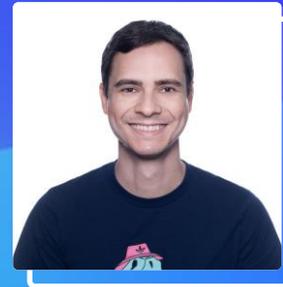


Observability at the Edge: Envoy distributed tracing with OpenTelemetry



PRESENTER

Joao Grassi
Dynatrace

Introduction

- Senior OpenSource Software Engineer @ Dynatrace
- OpenTelemetry semantic conventions maintainer
- Creator of OpenTelemetry recipes (otelrecipes.com)
- Ex .NET back-end developer
- Interested in open source, observability and online privacy



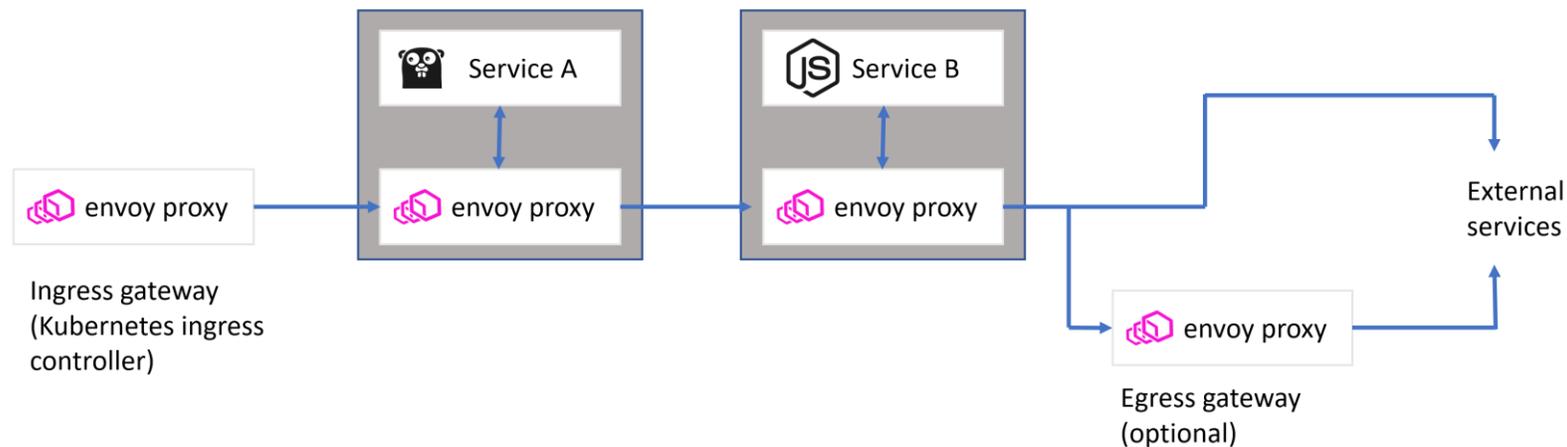
Agenda

- Quick intro to Envoy, Istio and OpenTelemetry
- What was wrong?
- New OTel features in Envoy and Istio
- Overview of tracing configuration in Istio
- Viewing the telemetry (demo) 🙌

What are these?

