AWS Solution Architect Associate

Version : C03

Domain 3

Task 4

Determine high-performing and/or scalable network architectures

Edge networking services with appropriate use cases

Amazon CloudFront

- ➔ **Website Acceleration** : Speed up the delivery of website content by caching content at edge locations
- ➔ **Live and On-Demand Video Streaming** : Distribute live or on-demand video content with low latency and high transfer speeds
- ➔ **API Acceleration** : Improves APIs performance by caching responses
- ➔ **Software Distribution** : Distribute software updates and patches efficiently to users around the world

AWS Global Accelerator

- ➔ **Multi-Region Applications** : Route user traffic to the nearest healthy endpoints
- ➔ **Disaster Recovery** : Redirect traffic to backup regions during failures or outages
- ➔ **Gaming** : Reducing latency and ensuring consistent performance across regions
- ➔ **IoT Applications** : Ensure low-latency and reliable connectivity for IoT applications

AWS Local Zones

- ➔ **Real-Time Gaming** : Host game servers closer to players for low-latency, real-time interactions
- ➔ **Media & Entertainment** : Enable real-time video rendering and editing by keeping the compute resources near the production sites
- ➔ **Hybrid Cloud Applications** : Extend on-premises applications to the cloud with low-latency connections to AWS services.
- ➔ **Machine Learning Inference** : Deploy machine learning models closer to end-users

Edge networking services with appropriate use cases

AWS Wavelength

- ➔ **AR and VR** : Deliver AR/VR experiences with ultra-low latency by processing data closer to end-users
- ➔ **Autonomous Vehicles** : Enable real-time data processing and decision-making for autonomous vehicles through low-latency edge computing
- ➔ **Smart Cities** : Support smart city applications such as traffic management and real-time surveillance
- ➔ **Healthcare** : Facilitate telemedicine\remote patient monitoring by processing data closer to patients

AWS Outposts

- ➔ **Data Residency Requirements** : Host applications that need to remain on-premises due to regulatory reqr.
- ➔ **Low-Latency Applications** : Run applications that require low-latency access to on-premises systems
- ➔ **Hybrid Cloud Workloads** : Seamlessly integrate on-premises applications with AWS cloud services
- ➔ **Manufacturing and Industrial IoT** : Deploy real-time processing applications\ML models

Amazon Route 53

- ➔ **Global Traffic Management** : Distribute traffic across multiple regions for HA and fault tolerance
- ➔ **Latency-Based Routing** : Route users to the AWS region that provides the lowest latency.
- ➔ **Geolocation Routing** : Serve content specific to the geographic location of your users.
- ➔ **DNS Failover** : Ensure application availability by routing traffic to healthy endpoints during failures.

Design Network Architecture

- Designing a network architecture in AWS (Amazon Web Services) involves creating a secure, scalable, and efficient network setup that supports the requirements of your application

  - Define Requirements
  - Create a Virtual Private Cloud (VPC)
  - Configure Route Tables
  - Set Up Internet Gateway and NAT Gateway
  - Security Groups and Network ACLs
  - Setup Bastion Host
  - Implement High Availability and Fault Tolerance
  - Connect to On-Premises Networks
  - Monitoring and Logging

Network Topology for different architectures

Single VPC Architecture

- ➔ Public Subnets : Resources that need direct access to the internet (e.g., web servers)
- ➔ Private Subnets : Resources that don't require direct internet access (e.g., databases)
- ➔ Internet Gateway : Provides internet access for resources in the public subnet
- ➔ NAT Gateway : Allows resources in private subnets to access the internet without exposing directly

Multi-VPC Architecture

- ➔ VPC Peering : Establishes connectivity between VPCs
- ➔ Transit Gateway : Central hub for connecting multiple VPCs and on-premises networks
- ➔ Direct Connect : Provides a dedicated network connection between on-premises and AWS
- ➔ VPN : Secure connection over the internet for on-premises to AWS connectivity

Microservices Architecture

- ➔ Public and Private Subnets : Separation of frontend and backend services
- ➔ Elastic Load Balancers : Distribute traffic across multiple services
- ➔ Amazon ECS/EKS : Manage containerized applications
- ➔ Service Mesh : Enhance inter-service communication, observability and security

Network Topology for different architectures

High Availability and Disaster Recovery Architecture

- ➔ Multi-Region Deployment : Distributes resources across different geographical regions
- ➔ Elastic Load Balancers : Span multiple AZs to ensure fault tolerance
- ➔ Route 53 : Manages DNS and routes traffic based on health checks and latency
- ➔ RDS Read Replicas and Cross-Region Replication : Ensures database availability and durability.

