

Microservices Platform Foundation Installation Guide  
Oracle Banking Electronic Data Exchange for Corporates  
Patchset Release 14.7.1.0.0

Part No. F83119-01

May 2023

**ORACLE®**

Microservices Platform Foundation Installation Guide

May 2023

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# 1. Preface

## 1.1 Introduction

This guide helps you to install the Oracle Banking Microservices Architecture services on designated environment. It is assumed that all the prior setup is already done related with WebLogic installation, WebLogic managed server creation and Oracle DB installation.

---

**Note:** For the exact version to be installed, refer to **Tech Stack** section of Release Notes.

---

It is recommended to use dedicated managed server for each of the Oracle Banking Microservices Architecture services.

## 1.2 Audience

This document is intended for WebLogic admin or ops-web team who are responsible for installing the OFSS banking products.

## 1.3 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>.

## 1.4 Organization

This installation user guide would allow you to install following services in same order:

- WebLogic system environment settings
- Plato Config Service
- Plato Discovery Service
- Plato API Gateway Service
- Plato Apigateway Router
- Plato UI Config Service
- Plato O (Conductor)
- Plato Orch Service
- Plato Feed Services
- Plato Batch Server
- Plato Alerts Management Services
- Security configuration and tool installation
- Plato Rules
- Plato Reports Services

## 2. Database Setup

### 2.1 Introduction

In this section you are going to setup database related configuration for Oracle Banking Microservices Architecture Installation. Before you proceed ensure pre-installation setup is done.

### 2.2 Pre-requisite

Before you proceed with the document, ensure Schemas are being created. It is recommended to have different schema for **Plato** and **Plato Security**. To configure Plato security, refer Security Configuration chapter. Make sure that the schema Plato Security user has the below rights:

| DB OBJECT    | OPERATION |       |      |        |        |        |
|--------------|-----------|-------|------|--------|--------|--------|
|              | CREATE    | ALTER | DROP | INSERT | UPDATE | DELETE |
| TABLE        | Y         | Y     | N    | Y      | Y      | Y      |
| VIEW         | NA        | NA    | NA   | NA     | NA     | NA     |
| SEQUENCE     | Y         | Y     | Y    | NA     | NA     | NA     |
| PACKAGE      | NA        | NA    | NA   | NA     | NA     | NA     |
| PACKAGE BODY | NA        | NA    | NA   | NA     | NA     | NA     |
| INDEX        | Y         | Y     | Y    | NA     | NA     | NA     |
| SYNONYM      | NA        | NA    | NA   | NA     | NA     | NA     |
| FUNCTION     | NA        | NA    | NA   | NA     | NA     | NA     |
| TRIGGER      | NA        | NA    | NA   | NA     | NA     | NA     |
| TYPE         | NA        | NA    | NA   | NA     | NA     | NA     |

To know the server port number, refer to **How to check port number** section in **Configuration and Deployment Guide** .

Ensure to configure Placeholder parameters in Weblogic server for Plato Config service, setDomain.env. To know more, refer to **Place Holder update for Plato-Config-Services** section in **Configuration and Deployment Guide**.

---

## 3. Domain and Cluster Configuration

### 3.1 Oracle Banking Microservices Architecture Domain Configuration

#### 3.1.1 Prerequisites

- Machine should have Java has installed.
- Oracle Fusion Middleware has to be installed on the machine.

---

**NOTE:** For the exact version to be installed, refer to **Software Pre-requisites** section in **License Guide**.

---

#### 3.1.2 Domain Creation and Configuration

It is recommended to have different managed server in one domain for each application. For Creating Domain and Configuration, refer to **How to create and Cluster Configuration** in **Configuration and Deployment Guide**.

## 4. Data Sources Creation

### 4.1 Prerequisite

Before you proceed with Data source creation, make sure Domain and cluster configuration steps completed.

### 4.2 Data sources List

The table below lists the data sources to be created on each managed server prior to deployment of applications onto managed servers.

| Data source Name             | Data source JNDI  | Targets   |
|------------------------------|---|---|
| <b>PLATO</b>                 | jdbc/PLATO  | Config Server, API Gateway Server, Plato Feed Server, Plato-Alerts-Management-Server, Plato-Batch-Server, Appshell Server |
| <b>PLATOSEC</b>              | jdbc/PLATO_SECURITY   | Config Server, API Gateway Server   |
| <b>PLATO_UI</b>              | jdbc/PLATO_UI_CONFIG  | Plato UI Config Server, Appshell Server   |
| <b>CONDUCTOR</b>             | jdbc/PLATO-O  | Plato-O, Plato Orch Server  |
| <b>PLATOFEED</b>             | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/PLATOFEED   | Plato-Feed-Server   |
| <b>PLATOALERTS</b>           | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/PLATOALERTS | Plato-Alerts-Management-Server  |
| <b>PLATOBATCH</b>            | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/PLATOBATCH  | Plato-Batch-server  |
| <b>PLATORULE</b>             | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/PLATORULE   | Plato-Rules-Server  |
| <b>REGIONAL CONFIGURATOR</b> | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/OBRC        | Config-Server   |



|                       |  |                                      |
|-----------------------|--|--------------------------------------|
| <b>REPORTSERVICE</b>  | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/jdbc/REPORTSERVICE | Plato-Report-Server                  |
| <b>PLATO_PASSWORD</b> | According to the JNDI created for each entity, for DEFAULTENTITY, the JNDI should be jdbc/PLATO_PASSWORD     | PLATO-PASSWORD-POLICY-SERVICE-Server |

For creating data source, refer to **How to create Data sources** section in **Configuration and Deployment Guide**.

## 5. Security Configuration and Tools Installation

### 5.1 Pre-requisite

Before you proceed, do the following steps:

- In case you are planning to use LDAP for web application authentication with Weblogic as provider for LDAP. Please first go through the steps of Embedded Weblogic setup steps in **Configuration and Deployment Guide**.
- In case you are planning to use OAuth without OAM(i.e. Spring OAuth), do the following **change in Weblogic configuration**:  
In the config.xml file of the concerned domain in Weblogic add the following script at the end of **security-configuration** tag (Just before the line **</security-configuration>**)

```
<enforce-valid-basic-auth-credentials>false</enforce-valid-
basic-auth-credentials>
```

To use the Standard LDAP directory authentication for Online Web Application authentication, make sure LDAP server details is provided to you:

Like LDAP\_URL, USER\_STORE, LDAP\_SERVER\_CREDENTIAL\_SALT, LDAP\_SERVER\_USER, LDAP\_SERVER\_BASE, LDAP\_SERVER\_CREDENTIAL, LDAP\_USER\_SEARCH\_BASE, LDAP\_USER\_PREFIX, CORS\_ALLOWED\_ORIGINS, LDAP\_SERVER\_CREDENTIAL\_SALT etc.

### 5.2 Plato Security JWT

Plato security module enables securing API micro services with JWT (JSON Web Tokens).

JSON Web Tokens are an open, industry standard RFC 7519 method for representing claims securely between two parties. JSON Web Token (JWT) is a compact, URL-safe means of representing claims to be transferred between two parties. The claims in a JWT are encoded as a JSON object that is used as the payload of a JSON Web Signature (JWS) structure or as the plaintext of a JSON Web Encryption (JWE) structure, enabling the claims to be digitally signed.

### 5.3 Plato Security Configuration (Online Web Application Authentication)

Oracle Banking Microservices Architecture recommend to create new schema for security to keep the security related database objects at one place. If the environment is configured for multi-tenant, we require a security schema per tenant.

