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Netflix RaaS: Reliability as a Service

Coburn Watson

@coburnw

- Cloud Performance, Reliability (and Capacity) @Netflix
  - Reactive and Proactive consultation
  - Build innovative performance analysis tooling
    - Microscope on Microservices Netflix Tech Blog
  - Drive operational best practice adoption
  - Optimize usage of AWS cloud
  - Optimize Netflix Linux BaseAMI and middleware configurations
  - Production On-Call resources as needed

- Hiring!
- Handing out Simian Army stickers after the talk

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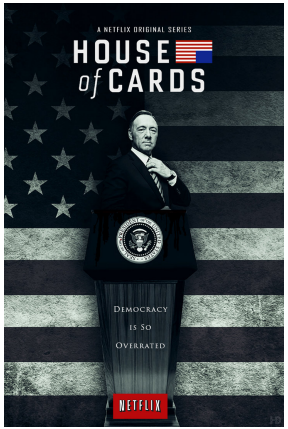
Netflix, Inc.

- Early to the cloud
  - tens of thousands of AWS instances, 3 regions
  - autoscale ~3k instances a day (per region)
  - failover traffic between regions
- Freedom & Responsibility Culture
- 34% of US Internet Traffic at Night*
  - Build and Maintain own CDN
- > 2B hours of streaming per month
  - 55M+ subscribers
  - Strong focus on originals



* 6% of traffic is upload

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The Challenge

- Finding the right balance
  - Dev vs. Ops responsibilities for a team
  - Shared versus distributed model

- Further Complications
  - large microservice-based architecture (many moving parts)
  - numerous, often complex, frameworks used across microservices
  - asymmetric distribution of operational complexity across teams

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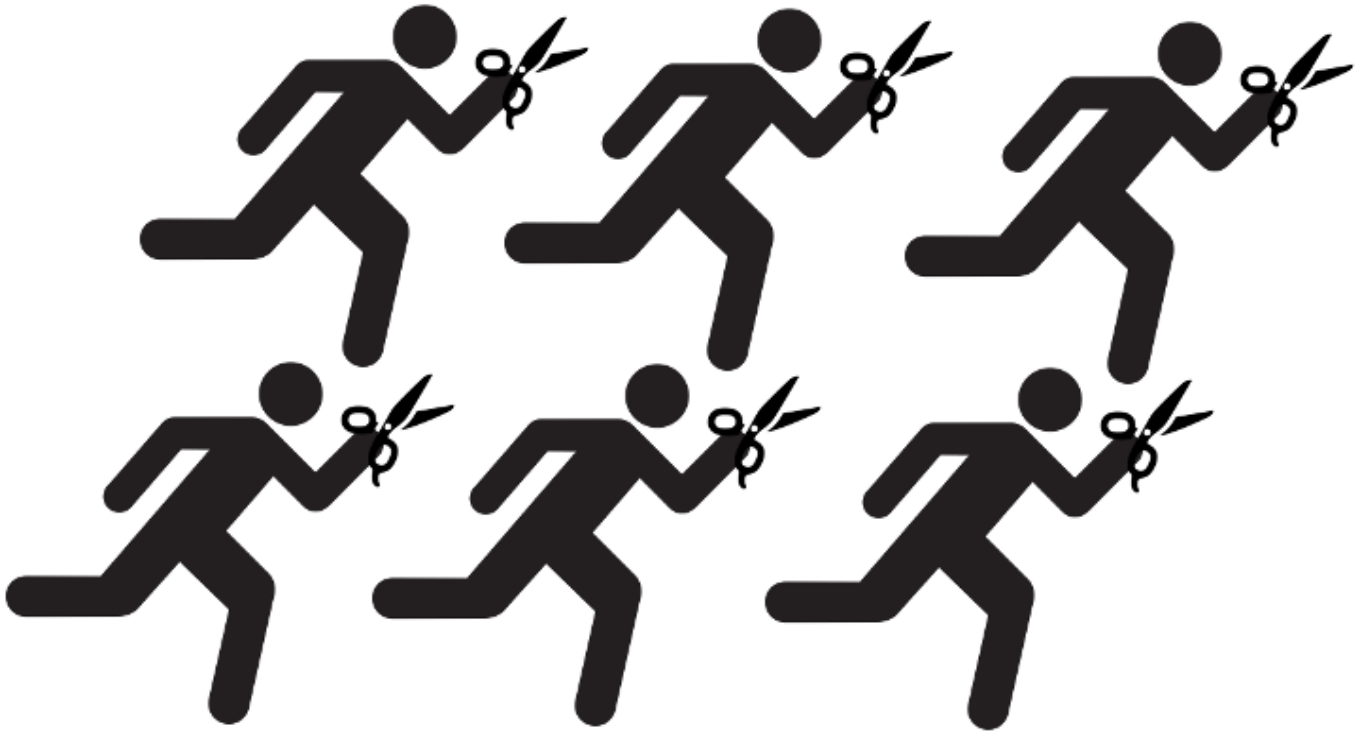
A Primitive DevOps Model



