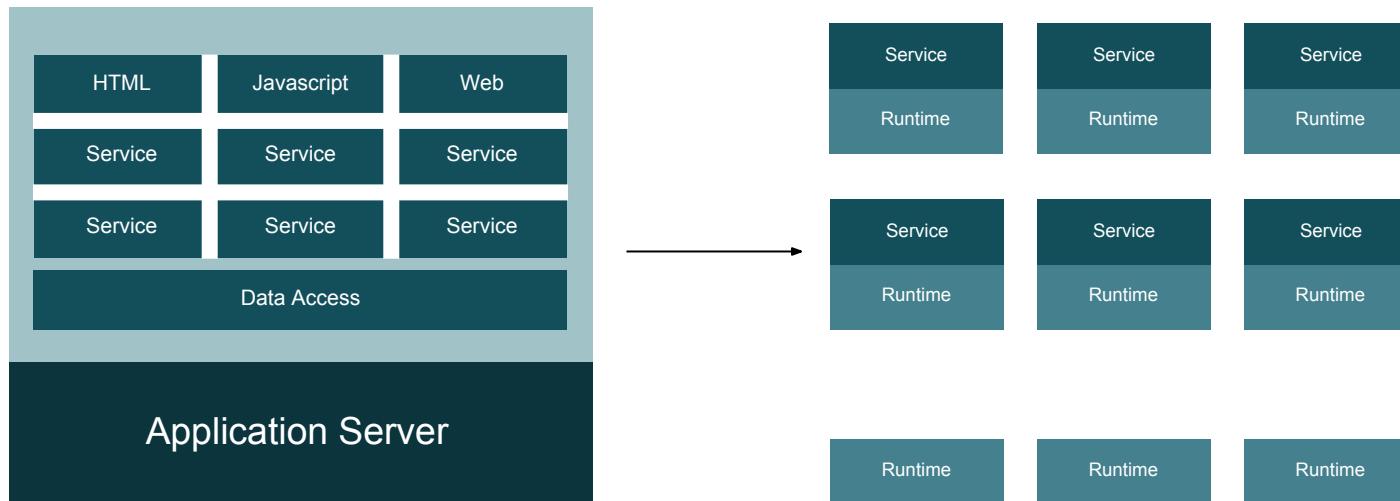


ISTIO SERVICE MESH ON OPENSHIFT

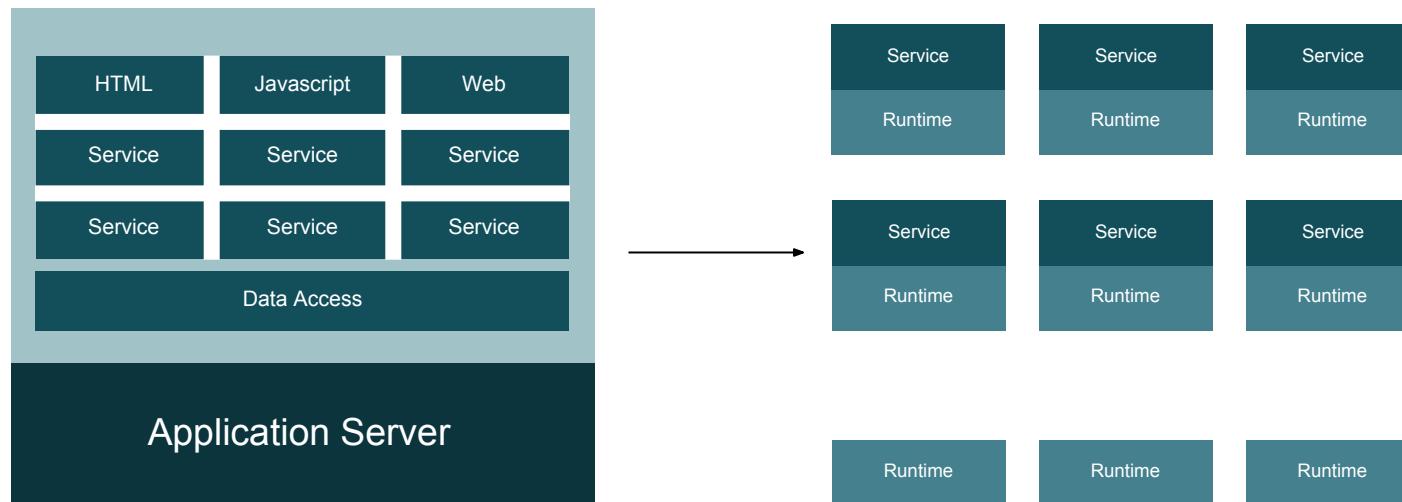
JongJin LIM
Solution Architect
Red Hat

MICROSERVICES ARCHITECTURE

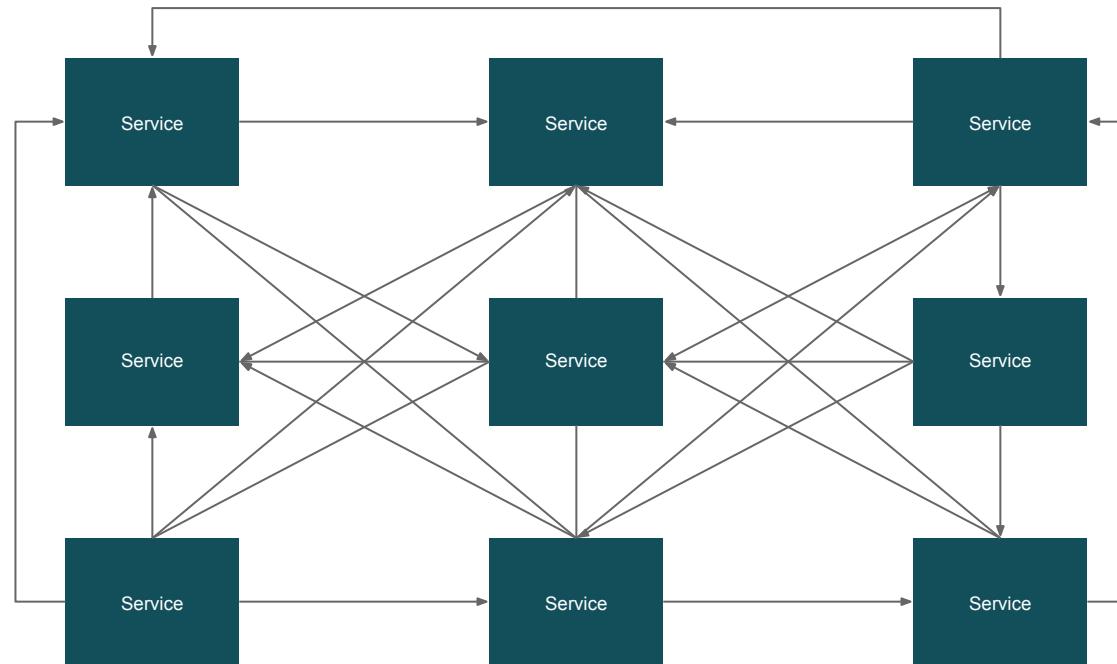


MICROSERVICES ARCHITECTURE

DISTRIBUTED

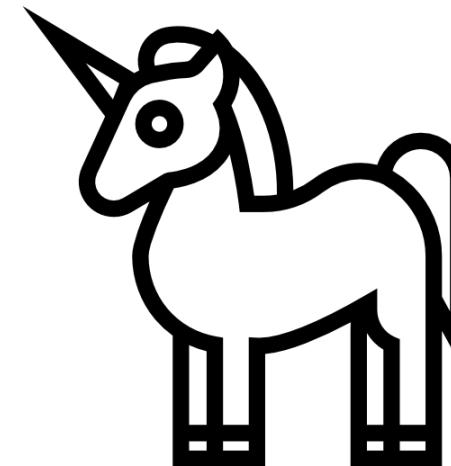


DISTRIBUTED ARCHITECTURE



EIGHT FALLACIES OF DISTRIBUTED COMPUTING

1. The network is reliable
2. Latency is zero
3. Bandwidth is infinite
4. The network is secure
5. Topology doesn't change
6. There is one administrator
7. Transport cost is zero
8. The network is homogeneous



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

Photo: Icon made by Freepik from www.flaticon.com

DISTRIBUTED SERVICES PAIN POINTS

- Discovery
- Distributed Tracing
- Circuit Breakers
- Metrics and Monitoring
- Operational Requirements
 - A/B Testing
 - Canary Release
 - Rate Limiting
 - Access Policies



HOW TO DEAL WITH THE COMPLEXITY?

WHAT DO DISTRIBUTED SYSTEMS NEED?

INFRA

BUILD

DEPLOYMENT

NETWORK

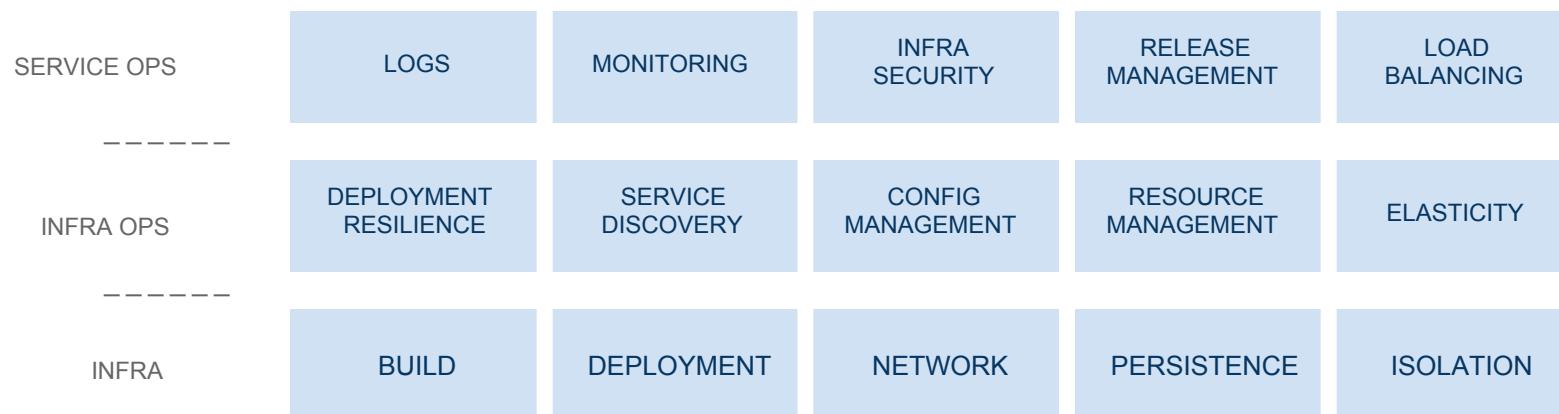
PERSISTENCE

ISOLATION

WHAT DO DISTRIBUTED SYSTEMS NEED?



