Cloud Native approach with Kyma

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PUBLIC

THE BEST RUN

Who we are

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Introduction

What is it really about ?

Agenda

❑ Introduction to cloud native and CNCF

❑ Introduction to Kubernetes

❑ Introduction to Kyma

❑ Scenarios

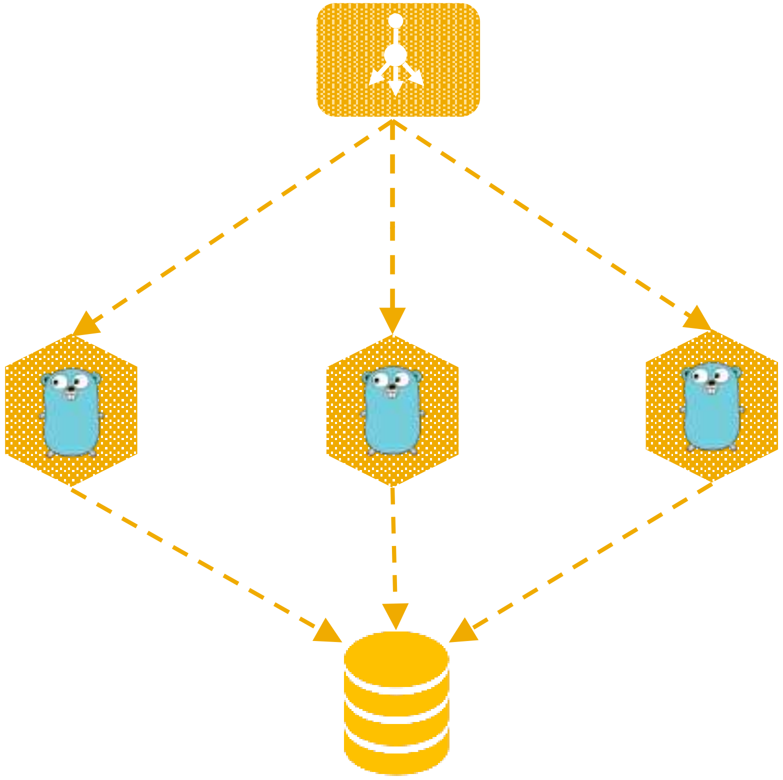
- Present scenario
- Demo part
- Architecture / Introduction to Kyma components

❑ Q&A

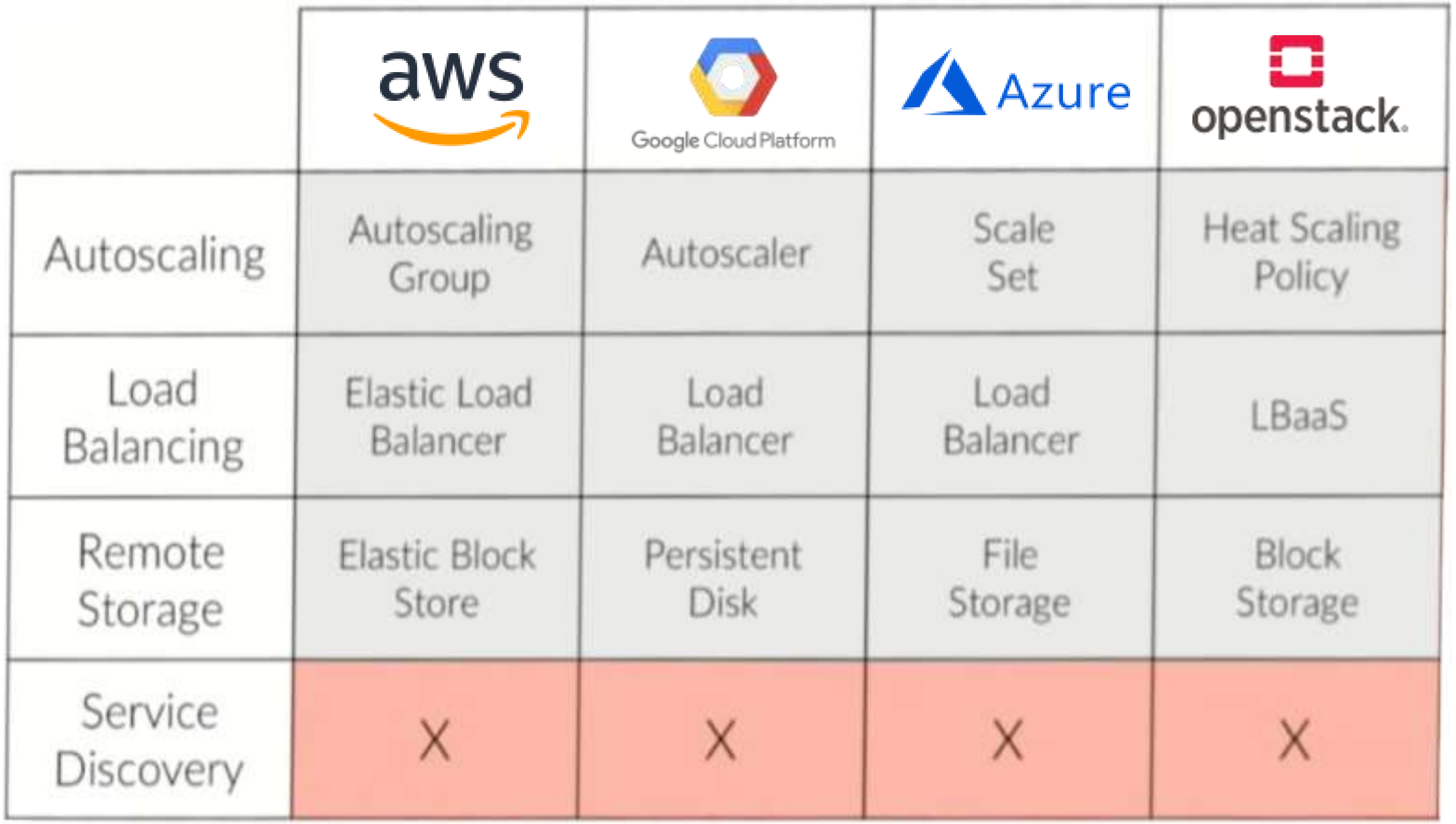
CNCF Kubernetes Kyma

Call me Cloud Native

- **Microservices architecture**: *individual components are small and decoupled.*
- **Containerize**: *package processes making them easy to test, move and deploy.*
- **Orchestrate**: *containers are actively scheduled and managed to optimize resource utilization.*

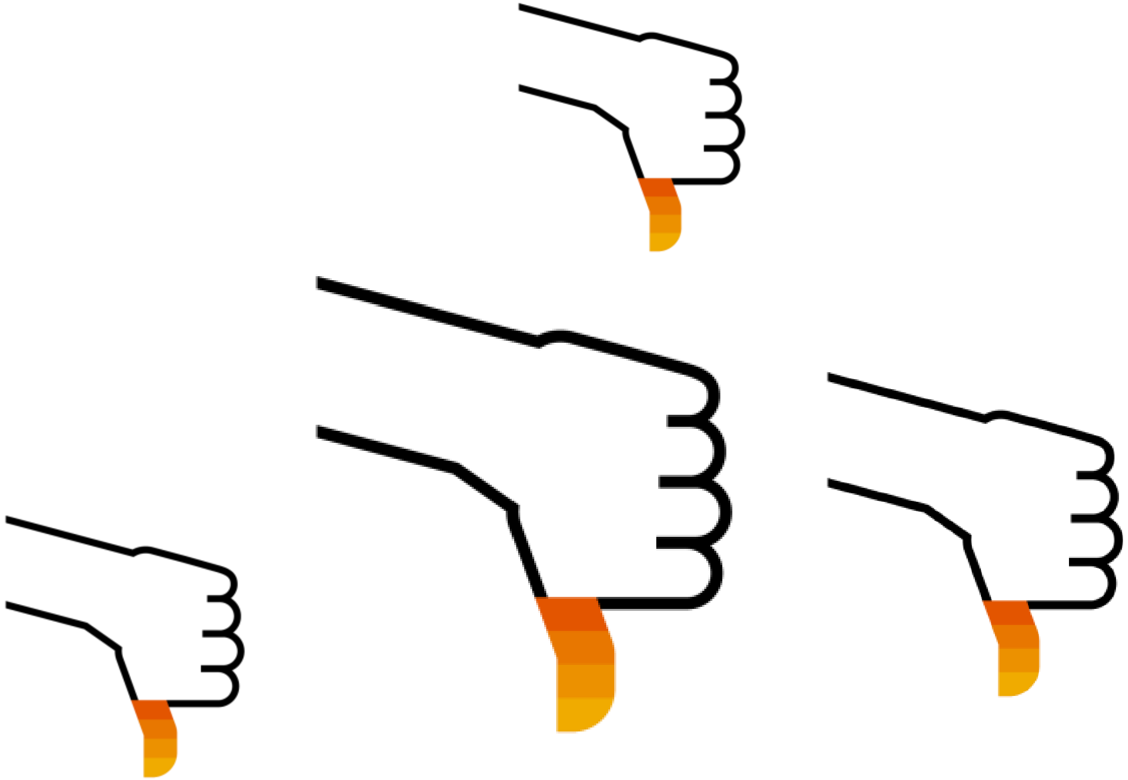


Where to run our solution?



	aws	Google Cloud Platform	Azure	openstack.
Autoscaling	Autoscaling Group	Autoscaler	Scale Set	Heat Scaling Policy
Load Balancing	Elastic Load Balancer	Load Balancer	Load Balancer	LBaaS
Remote Storage	Elastic Block Store	Persistent Disk	File Storage	Block Storage
Service Discovery	X	X	X	X

Portability

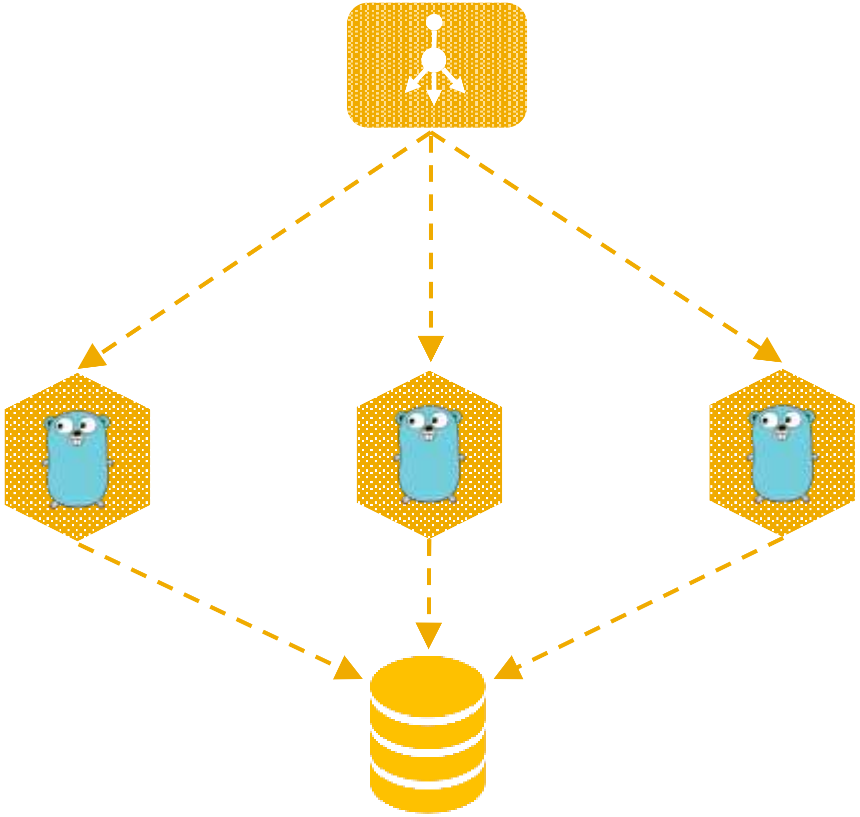


Let’s become portability

“Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.”

