Domain Driven Design in Action

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July 6, 2024

Objectives

1. Provide good Arabic content for the topic

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2. Overview of DDD and Deep Dive in Microservices

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4. Leave your fear, and let's do it

Table of Contents

Definition

Monolithic

A monolithic application is self-contained, and independent from other computing applications. The design philosophy is that the application is responsible not just for a particular task, but can perform every step needed to complete a particular function.

Microservices

Microservices is a software development technique that arranges an application as a collection of loosely coupled services.

https://en.wikipedia.org/wiki/Monolithic_application
https://en.wikipedia.org/wiki/Microservices

Domain-Driven Design(DDD) is a collection of principles and patterns that help developers craft elegant object systems.

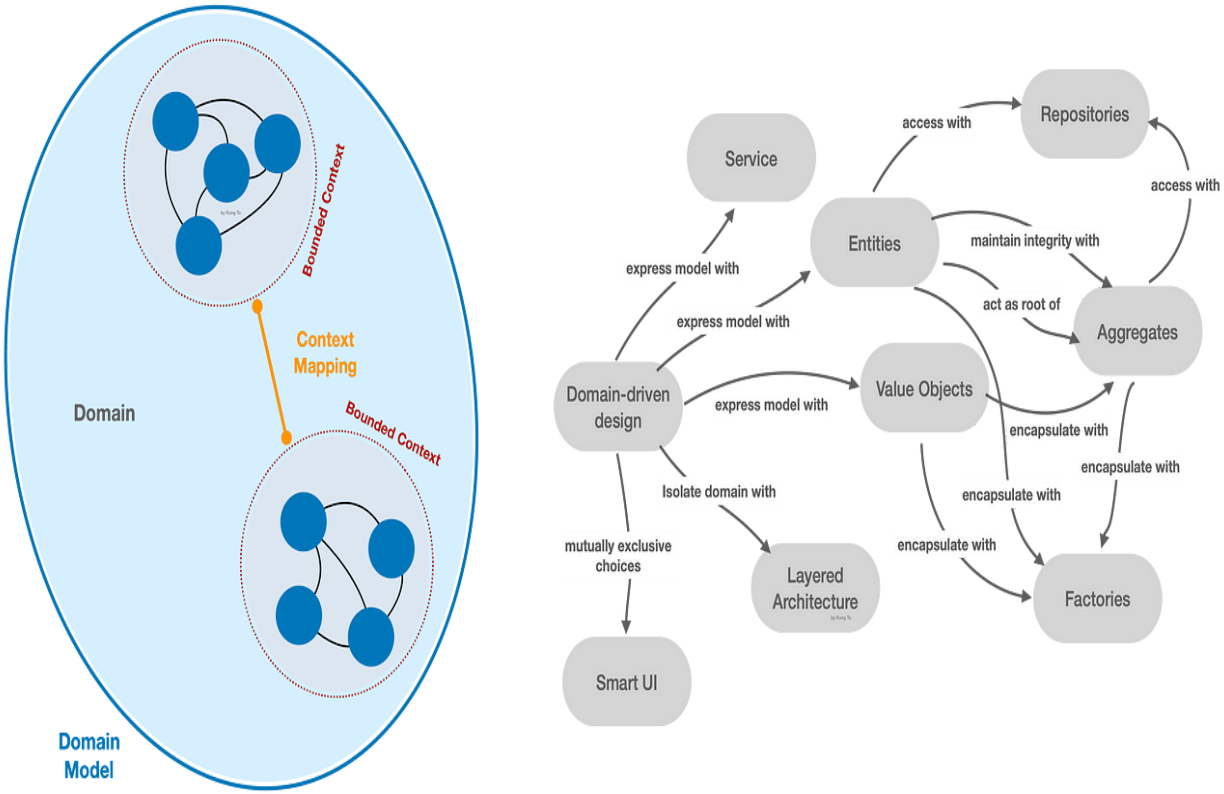

Figure: DDD Map

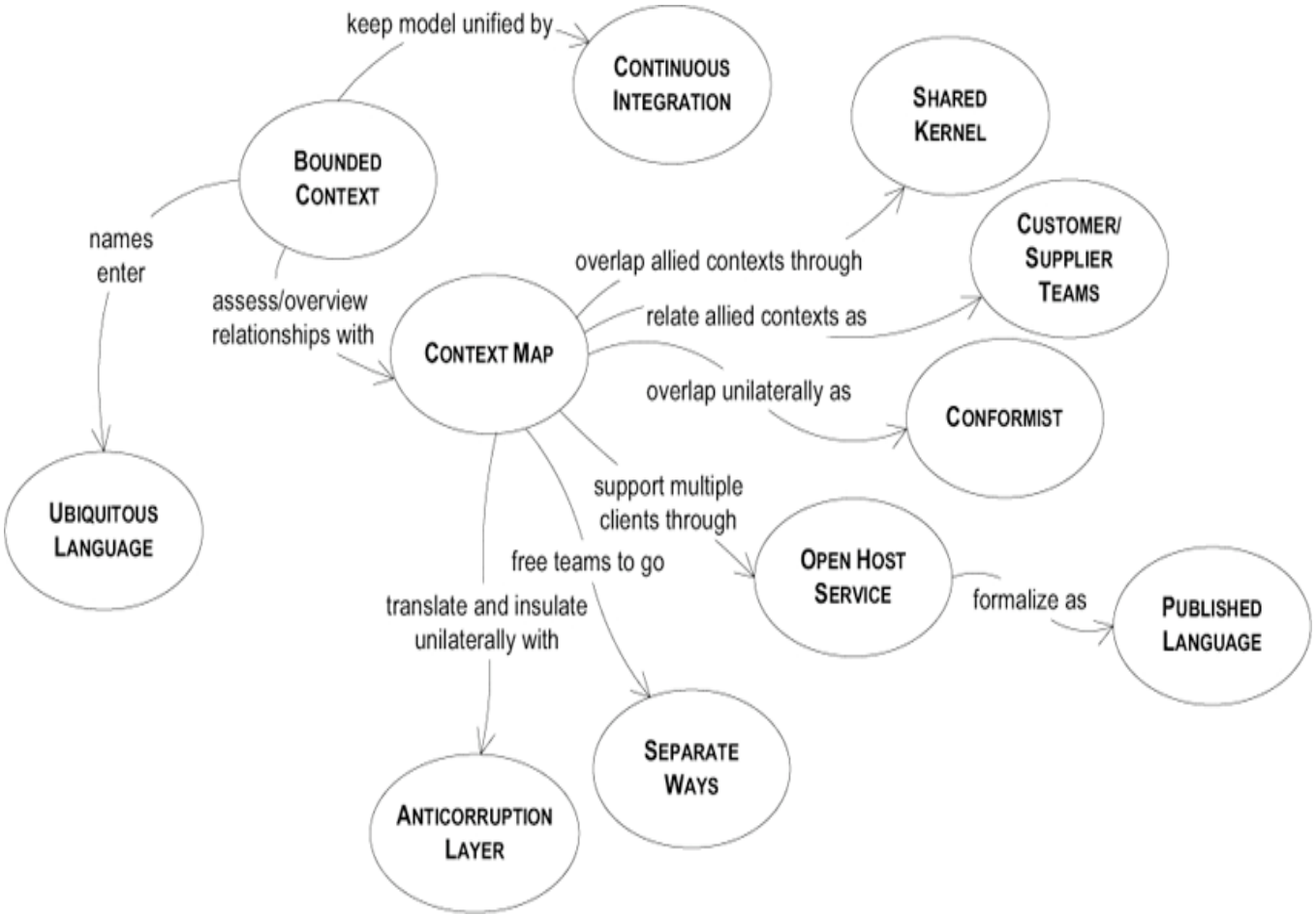

Figure: Strategic Design Map

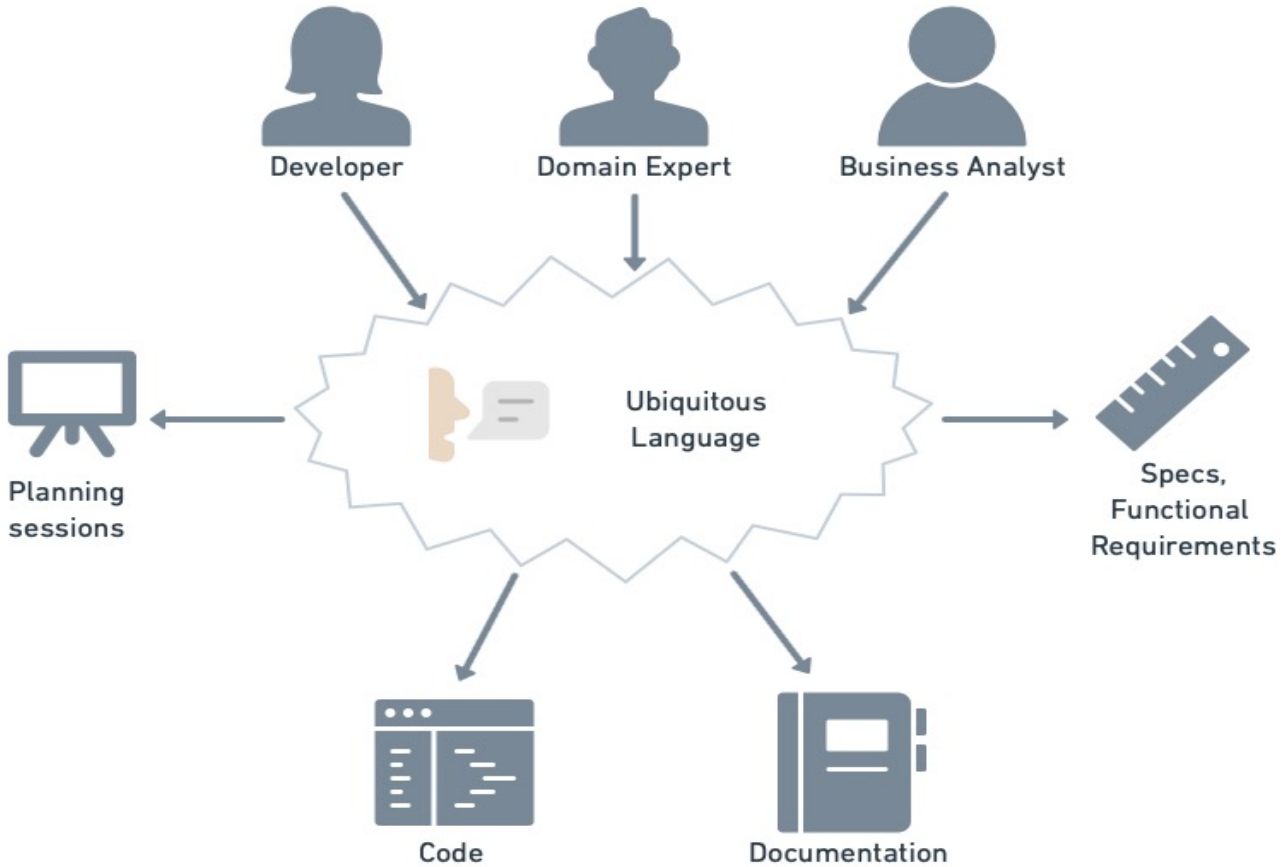

Figure: All Speak The Same Language "Ubiquitous Language"

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Why Microservices?

