Istio on Kubernetes: Enter the Service Mesh

Burr Sutter (burrsutter.com)

bit.ly/istio-tutorial

Upcoming 3 hour classes/workshops

Istio on Kubernetes: Enter the Service Mesh (Advanced Class)

Nov 27
https://www.safaribooksonline.com/live-training/courses/istio-on-kubernetes-enter-the-service-mesh/0636920221357/

9 Steps to Awesome with Kubernetes (Intro Class)

December 5
https://www.safaribooksonline.com/live-training/courses/9-steps-to-awesome-with-kubernetes/0636920222477/

Raffle Rules (applicable in the real)

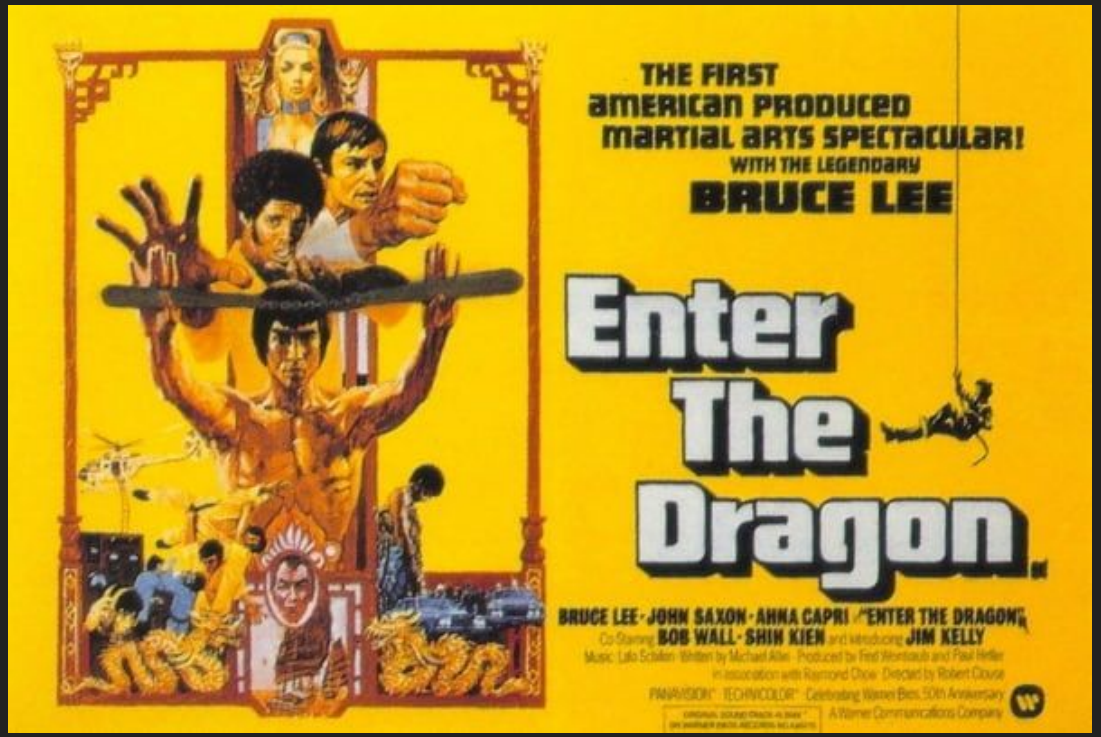
1. Follow: @burrsutter 
2. With picture of the session
3. Mention @burrsutter
4. With hashtag #oredev

Laptop Setup

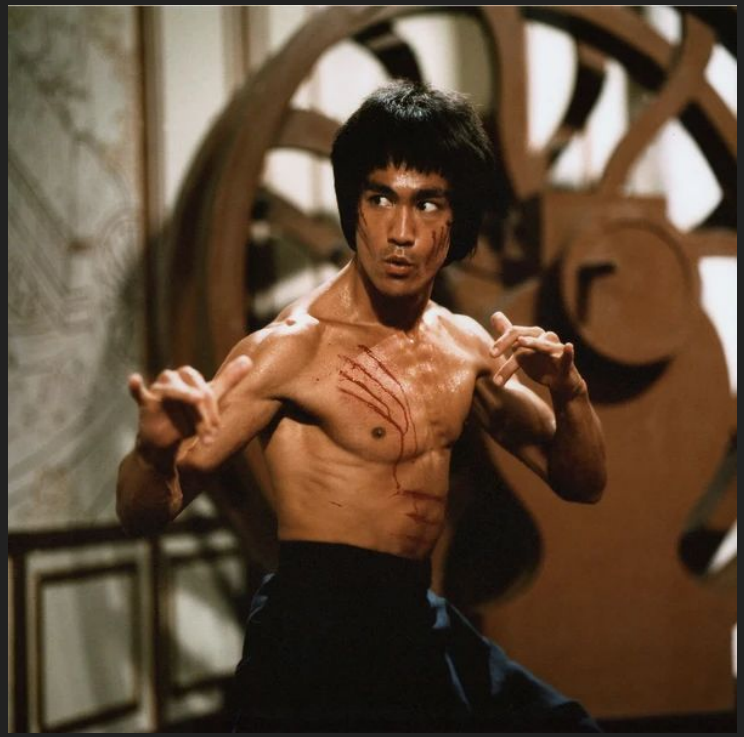
Minishift
https://redhat-developer-demos.github.io/istio-tutorial/istio-tutorial/1.0.0/1setup.html

Minikube
https://istio.io/docs/setup/kubernetes/platform-setup/minikube/
https://istio.io/docs/setup/kubernetes/quick-start/#verifying-the-installation

Scripts
https://github.com/burrsutter/scripts-istio



https://www.flickeringmyth.com/2018/07/deadpool-2-director-in-talks-for-enter-the-dragon-remake/



https://www.watershed.co.uk/whatson/9037/enter-the-dragon

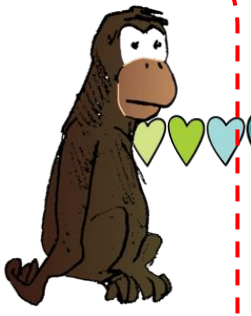
Your Journey to Awesomeness

Re-Org to DevOps

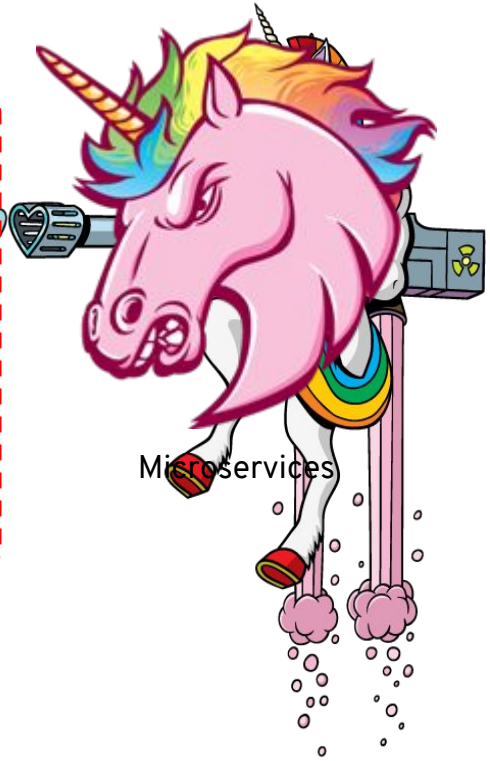
Self-Service, On-Demand, Elastic Infrastructure

