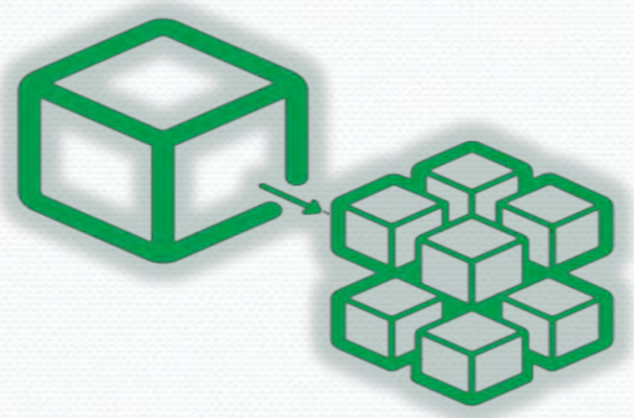
jax LONDON

Fly high with Microservices Architecture

Splitting the Monolith



DREAMIX

Software Development, Consulting and Innovations

www.dreamix.eu

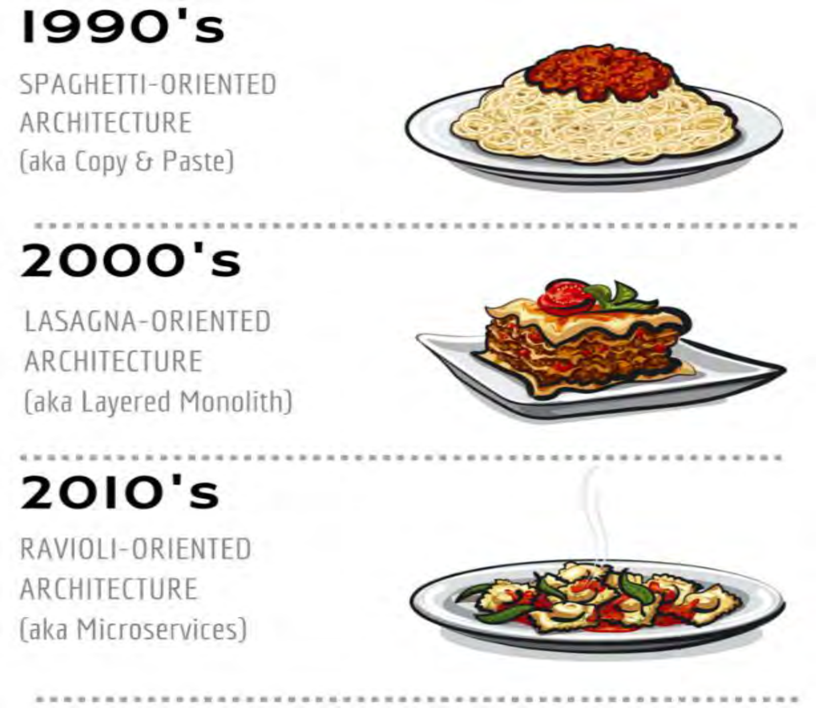
Angel Gruev
2017

Nice to meet you! I’m Angel from Dreamix.

Agenda

- How it all started?
- Key benefits of microservices
- Microservices and business capabilities
- What was our task and how we tackle it
- Time to Build and Deploy … automatically
- Are microservices the silver bullet ?

Software architecture evolution



1990's

SPAGHETTI-ORIENTED ARCHITECTURE (aka Copy & Paste)

2000's

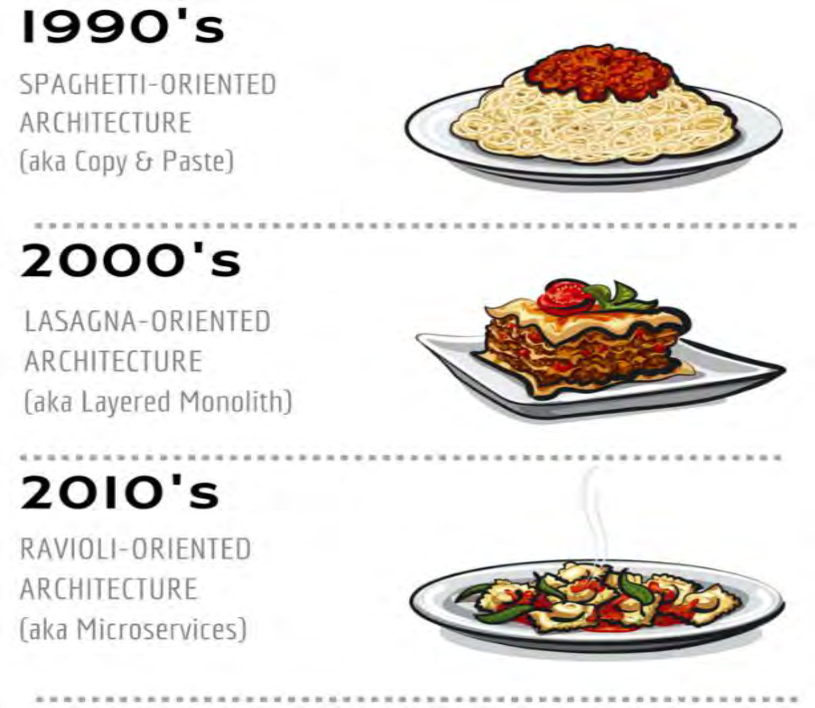
LASAGNA-ORIENTED ARCHITECTURE (aka Layered Monolith)

2010's

RAVIOLI-ORIENTED ARCHITECTURE (aka Microservices)

What's next?!

Software architecture evolution



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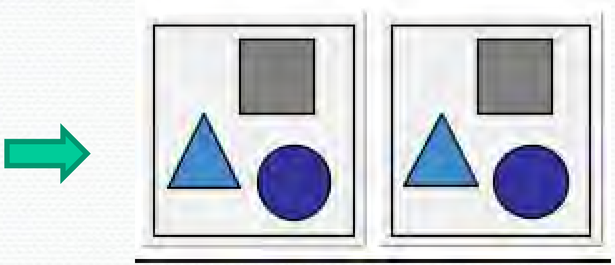
2020's

Pizza-oriented Architecture

How it all started?

- Private Business jet aviation company
- In-house software solutions
- 250+ IT specialists worldwide

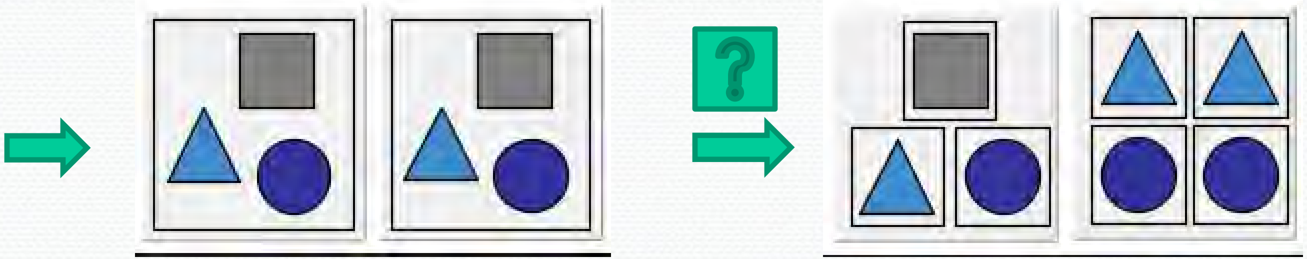
How it all started?



- Private Business jet company
- In-house software solutions
- 200+ IT specialits worldwide

- Several monolith applications with huge codebase

How it all started?



