Internship Report

(Project Work)

On

HOST A STATIC WEBSITE USING EC2 & S3 SERVICES IN AWS

Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU

In Partial Fulfilment of the Requirements for the Award of the Degree of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE & TECHNOLOGY

Submitted By

YASARAPU PRUDHVIRAJ - (21691A28D0)

Under the Guidance of

Dr.K.Sreedivya

Assistant Professor

Department of Computer Science & Technology

MADANAPALLE INSTITUTE OF TECHNOLGY & SCIENCE

(UGC – AUTONOMOUS)

(Affiliated to JNTUA, Ananthapuramu)

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This is to certify that the **SUMMER INTERNSHIP - 1 (20CST701)** entitled "**HOST A STATIC WEBSITE USING EC2 & S3 SERVICES IN AWS**" is a Bonafede work carried out by

YASARAPU PRUDHVIRAJ - 21691A28D0

Submitted in partial fulfilment of the requirements for the award of degree **Bachelor of Technology** in the stream of **Computer Science & Technology** in **Madanapalle Institute of Technology & Science, Madanapalle**, affiliated to **Jawaharlal Nehru Technological University Anantapur, Ananthapuramu** during the academic year 2023-2024

Guide
Dr.K.Sreedivya
Assistant Professor,
Department of CST

Internship Coordinator/CST
Mr.V.Naveen
Assistant Professor
Department of CST

Head of the Department
Dr.M. Sreedevi
Professor and Head
Department of CST

INTERNSHIP CERTIFICATE

DECLARATION

I hereby declare that results embodied in this **SUMMER INTERNSHIP-1(20CST701)**

"**HOST A STATIC WEBSITE USING EC2 & S3 SERVICES IN AWS**" by us under the guidance of **Dr.K.Sreedivya**, **Assistant Professor, Dept. of CST** in partial fulfilment of the award of **Bachelor of Technology** in **Computer Science & Technology** from **Jawaharlal Nehru Technological University Anantapur, Ananthapuramu** and I have not submitted the same to any other University/institute for award of any other degree.

Date:

Place: Madanapalle

PROJECT MEMBER

YASARAPU PRUDHVIRAJ (21691A28D0)

I certify that above statement made by the students is correct to the best of my knowledge.

Date :

Guide

Dr.K.Sreedivya
Assistant Professor
Department of CST

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ABSTRACT

In the digital age, the rapid growth of e-commerce has reshaped the way businesses and consumers interact, necessitating the development of robust and scalable online platforms. This abstract outlines the key components and benefits of creating an e-commerce website using Amazon Web Services (AWS) services, specifically EC2, VPC, and S3.The proposed e-commerce website infrastructure leverages the power of AWS to provide a secure, flexible, and high-performance environment. Amazon EC2 (Elastic Compute Cloud) serves as the backbone of the application, providing scalable compute capacity and enabling the deployment of web applications. By creating and managing EC2 instances, businesses can dynamically adjust resources to accommodate varying levels of user traffic and demand.The Virtual Private Cloud (VPC) enhances the security and isolation of the e-commerce platform. With VPC, organizations can isolate their application environment from the public internet, thereby reducing potential attack surfaces and ensuring a controlled and secure network architecture. VPC's subnets, network access control lists (NACLs), and security groups enable granular control over traffic flows and access permissions, enhancing the overall security posture of the e-commerce website.Amazon S3 (Simple Storage Service) plays a pivotal role in storing and delivering static assets, such as product images, videos, and downloadable files. S3's durability, scalability, and cost-effectiveness make it an ideal solution for hosting multimedia content. Additionally, S3 supports global distribution through its Content Delivery Network (CDN) capabilities, ensuring optimized content delivery to users across various geographic regions.The integration of these AWS services provides several benefits for building an e-commerce website. Scalability ensures that the platform can accommodate sudden spikes in user activity, such as during promotional events or holidays, without compromising performance. The secure VPC environment safeguards sensitive customer data and transaction information, fostering trust and compliance with data protection regulations. Leveraging S3 for static asset storage and distribution enhances user experience by minimizing latency and optimizing content delivery.In conclusion, the proposed e-commerce website infrastructure utilizing AWS EC2, VPC, and S3 services presents a comprehensive solution for businesses seeking to establish a resilient, scalable, and secure online presence. By harnessing the capabilities of these services, organizations can create a robust e-commerce platform capable of meeting user demands while maintaining data security and enhancing overall customer satisfaction.

Keywords: E-Commerce, AWS, EC2, VPC, S3, infrastructure, scalability, security, static assets, content delivery, online platform.

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LIST OF ABBREVIATIONS

AWS	Amazon Web Services
EC2	Elastic Compute Cloud
VPC	Virtual Private Cloud
S3	Simple Storage Service
CDN	Content Delivery Network
NACL	Network Access Control Lists

CHAPTER 1
INTRODUCTION

1.1 About Industry or Organization Details

Andhra Pradesh State Skill Development Corporation (APSSDC) is a unique organization formed as a Public-Private Partnership(PPP) corporation to promote skill-development & entrepreneurship in the state of Andhra Pradesh. The corporation is incorporated as a Section-8 company (not-for-profit) with a private equity component of 51% and 49% by Govt of AP.

The Corporation now serves as the "Executive Agency" for the newly formed Department of Skill Development, Entrepreneurship, and Innovation. APSSDC will also serve the important task of providing high quality skilled manpower as part of the "Knowledge and Skills Mission" of Go AP, which is one of the cross-cutting missions among the seven missions formed by the govt to facilitate double digit growth of the state.

The main objective of the corporation is to implement a structured and pragmatic solution to skill & upskill the workforce in the state of A.P. and to increase employability and promote entrepreneurship in sync with Industrial growth of the state.

Online Summer Internship Program , organized by the Andhra Pradesh State Skill Development Corporation (APSSDC). This program, conducted by the Department of Skills Development & Training, Government of Andhra Pradesh, offers an excellent opportunity for skill development and practical learning in various domains.

1.2. My Personal Benefits

- Learning new skills and enhancing existing ones.
- Gaining industry-specific knowledge and exploring potential career paths.
- Connecting with professionals for future opportunities.
- Adding valuable experience to my resume.
- Validating and boosting my self-confidence.
- Understanding my strengths and areas for improvement.
- Confirming my career interests.
- Obtaining strong recommendations for my future endeavors.

Skill Development and Expertise Enhancement :

- Engaging in this project has provided a substantial platform for honing technical competencies in cloud computing, particularly within the AWS ecosystem. The hands-on experience garnered throughout the project lifecycle, encompassing architecture

design, deployment strategies, and utilization of AWS services, has significantly augmented my proficiency in cloud-based solutions and infrastructure management.

Problem-Solving and Decision-Making Proficiency :

- Confronting the challenges inherent in designing and implementing a digital store has enhanced my problem-solving acumen and decision-making prowess. Addressing complexities such as system scalability, security integrations, and resource optimization has nurtured an adeptness in devising pragmatic solutions and making informed choices in the realm of cloud-based architectures.

Professional Growth and Adaptability :

- The project's immersive nature has fostered adaptability and agility in navigating the dynamic landscape of technological advancements. The exposure to industry-standard practices and the amalgamation of theoretical knowledge with practical application have contributed significantly to my professional growth, rendering me better equipped to undertake complex projects in the realm of digital commerce and cloud infrastructure.

Conclusion :

In summary, the execution of the "Digital Store using AWS EC2" project has not only bolstered my technical proficiency but also cultivated essential soft skills crucial for thriving in the contemporary technological milieu. The amalgamation of hands-on experience, problem-solving acumen, and adaptability has significantly enriched my skill set, augmenting my preparedness to tackle future challenges in the domain of cloud-based retail solutions.

1.3. Objective of the Project

To establish a highly scalable, secure, and performant online platform for e-commerce operations. The project aims to provide a seamless shopping experience for customers while enabling effortless management of product catalogs, user data, and transactions. Leveraging EC2 instances for web hosting, S3 for efficient storage and content delivery, and VPC for network isolation, the goal is to create an infrastructure that ensures data security, high availability, and the ability to dynamically adjust to varying traffic loads. Ultimately, the project's objective is to enable the growth and success of the e-commerce business in a cost-effective and user-friendly manner

- **Scalability and Elasticity:** Develop a digital store on AWS EC2 capable of scaling seamlessly to meet fluctuating user demands.
- **Security and Reliability:** Implement robust security measures to safeguard user data and ensure system resilience.
- **Performance Enhancement:** Optimize performance by leveraging AWS EC2's computing power and global infrastructure.
- **Cost Efficiency:** Strategize cost-effective solutions while maximizing operational efficiency.
-

Limitations of the Project:

- **Real-world Complexity:** The project's scope might not fully encompass real-world challenges like third-party integrations or compliance issues.
- **Resource Constraints:** Limited resources (time, budget) may restrict the depth of implementation and comprehensive testing.
- **Scalability Scope:** Scalability analysis might be confined, potentially overlooking certain future scaling requirements.
- **Security and Privacy:** Due to the project's scope, exhaustive security audits might not be feasible, possibly missing some security intricacies.

CHAPTER 2
SYSTEM ANALYSIS

2.1 Introduction

In the modern digital landscape, e-commerce has evolved into a cornerstone of global trade and consumer behavior. As businesses increasingly embrace the online marketplace, the need for a dynamic, secure, and scalable infrastructure to support e-commerce websites becomes paramount. This introduction sheds light on the strategic importance and core concepts involved in creating an e-commerce website using Amazon Web Services (AWS) services, specifically focusing on EC2 instances powered by Linux OS, Virtual Private Cloud (VPC), and Amazon S3.

The term "cloud ecommerce" refers to the practice of outsourcing a remote network of servers that are hosted on the Internet for the purposes of using application services, storing and processing data. Cloud based ecommerce can be contradistinguished to software installed on a local server.

Cloud-based solutions allow learners to access eLearning platforms and resources from anywhere with an internet connection. This means that learners can access course materials and collaborate with other learners regardless of their location.

The foundation of this E-commerce venture lies in the utilization of Amazon EC2, VPC and S3.

Elastic Compute Cloud (EC2): EC2 instances running on the Linux operating system. EC2 offers unparalleled computational capabilities, enabling businesses to effortlessly deploy, manage, and scale web applications to cater to varying levels of user traffic. Linux, a robust and open-source operating system, not only ensures cost-efficiency but also provides a high degree of customization and control over the application environment. By harnessing the synergy between EC2 and Linux, organizations can create an agile and responsive e-commerce platform that adapts to the ever-changing demands of the digital marketplace.

Elastic computing is the ability to quickly expand or decrease computer processing, memory, and storage resources to meet changing demands without worrying about capacity planning and engineering for peak usage. Typically controlled by system monitoring tools, elastic computing matches the amount of resources allocated to the amount of resources actually needed without disrupting operations. With cloud elasticity, a company avoids paying for unused capacity or idle resources and doesn’t have to worry about investing in the purchase or maintenance of additional resources and equipment.

While security and limited control are concerns to take into account when considering elastic cloud computing, it has many benefits. Elastic computing is more efficient than your typical IT infrastructure, is typically automated so it doesn't have to rely on human administrators around the clock, and offers continuous availability of services by avoiding unnecessary slowdowns or service interruptions.

Virtual Private Cloud (VPC): It constitutes a crucial component of this infrastructure, underpinning the security and isolation required for an e-commerce ecosystem. VPC allows businesses to establish a private network within the AWS cloud, ensuring a controlled environment shielded from the public internet. This isolation reduces the risk of potential security breaches and cyberattacks, while VPC's subnet and security group features provide fine-grained control over inbound and outbound network traffic. By implementing VPC, organizations can build a fortress around their e-commerce operations, safeguarding sensitive customer data and cultivating trust among users.

A private cloud consists of infrastructure dedicated completely to a single organization. Usually, an organization will buy the cloud infrastructure, install the software, and hire an IT management team. In this case, the organization owns everything from top to bottom.

loud security is always a shared responsibility between a cloud provider and its clients. Regardless of the cloud environment, users must take steps to secure data and applications in the cloud. For example, public cloud environments like Amazon AWS can be secured with third-party applications that automatically detect and manage threats.

Amazon S3: Simple Storage Service, plays a pivotal role in storing and distributing the multimedia assets that define an e-commerce experience. With S3, businesses can seamlessly host product images, videos, and downloadable files, providing a seamless and engaging shopping journey for customers. The inherent scalability, global reach, and integration with AWS's Content Delivery Network (CDN) make S3 an ideal solution for optimizing content delivery and minimizing latency, regardless of the user's geographical location.

Amazon Simple Storage Service (Amazon S3) is an object storage service that offers industry-leading scalability, data availability, security, and performance. Customers of all sizes and industries can use Amazon S3 to store and protect any amount of data for a range of use cases, such as data lakes, websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics.

Amazon S3 provides management features so that you can optimize, organize, and configure access to your data to meet your specific business, organizational, and compliance requirements.

Amazon S3 offers a range of storage classes designed for different use cases. For example, you can store mission-critical production data in S3 Standard for frequent access, save costs by storing infrequently accessed data in S3 Standard-IA or S3 One Zone-IA, and archive data at the lowest costs in S3 Glacier Instant Retrieval, S3 Glacier Flexible Retrieval, and S3 Glacier Deep Archive.

In the competitive world of e-commerce, building a robust and scalable infrastructure is essential for success. This introduction has provided a glimpse into the key components of creating an e-commerce website using AWS services, focusing on EC2 instances powered by the Linux operating system, Virtual Private Cloud (VPC), and Simple Storage Service (S3). By harnessing the power of these services, businesses can achieve seamless scalability, enhanced security, and optimized content delivery, ultimately offering customers an exceptional online shopping experience. The subsequent sections of this paper will delve deeper into the practical implementation and configuration steps required to bring this e-commerce vision to life.

- Configure a lifecycle configuration to manage your objects and store them cost effectively throughout their lifecycle. You can transition objects to other S3 storage classes or expire objects that reach the end of their lifetimes.
- Prevent Amazon S3 objects from being deleted or overwritten for a fixed amount of time or indefinitely. You can use Object Lock to help meet regulatory requirements that require storage or to simply add another layer of protection against object changes and deletions.
- Replicate objects and their respective metadata and object tags to one or more destination buckets in the same or different AWS Regions for reduced latency, compliance, security, and other use cases.

Amazon S3 provides features for auditing and managing access to your buckets and objects. By default, S3 buckets and the objects in them are private. You have access only to the S3 resources that you create. To grant granular resource permissions that support your specific use case or to audit the permissions of your Amazon S3 resources, you can use the following features.

2.1.1. Current System Assessment:

Objective: Evaluate the existing system, if any, and identify its strengths, weaknesses, and limitations.

Methods: Conduct a thorough review of any legacy systems or processes, noting areas that may be improved through the implementation of the new ecommerce website on AWS EC2 instances.

When you launch an instance, the *instance type* that you specify determines the hardware of the host computer used for your instance. Each instance type offers different compute, memory, and storage capabilities, and is grouped in an instance family based on these capabilities. Select an instance type based on the requirements of the application or software that you plan to run on your instance.

Amazon EC2 dedicates some resources of the host computer, such as CPU, memory, and instance storage, to a particular instance. Amazon EC2 shares other resources of the host computer, such as the network and the disk subsystem, among instances. If each instance on a host computer tries to use as much of one of these shared resources as possible, each receives an equal share of that resource. However, when a resource is underused, an instance can consume a higher share of that resource while it's available.

2.1.2. Requirement Identification:

Objective: Identify and document the functional and non-functional requirements of the ecommerce website.

Methods: Engage stakeholders, including end-users and business owners, through interviews, surveys, and workshops to gather information on features, performance expectations, security requirements, and user experience.

The resources that you have available impact your performance. For encoders, the resources determine the speed for encoding assets and the number of streams, bitrate, and type of encoding that's possible. We recommend the following hardware specifications for optimum performance.

2.1.3. Feasibility Study:

Objective: Assess the viability of implementing the proposed ecommerce website on AWS EC2 instances.

Methods: Conduct a feasibility study, considering technical, operational, economic, and scheduling aspects. Evaluate potential challenges and risks that may affect project success.

- **Auto Scaling groups** require at least 30 *consecutive* hours of metric data.
- **Amazon EBS volumes** require at least 30 *consecutive* hours of metric data.
- **Amazon ECS services on Fargate** require at least 24 hours of metric data.
- **Lambda functions** don't require CloudWatch metric data.
- **Commercial software licenses** require at least 30 *consecutive* hours of metric data.

2.1.4. System Design Specifications:

Objective: Develop detailed system design specifications based on the gathered requirements.

