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Oracle Financial Services Model Management and Governance Installation and Configuration Guide

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Primary Authors: (primary author), (primary author)

Contributing Authors: (contributing author), (contributing author)

Contributors: (contributor), (contributor)

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1 Preface

This section provides information about the Oracle Financial Services Model Management and Governance (OFS MMG) Installation and Configuration Guide.

Topics:

Related Topics

Audience

OFS MMG Installation and Configuration Guide is intended for Administrators and Implementation Consultants who handle installing and maintaining the Application Pack Components.

This document assumes that you have experience in installing Enterprise Components and basic knowledge about the following:

- OFS AAI Components
- OFSAA Architecture
- UNIX Commands
- Database Concepts
- Web Server or Web Application Server

Additional Resources

This section identifies additional resources to the OFS MMG Application. You can access the following documents from the Oracle Help Center:

- OFS Model Management and Governance Release Notes
- OFS Model Management and Governance User Guide

Additional related documents are as follows:

- OFS Analytical Applications 8.1.2.0.0 Technology Matrix

Conventions

The following text conventions are used in this document:

Table 1-1 Document Conventions

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, file names, text that appears on the screen, or text that you enter.
Hyperlink	Hyperlink type indicates the links to external websites, internal document links to sections.

Abbreviations

The following table lists the Abbreviations used in this document:

Table 1-2 Abbreviations

Abbreviation	Meaning
BDP	Big Data Processing
DBA	Database Administrator
DDL	Data Definition Language
DEFQ	Data Entry Forms and Queries
DML	Data Manipulation Language
EAR	Enterprise Archive
EJB	Enterprise JavaBean
ERM	Enterprise Resource Management
FTP	File Transfer Protocol
HDFS	Hadoop Distributed File System
HTTPS	Hypertext Transfer Protocol Secure
J2C	J2EE Connector
J2EE	Java 2 Enterprise Edition
JCE	Java Cryptography Extension
JDBC	Java Database Connectivity
JDK	Java Development Kit
JNDI	Java Naming and Directory Interface
JRE	Java Runtime Environment
JVM	Java Virtual Machine
LDAP	Lightweight Directory Access Protocol
LHS	Left Hand Side
MFA	Multi-Factor Authentication
MOS	My Oracle Support
OFSAA	Oracle Financial Services Analytical Applications
OFS AAI	Oracle Financial Services Analytical Application Infrastructure

Table 1-2 (Cont.) Abbreviations

Abbreviation	Meaning
OFS MMG	Oracle Financial Services Model Management and Governance Application
OHC	Oracle Help Center
OLAP	On-Line Analytical Processing
OLH	Oracle Loader for Hadoop
ORAAH	Oracle R Advanced Analytics for Hadoop
OS	Operating System
RAM	Random Access Memory
RDBMS	Relational Database Management System
RHEL	Red Hat Enterprise Linux
SFTP	Secure File Transfer Protocol
SID	System Identifier
SSL	Secure Sockets Layer
TNS	Transparent Network Substrate
URL	Uniform Resource Locator
VM	Virtual Machine
WAR	Web Archive
XML	Extensible Markup Language
PGX	Parallel Graph AnalytiX
FQDN	Fully Qualified Domain Name

2

Introduction

Financial Institutions require models that work on traditional statistical techniques, modern machine-learning methods, computational and simulation models. Oracle Financial Services Model Management and Governance leverage the Data Studio environment to develop, deploy, and manage models at the enterprise level.

The OFS Model Management and Governance Application enables institutions to implement their IT policies while providing flexibility and freedom that Data Scientists and Statistical Modelers desire. OFS MMG's design facilitates financial institutions to manage external regulatory and internal governance policies by building testing models in a workspace environment. A workspace is provisioned and authorized for use (usually by an Administrator) before making it available to modelers. Administrative users grant analysts and modelers access to workspaces along with a subset of production data to build models. Validated and approved models can then be promoted from workspaces to the enterprise model repository. Models in the repository can then be woven into analytical application flows crafted by mixing data management tasks, model execution, and deterministic business logic.

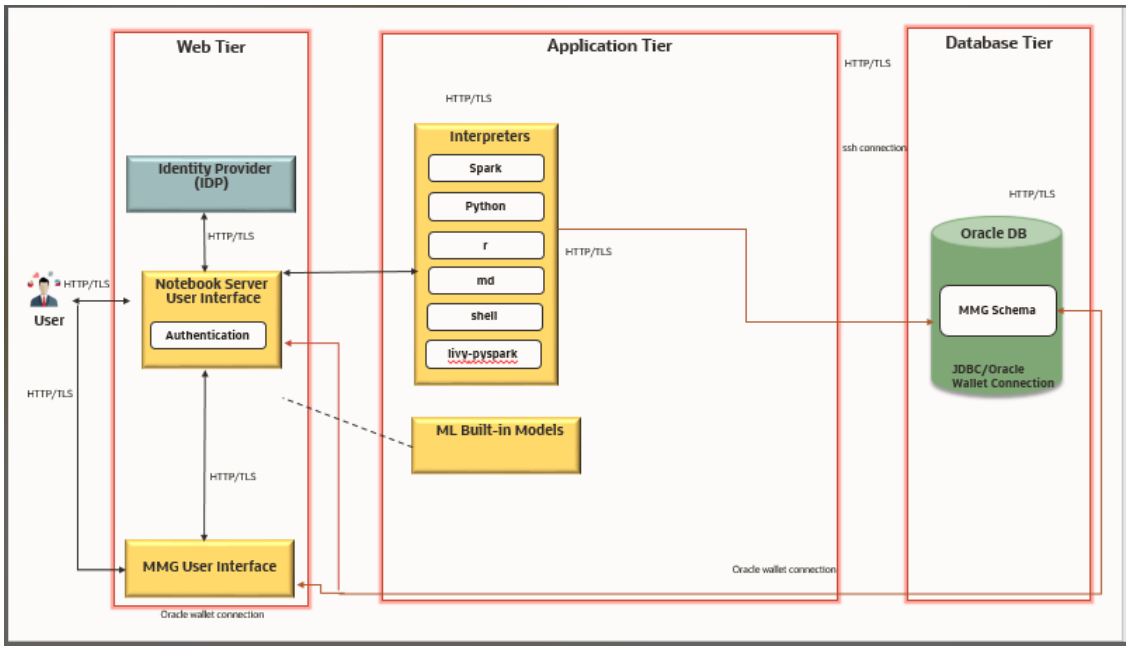
Topics:

Related Topics

- Deployment Topology
- Components of Oracle Financial Services Model Management Governance

Deployment Topology

Figure 2-1 The logical architecture implemented for OFS MMG Application Pack



Components of Oracle Financial Services Model Management Governance

The following are the components of Oracle Financial Services Model Management Governance Application:

- Workspace Management
- Model Management
- Dataset
- Model Pipelines
- Model Actions
- Graphs
- Scheduler Service
- Audit Trail
- Data Studio Options
- Object Migration
- Model Training

For more information on how to use the application, see the OFS Model Management and Governance User Guide.

Installation Check List

To complete the installation process, you must perform the following steps listed in the Pre-install Checklist. Use this checklist to verify whether these steps are completed or not.

Table 2-1 Installation Checklist

Sl. No.	Activity
Pre-installation Steps	
1	Install all the prerequisite *hardware and software* as per the OFS Analytical Applications 8.1.2.0.0 Technology Matrix.
2	Configure the Database Instance Settings.
3	Create the Installation, Download, and Metadata Repository Directories: • Installation Directory • Temporary Directory • Staging Area/Metadata Repository • Download Directory

Table 2-1 (Cont.) Installation Checklist

Sl. No.	Activity
4	Configure the following Operating System and File System Settings: • File Descriptor • Total number of processes • Port(s) • .profile file permissions • Add FTP or SFTP Configuration for file transfer (to access Staging Area and Metadata Directory)
5	Update the following Environment Settings as required for the installation in the .profile file: • Java Settings – Oracle Database Server and Client Settings – Add TNS entries in the TNSNAMES.ORA file – Time Zone Settings
Installation Steps	
6	Download the Installer Kit.
7	Extract the Installer Kit.
8	Configure the config.sh file.
9	Trigger the Application Installation.
Post-Installation Steps	
10	Access the MMG Application.
11	Create Application Users.
12	Map Application User(s) to User Groups.

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Hardware and Software Requirements

See the Oracle Financial Services Analytical Applications 8.1.2.0.0 Technology Matrix document for the hardware and software requirements.

License Information

For details on the third-party software tools used, see the OFSAA Licensing Information User Manual Release 8.1.2.0.0.

4
Preinstallation

This section lists all the prerequisites to install OFS STSA.

Before installing the application, ensure that you install the following:

1. OpenMetadata (OM)
2. Oracle Analytics Server version 7.0

Oracle Database Instance Settings

Ensure that the following database instance settings are configured:

- NLS_CHARACTERSET to AL32UTF8
- NLS_LENGTH_SEMANTICS to BYTE
- OPEN CURSORS limit to greater than 1000

Create the Database Schema on Oracle Database

Create the following database schemas:

- Application Configuration Schema (also known as Configuration or Config Schema)
- Metadata Schema
- Data Schema
- MMG Application Schema
- MMG Studio Schema
- MMG Graph Schema

Tablespace

You can either use the existing Tablespace or can create a new Tablespace during schema creation using the following script:

Permanent Tablespace

```
CREATE TABLESPACE <tablespace_name >

DATAFILE '<tablespace_name >.dat'

SIZE 1G

ONLINE;
```

Temporary Tablespace

```
CREATE TEMPORARY TABLESPACE <tablespace_name >

TEMPFILE '<tablespace_name >.dbf'

SIZE 100M;
```

Creating an Oracle User

You can create an Oracle user using the following script:

```
CREATE USER <oracle_user_name> IDENTIFIED BY <password> DEFAULT TABLESPACE USERS
TEMPORARY TABLESPACE TEMP QUOTA <quota_size>|UNLIMITED ON USERS
```

Creating the Application Configuration Schema

Ensure that you create an Oracle user to create the application configuration schema. For more details, see Creating an Oracle User section.

Assign the Grants

This section discusses the various grants required for the Oracle Database User.

Assign the following grants:

```
grant create SESSION to <oracle_database_user>;

grant create PROCEDURE to <oracle_database_user>;

grant create SEQUENCE to <oracle_database_user>;

grant create TABLE to <oracle_database_user>;

grant create TRIGGER to <oracle_database_user>;

grant create VIEW to <oracle_database_user>;

grant create MATERIALIZED VIEW to <oracle_database_user>;

grant select on SYS.V_$PARAMETER to <oracle_database_user>;

grant create SYNONYM to <oracle_database_user>;

grant select on sys.v_$parameter to <oracle_database_user>;

grant select on sys.dba_free_space to <oracle_database_user>;

grant select on sys.dba_tables to <oracle_database_user>;

grant select on sys.Dba_tab_columns to <oracle_database_user>;

grant create RULE to <oracle_database_user>;

grant create any trigger to <oracle_database_user>;

grant drop any trigger to <oracle_database_user>;

grant select on SYS.DBA_RECYCLEBIN to <oracle_database_user>;
```

> **Note:**
>
> This is required for the configuration schema and the workspace schema.

Create the MMG Studio Schema

You must create an Oracle User to create the MMG Studio Schema. For more details, see Creating an Oracle User section.

Assign the following grants:

```
GRANT CONNECT, CREATE TABLE, CREATE VIEW, CREATE SEQUENCE TO
<mmgstudio_schema_name>;
```

Create the Graph Schema

You must create an Oracle User to create the Graph Schema. For more details, see Creating an Oracle User section.

Assign Grants

This section discusses the various grants required for the Graph Schemas.

Assign the following grants for the schema:

1. Pre-installation grants for Graph Schema:

```
GRANT CREATE SESSION TO <GRAPH_SCHEMA>;

GRANT CREATE TABLE TO <GRAPH_SCHEMA>;

GRANT CREATE VIEW TO <GRAPH_SCHEMA>;

GRANT CREATE ANY PROCEDURE TO <GRAPH_SCHEMA>;

GRANT CREATE SEQUENCE TO <GRAPH_SCHEMA>;

GRANT CREATE JOB TO <GRAPH_SCHEMA>;

GRANT CREATE MATERIALIZED VIEW TO <GRAPH_SCHEMA>;

GRANT EXECUTE ON DBMS_SCHEDULER to <GRAPH_SCHEMA>;

GRANT EXECUTE ON DBMS_COMPARISON TO <GRAPH_SCHEMA>;

GRANT EXECUTE ON DBMS_RLS TO <GRAPH_SCHEMA>;

GRANT EXECUTE ON SYS.DBMS_SESSION TO <GRAPH_SCHEMA>;

GRANT EXECUTE ON DBMS_REDEFINITION TO <GRAPH_SCHEMA>;

GRANT REDEFINE ANY TABLE TO <GRAPH_SCHEMA>;

GRANT SELECT ON SYS.V_$PARAMETER TO <GRAPH_SCHEMA>;

GRANT SELECT ON <DATA_SOURCE_SCHEMA>.<TABLE_NAME> TO <GRAPH_SCHEMA>;
```

Example:

Change the `<DATA_SOURCE_SCHEMA>` to the schema used in the Graph pipeline.

> **Note:**
>
> If the user has to execute the custom graph, the same permissions have to be provided for the input tables referred in Custom Graph Pipeline.

Create the Installation, Download, and Metadata Repository Directories

To install the application, create the following directories:

- **OFS MMG Download Directory (Optional):** This is the directory where the downloaded installer or patches can be copied. Create a download directory and copy the OFS MMG Application Pack Installer File (archive). Assign 755 permission to this directory.
- **OFS STSA Download Directory (Optional):** You can copy the downloaded installer (OFS STSA Application Pack Installer File (archive)) or patches to this directory. Assign 755 permission to this directory.
- **Temporary Directory:** This is the default temporary directory where the installation files are stored for a short time to support faster installation. Configure adequate space on the `/tmp` directory. It is recommended to allocate more than 10 GB of space. Assign 755 permission to this directory and disable the `NOEXEC` option.

  > **Note:**
  >
  > If the `NOEXEC` option is enabled, the extraction of files by the installer into the `/tmp` directory is prevented and the binaries will not execute in the directory, hence resulting in failure of the installation.

- **OFS MMG Installation Directory (Mandatory): OFS STSA Installation Directory (Mandatory):** Create an installation directory where the product binaries are installed. Assign 755-user permission to the Installation Directory.
- **OFS MMG Staging/Metadata Directory (Mandatory): OFS STSA Staging/Metadata Directory (Mandatory):** This is a directory to hold the application metadata artifacts and additionally, act as the staging area for the flat files. This directory is also referred to as `FTPSHARE`. Create a Staging or Metadata Repository Directory to copy data files, save data extracts, and so on.
  Ensure that you create this directory on the same system as the OFS STSA Installation. You can configure this directory on a different mount or under a different user profile.

  > **Note:**
  >
  > Ensure that the OFS MMG Staging Directory is not set to the same path as the OFS MMG Installation Directory and is not a sub-directory inside the OFS MMG Installation Directory.

> **Note:**
>
> Ensure that the OFS STSA Staging Directory is not set to the same path as the OFS STSA Installation Directory and is not a sub-directory inside the OFS STSA Installation Directory.

Configure the OS File System Settings and Environment Settings in the .profile File

A `.profile` file is a start-up file of a UNIX User. Create the `.profile` file at the home directory of the logged-in user if it is not already available. The user must have 755 permission on the file to execute it. This file consists of various parameters for Environment Settings, OS, and File System Settings.

To set the parameters for the `.profile` file, login as a non-root user, and configure the environment settings.

> **WARNING:**
>
> Do not modify any other parameters other than the parameters mentioned in the following subsections.

Configure Operating System and File System Settings

To install the application, configure the operating system and file system settings refer the parameters and configuration actions.

Table 4-1 Configure operating system and file system settings

Parameter	Configuration Action
File Descriptor Settings	In the `sysctl.conf` file, to change the number of file descriptors, do the following as the root user: 1. Edit the following line in the /etc/`sysctl.conf` file: fs.file-max = <value> where <value> is greater than 15000 • Apply the change by running the following command: # /sbin/ sysctl -p **Note:** The value specified here is the minimum value to be set for the installation process to go forward. For other modules, this value may depend on the available resources and the number of processes executed in parallel.
Total Number of Process Settings	In the `sysctl.conf` file, set the value to greater than 4096. **Note:** The value specified here is the minimum value to be set for the installation process to go forward. For other modules, this value may depend on the available resources and the number of processes executed in parallel.

Configure the Environment Settings

Environment Settings refers to values related to the current environment, like the Operating System or user sessions. To configure the environment settings refer the following topics.

Java Settings

To configure the Java Settings, refer the following table:

Table 4-2 Java Settings

Description	Example Value
In the `.profile` file, set JAVA_BIN to include the JDK absolute path.	For example: JAVA_BIN =`/usr/java/jdk-11.0.20/bin` `export JAVA_BIN`

Table 4-3 Java Settings

Description	Example Value

In the `.profile` file, set the Java tool options for all versions JDK 11.0.20 and above updates.
Ensure that SYMBOLIC links to JAVA installation are not set in the PATH variable.
	`JAVA_TOOL_OPTIONS=" -Djdk.util.zip.disableZip64ExtraFieldValidation=true"`
	`export JAVA_TOOL_OPTIONS`
	Note:
	OFS STSA does not support OpenJDK.

In the `.profile` file, set JAVA_BIN to include the JDK absolute path.	For example: JAVA_BIN =`/usr/java/jdk-11.0.20/bin` `export JAVA_BIN`

Oracle Database Server and Client Settings

To configure the Oracle Database Server and Client Settings, refer to the following table:

Table 4-4 Oracle Database Server and Client Settings

Description	Example Value
In the `.profile` file, set TNS_ADMIN pointing to the appropriate tnsnames.ora file.	`TNS_ADMIN=$HOME/tns`
In the `.profile` file, set ORACLE_HOME pointing to the appropriate Oracle Client installation.	`ORACLE_HOME=/scratch/oraofss/app_client19c/product/ 19.0.0/client_1`
In the `.profile` file, set PATH to include the appropriate $ORACLE_HOME/bin path.	`PATH=$JAVA_HOME/bin:$ORACLE_HOME/bin`

TNS entries in the tnsnames.ora file for Non-TCPS

You must configure the TNS entries in the tnsnames.ora file for Non-TCPS.

