IT Ortenau

Breaking the monolith

Learnings from breaking the monolith into Microservices

Offenburg, 28.06.2023

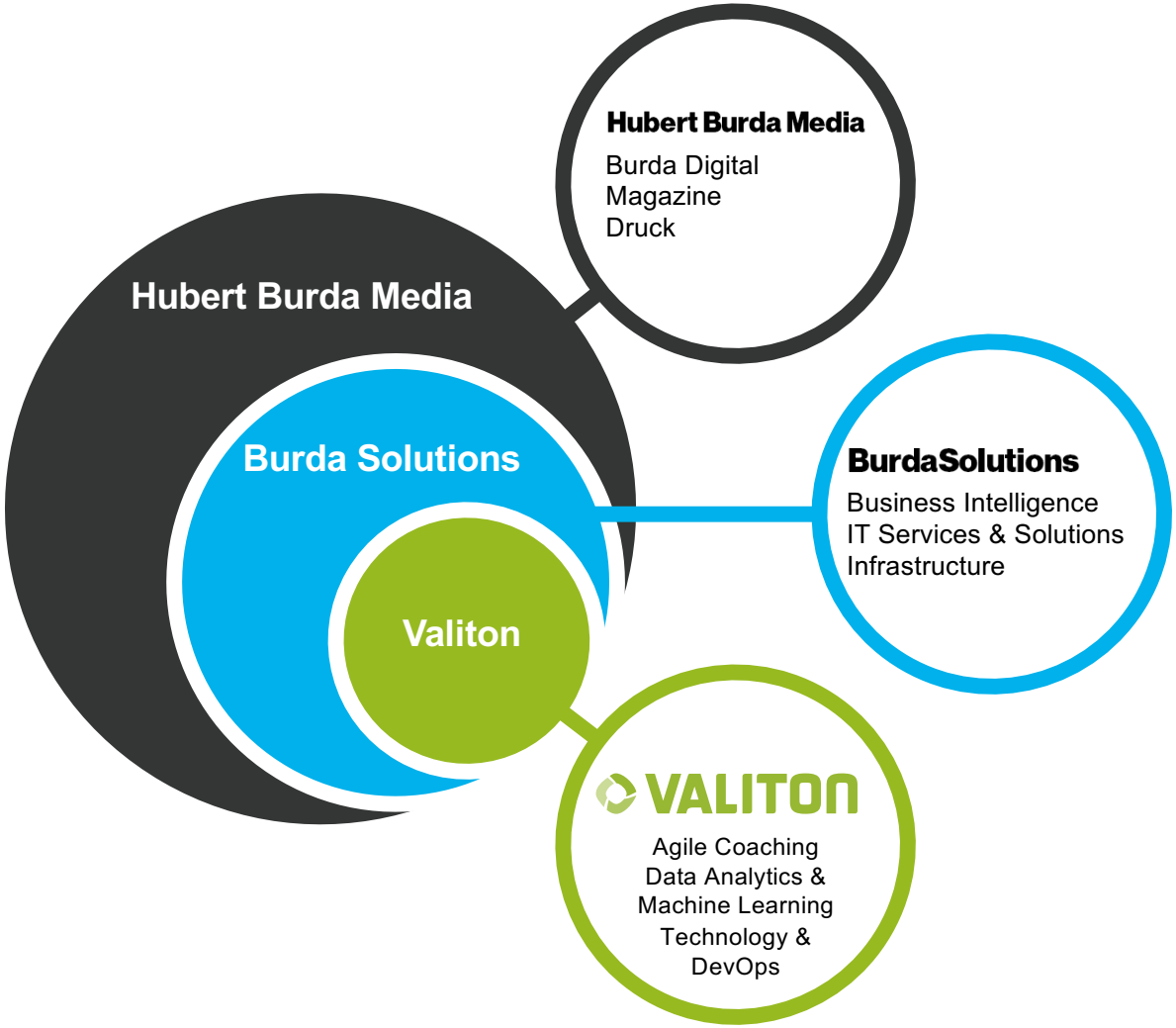
VALITON

Ein BurdaSolutions Unternehmen

AGENDA

1. Valiton in a Nutshell
2. Monolith vs Microservices Software Architecture
3. Challenges of a Microservice Architecture
4. Breaking the monolith (Pitfalls & Learnings)
5. Summary (Monolith frist)

1 Valiton in a Nutshell



Hubert Burda Media

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Machine Learning & AI

Software Development
Data Engineering

Data Analytics
Data Warehouse
Conversion Optimierung

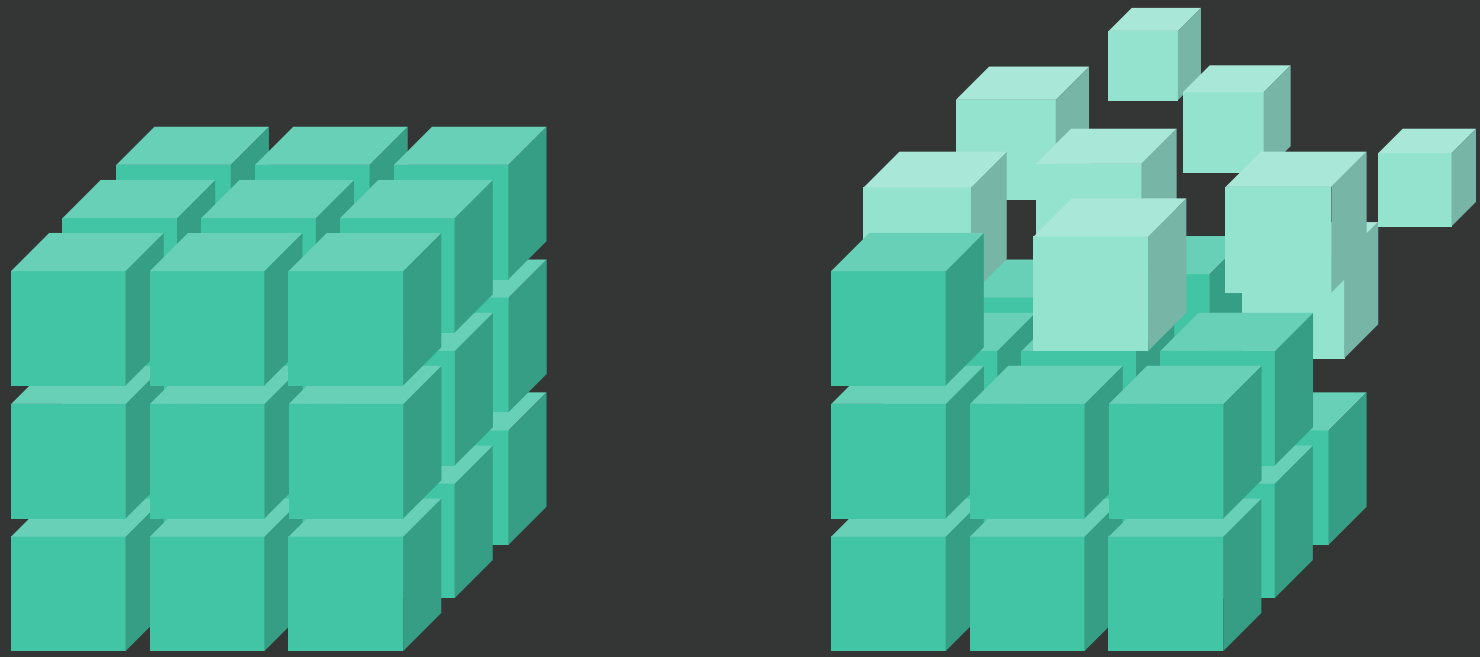
DevOps
Infrastructure as Code (IaC)

Agile Coaching
Project Management

Valiton key facts

- 55 employees
- Our offices:
  - Offenburg
  - Munich
  - Berlin
  - (Hamburg)

BREAKING THE MONOLITH...

