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KSQL

The streaming SQL engine for Apache Kafka®

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Agenda & Housekeeping

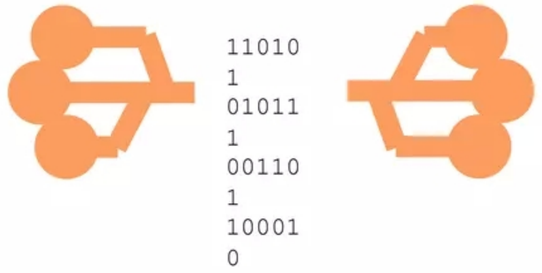
- Introduction to KSQL Presentation
- KSQL Demonstration
- Q & A - please ask your questions via that chat box

Follow up materials

- The slides and recording will be emailed

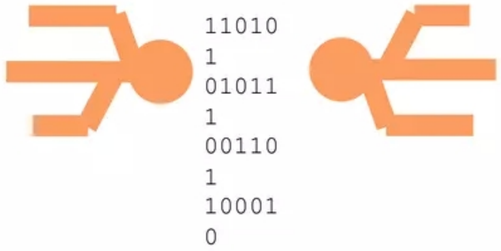
Apache Kafka is a Distributed Streaming Platform

Publish and subscribe to streams of data



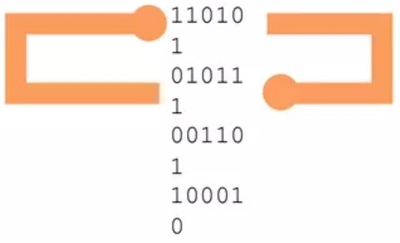
similar to a message queue or enterprise messaging system.

Store streams of data



in a fault tolerant way.

Process streams of data

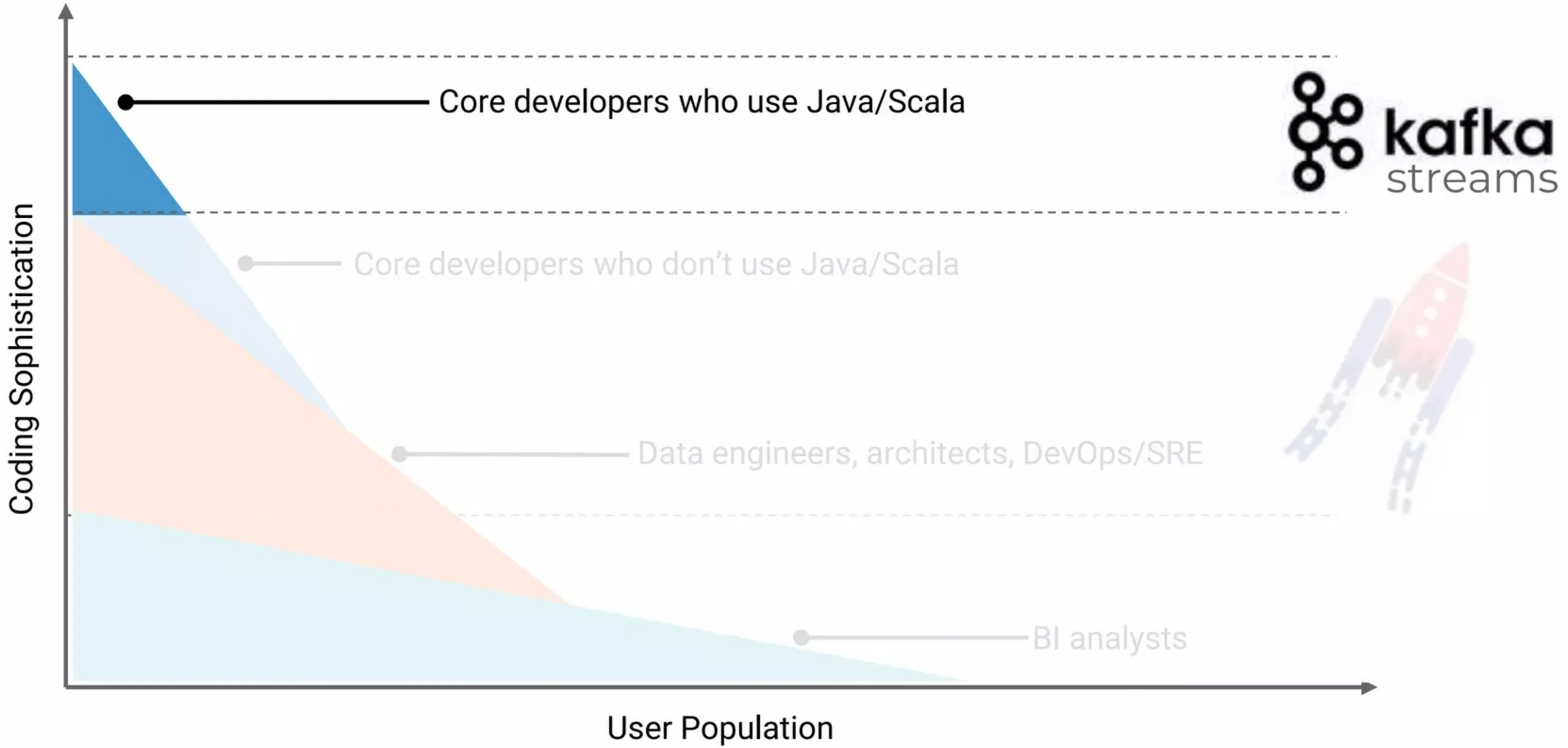


in real time, as they occur.

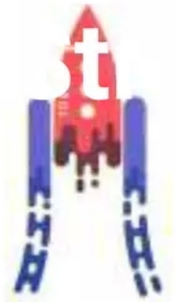
KSQL

The streaming SQL engine for Apache Kafka® to write real-time applications in SQL

Lower the bar to enter the world of streaming



Lower the bar to enter the world of streaming



KSQL

```
CREATE STREAM fraudulent_payments AS
 SELECT * FROM payments
 WHERE fraudProbability > 0.8;
```

vs.

kafka streams

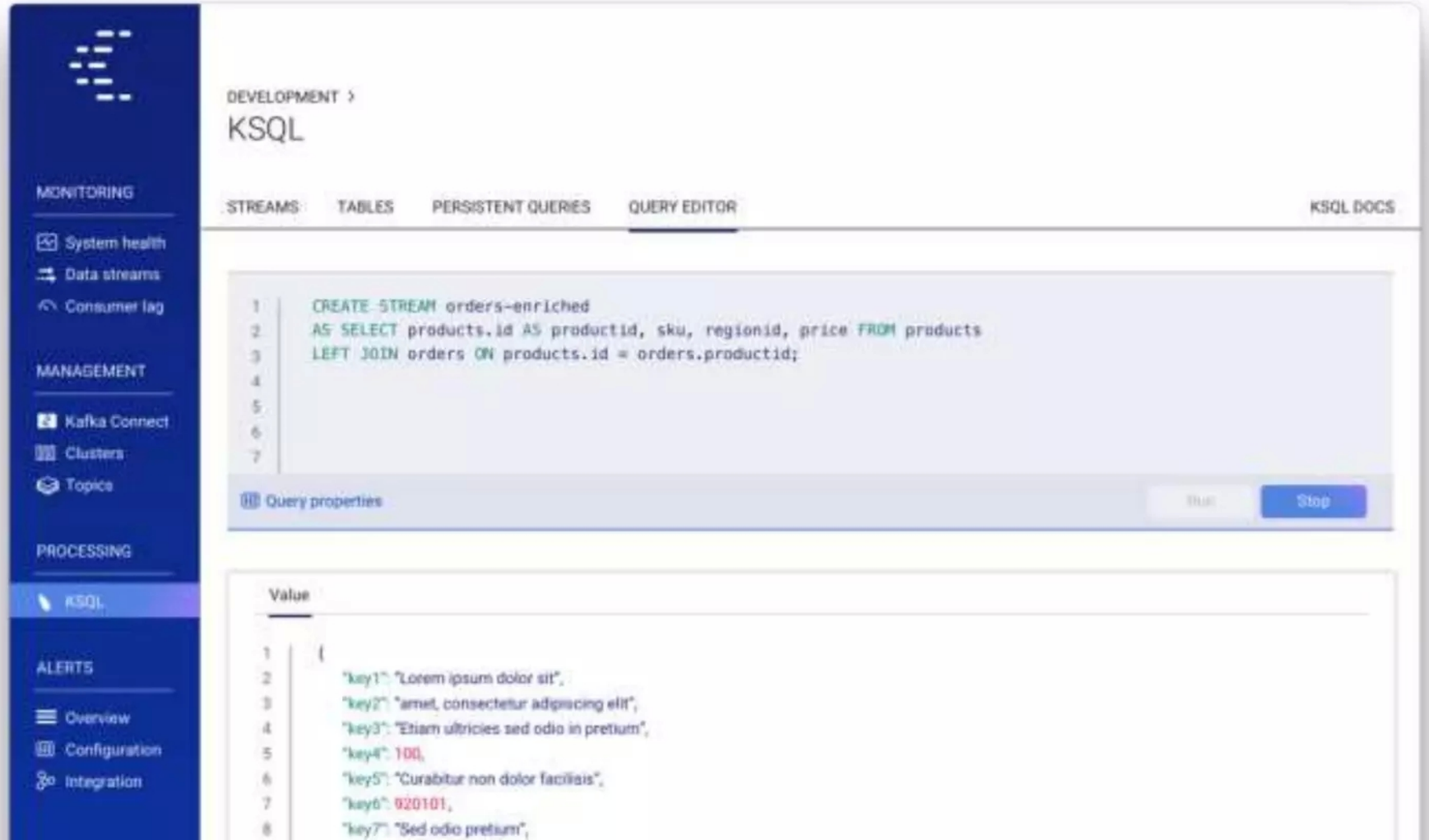
```
object FraudFilteringApplication extends App {

  val config = new java.util.Properties
  config.put(StreamsConfig.APPLICATION_ID_CONFIG, "fraud-filtering
  config.put(StreamsConfig.BOOTSTRAP_SERVERS_CONFIG, "kafka-broker

  val builder: StreamsBuilder = new StreamsBuilder()
  val fraudulentPayments: KStream[String, Payment] = builder
    .stream[String, Payment]("payments-kafka-topic")
    .filter((_ ,payment) => payment.fraudProbability > 0.8)

  val streams: KafkaStreams = new KafkaStreams(builder.build(), co
  streams.start()
}
```

