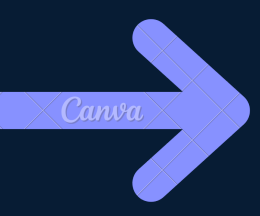
NEXTWORK

BALANCING TRAFFIC WITH APPLICATION LOAD BALANCER



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WHAT IS AN APPLICATION LOAD BALANCER?

What it does:

- **ALB distributes application traffic to many servers behind it using application-level logic configured by the operator.**

Why it's useful:

- It helps simplify and improve the security of your application, by ensuring that the latest SSL/TLS ciphers and protocols are used at all times.

How I'm using it in today's project:

- Am using it to manage traffic on OSI layer 7, improving the performance and scalability of my webservers.

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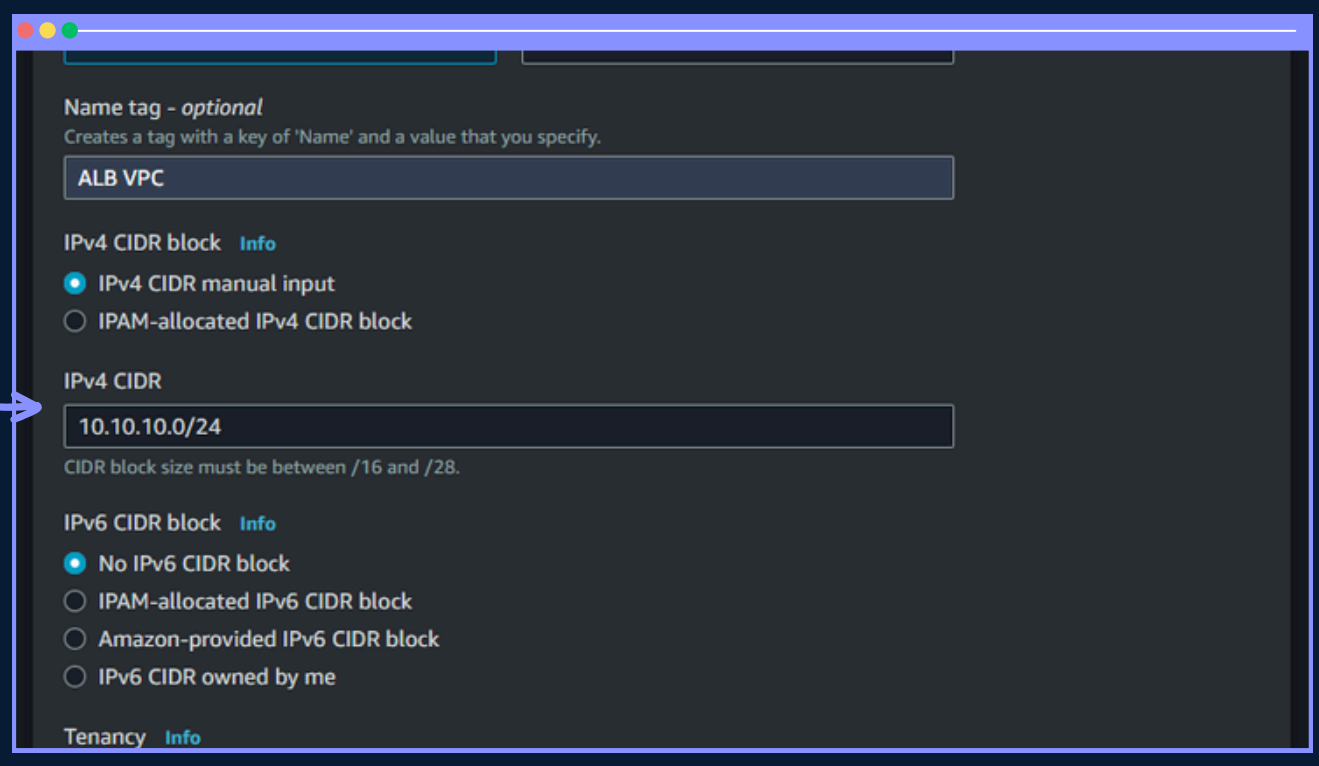
SETTING UP A VPC

- I've set up a vpc with ipv4 CIDR block 10.10.10.0/24.
- The tag I've used on my VPC is "ALB VPC". The value I've assigned for my instances is "10.10.10.0/24".
- Tags are like labels you can attach to AWS resources for organization

