Multistack App on Kubernete

Marty Kaiser | Ironhack DevOps Bootcamp 2025

📋 Project Overview

🎯 The Challenge

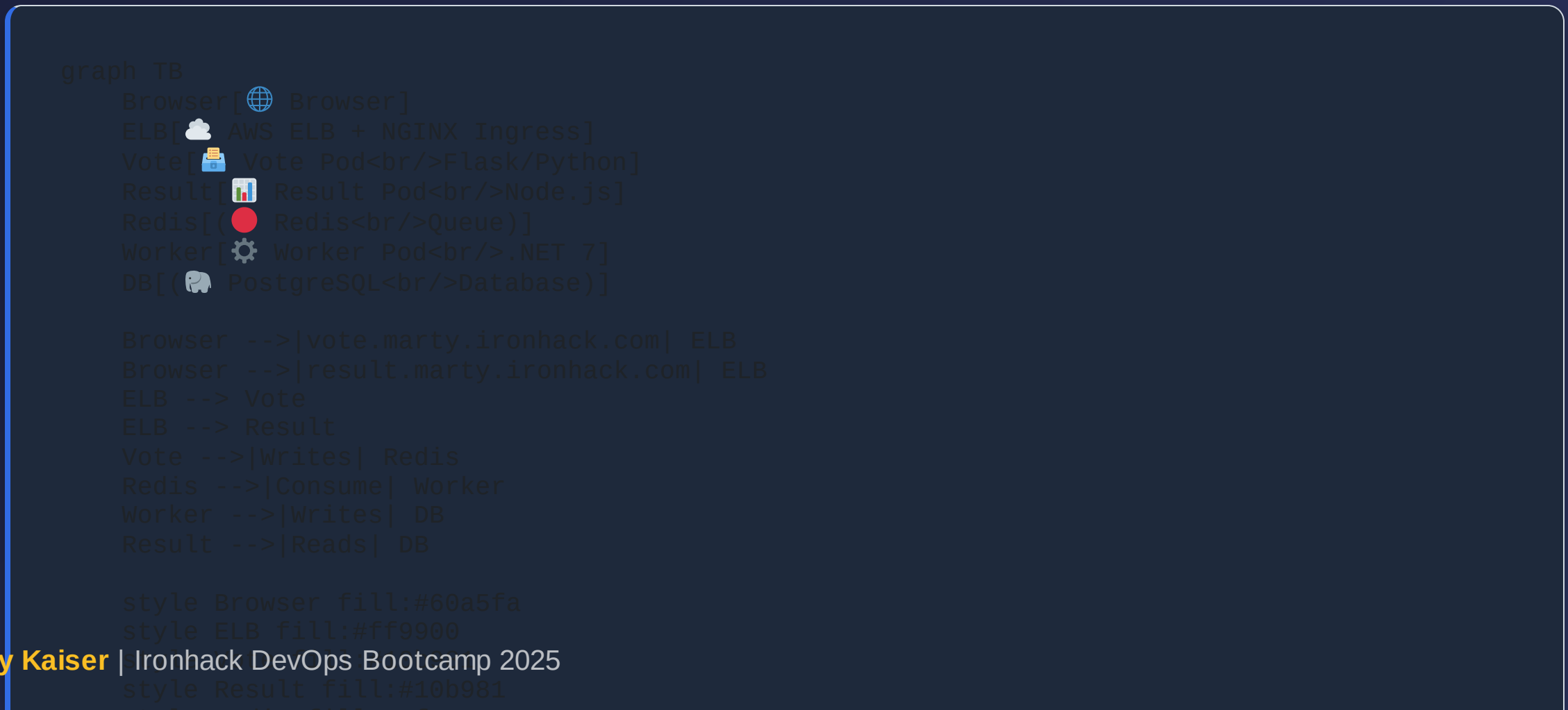
Deploy a **multi-language microservices application** to Kubernetes with:

- ⚡ Real-time voting system
- 🔄 Message queue processing

🛠️ Tech Stack

- **Vote Service:** Python/Flask
- **Worker Service:** .NET 7
- **Result Service:** Node.js/Express
- **Queue:** Redis

