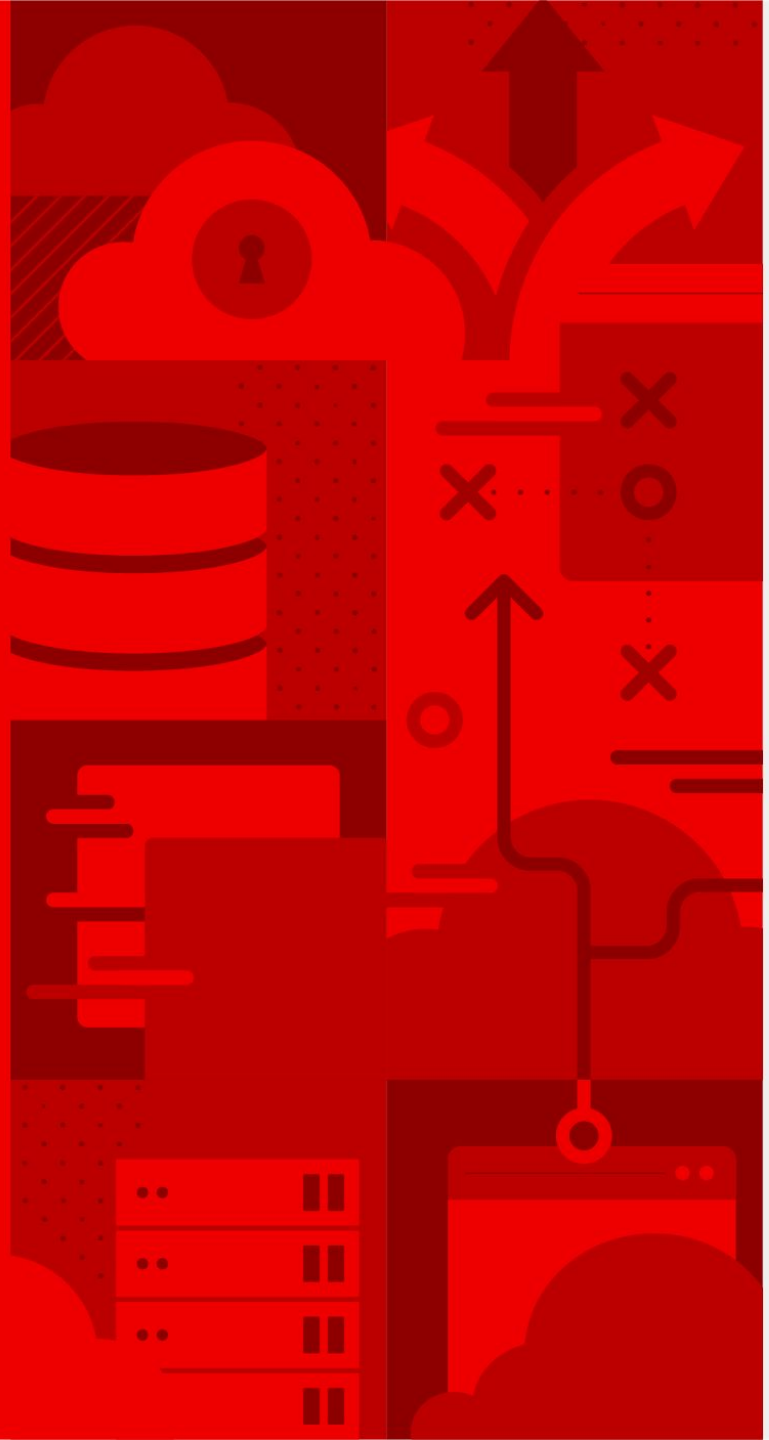


OPTIONAL SECTION MARKER OR TITLE

Observable microservices with MicroProfile OpenTracing and looking beyond to OpenTelemetry

Pavol Loffay
Senior Software Engineer

Red Hat

Agenda

- Introduction to distributed tracing
- MicroProfile-OpenTracing
- Demo tracing in Quarkus with Jaeger
- OpenTelemetry

