# Application Monitoring and Tracing in Kubernetes: Avoiding Microservice Hell!

David vonThenen
@dvonthenen
http://dvonthenen.com
github.com/dvonthenen

# Agenda

- Why do we care?
- Introduction to Metrics
- Introduction to Tracing
- Demo


Why do we care?

# Microservices Are Awesome!

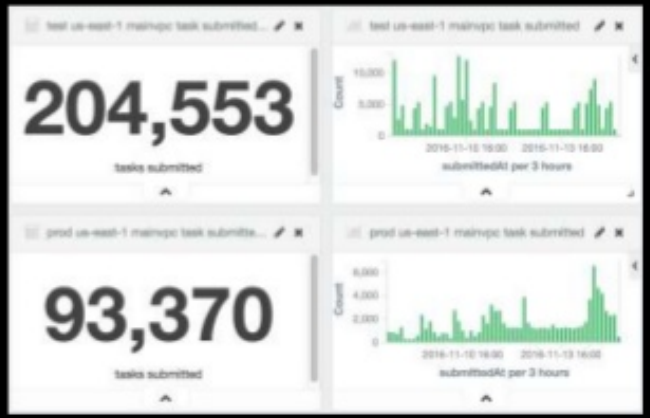
- Discrete Set of Functionality
- Resilient / Tolerates Failure
- Distributed / Highly Scalable
- Technology Freedom
- Autonomy of Dev Teams
- Enables Continuous Delivery

# Can Be Your Worst Nightmare!

- Complex to Build
- Decentralized Nature
- Interface / Docs Required
- Operational Complexity
- Transaction Management
- Visibility is Difficult

