Kubernetes Observability Scorecard

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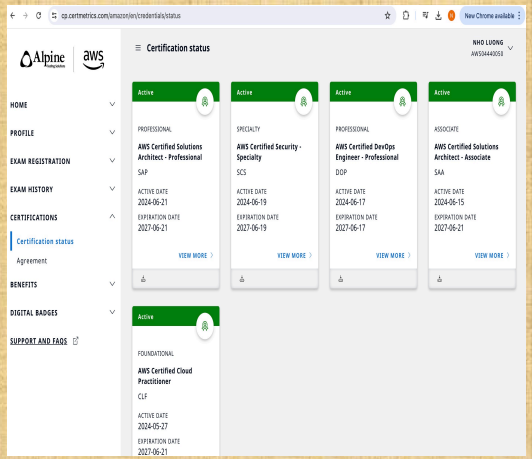

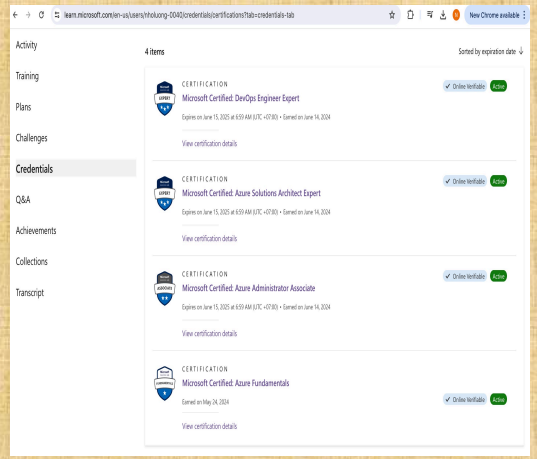

First, a Critique

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The Conventional Wisdom

Observing microservices is hard

Google and Facebook solved this (right???)

They used Metrics, Logging, and Distributed Tracing …

So we should, too.

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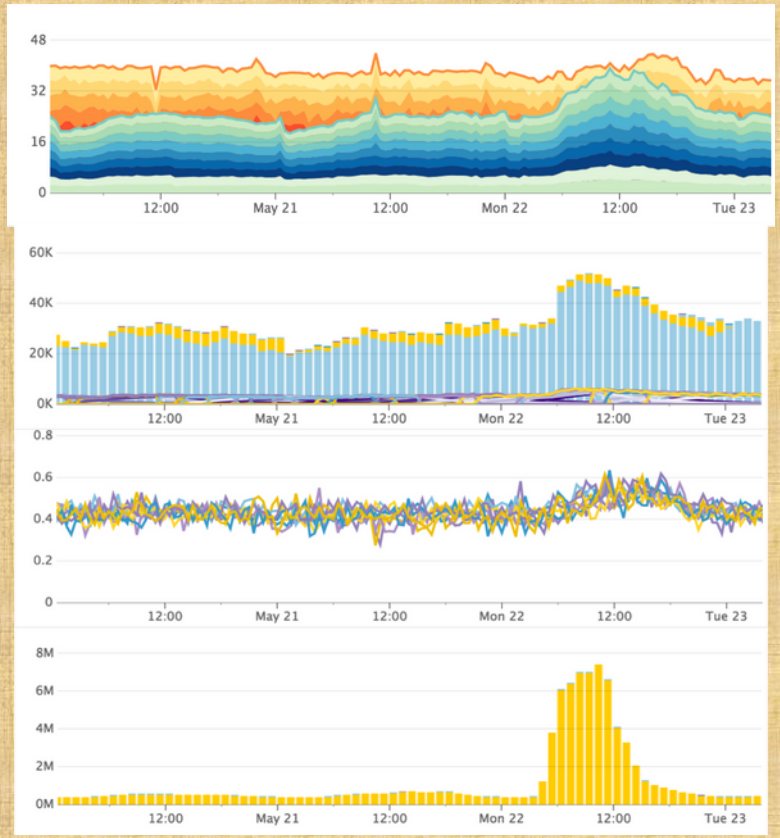
Metrics!



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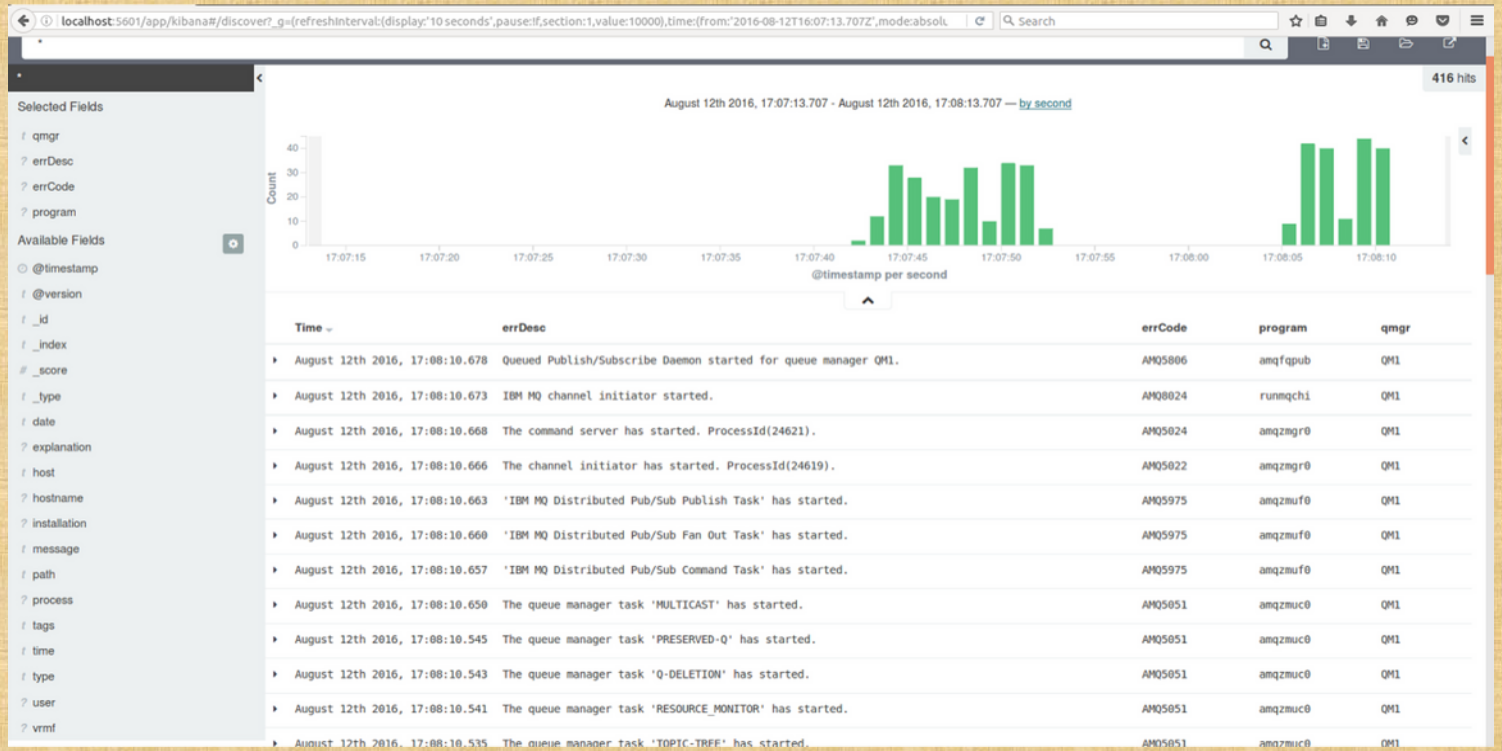
Logging!



