Red Hat OpenShift 4

Hands on with Service Mesh

NYRHUG December 2019

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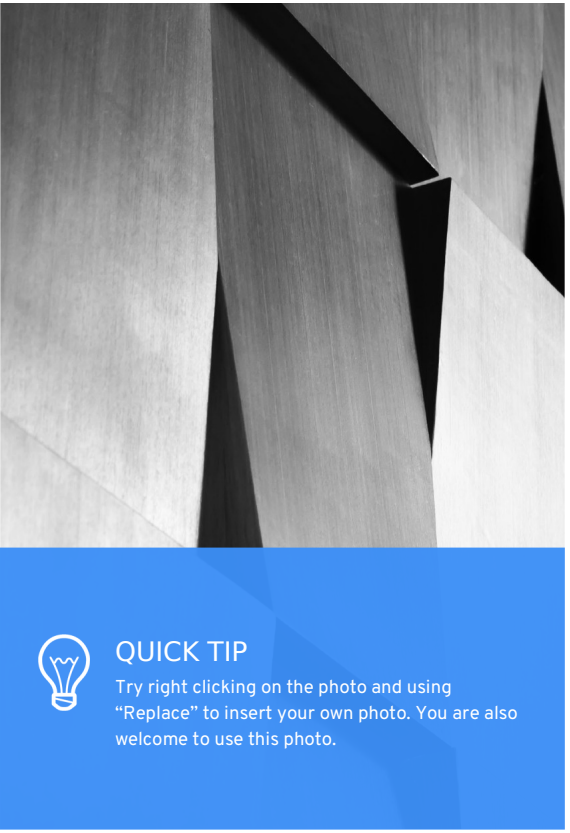
Red Hat



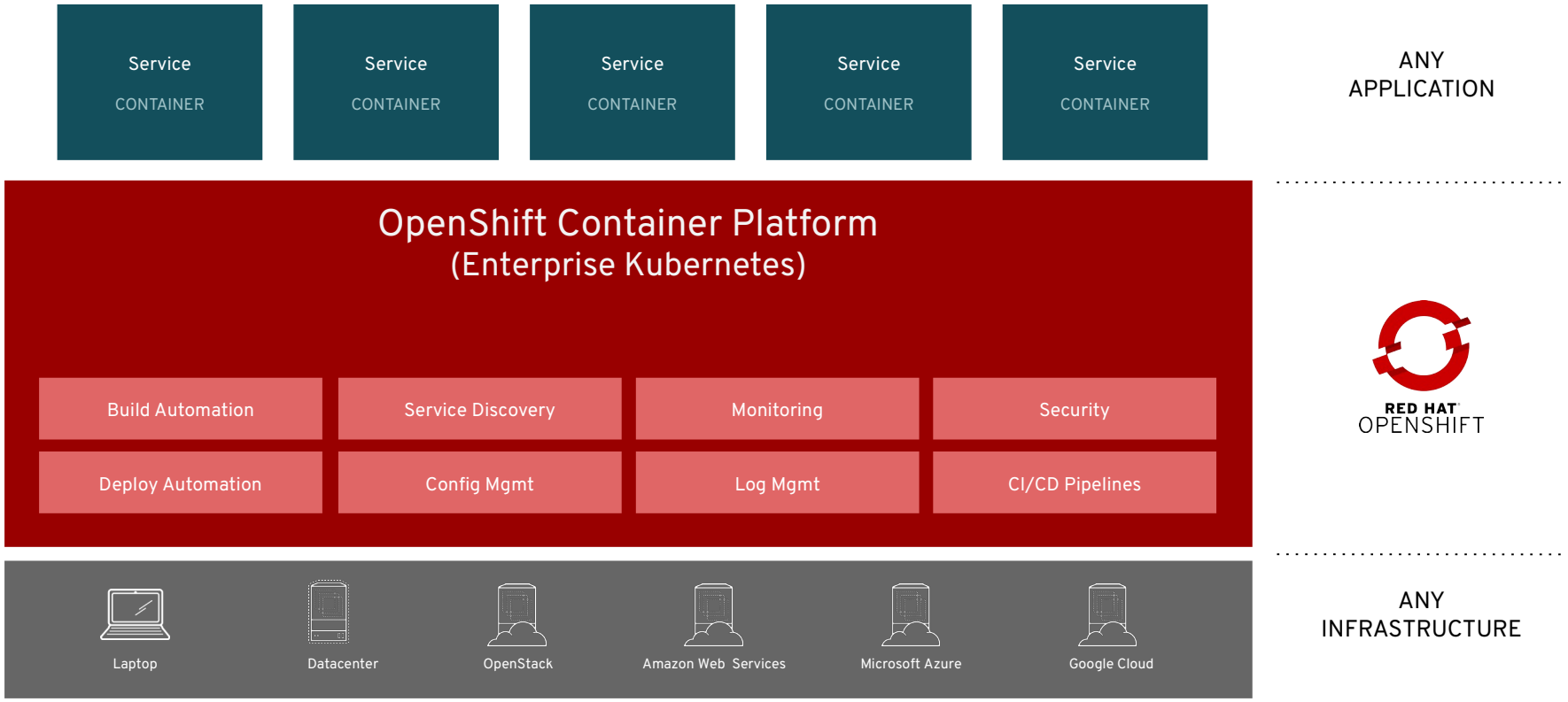
QUICK TIP

Try right clicking on the photo and using “Replace” to insert your own photo. You are also welcome to use this photo.

A mash-up of several better-known technologies: “A service mesh is a set of software components which act as the “glue” for a set of independent applications. The goal of the mesh is to guarantee secure communications between each application and be able to redirect traffic in the event of failures. Often the features of a service mesh look like a mash-up between a load balancer, a web application firewall, and an API gateway.”

- Brian “Redbeard” Harrington, Product Manager at Red Hat

BUILD AND DEPLOY CLOUD-NATIVE APPS WITH RED HAT OPENSHIFT



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DEVELOPMENT PAIN POINTS

Click to add subtitle

OUR SECURITY TEAM SAYS WE HAVE TO INTRODUCE _____

Security needs can change quickly. Many times this can require near-constant research to stay on top of the latest trends.

I'VE NEVER RUN A PRODUCTION FACING SERVICE DIRECTLY

If one has never "carried the pager" for a production service, it can be challenging to foresee the needs to of those who do.

DID THIS CODE CHANGE FIX MY PERFORMANCE ISSUE?

It can be challenging to ensure that bugs are actually squashed. We need better ways of measuring changes to applications, ideally in a deterministic manner.

MANAGEMENT PAIN POINTS

Click to add subtitle

IF I CAN'T SSH INTO THE HOST, I CAN'T DEBUG IT

Users have conflated *how* they achieve certain goals with the goal itself. There are bad behaviors which we must solve in other ways.

AUDITING OF EXISTING RESOURCES CAN BE CHALLENGING

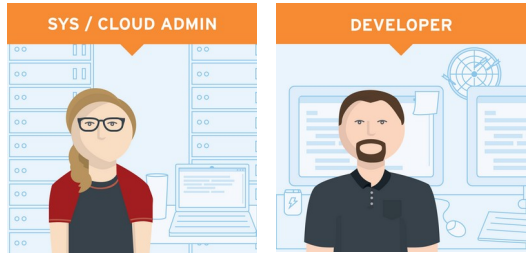
Do you know which services are safe to shut off, or how they are connected?

WHERE ARE THE LOGS FOR THE APPLICATION?

As monoliths are broken into microservices there are many more places to search for logs. As these are scheduled across hosts as containers, this challenge grows exponentially.

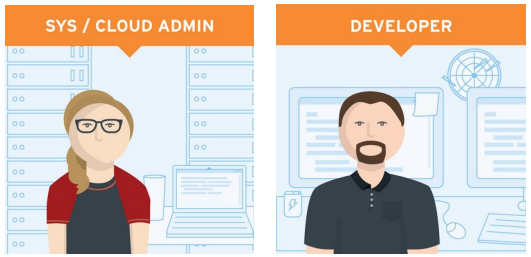
MANAGEMENT PAIN POINTS

Click to add subtitle



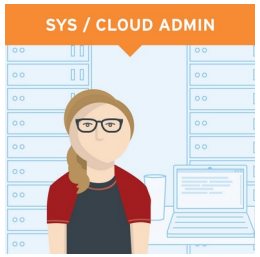
I DON'T UNDERSTAND ALL OF THESE APPLICATION COMPONENTS

Gabriel Monroy (Founder of Deis, former CTO of Engine Yard) summarized it well "DevOps means developers writing Puppet manifests and SysAdmins sitting through architecture meetings for software they will never understand."



"WHY DON'T YOU JUST _____?"

Often, the needs of each side are hard to understand. Developers may not see the importance of on-the-fly reconfiguration while SREs may not fully appreciate the need for application level tracing in a constellation of microservices.



I NEED TO CHANGE HOW TRAFFIC IS FLOWING

There are times when the easiest solution to a temporary problem is to redirect users and their traffic. If these features have not been built into an application it can be challenging (if not impossible) for operations to achieve this.

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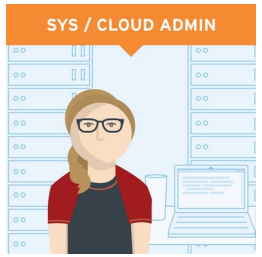
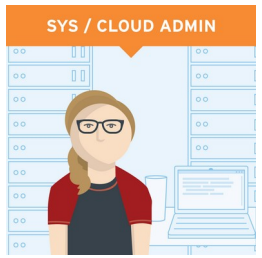
DEPLOYMENT PAIN POINTS

Click to add subtitle



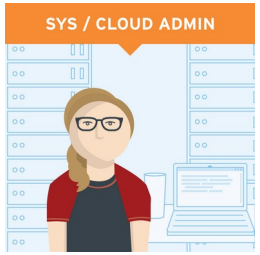
THERE IS NO REASON XXX SHOULD BE ABLE TO HIT YYY

Without the sufficient runbooks, understanding the flow of an application can be obtuse. Without understanding the flow, mitigating emerging security threats can be impossible.



IF I ROTATE THE CERTIFICATES* WILL THE APPLICATION BREAK?

Fear often drives the decisions of SysAdmins. Without the ability to test the outcome of changes, they will default to the most safe process.



I NEED TO TEST THIS NEW VERSION BEFORE DEPLOYING IT

A lack of real-time testing of software will lead to limited windows during which software can be deployed. Failures in this process lead to more draconian measures like ITIL.

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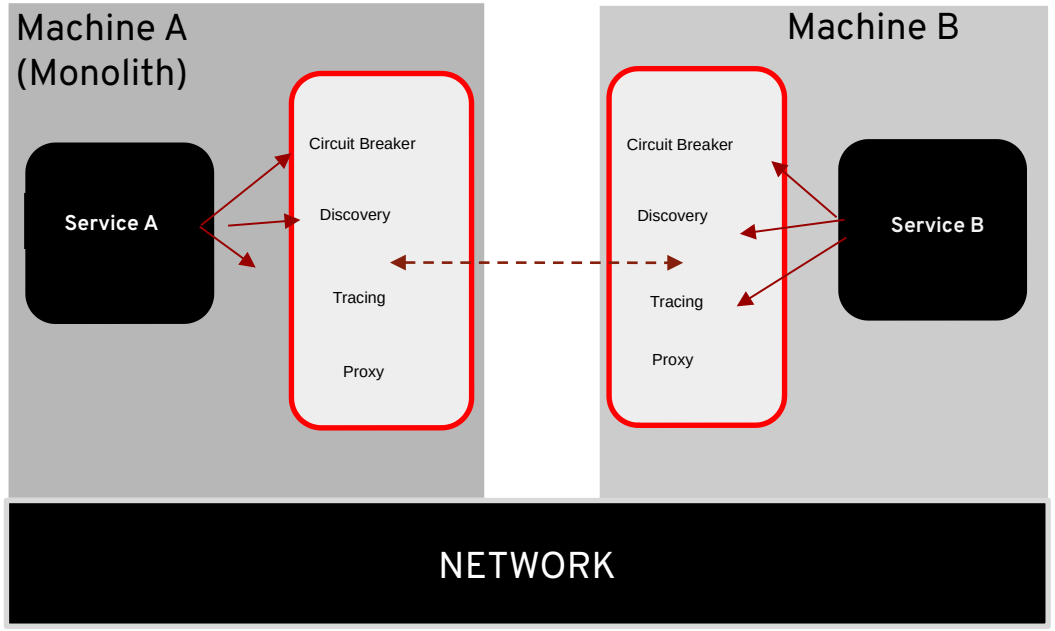
OVERVIEW

WHAT IS A SERVICE MESH ?