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   - The application consists of loosely coupled services.
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5. Scalability
   - Each microservice can be scaled independently of the other services.

Microservices vs Monolithic

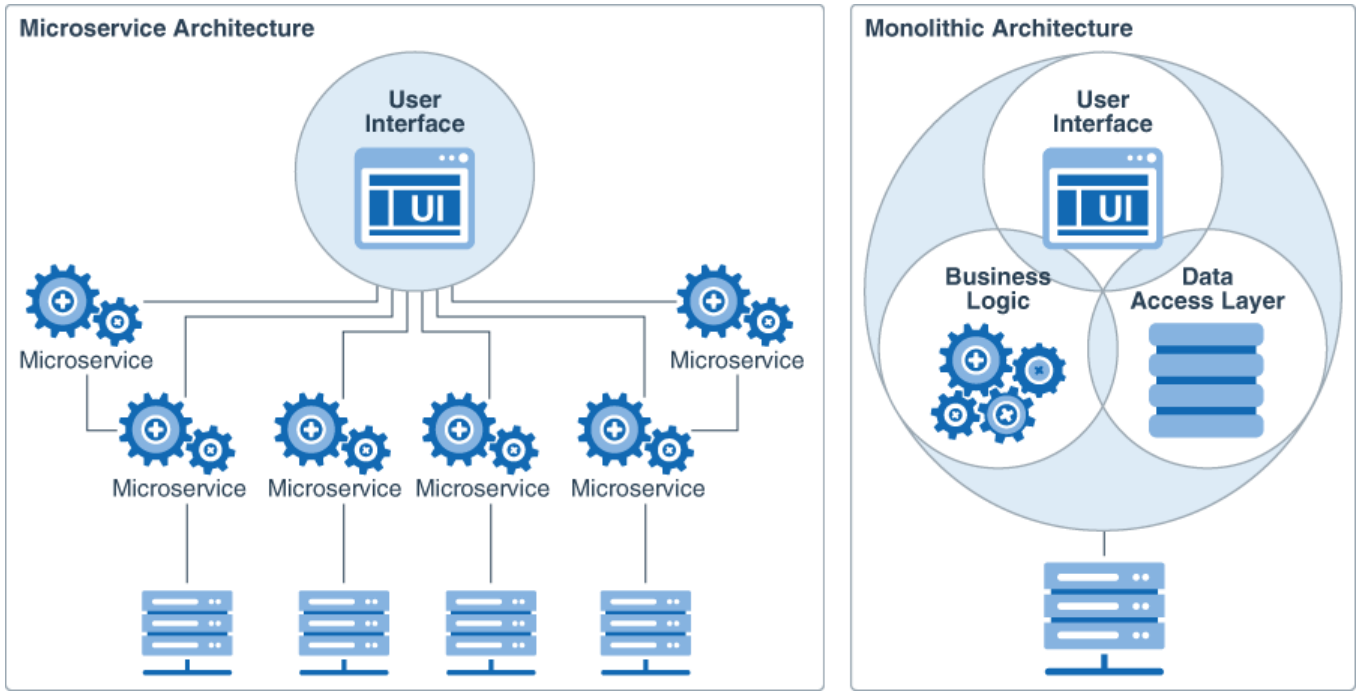

Figure: mivroservices vs monolithic

https://docs.oracle.com/en/solutions/learn-architect-microservice/index.html

Closer Look

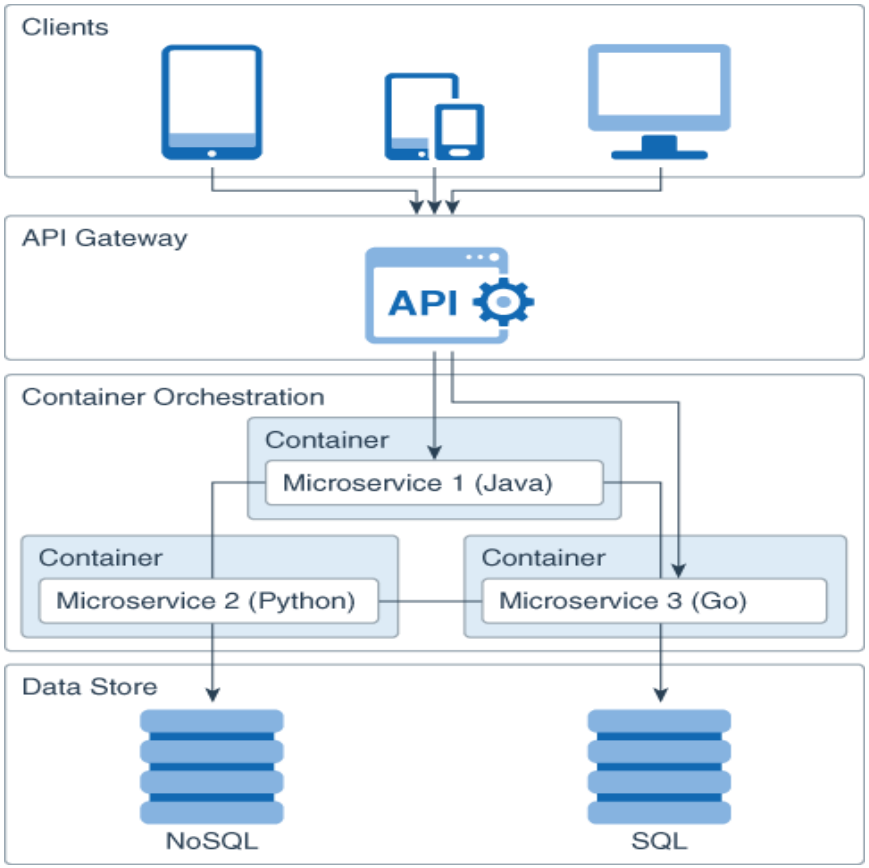

Figure: Microservices In Depth

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Microservices Architecture

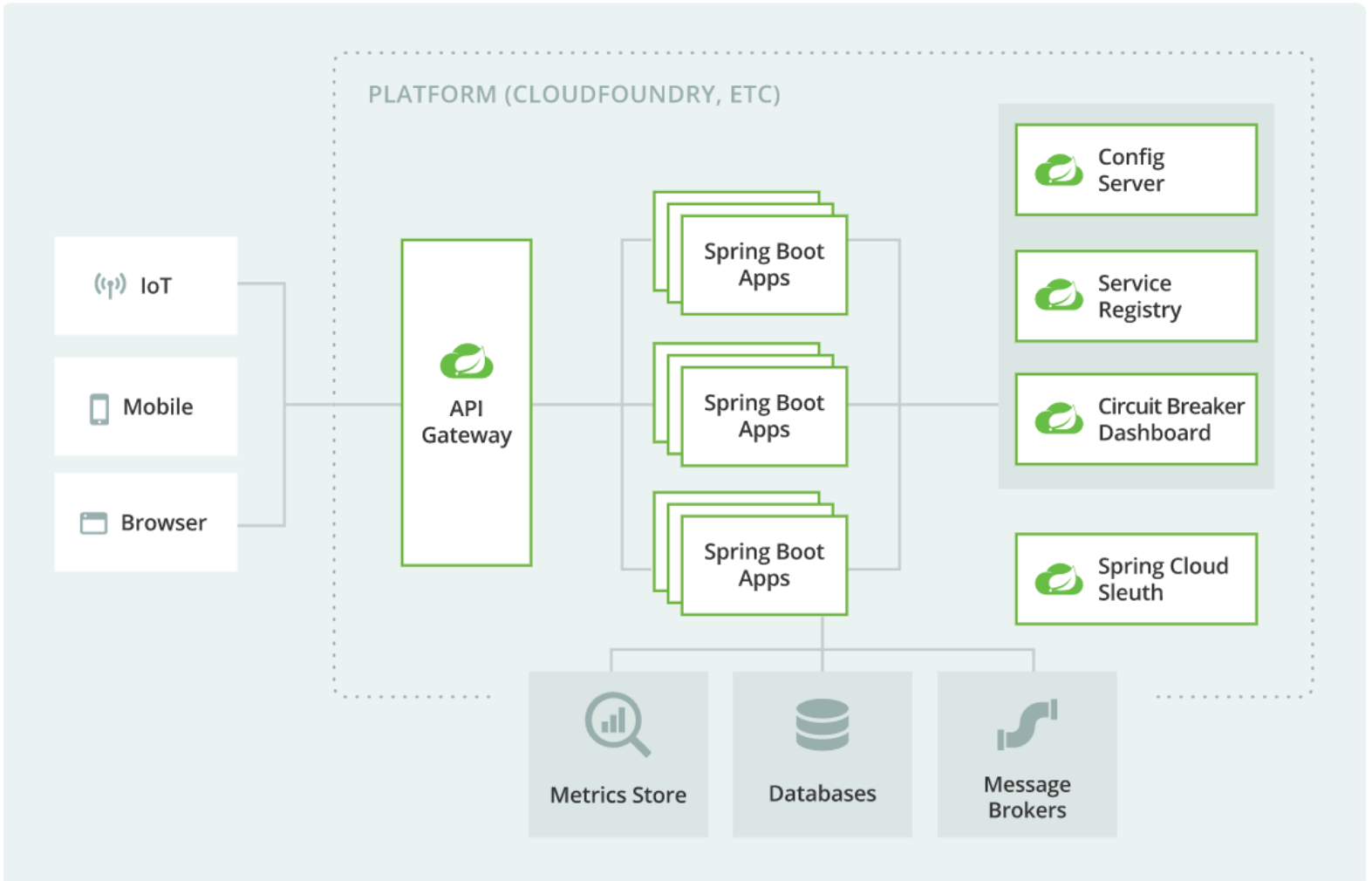
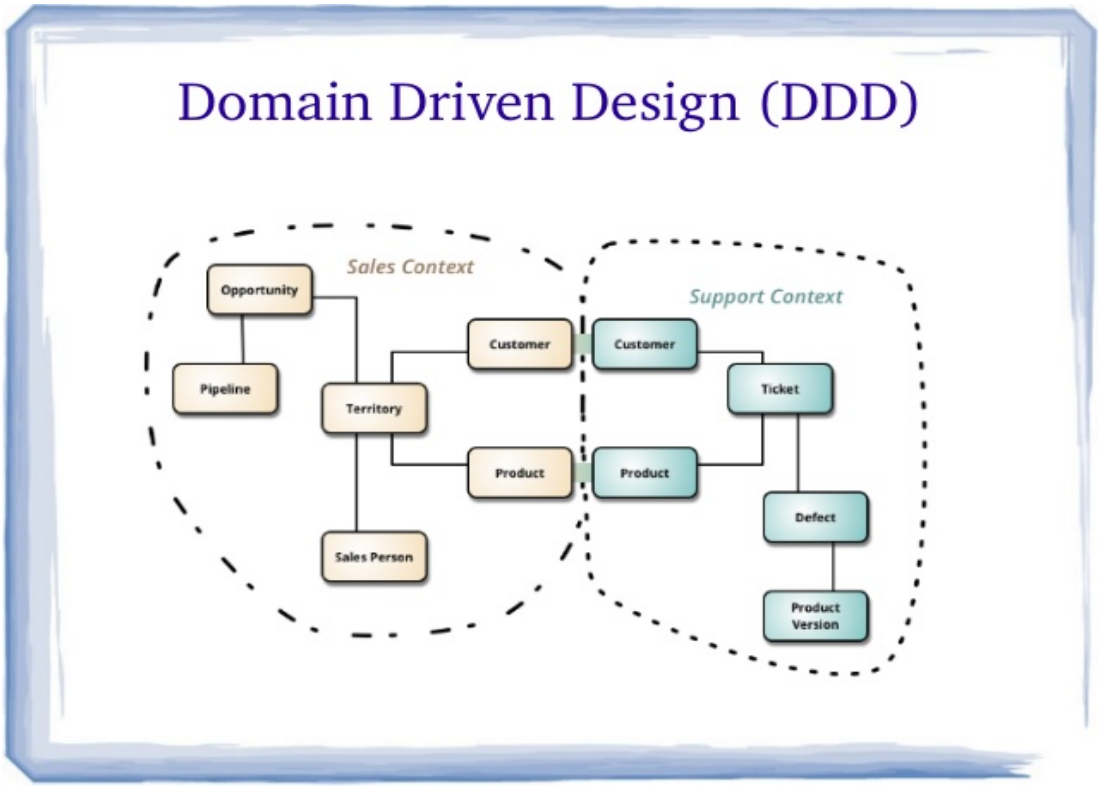


