UNIVERSIDADE DE COIMBRA
FACULDADE DE CIÊNCIAS E TECNOLOGIA
Departamento de Engenharia Informática

Project #3
Integração de Sistemas/
Enterprise Application Integration

2021/22 – 1st Semester
MEI, MES

Deadline: 2021-12-10

Nota: A fraude denota uma grave falta de ética e constitui um comportamento não admissível num estudante do ensino superior e futuro profissional. Qualquer tentativa de fraude pode levar à reprovação na disciplina tanto do facilitador como do prevaricador.

MUITO IMPORTANTE: o código entregue pelos alunos vai ser submetido a um sistema de deteção de fraudes.

VERY IMPORTANT: the code delivered by students will be submitted to a fraud detection system.

Message Oriented Middleware (MOM) and Kafka Streams

Objectives

- Learn how to create simple asynchronous and message-oriented applications.
- Learn to use Kafka Streams.

Resources

Apache Kafka Introduction: https://kafka.apache.org

Kafka Streams: https://kafka.apache.org/documentation/streams/

Apache Kafka Tutorial:
https://www.tutorialspoint.com/apache_kafka/apache_kafka_simple_producer_example.htm

Look for the Kafka and Kafka Streams materials available on UC Sutdent.

Make sure you understand the following concepts:

- Producer
- Consumer
- Topic

- Partition and partition offset
- Broker
- Zookeper

Kafka Training (doesn't count for evaluation)

1. You should start by installing Kafka (or find out where it is installed if you are using a container).

2. You may look at the reading material suggested before and follow that material to have a basic example running with a producer and consumer.

3. What happens to the messages that arrive at the topic, before the subscriber makes the subscription?

4. How do you change the type of data of the keys and values that you send?

5. How do you configure different partitions inside a topic?

6. What is the point of Consumer Groups? How do they work?

7. Now, read the Kafka Streams tutorial and run the example that counts the words that go through a stream.

8. Refer to the following blog message for this and the following exercises:

   https://eai-course.blogspot.com/2018/11/playing-with-kafka-streams.html

   Use Kafka Streams to count the events that happened for a given key. Display the result as 'k->v' in the final stream.

9. Now sum all the values that showed up for each key.

10. Use a materialized view to do range queries on the sums on a separate service.

11. Now, control the time considered in the stream to be 1 minute.

12. How could you send complex data instead of primitive types?

13. Use the Kafka Connect application to periodically fetch data from a database table (source). You can find help for this operation in the following blog message:

    https://eai-course.blogspot.com/2019/11/how-to-configure-kafka-connectors.html

14. Now do the inverse operation: send from a topic to a database table (sink).