

Application Monitoring and Tracing in Kubernetes Avoiding Microservice Hell

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Agenda

Why do we care?

Introduction to Metrics

Introduction to Tracing

Demo

Q&A

Why do we care?

Microservices Are Awesome!

Discrete Set of Functionality

Resilient / Tolerates Failure

Distributed / Highly Scalable

Technology Freedom

Autonomy of Dev Teams

Enables Continuous Delivery



Can Be Your Worst Nightmare!

Complex to Build

Decentralized Nature

Interface / Docs Required

Operational Complexity

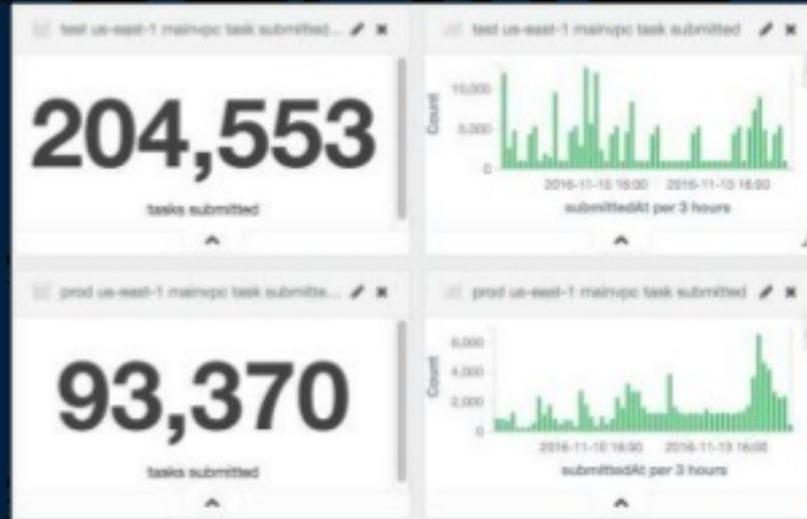
Transaction Management

Visibility is Difficult



Microservices at Scale

Titus Batch Usage (Week of 11/7)



- Started ~ 300,000 containers during the week
- Peak of 1000 containers per minute
- Peak of 3,000 instances (mix of r3.8xls and m4.4xls)

<https://www.slideshare.net/aspyker/reinvent-2016-container-scheduling-execution-and-aws-integration>

