

Mini Project: Application Load Balancer Deployment

Introduction

This project demonstrates the deployment and configuration of an **Application Load Balancer (ALB)** in AWS. An ALB distributes incoming HTTP/HTTPS traffic across multiple EC2 instances, enabling higher availability, fault tolerance, and scalability of web applications. Unlike the Classic Load Balancer, ALB operates at the application layer (Layer 7), allowing advanced routing features such as path-based routing, host-based routing, and SSL termination. It continuously performs health checks to ensure only healthy instances receive traffic.

Prerequisites

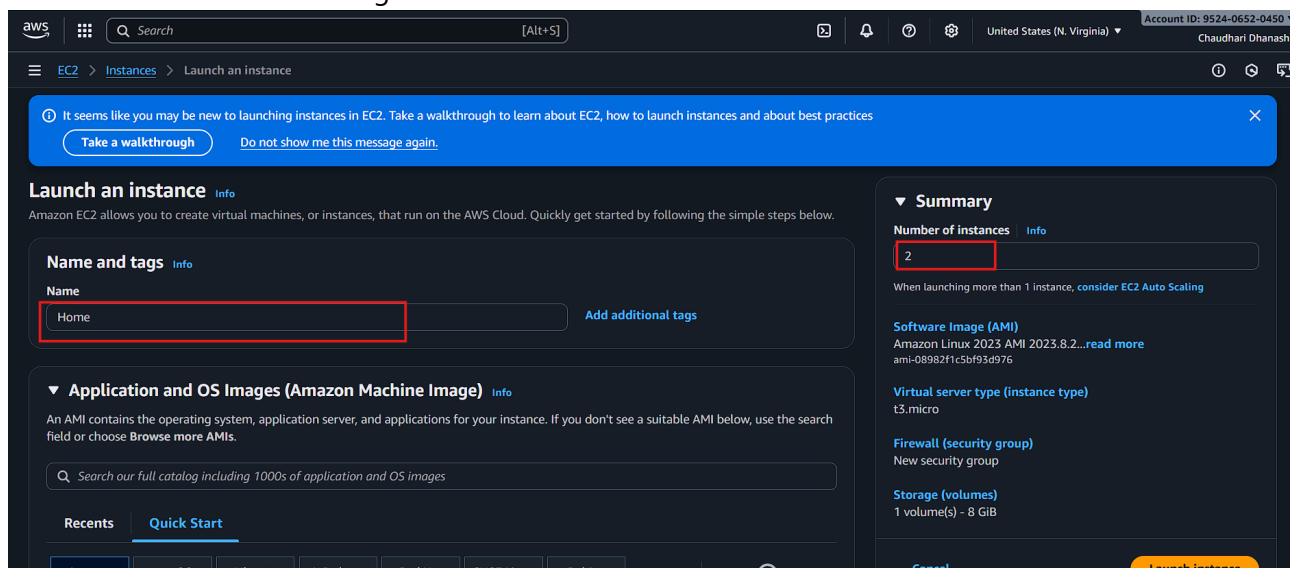
AWS Account with access to EC2, ALB, and IAM services

- Multiple running EC2 instances the same VPC and region
- Security Groups configured to allow:
 - Inbound HTTP (80) / HTTPS (443) traffic
 - Inbound SSH (22) traffic (optional)
- Web Server Installed (e.g., Apache/Nginx) on each instance
- IAM Permissions to create and manage ALBs.

Steps to Setup Application Load Balancer.

Step 1: Launch Instances

1. Create 2 Instance of Home Page



aws Search [Alt+S] United States (N. Virginia) Account ID: 9524-0652-0450 Chaudhari Dhanash

EC2 > Instances > Launch an instance

Select

User data - optional Info

Upload a file with your user data or enter it in the field.

Choose file

```
#!/bin/bash
yum update -y
yum install httpd -y
systemctl start httpd
systemctl enable httpd
echo "<h1>Hello World from $(hostname -f)</h1>" > /var/www/html/index.html
```

☐ User data has already been base64 encoded

Summary

Number of instances Info

2

When launching more than 1 instance, consider EC2 Auto Scaling

Software Image (AMI)

Amazon Linux 2023 AMI 2023.8.2...read more
ami-08982f1c5bf93d976

Virtual server type (instance type)

t3.micro

Firewall (security group)

launch-wizard-1

Storage (volumes)

1 volume(s) - 8 GiB

Cancel Launch instance Preview code

2. Create 2 Instance of Laptop Page

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EC2 > Instances > Launch an instance

Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags Info

Name

Laptop Add additional tags

Application and OS Images (Amazon Machine Image) Info

An AMI contains the operating system, application server, and applications for your instance. If you don't see a suitable AMI below, use the search field or choose [Browse more AMIs](#).

