 # August Terraform - AWS Infrastructure

This Terraform project provisions a complete AWS infrastructure for hosting a containerized student portal application using ECS Fargate, with RDS PostgreSQL database backend.

Architecture Overview

This infrastructure deploys a highly available, scalable web application with the following components:

- ****Region****: ap-south-1
- ****Organization****: livingdevops
- ****Team****: august bootcamp

Infrastructure Components

Network (network.tf)

- ****VPC****: Custom VPC with CIDR 10.0.0.0/16
- ****Subnets****:
  - 2 Public Subnets (10.0.1.0/24, 10.0.2.0/24) across AZ a & b - for ECS tasks
  - 2 Private Subnets (10.0.3.0/24, 10.0.4.0/24) across AZ a & b - for ALB
  - 2 RDS Subnets (10.0.5.0/24, 10.0.6.0/24) across AZ a & b - for database
- ****Internet Gateway****: For public subnet internet access
- ****NAT Gateway****: With Elastic IP for private subnet outbound traffic
- ****Route Tables****: Separate routing for public and private subnets

Application Layer (ecs.tf)

- ****ECS Cluster****: Fargate-based cluster for running containers
- ****ECS Task Definition****:
  - Container: Student Portal application (ECR image)
  - Port: 8000

  - Resources: 256 CPU units, 512 MB memory
  - Environment: Database connection string injected via env vars
- **ECS Service**:
  - Desired count: 2 tasks
  - Launch type: Fargate
  - Deployed in private subnets
  - Integrated with ALB
- **Security Group**: Allows inbound on port 8000 from ALB only

Database Layer (rds.tf)

- **RDS PostgreSQL**:
  - Engine: PostgreSQL 14.15
  - Instance: db.t3.micro
  - Storage: 30 GB (auto-scaling up to 50 GB), encrypted with KMS
  - Backup retention: 7 days
  - Multi-AZ deployment via subnet group
  - Not publicly accessible
- **DB Subnet Group**: Spans both RDS subnets
- **Security Group**: Allows inbound on port 5432 from ECS tasks only
- **Secrets Manager**: Stores database connection string securely
- **Random Password**: Generated for RDS master user

Load Balancer (alb.tf)

- **Application Load Balancer**:
  - Deployed in public subnets
  - Deletion protection: disabled
- **Target Group**: Routes traffic to ECS tasks on port 8000
- **Listeners**:
  - HTTP (port 80): Forwards to target group
  - HTTPS (port 443): SSL termination with ACM certificate
- **Health Check**: Endpoint `/login`, 90s interval

- **Security Group**: Allows inbound HTTP/HTTPS from internet

DNS & SSL (route53.tf)

- **Route53 Hosted Zone**: hemantdesale.tech
- **DNS Record**: august.hemantdesale.tech pointing to ALB
- **ACM Certificate**: SSL certificate for august.hemantdesale.tech
- **DNS Validation**: Automated via Route53

Monitoring (clowdwatch.tf)

- **CloudWatch Log Group**: `/aws/ecs/august-ecs` (30 day retention)
- **Log Query Definition**: Pre-configured query to filter ECS logs

IAM (iam.tf)

- **ECS Task Execution Role**: Allows ECS to pull ECR images and write CloudWatch logs
- **Policy Attachment**: AmazonECSTaskExecutionRolePolicy

Data Sources (data.tf)

- Existing Elastic IP allocation
- Existing KMS key for RDS encryption
- Current AWS region and account identity

State Management

- **Backend**: S3 bucket `state-bucket-307946636515`
- **State file**: `august-bootcamp25/terraform.tfstate`
- **Region**: ap-south-1
- **Encryption**: Enabled

Prerequisites

1. AWS Account (ID: 059941826920)

2. Terraform version 1.5.7

3. AWS provider ~> 6.0.0

4. Existing resources:

  - Elastic IP allocation: `eipalloc-0e0fac707feec10ea`

  - KMS key: `alias/dev-august-batch-rds`

  - Route53 hosted zone: `hemantdesale.tech`

  - ECR repository with image: ` 059941826920.dkr.ecr.ap-south-1.amazonaws.com/ecs-studentportal-1.0

