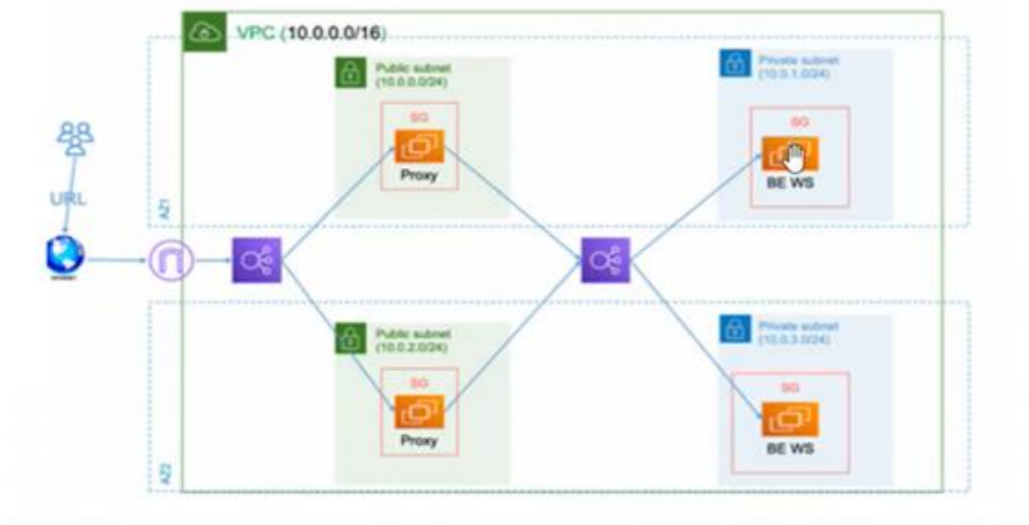


Project Overview

This Terraform project is designed to create an infrastructure with multiple EC2 instances and two load balancers, as shown in the provided diagram. The infrastructure consists of:

1. A Virtual Private Cloud (VPC) with public and private subnets.
2. EC2 instances configured as web servers in the private subnets.
3. A proxy server in the public subnets that routes traffic to the private web servers.
4. Two load balancers:
 - The first one is a public load balancer that forwards traffic to the proxy server.
 - The second one is a private load balancer that forwards traffic to the backend EC2 web servers.

The project uses AWS services, including EC2, Elastic Load Balancers (ELB), and S3 for storing Terraform state files.



Prerequisites

1. **Terraform** installed on your local machine.
2. **AWS CLI** configured with appropriate credentials.
3. An existing **S3 bucket** and **DynamoDB table** for remote state management.
4. **SSH key pair** for EC2 access

S3

General purpose buckets (2) [Info](#) [All AWS Regions](#)

[Refresh](#) [Copy ARN](#) [Empty](#) [Delete](#) [Create bucket](#)

Buckets are containers for data stored in S3.

	Name	AWS Region	IAM Access Analyzer	Creation date
<input type="radio"/>	mona-tf-bucket	US East (N. Virginia) us-east-1	View analyzer for us-east-1	September 9, 2024, 01:26:01 (UTC+03:00)
<input type="radio"/>	mona1-tf-bucket	US East (N. Virginia) us-east-1	View analyzer for us-east-1	September 9, 2024, 02:20:17 (UTC+03:00)

1. **VPC:** Create a VPC using a custom VPC module.
 - creating a VPC module in `modules/VPC/main.tf`:

[Alt+S] [Search](#) [Refresh](#) [Alerts](#) [Help](#) [Settings](#) [N. Virginia](#) [voclabs/user3431272=Mona_ismail_kabil @ 4195-1147-3881](#)

Your VPCs (1/4) [Info](#) [Last updated 1 minute ago](#) [Refresh](#) [Actions](#) [Create VPC](#)

