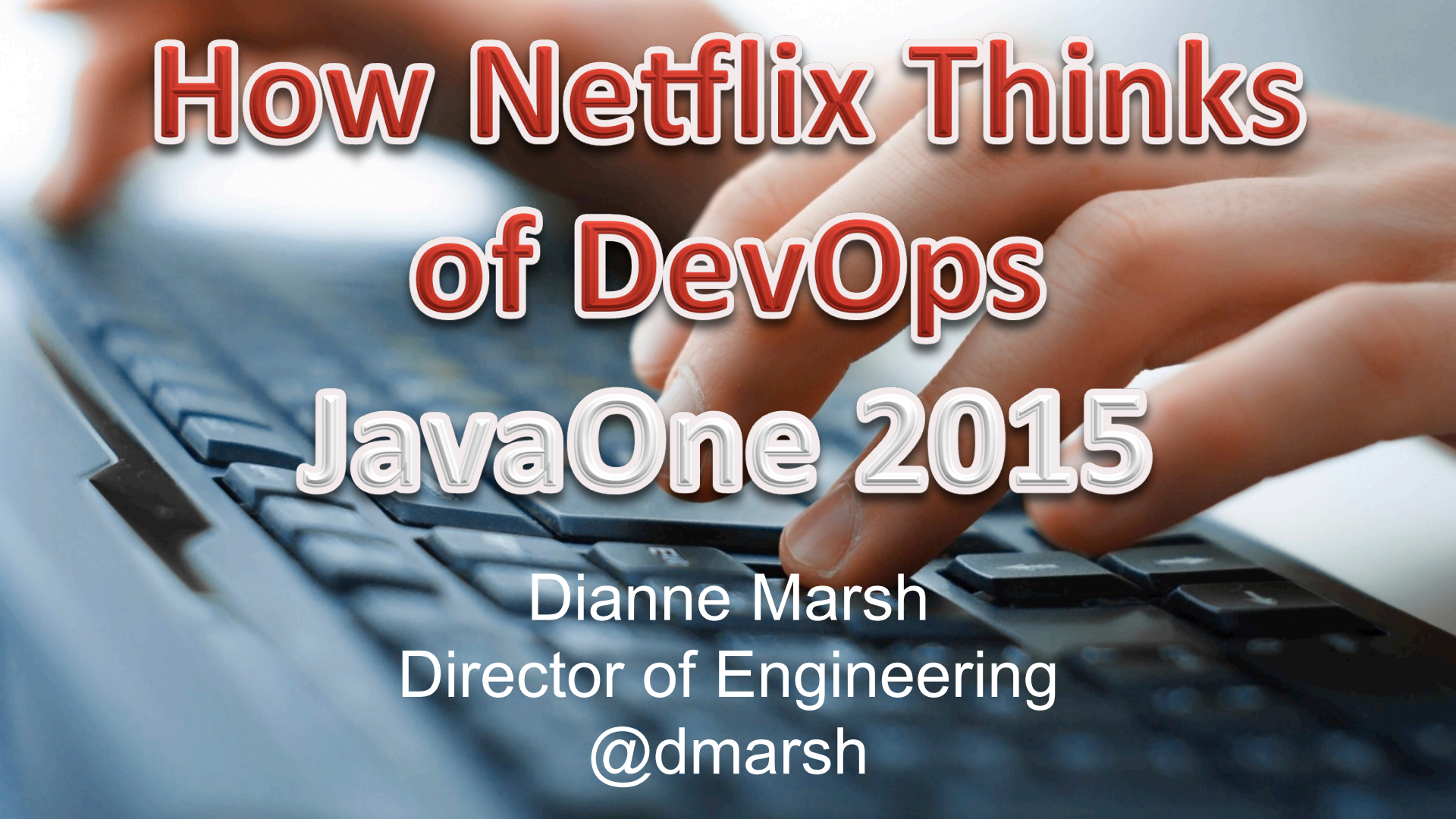
How Netflix Thinks of DevOps
JavaOne 2015
Dianne Marsh
Director of Engineering
@dmarsh

DevOps

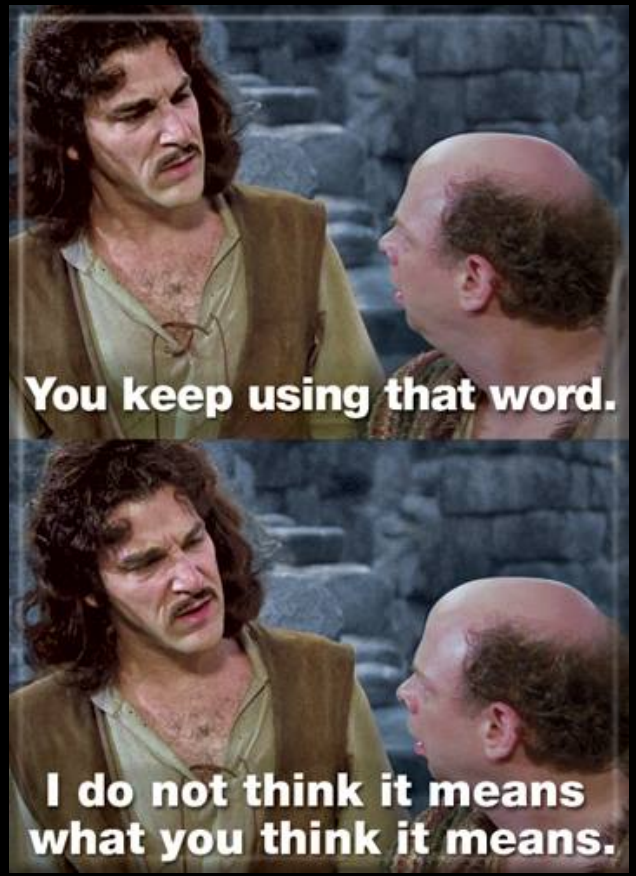

Photo Credit: https://www.facebook.com/theprincessbride/photos_stream

DevOps in Three Acts?

Netflix ecosystem

- 100s of microservices
- 1000s of daily production changes
- 10,000s of instances
- 100,000s of customer interactions/minute
- 1,000,000s of customers
- 1,000,000,000s of metrics
- 10,000,000,000 hours of streamed

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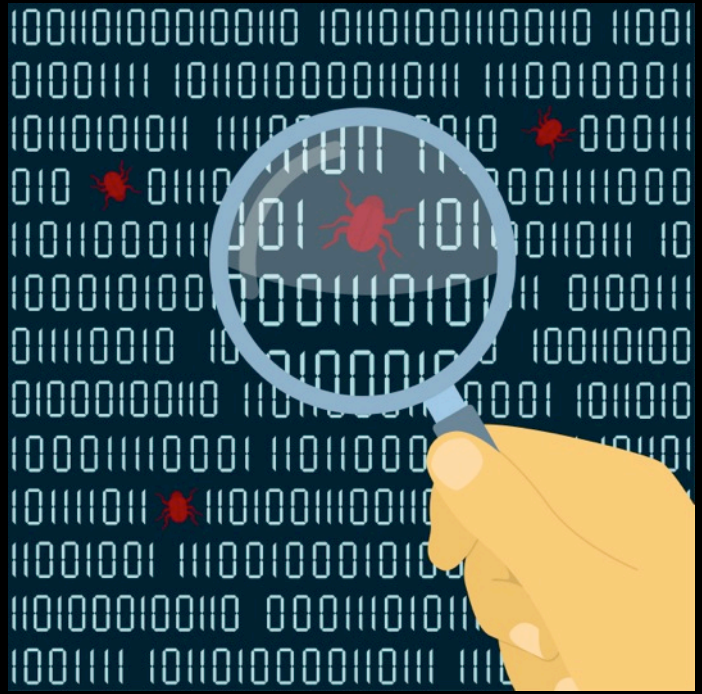
- 10,000,000,000 hours of streamed

