How I stopped worrying and learned to love microservices in Golang

Before We Begin

- This workshop is designed to be done locally on your computer
- This workshop requires Docker and Docker Compose
- It can work on Linux/Mac or Windows but is optimized for Linux/Mac
- Please clone https://github.com/vvydier/otel-golang-meetup
- Run (this may take a while!):

```
cd otel-golang-meetup/otel-docker && \
  docker-compose up

cd otel-golang-meetup && \ ls app app-with-otel
```

Vinod Vydier

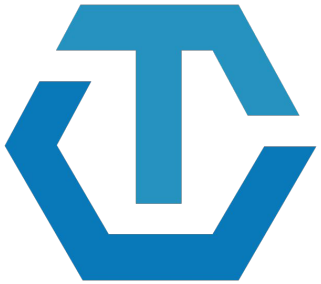
Observability Specialist at Splunk
OpenTelemetry Contributor and Approver
ex-Observe, ex-New Relic

Agenda

- What is Observability?
- How does OpenTelemetry(OTel) relate to Observability?
- What concepts do I need for OTel
  - Introduction to Instrumentation and Tracing
  - Metrics and Logs
- Introduction to OTel Collector
- How do I record telemetry and where can I send my data?
- Golang Lab
  - 101 (App)
  - 102 (Otel-collector)
  - 103 (App with OTel)
- Review
- AMA

Introduction

What is Observability and OpenTelemetry?



OPENTRACING

+

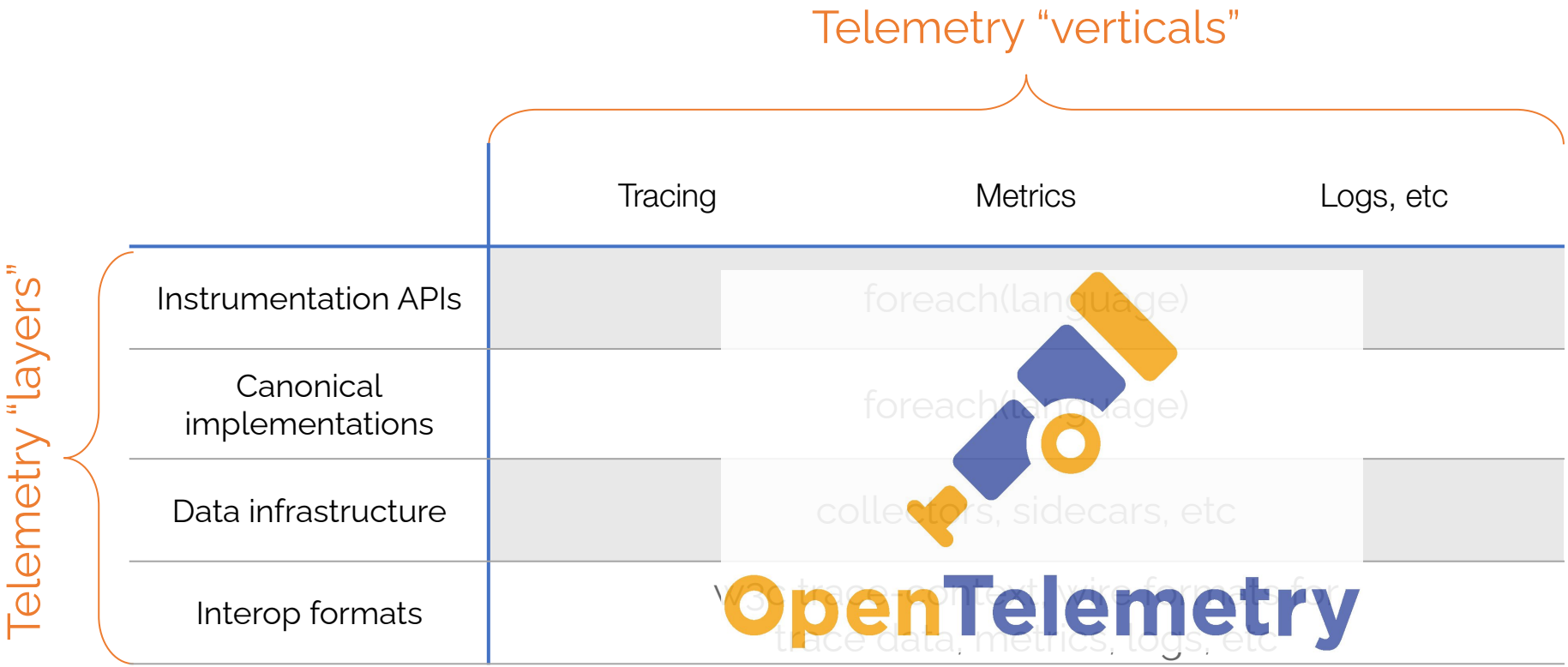
OpenCensus

=

OpenTelemetry

OpenTelemetry: **the next major version**
of *both* OpenTracing and OpenCensus

Cloud Native Telemetry

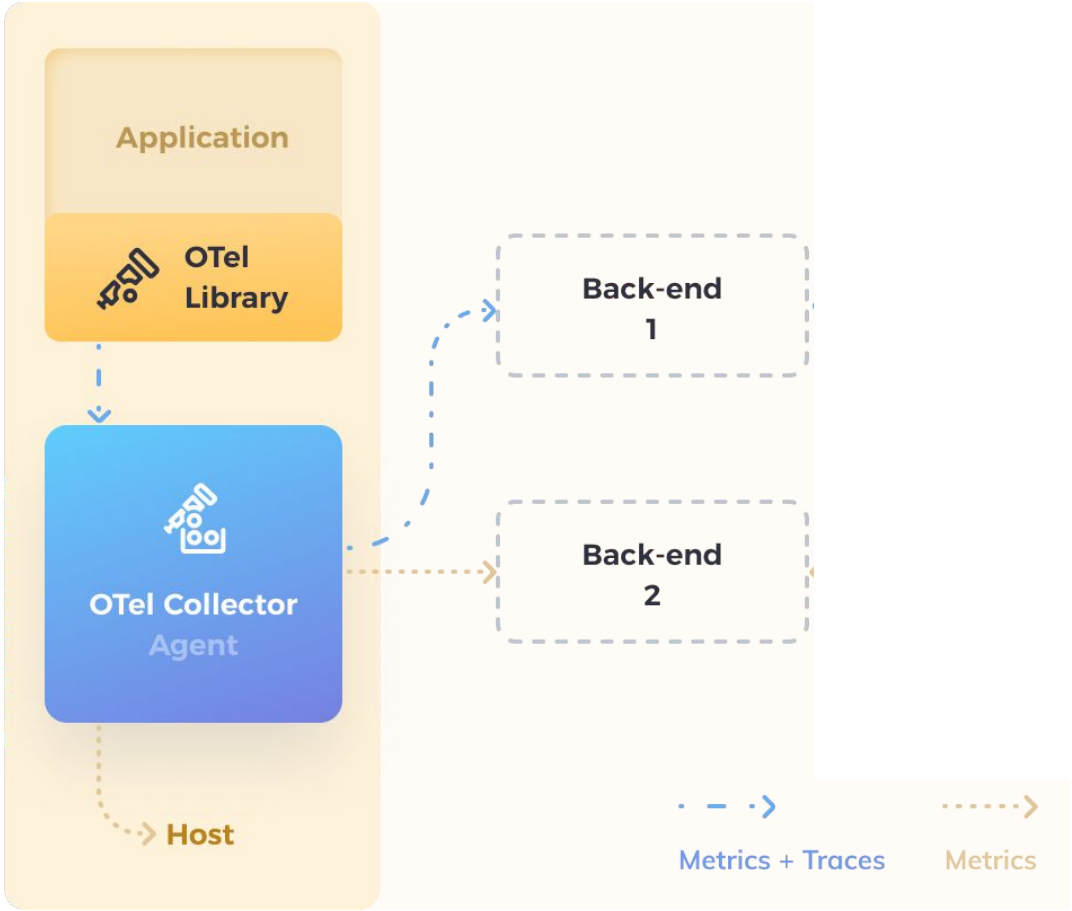


OpenTelemetry Components

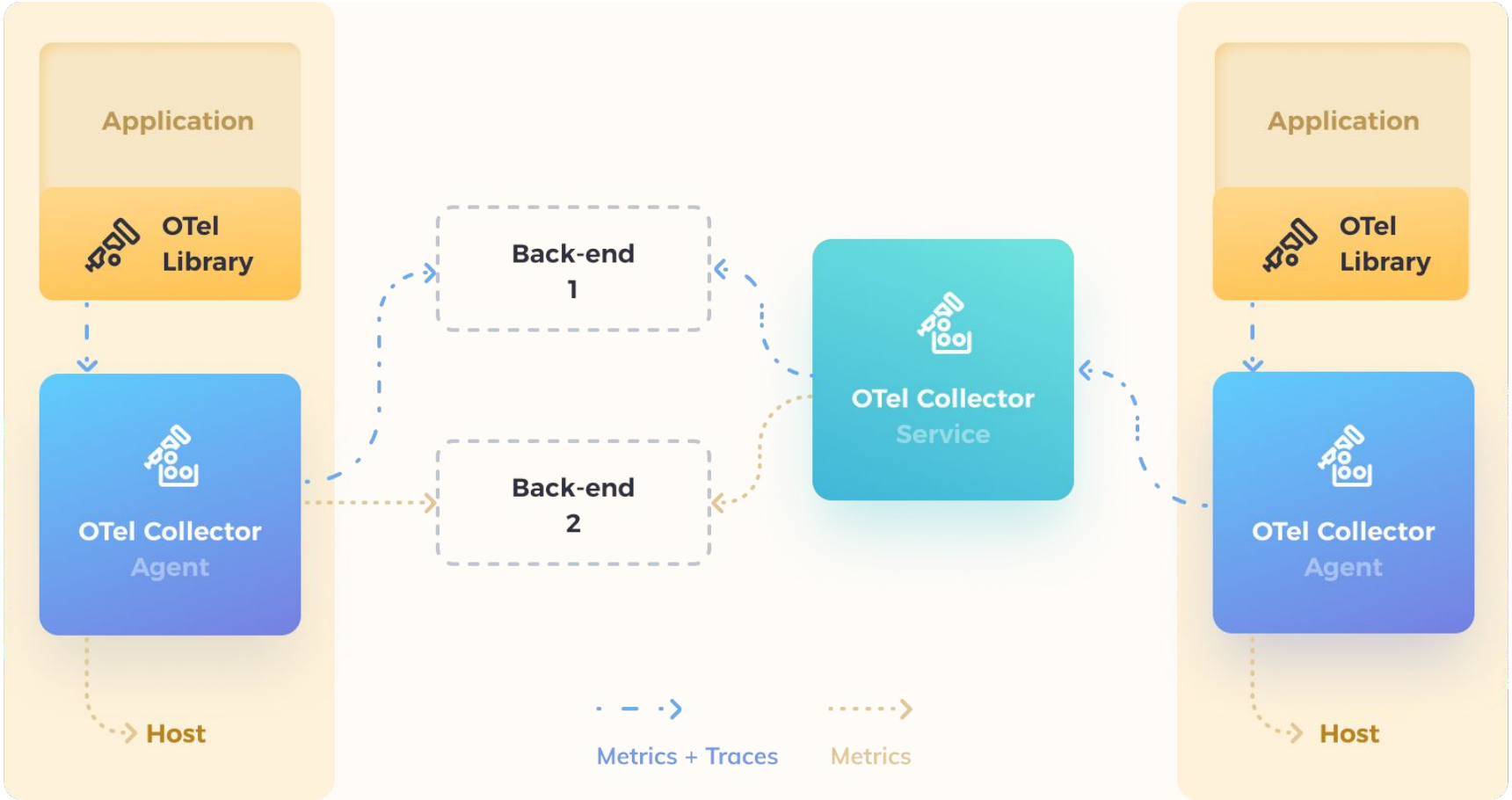
INSTRUMENTATION LIBRARIES
Single implementation per language

COLLECTOR
Single binary to receive, process, and export data

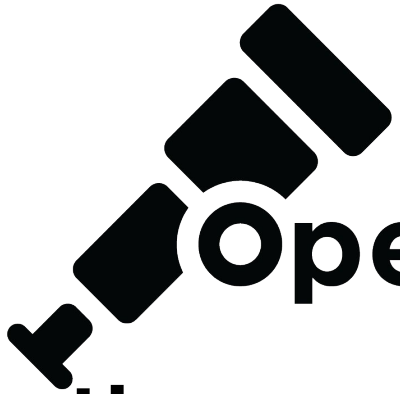
SPECIFICATION
API, SDK, Data



Reference architecture



Reference architecture



OpenTelemetry

is the second most active project in CNCF today!

(per CNCF DevStats)

Everyone is Contributing and Adopting

Cloud Providers

AWS | Azure | GCP

Vendors

Every major vendor!
Splunk, AWS,
MSFT, DD, NR, DT

End-users

Mailchimp (PHP)

Postmates (Erlang)

Shopify (Ruby)

Other

Jaeger > OtelCol

Fluent-bit <3 log SIG

Envoy roadmap

OpenMetrics roadmap

Spring roadmap

https://github.com/open-telemetry/community/blob/master/ADOPTERS.md
https://medium.com/jaegertracing/jaeger-embraces-opentelemetry-collector-90a545cbc24
https://aws-otel.github.io/docs/partners/splunk

Instrumentation

Instrumentation Libraries

Application


RUM

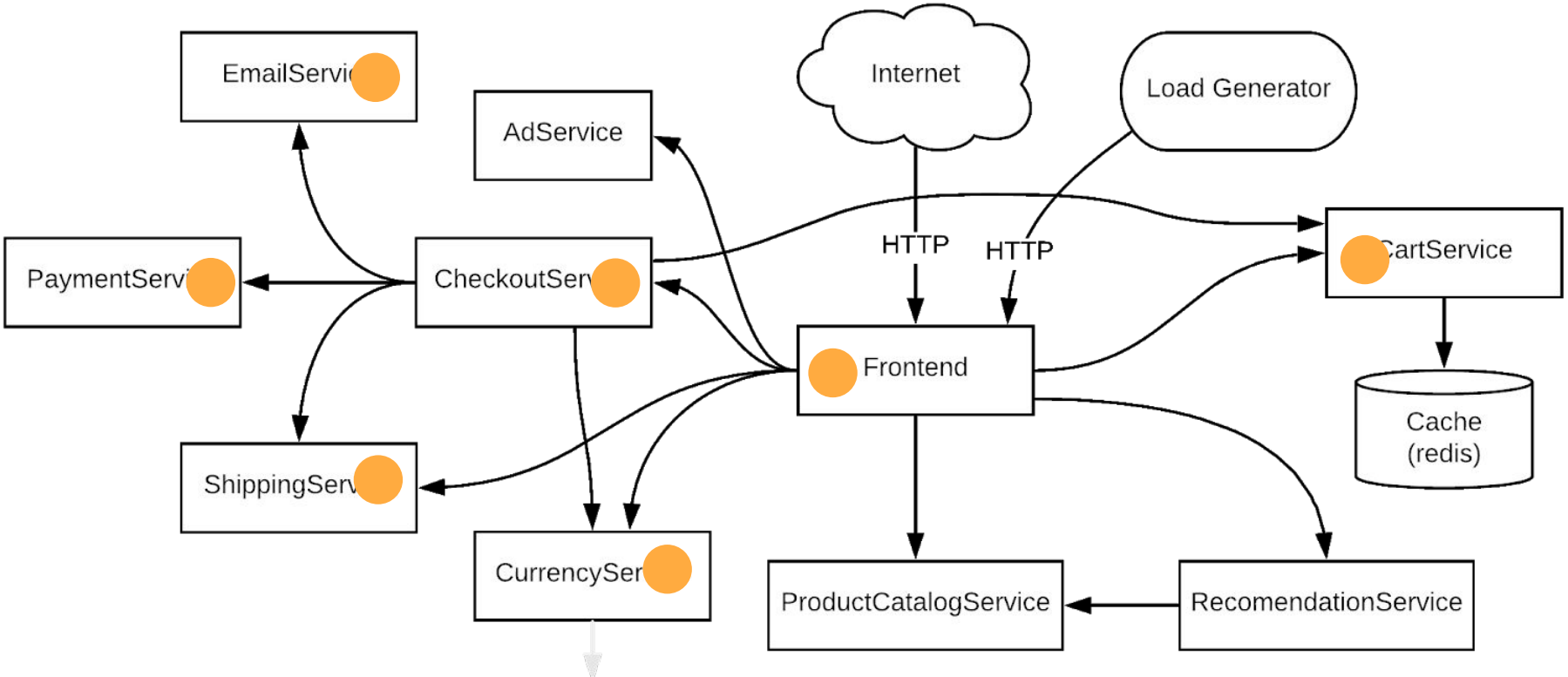

Serverless



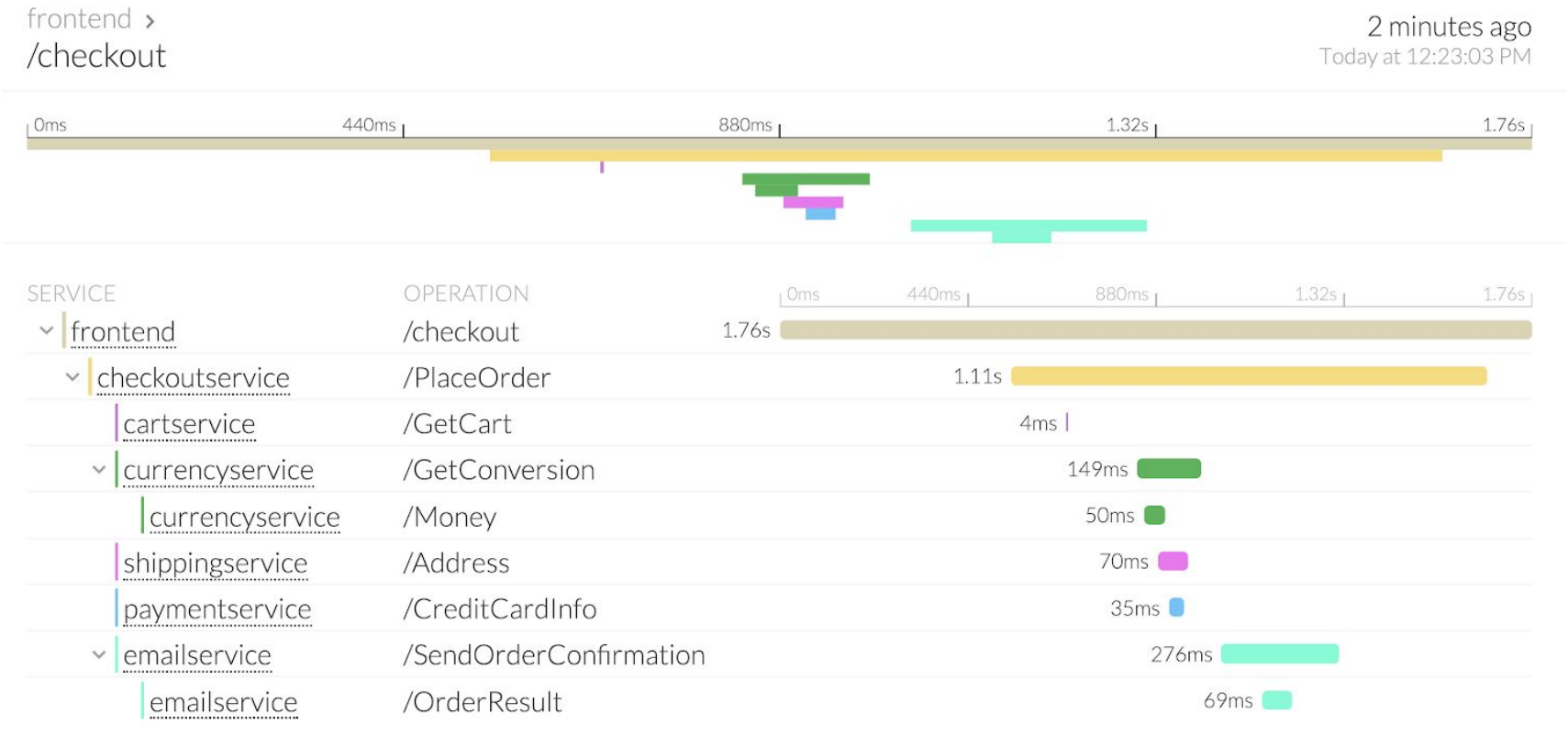
- Single instrumentation library per language
- All support manual instrumentation; some automatic
- Priority 1) traces 2) metrics 3) logs

OpenTelemetry

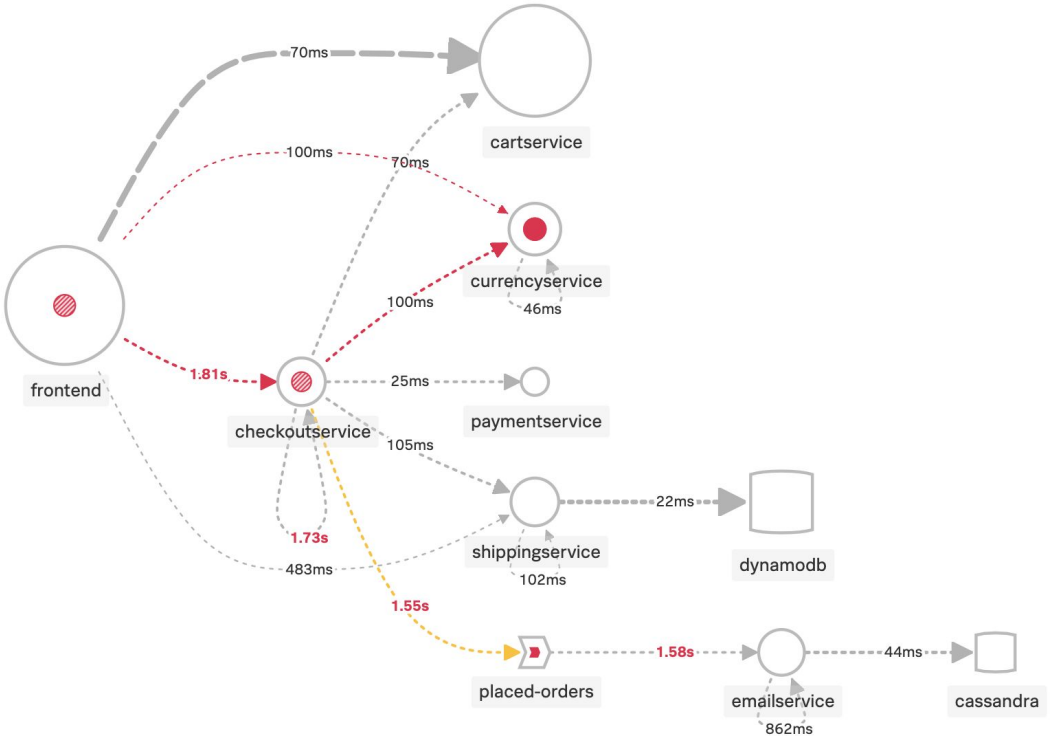
What is distributed tracing?



Distributed trace request visualization



Distributed trace service map visualization



Lab 101, 102, 103

Review

What did we accomplish?

- Instrumented an application with tracing
- Experienced exporters and configuration

What are the basic steps (language specific)?

