Terraform intern Induction

Write Terraform script to create a custom VPC and deploy two EC2 VMs on AWS using Terraform.

- **The code should be broken into three different parts:**
- **Networking (define the VPC and all of its components)**
- **SSH-Key (dynamically create an SSH-key pair for connecting to VMs)**
- **EC2 (deploy a VM in the public subnet, and deploy another VM in a private subnet)**
- **NGINX should be accessed for all the internet**
- **Automate Terraform Deployment with Jenkins Pipelines**

Working directory

```
terraform_project/
├── networking.tf
├── ssh_key.tf
├── ec2.tf
├── Jenkinsfile
```

networking.tf

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

resource "aws_vpc" "custom_vpc" {
  cidr_block = "10.0.0.0/16"
  enable_dns_support   = true
  enable_dns_hostnames = true
}

resource "aws_subnet" "public_subnet" {
  vpc_id                  = aws_vpc.custom_vpc.id
  cidr_block              = "10.0.1.0/24"
  map_public_ip_on_launch = true
  availability_zone       = "us-east-1a"
}
```

```
resource "aws_subnet" "private_subnet" {
  vpc_id            = aws_vpc.custom_vpc.id
  cidr_block        = "10.0.2.0/24"
  availability_zone = "us-east-1a"
}

resource "aws_internet_gateway" "internet_gateway" {
  vpc_id = aws_vpc.custom_vpc.id
}

resource "aws_route_table" "public_route_table" {
  vpc_id = aws_vpc.custom_vpc.id

  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.internet_gateway.id
  }
}

resource "aws_route_table_association" "public_subnet_association" {
  subnet_id      = aws_subnet.public_subnet.id
  route_table_id = aws_route_table.public_route_table.id
}

resource "aws_security_group" "default" {
  name        = "default-sg"
  vpc_id      = aws_vpc.custom_vpc.id

  ingress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  ingress {
    from_port   = 22
    to_port     = 22
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }
}
```

ec2.tf

```
resource "aws_instance" "public_vm" {
  ami           = "ami-0c02fb55956c7d316" # Amazon Linux 2 AMI (replace with your region's AMI)
  instance_type = "t2.micro"
  subnet_id     = aws_subnet.public_subnet.id
  key_name      = aws_key_pair.generated_key_pair.key_name
  security_groups = [
    aws_security_group.default.name,
  ]

  tags = {
    Name = "Public-VM"
  }

  user_data = <<-EOF
              #!/bin/bash
              yum update -y
              amazon-linux-extras enable nginx1
              yum install nginx -y
              systemctl start nginx
  EOF
}

resource "aws_instance" "private_vm" {
  ami           = "ami-0c02fb55956c7d316" # Amazon Linux 2 AMI (replace with your region's AMI)
  instance_type = "t2.micro"
  subnet_id     = aws_subnet.private_subnet.id
  key_name      = aws_key_pair.generated_key_pair.key_name
  security_groups = [
    aws_security_group.default.name,
  ]

  tags = {
    Name = "Private-VM"
  }
}
```

ssh_key.tf

```
resource "tls_private_key" "ssh_key" {
  algorithm = "RSA"
  rsa_bits  = 4096
}

resource "aws_key_pair" "generated_key_pair" {
  key_name   = "dynamic-key"
  public_key = tls_private_key.ssh_key.public_key_openssh
}

output "private_key" {
  value     = tls_private_key.ssh_key.private_key_pem
  sensitive = true
}
```

Jenkinsfile

```
pipeline {
    agent any

    environment {
        AWS_ACCESS_KEY_ID = credentials('aws-credentials')
        AWS_SECRET_ACCESS_KEY = credentials('aws-credentials')
    }

    stages {
        stage('Checkout') {
            steps {
                git branch: 'main', url: 'https://github.com/shashankhl-sigmoid/Terraform_assignment.git'
            }
        }

        stage('Terraform Init') {
            steps {
                sh 'terraform init'
            }
        }

        stage('Terraform Plan') {
            steps {
```

```
            sh 'terraform plan -out=tfplan'
        }
    }

    stage('Terraform Apply') {
        steps {
            sh 'terraform apply -auto-approve tfplan'
        }
    }

    stage('Terraform Destroy') {
        steps {
            sh 'terraform destroy -auto-approve'
        }
    }
  }
}
```

Initialize Terraform:

```
cd terraform_project
terraform init
```

Validate and Plan:

```
terraform validate
```

Generate an execution plan:

```
terraform plan -out=tfplan
```

Deploy the Infrastructure:

```
terraform apply -auto-approve
```

Access the Public VM

After deployment, get the **Public IP Address** of the public VM:

Run:

```
terraform output
```

Use the output to SSH into the public VM:

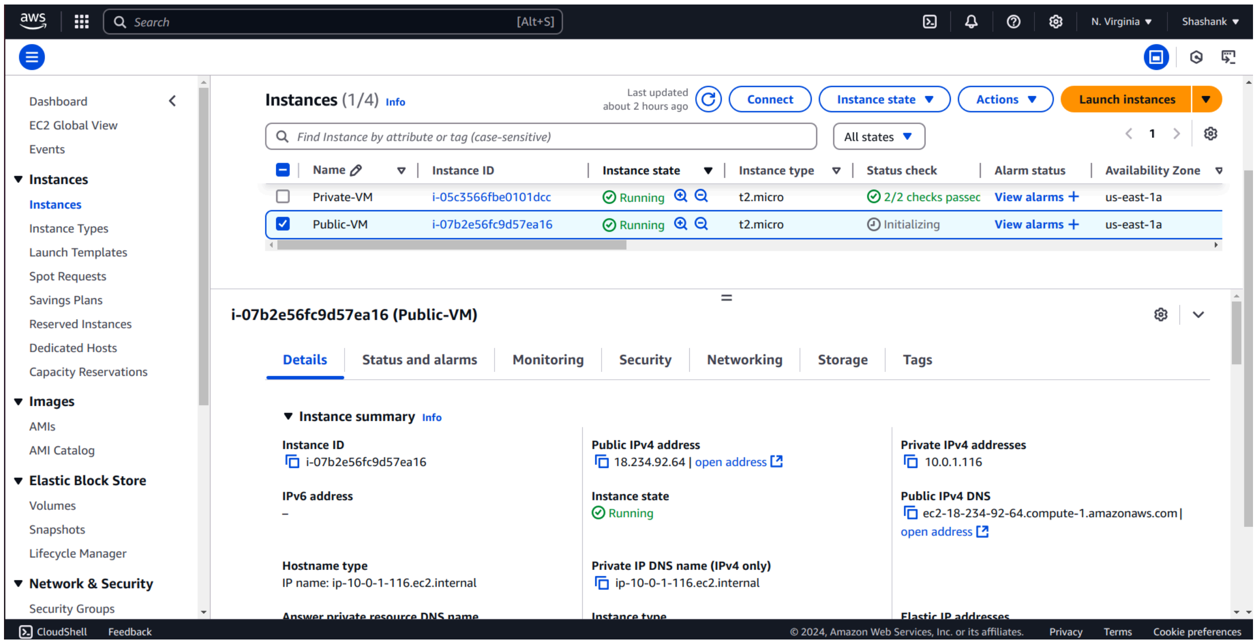
```
ssh -i <path-to-private-key.pem> ec2-user@<public-ip>
```

Replace <path-to-private-key.pem> with the path to your SSH private key.

Access NGINX in your browser using the public VM's IP:
http://<public-ip>

Clean Up Resources

terraform destroy -auto-approve



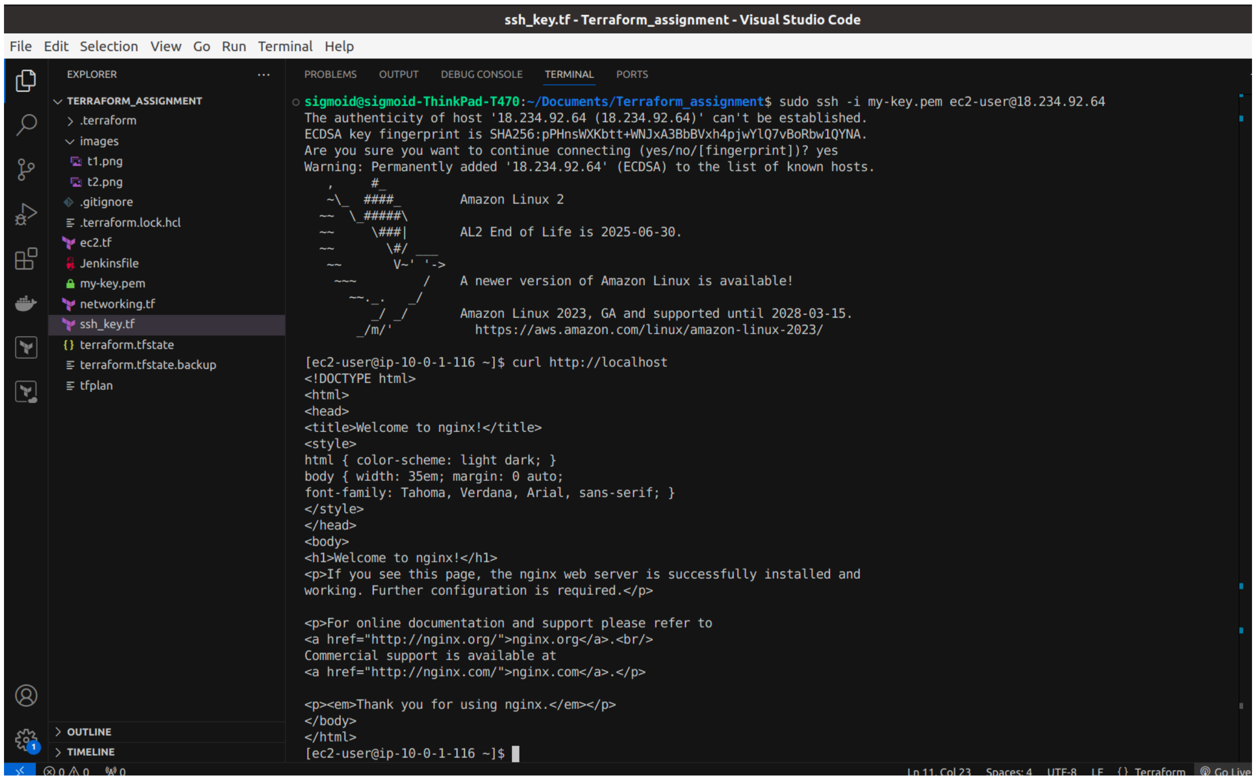
Instances (1/4) Info

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
☐	Private-VM	i-05c3566fbe0101dcc	Running	t2.micro	2/2 checks passec	View alarms +	us-east-1a