Methods: Translate requirements into technical specifications, including the architecture, database design, user interface, and integration points. Ensure alignment with AWS services, such as EC2 instances, RDS, and load balancing.

2.2 Existing System

In a traditional hosting setup, a proposal might involve using dedicated servers or shared hosting from providers like GoDaddy, Bluehost, or self-hosted solutions. These systems often lack the scalability and flexibility of cloud-based services like AWS.

The existing system, prior to the implementation of the "Ecommerce Website on AWS EC2 Instances" project, likely consists of a legacy infrastructure, potentially hosted on on-premises servers or another cloud platform. Its technology stack comprises a set of tools, programming languages, and databases supporting current ecommerce functionalities. The analysis of scalability and performance characteristics provides insights into the system's ability to handle varying levels of traffic. Security measures, encompassing data encryption and access controls, highlight the strengths and weaknesses of the existing system in safeguarding sensitive information. An examination of the user experience, maintenance procedures, and associated costs contributes to a comprehensive understanding of the current state, informing strategic decisions for the design and implementation of an improved ecommerce solution on AWS EC2 instances.

2.3 Disadvantages of Existing System

- **Complexity:** Setting up and managing EC2 instances, configuring a VPC, and ensuring security can be complex and may require a high level of expertise. Maintaining this infrastructure can be challenging for small teams or businesses without dedicated IT resources.
- **Cost Management:** While AWS provides cost efficiencies, it's easy to overspend if resources aren't managed correctly. Monitoring and controlling costs can be a time-consuming task.
- **Maintenance Overhead:** EC2 instances require ongoing maintenance, including patching, updates, and backups. Managing the entire infrastructure can be resource-intensive.
- **Latency and Global Distribution:** While CloudFront accelerates content delivery, the effectiveness of CDNs can vary based on the geographic distribution of your customers. Ensuring a consistent user experience worldwide can be a challenge.
- **Data Transfer Costs:** AWS charges for data transfer between services and regions. Data transfer costs can add up, especially if there's a significant amount of data movement between EC2, S3, and CloudFront.
- **Reliance on AWS:** The existing system is tightly coupled with AWS services, making it potentially challenging to migrate to another cloud provider or hosting solution in the future.

2.4 Proposed System

Transitioning from a traditional hosting system to AWS can significantly enhance scalability, security, and overall performance. It allows for flexible resource allocation, efficient storage with S3, and network isolation through VPC, providing a solid foundation for an e-commerce site's growth and stability.

The proposed system, "Ecommerce Website on AWS EC2 Instances," introduces significant improvements over the existing setup. Leveraging the robust infrastructure of Amazon Web Services, the solution enhances scalability, ensuring the ability to seamlessly handle varying levels of user traffic. Security measures are strengthened, incorporating advanced features provided by AWS to safeguard sensitive data. The user experience is optimized with a refined interface and improved interaction design. Maintenance procedures are streamlined, benefiting from the flexibility and ease of management offered by AWS services.

2.5 Advantages over Existing System

The proposed "Ecommerce Website on AWS EC2 Instances" system introduces several key advantages over the existing infrastructure. Firstly, the utilization of Amazon Web Services (AWS) brings unparalleled scalability, allowing the platform to dynamically adjust resources based on demand, ensuring optimal performance during peak periods. Enhanced security features inherent in AWS contribute to robust data protection, reducing the risk of breaches and ensuring compliance with industry standards. The user experience is elevated through improved interface design and responsive functionalities. Operational efficiency is streamlined with AWS services, facilitating easier maintenance and management. Additionally, the cloud-based architecture is expected to result in cost savings through efficient resource utilization and the pay-as-you-go model of AWS, providing a more economically sustainable solution compared to the limitations of the existing system. Overall, the proposed system stands to deliver superior scalability, security, user experience, and cost-effectiveness.

Using AWS services like EC2, S3, and VPC for an e-commerce website hosting system offers several advantages:

1. Scalability: EC2 instances can be easily scaled up or down based on traffic demands, ensuring your website can handle fluctuations in users.

2. Reliability: AWS services like S3 provide highly durable and available storage, ensuring your website's content remains accessible and secure.

3. Security: VPC allows you to create a private network, enhancing security by controlling inbound and outbound traffic. You can also use AWS security features to protect against various threats.

4. Performance: EC2 instances can be optimized for performance, and S3 provides high-speed data transfer, ensuring a seamless user experience.

5. Cost-Effectiveness: With AWS, you pay for what you use, allowing cost optimization by adjusting resources as needed, potentially reducing infrastructure costs.

6. Global Reach: AWS has data centers worldwide, enabling your e-commerce website to reach a global audience with low-latency access.

By leveraging these AWS services, your e-commerce website can benefit from improved performance, security, scalability, and cost efficiency.

CHAPTER 3
SYSTEM SPECIFICATIONS

3.1 Hardware Requirement Specifications

3.1.1 System Specifications

- Device name : No-One
- Processor : Intel(R) Core(TM) i5-10300H CPU @ 2.50GHz 2.50 GHz
- Installed RAM : 16.0 GB (15.8 GB usable)
- System type : 64-bit operating system, x64-based processor
-

3.1.2 Amazon Web Service Specifications

Amazon EC2 Instances:

Selection of EC2 instance types based on the anticipated workload and performance requirements, considering factors like CPU, memory, and storage capacity.

Utilization of Auto Scaling groups to dynamically adjust the number of instances based on traffic patterns, ensuring scalability and optimal resource utilization.

Storage:

Utilization of Amazon Simple Storage Service (S3) for scalable and durable object storage, catering to the storage needs of static assets and media files.

Integration with Amazon Elastic Block Store (EBS) for persistent block-level storage volumes for EC2 instances.

Networking:

Configuration of Amazon Virtual Private Cloud (VPC) to isolate and control network resources, ensuring secure communication between components.Implementation of security groups and network access controls to restrict and manage traffic.

Networking is the exchange of information and ideas among people with a common profession or special interest, usually in an informal social setting. Networking often begins with a single point of common ground.

CPU: AWS CLI v2 is a command-line tool and does not require a high-performance CPU. However, it may require more CPU resources if it is running commands that involve large amounts of data or if it is running multiple commands at the same time.

Memory: AWS CLI v2 does not require a large amount of memory, but it may require more memory if it is running commands that involve large amounts of data or if it is running multiple commands at the same time.

3.2 Software Requirement Specifications

3.2.1 System Software

- Operating System : windows , Linux
- Edition : Windows 11 Home Single Language
- Version : 22H2
- OS build : 22621.2283

3.2.2 Web Application Framework:

- Selection of a web application framework, potentially Node.js or a similar technology, for the backend development to handle server-side scripting.

3.2.3 Frontend Technologies:

- Utilization of modern frontend technologies, including HTML5, CSS3, and JavaScript, to create a responsive and visually appealing user interface.

3.3 Other Requirements

- AWS account
- Knowledge about Python

CHAPTER 4
SYSTEM DESIGN

4.1 System Architecture

Designing an e-commerce website using Amazon Web Services (AWS) components like EC2 (Elastic Compute Cloud), VPC (Virtual Private Cloud), and S3 (Simple Storage Service) requires careful planning to ensure security, scalability, and high availability. Here's a high-level system design and architecture for such a setup:

The architecture can be divided into various layers, each responsible for different aspects of the e-commerce website:

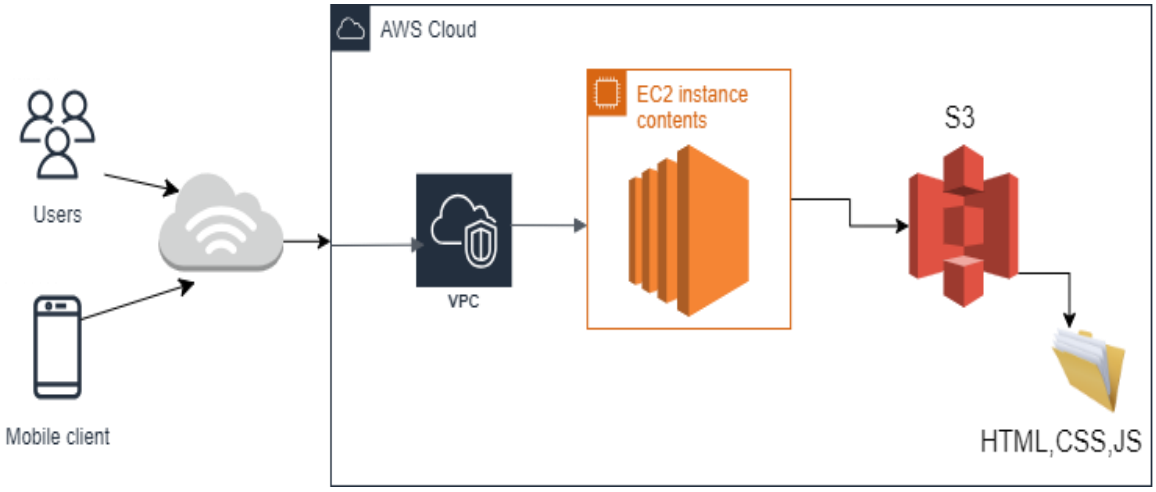


Figure 4.1.1: website Architecture

4.2 Modules Flow

4.2.1 User Interface Layer:

- EC2 instances hosting web servers (e.g., Apache, Nginx) to serve the user interface.
- Load Balancers (e.g., Elastic Load Balancing) distribute traffic across multiple instances for scalability and availability.

4.2.2. Application Layer:

- EC2 instances running the application server (e.g., Node.js, Ruby on Rails) that handles business logic, user authentication, and cart management.
- Autoscaling group to automatically adjust the number of instances based on traffic load.

4.2.3. Data Storage Layer

Utilize Amazon S3 to store static website assets such as HTML, CSS, and JavaScript files. Create an S3 bucket and configure it for static website hosting. Upload the website's frontend assets to the S3 bucket. Enable versioning and configure proper permissions to ensure secure access to these assets.

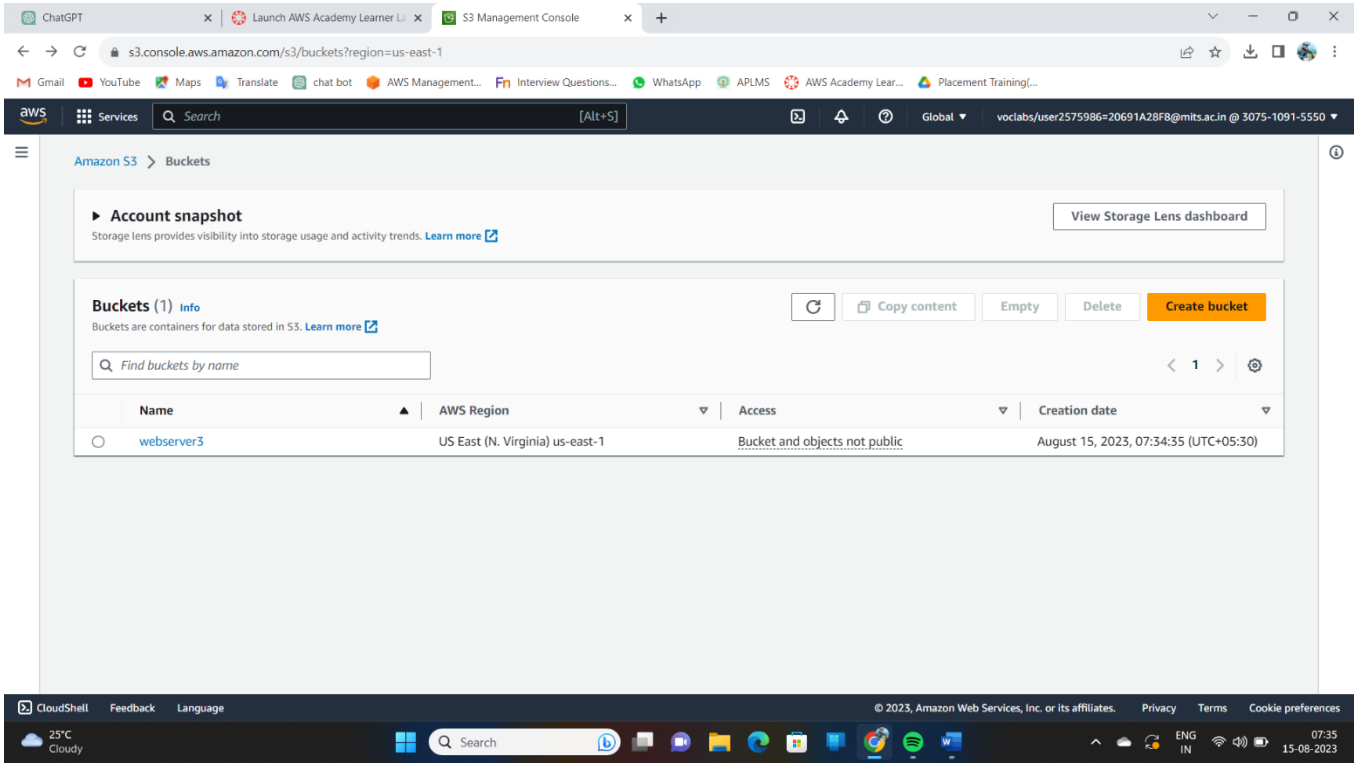


Figure 4.2.1:Detail of creating S3 bucket

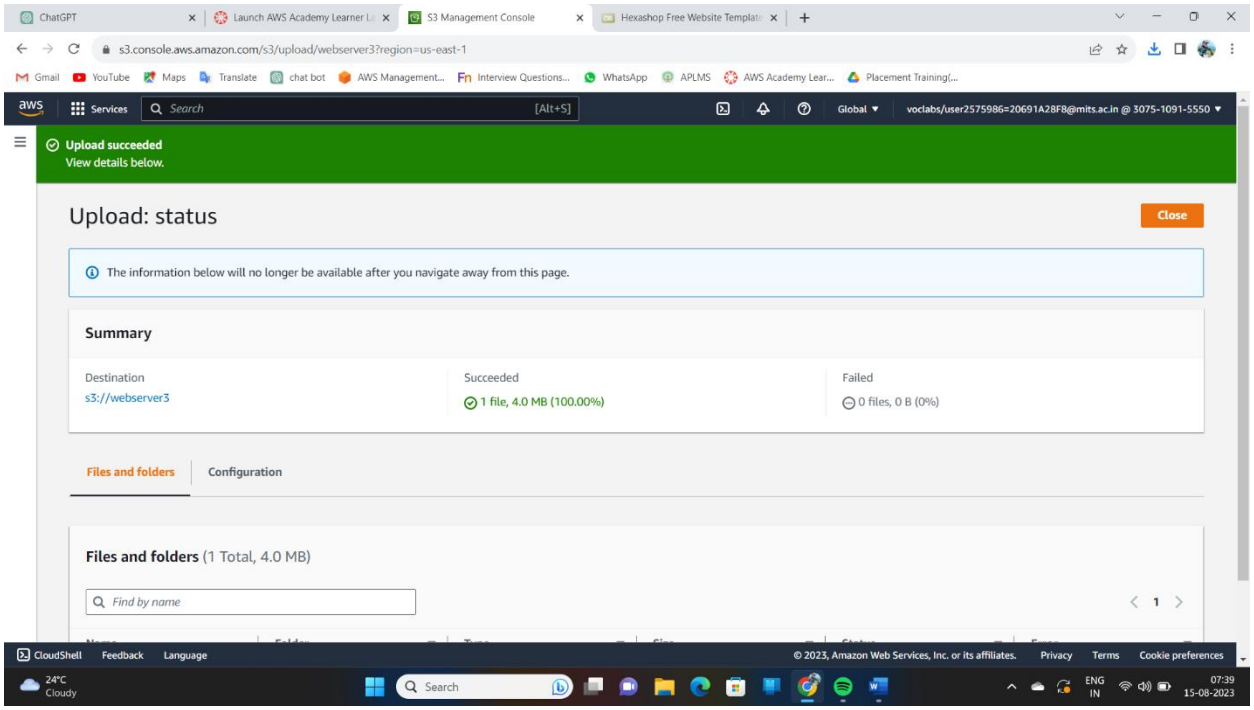


Figure 4.2.2: Details of uploading Files to S3

4.2.3.1 Use Amazon S3 with Amazon EC2

Amazon S3 is a repository for internet data. Amazon S3 provides access to reliable, fast, and inexpensive data storage infrastructure. It is designed to make web-scale computing easier by enabling you to store and retrieve any amount of data, at any time, from within Amazon EC2 or anywhere on the web. Amazon S3 stores data objects redundantly on multiple devices across multiple facilities and allows concurrent read or write access to these data objects by many separate clients or application threads. You can use the redundant data stored in Amazon S3 to recover quickly and reliably from instance or application failures. Amazon EC2 uses Amazon S3 for storing Amazon Machine Images (AMIs).