Non-TCPS

To configure the TNS entries in the `tnsnames.ora` file for Non-TCPS, refer to the following table:

Table 4-5 TNS entries in the TNSNAMES.ORA file for Non-TCPS

Description	Example Value
Ensure that an entry (with SID or SERVICE NAME) is added in the tnsnames.ora file on the OFSAA server. Ensure that an entry (with SID or SERVICE NAME) is added in the tnsnames.ora file on the STSA server.	`<SID_NAME> = DESCRIPTION =(ADDRESS_LIST = (ADDRESS = (PROTOCOL = TCP)(HOST = <HOST_NAME>.in.oracle.com)(PORT = 1521)))(CONNECT_DATA = (SERVICE_NAME = <SID_NAME>)))<ATOMIC_SCHEMA_NAME> = (DESCRIPTION =(ADDRESS_LIST = (ADDRESS = (PROTOCOL = TCP)(HOST = <HOST_NAME>.in.oracle.com)(PORT = 1521)))(CONNECT_DATA = (SERVICE_NAME = <SID_NAME>)))`

```
<SID NAME> =

(DESCRIPTION =

(ADDRESS_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = <HOST NAME>)(PORT = <PORT NUMBER>))

) (CONNECT_DATA =

(SERVICE_NAME = <SID NAME>)

)

)

<ATOMICSCHEMANAME> =

(DESCRIPTION =

(ADDRESS_LIST =

(ADDRESS = (PROTOCOL = TCP)(HOST = <HOST NAME>)(PORT = <PORT NUMBER>))

)

(CONNECT_DATA =

(SERVICE_NAME = <SID NAME>)

)

)
```

Time Zone Settings

In the `.profile` file, set the Time Zone Parameter to indicate the time zone of your region or location.

For more information, see *MMG User Guide*.

Table 4-6 Time Zone Settings

Description	Example Value
Time Zone	TZ=Asia/Calcutta

Setup Password Stores with Oracle Wallet

This section describes the steps to create a wallet and the aliases for the database user accounts. For more information on configuring authentication and password stores, see theOracle Database Security Guide.

As part of an Application Installation, Administrators must set up password stores for Database User Accounts using Oracle Wallet. These password stores must be installed on the Application Database side. The Installer handles much of this process. The Administrators must perform some additional steps.

A password store for the application and Application Server User Accounts must also be installed. However, the installer takes care of this entire process.

Setup the Password Stores for Database User Accounts

After the database is installed and the default Database User Accounts are set up, Administrators must set up a password store using the Oracle Wallet. This involves assigning an alias for the username and associated password for each Database User Account. The alias is used later during the application installation. This password store must be created on the system where the Application Server and database client are installed.

> **Note:**
>
> In this section, `<wallet_location>` is a placeholder text for illustration purposes. Before running the command, ensure that you have already created the <wallet_location> directory where you want to create and store the wallet.

The wallet is created in the <wallet_location> directory with the auto-login feature enabled. This feature enables the database client to access the wallet contents without using the password. For more information, see Oracle Database Security Guide.

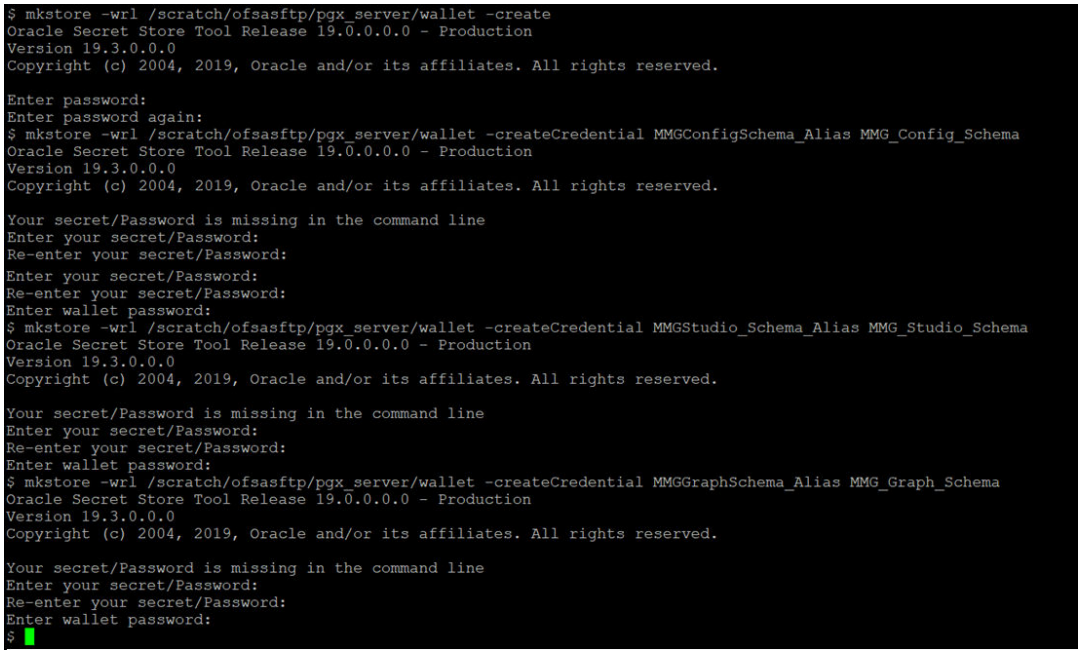
To create a wallet, follow these steps:

1. Login to the server as a Linux user.
2. Create a wallet in the `<wallet_location> using the following command:`
   `mkstore -wrl <wallet_location> -create`

   > **Note:**
   >
   > The mkstore utility is included in the Oracle Database Client Installation.

3. After you run the command, a prompt appears. Enter a password for the Oracle Wallet in the prompt.
   A prompt appears to re-enter the password. Re-enter the password.

Figure 4-1 Wallet Creation



4. Create the database connection credentials for the MMG Schema using the following command:
`mkstore -wrl <wallet_location> -createCredential <alias-name> <mmg-schema-name>`

   Here, MMG Schema is the same as explained in Create the MMG Schema section.

   After you run the command, a prompt appears. Enter the password associated with the Database User Account in the prompt. You are prompted to re-enter the password. You are prompted for the wallet password used in Step 1.

   > **Note:**
   >
   > In this manner, create a wallet and associated database connection credentials for all the Database User Accounts including Graph and Studio Schema.

   After the wallet is created, go to the `<wallet_location>` directory and click Refresh to view the created wallet folder.

   The wallet folder contains two files: **ewallet.p12** and **cwallet.sso**.

5. Create the database connection credentials for the STSA Schema using the following command:
`mkstore -wrl <wallet_location> -createCredential <alias-name> <est-schema-name>`

   The STSA Schema is the same as mentioned in the Create the STSA Schema section.

   After you run the command, a prompt appears. Enter the password associated with the Database User Account in the prompt. You are prompted to re-enter the password. You are prompted for the wallet password used in Step 1.

> **Note:**
>
> In this manner, create a wallet and associated database connection credentials for all the Database User Accounts including Graph and Studio Schema.

After the wallet is created, go to the `<wallet_location>` directory and click Refresh to view the created wallet folder.

The wallet folder contains two files: **ewallet.p12** and **cwallet.sso**.

6. In the `<wallet_location>` directory, configure the tnsnames.ora file to include the entry for each alias name to be set up. Alias name can be renamed as wallet db alias name.

> **Note:**
>
> - You can either update the existing tnsnames.ora file with the above details or create new tnsnames.ora file and add the required entries.
> - <alias-name> is a user-defined value.

7. Create a sqlnet.ora file in the wallet directory using the following content:

```
WALLET_LOCATION = (SOURCE = (METHOD = FILE) (METHOD_DATA =
(DIRECTORY = <Wallet_Location>)) ) SQLNET.WALLET_OVERRIDE=TRUE
SSL_CLIENT_AUTHENTICATION=FALSE
```

Here, `<Wallet_Location>` should be in below format:

```
WALLET_LOCATION = (SOURCE = (METHOD = FILE) (METHOD_DATA =
(DIRECTORY = <WALLET_PATH>) ) )
```

Verify the Connectivity of the Wallet

To verify the connectivity of the wallet, follow these steps:

1. Test the connectivity using the following command:

> **Note:**
>
> The ORACLE_HOME used with the wallet must be the same version or higher than the wallet created.

```
$ export WALLET_LOCATION=<wallet_location>

$ export TNS_ADMIN=<tnsnames.ora_location>. If you have created a new
tnsnames.ora file, provide the location of the new file.

$ sqlplus /@<alias_name>
```

The output is similar to:

```
SQL*Plus: Release 11

Connected to:
```

```
Oracle Database 12c
```

To verify if you are connected to the correct user:

```
SQL> show user
```

```
The output is similar to:
```

```
USER is "<database-user-name>"
```

5
Installation

This section provides detailed steps to install the application.

Prerequisites

Below is the list of prerequisites:

- Port Details
  MMG Studio uses the following ports by default, so make sure these are free:

  graph service: 7059

  Server: 7008

  markdown-interpreter: 7009, 7029

  python-interpreter: 7012, 7032, 6012

  shell-interpreter: 7013, 7033

  plainr-interpreter 7019, 7039, 6311 (Rserve port- configurable in plainr.Json)

  pgx server: 7007

  pgx-interpreter: 7022, 7042

  jdbc-interpreter : 7011, 7031

  coherence cluster : 7574
- For Solaris Operating System, the MMG Studio has to be configured in Linux machine remotely. And the studio URL must be the same as that of the remote studio during MMG Application installation. To configure Remote MMG Studio, see the Remote MMG Studio Configuration.

Download the OFS MMG Installer Kit

To download the software as a .zip folder, download the mandatory minor release patch **36885021** from My Oracle Support (MOS).

Download the installer archive and copy (in Binary Mode) to the download directory that exists in the OFS MMG Installation Setup.

Extract the Software

You must be logged in to the UNIX Operating System as a Non-Root User to perform the following steps. To extract the software, follow these steps:

1. Download the unzip (OS-specific) unzip_<os>.zip and copy it in Binary Mode to the directory that is included in your PATH variable.

   If you already have an unzip utility to extract the contents of the downloaded archive, skip this step. Uncompress the unzip installer file with the command:

   ```
   uncompress unzip_<os>.Z
   ```

> **Note:**
>
> If an error message "uncompress: not found [No such file or directory]" is displayed, contact your UNIX Administrator.

2. Assign execute (751) to the file with the following command:

   `chmod 751 unzip_<OS>`

   For example: `chmod 751 unzip_sparc`

3. Extract the contents of the OFS MMG Application Pack Release 8.1.2.7.0 installer archive file in the download directory with the following command:

   `unzip OFS_MMG_8.1.2.7.0_<OS>.zip`

   After unzipping the OFS_MMG_8.1.2.7.0 folder, following zip folders are displayed under OFS MMG folder.

   - mmg-installer.zip
   - mmg-metadata-manager.zip
   - mmg-pgx.zip
   - OFSMMG_8.1.2.7.0_Readme.html

   Unzip mmg-installer.zip and the following components are available under / OFS_MMG/mmg-`installer.zip`:

   - mmg-ui
   - mmg-studio
   - mmg-service
   - mmg-schema-creator
   - mmg-pipeline
   - mmg-load-to-graph
   - lib
   - bin
   - conf

4. Navigate to the download directory and assign execute permission to the installer directory with the following command:

   `chmod -R 750 OFS_MMG`

Configure the config.sh file

To configure the `config.sh` file:

1. Log in to the server as a Non-root user.
2. Navigate to the `<installation directory>/OFS_STSA/MMG/OFS_MMG/bin` directory.

