Connecting Kafka to Spark Streaming

In this lab, we will develop a program that reads the streaming data off the Kafka topic and counts the words. The aspects that will be captured in the following code are as follows:

Prereq

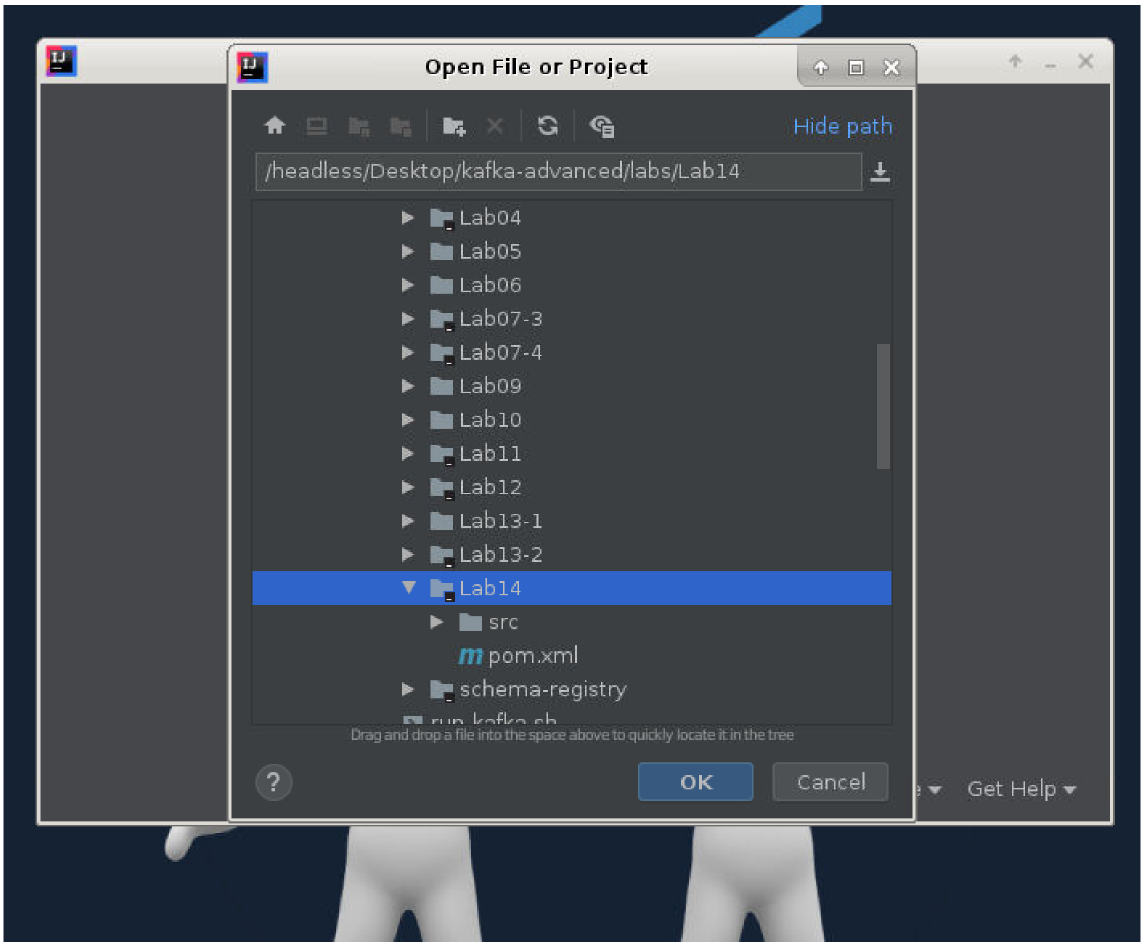
Zookeeper and apache kafka should be running.

