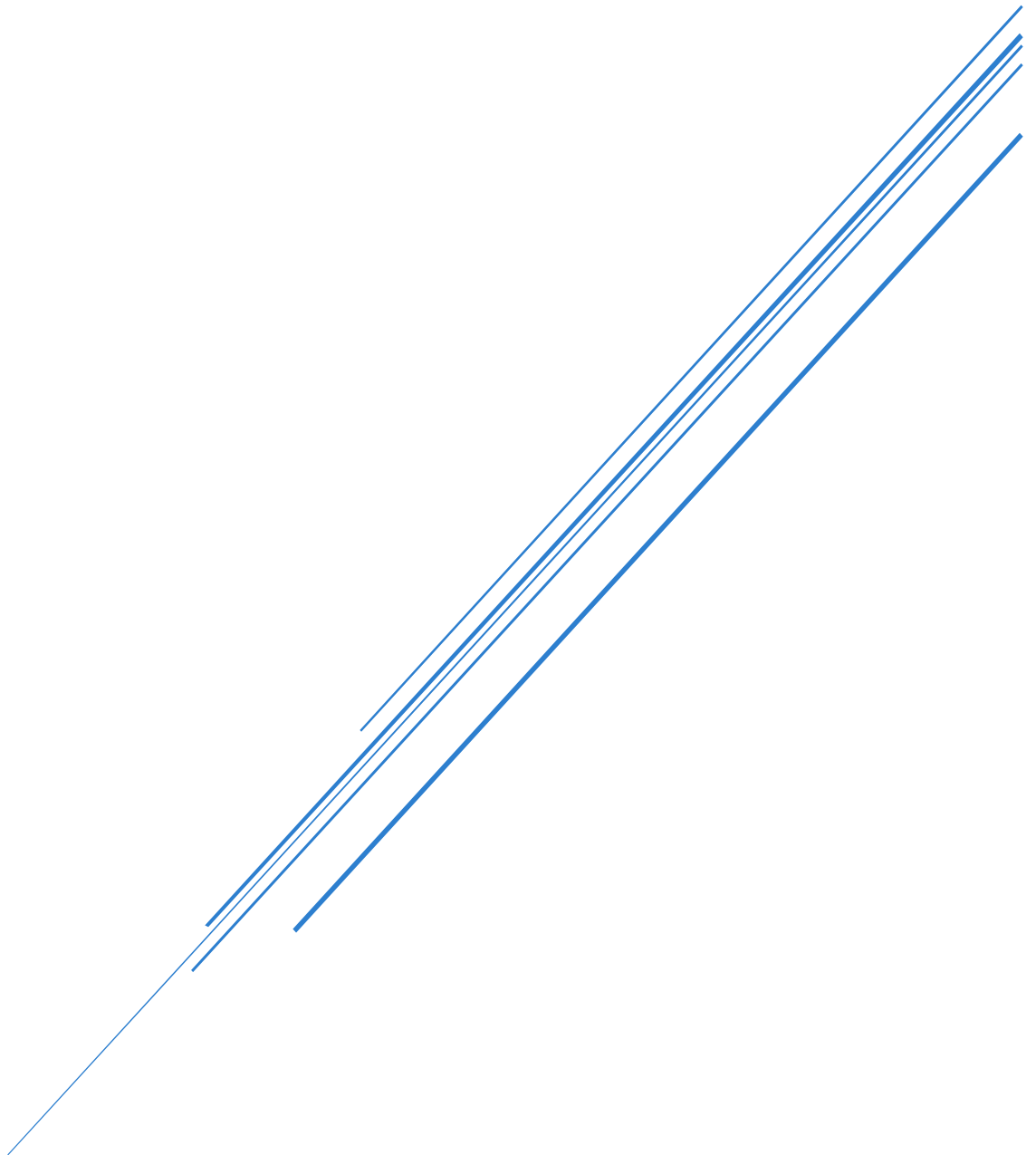


# EKS CLUSTER KARPENTER SOLUTION

Cost Analysis



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## EKS Cluster Solution with Karpenter Cost