KSQL

- You write **only SQL**. No Java, Python, or other boilerplate to wrap around it!
- Create KSQL **user defined functions** in Java when needed.

```
CREATE STREAM fraudulent_payments AS
 SELECT * FROM payments
 WHERE fraudProbability > 0.8;
```

New user experience: interactive stream processing

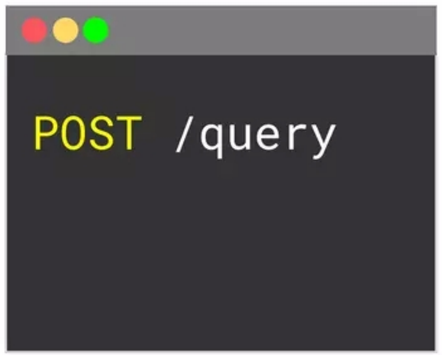


KSQL can be used interactively + programmatically

1 UI

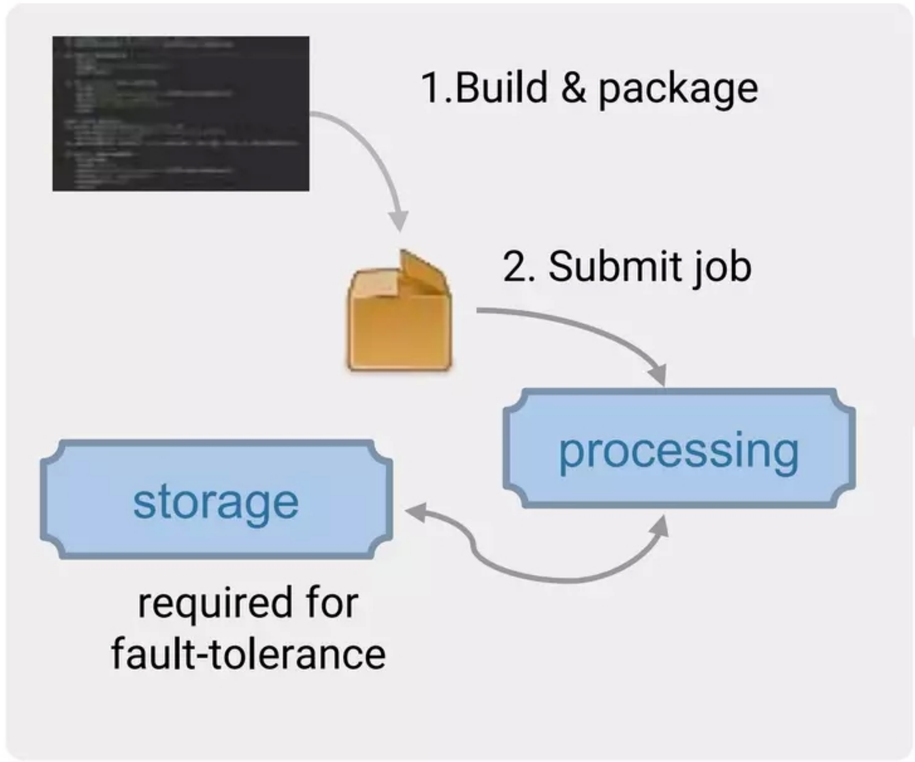
2 CLI

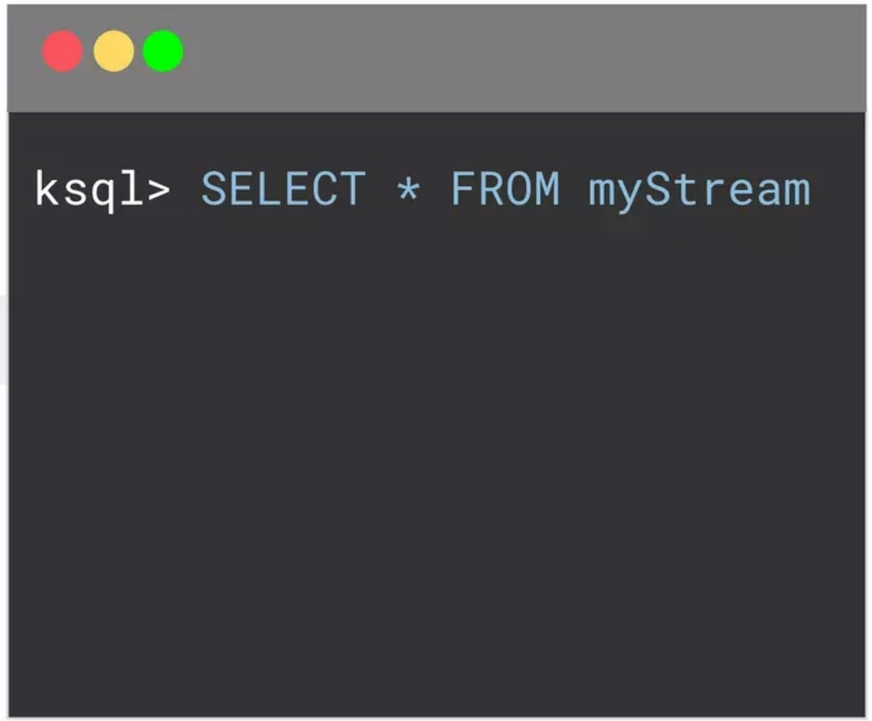
3 REST



4 Headless

All you need is Kafka and KSQL

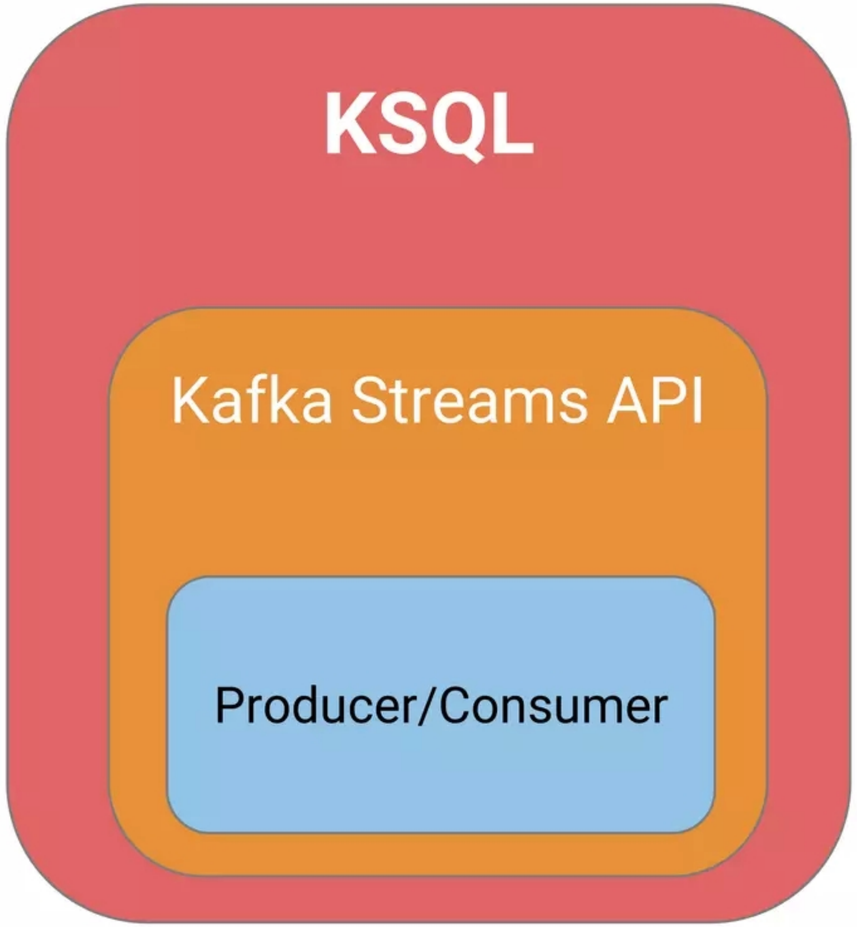




Without KSQL

With KSQL

Stream Processing in Kafka



- SQL
- Interactive service
- …

- Stateful stream processing
- Window operations
- DSL
  - `map(), filter(), join(), aggregate(), …`

…

Kafka Consumer Group Protocol
- Elasticity
- Fault Tolerance

…

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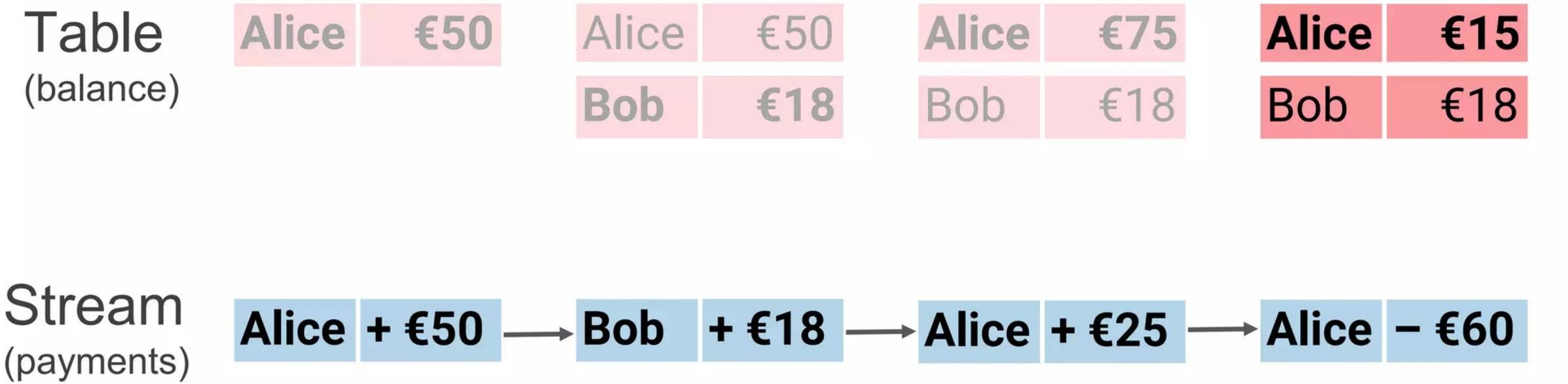
Stream/Table Duality

