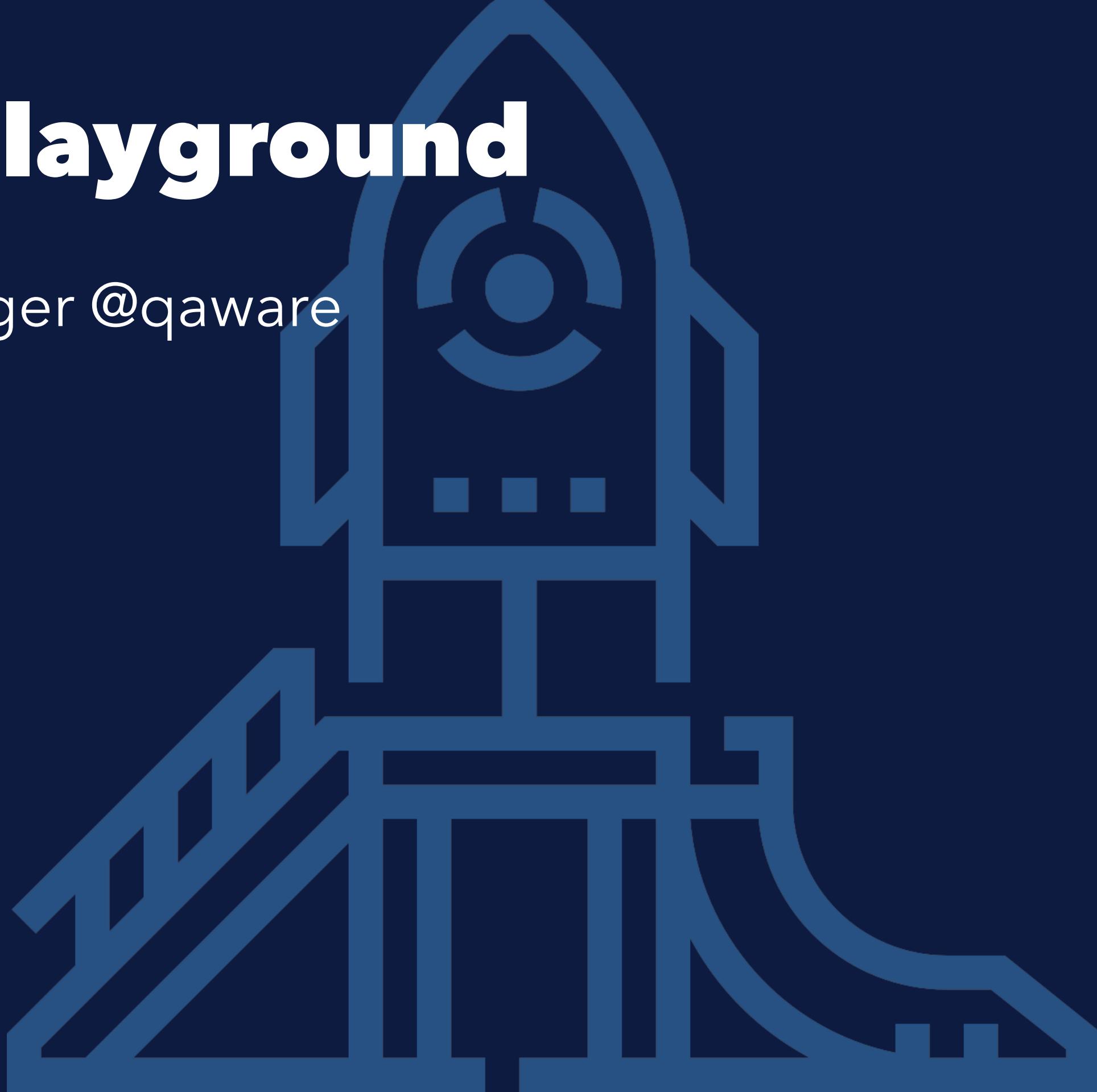


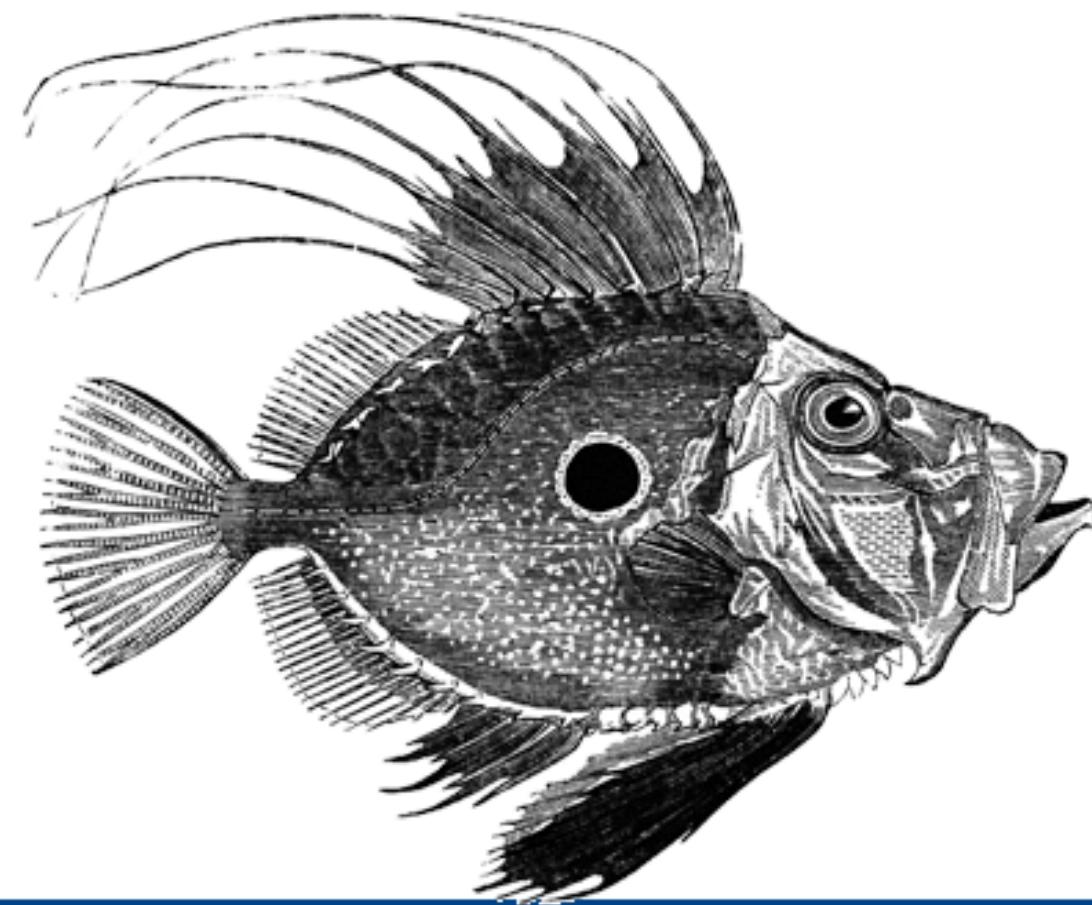
Istio Playground

@adersberger @qaware



Why?

