Oracle® Banking Liquidity Management

Kafka Configuration Guide

Release 14.7.2.0.0
F88343-01
November 2023

ORACLE

Oracle Banking Liquidity Management Kafka Configuration Guide, Release 14.7.2.0.0

F88343-01

Contents

Preface

Purpose

This guide provides the information about the kafka implementation which allows the user to publish and consume message from/by publisher and consumer respectively.

Audience

This guide is intended for the implementation teams.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

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Diversity and Inclusion

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Related Resources

For more information on any related features, refer to the following documents:

- *Oracle Banking Liquidity Management Installation Guide*
- *Oracle Banking Liquidity Management Configuration Guide*

Acronyms and Abbreviations

The list of the acronyms and abbreviations used in this guide are as follows:

Table 1 Acronyms and Abbreviations

Abbreviation	Description
JDBC	Java Database Connectivity
JNDI	Java Naming and Directory Interface

1 Prerequisites

This topic provides the prerequisites to be performed before the kafka configuration.

The following installation should be completed and running to enable the APIs to publish and consume message from Kafka.

- Zookeeper
- Kafka

Minimum requirements for installation are:

- Partition count: 2
- Replication factor: 2
- Kafka brokers: 2
- Zookeeper nodes: 2
- Servers: 2

These values can be increased based on the requirement and load. Restrict the access to the server*.properties file of Kafka servers.

2
Kafka Middleware Setup

This topic provides the information about the kafta middleware setup.

- Zookeeper Setup
  This topic provides the systematic instructions to install and setup the Zookeeper.
- Kafka Setup
  This topic provides the systematic instruction to install and setup kafka.

2.1 Zookeeper Setup

This topic provides the systematic instructions to install and setup the Zookeeper.

Kafka uses ZooKeeper to manage the cluster. ZooKeeper is used to coordinate the brokers/ cluster topology. ZooKeeper is a consistent file system for configuration information. ZooKeeper gets used for leadership election for Broker Topic Partition Leaders. Here we are going to start a node of 2 zookeeper ensemble on 2 servers each.

1. Extract the kafka installation files in `/tools/kafka` on both the servers.
2. Navigate to config folder in `/tools/kafka/conf`.
3. Duplicate the **zoo_sample.cfg** and rename it to **zookeeper1.cfg**
4. Open **zookeeper1.cfg** and modify the following properties.

```
DataDir= <kafka home directory>/data
tickTime=2000
clientPort= Zookeeper client Port value (2181)
initLimit=10
syncLimit=5

server.1=<hostname>:<peer port>:<leader port>
#1 is the id that we put in myid file.

server.2=<hostname>:<peer port>:<leader port>
#2 is the id that we will put in myid file of second node.

server.3=<hostname>:<peer port>:<leader port>
#3 is the id that we will put in myid file of third.
```

Example:

```
tickTime=2000

initLimit=5

syncLimit=2

clientPort=2181

dataDir=/tmp/zookeeper-oblm/zookeeper-node1
```

```
server.1=server1-IP:2666:3666

server.2=server2-IP:2667:3667
```

> **Note:**
>
> Update the IP value with the respective server IP.

5. Duplicate the **zoo.cfg** file and rename it as **zookeeper2.cfg** in the same directory on Server 2 (Other names can also be used). These configuration files used for each of the zookeeper nodes
6. Open **zookeeper2.cfg** and modify the following properties.

```
clientPort=2182

dataDir=/tmp/zookeeper-oblm/zookeeper-node2

server.1=server1-IP:2666:3666

server.2=server2-IP:2667:3667
```

> **Note:**
>
> Update the IP value with the respective server IP.

7. Copy the **zookeeper1.cfg** and **zookeeper2.cfg** and Paste it in the local.
8. Open the directory /tmp/zookeeper-oblm/zookeeper-node1 on server 1 and create a file named **myid**, open with text editor and write 1, save and close.
9. Open the directory /tmp/zookeeper-oblm/zookeeper-node2 on server 2 and create a file named **myid**, open with text editor and write 2, save and close.
10. Run the command to start the zookeeper nodes.

    On Server 1:

```
nohup ./bin/zkServer.sh start conf/zookeep
```

    On Server 2:

```
nohup ./bin/zkServer.sh start conf/zookeep
```

2.2 Kafka Setup

This topic provides the systematic instruction to install and setup kafka.

1. Extract the kafka installation file in `/tools/kafka` on both the servers.
2. Navigate to config folder in Apache Kafka (`/tools/kafka/config`).
3. Duplicate the **server.properties** from config folder and rename it to **server1.properties**.

4. Open **server1.properties** and modify the following properties.

```
broker.id= (Unique Integer which identifies the kafka broker in the
cluster.
listeners=PLAINTEXT://<hostname>:<Kafka broker listen port(9092)>
log.dirs=<Kafka home directory>/logs
log.retention.hours= <The number of hours to keep a log file
before deleting it (in hours), tertiary to log.retention.ms property>
log.retention.bytes= <The maximum size of the log before deleting it>
log.segement.bytes= <The maximum size of a single log file>
log.retention.check.interval.ms= <The frequency in milliseconds that
the log cleaner checks whether any log is eligible for deletion>
zookeeper.connect=<zookeeper_hostname_1>:<zookeeper_client_port>,
<zookeeper_hostname_2>:<zookeeper_client_port>,<zookeeper_hostname_3>:<zoo
keeper_client_port>
```

Example:

```
broker.id=0

port=9092

log.dirs=/tmp/kafka-oblm/logs-node1

zookeeper.connect=server1-IP:2181,server2-IP:2182

num.partitions=2

min.insync.replicas=1

default.replication.factor=2

offsets.topic.replication.factor=2

transaction.state.log.replication.factor=2

transaction.state.log.min.isr=1
```

> **Note:**
>
> If the Apache Zookeeper is on different server, then change the zookeeper.connect property. i.e., update the highlighted value for the respective server IPs. ***min.insync.replicas****:* A typical configuration is replication-factor minus 1.

