AWS Architecture Documentation
(Manara Project)

1. Overview

This architecture represents a highly available, secure, and scalable web application deployed in AWS US-East-1 using multiple AWS services.

The design includes a multi-AZ setup, ensuring fault tolerance, scalability, and security for the application.

2. Components and Their Functions

A. Networking & Security

- Virtual Private Cloud (VPC)
A logically isolated network where all resources are deployed, spanning two Availability Zones.

- Internet Gateway (IGW)
Enables public resources to communicate with the internet.

- Public Subnets
Contain NAT Gateways to allow private subnet instances to securely access the internet.

- Private Subnets
Hosts web application servers and Aurora databases, isolating them from direct internet access.

- NAT Gateways
Allow private subnet resources to access the internet without exposing them to inbound traffic.

- AWS WAF
Protects the web application from security threats like SQL injection and XSS.

- Amazon Route 53
Handles DNS routing for www.example.com to the application servers.

B. Compute & Scaling

- Auto Scaling Group (ASG)
Ensures high availability by dynamically adding or removing web servers based on traffic.

- Web Application Servers (EC2)
Handle application logic and reside in private subnets for security.

C. Database Layer

Amazon Aurora is used for database storage. The primary DB handles write operations, while the replica DB improves read performance and redundancy.

D. Storage & Monitoring

- Amazon S3
Stores static assets like images, CSS, and JavaScript to reduce server load.

- Amazon CloudWatch

Monitors EC2 instances, Auto Scaling, and databases, sending alerts when anomalies occur.

- **Amazon SNS**

Sends notifications based on CloudWatch alerts.

- **AWS IAM**

Manages access control and security policies across AWS services.

3. Workflow: How Components Work Together

- User requests are routed via Route 53 to the application.
- AWS WAF filters malicious traffic before reaching the web servers.
- The Auto Scaling Group ensures sufficient web servers are running.
- Web servers in private subnets process requests and interact with the Aurora database.
- Amazon S3 serves static content, reducing web server load.
- CloudWatch monitors the infrastructure and triggers SNS notifications for any issues.

4. High Availability & Fault Tolerance

This architecture ensures high availability through Multi-AZ deployment, Auto Scaling, database replication, and security layers such as WAF and IAM policies.

5. Conclusion

This AWS architecture is designed for scalability, security, and fault tolerance, ensuring a robust cloud-based application deployment. Here is the Architecture Diagram: