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Project: Deploying a Web Application on AWS Fargate

Overview

I worked on a cloud deployment project to host a simple web application called **"Movie Night"** a platform that allows members of a local cinema to vote on which movie should premiere each month.

The project demonstrates the use of several **AWS services** to build a secure, scalable, and containerized application deployment.

AWS Services Used

- **Amazon VPC** – Custom networking environment with public and private subnets
- **Amazon ECS (Fargate)** – Serverless container orchestration
- **Amazon ECR** – Container image repository
- **Amazon RDS (MySQL)** – Managed relational database service
- **Amazon Secrets Manager** – Secure management of application credentials
- **Amazon EC2** – Used as a Docker build server
- **AWS Lambda** – Automatic credential rotation for Secrets Manager

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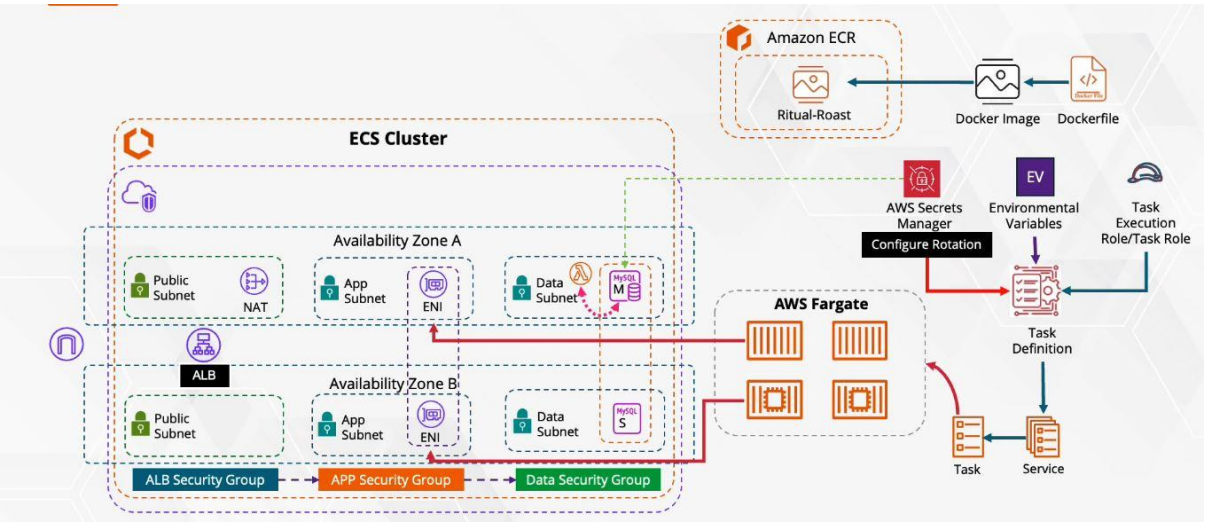
Architecture

A detailed architecture diagram illustrates the complete setup including the VPC, ALB, ECS cluster, and database tier showing secure communication flows between components



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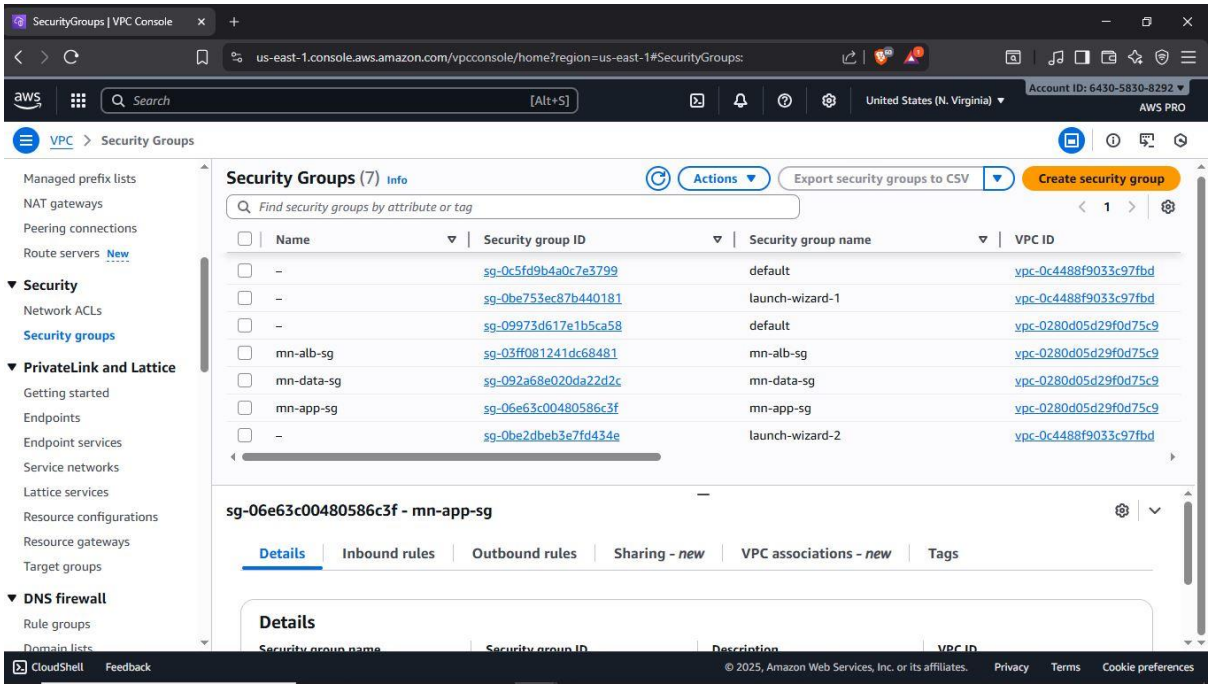
Implementation Steps

