Cloud Chats
by aiven

Apache Kafka 101: The Why, What, and How

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aiven

Aiven brings the best Open Source data technologies to all public clouds


Kafka


PostgreSQL


Elasticsearch


Cassandra


Grafana


Redis


InfluxDB


MySQL

Coming soon...

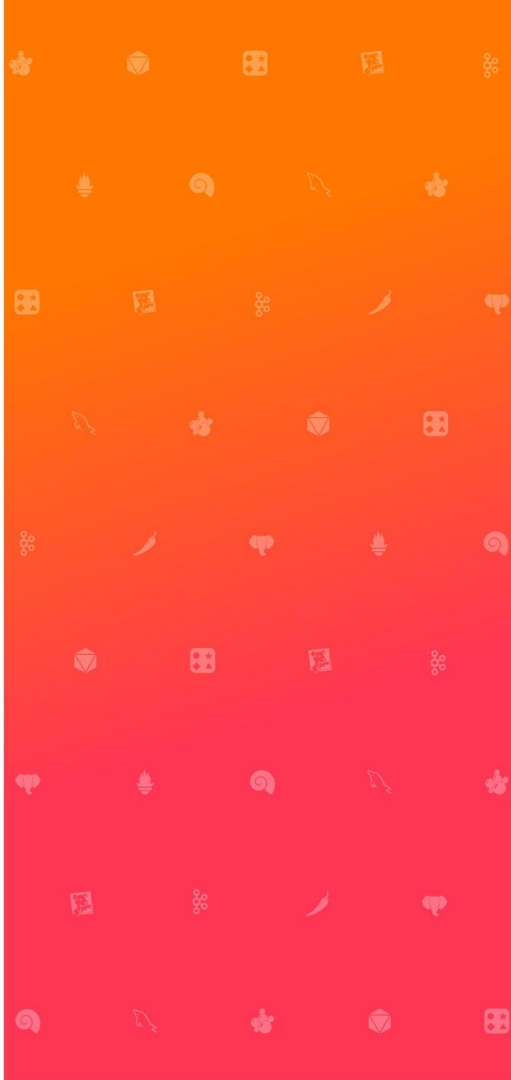

Clickhouse


M3


Flink

Agenda

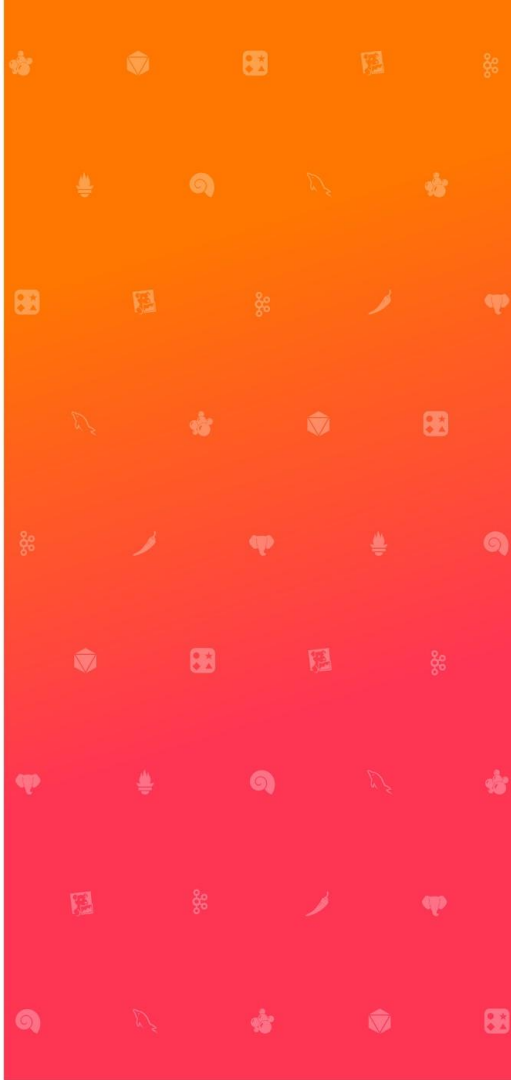
- Introduction
- Kafka -
  - WHY?
  - WHAT?
  - HOW?
- Kafka ecosystem
- DEMO
- Q & A (aka HUH?)