Figure: Microservices with Spring Cloud

Microservice characteristics

Single Responsibility

- Business Boundary
- Function Boundary



https://martinfowler.com/bliki/BoundedContext.html

Communication Design

HTTP communication

Also known as **Synchronous communication**, the calls between services is a viable option for **service-to-service** via REST API.

Message communication

Also known as **Asynchronous communication**, the services push messages to a message broker that other services subscribe to.

Event-driven communication

Another type of **Asynchronous communication**, the services does not need to know the common message structure. Communication between services takes place via events that individual services produce.

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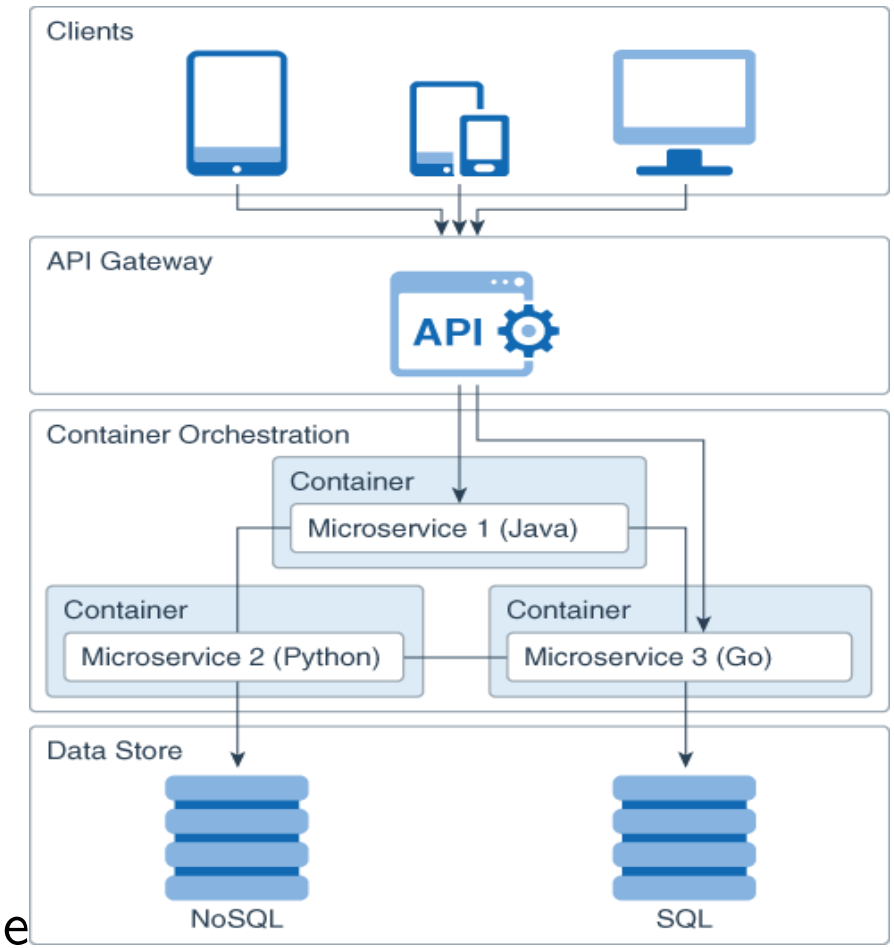
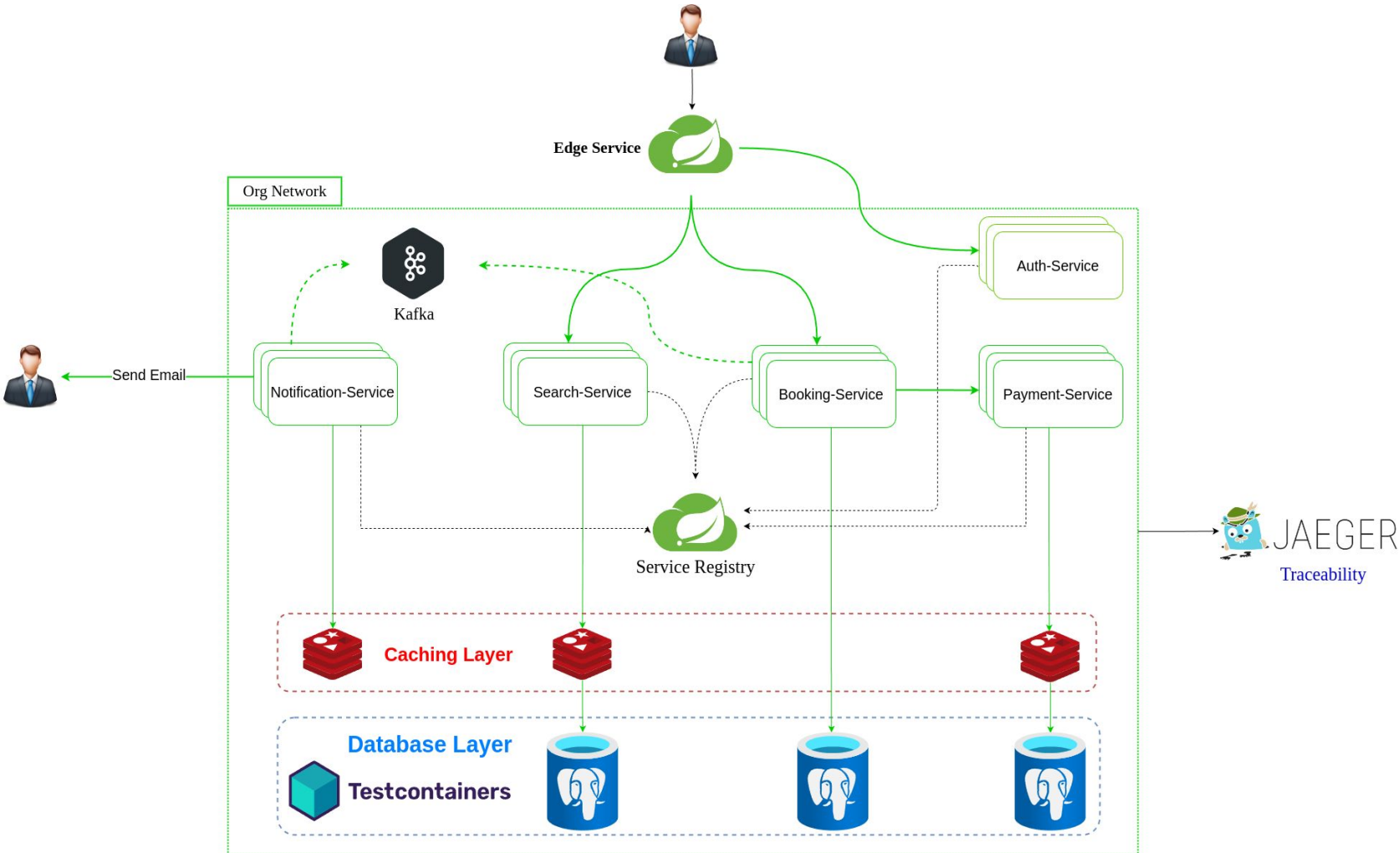


scale

Figure: Service to Service Calls

Welcome to Flight System



Event-driven communication

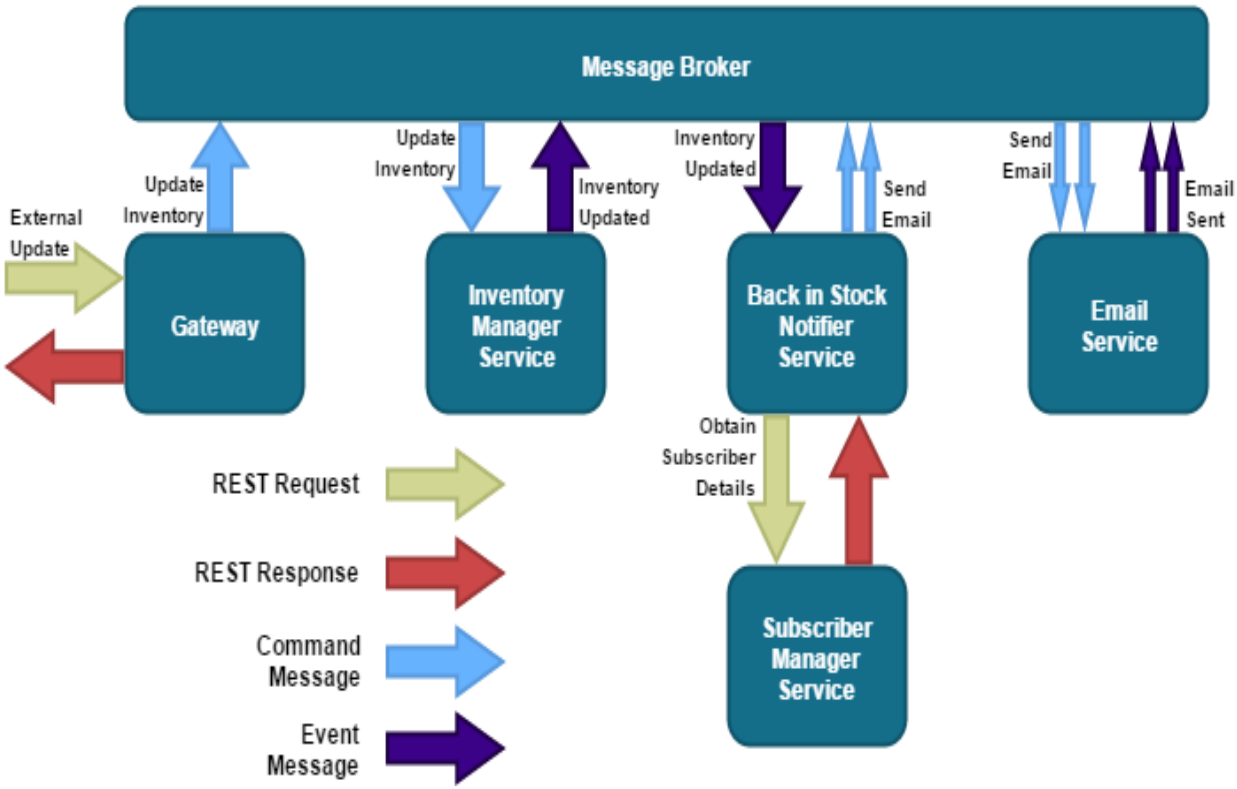


Figure: Asynchronous calls

https://capgemini.github.io/architecture/is-rest-best-microservices

Why not SOAP?

It is possible to build a microservices-based architecture using SOAP which uses HTTP. But:

- it only uses POST messages to transfer data to a server.
- SOAP lacks concepts such as HATEOAS that enable relationships between microservices to be handled flexibly.
- The interfaces have to be completely defined by the server and known on the client.

Microservices; Flexible Software Architecture. "Eberhard Wolff"

API Gateway

API Gateway

API Gateway is a tool that makes it easy for developers to create(1), publish(2), maintain(3), monitor(4), and secure(5) APIs at any scale. APIs act as the "front door" for applications to access data, business logic, or functionality from your backend services.

Figure: Amazon Gateway

Orchestration and API Gateway cont...

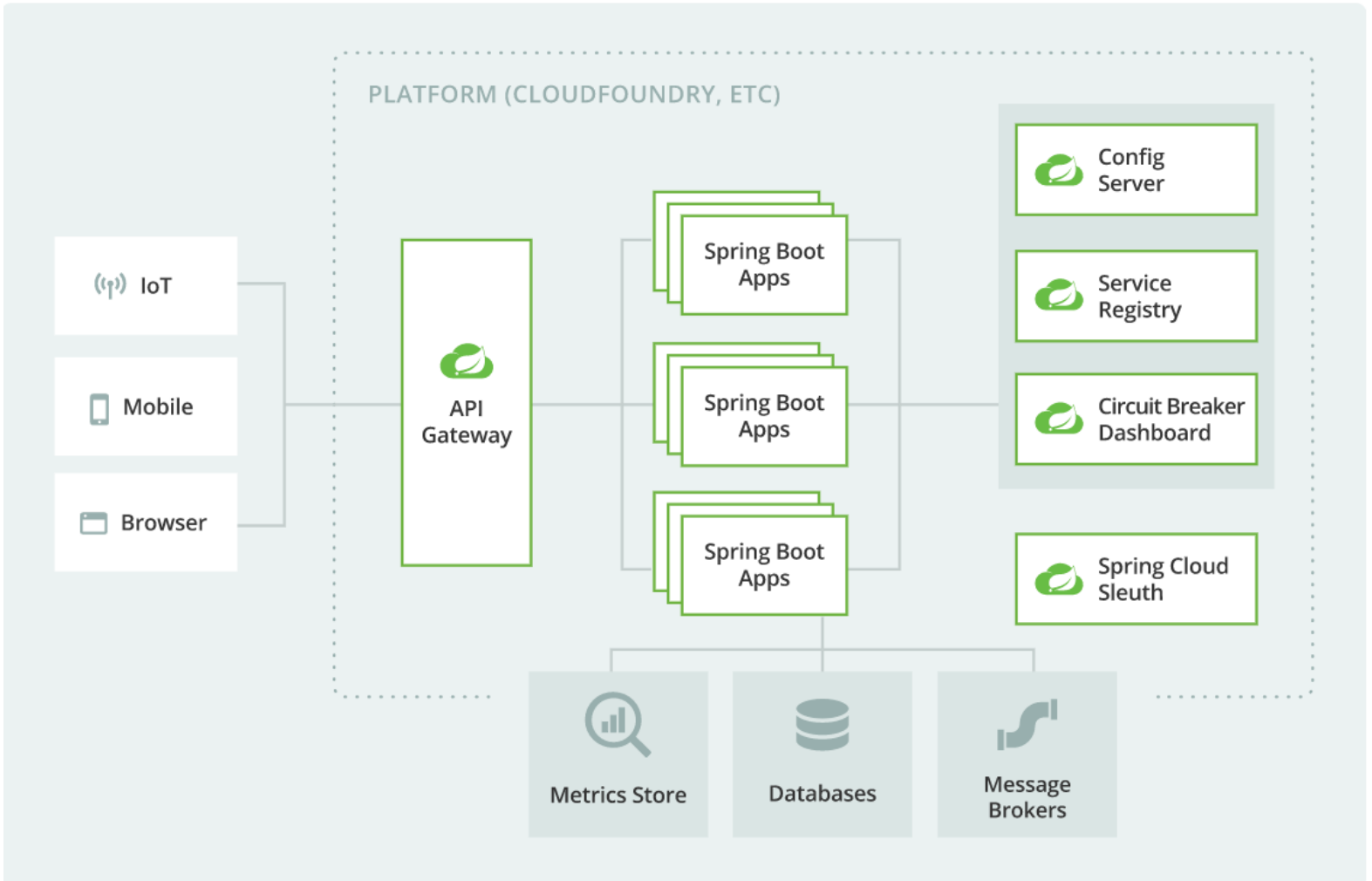


Figure: Microservices with Spring Cloud

Available Market Options

Figure: API Gateway Products

Service Discovery

Problem
In any distributed architecture, we need to find the physical address of where a machine is located.

Solution
Using service discovery, a service can register itself when it is up and healthy. By using such technology you can achieve:

1. Load balanced
   - dynamically load balance requests across all service instances to ensure that the service invocations are spread across all the service instances managed by it.

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3. Fault-tolerant
   - detect when a service instance isn't healthy and remove the instance from the list of available services.