# Microservices at Scale (Excuse the pun)

## Titus Batch Usage (Week of 11/7)



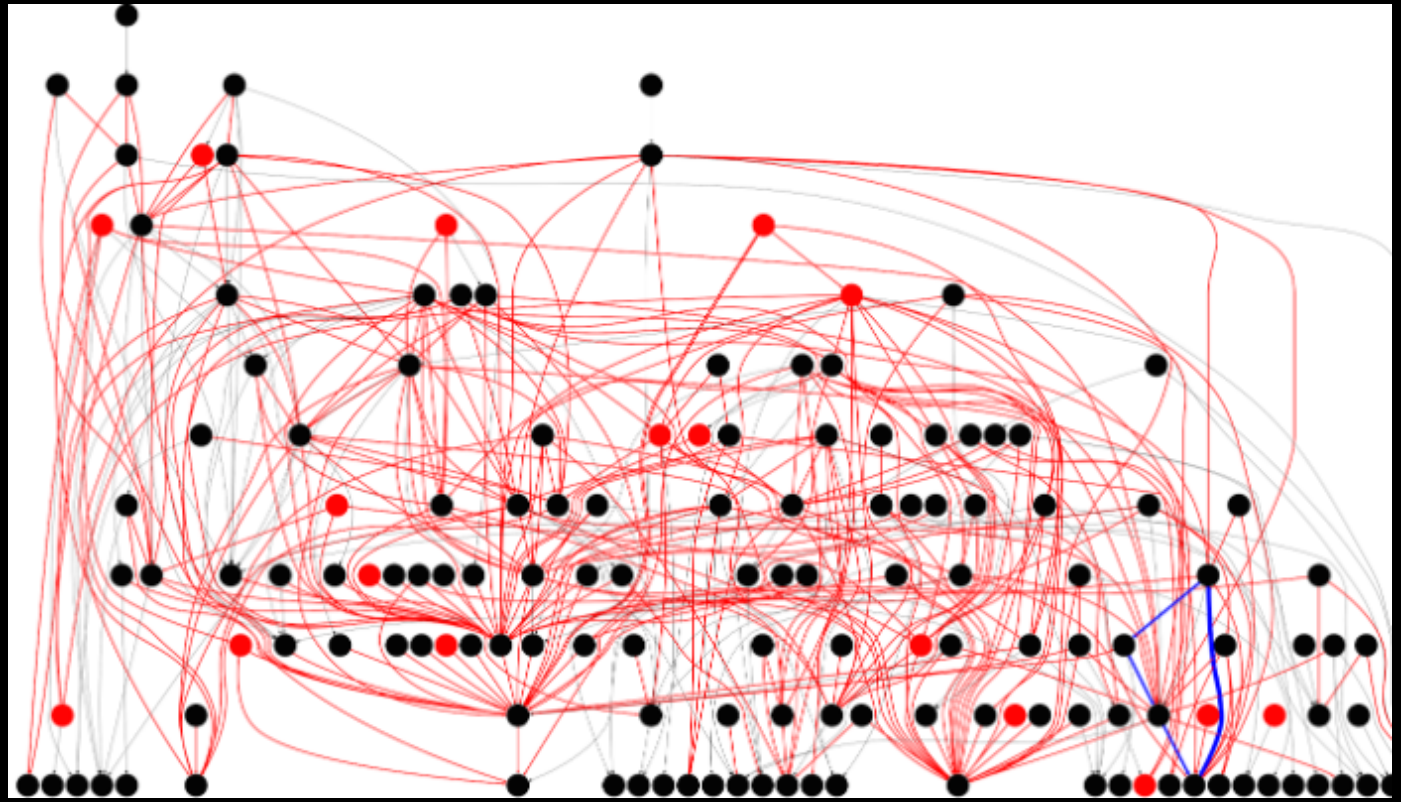

- Started ~ 300,000 containers during the week
- Peak of 1000 containers per minute
- Peak of 3,000 instances (mix of r3.8xls and m4.4xls)

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…

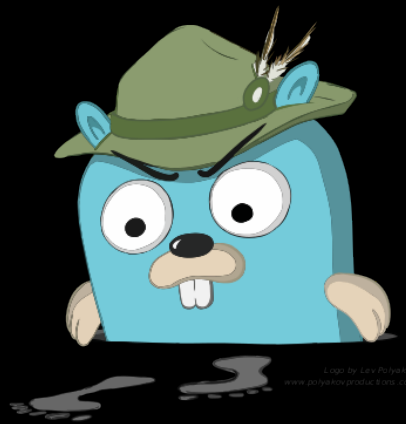
# Logs Aren’t Enough

# Gain Visibility Now!

# The Answer is…

- Metrics/Instrumentation
  - Measure properties of a given system
  - Alarms and Notifications

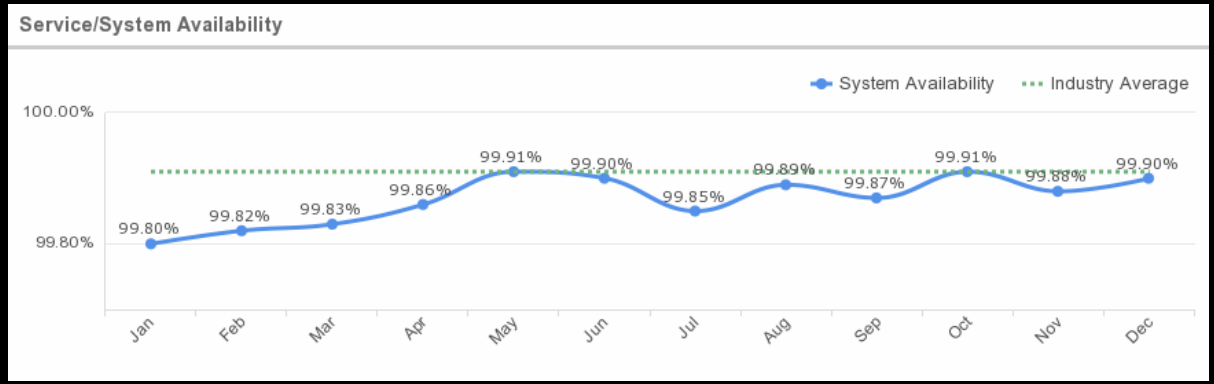
- Tracing
  - Observe interactions at a request level
  - Measure work in time



