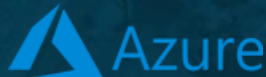


Pub Crawling ? No. Crawling FinOps for kubernetes on different clouds

Francisco Moreno & Jefferson Soto

EPAM Systems | DevOps & Azure Unit
45+ cloud certifications

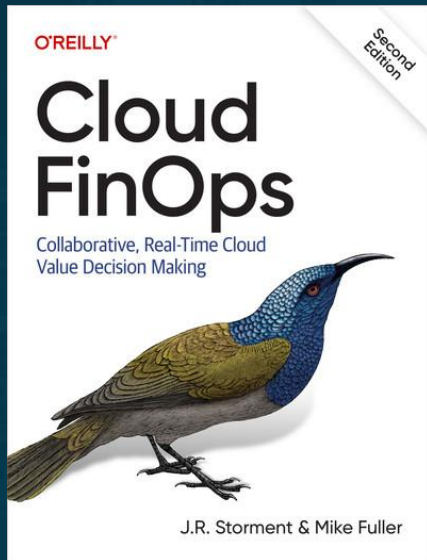




Slides and Code (Terraform for
Jefferson and TXT for Francisco)



References / Books



Ref. 1



Ref. 2

Ref. 3

Otherwise, reference are the links are on text, diagrams or icons

Ref and Pages are on left bottom corner

FinOps Foundation

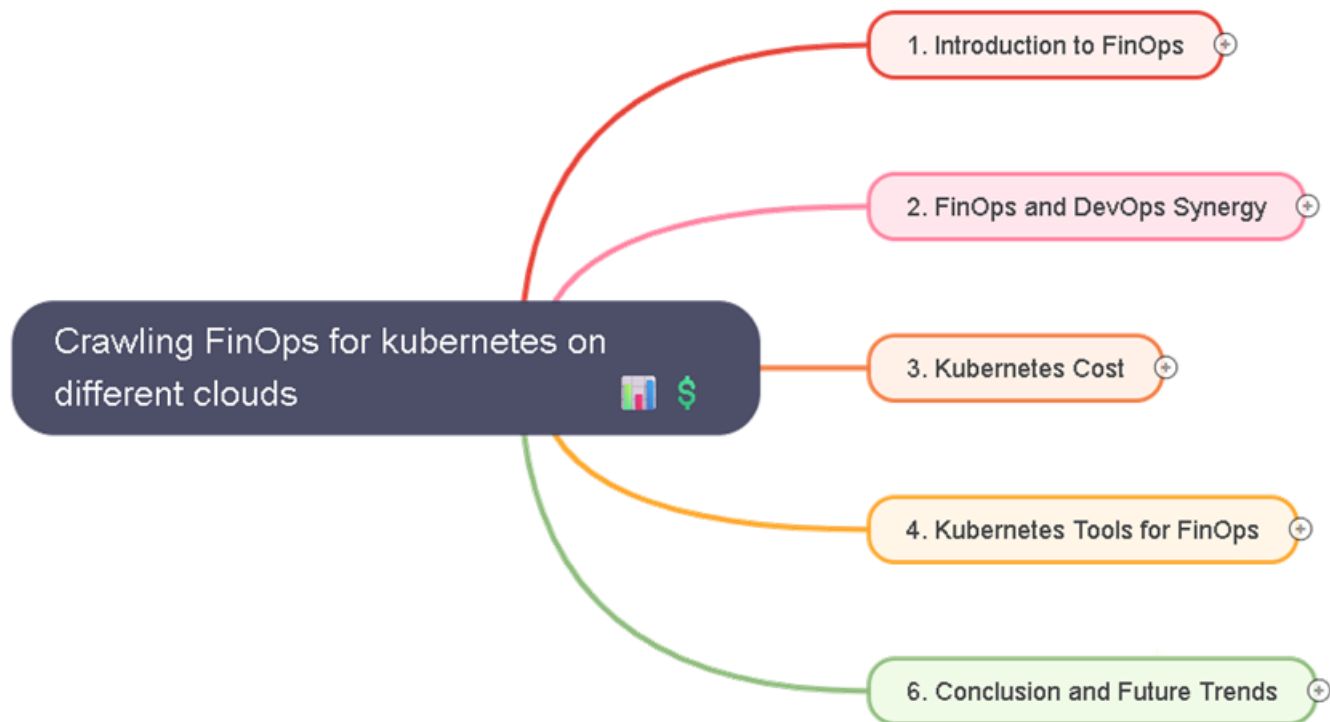
FinOps Foundation and CNCF is a project of the Linux Foundation (LF)
OpenCost is a CNCF incubating project. KubeCost is built on OpenCost.
KCD Colombia is an event of the CNCF

EPAM is a Platinum sponsor of KCD Colombia 2025.

EPAM has several partnerships with different CSPs: AWS, GCP, Azure, OCI,
etc.