Background: the WHY of Kafka

History of Apache Kafka

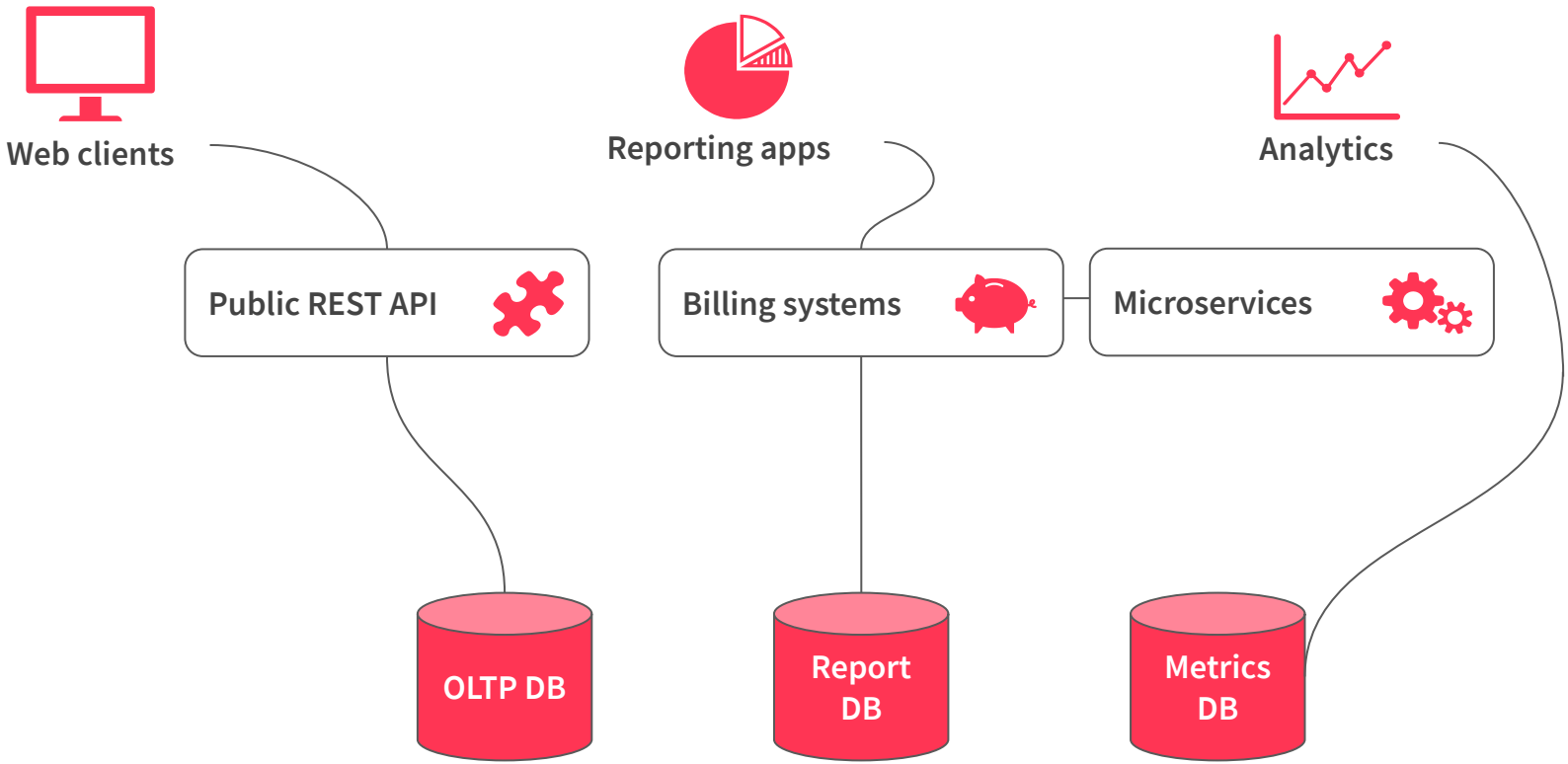
- shift away from “monolithic” programs to those that must pass data between ***senders*** and ***receivers***
- eventually, systems became **distributed**
- imagine the complexity with **millions of nodes** sending items back and forth like **status updates**, **presence**, **login states**, among other things. Imagine the volume of messages here.
- complexity = **n * n**
- **Also, decoupling...**



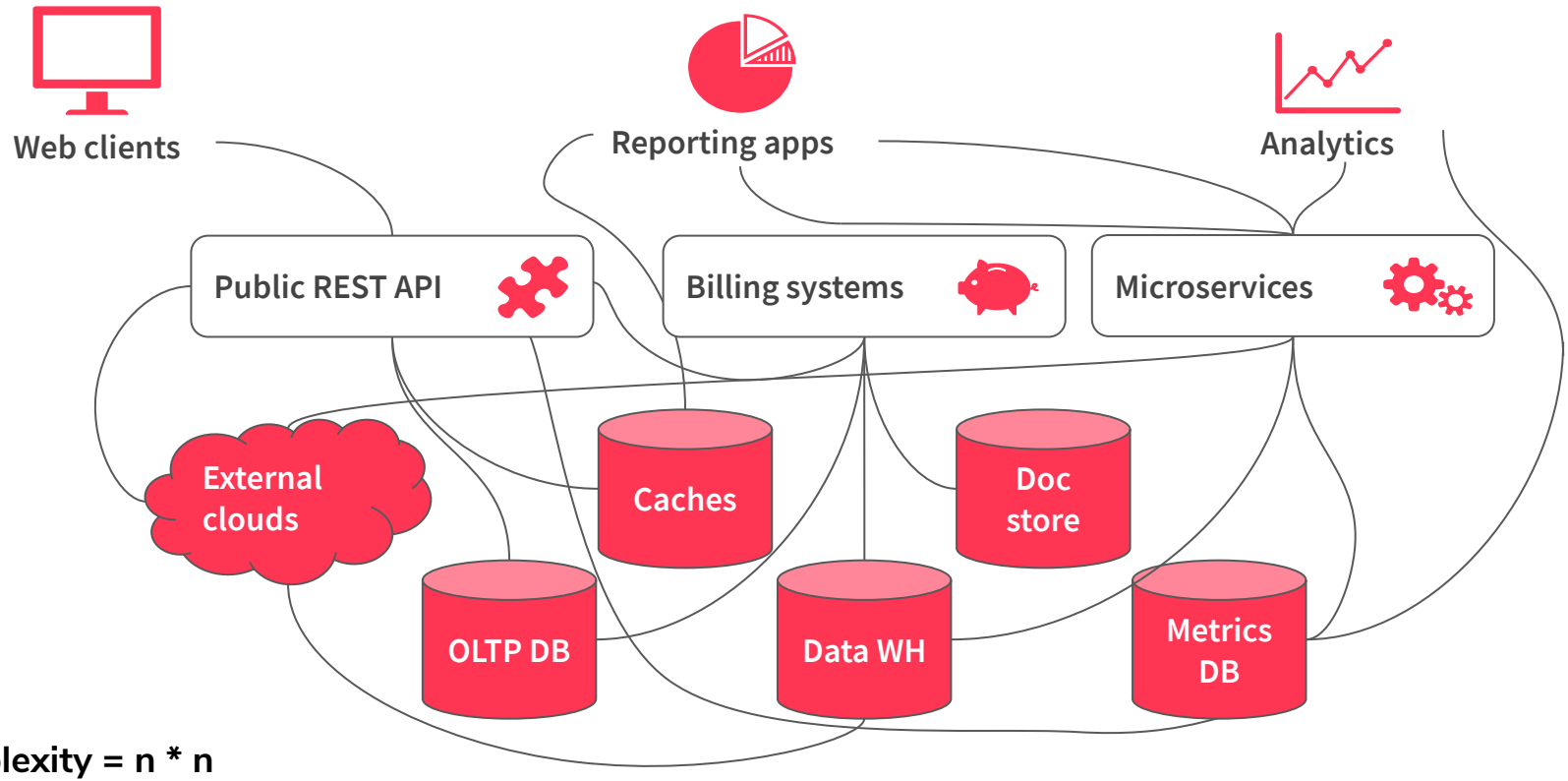
History, part II

Alas, a middle step:

“Traditional” data flow model



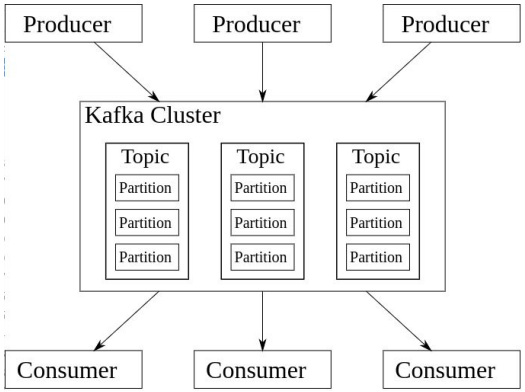
“Traditional” data flow model



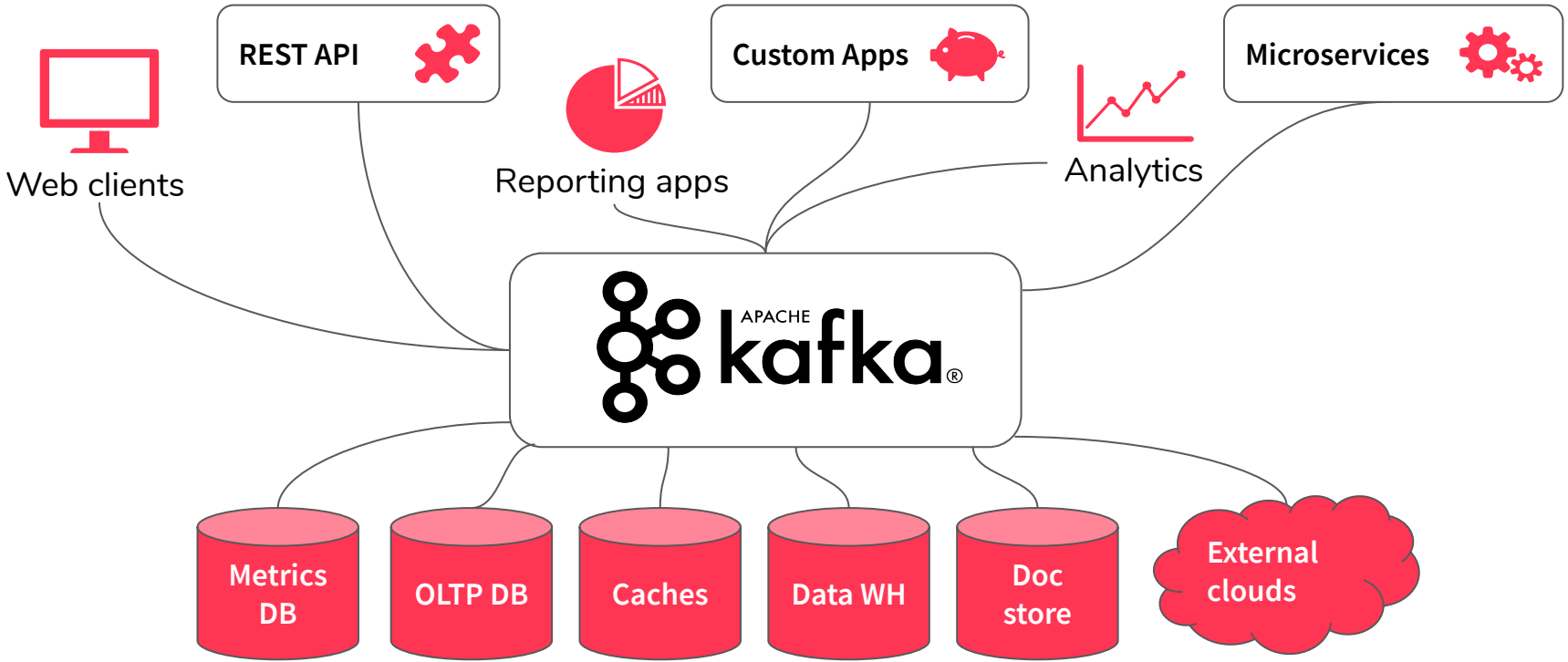
complexity = n * n

Enter: Apache Kafka!

- Developed at LinkedIn starting in 2010
- open-sourced to Apache in early 2011
- improved on the pub/sub architecture
- complexity = **n + n**