Resource	Pricing Details	Estimated Monthly Cost
EKS Control Plane	\$0.10 per hour (\$72/month per cluster)	\$72
EKS Worker Nodes	Depends on instance type and count	Varies

### EKS Worker Nodes (Managed by Karpenter)

- Assume we use 3 EC2 Spot instances (t3.large, m6g.large) dynamically provisioned.
- Spot Instances Cost (t3.large - x86\_64)
  - \$0.0416/hour in us-east-1 (~\$30/month per instance)
  - 3 instances ≈ \$90/month
- Spot Instances Cost (m6g.large - ARM64/Graviton)
  - \$0.0340/hour in us-east-1 (~\$24.50/month per instance)
  - 3 instances ≈ \$73.5/month
- Total (Worker Nodes - Spot Instances): ~\$163.50/month

### Karpenter Cost

Resource	Pricing Details	Estimated Monthly Cost
Karpenter	Free (Open-source)	\$0

Karpenter itself has no cost, but it dynamically provisions EC2 instances.

### Elastic Load Balancer (ALB/NLB)

Resource	Pricing Details	Estimated Monthly Cost
AWS ALB	\$0.0225 per ALB-hour + data transfer fees	~\$20–\$50/month
AWS NLB (Optional)	\$0.0225 per NLB-hour + LCU fees	~\$20–\$40/month

If we use an AWS Load Balancer Controller, it provisions an Application Load Balancer (ALB) or a Network Load Balancer (NLB).

- Assume 1 ALB: \$25/month
- Assume 1 NLB (for backend services): \$25/month
- Total (Load Balancers): ~\$50/month

#### 4. CloudWatch Logging and Metrics

Resource	Pricing Details	Estimated Monthly Cost
CloudWatch Logs	\$0.50 per GB ingestion + \$0.03 per GB storage	~\$10–\$20/month
CloudWatch Metrics	\$0.30 per metric per month	~\$10–\$15/month

If we log 5GB/month, estimated cost = ~\$10.

For basic CloudWatch metrics, assume 50 metrics, estimated = ~\$15.

Total (Logging & Metrics): ~\$25/month

#### Amazon EBS Storage (Persistent Volume Claims - PVC)

Resource	Pricing Details	Estimated Monthly Cost
EBS (gp3)	~\$0.08 per GB per month	~\$8/month (100GB)

Assuming 100GB of storage, total = \$8/month.

#### S3 for Backups / Storage (Optional)

Resource	Pricing Details	Estimated Monthly Cost
Amazon S3	\$0.023 per GB per month	~\$5/month

If we store 200GB of logs or backups, estimated = \$5/month.

## Helm-Installed Services (Optional)

Service	Pricing Details	Estimated Monthly Cost
Metrics Server	Free	~\$0

Total (Helm Add-ons): \$0/month.

## Total Estimated Monthly Cost

Category	Estimated Monthly Cost
EKS Control Plane	\$72
EC2 Worker Nodes (Spot)	\$163.50
Load Balancers (ALB/NLB)	\$50
CloudWatch Logs & Metrics	\$25
S3 (200GB Storage, Optional)	\$5
EBS Storage (100GB)	\$8
Helm Add-ons (Metrics, Dashboard)	\$0
TOTAL	\$323.50/month

## Cost Optimization Strategies

- Use More Spot Instances: Spot instances are ~70% cheaper than On-Demand instances.
- Enable Auto-Scaling for EKS Nodes: Use Karpenter to scale down unused instances.
- Monitor ALB Usage: If traffic is low, consider using 1 ALB instead of 2.
- Optimize Storage:
  - Reduce EBS usage by minimizing unnecessary logs.
  - Move logs to S3 Glacier for cheaper long-term storage.