

ISOVALENT

Cilium and Grafana LGTM!



KubeCon Amsterdam 2023



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@dejonggraymond

@lambdanis

Agenda

- Introduction to eBPF & Cilium
- Observability with Hubble
- Using Grafana
- Demo!



eBPF & Cilium



- Open Source Projects



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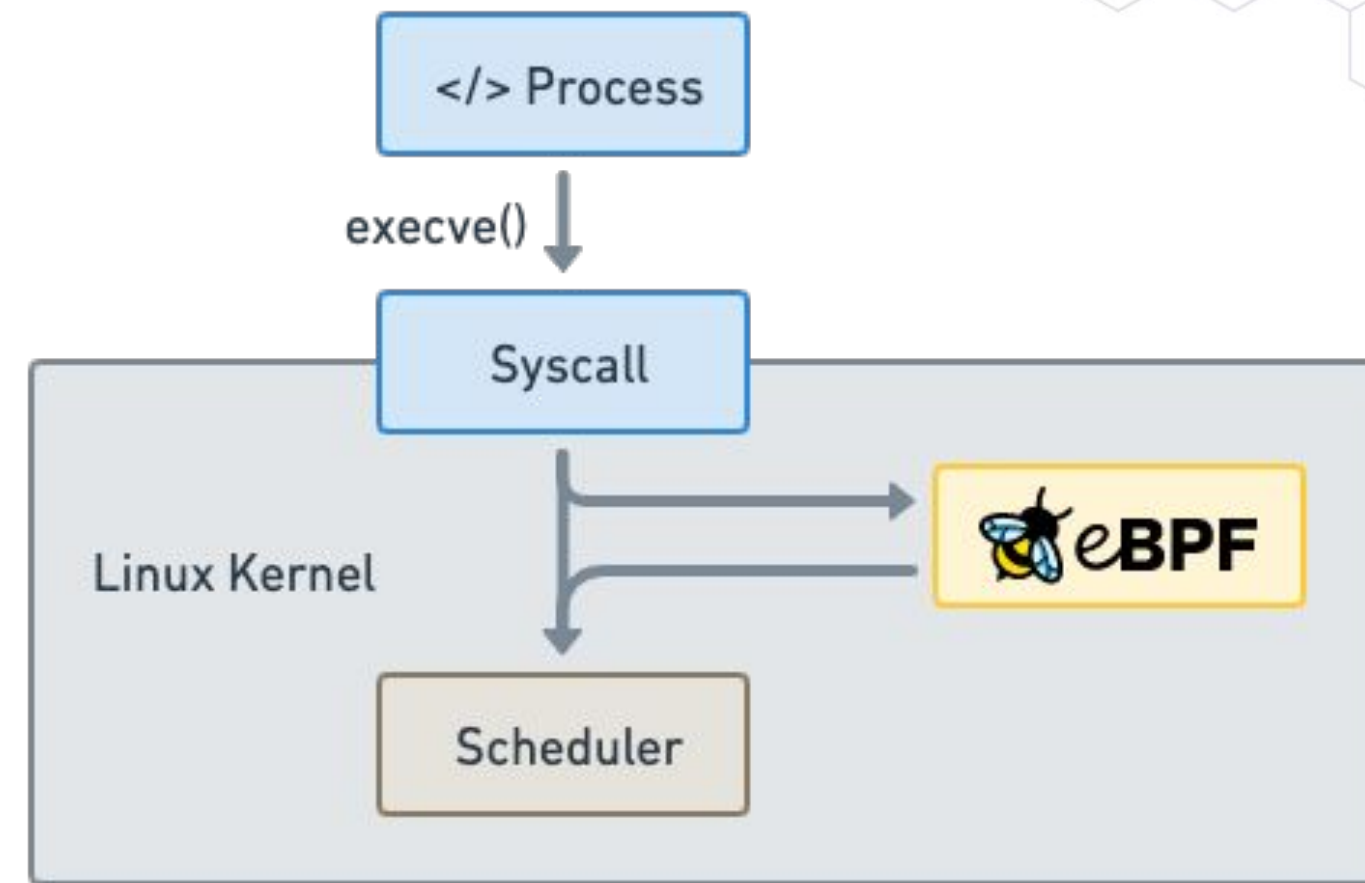
- Company behind Cilium
- Provides Cilium Enterprise





Makes the Linux kernel programmable in a secure and efficient way.

“What JavaScript is to the browser, eBPF is to the Linux Kernel”

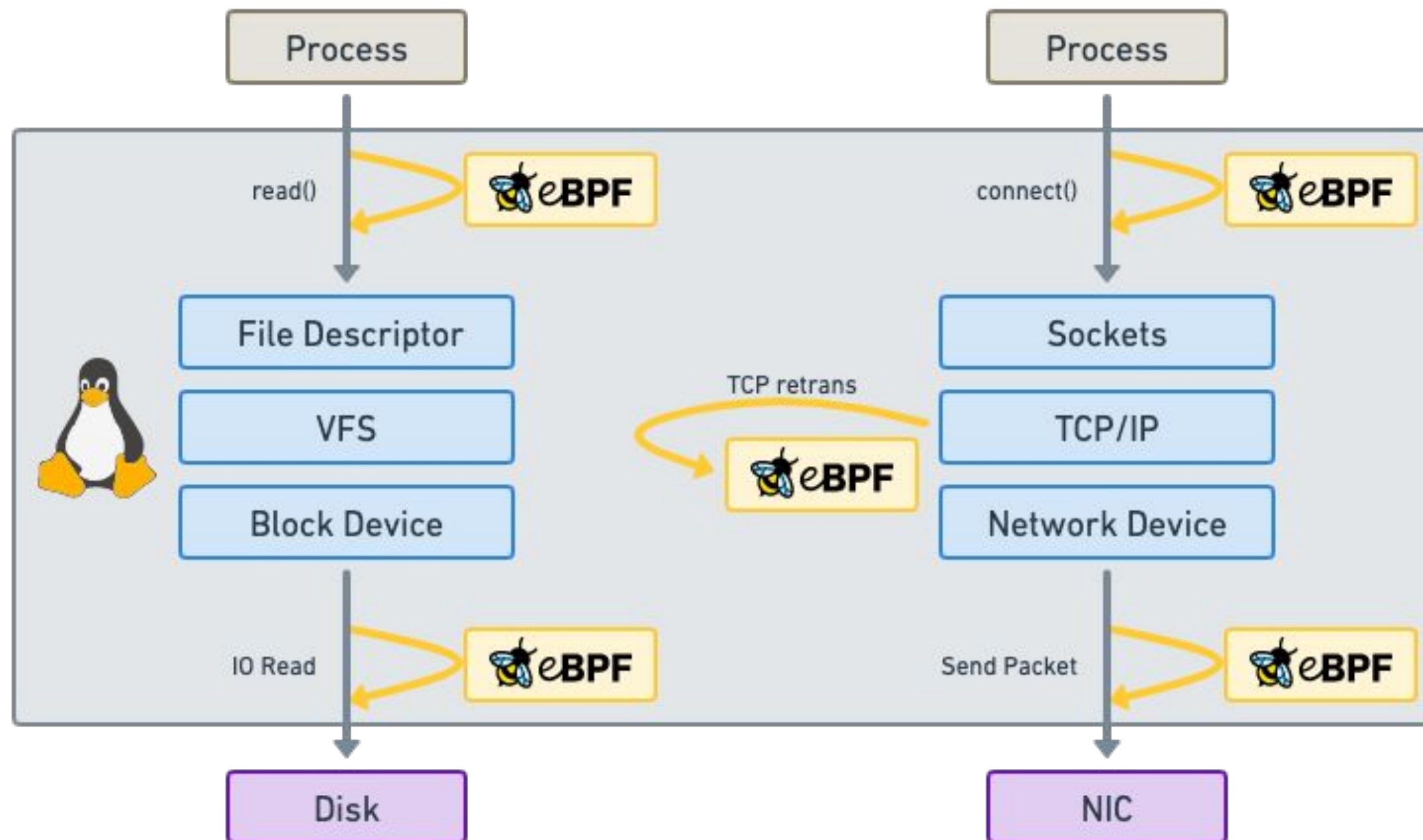


```
int syscall__ret_execve(struct pt_regs *ctx)
{
    struct comm_event event = {
        .pid = bpf_get_current_pid_tgid() >> 32,
        .type = TYPE_RETURN,
    };

    bpf_get_current_comm(&event.comm, sizeof(event.comm));
    comm_events.perf_submit(ctx, &event, sizeof(event));

    return 0;
}
```


