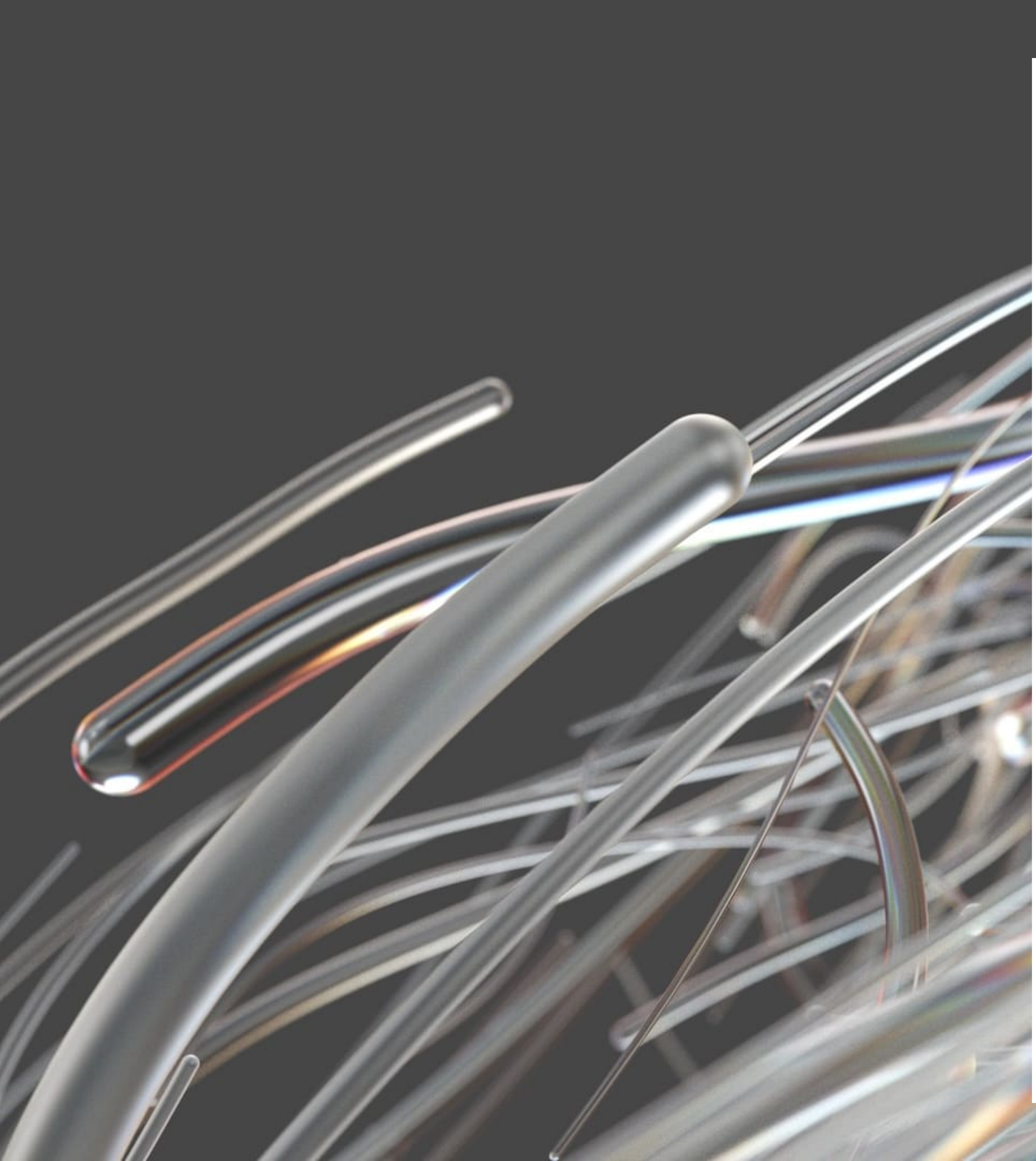
GOTOpia Chicago / April 2021

Service Meshes:

Istio, Linkerd - or No Mesh at All?



