

OpenTelemetry Collector as k8s Universal Telemetry Collector

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Jakarta, August 21, 2021

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About Me



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On GNU/Linux since 2000. Interested in Linux Kernel, Distributed & High Performance Computing, eBPF, IoT

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Agenda

- Observability 101
- Meet OpenTelemetry and OpenTelemetry Collector
- OpenTelemetryCollector Deployment
- Instrumentation Demo
- Q&A



Observability 101

The Observability Triad



Monitoring



Tracing

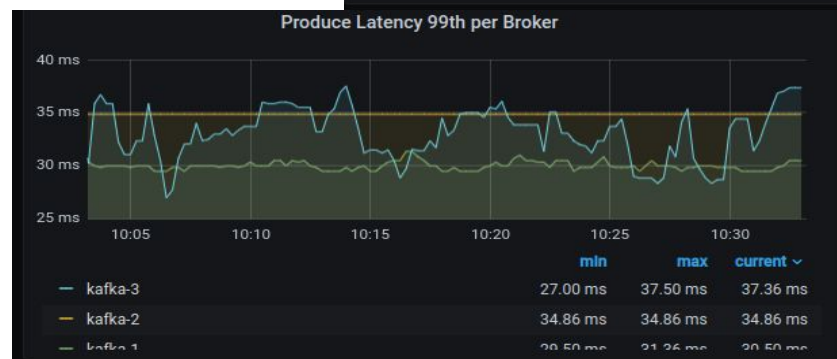
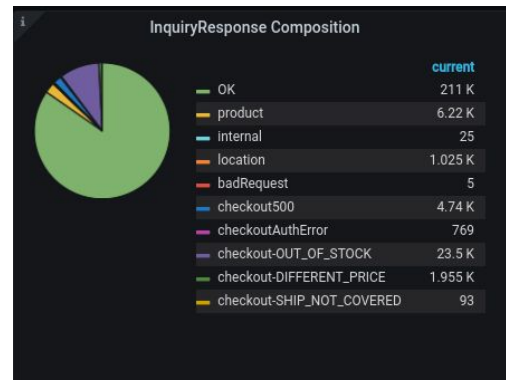


Logging

Do you know what your codes are doing on 2AM when your payment is down ?

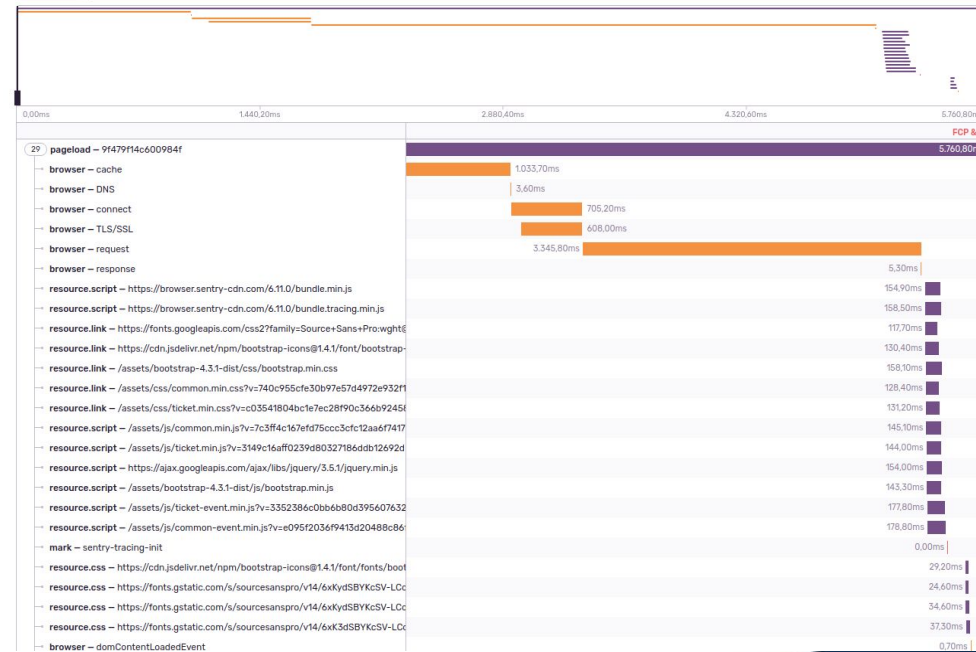
Metrics - It's About The Number

- Each metric reports a number
- The monitoring system tracks those numbers over time
- Identify anomalous behavior and wake someone up
- Recognizes trends for your infrastructure scaling
- Four Golden Signals - (Latency - Traffic - Saturation - Errors)