WHAT DO DISTRIBUTED SYSTEMS NEED?



WHAT DO DISTRIBUTED SYSTEMS NEED?

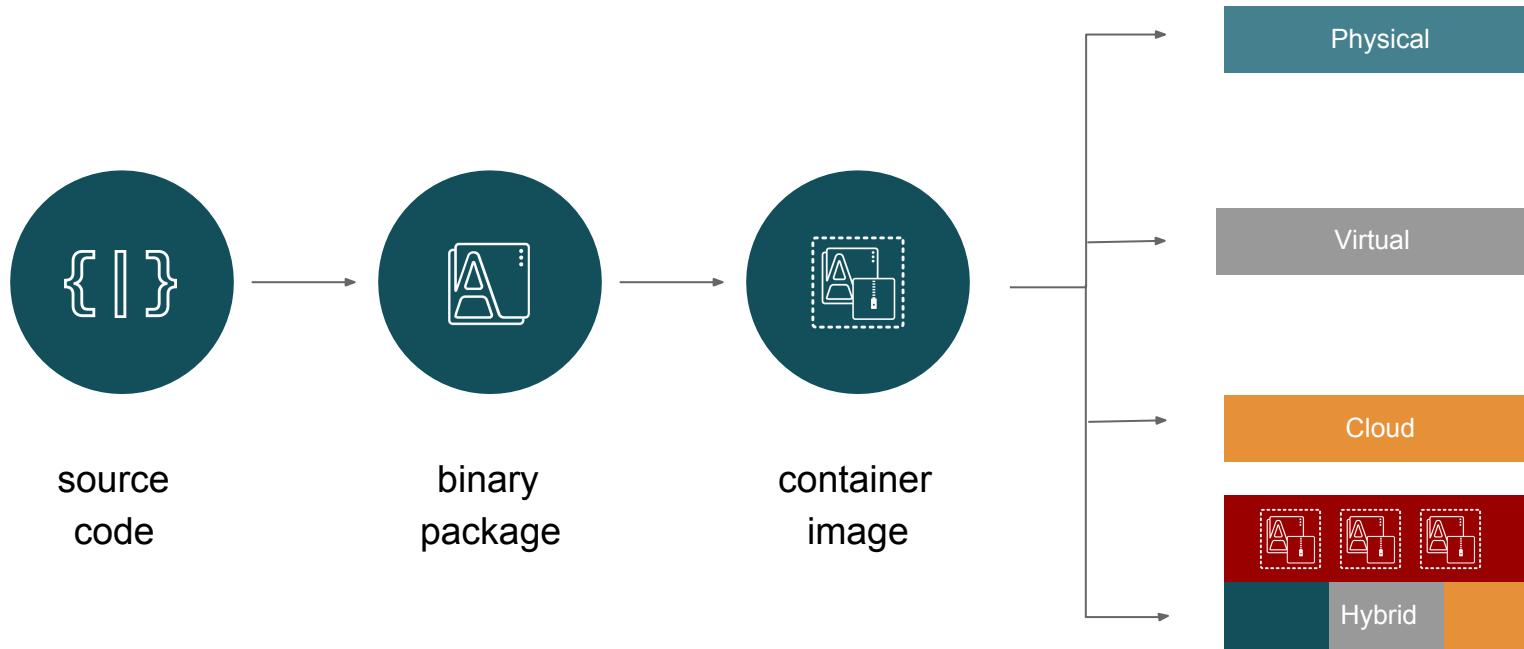
SERVICE	FAULT TOLERANCE	OBSERVABILITY	SERVICE SECURITY	CHAOS ENGINEERING	TRAFFIC CONTROL

SERVICE OPS	LOGS	MONITORING	INFRA SECURITY	RELEASE MANAGEMENT	LOAD BALANCING

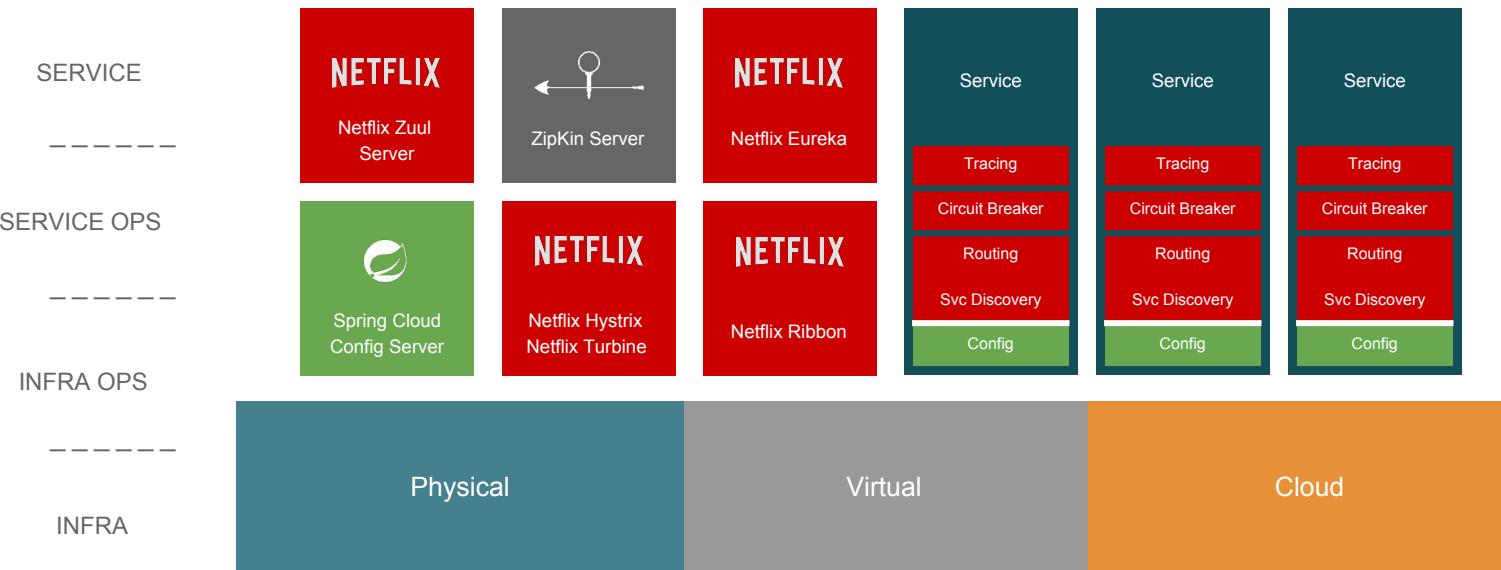
INFRA OPS	DEPLOYMENT RESILIENCE	SERVICE DISCOVERY	CONFIG MANAGEMENT	RESOURCE MANAGEMENT	ELASTICITY

INFRA	BUILD	DEPLOYMENT	NETWORK	PERSISTENCE	ISOLATION

BUILD ONCE, DEPLOY ANYWHERE



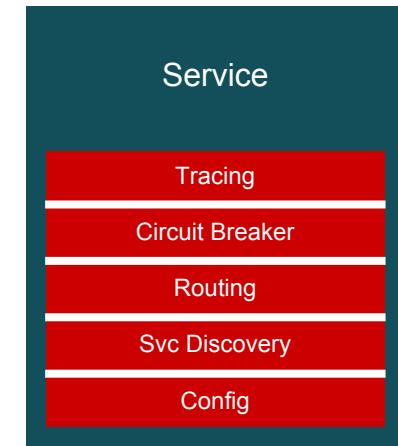
WHAT DO DISTRIBUTED SYSTEMS NEED?



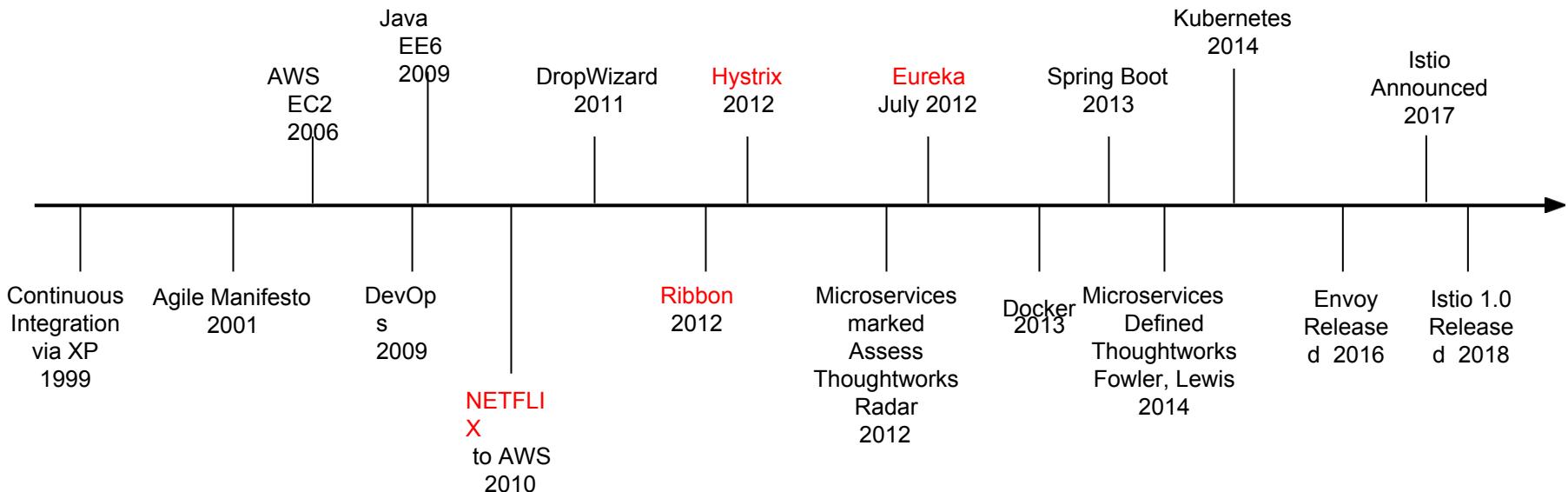
AN OPERATION NIGHTMARE!

