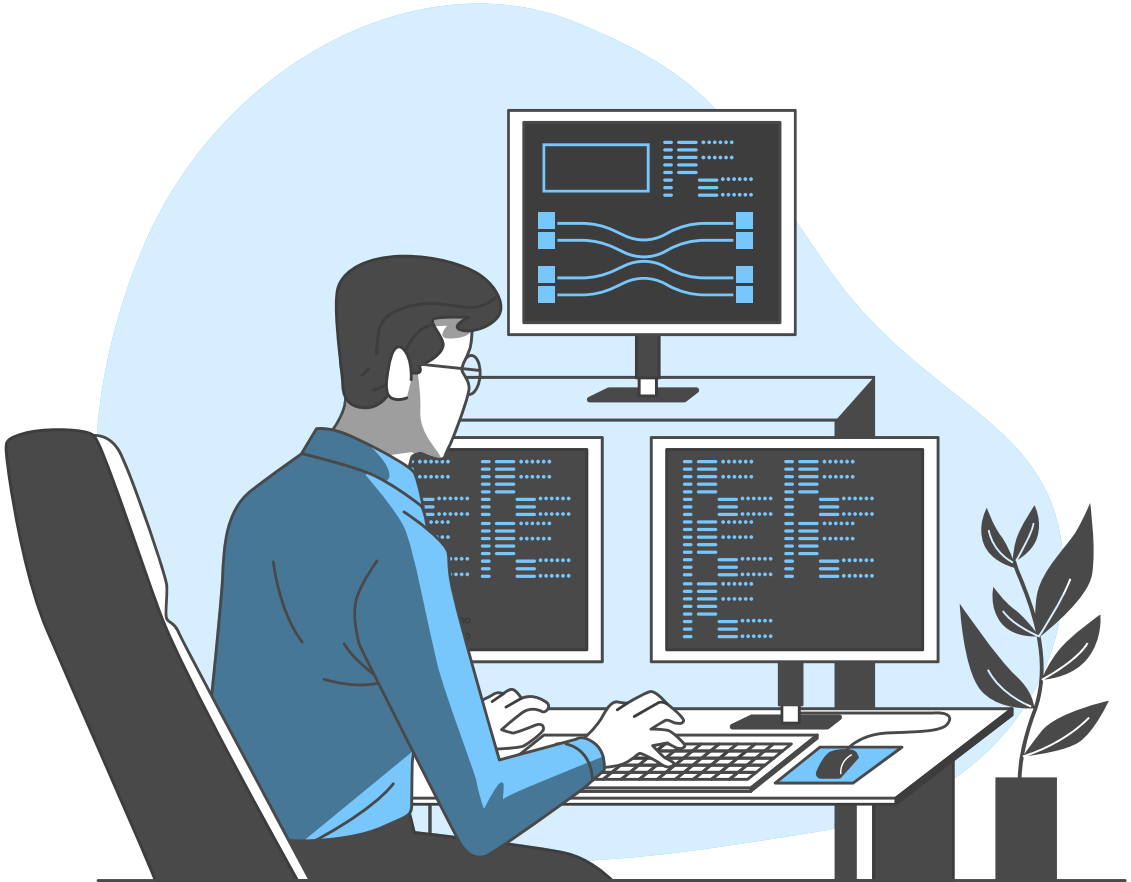
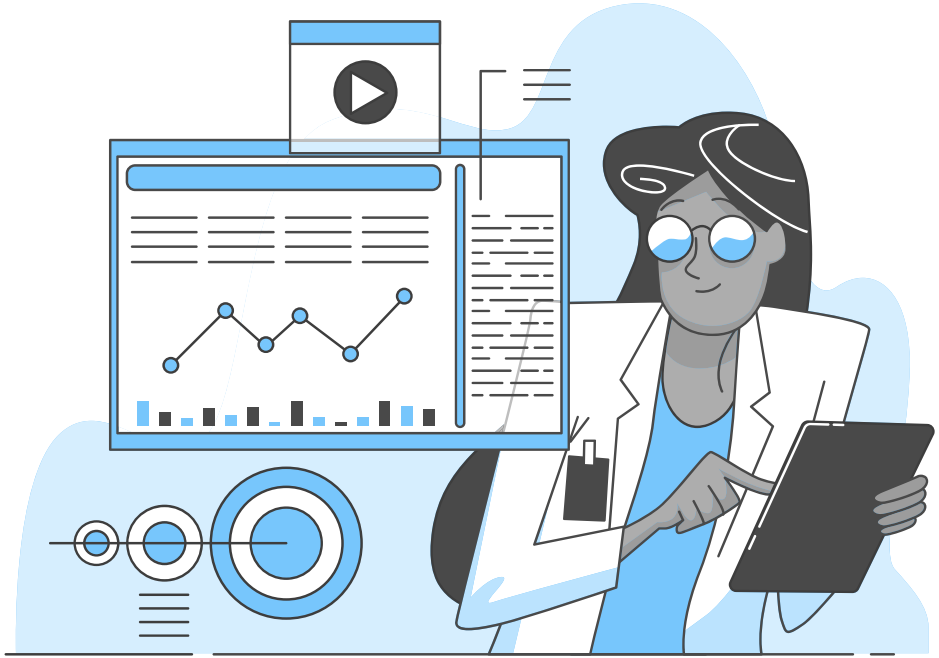


(SCTP) Cloud Infrastructure Engineering

Capstone Project
Cohort 3
Group 1

Table of Contents



01
Introduction

Use Case
Who We Are

Use Case 1 – CICD Pipeline Focused (DevOps)

Scenario:

You are working in a new startup.

You are tasked to **automate the deployment process** so that each release cycle can be released quickly from the development environment, to staging and to production environment.

As the company is going at a fast paced growth rhythm, there will be more engineers onboarding in the next few quarters. The tech lead needs to ensure that as the team size grows, **the release pipeline is well controlled**.

Our Company

From blueprint to blast-off in record time. We're the DevOps alchemists, transforming your ideas into scalable websites, enabling rapid deployment that leave your competition in the dust.

Our Story

01

Client

Online Education Training Provider

02

Static Website

Develop and deploy a newly revamped website in AWS S3

03

DevOps Principles

Streamline workflow using GitHub Actions

04

Infrastructure as Code

Terraform automates deployments to AWS

02

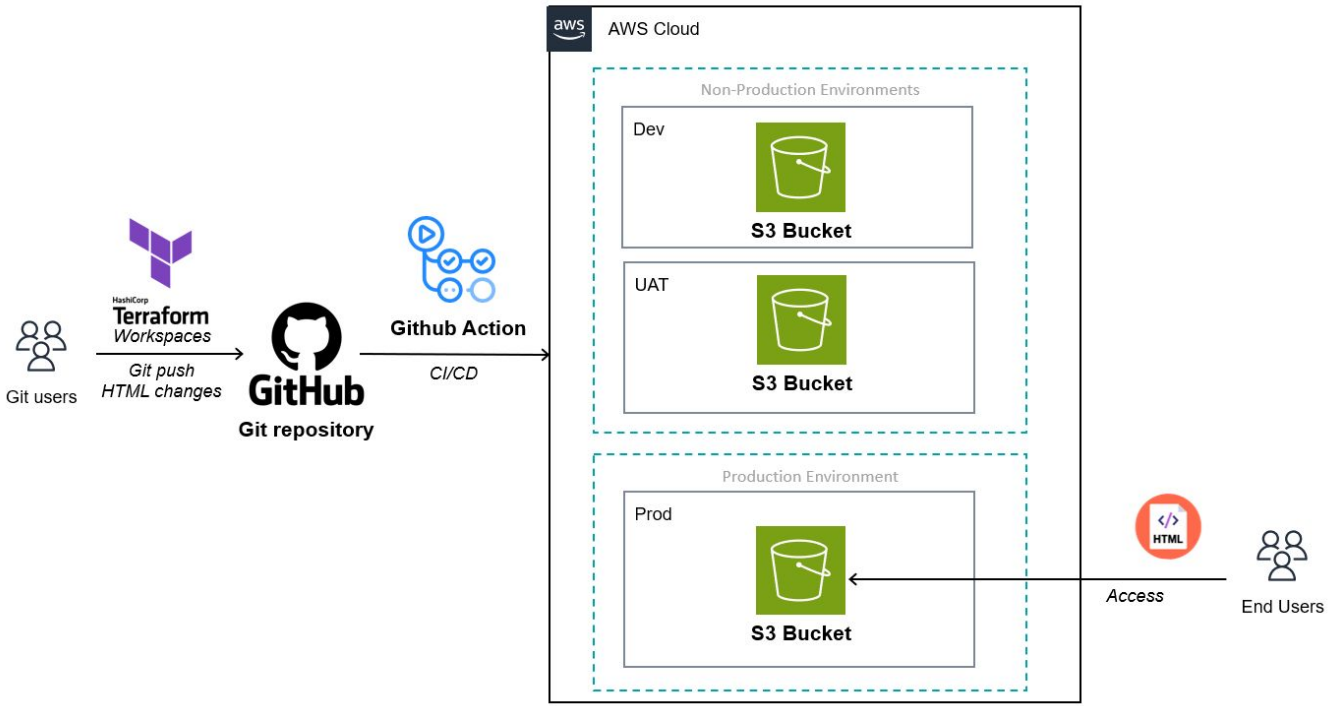
System Architecture & Technology Stack

AWS Cloud Architecture

3

AWS S3 Buckets

- Dev
- UAT
- Prod



Technology Stack

Terraform

Resources Created through Terraform

Terraform Workspaces

Infrastructure Environment Setup/Management

GitHub Actions

CI/CD

Snyk & Checkov

Package/Vulnerability Scans

Technology Stack

Terraform

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Infrastructure Environment Setup/Management

GitHub Actions

CI/CD

Github Secrets

Secrets Management and Access Control

03
Branching Strategy

Workflow
Branch Protection

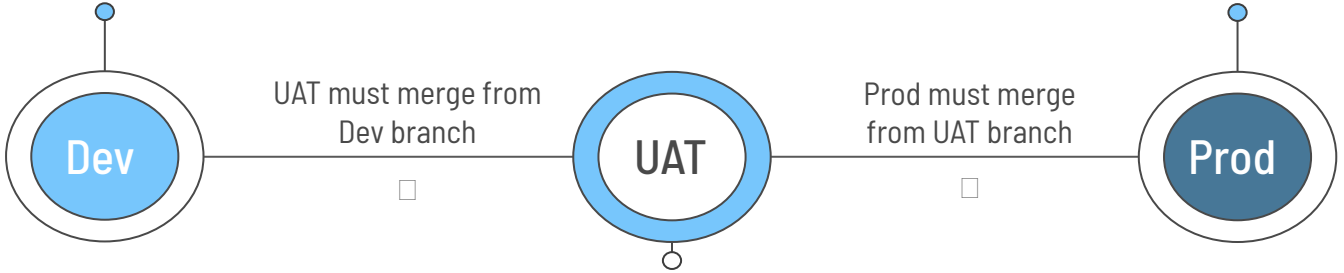
Workflow – 3 branches

1. Development Branch

- Primary integration branch - feature branches merge here for integration testing.
- Continuous integration implemented to allow automated testing and verification of code changes.

3. Production Branch

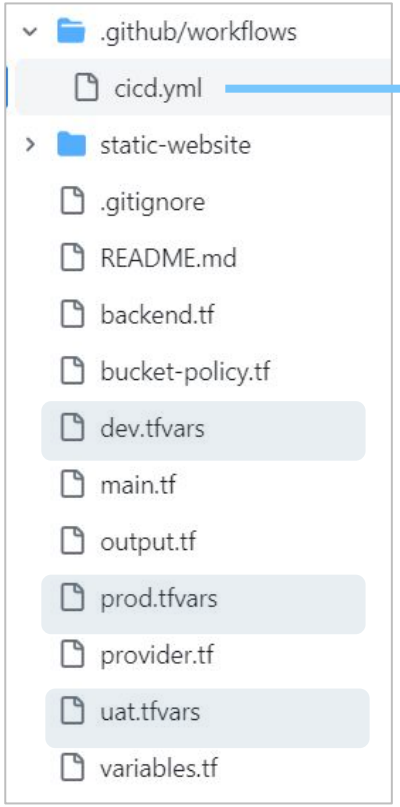
- Contains stable and thoroughly tested code
- Only fully reviewed and approved code changes can be merged
- Direct commits or modifications are restricted



2. User Acceptance Testing (UAT)

- Serves UAT for ongoing testing.
- It acts as a staging area for testing before deployment into Production

CI/CD

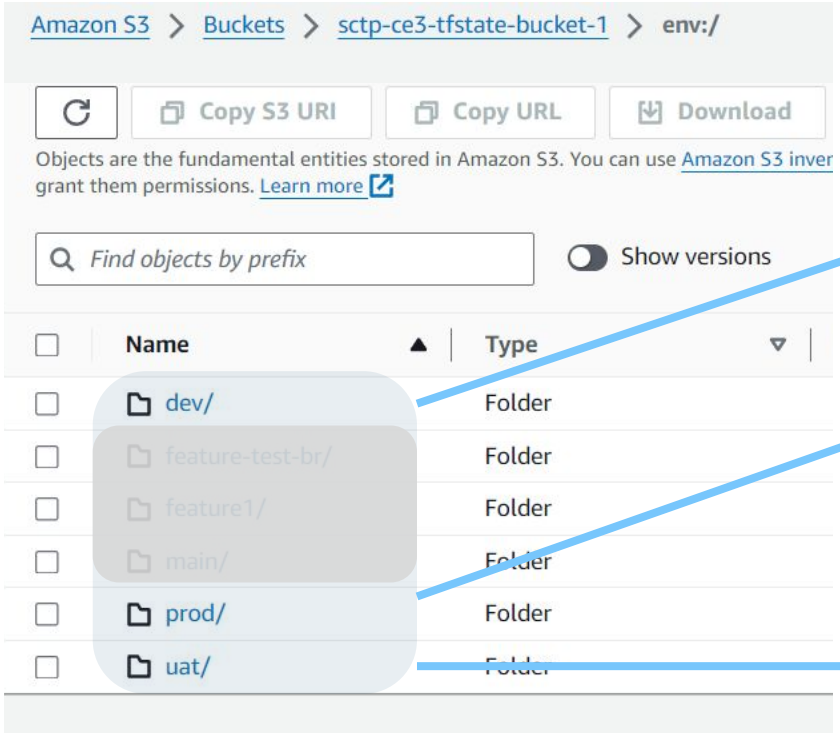


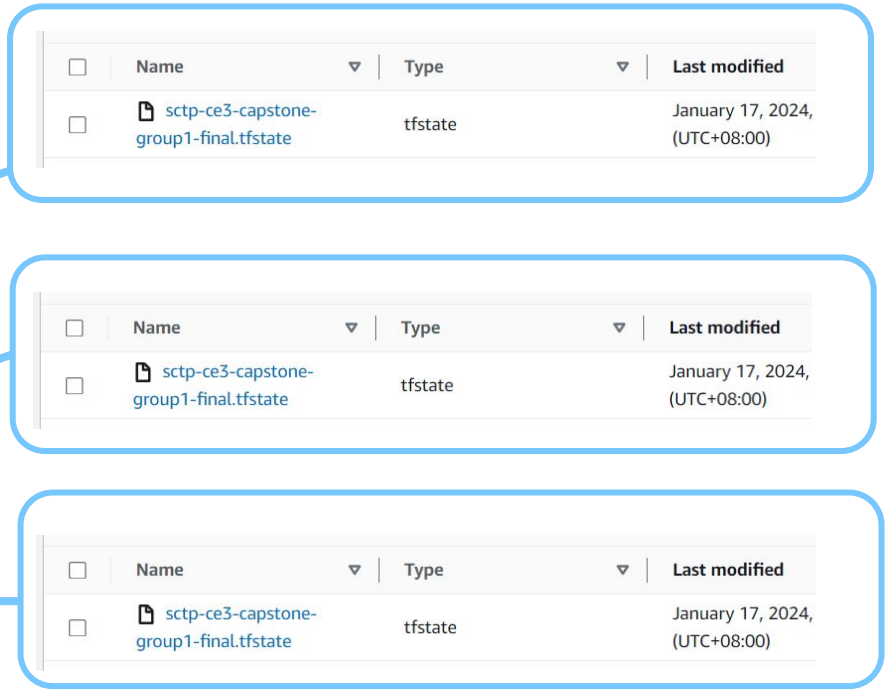
Single CI/CD yml file

Utilising **Terraform Workspaces** and **Variable Definition Files (.tfvars)** to manage multiple environment

```
CI:
  runs-on: ubuntu-latest

  steps:
  ⋮
  - name: Terraform init
    run: terraform init

  - name: Terraform workspace list
    run: terraform workspace list

  - name: Terraform workspace new environment and select
    run: |
      terraform workspace select ${{github.base_ref || github.ref_name}}  || terraform workspace new ${{github.base_ref || github.ref_name}}
      terraform workspace list

  - name: Terraform plan
    run: terraform plan -var-file=${{github.base_ref || github.ref_name}}.tfvars
```

Terraform State Files





CI/CD – Continous Integration

```
CI:
  runs-on: ubuntu-latest

  steps:
    - name: Checkout repository
      uses: actions/checkout@v2

    - name: print environment
      run: |
        echo "env choice is ${{github.base_ref || github.ref_name}} "

    - name: Set up Terraform
      uses: hashicorp/setup-terraform@v3

    - name: Configure AWS credentials
      uses: aws-actions/configure-aws-credentials@v1
      with:
        aws-access-key-id: ${{ secrets.AWS_ACCESS_KEY_ID }}
        aws-secret-access-key: ${{ secrets.AWS_SECRET_ACCESS_KEY }}
        aws-region: us-east-1

    - name: Terraform init
      run: terraform init

    - name: Terraform workspace list
      run: terraform workspace list

    - name: Terraform workspace new environment and select
      run: |
        terraform workspace select ${{github.base_ref || github.ref_name}}  || terraform workspace new ${{github.base_ref || github.ref_name}}
        terraform workspace list

    - name: Terraform plan
      run: terraform plan -var-file=${{github.base_ref || github.ref_name}}.tfvars
```

CI

- Configured to run on Push or Pull Requests
- Main Steps: Terraform Init, Terraform Plan

- Access to AWS configured using Github Secrets

CI/CD – Continous Delivery

```
CD:
  if: ${{ github.event_name == 'push' }}
  runs-on: ubuntu-latest
  steps:
    - name: Checkout repository
      uses: actions/checkout@v2

                ⋮

- name: Terraform init
  run: terraform init

- name: Terraform workspace list
  run: terraform workspace list

- name: Terraform workspace new environment and select                ⋮
  run: |
    terraform workspace select ${{github.base_ref || github.ref_name}}  || terraform workspace new ${{gith
    terraform workspace list

- name: Terraform Apply
  run: terraform apply -var-file=${{github.base_ref || github.ref_name}}.tfvars -auto-approve

                ⋮

- name: Deploy to AWS S3
  run: aws s3 sync . s3://${{steps.tfout.outputs.s3_bucket_name}} --delete
  working-directory: ./static-website
```

CD

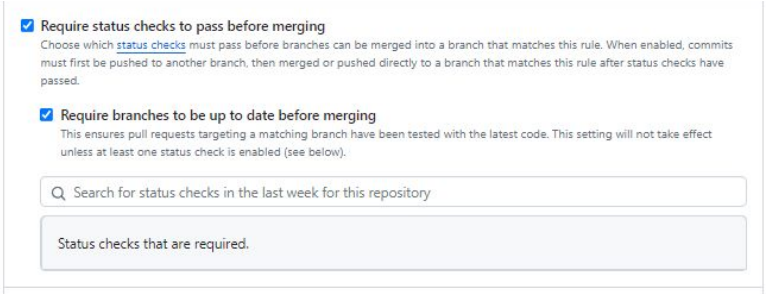
- Configured to run only on Push
- Steps : Terraform Init, Terraform workspace select, Terraform Apply, Sync S3 Bucket.

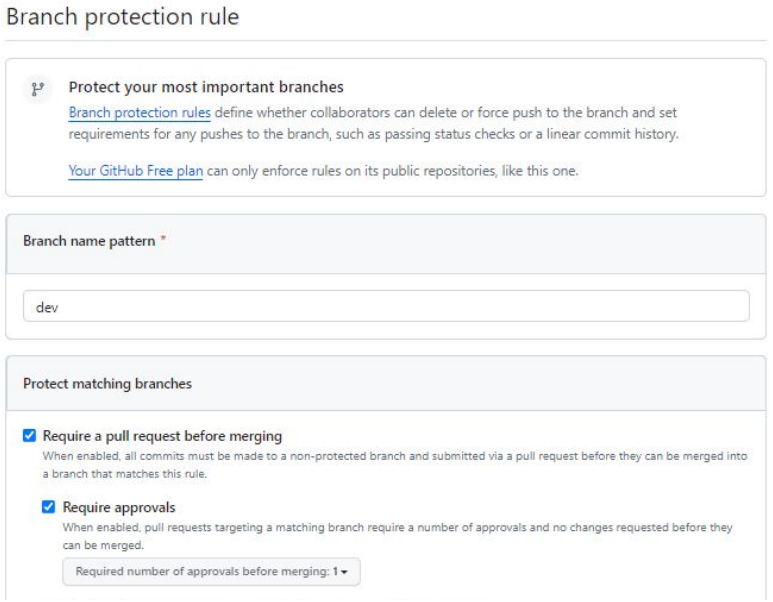
After Pull request is approved, Merge (“Push”) will run the CD job to apply infrastructure changes and update index.html file

