

Lab 6.7: Implementing a priority queue with consumer.assign()



Welcome to the session 6 lab 7. The work for this lab is done in `~/kafka-training/labs/lab6.7`. In this lab, you are going to implement a priority queue with `consumer.assign()`.

Lab Using consumer.assign to implement a priority queue

In this lab, you will implement a priority processing queue. You will use `consumer.partitionsFor(TOPIC)` to get a list of partitions. Usage like this simplest when the partition assignment is also done manually using `assign()` instead of `subscribe()`. Use `assign()`, pass a `TopicPartition` from the consumer worker. Use the `Partitioner` from an earlier example for Producer so only important stocks get sent to the important partition.

Using partitionsFor() for Priority Queue

`~/kafka-training/labs/lab6.7/src/main/java/com/fenago/kafka/consumer/ConsumerMain.java`

Kafka Consumer: ConsumerMain.main

```
package com.fenago.kafka.consumer;

import com.fenago.kafka.StockAppConstants;
import com.fenago.kafka.model.StockPrice;
import org.apache.kafka.clients.consumer.Consumer;
import org.apache.kafka.clients.consumer.ConsumerConfig;
import org.apache.kafka.clients.consumer.KafkaConsumer;
import org.apache.kafka.common.serialization.StringDeserializer;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

import java.util.ArrayList;
import java.util.List;
import java.util.Properties;
import java.util.concurrent.ExecutorService;
import java.util.concurrent.TimeUnit;
import java.util.concurrent.atomic.AtomicBoolean;
import java.util.stream.IntStream;

import static com.fenago.kafka.StockAppConstants.TOPIC;
import static java.util.concurrent.Executors.newFixedThreadPool;

public class ConsumerMain {
    ...
    public static void main(String... args) throws Exception {

        final List<PartitionInfo> partitionInfos =
createConsumer().partitionsFor(TOPIC);

        final int threadCount = partitionInfos.size();
```

```

final int workerThreads = 3;

final ExecutorService executorService = newFixedThreadPool(threadCount);
final AtomicBoolean stopAll = new AtomicBoolean();
final List<Consumer> consumerList = new ArrayList<>(threadCount);

IntStream.range(0, threadCount).forEach(index -> {
    final Consumer<String, StockPrice> consumer = createConsumer();

    final PartitionInfo partitionInfo = partitionInfos.get(index);

    final boolean importantPartition =
        partitionInfo.partition() == partitionInfos.size() - 1;

    final int workerCount = importantPartition ? workerThreads * 3 :
workerThreads;

    final StockPriceConsumerRunnable stockPriceConsumer =
        new StockPriceConsumerRunnable(consumer,
            100, index, stopAll, workerCount);
    consumerList.add(consumer);
    executorService.submit(stockPriceConsumer);
});

//Register nice shutdown of thread pool, then close consumer.
Runtime.getRuntime().addShutdownHook(new Thread(() -> {
    logger.info("Stopping app");
    stopAll.set(true);
    sleep();
    consumerList.forEach(Consumer::wakeup);
    executorService.shutdown();
    try {
        executorService.awaitTermination(5_000, TimeUnit.MILLISECONDS);
        if (!executorService.isShutdown())
            executorService.shutdownNow();
    } catch (InterruptedException e) {
        logger.warn("shutting down", e);
    }
    sleep();
    consumerList.forEach(Consumer::close);
}));
}

...
}

```

Notice that the index is the topic partition. Num threads are the partition count, and the priority partition gets extra workers.

Using assign() for Priority Queue

~/kafka-training/labs/lab6.7/src/main/java/com/fenago/kafka/consumer/StockPriceConsumerRunnable.java

Kafka Consumer: StockPriceConsumerRunnable.runConsumer

```

package com.fenago.kafka.consumer;

import com.fenago.kafka.model.StockPrice;
import org.apache.kafka.clients.consumer.*;
import org.apache.kafka.common.TopicPartition;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

import java.util.Collections;
import java.util.Map;
import java.util.concurrent.*;
import java.util.concurrent.atomic.AtomicBoolean;

import static com.fenago.kafka.StockAppConstants.TOPIC;

public class StockPriceConsumerRunnable implements Runnable {
    ...
    private void runConsumer() throws Exception {

        consumer.assign(Collections.singleton(topicPartition));

        final Map<String, StockPrice> lastRecordPerStock = new ConcurrentHashMap<>();

        int readCount = 0;
        while (isRunning()) {
            pollRecordsAndProcess(lastRecordPerStock, readCount);
            readCount++;
        }
    }
    ...
}

```

Lab Work

Use the slides for Session 6 as a guide.

ACTION - EDIT `src/main/java/com/fenago/kafka/consumer/ConsumerMain.java` and follow the instructions in the file.

ACTION - EDIT `src/main/java/com/fenago/kafka/consumer/StockPriceConsumerRunnable.java` and follow the instructions in the file.

ACTION - RECREATE the topic with five partitions (HINT: `bin/create-topic.sh`) and use 5 partitions.

ACTION - RUN ZooKeeper and Brokers if needed.

ACTION - RUN ConsumerMain from IDE

ACTION - RUN StockPriceKafkaProducer from IDE

ACTION - OBSERVE and then STOP consumers and producer

Expected behavior

It should run and should get messages like this:

Expected output

```
New ConsumerRecords par count 1 count 153, max offset
ticker IBM price 66.59 Thread 4
ticker UBER price 241.94 Thread 4
```

```
New ConsumerRecords par count 1 count 220, max offset
ticker ABC price 95.85 Thread 2
ticker BBB price 53.36 Thread 2
ticker FFF price 70.34 Thread 2
```

```
New ConsumerRecords par count 1 count 318, max offset
ticker GOOG price 458.44 Thread 0
ticker DDD price 68.38 Thread 0
ticker SUN price 91.90 Thread 0
ticker INEL price 65.94 Thread 0
```

```
New ConsumerRecords par count 1 count 364, max offset
ticker AAA price 66.53 Thread 1
ticker DEF price 65.94 Thread 1
ticker EEE price 70.34 Thread 1
ticker XYZ price 65.94 Thread 1
```

Try the following

Try using different worker pool sizes and different consumer thread pool sizes. Try adding a small wait for the processing. Try 10ms. It should all run. Stop consumer and producer when finished.