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Let me just push to Production..

(Implicit) Guidance

- Don’t break production!
  - Catch “bad” code early
  - Stagger global pushes
  - Rollback quickly if needed
  - Create and maintain effective alerts
  - Tune circuits (isolate failure)
  - Ensure sufficient capacity
    - but don’t use too much...
  - Remove misbehaving nodes

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A high bar...

- Requires broad and deep expertise
- Complicates hiring strategy
- Dilutes operational focus of team
- Introduces manual error
- Exacerbates configuration drift
- Encourages development of operational point solutions

- possibly impact engineer morale

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One Possible Solution

By Frits Ahlefeldt

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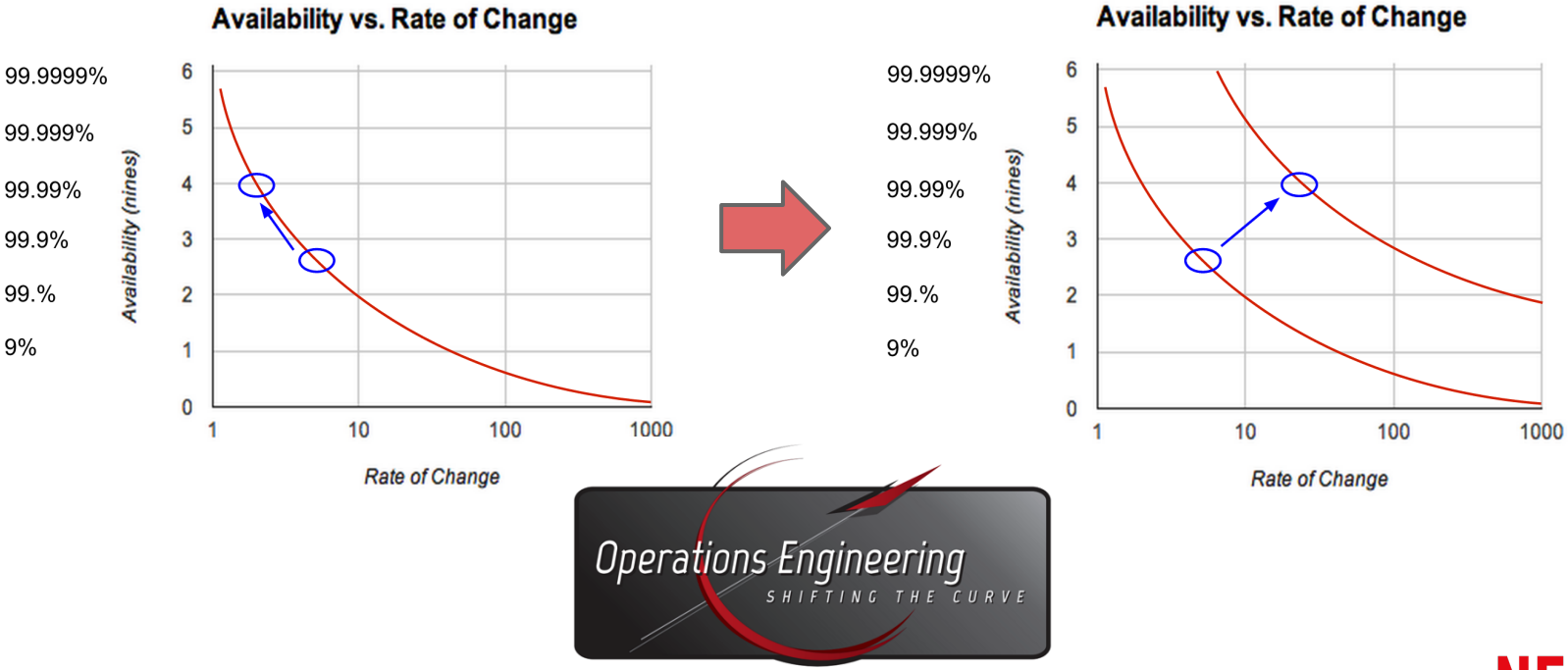
Operations Engineering