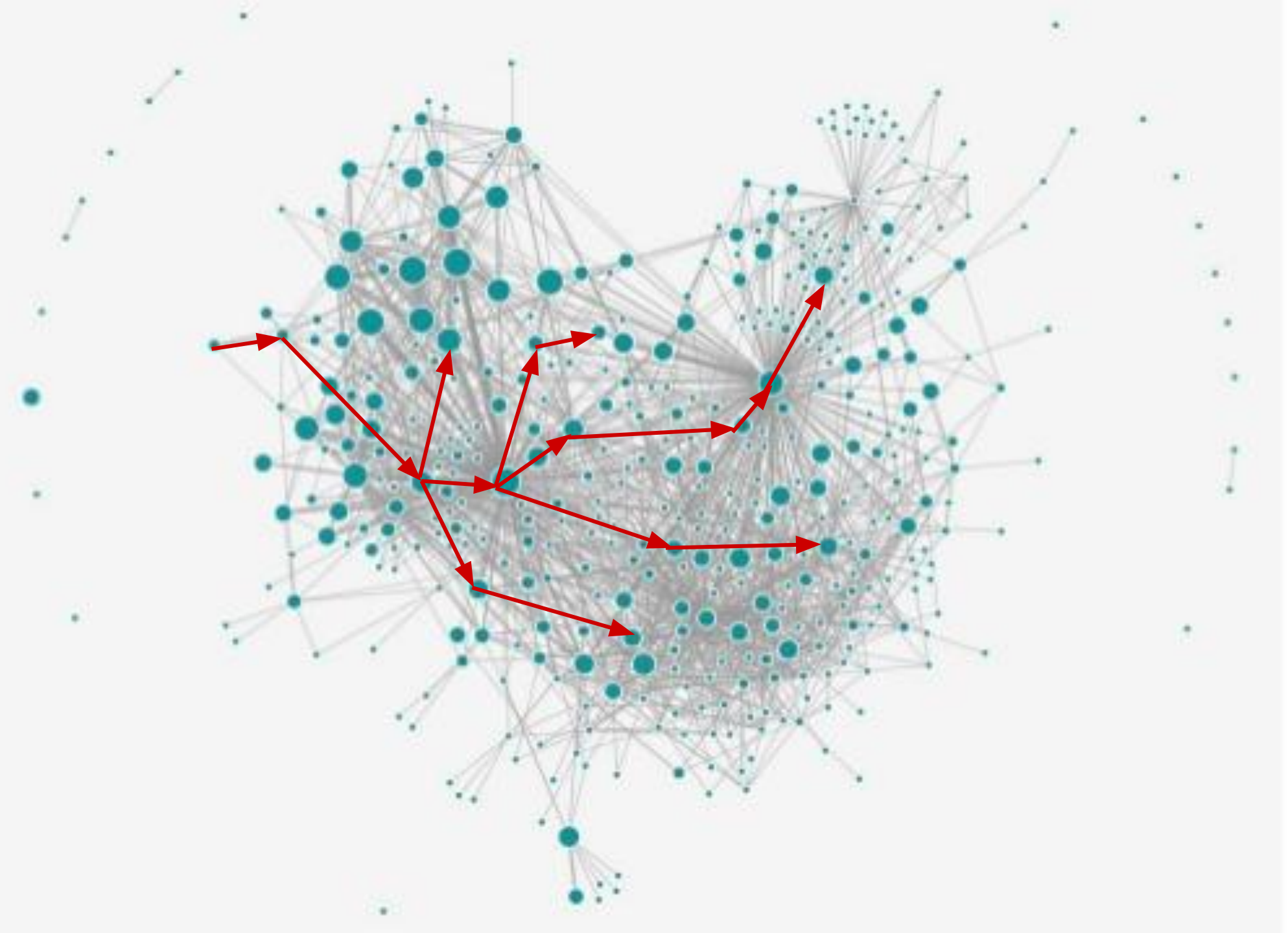
Pavol Loffay

- Software Engineer at Red Hat
- Distributed tracing: Jaeger, OpenTracing, OpenTelemetry
- MicroProfile-OpenTracing

Why tracing?

