Camel microservices with Spring Boot and Kubernetes

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@davsclaus

JFuture
October 2018

First time in Belarus

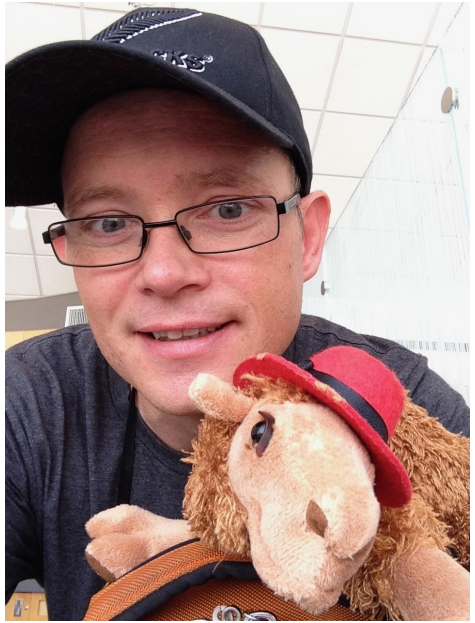
Claus Ibsen @davsclaus · Oct 11

Arrived in Minsk with @CamelFuse to host #ApacheCamel workshop and talk at @jfutureby - Its our first visit in Belarus 😄

You and Fuse Camel

About me

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



Blog: http://www.davsclaus.com
Twitter: @davsclaus
Linkedin: davsclaus

System Integration

Figure 1.1 Camel is the glue between disparate systems.

Apache Camel

is an

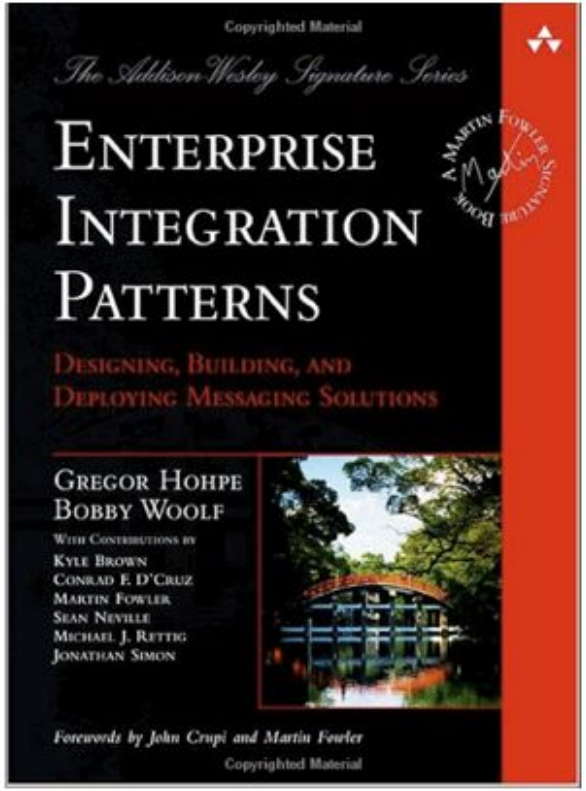
Integration Framework

based on

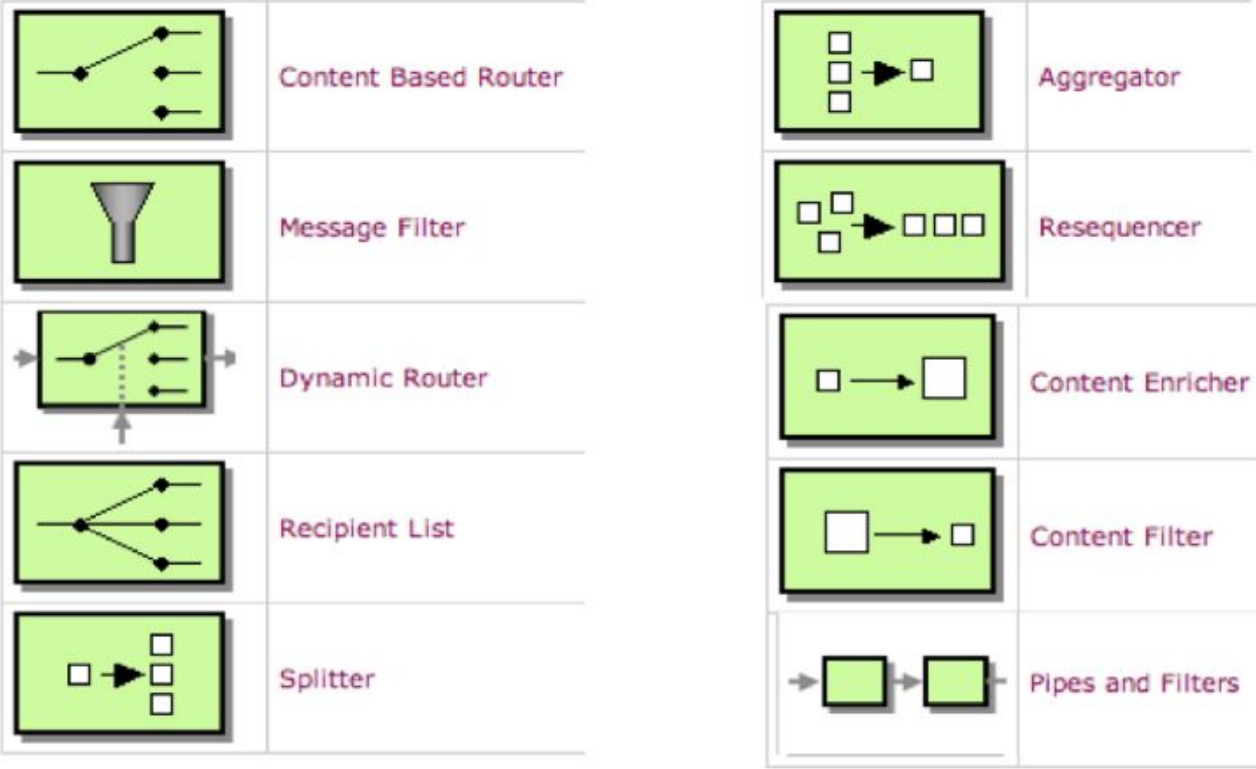
Enterprise Integration Patterns

Integration Framework

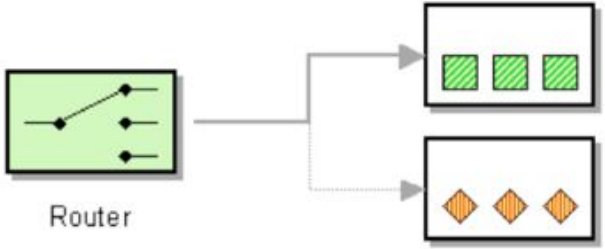
Enterprise Integration Patterns



Enterprise Integration Patterns



Camel Routes



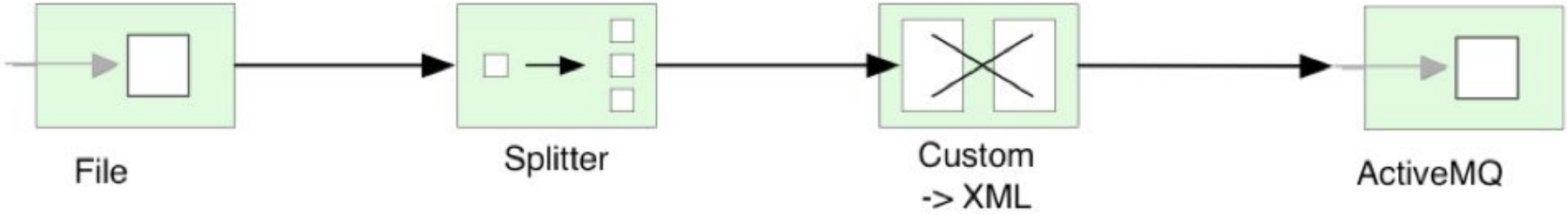

```
from("file:data/inbox")
  .to("jms:queue:order");
```