Lab Solution

Complete solution for this lab is available in the following directory:

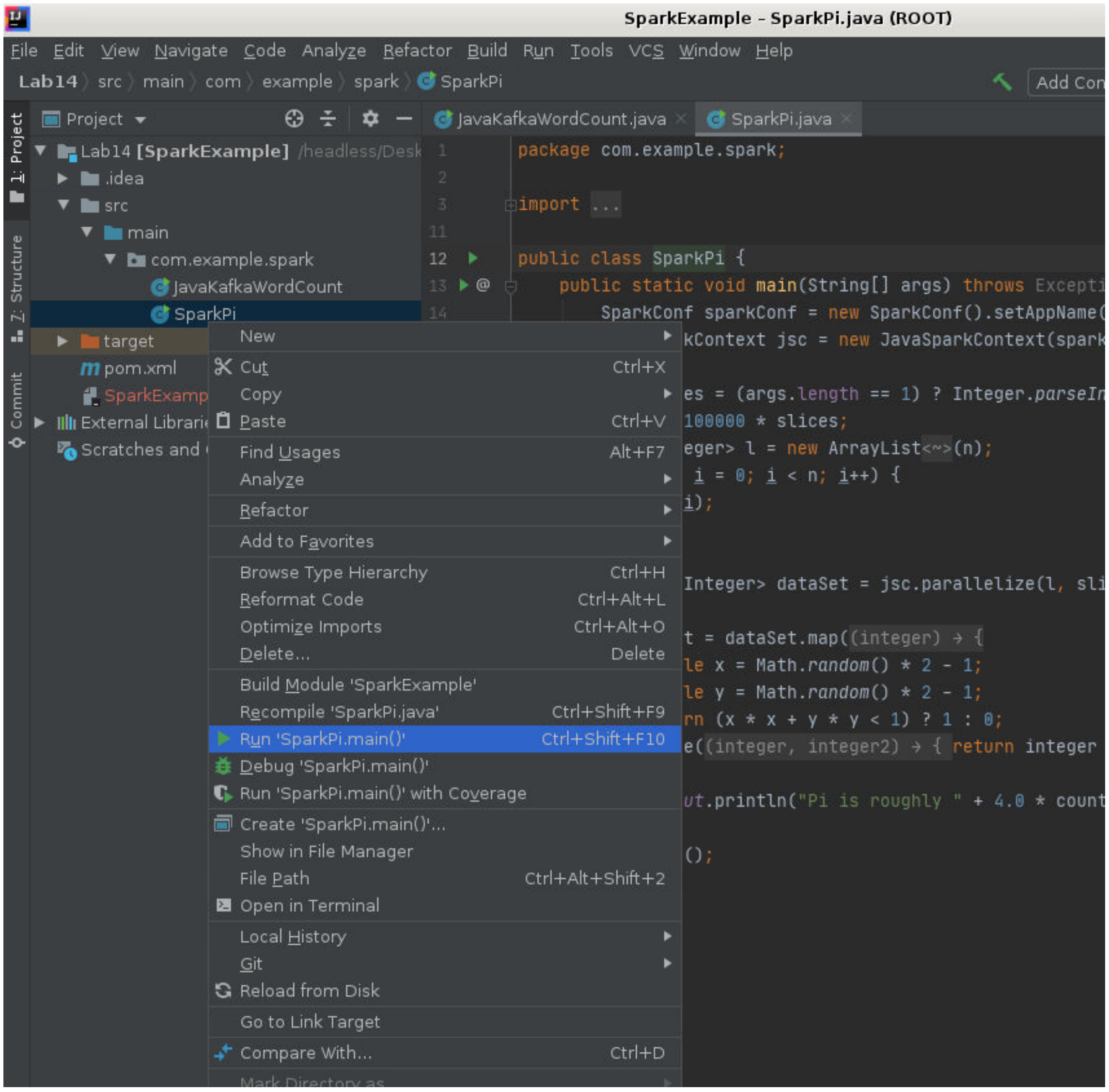
```
cd ~/kafka-advanced/labs/Lab14

mvn clean compile
```

Open solution in IntelliJ IDE:



SparkPi Example

Open project folder in IntelliJ and run the program as shown below:



```
package com.example.spark;

import ...

public class SparkPi {
    public static void main(String[] args) throws Excepti
        SparkConf sparkConf = new SparkConf().setAppName(
kContext jsc = new JavaSparkContext(spark

es = (args.length == 1) ? Integer.parseIn
100000 * slices;
eger> l = new ArrayList<~>(n);
 i = 0; i < n; i++) {
i);


Integer> dataSet = jsc.parallelize(l, sli

t = dataSet.map((integer) → {
le x = Math.random() * 2 - 1;
le y = Math.random() * 2 - 1;
rn (x * x + y * y < 1) ? 1 : 0;
e((integer, integer2) → { return integer

ut.println("Pi is roughly " + 4.0 * count

();
```

JavaKafkaWordCount Example

Complete solution for this example is present in `JavaKafkaWordCount.java` file.

