Camel microservices with Spring Boot and Kubernetes

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@davsclaus

Voxxed Days Ticino
October 2018

I was in Milan 2 days ago

About me

- Senior Principal Software Engineer at Red Hat
- 10 years as Apache Camel committer
- Author of Camel in Action books
- Based in Denmark

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Twitter:	@davsclaus
Linkedin:	davsclaus
Facebook:	Claus Ibsen

System Integration

Figure 1.1 Camel is the glue between disparate systems.

Apache Camel

is an

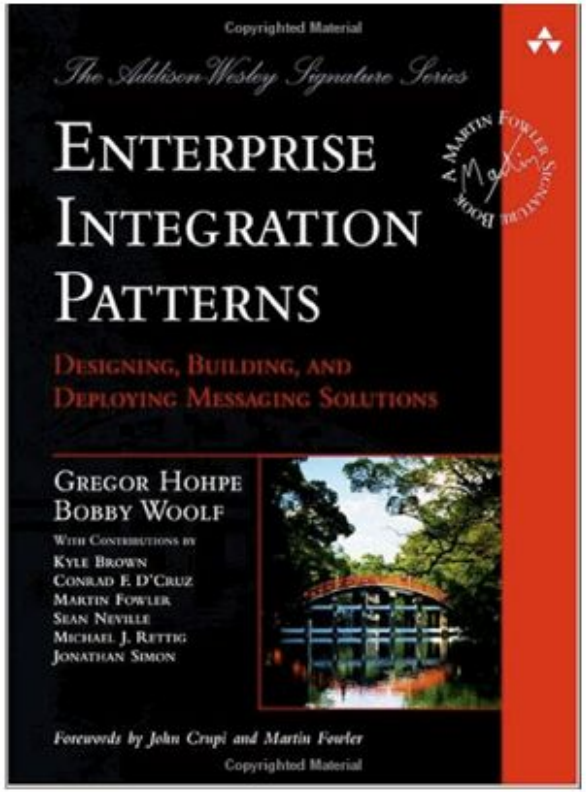
Integration Framework

based on

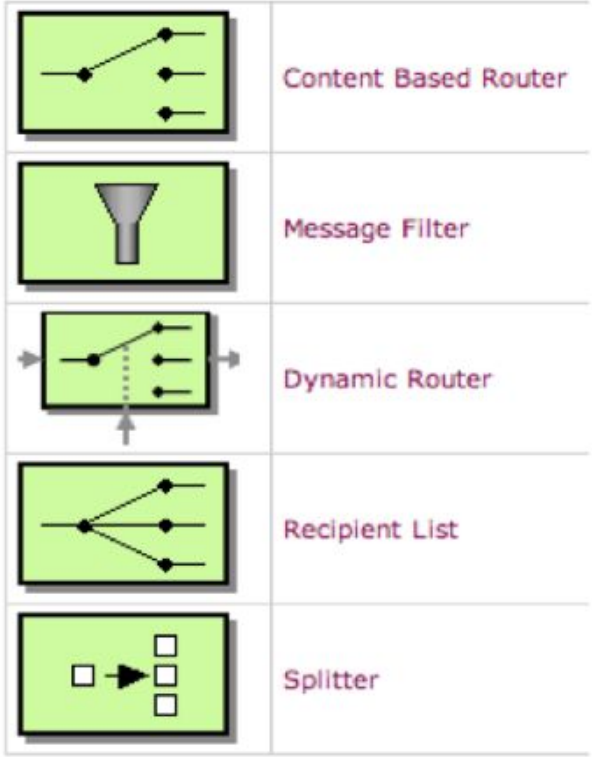
Enterprise Integration Patterns

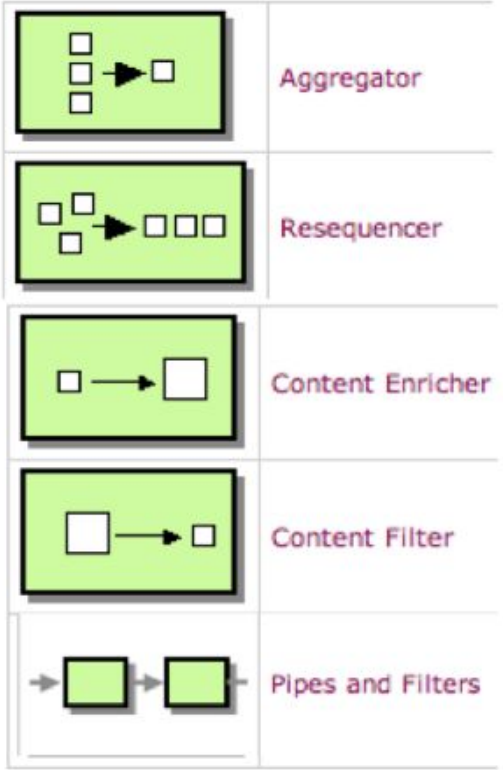
Integration Framework

Enterprise Integration Patterns

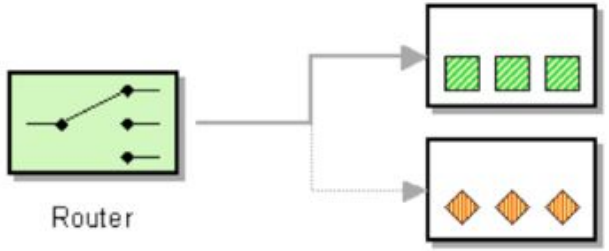


Enterprise Integration Patterns





Camel Routes



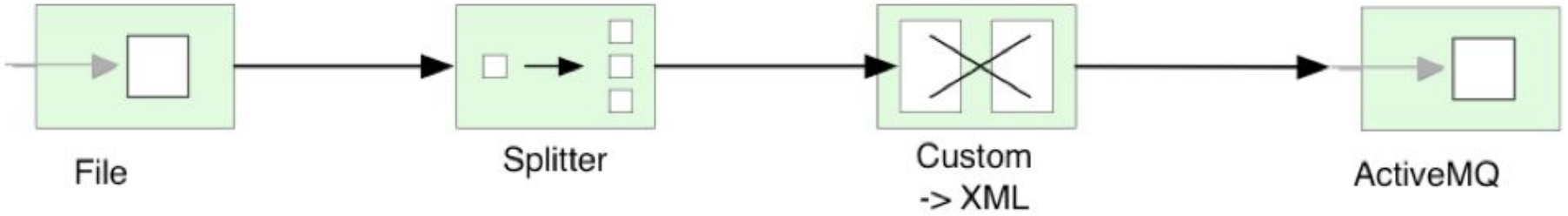

```
from("file:data/inbox")
   .to("jms:queue:order");
```

Java DSL

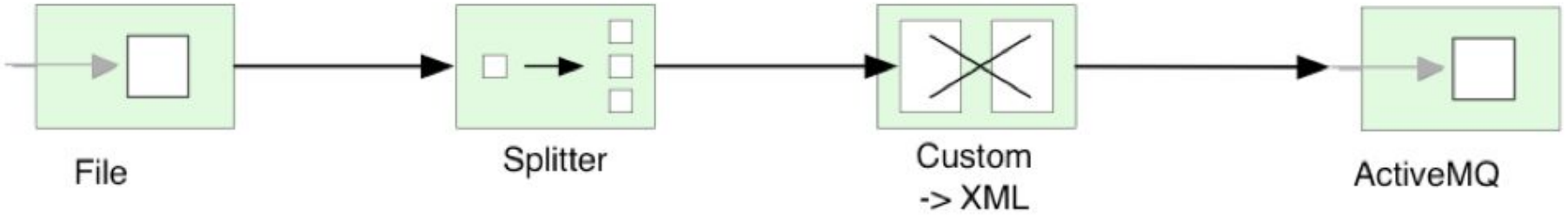
XML DSL

```
<route>
  <from uri="file:data/inbox"/>
  <to uri="jms:queue:order"/>
</route>
```

Camel Routes with Splitter

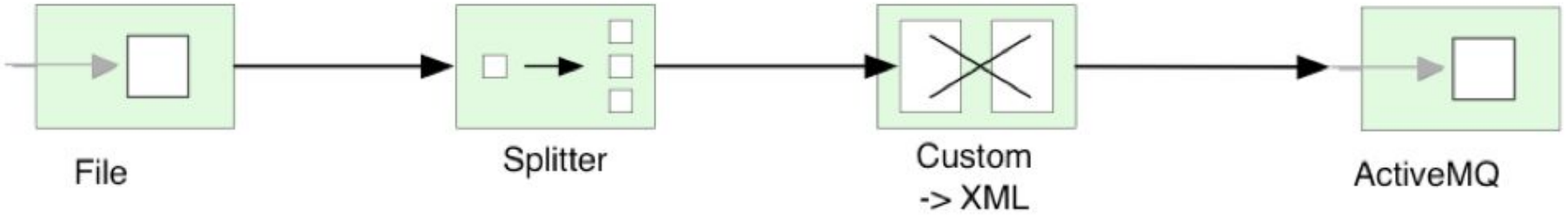


Camel Routes with Splitter



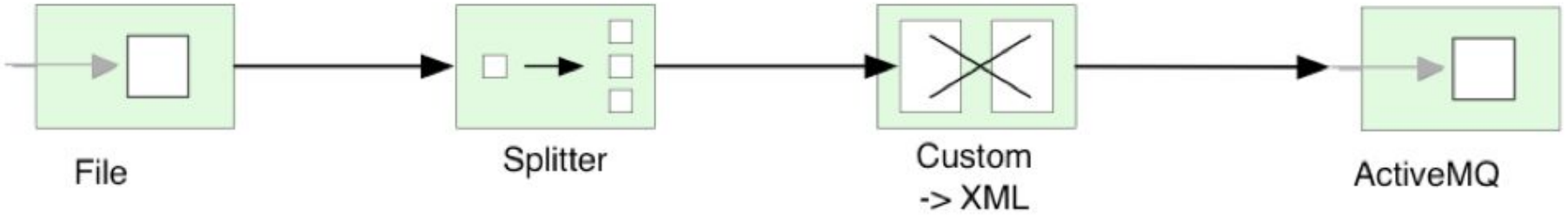

```
from("file:inbox")
```

Camel Routes with Splitter




```
from("file:inbox")
    .split(body().tokenize("\n"))
```

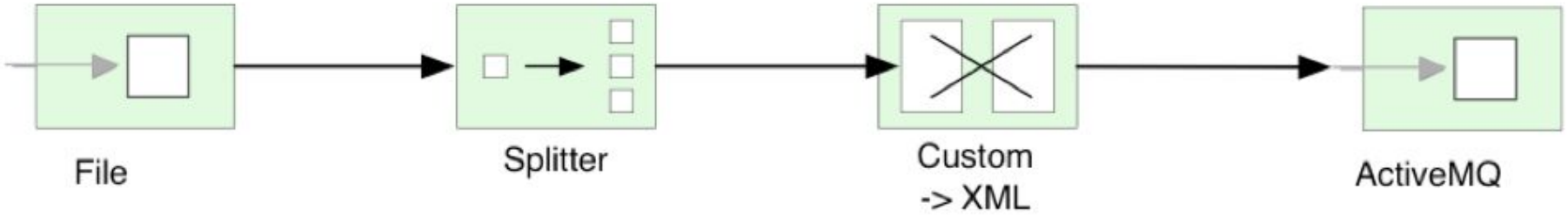
Camel Routes with Splitter




```
from("file:inbox")
    .split(body().tokenize("\n"))
        .marshal(customToXml)
```