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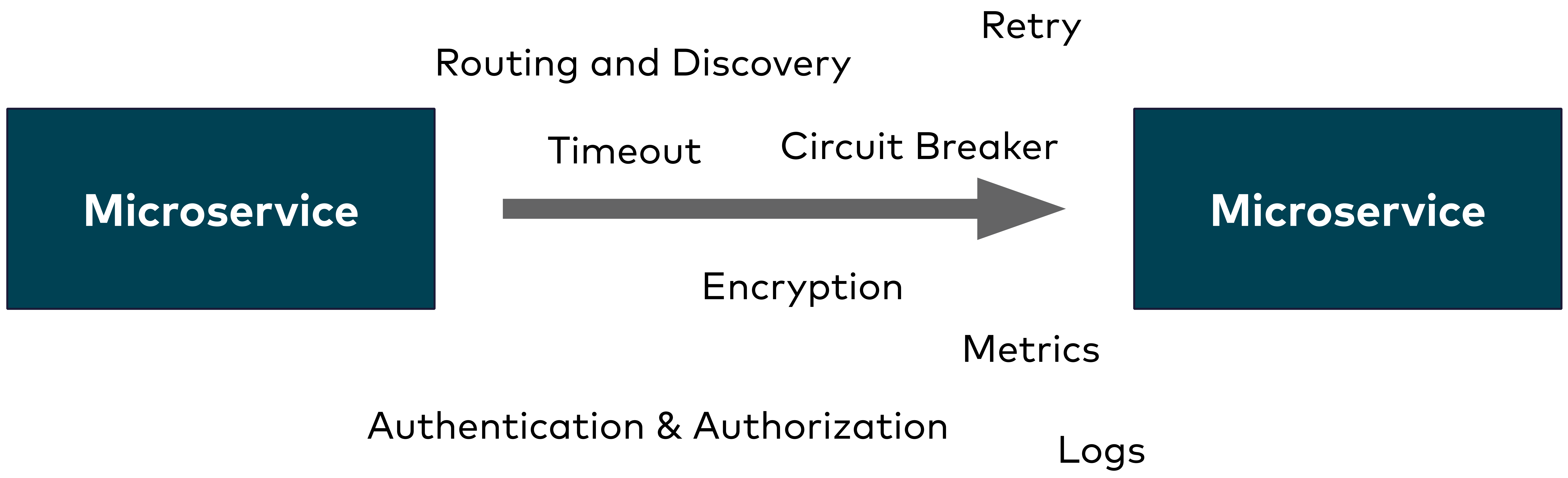
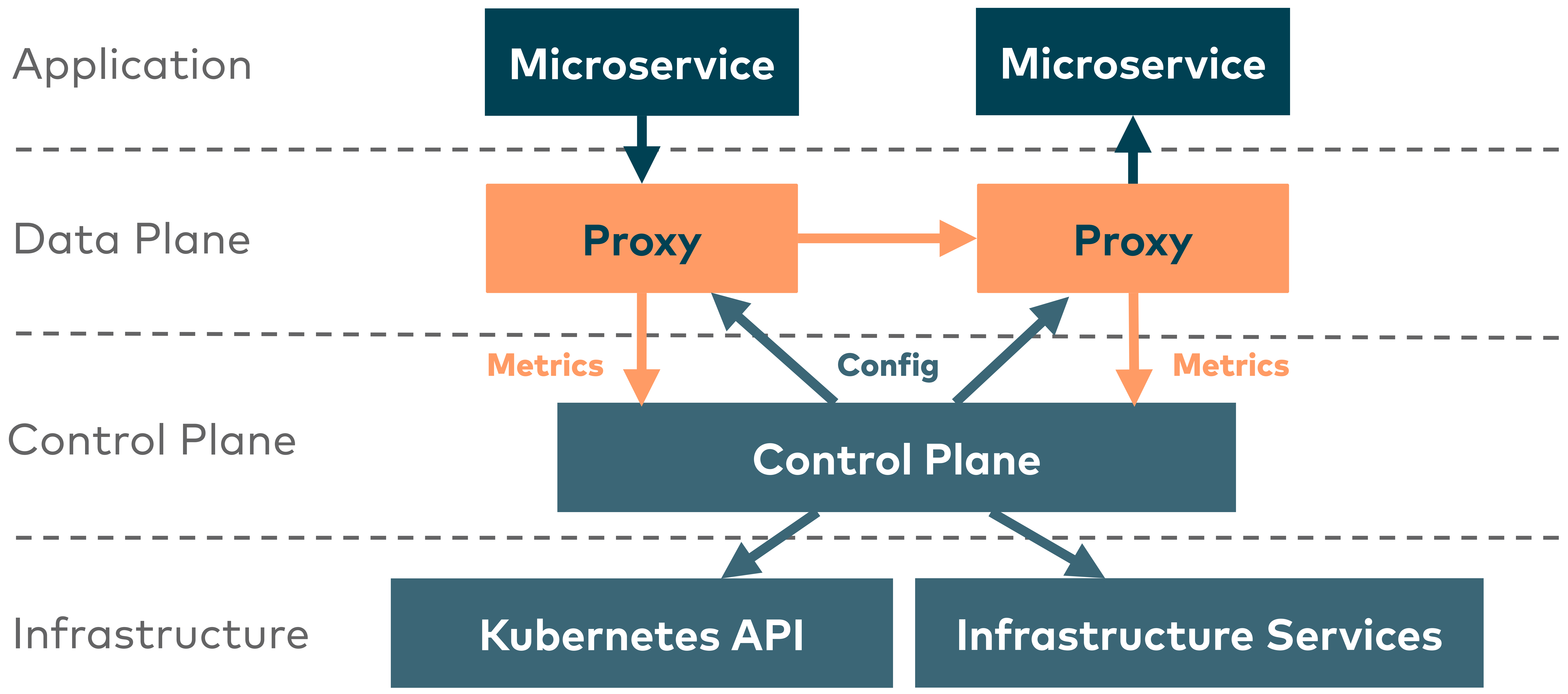
What is a service mesh?

What problems does it try to solve?

Microservices are distributed Systems



Service Mesh Architecture



Service Mesh Implementations

Istio vs Linkerd

Istio	Linkerd
Google, IBM & Lyft	**Buoyant**
many **features,** highly **customizable**	optimized for **usability** & **performance**
Envoy proxy	**linkerd-proxy**
custom concept for **ingress** traffic	supports any **ingress** controller
optimized for Kubernetes support for other platforms	**Kubernetes** only

Service Mesh Implementations

HashiCorp Consul

AWS App Mesh

træfik mesh

Service Mesh Interface

Kuma

LINKERD

Open Service Mesh

servicemesh.es

Istio

NGINX Service Mesh

servicemesh.es

	Istio	Linkerd 2	AWS App Mesh	Consul	Traefik Mesh (formerly Maesh)	Kuma	Open Service Mesh (OSM)
Current version	1.9	2.10		1.9	1.4	1.1	0.7
License	Apache License 2.0	Apache License 2.0	Closed Source	Mozilla License	Apache License 2.0	Apache License 2.0	MIT License
Developed by	Google, IBM, Lyft	Buoyant	AWS	HashiCorp	Containous	Kong	Microsoft
Service Proxy	Envoy	linkerd-proxy	Envoy	defaults to Envoy, exchangeable	Traefik	Envoy	Envoy
Ingress Controller	Envoy / Own Concept	any		Envoy and Ambassador in Kubernetes	any	any	Nginx, Azure Application Gateway Ingress Controller
Governance	see Istio Community and Open Usage Commons	see Linkerd Governance and CNCF Charter	AWS	see Contributing to Consul	see Contributing notice	see Contributing notice, Governance, and CNCF Charter	see Microsoft OpenSource
Tutorial	Istio Tasks	Linkerd Tasks	AWS App Mesh Getting Started	HashiCorp Learn platform	Traefik Mesh Example	Install Kuma on Kubernetes	Install OSM on Kubernetes
Used in production	yes	yes					