Fight Microservice Obesity



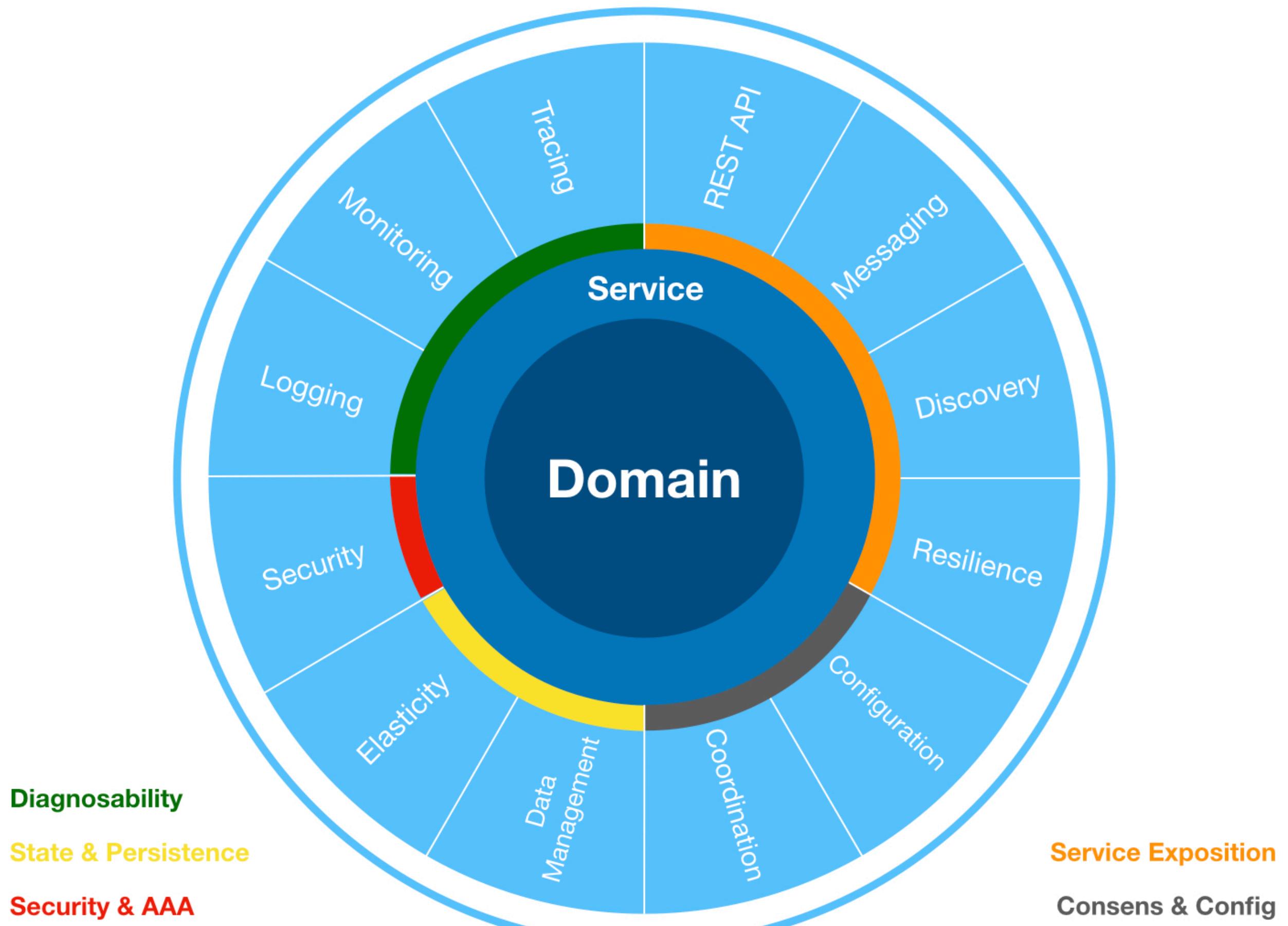
Hype-Driven Software Development

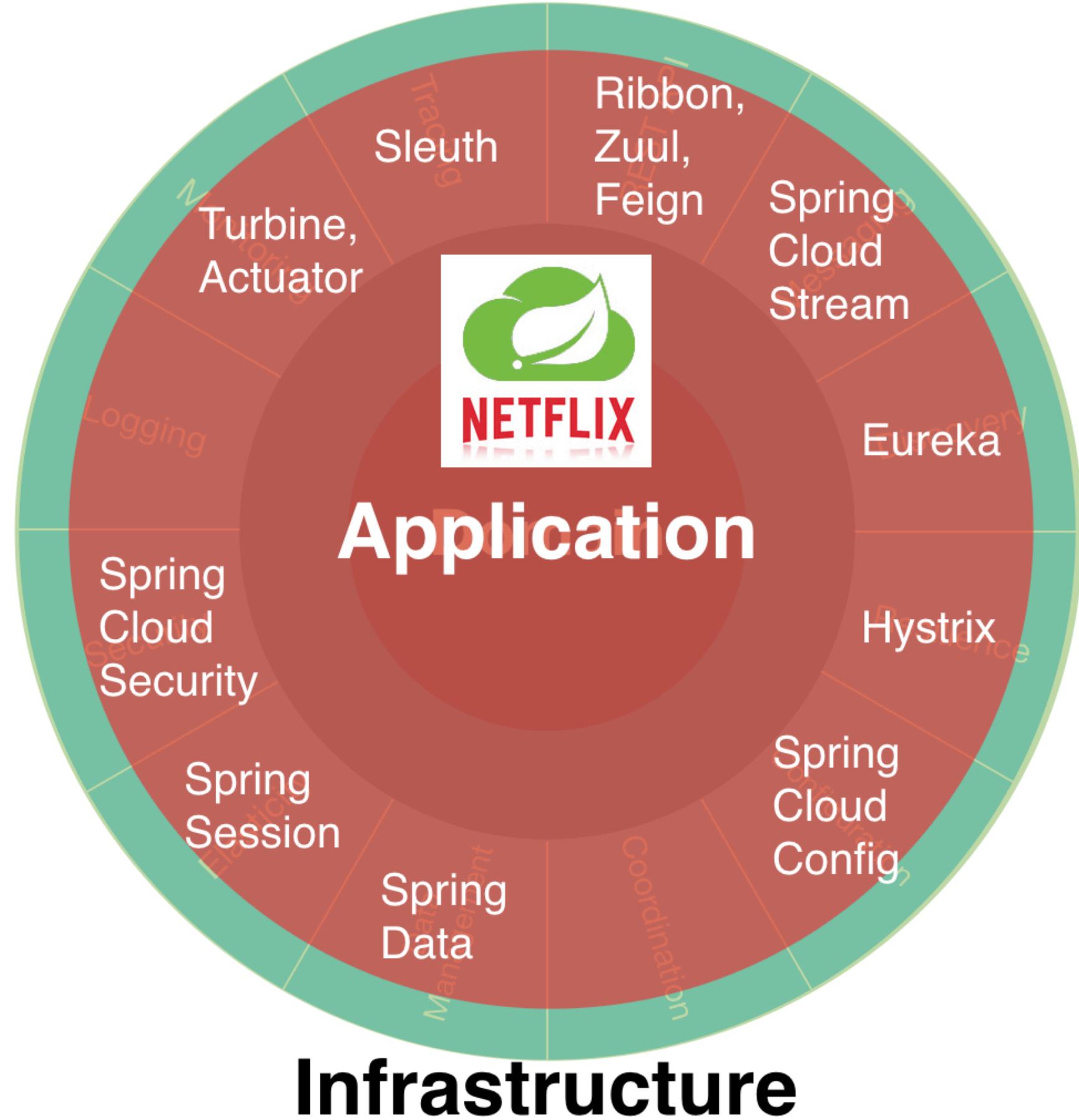
Istio Edition

O RLY[?]