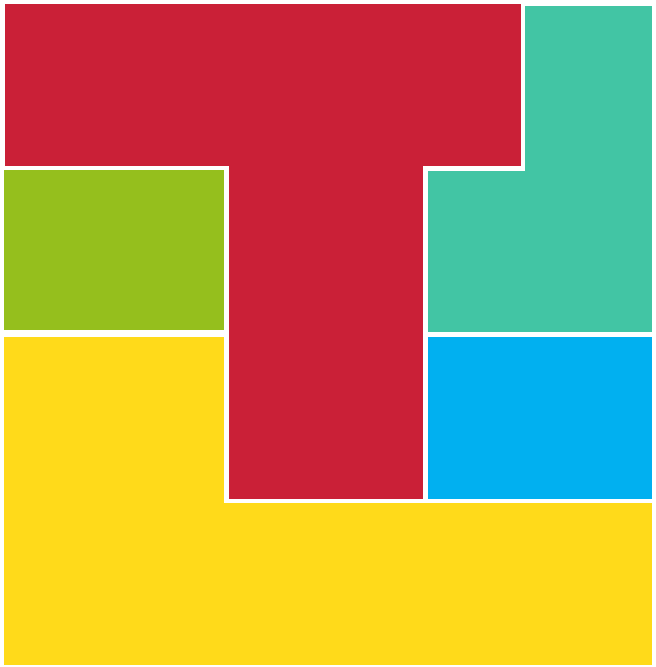


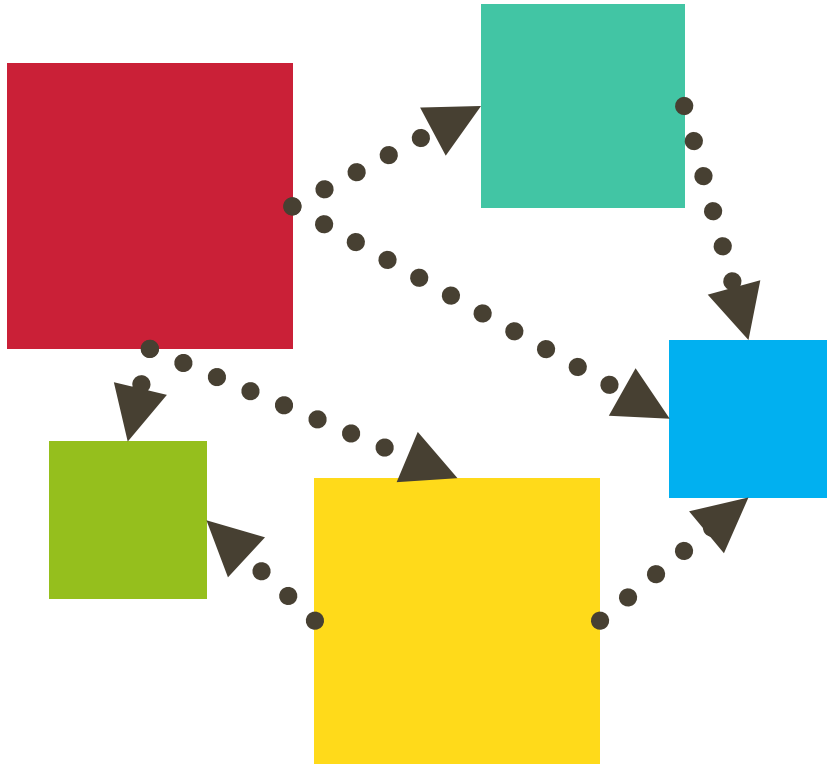
2

Monolith vs Microservices

- Software Architecture

Monolith vs Microservices





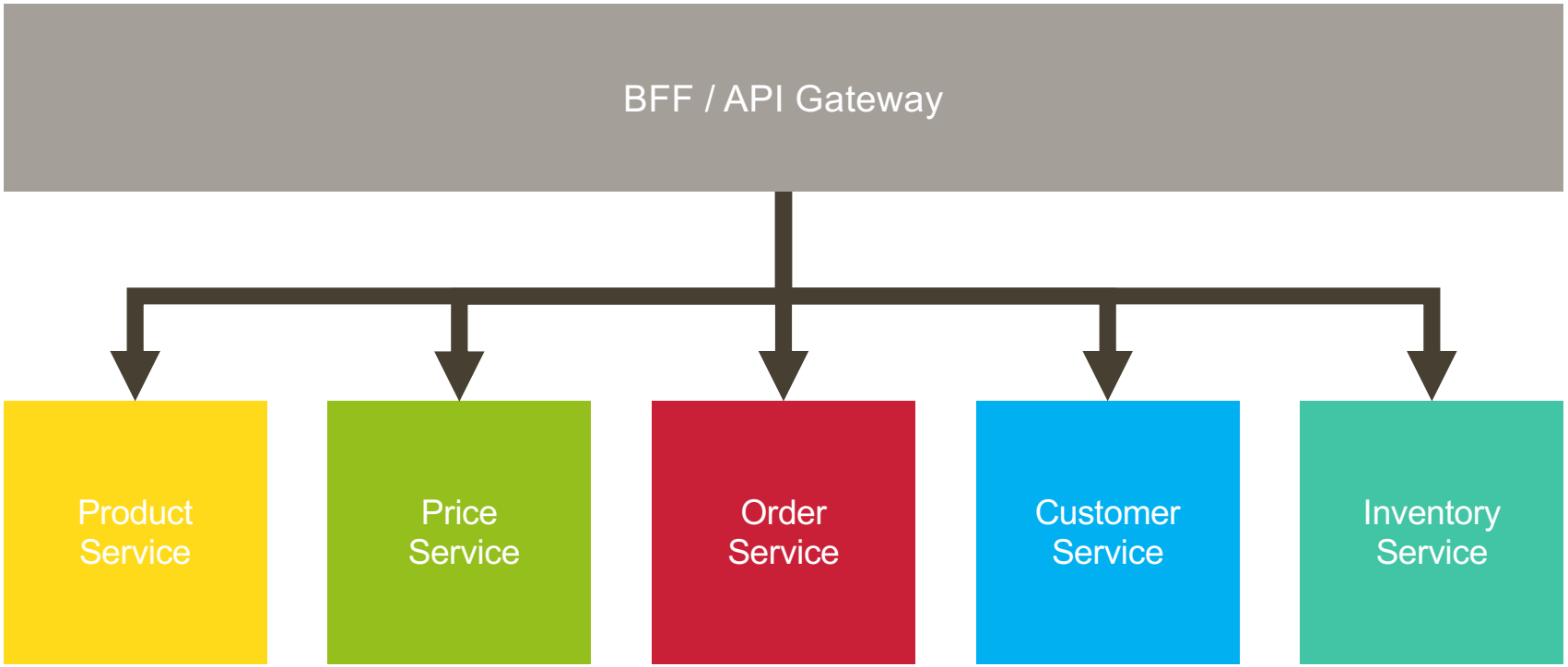
Microservices Pro & Cons

- module boundaries are strictly separated by services
- independent changes and updates (better maintainable/expandable)
- individual horizontal and vertical scaling
- individual tech-stack per service

