

# AWS Report

---

AUGUST 30

---

Authored by: Deya' Aldeen AL-Bettar



# Table Content

---

<u>1: Introduction.....</u>	<u>3</u>
<u>2: Explanation.....</u>	<u>4</u>
<u>3: Testing.....</u>	<u>15</u>

# Introduction

---

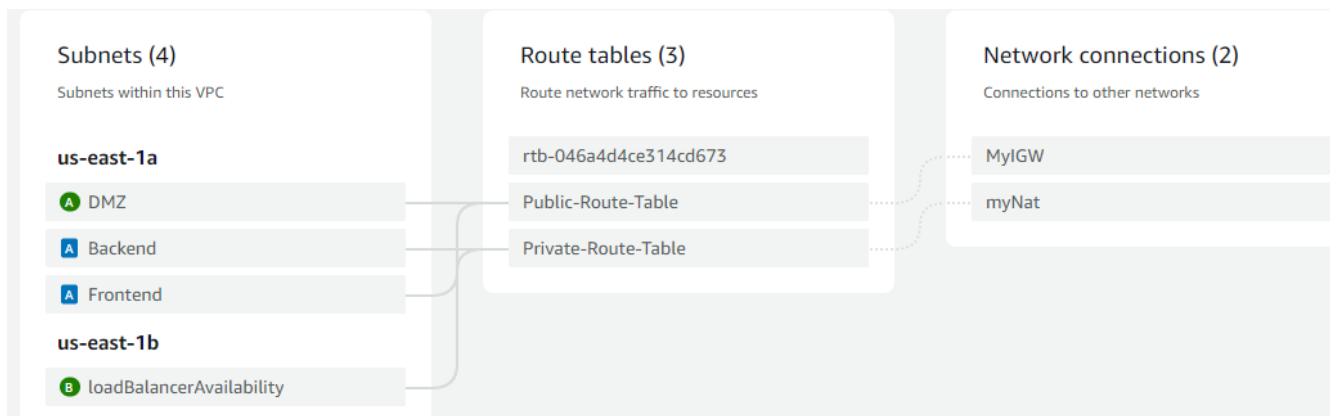
The deployment of cloud-based applications demands a well-structured network architecture to ensure scalability, reliability, and security. This report outlines the process of designing and implementing a network architecture within the AWS cloud environment, incorporating public and private subnets, an Application Load Balancer (ALB), multiple EC2 instances for the web application, and an EC2 instance for database.

The primary focus of this task is to establish a functional and resilient infrastructure that effectively manages traffic, supports multiple instances of a web application, and ensures successful connectivity between the web application and the database. These efforts aim to demonstrate best practices in building and managing cloud-native applications.

# Explanation

The resource map shows relationships between resources inside a VPC and how traffic flows from subnets to NAT gateways, internet gateway and gateway endpoints.

You can use the resource map to understand the architecture of My VPC, this resource map:



- **VPC**

- The entire infrastructure is set up within a single VPC, providing isolation and control over the network environment.

- **Subnets:** The VPC is divided into four subnets, each serving a specific purpose within the infrastructure.

<input type="checkbox"/>	Name	Subnet ID	State	VPC	IPv4
<input type="checkbox"/>	loadBalancerAvailability	<a href="#">subnet-06dee4b3708d7da1a</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.
<input type="checkbox"/>	Backend	<a href="#">subnet-037ea26527a8bdc75</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.
<input type="checkbox"/>	Frontend	<a href="#">subnet-04035b1ff3e87b4a6</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.
<input type="checkbox"/>	DMZ	<a href="#">subnet-0187affdde55a7b25</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.

- **DMZ Public Subnet:**

<input checked="" type="checkbox"/>	DMZ	<a href="#">subnet-0187affdde55a7b25</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.1.0/24	-
<input type="checkbox"/>	-	<a href="#">subnet-0c24d3d742d799a59</a>	Available	<a href="#">vpc-081428a591b8d8fd5</a>	172.31.0.0/20	-

**subnet-0187affdde55a7b25 / DMZ**

[Details](#) | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

**Details**

<b>Subnet ID</b> <a href="#">subnet-0187affdde55a7b25</a> <b>Available IPv4 addresses</b> 248 <b>Availability Zone ID</b> <a href="#">use1-az4</a>	<b>Subnet ARN</b> <a href="#">arn:aws:ec2:us-east-1:586794486969:subnet/subnet-0187affdde55a7b25</a> <b>IPv6 CIDR</b> -	<b>State</b> Available <b>IPv6 CIDR association ID</b> - <b>VPC</b> <a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	<b>IPv4 CIDR</b> <a href="#">10.0.1.0/24</a> <b>Availability Zone</b> <a href="#">us-east-1a</a> <b>Route Table</b> <a href="#">rtb-0ed56b37cc276b583   Public-Route-Table</a>
---	--	--	---

- **Purpose:** To host resources that need to be exposed to the public internet.
- **Components:**
  - **SSH EC2 Instance**

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input type="checkbox"/>	ubMySQLServer	<a href="#">i-0eddfc02ed50f1af5</a>	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input type="checkbox"/>	webserver1	<a href="#">i-021b3ef666b54fd52</a>	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input checked="" type="checkbox"/>	SSH Bastion H...	<a href="#">i-0ebbc4964f8b2ea85</a>	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input type="checkbox"/>	webserver2	<a href="#">i-0a53cbc7db2f2d815</a>	Running	t2.micro	Initializing	<a href="#">View alarms +</a>