You use AMIs for launching EC2 instances. In case of instance failure, you can use the stored AMI to immediately launch another instance, thereby allowing for fast recovery and business continuity. Amazon EC2 also uses Amazon S3 to store snapshots (backup copies) of the data volumes. You can use snapshots for recovering data quickly and reliably in case of application or system failures. You can also use snapshots as a baseline to create multiple new data volumes, expand the size of an existing data volume, or move data volumes across multiple Availability Zones, thereby making your data usage highly scalable.

Objects are the fundamental entities stored in Amazon S3. Every object stored in Amazon S3 is contained in a bucket. Buckets organize the Amazon S3 namespace at the highest level and identify the account responsible for that storage. Amazon S3 buckets are similar to internet domain names. Objects stored in the buckets have a unique key value and are retrieved using a URL. For example, if an object with a key value /photos/mygarden.jpg is stored in the DOC-EXAMPLE-BUCKET1 bucket, then it is addressable using the URL https://DOC-EXAMPLE-BUCKET1.s3.amazonaws.com/photos/ mygarden.jpg.

Usage examples

Given the benefits of Amazon S3 for storage, you might decide to use this service to store files and data sets for use with EC2 instances. There are several ways to move data to and from Amazon S3 to your instances. In addition to the examples discussed below, there are a variety of tools that people have written that you can use to access your data in Amazon S3 from your computer or your instance. Some of the common ones are discussed in the AWS forums. If you have permission, you can copy a file to or from Amazon S3 and your instance using one of the following methods.

GET or wget

The wget utility is an HTTP and FTP client that allows you to download public objects from Amazon S3. It is installed by default in Amazon Linux and most other distributions, and available for download on Windows. To download an Amazon S3 object, use the following command, substituting the URL of the object to download.

```
[ec2-user ~]$ wget https://my_bucket.s3.amazonaws.com/path-to-file
```

AWS Command Line Interface

The AWS Command Line Interface (AWS CLI) is a unified tool to manage your AWS services. The AWS CLI enables users to authenticate themselves and download restricted items from Amazon S3 and also to upload items.

The aws s3 cp command is similar to the Unix cp command. You can copy files from Amazon S3 to your instance, copy files from your instance to Amazon S3, and copy files from one Amazon S3 location to another.

Use the following command to copy an object from Amazon S3 to your instance.

```
[ec2-user ~]$ aws s3 cp s3://my_bucket/my_folder/my_file.ext my_copied_file.ext
```

Use the following command to copy an object from your instance back into Amazon S3

```
[ec2-user ~]$ aws s3 cp my_copied_file.ext s3://my_bucket/my_folder/my_file.ext
```

The aws s3 sync command can synchronize an entire Amazon S3 bucket to a local directory location. This can be helpful for downloading a data set and keeping the local copy up-to-date with the remote set. If you have the proper permissions on the Amazon S3 bucket, you can push your local directory back up to the cloud when you are finished by reversing the source and destination locations in the command.

Use the following command to download an entire Amazon S3 bucket to a local directory on your instance.

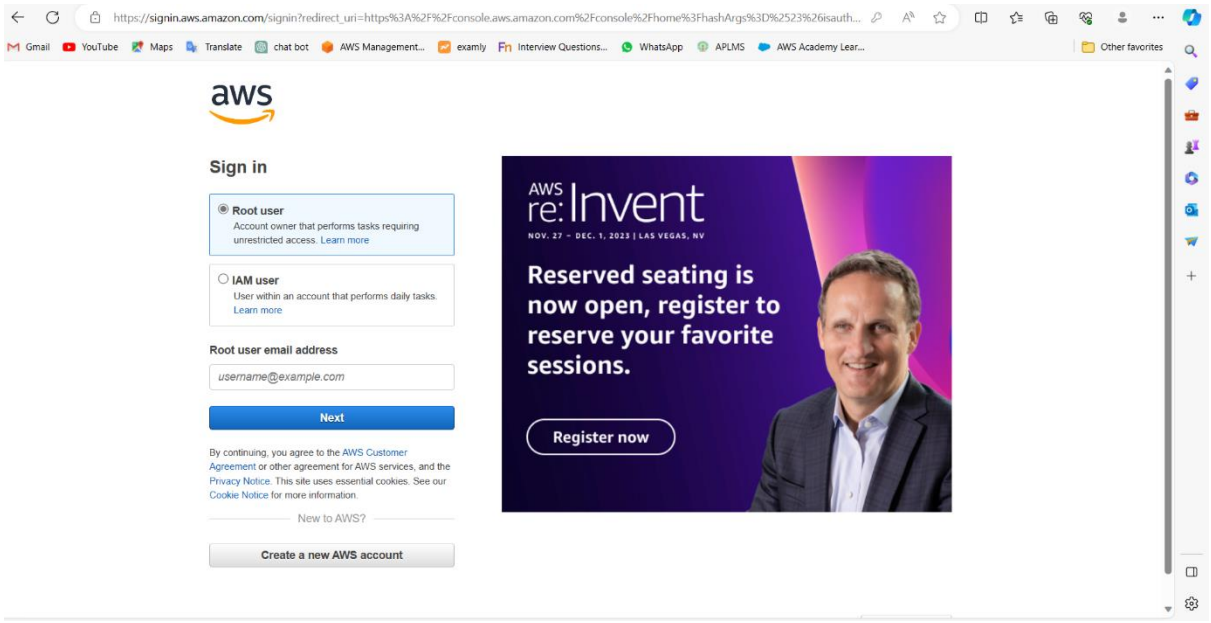
4.2.4. Cloud Hosting and Deployment

The E-COMMERCE WEBSITE USING AWS is hosted on an Amazon EC2 instance with a LINUX OS. This instance provides a scalable and reliable hosting environment for the application.

Creating a Virtual Private Cloud (VPC) in AWS involves several steps to establish a logically isolated network environment where you can launch and manage AWS resources. Here's a detailed guide on how to create a VPC:

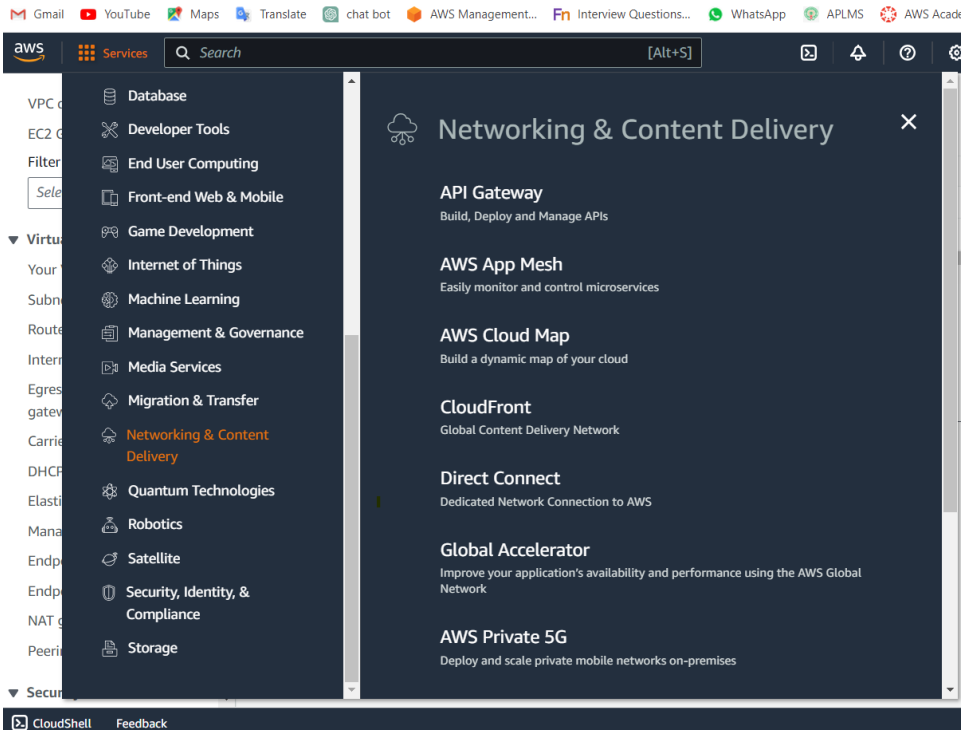
1. Sign in to AWS Console:

Log in to your AWS Management Console at https://aws.amazon.com/console/.

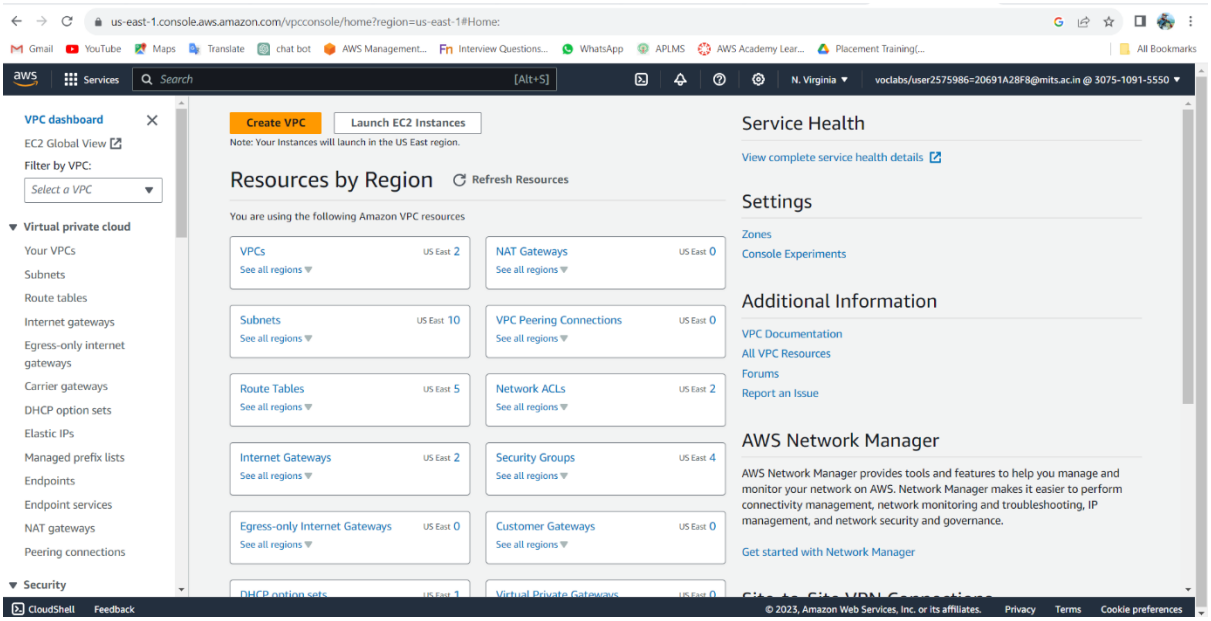


2. Create a VPC:

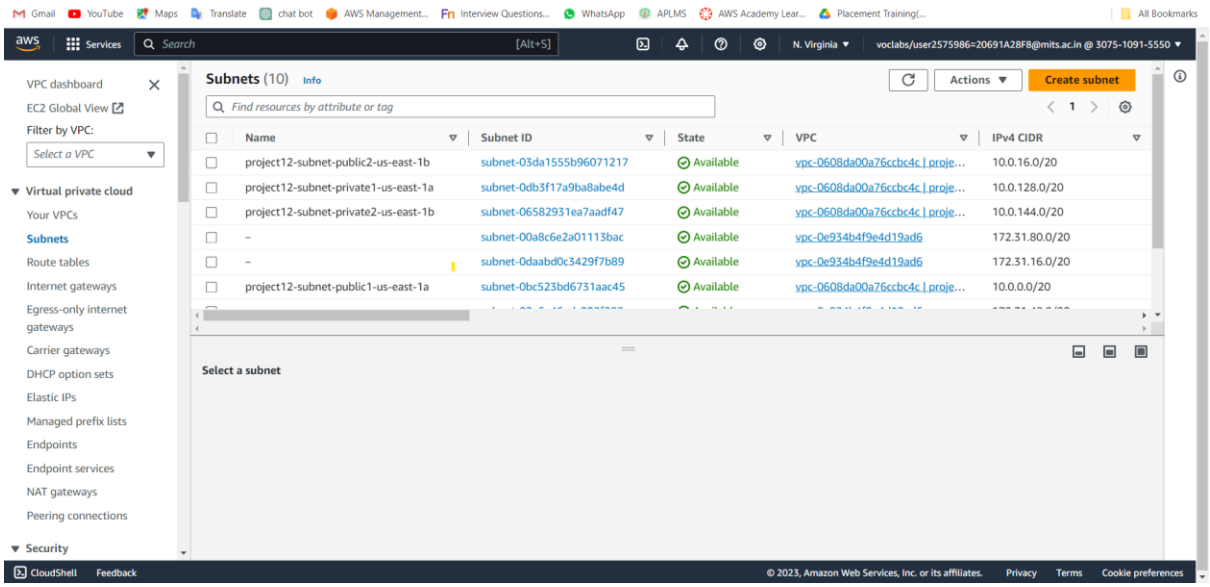
- Navigate to the AWS Management Console.



- Go to the "VPC Dashboard" under "Networking & Content Delivery."



- Click "Create VPC."



Enter the following details:

- VPC Name Tag: A name for your VPC (e.g., "MyVPC").
- IPv4 CIDR Block: Define the IP address range for your VPC using CIDR notation (e.g., 10.0.0.0/16).

3. Configure optional settings:

- IPv6 CIDR Block: Assign an IPv6 address range (optional).
- Tenancy: Choose between "Default" (shared hardware) or "Dedicated" (dedicated hardware for instances).

- Click "Create VPC."

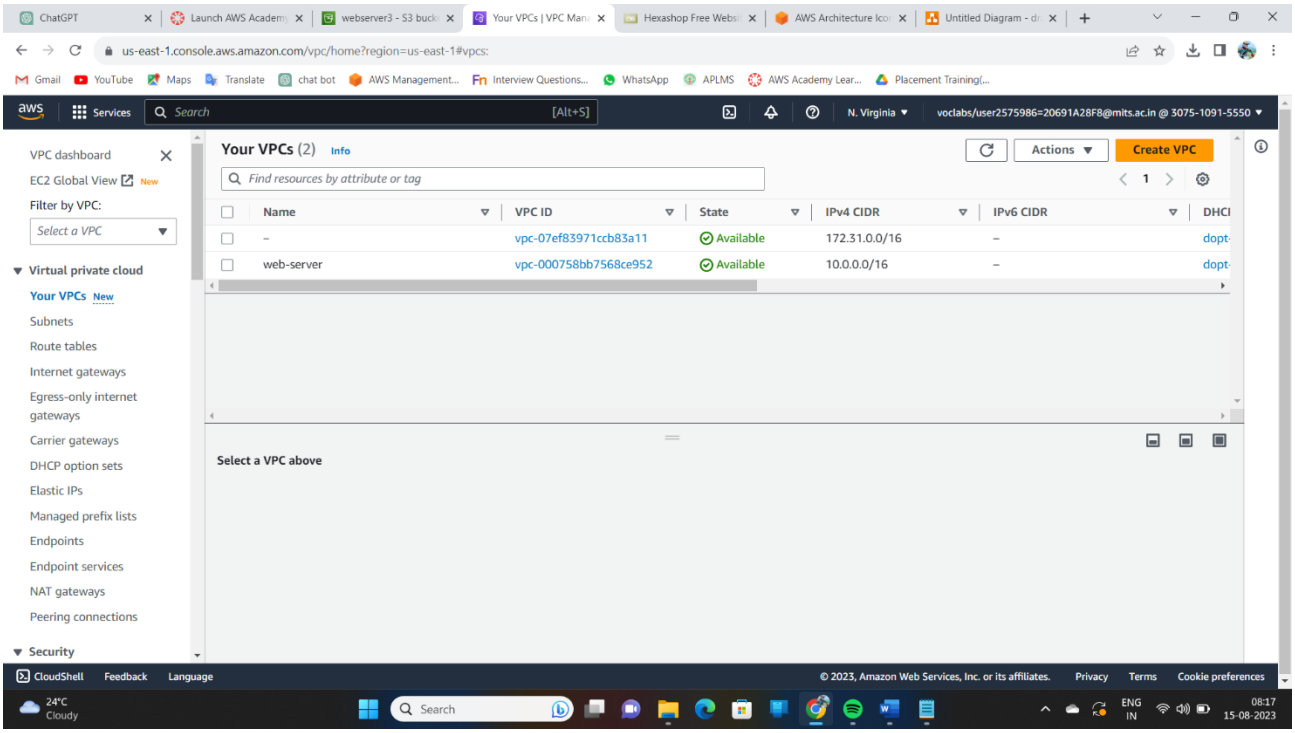


Figure 4.2.3.: Details of creating VPC

4.Create Subnets:

- After creating the VPC, go to the "Subnets" tab within the VPC dashboard.
- Click "Create subnet."
- Enter the following details for each subnet:
- Name Tag: A name for the subnet (e.g., "PublicSubnet").
- VPC: Choose the VPC you created earlier.
- Availability Zone: Select an availability zone.
- IPv4 CIDR Block: Define the subnet's IP address range within the VPC range.
- Create additional subnets for different purposes (e.g., public and private subnets).
- Edit the route table to add a route for the internet gateway to make the subnet public.