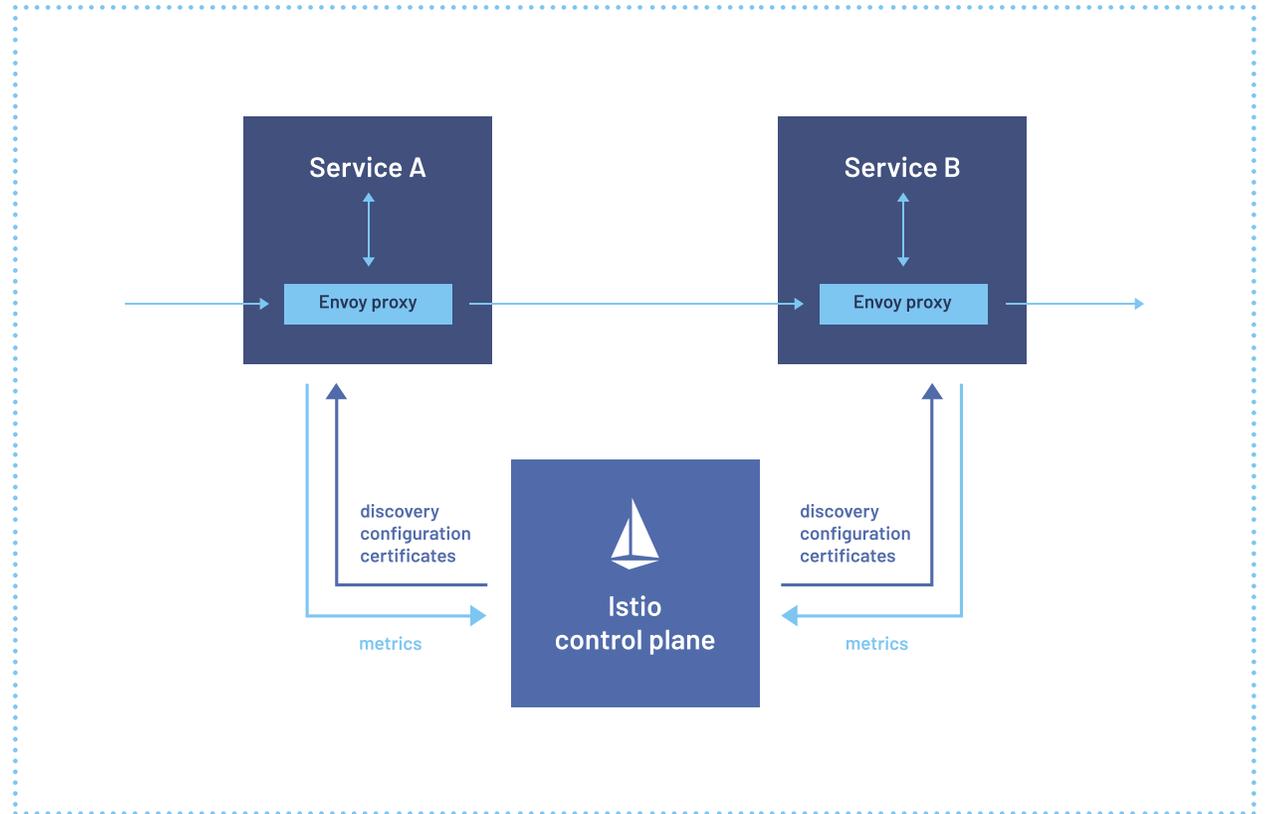


Open-source edge and service proxy, designed for cloud-native applications



What are these?

Open-source service mesh that allows users add capabilities like observability, traffic management, and security, without adding them to your own code



What are these?

OpenTelemetry, also known as OTel, is a vendor-neutral open source [Observability](#) framework for instrumenting, generating, collecting, and exporting telemetry data such as [traces](#), [metrics](#), and [logs](#).



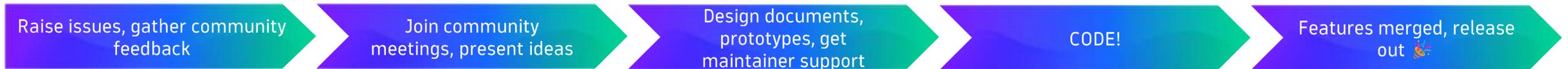
What changed?

Wait, don't we already have OpenTelemetry tracing support in Envoy?

