Event Streaming oder RDBMS
Choose Your Weapon

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DOAG K&A 2025

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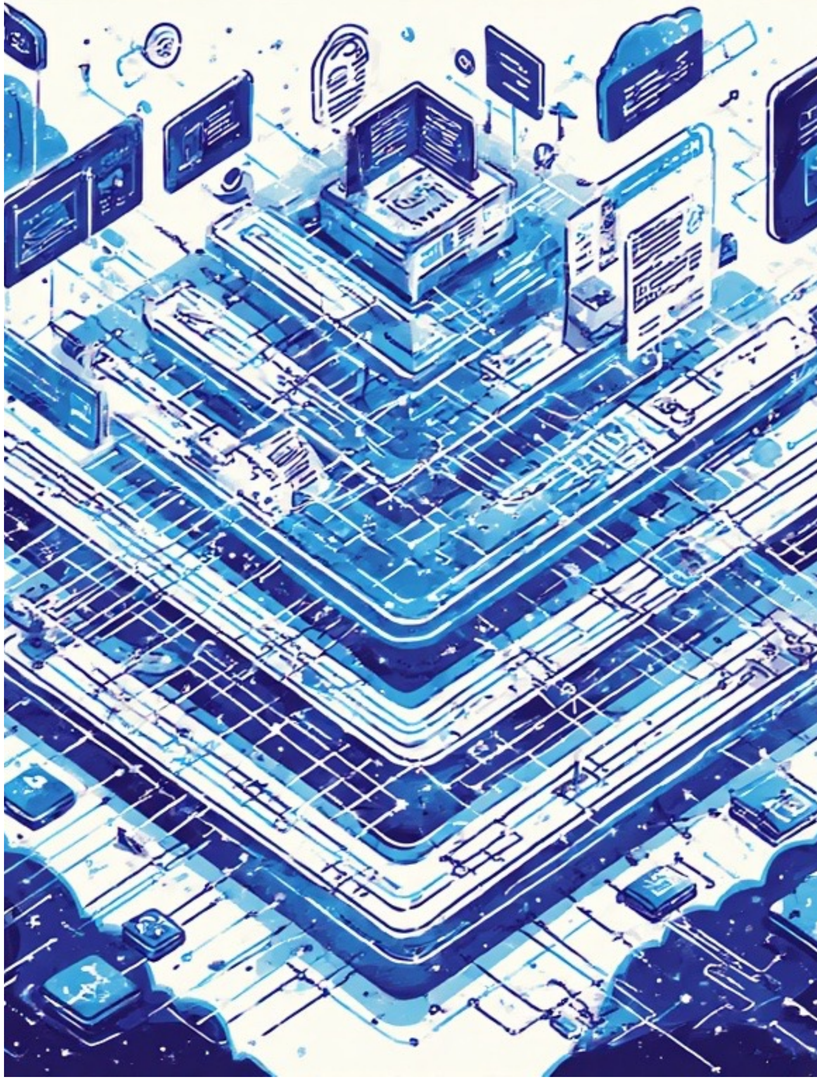
whoami

- Senior Principal Consultant @Apps Associates
- Focusing on data platforms
  - PostgreSQL, Oracle DB and other RDBMS
  - Kafka & Streaming

