Event Driven Architecture - JMS et KAFKA

Systèmes Distribués

Réalisé par :

Anas Nedday

Encadré par :

Mohamed YOUSSFI

Introduction

Kafka et Spring Cloud Stream sont deux technologies puissantes et très utilisées dans le domaine de la gestion des flux de données en temps réel. Lorsqu'elles sont combinées, elles offrent une solution robuste et flexible pour la création, la gestion et le traitement de flux de données en toute simplicité. Kafka, en tant que système de messagerie distribué, permet de stocker et de diffuser des flux de données, tandis que Spring Cloud Stream, une extension du framework Spring, simplifie le développement d'applications orientées flux en fournissant un modèle de programmation abstrait.

L'intégration de Kafka avec Spring Cloud Stream offre un ensemble de fonctionnalités pour la création d'applications de traitement de flux de données de manière efficace. Cela permet aux développeurs de se concentrer sur la logique métier de leurs applications sans se soucier des complexités liées à la gestion des flux de données. Dans cette introduction, nous explorerons comment Kafka et Spring Cloud Stream se complètent mutuellement pour créer un écosystème de traitement de flux de données puissant et évolutif, et nous discuterons de certaines des utilisations courantes de cette combinaison dans le monde de l'informatique moderne.

INSTALLATION KAFKA :

Lien d'installation : https://www.apache.org/dyn/closer.cgi?path=/kafka/3.6.0/kafka_2.13-3.6.0.tgz

We suggest the following location for your download:

https://dlcdn.apache.org/kafka/3.6.0/kafka_2.13-3.6.0.tgz

Alternate download locations are suggested below.

It is essential that you verify the integrity of the downloaded file using the PGP signature (`.asc` file) or a hash (`.md5` or `.sha*` file).

HTTP

https://dlcdn.apache.org/kafka/3.6.0/kafka_2.13-3.6.0.tgz

BACKUP SITES

https://dlcdn.apache.org/kafka/3.6.0/kafka_2.13-3.6.0.tgz

VERIFY THE INTEGRITY OF THE FILES

It is essential that you verify the integrity of the downloaded file using the PGP signature (`.asc` file) or a hash (`.md5` or `.sha*` file). Plea Verifying Apache Software Foundation Releases for more information on why you should verify our releases.

Quick start : https://kafka.apache.org/quickstart

STEP 1: GET KAFKA

```
$ tar -xzf kafka_2.13-3.6.0.tgz

$ cd kafka_2.13-3.6.0
```

```
Last login: Sun Oct 15 21:05:00 on ttys003
(base) nedday@MBP-de-Anas ~ % ls
AndroidStudioProjects          JavaProject              Postman              Tutoriel XGBooST.ipynb      hdfs
Applications                   Learn XML                ProjetACP            Uber Data Model.ipynb       kafka_2.13-3.6.0
Cisco Packet Tracer 8.2.0      Library                  Public               VirtualBox VMs              kafka_2.13-3.6.0.tgz
Data                           LogisticRegression       PycharmProjects      XGBOOST                     opt
Desktop                        Machine Learning         PythonExcelApp       cs                          sqoop
DjangoProject                  Movies                   PythonProject        dossier sans titre          sqoop-1.4.7.bin__hadoop-2.6.0
Documents                      Music                    RegressionLinéaire   dump.rdb                    sqoop-1.4.7.bin__hadoop-2.6.0.tar.gz
Downloads                      ONEE DATA ANALYST        Repos                eclipse                     tkinter-excel-app-main 2
Forest-ttk-theme-master        PacketTracer7            Sites                eclipse-workspace
Gestion-de-Vente               Pandas-Data-Science-Tasks-master  SoapUI-Tutorials  hadoop-3.3.4
IdeaProjects                   Pictures                 Tutorial Pyspark     hdata
(base) nedday@MBP-de-Anas ~ % cd kafka_2.13-3.6.0
```