Let's take a look at the following code:

```
package com.example.spark;
Import files:
import java.util.Collection;
import java.util.HashMap;
import java.util.Iterator;
import java.util.Map;
import java.util.regex.Pattern;

import org.apache.spark.SparkConf;
import org.apache.spark.api.java.function.Function;
import org.apache.spark.streaming.Duration;
import org.apache.spark.streaming.api.java.JavaDStream;
import org.apache.spark.streaming.api.java.JavaPairReceiverInputDStream;
import org.apache.spark.streaming.api.java.JavaStreamingContext;
import org.apache.spark.streaming.kafka.KafkaUtils;
import org.codehaus.jackson.map.DeserializationConfig.Feature;
import org.codehaus.jackson.map.ObjectMapper;
import org.codehaus.jackson.type.TypeReference;

import scala.Tuple2;

Then main classes:
public class JavaKafkaWordCount {
private static final Pattern SPACE = Pattern.compile("");

private JavaKafkaWordCount() {
}

@SuppressWarnings("serial")
public static void main(String[] args) throws InterruptedException {
//    if (args.length < 4) {
//      System.err.println("Usage: JavaKafkaWordCount <zkQuorum><group><topics>
<numThreads>");
//      System.exit(1);
//    }
```

Defining arrays:

```
args = new String[4];
    args[0]="localhost:2181";
    args[1]= "1";
    args[2]= "test";
    args[3]= "1";
```

We define the methods:

```
    SparkConf sparkConf = new
SparkConf().setAppName("JavaKafkaWordCount").setMaster("local[2]");
    // Create the context with a 1 second batch size
    JavaStreamingContext jssc = new JavaStreamingContext(sparkConf, new
Duration(20000));
```

The translation for the arguments:

```
    int numThreads = Integer.parseInt(args[3]);
    Map<String, Integer> topicMap = new HashMap<String, Integer>();
    String[] topics = args[2].split(",");
    for (String topic: topics) {
      topicMap.put(topic, numThreads);
    }
```

Receive the parameters:

```
    JavaPairReceiverInputDStream<String, String> messages =
            KafkaUtils.createStream(jssc, args[0], args[1], topicMap);

    final JavaDStream<String> lines = messages.map(new Function<Tuple2<String,String>,
String>() {
@Override
public String call(Tuple2<String, String> v1) throws Exception {
ObjectMapper objectMapper = new ObjectMapper();
objectMapper.configure(Feature.USE_ANNOTATIONS, false);
Map<String,String> mapValue = objectMapper.readValue(v1._2(), new
TypeReference<Map<String,String>>() {
});
```

Adapt the types of variables:

```
Collection<String> values = mapValue.values();
String finalString = "";
for (Iterator<String> iterator = values.iterator(); iterator.hasNext();) {
String value = iterator.next();
if(finalString.length()==0){
finalString = finalString +value;
}else {
finalString = finalString+","+ value;
}
}
```

