St. JOSEPH'S GROUP OF INSTITUTIONS
OMR, CHENNAI – 119

aws

Placement Empowerment Program

Cloud Computing and DevOps Centre

SET UP A LOAD BALANCER IN THE CLOUD

(Configure a load balancer to distribute traffic across multiple VMs hosting your web application)

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INTRODUCTION:

An Elastic Load Balancer (ELB) is an AWS-managed service that automatically distributes incoming network traffic across multiple targets, such as EC2 instances, containers, and IP addresses, in different Availability Zones. It ensures high availability, fault tolerance, and scalability of applications. In this PoC, we'll demonstrate the basic setup of an AWS Load Balancer, allowing traffic to be distributed between two EC2 instances running simple web servers.

IMPORTANCE:

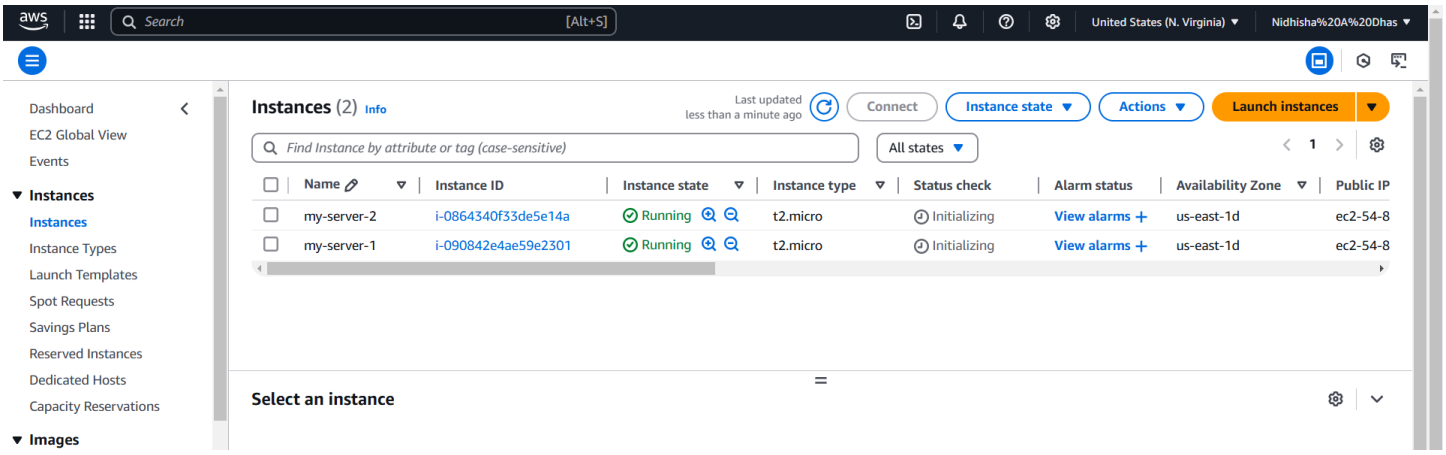
1. High Availability & Fault Tolerance - Spreads traffic across multiple instances to prevent a single point of failure and supports multiple Availability Zones for redundancy.
2. Scalability - Automatically scales with the incoming traffic load.
3. Security - Supports SSL/TLS encryption to secure traffic also works with AWS WAF (Web Application Firewall) to block malicious traffic.
4. Health Monitoring - Continuously checks the health of backend instances and automatically stops routing traffic to unhealthy instances.
5. Improved Performance - Supports content-based routing (Layer 7) for optimized request handling.
6. Integration with AWS Services - Works with Auto Scaling to dynamically add/remove instances. Also, supports AWS CloudWatch for monitoring and logging.