Branch Protections

All branches are protected

- Github Branch Protection Rules
- Requires Pull request and reviewers
- All checks must pass





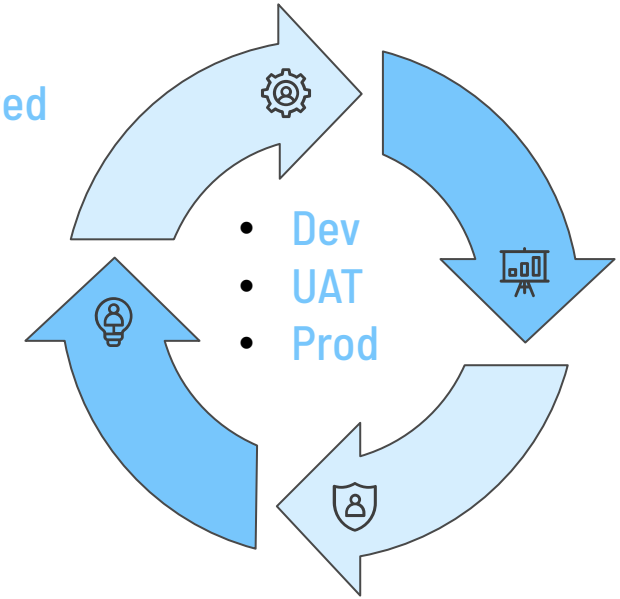
Workflow + CI/CD

Pull Request Submitted

Triggers CI job

Changes Deployed

Changes are deployed,
Branch is updated



Review

Reviewer checks code changes

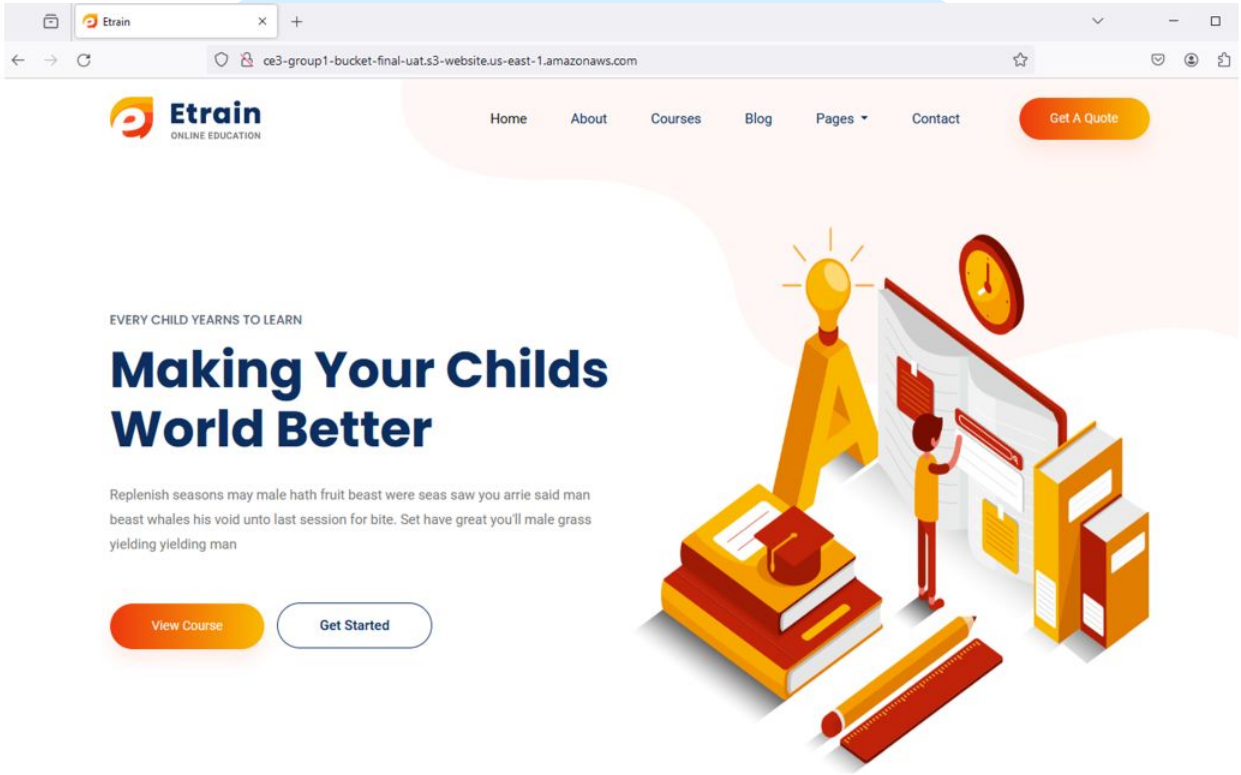
Reviewer Approves

Changes are Merged
Triggers CD job

04

Outputs and Conclusion

Website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Courses
Blog
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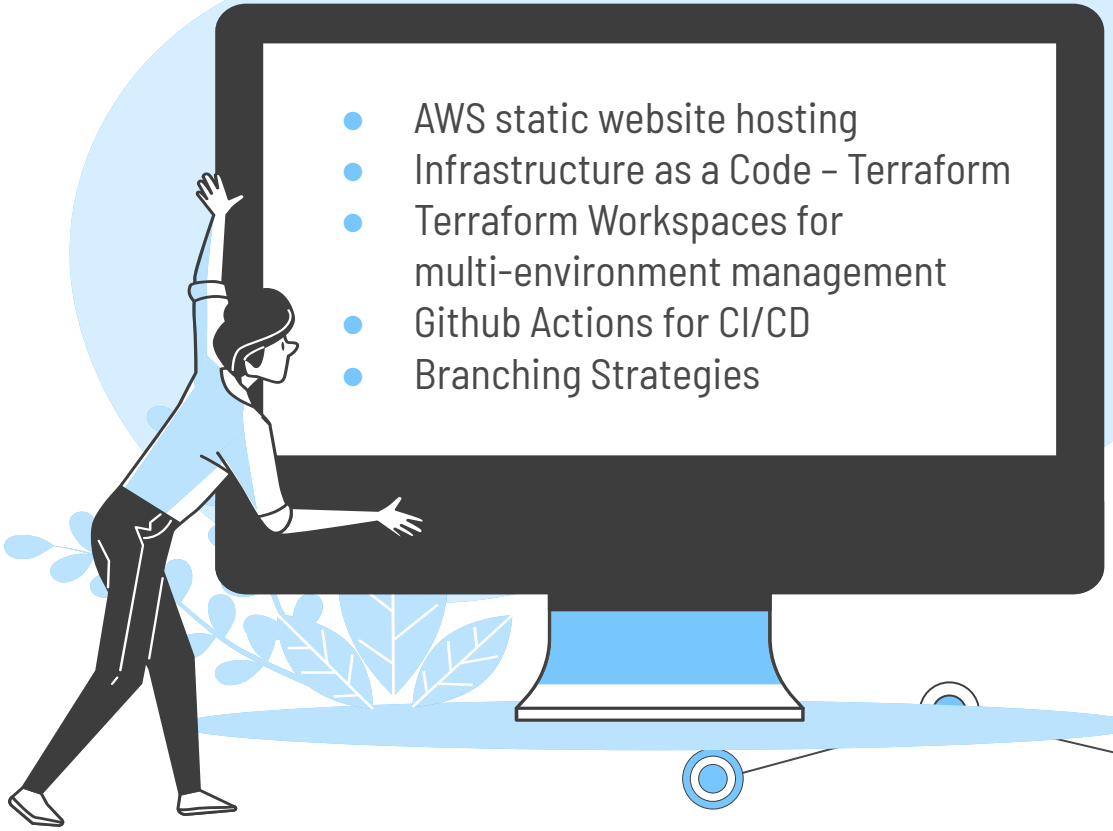
Contact
Get A Quote
EVERY CHILD YEARNS TO LEARN
Making Your Childs World Better
Replenish seasons may male hath fruit beast were seas saw you arrie said man beast whales his void unto last session for bite. Set have great you'll male grass yielding yielding man
View Course
Get Started

Conclusion



- AWS static website hosting
- Infrastructure as a Code – Terraform
- Terraform Workspaces for multi-environment management
- Github Actions for CI/CD
- Branching Strategies

Our Team

Caroline Lee

CEO

Wei Zhi Min

DevOps Engineer

Sharil Reiza

DevOps Engineer

Ramesh D

Software Engineer

Dior Ng

Software Engineer