Run eBPF programs on events



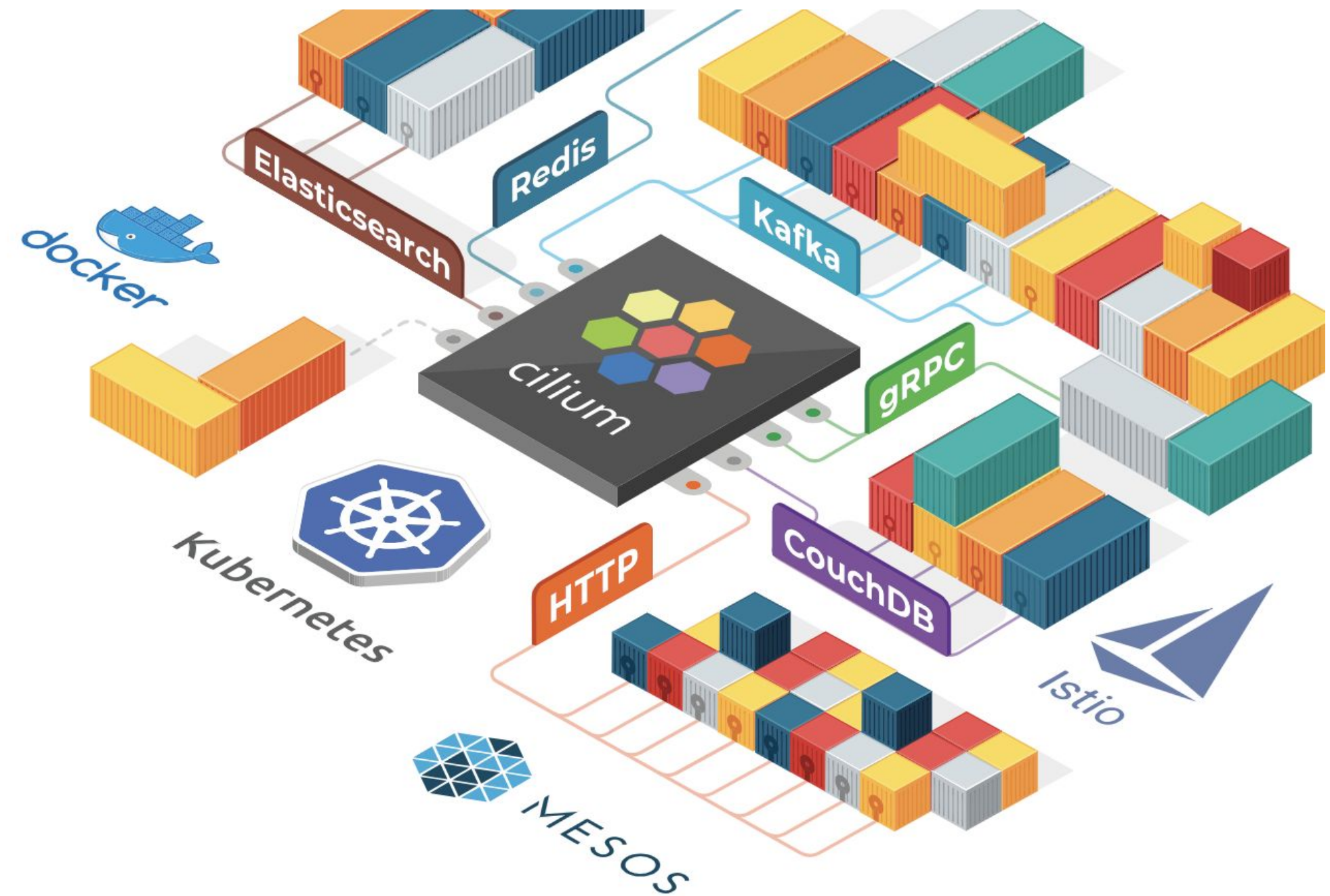
Attachment points

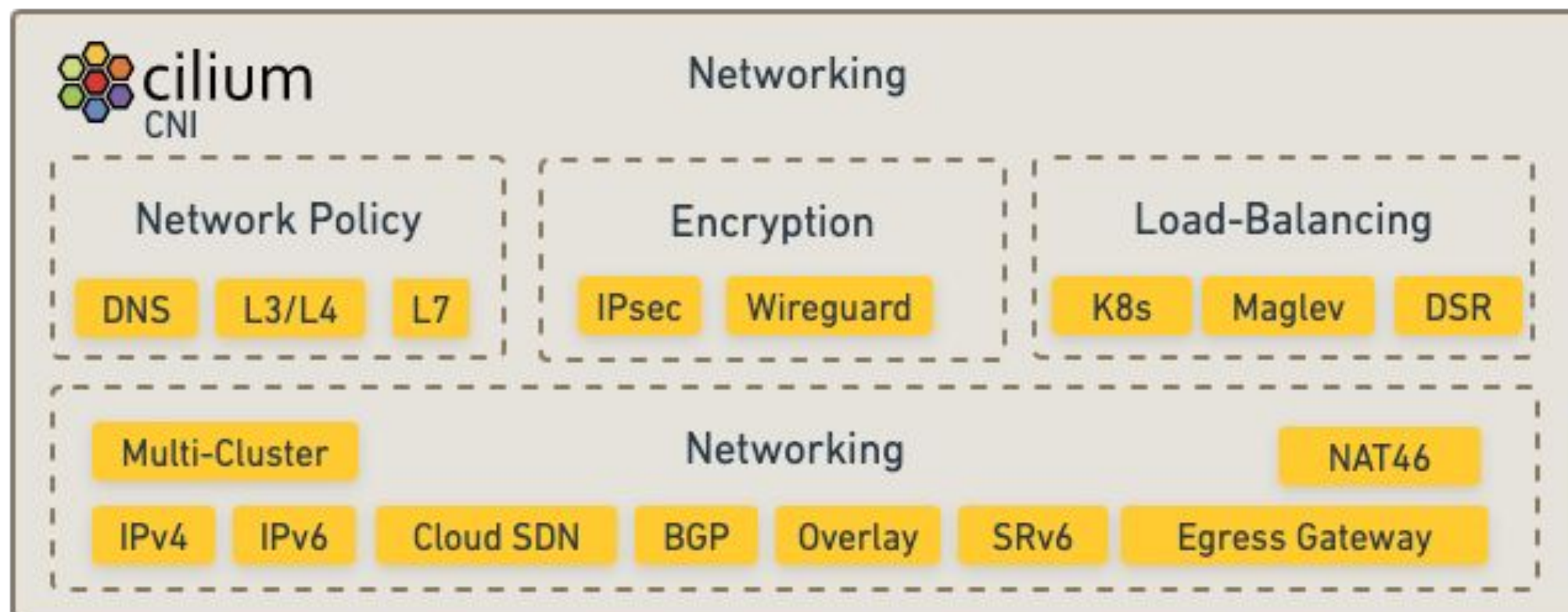
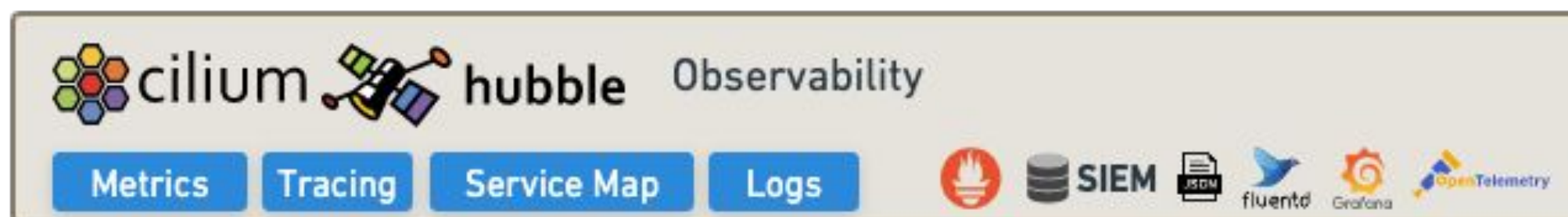
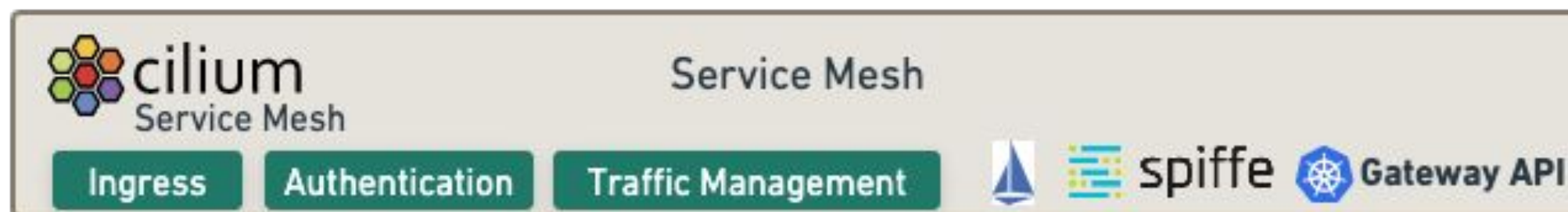
- Kernel functions (kprobes)
- Userspace functions (uprobe)
- System calls
- Tracepoints
- Sockets (data level)
- Network devices (packet level)
- Network device (DMA level) [XDP]
- ...

What is Cilium?



- **Networking & Load-Balancing**
 - CNI, Kubernetes Services, Multi-cluster, VM Gateway
- **Network Security**
 - Network Policy, Identity-based, Encryption
- **Observability**
 - Metrics, Flow Visibility, Service Dependency

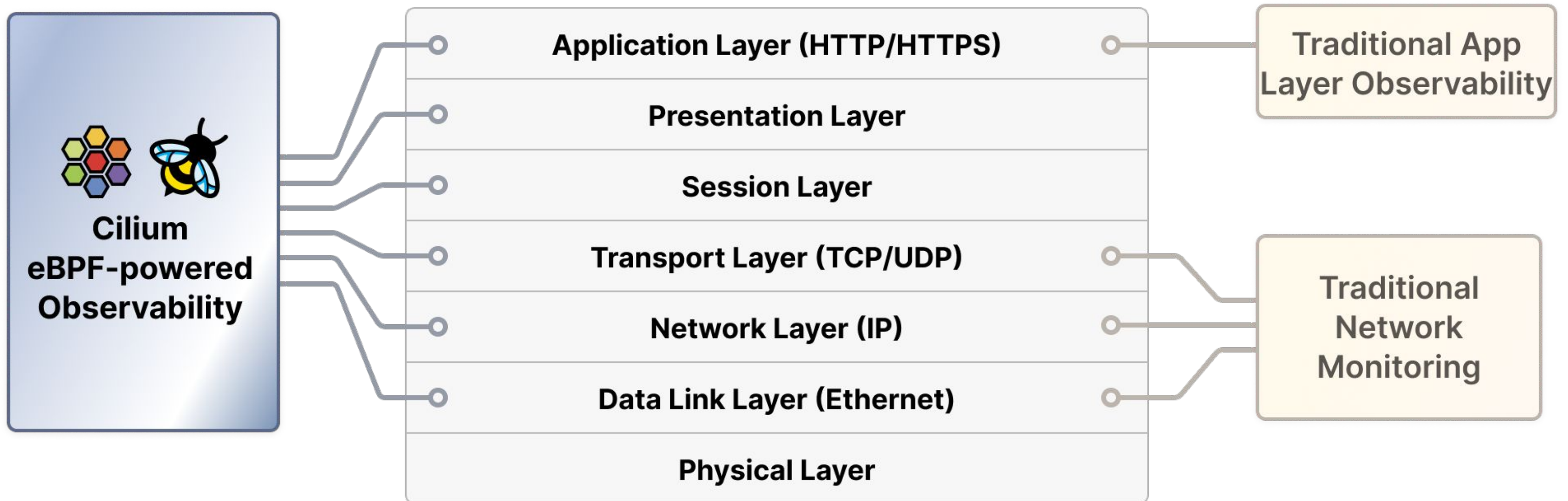




Observability

Connectivity Observability Challenges

#1 - Connectivity is layered (the “finger-pointing problem”)



Connectivity Observability Challenges

#2 - Application identity (the “signal-to-noise problem”)

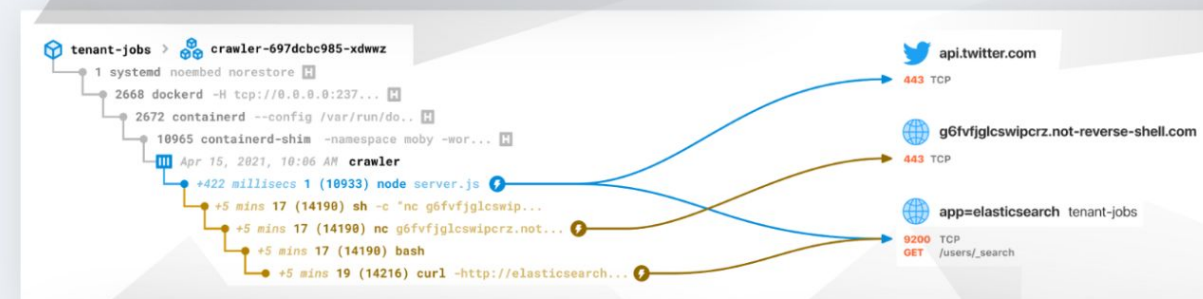


Cilium eBPF-Powered Networking & Security

✓ Source Service Identity

tenant-jobs > crawler-697dcbc985-xdwwz

api.twitter.com



✓ Destination DNS Service Identity

+5 mins 17 (14190) nc g6fvfjglcswipcrz.not...
+5 mins 17 (14190) bash
+5 mins 19 (14216) curl -http://elasticsearch...