Search our full catalog including 1000s of application and OS images

Recents Quick Start

Amazon Linux macOS Ubuntu Windows Red Hat SUSE Linux Debian

[Browse more AMIs](#)
Including AMIs from AWS Marketplace and

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Software Image (AMI)

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ami-08982f1c5bf93d976

Virtual server type (instance type)

t3.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Cancel Launch instance Preview code

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EC2 > Instances > Launch an instance

Select

User data - optional Info

Upload a file with your user data or enter it in the field.

Choose file

```
#!/bin/bash
yum update -y
yum install -y httpd
systemctl start httpd
systemctl enable httpd
sudo mkdir /var/www/html/laptop
echo "<h1>This is laptop page $(hostname -f)</h1>" > /var/www/html/laptop/index.html
```

☐ User data has already been base64 encoded

Summary

Number of instances Info

2

When launching more than 1 instance, consider EC2 Auto Scaling

Software Image (AMI)

Amazon Linux 2023 AMI 2023.8.2...read more
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Virtual server type (instance type)

t3.micro

Firewall (security group)

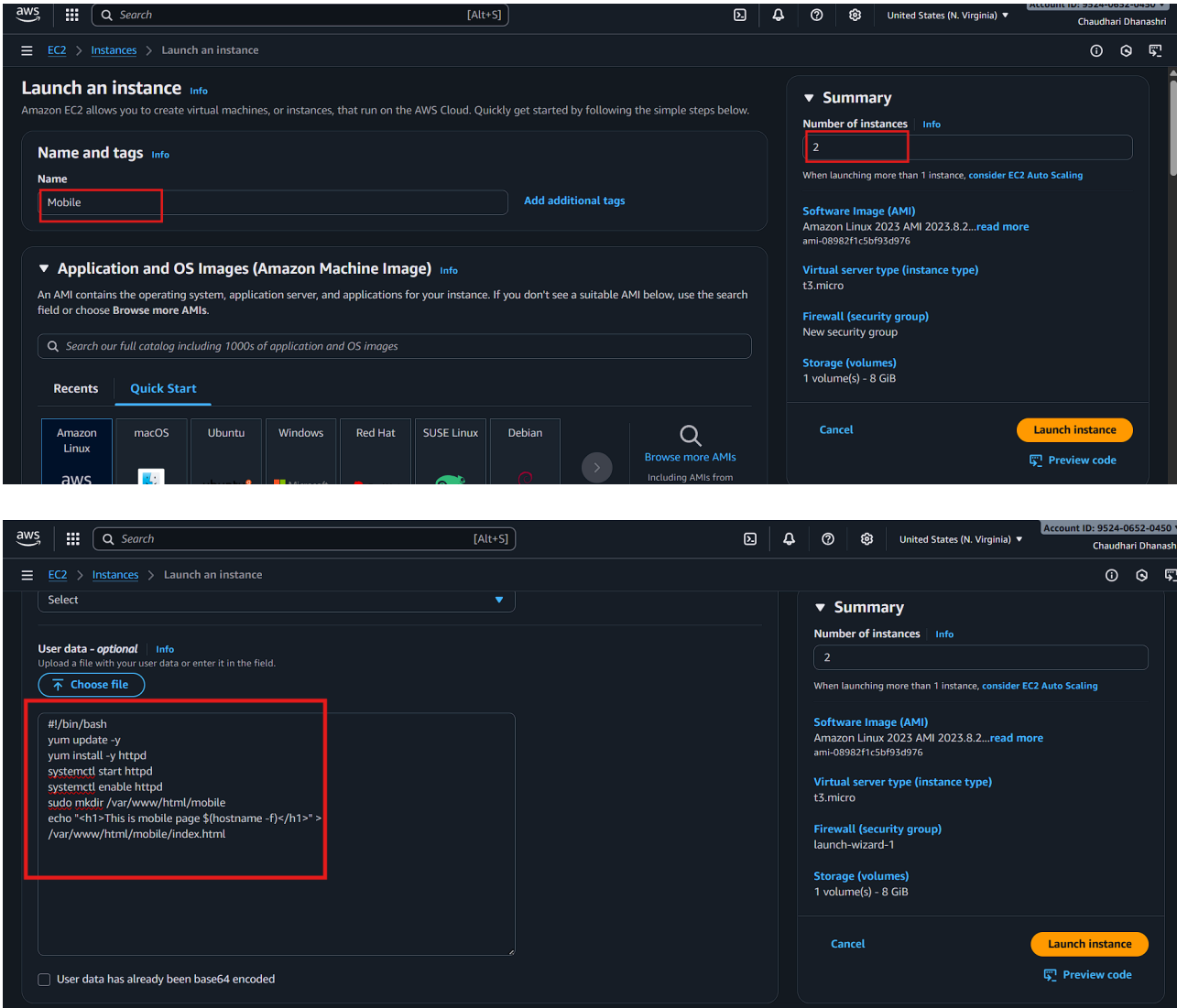
launch-wizard-1

Storage (volumes)

1 volume(s) - 8 GiB

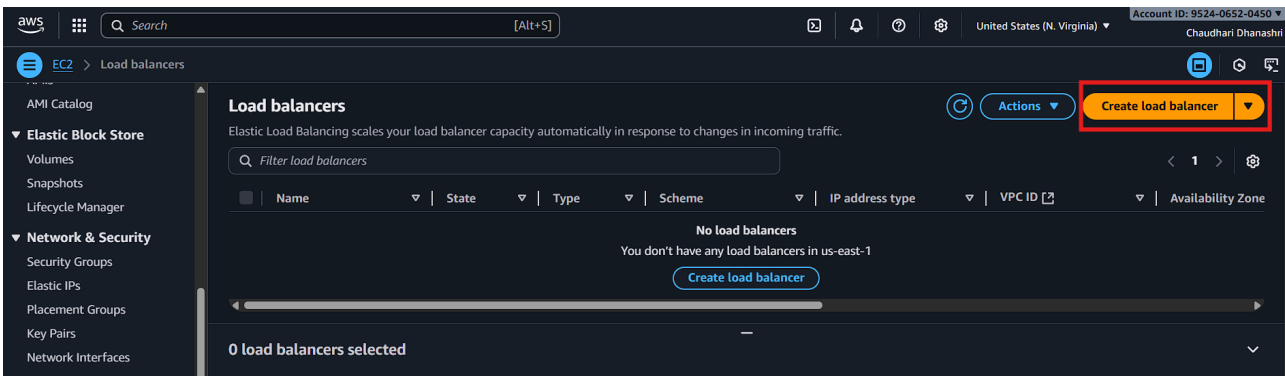
Cancel Launch instance Preview code

3. Create 2 Instance of Mobile Page



Step 2: Create an Application Load Balancer

1. Go to Load Balancer



2. Select Application Load Balancer

Application Load Balancer Info

Choose an Application Load Balancer when you need a flexible feature set for your applications with HTTP and HTTPS traffic. Operating at the request level, Application Load Balancers provide advanced routing and visibility features targeted at application architectures, including microservices and containers.

