Assignment 1

Objective: In this assignment, you will create a simple GitHub Actions workflow that builds a custom Docker image with a basic NGINX configuration, deploys it to an Amazon EC2 instance, and ensures that the container remains running even after an EC2 instance restart.

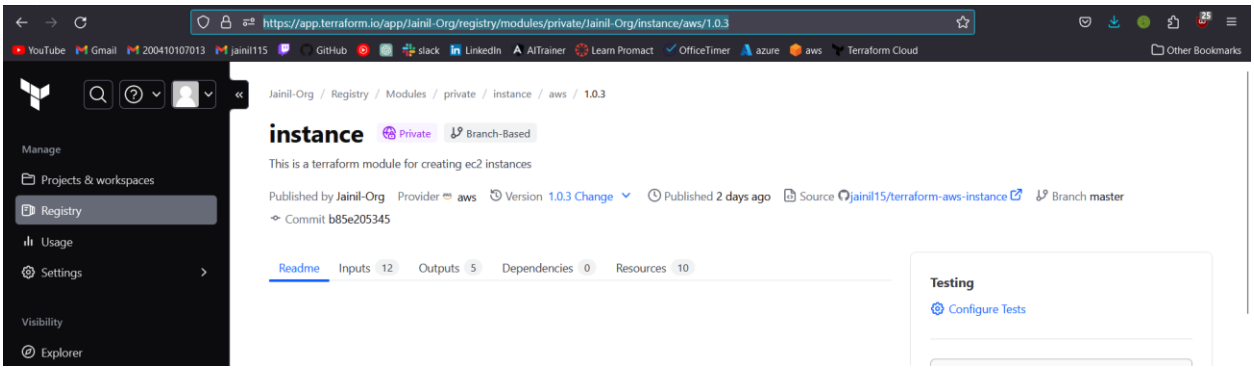
I have hosted terraform modules on github and on terraform cloud for better version control

Instance module: https://github.com/jainil15/terraform-aws-instance,

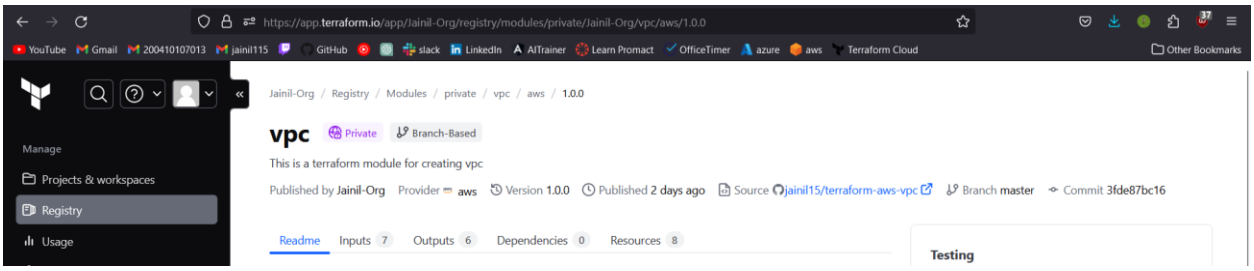
Aws module: https://github.com/jainil15/terraform-aws-vpc

I have also created private repository on the terraform cloud

Instance module:

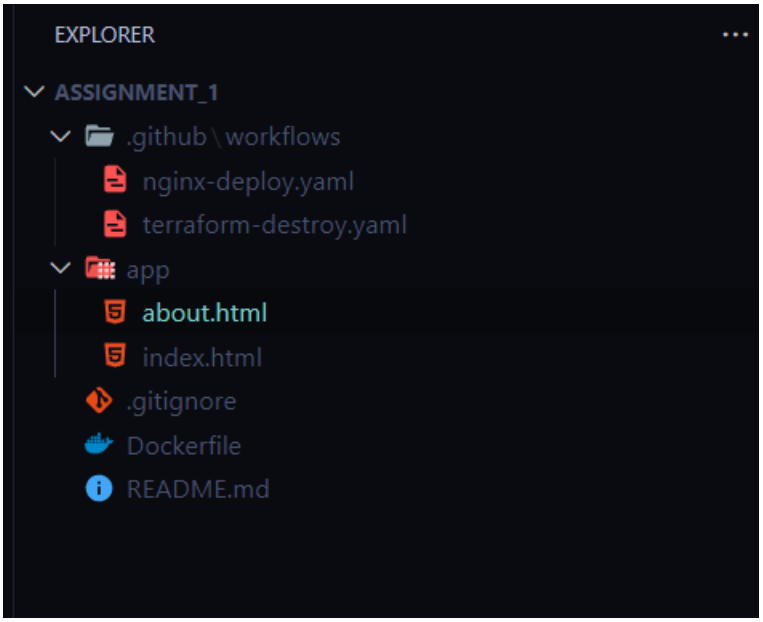


Vpc module:



Now lets create a simple application using html and docker:

1. I have already created two files index.html and about.html and placed them in app folder under root.



2. Then create a Dockerfile in root dir and enter the following code

```
FROM nginx:1.25-alpine
COPY ./app/* /usr/share/nginx/html
WORKDIR /app
EXPOSE 80
CMD ["nginx", "-g", "daemon off;"]
```

Now lets create a new repository for storing infrastructure code.