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SERVICE MESH ECOSYSTEM

Jaeger

Secure

Istio

Observe

Connect

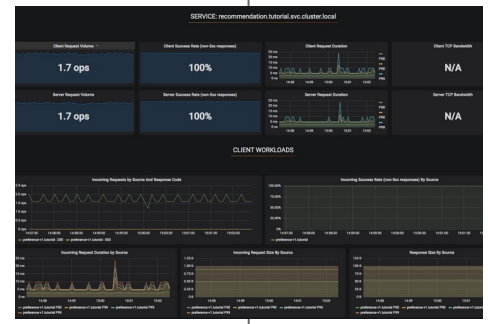
Control

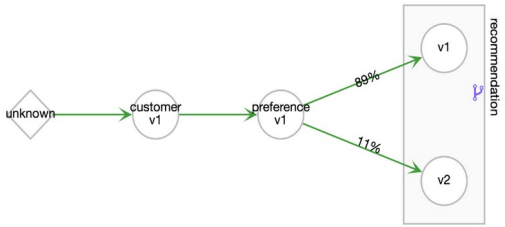
kiali

Kiali

Prometheus

Observe





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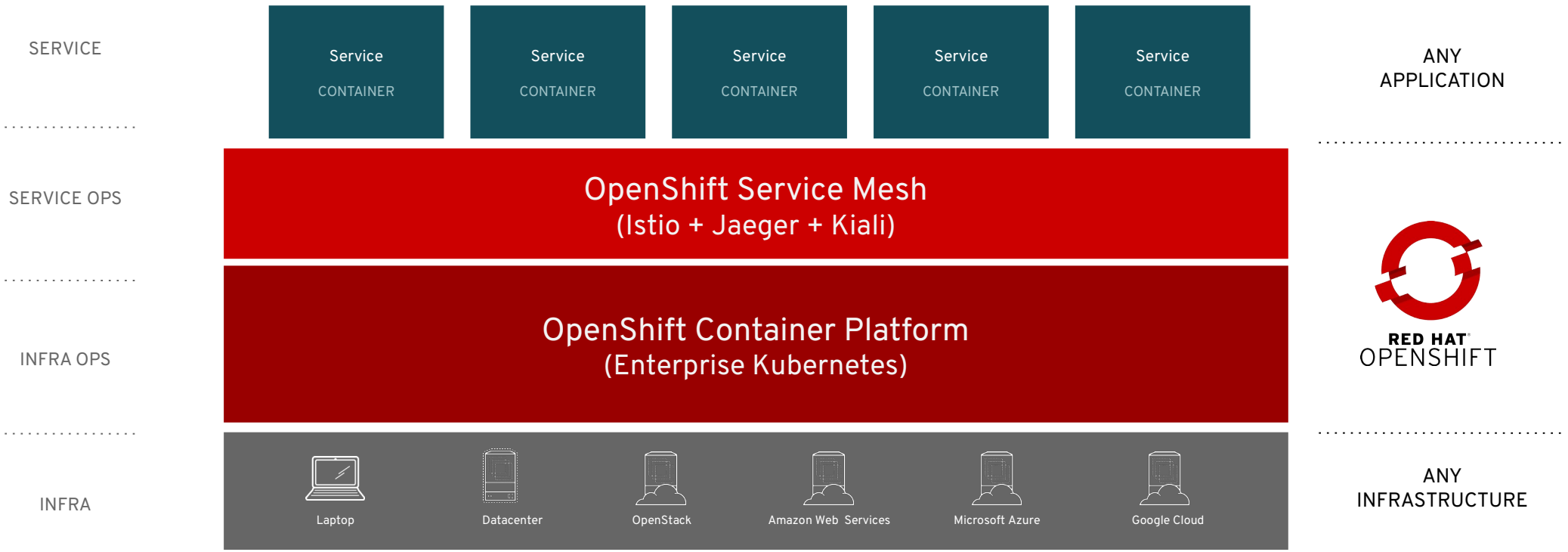
DISTRIBUTED SERVICES WITH RED HAT OPENSHIFT SERVICE MESH



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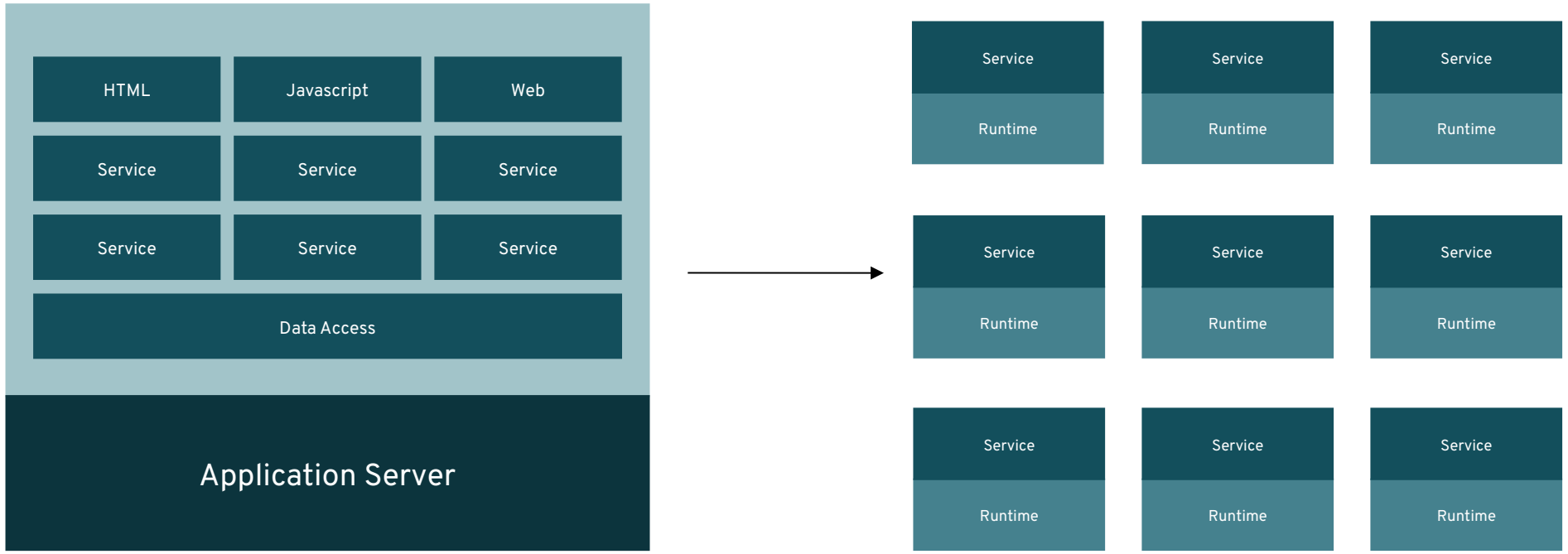
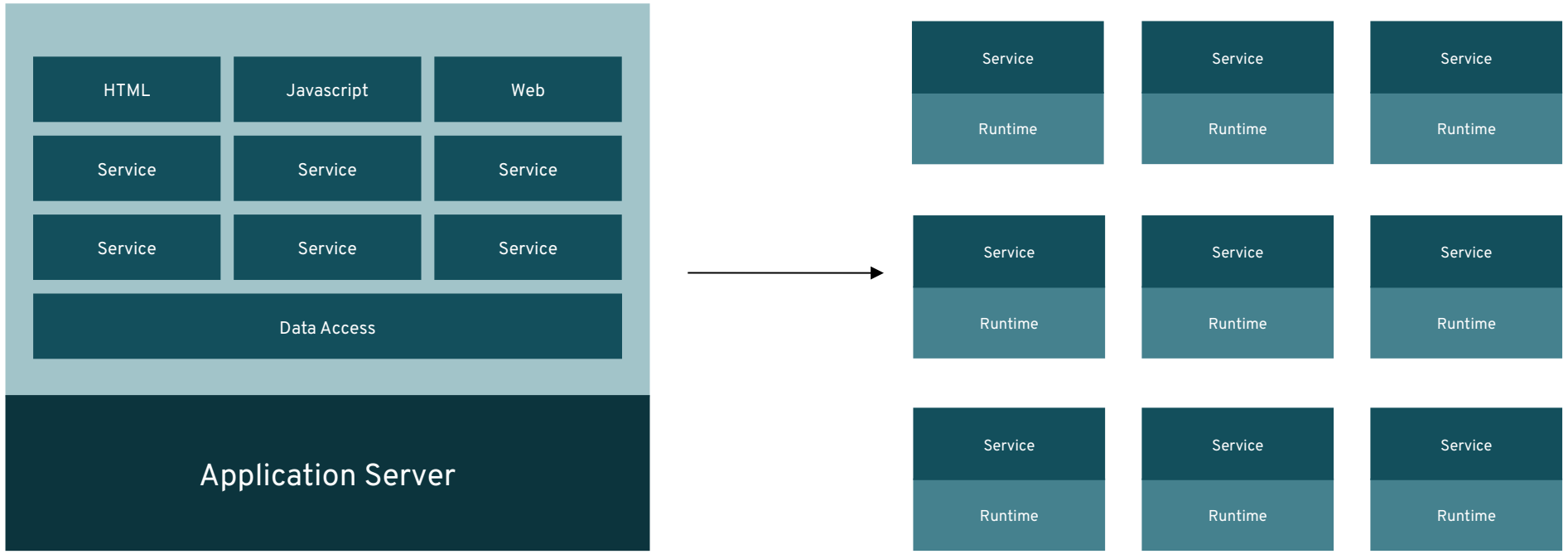
UNDER THE HOOD

MICROSERVICES ARCHITECTURE



~~MICROSERVICES~~ ARCHITECTURE

DISTRIBUTED



DISTRIBUTED ARCHITECTURE

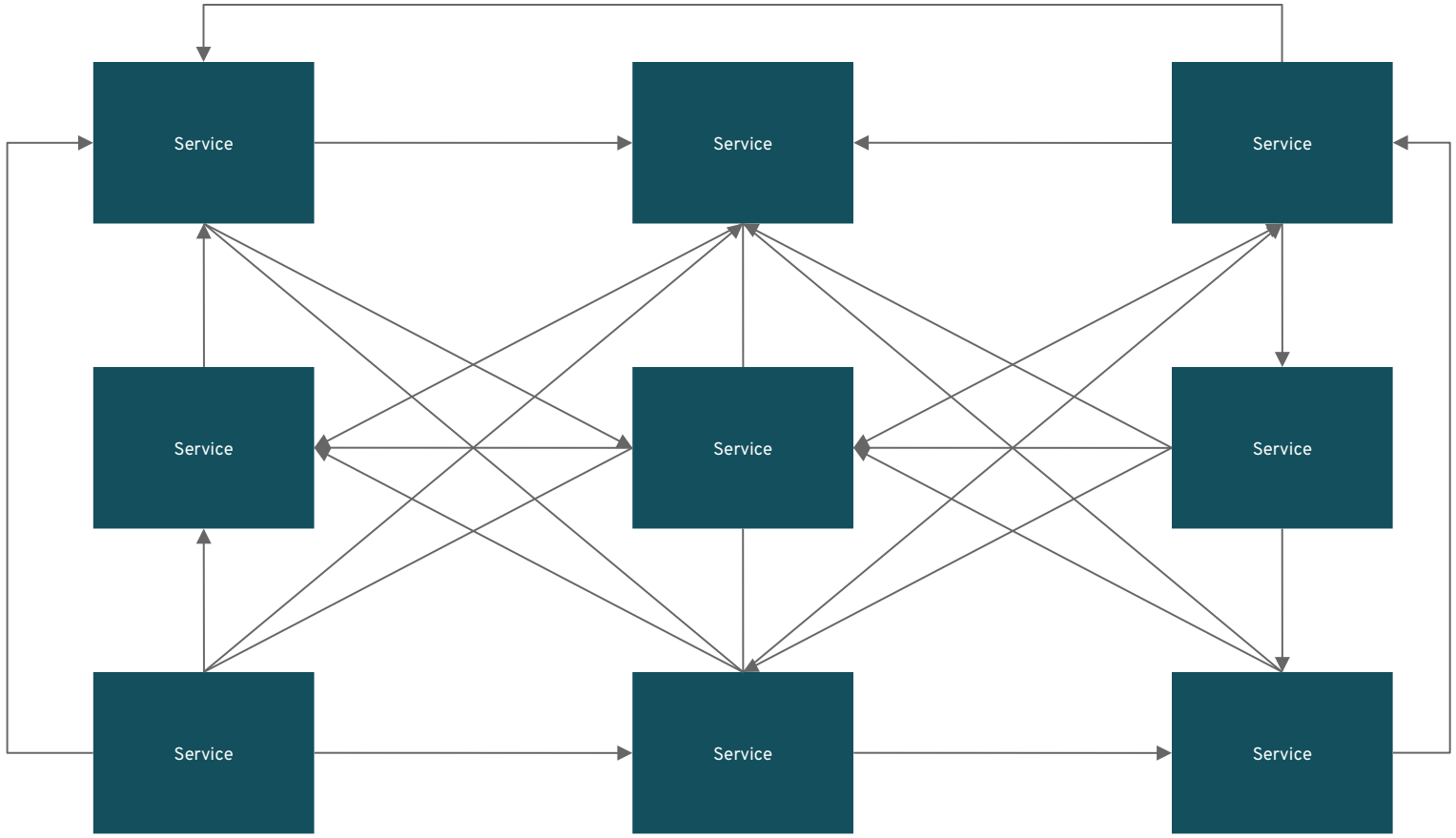
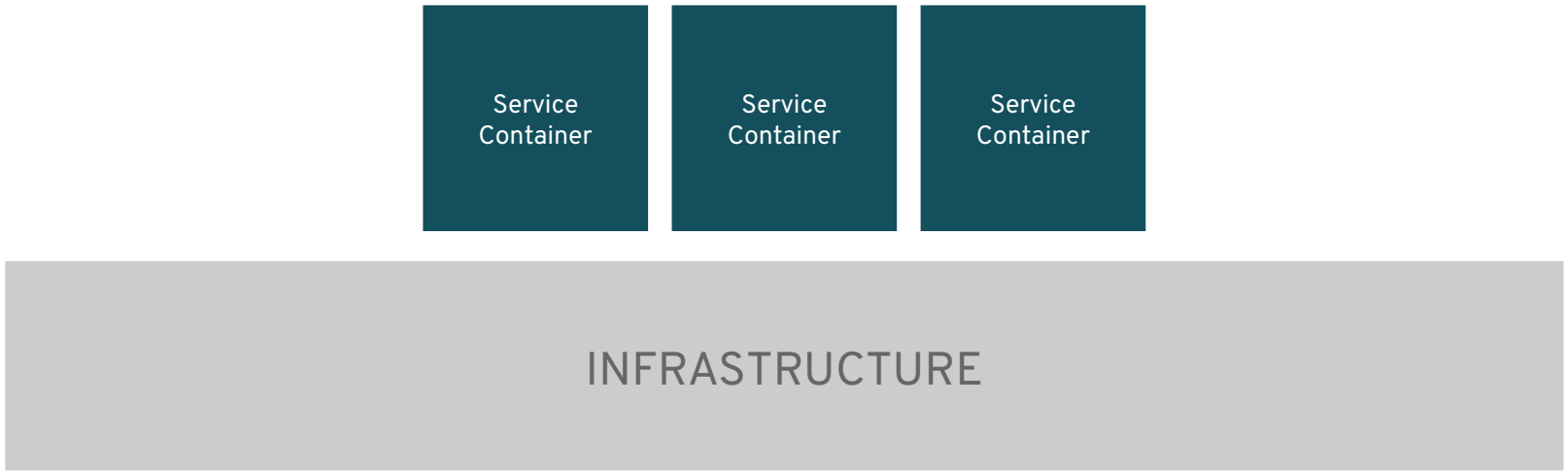
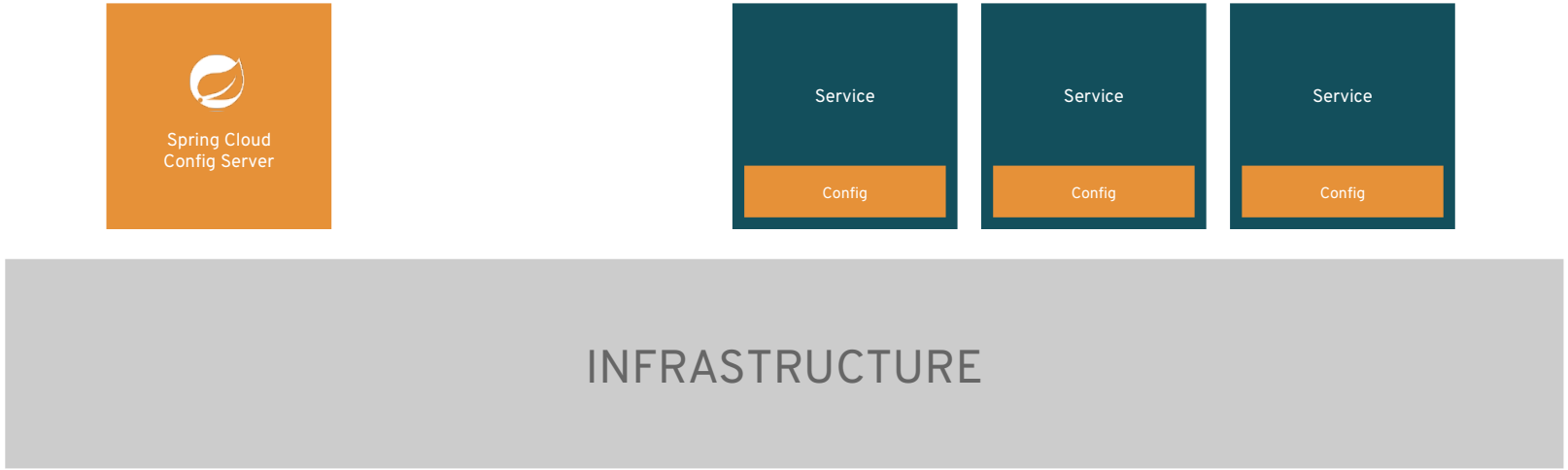