- At home in Heilbronn region, BW
- 💻, 📚, 🐝 keeping, 🎺, 🎧

Agenda

- Event Streaming
- RDBMS
- Platform Architecture



Event Streaming

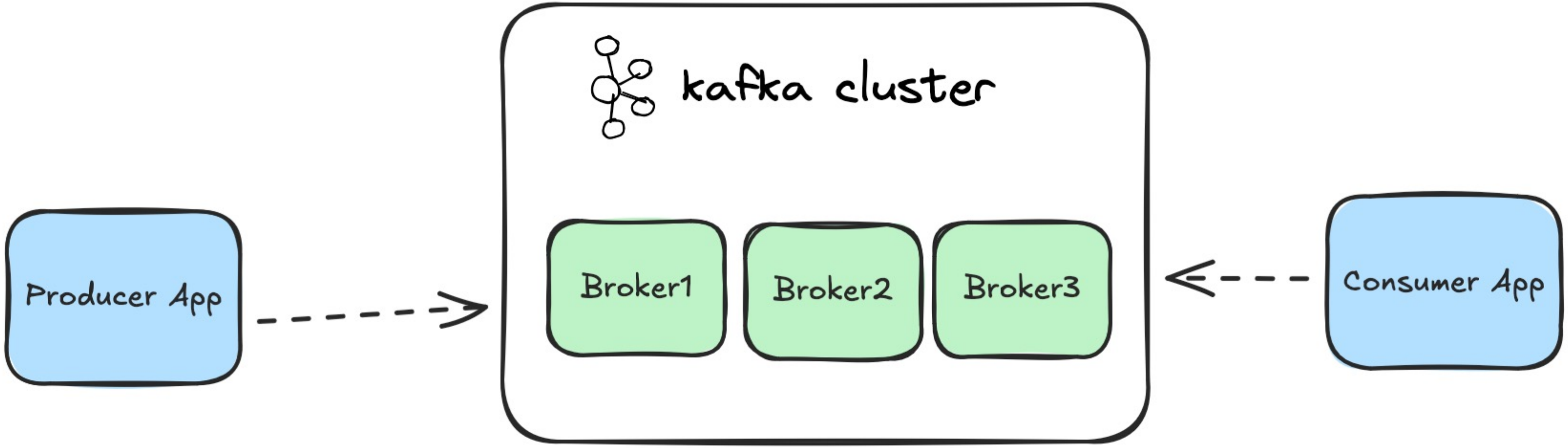
Event streaming

- An Event Stream is an (ordered) sequence of events representing important actions in a software domain
- Event Stream Processing (ESP) takes a continuous stream of events and processes them as soon as a change happens
- De facto standard/heart piece Kafka/Kafka API
- Other players
  - Redis, Apache Pulsar

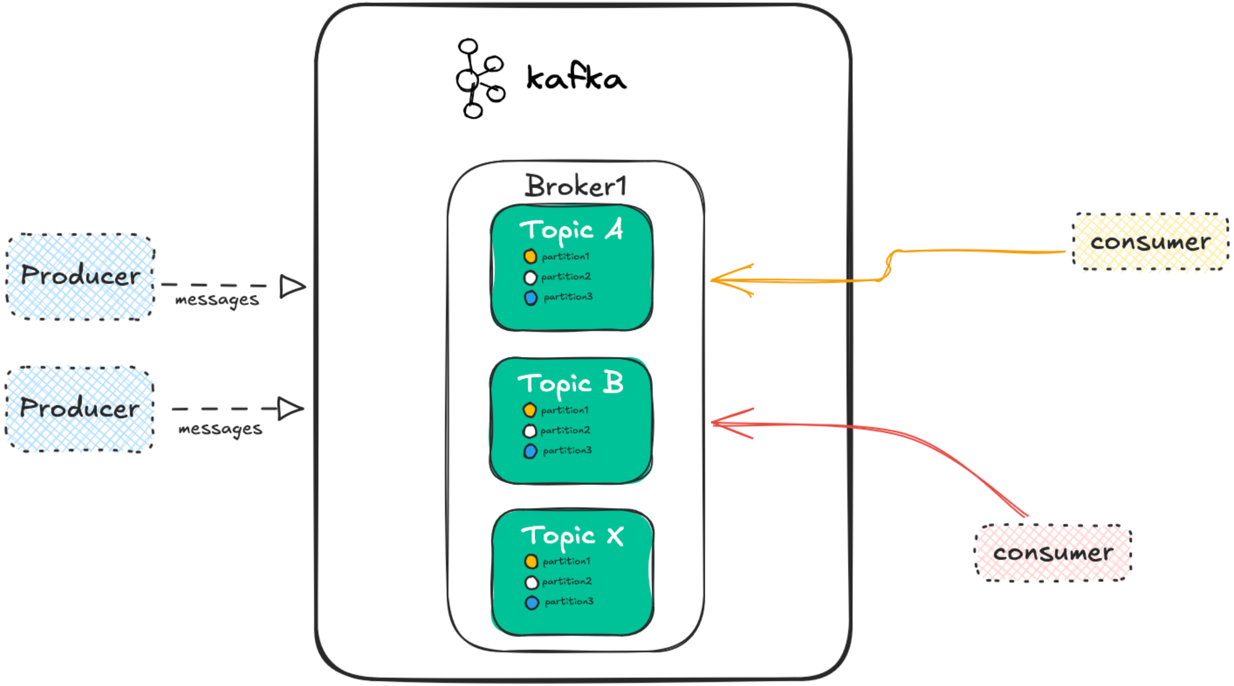
What Kafka is

- A distributed log!
- Kafka is an open-source stream processing platform developed by the Apache Software Foundation
- designed to handle real-time data streams
- distributed, fault-tolerant, and highly scalable architecture
- Data is organised in topics
  - Written by producers
  - Read by consumers

