

Microservices and Event-Driven Architecture

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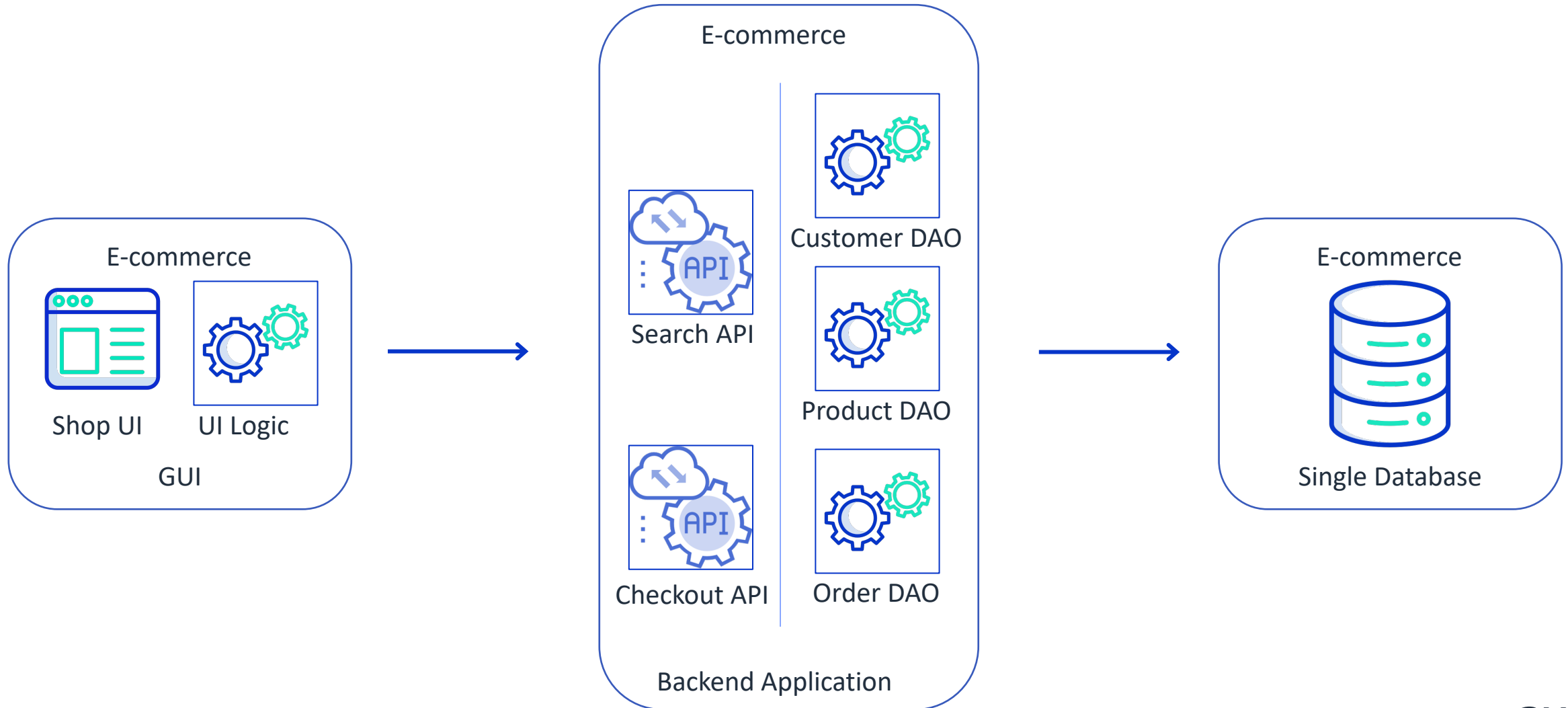
A Brief History of Time...



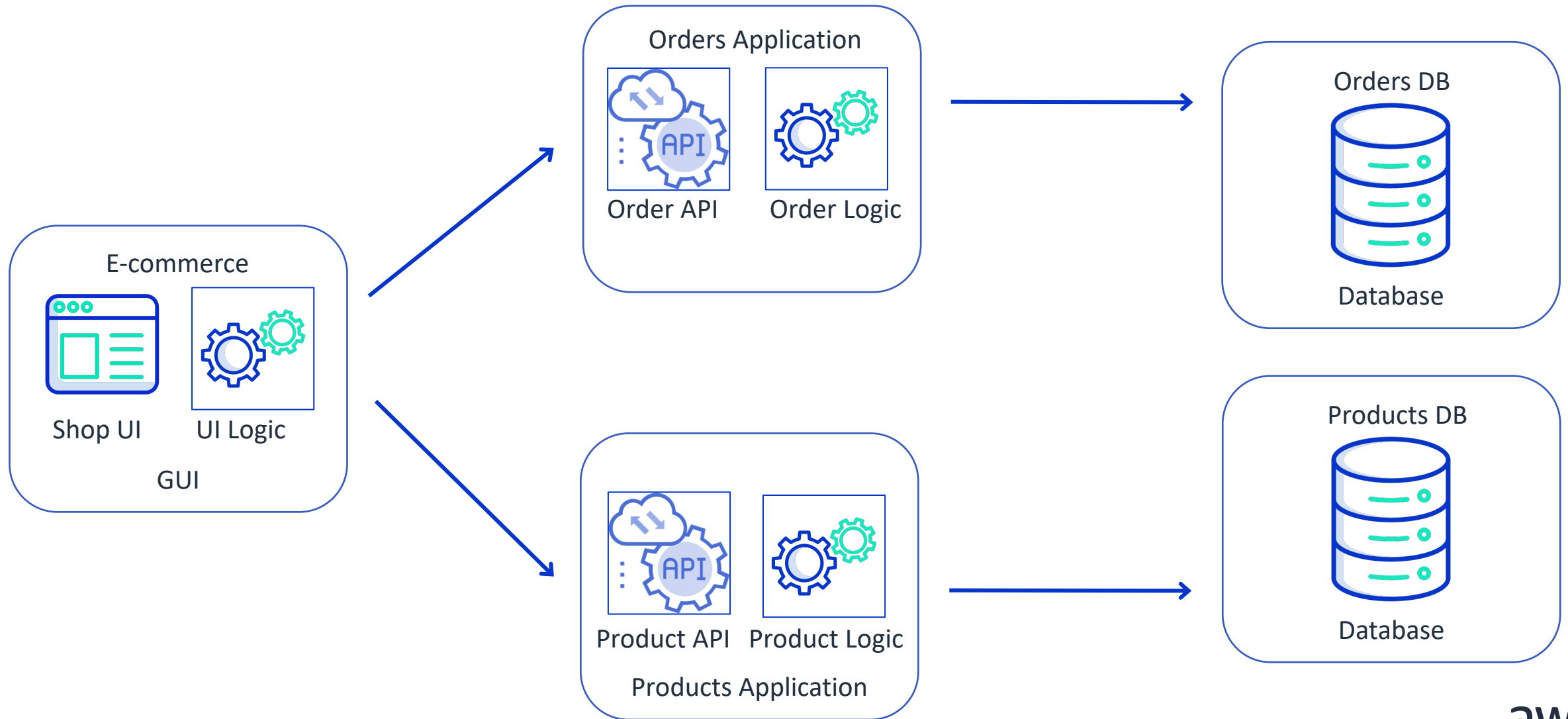
A Brief History of Time...