5. Duplicate the **server.properties** into the same directory and rename it to **server2.properties** on server 2.
6. Open **server2.properties** and modify the following properties.

```
broker.id=1

broker.id=1

log.dirs=/tmp/kafka-oblm/logs-node2
```

> **Note:**
>
> By default, Apache Kafka will run on port 9092 and Apache Zookeeper will run on port 2181.

7. Copy the **server1.properties** and **server2.properties** and paste it in local.
8. To run Kafka brokers, change path to `/tools/kafka` directory and run the following command in separate terminals.

   On Server 1:

   ```
   nohup ./bin/kafka-server-start.sh config/server1.properties
   ```

   On Server 2:

   ```
   nohup ./bin/kafka-server-start.sh config/server2.properties
   ```

9. The values set for Logs is under the segment: “Log Retention Policy” in server*.properties file attached in the document. The values set under this segment are defaults from Apache
10. At present, kafka takes the default value for message size as: `message.max.bytes=1000012`
11. Add and update this field in server*.properties for increasing based on requirement.
12. To add compression type for all data generated by the producer, add the following property in server*.properties file.

    ```
    compression.type=none
    ```

> **Note:**
>
> The default is none (i.e. no compression). Valid values are none, gzip, snappy, lz4, or zstd.

3
Important Commands

This topic provides the information about the important commands used for Kafka configuration.

View the Topic Configurations

```
./kafka-topics.sh --describe --zookeeper zookeeper-server --topic topic-name
```

Example:

```
./kafka-topics.sh --describe --zookeeper localhost:2181 --topic structure-closed
```

Output:

Topic: structure-closed PartitionCount: 2 ReplicationFactor: 2 Configs:
Topic: structure-closed Partition: 0 Leader: 1 Replicas: 1,0 Isr: 1,0
Topic: structure-closed Partition: 1 Leader: 0 Replicas: 0,1 Isr: 0,1

View the Messages Sent from producer-consumer

```
./kafka-console-consumer.sh --bootstrap-server Kafka-server --topic topic-name
```

Example:

```
./kafka-console-consumer.sh --bootstrap-server localhost:9092 --topic structure-
closed
```

Create Kafka Topics manually

```
./kafka-topics.sh --create --bootstrap-server kafka-server --replication-factor
factor-value --partitions partition-value --topic topic-name
```

Example:

```
./kafka-topics.sh --create --bootstrap-server localhost:9092 --replication-
factor 2 --partitions 2 --topic structure-closed
```

If the topics are created manually before the microservice deployment, then the values in the above command is considered otherwise if we are depending on the microservice deployment then the values configured in the server.properties file of Kafka is considered when the topics are created.

Configurations pertinent to topics have both a server default as well an optional per-topic override. If no per-topic configuration is given the server default is used. The override can be set at topic creation time by giving one or more --config options.

4

Increase Replication Factor for an existing topic

This topic provides the systematic instruction to increase Replication Factor for an existing topic.

In case, a topic is already created, and the user want to increase the replication factor. Then, follow the below steps. Explanation is given below with an example and desired output for easier understanding.

Increase the replicas for the topic structure-closed in partition 0 from only on broker id 0 to broker id 0, 1. i.e. increase replication factor of 1 to 2.

1. Dowload a **Increasing Replication Factor** file and save to the local.
2. Command to increase the replication factor.

   ```
   ./kafka-reassign-partitions.sh --zookeeper zookeeper-server --reassignment-json-file jsonFilePath --execute
   ```
   Example:

   ```
   ./kafka-reassign-partitions.sh --zookeeper localhost:2181 --reassignment-json-file D:\kafka\kafka_2.12-2.3.1\config\increase-replication-factor.json -execute
   ```

   Output:

   Current partition replica assignment

   {"version":1,"partitions":[{"topic":"structure-closed","partition":1,"replicas":[0],"log_dirs":["any"]},{"topic":"structure-closed","partition":0,"replicas":[1],"log_dirs":["any"]}]}

   Save this to use as the --reassignment-json-file option during rollbackSuccessfully started reassignment of partitions.
3. Command to increase the replication factor.

   ```
   ./kafka-reassign-partitions.sh --zookeeper zookeeper-server --reassignment-json-file jsonFilePath --execute
   ```
   Example:

   ```
   ./kafka-reassign-partitions.sh --zookeeper localhost:2181 --reassignment-json-file D:\kafka\kafka_2.12-2.3.1\config\increase-replication-factor.json -execute
   ```

   Output:

   Current partition replica assignment:

   ```
   {"version":1,"partitions":[{"topic":"structure-closed","partition":1,"replicas":[0],"log_dirs":["any"]},{"topic":"structure-closed","partition":0,"replicas":[1],"log_dirs":["any"]}]}
   ```

Save this to use as the --reassignment-json-file option during rollbackSuccessfully started reassignment of partitions.