Service Mesh Features

Service Mesh Features

Routing

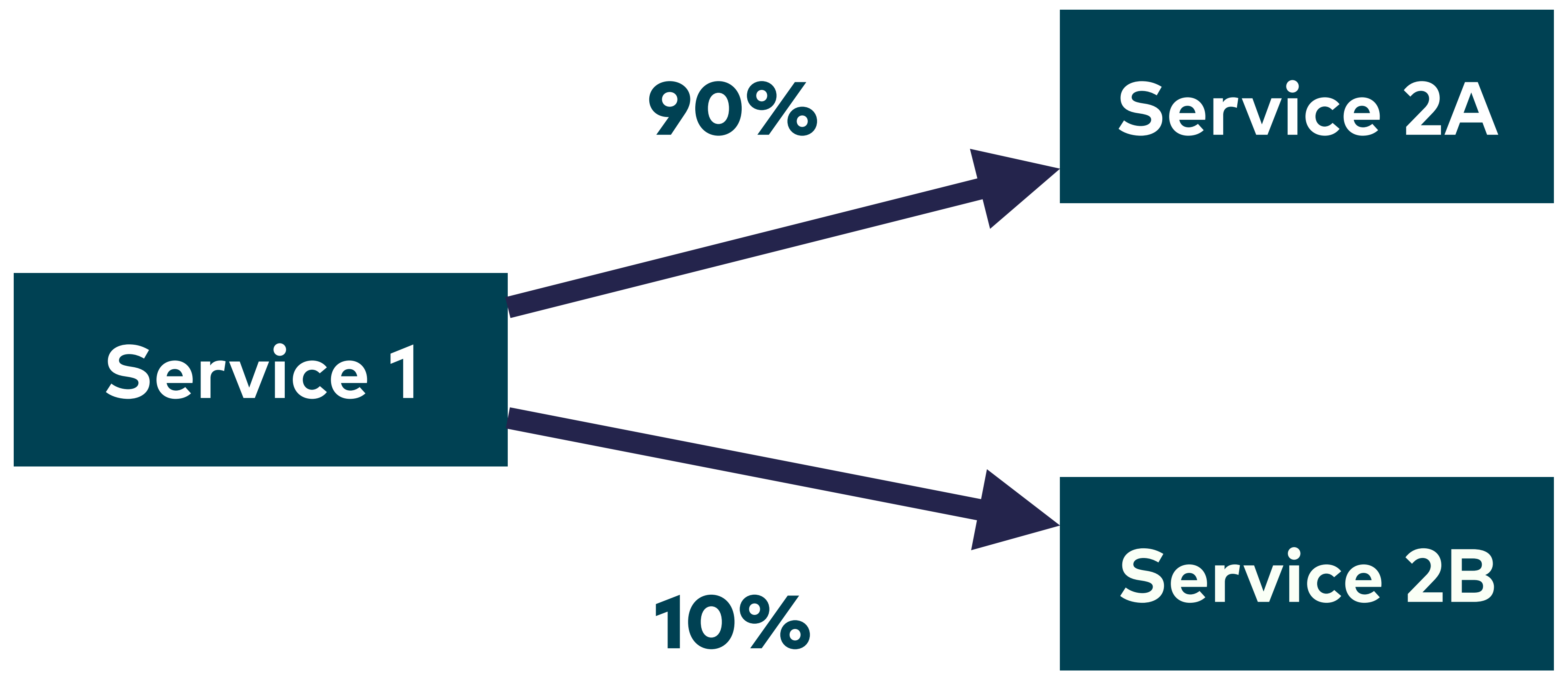
Resilience

Security

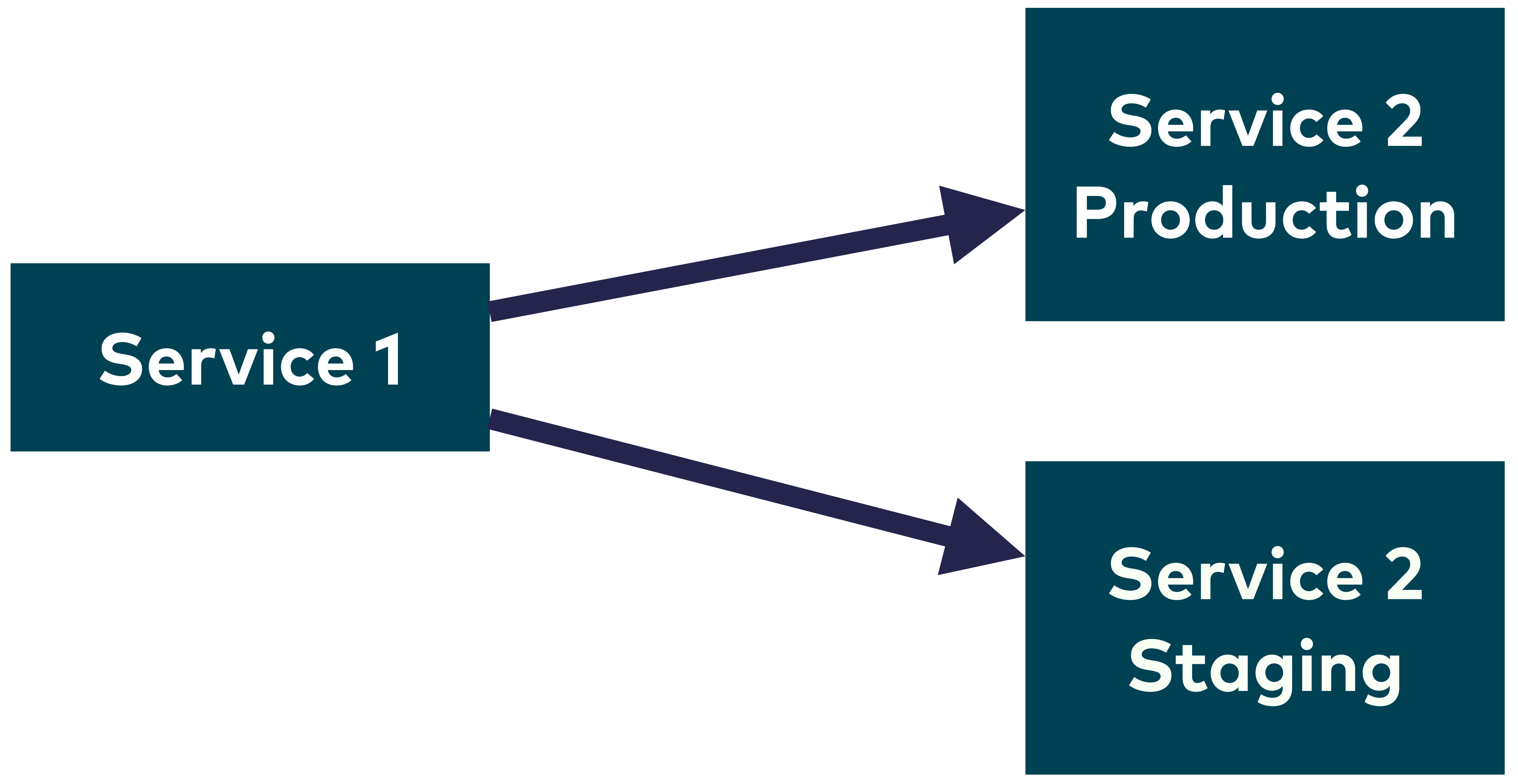
Observability

Routing

Complex routing for A/B testing & canary releasing



Traffic mirroring



Service Mesh Features

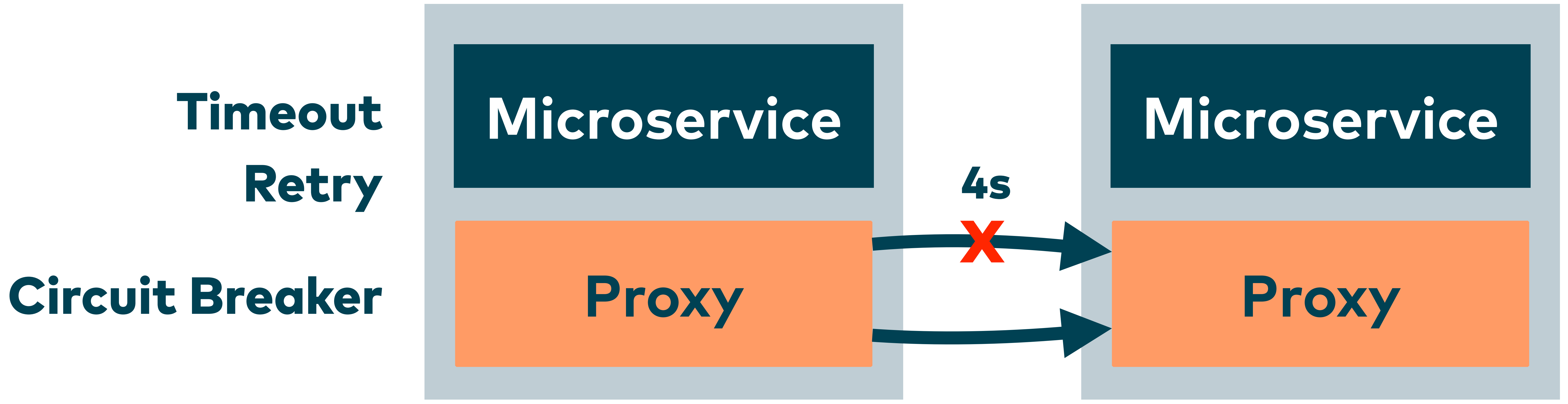
Routing

Resilience

Security

Observability

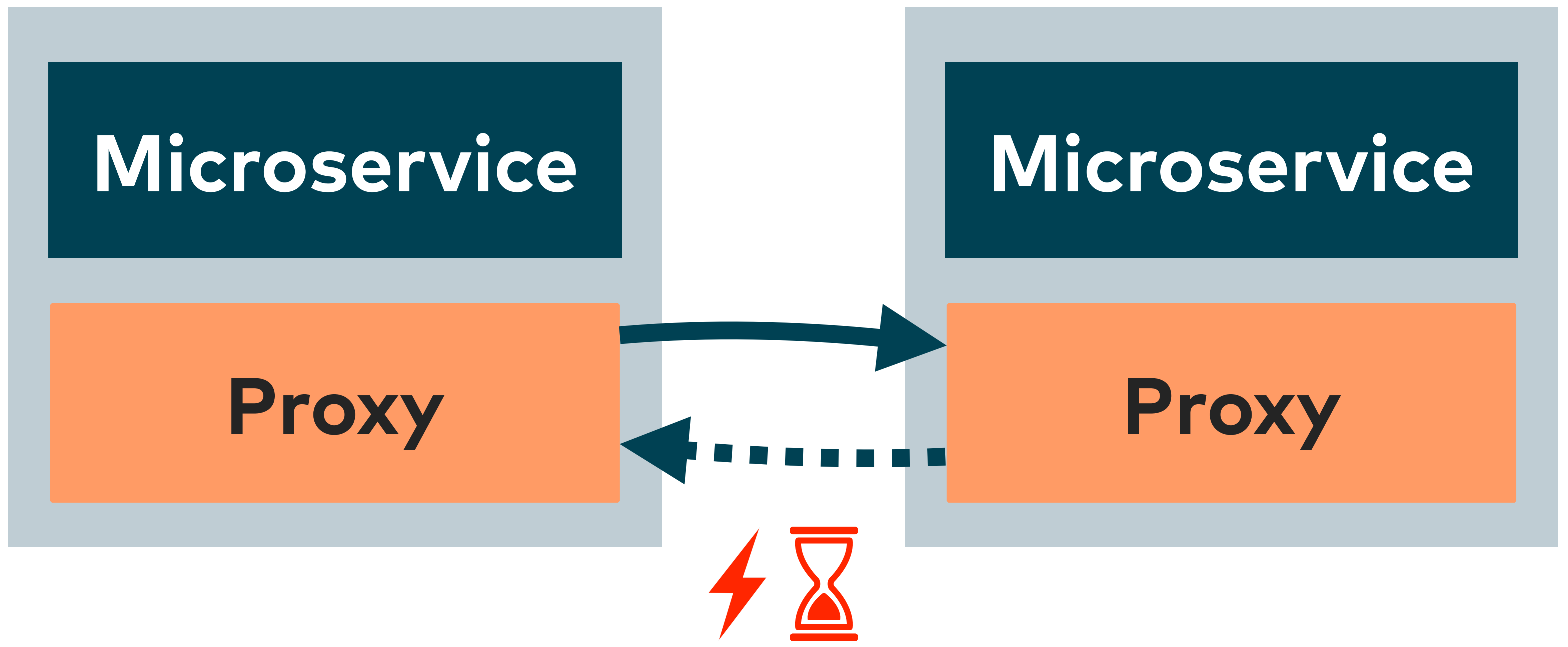
Resilience Features



Chaos Engineering

Fault Injection