All the Plato security configurations are maintained at SECURITY\_CONFIG table

Steps to configure in the table:

1. Change in case of **LDAP directory authentication** the below KEY with provided LDAP details:

| KEY                                | VALUE   |
|------------------------------------|---|
| <b>LDAP_SERVER_CREDENTIAL_SALT</b> | Enter LDAP server Credential salt e.g.<br>0.9482628451234567  |
| <b>CORS_ALLOWED_ORIGINS</b>        | valid host names<br>(comma delimited)   |
| <b>LDAP_URL</b>                    | Enter LDAP Server URL Example:<br>ldap://wxy00abc:9001  |
| <b>LDAP_SERVER_USER</b>            | Enter LDAP Server USERID Example:<br>uid=admin  |
| <b>LDAP_SERVER_BASE</b>            | Enter LDAP server BASE Example:<br>dc=oracle,dc=com   |
| <b>LDAP_SERVER_CREDENTIAL</b>      | Enter LDAP server encrypted password using<br>provided jwt algorithm Example:<br>m0o/F3UvlwvBSv5C/TSckA== (use plato<br>encryption utility to generate encrypted<br>password) |
| <b>LDAP_USER_SEARCH_BASE</b>       | Enter LDAP User search Base Example:<br>ou=people   |
| <b>LDAP_USER_PREFIX</b>            | Enter LDAP User Prefix Example: uid   |

2. Change in case of **SSO Agent** the below KEY with provided LDAP details:

| KEY                         | VALUE                              |
|-----------------------------|------------------------------------|
| <b>IS_SSO_CONFIGURED</b>    | True                               |
| <b>CORS_ALLOWED_ORIGINS</b> | valid host names (comma delimited) |

## 5.4 User Store

Oracle Banking Microservices Architecture supports following user stores for authentication Users Maintained at table. Plato security can authenticate the users maintained at table (APP\_USER) in the security schema. However, we do not recommend using this option.

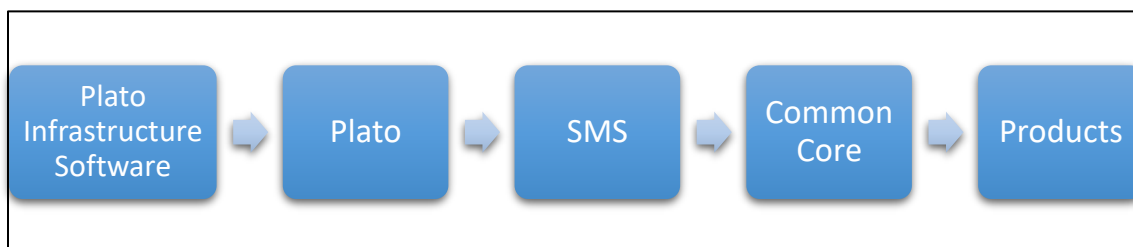
---

## 6. Deployments

### 6.1 Pre-requisite

Before you proceed with below, make sure previous steps are completed.

### 6.2 Deployment Order



### 6.3 Flyway configuration

The following parameters have to be added as jvm arguments for controlling flyway:

1. flyway.enabled = <Boolean>. If true, flyway will get executed. If false, flyway wouldn't be executed
2. spring.flyway.enabled=false (always).

## 7. Multi Entity Configuration

### 7.1 Enable Multi Entity

By Default, Multi Entity is disabled.

To enable Multi Entity, add jvm argument as `-Dmulti.entity.enabled=true`.

### 7.2 Default Entity Creation

Default entity creation is described as follows:

- A new column `ENTITY_ID` will be introduced in the `APPLICATION_LEDGER` table in the `PLATO` schema with default value as `"DEFAULTENTITY"`. This will get executed as a part of flyway for `plato-config-service-{version}.war`.
- A new table `"SERVICE_REGISTRY"` will be introduced in the `PLATO` schema. This table will contain the `Appld` and `microservice` name of all the microservices. This will get executed as a part of flyway for `plato-config-service-{version}.war`.
- A new table `"PLATO_TM_ENTITY"` will be introduced in the `PLATO SECURITY` schema with a single entry for `"DEFAULTENTITY"`. This will get executed as a part of the flyway scripts for `plato-api-gateway-{version}.war`
- A new table `"PLATO_TM_USER_ENTITY_MAPPING"` will be introduced in the `PLATO SECURITY` schema which will also get executed as part of the flyway scripts for `plato-api-gateway-{version}.war`
- **Only for Existing Customers** - For users already maintained in SMS, users must be replicated to `"PLATO_TM_USER_ENTITY_MAPPING"` for the `"DEFAULTENTITY"`.
- The sample query is as follows:

```
INSERT INTO PLATO_TM_USER_ENTITY_MAPPING (ID, USER_ID , ENTITY_ID
,HOME_ENTITY,MULTI_ENTITY_ADMIN,USER_NAME,ENTITY_ADMIN,EMAIL,START
_DATE,END_DATE)
```

```
SELECT ID , USER_LOGIN_ID ,'DEFAULTENTITY'
,'Y','N',USER_NAME,'N',USER_EMAIL,START_DATE,END_DATE FROM
PLATOSMS.SMS_TM_USER
```

PLATOSMS – SMS schema for the `DEFAULTENTITY`

- If the customer wishes to change the default entity ID, it can be done by changing the `ENTITY_ID` column value in the `PLATO_TM_ENTITY` , `APPLICATION_LEDGER` & `PLATO_TM_USER_ENTITY_MAPPING` table. It is considered that the entity schemas are same and only entity ID is changed.

## 7.3 Multi Entity Admin User Creation

Perform the following steps

1. The flyway scripts for creation of Multi entity admin user (**MEADMIN1** and **MEADMIN2**) would be executed through plato-api-gateway.
2. Create the multi entity admin user in the LDAP.

## 7.4 Entity Creation

Using the Multi entity admin created in the previous step, log in to the app-shell and create the entities.

---

**Note:** Refer to Oracle Banking Multi-Entity Deployment Guide for the steps to create an entity.

---

When the multi entity admin create an entity, the following processes will execute in the background:

- The entity details will be saved in the PLATO\_TM\_ENTITY table.
- The JNDIs will be saved in the APPLICATION\_LEDGER table.
- The flyway scripts for all the micro services will get executed in their respective schemas.
- Once the flyway execution is completed a new role “ENTITY\_ADMIN” will be created in the entity. This step will insert scripts into the following tables:
  - SMS\_TM\_ROLE
  - SMS\_TW\_ROLE
  - SMS\_TM\_ROLE\_ACTIVITY
  - SMS\_TW\_ROLE\_ACTIVITY

This role will be assigned to the entity admin user in the user creation step.

- The Head Office branch details will be inserted into the CMC\_TM\_CORE\_BRANCH and CMC\_TW\_CORE\_BRANCH tables.
- The Bank details will be inserted into the CMC\_TM\_CORE\_BANK and CMC\_TW\_CORE\_BANK tables.
- The System dates will be inserted into the CMC\_TM\_SYSTEM\_DATES and CMC\_TW\_SYSTEM\_DATES tables.

## 7.5 User Creation

Make sure that the entity creation step is complete before proceeding to create users.

- Create the users in the LDAP.
- Multi entity admin must login to the app-shell and create entity admins and users.

---

**Note:** Refer to Oracle Banking Multi Entity Deployment Guide for the steps to create users.

---

- The entity admins and user details will be stored in the PLATO\_TM\_USER\_MAPPING table in the security schema.
- For the entity admins scripts will be executed in the SMS schema in the following tables to assign the ENTITY\_ADMIN role to the entity admin users.

- sms\_tm\_user
  - sms\_tw\_user
  - sms\_tm\_user\_role\_branch
  - sms\_tw\_user\_role\_branch
  - sms\_tm\_user\_application
  - sms\_tw\_user\_application
- The entity admins need to log in to the app-shell, and provide the missing user details, assign roles and branches to users.

## 8. Plato Orchestration Services

### 8.1 Migration Endpoint

---

**Note:** This section is applicable only to the existing customers.

---

The task blob usage has been removed for GET endpoints in *plato-orch-service* for task list screens. The table *HTASK\_ADDN\_DTLS* contains the task related details. A migration endpoint needs to be executed to populate the data for the completed tasks in this table. In Progress tasks data will be automatically populated by the poller. This will improve the performance in Free Tasks/My Tasks/Completed Tasks/Supervisor Tasks inquiry.

To populate the table *HTASK\_ADDN\_DTLS* with previously COMPLETED tasks (for tasks not present in *task\_in\_progress* table), a migration API needs to be executed.

