ClickHouse

Simple cloud data transfer cost monitoring - Kubenetmon

Sichen Zhao

2026

Speakers

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01 Data transfer cost

What's Data Transfer Cost?

- Data-In for free
- Data-Out
- Data-xAZ

- Coming from reliable systems best practices

	Pricing
Data Transfer IN To Amazon EC2 From Internet	
All data transfer in	$0.00 per GB
Data Transfer OUT From Amazon EC2 To Internet	
AWS customers receive 100GB of data transfer out to the internet free each month, aggregated across all AWS Services and Regions (except China and GovCloud). The 100 GB free tier for data transfer out to the internet is global and does not apply separately or individually to AWS Regions.	
First 10 TB / Month	$0.09 per GB
Next 40 TB / Month	$0.085 per GB
Next 100 TB / Month	$0.07 per GB
Greater than 150 TB / Month	$0.05 per GB

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How to build a reliable system?

Cloud & K8s

Multi-AZ - Xregion replicas

Redundancy

Testing

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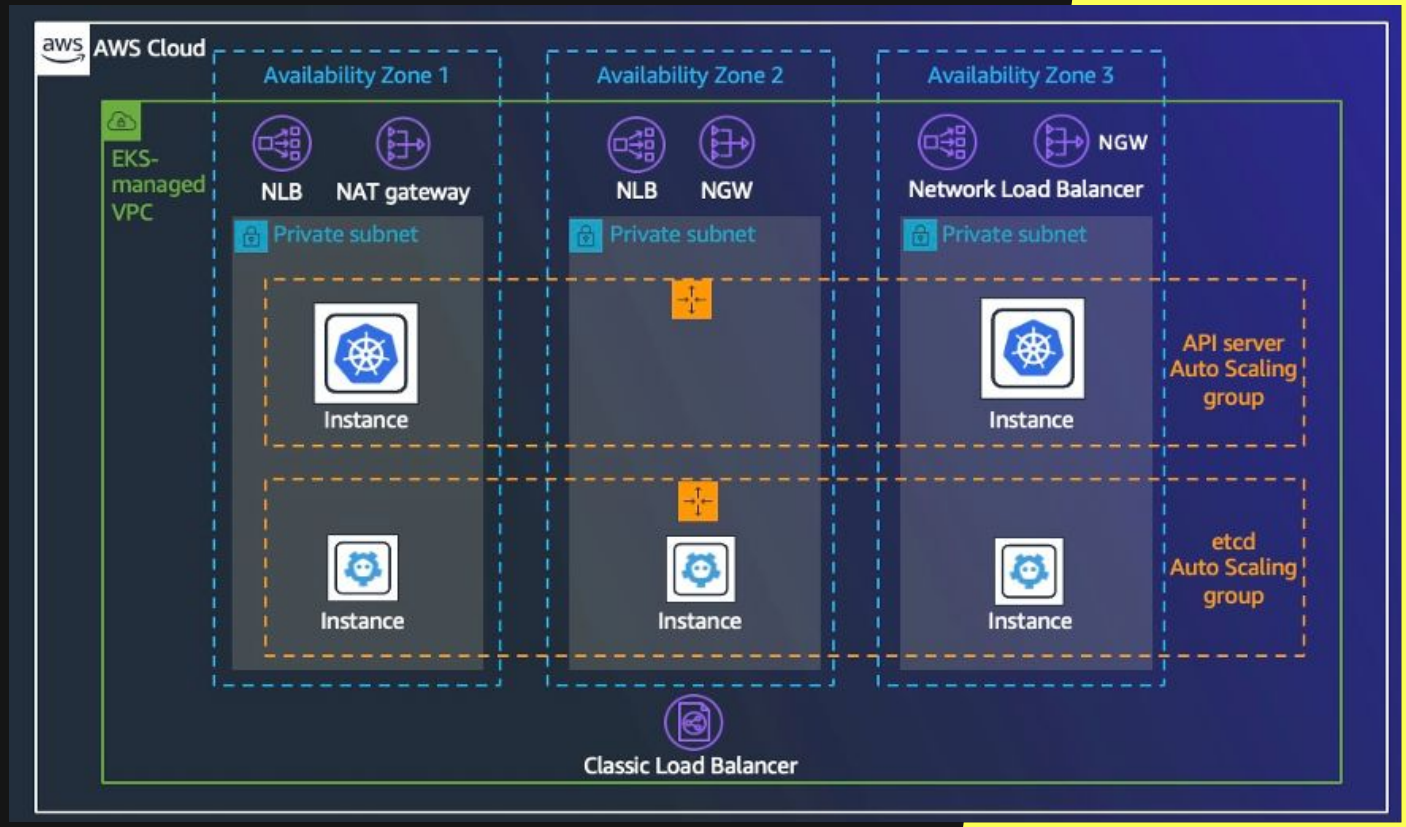
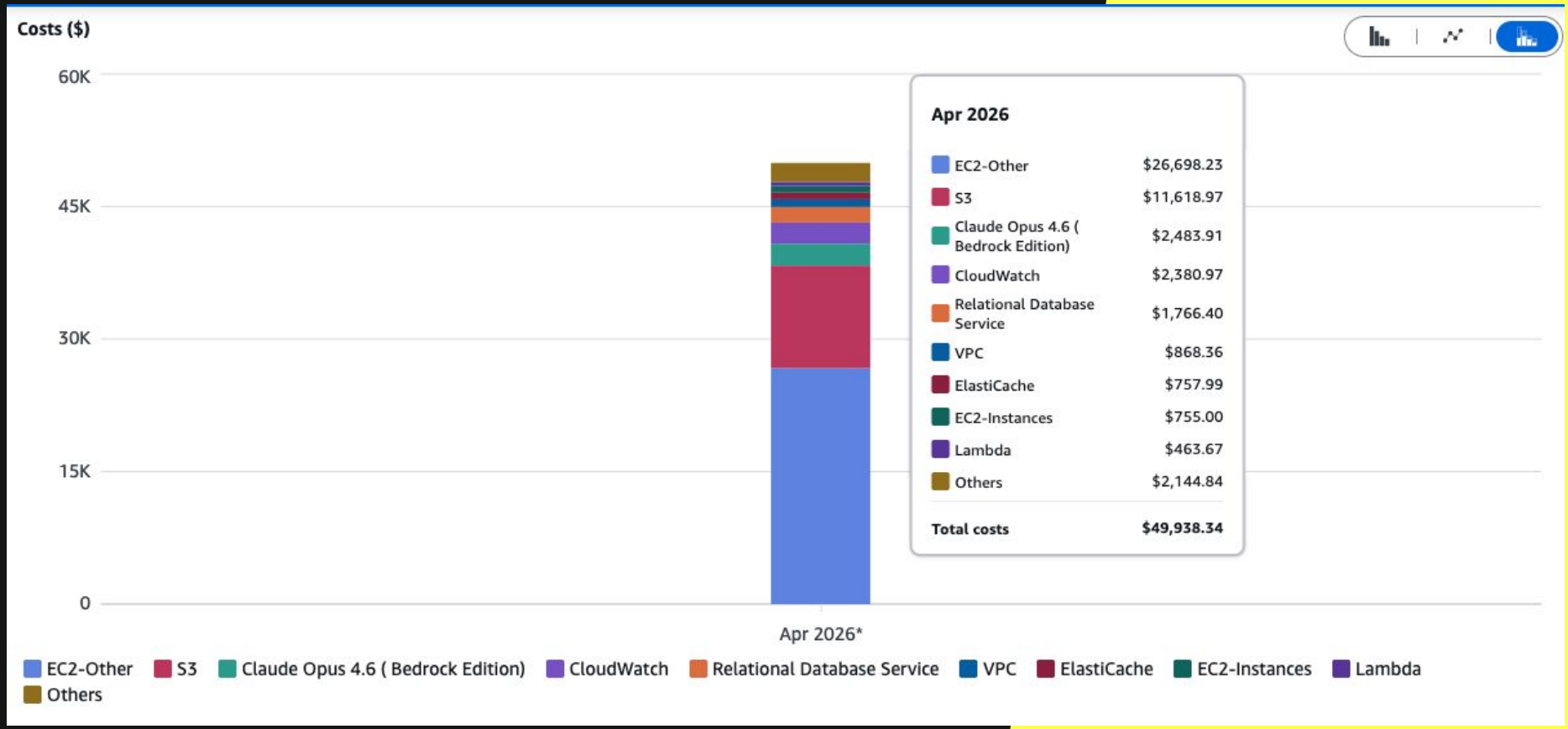

AWS Cloud
Availability Zone 1
Availability Zone 2
Availability Zone 3
EKS-managed VPC
NLB
NAT gateway
NLB
NGW
NGW
Network Load Balancer
Private subnet
Private subnet
Private subnet
Instance
Instance
API server Auto Scaling group
Instance
Instance
Instance
etcd Auto Scaling group
Classic Load Balancer