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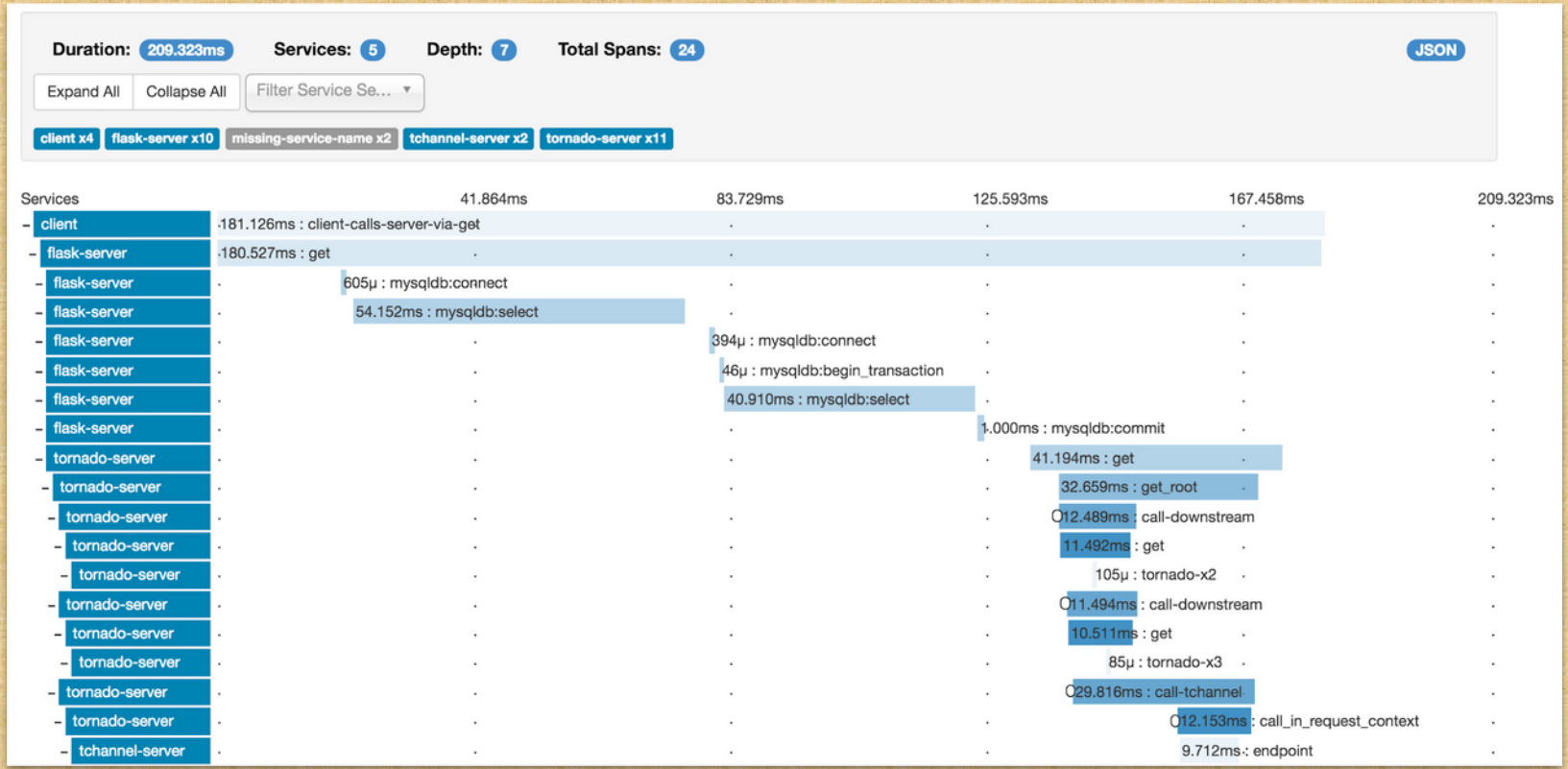
Tracing!