- Private Business jet company
- In-house software solutions
- 200+ IT specialits worldwide

- Several monolith applications with huge codebase

- Go to micro-service based approach
- New features as MS
- Splitting the monolith(s)

What are microservices

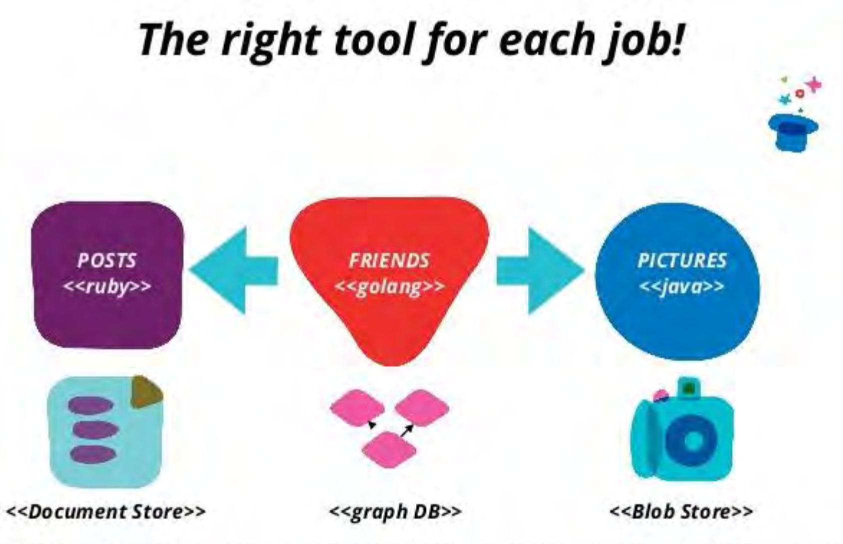
Key Features

- **Small** and **Focused** on doing **one** thing well
- **Autonomous**
    - Can you make a change to a service and deploy it by itself without changing anything else ?

What are microservices

Key Benefits

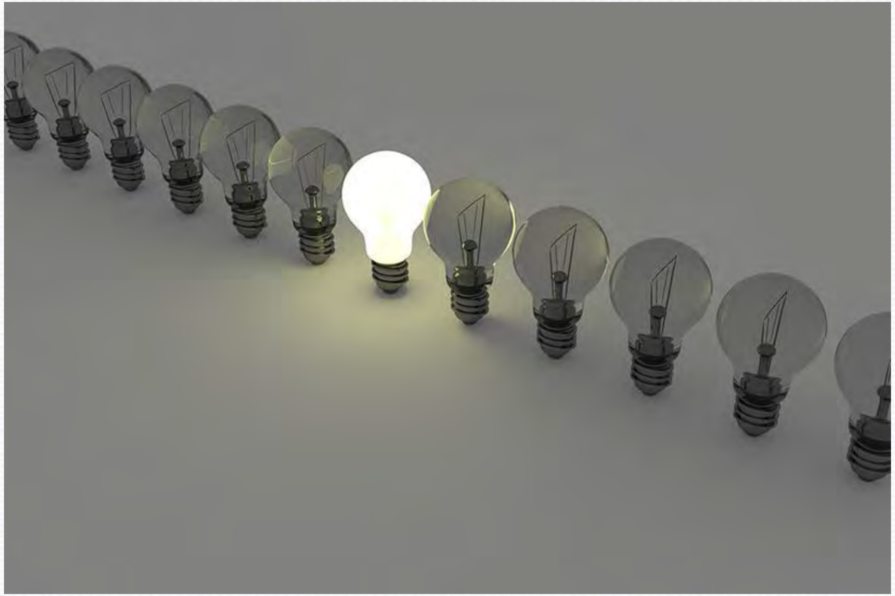
- **Technology Heterogeneity**



What are microservices

Key Benefits

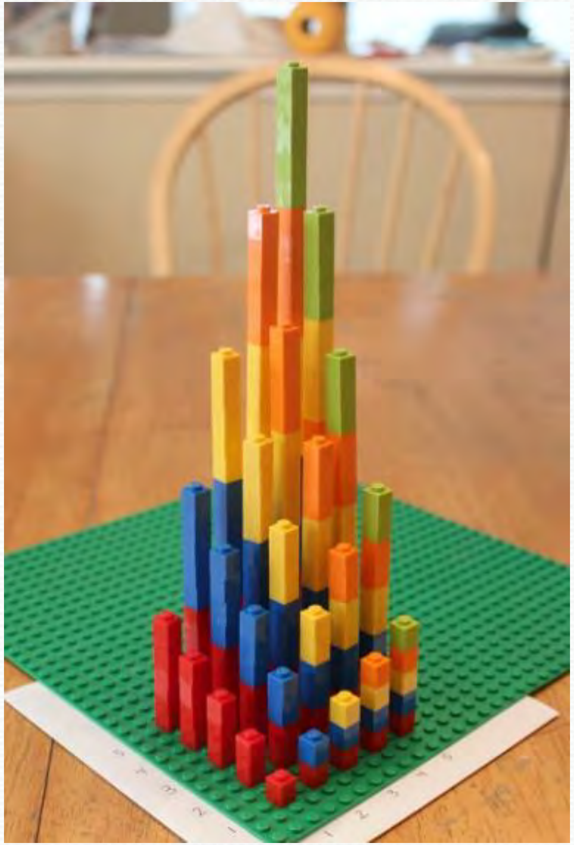
- Technology Heterogeneity
- **Resilience**



What are microservices

Key Benefits

- Technology Heterogeneity
- Resilience
- **Scaling**



What are microservices

Key Benefits

- Technology Heterogeneity
- Resilience
- Scaling
- **Ease of Deployment**

What are microservices

Key Benefits

- Technology Heterogeneity
- Resilience
- Scaling
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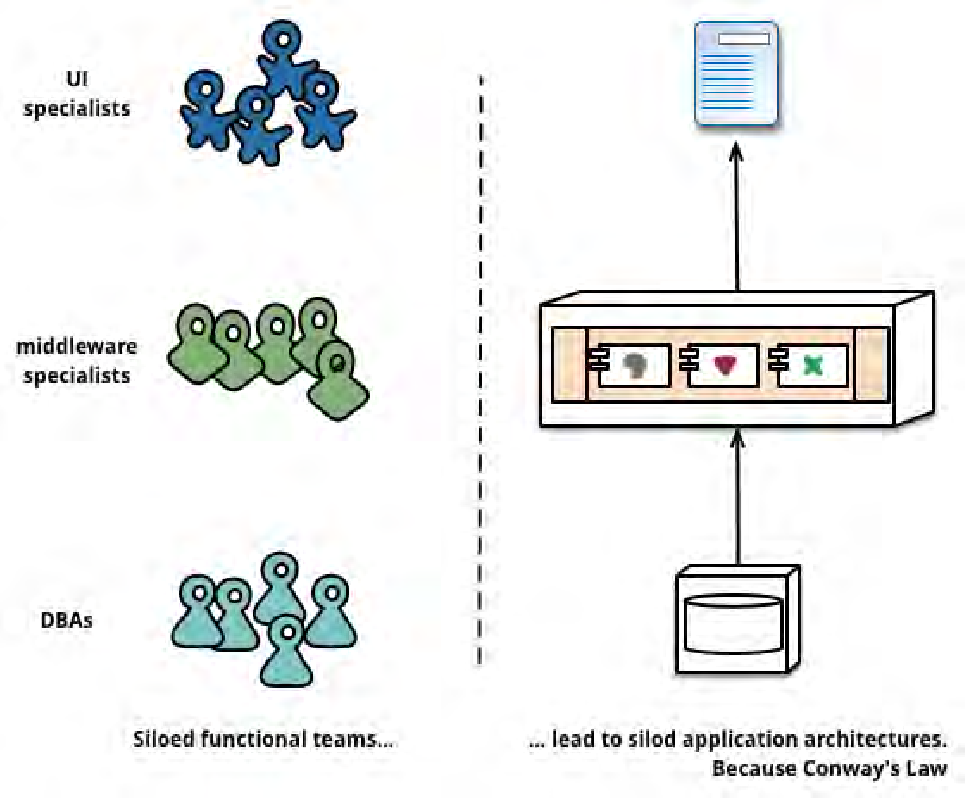
- **Composability & Replaceability**

What are microservices

Key Benefits

- Technology Heterogeneity
- Resilience
- Scaling
- Ease of Deployment
- Composability & Replaceability
- **Enforcing different security**