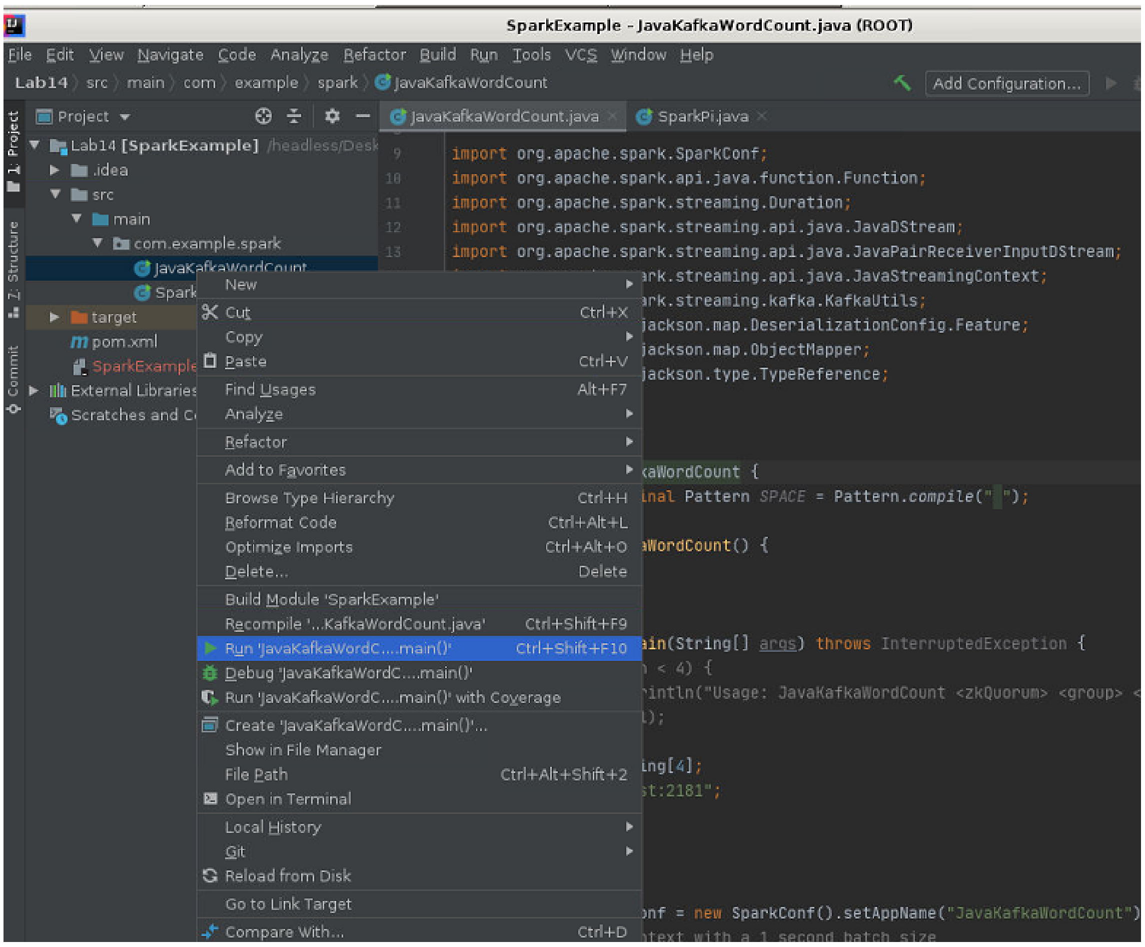
Return function with parameters:

```
return finalString;
}
});

    lines.print();
    new Thread(){
public void run() {
while(true){
try {
Thread.sleep(1000);
} catch (InterruptedException e) {
// TODO Auto-generated catch block
e.printStackTrace();
}
System.out.println("######################################################################

}
};
    }.start();

    jssc.start();
    jssc.awaitTermination();
  }
```

```
}
```

