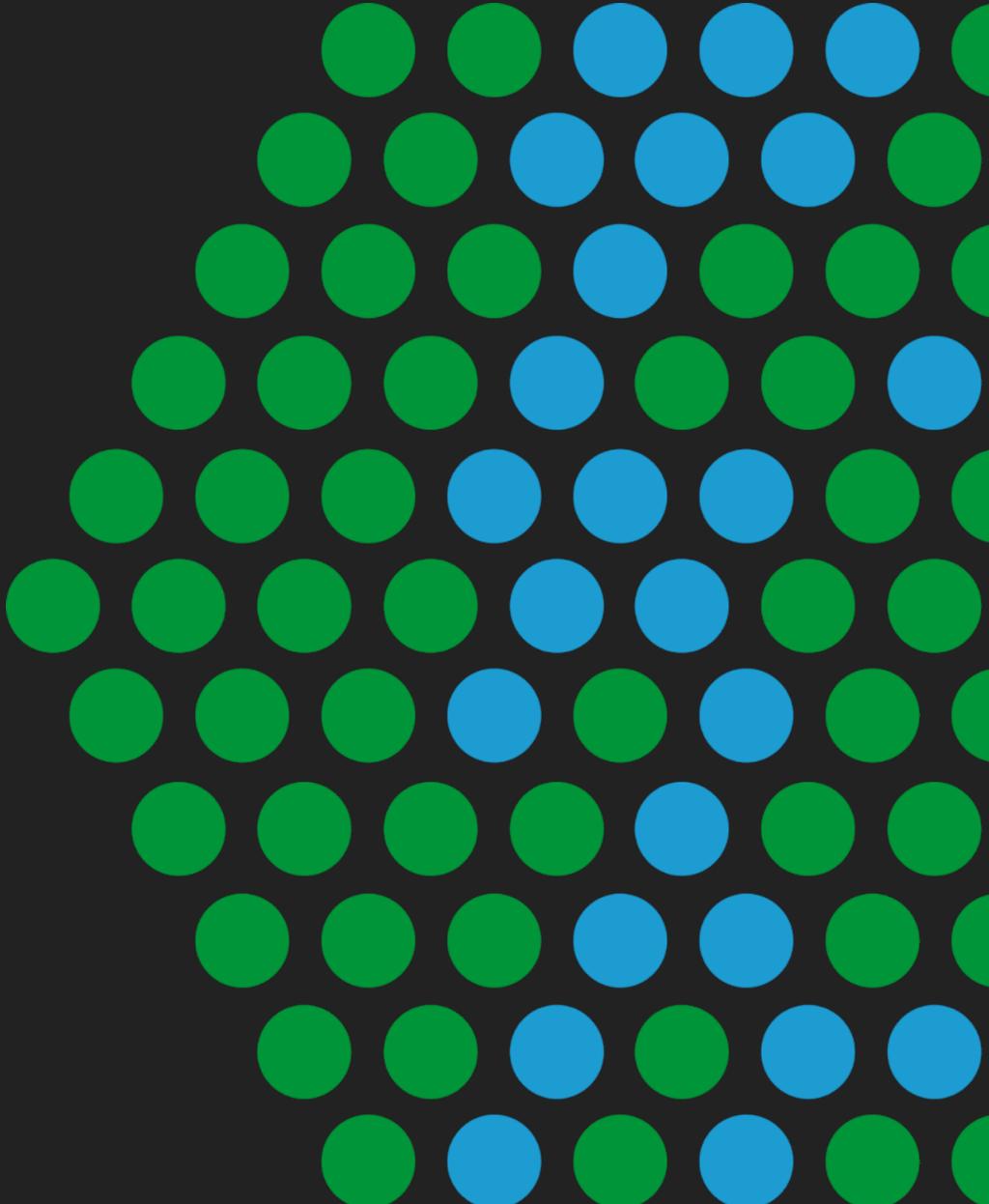




# 10 Murphy's Laws for Observability

And related guests

DAVE MCALLISTER



# Dave McAllister

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<https://www.linkedin.com/in/davemc>



# Whatever can go wrong, will go wrong”

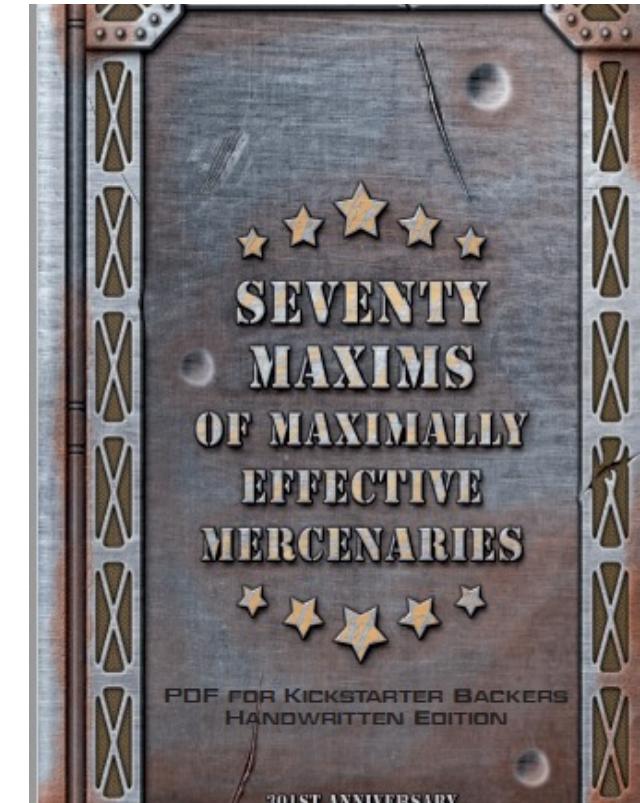
Whatever can go wrong, will go wrong”

at the worst possible time”



# There are lots of Murphy's categories

- Murphy's Technology Laws                          On Cooking
- Murphy's Military Laws                            On Cars
- Murphy's Laws on Love and Sex                 On Physics
- And spin offs                                         On measurements
- Abbott's Admonitions                              On Vacations
- Allen's Axioms



# Murphy's for Observability #1



**If you perceive that there are four possible ways in which a procedure can go wrong, and circumvent these, then a fifth way, unprepared for, will promptly develop.**

## OBSERVABILITY IS A DATA PROBLEM

THE MORE OBSERVABLE A SYSTEM, THE QUICKER WE CAN UNDERSTAND WHY IT'S ACTING UP AND FIX IT

Full-Stack Visibility & Context-Rich Insights

Metrics

Do I have  
a problem?

Traces

Where is the  
problem?

Logs

Why is the problem  
happening?

DETECT

TROUBLESHOOT

ROOT CAUSE

# A Brief View of Observability

**Observability is data.** Data from deeper sources, new sources, and data that ties our environment together to let us analyze and understand what is happening at each point across time.

Observability can and should use any sources of data needed to help us understand

Observability is a proxy for customer happiness



For Engineering purposes:

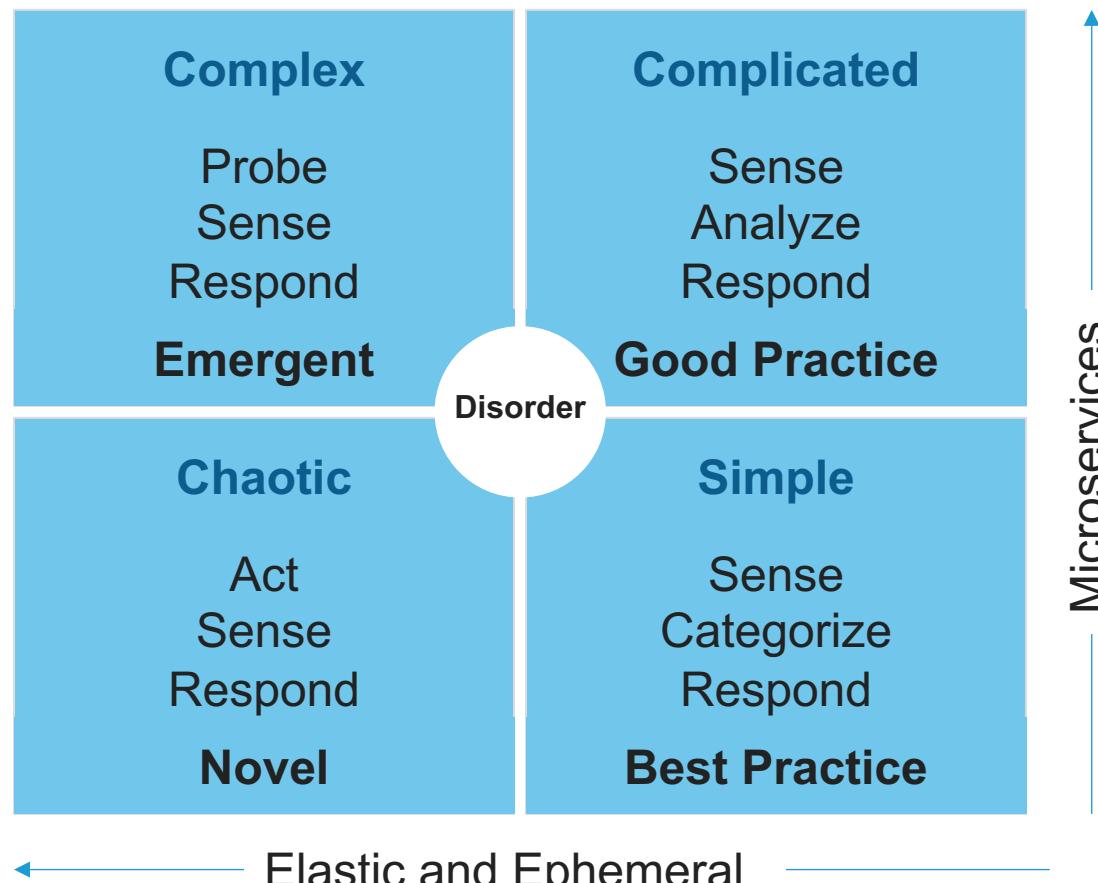
**Designing / defining the exposure of state variables in a manner to allow inference of internal behavior**