Photo by Clint Adair on Unsplash

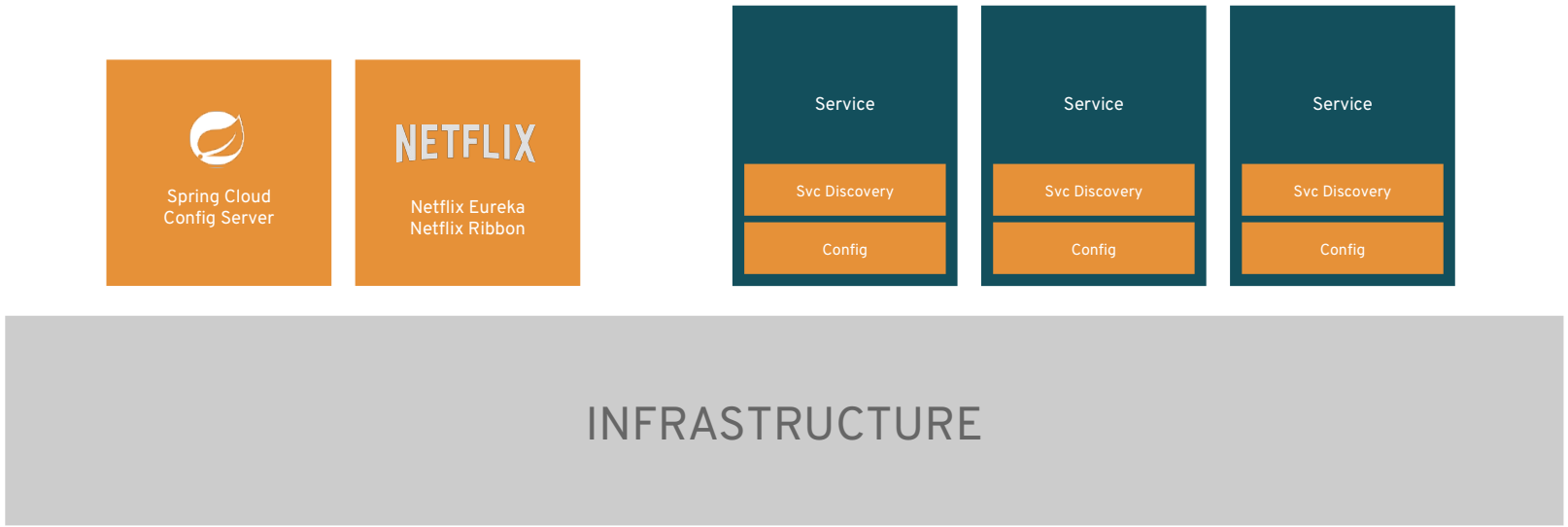
DEPLOYMENT


Service Container
Service Container
Service Container
INFRASTRUCTURE

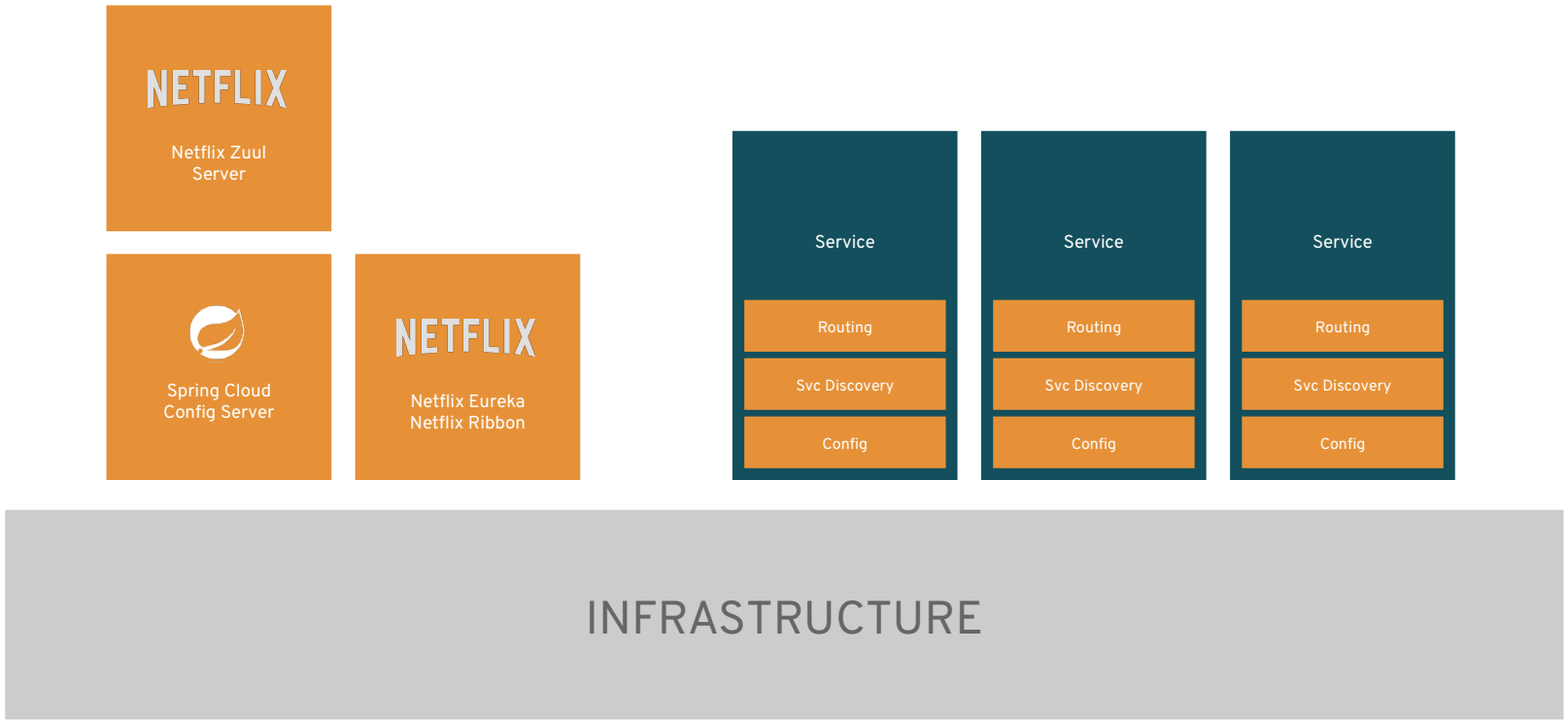
CONFIGURATION



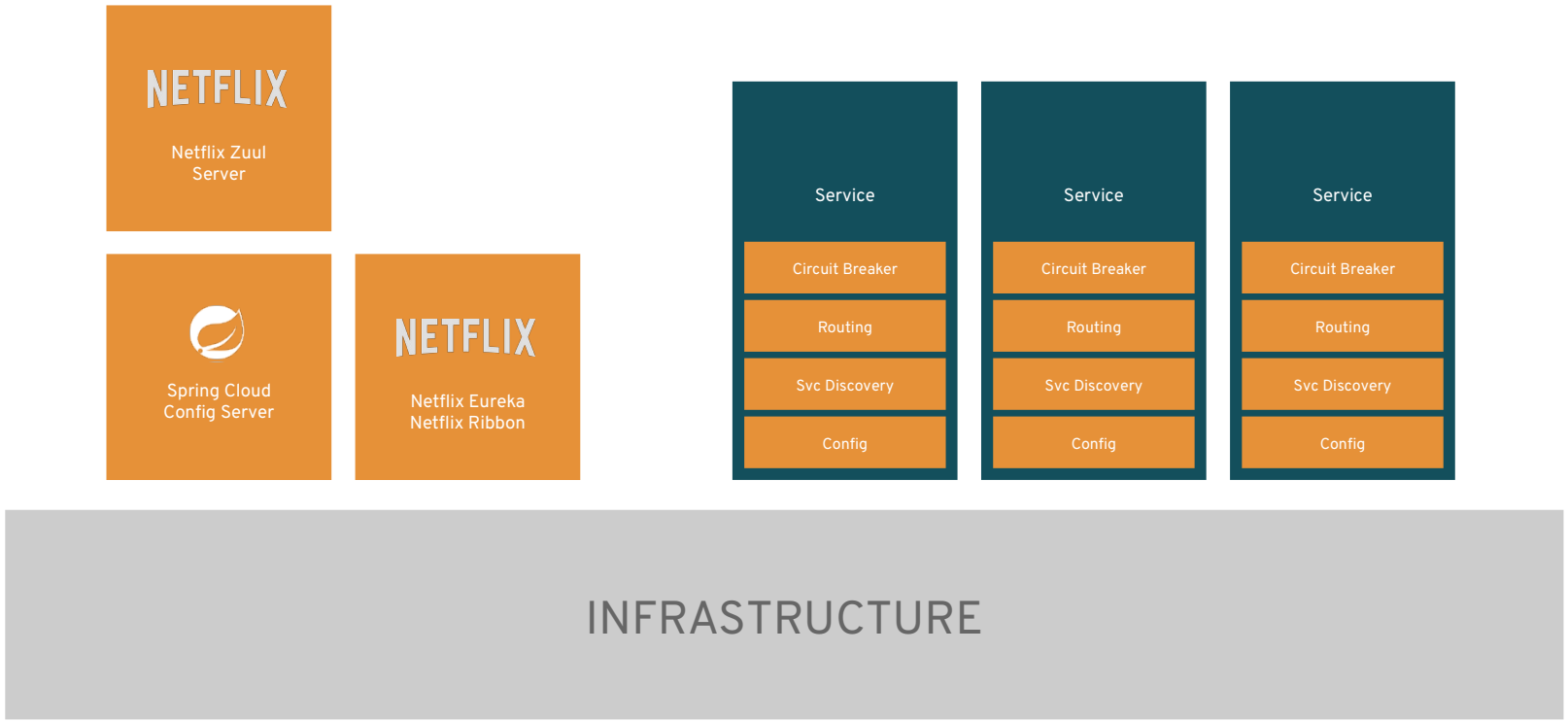
SERVICE DISCOVERY



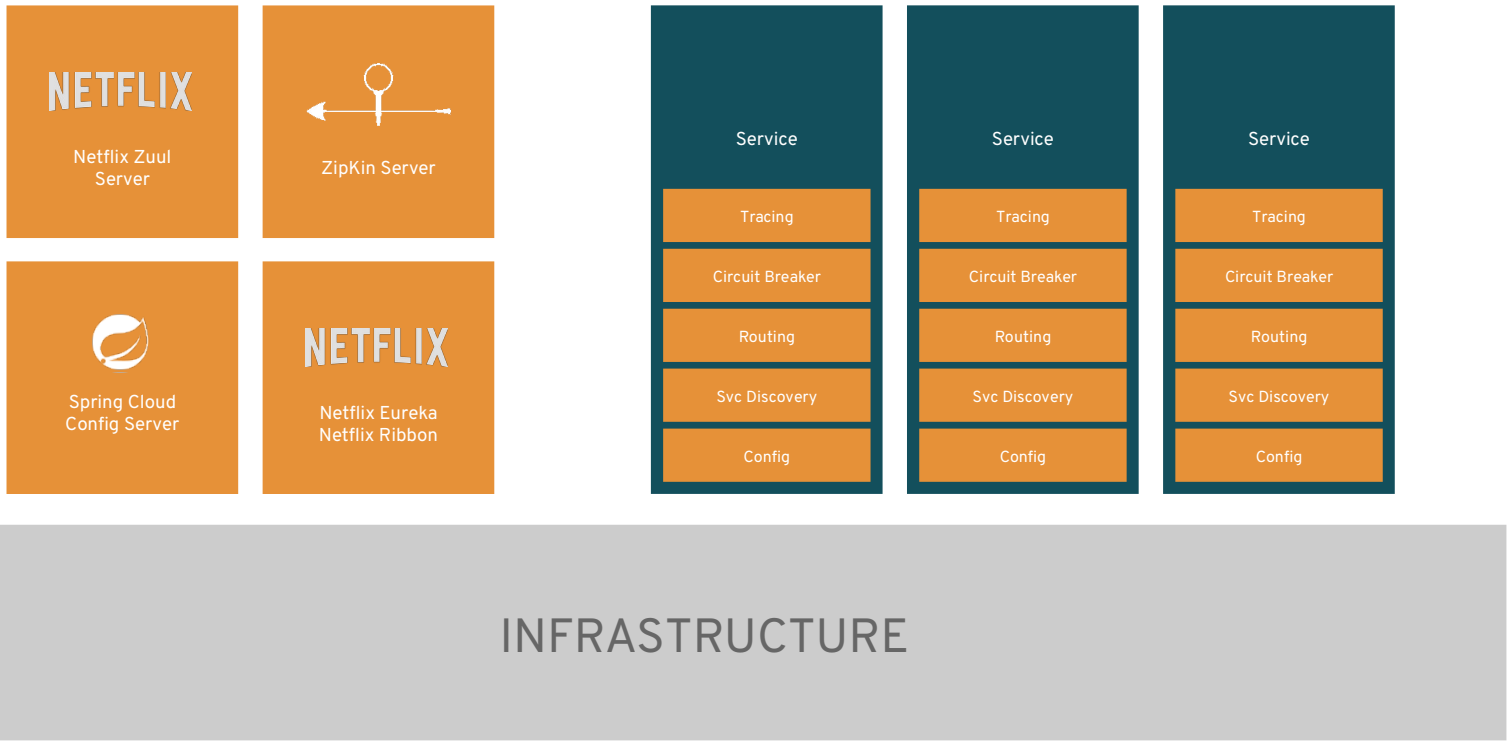
DYNAMIC ROUTING



FAULT TOLERANCE



TRACING AND VISIBILITY



WHAT ABOUT…?

POLYGLOT APPS

EXISTING APPS

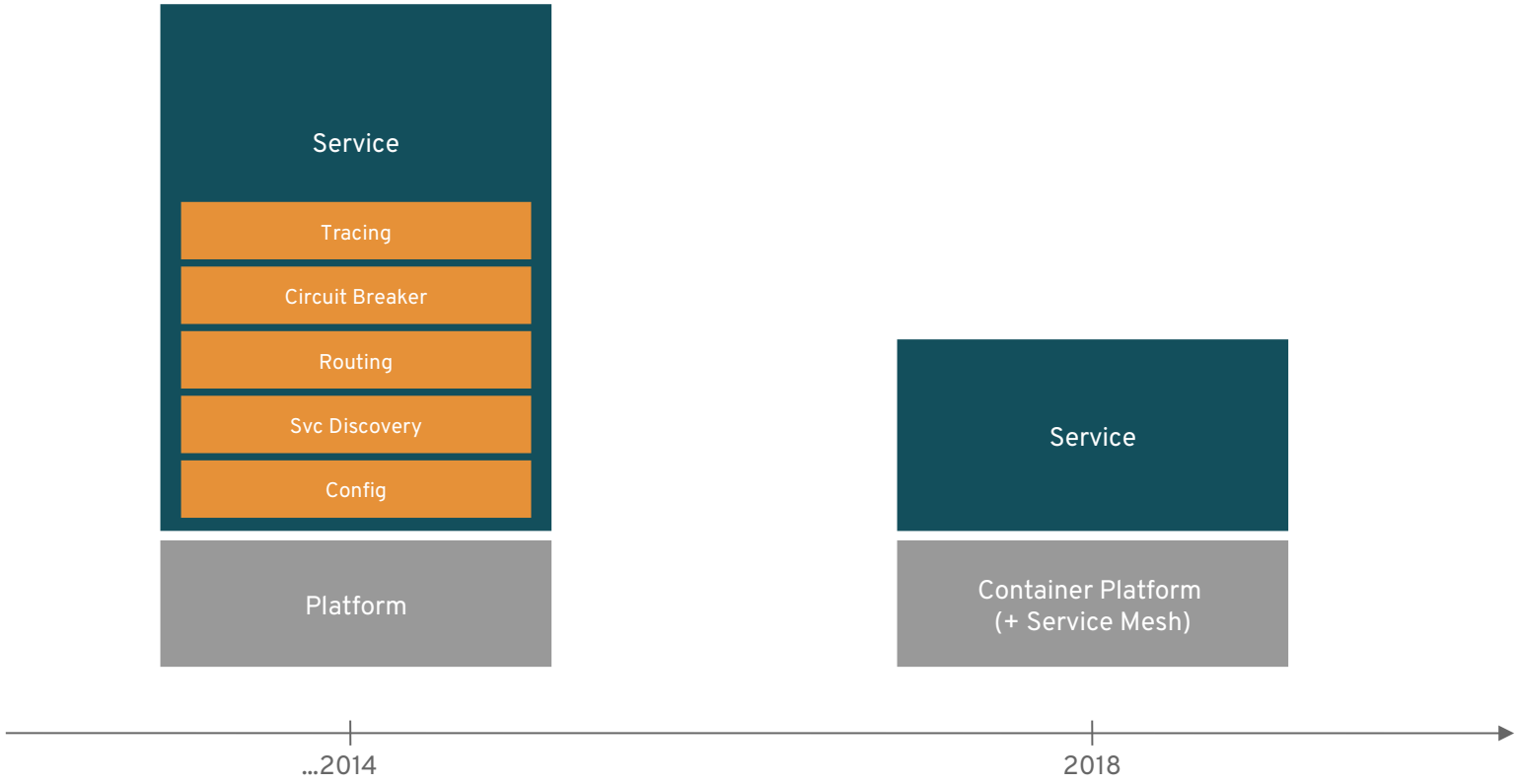
THERE SHOULD BE A BETTER WAY

ADDRESS THE COMPLEXITY IN THE INFRASTRUCTURE