Custom data transformation

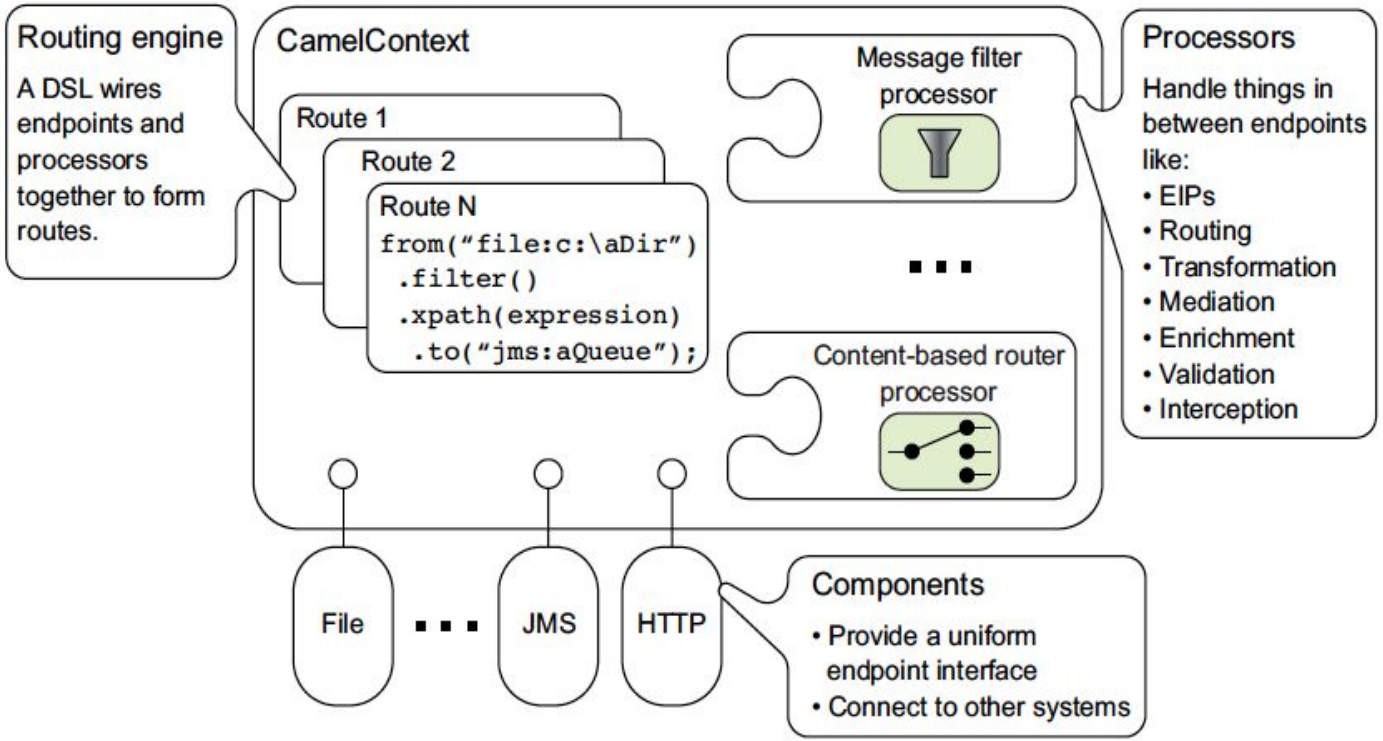
Camel Routes with Splitter



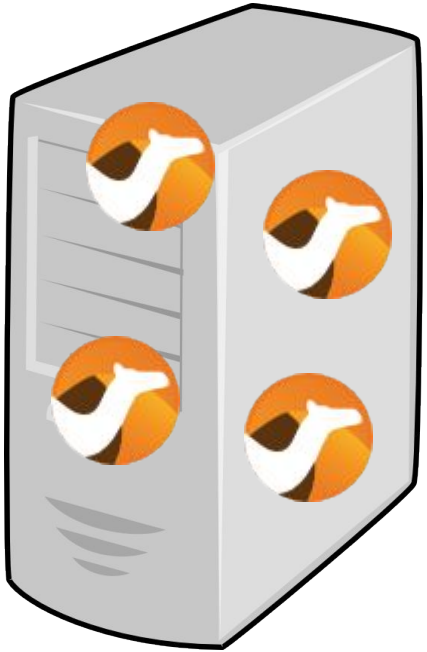

```
from("file:inbox")
    .split(body().tokenize("\n"))
        .marshal(customToXml)
        .to("activemq:line");
```

Custom data transformation

Camel Architecture



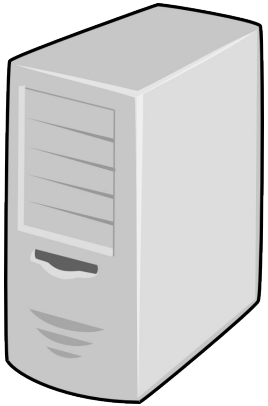
Camel runs everywhere



Application
Servers

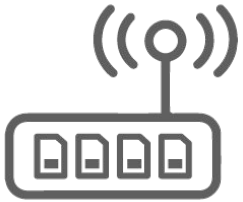
Linux
Containers

Camel connects everything



Enterprise Systems

- File
- FTP
- JMS
- AMQP
- JDBC
- SQL
- TCP/UDP
- Mail
- HDFS
- JPA
- MongoDB
- Kafka
- ...



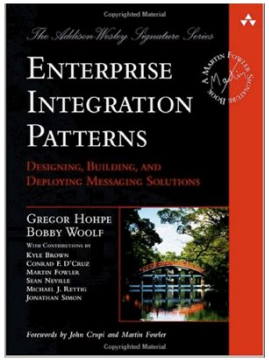
IoT

- CoAP
- MQTT
- PubNub

- AWS
  - S3
  - SQS
  - Kinesis
  - ...
- Google
  - BigQuery
  - PubSub
- Azure
  - Blob
  - Queue

- Box
- Dropbox
- Facebook
- Linkedin
- Salesforce
- SAP
- ServiceNow

TOOL BOX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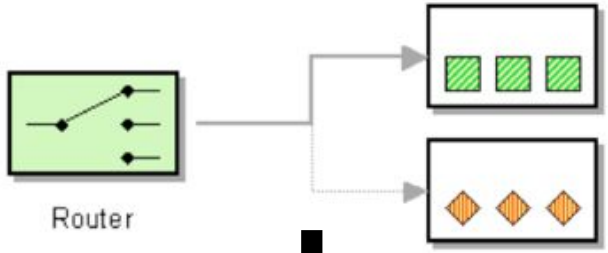
Router

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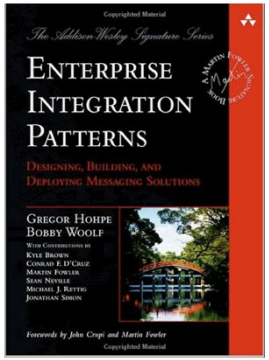
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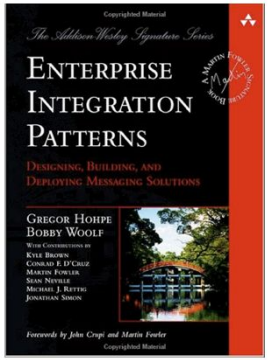
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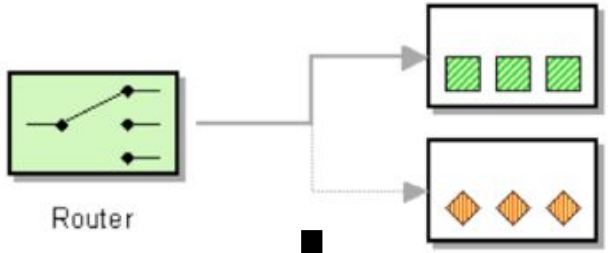
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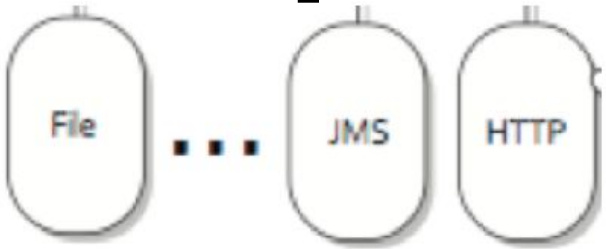
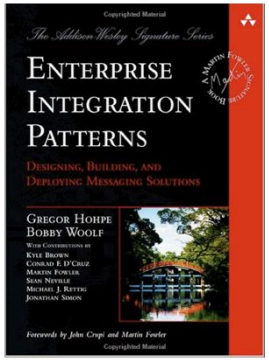

File
JMS
HTTP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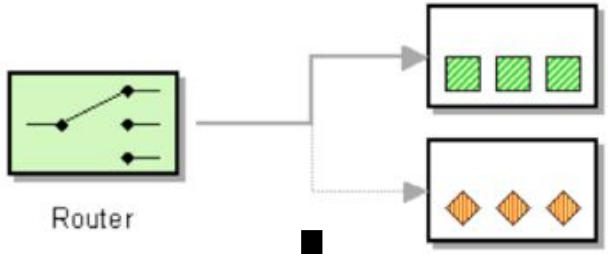
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TOOL BOX

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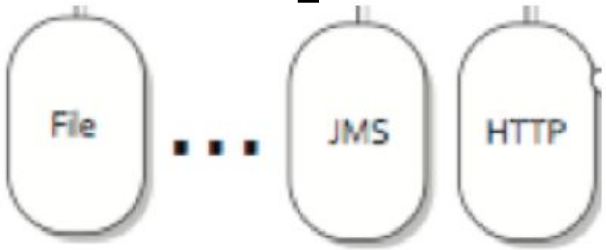
File
JMS
HTTP

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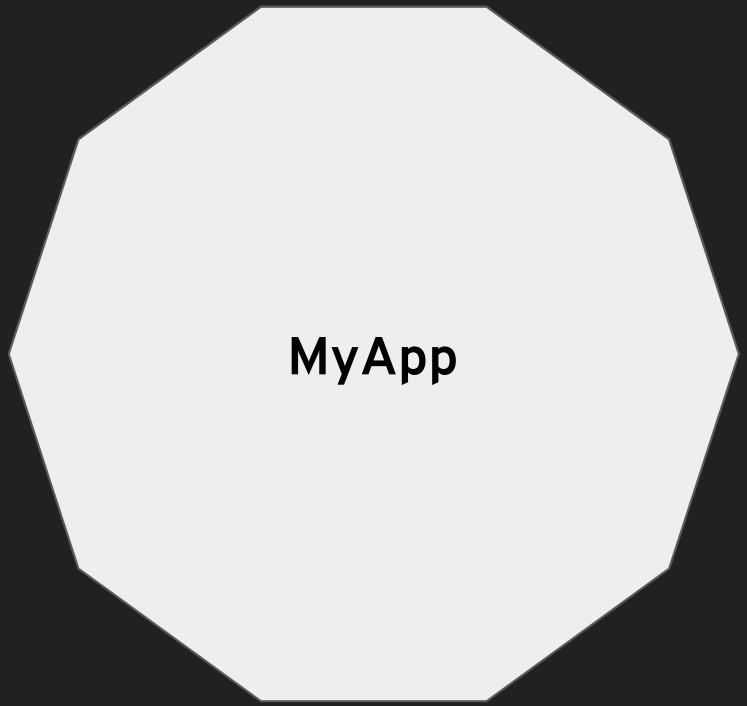
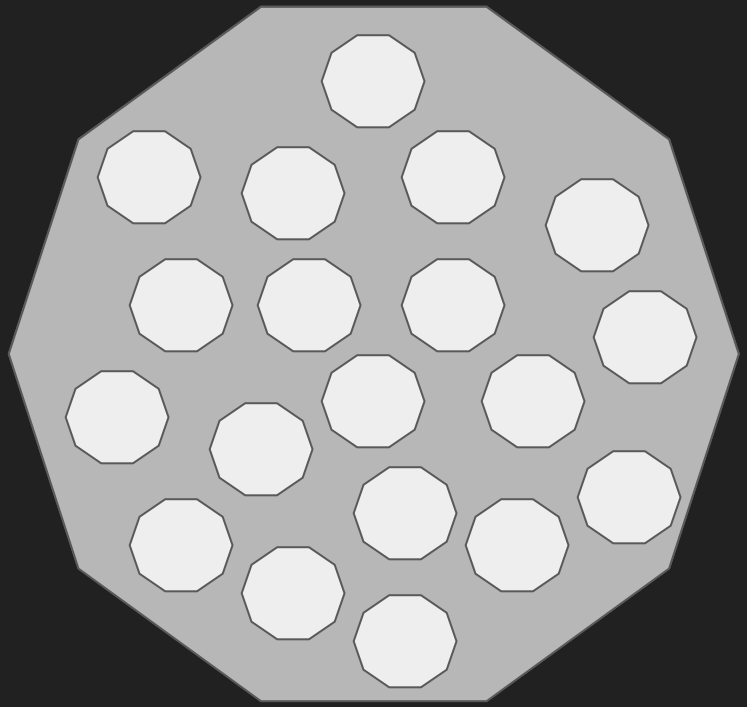
What about Camel
in the Cloud?