9200 TCP
GET /users/_search

app=elasticsearch tenant-jobs

✓ Process Execution Identity

✓ API-call Identity

✓ Destination Label Service Identity

Traditional Linux Networking & Security

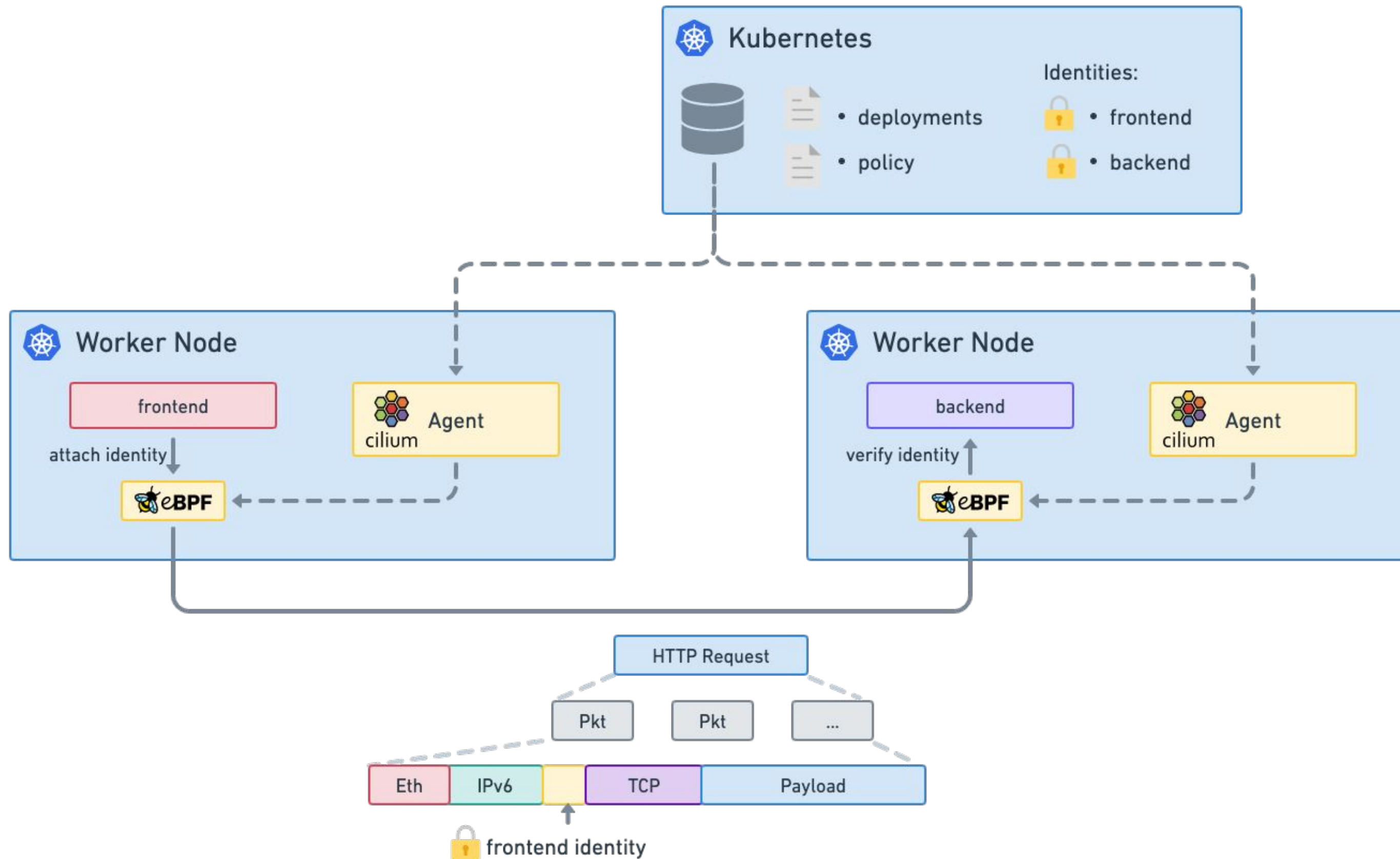
SrcIP+Port	Message	DstIP+Port	Protocol
	There are older events to load. Load more.		
2 10.3.102.179 4245	10.3.101.94 40024	6 8 416 1648748373 1648748403	ACCEPT OK
2 10.3.102.179 4245	10.3.101.94 49440	6 8 416 1648748373 1648748403	ACCEPT OK
2 10.3.102.179 4245	10.3.101.94 34788	6 8 416 1648748373 1648748403	ACCEPT OK
2 10.3.102.179 4245	10.3.101.94 48732	6 8 416 1648748373 1648748403	ACCEPT OK

Where existing mechanisms fall short

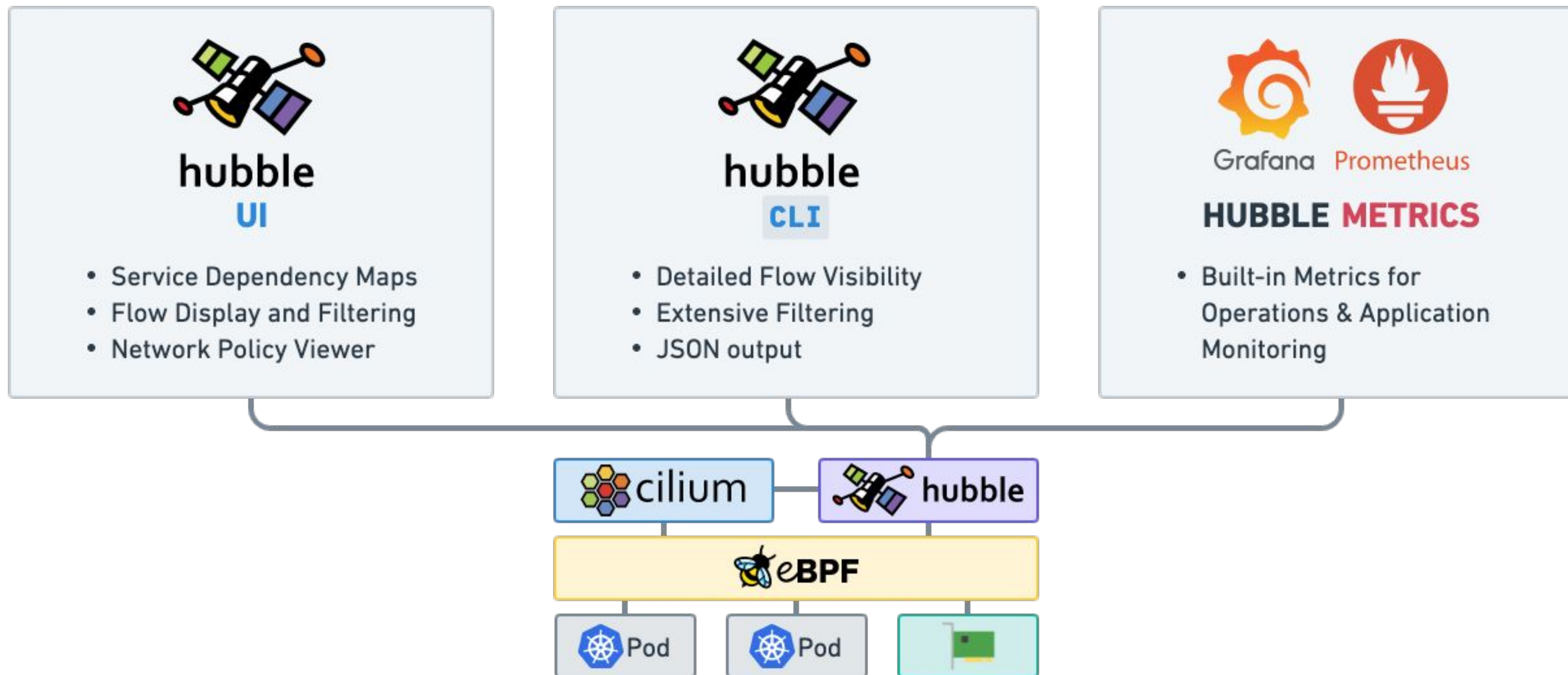


- Traditional network monitoring devices
- Cloud provider network flow logs
- Linux host statistics
- Modifying application code
- Sidecar-based service meshes