1. VPC Setup

- Created a custom **VPC** with **6 subnets**: 2 public and 4 private.
- Attached an **Internet Gateway**, configured a **NAT Gateway**, and set up appropriate **route tables**.
- Defined **three security groups** to control traffic flow:
  - mn-alb-sg — Allows inbound HTTP traffic from the internet.
  - mn-app-sg — Allows inbound HTTP traffic from the ALB security group.
  - mn-data-sg — Allows inbound MySQL traffic from the app security group.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AWS PRO
VPC > Security Groups
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NAT gateways
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PrivateLink and Lattice
Getting started
Endpoints
Endpoint services
Service networks
Lattice services
Resource configurations
Resource gateways
Target groups
DNS firewall
Rule groups
Security Groups (7) Info
Actions
Export security groups to CSV
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Details
Inbound rules
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Sharing - new
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Feedback
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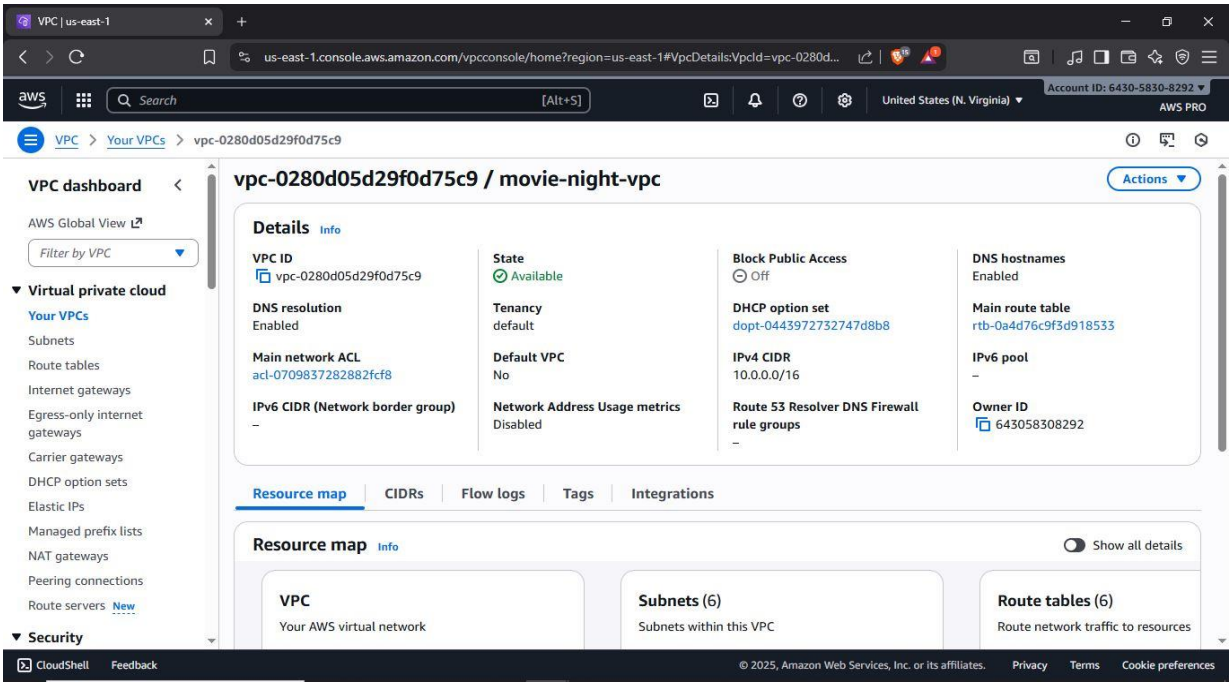
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AWS PRO
VPC > Your VPCs > vpc-0280d05d29f0d75c9
VPC dashboard
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Your VPCs
Subnets
Route tables
Internet gateways
Egress-only internet gateways
Carrier gateways
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NAT gateways
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DHCP option set
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Main route table
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Main network ACL
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Default VPC
No
IPv4 CIDR
10.0.0.0/16
IPv6 pool
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IPv6 CIDR (Network border group)
–
Network Address Usage metrics
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Route 53 Resolver DNS Firewall rule groups
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Owner ID
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Resource map
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VPC
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Subnets (6)
Subnets within this VPC
Route tables (6)
Route network traffic to resources
CloudShell
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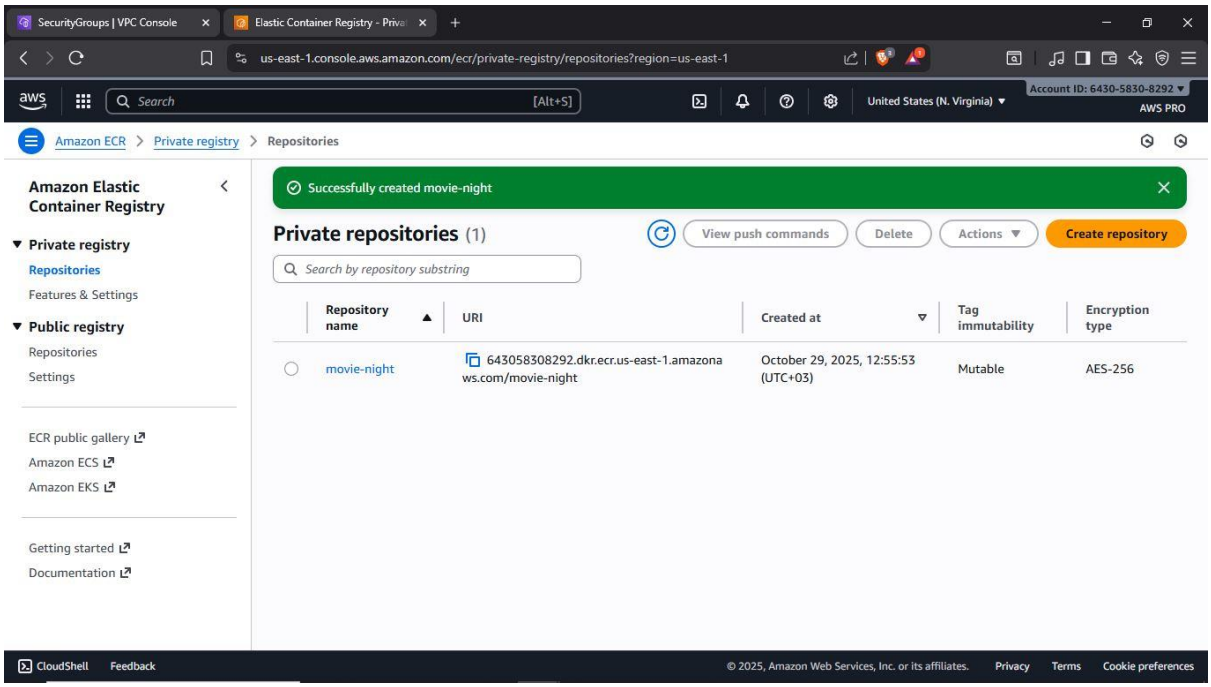
2. ECR Repository