Costs ($)
60K
45K
30K
15K
0
Apr 2026*
Apr 2026
EC2-Other $26,698.23
S3 $11,618.97
Claude Opus 4.6 (Bedrock Edition) $2,483.91
CloudWatch $2,380.97
Relational Database Service $1,766.40
VPC $868.36
ElastiCache $757.99
EC2-Instances $755.00
Lambda $463.67
Others $2,144.84
Total costs $49,938.34
EC2-Other
S3
Claude Opus 4.6 (Bedrock Edition)
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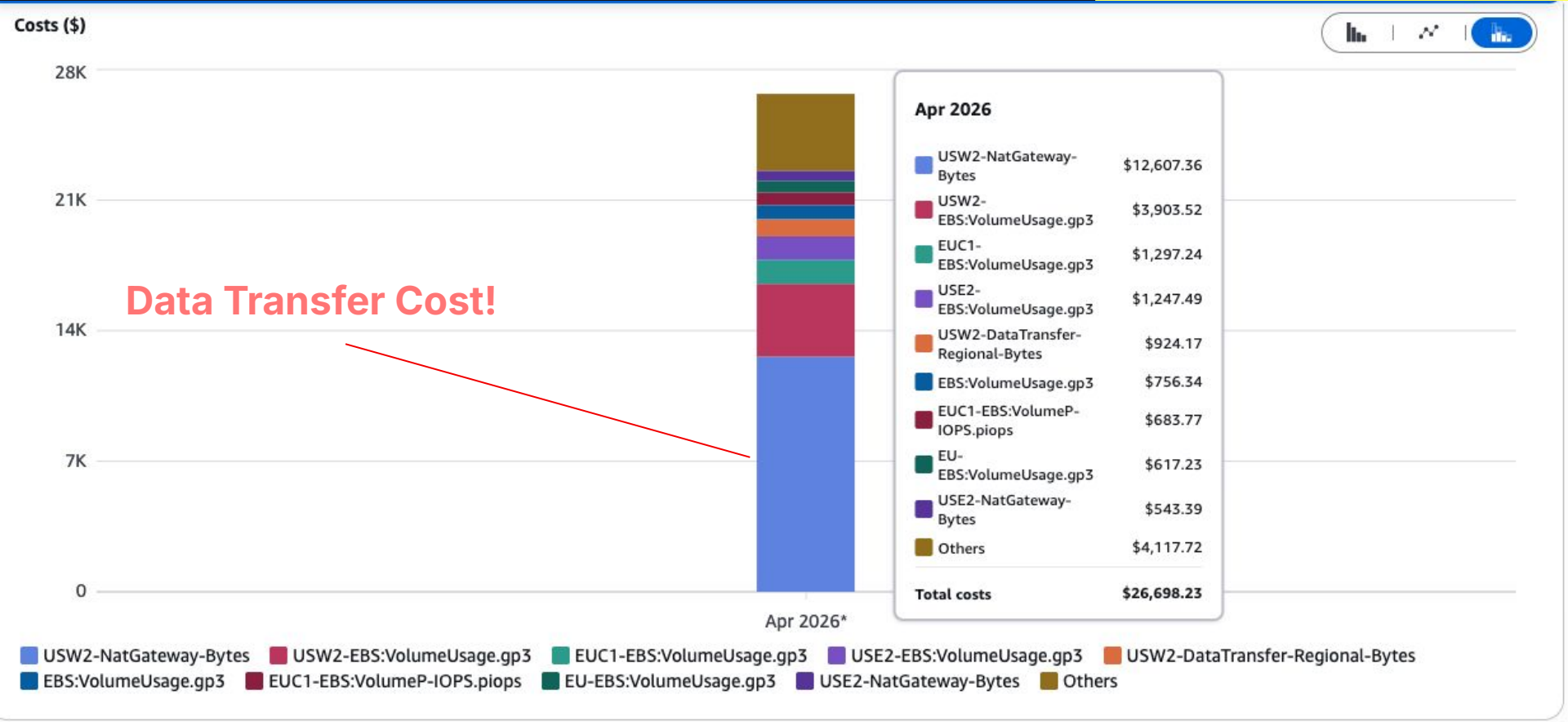
Others


Costs ($)
28K
21K
14K
7K
0
Data Transfer Cost!
Apr 2026*
Apr 2026
USW2-NatGateway-Bytes $12,607.36
USW2-EBS:VolumeUsage.gp3 $3,903.52
EUC1-EBS:VolumeUsage.gp3 $1,297.24
USE2-EBS:VolumeUsage.gp3 $1,247.49
USW2-DataTransfer-Regional-Bytes $924.17
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EUC1-EBS:VolumeP-IOPS.piops $683.77
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Others $4,117.72
Total costs $26,698.23
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USE2-NatGateway-Bytes
Others

The Problem: Surprise Cloud Network Bills

Unexpected data transfer costs from AWS, GCP, and Azure

Multi-AZ	K8s	Multi-Cloud
hidden cross-AZ charges	Hard to trace traffic to specific pods	No unified view across AWS / GCP / Azure

"Where is all this traffic coming from?"