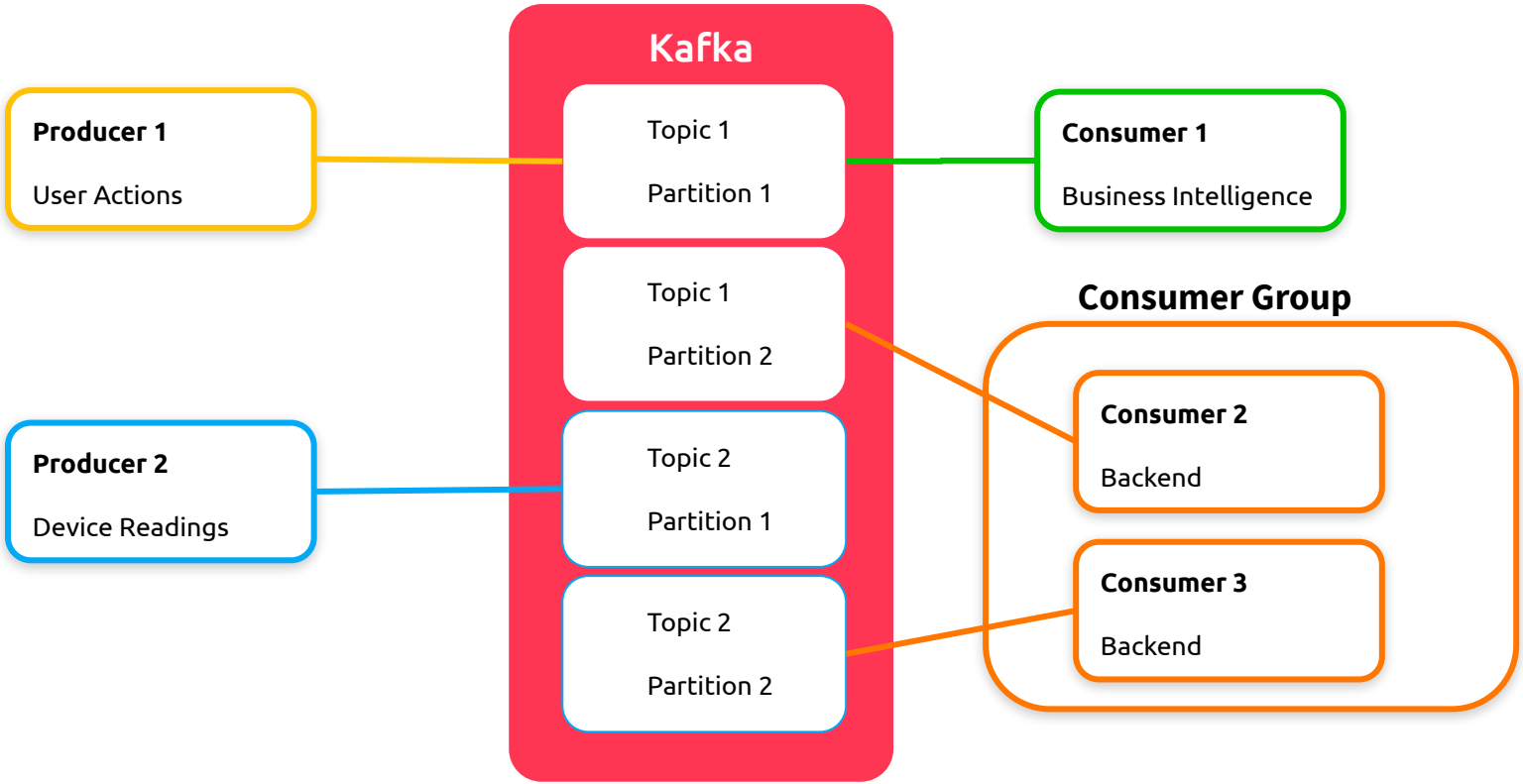
Kafka-centric data flow model



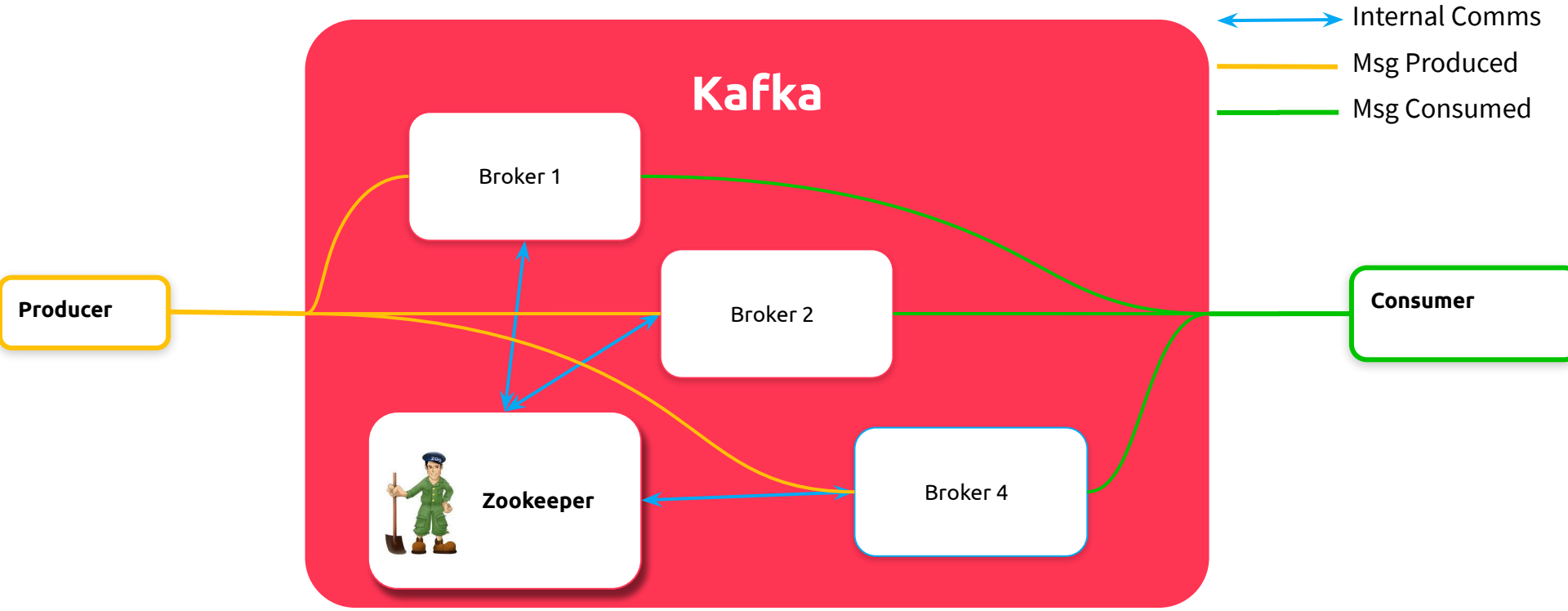