Limited set of OTel tracing features in Envoy

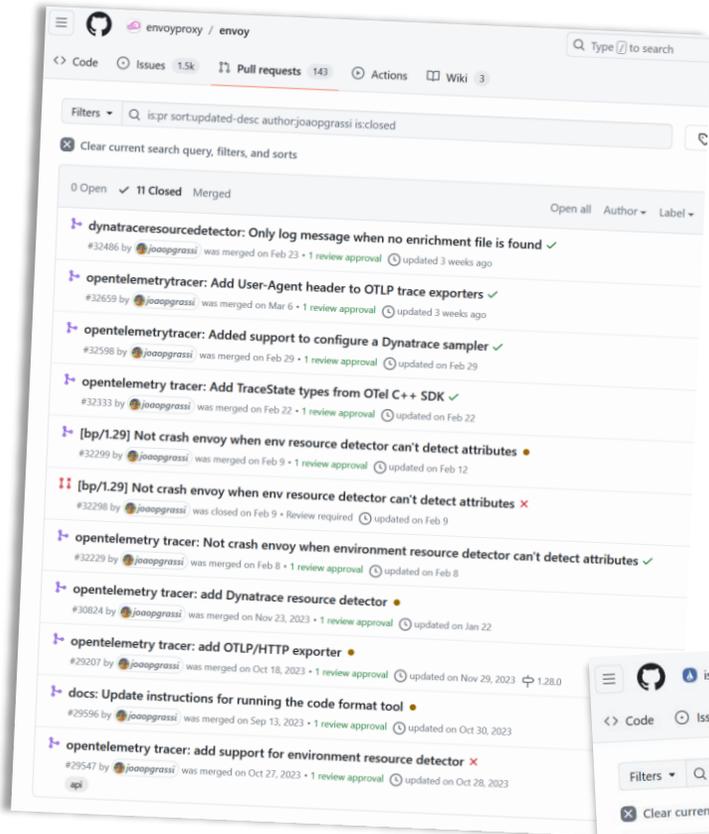
- Only exporting via gRPC
- Cannot enrich spans with resource attributes – Host information, process etc
- Only offers a simple percentage-based sampler

OSS collaboration FTW!



Networking and getting support from community and maintainers was key!

PRs, PRs everywhere

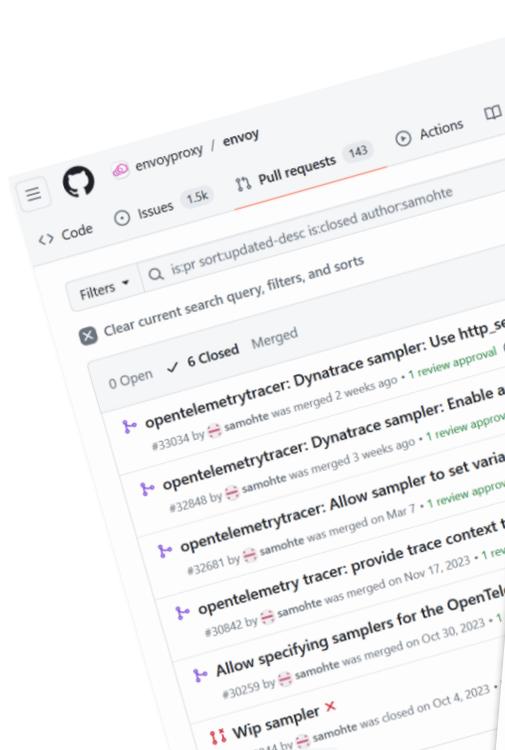


envoyproxy / envoy

Filters

0 Open 11 Closed Merged

- dynatrace resource detector: Only log message when no enrichment file is found** ✓
#32486 by joaopgrassi was merged on Feb 23 • 1 review approval updated 3 weeks ago
- opentelemetry-tracer: Add User-Agent header to OTLP trace exporters** ✓
#32659 by joaopgrassi was merged on Mar 6 • 1 review approval updated 3 weeks ago
- opentelemetry-tracer: Added support to configure a Dynatrace sampler** ✓
#32598 by joaopgrassi was merged on Feb 29 • 1 review approval updated on Feb 29
- opentelemetry tracer: Add TraceState types from OTEL C++ SDK** ✓
#32333 by joaopgrassi was merged on Feb 22 • 1 review approval updated on Feb 22
- [bp/1.29] Not crash envoy when env resource detector can't detect attributes** ●
#32299 by joaopgrassi was merged on Feb 9 • 1 review approval updated on Feb 12
- [bp/1.29] Not crash envoy when env resource detector can't detect attributes** ✖
#32298 by joaopgrassi was closed on Feb 9 • Review required updated on Feb 9
- opentelemetry tracer: Not crash envoy when environment resource detector can't detect attributes** ✓
#32229 by joaopgrassi was merged on Feb 8 • 1 review approval updated on Feb 8
- opentelemetry tracer: add Dynatrace resource detector** ●
#30824 by joaopgrassi was merged on Nov 23, 2023 • 1 review approval updated on Jan 22
- opentelemetry tracer: add OTLP/HTTP exporter** ●
#29207 by joaopgrassi was merged on Oct 18, 2023 • 1 review approval updated on Nov 29, 2023 → 1.28.0
- docs: Update instructions for running the code format tool** ●
#29596 by joaopgrassi was merged on Sep 13, 2023 • 1 review approval updated on Oct 30, 2023
- opentelemetry tracer: add support for environment resource detector** ✖
#29547 by joaopgrassi was merged on Oct 27, 2023 • 1 review approval updated on Oct 28, 2023