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02 ClickHouse specific problem

ClickHouse Cloud specific problem

What is ClickHouse?

ClickHouse is an **open-source**, columnar **OLAP database**

Designed for **blazing fast** analytics of massive volumes of data

- **SQL Native**
- **Lightning fast queries**
- **Highly efficient storage & compression**
- **Easily scalable to any size**

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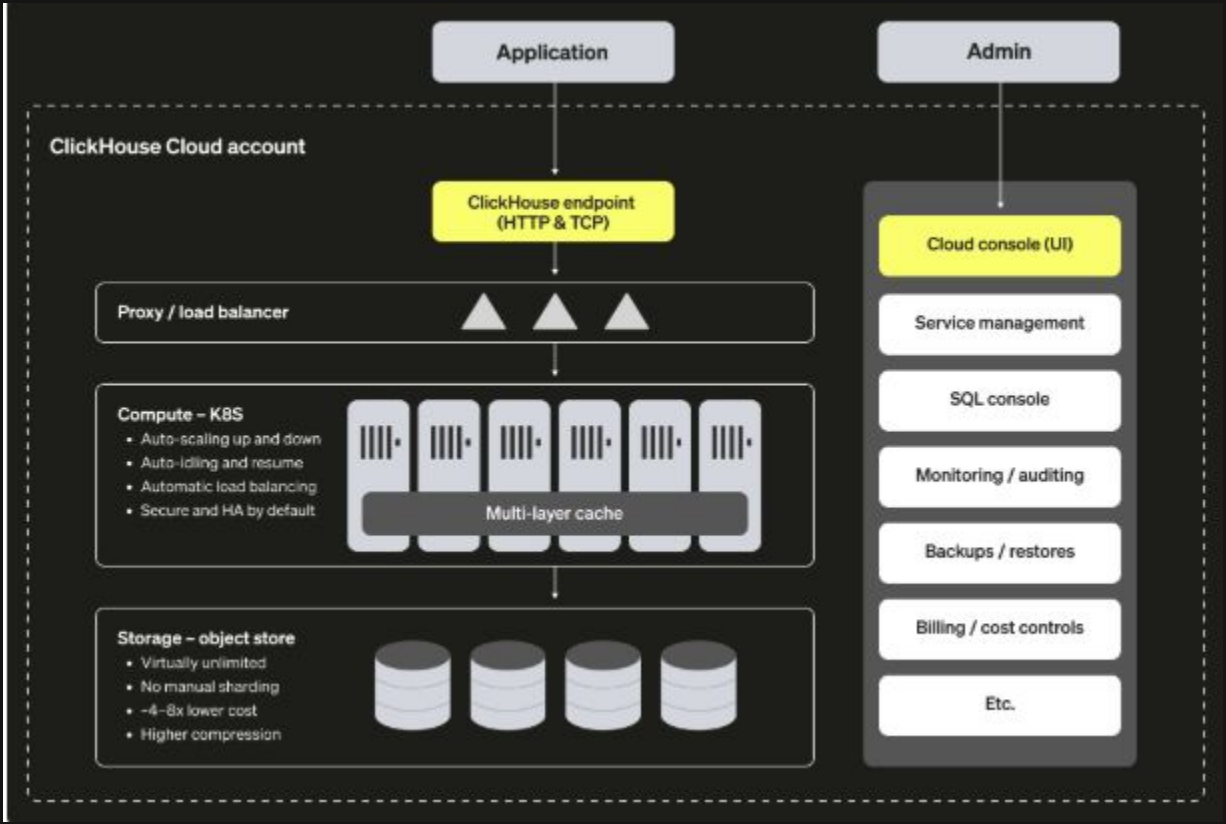
ClickHouse Cloud specific problem