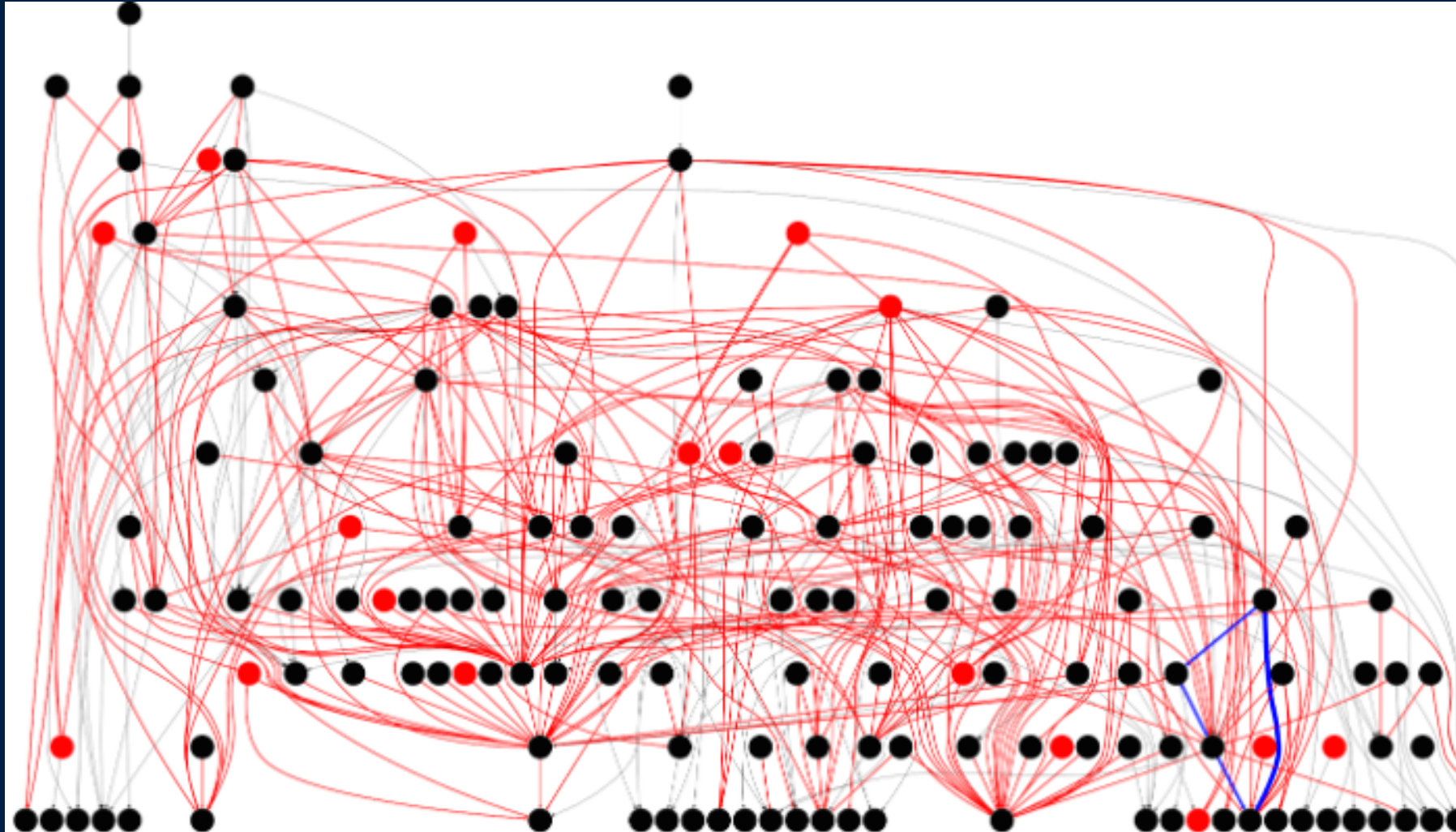
Simple Failures



Complex Failures



Who is Talking to Who?



One Bad Apple...



Logs Aren't Enough



Gain Visibility Now!



The Answer is...