Infra capabilities are tightly coupled with applications and services

- ✗ Incompatible across languages and frameworks
- ✗ Existing apps require refactoring
- ✗ Upgrades needs tight coordinations libraries

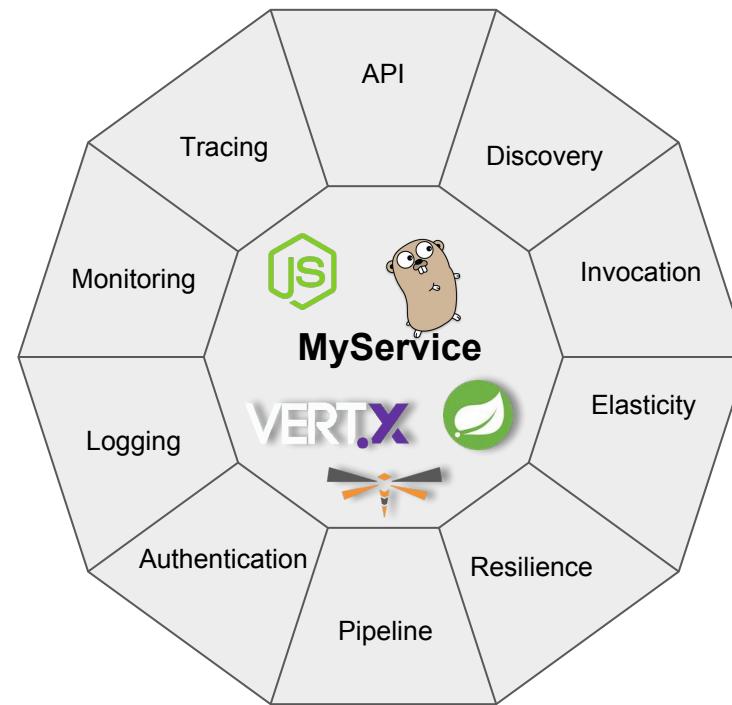


SHORT HISTORY OF MICROSERVICES

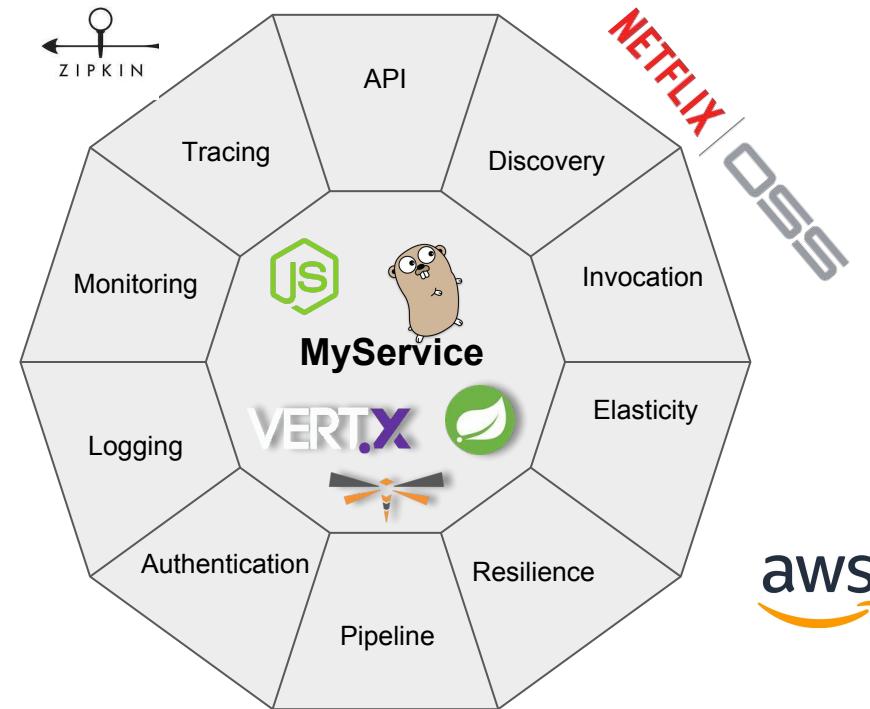


NETFLIX | OSS

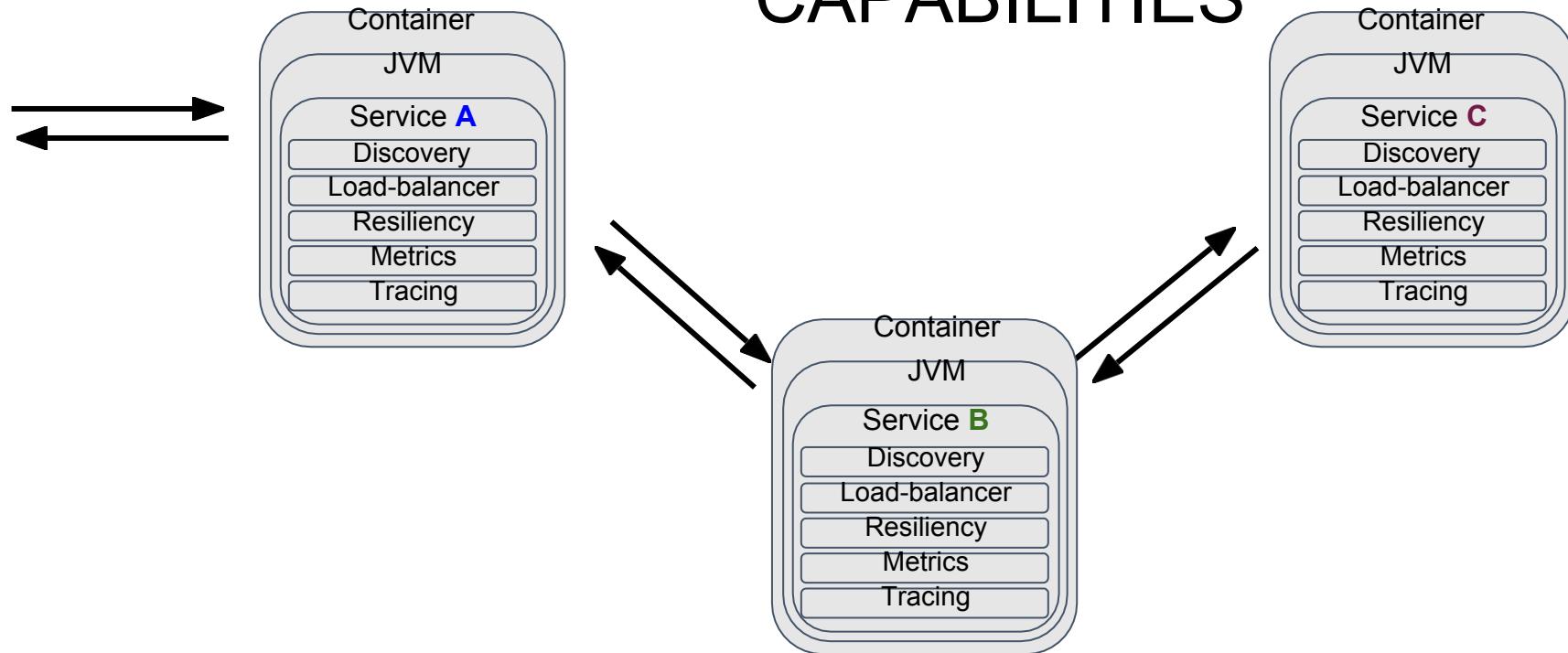
MICROSERVICES'ILITIES



SERVICES'ILITIES



MICROSERVICES EMBEDDING CAPABILITIES



What's Wrong with Netflix OSS?