Java DSL

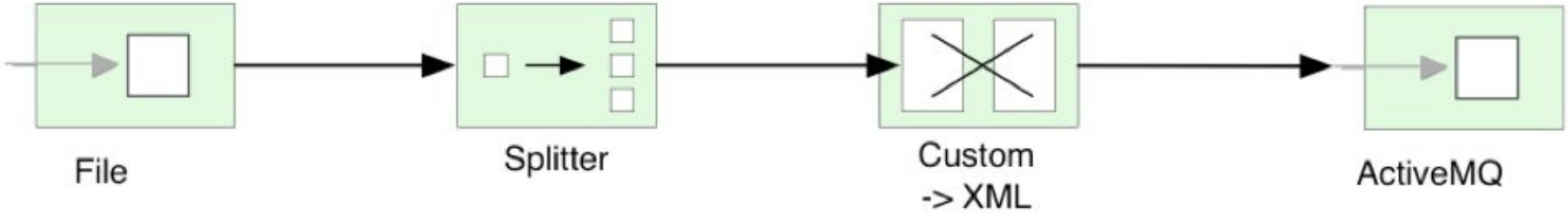
XML DSL

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

Camel Routes with Splitter

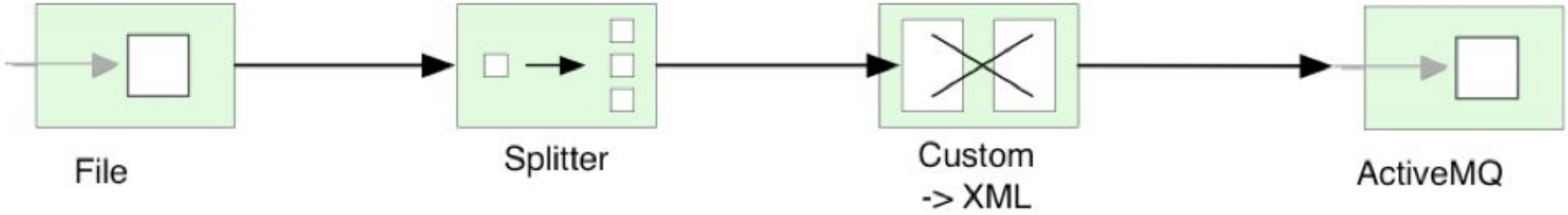


Camel Routes with Splitter



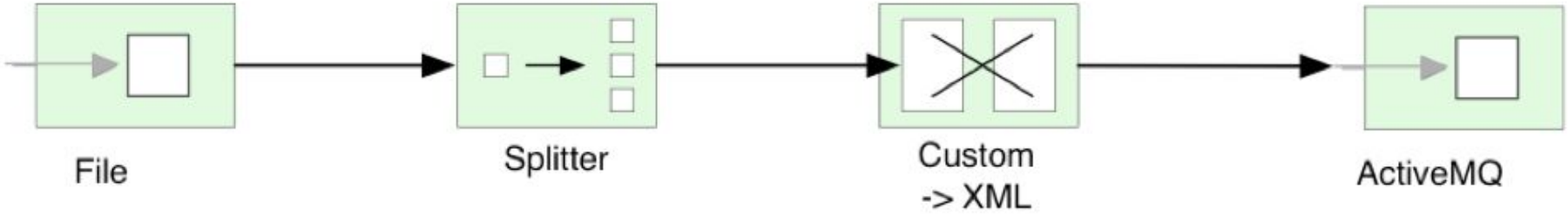

```
from("file:inbox")
```

Camel Routes with Splitter




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

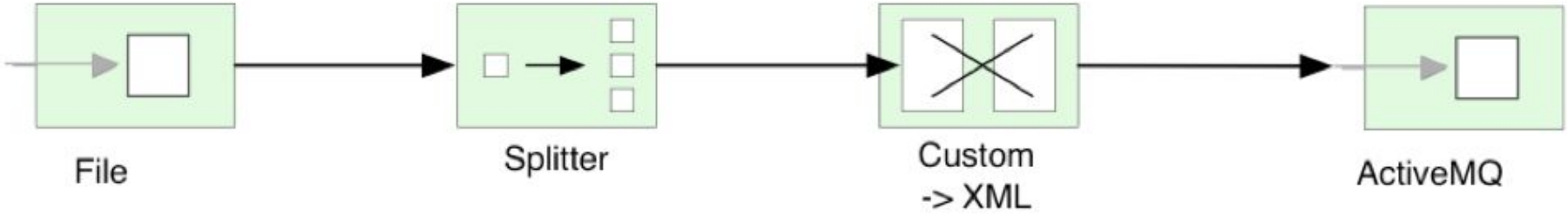
Camel Routes with Splitter




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

Custom data transformation

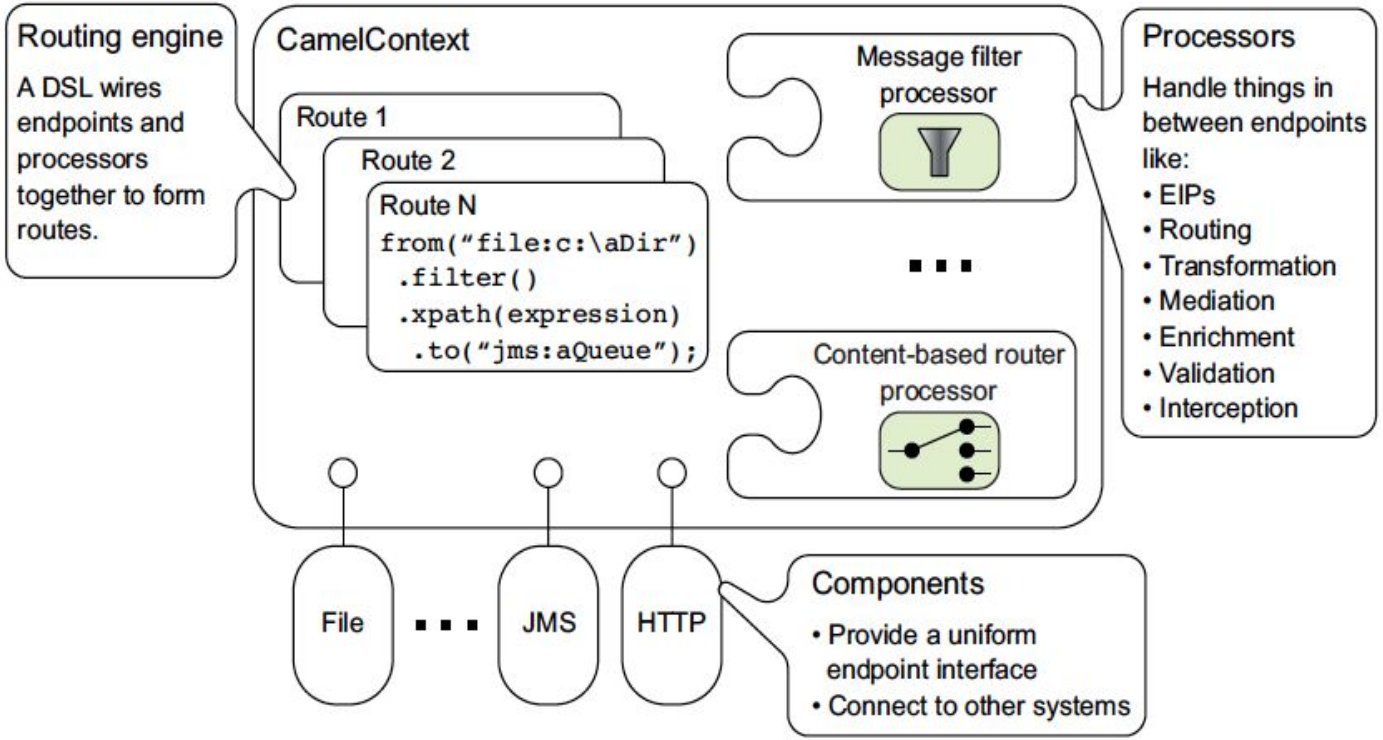
Camel Routes with Splitter



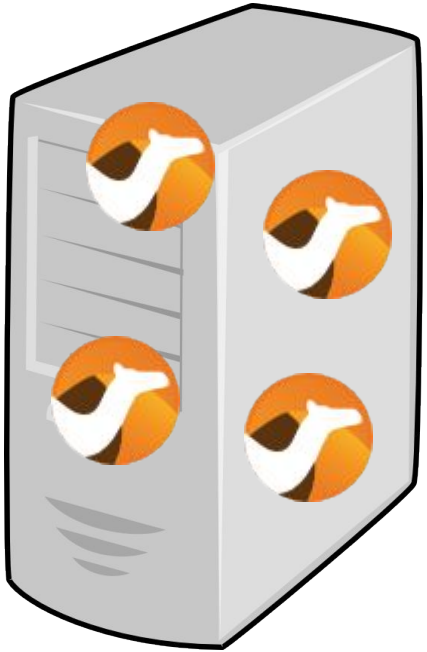

```
from("file:inbox")
    .split(body().tokenize("\n"))
        .marshal(customToXml)
        .to("activemq:line");
```

Custom data transformation

Camel Architecture



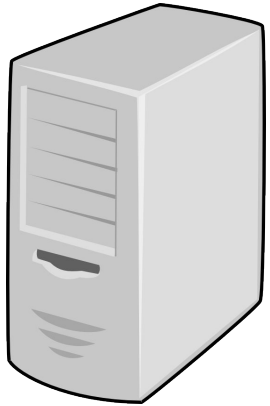
Camel runs everywhere



Application
Servers

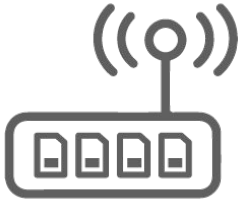
Linux
Containers

Camel connects everything



Enterprise Systems

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



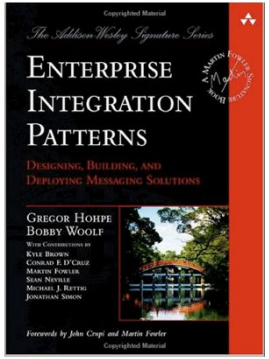
IoT

- 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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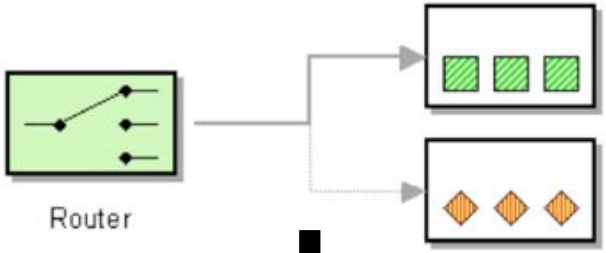
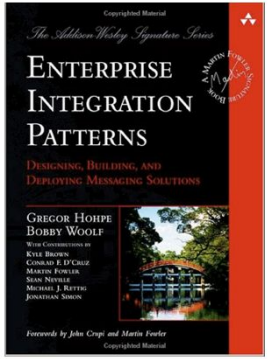

Router

+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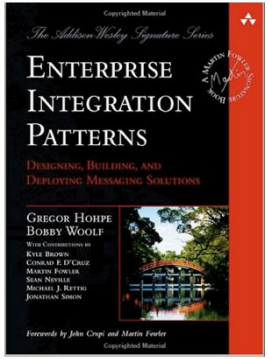
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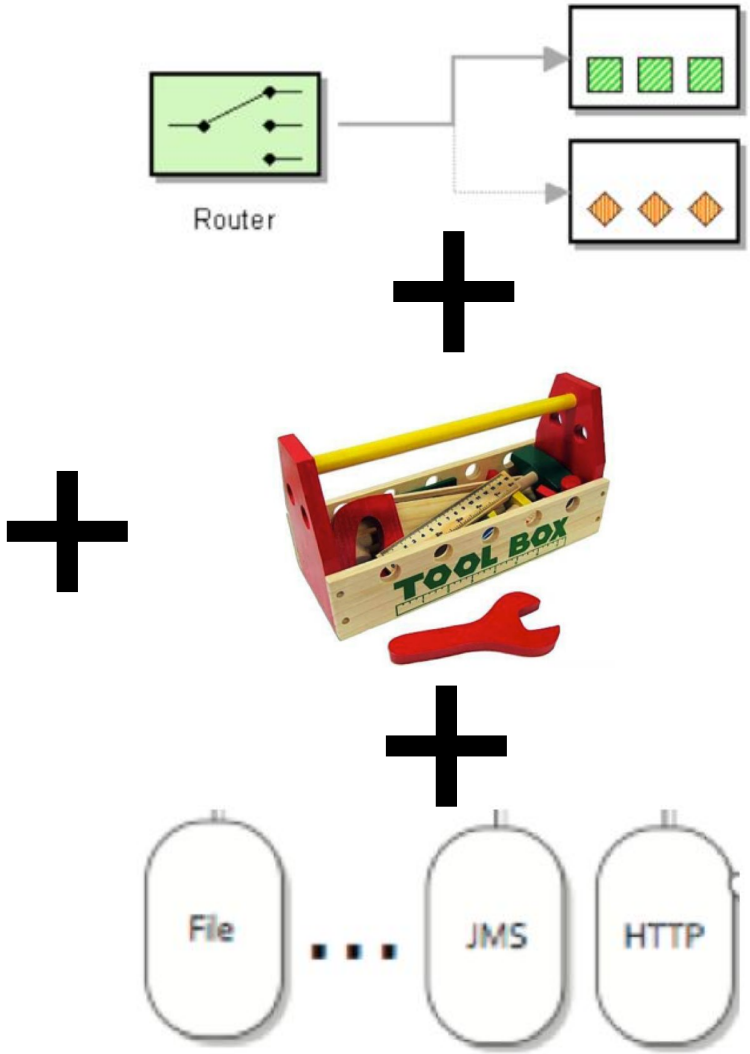
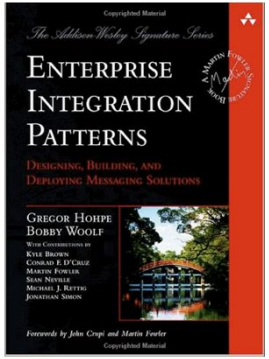