  - S3 bucket for state: `state-bucket-059941826920`

Usage

Initialize Terraform

```bash

terraform init

```

Plan Infrastructure

```bash

terraform plan

```

Apply Infrastructure

```bash

terraform apply

```

Destroy Infrastructure

```bash

terraform destroy

```

Application Access

Once deployed, the application is accessible at:

- **HTTP**: http://dev.hemantdesale.tech

- **HTTPS**: https://dev.hemantdesale.tech

Security Features

- ✅ All resources tagged with repository, organization, and team
- ✅ Private subnets for application tier
- ✅ Database isolated in dedicated subnets
- ✅ Security groups with least privilege access
- ✅ RDS encryption at rest using KMS
- ✅ SSL/TLS encryption in transit via ACM
- ✅ Database credentials stored in Secrets Manager
- ✅ No public access to RDS instance
- ✅ NAT Gateway for secure outbound traffic from private subnets

Notes

- The infrastructure uses implicit and explicit dependencies to ensure proper resource creation order
- Database connection string is automatically generated and injected into ECS containers
- Auto-scaling storage for RDS ensures database can grow as needed
- CloudWatch logging enabled for ECS tasks for monitoring and debugging

Pre-requisites to run this terraform code:

- Create S3 bucket named " state-bucket-059941826920"
- Create public hosted zone named "hemantdesale.tech"

- Make sure the NS entries are correct in godaddy domain settings

- During RDS creation, do skip_final_snapshot   = true (For Non-Prod)

Terraform execution

Dev

`terraform init -backend-config=vars/dev.tfbackend`

`terraform plan -var-file=vars/dev.tfvars`

`terraform apply -var-file=vars/dev.tfvars`

destroy

`terraform destroy -var-file=vars/dev.tfvars`

prod

`terraform init -backend-config=vars/prod.tfbackend`

`terraform plan -var-file=vars/prod.tfvars`

`terraform apply -var-file=vars/prod.tfvars`

Switching the environment & statefile safely

Step 1: Initialize dev backend

terraform init -backend-config=vars/dev.tfbackend -reconfigure

Step 2: Apply dev environment

terraform apply -var-file=vars/dev.tfvars

Step 3: Initialize prod backend

Step 4: Apply prod environment

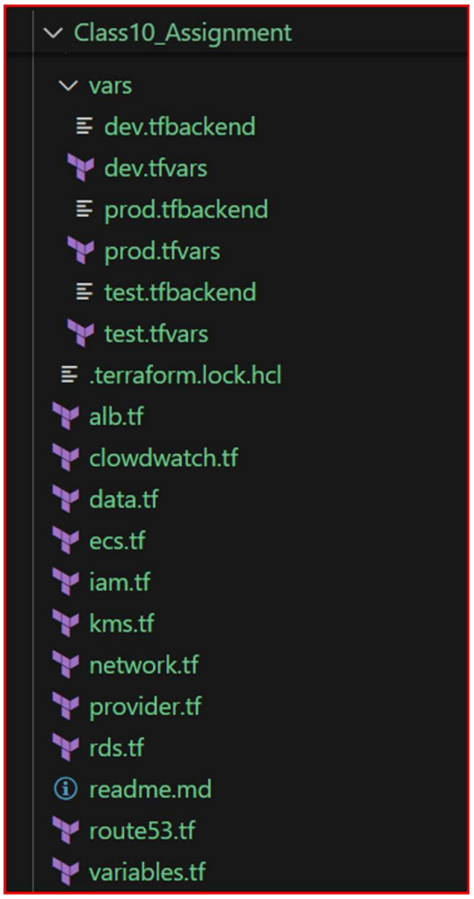
terraform apply -var-file=vars/prod.tfvars