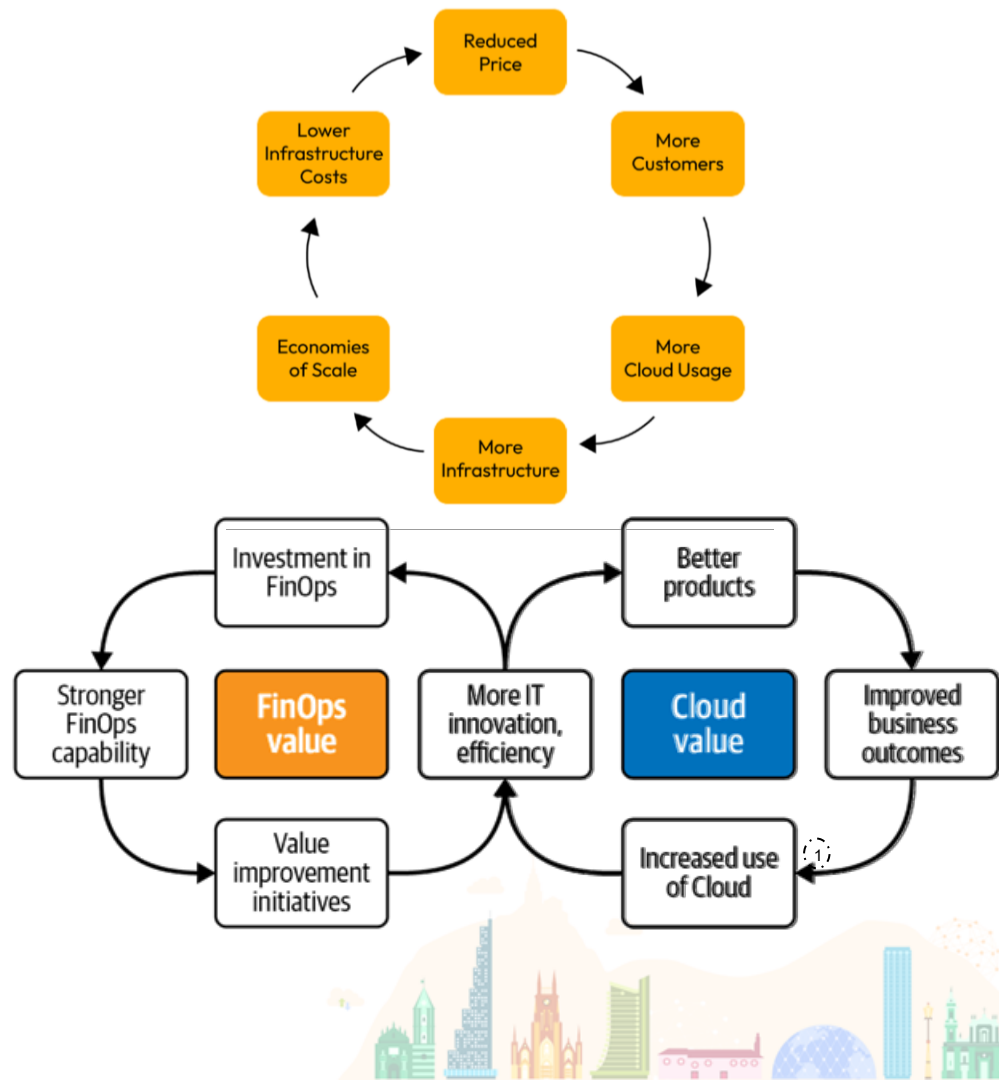
Agenda



Introduction to FinOps

NIST Definition: On-Demand Self-Service,
Measured Service

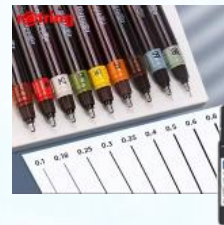
FinOps = Finance + Operations =
 (Cloud) Financial Operations (fin) =
 Cloud Financial Management =
 Cloud Financial Engineering =
 Cloud Cost Management =
 Cloud Optimization



Quotes

“FinOps brings financial accountability to the variable spend model of cloud”. ¹ (P. 1)

Taking decisions based on a transparent and understandable report.



Panamericana
San Victorino
Compraventas

“If it seems like FinOps is about saving money, then think again. FinOps is about making money.” ¹ (P. 7,8,81,199 & 233)

Savings? Difference between Actual Cost and Budget. Cash in hand.

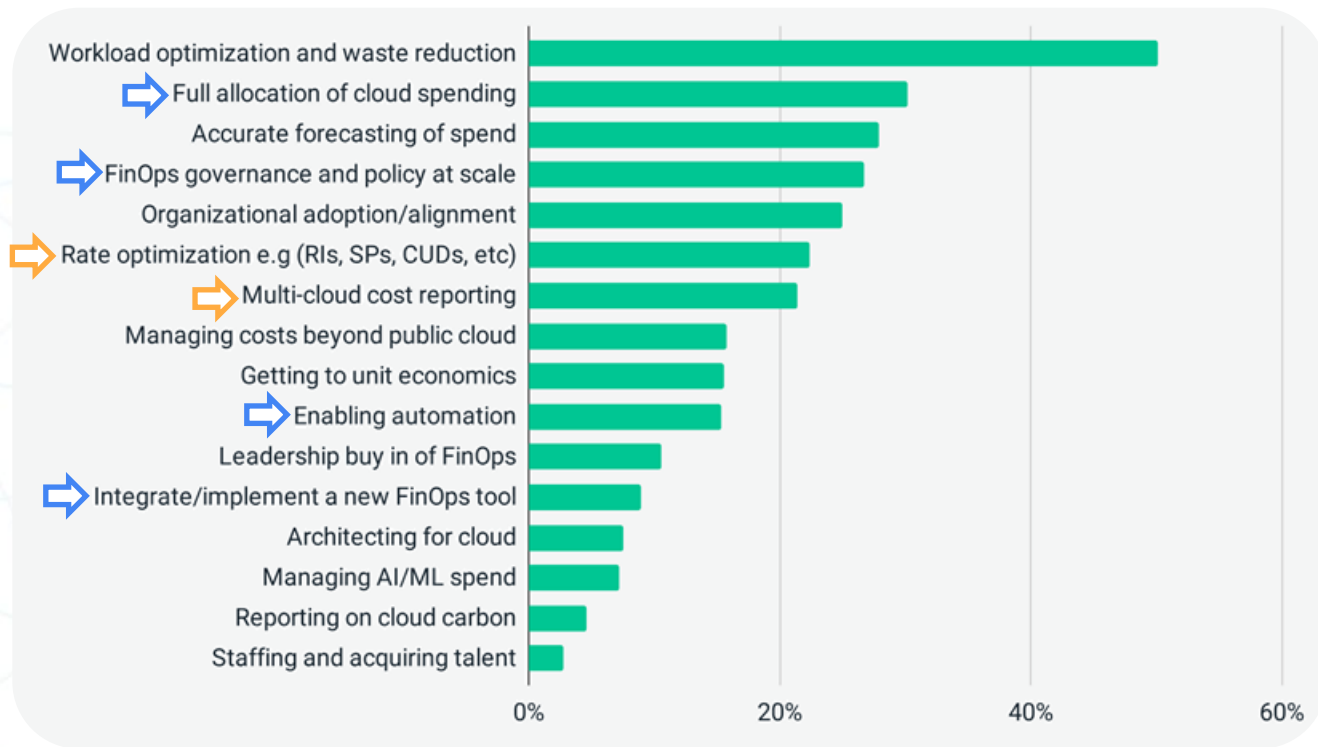


Motivación
Mejores trabajos
Mejores resultados

Accurate forecasting of cloud spending <~ Estimate based on your current consumption.



State of FinOps 2025



⇒ Allocation & Automation

⇒ Multicloud-related topics

5th Survey, ~69B Cloud spend, 800+ respondents.

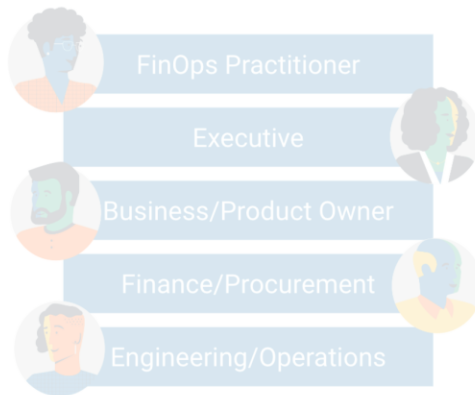
NA: 42%, EMEA: 26%, LATAM: 15%, AP: 10%

FinOps Framework

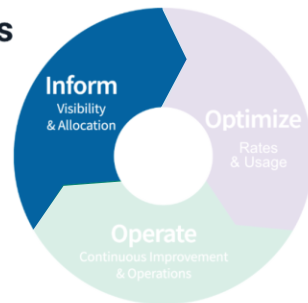
Principles

- Teams need to collaborate
- Everyone takes ownership for their cloud usage
- A centralized team drives FinOps
- Reports should be accessible and timely
- Decisions are driven by business value of cloud
- Take advantage of the variable cost model of the cloud

Personas









Phases



Maturity



 <p>Understanding Cloud Usage & Cost</p> <p>Cost Allocation</p> <p>Data Analysis and Showback</p> <p>Managing Shared Cost</p> <p>Data Ingestion & Normalization</p>	 <p>Performance Tracking & Benchmarking</p> <p>Measuring Unit Costs</p> <p>Forecasting</p> <p>Budget Management</p>	 <p>Real-Time Decision Making</p> <p>Managing Anomalies</p> <p>Establishing a FinOps Decision & Accountability Structure</p>	 <p>Cloud Rate Optimization</p> <p>Managing Commitment Based Discounts</p>	 <p>Cloud Usage Optimization</p> <p>Onboarding Workloads</p> <p>Resource Utilization & Efficiency</p> <p>Workload Management & Automation</p>	 <p>Organizational Alignment</p> <p>Establishing FinOps Culture</p> <p>Chargeback & Finance Integration</p> <p>FinOps Education & Enablement</p> <p>Cloud Policy & Governance</p> <p>FinOps Intersection with other Frameworks</p>
---	---	---	--	---	--