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Operations Engineering

5 Primary Teams

- Engineering Tools
- Insight Engineering
- Crisis Response Engineering
- Traffic & Chaos
- Cloud Network Engineering
- Performance and Reliability Engineering

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Strategy

- Lower operational barriers for getting code into production
  - Eliminate undifferentiated heavy lifting

- Create effective feedback loops (context)
  - Performance and reliability
  - Code Quality
  - Efficiency and Cost

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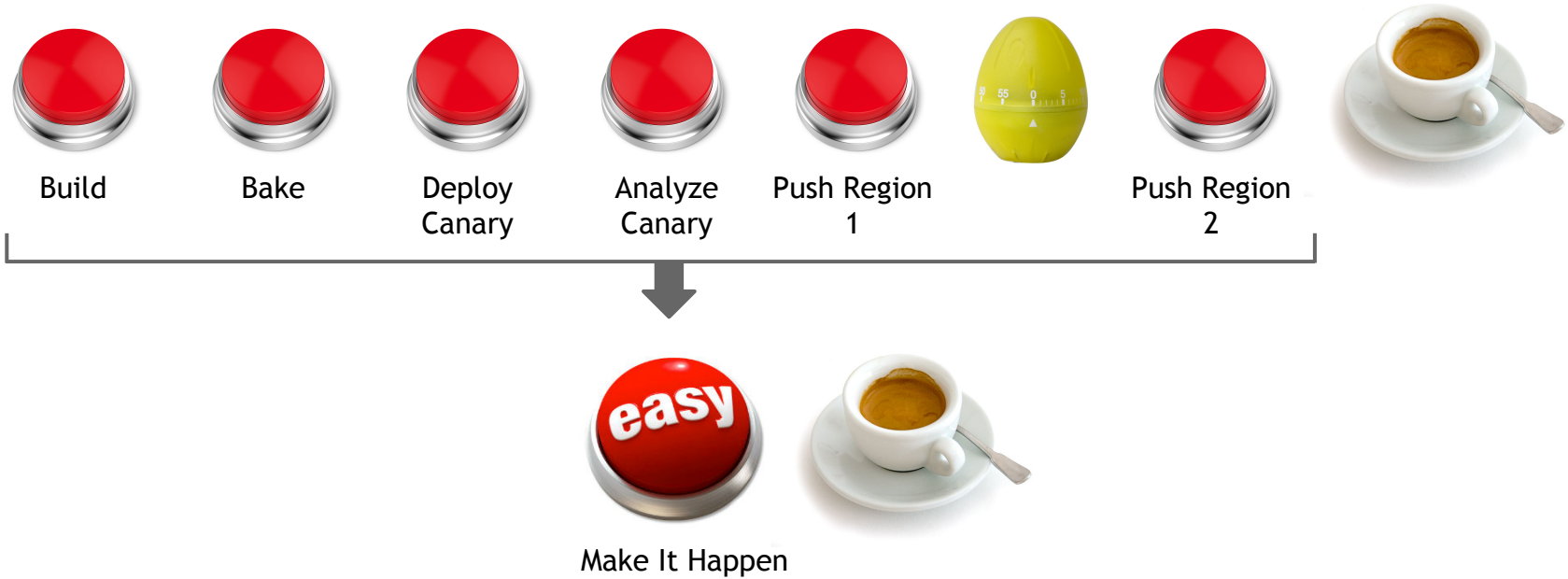
Strategies Applied



