# Availability & Troubleshooting in the Cloud

TEKsystems Global Services

# WORKFORCE DEVELOPMENT

# COURSE STRUCTURE

**Day 1:** Networking Fundamentals I

**Day 2:** Networking Fundamentals II

**Day 3:** Networking in the Cloud Era

**Day 4:** Cloud Network Services & Connectivity

**Day 5:** Availability & Troubleshooting in the Cloud

# AGENDA FOR DAY 5

1. High Availability & Resilience
2. Hybrid Connectivity and Availability
3. Troubleshooting Cloud Networking

# HIGH AVAILABILITY & RESILIENCE ON AWS

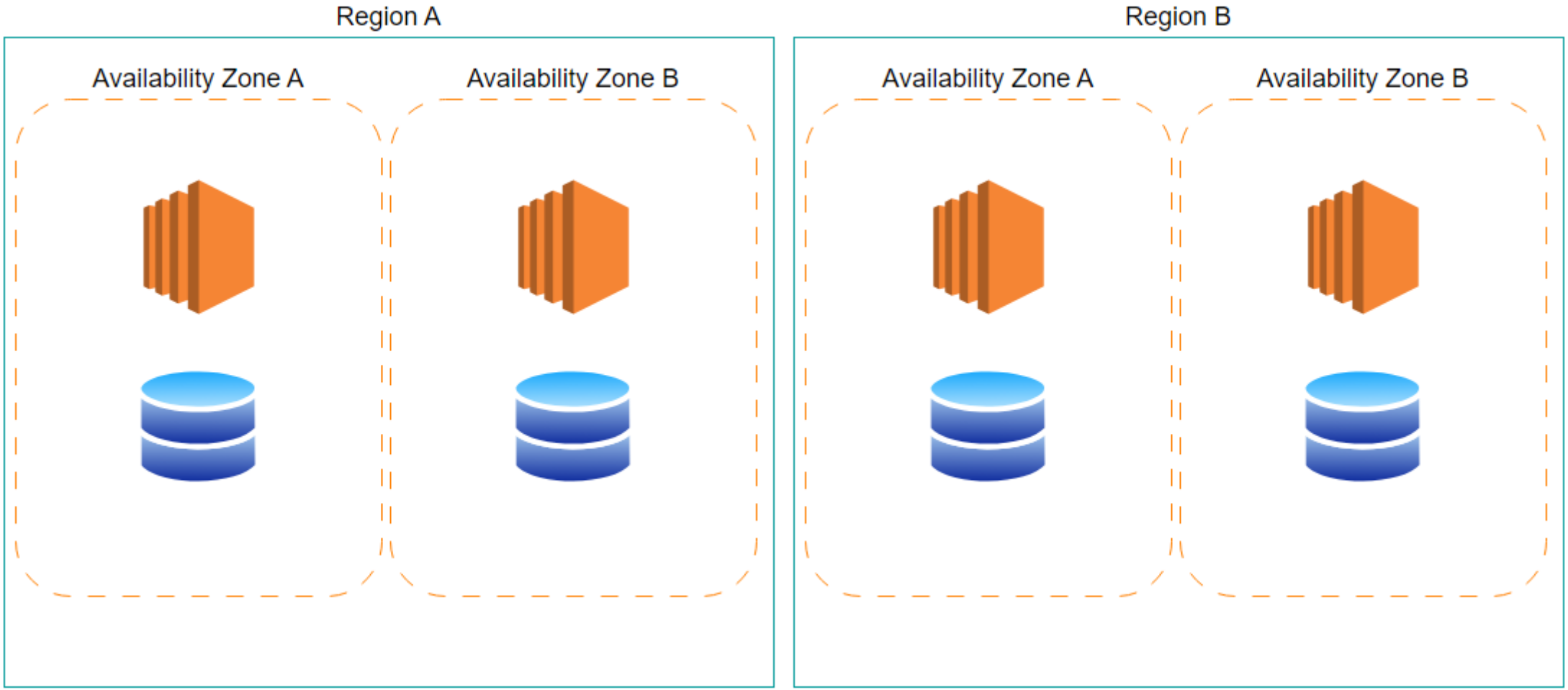
# WHAT HIGH AVAILABILITY MEANS


High availability is defined by a system's ability to remain operational and accessible to users for a very high percentage of the time, often 99.9% or higher, with minimal to no downtime.