# Murphy's for Observability #2



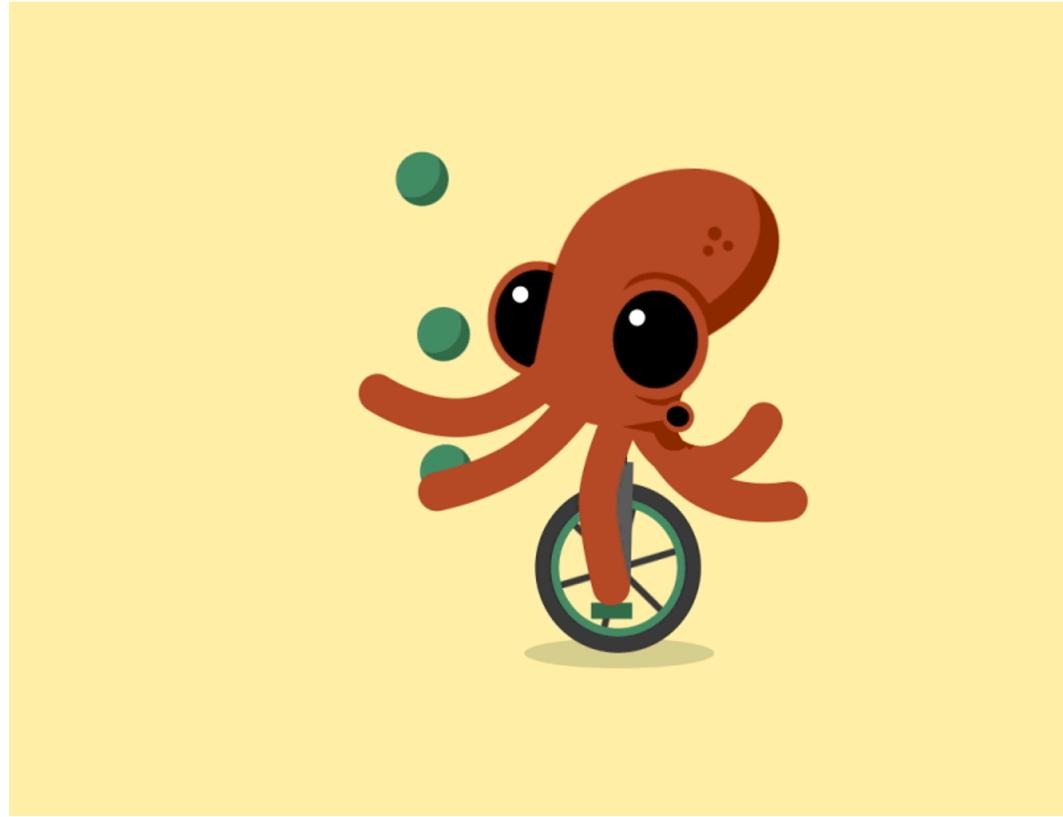
**Every Solution Breeds  
New Problems**

# Observability Challenges



- Microservices create complex interactions.
- Failures don't exactly repeat.
- Debugging multi-tenancy is painful.
- Traditional monitoring can no longer save us.

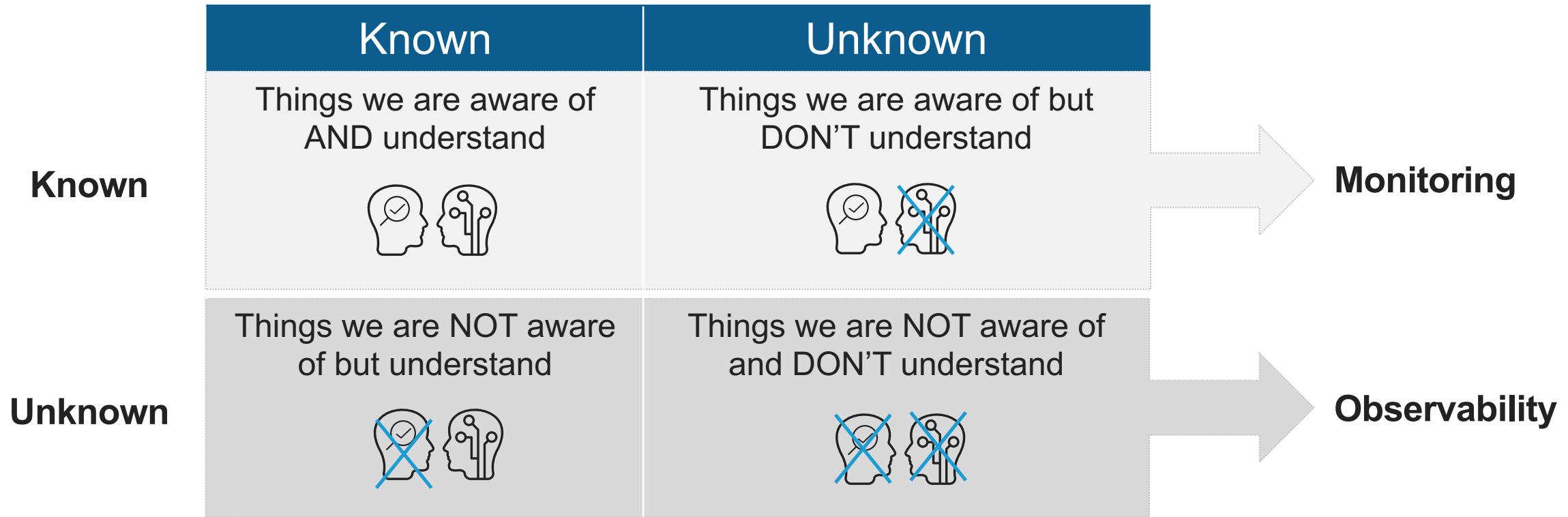
# Murphy's for Observability #3



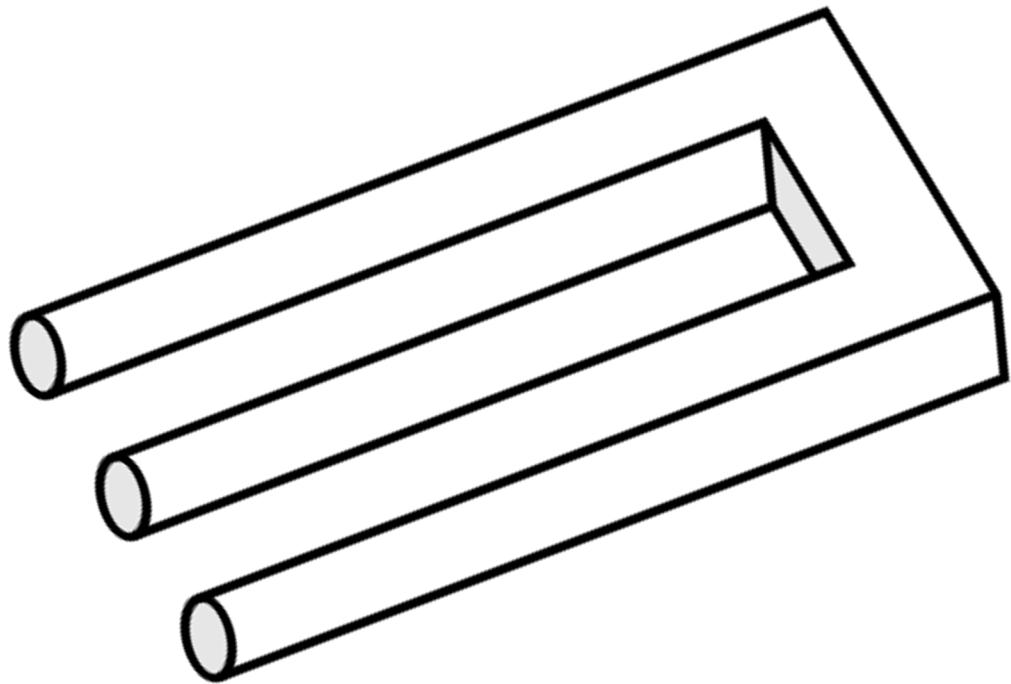
**You can never run out of  
things that can go wrong**