Service Discovery with Gateway

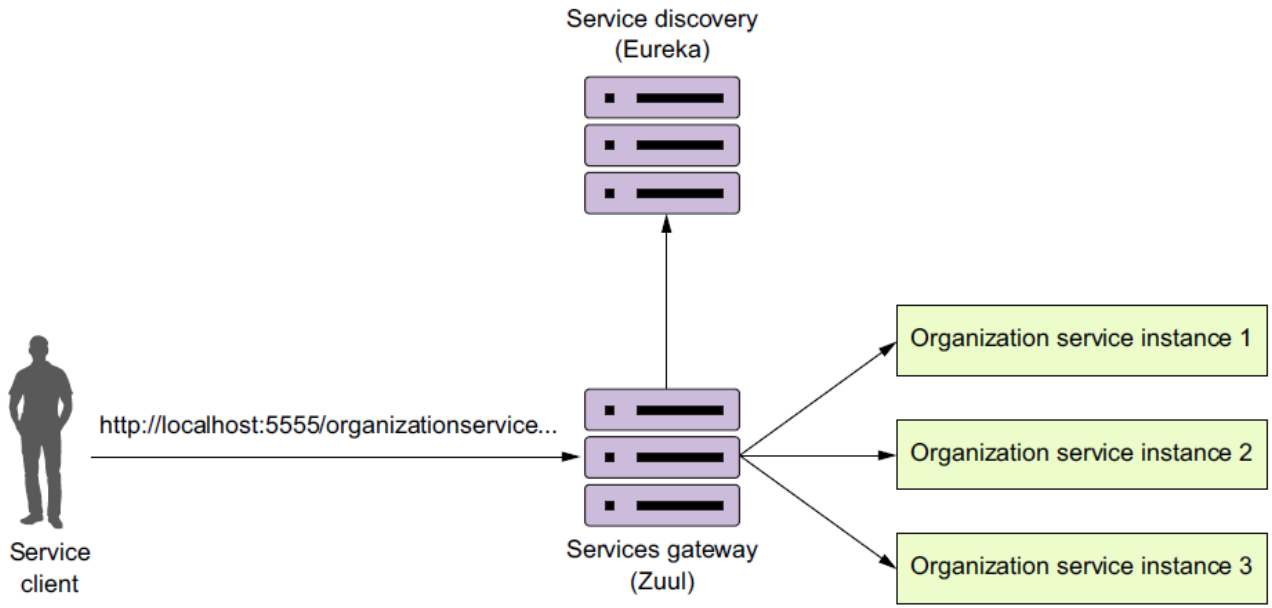


Figure: Service Registry and Gateway

Available Market Options

Figure: Service Registry Products

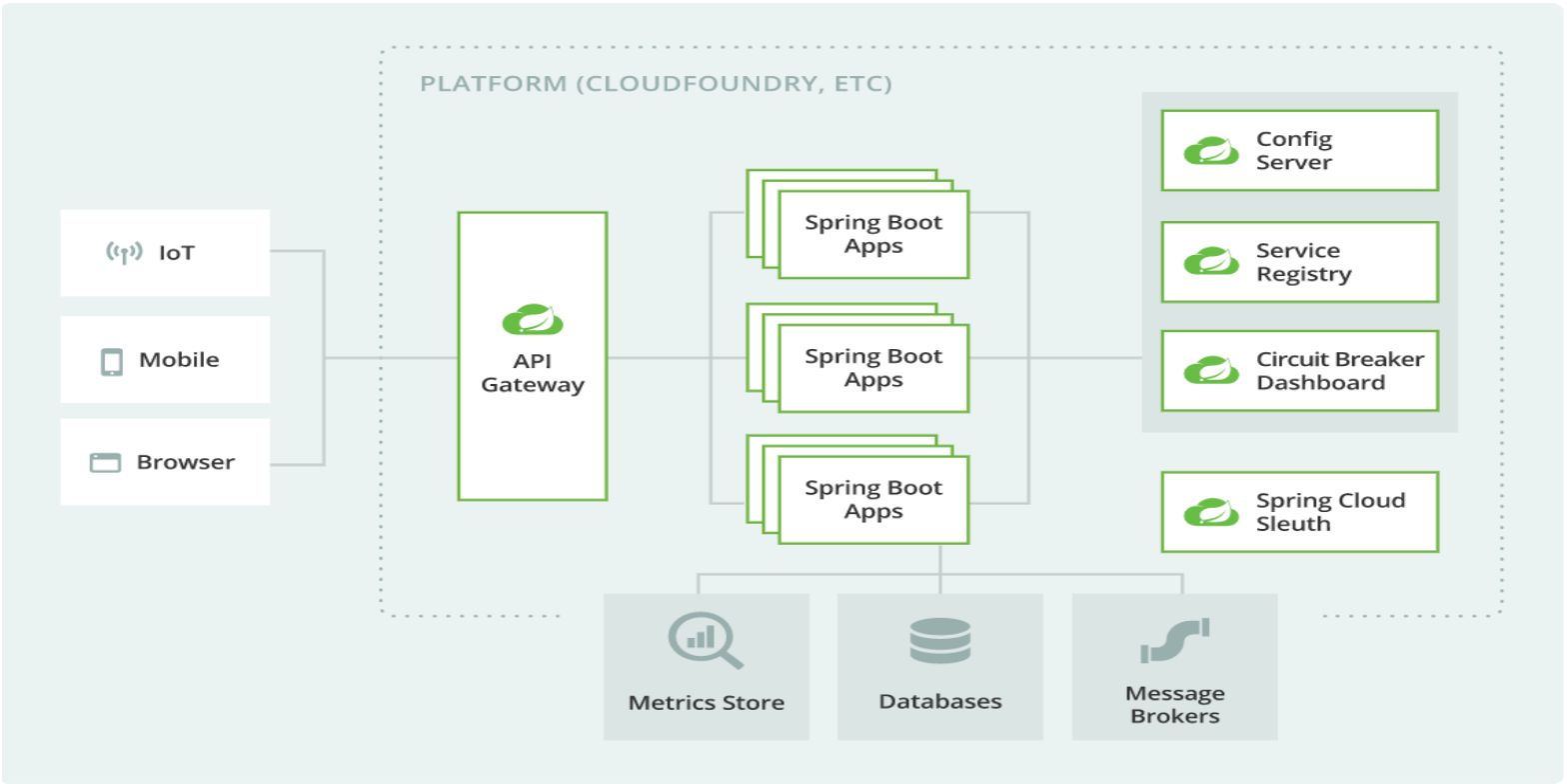
Externalized and Dynamic Configurations

Problem

Configurations will vary from environment to another, How to manage them?

Solution

Centralize your configuration



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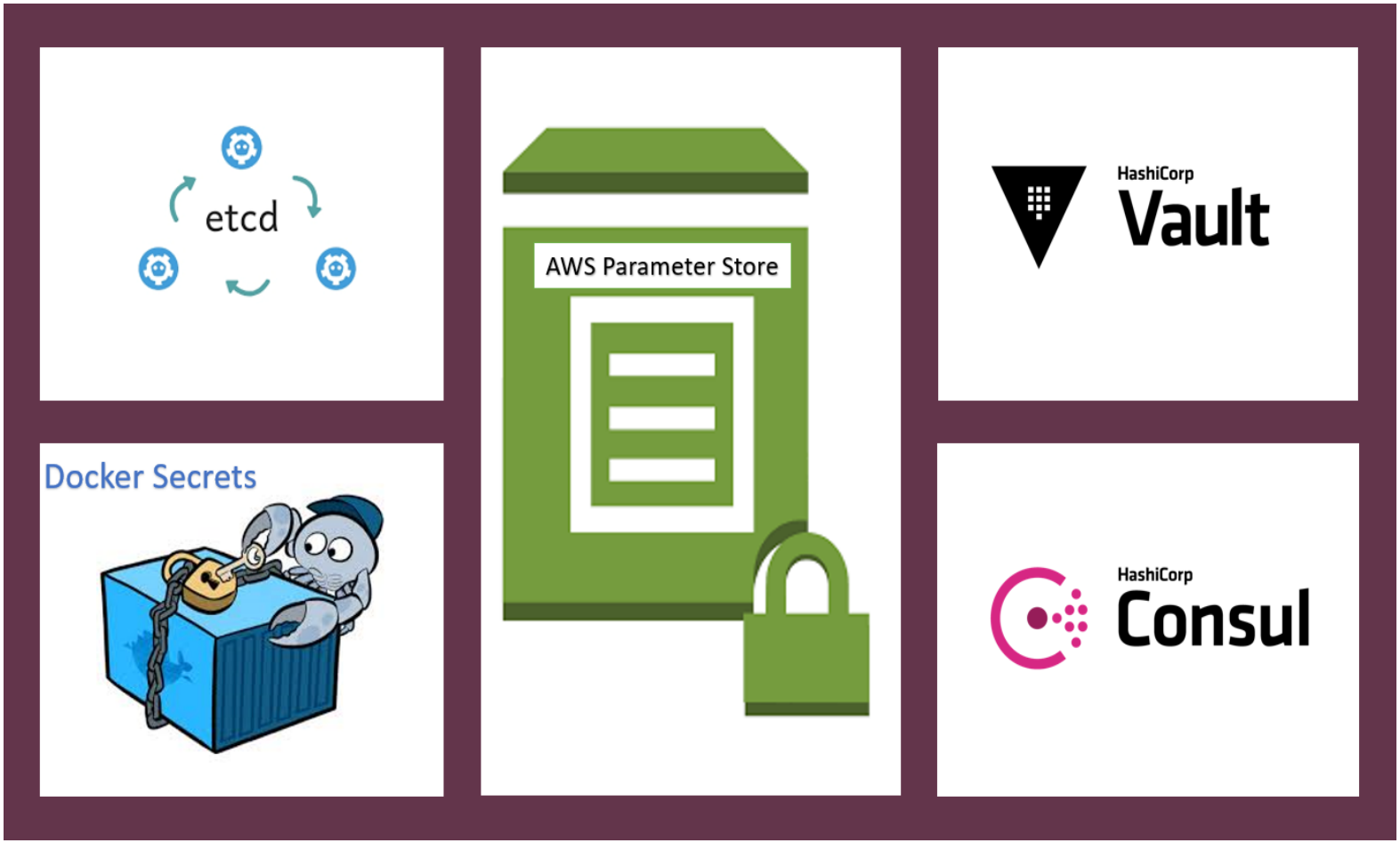

Figure: Popular Config Stores

Circuit Breaker Pattern

Problem

- One of the big differences between in-memory calls and remote calls is that remote calls can fail, or hang without a response until some timeout limit is reached.

Solution

Fault Tolerance

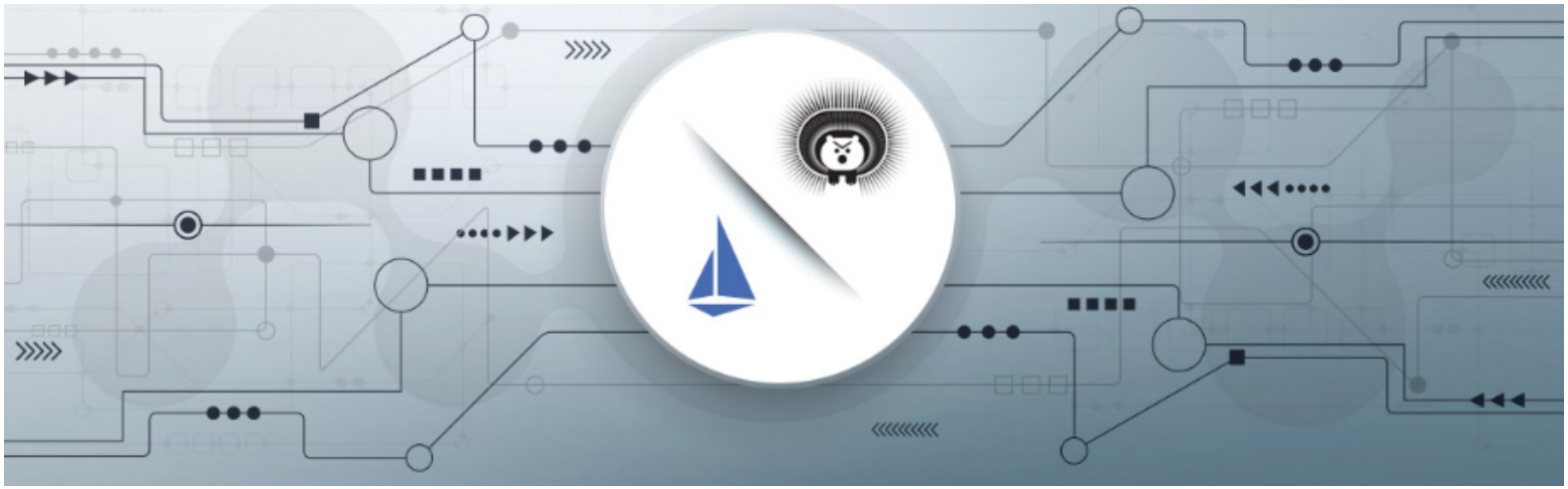

Figure: Circuit Breaker

Circuit Breaker Pattern

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- One of the big differences between in-memory calls and remote calls is that remote calls can fail, or hang without a response until some timeout limit is reached.
- What's worse if you have many callers on a unresponsive supplier, then you can run out of critical resources leading to cascading failures across multiple systems.