   For example, `/scratch/ofsaaweb/EST_HOME/OFS_STSA/MMG/OFS_MMG/bin`

3. Configure the applicable `config.sh` attributes as shown here.

Sample config.sh file

```
#!/bin/sh

## Common properties

export APPLICATION_NAME=Stress Testing and Scenario Analytics
export WALLET_LOCATION=/scratch/ofsaadb/EST_HOME/wallet
export TNS_ADMIN_PATH=/scratch/ofsaadb/EST_HOME
export WALLET_ALIAS=QACONFV7
export LOG_HOME=/scratch/ofsaadb/EST_HOME/logs
export FTPSHARE=/scratch/ofsaadb/EST_HOME/ftpshare

##By default, Data Studio is assumed to run on the same server. If it's
running on a different host, uncomment the line below and provide the
appropriate URL.
#export DATASTUDIO_URL=##DATASTUDIO_URL##

export BE_HOSTNAME=ofss-
mum-5443.snbomprshared2.gbucdsint02bom.oraclevcn.com
export BE_PORT=5552
export UI_PORT=5551
export SCHEMA_PORT=5550

export CONTEXT_PATH=mmg8127

export STUDIO_AUTH_TYPE=MMG_AAI

export
SSO_TOKEN=eyJhbGciOiJSUzI1NiJ9.eyJpbnN0YW5jZSI6IjBmNmQ4ZDFiLTFmZjgtNDIyMy05
NTE2LTAxZDg1OGNhYzQzYyIsInVzZXIiOiJNTUdfQVBJX1VTRVIifQ.CR5SM8NnpUwjPQ172AfC
ArQHiCp_tmp8vfE9IQ12HN5uiP7_p7zJ5y-r61tw0HPyizA71Uwu_rR4MG_aQlJHpZ0E-
TNvL5OuqHgofngZuS1hu-
xGuUla1L0TRFCFVtaeK6tY247HJ_8wNVVbGobc9KiZx9Ztpo_BUC_P7oUe1rXfr8_K776C2-
fRrt6z1Pa4MMw3bmxi8G-
ow0JMMpFP46eMlvV4yNvWrHzxM0vxA08WmOKIte_74CFrReHvN4qbhGOFoITPKBVUnTSHWmoOjn
ZbJzcOVd8HpIzlGy-ji2jF2SKBzB6IoFaEki1NXooQRQM0NRUfXzozQ6XoqwRTzA

export SSL_ENABLED=true
export SSL_KEYSTORE=/scratch/ofsaadb/EST_HOME/config_files/server.keystore
export SSL_KS_SECRET=secret
export SSL_KS_TYPE=PKCS12
export SSL_KS_ALIAS=esttest

export SESSION_TOKEN_CREDENTIALS=NA

export FCC_API_USER=NA


export MMG_DATASOURCE_MAX_POOL_SIZE=10
export MMG_DATASOURCE_IDLE_TIMEOUT=30000
export MMG_DATASOURCE_CONN_TIMEOUT=80000
export EXT_DATASOURCE_MAX_POOL_SIZE=10
export EXT_DATASOURCE_IDLE_TIMEOUT=30000
export EXT_DATASOURCE_CONN_TIMEOUT=80000
```

```
export MMG_HTTP_MAX_CONN=20
export MMG_HTTP_MAX_CONN_PER_ROUTE=2
export MMG_HTTP_CONNECT_TIMEOUT=30000
export MMG_HTTP_READ_TIMEOUT=120000

export APPLICATION_ID=ESTMMG

## Properties for mmg-ui

export APPLICATION_FAVICON_PATH=##APPLICATION_FAVICON_PATH##


export UI_AUTH_TYPE=aai
export AAI_AUTH_URL=http://100.76.147.137:7272/LLFP812/
export SAML_IDP_URL=##SAML_IDP_URL##
export SAML_SP_ENTITY=##SAML_SP_ENTITY##
export SAML_SRV_URL=##SAML_SRV_URL##
export SAML_LOGOUT_URL=##SAML_LOGOUT_URL##
export LDAP_URL=##LDAP_URL##
export LDAP_SEARCH_BASE=##LDAP_SEARCH_BASE##
export LDAP_USER_FILTER=##LDAP_USER_FILTER##

export LDAP_USER_SEARCH_FILTER=##LDAP_USER_SEARCH_FILTER##
export LDAP_GROUP_SEARCH_FILTER=##LDAP_GROUP_SEARCH_FILTER##
export LDAP_GROUP_SEARCH_BASE=##LDAP_GROUP_SEARCH_BASE##
export LDAP_GROUP_MEMBER=##LDAP_GROUP_MEMBER##



export SERVER_COOKIE_DOMAIN=.snbomprshared2.gbucdsint02bom.oraclevcn.com
export SERVER_COOKIE_NAME=ORA_OLDS_SESSION
export SERVER_COOKIE_TIMEOUT=999999
export SERVER_COOKIE_IS_SECURE=true

##Properties for mmg-service

export BE_AUTH_TYPE=public

export MMG_PYTHON_INTERPRETER=python

export DATACATALOG_SERVICE_URL=https://ofss-
mum-5443.snbomprshared2.gbucdsint02bom.oraclevcn.com:6082/estservice

##Properties for mmg-studio


export STUDIO_WALLET_ENABLED=true

export LOGIN_SHOW=true
export SESSION_MODE=NOTEBOOK
export STUDIO_REALM=OFSAARealm
export OFSAA_URL=http://100.76.147.137:7272/LLFP812/rest-api
export API_USERS=MMG_API_USER
export VALID_ROLES=DSUSRGRP,MDLAPPR,MDLREV,MDLUSR

export DATASOURCE_URL=jdbc:oracle:thin:@QADS
```

```
export DATASOURCE_USERNAME=##DATASOURCE_USERNAME##
export DATASOURCE_PASSWORD=##DATASOURCE_PASSWORD##
export DATASOURCE_DRIVER=oracle.jdbc.OracleDriver

export JPA_DB_PLATFORM=org.hibernate.dialect.Oracle12cDialect

export STUDIO_LOG_LEVEL=debug

export PYTHON_HOME=##PYTHON_HOME##

export SPARK_HOME=##SPARK_HOME##

export R_ENABLED=##R_ENABLED##
export RS_CONF_PATH=##RS_CONF_PATH##
export RS_KEYSTORE=##RS_KEYSTORE##
export RS_KS_SECRET=##RS_KS_SECRET##

# Following are fcc services specific configurations, Leave as it is if
not applicable
export TEMPLATE_CONFIG_PATH=##TEMPLATE_CONFIG_PATH##
export TEMPLATE_DEFAULT_LINK=##TEMPLATE_DEFAULT_LINK##
export AUTH_SERVICE_URL=##AUTH_SERVICE_URL##
export META_SERVICE_URL=##META_SERVICE_URL##
export ER_SERVICE_URL=##ER_SERVICE_URL##
export BATCH_SERVICE_URL=##BATCH_SERVICE_URL##
export SAML_ISSUER=##SAML_ISSUER##
export SAML_DESTINATION=##SAML_DESTINATION##
export SAML_ASSERTION=##SAML_ASSERTION##
export SAML_ROLE_ATTRIBUTE=##SAML_ROLE_ATTRIBUTE##
export SAML_STUDIO_LOGOUT_URL=##SAML_STUDIO_LOGOUT_URL##
export SAML_COOKIE_DOMAIN=##SAML_COOKIE_DOMAIN##


# Following are pipeline services specific configurations, Leave as it is
if not applicable
export DATAPIPELINE_SERVICE_PORT1=18411
export DATAPIPELINE_SERVICE_PORT2=18412
export DATAPIPELINE_METADATA_ARCHIVE_PATH=/scratch/ofsaadb/EST_HOME/
OFS_STSA/MMG/OFS_MMG/mmg-pipeline/pipeline/pipeline-service-10.0.1.1.0
export DATAPIPELINE_METADATA_IMPORT_SERVICE_PORT=18413
export DATAPIPELINE_ERXMLPATH=test-path
export DATAPIPELINE_GATEWAY_SERVICE_PORT=18414
export PIPELINE_UI_SERVICE_PORT=18415
export DATA_PIPELINE_UI_SERVICE_PORT=18416


#URLS for pipeline,ER and matching service. Leave as it is if not
applicable. Will impact the pipeline that could be added to a graph

export MATCHRULE_BASE_URL=
export LOADGRAPH_BASE_URL=https://ofss-
mum-5443.snbomprshared2.gbucdsint02bom.oraclevcn.com:7059/graph-service

export MATCHSRVC_UI_URL=
```

```
#URLS for index service. Leave as it is if not applicable. Will impact the
pipeline that could be added to a graph

export GRAPH_INDEX_BASE_URL=
export LOADINDEX_UI_URL=

export MATCHING_MECHANISM=##MATCHING_MECHANISM##
export CANDIDATE_SELECTION_SERVICE_URL=##CANDIDATE_SELECTION_SERVICE_URL##
export LOAD_TO_OS_URL=##LOAD_TO_OS_URL##

#Changes for auth services + mmg keys

export AAI_COOKIE_DOMAIN=.snbomprshared2.gbucdsint02bom.oraclevcn.com
export MMG_KEYS_LOC=/scratch/ofsaadb/EST_HOME/OFS_STSA/MMG/OFS_MMG/conf



#Properties to package Load to Graph (L2G) service inside MMG
## Start of L2G Properties ##
export GRAPH_INSTALLATION_PATH=/scratch/ofsaadb/EST_HOME/OFS_STSA/MMG/
OFS_MMG/mmg-load-to-graph/graph-service
export GRAPH_KEYSTORE_PASSWORD=password123
export GRAPH_SERVICE_PORT=7059

## Graph schema configurations
export MMG_DB_SERVER_NAME=ofss-
mum-1033.snbomprshared1.gbucdsint02bom.oraclevcn.com
export MMG_DB_PORT=1521
export MMG_DB_SERVICE_NAME=EST19PDB
export PGX_SERVER_URLS=https://ofss-
mum-5443.snbomprshared2.gbucdsint02bom.oraclevcn.com:7897/mmg-pgx
export GRAPH_SERVICE_CACHE_SERVER_PORT=##GRAPH_SERVICE_CACHE_SERVER_PORT##

#### PGX data memory limits configurations
## Overall Configuration
export MAX_TOTAL_SHARED_DATA_MEMORY_SIZE=20G
export MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE=8G
export MAX_PER_SESSION_DATA_MEMORY_SIZE=700M
## Role wise data memory limits
export MAX_DATA_MEMORY_SIZE_DSUSRGRP=10G
export MAX_DATA_MEMORY_SIZE_DSBATCH=10G
export MAX_DATA_MEMORY_SIZE_DSINTER=5G
export MAX_DATA_MEMORY_SIZE_DSAPPROVER=5G
export MAX_DATA_MEMORY_SIZE_DSUSER=5G


#end of Properties configurations for L2G

##Schema details for graph service. This is configured as a temporary/
target space for DP to create target tables which will act as input to L2G
export GRAPH_SCHEMA_WALLET_ALIAS=QAGRAPH
export GRAPH_SCHEMA_DB_SCHEMA_NAME=ESTQAgraphschema

#Additional MMG Features
export
MMG_MODEL_PIPELINE_SANDBOX_DEFAULT_VIEW=##MMG_MODEL_PIPELINE_SANDBOX_DEFAUL
```

```
T_VIEW##

## The following properties are optional and enabled by default. If
needed, you can uncomment them and set them to false.

#export MMG_HTTP2_ENABLED=##MMG_HTTP2_ENABLED##
#export MMG_SERVER_ACCESS_LOG_ENABLED=##MMG_SERVER_ACCESS_LOG_ENABLED##

## The following properties are optional and disabled by default. If
needed, you can uncomment them and set them to true.

#export OJET_CDN_ENABLED=##OJET_CDN_ENABLED##

##The Following Properties are related to EST
export EST_ENABLED=true
export EST_UI_URL=https://ofss-
mum-5443.snbomprshared2.gbucdsint02bom.oraclevcn.com:6083/estservice/
export EST_SERVICE_URL=##EST_SERVICE_URL##

##Data Studio Ports
## Following are the default ports 7008, 7009, 7012, -1. If needed, you
can change the port numbers other than the default values.
export DATASTUDIO_SERVER_PORT=5561
export DATASTUDIO_MARKDOWN_INTERPRETER_PORT=5562
export DATASTUDIO_PYTHON_INTERPRETER_PORT=5563
export DATASTUDIO_JDBC_INTERPRETER_PORT=5564
export DATASTUDIO_PYTHON_INTERPRETER_REST_SERVER_PORT=5565
export DATASTUDIO_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT=5566
export DATASTUDIO_THRIFT_EVENT_HANDLER_PORT=5567
export DATASTUDIO_PGX_INTERPRETER_PORT=5568

export MMG_COHERENCE_CLUSTER_PORT=##MMG_COHERENCE_CLUSTER_PORT##

##MMG Gateway Configuration

export MMG_GATEWAY_ENABLED=##MMG_GATEWAY_ENABLED##
export MMG_GATEWAY_PORT=##MMG_GATEWAY_PORT##

## If Gateway is enabled, the following property can be set to control the
pages where MMG can be embedded:
# Set to 'self' to allow embedding only from the same origin (recommended
for most setups).
# Set to 'all' or '*' to allow embedding from any origin. (less secure)
# Set to a comma-separated list of origins to allow embedding from those
specified origins and from the same origin.
# By default, this is set to 'self'.
export MMG_CSP_FRAME_ANCESTORS=##MMG_CSP_FRAME_ANCESTORS##

# If the Gateway is enabled, this property can be set to control the pages
where Data Studio can be embedded:
# Set to '*' to allow embedding from any origin (less secure).
# Set to a comma-separated list of origins to allow embedding from those
specified origins and from the same origin.
# By default, this is set to MMG Gateway URL.
# If a load balancer or an external gateway is configured for MMG Gateway,
the URL must be included in the list of origins.
```

```
export DATASTUDIO_CSP_FRAME_ANCESTORS=##DATASTUDIO_CSP_FRAME_ANCESTORS##


#ENDOFFILE#
```

Table 5-1 config.sh file

Parameter	Description	Is Mandatory	Comments
Common Properties			
##APPLICATION_NAME##	Title of the application; if not replaced, default is : Model Management and Governance.	YES	It defaults to "Model Management and Governance." NOTE: Provide double quotes for the application name if it is long or contains spaces.
##WALLET_LOCATION##	The wallet is the folder containing the sqlnet.ora, wallet.sso, and .p12 files.	YES	/scratch/users/wallet
##TNS_ADMIN_PATH##	The folder that contains the tnsnames.ora file.	YES	/scratch/users/tns
##WALLET_ALIAS##	The wallet alias name configured for the MMG application config schema.	YES	MMG_CONFIG STSA_CONFIG **Note**: Ensure that you provide the same alias name as provided in the `configForEST.sh` file.
##LOG_HOME##	A writable folder designated for storing application and MMG Studio logs.	YES	/scratch/users/logs **Note**: Ensure that log folder is created before installation.
##FTPSHARE##	This can be any writable folder accessible to the process owner.	YES	/scratch/users/ftpshare Ensure that ftpshare folder is created before installation. This should be same as the metadata directory mentioned above.
##DATASTUDIO_URL##	URL for MMG Studio.	YES	By default, Data Studio is assumed to run on the same server. If it is running on a different host, uncomment the line below and provide the appropriate URL. https://<hostname/IP>:7008/<contextpath> NOTE: The default port for MMG Studio is 7008 and should not be modified.

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##BE_HOSTNAME##	Hostname on which the backend service (mmg-service) runs. Use the same hostname wherever applicable.	YES	HostIP or FQDN
##BE_PORT##	Port on which the backend service (mmg-service) needs to run.	YES	7002
##UI_PORT##	Port on which UI service(mmg-ui) needs to run.	YES	7001
##SCHEMA_PORT##	Port on which Schema Creator service needs to run.	YES	7003
##CONTEXT_PATH##	Context path of the application.	YES	mmg
##STUDIO_AUTH_TYPE##	• FCC_SSO – for SAMLRealm based authentication in FCC Studio Note: Direct log in to Data studio using the Studio URL `<https:{host name:7008/context path}` is not supported. • MMG_AAI- AAI Based authentication for MMG Studio	YES	Can be either MMG_AAI or FCC_SSO

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##SSO_TOKEN##	SSO Token value for Studio authentication. Applicable only when STUDIO_AUTH_TYPE is FCC_SSO and MMG_AAI. For FCC_SSO, refer to the Oracle Financial Services Compliance Studio Installation Guide. For MMG_AAI, to create the SSO Token, follow these steps. a. Locate <MMG_INSTALLATION_PATH>/OFS_MMG/bin / key-generator.sh and execute it. b. After successful execution, public key and private key are generated at the following paths: <MMG_INSTALLATION_PATH>/OFS_MMG/conf and <MMG_INSTALLATION_PATH>/OFS_MMG/mmg-studio/conf/ Execute the token-generator.sh file by passing <API_USER> as an argument value. This file is located at the following path: <MMG_INSTALLATION_PATH>/OFS_MMG/bin Example: ./token-generator.sh MMG_API_USER a. After successful execution, a file named token.out is created inside the same bin directory. The token.out file contains the following content: “Generated JWT Token for MMG_API_USER:	YES	**Note**: SSO token value needs to be regenerated whenever new keys are generated.

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
	<some-long-random-token-value>” • Copy the <some-long-random-token-value> part mentioned above and paste it into ##SSO_TOKEN## in the config.sh file. Ensure that there is no space or end line at either the start or end while copying this value into ##SSO_TOKEN##.		
##SSL_ENABLED##	This enables https.	YES	Example: `true`
##SSL_KEYSTORE##	Absolute path for the keystore file. **Note**: Run the following command to create a keystore: keytool -genkey -v -alias demoalias -keyalg RSA -keysize 2048 -keystore server.keystore -validity 3650 -keypass secret -storepass secret -storetype PKCS12	YES	../conf/server.keystore. Include the file name in the path. **NOTE:** If ##SSL_ENABLED## is set to false, you must configure keystore for mmg-studio, as it is SSL-enabled by default. MMG application and MMG Studio can share the same SSL configuration if set up on the same server.
##SSL_KS_SECRET##	Keystore secret The value passed in the aforementioned command for -keypass	YES	Example: secret
##SSL_KS_TYPE##	Keystore type The value passed in the aforementioned command for -storetype Can be either JKS or PKCS12	YES	Example: PKCS12
##SSL_KS_ALIAS##	Keystore alias The value passed in the aforementioned command for -alias	YES	Example: demoalias
##SESSION_TOKEN_CREDENTIALS##	The password used to generate the Authorization header token to communicate with mmg-services.	YES	**NOTE:** If not applicable, enter NA
##FCC_API_USER##	API user for FCC Studio.	YES	**NOTE**: If not applicable, enter NA

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##MMG_DATASOURCE_MAX_POOL_SIZE##	Maximum connection pool size allowed for Config Datasource.	YES	It defaults to 10. You can edit it if required.
##MMG_DATASOURCE_IDLE_TIMEOUT##	Idle timeout for config Datasource.	YES	It defaults to 30000. You can edit it if required.
##MMG_DATASOURCE_CONN_TIMEOUT##	Connection timeout for Config Datasource.	YES	It defaults to 80000. You can edit it if required.
##EXT_DATASOURCE_MAX_POOL_SIZE##	Maximum connection pool size allowed for meta/data schemas.	YES	It defaults to 10. You can edit it if required.
##EXT_DATASOURCE_IDLE_TIMEOUT##	Idle timeout for meta/data schemas.	YES	It defaults to 30000. You can edit it if required.
##EXT_DATASOURCE_CONN_TIMEOUT##	Connection timeout for meta/data schemas.	YES	It defaults to 80000. You can edit it if required.
##MMG_HTTP_MAX_CONN##	The maximum number of connections allowed across all routes.	YES	It defaults to 20.
## MMG_HTTP_MAX_CONN_PER_ROUTE##	The maximum number of HTTP connections allowed for a route.	YES	It defaults to 2.
##MMG_HTTP_CONNECT_TIMEOUT##	The connection timeout for HTTP connection. A timeout value of 0 specifies an infinite timeout.	YES	It defaults to 30000.
##MMG_HTTP_READ_TIMEOUT##	The socket read timeout for HTTP connection. A timeout value of 0 specifies an infinite timeout.	YES	It defaults to 120000.
##APPLICATION_ID##	The id will be stored as app_id and must be the same as mentioned in the APP_ID column of MMG_PATCHES table. Currently the UI displays the MMG Version <version number of application> and last applied MMG version.	YES	The APPLICATION_ID should be without spaces.
mmg-ui			
##APPLICATION_FAVICON_PATH##	Icon for the application. If not specified, it will default to the icon at the following location: css/images/favicon.ico	NO	css/images/favicon.ico

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##UI_AUTH_TYPE##	aai – if using an existing AAI instance as the identity provider. saml – for saml based authentication ldap – for ldap based authentication **NOTE:** This is case sensitive.	YES	Can be one of the following: aai, or saml or ldap.
##AAI_AUTH_URL##	Base URL of the AAI instance. Will be used for ##UI_AUTH_TYPE## = aai **Note:** If the target AAI is https, then it is necessary to import the AAI host certificate into the MMG server Java keystore. Refer Import Server Certificate to Java Keystore for more details.	YES	http(s)://whfxxxxx.in.oracle.com:7110/mmg
##SAML_IDP_URL##	This is the endpoint on the IDP side where SAML requests are posted. The Service Provider (SP) needs to obtain this information from the Identity Provider (IdP).	YES	http(s)://idcs-xxxx.com/fed/v1/idp/sso This is used only if ##UI_AUTH_TYPE## is SAML.
##SAML_SP_ENTITY##	Enter a globally unique name for SAML entity. It typically takes the URL of an identity provider or a service provider as a value.	YES	http(s)://<UI_HOST>:<UI_PORT>/mmg This is used only if ##UI_AUTH_TYPE## is SAML.
##SAML_SRV_URL##	UI Landing Page URL.	YES	http(s)://<UI_HOST>:<UI_PORT>/mmg/home This is used only if ##UI_AUTH_TYPE## is SAML.
##SAML_LOGOUT_URL##	Initiated SAML Single Logout URL.	YES	http(s)://idcs-xxxx.com/sso/v1/user/logout This is used only if ##UI_AUTH_TYPE## is SAML.