How the CIDR block for my VPC looks like



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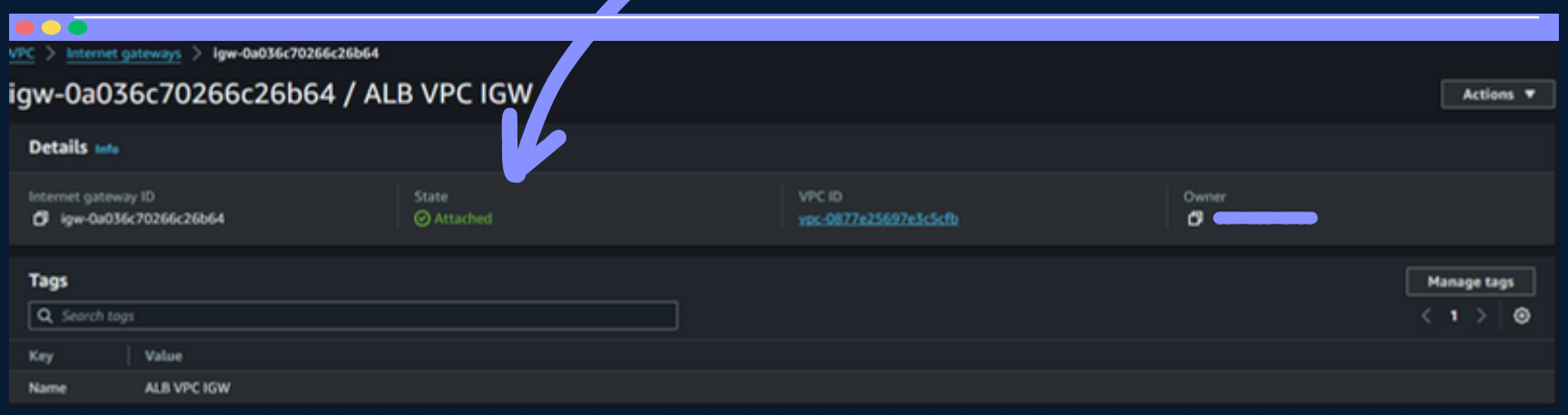
SETTING UP AN IGW

- After creating the VPC I created an Internet Gateway name "ALB VPC IGW" and attached it to the VPC.

- An Internet Gateway (IGW) is a horizontally scalable, redundant, and highly available VPC component that allows communication between instances in your VPC and the Internet.

- I used it to enable resources in my public subnets to connect to the internet.

Attached the internet gateway to the vpc



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SETTING UP SUBNETS

- After creating the VPC and Internet Gateway, I created a my public subnets.
- A subnet is a range of IP addresses in your VPC.
- I used them to segment and increase security for the resources in your VPC

Created 2 public subnets for higher availability

alb-subnet-public-1	subnet-0a6fb8a421684fdd2	Available	vpc-0877e25697e3c5cfb	10.10.10.0/26
alb-subnet-public-2	subnet-068415030385c6776	Available	vpc-0877e25697e3c5cfb	10.10.10.64/26

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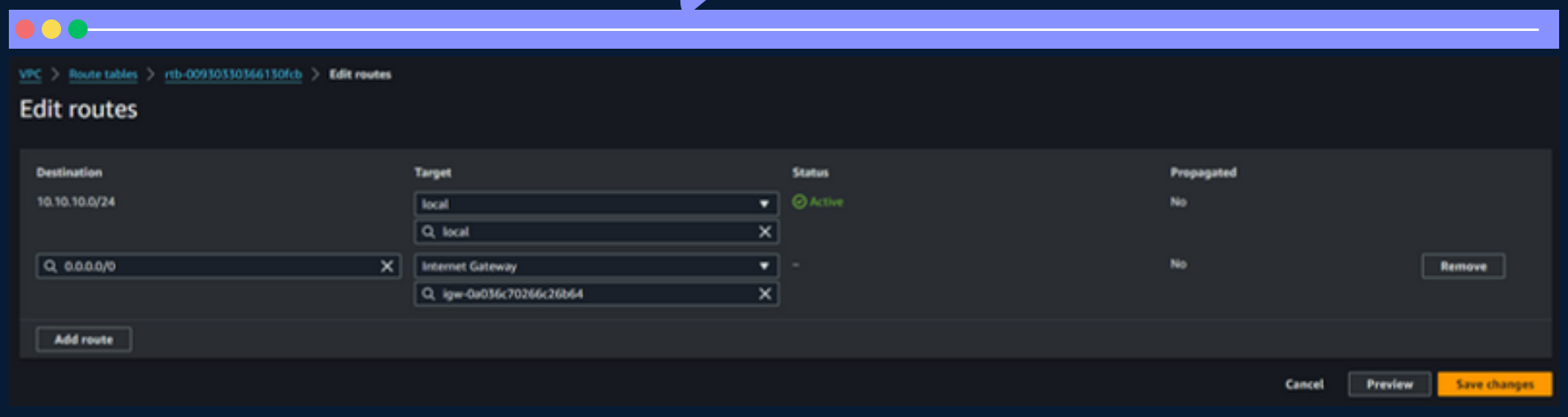
SETTING UP ROUTE TABLES & ADD ROUTES

- After creating the VPC, Internet Gateway, public subnets, I created a route table and added route to the internet via igw.

- A route table is a set of rules that determines where network traffic is directed.

- I used to help make effective routing decisions in the vpc.