4. Command to check the status of the partition reassignment.

```
./kafka-reassign-partitions.sh --zookeeper zookeeper-server --
reassignment-json-file jsonFilePath --verify
```

Example:

```
./kafka-reassign-partitions.sh --zookeeper localhost:2181 --
reassignment-json-file D:\kafka\kafka_2.12-2.3.1\config\increase-
replication-factor.json –verify
```

Output:

Status of partition reassignment:

Reassignment of partition structure-closed-0 completed successfully.

5. Describe and check the topic.

```
./kafka-topics.sh --describe --zookeeper zookeeper-server --topic
topic-name
```

Example:

```
./kafka-topics.sh --describe --zookeeper localhost:2181 --topic
structure-closed
```

Output:

Topic: structure-closed PartitionCount: 2 ReplicationFactor: 1 Configs:
Topic: structure-closed Partition: 0 Leader: 1 Replicas: 0,1 Isr: 1,0
Topic: structure-closed Partition: 1 Leader: 0 Replicas: 0 Isr: 0

5

Security - SSL Encryption with SASL-SCRAM Authentication

This topic describes about Security - SSL Encryption with SASL-SCRAM authentication.

Generate Keystore

The items highlighted in bold are placeholders and should be replaced with suitable values when running the command.

```
keytool -genkeypair -alias alias -keyalg keyalg -keysize keysize -sigalg
sigalg -validity valDays -keystore keystore
```

Table 5-1 Generate Keystore - Keyword Details

Keyword	Description
alias	Used to identify the public and private key pair created.
keyalg	It is a key algorithm used to generate the public and private key pair. The RSA key algorithm is recommended.
keysize	It is the size of the public and private key pairs generated. A key size of 1024 or more is recommended. Please consult with your CA on the key size support for different types of certificates.
sigalg	It is the algorithm used to generate the signature. This algorithm should be compatible with the key algorithm and should be one of the values specified in the Java Cryptography API Specification and Reference.
valdays	It is the number of days for which the certificate is to be considered valid. Please consult with your CA on this period.
keystore	It is used to specify the location of the JKS file. If no JKS file is present in the path provided, one will be created.

The command prompts for the following attributes of the certificate and Keystore:

Table 5-2 Generate Keystore - Attributes

Attributes	Description
Keystore Password	Specify a password used to access the Keystore. This password needs to be specified later when configuring the identity store in Kafka server.
Key Password	Specify a password used to access the private key stored in the Keystore. This password needs to be specified later when configuring the SSL attributes of the Kafka Server.

Table 5-2 (Cont.) Generate Keystore - Attributes

Attributes	Description
First and Last Name (CN)	Enter the domain name of the machine used to access Oracle Banking Liquidity Management. For example, www.example.com.
Name of your Organizational Unit	The name of the department or unit making the request. Use this field to further identify the SSL Certificate you are creating, for example, by department or by physical server.
Name of your Organization	The name of the organization making the certificate request. For example, Oracle Financial Services. It is recommended to use the company or organization's formal name, and this name entered here must match the name found in official records.
Name of your City or Locality	The city in which your organization is physically located. For example, Bengaluru.
Name of your State or Province	The state/province in which your organization is physically located. For example, Karnataka.
Two-letter Country Code for this Unit	The country in which your organization is physically located. For example, US, UK, IN, etc.

Example 5-1 Sample Execution

Listed below is the result of a sample execution.

```
keytool -genkeypair -alias OBLMcert -keyalg RSA -keysize 1024 -sigalg
SHA512withRSA
-validity 365 -keystore D:\kafka\securityKeys\KafkaServerKeystore.jks
```

Enter keystore password:<Enter a password to protect the keystore>

Re-enter new password:<Confirm the password keyed above>

What is your first and last name?

[Unknown]: name.oracle.com

What is the name of your organizational unit?

[Unknown]: OBLM

What is the name of your organization?

[Unknown]: Oracle Financial Services

What is the name of your City or Locality?

[Unknown]: Bengaluru

What is the name of your State or Province?

[Unknown]: Karnataka

What is the two-letter country code for this unit?

[Unknown]: IN

Is CN= name.oracle.com, OU=OBLM, O=Oracle Financial Services, L= Bengaluru, ST= Karnataka, C=IN correct? [no]: yes

Enter key password for < OBLMcert >

RETURN if same as keystore password): <Enter a password to protect the key>

Re-enter new password: <Confirm the password keyed above>

Export Private Key as Certificate

Export private key as certificate command is mentioned below:

```
keytool -export -alias <alias_name> -file
<export_certificate_file_name_with_location.cer>
-keystore <keystore_name.jks> -keypass <Private key Password> -storepass
<Store Password>
```

Example:

```
keytool -export -alias OBLMcert -file D:\kafka\securityKeys\KafkaCert.cer
-keystore D:\kafka\securityKeys\KafkaServerKeystore.jks -keypass oracle123 -
storepass oracle123
```

If successful, the following message will be displayed:

Certificate stored in file `< KafkaCert.cer>`

Import the Certificate and Generate Trust Store

To import the certificate and generate Trust store, the command is mentioned below:

```
keytool -import -alias alias -file cert_file -keystore truststore –storepass
storepass
```

Table 5-3 Generate Trust Store - Keyword Details

Keyword	Description
`alias`	It is used to identify the public and private key pair. Specify the alias of the key pair used to create the CSR in the earlier step.
`cert_file`	It is the location of the file containing the PKCS#7 formatted reply from the CA, containing the signed certificate.
`truststore`	It is the location where the TrustStore should be generated.
`storepass`	It is the password for the TrustStore.