STEP BY STEP OVERVIEW:

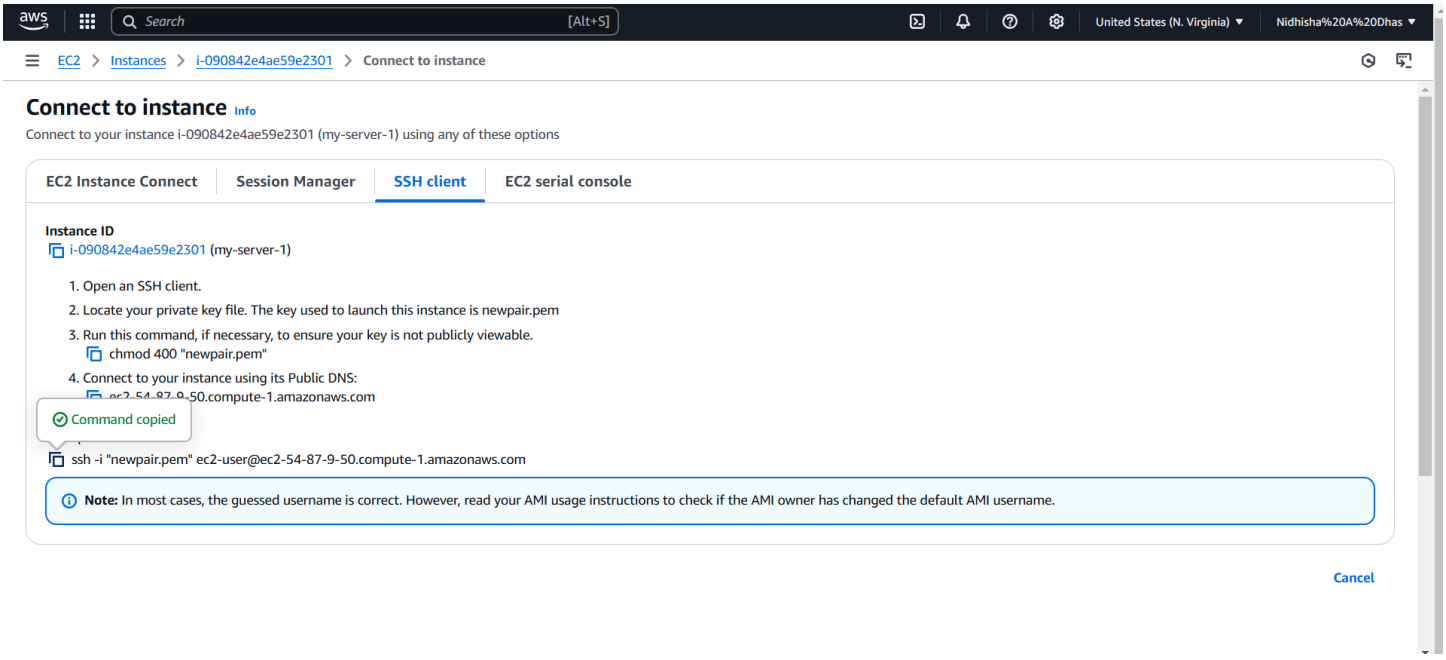
Step 1: CREATE INSTANCE

- Login into your AWS console and navigate to the EC2 dashboard.

- Click on Launch Instance and specify name the first instance, select Amazon Linux 2 AMI as the OS, and choose the t2.micro instance type. For the Key Pair, either select an existing one or create a new key pair to use for SSH access. Under Network Settings, ensure "Allow HTTP traffic from the internet" is checked to enable web traffic. Keep the storage size at the default 8 GB, then click Launch Instance.
- Repeat the same steps for the second instance.



- Click on my-server-1, then click Connect. Use the instructions under SSH client to connect to your instance via terminal.