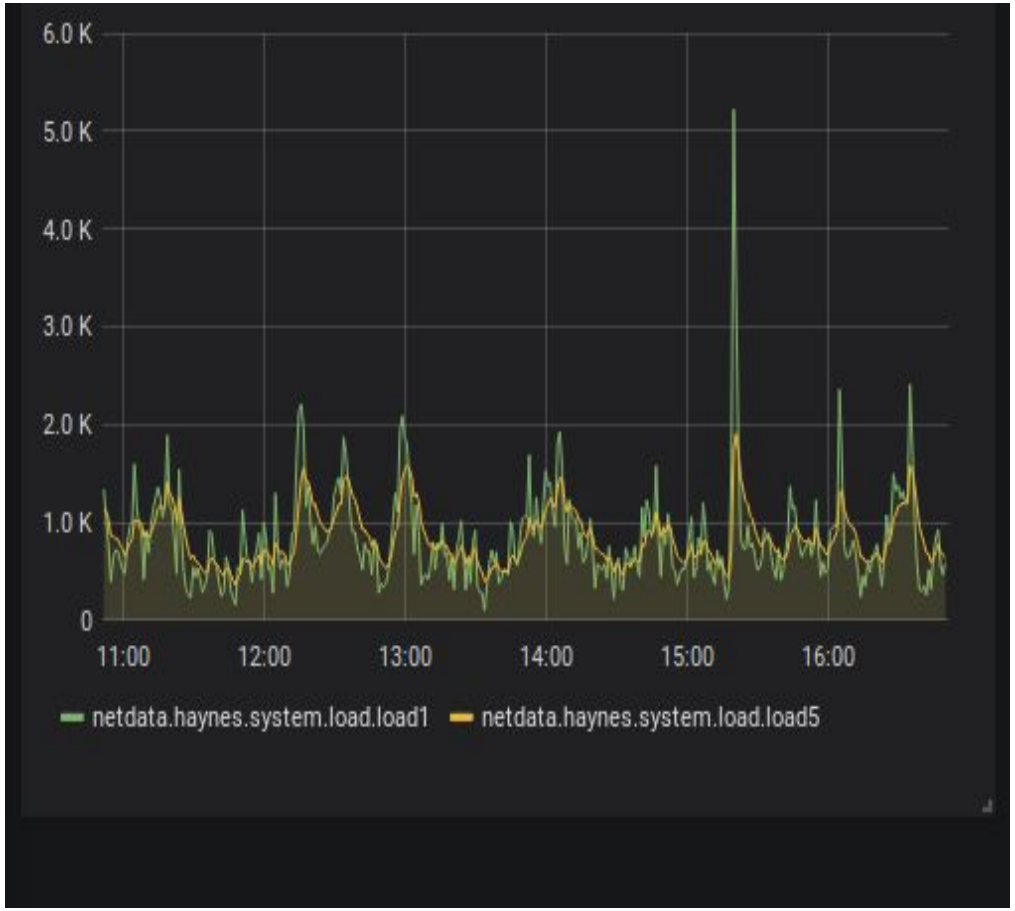
Modern distributed systems are complex.

Loading a page can involve 100s services and multiple nodes.



We want to tell what happened with the request.

Which service or component caused the problem under which conditions.




```
tecmint@TecMint ~ $ tailf /var/log/apache2/access.log
127.0.0.1 - - [31/Oct/2017:11:11:37 +0530] "GET / HTTP/1.1" 200 729 "-" "Mozill
127.0.0.1 - - [31/Oct/2017:11:11:37 +0530] "GET /icons/blank.gif HTTP/1.1" 200
fox/56.0"
127.0.0.1 - - [31/Oct/2017:11:11:37 +0530] "GET /icons/folder.gif HTTP/1.1" 200
efox/56.0"
127.0.0.1 - - [31/Oct/2017:11:11:37 +0530] "GET /icons/text.gif HTTP/1.1" 200 5
ox/56.0"
127.0.0.1 - - [31/Oct/2017:11:11:38 +0530] "GET /favicon.ico HTTP/1.1" 404 500
127.0.0.1 - - [31/Oct/2017:11:12:05 +0530] "GET /tecmint/ HTTP/1.1" 200 787 "ht
0"
127.0.0.1 - - [31/Oct/2017:11:12:05 +0530] "GET /icons/back.gif HTTP/1.1" 200 4
01 Firefox/56.0"
127.0.0.1 - - [31/Oct/2017:11:13:58 +0530] "GET /tecmint/Videos/ HTTP/1.1" 200
101 Firefox/56.0"
127.0.0.1 - - [31/Oct/2017:11:13:58 +0530] "GET /icons/compressed.gif HTTP/1.1"
) Gecko/20100101 Firefox/56.0"
127.0.0.1 - - [31/Oct/2017:11:13:58 +0530] "GET /icons/movie.gif HTTP/1.1" 200
o/20100101 Firefox/56.0"
```

Metrics - no context, which request caused a spike?