Added a route to the internet via IGW



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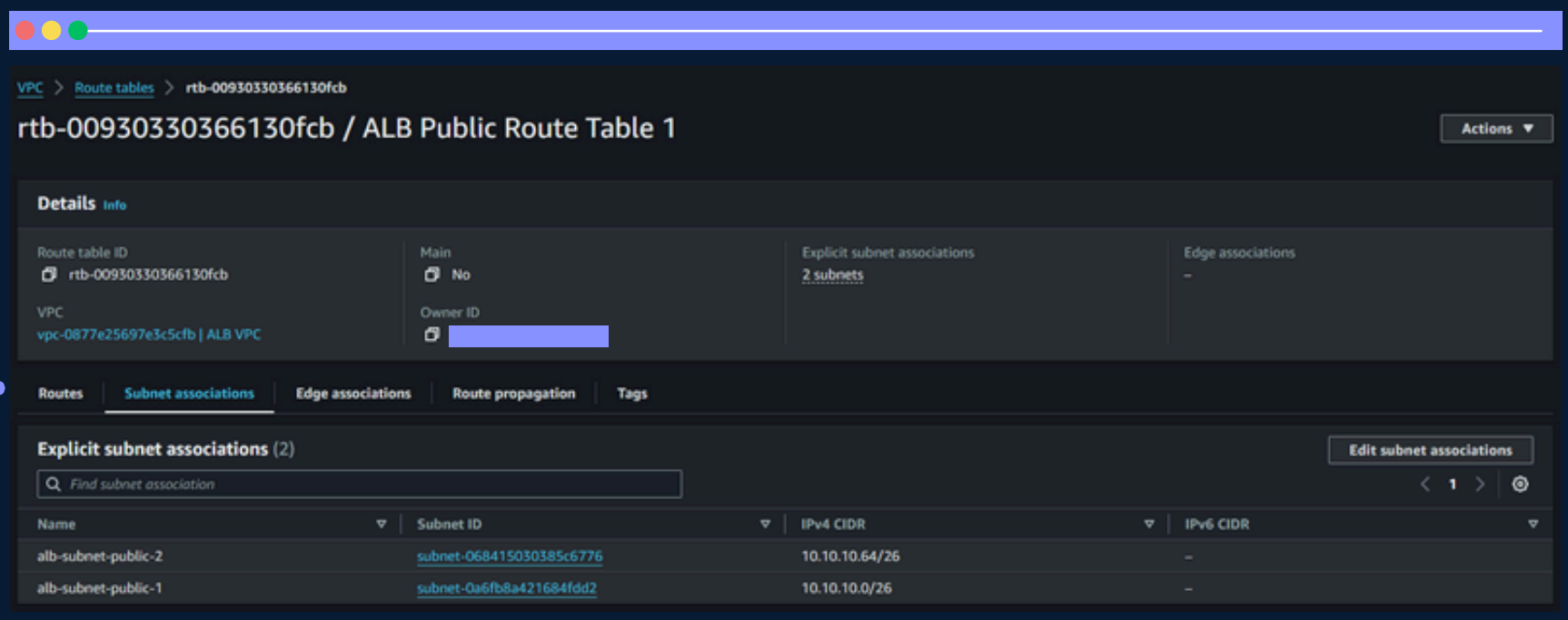
ASSOCIATING THE SUBNETS TO THE PUBLIC ROUTE TABLE

- After creating the VPC, Internet Gateway, public subnets, public route table, added route to the internet via igw, I associated the two public subnets to the public route table.

