Managing Microservices With Istio Service Mesh in Kubernetes

Kubernetes Advocate
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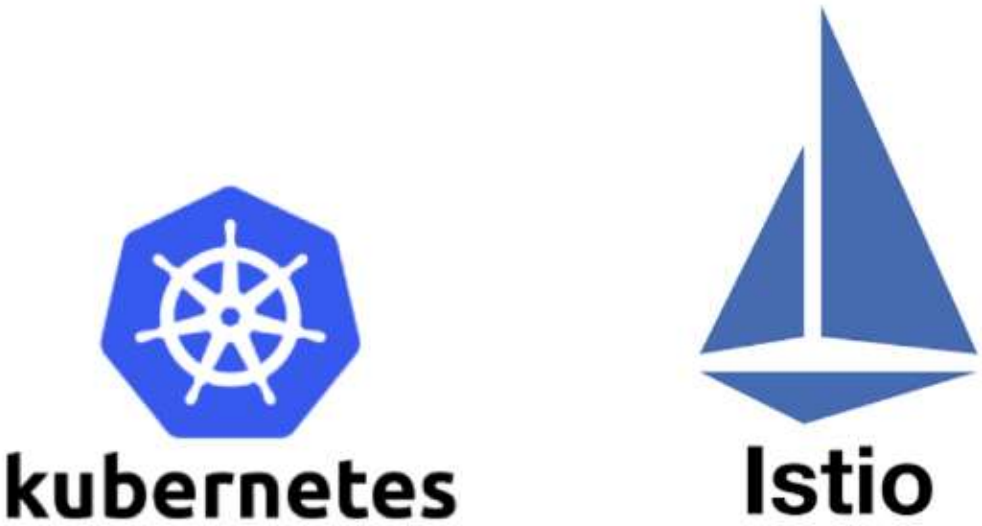
Services are at the core of modern **software architecture**. Deploying a series of standard, little (micro-)services instead of massive monoliths provides developers the flexibleness to figure in several languages, technologies, and unharness cadence across the system; leading to higher productivity and speed, particularly for larger groups.

With the adoption of microservices, however, new issues emerge because of the sheer variety of services that exist in a very larger system. issues that had to be resolved once a stone, like **security, load equalization, monitoring,** and rate-limiting have to be compelled to be handled for every service.