- 10s of operations engineers
- No NOC

You Build It, You Run It



Outages

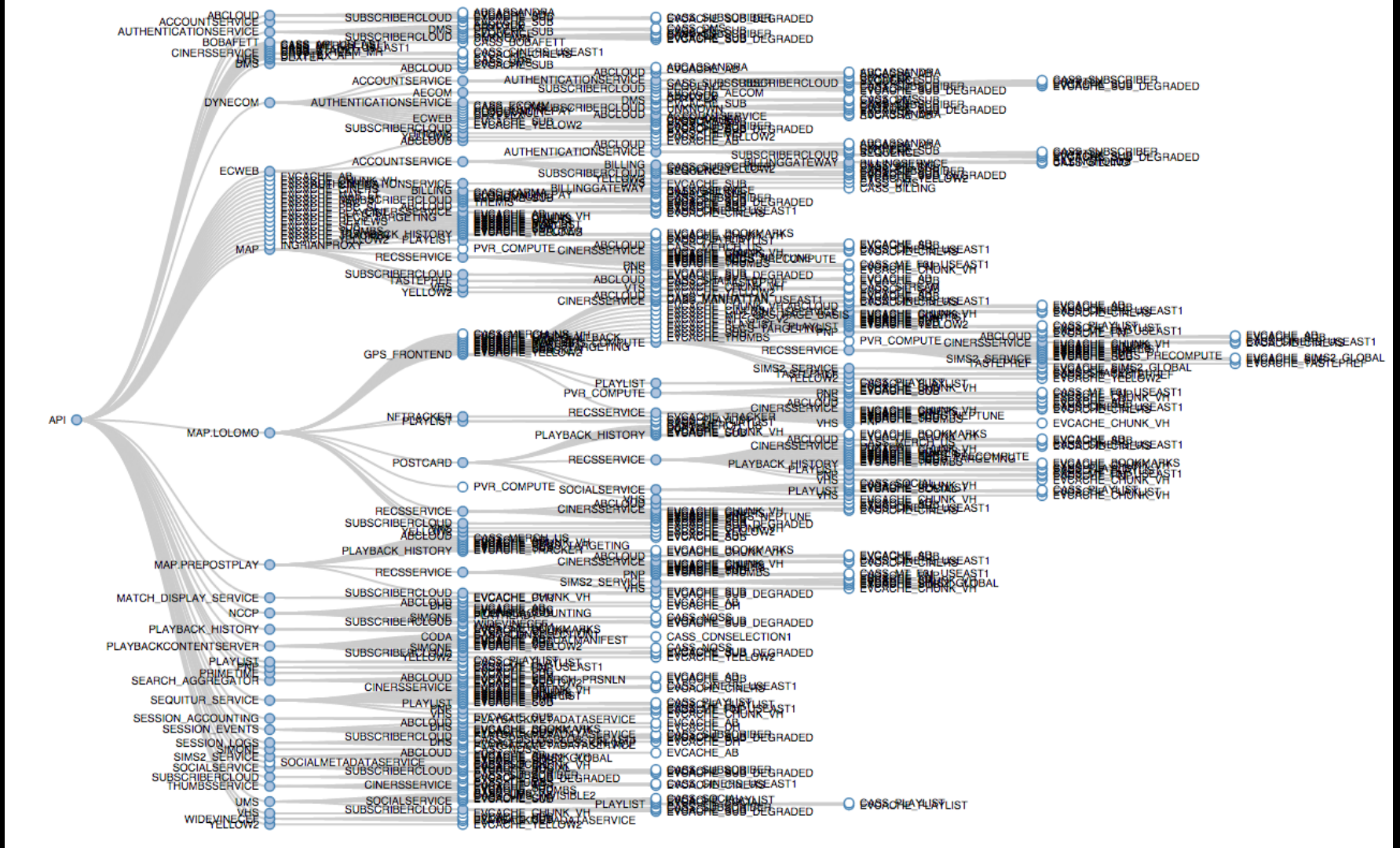
24/7

- Developers
- Critical Operations/Reliability Engineering team (CORE)
- Crisis Response Manager

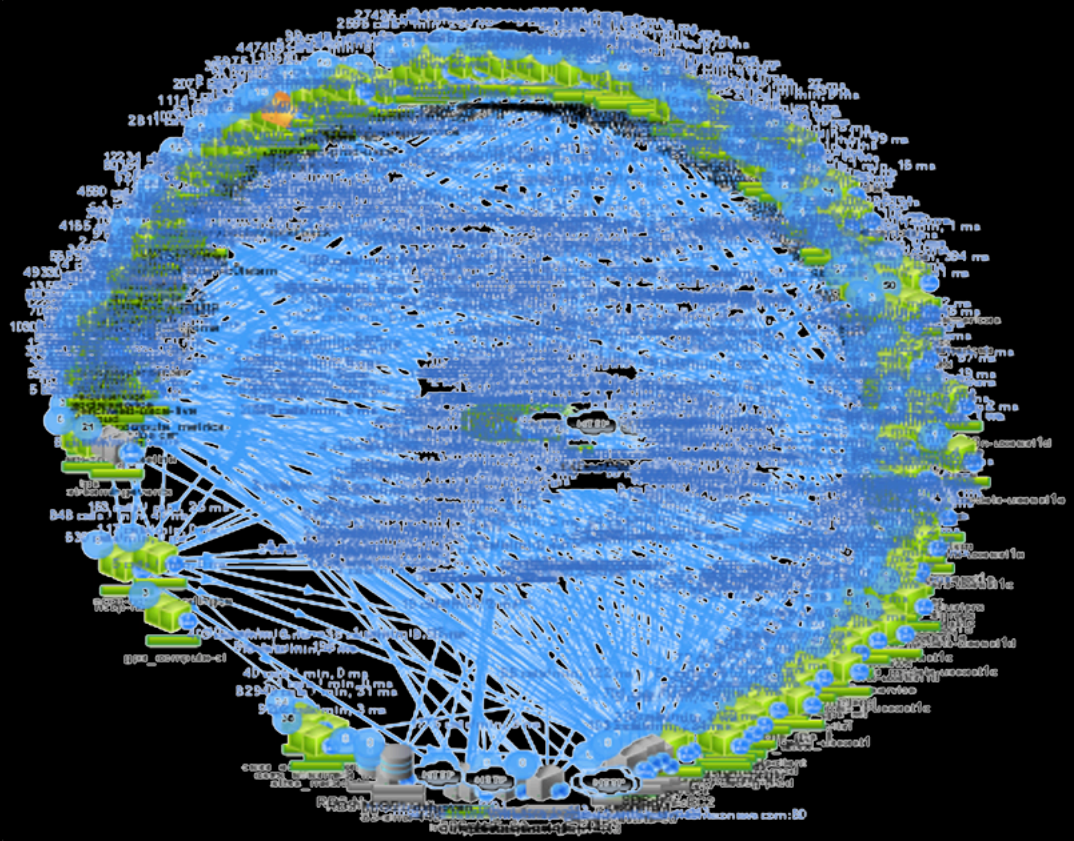
Netflix Culture:
Freedom & Responsibility

NETFLIX

“Get rid of the safeguards. Enable the most knowledgeable people to do their job effectively.”


API
MAP:LOLOMO
MAP.PREPOSTPLAY
MAP
ECWEB
DYNECOM
GPS_FRONTEND
POSTCARD
NFTRACKER
MATCH_DISPLAY_SERVICE
NCCP
PLAYBACK_HISTORY
PLAYBACKCONTENTSERVER
PLAYLIST
PRIME_TIME
SEARCH_AGGREGATOR
SEQUITUR_SERVICE
SESSION_ACCOUNTING
SESSION_EVENTS
SESSION_LOGS
SIMONE
SIMS2_SERVICE
SOCIALSERVICE
SUBSCRIBERCLOUD
THUMBSSERVICE
UMS
VHS
WIDEVINECDE
YELLOW2
ABCLOUD
ACCOUNTSERVICE
AUTHENTICATIONSERVICE
BOBAFETT
CINERSSERVICE
DMS
SUBSCRIBERCLOUD
AECOM
ECWEB
ACCOUNTSERVICE
BILLING
BILLINGGATEWAY
CHUNKS_VH
CINERSSERVICE
DMS
EVCACHE_SUB
EVCACHE_YELLOW2
FTLEMS
GEOLOCATION
HISTORY
INGHIANPROXY
PLAYLIST
PVR_COMPUTE
RECSSERVICE
SUBSCRIBERCLOUD
TASTEPREF
YELLOW2
PLAYLIST
PVR_COMPUTE
RECSSERVICE
PLAYBACK_HISTORY
PVR_COMPUTE
RECSSERVICE
SUBSCRIBERCLOUD
PLAYBACK_HISTORY
RECSSERVICE
SOCIALMETADATASERVICE
SUBSCRIBERCLOUD
CINERSSERVICE
SOCIALSERVICE
SUBSCRIBERCLOUD
UMS
VHS
YELLOW2
ABCASSANDRA
ABCLOUD
AUTHENTICATIONSERVICE
BILLING
BILLINGGATEWAY
CASS_BILLING
CASS_CDNSELECTION1
CASS_CONFIGSVC
CASS_CRYPTO
CASS_MANHATTAN_USEAST1
CASS_NCCP
CASS_NOSQL
CASS_PLAYLIST
CASS_SOCIAL
CASS_SUBSCRIBER
CINERSSERVICE
DMS
EVCACHE_ABB
EVCACHE_AB
EVCACHE_BOOKMARKS
EVCACHE_CHUNK_VH
EVCACHE_DMS
EVCACHE_EVL_USEAST1
EVCACHE_FTL_USEAST1
EVCACHE_PLAYLIST
EVCACHE_SUB
EVCACHE_SUB_DEGRADED
EVCACHE_THUMBS
EVCACHE_VHS
EVCACHE_YELLOW2
FNP
PLAYLIST
PVR_COMPUTE
RECSSERVICE
SIMS2_SERVICE
SUBSCRIBERCLOUD
TASTEPREF
VHS
YELLOW2

