Building a Highly Available, Scalable Web Application

Presented by/

Mennatallah Abdelkareem Habashi Saleh St-ID:21046685

Supervised by/

DEPI Eng/Merihan Adel

Overview and objectives:

Throughout various AWS Academy courses, we have completed hands-on labs. We have used different AWS services and features to create compute instances, install operating systems (OSs) and software, deploy code, and secure resources. We practiced how to enable load balancing and automatic scaling, and how to architect for high availability to build simple, lab-specific applications.

In this project, I'm challenged to use familiar AWS services to build a solution. Specific sections of the assignment are meant to challenge me on skills that I have acquired throughout the learning process.

By the end of this project, I should be able to do the following:

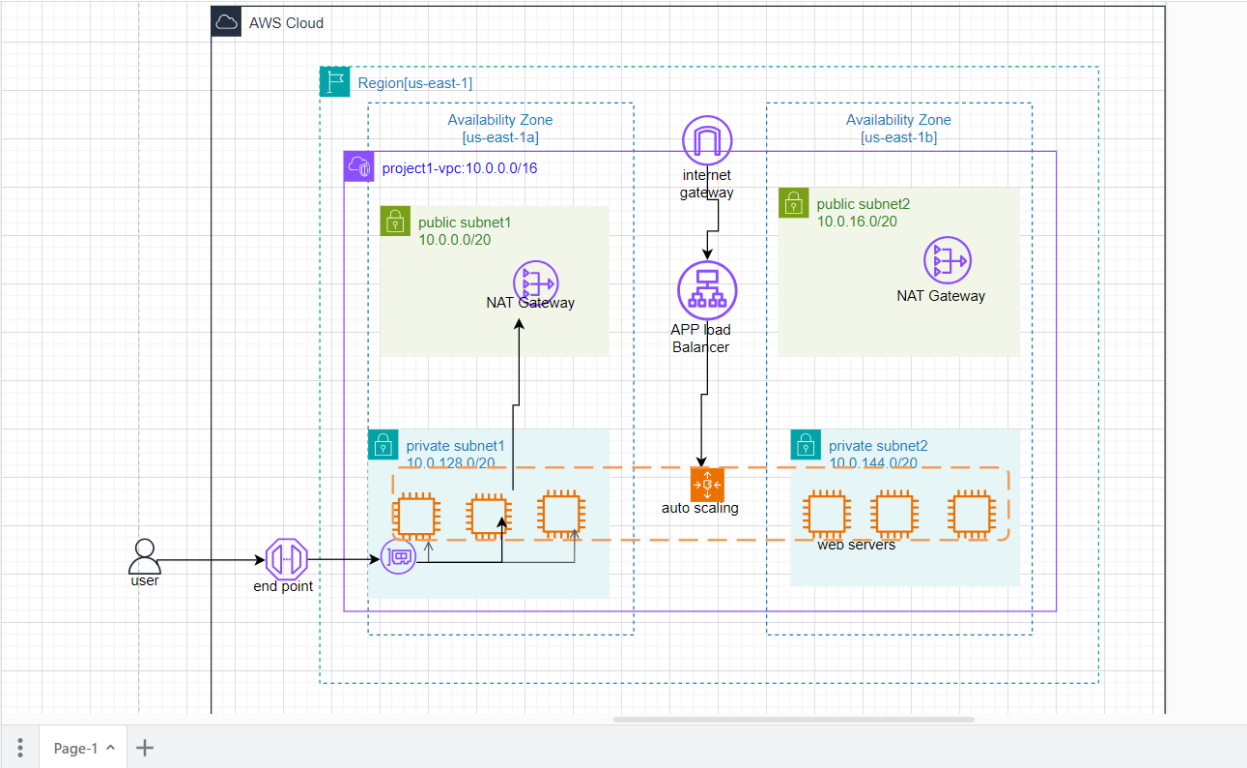
- Create an architectural diagram to depict various AWS services and their interactions with each other.
- Estimate the cost of using services by using the AWS Pricing Calculator.
- Deploy a functional web application that runs on a single virtual machine and is backed by a relational database.
- Architect a web application to separate layers of the application, such as the web server and database.
- Create a virtual network that is configured appropriately to host a web application that is publicly accessible and secure.
- Deploy a web application with the load distributed across multiple web servers.
- Configure the appropriate network security settings for the web servers and database.
- Implement high availability and scalability in the deployed solution.
- Configure access permissions between AWS services.

Phase 1: Planning the design and estimating cost:

In this phase, I will plan the design of my architecture. First, I will create an architecture diagram. Next, I will estimate the cost of the proposed solution, and present the estimate

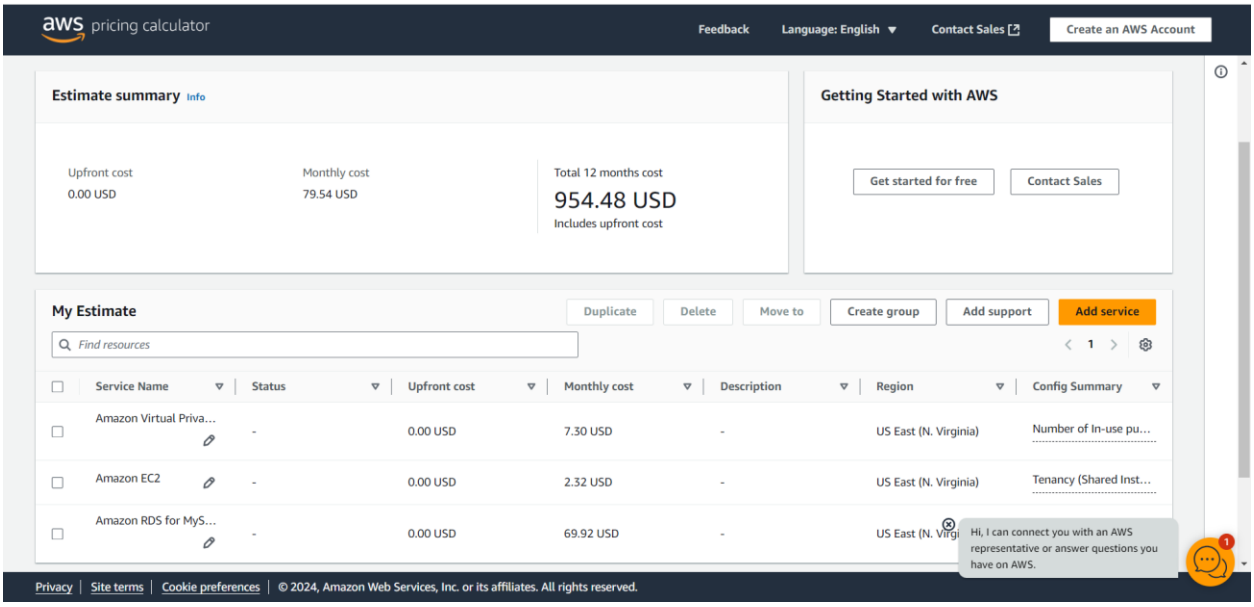
Task 1: Creating an architectural diagram:

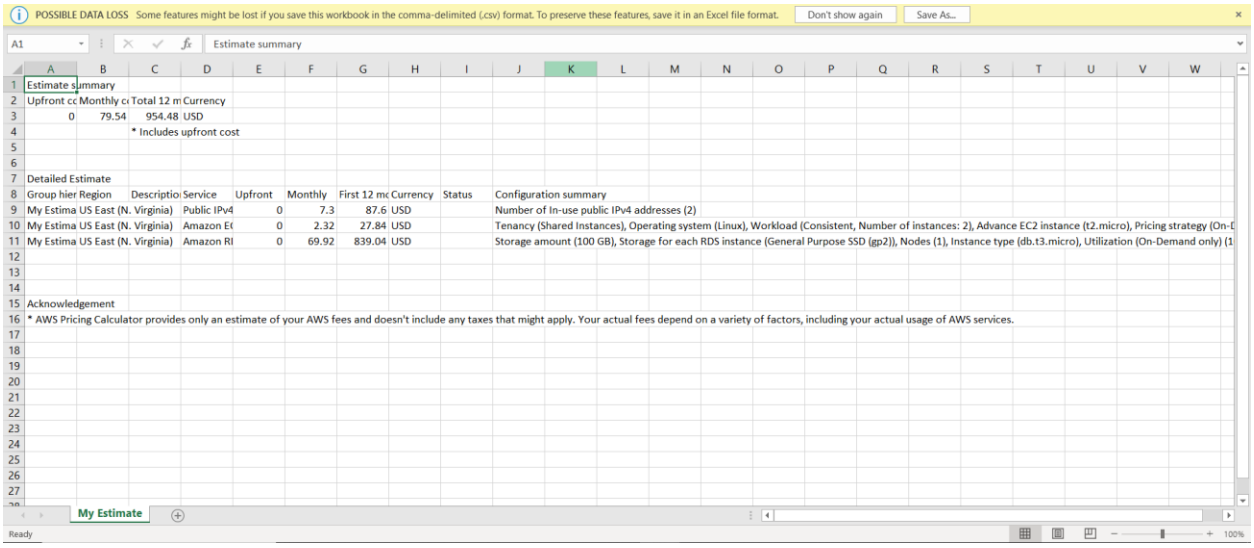
Create an architectural diagram to illustrate what I plan to build



Task 2: Developing a cost estimate:

Develop a cost estimate that shows the cost to run the solution in the us-east-1 Region for 12 months.



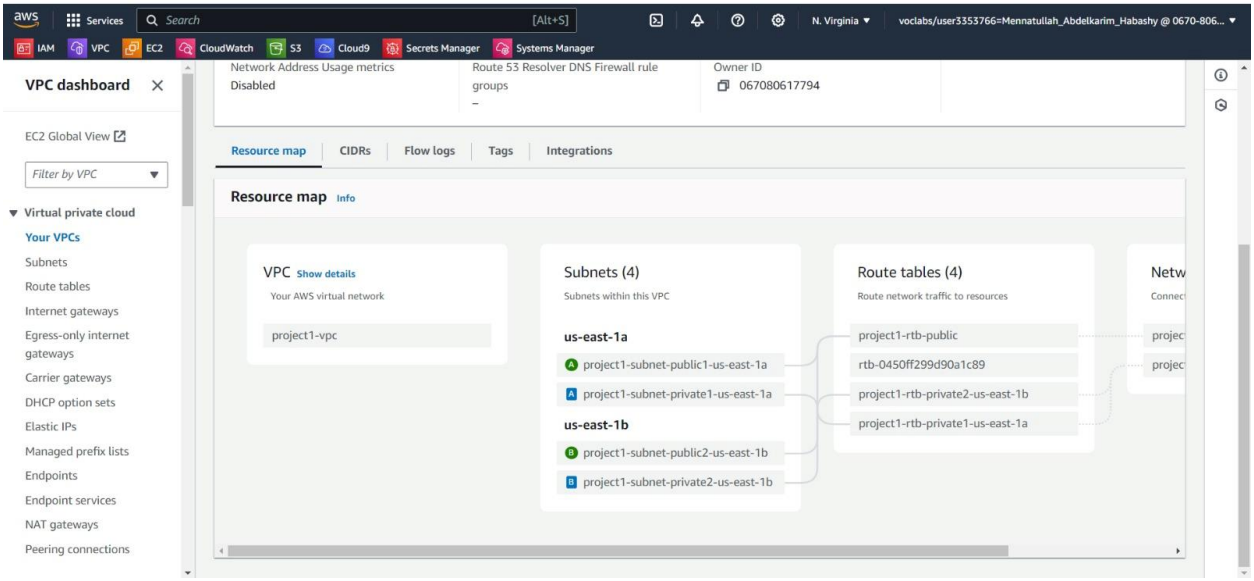


Phase 2: Creating a basic functional web application:

In this phase, I will start to build the solution. The objective of this phase is to have a functional web application that works on a single virtual machine in a virtual network that I create

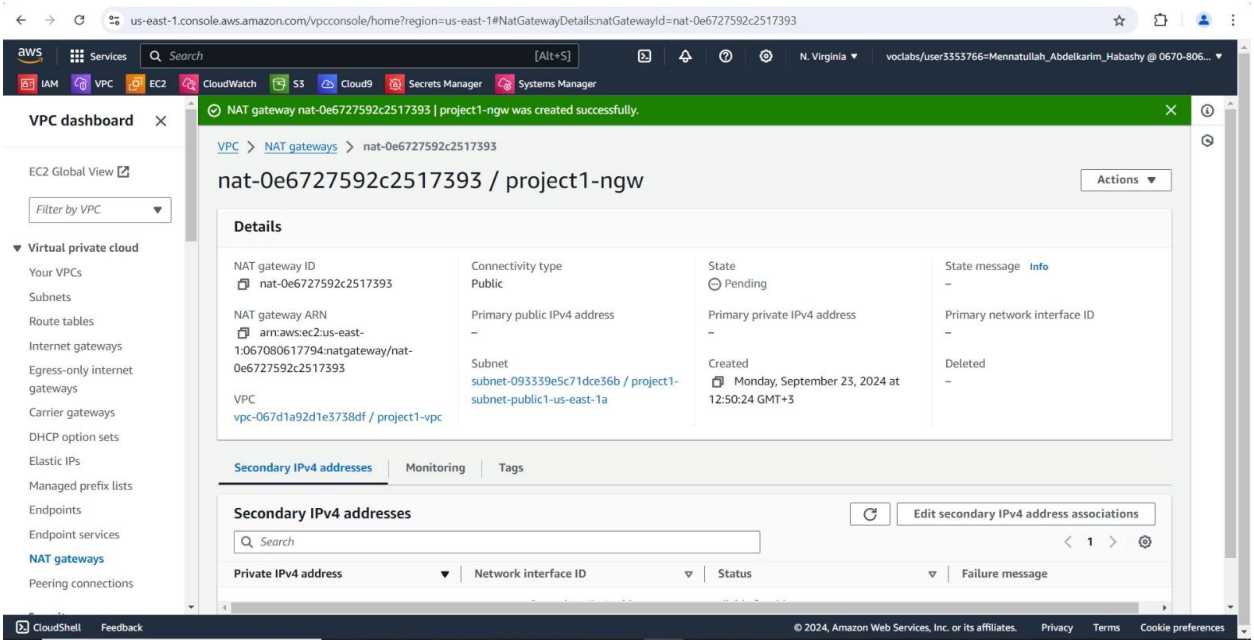
Task 1: Creating a virtual network:

Create a virtual network to host the web application(Create networking resources such as a virtual private cloud (VPC) and subnets.)



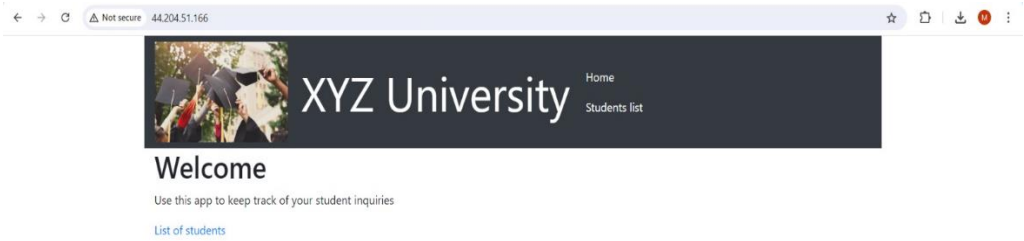
Task 2: Creating a virtual machine:

Create a virtual machine in the cloud to host the web application.



Task 3: Testing the deployment:

Test the deployment of the web application to ensure it is accessible from the internet and functional. (Perform a few tasks, such as viewing, adding, deleting, or modifying records).

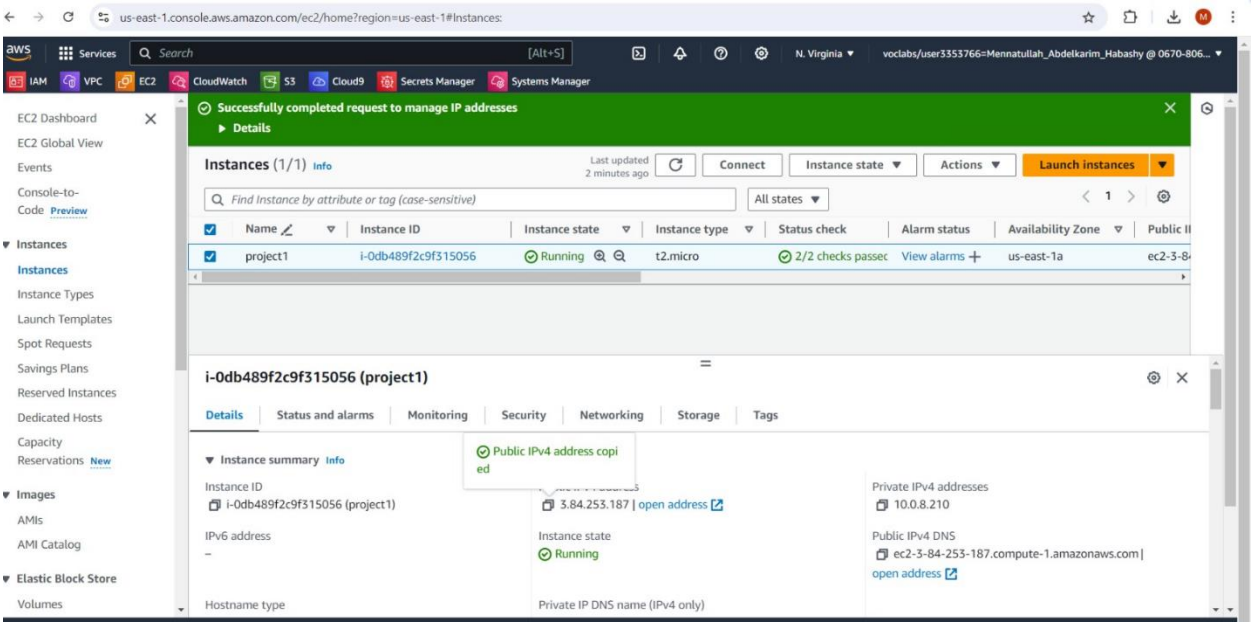


Phase 3: Decoupling the application components:

In this phase, I will continue building. The objective is to separate the database and the web server infrastructure so that they run independently. The web application should run on a separate virtual machine, and the database should run on the managed service infrastructure.

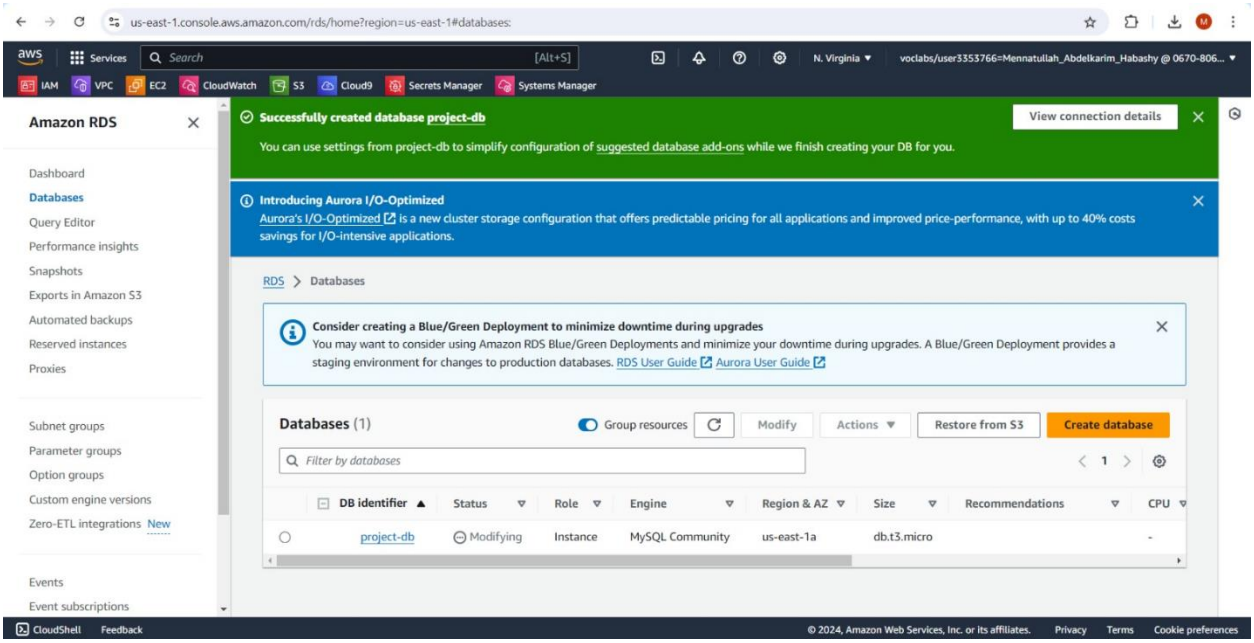
Task 1: Changing the VPC configuration:

Update or re-create the virtual network components that are necessary to support hosting the database separately from the application.



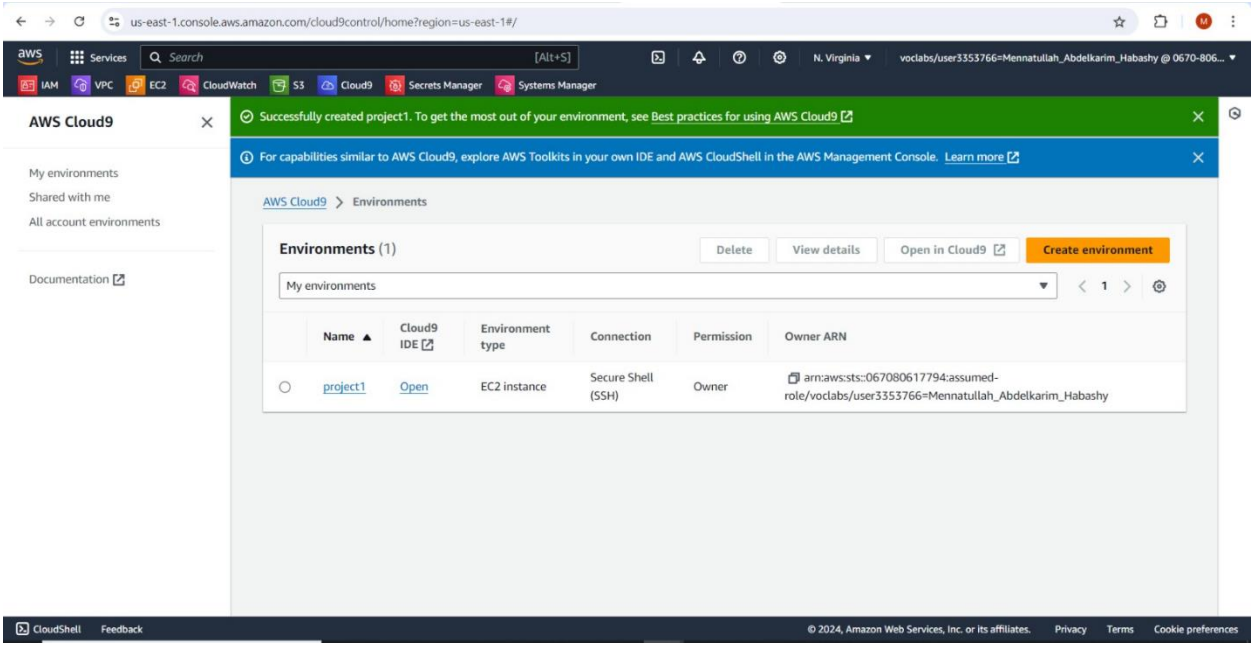
Task 2: Creating and configuring the Amazon RDS database:

Create an Amazon Relational Database Service (Amazon RDS) database that runs a MySQL engine.



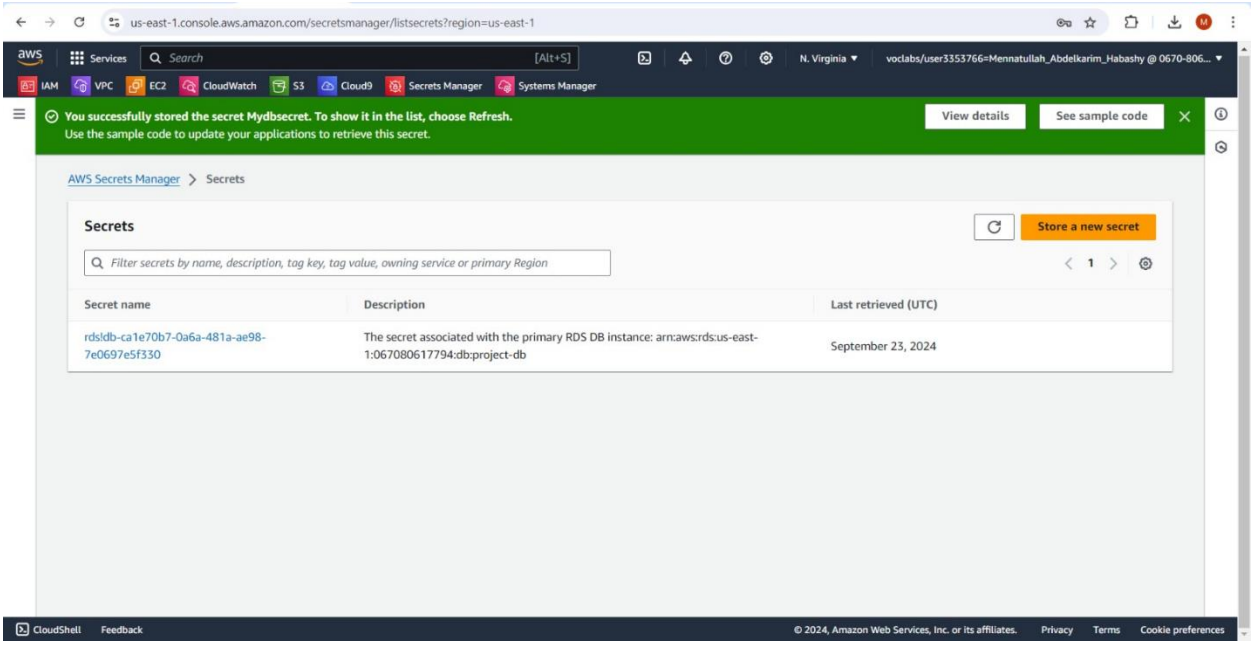
Task 3: Configuring the development environment:

Provision an AWS Cloud9 environment to run AWS Command Line Interface (AWS CLI) commands in later tasks.