Domains & Capabilities

New version:
2025
(reorg domains)



Capability: Cost Allocation

Cost = Specify cloud-cost model for the service/resource (provisioned, serverless, min. commitment)

Allocation = Link resource to specific project/cost center/team and consumption model

Cost = Usage (time, invocations) x Rate

Use less resources Paying less

Shareable spendings:

- Licenses
- Network (Dedicated Conn., DNS, Sh. LB)
- Security (Digital Certificates, WAF)
- Sh. Monitoring Platforms
- Sh. Centralized Data Platform





Inform: Visibility & Allocation



- Create showback (and other) reporting
- Set tag strategy and compliance
- Identify untagged (and untaggable) resources
- Allocate shared costs equitably

Set tag strategy and compliance



Current
Assignment:
Multicloud ToFu
Module



Hierarchy	Accounts (mgmt. & member)	Projects	Subscriptions and resource groups	Accounts (mgmt. & member)
Meta hierarchy	AWS Organizations	Folders	Management groups, departments	Organization Management
K/V pairs	Tags	Labels (C. Analysis) and tags (Ctrl/RM+C. Allocation)	Tags	Tags
# of tags per resource	50 (~ services allow 10 only)	64	50 (~ services allow 15 only)	10 free-form and 64 defined tags (inc. cost-tracking tags)
Tags automatically allocated to your detailed billing data	No, manual selection required	Yes, some limits apply	Yes, some limits apply	No, only cost-tracking tags
Tag restrictions	Some services limit supported characters	lowercase letters, numeric characters, underscores, and dashes	Some characters not supported	ASCII and Unicode, 100 per Key and 256 per Value
Tags can be applied to	Most services' resources (constantly changes), accounts (via AWS Organizations)	Most services' resources, projects, and folders	Most services' resources, Azure resource groups	Most services' resources.
Compliance	Tag Policies on AWS Organization	Mandatory tags on Organization Policy (Pre-GA)	Azure Policies (Initiative or policy)	Tag Namespace through Organizations Management

Capability: Data Ingestion and Normalization



Crawl

Customers want costs in these types of "cost containers"

Org, Folder, Project

Cores
RAM
GPU, TPU
Load Balancers
Persistent Disk
Custom Machines
Network Egress

i.e. ("default" and/or
"development", etc.

Team/Dept (i.e. "DevOps")
Cost Center (i.e. "Finance")
Application Name (i.e. "KMS App")
Environment (i.e. "Prod" or "Staging")
Version # (i.e. "Version 1.0")
Subcomponent (i.e. "Front End Controller")
Customer (SaaS) (i.e. "AcmeBiz")

To do:

Invoice Audits

Cost Allocation

Forecasts

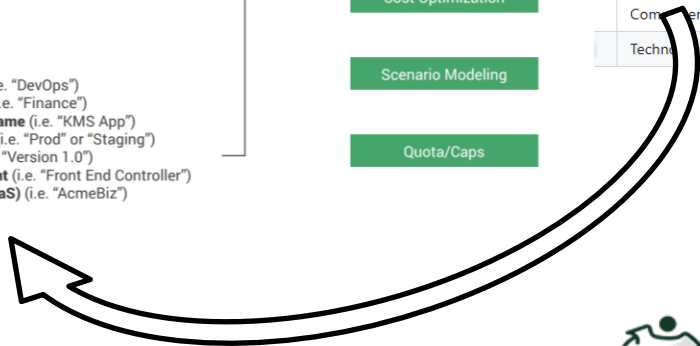
Cost Control/Budgets

Cost Optimization

Scenario Modeling

Quota/Caps

	Description	Example	Type	Maturity
n	Application Name	acme fitness	string	1 - Crawl
n	Cost Center	acme-1001	string	1 - Crawl
	Team	road-runner	string	1 - Crawl
	Product Name	acme fitness store	string	2 - Walk
	Department	retail	string	2 - Walk
t	Environment	production	string	2 - Walk
	Customer Name	acme	string	2 - Walk
	Service	store shopping cart	string	3 - Run
	Component	database	string	3 - Run
	Technology Stack by Purpose	application	string	3 - Run



"One Labeling Strategy to Rule them all"

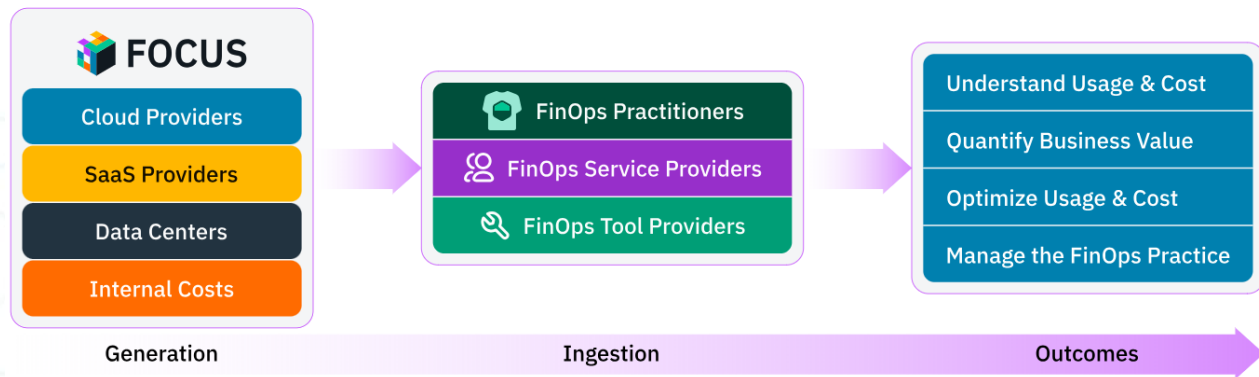


SIG for Containers on FinOps
Foundation



Google Cloud

Focus Spec



FOCUS™ dataset providers include:



Google Cloud



Microsoft



Tencent Cloud



Alibaba Cloud



databricks



Grafana



Cloud Billing Complexity:
i.e.

AWS: 200k SKUs (2020),
791k SKUs (2023).

Azure: ~8k levels SKUs

GCP: ~ 50k SKUs

OCI: ~1.5k + SKUs (2025)

FinOps Open Cost &
Usage Specification

Advantages:

- Simplify complexity
- Enhanced Consistency
- Streamlined Process
- Vendor Agnostic



FinOps and DevOps Synergy

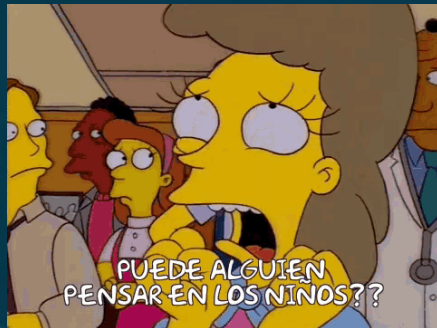
- Automatic Resource Allocation (Additional advantage: ABAC)
- Enhanced Collaboration
- Faster Innovation Cycles
- Cost Optimization Strategies

Current
Assignment:
Self-Service
Portal



“The most successful FinOps practices decentralize using less (i.e., **avoiding costs**) and centralize paying less (i.e., **reducing rates**).”