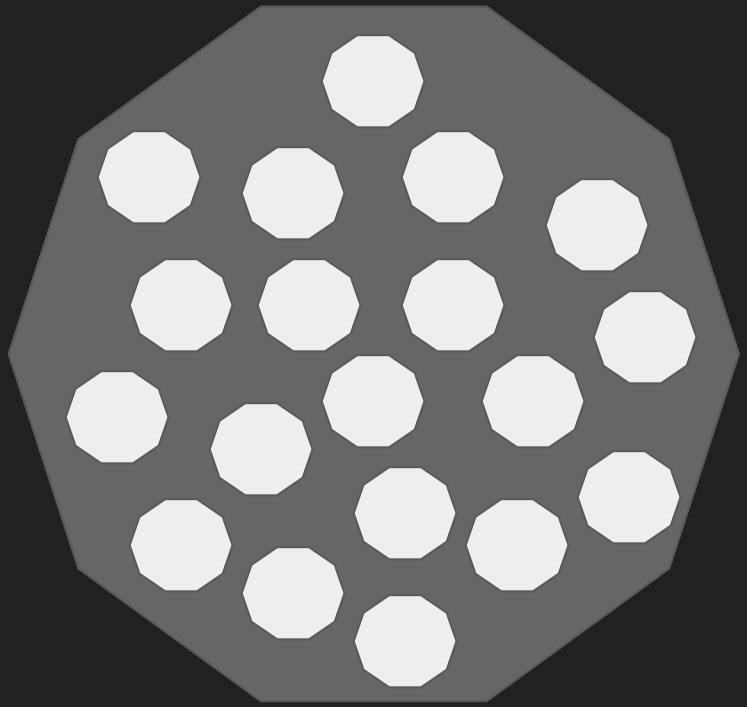
Monolith



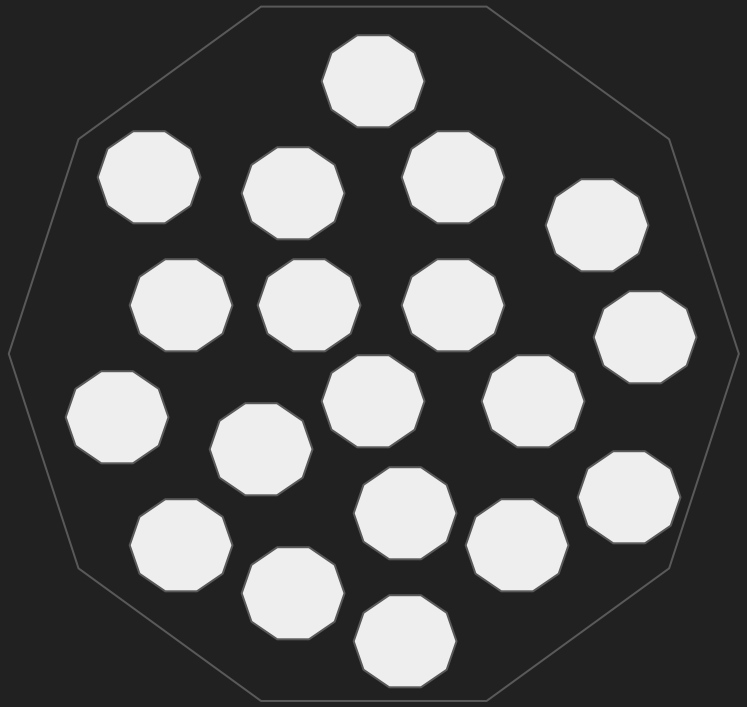
Microservices



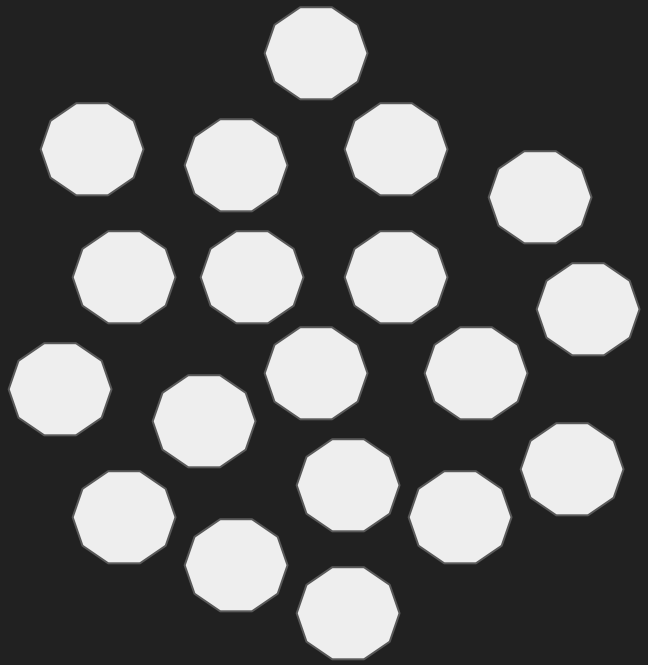
Microservices



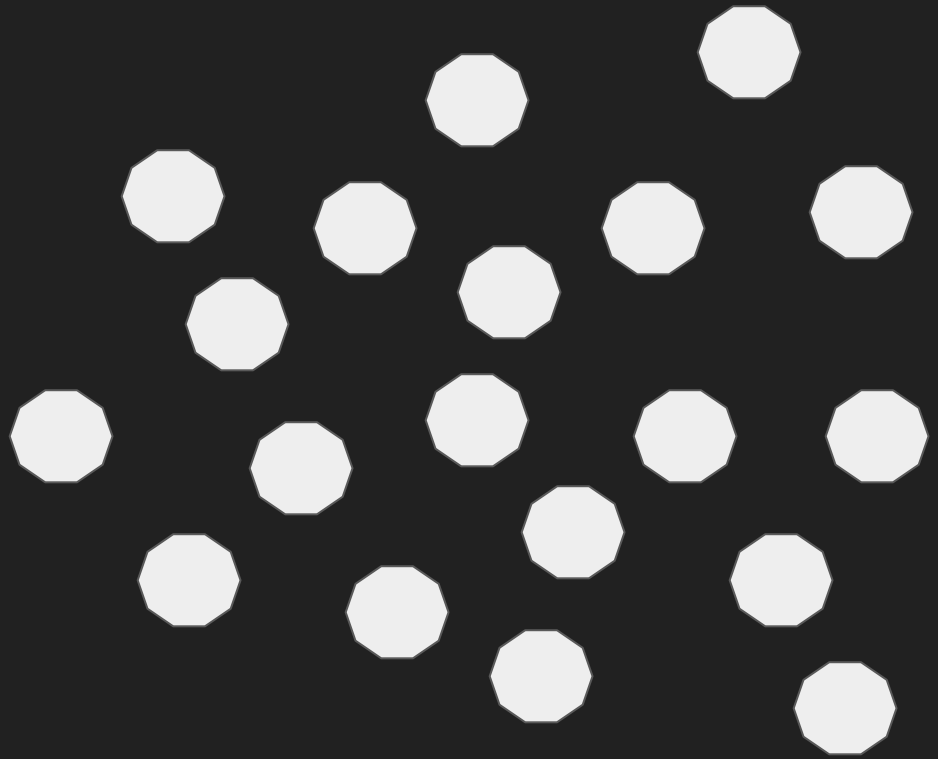
Microservices



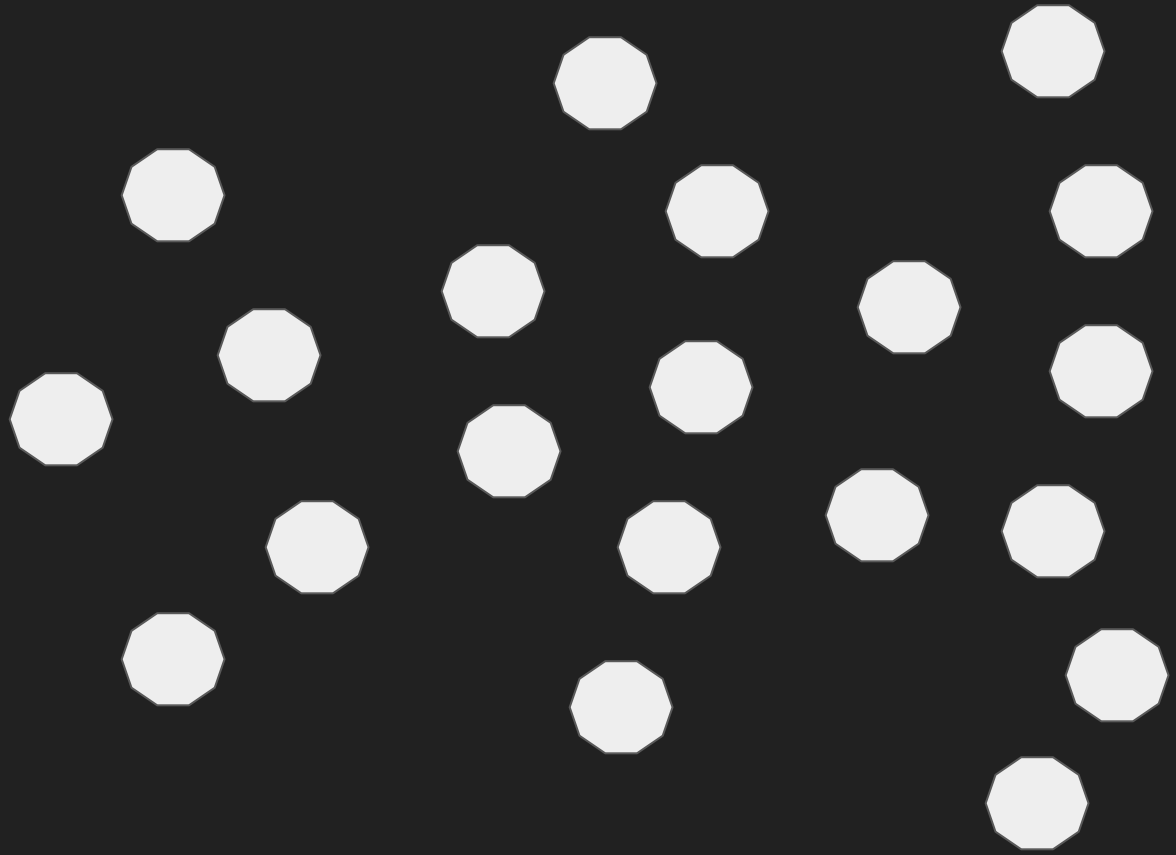
Microservices



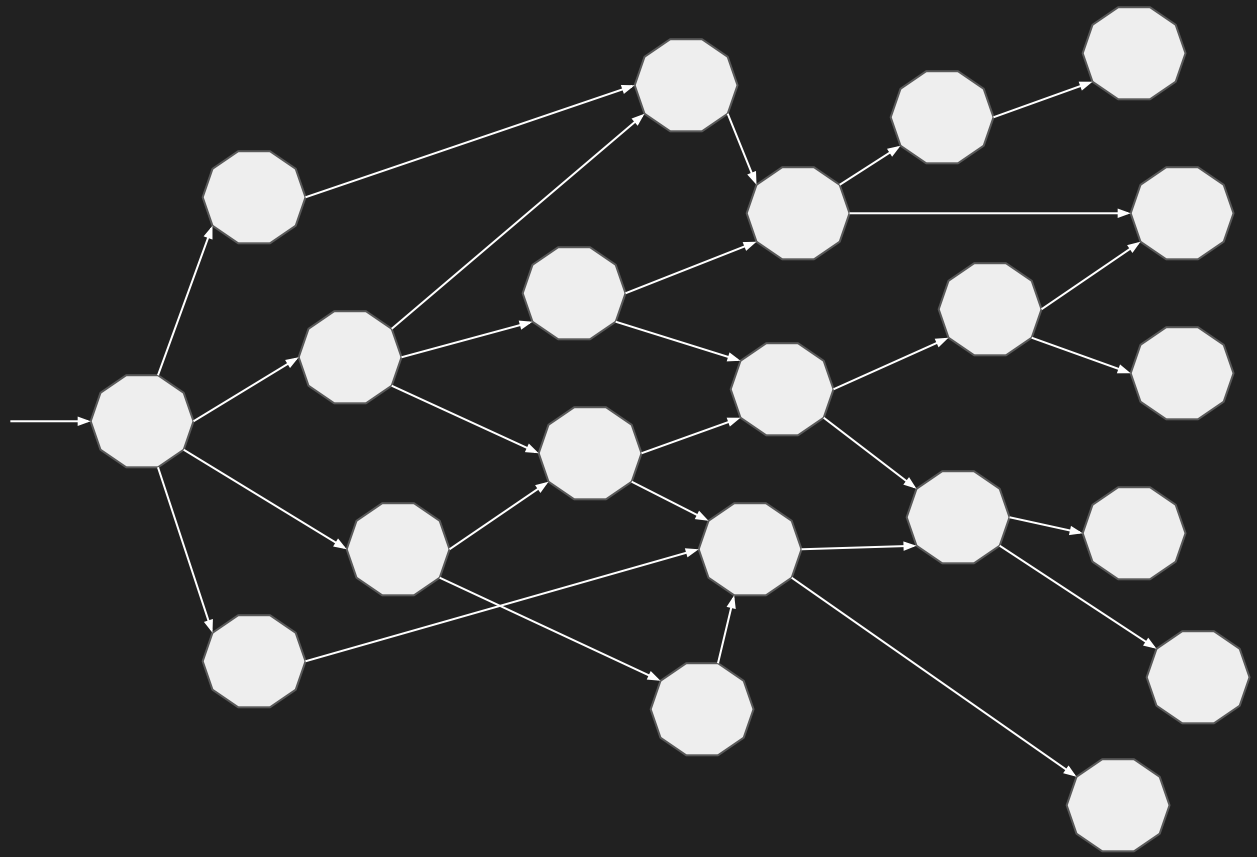
Microservices



