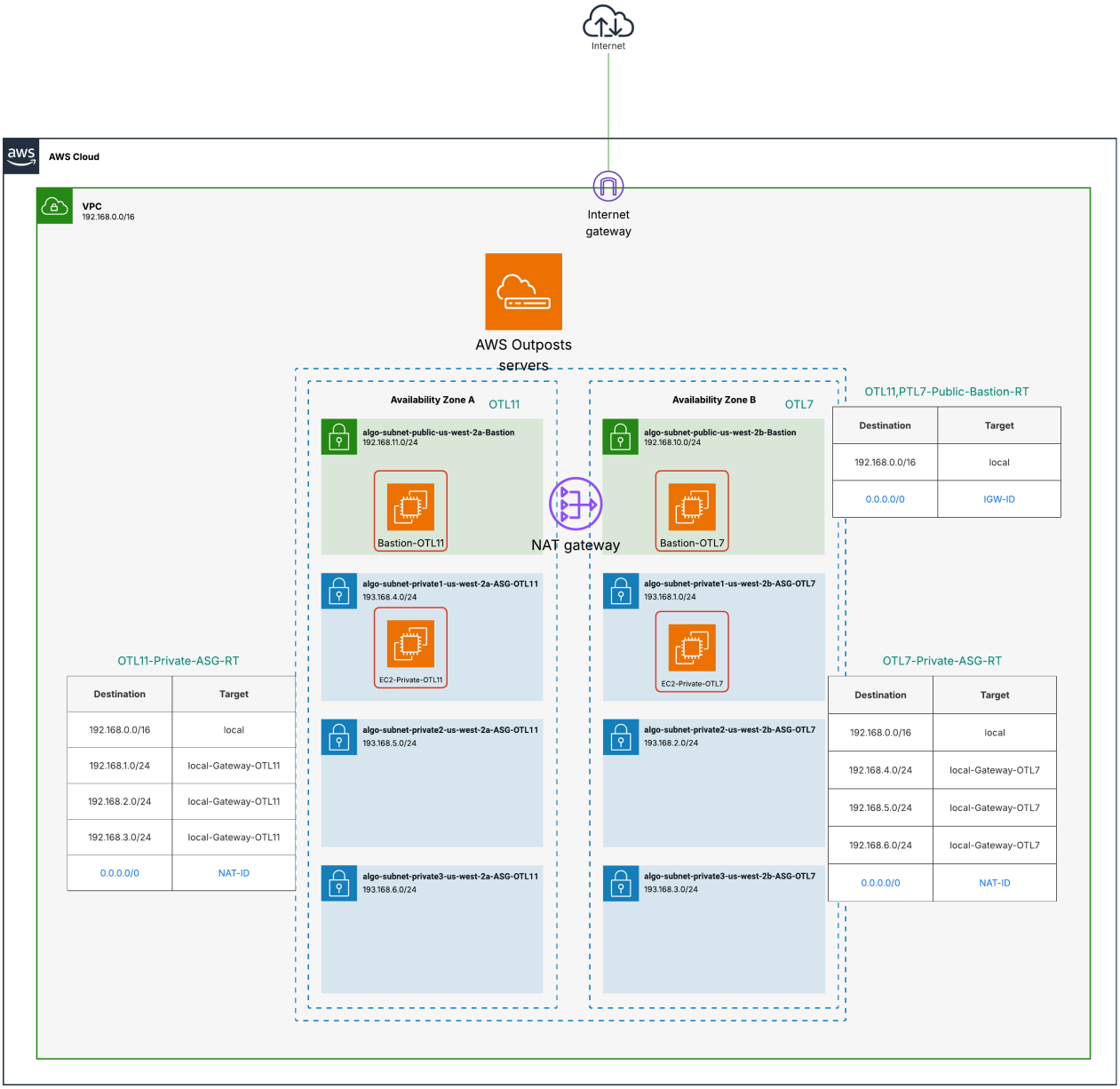
Done Documentation Cloud (Master) & HA Worker Nodes on Outposts ☑

