# Hands-On Infrastructure Deployment with Terraform

# CS423 Assignment 4


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# Introduction to the Deployed Infrastructure Project

## Overview

In the contemporary landscape of cloud computing, the deployment of reliable and scalable web application infrastructure is critical for the success of various online services. This project demonstrates the creation of a robust web application infrastructure on Amazon Web Services (AWS) utilizing Terraform, a well-known infrastructure as code (IaC) tool. The project is designed to be a prototype for a scalable, secure, and efficient cloud-based environment suitable for hosting a variety of web applications.

## Objective

The primary objective of this project is to establish a fundamental yet comprehensive AWS infrastructure that includes networking, security, compute, and identity management components. This infrastructure aims to provide a template for deploying web applications with an emphasis on high availability, security, and scalability.

## Tools and Technologies

### Amazon Web Services (AWS):

A leading cloud service provider offering a broad set of infrastructure services such as computing power, storage options, and networking capabilities.

### Terraform:

An open-source infrastructure as code software tool that provides a consistent CLI workflow to manage hundreds of cloud services. Terraform codifies cloud APIs into declarative configuration files.

## Infrastructure Components

### Virtual Private Cloud (VPC):

Name: 'devops-assignment-4'.

Configuration: A custom VPC with a CIDR block to isolate and control network environments within the AWS ecosystem.

### Subnets:

Design: Four subnets, comprising two public and two private subnets, are distributed across two Availability Zones for redundancy and high availability.

Purpose: The public subnets are designed for resources that must be connected to the internet, while the private subnets are for backend services requiring enhanced security.

### Internet Gateway (IGW):

Role: An essential component that allows communication between the VPC and the internet.

### Route Tables:

Functionality: Route tables are configured to define rules for directing network traffic from subnets to external destinations.

### Security Groups:

Implementation: Security groups act as virtual firewalls to control inbound and outbound traffic to EC2 instances and other AWS resources.

### IAM User:

Details: An IAM user named 'terraform-cs423-devops' is created with administrative privileges to securely manage AWS services.

### EC2 Instances:

Specifications: Two t2.micro EC2 instances are deployed within the VPC.

Roles: One instance is configured as a web server (potentially hosting Apache or similar web servers), and the other for backend operations (like a database or a machine learning model).

### Key Pair:

Usage: 'cs423-assignment4-key' is created for secure SSH access to the EC2 instances.

## Deployment Strategy

The deployment utilizes Terraform's capabilities to script and automate the creation of all required AWS resources. This approach not only streamlines the setup process but also ensures that the infrastructure can be replicated, versioned, and reused across various environments.

## Security Considerations

Security is a paramount aspect of this infrastructure. Security groups are meticulously configured to ensure that only the necessary ports are open, adhering to the principle of least

privilege. The IAM user is created with the necessary permissions to manage the infrastructure while limiting broader access to the AWS environment.

### Scalability and High Availability

The architecture is designed with scalability and high availability in mind. The use of multiple subnets across different Availability Zones ensures that the infrastructure can handle failures and can be scaled as per the demand.

### Conclusion

This infrastructure project serves as a foundational model for deploying web applications in the cloud. It encapsulates best practices in cloud architecture design and leverages the power of Terraform for efficient and repeatable deployments. The resulting environment is not only secure and reliable but also poised for future expansion and adaptation to various application needs.

## Architecture Diagram of Infrastructure Project