- Traditional App (3 tiers)
- SOA Approach
- Microservices

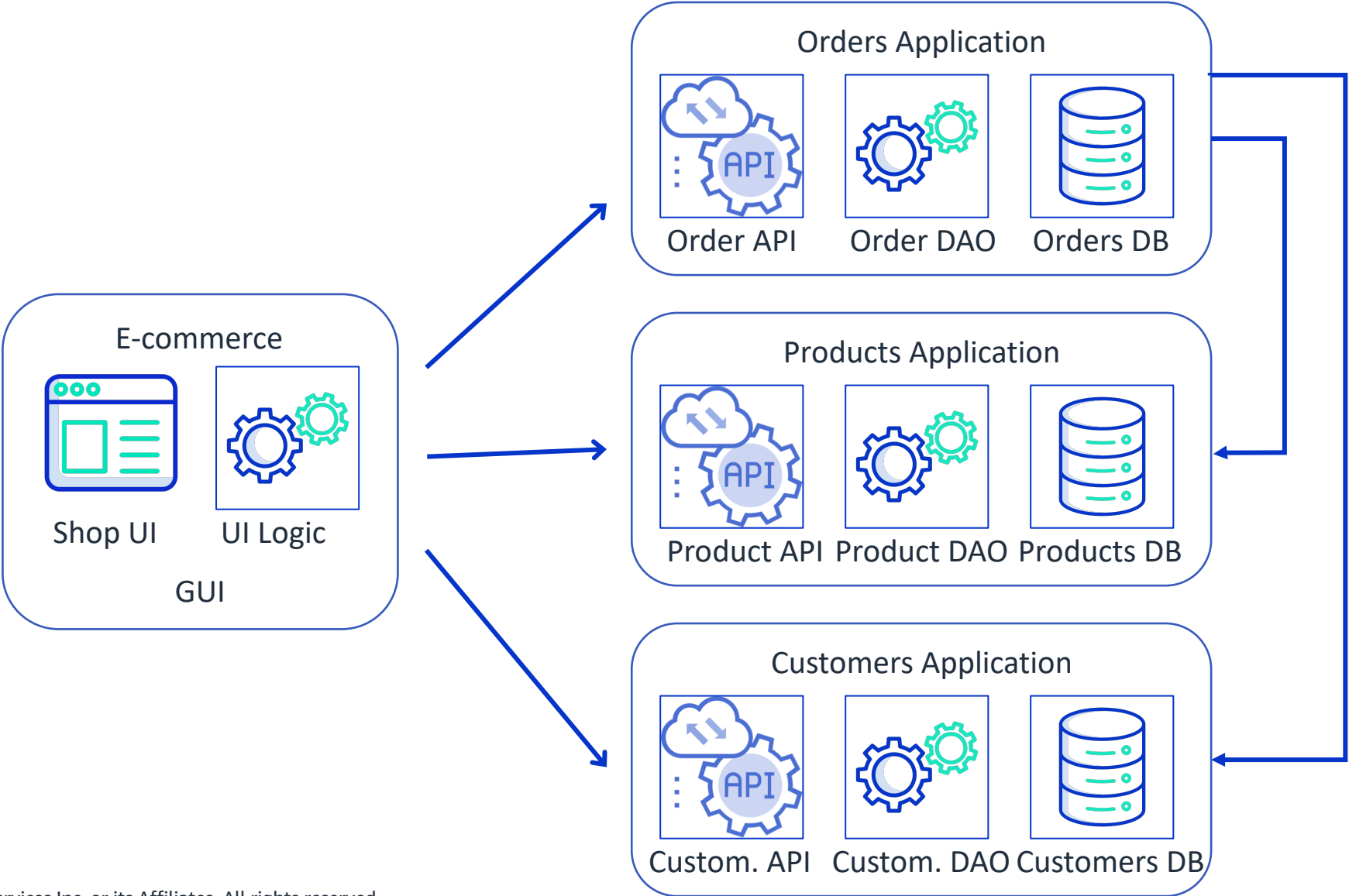
Traditional Application



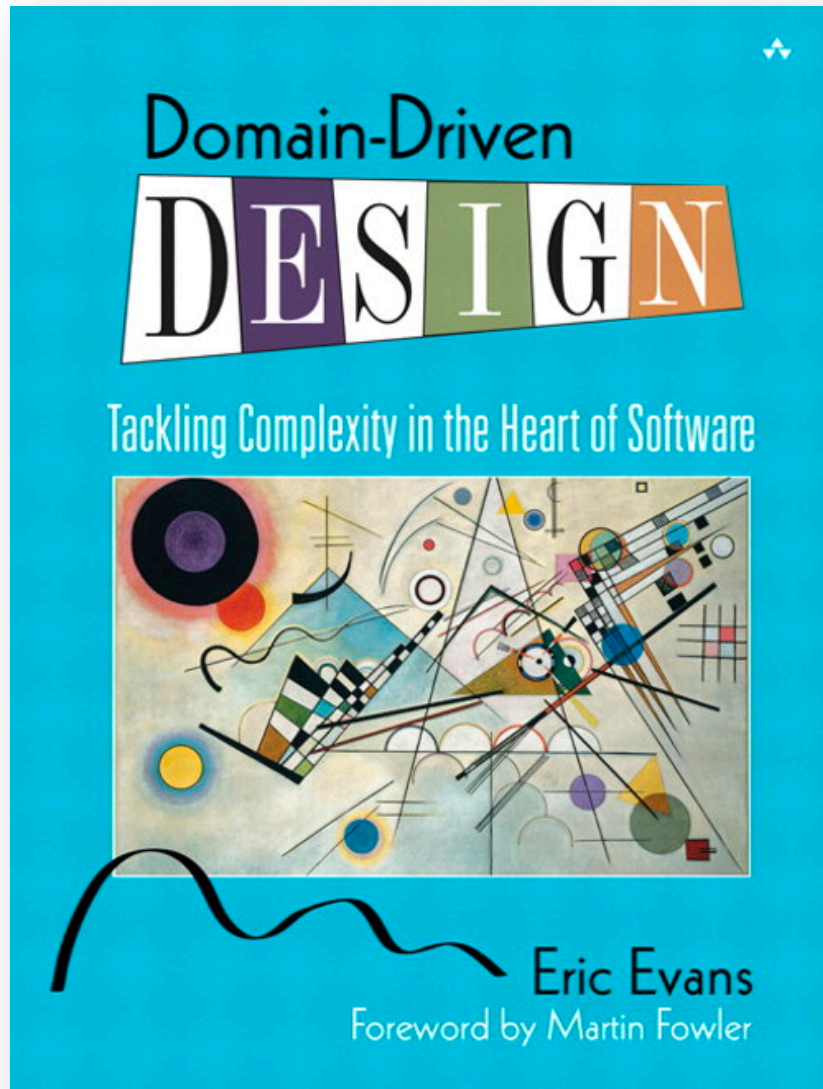
SOA Application



Microservices



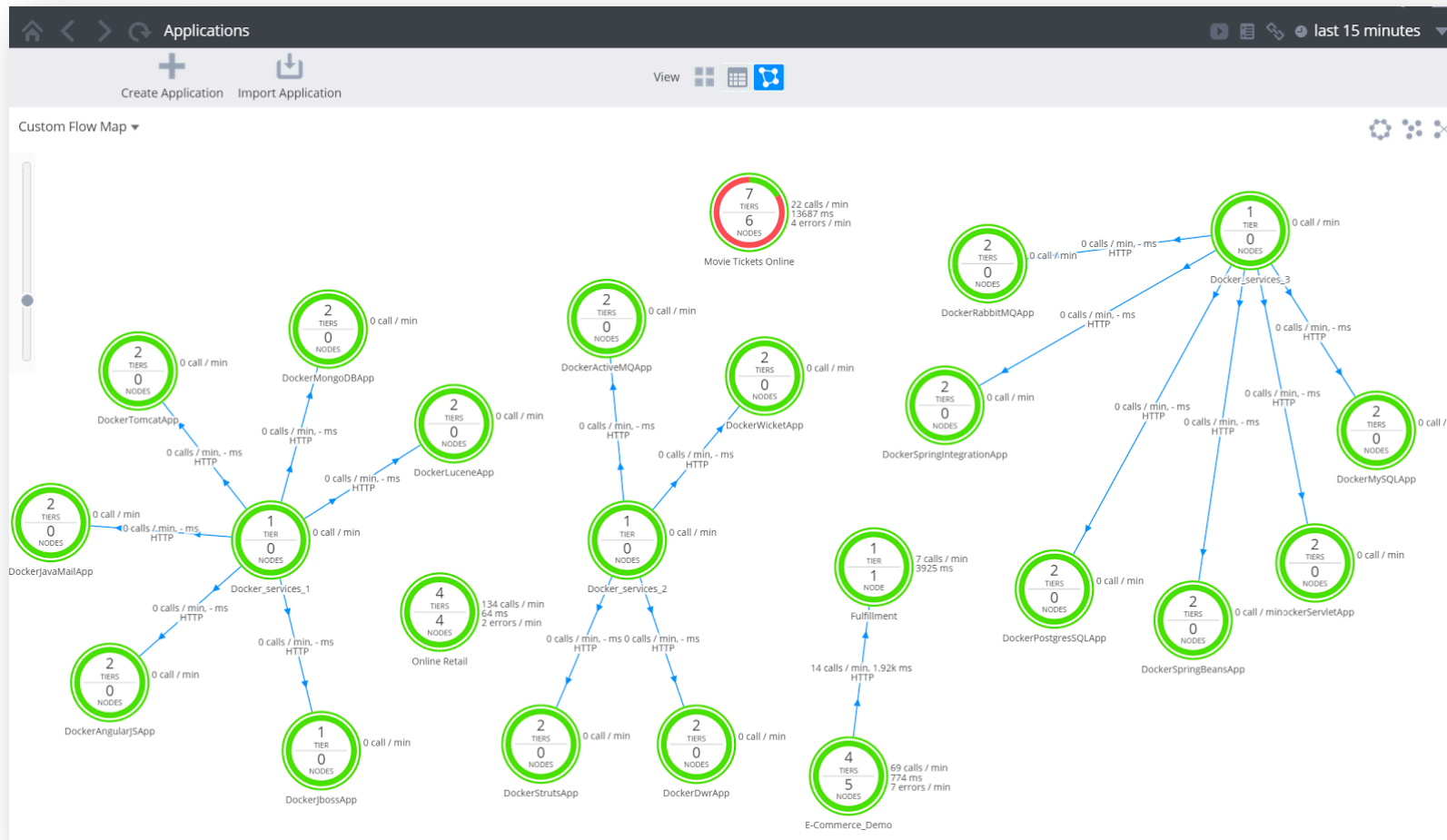
Wait!... And DDD?