Add Main.tf

main.tf:

```
terraform {
  backend "remote" {
    hostname     = "app.terraform.io"
    organization = "Jainil-Org"
    workspaces {
      name = "ForAssignment"
    }
  }

  required_providers {
    aws = {
      source  = "hashicorp/aws"
      version = "~> 5.0"
    }
```

```
  }
}

provider "aws" {
  region = var.aws_region
}

locals {
  env = "dev"
}

data "aws_ami" "ubuntu" {

  most_recent = true

  filter {
    name   = "name"
    values = ["ubuntu/images/hvm-ssd/ubuntu-jammy-22.04-amd64-server-*"]
  }

  filter {
    name   = "virtualization-type"
    values = ["hvm"]
  }

  owners = ["amazon"]
}
data "http" "myip" {
  url = "https://ipv4.icanhazip.com"
}
module "vpc" {

  source                     = "app.terraform.io/Jainil-Org/vpc/aws"
  version                    = "1.0.0"
  env                        = local.env
  vpc_cidr_block             = "12.88.0.0/16"
  azs                        = ["ap-south-1a"]
  public_subnet_cidr_blocks = ["12.88.0.64/26"]

}

module "instance" {
  source  = "app.terraform.io/Jainil-Org/instance/aws"
  version = "1.0.3"
  env     = local.env
```

```
  ami_id  = data.aws_ami.ubuntu.id
  instance_type      = "t2.micro"
  private_subnet_ids = module.vpc.private_subnet_ids
  public_subnet_ids  = module.vpc.public_subnet_ids
  vpc_id             = module.vpc.vpc_id
  public_sg_ingress_with_cidr_blocks = [
    {
      from_port   = 22
      to_port     = 22
      protocol    = "tcp"
      cidr_blocks = ["${chomp(data.http.myip.response_body)}/32"]
    },
    {
      from_port        = 80
      to_port          = 80
      protocol         = "tcp"
      cidr_blocks      = ["0.0.0.0/0"]
      ipv6_cidr_blocks = ["::/0"]
    },
    {
      from_port        = 443
      to_port          = 443
      protocol         = "tcp"
      cidr_blocks      = ["0.0.0.0/0"]
      ipv6_cidr_blocks = ["::/0"]
    }
  ]
  private_key = var.private_key
  user_data   = file("./docker_installation.sh")
}
```

3. Create outputs.tf

```
output "public_instance_ip" {
  value = module.instance.public_instance_public_ipv4[0]
}
```

4. Create variables.tf

```
variable "private_key" {
  type        = string
  description = "Enter the key value pair for ssh"
```

```
  sensitive   = true
}

variable "aws_region" {
  type        = string
  description = "AWS region"
}

variable "my_ip" {
  type = string
  description = "my ip for ssh"
}
```

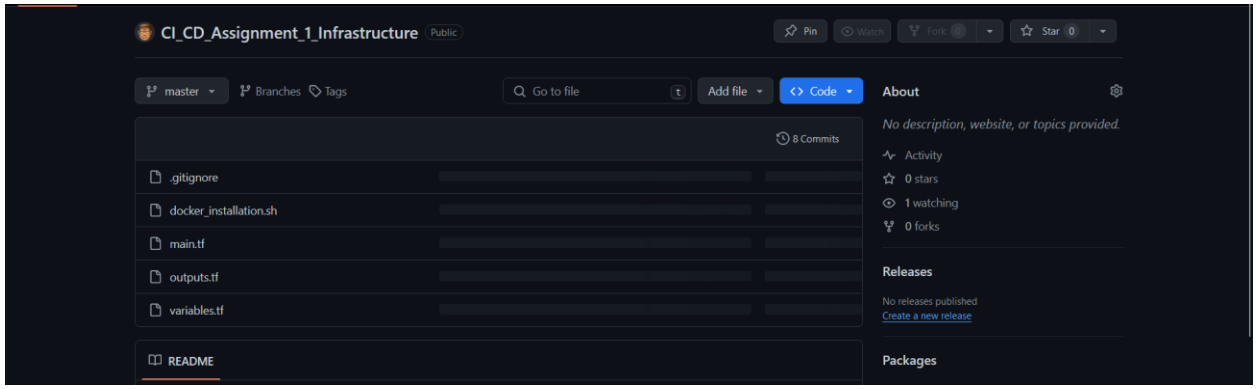
5. Create docker_installation.sh

```
#!/bin/bash

for pkg in docker.io docker-doc docker-compose docker-compose-v2
podman-docker containerd runc; do
  apt-get remove -y $pkg;
done

apt-get update
apt-get install -y ca-certificates curl

install -m 0755 -d /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o
/etc/apt/keyrings/docker.asc
chmod a+r /etc/apt/keyrings/docker.asc

echo "deb [arch=$(dpkg --print-architecture) signed-
by=/etc/apt/keyrings/docker.asc]
https://download.docker.com/linux/ubuntu $(. /etc/os-release && echo
"$VERSION_CODENAME") stable" | tee
/etc/apt/sources.list.d/docker.list > /dev/null
apt-get update

apt-get install -y docker-ce docker-ce-cli containerd.io docker-
buildx-plugin docker-compose-plugin
```

6. Generate ssh key using the following command:
   ssh-keygen -t rsa -b 2048 -f mykeypair.pem

```
> ssh-keygen -b 2048 -f mykeypair.pem -t rsa
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in mykeypair.pem
Your public key has been saved in mykeypair.pem.pub
The key fingerprint is:
```

7. Push these files to github repository (add private key it to .gitgnore).



Now lets setup workflows for automatic deployment of nginx.

Create .github in root directory and inside that create workflow directory.