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##LDAP_URL##	LDAP URL Will be used for ##UI_AUTH_TYPE## = LDAP	YES	ldap://whf00xyz:3060/
##LDAP_SEARCH_BASE##	LDAP Search Base Will be used for ##UI_AUTH_TYPE## = LDAP	YES	"cn=Users,dc=oracle,dc=com"
##LDAP_USER_FILTER##	LDAP User Filter Will be used for ##UI_AUTH_TYPE## = LDAP	YES	"cn={0}"
#LDAP_USER_SEARCH_FILTER##	LDAP User Search Filter Will be used for ##UI_AUTH_TYPE## = LDAP	YES	
##LDAP_GROUP_SEARCH_FILTER##	LDAP Group Search Filter Will be used for ##UI_AUTH_TYPE## = LDAP	YES	
##LDAP_GROUP_SEARCH_BASE##	LDAP Group Search Base Will be used for ##UI_AUTH_TYPE## = LDAP	YES	
##LDAP_GROUP_MEMBER#	LDAP Group Member Will be used for ##UI_AUTH_TYPE## = LDAP	YES	
##SERVER_COOKIE_DOMAIN##	The domain name.	YES	This should be the domain name of the host server. Example: .in.xyz.com **Note**: If the MMG application is configured with the IP address, then provide the same.
##SERVER_COOKIE_NAME##	The name for the cookie.	YES	If not set it will default to ORA_OLDS_SESSION
##SERVER_COOKIE_TIMEOUT##	Timeout/expiry duration in seconds.	YES	If not set, it defaults to 999999

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##SERVER_COOKIE_IS_SECURE##	Specifies if we are using cookies to add an additional security layer to prevent cross-origin requests. Can be either **true** or **false**	YES	If not set, it defaults to true.
Properties for mmg-service			
##BE_AUTH_TYPE##	Auth Type on which the backend service (mmg-service) runs.	YES	It defaults to public.
##MMG_PYTHON_INTERPRETER##	A comma separated value without whitespaces that specifies python interpreter python,fcc-ml4aml	YES	If not set, it defaults to python.
##DATACATALOG_SERVICE_URL##	Only used when EST application is integrated with MMG.	NO	
Properties for mmg-studio			
##STUDIO_WALLET_ENABLED##	Set as true when using a wallet for the MMG Studio Schema. Can be either **true/TRUE** or **false/FALSE (all caps or all small)**	YES	true/TRUE
##LOGIN_SHOW##	Can be either **true/TRUE** or **false/FALSE (all caps or all small)** **Note:** Set as true when the login screen of Studio is required. This property should be set as true if MMG application is non-SSL.	YES	It defaults to true.
##SESSION_MODE##	Can be either NOTEBOOK or NOTEBOOK_USER.	YES	If not set, it defaults to NOTEBOOK.
##STUDIO_REALM##	Can be either OFSAARealm or saml.OFSAASamlRealm	YES	OFSAARealm – the default realm for studio auth type FCC_AAI, MMG_AAI. .auth.saml.OFSAASamlRealm – for SAML specific studio authentication

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##OFSAA_URL##	AAI login IDM Service URL. This is applicable only if ## STUDIO_AUTH_TYPE ## is " MMG_AAI ".	YES	**Format**: http://<ofsa-web-host>:<port>/<context>/rest-api For example, http://ABC00abc:4325/LLFP/rest-api The /rest-api is mandatory for OFSAA URL.
##API_USERS##	This is the API user with which the token is generated; if not set, it defaults to MMG_API_USER. **Note**: Use the same <API_USER> as given in the ##SSO_TOKEN##	YES	MMG_API_USER
##VALID_ROLES##	MDLUSR,MDLREV,MDLAPPR The comma separated values for Studio-related roles in USER-ROLE mapping.	YES	MDLBATCHUSR, DSUSRGRP, DSREDACTGRP
##DATASOURCE_URL##	The connection address to the database where the MMG Studio Schema is created. When ##WALLET_ENABLED## is false- jdbc:oracle:thin:@<Host>:<Port>/<Service_Name> When ##WALLET_ENABLED## is true- jdbc:oracle:thin:@<DSALIAS> where <DS_ALIAS> is the wallet alias configured for the MMG Studio Schema.	YES	
##DATASOURCE_USERNAME##	MMG Studio Schema/ User name; required only when ##WALLET_ENABLED## is false	YES	dsschema

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##DATASOURCE_PASSWORD##	MMG Studio Schema/ User Password; required only when ##WALLET_ENABLED## is false	YES	password
##DATASOURCE_DRIVER##	Database Driver used in connection	YES	oracle.jdbc.OracleDriver
##JPA_DB_PLATFORM##	Hibernate Class or SQL Dialect used in Database	YES	org.hibernate.dialect.Oracle12cDialect
##STUDIO_LOG_LEVEL##	Logging level for logs.	YES	info, warn, debug or error logs
##PYTHON_HOME##	Home Path of Python Library. It defaults to python3 during installation. For a custom installation of python3 where the soft link is not configured, you can mention the complete path up to python3.	YES	python3
##SPARK_HOME##	Absolute path of Apache Spark Library.	NO	
##R_ENABLED##	This can be set to TRUE/true or FALSE/ false depending on which R interpreter will be started and will be present in the interpreters list. **Note**: If you are using an older Studio schema with an R-interpreter already present and then install with **R_ENABLED** set as FALSE; the R-interpreter will remain in the interpreter's menu of Studio and must be deleted from there.	YES	The default is False.
##RS_CONF_PATH##	Absolute path to Rserve.conf file for running Rserve.	YES	/scratch/users/ datastudio/conf/ Rserve.conf
##RS_KEYSTORE##	Absolute path for the Keystore file made for Rserve.conf.	YES	/scratch/users/ datastudio/conf/ rinterpreterkeystore
##RS_KS_SECRET##	Keypass for rinterpreterkeystore.	YES	Example: changeit
fcc services specific configurations			

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##TEMPLATE_CONFIG_PATH##	Configuration path of the Template.	NO	
##TEMPLATE_DEFAULT_LINK##	Default link of the template.	NO	
##AUTH_SERVICE_URL##	The AUTH service URL that is activated after the fccstudio.sh file runs.	NO	Example: https://<hostname>:7041/authservice
##META_SERVICE_URL##	The metaservice URL that is activated after the fccstudio.sh file runs.	NO	Example: https://<hostname>:7045/metaservice
##ER_SERVICE_URL##	Used for the entity resolution service.	NO	Example: https://<hostname>:<port>
##BATCH_SERVICE_URL##	Used for the batch service.	NO	Example: https://<hostname>:<port>/batchservice
##SAML_ISSUER##	The SAML entity ID (Studio URL) configured in the IDP.	YES	https://<hostname>.xyz.com:7008
##SAML_DESTINATION##	The SAML IDP URL that the Identity Provider provides after creating the SAML application.	YES	https://idcs-xyzgvh.com/fed/v1/idp/sso
##SAML_ASSERTION##	The SAML Consume URL (Studio/URL/saml/consume) that is configured in IDP.	YES	https://<hostname>.xyz.com:7008/saml/consume
##SAML_ROLE_ATTRIBUTE##	The SAML client identifier provided by the SAML Administrator for the role and attributes information while creating the SAML application for MMG Studio. The attribute will contain the role required for the application.	YES	Example: group
##SAML_STUDIO_LOGOUT_URL##	The SAML client identifier provided by the SAML Administrator for the Logout URL information, while creating the SAML application for MMG Studio.	YES	https://idcs-xyzgvh.com/sso/v1/user/logout
##SAML_COOKIE_DOMAIN##	Domain of the server.	YES	Example: in.xyz.com
pipeline services specific configurations			

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##DATAPIPELINE_SERVICE_PORT1##	The port where the pipeline service resides.	YES	By default, it is set as 18005.
##DATAPIPELINE_SERVICE_PORT2##	The port where the data pipeline service resides.	YES	By default, it is set as 18006.
##DATAPIPELINE_METADATA_ARCHIVE_PATH##	The dump path for the pipeline service.	YES	/OFS_MMG/mmg-pipeline/pipeline/pipeline-service-x.x.x.x.x.
##DATAPIPELINE_METADATA_IMPORT_SERVICE_PORT##	Meta data import service port.	YES	By default, it is set as 18007.
##DATAPIPELINE_ERXMLPATH##	The XML path in which the schema details are stored.	NO	
##DATAPIPELINE_GATEWAY_SERVICE_PORT##	Data pipeline gateway service port.	YES	
##PIPELINE_UI_SERVICE_PORT##	Pipeline UI service port.	YES	
##DATA_PIPELINE_UI_SERVICE_PORT##	Data pipeline UI service port	YES	
URLS for pipeline,ER and matching service. Leave as it is if not applicable. Will impact the pipeline that could be added to a graph			
##MATCHRULE_BASE_URL##	The host and port where the match rule service resides.	NO	http(s)://abc.in.xyz.com:7051
##LOADGRAPH_BASE_URL##	The host and port where the load graph service resides.	YES	http(s)://abc.in.xyz.com:7059/graph-service
##MATCHSRVC_UI_URL##	Matching Service UI resource path.	NO	
URLS for index service. Leave as it is if not applicable. Will impact the pipeline that could be added to a graph			
##GRAPH_INDEX_BASE_URL##	Indicates the Graph Index resource path.		http(s)://<hostname>xyz.com:7053/load-to-elastic-search
##LOADINDEX_UI_URL##	Indicates the Graph Load Index UI resource path.		
##MATCHING_MECHANISM##			
##CANDIDATE_SELECTION_SERVICE_URL##			
##LOAD_TO_OS_URL##			
Changes for auth services + mmg keys			
##AAI_COOKIE_DOMAIN##	The domain of the server.	YES	Example: in.xyz.com

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##MMG_KEYS_LOC##	Indicates public and private key location.	YES	Example:< MMG Installation Path> / OFS_MMG/conf
Properties to package Load to Graph (L2G) service inside MMG ## Start of L2G Properties ##			
##GRAPH_INSTALLATION_PATH##	The installation path of the Graph.	YES	<MMG Installation Path>/ OFS_MMG/ mmg-load-to-graph/ graph-service
##GRAPH_KEYSTORE_PASSWORD##	Graph Keystore Password.	YES	Password
##GRAPH_SERVICE_PORT##	Graph service port.	YES	By default, it is set as 7059. You should not modify the Graph service port if graphs are already created and executed.
Graph schema configurations			
##MMG_DB_SERVER_NAME##	Name of the MMG Database Server.	YES	
##MMG_DB_PORT##	The port of the MMG database server.	YES	
##MMG_DB_SERVICE_NAME##	Name of the MMG Database Service.	YES	
##PGX_SERVER_URLS##	Indicates the pgx server resource path. **Note**: Refer to the PGX Installation section for more details. Skip this if not installing pgx.	YES	http(s):// <hostname>.xyz.com:< pgx port>/<pgx context name>
PGX data memory limits configurations ## Overall Configuration			
##MAX_TOTAL_SHARED_DATA_MEMORY_SIZE##	Maximum total shared data memory size.	YES	Edit if required; default value is 20 GB.
##MAX_TOTAL_PRIVATE_DATA_MEMORY_SIZE##	Maximum total private data memory size.	YES	Edit if required; default value is 8 GB.
##MAX_PER_SESSION_DATA_MEMORY_SIZE##	Maximum per session data memory size.	YES	Edit if required; default value is 700 MB.
Role wise data memory limits			
##MAX_DATA_MEMORY_SIZE_DSUSRGRP##	Maximum data memory size allowed for DSUSRGRP.	YES	Edit if required; default value is 10 GB.
##MAX_DATA_MEMORY_SIZE_DSBATCH##	Maximum data memory size allowed for DSBATCH.	YES	Edit if required; default value is 10 GB.
##MAX_DATA_MEMORY_SIZE_DSINTER##	Maximum data memory size allowed for DSINTER.	YES	Edit if required; default value is 5 GB.

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##MAX_DATA_MEMORY_SIZE_DSAPPROVER##	Maximum data memory size allowed for DSAPPROVER.	YES	Edit if required; default value is 5 GB.
##MAX_DATA_MEMORY_SIZE_DSUSER##	Maximum data memory size allowed for DSUSER.	YES	Edit if required; default value is 5 GB.
end of Properties configurations for L2G Schema details for graph service. This is configured as a temporary/target space for DP to create target tables which will act as input to L2G			
##GRAPH_SCHEMA_WALLET_ALIAS##	Wallet alias created for the Graph Schema.	YES	
##GRAPH_SCHEMA_DB_SCHEMA_NAME##	Name of the Graph schema.	YES	
Additional MMG Features MMG_MODEL_PIPELINE_SANDBOX_DEFAULT_VIEW The following properties are optional and enabled by default. If needed, you can uncomment them and set them to false. **#export MMG_HTTP2_ENABLED=##MMG_HTTP2_ENABLED##** **#export MMG_SERVER_ACCESS_LOG_ENABLED=##MMG_SERVER_ACCESS_LOG_ENABLED##** The following properties are optional and disabled by default. If needed, you can uncomment them and set them to true. #export OJET_CDN_ENABLED=##OJET_CDN_ENABLED## The Following Properties are related to EST			
##EST_ENABLED##	Only used when EST application is integrated with MMG.	YES	The default value is FALSE.
##EST_UI_URL##	The URL of EST application. This is set based on ##EST_ENABLED## property.	NO	
##EST_SERVICE_URL##	The Base URL to STSA Backend Application	YES	<HOST_NAME>:<EST_SERVICE_SERVER_PORT>/<EST_SERVER_SERVLET_CONTEXT_PATH>
Data Studio Ports Following are the default ports 7008, 7009, 7012, -1. If needed, you can change the port numbers other than the default values.			
##DATASTUDIO_SERVER_PORT##	The port of the Data Studio server.	NO	The default value is 7008.
##DATASTUDIO_MARKDOWN_INTERPRETER_PORT##	The port of the Data Studio Markdown Interpreter.	NO	The default values are 7009, 7029.
##DATASTUDIO_PYTHON_INTERPRETER_PORT##	The port of the Data Studio Python Interpreter.	NO	The default values are 7012, 7032, 6012.
##DATASTUDIO_JDBC_INTERPRETER_PORT##	The port of the Data Studio JDBC Interpreter.	NO	The default values are 7011, 7031.

Table 5-1 (Cont.) config.sh file

Parameter	Description	Is Mandatory	Comments
##DATASTUDIO_PYTHON_INTERPRETER_REST_SERVER_PORT##	The port of the Data Studio Python Interpreter Rest server.	NO	The default value is 6012
##DATASTUDIO_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT##	The port of the Data Studio PGX Python Interpreter Rest server.	NO	The default value is 6022
##DATASTUDIO_THRIFT_EVENT_HANDLER_PORT##	The port of the Data Studio Thrift Event handler.	NO	The default value is 8432
##DATASTUDIO_PGX_INTERPRETER_PORT##	The port of the Data Studio PGX Interpreter.	NO	The default value is 7022.
##MMG_COHERENCE_CLUSTER_PORT##			
##MMG Gateway Configuration			
##MMG_GATEWAY_ENABLED##			
##MMG_GATEWAY_PORT##			
## If Gateway is enabled, the following property can be set to control the pages where MMG can be embedded: # Set to 'self' to allow embedding only from the same origin (recommended for most setups). # Set to 'all' or '*' to allow embedding from any origin. (less secure) # Set to a comma-separated list of origins to allow embedding from those specified origins and from the same origin. # By default, this is set to 'self'.			
##MMG_CSP_FRAME_ANCESTORS##			
# If the Gateway is enabled, this property can be set to control the pages where Data Studio can be embedded: # Set to '*' to allow embedding from any origin (less secure). # Set to a comma-separated list of origins to allow embedding from those specified origins and from the same origin. # By default, this is set to MMG Gateway URL. # If a load balancer or an external gateway is configured for MMG Gateway, the URL must be included in the list of origins.			
##DATASTUDIO_CSP_FRAME_ANCESTORS##			

Note:

- In case of ##OFSAA_URL## and ##MMG_SVC_URL##, don't add any ending '/' in the URLs
- If pool size, connection timeout and idle timeout are not configured, then it will proceed with default Hikari Configurations.
- The default session timeout is 3600 seconds (60 mins). You can configure timeout using server.servlet.session.timeout property.
- If the AUTH type specified is AAI, make sure the AAI System has appropriate user groups mapped for the users. WKSPADMIN, IDNTYADMN, IDNTYAUTH need minimally to be present for a successful subsequent logins.
- The name for MMG Studio cookie is ORA_OLDS_SESSION.
- If the ##SSL_ENABLED## is set to false, keystore configuration must be done for mmg-studio as it is SSL enabled by default. MMG application and MMG Studio can use the same SSL configuration if configured in the same server.
- The wallet is same for all the MMG services including MMG Studio. So, if you want to use the MMG Studio with wallet configurations, then configure in the same wallet.
- If the MMG Studio is remotely configured, then the MMG Application Configuration Schema wallet alias and `tnsnames.ora` file entries need to be added to the MMG Studio configured wallet and `tnsnames.ora` file.
- If MMG application is Non SSL, set the below property to "false" in the `application.yml` file inside the MMG Studio and restart the services.

```
security:

cookies:

secure: false
```

Import Server Certificate to Java Keystore

You must import the server certificate `(.cer)` file to the Java keystore.

To import the server certificate, perform the following steps:

1. Create a `.cer` file from the `server.keystore`.

   ```
   keytool -export -alias <alias>-file <filename>.cer -keystore
   <path_to_Keystore>/server.keystore -storepass secret
   ```

   Example:

   ```
   keytool -export -alias demo_alias -file server.cer -keystore OFS_MMG/config/
   server.keystore -storepass secret
   ```

2. Import `.cer` file generated from the above step to java keystore.

   ```
   keytool -import -file "<path_to_Keystore>/<filename>.cer" -alias <alias>-
   keystore "<java_home>/lib/security/cacerts" -storepass "changeit"
   ```

> **Note:**
>
> The above step should be performed by the Root user.

Run the MMG Installer

To run the MMG Installer, follow these steps:

1. Navigate to following path:

   Go to `<MMG_INSTALLATION_PATH>/bin` directory.

2. Run the following command:

   `./install.sh`

> **Note:**
>
> When ./install.sh command is triggered, pre-installation utility validates install configurations such as availability of ports, ftpshare/log folders, database connections, and so on.

This step will install the configurations and has to be executed only once per deployment. This will also bring up the Schema Creator Service in nohup mode.

A message similar to following means a successful startup:

<MMG_INSTALLATION_PATH>/OFS_MMG/bin>./install.sh

PIPELINE_HOME: <MMG_INSTALLATION_PATH>/OFS_MMG/mmg-pipeline/pipeline

<MMG_INSTALLATION_PATH>/OFS_MMG/mmg-pipeline/pipeline

PIPELINE_HOME: <MMG_INSTALLATION_PATH>/OFS_MMG/mmg-pipeline/pipeline

Installing Pipeline Data Model. Please Wait ...

Pipeline Data Model installation finished.

Starting Gateway ...

Starting Pipeline UI Service ...

Starting Pipeline Service ...

Starting Data Pipeline UI Service ...

Starting Data pipeline services ...

Inserting DataMeta Data ...

********** Data Pipeline Deployment Done **********

Stopping Graph-Service service...

Graph-Service stopped.

Schema Creator executed successfully for config schema

Schema Creator for config executed successfully.

If Graph Schema is configured, the below message is displayed.

Now triggering for graph-schema

./../mmg-schema-creator/bin/startup.sh: line 70: 126438 Killed nohup java -jar -Doracle.net.tns_admin=/scratch/ofsaadb -Doracle.net.wallet_location=/scratch/ofsaadb/wallet -Dspring.config.location=../conf/ -Dspring.datasource.url=jdbc:oracle:thin:@conf_als -Dspring.liquibase.change-log=file:../scripts/changelog-master.xml $JAVA_OPTS ../lib/mmg-schema-creator.war > nohup.out 2>&1

Schema Creator executed successfully for graph schema

nohup: ignoring input and redirecting stderr to stdout

Stopping Graph-Service service...

Graph-Service stopped.

nohup: ignoring input and redirecting stderr to stdout

You can check mmg-schema-creator/bin/nohup.out to check if the service comes up properly.
Started BuildSchemaCreatorApplication in 20.317 seconds (JVM running for 21.26)

> **WARNING:**
>
> If you notice any errors, do not proceed further. Contact My Oracle Support (MOS) and provide the applicable error code and log files.

3. Execute `shutdown.sh` and trigger `startup.sh` for the services to come up. For more details, refer to the below sections.

> **Note:**
>
> The MMG Application is installed with or without OFSAA, depending on the configuration provided in the `config.sh` file.

Starting MMG Services

To start the MMG service, run the following command:

- Navigate to `<MMG_INSTALLATION_PATH>/bin` directory. `./startup.sh`

  A message similar to following means a successful startup:

  Starting MMG UI...