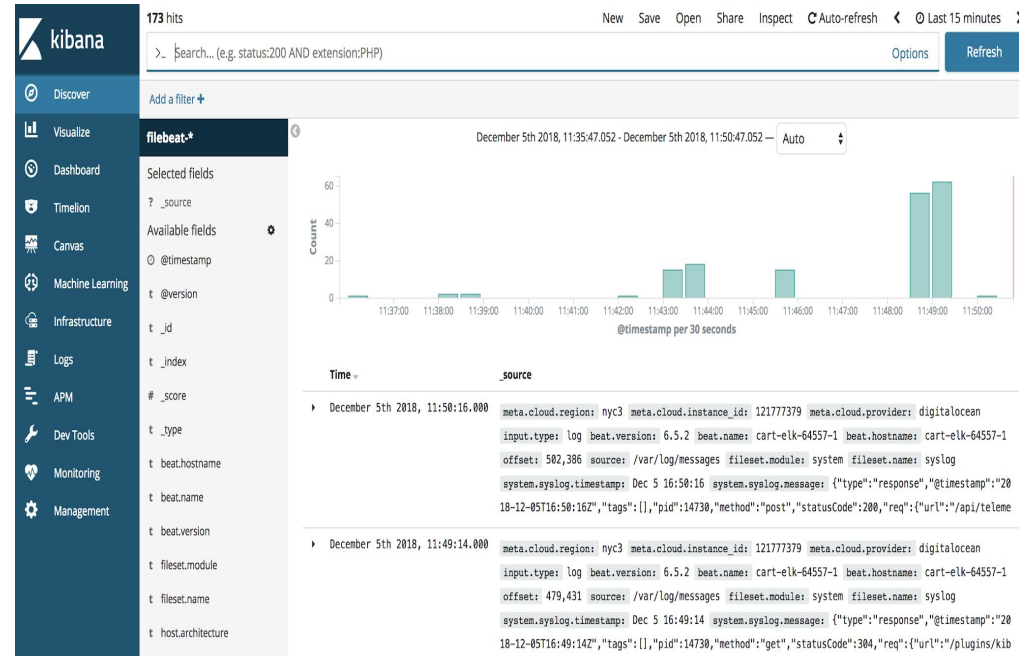
Tracing - Finding your Bottleneck

- Uniquely identify Requests and Spans
- Spans carry contextual metadata
- Runtime reports start/end timestamps for each span
- Span Aggregator find out how long everything took



Logging - How to debug your production at 2AM

- Convey appropriate urgency
- Provide enough information
- Not overwhelming
- Structured for searching not reading



Meet OpenTelemetry & OpenTelemetry Collector



OpenTelemetry

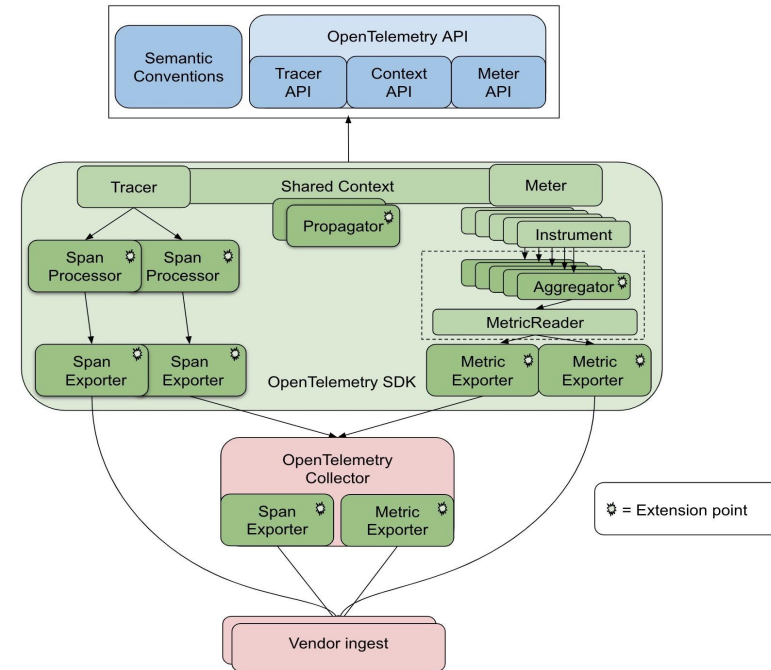
- OpenCensus + OpenTracing = OpenTelemetry
- Provides a unified set of open standards API, SDK, and middleware for generating and exporting Trace , Metrics, (and logging - incoming)
- Enabling quick bootstrap of observability into your system
- Contributor and support from various major vendor and wide community support



