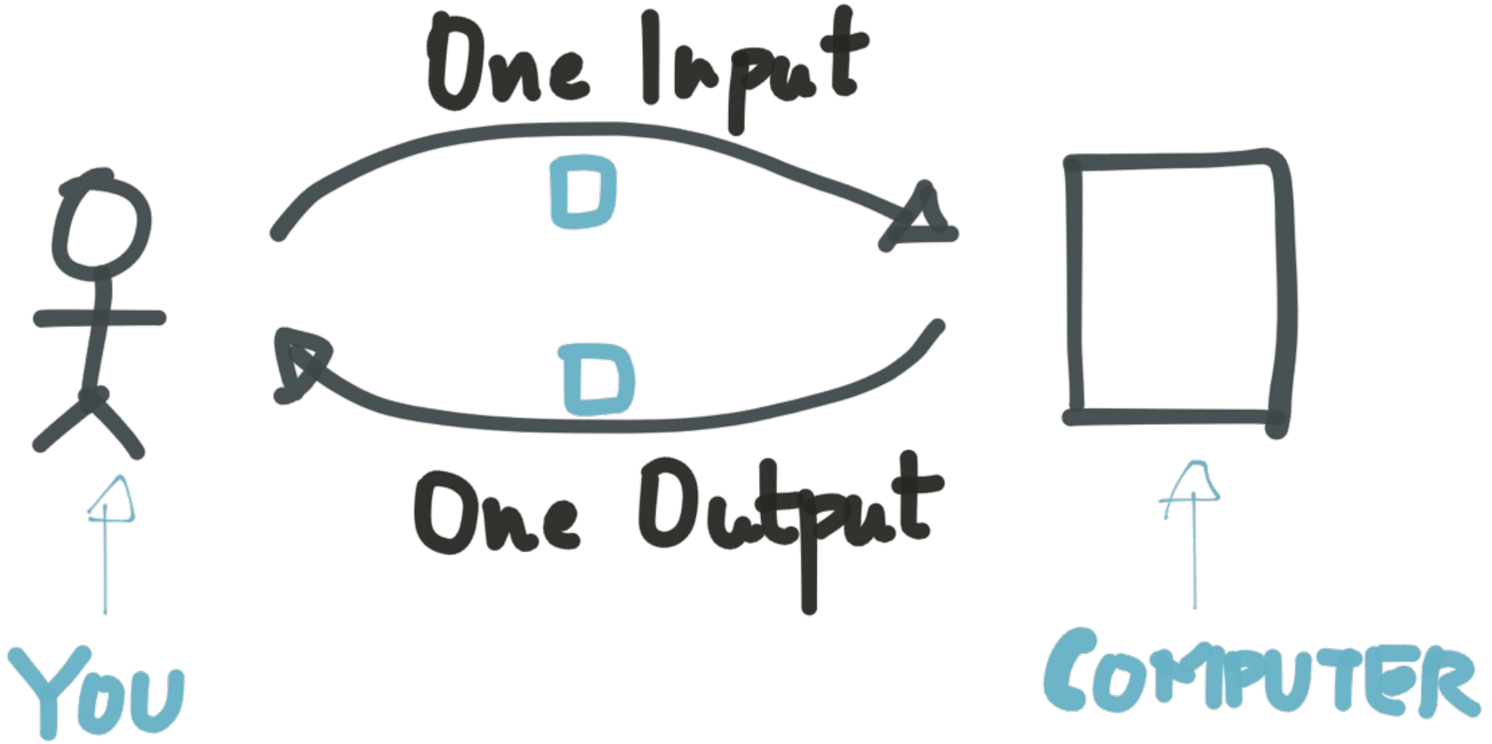