And....



Has someone talked about Kubernetes ?



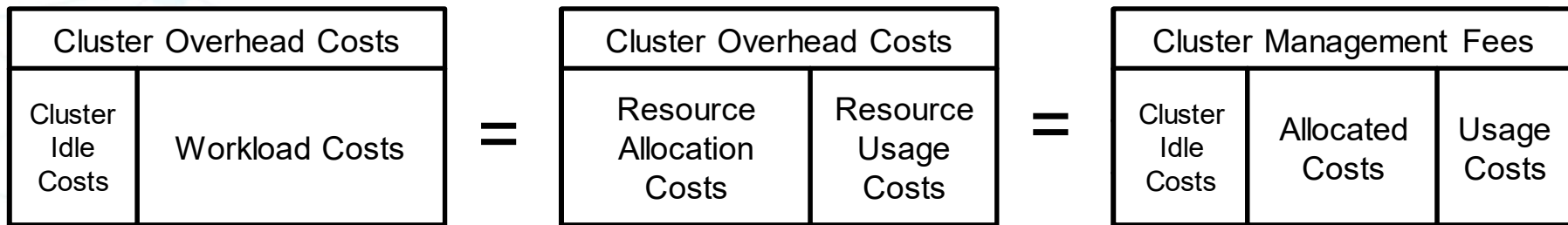
Kubernetes Costs

- **Compute:** **Node Size** and **Instance Type**, Pod Resource Requests and Limits, Namespaces Quotas, **Number of Running Pods**, **Unnecessary Pods**
- **Storage:** **PV Size and Type**, **Object Storage**, Storage Class Configuration, **Data Retention Policies**
- **Networking:** Ingress Controller Costs, Egress Traffic Charges, Network Policies and Security
- **Control Plane Costs:** According to CSP
- **Monitoring and Logging:** Consumption of **Metrics Collector** and **Tracers**, Alert Notification
- **Idle Resources, Inefficient Resource Utilization and Over-Provisioning**

WG Calculating Containers Costs [3 Phases on [FinOps](#)]

Using less
Paying less

Total Cluster Cost =

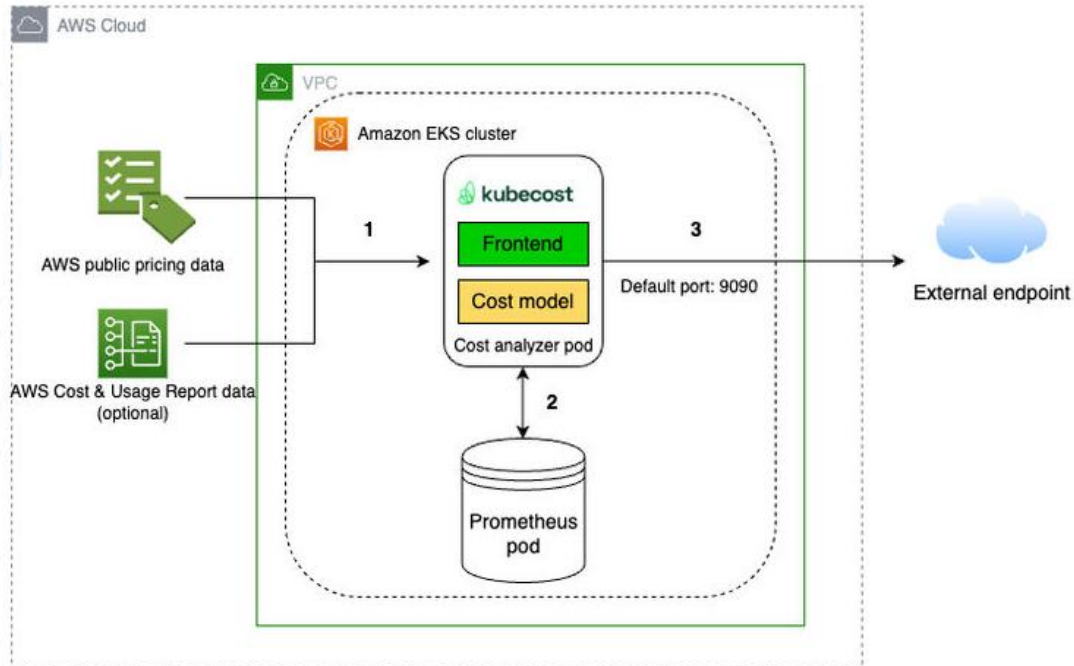


Allocated	Idle
-----------	------

Total CPU Capacity



Architecture: OpenCost and KubeCost



Kubecost reference architecture

The core components of KubeCost are:

- Frontend: runs Nginx, handles routing requests to cost-model, prometheus and shows data on KubeCost dashboard.
- Cost-model: back end for API calls, read and write metrics to Prometheus, cost allocation calculations.
- Prometheus: scrape K8s metrics, time-series data store for cost & health metrics.

When KubeCost is deployed on Amazon EKS:

1. Cost-model retrieves public pricing data from AWS billing API and custom pricing data from AWS Cost & Usage Report data (optional).
2. Cost-model retrieves K8s metrics from Prometheus then perform cost allocation calculations and write all data back to Prometheus.
3. Frontend routes requests to cost-model to query cost allocation data then expose Amazon EKS cluster cost and efficiency on KubeCost's dashboard/UI.

for
ng



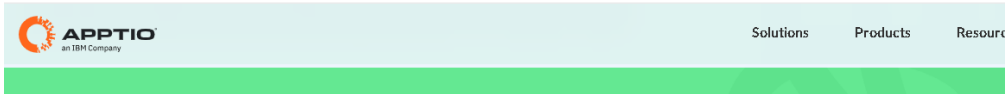
On OCI, Steps for OpenCost and KubeCost setup



OpenCost



- Install helm locally
- Install Prometheus, OpenCost UI
- Install krew locally
- Install OpenCost CLI Plugin



Before you begin

In order to deploy the KubeCost Helm chart, ensure the following is completed:

- Helm client (version 3.1+) installed [🔗](#)
- Kubectl installed [🔗](#)
- A supported Kubernetes cluster deployed [🔗](#)

Step 1: Install KubeCost

Running the following command will also install Prometheus and Grafana in the namespace supplied. View install configuration options [here](#).

```
helm install kubecost cost-analyzer \
--repo https://kubecost.github.io/cost-analyzer/ \
--namespace kubecost --create-namespace
```

Step 2: Enable port-forward

```
kubectl port-forward --namespace kubecost deployment/kubecost-cost-analyzer 9090
```

Having installation issues? View our [Troubleshoot Install](#)

Step 3: See the data!

