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# Streams for Apache Kafka Break-Fix Lab

Red Hat Streams for Apache Kafka 2.7 BF4821L

Student Workbook  
Edition 1

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Edition 1

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# Introduction

## Streams for Apache Kafka Break-Fix Lab

This lesson is a collection of scenarios whereby antipatterns are demonstrated to cause erroneous behaviour. Students are guided (and encouraged to further research) the behaviour, establish root cause, and sanitise the issues.

### *Course Objectives*

- Identify antipatterns in configuration and application development.
- Correct configuration, code, and behaviour to adhere to best practices.

### *Audience*

- Application Developers
- Infrastructure Engineers

### *Prerequisites*

- AD482 - Developing Event-driven Applications with Apache Kafka and Red Hat AMQ Streams

# Chapter 1. Introduction to Break-Fix Labs

## Goal

Configure the lab environment to support the break-fix session.

## Sections

- Deploying Streams for Apache Kafka (Guided Exercise)

# 1.1. Guided Exercise Deploying Streams for Apache Kafka

Perform initial configuration of projects and artifacts.

## Outcomes

- Ensure the lab environment is configured for the labs.
- Test operation of the environment.

## Instructions

1. Ensure prerequisites are on your system:

- Java 17 (or 21) SDK
- Streams for Apache Kafka 2.7.0
- some sort of IDE (such as Visual Studio Code)

### NOTE

You can download Streams for Apache Kafka from <https://developers.redhat.com/products/streams-for-apache-kafka/download/>.

2. Clone the Git repository with source code and lab materials.

1. Create a working directory, for example **labs**.

```
$ mkdir labs  
$ cd labs
```

2. Extract the Streams for Kafka ZIP file here. Rename the directory to just **kafka** for easier use.

```
$ unzip -q ~/Downloads/amq-streams-2.7.0-bin.zip  
  
$ mv kafka_2.13-3.7.0.redhat-00007 kafka
```

### NOTE

Use your own download location, it might be different than **~/Downloads** for you.

3. Clone the Git repository into the working directory.

```
$ git clone https://github.com/benko/streams-bf-lab-materials/  
Cloning into 'streams-bf-lab-materials'...  
remote: Enumerating objects: 297, done.  
remote: Counting objects: 100% (297/297), done.  
remote: Compressing objects: 100% (113/113), done.
```

```
remote: Total 297 (delta 92), reused 291 (delta 86), pack-reused 0 (from 0)
Receiving objects: 100% (297/297), 36.70 KiB | 3.06 MiB/s, done.
Resolving deltas: 100% (92/92), done.
```

#### NOTE

If you get an error saying the files can not be cloned, use the `-b main` option to force Git to switch to the `main` branch immediately.

4. Copy the broker and Zookeeper properties from materials to working directory.

```
$ cp streams-bf-lab-materials/labs/broker* \
  streams-bf-lab-materials/labs/zookeeper.properties .

$ ls -l
total 32
-rw-r--r--@ 1 johndoe  staff  926 10 Sep 14:31 broker0.properties
-rw-r--r--@ 1 johndoe  staff  926 10 Sep 14:31 broker1.properties
-rw-r--r--@ 1 johndoe  staff  926 10 Sep 14:31 broker2.properties
drwxr-xr-x@ 9 johndoe  staff  288 10 Sep 14:36 kafka/
-rw-r--r--@ 1 johndoe  staff  101 10 Sep 14:31 zookeeper.properties
```

3. Start the Kafka broker cluster, each service in a separate window/tab.

1. Start Zookeeper first.

```
$ ./kafka/bin/zookeeper-server-start.sh zookeeper.properties
[2024-09-11 22:15:50,105] INFO Reading configuration from:
./zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-09-11 22:15:50,112] INFO clientPortAddress is 0.0.0.0:2181
(org.apache.zookeeper.server.quorum.QuorumPeerConfig)
...
```

2. Start each of the three brokers.

```
$ ./kafka/bin/kafka-server-start.sh broker0.properties
[2024-09-11 22:15:58,087] INFO Registered kafka:type=kafka.Log4jController MBean
(kafka.utils.Log4jControllerRegistration$)
[2024-09-11 22:15:58,338] INFO Setting -D
jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS
renegotiation (org.apache.zookeeper.common.X509Util)
[2024-09-11 22:15:58,416] INFO Registered signal handlers for TERM, INT, HUP
(org.apache.kafka.common.utils.LoggingSignalHandler)
[2024-09-11 22:15:58,420] INFO starting (kafka.server.KafkaServer)
...
```

```
$ ./kafka/bin/kafka-server-start.sh broker1.properties
[2024-09-11 22:15:58,087] INFO Registered kafka:type=kafka.Log4jController MBean
```



```
(kafka.utils.Log4jControllerRegistration$)
[2024-09-11 22:15:58,338] INFO Setting -D
jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS
renegotiation (org.apache.zookeeper.common.X509Util)
[2024-09-11 22:15:58,416] INFO Registered signal handlers for TERM, INT, HUP
(org.apache.kafka.common.utils.LoggingSignalHandler)
[2024-09-11 22:15:58,420] INFO starting (kafka.server.KafkaServer)
...
```

```
$ ./kafka/bin/kafka-server-start.sh broker2.properties
[2024-09-11 22:15:58,087] INFO Registered kafka:type=kafka.Log4jController MBean
(kafka.utils.Log4jControllerRegistration$)
[2024-09-11 22:15:58,338] INFO Setting -D
jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS
renegotiation (org.apache.zookeeper.common.X509Util)
[2024-09-11 22:15:58,416] INFO Registered signal handlers for TERM, INT, HUP
(org.apache.kafka.common.utils.LoggingSignalHandler)
[2024-09-11 22:15:58,420] INFO starting (kafka.server.KafkaServer)
...
```