**GET Request:**

**Endpoint:** http://<host>:<port>/plato-orch-service/api/v1/extn/migrate

**Headers:** Sample inputs shown below.

**appld:** platoorch  
**branchCode:** 000  
**Content-Type:** application/json  
**entityId:** DEFAULTENTITY

To verify if the **HTASK\_ADDN\_DTLS** table entries are consistent with others, execute the following script and check if the count comes as zero.

```
SELECT COUNT(*) FROM TASK t
WHERE JSON_VALUE(json_data, '$.status') = 'COMPLETED'
AND JSON_VALUE (json_data, '$.taskType') = 'WAIT'
AND TASK_ID NOT IN (SELECT TASK_ID FROM HTASK_ADDN_DTLS);
```

---

**Note:** For future tasks and previous non-completed tasks present in *task\_in\_progress* table, poller keeps checking the *task\_in\_progress* table and populates the *HTASK\_ADDN\_DTLS* table.

---



---

## 9. Plato Feed Services

To avail the feature of record level approval functionality in Plato-Feed, the below property needs to be maintained in the RECORD\_LEVEL\_APPROVAL column of PLATO\_TM\_FEED table. If not maintained, the default behavior will be of file-level approval only.

property name – RECORD\_LEVEL\_APPROVAL

property value - Y or N

default value - N

## 10. Coherence Adoption

Coherence provides replicated and distributed (partitioned) data management and caching services on top of a reliable, highly scalable peer-to-peer clustering protocol.

Coherence includes network-level fault tolerance features and transparent soft re-start capability to enable servers to self-heal.

### 10.1 Pre-requisite

Before you proceed with the below, make sure cmc services are deployed in order.

### 10.2 Deployment of Plato coherence server

1. Deploy the plato-coherence-server.
2. One can change the min and max threads for distributed and proxy schemes for the coherence server by setting properties of "coherence.distributed.threads.max", "coherence.distributed.threads.min", "coherence.proxy.threads.min", "coherence.proxy.threads.min". This is optional and only needs to be done to fine tune performance after monitoring certain coherence metric.

| Property                         | Value          | Description  |
|----------------------------------|----------------|--|
| -Dtangosol.coherence.clusterport | 7574 (default) | The port on which the coherence server will start on |

### 10.3 CMC service deployment

1. Execute SQL scripts to insert data for COHERENCE\_CACHE\_KEY TABLE (Find the script in the attachment) in the CMC schema.
2. Add the following properties in the PROPERTIES table.

| Key                | Value          | Description   |
|--------------------|----------------|---|
| coherence.enabled  | true           | Through this flag, we can switch between normal implementation and coherence implementation of cmc-service. |
| loadCacheOnStartUp | false(default) | Only if you want to load data on startup of CMC services then set this flag as true, else flag not needed.  |

3. Add the following JVM params for cmc services:
  - -Dcoherence.server.port = (default value: 7574)
  - -Dcoherence.server.address = (address where your plato coherence server is deployed)
4. Deploy the coherence-enabled cmc services.
5. Hit the /loadData endpoint with **applicationName**, **applId**, and **apiName(Optional)** as parameters.

The screenshot shows a REST client interface for a GET request. The URL is `http://localhost:8089/cmcc-branch-services/loadData?appld=CMNCORE&applicationName=cmc-branch-services&apiName=corebranch`. The query parameters are listed in a table below.

| KEY   | VALUE               | DESCRIPTION |
|---|---------------------|-------------|
| <input checked="" type="checkbox"/> appld           | CMNCORE             |             |
| <input checked="" type="checkbox"/> applicationName | cmc-branch-services |             |
| <input checked="" type="checkbox"/> apiName         | corebranch          |             |
| Key   | Value               | Description |

Note: `apiName` is used to load data for a particular table only. For example: In the above image, **`apiName = corebranch`** will load data only for the corresponding table, in this case `CMC_TM_CORE_BRANCH`.

- Hit the `/deleteData` endpoint with **`applicationName`**, **`appld`**, and **`apiName(Optional)`** as parameters. This works same as `/loadData` just that it will delete data from cache.

---

# 11. Oracle Banking Microservices Architecture Software Deployment

Once everything is deployed, the managed servers. For each application, call path “/refresh” for refreshing the configuration properties.

## 11.1 Zookeeper Cluster Setup

To restart the server, refer to **How to restart** section in **Configuration and Deployment Guide**.

### 11.1.1 Pre-requisite

JDK should be installed in all node machines.

Download kafka\_2.13-3.4.0 and extract the binary in all node machines. Kafka can be found at <Unzip the file>/THIRD\_PARTY\_SOFTWARES/KAFKA/ARCHIVE.

---

Note: Please note that the zookeeper that we will be using is bundled within kafka.

---

### 11.1.2 Installation

- Untar/unzip the kafka binary and move them into a folder which will be the kafka home directory.
- Create two directories named logs and data inside the kafka home directory folder in all the nodes with appropriate permission. If logs folder is already present, please clear it.
- Inside the <kafka home directory>/data folder create a myid file. The myid file consists of a single line containing only the text of that machine's id. So myid of server 1 would contain the text "1" and nothing else. The id must be unique within the ensemble and should have a value between 1 and 255.
- Edit the configuration file named zookeeper.properties at <kafka home directory>/kafka\_2.13-3.4.0/config

Add the following set of properties and values to that file

```
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.
```

---

**Note:** Any odd number of zookeeper servers can be configured under the cluster. The properties with the key as server.x are only required if you want to have a multiNode kafka setup.

---

- Start the zookeeper on each node machine

Navigate to <kafka home directory>/kafka\_2.13-3.4.0 and execute the below command

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

- To see who is the leader and followers in the cluster, run the below command on each node

```
echo stat | nc localhost 2181
```

- To check the zoo cluster functioning i.e dynamic leader election, kill the zookeeper process on the leader node and check again with the following commands on the remaining live zookeeper node.

```
echo stat | nc localhost 2181
```

## 11.2 Kafka Cluster Setup

### 11.2.1 Pre-requisite

JDK should be installed in all node machines.

Download Kafka and extract the binary in all node machines. Kafka can be found at <Unzip the file>/THIRD\_PARTY\_SOFTWARES/KAFKA/ARCHIVE.

### 11.2.2 Installation

- Untar/unzip the kafka binary and move them into a folder which will be the kafka home directory.
- Create two directories named logs and data inside the kafka home directory folder in all the nodes with appropriate permission. If logs folder is already present, please clear it.

Please skip the above 2 steps if already done during zookeeper setup.

- Edit the below lines in the <kafka home directory>/kafka\_2.13-2.8.1/config/server.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.segment.bytes= <The maximum size of a single log file>
```

<kafka home directory>/kafka\_2.13-3.4.0/config/server.properties.

- To start the Kafka, navigate to <kafka home directory>/kafka\_2.13-3.4.0/ folder and run the below command on each node.

```
export JMX_PORT=[PORT VALUE]

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

The Default value of JMX Port is 9999.

Tail the log for server status.

- To create topic, navigate to <kafka home directory>/kafka\_2.13-3.4.0/ folder and run the below command:

```
/bin/kafka-topics.sh --create --bootstrap-server
<hostname>:<client port> --replication-factor 3 --partitions
```

- To list the available topic on kafka server, navigate to *<kafka home directory>/kafka\_2.13-3.4.0/* folder and run the below command:

```
./bin/kafka-topics.sh --list --bootstrap-server
```

- To describe the topic, navigate to *<kafka home directory>/kafka\_2.13-3.4.0/* folder and run the below command:

```
./bin/kafka-topics.sh --describe --topic <topic name> --
bootstrap-server <hostname>:<client port>
```

- To start a producer, navigate to *<kafka home directory>/kafka\_2.13-3.4.0/* folder and run the below command:

```
export JMX_PORT=[PORT VALUE]//Different Value from the server
JMX port
```

```
./bin/kafka-console-producer.sh --broker-list
```

By default, port is taken as 9092 for the producer.