“Kubernetes builds upon 15 years of experience of running production workloads at Google (..)”

Let’s become portability



- ❑ Deployment
- ❑ PodAutoscaler
- ❑ Service
- ❑ Volume

Let’s become portability

Autoscaling

Load Balancing

kubernetes

Remote Storage

Service Discovery

aws

Google Cloud Platform

Azure

openstack.

Bare Metal

Patroness of Cloud Native ecosystem

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https://www.cncf.io/people/technical-oversight-committee/

https://landscape.cncf.io/

https://www.cncf.io/about/members/

So what is Kyma about?

- Cloud native extension and integration solution
  - Integrate existing company product portfolio
  - Extend existing products

- „Developer agnostic”, new functionality written in Kyma independent of extended system

- By default cloud native (out of the box ecosystem), e.g.
  - Kubernetes
  - Tracing
  - Monitoring
  - Scaling
  - Microservices

So what is Kyma about?

Focused on:

- *being a micro service based development platform for SAP Hybris Solutions*
- *offering a marketplace for micro service based solutions build on top of platform*
- *platform itself not available to customers*
- *offering a number of reusable micro services for building applications*

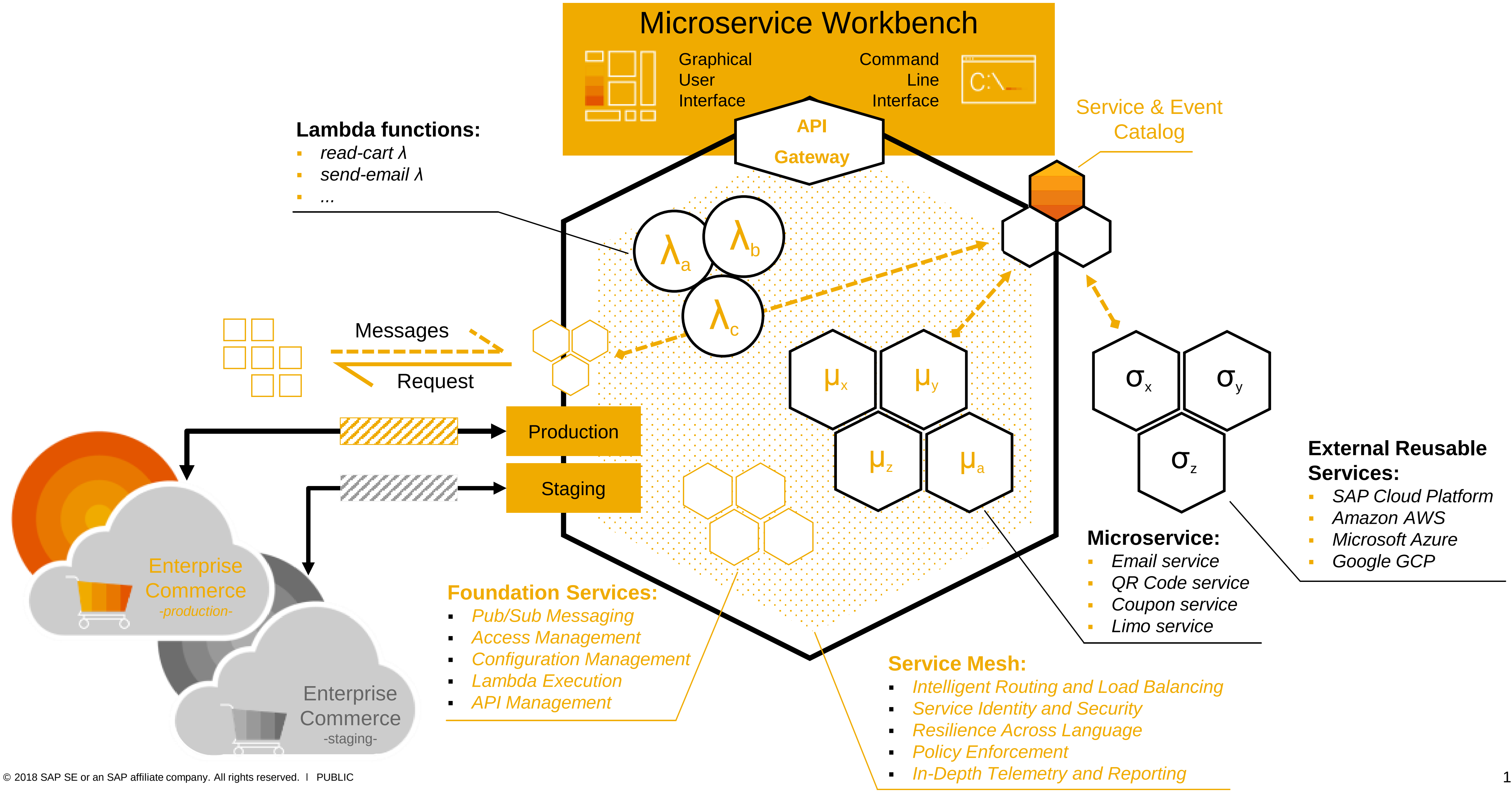
Focuses on:

- *being a cloud-native extension and integration solution for the SAP Hybris Portfolio*
- *leaving commercial aspects to the now available SAP solutions*
- *platform should be available to everyone*
- *offering access to many reusable services from different providers (AZURE, GCP, AWS, SCP)*

Kyma manifest

- Integration first
  - use and contribute to open source
- CLI and UI
- Aplication memory default and max limits
- Go language only
- Local development
  - minikube

Architecture



Lambda functions:

- *read-cart λ*
- *send-email λ*
- *...*

Foundation Services:

- *Pub/Sub Messaging*
- *Access Management*
- *Configuration Management*
- *Lambda Execution*
- *API Management*

Service Mesh:

- *Intelligent Routing and Load Balancing*
- *Service Identity and Security*
- *Resilience Across Language*
- *Policy Enforcement*
- *In-Depth Telemetry and Reporting*

Microservice:

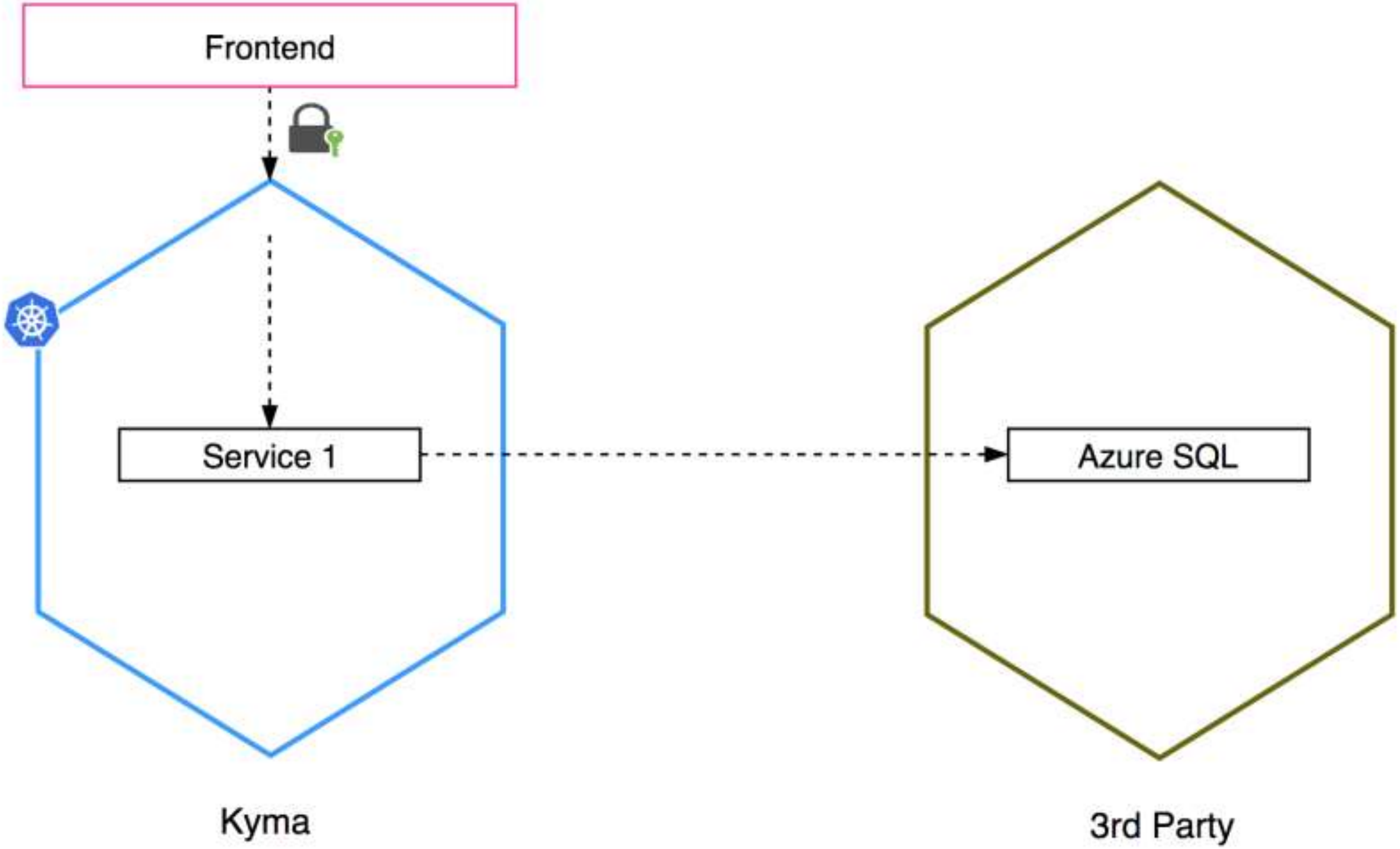
- *Email service*
- *QR Code service*
- *Coupon service*
- *Limo service*