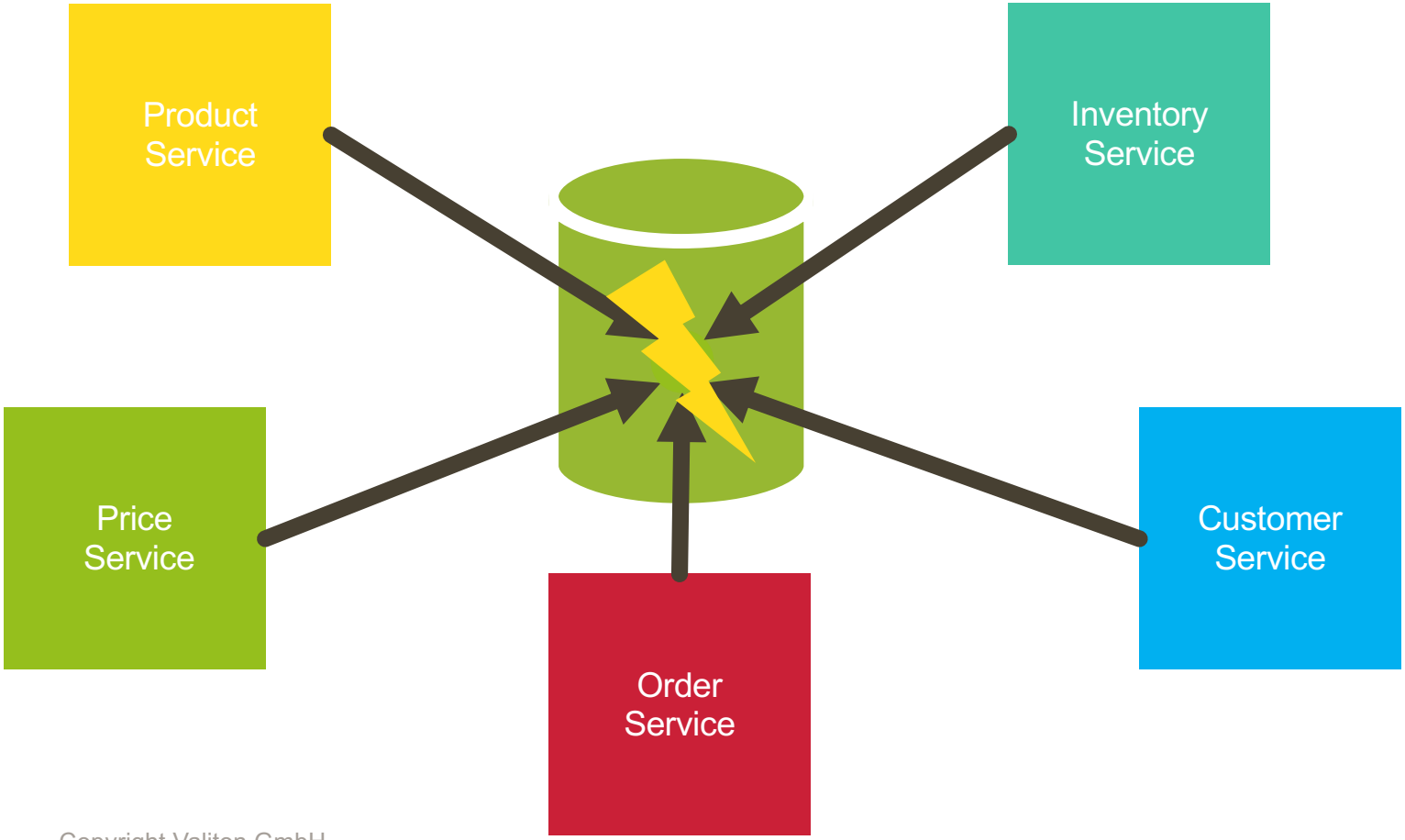
- higher complexity due to many services
- higher costs for operation, deployment and monitoring
- enormous migration effort
- higher latency (network, messaging)
- consistency (transactions)

3 Challenges of a Microservice Architecture

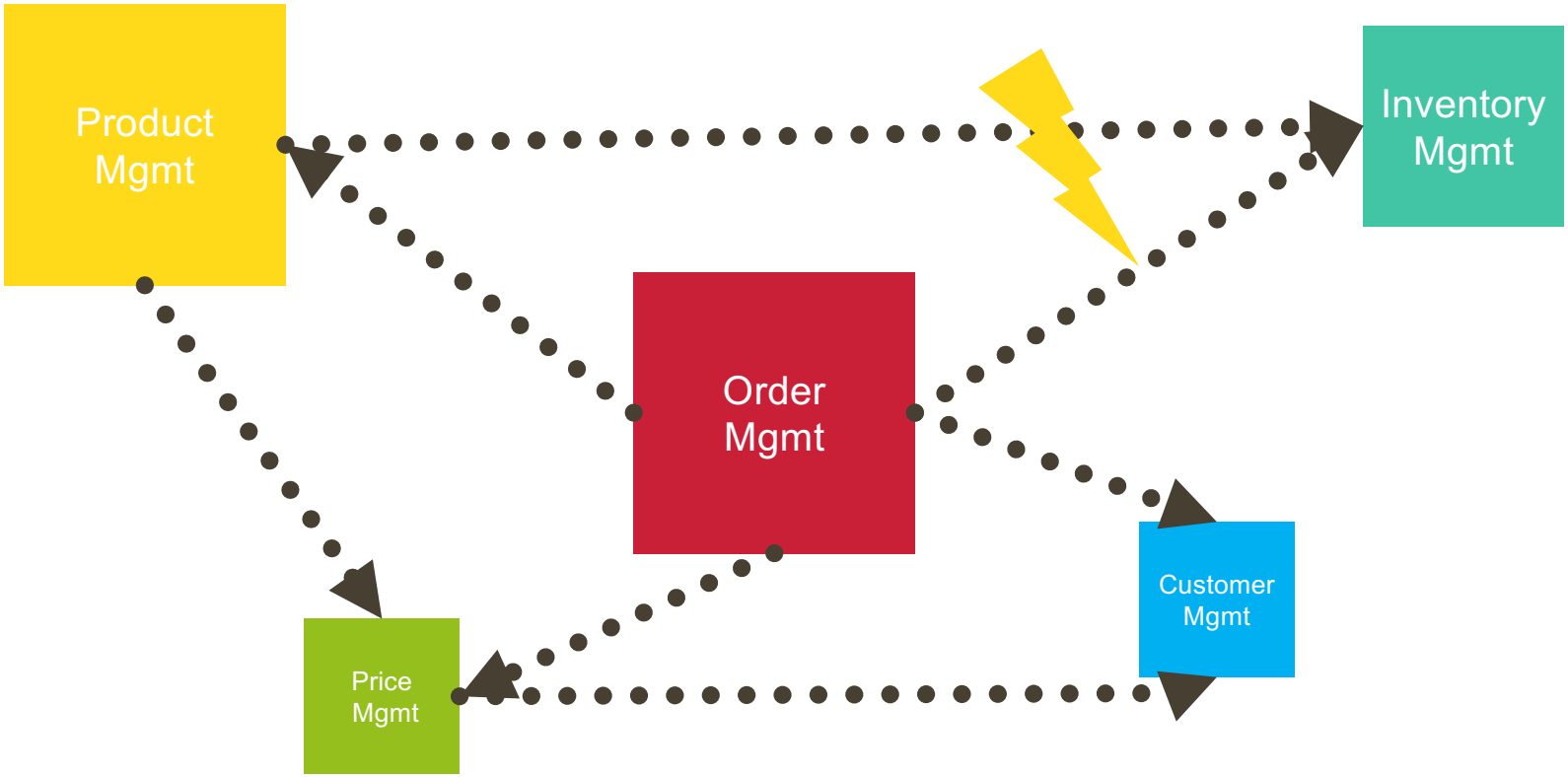
Orchestrierung - Backend for Frontend (BFF) / API Gateway