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Fatal Flaws

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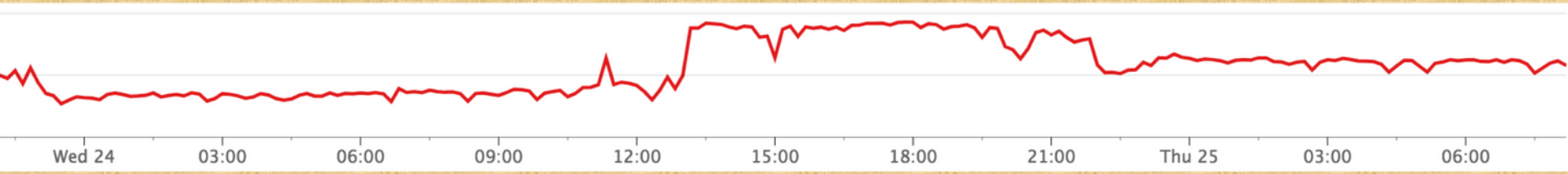
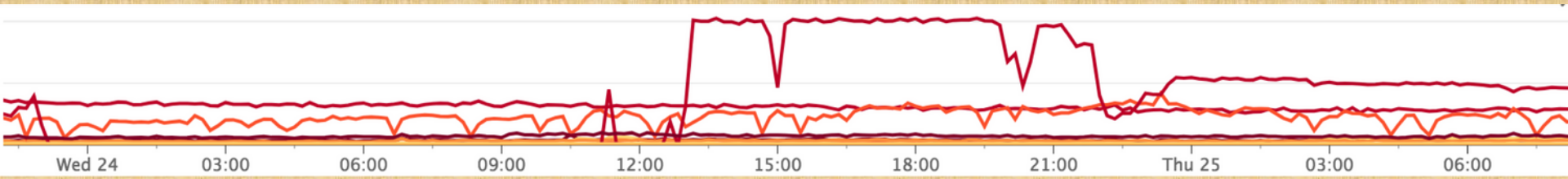
A word nobody knew in 2015...

Dimensions (aka “tags”) can explain variance in timeseries data (aka “metrics”) ...

... but cardinality





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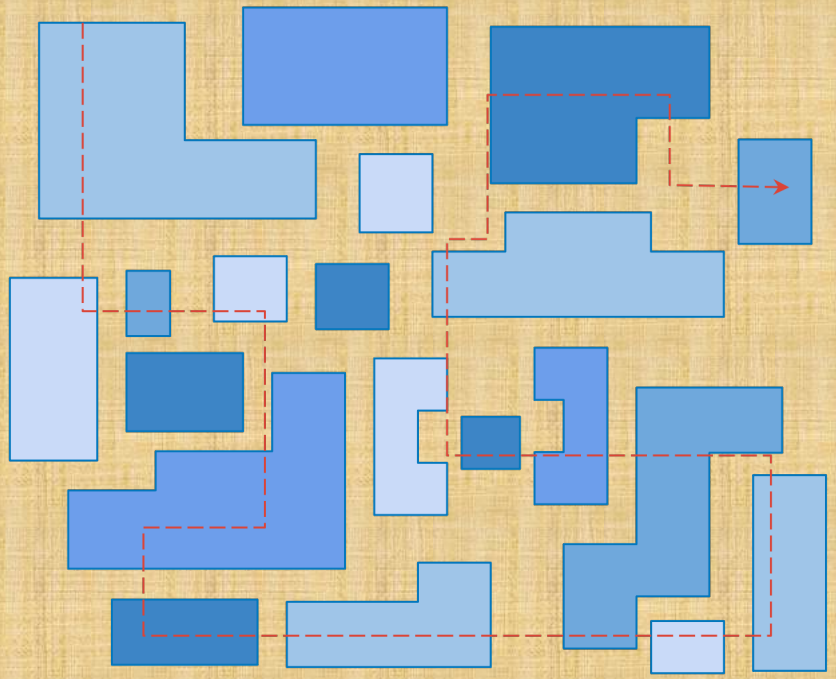
Logging Data Volume: a reality check



transaction rate all
x microservices cost of
x net+storage weeks of
retention
x ----------
----
way too much $$$$

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The Life of Transaction Data: Dapper

Stage	Overhead affects...	Retained
Instrumentation Executed	App App App Regional	100.00%
Buffered within app	network + storage WAN +	000.10%
process Flushed out of	storage	000.10%
process Centralized		000.10%
regionally Centralized		000.01%
globally		

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Fatal Flaws: A Review

	Logs	Metrics	Dist. Traces
TCO scales gracefully	–	√	√
Accounts for all data (i.e., unsampled)	√	√	–
Immune to cardinality	√	–	√

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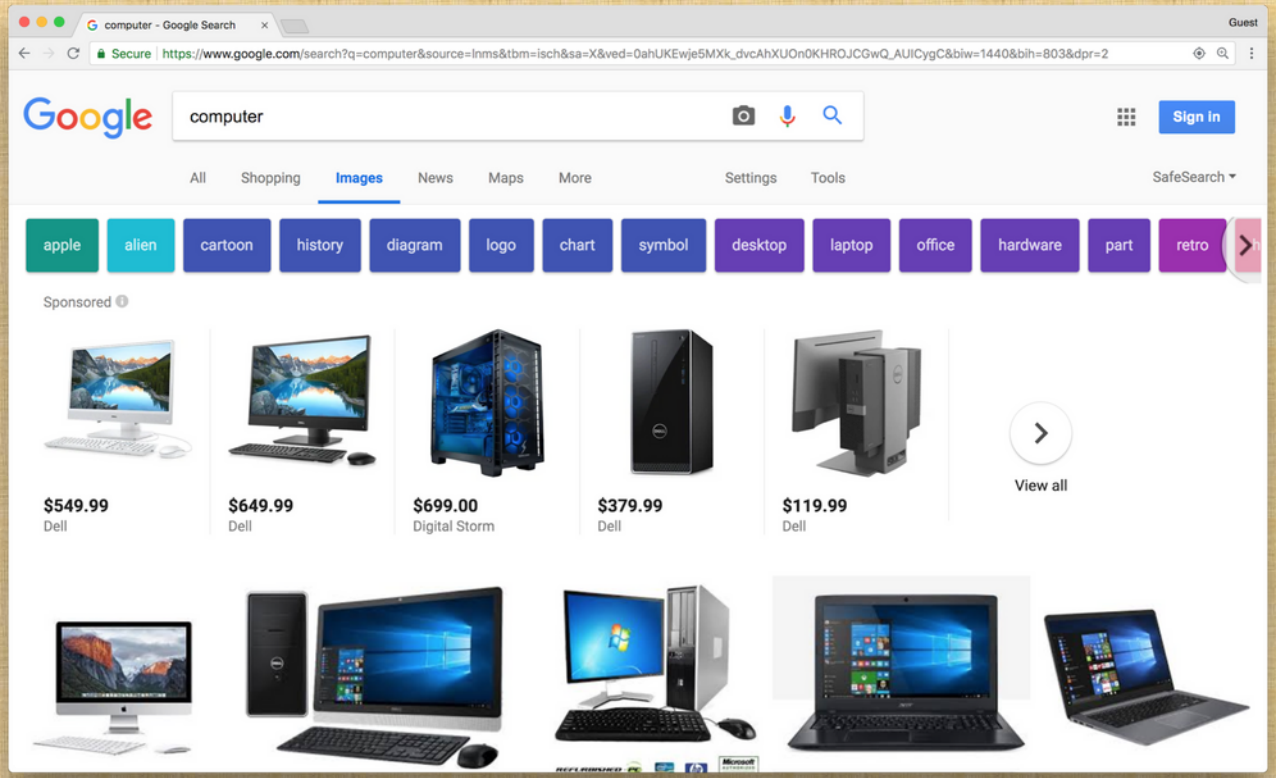
Data vs UI