Step 2: INSTALL & RUN THE WEB-SERVER

- Run the following command to install and run the web-server.

```
PS C:\Users\Aruldhas> cd downloads
PS C:\Users\Aruldhas\downloads> ssh -i "sample.pem" ec2-user@ec2-13-201-20-140.ap-south-1.compute.amazonaws.com
```

```
       _/m/'
[ec2-user@ip-172-31-9-33 ~]$ sudo yum update -y
```

```
[ec2-user@ip-172-31-9-33 ~]$ sudo yum install httpd -y
```

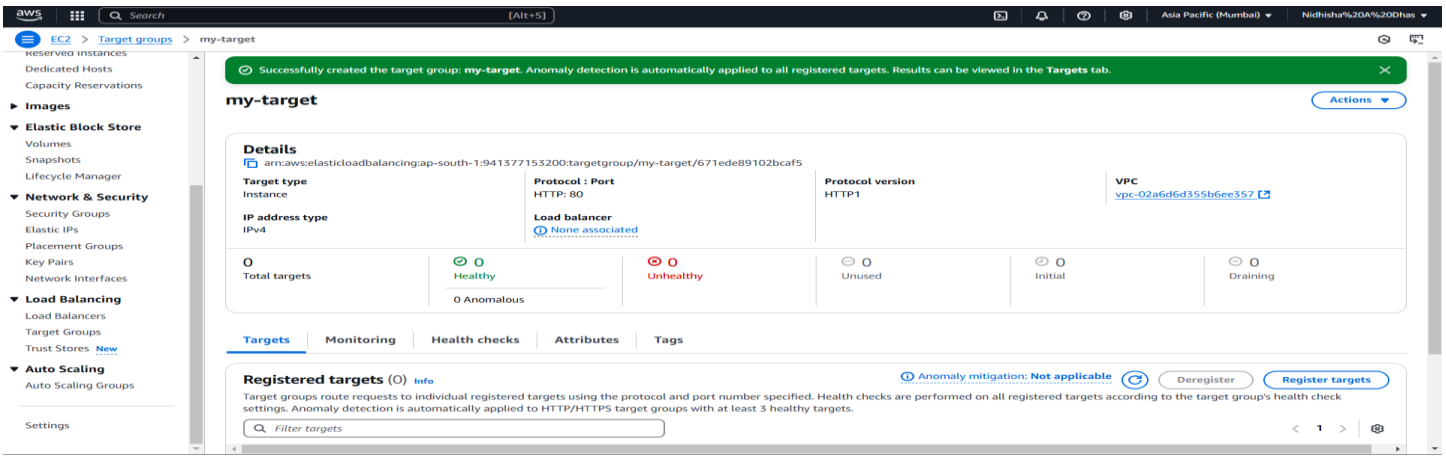
```
[ec2-user@ip-172-31-9-33 ~]$ sudo systemctl start httpd
[ec2-user@ip-172-31-9-33 ~]$ sudo systemctl enable httpd
```

- Repeat the same steps for the second instance and add the following command.

```
[ec2-user@ip-172-31-9-33 ~]$  echo "hello from server-2" | sudo tee /var/www/html/index.html
hello from server-2
[ec2-user@ip-172-31-9-33 ~]$
```