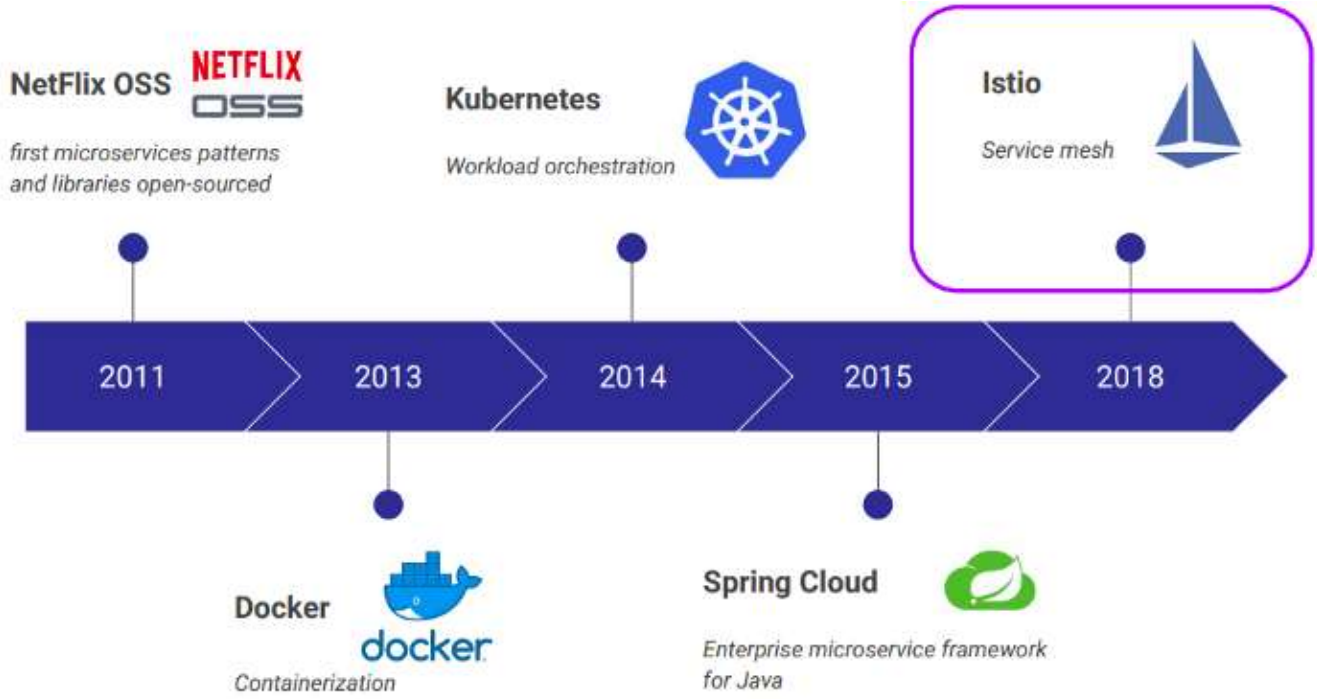


Istio & Kubernetes

Moving to microservices network challenges

1. Network Reliability
2. Fault tolerance and resiliency
3. Monitoring and Observability

The evolution of microservices frameworks: **from NetFlix OSS to Istio**



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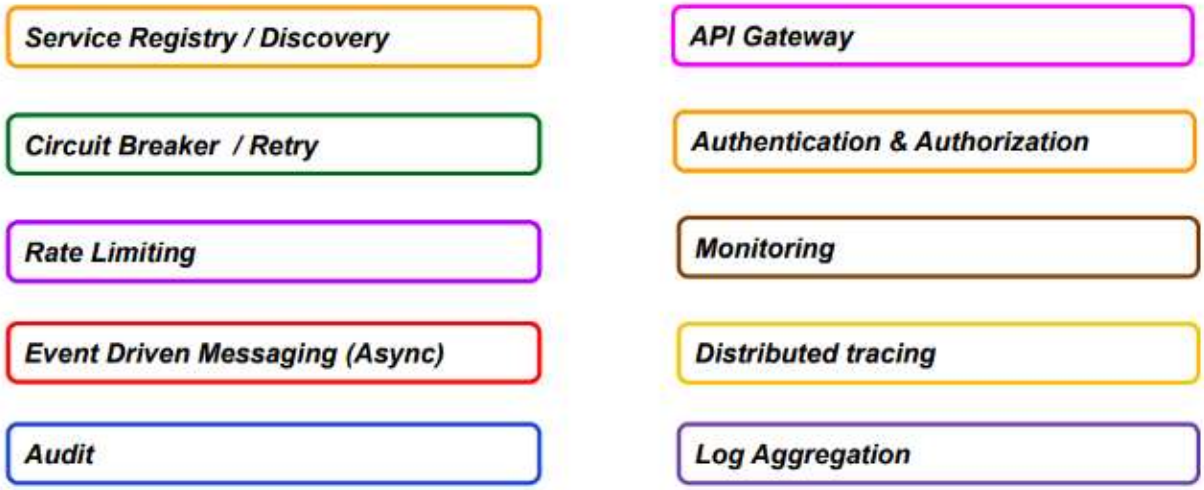
Microservices challenges

1. Challenge 1 = N to N communications.
2. Challenge 2 = Distributed software **interconnection** and troubleshooting are hard.
3. Challenge 3 = Containers should stay thin and **platform agnostic.**
4. Challenge4 = Upgrade of polyglot microservices is hard at scale.