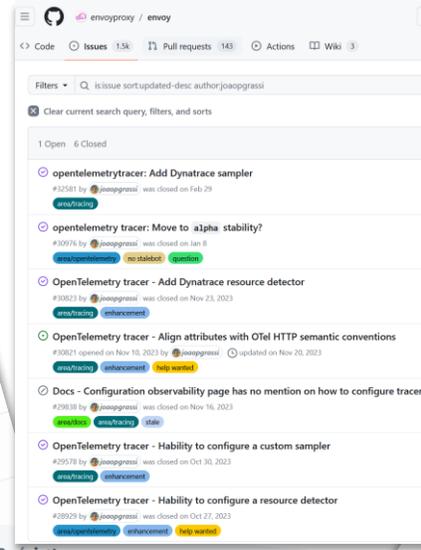


envoyproxy / envoy

Filters

0 Open 6 Closed Merged

- opentelemetry-tracer: Dynatrace sampler: Use http_service in configura...** ✓
#33034 by samohte was merged 2 weeks ago • 1 review approval updated 2 weeks ago
- opentelemetry-tracer: Dynatrace sampler: Enable adaptative sampling** ✓
#32848 by samohte was merged 3 weeks ago • 1 review approval updated 3 weeks ago
- opentelemetry-tracer: Allow sampler to set variant** ✓
#32681 by samohte was merged on Mar 7 • 1 review approval updated on Mar 7
- opentelemetry tracer: provide trace context to** ✓
#30842 by samohte was merged on Nov 17, 2023 • 1 review approval updated on Nov 17, 2023
- Allow specifying samplers for the OpenTele** ✓
#30259 by samohte was merged on Oct 30, 2023 • 1 review approval updated on Oct 30, 2023
- Wip sampler** ✖
#30144 by samohte was closed on Oct 4, 2023 • Review required updated on Oct 4, 2023