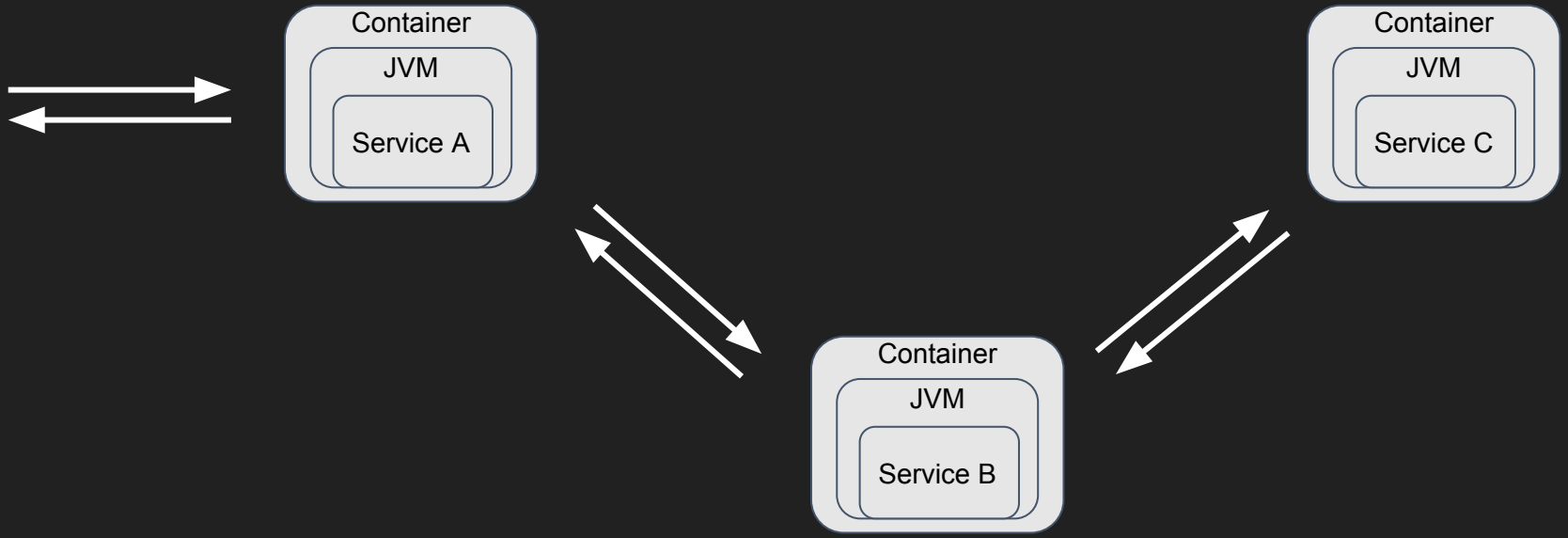
Microservices



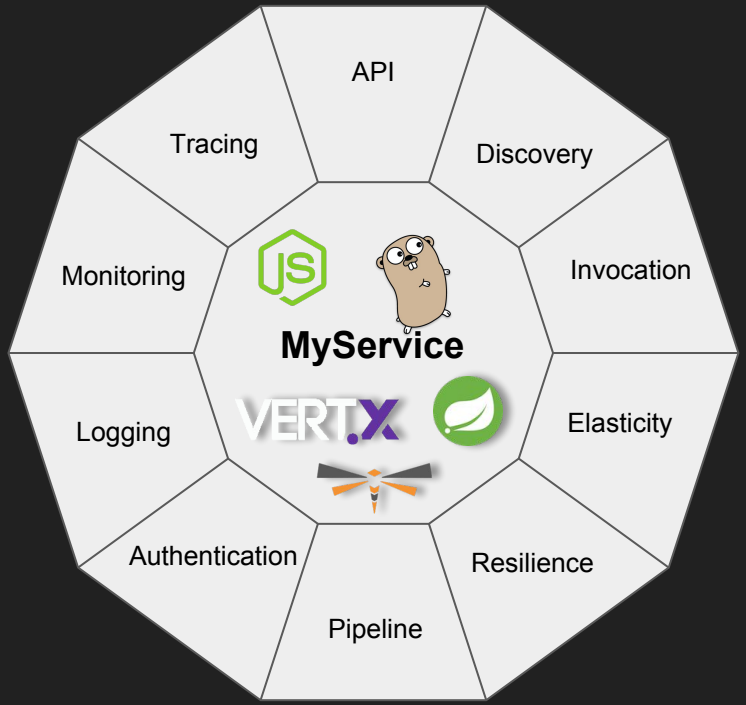
Network of Services



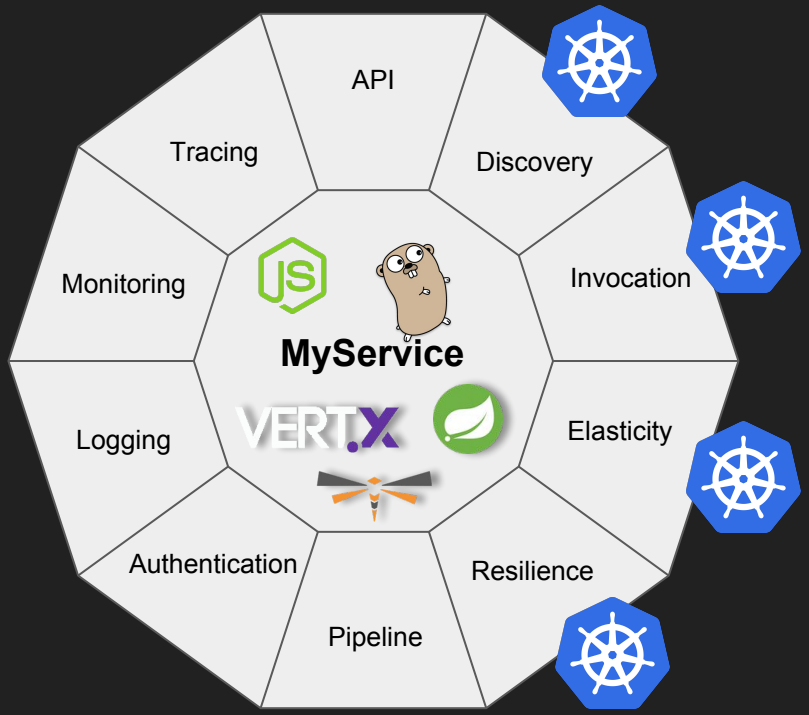
Microservices == Distributed Computing



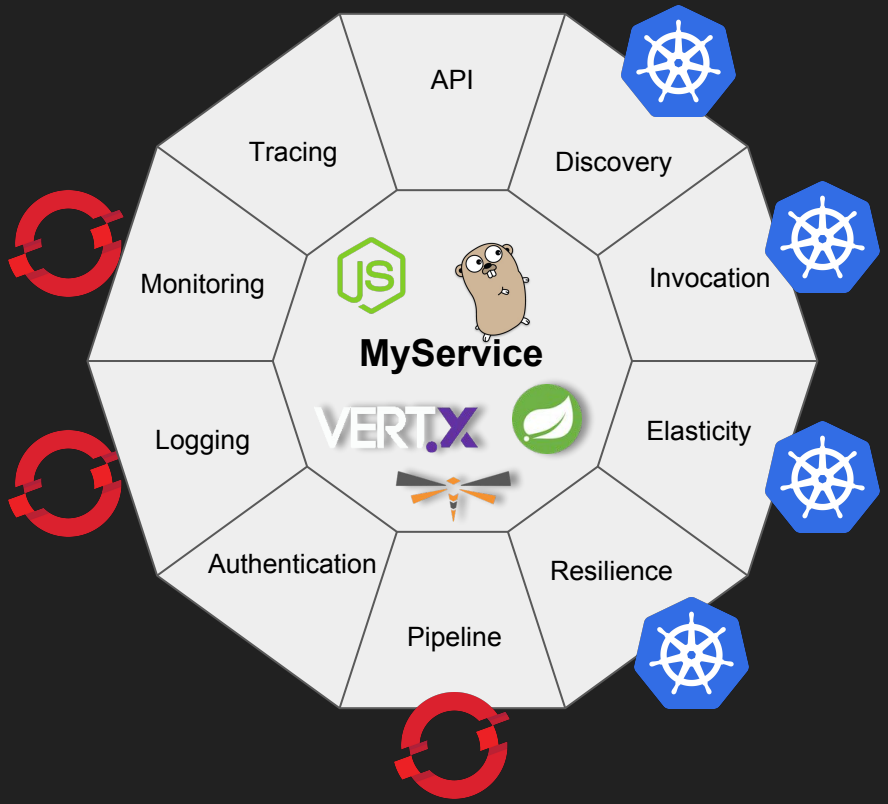
Microservices'ilities



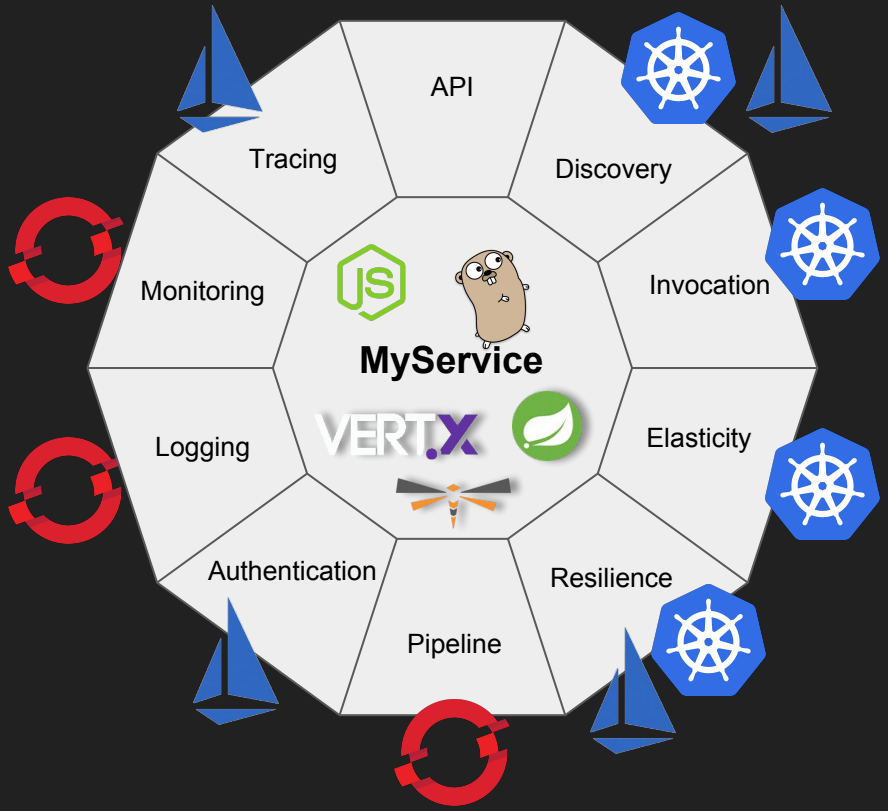
Microservices'ilities + Kubernetes