The user can generate two TrustStores from the same cert.

- One used for Kafka server
- One used for Clients

Example:

```
keytool -import -alias OBLMcert -file
D:\kafka\securityKeys\KafkaCert.cer
-keystore D:\kafka\securityKeys\KafkaServerTrustStore.jks -storepass
oracle123


keytool -import -alias OBLMcert -file
D:\kafka\securityKeys\KafkaCert.cer
-keystore D:\kafka\securityKeys\KafkaClientTrustStore.jks -storepass
oracle123
```

Three Keystore files are required for this method as given in the table below:

Table 5-4 Keystore Files

File Name	Description
KafkaServerKeystore.jks	Keystore file for Kafka brokers
KafkaServerTrustStore.jks	TrustStore file for server
KafkaClientTrustStore.jks	TrustStore file for client

To validate the server, each client should import the KafkaClientTrustStore.jks file.

> **Note:**
>
> The truststore files should be generated using the same CA. The user can generate and place these files on all the different servers of Kafka so that they can be accessed by server*.properties file. The KafkaClientTrustStore.jks should be placed on the server, which is accessible by the microservices also.

Create Users in Zookeeper

To create users in Zookeeper, follow below steps:

1. Start the zookeeper.

   > **Note:**
   >
   > Refer to Zookeeper Setup topic.

2. Follow the below steps for user creation.
   a. Execute the admin command for admin user creation.

```
./kafka-configs.sh --zookeeper localhost:2181,localhost:2182 --
alter --add-config
"SCRAM-SHA-256=[password=admin-secret],SCRAM-
```

```
SHA-512=[password=admin-secret]”
--entity-type users --entity-name admin
```

> **Note:**
>
> The user created with admin as username and password is setup for the user for each scram mechanism. Here, the user **admin** is used for Kafka broker auth.

b. Execute the test command for test user creation.

```
./kafka-configs.sh --zookeeper localhost:2181,localhost:2182 --alter
--add-config
“SCRAM-SHA-256=[iterations=8192,password=alice-secret],SCRAM-
SHA-512=[password=alice-secret]”
--entity-type users --entity-name alice
```

> **Note:**
>
> The user created with alice as username and password is setup for the user for each scram mechanism. Here, the user **alice** is used for client auth. For multiple zookeeper nodes, use comma separated serverIP:port like in the above example(localhost:2181,localhost:2182).

Configure Brokers

Some modifications need to be made in the server*.properties file of kafka server. The following properties need to be added in **server1.properties** file of kafka.

```
############################# SSL-SCRAM Settings
#############################
ssl.endpoint.identification.algorithm=
ssl.truststore.location=D:\\kafka\\securityKeys\\KafkaServerTrustStore.jks
ssl.truststore.password=oracle123
ssl.keystore.location=D:\\kafka\\securityKeys\\KafkaServerKeystore.jks
ssl.keystore.password=oracle123
ssl.key.password=oracle123
sasl.enabled.mechanisms= SCRAM-SHA-256
sasl.mechanism.inter.broker.protocol= SCRAM-SHA-256
security.inter.broker.protocol=SASL_SSL
listeners=SASL_SSL://HOSTNAME:9092
advertised.listeners=SASL_SSL://IP:9091
listener.name.sasl_ssl.scram-sha-256
.sasl.jaas.config=org.apache.kafka.common.security.scram.ScramLoginModule
required
username="admin" password="admin-secret";
```

> **Note:**
>
> In the highlighted section, give the absolute path of the Kafka Server Truststore and keystore, and its respective passwords. Modify the hostname and IP in the listeners and advertised.listeners properties field accordingly

Copy the above properties into the **server2.properties** file and modify the hostname/IP and port in the listeners and advertised.listeners properties field. Sample properties files can be downloaded through the below link.

Download server1.properties and server1.properties and save to the local.

Start the kafka servers.

> **Note:**
>
> Refer to Kafka Setup topic.

Changes to Clients

For the microservices which publish/consume data through kafka, insert the following values in the PROPERTIES table in PLATO schema before deployment.

Table 5-5 PLATO PROPERTIES Table - Key Values

KEY	VALUE
plato.services.kafka.brokers	<comma separated kafka hostname:port>
plato.services.zknodes	<comma separated Zookeeper hostname:port>
plato.services.kafka.security.protocol	SASL_SSL
plato.services.kafka.truststore.location	<absolute path of client truststore>
plato.services.kafka.truststore.password	<encrypted truststore password>
spring.cloud.stream.kafka.binder.configuration.sasl.mechanism	SCRAM-SHA-256
spring.cloud.stream.kafka.binder.jaas.loginModule	org.apache.kafka.common.security.scram.ScramLoginModule
spring.cloud.stream.kafka.binder.jaas.options.username	<Zookeeper SCRAM user created for clients>
spring.cloud.stream.kafka.binder.jaas.options.password	<Zookeeper SCRAM user encrypted password for clients>

To encrypt the password, use the following api of plato-config-service of Oracle Banking Liquidity Management:

API: http://hostname:port/config-service/encrypt
Request Type: Text
Request Body: Password

Example 1:

Once the above API is hit for the following passwords, the response of encrypted value is received.
alice-secret : 2f32dc1770acec085105e3ba585cc44c71534451b88b6047504f11191ad8cc1f
oracle123 : 7ec1250634259a1af12f74a7e4705ade7493a4695cc1efd3b713571453fda266

Example 2:

When inserting to properties table, append the encrypted values with the keyword {cipher} to get it decrypted by the config-service during fetch as given in example below.

```
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10110,'oblm-structure-
services','jdbc','jdbc','plato.services.kafka.brokers','localhost:9092,localhost
:9093');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10111,'oblm-structure-
services','jdbc','jdbc','plato.services.zknodes','localhost:2181');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10112,'oblm-structure-
services','jdbc','jdbc','plato.services.kafka.security.protocol','SASL_SSL');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10113,'oblm-structure-
services','jdbc','jdbc','plato.services.kafka.truststore.location','D:\kafka\sec
urityKeys\KafkaClientTrustStore.jks');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10114,'oblm-structure-
services','jdbc','jdbc','plato.services.kafka.truststore.password','{cipher}7ec1
250634259a1af12f74a7e4705ade7493a4695cc1efd3b713571453fda266');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10115,'oblm-structure-
services','jdbc','jdbc','spring.cloud.stream.kafka.binder.configuration.sasl.mec
hanism','SCRAM-SHA-256');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10116,'oblm-structure-
services','jdbc','jdbc','spring.cloud.stream.kafka.binder.jaas.loginModule','org
.apache.kafka.common.security.scram.ScramLoginModule');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10117,'oblm-structure-
services','jdbc','jdbc','spring.cloud.stream.kafka.binder.jaas.options.username'
,'alice');
insert into PROPERTIES (ID,APPLICATION,PROFILE,LABEL,KEY,VALUE) values
(10118,'oblm-structure-
services','jdbc','jdbc','spring.cloud.stream.kafka.binder.jaas.options.password'
,'{cipher}2f32dc1770acec085105e3ba585cc44c71534451b88b6047504f11191ad8cc1f');
```

Important Commands

Create Topics manually is same as the command mentioned in Create Kafka Topics Manually. If the user want to view the messages getting sent in kafka, then store the below lines in a file and name it as **ssl.properties**.

```
ssl.truststore.location=D:\\kafka\\securityKeys\\KafkaClientTrustStore.jks
ssl.truststore.password=oracle123
security.protocol=SASL_SSL
ssl.endpoint.identification.algorithm=
sasl.mechanism=SCRAM-SHA-256
sasl.jaas.config=org.apache.kafka.common.security.scram.ScramLoginModule
```

```
required
\username="alice"
\password="alice-secret";
```

> **Note:**
>
> Update the trust store location and password.

Download ssl.properties file and save to the local.

Command to view the messages being published:

```
./kafka-console-consumer.sh --bootstrap-server kafka-server --topic
topicName --consumer.config absolute-path-of-consumer-config --from-
beginning
```

Example:

```
./kafka-console-consumer.sh --bootstrap-server localhost:9092 --topic oblm
--consumer.config D:\kafka\kafka_2.12-2.3.1\config\ssl.properties --from-
beginning
```

6
Implementation

This topic describes the implementation flow for the various service functionalities.

The Flow

There is an events table in Maintenance schema with all the events that we will publish listed on it with some more properties. There is an IsEnabled column for all the events listed. Only for all those events where the IsEnabled field is set to true will publish to kafka.

oblm-services that wants to publish to kafka will fetch the events table in maintenance schema using the eventcode and check for the isEnabled field. If the isEnabled is ‘Y’ it will store the data in an eventlog table in LMX schema.

We have a cron job that will be triggered in configured time interval which will fetch the value from the integration schema and chck for the unpublished message. Those message that are not published and havenot errored out will be published to kafka.

Maintenance Service Functionality

The oblm-maintenance-services has the following events configured.

1. bank-pref
2. branch-pref
3. pricing-map

The oblm-maintenance-services will check the value of the isEnabled column for the above event_code, if ‘Y’ the event will be logged in the lmx schema in lmx_tb_event_log along with the event_code and event_topic.

The LMM_TM_EVENTS table in the maintenance schema has the following columns

- ID
- EVT_CODE
- EVT_CATEGORY
- EVT_DESC
- EVT_TOPIC
- EVT_ISENABLED
- MAKER_ID
- MAKER_DT_STAMP
- CHECKER_ID
- CHECKER_DT_STAMP
- RECORD_STAT
- AUTH_STAT

- ONCE_AUTH
- MOD_NO

Here the event_code will be predefined by the developers and this event_code will be used to map an event from service to the even_topic in which kafka will be publishing.

Depending on the requirement the consumer can alter the value of the isEnabled field to ‘Y’ if events need to be published for that event.

Events will have been pre-added into the database before the deployment.

Sweep Service Functionality

The oblm-sweep-services has the following events configured.

1. sweep-success (S)
2. sweep-error (E)
3. sweep-pending (P)
4. sweep-handOff (H)

The oblm-sweep-services will call the oblm-maintenance-services and for the above event_code it will check the value of the isEnabled column, if ‘Y’ the event will be logged in the lmx schema in lmx_tb_event_log along with the event_code and event_topic.

Structure Service Functionality

The oblm-structure-services has the following events configured.

1. structure-created
2. structure-createdAndAuthorized
3. structure-modified
4. structure-modifiedAndAuthorized
5. structure-closed
6. structure-closedAndAuthorized
7. structure-reopen
8. structure-reopenAndAuthorized
9. structure-expiry (structure expiring in n number of days where n is configurable)
10. structure-charge

The oblm-structure-service will call the oblm-maintenance-service and for the above event_code it will check the value of the isEnabled column, if ‘Y’ the event will be logged in the lmx schema in lmx_tb_event_log along with the event_code and event_topic.

