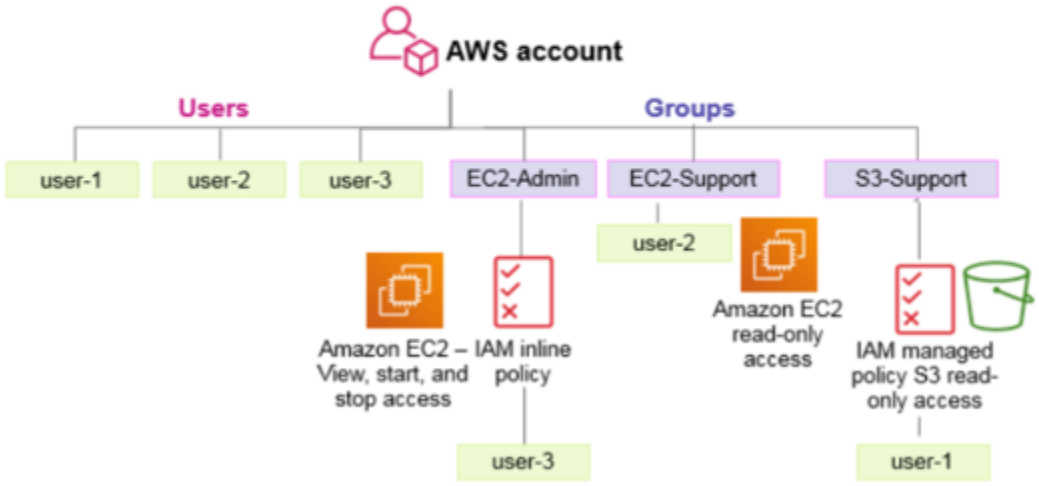
AWS Cloud Infrastructure Labs – Detailed Engineering Notes

Lab 1: Introduction to IAM

Final Product:



Lab 1: Introduction to AWS IAM

Problem

Cloud environments require strict access control to prevent unauthorized actions, accidental misconfigurations, and security breaches. Managing permissions at scale without individual credential sharing is a core challenge in production systems.

Solution

Implemented AWS Identity and Access Management (IAM) to:

- **Create users, groups, and roles**
- **Assign fine-grained permissions using IAM policies**
- **Enforce the principle of least privilege**
- **Use role-based access instead of long-term credentials**

Impact

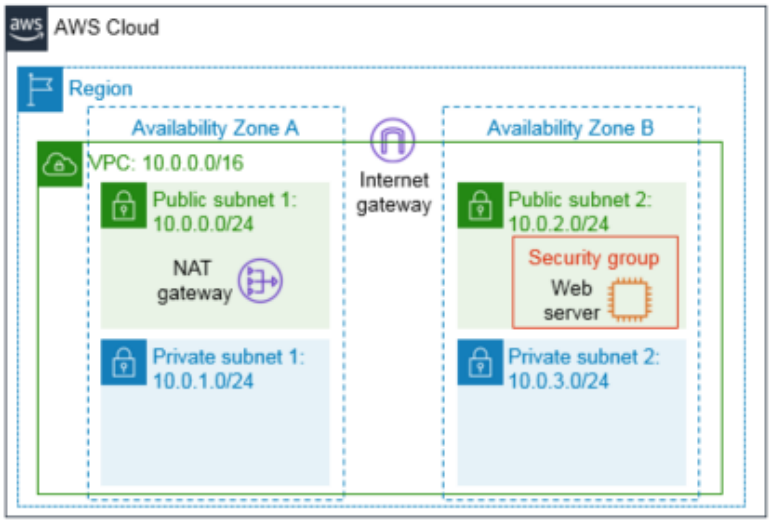
- **Reduced security risk by isolating permissions**
- **Enabled secure access delegation for services and users**
- **Established a foundation for secure cloud operations**

Key Learnings

- **IAM is the security backbone of AWS**
- **Policies are evaluated using explicit allow/deny logic**
- **Roles are preferred over access keys in production systems**

Lab 2: Build the VPC and Launch a Web Server

Final Product:



Public Route Table

Destination	Target
10.0.0.0/16	Local
0.0.0.0/0	Internet gateway

Private Route Table

Destination	Target
10.0.0.0/16	Local
0.0.0.0/0	NAT gateway

Lab 2: Build Your VPC and Launch a Web Server

Problem

Applications must be isolated from public networks while still allowing controlled internet access. Flat networks introduce security and scalability risks.