complexity = n + n

Architecture: the WHAT of Kafka

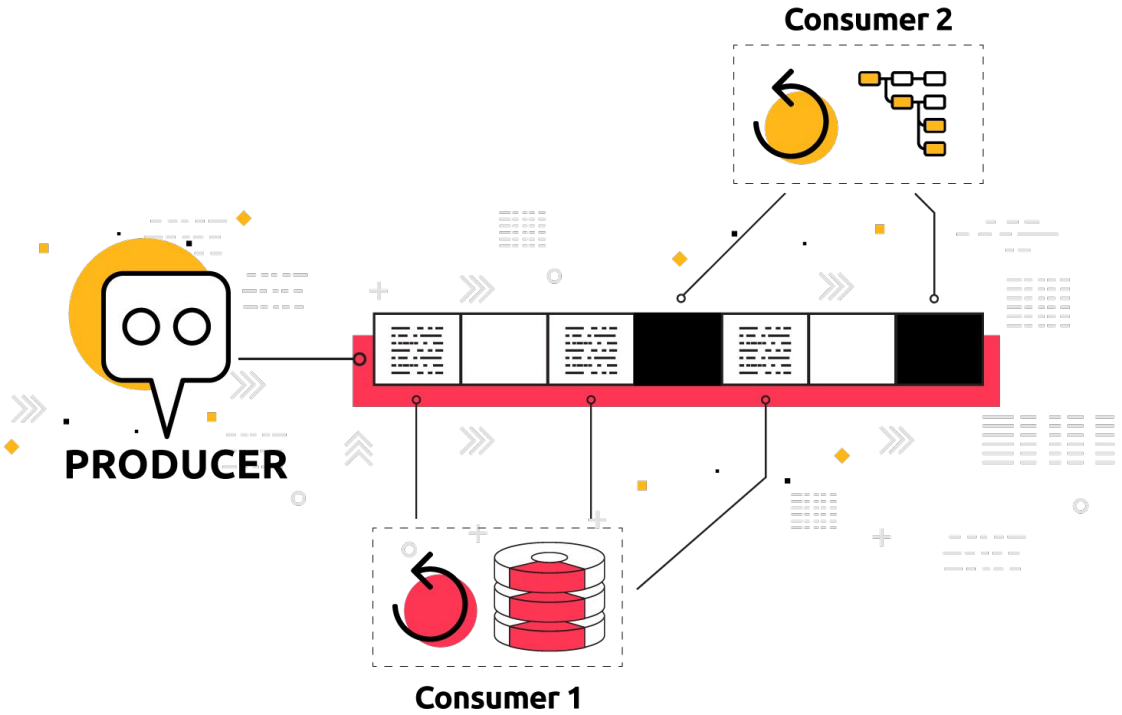
Producin' and Consumin'



