

Part 1: VPC Architecture Design

- **Task 1.1**

Create Custom VPC

Design and create a VPC with the following specifications:

VPC Name: student-vpc

CIDR Block: 10.0.0.0/16

Enable DNS hostnames: Yes

Enable DNS resolution: Yes

- **Task 1.2**

Create Subnets

Create the following subnets in different Availability Zones:

- 1) Public Subnet 1: 10.0.1.0/24 (AZ: us-east-1a)
- 2) Public Subnet 2: 10.0.2.0/24 (AZ: us-east-1b)
- 3) Private Subnet 1: 10.0.3.0/24 (AZ: us-east-1a)
- 4) Private Subnet 2: 10.0.4.0/24 (AZ: us-east-1b)
- 5)

- **Task 1.3**

Configure Internet Gateway

Create an Internet Gateway named student-igw

Attach it to your VPC

Update route table for public subnets to route 0.0.0.0/0 to IGW

- **Task 1.4**

Configure NAT Gateway

Create NAT Gateway in Public Subnet 1

Allocate Elastic IP for NAT Gateway

Update private subnet route table to route 0.0.0.0/0 to NAT Gateway

Create NAT gateway

A highly available, managed Network Address Translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the Internet.

NAT gateway settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.
natgateway1
The name can be up to 256 characters long.

Availability mode info
Choose whether to deploy across all zones in the region or restrict to a single availability zone.
☐ Regional - new
 Scales automatically across all regional AZs, simplifying management for multi-AZ deployments.
☒ Zonal
 Provides granular control within a specific availability zone, adhering to subset level settings.

Subnet
Select a subnet in which to create the NAT gateway.
subnet-01d31e53543c2a94 (student-vpc-subnet-public1-us-east-1a)

Connectivity type
Select a connectivity type for the NAT gateway.
☒ Public
☐ Private

Elastic IP allocation ID info
Assign an Elastic IP address to the NAT gateway.
 eipalloc-0843bdc23f813da3 Allocate Elastic IP

Additional settings info

Tags
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.
 Key: Name Value: natgateway1
 Add new tag

Cancel Create NAT gateway

Create VPC

Number of private subnets info
The number of private subnets to add to your VPC. Use private subnets to secure backend resources that don't need public access.
0 1 2 3 4

Customize subnets CIDR blocks

Public subnet CIDR block in us-east-1a 256 IP's
10.0.1.0/24

Public subnet CIDR block in us-east-1b 256 IP's
10.0.2.0/24

Private subnet CIDR block in us-east-1a 256 IP's
10.0.3.0/24

Private subnet CIDR block in us-east-1b 256 IP's
10.0.4.0/24

NAT gateways (3) updated info
NAT gateway allows private resources to access the Internet from any availability zone within a VPC, providing a single managed Internet exit point for the entire region. Additional charges apply.
 None ☒ Regional - new ☐ Zonal

VPC endpoints info
Endpoints can help reduce NAT gateway charges and improve security by accessing US directly from the VPC. By default, full access policy is used. You can customize this policy at any time.
None ☒ S3 Gateway

DNS options info
☒ Enable DNS hostnames
☒ Enable DNS resolution

Additional tags

Cancel Preview code Create VPC

Preview

VPC view details
Your AWS virtual network.
student-vpc-vpc

Subnets (4) Subnets within this VPC

- us-east-1a
 - student-vpc-subnet-public1-us-
 - student-vpc-subnet-private1-us-
- us-east-1b
 - student-vpc-subnet-public2-us-
 - student-vpc-subnet-private2-us-

Route tables (3) Route network traffic to resources

- student-vpc-rtb-public
- student-vpc-rtb-private1-us-east
- student-vpc-rtb-private2-us-east

Part 2: Security Configuration

• Task 2.1

Create Security Groups

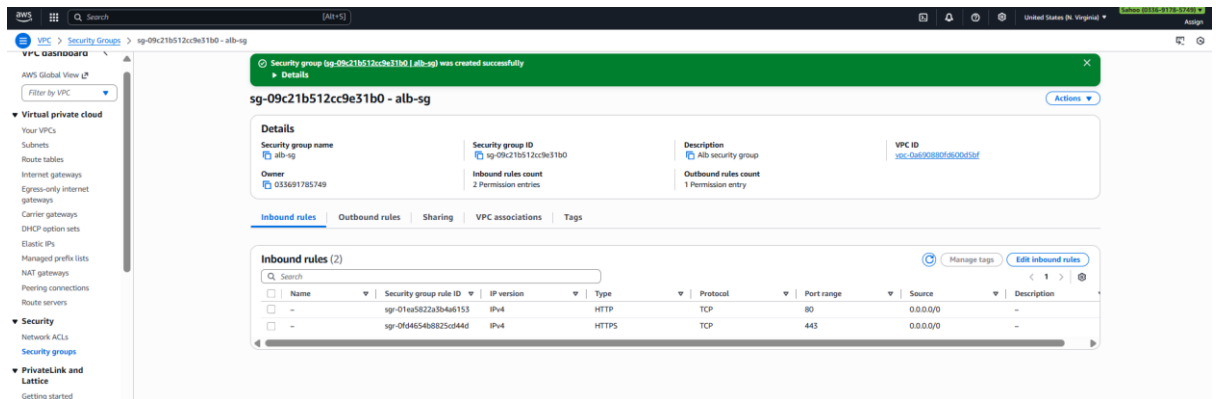
ALB Security Group (alb-sg):