The structure-expiry event is a scheduler. It will be triggered once a day. The scheduler is a cron job, the time is configurable, and it should be cron expression.

Cron expression example: ‘0 40 20 * * ?’ will trigger the service endpoint at 8.40pm every day.

Integration Service Functionality

The events that need to be published from the oblm-services will be stored in the lmx_tb_events_log.

The oblm-integration-service has a scheduler that will be triggered in configured interval. The scheduler is a cron job, the time interval is configurable.

The lmx_tb_events_log have columns event is a scheduler. It will be triggered once a day. The scheduler is a cron job, the time is configurable, and it should be cron expression.

Some important columns of lmx_tb_events which is generic for all the oblm-services that wants to publish to kafka.

1. ID
2. EVT_CODE
3. EVT_ TOPIC
4. LOG_TYPE
5. LOG_DESCRIPTION
6. LOG_TIME
7. SERVICE_DATA
8. PUBLISHED_TIME
9. IS_PUBLISHED
10. RETRY_COUNT
11. EVT_KEY

EVT_ TOPIC is the topic name on which the event will be published

EVT_ CODE is unique for each event and it helps to map the events from each service to an event_topic. The evt_code is developer specified.

LOG_TYPE is the name of the service which has logged this event in the lmx schema

LOG_DESCRIPTION is the brief description of that particular event.

SERVICE_DATA is the service specific data that will be logged from oblm-services as string

LOG_TIME is the time at which the events from an oblm-service is logged in the lmx schema, or else we can say it is the time at which an event occurred (Example: structure created)

PUBLISHED_TIME is the time at which an event will be published to kafka from oblm-integration-service.

RETRY_COUNT is the number of times an event entry in the lmx_tb_event_log will be retried to send the event for the retryCount(this is configurable will be fetched from properties table, so value of RETRY_COUNT<= retryCount publish) number of times, and if it fails for retryCount number of times it will be marked as an error and will not be processed further.

EVT_KEY is the service specific id. If the event is from oblm-sweep-service, it will be storing the sweepId.

IS_PUBLISHED is the column which will store value such a ‘Y’ if the event is published, ‘N’ if the event is not published, ‘E’ if the event couldn’t be published for retryCount number of

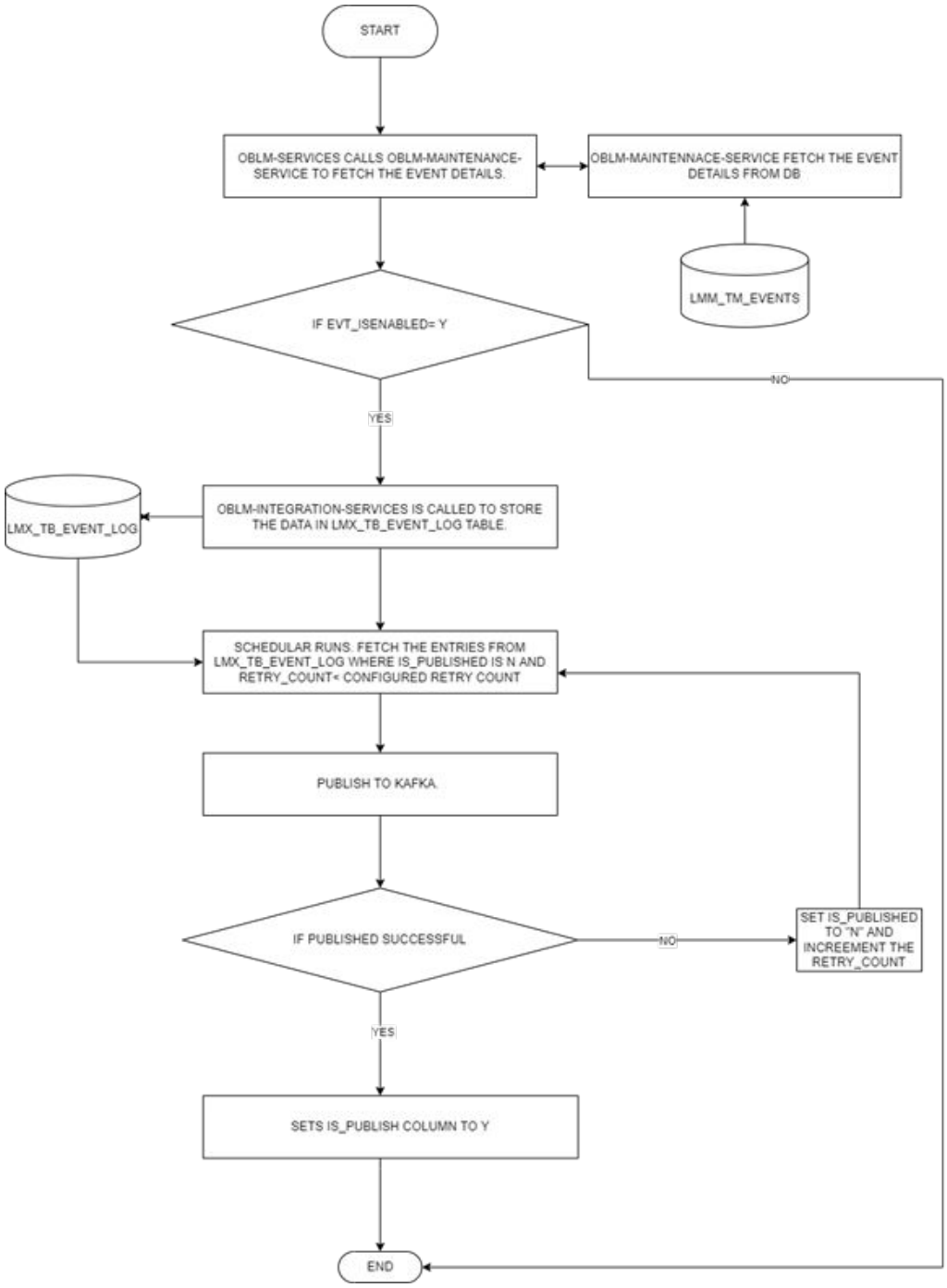
times. Default value of this field will be ‘N’, which will be updated for the above-mentioned scenarios.