Router
TOOL BOX
File
JMS
HTTP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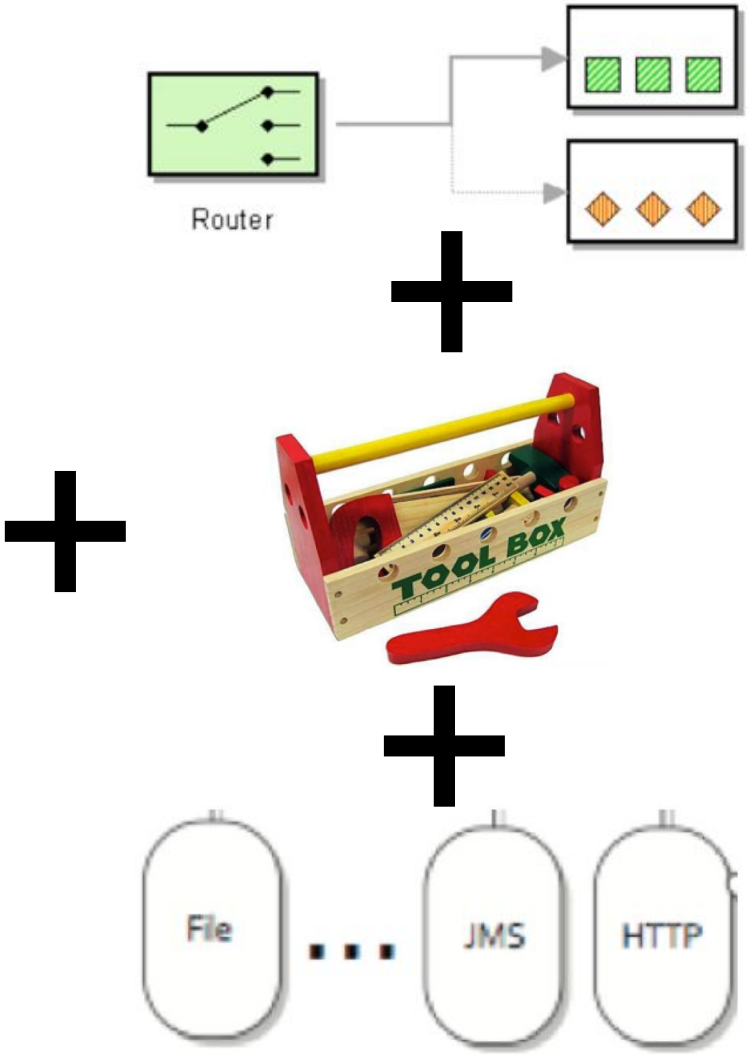
Router
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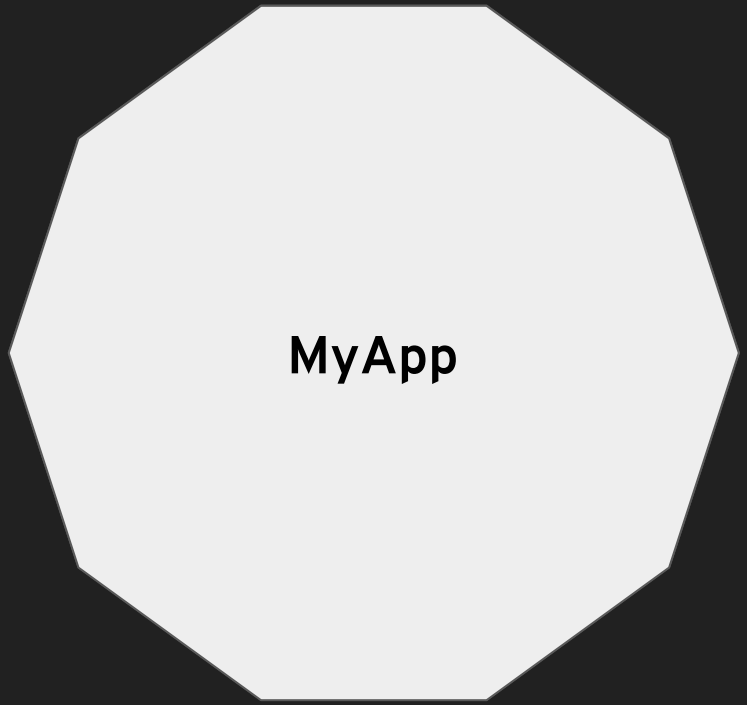
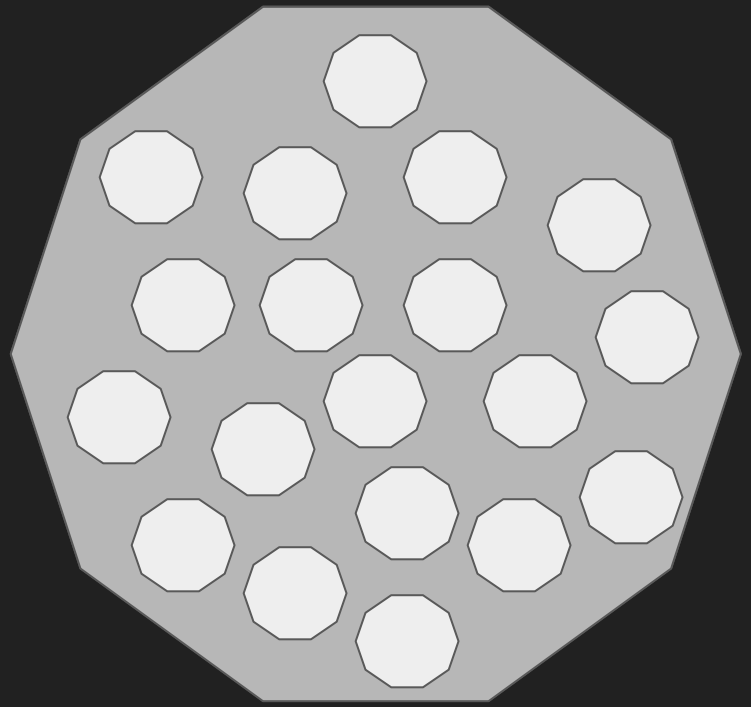
File
JMS
HTTP

What about Camel in the Cloud?