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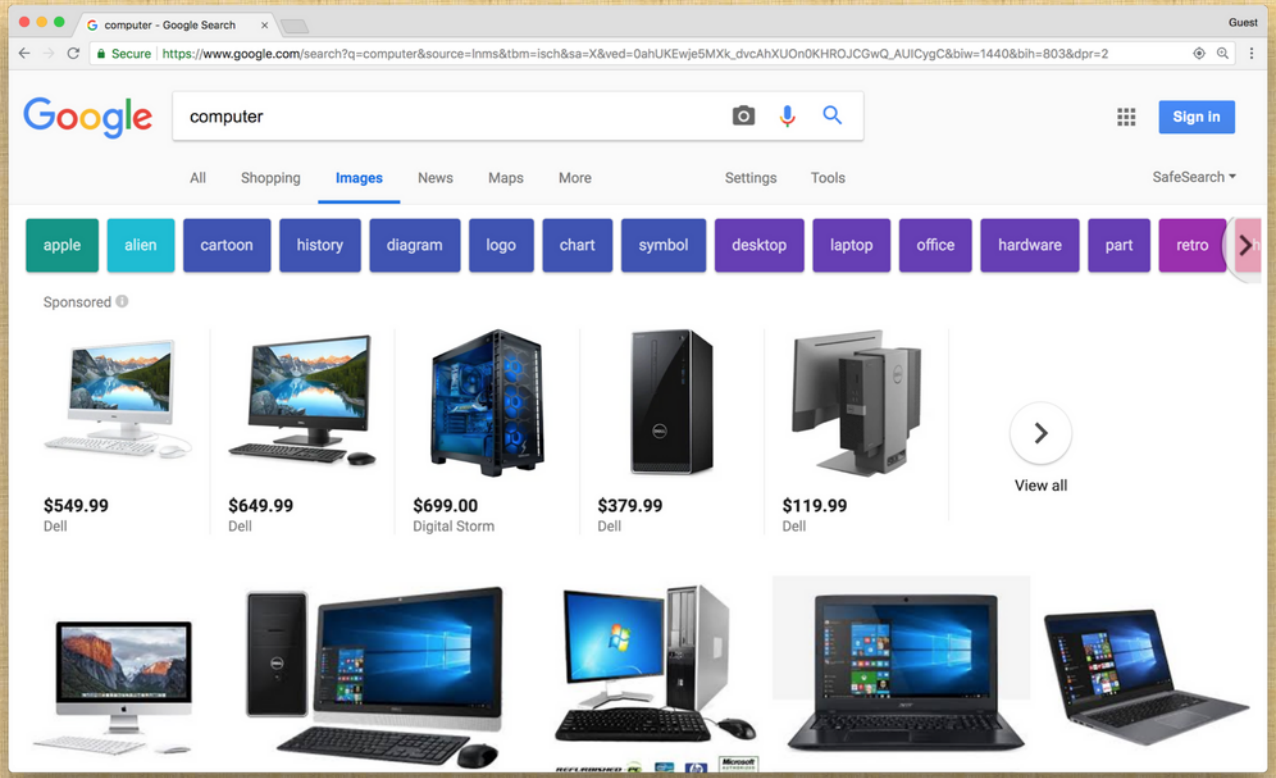
Data vs UI



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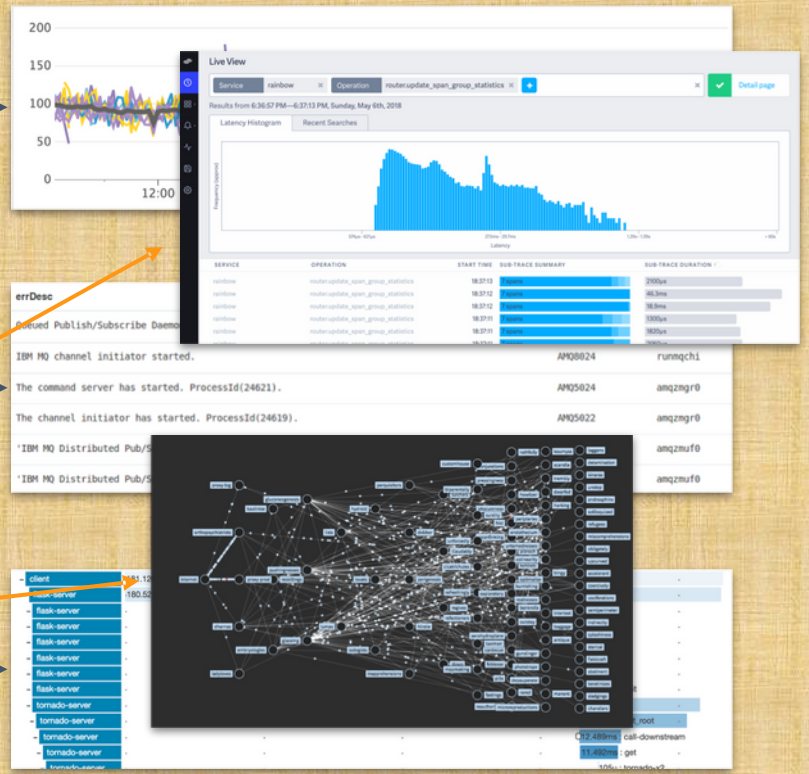
Data vs UI