Inbound Rules:

- HTTP (80) from 0.0.0.0/0
- HTTPS (443) from 0.0.0.0/0

Outbound Rules:

- All traffic to 0.0.0.0/0



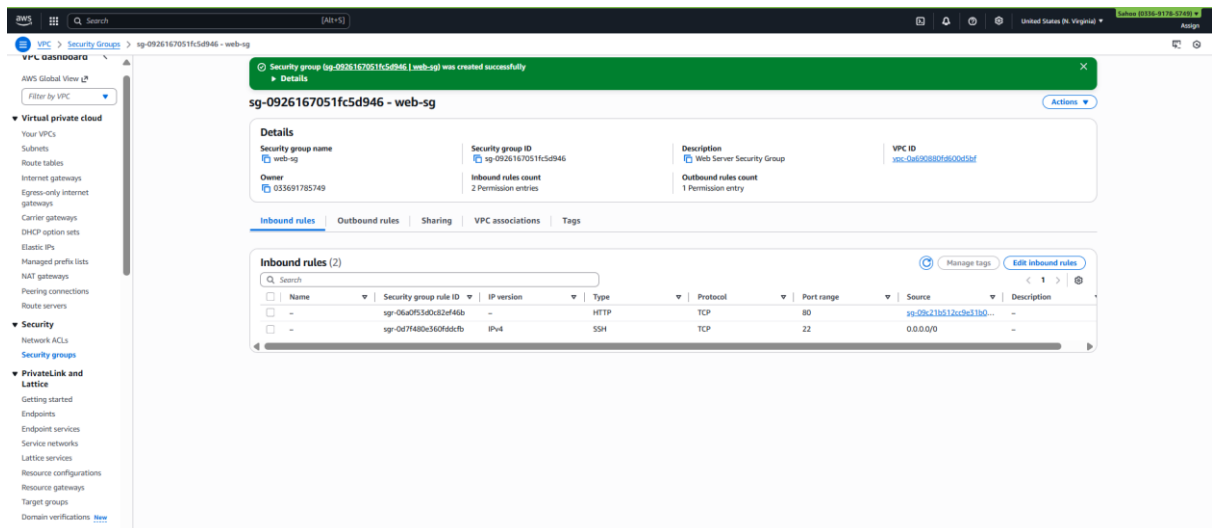
Web Server Security Group (web-sg):

Inbound Rules:

- HTTP (80) from alb-sg
- SSH (22) from your IP

Outbound Rules:

- All traffic to 0.0.0.0/0



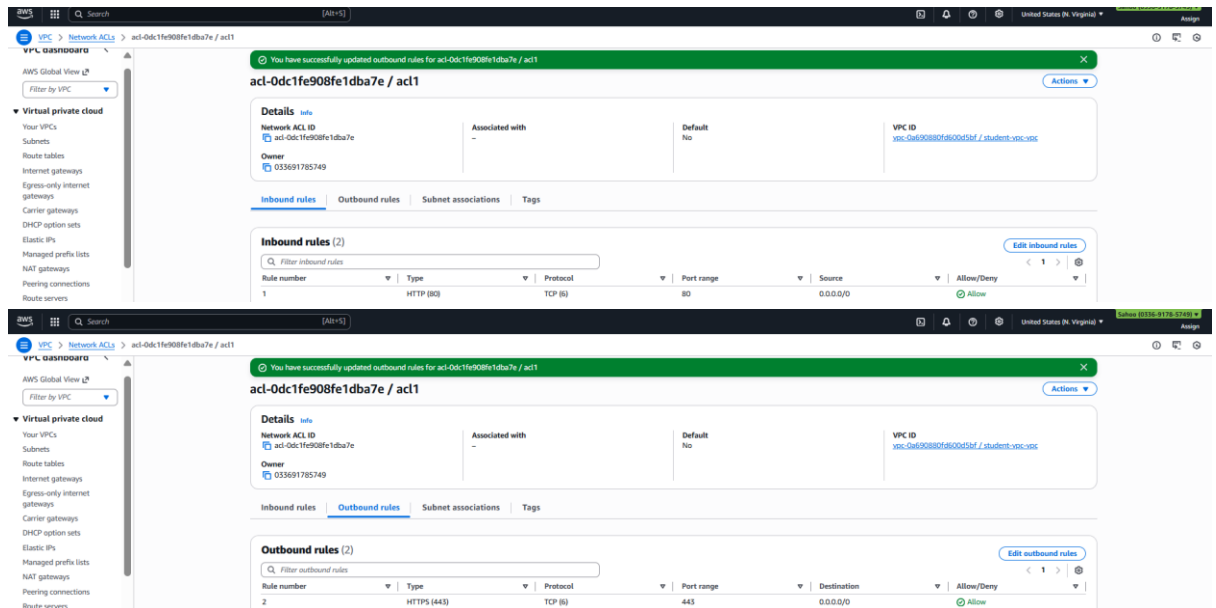
Task 2.2

Configure Network ACLs

Create custom NACL for public subnets

Allow HTTP/HTTPS inbound and outbound

Allow ephemeral ports (1024-65535)