Network Load Balancer Info

Choose a Network Load Balancer when you need ultra-high performance, TLS offloading at scale, centralized certificate deployment, support for UDP, and static IP addresses for your applications. Operating at the connection level, Network Load Balancers are capable of handling millions of concurrent connections.

Gateway Load Balancer Info

Choose a Gateway Load Balancer when you need to deploy and manage a fleet of third-party virtual appliances that support GENEVE. These appliances enable you to improve security, compliance, and policy controls.

3. Name the Application Load Balancer

Create Application Load Balancer Info

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

► **How Application Load Balancers work**

Basic configuration

Load balancer name

Name must be unique within your AWS account and can't be changed after the load balancer is created.

ALB

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme Info

Scheme can't be changed after the load balancer is created.

☒ **Internet-facing**

- Serves internet-facing traffic.
- Has public IP addresses.
- DNS name resolves to public IPs.
- Requires a public subnet.

☐ **Internal**

- Serves internal traffic.
- Has private IP addresses.
- DNS name resolves to private IPs.
- Compatible with the IPv4 and Dualstack IP address types.

4. Select all Availability Zones.

Availability Zones and subnets Info

Select at least two Availability Zones and a subnet for each zone. A load balancer node will be placed in each selected zone and will automatically scale in response to traffic. The load balancer routes traffic to targets in the selected Availability Zones only.