# Observability Allows Us to Monitor For the Unknown Unknowns

**Today's knowns are yesterday unknowns**

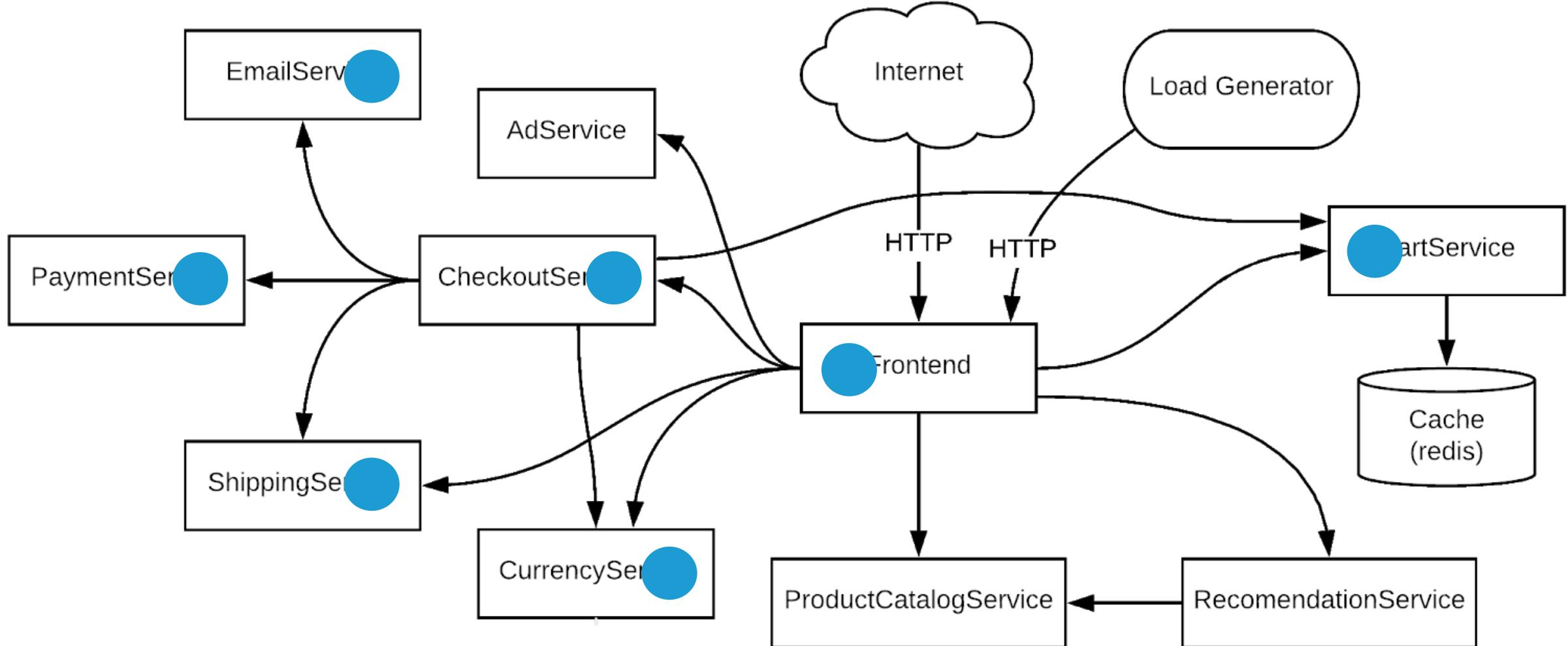


# Murphy's for Observability #4



**Nothing is as easy as it looks**

# EXAMPLE MICROSERVICE ARCHITECTURE



**Systems**

- bean nginx 1.10.0
- dev-nodejs-api01 nginx 1.10.0
- dev-nodejs-api02 nginx 1.10.0
- dev-nodejs-api03 nginx 1.10.0
- peanut-02 nginx-plus-r13**
- prod-rails-web01 nginx 1.10.0
- prod-rails-web02 nginx 1.10.0

**peanut-02**

nginx-plus-r13 nginx 1.12.0 PHP-FPM System

**NGINX Connections/s**

**NGINX Current Connections**

**NGINX HTTP Errors**

**NGINX Workers**

**NGINX CPU Usage %**

**NGINX Requests/s**

**NGINX Current Requests**

**NGINX HTTP Version**

**Request rate [5m]**  
Requests/sec processed by the service

**Request Latency (p90) [5m]**  
90th percentile response time

**Error rate [5m]**  
Error rate on requests made to the service

**Request rate by endpoint [10s]**

**Request Latency (p90) by endpoint [10s]**

**Error rate by endpoint [10s]**

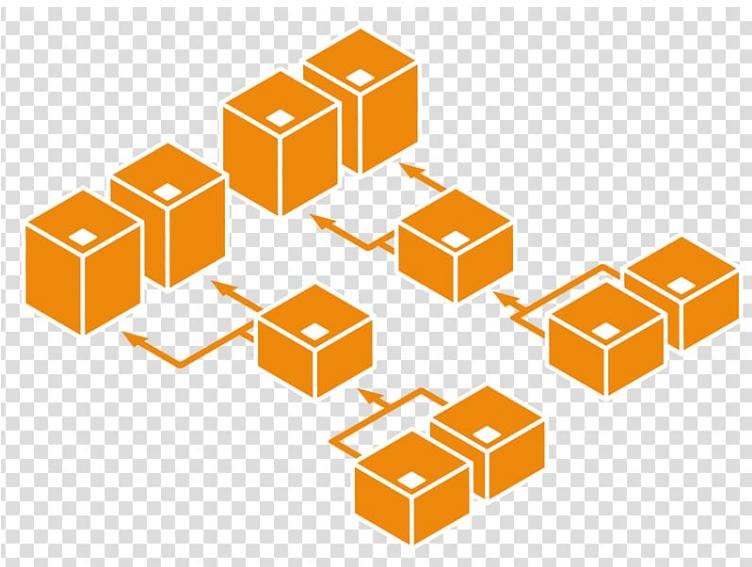
**NGINX Memory Usage**

19.07 MB

**Service Mesh Tracing**

# Complexity

Cloud-compute Elasticity



Ephemeral Behavior



Drift and Skew

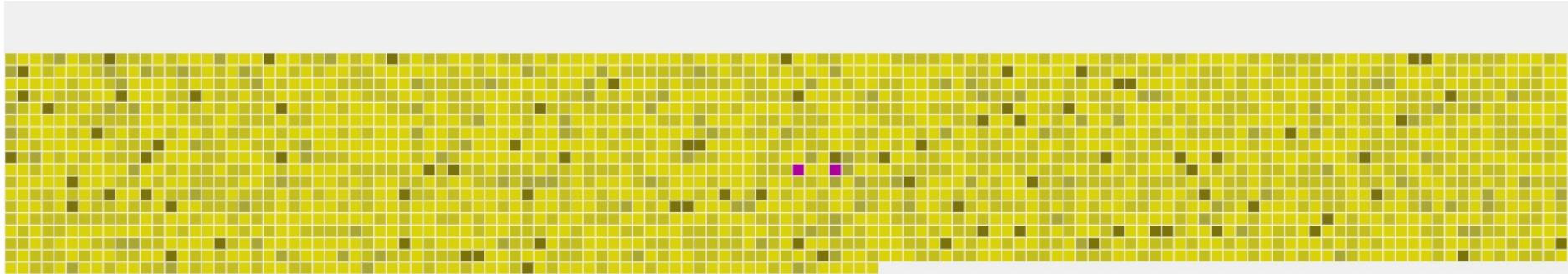


# Murphy's for Observability #5

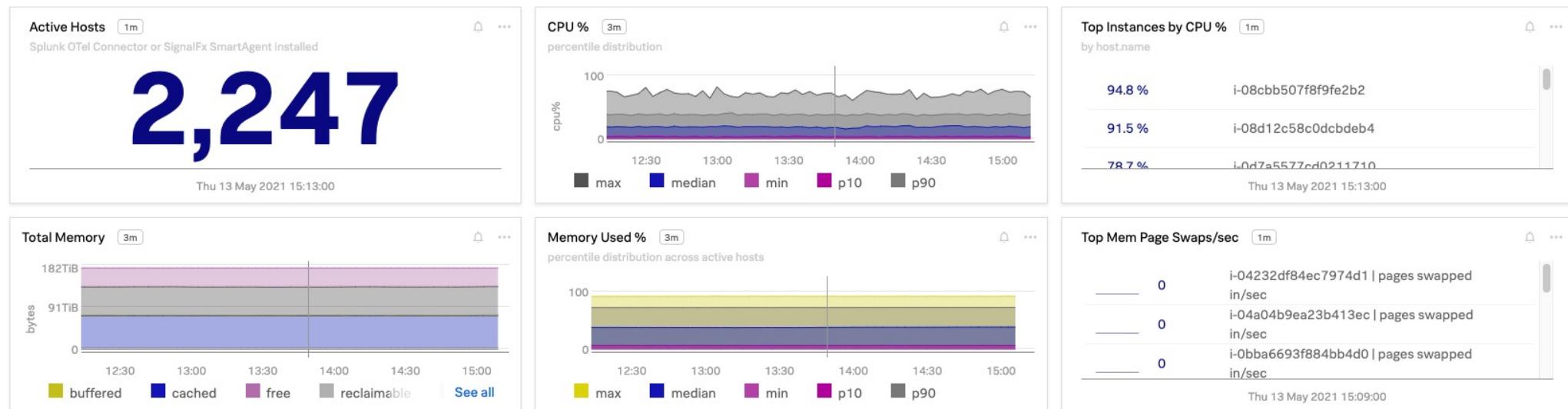


**Things get worse under pressure**

# All about scale



Dashboard: Hosts



# The Scalability Envelope

System scale is multi-dimensional

- Kubernetes objects
- Backend services
- Deployed microservices
- Frequency of deployments
- Dimensions (e.g. pod labels) and high-cardinality
- Streaming vs batch & query analytics
- Alerting on multiple metric time series