**i-0ebbc4964f8b2ea85 ( SSH Bastion Host)**

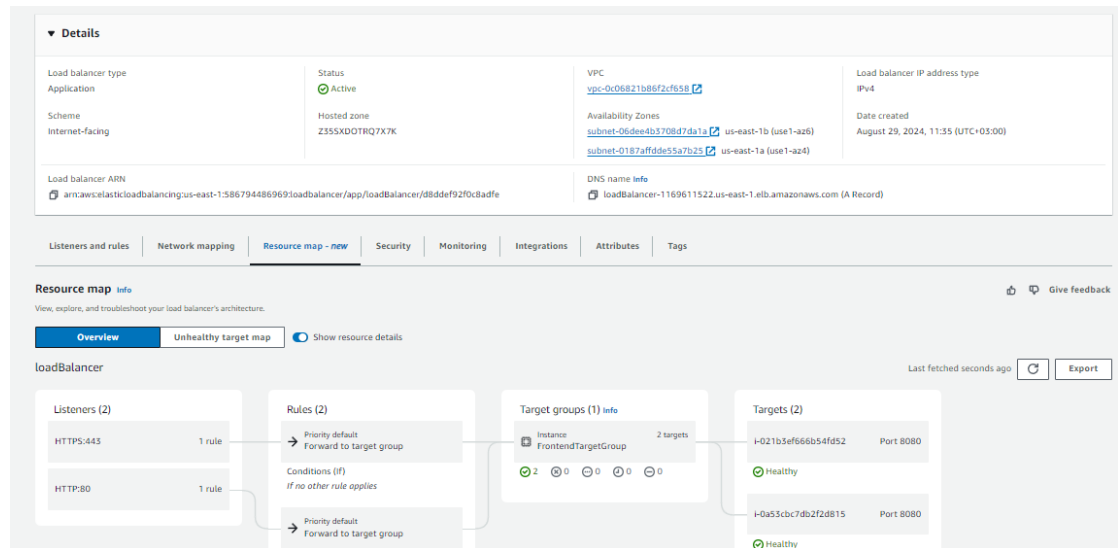
[Details](#) | [Status and alarms](#) | [Monitoring](#) | [Security](#) | [Networking](#) | [Storage](#) | [Tags](#)

**Instance summary**

<b>Instance ID</b> <a href="#">i-0ebbc4964f8b2ea85 ( SSH Bastion Host)</a>	<b>Public IPv4 address</b> <a href="#">100.27.209.131   open address</a>	<b>Private IPv4 addresses</b> <a href="#">10.0.1.164</a>
---	---	---

- **Purpose:** To manage and connect to web servers in the private subnets.
- **Instance Type:** [Specify instance type, e.g., t2.micro]
- **Security Group:** Configured to allow SSH access from specific IP addresses.

- **Elastic Load Balancer (ELB)**



- **Purpose:** To distribute incoming traffic across multiple web servers, ensuring high availability and fault tolerance.
- **ELB Type:** Application Load Balancer
- **Listeners:** Configured to listen on port 80 (HTTP) and port 443 (HTTPS) with Certificated Manger.
- **Target Group:**

Details						
arn:aws:elasticloadbalancing:us-east-1:586794486909:targetgroup/frontendTargetGroup/306c690670613ed						
Target type	Instance	Protocol: Port	HTTP: 8080	Protocol version	HTTP1	VPC
IP address type	IPv4	Load balancer	loadBalancer			
2	0 Anomalous	2 Healthy	0 Unhealthy	0 Unused	0 Initial	0 Draining
<b>Distribution of targets by Availability Zone (AZ)</b> Select values in this table to see corresponding filters applied to the Registered targets table below.						
<b>Registered targets (2)</b> Info           Anomaly mitigation: Not applicable           Deregister           Register targets						
Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets.						
<input type="text"/> Filter targets						
<input type="checkbox"/>	Instance ID	Name	Port	Zone	Health status	Health status details
<input type="checkbox"/>	I-0a51c7db2f2d815	webserver2	8080	us-east-1a	Healthy	-
<input type="checkbox"/>	I-021b3ef66b54fd52	webserver1	8080	us-east-1a	Healthy	-

- **Name:** `frontedTargetGroup`
- **Function:** A Target Group is a logical grouping of instances (or targets) that the Load Balancer routes traffic to. It defines how the Load Balancer should distribute traffic among the targets.

- **Purpose:** Ensures that incoming requests are efficiently distributed across the instances in the group, helping to balance the load and improve performance.

- **NAT Gateway**

NAT gateways (1/1) Info							
Find resources by attribute or tag							
Name	NAT gateway ID	Connectivity...	State	State message	Primary public IP...	Primary private IPv4 address	
myNat	nat-09eb94814c0650233	Public	Available	–	3.234.232.187	10.0.1.33	

Details			
NAT gateway ID nat-09eb94814c0650233	Connectivity type Public	State Available	State message –
NAT gateway ARN arn:aws:ec2:us-east-1:586794486969:natgateway/nat-09eb94814c0650233	Primary public IPv4 address 3.234.232.187	Primary private IPv4 address 10.0.1.33	Primary network interface ID eni-061e3b4c69fa664cb
VPC vpc-0c06821b86f2cf658 / MyVPC	Subnet subnet-0187affd0e55a7b25 / DMZ	Created Thursday, August 29, 2024 at 09:28:05 GMT+3	Deleted –

- **Purpose:** To enable instances in private subnets (Frontend and Backend) to initiate outbound connections to the internet (e.g., for software updates) while preventing inbound traffic from the internet.