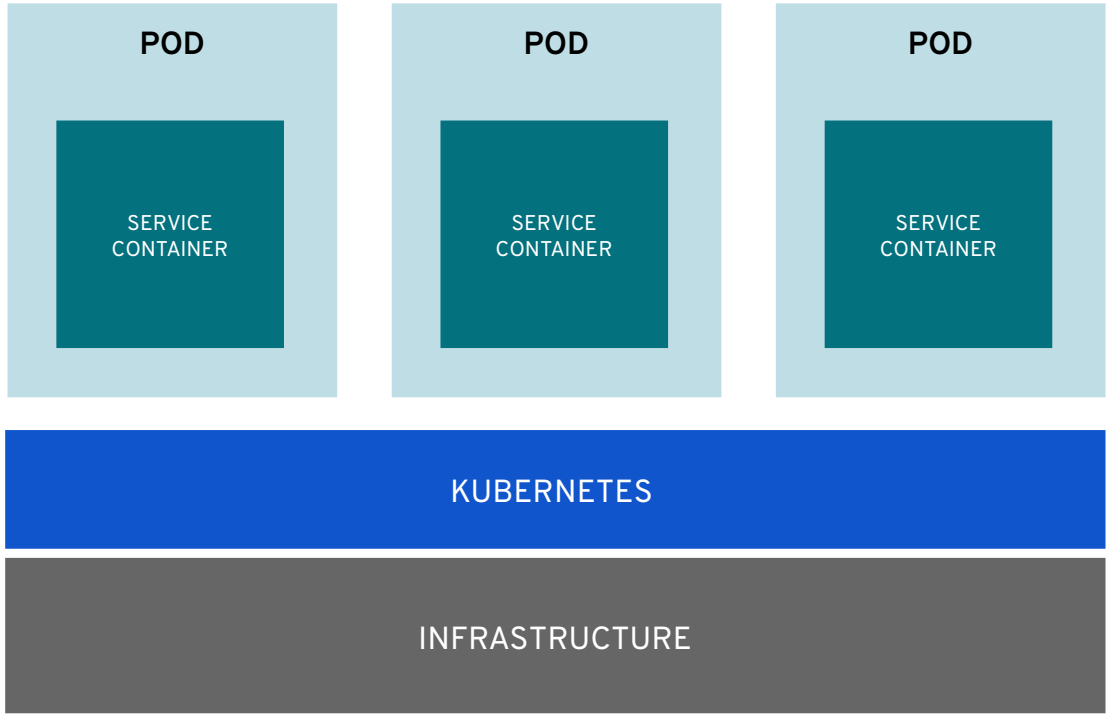
SERVICE MESH

A dedicated infrastructure layer for service-to-service communications

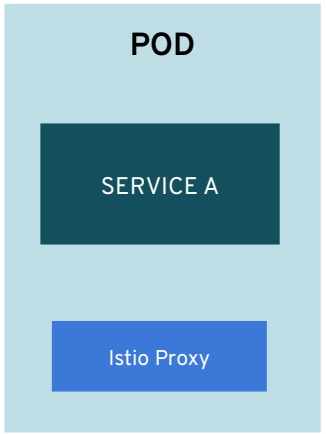
MICROSERVICES EVOLUTION



AUTOMATING CONTAINER DEPLOYMENT



SIDECARS



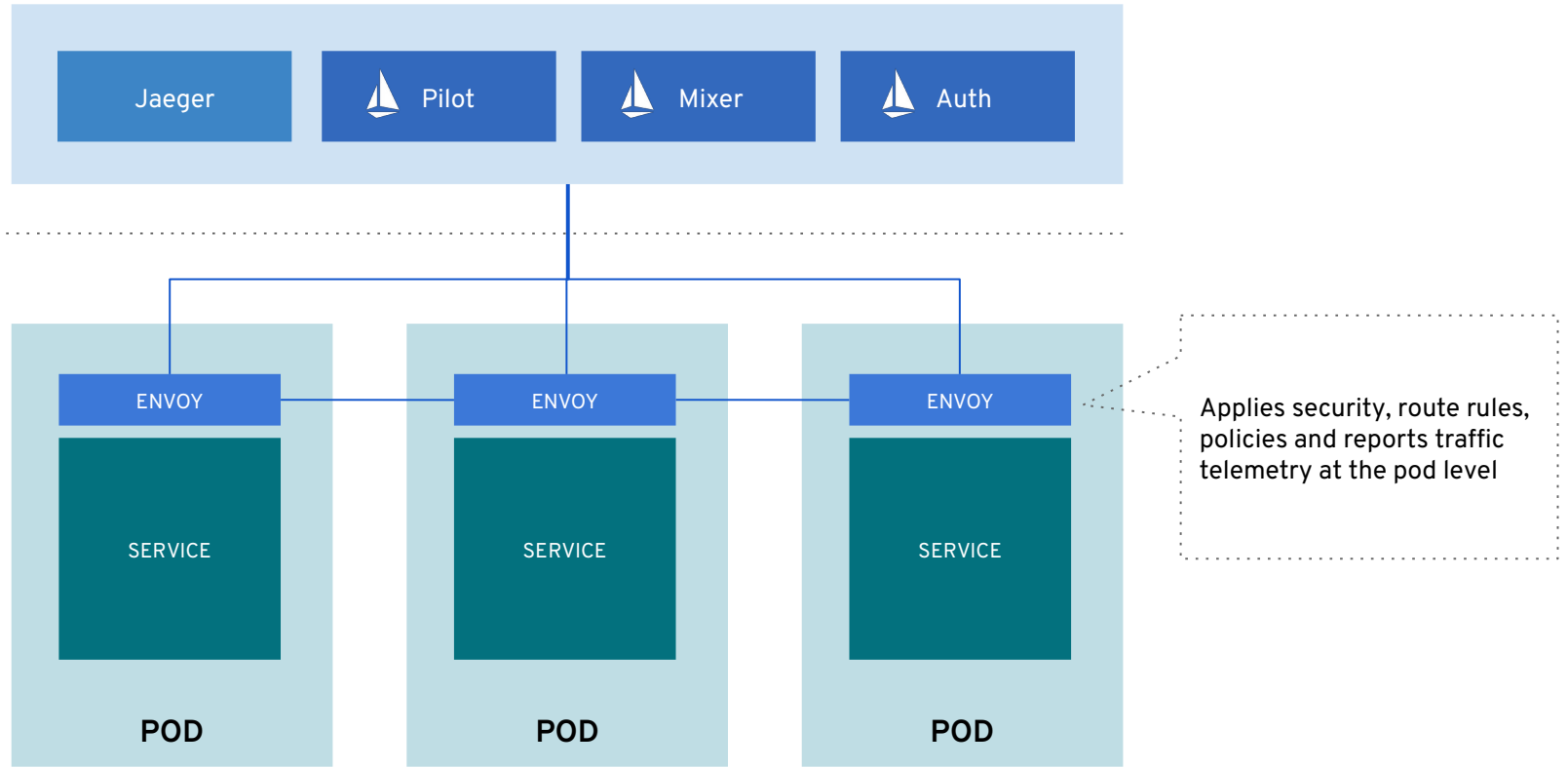
- Two or more containers deployed to same pod
- Share
  - Same
    - Namespace
    - Pod IP
  - Shared lifecycle
- Used to enhance the co-located containers
- Istio Proxy (L7 Proxy)
  - Proxy all network traffic in and out of the app container