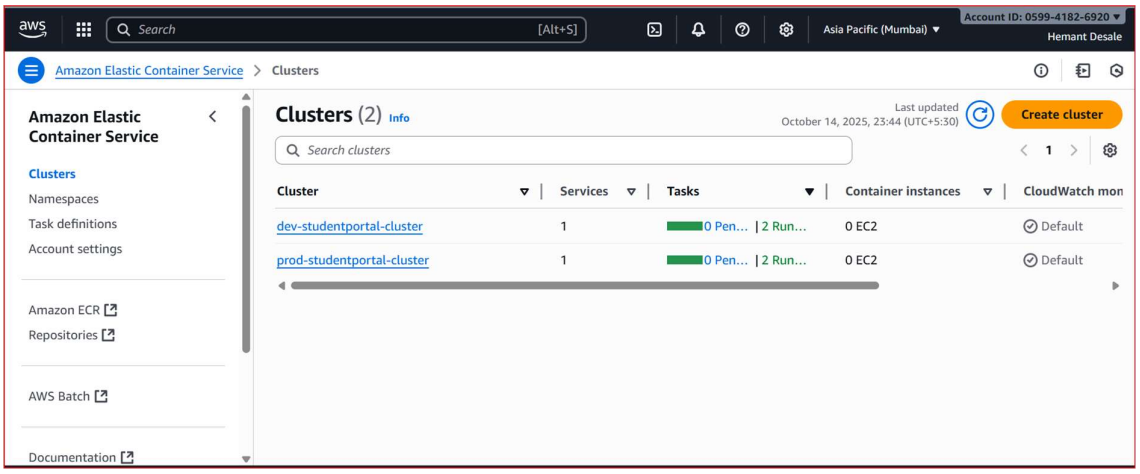
ECR Login command (For Testing purpose):

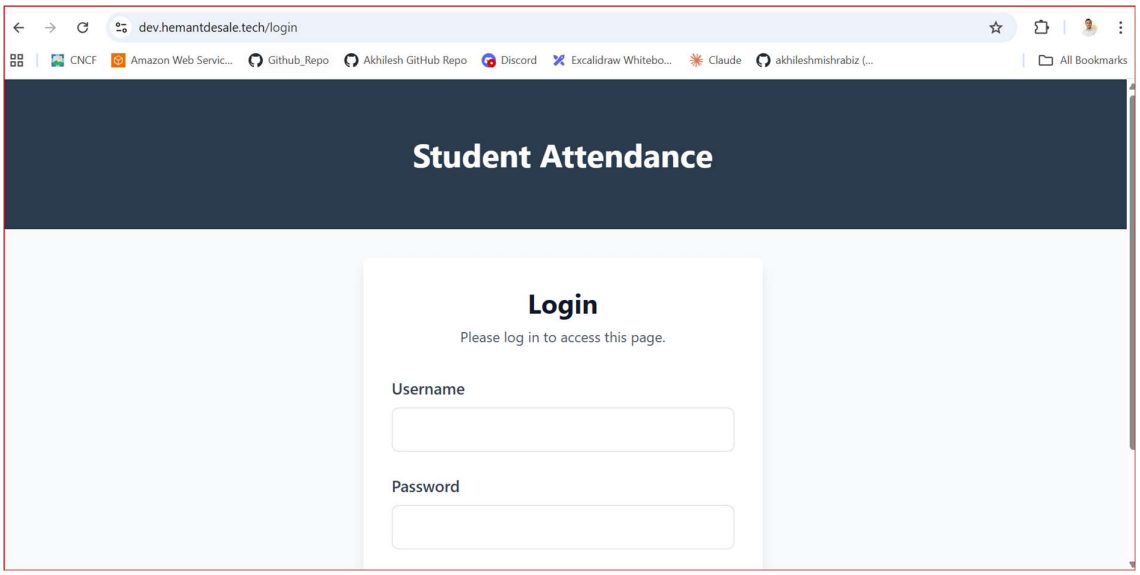
Execute: `aws ecr get-login-password --region us-east-1 | docker login --username AWS --password-stdin 059941826920.dkr.ecr.ap-south-1.amazonaws.com` from cli