STEP 2: START THE KAFKA ENVIRONMENT

Kafka with ZooKeeper:

```
bin/zookeeper-server-start.sh config/zookeeper.properties
```

```
(base) nedday@MBP-de-Anas ~ % cd kafka_2.13-3.6.0
(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/zookeeper-server-start.sh config/zookeeper.properties

[2023-10-15 21:01:55,007] INFO Reading configuration from: config/zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,010] WARN config/zookeeper.properties is relative. Prepend ./ to indicate that you're sure! (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,013] INFO clientPortAddress is 0.0.0.0:2181 (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,013] INFO secureClientPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,013] INFO observerMasterPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,013] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,015] INFO autopurge.snapRetainCount set to 3 (org.apache.zookeeper.server.DatadirCleanupManager)
[2023-10-15 21:01:55,015] INFO autopurge.purgeInterval set to 0 (org.apache.zookeeper.server.DatadirCleanupManager)
[2023-10-15 21:01:55,015] INFO Purge task is not scheduled. (org.apache.zookeeper.server.DatadirCleanupManager)
[2023-10-15 21:01:55,015] WARN Either no config or no quorum defined in config, running in standalone mode (org.apache.zookeeper.server.quorum.QuorumPeerMain)
[2023-10-15 21:01:55,016] INFO Log4j 1.2 jmx support not found; jmx disabled. (org.apache.zookeeper.jmx.ManagedUtil)
[2023-10-15 21:01:55,017] INFO Reading configuration from: config/zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,017] WARN config/zookeeper.properties is relative. Prepend ./ to indicate that you're sure! (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,017] INFO clientPortAddress is 0.0.0.0:2181 (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,017] INFO secureClientPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,017] INFO observerMasterPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,018] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2023-10-15 21:01:55,018] INFO Starting server (org.apache.zookeeper.server.ZooKeeperServerMain)
[2023-10-15 21:01:55,044] INFO ServerMetrics initialized with provider org.apache.zookeeper.metrics.impl.DefaultMetricsProvider@197d671 (org.apache.zookeeper.server.ServerMetrics)
[2023-10-15 21:01:55,047] INFO ACL digest algorithm is: SHA1 (org.apache.zookeeper.server.auth.DigestAuthenticationProvider)
[2023-10-15 21:01:55,047] INFO zookeeper.DigestAuthenticationProvider.enabled = true (org.apache.zookeeper.server.auth.DigestAuthenticationProvider)
[2023-10-15 21:01:55,054] INFO zookeeper.snapshot.trust.empty : false (org.apache.zookeeper.server.persistence.FileTxnSnapLog)
[2023-10-15 21:01:55,063] INFO  (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,063] INFO   _____                _                       (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,063] INFO  |___  /              | |                      (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO     / /  ___   ___   | | __ ___   ___  _ __    (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO    / /  / _ \ / _ \  | |/ // _ \ / _ \| '_ \   (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO   / /__| (_) | (_) | |   < |  __/|  __/| |_) |  (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO  /_____|\___/ \___/  |_|\_\ \___| \___|| .__/  (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO                                        | |     (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO                                        |_|     (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,064] INFO  (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,149] INFO Server environment:zookeeper.version=3.8.2-139d619b58292d7734b4fc83a0f44be4e7b0c986, built on 2023-07-05 19:24 UTC (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,151] INFO Server environment:host.name=mbp-de-anas (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,151] INFO Server environment:java.version=19 (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,151] INFO Server environment:java.vendor=Oracle Corporation (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,151] INFO Server environment:java.home=/Users/nedday/Library/Java/JavaVirtualMachines/openjdk-19/Contents/Home (org.apache.zookeeper.server.ZooKeeperServer)
[2023-10-15 21:01:55,151] INFO Server environment:java.class.path=/Users/nedday/kafka_2.13-3.6.0/bin/../libs/activation-1.1.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/aopalliance-repackaged-2.6
jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/argparse4j-0.7.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/audience-annotations-0.12.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/caffeine-2.9.
ar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/checker-qual-3.19.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-beanutils-1.9.4.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-cli-1.4
r:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-collections-3.2.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-digester-2.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-io-2.
0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-lang3-3.8.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-logging-1.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-validato
```

```
$ bin/kafka-server-start.sh config/server.properties
```

```
(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-server-start.sh config/server.properties

[2023-10-15 21:05:39,787] INFO Registered kafka:type=kafka.Log4jController MBean (kafka.utils.Log4jControllerRegistration$)