Metrics

Logs

Traces



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Metrics, Logs, and Traces are Just Data,

... not a feature or use case.

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A New Scorecard for Observability

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Observability: Quick Vocab Refresher

"SLI" = "Service Level Indicator"

TL;DR: An SLI is **an indicator of health** that a service's **consumers** would care about.

... *not* an indicator of its inner workings

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Observability: Two Fundamental **Goals**

-Gradually improving an SLI

-Rapidly restoring an SLI

Reminder: “SLI” = “Service Level Indicator”

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Observability: Two Fundamental **Activities**

1. Detection: perfect SLI capture
2. Refinement: reduce the search space

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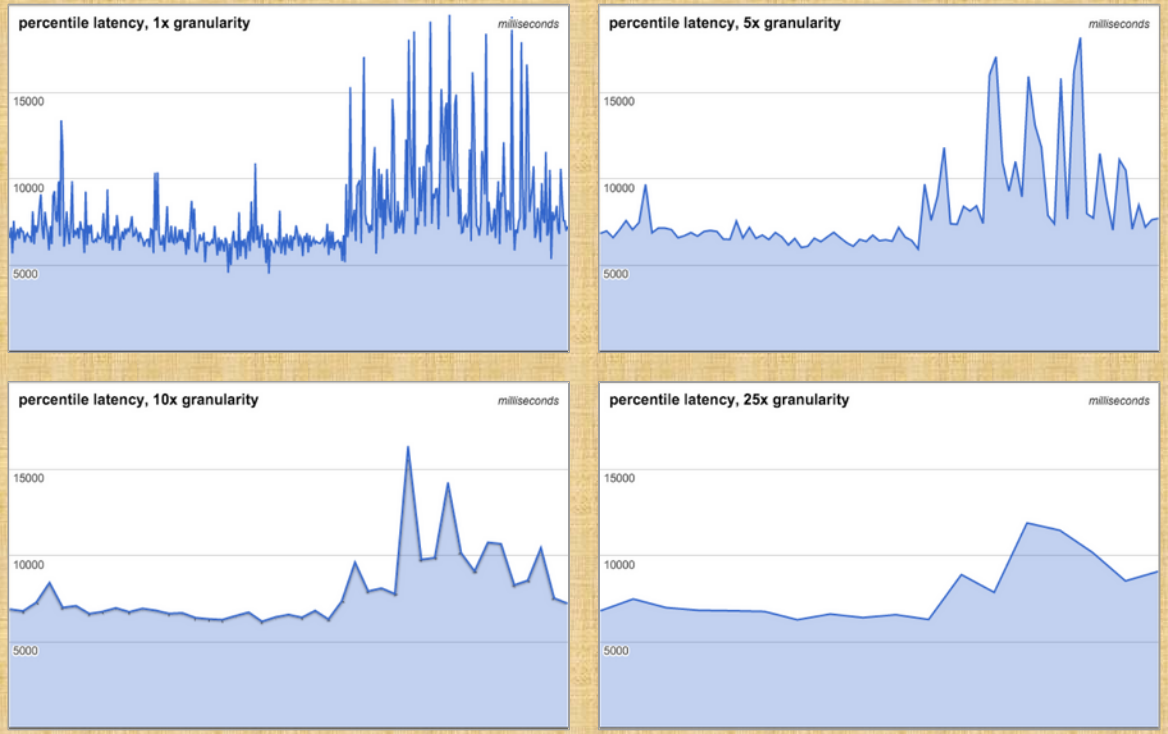
An interlude about stats frequency



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Scorecard >> **Detection**

Specificity:

- Arbitrary dimensionality and cardinality
- Any layer of the stack, including mobile+web!

Fidelity:

- Correct stats!!!
- High stats frequency (i.e., “beware smoothing”!)