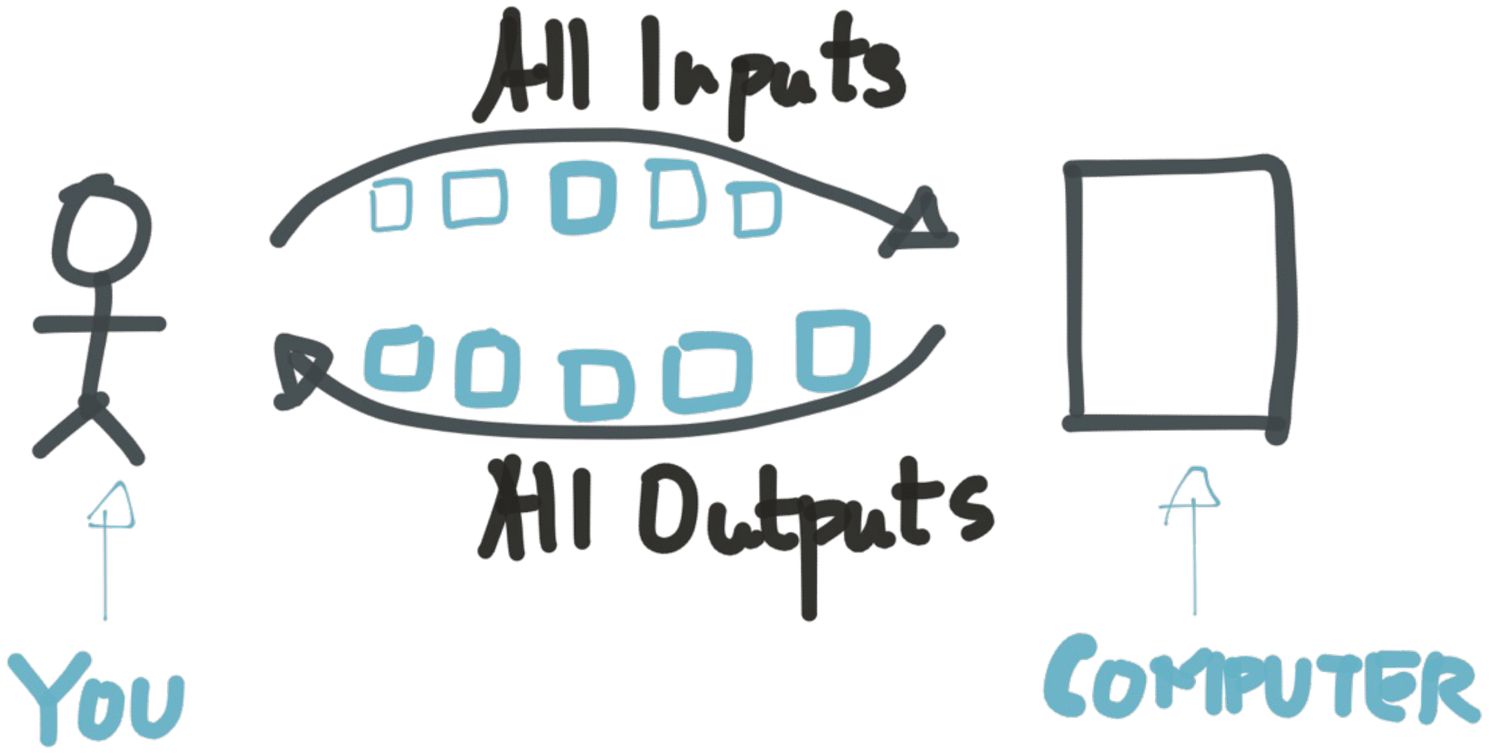
Kafka Streams