  MMG UI started successfully.

  Starting MMG Service...

  MMG Service started successfully.

  Starting Data Studio...

  Data Studio started successfully.

  Starting Gateway ...

  Starting Pipeline UI Service ...

  Starting Pipeline Service ...

  Starting Data Pipeline UI Service ...

  Starting Data pipeline services ...

You may check `<MMG_INSTALLATION_PATH>/mmg-ui/bin/nohup.out` to check if the UI service comes up properly.

A message similar to following means a successful startup:

```
Started BuildUIServiceApplication in 27.981 seconds (JVM running for 29.365)
```

You can check `<MMG_INSTALLATION_PATH>/mmg-service/bin/nohup.out` to check if the backend service comes up properly.

A message similar to following means a successful startup:

```
Started BuildServiceBuildApplication in 20.317 seconds (JVM running for 21.26)
```

You can check `<MMG_INSTALLATION_PATH>/mmg-studio/bin/nohup.out` to check if the backend service comes up properly.

A message similar to following means a successful startup:

```
05:06:02.155 Thread-9] INFO oracle.datastudio.starter.App - Data Studio Server
is ready to use
```

This will start the successful installation of application.

> **WARNING:**
>
> If you notice any errors, do not proceed further. Contact My Oracle Support (MOS) and provide the applicable error code and log files.

> **Note:**
>
> Unset the https/http proxy details before starting the services.
> OR
>
> Add the relevant entries in no_proxy with mmg hosted server details.

Stopping MMG Services

To stop the MMG services, run the following command: `./shutdown.sh`

A message similar to following means a successful shutdown:

Stopping Graph-Service service...

Graph-Service stopped.

MMG UI shutdown is complete.

MMG Service shutdown is complete.

MMG Schema Creator shutdown is complete.

Data Studio shutdown is complete.

Data Pipeline Service shutdown is complete.

Generate GRAPH-KEYSTORE.P12

Graph services should be up and running.
To generate GRAPH-KEYSTORE.P12 file, perform the below steps:

> **Note:**
>
> The Keystore generation fails if graph service is down.

1. Execute `graph-keystore-generator.sh` using PUTTY.
2. Enter the values as below when prompted.

   Enter Wallet Alias : <GRAPH_SCHEMA_WALLET_ALIAS> as given in the `config.sh` file.

   Enter Password: <GRAPH_SCHEMA_DB_SCHEMA> password

   Enter Keystore alias: <GRAPH_SCHEMA_DB_SCHEMA_NAME> as given in the `config.sh` file.

   Check the below location for the graph-keystore.p12

   <mmg installation path>/OFS MMG/mmg-load-to-graph/graph-service/conf/

Installing Python Library

This section provides detailed steps to install the Python Library.

Prerequisites

- Python 3.8.x and above

> **Note:**
>
> : Ensure the libraries, bzip2-devel, sqlite-devel, ncurses-devel, and xz-devel, libffi-devel are installed before you install the Python package.

For Example:

> **Note:**
>
> Install the below libraries as a root user.
>
> - **bzip2-devel:** Execute the command `yum install bzip2-devel`
> - **sqlite-devel:** Install as a root user using the command `yum install sqlite-devel`
> - **ncurses-devel:** Install as a root user using the command `yum install ncurses-devel`
> - **xz-devel:** Install as a root user using the command `yum install xz-devel`
> - **libffi-devel:** Install as a root user using the command `yum install libffi-devel`

Procedure

1. Set system python3 to the one that is to be used. Navigate to bin folder.
2. To install the mmg library with dependencies from `conf/requirements.txt`, execute the following command:

   ```
   ./python-env-install.sh
   ```
3. To install the mmg library with flexible dependencies or using already installed dependent packages, execute the following command:

   ```
   ./python-env-install.sh -S
   ```

   OR

   ```
   ./python-env-install.sh --skip
   ```

   This will skip the installation of dependency based on the version mentioned in the conf/requirements.txt. The installation will be with whatever version available in the pypi server.
4. To install the Apache Flink packages, execute the following command:

   ```
   ./python-env-install.sh --include-flink
   ```

Note:

Ignore the below error message during Apache Flink package installation.

```
ERROR: pip's dependency resolver does not currently take into account
all the

packages that are installed. This behavior is the source of the
following dependency conflicts.

modin 0.19.0 requires pandas==1.5.3, but you have pandas 1.3.5 which
is incompatible.

Successfully installed numpy-1.21.4 pandas-1.3.5 python-
dateutil-2.8.0

Installing with dependencies

ERROR: pip's dependency resolver does not currently take into account
all the

packages that are installed. This behavior is the source of the
following dependency conflicts.

pemja 0.2.6 requires numpy==1.21.4, but you have numpy 1.24.2 which
is incompatible.

apache-flink 1.16.1 requires numpy<1.22.0,>=1.21.4;
python_full_version >=

"3.7", but you have numpy 1.24.2 which is incompatible.

apache-flink 1.16.1 requires pandas<1.4.0,>=1.3.0;
python_full_version >=

"3.7", but you have pandas 1.5.3 which is incompatible.

apache-flink 1.16.1 requires python-dateutil==2.8.0, but you have

python-dateutil 2.8.2 which is incompatible.

apache-beam 2.38.0 requires

numpy<1.23.0,>=1.14.3, but you have numpy

1.24.2 which is incompatible.
```

Setting up the Environment for Hive Data Sourcing

This section is applicable if you want to use Hive Data Source.

In the MMG Home directory, a lib folder is available for the Hive specific jars and a conf folder is available for the Kerberos configuration and Keytab files.

Hive source connection requirements

MMG_HOME/conf : kbank.keytab and krb5.conf files

MMG_HOME/lib : hive-jdbc-uber-2.6.3.0-235.jar

mmg-studio/conf : kbank.keytab, krb5.conf and hive-jdbc-driver.jar

> **Note:**
>
> The datastudio placement of jars are for creating a connection from python lib and the other is from java for data sourcing.

Configure the Hive jars and configuration files.

For Hadoop version 3.1.1 and hive version 3.1.2, below is the list of jar files that needs to be copied into the `OFS_MMG/lib location`:

zookeeper-3.4.9.jar

woodstox-core-5.0.3.jar

stax2-api-3.1.4.jar

slf4j-log4j12-1.7.25.jar

slf4j-api-1.7.25.jar

re2j-1.1.jar

log4j-1.2.17.jar

libthrift-0.9.3.jar

libfb303-0.9.3.jar

httpcore-4.4.4.jar

httpclient-4.5.2.jar

htrace-core4-4.1.0-incubating.jar

hive-service-3.1.2.jar

hive-metastore-3.1.2.jar

hive-jdbc-3.1.2.jar

hive-exec-3.1.2.jar

hadoop-hdfs-client-3.1.1.jar

hadoop-common-3.1.1.jar

hadoop-auth-3.1.1.jar

curator-client-2.12.0.jar

commons-logging-1.0.4.jar

commons-io-2.4.jar

commons-configuration2-2.1.1.jar

commons-collections-3.2.2.jar

commons-cli-1.2.jar

The mmg-service requires a restart after copying the Hive jars and configuration files. For more information, see the MMG User Guide.

Remote MMG Studio Configuration

For Solaris Operating System, the MMG Studio has to be configured in Linux machine remotely. The MMG Studio URL must be the same as that of the remote studio during MMG Application Installation.

In the `OFS_MMG/bin/config.sh`, update the following properties with the remote server where the MMG Studio will be running:

Copy the mmg-studio folder to the remote machine where you want to configure the same.

Navigate to `mmg-studio/bin` and update the config.sh file with respect to studio server values. For more details, see the Configure the config.sh file section.

```
export DATASTUDIO_URL=##DATASTUDIO_URL##

export SSL_KEYSTORE=##SSL_KEYSTORE##

export SSL_KS_SECRET=##SSL_KS_SECRET##

export SSL_KS_TYPE=##SSL_KS_TYPE##

export SSL_KS_ALIAS=##SSL_KS_ALIAS##
```

> **Note:**
>
> The keystore must be generated for the remote machine and the path must be present in the remote server.

```
export DS_TNS_ADMIN_PATH=##DS_TNS_ADMIN_PATH##

export DS_WALLET_LOCATION=##DS_WALLET_LOCATION##
```

TNS admin and wallet must be configured in the remote server and the wallet must contain the mmg config schema wallet configurations.

```
export MMG_TNS_ADMIN_PATH=##MMG_TNS_ADMIN_PATH##

export MMG_LIB_WALLET_ALIAS=##MMG_LIB_WALLET_ALIAS##
```

> **Note:**
>
> The Self signed certificate needs to be generated and imported to the java keystore. In case self-signed certificate is being used, perform the below step:
>
> - Import MMG studio server certificate to MMG application server java keystore and vice versa.
>
> For more details, see Import Server Certificate to Java Keystore section.

> **Note:**
>
> Once the token is generated, ignore '-e' character present in the `token.out` file.

PGX Installation

> **Note:**
>
> PGX Installation is recommended to be installed in a different server other than the MMG Installation Server.

To install the PGX, follow these steps:

1. Copy the mmg-pgx.zip file from MMG Server and copy it to the target server where PGX has to be installed remotely to MMG.
2. Unzip the mmg-pgx.zip file.

   For Example: unzip -a mmg-pgx.zip.

   The below files will be displayed:

   - bin
   - conf
   - pgx-23.4.6
3. Give 0755 permission to mmg-pgx folder.
4. Configure the config.sh of pgx. For more details, see Configure the config.sh File of PGX section.
5. Copy the graph-keystore.p12 from MMG Installation server to <pgx installation path>/mmg-pgx/conf. For more details, see Generate GRAPH-KEYSTORE.P12 section.
6. Copy the below key files from <MMG Installation path>/OFS_MMG/conf to <pgx installation path>/mmg-pgx/conf.
   - public.key
   - private.key
7. Run the install.sh from <pgx installation path>/mmg-pgx/bin
8. Update the pgx-server URL in config.sh for ##PGX_SERVER_URLS## in the <MMG Installation path>/bin and run the install.sh -u command and restart the MMG services. For more details, see Configure the config.sh File of PGX section.
9. Start the Server. For more details, see Starting PGX Server section.
10. Stop the Server. For more details, see Stopping PGX Server section.

Configure the config.sh File of PGX

To configure the config.sh file for installing PGX with MMG, follow these steps:

1. Login to the server as a non-root user.
2. Navigate to the <OFS_MMG>/mmg-pgx/bin directory.
3. Configure the applicable config.sh attributes as shown in the following table:

   Sample Config.sh file

   ```
   #!/bin/sh
   ```

```
export PGX_PORT=##PGX_PORT##

export PGX_CONTEXT_PATH=##PGX_CONTEXT_PATH##

export PGX_SSL_ENABLED=##PGX_SSL_ENABLED##

export PGX_SSL_KEYSTORE=##PGX_SSL_KEYSTORE##

export PGX_SSL_KS_SECRET=##MMG_SSL_KS_SECRET##

export PGX_SSL_KS_TYPE=## PGX_SSL_KS_TYPE ##

export PGX_SSL_KS_ALIAS=## PGX_SSL_KS_ALIAS##

export GRAPH_SERVICE_URL=## GRAPH_SERVICE_URL##

export GRAPH_KEYSTORE_PASSWORD=## GRAPH_KEYSTORE_PASSWORD##

export LOG_HOME=##LOG_HOME##

export LOG_LEVEL=##LOG_LEVEL##
```

Table 5-2 config.sh file of pgx

Parameter	Description	Is Mandatory	Comments
##PGX_PORT##	Port on which pgx server needs to be run.	YES	If not set, Port defaults to 7007.
##PGX_CONTEXT_PATH##	Context path of pgx server	YES	If not set, Context path defaults to pgx.
##PGX_SSL_ENABLED##	The values can be true /false. If true, follow the below steps if Self Signed is being used: • Import pgx server.cer file to MMG server java keystore • Import MMGserver.cer file to pgx server java keystore For more details, see Import Server Certificate to Java Keystore section.	YES	

Properties if ##PGX_SSL_ENABLED## is set to true.

Table 5-2 (Cont.) config.sh file of pgx

Parameter	Description	Is Mandatory	Comments
##PGX_SSL_KEYSTORE##	Absolute path for the keystore file. This is applicable only if ##PGX_SSL_ENABLED## is set to true. NOTE: Run the following command to create a keystore: keytool -genkey -v -alias demoalias -keyalg RSA -keysize 2048 -keystore server.keystore -validity 3650 -keypass secret -storepass secret -storetype PKCS12	YES	../conf/server.keystore. Include the file name in the path.
##PGX_SSL_KS_SECRET##	Value passed in above command for keypass. This is applicable only if ##PGX_SSL_ENABLED## is set to true.	YES	Keystore password
##PGX_SSL_KS_TYPE##	The type of the pgx keystore. This is applicable only if ##PGX_SSL_ENABLED## is set to true.	YES	PKCS12
##PGX_SSL_KS_ALIAS##	The Alias of the pgx keystore. This is applicable only if ##PGX_SSL_ENABLED## is set to true.	YES	password123
Properties for graph service			
## GRAPH_SERVICE_URL ##	Graph Service URL. The value is same as ##LOADGRAPH_BASE_URL## in the MMG.config.sh	YES	http(s)://<MMG Host>:<Graph service port>/graph-service
## GRAPH_KEYSTORE_PASSWORD ##	Graph Keystore password. The value is same as ##GRAPH_KEYSTORE_PASSWORD## in the MMG.config.sh	YES	password123
Properties for setting log path			
##LOG_HOME##	A writable folder that stores pgx logs.		/scratch/users/logs
##LOG_LEVEL##			The values can be DEBUG/INFO/WARN

Starting PGX Server

To start the PGX Server, run the following command:

- Navigate to `<MMG_INSTALLATION_PATH>/bin` directory. ./startup.sh

  You may check `<mmg-pgx/pgx-<pgx-version/bin/nohup.out` to check if the UI service comes up properly.

  A message similar to following means a successful startup:

  ```
  INFO: Starting ProtocolHandler ["http-nio-7007"]
  ```

  This will start the successful installation of PGX Server.

Stopping PGX Server

To stop the PGX Server, run the following command:

```
./shutdown.sh
```

A message similar to following means a successful shutdown:

PGX Server shutdown is complete.

R Interpreter

You can configure the R Interpreter support either with ORD-3.6.1 or R 4.1.2.

ORD-3.6.1 Installation

To install ORD-3.6.1, follow the steps mentioned in the below guides:

- https://www.oracle.com/database/technologies/r-distribution.html
- https://docs.oracle.com/en/database/oracle/machine-learning/oml4r/1.5.1/oread/installing-oracle-R-distribution-on-linux.html#GUID-A73BA0EB-507C-4678-9AD7-CE2CB6CE0251

1. Check installation:
   a. R-version
2. Installing other packages:

   Set proxy:

   a. R-e "install.packages('Rserve', repos='https://www.rforge.net/')"
   b. R-e "install.packages(c('knitr', 'ggplot2', 'backports'), repos='https://mirror.las.iastate.edu/CRAN/')"

R 4.1.2 Installation

> **Note:**
>
> This setup might update some of the older root level files and using Non-Oracle Yum Repository for getting R rpm files.

To install R 4.1.2, follow these steps:

1. Set Proxy, (pseudo user):
   a. curl- O https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm
   b. yum install epel-release-latest-7.noarch.rpm
   c. curl- O https://cdn.rstudio.com/r/centos-7/pkgs/R-${R_VERSION}-1-1.x86_64.rpm
   d. sudo yum install R-${R_VERSION}-1-1.x86_64.rpm
   e. sudo ln -s /opt/R/${R_VERSION}/bin/R /usr/bin/R
2. Check installation:
   a. R-version
3. Installing other packages:
   a. R-e "install.packages('Rserve', repos='https://www.rforge.net/')"
   b. R-e "install.packages(c('knitr', 'ggplot2', 'backports'), repos='https://mirror.las.iastate.edu/CRAN/')"

Configuring R Interpreter

1. Configure Rserve

```
nano /scratch/software/R/Rserve.conf (sample file)

>

auth required

plaintext disabled

pwdfile /scratch/software/R/creds/Rserve.pwd

remote enable

switch.qap.tls enable

tls.port 6311

qap disable

interactive no

rsa.key /scratch/software/R/creds/server.key

tls.key /scratch/software/R/creds/server.key

tls.cert /scratch/software/R/creds/server.crt
```

2. password file Rserve.pwd:

```
>

oml $5baa61e4c9b93f3f0682250b6cf8331b7ee68fd8
```

   The file contains one line per user, where the first part is the username, and the second part is the password.

   The password can either be plain text or a MD5/SHA1 hash. In this example the password `password` is hashed with SHA1.

   If you use hashed passwords, the password string needs to start with a `$` sign.

3. SSL Key:

```
openssl genrsa -out server.key 2048
```

```
openssl req -new -key server.key -out server.csr # password 1234

openssl x509 -req -days 365 -in server.csr -signkey server.key -out server.crt
```

4. Creating Keystore:

```
keytool -import -alias <keystore-alias> -file <path-to-server.crt>/server.crt
-keystore <output-path-to-keystore/rinterpreterkeystore -storepass <keystore-
secret> -noprompt

eg. keytool -import -alias rserve -file /scratch/software/R/creds/server.crt -
keystore /scratch/software/R/creds/rinterpreterkeystore -storepass changeit -
noprompt
```

MMG Connection Objects Library Setup

This section describes the MMG Connection Objects Library Setup.

Installing ROracle Library

Prerequisites

DBI is one of the dependencies for using this library.