- **Load Balancer Availability Public Subnet:**

<input checked="" type="checkbox"/>	loadBalancerAvailability	subnet-06dee4b3708d7da1a	Available	vpc-0c06821b86f2cf658   MyVPC	10.0.5.0/24	–
<input type="checkbox"/>	Backend	subnet-037ea26527a8bdc75	Available	vpc-0c06821b86f2cf658   MyVPC	10.0.3.0/24	–
<input type="checkbox"/>	Frontend	subnet-04035b1ff3e87b4a6	Available	vpc-0c06821b86f2cf658   MyVPC	10.0.2.0/24	–
<input type="checkbox"/>	DMZ	subnet-0187affd0e55a7b25	Available	vpc-0c06821b86f2cf658   MyVPC	10.0.1.0/24	–
<input type="checkbox"/>	–	subnet-0c24d3d742d799a59	Available	vpc-081428a591b8d8f05	172.31.0.0/20	–

Details			
Subnet ID subnet-06dee4b3708d7da1a	Subnet ARN arn:aws:ec2:us-east-1:586794486969:subnet/subnet-06dee4b3708d7da1a	State Available	IPv4 CIDR 10.0.5.0/24
Available IPv4 addresses 250	IPv6 CIDR –	IPv6 CIDR association ID –	Availability Zone us-east-1b
Availability Zone ID use1-az6	Network border group us-east-1	VPC vpc-0c06821b86f2cf658   MyVPC	Route table rtb-0ed56b37cc276b583   Public-Route-Table
Network ACL acl-0a3e1f4d736da7		Auto-assign public IPv4 address No	Auto-assign IPv6 address No

- **Purpose:** AWS Load Balancers require deployment across at least two Availability Zones (AZs) to ensure optimal functionality and reliability. This setup is crucial for enhancing the resilience and availability of your application. By distributing traffic across instances in different AZs, the

load balancer ensures that your application remains highly available and responsive, even in the event of an AZ failure.

- **Frontend Private Subnet:**

<input checked="" type="checkbox"/>	Frontend	<a href="#">subnet-04035b1ff3e87b4a6</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.2.0/24	–
<input type="checkbox"/>	DMZ	<a href="#">subnet-0187affdde55a7b25</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.1.0/24	–
<input type="checkbox"/>	–	<a href="#">subnet-0c24d3d742d799a59</a>	Available	<a href="#">vpc-081428a591b8d8d5</a>	172.31.0.0/20	–

**subnet-04035b1ff3e87b4a6 / Frontend**

[Details](#) | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

**Details**

Subnet ID subnet-04035b1ff3e87b4a6	Subnet ARN arn:aws:ec2:us-east-1:586794486969:subnet/subnet-04035b1ff3e87b4a6	State Available	IPv4 CIDR 10.0.2.0/24
Available IPv4 addresses 249	IPv6 CIDR –	IPv6 CIDR association ID –	Availability Zone us-east-1a
Availability Zone ID use1-az4	Network border group ec2-net-1	VPC vpc-0c06821b86f2cf658   MyVPC	Route table rtb-0b5929dcd4b46cbac   Private-Route-Table
Network ACL		Auto-assign public IPv4 address	Auto-assign IPv6 address

- **Purpose:** The Frontend Private Subnet is used to house the instances (such as web servers or application servers) that handle the application logic and user requests. These instances are not directly exposed to the internet but are accessible through a Load Balancer that is placed in a public subnet.
- **Location:** This subnet is within the private network space of your Virtual Private Cloud (VPC) and is typically configured to be isolated from direct internet access for security reasons.
- **Components:**
  - **Web Server1**

Name	Instance ID	Instance state	Instance type	Status check	Alarm status
ubMySQLServer	i-0eddfc02ed50f1af5	Running	t2.micro	Initializing	View alarms +
webserver1	i-021b3ef666b54fd52	Running	t2.micro	Initializing	View alarms +
SSH Bastion H...	i-0ebbc4964f8b2ea85	Running	t2.micro	Initializing	View alarms +
webserver2	i-0a53cbc7db2f2d815	Running	t2.micro	Initializing	View alarms +

**i-021b3ef666b54fd52 (webserver1)**

[Details](#) | [Status and alarms](#) | [Monitoring](#) | [Security](#) | [Networking](#) | [Storage](#) | [Tags](#)

**Instance summary**

Instance ID i-021b3ef666b54fd52 (webserver1)	Public IPv4 address –	Private IPv4 addresses 10.0.2.32
---	--------------------------	-------------------------------------

- **Purpose:** To host the web application.



- **Configuration:**

- Instances are part of private subnets and are not directly accessible from the internet.
- Traffic is routed through the ELB for inbound requests.
- Security Groups: Configured to allow traffic only from the ELB and the SSH instance.

- **WebServer2**

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input type="checkbox"/>	ubMySqlServer	i-0eddfc02ed50f1af5	Running	t2.micro	Initializing	<a href="#">View alarms</a> +
<input type="checkbox"/>	webserver1	i-021b3ef666b54fd52	Running	t2.micro	Initializing	<a href="#">View alarms</a> +
<input type="checkbox"/>	SSH Bastion H...	i-0ebbc4964f8b2ea85	Running	t2.micro	Initializing	<a href="#">View alarms</a> +
<input checked="" type="checkbox"/>	webserver2	i-0a53cbc7db2f2d815	Running	t2.micro	Initializing	<a href="#">View alarms</a> +

i-0a53cbc7db2f2d815 (webserver2)

Details

Status and alarms

Monitoring

Security

Networking

Storage

Tags

▼ Instance summary [Info](#)

Instance ID

i-0a53cbc7db2f2d815 (webserver2)

Public IPv4 address

-

Private IPv4 addresses

10.0.2.252

- **Purpose:** To host the web application.

- **Configuration:**

- Instances are part of private subnets and are not directly accessible from the internet.
- Traffic is routed through the ELB for inbound requests.
- Security Groups: Configured to allow traffic only from the ELB and the SSH instance.