Identity-based Security & Observability

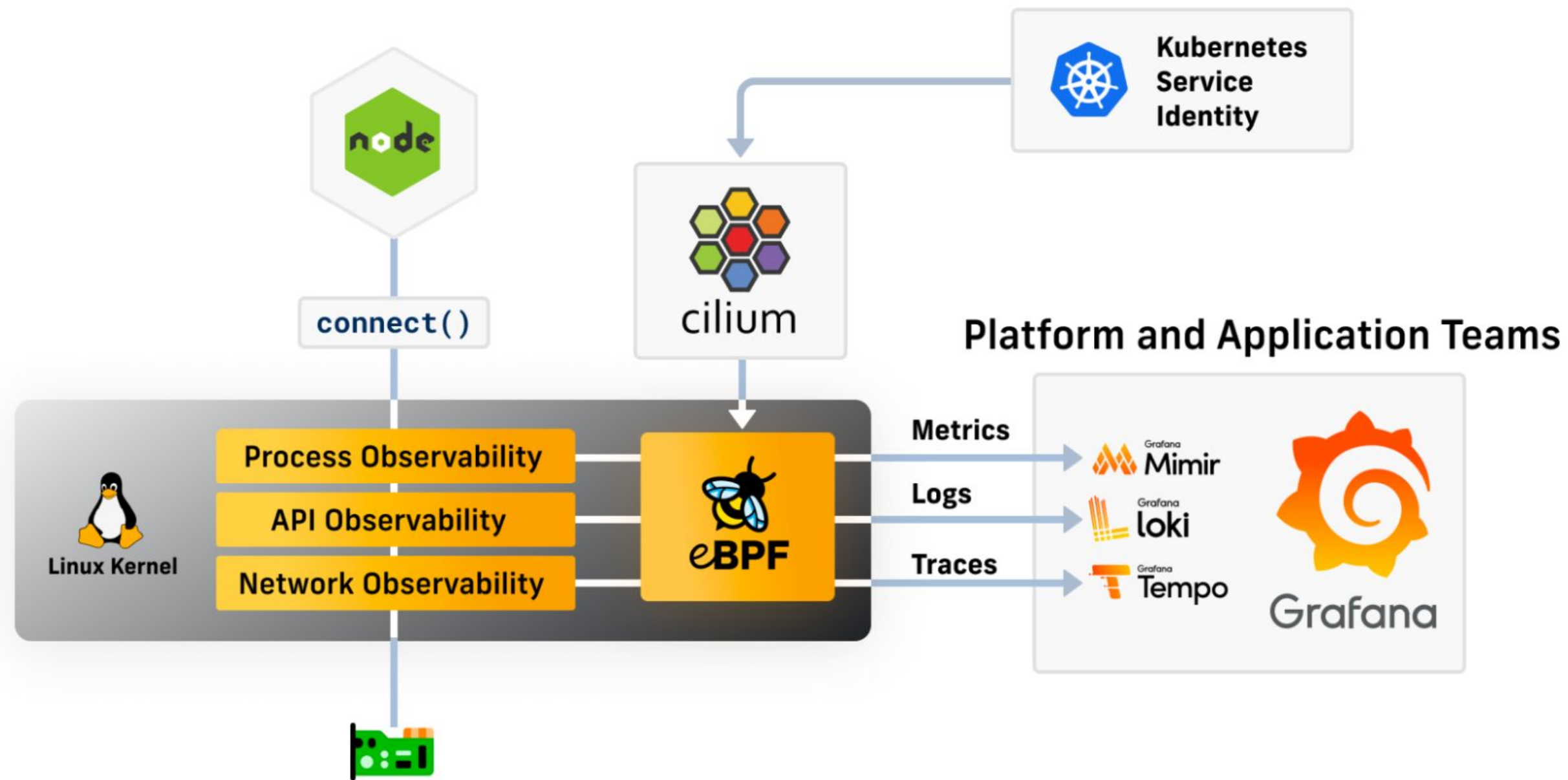


What is Hubble?



Service identity-aware network and API-layer observability with eBPF & Cilium

cilium

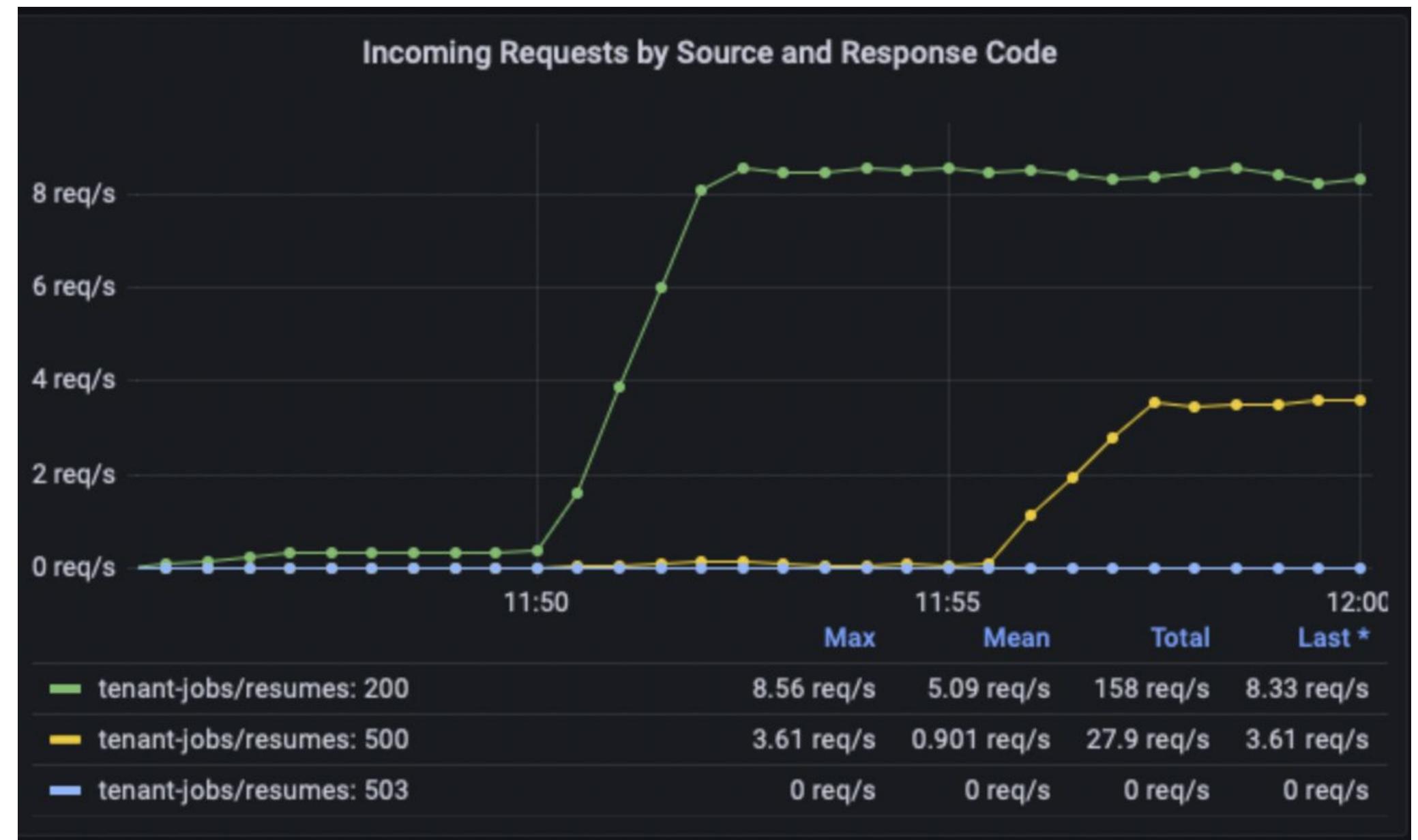


HTTP Golden Signals



eBPF powered metrics without Application changes or Sidecars required:

- HTTP Request Rate
- HTTP Request Latency
- HTTP Request Response Codes / Errors