Automation

CI & CD Deployment Pipeline

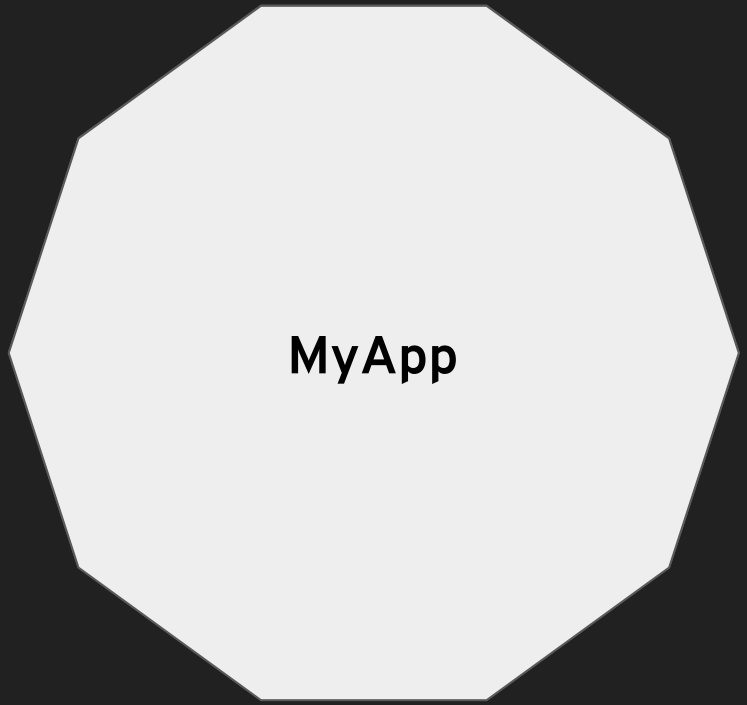


Advanced Deployment Techniques

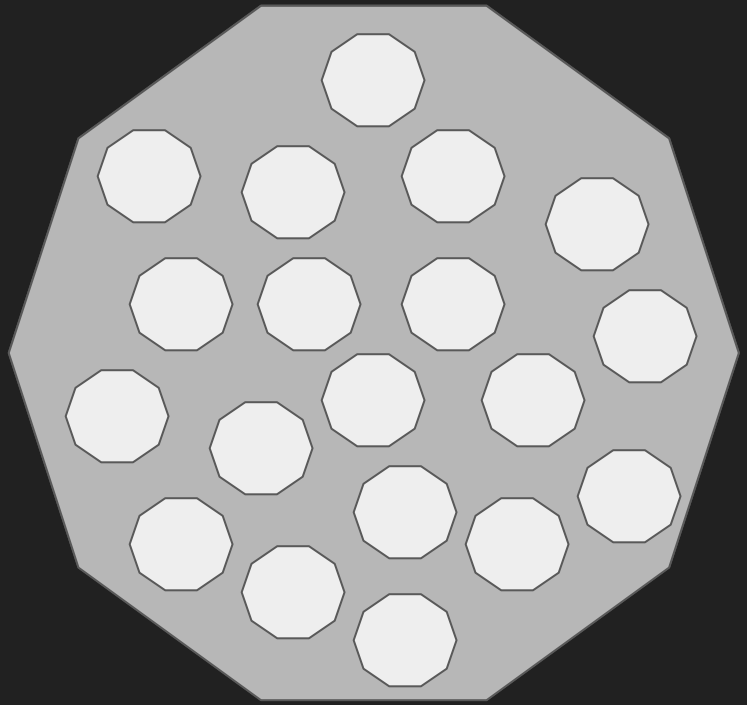


Microservices

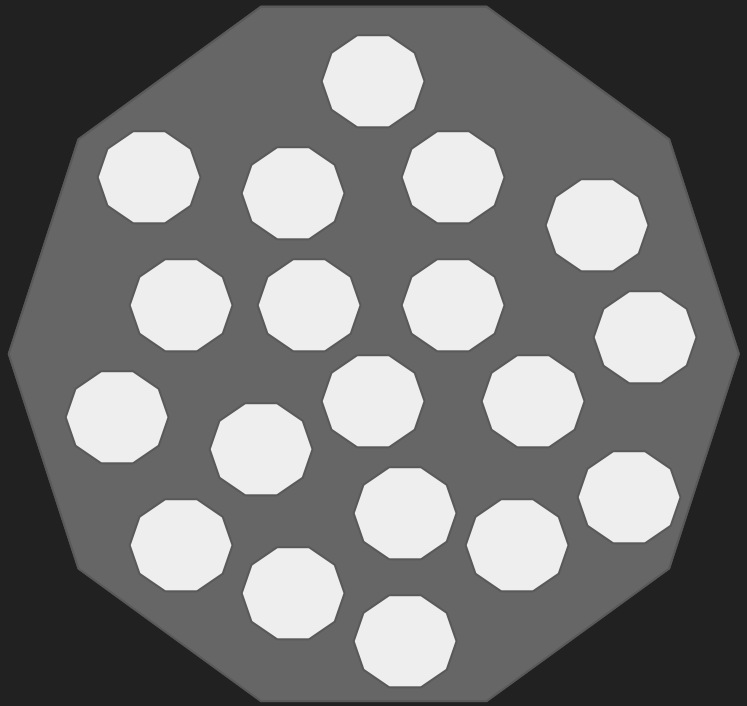
Monolith



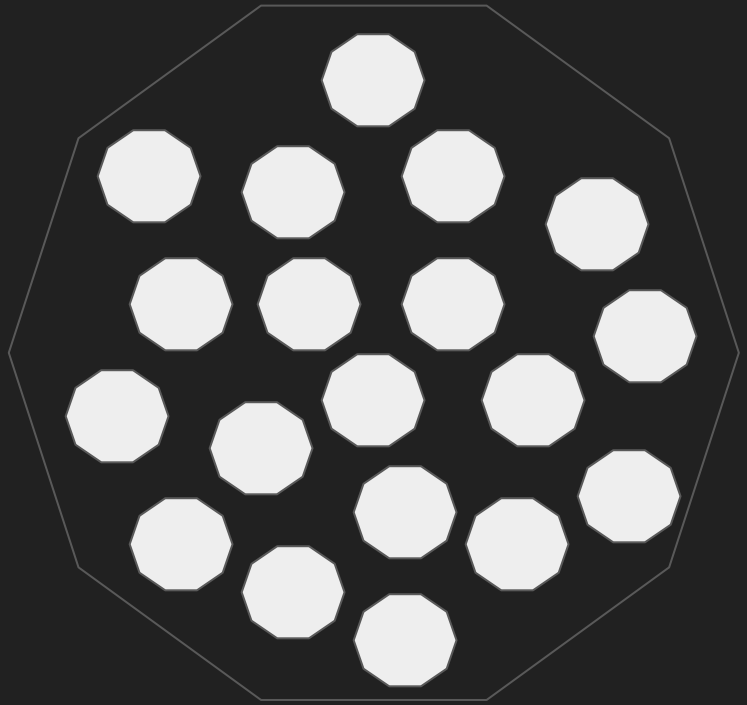
The Application



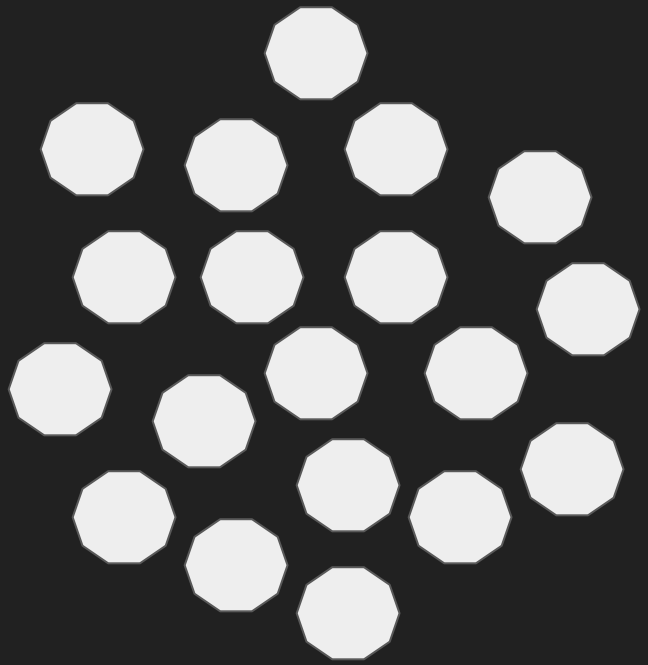
Modules



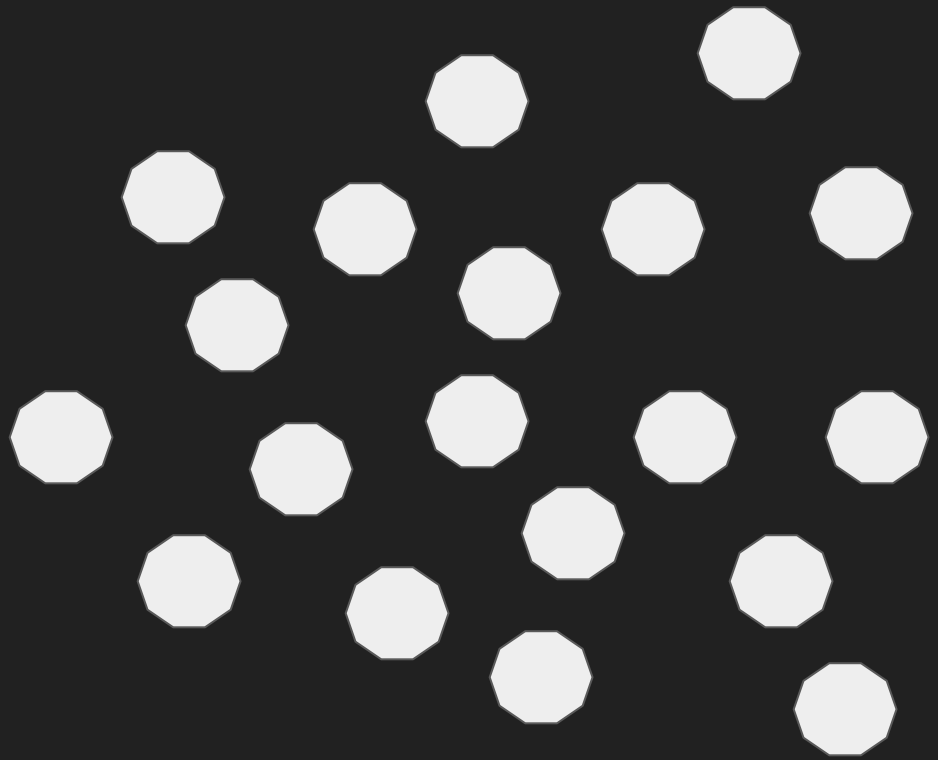
Microservices



Microservices



Microservices



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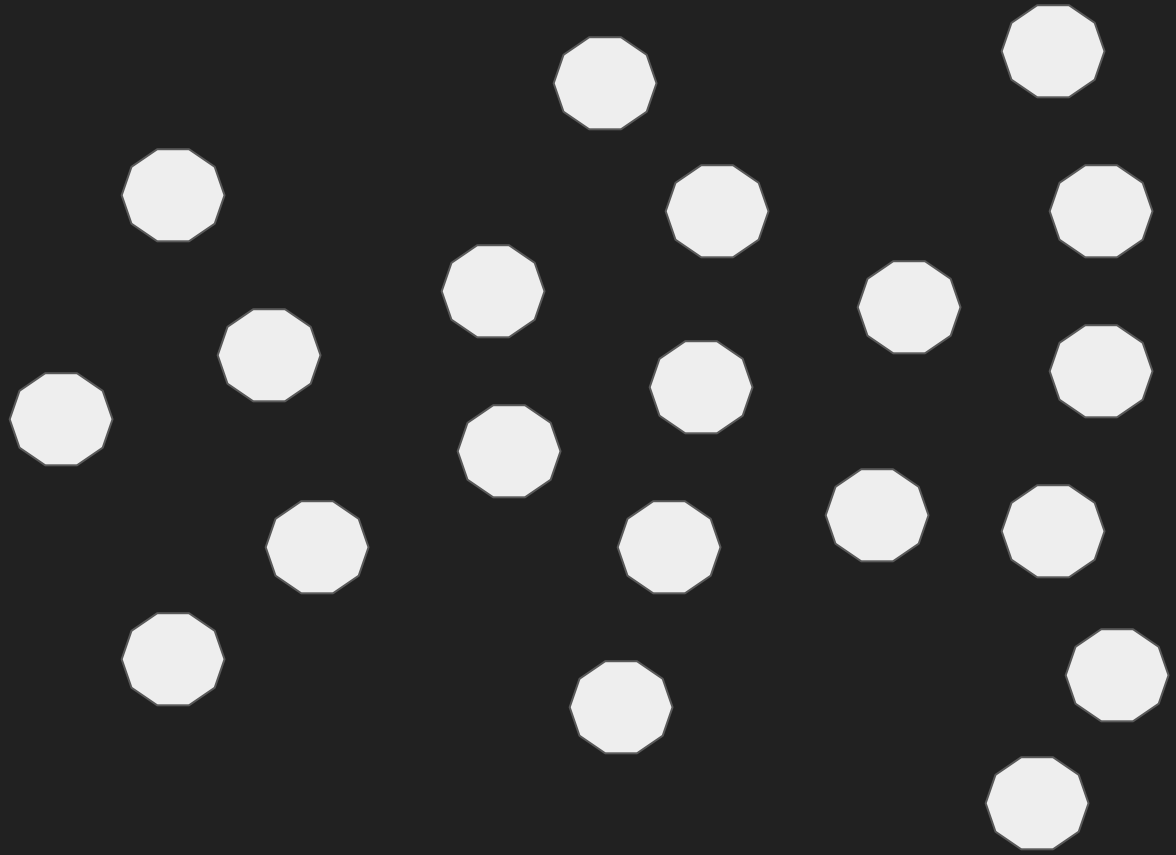
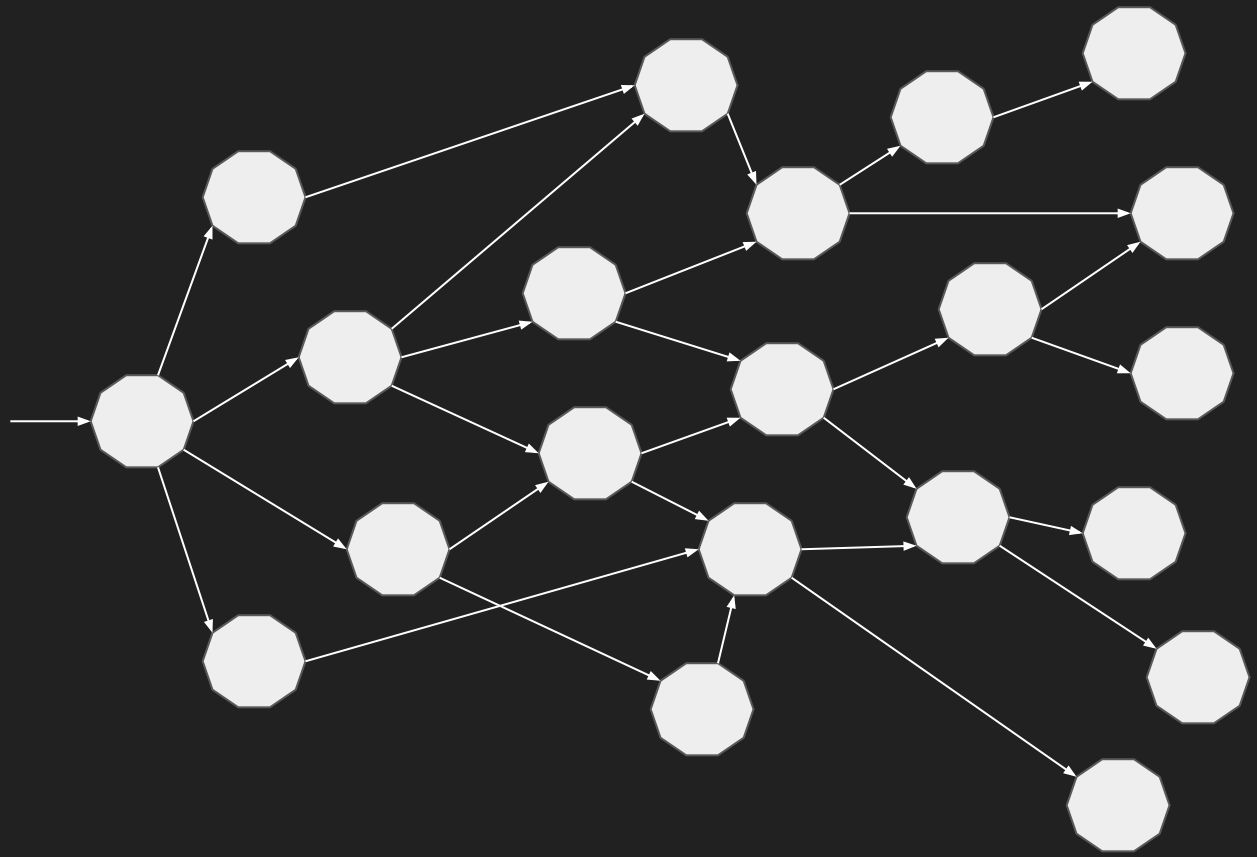
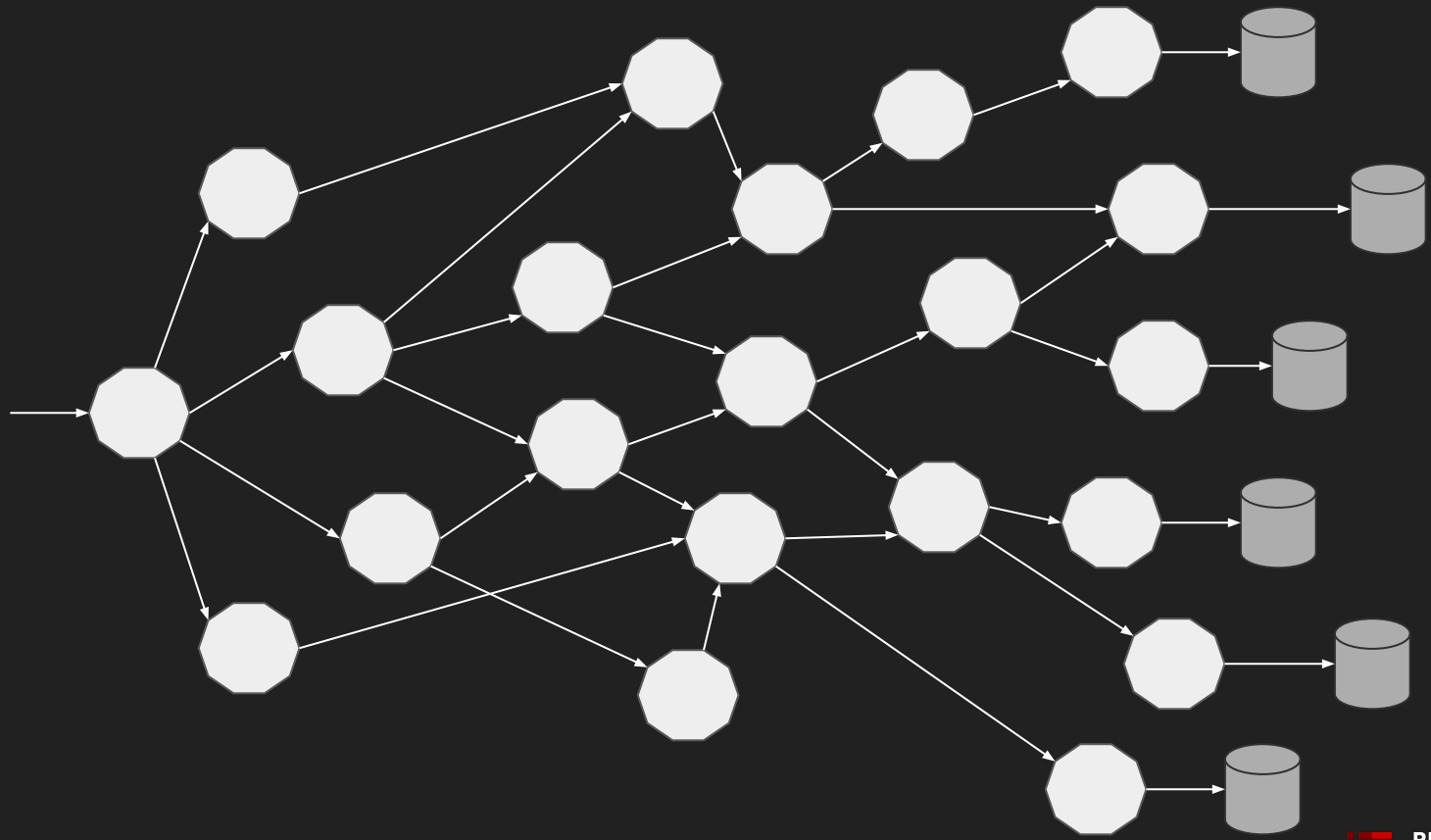


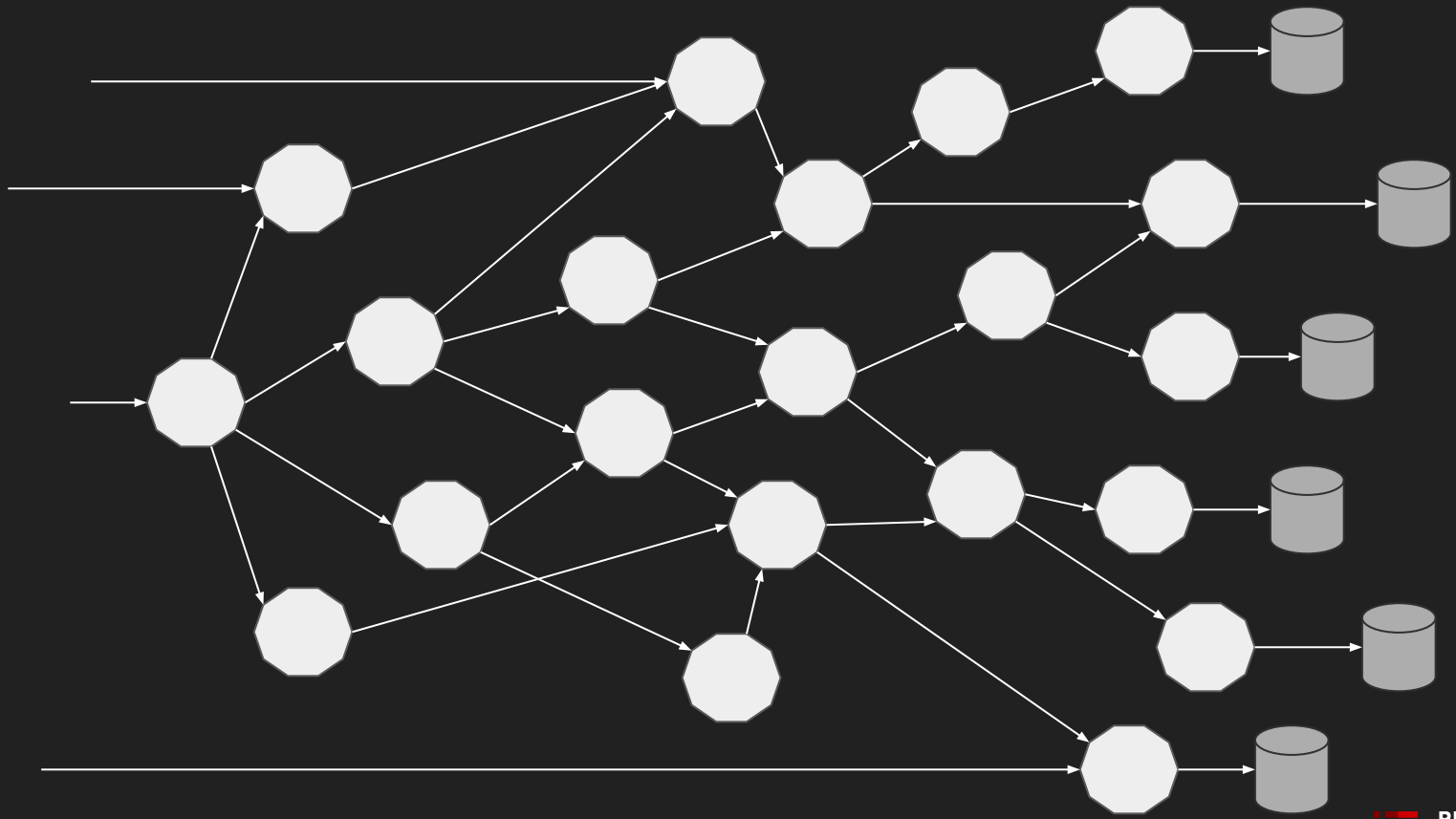
Network of Services



Microservices own their Data



Multiple Points of Entry



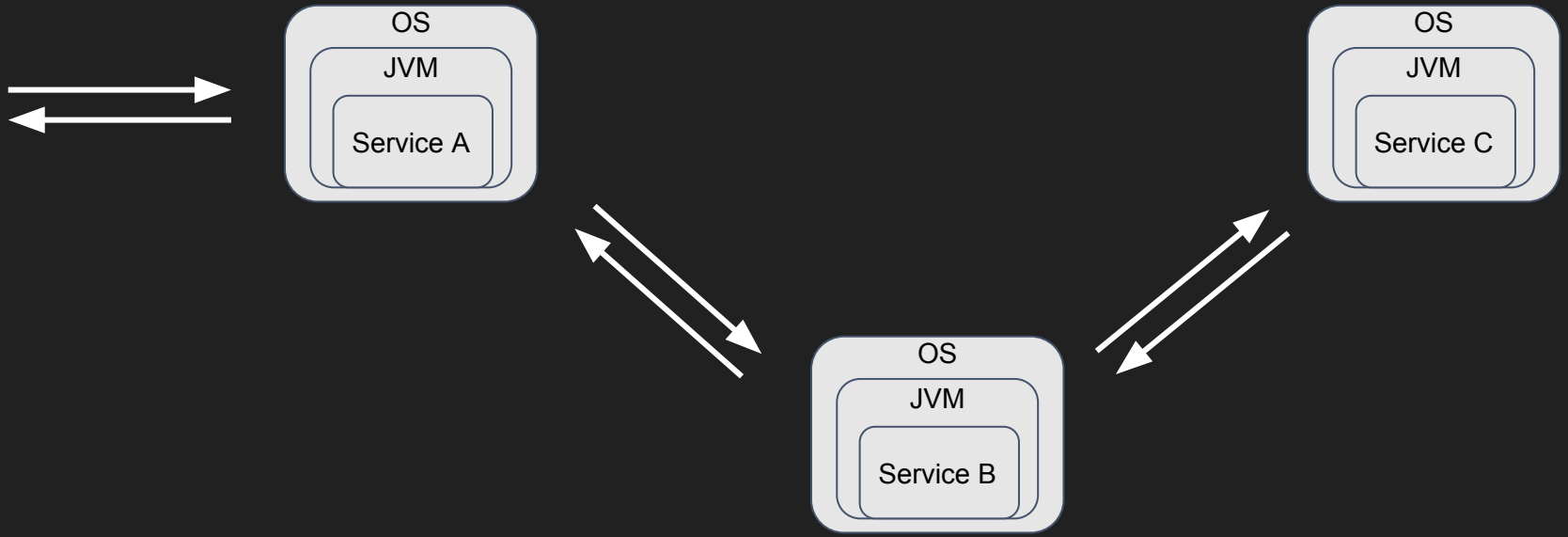
Microservices Principles

1. Deployment **Independence** - updates to an individual microservice have no negative impact to any other component of the system. Optimized for **Replacement**
2. Organized around **business** capabilities
3. **Products** not Projects
4. **API** Focused
5. **Smart** endpoints and dumb pipes
6. Decentralized Governance
7. Decentralized Data Management
8. Infrastructure Automation (infrastructure as code)
9. Design for failure
10. Evolutionary Design