OpenTelemetry

OpenTelemetry Architecture

- **API** : Used to generate telemetry data
- **SDK** : Implementation of API in various languages
 - **Tracer** : responsible for creating and tracking span - distributed tracing
 - **Meter** : responsible for creating and tracking metrics
- **OpenTelemetry Proto** : protobuf implementation on semantic convention and OpenTelemetry Protocol (OTLP)

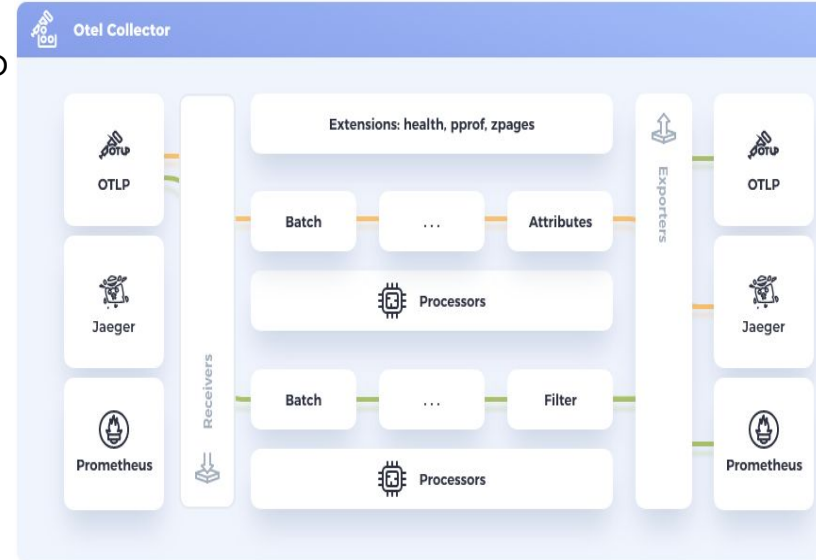


source :

<https://blog.newrelic.com/product-news/what-is-opentelemetry/>

OpenTelemetry Collector [1]

- Collector : middleware service on receiving, processing, and exporting telemetry data to various telemetry backend (ex : Jaeger, Prometheus, Datadog, etc).
- It's acting as telemetry pipeline
- Single Binary Service
- Can Be Deployed as **Agent** or **Gateway**

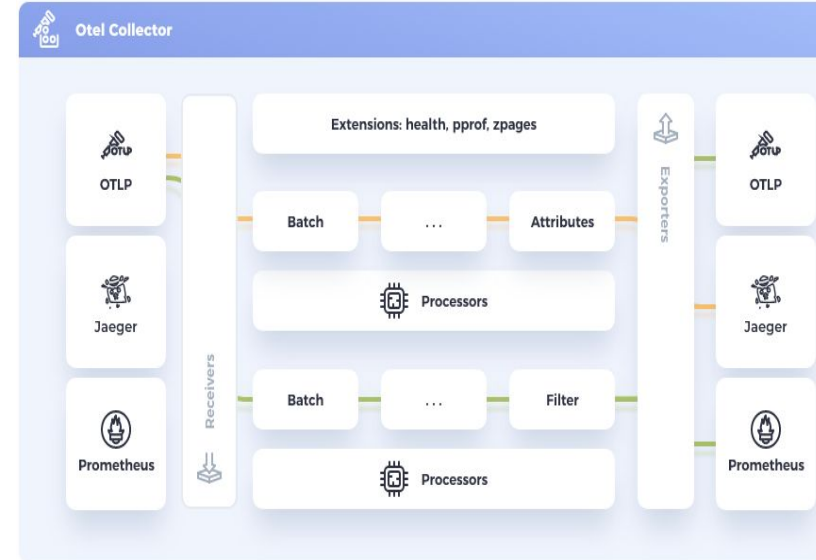


source : <https://opentelemetry.io/docs/collector/>

OpenTelemetry Collector [2]