Outpost Architecture Overview ☑



Connection between 2 AWS Outposts ☑

Communication Status between 2 Outposts

lgw-rtb-00fce8ca84c141ba9

Find LGW routes

Clear filters

1

CIDR	Target	Route status	Type
0.0.0.0/0	lgw-vif-grp-01b2085d5fea05f73	Active	static
10.77.11.0/24	lgw-vif-grp-01b2085d5fea05f73	Active	static
10.78.11.0/24	lgw-vif-grp-01b2085d5fea05f73	Active	static
192.168.3.0/24	subnet-0bee68aa87ffa762b	Active	propagated
192.168.1.0/24	subnet-0ad247a6ca814ac0a	Active	propagated
192.168.2.0/24	subnet-0f1ef6f86539863eb	Active	propagated

lgw-rtb-07d2eb0deaf88456b

Clear filters

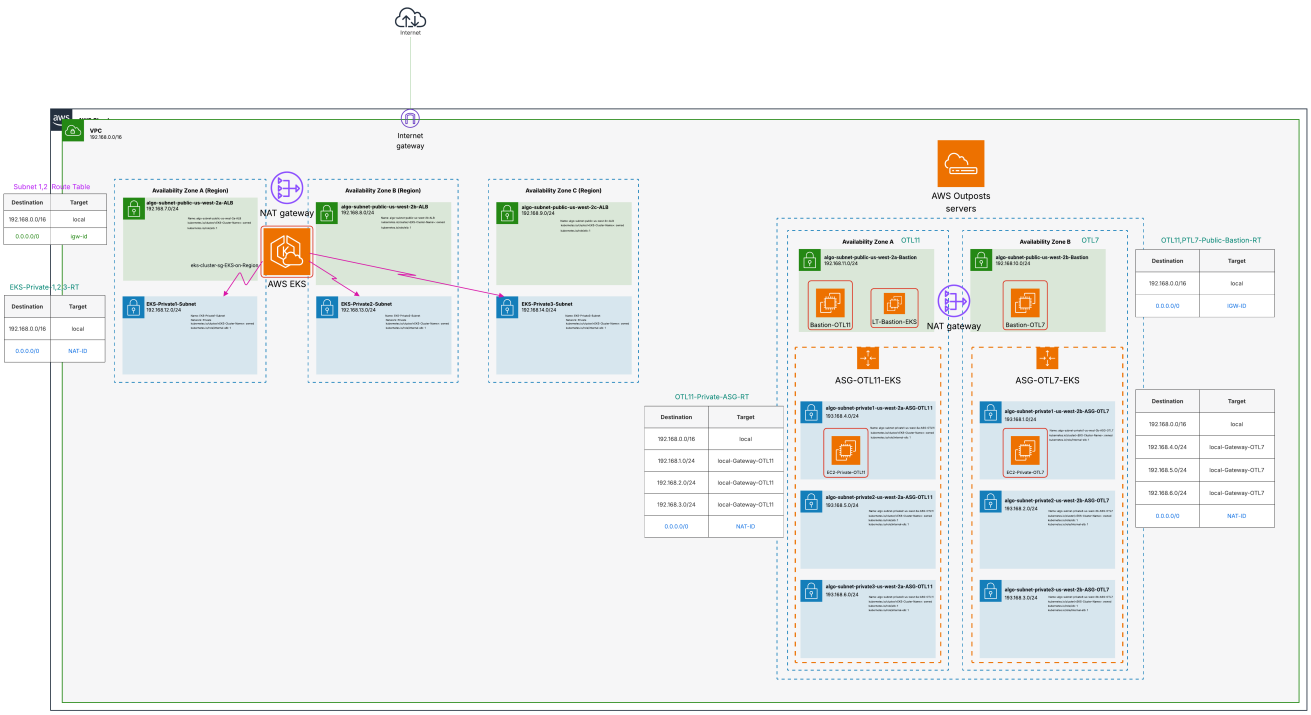
1

CIDR	Target	Route status	Type
0.0.0.0/0	lgw-vif-grp-0407a60df52242eab	Active	static
10.77.3.0/24	lgw-vif-grp-0407a60df52242eab	Active	static
10.77.7.0/24	lgw-vif-grp-0407a60df52242eab	Active	static
10.78.7.0/24	lgw-vif-grp-0407a60df52242eab	Active	static
192.168.5.0/24	subnet-0766bbadb27e054d1	Active	propagated
192.168.4.0/24	subnet-09265fab85d4063f8	Active	propagated
192.168.6.0/24	subnet-0af02ab05d77a78c6	Active	propagated

