Final Project

Architecture Overview: Scalable Web Application on AWS

This architecture demonstrates a highly available and scalable web application deployed on Amazon Web Services (AWS) using best practices in cloud computing.

Implementation:

Virtual Private Cloud (VPC):

Use Case: Create a secure and isolated network environment for hosting all components of the online platform.

Benefits:

Enhanced security with network access control.

Better management of network traffic.

2. Internet Gateway:

Use Case: Connects a VPC to the internet, enabling public access to web applications hosted on AWS.

Benefits:

Automatically handles varying traffic volumes to and from the VPC.

AWS provides redundancy and ensures the IGW is highly available, reducing downtime risks.Works with Security Groups and Network ACLs to help enforce granular access controls.

3. Public Subnets:

Use Case:

Host public web applications and services that require internet access.

Benefits:

High availability and redundancy by distributing resources across Availability Zones.

Improved fault tolerance.

4. Auto Scaling Group (ASG) and Apache Setup:

Use Case: Automatically scale the web server instances up or down based on user demand.

Benefits:

Optimal resource usage, reducing operational costs during low traffic periods.

Ensured performance and user satisfaction during peak loads.

5. Application Load Balancer (ALB):

Use Case: Distribute incoming traffic effectively across multiple EC2 instances.

Benefits:

Increased application availability and reliability.

Load balancing to prevent any single instance from becoming a bottleneck.

6. Web Server and Load Balancer Security Groups:

Use Case: Restrict direct access to web servers and allow traffic only through the ALB.

Benefits:

Enhanced security by limiting entry points.

Protection against unauthorized access and potential attacks.

7. Automated Scaling Policy:

Use Case: Automatically adjust the number of instances based on CPU utilization.

Benefits:

Dynamic scaling ensures the application maintains performance without manual intervention.

Cost efficiency by running only the number of instances needed.

8. CloudWatch & SNS
Used for real-time monitoring and alerting. Metrics from EC2 and ALB are sent to CloudWatch, with automated alerts configured via Amazon SNS.

- **IAM Roles**
  EC2 instances are assigned IAM roles to access S3 or publish logs to CloudWatch securely without using hardcoded credentials.

🎯 **Goals Achieved:**

- **High Availability** through Multi-AZ deployments for both compute and database layers.

- **Scalability** using Auto Scaling policies based on demand.

- **Security** by segmenting the infrastructure across public and private subnets with fine-grained access control.

- **Cost Optimization** by scaling in during low traffic periods and using managed services like RDS.