The Stream-Table Duality



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KSQL Examples

KSQL example use cases

Data exploration

Data enrichment

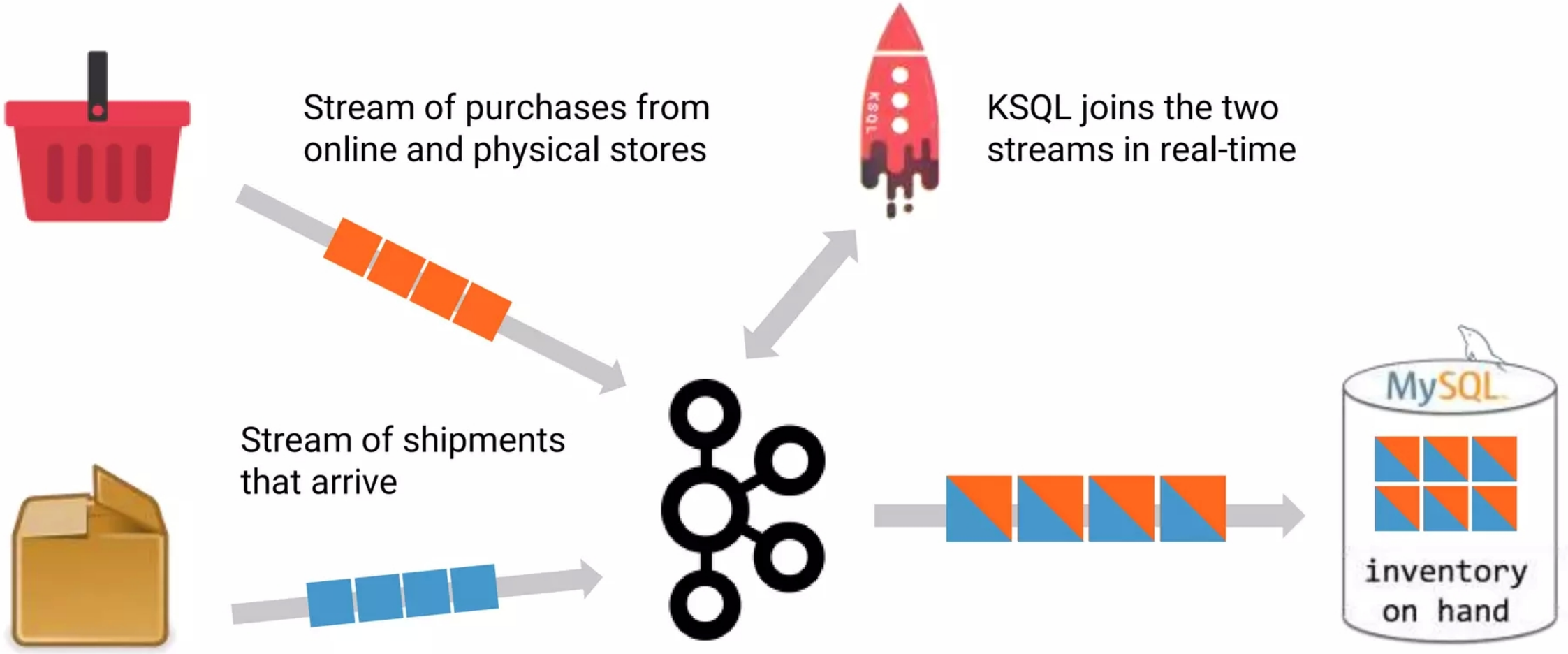
Streaming ETL

Filter, cleanse, mask

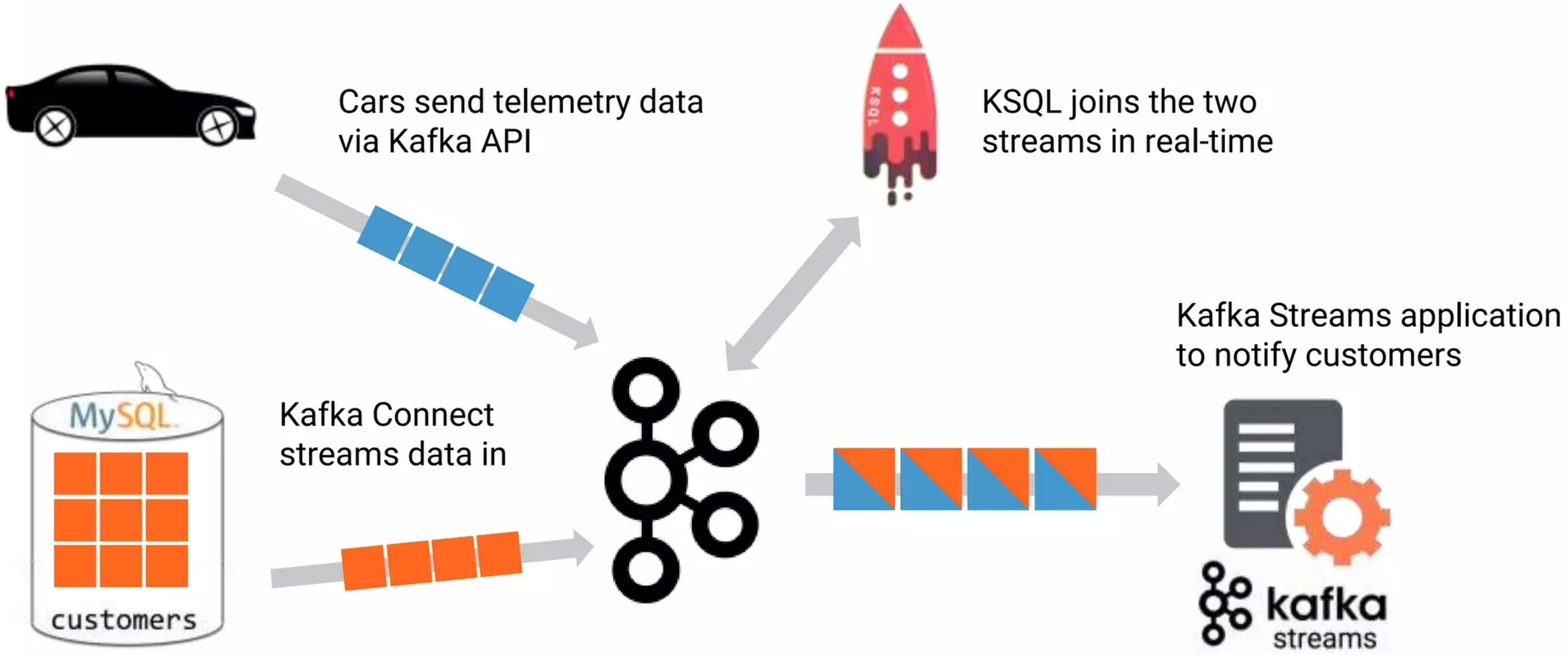
Real-time monitoring

Anomaly detection

Example: Retail



Example: IoT, Automotive, Connected Cars



KSQL for Real-Time Monitoring

- Log data monitoring
- Tracking and alerting
- Syslog data
- Sensor / IoT data
- Application metrics

```
CREATE STREAM syslog_invalid_users AS
  SELECT host, message
  FROM syslog
  WHERE message LIKE '%Invalid user%';
```

http://cnfl.io/syslogs-filtering / http://cnfl.io/syslog-alerting

KSQL for Anomaly Detection

- Identify patterns or anomalies in real-time data, surfaced in milliseconds

```
CREATE TABLE possible_fraud AS
  SELECT card_number, COUNT(*)