Detecting Transient Network Issues



ICMP

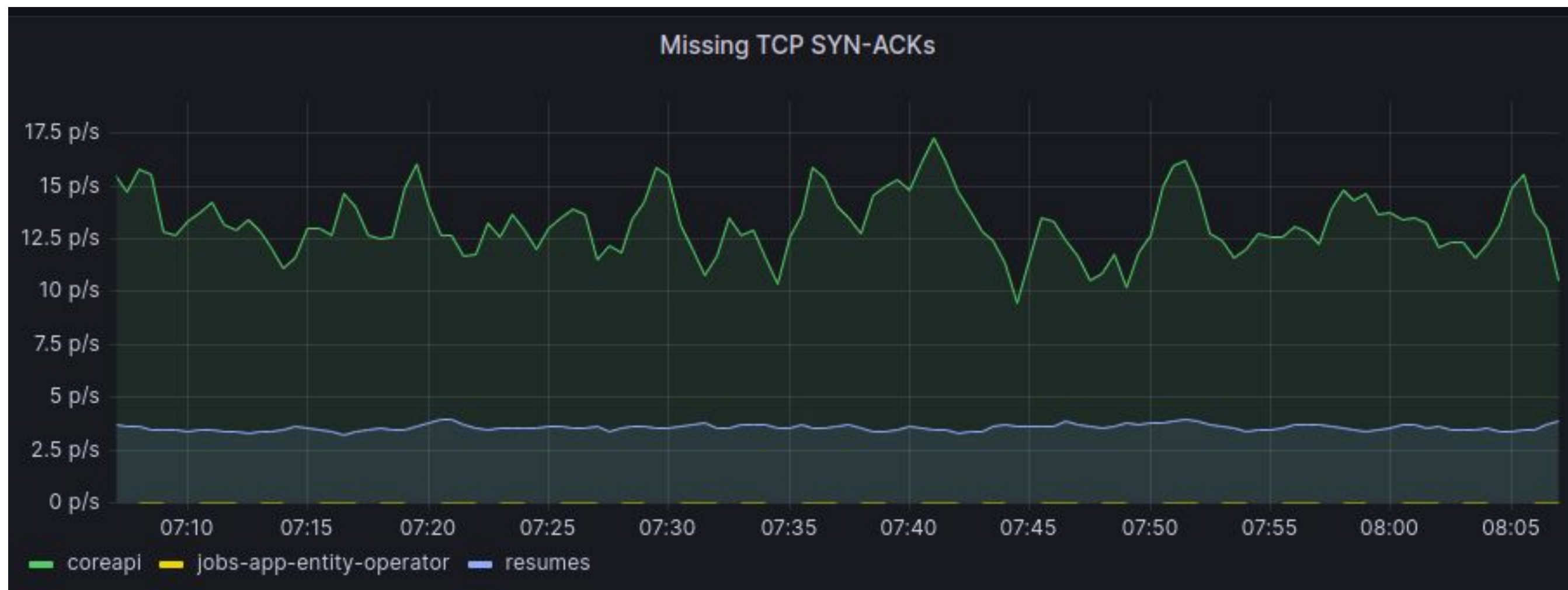
Echo Request
missing
Echo Reply

TCP

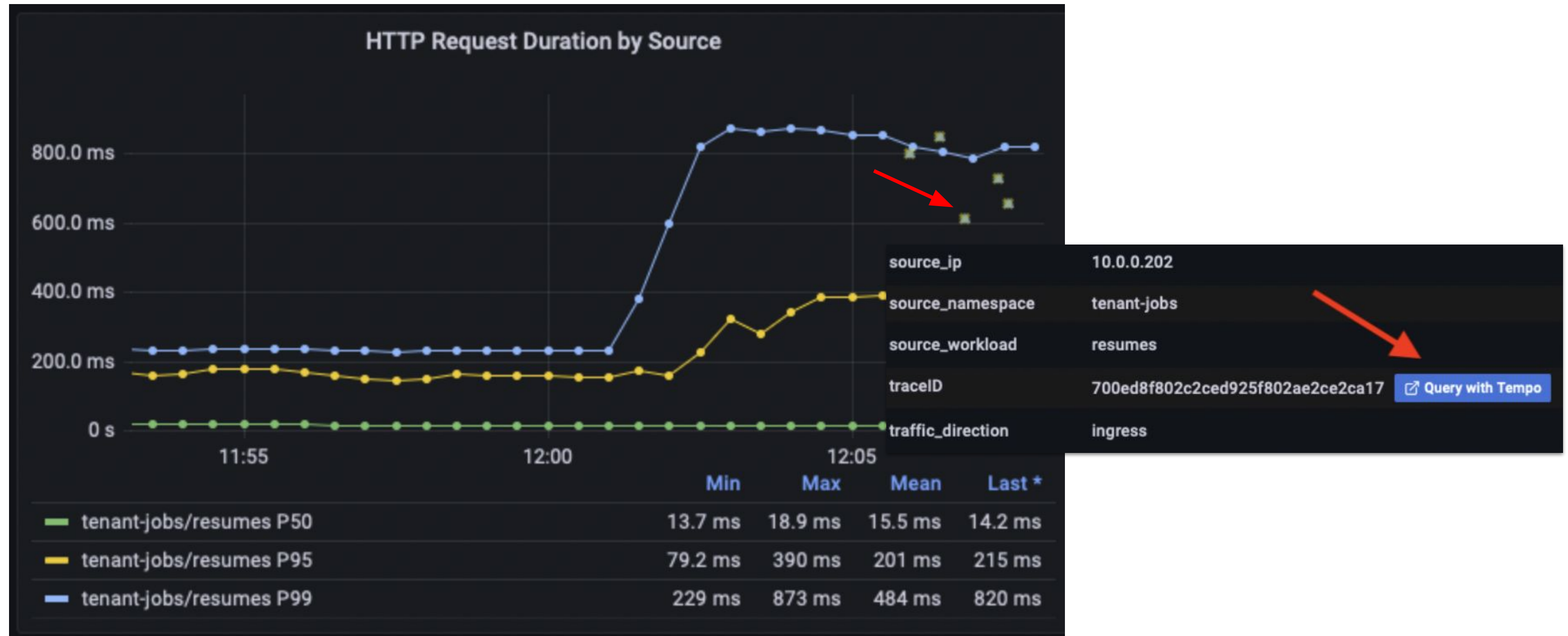
SYN
missing
SYN-ACK

DNS

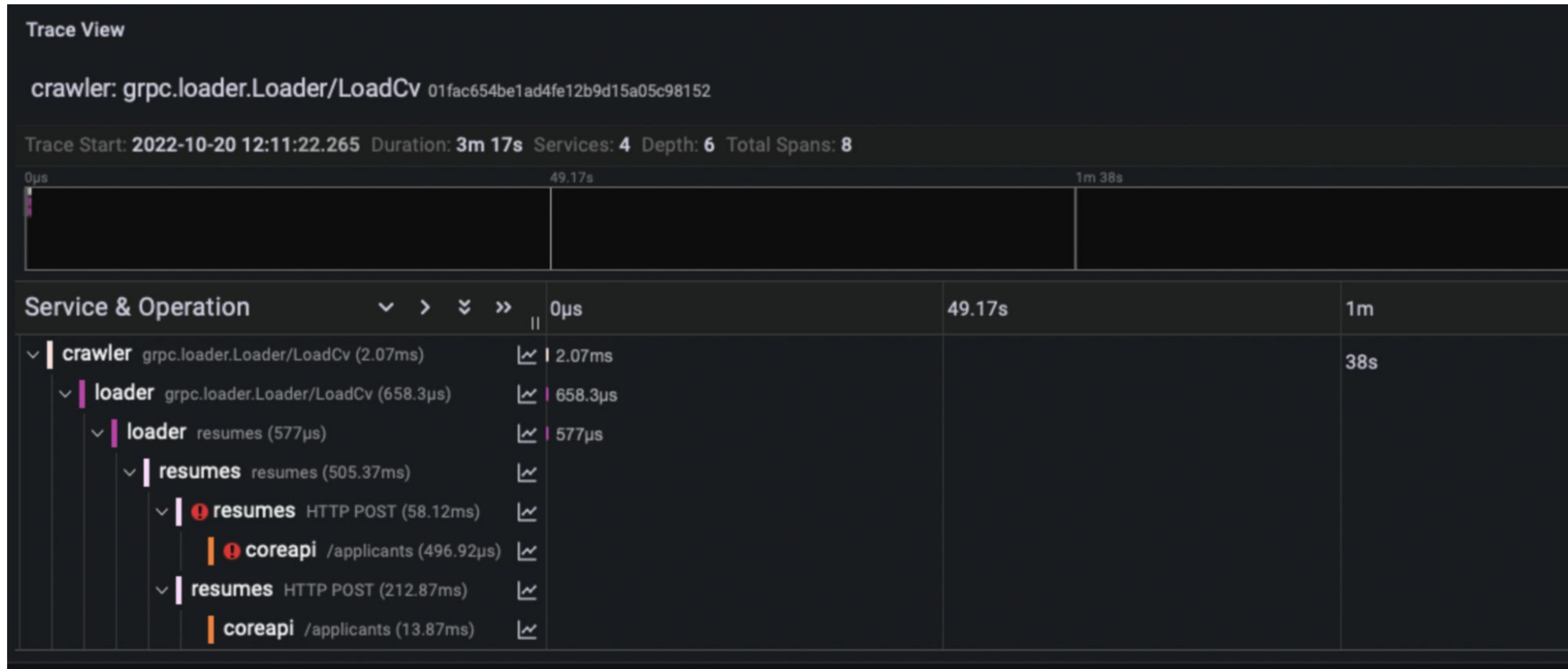
Query
missing
Response



Identifying problematic API request with transparent tracing



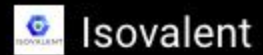
Identifying problematic API request with transparent tracing



Monitoring Cilium

Ready to use Cilium Dashboards

<https://grafana.com/orgs/isovalent/dashboards>



Cilium v1.12 Agent Metrics by Isovalent

Downloads: 638 | Reviews: 0 | uploaded on July 20, 2022

Dashboard for Cilium v1.12 (<https://cilium.io/>) Agent metrics

Details

Prometheus



Cilium v1.12 Hubble Metrics by Isovalent

Downloads: 518 | Reviews: 0 | uploaded on July 20, 2022

Dashboard for the Cilium v1.12 (<https://cilium.io/>) Hubble metrics

Details

Prometheus



Cilium v1.12 Operator Metrics by Isovalent

Downloads: 625 | Reviews: 0 | uploaded on July 20, 2022

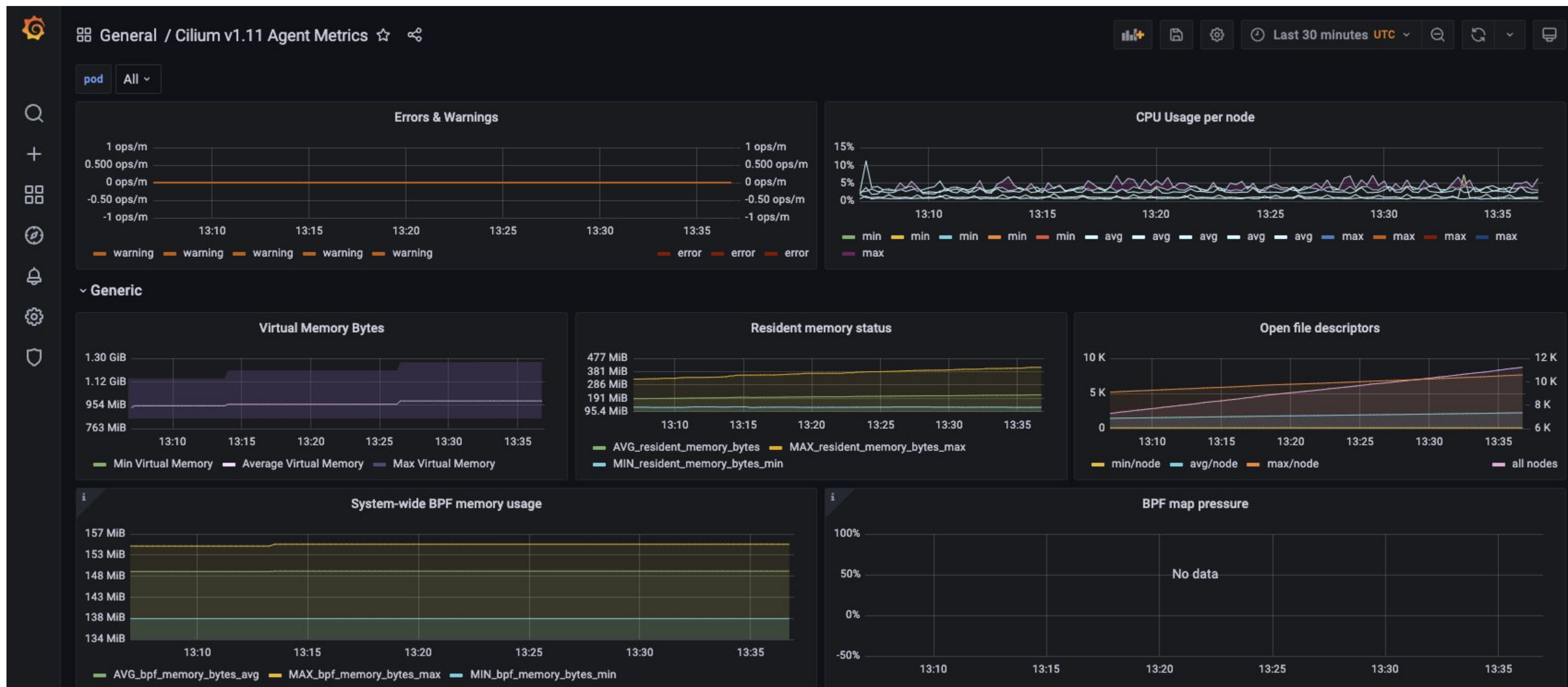
Dashboard for the Cilium v1.12 (<https://cilium.io/>) Operator metrics