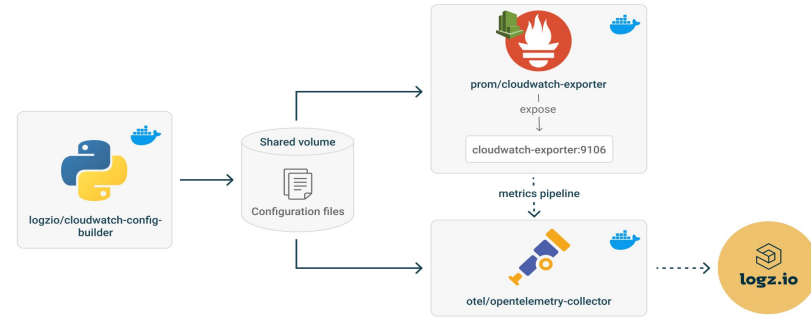
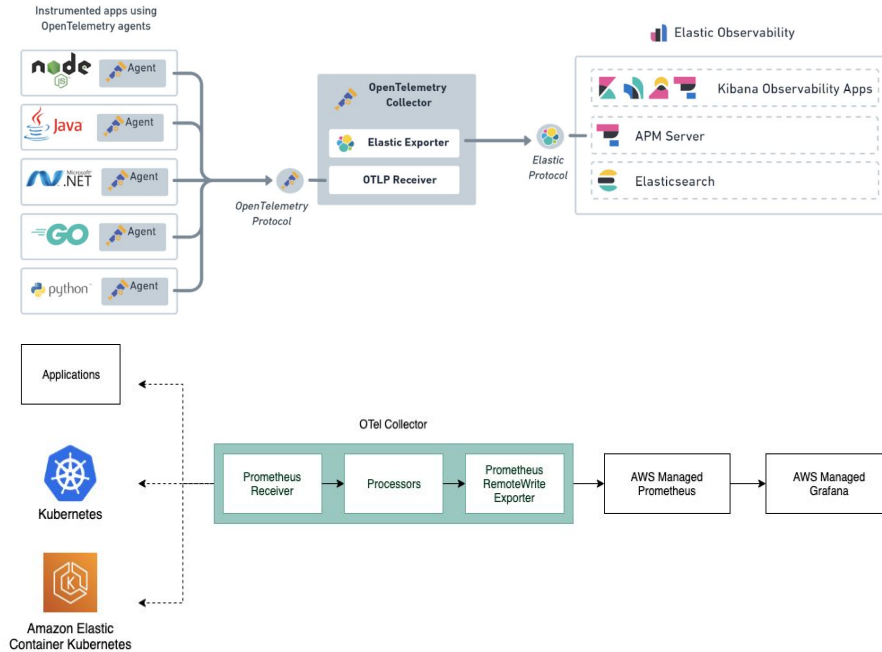
Collector comprises of :

- **Receivers:** Receivers ingest data from a variety of telemetry popular sources and formats, such as Zipkin, Jaeger and Prometheus.
- **Processors:** Processors allow tracing, metrics, and resources to be manipulated in a variety of ways.
- **Exporters:** Exporters send completed telemetry data from pipeline to final backend. Exporters can be run in parallel, sending multiple telemetry data to multiple endpoint



source : <https://opentelemetry.io/docs/collector/>

Various Telemetry Pipeline



OpenTelemetry Collector Deployment

OpenTelemetry Operator

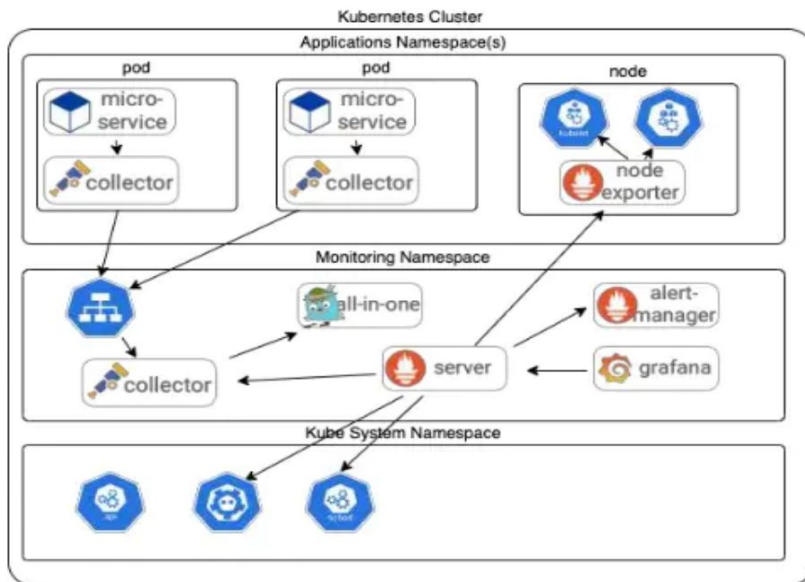
- OpenTelemetry Operator is Kubernetes Operator to manage OpenTelemetry deployment (<https://github.com/open-telemetry/opentelemetry-operator>)
- Currently the operand only OpenTelemetry Collector
- Simple Deployment
 - Deploy Cert Manager

```
$ kubectl apply -f https://github.com/jetstack/cert-manager/releases/latest/download/cert-manager.yaml
```