Freshness: ≤ 5 second lag

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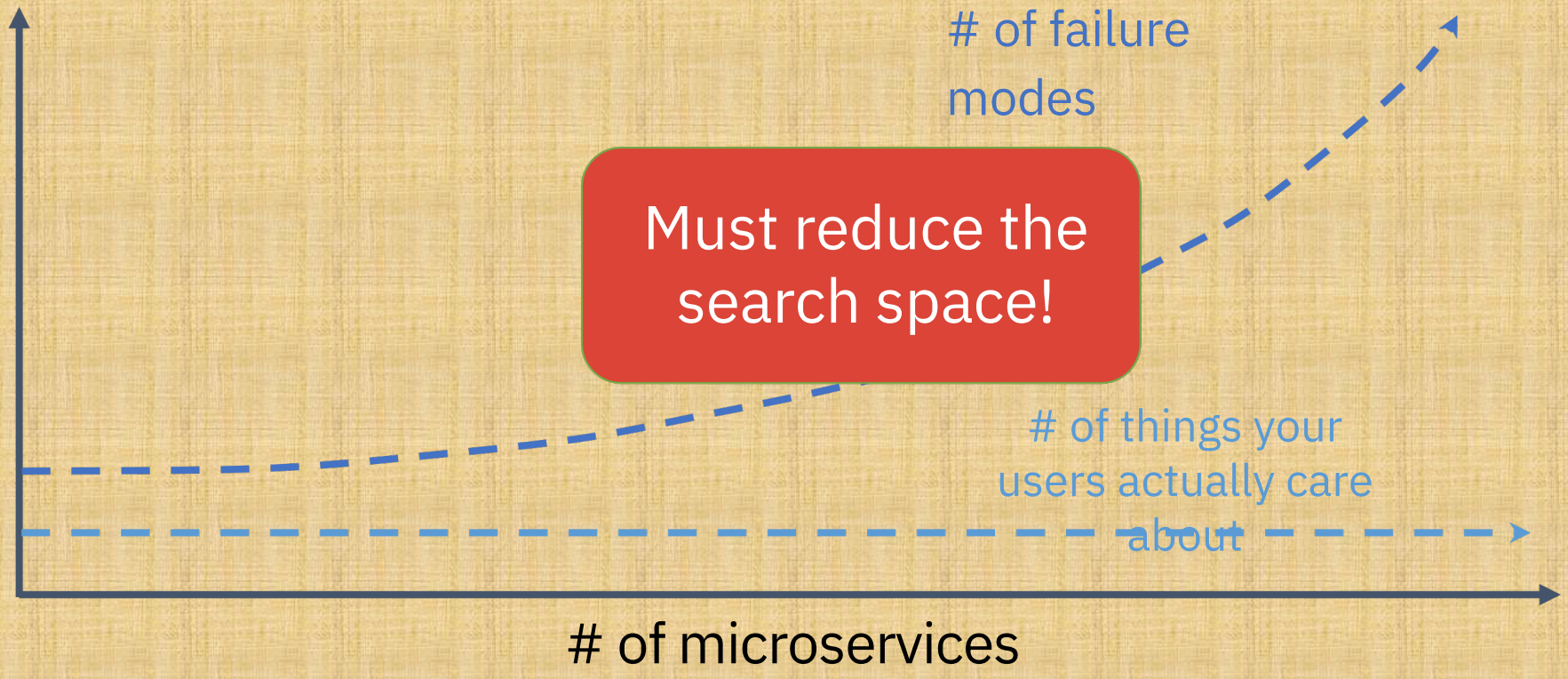
Scorecard >> **Refinement**



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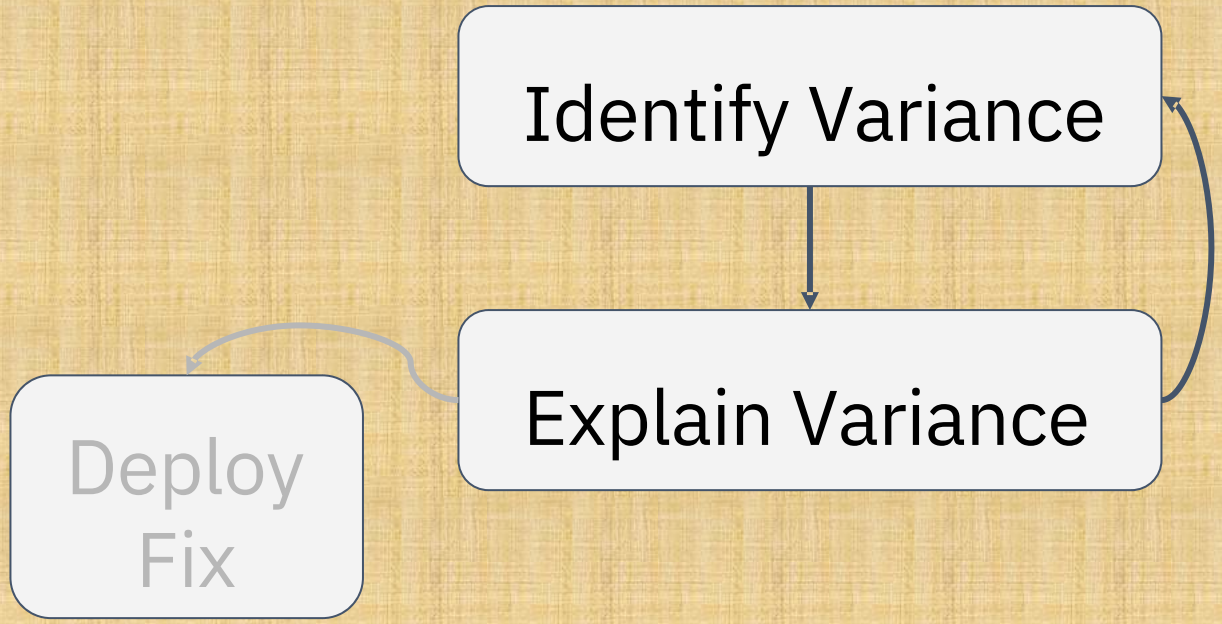
Scorecard >> **Refinement**