Java Only

Adds a lot of libraries to YOUR
code



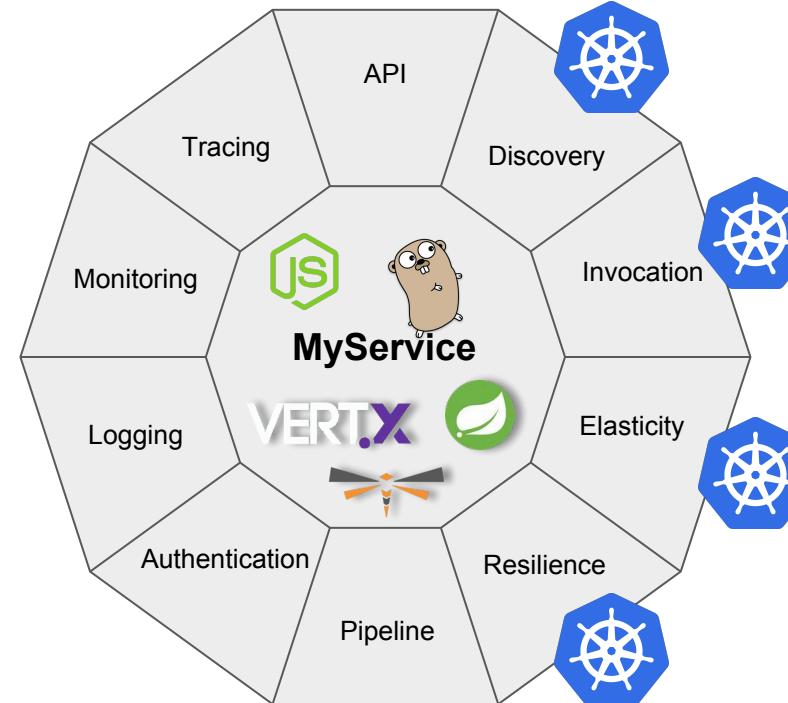


kubernetes

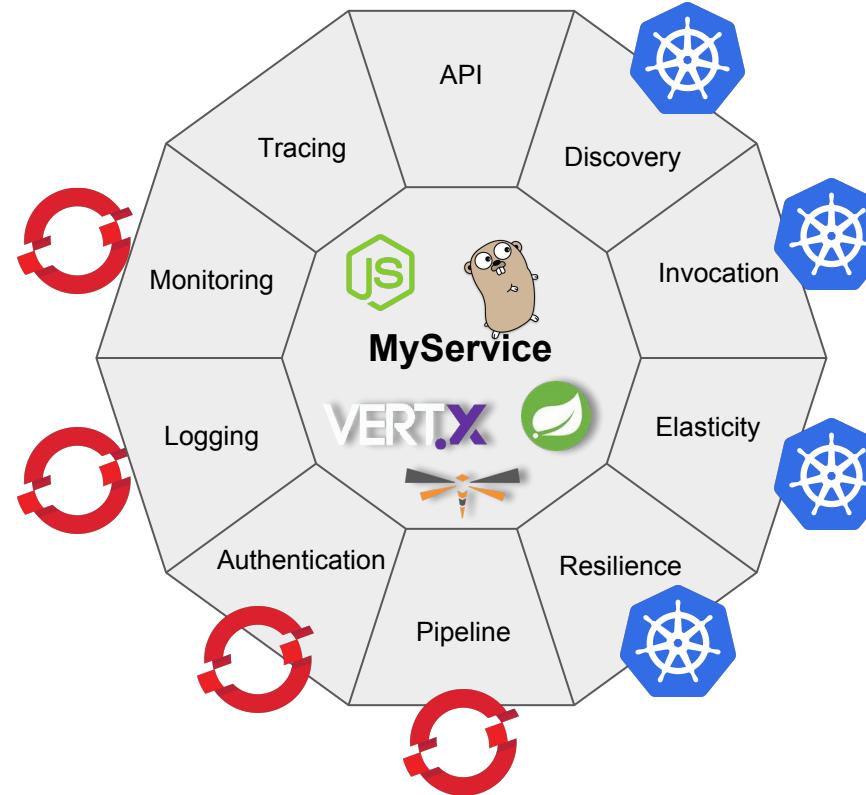


OPENSIFT

MICROSERVICES'ILITIES + KUBERNETES



MICROSERVICES'ILITIES + OPENSHIFT



THERE SHOULD BE A BETTER WAY

DISTRIBUTED SERVICES WITH KUBERNETES

SERVICE



SERVICE OPS



INFRA OPS

KUBERNETES

Deployment Resiliency | Service Discovery | Service Invocation | Config Management | Resource Management | Elasticity



INFRA

Physical

Virtual

Cloud

Container Infrastructure

DISTRIBUTED SERVICES WITH OPENSHIFT

SERVICE

SERVICE OPS

INFRA OPS

INFRA

OPENSIFT

THE ENTERPRISE KUBERNETES

Build Automation | Logs | Monitoring | Infra Security | Release Management | Load Balancing | Deployment
Resiliency | Service Discovery | Config | Resource Management | Elasticity