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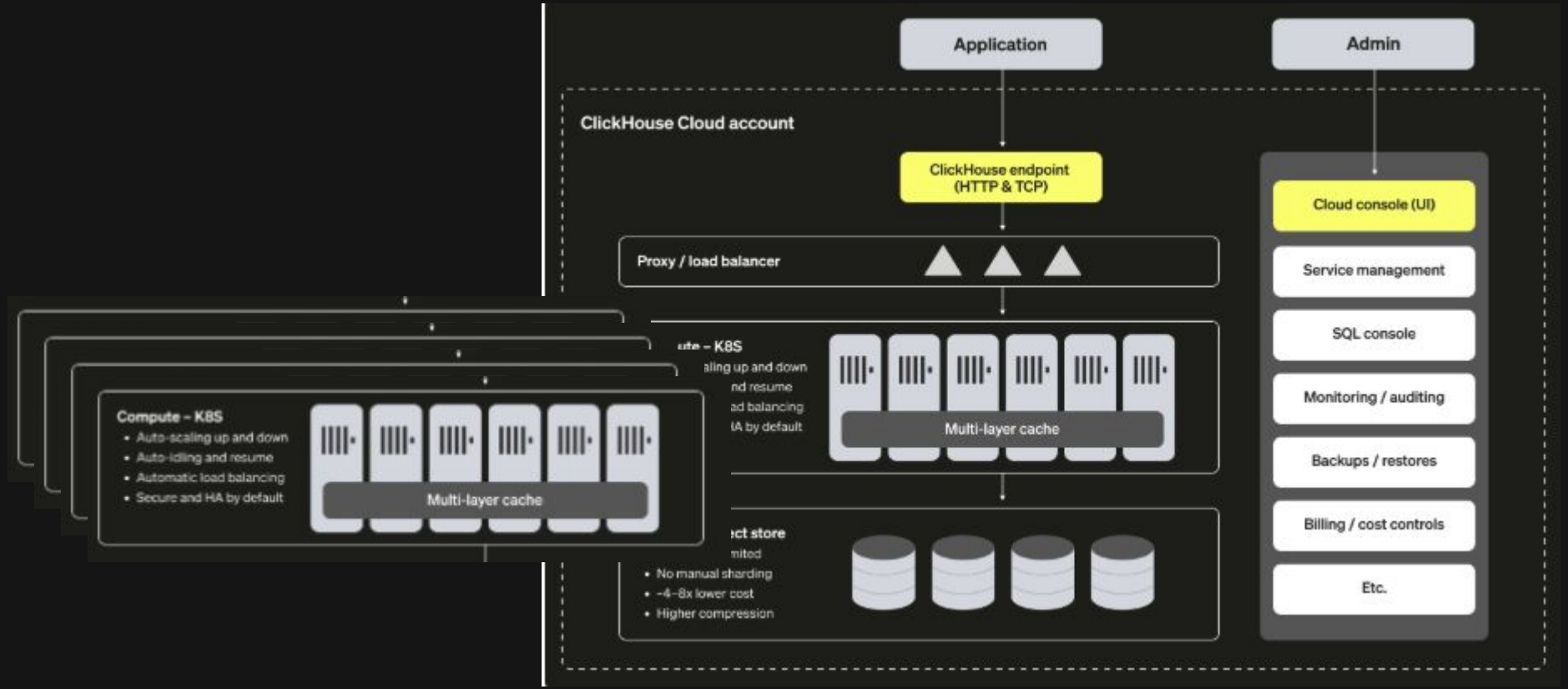
ClickHouse Cloud specific problem