- To start a consumer console for viewing the received messages sent by the producer, use the following command:

```
export JMX_PORT=[PORT VALUE]//Different Value from the server
JMX port
```

```
./bin/kafka-console-consumer.sh --bootstrap-server
```

### 11.2.3 Configuring a standalone Kafka instance in cluster mode

If there is already a standalone Kafka instance with OBMA services running on it, it is expected the topics are already created in the Kafka instances. In this case use the below steps to enable replication of messages between Kafka brokers:

**Step1: The attached json has to be edited to have all the topics and their replication confirmation updated.**



increase.json

For example, if you have a 3 node setup, the json will look like the attached sample.

It is ideal to have the number of replicas equal to the number of brokers.

```
{
  "version":1,
  "partitions":[
    {
      "topic":"<Topic Name>","partition":0<if there is just one partition, else there has to be a different record for each partition per topic>,"replicas":[comma separated list of broker ids]}
  ]
}
```

#### Step 2: Run the below command

```
.\bin\windows\kafka-reassign-partitions.bat --bootstrap-server localhost:9092 --reassignment-json-file increase.json --execute
```

## 11.3 KAFKA Security Setup

### 11.3.1 Pre-requisite

JDK should be installed in all node machines.

Download Kafka and extract the binary in all node machines. Kafka can be found at <Unzip the file>/THIRD\_PARTY\_SOFTWARES/KAFKA/ARCHIVE

### 11.3.2 Installation

#### 11.3.2.1 Generate Keystore

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

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

In the above command,

1. alias is used to identify the public and private key pair created.
2. keyalg is the key algorithm used to generate the public and private key pair. The RSA key algorithm is recommended.
3. keysize is the size of the public and private key pairs generated. A key size of 1024 or more is recommended.



4. `sigalg` 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.
5. `valdays` is the number of days for which the certificate is to be considered valid. Please consult with your CA on this period.
6. `keystore` 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 will prompt for the following attributes of the certificate and keystore:

1. **Keystore Password:** Specify a password that will be used to access the keystore. This password needs to be specified later, while configuring the identity store in Kafka Server.
2. **Key Password:** Specify a password that will be used to access the private key stored in the keystore. This password needs to be specified later, while configuring the SSL attributes of the Kafka Server.
3. **First and Last Name (CN):** Enter the domain name of the machine. For example: `www.example.com`
4. **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.
5. **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.
6. **Name of your City or Locality:** The city in which your organization is physically located. For example: Bengaluru.
7. **Name of your State or Province:** The state/province in which your organization is physically located. For example: Karnataka.
8. **Two-letter CountryCode for this Unit:** The country in which your organization is physically located. For example US, UK, IN etc.

#### **Example:**

A sample execution of the command is mentioned below:

```
keytool -genkeypair -alias certificates -keyalg RSA -keysize 1024 -sigalg SHA512withRSA -validity 365 -keystore /scratch/Data/Certificates/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]: <domain name>.oracle.com

What is the name of your organizational unit?

[Unknown]: <application name>

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=Test, O=Oracle Financial Services, L= Bengaluru, ST= Karnataka, C=IN correct? [no]: yes

Enter key password for < password >

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

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

### 11.3.2.2 Export Private Key as Certificate

The command is given 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 certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore
/scratch/Data/Certificates/KafkaServerKeystore.jks -keypass oracle123 -storepass oracle123
```

If successful, the following message is displayed:

Certificate stored in file < KafkaCert.cer>

### 11.3.2.3 Import the Cert and generate TrustStore

The command is given below:

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

In the above command:

1. *alias* 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 mentioned in section 7.3.1.2.
2. *cert\_file* is the location of the file containing the PKCS#7 formatted reply from the CA, containing the signed certificate.
3. *truststore* is the location where the truststore should be generated.
4. *storepass* is the password for the truststore.

Generate two truststores from the same cert. One is used for Kafka server and another is used for clients.

**Example:**

```
keytool -import -alias certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore  
/scratch/Data/Certificates/KafkaServerTrustStore.jks -storepass oracle123
```

```
keytool -import -alias certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore  
/scratch/Data/Certificates/KafkaClientTrustStore.jks -storepass oracle123
```

Hence, the following three keystore files would be needed for this method:

1. *KafkaServerKeystore.jks* : keystore file for Kafka brokers
2. *KafkaServerTrustStore.jks* : Truststore file for server
3. *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. Generate and place these files on all the different servers of Kafka so that it can be accessed by server\*.properties file. The KafkaClientTrustStore.jks should be placed on the server, which is accessible by the microservices also.

---

#### 11.3.2.4 Creation of users in Zookeeper

Follow the below steps to create user in Zookeeper:

1. Start the zookeeper. Refer command in Section 11.1.2.
2. Execute the below commands for the user creation.

```
./kafka-configs.sh --zookeeper localhost:2181 --alter --add-config "SCRAM-SHA-256=[password=admin-secret],SCRAM-SHA-512=[password=admin-secret]" --entity-type users --entity-name admin
```

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

Two users are created above with user names as test and admin, and two different passwords are setup for each user one for each scram mechanism. Here, the user 'admin' is used for Kafka broker auth and 'test' is used for client auth.

#### 11.3.2.5 Configuring Brokers

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

##### **SSL-SCRAM Settings for SSL configuration(Recommended)**

```
listeners=SSL://localhost:9092
advertised.listeners=SSL://localhost:9092
ssl.endpoint.identification.algorithm=
ssl.truststore.location=C:/Users/sharaghu/Downloads/KafkaServerTrustStore.jks
ssl.truststore.password=oracle123
ssl.keystore.location=C:/Users/sharaghu/Downloads/KafkaServerKeystore.jks
ssl.keystore.password=oracle123
ssl.key.password=oracle123
security.inter.broker.protocol=SSL
```

Entries in the properties table for each kafka consumer/producer service

- 'spring.cloud.stream.kafka.binder.configuration.ssl.truststore.location'
- 'spring.cloud.stream.kafka.binder.configuration.ssl.truststore.password'
- 'spring.cloud.stream.kafka.binder.configuration.security.protocol' value = 'SSL'
- 'ssl.endpoint.identification.algorithm' = ''

**SSL-SCRAM Settings for SASL-SSL configuration (Not recommended)**

```
ssl.endpoint.identification.algorithm=
```

```
ssl.truststore.location=/scratch/Data/Certificates/KafkaServerTrustStore.jks
```

```
ssl.truststore.password=orcl@123
```

```
ssl.keystore.location/scratch/Data/Certificates/KafkaServerKeystore.jks
```

```
ssl.keystore.password=orcl@123
```

```
ssl.key.password=orcl@123
```

```
sasl.enabled.mechanisms= SCRAM-SHA-256
```

```
sasl.mechanism.inter.broker.protocol= SCRAM-SHA-256
```

```
security.inter.broker.protocol=SASL_SSL
```

```
listeners=SASL_SSL://whf00phz:9093
```

```
advertised.listeners=SASL_SSL://10.40.162.113:9093
```

```
listener.name.sasl_ssl.scram-sha-256.sasl.jaas.config=org.apache.kafka.common.security.scram.ScramLoginModule required
username="admin" password="admin-secret";
```

---

**Note:** Provide 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.

---

Start the Kafka servers. Refer command in Section [10.2.2](#).