DON'T PANIC

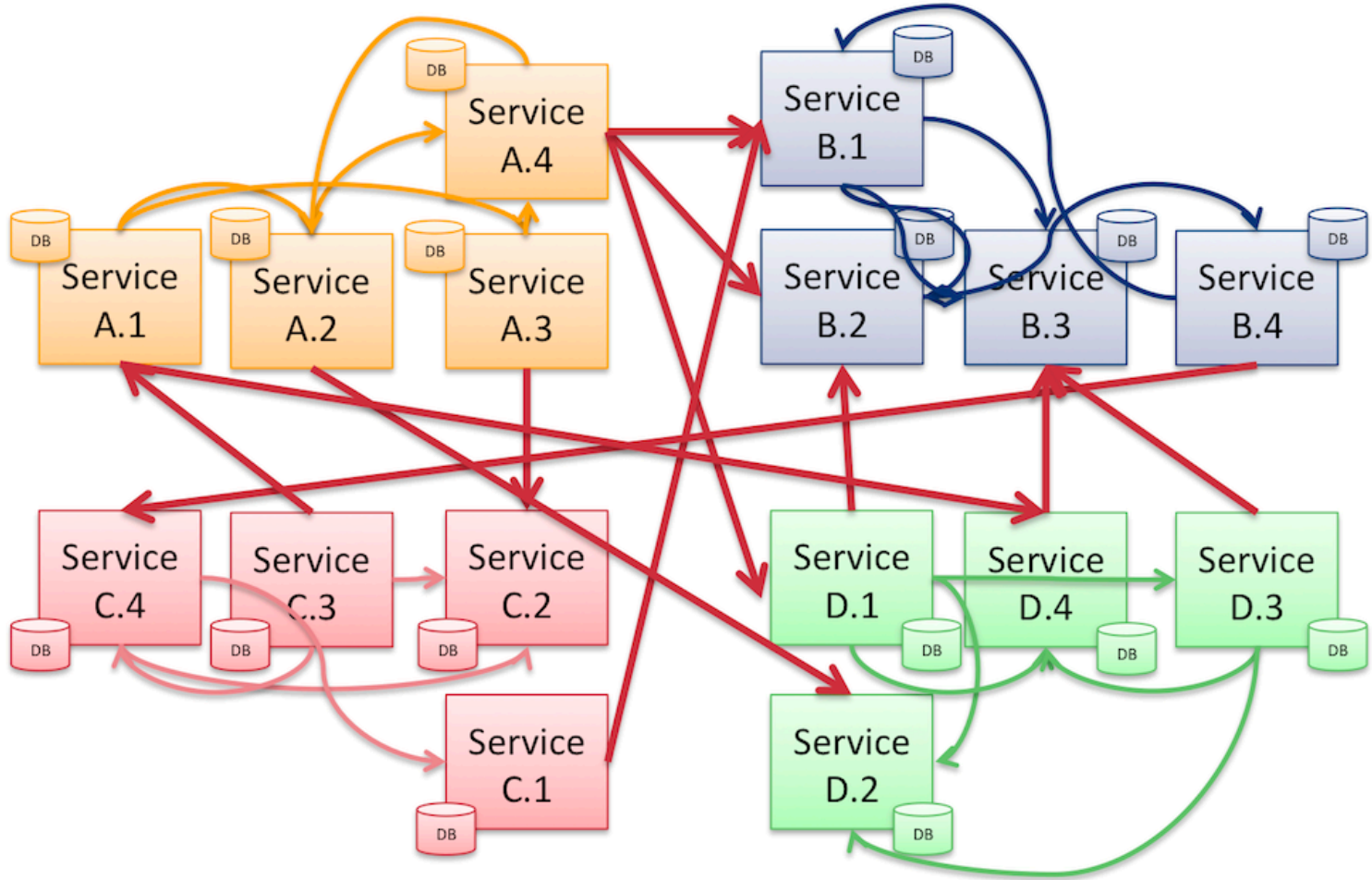


Microservices Communication



Expectation

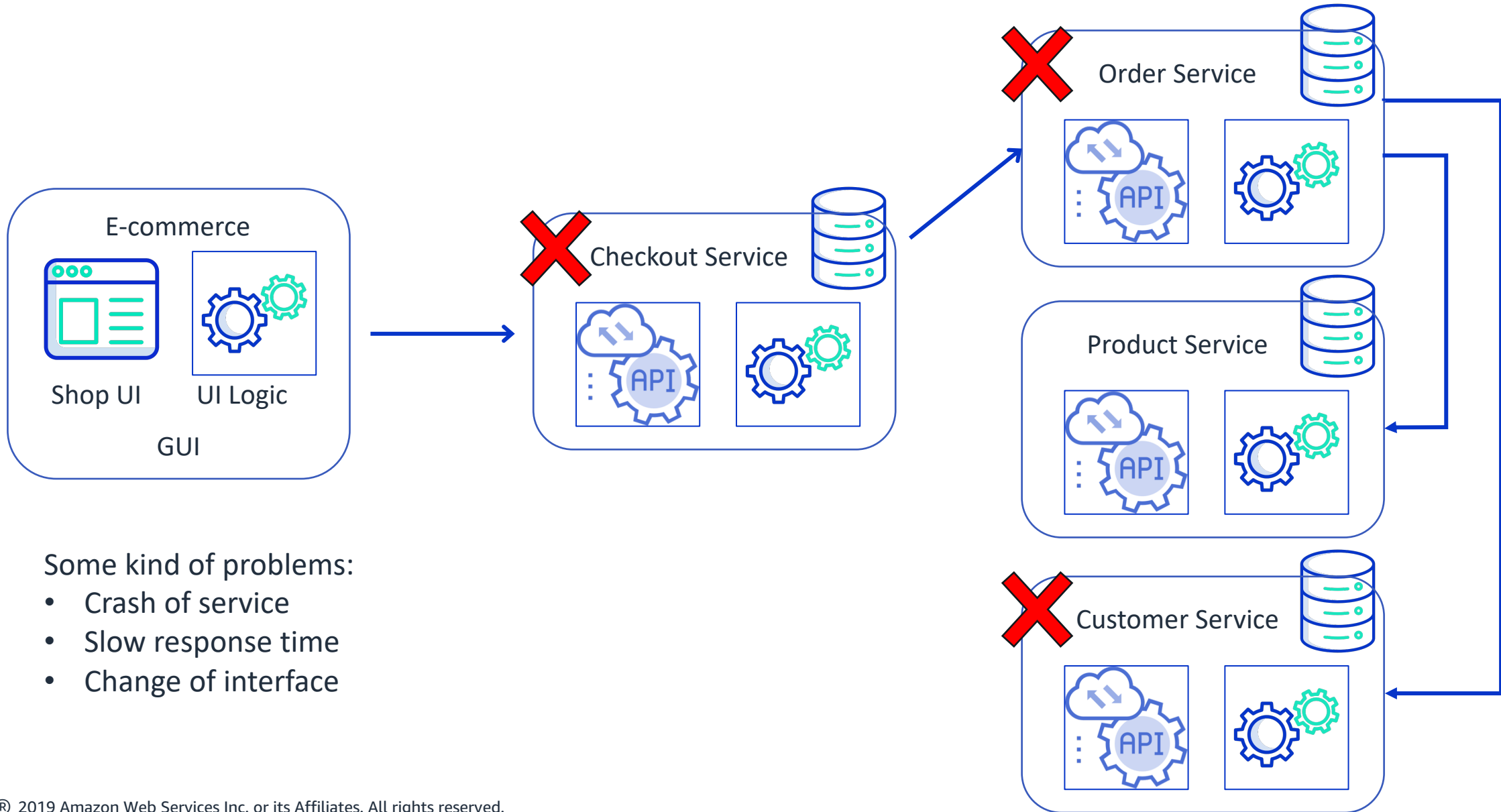
Microservices Communication



Reality



Point-to-point Couplings



Some kind of problems:

- Crash of service
- Slow response time
- Change of interface

Sync vs Async

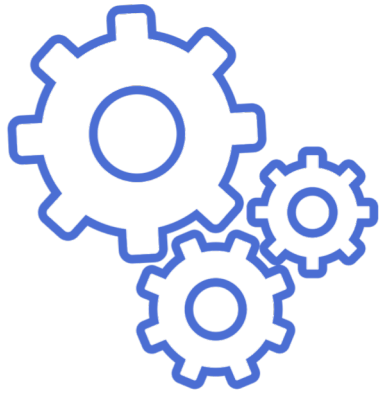


Synchronous



Asynchronous

Reasons to Send a Message



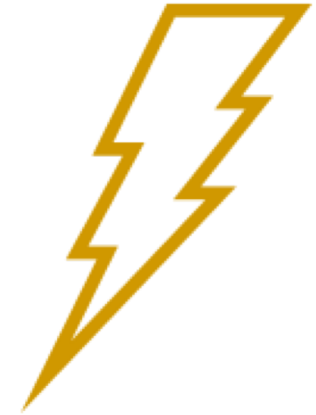
Command

I want to
do something



Query

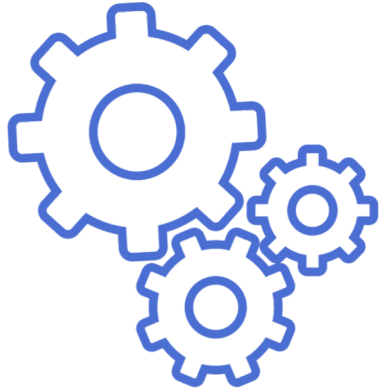
I want to
know something



Event

Something has
happened

Reasons to Send a Message



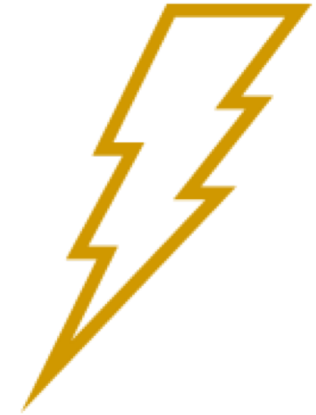
Command

I want a Pizza



Query

Is my pizza ready!?