- **Backend Private Subnet:**

<input checked="" type="checkbox"/>	Backend	<a href="#">subnet-037ea26527a8bdc75</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.3.0/24	–
<input type="checkbox"/>	Frontend	<a href="#">subnet-04035b1ff3e87b4a6</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.2.0/24	–
<input type="checkbox"/>	DMZ	<a href="#">subnet-0187affdde55a7b25</a>	Available	<a href="#">vpc-0c06821b86f2cf658   MyVPC</a>	10.0.1.0/24	–
<input type="checkbox"/>	–	<a href="#">subnet-0c24d3d742d799a59</a>	Available	<a href="#">vpc-081428a591b8d8fd5</a>	172.31.0.0/20	–

**subnet-037ea26527a8bdc75 / Backend**

[Details](#) | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

**Details**

Subnet ID subnet-037ea26527a8bdc75	Subnet ARN arn:aws:ec2:us-east-1:586794486969:subnet/subnet-037ea26527a8bdc75	State Available	IPv4 CIDR 10.0.3.0/24
Available IPv4 addresses 250	IPv6 CIDR –	IPv6 CIDR association ID –	Availability Zone us-east-1a
Availability Zone ID use1-az4	Network border group us-east-1	VPC vpc-0c06821b86f2cf658   MyVPC	Route table rtb-0b5929dcd4b46cbac   Private-Route-Table
Network ACL acl-0c2ec1facd7fa4e47		Auto-assign public IPv4 address No	Auto-assign IPv6 address No

- **Purpose:** The Backend Private Subnet is designed to host resources such as databases, internal application services, or other backend systems that need to remain secure and are not directly exposed to external traffic. This setup helps in maintaining a clear separation of concerns between frontend-facing components and backend data storage or processing systems.
- **Location:** This subnet is part of your Virtual Private Cloud (VPC) but is isolated from direct internet access to enhance security.
- **Components:**
- **MySQL Server**

<input checked="" type="checkbox"/>	ubMySQLServer	i-0eddfc02ed50f1af5	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input type="checkbox"/>	webserver1	i-021b3ef666b54fd52	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input type="checkbox"/>	SSH Bastion H...	i-0ebbc4964f8b2ea85	Running	t2.micro	Initializing	<a href="#">View alarms +</a>
<input type="checkbox"/>	webserver2	i-0a53cbc7db2f2d815	Running	t2.micro	Initializing	<a href="#">View alarms +</a>

**i-0eddfc02ed50f1af5 (ubMySQLServer)**

[Details](#) | [Status and alarms](#) | [Monitoring](#) | [Security](#) | [Networking](#) | [Storage](#) | [Tags](#)

**Instance summary** [Info](#)

Instance ID i-0eddfc02ed50f1af5 (ubMySQLServer)	Public IPv4 address –	Private IPv4 addresses 10.0.3.53
--	--------------------------	-------------------------------------

- **Purpose:** To store application data.
- **Configuration:**
  - Hosted in a backend private subnet.
  - Security Groups: Configured to allow traffic only from the web servers and the NAT Gateway.

- **Route tables:**

- **Public Route Table (for DMZ and load balancer availability subnet ):**

	Name	Route table ID	Explicit subnet associ...	Edge associations	Main
<input checked="" type="checkbox"/>	Public-Route-Table	<a href="#">rtb-0ed56b37cc276b583</a>	2 subnets	–	No
<input type="checkbox"/>	Private-Route-Table	<a href="#">rtb-0b5929dcd4b46cbac</a>	2 subnets	–	No

#### rtb-0ed56b37cc276b583 / Public-Route-Table

Details

Routes

Subnet associations

Edge associations

Route propagation

Tags

Explicit subnet associations (2)

Edit subnet associations

Find subnet association

<

1

>

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
loadBalancerAvailability	<a href="#">subnet-06dee4b3708d7da1a</a>	10.0.5.0/24	–
DMZ	<a href="#">subnet-0187affdde55a7b25</a>	10.0.1.0/24	–

- **Purpose:** Allows instances in the public subnet (DMZ) to communicate directly with the internet via the Internet Gateway.

- **Private Route Table (for Frontend and Backend subnet)**

	Name	Route table ID	Explicit subnet associ...	Edge associations	Main
<input type="checkbox"/>	Public-Route-Table	<a href="#">rtb-0ed56b37cc276b583</a>	2 subnets	–	No
<input checked="" type="checkbox"/>	Private-Route-Table	<a href="#">rtb-0b5929dcd4b46cbac</a>	2 subnets	–	No

#### rtb-0b5929dcd4b46cbac / Private-Route-Table

Details

Routes

Subnet associations

Edge associations

Route propagation

Tags

Explicit subnet associations (2)

Edit subnet associations

Find subnet association

<

1

>

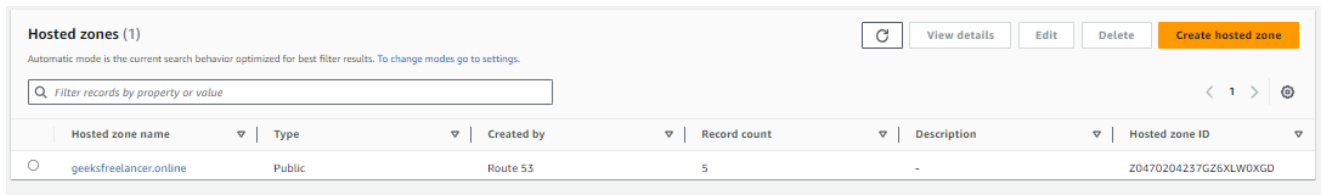
Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
Backend	<a href="#">subnet-037ea26527a8bdc75</a>	10.0.3.0/24	-
Frontend	<a href="#">subnet-04035b1ff3e87b4a6</a>	10.0.2.0/24	-

- **Purpose:** Allows instances in the private subnet to access the internet for updates or downloads via the NAT Gateway, but prevents direct inbound internet access.

- **DNS Configuration and SSL/TLS Setup:** For domain management, I will use a domain registered with Hostinger, avoiding the need to purchase a new domain from Amazon, which is priced higher. Hostinger offers domain registration at a significantly lower cost, with some domains available for as little as \$0.99 compared to Amazon's minimum price of \$14. To integrate this domain with AWS, I will update the name server settings in Hostinger to point to Amazon's servers. Additionally, SSL/TLS certificates will be configured to ensure secure communication.