**Changes to Clients(Kafka Consumer and Producer Services)**

These attributes should be available in application.yml of any custom service that connects to SSL/Authentication enabled Kafka broker. Values for these needs to be released to the PROPERTIES table.

| Key   | Value   |
|---|---|
| <b>spring.cloud.stream.kafka.binder.brokers</b>               | <hostname:port>                                 |
| <b>spring.cloud.stream.kafka.binder.zknodes</b>               | <hostname:port>                                 |
| <b>spring.cloud.stream.kafka.binder.jaas.options.username</b> | <Zookeeper user created for clients>            |
| <b>spring.cloud.stream.kafka.binder.jaas.options.password</b> | <Zookeeper user encrypted password for clients> |

| Key   | Value  |
|---|--|
| <b>spring.cloud.stream.kafka.binder.configuration.ssl.truststore.location</b> | <location of client trust store certificate> |
| <b>spring.cloud.stream.kafka.binder.configuration.ssl.truststore.password</b> | <Pass code of client truststore certificate> |

To encrypt the password, use the following API of plato-config-service:

**API:** http://hostname:port/config-service/encrypt

**Request Type:** Text

**Request Body:** Password

For example, when you hit the above API for the following passwords we get the response of encrypted value:

```
test-secret : 36c11a239ffafbe229d888e7d21f0508a38a2501fd5592b1fe54e30889dd57ed
```

While 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 below example:

For more information on adding properties to plato-config-deploy.env, refer to the section “Method 3 – Using env files and setUserOverrides.sh file” in **Configuration and Deployment Guide**.

### 11.3.2.6 Important Commands

To view the messages getting sent in Kafka, save the below lines in a file, and name it as ssl.properties.

```
ssl.truststore.location=/scratch/Data/Certificates/KafkaClientTrustStore.jks
ssl.truststore.password=orcl@123
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="obvam_new" \
  password="obvam-secret";
```

---

**NOTE:** Update the truststore location and the password.

---

To view the messages being published use the below command:

```
./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 test_topic --  
consumer.config =/scratch/kafka/config/ssl.properties --from-beginning
```

## 11.4 Tesseract Installation

### 11.4.1 Pre-requisite

#### 11.4.1.1 Build Tools

Ensure that the following build tools are available:

- GNU Autotools—autoconf, automake, libtool
- CMake (Optional, we will use this only if autoconf fails while building leptonica)

Both should be available inside Oracle yum.

#### 11.4.1.2 Dependent Libraries

These libraries should be present in the server. By default, these libraries are available in Oracle Linux. If these libraries are not present, please install it through yum with the following command:

```
sudo yum install <LIBRARY_NAME>
```

Following are the library names:

- libjpeg
- libtiff
- zlib
- libjpeg-turbo
- libwebp
- libpng-devel
- libtiff-devel
- libwebp-devel

---

**Note:** If you are using any distribution other than Oracle Linux, please install the libraries from official Oracle repo or any other repo available for that distribution.

---

#### 11.4.1.3 Installation Files

Download installation files required to install and set up tesseract. Files are available at the following location:

**<Unzip the file>/THIRD\_PARTY\_SOFTWARES/Tesseract**

Please find below the list of files present in the directory:

1. leptonica-1.82.0.tar.gz
2. tesseract-5.1.0.tar.gz
3. eng.traineddata
4. osd.traineddata



## 11.4.2 Installation

### 11.4.2.1 Leptonica Installation:

Tesseract uses leptonica internally for image processing. Leptonica can be build and installed either by autoconf or by CMake.

In this document, we will cover installation using both autoconf and CMake.

---

**Note:** If you already have all access to all installation directory then sudo is not required.

---

>sudo LINUX\_COMMAND (In case the user does not have file access permissions)

>LINUX\_COMMAND (In case the user has all access. Example: DBA user, Root user)

In this document, we will execute all the commands with sudo. You can omit it based upon your user's permission details.

#### 11.4.2.1.1 Installation through Autoconf

- Copy the downloaded leptonica tarball (leptonica-1.82.0.tar.gz) in server (in the installation directory. Ex: /scratch)
- Execute below commands sequentially to install leptonica through autoconf

---

**Note:** In line 4, we used **sudo make -j4**. Here 4 is the number of CPU core. Generally, you can use **sudo make -jn** where n is the number of core. It will make the build process much faster.

---

In the document, we will use 4 as core number to build the software.

If the processor does not have multiple cores you can use normal make command **sudo make**.

```
sudo tar xvf leptonica-1.82.0.tar.gz
cd leptonica-1.82.0
```

If the installation is successful, then go to 10.4.2.2. Else, go to 10.4.2.1.2.

### 11.4.2.1.2 Installation through CMake

In case autoconf fails to generate the configure file or there is any other error, then proceed with the below steps, to build through CMake.

```
sudo tar xvf leptonica-1.82.0.tar.gz

cd leptonica-1.82.0

sudo mkdir build

cd build
```

### 11.4.2.2 Leptonica Configuration

- Leptonica path should be configured such that tesseract can find the leptonica installation.
- Please add the leptonica installation directory (Ex: /usr/local/lib ,/usr/lib, /usr/lib64 etc) in library path.
- leptonica header path (Ex: /usr/local/include/leptonica ) should be configured.
- Pkgconfig path also need to be set up.

Execute the below mentioned commands to set the path:

```
export PKG_CONFIG_PATH=$PKG_CONFIG_PATH:/usr/local/lib/pkgconfig/

export PKG_CONFIG_PATH=$PKG_CONFIG_PATH:/usr/lib64/pkgconfig/

export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/lib
```

---

**NOTE:** Sometimes, tesseract will still be unable to find lept.pc file.

---

It will give configuration errors (ex: Leptonica 1.74 or higher is required). In that case locate the lept.pc file (usually present at /usr/local/lib/pkgconfig/) with the command `locate lept.pc` and copy the same in /usr/lib64 directory.

```
sudo cp /usr/local/lib/pkgconfig/lept.pc /usr/lib64/pkgconfig/
```

- Similarly, some services might not be able to get libleptonica shared object files (.so files, ex: liblept.so, libleptonica.so etc.)
- .so files are usually present in the server at /usr/local/lib. You can type `whereis libleptonica` or `locate libleptonica` to find the path. Then copy the .so files in /usr/lib64 path.

```
cd /usr/local/lib
```

### 11.4.2.3 Tesseract Installation

- Copy the tesseract tarball tesseract-5.1.0.tar.gz in server (in the installation directory. Ex: /scratch)
- Copy the tesseract trained files eng.traineddata, osd.traineddata in the server
- Execute below commands sequentially to build and install tesseract

---

**NOTE:** /usr/bin is the directory where tesseract binary will be present if you pass prefix=/usr in configure. You can provide the path based upon where you want to install.

---

```
sudo tar xvf tesseract-5.1.0.tar.gz

cd tesseract-5.1.0

sudo ./autogen.sh

sudo ./configure --prefix=/usr
```

- Copy the traineddata files in tessdata directory. If you use prefix=/usr, tessdata directory will be present at /usr/share. If you use prefix=/usr/local, tessdata directory will be present at /usr/local/share.

```
sudo cp osd.traineddata /usr/share/tessdata
```

### 11.4.2.4 Tesseract Configuration

- Set the tesseract library path by executing the below commands:

```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/lib
```

- Sometimes services are unable to find libtesseract shared object files (.so files) present in system (Usually at /usr/lib). In that case copy the libtesseract files in /usr/lib64

```
cd /usr/lib
```

- Some of the programs search for the tessdata directory in a different path (usr/share/tesseract/4/tessdata). Copy the existing tessdata directory (which will be present in either /usr/share or /usr/local/share based on your installation) in that path.

```
cd /usr/share

sudo mkdir tesseract (execute if tesseract
directory is not present)

cd tesseract
```

- Set tessdata prefix by running following command.

```
export TESSDATA_PREFIX=/usr/share/tesseract/4/tessdata
```

- Tesseract is now installed.
- You can verify the version with following command. It will give the tesseract version (5.1.0), leptonica version (1.82.0) along with other default libraries (libjpeg, libjpeg-turbo, libpng, libtiff, zlib).

```
tesseract --version
```

## 11.5 Conductor Installation

### 11.5.1 Pre-requisite

Perform the following steps:

1. Ensure that the datasource jdbc/PLATO-O is created. The maximum capacity attribute of the datasource connection pool should be greater than 100.
2. Make sure that the Domain and cluster configuration steps completed.

---

**Note:** The conductor-server.war file needs to be deployed in a separate managed server because of its load and size.

---

### 11.5.2 Installation

Perform the following steps:

1. Required properties should be set in the config.properties file found in {**unzip the file**} THIRD\_PARTY\_SOFTWARES\CONDUCTOR\_SERVER\CONFIG. Refer to the below table to find the description of properties in the config.properties. This file should be placed at <<CONFIG.PROPERTIES LOCATION >>.
2. An additional environment variable is required for setting up the conductor. Include the below mentioned -Dparam along with the existing environment variables.