# 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



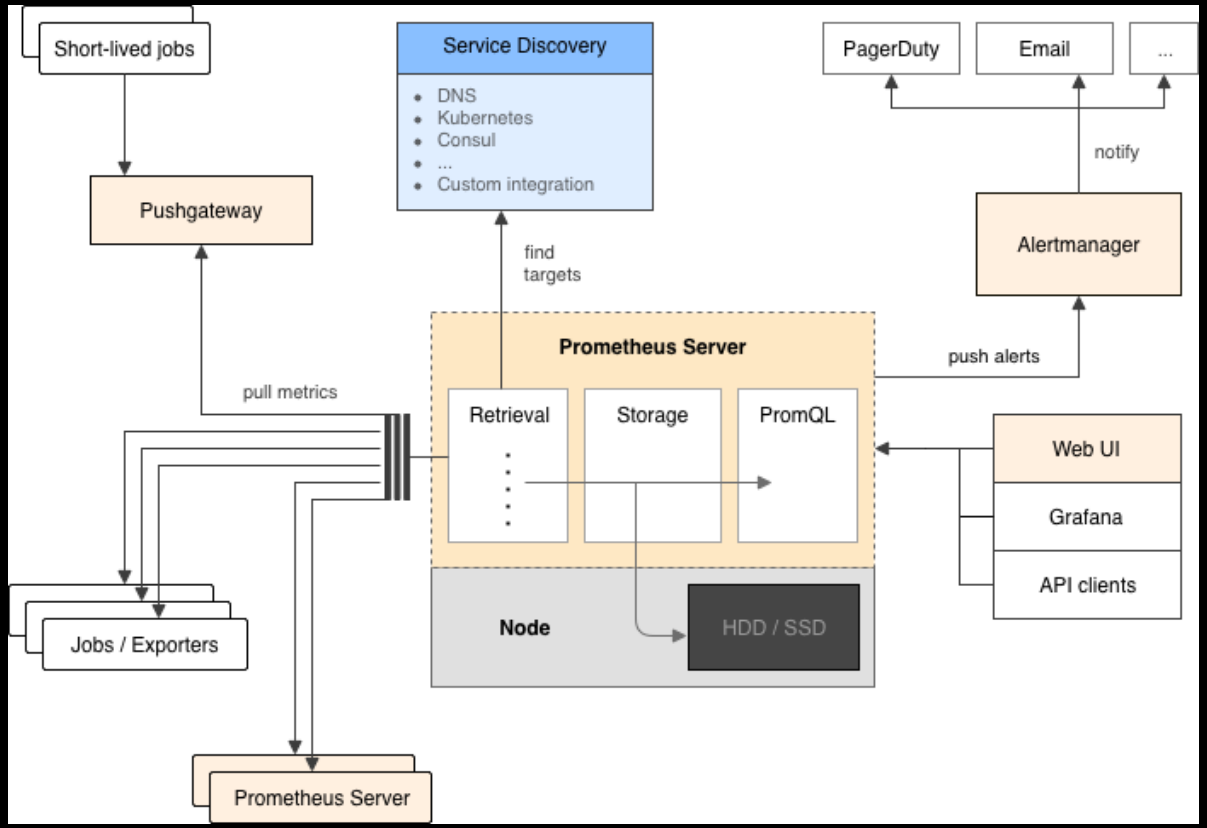
# Prometheus

- Open-source systems monitoring and alerting project
- Cloud Native Compute Foundation (CNCF) hosted project
- Originally built by SoundCloud
- Data model with time series data
- https://github.com/prometheus/prometheus