External Reusable Services:

- *SAP Cloud Platform*
- *Amazon AWS*
- *Microsoft Azure*
- *Google GCP*

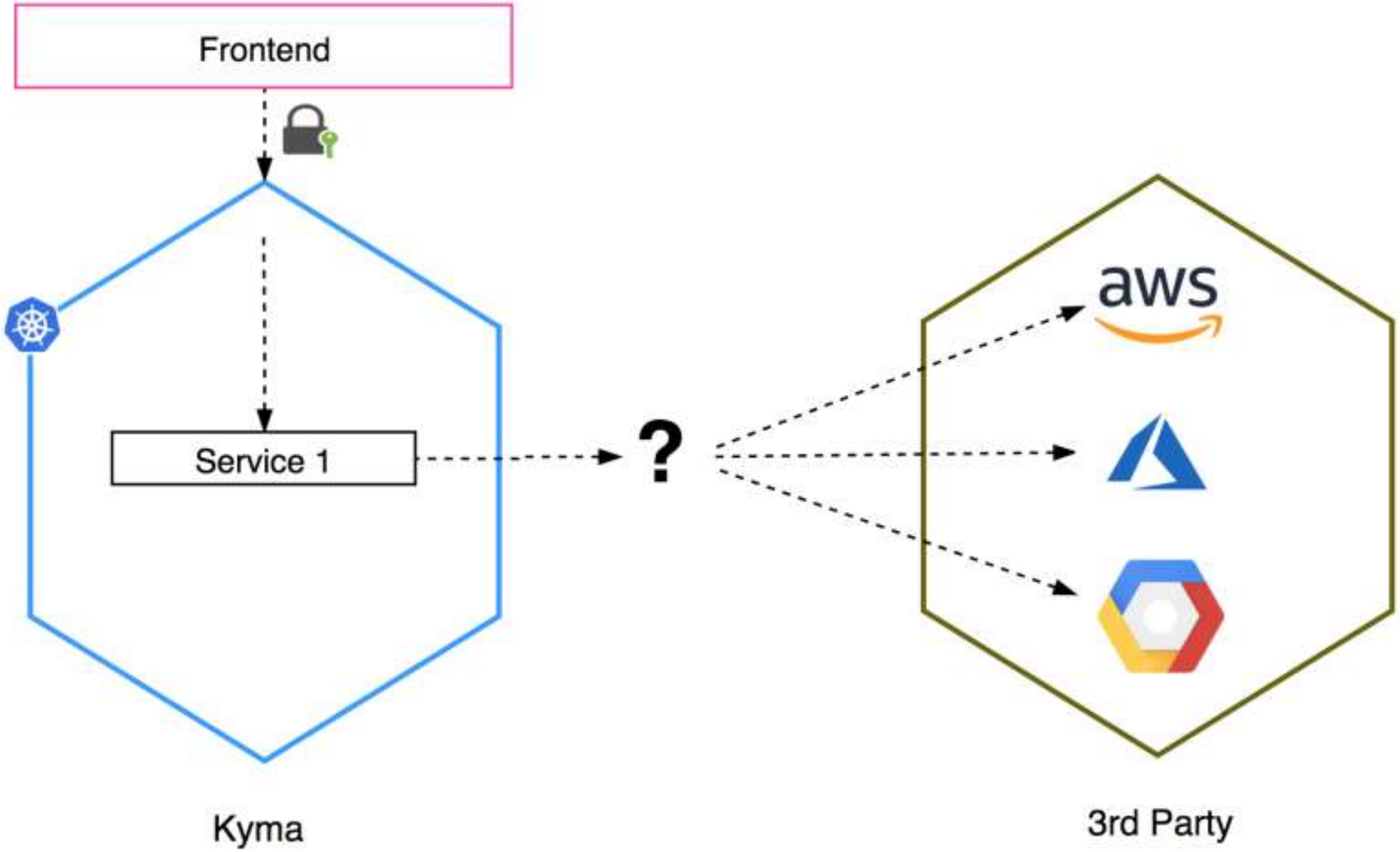
Scenario 1 Deploy a service which using database and expose API to the world

Diagram



Demo time

Let’s solve some problem



Let’s solve some problem

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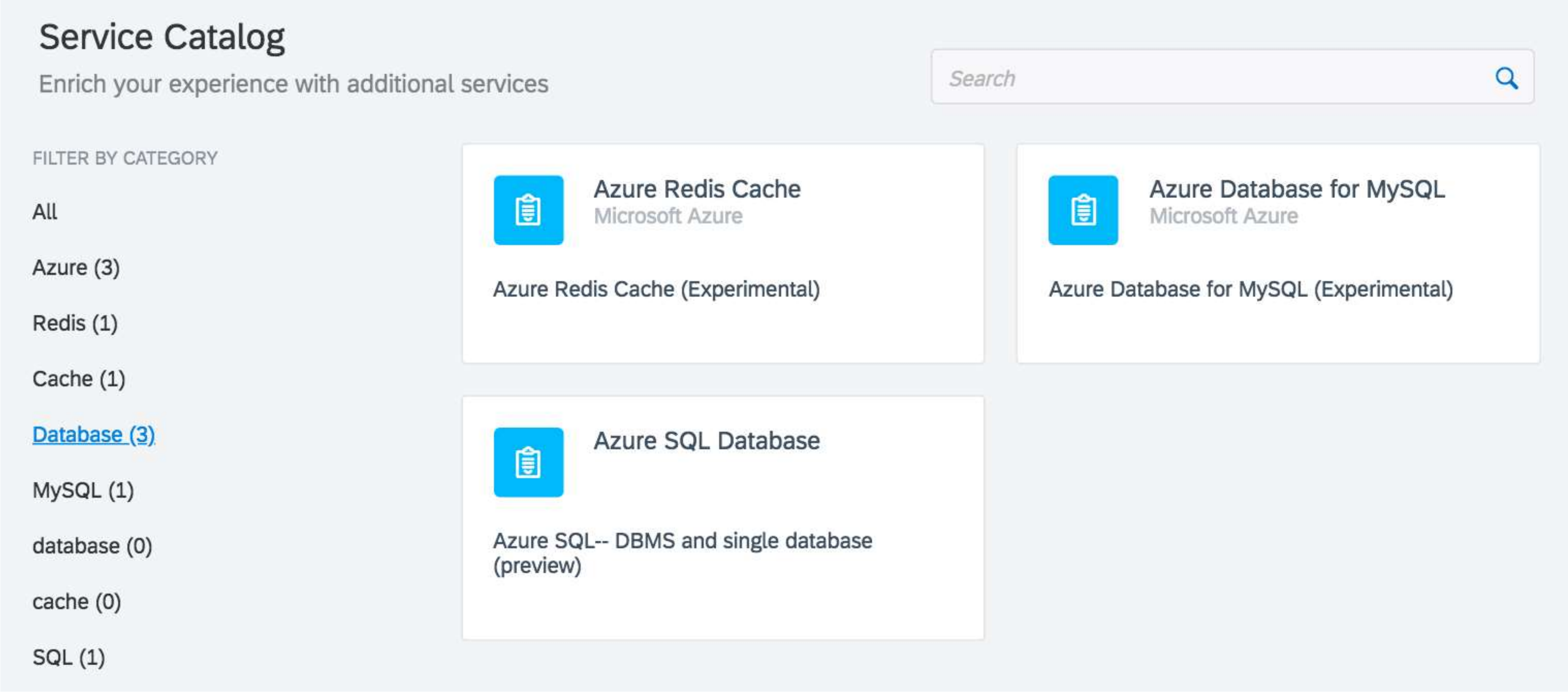


Service Catalog

Enrich your experience with additional services

FILTER BY CATEGORY

- All
- Azure (3)
- Redis (1)
- Cache (1)
- Database (3)
- MySQL (1)
- database (0)
- cache (0)
- SQL (1)

Azure Redis Cache
Microsoft Azure

Azure Redis Cache (Experimental)

Azure Database for MySQL
Microsoft Azure

Azure Database for MySQL (Experimental)

Azure SQL Database

Azure SQL-- DBMS and single database (preview)

Let’s do it right!

OPEN SERVICE BROKER API™

“A multi-vendor project to standardize how services are consumed on cloud-native platforms across service providers.”