☒ **us-east-1a (use1-az6)**

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-0074946e1e6cb0a0a

IPv4 subnet CIDR: 172.31.32.0/20

☒ **us-east-1b (use1-az1)**

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-0a0a2f906dbf510a7

IPv4 subnet CIDR: 172.31.0.0/20

☒ **us-east-1c (use1-az2)**

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

subnet-012dbf3ca55b1eabb

IPv4 subnet CIDR: 172.31.80.0/20

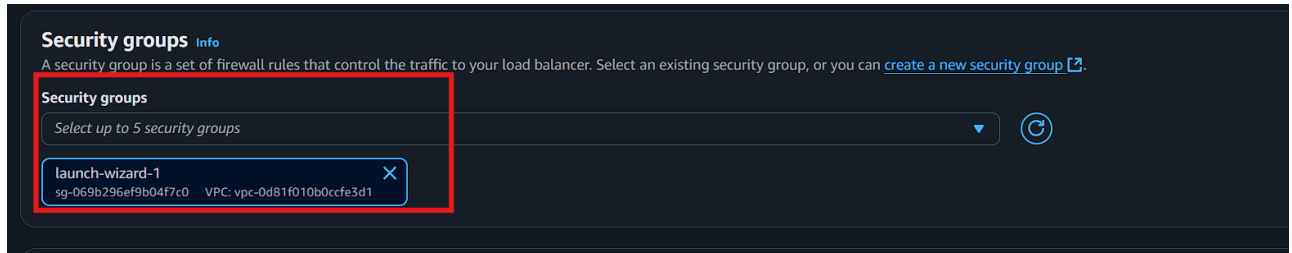
☒ **us-east-1d (use1-az4)**

Subnet

Only CIDR blocks corresponding to the load balancer IP address type are used. At least 8 available IP addresses are required for your load balancer to scale efficiently.