Solution

Fault Tolerance

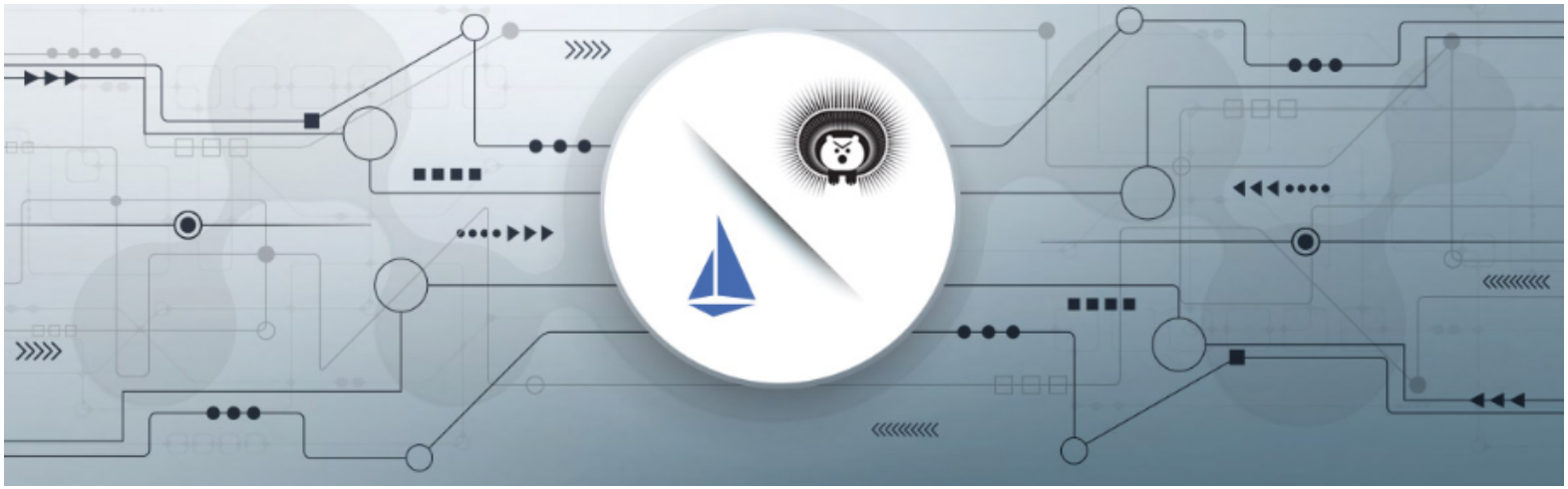

Figure: Circuit Breaker

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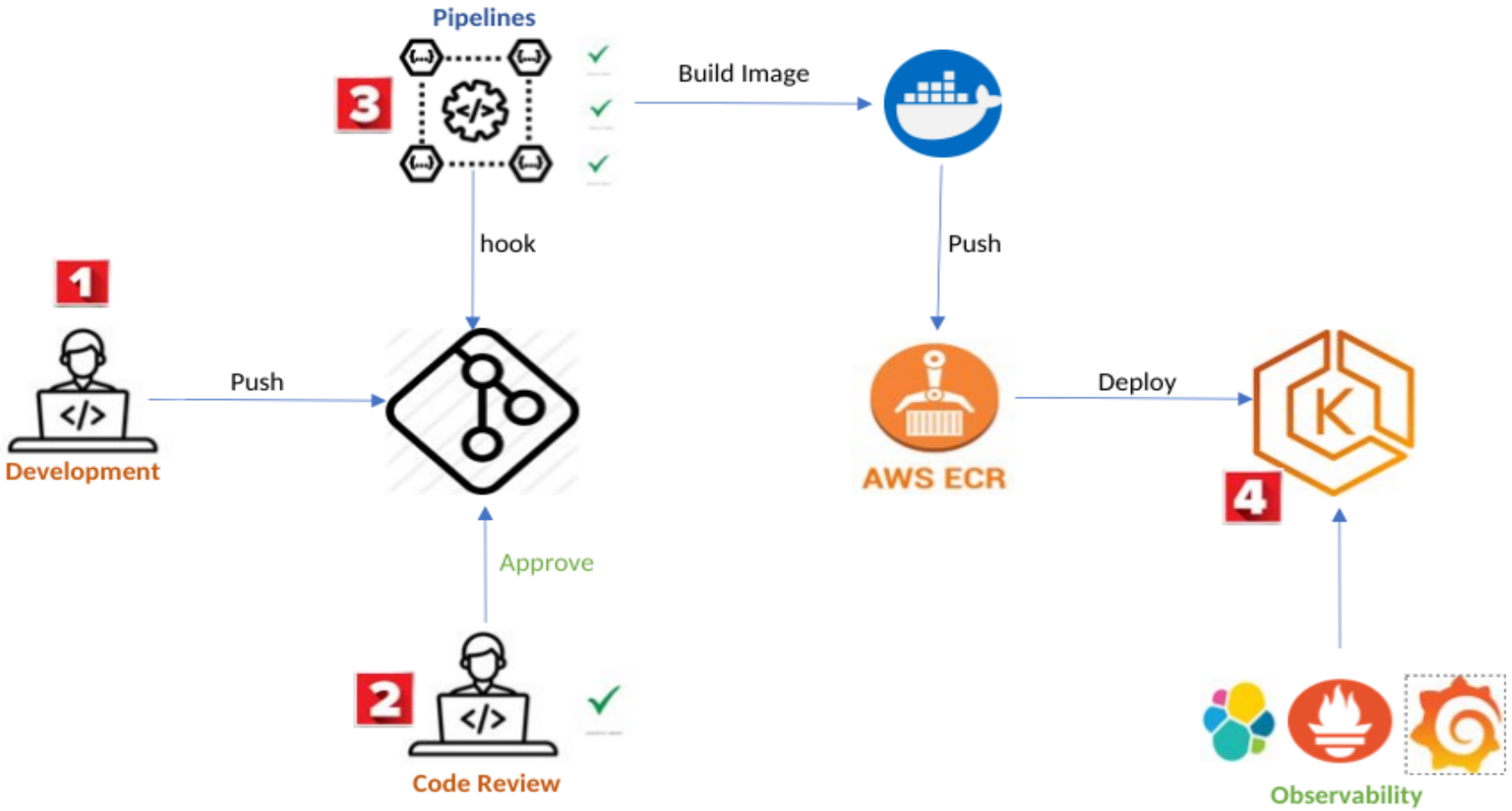
Popular Orchestrators

- Docker Swarm
- Kubernates
- AWS ECS
- Service Fabric
- Openshift

Real Example

Continuous Integration, and Deployment are your friends



Infrastructure as Code "**IaC**"

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- Should I (SysAdmin/Operator) learn programming to apply IaC?

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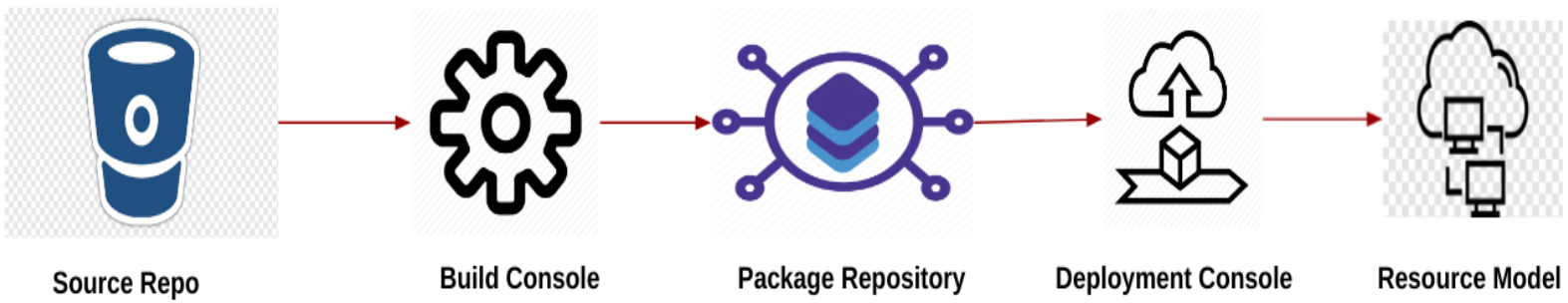

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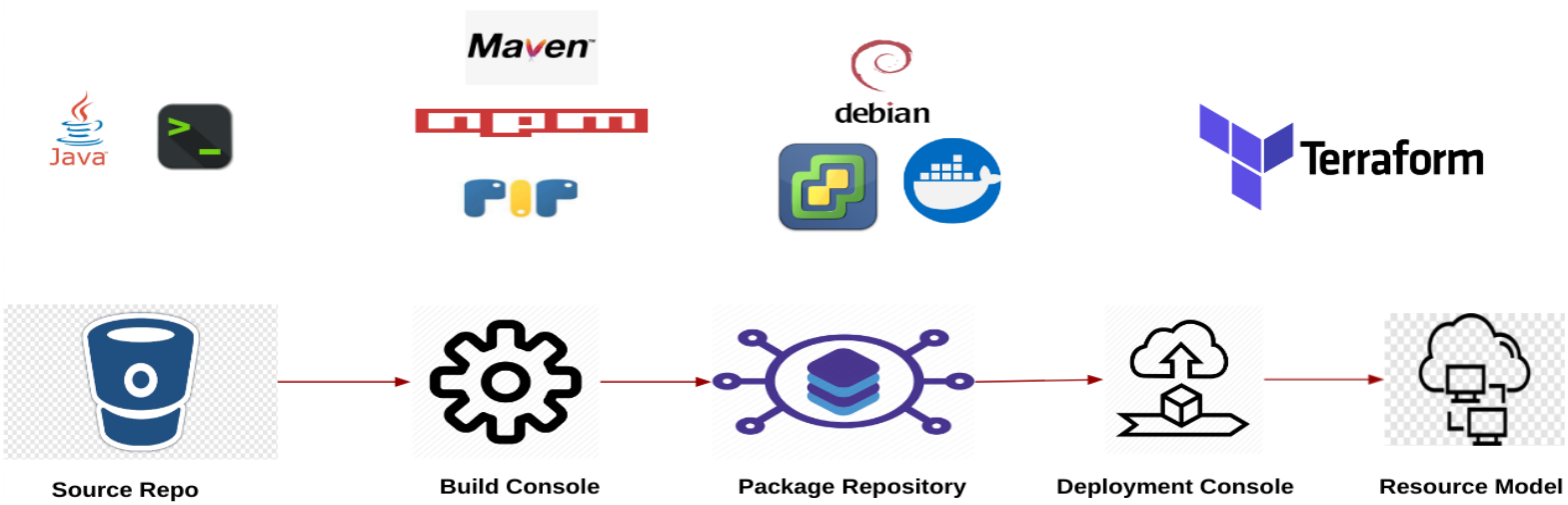

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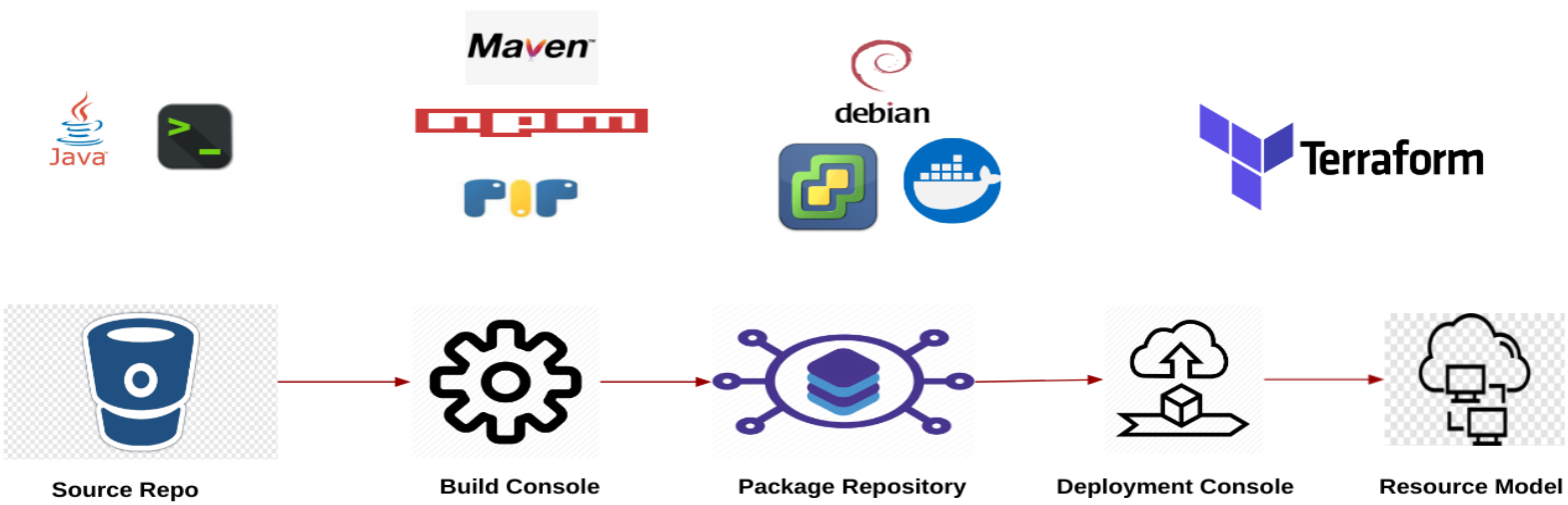