## 1. Route 53 Hosted Zone Configuration:

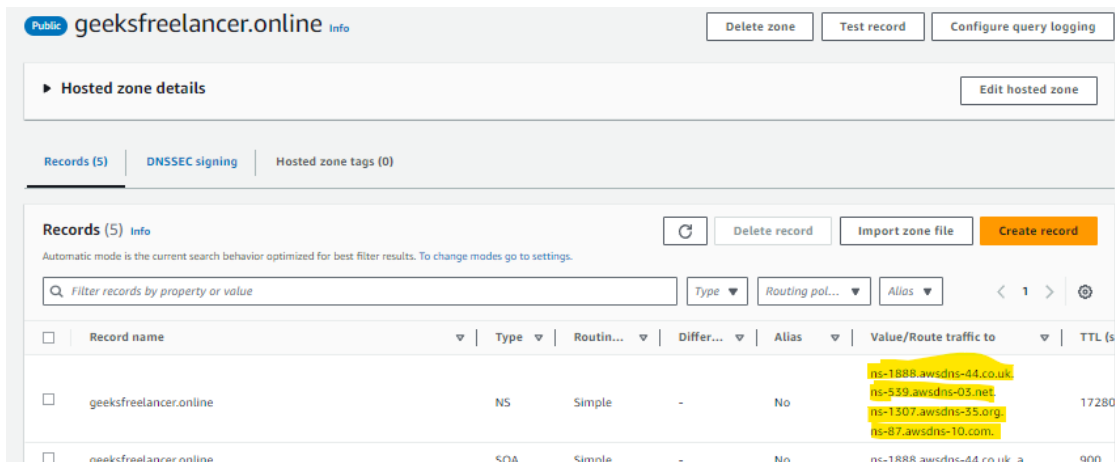
### ○ Create Hosted Zone:



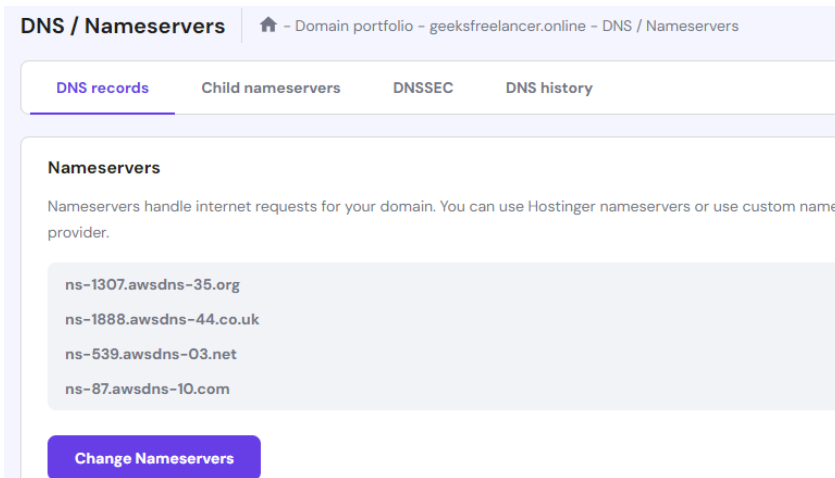
Hosted zone name	Type	Created by	Record count	Description	Hosted zone ID
geeksfreelancer.online	Public	Route 53	5	-	Z0470204237GZ6XLW0XGD

- A new hosted zone was created in Amazon Route 53 for the domain `geeksfreelancer.online`.
- This hosted zone manages DNS records for the domain, enabling it to route traffic to the appropriate resources.

### ○ Retrieve Name Servers:

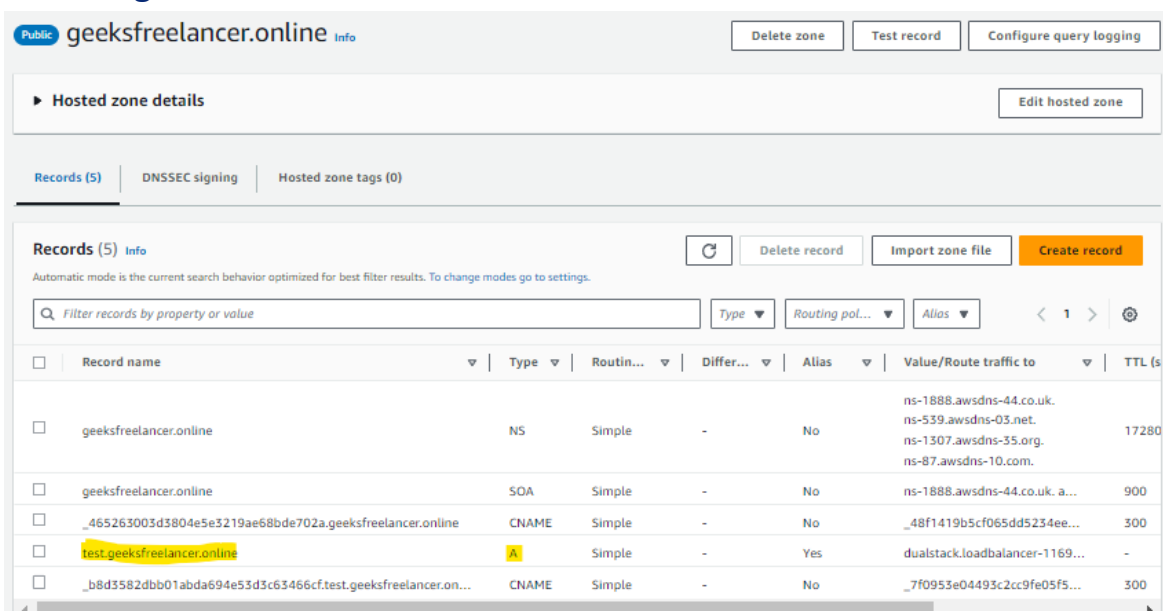


Record name	Type	Routing	Differ...	Alias	Value/Route traffic to	TTL (s)
geeksfreelancer.online	NS	Simple	-	No	ns-1888.awsdns-44.co.uk ns-539.awsdns-03.net ns-1307.awsdns-35.org ns-87.awsdns-10.com	17280
geeksfreelancer.online	SOA	Simple	-	No	ns-1888.awsdns-44.co.uk, a...	900



- Amazon Route 53 provided a set of name servers for the hosted zone. These name servers were configured in the domain registrar's settings (Hostinger) to point to Route 53's DNS service.

