Stream Processing

Stream processing deals with the ability to understand and process a continuous stream of data and produce insights in real time.

Source:
Streaming Processing with Kafka Streams
lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Streaming Processing Pattern

- **Streaming Analytics**
- **Alerts and Thresholds**
- **Leaderboard**
- **Real-Time Predictions**

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Streaming Analytics

Analyze streaming data in real time and publish insights for consumption by real-time dashboards and actions.

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Streaming analytics: Use Cases

- **Ecommerce**: orders and activities
- **Health care**: patient vitals summary
- **IT operations**: system/service load
- **Media**: sentiment analysis
- **Online education**: student engagement

Source:
Streaming Processing with Kafka Streams
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Streaming analytics: Example

- **Input Kafka Topic**: real-time orders
- **JSON input**:
  - orderID, product, quantity, price
- **Goal**: every five seconds
  - Product wise total value (quantity * price)
- **Write to MariaDB table**

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Alerts and Thresholds

Analyze streaming data in real-time to compare against thresholds, then publish exceptions to spezial output streams.

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Alerts and Thresholds: Use Cases

- **Ecommerce**: aborted shopping carts by product
- **Health care**: vitals going beyond normal thresholds
- **IT operations**: failures above thresholds
- **Media**: negative reactions by topic
- **Online education**: session aborted by geography

Source:
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Alerts and Thresholds: Example

- **Input Kafka Topic**: real-time exception logs
- **CSV input**:
  - Timestamp, code, level message
- **Goal 1**: when LEVEL=CRITICAL
  - Send to topic for critical alerts
- **Goal 2**: when same code occurs two times in 10 seconds
  - Send summary to topic for high-volume alerts

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Leaderboard

Analyze streaming data in real-time and update and maintain a leaderboard that shows the top X elements.

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Leaderboard: Use Cases

- **Ecommerce**: top trending products
- **Health care**: top causes diagnosed across hospital
- **IT operations**: top exception codes
- **Media**: top trending topics
- **Online education**: top currently viewed videos

Source:
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lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Leaderboard: Example

- **Input Kafka Topic**: gaming scores by player
- **Key-value input**:
  - Player = score increment
- **Goal** : maintain a player leaderboard based on the current total scores

Source:
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lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Real-Time Predictions

Analyze streaming data in real-time to predict outcomes and behavior and publish them to outgoing streams.

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Real-Time Predictions: Use cases

- **Ecommerce**: product recommendations
- **Health care**: triaging
- **IT operations**: system/service failures
- **Media**: recommendations
- **Online education**: student engagement

Source:
Streaming Processing with Kafka Streams
lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Real-Time Predictions: Example

- **Input Kafka Topic**: user reviews
- **Text input**:
  - Review-ID = review-content
- **Goal** : use an HTTP service to predict sentiment of each reviewnd publish the sentiments to an outgoing topic

Source:
Streaming Processing with Kafka Streams
lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Another Example Use Case

- A technical website that publishes articles on various topics
- For each article view, a clickstream event is generated after the user completes reading
- Compute five-seconds user summaries for total minutes and print to console
- Maintain topic leaderboard by views

Source:
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lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern

Another Example Use Case (Leaderboard)

- **Source Data**
- **Kafka Topic**: streaming.views.input
  - Timestamp
  - User
  - Topic
  - Minutes

Source:
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lhttps://www.linkedin.com/learning/stream-processing-design-patterns-with-kafka-streams/streaming-analytics-pattern