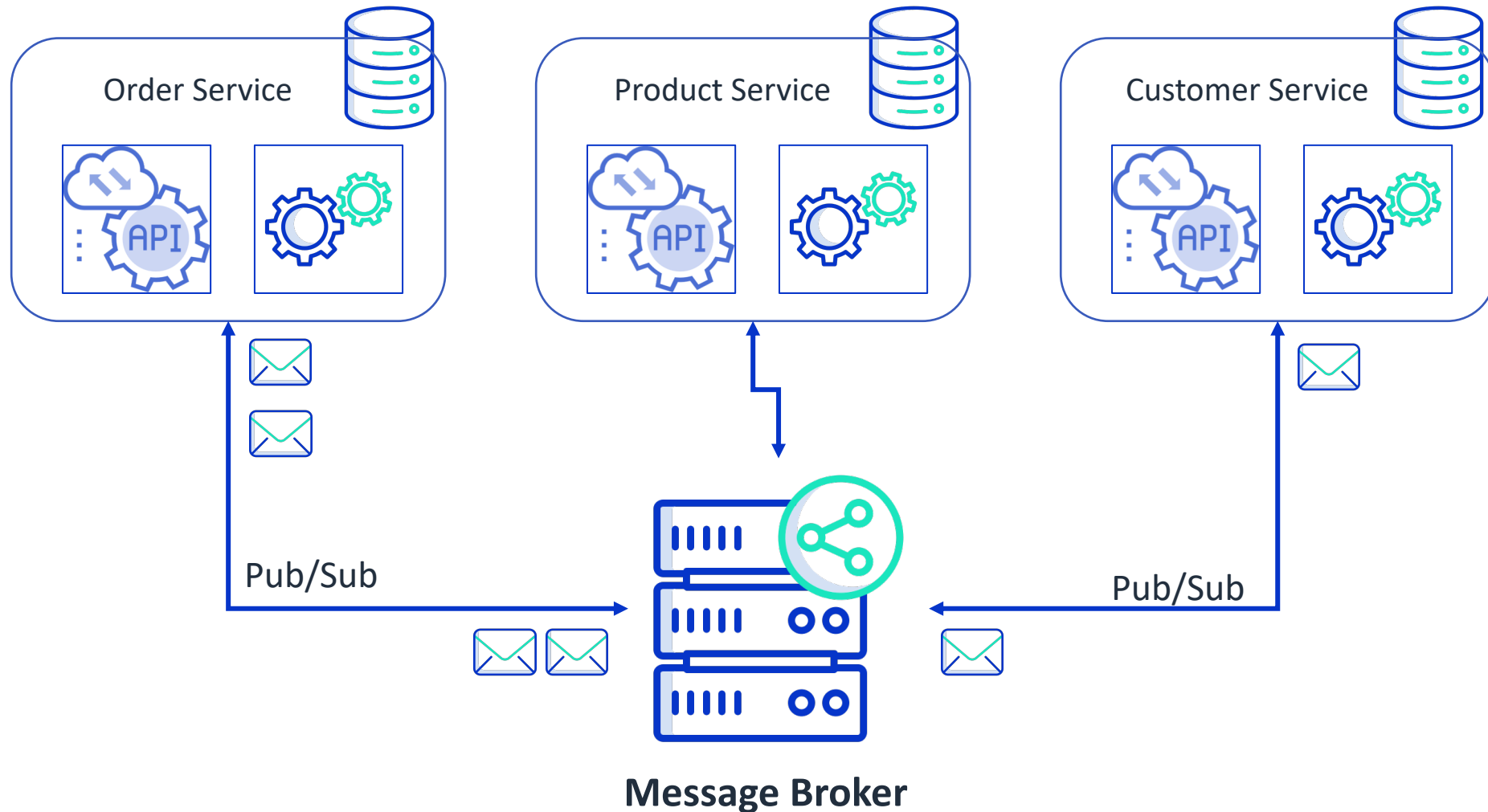


Event

Pizza delivered

Event-Driven Microservices

Async Communication

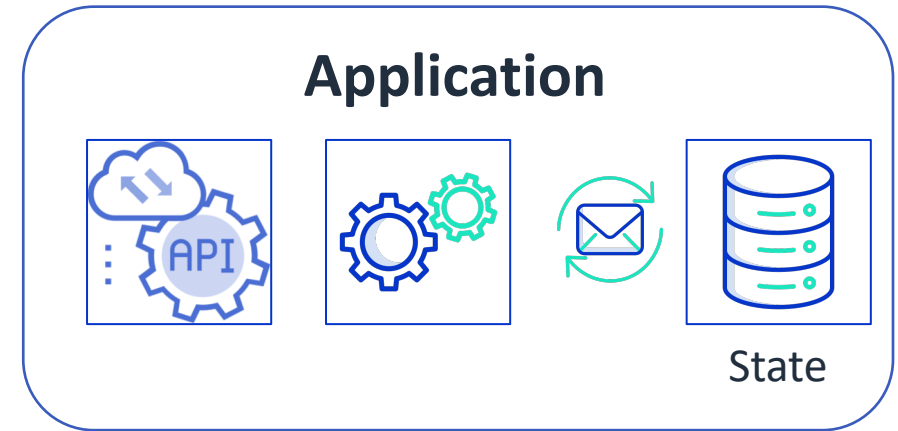
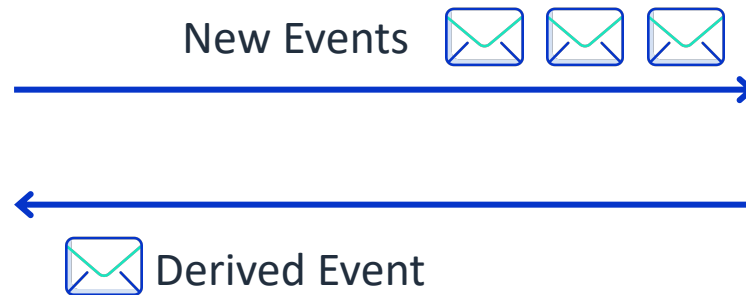


Event-Driven Microservices

Async Communication



**Message
Broker**



“We have an amazing API...

...but please subscribe to our event streams instead.”



Event-Driven

Simple Pattern for Streaming Data

Data Producer

Continuously creates data

Continuously writes data to a stream

Can be almost anything

Streaming Service

Durably stores data

Provides temporary buffer that preps data

Supports very high-throughput

Data Consumer

Continuously process data

Cleans, prepares, and Aggregates

Transforms data to information

Streams

Event Stream

2015-10-02	11,Peter,Muster,3010,Berne
2016-10-04	12,Paul,Steffen,8001,Zurich
2016-12-02	21,Lisa,Meier,3043,Ittigen
2017-05-03	11,Peter,Muster, 3015 ,Berne
2017-05-03	21,Lisa,Steffen,8001,Zurich
2017-07-03	11,Peter,Muster, 3052 ,Zollikofen

State Stream (Change Log Stream)

2015-10-02	11,Peter,Muster,3010,Berne
2016-10-04	12,Paul,Steffen,8001,Zurich
2016-12-02	21,Lisa,Meier,3043,Ittigen
2017-05-03	11,Peter,Muster,3015,Berne
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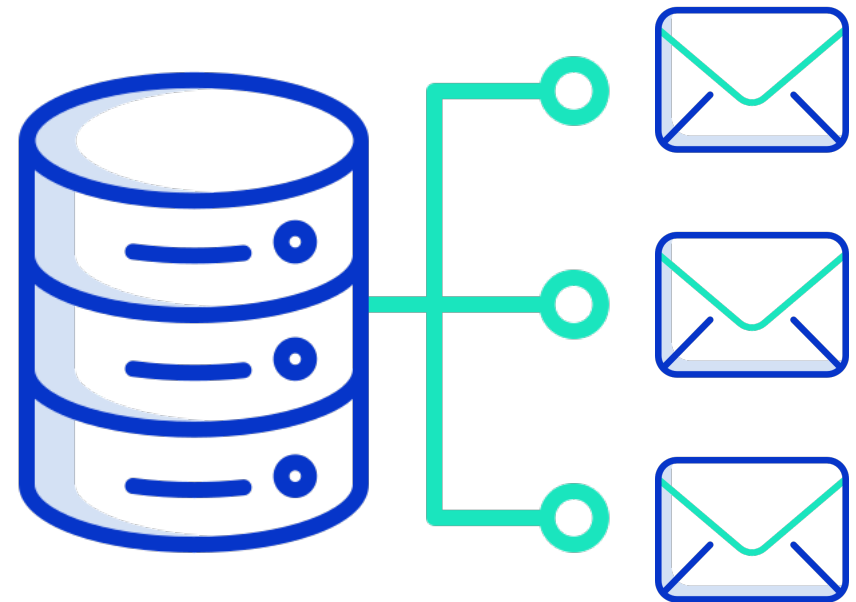
Event Sourcing vs Event Store

Persists the state of an entity as a **sequence of state-changing events**

Whenever state of entity changes, a new event is **appended to the list of events**

Saving an event is a **single operation (atomic)**

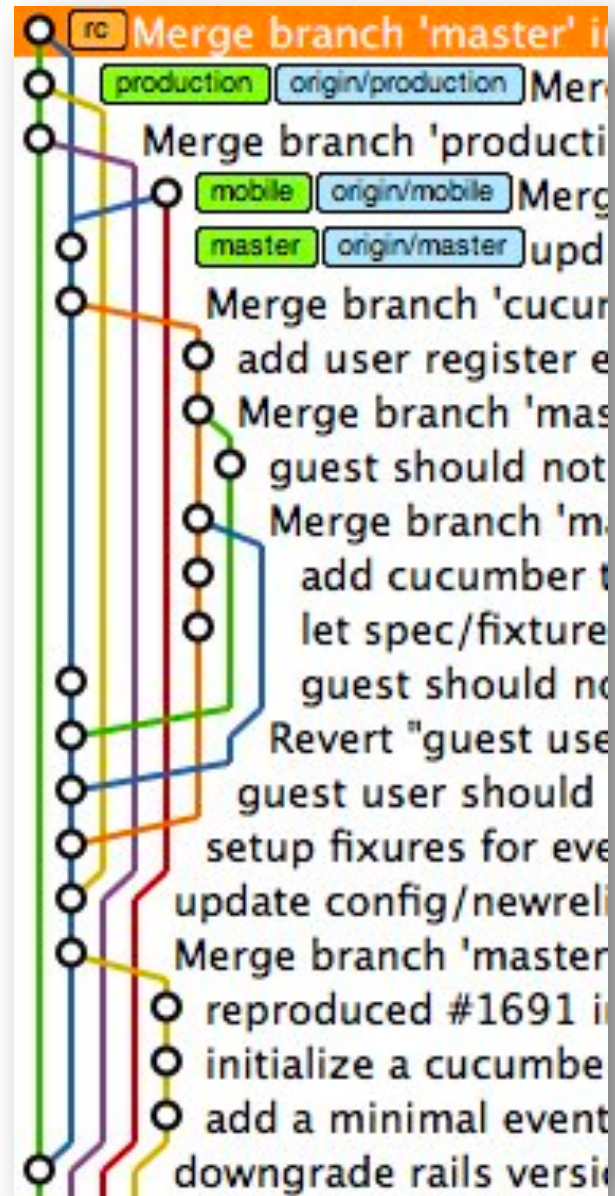
The application reconstructs an entity's current state by **replaying the events**