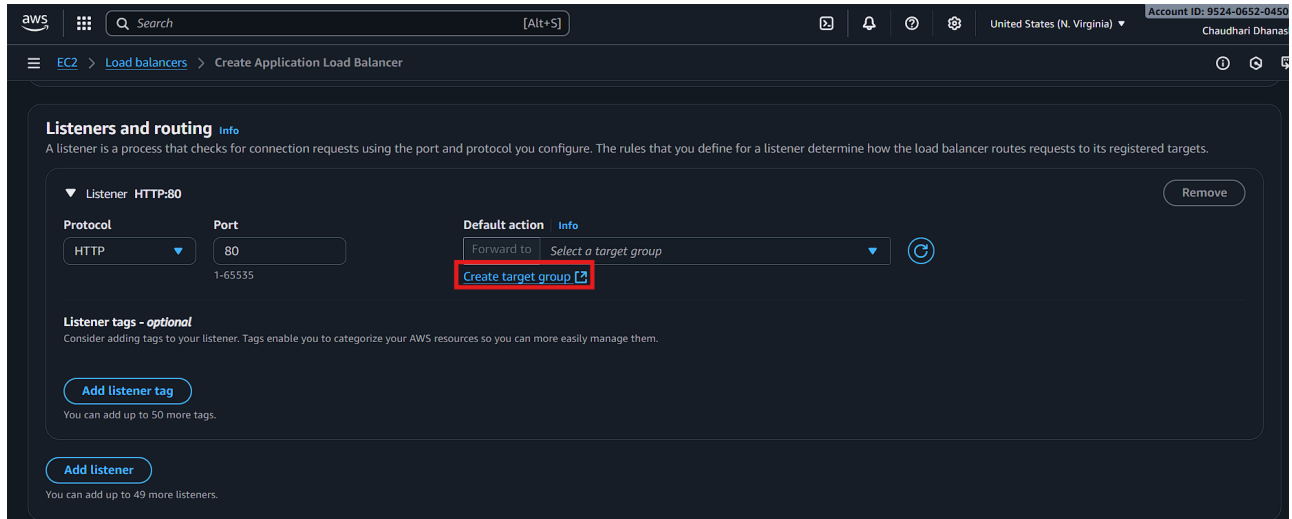
subnet-067179291e79afeef

5. Manage Security Group

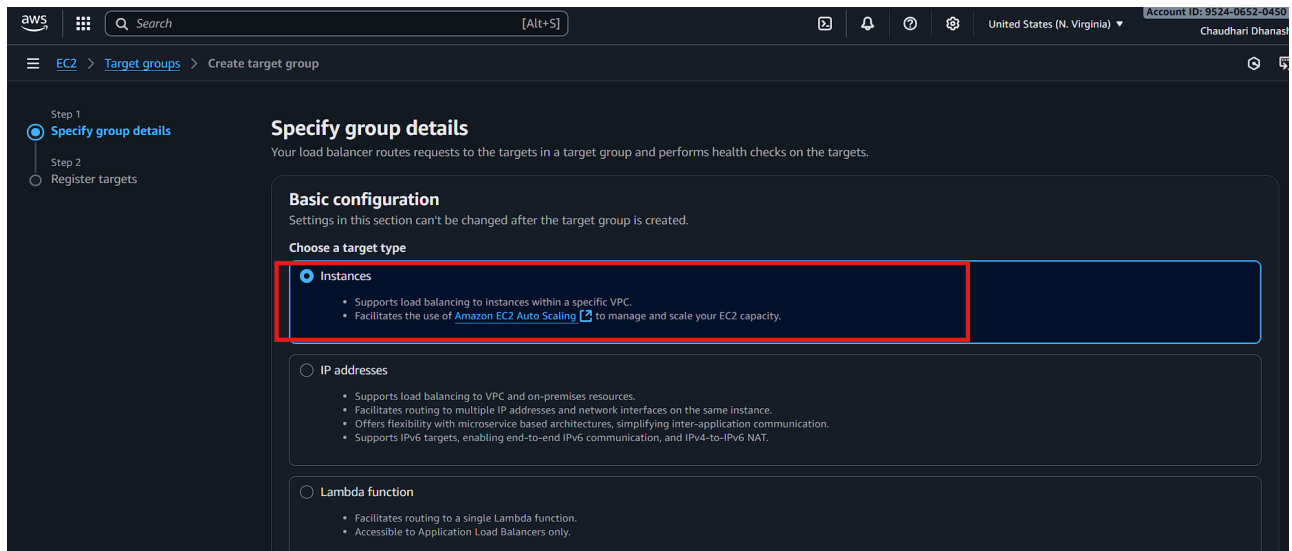


6. Create Target Group 1 (Home).

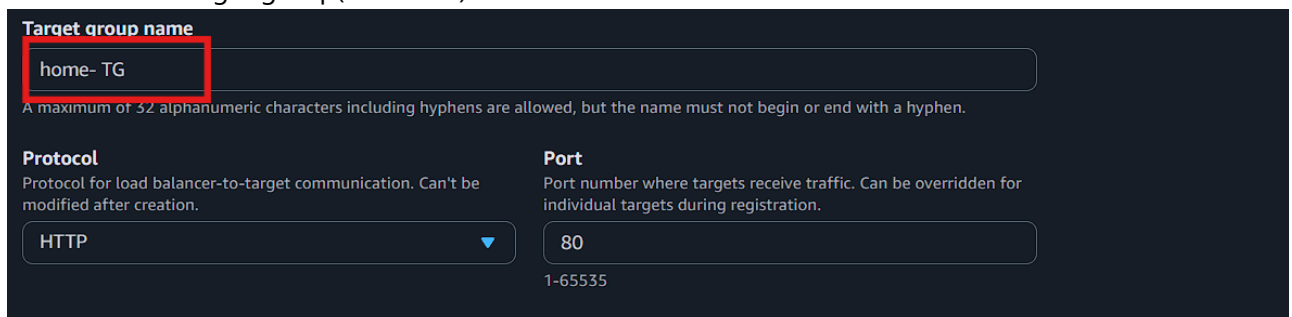
- Click on Create target group



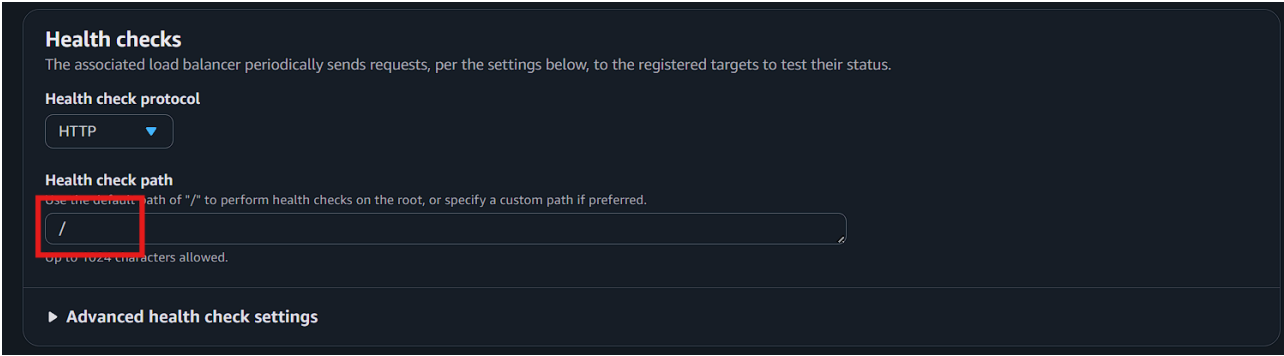
- Select instance



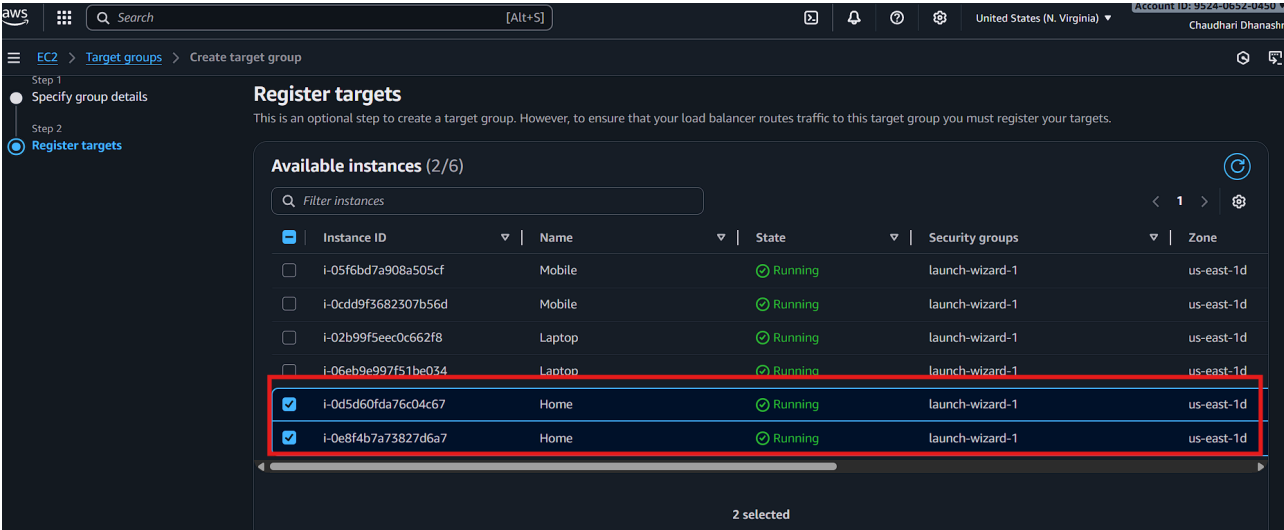
- Give name to target group(home-TG)