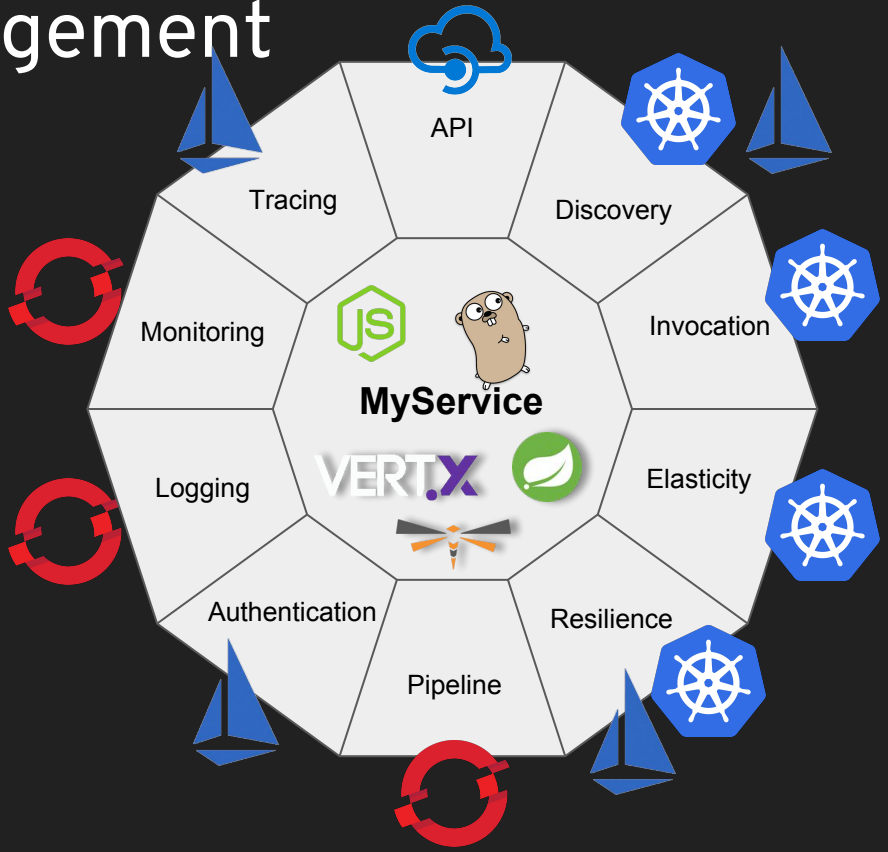
Microservices'ilities + PaaS



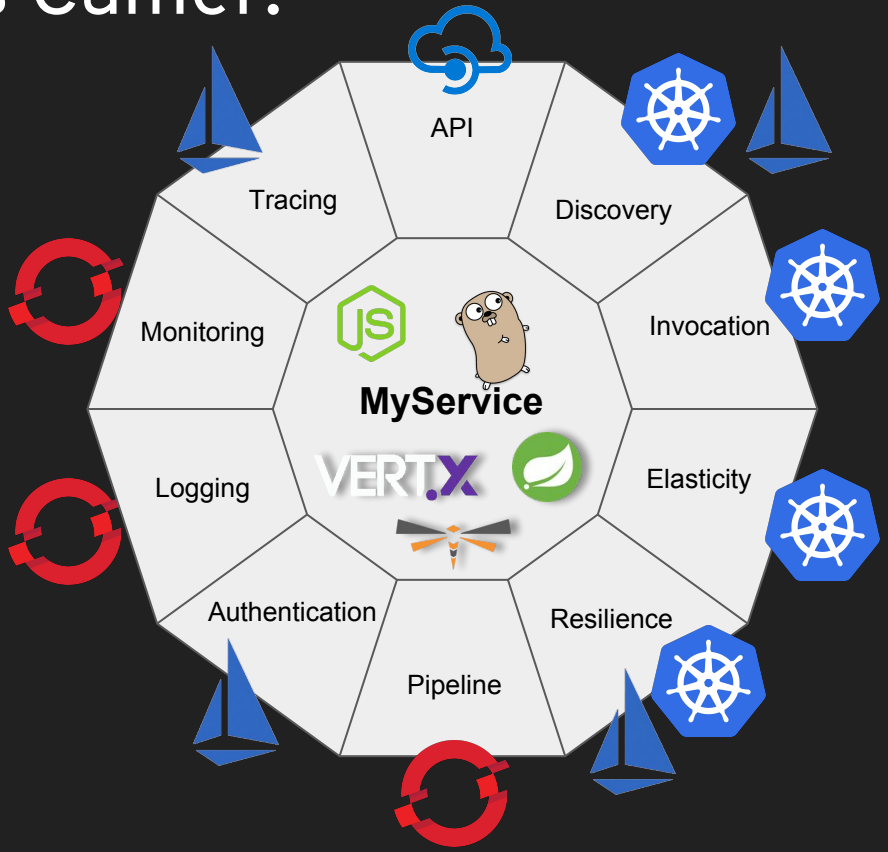
Microservices'ilities + Istio



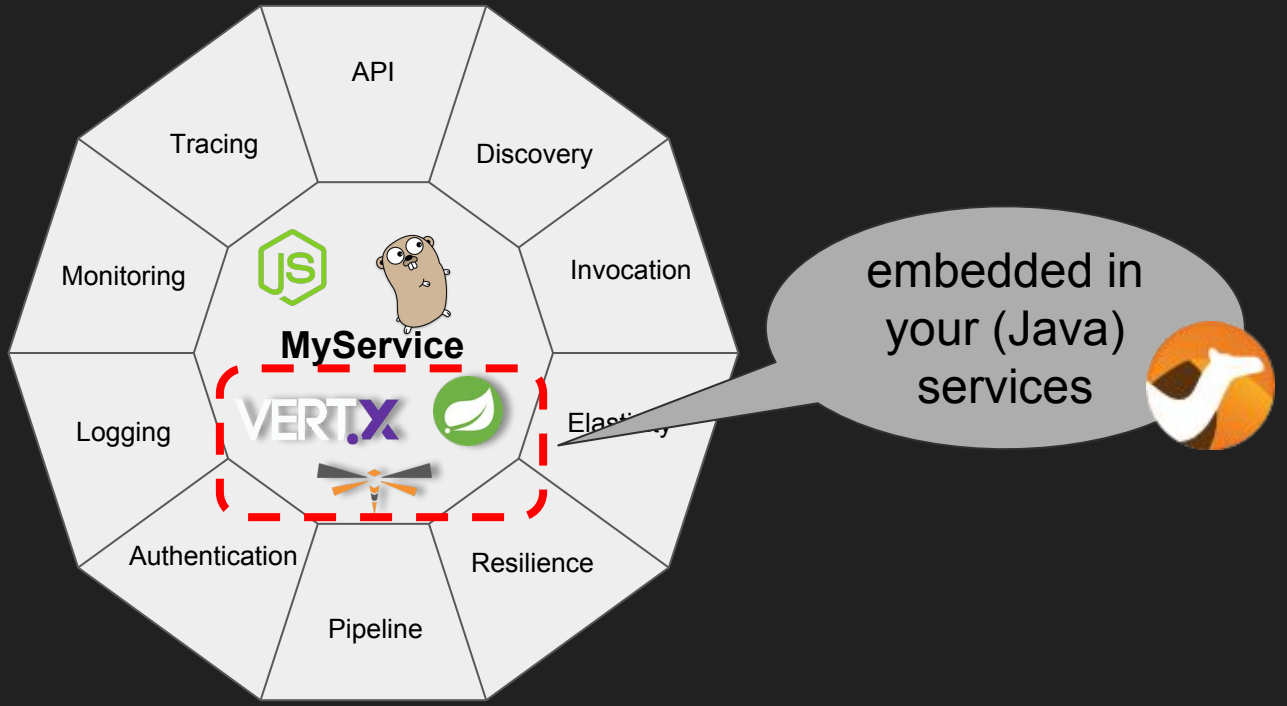
Microservices'ilities + API management



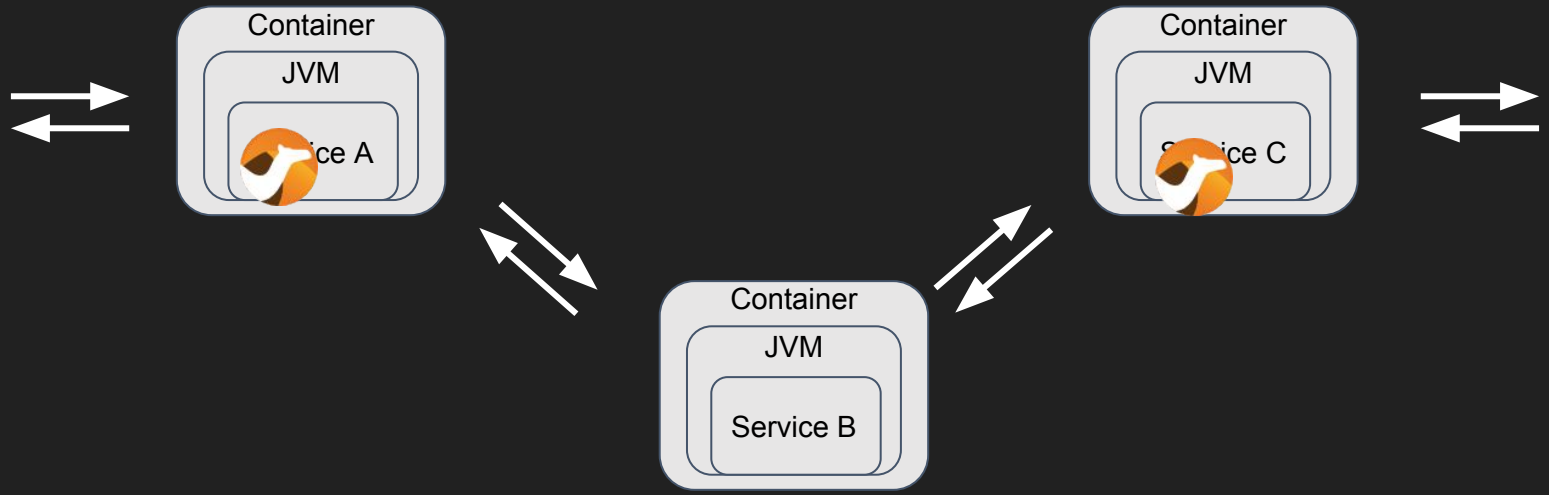
But where is Camel?



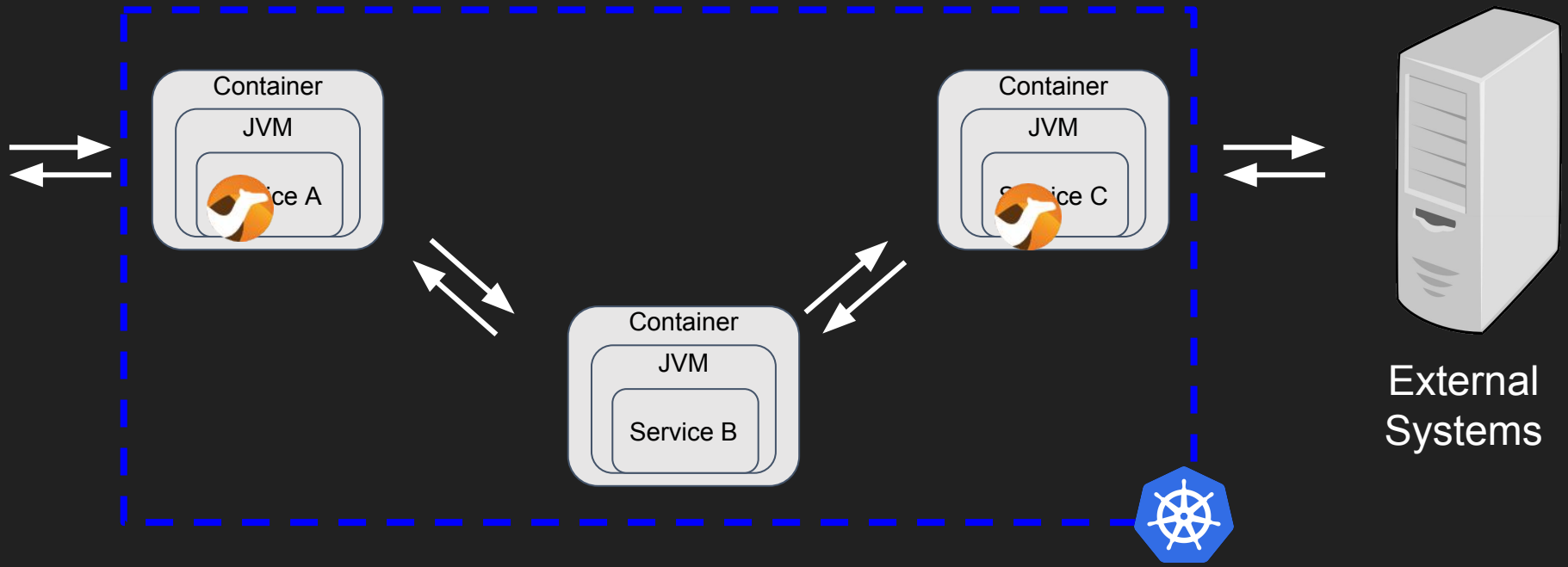
But where is Camel?



