Flask App Deployment on AWS with Terraform, GitHub Actions, and Custom Domain

This project demonstrates how to deploy a Flask web application using Docker, ECS (Fargate), and Terraform. It also integrates GitHub Actions for CI/CD and maps a custom domain (23surajrc.com) using Route 53, ACM (SSL), and Namecheap.



Project Structure

```
# Flask app folder
- app/
 ├─ Dockerfile
 — app.py
 terraform/
                              # Terraform infrastructure setup
   — main.tf
   vpc.tf
   ecs.tf
   alb.tf
   — iam.tf
 - variables.tf
    - outputs.tf
   backend-setup.tf
.github/workflows/
 └─ deploy.yml
                              # GitHub Actions CI/CD pipeline
- README.md

    .gitignore
```

Flask App (app/app.py)

```
from flask import Flask
app = Flask(__name___)
@app.route('/')
def home():
    return "Hello from Flask on ECS!"
if __name__ == '__main__':
    app.run(debug=True, host='0.0.0.0')
```



```
FROM python: 3.9-slim
WORKDIR /app
COPY . .
RUN pip install flask
CMD ["python", "app.py"]
```

Terraform Infrastructure

1. Initialize Backend (S3 + DynamoDB for tfstate)

```
# backend-setup.tf
resource "aws_s3_bucket" "tfstate" {
  bucket = "tfstate-suraj2310-20250716"
  versioning { enabled = true }
 force_destroy = true
 tags = { Name = "Terraform State Bucket", Environment = "dev" }
}
resource "aws_s3_bucket_server_side_encryption_configuration" "tfstate"
  bucket = aws_s3_bucket.tfstate.id
  rule {
    apply_server_side_encryption_by_default {
     sse_algorithm = "AES256"
    }
 }
}
resource "aws_dynamodb_table" "tf_locks" {
  name = "terraform-locks"
  billing_mode = "PAY_PER_REQUEST"
  hash_key = "LockID"
  attribute {
    name = "LockID"
   type = "S"
  }
  tags = {
    Name = "Terraform Locks Table"
    Environment = "dev"
 }
}
```

Then run:

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```
terraform init -backend-config="bucket=tfstate-suraj2310-20250716" \
               -backend-config="key=terraform.tfstate" \
               -backend-config="region=ap-south-1" \
               -backend-config="dynamodb_table=terraform-locks"
```

2. Provision the Infrastructure

```
terraform plan
terraform apply
```

This will:

- Create a VPC with public and private subnets
- Create an ECS Cluster with a Fargate service
- Create an ALB to expose the service



ም GitHub Actions CI/CD

Create .github/workflows/deploy.yml:

```
name: Deploy Flask App to ECS
on:
  push:
    branches:
      - main
jobs:
  deploy:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v3
      - name: Configure AWS Credentials
        uses: aws-actions/configure-aws-credentials@v2
        with:
          aws-access-key-id: ${{ secrets.AWS_ACCESS_KEY_ID }}
          aws-secret-access-key: ${{ secrets.AWS_SECRET_ACCESS_KEY }}
          aws-region: ap-south-1
      - name: Build & Push Docker image to ECR
        run:
          # Replace with your own logic for ECR login & push
          echo "Build and push steps here"
```

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```
name: Terraform Apply
run:
  cd terraform
  terraform init
  terraform apply -auto-approve
```



Mapping Custom Domain (23surajrc.com) with SSL

1. Route 53 Hosted Zone

- Create a hosted zone for 23surajrc.com in Route 53.
- Note the NS records and update them in Namecheap under Domain > Advanced DNS.

2. ACM (SSL Certificate)

- Request a certificate for:
 - 23surajrc.com
 - www.23surajrc.com
- Choose **DNS validation**.
- Add the provided **CNAME** records into your Route 53 hosted zone.
- Wait until status = Issued.

3. ALB HTTPS Listener

- Create an HTTPS listener (port 443) on your Application Load Balancer.
- Attach the issued ACM certificate.
- Forward traffic to your ECS target group.

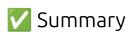
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4. DNS Records in Route 53

Create:

- A Record for 23surajrc.com → Alias → your ALB DNS name
- A Record for www.23surajrc.com → Alias → your ALB DNS name

Now both https://23surajrc.com and https://www.23surajrc.com should work securely.



Feature	Done
Flask App in Docker	V
ECS (Fargate) Deployment	V

Feature	Done
Terraform Infra Provision	V
GitHub Actions CI/CD	V
Domain Mapping via Route 53	V
SSL Certificate via ACM	V



- Make sure ports 80 and 443 are open in the ALB security group.
- ACM certificates must be in **us-east-1** for CloudFront, but in your region (e.g., ap-south-1) for ALB.
- Use terraform destroy to tear down the infra when done.

:handshake: Contributing

Feel free to fork and improve this project. Pull requests are welcome!

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