Delay Injection



Service Mesh Features

Routing

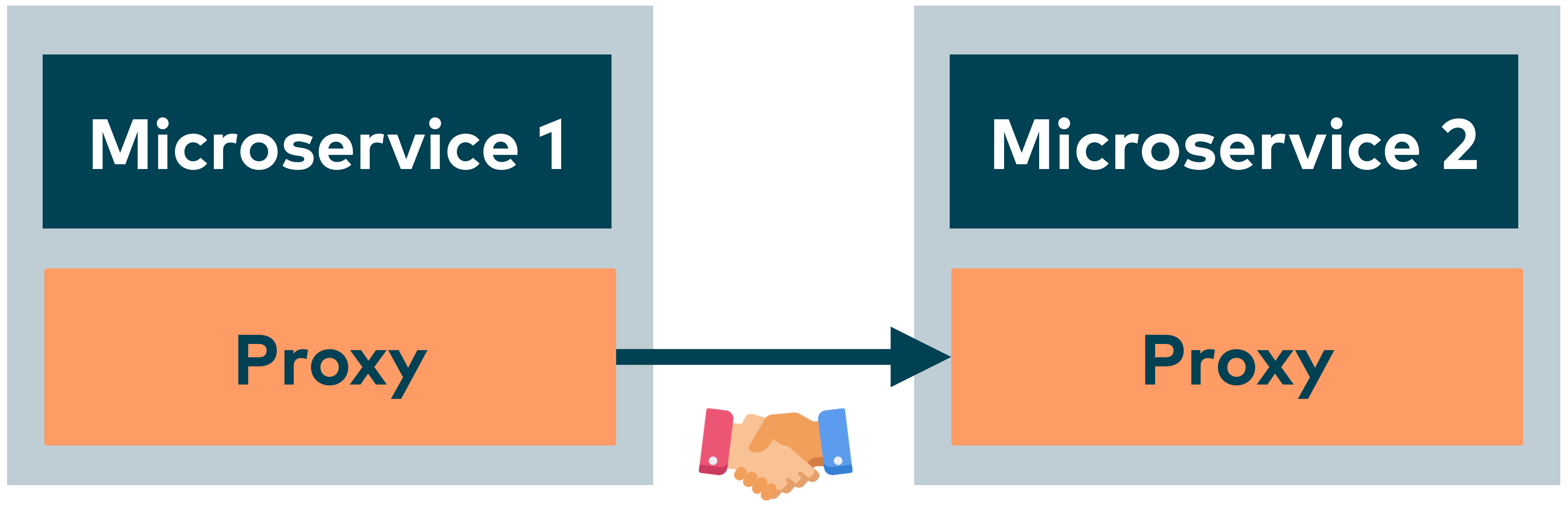
Resilience

Security

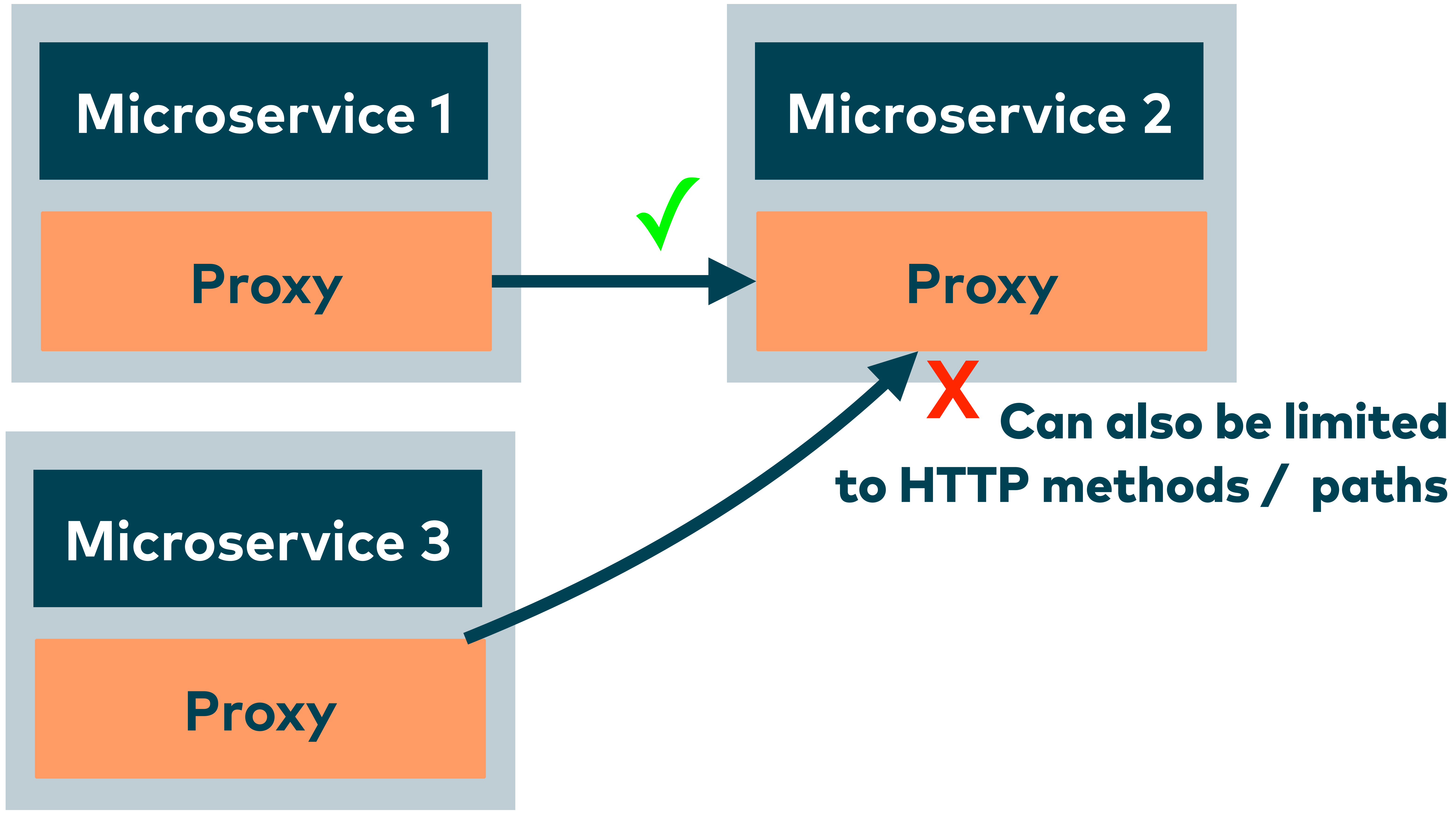
Observability

Authentication & Encryption

mTLS Encryption
& Authentication



Service Authorization



Service Mesh Features

Routing

Resilience

Security

Observability

Observability Features

- Dashboard

LINKERD
Namespace > default
CLUSTER
Namespaces
Control Plane
DEFAULT
WORKLOADS