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

SERVICE MESH ARCHITECTURE

Control Plane

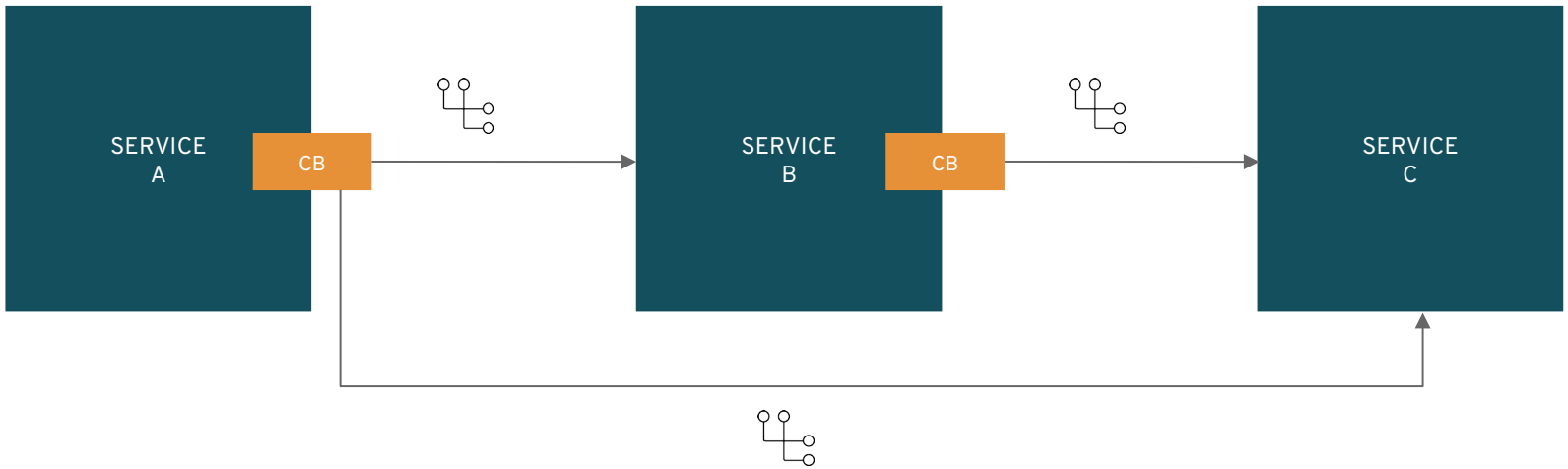
Data Plane



MAJOR FUNCTIONALITY

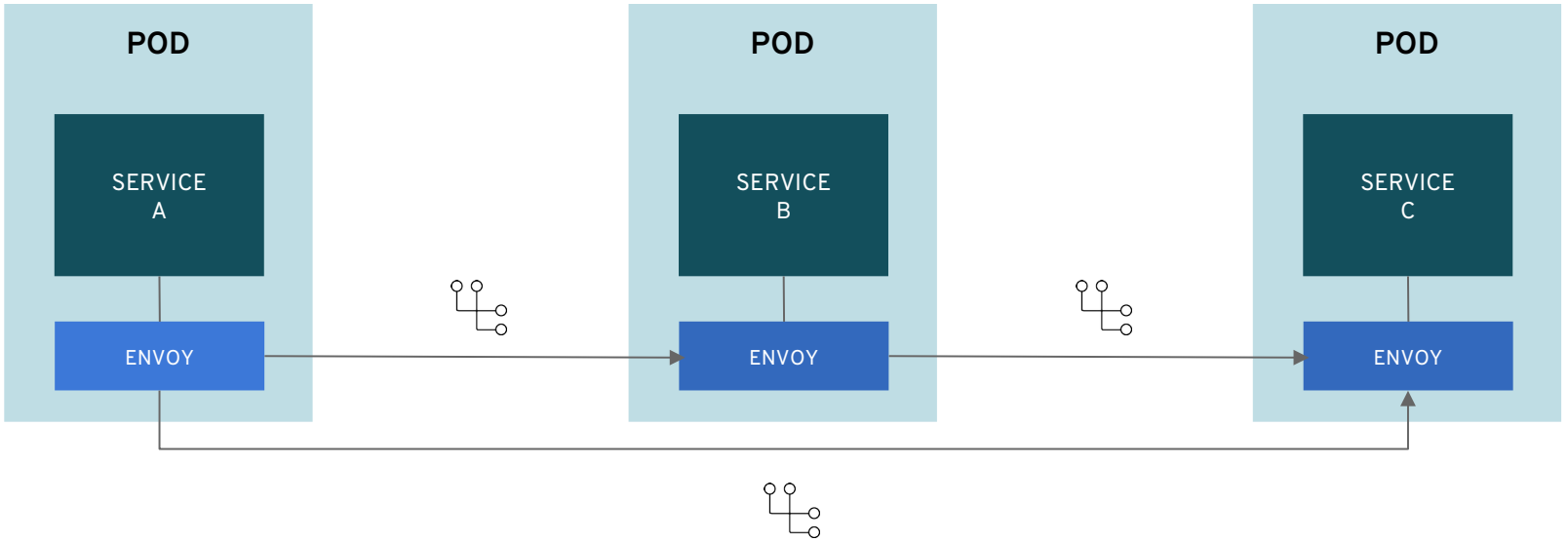
FAULT TOLERANCE

CIRCUIT BREAKERS WITHOUT ISTIO



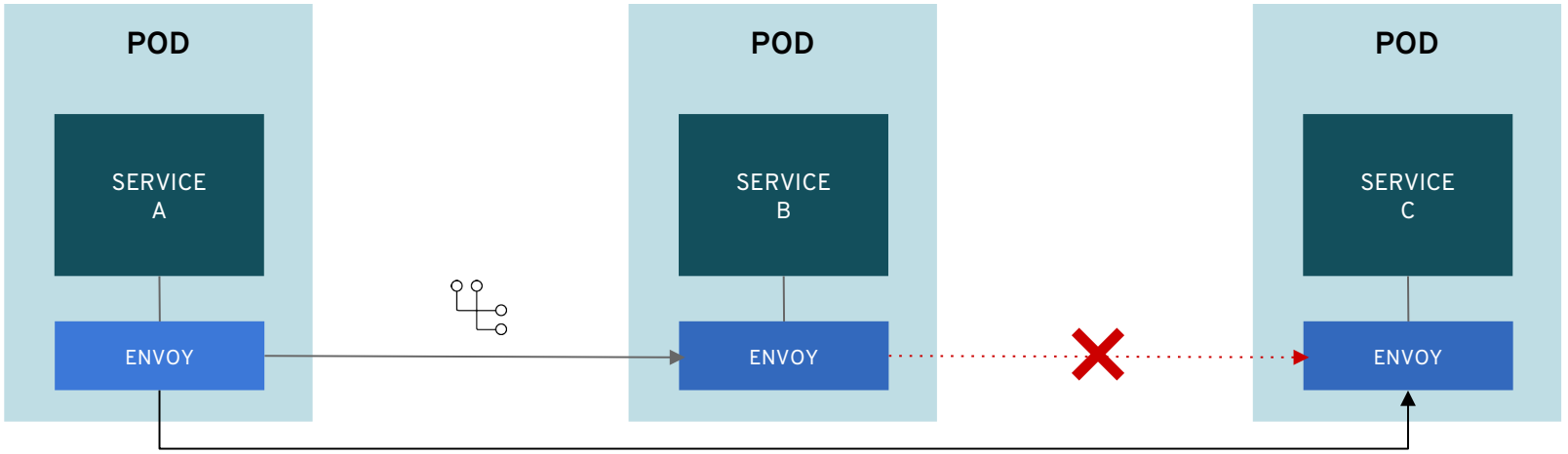
coupled to the service code

CIRCUIT BREAKERS WITH ISTIO



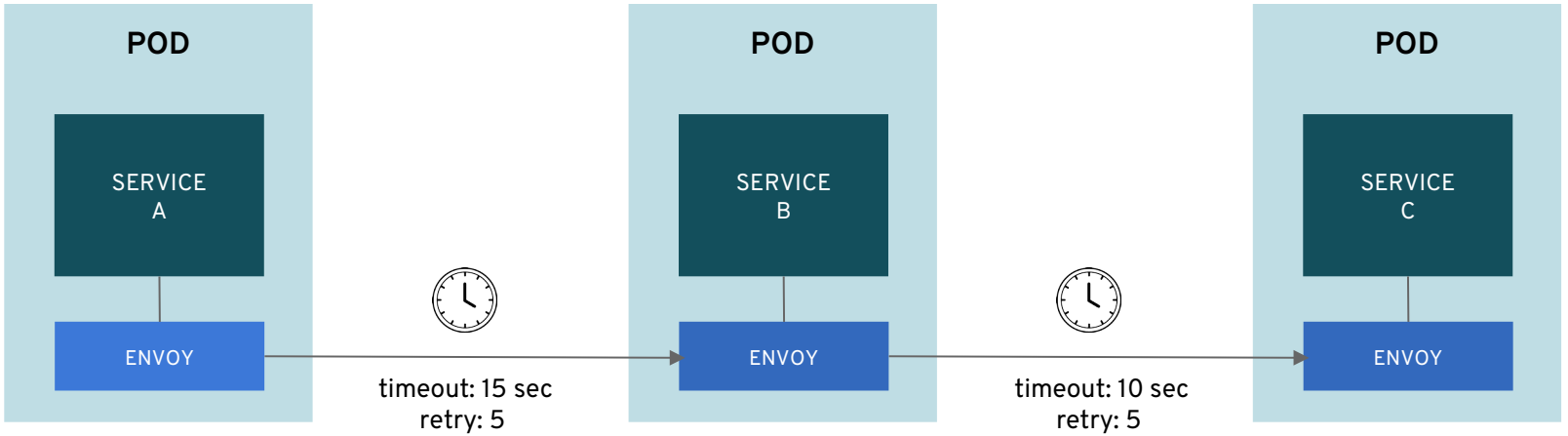
transparent to the services

CIRCUIT BREAKERS WITH ISTIO



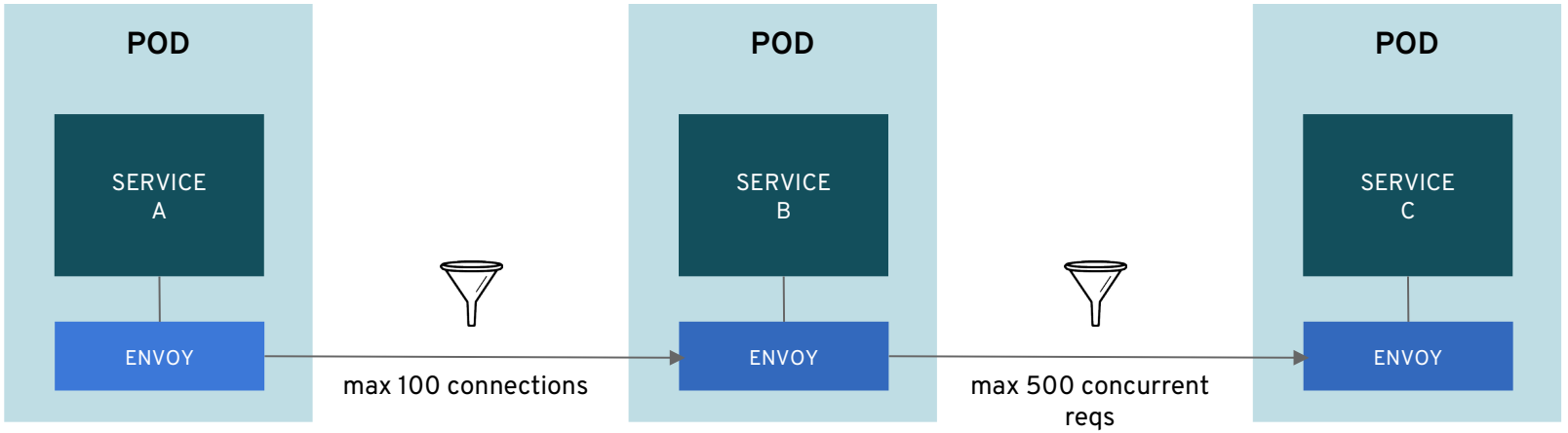
improved response time with global circuit status