You can now view the deployed frontend by visiting the f

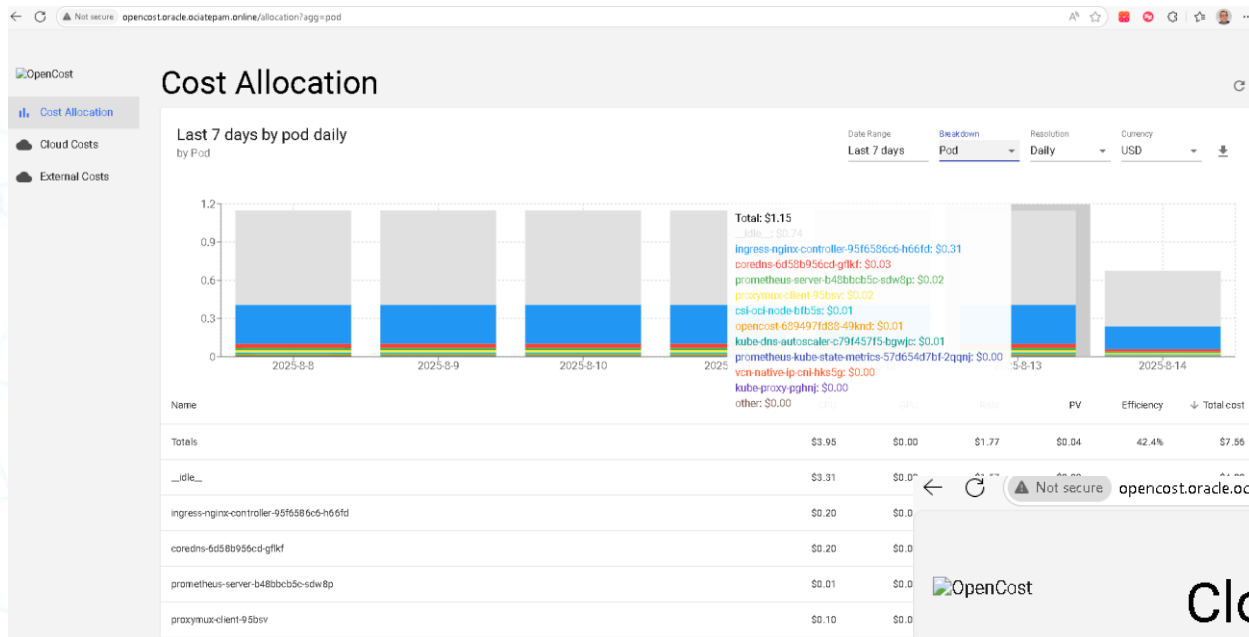
<http://localhost:9090>

With this newfound visibility, teams often start with 1) looking at cost allocation trends and 2) searching for quick cost savings or reliability improvements. View our [Getting Started](#) information on product configuration and common initial actions.





On Oracle Cloud, OpenCost



Not secure opencost.oracle.ociatepam.online/cloud

OpenCost

Cloud Costs

Cost Allocation

Cloud Costs

External Costs



There are no Cloud Cost integrations currently configured.

Learn more about setting up Cloud Costs [here](#)



On Oracle Cloud, Kubecost

The screenshot displays the Kubecost dashboard interface. At the top, a green banner indicates that Kubecost is syncing data (2/3) with a 75% progress bar. The left sidebar contains navigation links: Overview, Monitor (active), Allocations, Assets, Cloud Costs, Clusters, External Costs, Efficiency, Network, and Collections.

Allocations Section: Shows 'Cumulative cost for last 7 days by pod with filters'. A bar chart displays costs for 19/08/2025. A sidebar overlay shows the same navigation menu.

Cloud Cost Explorer Section: Shows 'Cumulative cost for last 7 days by service'. A bar chart displays costs for 21/08/2025, 22/08/2025, and 23/08/2025. A 'Filters' dropdown menu is open, showing options: API Gateway, Block Storage, Compute (highlighted), Container Engine for Kubernetes, Container Instance Service, Data Science, and Database.

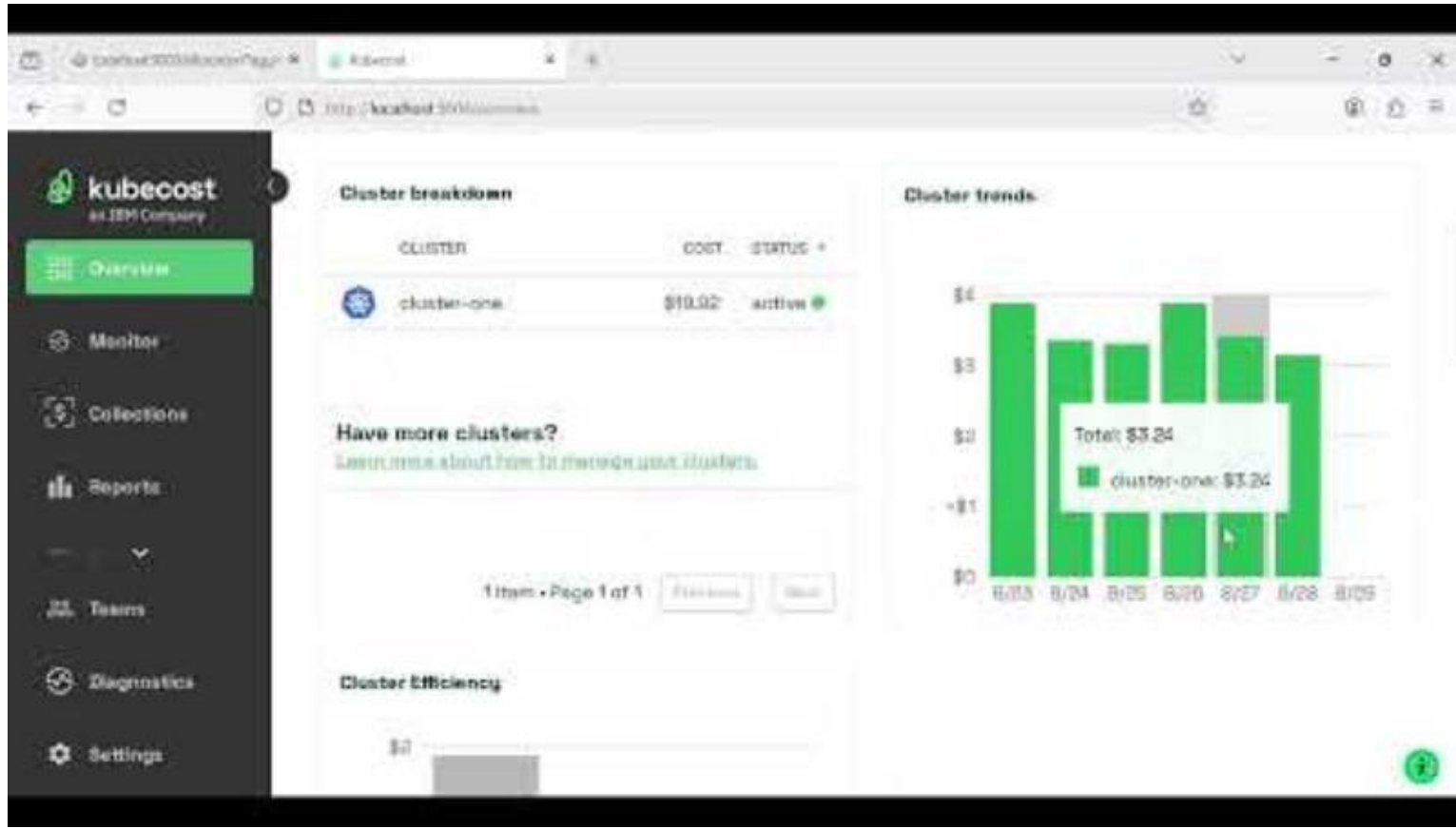
Cloud Integrations Section: Shows 'No Cloud Integrations Yet!'. It includes a 'Back to Settings' link, a 'Filter' section with 'All Integrations (0)', 'Successful Integrations (0)', 'Failed Integrations (0)', and 'No Connections or Missing Data Integrations (0)'. Below this, it says 'Add your first one here or get started with our documentation' and provides a link to 'CLOUD INTEGRATION DOCUMENTATION'.