  FROM authorization_attempts
  WINDOW TUMBLING (SIZE 5 SECONDS)
  GROUP BY card_number
  HAVING COUNT(*) > 3;
```

KSQL for Streaming ETL

- Joining, filtering, and aggregating streams of event data

```
CREATE STREAM vip_actions AS
  SELECT user_id, page, action
  FROM clickstream c
  LEFT JOIN users u
    ON c.user_id = u.user_id
  WHERE u.level = 'Platinum';
```

KSQL for Data Transformation

- Easily make derivations of existing topics

```
CREATE STREAM pageviews_avro
  WITH (PARTITIONS=6,
        VALUE_FORMAT='AVRO') AS
  SELECT * FROM pageviews_json
  PARTITION BY user_id;
```

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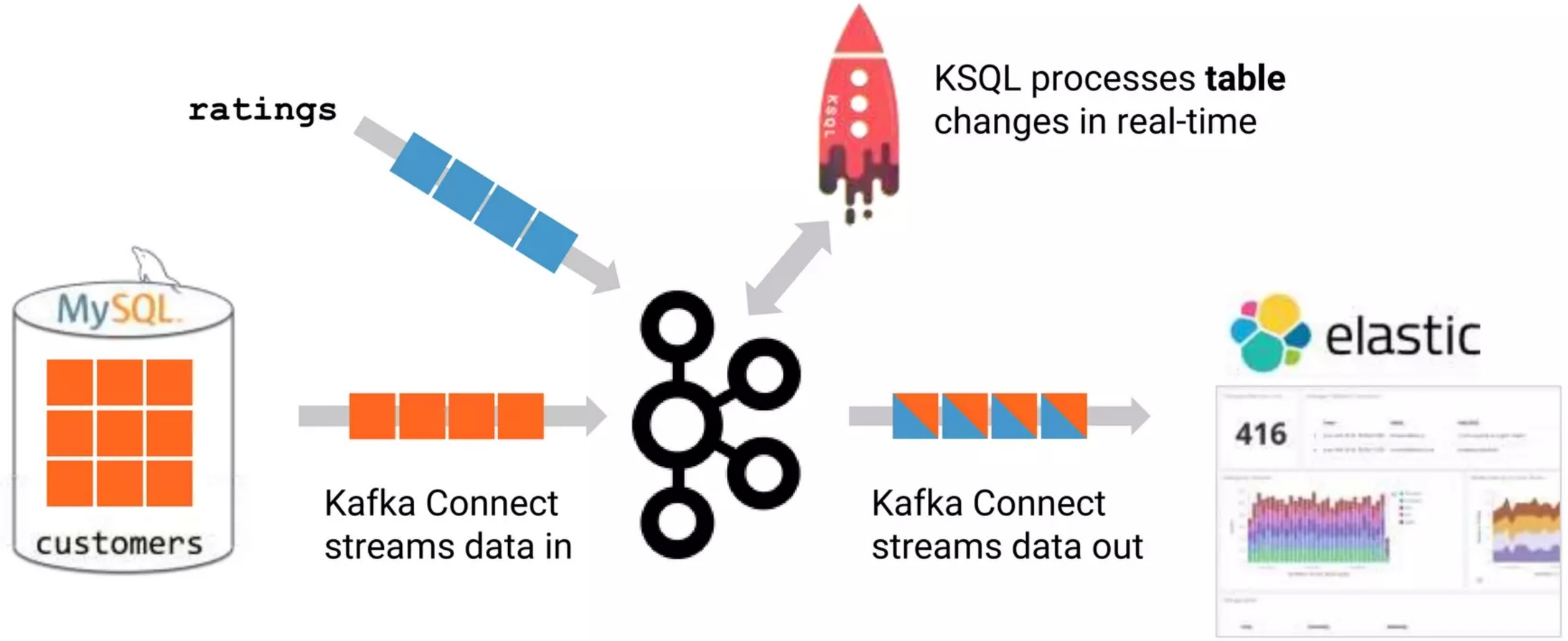
Demo

Example: CDC from DB via Kafka to Elastic



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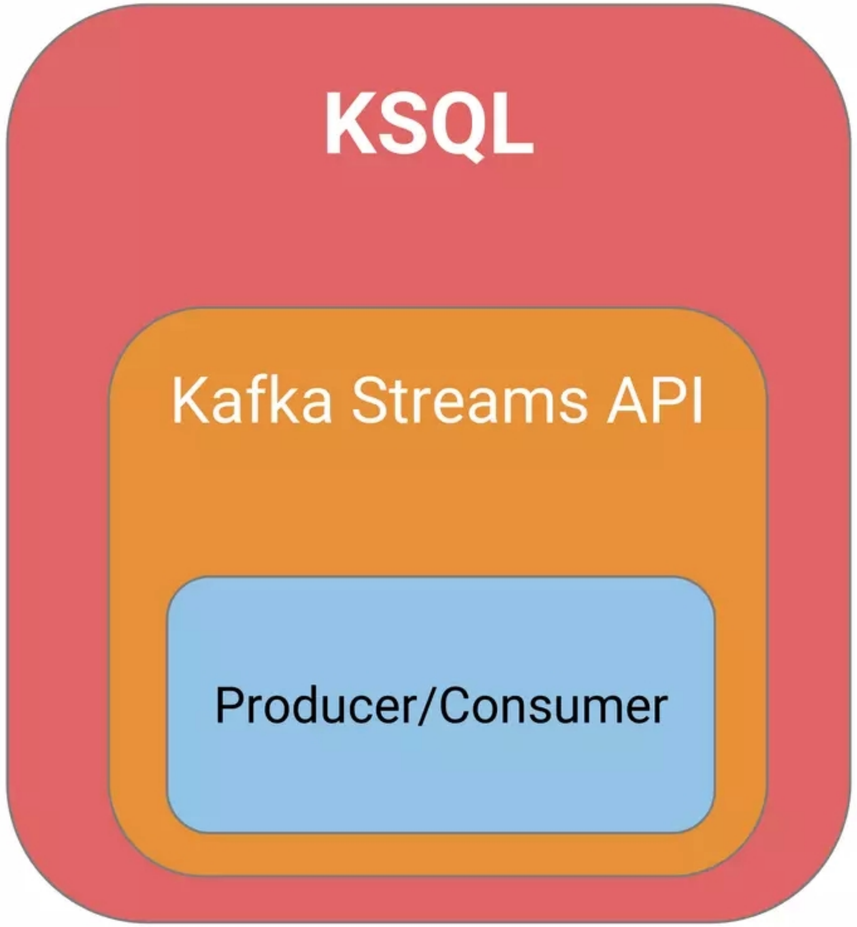
Deployment Scalability and HA