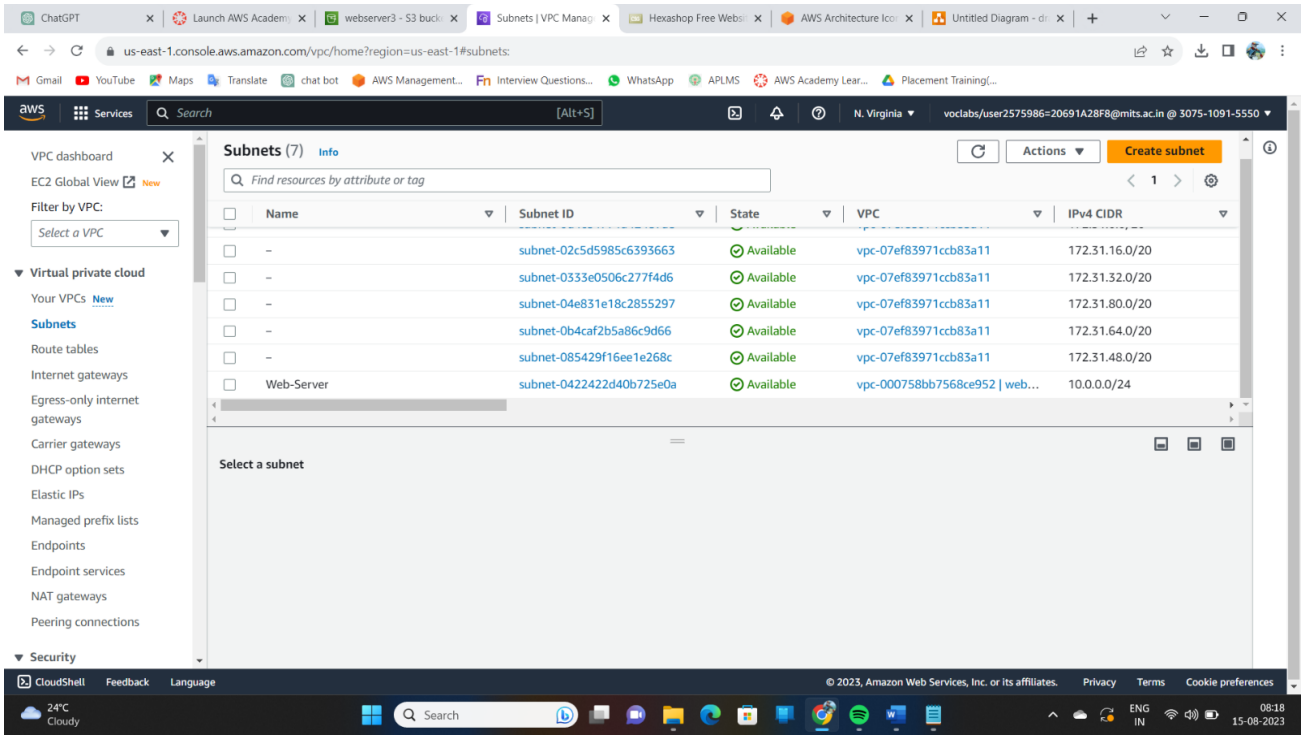


Figure 4.2.4: Details of creating subnet in VPC

5. Security Groups:

- In the EC2 dashboard, navigate to "Security Groups" under "Security."
- Create security groups to control inbound and outbound traffic for instances.
- Associate security groups with instances as needed.

6. Launch Instances:

- In the EC2 dashboard, create and launch instances within the desired subnets.
- Configure security groups and network settings during instance creation.

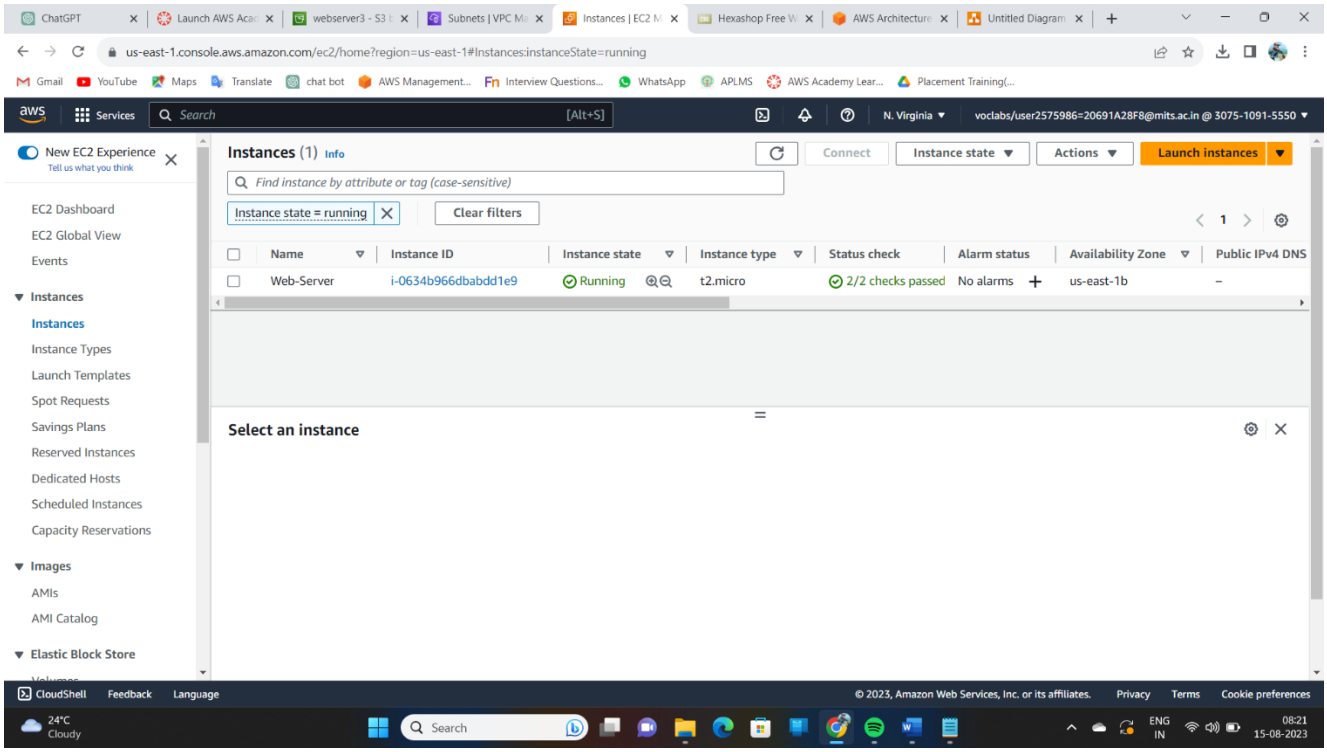


Figure 4.2.5: Details of creating EC2

CHAPTER 5
IMPLEMENTATION AND RESULTS

5.1 Introduction

In the digital age, e-commerce has revolutionized the way businesses operate, allowing them to reach a global audience and conduct transactions online. To create a successful e-commerce website, it is crucial to have a robust and efficient infrastructure that ensures seamless user experience, high availability, and secure data storage. This document outlines the design and implementation of an e-commerce website using Amazon EC2, Amazon VPC, and Amazon S3, showcasing their integral roles in building a reliable e-commerce platform.

5.2 Implementation of key functions

5.2.1 Planning and Design:

- Define the structure of your e-commerce website, including the layout, navigation, and functionality of each page.
- Create wireframes or mockups of the three pages: homepage, product listing, and product details.
- Decide on the technology stack: HTML, CSS, JavaScript for front-end development, and any back-end technologies you might use.

5.2.2 Amazon Web Services Setup:

Implementing an e-commerce website using AWS services like EC2, VPC, and S3 involves several steps. Here's a simplified guide to get you started:

1. **Set Up Amazon VPC:**

- Create a Virtual Private Cloud (VPC) with public and private subnets.
- Configure route tables and associate them with subnets.
- Set up Network ACLs and Security Groups to control inbound and outbound traffic.
- Create an Internet Gateway and associate it with the VPC to enable communication with the public internet.

2. **Create Amazon EC2 Instances:**

- Launch EC2 instances for the web servers and application servers in the appropriate subnets.
- Choose the appropriate Amazon Machine Image (AMI) based on your operating system (Linux).
- Configure instance details, such as instance type, networking, and storage.
- Set up security groups to control incoming traffic to the instances.
- Configure SSH key pairs for secure access to the instances.

3. Set Up Amazon S3:

- Create an S3 bucket to store static assets like images, CSS, and JavaScript files.
- Configure bucket policies to control access permissions to the bucket.
- Upload your static assets to the S3 bucket.
- To access S3 data we have to make S3 bucket as public ,without giving permission to the S3 bucket we cannot access that data because we are using VPC subnets .
- The code to make S3 service as public

4. Install and Configure Software:

- Connect to the EC2 instances using SSH.
- Install and configure web servers (e.g., Apache, Nginx) on the web server instances.

Linux Commands:

a. sudo su –

b. yum update -y

c. yum install -y httpd

d. systemctl status httpd

e. mkdir temp

f. cd temp

g. wget https://webserver3.s3.amazonaws.com/Hexashop+Free+Website+Template+-+Free-CSS.com+(1).zip

h. unzip complex.zip

i. cd complex

j. ls -lrt mv * /var/www/html

k. systemctl enable httpd

l. systemctl start httpd

5. Front-End Development:

- Develop the front-end of your e-commerce website using HTML, CSS, and JavaScript.
- Organize your website files into appropriate directories within your local development environment.
- Use an integrated development environment (IDE) or code editor for efficient coding.

6. Upload Website Files to S3:

- Upload your website's HTML, CSS, JavaScript, and other static assets to the S3 bucket.
- Make sure to set appropriate permissions on the S3 objects to allow public access.

7. Configuring Website Routing:

- Set up routing rules within your web server on the EC2 instance to direct incoming requests to the appropriate pages.

8. Testing:

- Test your e-commerce website thoroughly on different browsers and devices to ensure responsiveness and functionality.
- Debug and fix any issues that arise during testing.

9. Domain Setup (Optional):

- If you have a domain name, configure your domain's DNS settings to point to your EC2 instance's public IP or a load balancer's IP.

10. Security and Optimization:

- Implement security best practices, including regular updates and patches for your EC2 instance and web server.
- Enable HTTPS using SSL/TLS certificates for secure communication.
- Optimize your website's performance by utilizing caching, content delivery networks (CDNs), and minification of assets.

11. Launch and Deployment:

- Launch your e-commerce website by accessing it through the public IP of your EC2 instance or your domain name.
- Monitor your website's performance and usage, and make further optimizations as needed.
- Test your e-commerce application thoroughly to ensure functionality and performance.
- Implement a deployment process for updates and changes to the application.
- Remember that this is a simplified overview, and there are many additional considerations and best practices to follow when building a production-ready e-commerce website. It's recommended to refer to AWS documentation and guides for detailed instructions on each step and to adapt the implementation based on your specific requirements.

12.Maintenance and Updates:

- Regularly update and maintain your website, including adding new products, updating content, and improving features based on user feedback.

Note: Remember that this is a high-level methodology, and there may be additional steps or considerations based on your specific requirements and technologies. It's important to stay informed about the latest best practices for security, scalability, and performance in your AWS setup.

5.4 Result Analysis

1. Amazon EC2 (Elastic Compute Cloud):

Amazon EC2 provides scalable virtual servers in the cloud, enabling businesses to host web applications, databases, and other services. In our e-commerce website architecture, EC2 instances serve as the backbone, hosting the web application that users interact with. EC2 instances can be configured based on the anticipated traffic load, ensuring the website can handle varying levels of demand. For example, during peak shopping seasons, the website can dynamically scale up by adding more instances to manage the increased load.

2. Amazon VPC (Virtual Private Cloud):

Amazon VPC offers a private network environment within the Amazon Web Services (AWS) cloud. It allows you to isolate your resources, control network traffic, and enhance security. Our e-commerce website's VPC creates an isolated environment where EC2 instances reside. This isolation enhances security by preventing unauthorized access and potential threats from the public internet. By configuring subnets, route tables, and network gateways, we ensure efficient data flow between EC2 instances while maintaining a secure network architecture.

3. Amazon S3 (Simple Storage Service):

Amazon S3 is a scalable object storage service that provides highly durable and available storage for a wide range of data types, including images, videos, and product information. In our e-commerce website, Amazon S3 stores product images, multimedia content, and other assets that need to be accessible quickly. This offloads the storage burden from EC2 instances, allowing them to focus on processing user requests and delivering a seamless shopping experience. Amazon S3's built-in redundancy ensures that data is safe and accessible even in the event of hardware failures.

Key Benefits:

Benefits of EC2, VPC, and S3 in E-commerce:

- **Scalability:** Amazon EC2's auto-scaling capability ensures the website can handle traffic spikes without compromising performance.
- **Security:** Amazon VPC creates a private network environment, reducing exposure to potential cyber threats and unauthorized access.
- **Data Storage and Accessibility:** Amazon S3 offers reliable and high-speed data storage, making images and multimedia content readily available to users.
- **Cost Efficiency:** By utilizing these three core services, businesses can optimize costs based on usage and only pay for the resources they consume.

5.3. 1Screenshots of the outputs:

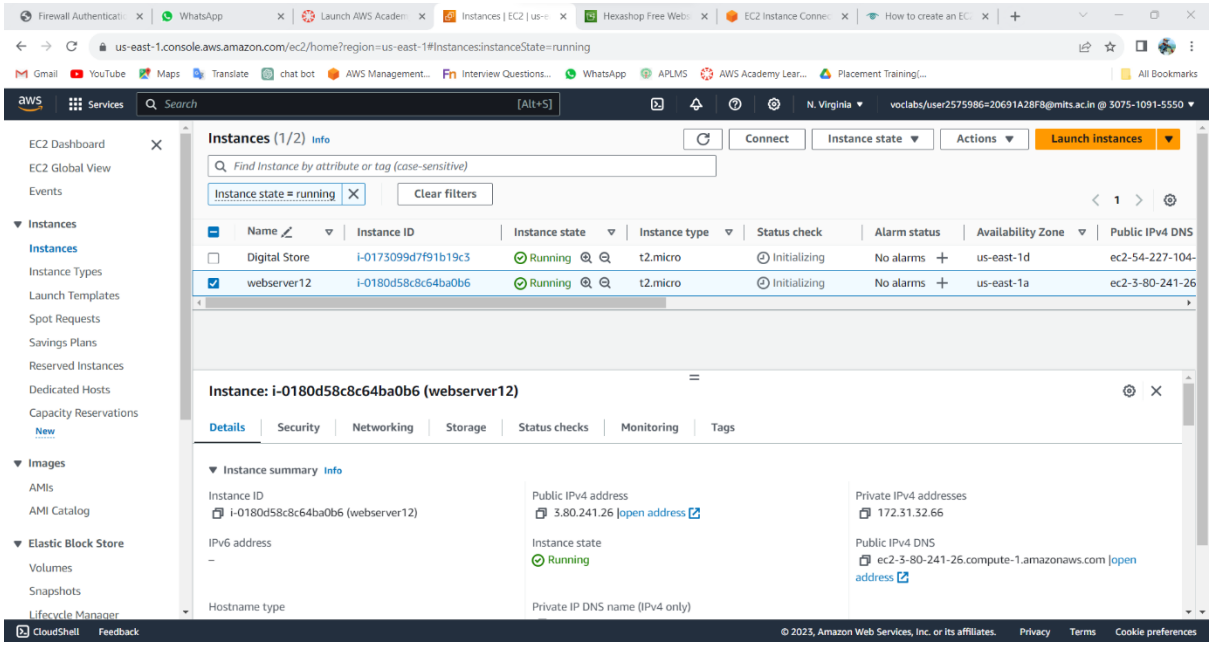


Figure 5.3.1: Go to the EC2 instance and select EC2 instance and click on connect