Created a **private repository** in **Amazon ECR** to store and manage container images securely.



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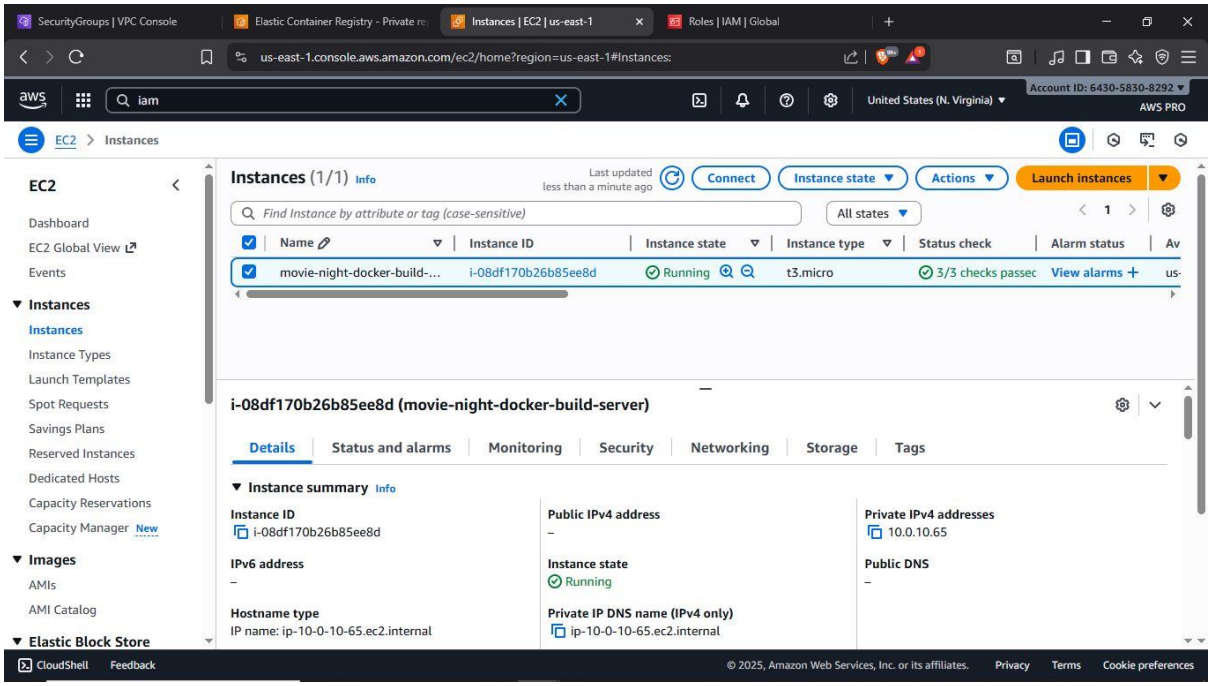
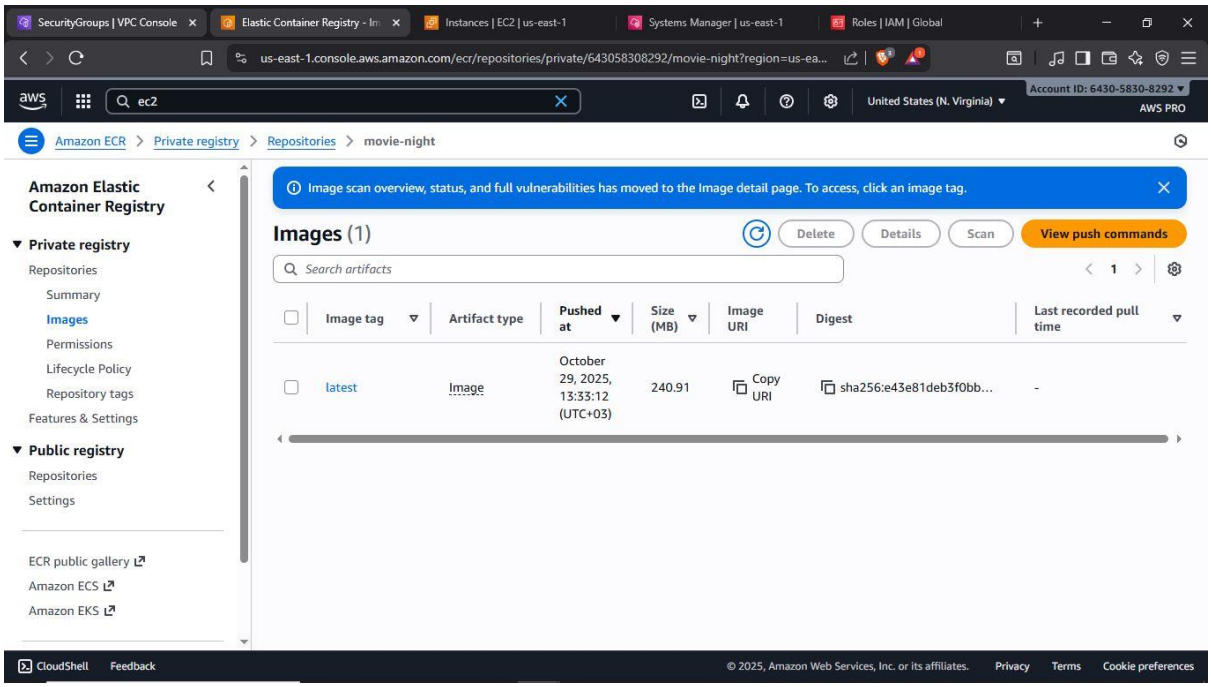
3. Docker Image Build

- Launched an **EC2 instance** as a dedicated Docker build server.
- Assigned an **IAM role** to allow interaction with ECR.
- Installed Docker, built the application image, and verified its functionality locally.