redhat

Pivotal

Google

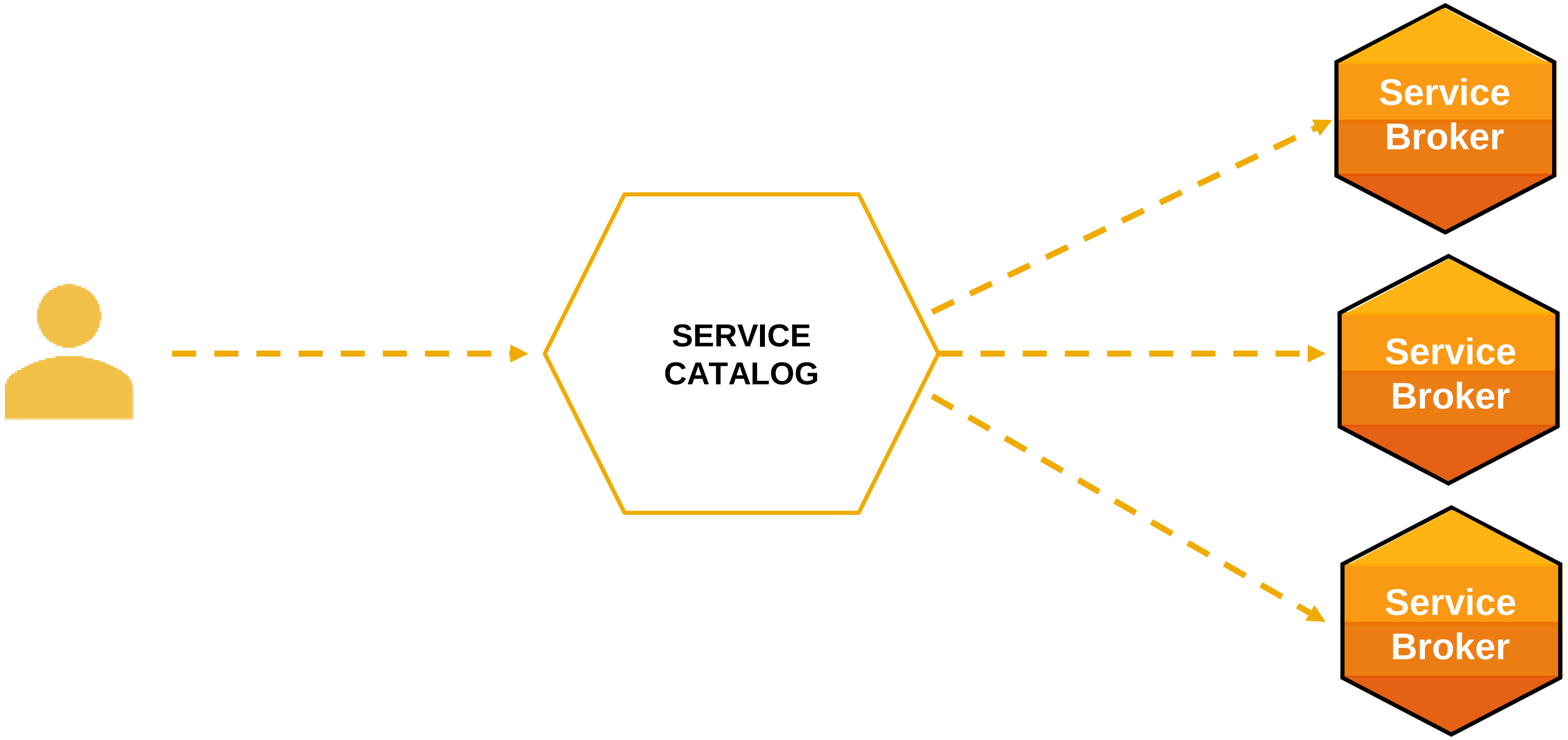
SAP®

IBM®

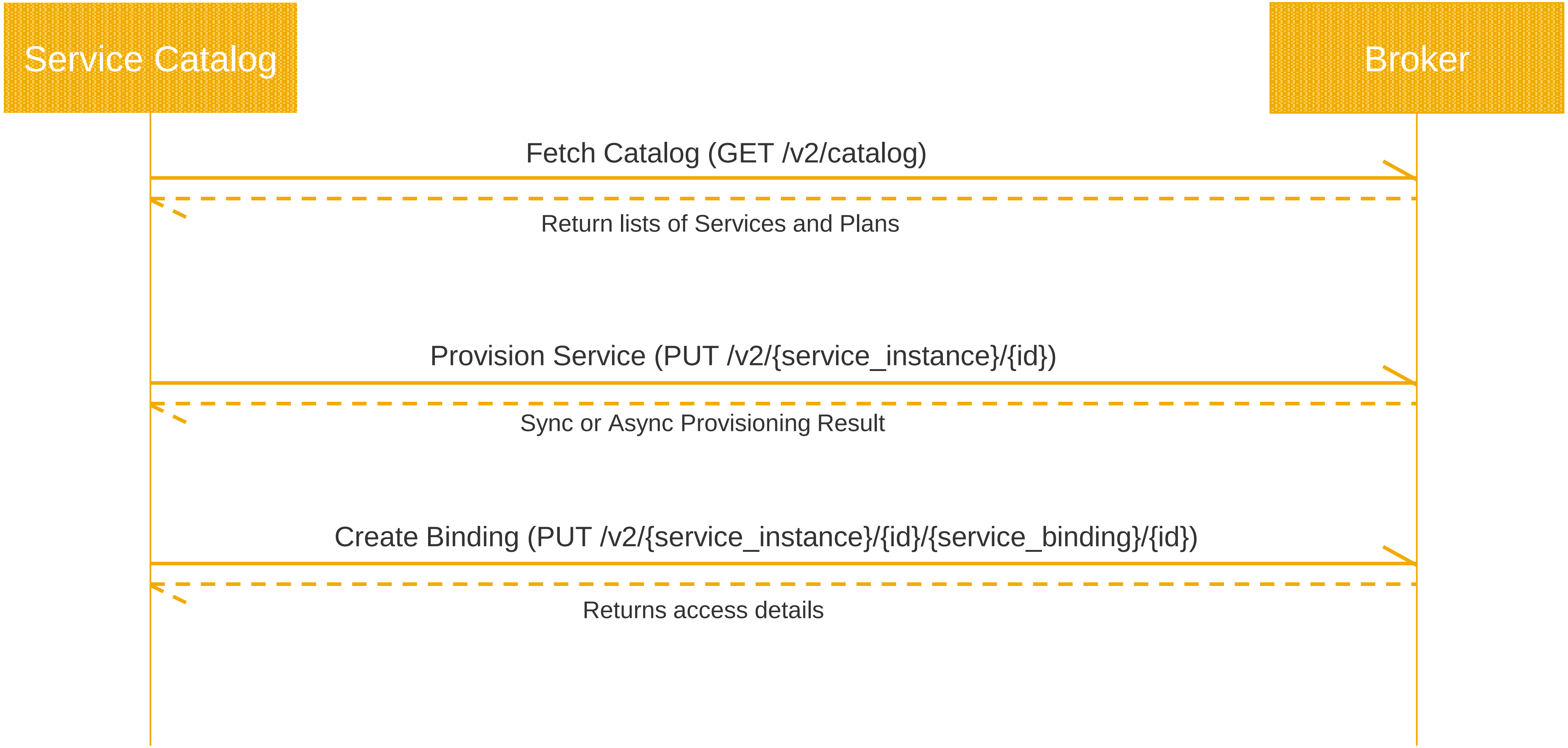
FUJITSU

Let’s do it right!

The Open Service Broker API defines the interaction between the platform and a broker



Let’s do it right!



Service Catalog

Broker

Fetch Catalog (GET /v2/catalog)

Return lists of Services and Plans

Provision Service (PUT /v2/{service_instance}/{id})

Sync or Async Provisioning Result

Create Binding (PUT /v2/{service_instance}/{id}/{service_binding}/{id})

Returns access details

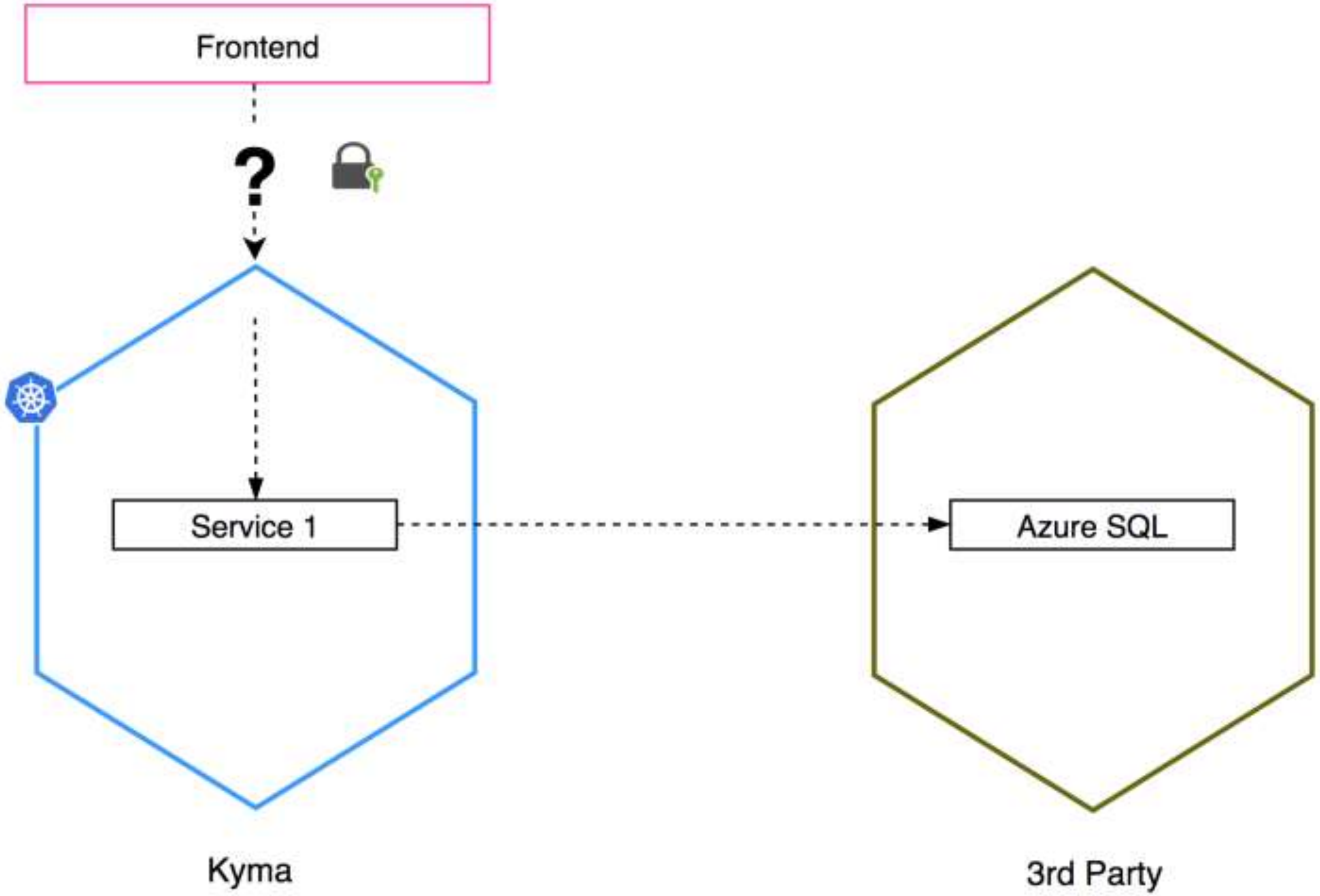
…Unbind, Deprovision Service

Let’s do it right!