[2023-10-15 21:05:40,044] INFO Setting -D jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS renegotiation (org.apache.zookeeper.common.X509Util)
[2023-10-15 21:05:40,165] INFO Registered signal handlers for TERM, INT, HUP (org.apache.kafka.common.utils.LoggingSignalHandler)
[2023-10-15 21:05:40,166] INFO starting (kafka.server.KafkaServer)
[2023-10-15 21:05:40,167] INFO Connecting to zookeeper on localhost:2181 (kafka.server.KafkaServer)
[2023-10-15 21:05:40,177] INFO [ZooKeeperClient Kafka server] Initializing a new session to localhost:2181. (kafka.zookeeper.ZooKeeperClient)
[2023-10-15 21:05:40,200] INFO Client environment:zookeeper.version=3.8.2-139d619b58292d7734b4fc83a0f44be4e7b0c986, built on 2023-07-05 19:24 UTC (org.apache.zookeeper.ZooKeeper)
[2023-10-15 21:05:40,200] INFO Client environment:host.name=mbp-de-anas (org.apache.zookeeper.ZooKeeper)
[2023-10-15 21:05:40,200] INFO Client environment:java.version=19 (org.apache.zookeeper.ZooKeeper)
[2023-10-15 21:05:40,200] INFO Client environment:java.vendor=Oracle Corporation (org.apache.zookeeper.ZooKeeper)
[2023-10-15 21:05:40,200] INFO Client environment:java.home=/Users/nedday/Library/Java/JavaVirtualMachines/openjdk-19/Contents/Home (org.apache.zookeeper.ZooKeeper)
[2023-10-15 21:05:40,200] INFO Client environment:java.class.path=/Users/nedday/kafka_2.13-3.6.0/bin/../libs/activation-1.1.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/aopalliance-repackaged-2
jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/argparse4j-0.7.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/audience-annotations-0.12.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/caffeine-2.
ar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/checker-qual-3.19.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-beanutils-1.9.4.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-cli-1
r:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-collections-3.2.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-digester-2.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-io-
0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-lang3-3.8.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-logging-1.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/commons-valida
.7.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/connect-api-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/connect-basic-auth-extension-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs,
ct-json-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/connect-mirror-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/connect-mirror-client-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/
s/connect-runtime-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/connect-transforms-3.6.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/error_prone_annotations-2.10.0.jar:/Users/nedday/kafka
-3.6.0/bin/../libs/hk2-api-2.6.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/hk2-locator-2.6.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/hk2-utils-2.6.1.jar:/Users/nedday/kafka_2.13-3.6.0/b
/libs/jackson-annotations-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-core-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-databind-2.13.5.jar:/Users/nedday/kafka_2.
6.0/bin/../libs/jackson-dataformat-csv-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-datatype-jdk8-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-jaxrs-base-2.13.5.ja
ers/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-jaxrs-json-provider-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jackson-module-jaxb-annotations-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/b
/libs/jackson-module-scala_2.13-2.13.5.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.activation-api-1.2.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.annotation-api-1.3.5.jar:/L
nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.inject-2.6.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.validation-api-2.0.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.ws.rs-ap:
6.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jakarta.xml.bind-api-2.3.3.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/javassist-3.29.2-GA.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/javax.
tion-api-1.2.0.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/javax.annotation-api-1.3.2.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/javax.servlet-api-3.1.0.jar:/Users/nedday/kafka_2.13-3.6.0/b:
libs/javax.ws.rs-api-2.1.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jaxb-api-2.3.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jersey-client-2.39.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/
s/jersey-common-2.39.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jersey-container-servlet-2.39.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jersey-container-servlet-core-2.39.1.jar:/Users,
y/kafka_2.13-3.6.0/bin/../libs/jersey-hk2-2.39.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jersey-server-2.39.1.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-client-9.4.52.v20230823.ja
rs/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-continuation-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-http-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs,
-io-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-security-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-server-9.4.52.v20230823.jar:/Users/nedday/ka
.13-3.6.0/bin/../libs/jetty-servlet-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-servlets-9.4.52.v20230823.jar:/Users/nedday/kafka_2.13-3.6.0/bin/../libs/jetty-util-9.4.52.
```