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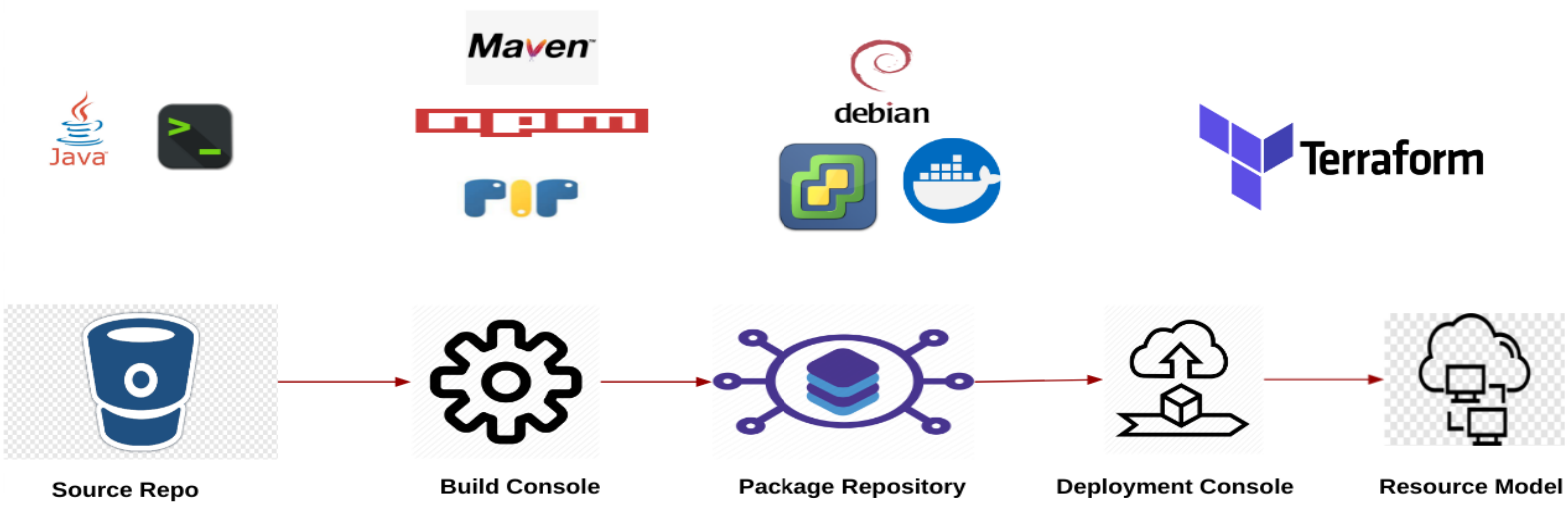

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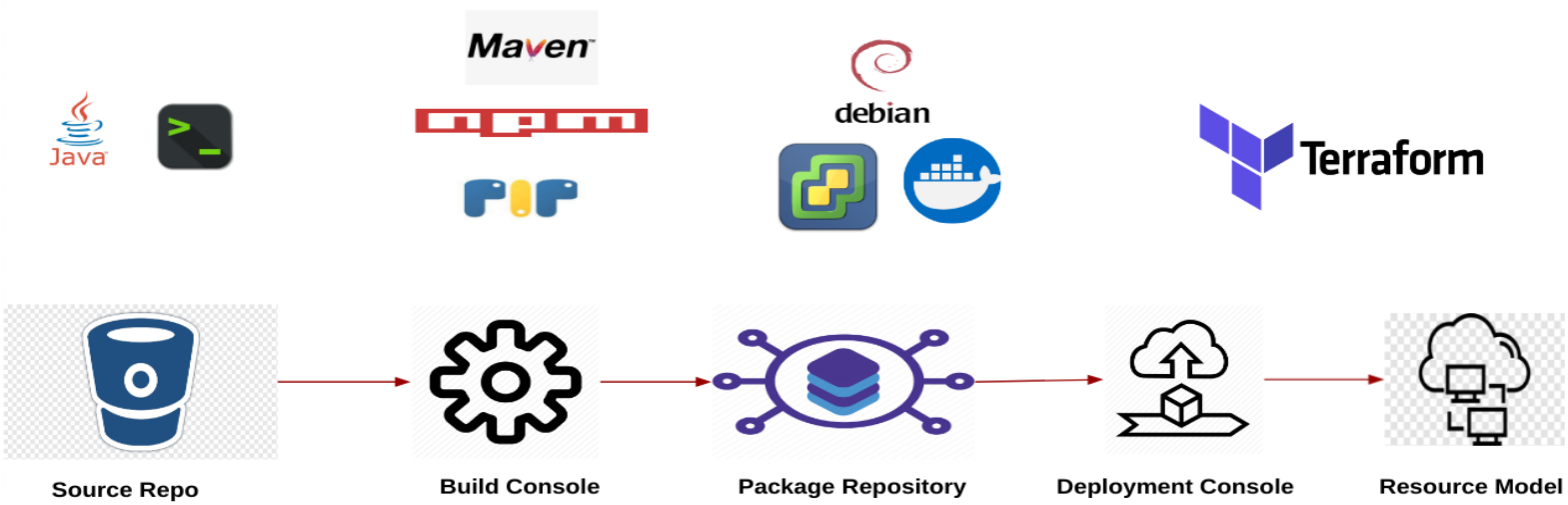

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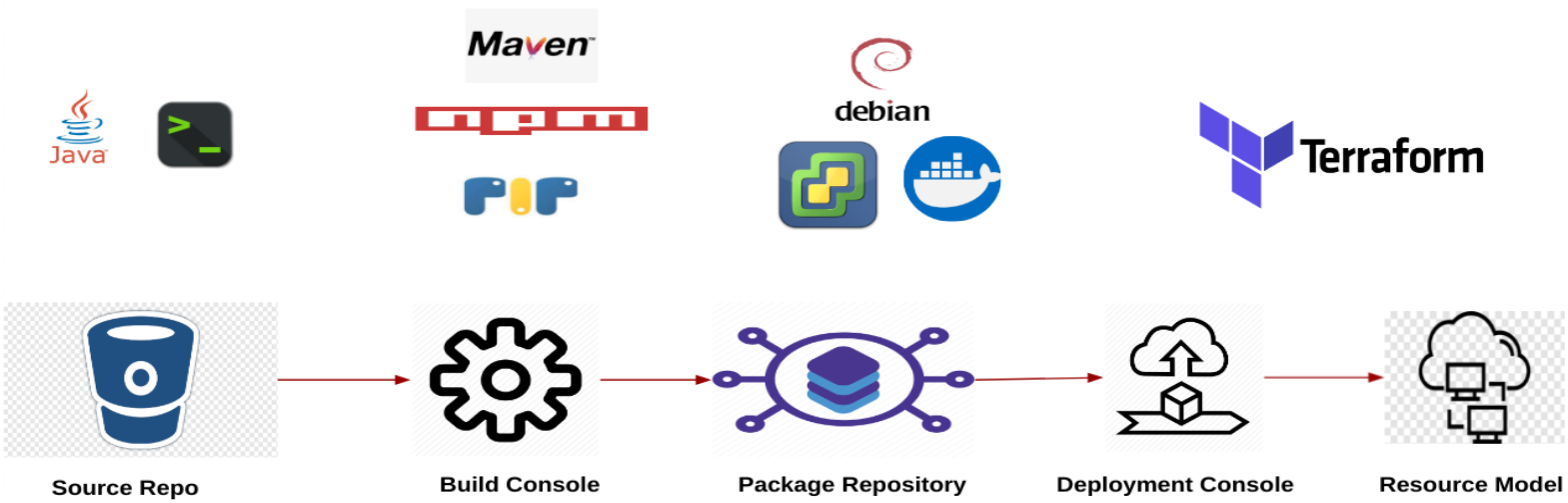
- There will be always kind of tension between Dev team and Ops team; especially if Ops team is applying SRE principles



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Communication Design - Async & Messaging

Online purchase example

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Online purchase example

- Save it

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- Check Duplicates

Communication Design - Async & Messaging

Online purchase example

- Save it
- Check Duplicates
- Charge Customer

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Online purchase example

- Save it
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Communication Design - Async & Messaging