Stream processing Made Simple with Kafka

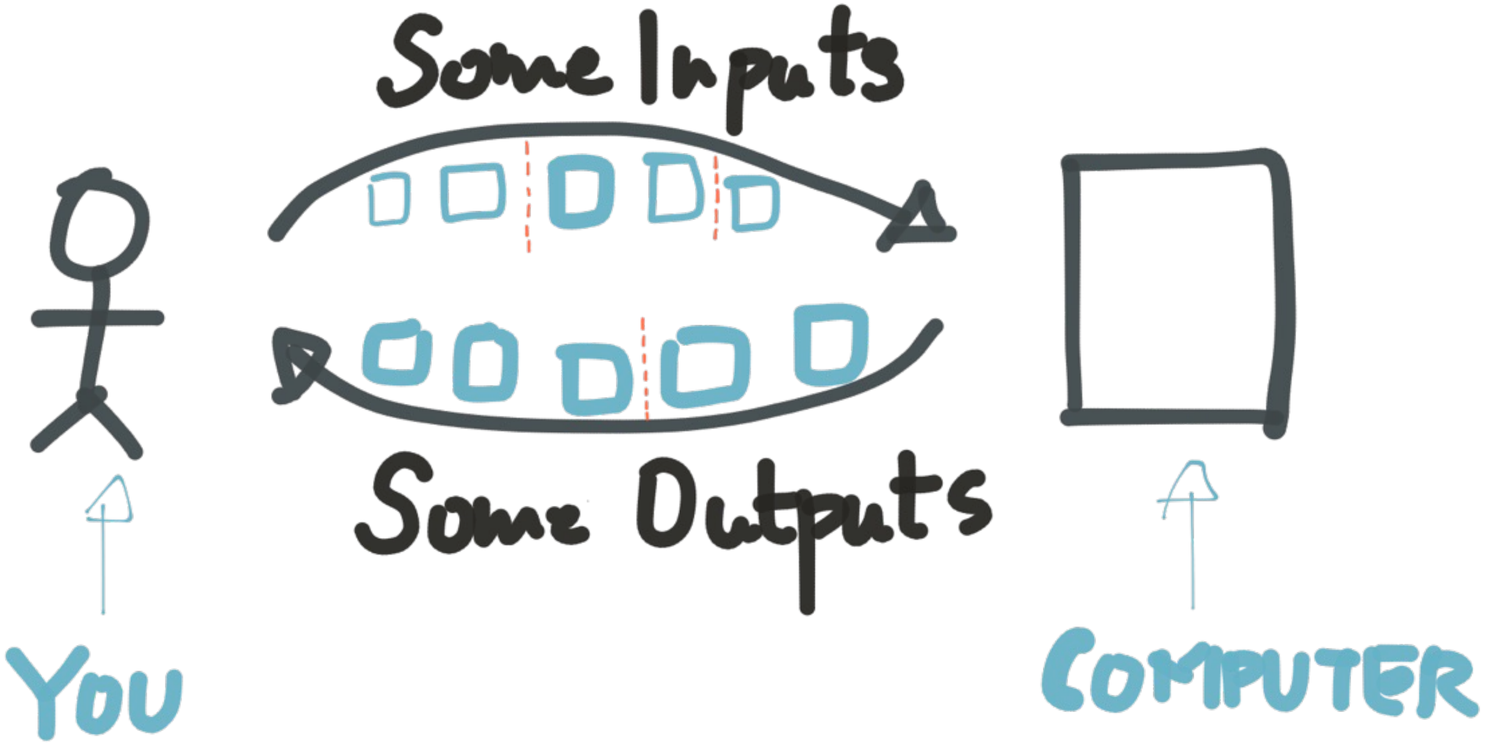
Request / Response



BATCH



Stream Processing



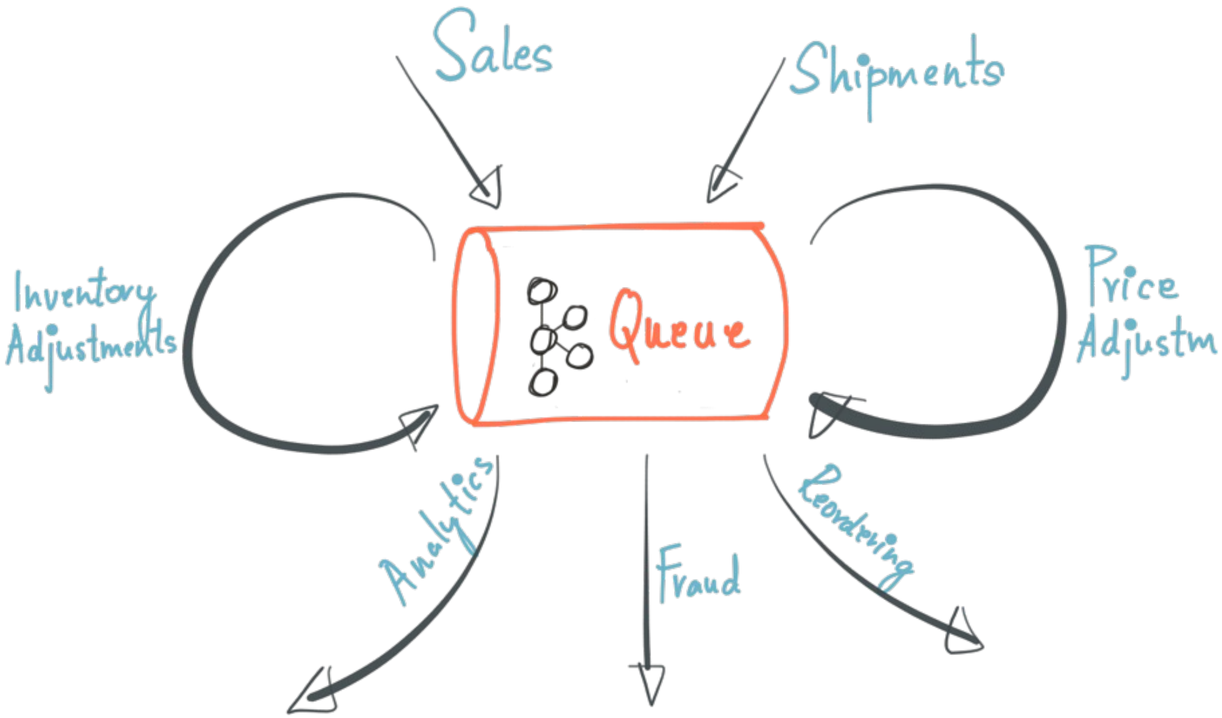
Stream Processing

- *A different programming paradigm*
  - *.. that brings computation to* ***unbounded*** *data*
  - *.. with tradeoffs between latency / cost / correctness*

Kafka Streams is a lightweight, yet powerful Java library for enriching, transforming,and processing real-time streams of data.

Kafka: Real-time Platforms

- *Persistent Buffering*
- *Logical Ordering*
- *Scalable "source-of-truth"*



APIs for moving data to and from Kafka

API	Topic interaction	Examples
Producer API	*Writing* messages to Kafka topics.	• Filebeat • rsyslog • Custom producers
Consumer API	*Reading* messages from Kafka topics.	• Logstash • kafkacat • Custom consumers
Connect API	*Connecting* external data stores, APIs, and filesystems to Kafka topics. Involves both *reading* from topics (sink connectors) and *writing* to topics (source connectors).	• JDBC source connector • Elasticsearch sink connector • Custom connectors

Stream Processing with Kafka

- *Option I: Do It Yourself !*

```
while (isRunning) {
    // read some messages from Kafka
    inputMessages = consumer.poll();

    // do some processing…

    // send output messages back to Kafka
    producer.send(outputMessages);
}
```

DIY Stream Processing

DIY Stream Processing is *Hard*

- ***Ordering***
- ***Partitioning & Scalability***
- ***Fault tolerance***
- ***State Management***
- ***Time,Window & Out-of-order Data***
- ***Re-processing***