Kubernetes/OpenShift Re-cap Demo

mvn package, docker build, kubectl apply -f deploy.yml

Microservices == Distributed Computing

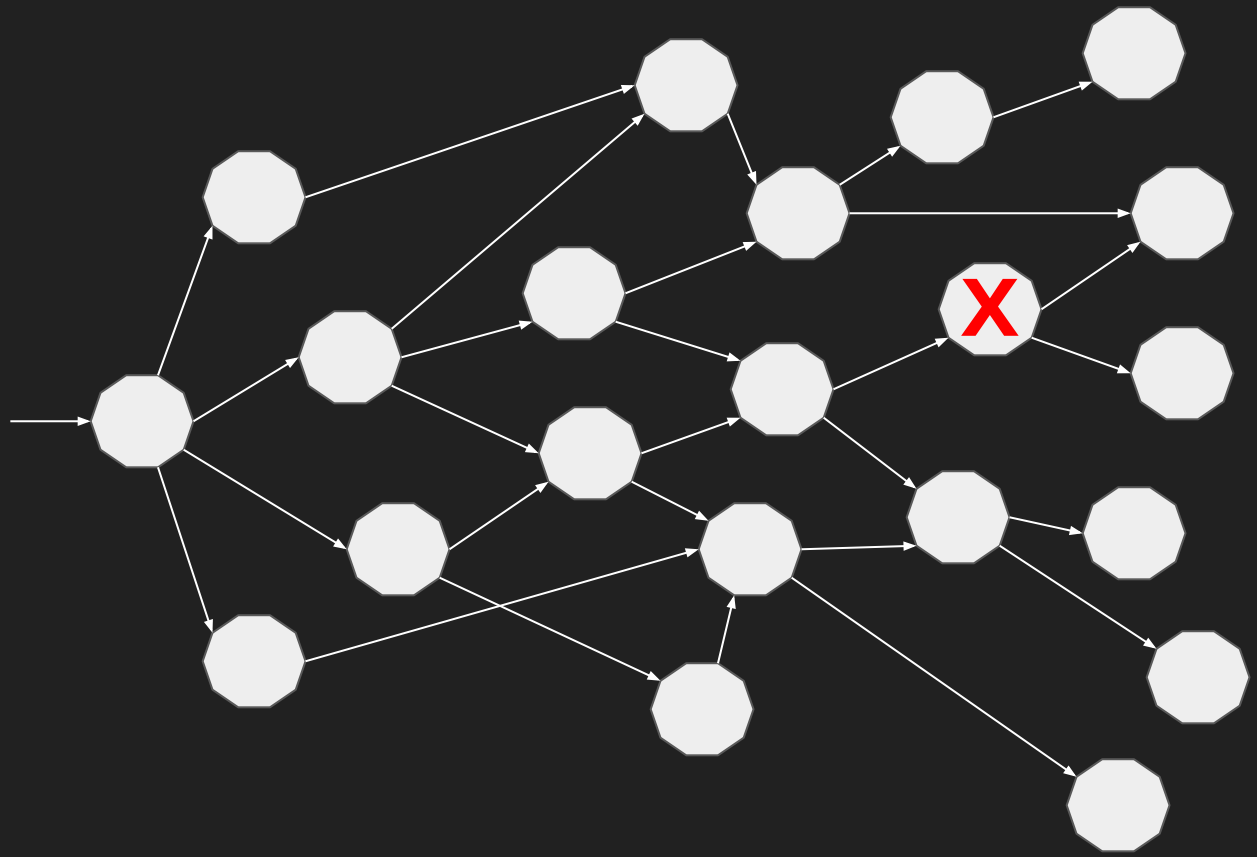


Fallacies of Distributed Computing

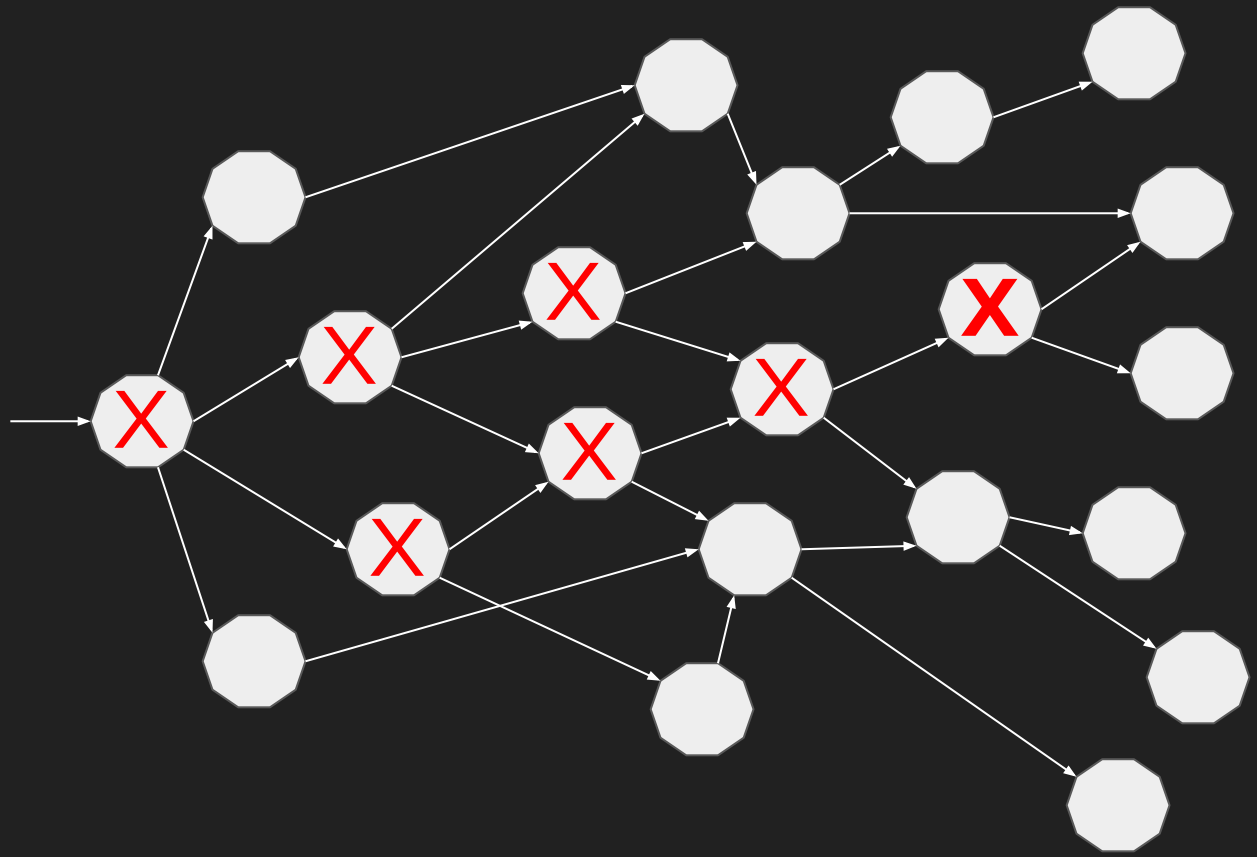
- The Network is Reliable
- Latency is zero
- Bandwidth is infinite
- Topology does not change
- There is one administrator
- Transport cost is zero
- The network is homogeneous

https://en.wikipedia.org/wiki/Fallacies_of_distributed_computing

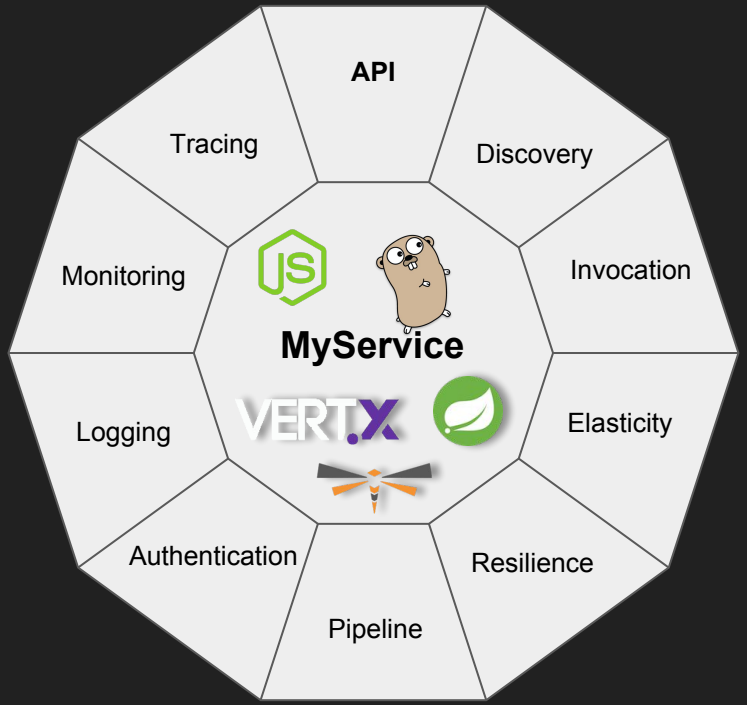
Failure of a Service



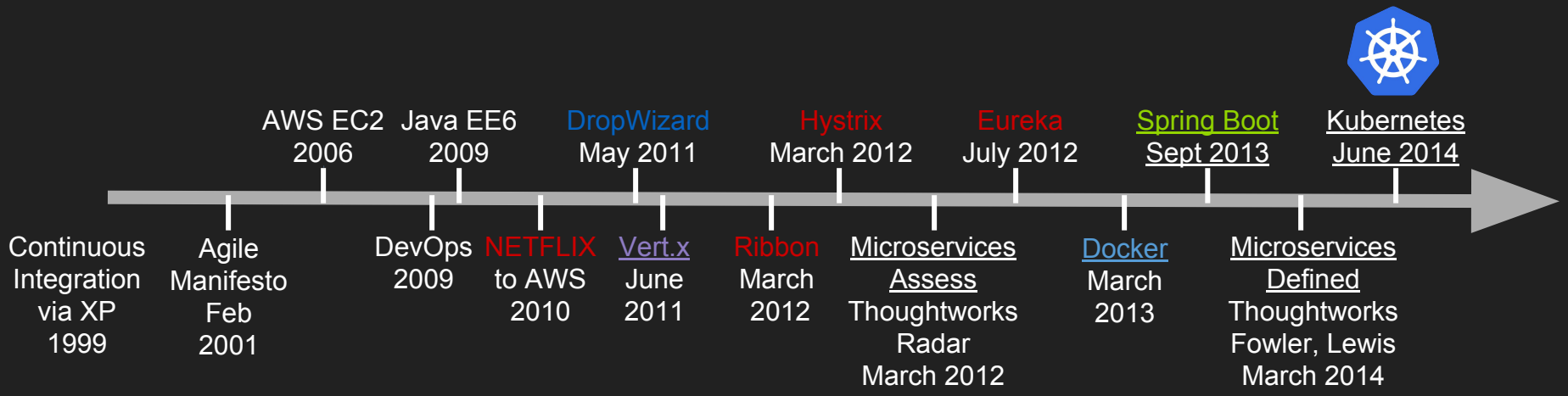
Cascading Failure



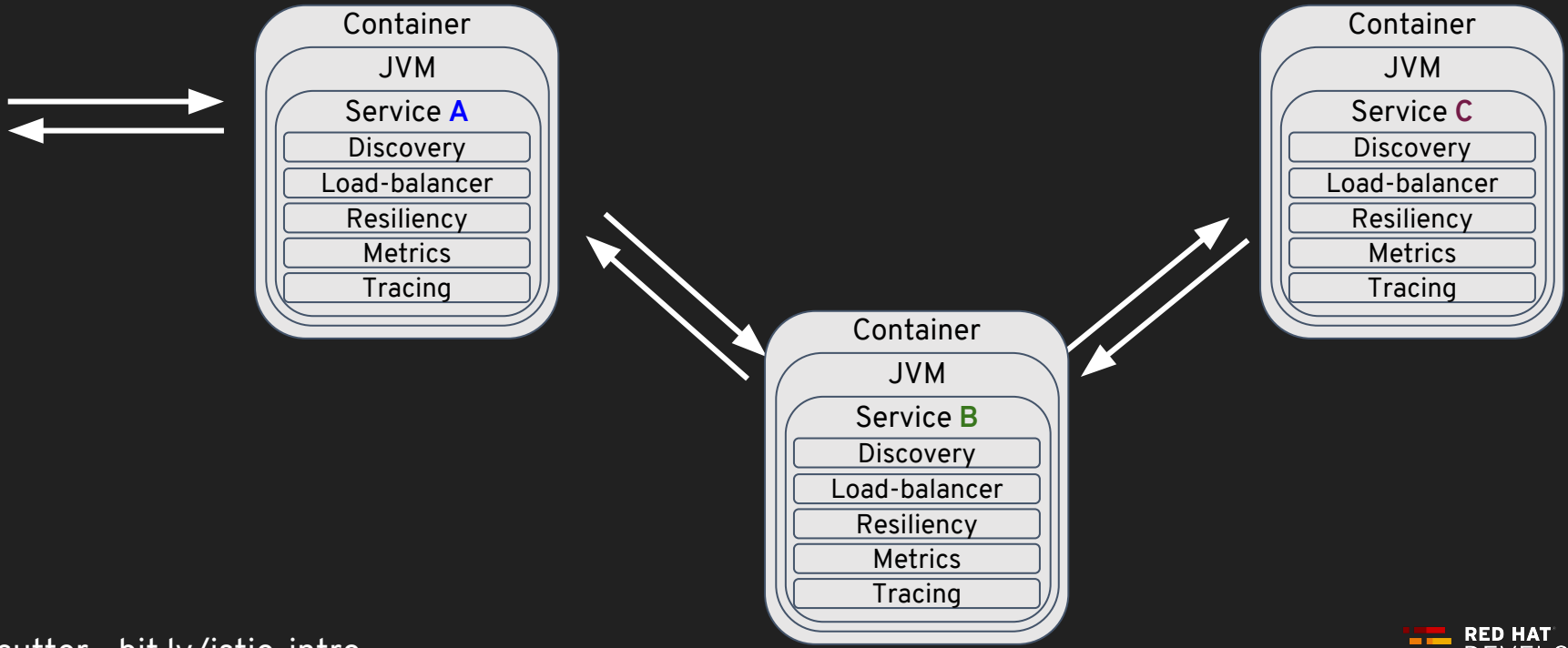
Microservices'ilities



History of Microservices



Microservices embedding Capabilities

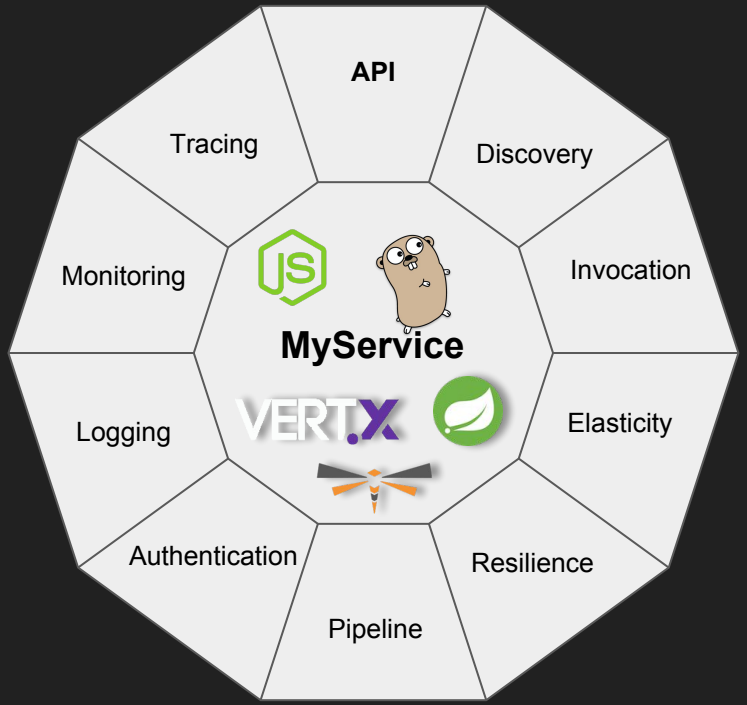


What's Wrong with Netflix OSS?