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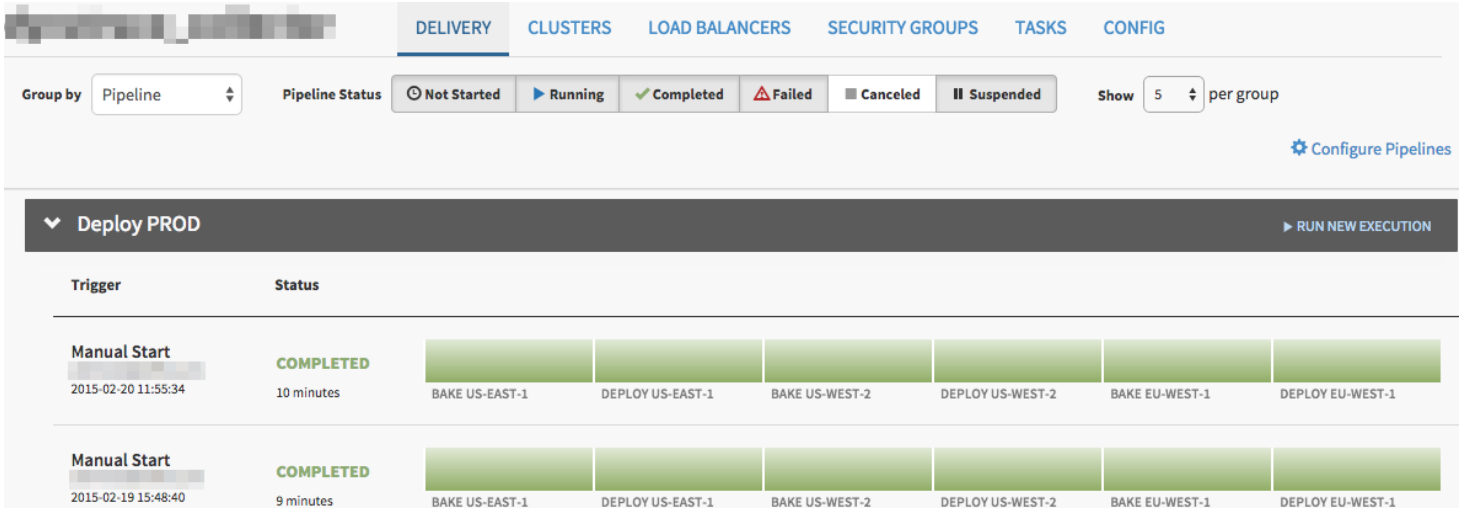
Continuous Integration

- One button staggered global deploy (or scheduled)
- Integrates with Automated Canary Analysis Framework



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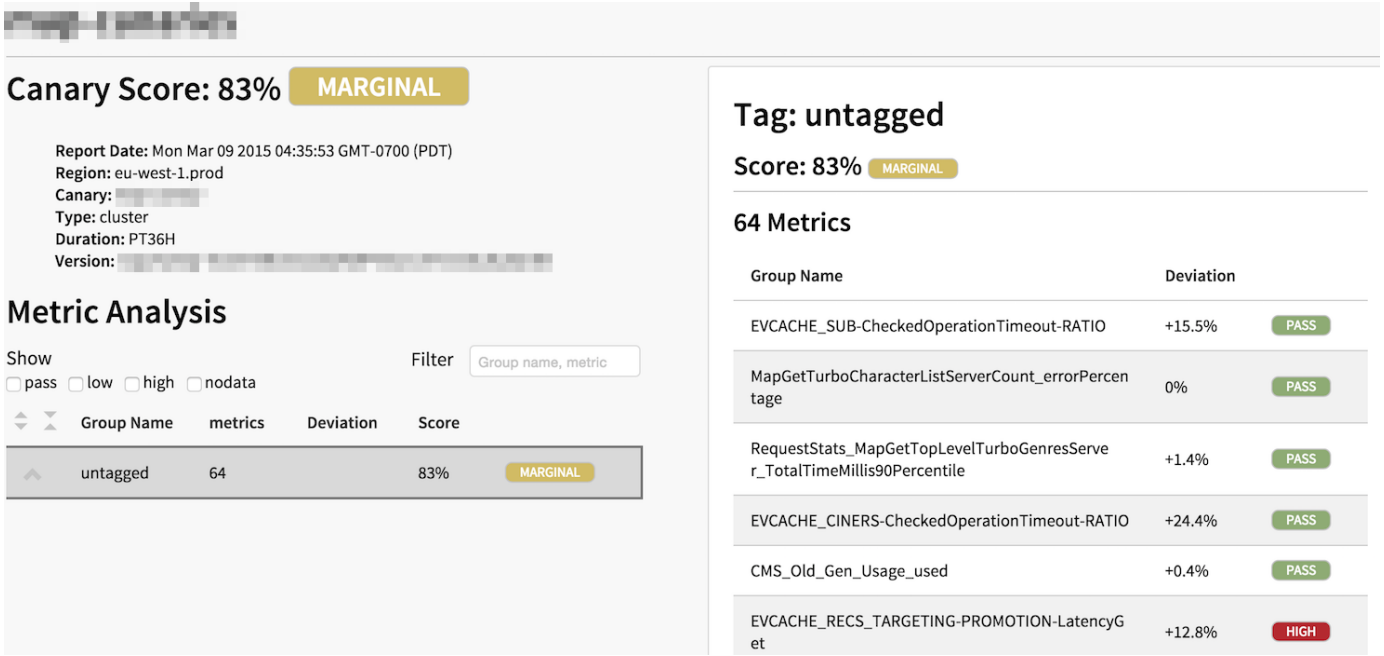
Catch “bad” code early