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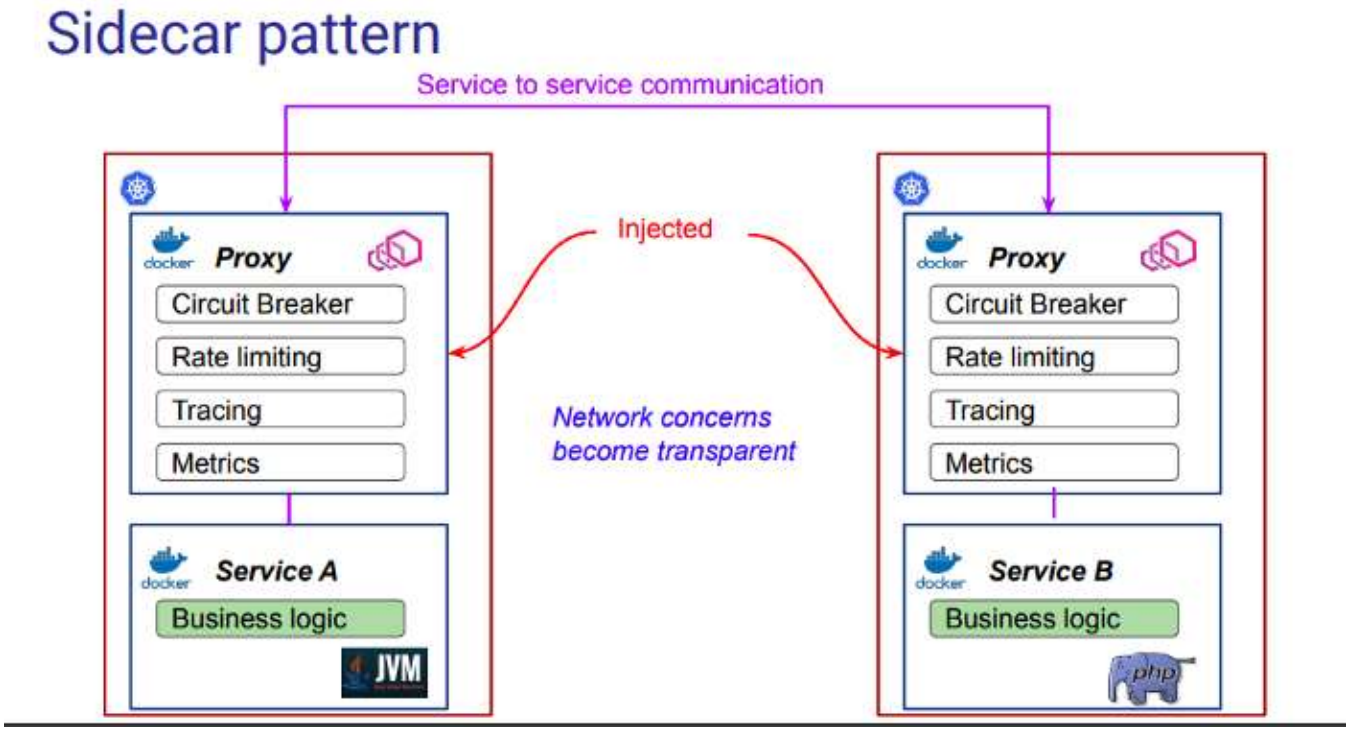
Service Mesh (buoyant.io)

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

Each service will have its own proxy service and all these proxy services **along kind** the "Service Mesh". All the requests to and from each service will go through the mesh proxies. Proxies are also known as sidecars.



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History of Istio

1. Envoy proxy (Istio data plane) was created by Lyft and open-sourced in 2016.
2. IBM and Google launch the project in May 2017
3. The first major version was released in July 2018.
4. Current version: 1.3

Istio goal

Develop an open technology that gives a consistent medium to connect, secure, manage and monitor a network of **microservices** despite the platform supply or merchant.

Solution Istio Promises

- concentrate on business logic and spent less time with common considerations.
- No change in the service code.
- Central configuration management.
- Easy to upgrade
- Security