Solution

Designed a custom Virtual Private Cloud (VPC) with:

- **Public and private subnets**
- **Route tables and Internet Gateway**
- **Security Groups to allow HTTP/SSH traffic**
- **EC2 instance deployed as a web server**

Impact

- **Achieved network isolation and controlled exposure**
- **Enabled secure inbound/outbound communication**
- **Established a scalable networking foundation**

Key Learnings

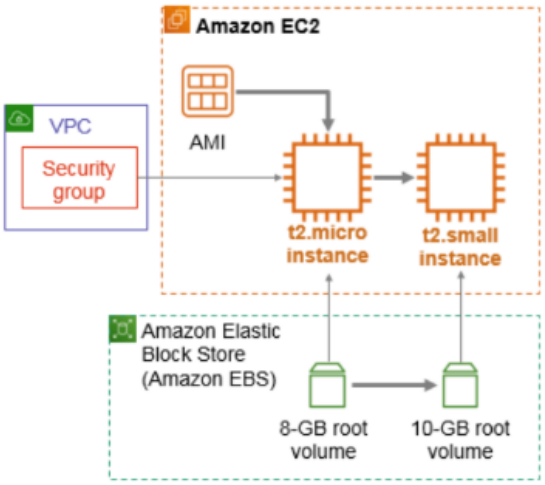
- **VPCs provide logical network isolation**
- **Subnet design impacts security and scalability**
- **Internet Gateways enable controlled public access**

Lab 3: Introduction to Amazon EC2 (Cont.)

Final Product:

By the end of the lab, you will have:

- **Launched an instance that is configured as a web server**
- **Viewed the instance system log**
- **Reconfigured a security group**
- **Modified the instance type and root volume size**



Lab 3: Introduction to Amazon EC2

Problem

Applications require flexible compute resources that can be provisioned and scaled on demand without hardware dependency.

Solution

Provisioned EC2 instances with:

- Appropriate instance types
- Key pairs for secure access
- Security groups for traffic control
- Lifecycle management (start, stop, terminate)

Impact

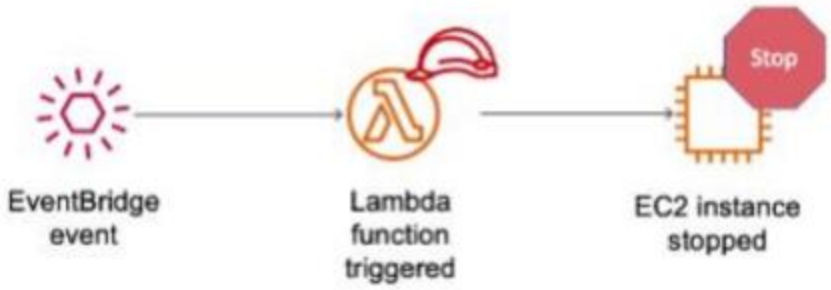
- Enabled rapid compute provisioning
- Improved operational flexibility
- Reduced infrastructure setup time

Key Learnings

- Instance type selection affects performance and cost
- Security groups act as stateful firewalls
- EC2 forms the foundation of IaaS workloads

Lab 3.2: AWS Lambda Activity (Cont.)

Final Product:



AWS Lambda Activity

Problem

Not all workloads require continuously running servers. Idle compute increases cost and complexity.

Solution

Implemented AWS Lambda to:

- Execute code in response to events
- Eliminate server management
- Scale automatically

Impact

- Reduced operational overhead
- Improved cost efficiency
- Enabled event-driven architectures

Key Learnings

- Serverless shifts focus from infrastructure to logic
- Billing is based on execution, not uptime
- Ideal for microservices and automation

Lab 4: Working with Amazon EBS

Lab Scenario:

This lab is designed to show you how to create an Amazon EBS volume. After you create the volume, you will attach the volume to an Amazon EC2 instance, configure the instance to use a virtual disk, create a snapshot and then restore from the snapshot.

Lab 4: Working with Amazon EBS

Problem

Compute instances require persistent storage that survives instance restarts and failures.