Physical

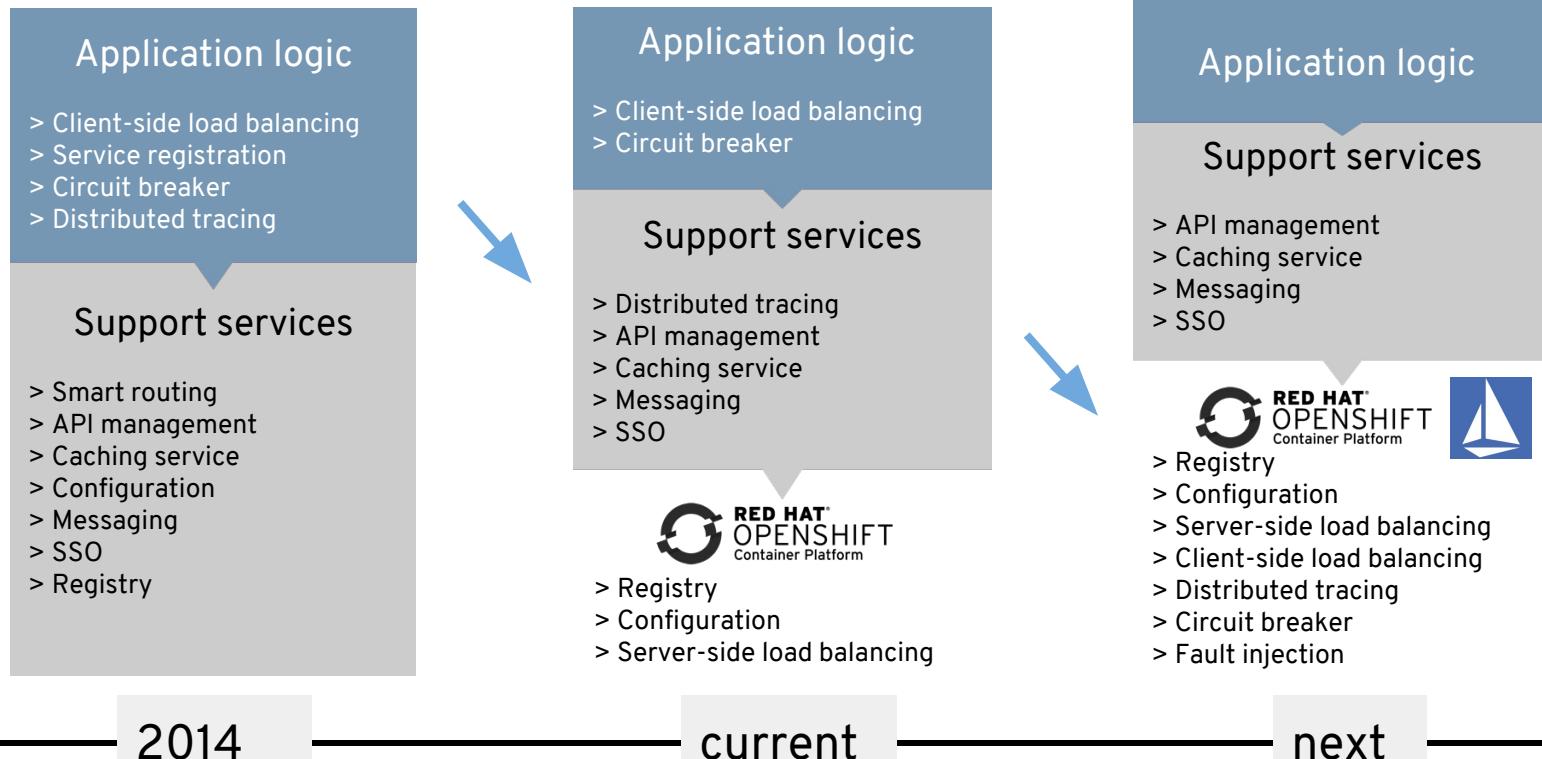
Virtual

Cloud

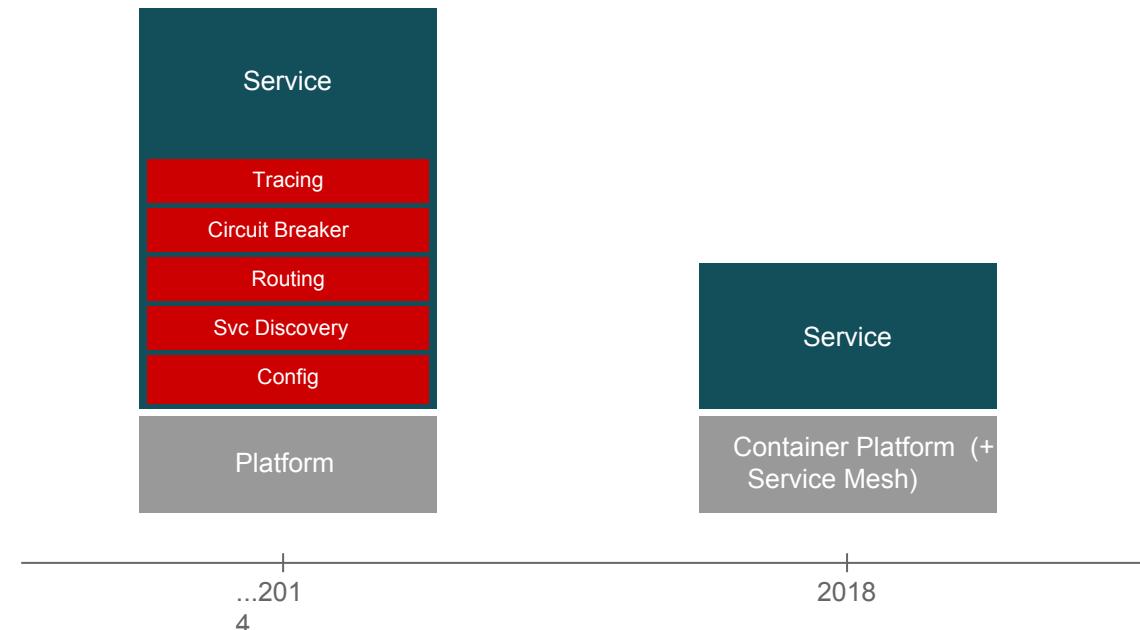
Container Infrastructure

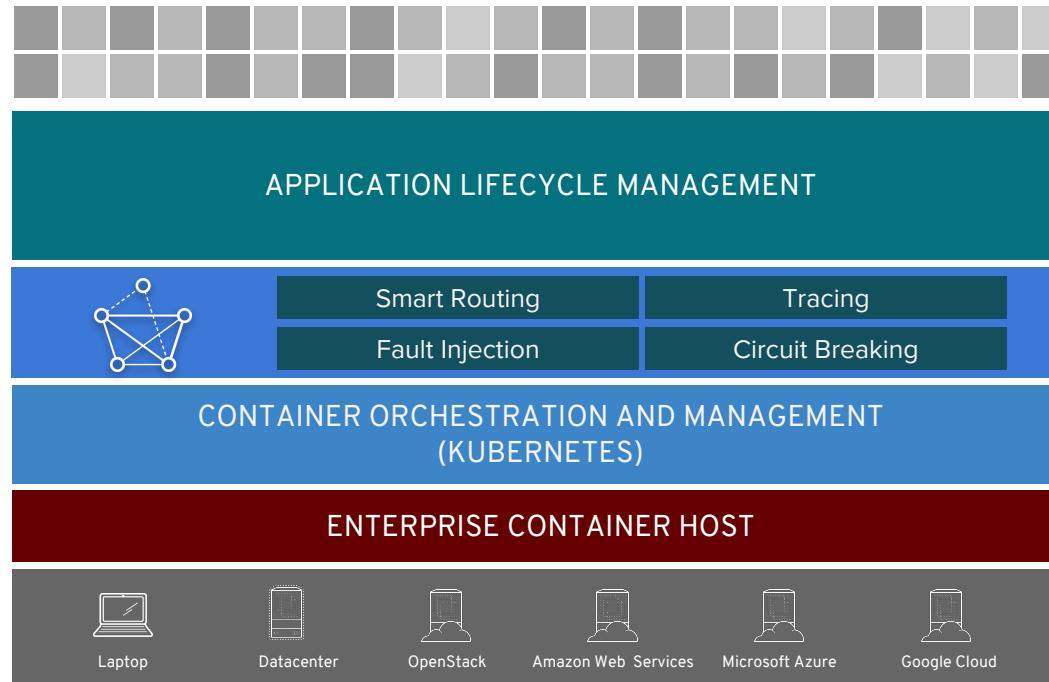
SERVICE MESH

A dedicated network for
service-to-service communications

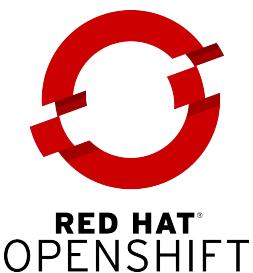


EVOLUTION OF SERVICES



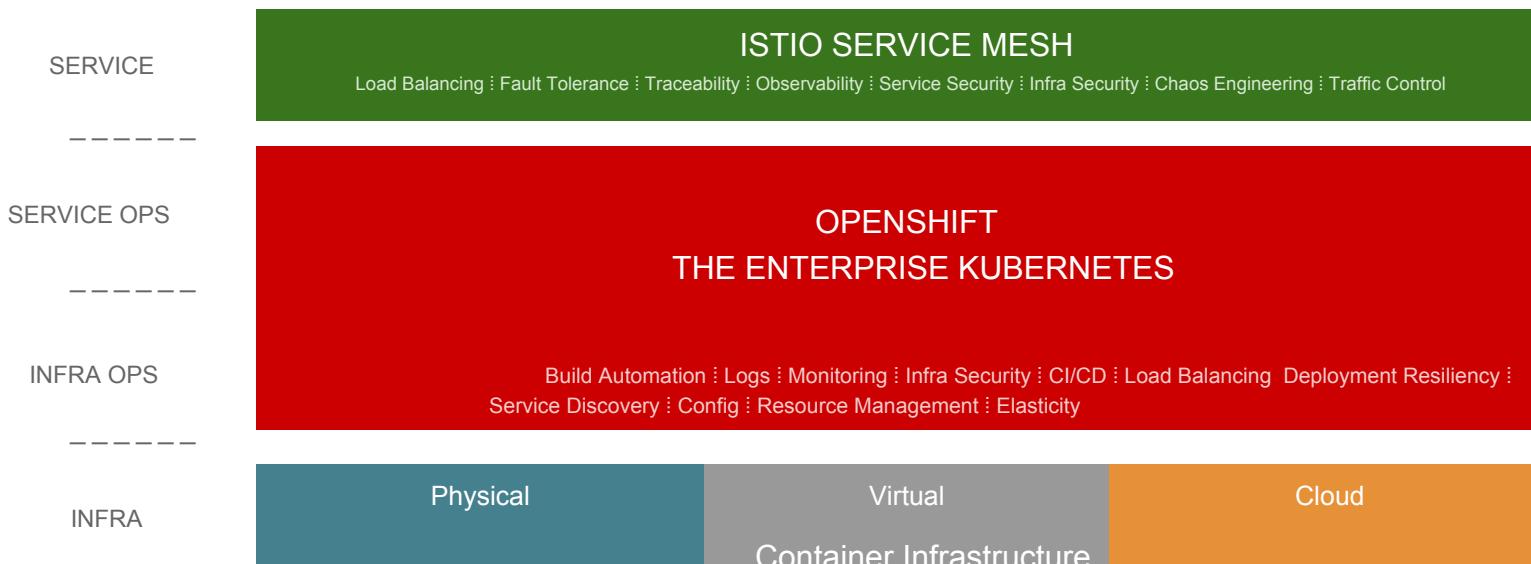


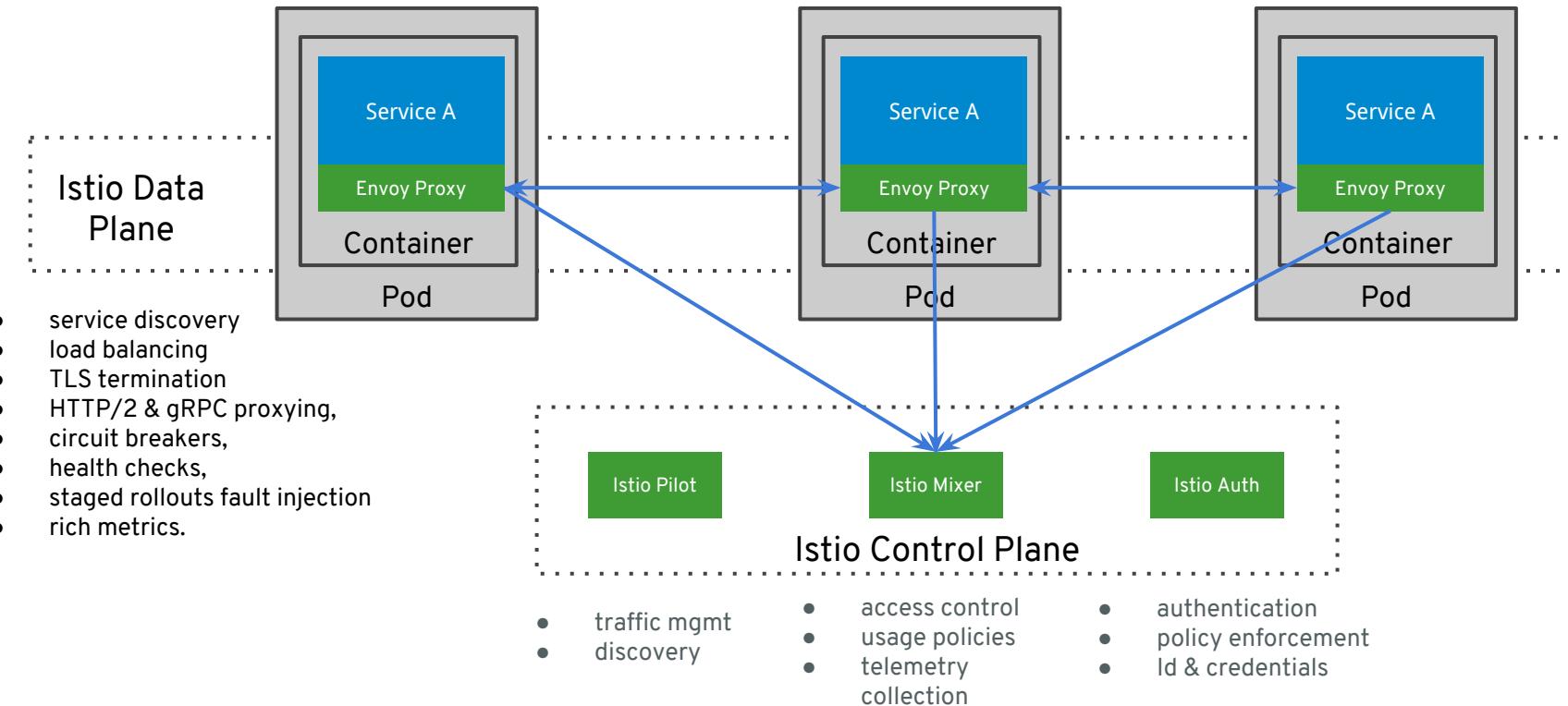
ANY
CONTAINER



ANY
INFRASTRUCTURE

DISTRIBUTED SERVICES WITH ISTIO SERVICE MESH





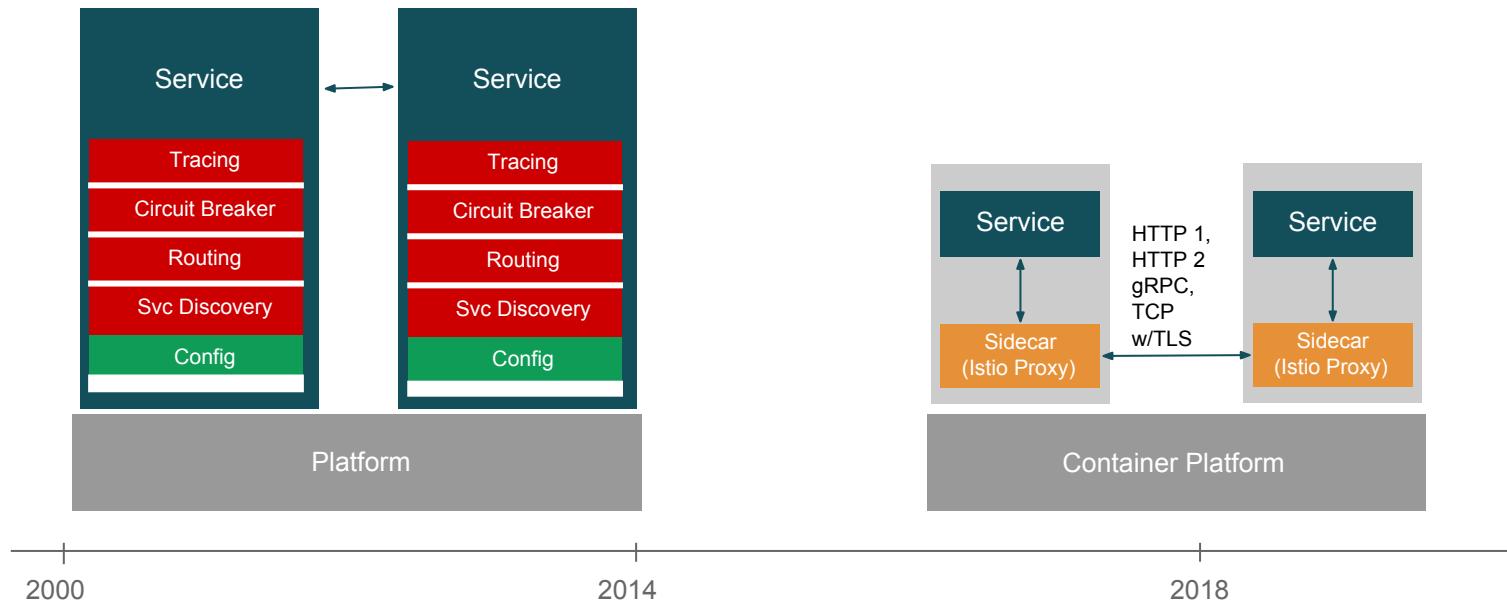
SIDECAR PATTERN

- A utility container in the same pod to enhance the main container's functionality
- Share the same network and lifecycle
- Istio uses an Istio Proxy (L7 Proxy) sidecar to proxy all network traffic between apps