Stream Processing in Kafka



- SQL
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Kafka Consumer Group Protocol
- Elasticity
- Fault Tolerance

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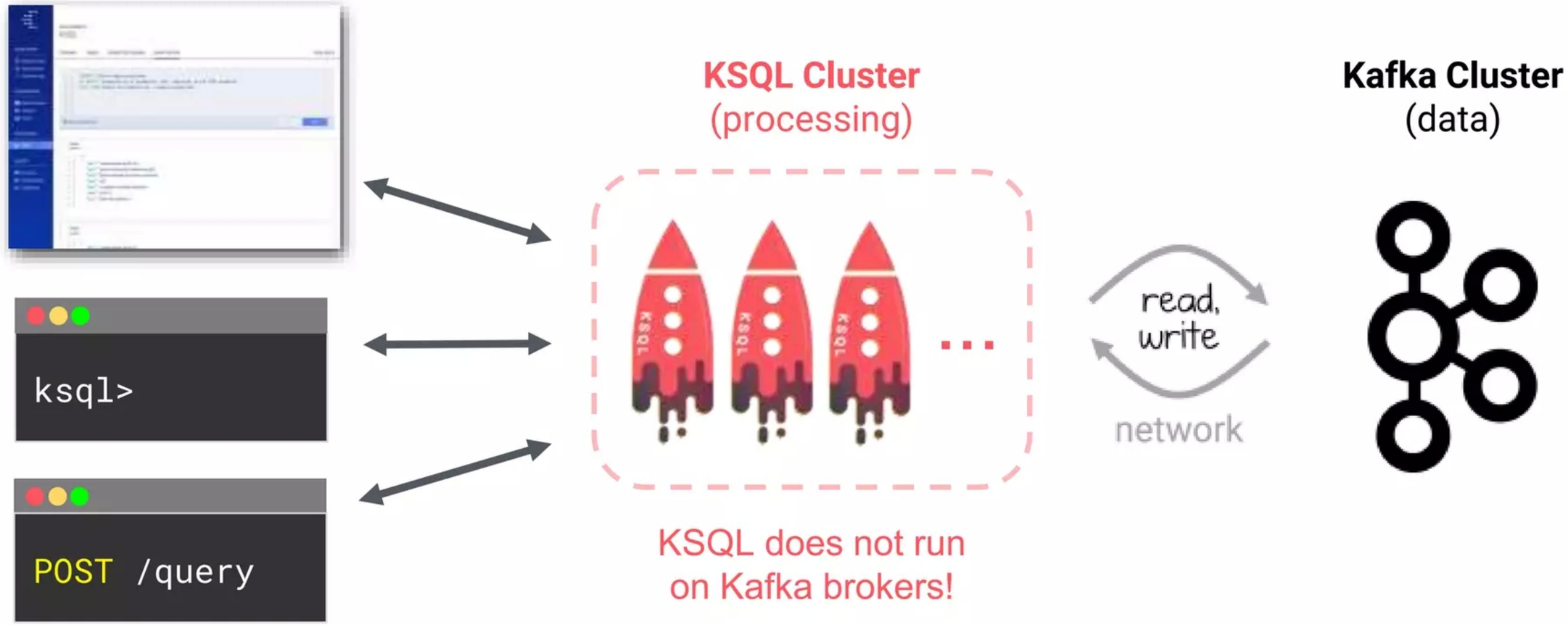
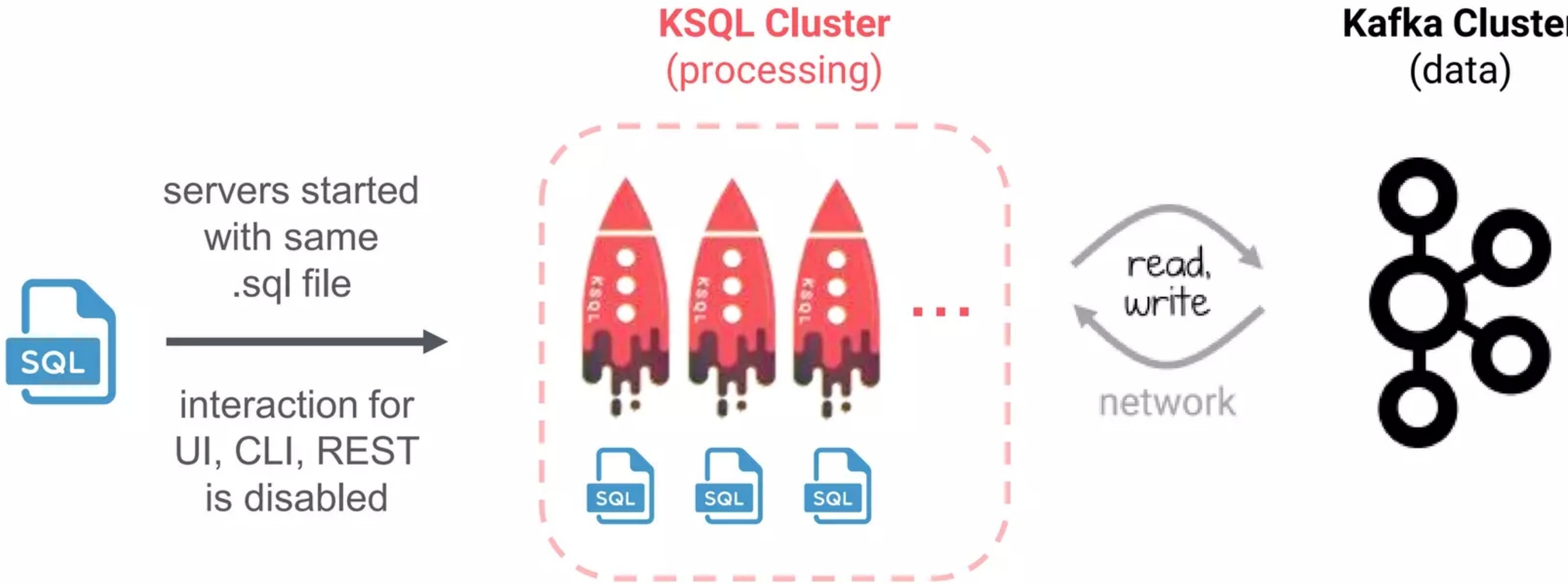
How to run KSQL