Associated the public subnets to the route table



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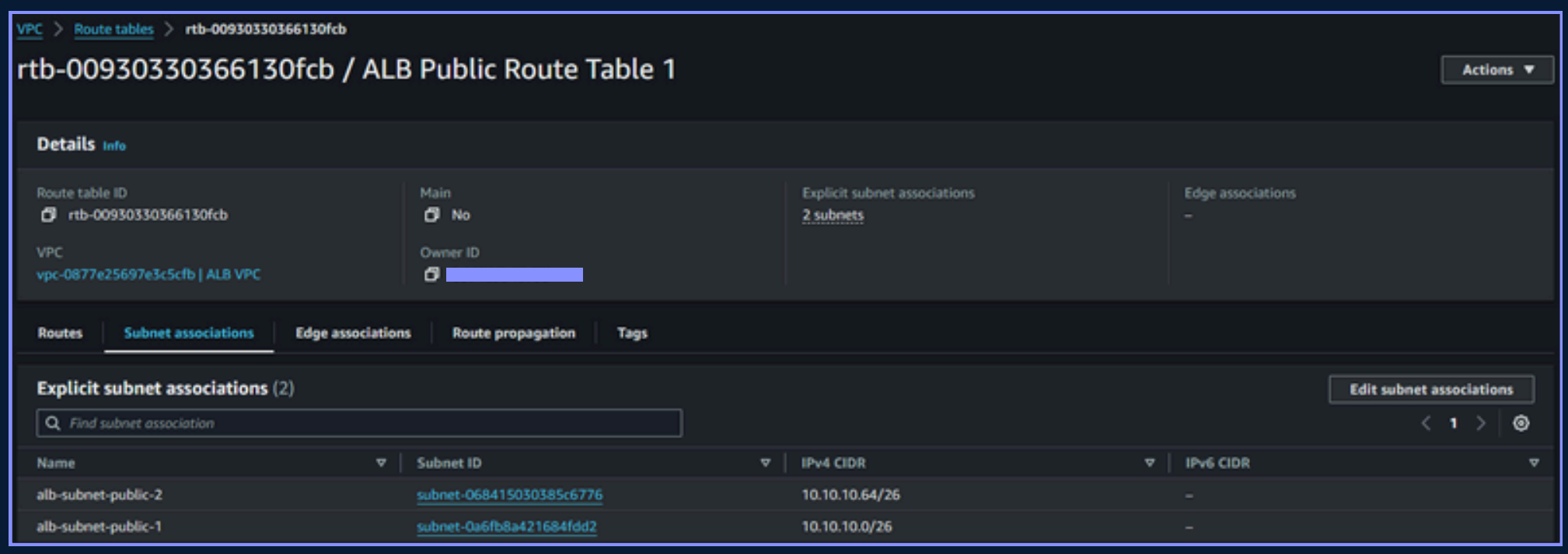
NAT GATEWAY & ASSOCIATE WITH PUBLIC SUBNET

- A NAT gateway **provides network address translation (NAT) service.**

- I implemented a NAT gateway so that instances in a private subnet can connect to services outside the VPC but external services cannot initiate a connection with those instances.



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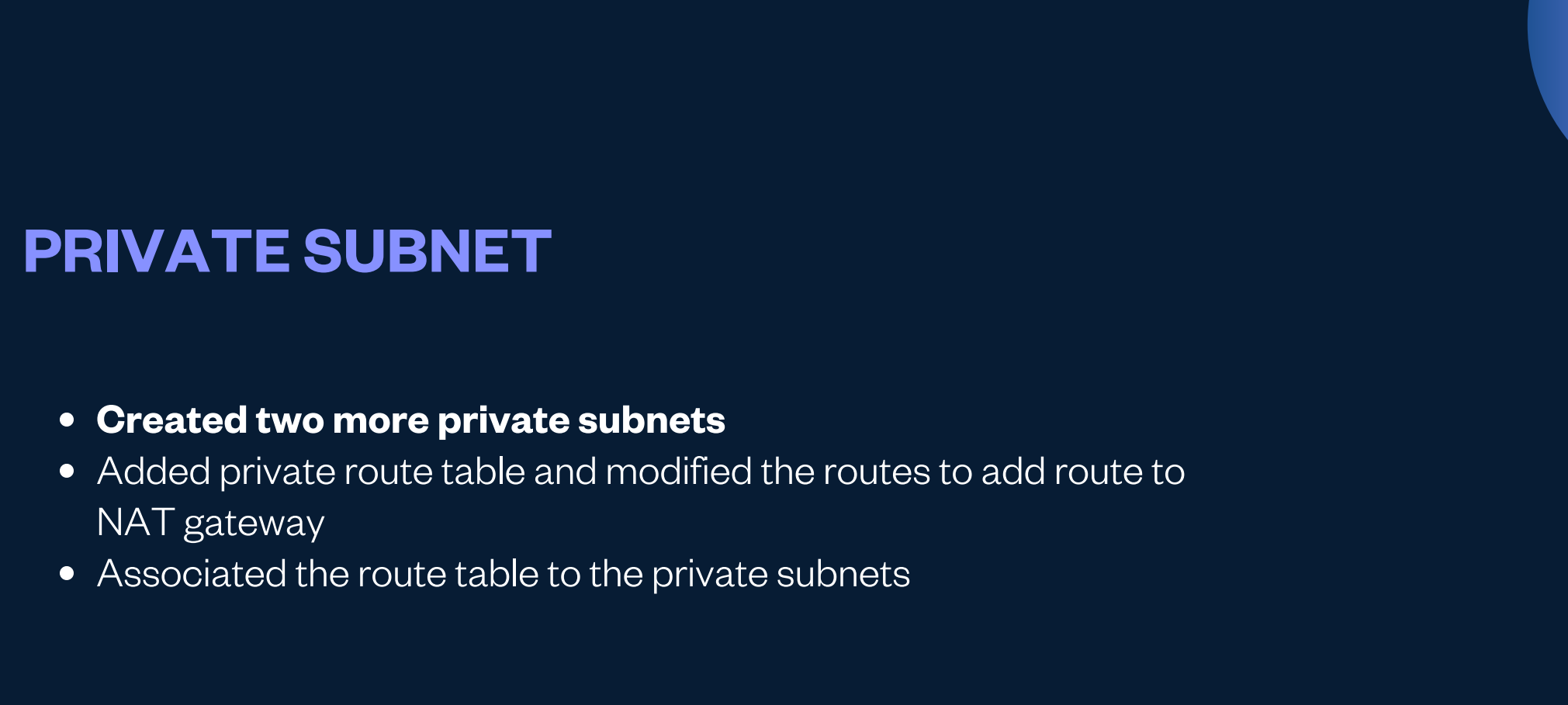
PRIVATE SUBNET