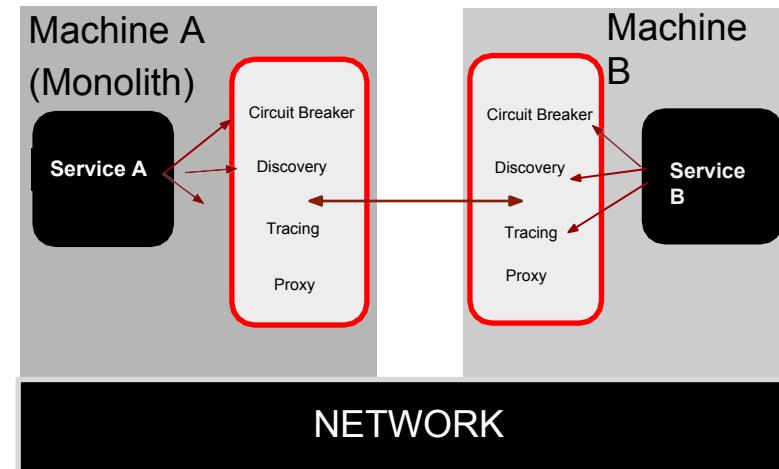


Source: <http://blog.kubernetes.io/2015/06/the-distributed-system-toolkit-patterns.html>

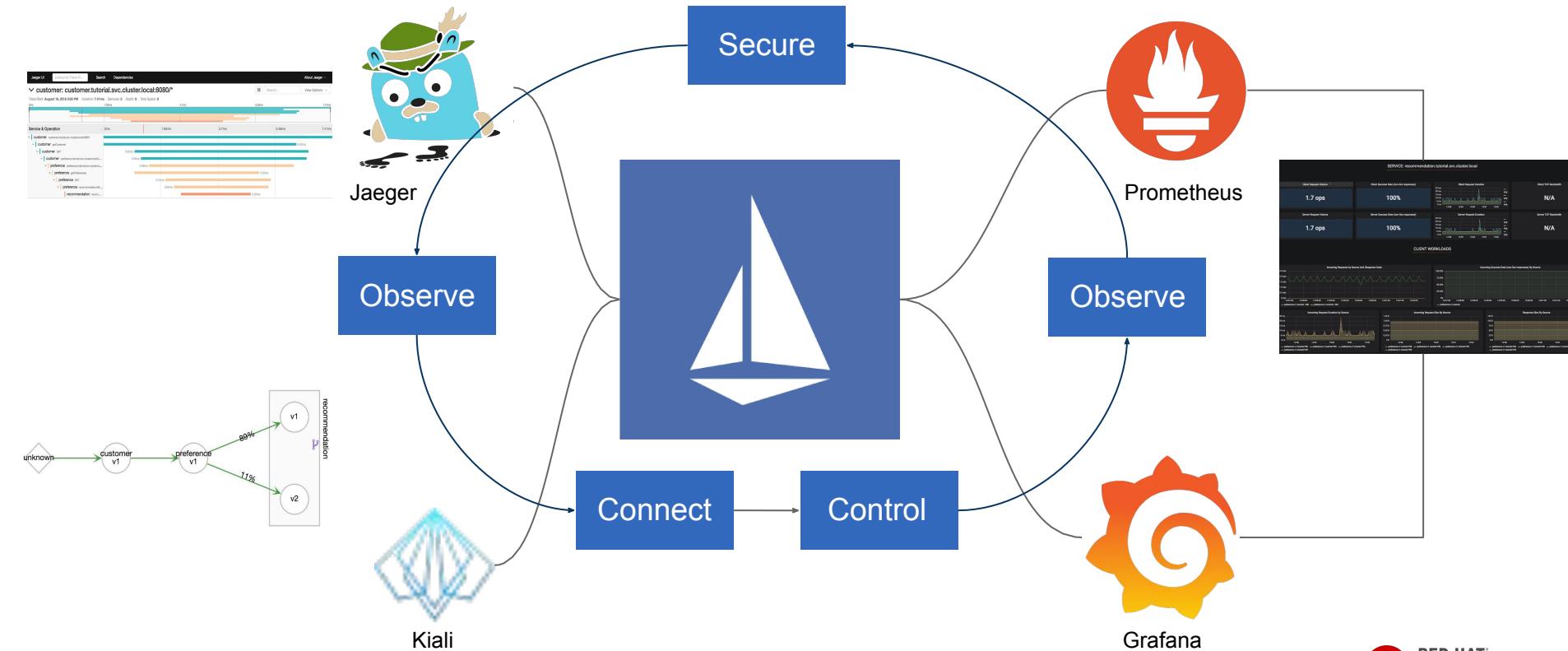
EVOLUTION OF SERVICES



WHAT IS A SERVICEMESH ?