Java Only

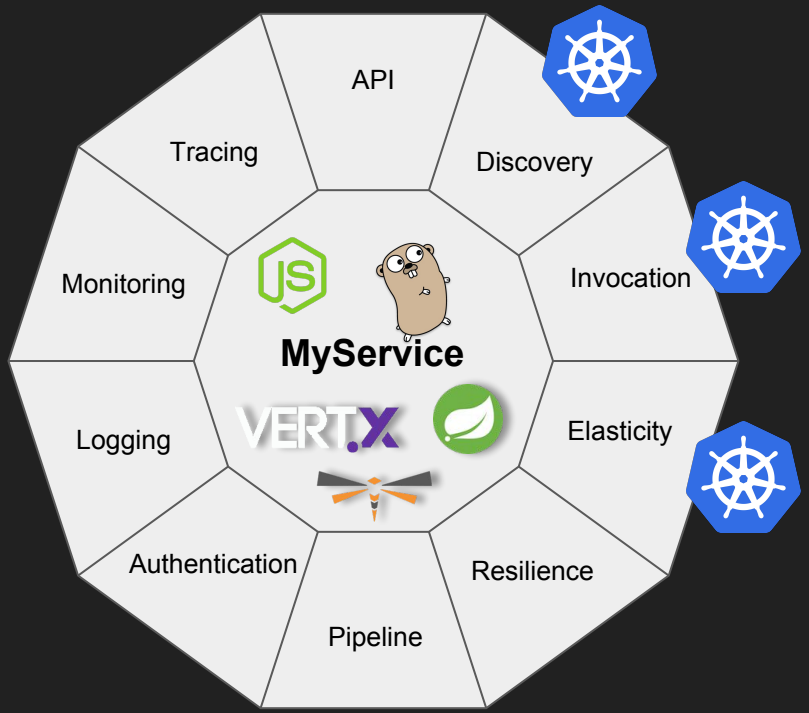
Adds a lot of libraries to YOUR code

Microservices'ilities

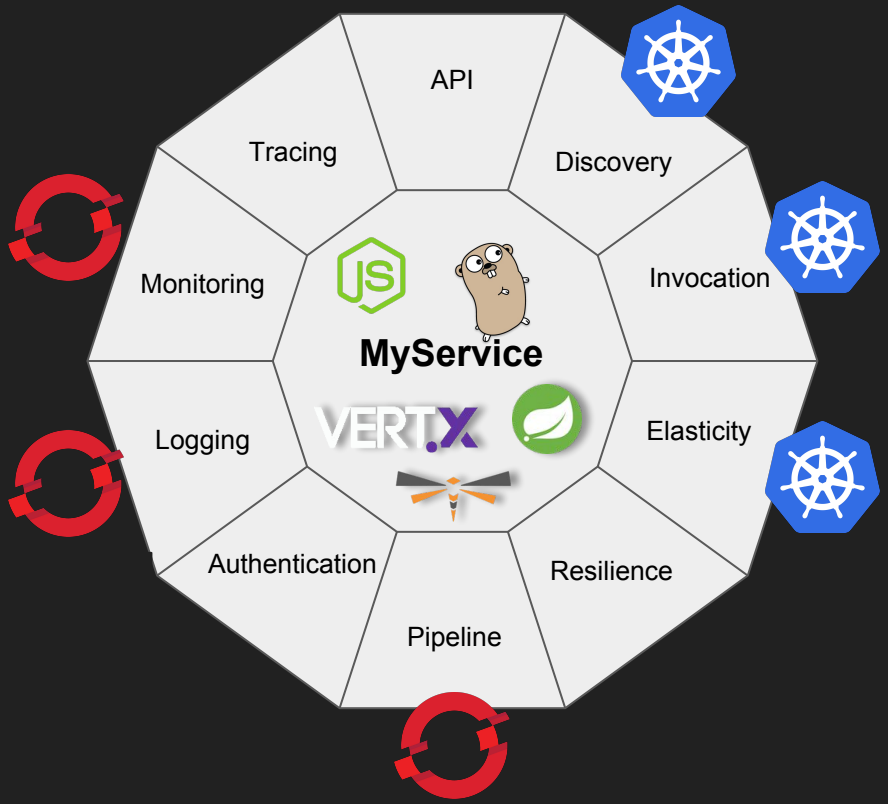


OPENSHIFT

Microservices'ilities + Kubernetes



Microservices'ilities + OpenShift



Istio - Sail

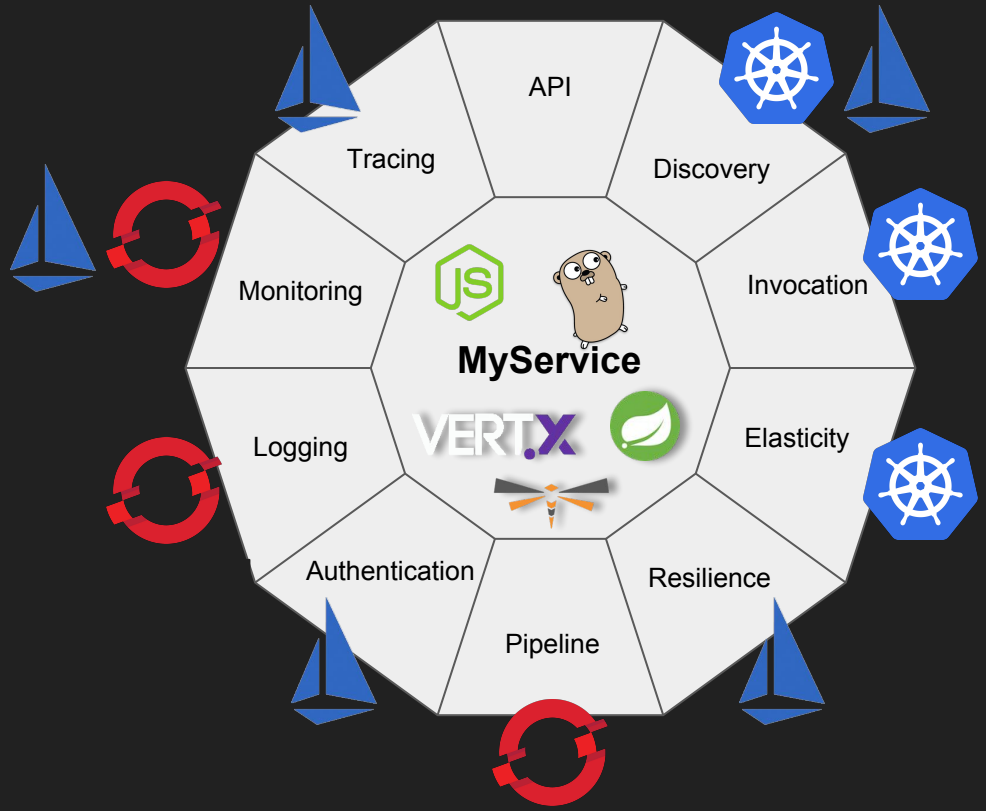
(Kubernetes - Helmsman or ship's pilot)

Service Mesh Defined

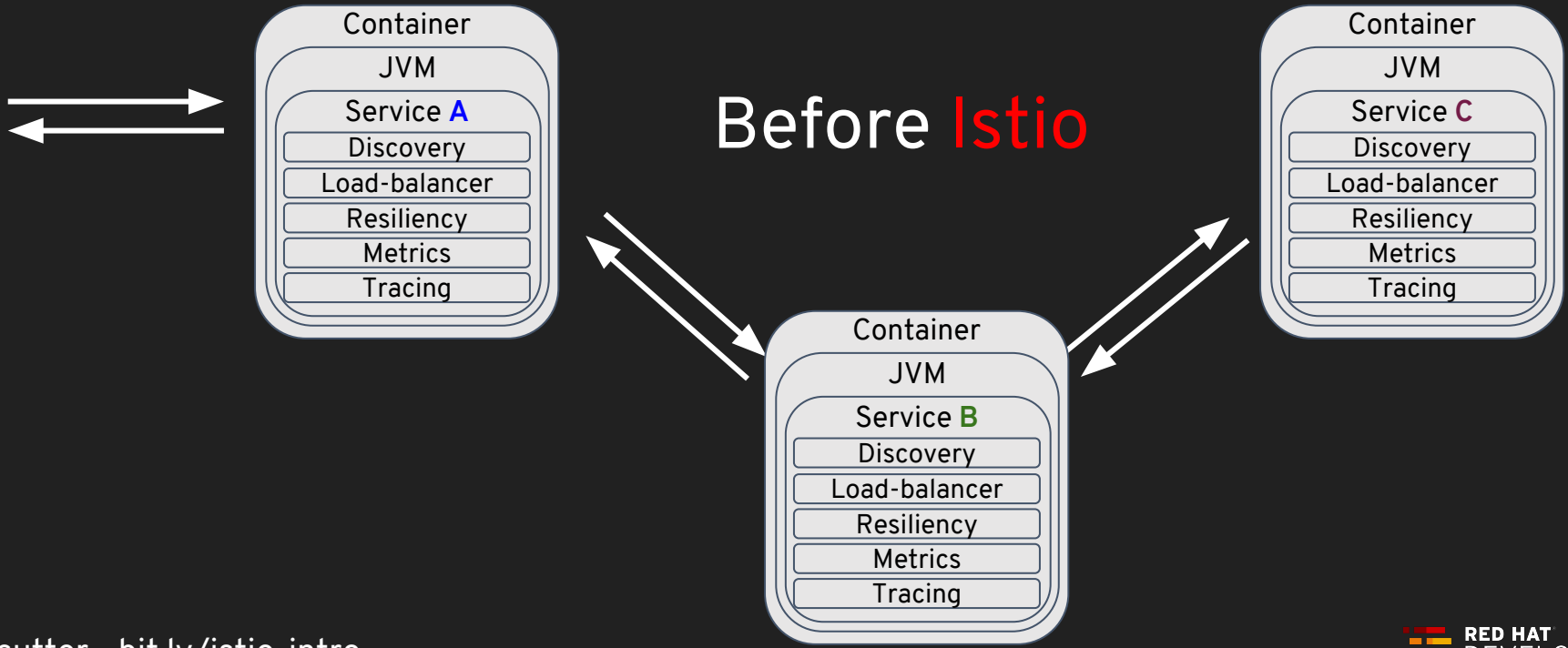
A service mesh is a dedicated infrastructure layer for handling service-to-service communication. It's responsible for the reliable delivery of requests through the complex topology of services that comprise a modern, cloud native application. In practice, the service mesh is typically implemented as an array of lightweight network proxies that are deployed alongside application code, without the application needing to be aware