Metrics/Instrumentation

- Measure properties of a given system
- Alarms and Notifications



Tracing

- Observe interactions at a request level
- Measure work in time



Introduction to Metrics

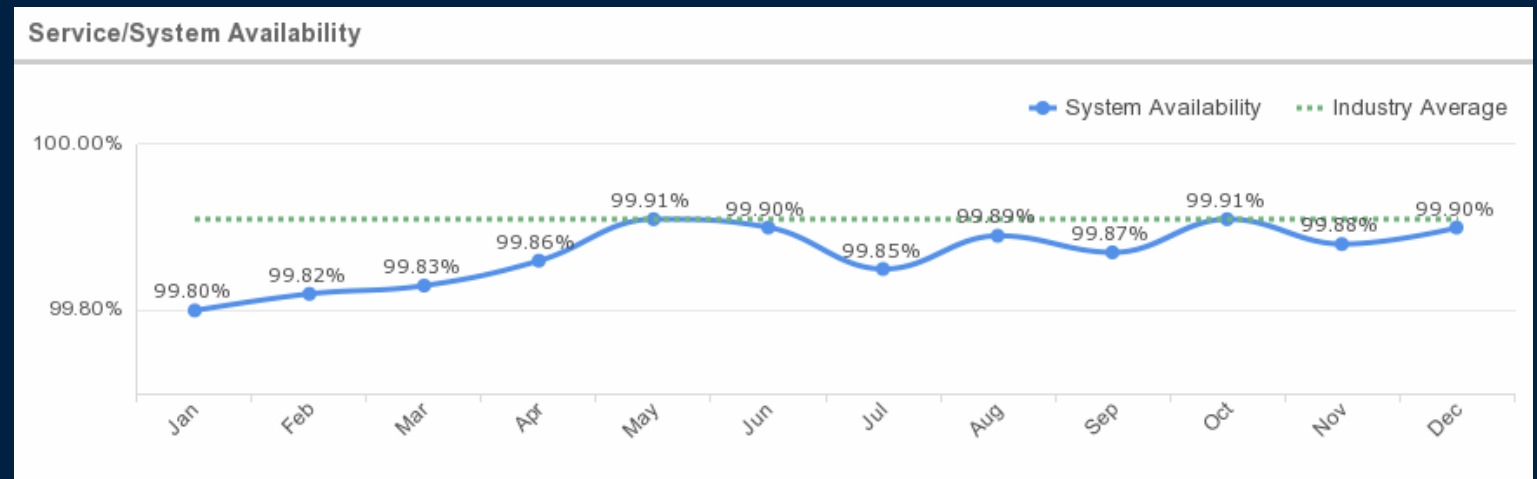
What are Metrics?

Metrics are a quantifiable set of measurements of a property for a given system, process, or component.

- Performance counters
- Instrumentation

Observe behavior

React to changes



Prometheus

Open-source systems monitoring and alerting project

Cloud Native Computing Foundation (CNCF) hosted project

Originally built by SoundCloud

Data model with time series data



<https://github.com/prometheus/prometheus>

Types of Measurements

Counter – only increases in value

Gauge – value goes up or down over time

Histogram – samples observations and counts them over buckets

Summary – histogram plus a summation of value



Alerts

Create rules based on observed metrics

Alerts trigger actions to be taken

- Email
- Slack
- Webhooks

Why do we care?

- Enables dynamic scale up and down



Prometheus Language Bindings

15 official and community supported libraries

- Go, Java, Python, Ruby, C++, etc

<https://prometheus.io/docs/instrumenting/clientlibs/>



Introduction to Tracing

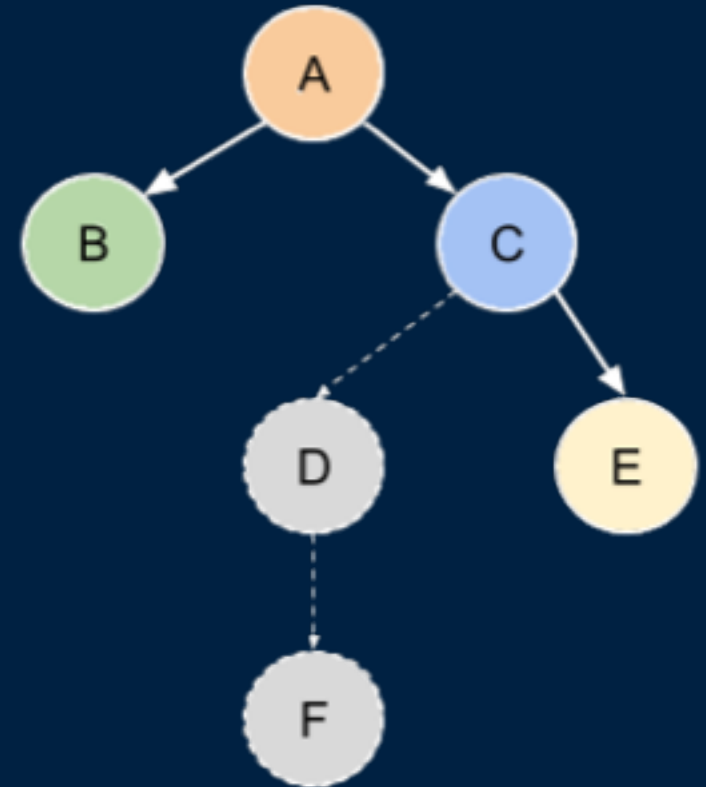
What is Tracing?