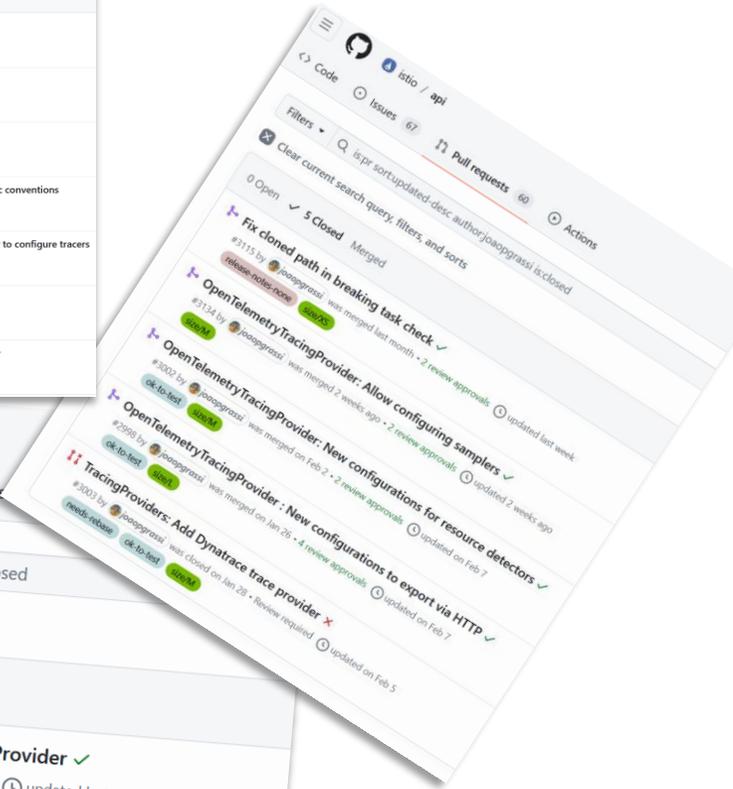


envoyproxy / envoy

Filters

1 Open 6 Closed

- opentelemetry-tracer: Add Dynatrace sampler** ✓
#32581 by joaopgrassi was closed on Feb 29
- opentelemetry tracer: Move to alpha stability?** ✓
#30976 by joaopgrassi was closed on Jan 8
- OpenTelemetry tracer - Add Dynatrace resource detector** ✓
#30023 by joaopgrassi was closed on Nov 23, 2023
- OpenTelemetry tracer - Align attributes with Otel HTTP semantic conventions** ✓
#30021 opened on Nov 10, 2023 by joaopgrassi updated on Nov 20, 2023
- Docs - Configuration observability page has no mention on how to configure tracers** ✓
#29838 by joaopgrassi was closed on Nov 16, 2023
- OpenTelemetry tracer - Ability to configure a custom sampler** ✓
#29578 by joaopgrassi was closed on Oct 30, 2023
- OpenTelemetry tracer - Ability to configure a resource detector** ✓
#28929 by joaopgrassi was closed on Oct 27, 2023

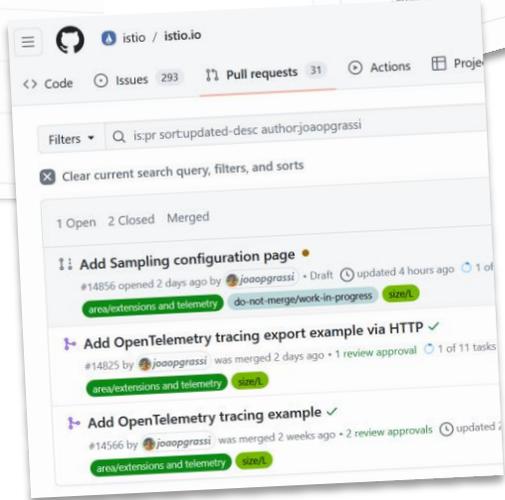


istio / istio

Filters

0 Open 5 Closed Merged

- Fix cloned path in breaking task check** ✓
#3115 by joaopgrassi was merged last month • 2 review approvals updated last week
- OpenTelemetryTracingProvider: Allow configuring samplers** ✓
#3134 by joaopgrassi was merged 2 weeks ago • 2 review approvals updated 2 weeks ago
- OpenTelemetryTracingProvider: New configurations for resource detectors** ✓
#3002 by joaopgrassi was merged on Feb 9 • 2 review approvals updated on Feb 7
- OpenTelemetryTracingProvider: New configurations to export via HTTP** ✓
#2990 by joaopgrassi was merged on Jan 26 • 4 review approvals updated on Feb 7
- TracingProviders: Add Dynatrace trace provider** ✖
#3303 by joaopgrassi was closed on Jan 26 • Review required updated on Feb 5