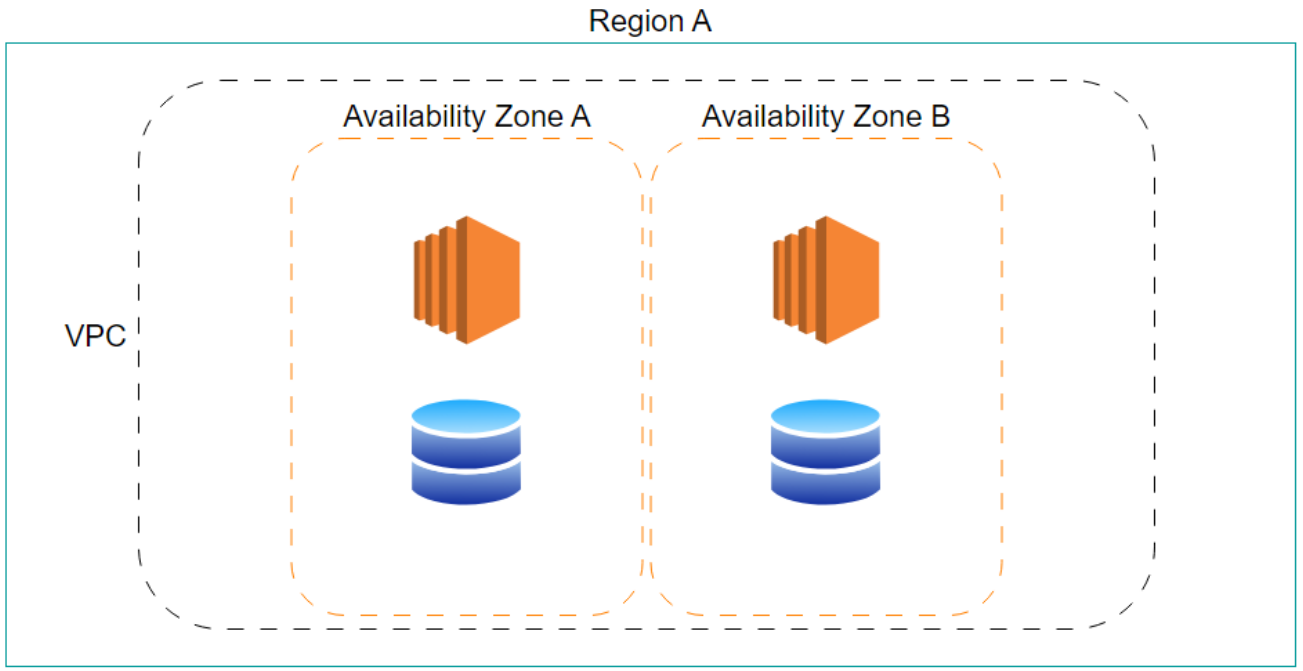
The goal will be to go above 99.99% availability when the systems requires it.

# AWS REGION AND AVAILABILITY ZONES

*"Design services to remain available even if part of the infrastructure fails."*



# MULTI-AZ ARCHITECTURE




Multi Availability Zone Architecture can be used to achieve redundancy, automatic failover, which leads to increase availability.

Each VPC spans multiple availability zones.