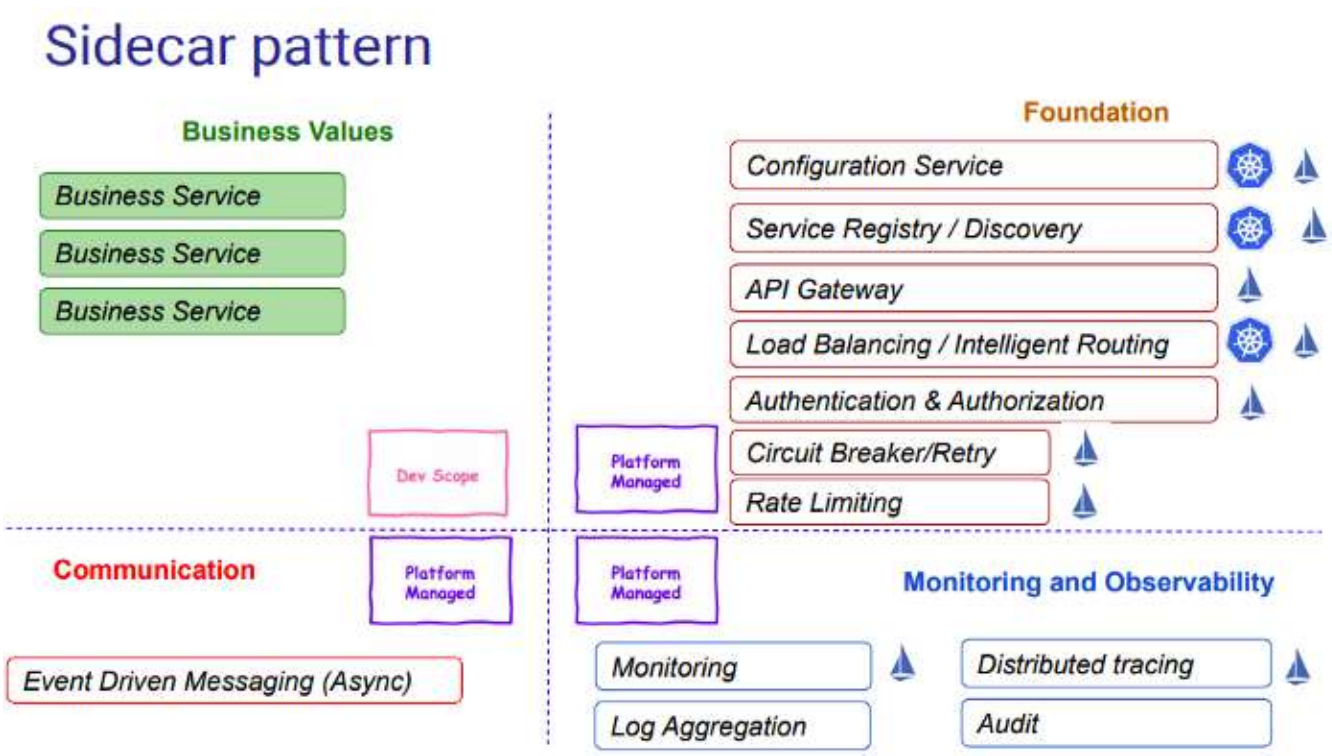
Istio does:

1. Service discovery
2. Load Balancing & Intelligent Routing
3. Resiliency: Circuit Breaker & Retry
4. Rate Limiting
5. Authentication and Authorization
6. Service to Service mTLS
7. Policy enforcement
8. Observability
9. Monitoring metrics
10. Distributed tracing

Istio does not:

1. Event-Driven Asynchronous communication

2. Service Orchestration



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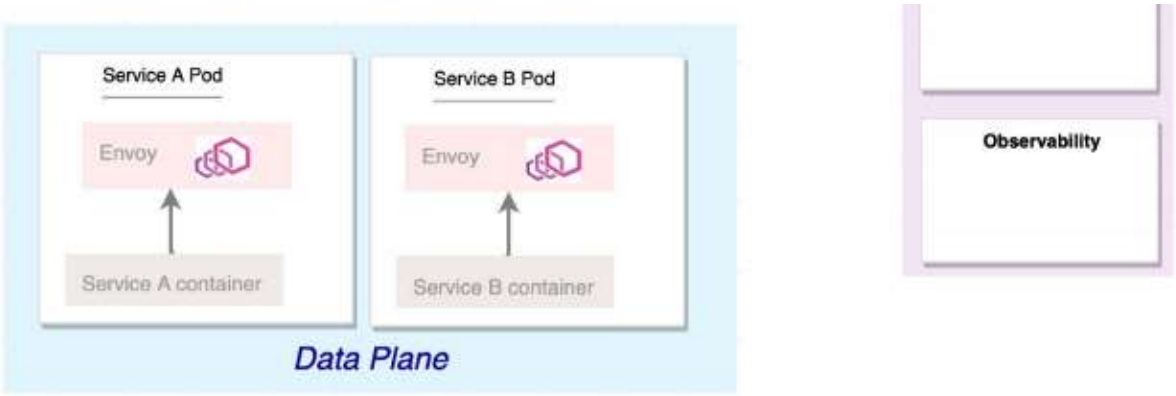
Service Discovery Challenge

Kubernetes provides service discovery, why do I need an extra one?