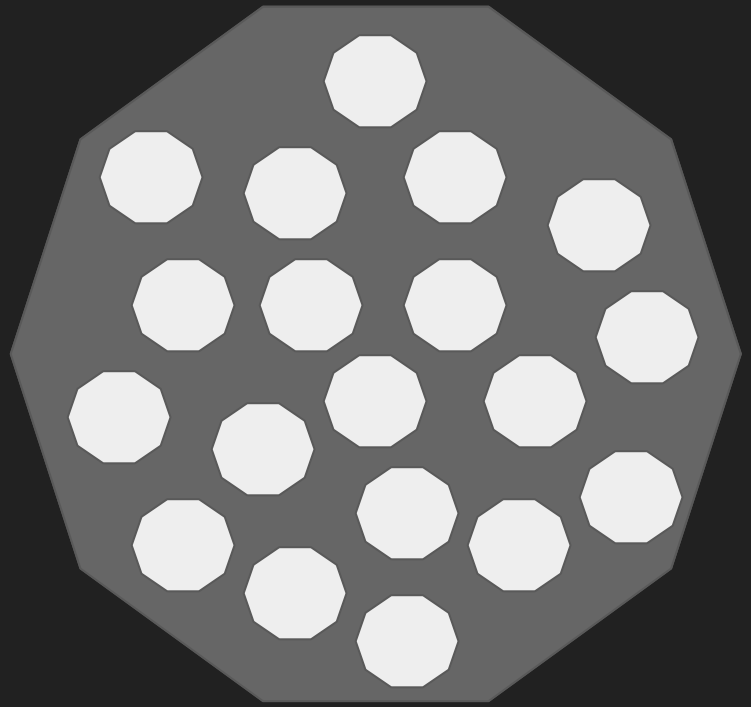
Monolith



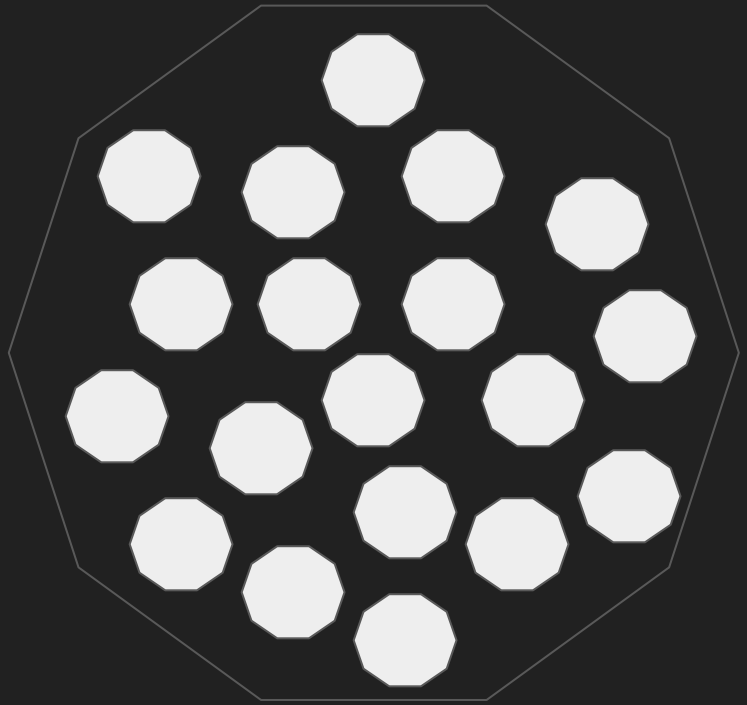
Microservices



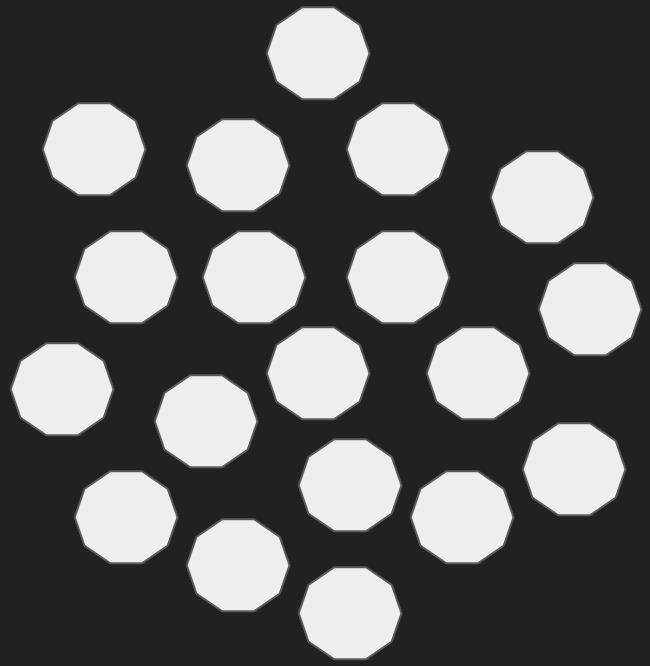
Microservices



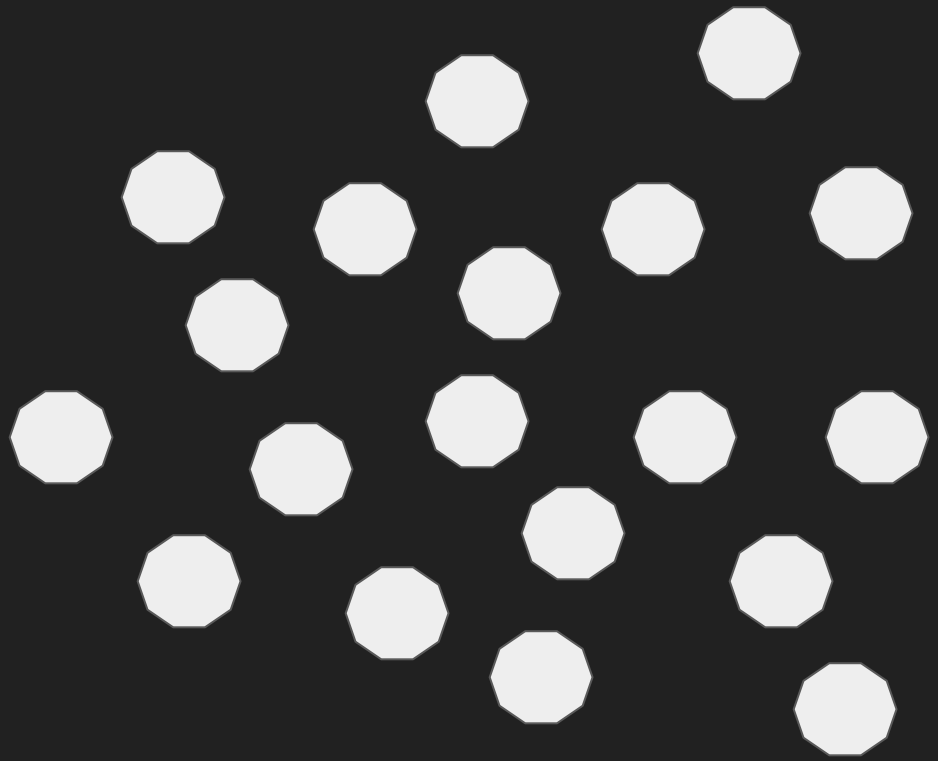
Microservices



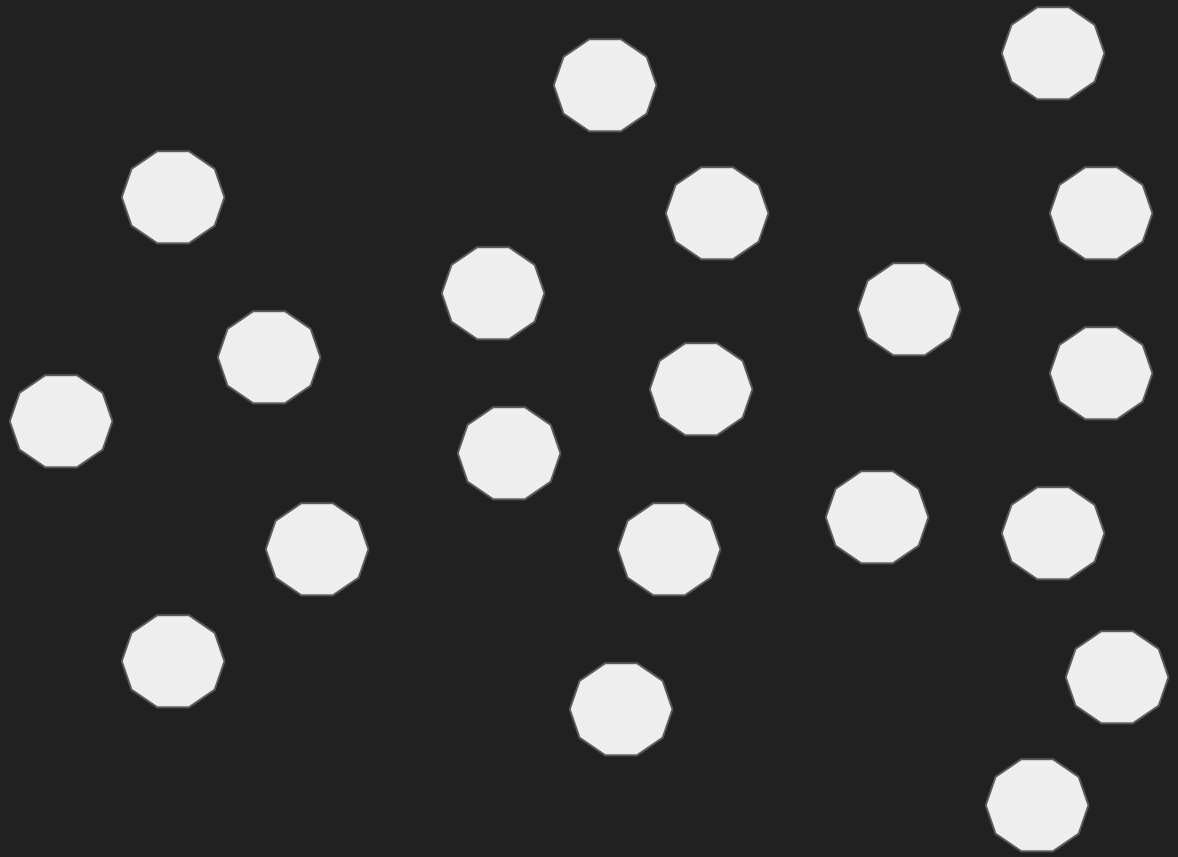
Microservices



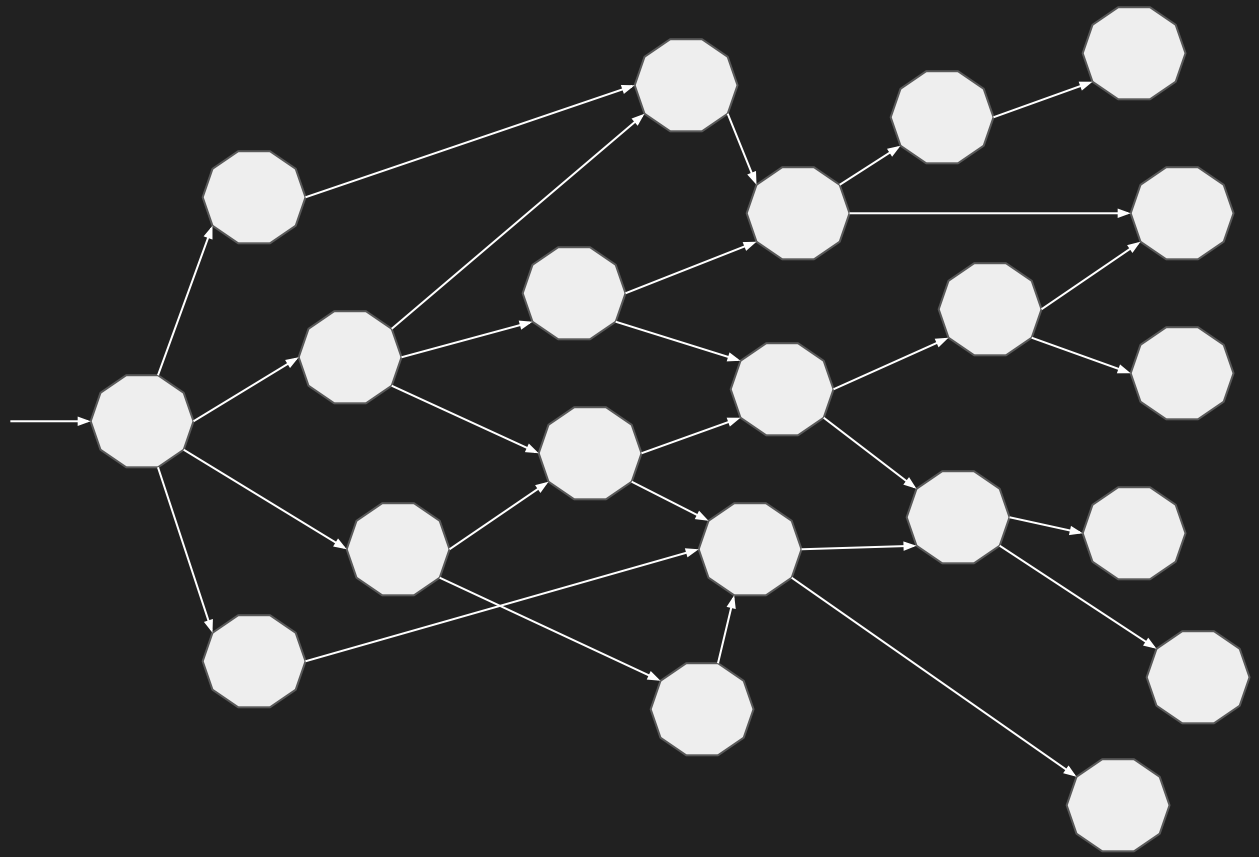
Microservices



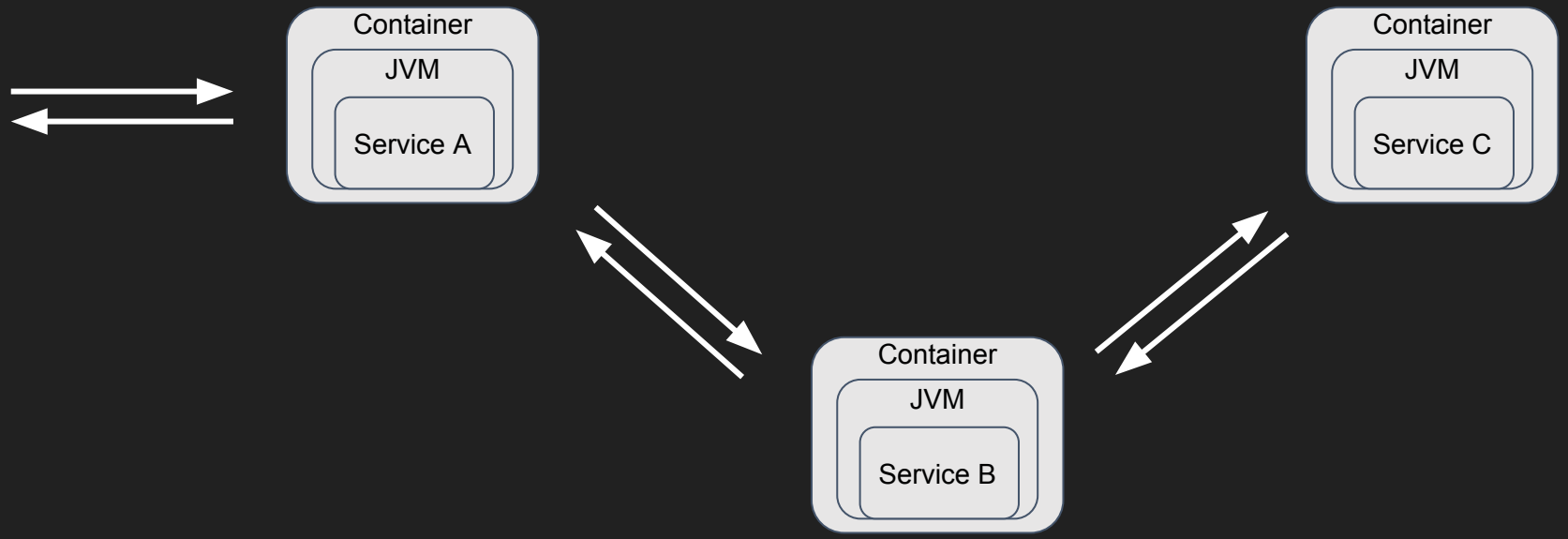
Microservices



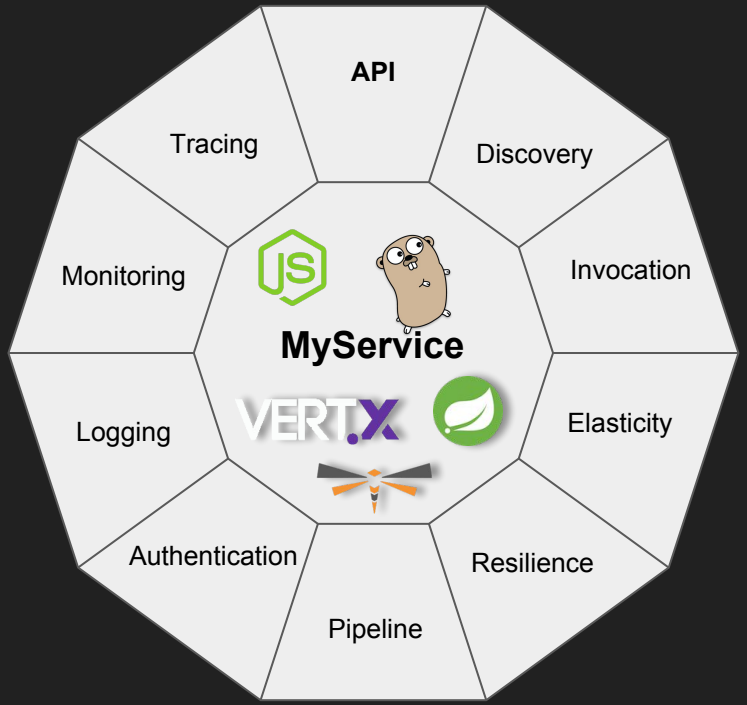
Network of Services