Microservices == Distributed Integration



Microservices == Distributed Integration



Camel in the Cloud

Best Practice - Small in Size

- Camel is light-weight
  - (camel-core 4mb)
  - + what you need

- Single fat-jar via:

Best Practice - Stateless

- Favour stateless applications

- If state is needed:
  - Data-grid
    - camel-infinispan
    - camel-hazelcast
    - camel-ignite
    - ...
  - Storage
    - camel-sql
    - camel-jpa
    - camel-kafka
    - ...
  - Kubernetes
    - Stateful-set

Best Practice - Configuration Management

- Kubernetes ConfigMap
  - Inject via ENV
  - Inject via files
- Kubernetes Secrets
  - Inject via ENV
  - Inject via files

```
$ kubectl get cm -o yaml my-configmap
apiVersion: v1
data:
  fallback: I still got no response
kind: ConfigMap
```

Best Practice - Fault Tolerant

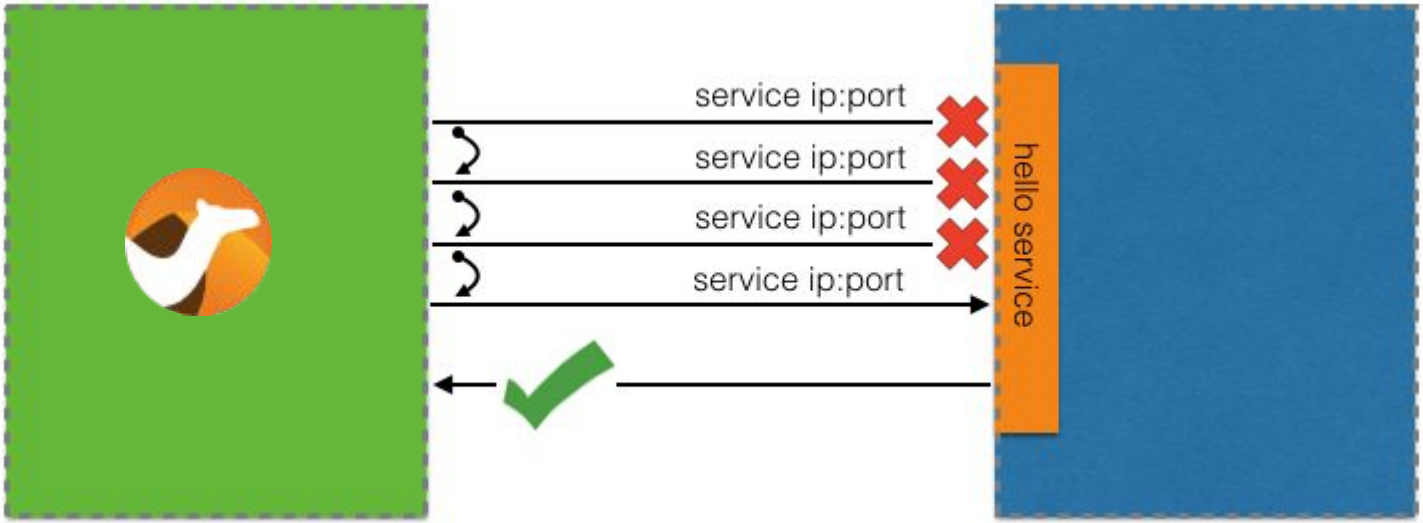
- Camel Retry
  - onException
  - errorHandler

- Circuit Breaker
  - camel-hystrix

Best Practice - Fault Tolerant

- Camel Retry
  - onException
  - errorHandler

```
onException(Exception.class)
    .maximumRedeliveries(10)
    .redeliveryDelay(1000);
```



Best Practice - Fault Tolerant

- Camel Retry
  - onException
  - errorHandler

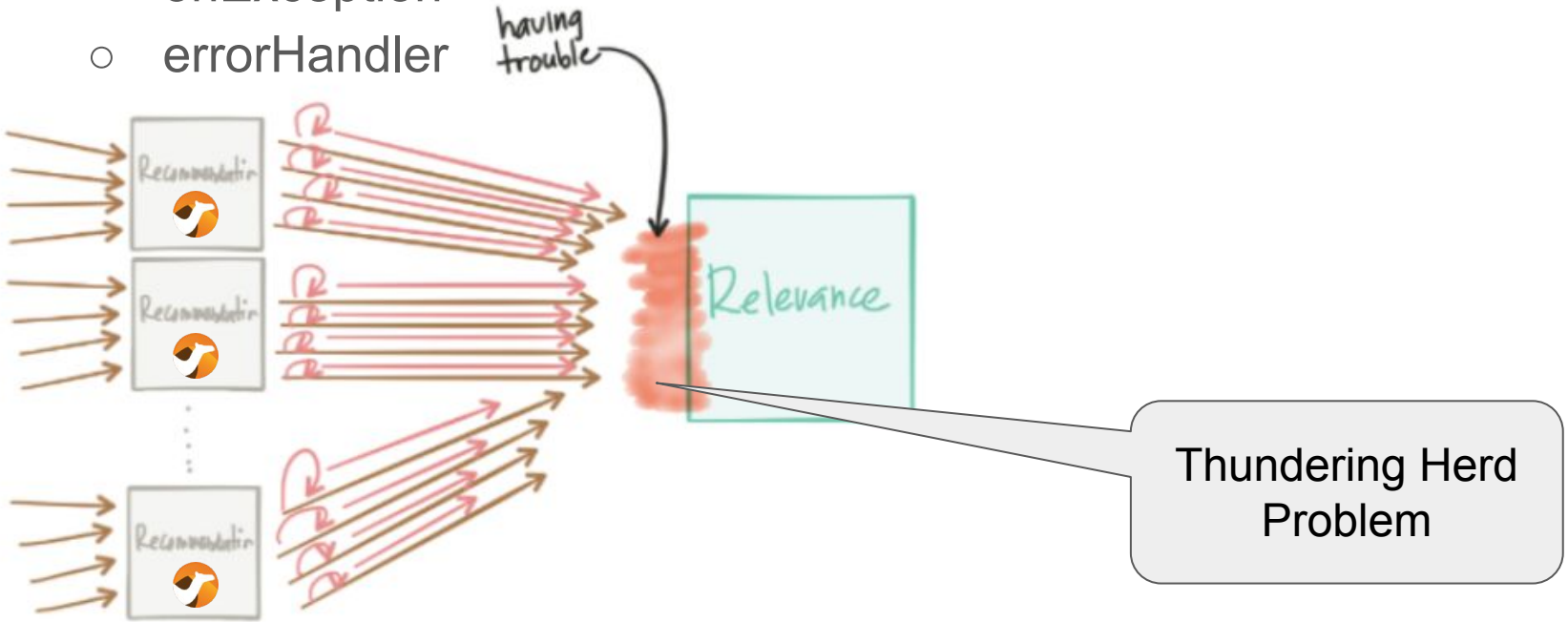
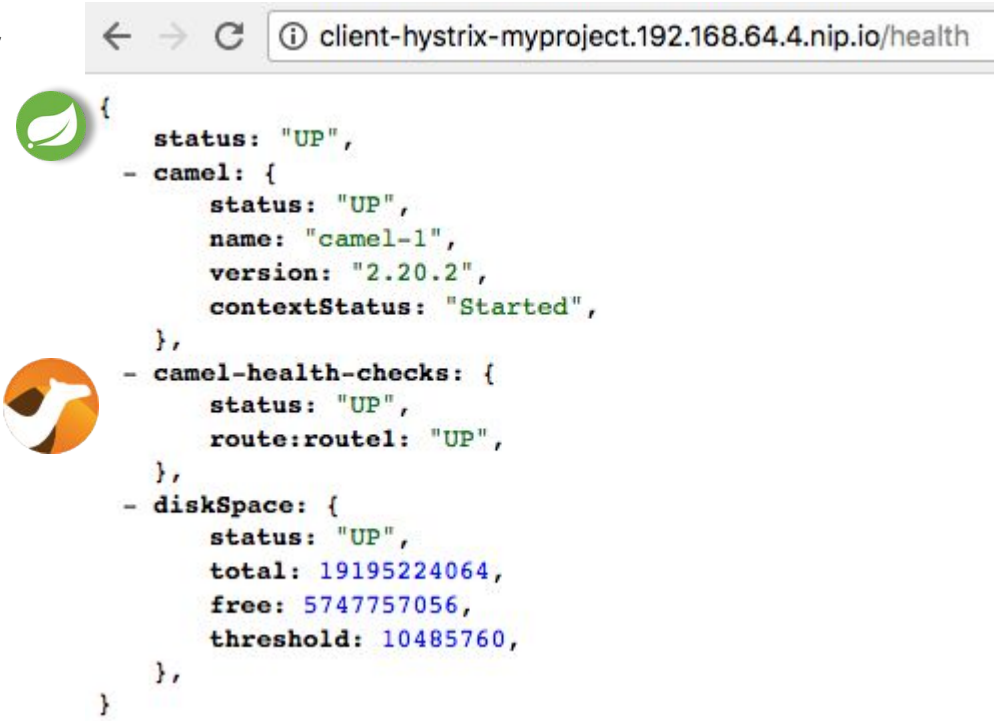


Figure by Christian Posta

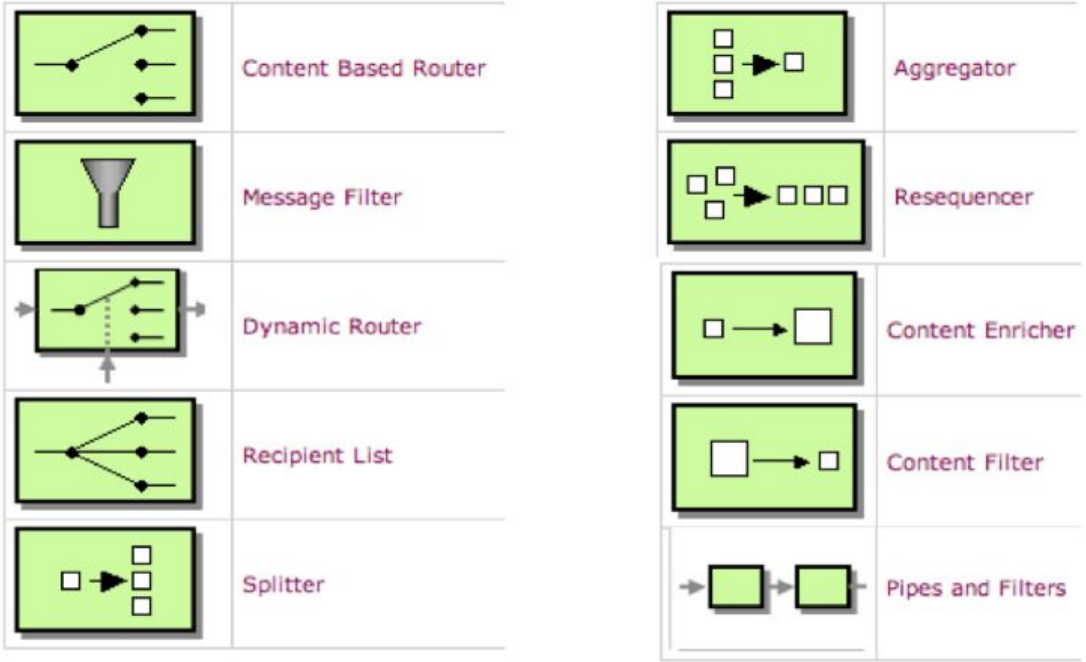
Best Practice - Health Checks

- Health Checks
  - camel-spring-boot actuator
  - wildfly-swarm monitor
- Readiness Probe
  - Kubernetes
- Liveness Probe
  - Kubernetes

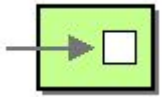


Best Practice - EIP Patterns

- Works anywhere



EIP Cloud Patterns



Service Call

Plugins

- Consul
- Etcd
- Kubernetes
- Ribbon
- Zookeeper

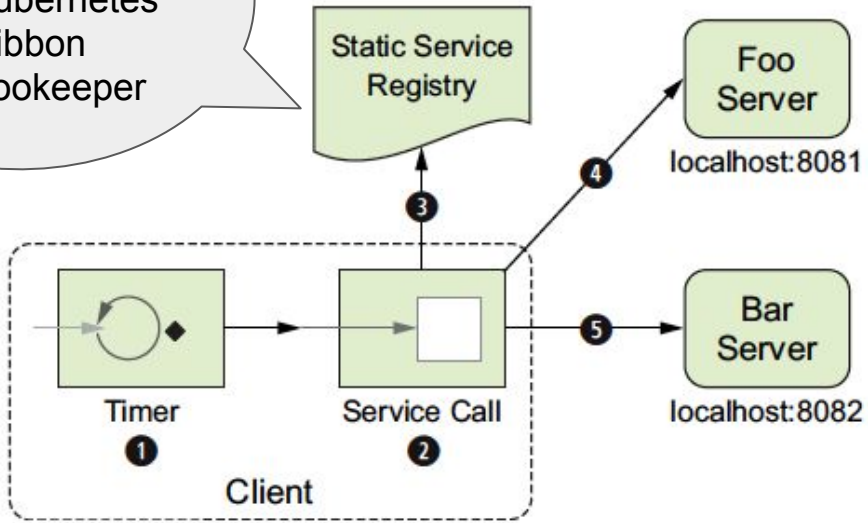
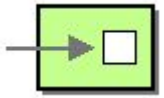