TIMEOUTS AND RETRIES WITH ISTIO



configure timeouts and retries, transparent to the services

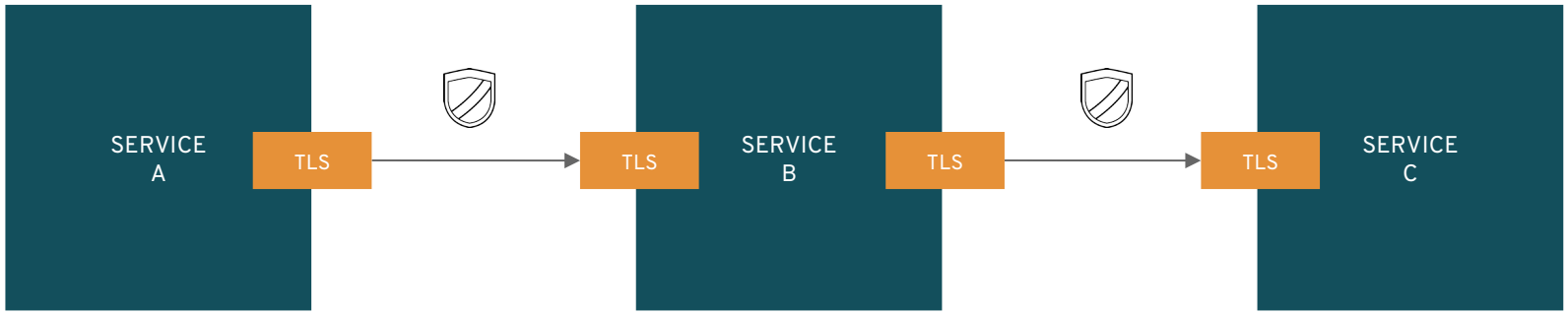
RATE LIMITING WITH ISTIO



limit invocation rates, transparent to the services

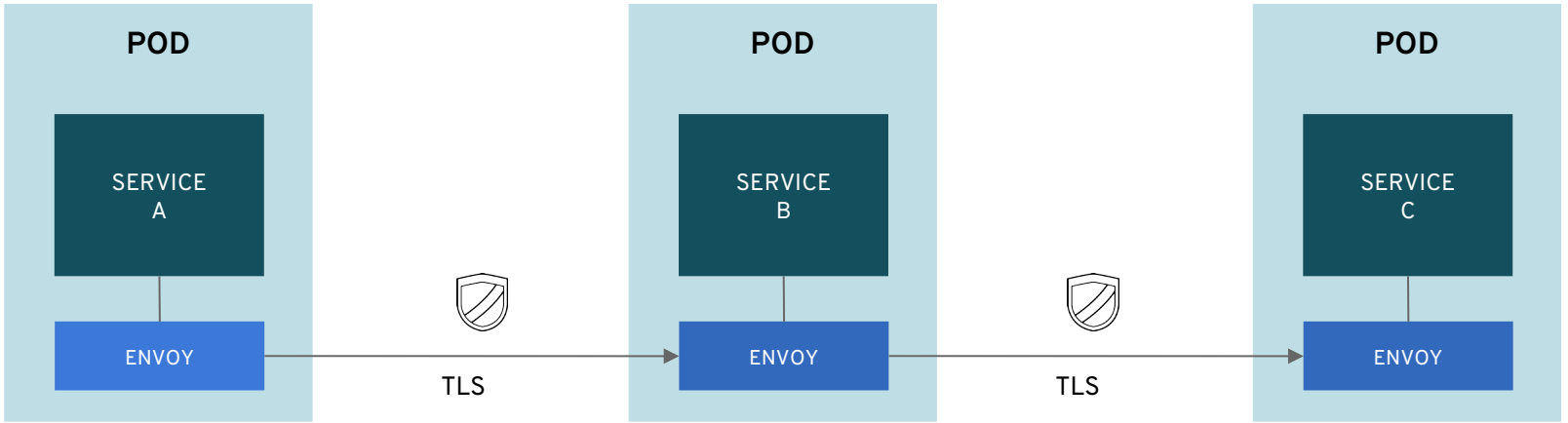
SERVICE SECURITY

SECURE COMMUNICATION WITHOUT ISTIO



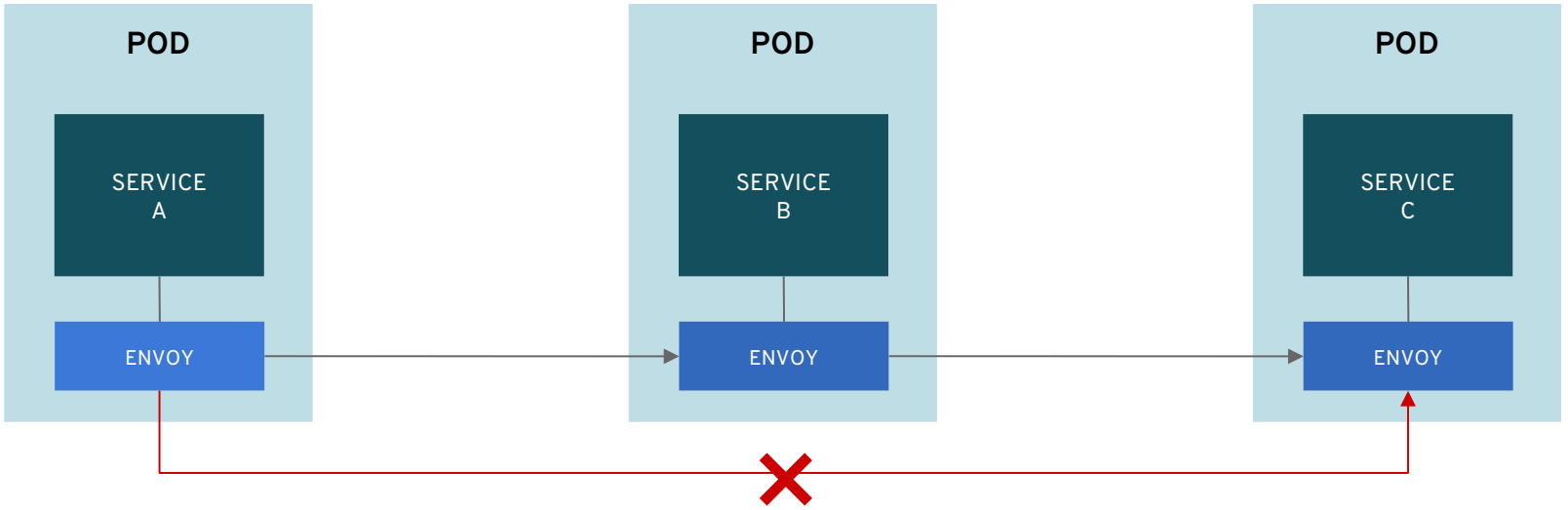
coupled to the service code

SECURE COMMUNICATION WITH ISTIO



mutual TLS authentication, transparent to the services

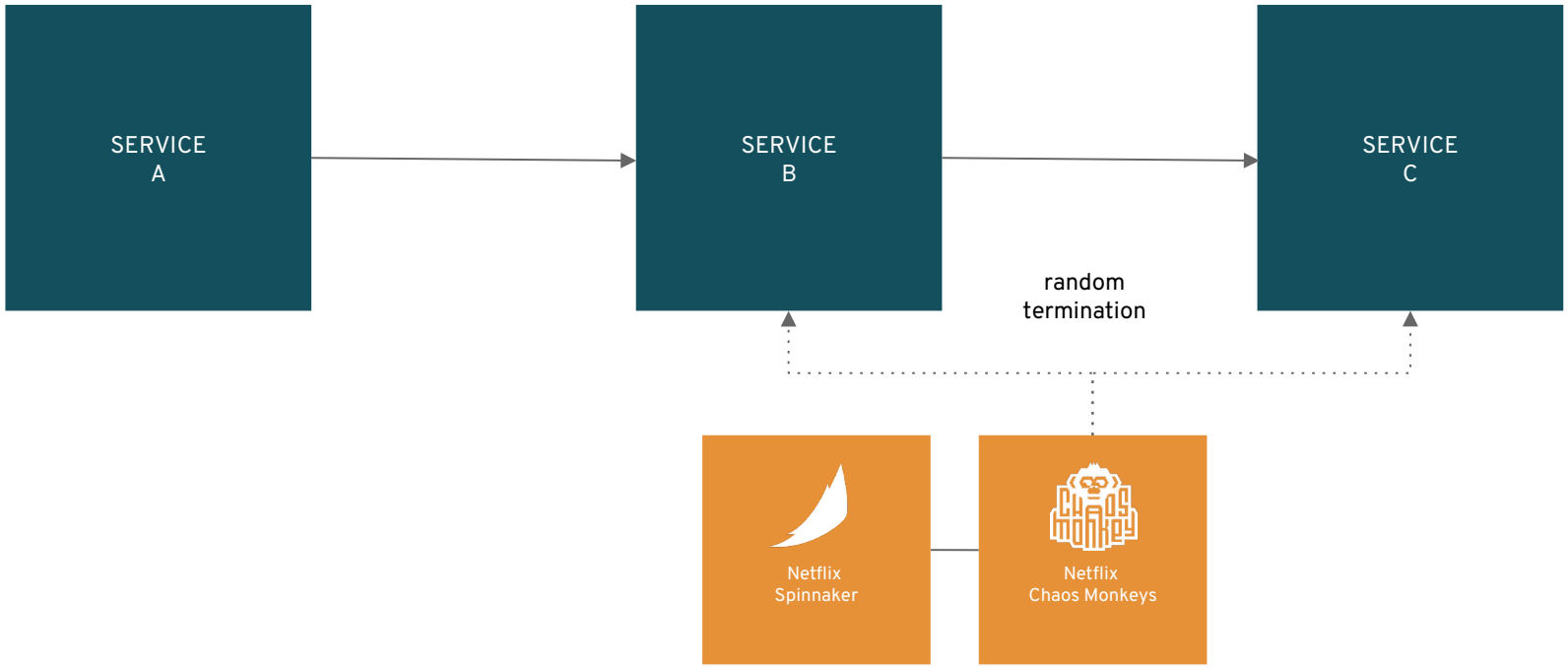
CONTROL SERVICE ACCESS WITH ISTIO



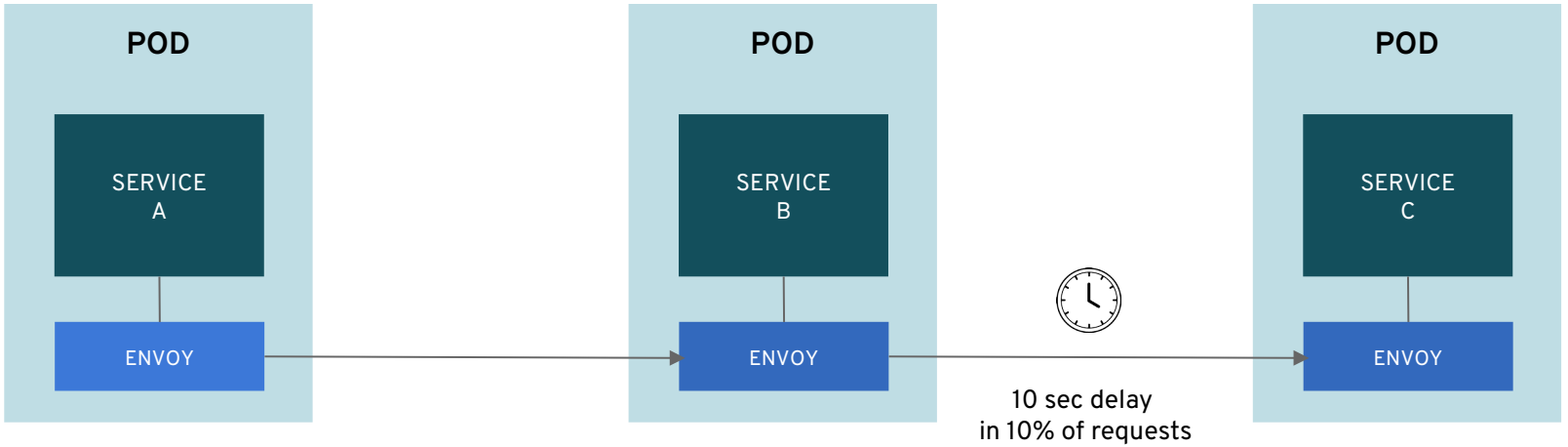
control the service access flow, transparent to the services