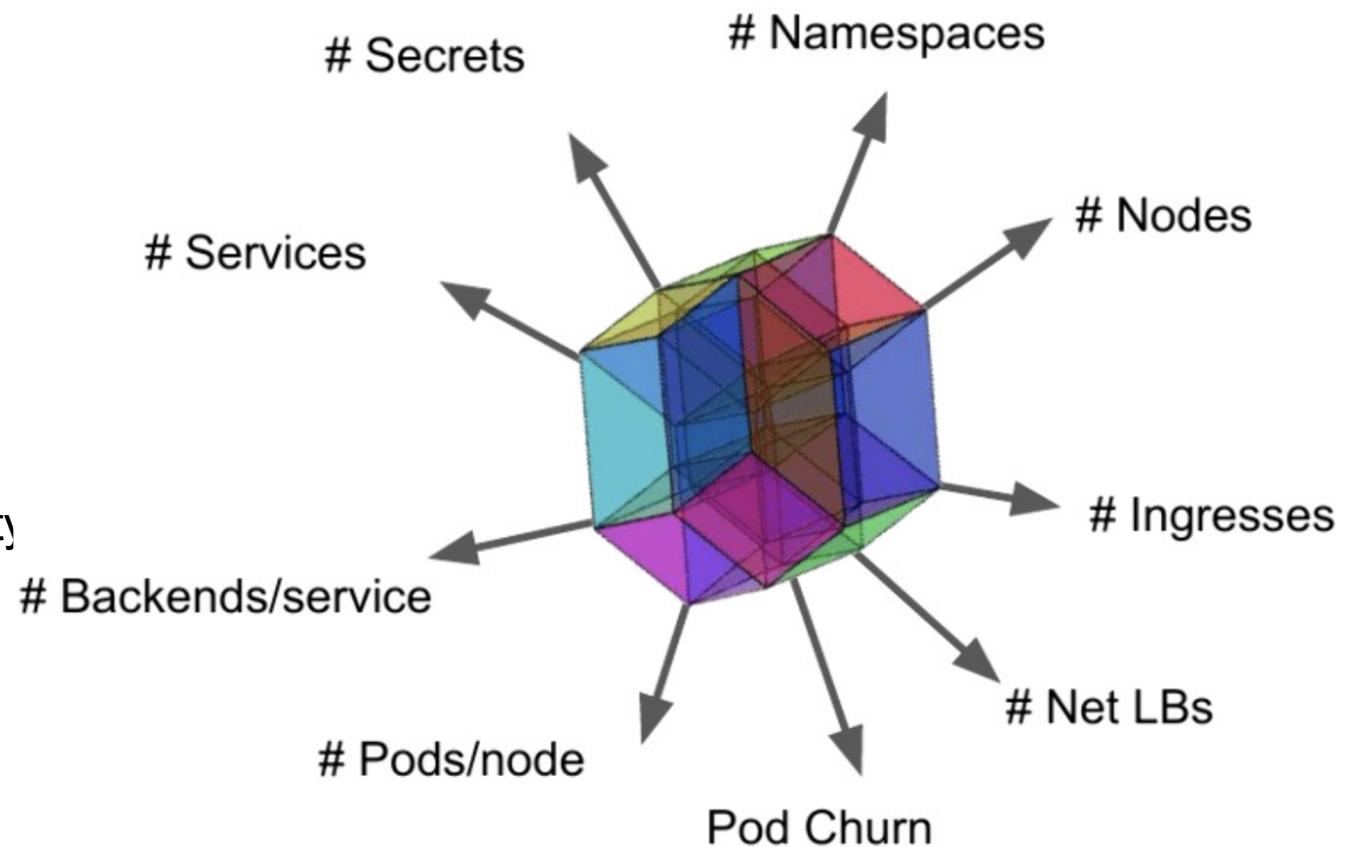
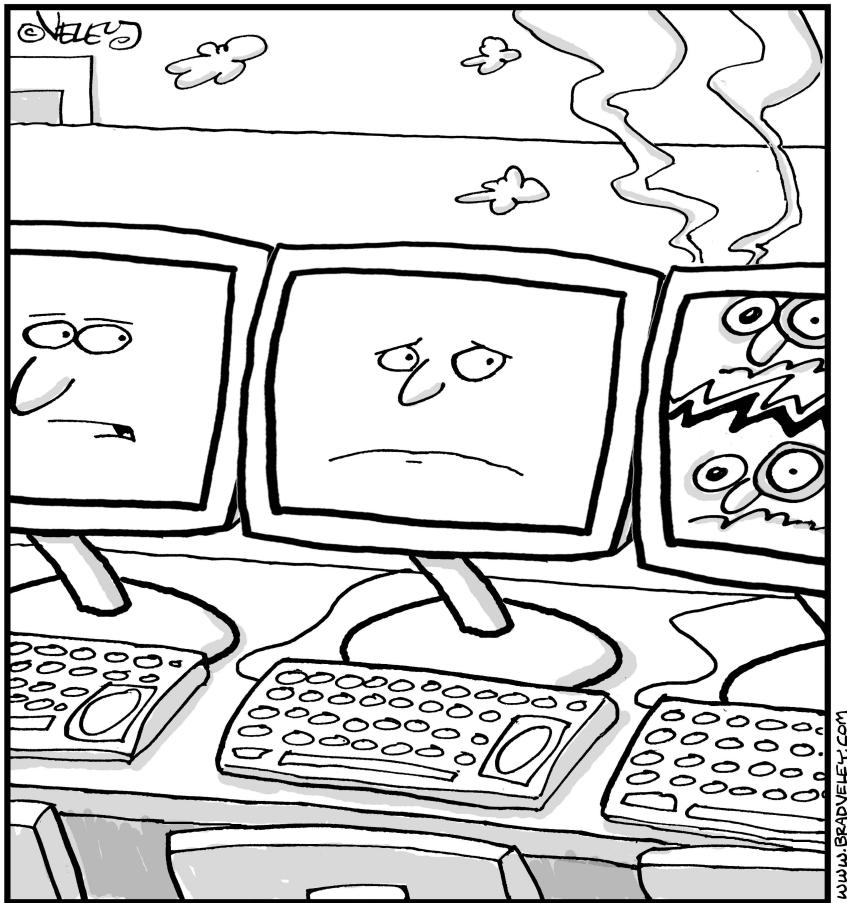


Image source:  
<https://github.com/kubernetes/community/blob/master/sig-scalability/configs-and-limits/thresholds.md>

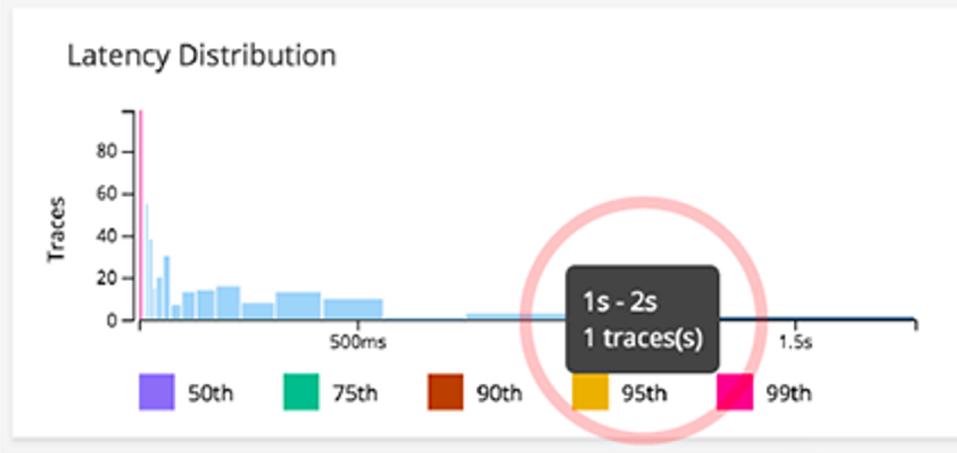
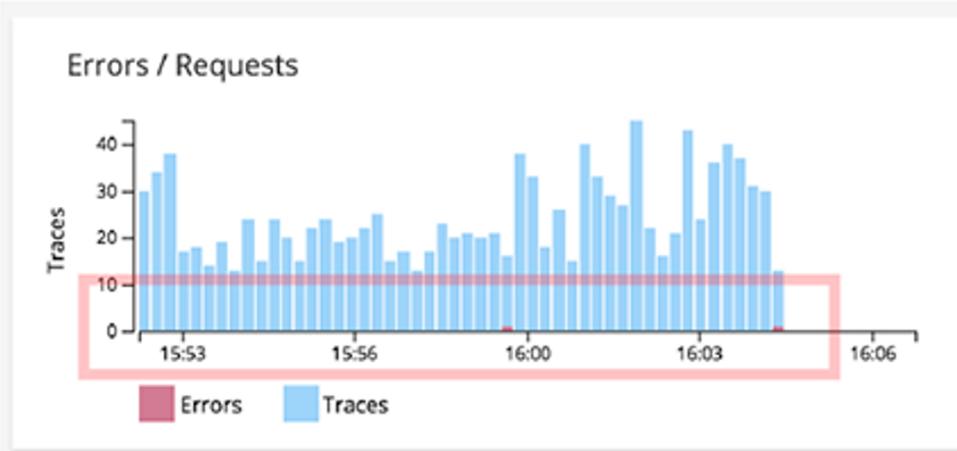
# Murphy's for Observability #6