-Dconductor.properties = << CONFIG.PROPERTIES LOCATION >>/config.properties

3. Deploy the conductor-server.war file in the weblogic. To deploy application, refer to **How to deploy section Configuration and Deployment Guide**.
4. To control the Log Level, the following property has to be added as a –Dparam along with the existing environment variables:  
-Dplato.conductor.logging.level = << LOG-LEVEL >>

By default the log level is “DEBUG”. To obtain only ERROR logs value has to be given as “ERROR” and to completely switch of conductor logs, the value has to be set as “OFF”

| Property Name               | Property Description  |
|-----------------------------|---|
| flyway.enabled              | Set this to true to enable flyway and false to disable flyway.  |
| flyway.setbaselineOnMigrate | Set this to true to enable flyway baselineOnMigrate and false to disable.   |
| eureka.registration.enabled | Should be set to true to enable discovery registration.   |
| eureka.hostName             | plato-o   |
| eureka.instanceId           | plato-o:<port-number>   |
| eureka.serviceUrl.default   | Discovery service URL<br>(http://<hostname>:<port>/plato-discovery-service/eureka)  |
| eureka.registerWithEureka   | true  |
| eureka.name                 | plato-o   |
| eureka.vipAddress           | plato-o   |
| eureka.port                 | Port Number on which the conductor server war file is deployed.   |
| conductor.entity.list       | DEFAULTENTITY~jdbc/PLATO-O<br>Here – DEFAULTENTITY – is entity Id<br>jdbc/PLATO-O – JNDI name of Conductor Datasource<br><br>The entity added, need to make changes in this property. Multiple entities can be added using “,” as a delimiter.<br><br>For example, ENTITY1~jdbc/PLATO-O1, ENTITY2~jdbc/PLATO-O2 |

| Property Name  | Property Description  |
|--|---|
| <b>workflow.elasticsearch.instanceType</b>   | EXTERNAL  |
| <b>multi.entity.enabled</b>  | By default, it is false.<br>To enable multi-entity, set it to true.   |
| <b>decider.sweep.disable</b>   | true  |
| <b>db</b>  | oracle  |
| <b>isSSLenabled</b>  | By default, it is false.<br>To enable SSL, set it to true   |
| <b>security.protocol</b>   | Kafka SSL property. Valid only if SSL is enabled.<br>Value has to be set as SASL_SSL                          |
| <b>ssl.truststore.location</b><br><b>ssl.truststore.password</b><br><b>sasl.mechanism</b><br><b>sasl.jaas.config</b> | All are kafka SSL related properties. These are valid only if SSL is enabled<br>ALL ARE ENVIRONMENT SPECIFIC. |

## 11.6 Report Service Installation

### 11.6.1 Pre-requisite

Make sure that the data source is created.

| Data source Name | Data source JNDI   | Targets                     |
|------------------|--------------------|-----------------------------|
| PLATOCMC         | jdbc/CMNCORE       | Plato Common Core Server    |
| PLATOSMS         | jdbc/sms           | Plato-SMS-Server            |
| REPORTSERVICE    | jdbc/REPORTSERVICE | Plato-Report-Service-Server |

Make sure that the wars mentioned below are installed along with the ones mentioned above.

- CMC Core Service
- CMC Base Service
- CMC Currency Service
- CMC Component Service
- Plato Report Service
- SMS Component Server
- App Shell

### 11.6.2 Installation

#### 11.6.2.1 setUserOverrides.sh file

Perform the following steps:

1. Create a file called **setUserOverrides.sh** inside the Weblogic bin location.
2. The following formats of the **setUserOverrides.sh** file and the list of parameters that need to be passed in order to run the plato services properly.

---

Note: Below are the list of **-D params** (ENV Variables), which needs to be set for all the individual services. Set a single **-Dparam** as follows:

---

```
JAVA_OPTIONS="{JAVA_OPTIONS} -DParam =<ParamValue>"
```

```
export JAVA_OPTIONS
```

```
//Plato Report Service
```

```
-Dflyway.domain.placeholders.report-  
service.hostname=<http://<REPORT_SERVOICE_HOSTNAME>:<REPORT_SERVICE_PORT>/  
report-service/api/>
```

```
-Dflyway.domain.placeholders.report-service.server.port=<REPORT_SERVICE_PORT>
```

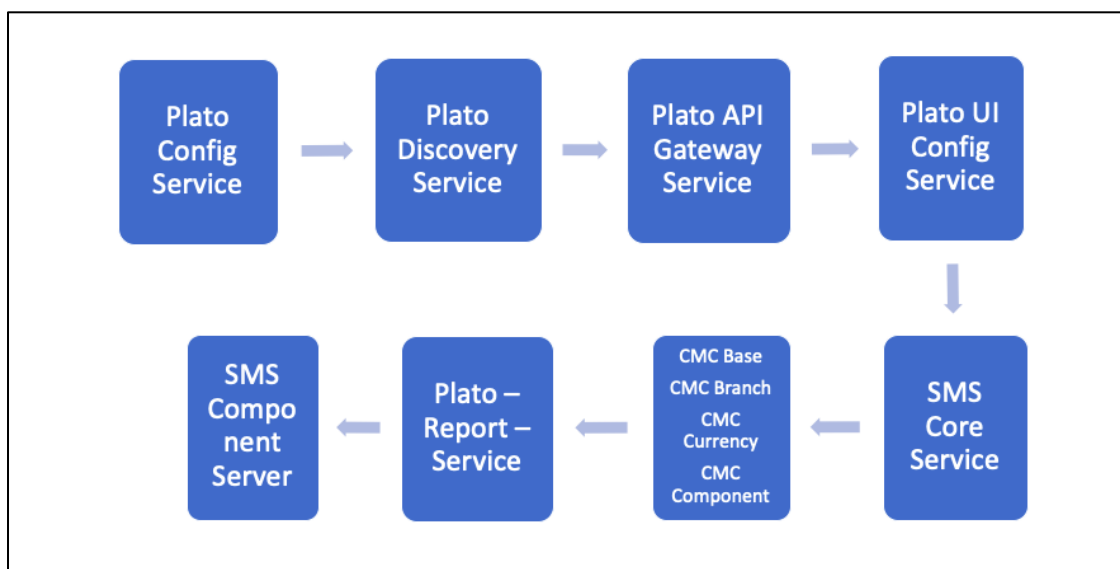
-Dflyway.domain.placeholders.report-service.domain.jndi=<JNDI\_SCHEMA>

-Dflyway.domain.placeholders.report-service.template-metadata-directory=/scratch/OBMA/report-service/template\_metadata

-Dflyway.domain.placeholders.report-service.output-directory=/scratch/OBMA/report-service/output/

-Dflyway.domain.placeholders.report-service.fop-config-file=/scratch/OBMA/report-service/fop.xconf

### 11.6.2.2 Plato Reporting Deployment Order



#### Installation Summary for Plato Reporting Service:

| Application                  | Archive name                        | OSDC path                                   | Targets              |
|------------------------------|-------------------------------------|---|----------------------|
| <b>sms-core-Service</b>      | sms-core-Service-{version}.war      | {unzip the file}PLATO\sms-core-service\     | Sms-core-Service     |
| <b>cmc-base-services</b>     | cmc-base-services-{version}.war     | {unzip the file}PLATO\cmc-base-service\     | cmc-base-Service     |
| <b>cmc-branch-services</b>   | cmc-branch-services-{version}.war   | {unzip the file}PLATO\cmc-branch-service\   | cmc-branch-Service   |
| <b>cmc-currency-services</b> | cmc-currency-services-{version}.war | {unzip the file}PLATO\cmc-currency-service\ | cmc-currency-Service |



| Application                  | Archive name                         | OSDC path   | Targets               |
|------------------------------|--------------------------------------|---|-----------------------|
| <b>cmc-component-server</b>  | cmc-component-services-{version}.war | { <b>unzip the file</b> }PLATO\cmc-component-service\ | cmc-component-Service |
| <b>plato-report-Services</b> | plato-report-Services-{version}.war  | { <b>unzip the file</b> }PLATO\plato-report-services\ | Plato-report-Server   |
| <b>sms-component-server</b>  | sms-component-services-{version}.war | { <b>unzip the file</b> }PLATO\sms-component-service\ | sms-component-Service |