Integration with OCI [News] - 2024

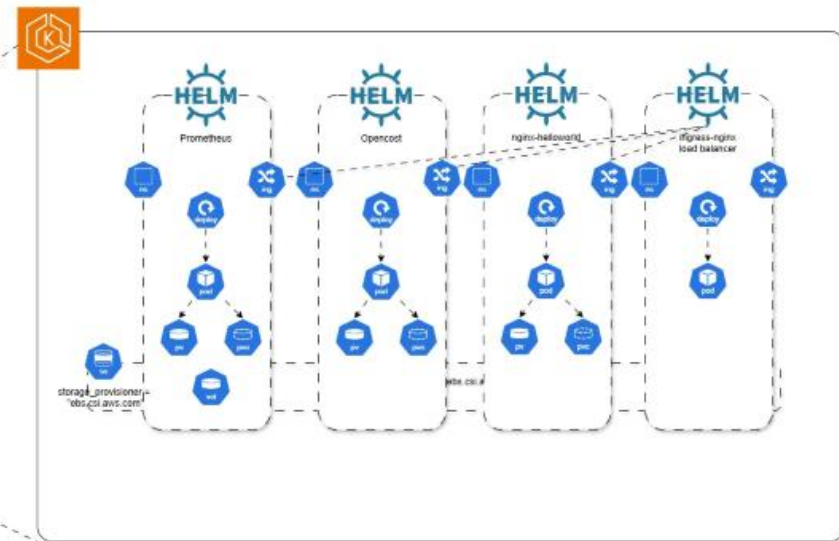
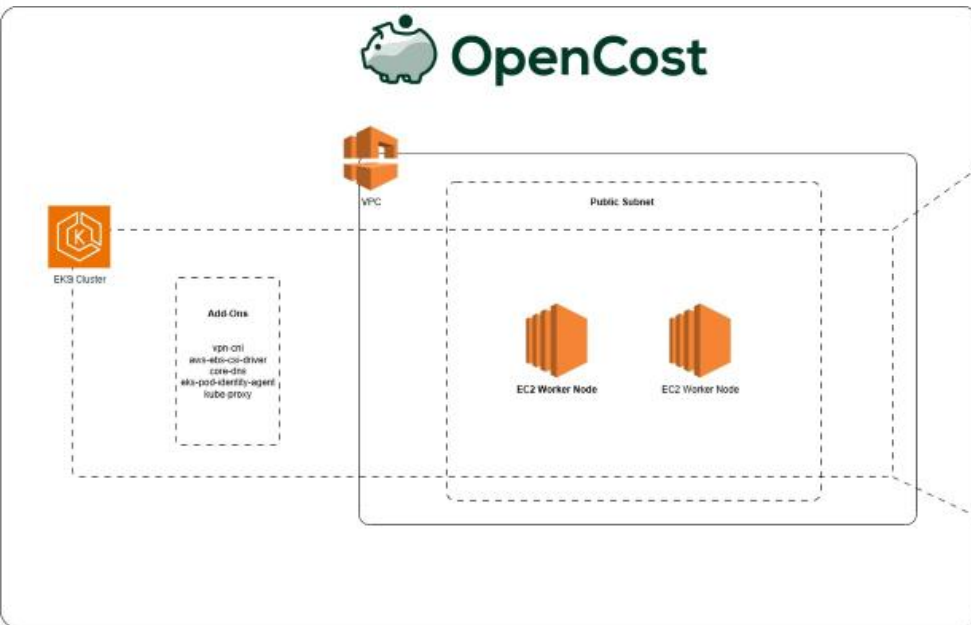
Table: Cloud Integrations

Integration	Usage	Total Cost	Change
OCI	0%	\$21.24	
Azure	0%	\$9.33	-1.2%
AWS	0%	\$3.47	+0.1%
GCP	0%	\$2.98	+2.5%
Other	0%	\$2.16	+25.3%
Unlabeled	0%	\$1.32	0.0%

On Oracle Cloud, OpenCost and KubeCost



On AWS, Open Cost





On AWS, Open Cost

← ↻ Not secure opencost.nonprod.aws.ociatepam.online/allocation ← ↻ Not secure opencost.nonprod.aws.ociatepam.online/cloud?agg=service

OpenCost

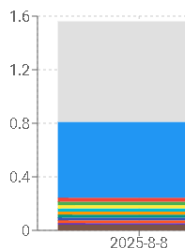
Cost Allocation

Cost Allocation

Cloud Costs

External Costs

Last 7 days by pod data
by Pod



Name

Totals

idle

nginx-ingress-controller-ingress-nginx

OpenCost

Cost Allocation

Cloud Costs

External Costs

Cloud Costs

Cumulative cost for Last 7 days by service
by Service

Date Range

Last 7 days

Breakdown

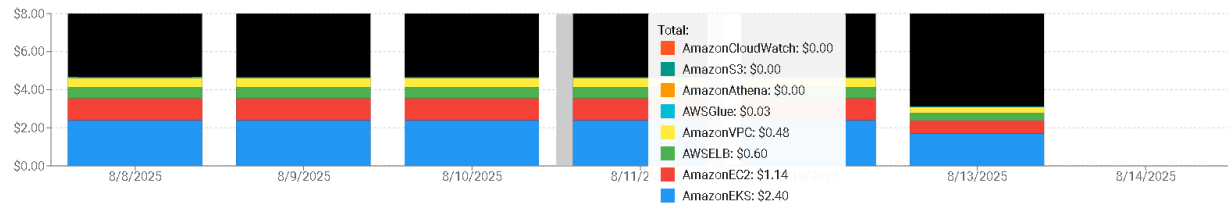
Service

Cost Metric

Amortized Net Cost

Currency

USD

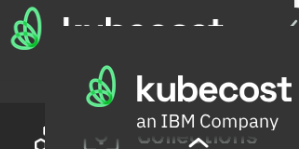


Name	KBs Utilization	Total cost
Totals	52%	\$26.40
AmazonEKS	100%	\$13.70
AmazonEC2	0%	\$6.38
AWSELB	0%	\$3.40
AmazonVPC	0%	\$2.71
AWSGlue	0%	\$0.21
AmazonAthena	0%	<\$0.01



On AWS, KubeCost

Cumulative cost for today by pod with filters



Cluster Details

cluster-one ▾

Upgrade License



Last 7 days

Provider ⓘ	AWS
Version ⓘ	1.33
Region ⓘ	us-east-1
Health Score ⓘ	N/A

Nodes ⓘ	3
Namespaces ⓘ	7
Pods ⓘ	30
Controllers ⓘ	17

Total Cost ⓘ	<\$0.01
Estimated Monthly Savings ⓘ	\$27.83
Workload Efficiency ⓘ	13.46%
Spending Trend ⓘ	N/A