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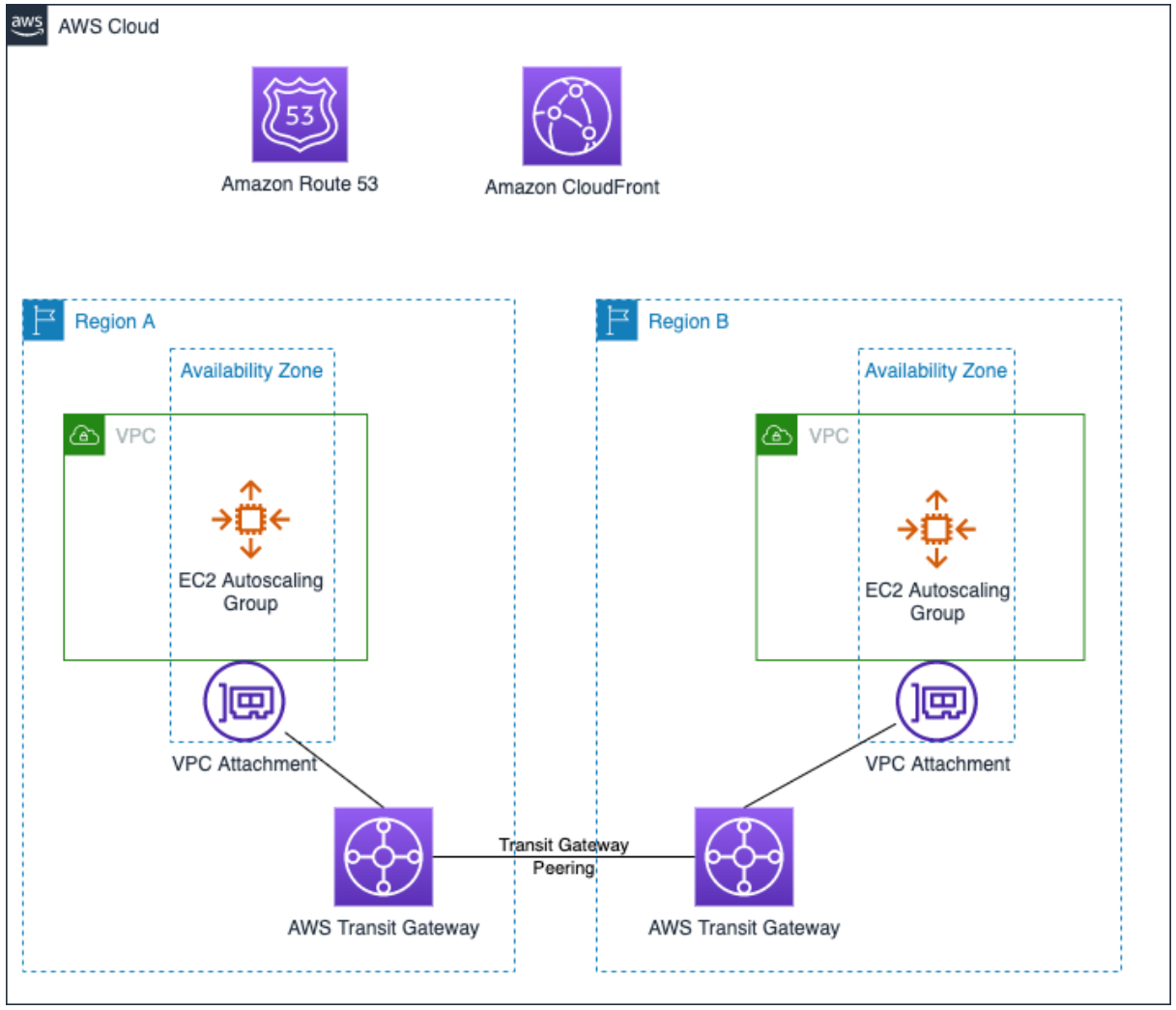


Multi-Region Architecture aims at achieving global load balancing and disaster recovery.

AWS provides tools like Route53 for load balancing and CloudFront as content delivery network service, providing low latency and high transfer speeds.

# DESIGNING FOR FAILURE ON AWS

- Assume instances, AZs, and links can fail.
- Automate recovery → Auto Scaling Groups.
- Decouple using SQS, SNS, EventBridge.
- Monitor with CloudWatch + AWS Health Dashboard.
- Store state in durable services (S3, DynamoDB, RDS).

# LAB 1: MULTI-AZ WEB APP

- Goal: Build a redundant web tier in two AZs.
- Steps:
  - Create Auto Scaling Group (ASG) across 2 AZs.
  - Attach Application Load Balancer (ALB).
  - Deploy sample app via Launch Template.
  - Stop instances in one AZ → verify traffic shifts.