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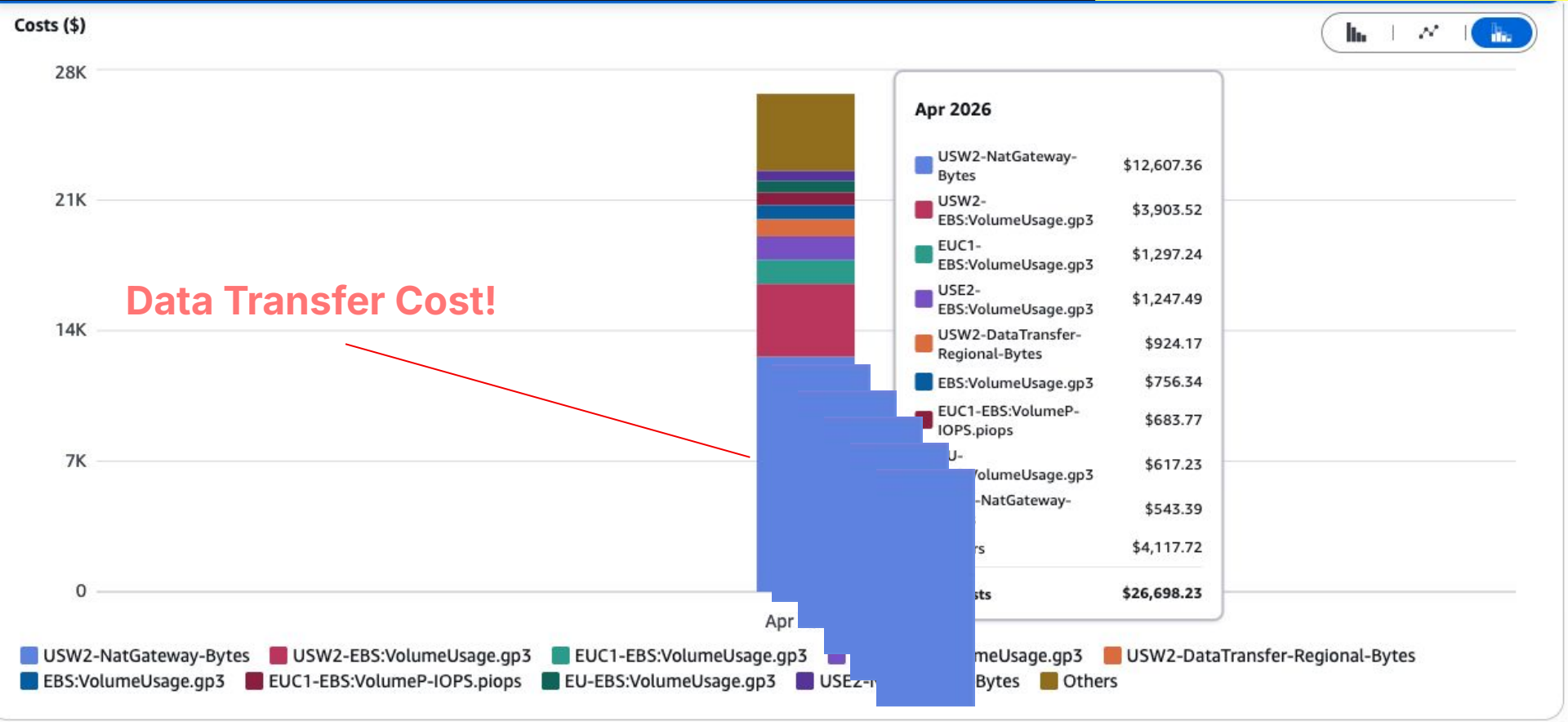
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EU-EBS:VolumeUsage.gp3
Others

ClickHouse Cloud network charge

Data transfer for public internet egress starting at **$0.1152 / GB**, inter region egress starting at **$0.0312 / GB**.

AWS

Cloud Provider	Region	Public Internet Egress	Same region	Cross-region (all Tier 1)
AWS	ap-northeast-1	$0.1440	$0.0000	$0.1152
AWS	ap-south-1	$0.1384	$0.0000	$0.1104
AWS	ap-southeast-1	$0.1512	$0.0000	$0.1152
AWS	ap-southeast-2	$0.1440	$0.0000	$0.1248

GCP

Cloud Provider	Origin Region	Public Internet Egress	Destination region				
			Same region	North America	Europe	Asia, Oceania	Middle East, South America, Africa
GCP	us-central1	$0.1140	$0.0000	$0.0360 (Tier 1)	$0.0720 (Tier 2)	$0.1200 (Tier 3)	$0.1620 (Tier 4)
GCP	us-east1	$0.1140	$0.0000	$0.0360 (Tier 1)	$0.0720 (Tier 2)	$0.1200 (Tier 3)	$0.1620 (Tier 4)
GCP	europe-west4	$0.1140	$0.0000	$0.0720 (Tier 2)	$0.0360 (Tier 1)	$0.1200 (Tier 3)	$0.1620 (Tier 4)
GCP	asia-southeast1						

Azure

Cloud Provider	Origin Region	Public Internet Egress	Destination region				
			Same region	North America	Europe	Asia, Oceania	Middle East, South America, Africa
Azure	eastus2	$0.1020	$0.0000	$0.0300 (Tier 1)	$0.0660 (Tier 2)	$0.0660 (Tier 2)	$0.0660 (Tier 2)
Azure	westus3	$0.1020	$0.0000	$0.0300 (Tier 1)	$0.0660 (Tier 2)	$0.0660 (Tier 2)	$0.0660 (Tier 2)
Azure	germanywestcentral	$0.1020	$0.0000	$0.0660 (Tier 2)	$0.0300 (Tier 1)	$0.0660 (Tier 2)	$0.0660 (Tier 2)