Josef Adersberger

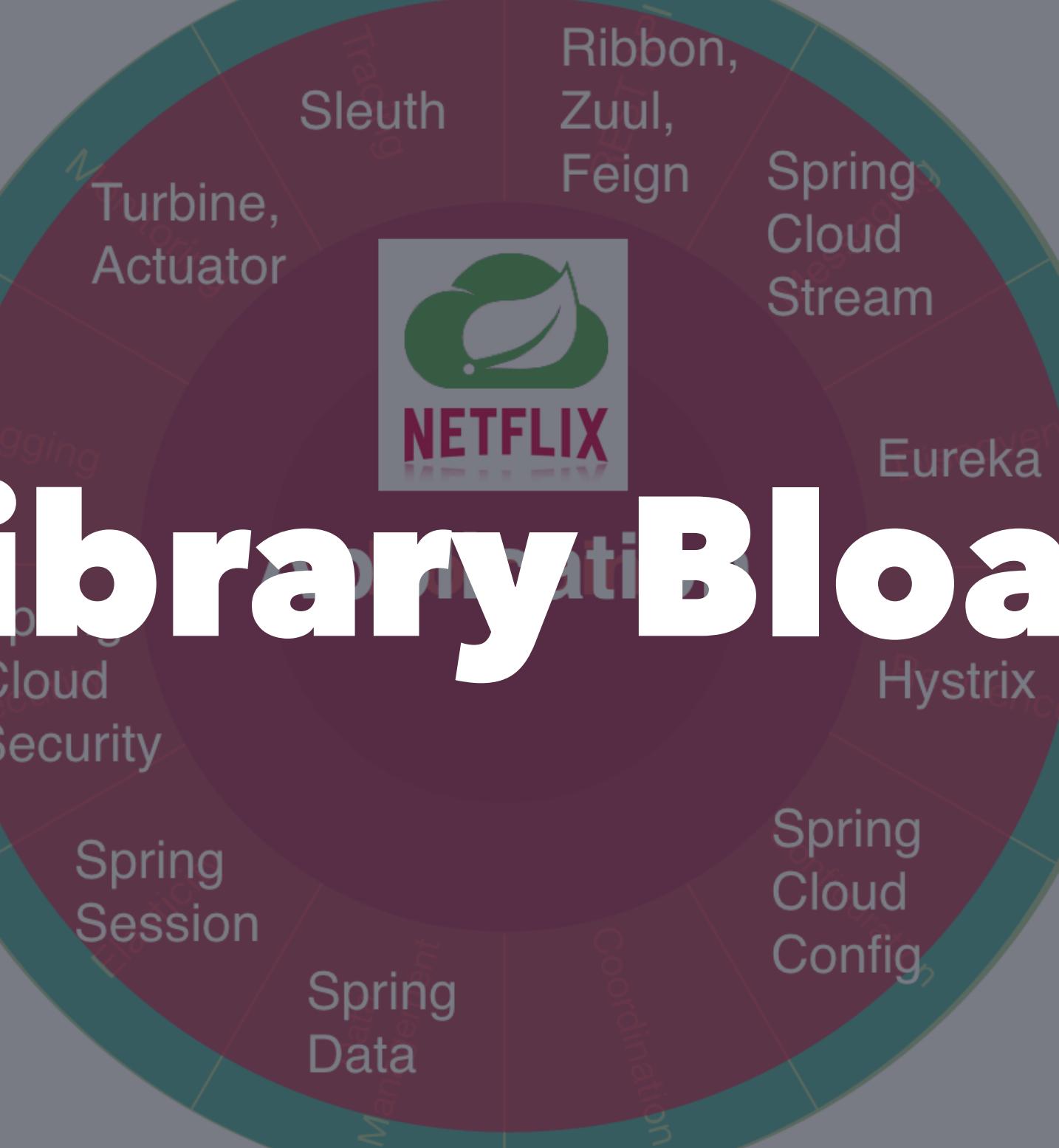
Atomic Architecture





library Bloat

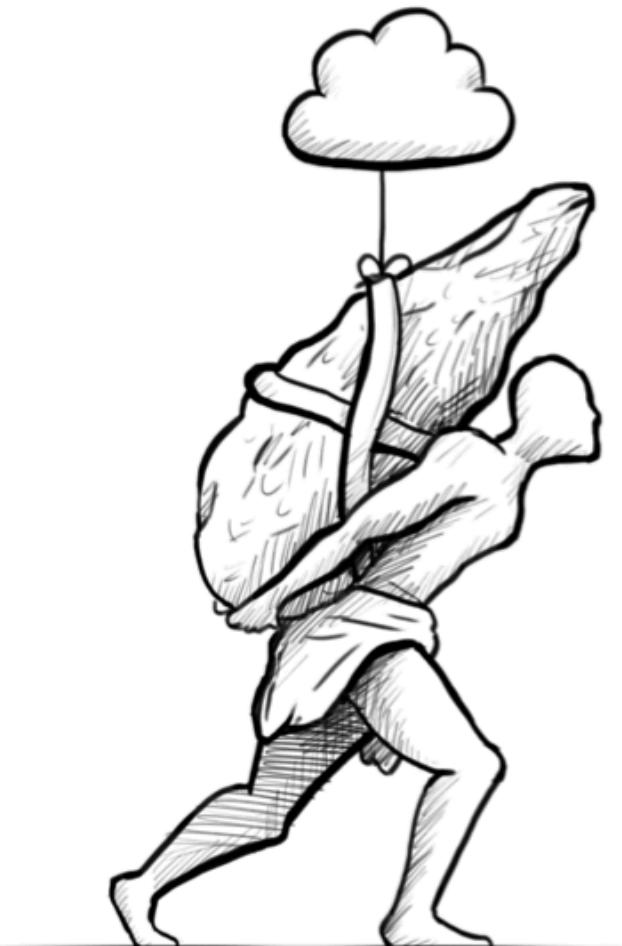
Infrastructure



Can we evolve existing enterprise applications into the cloud with reasonable effort?



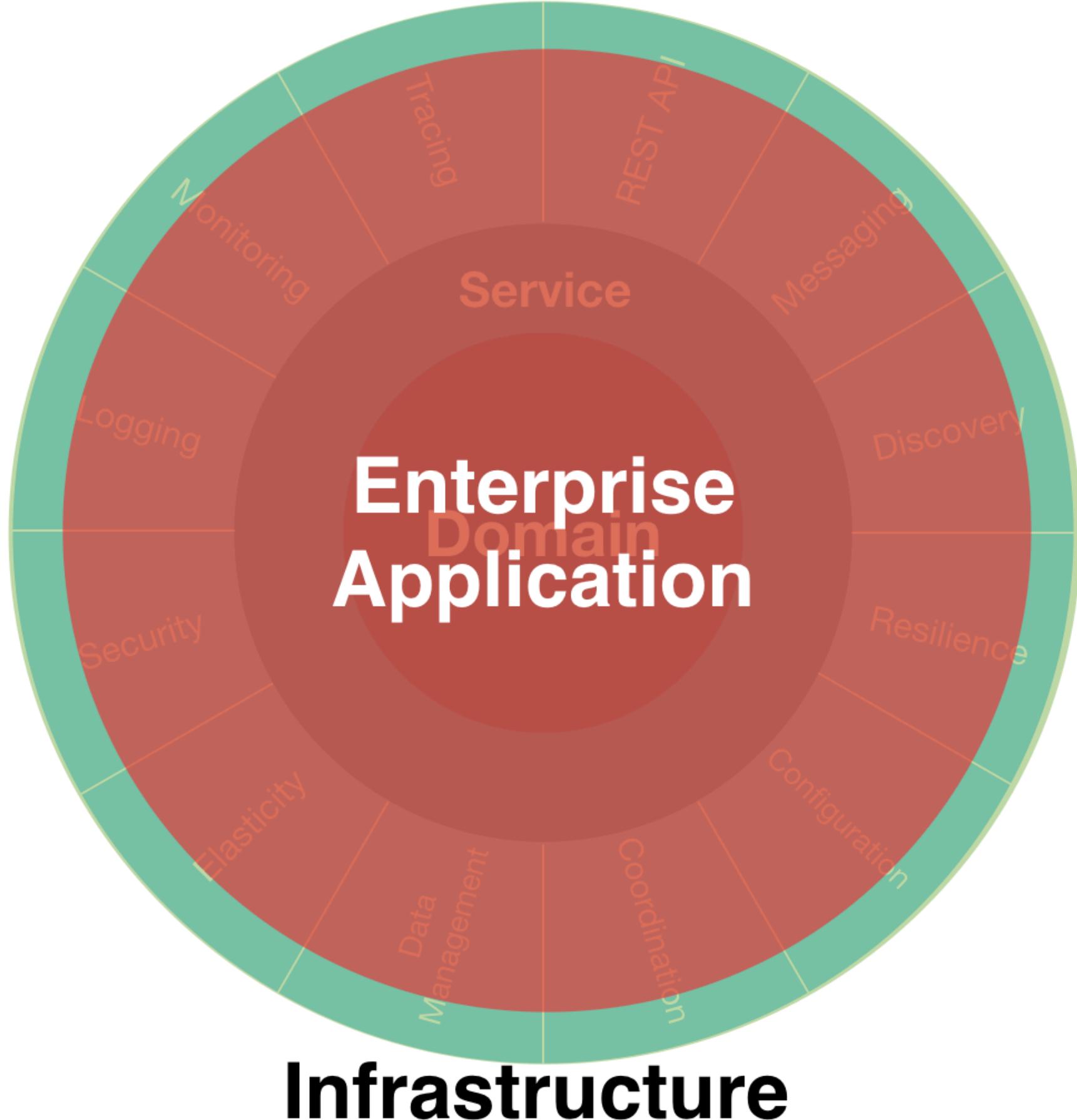
- Monolithic Deployment
- Traditional Infrastructure