- Automated Canary Analysis



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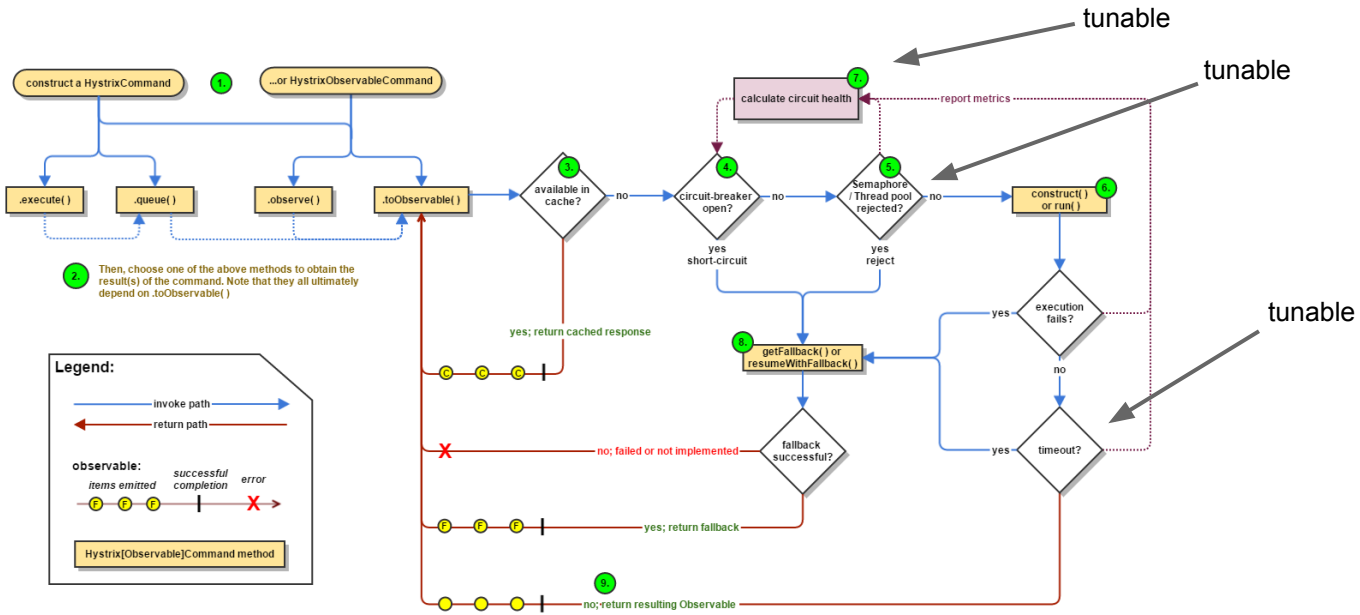
Tune Circuits

- Fault isolation frameworks can require significant babysitting
  - Netflix framework is Hystrix



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Tune Circuits, cont.