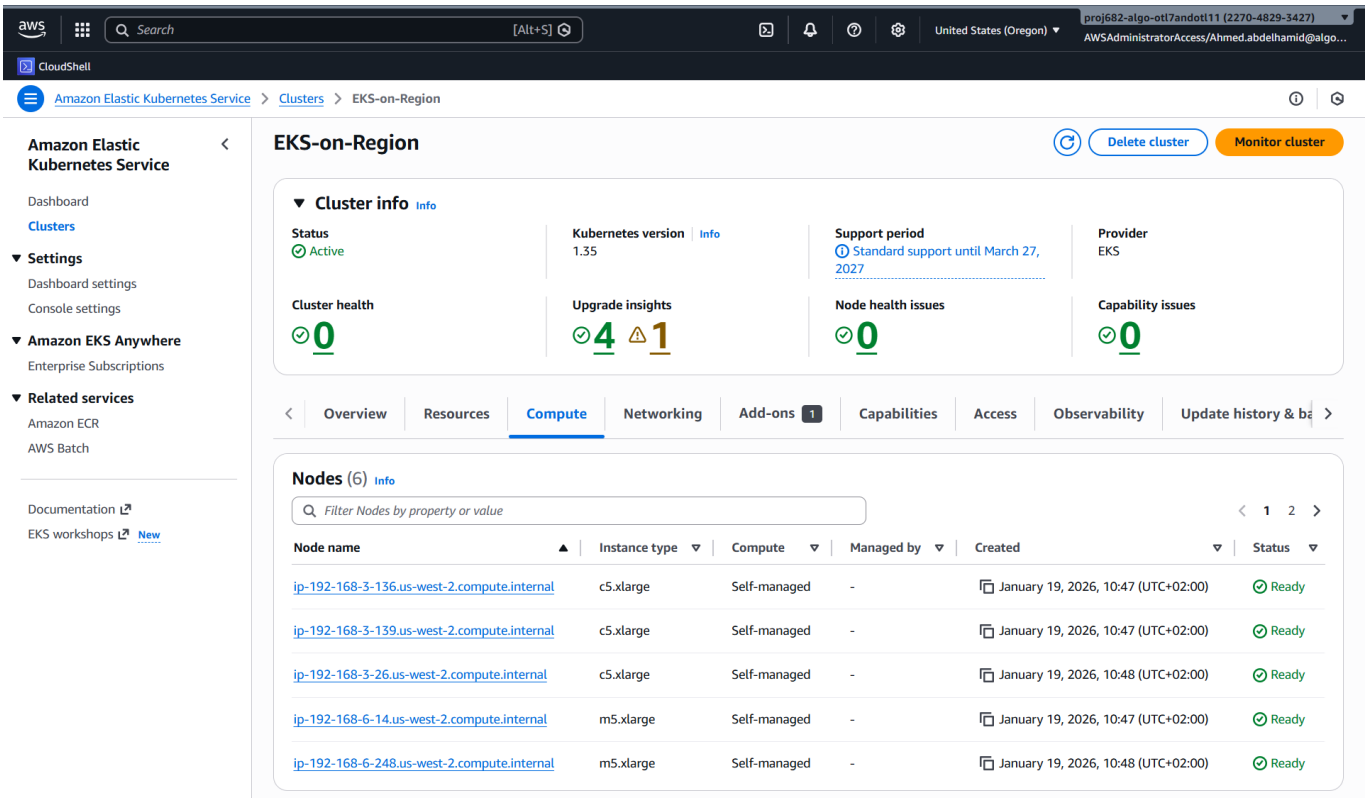
Final Configuration ☑

- ☑ 3 Private Subnet on each AWS Outpost
- ☑ Route between them success & they can communicate with each other
- ☑ Test connection between 2-Outposts through (Bastion - Ping)