https://buoyant.io/2017/04/25/whats-a-service-mesh-and-why-do-i-need-one/

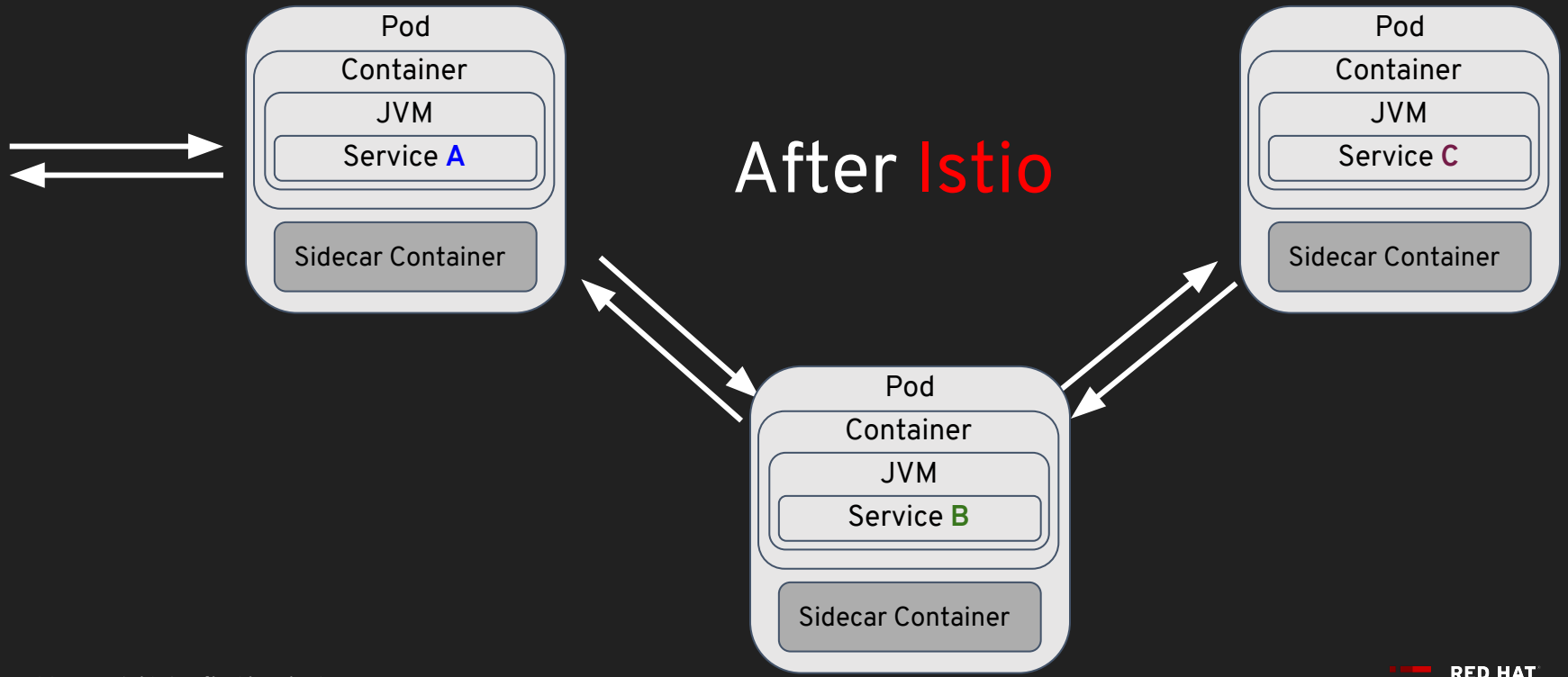
Microservices'ilities + Istio



Microservices embedding Capabilities



Microservices externalizing Capabilities



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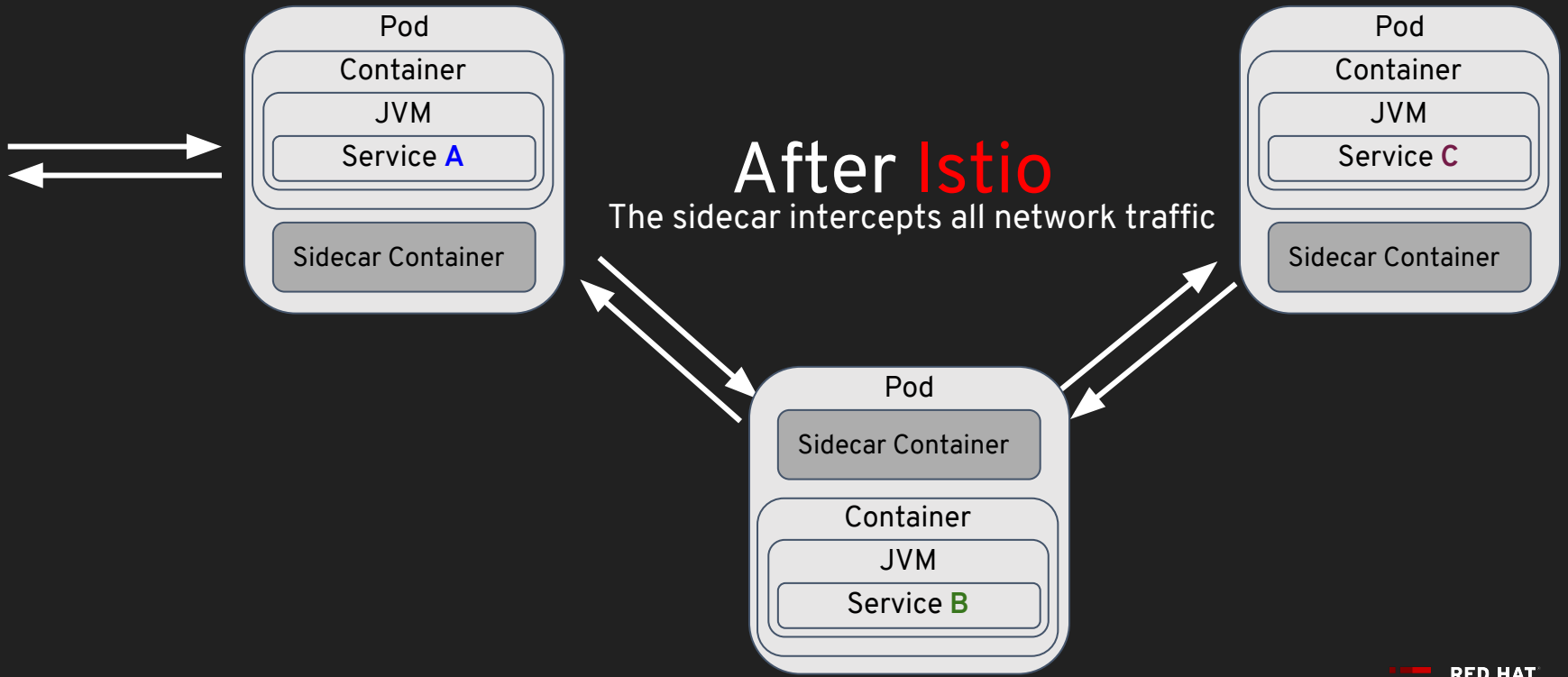
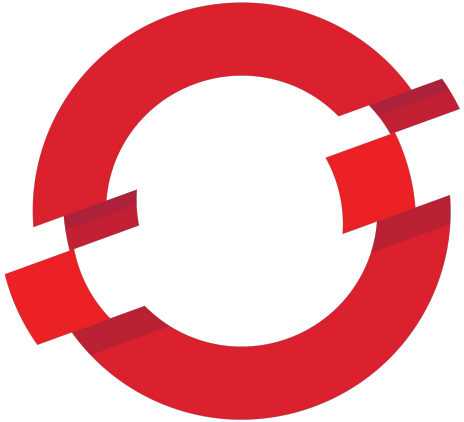


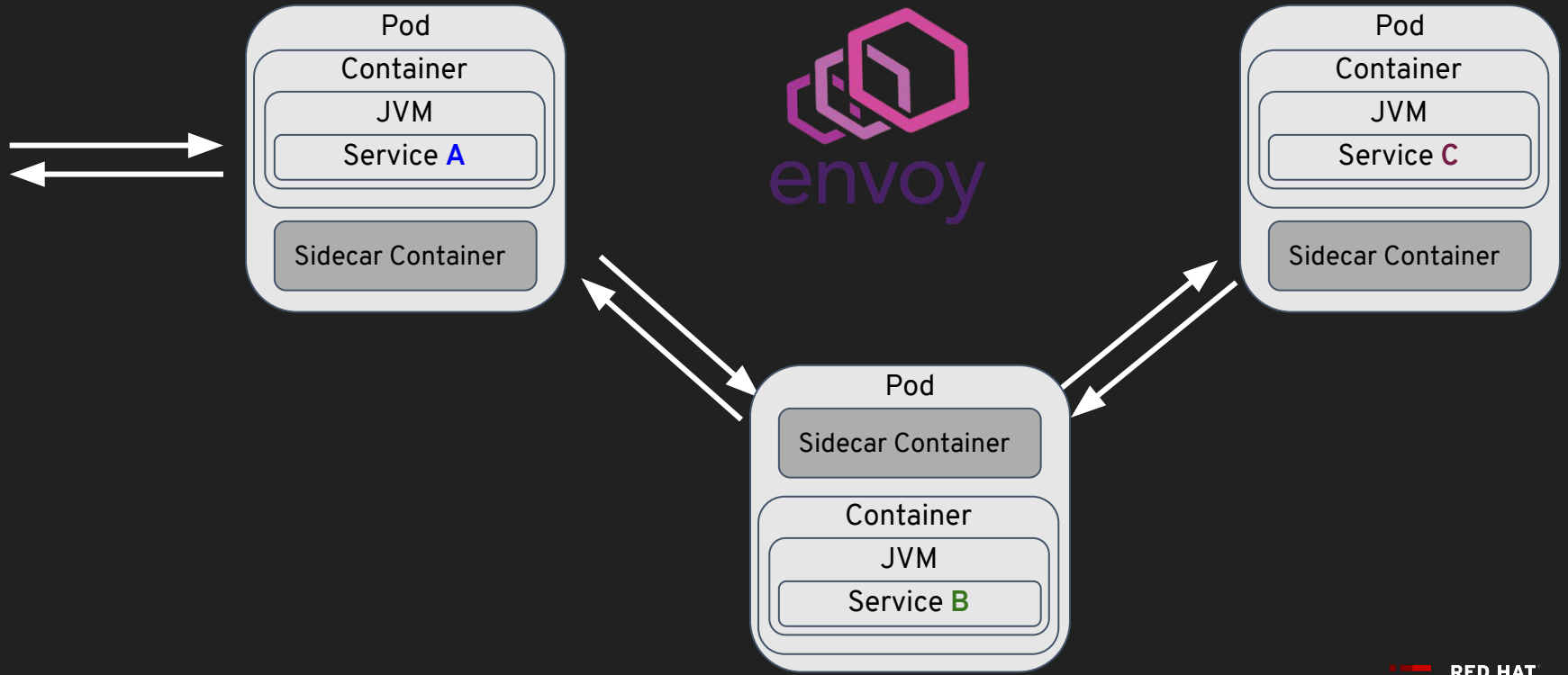
Better Microservices Platform circa 2018



OPENSHIFT

Polyglot Microservices Platform circa 2018

Envoy is the current sidecar

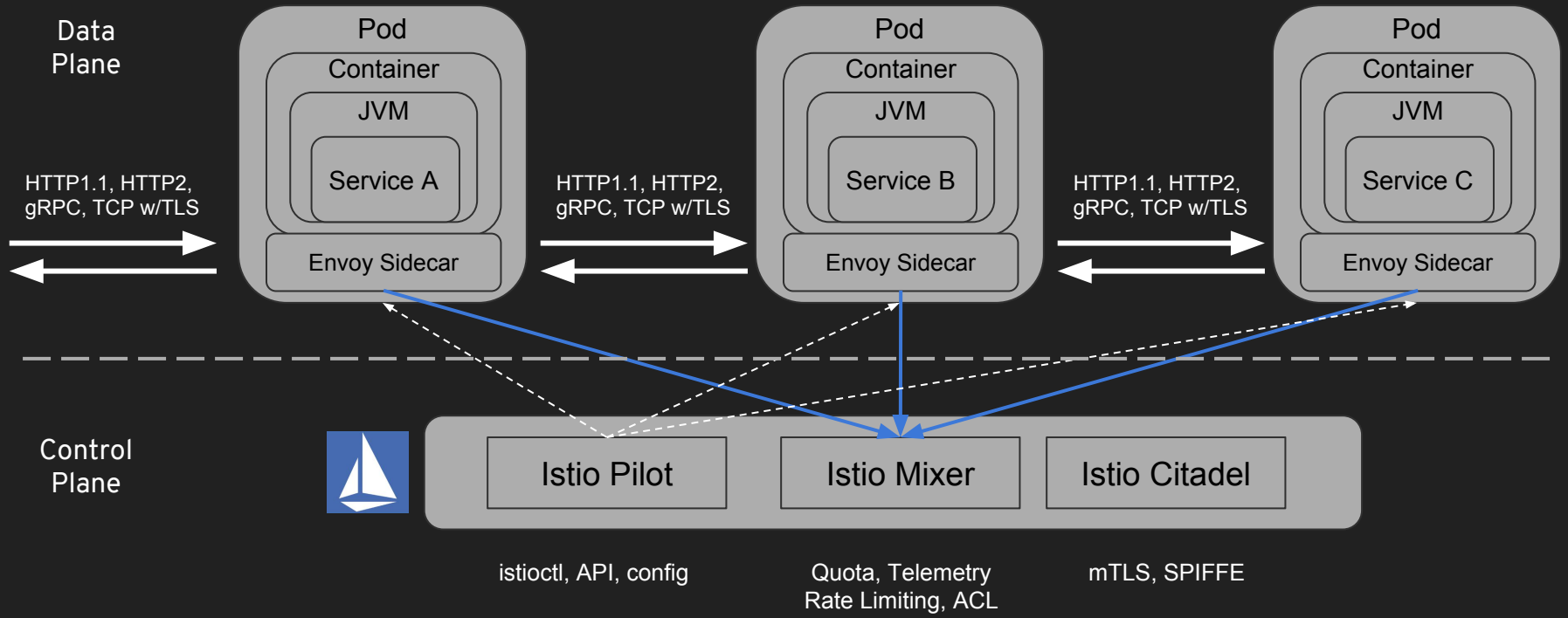


Next Generation Microservices - Service Mesh

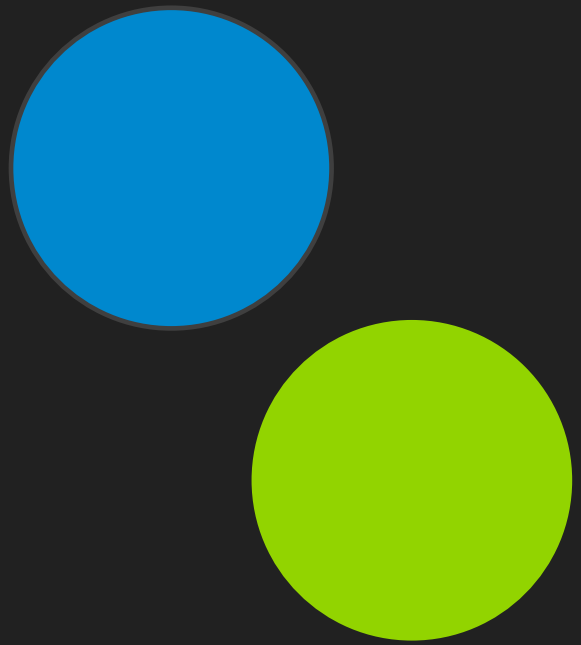
Code Independent (Polyglot)

- Intelligent Routing and Load-Balancing
  - A/B Tests
  - Smarter Canary Releases
- Chaos: Fault Injection
- Resilience: Circuit Breakers
- Observability: Metrics and Tracing
- Fleet wide policy enforcement

Istio Data Plane vs Control Plane



Blue/Green Deployment



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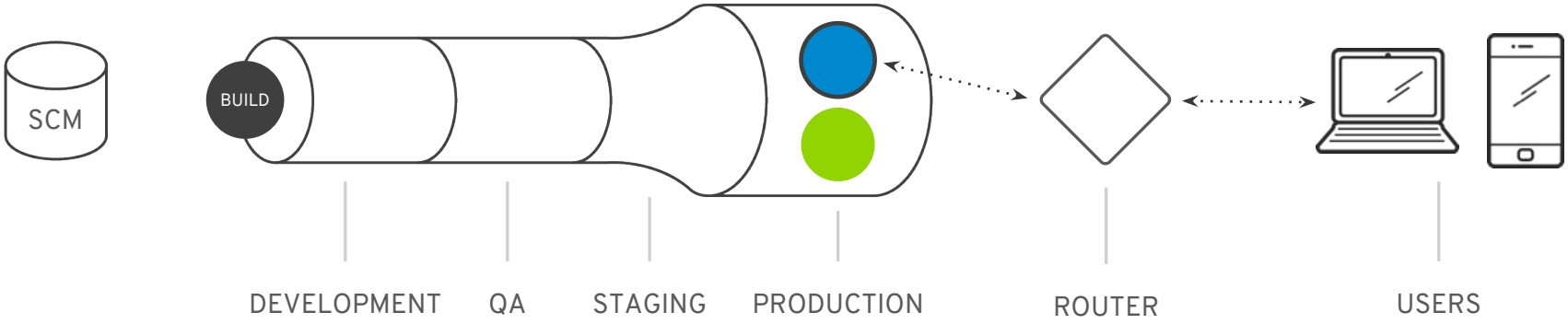

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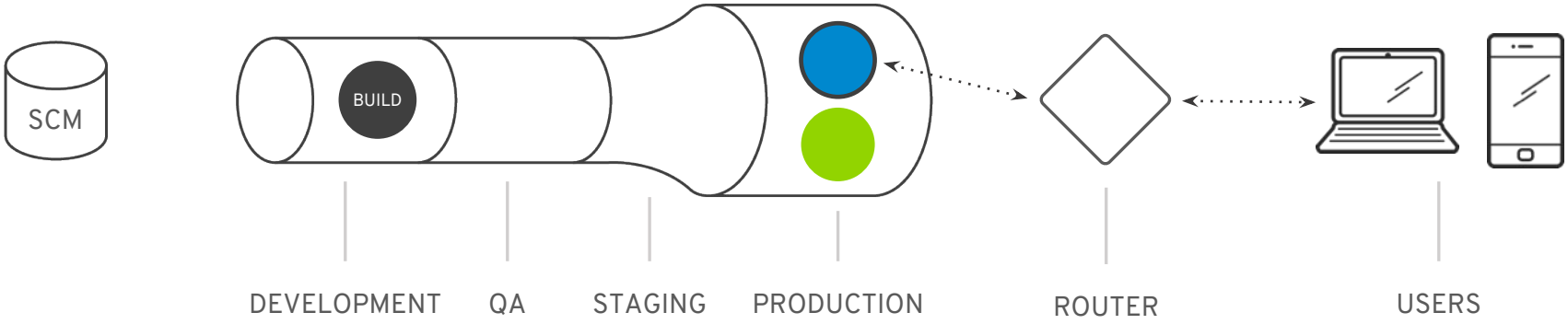

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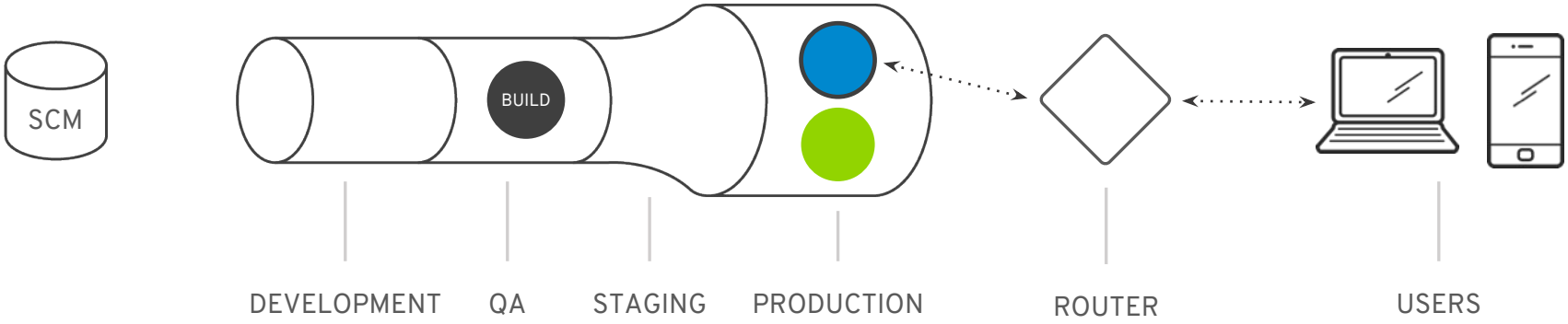