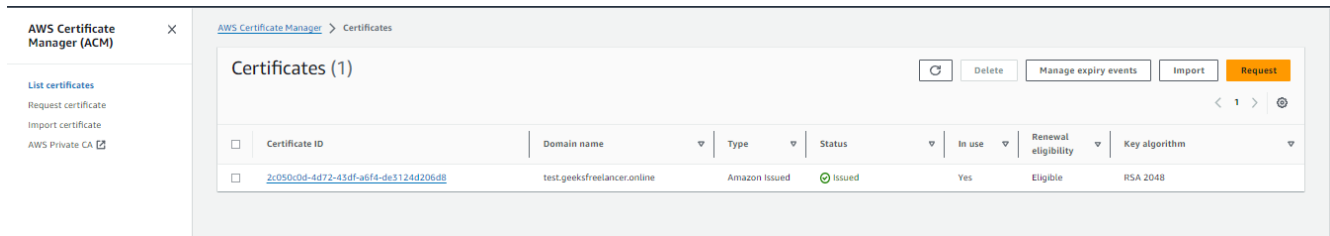
## 2. Adding an A Record:



### ○ Configure DNS Record:

- An A record was added to the Route 53 hosted zone for test.geeksfreelancer.online.
- This A record points to the public DNS name of the Elastic Load Balancer (ELB), allowing traffic directed to test.geeksfreelancer.online to be distributed across the backend servers managed by the ELB.

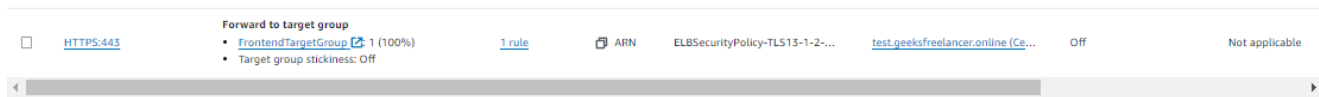
### 3. SSL/TLS Certificate Setup:



#### ○ Obtain SSL/TLS Certificate:

- An SSL/TLS certificate was obtained from AWS Certificate Manager (ACM) for the domain `test.geeksfreelancer.online`.
- This certificate enables HTTPS on the load balancer, ensuring secure, encrypted connections between users and the web application.

#### ○ Associate Certificate with Load Balancer:



- The SSL/TLS certificate was associated with the Elastic Load Balancer, enabling HTTPS for `test.geeksfreelancer.online`.
- This configuration ensures that all traffic between clients and the load balancer is encrypted and secure.

# Testing

To ensure that the architecture is functioning as expected, I performed the following testing steps:

- **SSH Access to the SSH Bastion Host**

```
user@DESKTOP-IE2HST9:~/deaa$ ssh -i "ssh.pem" ec2-user@100.27.209.131
The authenticity of host '100.27.209.131 (100.27.209.131)' can't be established.
ED25519 key fingerprint is SHA256:2cPNfXmZ25e9vQ2NNvLSs7Vw6qC+Phz902gDOEgA5Y4.
This host key is known by the following other names/addresses:
  ~/.ssh/known_hosts:1: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '100.27.209.131' (ED25519) to the list of known hosts.

      #_
     _\  #####_      Amazon Linux 2023
    NN  \_#####\
    NN   \###|
    NN   \#/  ---
    NN   V~'  '---> https://aws.amazon.com/linux/amazon-linux-2023
      NNN
      NN  _.-
      _/  _/
     _/m/'

Last login: Thu Aug 29 13:18:05 2024 from 176.28.150.243
[ec2-user@ip-10-0-1-164 ~]$
```

## Keys in SSH Bastion Host:

```
[ec2-user@ip-10-0-1-164 ~]$ ls
webserver1.pem  webserver2.pem
[ec2-user@ip-10-0-1-164 ~]$
```

- **Connect to Web Server 1 from SSH Bastion Host:**

```
[ec2-user@ip-10-0-1-164 ~]$ ssh -i webserver1.pem ubuntu@10.0.2.32
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Fri Aug 30 11:58:22 UTC 2024

System load:  0.0           Processes:            112
Usage of /:   30.7% of 6.71GB Users logged in:        0
Memory usage: 24%          IPv4 address for enX0: 10.0.2.32
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

81 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

*** System restart required ***
Last login: Thu Aug 29 14:09:14 2024 from 10.0.1.164
ubuntu@ip-10-0-2-32:~$
```

- Test Internet Connectivity from Web Server 1

```
ubuntu@ip-10-0-2-32:~$ ping google.com
PING google.com (172.253.122.100) 56(84) bytes of data.
64 bytes from bh-in-f100.1e100.net (172.253.122.100): icmp_seq=1 ttl=55 time=2.92 ms
64 bytes from bh-in-f100.1e100.net (172.253.122.100): icmp_seq=2 ttl=55 time=2.45 ms
64 bytes from bh-in-f100.1e100.net (172.253.122.100): icmp_seq=3 ttl=55 time=2.46 ms
64 bytes from bh-in-f100.1e100.net (172.253.122.100): icmp_seq=4 ttl=55 time=2.51 ms
^C
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 2.451/2.586/2.921/0.194 ms
```

- Test MySQL Connectivity from Web Server 1

```
ubuntu@ip-10-0-2-32:~$ mysql -h 10.0.3.53 -P 3306 -u deaa -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.39-0ubuntu0.24.04.2 (Ubuntu)

Copyright (c) 2000, 2024, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

- Connect to Web Server 2 from SSH Bastion Host:

```
[ec2-user@ip-10-0-1-164 ~]$ ssh -i "webserver2.pem" ec2-user@10.0.2.252
#_
~\_ #####_ Amazon Linux 2023
~~ \_#####\
~~ \###|
~~ \#/ ____ https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' ' ->
    /
  /
 /
/_/m/'

Last login: Thu Aug 29 13:47:46 2024 from 10.0.1.164
[ec2-user@ip-10-0-2-252 ~]$
```

- Test Internet Connectivity from Web Server 2

```
[ec2-user@ip-10-0-2-252 ~]$ ping google.com
PING google.com (172.253.122.138) 56(84) bytes of data.
64 bytes from bh-in-f138.1e100.net (172.253.122.138): icmp_seq=1 ttl=57 time=2.70 ms
64 bytes from bh-in-f138.1e100.net (172.253.122.138): icmp_seq=2 ttl=57 time=2.14 ms
64 bytes from bh-in-f138.1e100.net (172.253.122.138): icmp_seq=3 ttl=57 time=2.09 ms
64 bytes from bh-in-f138.1e100.net (172.253.122.138): icmp_seq=4 ttl=57 time=2.08 ms
^C
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 2.080/2.253/2.701/0.259 ms
[ec2-user@ip-10-0-2-252 ~]$
```



- **Connect to MySql Server from SSH Bastion Host:** here I used webserver2 key also for MySql server

```
[ec2-user@ip-10-0-1-164 ~]$ ssh -i "webserver2.pem" ubuntu@10.0.3.53
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:        https://ubuntu.com/pro
```

System information as of Fri Aug 30 12:14:44 UTC 2024

```
System load:  0.0           Processes:            104
Usage of /:   36.8% of 6.71GB Users logged in:      0
Memory usage: 59%          IPv4 address for enX0: 10.0.3.53
Swap usage:   0%
```

Expanded Security Maintenance for Applications is not enabled.

81 updates can be applied immediately.

To see these additional updates run: `apt list --upgradable`

Enable ESM Apps to receive additional future security updates.

See <https://ubuntu.com/esm> or run: `sudo pro status`

\*\*\* System restart required \*\*\*

Last login: Thu Aug 29 13:20:06 2024 from 10.0.1.164

ubuntu@ip-10-0-3-53:~\$

```
ubuntu@ip-10-0-3-53:~$ sudo systemctl status mysql
```

```
• mysql.service - MySQL Community Server
   Loaded: loaded (/usr/lib/systemd/system/mysql.service; enabled; preset: enabled)
   Active: active (running) since Fri 2024-08-30 09:16:47 UTC; 2h 58min ago
   Main PID: 10170 (mysqld)
   Status: "Server is operational"
   Tasks: 38 (limit: 1130)
   Memory: 364.4M (peak: 391.0M)
   CPU: 39.267s
   CGroup: /system.slice/mysql.service
           └─10170 /usr/sbin/mysqld
```

```
Aug 30 09:16:46 ip-10-0-3-53 systemd[1]: Starting mysql.service - MySQL Community Server...
```

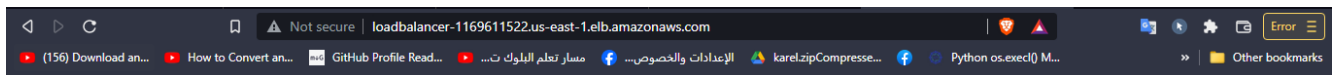
```
Aug 30 09:16:47 ip-10-0-3-53 systemd[1]: Started mysql.service - MySQL Community Server.
```