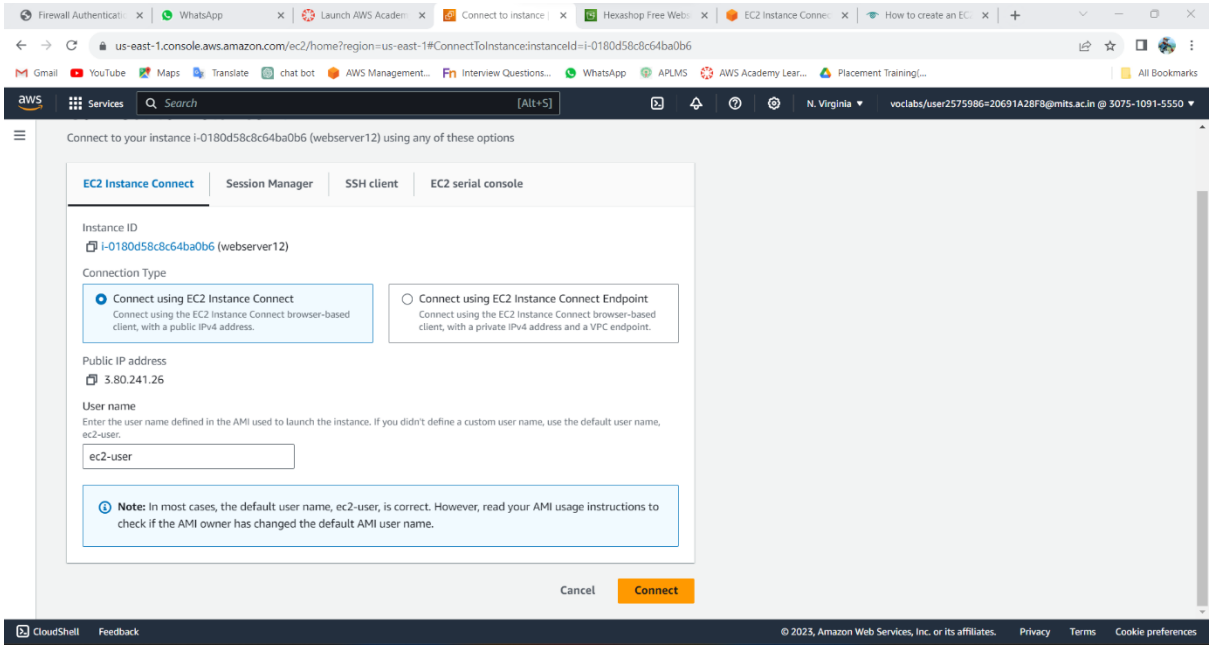


Figure 5.3.2: Use the default setting and click on connect button to open aws shell

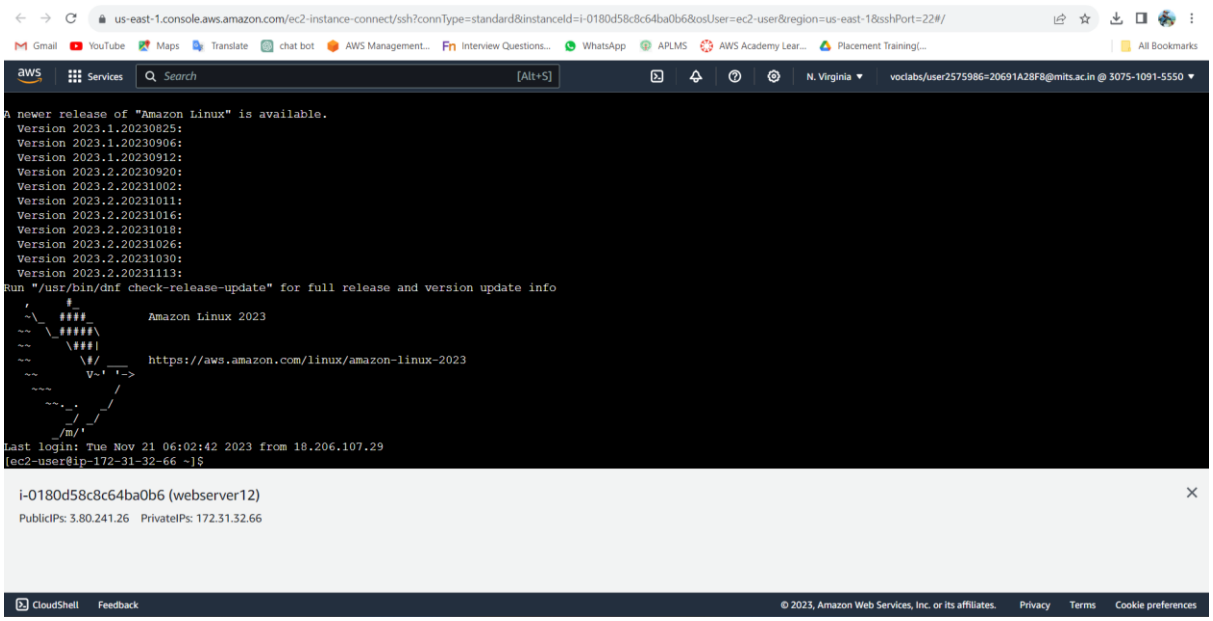


Figure 5.3.3: It is the Amazon Linux command prompt

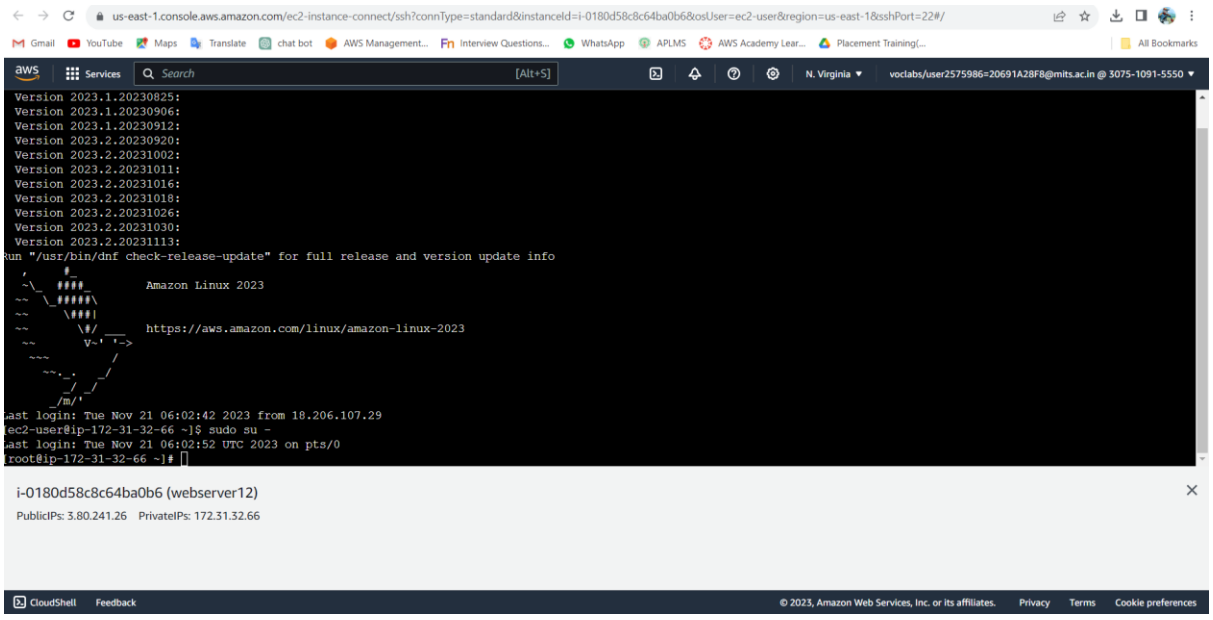


Figure 5.3.4: sudo su – command is used to allow us to switch to a different user and executes one or more commands in the shell without logging out from our current session

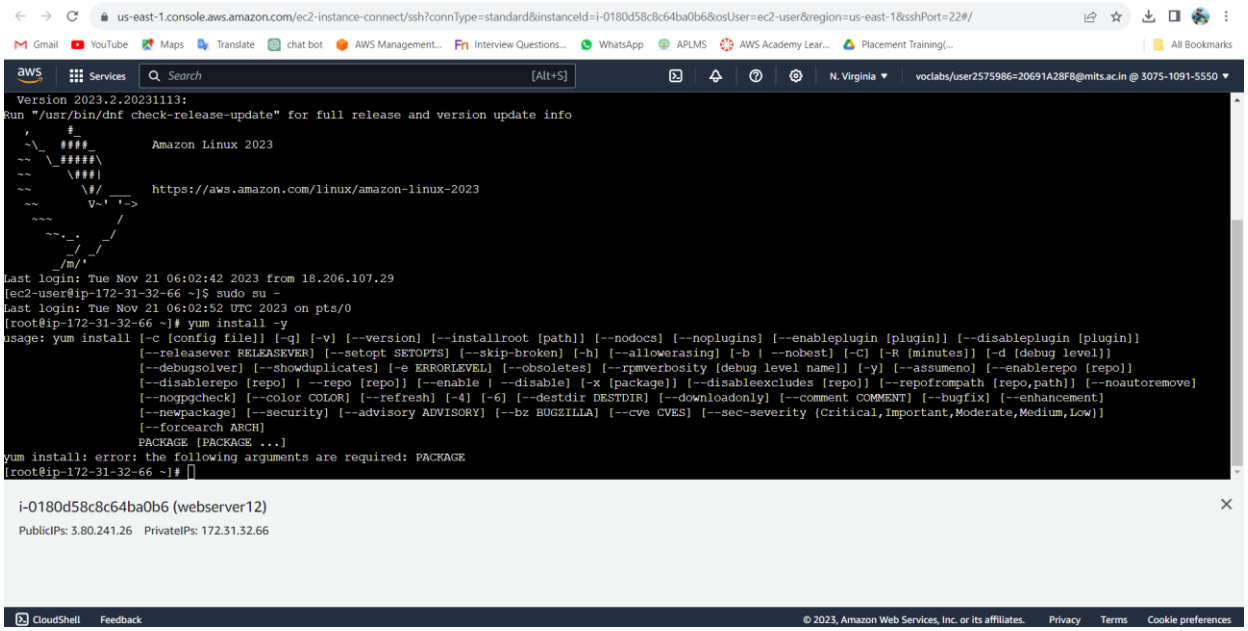


Figure 5.3.5: yum will install specified packages along with its dependant packages without asking for confirmation.

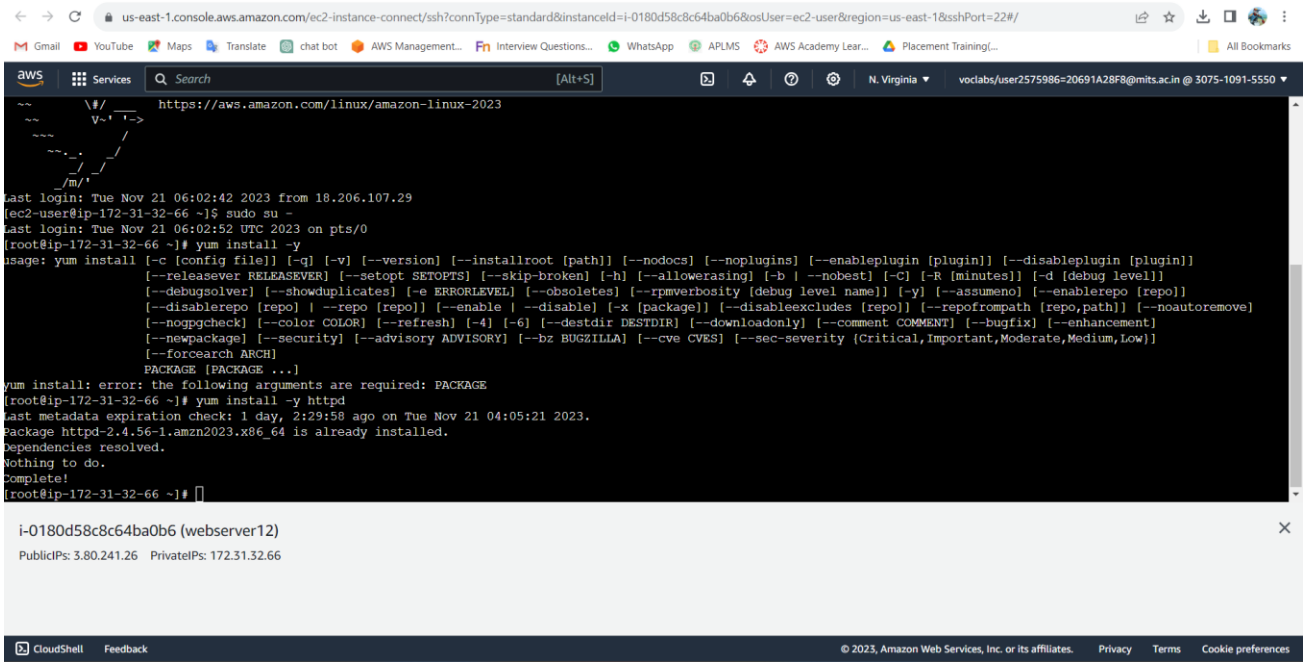


Figure 5.3.6: yum install -y httpd command plays the role of server in a client-server model using HTTP and/or HTTPS network protocols.

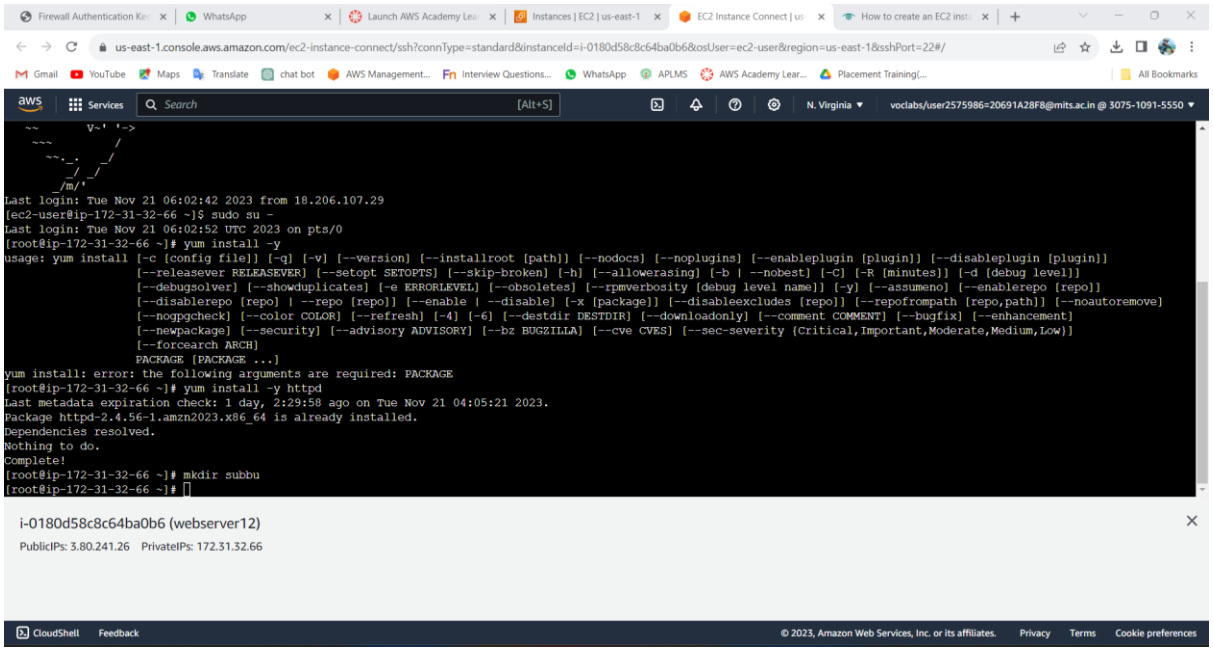


Figure 5.3.7: mkdir command used to create one or more directories specified by the Directory parameter.