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A. Multi-Region replication
B. Multi-AZ deployments
C. Elastic IPs
D. NAT Gateways

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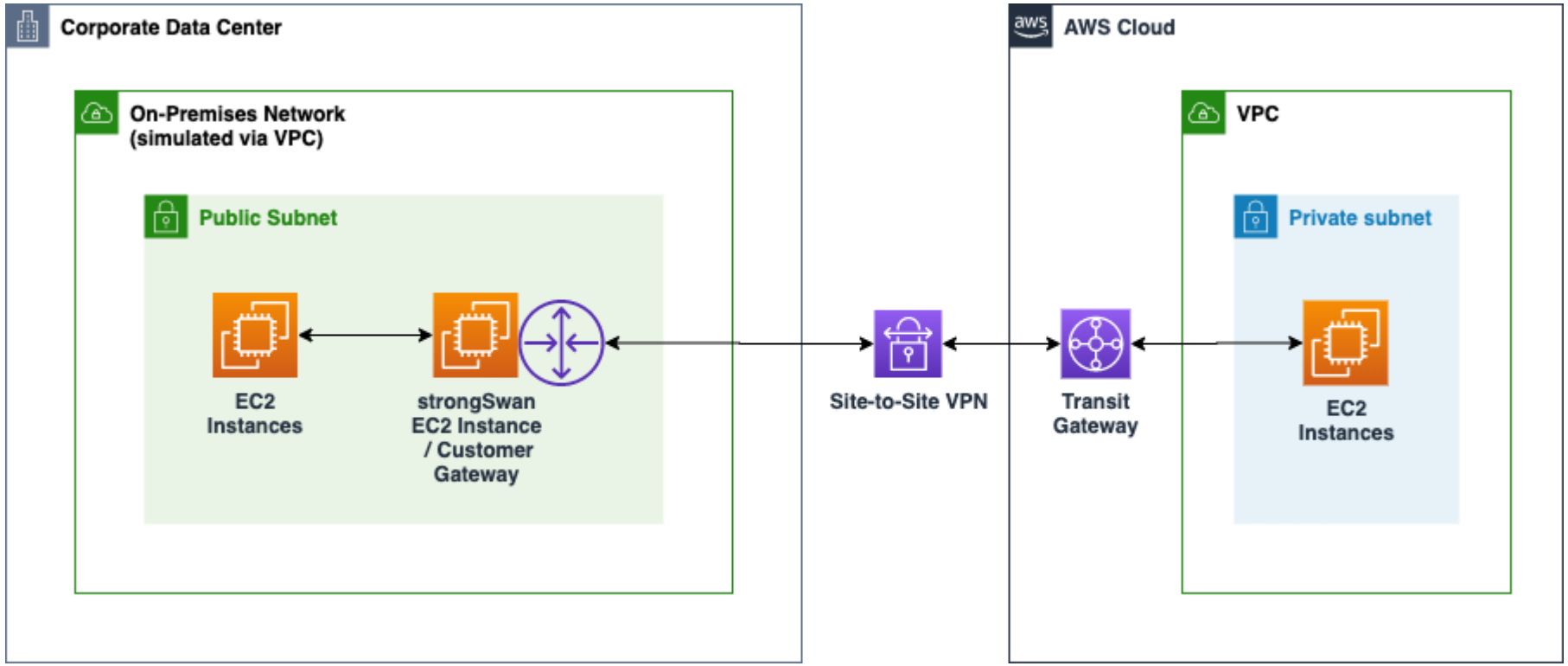
# HYBRID CONNECTIVITY AND AVAILABILITY