- Deploy OpenTelemetry Operator

```
$ kubectl apply -f https://github.com/open-telemetry/opentelemetry-operator/releases/latest/download/opentelemetry-operator.yaml
```

Agent Deployment



Application Namespaces

```

service:
  pipelines:
    traces:
      receivers: [otlp]
      processors: [memory_limiter, resource, ...]
      exporters: [otlp]
  metrics:
    receivers: [otlp, prometheus]
    processors: [memory_limiter, resource, ...]
    exporters: [otlp]
  
```

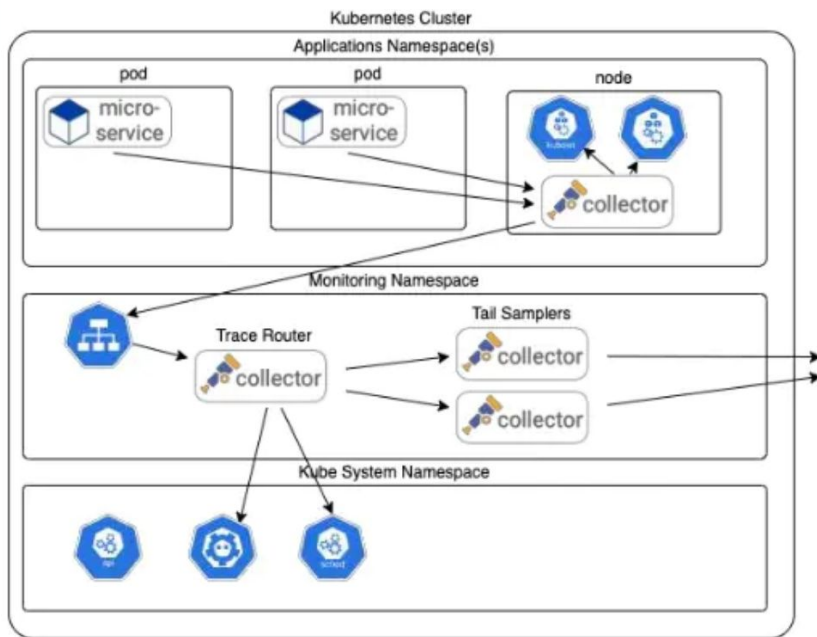
Monitoring Namespaces

```

service:
  pipelines:
    traces:
      receivers: [otlp]
      processors: [memory_limiter, batch, queued_retry]
      exporters: [jaeger]
  metrics:
    receivers: [otlp]
    processors: [memory_limiter]
    exporters: [prometheus]
  
```

source : [OpenTelemetry for Architects](#) - Kevin Brokchoff

Gateway Deployment



Application Namespaces

```
service:
  pipelines:
    traces:
      receivers: [otlp, zipkin]
      processors: [memory_limiter, resource, ...]
      exporters: [otlp]
    metrics:
      receivers: [otlp, prometheus]
      processors: [memory_limiter, resource, ...]
      exporters: [otlp]
```

Monitoring Namespaces

```
service:
  pipelines:
    traces:
      receivers: [otlp]
      processors: [memory_limiter, batch, queued_retry]
      exporters: [commercial...]
    metrics:
      receivers: [otlp]
      processors: [memory_limiter, batch, queued_retry]
      exporters: [commercial...]
```

