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DevOps Engineer Diploma

DevOps Engineer Diploma

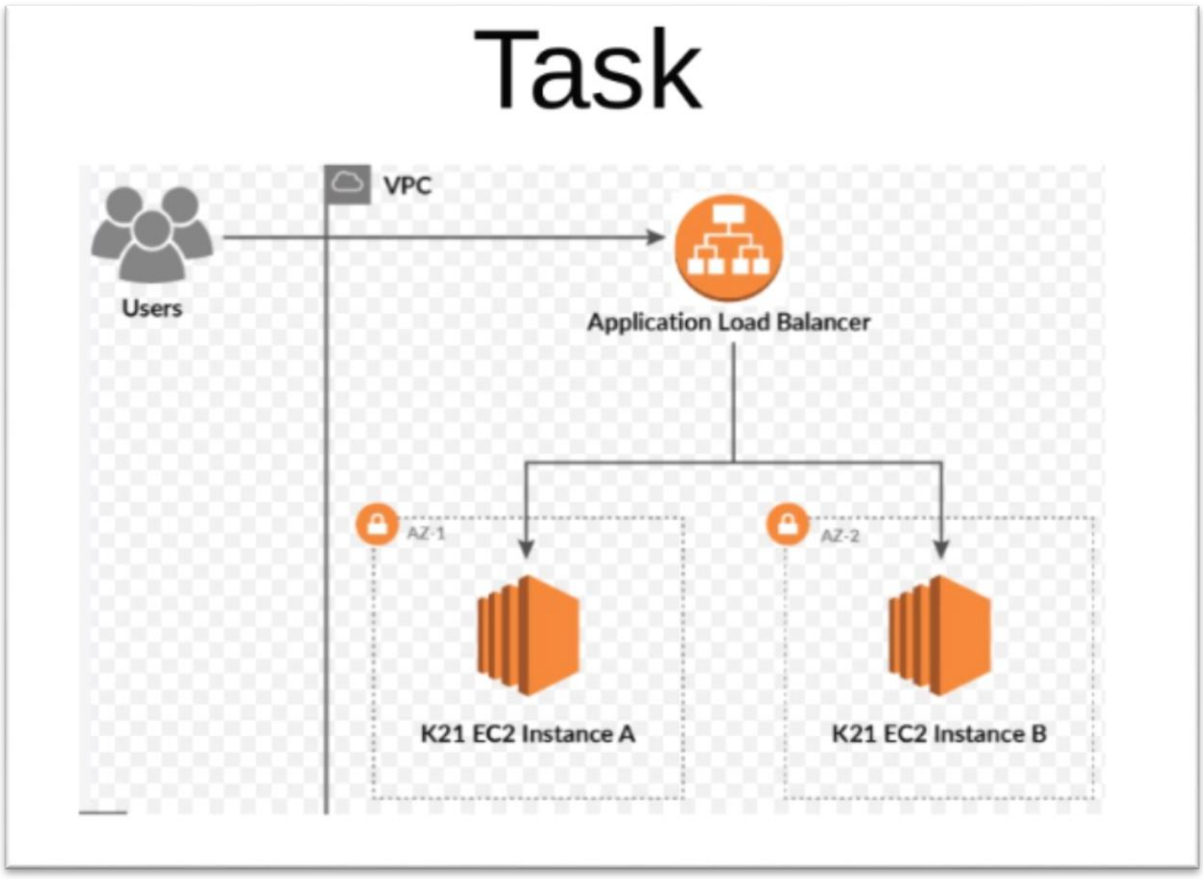
AWS Labs

Lab 18

Deploying EC2 Instances Behind an Application Load Balancer

Lab Objectives

- Working with VPC Networking
- Deploying EC2 Instances Across Availability Zones
- Configuring an Application Load Balancer
- Ensuring High Availability Across Multiple AZs
- Managing Security Groups and Instance Access
- Verifying Load Balancer Traffic Distribution



In this lab, you will design and deploy a highly available web application architecture on AWS using a Virtual Private Cloud (VPC), multiple EC2 instances, and an Application Load Balancer (ALB). The focus of this lab is understanding how traffic flows from end-users to backend compute resources across multiple Availability Zones for improved fault tolerance and scalability.

Scenario Overview

A group of users needs to access a web application hosted within a VPC. Instead of directing traffic to a single server, the architecture uses an **Application Load Balancer** to intelligently distribute requests across multiple EC2 instances deployed in different Availability Zones. This ensures the application remains responsive even if one AZ becomes unavailable.

The environment consists of:

1. Users

- External clients accessing the application via the public endpoint of the Application Load Balancer.

- Users are unaware of the EC2 backend and only interact with the ALB.

2. VPC (Virtual Private Cloud)

- Acts as the isolated network environment hosting all AWS resources in this lab.
- Contains subnets across at least two Availability Zones to support high availability.

3. Application Load Balancer

- Serves as the entry point for user traffic.
- Distributes HTTP/HTTPS requests evenly between backend EC2 instances.
- Provides health checks to ensure traffic is only routed to healthy instances.
- Enhances application reliability and scalability.

4. Availability Zones

Two distinct Availability Zones are used:

AZ-1

- Hosts **EC2 Instance A** (labeled K21 EC2 Instance A).
- Provides redundancy so that the application continues serving traffic if AZ-2 fails.

AZ-2

- Hosts **EC2 Instance B** (labeled K21 EC2 Instance B).
- Ensures load balancing across different physical data centers for increased resiliency.

Both EC2 instances run the same application code or web server, ensuring consistent behavior regardless of which instance receives the request.

Architecture Purpose

This architecture models a **high-availability multi-AZ deployment**, commonly used for production-grade web applications. Key goals include:

- **Fault tolerance:** If one instance or Availability Zone becomes unavailable, the application remains online.
- **Scalability:** Additional instances can be added behind the ALB with minimal changes.
- **Load distribution:** Requests are shared across instances to avoid performance bottlenecks.
- **Abstraction:** Users interact only with the ALB, never directly with backend EC2 instances.

What You Will Build

By the end of the lab (without providing the solution here), the expected architecture will include:

- A properly configured **VPC** with subnets in multiple Availability Zones.
- Two **EC2 instances** running the same application in separate AZs.
- An **Application Load Balancer** that routes user traffic to both instances.
- Security controls ensuring proper access to the ALB and instances.
- A working multi-AZ, load-balanced web application architecture.

You are Welcome