1. First lets setup nginx-deployment.yaml

```yaml
name: "Nginx Deployment"
on:
  push:
    branches: ["dev"]
  pull_request:
    branches: ["dev"]

jobs:
  terrafom:
    runs-on: ubuntu-latest
    steps:
      - name: Docker Checkout
        uses: actions/checkout@v4

      - name: Docker Login
        uses: docker/login-action@v3
        with:
          username: ${{ secrets.DOCKER_USERNAME }}
          password: ${{ secrets.DOCKER_PASSWORD }}

      - name: Docker Build
```

```
        run: |
          docker build -t ${{ secrets.DOCKER_USERNAME }}/nginx-
assignment:${{ github.sha }} .
          docker push ${{ secrets.DOCKER_USERNAME }}/nginx-
assignment:${{ github.sha }}

      - name: Infra Checkout
        uses: actions/checkout@v4
        with:
          repository: "jainil15/${{ secrets.INFRA_REPO }}"

      - name: Terraform setup
        uses: hashicorp/setup-terraform@v3
        with:
          cli_config_credentials_token: ${{ secrets.TF_API_TOKEN }}

      - name: Configure AWS Credentials
        uses: aws-actions/configure-aws-credentials@v4.0.2
        with:
          aws-access-key-id: ${{ secrets.AWS_ACCESS_KEY_ID }}
          aws-secret-access-key: ${{ secrets.AWS_SECRET_ACCESS_KEY
}}
          aws-region: ${{ secrets.AWS_REGION }}

      - name: Get MY IP
        id: get_my_ip
        run: echo "my_ip=$(curl https://ipv4.icanhazip.com/)" >>
$GITHUB_OUTPUT

      - name: Terraform Init
        run: terraform init


      - name: Terraform Plan
        env:
          TF_VAR_private_key: ${{ secrets.AWS_KEYPAIR }}
          TF_VAR_aws_region: ${{ secrets.AWS_REGION }}
          TF_VAR_my_ip: ${{ steps.get_my_ip.outputs.my_ip }}

        run: terraform plan -no-color

      - name: Terraform Apply
        env:
          TF_VAR_private_key: ${{ secrets.AWS_KEYPAIR }}
          TF_VAR_aws_region: ${{ secrets.AWS_REGION }}
```

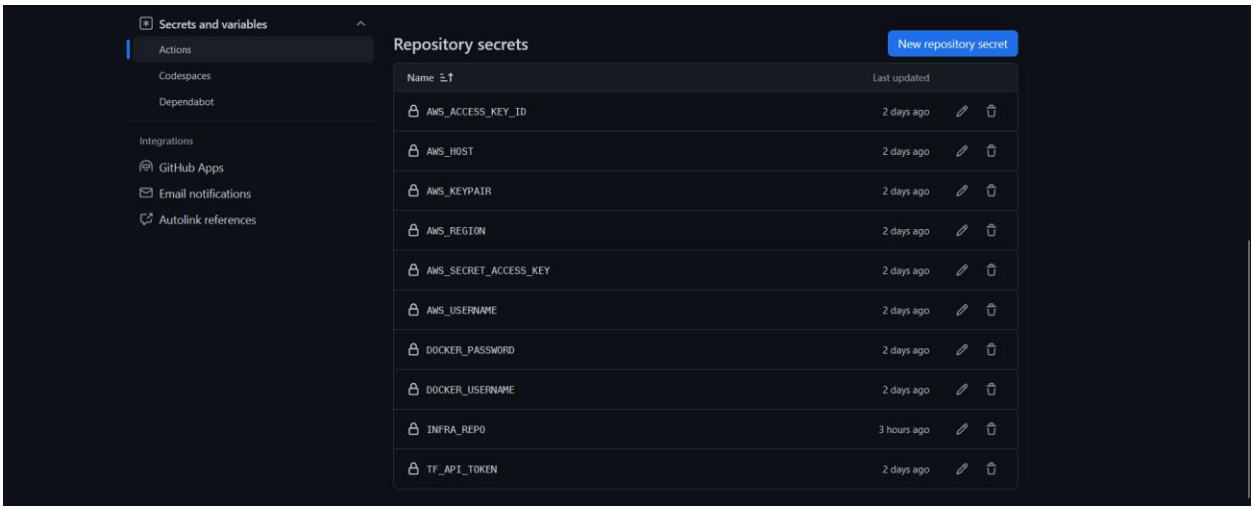
```
          TF_VAR_my_ip: ${{ steps.get_my_ip.outputs.my_ip }}
        run: terraform apply -auto-approve

      - name: Terraform output
        id: terraform_output
        run: |
          echo "public_instance_ip=$(terraform output
public_instance_ip | sed -e 's/^"//' -e 's/"$//')" >> $GITHUB_OUTPUT

      - name: Wait for Port Open
        run: |
          while ! nc -zv ${{
steps.terraform_output.outputs.public_instance_ip }} 22; do
            echo "Waiting for port 22 on host ${{
steps.terraform_output.outputs.public_instance_ip }} to be open..."
            sleep 10
          done
          echo "Port 22 on host ${{
steps.terraform_output.outputs.public_instance_ip }} is now open."

      - name: SSH to AWS Instance and Pull Image
        uses: appleboy/ssh-action@master
        with:
          host: "${{
steps.terraform_output.outputs.public_instance_ip }}"
          username: ${{ secrets.AWS_USERNAME }}
          key: ${{ secrets.AWS_KEYPAIR }}
          script: |
            while ! dpkg -l | grep -q docker; do
              echo "Docker is not installed yet. Waiting..."
              sleep 10
            done
            echo "Docker is installed"
            sleep 10
            sudo systemctl start docker
            sudo systemctl enable docker
            sudo docker stop nginx_container
            sudo docker rm nginx_container
            sudo docker run -d -p 80:80 --restart unless-stopped --
name nginx_container ${{ secrets.DOCKER_USERNAME }}/nginx-
assignment:${{ github.sha }}
```