Brokers, Clusters, ISRs and Zookeeper

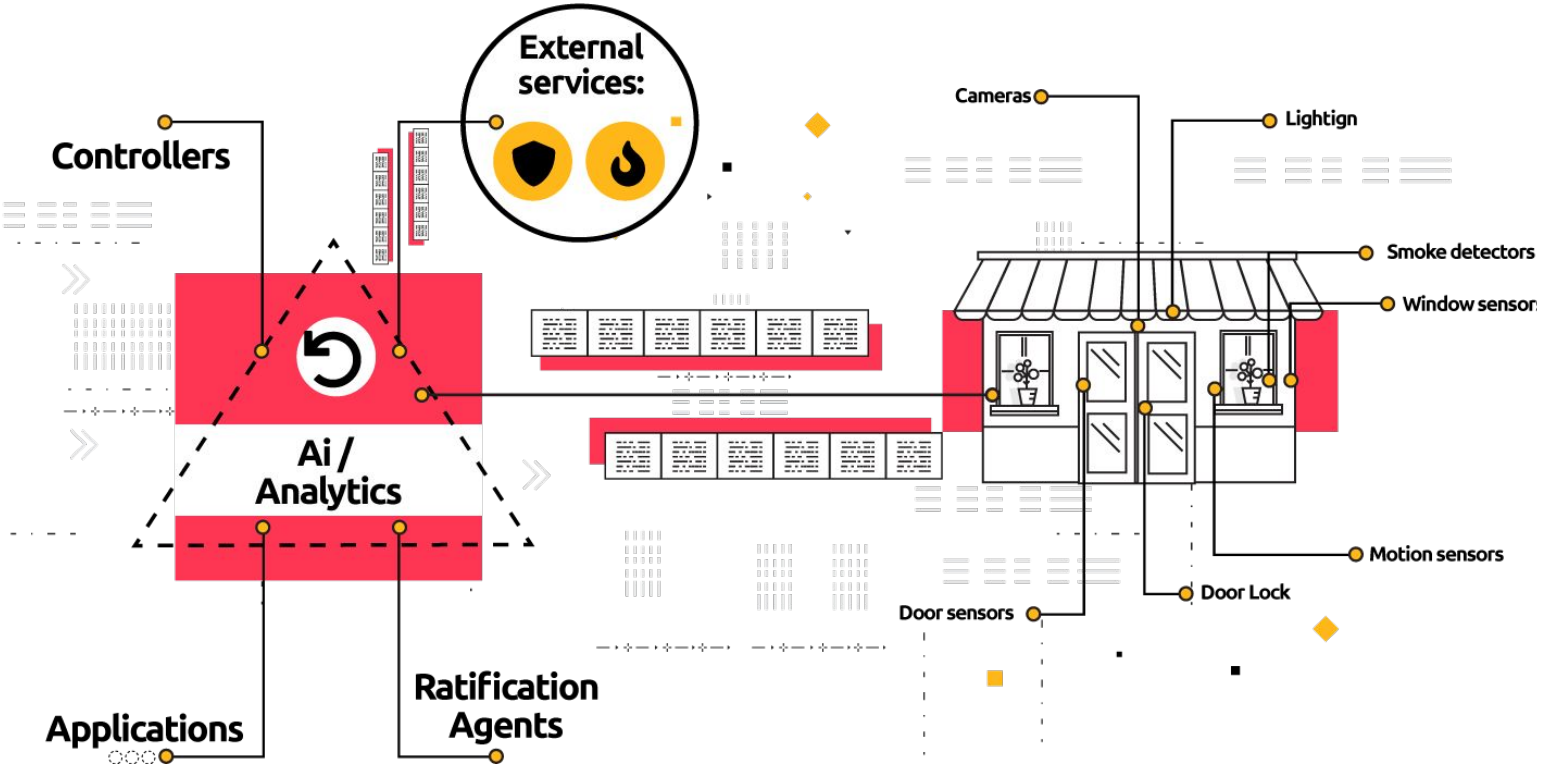


What Apache Kafka does: Publish/Subscribe

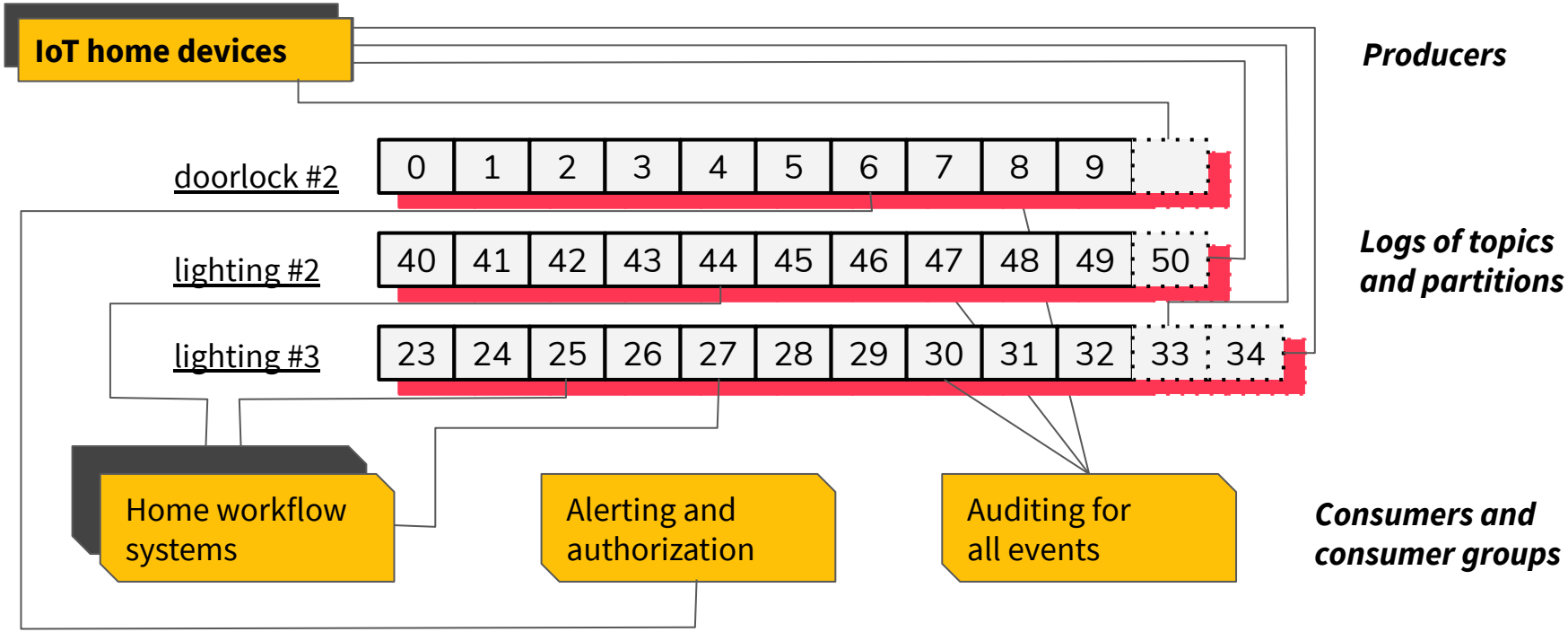


Use-Cases: the HOW of Kafka

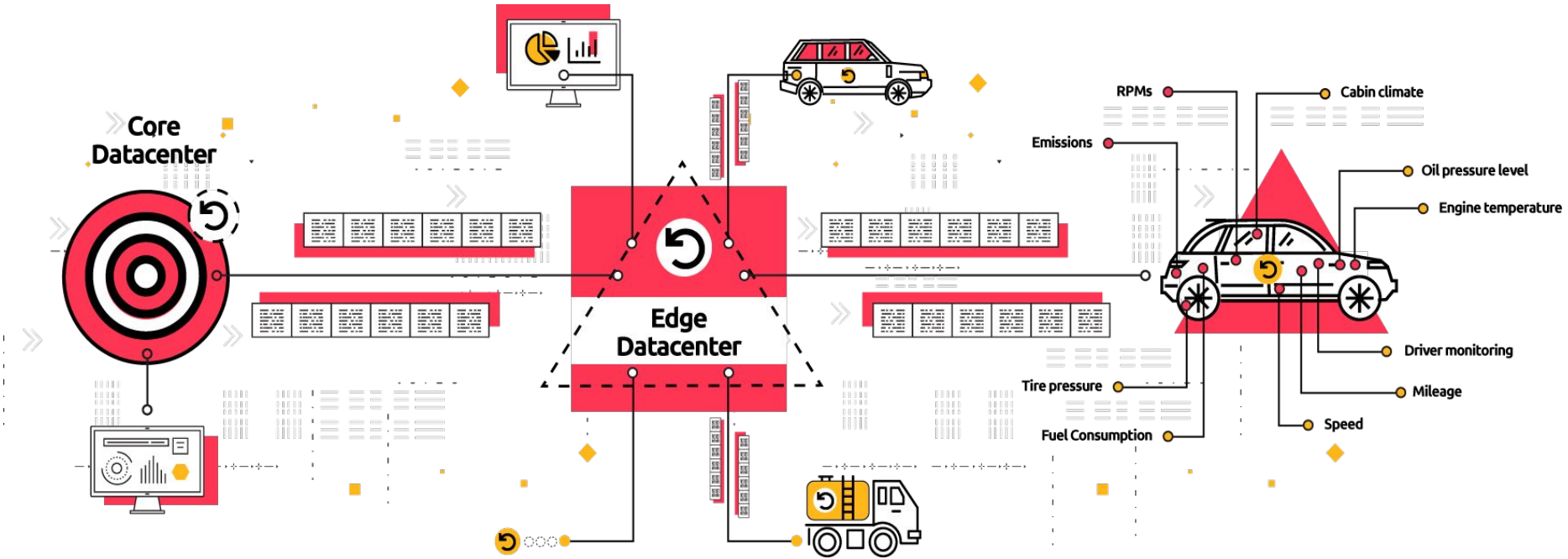
IoT event processing example



How Kafka handles that



Core to Edge example



Advantages of Managed Kafka

WHY Apache Kafka?

- Routing rules configured by consumer
- Built-in support for asynchronous messaging
- High throughput/low latency

Operating Apache Kafka

Covers data pipeline requirements

- Scales to billions of messages per day
- Supports rack and data center aware replication
- Cross-region replication using MirrorMaker
- Real-time streaming
- Decoupling of message consumption & producing
- Client libraries & tools available for all popular languages

But maintenance can be a burden

- Depends on ZooKeeper
- Rebalancing of leaders and partitions