Kafka with KRaft:

```
$ KAFKA_CLUSTER_ID="$(bin/kafka-storage.sh random-uuid)"

$ bin/kafka-storage.sh format -t $KAFKA_CLUSTER_ID -c
config/kraft/server.properties

$ bin/kafka-server-start.sh config/kraft/server.properties
```

```
[(base) nedday@MBP-de-Anas ~ % cd kafka_2.13-3.6.0
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % KAFKA_CLUSTER_ID="$(bin/kafka-storage.sh random-uuid)"
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-storage.sh format -t $KAFKA_CLUSTER_ID -c config/kraft/server.properties
Formatting /tmp/kraft-combined-logs with metadata.version 3.6-IV2.
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-server-start.sh config/kraft/server.properties
[2023-10-15 21:06:39,705] INFO Registered kafka:type=kafka.Log4jController MBean (kafka.utils.Log4jControllerRegistration$)
[2023-10-15 21:06:39,951] INFO Setting -D jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS renegotiation (org.apache.zookeeper.common.X509Util)
[2023-10-15 21:06:40,139] INFO Registered signal handlers for TERM, INT, HUP (org.apache.kafka.common.utils.LoggingSignalHandler)
[2023-10-15 21:06:40,142] INFO [ControllerServer id=1] Starting controller (kafka.server.ControllerServer)
[2023-10-15 21:06:40,167] INFO authorizerStart completed for endpoint CONTROLLER. Endpoint is now READY. (org.apache.kafka.server.network.EndpointReadyFutures)
[2023-10-15 21:06:40,579] INFO Updated connection-accept-rate max connection creation rate to 2147483647 (kafka.network.ConnectionQuotas)
[2023-10-15 21:06:40,632] INFO [SocketServer listenerType=CONTROLLER, nodeId=1] Created data-plane acceptor and processors for endpoint : ListenerName(CONTROLLER) (kafka.network.SocketServer)
[2023-10-15 21:06:40,636] INFO [SharedServer id=1] Starting SharedServer (kafka.server.SharedServer)
[2023-10-15 21:06:40,755] INFO [LogLoader partition=__cluster_metadata-0, dir=/tmp/kraft-combined-logs] Loading producer state till offset 0 with message format version 2 (kafka.log.UnifiedLog$)
[2023-10-15 21:06:40,755] INFO [LogLoader partition=__cluster_metadata-0, dir=/tmp/kraft-combined-logs] Reloading from producer snapshot and rebuilding producer state from offset 0 (kafka.log.Unif
$)
[2023-10-15 21:06:40,755] INFO [LogLoader partition=__cluster_metadata-0, dir=/tmp/kraft-combined-logs] Producer state recovery took 0ms for snapshot load and 0ms for segment recovery from offset
ka.log.UnifiedLog$)
[2023-10-15 21:06:40,784] INFO Initialized snapshots with IDs SortedSet() from /tmp/kraft-combined-logs/__cluster_metadata-0 (kafka.raft.KafkaMetadataLog$)
[2023-10-15 21:06:40,795] INFO [raft-expiration-reaper]: Starting (kafka.raft.TimingWheelExpirationService$ExpiredOperationReaper)
[2023-10-15 21:06:40,908] INFO [RaftManager id=1] Completed transition to Unattached(epoch=0, voters=[1], electionTimeoutMs=1942) from null (org.apache.kafka.raft.QuorumState)
[2023-10-15 21:06:40,918] INFO [RaftManager id=1] Completed transition to CandidateState(localId=1, epoch=1, retries=1, voteStates={1=GRANTED}, highWatermark=Optional.empty, electionTimeoutMs=1738
Unattached(epoch=0, voters=[1], electionTimeoutMs=1942) (org.apache.kafka.raft.QuorumState)
[2023-10-15 21:06:40,927] INFO [RaftManager id=1] Completed transition to Leader(localId=1, epoch=1, epochStartOffset=0, highWatermark=Optional.empty, voterStates={1=ReplicaState(nodeId=1, endOffs
ional.empty, lastFetchTimestamp=-1, lastCaughtUpTimestamp=-1, hasAcknowledgedLeader=true)}) from CandidateState(localId=1, epoch=1, retries=1, voteStates={1=GRANTED}, highWatermark=Optional.empty,
ionTimeoutMs=1738) (org.apache.kafka.raft.QuorumState)
[2023-10-15 21:06:40,954] INFO [kafka-1-raft-outbound-request-thread]: Starting (kafka.raft.RaftSendThread)
[2023-10-15 21:06:40,954] INFO [kafka-1-raft-io-thread]: Starting (kafka.raft.KafkaRaftManager$RaftIoThread)
[2023-10-15 21:06:40,981] INFO [RaftManager id=1] High watermark set to LogOffsetMetadata(offset=1, metadata=Optional[(segmentBaseOffset=0,relativePositionInSegment=91)]) for the first time for ep
based on indexOfHw 0 and voters [ReplicaState(nodeId=1, endOffset=Optional[LogOffsetMetadata(offset=1, metadata=Optional[(segmentBaseOffset=0,relativePositionInSegment=91)])], lastFetchTimestamp=-
tCaughtUpTimestamp=-1, hasAcknowledgedLeader=true)] (org.apache.kafka.raft.LeaderState)
[2023-10-15 21:06:40,989] INFO [ControllerServer id=1] Waiting for controller quorum voters future (kafka.server.ControllerServer)
[2023-10-15 21:06:40,989] INFO [MetadataLoader id=1] initializeNewPublishers: The loader is still catching up because we have loaded up to offset -1, but the high water mark is 1 (org.apache.kafka
.loader.MetadataLoader)
[2023-10-15 21:06:40,989] INFO [ControllerServer id=1] Finished waiting for controller quorum voters future (kafka.server.ControllerServer)
[2023-10-15 21:06:41,004] INFO [RaftManager id=1] Registered the listener org.apache.kafka.image.loader.MetadataLoader@1153420901 (org.apache.kafka.raft.KafkaRaftClient)
[2023-10-15 21:06:41,010] INFO [MetadataLoader id=1] maybePublishMetadata(LOG_DELTA): The loader is still catching up because we have not loaded a controller record as of offset 0 and high water m
 1 (org.apache.kafka.image.loader.MetadataLoader)
[2023-10-15 21:06:41,019] INFO [RaftManager id=1] Registered the listener org.apache.kafka.controller.QuorumController$QuorumMetaLogListener@2058660924 (org.apache.kafka.raft.KafkaRaftClient)
[2023-10-15 21:06:41,025] INFO [controller-1-ThrottledChannelReaper-Fetch]: Starting (kafka.server.ClientQuotaManager$ThrottledChannelReaper)
```