2. Now lets setup terraform-destroy.yaml (for destroying)

```
name: "Terraform destroy"
```

```yaml
on:
  workflow_dispatch:

jobs:
  terrafom:
    runs-on: ubuntu-latest

    steps:
      - name: Infra Checkout
        uses: actions/checkout@v4
        with:
          repository: "jainil15/${{ secrets.INFRA_REPO }}"
      - name: Terraform setup
        uses: hashicorp/setup-terraform@v3
        with:
          cli_config_credentials_token: ${{ secrets.TF_API_TOKEN }}

      - name: Configure AWS Credentials
        uses: aws-actions/configure-aws-credentials@v4.0.2
        with:
          aws-access-key-id: ${{ secrets.AWS_ACCESS_KEY_ID }}
          aws-secret-access-key: ${{ secrets.AWS_SECRET_ACCESS_KEY
}}
          aws-region: ${{ secrets.AWS_REGION }}

      - name: Get MY IP
        id: get_my_ip
        run: echo "my_ip=$(curl https://ipv4.icanhazip.com/)" >>
$GITHUB_OUTPUT

      - name: Terraform Init
        run: terraform init

      - name: Terraform Destroy
        env:
          TF_VAR_private_key: ${{ secrets.AWS_KEYPAIR }}
          TF_VAR_aws_region: ${{ secrets.AWS_REGION }}
          TF_VAR_my_ip: ${{ steps.get_my_ip.outputs.my_ip }}
        run: terraform destroy -auto-approve
```

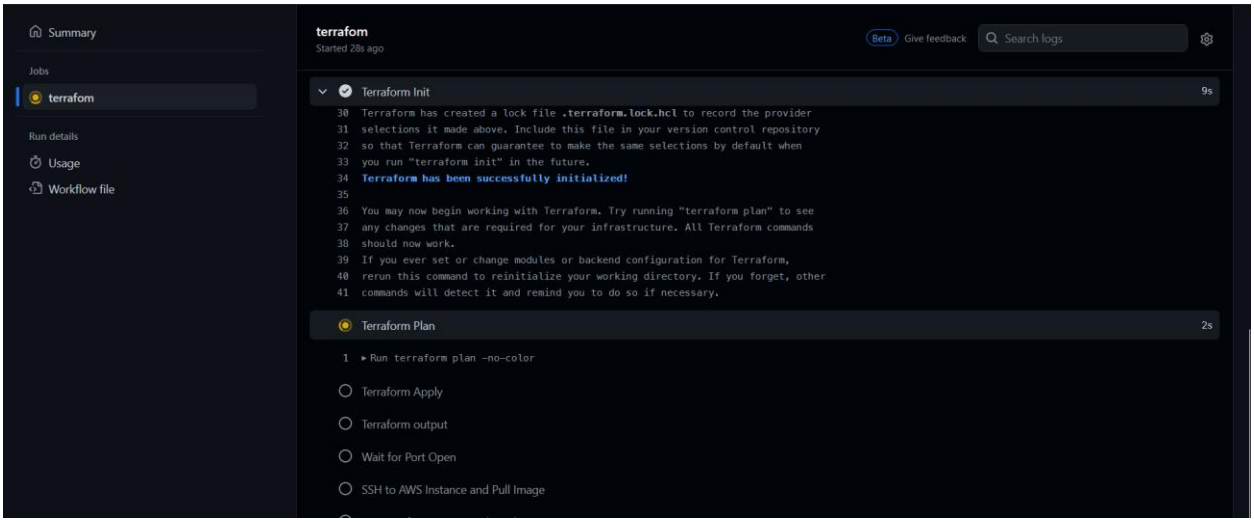
Now add the required secrets:



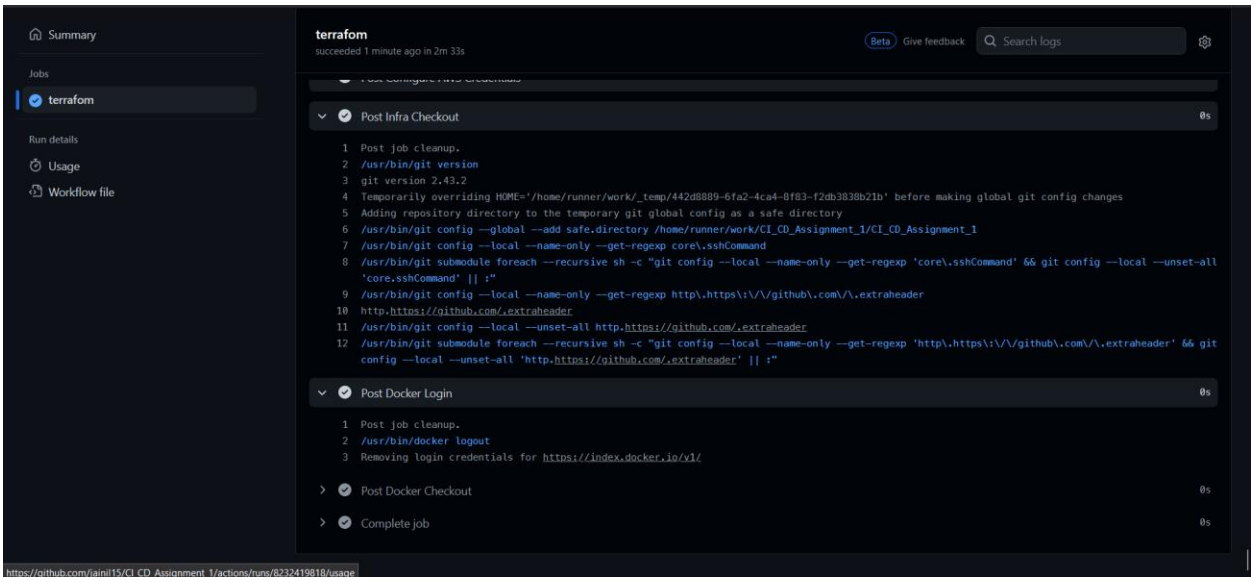
Now let create a new branch dev and push these changes.