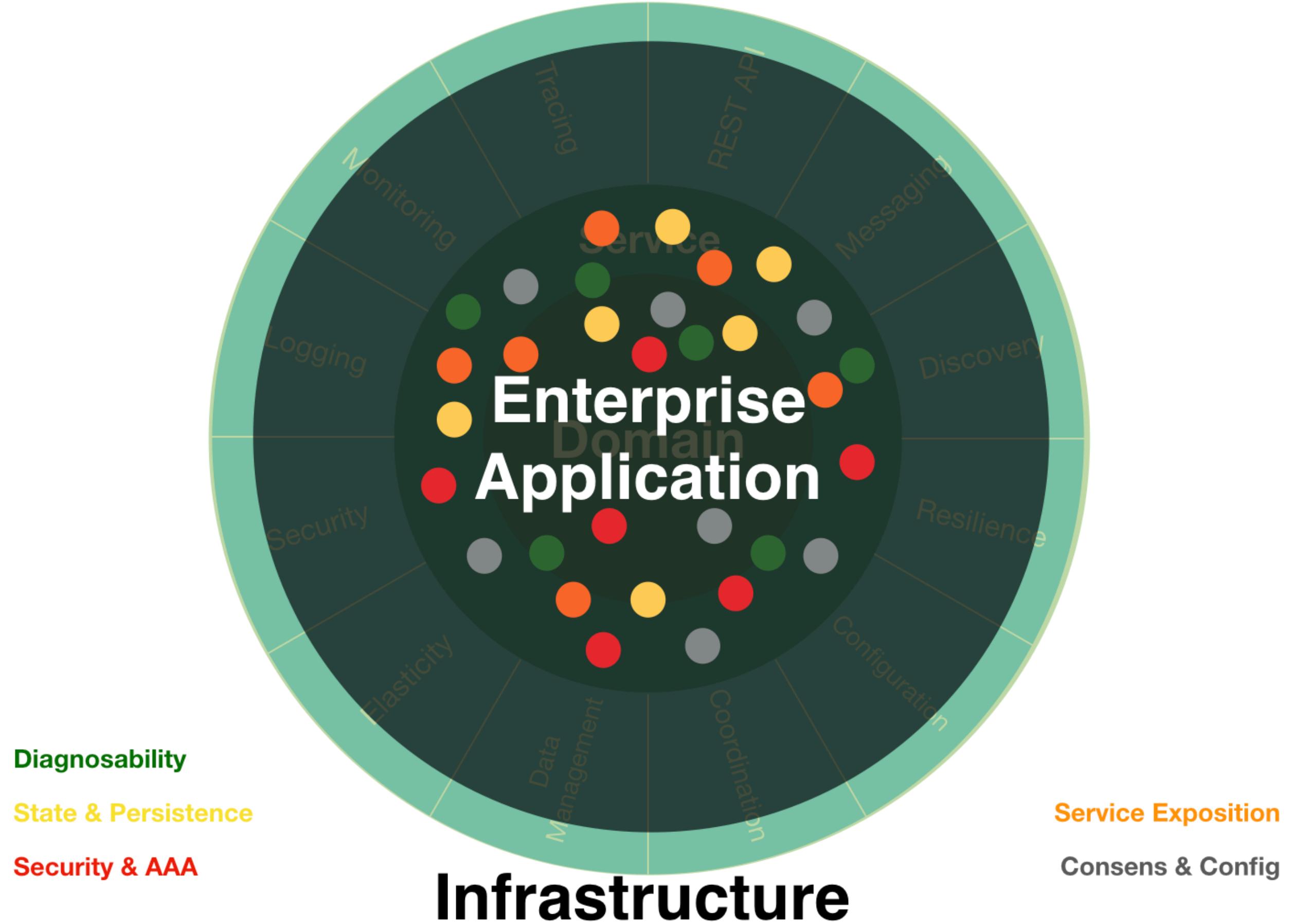


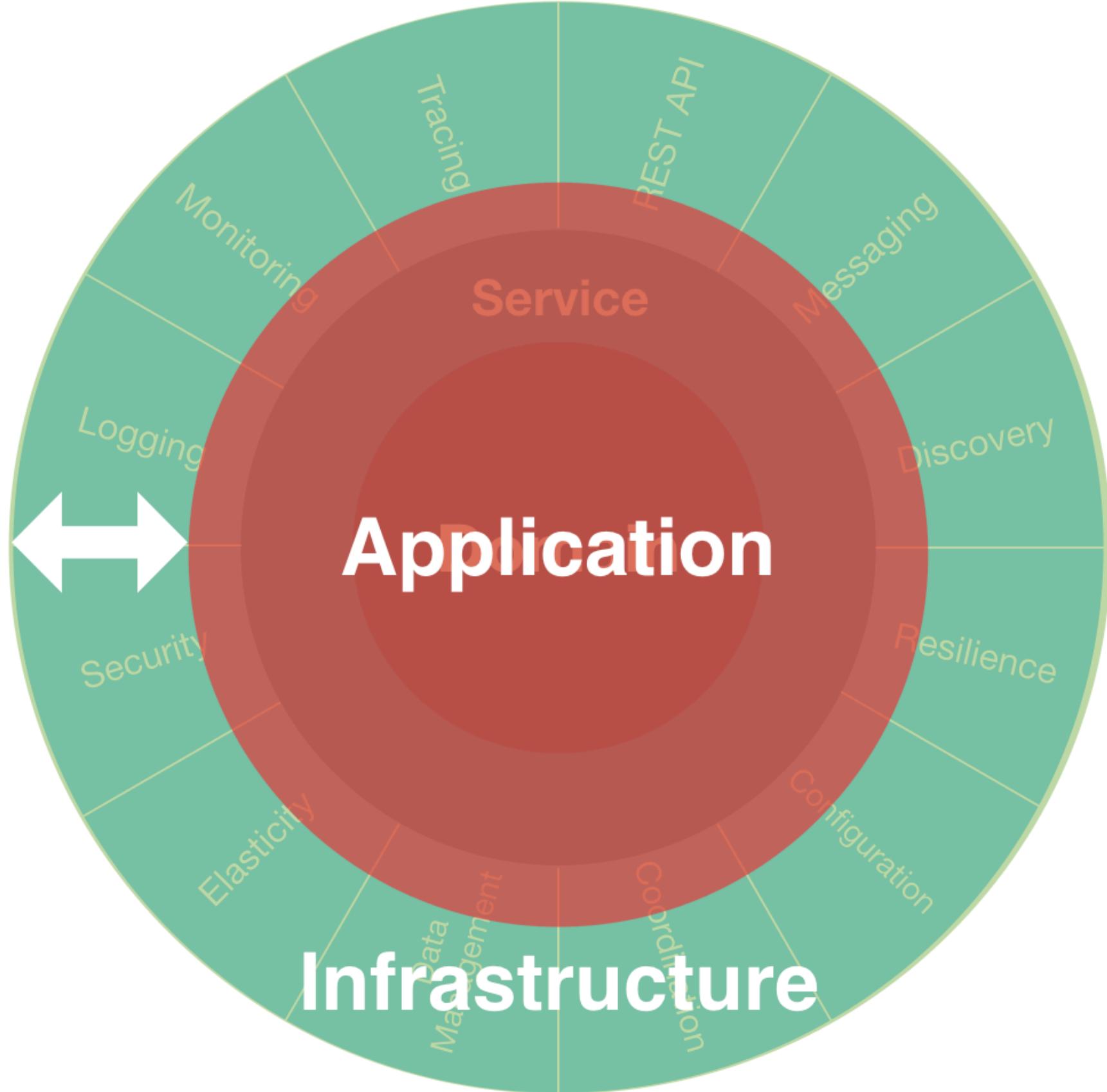
- Containerization
- 12-Factor App Principles