Organization and business capabilities

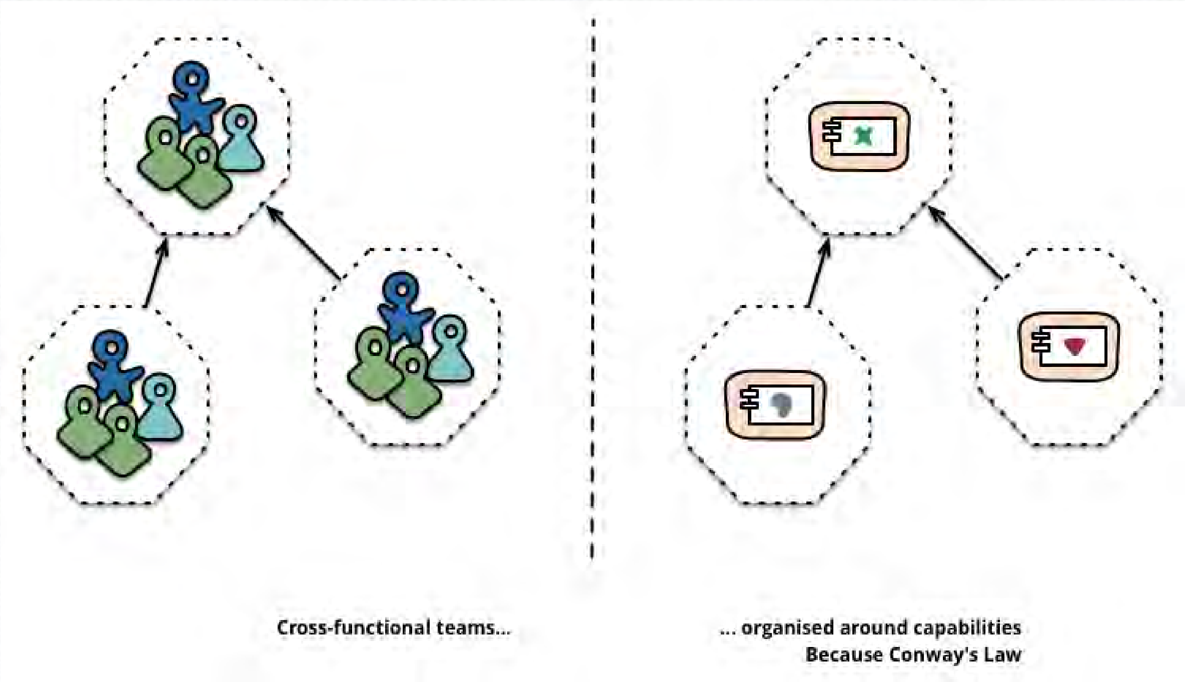

UI specialists
middleware specialists
DBAs
Siloed functional teams...
... lead to silod application architectures.
Because Conway's Law

“Any organization that designs a system (defined broadly) will produce a design whose structure is a copy of the organization's communication structure.”

Melvyn Conway, 1967

Source: http://martinfowler.com

Organization and business capabilities



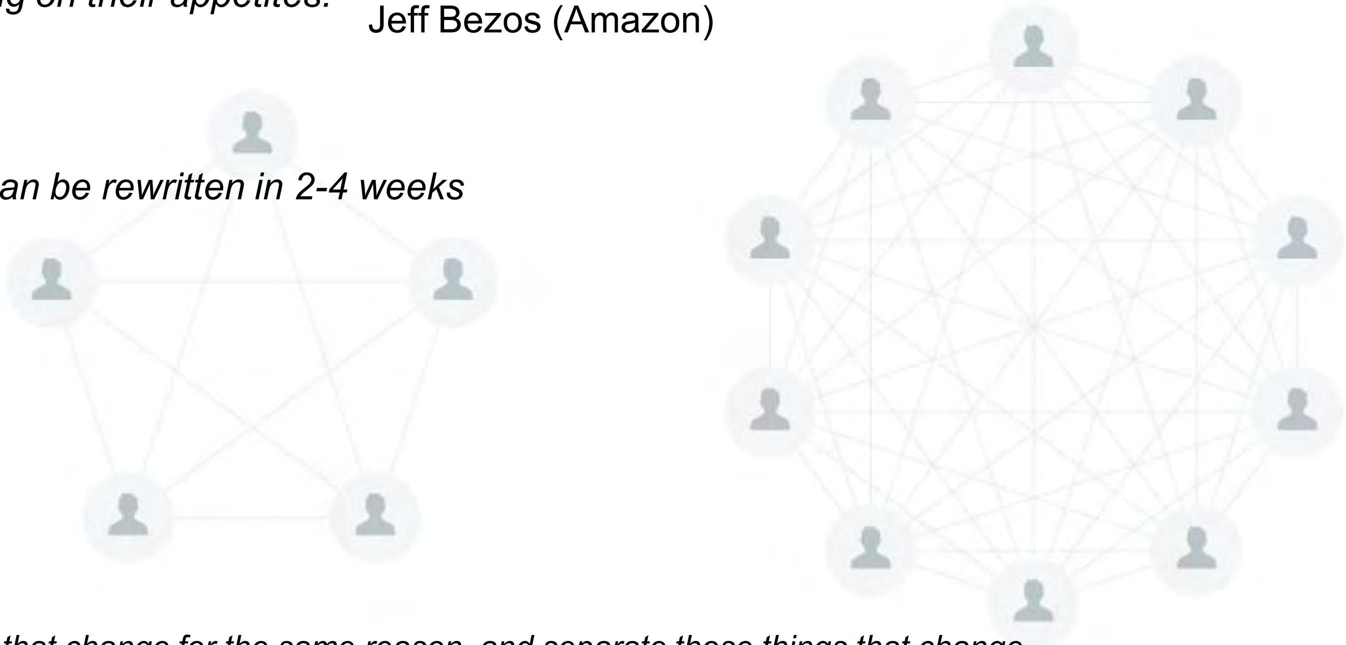
Source: http://martinfowler.com

Microservice size

- ✓ *If you can’t feed a team with two pizzas, it’s too large. That limits a task force to five to seven people, depending on their appetites.*

Jeff Bezos (Amazon)

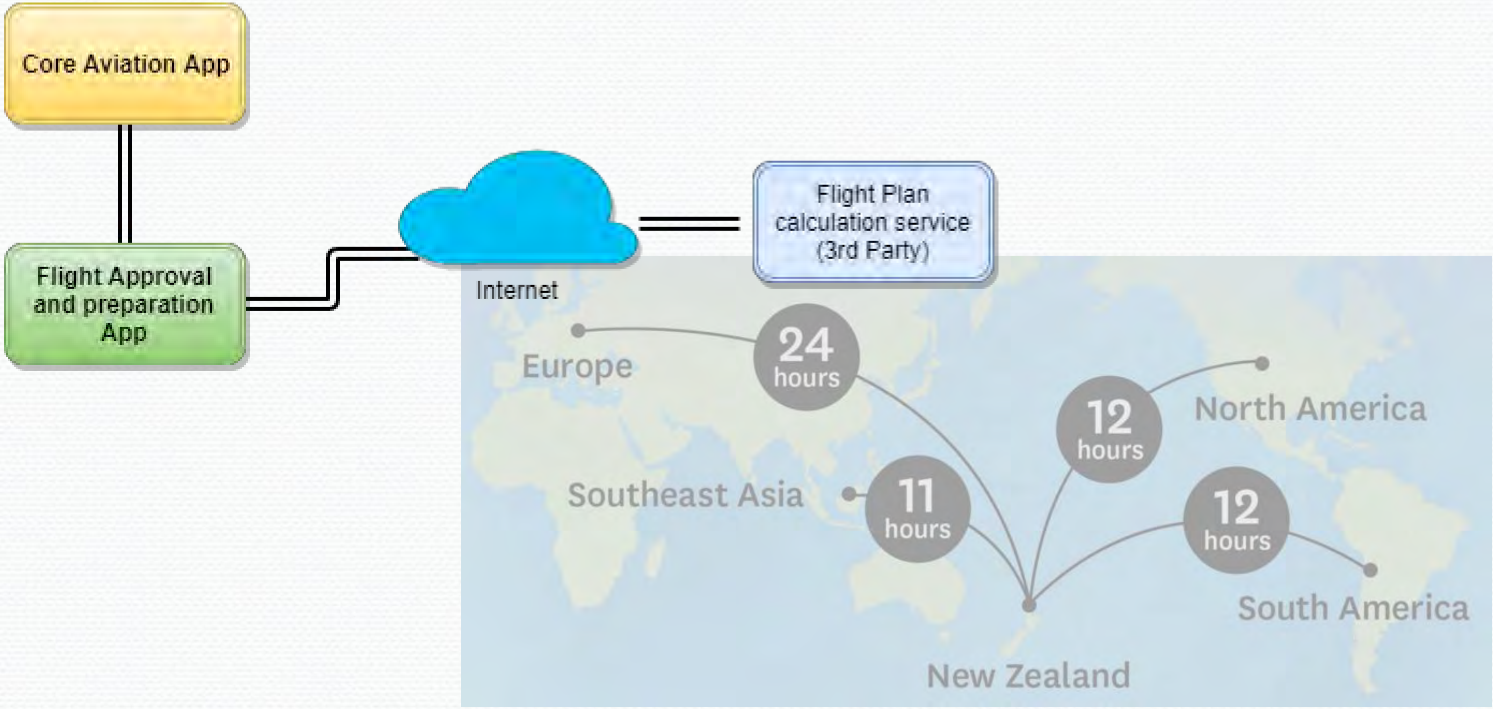
- ✓ *Something that can be rewritten in 2-4 weeks*