#1 Interactive KSQL, for development & testing



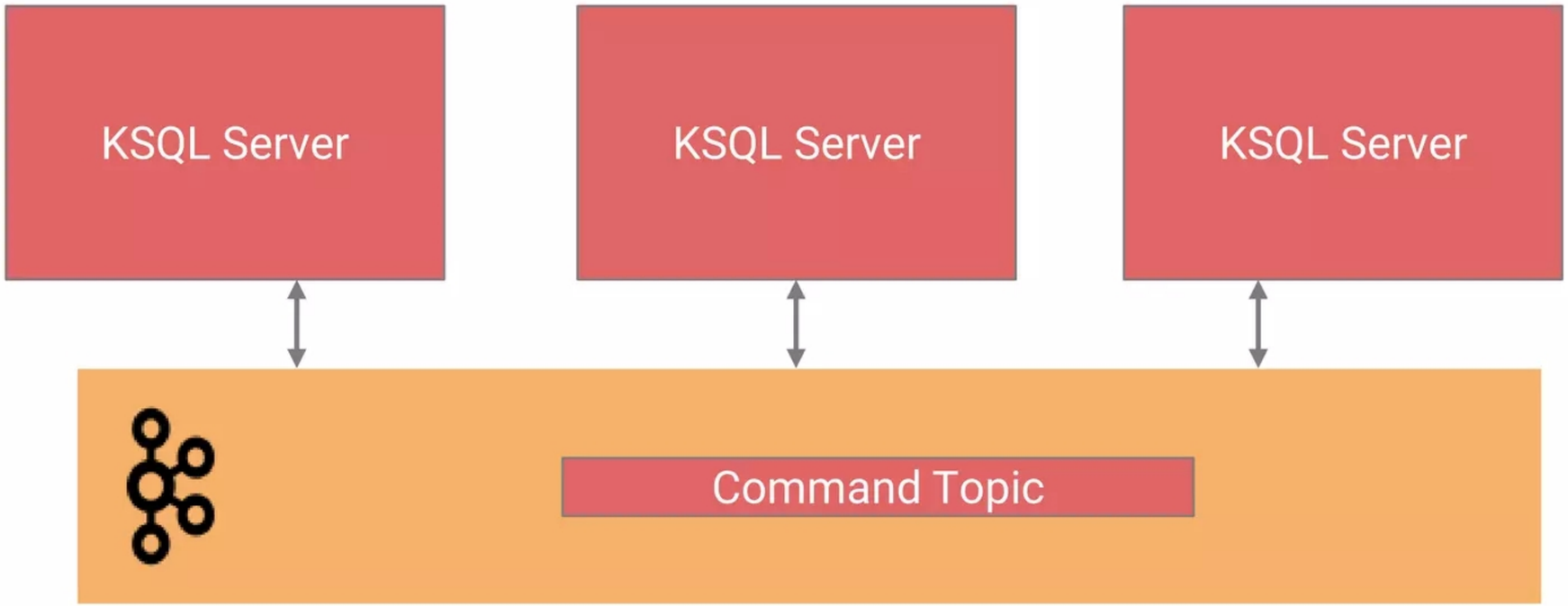
How to run KSQL

#2 Headless KSQL, for production

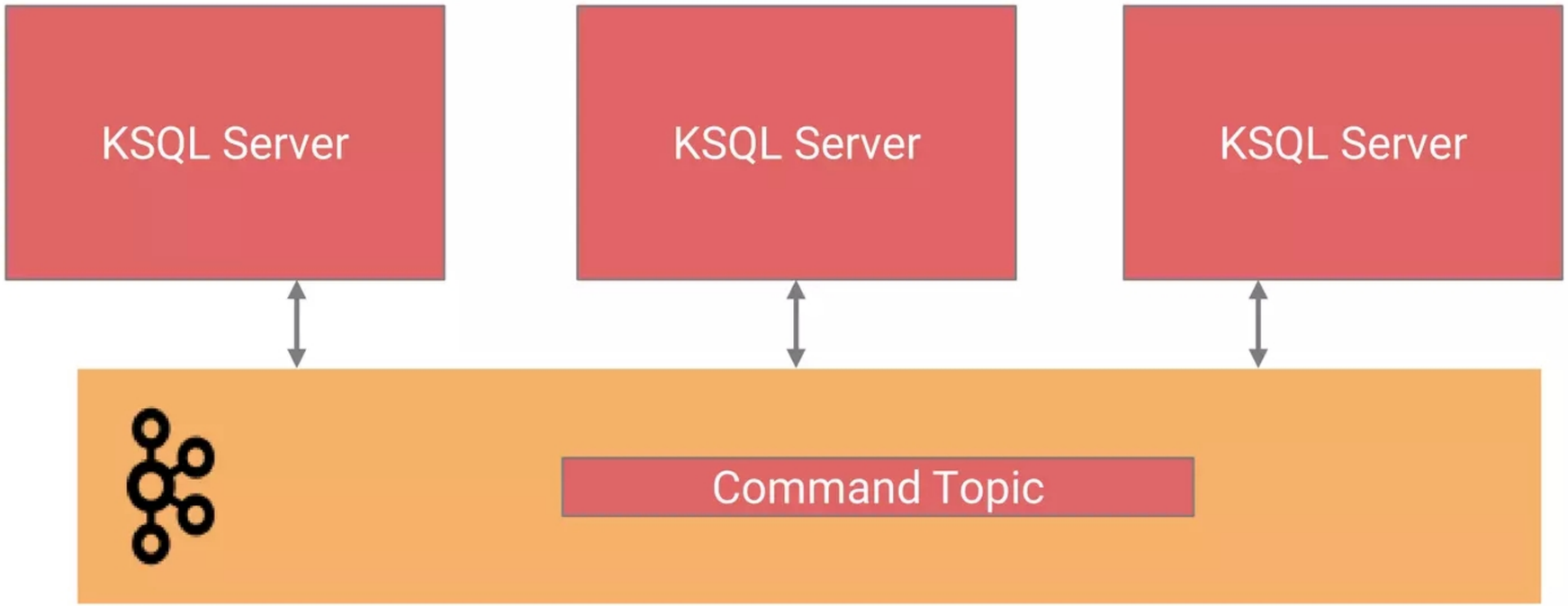


KSQL Deployment

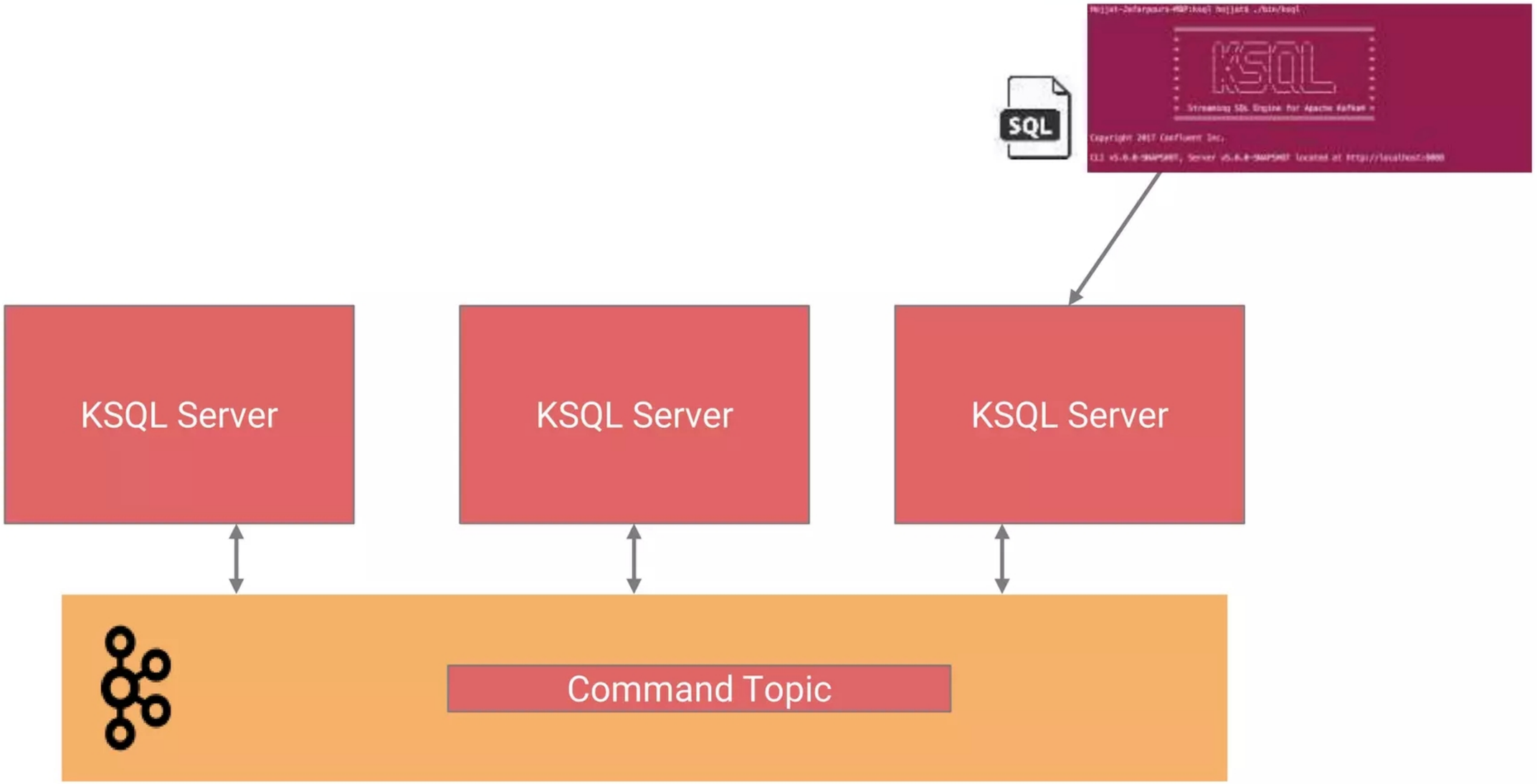
- Interactive Service
  - REST API
  - Command Topic