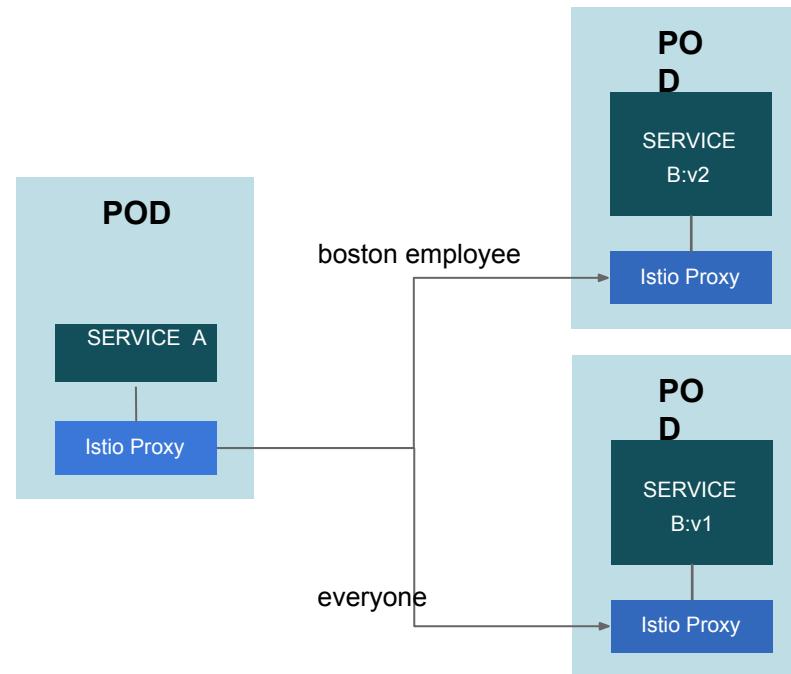
SERVICE MESH ECOSYSTEM



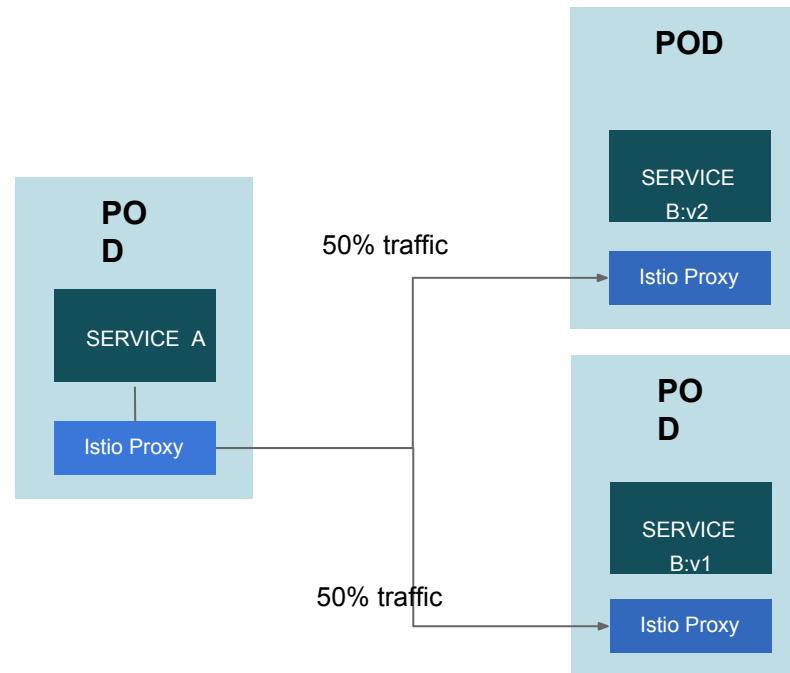
ISTIO DEEP DIVE

TRAFFIC CONTROL

CANARY DEPLOYMENT WITH ISTIO

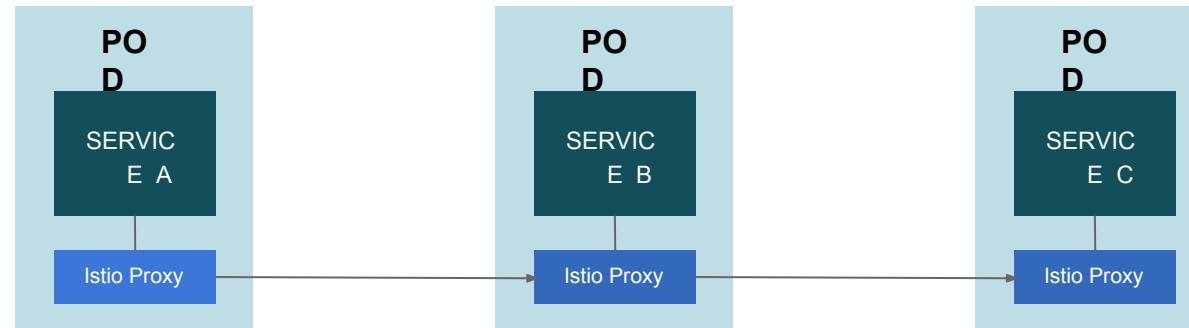


A/B DEPLOYMENT WITH ISTIO



TRACING

TRACING WITH ISTIO & JAEGER



discovers service relationships and process times,
transparent to the services

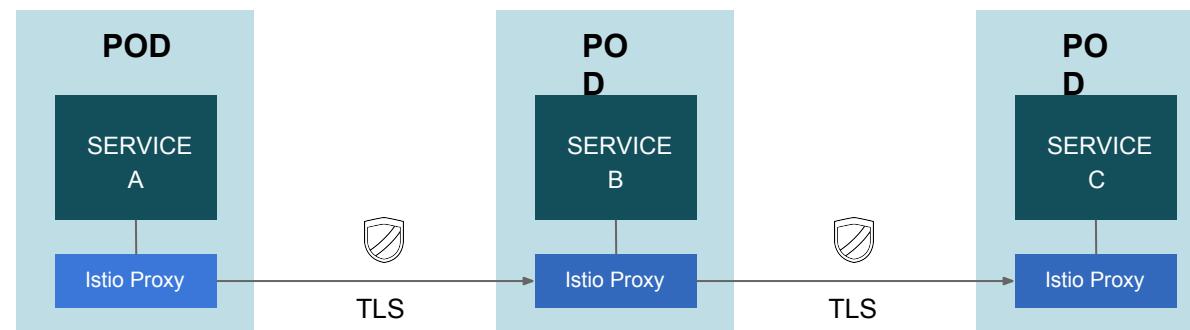


TRACING WITH ISTIO & JAEGER



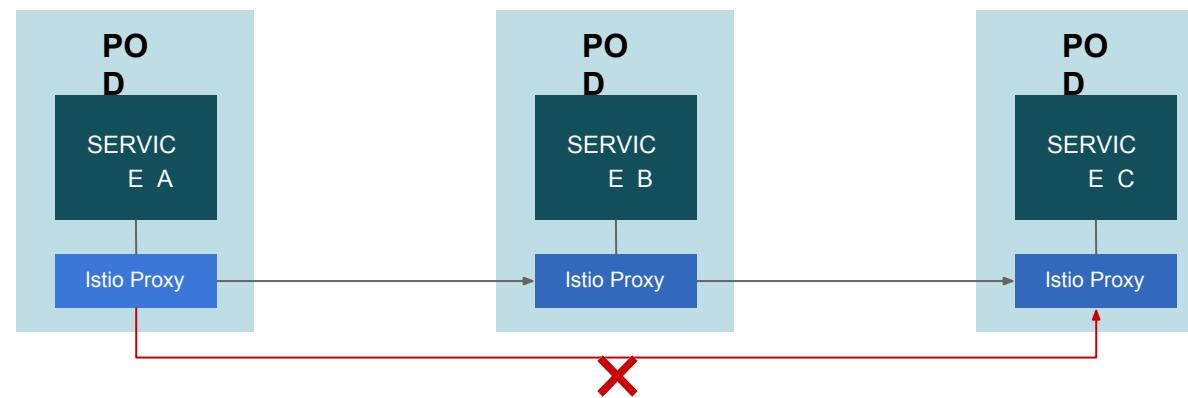
SERVICE SECURITY

SECURE COMMUNICATION WITH ISTIO



mutual TLS authentication, transparent to the services

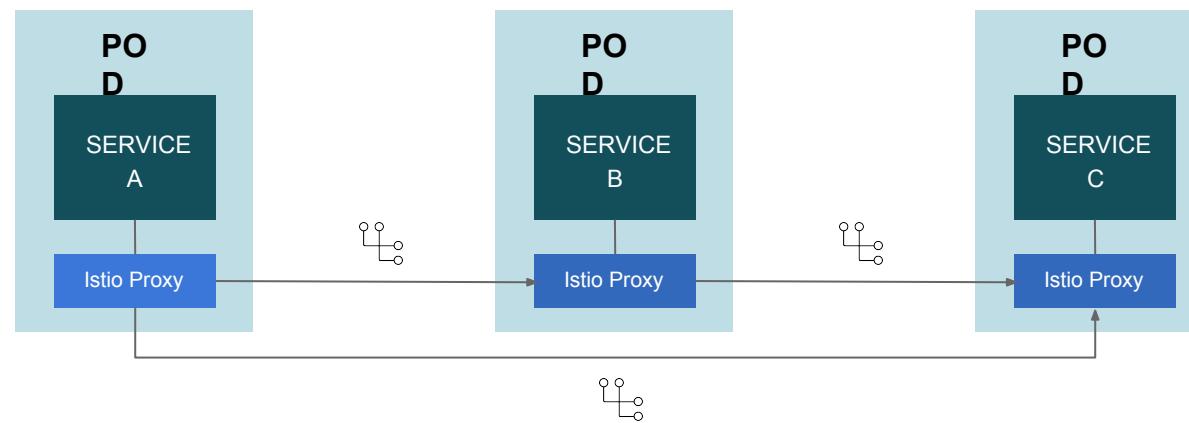
CONTROL SERVICE ACCESS WITH ISTIO



control the service access flow, transparent to the services

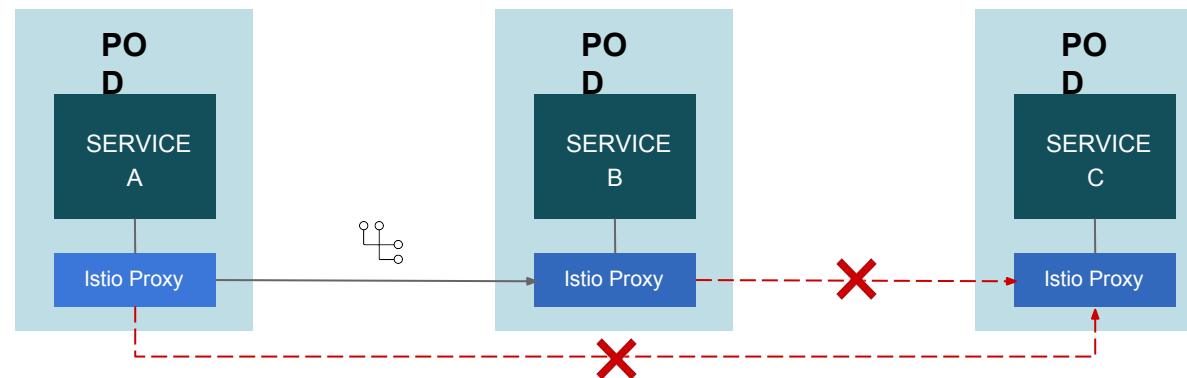
FAULT TOLERANCE

CIRCUIT BREAKERS WITH ISTIO



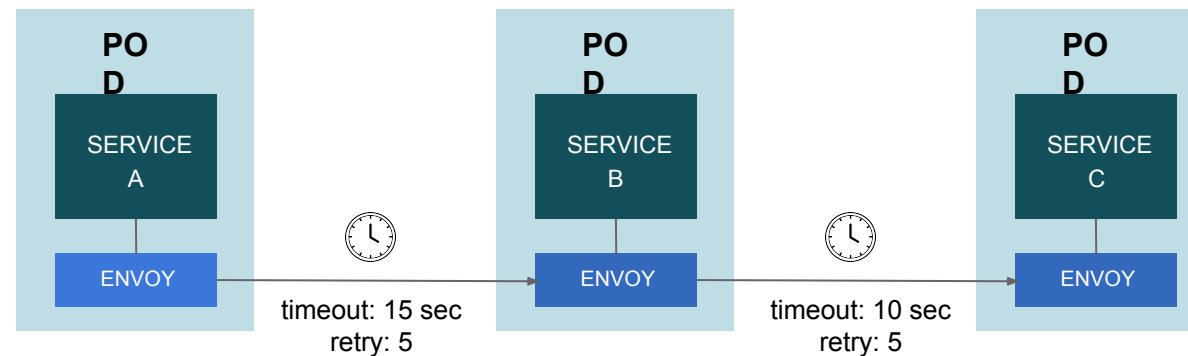
transparent to the services

CIRCUIT BREAKERS WITH ISTIO



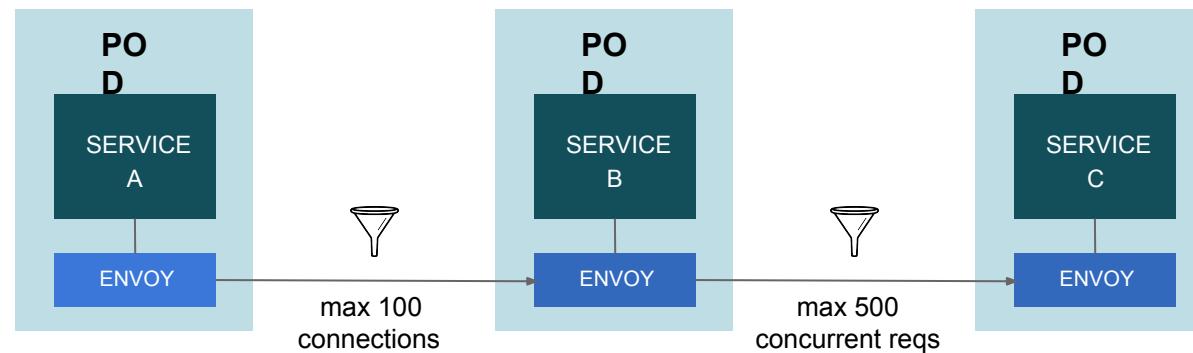
- improved response time with global circuit status
- Pool Ejection to allow auto healing of unhealthy pod

