

Terraform Practice Exercises for DevOps Engineers



Exercise 1: Provision an EC2 Instance on AWS

Question:

Provision an EC2 instance using Terraform on AWS. Define the AMI, instance type, and key pair as variables.

Answer:

```
# Define provider
provider "aws" {
  region = "us-east-1"
}

# Define variables
variable "ami" {
  default = "ami-0c55b159cbfafa1f0"
}

variable "instance_type" {
  default = "t2.micro"
}

variable "key_name" {
  default = "my-key"
}

# EC2 instance resource
resource "aws_instance" "example" {
  ami           = var.ami
  instance_type = var.instance_type
  key_name      = var.key_name
}
```

```
# Output the public IP
output "instance_ip" {
  value = aws_instance.example.public_ip
}
```

Steps to follow:

1. Initialize Terraform: `terraform init`
2. Validate: `terraform validate`
3. Apply: `terraform apply`
4. Check the output for the EC2 instance's public IP.

Exercise 2: Create a VPC with Subnets

Question:

Using Terraform, create a VPC with two subnets (public and private). Ensure that the public subnet has access to the internet via an internet gateway.

Answer:

```
# Provider configuration
provider "aws" {
  region = "us-east-1"
}

# VPC
resource "aws_vpc" "example_vpc" {
  cidr_block = "10.0.0.0/16"
}

# Internet Gateway
resource "aws_internet_gateway" "example_igw" {
  vpc_id = aws_vpc.example_vpc.id
}

# Public Subnet
resource "aws_subnet" "public_subnet" {
  vpc_id            = aws_vpc.example_vpc.id
  cidr_block        = "10.0.1.0/24"
  map_public_ip_on_launch = true
}
```

```

}

# Private Subnet
resource "aws_subnet" "private_subnet" {
  vpc_id      = aws_vpc.example_vpc.id
  cidr_block  = "10.0.2.0/24"
}

# Route Table for Public Subnet
resource "aws_route_table" "public_route_table" {
  vpc_id = aws_vpc.example_vpc.id
}

resource "aws_route" "public_route" {
  route_table_id      = aws_route_table.public_route_table.id
  destination_cidr_block = "0.0.0.0/0"
  gateway_id          = aws_internet_gateway.example_igw.id
}

# Associate Route Table with Public Subnet
resource "aws_route_table_association" "public_association" {
  subnet_id      = aws_subnet.public_subnet.id
  route_table_id = aws_route_table.public_route_table.id
}

```

Steps to follow

1. Initialize Terraform: `terraform init`
2. Apply the configuration: `terraform apply`
3. Verify the VPC and subnet configuration in the AWS console.

Exercise 3: S3 Bucket with Versioning and Encryption

Question:

Create an S3 bucket with versioning and server-side encryption enabled using Terraform.

Answer:

```

# S3 bucket resource
resource "aws_s3_bucket" "example_bucket" {
  bucket = "my-example-bucket"
  acl    = "private"
}

```

```

versioning {
  enabled = true
}

server_side_encryption_configuration {
  rule {
    apply_server_side_encryption_by_default {
      sse_algorithm = "AES256"
    }
  }
}

# Output the bucket name
output "bucket_name" {
  value = aws_s3_bucket.example_bucket.bucket
}

```

Steps to follow:

1. Initialize Terraform: `terraform init`
2. Apply: `terraform apply`
3. Check the AWS console for the S3 bucket, versioning, and encryption settings.

Exercise 4: Deploy a Simple Web Server on EC2

Question:

Deploy a simple web server on an EC2 instance. Use user data to automatically install and run a web server.

Answer:

```

# Provider configuration
provider "aws" {
  region = "us-east-1"
}

# EC2 instance
resource "aws_instance" "web_server" {
  ami           = "ami-0c55b159cbfaffe1f0"
  instance_type = "t2.micro"
  key_name      = "my-key"
}

```

```

user_data = <<-EOF
#!/bin/bash
sudo yum update -y
sudo yum install -y httpd
sudo systemctl start httpd
sudo systemctl enable httpd
EOF

tags = {
  Name = "WebServer"
}

# Output the public IP
output "web_server_ip" {
  value = aws_instance.web_server.public_ip
}

```

Steps to follow:

1. Initialize Terraform: `terraform init`
2. Apply: `terraform apply`
3. Use the public IP of the instance to access the web server via a browser.

Exercise 5: Use Terraform to Manage IAM Roles and Policies

Question:

Create an IAM role for EC2 with a policy that allows access to S3.

Answer:

```

# IAM Role
resource "aws_iam_role" "ec2_role" {
  name = "ec2_role"

  assume_role_policy = jsonencode({
    Version = "2012-10-17"
    Statement = [
      {
        Action = "sts:AssumeRole"
        Effect = "Allow"
      }
    ]
  })
}

```

```

        Principal = {
          Service = "ec2.amazonaws.com"
        }
      }
    ]
  })
}

# IAM Policy
resource "aws_iam_policy" "s3_policy" {
  name = "s3_access_policy"

  policy = jsonencode({
    Version = "2012-10-17"
    Statement = [
      {
        Action = [
          "s3:ListBucket",
          "s3:GetObject"
        ]
        Effect = "Allow"
        Resource = [
          "arn:aws:s3:::my-bucket",
          "arn:aws:s3:::my-bucket/*"
        ]
      }
    ]
  })
}

# Attach Policy to Role
resource "aws_iam_role_policy_attachment" "attach_s3_policy" {
  role      = aws_iam_role.ec2_role.name
  policy_arn = aws_iam_policy.s3_policy.arn
}

```

Steps to follow:

1. Initialize Terraform: `terraform init`
2. Apply: `terraform apply`
3. Verify the IAM role and policy in the AWS console.

Exercise 6: Create an RDS MySQL Instance

Question:

Provision an Amazon RDS MySQL instance using Terraform with an allocated storage size of 20 GB and a db instance class of `db.t2.micro`.

Answer:

```
provider "aws" {
  region = "us-east-1"
}

resource "aws_db_instance" "example_db" {
  allocated_storage = 20
  engine            = "mysql"
  engine_version    = "5.7"
  instance_class    = "db.t2.micro"
  name              = "exampledb"
  username          = "admin"
  password          = "password"
  parameter_group_name = "default.mysql5.7"
  skip_final_snapshot = true
}

output "db_endpoint" {
  value = aws_db_instance.example_db.endpoint
}
```

Steps to follow:

1. Initialize Terraform: `terraform init`
2. Apply: `terraform apply`
3. Retrieve the DB endpoint from the output.