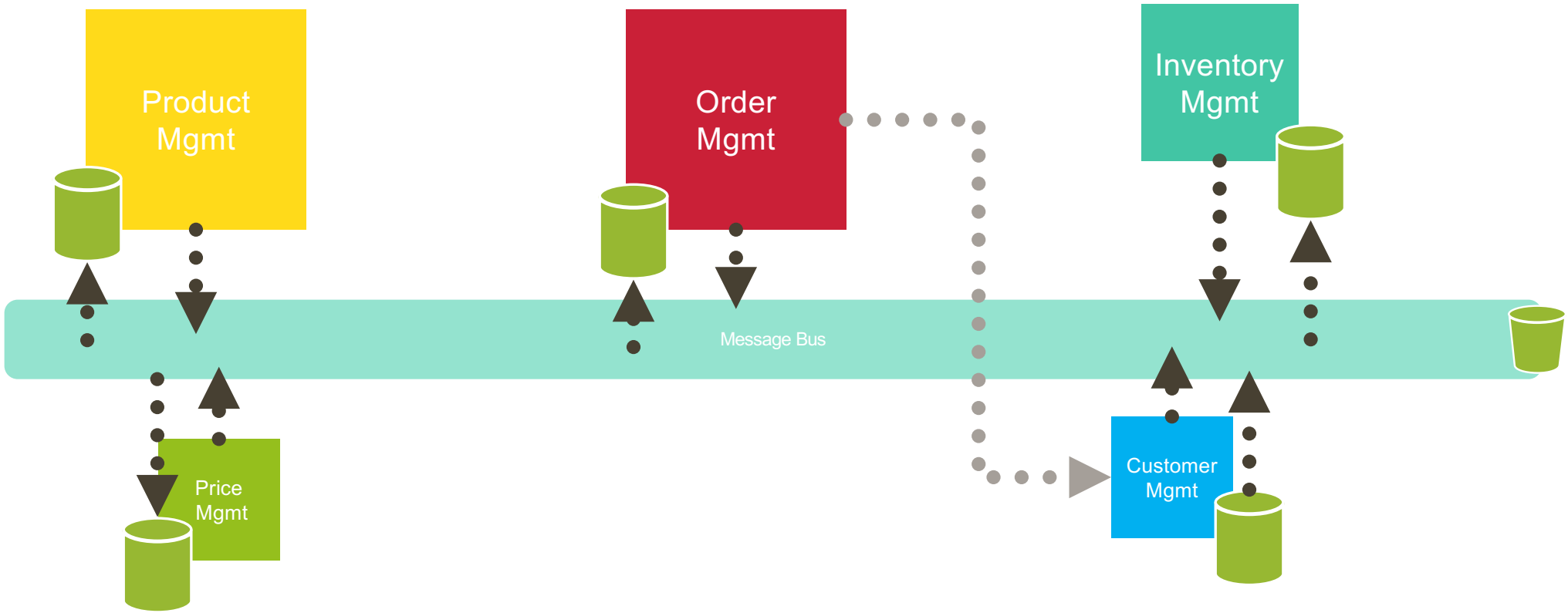
Don't share Databases or Schemas



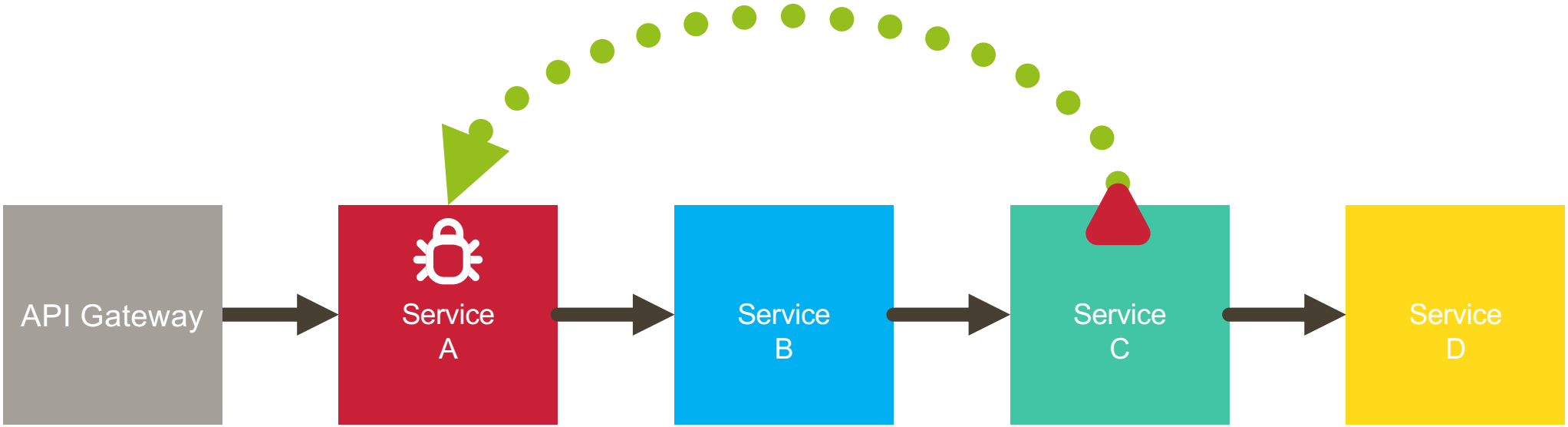
Avoid sync. communication - Distributed Monolith