Logs - hard to correlate, parallel requests, multiple hosts.

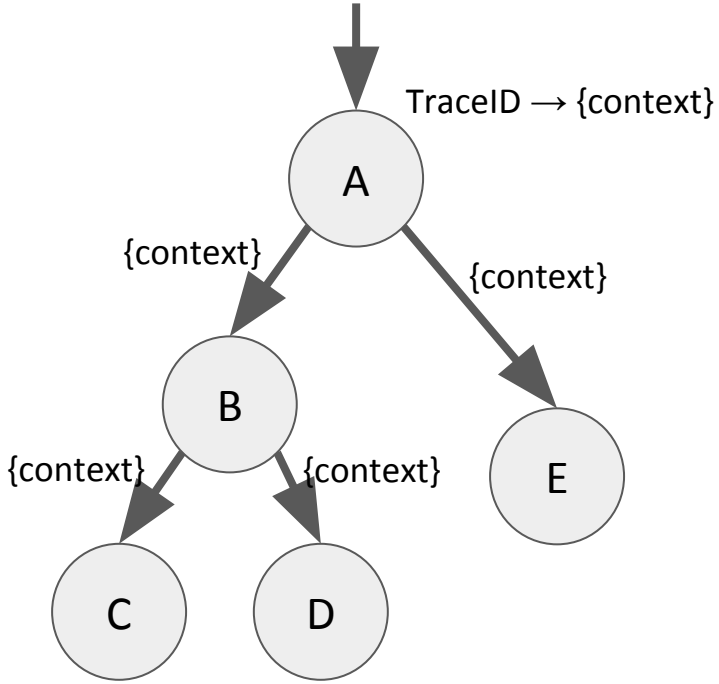
Monitoring tools must tell stories

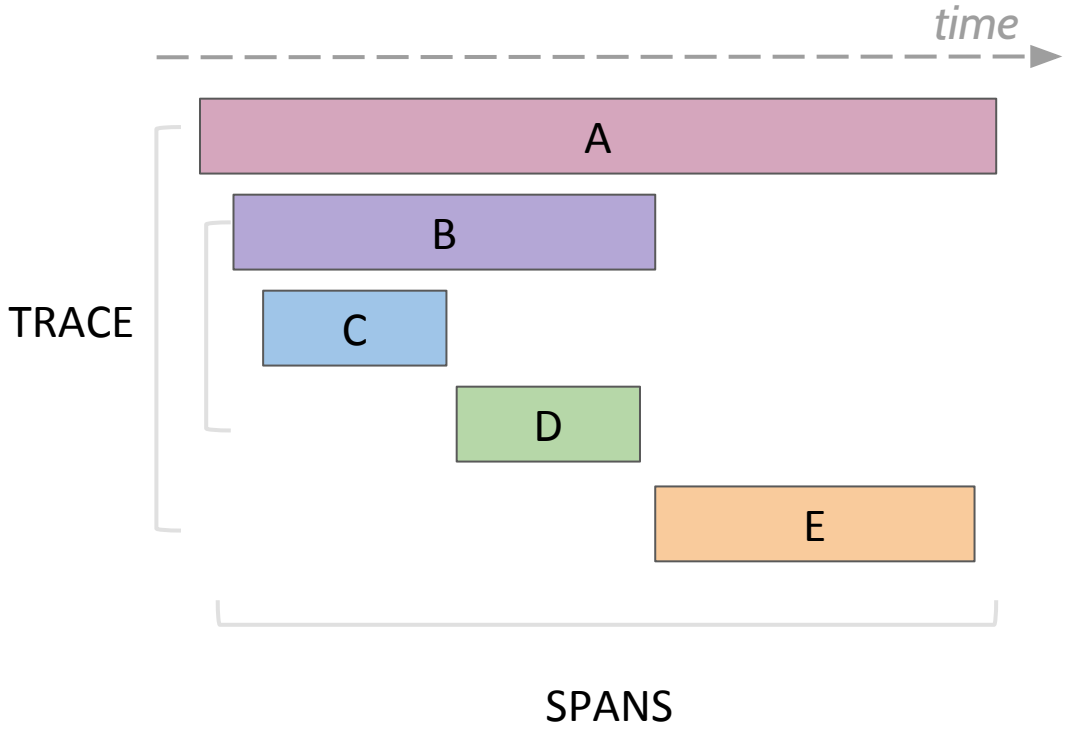
Metrics and logs have no context or describe only one instance.