Event Sourcing - Example



git

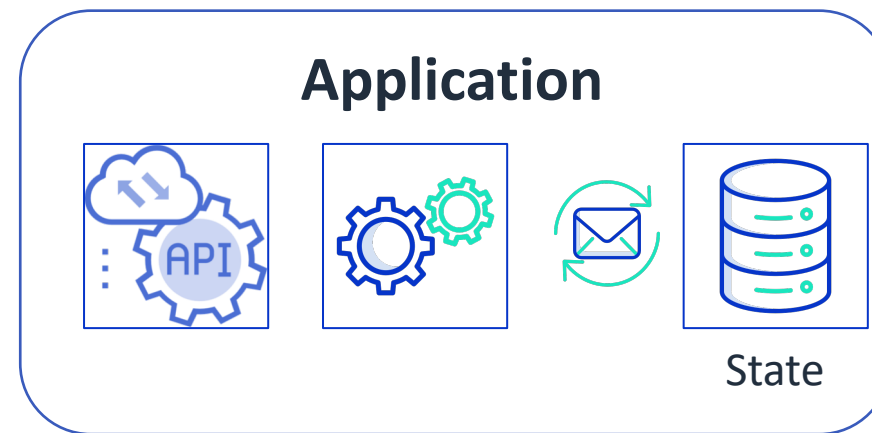
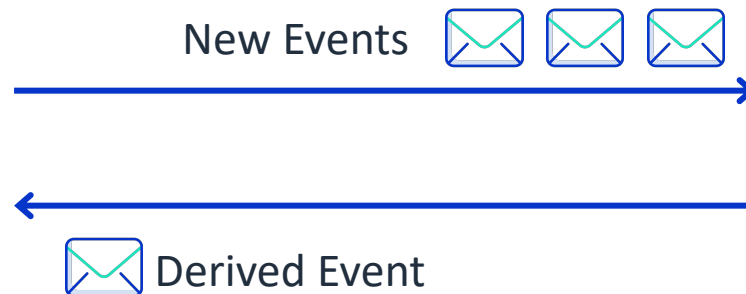


Event-Driven Microservices

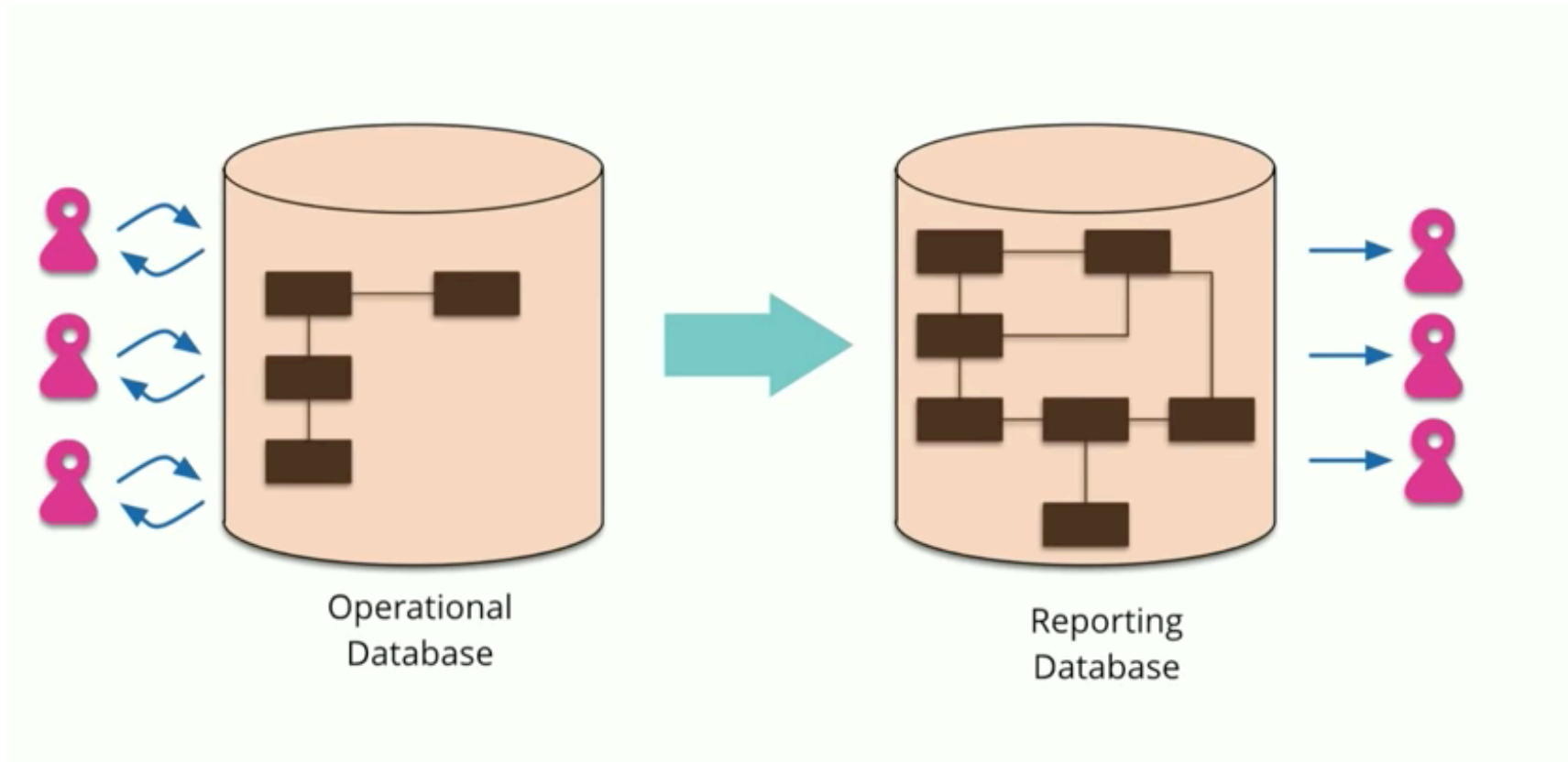
Async Communication



**Message
Broker**



Old Idea? OLTP vs OLAP



Operational/Transactional Database vs Reporting/Analytical Database

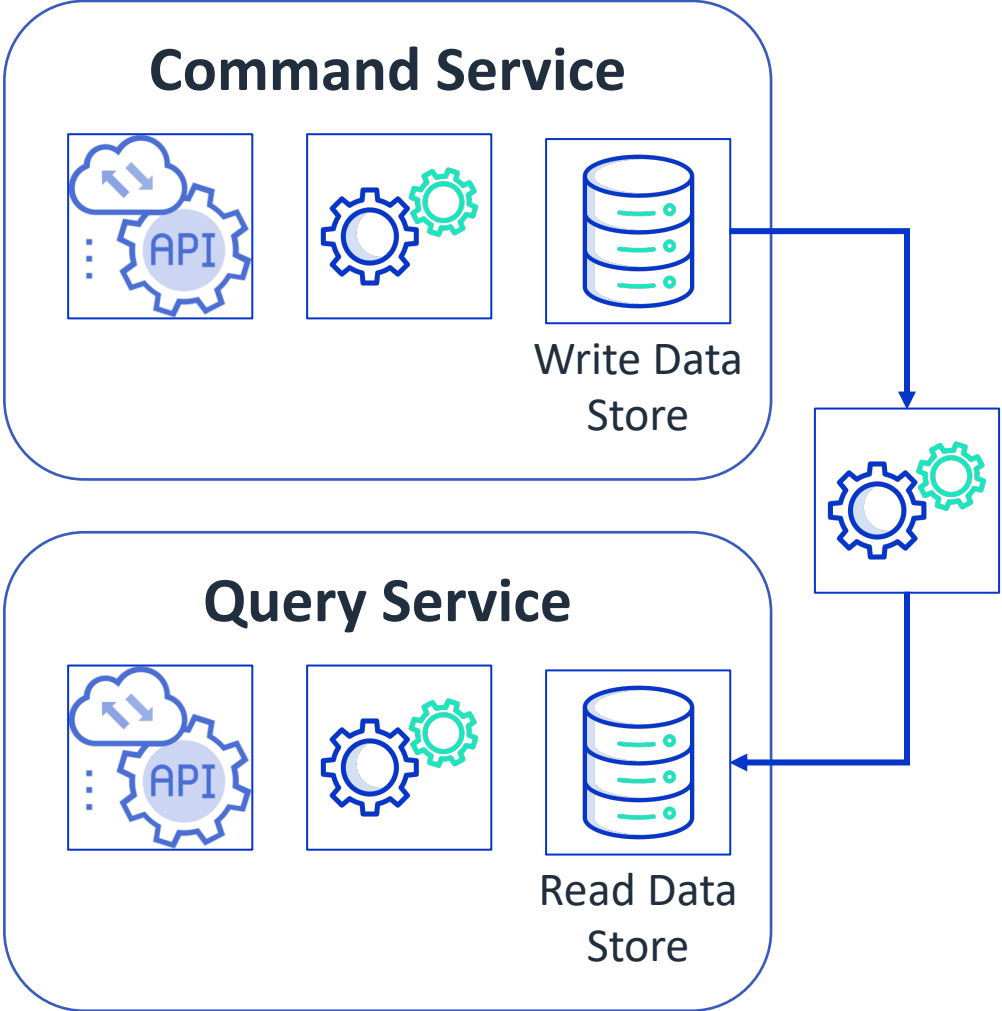
CQRS – Command Query Responsibility Segregation