# Let’s Deploy Prometheus


+

# Architecture



# Types of Metrics

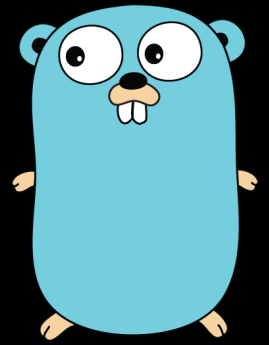
- Counter – only increases in value
- Gauge – value goes up or down over time
- Histogram – samples observations and counts them over buckets
- Summary – histogram plus a summation of value

# 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/

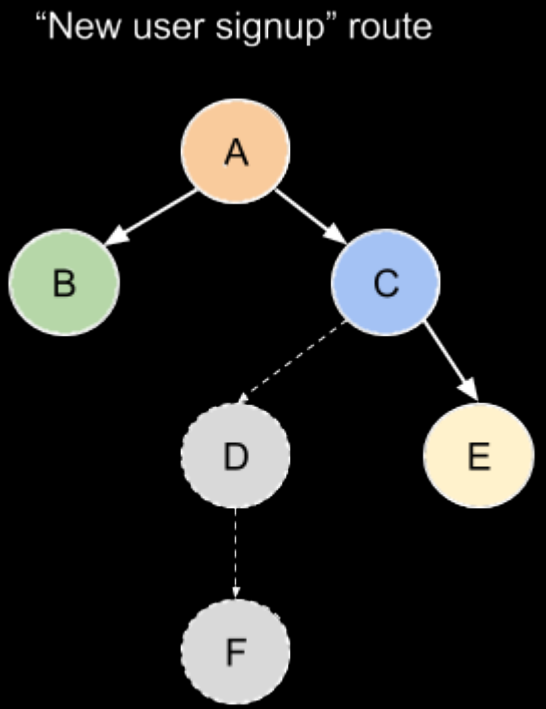




Introduction to Tracing

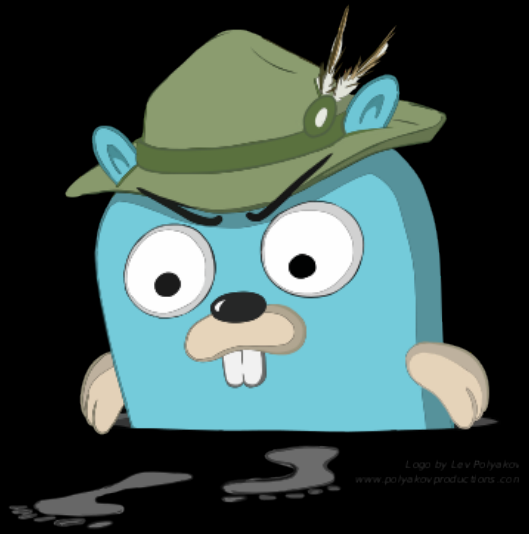
# What is Tracing?

- 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



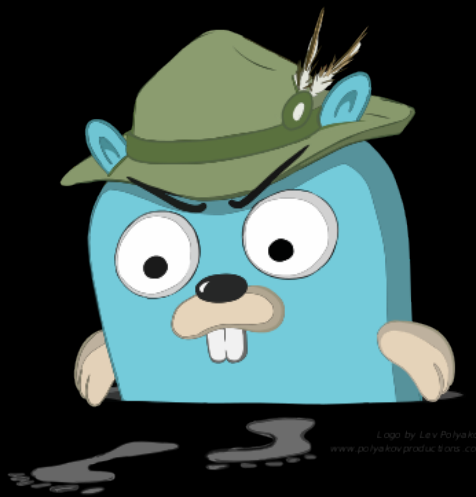
# Jaeger

- Open-source distributed tracing system
- CNCF hosted project
- Originally built by Uber
- OpenTracing compatible
- Root cause and observe performance
- https://github.com/jaegertracing/jaeger