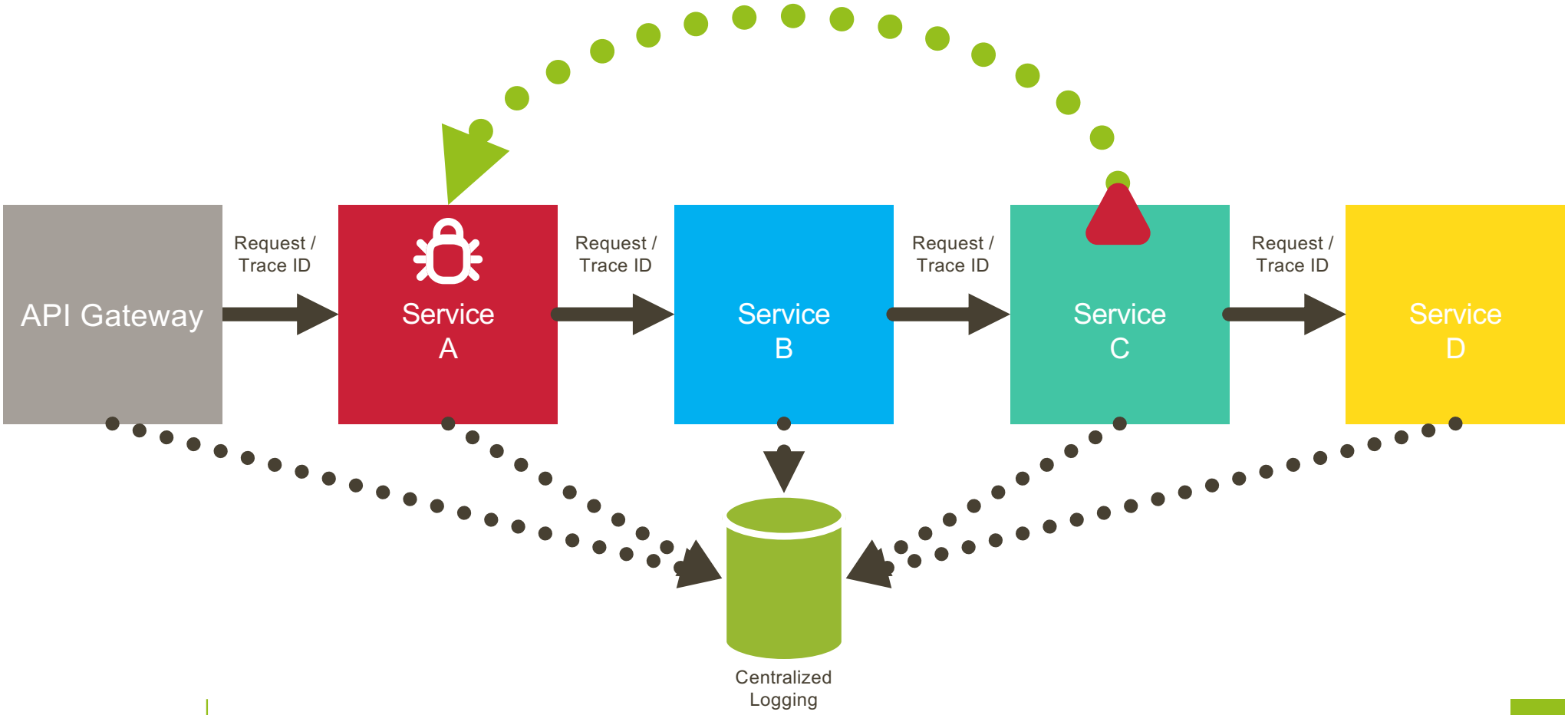
Loosely coupled services



Observability



Distributed Tracing & Centralized Logging

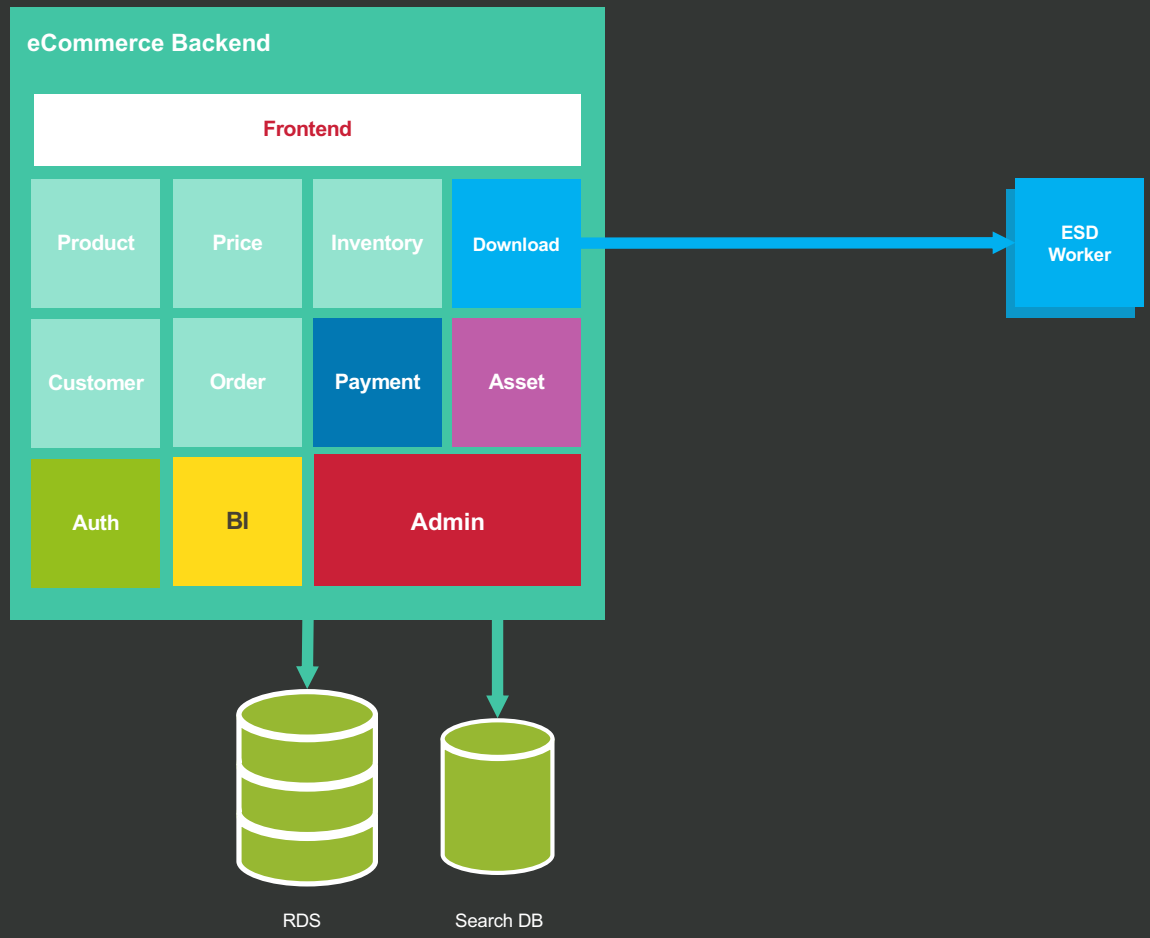


4 Breaking the monolith

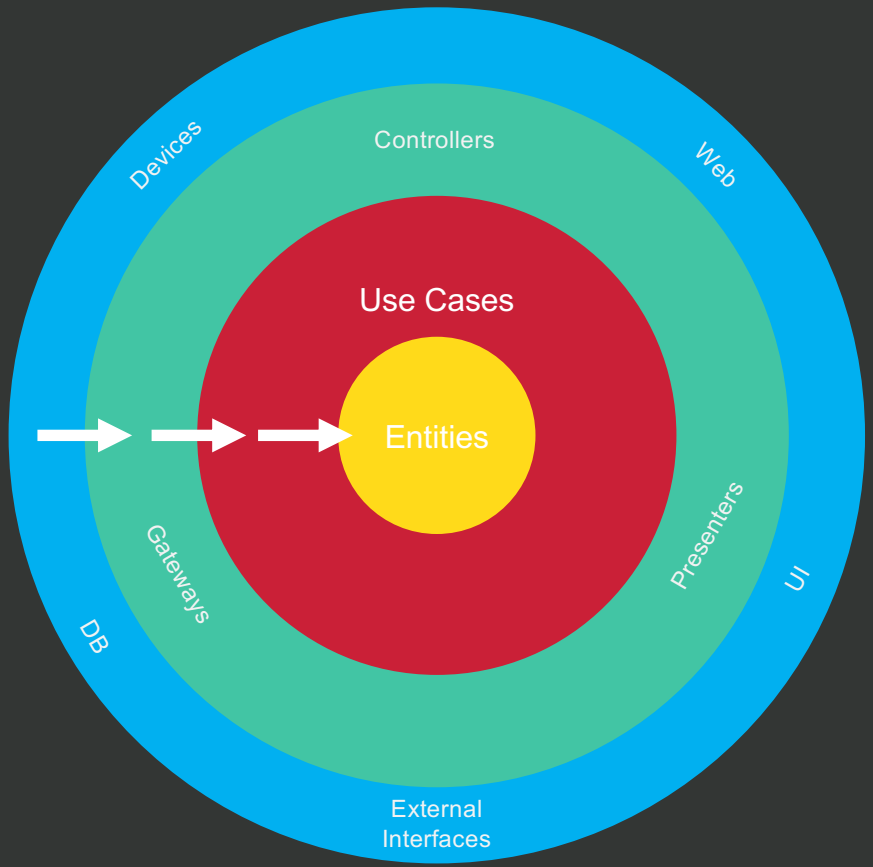
- our approach to break the monolith
- Pitfalls & Learnings

Example: Monolith

Before



Clean Architecture



- Enterprise Business Rules
- Application Business Rules
- Interface Adapters
- Framework & Drivers

Source: Robert C. Martin, Clean Architecture, Chapter 22 Figure 22.1
https://blog.cleancoder.com/uncle-bob/2012/08/13/the-clean-architecture.html

SOLID Principles

Single-responsibility principle

Open–closed principle

Liskov substitution principle

Interface segregation principle

Dependency inversion principle

Clean Architecture

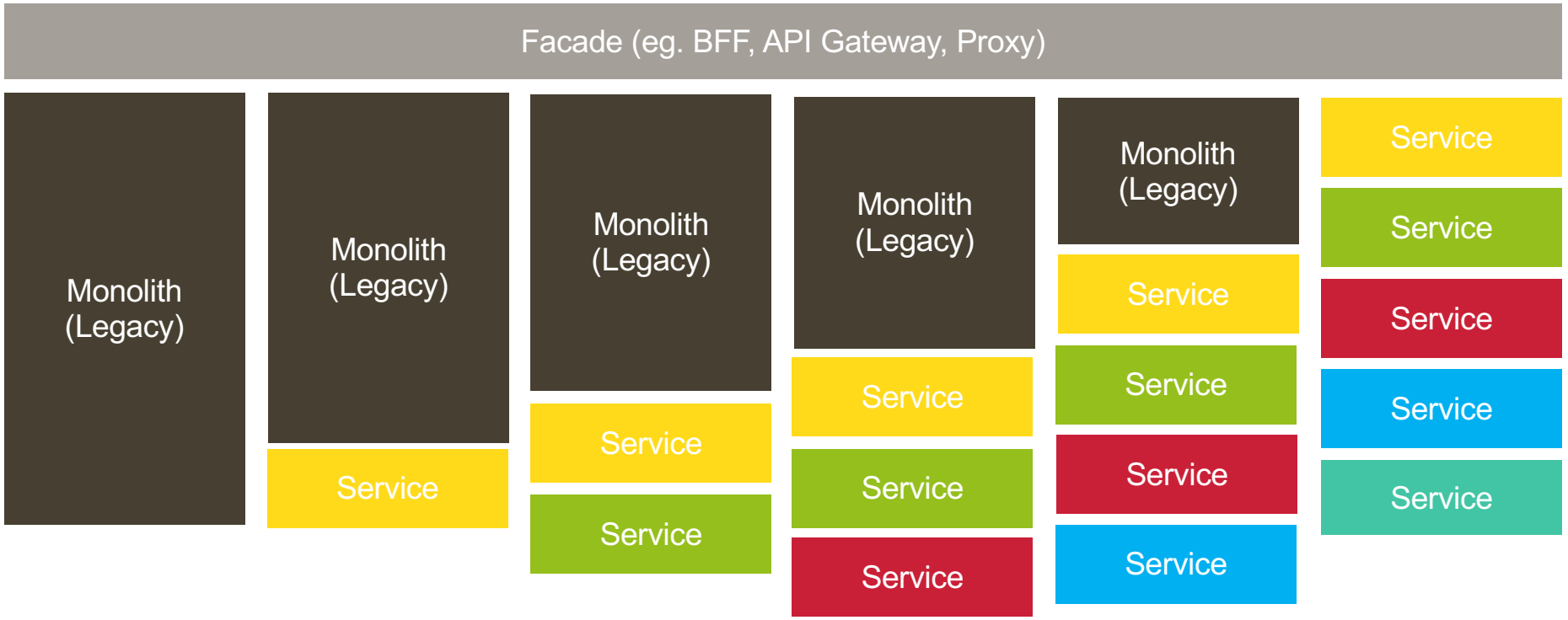
« A good architecture will allow a system to be born as a monolith, deployed in a single file, but then to grow into a set of independently deployable units, and then all the way to independent services and/or micro-services. »