Command that trigger
change in state



Query that provide
read access to the state



*One alternative for CQRS implementation

<https://martinfowler.com/bliki/CQRS.html> - 2011



Event Sourcing & CQRS

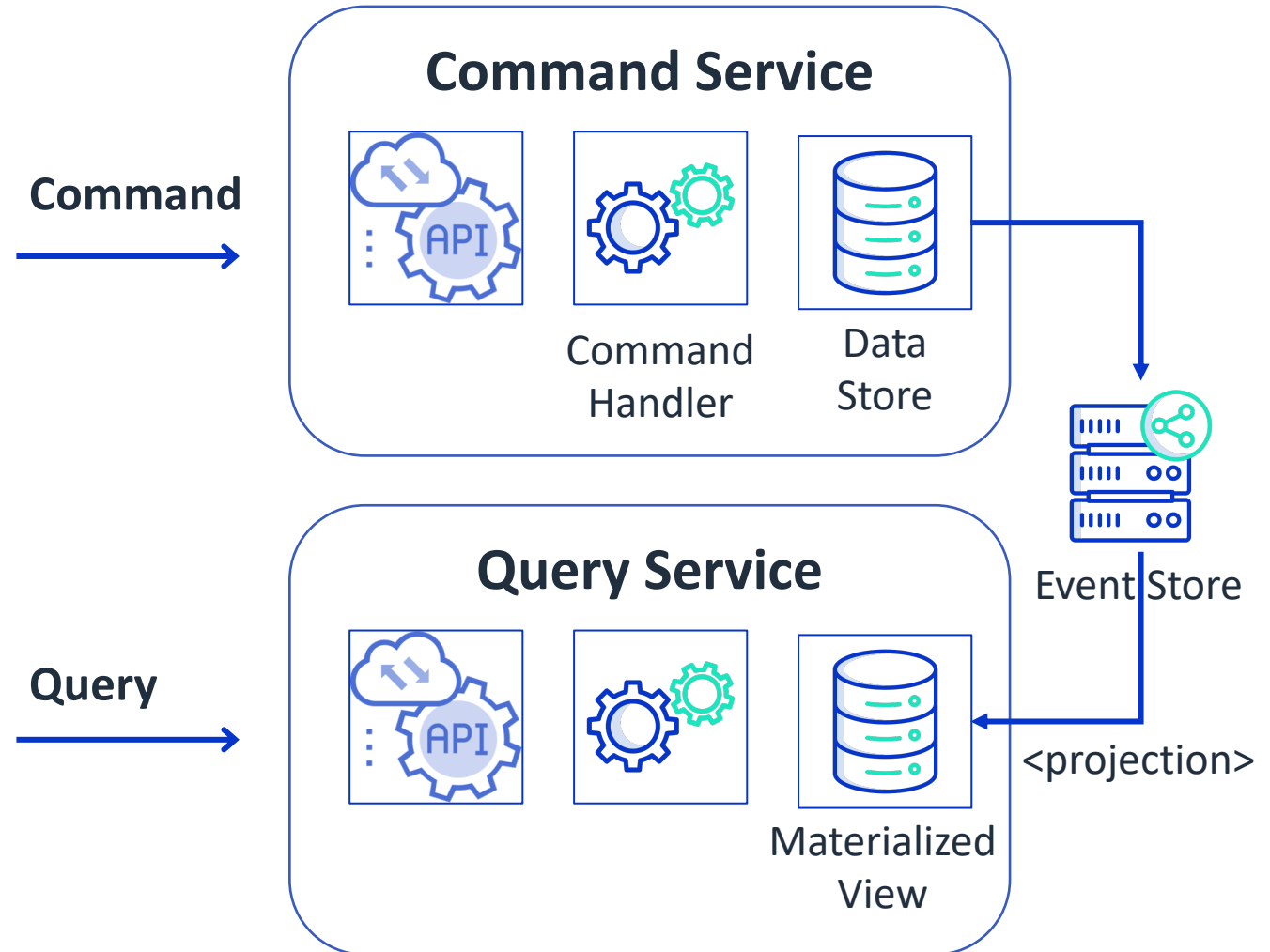
Optimize different nonfunctional requirements for **read and write**

Write Delay

Eventual Consistency

Database as event publisher (optional)

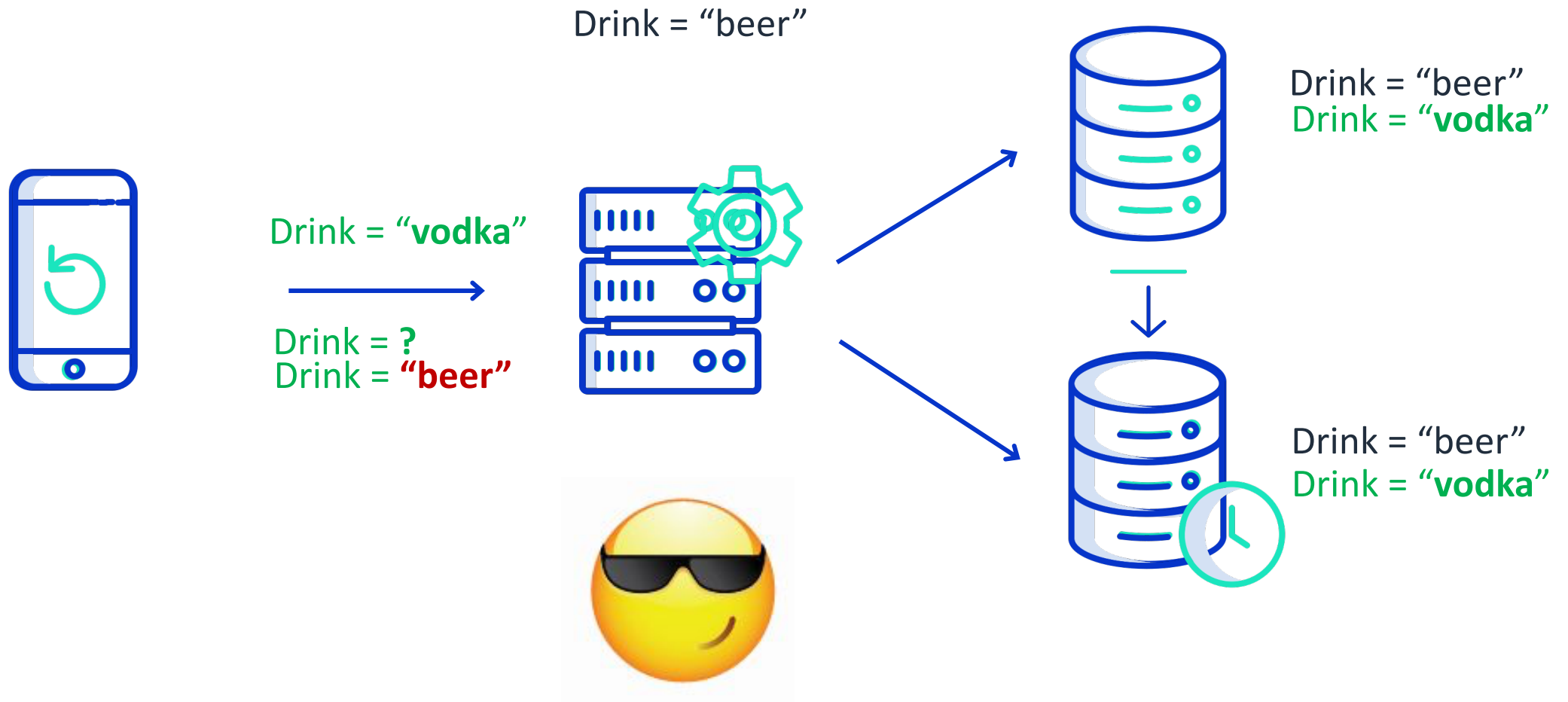
Data Projection and Materialized View

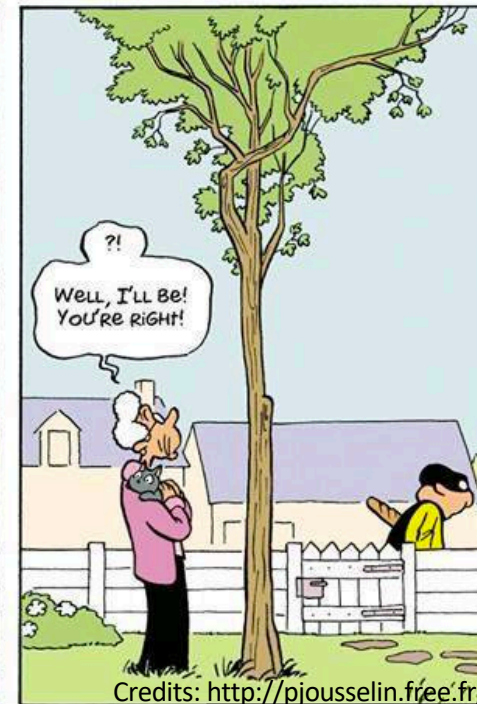
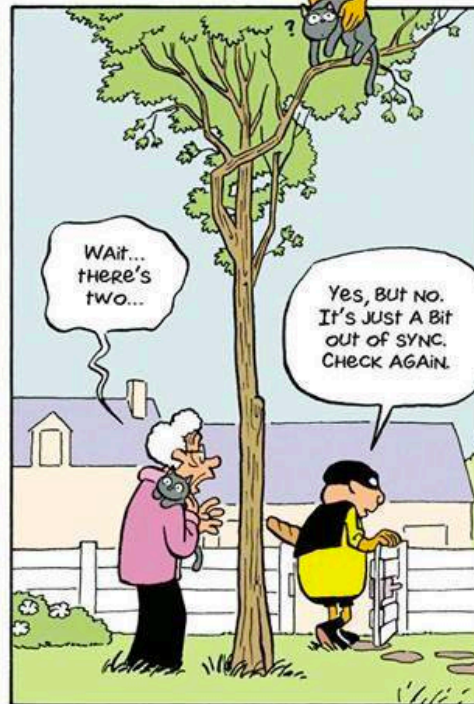
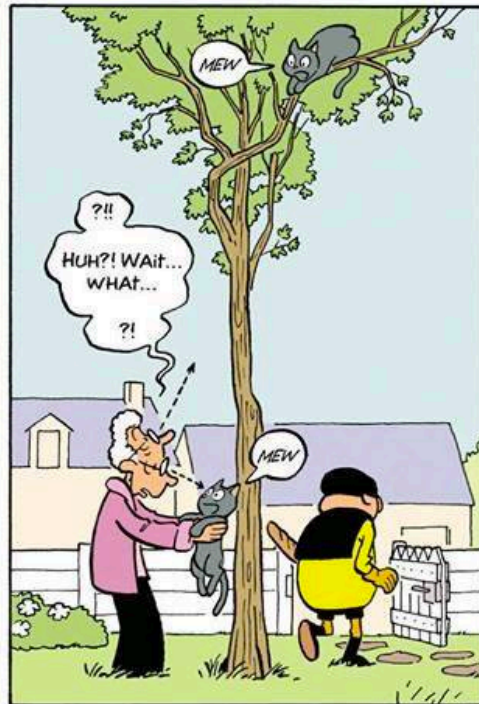