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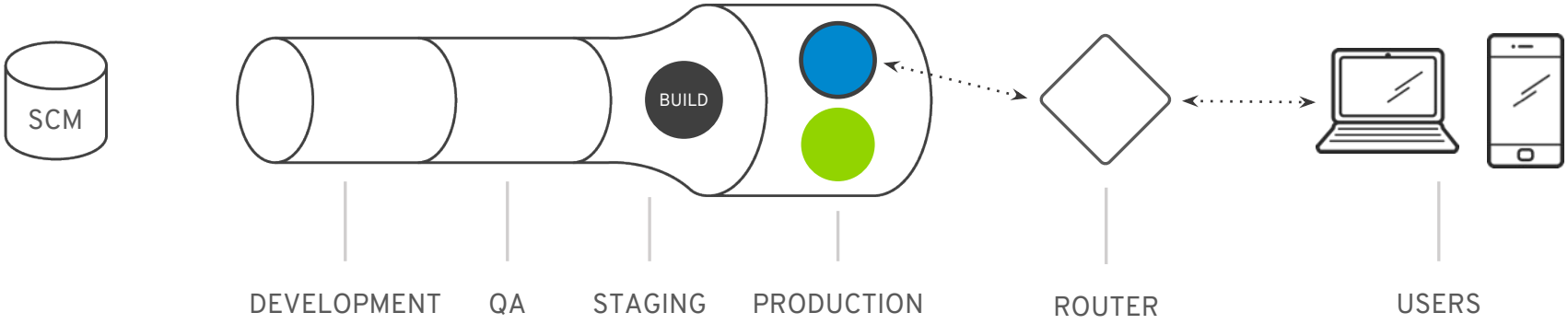

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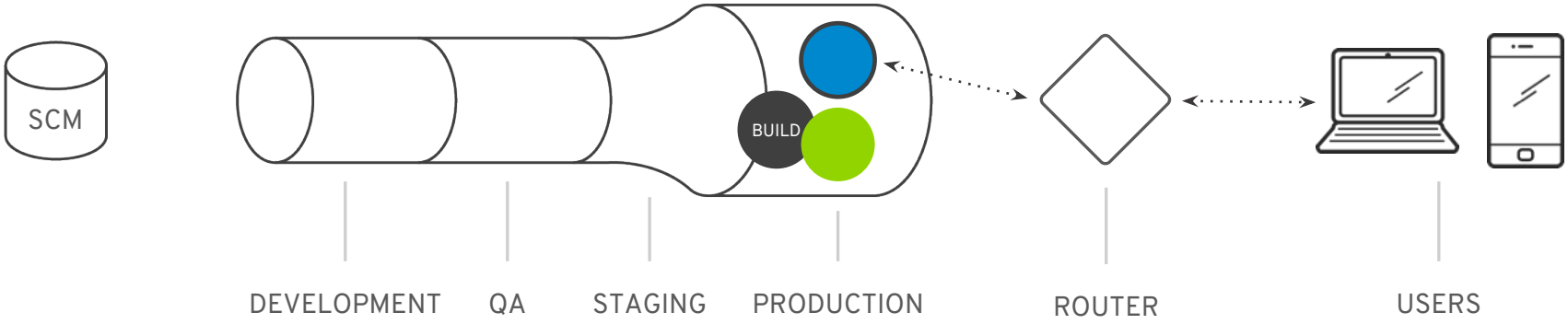

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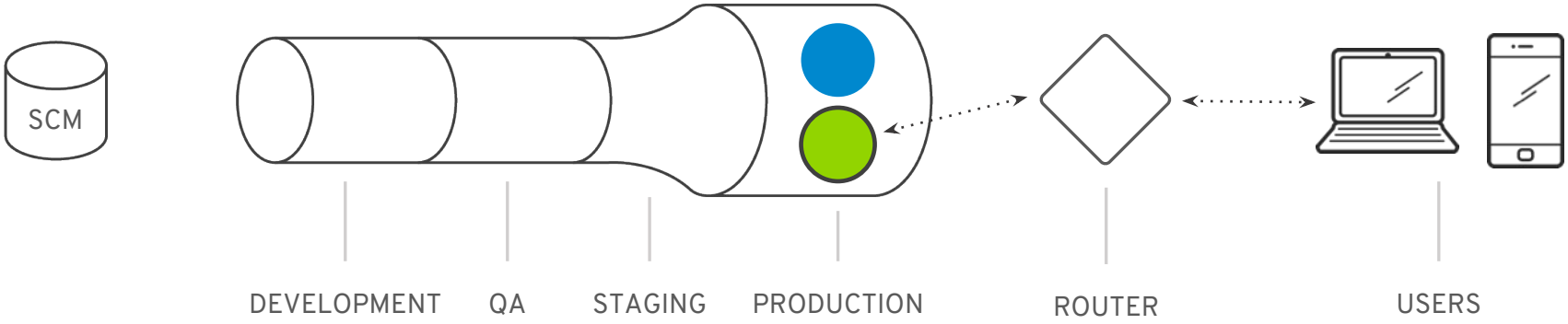

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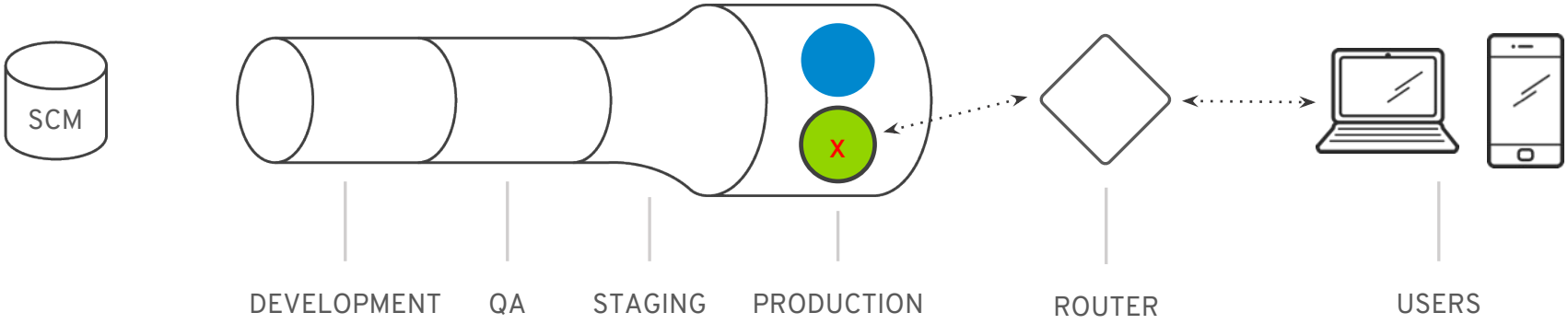

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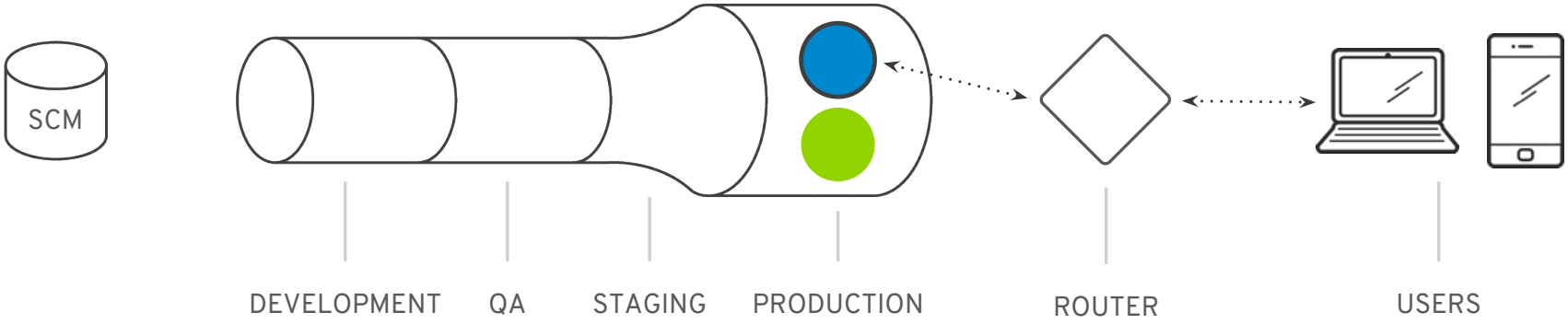
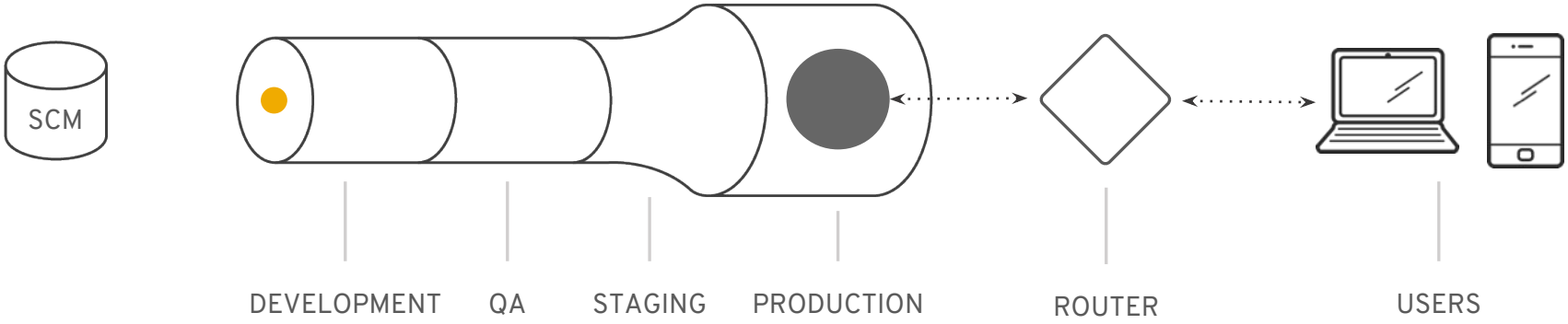


Canary Deployment

Canary Deployment



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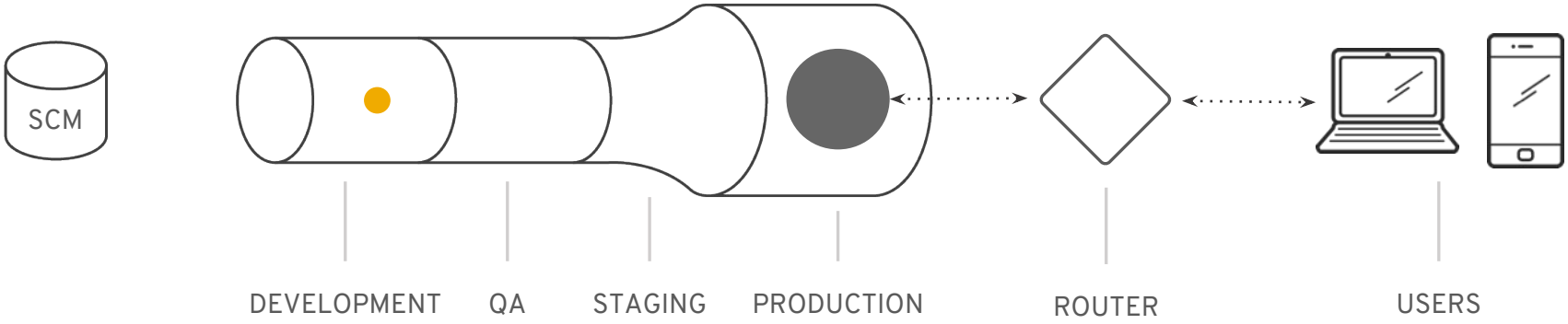

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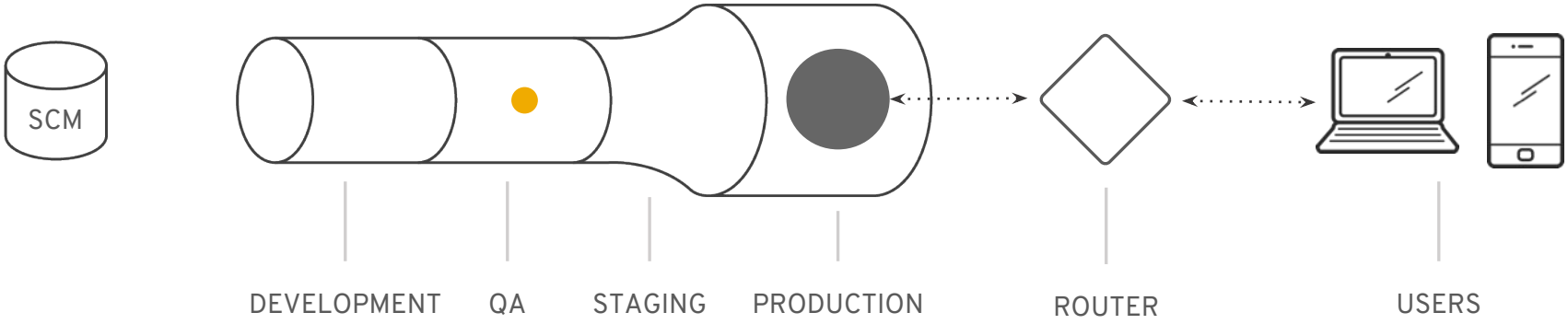

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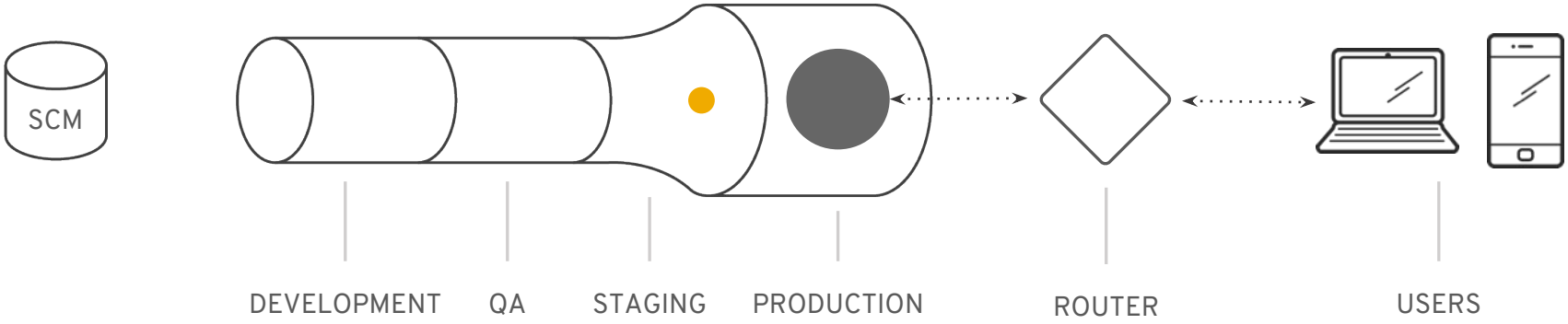

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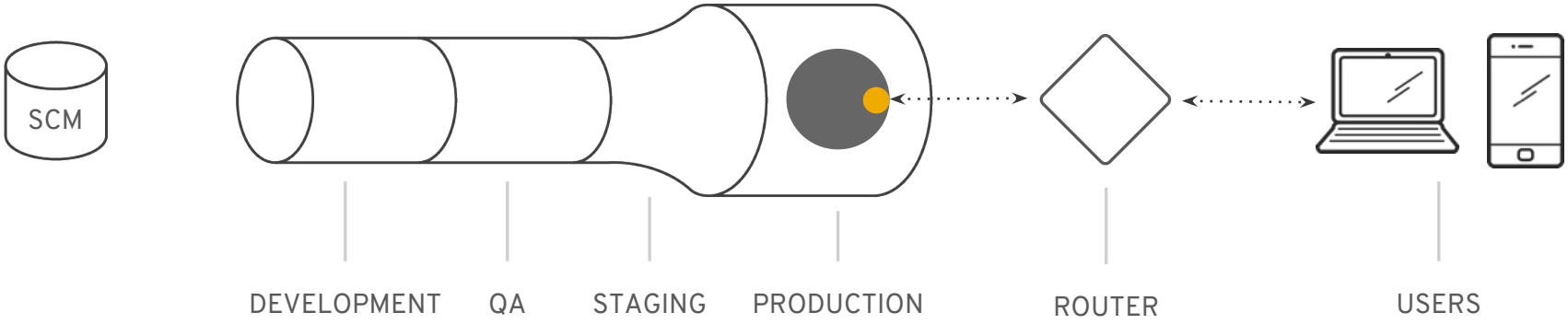