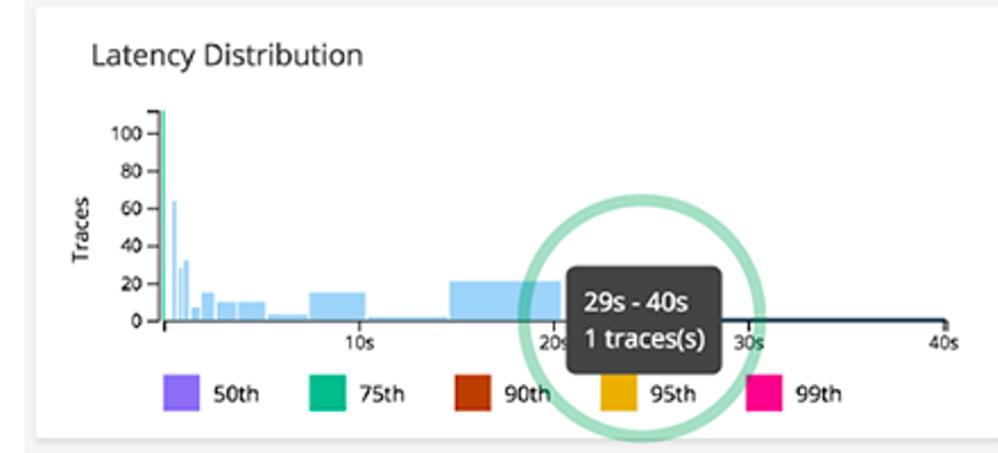
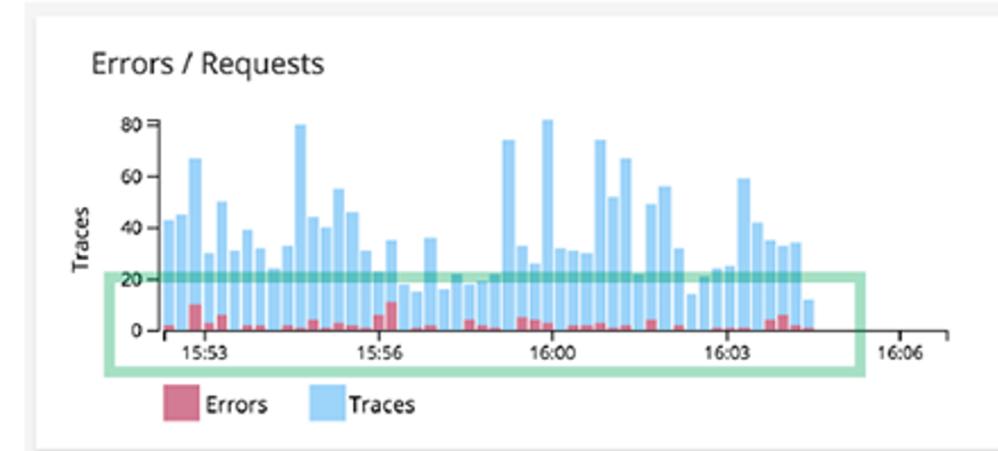
*"It's the age-old question of our existence, Bill:  
'Why does bad data happen to good computers?'"*