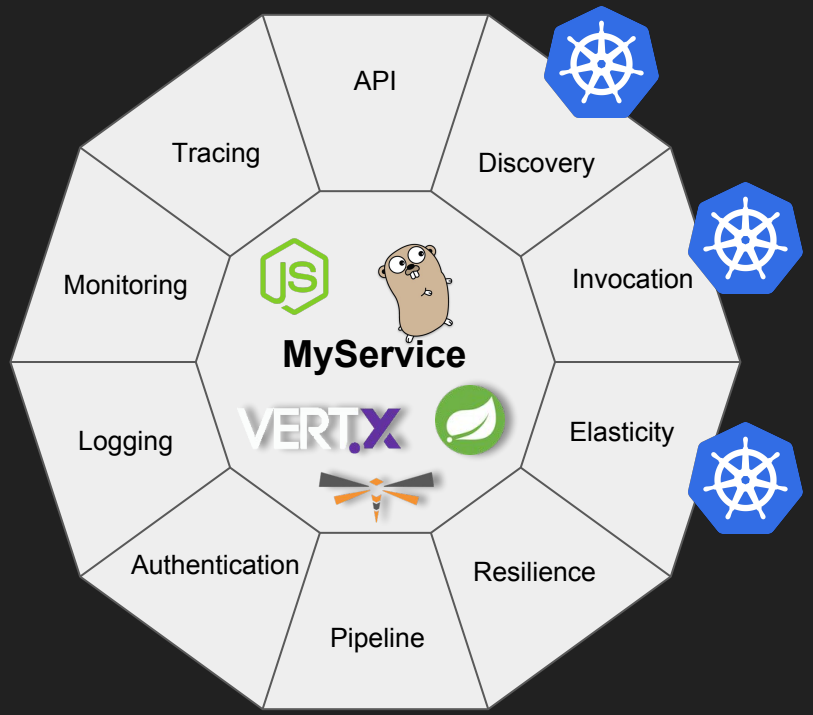
Microservices == Distributed Computing



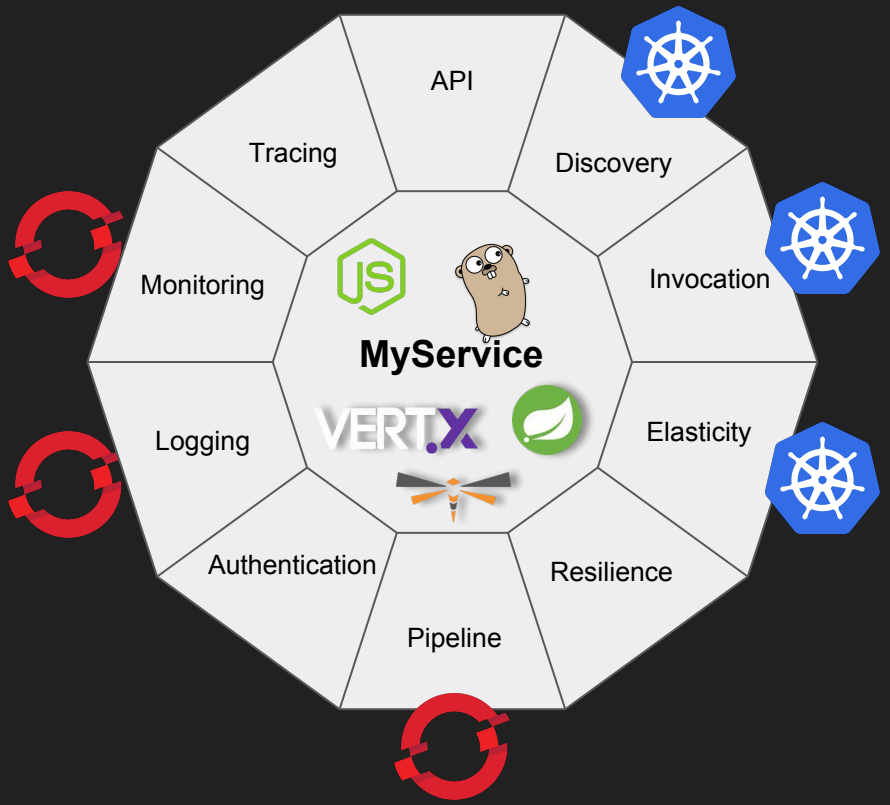
Microservices'ilities



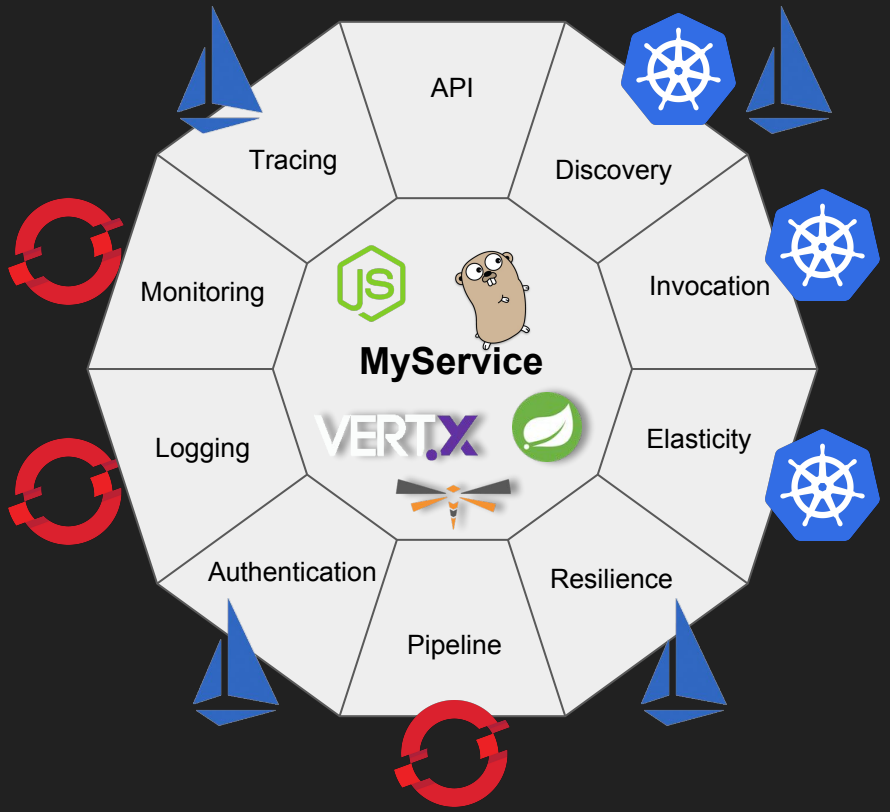
Microservices'ilities + Kubernetes



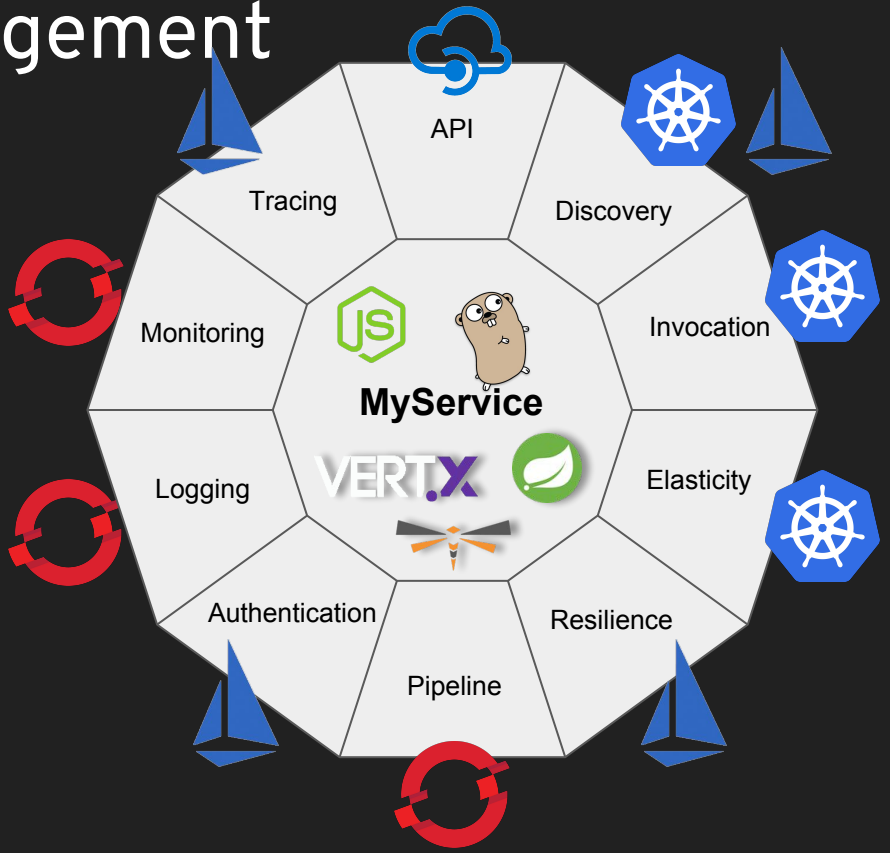
Microservices'ilities
+ PaaS



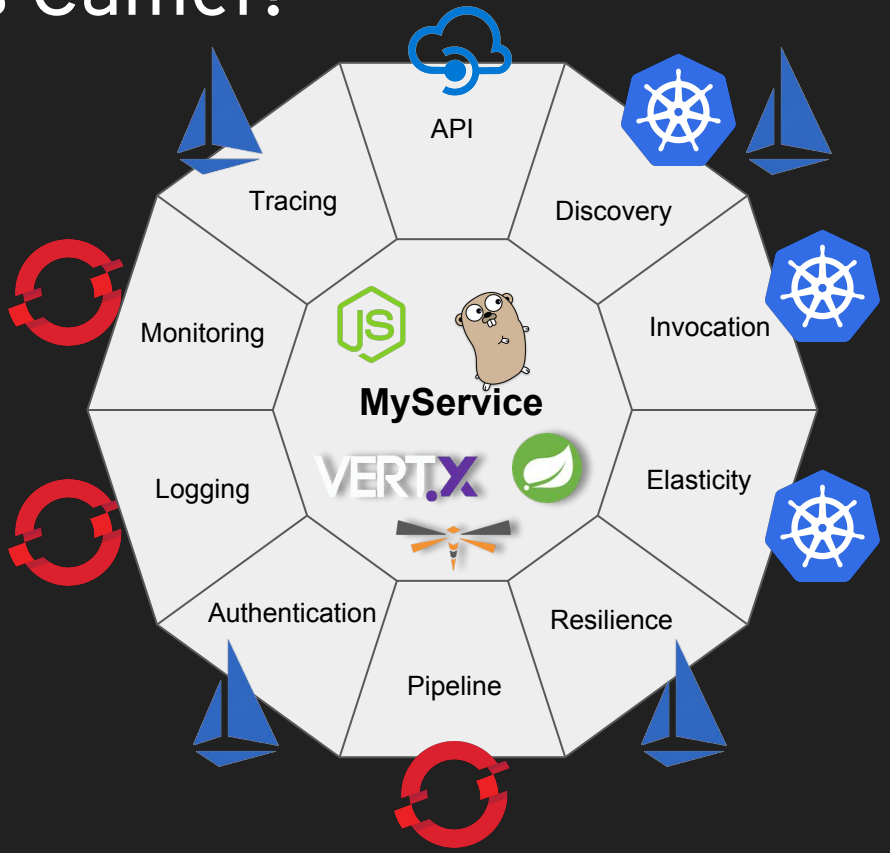
Microservices'ilities
+ Istio



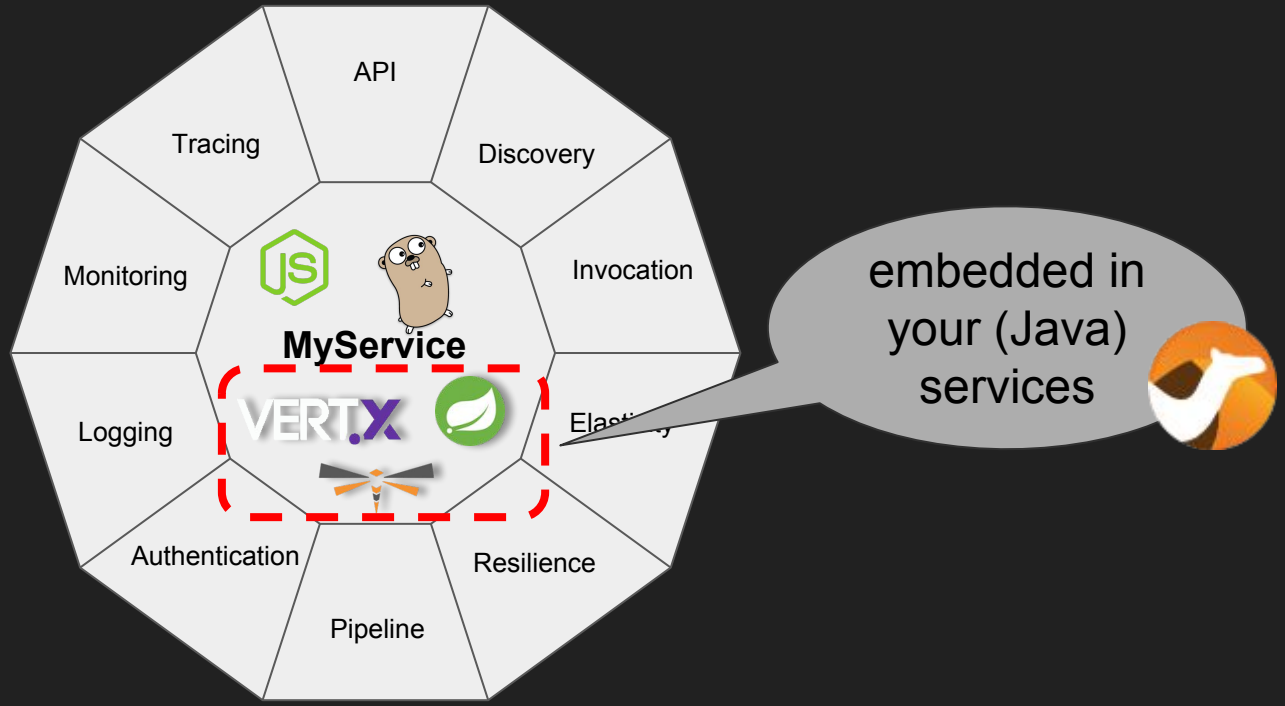
Microservices'ilities + API management



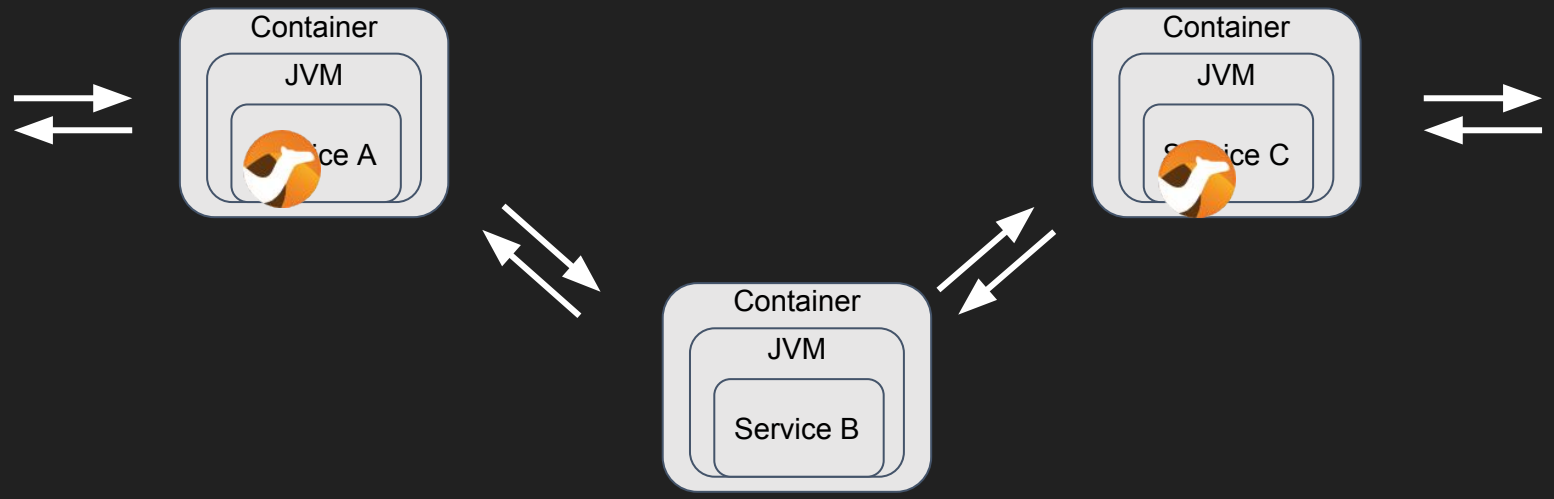