What Kafka is



What Kafka is



What Kafka is not

- A database for complex queries and batch analytics
  - Traditional RDBMS perform better here
- A traditional message queue
  - Kafka is **not** “consume once, guarantee delivery, and then forget”
- A proxy for millions of clients
  - Use a http proxy or MQTT
- Built for bad networks between Kafka clients and brokers
  - Good network connection required between all components

What Kafka is not

- A tool for hard real-time apps
  - If you require latency < 1ms , Kafka is not the right tool

- A system for embedded and safety critical systems
  - Needs to be done with low level programming languages not Kafka

- An API management tool
  - Supplementary to Kafka

Deal with it ☺

Kafka Benefits

- Use (any) programming language your familiar with
- Designed for Performance and Reliability
- Many connectors to integrate foreign systems
- Real-time analytics
- Schema-less
- Open Source
- Huge Community

Kafka Downside

- Complexity
  - Operations
  - Getting started
  - Security

- Not that much tools around the platform

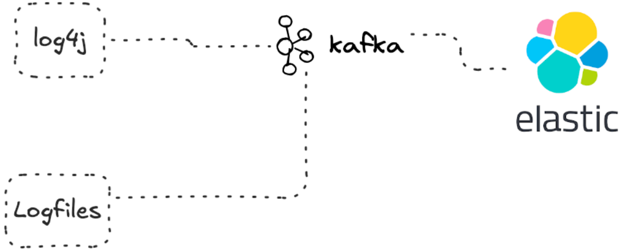
- You might be the first to solve a given problem

What else?

- Applications
- Kafka Connect
- Processing engines
  - Flink
  - Kafka Streams
  - Ksqldb
- Monitoring

Kafka/Streaming Use Cases

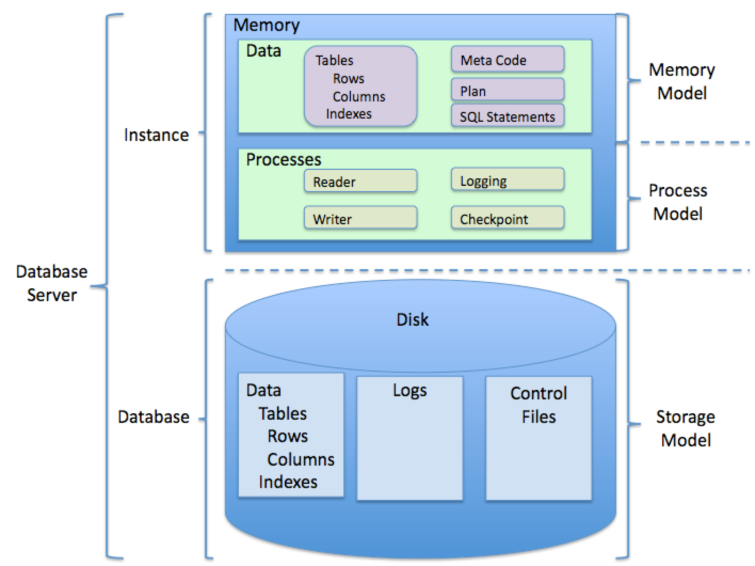
- Log analysis
- User Click analysis
- Monitoring and alerting
- System migrations
  - One DB platform to another
- CDC



RDBMS

RDBMS

- classical RDBMS
  - Established 1970
  - ”A relational Model of Data for Large Shared Data Banks”
    - https://www.seas.upenn.edu/~zives/03f/cis550/codd.pdf
    - https://dl.acm.org/doi/10.1145/362384.362685
- Several implementations in the wild
  - Oracle
  - PostgreSQL
  - MariaDB
  - MySQL
  - SQL Server
  - DB2