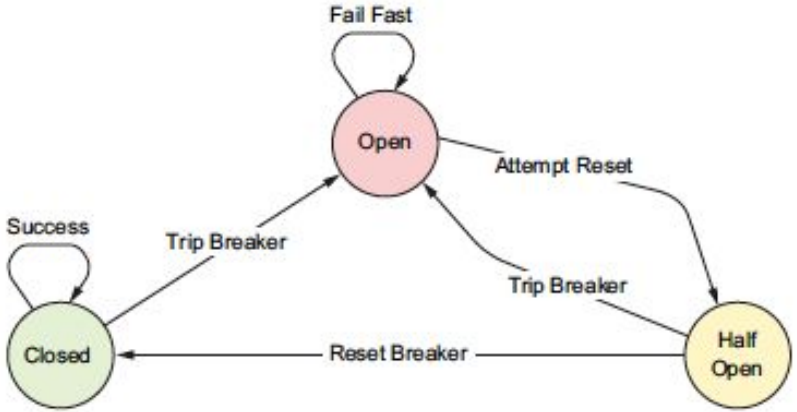
Figure 17.9 A timer (1) triggers the Service Call EIP (2) to call a clustered service. The physical locations of the service are looked up in the service registry (3). The service is then called in a round-robin fashion by calling either Foo server (4) or Bar server (5).

```
from("timer")
  .serviceCall("hello-service");
```

EIP Cloud Patterns

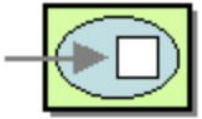


Hystrix EIP

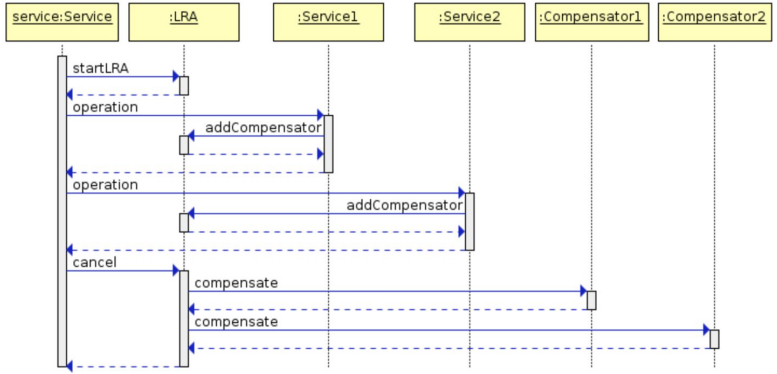



```
from("timer:foo")
   .hystrix()
      .to("http:myservice")
   .onFallback()
      .to("bean:myfallback")
   .end()
```

EIP Cloud Patterns



Saga EIP



Sequence diagram of a failed LRA saga

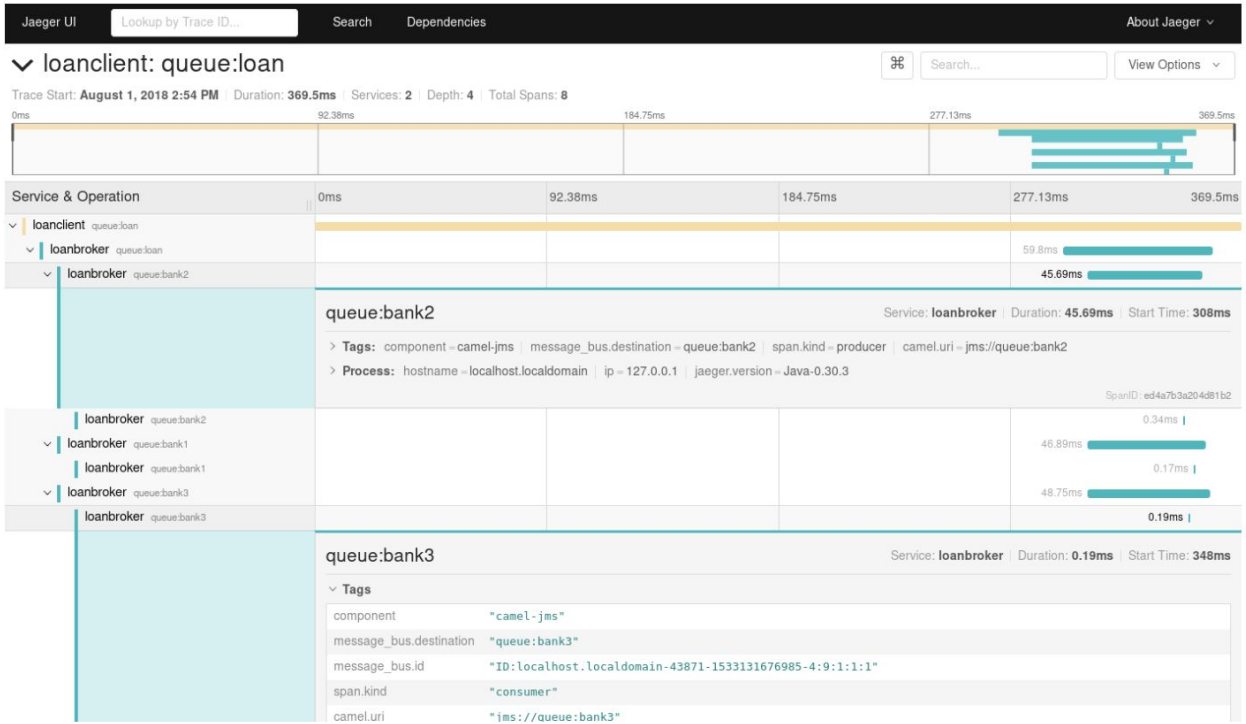
```
rest().post("train/buy/seat")
   .saga()
      .compensation("direct:cancel")
      ...
      .to("http:trainservice/buy")
```

EIP Cloud Patterns

Distributed Tracing

EIP Cloud Patterns

Distributed Tracing

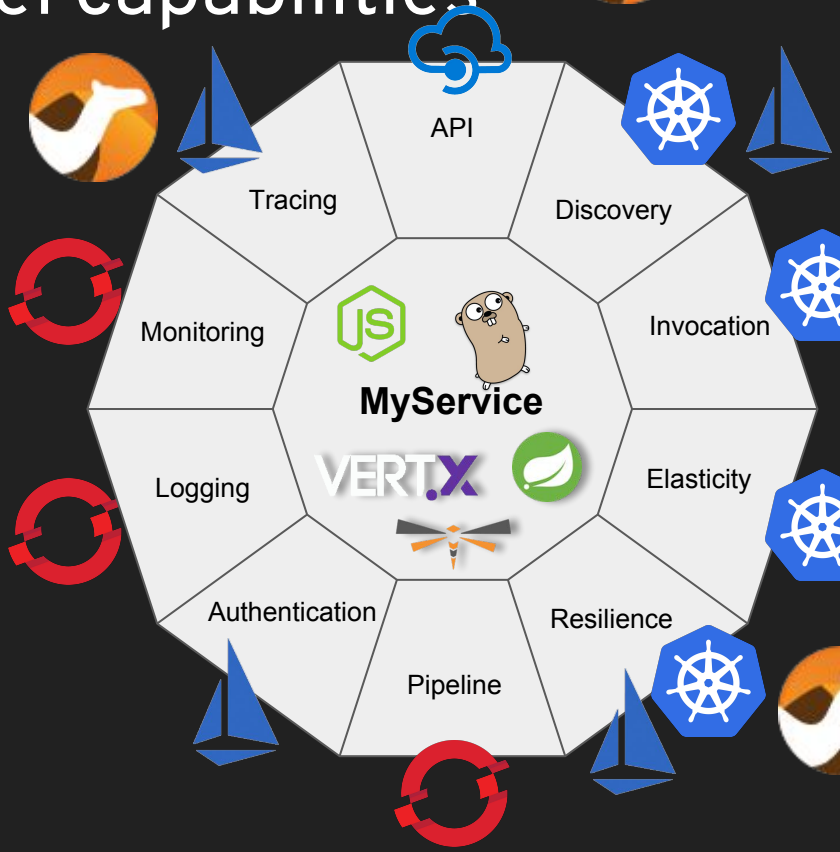


Jaeger UI

Usable Camel capabilities

Camel Rest

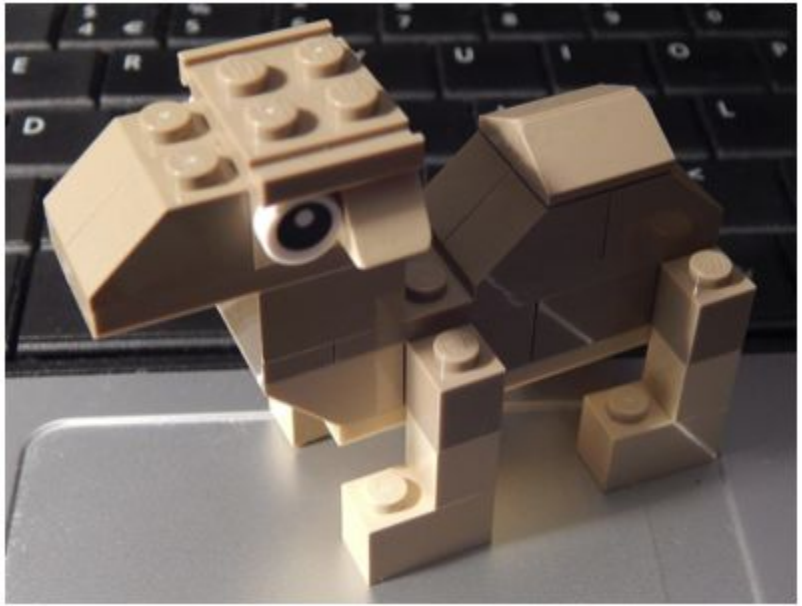
Camel Zipkin
Camel OpenTracing



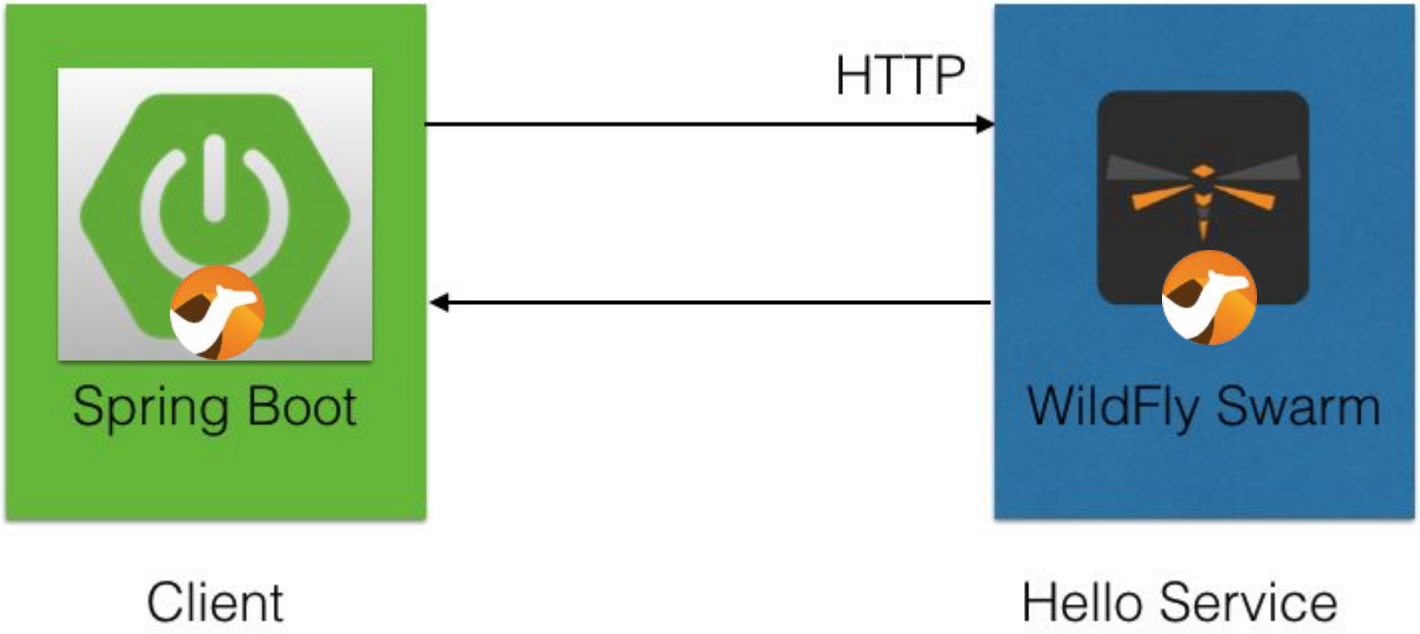
Camel Components

Camel Retry
Camel Hystrix

Demo Time



Basic Demo

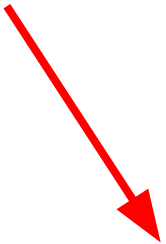


Client Camel Route

```
from("timer:foo?period=1000")
   .hystrix()
     .to("http:helloswarm:8080/hello")
   .onFallback()
     .setBody()
       .constant("Nobody want to talk to me")
   .end()
   .log("${body}");
```