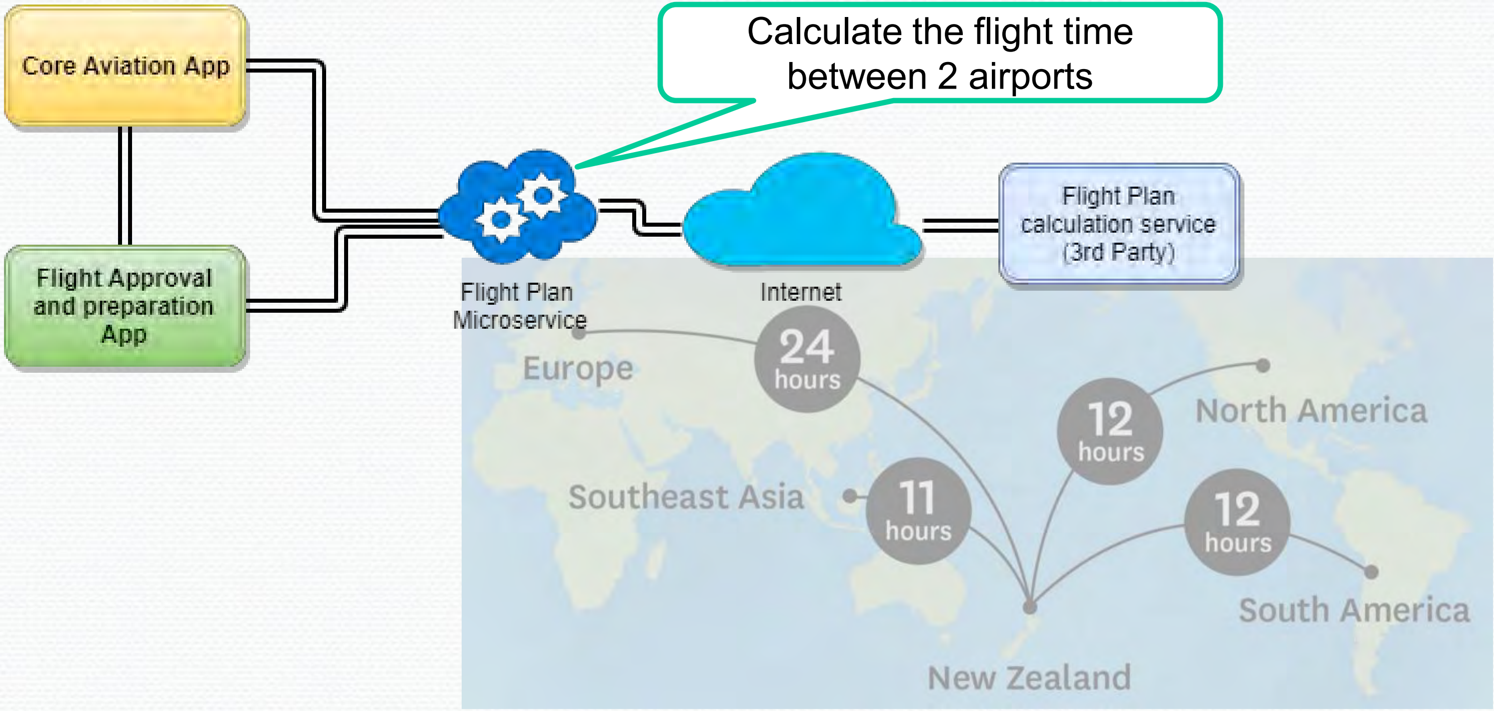
“Gather together those things that change for the same reason, and separate those things that change for different reasons.”

SRP – Robert Martins

The initial requirements



The initial requirements



Calculate the flight time between 2 airports

Core Aviation App

Flight Approval and preparation App

Flight Plan Microservice

Internet

Flight Plan calculation service (3rd Party)

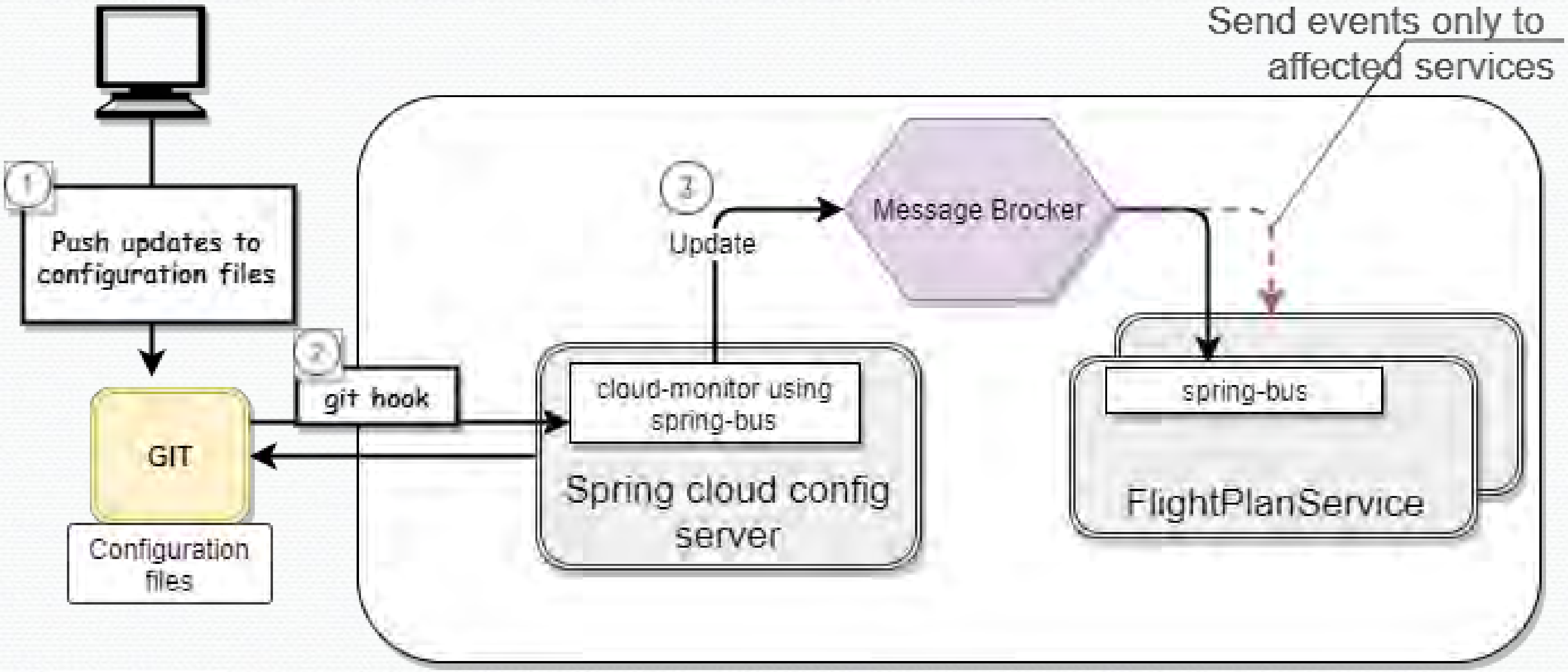
Where is my service?