https://commons.wikimedia.org/wiki/File:RDBMS_structure.png

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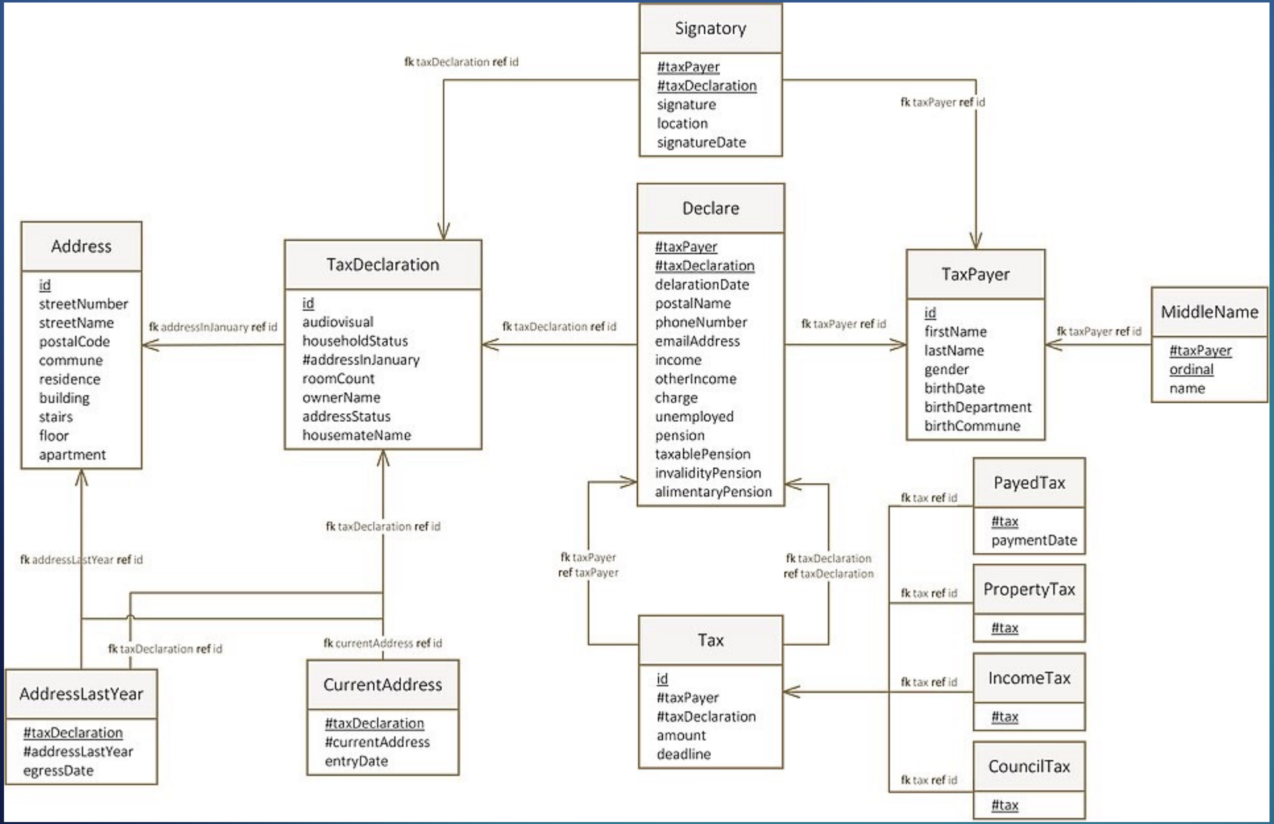
RDBMS

It’s all about relations!



Signatory
#taxPayer
#taxDeclaration
signature
location
signatureDate

Address
id
streetNumber
streetName
postalCode
commune
residence
building
stairs
floor
apartment

TaxDeclaration
id
audiovisual
householdStatus
#addressInJanuary
roomCount
ownerName
addressStatus
housemateName

Declare
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#taxDeclaration
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postalName
phoneNumber
emailAddress
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otherIncome
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pension
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alimentaryPension

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birthDepartment
birthCommune

MiddleName
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ordinal
name

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paymentDate

PropertyTax
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IncomeTax
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CouncilTax
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amount
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AddressLastYear
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CurrentAddress
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RDBMS

- Extendable (PostgreSQL) to work with other systems (Kafka, MQTT)
- Some already with built-in analytic features (SQL Server, Oracle,…)
  - Oracle allows access to Kafka clusters from within the database

ORACLE

Microsoft SQL Server

RDBMS Benefits

- ACID
- Maturity
- Longly used
- Wide user base
- Mostly built-in procedural extension of SQL available (PL/SQL, PL/pgSQL, t-SQL,…)
- Cloud availability (AWS, Azure, OCI, …)

RDBMS Downsides

- (Licensing)
- Scalability limits
  - Performance
  - Ease of scaling
- Fixed Schema
- Complex in some deployments (HA, Sharding, Replication)
- Not suitable for some data models

RDBMS Use Cases

- E-Commerce
- Finance
- Healthcare
- Trading

woo

avaloq

CGM CompuGroup Medical

Platform Architecture

Platform Architecture

- How to design, build and run our future platform architecture?