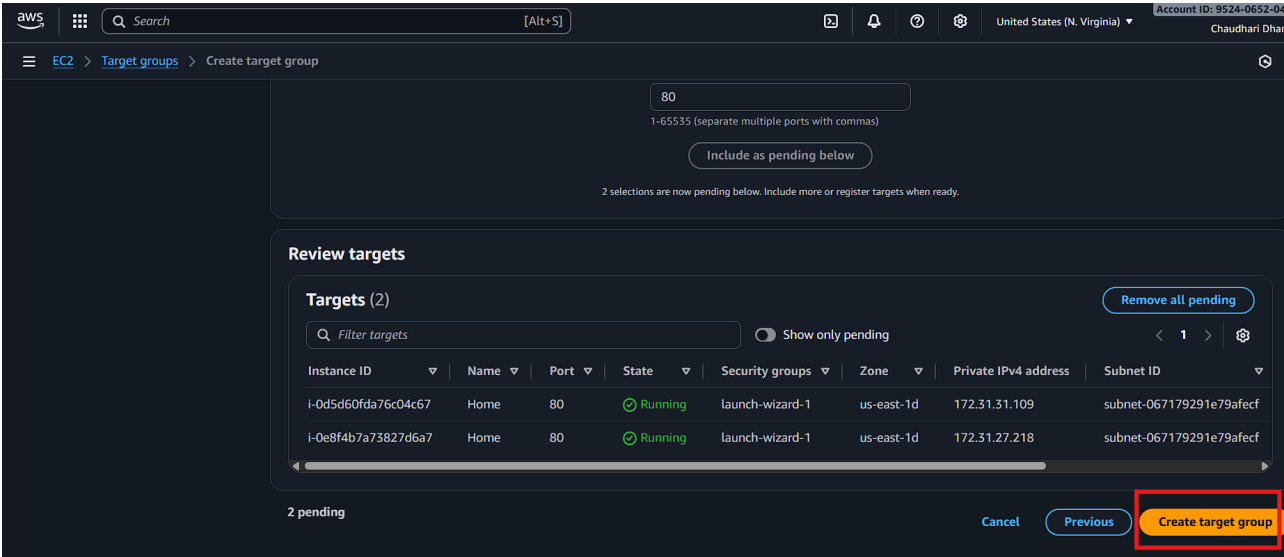
- Insert health check path



- Select home instance and click on include as pending below



- Click on create target group



7. Create Target Group 2 (Laptop).

- Give name to target group(laptop-TG)

Target group name

Laptop-TG

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Protocol
Protocol for load balancer-to-target communication. Can't be modified after creation.