TIMEOUTS AND RETRIES WITH ISTIO



configure timeouts and retries, transparent to the services

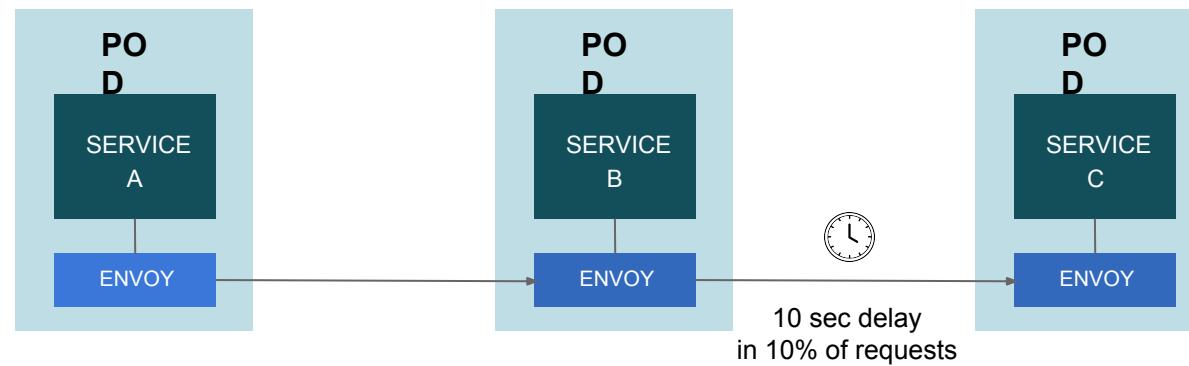
RATE LIMITING WITH ISTIO



limit invocation rates, transparent to the services

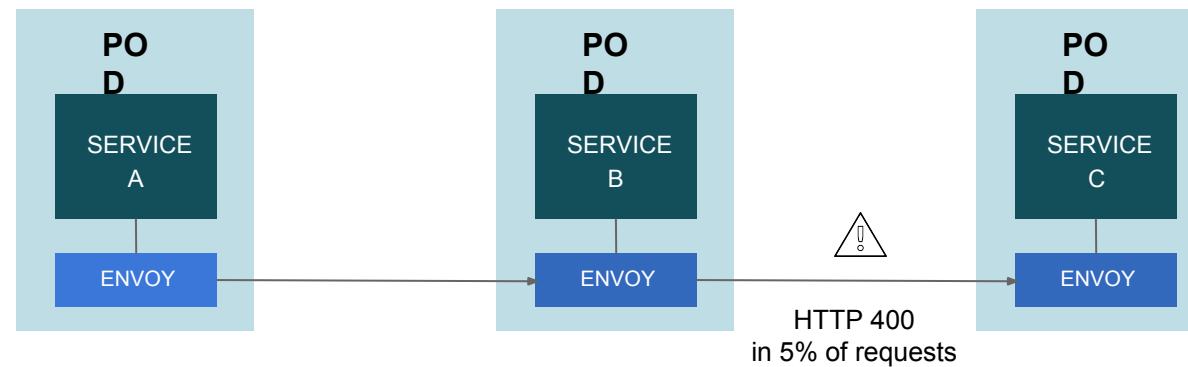
CHAOS ENGINEERING

CHAOS ENGINEERING WITH ISTIO



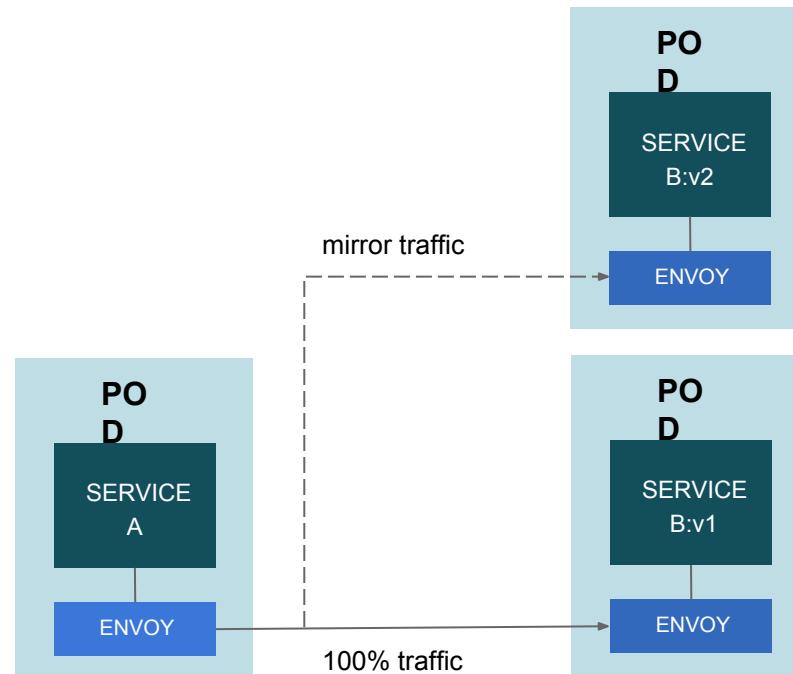
inject delays, transparent to the services

CHAOS ENGINEERING WITH ISTIO



inject protocol-specific errors, transparent to the services

DARK LAUNCHES WITH ISTIO



RED HAT OPENSHIFT SERVICE MESH

OPENSHIFT SERVICE MESH

- Supported distribution of
 - Istio
 - Jaeger
 - Kiali
 - Prometheus
 - Grafana
- Upstream project called Maistra
<https://github.com/Maistra>
- Integrated with Red Hat
OpenShift Application Runtimes
(RHOAR)

Select a mission

A specification that describes what your application will do.

- | Istio - Circuit Breaker
The Istio Circuit Breaker mission demonstrates limiting access to... [More](#)
- | Istio - Security
Ths Istio Security mission demonstrates how Istio secures communi... [More](#)
- | Istio - Distributed Tracing
The Istio Distributed Tracing mission demonstrates how simple dis... [More](#)

OPENSHIFT SERVICE MESH MW ROAD MAP

- RHOAR:
 - Goal: Better support Service Mesh and Observability use-cases for all the runtimes
 - Train E (end of Aug)
 - Spring Boot, Vert.x, Thorntail boosters:
 - Circuit Breaker
 - Security (TLS and ACL)
 - Distributed Tracing (Jaeger)
 - Train F (end of Nov)
 - Runtime expose metrics consumable by Prometheus
 - Jaeger support
- Docs will be added to OCP and OKD docs

Select a mission

A specification that describes what your application will do.

- Istio - Circuit Breaker
The Istio Circuit Breaker mission demonstrates limiting access to... [More](#)
- Istio - Security
Ths Istio Security mission demonstrates how Istio secures communi... [More](#)
- Istio - Distributed Tracing
The Istio Distributed Tracing mission demonstrates how simple dis... [More](#)

OPENSHIFT SERVICE MESH TECH PREVIEW

TECH PREVIEW 1

- Available for OCP 3.10
- Renders the whole cluster as tech preview
- Installation with Service Mesh Operator



NOT RECOMMENDED FOR PRODUCTION

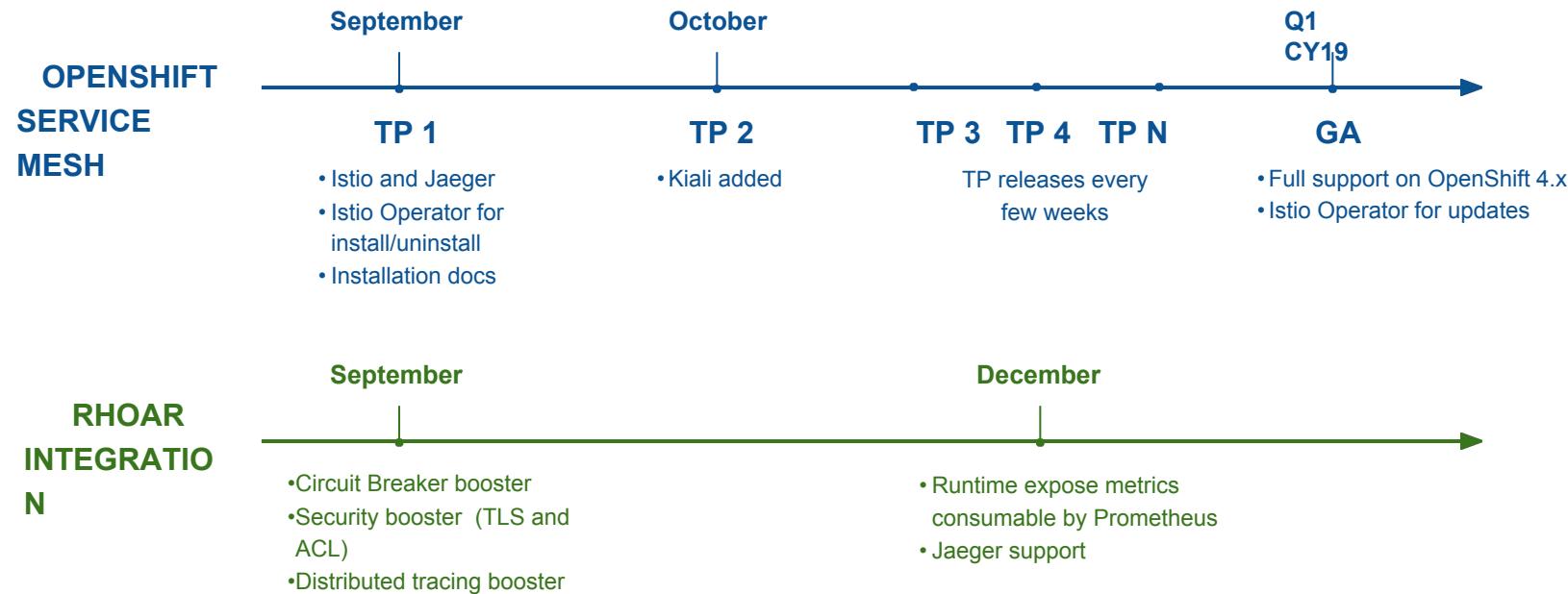
LIMITATIONS

- Works on a single cluster where all deployments are on OpenShift
- Works with OpenShift SDN with no external providers

HOW TO GET ACCESS

- Install Istio Operator
- Create an Istio Installation object
- Scheduled to be available on CDK at the end of the year

OPENSIFT SERVICE MESH ROADMAP





redhat[®]