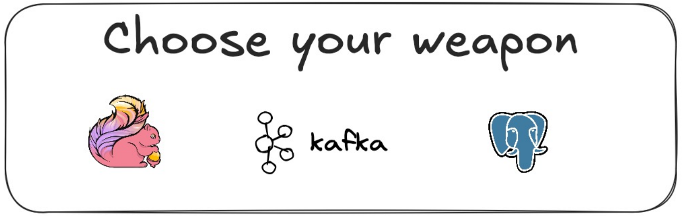
- Design and plan carefully
  - First step is to understand what we would like to achieve (use case level)
  - Do not start with the technical design/implementation before the step above

- Ask yourself: “Am I using the right tool, software, … (you name it) for the given use case/problem?
  - If you’re not convinced take a step back

Platform Architecture

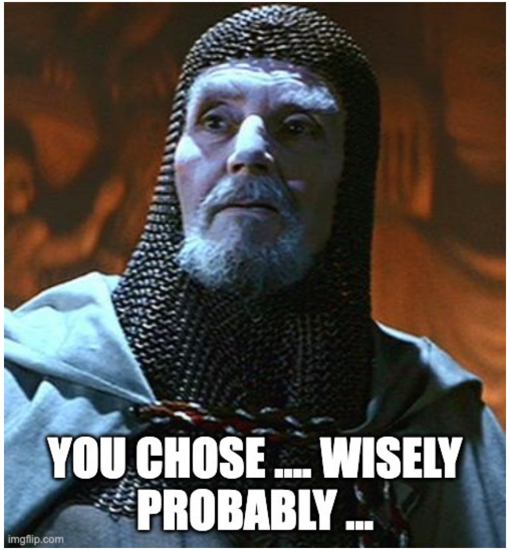
- Start with the long-hanging fruits

- Keep an eye on the anti patterns of each solution/platform
  - Choose the right tool for the right job
- Do not overengineer
  - Use what’s already there
- Ask for help

