Programming for Big Data

Apache Kafka and Flume

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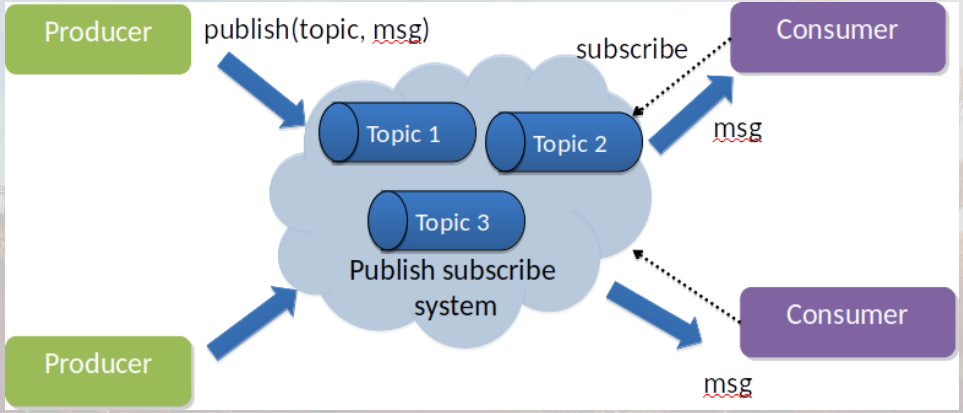
Outline

- Publish-Subscribe
- What is Apache Kafka?
- Messaging Systems in Apache Kafka
- Apache Kafka Architecture
- Apache Kafka Use Cases
- Apache Flume
- Apache Flume Architecture
- Apache Flume – Data Flow
- Apache Kafka vs Flume


Producer
publish(topic, msg)
subscribe
Consumer
Topic 1
Topic 2
msg
Topic 3
Publish subscribe system
Producer
Consumer
msg

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- Kafka provides three main functions to its users:
  1. Publish and subscribe to streams of records.
  2. Effectively store streams of records in the order in which records were generated.
  3. Process streams of records in real time.

- Before moving deep into the Kafka, you must aware of the main terminologies:

Message: In Kafka often we consider data as a set of messages. A message is a simple array of bytes, e.g. csv file.

Producer: Producer is an application that sends messages. It does not send messages directly to the recipient. It send messages only to the Kafka server.

Consumer: It is an application that reads messages from the Kafka server. (i.e. consumers are the recipients.) Consumers should have the permission to read the messages.

Broker: The broker is a Kafka server. One can say that all Kafka does is act as a message broker between producer and consumer, because producer and consumer do not connect directly.

Cluster: Kafka is a distributed system, it act as a cluster. That is, a group of computers sharing workload for common purpose. Each instance contains a Kafka broker.

Topics: A stream of messages belonging to a particular category is called a topic. Data is stored in topics.

Partitions: Kafka Brokers will store messages for a topic. But the capacity of data can be enormous and it may not be possible to store in a single computer.

Offsets: Offset is a sequence of ids given to messages as the arrive at a partition. Once the offset is assigned it will never be changed.

Zookeeper: Zookeeper serves as the coordination interface between the Kafka brokers and consumers.

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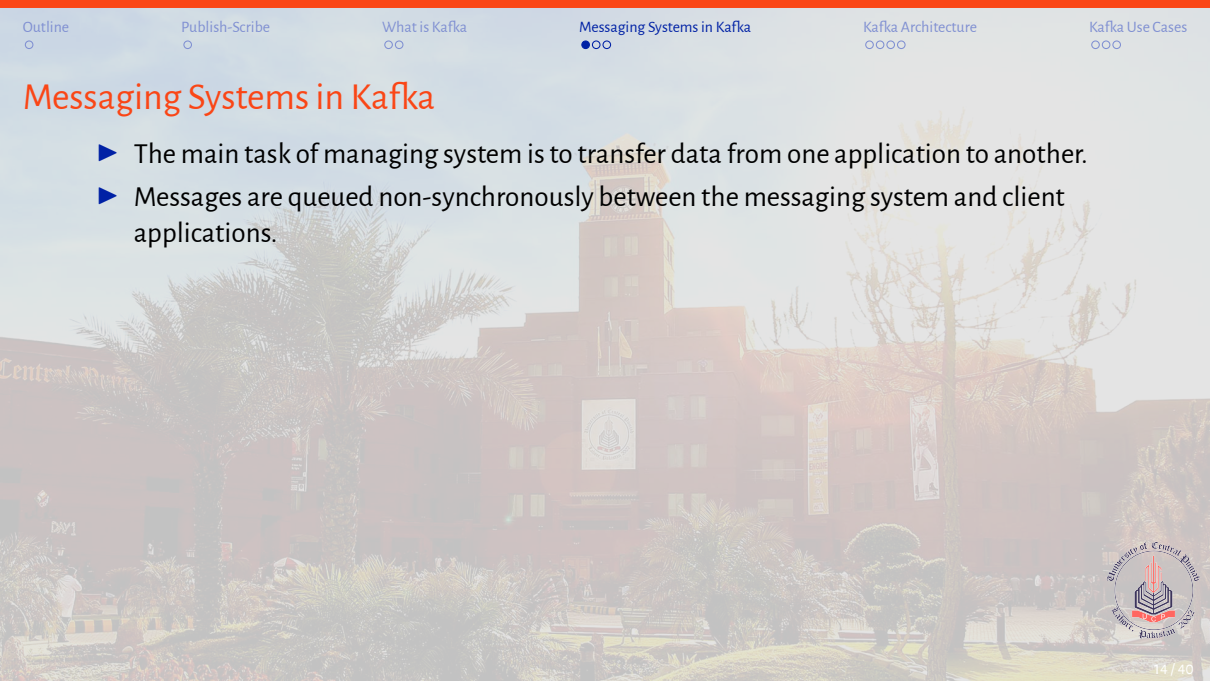

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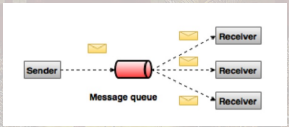
- There are two types of messaging patterns available:
  1. Point to point messaging system.