Enables observability of a given transaction as it moves through a (distributed) system

Allows visualization of which microservice instances are involved

Tracks the path through the software stack + time metrics

"New user signup" route



Jaeger

Open-source distributed tracing system

CNCF hosted project

Originally built by Uber

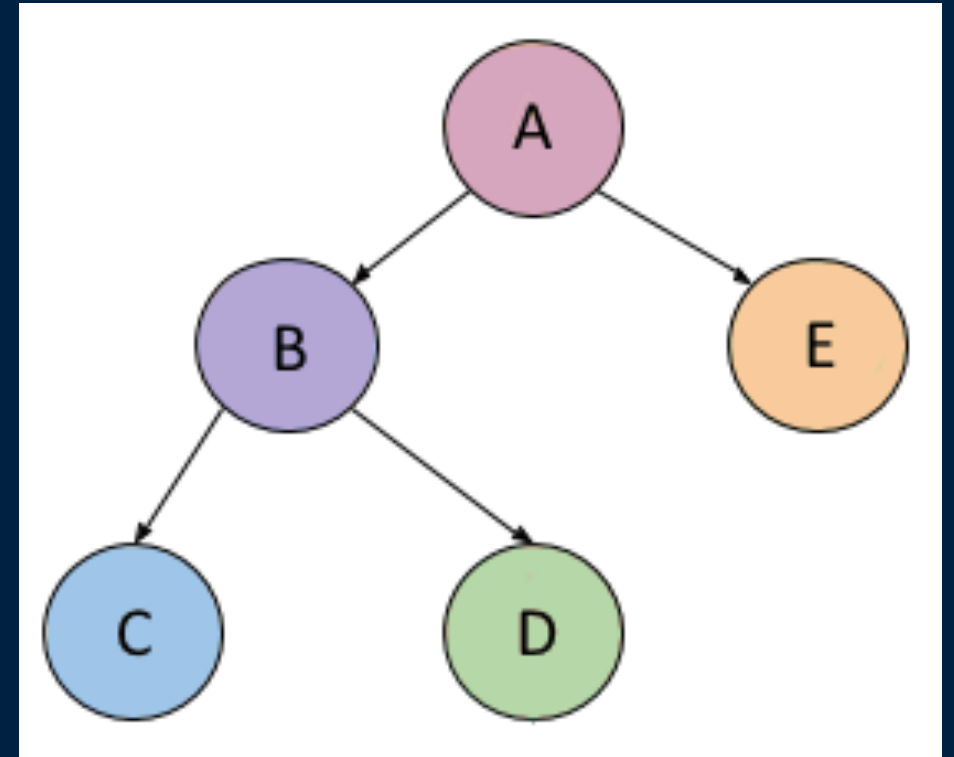
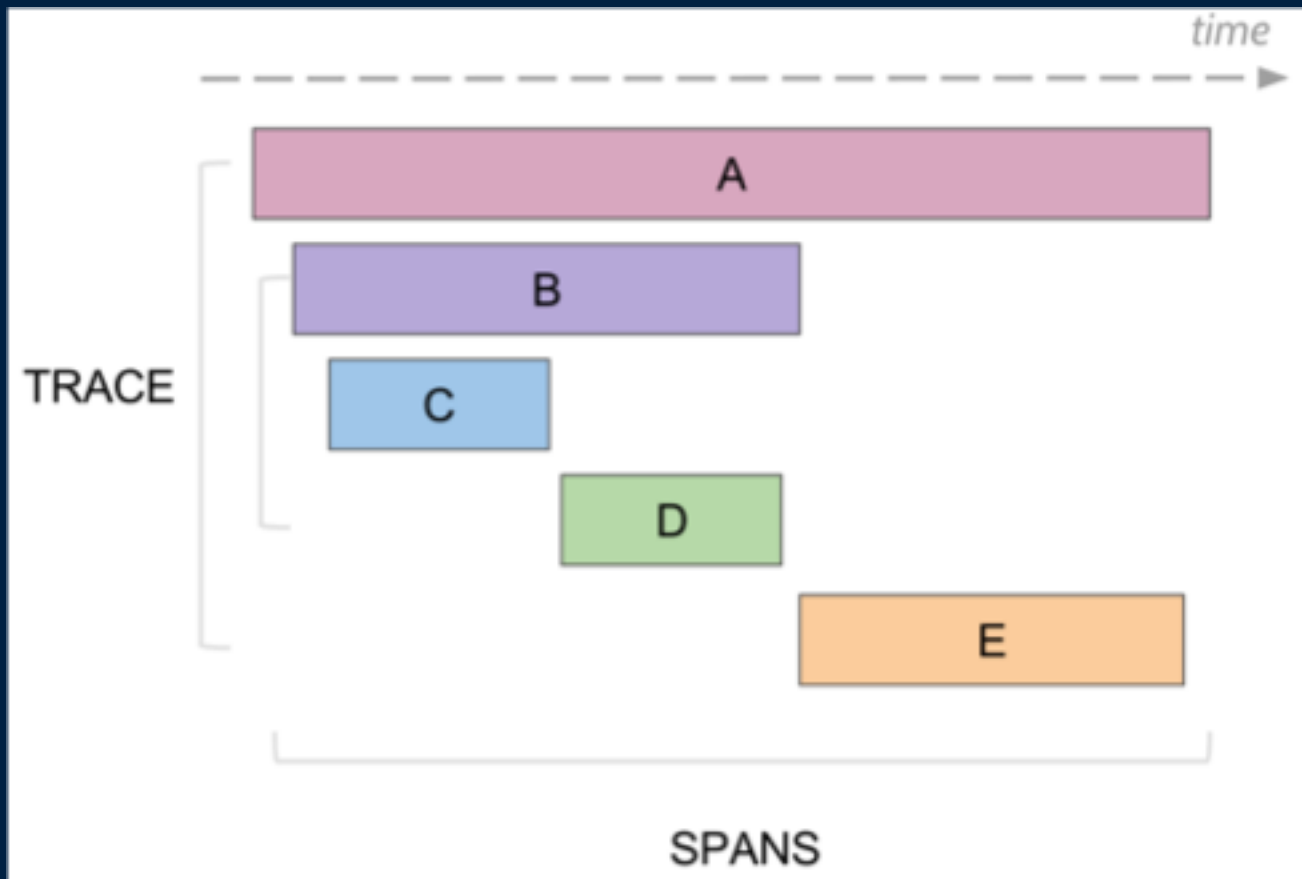
OpenTracing compatible

Root cause and observe performance

<https://github.com/jaegertracing/jaeger>



Traces and Spans



Jaeger Language Bindings

5 official and bunch of community supported libraries

- Go, Java, Python, node, C++
- http://jaeger.readthedocs.io/en/latest/client_libraries/



Metrics vs Tracing

Metrics

- Gives a singular per node, instance, or component view of the world
- Health checks, performance monitoring, etc
- Alerts and reaction to change

Tracing

- Follows a single transaction, API call, etc through a given system or application
- Think what a stack trace provides except tracing is doing it in a distributed fashion

Demo

Demo



Demo Configuration

Kubernetes 1.9

Prometheus 2.2

Jaeger 1.5

How-to:

[https://github.com/dvonthenen/proposals/tree/master/
2018_OSS_JAPAN](https://github.com/dvonthenen/proposals/tree/master/2018_OSS_JAPAN)



Thank You / Q&A