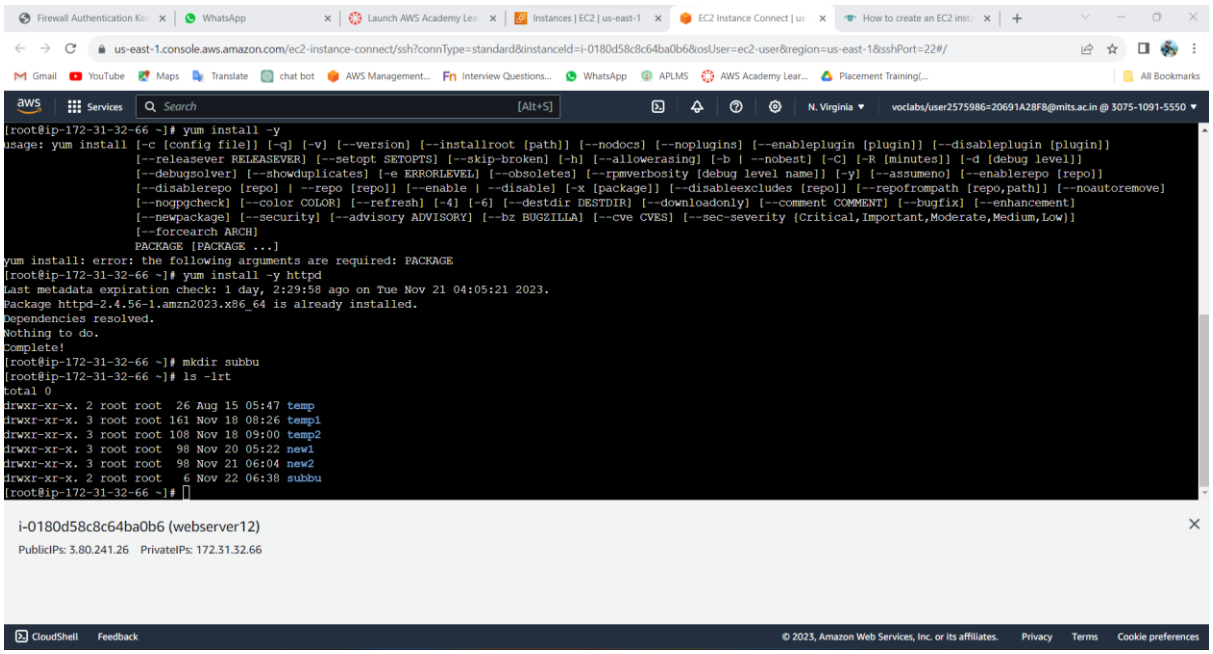


Figure 5.3.8: ls -lrt will give a long listing, oldest first, which is handy for seeing which files in a large directory have recently been changed.

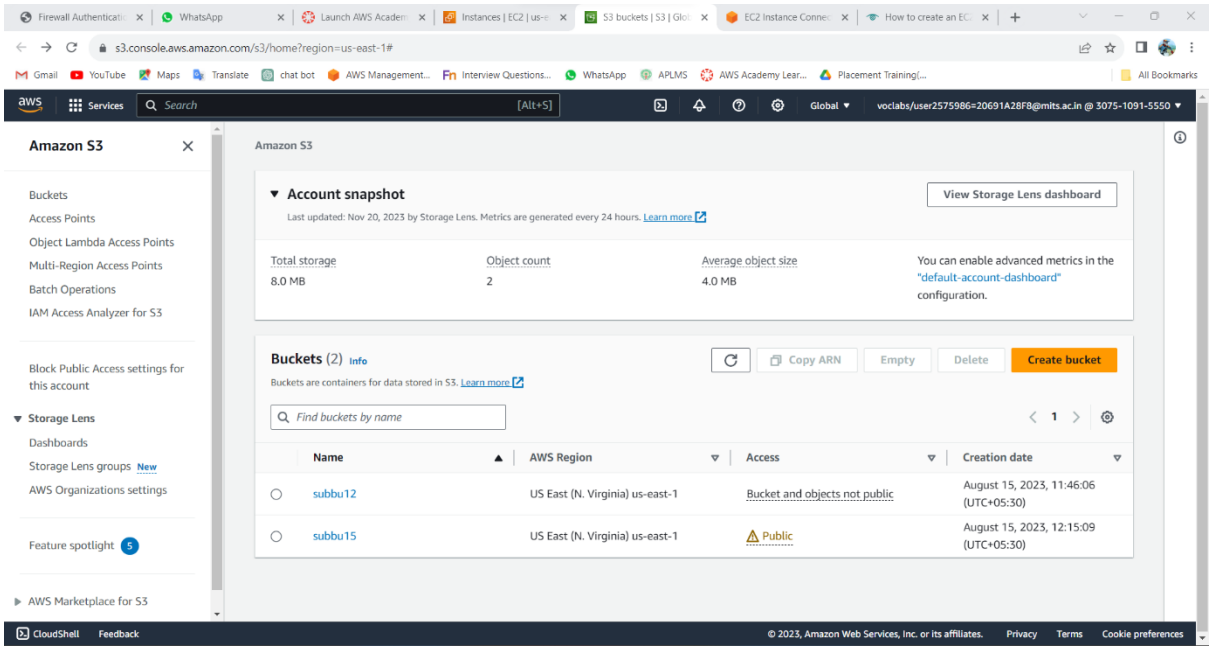


Figure 5.3.9: Open S3 and under the Buckets click on public access bucket.

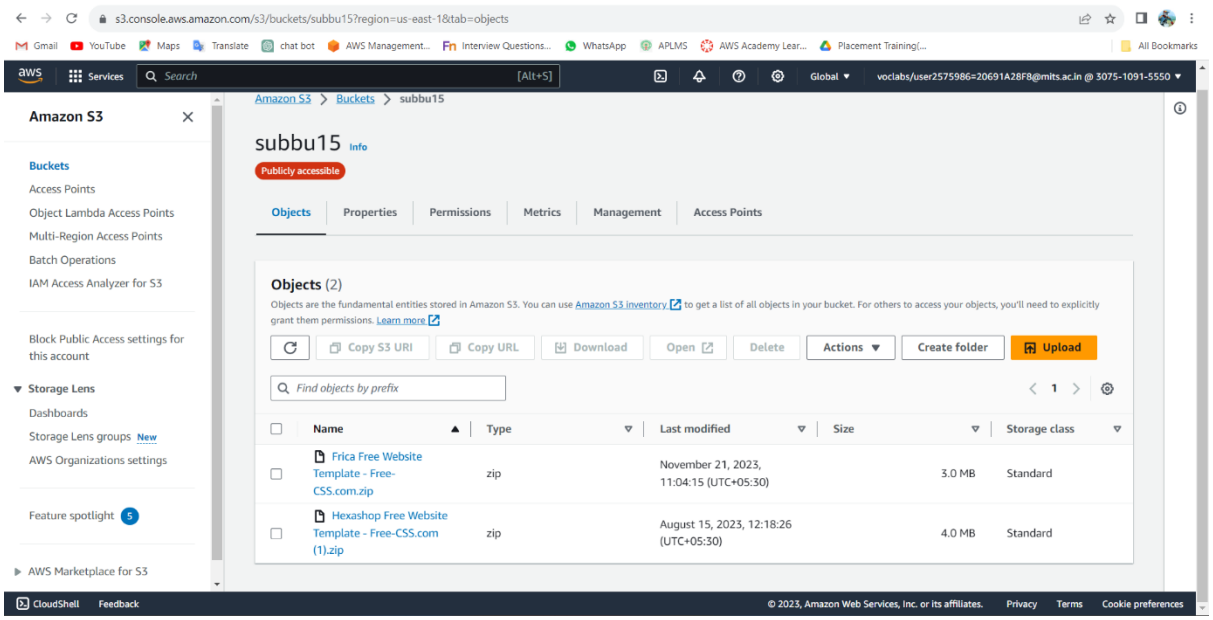


Figure 5.3.10: Select Objects file buckets as per the require files.

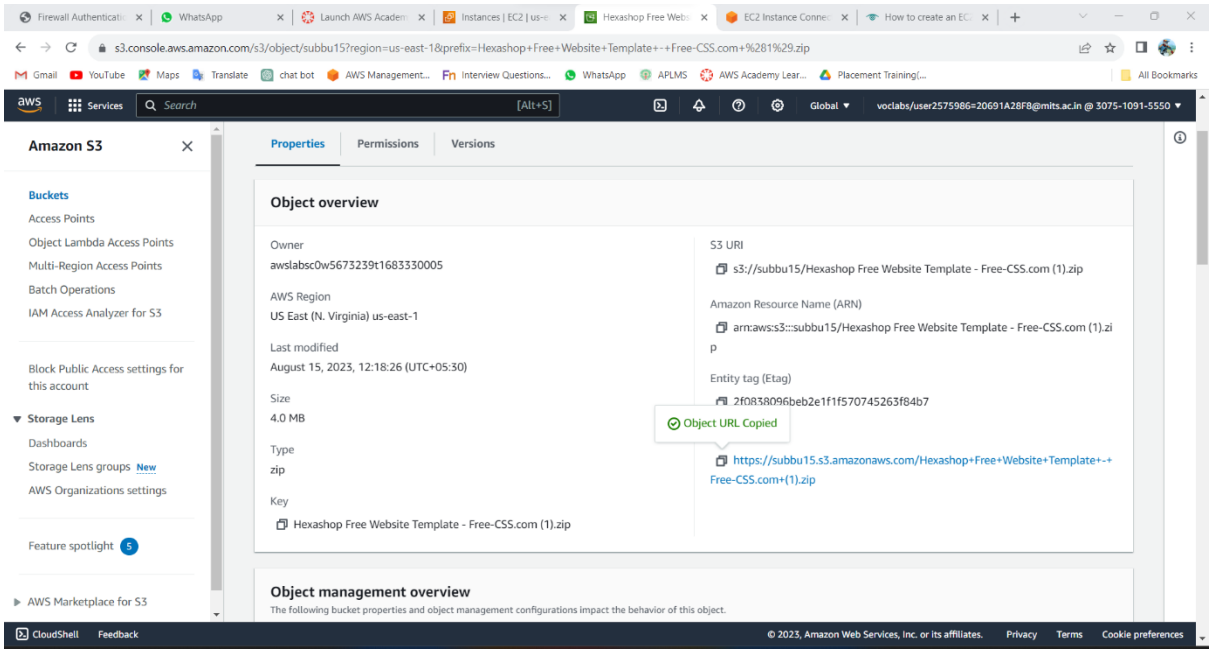


Figure 5.3.11: After opening required file copy the Object URL to paste it in next step

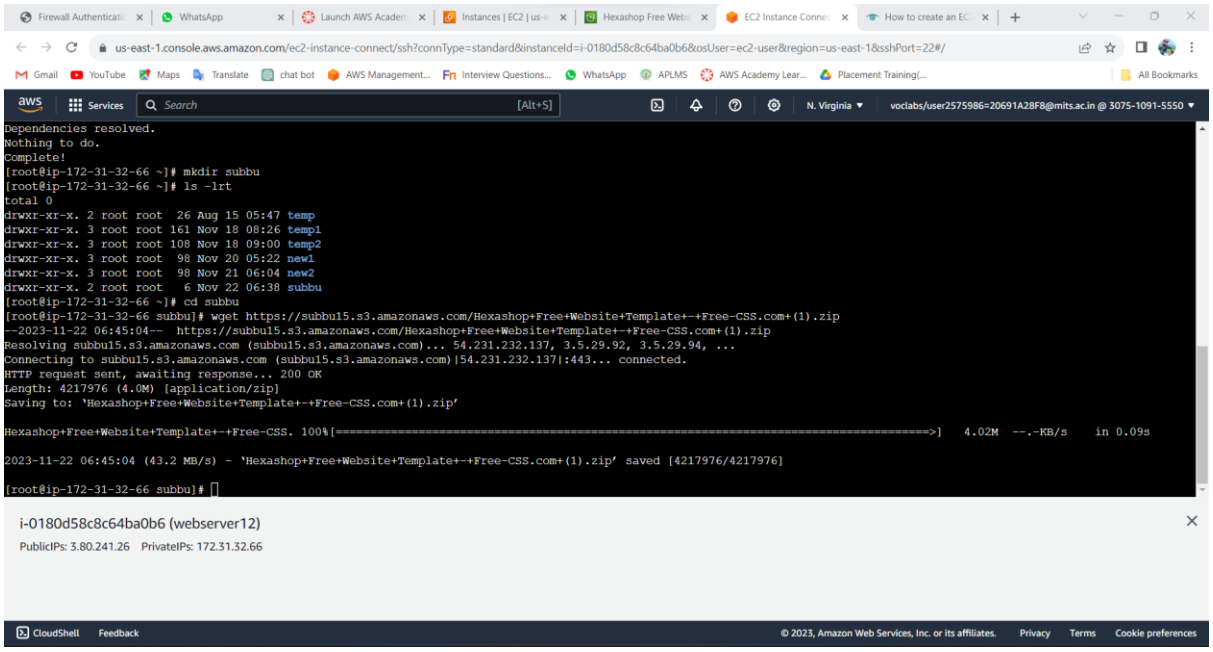


Figure 5.3.12: wget command is used to download a file from the internet. In shell paste the copied Object URL

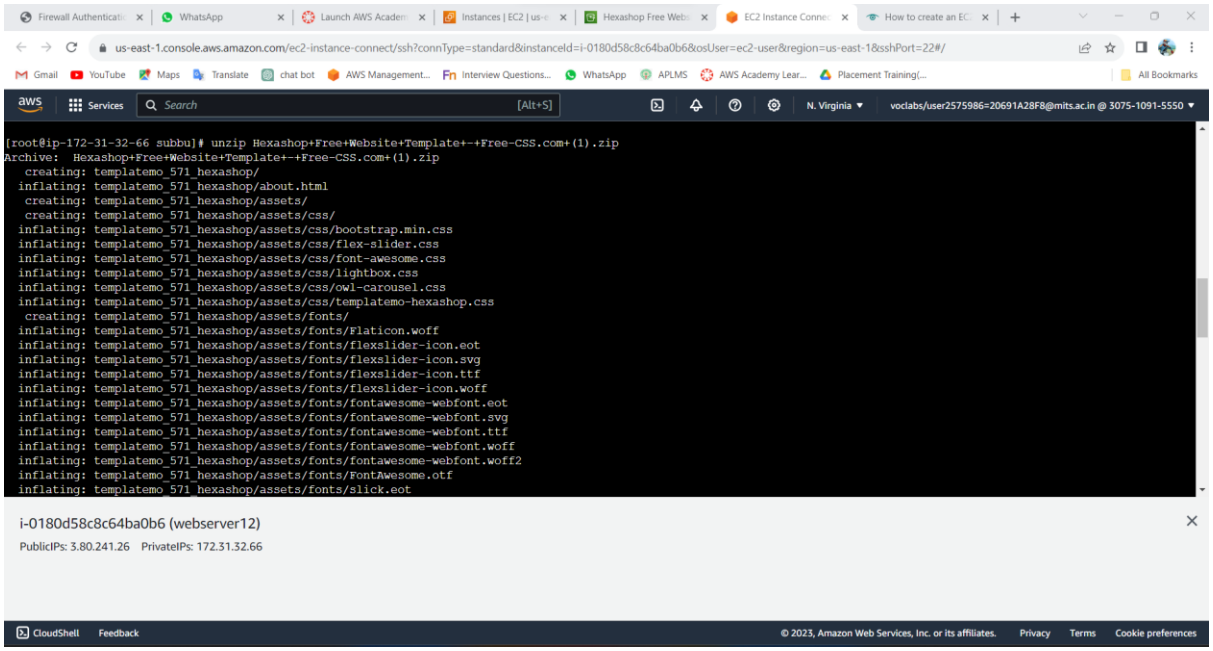


Figure 5.3.13: unzip command is used to decompress or extract the content from the compressed archive.