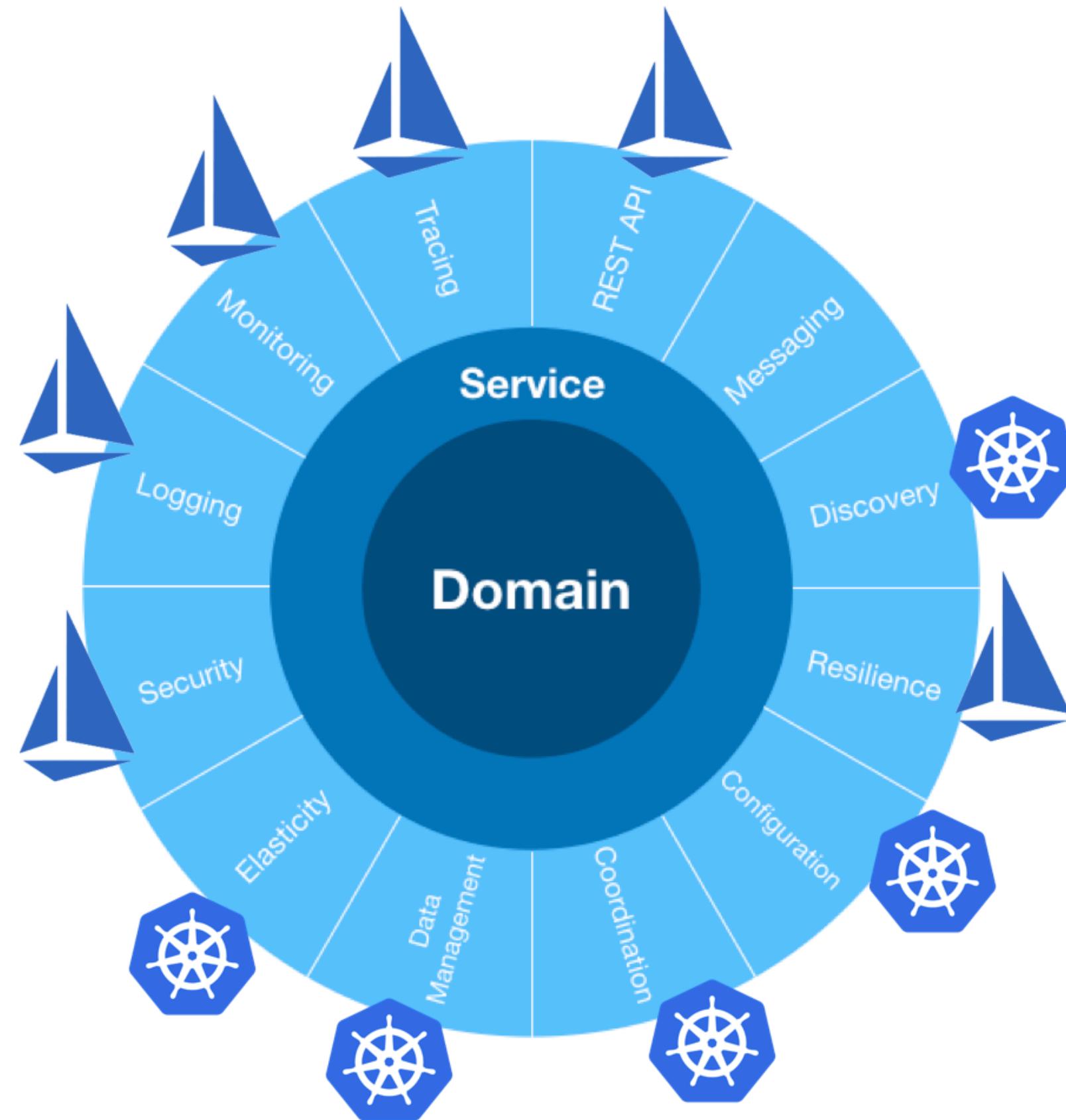


- Microservices
- Cloud-native Apps



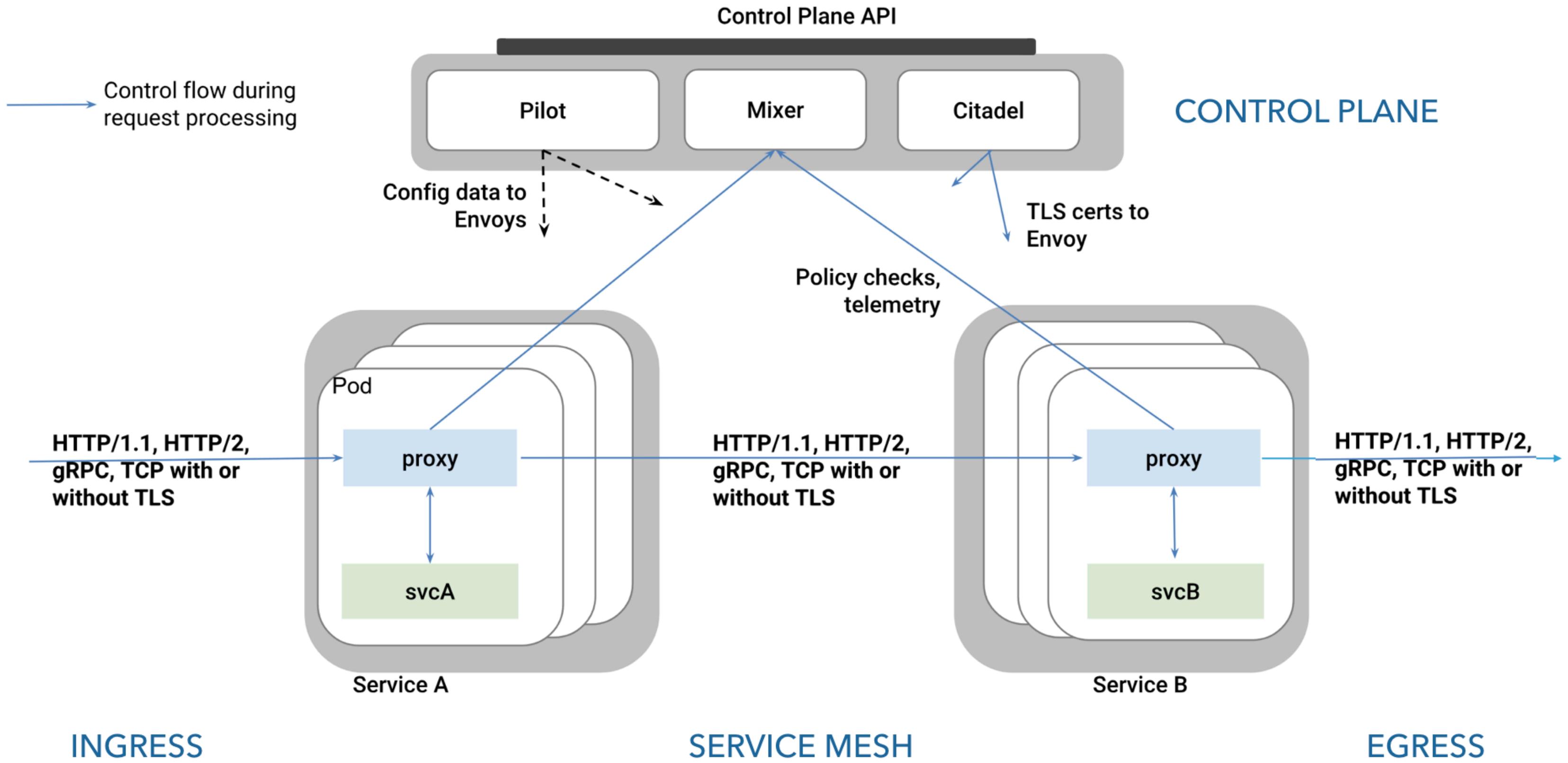






Setting the Sails with Istio 0.8





Workshop Prerequisites

- Bash
- git Client
- Text editor (like VS.Code)

Baby Step: Grab the Code

```
git clone https://github.com/adersberger/istio-playground
```

Baby Step: Install a (local) Kubernetes Cluster

Version 18.04.0-ce-mac62 (23965)

<https://www.docker.com/community-edition>

e0a85f64c1

- Preferences: enable Kubernetes
- Preferences: increase resource usage to 3 cores