No Budget Set

Add a New Budget

Efficiency

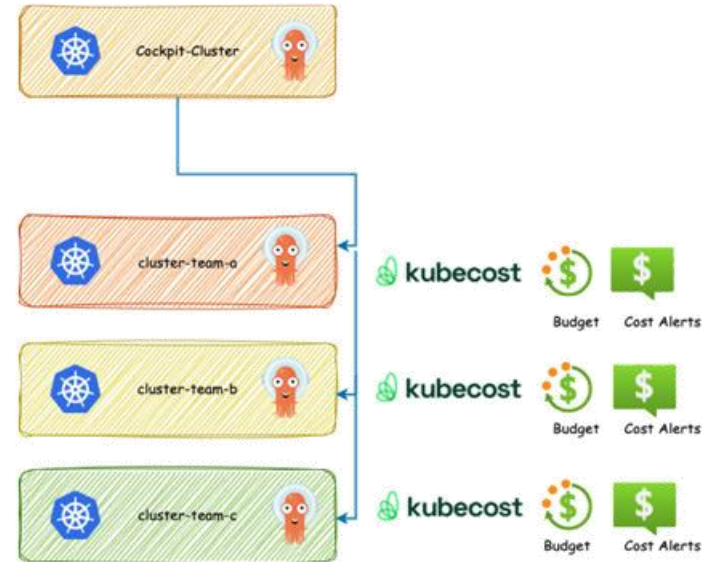
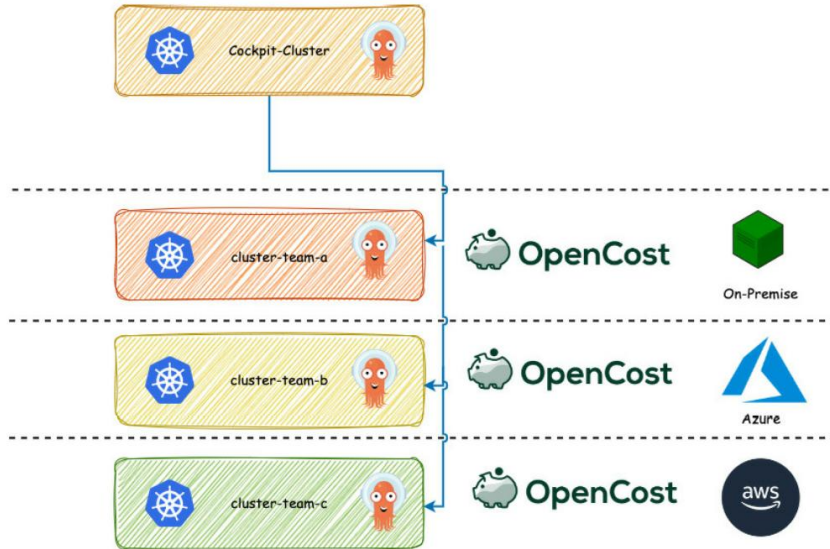
NAME • REQUESTED • USAGE

CPU	3% Efficiency
RAM	95% Efficiency





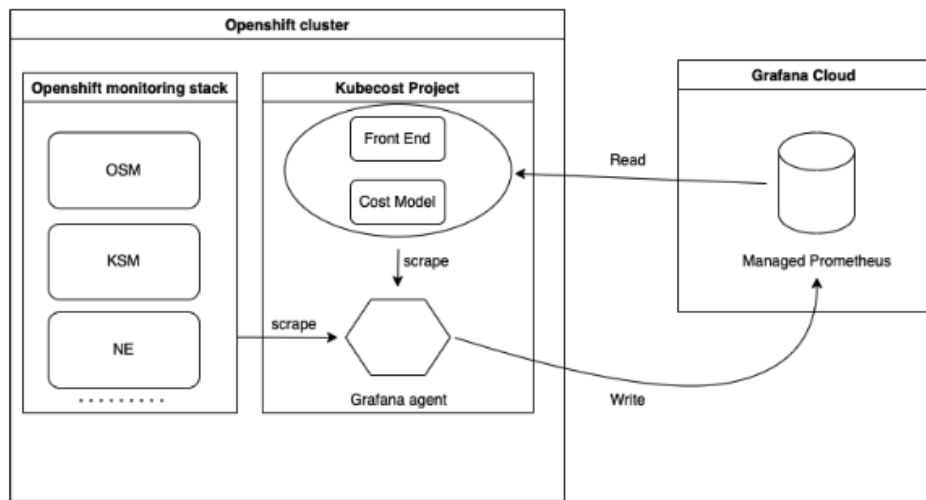
OpenCost and KubeCost on Multisite/Multicloud



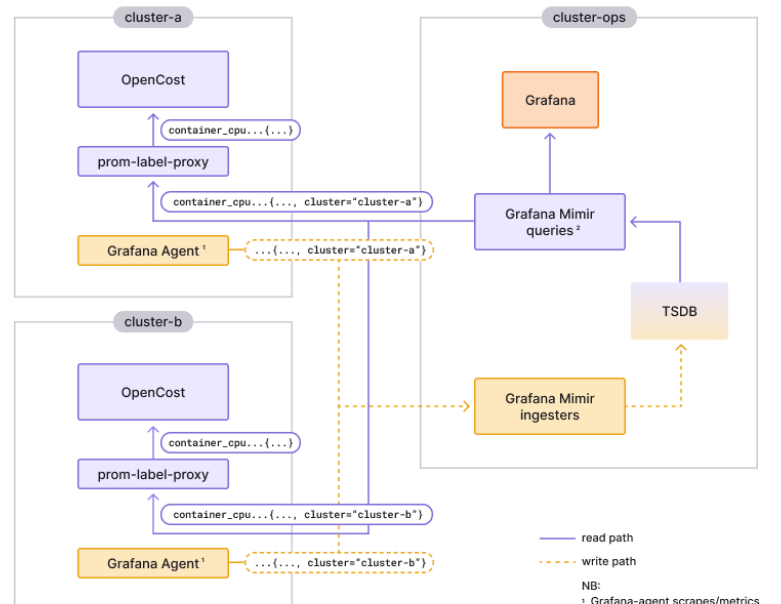


OpenCost and KubeCost on Multisite/Multicloud

Example from RedHat OpenShift



Example from Grafana Labs



NB:

¹ Grafana-agent scrapes/metrics endpoints inside each cluster

² Simplified Mimir architecture showing main read/write backends



Multicloud about OpenCost and KubeCost



Cloud Cost

Cost Allocation

Cloud Costs

Cumulative cost for Last 7 days by provider
by Provider

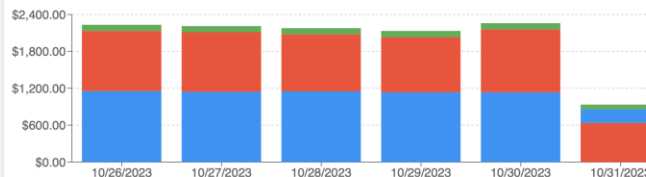
Date Range

Last 7 days

Breakdown

Provider

Cost Metric
Amortized Net Cos



Name	K8s Utilization
Totals	69%
AWS	67%
GCP	70%
Azure	97%



Overview

Monitor

Reports

Savings

Alerts

Health

Govern

Settings

Overview

Last 7 Days

Kubernetes Costs

\$199.01

↓ 4.51%

Including 3 clusters

[View report →](#)