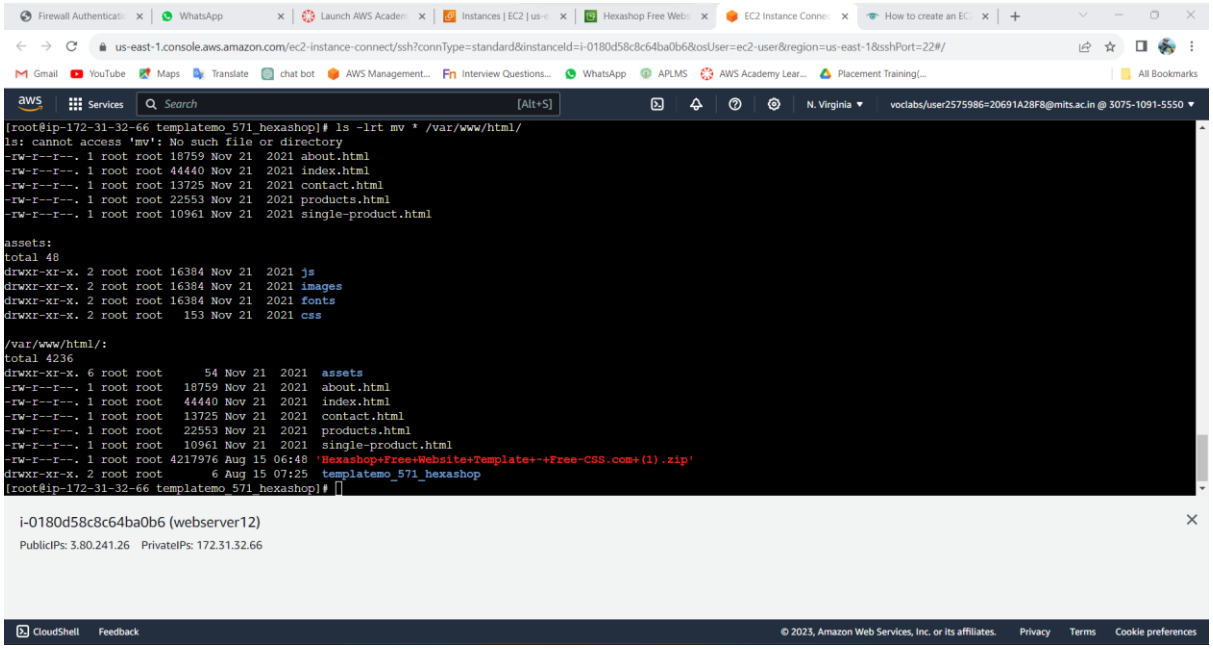
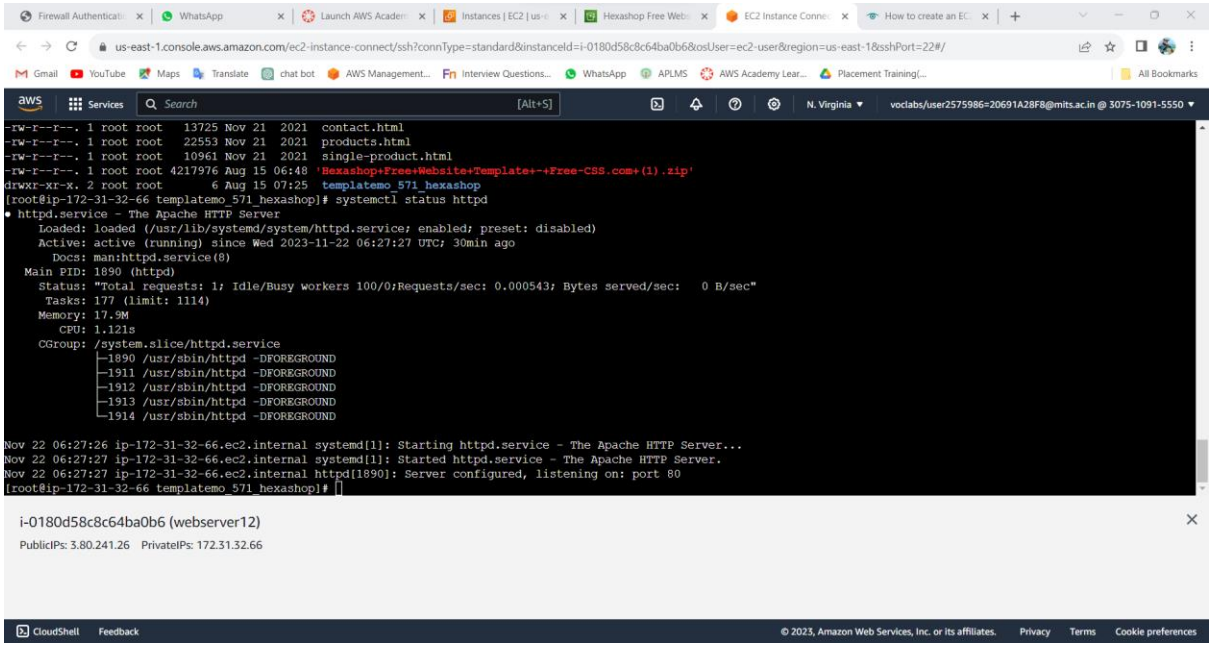


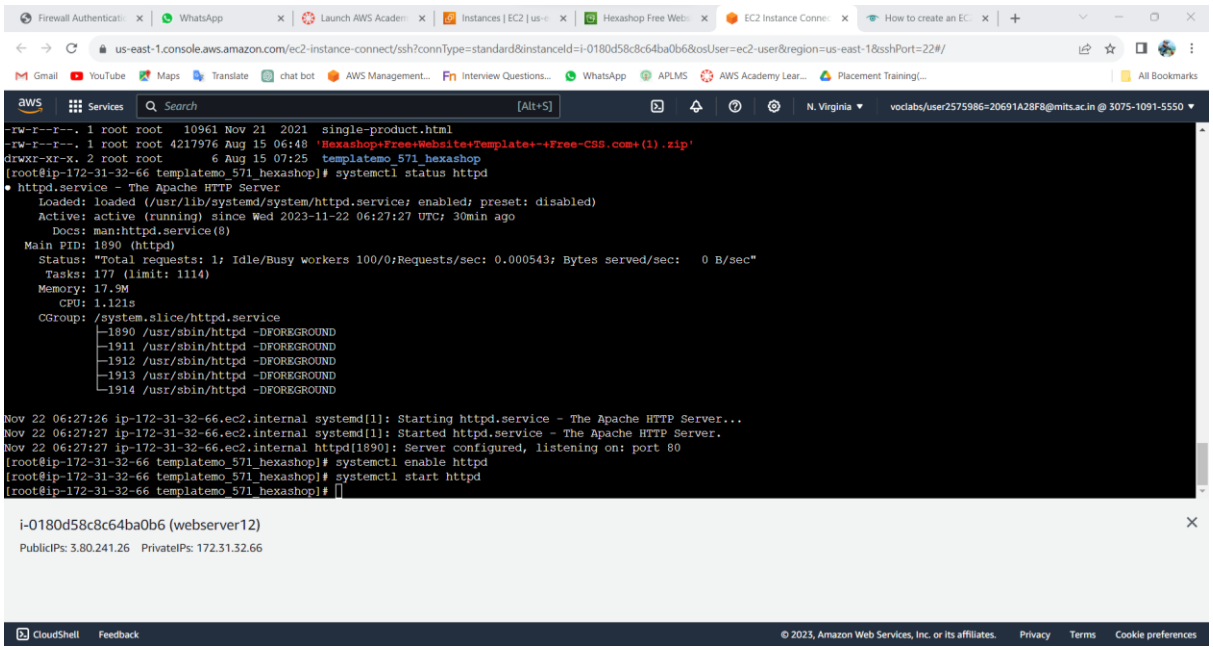
Figure 5.3.14: ls -lrt used to list files by modification time, mv * /var/www/html/ used to move files to /var/www/html/

Note:

- **ls -lrt:** This command lists files and directories in the current directory in long format (-l), sorted by modification time in reverse order (-r) so that the latest modification appears at the bottom of the list.

- **mv * /var/www/html/:** This command tries to move (using mv) all files and directories (* is a wildcard representing all items) from the current directory to the /var/www/html/ directory. However, the ls -lrt part doesn't really interact with the mv command; it seems like these commands were combined without a logical connection.





Final Output:

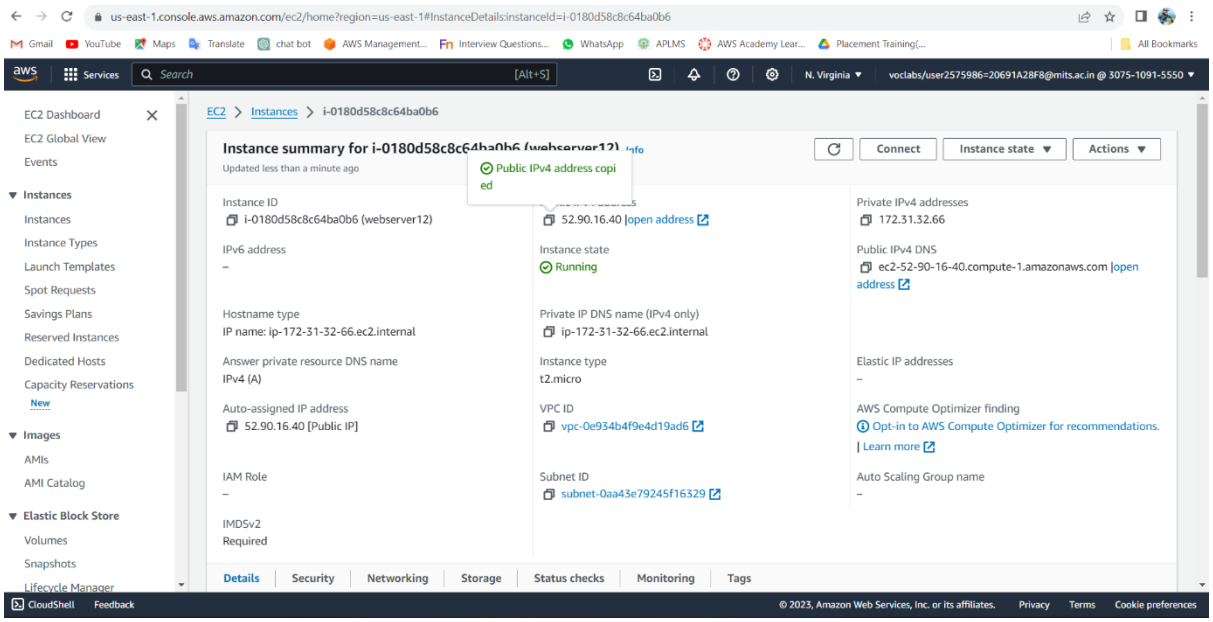


Figure: Copy the EC2 public Ipv4 address

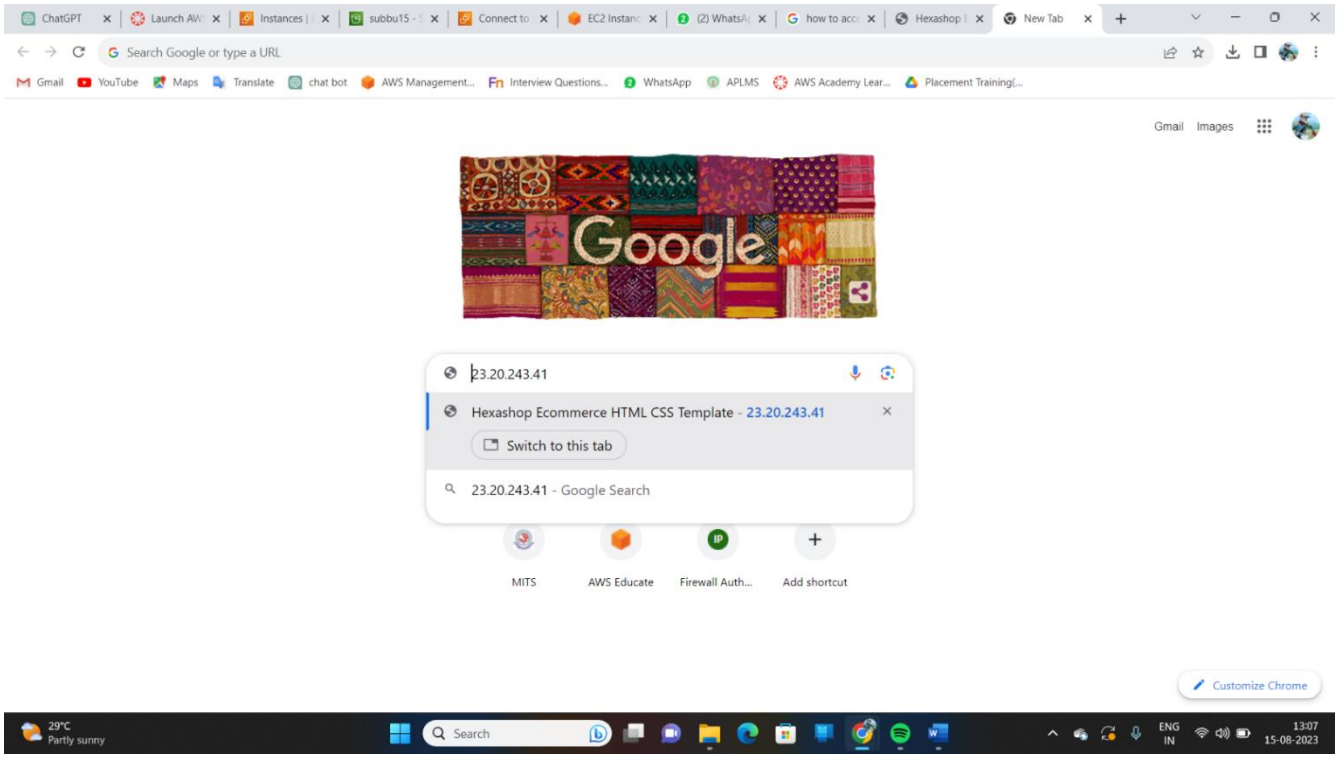


Figure: Paste the copied Ec2 public Ipv4 address in Google Search bar

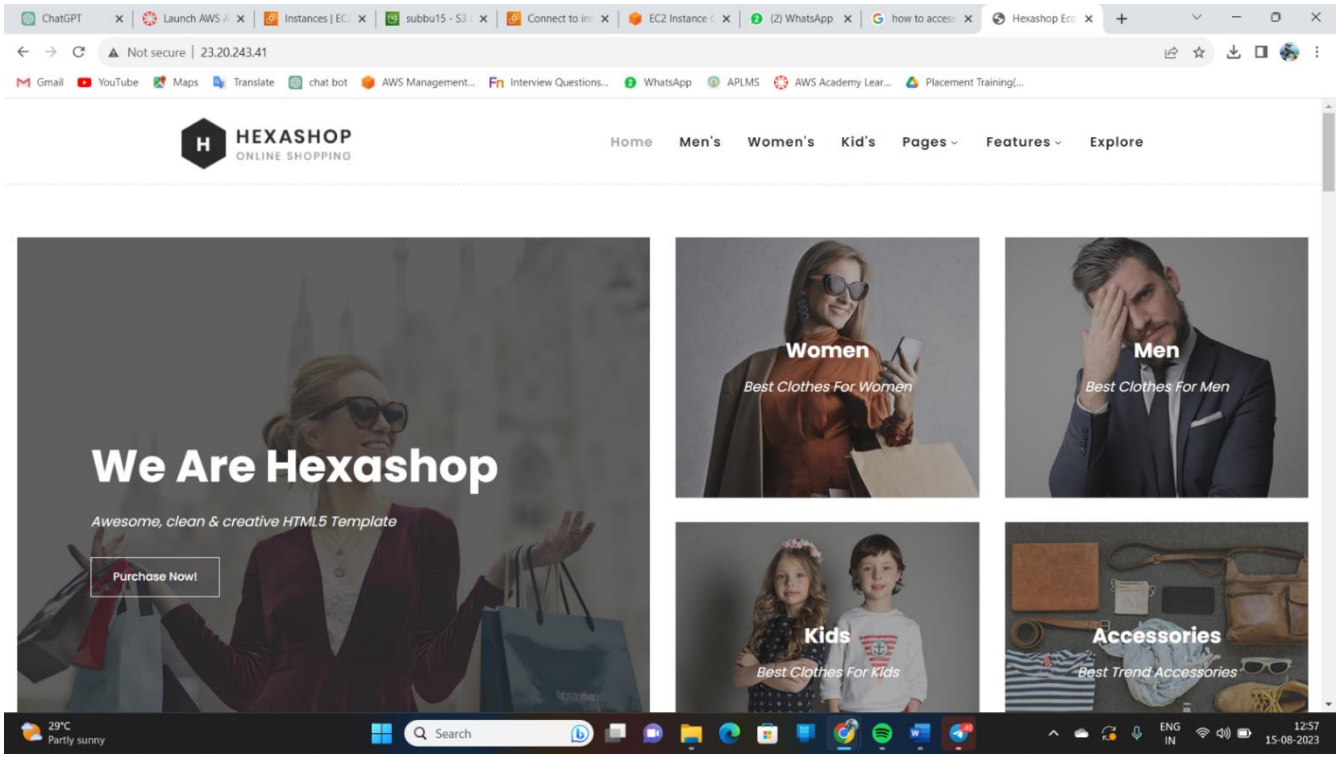


Figure A: This is the final E-commerce website open by typing the IP address in any browser