STEP 3: CREATE A TOPIC TO STORE YOUR EVENTS

```
$ bin/kafka-topics.sh --create --topic quickstart-events
--bootstrap-server localhost:9092

$ bin/kafka-topics.sh --describe --topic quickstart-events
--bootstrap-server localhost:9092
```

```
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-topics.sh --create --topic quickstart-events --bootstrap-server localhost:9092
Created topic quickstart-events.
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-topics.sh --describe --topic quickstart-events --bootstrap-server localhost:9092
Topic: quickstart-events        TopicId: S8d3lyaUT1yGqCQLoZSPsg PartitionCount: 1        ReplicationFactor: 1    Configs:
        Topic: quickstart-events        Partition: 0    Leader: 0       Replicas: 0     Isr: 0
(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 %
```

Application Spring CLoud Streams :

```xml
        <groupId>org.projectlombok</groupId>
        <artifactId>lombok</artifactId>
        <optional>true</optional>
    </dependency>
    <dependency>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-test</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.springframework.cloud</groupId>
        <artifactId>spring-cloud-stream-test-binder</artifactId>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.springframework.kafka</groupId>
        <artifactId>spring-kafka-test</artifactId>
        <scope>test</scope>
    </dependency>
</dependencies>
```
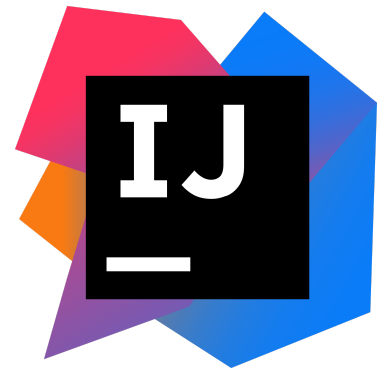
CLASS PageEvent :

```java
import lombok.AllArgsConstructor;
import lombok.Data;
import lombok.NoArgsConstructor;
import lombok.ToString;

import java.util.Date;

4 usages
@Data @NoArgsConstructor @AllArgsConstructor @ToString
public class PageEvent {
    private String name;
    private String iser;
    private Date date;
    private long duration;
}
```