Engine: 18.04.0-ce

Notary Notary: 0.6.0



Compose: 1.21.0



Credential Helper: 0.6.0

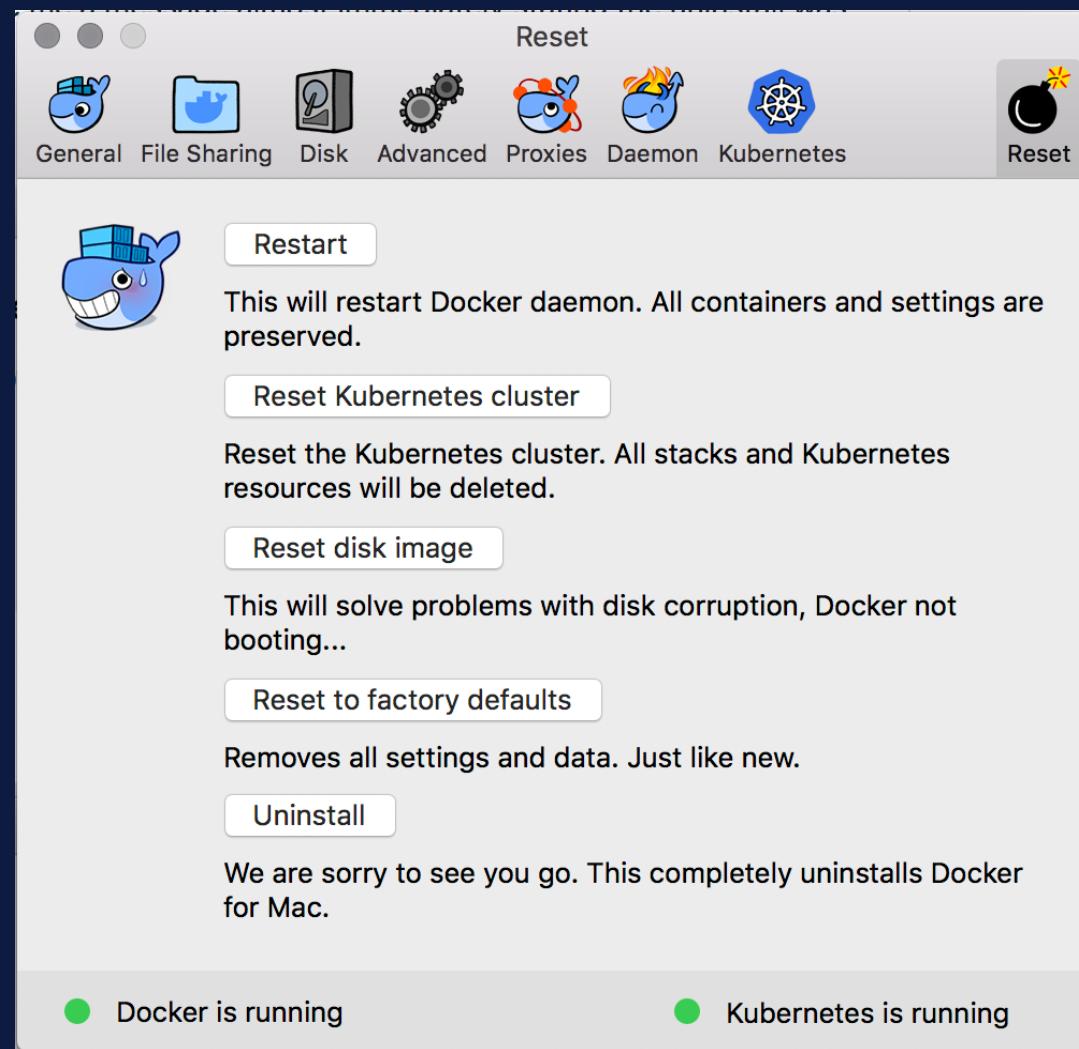


Machine: 0.14.0



Kubernetes: v1.9.6

The Ultimate Guide to Fix Strange Kubernetes Behavior



Setup Kubernetes Environment

```
# Switch k8s context
kubectl config use-context docker-for-desktop
# Deploy k8s dashboard
kubectl create -f https://raw.githubusercontent.com/kubernetes/dashboard/master/src/deploy/recommended/kubernetes-dashboard.yaml
# Extract id of default service account token (referred as TOKENID)
kubectl describe serviceaccount default
# Grab token and insert it into k8s Dashboard UI auth dialog
kubectl describe secret TOKENID
# Start local proxy
kubectl proxy --port=8001 &
# Open k8s Dashboard
open http://localhost:8001/api/v1/namespaces/kube-system/services/https:kubernetes-dashboard:/proxy/#!/login
```

Deploy Istio

```
curl -L https://git.io/getLatestIstio | sh -
cd istio-0.8.0
export PATH=$PWD/bin:$PATH
istioctl
```

```
# deploy Istio
# (demo setting, default deployment is via Helm)
kubectl apply -f install/kubernetes/istio-demo.yaml
kubectl get pods -n istio-system
```

```
# label default namespace to be auto-sidecarred
kubectl label namespace default istio-injection=enabled
kubectl get namespace -L istio-injection
```

Deploy Sample Application (BookInfo)

```
kubectl apply -f samples/bookinfo/kube/bookinfo.yaml  
istioctl create -f samples/bookinfo/routing/bookinfo-gateway.yaml  
open http://localhost/productpage
```

Deploy Sample Application (BookInfo)

```
kubectl apply -f samples/bookinfo/kube/bookinfo.yaml  
istioctl create -f samples/bookinfo/routing/bookinfo-gateway.yaml  
open http://localhost/productpage
```

Hint: Since Istio release 0.8 you can substitute istioctl with kubectl. We're still using istioctl for clarity purposes.

Cluster

Namespaces

Nodes

Persistent Volumes

Roles

Storage Classes

Namespace

default ▾

Overview

Workloads

Cron Jobs

Daemon Sets

Deployments

Jobs

Pods

Replica Sets

Replication Controllers

Stateful Sets

Discovery and Load Balancing

Ingresses

Services

Config and Storage

Config Maps

Persistent Volume Claims

Secrets

Details

Name: productpage-v1-7bbdd59459-5bb28

Namespace: default

Labels: app: productpage pod-template-hash: 3668815015 version: v1

Annotations: sidecar.istio.io/status: {"version":"55c9e544b52e1d4e45d18a58d0b34ba4b72531e45fb6d1572c77191422556ffc","initContainers":["istio-init"],"containers":["istio-proxy"],"volumes":["istio-envoy","istio-c..."]}

Creation Time: 2018-06-11T14:26 UTC

Status: Running

QoS Class: Burstable

Network

Node: docker-for-desktop

IP: 10.1.1.178

Containers

productpage

Image: istio/examples-bookinfo-productpage-v1:1.5.0

Environment variables: -

Commands: -

Args: -

istio-proxy

Image: docker.io/istio/proxyv2:0.8.0

Environment variables: POD_NAME: productpage-v1-7bbdd59459-5bb28

POD_NAMESPACE: default

INSTANCE_IP:

ISTIO_META_POD_NAME: productpage-v1-7bbdd59459-5bb28

ISTIO_META_INTERCEPTION_MODE: REDIRECT

Commands: -

Args: -

Init Containers

istio-init

Image: docker.io/istio/proxy_init:0.8.0

Environment variables: -

Commands: -

Args: -

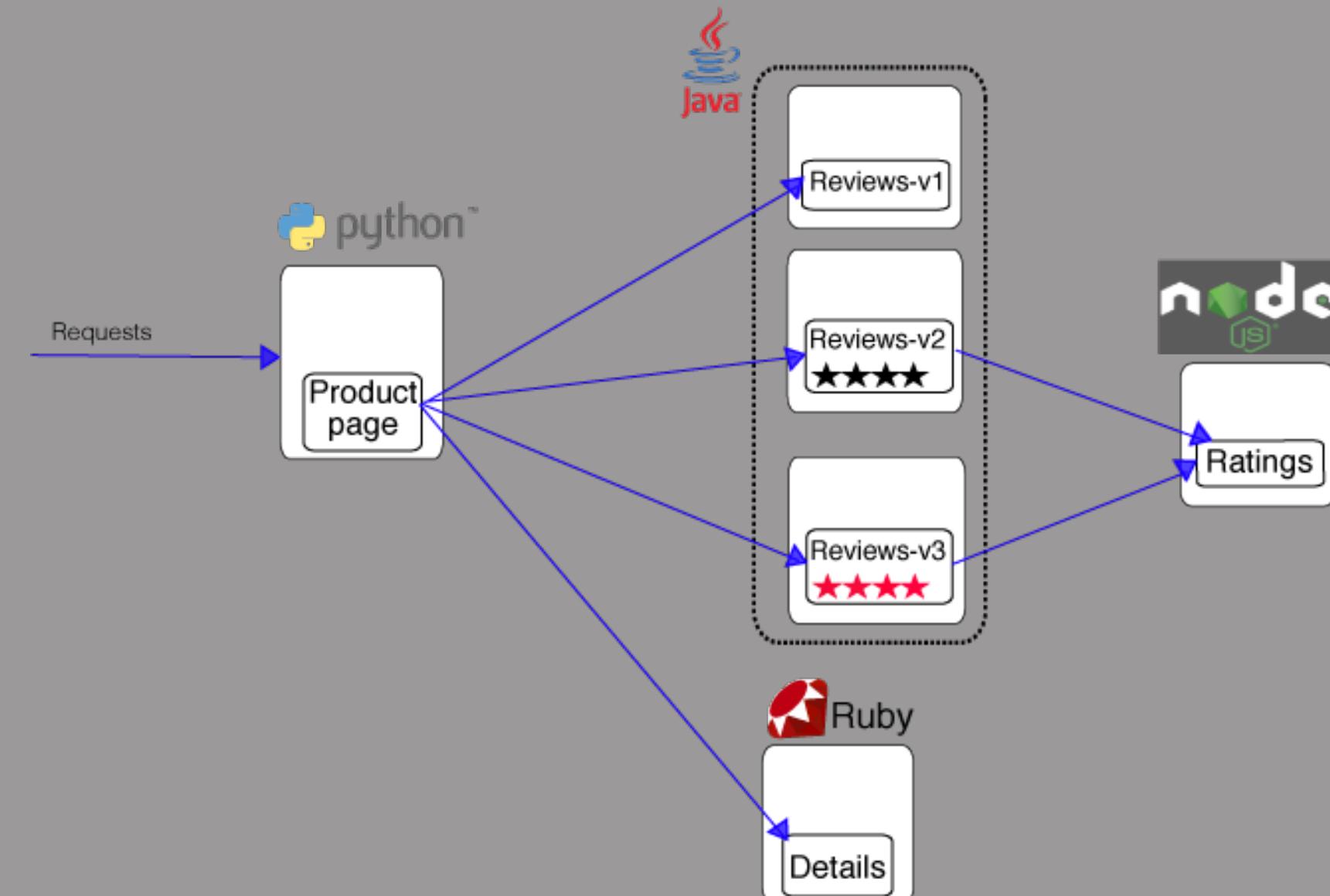
bookinfo-gateway.yaml (1/2)

```
apiVersion: networking.istio.io/v1alpha3
kind: Gateway
metadata:
  name: bookinfo-gateway
spec:
  selector:
    istio: ingressgateway # use istio default controller
  servers:
  - port:
      number: 80
      name: http
      protocol: HTTP
  hosts:
  - "*"
```

bookinfo-gateway.yaml (2/2)

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: bookinfo
spec:
  hosts:
    - "*"
  gateways:
    - bookinfo-gateway
  http:
    - match:
        - uri:
            exact: /productpage
        - uri:
            exact: /login
        - uri:
            exact: /logout
        - uri:
            prefix: /api/v1/products
  route:
    - destination:
        host: productpage
        port:
          number: 9080
```

Sample Application: BookInfo¹



¹ Istio BookInfo Sample (<https://istio.io/docs/guides/bookinfo.html>)

Expose Istio Observability Tools

```
#Metrics: Prometheus
kubectl expose deployment prometheus --name=prometheus-expose
  --port=9090 --target-port=9090 --type=LoadBalancer -n=istio-system
open http://localhost:9090/graph?g0.expr=istio_request_count
```

```
#Metrics: Grafana
kubectl expose deployment grafana --name=grafana-expose
  --port=3000 --target-port=3000 --type=LoadBalancer -n=istio-system
open http://localhost:3000/d/1/istio-dashboard
```

```
#Tracing: Jaeger
kubectl expose deployment istio-tracing --name=tracing-expose
  --port=16686 --target-port=16686 --type=LoadBalancer -n=istio-system
open http://localhost:16686
```

```
#Tracing: ServiceGraph
kubectl expose service servicegraph --name=servicegraph-expose
  --port=8088 --target-port=8088 --type=LoadBalancer -n=istio-system
open http://localhost:8088/force/forcegraph.html
open http://localhost:8088/dotviz
```

Deploy Missing Observability Feature: Log Analysis (EFK)

```
cd ..  
kubectl apply -f logging-stack.yaml  
kubectl expose deployment kibana --name=kibana-expose  
  --port=5601 --target-port=5601 --type=LoadBalancer -n=logging  
istioctl create -f fluentd-istio.yaml  
open http://localhost:5601/app/kibana
```

- Perform some requests to the BookInfo application
- Use * as the index pattern
- Select @timestamp as the time filter field name

fluentd-istio.yaml (1/3)

```
# Configuration for logentry instances
apiVersion: "config.istio.io/v1alpha2"
kind: logentry
metadata:
  name: newlog
  namespace: istio-system
spec:
  severity: '"info"'
  timestamp: request.time
  variables:
    source: source.labels["app"] | source.service | "unknown"
    user: source.user | "unknown"
    destination: destination.labels["app"] | destination.service | "unknown"
    responseCode: response.code | 0
    responseSize: response.size | 0
    latency: response.duration | "0ms"
  monitored_resource_type: '"UNSPECIFIED"'
```

fluentd-istio.yaml (2/3)

```
# Configuration for a fluentd handler
apiVersion: "config.istio.io/v1alpha2"
kind: fluentd
metadata:
  name: handler
  namespace: istio-system
spec:
  address: "fluentd-es.logging:24224"
```

fluentd-istio.yaml (3/3)

```
# Rule to send logentry instances to the fluentd handler
apiVersion: "config.istio.io/v1alpha2"
kind: rule
metadata:
  name: newlogtofluentd
  namespace: istio-system
spec:
  match: "true" # match for all requests
  actions:
    - handler: handler.fluentd
      instances:
        - newlog.logentry
```

Stimulate!

```
slapper -rate 4 -targets ./target -workers 2 -maxY 15s
```

Download from: <https://github.com/adersberger/slapper/releases/tag/0.1>

Slapper² in action