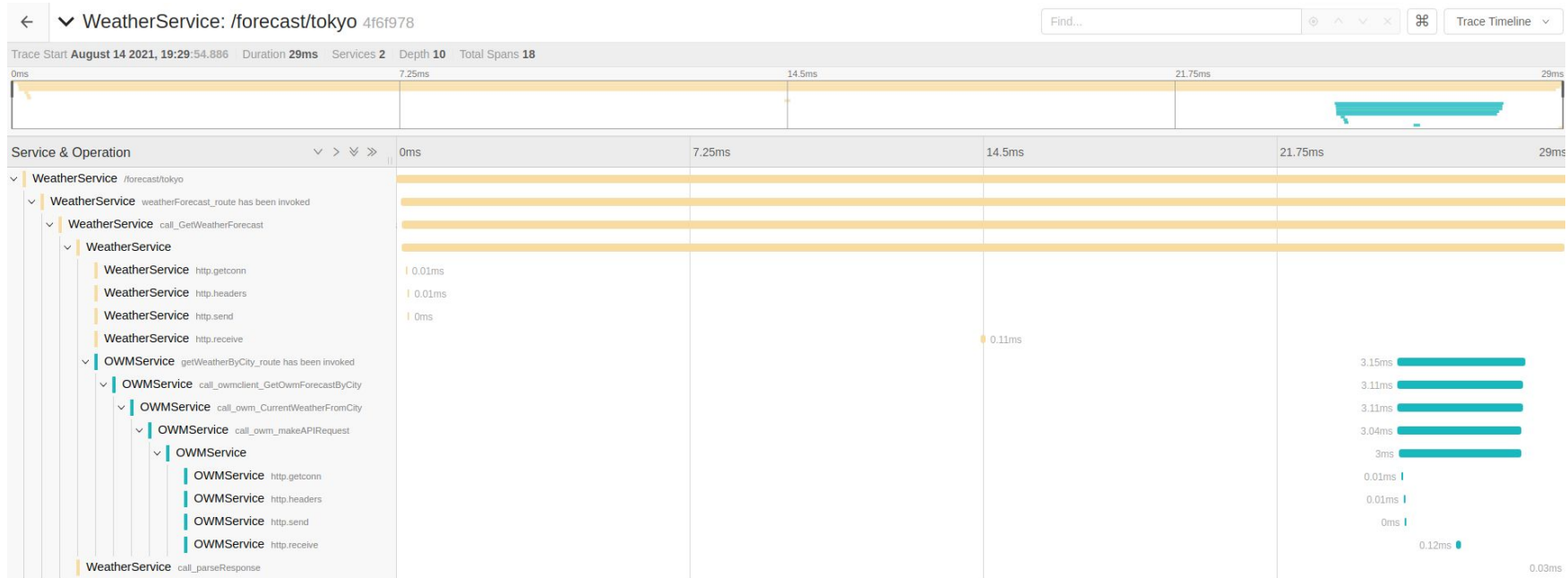
source : [OpenTelemetry for Architects](#) - Kevin Brokchoff

Instrumentation Demo

Instrumentation Demo

- Demo Repository in Golang
<https://github.com/tonnyadhi/distributed-tracing-example>
- Contains two services
 - Weather Service, fetch weather report from backend and print it in JSON
 - OWM Service, fetch weather report from OpenWeathermap, simplify it and Sent it to Weather Service
- Distributed Tracing is set between two services using OpenTelemetry HTTP Traces
- Span are sent to OpenTelemetry Collector. The collector will export the span to Jaeger and Sentry

Span Result



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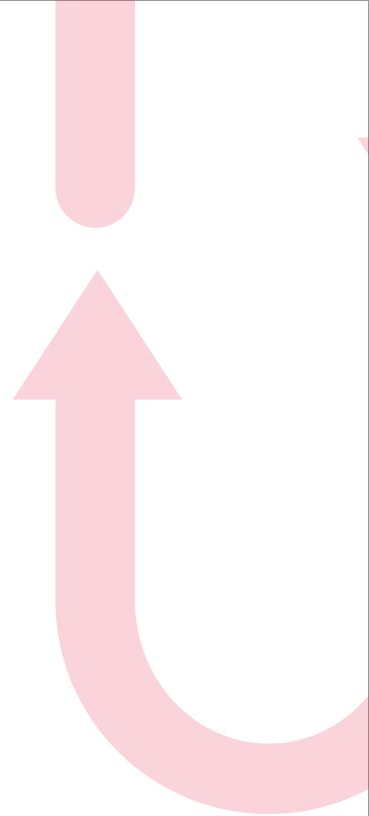
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