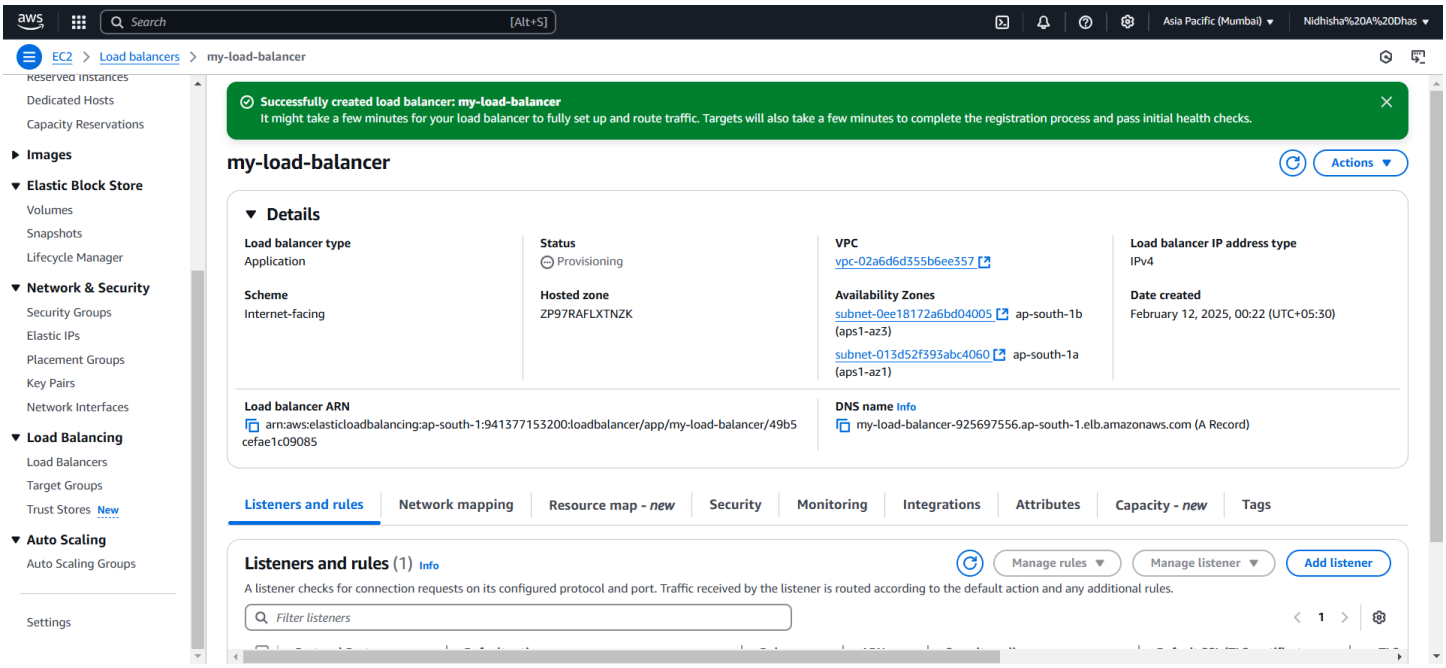
Step 3: CREATE TARGET GROUP

- In the AWS Management Console, go to the EC2 Dashboard and scroll down and click on Target Groups under "Load Balancing."
- Click Create Target Group.
- To create a target group, select Instances as the target type, name it and set the Protocol to HTTP and Port to 80, and choose the VPC (usually the default VPC). Keep the Health Check Path Click Next, select both instances under "Register Targets," and then create the target group.



Step 4: CREATE LOAD BALANCER

- In the EC2 Dashboard, go to Load Balancers under "Load Balancing" and click Create Load Balancer.
- Select Application Load Balancer (free tier eligible) and configure it: name it & set the Scheme to Internet-facing, IP Address Type to IPv4, and ensure the listener is HTTP on port 80. Select the VPC and at least two subnets for high availability. Skip the security settings since this is HTTP.
- On the Security Groups page, choose or create a security group that allows HTTP traffic. On the Routing page, select the previously created target group and click Create Load Balancer.



Step 5: TESTING THE FUNCTIONALITY

To verify the functionality of your Load Balancer:

- Go to the Load Balancers section in the AWS Management Console. Select your Load Balancer and find its DNS name under the Description tab.

- Copy the DNS name and open it in your browser. Refresh the page to confirm that traffic is being alternated between the two EC2 instances.
- You should see the messages "Hello from my-server1" and "Hello from my-server-2" displayed alternately. This confirms that the Load Balancer is correctly distributing traffic and ensuring high availability.

CONCLUSION:

By completing this PoC, you will:

- Launch and configure two EC2 instances with Amazon Linux 2, each hosting a simple web server with unique content.
- Create and configure an Application Load Balancer to distribute incoming traffic between the two EC2 instances.
- Verify the functionality of the Load Balancer by accessing the DNS name and observing traffic alternation between the two web servers.
- Understand the importance of Load Balancers in ensuring high availability and fault tolerance for web applications.