Distributed tracing tells story about the whole the transaction.

Distributed Tracing

Distributed Tracing concepts

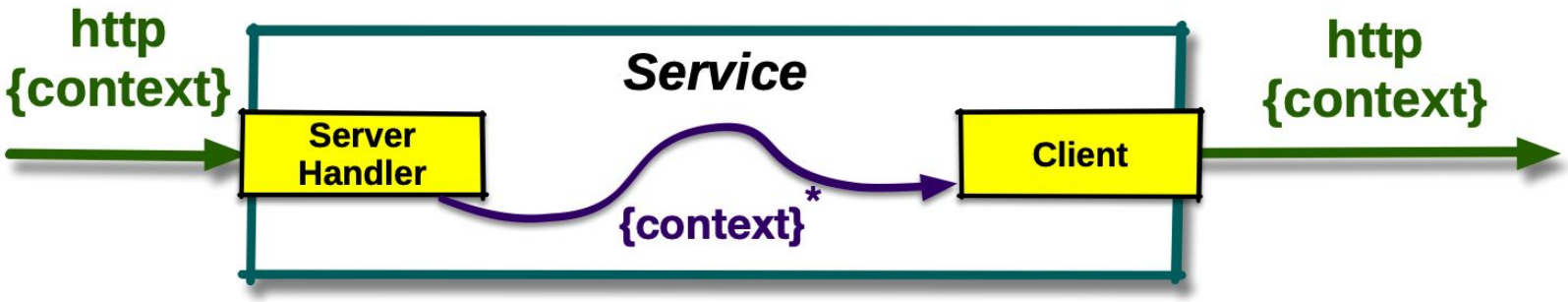




Red Hat

Distributed Tracing concepts

In-process context propagation



*) Thread pools, Queues, Futures

MicroProfile-OpenTracing

MicroProfile-OpenTracing

- Tracing API
- Vendor neutral
- No data/wire format

- Uses OpenTracing semantics and API
- Defines additional API

MicroProfile-OpenTracing

Auto instrumentation

- JAX-RS
- MicroProfile Rest Client

```
@Path("/")
public class Handler {

  @GET
  @Path("/hello")
  public Response hello() {
    Response response = client
        .target("http://localhost:8090/api")
        .request()
        .get();
    String entity = response.readEntity(String.class);
    response.close();
    return Response.ok(entity).build();
  }
}
```

MicroProfile-OpenTracing

Explicit instrumentation

- @Traced
- @Inject
  io.opentracing.Tracer

```
@Path("/")
public class Handler {

  @Inject
  private io.opentracing.Tracer tracer;

  @GET
  @Path("/hello")
  @Traced(operationName = "bonjour")
  public Response hello() {
    return Response.ok().build();
  }

  @GET
  @Path("/ping")
  @Traced(false)
  public Response ping() {
    return Response.ok().build();
  }
}
```

MicroProfile-OpenTracing

Configuration

- MP Config
- `mp.opentracing.server.operation-name-provider`
  - `GET:foo.bar.UserHandler.getUser`
  - `/user/{id}`
- `mp.opentracing.server.skip-pattern`
  - `/health|/foo/bar*`

Demo

Quarkus application

https://github.com/pavolloffay/quarkus-tracing

MicroProfile-OpenTracing

Roadmap

- Operation names for MP Rest Client
- More annotations
- Automatically trace CDI
- MicroProfile-Reactive Messaging
- MicroProfile-Fault tolerance