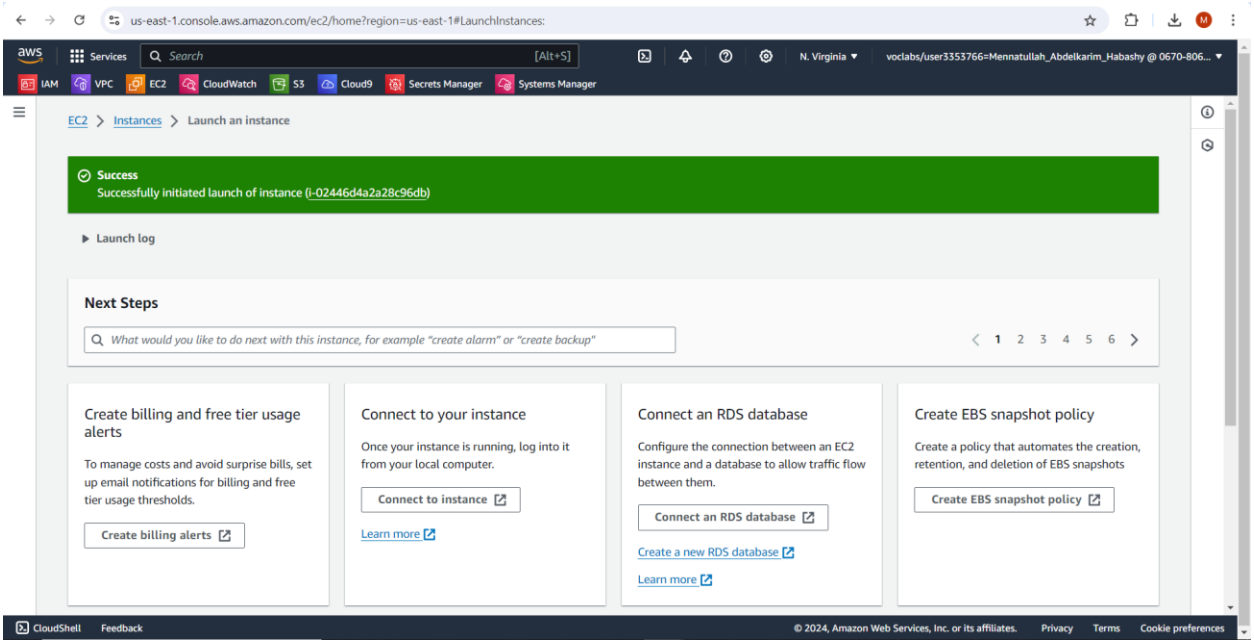
Task 4: Provisioning Secrets Manager:

Use AWS Secrets Manager to create a secret to store the database credentials, and configure the web application to use Secrets Manager.



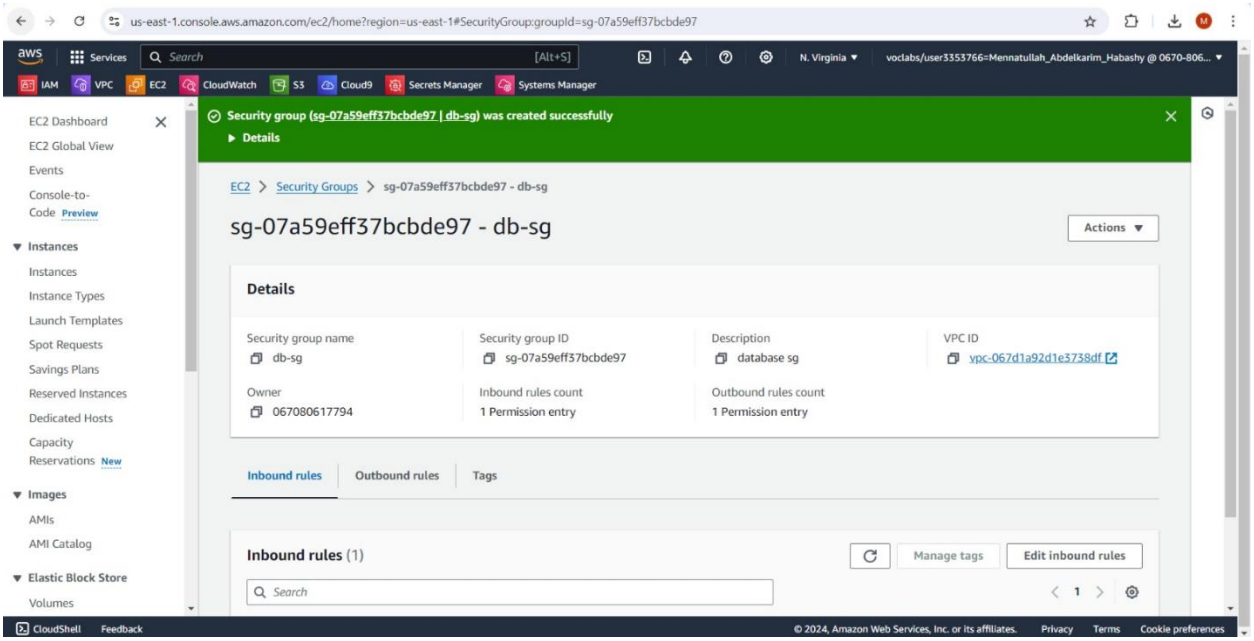
Task 5: Provisioning a new instance for the web server:

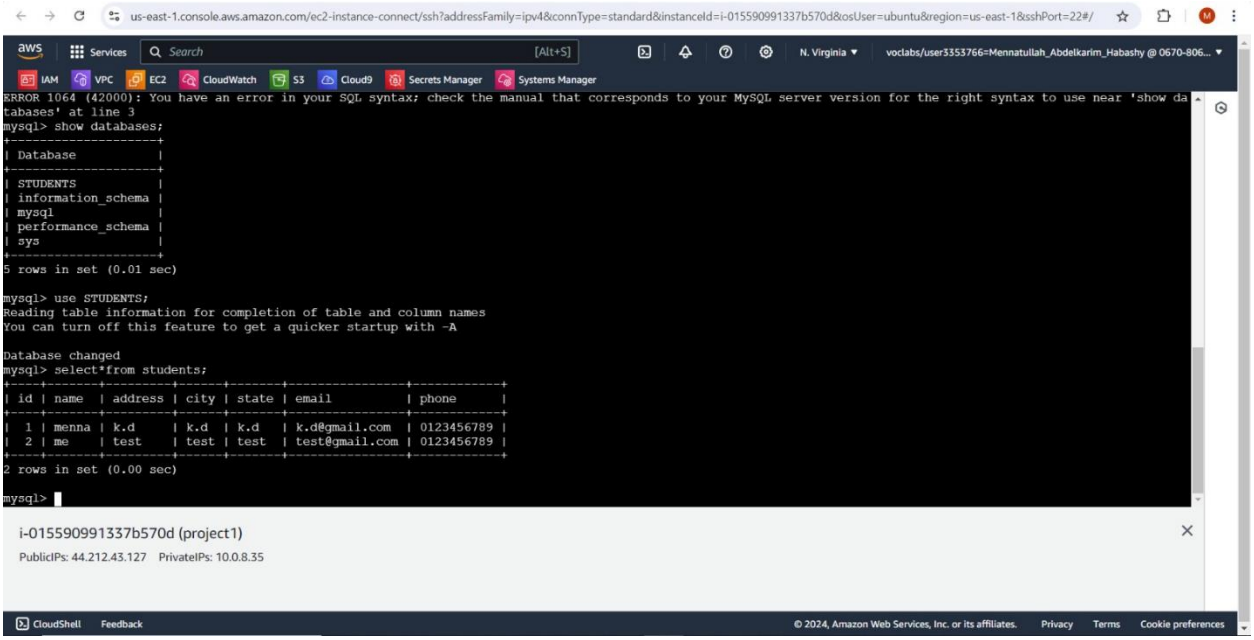
Create a new virtual machine to host the web application.



Task 6: Migrating the database:

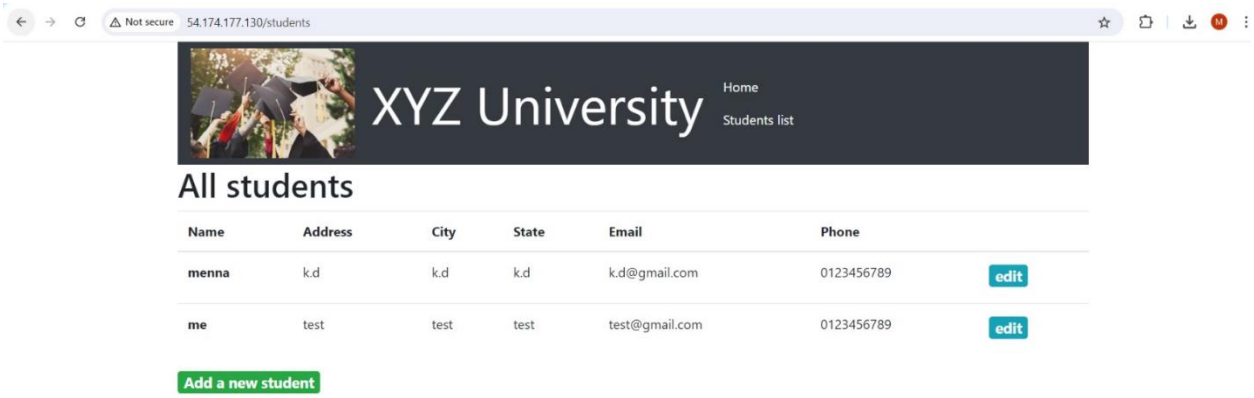
Migrate the data from the original database, which is on an EC2 instance, to the new Amazon RDS database.





Task 7: Testing the application:

Access the application and perform a few tasks to test it. For example, view, add, delete, and modify student records.

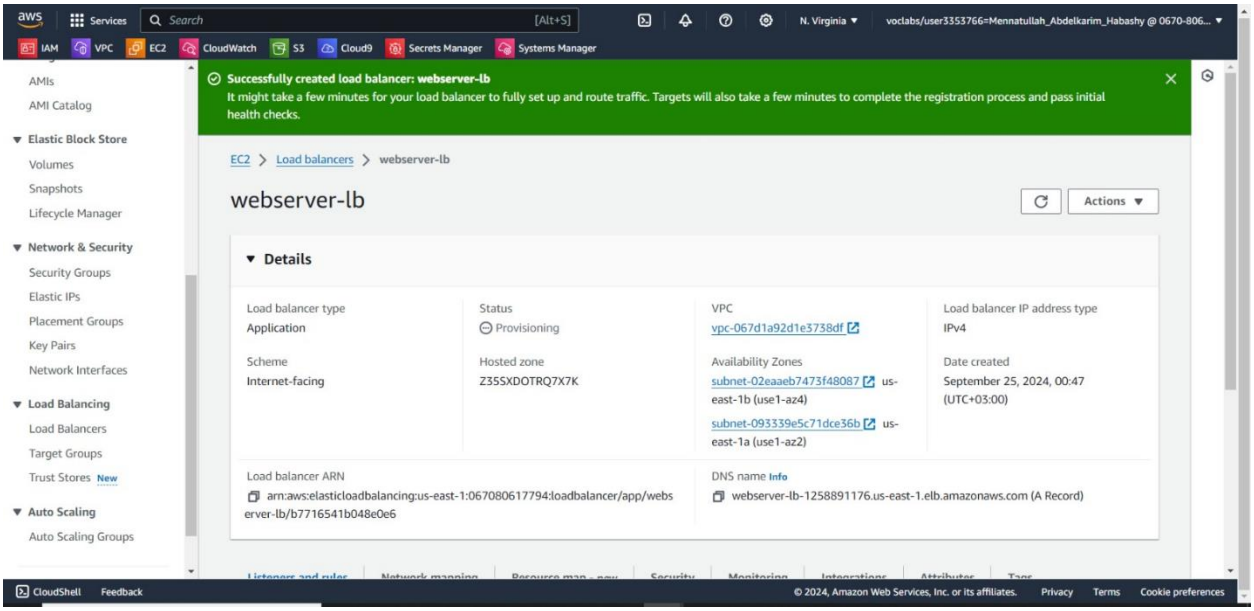


Phase 4: Implementing high availability and scalability

In this phase, I will complete the design and fulfill the remaining solution requirements. The objective is to use the key components that I created in earlier phases to build a scalable and highly available architecture.