But where is Camel?



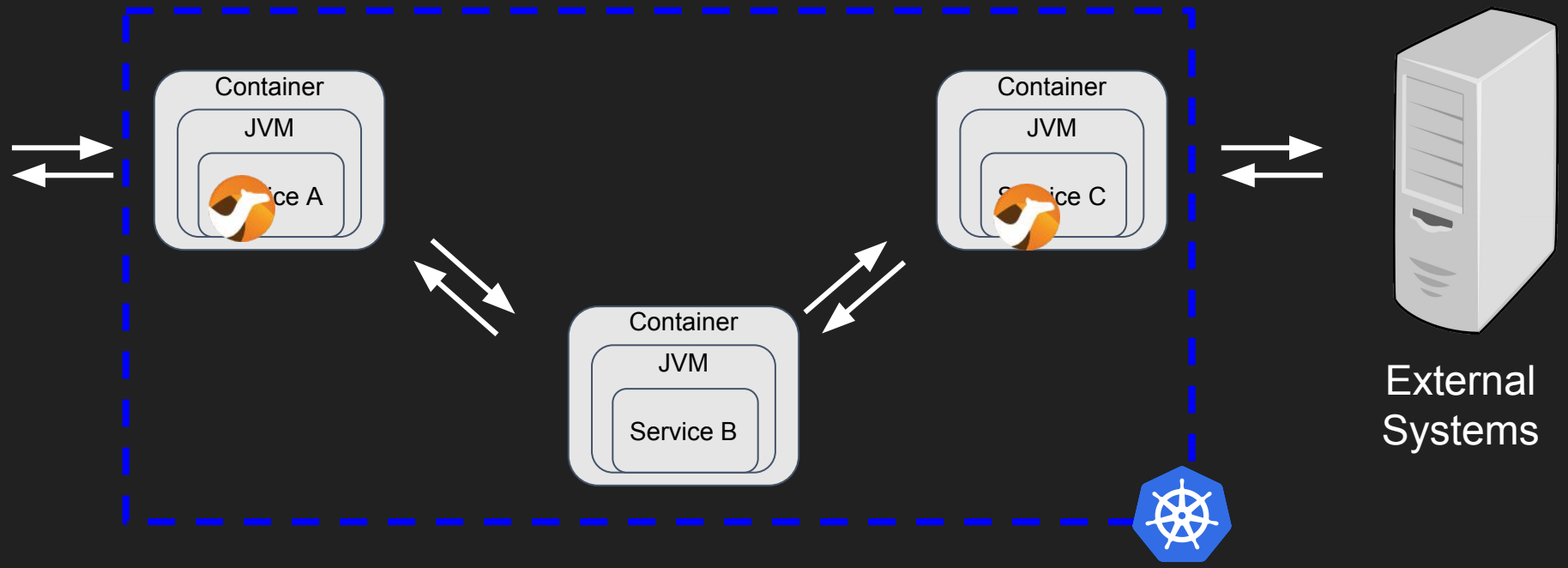
But where is Camel?



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

```
// inject configuration via spring-style @Value
@Value("${fallback}")
private String fallback;
```

```
.simple( text: "{{fallback}}")
```

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

Best Practice - Fault Tolerant

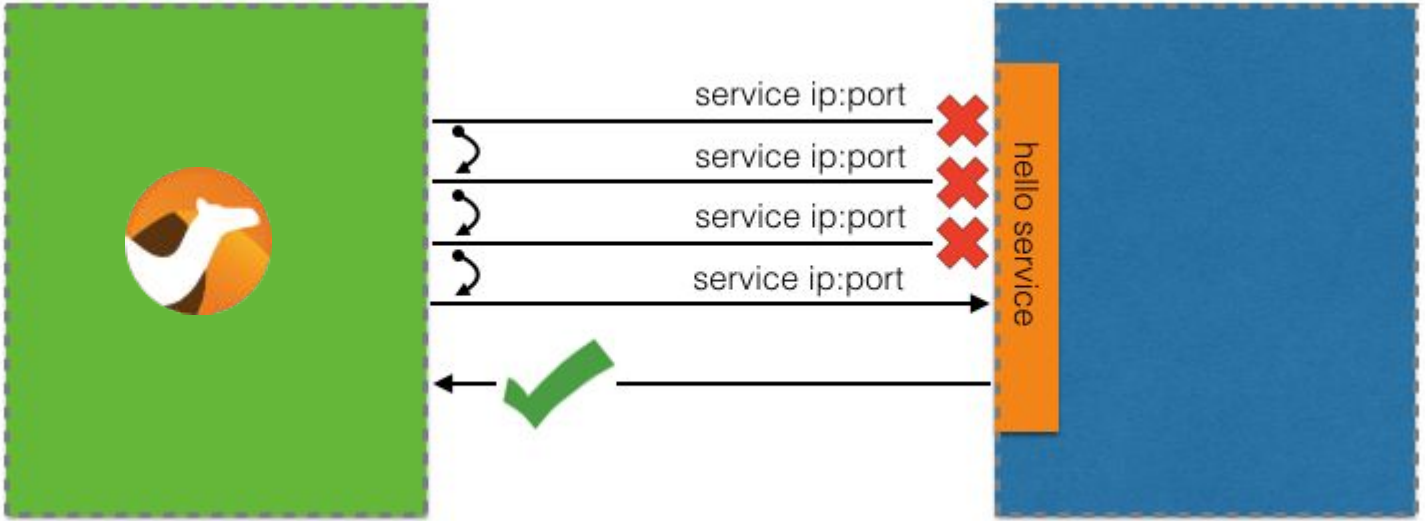
- Camel Retry
  - onException
  - errorHandler

