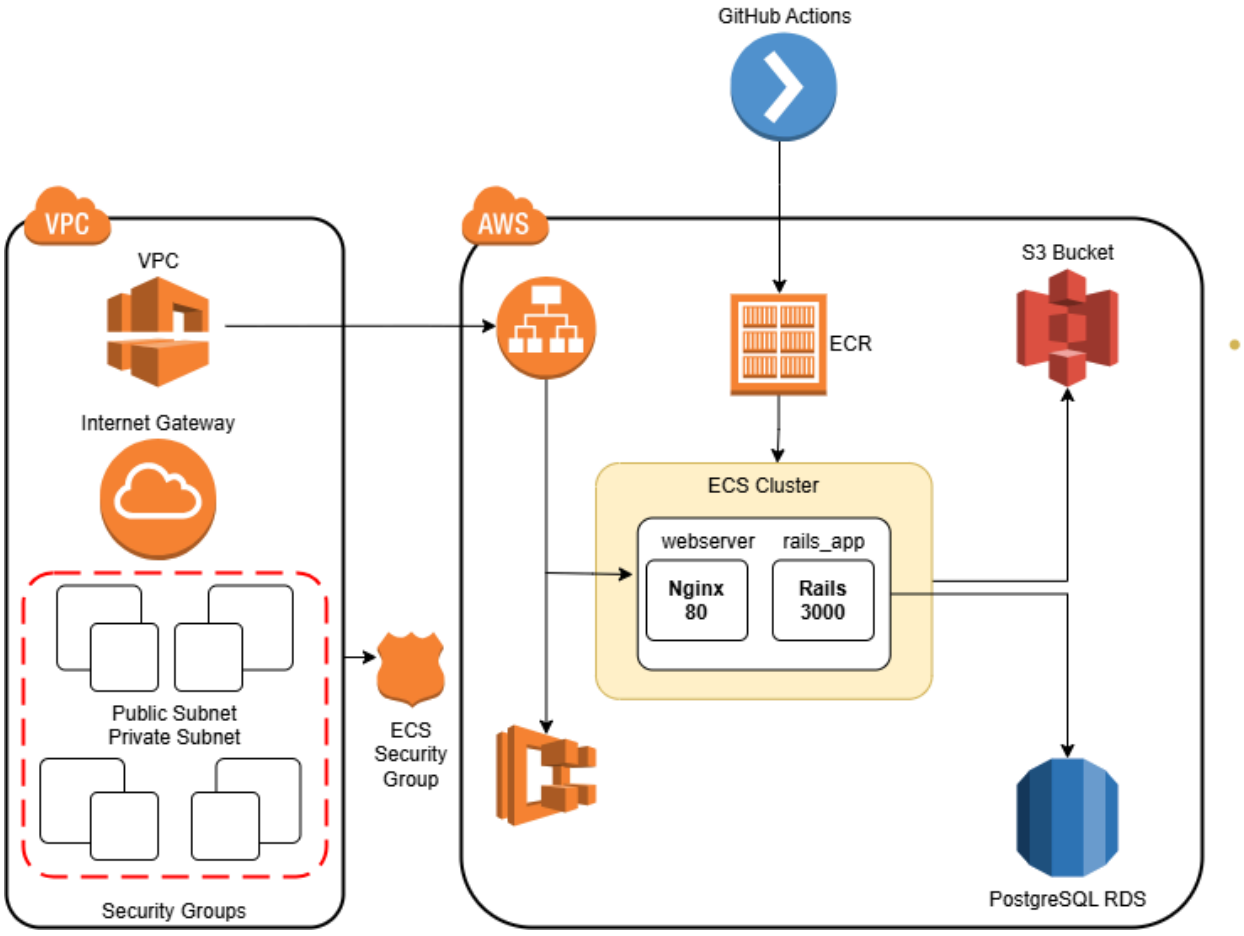
# AWS ECS Deployment Documentation

## 1. Overview

This document describes the deployment process of a Ruby on Rails application with Nginx using AWS ECS (Fargate), RDS (PostgreSQL), and S3. The deployment is automated using GitHub Actions for CI/CD, and AWS CloudFormation is used for infrastructure provisioning.

## 2. Architecture Diagram



# 3. Deployment Steps

## 3.1 GitHub Actions for CI/CD

1. A GitHub Actions workflow is set up to trigger on a push to the repository.
2. The workflow builds Docker images of the Rails and webserver application.
3. The built images are then pushed to AWS Elastic Container Registry (ECR).
4. The ECS service is updated to use the new images.

## 3.2 CloudFormation Stack Creation

1. A CloudFormation stack is created using YAML template.
2. This stack provisions:
    - A **VPC** with public and private subnets.
    - **Security groups** for ALB, ECS, and RDS.
    - An **Application Load Balancer (ALB)**.
    - An **ECS Cluster** with Fargate.
    - An **RDS PostgreSQL instance**.
    - An **S3 bucket** for storage.
    - An **ECS Task Definition and Service**.
3. Upload the YAML file to CloudFormation and create the stack, the ECS service runs the Rails and Nginx containers.

# 4. Networking Configuration

## 4.1 ECS to ECR Connectivity Issue

- Initially, ECS was unable to pull images from ECR due to the lack of internet access.
- The solution was to **enable a NAT Gateway** for a public subnet.
- This allowed the ECS tasks (in a private subnet) to communicate with ECR and pull the required images.

### 4.2 Security Groups & Routing

- ALB allows public HTTP access on port 80.
- ECS tasks allow only internal communication from the ALB.
- RDS is only accessible from ECS (not publicly exposed).
- NAT Gateway enables outbound internet access for ECS.

## 5. Issues Faced & Solutions

| Issue | Solution |
|---|---|
| ECS task unable to pull from ECR | Enabled NAT Gateway for the private subnet |
| RDS not accessible from ECS | Ensured correct security groups and subnet configuration |
| ALB not resolving requests | Verified target group and health check settings |

## 6. Application Access

The application is accessible through the **ALB DNS Name**:

- Can find this value in the **CloudFormation Outputs section** under LoadBalancerDNS.

# 7. Conclusion

The deployment is automated, scalable, and secure. The ECS service is running behind an ALB, with a PostgreSQL RDS database and S3 integration.