- **Created two more private subnets**
- Added private route table and modified the routes to add route to NAT gateway
- Associated the route table to the private subnets



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EC2 + WEB SERVER

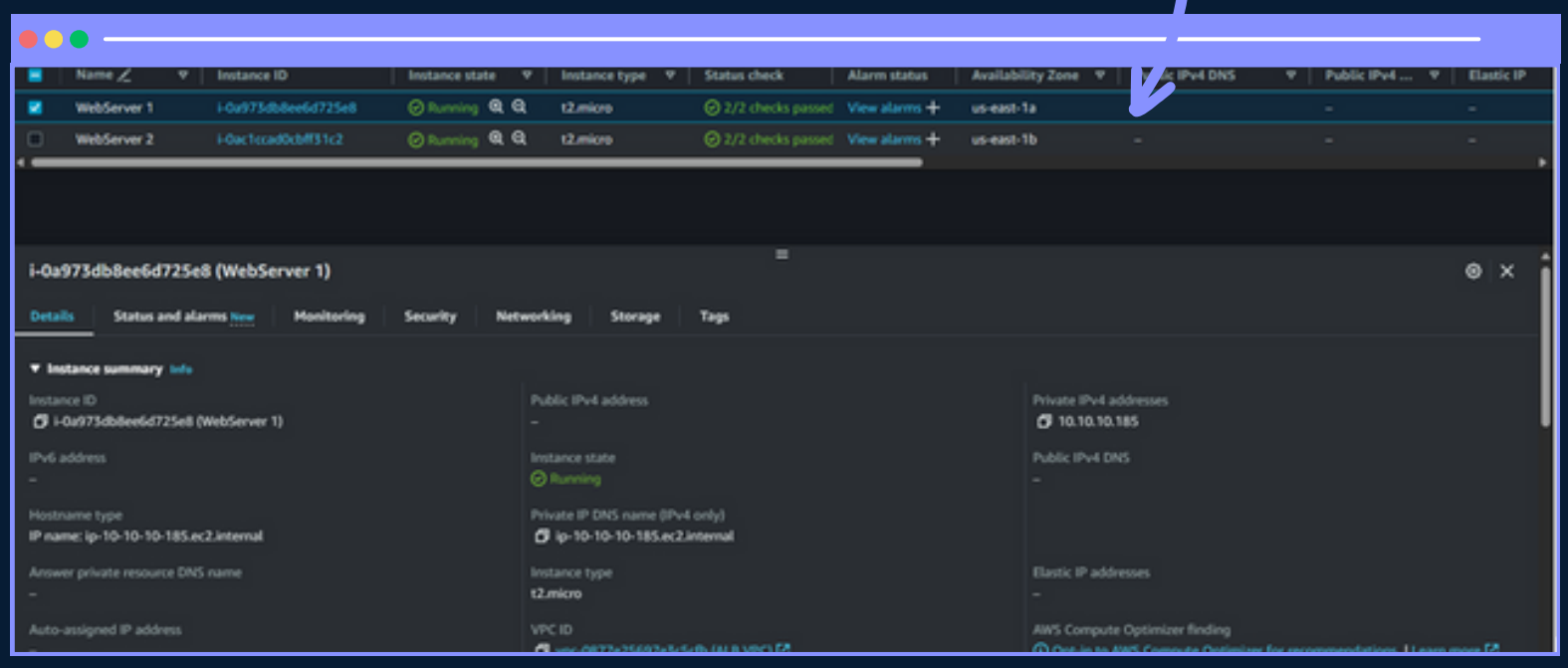
- **Created 2 EC2 instances with webservers installed.**

- **Created key pairs**
- Created a security group & allowed ssh from my ip and http traffic from the internet
- I launched them in the ALB VPC inside private subnets
- Installed the apache webserver with a script.