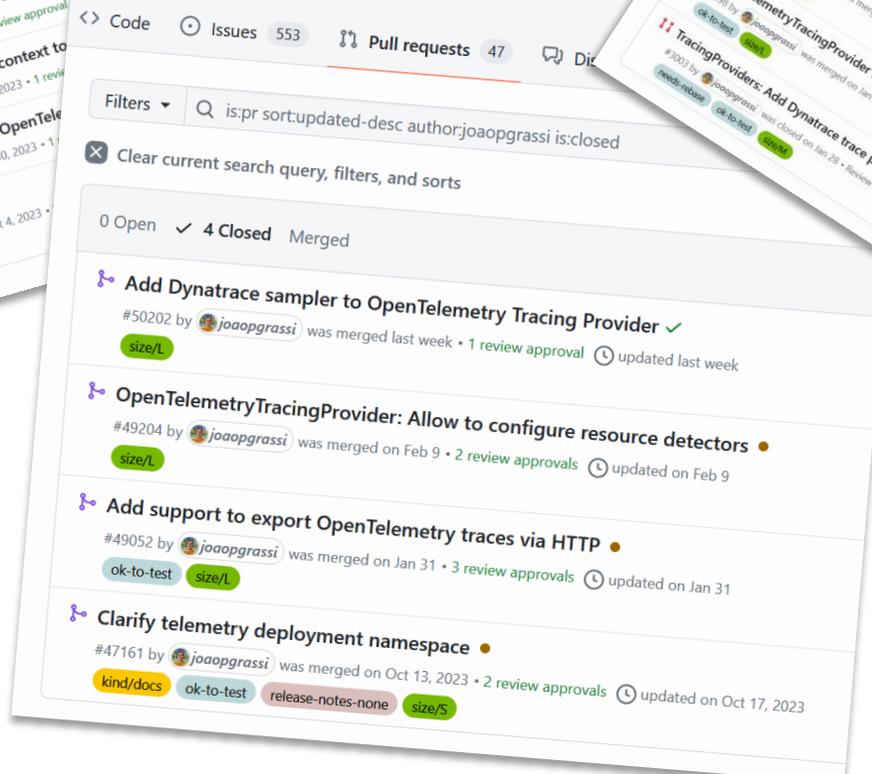


istio / istio.io

Filters

1 Open 2 Closed Merged

- Add Sampling configuration page** ●
#14856 opened 2 days ago by joaopgrassi • Draft updated 4 hours ago • 1 of 1 task
- Add OpenTelemetry tracing export example via HTTP** ✓
#14825 by joaopgrassi was merged 2 days ago • 1 review approval • 1 of 11 tasks
- Add OpenTelemetry tracing example** ✓
#14566 by joaopgrassi was merged 2 weeks ago • 2 review approvals updated 2 weeks ago



istio / istio

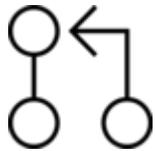
Filters

0 Open 4 Closed Merged

- Add Dynatrace sampler to OpenTelemetry Tracing Provider** ✓
#50202 by joaopgrassi was merged last week • 1 review approval updated last week
- OpenTelemetryTracingProvider: Allow to configure resource detectors** ●
#49204 by joaopgrassi was merged on Feb 9 • 2 review approvals updated on Feb 9
- Add support to export OpenTelemetry traces via HTTP** ●
#49052 by joaopgrassi was merged on Jan 31 • 3 review approvals updated on Jan 31
- Clarify telemetry deployment namespace** ●
#47161 by joaopgrassi was merged on Oct 13, 2023 • 2 review approvals updated on Oct 17, 2023

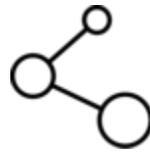
New OTel tracing features in Envoy/Istio

HTTP Exporter



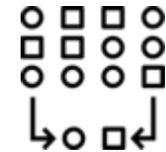
Allows exporting spans via HTTP to Dynatrace