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets
CONFIGURATION
Traffic Splits
TOOLS
Tap
Top
invoicing
shipping
order

Deployments

Deployment	Meshed	Success Rate	RPS	P50 Latency	P95 Latency	P99 Latency	Grafana
apache	1/1	100.00% ●	0.42	1 ms	1 ms	1 ms	
invoicing	1/1	100.00% ●	0.83	6 ms	16 ms	19 ms	
order	1/1	100.00% ●	1.75	17 ms	29 ms	30 ms	
postgres	1/1	---	---	---	---	---	
shipping	1/1	100.00% ●	0.83	10 ms	19 ms	20 ms	

Pods

kiali
admin
Overview
Graph
Applications
Workloads
Services
Istio Config
Graph tour
Display
Find...
Hide...
Hide
apache
latest
apache
shipping
90ms
latest
shipping
istio-ingressgateway
latest
(istio-system)
order
24ms
latest
order
invoicing
228ms
latest
invoicing
postgres.default.s
Legend
1
2
Incoming
Outgoing
Total

Namespace: default

Versioned app graph

Last 1m

Every 15s

May 27, 9:15:58 AM ... 9:16:58 AM

NS default

Current Graph:

- 6 apps (6 versions)
- 6 services
- 15 edges

HTTP (requests per second):