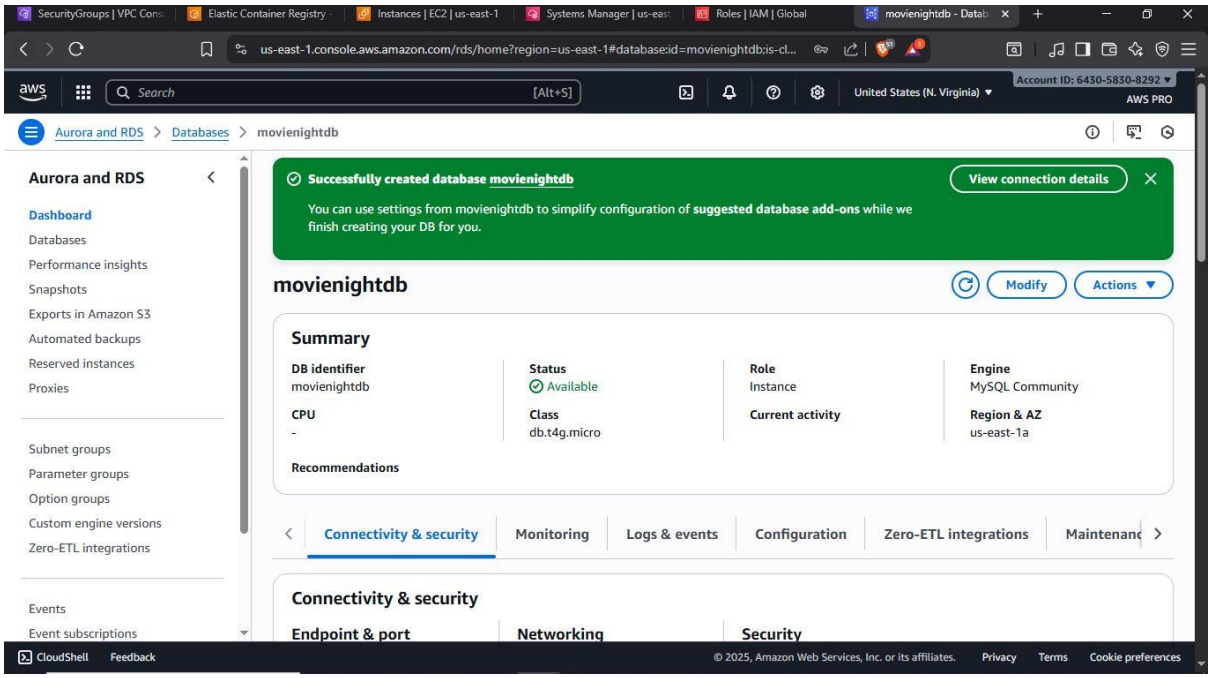
4. Push Image to ECR

Authenticated to ECR and **pushed the Docker image** to the repository for later use in ECS tasks.



5. Database Setup (RDS MySQL)

- Defined **subnet groups** for database placement within private subnets.
- Deployed an **RDS MySQL instance** with multi-AZ capability for high availability.



