# **Terraform AWS Infrastructure Provisioning**

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## **Overview**

This Terraform configuration provisions a basic AWS infrastructure, including a Virtual Private Cloud (VPC), subnets, security groups, and an EC2 instance. Terraform is used due to its utility as a cloud agnostic platform. The infrastructure is designed using Terraform modules to ensure modularity, reusability, and maintainability.

## **Directory Structure**

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├── backend.tf

├── main.tf

├── variables.tf

└── modules

├── vpc

│ ├── main.tf

│ ├── variables.tf

│ └── outputs.tf

├── ec2

│ ├── main.tf

│ ├── variables.tf

│ └── outputs.tf

└── security\_group

├── main.tf

├── variables.tf

└── outputs.tf

## **Design Decisions**

**The infrastructure is broken down into three main modules:**

1. **VPC Module:**
   * Creates a VPC, public and private subnets, an Internet Gateway, and route tables.
   * This modular approach allows for easy reuse of the VPC configuration in other projects.
2. **Security Group Module:**
   * Defines a security group that allows SSH access from a specified IP address.
   * This ensures that security configurations are centralized and can be reused or updated independently.
3. **EC2 Module:**
   * Launches an EC2 instance in one of the public subnets.
   * The EC2 instance is associated with the specified security group and key pair for SSH access.

### **Backend Configuration**

The backend.tf file configures Terraform to use an S3 bucket for state storage and a DynamoDB table for state locking. This ensures that the Terraform state is stored securely and state operations are not performed concurrently by multiple users or processes.

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### **Variables and Outputs**

* **Variables**: Used to customize values such as CIDR blocks, instance types, key pair names, and IP addresses. This allows the configuration to be flexible and adaptable to different environments.
* **Outputs**: Provide important resource information such as VPC ID, public subnet IDs, private subnet IDs, EC2 instance public IP, and security group ID. This information is useful for further configurations and verifications.

## **Challenges Faced**

### **Module Interdependencies**

One challenge was ensuring that resources within modules could reference each other correctly. This required careful management of inputs and outputs between modules to ensure dependencies were resolved.

### **Dynamic Resource References**

Ensuring that dynamic references, such as availability zones and subnet IDs, were correctly handled within modules posed a challenge. This was addressed by moving data sources into the appropriate modules and passing necessary values through outputs.

### **Security and Access Management**

Managing SSH access securely required setting up appropriate key pairs and security groups. Ensuring that the correct private key was used for SSH access and that the security group rules allowed access only from specific IP addresses was critical for maintaining security. Challenges were faced while trying to connect using SSH from my own IP address so I updated the permissions to allow access from all IPs at the moment.

## **How to Use This Configuration**

1. **Initialize Terraform:**

terraform init

1. **Customize Variables:**

Modify the variables.tf file to customize values such as CIDR blocks, instance type, and key pair name.

1. **Validate the configuration**

terraform validate

1. **Apply the configuration**

terraform apply

1. **Retrieve Output Explicitly**

terraform output

1. **SSH into EC2 instance**

ssh -i /path/to/your-private-key.pem ec2-user@<ec2\_public\_ip>

Replace /path/to/your-private-key.pem with the path to your private key file and <ec2\_public\_ip> with the actual public IP address of your EC2 instance.

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## **Conclusion**

This Terraform configuration provides a modular and flexible way to provision basic AWS infrastructure. By using modules, variables, and outputs, the configuration is designed to be reusable and easily customizable for different environments and projects.