AWS Architecture Documentation for E-commerce Portal

Use Case Summary:

An e-commerce business is looking to deploy an application portal for their customers in Africa, focusing on low latency, high availability, fault tolerance, and security. The portal needs to store product images and relational data securely while being cost-efficient. Monitoring and logging are also required to ensure operational visibility.

Architecture Overview:

AWS Region and Availability Zones

The architecture uses two Availability Zones (AZ1 and AZ2) within a single AWS Region to ensure high availability and fault tolerance. Spreading resources across multiple availability zones allows for failover in case one zone goes down.

VPC with Subnets

A Virtual Private Cloud (VPC) is created with public and private subnets in each availability zone. This separates internet-facing components from the internal backend resources.

- Public Subnets host internet-facing resources (like the application instances and load balancers).
- Private Subnets host the relational database (RDS), enhancing security by isolating it from public access.

Elastic Load Balancer (ELB)

The ELB is placed in front of application instances to distribute incoming traffic, improving availability and fault tolerance. It helps handle traffic spikes and ensures seamless performance by balancing requests between instances in both availability zones.

EC2 Instances with Auto Scaling

EC2 Auto Scaling is configured to automatically increase or decrease the number of application instances based on traffic and load, ensuring optimal resource utilization and cost efficiency. The

EC2 instances reside in both public subnets, ensuring availability in case of a zone failure.

Amazon RDS (Relational Database Service)

The Amazon RDS instance with multi-AZ deployment is used to store relational user data. The primary database is hosted in one availability zone, and a standby replica is automatically deployed in another, providing failover support. This ensures minimal downtime during failover events and secure data storage.

Amazon S3 for Image Storage

Amazon S3 is used for storing product images. S3 provides high availability, durability, and low-latency access to these images, meeting the requirement for fast retrieval and secure storage. Object data in S3 is encrypted at rest using server-side encryption (SSE).

Amazon CloudFront (CDN)

CloudFront is configured to cache content closer to users in Africa, improving performance and reducing latency. This CDN service ensures that static content such as images and website assets are served quickly.

Security Groups and Encryption

Security Groups are applied to control traffic flow between resources.

- SSL/TLS is enforced on the ELB and CloudFront to ensure encryption of data in transit.
- Data at rest in RDS is encrypted using KMS (AWS Key Management Service) to provide strong security.
- S3 buckets also utilize encryption for storing images.

Monitoring with CloudWatch

Amazon CloudWatch is set up to monitor the health and performance of the infrastructure. CloudWatch logs are configured for tracking application logs, system errors, and security incidents.

How to Present to Managers

Start with Business Requirements

Emphasize the need for low-latency, high availability, and security. Explain how each AWS service chosen addresses these requirements directly.

Cost-Effective Design

Highlight that the architecture is designed to be cost-efficient by using Auto Scaling to optimize resource usage based on demand. Point out that services like S3 and RDS provide cost-effective storage solutions with built-in durability.

Security Features

Focus on how security is maintained at various levels (encryption in transit with SSL, encryption at rest with KMS, use of security groups to limit access). Mention that both the data and infrastructure are protected from unauthorized access through IAM roles and security group rules.

High Availability and Fault Tolerance

Explain the use of multiple availability zones to achieve fault tolerance. Stress that the multi-AZ RDS and Elastic Load Balancer ensure failover support and seamless user experience even during disruptions.

Performance and Monitoring

Mention the use of CloudFront for content delivery and CloudWatch for real-time monitoring and logging, ensuring the application remains performant and provides insights for proactive troubleshooting.

Visual Aid

Use the diagram to visually walk through the architecture during the presentation. Explain each component in simple terms, starting with user interactions (CloudFront, ELB) down to the backend services (EC2, RDS, S3).