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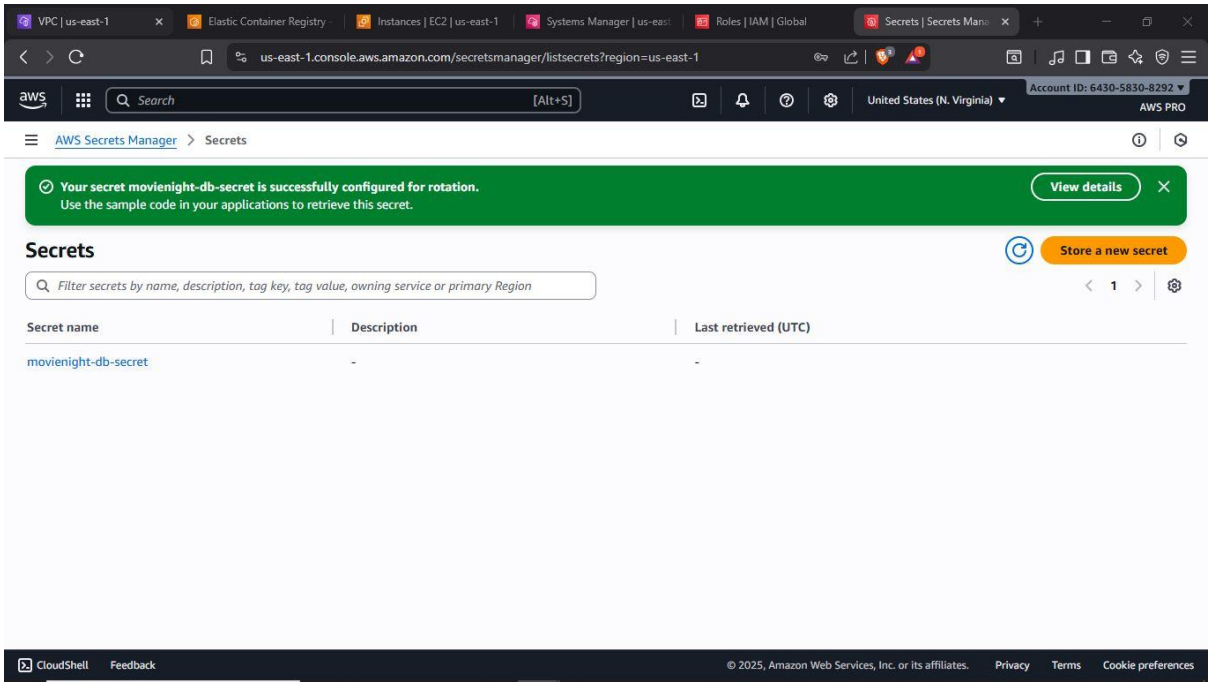
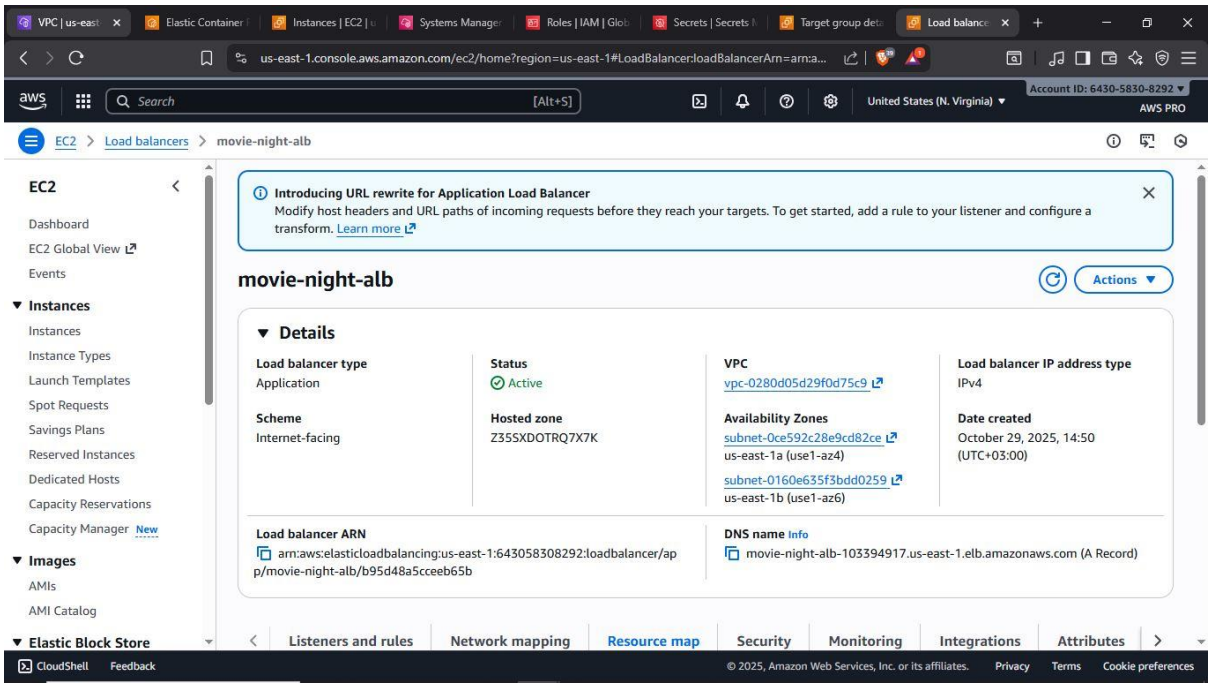
6. Secrets Management

- Configured **AWS Secrets Manager** to securely store database credentials.
- Enabled **automatic key rotation** via a **Lambda function**, reducing manual overhead and improving security posture.



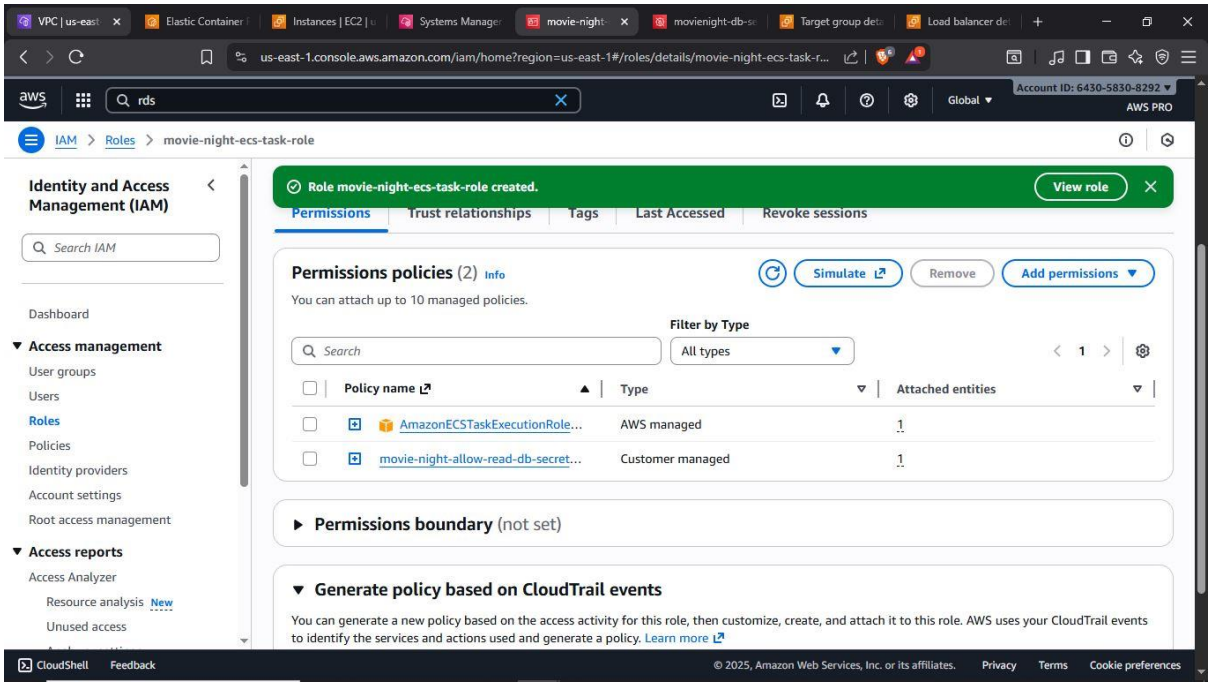
7–8. Load Balancer Configuration

- Created a **target group** for ECS tasks.
- Deployed an **Application Load Balancer (ALB)** in the public subnets to distribute inbound traffic across containers running on Fargate.