- Strategy
  - Consult experts users of Hystrix within Netflix
  - Identify possible models to apply
  - Train selected model against simulation framework
  - Validate model against production workload
  - Automate analysis through RTA framework
  - Configure RTA* framework to send emails highlighting risk
- 90/10 rule
  - There are always corner cases, don’t be discouraged
- Research took about a quarter

*RTA is an analytics platform built internally

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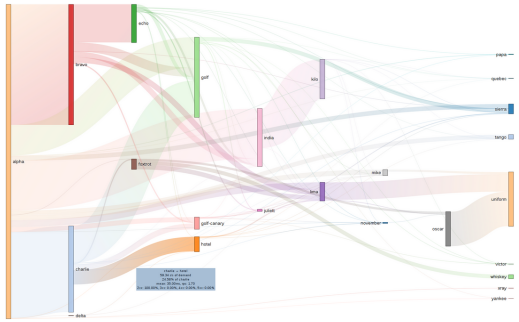
Improved Observability

Self-service tooling based on that used by Performance & Reliability Team



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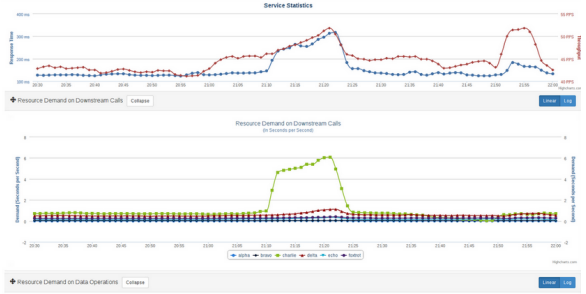

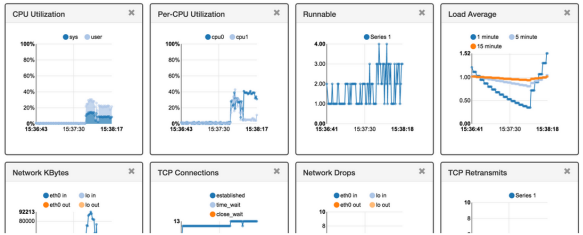

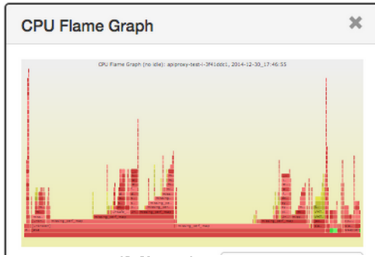

(Micro)

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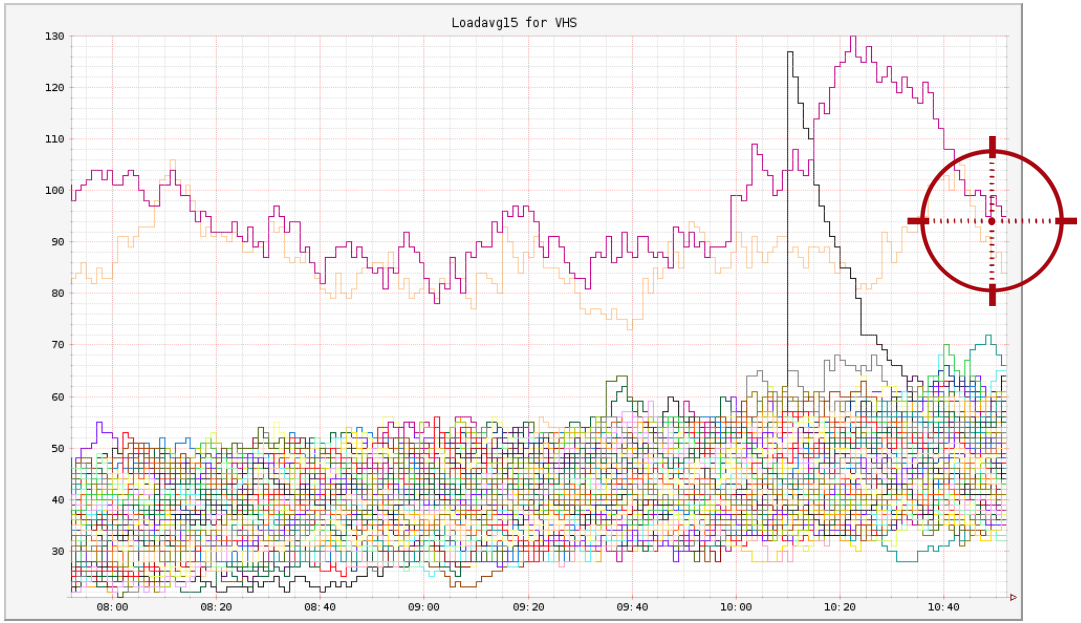
Eliminate Outliers

- *Two of these instances are not like the others, two of these just don't belong**..