Task 1: Creating an Application Load Balancer:

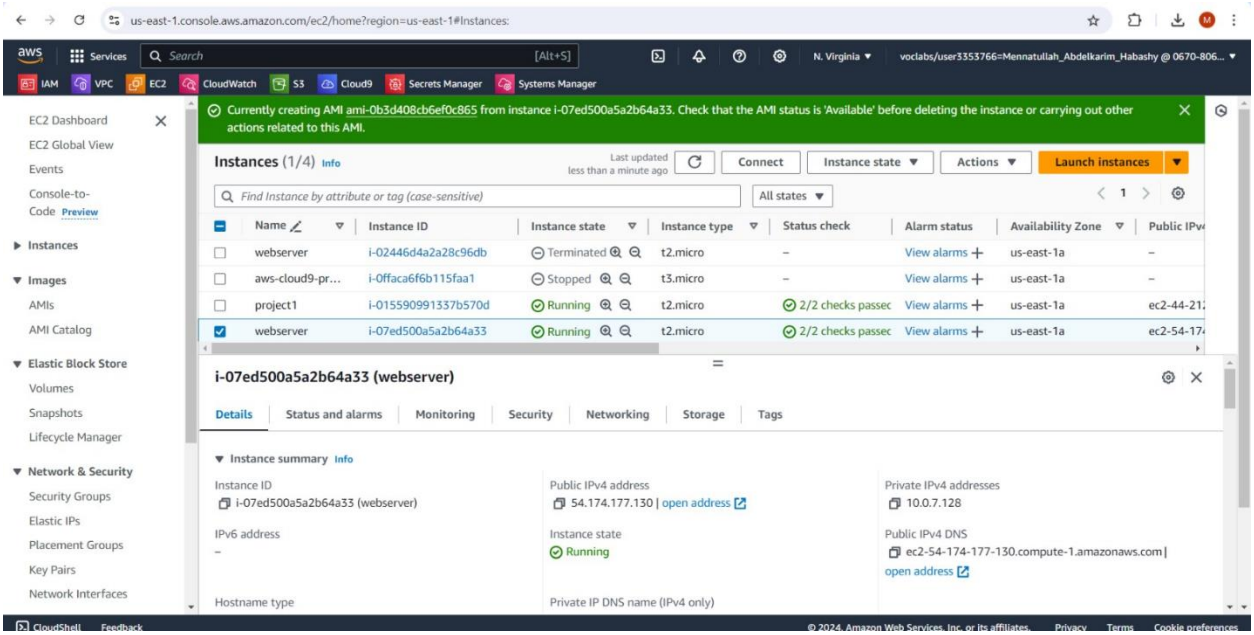
Launch a load balancer. The endpoint will be used to access The web application.



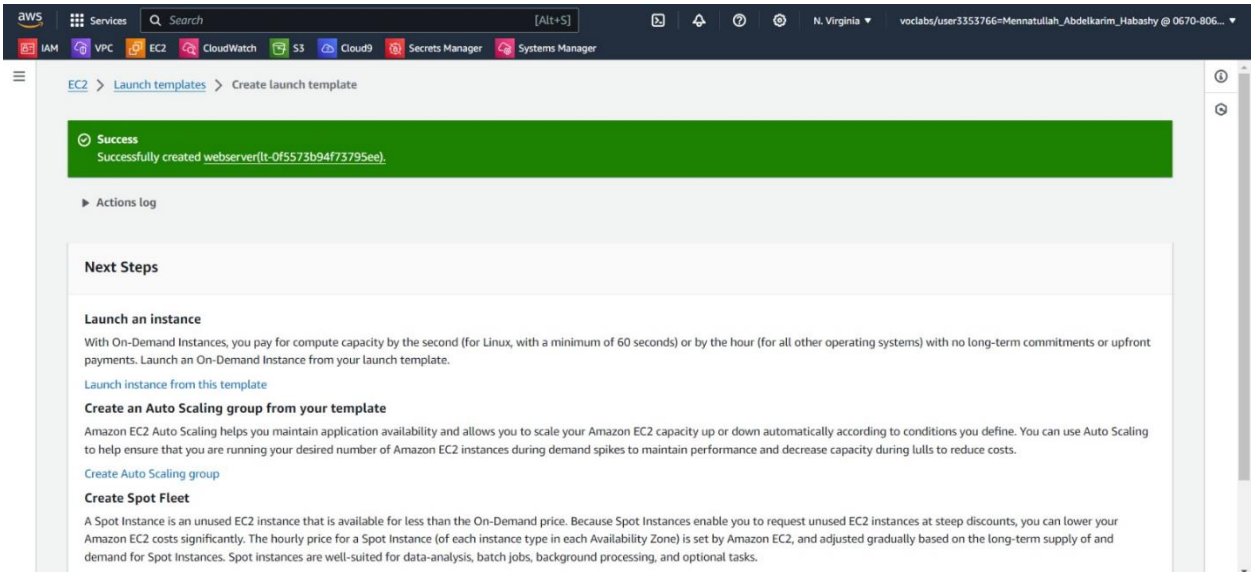
Task 2: Implementing Amazon EC2 Auto Scaling:

In this task I will Create a new launch template, and use an Auto Scaling group to launch the EC2 instances that host the web application.

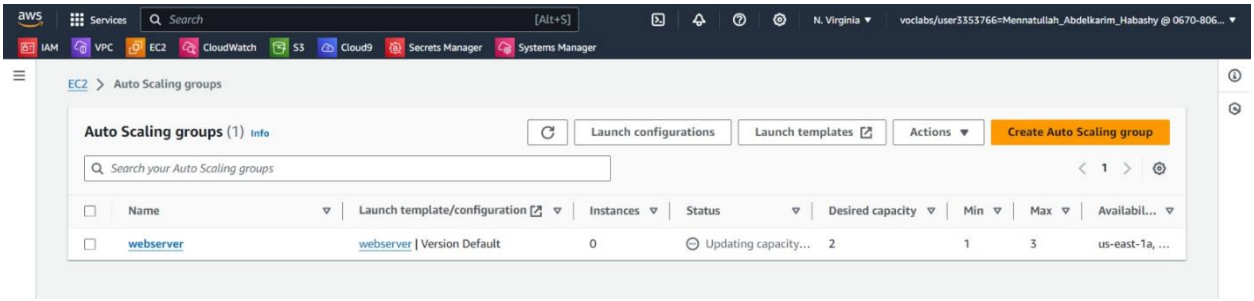
-Create an image for Auto Scaling:



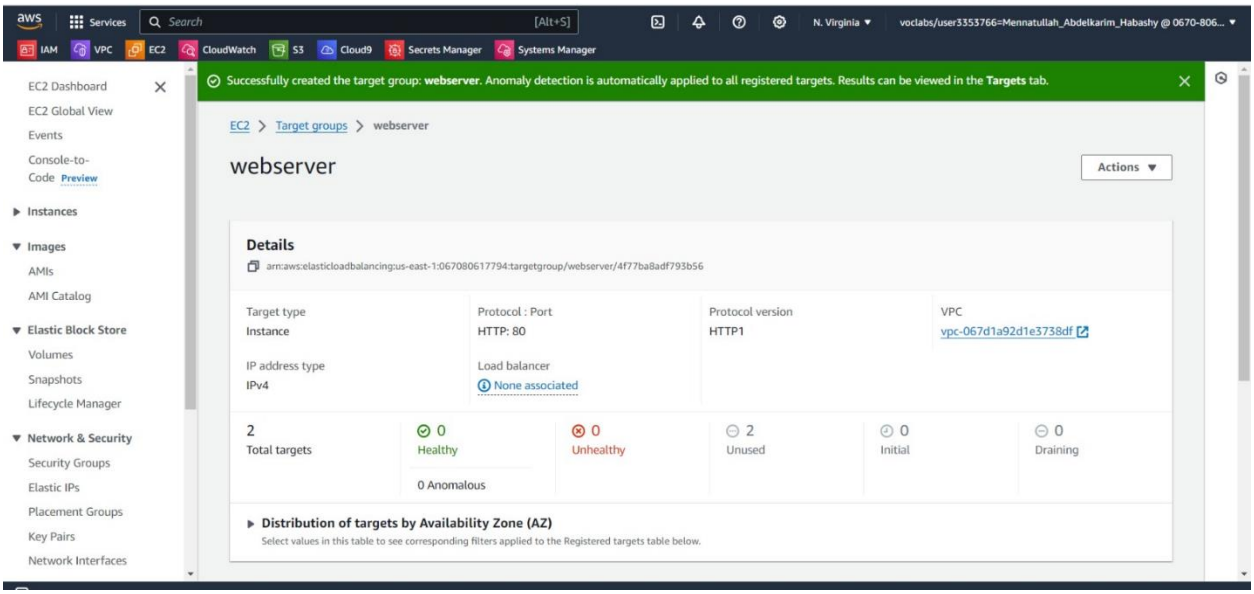
-create launch template:



-Auto Scaling

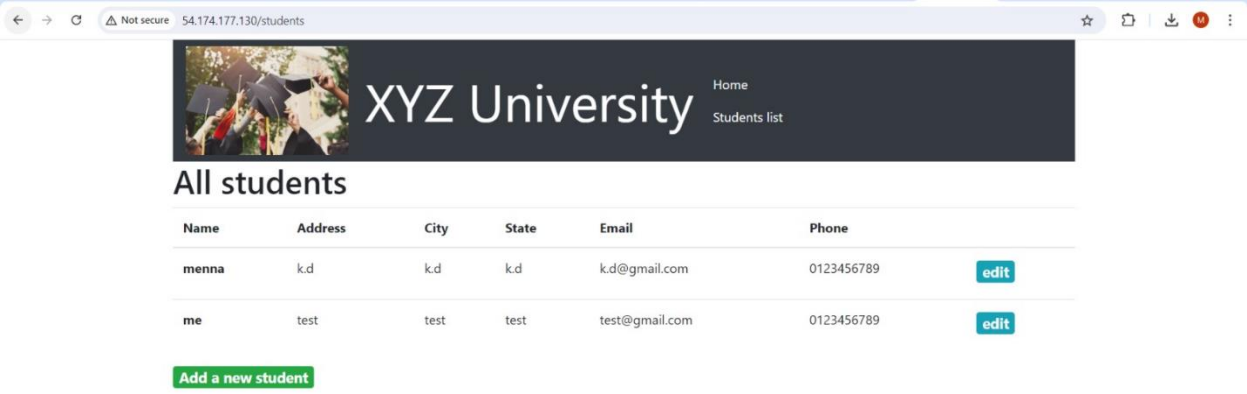


-create target group



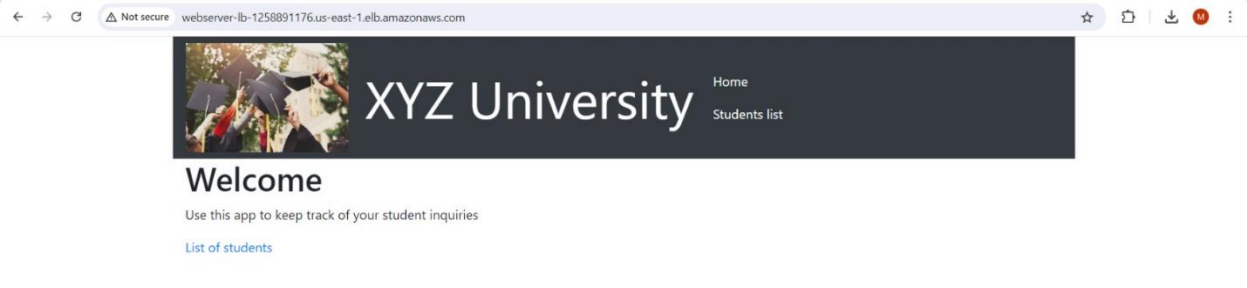
Task 3: Accessing the application:

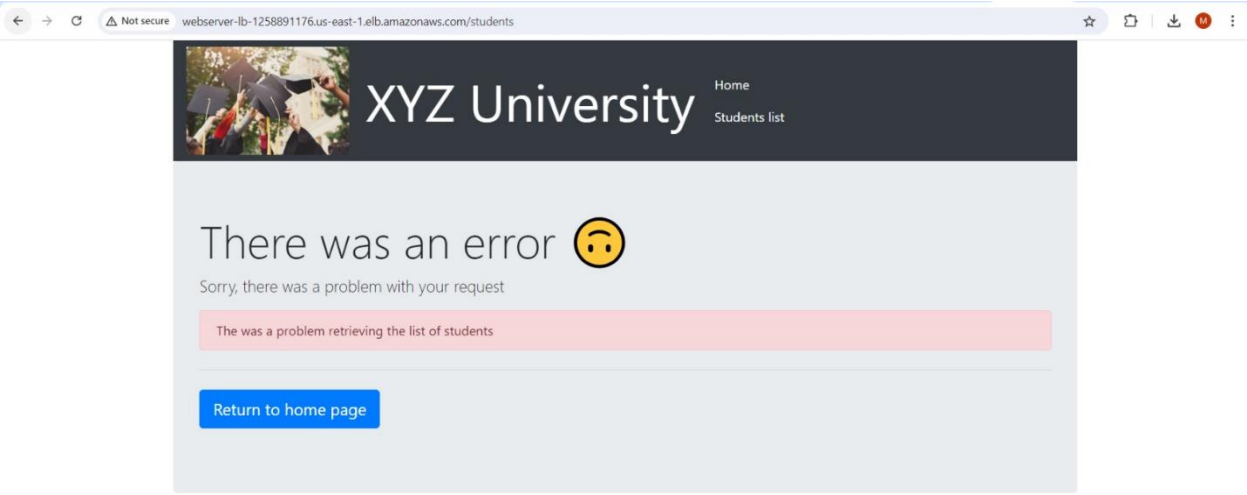
Access the application and perform a few tasks to test it. For example, view, add, delete, and modify student records.



Task 4: Load testing the application:

Perform a load test on the application to monitor scaling.





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