---

**Note:** Refer to OSDC file for the exact version number for each service.

---

## 12. Security- SSL Encryption with SASL-SCRAM Authentication

### 12.1 Generate Keystore

The items highlighted in blue 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
```

In the above command:

1. *alias* is used to identify the public and private key pair created.
2. *keyalg* is the key algorithm used to generate the public and private key pair. The RSA key algorithm is recommended.
3. *keysize* is the size of the public and private key pairs generated. A key size of 1024 or more is recommended.
4. *sigalg* 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*.
5. *valdays* is the number of days for which the certificate is to be considered valid. Please consult with your CA on this period.
6. *keystore* 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 will prompt for the following attributes of the certificate and keystore:

1. *Keystore Password: Specify a password that will be used to access the keystore. This password needs to be specified later, when configuring the identity store in Kafka Server.*
2. *Key Password: Specify a password that will be 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.*
3. *First and Last Name (CN): Enter the domain name of the machine, for instance, www.example.com.*
4. *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.*
5. *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.*
6. *Name of your City or Locality: The city in which your organization is physically located, for example Bengaluru.*
7. *Name of your State or Province: The state/province in which your organization is physically located, for example Karnataka.*
8. *Two-letter CountryCode for this Unit: The country in which your organization is physically located, for example US, UK, IN etc.*

For example:

Listed below is the result of a sample execution of the command:

```
keytool -genkeypair -alias certificates -keyalg RSA -keysize 1024 -sigalg SHA512withRSA -validity 365 -keystore /scratch/Data/Certificates/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]: <domain name>.oracle.com

What is the name of your organizational unit?

[Unknown]: <application name>

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=Test, O=Oracle Financial Services, L= Bengaluru, ST= Karnataka, C=IN correct? [no]: yes

Enter key password for < password >

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

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

## 12.2 Export Private Key as Certificate

The 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>
```

For example,:

```
keytool -export -alias certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore
/scratch/Data/Certificates/KafkaServerKeystore.jks -keypass oracle123 -storepass oracle123
```

If successful, the following message will be displayed:

**Certificate stored in file < KafkaCert.cer>**

## 12.3 Import the Cert and generate TrustStore

The command is mentioned below:

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

In the above command:

1. *alias* 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.
2. *cert\_file* is the location of the file containing the PKCS#7 formatted reply from the CA, containing the signed certificate.
3. *truststore* is the location where the truststore should be generated.
4. *storepass* is the password for the truststore.

Generate two truststores from the same cert. One used for kafka server and one for clients.

For example:

```
keytool -import -alias certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore
/scratch/Data/Certificates/KafkaServerTrustStore.jks -storepass oracle123
```

```
keytool -import -alias certs -file /scratch/Data/Certificates/KafkaCert.cer -keystore
/scratch/Data/Certificates/KafkaClientTrustStore.jks -storepass oracle123
```

Hence, three keystore files would be needed for this method:

1. *KafkaServerKeystore.jks* : keystore file for Kafka brokers
2. *KafkaServerTrustStore.jks* : Truststore file for server
3. *KafkaClientTrustStore.jks* : Truststore file for client

The KafkaClientTrustStore.jks file need to be imported by every client to validate the server.

---

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

---

## 12.4 Creation of users in Zookeeper

Start the zookeeper (command in Section 10.1) and execute the below commands for the user creation.