Resource Detector



Allows enrichment of spans with resource attributes

Custom samplers



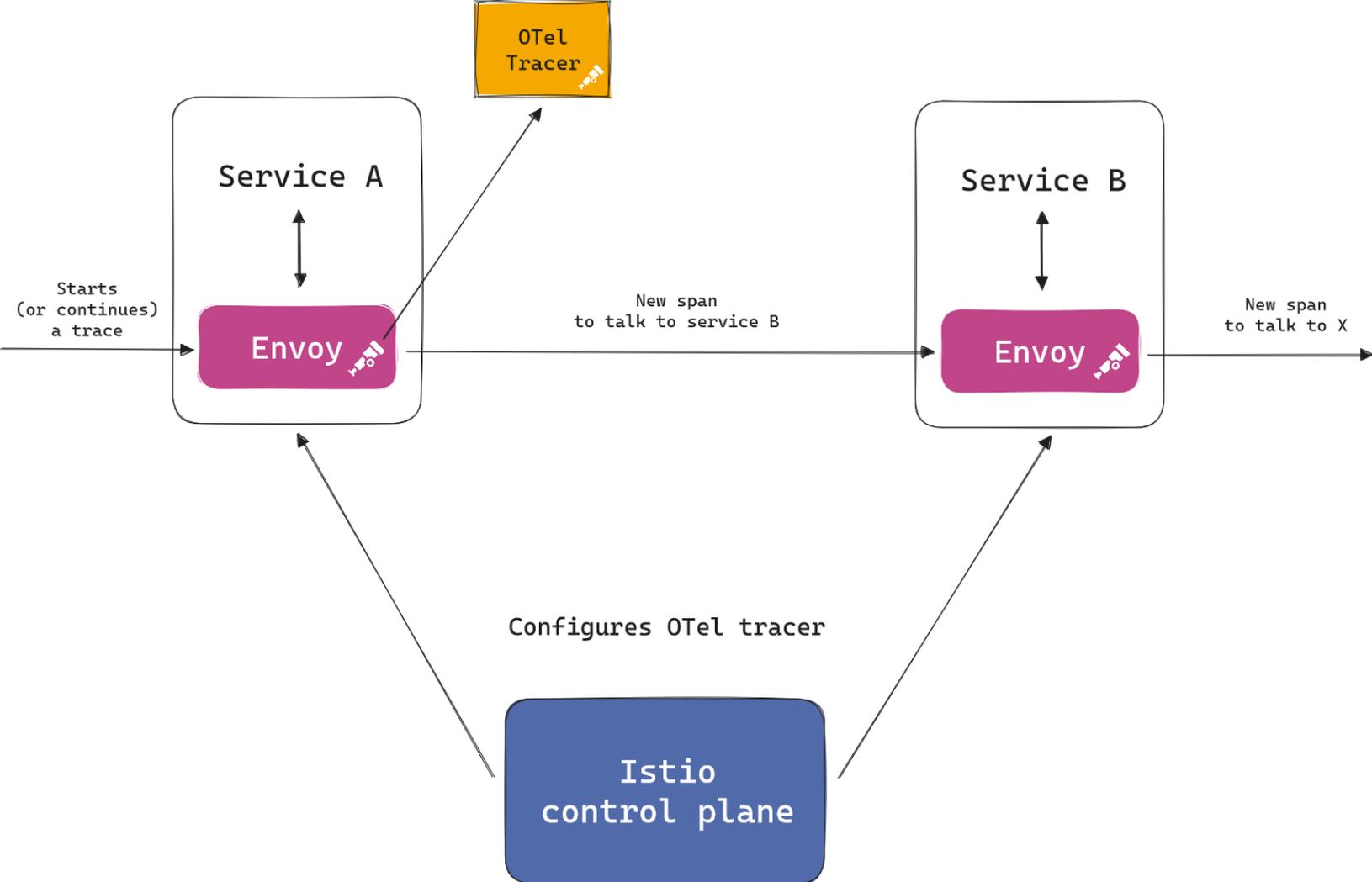
Allows defining more intelligent sampling mechanisms



Istio + Envoy



How are things configured?



Istio Telemetry API

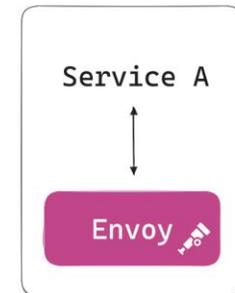
- **Preferred** mechanism for configuring Istio observability going forward
- Work around the concept of **Telemetry Providers**
- **Flexible**: Telemetry can be enabled for the entire mesh, for single namespaces or workloads

Istio Mesh Config

```
apiVersion: install.istio.io/v1alpha1
kind: IstioOperator
spec:
  meshConfig:
    enableTracing: true
    extensionProviders:
      - name: otel-tracing
    opentelemetry:
      port: 4318
      service: opentelemetry-collector.observability.svc.cluster.local
      http:
        path: "/v1/traces"
        timeout: 5s
        headers:
          - name: "custom-header"
            value: "custom value"
      resource_detectors:
        environment: {}
```