☑	Public-VM	i-07b2e56fc9d57ea16	Running	t2.micro	Initializing	View alarms +	us-east-1a

i-07b2e56fc9d57ea16 (Public-VM)

Instance summary

Instance ID: i-07b2e56fc9d57ea16
Public IPv4 address: 18.234.92.64 | open address
Private IPv4 addresses: 10.0.1.116
IPv6 address: –
Instance state: Running
Public IPv4 DNS: ec2-18-234-92-64.compute-1.amazonaws.com | open address
Hostname type: IP name: ip-10-0-1-116.ec2.internal
Private IP DNS name (IPv4 only): ip-10-0-1-116.ec2.internal

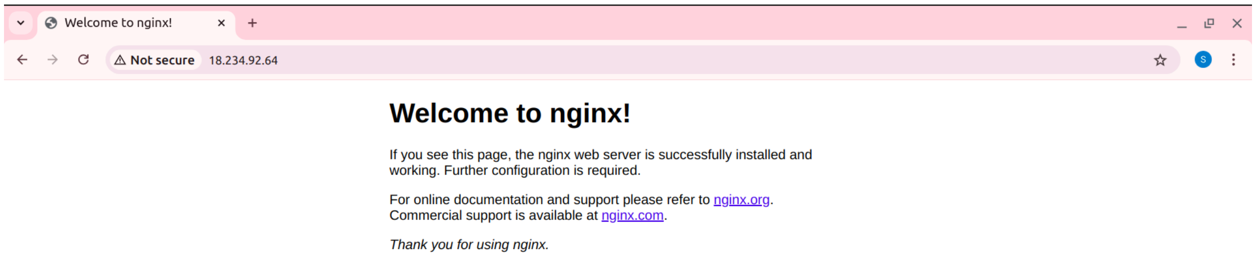