Amazon EKS Cluster (Region) Architecture Overview ☑



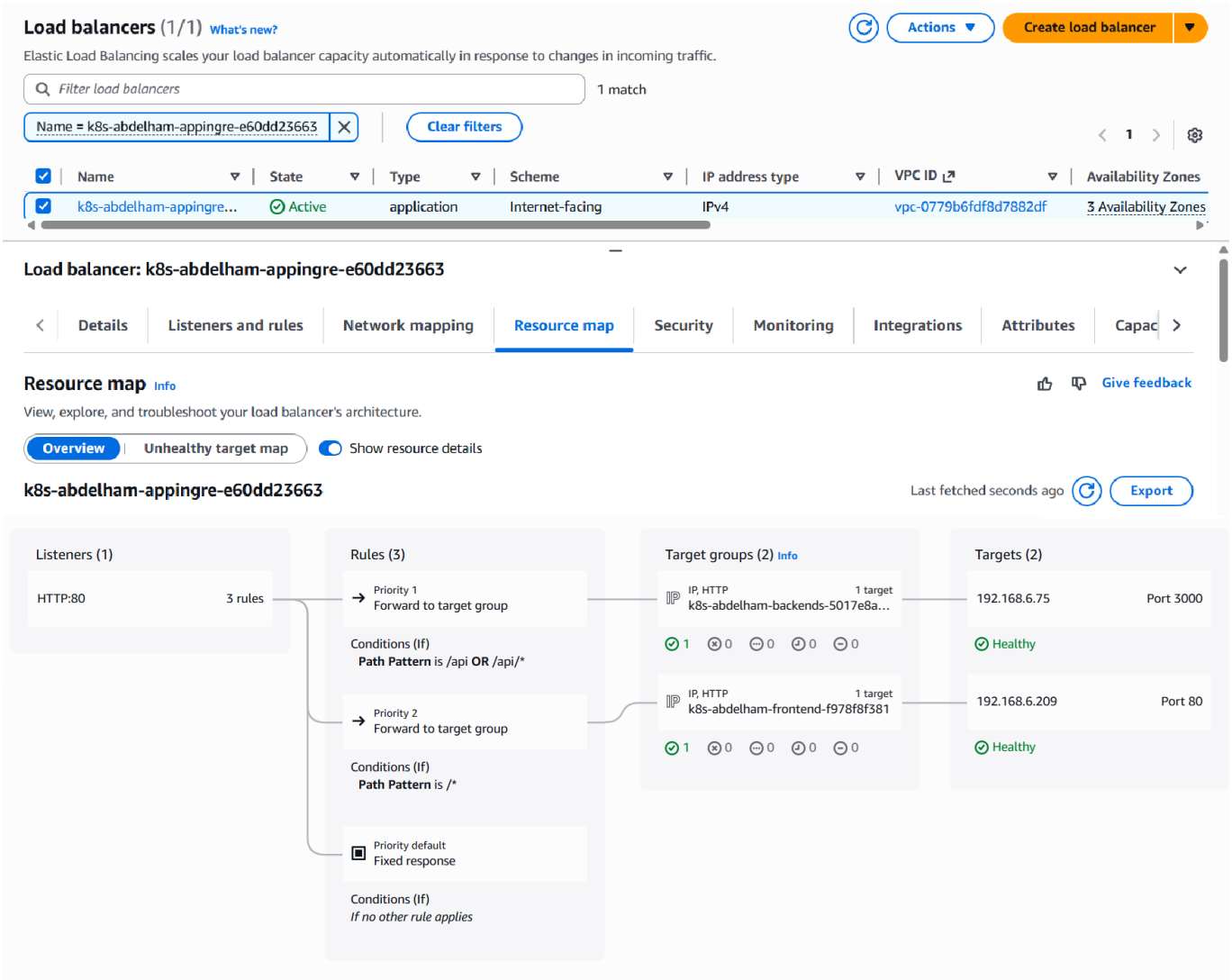
Amazon EKS Cluster Status ☑



Final Configuration ☑

- ☑ 3 Private Subnets on region for Amazon EKS Control Plane
- ☑ Create 3 Launch Templates
- ☑ Create 2 Auto Scaling Groups
- ☑ Run Worker Nodes on AWS outposts

Deploy 3-tier applications Architecture Overview ☑



🕵 *Check My Repo to see the files that are used to deploy the 3-tier applications*