- The problems:
  - Many small services in the cloud
  - Constantly destroying and deploying new instances
  - Different environments
- How to specify the URL of the service?
- Dynamic Service Registries applications
  - Zookeeper
  - Netflix Eureka
  - Consul

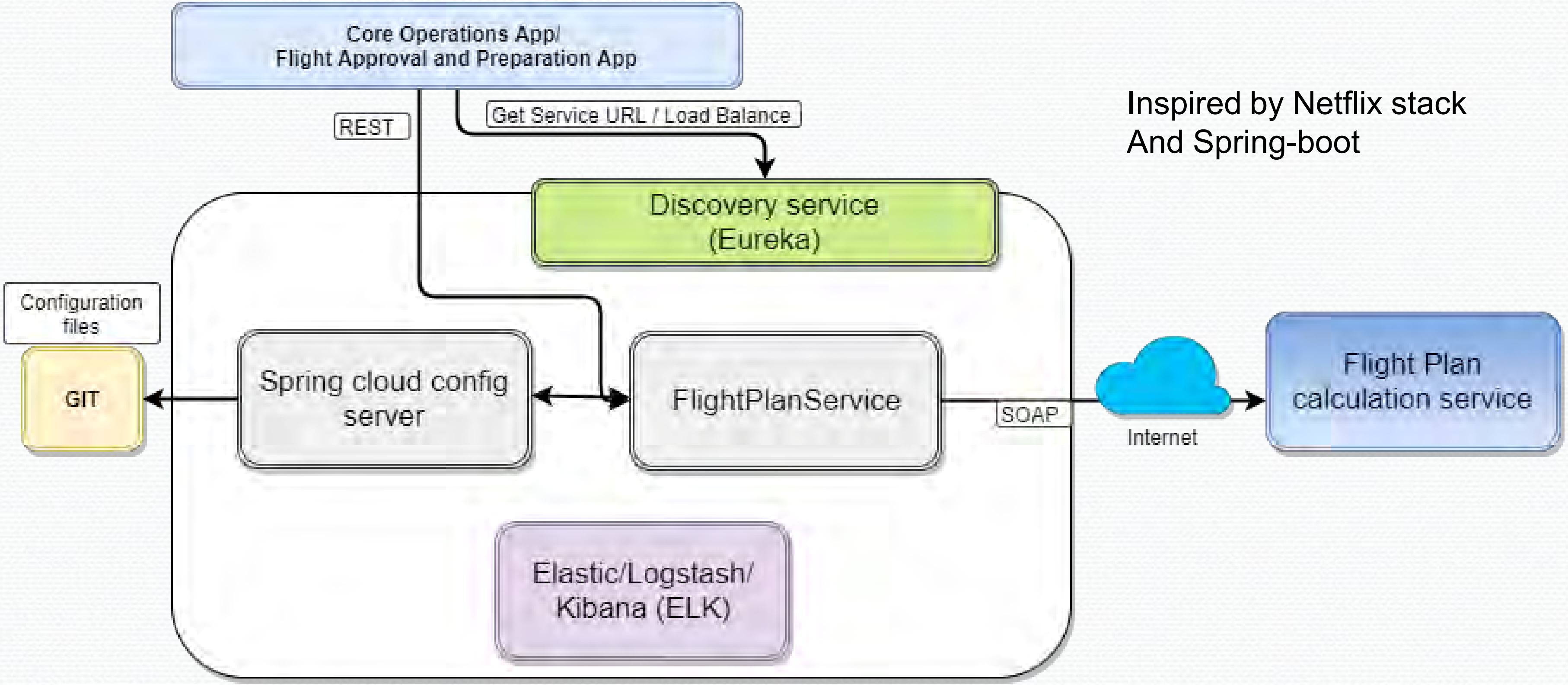
Multiple configuration files

- Multiple services = many configuration files
- Multiple services * several environments = too many configuration files

Centralized configuration

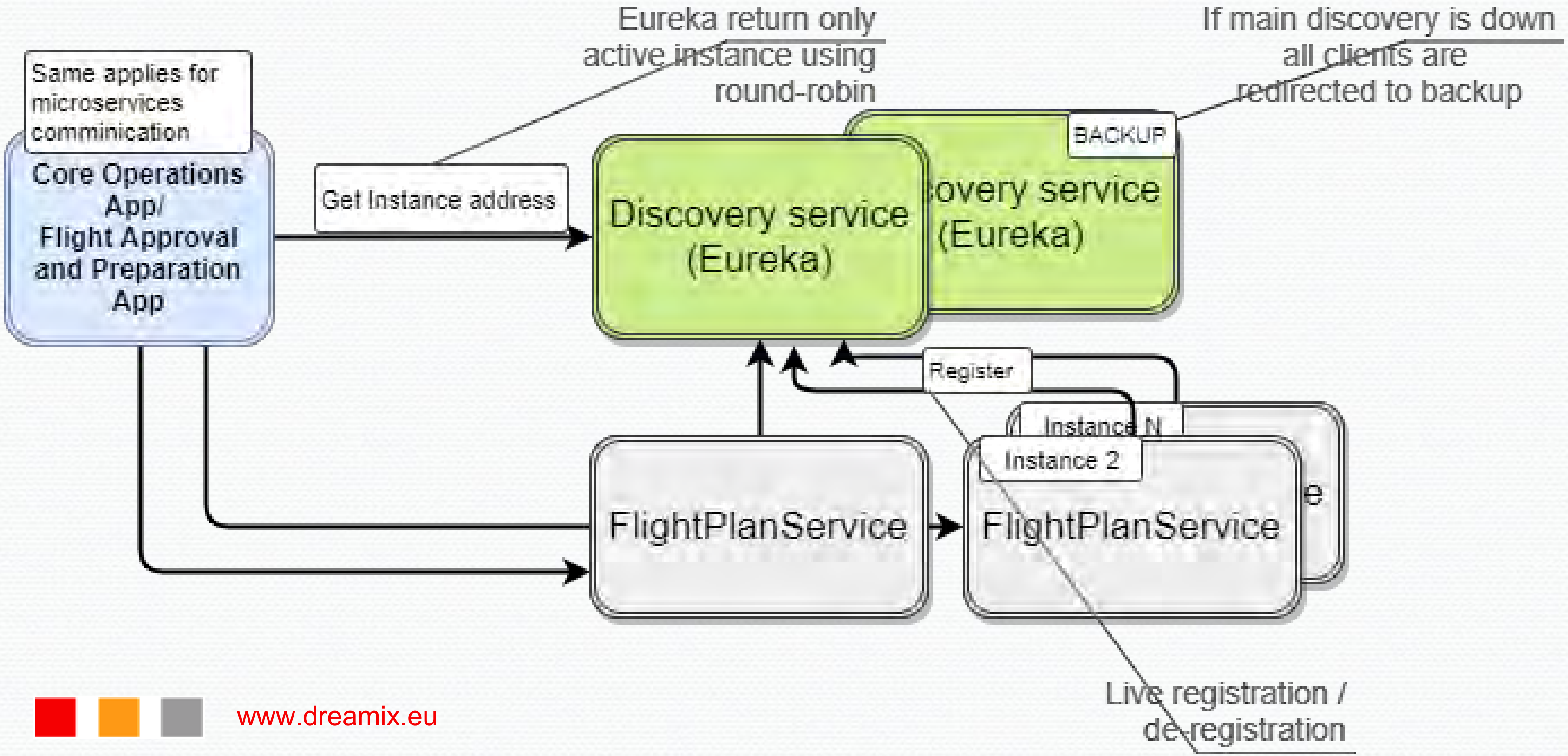

Send events only to affected services
1
Push updates to configuration files
2
git hook
GIT
Configuration files
3
Update
Message Brocker
cloud-monitor using spring-bus
Spring cloud config server
spring-bus
FlightPlanService

Coming up with the first design



Inspired by Netflix stack
And Spring-boot

Getting ready for High Availability



Eureka return only active instance using round-robin

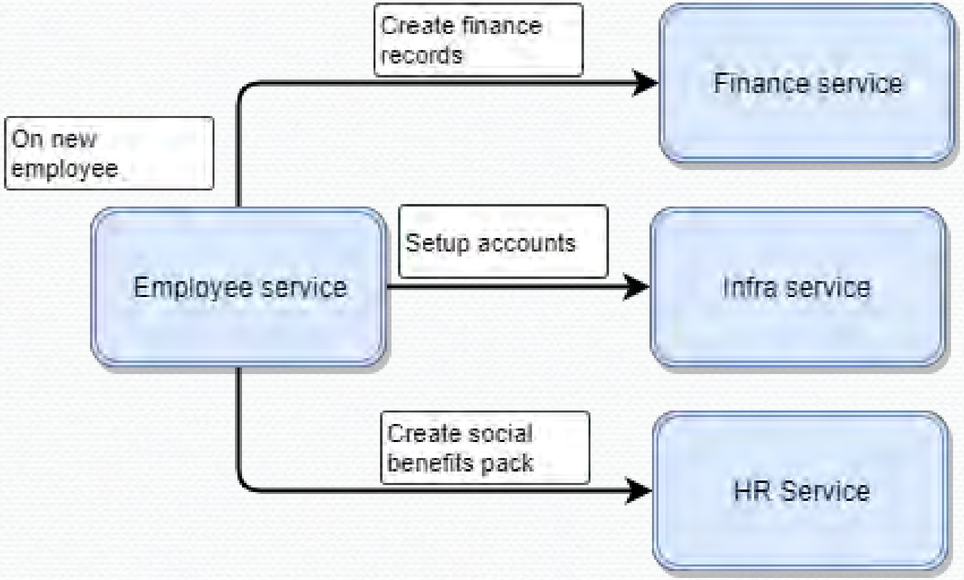
If main discovery is down all clients are redirected to backup

