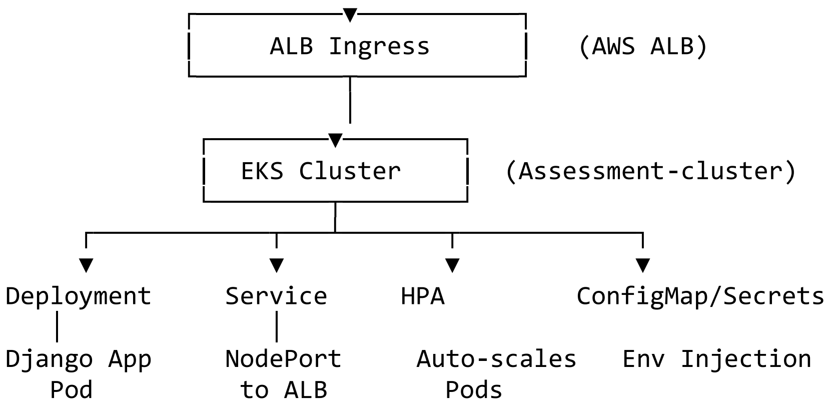
Title: Deploying a Django Application on Amazon EKS with ALB Ingress and HPA

1. Overview

This document outlines the setup and deployment of a Django 5.2.4 application on **Amazon Elastic Kubernetes Service (EKS)** using:

- AWS Load Balancer Controller (ALB Ingress)
- Horizontal Pod Autoscaler (HPA)
- ConfigMap and Secrets for environment configuration
- Resource requests and limits for pods

2. Architecture Diagram



3. Setup Instructions

✅Prerequisites

- AWS CLI and eksctl installed
- IAM permissions
- Helm installed
- EKS cluster running (`Assessment-cluster`)

Step-by-Step Setup

Step 1: Associate IAM OIDC Provider

```
eksctl utils associate-iam-oidc-provider --cluster Assessment-cluster --approve
```

Step 2: Create IAM Policy

```
curl -o iam-policy.json https://raw.githubusercontent.com/kubernetes-sigs/aws-load-
balancer-controller/main/docs/install/iam_policy.json
aws iam create-policy \
  --policy-name AWSLoadBalancerControllerIAMPolicy \
  --policy-document file://iam-policy.json
```

Step 3: Create IAM ServiceAccount

```
eksctl create iamserviceaccount \
  --cluster Assessment-cluster \
  --region ap-south-1 \
  --namespace kube-system \
  --name aws-load-balancer-controller \
  --attach-policy-arn
arn:aws:iam::<ACCOUNT_ID>:policy/AWSLoadBalancerControllerIAMPolicy \
  --approve
```

Step 4: Install Load Balancer Controller via Helm

```
helm repo add eks https://aws.github.io/eks-charts
helm repo update

helm install aws-load-balancer-controller eks/aws-load-balancer-controller \
  -n kube-system \
  --set clusterName=Assessment-cluster \
  --set serviceAccount.create=false \
  --set serviceAccount.name=aws-load-balancer-controller \
  --set region=ap-south-1 \
  --set vpcId=vpc-0b471a8b999e1793d
```

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4. Kubernetes Manifests

All files are placed under `/k8s` folder.

deployment.yaml

- Includes resource requests & limits
- Liveness and readiness probes

service.yaml

- Type: NodePort
- Annotations for ALB

configmap.yaml

- Includes environment variables like DEBUG, ALLOWED_HOSTS

secrets.yaml

- Holds sensitive vars like `DJANGO_SECRET_KEY`

ingress.yaml

- Uses ALB Ingress with `alb` ingressClassName
- Exposes service publicly

hpa.yaml

- Sets min/max pods

- CPU-based autoscaling (target 60%)

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5. Deployment Process

```
kubectl apply -f k8s/namespace.yaml
kubectl apply -f k8s/configmap.yaml
kubectl apply -f k8s/secrets.yaml
kubectl apply -f k8s/deployment.yaml
kubectl apply -f k8s/service.yaml
kubectl apply -f k8s/hpa.yaml
kubectl apply -f k8s/ingress.yaml
```

Get ALB DNS:

```
kubectl get ingress -n prod
```

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6. Result

- Django app accessible via ALB:

```
http://k8s-prod-<auto-generated>.ap-south-1.elb.amazonaws.com
```

- HPA working: auto-scales when CPU > 60%
- Service stable, domain can be pointed via Route53

📋 CloudWatch Monitoring Setup for `Assessment-cluster`

✅ Overview

We have successfully enabled **Amazon CloudWatch Container Insights** on our Kubernetes cluster named `Assessment-cluster`. This setup allows us to monitor infrastructure-level and container-level performance, as well as collect application logs.

✅ What Monitoring Has Been Enabled

Capability	Description
📊 **Resource Metrics**	- Collects CPU, memory, disk, and network usage for all **nodes, pods, and containers**. - Useful for performance monitoring and scaling decisions.
⚠ **Pod & Node Health**	- Detects issues like pod restarts, **OOMKilled** errors, container crashes, and node failures. - Helps in diagnosing deployment and runtime issues.
📜 **App Logs**	- Application logs are collected via **Fluent Bit DaemonSet** and sent to **CloudWatch Logs**. - Includes both `stdout` and `stderr` from containers.

Capability	Description
🔍 **Log Search**	- Logs are available in **CloudWatch Log Groups**, searchable using filters. - Paths include: `/aws/containerinsights/Assessment-cluster/application` `/aws/containerinsights/Assessment-cluster/dataplane`
📈 **Dashboards**	- Auto-generated dashboards in CloudWatch under **Container Insights**. - Includes performance graphs and resource utilization heatmaps.

💼 Files Applied

The following YAML files were applied to enable this setup:

1. `cwagent-custom-resour```** – Registers CRDs required by** CloudWatch agent.
2. `cwagent-operator-rendered.yaml` – Deploys CloudWatch agent and Fluent Bit components.
3. `cwagent.yaml` – Deploys custom resources for data collection and logging.

📂 CloudWatch Log Groups Created

Log Group Path	Purpose
`/aws/containerinsights/Assessment-cluster/application`	Application container logs
`/aws/containerinsights/Assessment-cluster/dataplane`	Metrics and infrastructure logs

🔄 Data Collection Interval

- Logs and metrics are pushed to CloudWatch in near real-time (typically every 60 seconds).

📩 Notes

- Ensure your nodes have appropriate IAM roles (via IRSA or EC2 instance roles) to push data to CloudWatch.
- You can customize Fluent Bit filters and cwagent configuration for advanced monitoring needs.