- Brokers already in place
  - Google Cloud Platform Service Broker
  - Open Service Broker for Azure
  - AWS Service Broker
  - ***and more and more…***

- Own broker? **OSB Starter Pack**
  - Catalogue
  - Provision
  - Bind
  - Update
  - Unbind
  - Deprovision

Inbound traffic & Authorization



Ingress

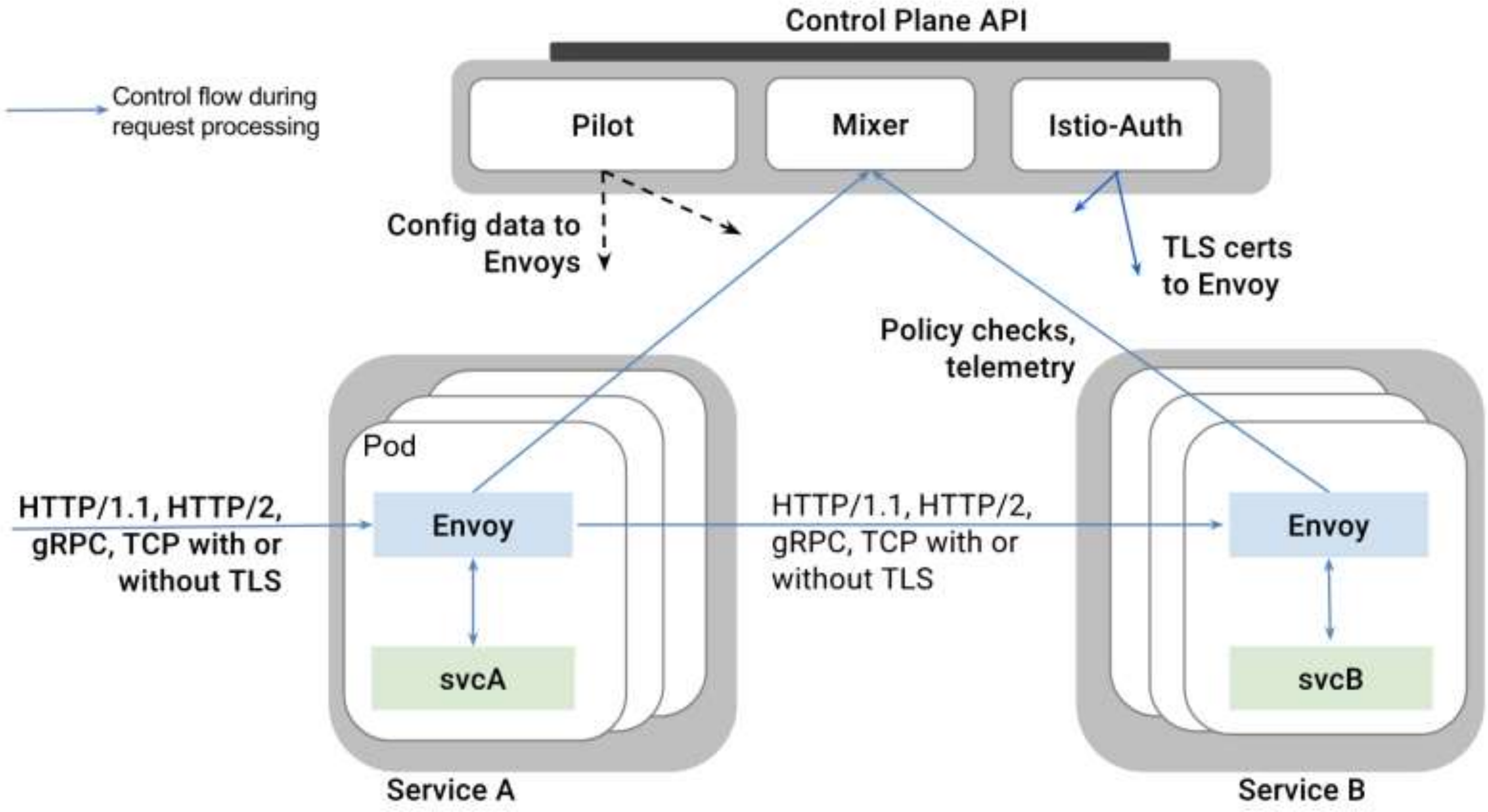
```
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  annotations:
    kubernetes.io/ingress.class: istio
  name: http-db-service-ing
  namespace: stage
spec:
  tls:
  - secretName: istio-ingress-certs
  rules:
  - host: app.webinar.cluster.kyma.cx
   http:
    paths:
    - backend:
      serviceName: http-db-service
      servicePort: 8017
     path: /.*
```

Service Mesh

But wait.. the network is complicated

- ❑ Request retires
- ❑ Authentication
- ❑ Failure Management
- ❑ Fault Injection
- ❑ Circuit Breaker
- ❑ Logging
- ❑ Metrics

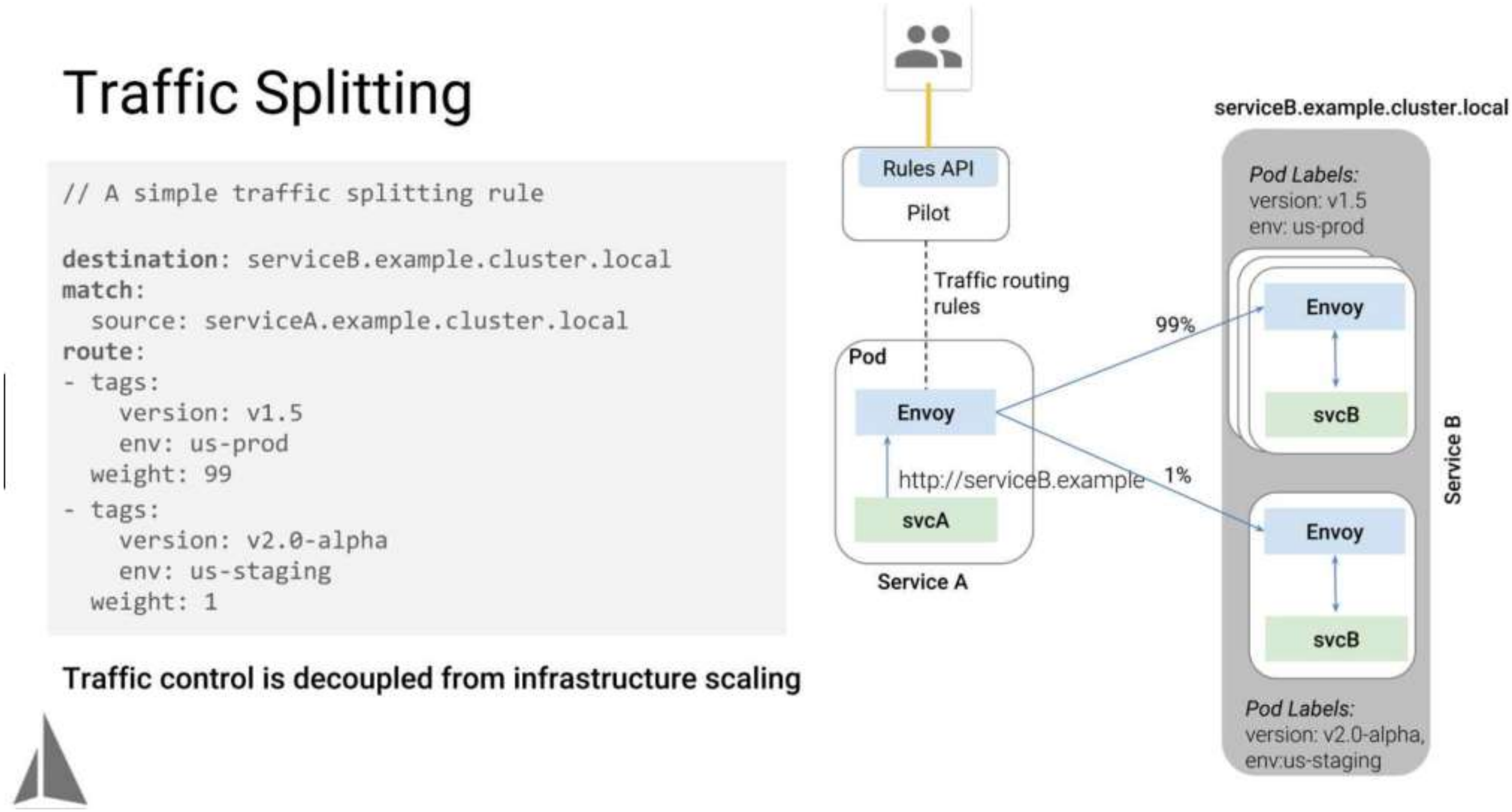
Service Mesh



Istio Architecture

Source https://istio.io/docs/concepts/what-is-istio/img/overview/arch.svg

Service Mesh



Traffic Splitting

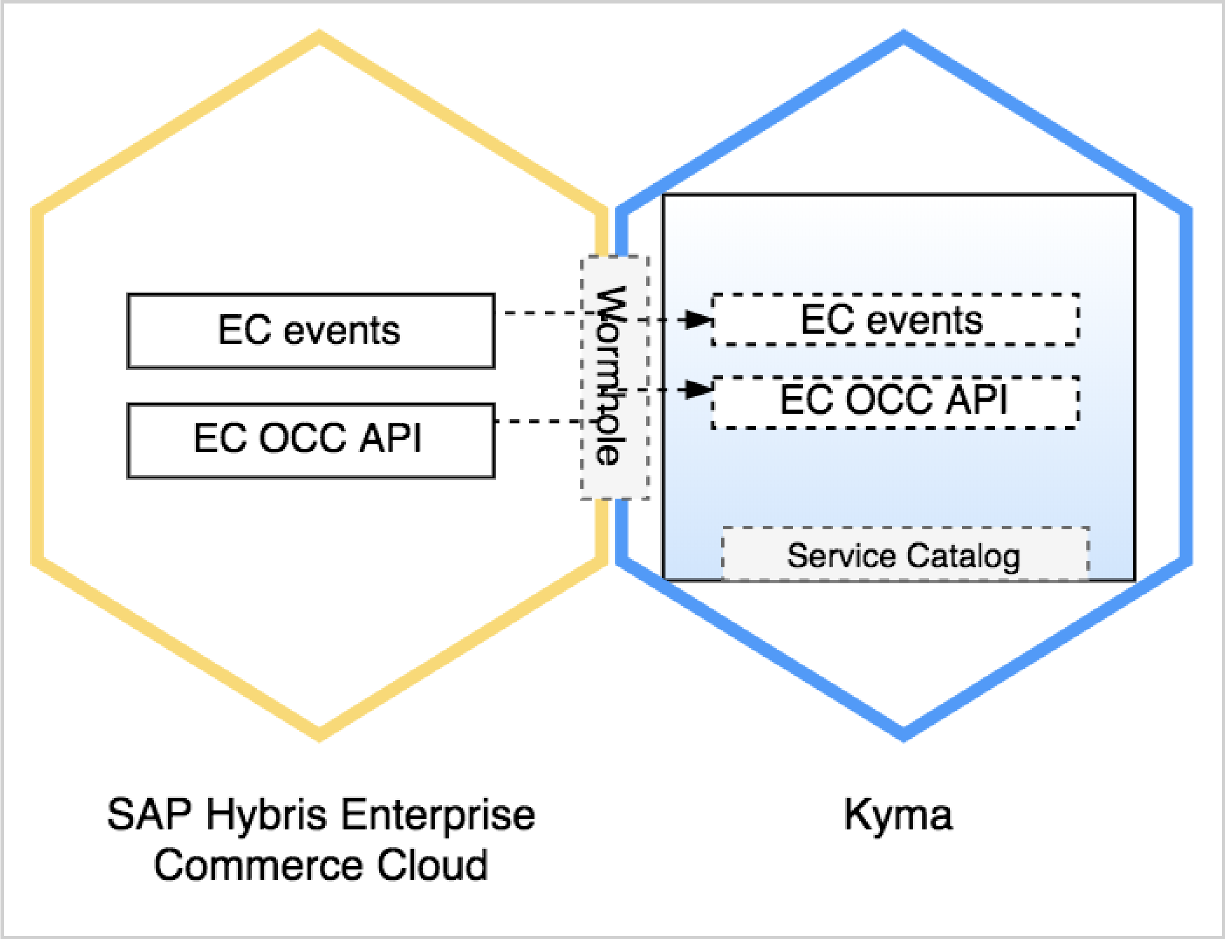
```
// A simple traffic splitting rule

destination: serviceB.example.cluster.local
match:
  source: serviceA.example.cluster.local
route:
- tags:
    version: v1.5
    env: us-prod
  weight: 99
- tags:
    version: v2.0-alpha
    env: us-staging
  weight: 1
```