KSQL Deployment



KSQL Deployment



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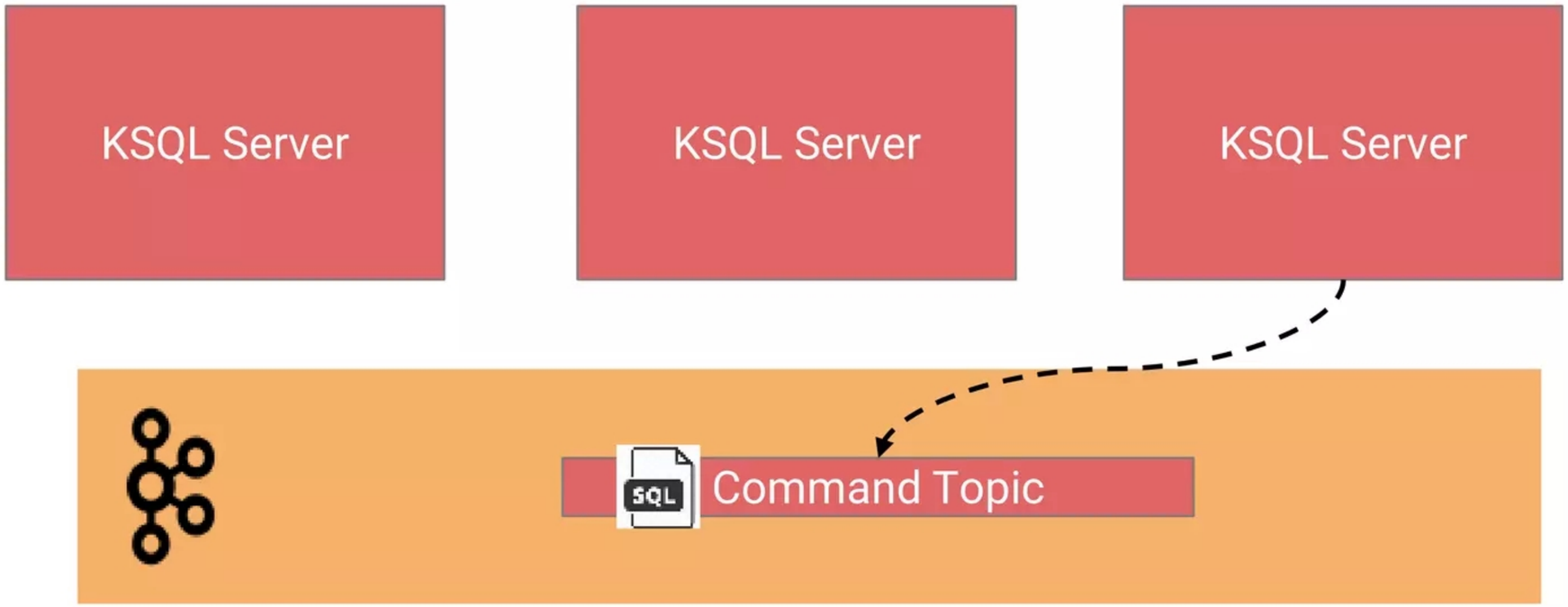
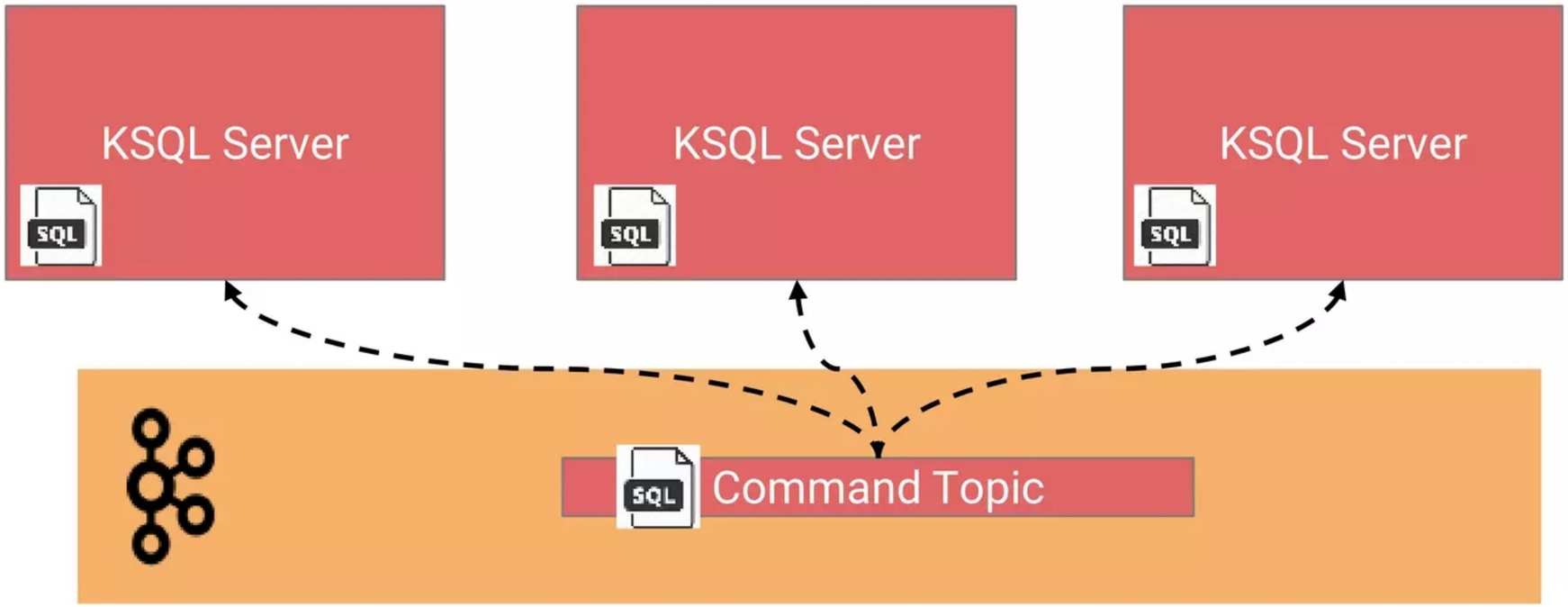
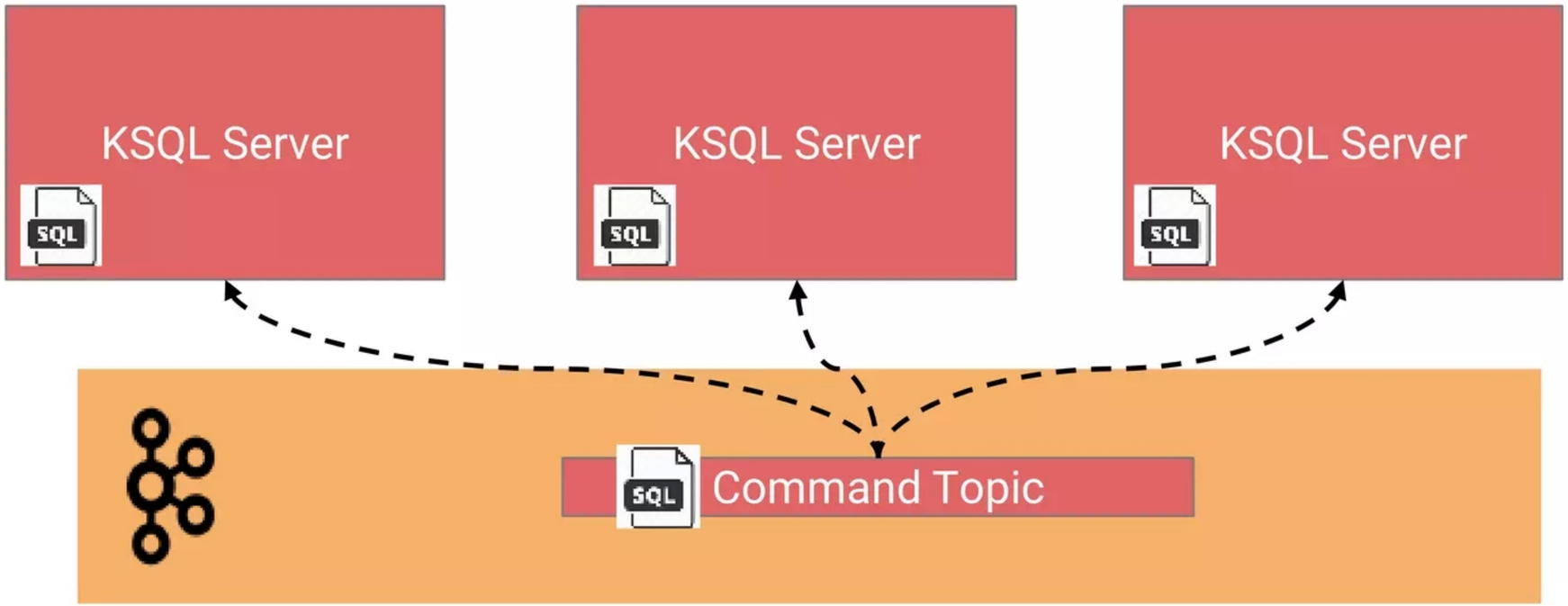


KSQL Deployment



KSQL Deployment

Fault Tolerance:



KSQL Deployment

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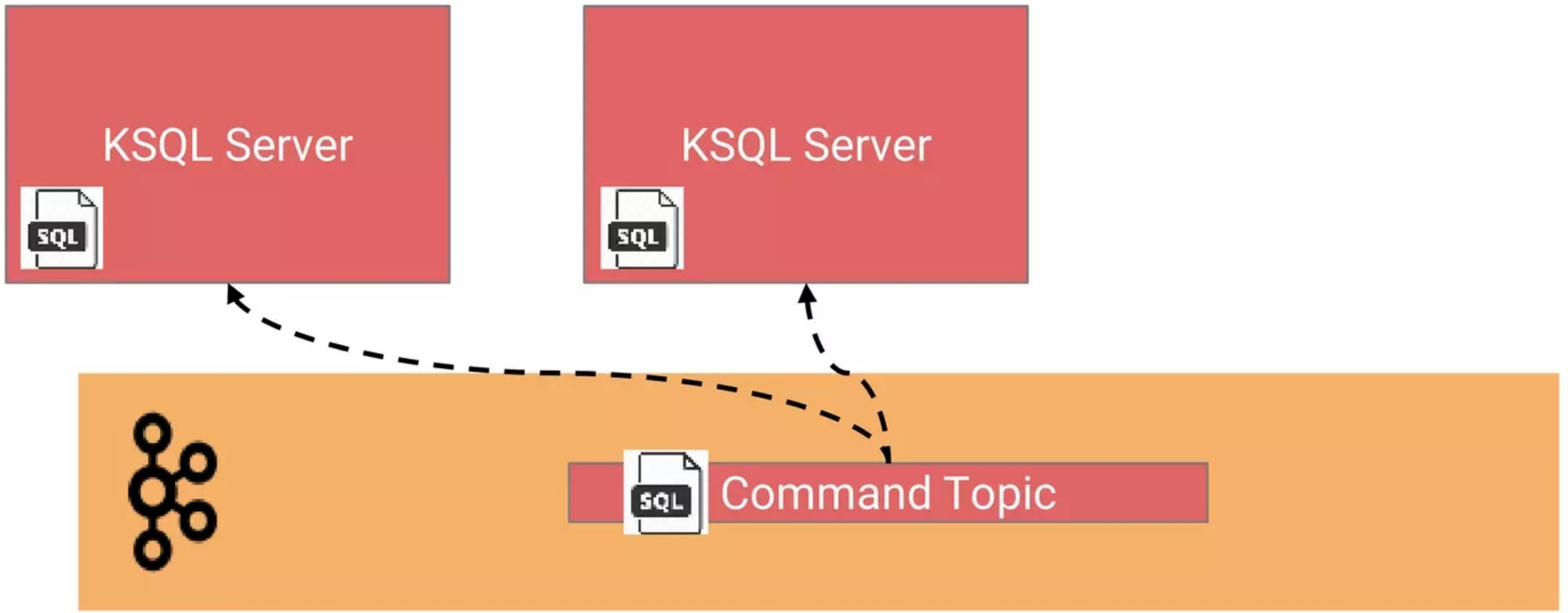
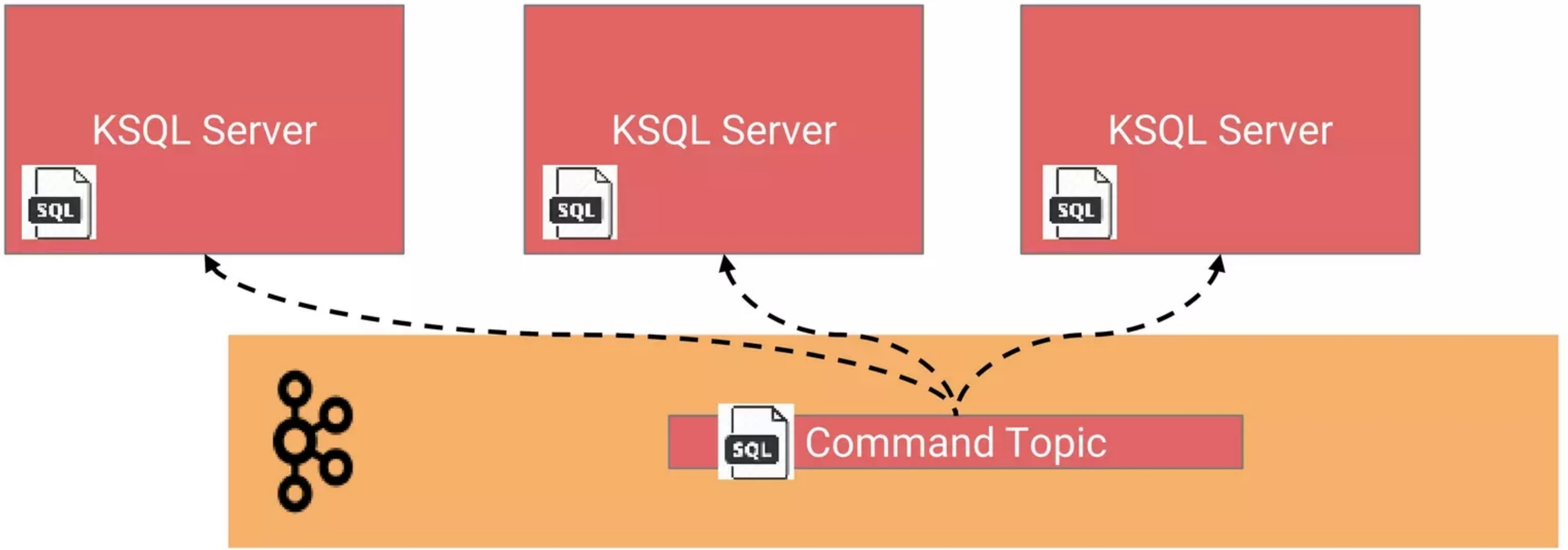


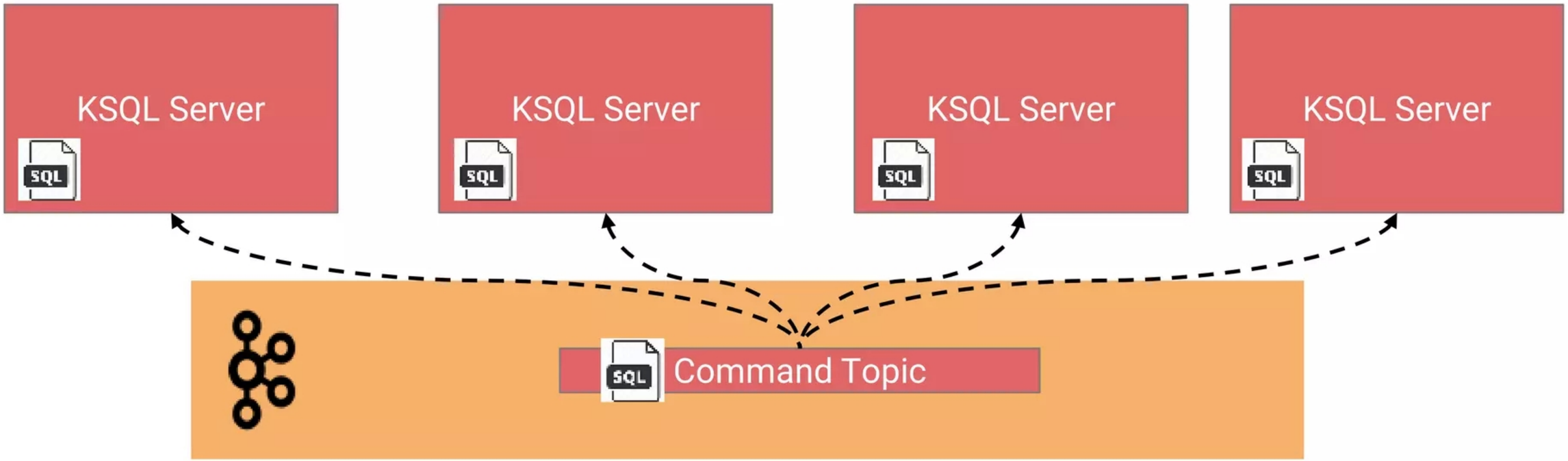
KSQL Deployment

Scale Out:



KSQL Deployment

Scale Out:



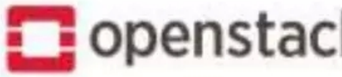
How to run KSQL

KSQL Server
(JVM process)

DEB, RPM, ZIP, TAR downloads
http://confluent.io/ksql

Docker images
confluentinc/cp-ksql-server
confluentinc/cp-ksql-cli


Physical



…and many more…

Resources and Next Steps

http://confluent.io/ksql

http://cnfl.io/slack

confluentinc/ksql