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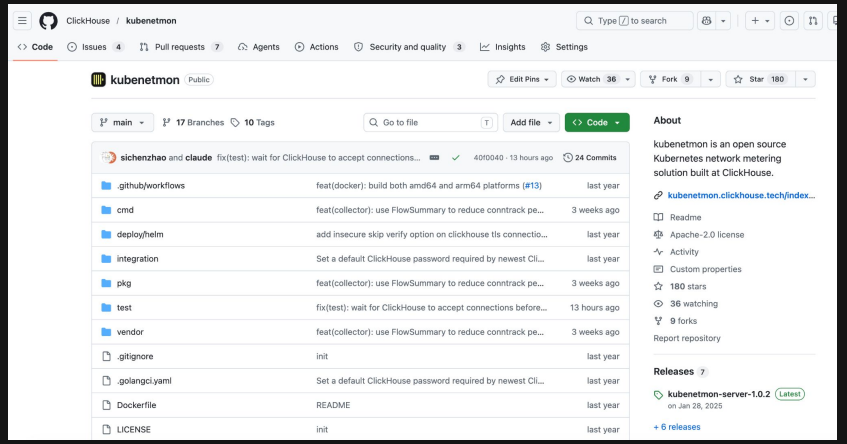
03 Kubenetmon solves the problem

An open source K8s network traffic monitoring tool

What is Kubenetmon?

An open source K8s network traffic monitoring tool

- Built and used at ClickHouse Cloud to track network traffic
- Works on AWS, GCP, and Azure
- Packaged as a Helm chart with a Docker image for plug and play easy set up!



https://github.com/ClickHouse/kubenetmon

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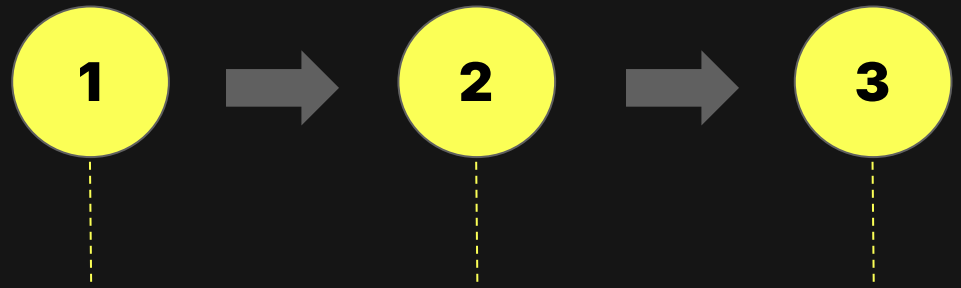
How Kubenetmon Works



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Step 1: Extract source of connection data

Kubenetmon Agent

- Linux netfilter framework has a classic part Conntrack table accessible through APIs with mature libraries in Golang.
- We need to enable the accounting feature to show packets and bytes counts too

```
# echo "1" > /proc/sys/net/netfilter/nf_conntrack_acct
# conntrack -L
tcp      6 35 TIME_WAIT src=10.1.1.42 dst=10.1.2.228 sport=41442 dport=5555
packets=334368 bytes=106591692 src=10.1.2.228 dst=10.1.1.42 sport=5555
dport=41442 packets=280371 bytes=692287110 [ASSURED] mark=0 use=1
tcp      6 431999 ESTABLISHED src=10.1.0.27 dst=10.1.131.55 sport=37670
dport=10249 packets=20 bytes=21564 src=10.1.131.55 dst=10.1.0.27 sport=10249
dport=37670 packets=11 bytes=2011 [ASSURED] mark=0 use=1
```


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Step 2: Label K8s info to connection data

Kubenetmon Server

- K8s APIs provides IP to pod mapping but if we depend on K8s APIs we will overwhelm control plane easily with the traffic we get
- As a result, instead of using API, we used k8s informers so we get push events notifications on cluster state

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Step 3: Aggregate connection data for metering

Datawarehouse - ClickHouse in ClickHouse cloud use case

- We offload data to external data-warehouse for aggregation and data processing
- In ClickHouse cloud case, we used ClickHouse cloud instance ourselves
  - Good to handle high-cardinality data
  - Supports well real-time concurrency writes