  - In case of failure
  - When scaling up or down
- Broker hangs
- Consider using a managed Kafka service, available from multiple vendors including us

WHY *Managed* Apache Kafka?

- Easy deployment
- No outlay costs
- Thousands of hours of experience
- Auto-scaling
- Centralized, no-fuss management
- High Availability

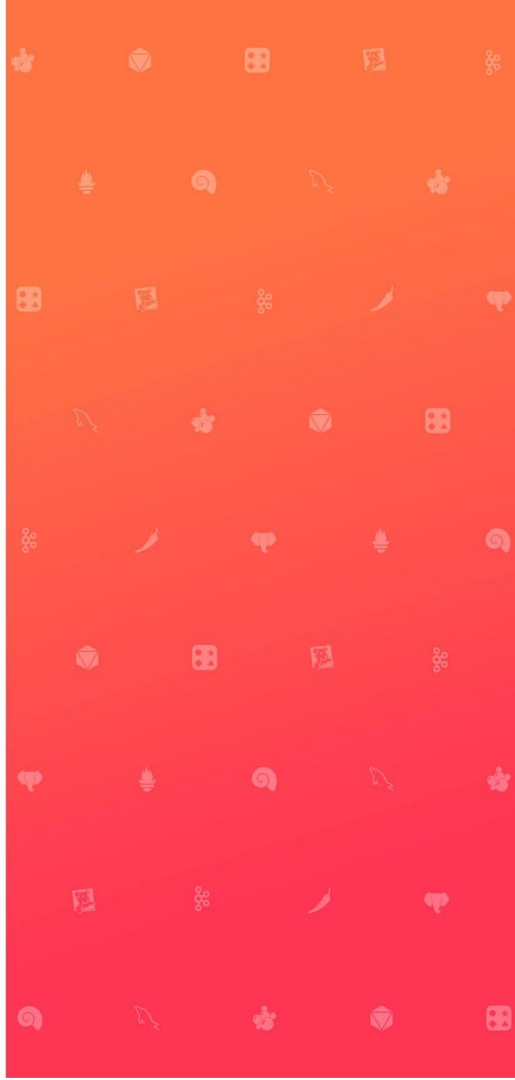
Managed is Peace of Mind

Focus on your product and let us take care of your infrastructure

The
Kafka Ecosystem

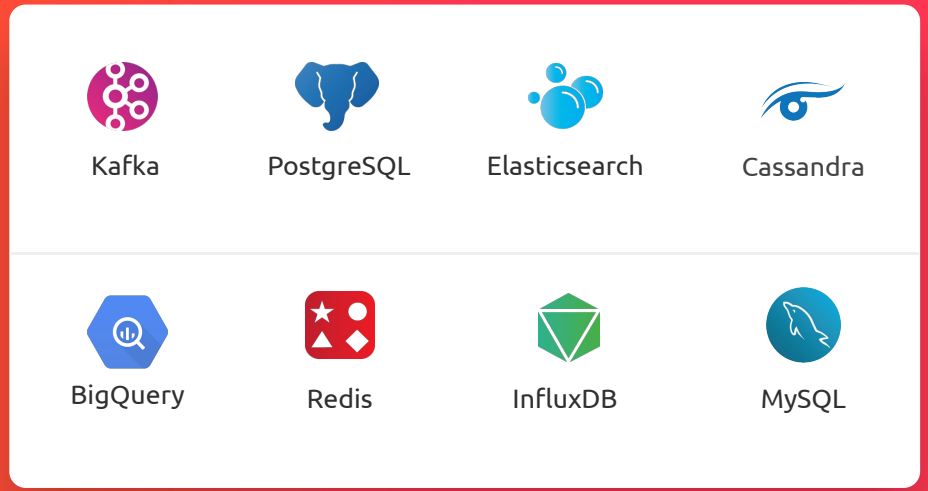
The Kafka Ecosystem

- Kafka Connect
- Schema Registry
- Data Streaming
  - Kafka Streams
  - Spark/Flink



Kafka Connect

- Native Kafka framework for integrating multiple data sources
  - Source Connectors push data to Kafka
  - Sinks dump data
- Runs alongside Kafka OR separately
- Configure with JSON
- Available for: RabbitMQ, Google BigQuery, PostgreSQL and more