** paraphrased

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Another helping hand

All the monkeys and gorillas you could want..the Netflix Simian Army

- Automated (unplanned) Terminations
- Security Scans
- Cleanup of unused resources
- Injection of latency and failures
- Terminate an availability zone
- Fail a Region

...all opt-in by default

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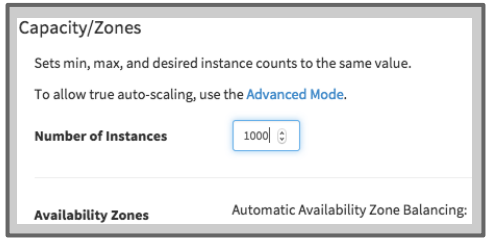
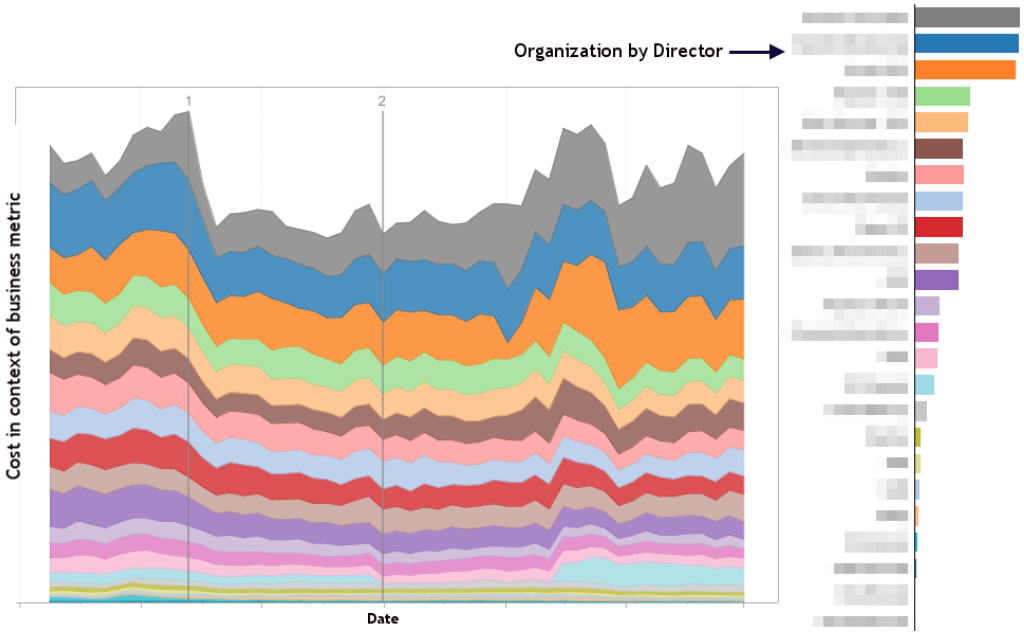
Efficiency & Cost

Distribute weekly cost report



Freedom



Responsibility

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Tool Transitions

- (Point) Solutions built out of necessity
  - broad value for long-term care and feeding

- Example: Scryer
  - Predictive autoscaling engine
  - Developed by Edge Platform..migrated to Performance and Reliability team

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Measuring Success

- Reduction in incidents related to specific operational areas/tasks
- Instrument applications to quantify uptake rates
- Talk to your customers...often; solicit critical feedback
- Engineering teams providing resources for tool development/extension
    - vs building point solution w/in team

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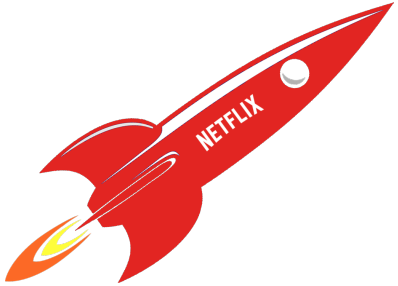
Onwards and upwards



- Evolve operational best practices program
  - Production Ready
  - Prioritize work to align with “critical” services; maximize leverage
- Create and extend tooling
  - Autoscaling RTA module, Java GC tuning, etc.
- Continue to strengthen Reliability Engineering base

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Q&A

- cwatson@netflix.com, @coburnw
- Netflix Open Source Portal

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