- Camel Hystrix
  - circuit breaker

Best Practice - Fault Tolerant

- Camel Retry
  - onException
  - errorHandler

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



Best Practice - Fault Tolerant

- Camel Retry
  - onException
  - errorHandler

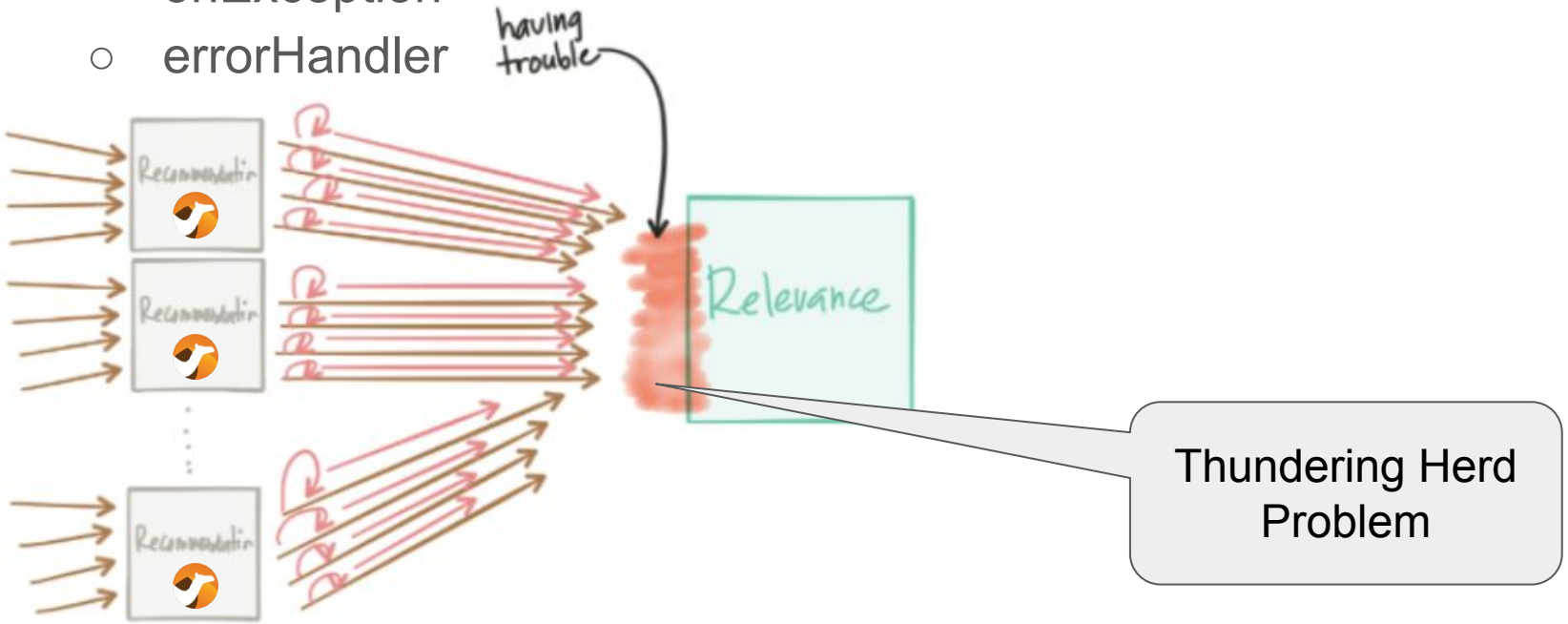


Figure by Christian Posta

Best Practice - Health Checks

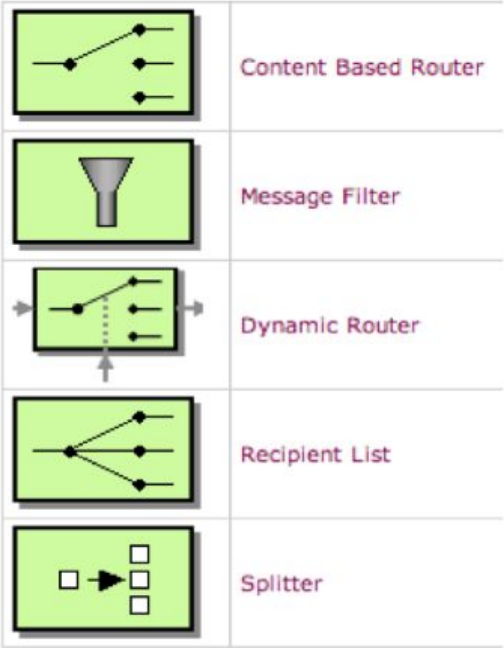
- Health Checks
  - camel-spring-boot actuator
  - wildfly-swarm monitor
- Readiness Probe
  - Kubernetes
- Liveness Probe
  - Kubernetes

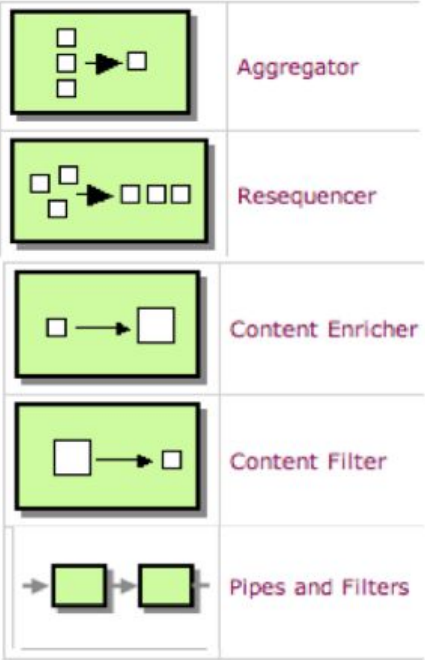
client-hystrix-myproject.192.168.64.4.nip.io/health


```
{
    status: "UP",
  - camel: {
        status: "UP",
        name: "camel-1",
        version: "2.20.2",
        contextStatus: "Started",
    },
  - camel-health-checks: {
        status: "UP",
        route:route1: "UP",
    },
  - diskSpace: {
        status: "UP",
        total: 19195224064,
        free: 5747757056,
        threshold: 10485760,
    },
}
```

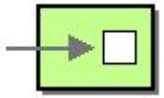
Best Practice - EIP Patterns

- Works anywhere





EIP Cloud Patterns



Service Call

Plugins

- Consul
- Etcd
- Kubernetes
- Ribbon
- Zookeeper

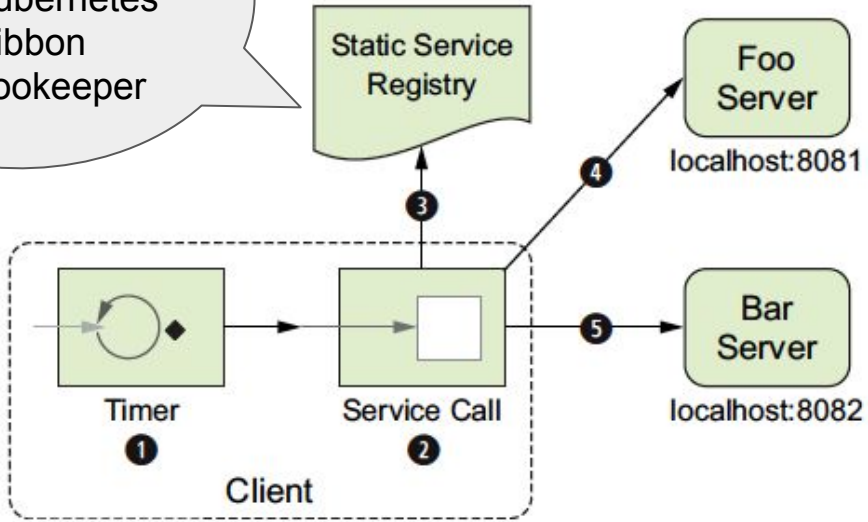
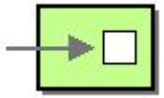


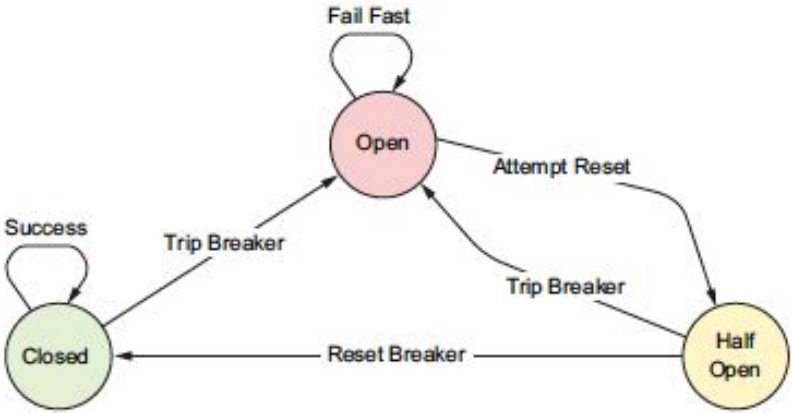
Figure 17.9 A timer (1) triggers the Service Call EIP (2) to call a clustered service. The physical locations of the service are looked up in the service registry (3). The service is then called in a round-robin fashion by calling either Foo server (4) or Bar server (5).

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

EIP Cloud Patterns

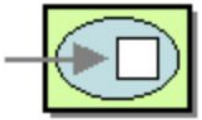


Hystrix EIP

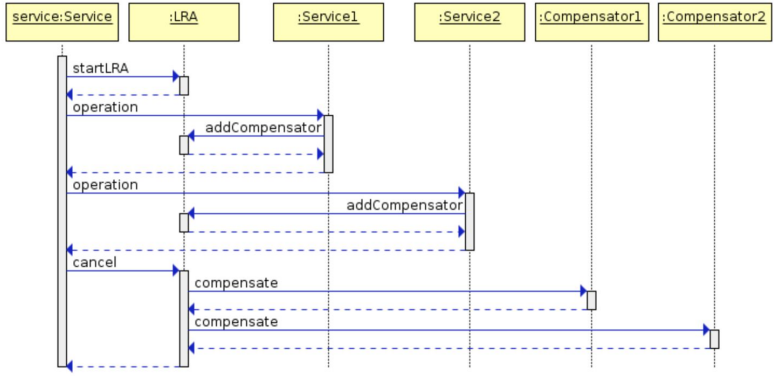



```
from("timer:foo")
   .hystrix()
      .to("http:myservice")
   .onFallback()
      .to("bean:myfallback")
   .end()
```

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 | Lookup by Trace ID... | Search | Dependencies | About Jaeger

loanclient: queue:loan

Search... | View Options

Trace Start: **August 1, 2018 2:54 PM** | Duration: **369.5ms** | Services: **2** | Depth: **4** | Total Spans: **8**

Service & Operation	0ms	92.38ms	184.75ms	277.13ms	369.5ms
loanclient queue:loan					
loanbroker queue:loan				59.8ms	
loanbroker queue:bank2				45.69ms	
loanbroker queue:bank2				0.34ms	
loanbroker queue:bank1				46.89ms	
loanbroker queue:bank1				0.17ms	
loanbroker queue:bank3				48.75ms	
loanbroker queue:bank3				0.19ms	

queue:bank2 — Service: **loanbroker** | Duration: **45.69ms** | Start Time: **308ms**

Tags: component = camel-jms | message_bus.destination = queue:bank2 | span.kind = producer | camel.uri = jms://queue:bank2

Process: hostname = localhost.localdomain | ip = 127.0.0.1 | jaeger.version = Java-0.30.3