It’s Complicated …



Production Ready

- Identify Critical Services
- Conformity Monkey

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Automation and Tools

Common Runtime Services and Libraries

Eureka

Ribbon

Hystrix

Zuul

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Delivery Tools

Aminator

Spinnaker

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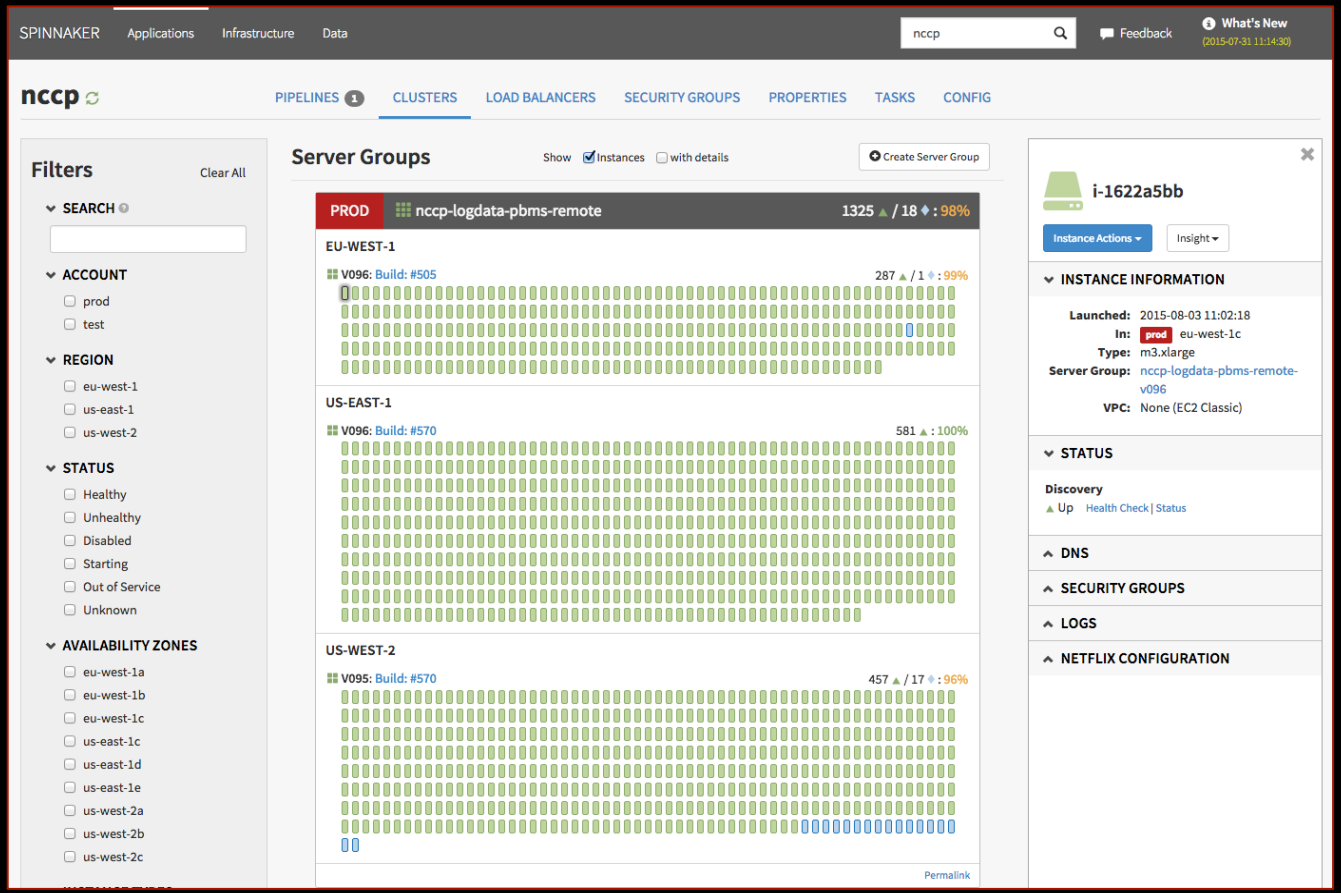
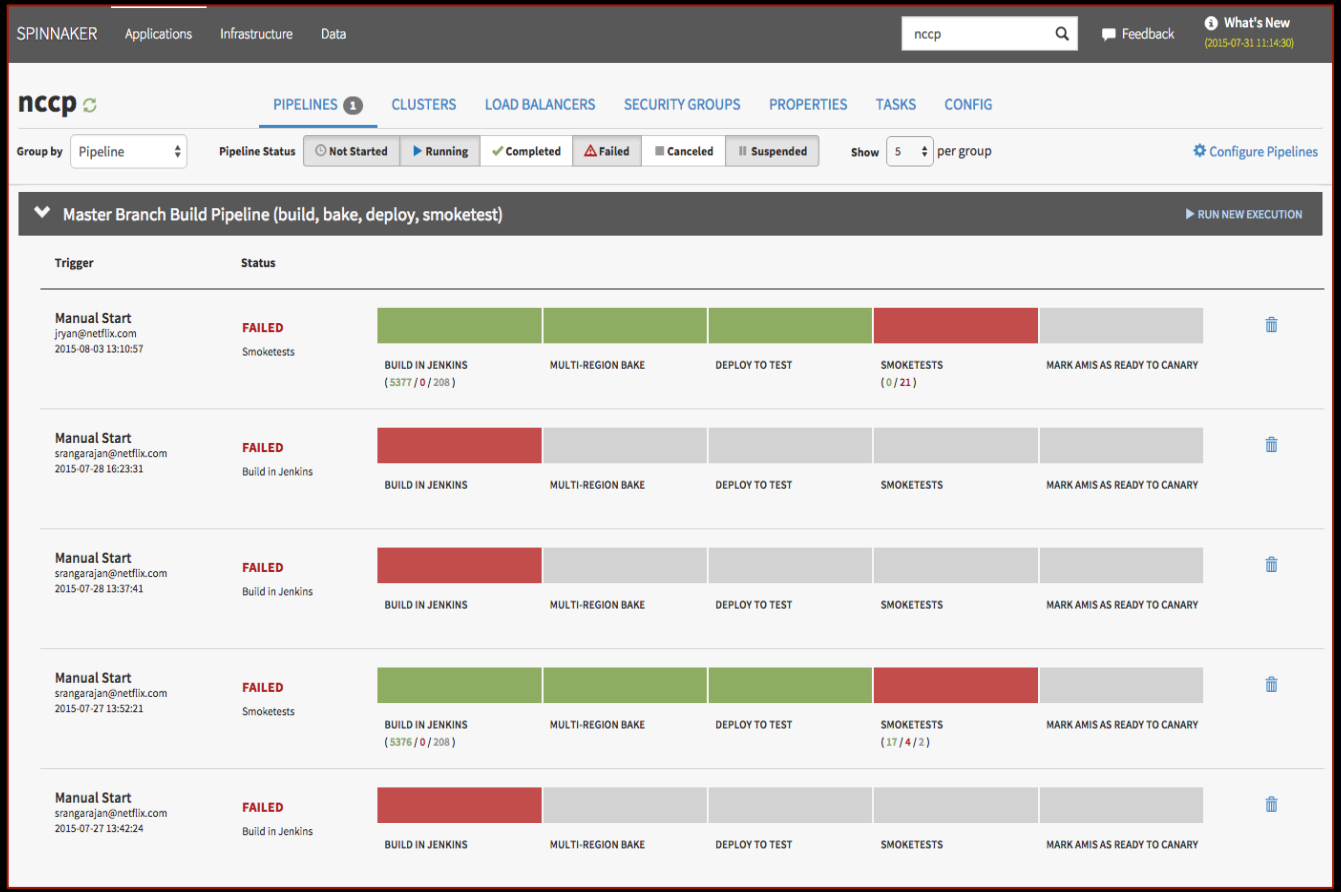
- Cloud Management
- Delivery Engine
- Automation Platform