- Installing DBI
  1. curl- O https://cran.r-project.org/src/contrib/DBI_1.1.1.tar.gz
  2. R CMD INSTALL DBI_1.1.1.tar.gz

Procedure

To install ROracle Library, follow these steps:

- For ORD 3.6.1/R 4.1.2
  1. curl- O https://cran.r-project.org/src/contrib/ROracle_1.3-1.1.tar.gz
  2. Install Oracle Instant Client Sdk Package. This is required for additional header files and an example makefile for developing Oracle Applications with Instant Client.
  3. Oracle client lib must be present in PATH. In the .profile file, set PATH to include the appropriate `$ORACLE_HOME/bin` path.
     For example:

     ```
     PATH=$JAVA_HOME/bin:$ORACLE_HOME/bin
     ```

  4. R CMD INSTALL `--configure-args='--with-oci-lib=<absolute-path-to-oracle-client-lib>` --with-`oci-inc=<absolute path to instantclient_21_5>/include' ROracle_1.3-1.1.tar.gz`
     For example:

     R CMD INSTALL --configure-args='--with-oci-lib=/scratch/users/oracle/app/oracle/product/19.3.0/client_1/lib --with-oci-inc=/scratch/users/oracle/instantclient-sdk/instantclient_21_5/sdk/include' ROracle_1.3-1.1.tar.gz

Installing RODBC Library

- **For ORD 3.6.1**
  1. curl- O https://cran.r-project.org/src/contrib/Archive/RODBC/RODBC_1.3-16.tar.gz
  2. R CMD INSTALL RODBC_1.3-16.tar.gz

> **Note:**
>
> It needs write permission to `'/usr/lib64/R/library'` or similar root directory for system installation.

- **For R 4.1.2**
  1. curl- O https://cran.r-project.org/src/contrib/RODBC_1.3-19.tar.gz
  2. R CMD INSTALL RODBC_1.3-19.tar.gz

> **Note:**
>
> `LD_LIBRARY_PATH` should contain path to `$ORACLE_HOME/lib` and check that file 'libsqora.so.19.1' exists in `$ORACLE_HOME/lib`. Now, set an environment variable named `RODBC_DRIVER` with value 'libsqora.so.19.1' whichever is present in `$ORACLE_HOME/lib/` directory based on the Oracle Client Version Installation.
> Now for RODBC Connection to work for Sandbox, check the `TNS_ADMIN` path set, and then in `tnsnames.ora`, add the connection string details with alias as Sandbox Name. For example, if Sandbox Name is SAND1 for which the datasource is on host abc.in.oracle.com , port 1234 and service name – ABCXYZ, then in `tnsnames.ora` file add the following entry-
>
> ```
> SAND1 =
> (DESCRIPTION =
> (ADDRESS_LIST =
> (ADDRESS = (PROTOCOL =
> TCP)(HOST=abc.in.oracle.com)(PORT=1234))
> )
> (CONNECT_DATA =
> (SERVICE_NAME = ABCXYZ)
> )
> )
> ```
>
> If this only does not resolve the connections, then configure `odbcinst.ini. / odbc.ini` files as well as mentioned in Oracle Client Installation and Setup (figured by: > odbcinst -j)

Using MMG Studio to Oracle Connection Objects

This section describes the Using MMG Studio to Oracle Connection Objects.

Workspaces

1. `mmg.list_workspaces()`: Used to fetch a vector of all workspaces.
   For example: `vec <- mmg.list_workspaces() vec will be vector object`
2. `mmg.attach_workspace("workspace_name ")`: A method used to set workspace.

Sets a global `mmg_attached_WS` variable with value of `workspace_name`

Sets a `mmg_DS_Vec` Vector Object with name and order of all datasources for attached workspace.

Sets a `mmg_WL_Vec` Vector Object with name and wallet of all datasources for attached workspace.

For example:

```
mmg.attach_workspace("SB1")
```

Connections

Following is the list of datasources related to workspace using:

- `mmg.list_datasources("SB1", 1)`: will list datasources related to SB1 workspace with order 1 as passed in second argument `mmg.list_datasources("workspace_name",order)` order is integer for specific order or null for all datasources.

  For example:

  df <- mmg.list_datasources("workspace_name",order) df will be Data.Frame Object.

  From the datasource name or order for the attached workspace, we can get the **ROracle** or **RODBC** Connection Object.

- `mmg.get_connection()`:
  datasource_name is the string name of the datasource, order is integer, library is one of **"RODBC" or "ROracle"**

  conn <- mmg.get_connection(datasource=order,conn_type="library");

  conn <- mmg.get_connection(datasource="datasource_name",conn_type="library");

  conn <- mmg.get_connection(datasource="datasource_name","library");

  conn <- mmg.get_connection(datasource=order,"library");

  conn <- mmg.get_connection("datasource_name",conn_type="library");

  conn <- mmg.get_connection(order,conn_type="library");

  conn <- mmg.get_connection("datasource_name","library");

  conn <- mmg.get_connection(order,"library");

  sets the conn variable to connection object of relevant library

Conda

Conda as a package manager helps you to find and install packages. With the capability of environment manager, you can set up a totally separate environment to run different versions of Python. In addition, you can continue to run your usual version of Python in your normal environment.

> **Note:**
>
> The supported version is 4.14.0.

To install the Conda, perform the following:

1. Download the miniconda.
2. Copy it to your server where the Conda needs to be installed.
3. Grant execute permission to the Conda folder.
4. Execute the following command: `$ ./Miniconda3-latest-Linux-x86_64.sh`
5. Update the PATH variable with miniconda installation path:

   `<install_path>/miniconda3/bin`

> **Note:**
>
> In the current release, the Conda feature is not supported in Solaris Operating System.

For more details on the Roles and privileges, see *MMG User Guide*.

Multi Level Approval

Model Pipeline deployment process by default requires one level of approval for every stage including model pipeline acceptance, promotion to production, and so on.
The requestor is allowed to select Reviewer and Approver user groups. All the user groups with MDLREVIEW function mapped to them are displayed in the Reviewers selector field. Similarly, the user groups with the MDLAPPROVE function mapped to them are displayed in the Approvers selector field. Applicable Pending requests are shown in the Reviewer/Approver tabs.

To add multi level approvers or reviewers, perform the following:

1. Navigate to `<mmg-home>/conf/workflow/model-pipeline/default.yml`

   Following are the default values:
   workflow:

   workflow-name: Default Workflow

   num-approver-levels: 1

   levels:

   - level: 1

   approvers:

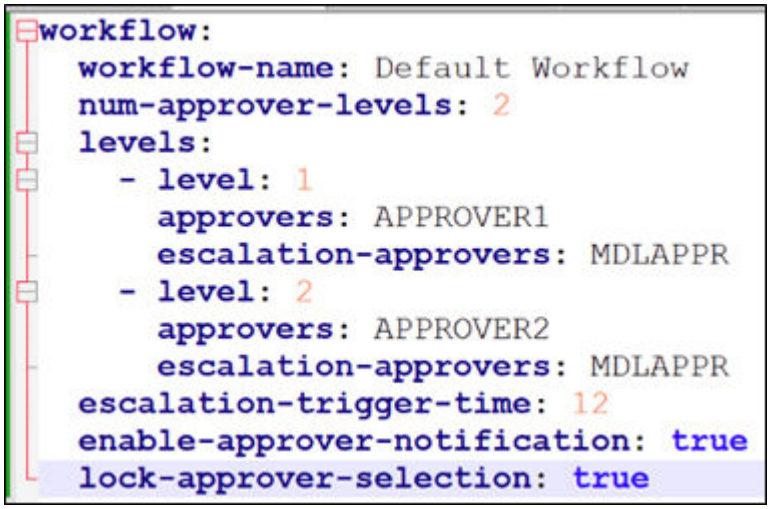
   escalation-approvers:

   escalation-trigger-time: 0

   lock-approver-selection: false

   enable-approver-notification: true
2. Modify the approver levels based on your requirements as shown below.

Figure 5-1 Multi level approval



6
Post Installation Steps

On successful installation of the OFS MMG Application, refer to the below topics for Post Installation procedures.

> **Note:**
>
> These Post Installation steps are applicable for both when MMG Installation is performed with or without OFSAA instance.

Access the Application

To access the application, follow these steps:

- Open a browser and enter the URL in the following format:

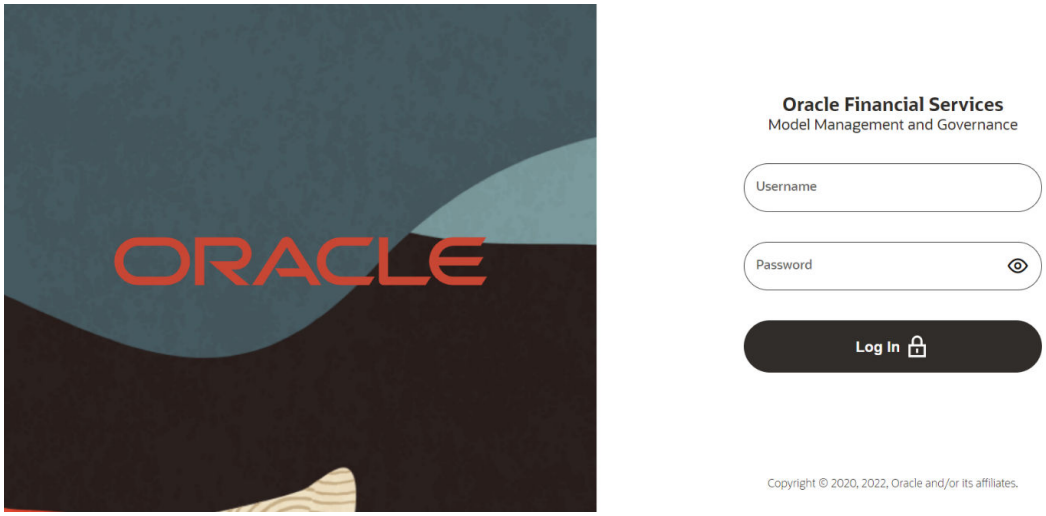
  ```
  http(s)://<MMG UI service host name>:<UI_PORT>/context_path/home
  http(s)://est service host name: <est-ui-service port>/<context_path>/home
  ```

  For example:

  ```
  https://xyz.com:4155/mmg/home
  https://xyz.com:4155/estservice/home
  ```

  The MMG Login window is displayed.

Figure 6-1 MMG Login window – AAI Authentication



For more information, see the User Access and Permissioning Management section.

Create Application Users

Create the application users in the MMG setup before use. For more information, see the User Access and Permissioning Management section.

Map Application User(s) to User Group

User Groups seeded with the OFS MMG Application Pack are listed in the Seeded User Groups table.

Table 6-1 Seeded User Groups

User Group Name	User Group Description
MDLREV	The Modeling Reviewer Group. Users mapped to this group have access to the menu items in the OFS MMG Application that are related to model review activities.
MDLAPPR	The Modeling Approver Group. Users mapped to this group have the rights to approve models created by the users.
MDLBATCHUSR	The Modeling Batch User. Scheduler can use this Group for executing batches.
WKSPADMIN	The Workspace Administrator Group. Users mapped to this group have access to all the menu items in the OFS MMG Application. Additionally, they have authorization rights to create and populate workspaces.
MDLUSR	The Modeling User Group. Users mapped to this group have access to all the menu items in the OFS MMG Application that is related to model creation.
DSUSRGRP	General Role Users mapped to this group have permission to access/modify MMG Studio Interpreter Configurations.
DSREDACTGRP	Roles for applying redaction in graph. This group will be applicable to only those users for whom graph redaction is required.
OBJMIGADMIN	Users mapped to this group have access to Object Migration links and UI to perform import or export of objects.
GRPADMIN	The Graph Administrator Group. Users mapped to this group have access to all the menu items in the OFS MMG Application related to graph and Pipeline/Refresh graphs related health services.
GRPUSR	The Graph User Group. Users mapped to this group have access to all the menu items in the OFS MMG Application related to graph and Pipeline/Refresh graphs related health services.

> **Note:**
>
> Admin link in MMG Application Home page will only be accessible if the below seeded groups are mapped to the user:
>
> - IDNTYADMN
> - IDNTYAUTH

Model Techniques/ Model Library

Following are the prerequisites to use the model techniques from the older version when you upgrade to 8.1.2.4.0 version.

> **Note:**
>
> MMG_TECHNIQUE_MASTER table had no V_WORKSPACE_ID column, which has been added in this release and then the primary key is updated to (V_TECHNIQUE_ID, V_WORKSPACE_ID).

To use the existing Techniques in the upgraded setup, perform the below:

The V_WORKSPACE_ID column will have the value set as ##WORKSPACE## for the existing records by default. If the same records has to be used in the latest version of MMG, you must update the table MMG_TECHNIQUE_MASTER with relevant Workspace ID.

.PEM file creation for Model Service

You must create **server.pem** file from **server.keystore** in the same path where server.keystore file is present using the below command:

```
openssl pkcs12 -in <Path_To_server.keystore> -out <Path_To_Server.pem> -nodes
```

For Example:

```
openssl pkcs12 -in

/scratch/users/ofsaa/dev_home/config/server.keystore -out

/scratch/users/ofsaa/dev_home/config/server.pem -nodes
```

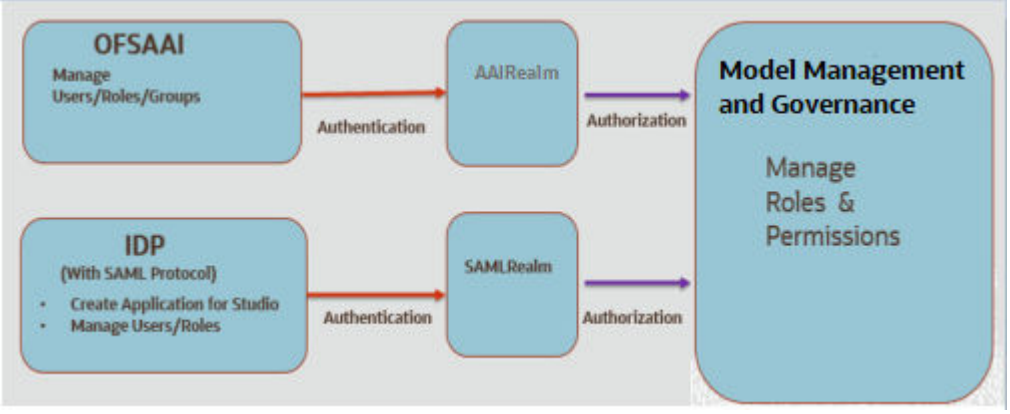
Access and Permissioning Management

MMG uses a realm based on unique authentication and authorization for its users. Realm indicates the functional grouping of Database Schemas and roles that must be secured for an application. Realms protect data from access through system privileges and do not provide its owner or participants additional privileges. Realm based authorization establishes a set of database accounts and roles that can manage, or access objects protected in realms and are authorized to use its system privileges. It provides a runtime mechanism to check logically if a user's command can access objects specified in the command and proceed with its execution. Realms (AAIRealm, SAMLRealm) are selected based on the Identity Provider (IDP) during the installation. For more information, see the OFS MMG Installation Guide. After you select the

realms, you can register a set of schema objects or roles (secured objects) for realm protection and authorize a set of users or roles to access the secured objects. The MMG Application is accessed using the following realms that you have selected during the installation of the MMG Application:

- **AAIRealm:** This uses Oracle Financial Services Analytical Applications Infrastructure (OFSAAI) Identity Management System for User Authentication. Users, Roles, and Groups are created in the OFSAAI. The OFSAAI facilitates System Administrators to provide access, monitor, and administer users along with the infrastructure metadata operations. The required permissions to roles or groups are authorized in the MMG applications using the Permission feature.
- **SAMLRealm:** The SAMLRealm uses an identity provider (IDP) Identity Management System for User Authentication. Security Assertion Markup Language (SAML) is an open standard that allows Identity Providers (IDP) to pass authorization credentials to Service Providers (SP). IDP acts as the Single Sign-On (SSO) service. Users and Roles are created in the IDP. The required permissions to Users and Roles are authorized in the MMG Applications using the Permission feature.

Figure 6-2 Authentication and Authorization process in MMG



Access MMG Using AAI Realm

This section provides information on creating users who can access MMG using the AAIRealm Method of authentication through Oracle Financial Services Analytical Applications Infrastructure (OFSAAI). The users with SYSADMN and SYSAUTH roles in OFSAAI can create and authorize users, respectively.

Identity Management in the OFSAAI facilitates System Administrators to provide access, monitor, and administer users along with the infrastructure metadata operations. The Security Management System (SMS) component is incorporated with Password Encryption, Single Logon, Role and DataBased Security, Access Control, and Audit Trail feature to provide a highly flexible security envelope. Administrators can create, map, and authorize users defining a security framework that can restrict access to the data and meta-data in the warehouse, based on a fine-grained access control mechanism. These activities are done at the initial stage and then on a required basis. For more information on creating and authorizing users in OFSAAI, see the Oracle Financial Services Analytical Applications Infrastructure User Guide. The following table describes the ready-to-use roles and the corresponding user groups who can access MMG using AAIRealm. NOTE Only in AAIRealm, users are mapped to user groups. The default permissions mapped to these users and user groups are available in the Permission section. However, these permissions can be added or modified.

Prerequisites

1. Configuring WebLogic for REST Services Authorization.

   To enable REST API authorization by OFSAA in WebLogic server, perform the following steps:

   a. Open the config.xml file located in the domain where OFSAA is deployed that is: `<domain_home>/config/config.xml`.

   b. Add the following in the security-configuration tag: `<enforce-valid-basic-auth-credentials>false</enforce-valid-basic-authcredentials>`.

2. If MMG is SSL enabled, then the SSL certificate for MMG application should be imported in AAI.
3. In OFSAA Application, **Allow user to log in from multiple machines** option should be enabled.

Access MMG Using SAMLRealm

This section provides information on managing users who can access MMG with Identity Provider (IdP or IDP). The IdP acts as the Single Sign-On (SSO) service provider for implementations between MMG, and Compliance Studio. This configuration prevents separate login for each application. An Identity Provider (IdP) is a service that stores and verifies user identity. IdPs are cloud-hosted services, and they often work with single sign-on (SSO) providers to authenticate users. An Identity Provider (IdP or IDP) stores and manages users' digital identities. An IdP checks user identities via username-password combinations and other factors, or it may simply provide a list of user identities that another Service Provider (like an SSO) checks. The following are the ready-to-use roles that can access MMG using SAMLRealm. To integrate MMG with IdP as the SSO Provider, follow these steps:

1. Create the following roles in the IDP System:
   - IDNTYADMN
   - IDNTYAUTH
   - MDLREV
   - MDLAPPR
   - MDLBATCHUSR
   - WKSPADMIN
   - MDLUSR
   - DSUSRGRP
   - DSREDACTGRP
   - GRPADMIN
   - GRPUSR

> **Note:**
>
> IDNTYADMN role is required only if you need the Admin Access.