	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	my-vpc	vpc-0f5a6eaf8219cf0c0	Available	10.0.0.0/16	-
<input checked="" type="checkbox"/>	-	vpc-0fe3066d664754982	Available	172.31.0.0/16	-
<input type="checkbox"/>	-	vpc-01260145732327645	Available	10.0.0.0/16	-

vpc-0fe3066d664754982

[Details](#) [Resource map](#) [CIDRs](#) [Flow logs](#) [Tags](#) [Integrations](#)

Details			
VPC ID	State	DNS hostnames	DNS resolution
vpc-0fe3066d664754982	Available	Enabled	Enabled
Tenancy	DHCP option set	Main route table	Main network ACL
Default	dopt-0878c3d4c203bd73a	rtb-06913f23b28f9e393	acl-01112d20a19cbb31b

2. **Subnets:** create public and private subnets using a custom **Subnet** module
 - Define subnets, route tables, and gateways as needed in `modules/Subnet/main.tf`

Subnets (1/15) Info

Last updated 2 minutes ago

Actions

Create subnet

Find resources by attribute or tag

	Name	Subnet ID	State	VPC
<input type="checkbox"/>	public_subnet_a	subnet-0e5a2e6e3315cf7ef	Available	vpc-010f8e453c2e27f45 myvpc
<input checked="" type="checkbox"/>	Public subnet 1	subnet-027b077e3915041f0	Available	vpc-067a2c8e193c04fce my_vpc
<input type="checkbox"/>	private_subnet_b	subnet-05c813fe060eedc7a	Available	vpc-010f8e453c2e27f45 myvpc

subnet-027b077e3915041f0 / Public subnet 1

Details | Flow logs | Route table | Network ACL | CIDR reservations | Sharing | Tags

Details

Subnet ID

subnet-027b077e3915041f0

Available IPv4 addresses

Subnet ARN

arn:aws:ec2:us-east-1:419511473881:subnet/subnet-027b077e3915041f0

State

Available

IPv6 CIDR association ID

-

IPv4 CIDR

10.0.1.0/24

Availability Zone

us-east-1a

[Alt+S]

N. Virginia

voclabs/user3431272=Mona_ismail_kabil @ 4195-1147-3881

Subnets (1/15) Info

Last updated 3 minutes ago

Actions

Create subnet

Find resources by attribute or tag

	Name	Subnet ID	State	VPC
<input type="checkbox"/>	public_subnet_a	subnet-0e5a2e6e3315cf7ef	Available	vpc-010f8e453c2e27f45 myvpc
<input type="checkbox"/>	Public subnet 1	subnet-027b077e3915041f0	Available	vpc-067a2c8e193c04fce my_vpc
<input checked="" type="checkbox"/>	private_subnet_b	subnet-05c813fe060eedc7a	Available	vpc-010f8e453c2e27f45 myvpc

subnet-05c813fe060eedc7a / private_subnet_b

Details | Flow logs | Route table | Network ACL | CIDR reservations | Sharing | Tags