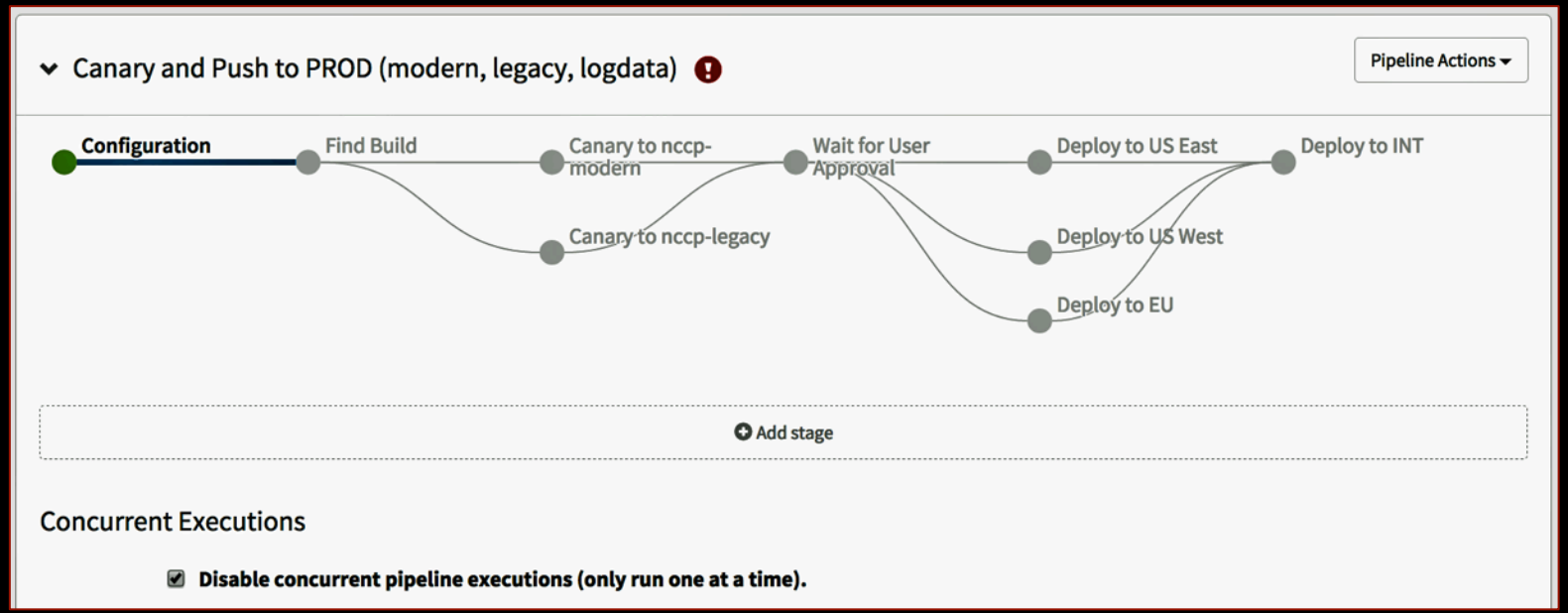
Global Cloud Management



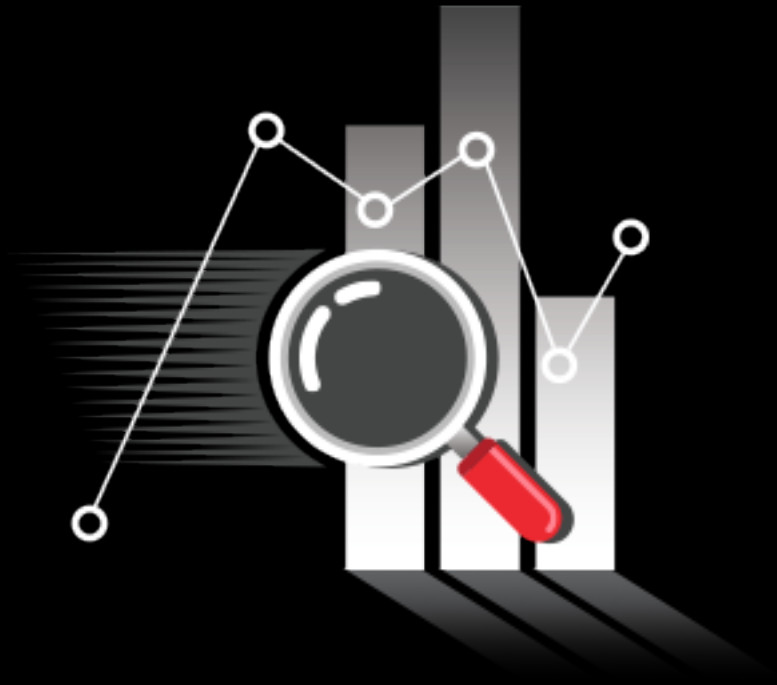
Delivery Pipelines



Automated Global Delivery



Insight



Atlas

Edda

Vector

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Atlas: Telemetry Platform

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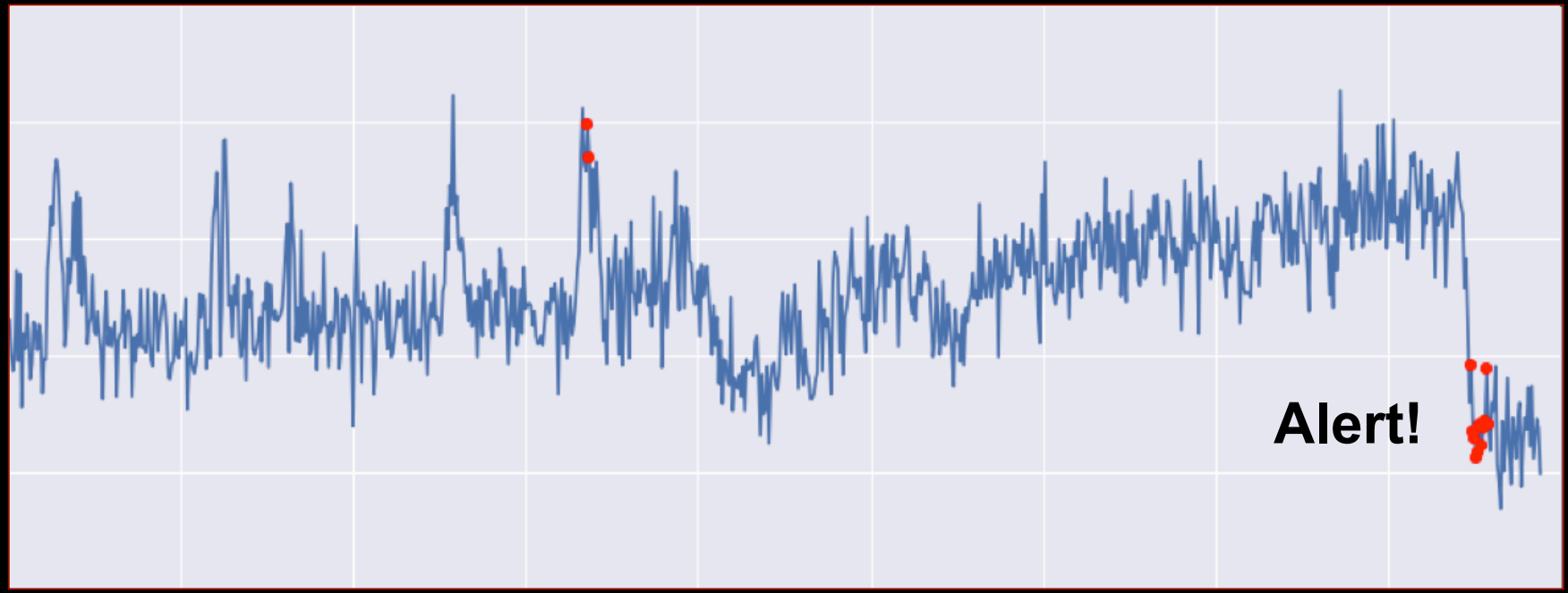