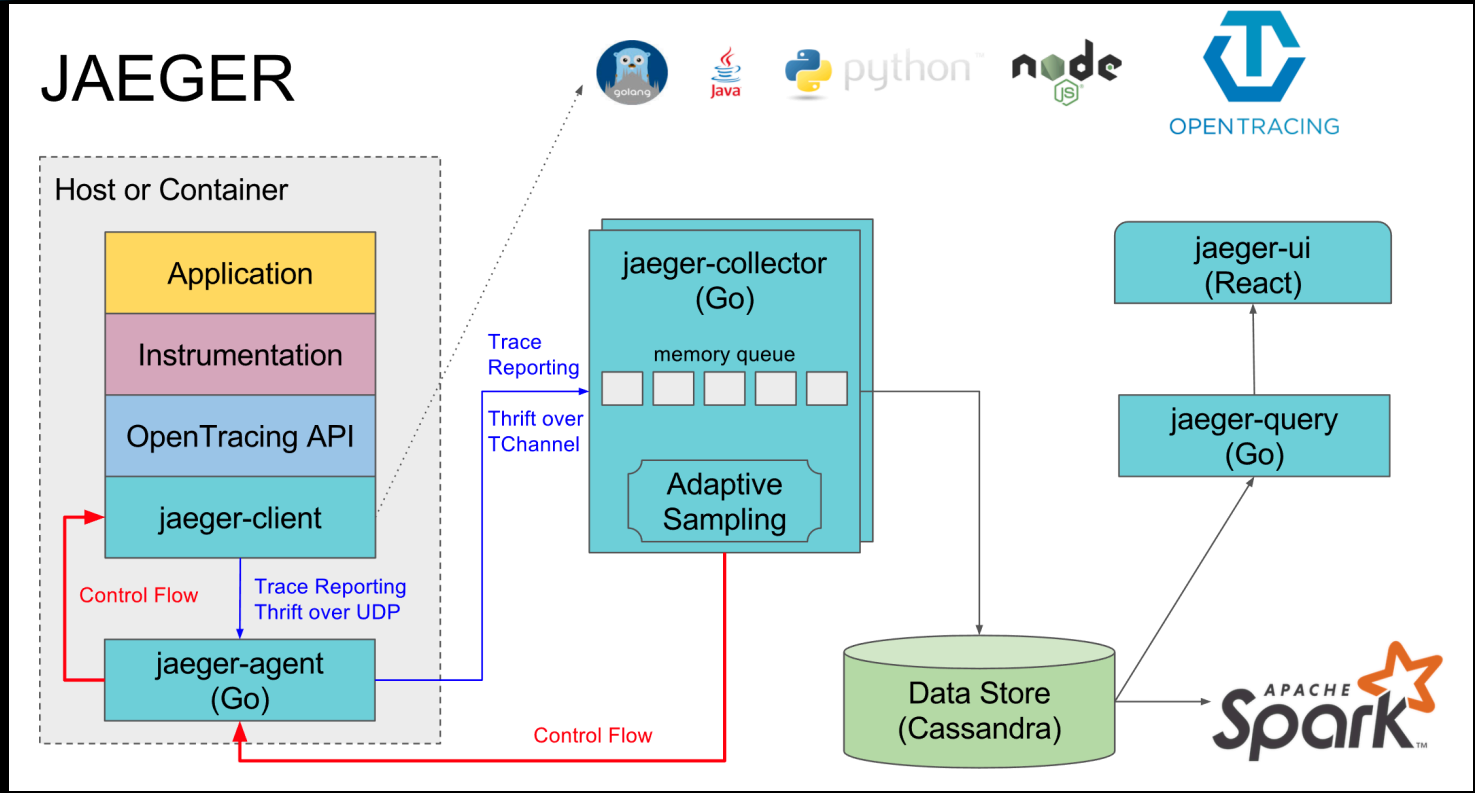


# Let’s Deploy Jaeger

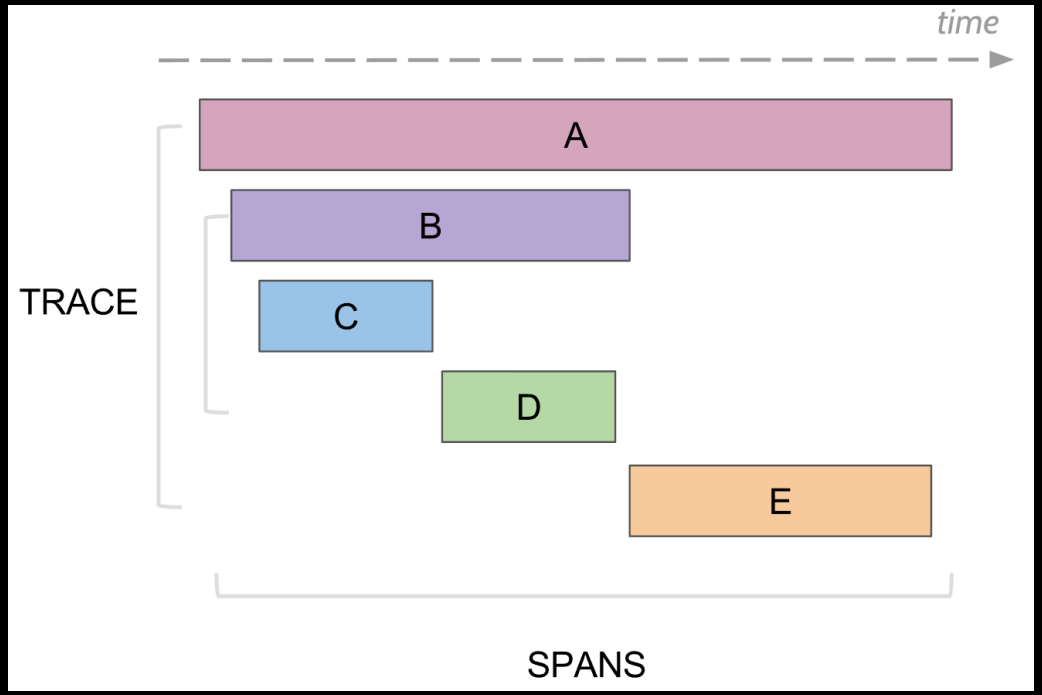

+

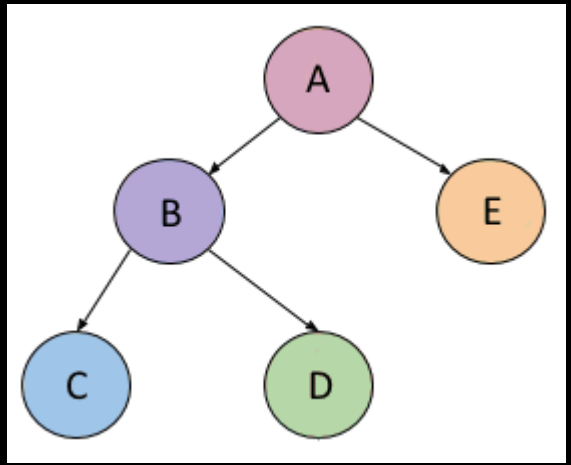


# Architecture



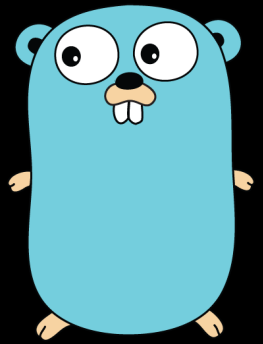
# Traces and Spans



# 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
- Tracing
  - Follows a single transaction, API call, etc
  - Think what a stack trace provides except tracing is doing it in a distributed fashion

# Demo

# Demo Time!

# Demo Configuration

- Kubernetes 1.7
- Prometheus 2.1
- Jaeger 1.1
- How-to: https://github.com/dvonthenen/proposals/tree/master/2018_SCALE16

# Thank You

David vonThenen
{code} – Dell Technologies
@dvonthenen
http://dvonthenen.com
github.com/dvonthenen