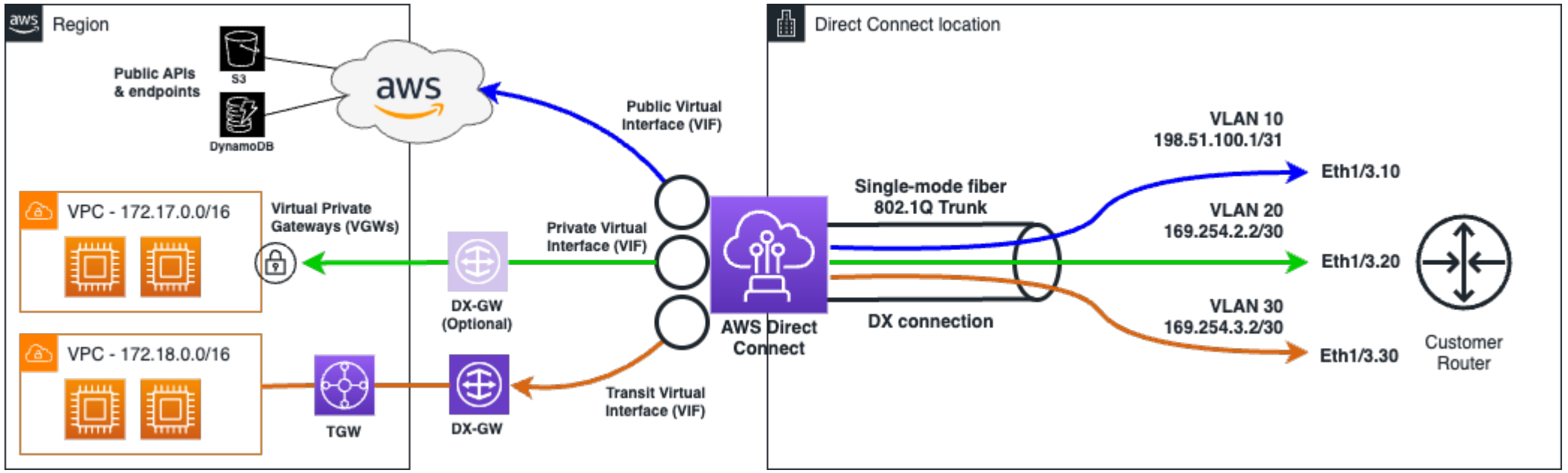
# SITE-TO-SITE VPN OVERVIEW

- AWS VPN = VGW (Virtual Private Gateway) + CGW (Customer Gateway).
- Two IPsec tunnels per connection (default redundancy).
- Supports BGP for dynamic failover.



# AWS DIRECT CONNECT FOR RESILIENCY

Direct Connect links your internal network to an Direct Connect location over a standard Ethernet fiber-optic cable to AWS Services.



# AWS DIRECT CONNECT PRICING

3 factors will determine pricing when it comes to AWS Direct Connect :

- Capacity : Maximum rate that data can be transferred through a network, measured in mega or gigabit per second (gpbs)
- Port hours : Measure the time that a port is provisioned for. Price will depend on the connection type, dedicated or hosted.
- Data Transfer out, or DTO: Refers to the cumulative network traffic that is sendt out of AWS through Direct Connect location.

# LAB 2: VPN FAILOVER MONITORING

- Goal: Observe AWS VPN failover behavior.
- Steps:
  - Create Site-to-Site VPN with two tunnels.
  - Bring down primary Customer Gateway interface.
  - View CloudWatch metric TunnelState.
  - Confirm secondary tunnel handles traffic.

# POP QUIZ:

What is the main benefit of AWS Direct Connect compared to a VPN connection?