OpenTelemetry

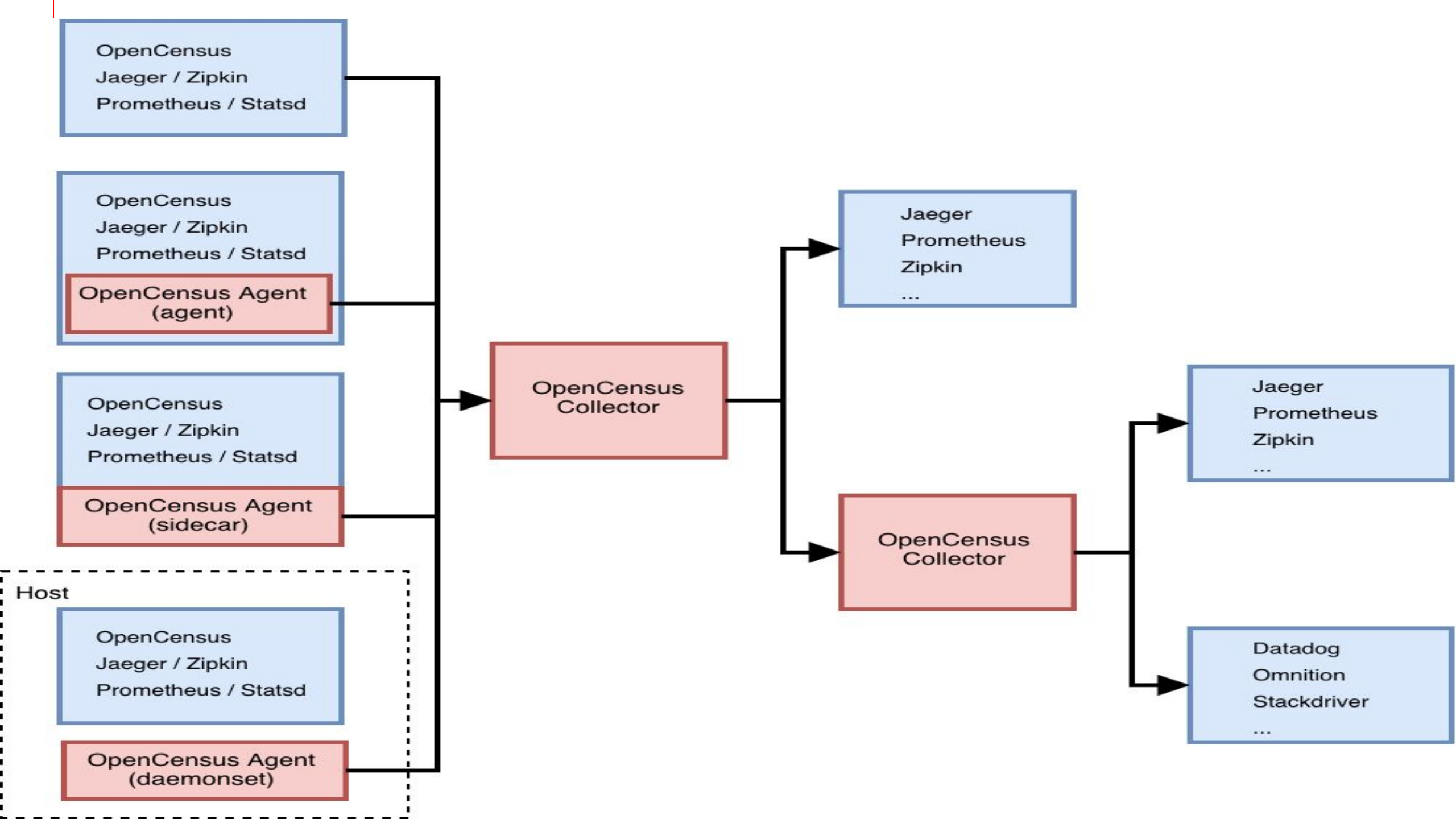
OpenTelemetry

- “The next major version of OpenTracing and OpenCensus”
- CNCF (Google, Microsoft, LightStep, Dynatrace, DataDog…)

OpenTelemetry

- API, SDK
- Data format and W3C Trace-Context
- Tracing, Metrics, (Logs)
- Named tracers/meters tracer =

  OpenTelemetry.getTracerFactory().getTracer("io.opentelemetry.contrib.mongodb", "semver:1.0.0");
- Agent/Collector