{"name":"blog","iser":"U1","date":"2023-10-15T20:51:45.232+00:00","duration":3166}
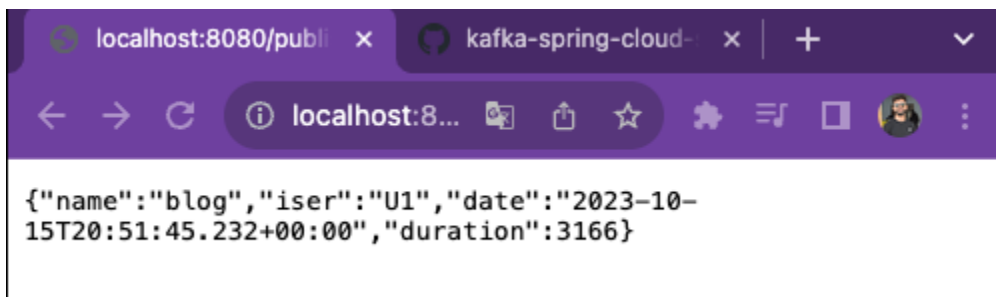
STEP 4: WRITE SOME EVENTS INTO THE TOPIC

```
$ bin/kafka-console-producer.sh --topic quickstart-events
--bootstrap-server localhost:9092
```

```
        at joptsimple.OptionParserState$2.handleArgument(OptionParserState.java:56)
        at joptsimple.OptionParser.parse(OptionParser.java:396)
        at kafka.admin.TopicCommand$TopicCommandOptions.<init>(TopicCommand.scala:558)
        at kafka.admin.TopicCommand$.main(TopicCommand.scala:49)
        at kafka.admin.TopicCommand.main(TopicCommand.scala)
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-topics.sh --describe --topic R1  quickstart-events --bootstrap-server localhost:9092
Topic: R1       TopicId: DWGsEeiBQm2CpVCYPtGgAw PartitionCount: 1       ReplicationFactor: 1    Configs:
        Topic: R1       Partition: 0    Leader: 0       Replicas: 0     Isr: 0
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-console-producer.sh --topic R1  quickstart-events --bootstrap-server localhost:9092
 >
```

STEP 5: READ THE EVENTS

```
$ bin/kafka-console-consumer.sh --topic quickstart-events
--from-beginning --bootstrap-server localhost:9092
```



```
[(base) nedday@MBP-de-Anas kafka_2.13-3.6.0 % bin/kafka-console-consumer.sh --topic R1  quickstart-events --from-beginning --bootstrap-server localhost:9092

{"name":"bloq","iser":"U2","date":"2023-10-15T20:08:38.801+00:00","duration":7096}
{"name":"blog","iser":"U1","date":"2023-10-15T20:42:40.198+00:00","duration":4288}
{"name":"blog","iser":"U1","date":"2023-10-15T20:43:10.726+00:00","duration":2538}
{"name":"blog","iser":"U2","date":"2023-10-15T20:43:17.287+00:00","duration":4200}
{"name":"blog","iser":"U1","date":"2023-10-15T20:43:17.647+00:00","duration":4252}
{"name":"blog","iser":"U2","date":"2023-10-15T20:43:20.736+00:00","duration":8725}
{"name":"blog","iser":"U2","date":"2023-10-15T20:45:23.286+00:00","duration":8644}
{"name":"blog","iser":"U2","date":"2023-10-15T20:49:24.723+00:00","duration":5355}
{"name":"blog","iser":"U1","date":"2023-10-15T20:51:45.232+00:00","duration":3166}
HY
R2
```