Apache shell script

```
#!/bin/bash
yum update -y
yum install -y httpd.x86_64
systemctl start httpd.service
systemctl activate httpd.service
echo “Hello World from $(hostname
-f)” > /var/www/html/index.html
```

My 2 webservers



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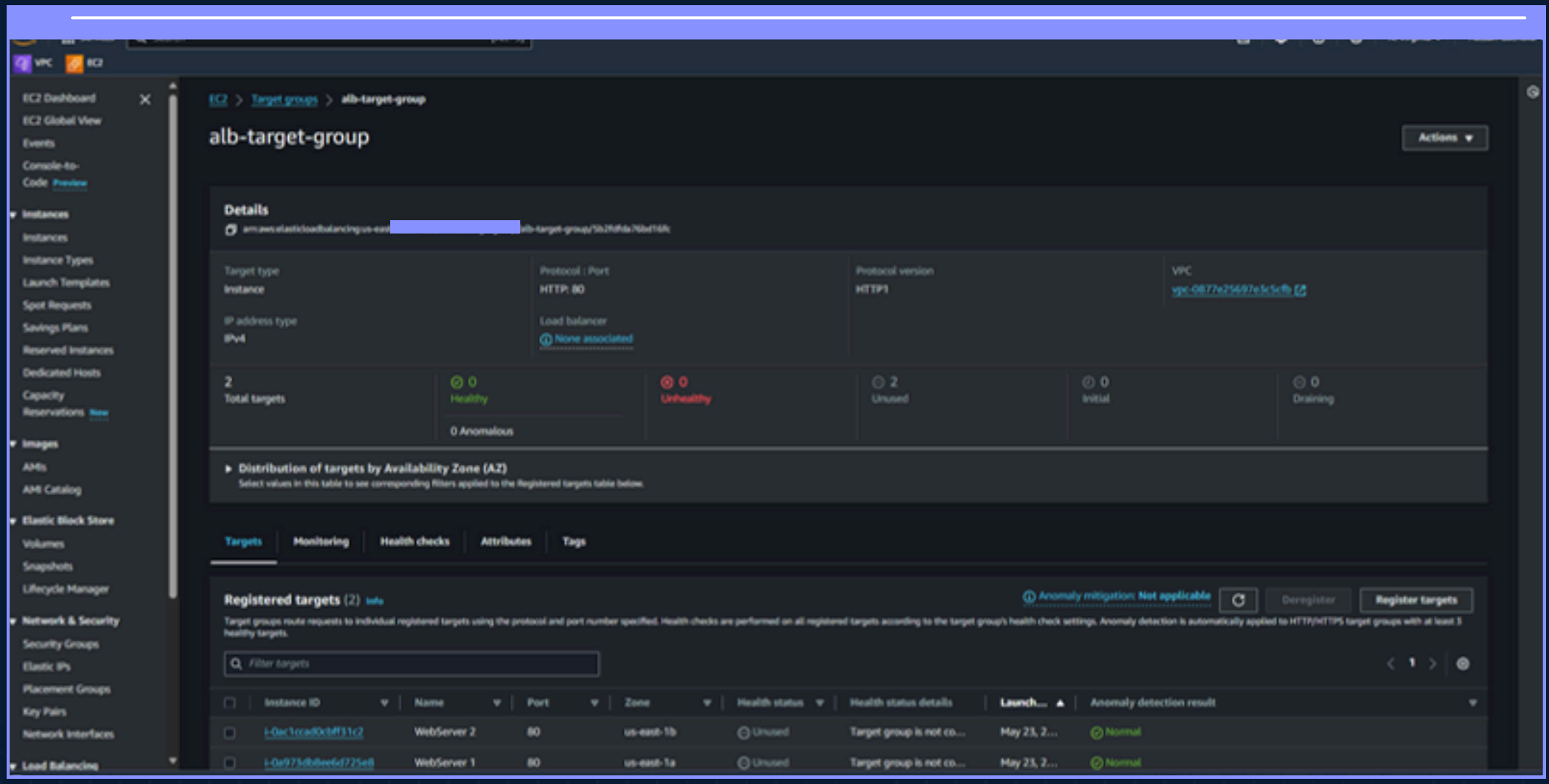
TARGET GROUP FOR THE ALB

- Created a load balancing instance target group named “alb-target-group”.
- It uses HTTP protocol and port 80 and it's placed on my ALB VPC
- On the register targets I added the two targets (webservers) and included them as pending