**If it is not in the  
computer, it doesn't  
exist**

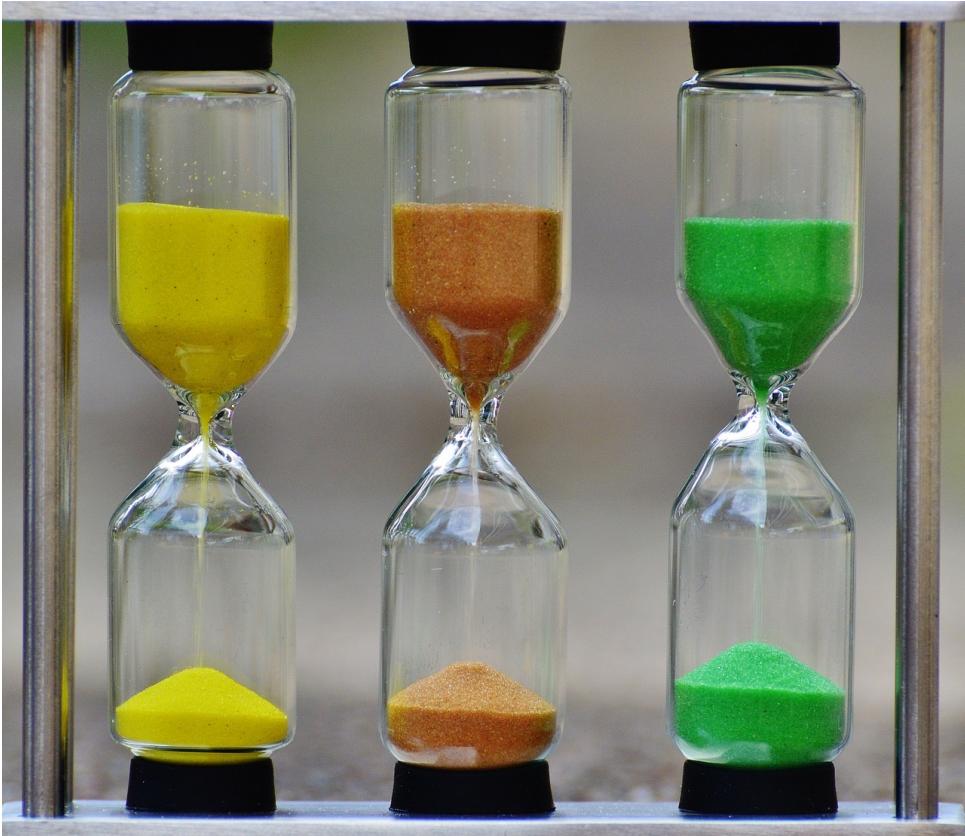
# Sampling



# No Sampling

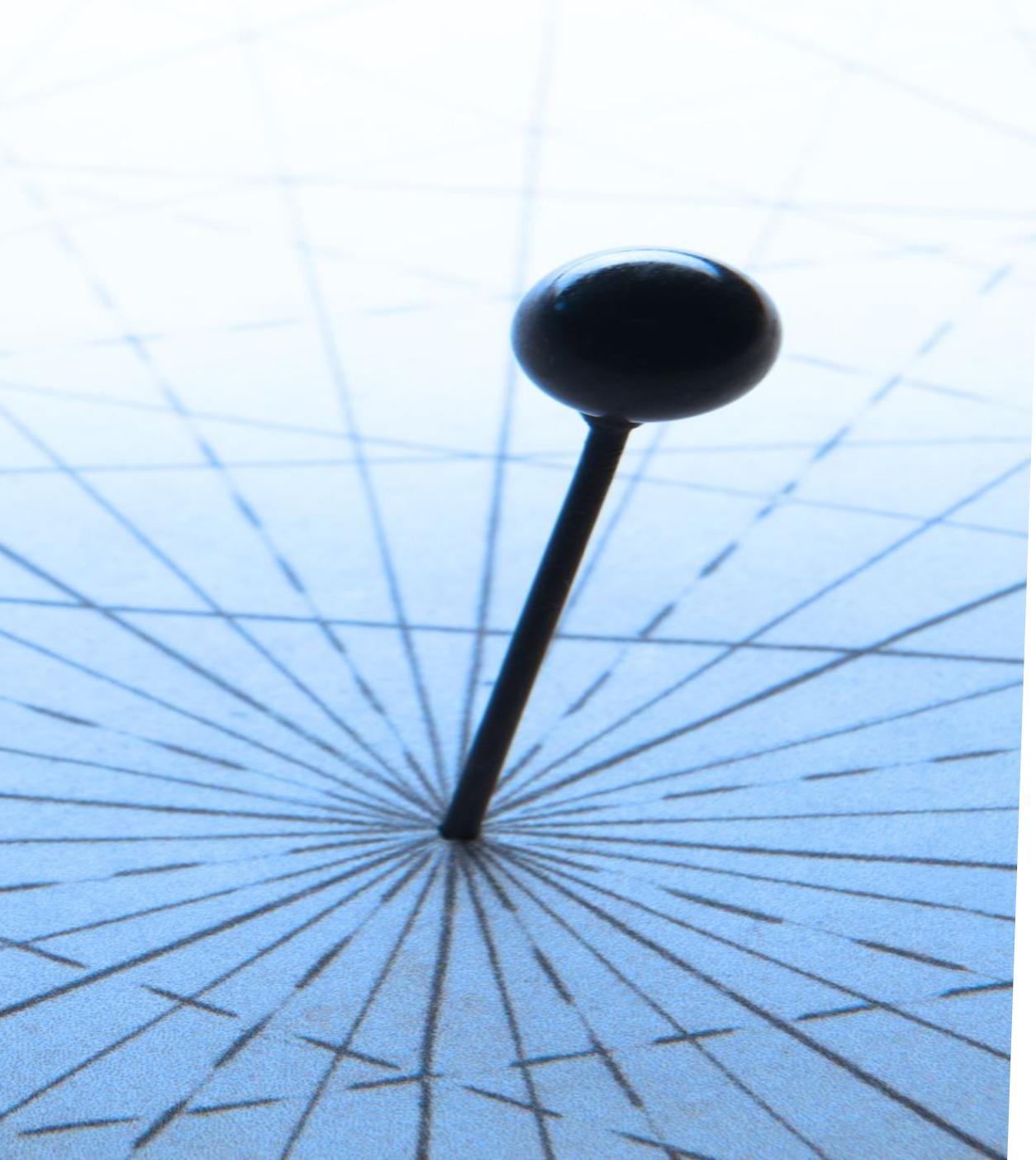


# Murphy's for Observability #7



**Availability is a function  
of time**

The resolution and speed of the data  
directly impact the insights you gain



# Discussing accuracy and precision

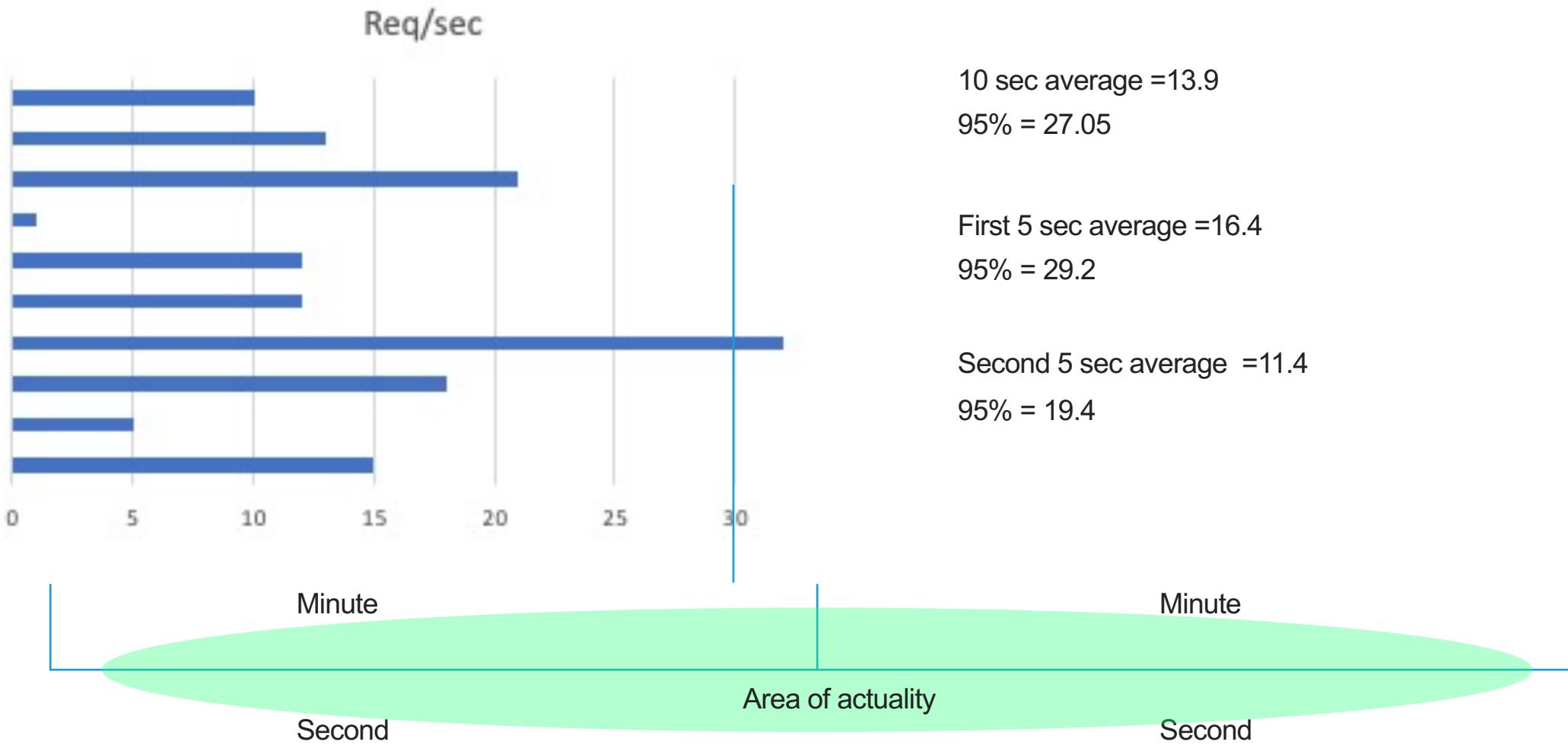
Interchangeable?

- Accuracy is that the measure is correct
- Precise means it is consistent with other measurements

