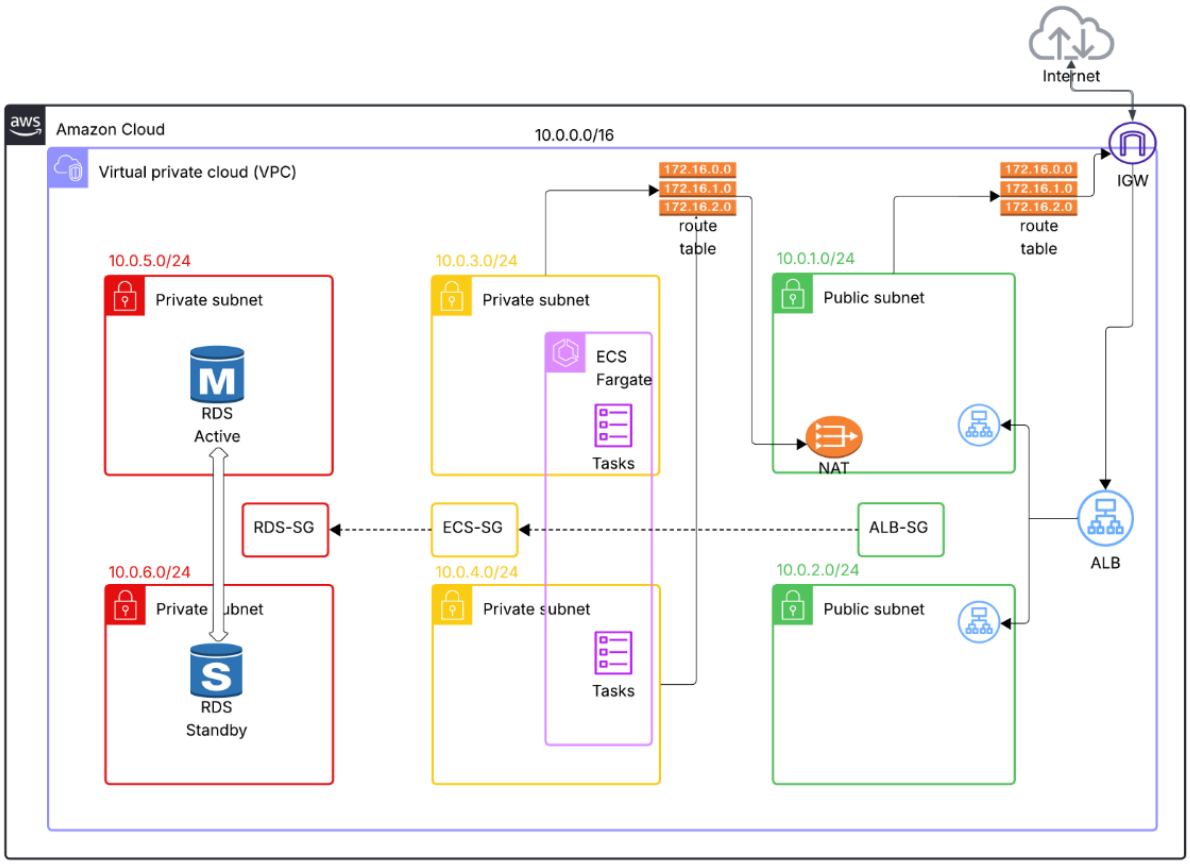
Deploy Student Portal App in AWS ECS using Terraform

Scenario: Student Portal App on AWS ECS using Terraform

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

Architectural Diagram



Infrastructure Components

Network (network.tf)

- **VPC**: Custom VPC with CIDR 10.0.0.0/16
- **Subnets**:
  - 2 Private Subnets (10.0.1.0/24, 10.0.2.0/24) across AZ a & b - for ECS tasks
  - 2 Public 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**: rajeshapps.site
- **DNS Record**: august.rajeshapps.site pointing to ALB
- **ACM Certificate**: SSL certificate for august.rajeshapps.site
- **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)

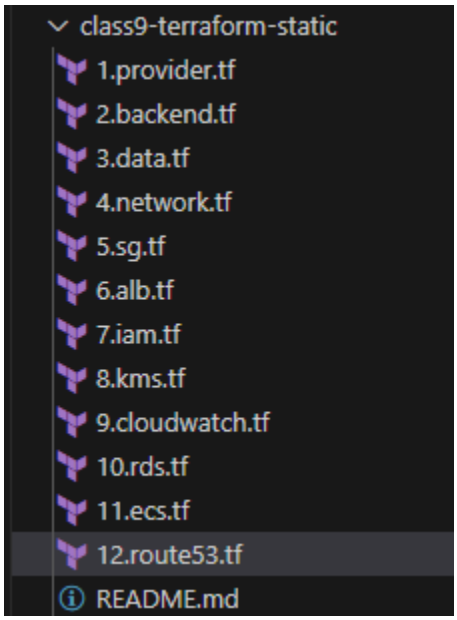
- Existing Hosted Zone details
- Current AWS region and account identity

State Management

- **Backend**: S3 bucket state-bucket-307946636515
- **State file**: august/terraform.tfstate

- **Region**: us-east-1
- **Encryption**: Enabled

Terraform Code Directory Structure



Terraform Execution

terraform init

- Initializes the working directory, downloads provider plugins, and sets up the backend.

terraform plan

- Shows the execution plan, previewing what resources will be created, changed, or destroyed.

terraform apply –auto-approve

- Applies the changes without asking for interactive approval.

Pre-requisites to run this terraform code

- Create S3 bucket named "state-bucket-307946636515"
- Create public hosted zone named "rajeshapps.site"
- Make sure the NS entries are correct in godaddy domain settings

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

GitHub Repository

https://github.com/rajeshchandranaws3/bootcamp-august-rajesh/tree/main/class9-terraform-static

Application Output