Details

Prometheus

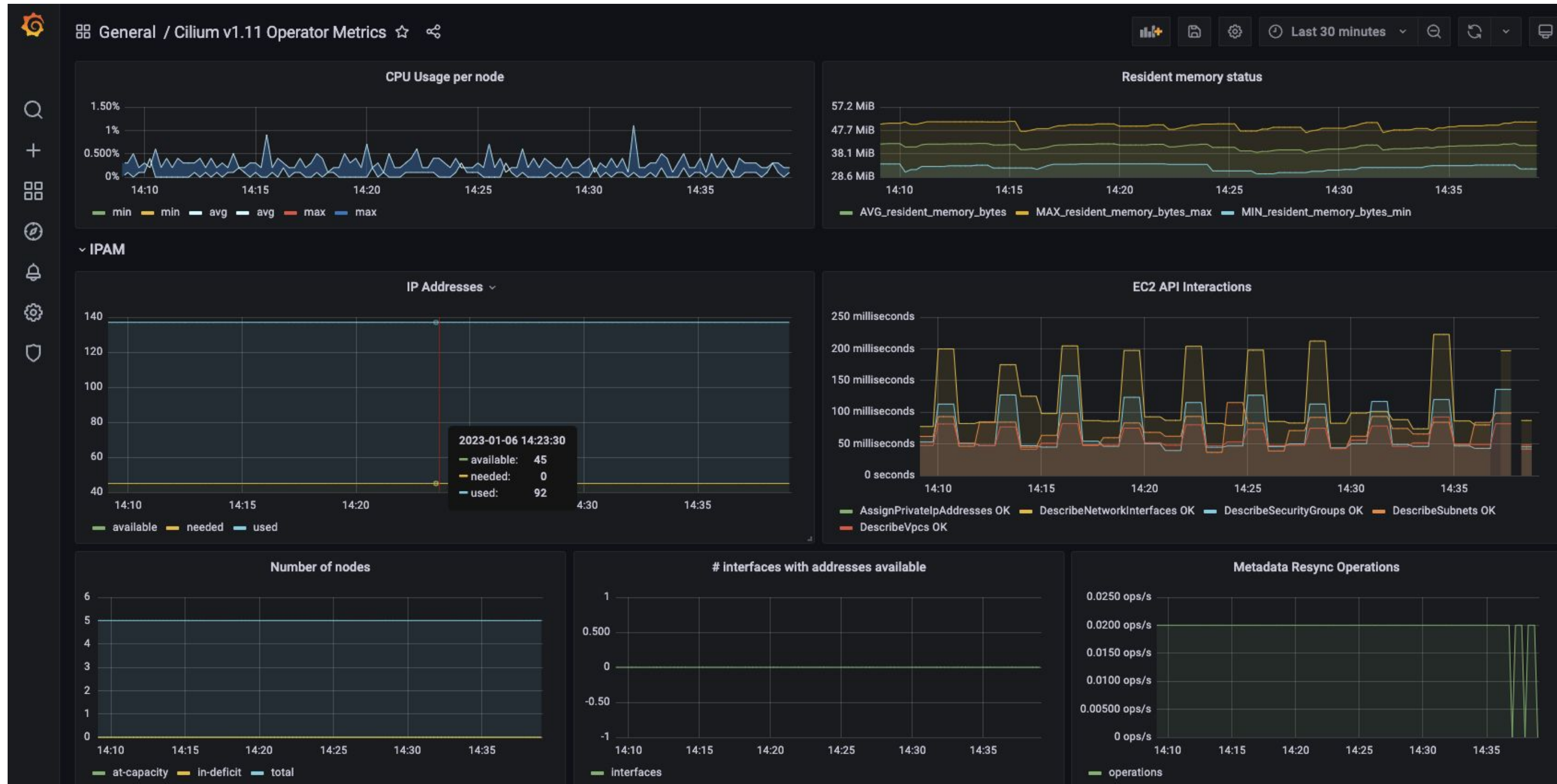
Cilium Dashboards on Grafana

Agent Metrics



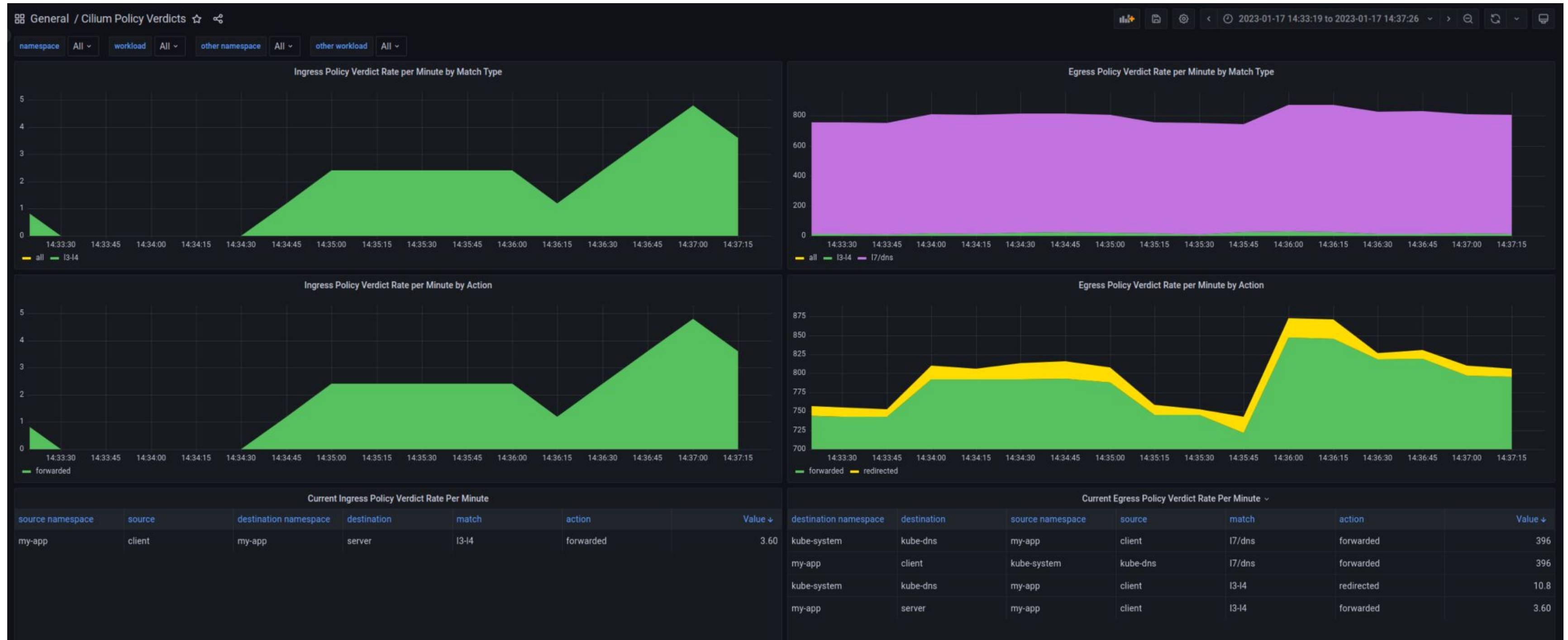
Cilium Dashboards on Grafana

Operator Metrics



Cilium Dashboards on Grafana

Hubble & Grafana for Policy Verdicts Metrics



Demo!



OpenTelemetry Demo



OpenTelemetry Demo

[slack](#) [@cnct/otel/demo](#) [release](#) [v1.4.0-beta](#) [commits since 1.4.0-beta](#) [2](#) [docker pulls](#) [178k](#) [License](#) [Apache 2.0](#)

Welcome to the OpenTelemetry Astronomy Shop Demo

This repository contains the OpenTelemetry Astronomy Shop, a microservice-based distributed system intended to illustrate the implementation of OpenTelemetry in a near real-world environment.

Our goals are threefold:

- Provide a realistic example of a distributed system that can be used to demonstrate OpenTelemetry instrumentation and observability.
- Build a base for vendors, tooling authors, and others to extend and demonstrate their OpenTelemetry integrations.
- Create a living example for OpenTelemetry contributors to use for testing new versions of the API, SDK, and other components or enhancements.

We've already made [huge progress](#), and development is ongoing. We hope to represent the full feature set of OpenTelemetry across its languages in the future.

If you'd like to help (**which we would love**), check out our [contributing guidance](#).

If you'd like to extend this demo or maintain a fork of it, read our [fork guidance](#).



OpenTelemetry
demo

local

The best telescopes to see the world closer

Go Shopping



OpenTelemetry Demo



```
$ kubectl -n anna-otel-demo get po
```

NAME	READY	STATUS	RESTARTS	AGE
otel-demo-accountingservice-dcfbfc9dd-wc9m7	1/1	Running	0	2d2h
otel-demo-adservice-7fdd7664d9-bg7cn	1/1	Running	0	2d2h
otel-demo-cartservice-75c975bb7c-7c967	1/1	Running	0	2d2h
otel-demo-checkoutservice-57c9445dc9-sb8gt	1/1	Running	0	2d2h
otel-demo-currencyservice-6975d7698c-jxkq6	1/1	Running	0	2d2h
otel-demo-emailservice-56bc67c9-nql59	1/1	Running	0	2d2h
otel-demo-featureflagservice-5bdb6c6f59-rdhqq	1/1	Running	0	2d2h
otel-demo-ffspostgres-57b774fdd6-l6n9w	1/1	Running	0	2d2h
otel-demo-frauddetectionservice-74974dbf66-7j4q2	1/1	Running	0	2d2h
otel-demo-frontend-7ffc85fcf5-m5ch5	1/1	Running	0	2d2h
otel-demo-frontendproxy-6585956cdd-lhnvx	1/1	Running	0	2d2h
otel-demo-kafka-68d5d6dc68-5c94t	1/1	Running	0	2d2h
otel-demo-loadgenerator-6fd98c8b56-s8gp7	1/1	Running	0	2d2h
otel-demo-paymentservice-7ddb794c5d-q9pb6	1/1	Running	0	2d2h
otel-demo-productcatalogservice-75c468ddc4-vw6bt	1/1	Running	0	2d2h
otel-demo-quoteservice-6784cc6658-t5858	1/1	Running	0	2d2h
otel-demo-recommendationservice-76b9d6559d-5g7gb	1/1	Running	0	2d2h
otel-demo-redis-fb8c54789-7nnjz	1/1	Running	0	2d2h
otel-demo-shippingservice-f59c9546d-w64zc	1/1	Running	0	2d2h

