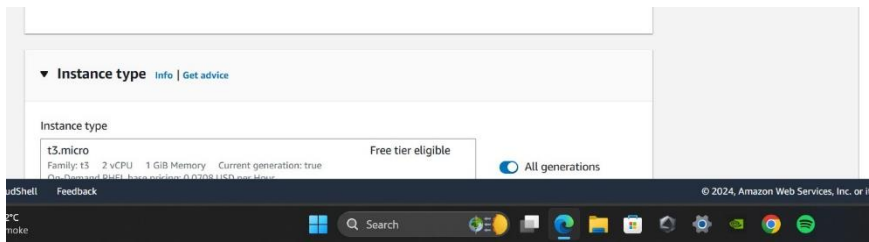
2. Click the launch instance



3. Select Ubuntu Server 20.0.4

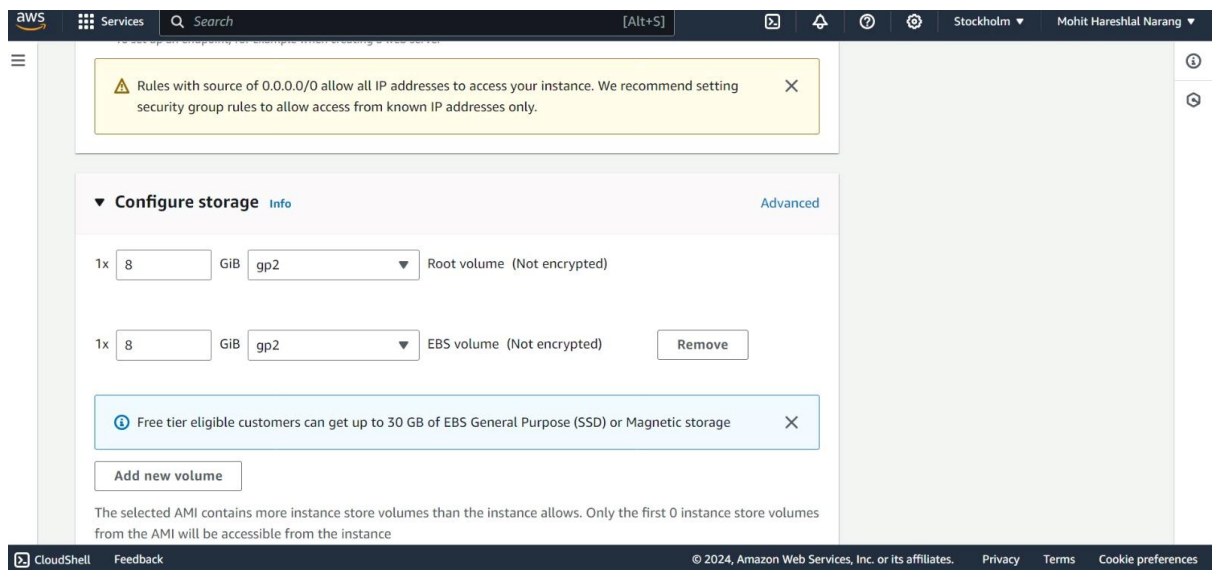


4. Select the Instance Type

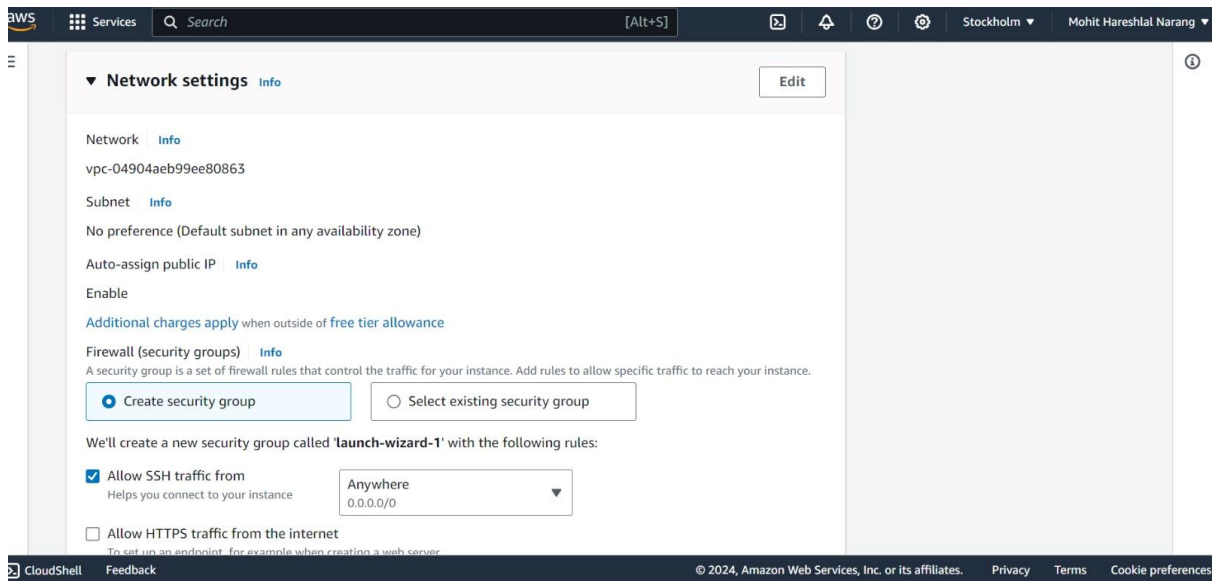


Configure Installation Details as:

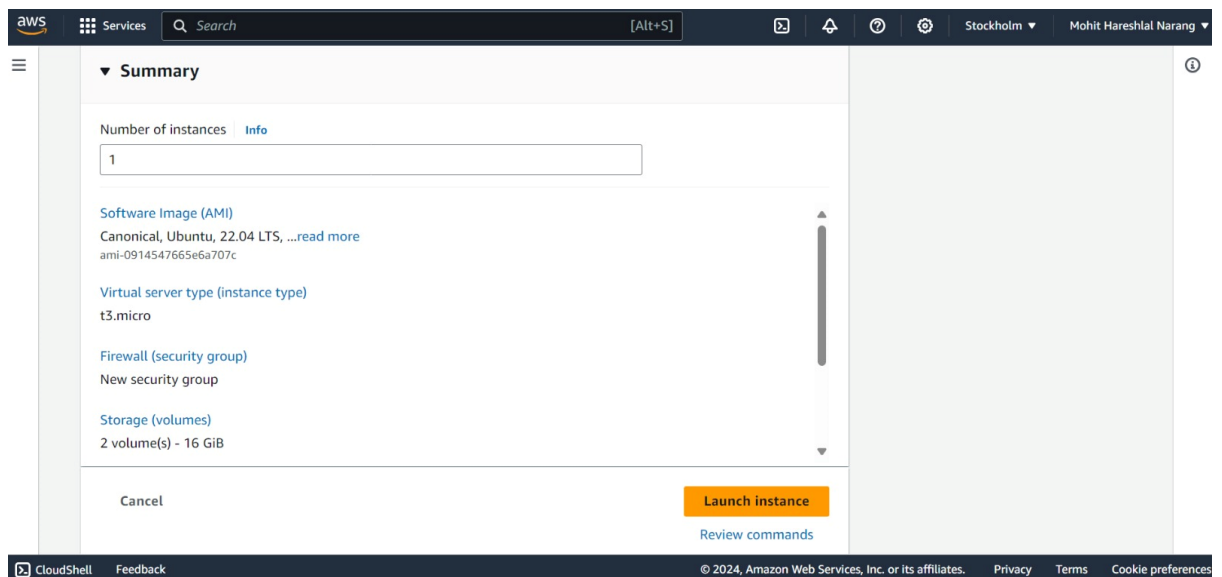
5. Add a new volume



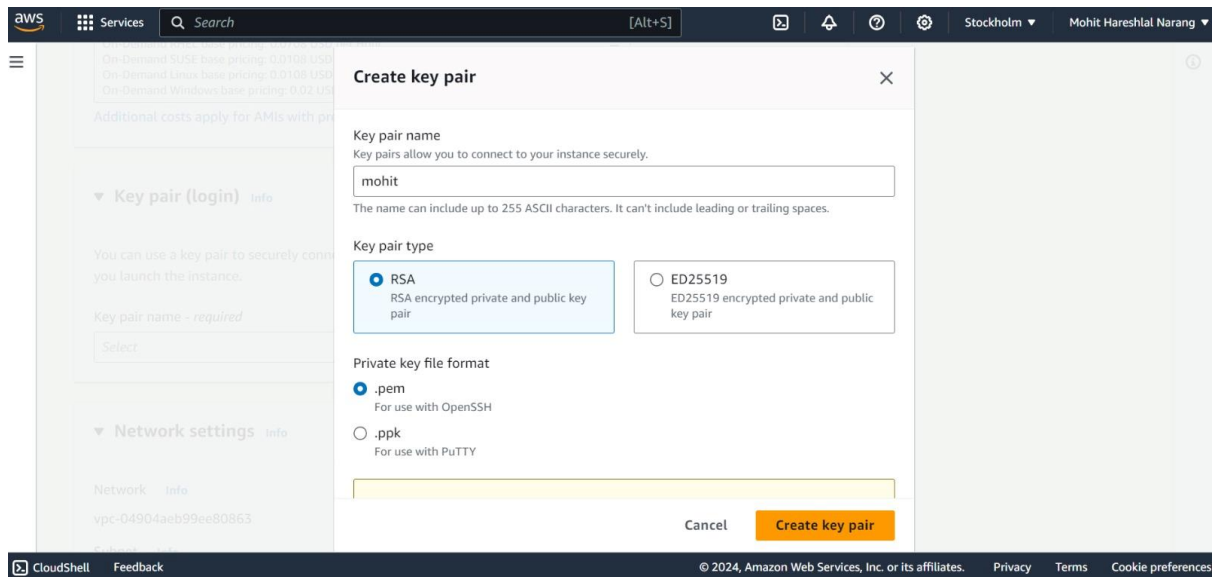
6. Create a new Security Group



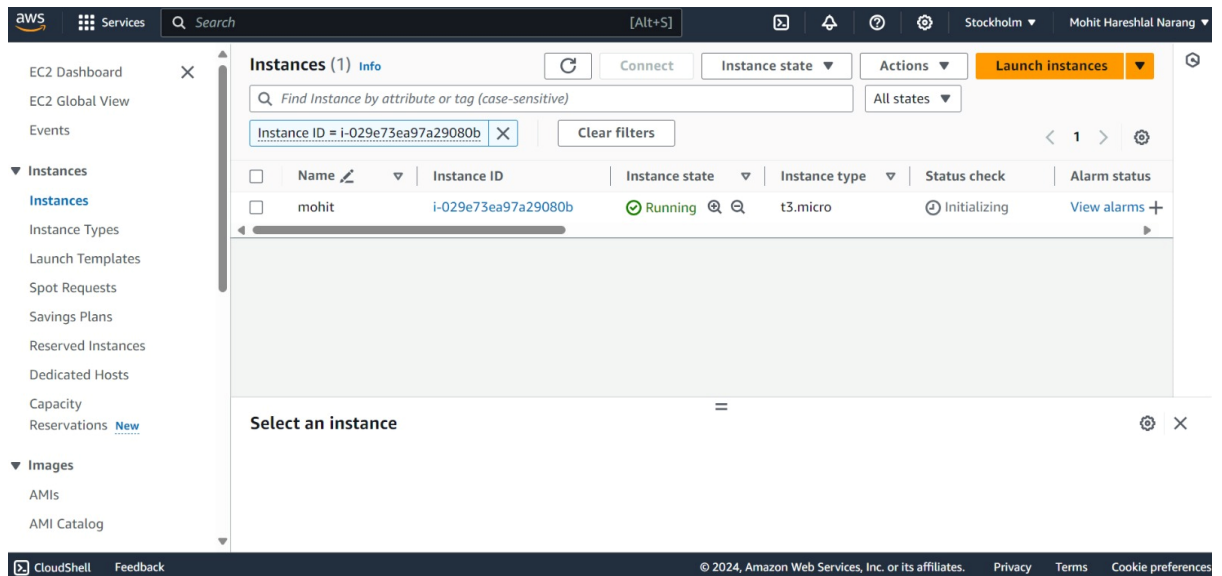
7. Review all details and launch

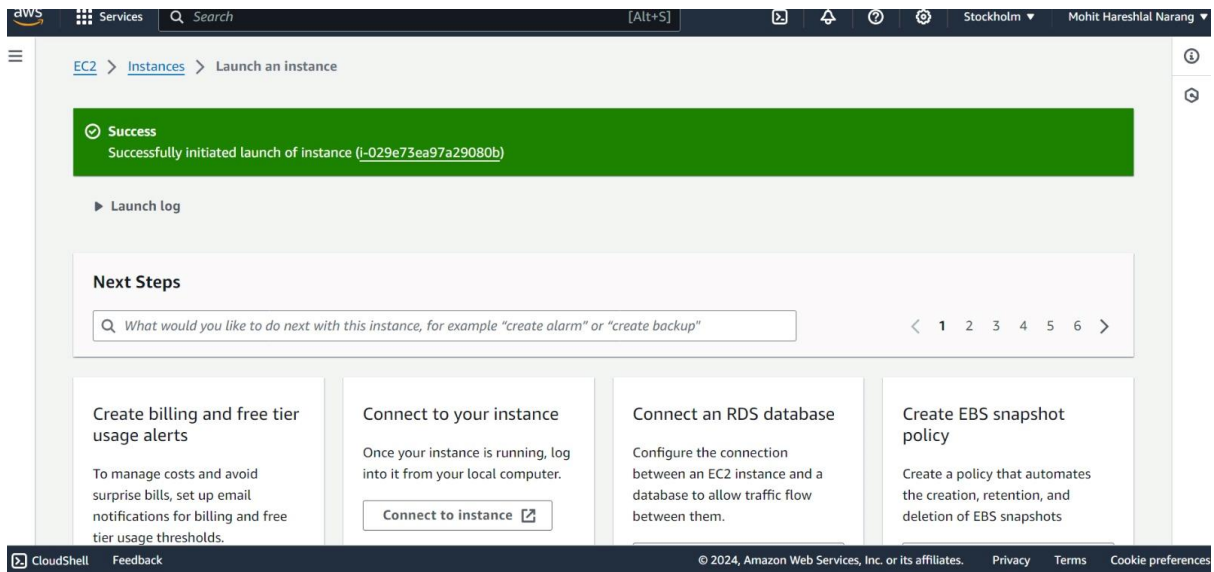


8. Create a new Key Pair & Download it.

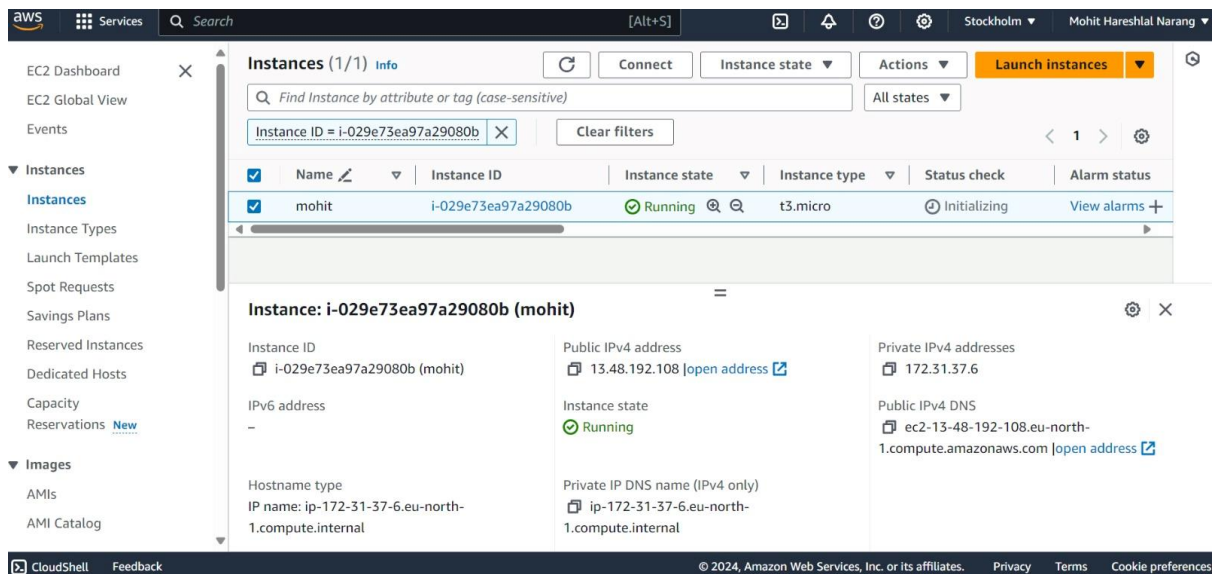