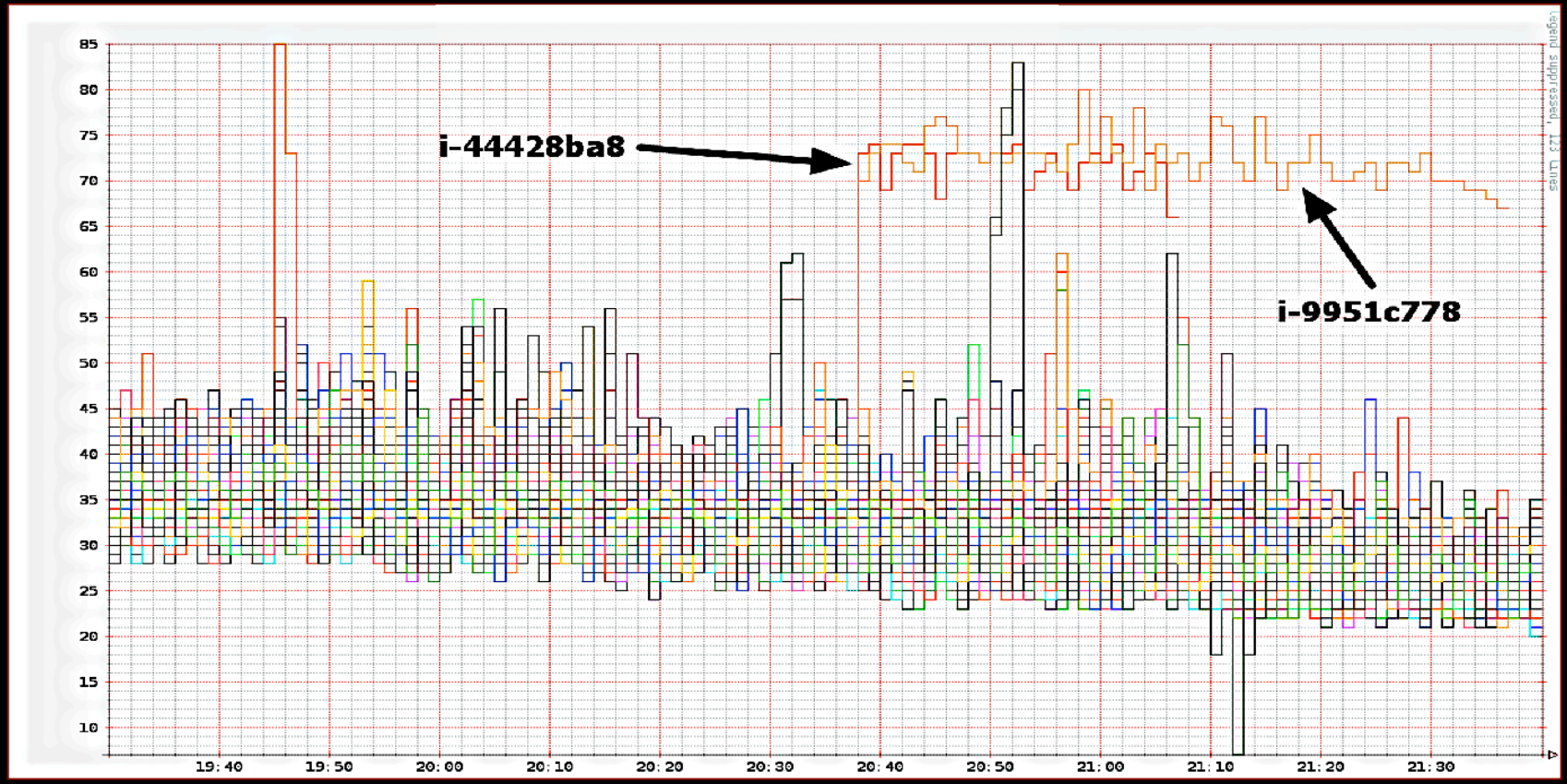
Improvements in Anomaly Detection



From 6-8 minutes to < 1 minute

Getting the Humans Out of the Equation

Outlier Detection & Remediation



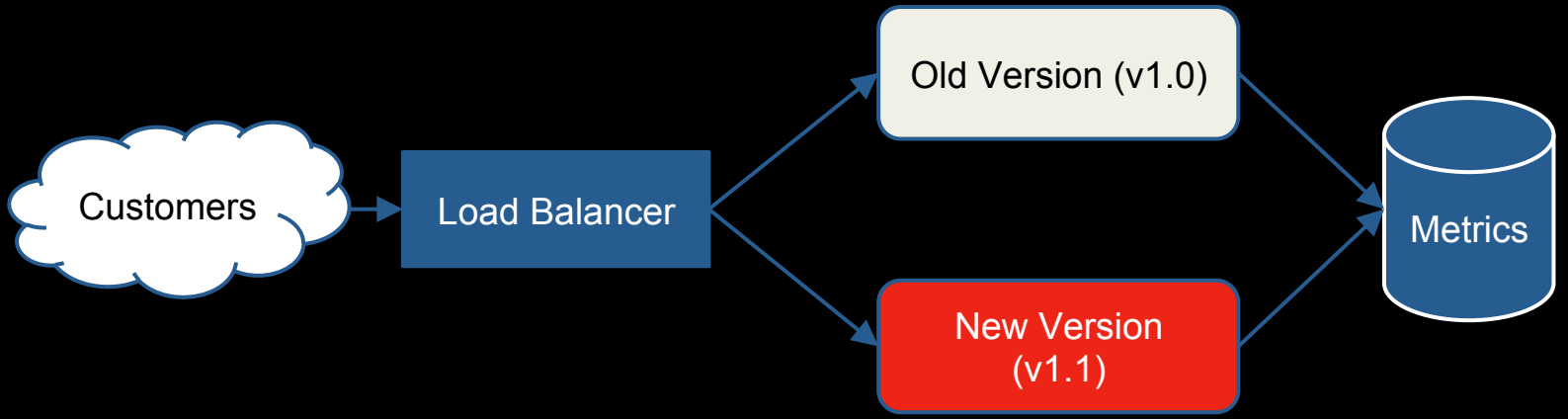
Kepler

- Unsupervised machine learning
- Density-based clustering algorithm

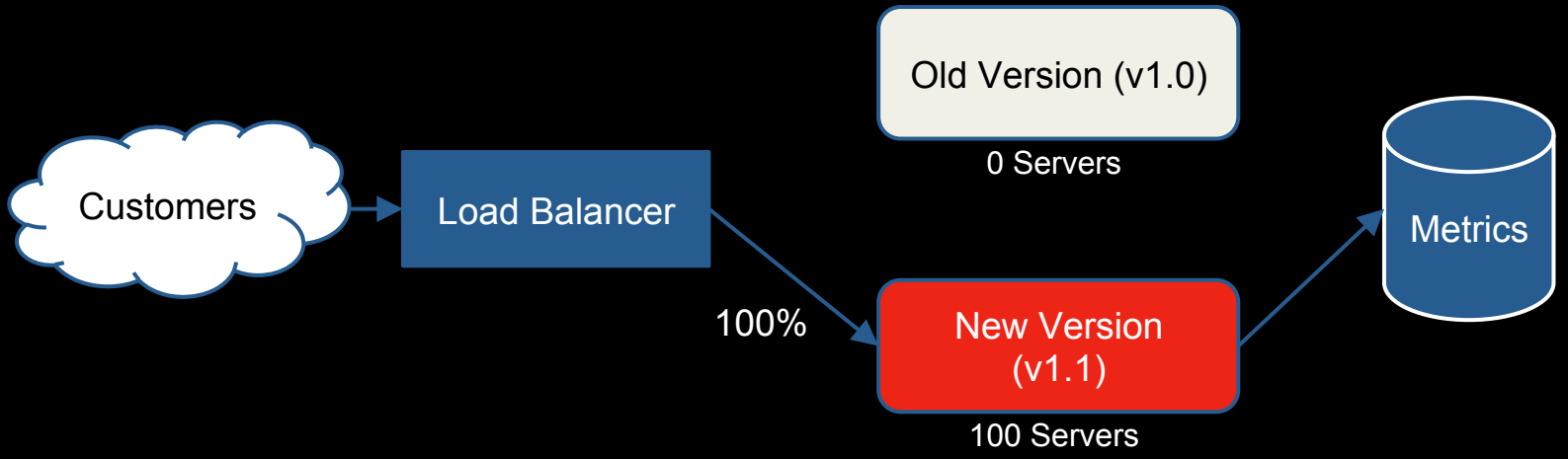
- Actions
  - Email, page
  - OOS, detach, terminate