Serverless Architecture

- ➔ Lambda Functions : Executed in response to events.
- ➔ API Gateway : Manages and secures APIs.
- ➔ DynamoDB : NoSQL database service for fast and predictable performance.
- ➔ S3 : Object storage for storing application data and assets.
- ➔ EventBridge : Event bus for integrating various AWS services and third-party applications.

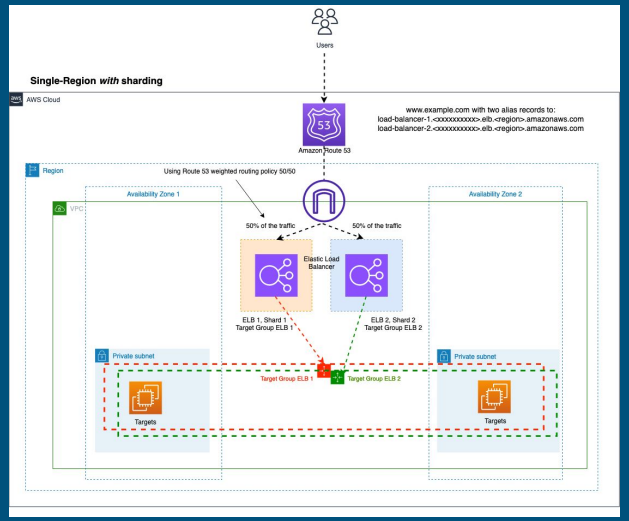
Network configurations

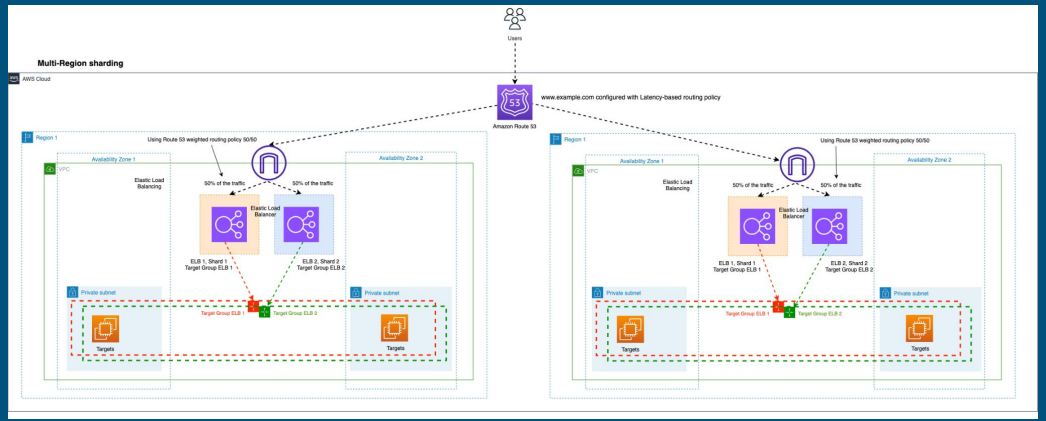
Configuring a network in AWS (Amazon Web Services) involves setting up and managing various components to ensure secure and efficient communication within and between AWS resources.
Key elements and steps involved in configuring a network in AWS -

- ➔ Virtual Private Cloud (VPC)
- ➔ Subnets
- ➔ Route Tables
- ➔ Internet Gateway
- ➔ NAT Gateway
- ➔ Security Groups and Network ACLs
- ➔ Elastic Load Balancer (ELB)
- ➔ VPC Peering
- ➔ VPN and Direct Connect

Load balancing strategy

- Elastic Load Balancing offer 4 types of load balancers - Application LB(ALB), Network LB(NLB) , Gateway LB(GWLB) and Classic LB(CLB)
- Single ELB handles all of the traffic but when using sharding , the overall traffic is distributed across multiple ELB's with which each ELB handling s portion of the overall traffic
- Sharding architectures
  - **Single Region Sharding**
  - **Multi Region Sharding**





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