```
sigmoid@sigmoid-ThinkPad-T470:~/Documents/Terraform_assignment$ sudo ssh -i my-key.pem ec2-user@18.234.92.64
The authenticity of host '18.234.92.64 (18.234.92.64)' can't be established.
ECDSA key fingerprint is SHA256:pPHnsWXKbtt+WNJxA3BbBVxh4pjwYlQ7vBoRbw1QYNA.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '18.234.92.64' (ECDSA) to the list of known hosts.
   ,     #_
   ~\_  ####_        Amazon Linux 2
  ~~  \_#####\
  ~~     \###|       AL2 End of Life is 2025-06-30.
  ~~       \#/ ___
   ~~       V~' '->
    ~~~         /    A newer version of Amazon Linux is available!
      ~~._.   _/
         _/ _/       Amazon Linux 2023, GA and supported until 2028-03-15.
       _/m/'           https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-10-0-1-116 ~]$ curl http://localhost
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
html { color-scheme: light dark; }
body { width: 35em; margin: 0 auto;
font-family: Tahoma, Verdana, Arial, sans-serif; }
</style>
</head>
<body>
<h1>Welcome to nginx!</h1>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>

<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>

<p><em>Thank you for using nginx.</em></p>
</body>
</html>
[ec2-user@ip-10-0-1-116 ~]$
```



Welcome to nginx!

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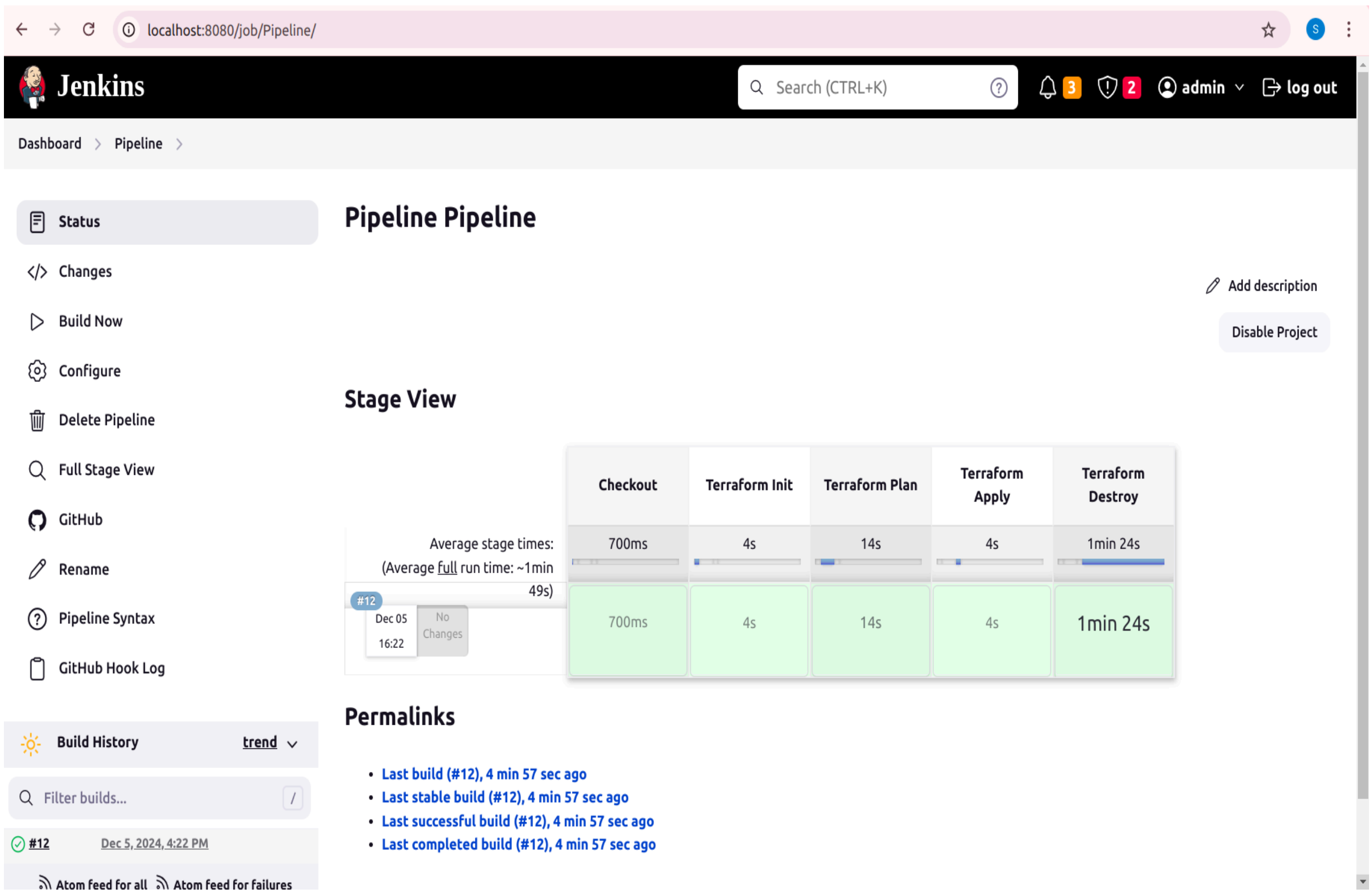
Thank you for using nginx.



Pipeline Pipeline

Stage View

	Checkout	Terraform Init	Terraform Plan	Terraform Apply	Terraform Destroy
Average stage times: (Average full run time: ~1min 49s)	700ms	4s	14s	4s	1min 24s
#12 Dec 05 16:22 No Changes	700ms	4s	14s	4s	1min 24s

Permalinks

- Last build (#12), 4 min 57 sec ago
- Last stable build (#12), 4 min 57 sec ago
- Last successful build (#12), 4 min 57 sec ago
- Last completed build (#12), 4 min 57 sec ago