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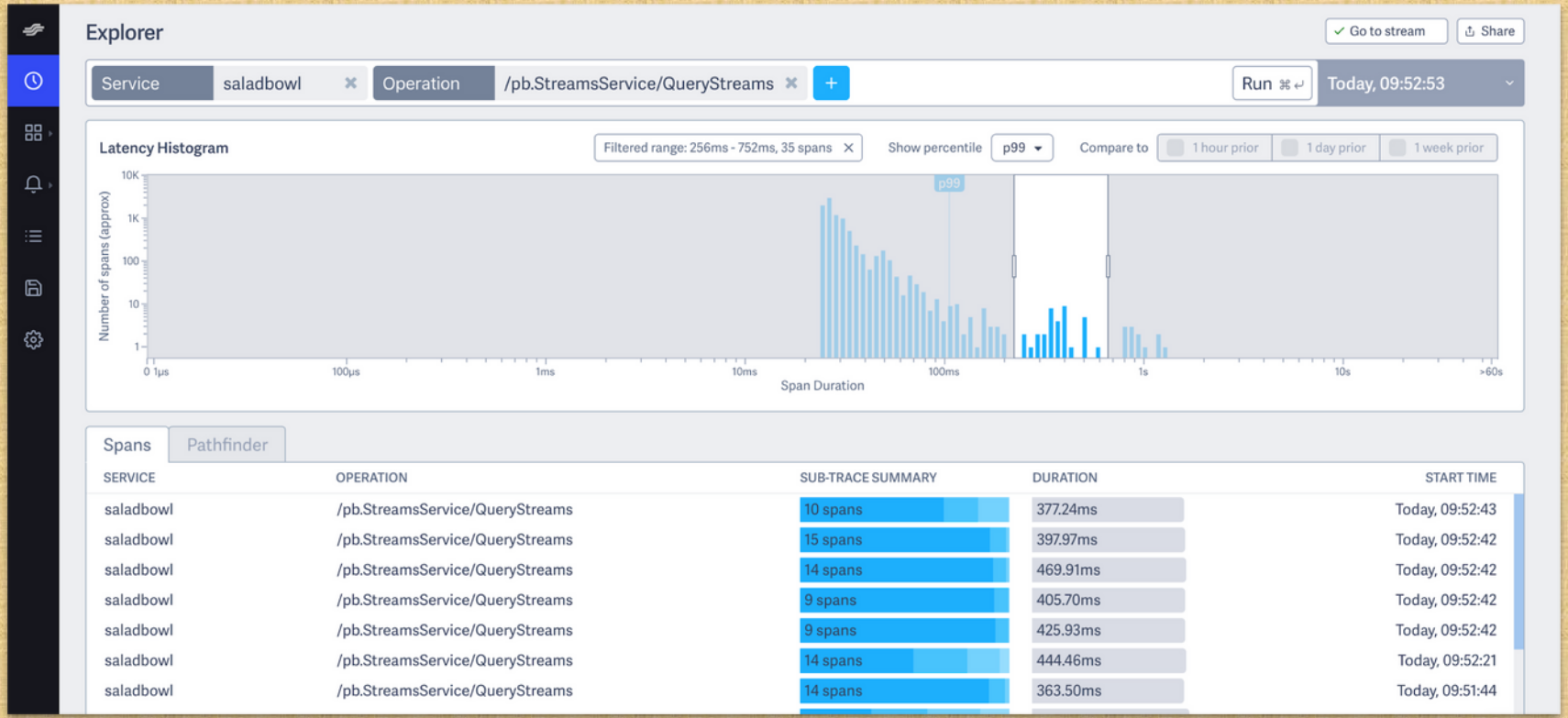
An interlude about variance and “p99”



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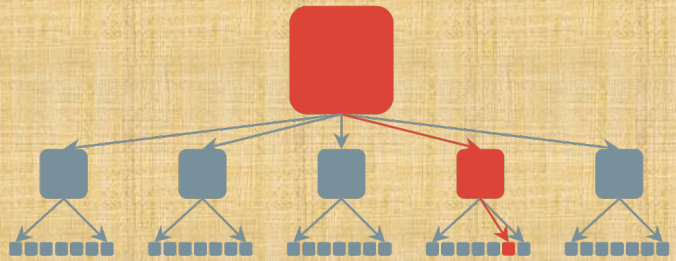
Scorecard >> **Refinement**



Identifying Variance:

- Cardinality: understand which tag changed
- Robust stats: *histograms*(see prev slide)

-Data retention: always “Know What’s Normal”

Explaining variance:

- Correct stats!!!
- “Suppress the messengers” of microservice failures

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Wrapping up...

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(first, a hint at my perspective)

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(Review)

The Life of Transaction Data: Dapper

Stage	Overhead affects...	Retained
Instrumentation Executed	App App App Regional	100.00%
Buffered within app process	network + storage WAN +	000.10%
Flushed out of process	storage	000.10%
Centralized regionally		000.10%
Centralized globally		000.01%

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The Life of Transaction Data: ~~Dapper~~LightStep

Stage	Overhead affects...	Retained
Instrumentation Executed	App App App Regional	100.00%
Buffered within app process	network + storage WAN +	100.00%
Flushed out of process	storage	100.00%
Centralized regionally		100.00%
Centralized globally		on-demand

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An Observability Scorecard

Detection

- Specificity: unlimited cardinality, across the entire stack Fidelity:
- correct stats, high stats frequency
- Freshness: ≤5 seconds

Refinement

- Identifying variance: unlimited cardinality, hi-fi histograms, data retention
- “Suppress the messengers”

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Extra slides

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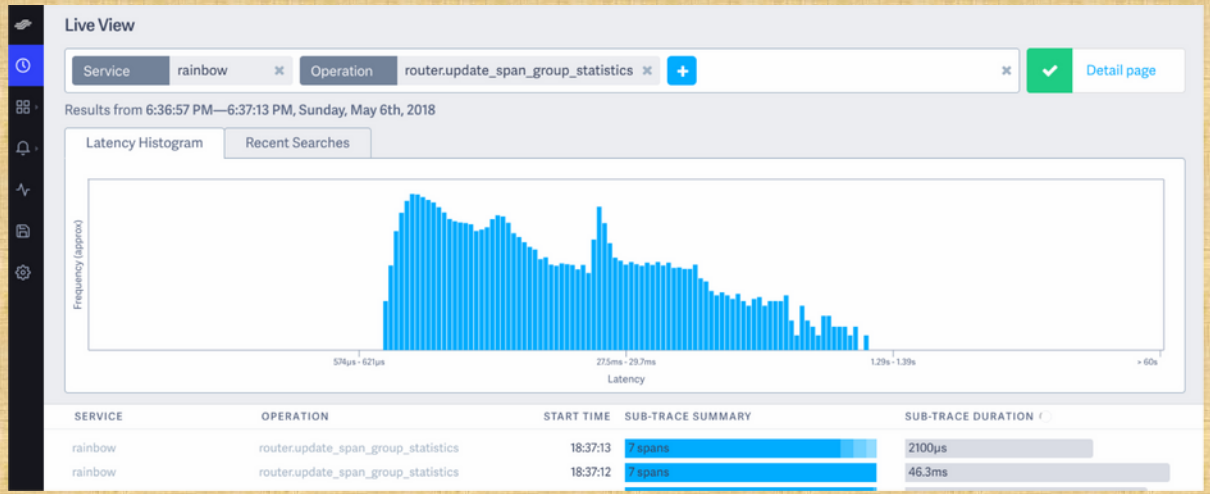
Ideal Measurement: Robust