Same applies for microservices comminication

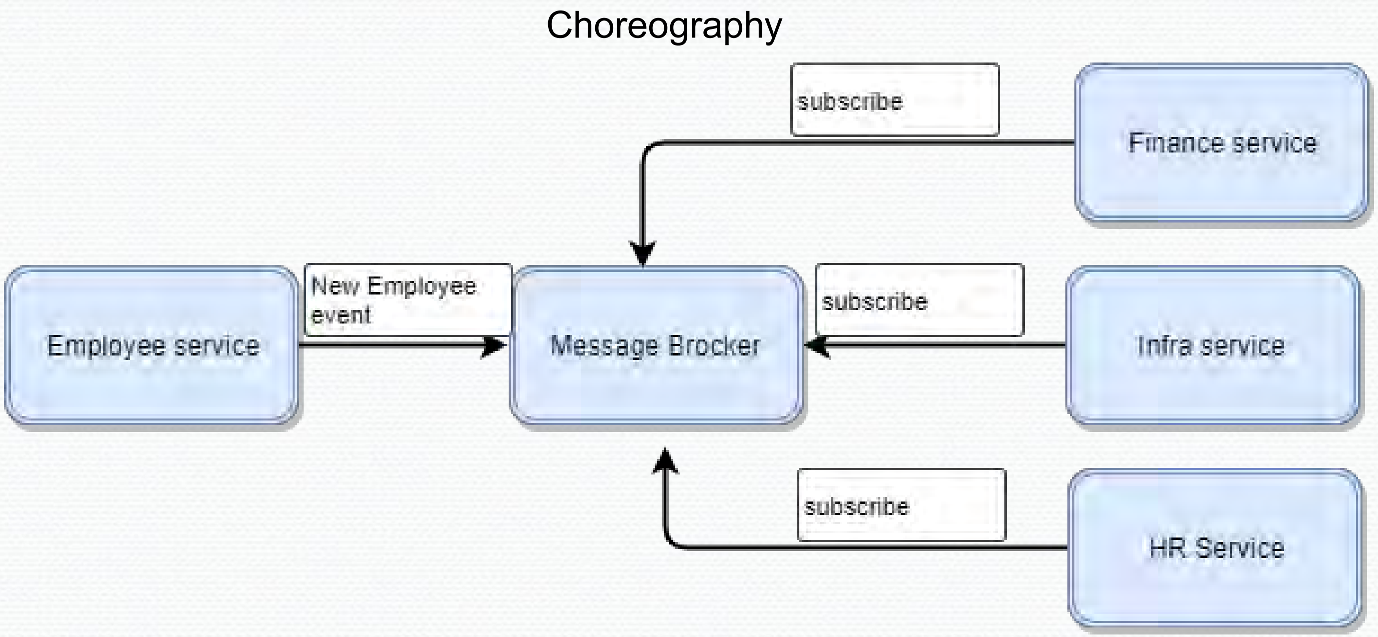
Live registration / de-registration

Orchestration vs. Choreography

Orchestration

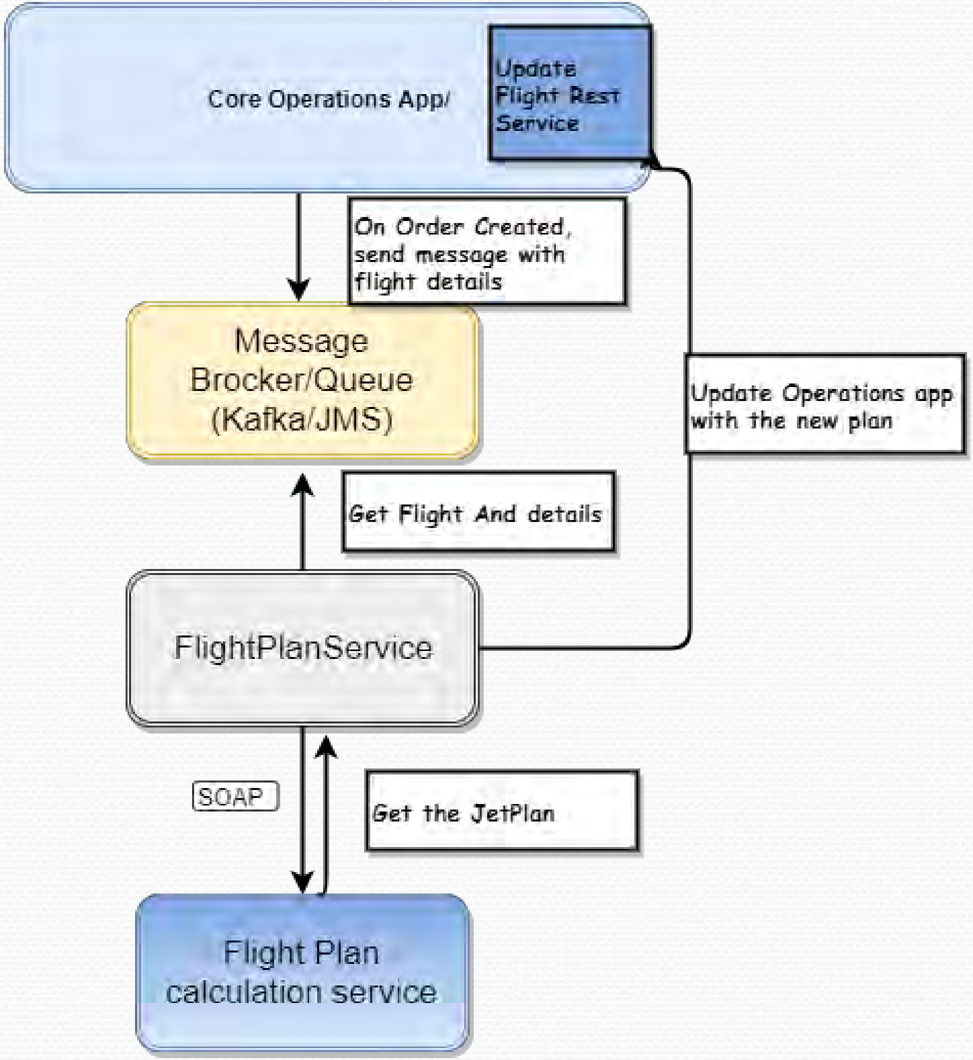


Orchestration vs. Choreography



Event driven approach

- Fire events on certain triggers
- Use message brocker
- Callbacks

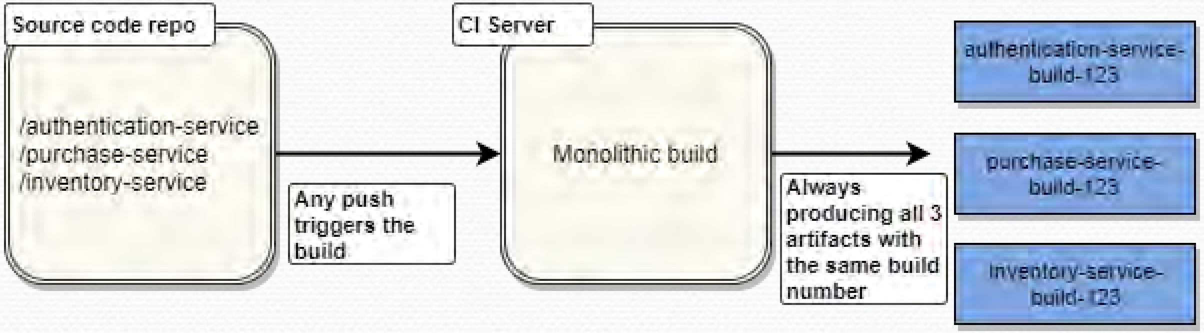

Core Operations App/
Update Flight Rest Service
On Order Created, send message with flight details
Message Brocker/Queue (Kafka/JMS)
Update Operations app with the new plan
Get Flight And details
FlightPlanService
SOAP
Get the JetPlan
Flight Plan calculation service

BUILD & DEPLOY

Automatically!