Cron expression example: ‘0 0/10 * * * ?’ will trigger the the service endpoint on every 10 mins

7
Flow Diagram

This topic describes about the flow diagram of Kafka events.

Figure 7-1 Flow Diagram



8
Payload and Header

This topic describes about the various payload and header for Oracle Banking Liquidity Management.

Generic LM Event Payload

This payload is applicable for the below sweep and structure service events:

- sweep-success (S)
- sweep-error (E)
- sweep-pending (P)
- sweep-handOff (H)
- structure-created
- structure-createdAndAuthorized
- structure-modified
- structure-modifiedAndAuthorized
- structure-closed
- structure-closedAndAuthorized
- structure-reopen
- structure-reopenAndAuthorized
- structure-expiry (structure expiring in n number of days where n is configurable)

Payload:

```
id

String,Null

Default: null

evtCode

String,Null

Default: null

logTime

String,Null

Default: null

logType

String,Null

Default: null

logDescription
```

String,Null

Default: null

serviceData

String,Null

Default: null

publishedTime

String,Null

Default: null

Bank Preference Event Payload

Payload:

id

String,Null

Default: null

modNo

String,Null

Default: null

RecordStat

String,Null

Default: null

AuthStat

String,Null

Default: null

MakerId

String,Null

Default: null

MakerDateStamp

String,Null

Default: null

CheckerId

String,Null

Default: null

checkerDateStamp

String,Null

Default: null

OnceAuth

String,Null

Default: null

applicationCode

String,Null

Default: null

bankCode

String,Null

Default: null

chargeCalcPref

String,Null

Default: null

chargeCollPref

String,Null

Default: null

chgIncludeClosedVa

String,Null

Default: null

Branch Preference Event Payload

Payload:

id

String,Null

Default: null

modNo

String,Null

Default: null

RecordStat

String,Null

Default: null

AuthStat

String,Null

Default: null

MakerId

String,Null

Default: null

MakerDateStamp

String,Null

Default: null

CheckerId

String,Null

Default: null

checkerDateStamp

String,Null

Default: null

OnceAuth

String,Null

Default: null

applicationCode

String,Null

Default: null

branchCode

String,Null

Default: null

chargeRateCode

String,Null

Default: null

chargeRateType

String,Null

Default: null

Structure Charge Event Payload

Payload:

id

String,Null

Default: null

modNo

String,Null

Default: null

RecordStat

String,Null

Default: null

AuthStat

String,Null

Default: null

MakerId

String,Null

Default: null

MakerDateStamp

String,Null

Default: null

CheckerId

String,Null

Default: null

CheckerDateStamp

String,Null

Default: null

OnceAuth

String,Null

Default: null

applicationCode

String,Null

Default: null

strCode

String,Null

Default: null

realCustomerNo

String,Null

Default: null

chgFundingAccount

String,Null

Default: null

chgFundingAccountBranch

String,Null

Default: null

chgFundingAccountCCY

String,Null

Default: null

vaCount

String,Null

Default: null

event

String,Null

Default: null

strChgType

String,Null

Default: null

Pricing Map Event Payload

Payload:

id

String,Null

Default: null

modNo

String,Null

Default: null

RecordStat

String,Null

Default: null

AuthStat

String,Null

Default: null

MakerId

String,Null

```
Default: null
MakerDateStamp
String,Null
Default: null
CheckerId
String,Null
Default: null
checkerDateStamp
String,Null
Default: null
OnceAuth
String,Null
Default: null
applicationCode
String,Null
Default: null
pricingScheme
String,Null
Default: null
realCustomerNo
String,Null
Default: null
chgFundingAccount
String,Null
Default: null
chgFundingAccountBranch
String,Null
Default: null
chgFundingAccountCCY
String,Null
Default: null
chgPostingBranch
String,Null
```

```
Default: null

event

String,Null

Default: null
```

Header

Common Header:

```
userId

String

branchCode

String

sourceSystem

String

event

String

ackRequired

Boolean

Default: false

kafka_messageKey

String

messageId

String

entityId

String
```

9 Tables

LMM_TM_EVENTS

In the below table, we configure all the events that Oracle Banking Liquidity Management is supporting. Here we can toggle the evt_isEnabled column to “Y” (If we want to publish that event) or “N”(If we want to publish that event).