Schema Registry

Validate

Ensure message consistency

Validate message source

Many Formats

JSON

Avro

PROTOBUF

Compatibility

Per Schema compatibility

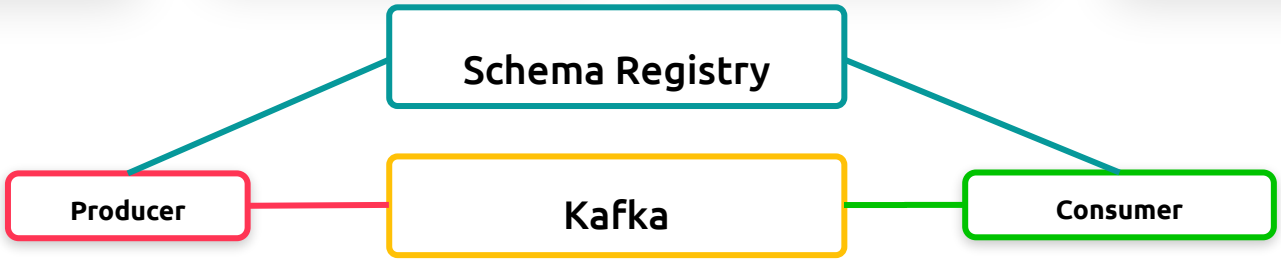
Backwards

Forwards

High support & service level

24/7/365 monitoring by experienced Aiven personnel

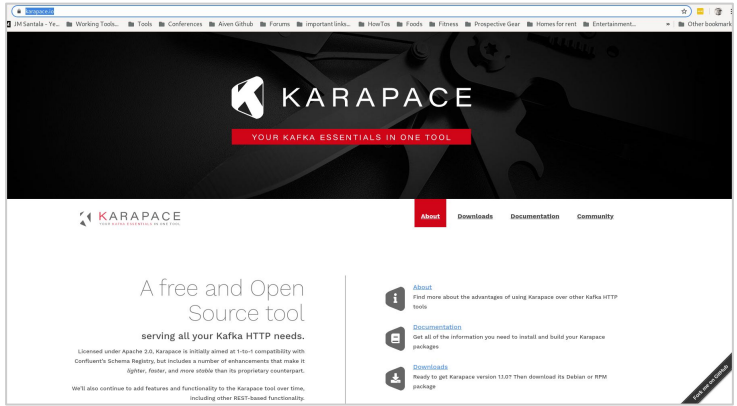
Dedicated phone support available



Karapace

github.com/aiven/karapace

aiven



Schema Registry++

OSI approved license

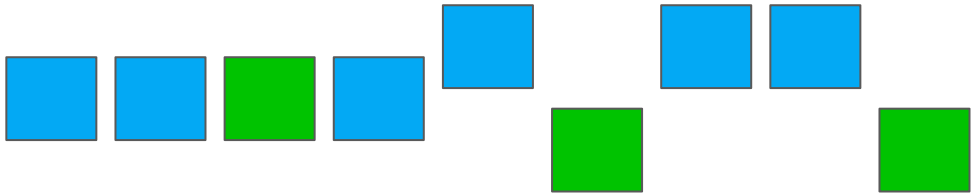
Use with ANY Kafka

Lighter, faster, better, YOURS

Data Streaming -> Flink

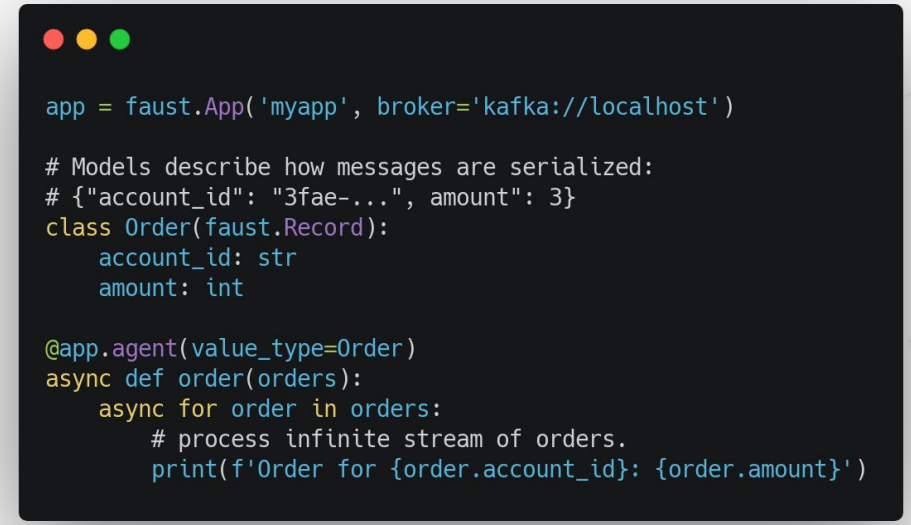
- Stateful Computations over Data Streams
  - Flink lets you run stream and batch processing over any supported data source
- Processing can take place as SQL or as custom code running against the data
- Custom code written in Java or Python

Flink



Kafka Streams

- Stream processing without the need for Spark/Flink
  - Java/Scala native (libraries for many other languages)
- Stateful
- Support out of the box
  - Essentially a Consumer



```python
app = faust.App('myapp', broker='kafka://localhost')

# Models describe how messages are serialized:
# {"account_id": "3fae-...", amount": 3}
class Order(faust.Record):
    account_id: str
    amount: int

@app.agent(value_type=Order)
async def order(orders):
    async for order in orders:
        # process infinite stream of orders.
        print(f'Order for {order.account_id}: {order.amount}')
```

DEMO

Try it yourself!

https://github.com/aiven/presentations/tree/master/Cloud_chats_by_Aiven/Kafka_101

Final words

- **Kafka is:**
  - The evolution of messaging systems
  - The backbone of a Data Pipeline
  - An ecosystem of tools
  - Easy to integrate with popular software
  - Waiting for **you** at **aiven.io**

Produce once, consume everywhere

Thank you for your time!

Q & A

Do You Have Any Questions?

@aiven_io

webinars@aiven.io

Links / Further Reading

- Aiven Kafka
- Karapace
- Aiven's Presentations
- Kafdrop
- Using Kafdrop Web- UI with Aiven Kafka
- Effective Kafka (ebook) (unaffiliated)