Robert C. Martin, Book "Clean Architecture"

source: https://martinfowler.com/bliki/MonolithFirst.html

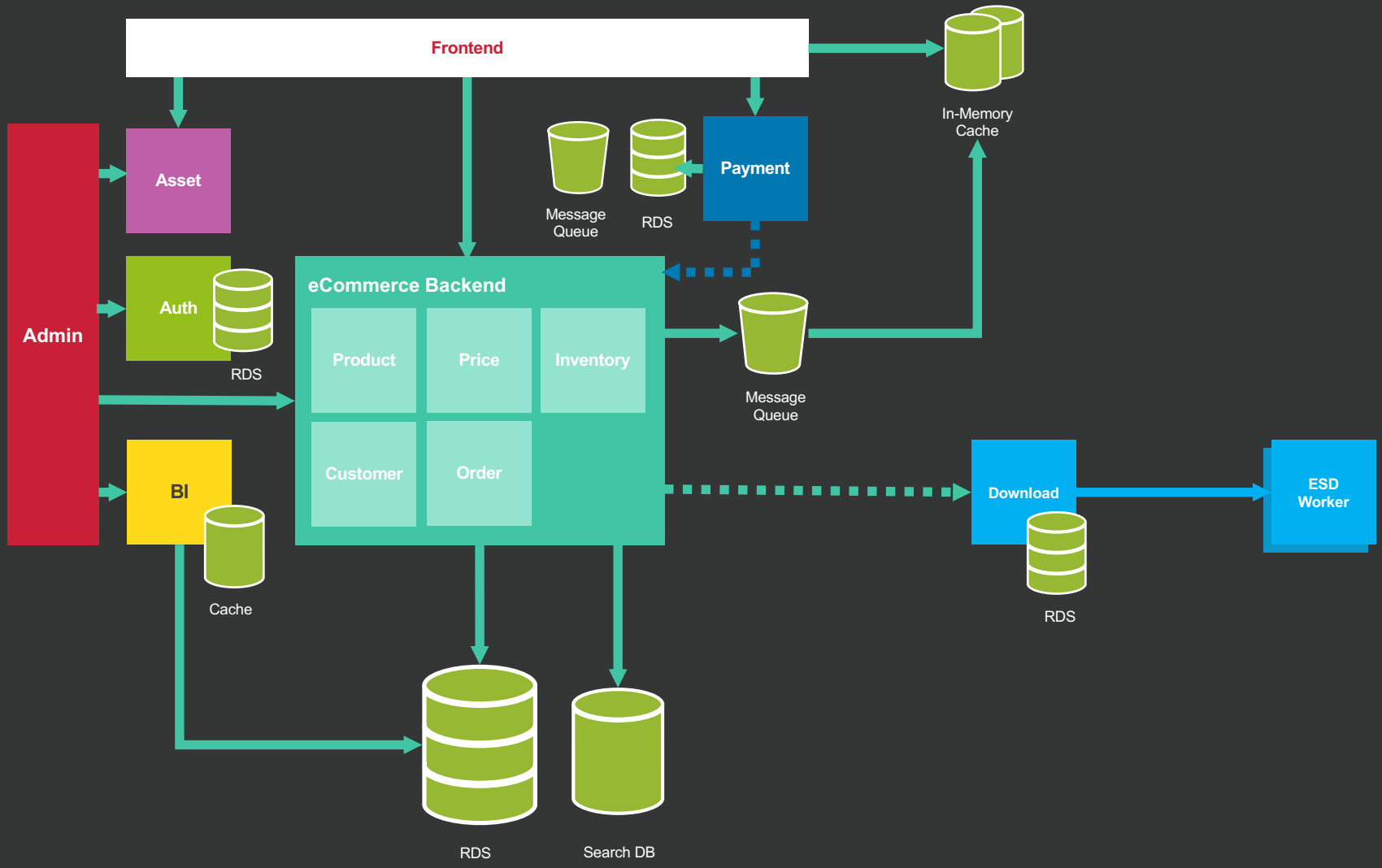
Strangling the monolith

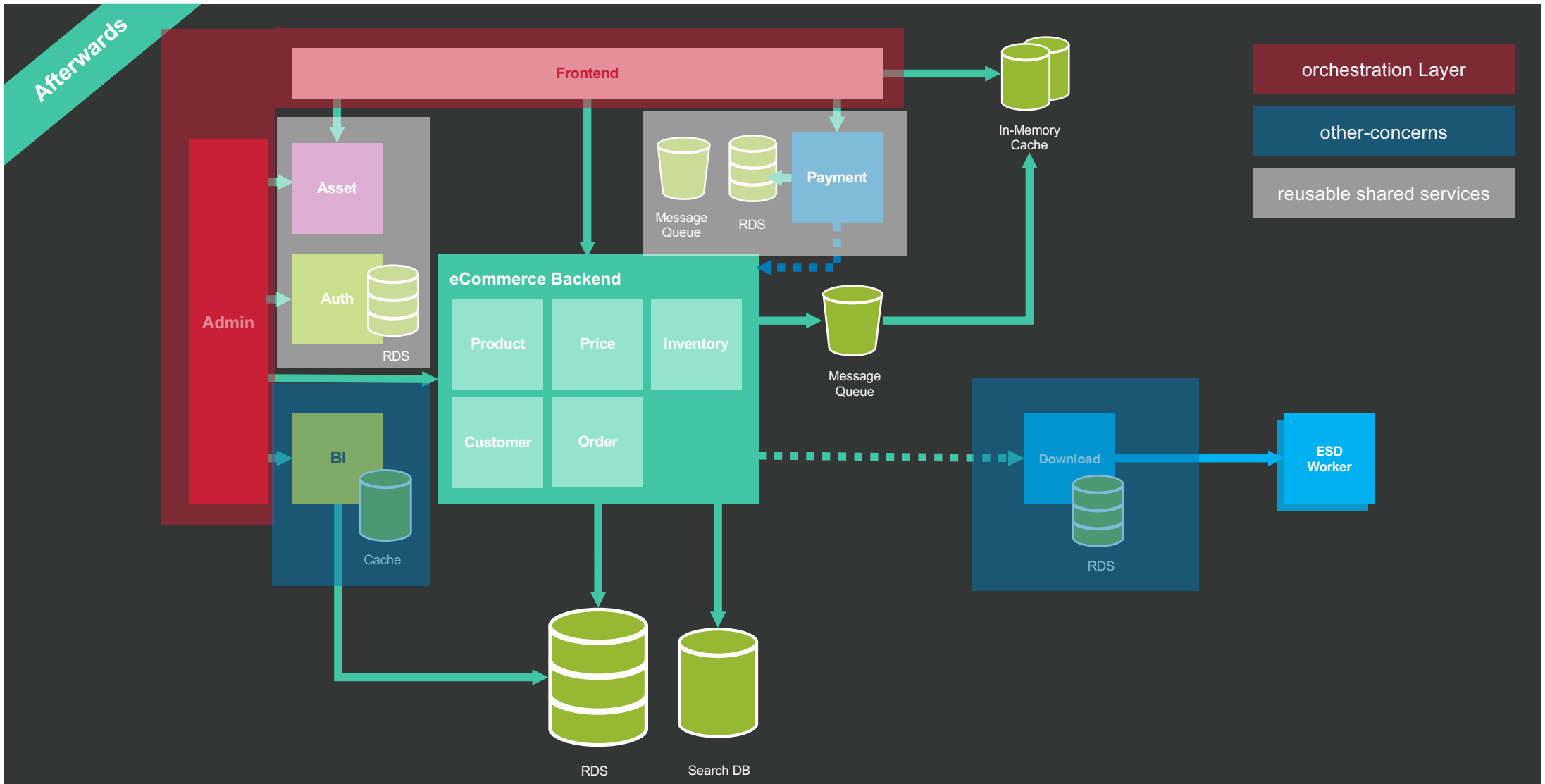
- Strangler (figs) application pattern



https://microservices.io/patterns/refactoring/strangler-application.html
https://martinfowler.com/bliki/StranglerFigApplication.html