Cilium Service Mesh - ingress

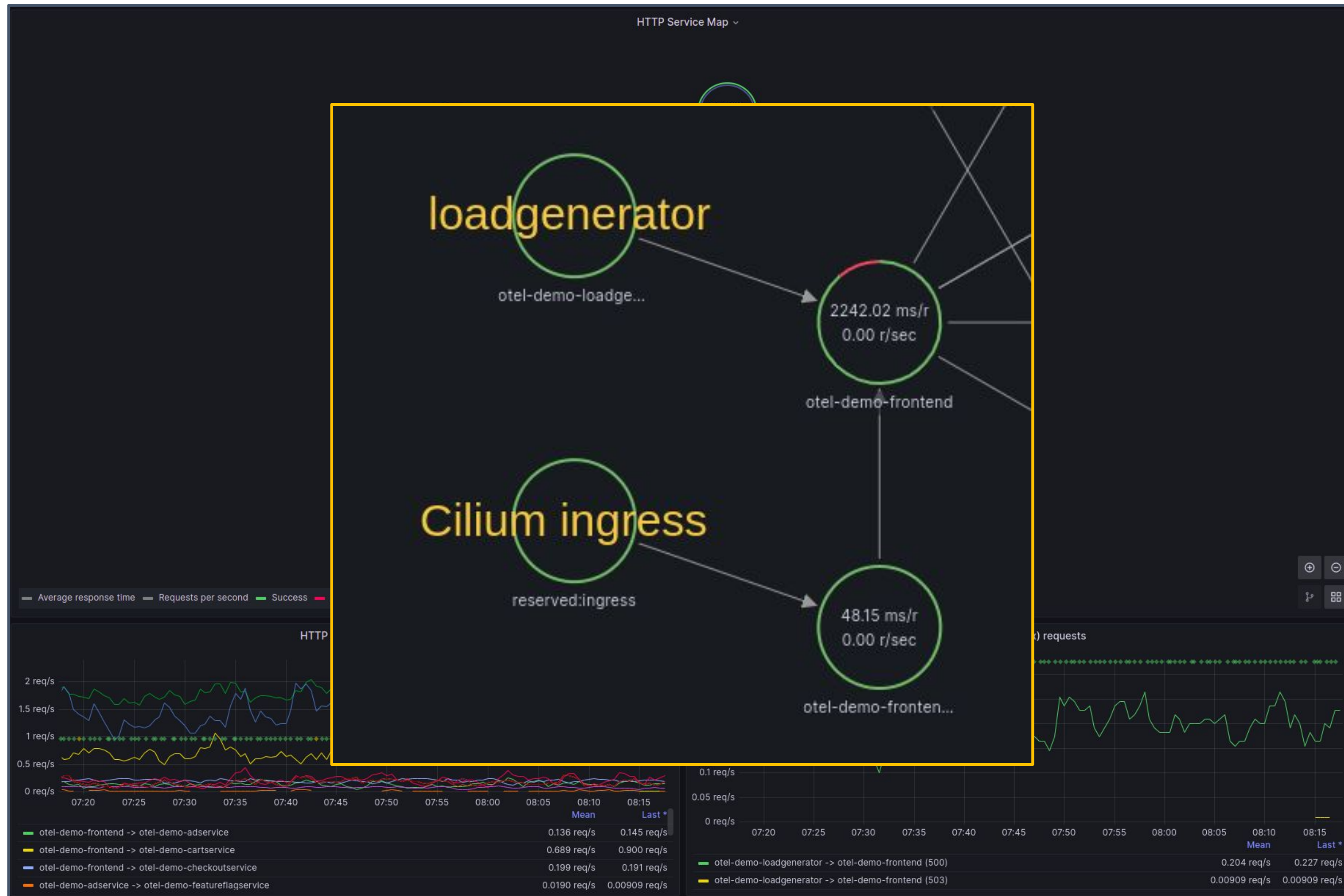


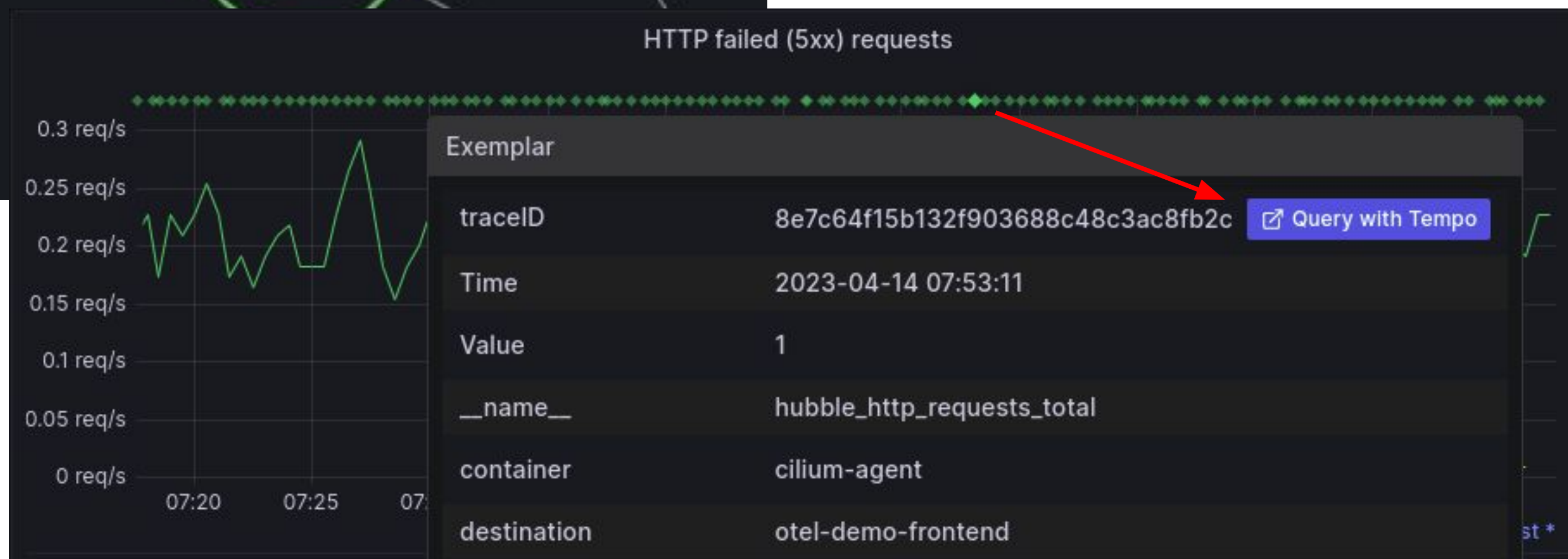
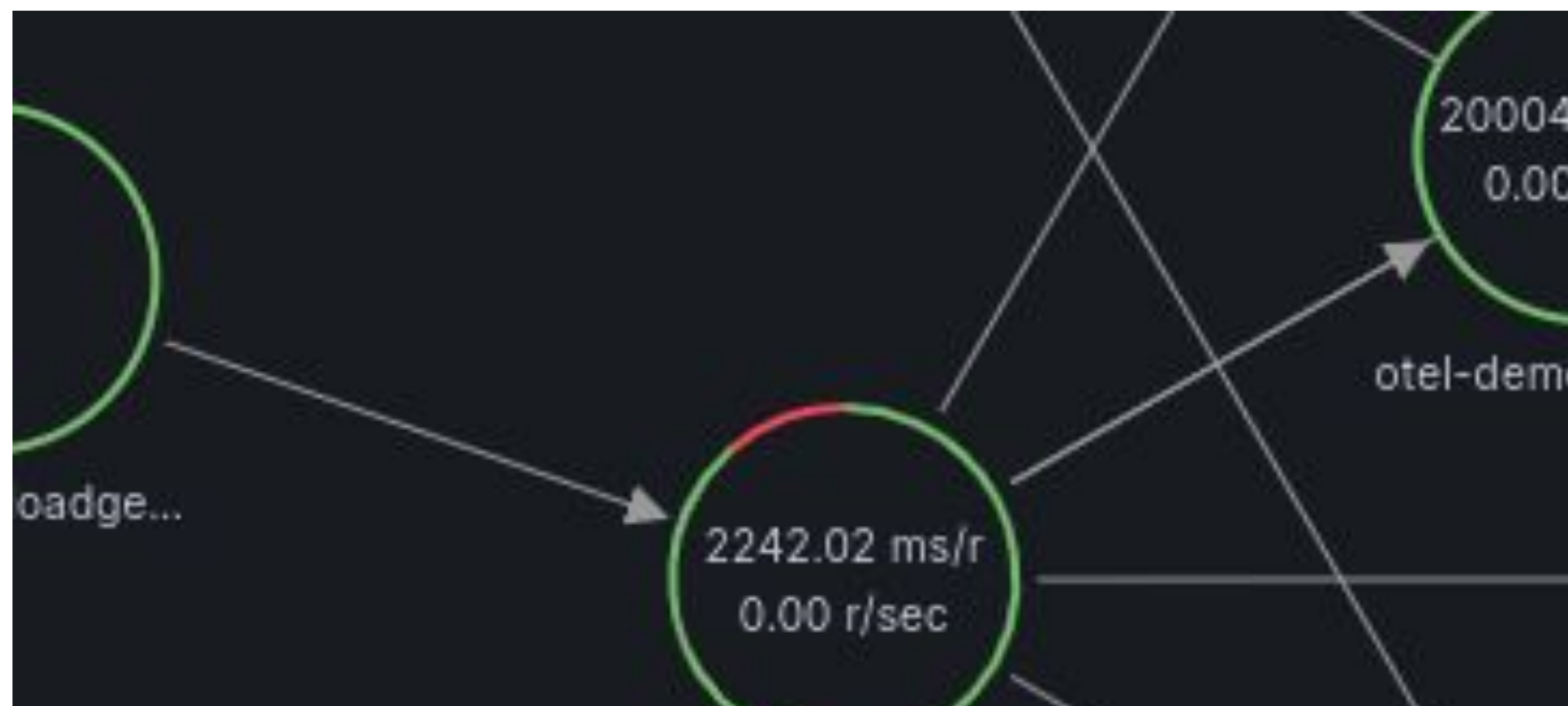
```
$ kubectl -n anna-otel-demo get ingress
```

NAME	CLASS	HOSTS	ADDRESS	PORTS	AGE
otel-demo-cilium	cilium	*	35.235.84.235	80	2d2h