*Another alternative for CQRS implementation



Eventual Consistency





Event Ordering



Expectation



Reality

Event Ordering

“Don’t do it, if you can avoid it.”

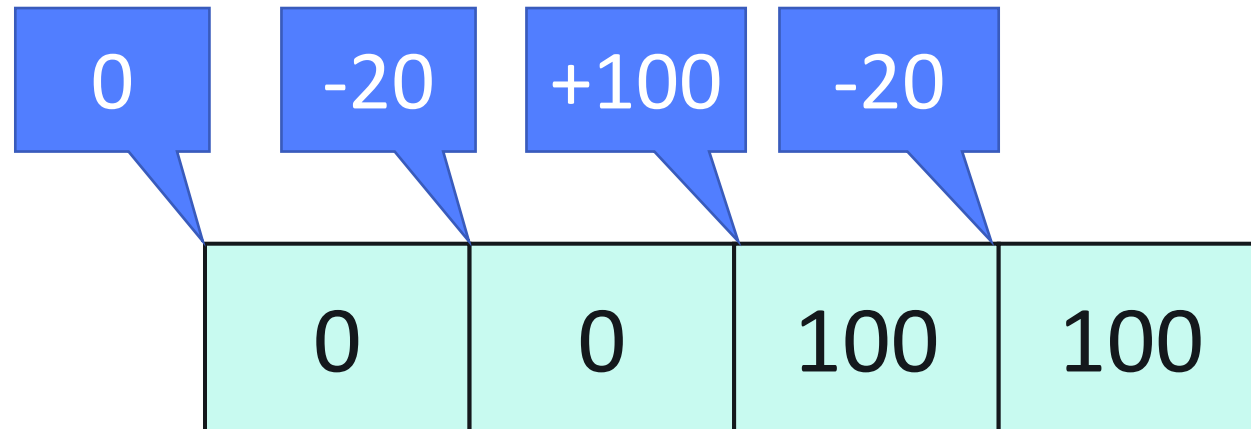
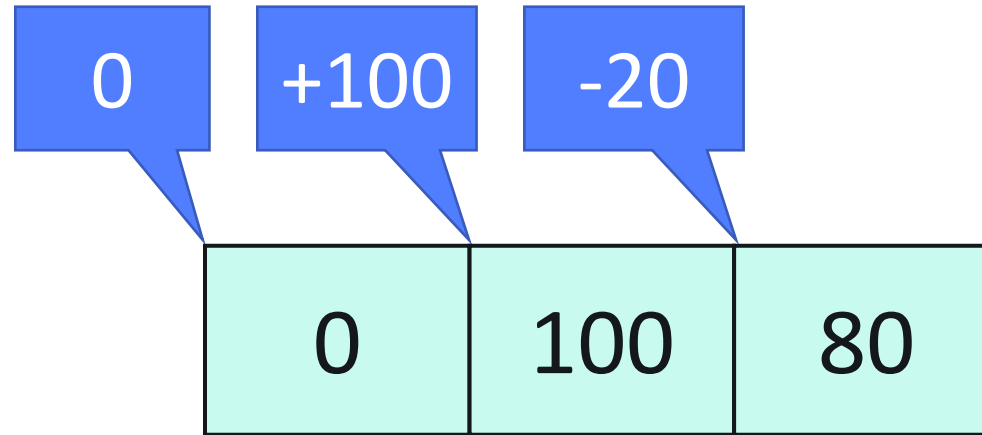
Event Ordering

 Account **Created**

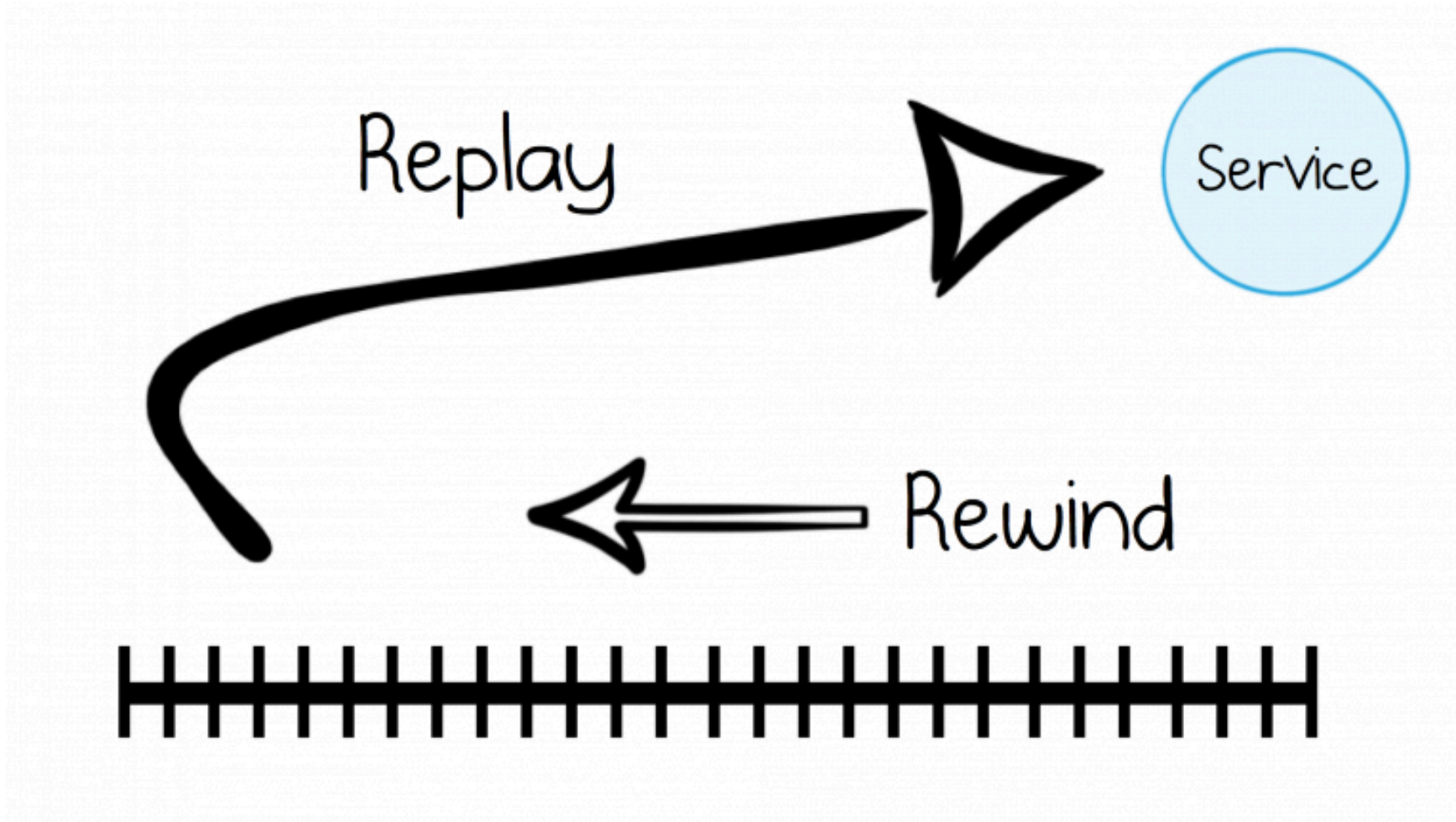
 Deposit: **100**

 Withdraw: **20**

 Withdraw: **20**



Events are Immutable! Or not!?



BACK TO THE FUTURE



An iceberg floating in the ocean. The tip of the iceberg is above the water line, and the rest of the iceberg is submerged. A horizontal line represents the water surface. The sky is blue with some clouds. The water is a deep blue. The iceberg is white and blue. There are orange circles on the iceberg, each connected by a line to a text label on the right. The labels are: "We are here!", "Projections and Aggregates", "Backpressure and Exponential Backoff", "Complex Event Processing", "Monitoring and Fitness Functions for EDA", "Change Data Capture over Streams", "Clustered Event Sourcing and Assured Delivery", "Event Versioning", "Channels and Data Security", "Temporal Semantics", and "Governance and Event Catalog".

We are here!