9. IAM Roles and Policies

- Created a **custom IAM policy** (movie-night-allow-read-db-secrets-policy) to grant ECS tasks permission to read secrets.
- Created an **ECS Task Role** and attached:
  - AmazonECSTaskExecutionRolePolicy (managed)
  - Custom secrets access policy



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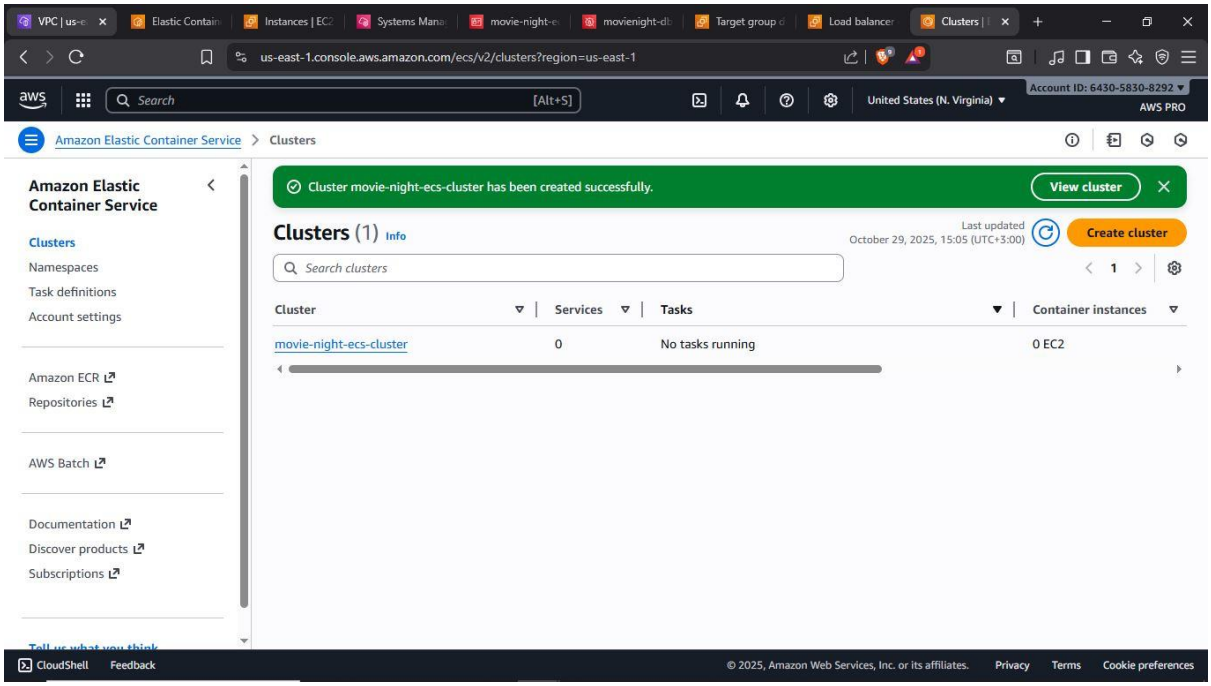
10. ECS Cluster (Fargate)

Created an **ECS cluster** configured to use **AWS Fargate**, allowing fully managed, serverless container execution.



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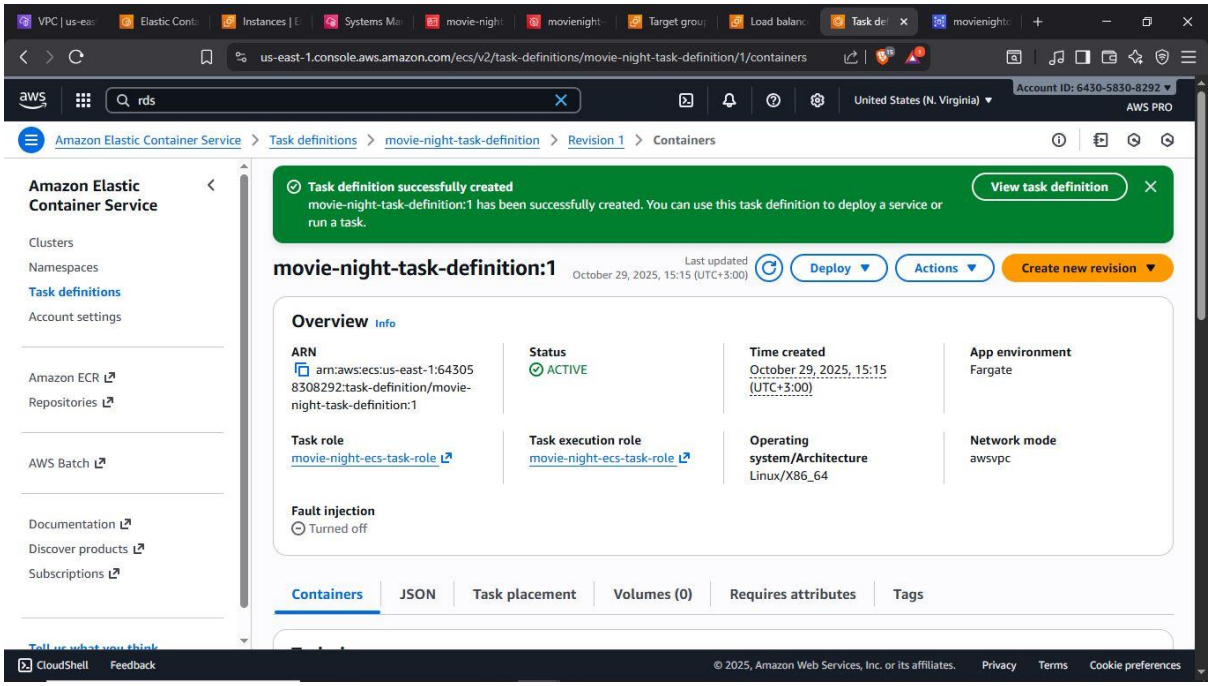
11. Task Definition