Source repositories and CI

- The monolithic approach



Source code repo

/authentication-service
/purchase-service
/inventory-service

Any push triggers the build

CI Server

Monolithic build

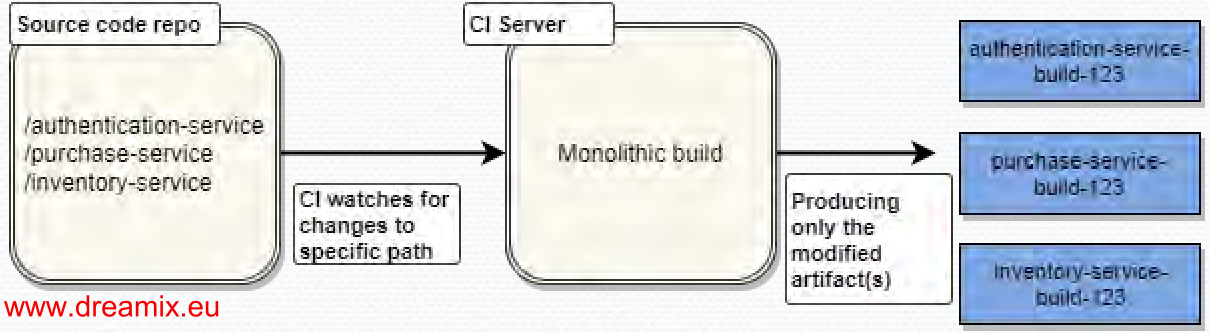
Always producing all 3 artifacts with the same build number

authentication-service-build-123

purchase-service-build-123

inventory-service-build-123

- The improved monolithic approach



Source code repo

/authentication-service
/purchase-service
/inventory-service

CI watches for changes to specific path

CI Server

Monolithic build

Producing only the modified artifact(s)

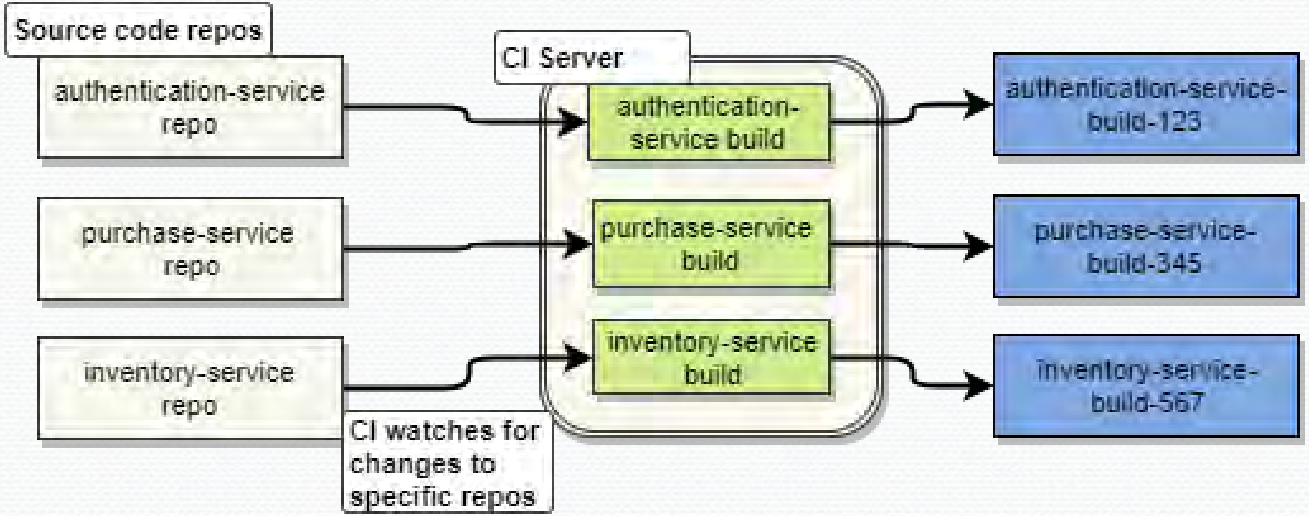
authentication-service-build-123

purchase-service-build-123

inventory-service-build-123

Source repositories and CI

- The microservice approach


Source code repos
authentication-service repo
purchase-service repo
inventory-service repo
CI Server
authentication-service build
purchase-service build
inventory-service build
authentication-service-build-123
purchase-service-build-345
inventory-service-build-567
CI watches for changes to specific repos

How many services per machine ?

- Multiple services per one host
  - Hard to monitor and hard for problem determination
- Application containers
  - Example: One JVM hosting different service artifacts (wars)
- Single service per host
  - Easier to monitor and easier to scale
- Platform as a service
  - Automatically provisioning
  - Automatic scaling