Istio supports:

1. HTTP L7 filter
2. HTTP L7 routing (based on HTTP headers and cookies)
3. First-class HTTP/2
4. gRPC support
5. Fine-grained traffic splitting

Architecture



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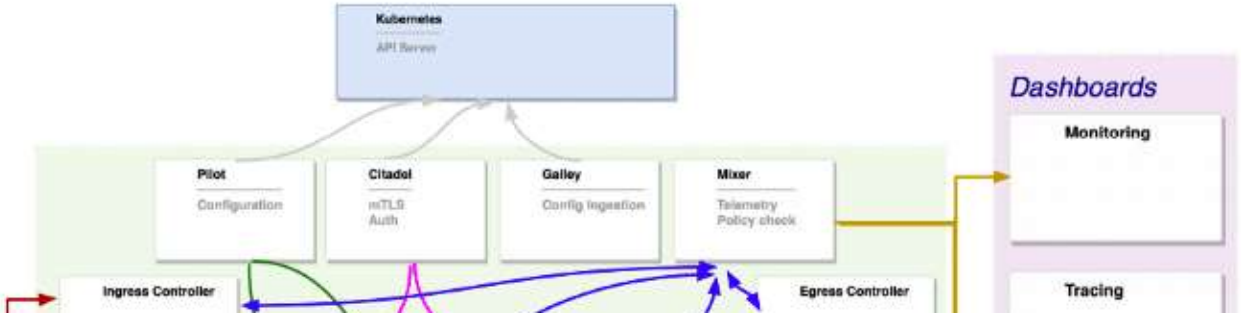
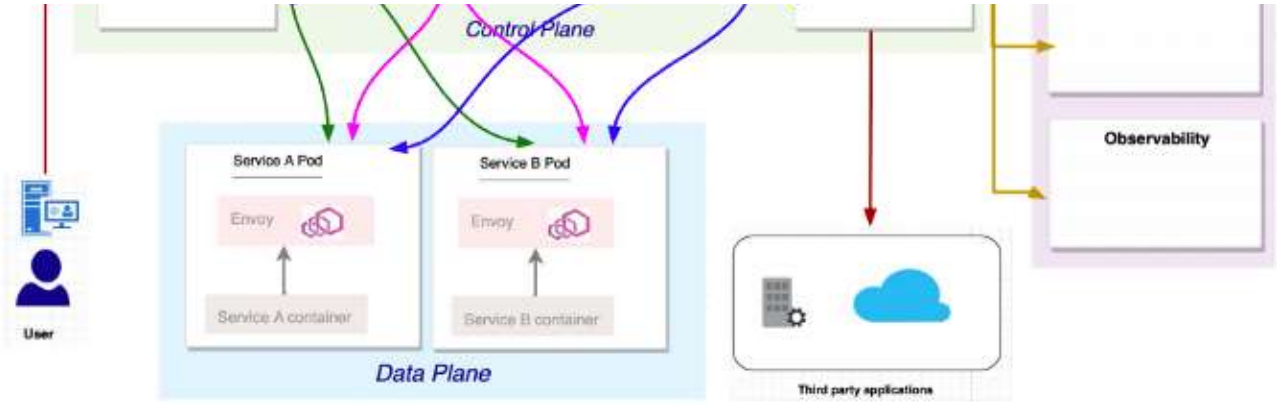
Istio building blocks 1

1. Pilot = Responsible for service discovery and for configuring the Envoy sidecar proxies
2. Citadel = Automated key and certificate management
3. Mixer = Istio-Policy: policy enforcement Istio-Telemetry: gather telemetry data
4. Galley= Configuration ingestion for istio components
5. Ingress Gateway =manages an inbound connection to the service mesh
6. Egress Gateway = manages outbound connection from the service mesh
7. Sidecar injector = Inside sidecar for enabled pods/namespaces

Istio building blocks 2

1. Prometheus =Metrics collection
2. Grafana = Monitoring dashboard
3. Jaeger =Distributed tracing
4. Kiali =Observability dashboard





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