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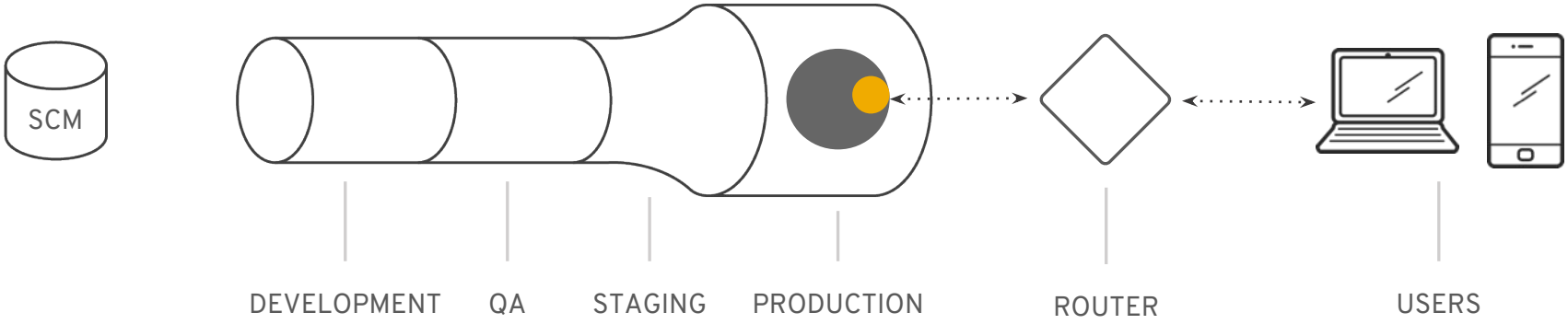

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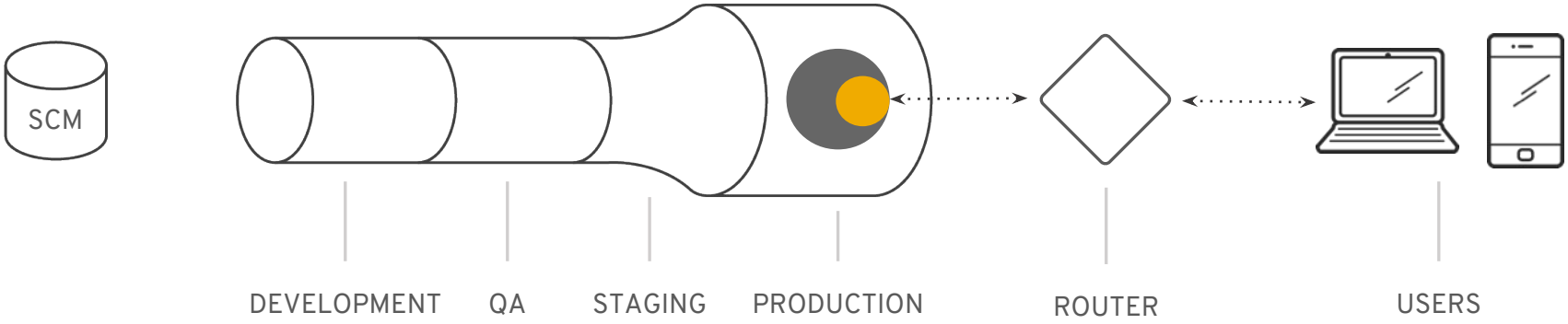

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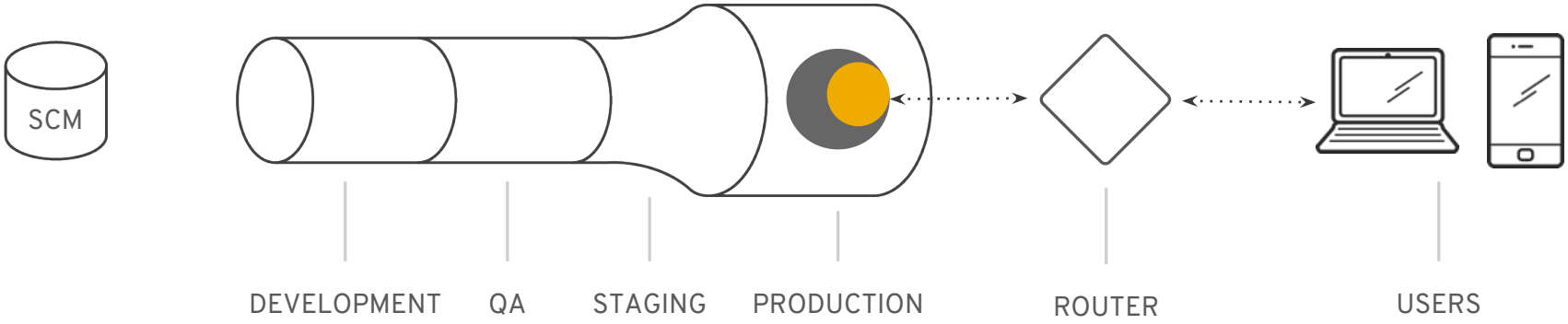

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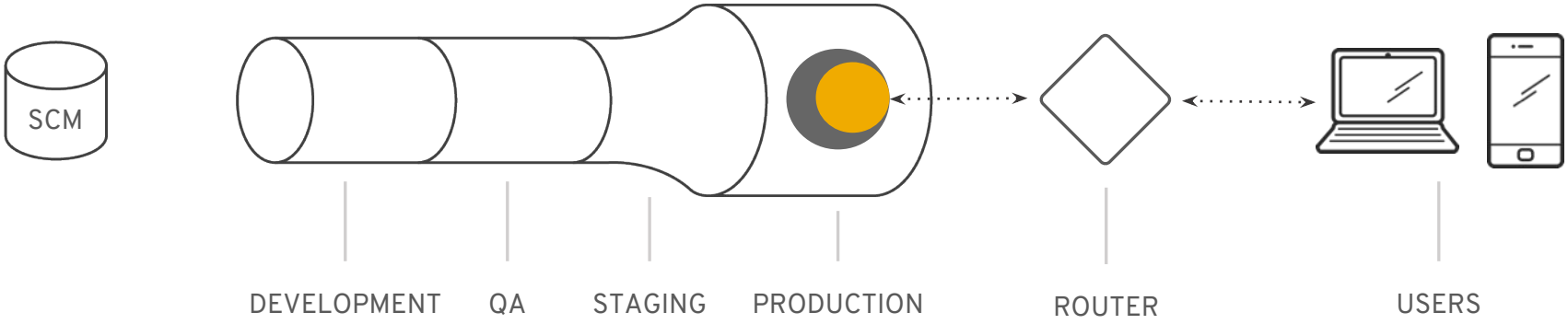

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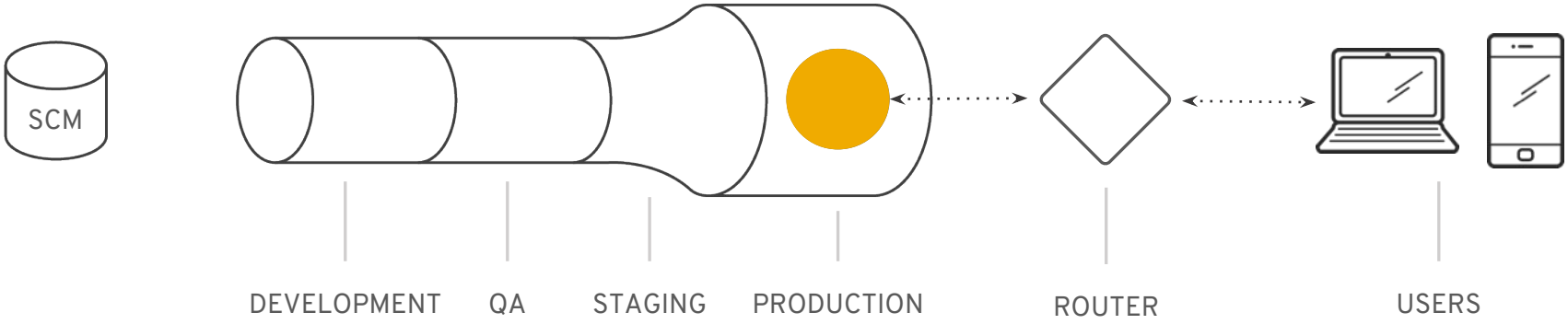
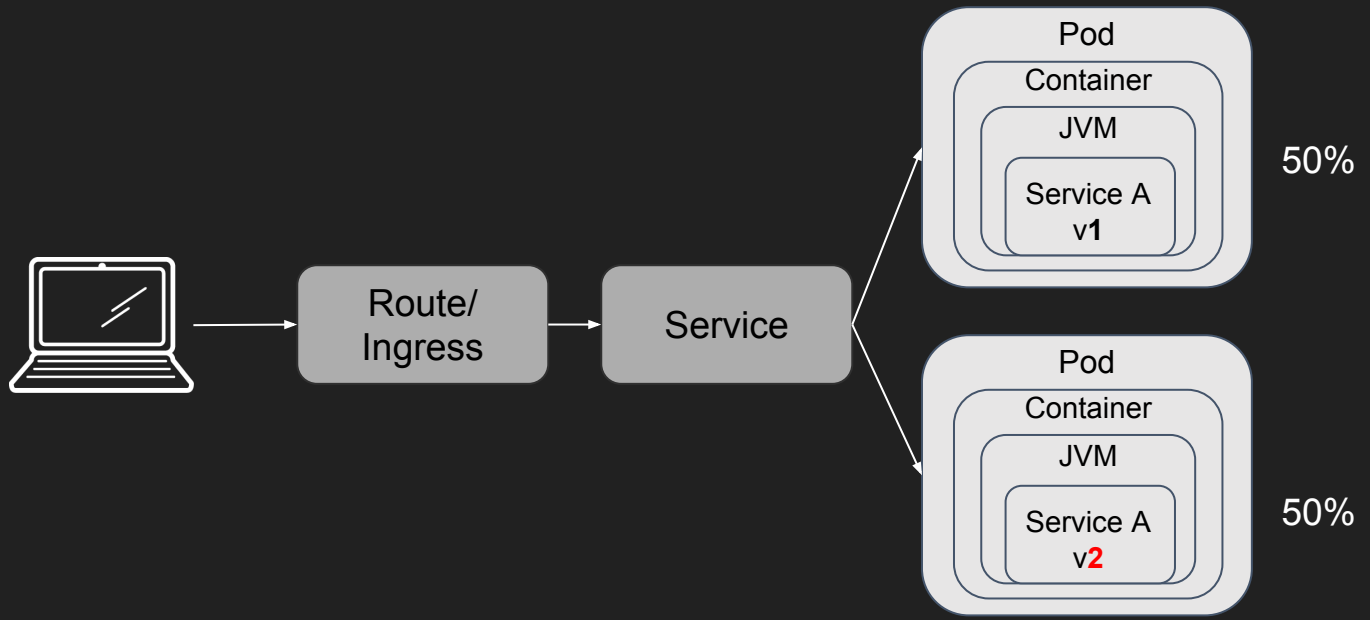
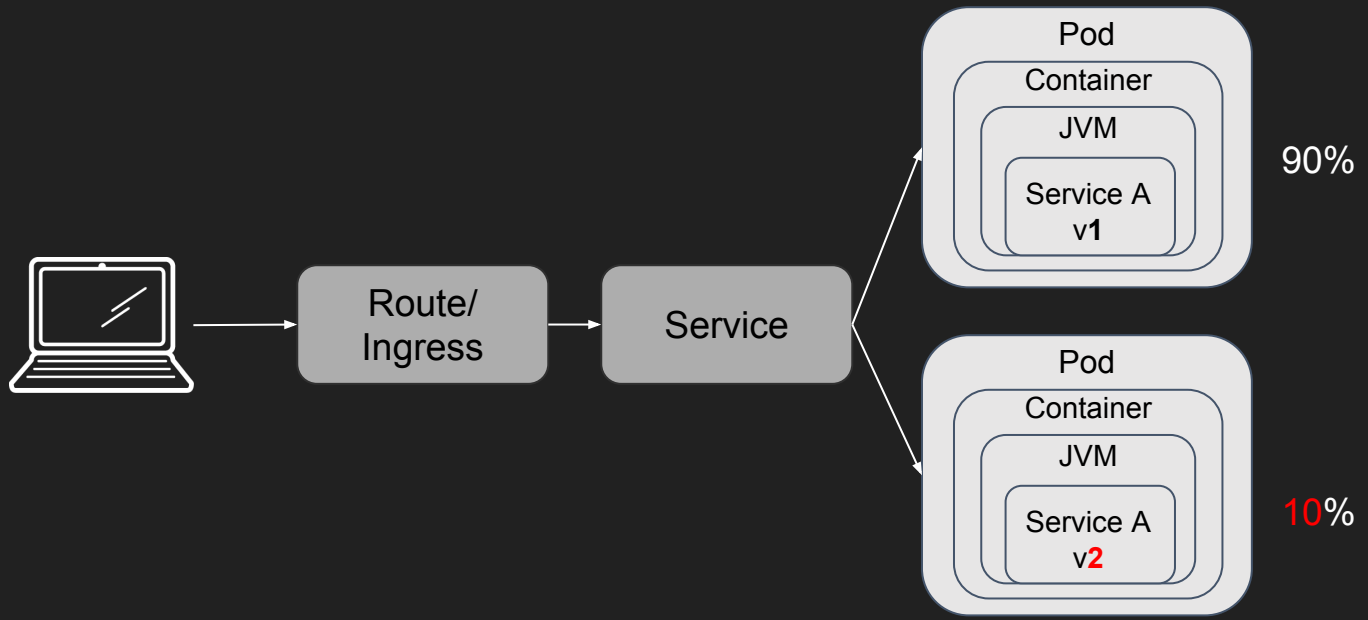


