Aalto University
School of Science

Streaming Data Processing with Apache Flink[1] [2]

Hong-Tri Nguyen
Department of Computer Science
hong-tri.nguyen@aalto.fi

CS-E4640 Big Data Platforms, Spring 2025
March 17, 2025

[1] https://flink.apache.org/
[2] https://github.com/rdsea/bigdataplatforms/blob/master/tutorials/streamingwithflink/

Outline

Flink

Dirty your hand

Peparation

At home

Slide streaming process

Download and run

- Flink -v 1.20.1 (binary file)
- RabbitMQ (docker image) – not work for Flink 1.20
- Kafka -v 3.9.0 (binary file)
- BTS (csv dataset)

At class

Dirty hand with Flink

- Flink setting
- An example usecase with a dataset

Introduce the concept

Apache Flink is a framework and distributed processing engine for stateful computations over unbounded and bounded data streams.

- Stream Processing with Unbounded Streams, Bounded Streams
- Stateful Computations: it can maintain and update state information as events are processed.
- Exactly-Once Semantics: in the event of a failure, it guarantees state is neither duplicated nor lost, providing strong reliability guarantees.

Why need this tools[3]

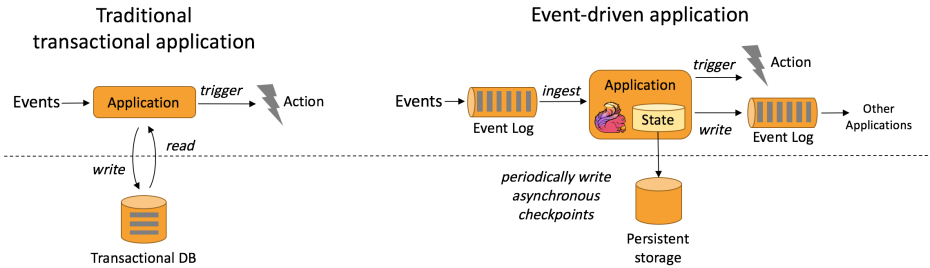


Figure: Event-driven applications

Why need this tools[3]

Traditional

Use cases

- Fraud detection
- Anomaly detection
- Rule-based alerting
- Business process monitoring
- Social network

Event-driven application

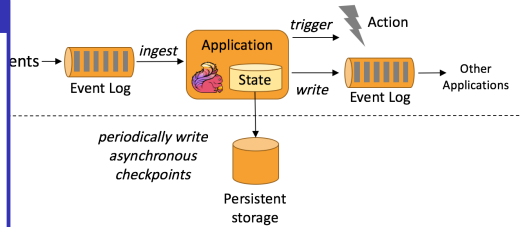
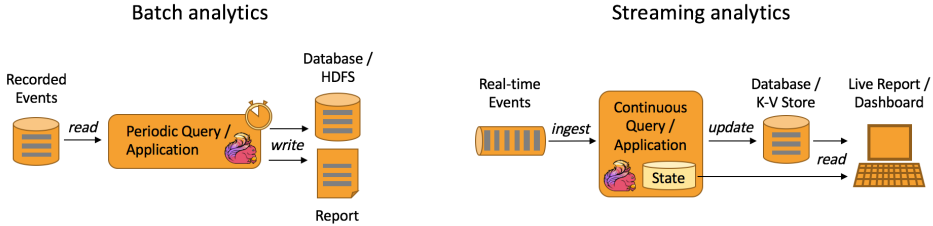


Figure: Event-driven applications

[3] https://flink.apache.org/what-is-flink/use-cases/

Why need this tools[4]

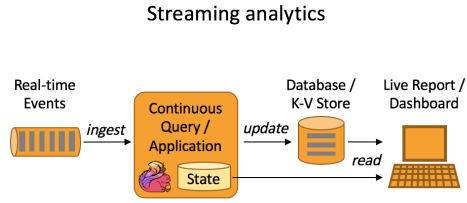


[4] https://flink.apache.org/what-is-flink/use-cases/

Why need this tools[4]