```
./kafka-configs.sh --zookeeper localhost:2181 --alter --add-config "SCRAM-SHA-256=[password=admin-secret],SCRAM-SHA-512=[password=admin-secret]" --entity-type users --entity-name admin
```

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

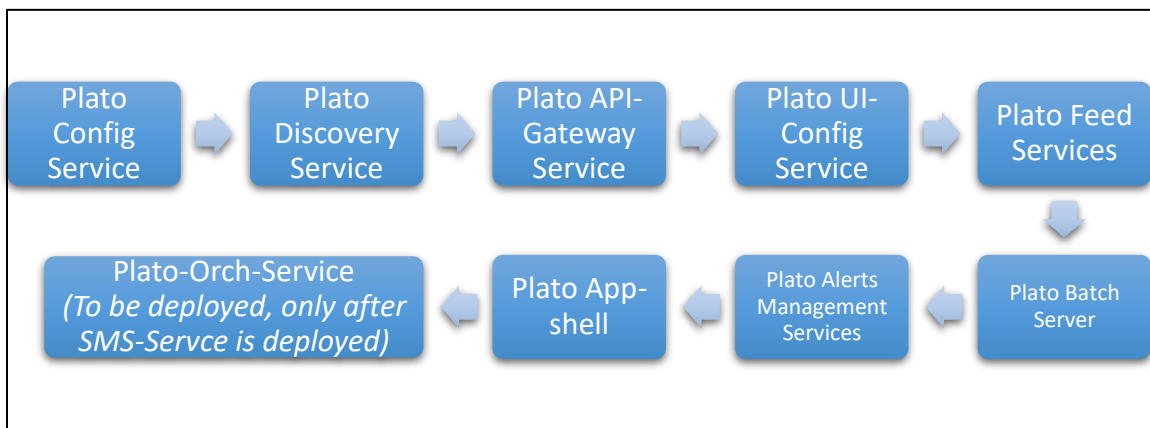
Two users are created above with test and admin as usernames and two different passwords are setup for each user one for each scram mechanism. Here, the user 'admin' is used for Kafka broker auth and 'test' is used for client auth.

## 13. Oracle Banking Microservices Architecture Deployments

### 13.1 Pre-requisite

Before you proceed with below, make sure that the previous steps are completed. Below table give details of the deployments required on each Server for the Oracle Banking Microservices Architecture application to run.

### 13.2 Oracle Banking Microservices Architecture Applications Deployment Order



#### Installation Summary for Oracle Banking Microservices Architecture Services:

| Application             | Archive name                              | OSDC path                                      | Targets          |
|-------------------------|---|--|------------------|
| Plato-config-service    | plato-config-service-<br>{version}.war    | {unzip the file}PLATO\plato-config-service\    | Config Server    |
| Plato-discovery-service | plato-discovery-service-<br>{version}.war | {unzip the file}PLATO\plato-discovery-service\ | Discovery Server |
| Plato-api-gateway       | plato-api-gateway-<br>{version}.war       | {unzip the file}PLATO\plato-api-gateway\       | Api Gateway      |

| Application   | Archive name                                   | OSDC path   | Targets                        |
|---|--|---|--------------------------------|
| <b>Plato-ui-config-service</b>  | plato-ui-config-service-{version}.war          | {unzip the file}PLATO\plato-ui-config-service\          | Plato UI Config                |
| <b>Plato-apigateway-router</b>  | plato-apigateway-router-{version}.jar          | {unzip the file}PLATO\plato-apigateway-router\          | Plato-Apigateway-Router        |
| <b>Plato-Orch-Service</b><br>(To be deployed after sms-service is deployed) | plato-orch-service-{version}.war               | {unzip the file}PLATO\plato-orch-service\               | Plato-Orch-Service             |
| <b>Plato-Feed-Services</b>  | plato-feed-services-{version}.war              | {unzip the file}PLATO\plato-feed-services\              | Plato-Feed-Services            |
| <b>Plato-Batch-Server</b>   | plato-batch-server-{version}.war               | {unzip the file}PLATO\plato-batch-server\               | Plato-Batch-Server             |
| <b>Plato-Alerts-Management-Services</b>                                     | plato-alerts-management-services-{version}.war | {unzip the file}PLATO\plato-alerts-management-services\ | Plato-Alerts-Management-Server |
| <b>Plato-Rule-Services</b>  | plato-rule-service-{version}.war               | {unzip the file}PLATO\ plato-rule-service\              | Plato-Rule-Server              |
| <b>Plato-Report-Services</b>  | plato-report-services-{version}.war            | {unzip the file}PLATO\ plato-report-services\           | Plato-Report-Server            |
| <b>Plato-Swagger-API</b>  | plato-swagger-api-{version}.war                | {unzip the file}PLATO\ plato-swagger-api\               | Plato-Swagger-API Server       |

| Application | Archive name                | OSDC path   | Targets         |
|-------------|-----------------------------|---|-----------------|
| Appshell    | app-shell-<br>{version}.war | {unzip the<br>file}UI\app-shell-<br>{version}.war | Appshell Server |

Refer to OSDC file for the exact version number for each service.

---

**NOTE:** Eventhub based applications should not be deployed in admin server

---

### 13.3 Steps to Deploy as Application

To deploy application, refer to **How to deploy section** in **Configuration and Deployment Guide**.

### 13.4 SSL Configuration

The below parameters should be available into JVM for SSL configuration.

| Key                           | Default Value | Purpose   |
|-------------------------------|---------------|---|
| \${apigateway.protocol}       | https         | Only for API gateway protocol. it must be <b>https only</b> .   |
| \${eureka.protocol}           | https         | For inter-service communication protocol. Values can be <b>http</b> or <b>https</b> .                   |
| \${prefer.ip.address.enabled} | false         | For prefer IP address flag. it must be <b>false</b> only.   |
| \${nonsecure.port.enabled}    | false         | For disabling inter-service communication on non secure port. Values can be <b>false</b> or <b>true</b> |
| \${secure.port.enabled}       | true          | For allowing inter-service calls on secure port. Values scan be <b>false</b> or <b>true</b>             |

We recommend only https-based connections. Below are the recommendations:

1. Appshell needs to be secured with SSL.
2. Api-Gateway needs to be secured with SSL.
3. Appshell to Api-gateway communication should happen over SSL. The api-gateway url mentioned as -D parameter for appshell should be ssl enabled (i.e. https-based) and must point to plato-apigateway-router.



---

## 14. Restarts and Refresh

Once everything is deployed, the managed servers. And for each application call path “/refresh” for refreshing the configuration properties.

### 14.1 Restarting Servers

To restart the server, refer to **How to restart** section in **Configuration and Deployment Guide**.

## 15. Logging Area

### 15.1 Introduction

This section describes the logs area where after deployment of Plato Applications in the WebLogic server.

### 15.2 Dynamic Logging

This will basically provide the developers to change different parameters related to logging in runtime. plato-logging facility has been incorporated in the plato-core dependency.

Plato-logging-service is dependent on two tables which are to be present in the PLATO schema (JNDI name: jdbc/PLATO). The two tables are as follows:

1. **PLATO\_DEBUG\_USERS:** This table will contain the information about whether the dynamic logging will be enabled to a particular user for a particular service. The table will contain have records where **DEBUG\_ENABLED** values for a particular user and a particular service will having values 'Y' or 'N' and depending on that plato-logger will enable dynamic logging.

| ID | DEBUG_ENABLED | SERVICE_CODE     | USER_ID |
|----|---------------|------------------|---------|
| 1  | 2 Y           | plato-logger-ref | soham   |
| 2  | 3 Y           | plato-ref        | soham   |

2. **PLATO\_LOGGER\_PARAM\_CONFIG:** This table will contain the key-value entries of different parameters that can be changed at runtime for the dynamic logging. The values that can be passed are as follows:
  - **LOG\_PATH:** This will specify a dynamic logging path for the logging files to be stored. Changing this in runtime will change the location of the log files at runtime. If this value is not passed then by default the LOG\_PATH value will be taken from the -D parameter of "plato.service.logging.path"
  - **LOG\_LEVEL:** The level of the logging can be specified on runtime as "INFO" or "ERROR" etc. The default value of this can be set in the logback.xml.
  - **LOG\_MSG\_WITH\_TIME:** Making this 'Y' will append the current date into the logfile name. Setting the value of this as 'N' will not append the current date into the filename.

| ID | MODIFY_FIELD | PARAM_NAME        | PARAM_VAL   |
|----|--------------|-------------------|---|
| 1  | 3 N          | LOG_PATH          | C:\NewWeblogic\user_projects\domains\base_domain\logs |
| 2  | 2 N          | LOG_LEVEL         | INFO  |
| 3  | 1 N          | LOG_MSG_WITH_TIME | Y   |

### 15.3 Logging Area

Plato Application writes logs in the below area of the server:  
 <WEBLOGIC\_DOMAIN\_CONFIG\_AREA>/logs/plato-api-gateway.log

For example, consider that a domain has been created **platoinfra\_domain** in the following area of the server "/scratch/oracle/middleware/user\_projects/domains/platoinfra\_domain".

Logging area for Plato

=<URL>

## 16. Password Policy

The Password Policy Service in Plato provides the facility to maintain the configurations for generation of a password string which can be used to encrypt email attachments.

### PLATO\_TM\_PASSWORD\_POLICY\_MASTER

| FIELD                | DATATYPE               | SIGNIFICANCE   |
|----------------------|------------------------|--|
| MODULE_CODE          | VARCHAR2(100<br>BYTE)  | Module Code or App Id of the service which is using the password policy service        |
| POLICY_CODE          | VARCHAR2(100<br>BYTE)  | Unique Identifier corresponding to each policy in a service                            |
| POLICY_DESCRIPTION   | VARCHAR2(4000<br>BYTE) | Description of the policy being used in a service                                      |
| POLICY_TEXT          | VARCHAR2(4000<br>BYTE) | Explanation of the password of an attachment so that the user can open the attachment. |
| CONVERT_TO_UPPERCASE | VARCHAR2(4000)         | To determine if the password should be converted to uppercase                          |

Primary Key - Combination of MODULE\_CODE and POLICY\_CODE

### PLATO\_TM\_PASSWORD\_POLICY\_DETAIL

| FIELD                 | DATATYPE              | SIGNIFICANCE   |
|-----------------------|-----------------------|--|
| POLICY_CODE           | VARCHAR2(100<br>BYTE) | Unique Identifier which maps both the tables                               |
| SEQ_NO                | NUMBER                | Sequence Number of a particular parameter in the password                  |
| DOMAIN_ATTR_JSON_PATH | VARCHAR2(100<br>BYTE) | JSON Path of the value in the product service to be fetched for this field |
| FIELD_NAME            | VARCHAR2(100<br>BYTE) | Name of the field used for password generation                             |

| FIELD         | DATATYPE              | SIGNIFICANCE   |
|---------------|-----------------------|--|
| FIELD_TYPE    | VARCHAR2(20<br>BYTE)  | Value can either be STRING or DATE (case insensitive).<br>In case of DATE, the value of this corresponding field is expected in the format <b>YYYY-MM-DD</b><br>And the password component of this field is determined accordingly.  |
| FIRST_CHAR    | VARCHAR2(20<br>BYTE)  | If FIELD_TYPE is STRING, then this will be a number containing the number of characters to be added from the start of the field value to the password.<br><br>If FIELD_TYPE is DATE, then this will be a string containing the components of the date to be added to the password. |
| LAST_CHAR     | VARCHAR2(20<br>BYTE)  | If FIELD_TYPE is STRING, then this will be a number containing the number of characters to be added from the end of the field value to the password.<br><br>If FIELD_TYPE is DATE, then this value is not applicable   |
| DEFAULT_VALUE | VARCHAR2(100<br>BYTE) | Default Value of the password component of this field in case any configurations above are not maintained  |

---

## 17. Known Issues – Resolutions

For deploying any application, if there is an issue with ID column conflict for table *product\_services\_ledger* (PLATO\_UI\_CONFIG schema), change the current value of DB sequence (PRODUCT\_SVCS\_LEDGER\_ID\_SEQ) to maximum value present in ID column for table *product\_services\_ledger*.