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Ideal Measurement: High-Dimensional

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Ideal Refinement: Real-time

Must be able to test and eliminate hypotheses quickly

- Actual data must be ≤10s fresh UI /
- API latency must be very low

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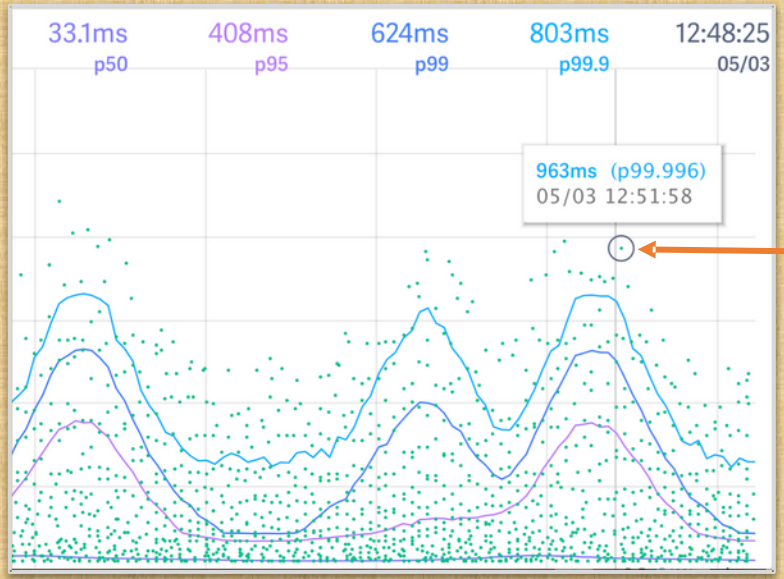
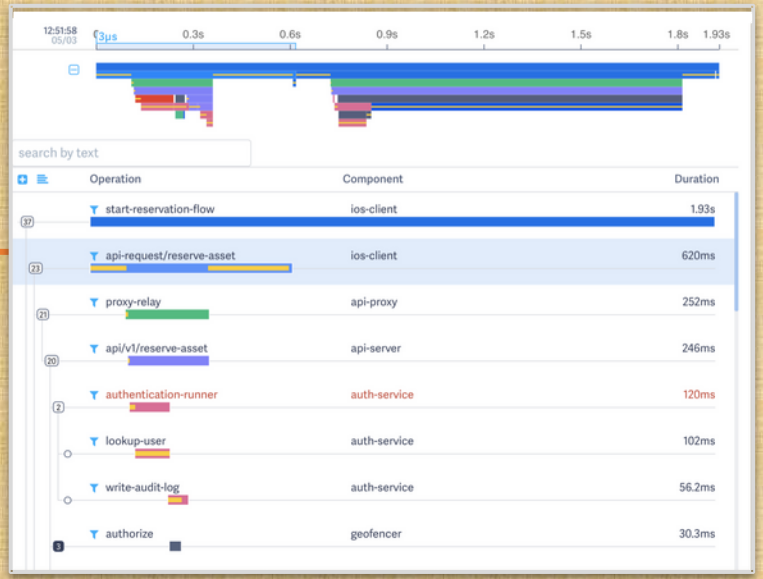
Ideal Refinement: Global





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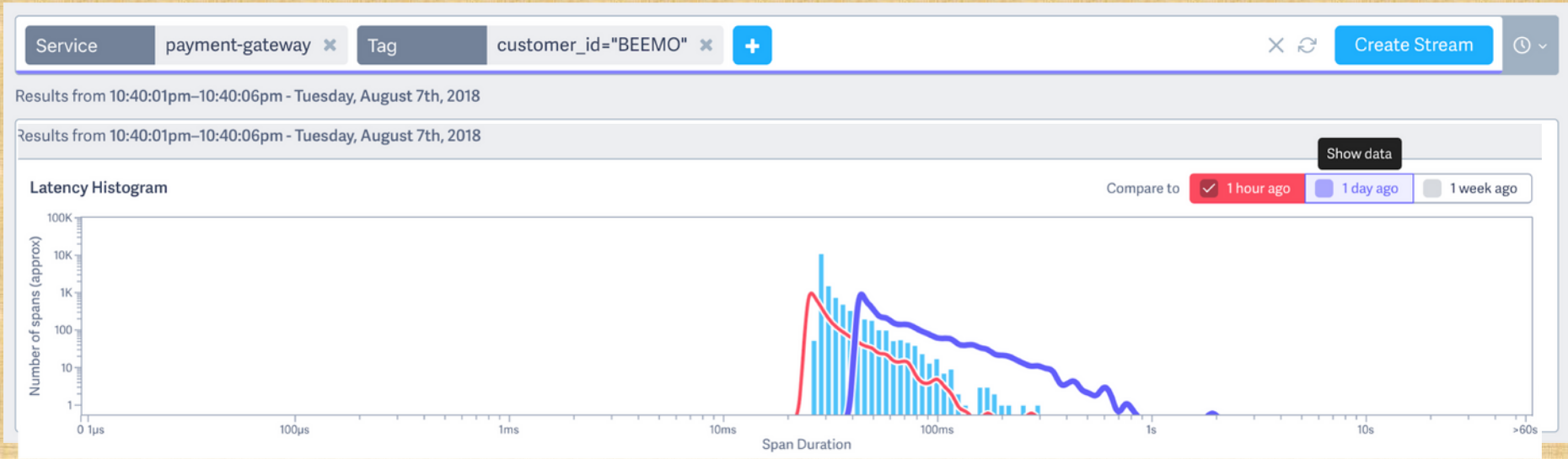
Ideal Refinement: Context-Rich

We can’t expect humans to **know what’s normal**



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Thank You

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