



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:
  - CIDR block: 10.0.0.0/16.
- Create Subnets:
  - Public Subnets:
    - AZ1: 10.0.0.0/20
    - AZ2: 10.0.16.0/20
  - Private Subnets (App Tier):
    - AZ1: 10.0.128.0/20
    - AZ2: 10.0.144.0/20
  - Private Subnets (DB Tier):

- AZ1: 10.0.160.0/20
  - AZ2: 10.0.176.0/20
  - Enable Auto-assign Public IP for public subnets.
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## 2. Internet Gateway and Route Tables

- Attach an Internet Gateway to the VPC.
  - Create Route Tables:
    - Public RT: Route 0.0.0.0/0 → IGW.
    - Private RTs: Associate with private subnets (App and DB Tiers), no IGW route.
  - Associate Subnets with Route Tables:
    - Public Subnets → Public RT.
    - Private Subnets → Separate or shared private RTs.
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## 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.
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## 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.
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## 5. Application Load Balancer (ALB)

- Create ALB in public subnets: saa-pr-alb
  - Target group → Register web servers.
  - Listener on port 80/443 → forward to target group.
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## 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 → EC2 (app logic).
- User Data to install app backend (PHP).
- Subnets: private subnets for App tier.
- Attach appserver-sg.

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#### 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.

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#### 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/>

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#### 9. Monitoring with CloudWatch

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