Application Spring Cloud Streams Functions
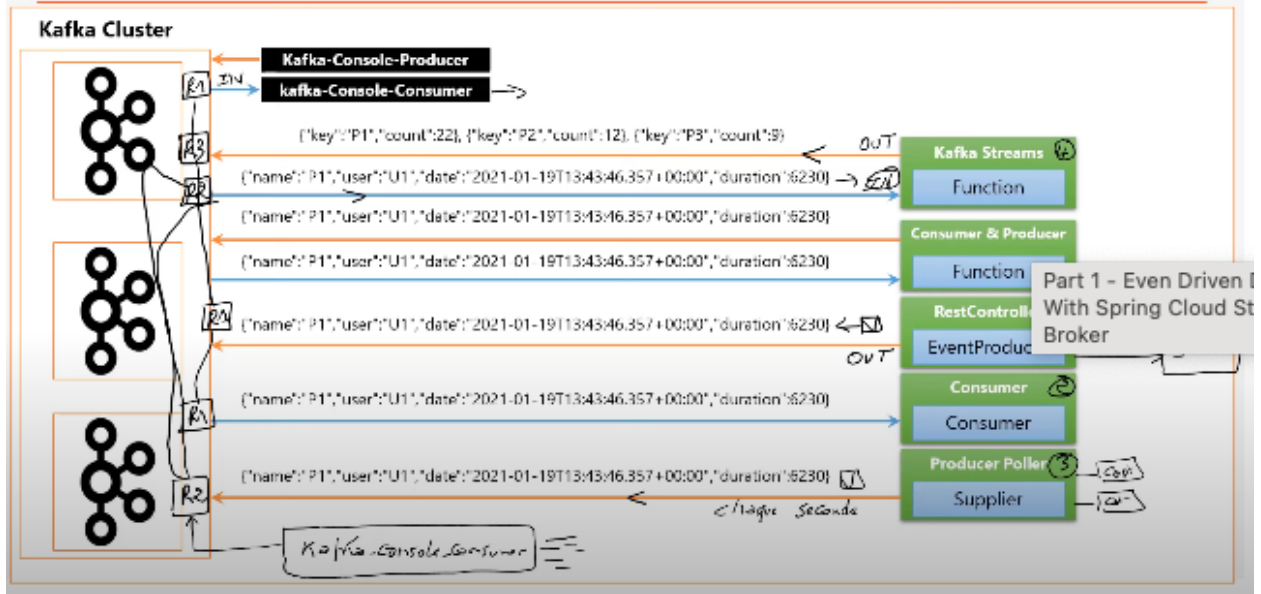
class PageEventService :


```java
import java.util.Date;
import java.util.Random;
import java.util.function.Consumer;
import java.util.function.Function;
import java.util.function.Supplier;

@Service
public class PageEventService {
    @Bean
    public Consumer<PageEvent> pageEventConsumer(){
        return (input)->{
            System.out.println("****************");
            System.out.println(input.toString());
            System.out.println("****************");
        };
    }
    public Supplier<PageEvent> pageEventSupplier(){
        return ()->new PageEvent(Math.random()>0.5?"P1":"P2",
                Math.random()>0.5?"U1":"U2",
                new Date(),
                new Random().nextInt( bound: 9000));
    }
    @Bean
    public Function<PageEvent,PageEvent> pageEventFunction(){
        return (input)->{
            input.setName("Page Event");
            input.setUser("UUU");
            return input;
        };
    }
}
```

class PageEventRestController

```java
package org.sid.demospringcloudstreams.web;

import lombok.AllArgsConstructor;
import org.sid.demospringcloudstreams.entities.PageEvent;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.cloud.stream.function.StreamBridge;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RestController;

import java.util.Date;
import java.util.Random;

@RestController
@AllArgsConstructor
public class PageEventRestController {
    1 usage
    private StreamBridge streamBridge;
    @GetMapping("/publish/{topic}/{name}")
    public PageEvent publish(@PathVariable String topic,@PathVariable String name){
        PageEvent pageEvent=
                new PageEvent(name,Math.random()>0.5?"U1":"U2",new Date(),new Random().nextInt( bound: 9000));
        streamBridge.send(topic,pageEvent);
        return pageEvent;

    }
}
```

spring.cloud.stream.bindings.pageEventConsumer-in-0.destination=R1

spring.cloud.stream.bindings.pageEventSupplier-out-0.destination=R2

spring.cloud.function.definition:=pageEventCosnumer;pageEventSupplier

spring.cloud.stream.poller.fixed-delay=100

spring.cloud.stream.bindings.pageEventFunction-in-0.destination=R1

spring.cloud.stream.bindings.pageEventFunction-out-0.destination=R3