Part 3: Deploy Web Servers

• Task 3.1

Launch EC2 Instances

Launch 2 EC2 instances with the following configuration:

AMI: Amazon Linux 2

Instance Type: t2.micro

Network: student-vpc

Subnet: Private Subnet 1 and Private Subnet 2

Security Group: web-sg

Auto-assign Public IP: Disable

• Task 3.2

Configure Web Server

Use the following User Data script to install Apache web server:

```
#!/bin/bash
```

```
yum update -y
```

```
yum install -y httpd
```

```
systemctl start httpd
```

```
systemctl enable httpd
```

```
# Create custom page
```

```
INSTANCE_ID=$(curl -s http://169.254.169.254/latest/meta-data/instance-id)
```

```
AZ=$(curl -s http://169.254.169.254/latest/meta-data/placement/availability-zone)
```

```
cat <<EOF > /var/www/html/index.html
```

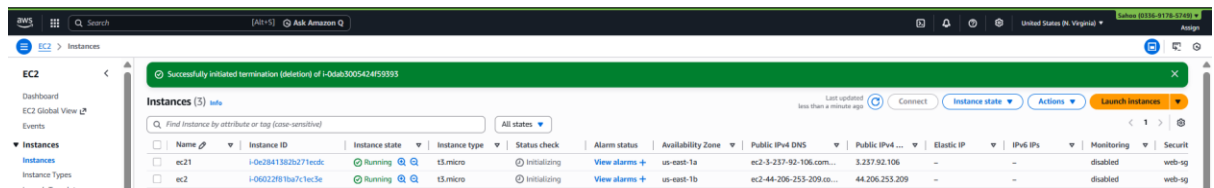
```
<!DOCTYPE html>
```

```
<html>
```

```

<head><title>Student Project</title></head>
<body style="font-family: Arial; text-align: center; padding: 50px;">
<h1>VPC & ALB Project</h1>
<h2>Instance ID: $INSTANCE_ID</h2>
<h3>Availability Zone: $AZ</h3>
<p>Student Name: [Your Name]</p>
</body>
</html>
EOF

```



Part 4: Application Load Balancer Setup

- Task 4.1

Create Target Group

Name: student-tg

Target type: Instances

Protocol: HTTP

Port: 80

VPC: student-vpc

Health check path: /

Health check interval: 30 seconds

Healthy threshold: 2

Unhealthy threshold: 2

Register both EC2 instances to this target group.

- Task 4.2

Create Application Load Balancer

Name: student-alb

Scheme: Internet-facing

IP address type: IPv4

VPC: student-vpc

Subnets: Select both public subnets

Security Group: alb-sg

- Task 4.3

Configure Listener

Protocol: HTTP

Port: 80

Default action: Forward to student-tg

Load balancer name

student-alb

Scheme

Internet-facing

Load balancer IP address type

IPv4

Network mapping

VPC

vpc-0a90808f0d00d50f (student-vpc-vpc)

IP pools

Use IPAM pool for public IPv4 addresses

Availability Zones and subnets

us-east-1a (subnet-01c31e3353452a94)

us-east-1b (subnet-087ba9c3b7bf2c9e)

Security groups

alb-sg

Listeners and routing

Listener: HTTP80

Protocol: HTTP

Port: 80

Default action: Forward to target groups

Target group: student-tg

Final output

EC2 > Load balancers > student-alb

Successfully created load balancer: student-alb
It might take a few minutes for your load balancer to fully set up and route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.

Introducing ALB target optimizer
Target optimizer lets you enforce a maximum number of requests per target using an ALB-provided agent, improving success rates, latency, and efficiency. [Learn more](#)

student-alb

Details

Load balancer type Application	Status Provisioning	VPC vpc-0a590880f96000f0af	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z35SXDOTRQ7XVK	Availability Zones subnet-087ba5c3b70aff2c9e us-east-1b (use1-az2) subnet-01a81ef333543c2af04 us-east-1a (use1-az1)	Date created December 24, 2025, 20:30 (UTC+05:30)
Load balancer ARN arn:aws:elasticloadbalancing:us-east-1:033691785749:loadbalancer/app/student-alb/54622959a5e894a		DNS name student-alb-700450806.us-east-1.elb.amazonaws.com (A Record)	

Listeners and rules (1) info

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Protocol/Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	mTLS	Trust store
HTTP:80	Forward to target group student-ig 1 (100%) Target group stickiness: Off	1 rule	ARN	Not applicable	Not applicable	Not applicable	Not applic

student-alb-700450806.us-east-1.elb.amazonaws.com

Not secure

Disney+ Hotstar ... Freelancer Solflare Rats Kingdom (RQ) Home - NetMirror ONLINE NOTES - G...

All Bookmarks

VPC & ALB Project

Instance ID:

Availability Zone:

Student Name: [Your Name]