Use cases for data analytic

- Quality monitoring of Telco networks
- Analysis of product updates & experiment evaluation in mobile applications
- Ad-hoc analysis of live data in consumer technology
- Large-scale graph analysis



[4] https://flink.apache.org/what-is-flink/use-cases/

Why need this tools[5]

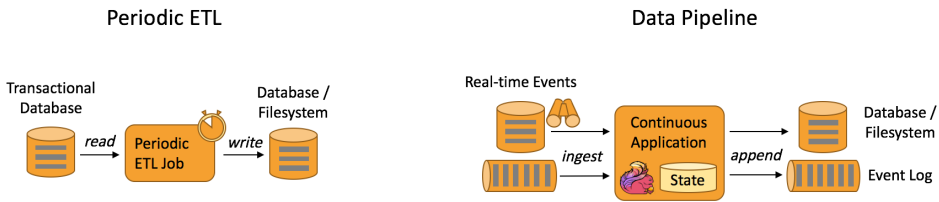


Figure: Data pipeline applications

[5] https://flink.apache.org/what-is-flink/use-cases/

Why need this tools[5]

Use cases for data pipeline

- Real-time search index building in e-commerce
- Continuous ETL in e-commerce

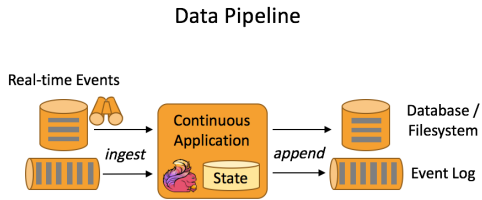


Figure: Data pipeline applications

[5] https://flink.apache.org/what-is-flink/use-cases/

Errors

- Dependencies of versions
- Kafka[6]

[6] https://nightlies.apache.org/flink/flink-docs-release-1.20/docs/connectors/datastream/kafka/

Ready for Dirty Hand?

Basic cases

1. Settup Flink for practices
2. Play arround with a csv dataset (BST dataset)

1. Settup Flink for practices

Download and run

Down flink v 1.20.1

start ./bin/start-cluster.sh

stop ./bin/stop-cluster.sh

job ./bin/flink run examples/streaming/WordCount.jar

Kafka producer and consumer

Producer topic and address

Consumer topic and address

2. Play around with a CSV dataset (BST dataset)

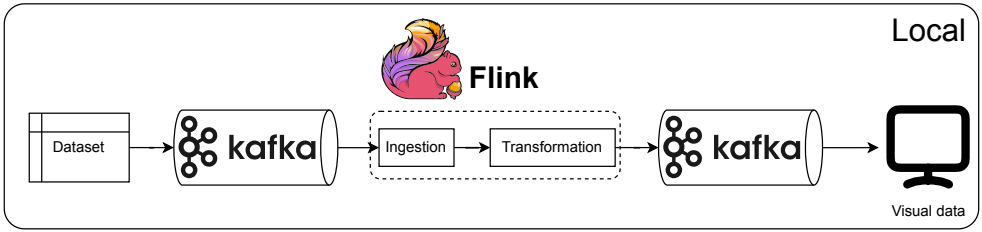


Figure: All local setting

3. Play around with a CSV dataset (BST dataset)

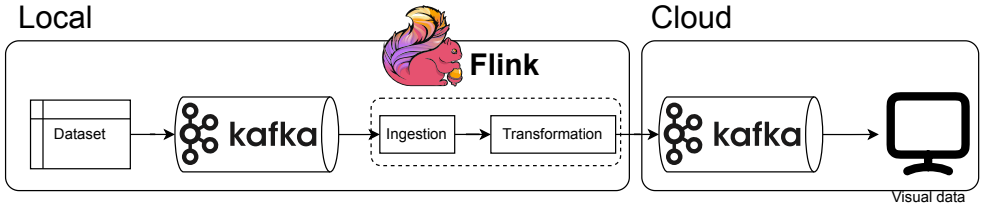


Figure: Work with a Kafka-based messageQ in cloud