  2. Publish-subscribe messaging system



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- **The PTP messaging model can be further categorized into two types:**
  1. Fire-and-forget model
  2. Request/reply model

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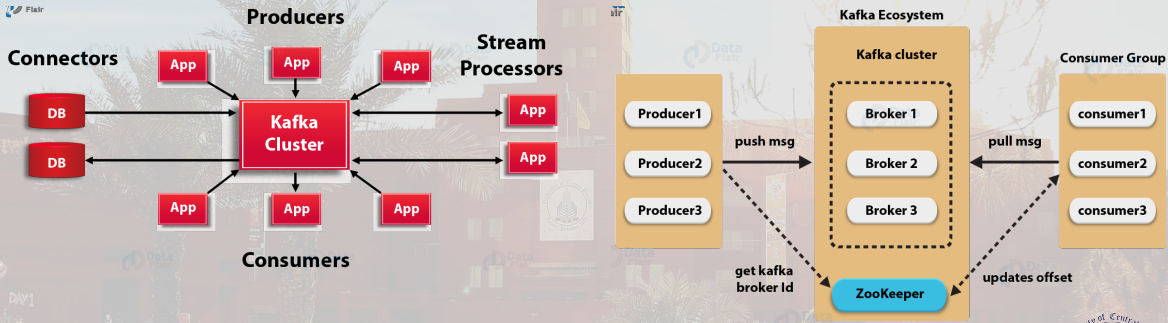
- The Publisher generally does not know and is not aware of which subscribers are receiving the topic messages.

Kafka Architecture



Kafka Architecture

- Apache Kafka Architecture has four core APIs, Producer, Consumer, Streams, and Connector API.

Producer: In order to publish a stream of records to one or more Kafka topics, the Producer API allows an application.

Consumer: This API permits an application to subscribe to one or more topics.

Streams: It consuming an input stream from one or more topics and producing an output stream to one or more output topics.

Connector: While it comes to building and running reusable producers or consumers that connect Kafka topics to existing applications or data systems, we use the Connector API.

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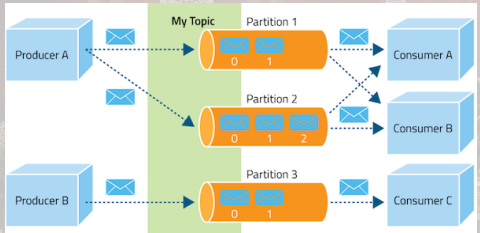
  6. We can not change or update data, as soon as it gets published.



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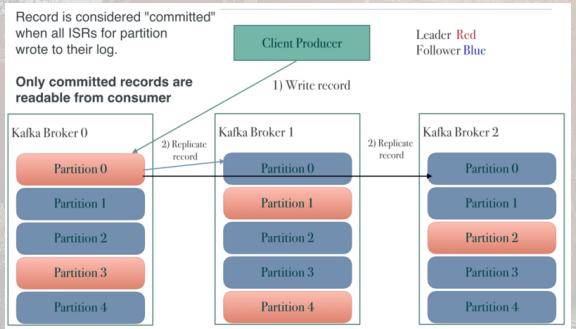
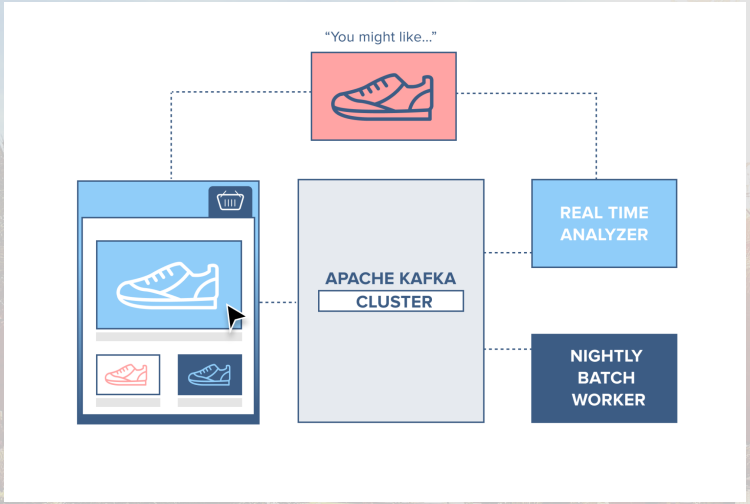
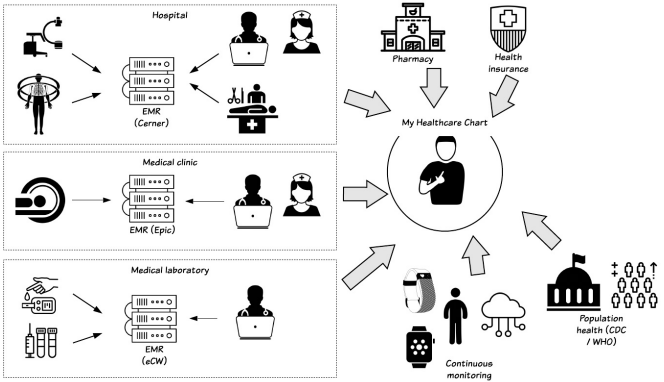


Kafka Use Cases – eshop



Kafka Use Cases – Healthy AI



Thank You