Online purchase example

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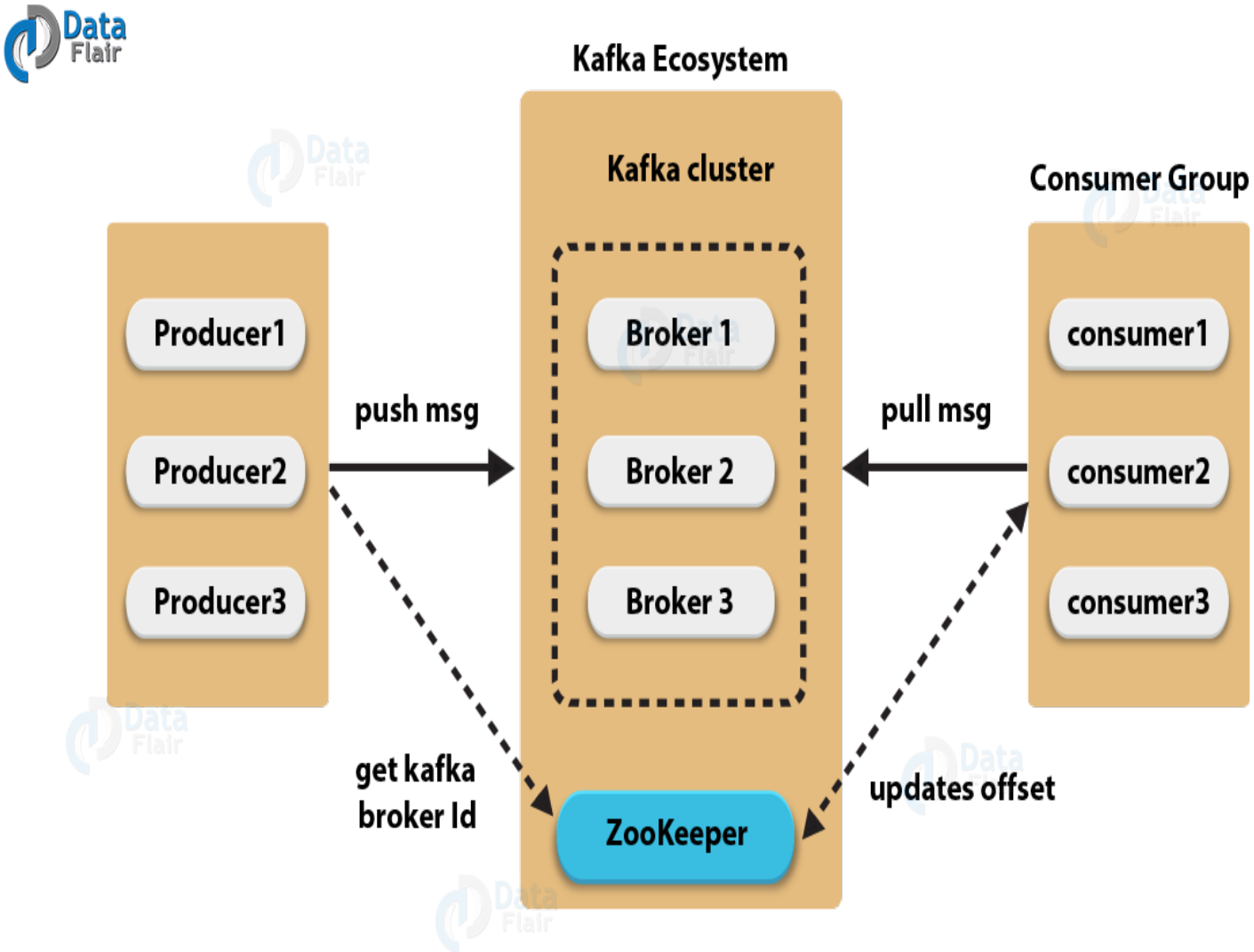

Scalability and High Availability

Scalability is about your system capability to scale (In or Out) in order to handle workload and throughput

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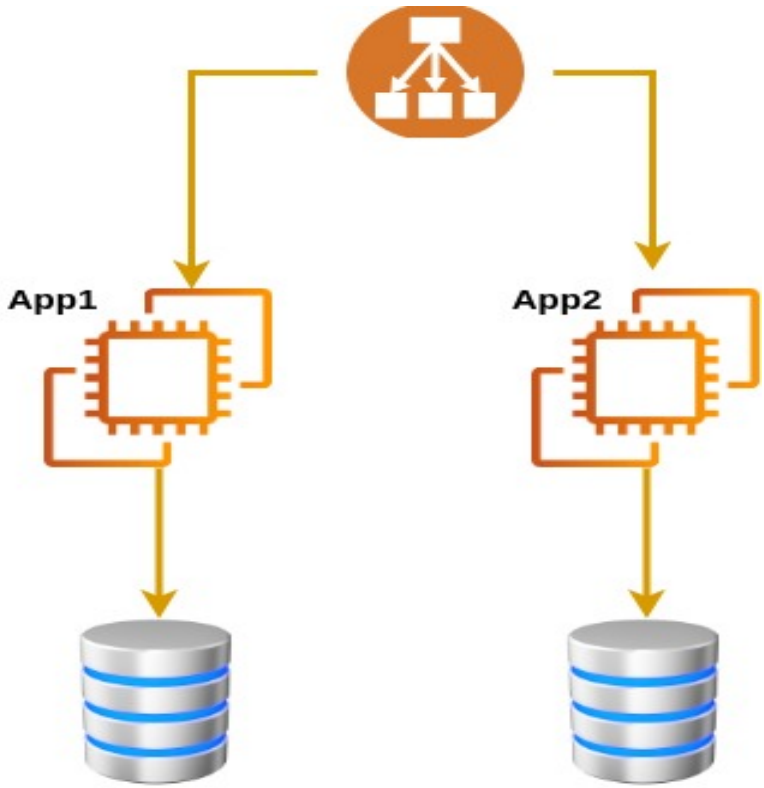

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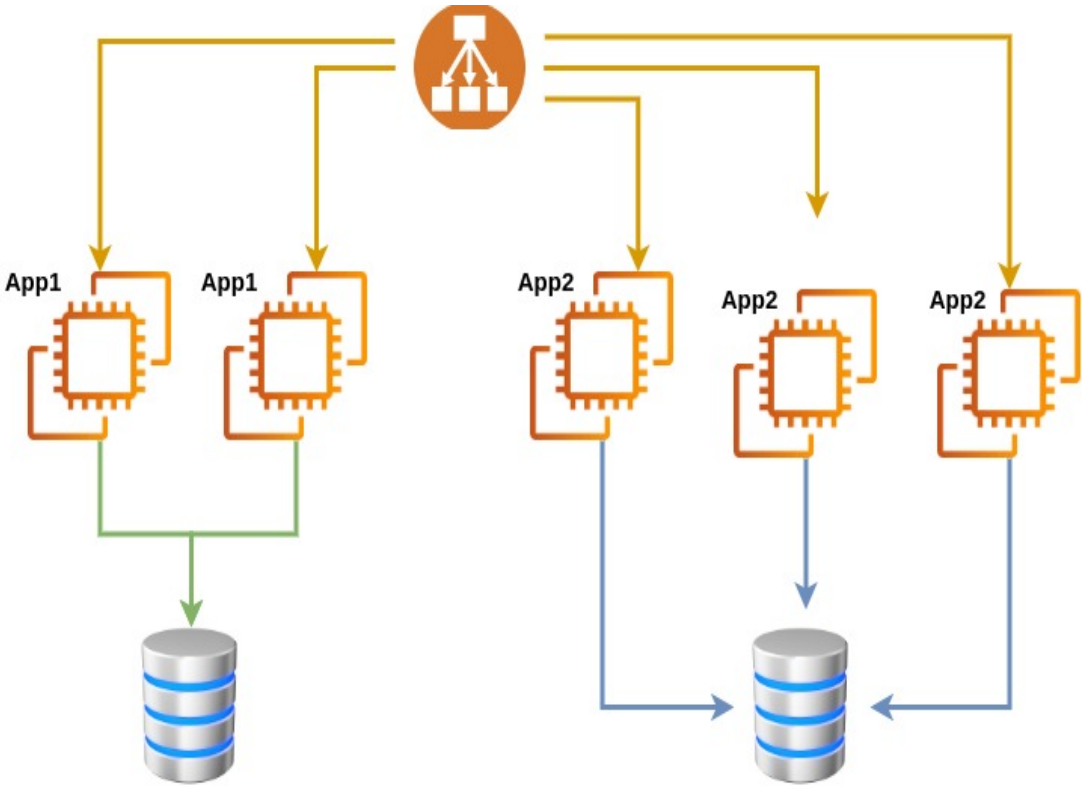
Horizontal Scaling



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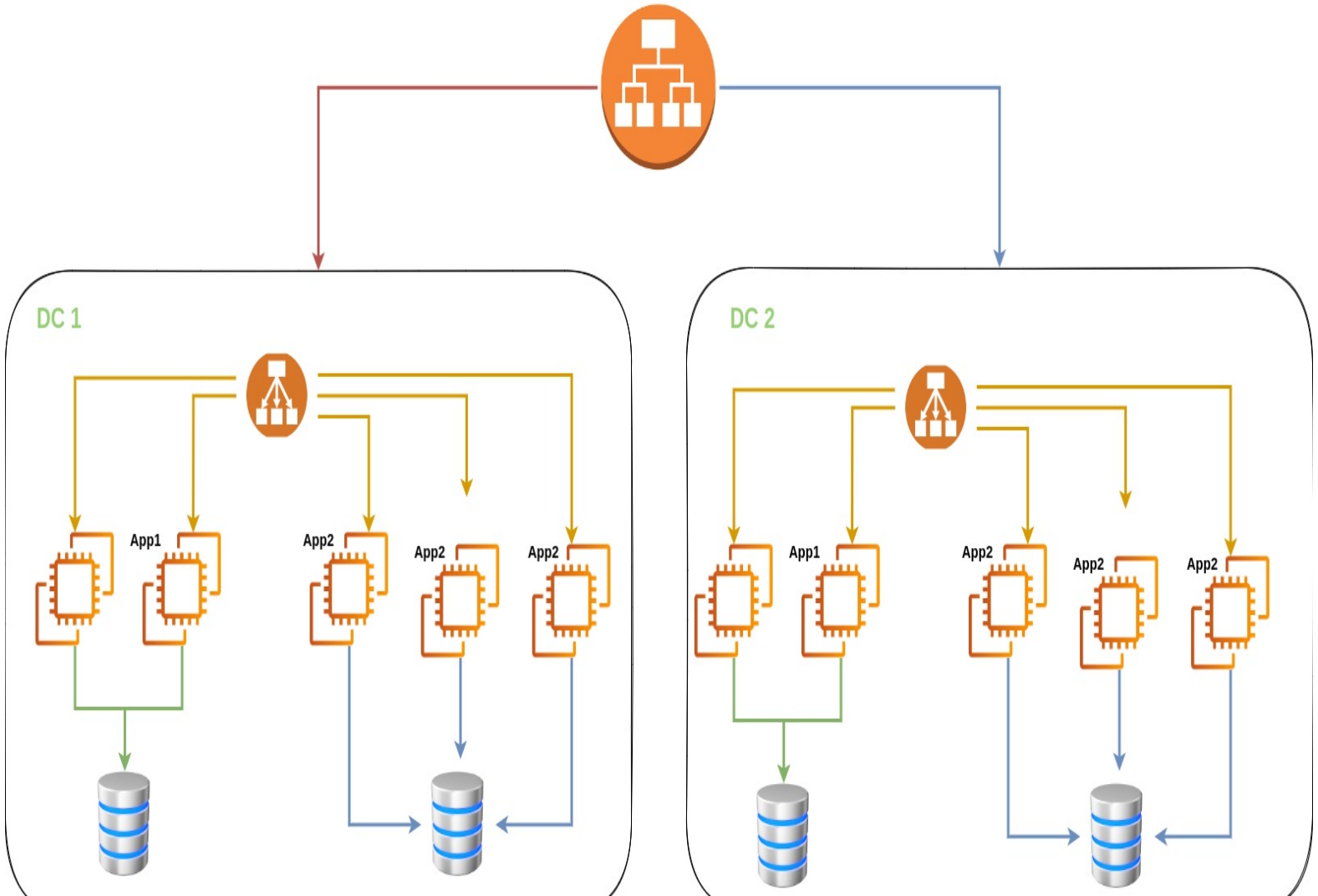
Fault Tolerant



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Thank You