Server Camel Route

```
from("undertow:http://0.0.0.0:8080/hello")
  .bean(helloBean);
```



```
public String sayHello() throws Exception {
  return "Swarm says hello from " +
    InetAddressUtil.getLocalHostName();
}
```

Tip of the iceberg

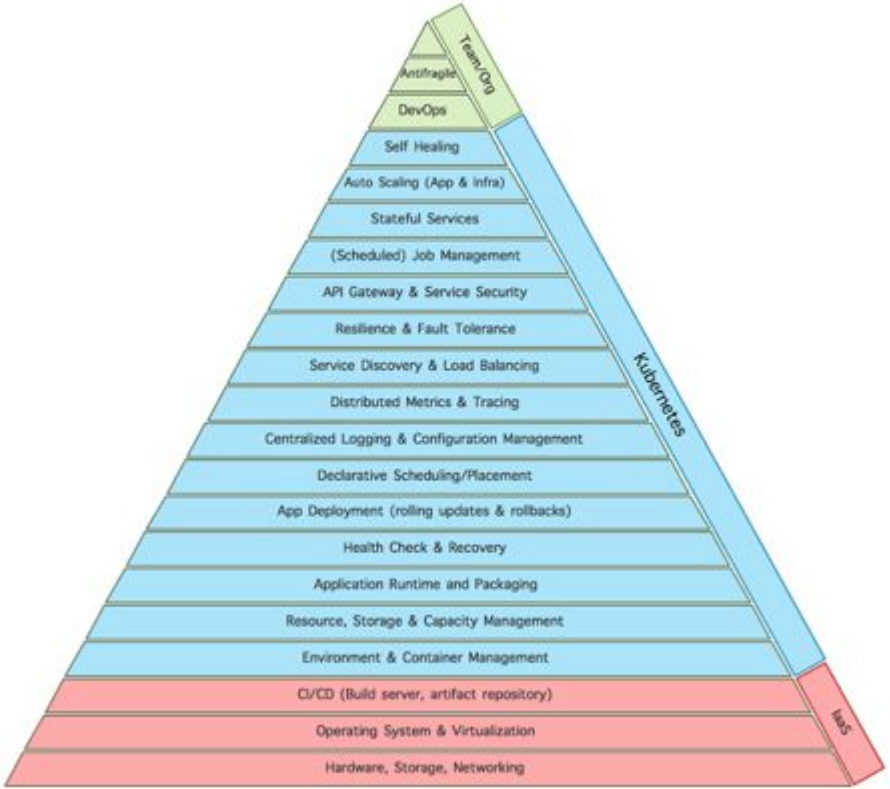


Figure by Bilgin Ibryam

Future of Apache Camel

- New website and documentation
  - End of 2018 / Start of 2019
- Apache Camel 2.23
  - November
  - ... likely last 2.x release
- Camel 3 currently being planned
  - To be released in 2019 (summer or before)

Future of Apache Camel

- Camel on GraalVM
  - https://lburgazzoli.github.io/2018/09/04/Adventures-in-GraalVM-polyglot-Camel-routes-with-native-image.html

Now, let's write a simple JavaScript route:

```
from('timer:js')
    .setBody('test')
    .to('log:js')
```

And finally, let's run it:

```
sources/route.js
t - Apache Camel 2.23.0-SNAPSHOT (CamelContext: camel-1) is starting
t - StreamCaching is not in use. If using streams then its recommended to enable
t - Route: route1 started and consuming from: timer://js
t - Total 1 routes, of which 1 are started
t - Apache Camel 2.23.0-SNAPSHOT (CamelContext: camel-1) started in 0.001 seconds
xchange[ExchangePattern: InOnly, BodyType: String, Body: test]
xchange[ExchangePattern: InOnly, BodyType: String, Body: test]
xchange[ExchangePattern: InOnly, BodyType: String, Body: test]
```

Future of Apache Camel

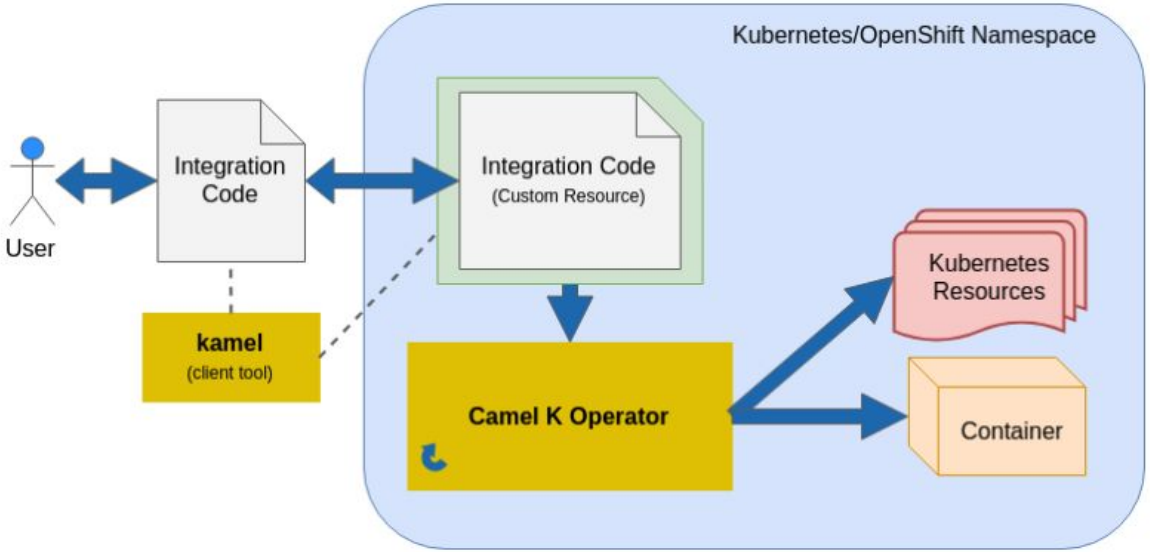
- Apache Camel K
  - https://github.com/apache/camel-k
  - Blog with details: https://www.nicolaferraro.me/2018/10/15/introducing-camel-k

Apache Camel K (a.k.a. Kamel) is a lightweight integration framework built from Apache Camel that runs natively on Kubernetes and is specifically designed for serverless and microservice architectures.

Future of Apache Camel

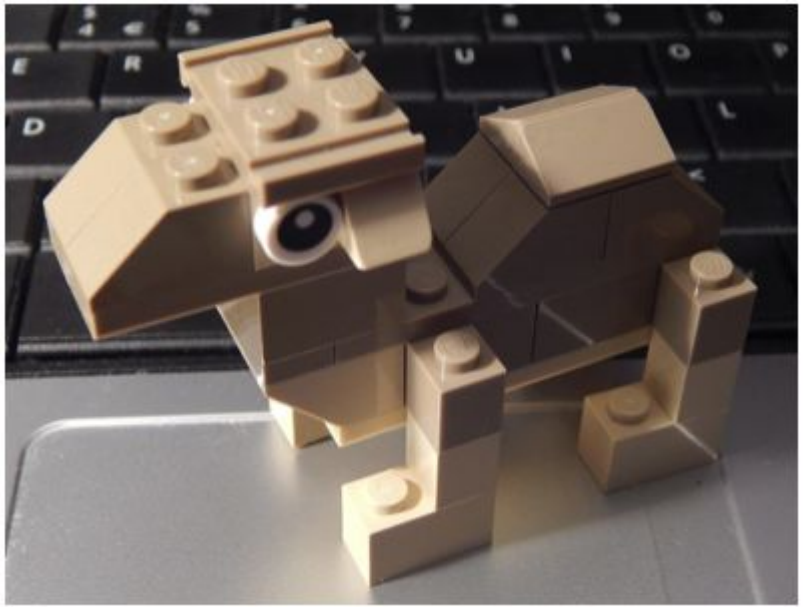
- Apache Camel K

This is what happens under the hood:

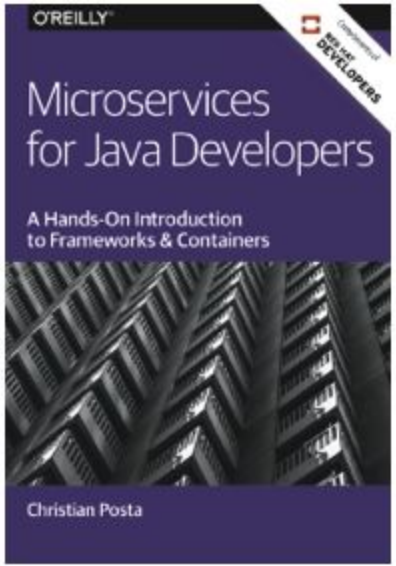


https://www.nicolaferraro.me/2018/10/15/introducing-camel-k

Demo Time

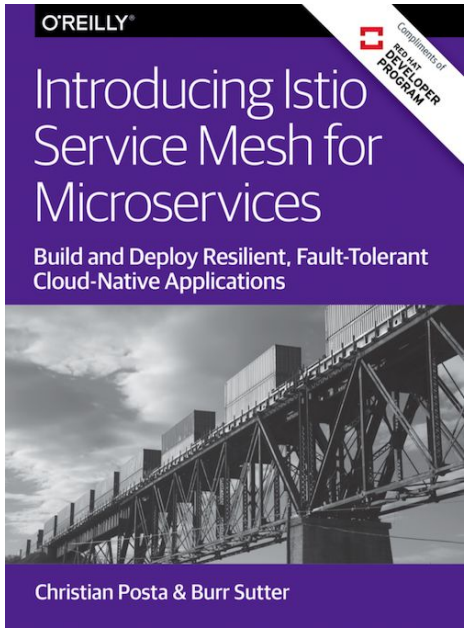


Free book



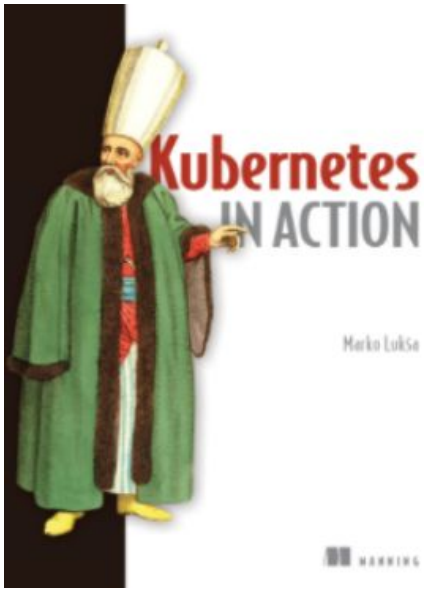
http://developers.redhat.com/promotions/microservices-for-java-developers

Free book



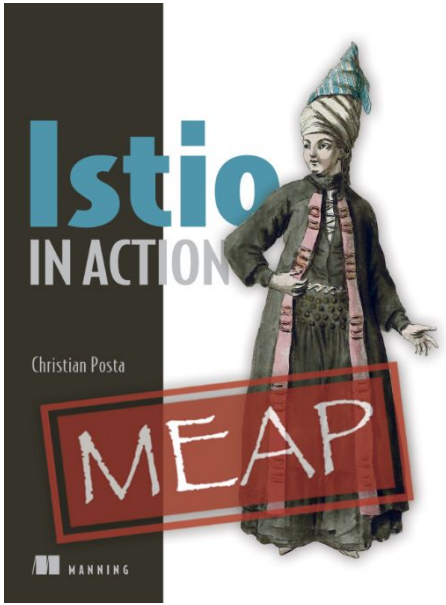
https://developers.redhat.com/books/introducing-istio-service-mesh-microservices/

Not so free book



https://www.manning.com/books/kubernetes-in-action

Not so free book



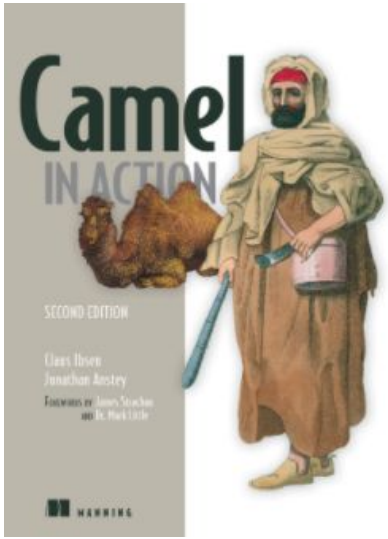
https://www.manning.com/books/istio-in-action

Not so free book

- Discount code (39%):

  `camel139`

  (ordering from Manning)



https://www.manning.com/books/camel-in-action-second-edition

More Information

- Slides and Demo source code:
  https://github.com/davsclaus/camel-riders-in-the-cloud
- Apache Camel website:
  http://camel.apache.org
- Best "What is Apache Camel" article:
  https://dzone.com/articles/open-source-integration-apache
- My blog:
  http://www.davsclaus.com
- Camel K:
  https://github.com/apache/camel-k

Q & A