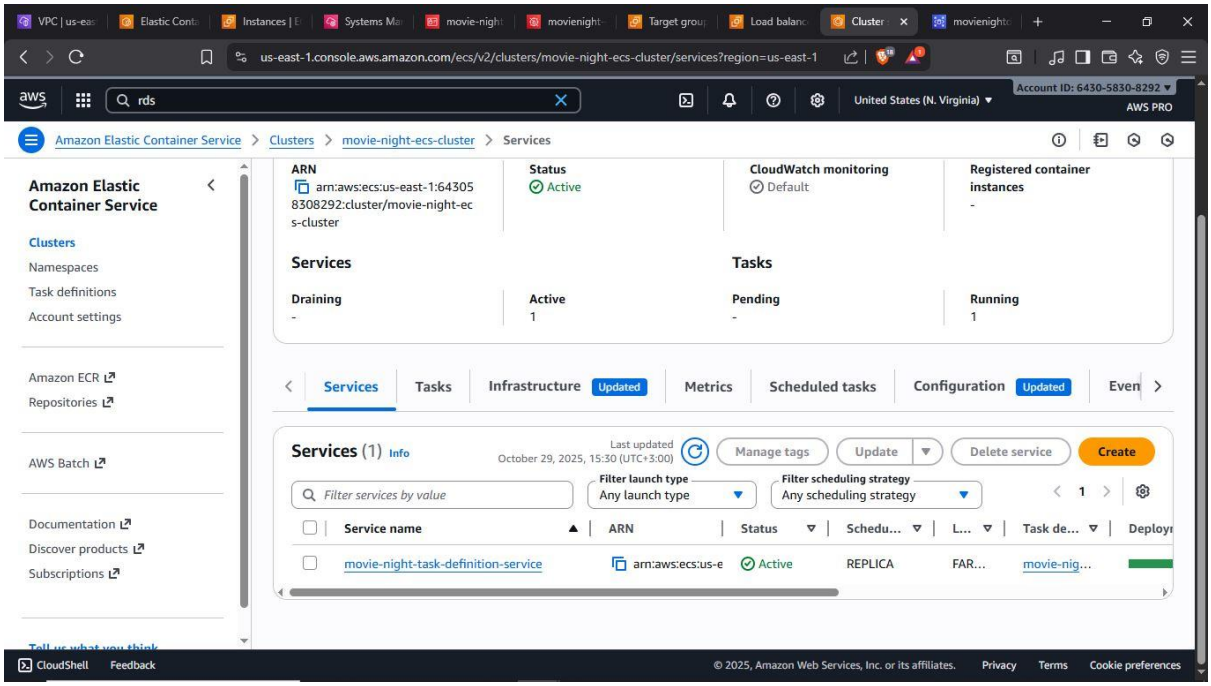
Defined a **task definition** specifying:

- Launch type (Fargate)
- Container image (from ECR)
- Port mappings
- IAM roles
- Environment variables and secrets references