HTTP

Port
Port number where targets receive traffic. Can be overridden for individual targets during registration.

80

1-65535

IP address type
Only targets with the indicated IP address type can be registered to this target group.

☒ IPv4

Each instance has a default network interface (eth0) that is assigned the primary private IPv4 address. The instance's primary

- Insert health check path

Health checks
The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

HTTP

Health check path
Use the default path of / to perform health checks on the root, or specify a custom path if preferred.

/laptop/

Up to 1024 characters allowed.

► Advanced health check settings

- Click on create target group

aws

Search [Alt+S]

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EC2 > Target groups > Create target group

80

1-65535 (separate multiple ports with commas)

Include as pending below

2 selections are now pending below. Include more or register targets when ready.

Review targets

Targets (2)

Filter targets Show only pending Remove all pending

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Subnet ID
i-02b99f5ec0c662f8	Laptop	80	Running	launch-wizard-1	us-east-1d	172.31.21.37	subnet-067179291e79afecf
i-06eb9e997f51be034	Laptop	80	Running	launch-wizard-1	us-east-1d	172.31.19.132	subnet-067179291e79afecf

2 pending

Cancel Previous **Create target group**

8. Create Target Group 3 (Mobile).

- Give name to target group(Mobile-TG)

Target group name

Mobile-TG

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Protocol
Protocol for load balancer-to-target communication. Can't be modified after creation.

HTTP

Port
Port number where targets receive traffic. Can be overridden for individual targets during registration.

80

1-65535

- Insert health check path

Health checks

The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

HTTP

Health check path

Use the default path of "/" to perform health checks on the root, or specify a custom path if preferred.

/mobile/

Up to 1024 characters allowed.

Advanced health check settings

- Click on create target group

aws

Search

[Alt+S]

United States (N. Virginia)

Account ID: 9524-0652-0450

Chaudhari Dhanash

EC2 > Target groups > Create target group

80

1-65535 (separate multiple ports with commas)

Include as pending below

2 selections are now pending below. Include more or register targets when ready.

Review targets

Targets (2)

Filter targets

Show only pending

Remove all pending

Instance ID	Name	Port	State	Security groups	Zone	Private IPv4 address	Subnet ID
i-0cdd9f3682307b56d	Mobile	80	Running	launch-wizard-1	us-east-1d	172.31.24.137	subnet-067179291e79afecf
i-05f6bd7a908a505cf	Mobile	80	Running	launch-wizard-1	us-east-1d	172.31.16.46	subnet-067179291e79afecf

2 pending

Cancel

Previous

Create target group

9. Add Default action (Home-TG)

aws

Search

[Alt+S]

United States (N. Virginia)

EC2 > Load balancers > Create Application Load Balancer

Listener HTTP:81

Protocol

HTTP

Port

81

1-65535

Default action

Info

Forward to

Select a target group

Create target group

Q

Laptop-TG

Target type: Instance, IPv4

HTTP

Mobile-TG

Target type: Instance, IPv4

HTTP

home-TG

Target type: Instance, IPv4

home-TG

Listener tags - optional

Consider adding tags to your listener. Tags enable you to categorize your AWS resources so you can manage them more effectively.

Add listener tag

You can add up to 50 more tags.

Add listener

You can add up to 48 more listeners.

10. Add Listener Rules

- Go to Rule and add Laptop Rule

aws

Search

[Alt+S]

EC2 > Load balancers > ALB > HTTP:80 listener > Add rule

review and create

Name and tags

Tags can help you manage, identify, organize, search for and filter resources.

Name

laptop-rule

Add additional tags

Conditions (1 value)

Define 1-5 condition values. Additional conditions can't be added once the limit is reached.

Path = /laptop/*

Remove

Path condition value

Case sensitive.

= /laptop/*

Valid characters are a-z, A-Z, 0-9 and special characters. Path must be 1-128 characters.

+ Add OR condition value

Add condition

Actions

Requests matching all rule conditions route according to the rule actions.