**NOTE**

When stopping the services, always do it in reverse order (broker2 first, etc., then Zookeeper last).

3. Test communication. Request a list of topics in the broker cluster.

```
$ ./kafka/bin/kafka-topics.sh --bootstrap-server localhost:9092 --list
```

**NOTE**

The command is expected to produce a blank line as its output - we have not created any topics yet.

This concludes this exercise.

# Chapter 2. Kafka Producer and Consumer Clients

## Goal

Learn how to use the producer and consumer applications. Familiarize yourself with the additional scripts.

## Sections

- Getting to know the client apps and tools.

## 2.1. Getting to know the client apps and tools.

### Objectives

- Learn about the various command-line options for the client apps.
- Familiarize yourself with the result processing scripts.

### About the Producer and Consumer applications

#### Producer

The producer application is available in the `code/core-api-producer/` directory.

It supports the following application-specific properties that affect its behaviour:

- `producer.topic`, the topic to send records to, defaults to `test-topic`
- `producer.num-rolls`, number of send cycles, defaults to `1`
- `producer.num-records-per-roll`, number of records per send cycle, defaults to `100`
- `producer.wait-after-roll`, the amount of time (ms) to wait after each cycle, defaults to `5000`
- `producer.wait-after-send`, the amount of time (ms) to wait after each send, defaults to `500`

The following producer options can also be controlled from the command line:

- `producer.acks`, acknowledgments to request, defaults to `all`
- `producer.max-inflight`, maximum unacknowledged messages, defaults to `5`
- `producer.idempotent`, idempotency setting, defaults to `true` if the above two are `all` and at most `5`, otherwise `false`
- `producer.batch`, the maximum number of messages in a batch, defaults to `16384`
- `producer.linger`, the amount of time (ms) to wait for more messages before sending the batch anyway, defaults to `0`
- `producer.retries`, the number of send retries when encountering an error, defaults to `2147483647`
- `producer.delivery-timeout`, overall delivery timeout (linger + retry backoff + request timeout), defaults to `120000`

#### Consumer

The consumer application is available in the `code/core-api-consumer/` directory.

It supports the following application-specific properties that affect its behaviour:

- `consumer.topic`, the topic to receive records from, defaults to `test-topic`
- `consumer.poll-period`, maximum amount of time (ms) to wait for messages to arrive in one poll, defaults to `1000`

- `consumer.wait-after-recv`, the amount of time (ms) to wait after each batch is received, defaults to `0`
- `consumer.wait-period`, when receiving a `wait` command, the amount of time (ms) to block for, defaults to `5000`
- `consumer.local-id`, when writing log files, the sequence to append to the name, defaults to `-1` (meaning no suffix)
- `consumer.payload-trunc`, when starting up, whether to truncate the payload log, defaults to `false`

The following consumer options can also be controlled from the command line:

- `consumer.group-id`, the consumer group to announce, defaults to `test-app`
- `consumer.instance-id`, consumer instance ID, defaults to `null`
- `consumer.auto-commit`, whether to automatically commit offsets, defaults to `true`
- `consumer.ac-interval`, how often (in ms) to commit offsets, defaults to `5000`
- `consumer.fetch-min-bytes`, minimum amount of data to fetch, defaults to `1`
- `consumer.assignment-strategy`, partition assignment strategy, one of `cooperative`, `range`, `rr`, and `sticky` (default is `cooperative`)
- `consumer.heartbeat-interval`, how often to report liveness to broker (in ms), defaults to `3000`
- `consumer.session-timeout`, how long (in ms) before the consumer is disconnected for lack of heartbeat, defaults to `45000`
- `consumer.auto-offset-reset`, what to do when no consumer offsets are found in the broker, defaults to `latest`, can also be `earliest` or `none` (but do not use `none`)

## Other Tools

A couple of scripts exist to aid you in collecting the logs and cleaning up after a session.

- `get-logs.sh` will sort both producer and consumer logs and store them into `producer.log` and `consumer.log` next to the script
- `remove-logdirs.sh` will remove all broker and Zookeeper data, it should be executed from the same directory where the broker property files are

## REFERENCES

[Break-Fix Labs Client Apps and Tools on GitHub](#)