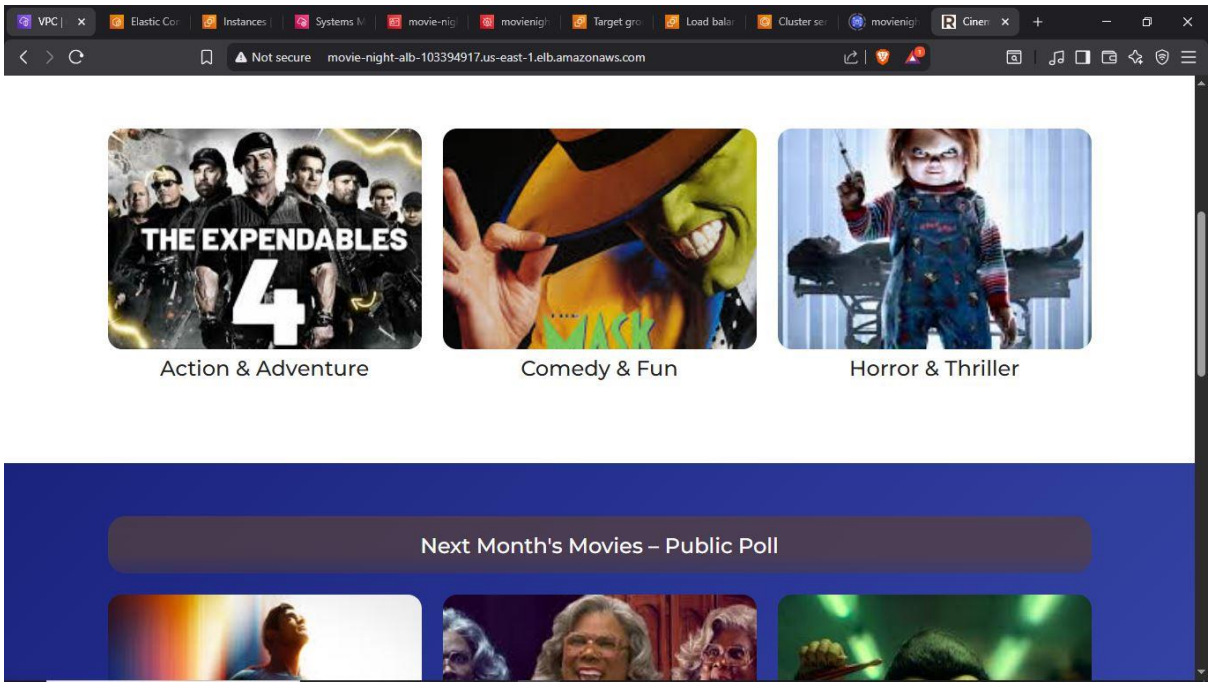
12. ECS Service Deployment

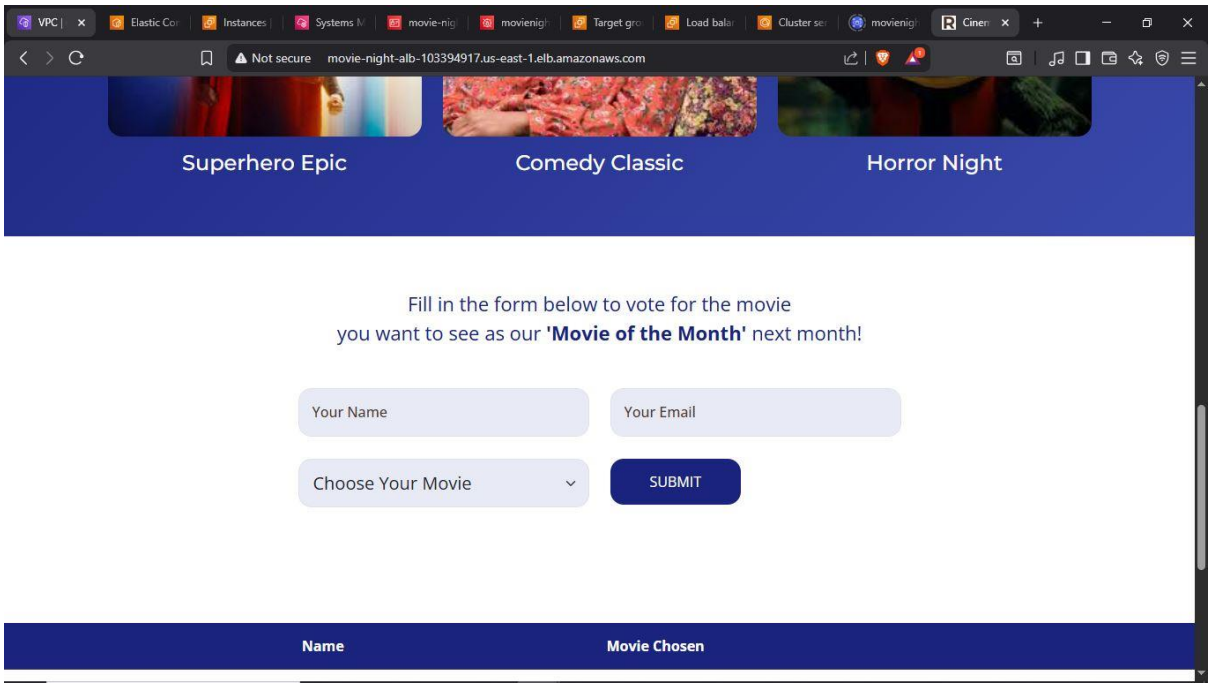
- Configured the **ECS service** for deployment, networking, load balancing, and **auto-scaling**.
- Verified that containers were successfully deployed to the cluster and accessible via the ALB endpoint.

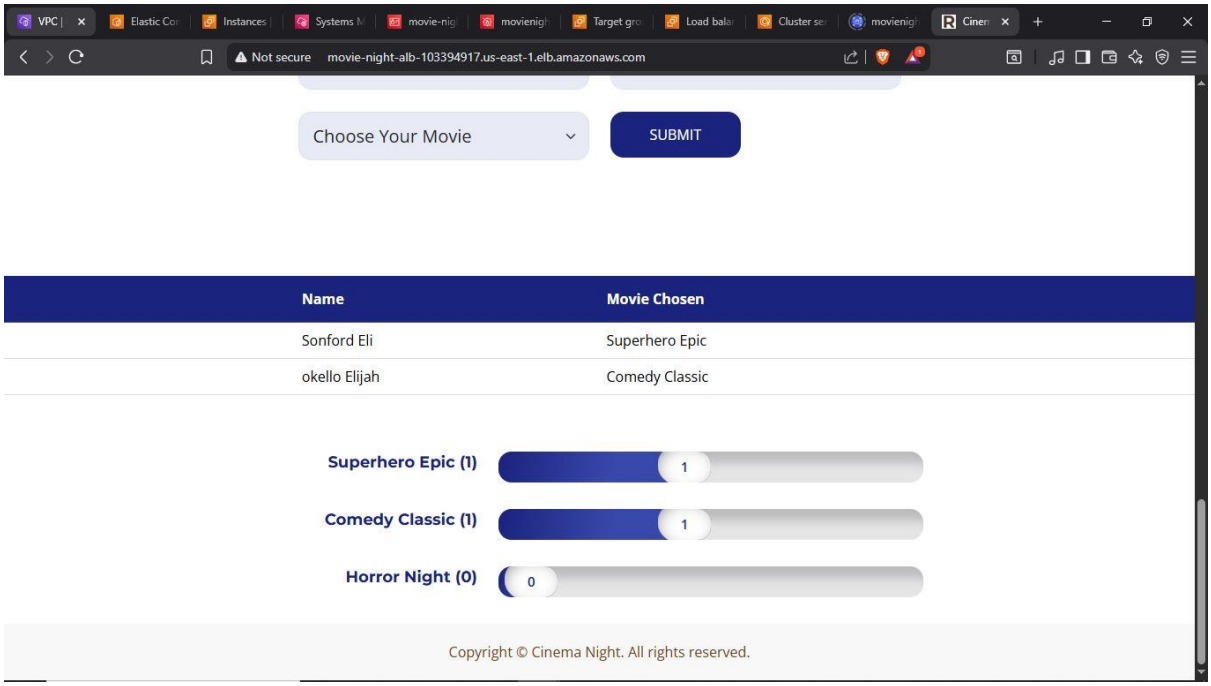


Outcome

The deployment successfully delivered a **secure, fully managed, and scalable containerized web application** on AWS Fargate, integrating best practices for networking, secrets management, and load balancing.



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