An ounce of prevention…

Canary Release Process



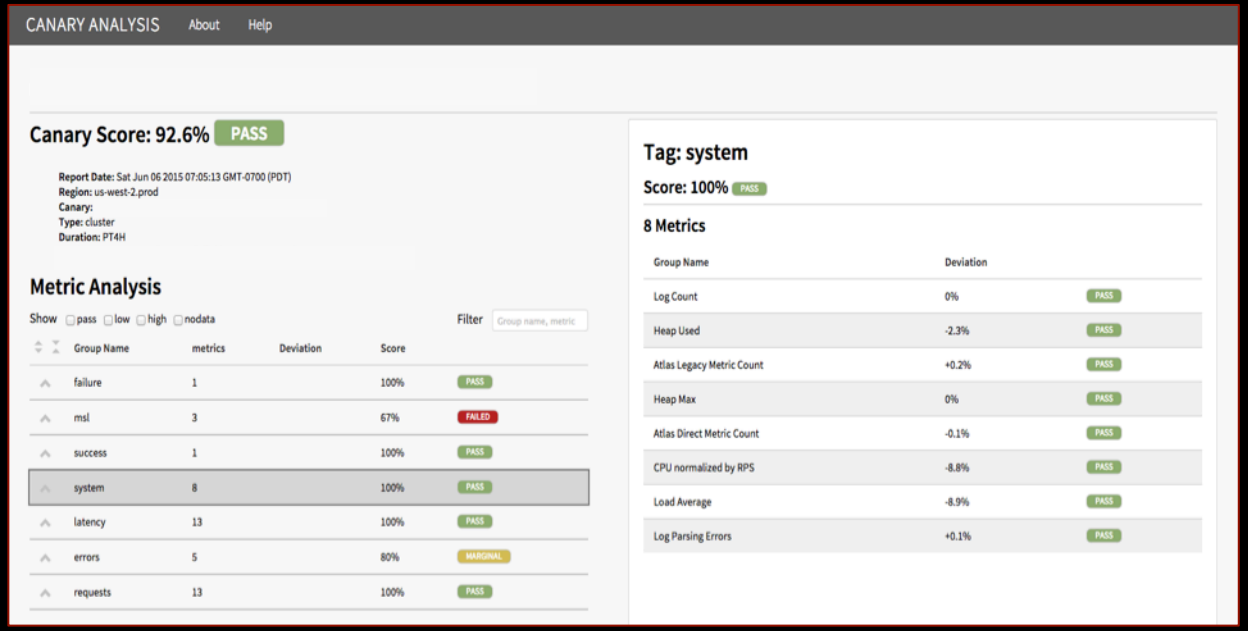
Canary Release Process



Automated Canary Analysis

Define
- Metrics
- A threshold

Every n minutes
- Classify metrics
- Compute score
- Make a decision



Automated Ops

- Systematic observation of facets & permutations
- Unsupervised monitoring & decision- making
- Automated tuning & recovery
- Alerts with analysis

Performance Monitoring

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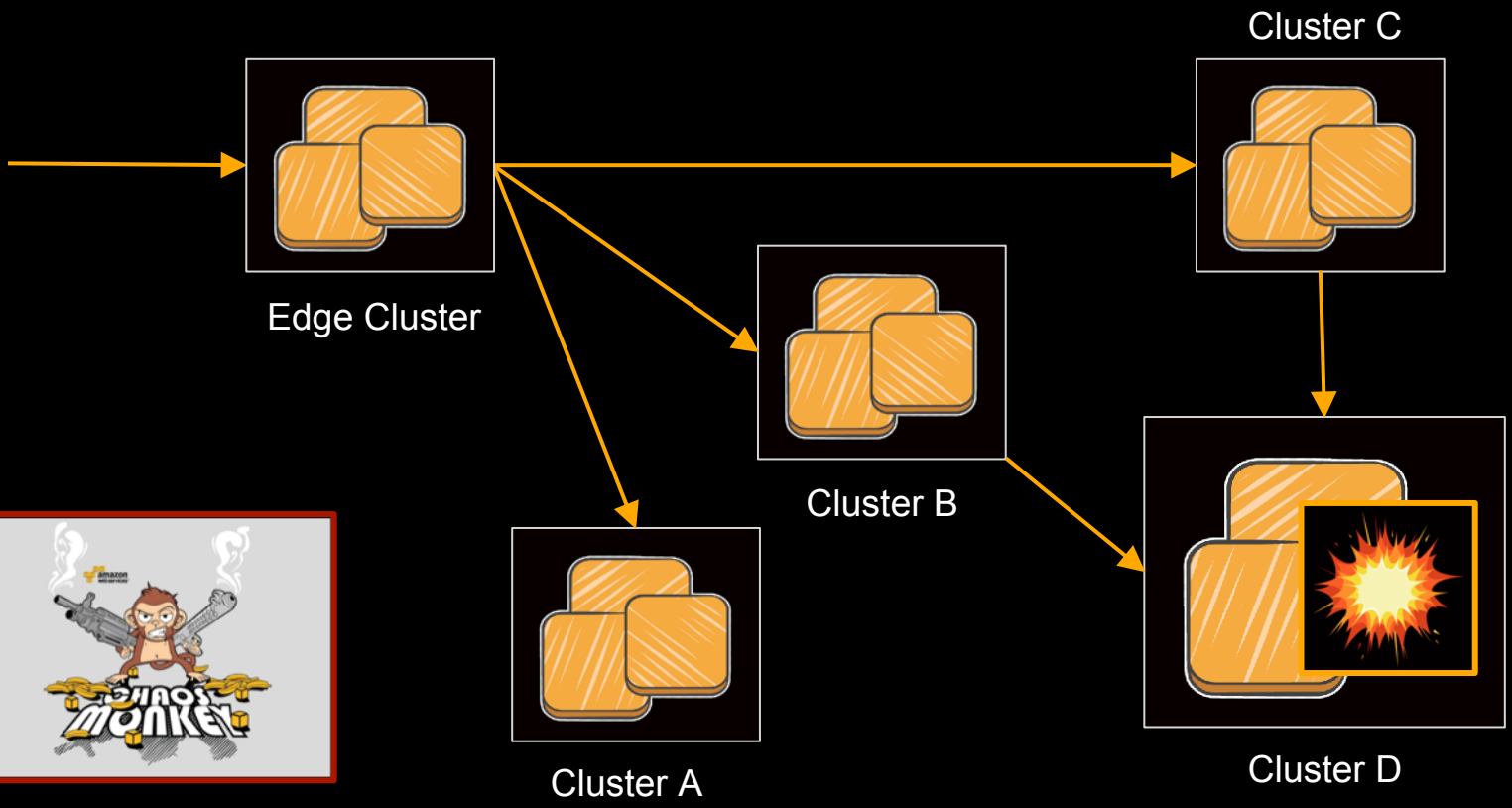
Chaos Engineering is the discipline of experimenting on a distributed system in order to build confidence in the systems capability to withstand turbulent conditions in production.