CHAOS ENGINEERING

CHAOS ENGINEERING WITHOUT ISTIO

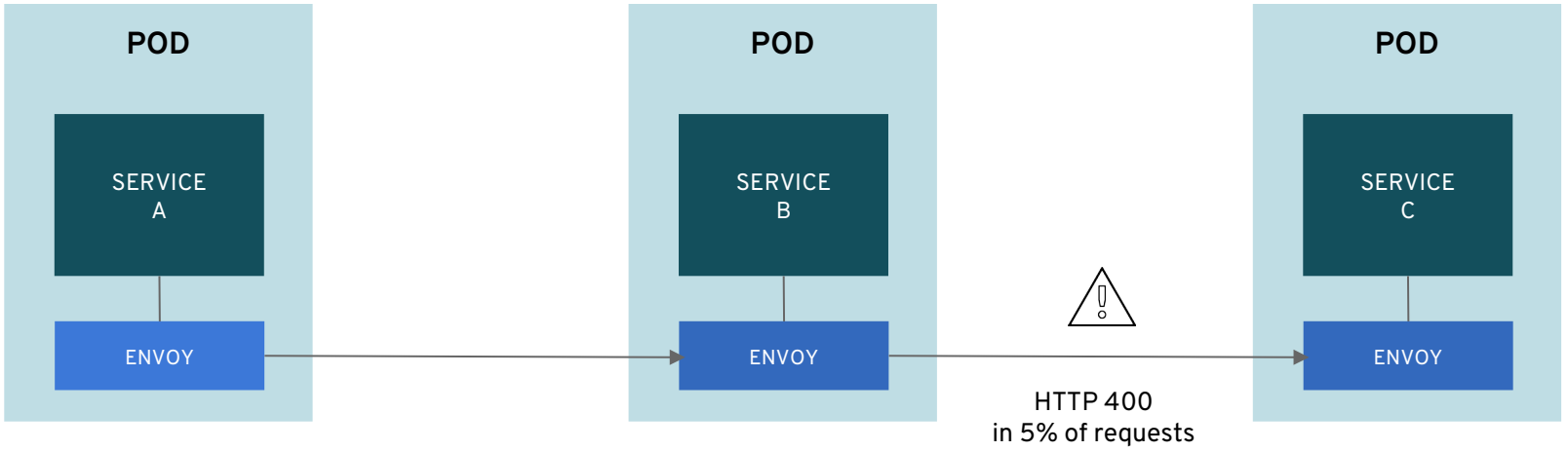


CHAOS ENGINEERING WITH ISTIO



inject delays, transparent to the services

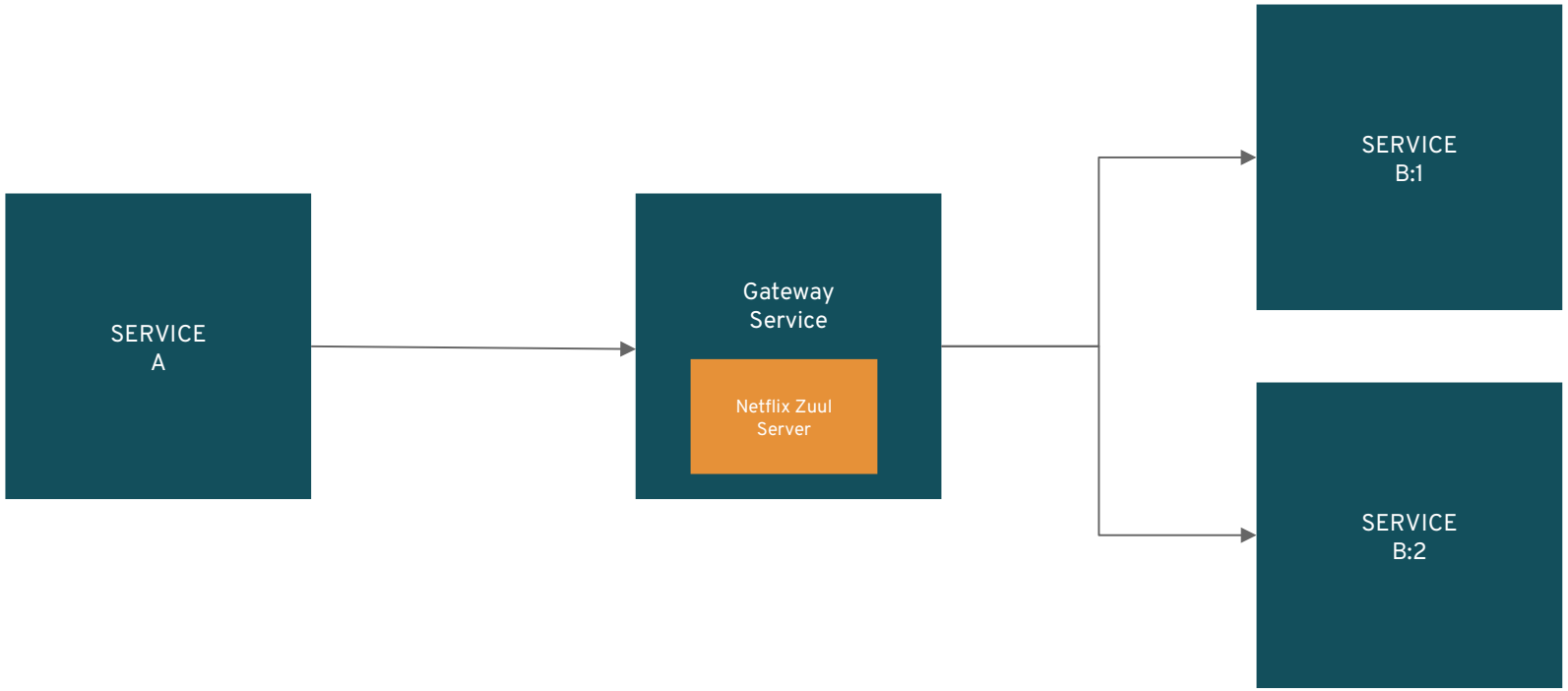
CHAOS ENGINEERING WITH ISTIO



inject protocol-specific errors, transparent to the services

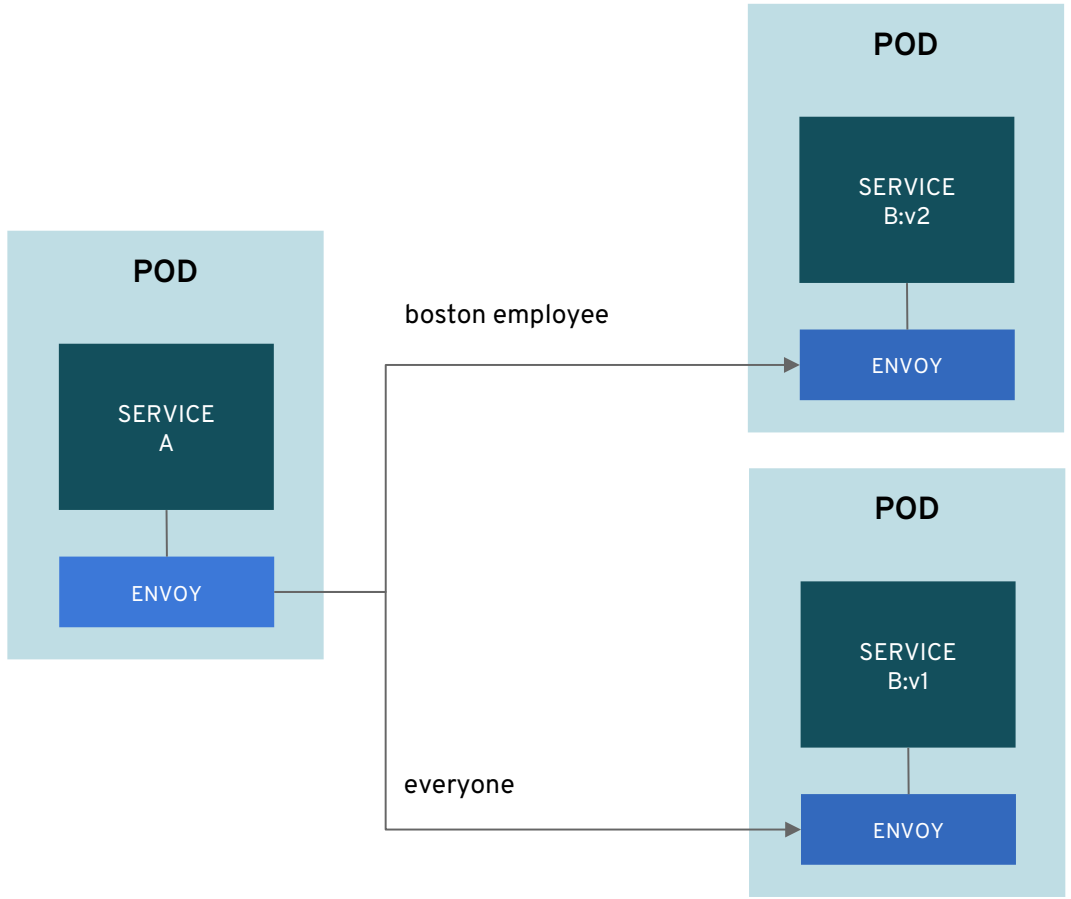
DYNAMIC ROUTING

DYNAMIC ROUTING WITHOUT ISTIO

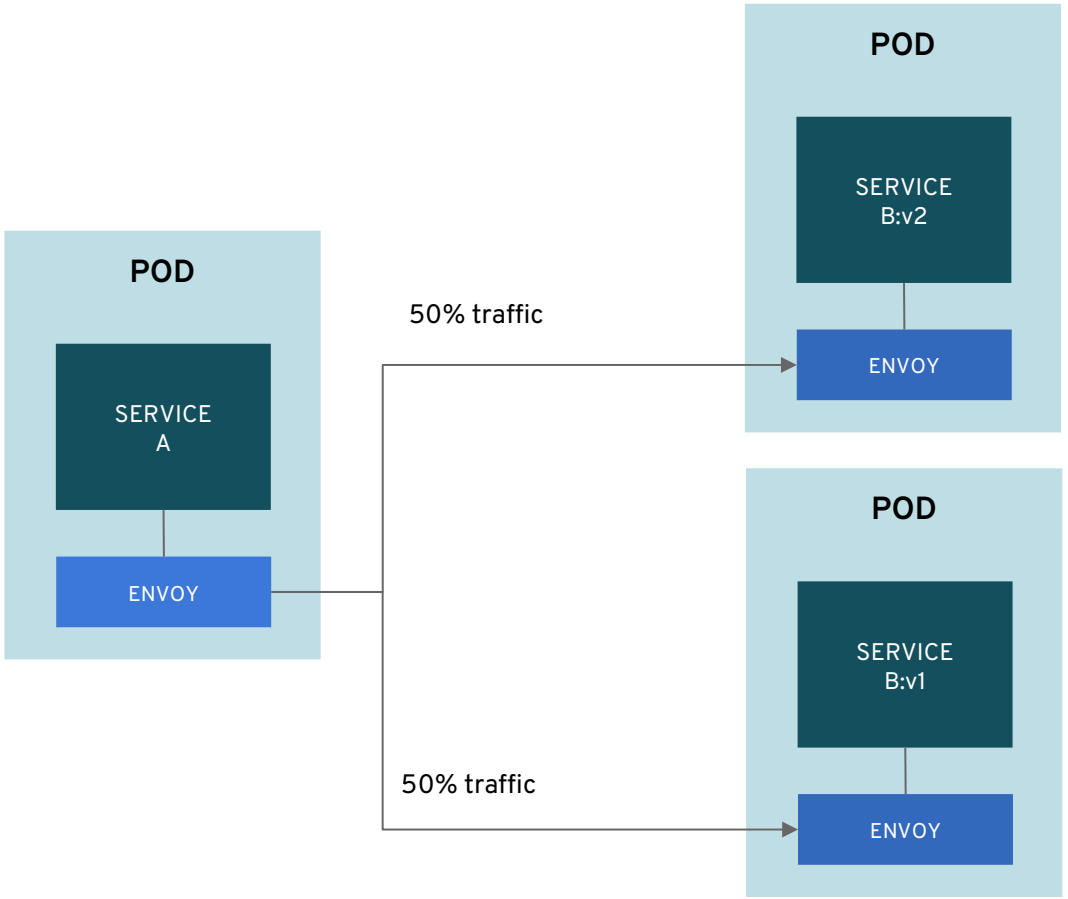


custom code to enable dynamic routing

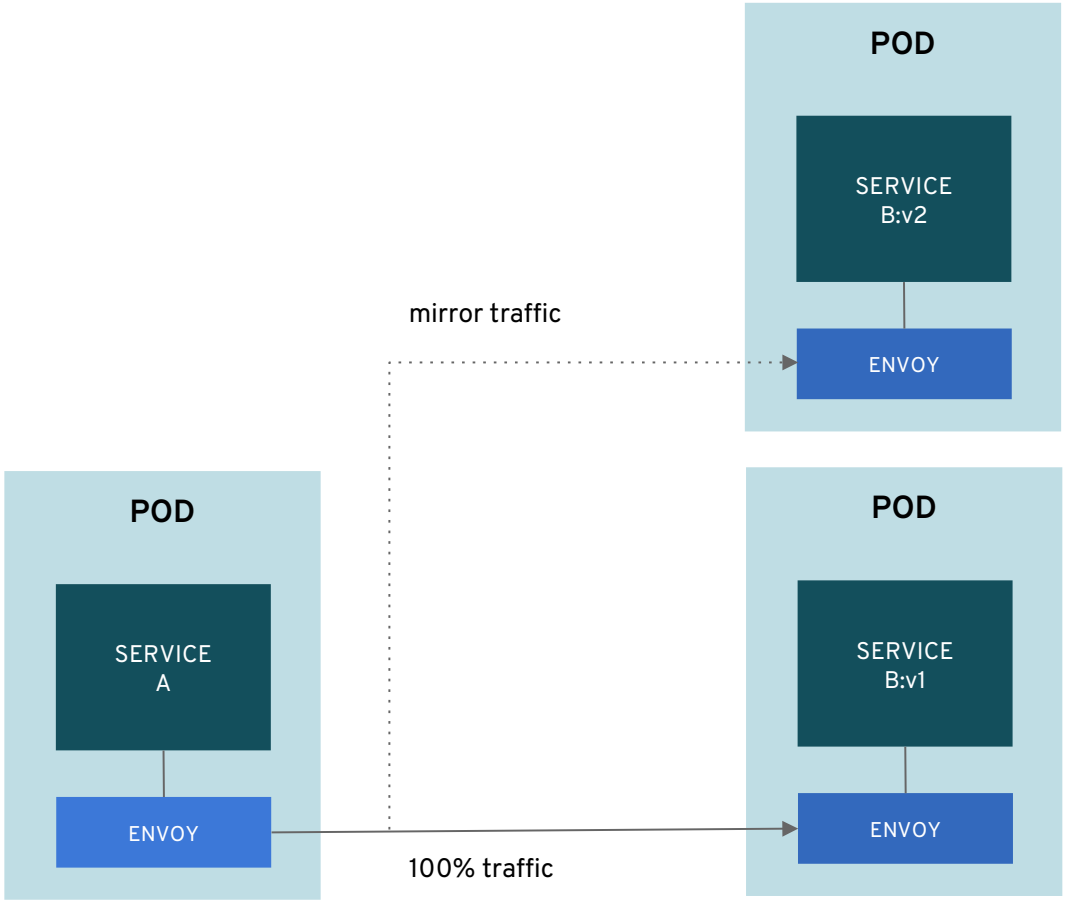
CANARY DEPLOYMENT WITH ISTIO



A/B DEPLOYMENT WITH ISTIO

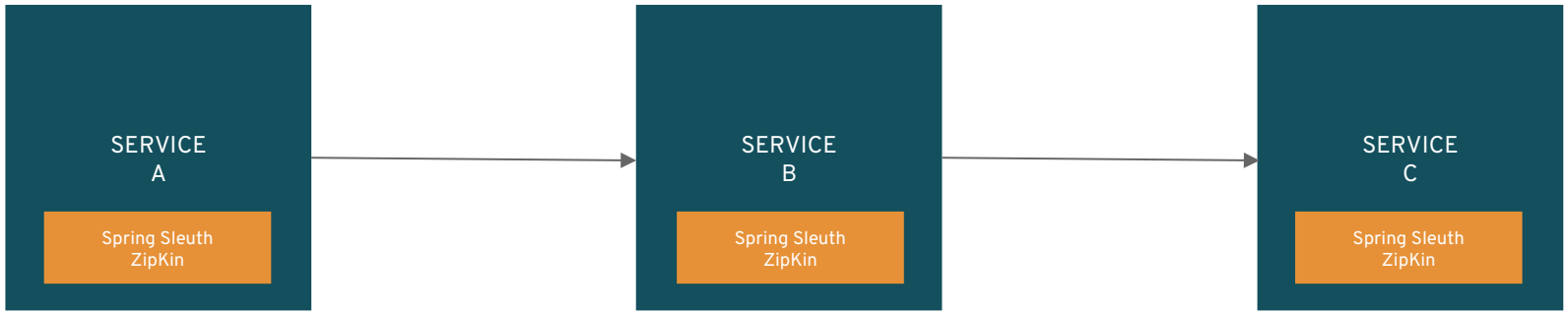


DARK LAUNCHES WITH ISTIO



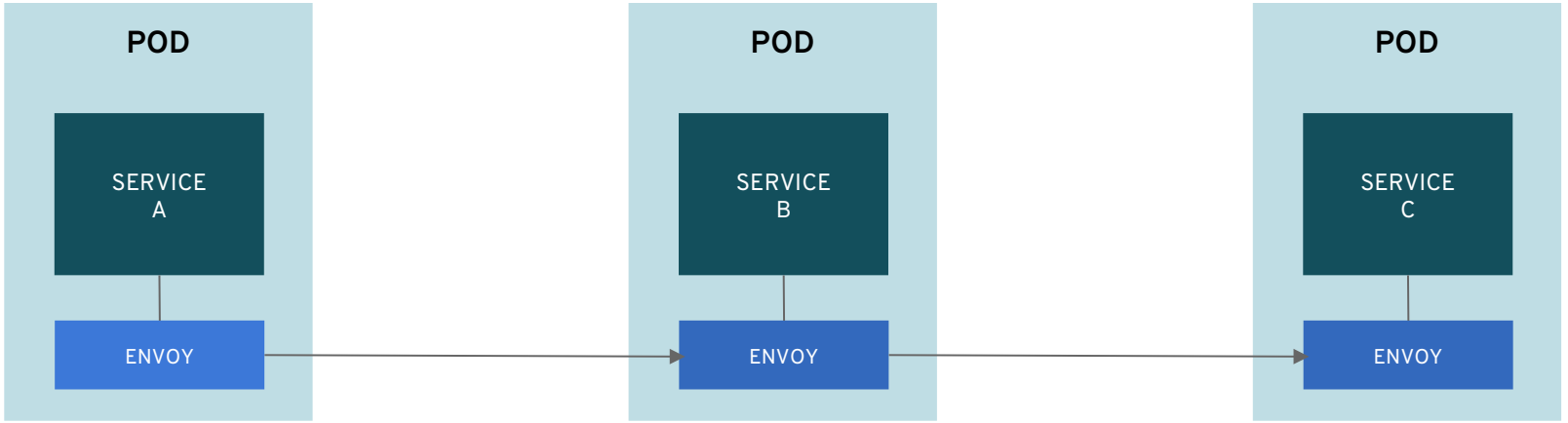
DISTRIBUTED TRACING (JAEGER)

DISTRIBUTED TRACING WITHOUT ISTIO

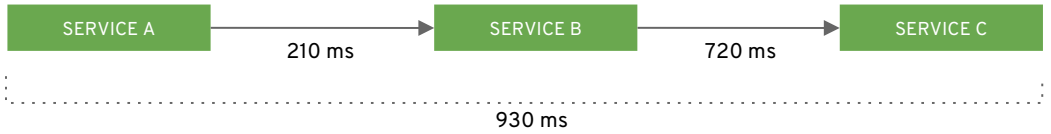


code to enable dynamic tracing

DISTRIBUTED TRACING WITH ISTIO & JAEGER



discovers service relationships and process times, transparent to the services



SERVICE MESH OBSERVABILITY (KIALI)

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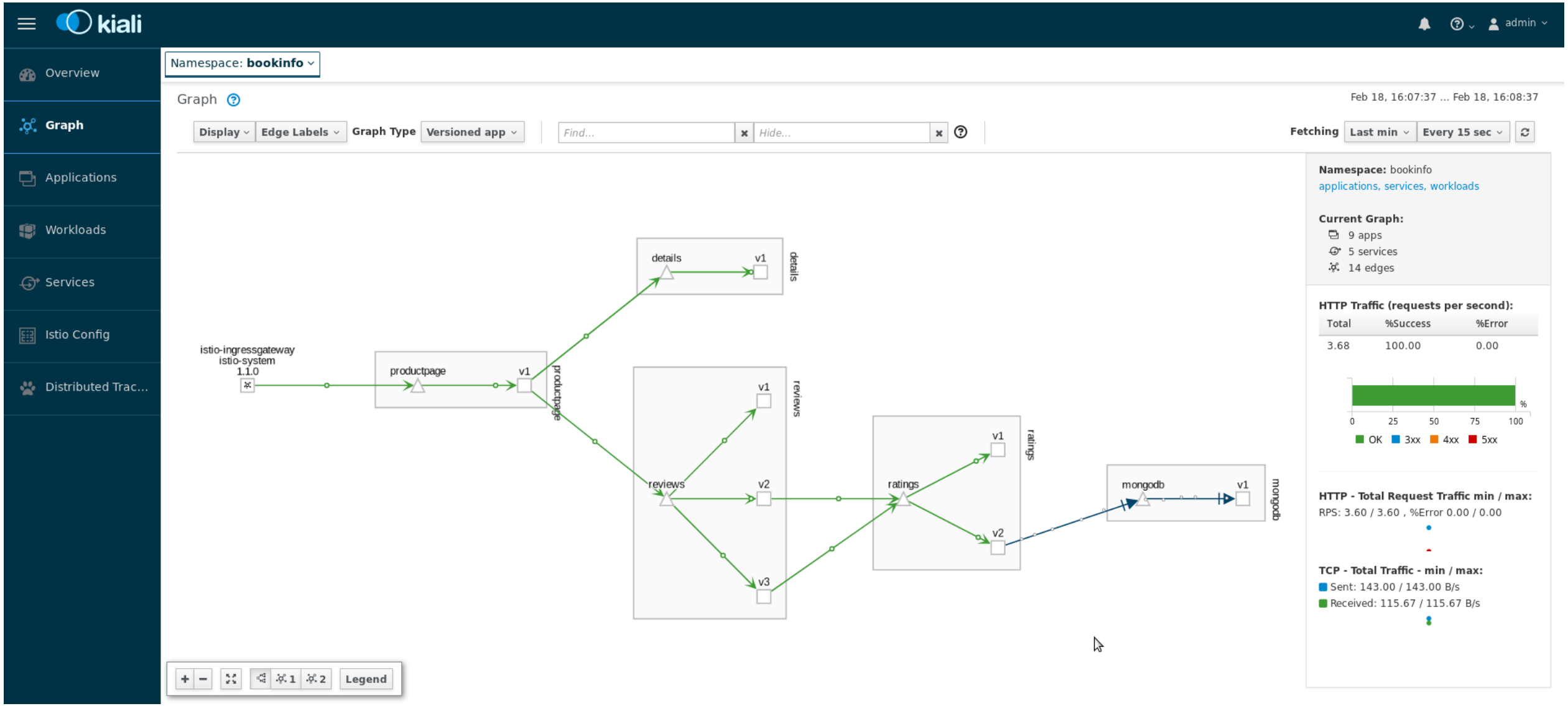
kiali
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Workloads
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Istio Config
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Last min