Solution

Attached Amazon Elastic Block Store (EBS) volumes to EC2:

- Created and mounted volumes
- Managed snapshots for backup
- Observed performance characteristics

Impact

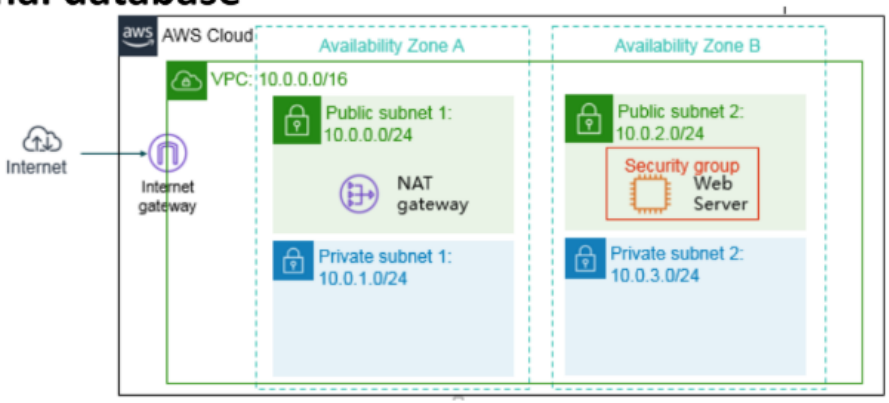
- Ensured data persistence independent of compute lifecycle
- Enabled backup and recovery strategies
- Improved reliability of stateful applications

Key Learnings

- EBS is tightly coupled with EC2
- Snapshots enable point-in-time recovery
- Storage performance affects application latency

Lab 5: Build a Database Server

Lab Scenario: **This lab is designed to show you how to use an AWS managed database instance to solve a need for a relational database**



Lab 5: Build a Database Server

Problem

Applications require reliable data storage with high availability and managed maintenance.

Solution

Deployed a database server using AWS services:

- Configured storage and access controls
- Enabled secure connectivity
- Applied best practices for durability

Impact

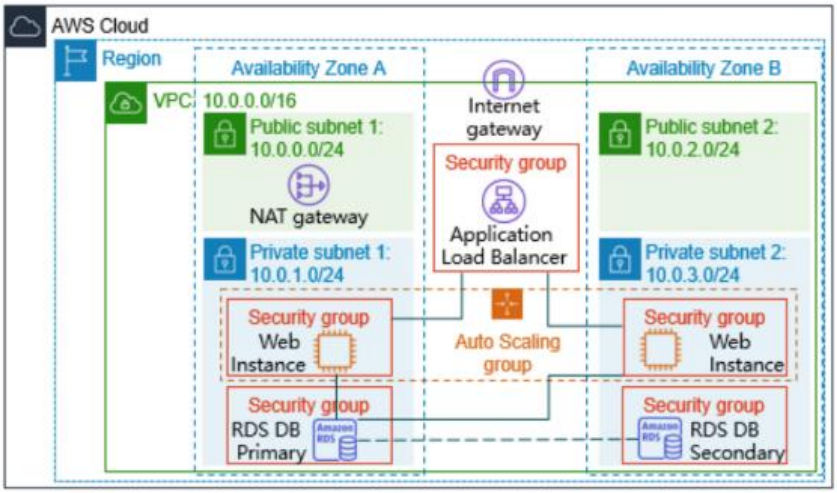
- Simplified database management
- Improved data reliability
- Reduced operational overhead

Key Learnings

- Managed databases reduce maintenance burden
- Security and networking are critical for databases
- Backup strategies are essential for data integrity

Lab 6: Scale and Load Balance Your Architecture (Cont.)

Final Product:



Lab 6: Scale & Load Balance Your Architecture

Problem

Single-instance architectures cannot handle traffic spikes or failures, leading to downtime.

Solution

Implemented:

- Auto Scaling Groups
- Elastic Load Balancer
- Multi-AZ deployment

Impact

- Achieved high availability
- Automatically handled traffic spikes
- Improved fault tolerance

Key Learnings

- Horizontal scaling improves resilience
- Load balancers distribute traffic efficiently
- Multi-AZ design is critical for production systems

These labs collectively simulate **real-world cloud engineering workflows** involving security, networking, scalability, reliability, and cost control—core competencies expected of engineers at FAANG-scale organizations.