Traffic control is decoupled from infrastructure scaling

Source https://istio.io/docs/concepts/traffic-management/img/pilot/ServiceModel_Versions.svg

Scenario 2 Register remote environment

Diagram


EC events
EC OCC API
Wormhole
EC events
EC OCC API
Service Catalog
SAP Hybris Enterprise Commerce Cloud
Kyma

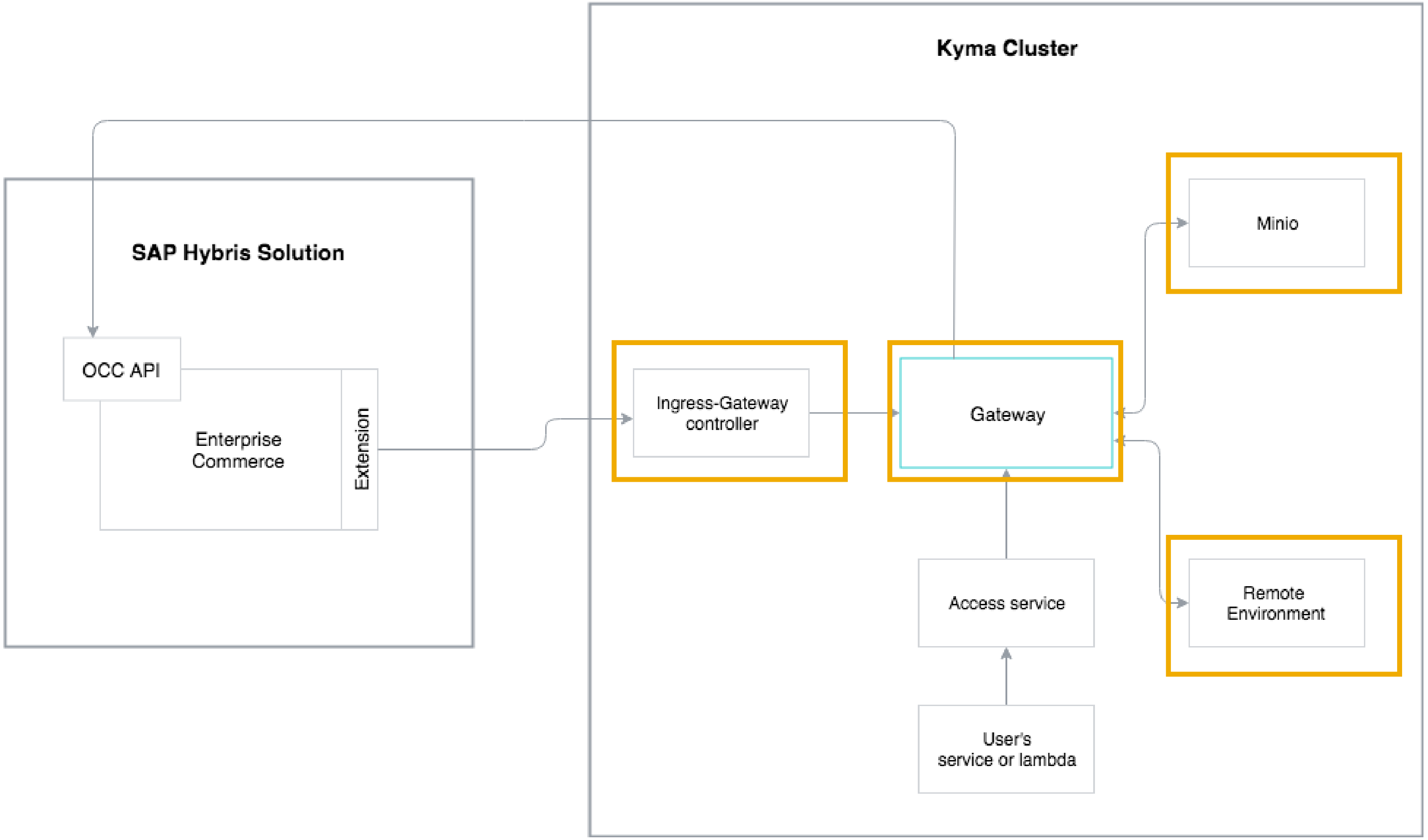
Demo time

Register your application to Kyma

- **Metadata API**: for *registering solutions’ APIs, Event Catalog, and documentation*
- **Events API**: *for sending Events from solutions’ to the Kyma Event Bus*
- **Proxy API**: *for calling registered solutions' APIs from Kyma services or lambdas*

Register your application to Kyma – Application Connector

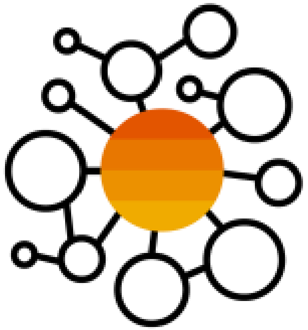
- **Ingress-Gateway controller**: responsible for validating certificates and exposing multiple Application Connectors to the external world
- **Gateway**: responsible for registering available services (APIs, Events) and proxying calls to the registered solution
- **Remote Environment CRD instance**: responsible for storing a solution's metadata
- **Minio bucket:** responsible for storing API specifications, Event Catalog, and documentation

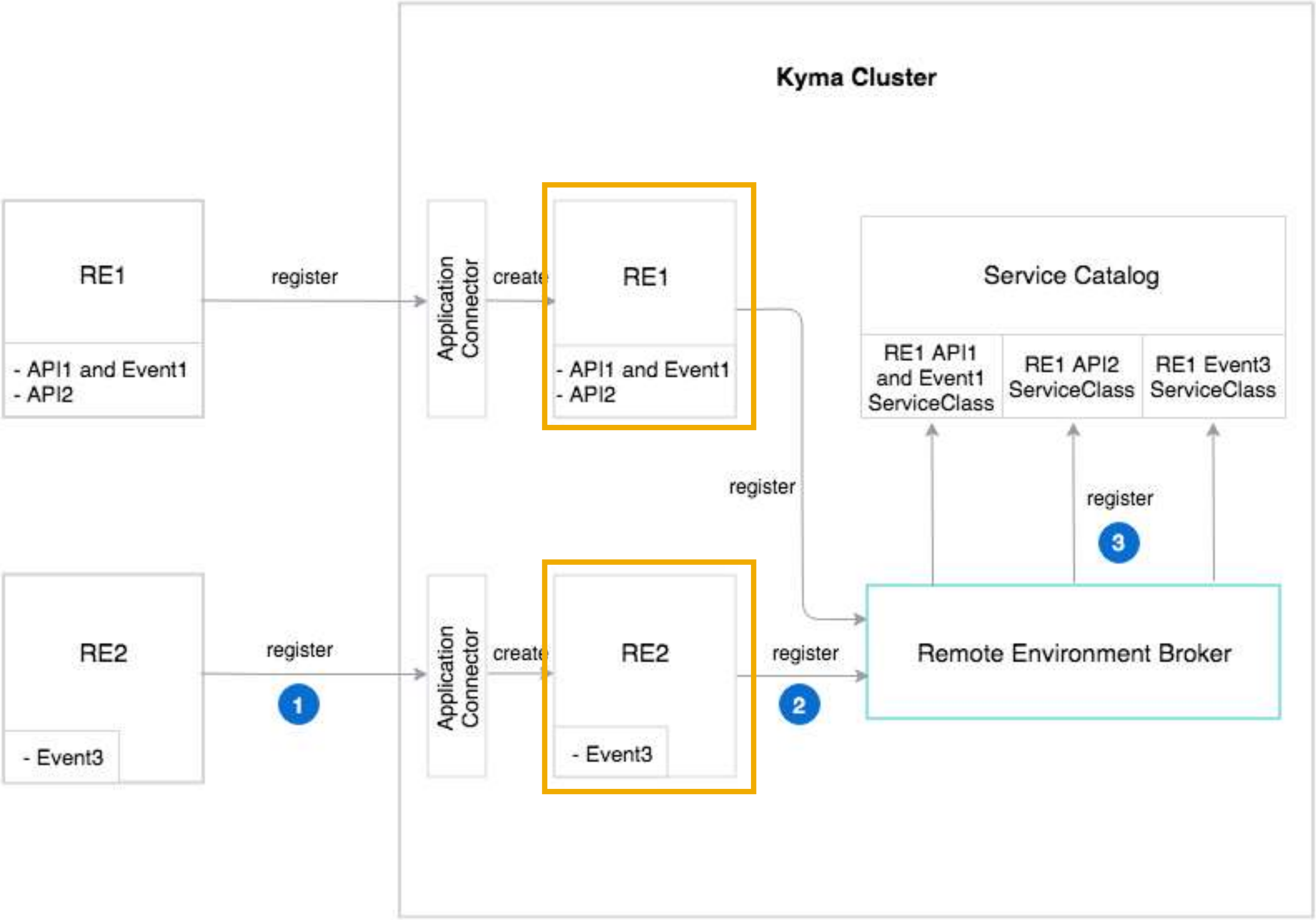


Register your application to Kyma – Service Catalog

The Remote Environment Broker:

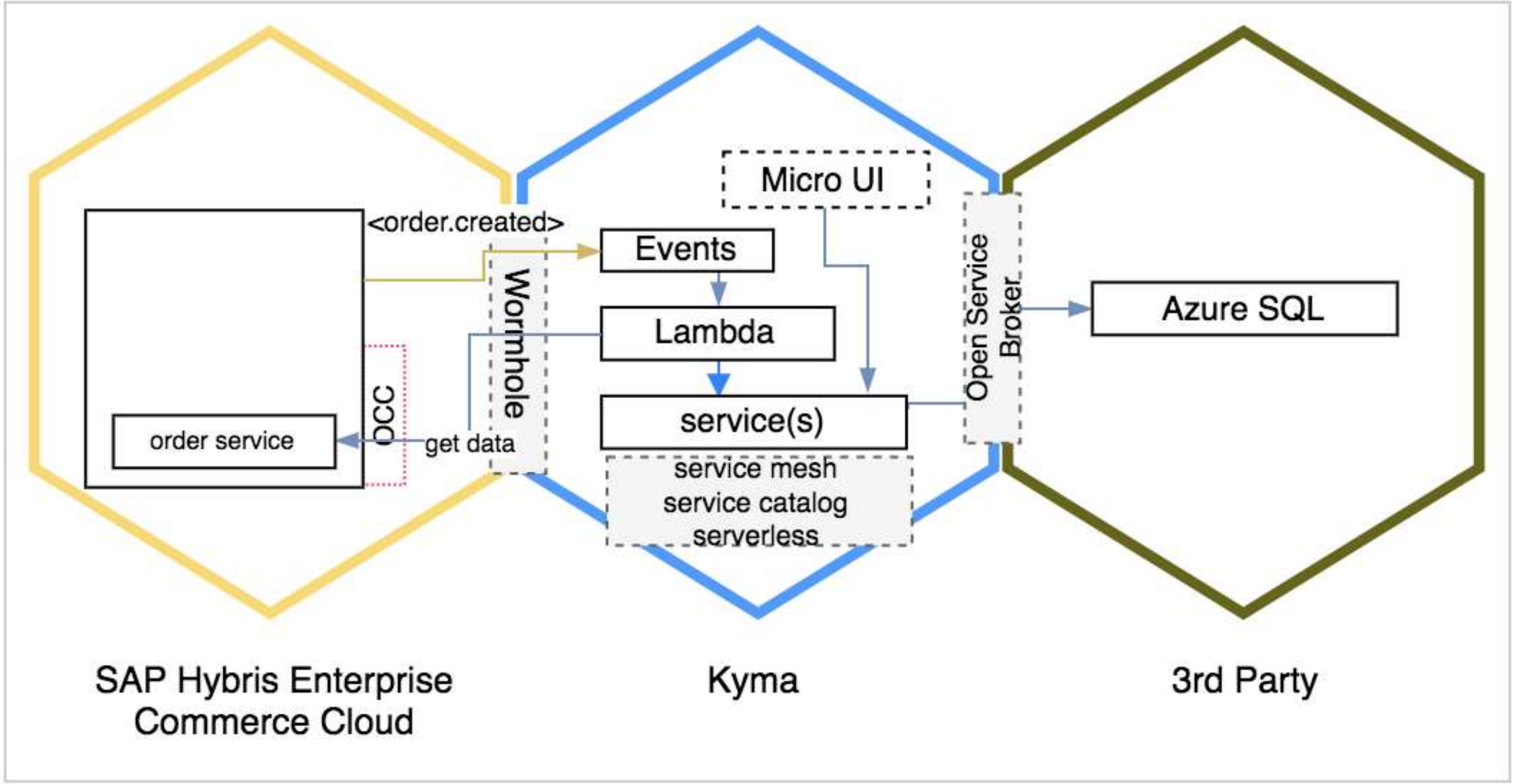
- *implements the Service Broker API.*
- *observes all the remote environment custom resources and exposes their APIs and/or Events as ServiceClasses to the Service Catalog.*





Scenario 3 Trigger Lambda by Event, Monitor and Trace

Diagram


Micro UI
<order.created>
Events
Wormhole
Lambda
service(s)
Open Service Broker
Azure SQL
OCC
order service
get data
service mesh
service catalog
serverless
SAP Hybris Enterprise Commerce Cloud
Kyma
3rd Party

Demo time

Serverless

„Serverless computing still requires servers!”

„The name "serverless computing" is used because the server management and capacity planning decisions are completely hidden from the developer or operator.”

Kubeless

„Kubeless is a Kubernetes-native serverless framework that lets you deploy small bits of code (functions) without having to worry about the underlying infrastructure.”

„It is designed to be deployed on top of a Kubernetes cluster and take advantage of all the great Kubernetes primitives. If you are looking for an open source serverless solution that clones what you can find on AWS Lambda, Azure Functions, and Google Cloud Functions, Kubeless is for you!”

Lambdas – make simple things simple

Triggers

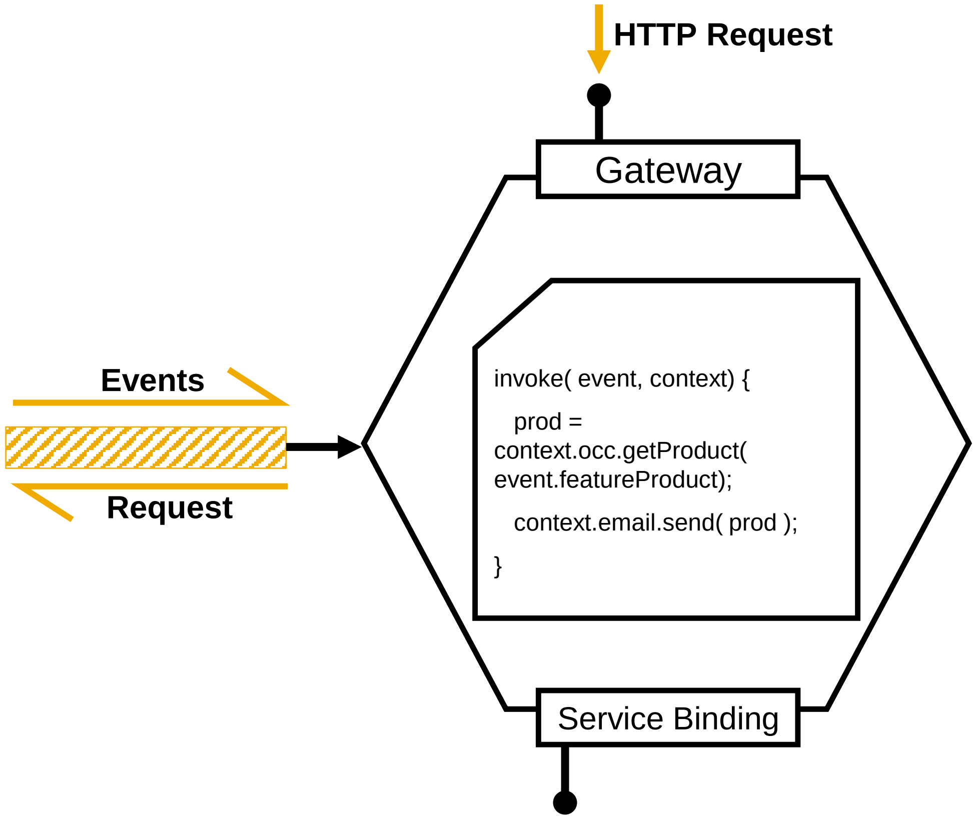
- Events (exposed by connected SAP Hybris Products)
- HTTP Endpoints (registered in Gateway)

Define Lambda

- Define Trigger and Context (which services will be used)
- Define logic (in UI with Code Completion, or CLI)
- Focus on logic as preconfigured clients for all selected services (e.g. for OCC API) are automatically available in your lambda (e.g. no manual handling of secrets)
- Versioning Support for Lambdas
- Tracing / Resilience (Istio)

Operations

- Deployment, Scaling, Restarts handled for you!



```
invoke( event, context) {
  prod =
context.occ.getProduct(
event.featureProduct);
  context.email.send( prod );
}
```

NATS

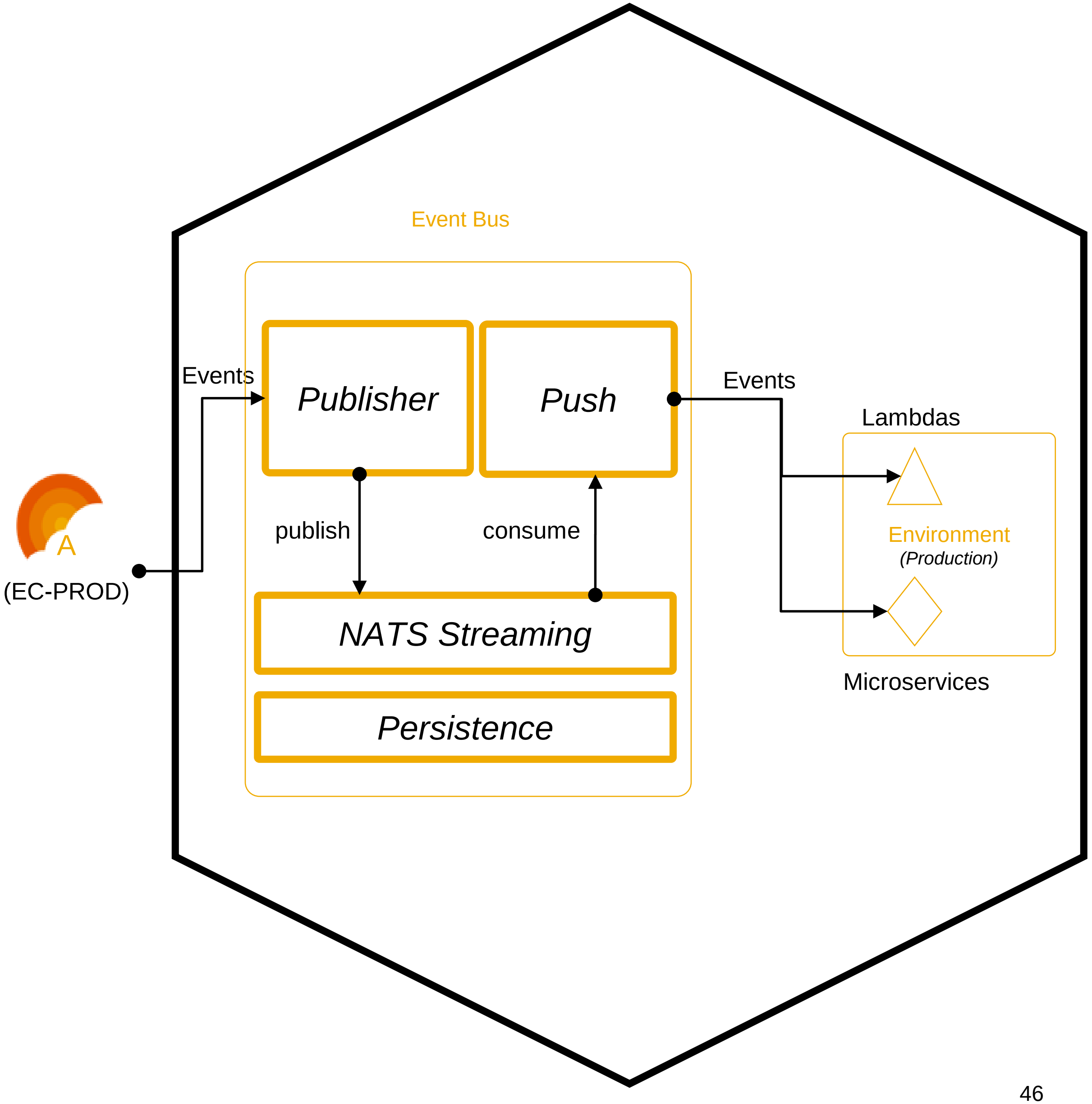
Kubeless

Messaging system – NATS

„NATS Server is a simple, high performance open source messaging system for cloud native applications, IoT messaging, and microservices architectures.”