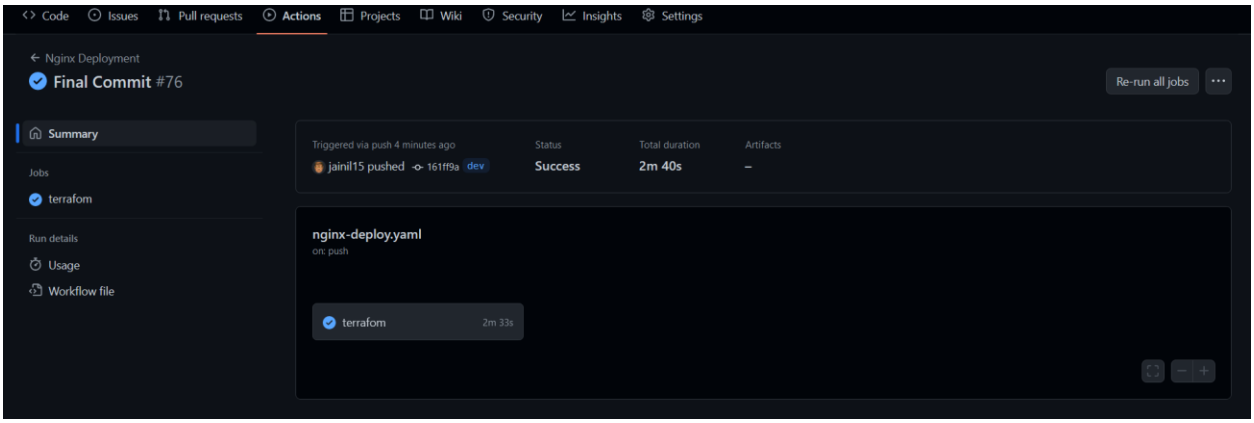
```
> git commit -am "Final Commit"
[dev 161ff9a] Final Commit
 1 file changed, 1 insertion(+), 1 deletion(-)
> git push origin dev
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 12 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 295 bytes | 295.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/jainil15/CI_CD_Assignment_1.git
   ec22eb0..161ff9a  dev -> dev
Assignment_1  dev ≡  13s 534ms
```

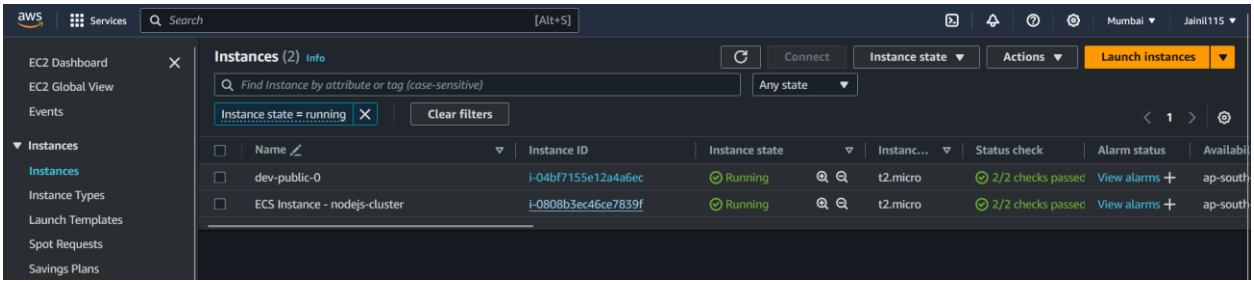
After commit:



After complete:

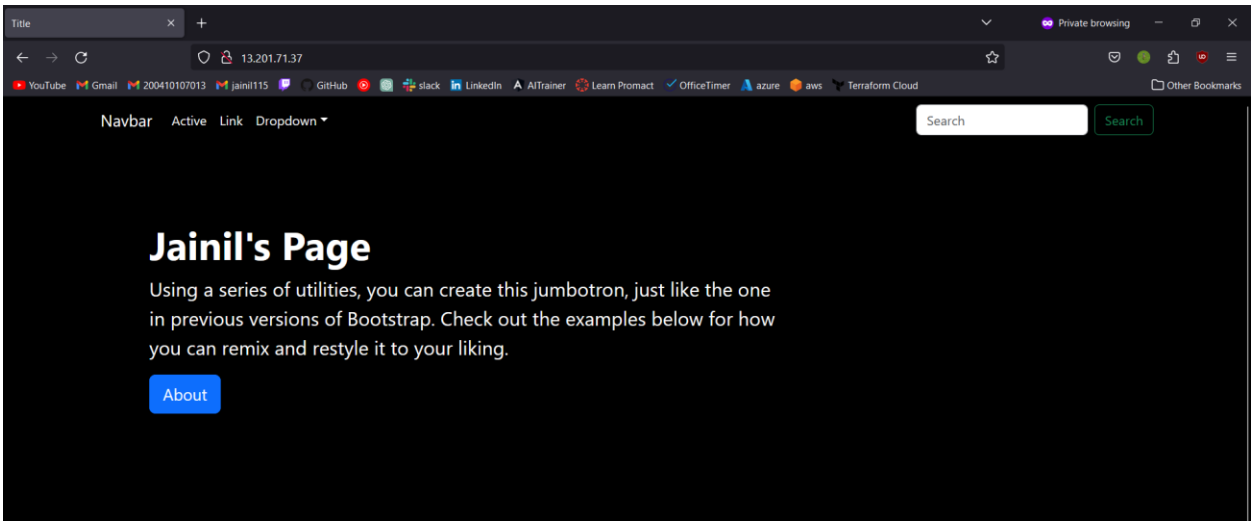


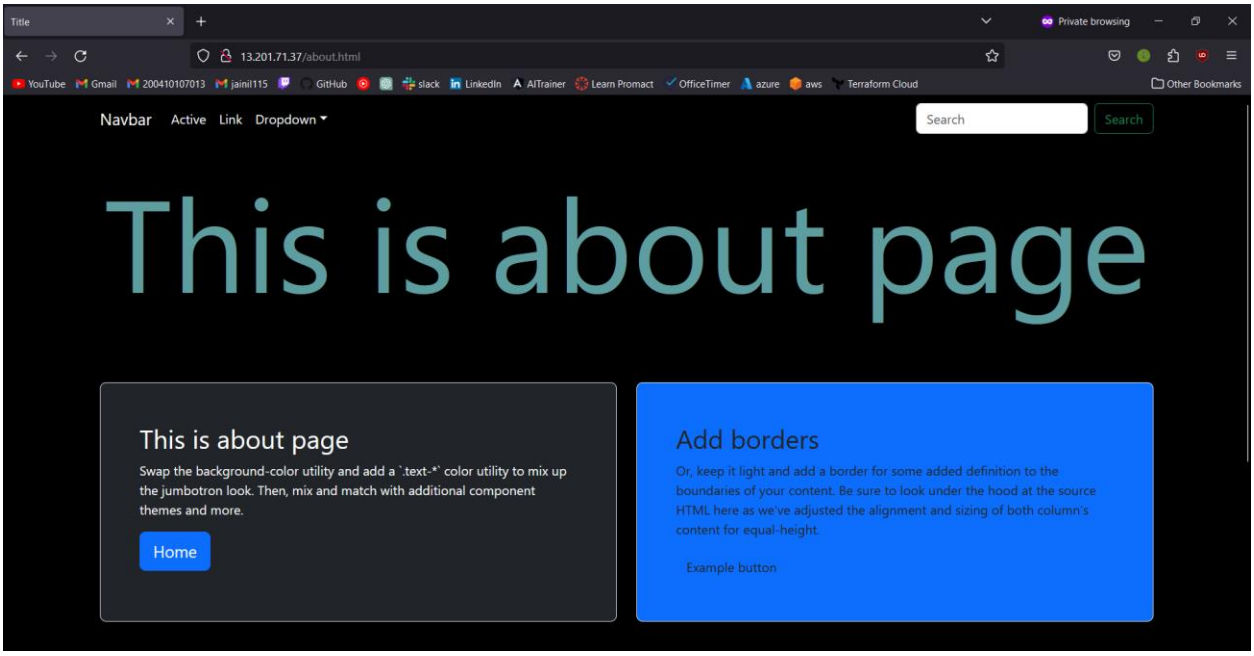




Lets check that the website is working:

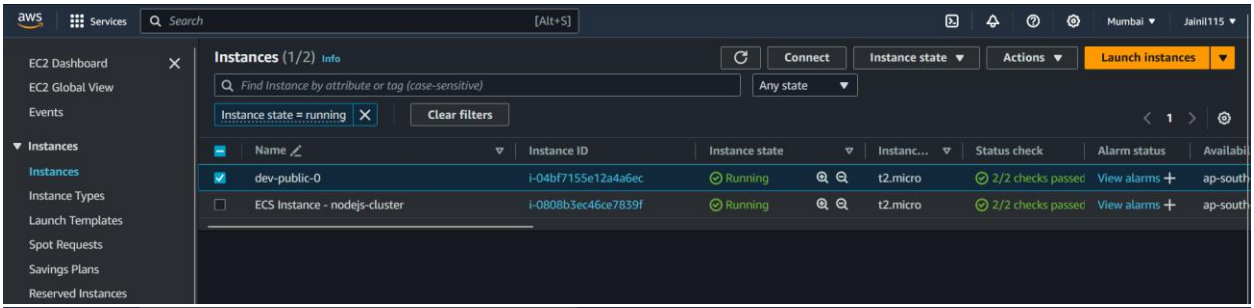
Enter the public ip in the browser, 13.201.71.37:

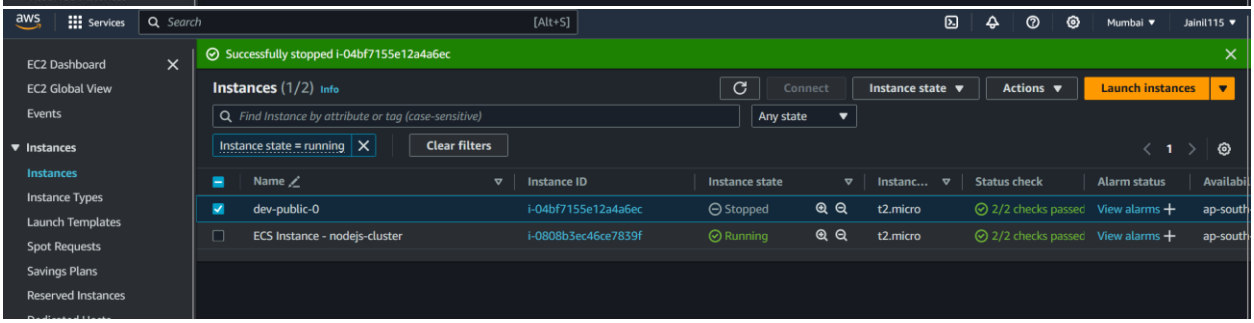




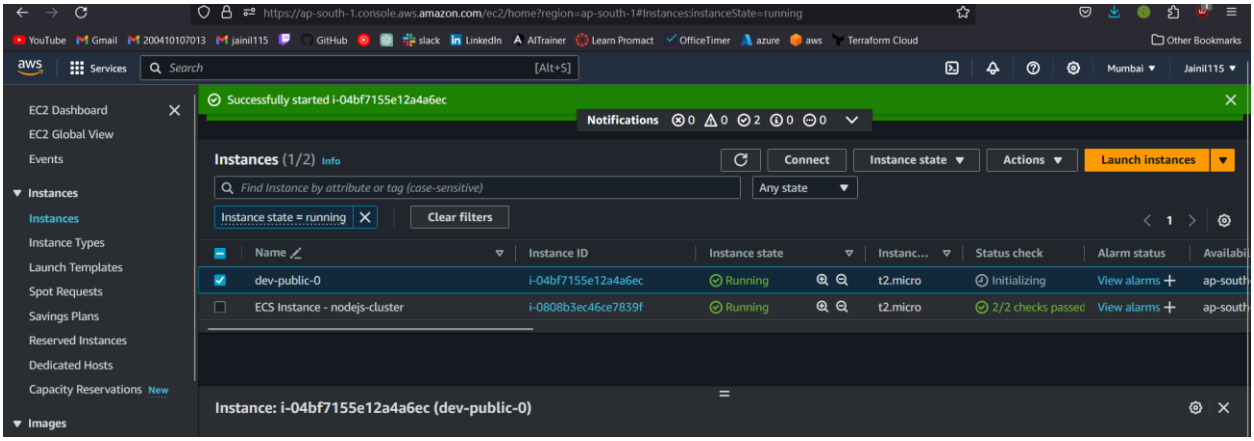
Now lets stop the page and test that after restarting does it work.