2. Map the user groups to the respective user based on the user roles. The default permissions mapped to these users are available in the Permission section. However, these permissions can be added or modified.

> **Note:**
>
> It is recommended to use AAIRealm or SAMLRealm.

AAI User Provisioning SQL Scripts Generator Utility

This utility allows you to use AAI for authN in MMG. Identity administrators can create new user groups/roles, perform appropriate roles, usergroup and domain mapping, and so on.

This is provided as a SQL generator utility. This SQL scripts is executed in the AAI's config schema to create the required metadata.

You must execute this script multiple times against each username. Additionally, generate the merge scripts accordingly.

Execute the following command from `<mmg-home>/bin` folder

```
./userprovisioning-script-generator.sh <user> <comma separated listof user groups
or ALL> <infodom> <segment>
```

Sample Commands:

```
./userprovisioning-script-generator.sh SCRIPTUSER ALL OFSAAAIINFO EMFLD
```

```
./userprovisioning-script-generator.sh SCRIPTUSER MDLREV,MDLUSR,IDENTITY_ADMIN
```

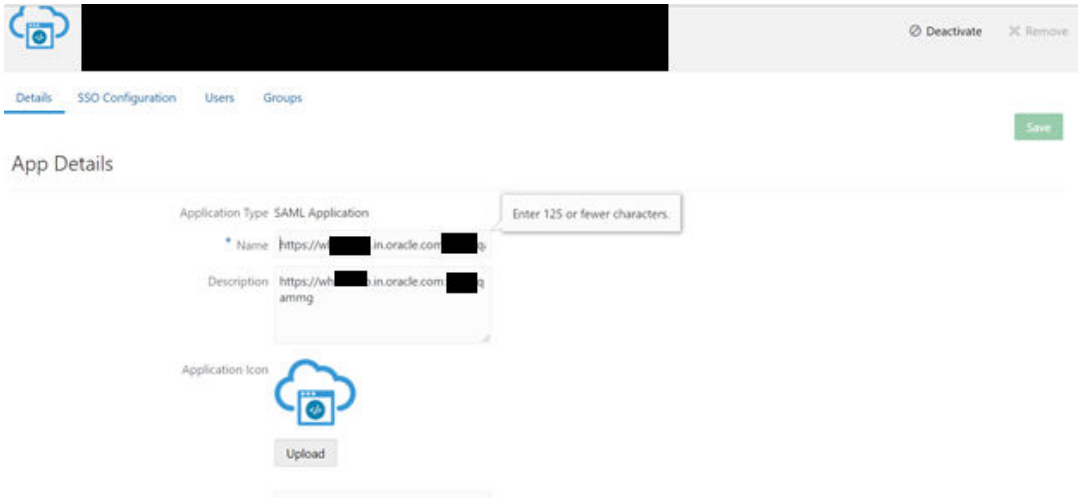
```
OFSAAAIINFO EMFLD
```

IDCS Server Configuration

To perform IDCS Server Configuration, follow these steps:

1. Navigate to SAML IDCS Admin.
2. Navigate to Details section and add the app details in IDCS Server as shown below:

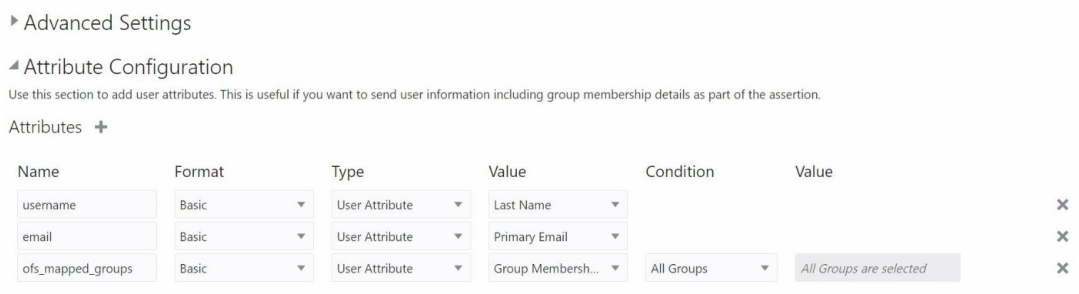
Figure 6-3 IDCS Server



3. Navigate to SSO Configuration section and add the app details in IDCS Server as shown below:

Figure 6-4 SSO Configuration section

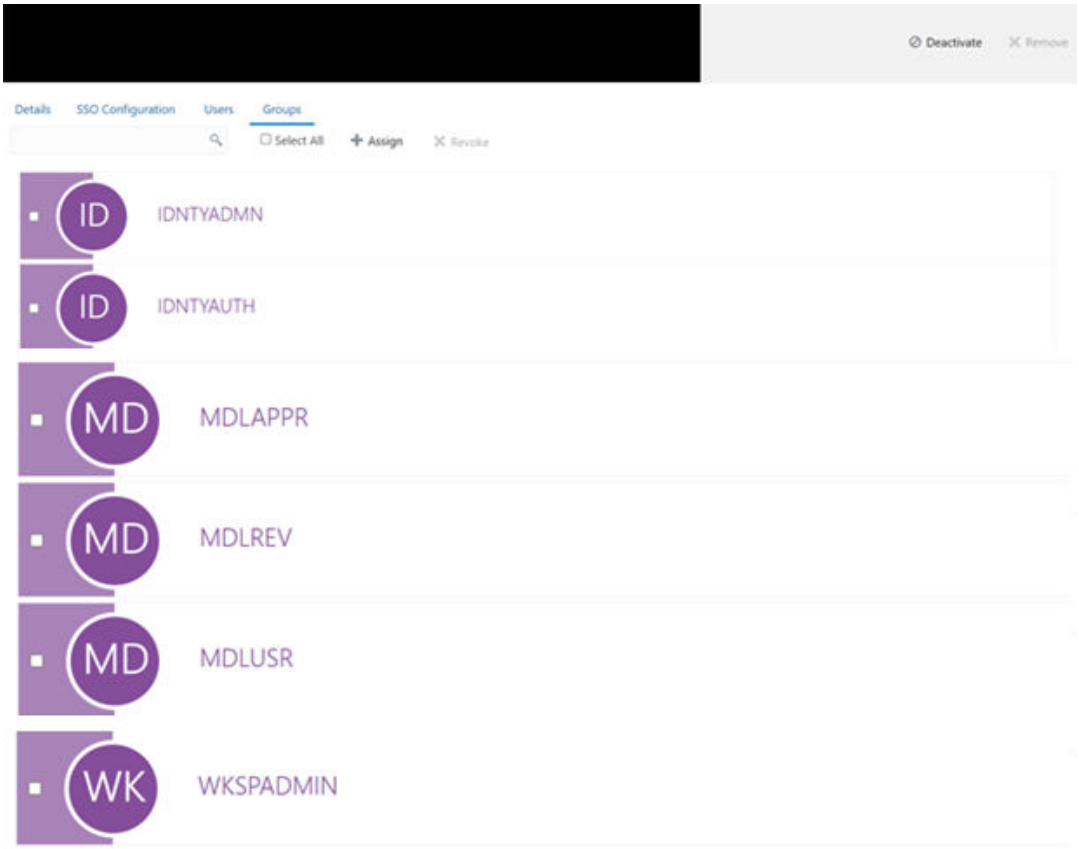
Figure 6-5 IDCS Server



> **Note:**
>
> The following attributes such as username, email, and ofs_mapped_groups needs to configure as shown in the above image.

4. Navigate to Group section and Configure User Groups.

Figure 6-6 Configure User Groups in Group section



7

Upgrade Installation

This chapter describes the Upgrade Installation.

Upgrading to 8.1.2.6.0

To update an already installed MMG Application, perform the following steps:

Prerequisite:

- A valid working setup should be available before performing the upgrade.
- Use the MMG Config and MMG Datastudio Schema from the existing version along with the wallet configurations.
- Create a new Graph Schema. For more details, see Create the Graph Schema section.

> **Note:**
>
> If upgrading the MMG Application from 8.1.2.3.0 and above versions, skip the above step.

- Shutdown all the services of the existing installation using shutdown.sh.
- Backup the existing MMG Installation to a backup folder.

Upgrade:

Follow steps mentioned in the Installation section.

> **Note:**
>
> Compare and copy the placeholder values from the existing installed MMG.config.sh to the new MMG.config.sh mentioned in the Installation section.

8

Update Utility to Reconfigure Installation Parameters

If you need to update any of the existing configuration related values, perform the following steps:

> **Note:**
>
> This Utility is applicable from 8.1.2.3.0 version onwards.

Procedure:

1. Shut down all the services using shutdown.sh command.
2. Reconfigure the config.sh file with the required changes.
3. Execute the command `install.sh -u` from the following path: <mmg installation path>/OFS MMG/bin
   A successful update message as follows:

```
nohup: ignoring input and redirecting stderr to stdout
PIPELINE_HOME: /scratch/ofsaaapp/OFS_MMG/mmg-pipeline/pipeline
/scratch/ofsaaapp/OFS_MMG/mmg-pipeline/pipeline
PIPELINE_HOME: /scratch/ofsaaapp/OFS_MMG/mmg-pipeline/pipeline
Installing Pipeline Data Model. Please Wait ...
Pipeline Data Model installation finished.
Starting Pipeline Service...
Starting Data pipeline services...
Inserting DataMeta Data...
***************** Data Pipeline Deployment Done *****************
Stopping Graph-Service service...
Graph-Service stopped.
Stopping Graph-Service service...
Graph-Service stopped.
nohup: ignoring input and redirecting stderr to stdout
```

4. Start all the MMG services using `startup.sh` command.

9
Cloning the MMG Instance

There is a consistent requirement for a faster and effective approach of replicating an existing MMG Instance for further project developments. The approach is to set up the MMG Instances that are exact copies of the current MMG Instance.

Copying the Directories

The Installation Directory structure in the base environment has to be replicated in the clone environment.

- Copy the MMG base directory (OFS_MMG, by default) in the base environment with all of its contents to the clone environment.
  The base directory in the clone environment will have the following folders upon copying:
  - mmg-ui
  - mmg-studio
  - mmg-service
  - mmg-schema-creator
  - mmg-pipeline
  - lib
  - bin
  - conf

> **Note:**
>
> You need to copy LOG and FTPSHARE directories to the cloned environment.

Copying the Database Schemas

To copy the Database Schemas:

1. Create a copy each of the MMG Config Schema and the Data Studio Schema.
   You may use Oracle Data Pump Export/Import or the Database Copy feature of Oracle SQL Developer. For more details, see Database Copy using Oracle SQL Developer.

   The Cloned Schemas can be created either in the same database instance or in a different one.
2. Similarly, create copies of Workspace Schemas or other Data Source Schemas as required.

Configuring Password Store with Oracle Wallet

To configure the password store with Oracle Wallet:

- Setup an Oracle wallet in the clone environment. For more details, see Setup Password Stores with Oracle Wallet.

> **Note:**
>
> It is recommended to use the same wallet aliases used in the base environment.

Updating the WALLET_LOCATION and TNS_ADMIN_PATH

Update the WALLET_LOCATION and TNS_ADMIN_PATH values in config.sh file present in the following path: `OFS_MMG/bin` with configured corresponding values of the cloned environment.

Updating the Host Details

Update the HOST and PORT values in `config.sh` file present in the following path: `OFS_MMG/bin` with configured corresponding values of the cloned environment.

> **Note:**
>
> It is recommended to use the same ports and context used in the base environment.

Replace the placeholders and update the host name in the MMG Config schema using the following command:

```
update NEXTGENEMF_CONFIG set V_VALUE =

'http(s)://##HOST_NAME##:##BE_PORT##/##CONTEXT##' where V_NAME in ( '

BASE_URL', 'EMFSTUDIO_SERVICE_URL')

/

update NEXTGENEMF_CONFIG set V_VALUE =

'http(s)://##HOST_NAME##:7008/##CONTEXT##' where V_NAME = 'DATASTUDIO_URL'

/

update AAICL_SS_BATCH_URL set V_URL =

'http(s)://##HOST_NAME##:##BE_PORT##/##CONTEXT##' whereV_URL_NAME in

('CS_SERVICE_URL', 'MMG_SERVICE_URL', 'WORKSPACE_URL')

/
```

Update LOG_HOME and FTPSHARE

Update the LOG_HOME and FTPSHARE values in `config.sh` file present in the following path:

`OFS_MMG/bin` with configured corresponding values of the cloned environment.

Replace the ##LOG_HOME## and ##FTPSHARE## placeholders and update the LOG_HOME and FTPSHARE values in the MMG Config Schema using the following command:

```
update NEXTGENEMF_CONFIG set V_VALUE = '##LOG_HOME##' where V_NAME = 'LOG_HOME'

/

update NEXTGENEMF_CONFIG set V_VALUE = '##FTPSHARE##' where V_NAME = 'FTPSHARE'

/
```

Setting up the SSL Keystore

To run on HTTPS, you must create a Keystore for MMG Application. For more details, see the SSL Keystore in the Configure the config.sh File.

Update the Keystore path, Password and Storetype values in config.sh file present in the following path: `OFS_MMG/bin` with configured corresponding values of the cloned environment.

Updating Wallet Aliases for Oracle Schemas

> **Note:**
>
> It is recommended to use the same wallet aliases used in the base environment.

In case if the same wallet aliases cannot be used, perform the following:

1. Update the MMG Config Schema Wallet Alias values in `config.sh` file present in the following path: `OFS_MMG/bin` with configured corresponding values of the cloned environment.
2. Replace the placeholders and update the wallet alias for Workspace Schemas or other Oracle datasources using the following command:

   ```
   update MMG_DB_MASTER set V_PROPERTY_VALUE = '##WALLET_ALIAS##' where
   V_PROPERTY_NAME = 'WALLET_ALIAS' and V_DB_NAME = '##DATASOURCE NAME##'

   /
   ```

Updating Context and Ports

> **Note:**
>
> It is recommended to use the same context and ports used in the base environment.

In case if the same context and ports aliases cannot be used, perform the following:

1. Update the references of context path and port values in config.sh file present in the following path: `OFS_MMG/bin` with configured corresponding values of the cloned environment.
2. Replace the ##CONTEXT## and ##BE_PORT## placeholders.

For more details, see Updating the Host Details.

Starting MMG Services

Post updating all the required parameters in the new `config.sh` file, start the services by using the following command: `./install.sh -u`

10

Frequently Asked Questions (FAQs) and Error Dictionary

This section consists of resolution to the Frequently Asked Questions and Error Codes noticed during OFS MMG Installation.

Topics:

Related Topics

- Frequently Asked Questions
- Frequently Asked Questions (FAQs) and Error Dictionary

Frequently Asked Questions

You can refer to the Frequently Asked Questions, which is developed with the interest to help you resolve some of the OFS MMG Installation and Configuration Issues. This intends to share the knowledge of problem resolution to a few of the Known Issues. This is not an official support document and just attempts to share the knowledge of problem resolution to a few of the Known Issues.

Frequently Asked Questions

1. Why does my console show an unsuccessful message during wallet creation?
   Please check if you have run the following commands correctly. For more information on wallet creation, see Setup Password Stores with Oracle Wallet.

   a. `mkstore -wrl <wallet_location> -create` //creates a wallet in the specified location.

   b. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the Studio Schema.

   c. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the Atomic Schema.

   d. `mkstore -wrl <wallet_location> -createCredential <alias-name> <database-user-name>` //creates an alias in the configuration schema.

   If your issue is still not resolved, contact My Oracle Support (MOS).

2. Where can I find my created wallet?
   Your wallet will be in the directory you have set as your wallet location.

   If your issue is still not resolved, contact My Oracle Support (MOS).

3. When should I create a Database link, and if yes, how do I do it?
   Create a Database link to connect the Atomic and Configuration Database Schemas to the Studio Database Schema if the databases are different. You must create the link in the Studio Database.

   In the following example, a link has been created from the Configuration Schema to the Atomic Schema by running the following script:

```
create public database link <studio database link> connect to <Config Schema>
identified by password using ' (DESCRIPTION = ADDRESS_LIST = (ADDRESS =
(PROTOCOL = TCP) (HOST =<host name> (PORT = <port number>)) (CONNECT_DATA =
(SERVICE_NAME = <service name>))) ';

Config Schema : <Config Schema>/password ' (DESCRIPTION = ADDRESS_LIST =
(ADDRESS = (PROTOCOL = TCP) (HOST =<host name> (PORT = <port number>))
(CONNECT_DATA = (SERVICE_NAME = <service name>))) ';
```

After running the script, run the FCDM Connector and ICIJ Connector jobs.

4. Why does my installed studio setup not have any notebooks?
   Some default notebooks are ready to use when you install Compliance Studio. If you do not see any notebooks when you log in to the application, you may not be assigned any roles. Check the <COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs directory to see if you have been assigned any roles, and if not, contact your Administrator. If your issue is still not resolved, contact My Oracle Support (MOS).
5. What can I do if the Schema Creation fails?
   If the Atomic Schema creation fails, login to the BD and ECM Atomic Schemas and run the following query: select * from fcc_orahive_datatypemapping; The fcc_orahive_datatypemapping table must not have duplicate data types. If the Studio schema creation fails, login as a Studio user and run the following query: select * from fcc_datastudio_schemaobjects Run the following query to replace all Y values with '': update fcc_datastudio_schemaobjects set SCHEMA_OBJ_GENERATED='' After the schema creation is successful, the value of the SCHEMA_OBJ_GENERATED attribute changes to Y. You can also check for errors in the application log file in the <COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs directory. If your issue is still not resolved, contact My Oracle Support (MOS).
6. What can I do if the Import_training_model batch execution fails?
   Batch Execution Status always displays success in case of success or failure.

   You can also check for errors in the application log file in the <COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs directory. You can fix the failure according to the log details and run the same batch again.
7. Why is the sqoop job not successful?
   The Sqoop job may fail if some of the applicable values are null or if the service name or SID value is not provided. Do one of the following:
   - Check if there are any null values for the applicable configurations in the config.sh and FCC_DATASTUDIO_CONFIG tables. If there are any null values, add the required value.
   - Check for any errors in the application log file in the <COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs directory. If your issue is still not resolved, contact My Oracle Support (MOS).
8. Why am I getting the following error when I run the sqoop job:
   `Error: Could not find or load main class com.oracle.ofss.fccm.studio.batchclient.client.BatchExecute`

   Set the `FIC_DB_HOME` path in the `<COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/ficdb` directory.