Event Bus

- **NATS Streaming**: log-based streaming system that serves as a database allowing the Event Bus to store and transfer the Events on a large scale.
- **Persistence**: a back-end storage volume for NATS Streaming that stores Events.
- **Publish**: service that transfers the enriched Event from a given solution to NATS Streaming.
- **Push**: receives Events from NATS Streaming and delivers them to the lambda or the service. The Events are delivered through the Envoy proxy sidecar with mTLS enabled.



Monitoring and alerting

Grafana

Prometheus

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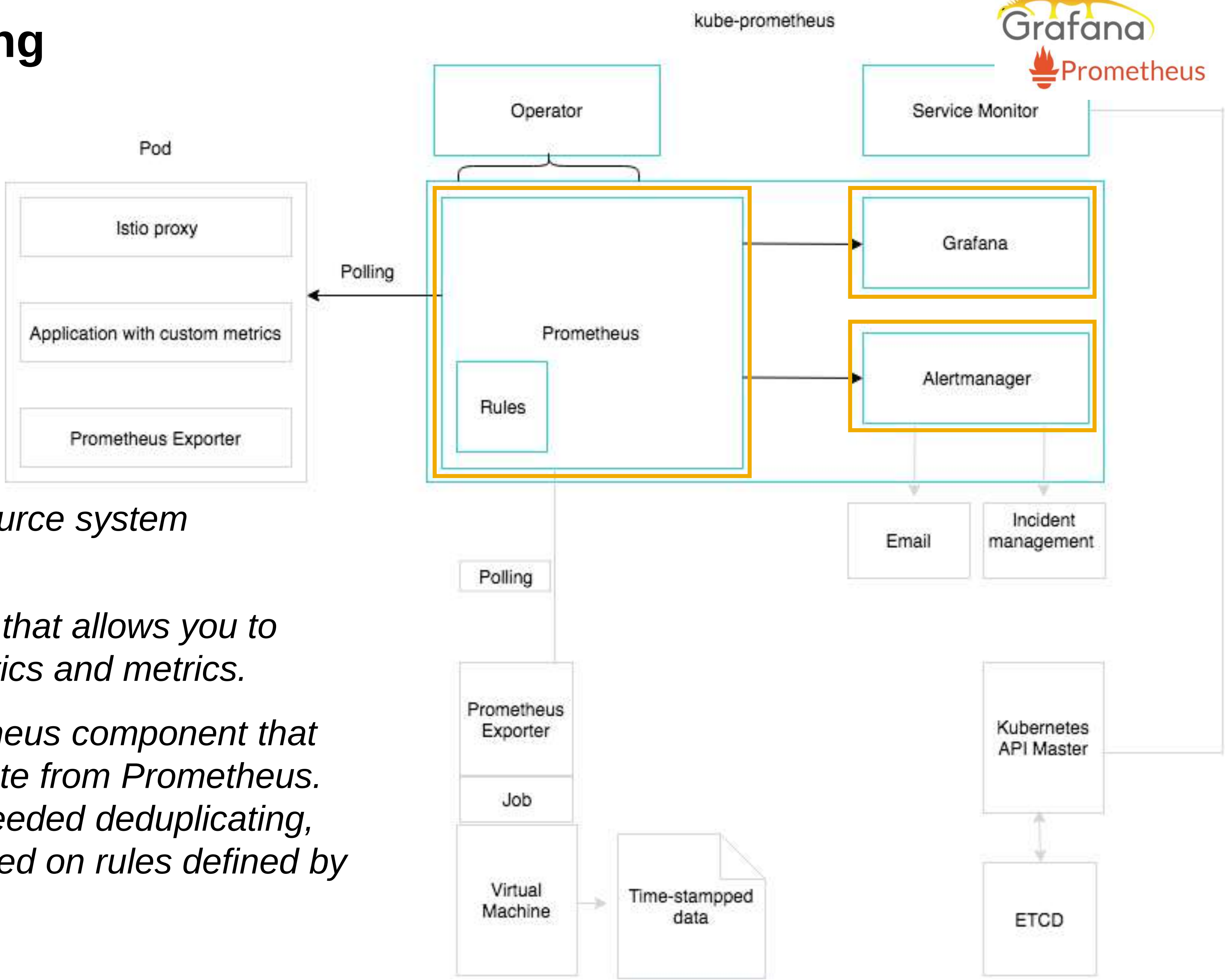
„An open source monitoring system and alerting toolkit, Prometheus helps companies with metrics and monitoring as they shift toward a cloud native computing world.”

Monitoring and alerting



- **Prometheus**: *an open-source system monitoring toolkit.*
- **Grafana**: *a user interface that allows you to query and visualize statistics and metrics.*
- **AlertManager**: *a Prometheus component that handles alerts that originate from Prometheus. AlertManager performs needed deduplicating, grouping, and routing based on rules defined by the Prometheus server.*

Tracing – Jeager

„As on-the-ground microservice practitioners are quickly realizing, the majority of operational problems that arise when moving to a distributed architecture are ultimately grounded in two areas: **networking** and **observability**.

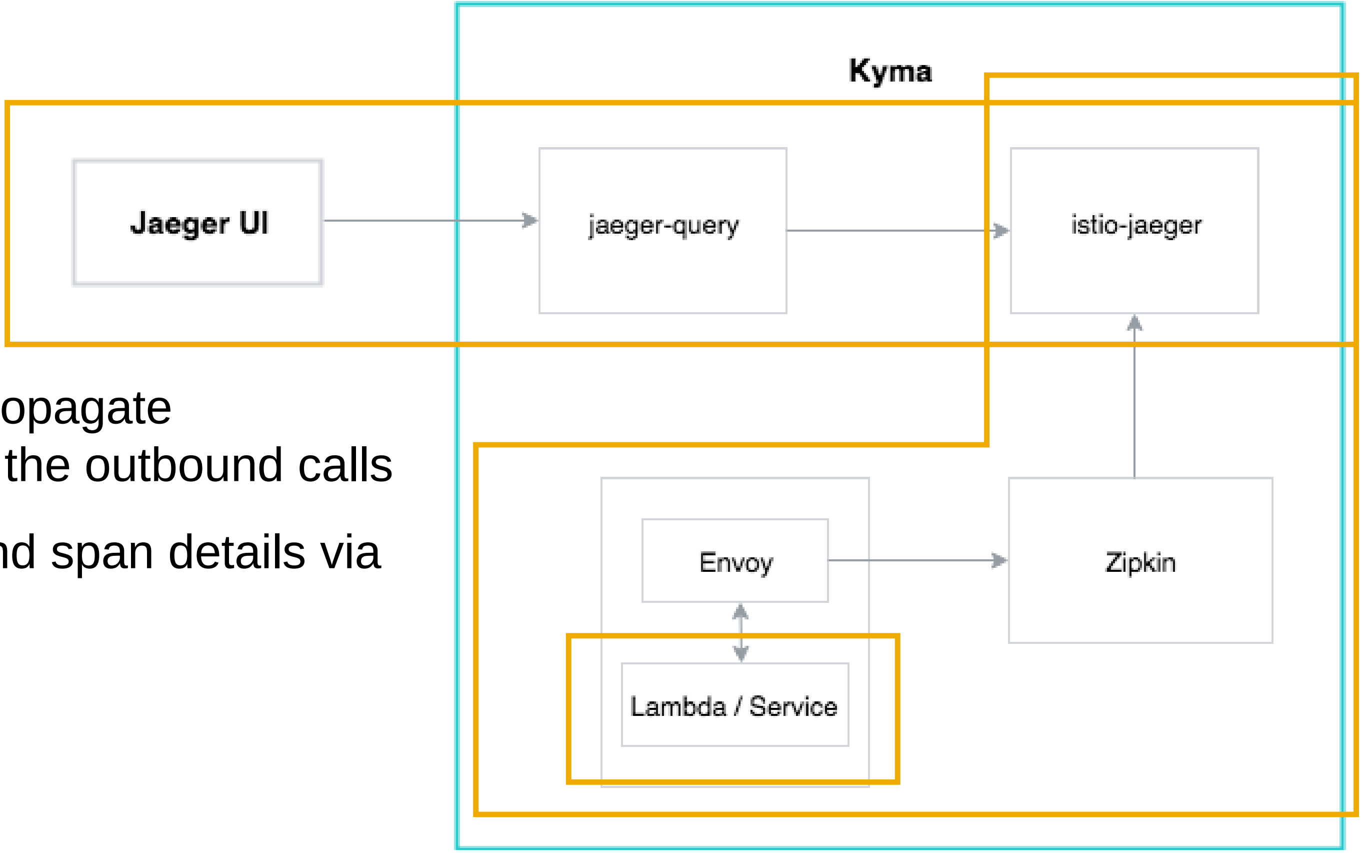
Jaeger provides compatibility with the Zipkin protocol. The compatibility makes it possible to use Zipkin protocol and clients in Istio, Envoy, and Kyma services.

Tracing – Istio jeager

Problems that Jaeger addresses

- distributed transaction monitoring
- performance and latency optimization
- root cause analysis
- service dependency analysis
- distributed context propagation

- **Request traces**
- **Store traces**:
  - configure application to propagate correct HTTP headers for the outbound calls
  - envoy passes the trace and span details via k8s service to istio-jeager



Links

- Microservices: https://www.martinfowler.com/articles/microservices.html
- Docker: https://www.docker.com/what-docker
- Kubernetes: https://kubernetes.io/
- CNCF: https://www.cncf.io/

- Open Service Broker API Spec: https://www.openservicebrokerapi.org/
- Service Catalog: https://github.com/kubernetes-incubator/service-catalog
- Azure Broker: https://osba.sh/
- OSB Starter Pack: https://github.com/pmorie/osb-starter-pack

- Grafana: https://grafana.com/
- Prometheus: https://prometheus.io/
- Jaeger: https://www.jaegertracing.io/

- Istio: https://istio.io/
- Kubeless: https://kubeless.io/
- Nats: https://nats.io/

Thank you.

Kyma will be open source soon!

Contact information:

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Q&A

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