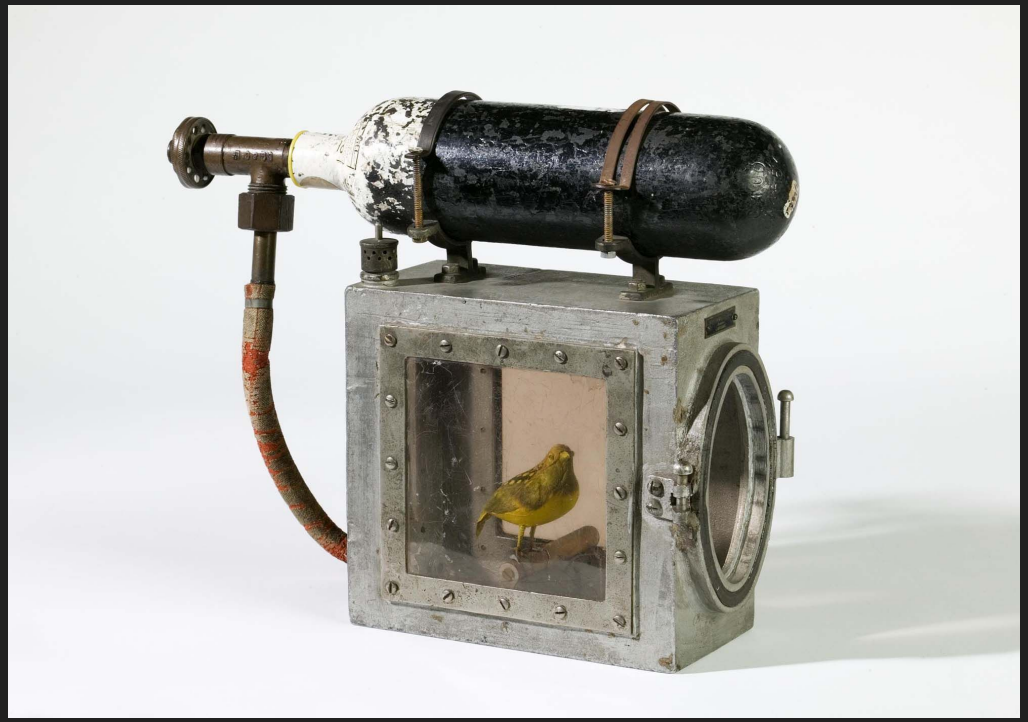
Canaries with Kubernetes



Canaries with Istio



Canary Resuscitator

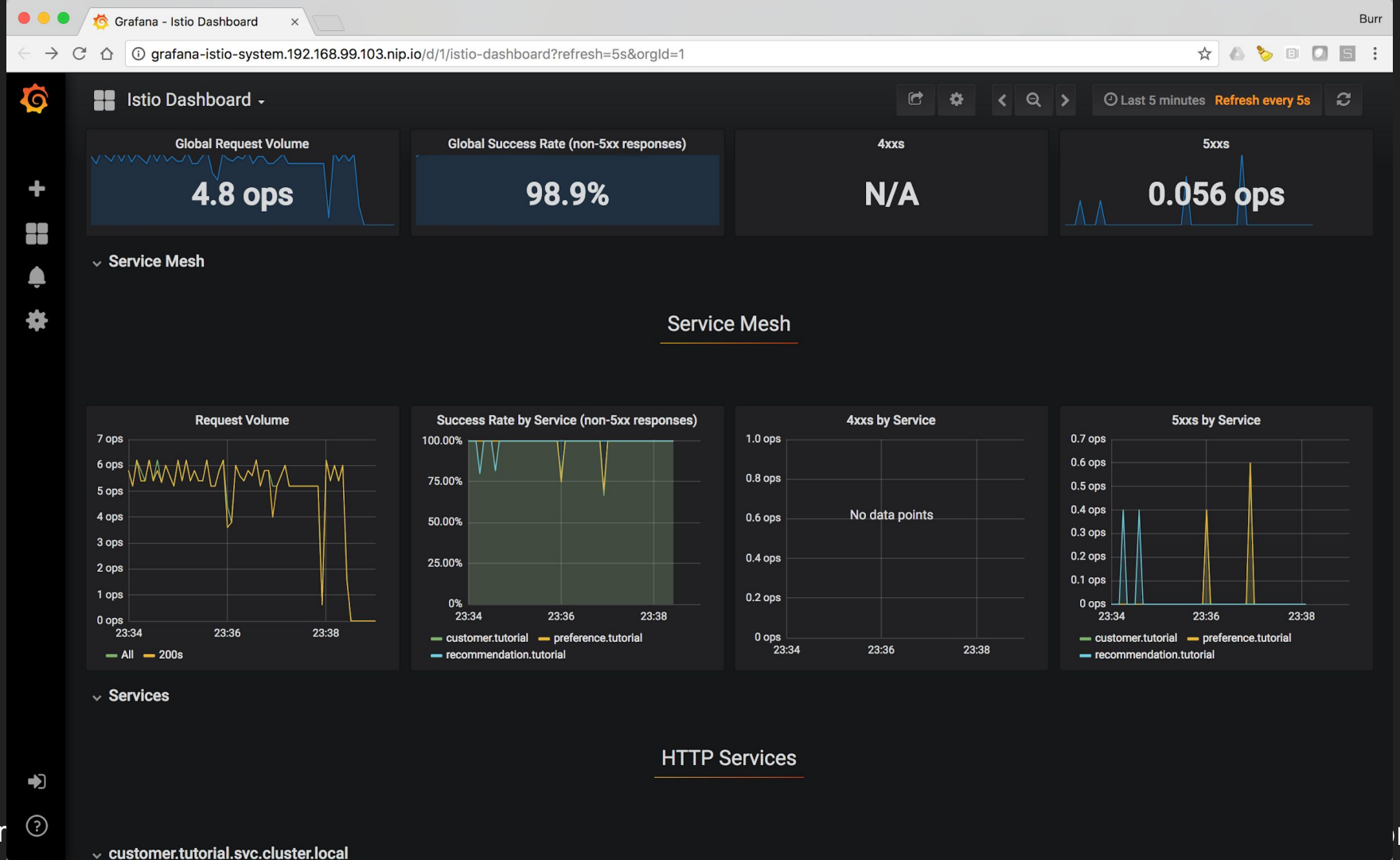


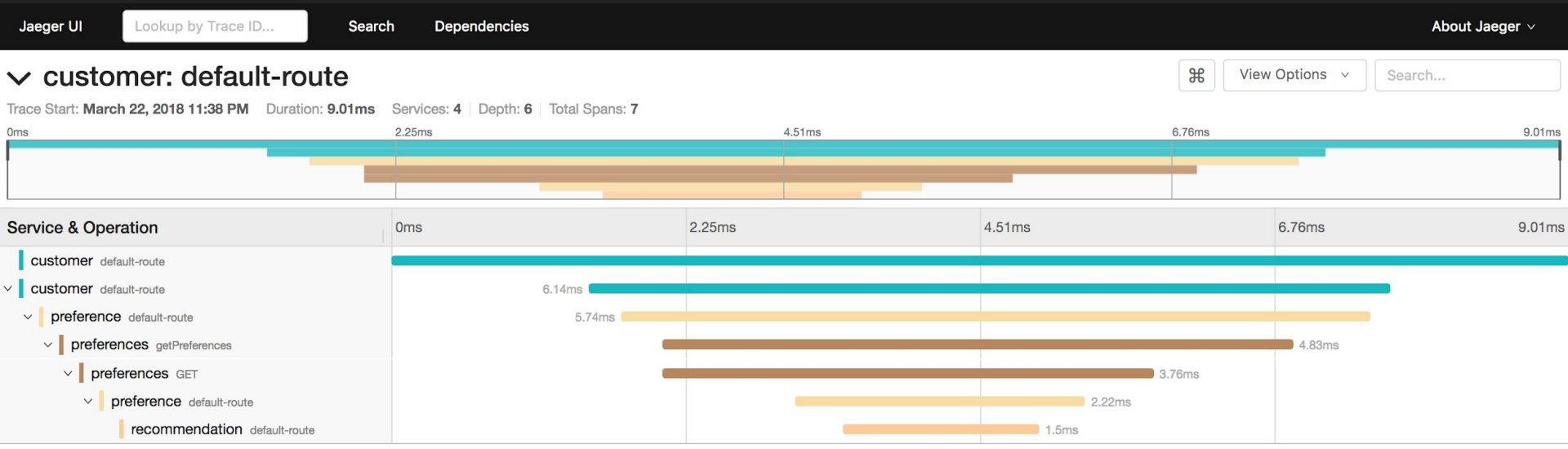
http://www.openculture.com/2018/05/the-device-invented-to-resuscitate-canaries-in-coal-mines-circa-1896.html

Thanks to **Paolo Antinori!**

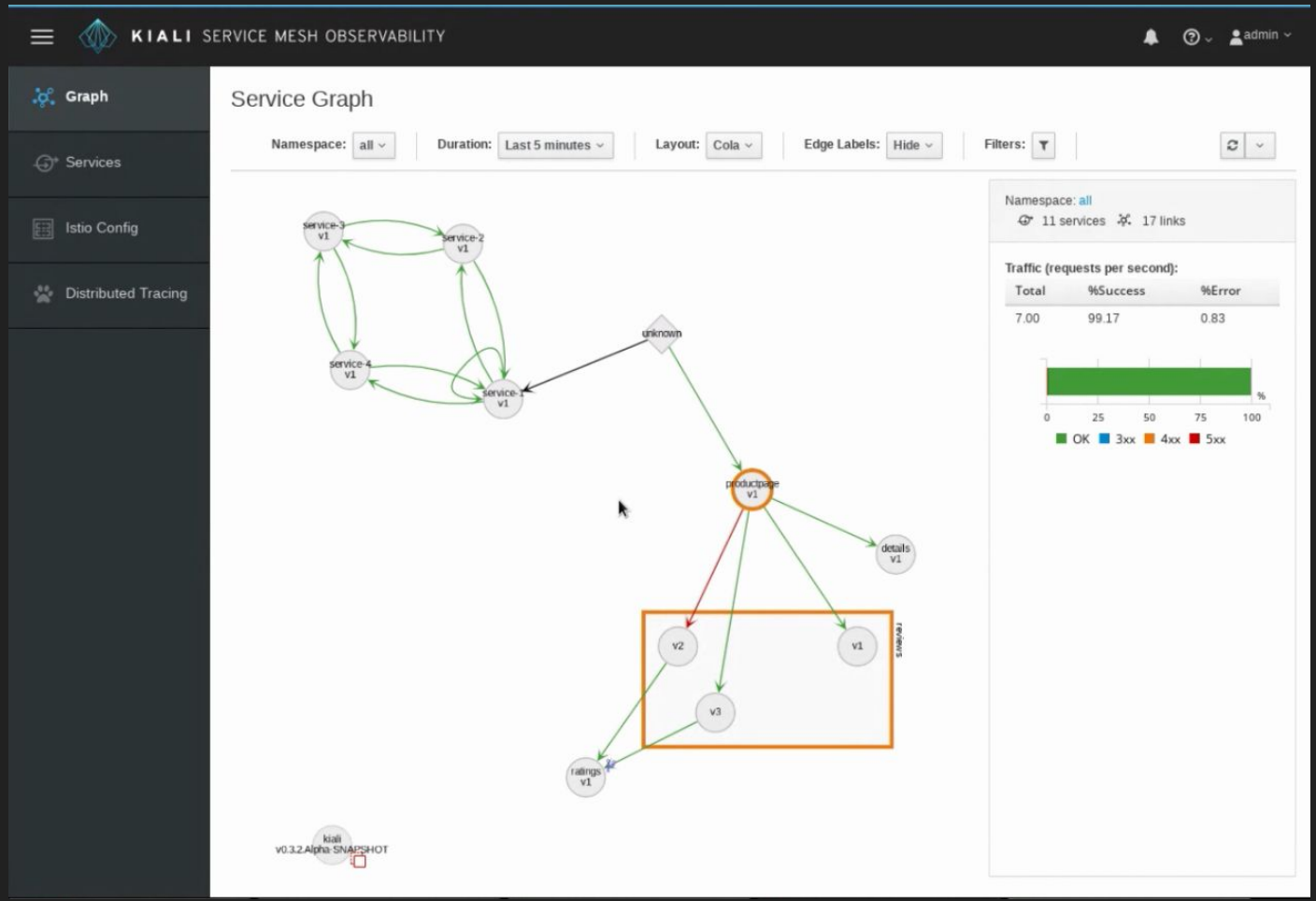
Demo

bit.ly/istio-tutorial

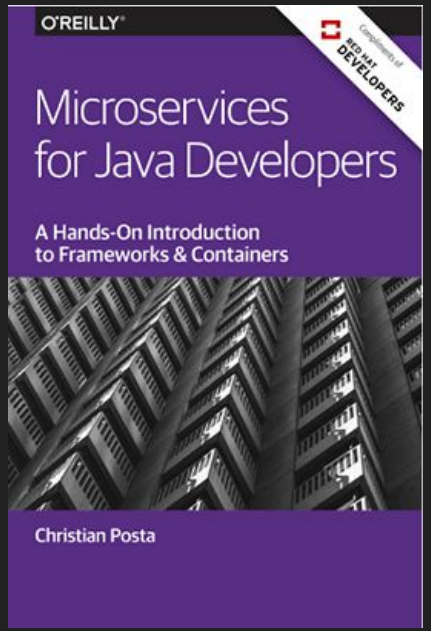

Grafana - Istio Dashboard
Burr
grafana-istio-system.192.168.99.103.nip.io/d/1/istio-dashboard?refresh=5s&orgId=1
Istio Dashboard
Last 5 minutes
Refresh every 5s
Global Request Volume
4.8 ops
Global Success Rate (non-5xx responses)
98.9%
4xxs
N/A
5xxs
0.056 ops
Service Mesh
Service Mesh
Request Volume
7 ops
6 ops
5 ops
4 ops
3 ops
2 ops
1 ops
0 ops
23:34
23:36
23:38
All
200s
Success Rate by Service (non-5xx responses)
100.00%
75.00%
50.00%
25.00%
0%
customer.tutorial
preference.tutorial
recommendation.tutorial
4xxs by Service
1.0 ops
0.8 ops
0.6 ops
0.4 ops
0.2 ops
0 ops
No data points
5xxs by Service
0.7 ops
0.6 ops
0.5 ops
0.4 ops
0.3 ops
0.2 ops
0.1 ops
Services
HTTP Services
customer.tutorial.svc.cluster.local



Kiali.io
New Service Graph



bit.ly/javamicroservicesbook



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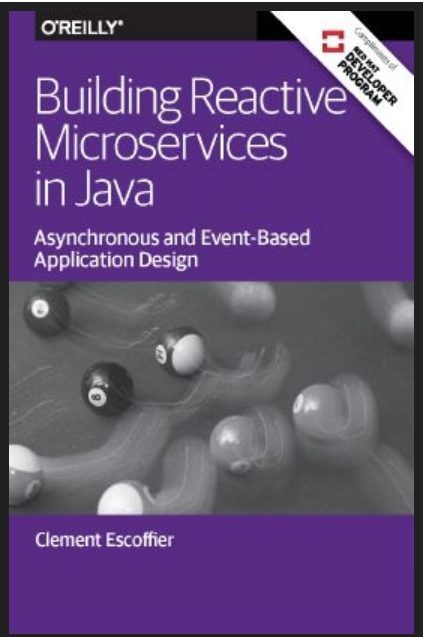

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Microservices Introductory Materials

Demo: bit.ly/msa-instructions
Slides: bit.ly/microservicesdeepdive
Video Training: bit.ly/microservicesvideo
Kubernetes for Java Developers
9 Steps to Awesome with Kubernetes

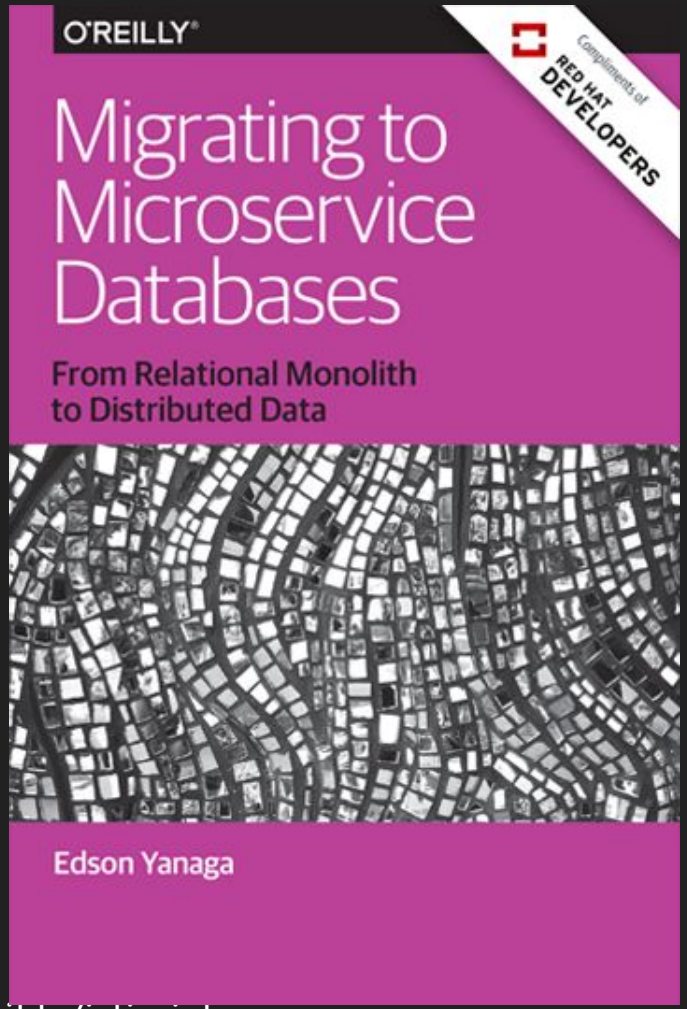
Advanced Materials

bit.ly/istio-tutorial
learn.openshift.com/servicemesh

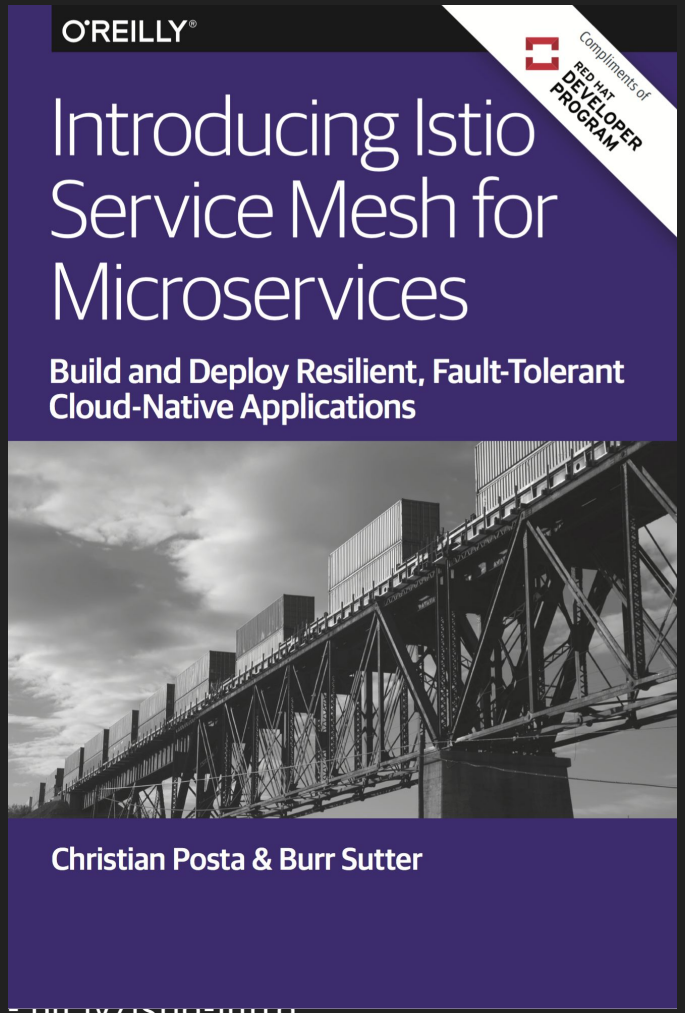
bit.ly/faas-tutorial
learn.openshift.com/serverless

bit.ly/istio-intro

RED HAT DEVELOPER



bit.ly/mono2microdb



bit.ly/istio-book

The End
(but Serverless is coming)