Run Kafka Spark Application

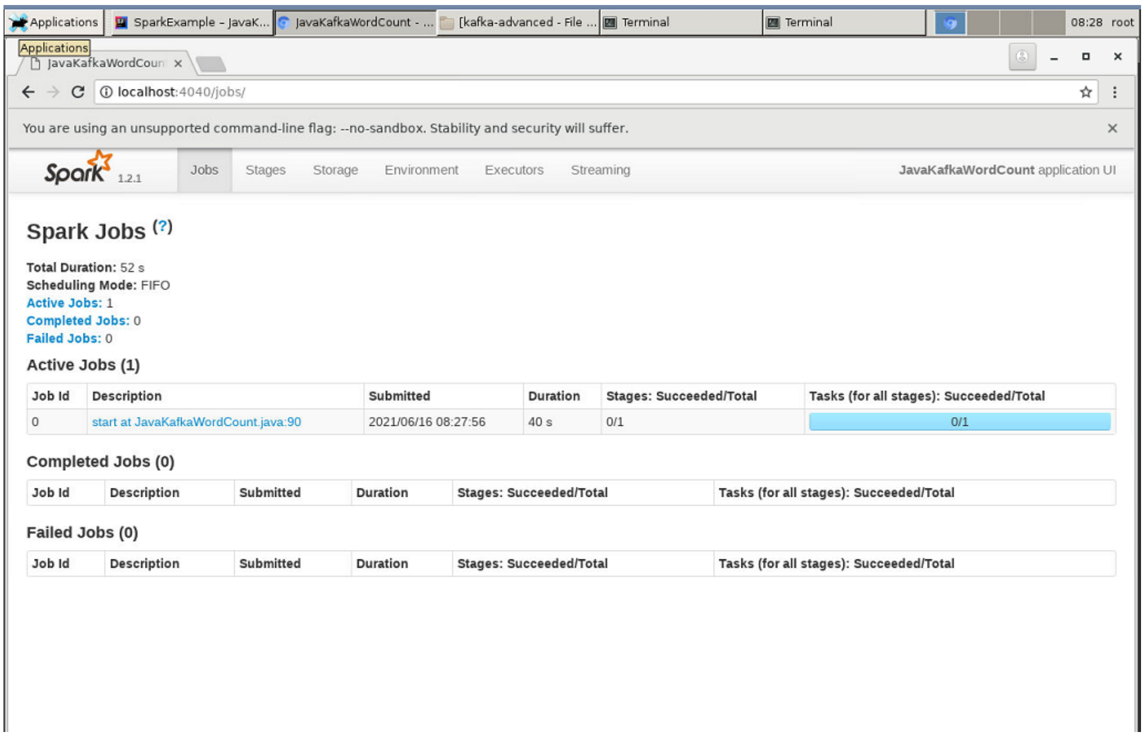
1. Run the program as shown below:



```
import org.apache.spark.SparkConf;
import org.apache.spark.api.java.function.Function;
import org.apache.spark.streaming.Duration;
import org.apache.spark.streaming.api.java.JavaDStream;
import org.apache.spark.streaming.api.java.JavaPairReceiverInputDStream;
ark.streaming.api.java.JavaStreamingContext;
ark.streaming.kafka.KafkaUtils;
jackson.map.DeserializationConfig.Feature;
jackson.map.ObjectMapper;
jackson.type.TypeReference;

kaWordCount {
inal Pattern SPACE = Pattern.compile(" ");

aWordCount() {

ain(String[] args) throws InterruptedException {
n < 4) {
rintln("Usage: JavaKafkaWordCount <zkQuorum> <group> <
1);

ing[4];
st:2181";

onf = new SparkConf().setAppName("JavaKafkaWordCount")
ntext with a 1 second batch size
```

SparkExample - JavaKafkaWordCount.java (ROOT)
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
Lab14 src main com example spark JavaKafkaWordCount
Add Configuration...
Project
JavaKafkaWordCount.java
SparkPi.java
Lab14 [SparkExample] /headless/Desk
.idea
src
main
com.example.spark
JavaKafkaWordCount
Spark
target
pom.xml
SparkExample
External Libraries
Scratches and Co
1: Project
7: Structure
Commit
New
Cut Ctrl+X
Copy
Paste Ctrl+V
Find Usages Alt+F7
Analyze
Refactor
Add to Favorites
Browse Type Hierarchy Ctrl+H
Reformat Code Ctrl+Alt+L
Optimize Imports Ctrl+Alt+O
Delete... Delete
Build Module 'SparkExample'
Recompile '...KafkaWordCount.java' Ctrl+Shift+F9
Run 'JavaKafkaWordC....main()' Ctrl+Shift+F10
Debug 'JavaKafkaWordC....main()'
Run 'JavaKafkaWordC....main()' with Coverage
Create 'JavaKafkaWordC....main()'...
Show in File Manager
File Path Ctrl+Alt+Shift+2
Open in Terminal
Local History
Git
Reload from Disk
Go to Link Target
Compare With... Ctrl+D

2. Enter `http://localhost:4040` in browser after running java program:



Applications | SparkExample – JavaK... | JavaKafkaWordCount - ... | [kafka-advanced - File ... | Terminal | Terminal | 08:28 root

localhost:4040/jobs/

You are using an unsupported command-line flag: --no-sandbox. Stability and security will suffer.

Spark 1.2.1 | Jobs | Stages | Storage | Environment | Executors | Streaming | **JavaKafkaWordCount** application UI

Spark Jobs (?)

Total Duration: 52 s
Scheduling Mode: FIFO
Active Jobs: 1
Completed Jobs: 0
Failed Jobs: 0

Active Jobs (1)

Job Id	Description	Submitted	Duration	Stages: Succeeded/Total	Tasks (for all stages): Succeeded/Total
0	start at JavaKafkaWordCount.java:90	2021/06/16 08:27:56	40 s	0/1	0/1

Completed Jobs (0)

Job Id	Description	Submitted	Duration	Stages: Succeeded/Total	Tasks (for all stages): Succeeded/Total

Failed Jobs (0)

Job Id	Description	Submitted	Duration	Stages: Succeeded/Total	Tasks (for all stages): Succeeded/Total