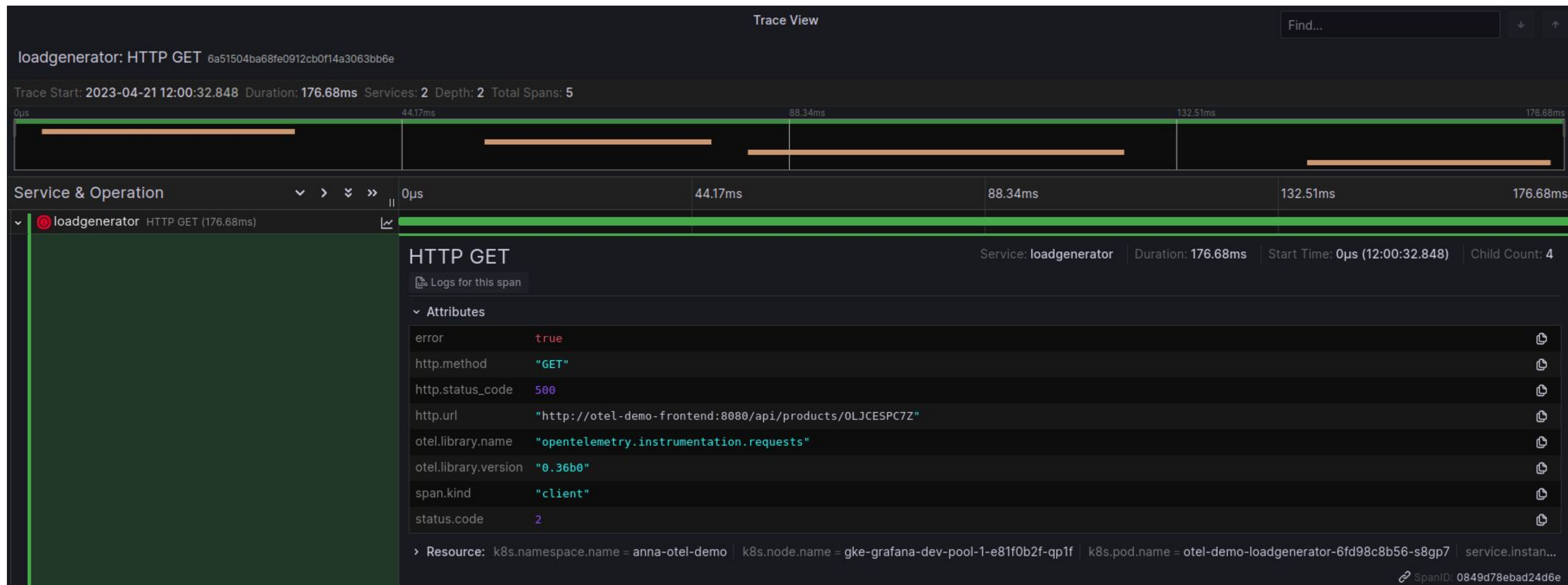
```
$ kubectl -n anna-otel-demo get ciliumenvoyconfig
```

NAME	AGE
cilium-ingress-anna-otel-demo-otel-demo-cilium	2d2h





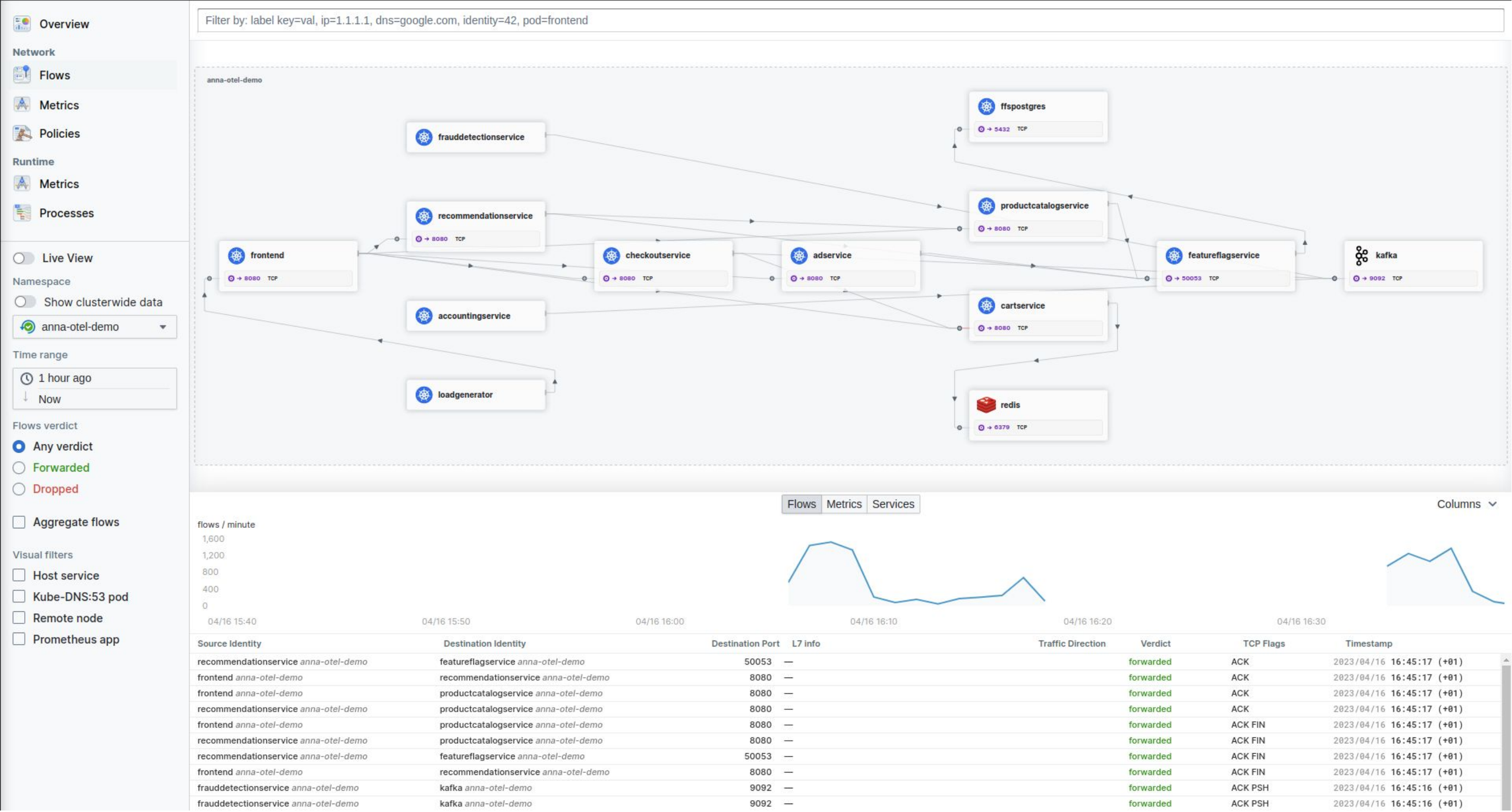
Distributed trace - Tempo



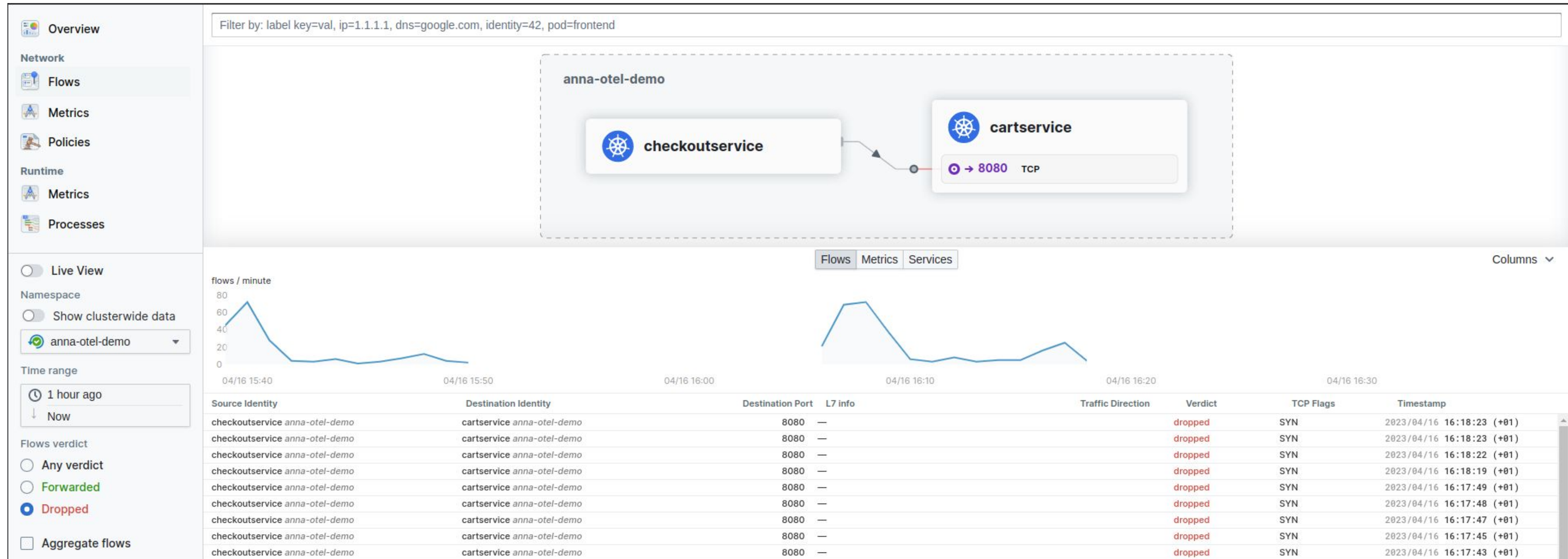
What if the graph is green?

“Network issue”.

Hubble UI



“Negative service map” - dropped flows





```
apiVersion: cilium.io/v2
kind: CiliumNetworkPolicy
metadata:
  name: deny-checkout-to-cart
  namespace: anna-otel-demo
spec:
  egressDeny:
    - toEndpoints:
      - matchLabels:
          app.kubernetes.io/name: otel-demo-cartservice
  endpointSelector:
    matchLabels:
      app.kubernetes.io/name: otel-demo-checkoutservice
```


Learn more!

ISOVALENT

For the Enterprise

Hardened, enterprise-grade
eBPF-powered networking,
observability, and security.

isovalent.com/product
isovalent.com/labs



OSS Community

eBPF-based Networking,
Observability, Security

cilium.io
cilium.slack.com
github.com/cilium



Base technology

The revolution in the Linux kernel,
safely and efficiently extending the
capabilities of the kernel.

ebpf.io
[What is eBPF? - ebook](#)

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Thank you!