Total	%Success	%Error
0.34	100.00	0.00

0 25 50 75 100

🟩 OK 🟦 3xx 🟥 4xx ■ 5xx

@hannaprinz @ewolff @INNOQ

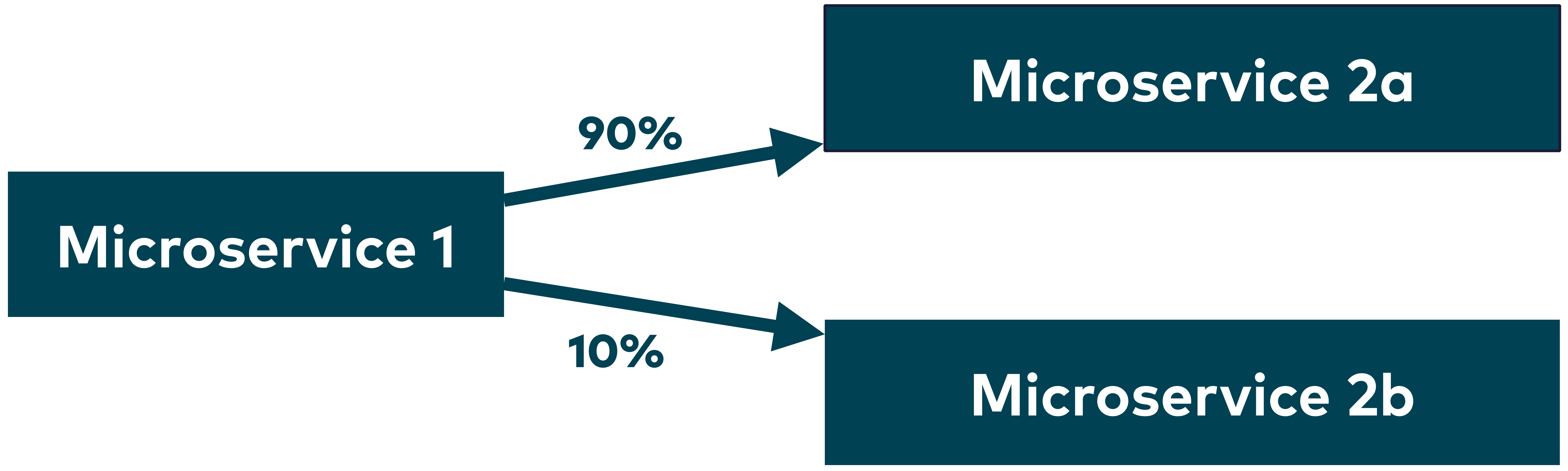
Observability Features

- Dashboard
- Preconfigured Prometheus, Grafana and Jaeger
- Tracing support
- Access logs (or similar features such as Linkerd's "tap")

Service Mesh Challenges

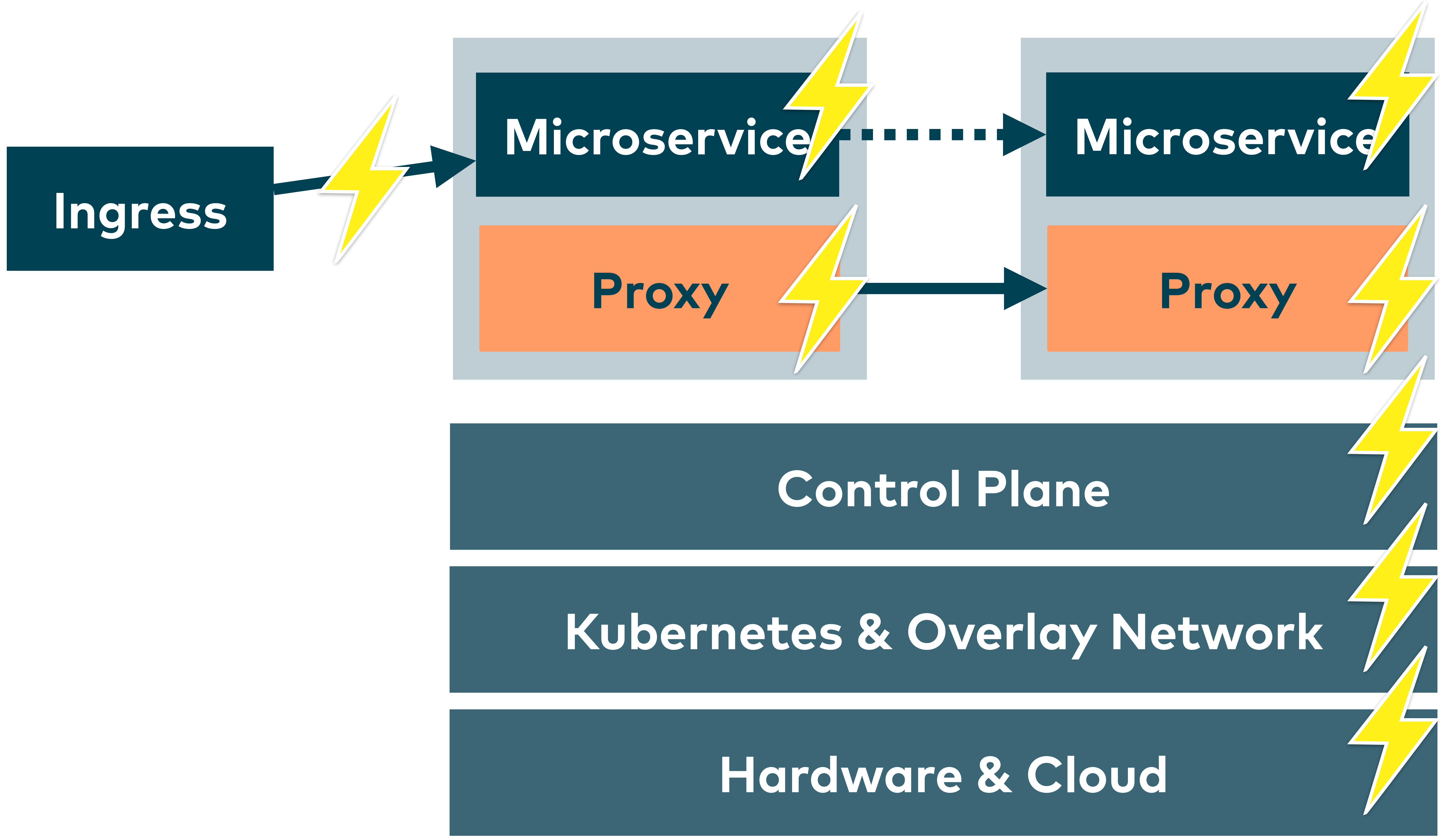
Configuration Complexity

Example: Traffic Split



can be one CRD (Custom Resource Definition) with 10 lines of YAML (Linkerd)
… or two CRDs with 30 lines of YAML (Istio)