- Download/Install dependencies
- Configure environment variables
- Update runtime parameters

Tracing Basics

- **Context:** W3C trace-context, B3, etc.
- **Tracer:** get context
- **Spans:** “call” in a trace
  - **Kind:** client/server, producer/consumer, internal
  - **Attributes:** key/value pairs; tags; metadata
  - **Events:** named strings
  - **Links:** useful for batch operations
- **Sampler:** always, probabilistic, etc.
- **Span processor:** simple, batch, etc.
- **Exporter:** OTLP, Jaeger, etc.

Tracing Semantic Conventions

In OpenTelemetry, spans can be created freely and it's up to the implementor to annotate them with attributes specific to the represented operation. Some span operations represent calls that use well-known protocols like HTTP or database calls. It is important to unify attribution.

- **HTTP:** http.method, http.status_code
- **Database:** db.type, db.instance, db.statement
- **Messaging:** messaging.system, messaging.destination
- **FaaS:** faas.trigger

Semantic Conventions: Example

Resource SDK + Semantic Conventions

A Resource is an immutable representation of the entity producing telemetry. For example, a process producing telemetry that is running in a container on Kubernetes has a Pod name, it is in a namespace and possibly is part of a Deployment. All three of these attributes can be included in the Resource.

- **Environment:** Attributes defining a running environment (e.g. cloud)
- **Compute instance:** Attributes defining a computing instance (e.g. host)
- **Deployment service:** Attributes defining a deployment service (e.g. k8s).
- **Compute unit:** Attributes defining a compute unit (e.g. container, process)

Collector

How is the OTel Collector architected?

https://opentelemetry.io/docs/collector/

- Components
  - **Receivers:** how you get data in (can be push or pull-based)
  - **Processors:** what you to do the data (e.g. batching, metadata, etc.)
  - **Exporters:** how you get data out (can be push or pull-based)
  - **Extensions:** things you do in the collector typically outside processing data (e.g. health check)
- Configuration is done in YAML and consists of two steps:
  - Define component configuration
  - Enable the component

How is the OTel Collector configured?

https://opentelemetry.io/docs/collector/configuration/

```yaml
receivers:
  host:
    scrapers: [cpu, disk, memory]
  zipkin:
processors:
  batch:
exporters:
  jaeger:
    endpoint: jaeger-all-in-one:14250
  prometheus:
    endpoint: prometheus:9091
service:
  pipelines:
    metrics:
      receivers: [host]
      processors: [batch]
      exporters: [prometheus]
    traces:
      receivers: [zipkin]
      processors: [batch]
      exporters: [jaeger]
```

How to configure components. Many components come with default configuration baked in.

How to enable components. Note the order of processors matters!

Review(cont.)

What did we accomplish?

- Configuring the collector
- CRUD metadata via collector

What are the basic steps (language specific)?

- Configure component (receiver, processor, exporter)
- Enable component (pipeline)

Other Project Aspects

- Governance Board
  - Code of conduct
  - Technical steering committee
- OpenTelemetry Enhancement Proposals (OTEPs)
  - OTLP protocol and support for HTTP
  - Log SIG
- Core versus Contrib
- Website (https://opentelemetry.io)

Next Steps

- Join the conversation: https://cloud-native.slack.com
- Join a SIG: https://github.com/open-telemetry/community#special-interest-groups
- Submit a PR (consider good-first-issue and help-wanted labels)

Links

- Specification
  - https://github.com/open-telemetry/opentelemetry-specification
- OpenTelemetry Collector
  - https://opentelemetry.io/docs/collector/about/
  - https://opentelemetry.io/docs/collector/configuration/
- Golang client library
  - https://github.com/open-telemetry/opentelemetry-go
  - https://opentelemetry.io/ecosystem/registry/?language=go&component=instrumentation
  - https://github.com/open-telemetry/opentelemetry-go-contrib
  - https://github.com/open-telemetry/opentelemetry-go-instrumentation
- Java client library
  - https://github.com/open-telemetry/opentelemetry-java/blob/master/QUICKSTART.md
  - https://github.com/open-telemetry/opentelemetry-java-instrumentation
- Other
  - https://opentelemetry.io/docs/workshop/resources/
  - https://devstats.cncf.io/
  -

Thank You!

AMA