Routing action

Forward to target groups

Redirect to URL

Return fixed response

Forward to target group

Choose a target group and specify routing weight or create target group

Target group

Laptop-TG

Target type: Instance, IPv4 | Target stickiness: Off

HTTP

Weight

1

Percent

100%

0-999

+ Add target group

You can add up to 4 more target groups.

Target group stickiness

Enables the load balancer to bind a user's session to a specific target group. To use stickiness the client must support cookies. If you want to bind a user's session to a specific target, turn on the Target Group attribute Stickiness.

Turn on target group stickiness

Cancel

Next

9 / 12

- Go to Rule and add Mobile Rule

▼ Name and tags [Info](#)

Tags can help you manage, identify, organize, search for and filter resources.

Name

Mobile-rule

Add a

Conditions (1 value) [Info](#)

Define 1-5 condition values. Additional conditions can't be added once the limit is reached.

▼ **Path =**

Path condition value

Case sensitive.

=

Valid characters are a-z, A-Z, 0-9 and [special characters](#). Path must be 1-128 characters.

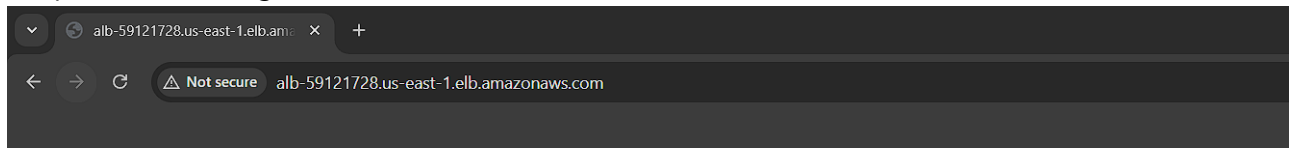
[+ Add OR condition value](#)

11. Copy the DNS Command

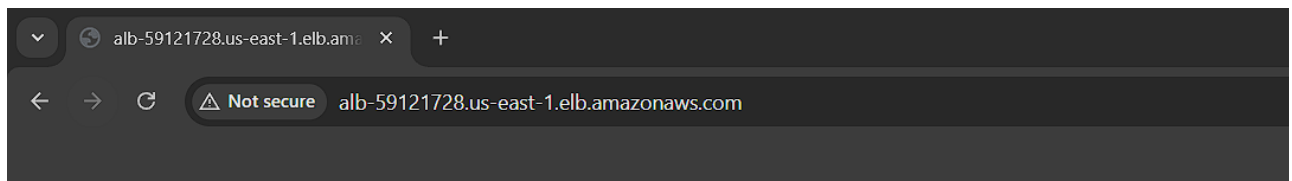
The screenshot shows the AWS Management Console interface for the 'Load balancers' page. The left sidebar contains navigation links for EC2, Instances, Images, and Elastic Block Store. The main content area shows a table of load balancers with columns for Name, State, Type, Scheme, IP address type, VPC ID, and Availability Zones. The table lists one load balancer named 'ALB' with a state of 'Active'. Below the table, the 'Load balancer: ALB' section displays details including the 'Load balancer ARN' and the 'DNS name info'. The 'DNS name info' is highlighted with a red box and shows the value 'ALB-787691554.us-east-1.elb.amazonaws.com (A Record)'.

Step 3: Testing the ALB

1. Output for Home Page

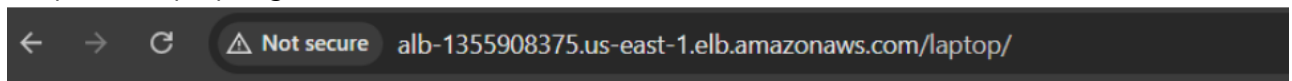


This is home page ip-172-31-26-70.ec2.internal

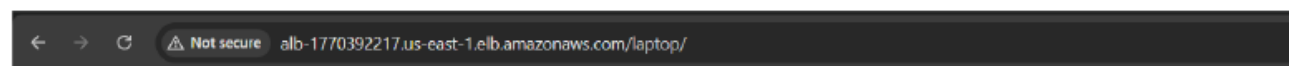


This is home page ip-172-31-31-116.ec2.internal

2. Output for Laptop Page



this is laptop page ip-172-31-27-238.ec2.internal



this is laptop page ip-172-31-24-241.ec2.internal

3. Output for Mobile Page



Summary

This mini project demonstrates the deployment and configuration of an AWS Application Load Balancer (ALB) to efficiently distribute incoming web traffic across three EC2 instances. By using a user-data script during instance launch, each server automatically runs a web server and serves unique content, allowing easy verification of traffic distribution.