   You can also check for any errors in the application log file in the `<COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs` directory.
9. 11. Why is the PGX server is not starting even though the graph service is up and running?
   Grant execution rights to the PGX folder to start the PGX server.
10. Why is the PGX Server not starting?

The PGX server starts only after the FCDM tables are created after the FCDM Connector Job is run. Check if all FCDM tables are created and then start the PGX Server. You can also check for any errors in the application log file in the <COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs directory. If your issue is still not resolved, contact My Oracle Support (MOS).

11. Why is the ICIJ Connector job failing?
This can happen because of a missing `csv` file path in the FCC_STUDIO_ETL_FILES table. Add the `CSV` file path. You can also check for any errors in the application log file in the `<COMPLIANCE_STUDIO_INSTALLATION_PATH>/deployed/logs` directory. If your issue is still not resolved, contact My Oracle Support (MOS).

12. What should I do if there is a below Error while selecting edges in manual Decision UI?

```
java.lang.IllegalStateException: Unable to create
PgxSessionWrapperjava.lang.IllegalStateException: Unable to create
PgxSessionWrapper at
oracle.datastudio.interpreter.pgx.CombinedPgxDriver.getOrCreateSession(Combine
dPgxDriver.java:147) at
oracle.pgx.graphviz.driver.PgxDriver.getGraph(PgxDriver.java:334) at
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(QueryEnhancer.java:22
3) at
oracle.pgx.graphviz.library.QueryEnhancer.createEnhancer(QueryEnhancer.java:20
9) at oracle.pgx.graphviz.library.QueryEnhancer.query(QueryEnhancer.java:150)
at oracle.pgx.graphviz.library.QueryEnhancer.execute(QueryEnhancer.java:136)
at
oracle.pgx.graphviz.interpreter.PgqlInterpreter.interpret(PgqlInterpreter.java
:131) at
oracle.datastudio.interpreter.pgx.PgxInterpreter.interpret(PgxInterpreter.java
:120) at
org.apache.zeppelin.interpreter.LazyOpenInterpreter.interpret(LazyOpenInterpre
ter.java:103) at
org.apache.zeppelin.interpreter.remote.RemoteInterpreterServer$InterpretJob.jo
bRun(RemoteInterpreterServer.java:632) at
org.apache.zeppelin.scheduler.Job.run(Job.java:188) at
org.apache.zeppelin.scheduler.FIFOScheduler$1.run(FIFOScheduler.java:140) at
java.base/
java.util.concurrent.Executors$RunnableAdapter.call(Executors.java:515) at
java.base/java.util.concurrent.FutureTask.run(FutureTask.java:264) at
java.base/
java.util.concurrent.ScheduledThreadPoolExecutor$ScheduledFutureTask.run(Sched
uledThreadPoolExecutor.java:304) at java.base/
java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1128
) at java.base/
java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:628
) at java.base/java.lang.Thread.run(Thread.java:834)Caused by:
java.util.concurrent.ExecutionException:
oracle.pgx.common.auth.AuthorizationException: PgxUser(FCCMDSADMIN) does not
own session 6007f00a-8305-4576-9a56-9fa0f061586f or the session does not exist
code: PGX-ERROR-CQAZPV67UM4H at java.base/
java.util.concurrent.CompletableFuture.reportGet(CompletableFuture.java:395)
at java.base/
java.util.concurrent.CompletableFuture.get(CompletableFuture.java:1999) at
oracle.pgx.api.PgxFuture.get(PgxFuture.java:99) at
oracle.pgx.api.ServerInstance.getSession(ServerInstance.java:670)
oracle.datastudio.interpreter.pgx.CombinedPgxDriver.getOrCreateSession(Combine
dPgxDriver.java:145) ... 17 moreCaused by:
oracle.pgx.common.auth.AuthorizationException: PgxUser(FCCMDSADMIN) does not
```

```
own session 6007f00a-8305-4576-9a56-9fa0f061586f or the session does not exist
code: PGX-ERROR-CQAZPV67UM4H at
oracle.pgx.common.marshalers.ExceptionMarshaler.toUnserializedException(Except
ionMarshaler.java:107) at
oracle.pgx.common.marshalers.ExceptionMarshaler.unmarshal(ExceptionMarshaler.j
ava:123) at
oracle.pgx.client.RemoteUtils.parseExceptionalResponse(RemoteUtils.java:130)
at
oracle.pgx.client.HttpRequestExecutor.executeRequest(HttpRequestExecutor.java:
198) at
oracle.pgx.client.HttpRequestExecutor.get(HttpRequestExecutor.java:165) at
oracle.pgx.client.RemoteControlImpl$10.request(RemoteControlImpl.java:313) at
oracle.pgx.client.RemoteControlImpl$ControlRequest.request(RemoteControlImpl.j
ava:119) at
oracle.pgx.client.RemoteControlImpl$ControlRequest.request(RemoteControlImpl.j
ava:110) at
oracle.pgx.client.AbstractAsyncRequest.execute(AbstractAsyncRequest.java:47)
at oracle.pgx.client.RemoteControlImpl.request(RemoteControlImpl.java:107) at
oracle.pgx.client.RemoteControlImpl.getSessionInfo(RemoteControlImpl.java:296)
at
oracle.pgx.api.ServerInstance.lambda$getSessionInfoAsync$14(ServerInstance.jav
a:490) at java.base/
java.util.concurrent.CompletableFuture.uniComposeStage(CompletableFuture.java:
1106) at java.base/
java.util.concurrent.CompletableFuture.thenCompose(CompletableFuture.java:2235
) at oracle.pgx.api.PgxFuture.thenCompose(PgxFuture.java:158)
```

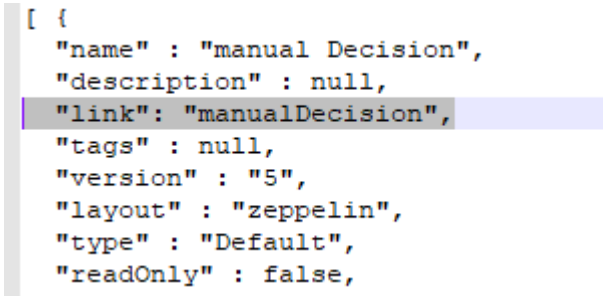
Then, perform the below steps as a workaround -

Export the "Manual Decision" Notebook

Add the link parameter just below Description

for Ex - "link": "manualDecision",

Figure 10-1 Manual Decision



Truncate the table “fcc_er_paragraph_manual" in Studio Schema. Import the modified notebook again.

13. What should I do when the result set is truncated if the size goes above '102400' bytes? Perform the following steps:
    a. Login to Compliance Studio.
    b. Navigate to interpreter zeppelin.interpreter.output.limit.

Figure 10-2 Zeppelin Interpreter

c. Set the value to the required size.

d. Restart the Studio Application.

14. What should I do if there is a below KubernetesClientException in load-to-elastic-search.log, matching-service.log files after Compliance Studio installation?

```
configServicePropertySourceLocator - Could not locate PropertySource: I/O
error on GET request for "http://localhost:8888/<Service Name>/default":
Connection refused (Connection refused); nested exception is
java.net.ConnectException: Connection refused (Connection
refused)onfigServicePropertySourceLocator - Could not locate PropertySource:
I/O error on GET request for "http://localhost:8888/<Service Name>/default":
Connection refused (Connection refused); nested exception is
java.net.ConnectException: Connection refused (Connection refused)20:04:55.686
[ main] WARN .cloud.kubernetes.config.ConfigMapPropertySource - Can't read
configMap with name: [<Service Name>] in namespace:[null].
Ignoring.io.fabric8.kubernetes.client.KubernetesClientException: Operation:
[get] for kind: [ConfigMap] with name: [<Service Name>] in namespace: [null]
failed. at
io.fabric8.kubernetes.client.KubernetesClientException.launderThrowable(Kubern
etesClientException.java:64) ~[kubernetes-client-4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.KubernetesClientException.launderThrowable(Kubern
etesClientException.java:72) ~[kubernetes-client-4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.dsl.base.BaseOperation.getMandatory(BaseOperation
.java:229) ~[kubernetes-client-4.4.1.jar!/:?] at
io.fabric8.kubernetes.client.dsl.base.BaseOperation.get(BaseOperation.java:162
) ~[kubernetes-client-4.4.1.jar!/:?] at
org.springframework.cloud.kubernetes.config.ConfigMapPropertySource.getData(Co
nfigMapPropertySource.java:96) ~[spring-cloud-kubernetes-
config-1.1.3.RELEASE.jar!/:1.1.3.
```

You can ignore the error when the following message is displayed at the end of the log; if you do not see this message, contact My Oracle Support (MOS) and provide the applicable error code and log:

```
13:52:57.698 [main] INFO org.apache.catalina.core.StandardService - Starting
service [Tomcat] 13:52:57.699 [ main] INFO
org.apache.catalina.core.StandardEngine - Starting Servlet engine: [Apache
Tomcat/9.0.43]
```

15. What happens if a new sandbox workspace is created?
When a new sandbox workspace is created, the folders of the older workspace are by default being copied into the new workspace. Here, folder means the Model Objectives. The Model Objectives are global objects and will be visible across the workspaces. However, the models created within those objectives will be private. This has been done purposely as you expect multiple modelers working on the common objective in their private workspaces.

16. Not able to access any models in the copied folders in the new workspace – the folders are being copied as empty folders?
    Yes, you should not be able to access other workspace's private models. Also, as long as other users are working on the objective and have their models in there, you will not be able to delete the objectives.
17. What should you do when UI pages does not load due to less network speed?
    The default time to load all the modules of OJET/REDWOOD page is 1 minute. Reload the page to view the UI pages.
18. What are the Workspace parameters used in MMG Python Scripts?
    The following parameters are used:
    - **workspace.list_workspaces():** Used to fetch a list of all workspaces. This list is populated in the dropdown menu of datastudio.
    - **workspace.check_aif():** A method used to check if AIF is enabled or not
    - **workspace.attach_workspace("SANDBOX123"):** A method used to set workspace
    - **workspace.get_workspace():** Used to fetch the selected workspace (for example, SB1)
    - **get_mmg_studio_service_url():** Used to fetch the base URL (for example, http://whf999yyy:0000/mmg)
    - **get_user():** Used to fetch current user (for example, mmguser)
19. How to take connections for Data access?
    You need access to the data to work on it. For the workspace, there are some underlying Data Schemas. You can also create a workspace that allows to select multiple underlying Data Schemas. You can use or remove multiple Data Schemas like multi combo box, where 1, 2, 3, and 4, 5 are schemas underlying. When you work with the models, you can access the notebook to fetch data for all these Data Schemas and create some data frames out of it. That can be used for model reading or other purposes.

    This happens in workspace of the sandbox where you are building a Notebook. The same Notebooks gets promoted to production workspace. Therefore, the workspace production has its own set of underlying Data Schemas. When you build the model with getting connection for the underlying Schema 1 and 2, and getting the data and building, it makes rules work and will not be affected if the same Notebooks gets promoted to production or deployment is cloned.

    Therefore, the Notebook needs to run which should not be fetching this data because it will be working on any 1 and 2 Schemas.

    To avoid this issue, you can use connection feature to connect with a schema. This is a wrapper function where you can specify which workspace you are connecting to.

    You can enter the workspace details to get the connection and that starts fetching the data.

    When you create the Notebook to production, a script runs to not to connect the workspace. This also uses overloaded methods. This method tells how to get the connection. Simple get connection gets the primary connection as first Data Schema which you are using without any overload.

    The second connection gets an ID as the name the Data Source which you are using and for the current one will passes as get connection 1.

    In the sandbox, this script looks for 1 and it creates a connection and moves to production.

    It will again look for an equivalent 1 and tries to get a connection.

    Therefore, whatever you select first, becomes the first Data Schema, Second Schema, Third Schema, therefore, Primary, Secondary, Tertiary and so on. You can also pass the

number while getting the connection to get the first primary Data Schema as a secondary Data Schema. Therefore, when it runs in sandbox, it gets the Secondary Schema. When it runs in the production, it fetches a Secondary Data Schema of production.

20. What are parameters to establish the Connection for data access?
The following section lists the connection details such as the Data Sources and so on: workspace.get_connection(): fetches connection object for the Primary Data Source of the workspace. This is equivalent to executing workspace.get_connection(1). workspace.get_connection('id'): fetches connection for the Data Source by name. For example, workspace.getconnection ('ws_data_1') – here 'ws_data_1' is one of the underlying Data Source for the workspace. workspace.get_connection(n): fetches connection for the Data Source by order. For example, workspace.getconnection(2) – this will fetch connection for the Secondary Data Source. The following section lists the workspace details: After a workspace is attached, we can list Data Sources related to that using: workspace.list_datasources(): will list Data Sources related to attached workspace with default order 1 For example, {'Data Source': [{'name': 'newdatasource1', 'order': '1'}]} workspace.list_datasources("SB1"): will list Data Sources related to SB1 workspace with default order 1 For example, {'Data Source': [{'name': 'ds1', 'order': '1'}]} workspace.list_datasources("SB1", 1): will list Data Sources related to SB1 workspace with order 1 as passed in second argument For example, {'Data Source': [{'name': 'ds1', 'order': '1'}]} Note: This is applicable for Python and Python variants interpreters, and not on any other interpreters.

21. What should I do if the Python installation displays the following error message, " If ModuleNotFoundError: No module named '_lzma'"?
You must install xz-devel library before installing the Python. For more details, see Install MMG Python Library section.

    To install, perform the following step:

    ```
    $yum install -y xz-devel.
    ```

22. What should I do to reconfigure DS Studio server port and its interpreter's default port to available ports?
To reconfigure port numbers:

    a. Run the command `install.sh -u` to change the current studio port to the desired port number in the configuration files/tables.

    b. Run the t `startup.sh` script of Studio at the location: OFS_MMG/mmg-studio/bin/ and modify the line numbers 24/25 of OFS-MMG/mmg-studio/bin/startup.sh to specify the interpreter name and port number.
    DS version 22.4.3

    ****

    nohup "$DIR"/datastudio --jdbc -1 --eventjdbc -1 --shell -1 --eventshell -1 --graalvm -1 --eventgraalvm -1 --pgx -1 --eventpgx -1 --external --port 8008 --jdbc 3011 --eventjdbc 3031 --python 3012 --eventpython 3032 --markdown 3009 --eventmarkdown 3029 --spark 3014 --eventspark 3034 &> "$DIR"/nohup.out &

    For pgx interpreter, modify: OFS_MMG/mmg-studio/interpreter-server/pgx-interpreter-22.4.3/bin/pgx-interpreter file "${1:-7022}" "${2:-7042}" values to "${1:-3022}" "${2:-3042}"

    DS version 23.3.5

    ****

    nohup "$DIR"/datastudio --jdbc -1 --shell -1 --external --port 8008 --jdbc 3011 --python 3012 --markdown 3009 --spark 3014 --pgx 3022 &> "$DIR"/nohup.out &

    For event ports in DS 23.3.5

Set the environment variables DS_EVENT_HANDLER_HOST and DS_EVENT_HANDLER_PORT before launching the interpreters, else, default values will be used. You can modify these ports in the startup.sh of the Studio.

Example:

export DS_EVENT_HANDLER_HOST=localhost

export DS_EVENT_HANDLER_PORT=3432

To change the ports configured for events in the Data Studio server, modify the following server configuration:

studio-server:

thrift-server:

enabled: true

port: <desired port -defaulted to 8432>

mode: TCP

NOTE:

****

Python Interpreter

Beginning with Data Studio 21.4.0, 6012 is default port on which the REST server for the Python interpreter listens. To overwrite this, set the STUDIO_INTERPRETER_PYTHON_INTERPRETER_REST_SERVER_PORT environment variable.

PGX-Python Interpreter

Beginning with Data Studio 23.1.0, 6022 is the default port on which the REST server for the PGX-Python interpreter listens. To overwrite this, set the STUDIO_INTERPRETER_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT environment variable.

Modify the `startup.sh` to:

export STUDIO_INTERPRETER_PYTHON_INTERPRETER_REST_SERVER_PORT=3038

export STUDIO_INTERPRETER_PGX_PYTHON_INTERPRETER_REST_SERVER_PORT=3039

This configuration changes the default interpreter ports to new ports.

c. Ports mentioned in the interpreter json files should be reconfigured. The interpreter file location is: “OFS_MMG/mmg-studio/server/builtin/interpreters/<interpreter>.json” file.

d. Execute startup.sh and check the studio/interpreter ports.

e. Similarly, execute ./datastudio.sh –help from OFS_MMG/mmg-studio/bin/ for all available options.

Application Pack 8.1.2.0.0 FAQs

1. **If the cx_Oracle connection is failing in DS with below error in OEL 8.**
Fail to execute line 4: cx_Oracle.connect(dsn=dsn_alias)\nTraceback (most recent call last):\n File "/tmp/1638454321889-0/zeppelin_python.py", line 163, in <module>\n exec(code, _zcUserQueryNameSpace)\n File "<stdin>", line 4, in <module>\ncx_Oracle.DatabaseError: DPI-1047: Cannot locate a 64-bit Oracle Client

library: "libnsl.so.1: cannot open shared object file: No such file or directory". Install the libnsl package as below: yum install libnsl or sudo yum install libnsl

2. **Incase of Python Interpreter fails With `py4j` Error**
   When running interpreters locally, they assume all the dependencies to be already installed and available. Python Interpreter needs `py4j` Package, exact steps to install it depend on the Operating System. If you use `pip`, it can be done with ```bash pip install --user py4j ``` Install the package for all users, root user can run this command without `--user`.

3. **What is the reason for the http error code 401 when I successfully log in to the MMG application while MMG Studio is down?**
   If MMG Studio is not up during the MMG application login, the mmg-ui logs capture the http error code : 401 . Since the cookie creation is done during MMG application login, the user must re login to the MMG application once the Studio is up and running.

4. **What should I do when the following error message is displayed, and the SSL module is unavailable for Linux 8?**
   urllib3.exceptions.SSLError: Can’t connect to HTTPS URL because the SSL module is not available. During handling of the above expectation, another exception occurred:

   a. Install the compat-openssl10 module on Linux 8.

   b. Log in to the server as a root user where MMG Application is installed.

   c. Run the following Shell command: yum -y install compat-openssl10.