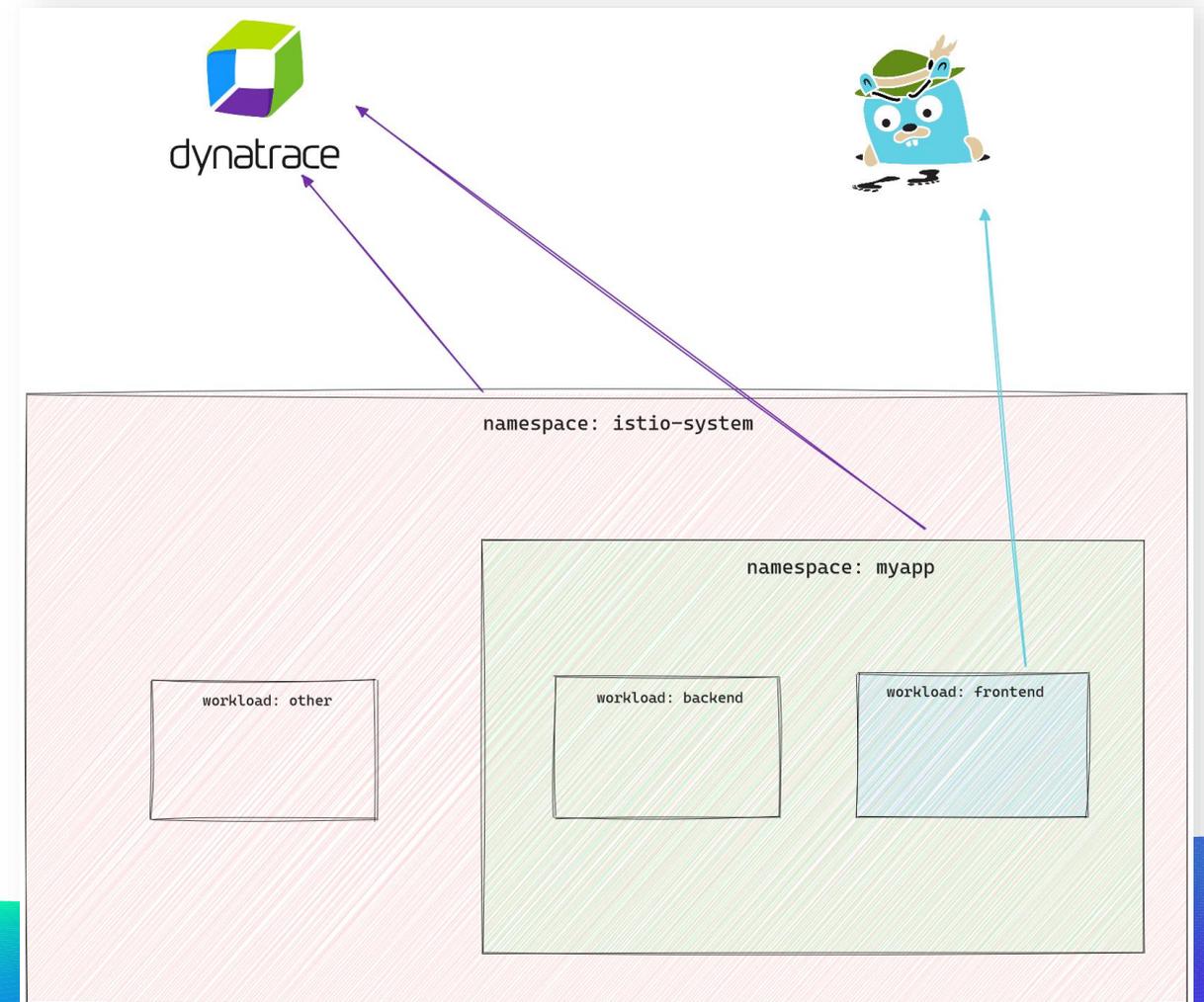
Telemetry API

```
apiVersion: telemetry.istio.io/v1alpha1
kind: Telemetry
metadata:
  name: otel-demo
spec:
  tracing:
    - providers:
      - name: otel-tracing
        randomSamplingPercentage: 100
        customTags:
          "my-attribute":
            literal:
              value: "default-value"
```



Flexible tracing configuration via Istio Telemetry API

- Tracing can be configured for different scopes: Entire mesh, per namespace or per workload
- Allows to choose a different tracing “strategy” for each scope
- For example: Send traces to Staging/Prod Dynatrace tenants, or to a different tool, like Jaeger for testing



Flexible tracing configuration via Istio Telemetry API

Namespace scope – Send to Dynatrace

```
● ● ●  
apiVersion: telemetry.istio.io/v1alpha1  
kind: Telemetry  
metadata:  
  name: namespace-override  
  namespace: myapp  
spec:  
  tracing:  
    - providers:  
      - name: dynatrace-otel
```

Workload scope – Send to Jaeger

```
● ● ●  
apiVersion: telemetry.istio.io/v1alpha1  
kind: Telemetry  
metadata:  
  name: workload-override  
  namespace: myapp  
spec:  
  selector:  
    matchLabels:  
      service.istio.io/canonical-name: frontend  
  tracing:  
    - providers:  
      - name: jaeger
```

Questions?

Thank you!