SpanID: ed4a7b3a204d81b2

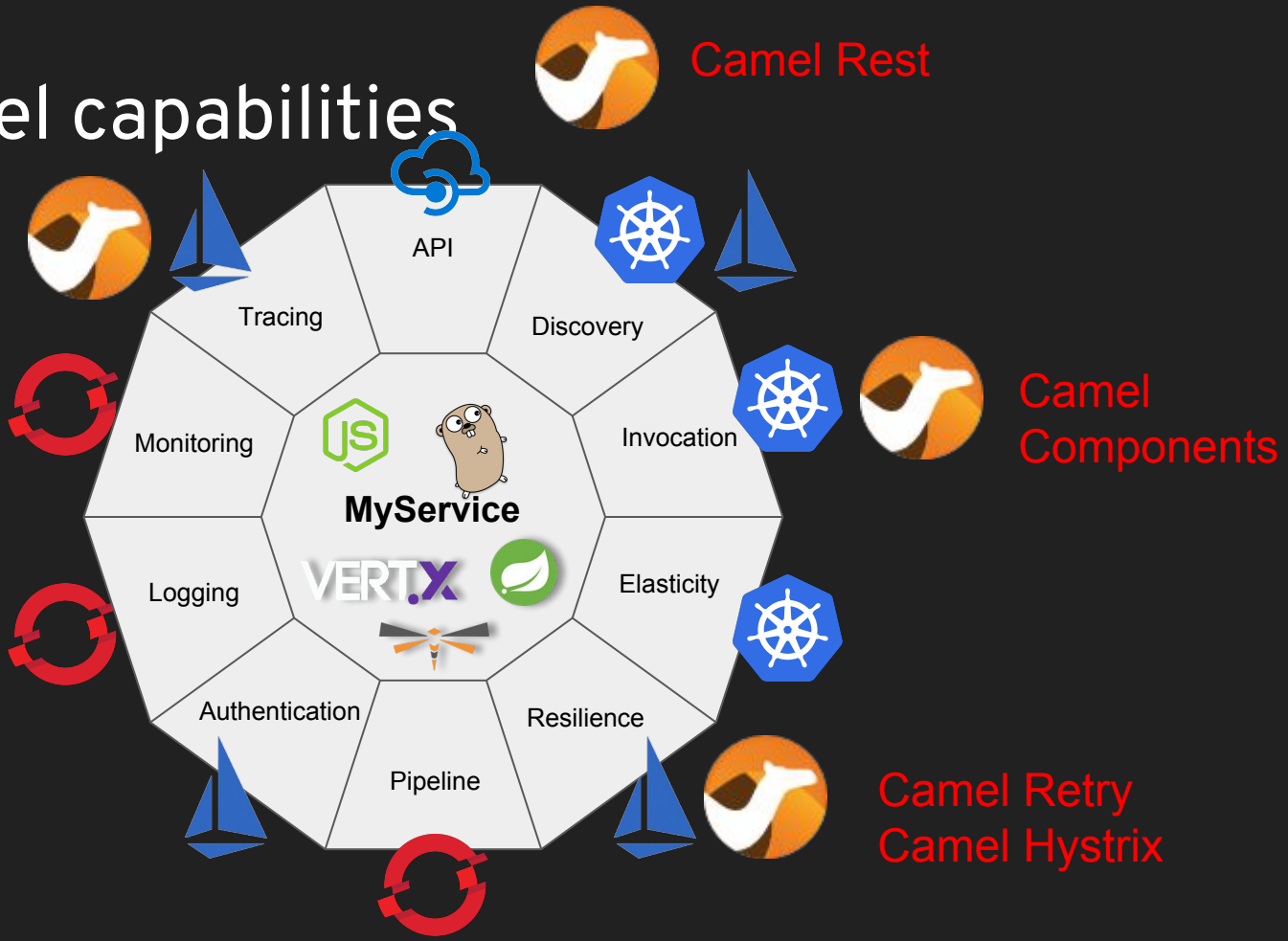
queue:bank3 — Service: **loanbroker** | Duration: **0.19ms** | Start Time: **348ms**

Tags

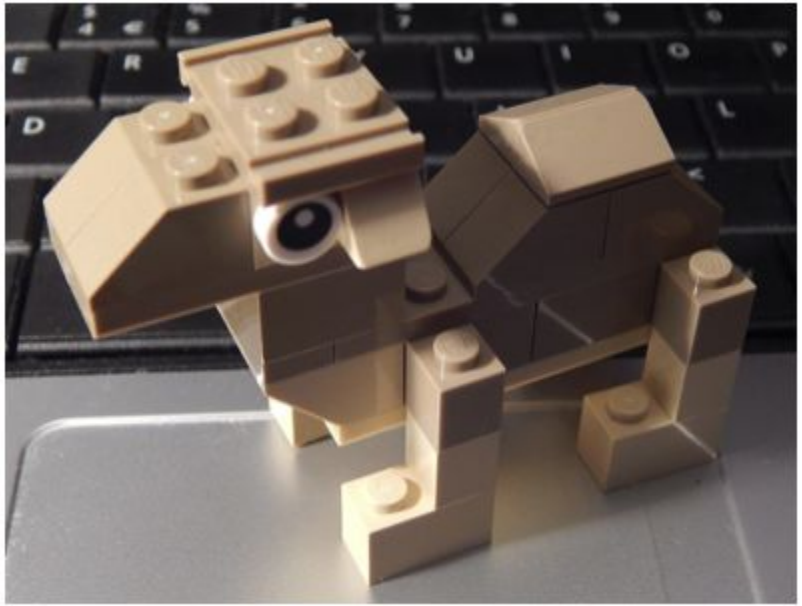
component	"camel-jms"
message_bus.destination	"queue:bank3"
message_bus.id	"ID:localhost.localdomain-43871-1533131676985-4:9:1:1:1"
span.kind	"consumer"
camel.uri	"jms://queue:bank3"

Jaeger UI

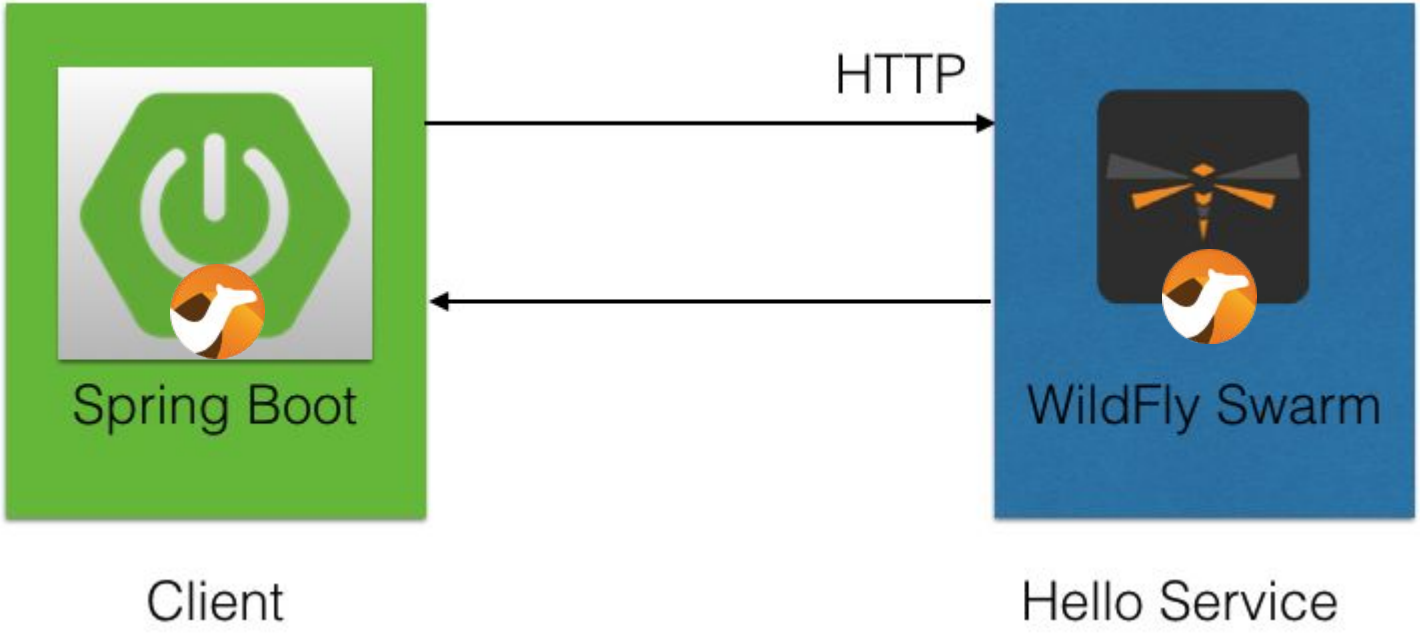
Usable Camel capabilities



Demo Time



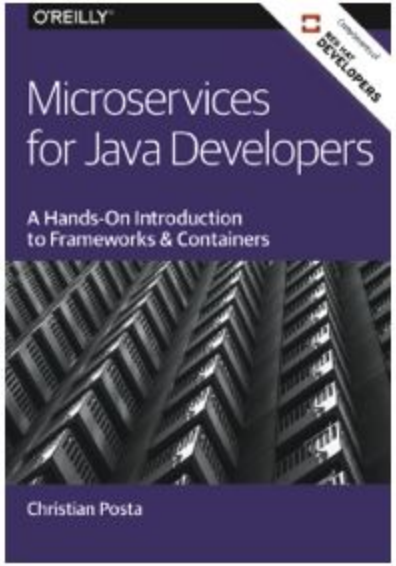
Basic Demo



Tip of the iceberg

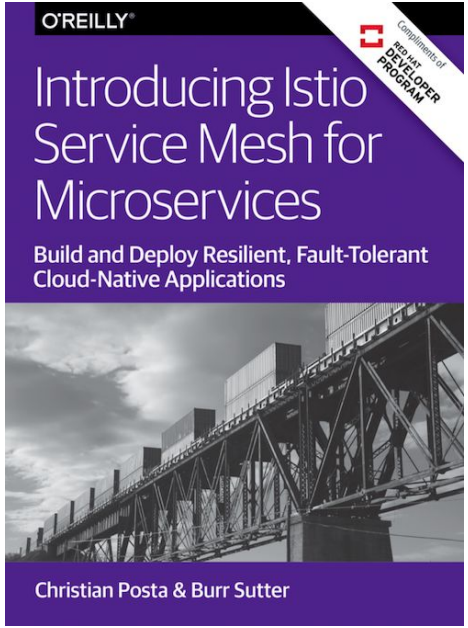
Figure by Bilgin Ibryam

Free book



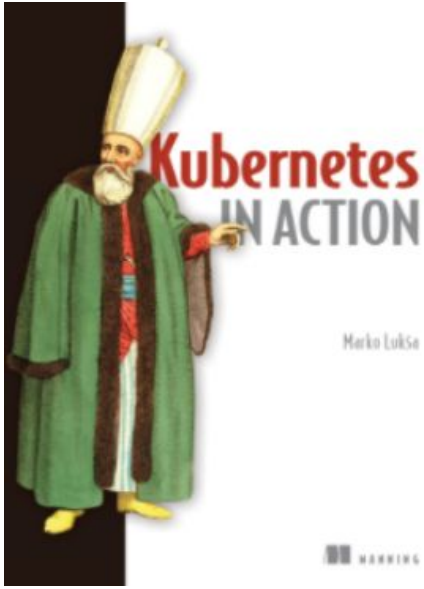
http://developers.redhat.com/promotions/microservices-for-java-developers

Free book



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

Not so free book



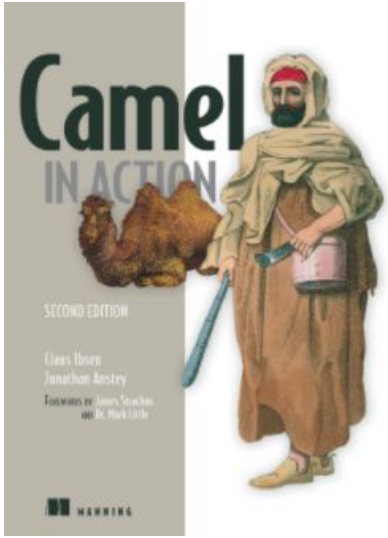
https://www.manning.com/books/kubernetes-in-action

Not so free book

- Discount code (39%):

  `came139`

  (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

Q & A