Projections and Aggregates

Backpressure and Exponential Backoff

Complex Event Processing

Monitoring and Fitness Functions for EDA

Change Data Capture over Streams

Clustered Event Sourcing and Assured Delivery

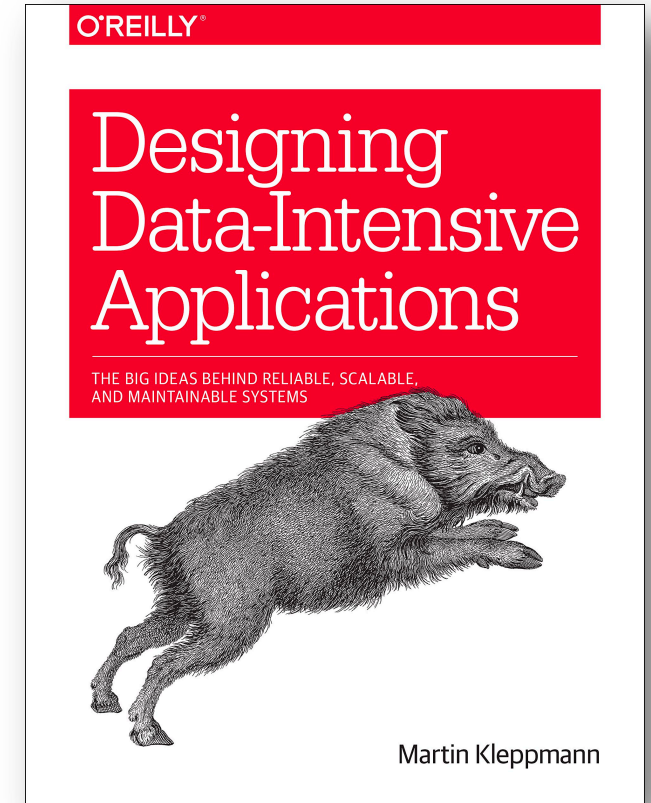
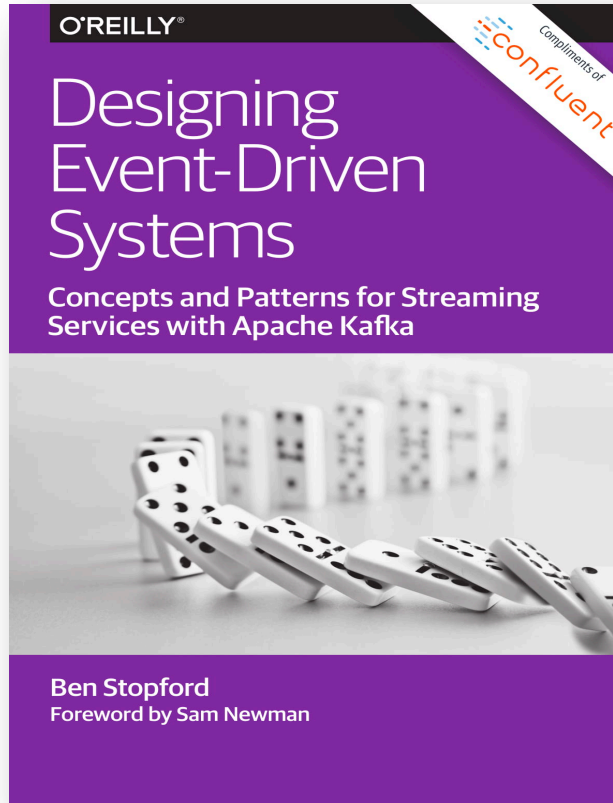
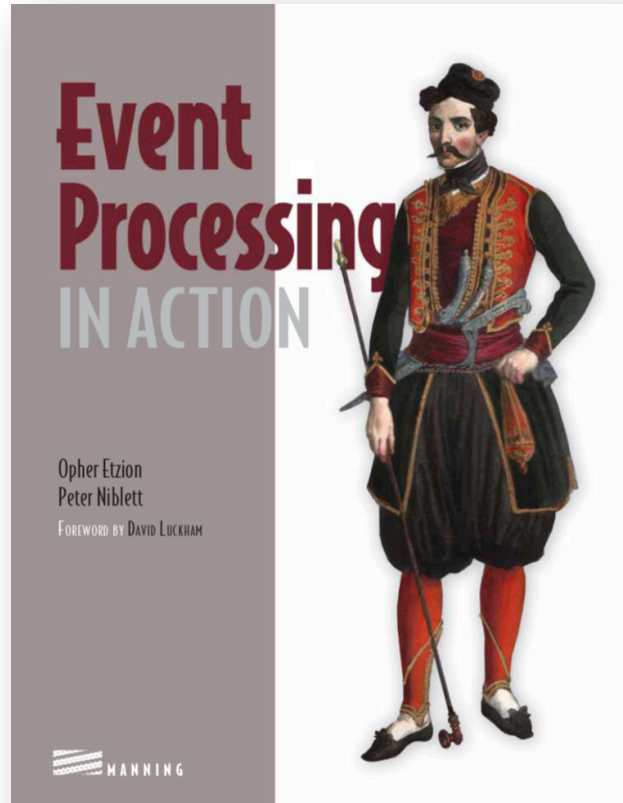
Event Versioning

Channels and Data Security

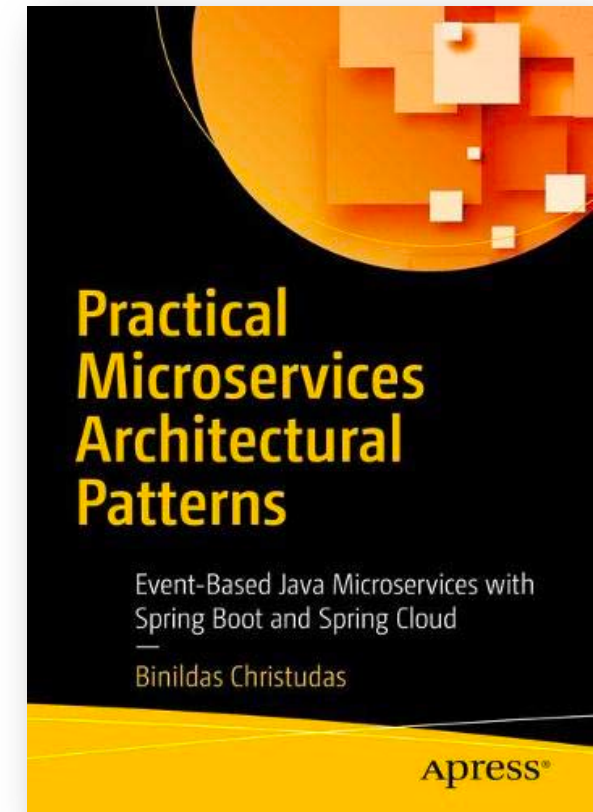
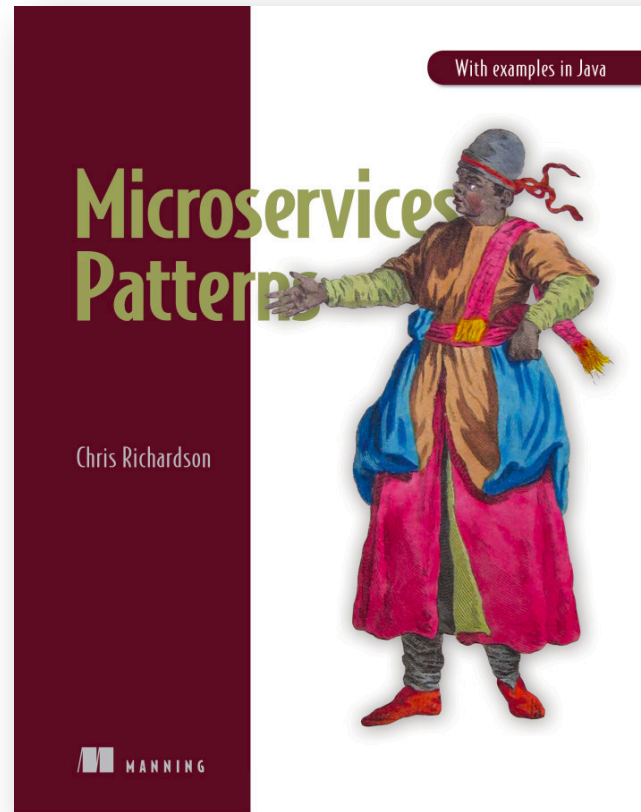
Temporal Semantics

Governance and Event Catalog

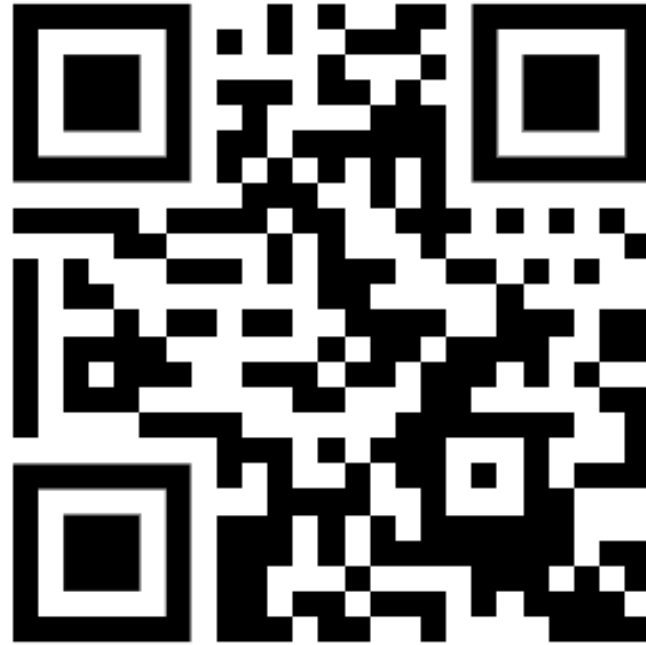
Some books...



...and other books



... or just do this!



bit.ly/tdcpoa-2019

Thank you!

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