Table 9-1 LM_TM_EVENTS Table

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
ID	VARCHAR2 (36 BYTE)	No	(null)	1	(null)
EVT_CODE	VARCHAR2 (50 BYTE)	No	(null)	2	(null)
EVT_CATEGORY	VARCHAR2 (20 BYTE)	No	(null)	3	(null)
EVT_DESC	VARCHAR2 (100 BYTE)	No	(null)	4	(null)
EVT_TOPIC	VARCHAR2 (50 BYTE)	Yes	(null)	5	(null)
EVT_ISENABLED	CHAR (1 BYTE)	No	(null)	6	(null)
MAKER_ID	VARCHAR2 (12 BYTE)	Yes	(null)	7	(null)
MAKER_DT_STAMP	DATE	Yes	(null)	8	(null)
CHEKER_ID	VARCHAR2 (12 BYTE)	Yes	(null)	9	(null)
CHECKER_DT_STAMP	DATE	Yes	(null)	10	(null)
RECORD_STAT	CHAR (1 BYTE)	Yes	(null)	11	(null)
AUTH_STAT	CHAR (1 BYTE)	Yes	(null)	12	(null)
ONCE_AUTH	CHAR (1 BYTE)	Yes	(null)	13	(null)
MOD_NO	NUMBER (4,0)	Yes	(null)	14	(null)

LMX_TB_EVENT_LOG

In the below table, all the Oracle Banking Liquidity Management services that wants to publish will store their payload and a scheduler will fetch data from this table and fetch all the records where is_published is “N” and retry_count<=max_retry_configured.

Table 9-2 LMX_TB_EVENT_LOG Table

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
ID	VARCHAR2 (36 BYTE)	No	(null)	1	(null)
EVT_CODE	VARCHAR2 (50 BYTE)	No	(null)	2	(null)
EVT_TOPIC	VARCHAR2 (50 BYTE)	No	(null)	3	(null)
EVT_KEY	VARCHAR2 (50 BYTE)	Yes	(null)	4	(null)
LOG_TYPE	VARCHAR2 (20 BYTE)	Yes	(null)	5	(null)
LOG_DESCRIPTION	VARCHAR2 (500 BYTE)	Yes	(null)	6	(null)
LOG_TIME	TIMESTAMP (6)	Yes	(null)	7	(null)
SERVICE_DATA	CLOB	Yes	(null)	8	(null)
PUBLISHED_TIME	TIMESTAMP (6)	Yes	(null)	9	(null)
IS_PUBLISHED	CHAR (1 BYTE)	Yes	'N'	10	(null)
RETRY_COUNT	NUMBER	Yes	0	11	(null)

PLATO_EVENTHUB_OUT_LOG

The below table is provided in by the plato-event-hub-core (in LMX schema in Oracle Banking Liquidity Management). Here all the events that are to be published are stored along with the publisher service name and status is changed to success once successfully published to kafka.

Table 9-3 LMX_TB_EVENT_LOG Table

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
ID	VARCHAR2 (36 BYTE)	No	(null)	1	(null)
TOPIC_NAME	VARCHAR2 (255 BYTE)	No	(null)	2	(null)
MESSAGE_KEY	VARCHAR2 (36 BYTE)	Yes	(null)	3	(null)
EVENT_TYPE	VARCHAR2 (25 BYTE)	Yes	(null)	4	(null)
PAYLOAD	CLOB	Yes	(null)	5	(null)
EXCEPTION	VARCHAR2 (512 BYTE)	Yes	(null)	6	(null)
STATUS	VARCHAR2 (33 BYTE)	Yes	(null)	7	(null)
RETRY_COUNT	NUMBER	Yes	(null)	8	(null)
RETRY_DATATIME	DATE	Yes	(null)	9	(null)

Table 9-3 (Cont.) LMX_TB_EVENT_LOG Table

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
CREATED_BY	VARCHAR2 (12 BYTE)	Yes	(null)	10	(null)
CREATED_DATE	DATE	Yes	(null)	11	(null)
UPDATED_BY	VARCHAR2 (12 BYTE)	Yes	(null)	12	(null)
UPDATED_DATE	DATE	Yes	(null)	13	(null)
CORRELATION_ID	VARCHAR2 (256 BYTE)	Yes	(null)	14	(null)
APPLICATION_NAME	VARCHAR2 (120 BYTE)	Yes	(null)	15	(null)
ACK_COUNT	NUMBER (38, 0)	Yes	0	16	(null)
HEADER	CLOB	Yes	(null)	17	(null)
CONSUMER_APPL...	VARCHAR2 (512 BYTE)	Yes	(null)	18	(null)

PLATO_EVENTHUB_IN_LOG

The below table is provided in by the plato-event-hub-core (in LMX schema in Oracle Banking Liquidity Management). Here all the events that are consumed are stored along with the consumer service name.

Table 9-4 LMX_TB_EVENT_LOG Table

COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
ID	VARCHAR2 (36 BYTE)	No	(null)	1	(null)
TOPIC_NAME	VARCHAR2 (100 BYTE)	Yes	(null)	2	(null)
MESSAGE_KEY	VARCHAR2 (255 BYTE)	Yes	(null)	3	(null)
EVENT_TYPE	VARCHAR2 (36 BYTE)	Yes	(null)	4	(null)
EVENT_PAYLOAD	CLOB	Yes	(null)	5	(null)
STATUS	VARCHAR2 (36 BYTE)	Yes	(null)	6	(null)
EXCEPTION	VARCHAR2 (500 BYTE)	Yes	(null)	7	(null)
MSG_DT_STAMP	DATE	Yes	(null)	8	(null)
CORRELATION_ID	VARCHAR2 (256 BYTE)	Yes	(null)	9	(null)
APPLICATION_NAME	VARCHAR2 (100 BYTE)	Yes	(null)	10	(null)

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