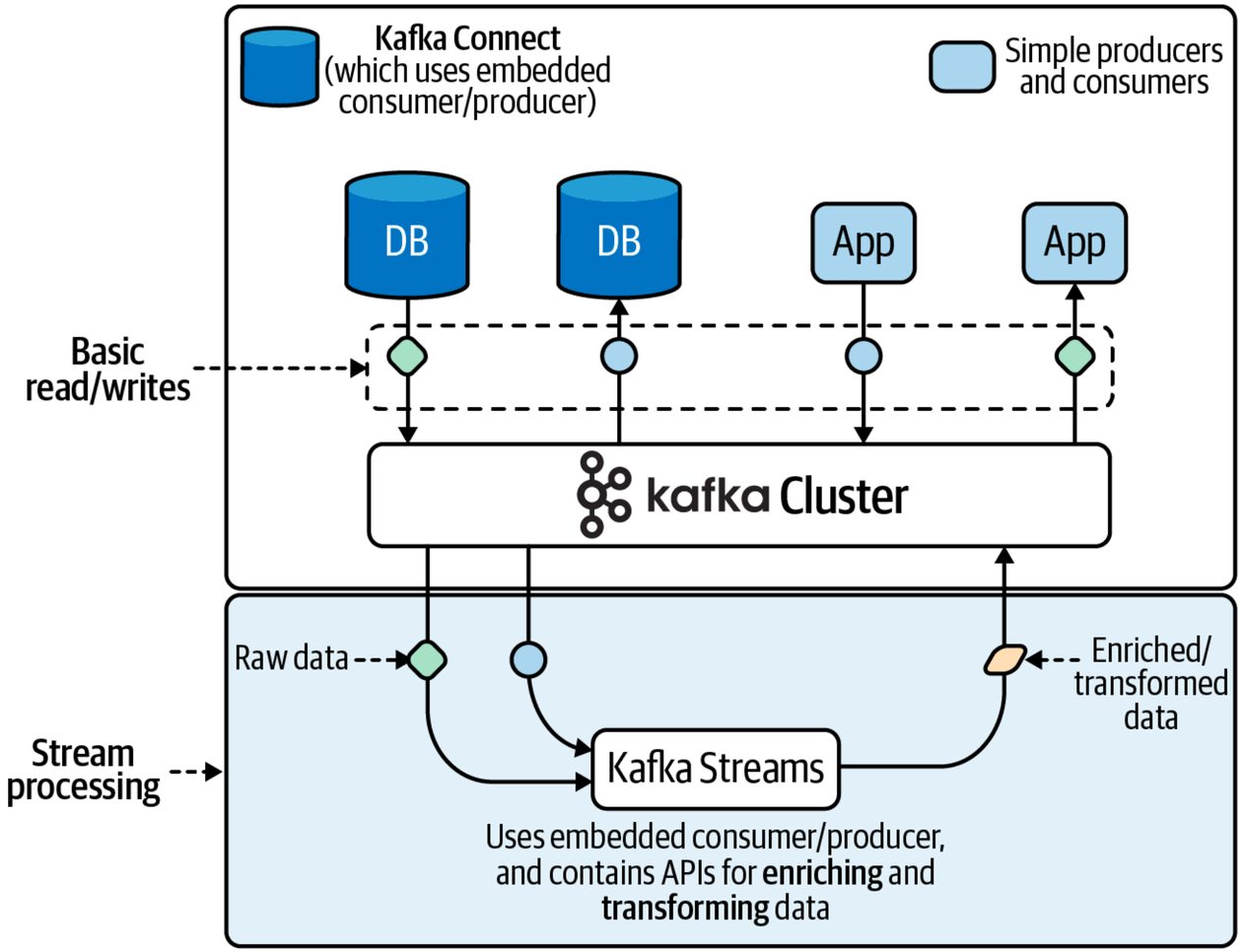
Kafka Streams

- *In Apache Kafka since v0.10, May 2016*
- *Powerful yet easy-to-use stream processing library*
  - *Event-at-a-time, Stateful*
  - *Windowing with out-of-order handling*
  - *Highly scalable, distributed,* fault tolerant
  - *and more..*

Anywhere, anytime

```
<dependency>
  <groupId>org.apache.kafka</groupId>
  <artifactId>kafka-streams</artifactId>
  <version>2.10.0.0</version>
</dependency>
```