Afterwards

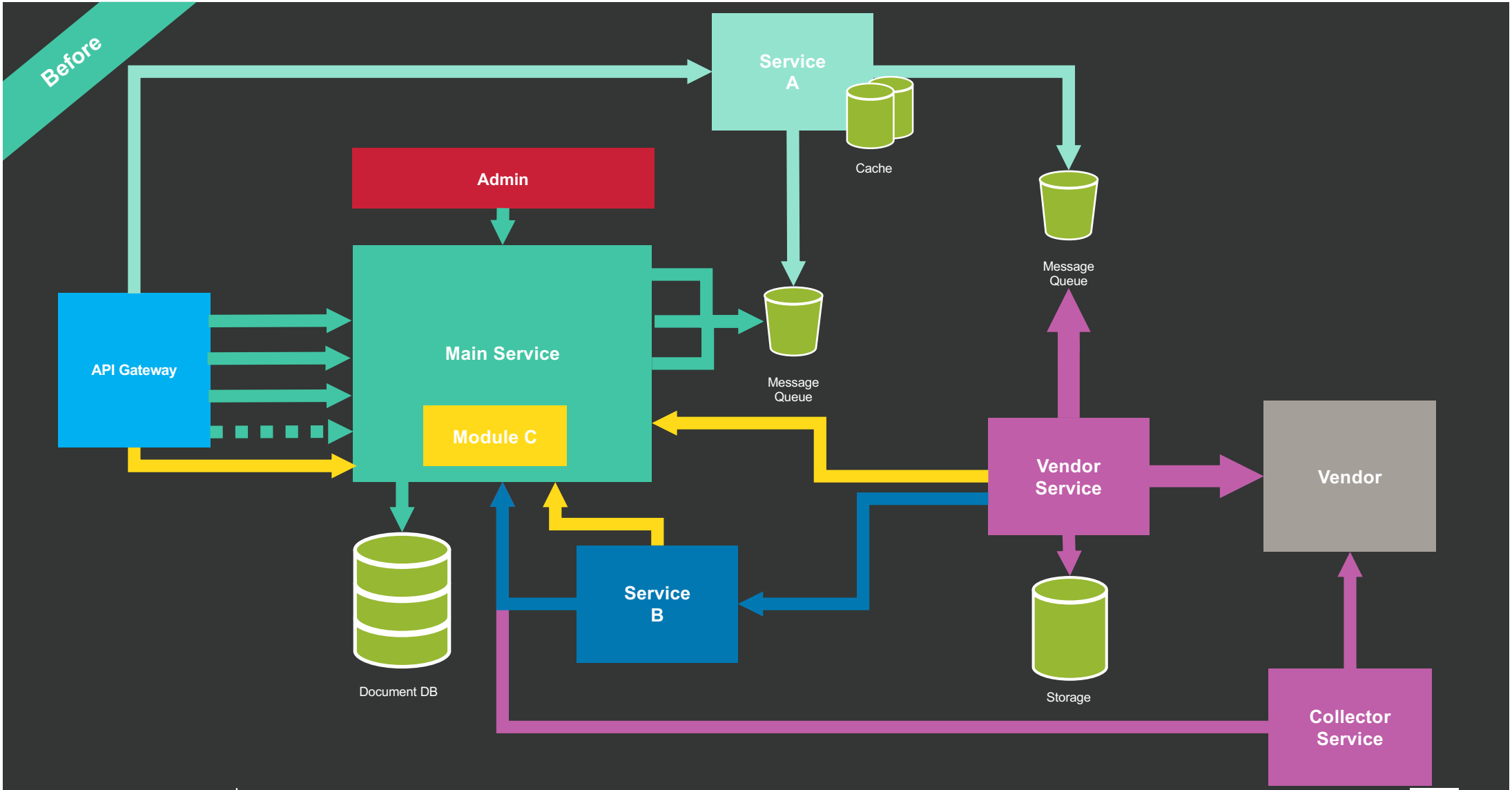


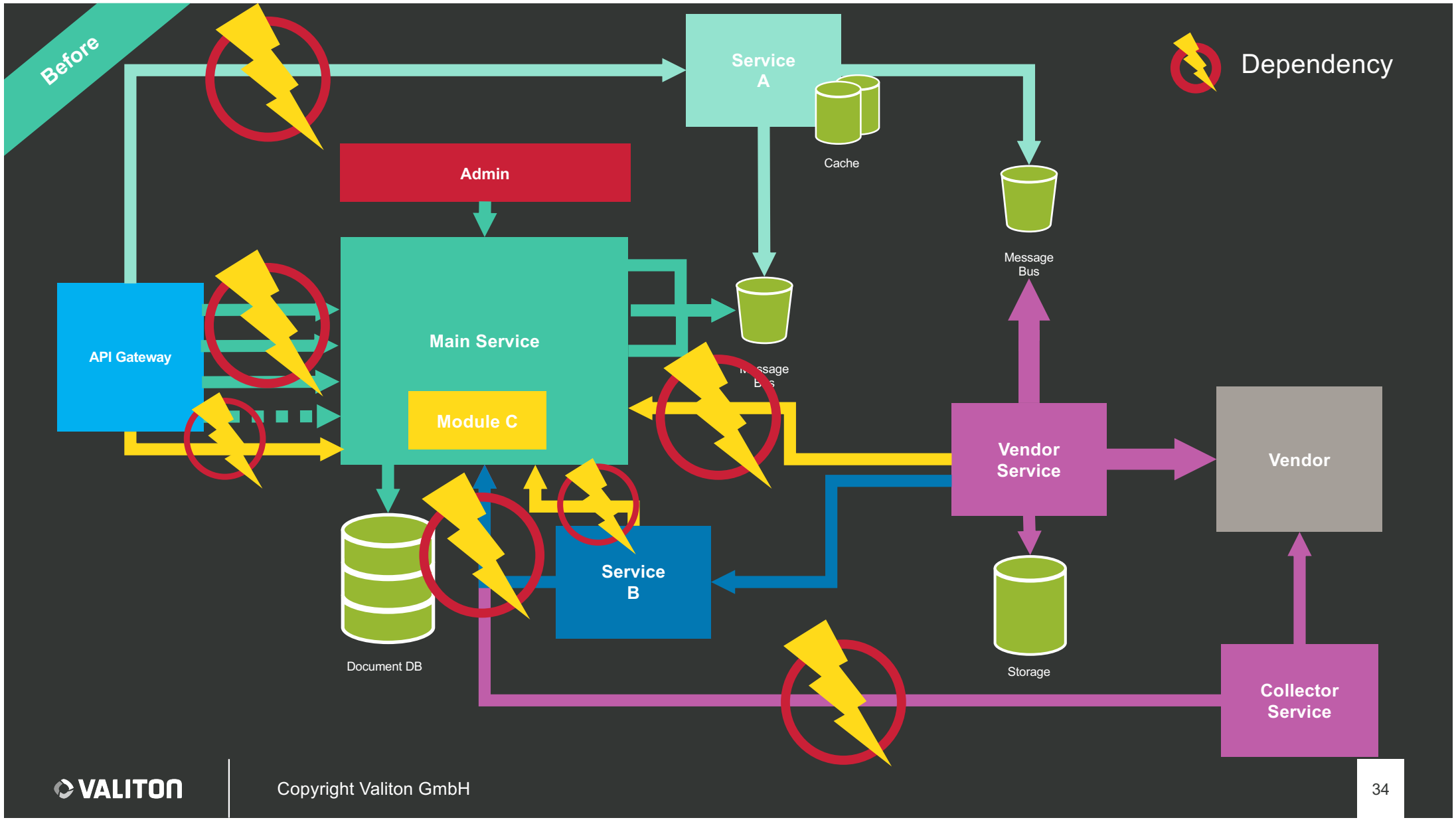


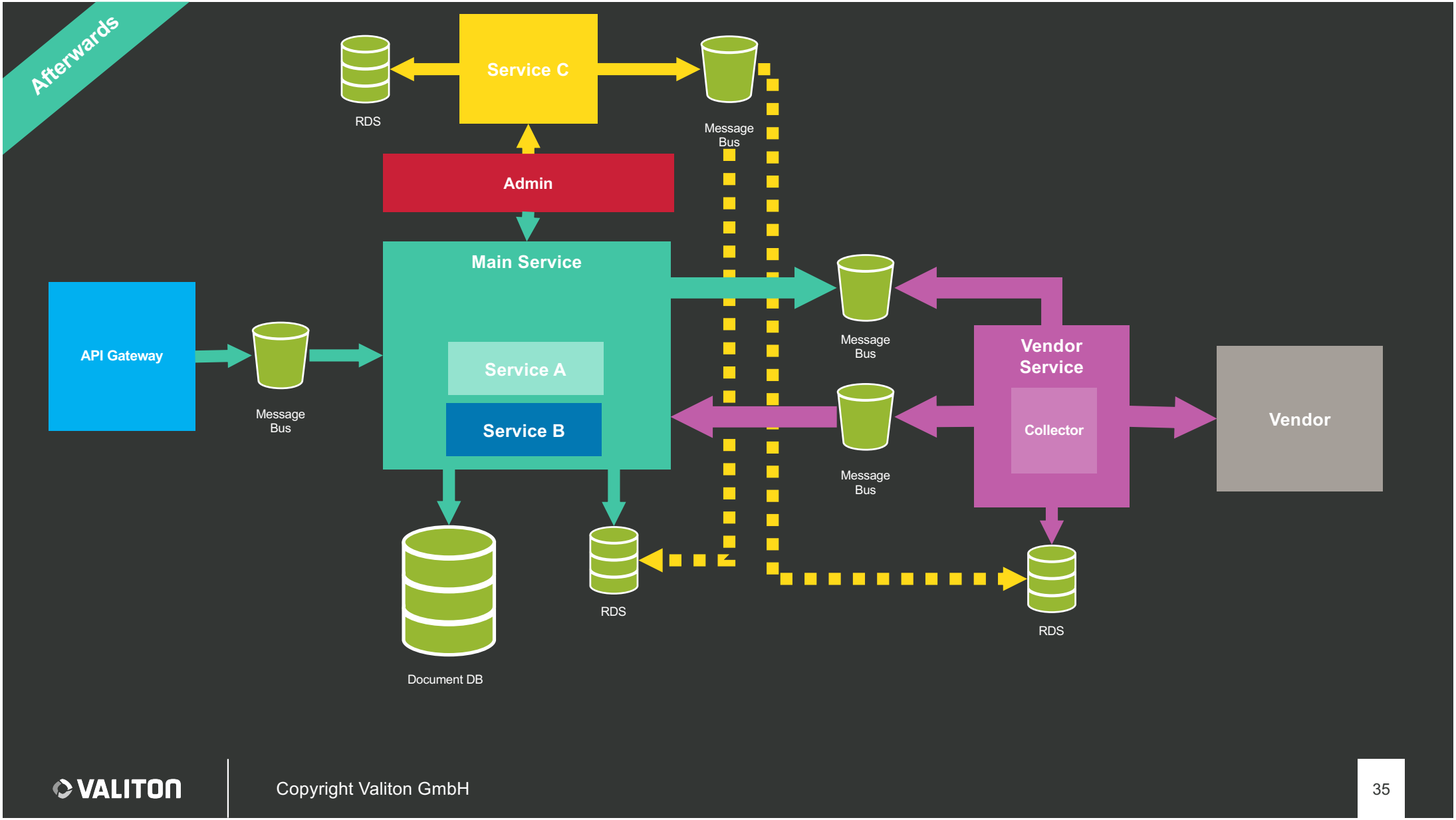
Learnings

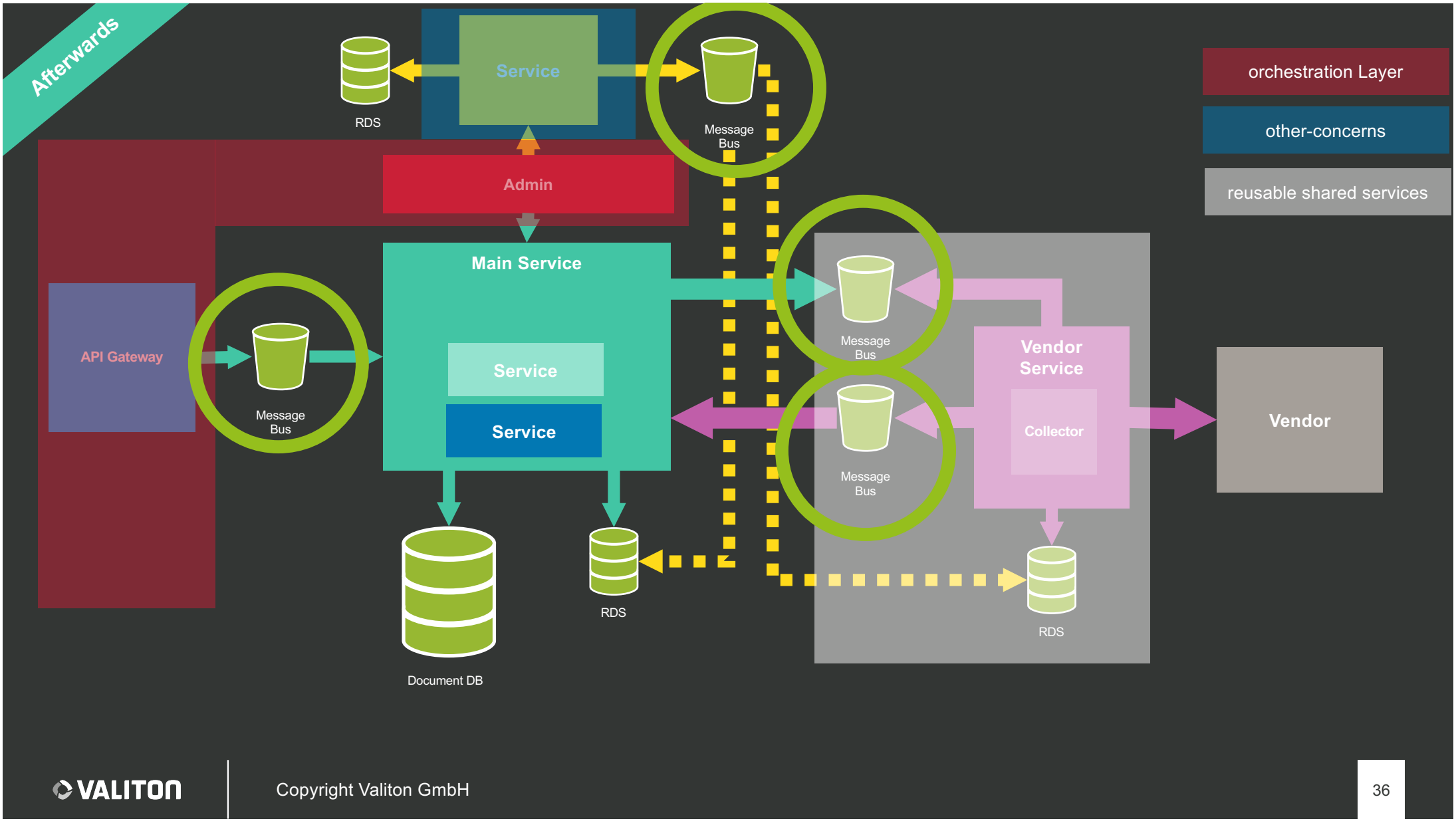
- first start refactoring your codebase, step by step (Boy-Scout principle)
  - strict boundries between modules (Clean Architecture / SOLID)
  - high test coverage
- extract frontend (orchestration layer)
- extract shared services eg. authentication

Example: Distributed Monolith









Learning

- don't depend on other services
- avoid synchronous communication between services
- message bus provides failover
- don't slice your services to small - prefer micro-monolith over atomic services

5 Summary

Monolith First

« you shouldn't start a new project with microservices, even if you're sure your application will be big enough to make it worthwhile. »

Martin Fowler, Author of "Patterns of Enterprise Application Architecture"

source: https://martinfowler.com/bliki/MonolithFirst.html

Take Aways – Monolith first

- don't do it because others do
- migration from a Monolith to Microservices is an Epic journey
- takes a lot of time and money
- brings tons of challenges
- first start refactoring your monolith step by step (continuous refactoring)
  - identify bountries and refactor into separate modules
    (SOLID, DDD, Clean Architecture)

Take Aways - Microservice the right way

- loosely coupled services are the key
  - message queues or message bus (event driven architecture)
  - separate databases and data schemas
- don't slice your services to small (fragmentation)
- invest in Observability: centralized logging and distributed tracing
- automate deployment: Continues Integration and Deployment (CI/CD)

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