Every 15 sec
Namespace: bookinfo
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Current Graph:
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5 services
14 edges
HTTP Traffic (requests per second):
Total
%Success
%Error
3.68
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100
%
OK
3xx
4xx
5xx
HTTP - Total Request Traffic min / max:
RPS: 3.60 / 3.60 , %Error 0.00 / 0.00
TCP - Total Traffic - min / max:
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v3
ratings
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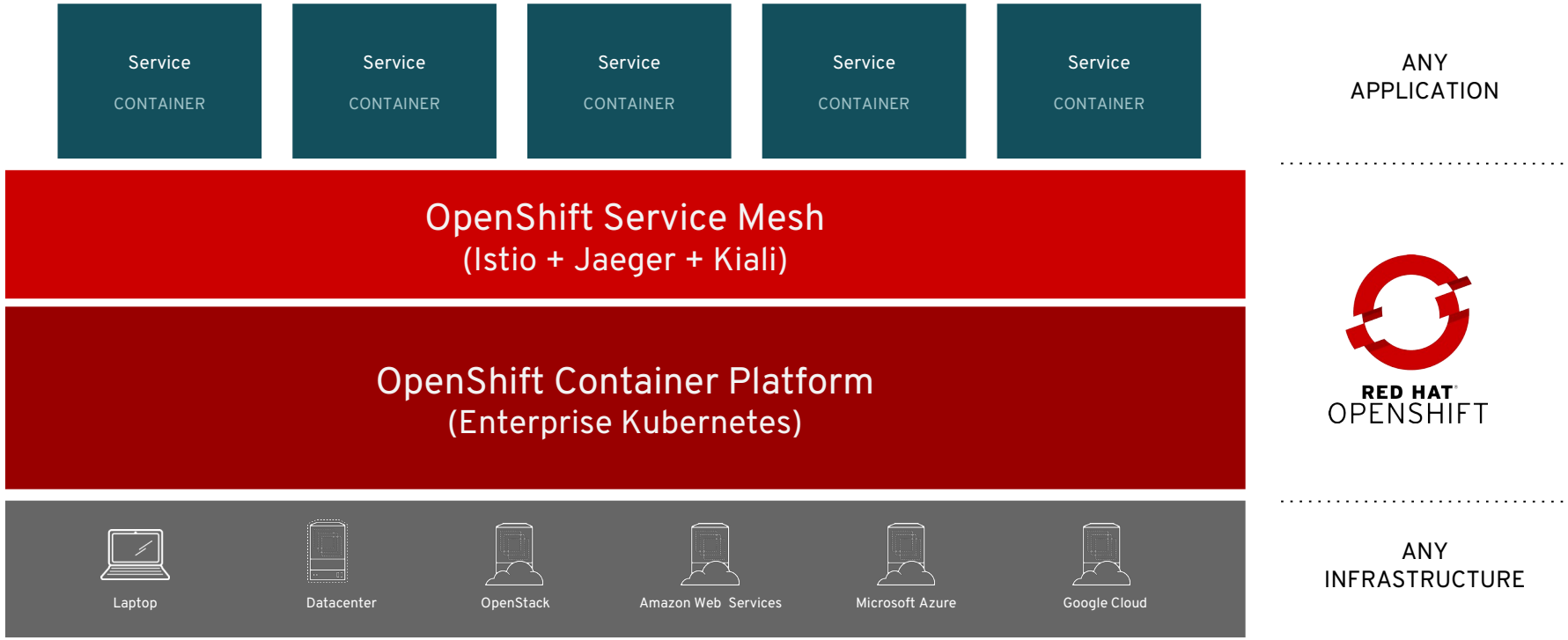
Legend

DISTRIBUTED SERVICES PLATFORM



References

How to explain service mesh in plain English
https://enterprisersproject.com/article/2019/6/service-mesh-plain-english

OpenShift Commons 2019
https://blog.openshift.com/wp-content/uploads/State-of-the-Platform-Services-Integrated-1.pdf

Service Mesh Documentation (OCP 4.2)
Architecture:
https://docs.openshift.com/container-platform/4.2/service_mesh/service_mesh_arch/understanding-ossm.html
Install:
https://docs.openshift.com/container-platform/4.2/service_mesh/service_mesh_install/preparing-ossm-installation.html
Day 2:
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Thank you

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