Anywhere, anytime



Kafka Streams DSL

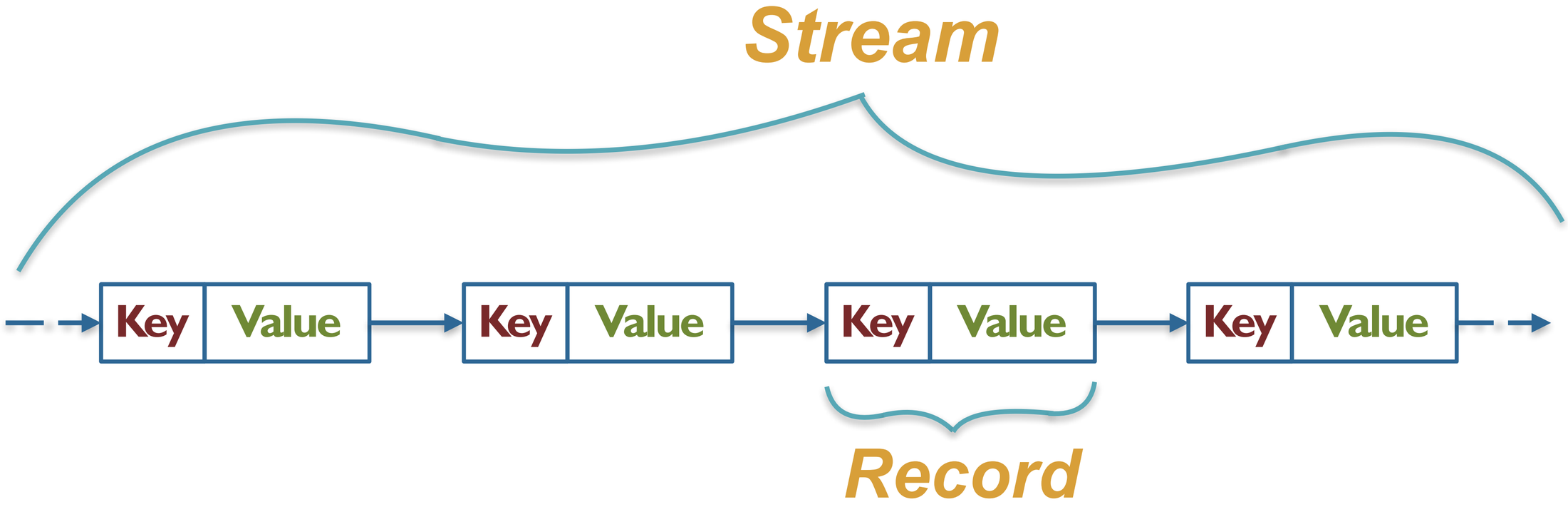
```
public static void main(String[] args) {
    // specify the processing topology by first reading in a stream from a topic
    KStream<String, String> words = builder.stream(”topic1”);

    // count the words in this stream as an aggregated table
    KTable<String, Long> counts = words.countByKey(”Counts”);

    // write the result table to a new topic
    counts.to(”topic2”);

    // create a stream processing instance and start running it
    KafkaStreams streams = new KafkaStreams(builder, config);
    streams.start();
}
```