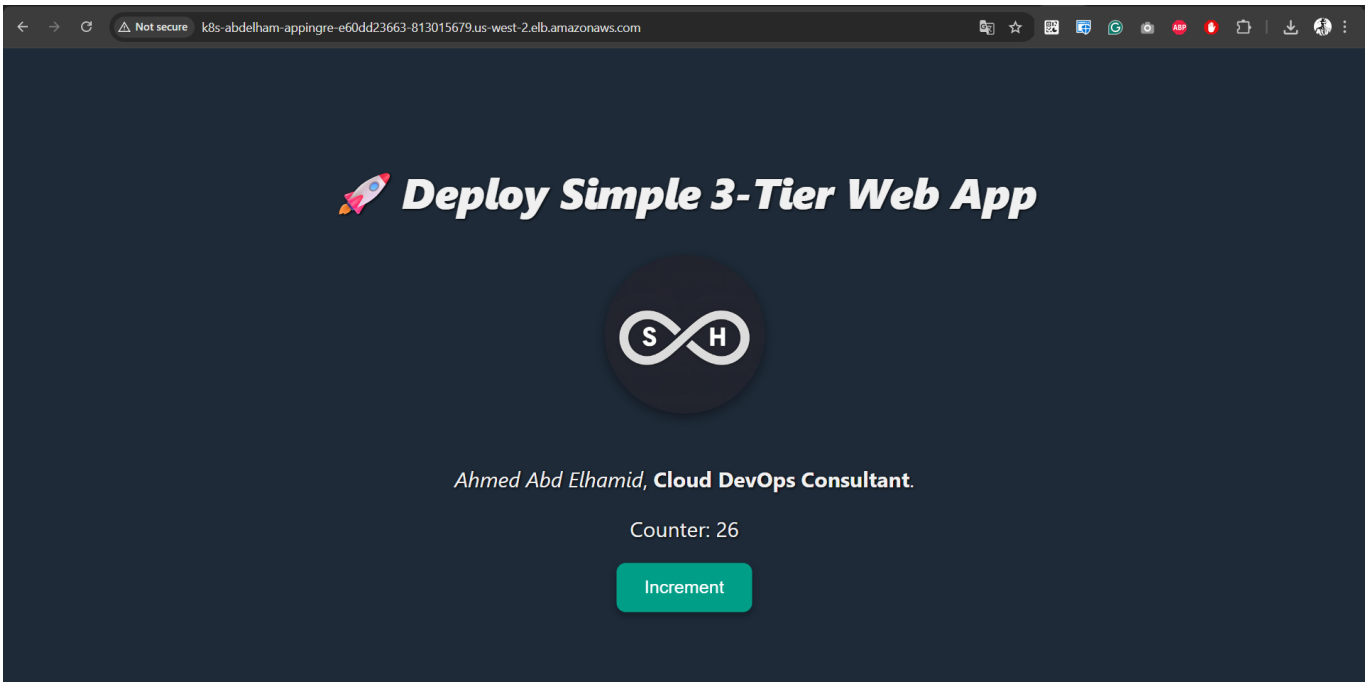
- GitHub Repository

Application Access Status ☑

```
[ec2-user@ip-192-168-11-111 ~]$ kubectl get all -n abdelhamid-ns
NAME                            READY   STATUS    RESTARTS   AGE
pod/backend-5ccf4f44f6-xmb5f    1/1     Running   0          5d8h
pod/frontend-5d9cc9f7c5-nv5x9   1/1     Running   0          4d
pod/mongo-0                     1/1     Running   0          5d14h

NAME                       TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
service/backend-service    ClusterIP   10.100.6.179    <none>        3000/TCP       5d8h
service/frontend-service   NodePort    10.100.42.192   <none>        80:32567/TCP   5d14h
service/mongo-service      ClusterIP   None            <none>        27017/TCP      5d14h

NAME                       READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/backend    1/1     1            1           5d8h
deployment.apps/frontend   1/1     1            1           5d14h

NAME                                  DESIRED   CURRENT   READY   AGE
replicaset.apps/backend-5ccf4f44f6    1         1         1       5d8h
replicaset.apps/frontend-5d9cc9f7c5   1         1         1       4d

NAME                     READY   AGE
statefulset.apps/mongo   1/1     5d14h
[ec2-user@ip-192-168-11-111 ~]$
[ec2-user@ip-192-168-11-111 ~]$
[ec2-user@ip-192-168-11-111 ~]$ kubectl get ingress -n abdelhamid-ns
NAME          CLASS   HOSTS   ADDRESS                                                                  PORTS   AGE