Total Costs

\$9.03K

Combined Kubernetes and Cloud costs

[View report →](#)

Possible Monthly Savings

\$531.21/mo

See Recommendations

[View report →](#)

Cluster Efficiency

16.4%

Including 3 clusters

[View report →](#)

Clusters

Cluster breakdown

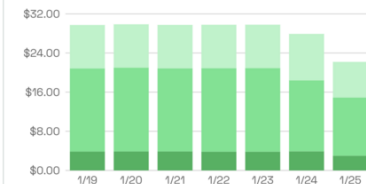
	CLUSTER	COST	STATUS
	kc-demo-dev	\$26.15	active
	kc-demo-stage	\$61.16	active
	kc-demo-prod	\$111.70	active
	kc-integration-test	\$224.24	unmonitored
	new-kc-demo	\$2.22	unmonitored

78 items • Page 1 of 16

[Previous](#)

[Next](#)

Cluster trends



Cluster Efficiency





Comparison OpenCost and Kubecost



Description	Lightweight, focused on cost monitoring	Large Cluster with scaling, ETL and dashboards. Use opencost for allocation only.
Type	Open Source/Apache 2	Free and Enterprise (SaaS) Option.
# of cores	Unlimited	250 (Free), Unlimited (Ent)
Deployment	Helm, Prometheus and kube-state-metrics	Helm, Prometheus and Grafana
Retention	by Prometheus Env.	15d (Free), Obj. storage (Ent)
Support/Consulting	Community	Professional (Free?)
Custom Pricing Model	Intermediate	Advanced (Reconciling bill)
Cost Allocation	Basic	Advanced
Analyze and optimize resource utilization	No	Yes
Cost Trend Analysis/Predict Cost	No	Yes
Custom Alerts and Reports	No	Yes
Integrations	AWS, Azure, GCP. No OCI	AWS, Azure, GCP, OCI

Comparison from Kubecost [\[here\]](#) and from Opencost [\[here\]](#)





Other Tools for Infrastructure and FinOps Certified

- **Sustainability** (Avoiding costs):

[Kube-green](#) and [Armada](#) (CNCf Incubation project)

2 (P. 663 & 673)

- **Observability using IA:**

[Robusta.dev](#) (Prometheus & ChatGPT) and [iitsAI](#) (Distributed RAG on Kubernetes)

- **By Cloud:**

3 (P. 34-46)

AWS: AWS Cost Explorer, [AWS Cost and Usage Reports \(CUR\)](#), AWS Trusted Advisor

Azure: [Azure Advisor](#), Azure Cost Management,

GCP: GCP Cloud Billing Reports (See CUD Analysis Report), [GCP Recommender](#),
Exporting GCP Cloud Billing data to BigQuery

OCI: Cost Analysis, Cost and Usage Report, Cloud Advisor and Oracle [FinOps Hub](#)

- **Commercials:**

[VMware Tanzu CloudHealth](#), [NetApp Spot](#), [Apptio Cloudability](#), [CloudPouch](#) (Focus on AWS), [Turbo360](#) (Focus on Azure), [Infracost](#) (Focus on TF), [CastAI](#) (Former Ex-Oracle)



Other Tools for Infrastructure and FinOps Certified

OpenInfraQuote (Showback)

gitlab=gitlab.pgsappsio@pgsappsio on behalf of openInfraQuote
To: Francisco Moreno - EPAM
Retention: Corp Policy - 7yr (7 years) Expires: Fri 2032-08-27 07:45

<CAUTION - From External S

openInfraQuote commented:

enInfraQuote Cost Estimation

enInfraQuote: Monthly Cost Estimate

Monthly cost unchanged

Before: \$7.59

After: \$7.59

Added: 0 Removed: 0 Existing: 1

Existing resources:

Resource

aws_instance.bastionhostforprivakeendpoint

FinOps Certified Platforms

finops.org/landscape/?prod_TOOLS_SERVICES%BrefinementList%D%5Bcategories%D%5B0%D=FinOps%20Tool&pro

FinOps Foundation

Community Training Framework FOCUS State

NEW FinOps for AI Training Now Available

FinOps Landscape

Asset Library FinOps X Session Library FinOps Landscape KPIs Terminology FinOps Assessment FinOps C

Search

Showing 10 Landscape cards

Clear All Filters (4)

FOCUS

☐ FOCUS Adopter

Categories (1)

☒ FinOps Tool (10)

certero.

CerteroX

Unified multi-cloud & SaaS visibility, providing governance, financial accountability, cost-management, resource optimization, live dashboards and reports.



CLOUDBOLT
The cloud ROI company™

CloudBolt Software

Platform provides cloud usage and spend visibility, cloud cost management and automation of cloud deployments to improve consistency and reduce wasted cost.



Alibaba IBM Cloud GCP AWS

Current Assignment: GitLab CI stage



Current Assignment: FinOps report for Multicloud LZ

BILLING_PERIOD

☐ 2025-07☒ 2025-08

charging_code

☐ (Blank)☒ architecture-and-platform

account_name

☐ d-nonprod-example-account☐ d-nonprod-paul-playground☒ d-nonprod-sander-playground☐ d-nonprod-tf-gitlab-module☐ d-nonprod-torfjor☐ d-nonprod-wild-test

AWS cost 2025 Interim report

Data updated 8/27/25

Search



Pages



File



Export



Share



Copilot



Cost per sku, account, ...

Cost by day & charging ...

Cost by period

All key value combo's w...

cost_with_tax	product_product_family	product_servicecode	line_item_usage_type	account_name	
41.28		AWSCloudWAN	USE1-CloudWAN-Attachment-Hours	d-nonprod-sander-playground	architecture-and-platform
28.58	NAT Gateway	AmazonEC2	NatGateway-Hours	d-nonprod-sander-playground	architecture-and-platform
1.89	NAT Gateway	AmazonEC2	NatGateway-Bytes	d-nonprod-sander-playground	architecture-and-platform
1.20	Data Payload	AmazonCloudWatch	USE1-VendedLog-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.42	Data Transfer	AWSDataTransfer	DataTransfer-Regional-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.11	Data Payload	AmazonCloudWatch	USE1-S3-Egress-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.04	Data Transfer	AWSDataTransfer	DataTransfer-Out-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.01	Storage Snapshot	AmazonCloudWatch	USE1-TimedStorage-ByteHrs	d-nonprod-sander-playground	architecture-and-platform
0.00	Data Transfer	AWSDataTransfer	USE1-EU-AWS-Out-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.00	Data Transfer	AWSDataTransfer	USE1-USW2-AWS-Out-Bytes	d-nonprod-sander-playground	architecture-and-platform
0.00	Data Transfer	AWSDataTransfer	USE1-APE1-AWS-Out-Bytes	d-nonprod-sander-playground	architecture-and-platform

Conclusions

1. Rethink the value of the spending, and other ways to redirect it.
2. Understand the idiosyncrasy of your company, before of use any framework/tool: Think of your customer, when you design tag structure because the report takes information from there.
3. Every cloud has its DNA, try to use industry standards (FOCUS specs) or cloud-agnostic tools.
4. Before of spending time on any tool, it is better think of flexibility, costs, learning curve. Check reviews, experiences and go deep on a PoC.



Questions ?