Native Kafka Integration

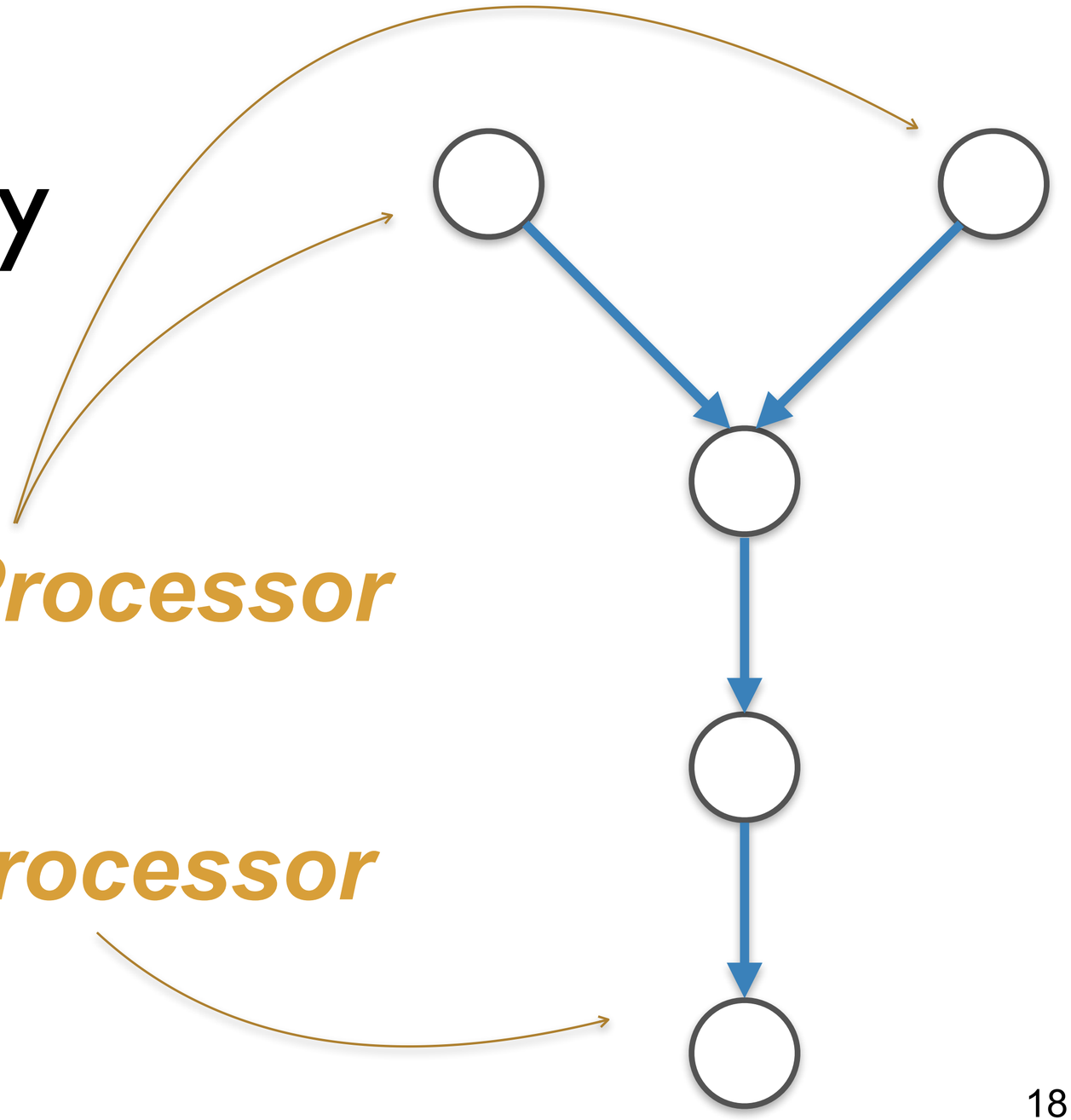
```
Property cfg = new Properties();

cfg.put(StreamsConfig.APPLICATION_ID_CONFIG, “my-streams-app”);
cfg.put(StreamsConfig.BOOTSTRAP_SERVERS_CONFIG, “broker1:9092”);
cfg.put(ConsumerConfig.AUTO_OFFSET_RESET_CONIFG, “earliest”);
cfg.put(CommonClientConfigs.SECURITY_PROTOCOL_CONFIG, “SASL_SSL”);
cfg.put(KafkaAvroSerDeConfig.SCHEMA_REGISTRY_URL_CONFIG, “registry:8081”);

StreamsConfig config = new StreamsConfig(cfg);
final StreamsBuilder builder = new StreamsBuilder();
KafkaStreams streams = new KafkaStreams(builder, config);
```

Kafka Streams: **Key Concepts**

Stream and Records



Processor Topology



Source Processor

```
KStream<..> stream1 = builder.stream(
KStream<..> stream2 = builder.stream(
```

Sink Processor

```
aggregated.to(
```

Stream API features:

- A high-level DSL that looks and feels like Java’s streaming API
- A low-level Processor API that gives developers fine-grained control when they need it.
- Convenient abstractions for modeling data as either streams or tables
- The ability to join streams and tables, which is useful for data transformation and enrichment.
- Support for time-based operations, including windowing and periodic functions.
- Easy installation. It’s just a library, so you can add Kafka Streams to any Java application.
- Scalability, reliability, maintainability

Uses Cases

- Financial data processing (Flipkart), purchase monitoring, fraud detection
- Algorithmic trading
- Stock market/crypto exchange monitoring
- Real-time inventory tracking and replenishment (Walmart)
- Event booking, seat selection (Ticketmaster)
- Email delivery tracking and monitoring (Mailchimp)

`

Lab : Using kafka Stream – 90 Minutes