app-ingress   alb     *       k8s-abdelham-appingre-e60dd23663-813015679.us-west-2.elb.amazonaws.com   80      5d8h
[ec2-user@ip-192-168-11-111 ~]$
```

i-077825c693e3953f1 (Bastion-EKS)

PublicIPs: 35.87.148.136 PrivateIPs: 192.168.11.111



Final Configuration ☑

- ☑ Successfully deployed a 3-tier application (Frontend, Backend, Database) on Amazon EKS.
- ☑ Verified persistence via EBS CSI Driver for MongoDB.
- ☑ Automated Application Load Balancer (ALB) provisioning and traffic routing.
- ☑ Verified end-to-end connectivity from Internet Gateway to Worker Nodes on Outposts.

📊 *Project Implementation Status*

Component	Task Description	Status
Infrastructure	Hybrid VPC Configuration (Region + Outposts)	☑ Done
Networking	Connectivity between OTL11 and OTL7 via LGW	☑ Done
EKS Cluster	Management Plane deployed on AWS Region	☑ Done
Worker Nodes	Self-managed nodes joined from Outposts	☑ Done
Auto Scaling	ASG & Launch Templates for Outpost Nodes	☑ Done
Storage	EBS CSI Driver integration for MongoDB persistence	☑ Done
Traffic Control	AWS Load Balancer Controller (ALB Ingress)	☑ Done
Security	IAM Roles for Service Accounts (IRSA) via OIDC	☑ Done
Application	3-Tier Stack (React, Node.js, MongoDB)	☑ Done

🎯 *Key Achievements:*

🏅 Achieved sub-millisecond latency for local service communication via AWS Outposts.
🏅 Implemented seamless hybrid connectivity between Region-based EKS Control Plane and Outpost-based Worker Nodes.
🏅 Automated ALB provisioning and Target Group registration using AWS Load Balancer Controller.