Details

Subnet ID

subnet-05c813fe060eedc7a

Available IPv4 addresses

Subnet ARN

arn:aws:ec2:us-east-1:419511473881:subnet/subnet-05c813fe060eedc7a

State

Available

IPv6 CIDR association ID

-

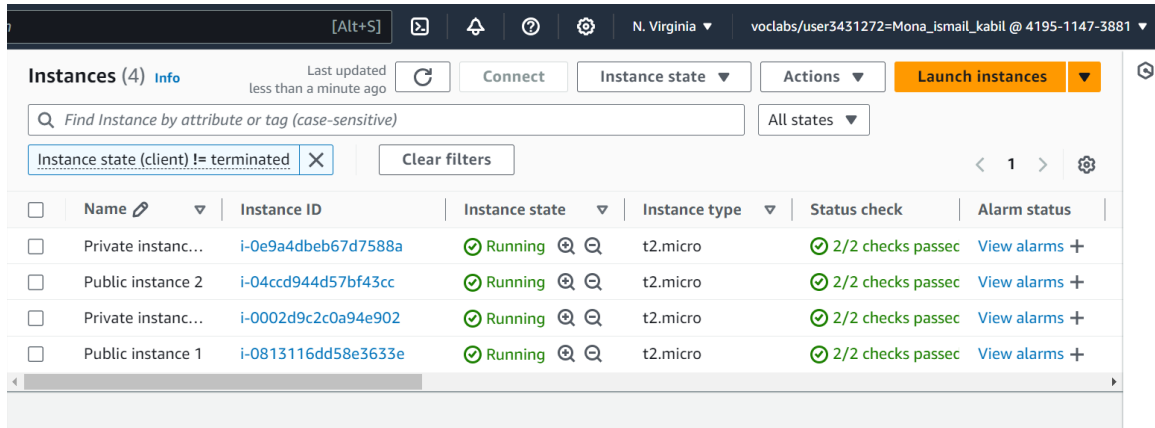
IPv4 CIDR

10.0.4.0/24

Availability Zone

us-east-1b

3. EC2 Instances:



Instances (4) Info

Last updated less than a minute ago

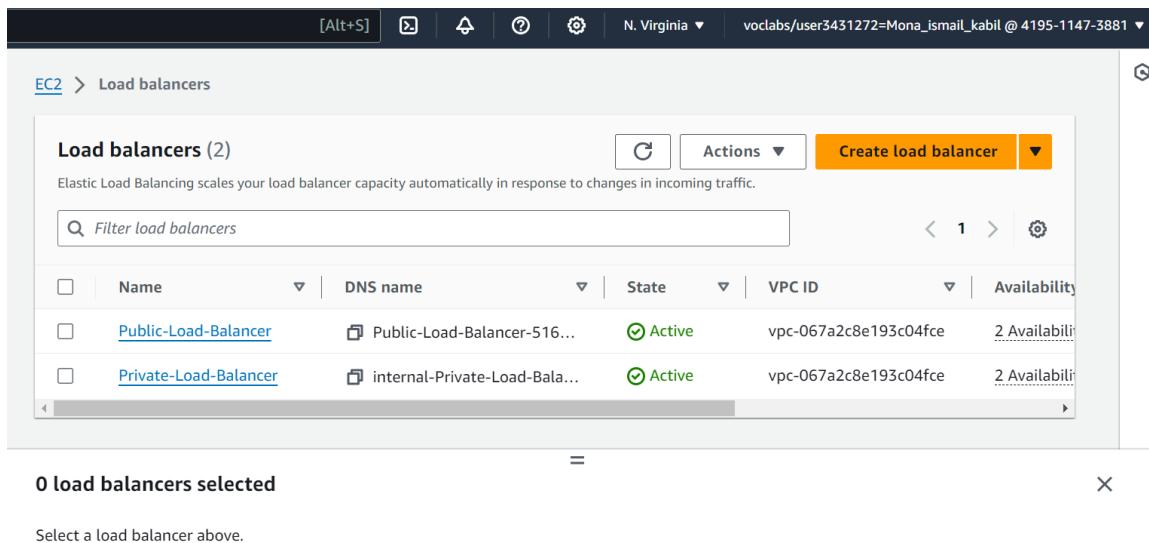
Find Instance by attribute or tag (case-sensitive)

Instance state (client) != terminated

Clear filters

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input type="checkbox"/>	Private instanc...	i-0e9a4db67d7588a	Running	t2.micro	2/2 checks passec	View alarms +
<input type="checkbox"/>	Public instance 2	i-04ccd944d57bf43cc	Running	t2.micro	2/2 checks passec	View alarms +
<input type="checkbox"/>	Private instanc...	i-0002d9c2c0a94e902	Running	t2.micro	2/2 checks passec	View alarms +
<input type="checkbox"/>	Public instance 1	i-0813116dd58e3633e	Running	t2.micro	2/2 checks passec	View alarms +

4. Load Balancers:



EC2 > Load balancers

Load balancers (2)

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

Filter load balancers

<input type="checkbox"/>	Name	DNS name	State	VPC ID	Availability
<input type="checkbox"/>	Public-Load-Balancer	Public-Load-Balancer-516...	Active	vpc-067a2c8e193c04fce	2 Availability
<input type="checkbox"/>	Private-Load-Balancer	internal-Private-Load-Bala...	Active	vpc-067a2c8e193c04fce	2 Availability

0 load balancers selected

Select a load balancer above.