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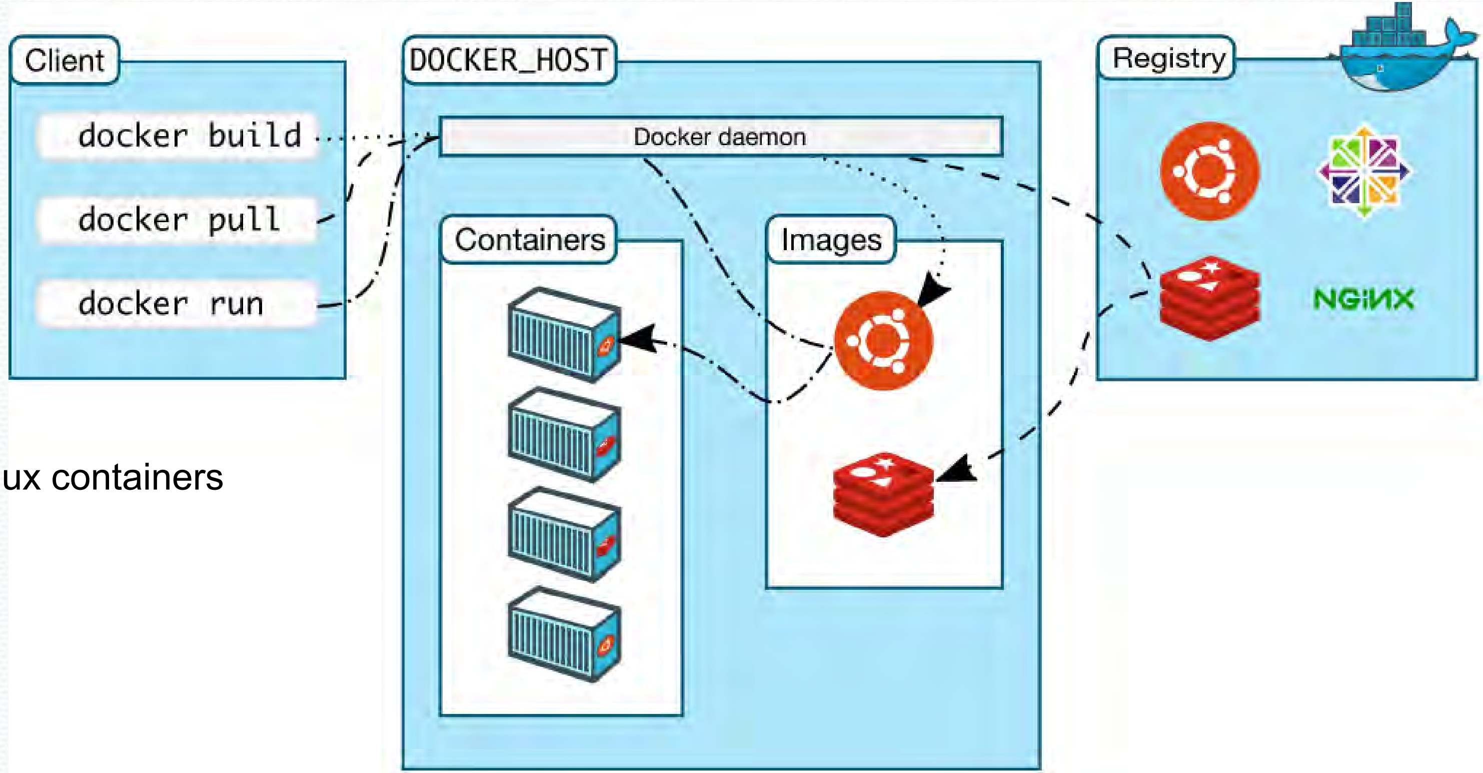
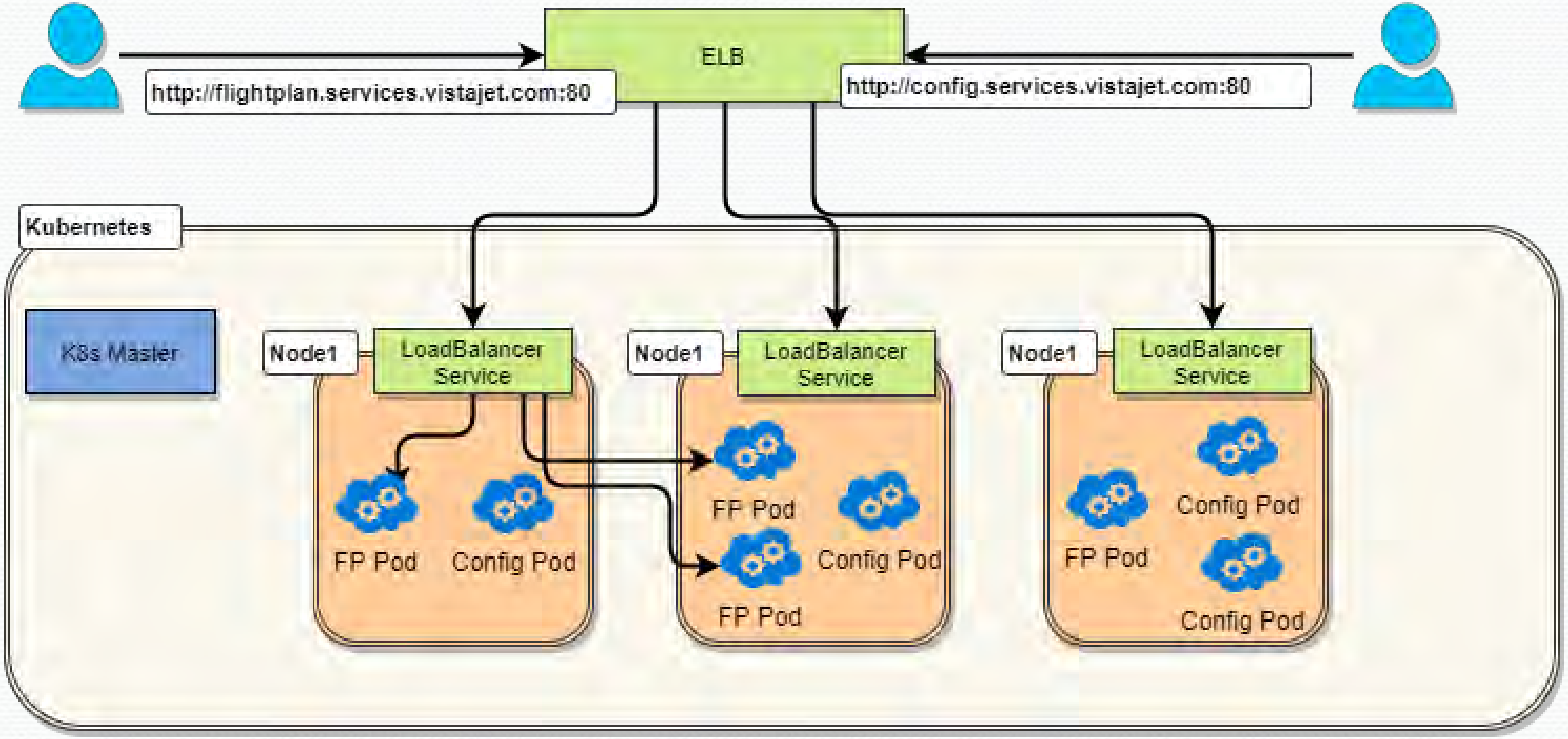
Docker



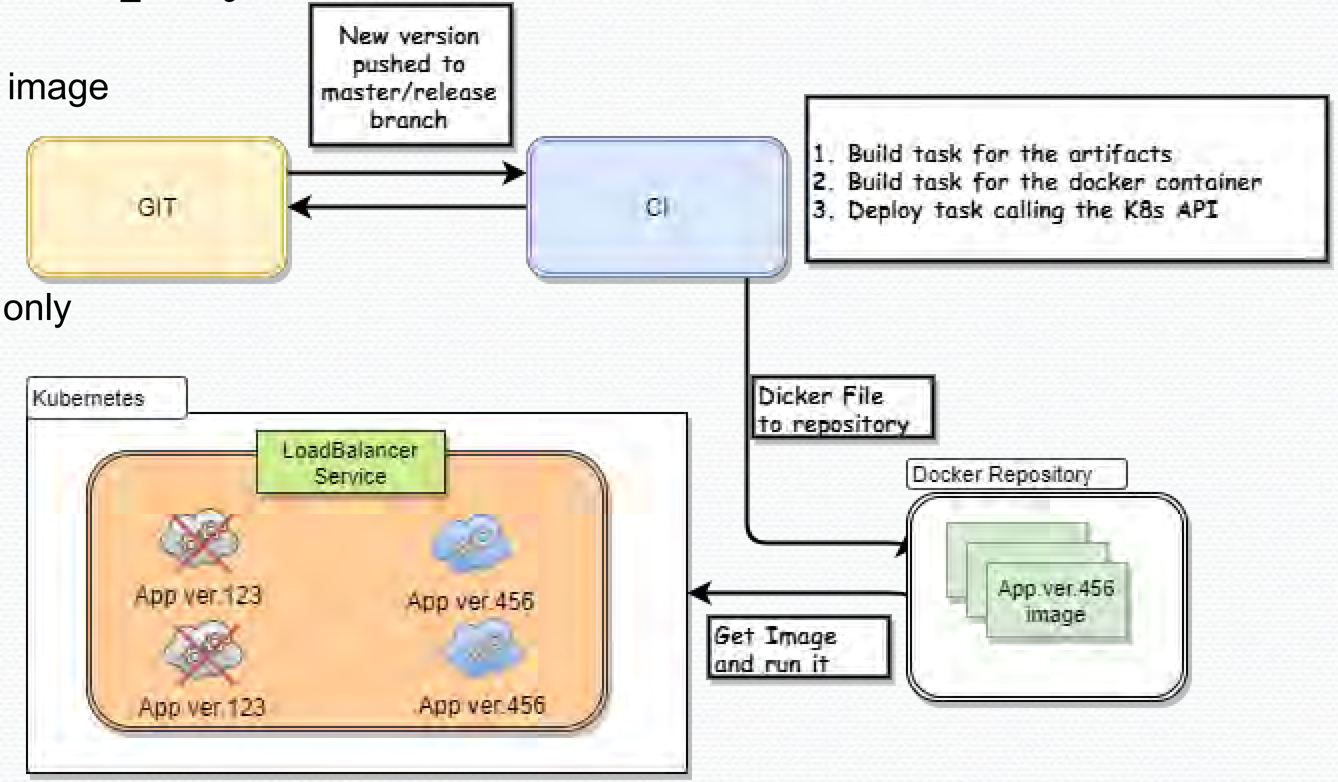
- Using existing Linux containers feature

Kubernetes & Docker



Zero-downtime deployments

1. Build new version docker image
2. Deploy to K8s
3. Health-check OK
4. LB routes to new version only
5. Wait for active request on the old version
6. Undeploy old version



New version pushed to master/release branch

1. Build task for the artifacts
2. Build task for the docker container
3. Deploy task calling the K8s API

Dicker File to repository

Get Image and run it

No Silver Bullet

- Pay special attention to logging and problem determination
- Prepare for even more failures
    - Chaos Monkey
- Timeouts and Circuit Breakers
- Consider Initially go for monolith with well established modules and bounderies

That's all folks!

Thank you!

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