A. Uses the public internet for redundancy
B. Provides a dedicated, private fiber link for low latency and consistency
C. Requires less configuration effort
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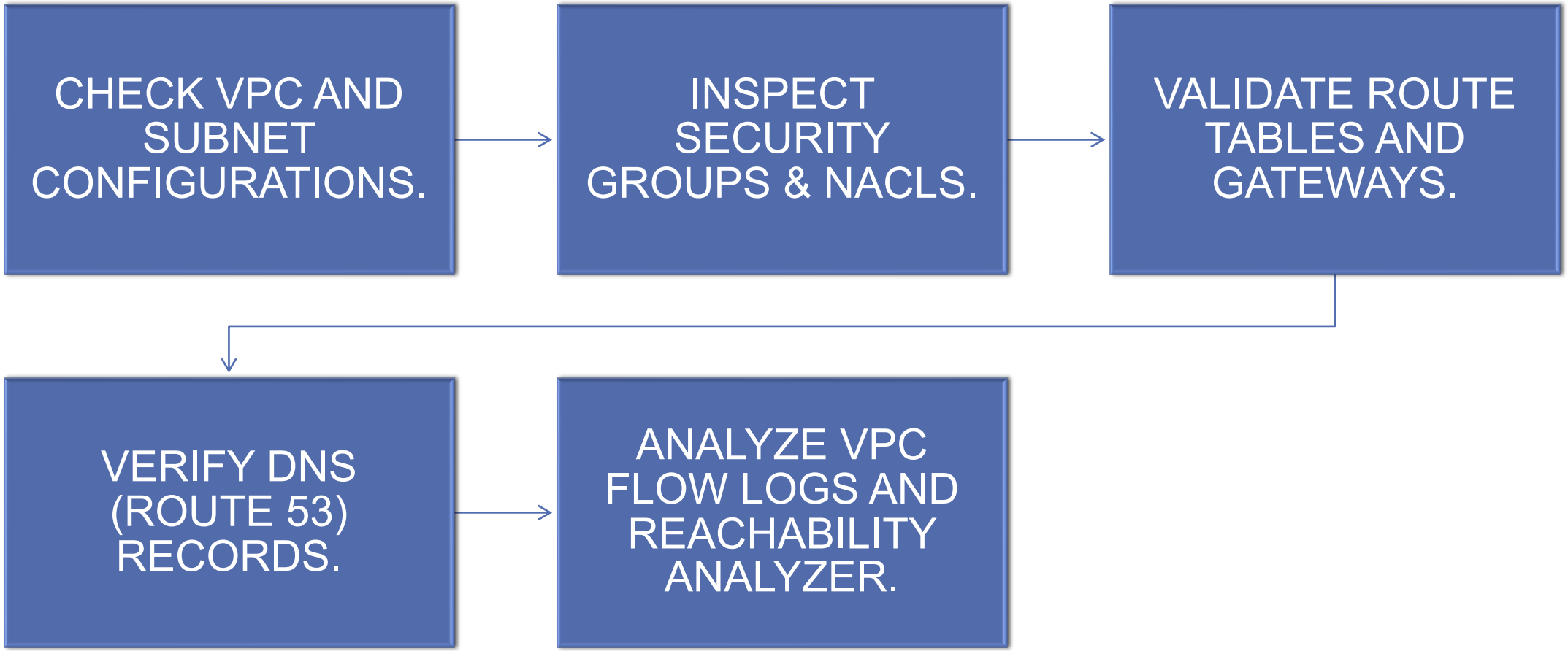
# TROUBLESHOOTING AWS NETWORK CONNECTIVITY

# TROUBLESHOOTING WORKFLOW IN AWS



# COMMON AWS NETWORK ISSUES

| Component | Issue Identified |
| --- | --- |
| Security Groups | Missing inbound/outbound rules |
| NACLs | Overly restrictive stateless filters |
| Route Tables | No route to Internet Gateway or Peering link |
| DNS | Private/public mismatch |
| Load Balancer | Targets failing health checks |

# AWS NETWORK DIAGNOSTICS TOOLS

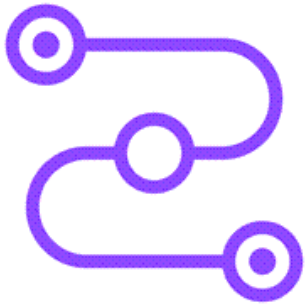
## AWS Config

Track Network changes

## AWS Cloudwatch

VPC logs and traffic insights

## Reachability Analyzer



End-to-end connectivity assessment

## CLI Tools

In-instance command line tools

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What is the first step in troubleshooting AWS network issues?

A. Check DNS propagation
B. Validate VPC, subnets, and routing configurations
C. Restart EC2 instances
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# LAB 3: TROUBLESHOOTING COMMON VPC ISSUES

- Goal: Diagnose and fix network connectivity problems.
- Steps:
  - Build working environment then intentionally break it.
  - Troubleshoot NAT Gateway connectivity issues.
  - Fix ALB health check and security group problems.
  - Restore VPC peering route configurations.

# WRAP-UP : AWS RESILIENCY RECAP

- Multi-AZ and Auto Scaling → continuous availability.
- Route 53 + VPN/Direct Connect → resilient connectivity.
- CloudWatch + SNS → real-time visibility.
- Well-Architected Framework = design checklist.