# Hafida Saidi

# **SAA Project Report**

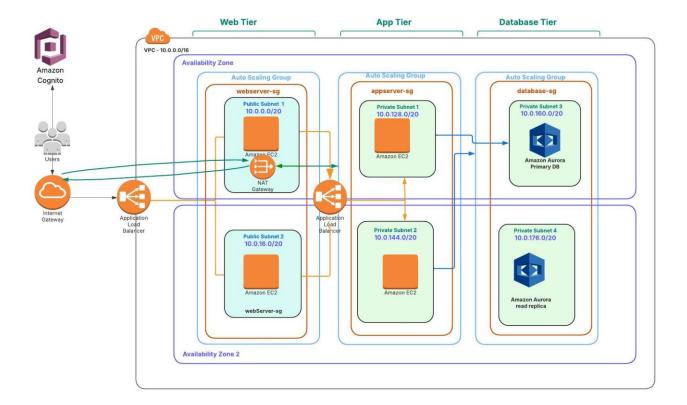


Fig 1: Project architecture V2

Here's a step-by-step guide to deploy the architecture shown in the Fig1, which includes a Web Tier, App Tier, and Database Tier across two Availability Zones (AZ1 and AZ2).

#### 1. VPC and Subnets

• Create a VPC:

o CIDR block: 10.0.0.0/16.

• Create Subnets:

o Public Subnets:

• AZ1: 10.0.0.0/20

AZ2: 10.0.16.0/20

o Private Subnets (App Tier):

AZ1: 10.0.128.0/20

AZ2: 10.0.144.0/20

o Private Subnets (DB Tier):

- AZ1: 10.0.160.0/20
- AZ2: 10.0.176.0/20
- Enable Auto-assign Public IP for public subnets.

# 2. Internet Gateway and Route Tables

- Attach an Internet Gateway to the VPC.
- Create Route Tables:
  - Public RT: Route  $0.0.0.0/0 \rightarrow IGW$ .
  - o Private RTs: Associate with private subnets (App and DB Tiers), no IGW route.
- Associate Subnets with Route Tables:
  - $\circ$  Public Subnets → Public RT.
  - o Private Subnets  $\rightarrow$  Separate or shared private RTs.

## 3. NAT Gateway

- Deploy a NAT Gateway in a public subnet (e.g., AZ1 10.0.0.0/20).
- Allocate and associate an Elastic IP to it.
- Update private route table to route 0.0.0.0/0 to the NAT Gateway.

#### 4. Security Groups

- webserver-sg: Allow inbound HTTP/HTTPS from anywhere.
- appserver-sg: Allow traffic only from webserver-sg.
- database-sg: Allow traffic only from appserver-sg.

## 5. Application Load Balancer (ALB)

- Create ALB in public subnets: saa-pr-alb
- Target group  $\rightarrow$  Register web servers.
- Listener on port  $80/443 \rightarrow$  forward to target group.

## 6. Auto Scaling Groups

Web Tier:

- Launch Template → EC2 (web server), Amazon Linux/Ubuntu.
- Set User Data script to install web server (Apache).
- Attach to ALB.
- Subnets: public subnets in AZ1 & AZ2.
- Attach webserver-sg.

### App Tier:

- Launch Template  $\rightarrow$  EC2 (app logic).
- User Data to install app backend (PHP).
- Subnets: private subnets for App tier.
- Attach appserver-sg.

#### 7. Database Tier: Amazon Aurora

- Go to RDS → Create Aurora DB Cluster.
- Engine: Aurora MySQL or PostgreSQL.
- Primary instance in AZ1 (10.0.160.0/20).
- Read replica in AZ2 (10.0.176.0/20).
- Subnet group: include DB subnets.
- Attach database-sg.

#### 8. Application Deployment

- Web Tier: Deploy static files or UI (HTML, JS).
- App Tier: Connect backend app to the Aurora endpoint (read/write).

Access the web app via the ALB DNS name: http://saa-pr-alb-951903903.eu-west-2.elb.amazonaws.com/?

# 9. Monitoring with CloudWatch

- Enable detailed monitoring for:
  - o EC2 instances (CPU, memory, status checks).
  - o ALB (request count, latency).
  - o RDS/Aurora (read/write IOPS, connections).
- Set alarms and scaling policies as needed.