The two targets for my target group



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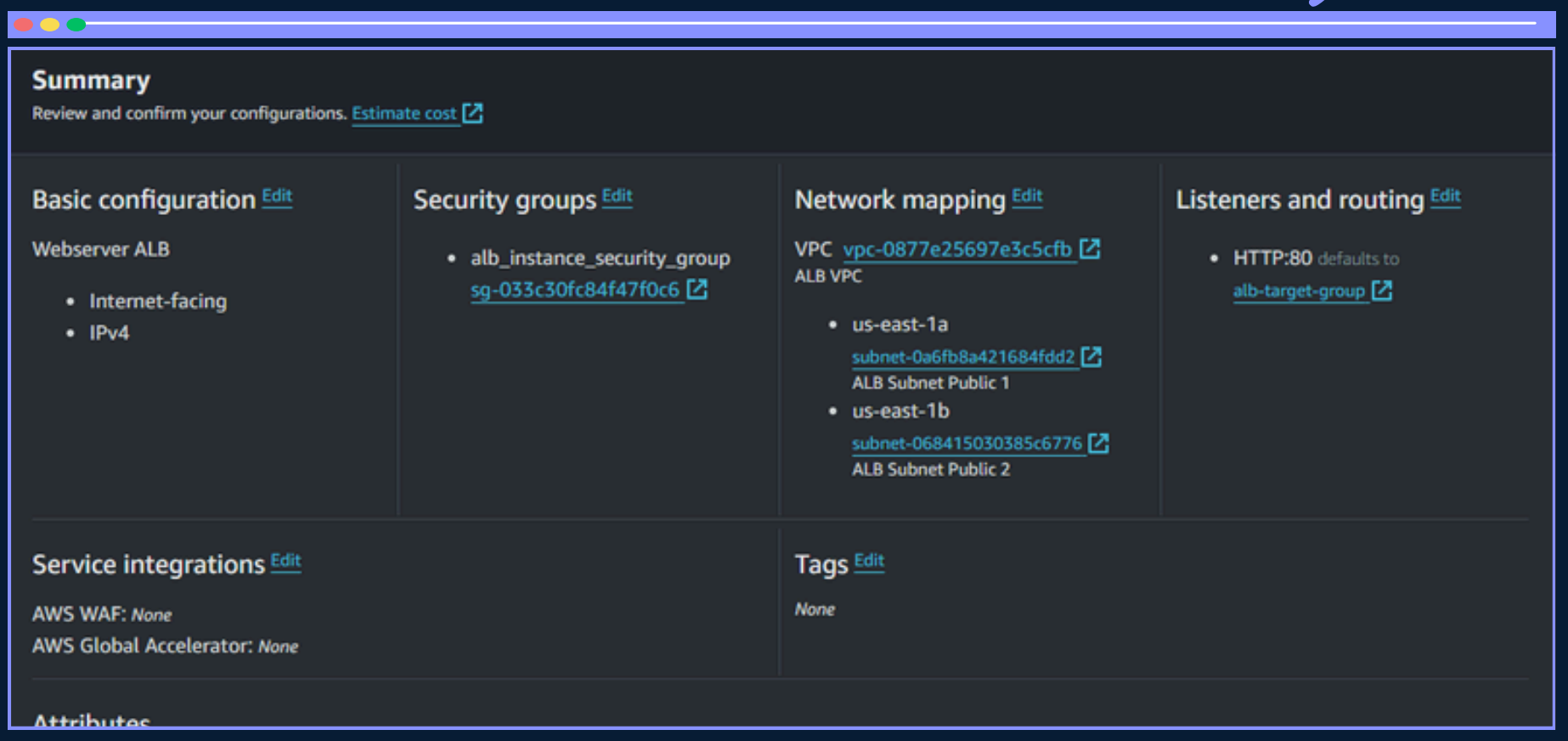
LAUNCHING THE APPLICATION LOAD BALANCER

- From the EC2 dashboard > Load Balancing > Load Balancer, I created my Application Load Balancer

- I used the internet facing scheme, ipv4, ALB VPC, the two regions I placed the public subnets, Security group I created earlier.

- For the listener HTTP:80 I updated the default action to forward to the "alb-target-group".

Summary of the ALB



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TESTING THE LOAD BALANCER

- From the EC2 dashboard > Load Balancing > Load Balancer > Webserver-ALB > Then coppied the DNS name for testing on a terminal using curl command several times.

- I used the internet facing scheme, ipv4, ALB VPC, the two regions I placed the public subnets, Security group I created ealier.
- For the listerner HTTP:80 I updated the default action to forward to the "alb-target-group" and then a web browser.
- The testing returned a success confirmation