Imagine a monkey loose in your data center…



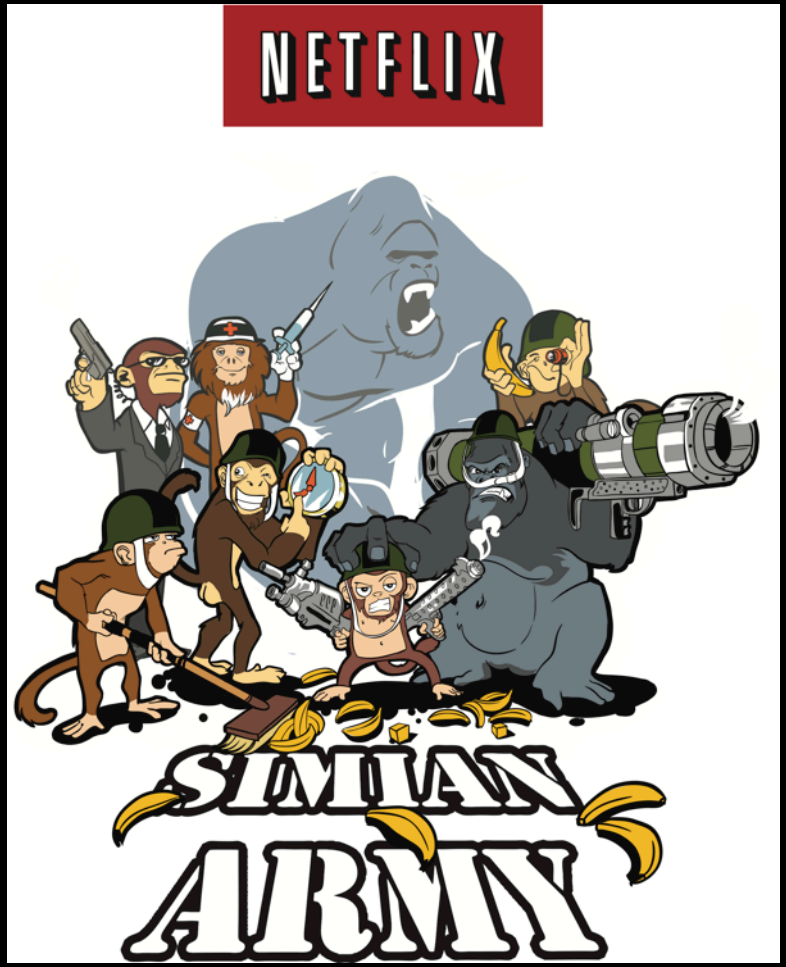
A State of Xen – Chaos Monkey & Cassandra

Xen Hypervisor vulnerability – 9/25/14

218 out of 2700+ Cassandra nodes rebooted
22 did not reboot successfully
Automation handled the rest

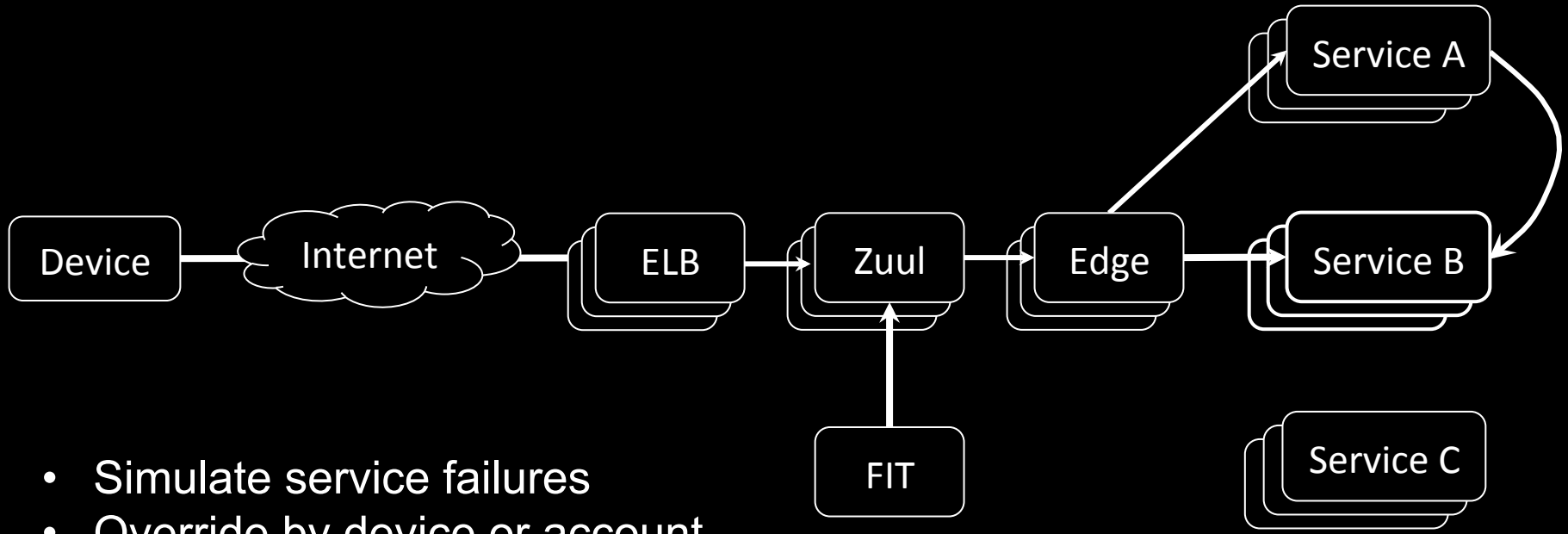
More Chaos

Monkey – Single Instance
Gorilla – Availability Zone
Kong - Region



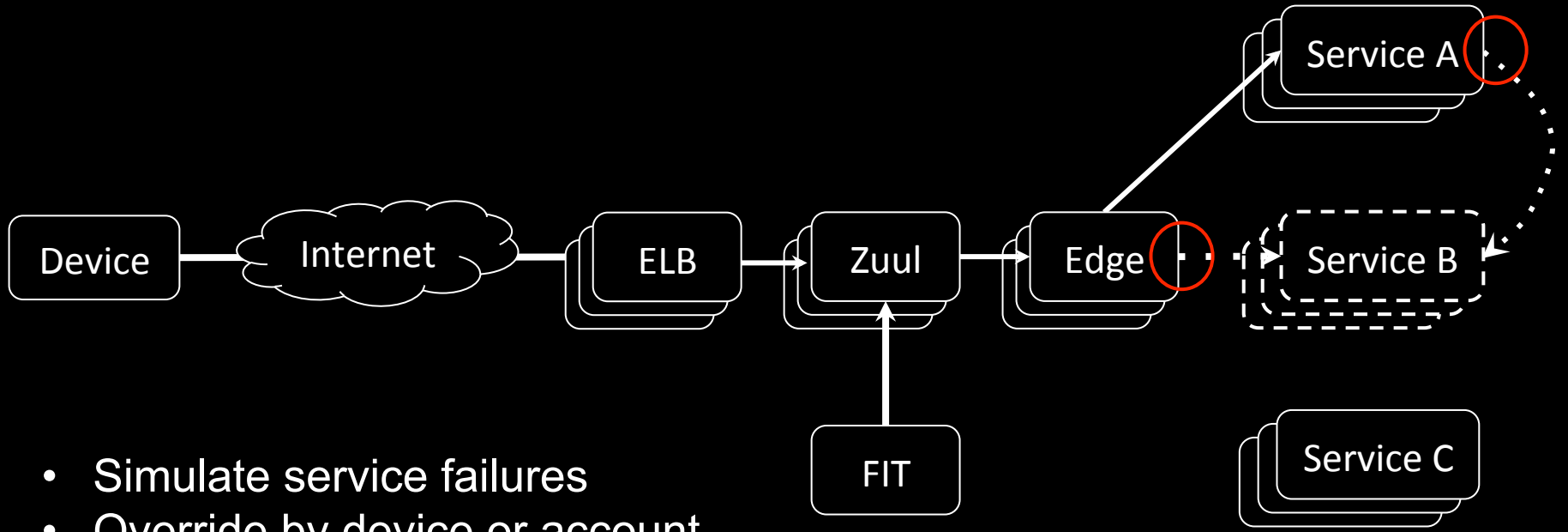
Exercise Regularly

Fault-Injection Testing (FIT)



- Simulate service failures
- Override by device or account
- % of member traffic

Fault-Injection Testing (FIT)