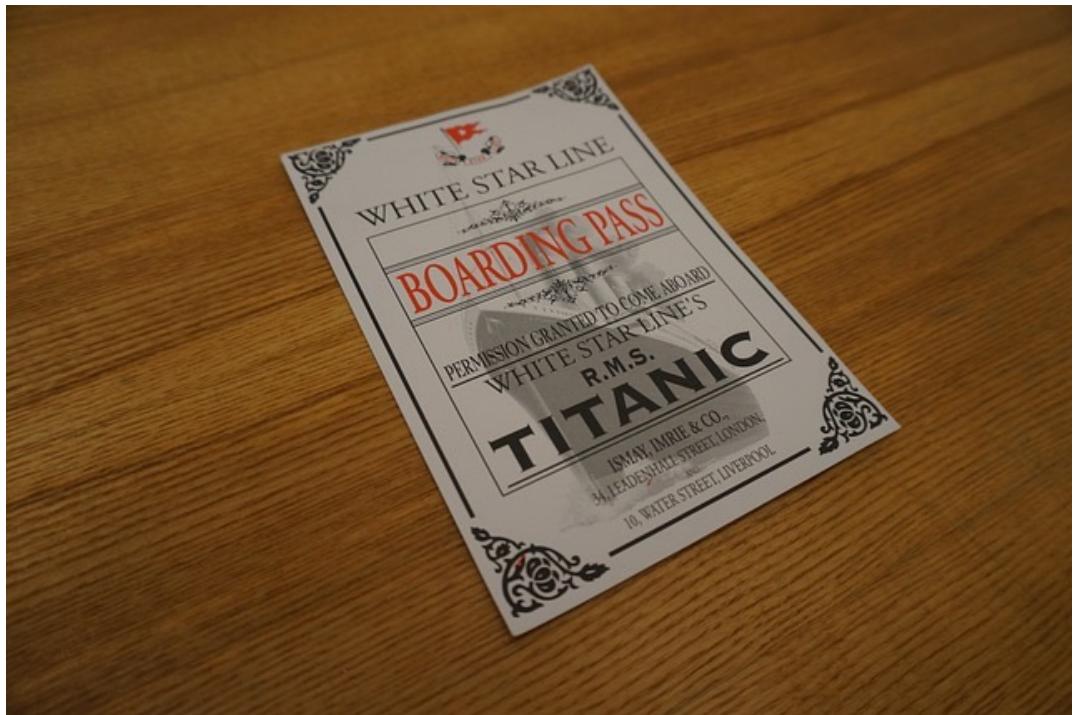
Observability depends on both

**But aggregation and analysis can skew this**

# Missing the point

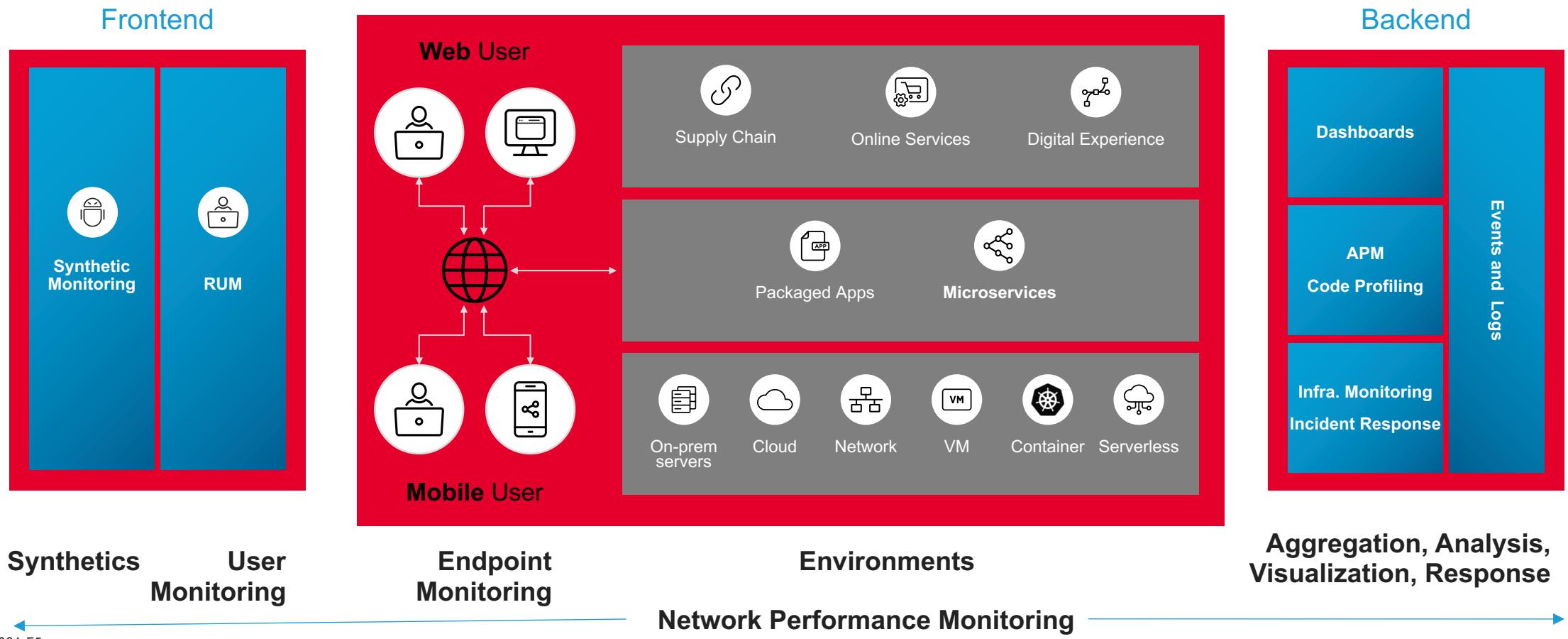


# Murphy's for Observability #8



**If anything cannot go wrong, it will anyway**

# Facets of Technology

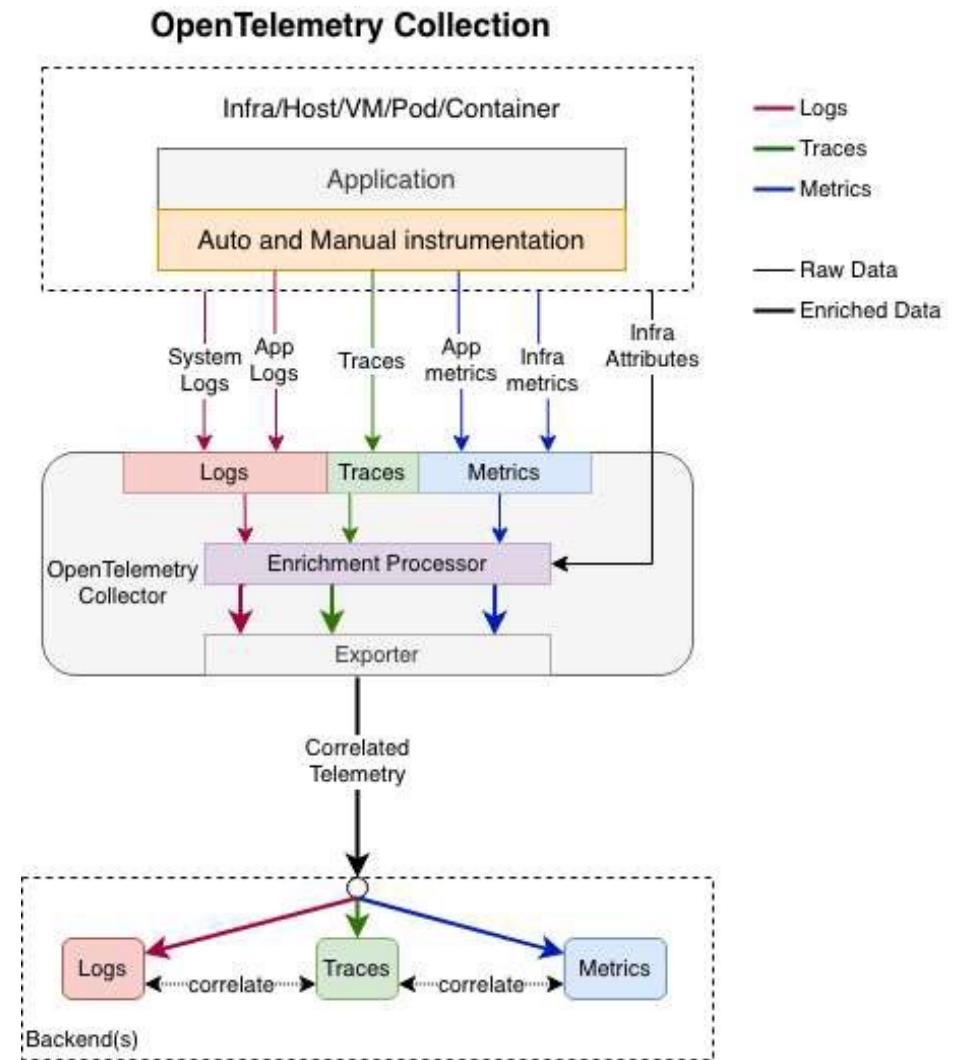
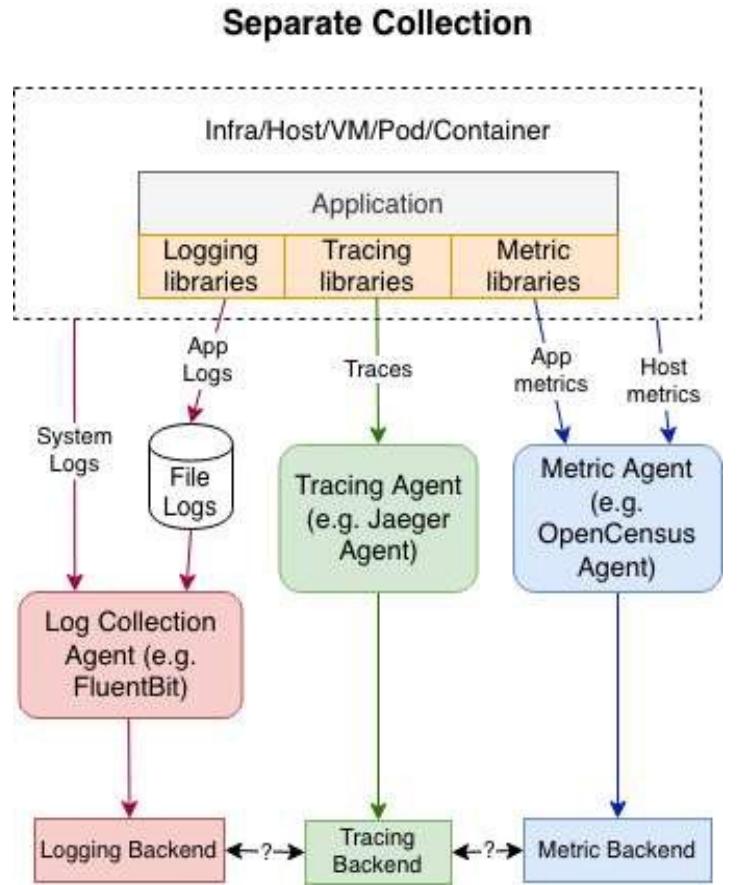


# Murphy's for Observability #9

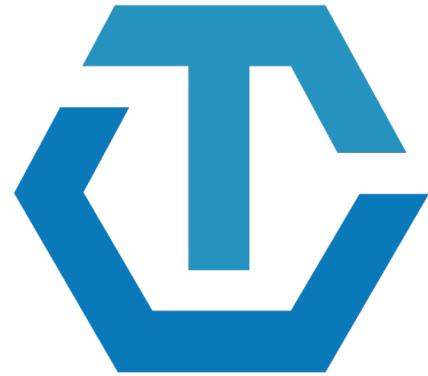


**Whenever you set out to  
do something,  
something else must be  
done first.**

# From Observability 1.0 to 2.0



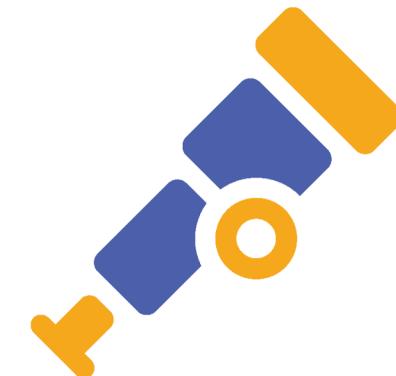
# What is OpenTelemetry?



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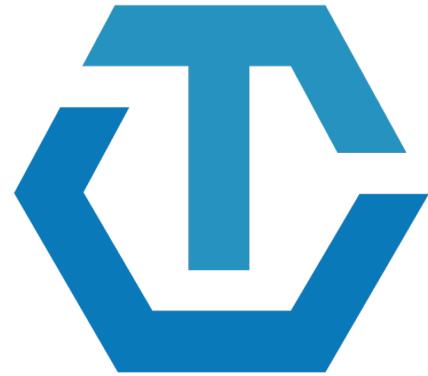
OPENTRACING

OpenCensus

OpenTelemetry

OpenTelemetry: **the next major version**  
of *both* OpenTracing and OpenCensus

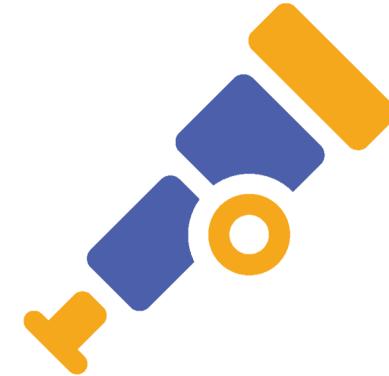
# What is OpenTelemetry?



