INTRODUCTION TO OPENTRACING

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TRACING AND PROFILING

OPERATING SYSTEM
STRACE, FTRACE, PERF, ...

VIRTUAL MACHINE
JAVA FLIGHT RECORDER, ...

APPLICATION
TYPICAL APM SOLUTIONS, OPENTRACING, ...

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WHAT IS OPENTRACING?

AIMS TO STANDARDIZE THE SEMANTICS FOR DISTRIBUTED TRACING, WHICH IS ESPECIALLY USEFUL IN OBSERVING DISTRIBUTED SYSTEMS, SUCH AS MICROSERVICES.
MICROSERVICES

THEY ARE JUST DISTRIBUTED SYSTEMS, BUT IN THE HUNDREDS (THOUSANDS!)

DISTRIBUTED SYSTEMS FAIL. ALL THE TIME.

MULTIPLE VERSIONS PER SERVICE

A/B TESTS, CANARY RELEASES, ROLLING DEPLOYMENT, ...
MICROSERVICES

CHAOS
MICROSERVICES

CHAOS

YAY! AS LONG AS IT'S OBSERVABLE.

WITH CHAOS, WE GET RESILIENCY.
OBSERVABILITY

WHAT WENT WRONG, WHERE AND WHY

METRICS, LOGS, TRACING
OBSERVABILITY

by @peterbourgon

source: https://peter.bourgon.org/blog/2017/02/21/metrics-tracing-and-logging.html
DISTRIBUTED TRACING

STORY OF A REQUEST ACROSS SERVICES

WHICH SERVICES WERE TOUCHED, WHEN, IN WHICH ORDER, WITH INSTANCE INFORMATION (ROUTING INFO, VERSION, TAGS, ...)

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DISTRIBUTED TRACING

MEASURES UNITS OF WORK
STORES IN A DATA STRUCTURE CALLED "SPAN"

REFERENCES OTHER SPANS
CAUSALITY!

CONTEXT PROPAGATION

MOST OF IT IS SIMILAR TO CORRELATION ID

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DISTRIBUTED TRACING

OUR CODE

chargeCreditCard();
changeOrderStatus();
dispatchEventToInventory();
```java
try (Scope scope = tracer.buildSpan("submitOrder").startActive(true)) {
    chargeCreditCard();
    changeOrderStatus();
    dispatchEventToInventory();
}
```
try (Scope scope = tracer.buildSpan("submitOrder").startActive(true)) {
    scope.span().setTag("order-id", "c85b7644b6b5");
    chargeCreditCard();
    changeOrderStatus();
    dispatchEventToInventory();
}
DISTRIBUTED TRACING
OPENTRACING

SPECIFICATION
WHAT'S A TRACE, WHAT'S A SPAN, ...

INSTRUMENTATION API
OFFICIAL APIS FOR GO, JAVASCRIPT, JAVA, PYTHON, RUBY, PHP, OBJECTIVE-C, C++, C#
CAN BE USED WITH COMPATIBLE TRACERS, LIKE ZIPKIN, JAEGGER, ...
OPENTRACING

SPAN

- OPERATION NAME
- START/FINISH TIMESTAMP
- TAGS, AS KEY-VALUE PAIRS
- LOGS
- REFERENCES (FOLLOWS-FROM, CHILD-OF)
- SPAN CONTEXT

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SPAN CONTEXT

- BAGGAGE ITEMS
- IMPLEMENTATION-SPECIFIC STATE, LIKE:
  * TRACE ID
  * SPAN ID

THIS IS WHAT IS SENT ACROSS PROCESS BOUNDARIES (INJECTED/EXTRACTED)
OPENTRACING

TRACER

- Builds spans captured by the instrumentation
- Writes spans somewhere
- Performs inject/extract operations

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OPENTRACING

FRAMEWORK, STACK, PLATFORM

JAX-RS, JDBC, SERVLET, ...
SPRING BOOT, MICROPROFILE, BYTECODE MANIPULATION, ...

AND MORE

GITHUB.COM/OPENTRACING-CONTRIB
OPENTRACING IS NOT A TRACING SOLUTION

NO BACKEND
NO WIRE SPEC
NO PROVISIONS FOR VENDOR INTEROPERABILITY

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JAEGGER

IT'S NOT OPENTRACING

CONCRETE OPENTRACING TRACER AND THE BACKEND COMPONENTS

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