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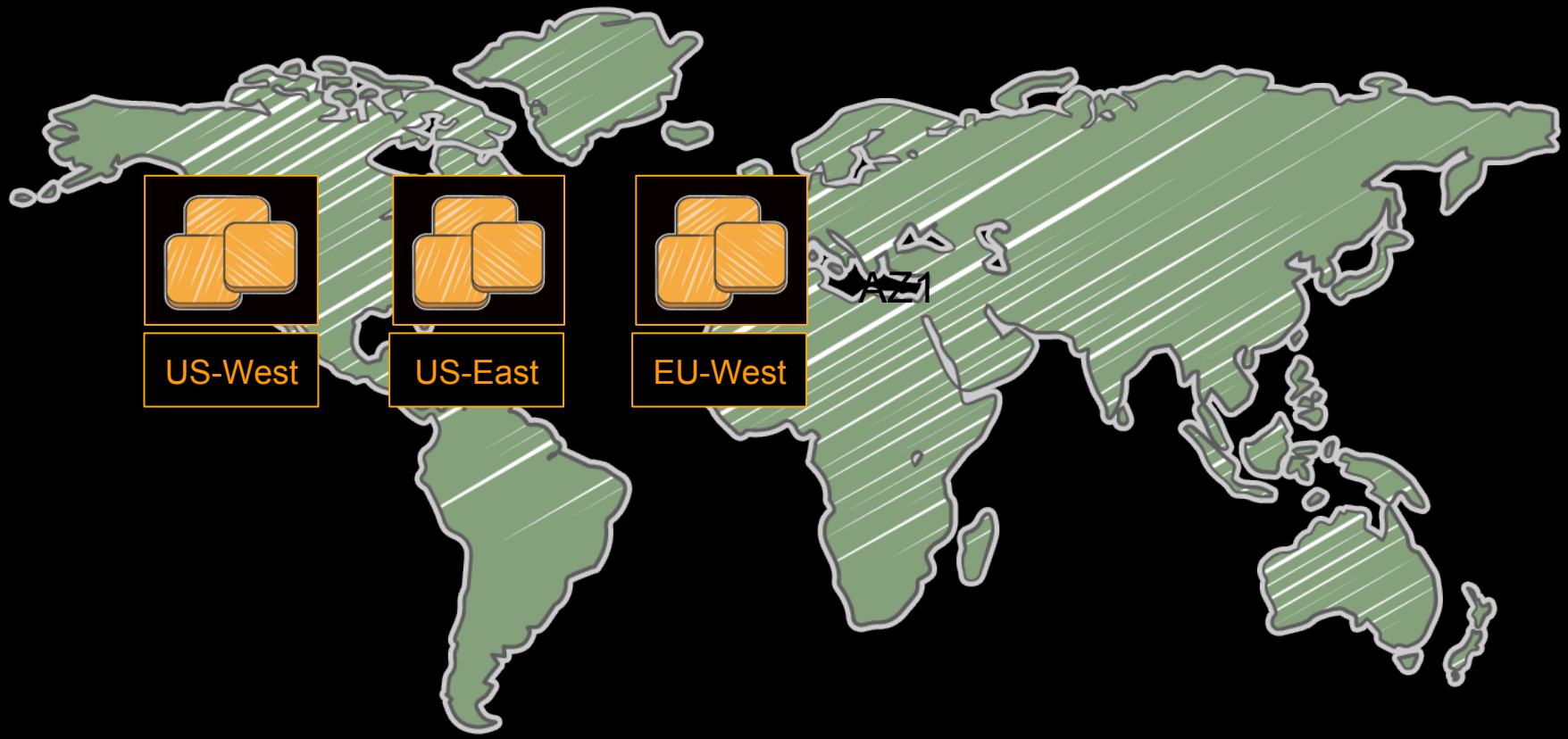
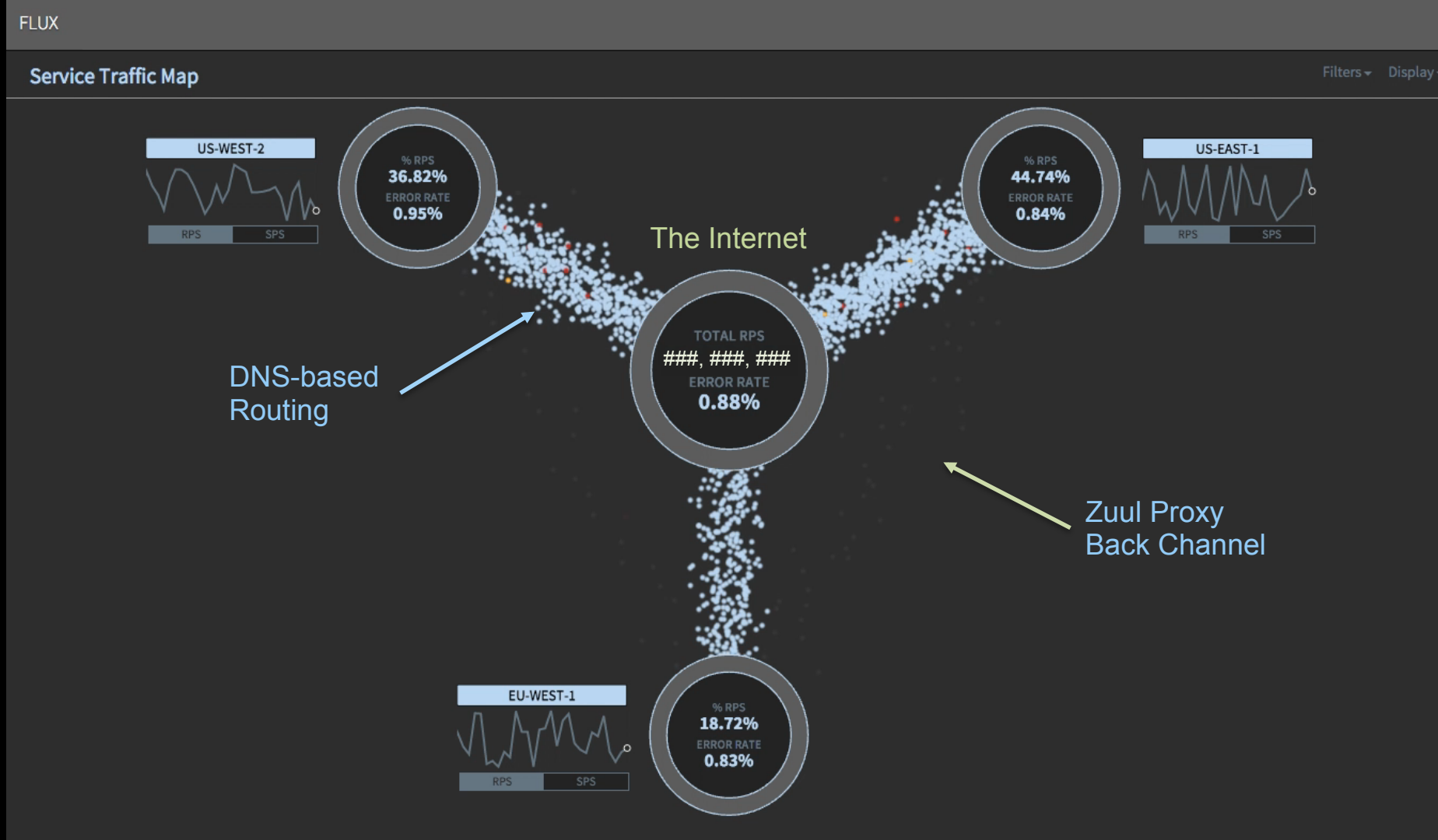
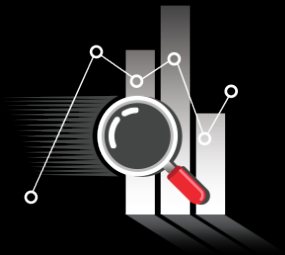
Global Traffic Management




FLUX
Service Traffic Map
Filters
Display
US-WEST-2
RPS
SPS
% RPS
36.82%
ERROR RATE
0.95%
% RPS
44.74%
ERROR RATE
0.84%
US-EAST-1
RPS
SPS
The Internet
TOTAL RPS
###, ###, ###
ERROR RATE
0.88%
DNS-based
Routing
Zuul Proxy
Back Channel
EU-WEST-1
RPS
SPS
% RPS
18.72%
ERROR RATE
0.83%

What will you call DevOps?



Roll the Credits

Netflix.github.io

Dianne Marsh, Director of Engineering

NETFLIX

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