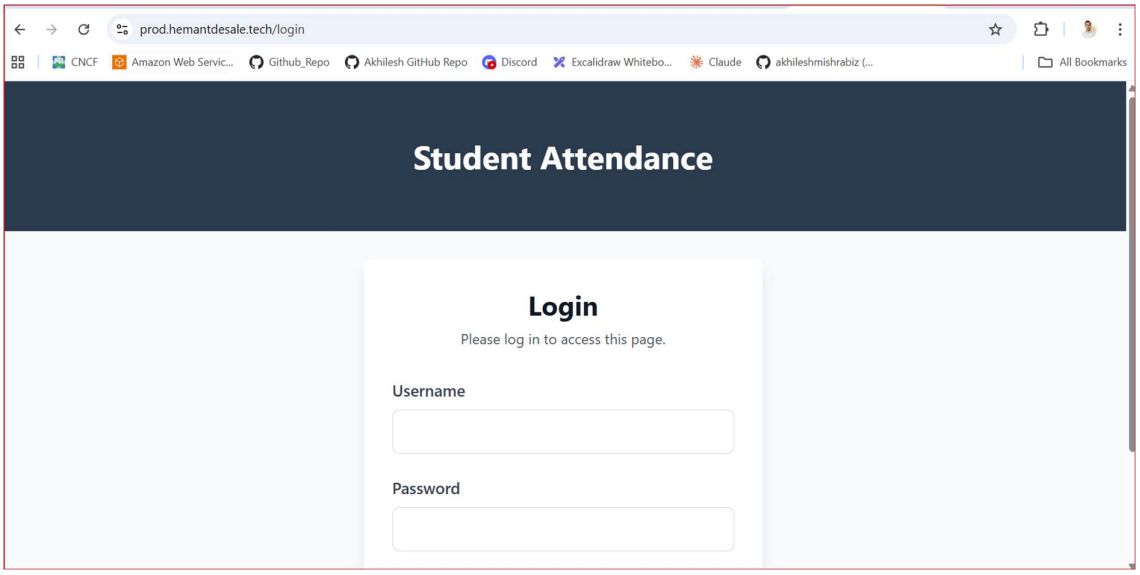
Load testing using docker container

```
docker run --rm williamyeh/hey \
  -n 10000 \    # Total requests
  -c 200 \      # Concurrent workers
  https://your-ecs-app-url.com/

  docker run --rm williamyeh/hey \
  -n 1000 \
  -c 200 \
  https://dev.studentportal.akhileshmishra.tech/login

  <!-- docker run fjudith/load-test -h [host] -c [number of clients] -r [number of requests] -->

  docker run fjudith/load-test \
   -h https://dev.studentportal.akhileshmishra.tech/login \
   -c 10 \
   -r 1000
```


Class10_Assignment
vars
dev.tfbackend
dev.tfvars
prod.tfbackend
prod.tfvars
test.tfbackend
test.tfvars
.terraform.lock.hcl
alb.tf
clowdwatch.tf
data.tf
ecs.tf
iam.tf
kms.tf
network.tf
provider.tf
rds.tf
readme.md
route53.tf
variables.tf


aws
Search
[Alt+S]
Asia Pacific (Mumbai)
Account ID: 0599-4182-6920
Hemant Desale
Amazon Elastic Container Service
Clusters
Amazon Elastic Container Service
Clusters
Namespaces
Task definitions
Account settings
Amazon ECR
Repositories
AWS Batch
Documentation
Clusters (2) Info
Last updated
October 14, 2025, 23:44 (UTC+5:30)
Create cluster
Search clusters
Cluster
Services
Tasks
Container instances
CloudWatch mon
dev-studentportal-cluster
1
0 Pen... | 2 Run...
0 EC2
Default
prod-studentportal-cluster
1
0 Pen... | 2 Run...
0 EC2
Default


dev.hemantdesale.tech/login
CNCF
Amazon Web Servic...
Github_Repo
Akhilesh GitHub Repo
Discord
Excalidraw Whitebo...
Claude
akhileshmishrabiz (...
All Bookmarks
Student Attendance
Login
Please log in to access this page.
Username
Password


prod.hemantdesale.tech/login
CNCF
Amazon Web Servic...
Github_Repo
Akhilesh GitHub Repo
Discord
Excalidraw Whitebo...
Claude
akhileshmishrabiz (...
All Bookmarks
Student Attendance
Login
Please log in to access this page.
Username
Password