5. Output Values:

- Define output values for the public IP addresses and DNS names of the load balancers.
- Examples
 - **Public Load Balancer DNS:** The DNS name of the public load balancer.
 - **Private Load Balancer DNS:** The DNS name of the private load balancer.
 - **EC2 Public IPs:** The public IP addresses of EC2 instances created in the public subnets.

The final Result:

```
module.Public_Load_Balancer.aws_lb_listener.alb_listener: Create
f69c/4e057000e9ec8ff8]
Releasing state lock. This may take a few moments...

Apply complete! Resources: 33 added, 0 changed, 0 destroyed.

Outputs:

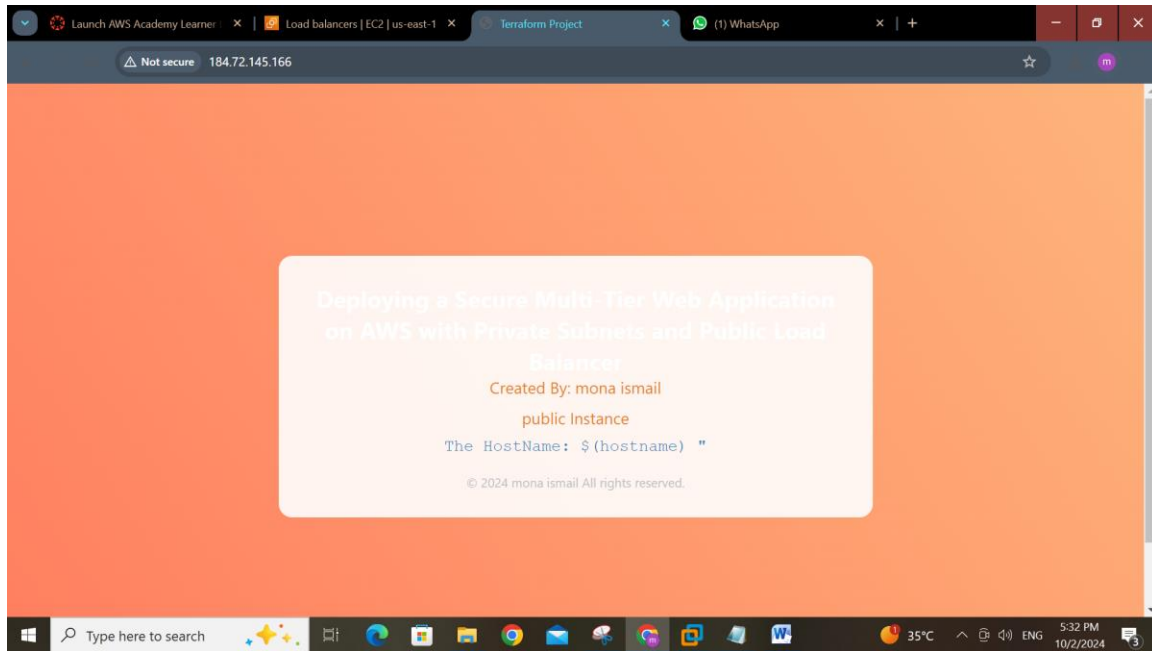
private_lb_dns = "internal-Private-Load-Balancer-1347582357.us-
public_lb_dns = "Public-Load-Balancer-516705079.us-east-1.elb.a
○ [mona@192 terraform_project2]$
```

The all-ips.txt file

```
all-ips.txt
1 public-ip : 54.236.254.56
2 public-ip : 44.200.230.184
3 public-ip : 44.211.90.75
4 public-ip : 54.157.217.135
5 public-ip : 54.236.254.56
```

6. Testing:

- Access the public DNS of the load balancer and verify it forwards traffic to the proxy.



Conclusion

This documentation outlines the steps to implement a complex AWS infrastructure using Terraform. The project is structured to separate concerns into modules, making it easier to manage and scale