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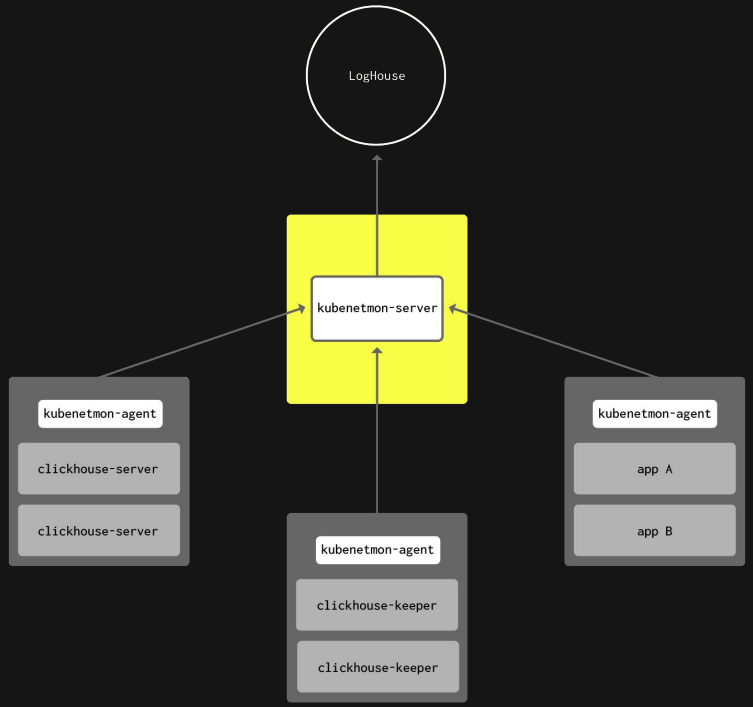
Kubenetmon in ClickHouse Cloud



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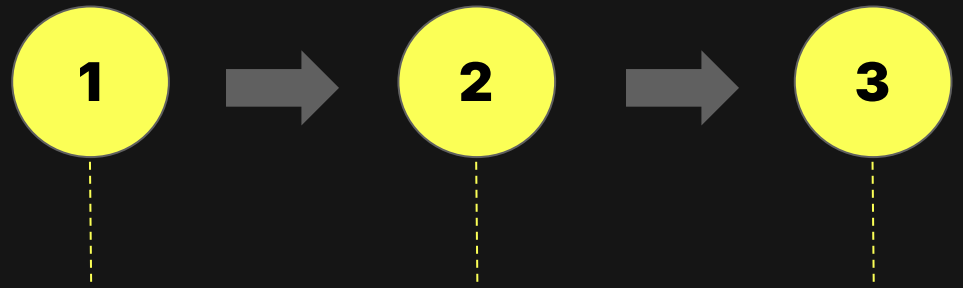
How Kubenetmon Works



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Query network traffic data from ClickHouse

```
SELECT
    formatReadableQuantity(sum(rows)),
    formatReadableSize(sum(data_compressed_bytes)) AS compressed_size,
    formatReadableSize(sum(data_uncompressed_bytes)) AS uncompressed_size,
    sum(data_compressed_bytes) / sum(data_uncompressed_bytes) AS
compression_ratio
FROM system.parts
WHERE (database = 'default') AND (`table` = 'network_flows_0') AND (active = 1);
```

```
Row 1:
──────
formatReadab⋯(sum(rows)): 399.05 billion
compressed_size:          2.66 TiB
uncompressed_size:        86.69 TiB
compression_ratio:        0.030629224420511452
1 row in set. Elapsed: 0.116 sec.
```


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04 How to use Kubenetmon

Set up Kubenetmon

Next, we create two namespaces:

```
kubectl create namespace kubenetmon-server
kubectl create namespace kubenetmon-agent
```

Let's add this Helm repository:

```
helm repo add kubenetmon https://kubenetmon.clickhouse.tech
```

We now install `kubenetmon-server`. `kubenetmon-server` expects an environment, cluster name, cloud provider name (`aws`, `gcp`, or `azure`), and region, so we provide these. We are also going to supply connection credentials for our ClickHouse instance:

```
helm install kubenetmon-server kubenetmon/kubenetmon-server \
--namespace kubenetmon-server \
--set region=us-west-2 \
--set cluster=cluster \
--set environment=development \
--set cloud=aws \
--set inserter.endpoint=pwlo4fffj6.eu-west-2.aws.clickhouse.cloud:9440 \
--set inserter.username=default \
--set inserter.password=etK0~PWR7DgRA \
--set deployment.replicaCount=1
```

https://github.com/ClickHouse/kubenetmon

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Questions?

Connect with ClickHouse

slack

Try ClickHouse for your use case

- ClickHouse Cloud
- Download open source

Learn

- Academy / certifications
- Blogs / YouTube

Engage with our community

- Community Slack
- Monthly Community calls
- Meetups / events

We are Hiring. Come Work with Us!

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Thank you!

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