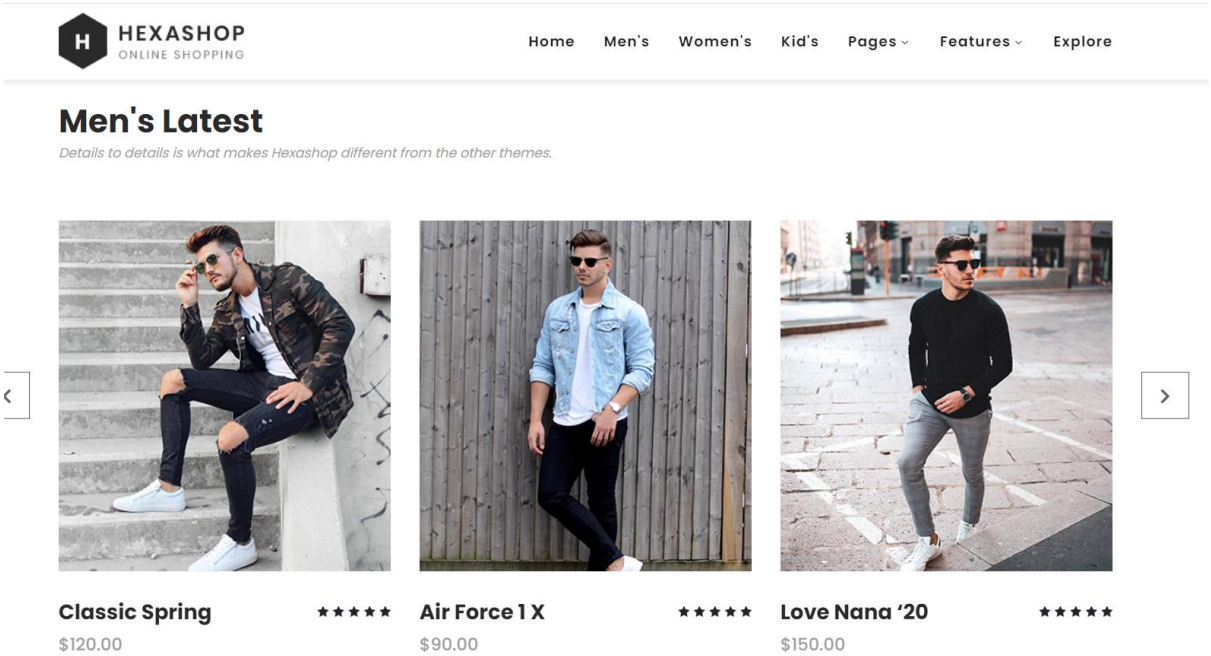


Figure B: This is the final E-commerce website open by typing the IP address in any browser

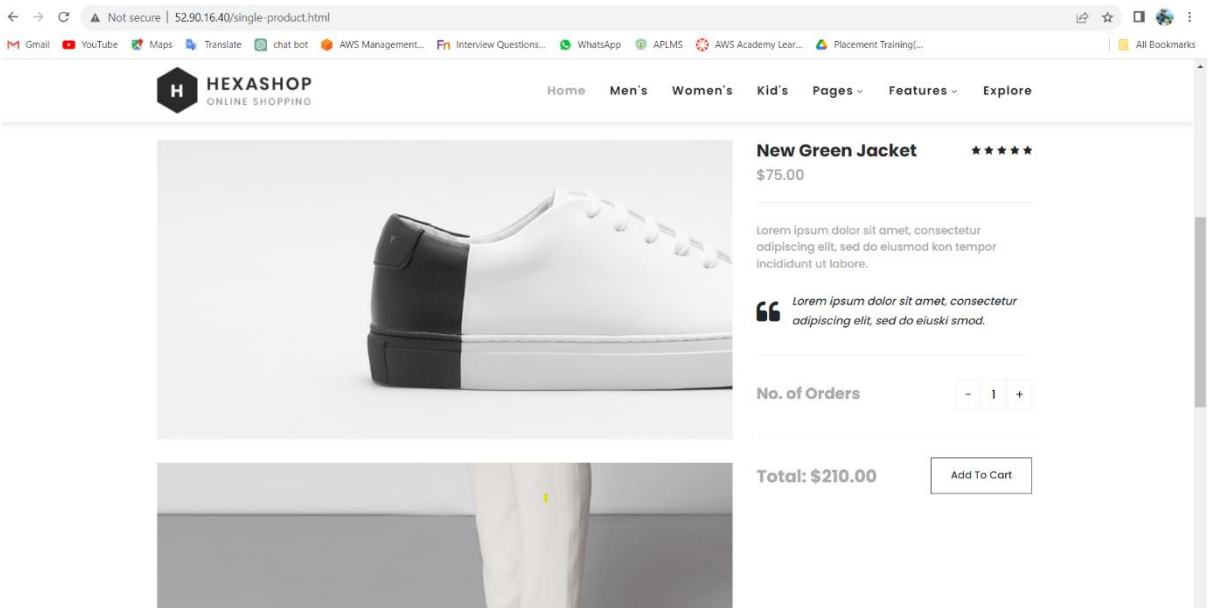
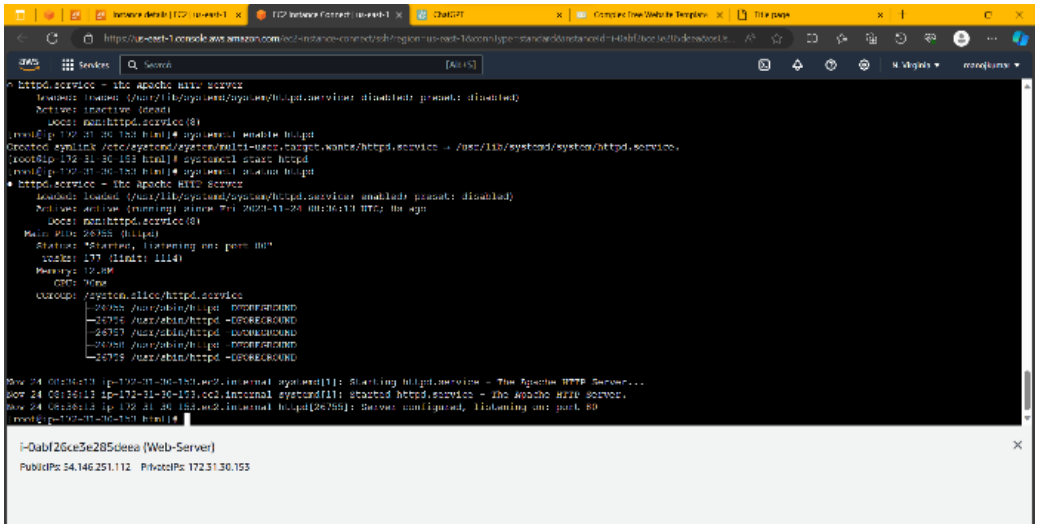
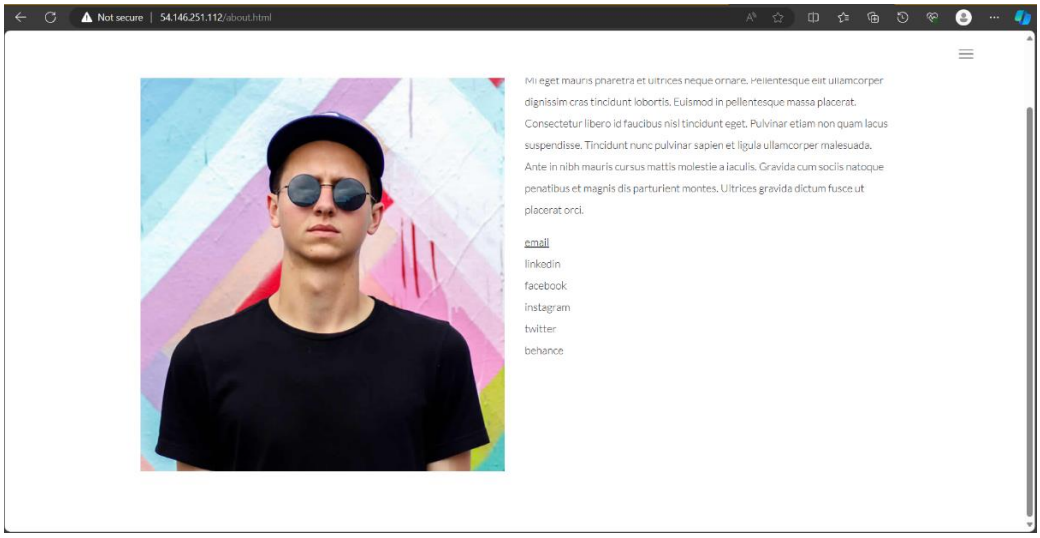


Figure C: This is the final E-commerce website open by typing the IP address in any browser


i-0abf26ce3e285deea (Web-Server)
PublicIPs: 54.146.251.112 PrivateIPs: 172.31.30.153


Not secure | 54.146.251.112/about.html
Mi eget mauris pharetra et ultrices neque ornare. Pellentesque elit ullamcorper dignissim cras tincidunt lobortis. Euismod in pellentesque massa placerat. Consectetur libero id faucibus nisl tincidunt eget. Pulvinar etiam non quam lacus suspendisse. Tincidunt nunc pulvinar sapien et ligula ullamcorper malesuada. Ante in nibh mauris cursus mattis molestie a iaculis. Gravida cum sociis natoque penatibus et magnis dis parturient montes. Ultrices gravida dictum fusce ut placerat orci.
email
linkedin
facebook
instagram
twitter
behance

CHAPTER 6
TESTING AND VALIDATION:

6.1 Introduction

Within the context of the Self-Served DIY Web Hosting system on EC2, the testing and validation phase becomes crucial for ensuring system stability, security, and functionality. This chapter scrutinizes the methods used to assess and confirm the system's reliability.

6.2 Design of Test Cases and Scenarios

This section outlines the systematic creation of test cases and scenarios. It includes varied scenarios covering load testing, security vulnerability assessments, usability checks, and functional tests. Each test case is meticulously designed to validate a specific aspect of the hosting environment.

6.2.1. User Authentication

Test Case: Validate that users can successfully register, log in, and log out.

Scenario: Attempt user registration with valid and invalid information. Verify successful login and logout procedures.

6.2.2. Product Catalog

Test Case: Ensure proper management of the product catalog.

Scenario: Add, update, and remove products. Verify accurate display of product information, including images and pricing.

6.2.3. Shopping Cart Functionality

Test Case: Validate the functionality of the shopping cart.

Scenario: Add, remove, and update items in the cart. Verify correct calculation of total prices and seamless synchronization during user sessions.

6.2.4. Order Processing and Checkout

Test Case: Confirm the efficiency of order processing and checkout.

Scenario: Simulate user transactions, including payment processing. Verify order confirmation, payment verification, and successful order fulfillment.

6.2.5. User Reviews and Ratings

Test Case: Ensure accurate display and submission of user reviews and ratings.

Scenario: Submit reviews and ratings for products. Verify their display on product pages.

6.2.6. Search and Filtering

Test Case: Validate the effectiveness of the search and filtering functionalities.

Scenario: Perform searches using different keywords. Apply filters and confirm accurate product listings.

6.2.7. User Account Management

Test Case: Confirm the functionality of user account management.

Scenario: Update personal information, change passwords, and recover forgotten passwords.

6.2.8. Responsive Design

Test Case: Ensure the responsiveness of the user interface.

Scenario: Access the website on various devices and browsers, verifying a consistent and user-friendly display.

6.2.9. Security Measures

Test Case: Validate the implementation of security measures.

Scenario: Conduct penetration testing to identify and rectify potential vulnerabilities. Confirm SSL/TLS encryption.

6.2.10. Performance Testing

Test Case: Assess the system's performance under different loads.

Scenario: Simulate various user loads and verify the system's responsiveness and scalability.

6.2.11. Compatibility Testing

Test Case: Confirm cross-browser and device compatibility.

Scenario: Test the website on different browsers and devices, ensuring consistent functionality and appearance.

6.2.12. Disaster Recovery

Test Case: Validate the effectiveness of disaster recovery mechanisms.

Scenario: Simulate system failures and confirm the successful recovery of data and functionality.

6.2.13. Compliance Testing

Test Case: Confirm adherence to industry regulations and standards.

Scenario: Review and verify compliance with data protection and privacy standards.

These test cases and scenarios cover a range of functionalities, ensuring thorough testing of the "Ecommerce Website on AWS EC2 Instances" project. Each test case aims to validate a specific aspect of the system, contributing to the overall quality, security, and performance of the ecommerce platform.

6.3 Validation

Executing the designed test cases reveals the system's performance under different conditions. Validation involves verifying if the system meets predefined standards. It includes rigorous assessments to validate scalability, security measures, data integrity, and overall system robustness.

6.3.1. Functional Validation

Objective: Confirm that all planned functionalities work as intended.

Activities: Execute test cases for user authentication, product catalog management, shopping cart operations, order processing, user reviews, and other critical functions.

6.3.2. User Acceptance Validation

Objective: Ensure the system meets user expectations and usability standards.

Activities: Conduct user acceptance testing (UAT) with real users to assess the user interface, navigation, and overall user experience.

6.3.3. Security Validation

Objective: Verify the implementation of security measures to protect user data.

Activities: Perform penetration testing, code reviews, and security audits to identify and address potential vulnerabilities.

6.3.4. Performance Validation

Objective: Confirm the system's responsiveness and scalability under varying loads.

Activities: Execute performance testing scenarios to assess how the system handles different levels of user traffic and workload.

6.3.5. Compatibility Validation

Objective: Ensure the website functions consistently across various browsers and devices.

Activities: Test the website on different browsers, operating systems, and devices to validate cross-browser and cross-device compatibility.

6.3.6. Data Integrity Validation

Objective: Confirm the accuracy and consistency of stored data.

Activities: Verify that data in the product catalog, user accounts, and order history remains accurate and is correctly processed.

6.3.7. Disaster Recovery Validation

Objective: Ensure the effectiveness of disaster recovery mechanisms.

Activities: Simulate system failures and assess the recovery processes, verifying data integrity and minimal downtime.

6.3.8. Regulatory Compliance Validation

Objective: Confirm adherence to industry regulations and data protection standards.

Activities: Review and validate compliance with applicable laws, ensuring the protection of user privacy and data.

6.3.9. Documentation Validation

Objective: Ensure accuracy and completeness of project documentation.

Activities: Review user manuals, technical documentation, and system architecture diagrams to confirm alignment with the implemented features.

6.4 Conclusion

The conclusion draws insights from the testing phase, summarizing the system's performance, identifying any detected issues or shortcomings, and outlining enhancements or modifications made based on the test outcomes. It acts as a comprehensive evaluation report, ensuring the system's readiness for deployment.

CHAPTER 7
CONCLUSION

7.1 CONCLUSION

In the fast-paced world of e-commerce, the foundation of a successful online business lies in a robust and scalable infrastructure. Through the strategic utilization of Amazon EC2, Amazon VPC, and Amazon S3, we have outlined a comprehensive approach to crafting a high-performing and secure e-commerce website. This architecture not only addresses the core requirements of an online platform but also ensures a seamless user experience, efficient data storage, and reliable resource management.

Amazon EC2 serves as the cornerstone of our infrastructure, enabling us to flexibly scale our resources to accommodate varying levels of demand. The ability to dynamically adjust the number of instances ensures optimal performance during peak traffic periods while minimizing costs during quieter times.

The integration of Amazon VPC guarantees a secure network environment where our EC2 instances operate. By isolating our resources from the public internet and utilizing network gateways, we mitigate potential security risks and unauthorized access, bolstering the confidence of both businesses and users alike.

Amazon S3 provides the ideal solution for storing and retrieving product images, multimedia content, and other assets. Its scalability, high durability, and accessibility contribute to a seamless shopping experience, while relieving EC2 instances of the storage burden and facilitating faster content delivery.

Together, these services create a synergy that is greater than the sum of its parts. They enable us to deliver a feature-rich e-commerce website that is not only user-friendly but also cost-efficient to operate. As the e-commerce landscape continues to evolve, the adaptability of this architecture ensures that businesses can remain agile in the face of technological advancements and changing market conditions.

In conclusion, our implementation of an e-commerce website using Amazon EC2, Amazon VPC, and Amazon S3 presents a holistic approach that caters to the needs of modern online businesses. By prioritizing scalability, security, and accessibility, we have laid the groundwork for an e-commerce platform that can thrive in today's digital marketplace while paving the way for future growth and innovation.

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These references span various domains, including cloud computing, software architecture, design patterns, software engineering practices, and operating systems. They've contributed to shaping the conceptualization, design, and development of the Self-Served DIY Web Hosting system on EC2.