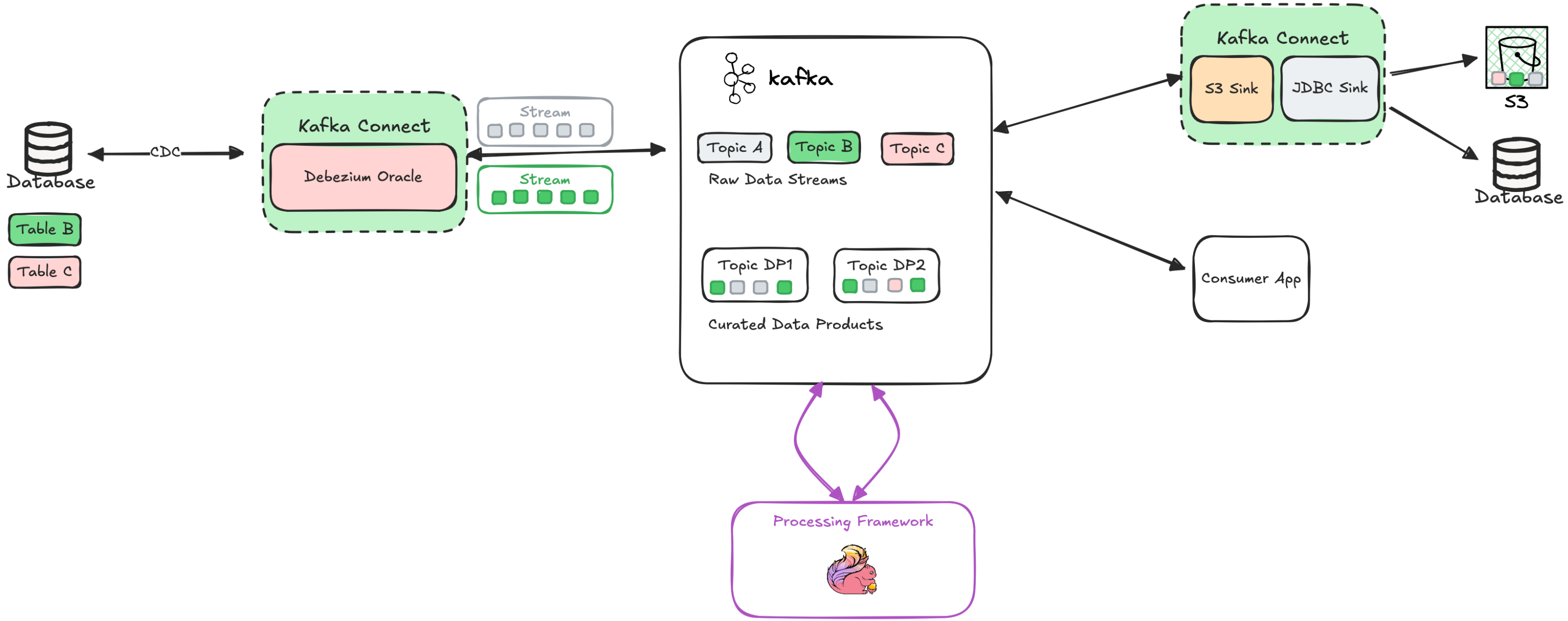


Platform Architecture

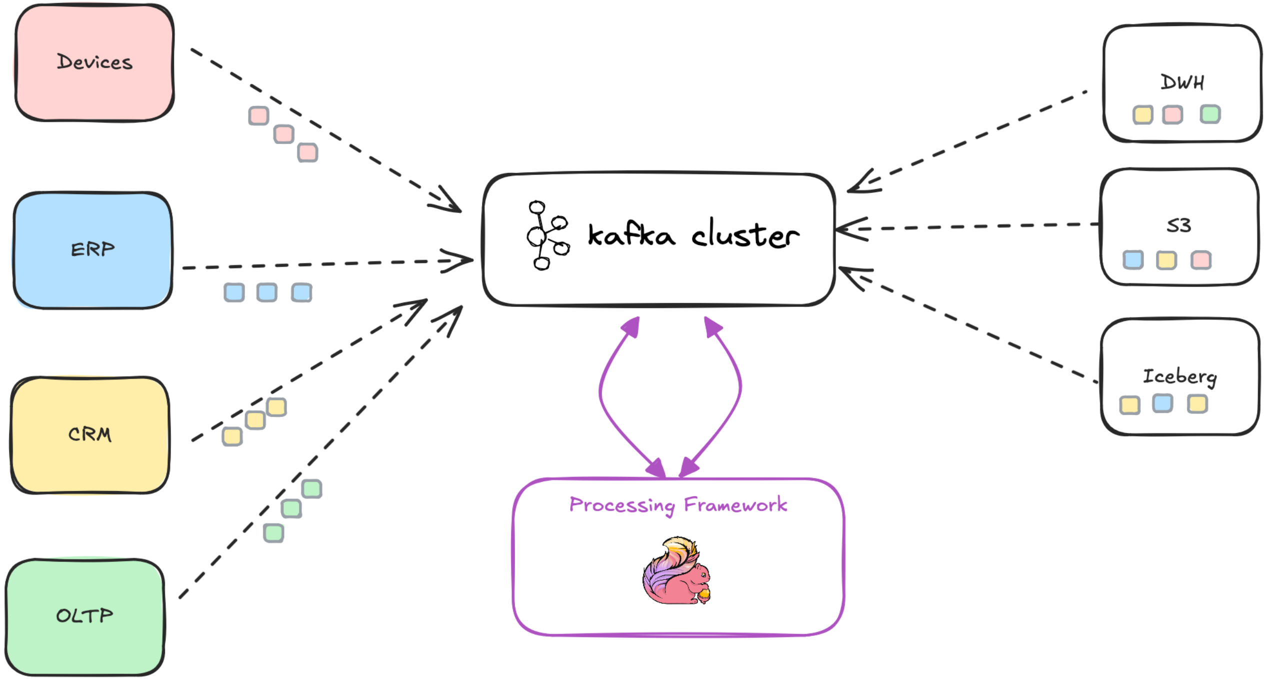
- There probably won’t be “the one answer” to your challenge ☺
- Combine the software stacks which make sense for your current use case
- Fail fast!
  - mistakes are part of the progress