1. Go to dev-public-0 instance and select stop in instance state

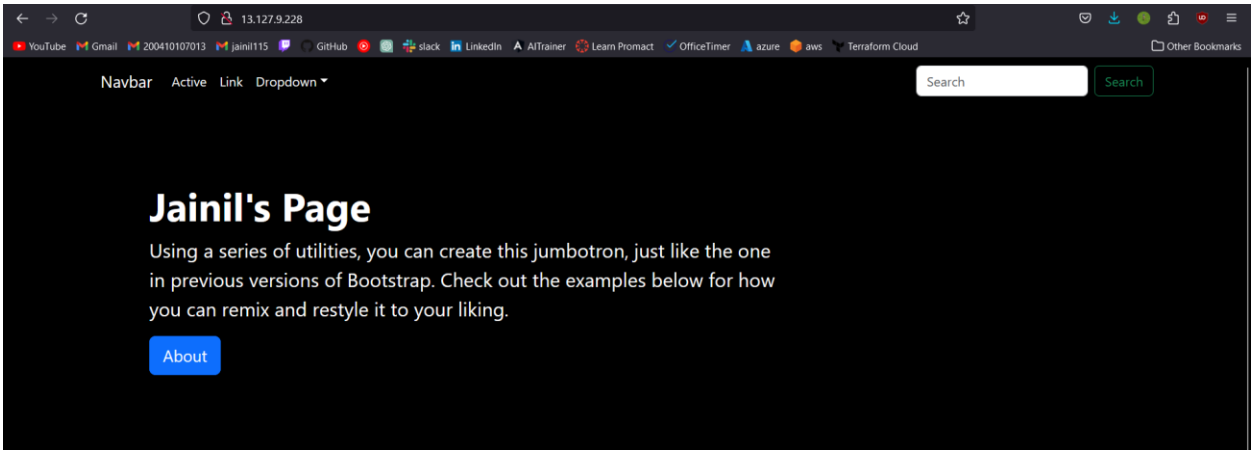




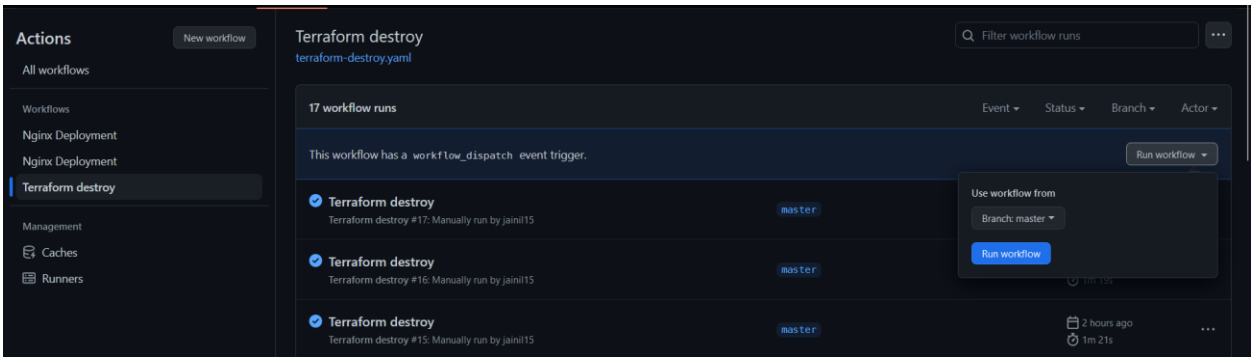
2. After it is stopped start the instance again by going to instance state and clicking on start



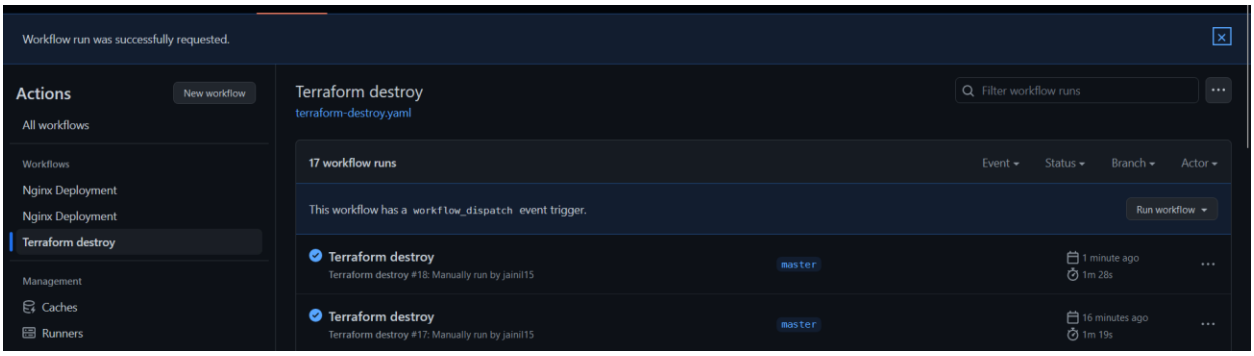
3. Now go to brower and enter the public ip of dev-public-0, 13.127.9.228.