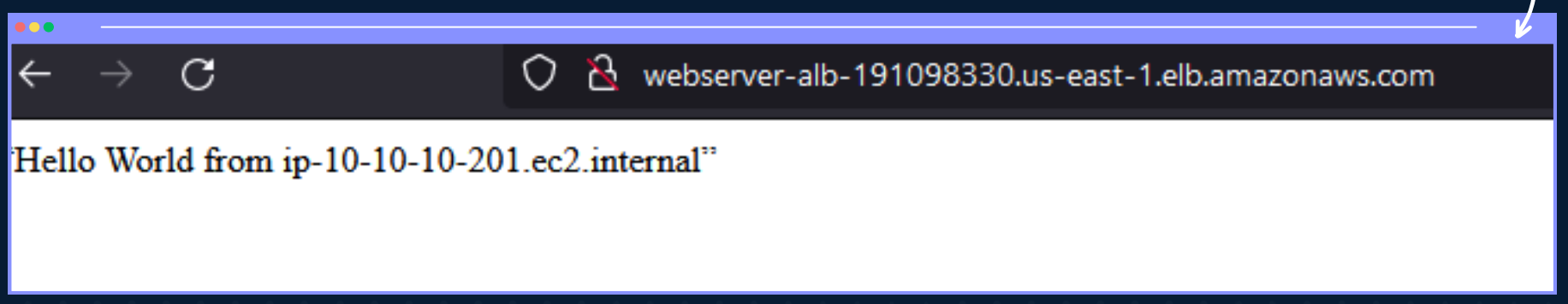
- From the terminal

Curl shows the response is from differet targets

```
[cloudshell-user@ip-10-130-90-191 ~]$ curl Webserver-ALB-191098330.us-east-1.elb.amazonaws.com
"Hello World from ip-10-10-10-201.ec2.internal"
[cloudshell-user@ip-10-130-90-191 ~]$ curl Webserver-ALB-191098330.us-east-1.elb.amazonaws.com
"Hello World from ip-10-10-10-201.ec2.internal"
[cloudshell-user@ip-10-130-90-191 ~]$ curl Webserver-ALB-191098330.us-east-1.elb.amazonaws.com
"Hello World from ip-10-10-10-185.ec2.internal"
```

- From the browser

Browser response



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TO SUMMARISE

I created:

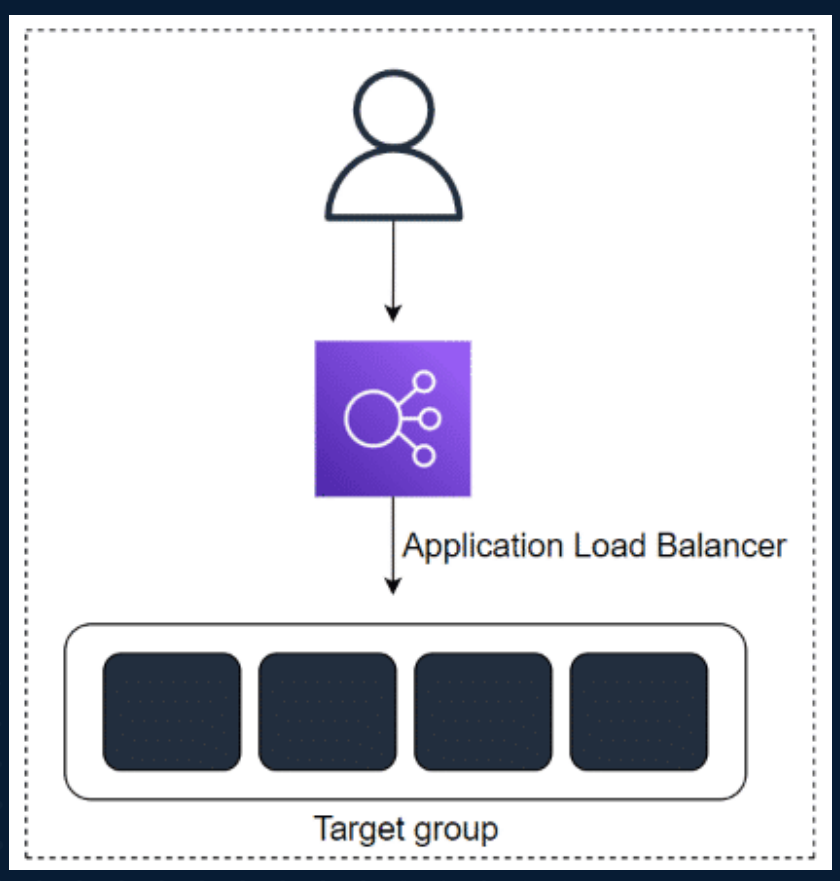
- An Amazon VPC and subnets
- A network address translation (NAT) gateway and associate it to the private subnets
- A target group

I launched:

- Launch EC2 instances and install web servers
- Launch the Application Load Balancer

Tested:

- Load balancing



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My Key Learnings

01

Deploying an Application Load Balancer (ALB) on AWS improves availability and fault tolerance by distributing traffic across multiple targets like EC2 instances and containers. Health checks ensure traffic is directed to healthy instances, maintaining performance and user satisfaction. Properly configuring security groups and Network ACLs (NACLs) is crucial for controlling traffic and protecting the application.

02

Managing listener rules and path-based routing with ALB optimizes traffic distribution, supporting a modular and scalable architecture. This is useful for routing traffic to different microservices, enhancing flexibility. ALB's SSL/TLS termination simplifies secure connection management and reduces backend load.

03

Monitoring and logging with AWS CloudWatch and CloudTrail provide valuable insights into ALB performance and security. These tools aid in proactive troubleshooting, ensuring the application's reliability and efficiency.

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Final thoughts...

The project of balancing a web server using AWS Application Load Balancer (ALB) has been a highly educational and rewarding experience. By leveraging the ALB, we achieved robust traffic distribution, improved application availability, and enhanced security. Key technical insights included the critical role of correctly configuring health checks, security groups, and cross-zone load balancing.

Additionally, the project underscored the importance of effective team collaboration, continuous improvement, and agility in responding to changing requirements and traffic patterns. The thorough documentation and adherence to security and compliance standards further ensured a secure and scalable architecture. Overall, this project has significantly bolstered our technical capabilities and operational practices, positioning us well for future challenges and opportunities in cloud infrastructure management.

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