Architecture & Infrastructure



🔄 CI/CD Workflow

1️⃣ Trigger
Push to `main`

2️⃣ Build
Docker images
→ Docker Hub

3️⃣ Deploy
AWS + EKS
K8s Secrets

4️⃣ Result
Production!
✅

Pipeline Details

```
GitHub Actions → Docker Build → Push to Registry
                      ↓
              Configure AWS Credentials
                      ↓
              Connect to EKS (ironhack-main-2)
```

⚠️ Problem 1: Infrastructure & Configuration Hell

🚨 Multiple Issues Stacking Up

```
Browser: "DNS_PROBE_FINISHED_NXDOMAIN"
Worker:  "Waiting for db... Giving up"
```

🔍 Root Causes

1. Cluster Migration

3. Missing Secrets

✅ Solutions Applied

🌐 Networking

- ✅ Subdomain routing
- ✅ `vote.marty.ironhack.com`
- ✅ No path rewriting needed
- ✅ Modern Ingress config

🔐 Security

- ✅ GitHub Secrets → K8s Secrets
- ✅ Automated injection
- ✅ No hardcoded credentials
- ✅ CI/CD automation

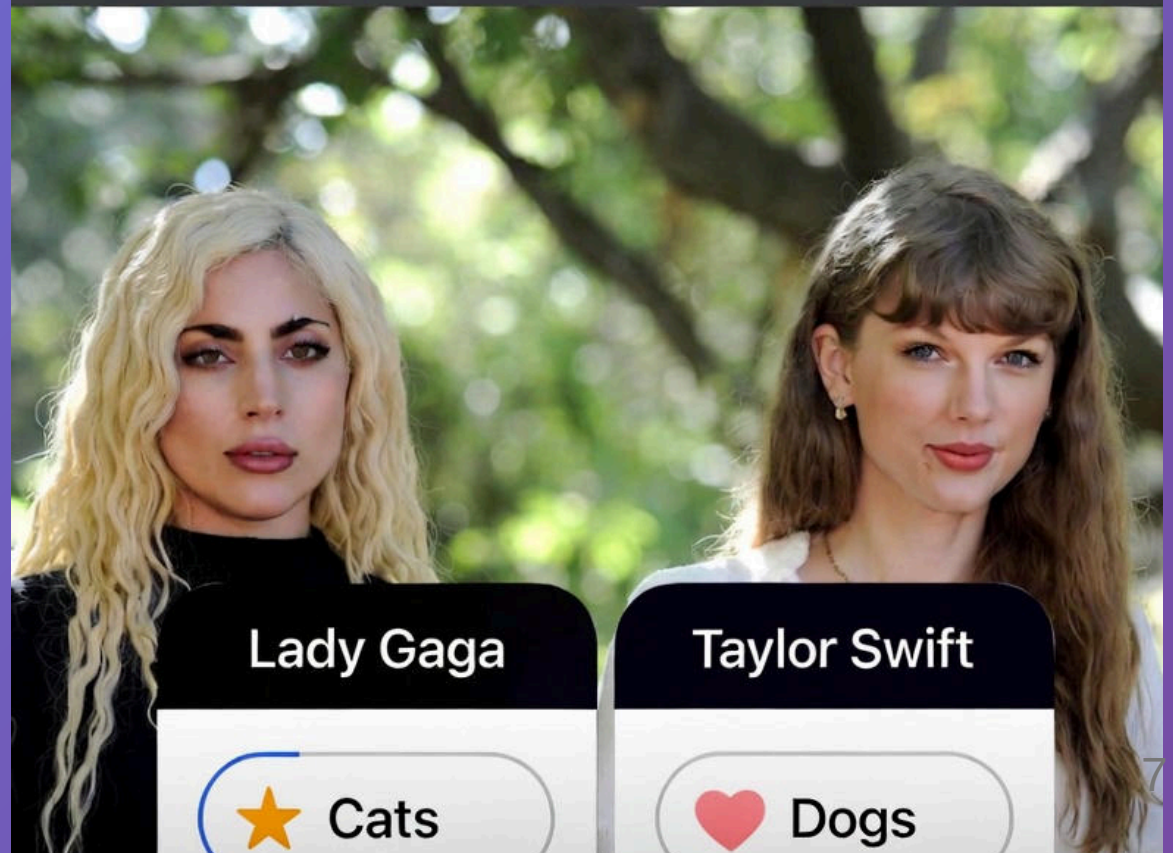
⚙️ Configuration

🏷️ Ingress

Problem 2: The Wildcar


```
# Another team's Ingress configuration spec:
rules:
 - http:
# ~~ No "host:" field = matches ALL traffic!
paths:
 - path: /vote
```

Issue: An Ingress without a specified host field acts as a catch-all, matching requests that don't explicitly match other rules.



⚠️ The Wildcard Ingress Challenge

🤔 What Happened?

Accessing `vote.marty.ironhack.com` unexpectedly displayed a different voting application **(Taylor Swift vs Lady Gaga)** instead of the intended **Cats vs Dogs** interface.

🔬 Root Cause Analysis

```
# Another team's Ingress configuration
spec:
  rules:
  - http:  # ⚠️ No "host:" field = matches ALL traffic!
      paths:
```

✅ The Solution

✅ Explicit Hostname Matching

```yaml
# Updated Ingress - Specific routing
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: marty-ingress
  namespace: marty
spec:
  ingressClassName: nginx  # Modern approach
  rules:
  - host: vote.marty.ironhack.com      # ✅ Explicit
    http:
      paths:
      - path: /
        pathType: Prefix
        backend:
          service:
            name: marty-svc-vote
            port:
              number: 80
  - host: result.marty.ironhack.com    # ✅ Prevents conflicts
    http:
      paths:
```

⚠️ Problem 3: Hardcoded Connections Everywhere

Vote App (Flask)

```
# ❌ Before
Redis(host="redis")

# ✅ After
redis_host = os.getenv(
    'REDIS_HOST',
    'redis'
)
Redis(host=redis_host)
```

Result App (Node.js)

```
// ❌ Before
connectionString:
  'postgres://postgres:postgres@db/postgres'

// ✅ After
connectionString:
  `postgres://${process.env.POSTGRES_USER}:
  ${process.env.POSTGRES_PASSWORD}@
  ${process.env.POSTGRES_HOST}/
  ${process.env.POSTGRES_DB}`
```

⚠️ Problem 3: Worker Environment Variables

🔵 Worker App (.NET)

❌ Wrong Deployment Config

```
env:
  - name: POSTGRES_HOST
  - name: POSTGRES_USER
  - name: POSTGRES_PASSWORD
```

Code expected different variable

✅ Corrected Variables

```
env:
  - name: DB_HOST
    value: "marty-svc-postgres"
  - name: DB_USERNAME
    valueFrom:
      secretKeyRef:
        name: marty-db-credentials
        key: POSTGRES_USER
  - name: DB_PASSWORD
```

✅ 🎯 Complete Solution Framework

🔐 Security

- GitHub Secrets → K8s Secrets
- No credentials in code/manifests
- Automated secret injection
- CI/CD automation

⚙️ Configuration

- Environment variables everywhere
- 12-factor app methodology
- Docker Compose → K8s migration
- Proper service naming

🏆 Summary & Key Learnings

What We Accomplished

✅ Multi-language microservices
✅ AWS ELB + NGINX Ingress routing
✅ Secure secret management
✅ Automated CI/CD pipeline
✅ Real-time WebSocket updates

Technical Skills Demonstrated:

- **Kubernetes:** Deployments, Services, Ingress, Secrets
- **AWS:** EKS, ELB, IAM
- **Docker:** Multi-stage builds, registries

Is Kubernetes easy?

? Questions?

🙏 Thank You!

📦 Project Repository

https://github.com/kaiser-data/marty-voting-app

🌐 Live Application

🗳️ **Vote:** http://vote.marty.ironhack.com

📊 **Result:** http://result.marty.ironhack.com

📚 Documentation

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