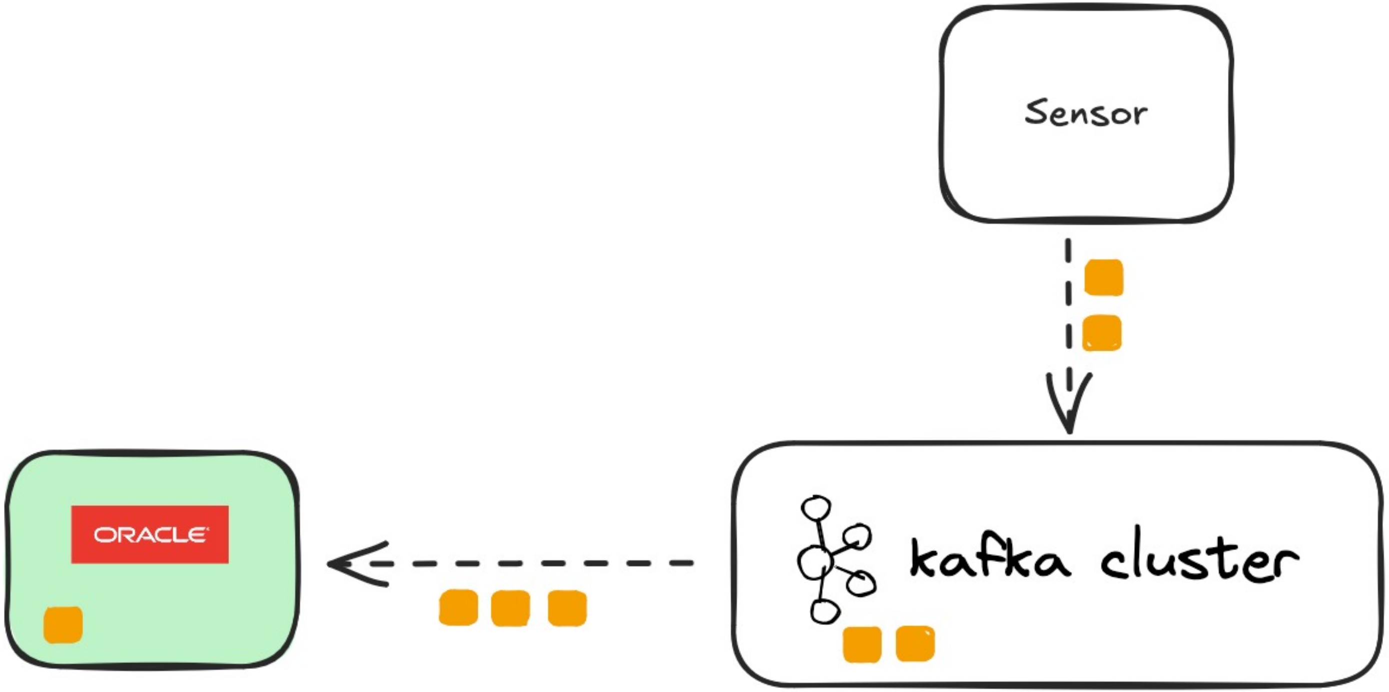
Platform Architecture Designs



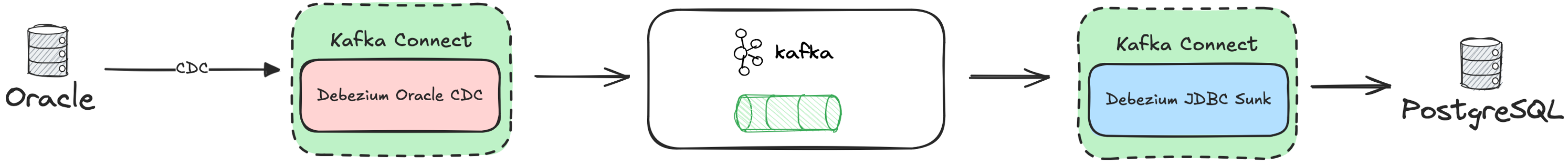
Platform Architecture Designs



Read streaming data from within Oracle



CDC with Kafka



Links

- https://github.com/mmuehlbeyer/talks/tree/main
- Kai Waehners blog
  - https://www.kai-waehner.de/
- Confluent demos
  - https://developer.confluent.io/tutorials
- Accessing Kafka from an oracle DB
  - https://docs.oracle.com/en/database/oracle/oracle-database/26/sutil/oracle-sql-access-to-kafka.html#GUID-EA66FD41-16B6-4E3F-A5ED-8C1897F1988F

Thank you!

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