Debugging Complexity



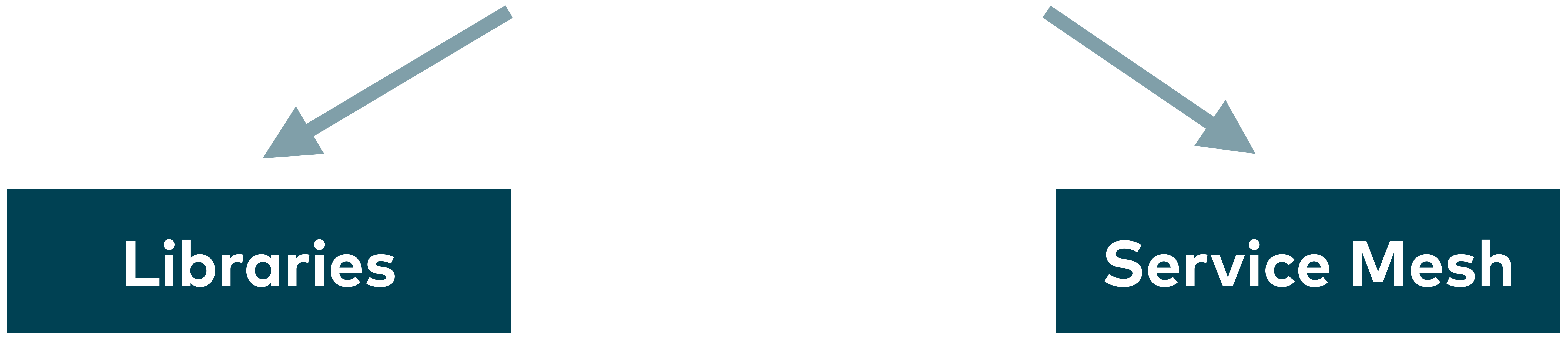
Performance & Benchmarking

- Additional latency: ~ 3ms (as published by Istio)
- Additional CPU & memory resources
- Depending on architecture, traffic and mesh implementation

→ **Do your own benchmark!**

Do You Need a Service Mesh?

Do your services need mentioned routing, resilience, security, or observability features?



Can you avoid needing these features at all?

… by choosing a suitable architecture

Syncronous

Asyncronous

Deployment Monollith

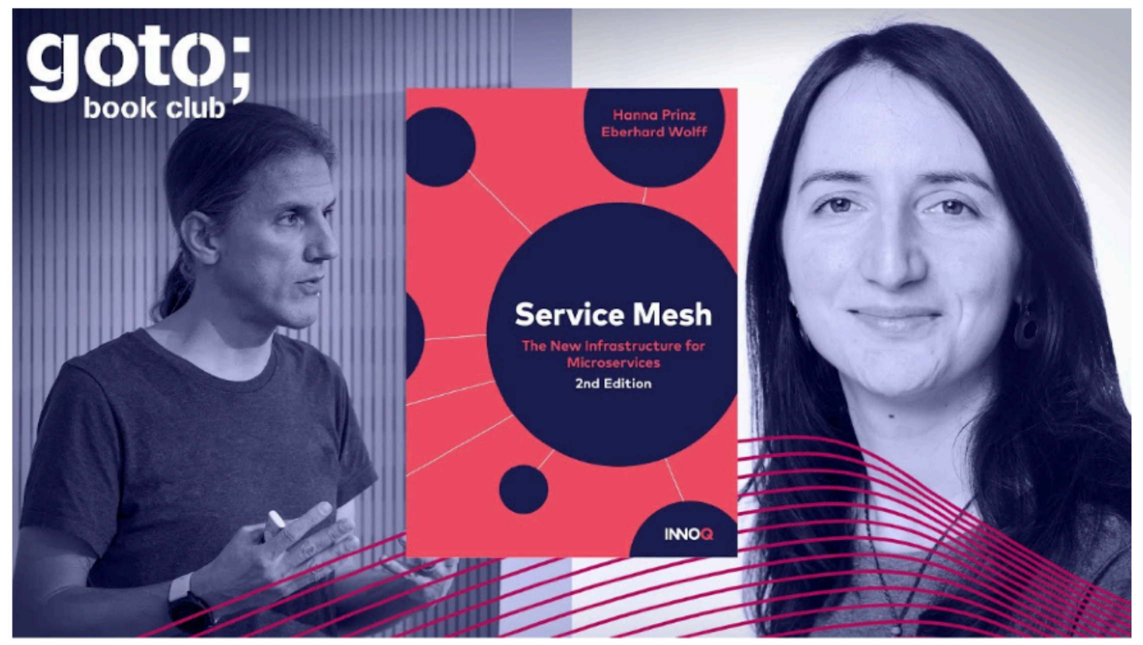
Conclusion

Approaching Service Mesh

1. Is the problem somewhere else?
   → e.g. synchronous architecture: lots of network traffic, slow, unreliable
2. Which features do you need?
   → routing, resilience, security, observability?
3. Have you considered alternatives?
   → e.g. libraries
4. Challenges acceptable?
   → e.g. configuration, performance impact, additional complexity

More about Service Mesh

- **Service Mesh Comparison**
  https://servicemesh.es
- **Blog Post: Happy without a Service Mesh**
  https://www.innoq.com/en/blog/happy-without-a-service-mesh
- **Linkerd Tutorial**
  https://linkerd.io/getting-started
- **Istio Tutorial**
  https://istio.io/docs/setup/getting-started
- **Sample application with Istio and Linkerd Tutorial on GitHub**
  https://github.com/ewolff/microservice-istio
  https://github.com/ewolff/microservice-linkerd



GOTO Book Club • Getting started with Service Mesh
https://www.youtube.com/watch?v=w14ge2838Vs

Service Mesh Primer - 2nd Edition
for free at leanpub.com/service-mesh-primer

Thank you! Questions?

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