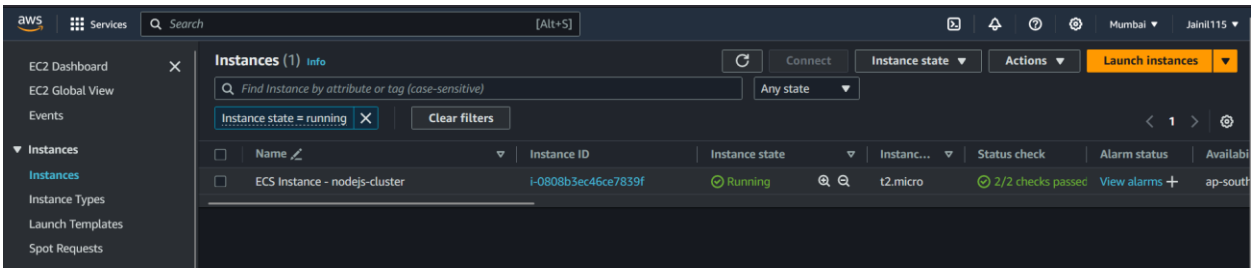


Now lets destroy these resources. Go to your github repo and go to actions and select terraform destroy action and click on run workflow:



After complete:





Now lets try pushing to a different branch and see if it is deploying.

Use the following command:

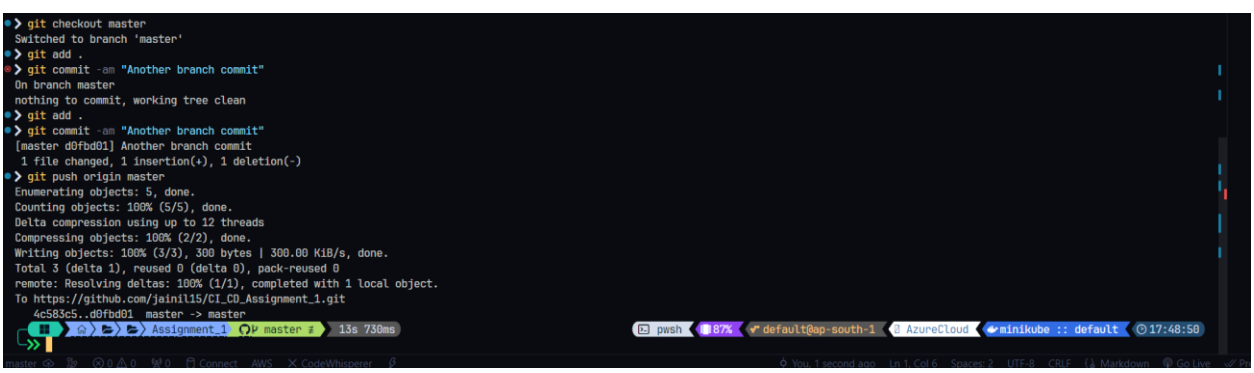
git branch master

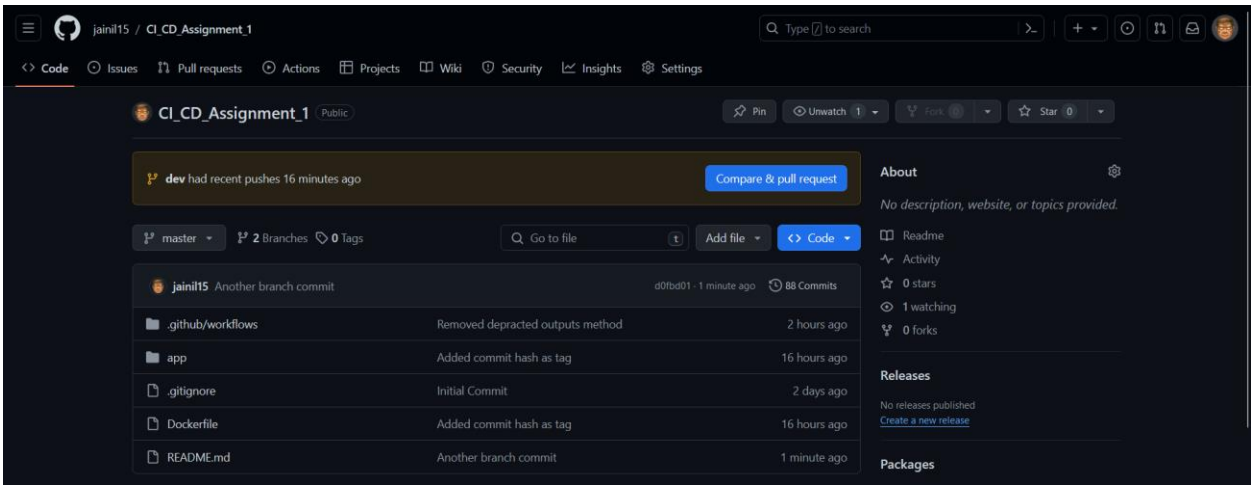
git checkout master

git add .

git commit -m "Another branch commit"

git push origin master




jainil15 / CI_CD_Assignment_1
Type / to search
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
CI_CD_Assignment_1
Public
Pin
Unwatch 1
Fork 0
Star 0
dev had recent pushes 16 minutes ago
Compare & pull request
master
2 Branches
0 Tags
Go to file
t
Add file
Code
jainil15 Another branch commit
d0fbd01 · 1 minute ago
88 Commits
.github/workflows
Removed depracted outputs method
2 hours ago
app
Added commit hash as tag
16 hours ago
.gitignore
Initial Commit
2 days ago
Dockerfile
Added commit hash as tag
16 hours ago
README.md
Another branch commit
1 minute ago
About
No description, website, or topics provided.
Readme
Activity
0 stars
1 watching
0 forks
Releases
No releases published
Create a new release
Packages