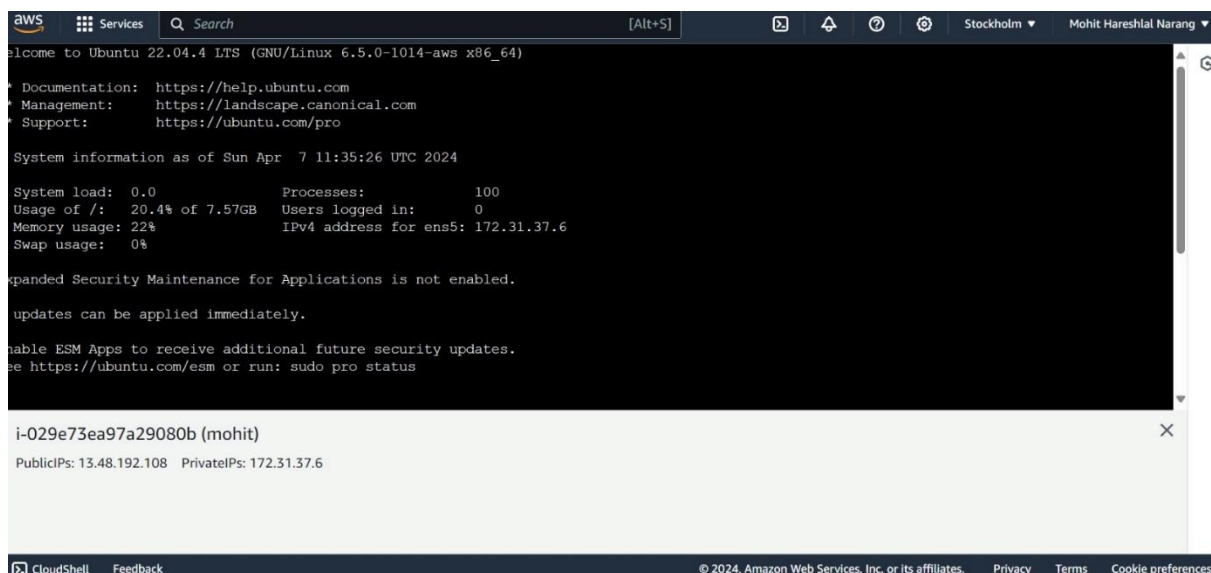
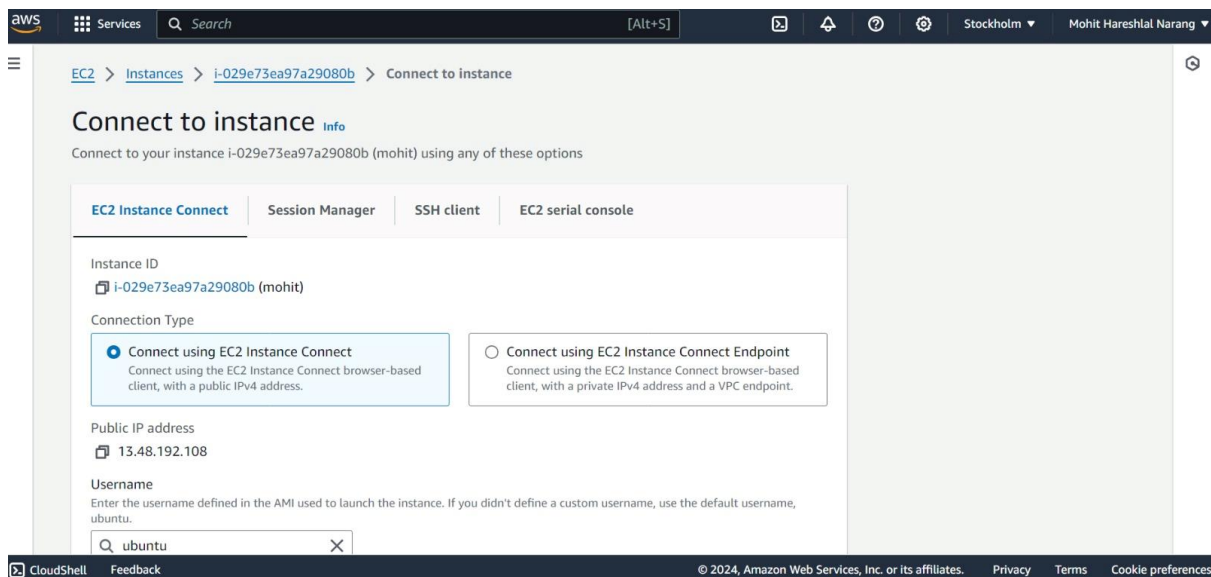
9. Launch the instance by clicking on the instance ID Then click connect.





10. Ubuntu Remote access is successful





11. Testing Linux commands:

The screenshot displays the AWS CloudShell terminal interface. The top header bar includes the AWS logo, a 'Services' menu, a search bar, and the user's name 'Mohit Hareshlal Narang'. The terminal window shows the following text:

```
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
ubuntu@ip-172-31-37-6:~$ ls  
ubuntu@ip-172-31-37-6:~$ mkdir mohitAWS  
ubuntu@ip-172-31-37-6:~$ ls  
mohitAWS  
ubuntu@ip-172-31-37-6:~$
```

Below the terminal output, a metadata box shows the instance ID 'i-029e73ea97a29080b (mohit)' and IP addresses: 'PublicIPs: 13.48.192.108 PrivateIPs: 172.31.37.6'. The bottom footer bar contains 'CloudShell', a 'Feedback' link, and copyright information for Amazon Web Services, Inc. (© 2024).

Conclusion: Hence, an EC2 Instance was setup and run on Amazon Web Services