```
ubuntu@ip-10-0-3-53:~$
```

- **Test Internet Connectivity from MySql Server**

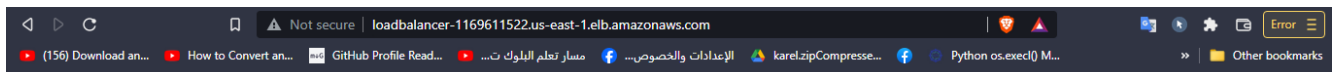
```
ubuntu@ip-10-0-3-53:~$ ping google.com
PING google.com (142.251.16.102) 56(84) bytes of data:
64 bytes from bl-in-f102.1e100.net (142.251.16.102): icmp_seq=1 ttl=57 time=2.09 ms
64 bytes from bl-in-f102.1e100.net (142.251.16.102): icmp_seq=2 ttl=57 time=1.68 ms
64 bytes from bl-in-f102.1e100.net (142.251.16.102): icmp_seq=3 ttl=57 time=1.66 ms
64 bytes from bl-in-f102.1e100.net (142.251.16.102): icmp_seq=4 ttl=57 time=1.62 ms
64 bytes from bl-in-f102.1e100.net (142.251.16.102): icmp_seq=5 ttl=57 time=1.63 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 1.616/1.733/2.085/0.177 ms
ubuntu@ip-10-0-3-53:~$
```

- **Test Web Accessibility via Load Balancer DNS:** we using this  
loadbalancer-1169611522.us-east-1.elb.amazonaws.com



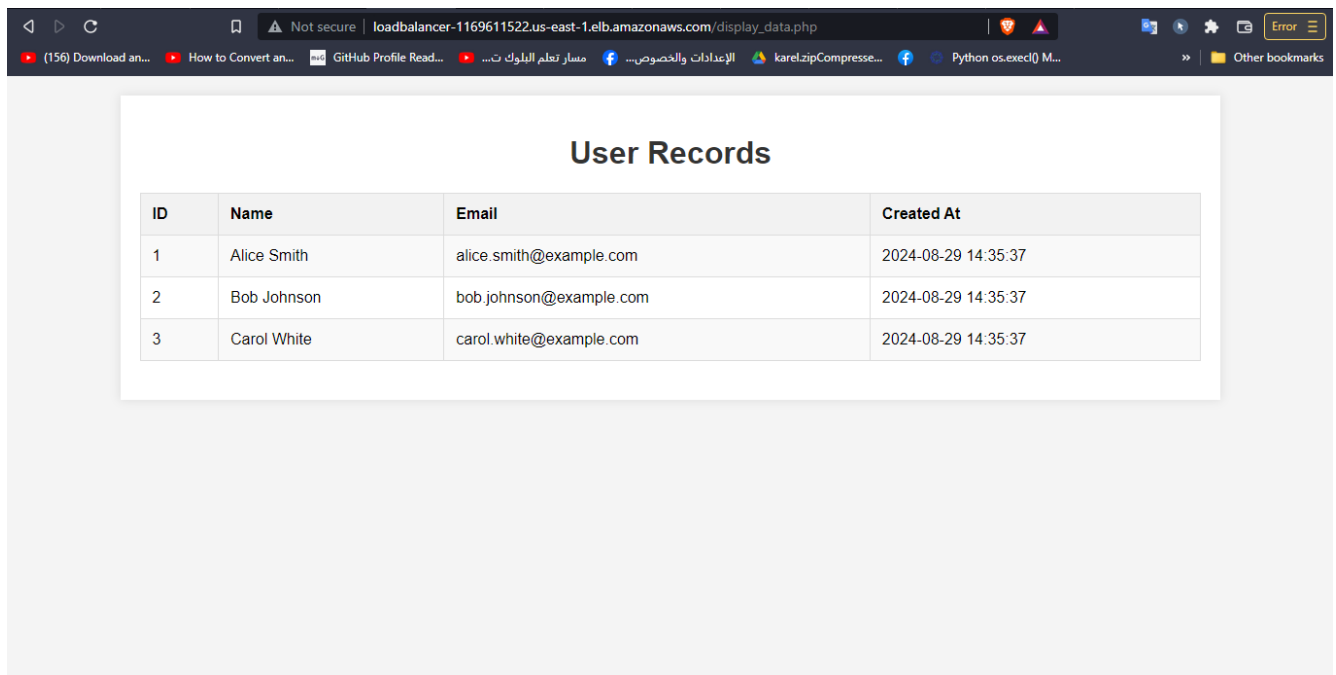
## Welcome to Apache Server

Private IP Address:10.0.2.32:8080



Apache is now running on http://10.0.2.252:8080

- **Test Connectivity between web server and MySQL server to show users data**

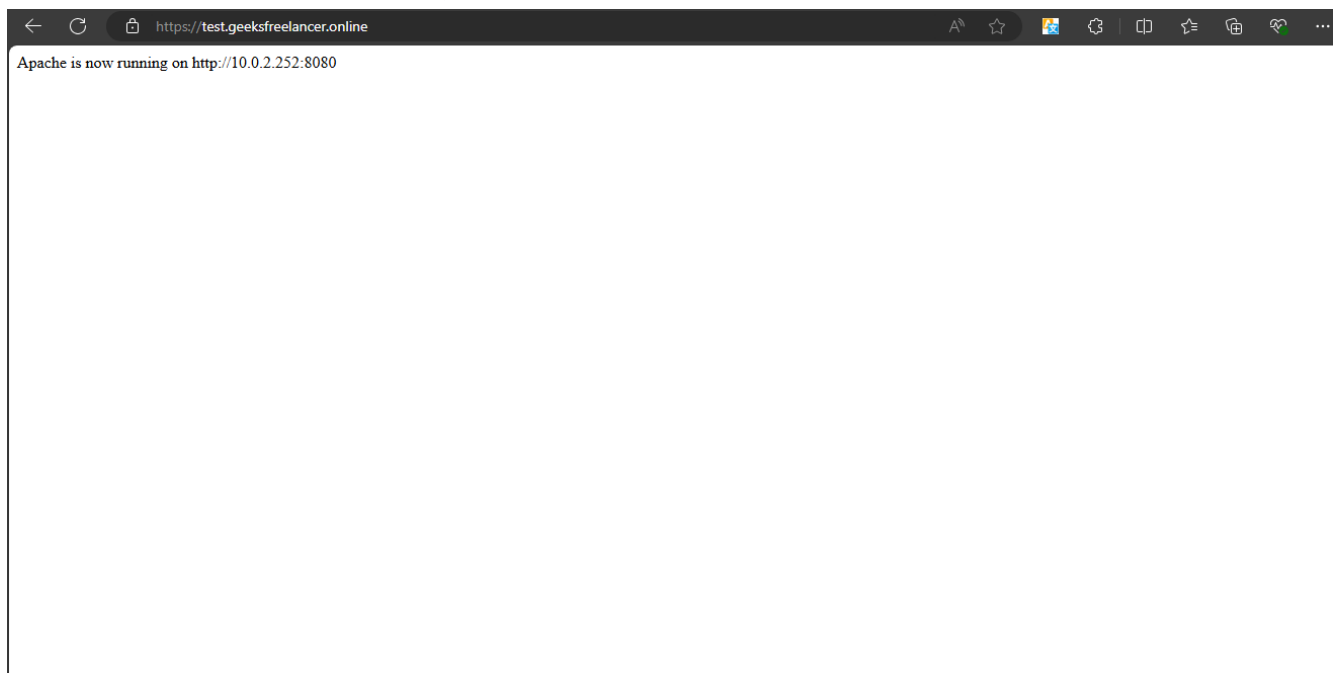


The screenshot shows a web browser window with the address bar displaying 'loadbalancer-1169611522.us-east-1.elb.amazonaws.com/display\_data.php'. The page content is titled 'User Records' and displays a table with the following data:

ID	Name	Email	Created At
1	Alice Smith	alice.smith@example.com	2024-08-29 14:35:37
2	Bob Johnson	bob.johnson@example.com	2024-08-29 14:35:37
3	Carol White	carol.white@example.com	2024-08-29 14:35:37

- **After DNS Configuration and SSL/TLS Setup**

Check this link: <https://test.geeksfreelancer.online/>



The screenshot shows a web browser window with the address bar displaying 'https://test.geeksfreelancer.online'. The page content displays the message: 'Apache is now running on http://10.0.2.252:8080'.