```
sent: 773    in-flight: 0   rate:    4/4 RPS responses: [200]: 7
72  [503]: 1  0/  0]
<1.0 ms: [  0/  0]
<1.0 ms: [  0/  0]
1.0-1.3 ms: [  0/  0]
1.3-1.7 ms: [  0/  0]
1.7-2.1 ms: [  0/  0]
2.1-2.8 ms: [  0/  0]
2.8-3.5 ms: [  0/  0]
3.5-4.6 ms: [  0/  0]
4.6-5.9 ms: [  0/  0]
5.9-7.6 ms: [  0/  0]
7.6-9.8 ms: [  0/  0]
10- 13 ms: [  0/  0]
13- 16 ms: [  0/  0]
16- 21 ms: [  0/  0]
21- 27 ms: [  2/  0] ****
27- 35 ms: [ 11/  0] ****
35- 45 ms: [ 10/  0] ****
45- 57 ms: [  9/  0] ****
57- 74 ms: [  7/  0] ****
74- 95 ms: [  0/  0]
95-122 ms: [  0/  0]
```

² Key bindings:

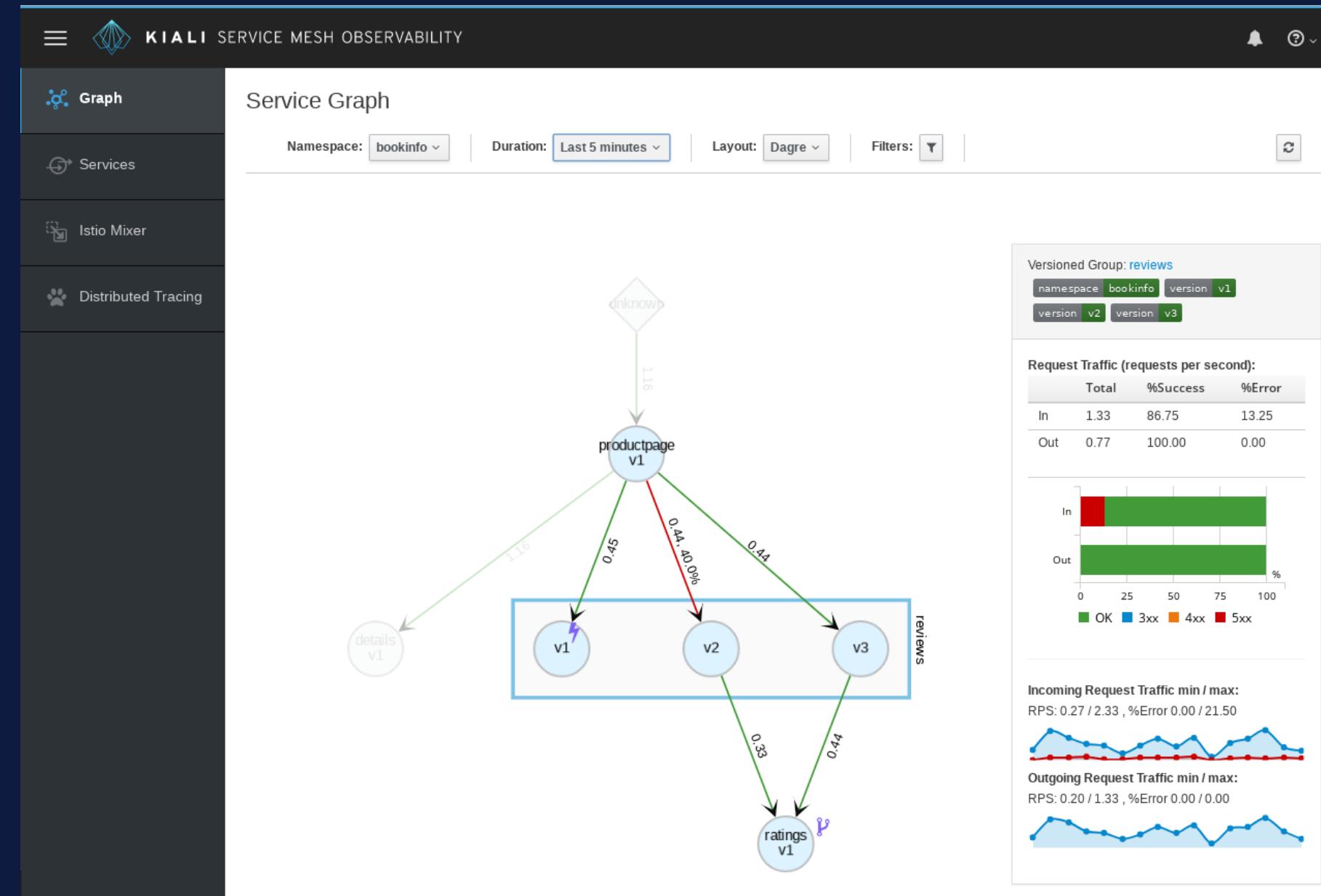
q, ctrl-c - quit

r - reset stats

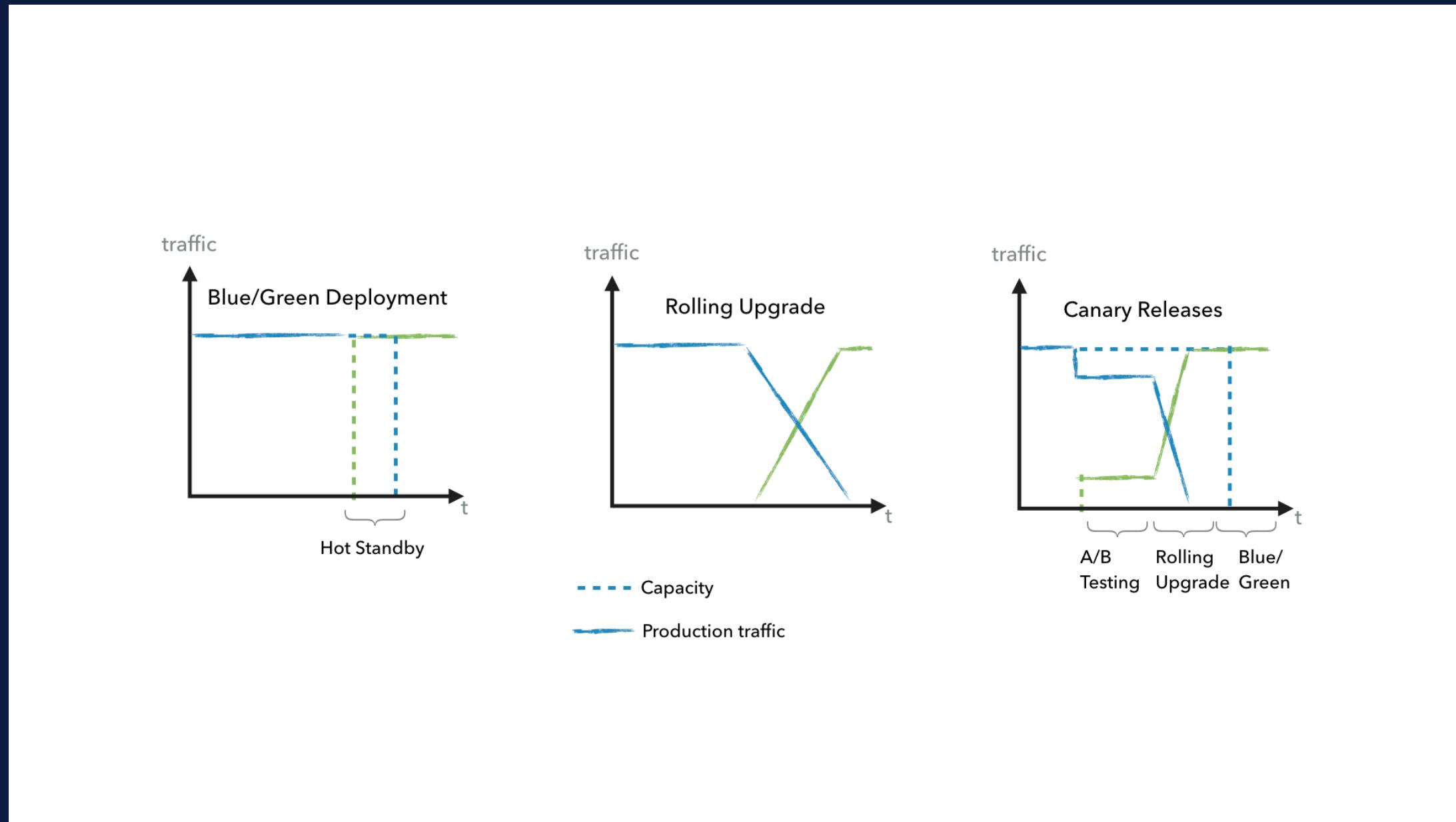
k - increase rate by 100 RPS

j - decrease rate by 100 RPS

Observability Outlook: Kiali



Release Patterns



Canary Releases: A/B Testing

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
    - match:
        - headers:
            cookie:
              regex: "^(.*?;)?(user=jason)(;.*)?$$"
    route:
      - destination:
          host: reviews
          subset: v2
      - route:
          - destination:
              host: reviews
              subset: v1
```

Canary Releases: A/B Testing

```
istioctl create -f samples/bookinfo/routing/route-rule-reviews-test-v2.yaml
```

```
open http://localhost/productpage
```

- login as "jason" / "jason" leads to v2 (black stars)
- anonymous user leads to v1 (no stars)

Canary Releases: Rolling Upgrade

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
    - route:
        - destination:
            host: reviews
            subset: v1
            weight: 50
        - destination:
            host: reviews
            subset: v3
            weight: 50
```

```
istioctl replace -f samples/bookinfo/routing/route-rule-rev
```

Canary Releases: Blue/Green

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
    - route:
        - destination:
            host: reviews
            subset: v3
```

```
istioctl replace -f samples/bookinfo/routing/route-rule-reviews-v3.yaml
```

Time to Play!

Traffic Management	Resiliency	Security	Observability
Request Routing	Timeouts	mTLS	Metrics
Load Balancing	Circuit Breaker	Role-Based Access Control	Logs
Traffic Shifting	Health Checks (active, passive)	Workload Identity	Traces
Traffic Mirroring	Retries	Authentication Policies	
Service Discovery	Rate Limiting		
Ingress, Egress	Delay & Fault Injection		
API Specification			

<https://istio.io/docs/tasks>

Thank you!



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@adersberger

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