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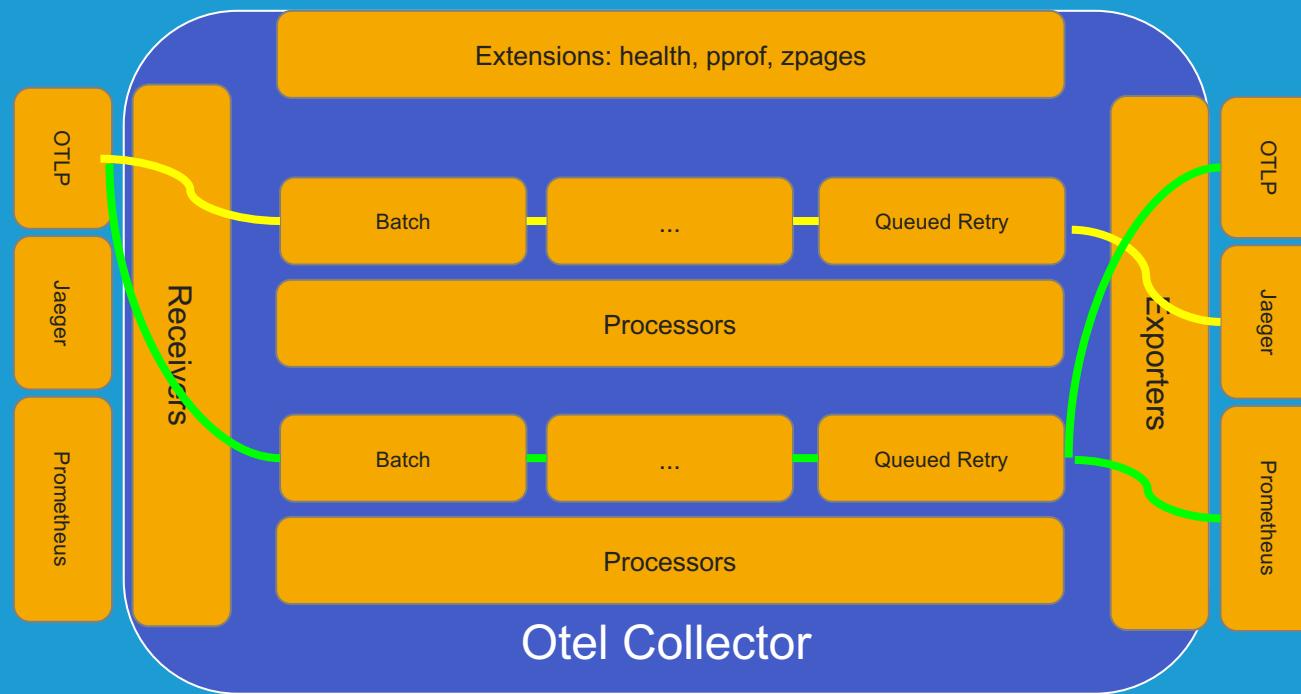
OPENTRACING

OpenCensus

OpenTelemetry

<https://github.com/open-telemetry/community>

# Collector Architecture



# Ashley-Perry Statistical Axiom

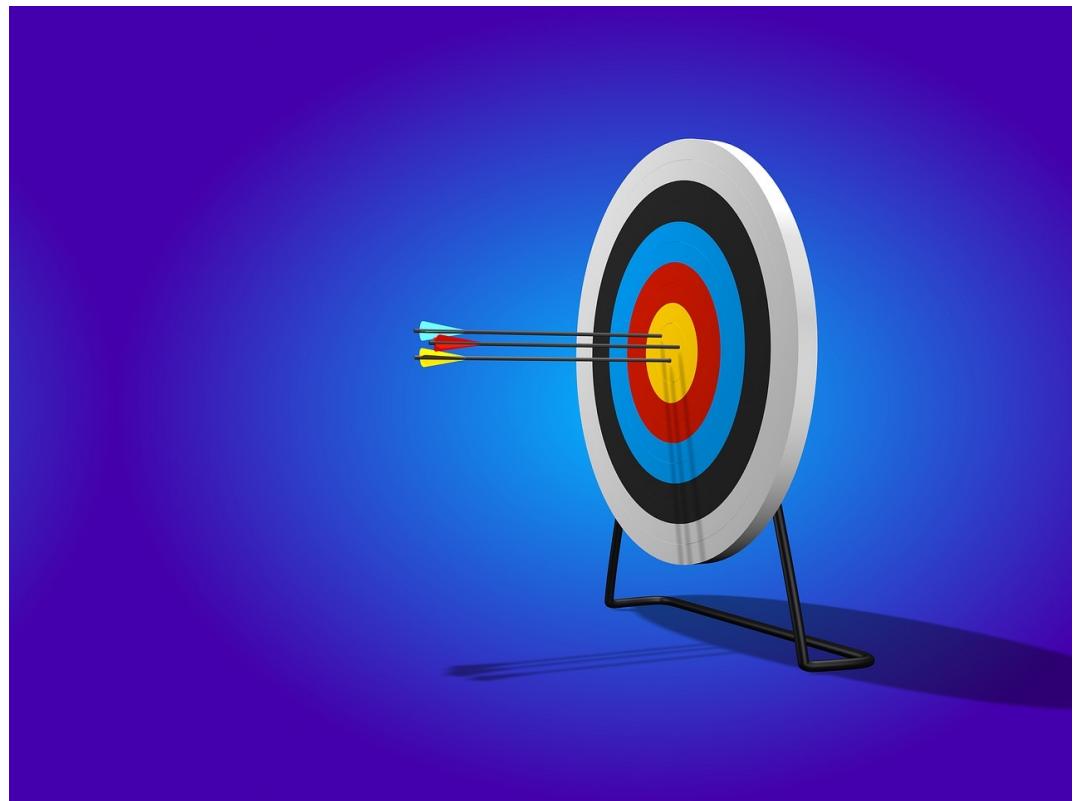


**Numbers are tools, not rules**

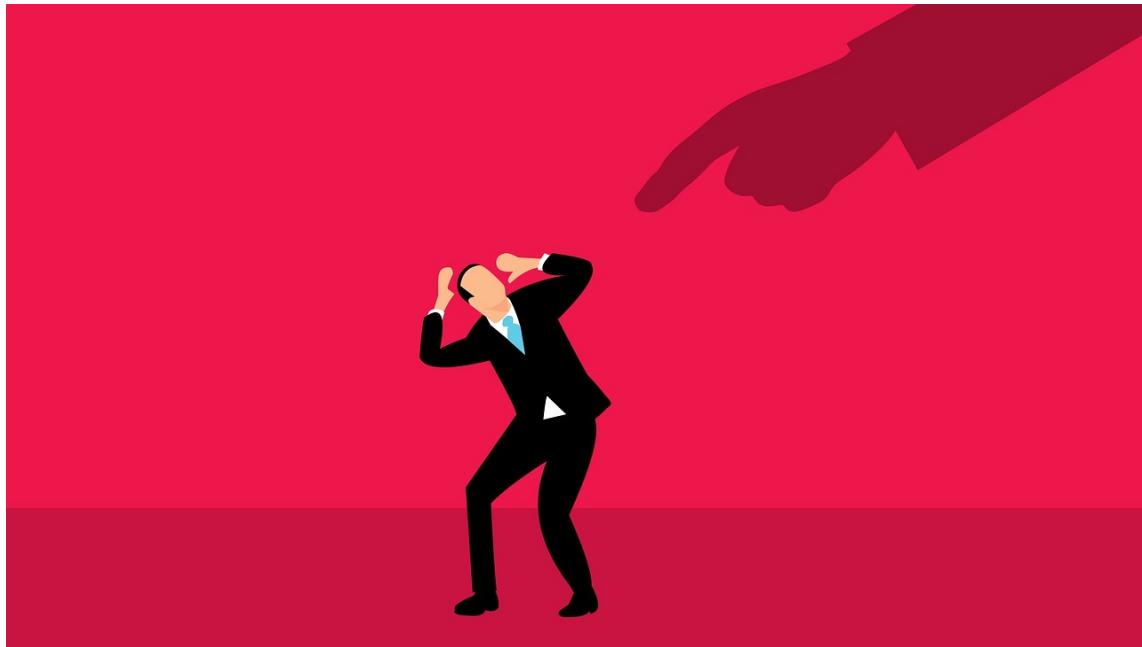
# Predictive behavior

Sometimes you want to know what's coming

- Prediction is only as good as the data precision and accuracy
- Historic versus Sudden Change
- (Trend) Stationary
- Expect false positives (and negatives)



# Baker's Law



**Misery no longer loves  
company.  
Now it insists on it**

# Hills Commentaries



- If we lose much by having things go wrong, take all possible care
- If we have nothing to lose by change, relax
- If we have everything to gain by change, relax
- If it doesn't matter, it does not matter

**McAllister Corollary: Until it does**

# Murphy's for Observability #10



**All's well that ends**

# Thanks for listening

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