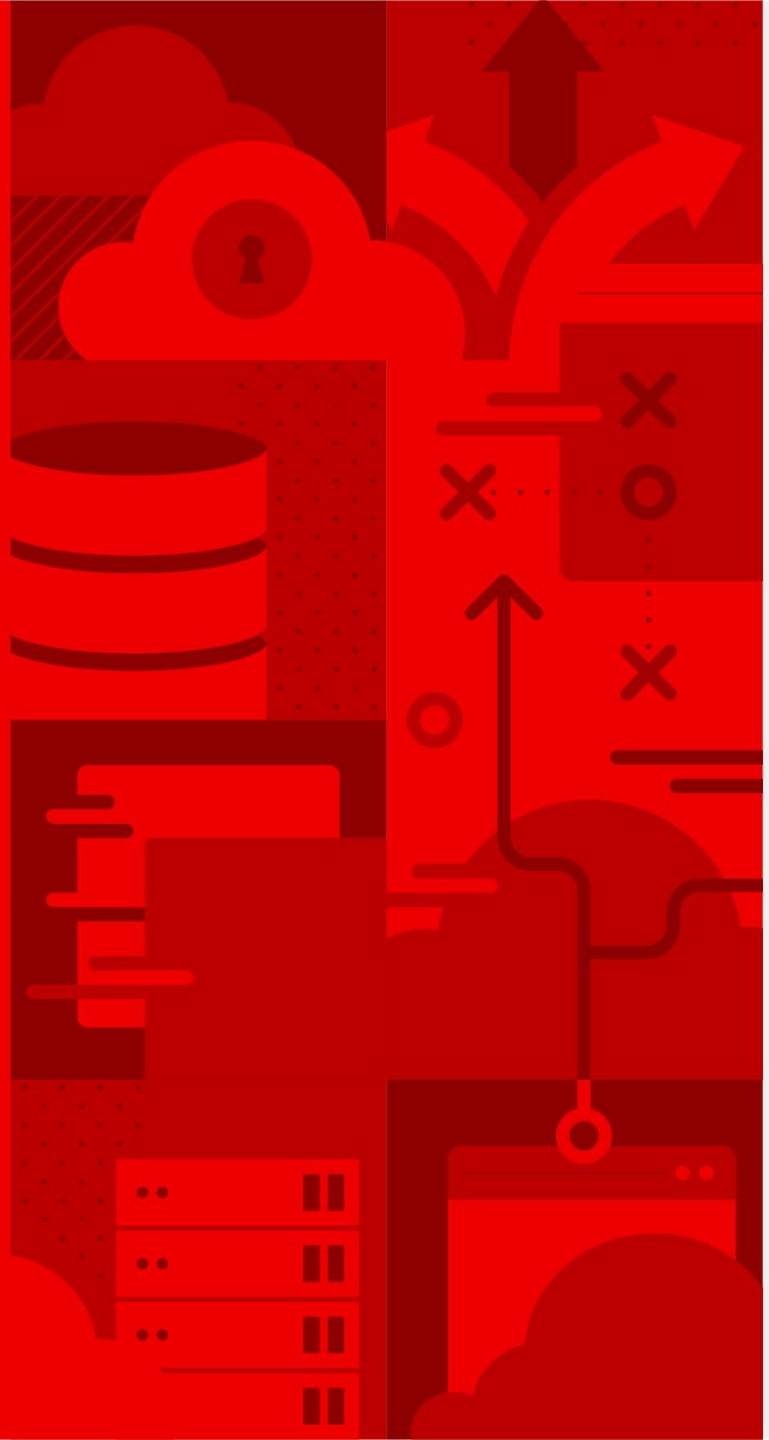

OpenCensus
Jaeger / Zipkin
Prometheus / Statsd
OpenCensus
Jaeger / Zipkin
Prometheus / Statsd
OpenCensus Agent
(agent)
OpenCensus
Jaeger / Zipkin
Prometheus / Statsd
OpenCensus Agent
(sidecar)
Host
OpenCensus
Jaeger / Zipkin
Prometheus / Statsd
OpenCensus Agent
(daemonset)
OpenCensus
Collector
Jaeger
Prometheus
Zipkin
...
OpenCensus
Collector
Jaeger
Prometheus
Zipkin
...
Datadog
Omnition
Stackdriver
...

OpenTelemetry in MP

1. New specification
2. Expose OpenTelemetry in MP-OT
3. Hybrid: new project and use OT shim

Start with distributed tracing as early as possible.

Go to MicroProfile forum and vote which proposal you like!



Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

linkedin.com/company/red-hat

facebook.com/redhatinc

youtube.com/user/RedHatVideos

twitter.com/RedHat

Red Hat